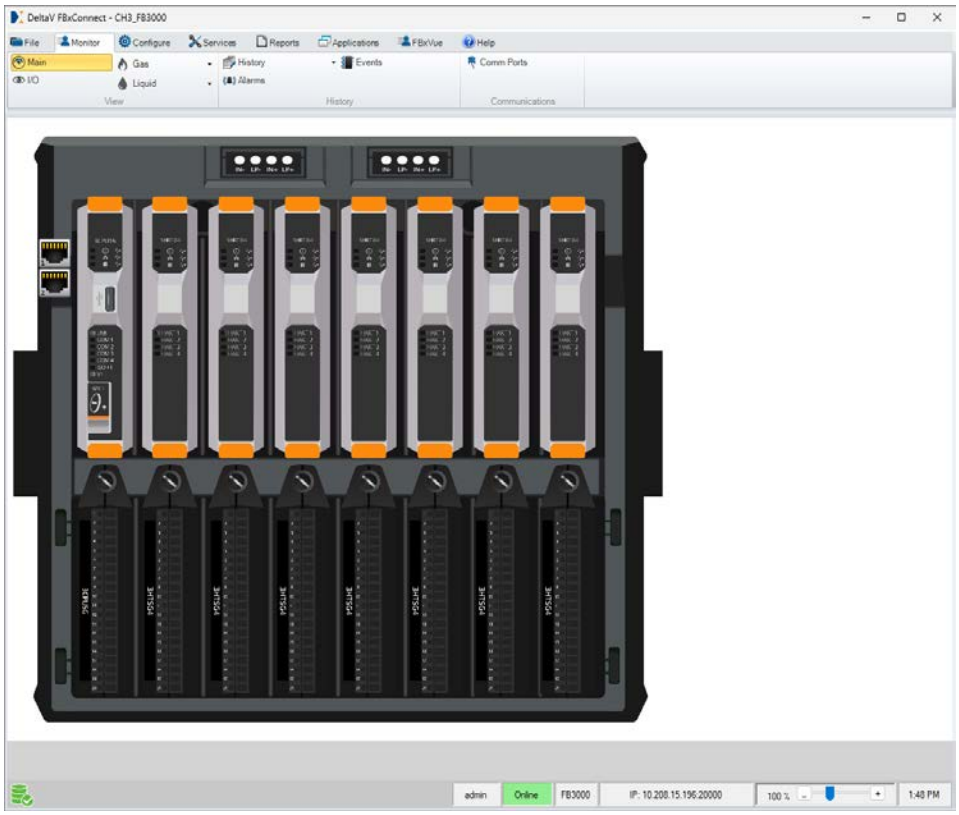
# DeltaV™ FBxConnect™ Configuration Software User Manual (for DeltaV FB3000 RTU)




DELTAV™

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# System Training

A well-trained workforce is critical to the success of your operation. Knowing how to correctly install, configure, program, calibrate, and troubleshoot your Emerson equipment provides your engineers and technicians with the skills and confidence to optimize your investment. Energy and Transportation Solutions offers a variety of ways for your personnel to acquire essential system expertise. Our full-time professional instructors can conduct classroom training at several of our corporate offices, at your site, or even at your regional Emerson office. You can also receive the same quality training via our live, interactive Emerson Virtual Classroom and save on travel costs. For our complete schedule and further information, contact the Energy and Transportation Solutions Training Department at 800-338-8158 or e-mail us at Education@Emerson.com.

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# Section 1: Introduction

DeltaV™ FBxConnect™ configuration software enables you to monitor, configure, and calibrate Emerson's DeltaV™ DeltaV FB3000 RTU. Designed for ease of use, DeltaV FBxConnect configuration software provides at-a-glance monitoring, quick access to commonly performed tasks, and configuration wizards to quickly get your equipment up and running.

## 1.1 Installing and Starting DeltaV™ FBxConnect

™DeltaV FBxConnect configuration software is installed as a part of DeltaV FBxConnect Launchpad. For more information about installing DeltaV FBxConnect Launchpad and connecting to a device, refer to *DeltaV FBxConnect Launchpad Quick Start Guide* (D301703X412).

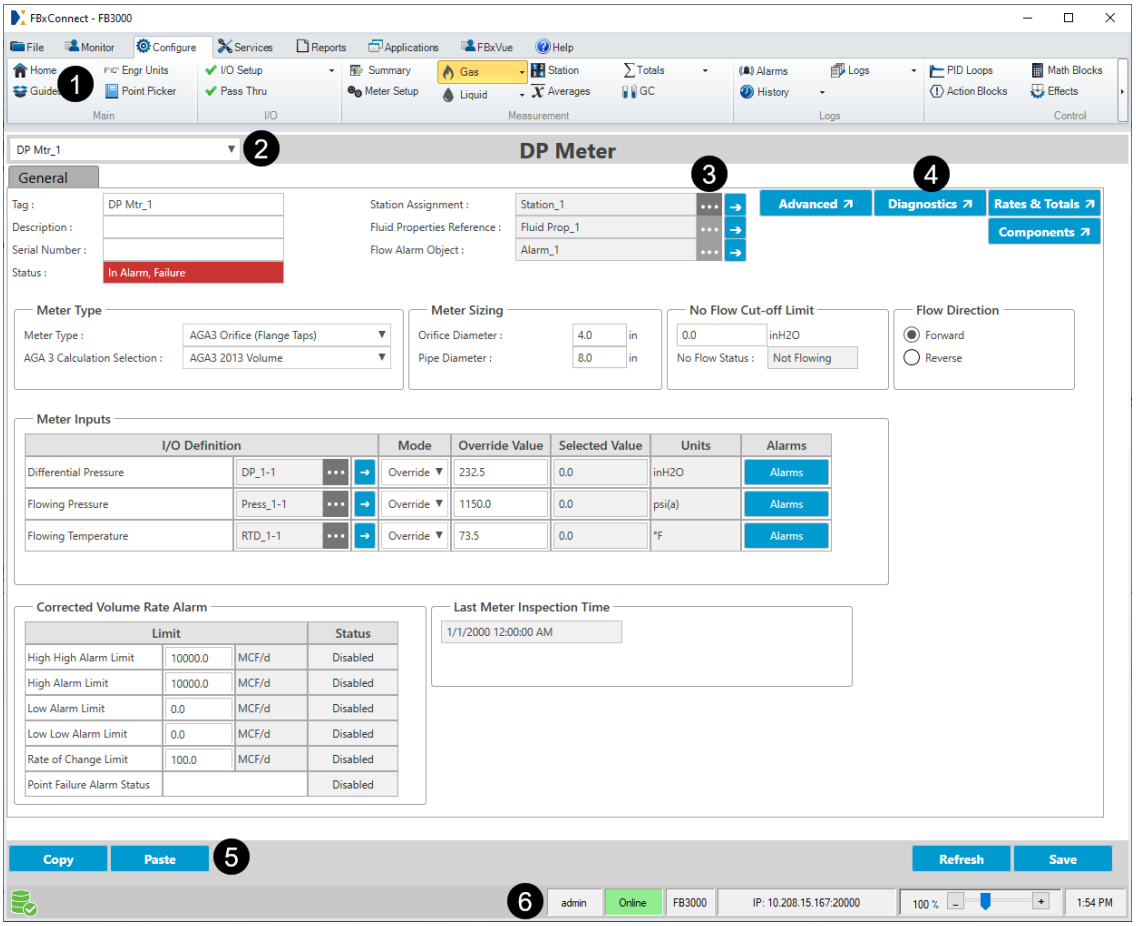
## 1.2 User Interface

DeltaV FBxConnect configuration software is designed for ease of use. At the top of the display, DeltaV FBxConnect configuration software utilizes a ribbon-style tabbed menu to navigate the software. Select a menu and submenu option to open the various displays of DeltaV FBxConnect configuration software.

**Note**

- Standard Microsoft® Windows® keyboard shortcuts are supported. Refer to Keyboard Shortcuts.
- You can right-click your mouse on any field that is associated with an object or parameter in the FBx product database and select **Copy Tag** to copy the database tag to your computer's clipboard. You can then paste the information into another application such as FBxDesigner™ or FBxNet.

**Figure 1. User Interface**




Click on the links below for more information about each user interface element:

1. Menu – Use the Menu to access the displays and wizards used to configure and monitor your FB Series product.

2. Instance Drop-Down List – The instance drop-down list allows you to choose different instances of a database object and appears at the top-left of many displays in DeltaV FBxConnect configuration software.

3. Point Picker – The Point Picker dialog allows you to reference a specific object or parameter in the database.

4. Forward, Back, and Pop-Up Buttons Forward, back, and pop-up buttons give you the ability to quickly jump back and forth between displays without losing your spot in the configuration process.

5. Copy and Paste Buttons – Use the Copy and Paste buttons to copy information from one instance and paste it into another instance.

6. Status Bar – The Status Bar provides general information about the connection to the FB Series product and contains a slider that controls the zoom level of the display.

7. Pause/Resume Button (not shown) – Use the Pause/Resume button to prevent or restart automatically refreshing the values on the display.

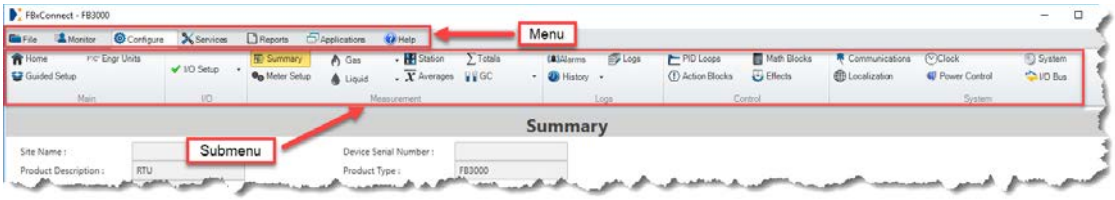
### 1.2.1 Menu

DeltaV FBxConnect configuration software contains a ribbon-style tabbed menu at the top of the window. Select a menu tab to view a list of options in a submenu. Select an option from the submenu to open that display or option.

**Note**

The submenu options are grouped together based on functionality. For example, the Configure menu has a group named Control where you can configure PID Loops, Action Blocks, Math Blocks, and Effects.

**Figure 2. Menu and Submenu**




For more information about each menu, select the name of a menu tab below:

File Menu – Use the options in this menu to save a device configuration file to your PC, save a device configuration to flash memory, load a saved configuration to the device, or close the current connection to the device.

Monitor Menu – Use the options in this menu to view current conditions including flowing conditions, history, alarms, events, and communication port status.

Configure Menu – Use the options in this menu to configure device parameters, including meter runs, I/O, fluid properties, history, customizing the display, and running the Guided Setup.

Services Menu – Use the options in this menu to access utilities and perform maintenance on your device, such as user management, firmware updates, and calibration.

Reports Menu – Use the options in this menu to collect information and view reports, including EFM, CFX, fluid composition, history, alarms, events, and diagnostic reports.

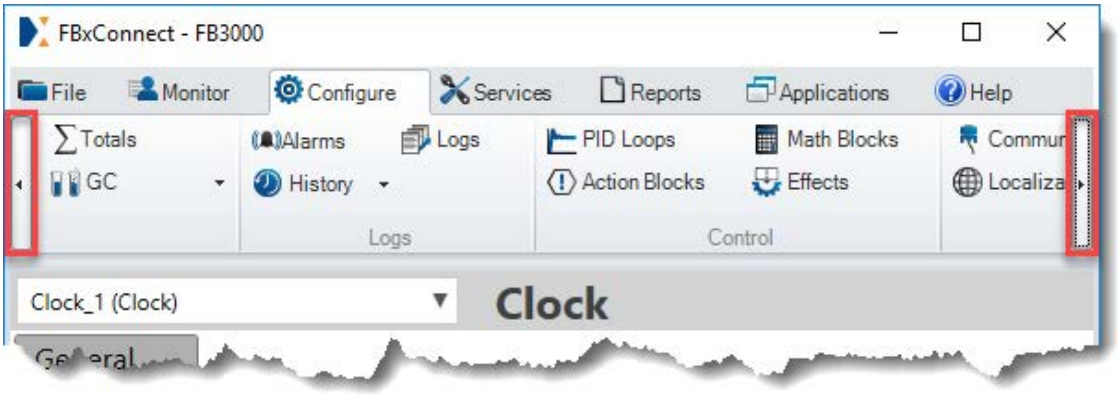
Applications Menu – Use the options in this menu to access applications installed on your flow computer or RTU.

FBxVue Menu – Use the FBxVue menu to create customized displays for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.

Help Menu – Use the options in this menu to view information about your installed version of DeltaV FBxConnect Launchpad, and to access the online help system.

**Note**

If the submenu extends past the end of your screen, use the arrows located on the sides of the submenu to view the available options.



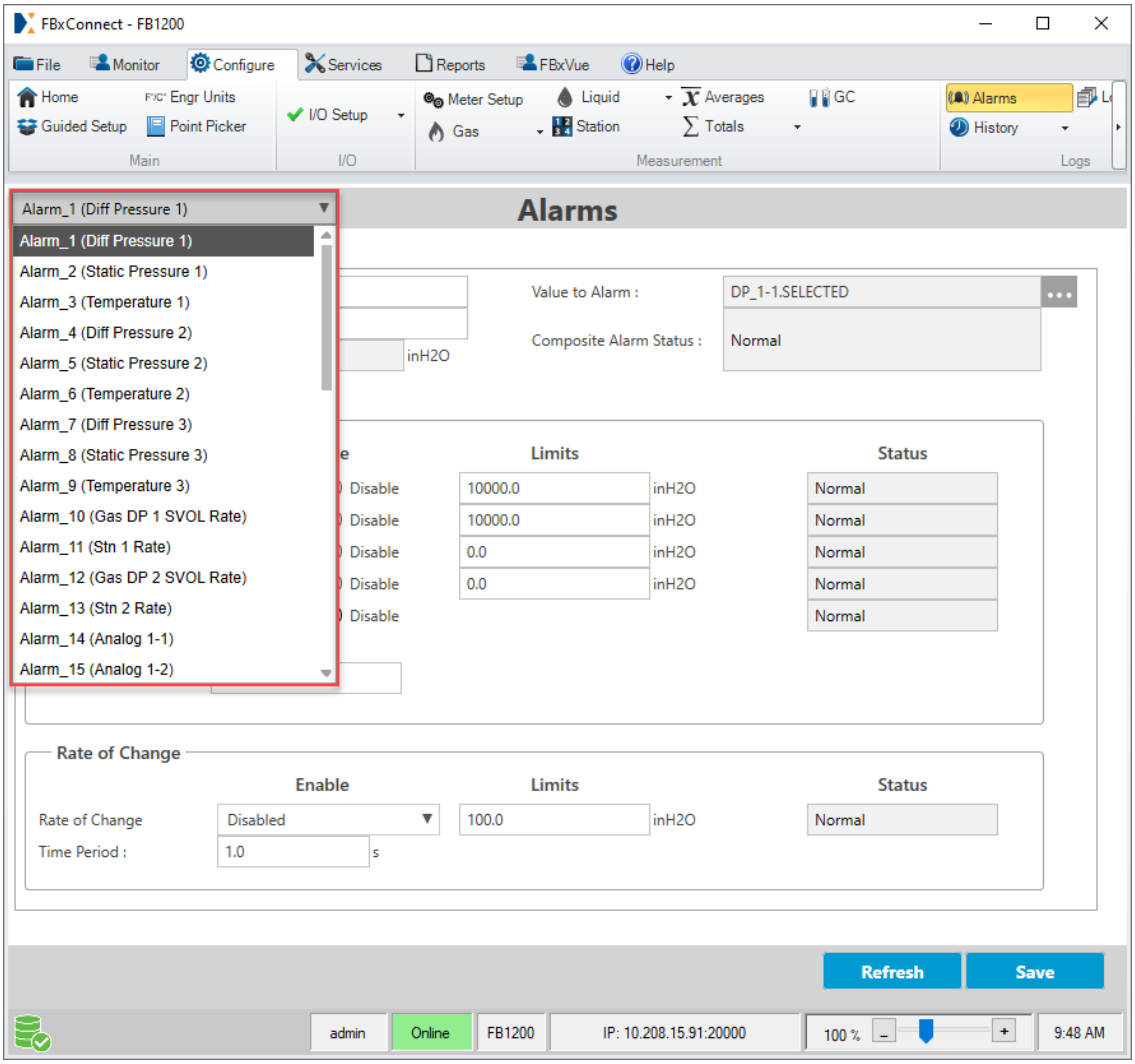

## 1.2.2 Instance Drop-Down List

The instance drop-down list allows you to choose different instances of a database object and appears at the top-left of many displays in DeltaV FBxConnect configuration software. When viewing a display with an instance drop-down list, select ▼ to show all available instances. For example, the Alarms display (shown below) allows you to choose many different instances of the alarm object. The text shown in the instance drop-down list follows a specific format. This text shows the object name and instance number (Alarm_1 in the picture below) followed by the configured Tag in parentheses (Diff Pressure 1 in the picture below).

**Note**

The tag shows in the instance drop-down list only if you have configured a unique tag for an instance. If you have not configured a unique tag, only the object and instance number shows in the instance drop-down list.

**Instance Drop-Down List**




## 1.2.3 Point Picker

In many locations in DeltaV FBxConnect, you can click browse (•••) to view the Point Picker dialog. The Point Picker dialog allows you to reference a specific object or parameter in the database. These are used typically when linking two objects together

(like a meter to a station) or when dynamically assigning an input or output variable to a source (like an analog input to a meter temperature input).

You can also open the Point Picker dialog to view the database by selecting **Configure > Point Picker** from the DeltaV FBxConnect configuration software main menu.

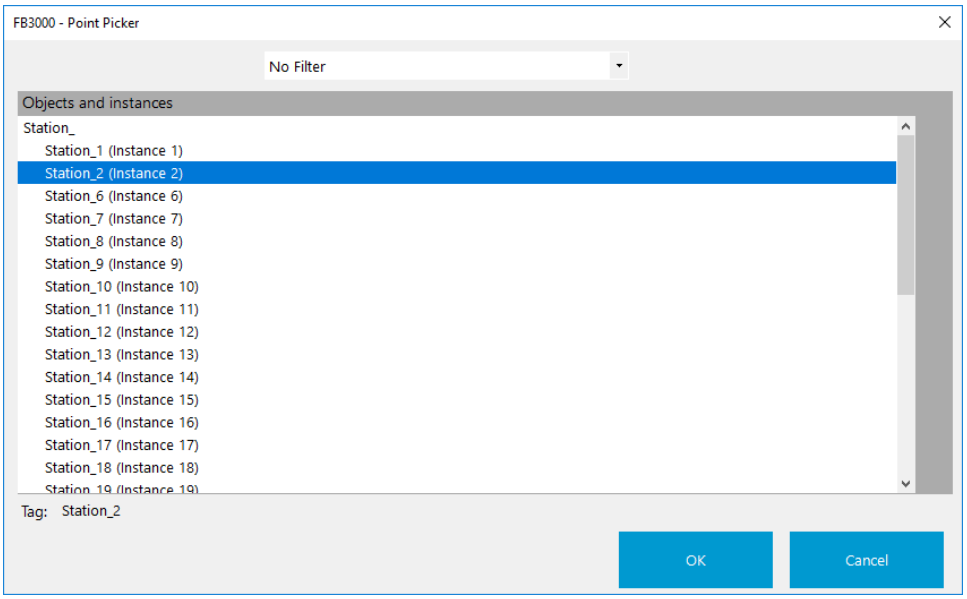
You can select two different types of references in DeltaV FBxConnect configuration software depending on the field: object references and parameter references.

**Note**

If you open the Point Picker from the DeltaV FBxConnect configuration software main menu (**Configure > Point Picker**), the dialog shows parameter references.

- **Object References** – Sometimes the point picker is used to pick an object reference. In this case, you are only able to select the object and instance of the object. For example, if you are configuring a meter run and are setting the station assignment, you can only pick which station you wish to assign, not a particular parameter.

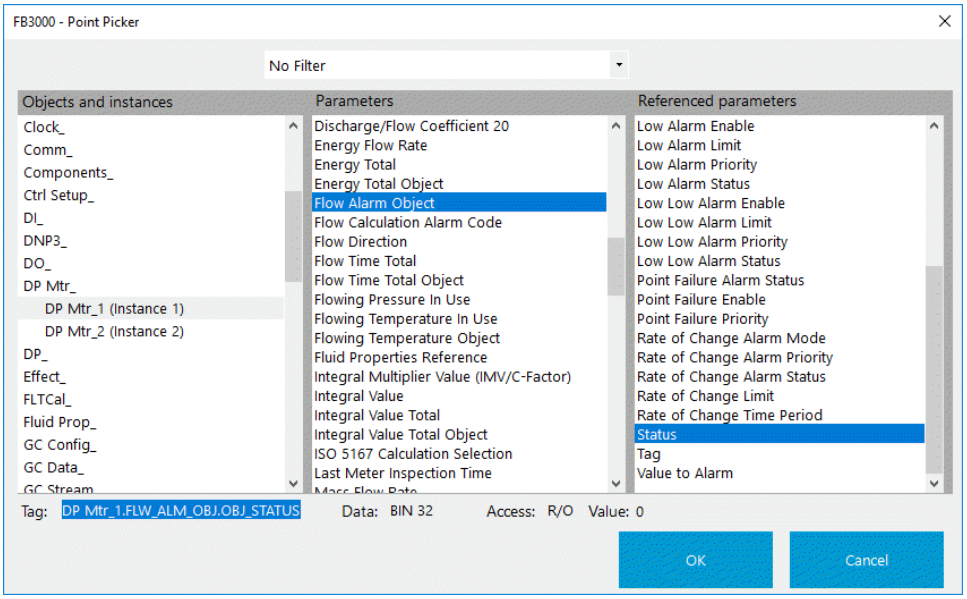
**Figure 3. Point Picker – Object Reference**




- **Parameter References** – Sometimes the point picker is used to pick a parameter reference. In this case, the Point Picker dialog shows three columns. You select an object and instance of the object in the first column. After clicking on the object type and instance in the first column, the second column displays all appropriate parameters for this particular object reference. Sometimes the parameter you pick in the second column is an object itself, and this object contains additional referenced

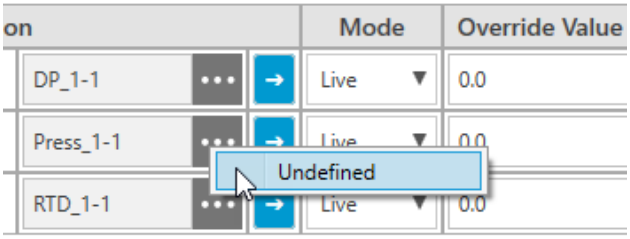
parameters. You can choose these additional referenced parameters in the third column.

**Figure 4. Point Picker – Parameter Reference**




## Note

To quickly remove a previously assigned object or parameter reference, right-click the browse button (•••) and select **Undefined**.




| Field | Description |
|---|---|
| **Filter** | Click ▼ to change which objects and parameters are displayed. Filters may be based on object type, measurement type, or data type.<br>**Note**<br>Select **No Filter** to view all available Objects. |

| Field | Description | |
|---|---|---|
| **Object and Instances** | **Object** | A group of configuration settings and calculated or measured values related to a specific function. For example, all values associated with the device clock (second, hour, day, etc.) are part of an Object named Clock. From the first column, click on the object type you wish to reference. |
| | **Instance** | There may be one or more occurrences of each type of object with its own set of configuration settings and values. Each occurrence of an object is called an instance. For example, there are multiple instances of the object named Comm, and each instance represents one of the FB Series product's communication ports. After clicking on the object you wish to reference, the available instances are displayed. Click on the instance you wish to reference. |
| **Parameter** | One of the configuration settings, calculated values, or measured values that is a part of the object. Each parameter has a value as well as a set of attributes that define it, such as data type, R/W access, measurement type, units, and parameter health. After clicking on the object and instance you wish to reference, the available parameters are displayed. Click on the parameter you wish to reference.<br>**Note**<br>• This column appears **only** if you select the Point Picker for a **Parameter Reference**.<br>• To switch between viewing the parameter description or the parameter name, select an instance in the Objects and Instances column and enter **Ctrl+P** on your keyboard. | |

| Field | Description |
|---|---|
| **Referenced Parameter** | If the point picker is used to pick a parameter reference, you can pick a parameter directly from the object to which it belongs, or you can pick the parameter through an object reference in a related object. For instance, to pick a parameter to assign to an Average object, you can pick the DP Mtr_1 object and the Station Assignment parameter and then the third column displays all of the parameters that are available from the Station object that is assigned to DP Mtr_1. This is useful because even if the station assignment later changes, the Average object is always associated with DP Mtr_1.<br>**Note**<br>This column appears **only** if you select the Point Picker for a **Parameter Reference**. |
| **Tag** | This **read-only** field shows the name of the selected parameter. |
| **Data** | This **read-only** field shows the data type of the selected parameter. For more information, refer to Native Data Types. |
| **Access** | This **read-only** field shows the read/write access of the selected parameter. |
| **Value** | This **read-only** field shows the value of the selected parameter. |
| **Collect Tag Names** | Select this button to query the FB Series product and display any unique tag names you have assigned to individual parameters.<br>**Note**<br>You can perform this action at any time to reflect recent configuration changes. |
| **Copy Tag** | Select this button to copy the currently selected tag to the computer's clipboard. You can then paste the selected tag into a different application, such as FBxDesigner™. |

### 1.2.4 Forward, Back, and Pop-Up Buttons

Forward, back, and pop-up buttons give you the ability to quickly jump back and forth between displays without losing your spot in the configuration process. Forward buttons allow you to navigate to a new display to perform additional configuration changes, back buttons return you to the previous display, and pop-up buttons open a pop-up display that contains additional configuration options without navigating away from the current

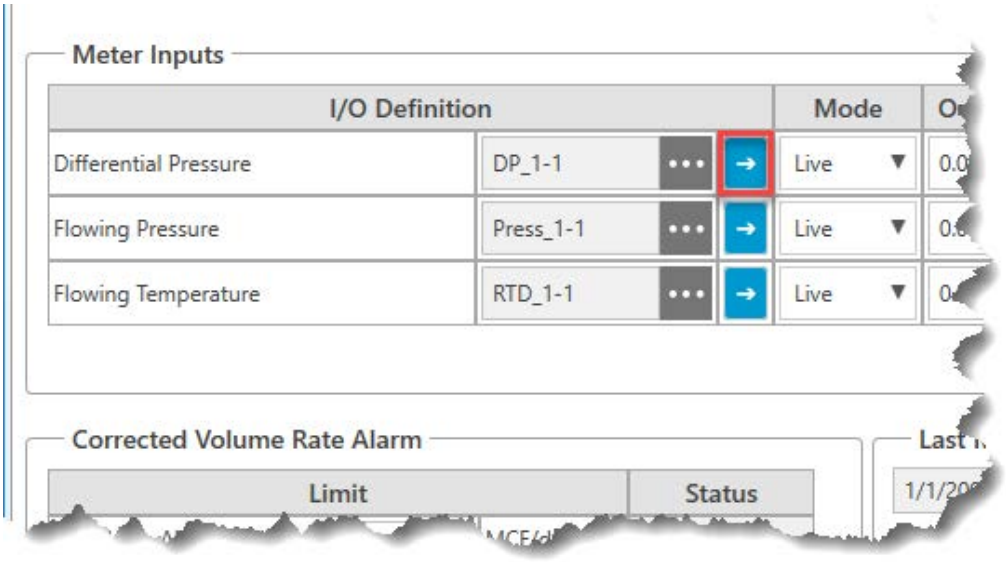
display. You can determine the behavior of a button based on the direction of the arrow on the button label.

- Buttons with an arrow pointing to the right ( ) navigate to a new display.
- Buttons with an arrow pointing to the left ( ) navigate to the previous display.
- Buttons with an arrow pointing to the upper-right ( ) open a pop-up display.

For example:

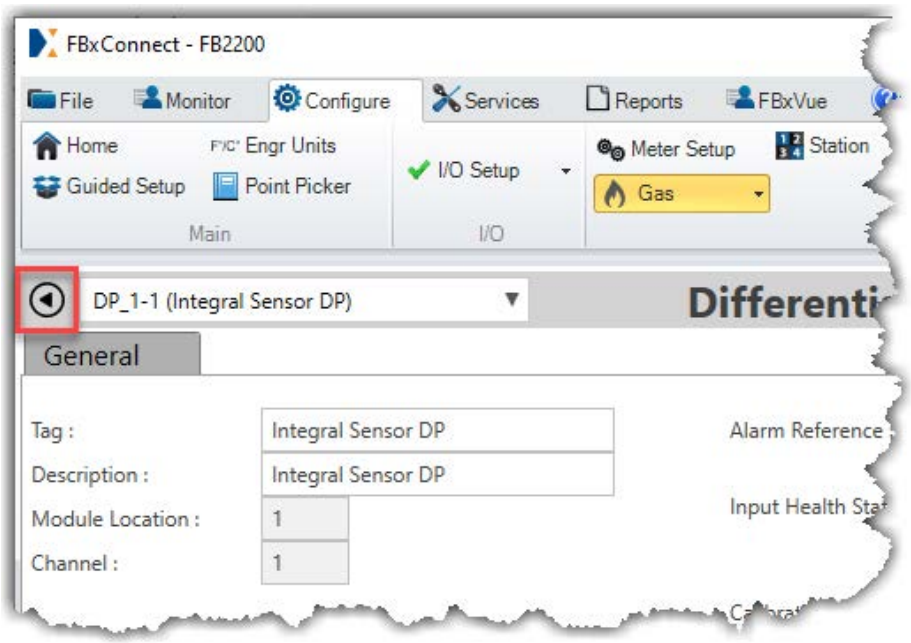
1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu. The DP Meter – General display opens.
2. Select the forward button ( ) located to the right of the Differential Pressure field. The Differential Pressure I/O display opens and allows you to configure the selected differential pressure input.

**Figure 5. Forward Buttons**



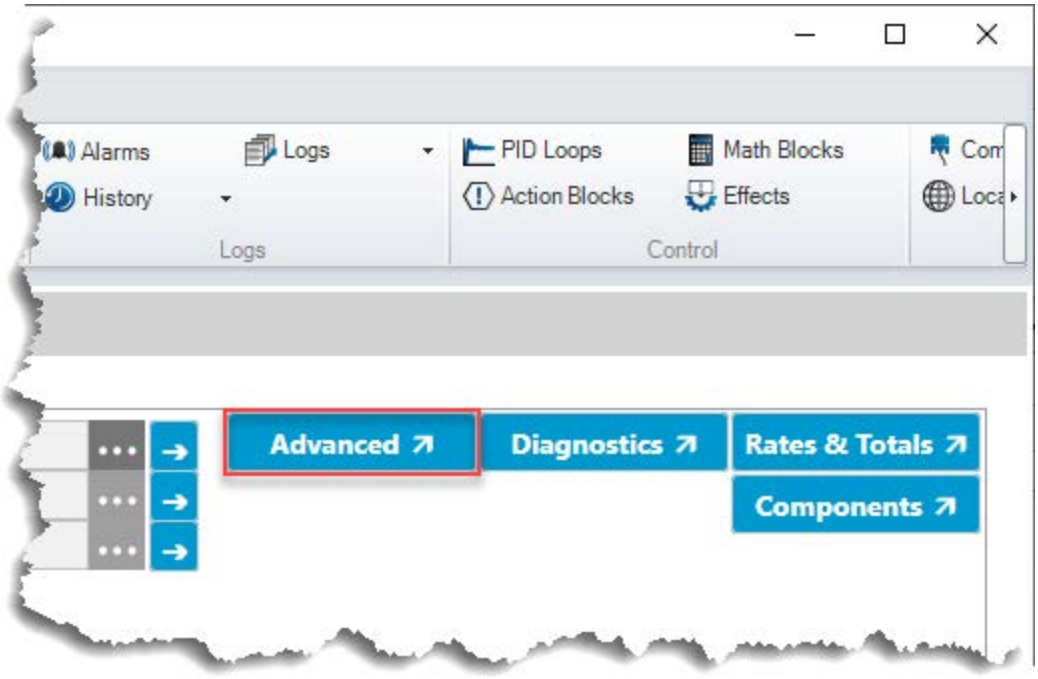

3. After you are done performing changes on the Differential Pressure I/O display, select the back button ( ) to return to the DP Meter display.

**Figure 6. Back Button**



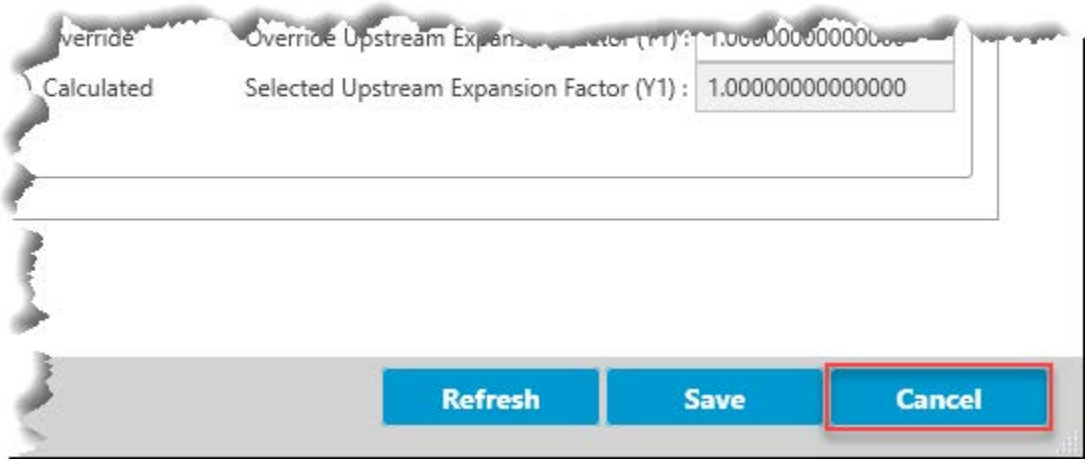

4. Select the **Advanced** button (with the arrow pointing to the upper-right ) to open the DP Meter – Advanced display to configure additional options for your meter.

**Figure 7. Pop-Up Button**



5. When you are done making configuration changes, select **Cancel** to close the DP Meter – Advanced pop-up display.

**Figure 8. Cancel Button**



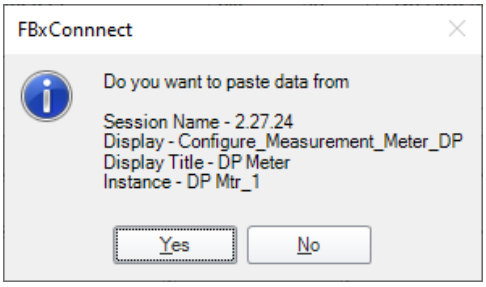

## 1.2.5 Copy and Paste Buttons

Use the Copy and Paste buttons to copy information from one instance and paste it into another instance. This makes it easy to configure objects that contain similar information, such as meter runs or stations.

For example:

1. Select **Configure > Gas > DP Meter**. The DP Meter opens showing the General tab.
2. Select the **Copy** button located at the bottom of the display.
3. Click ▼ from drop-down list at the top of the display and select DP Meter instance 2.
4. Select the **Paste** button. A confirmation message opens.

**Figure 9. Copy/Paste Confirmation**



5. Select **Yes** to paste the data. Configuration information is copied from the first instance into the second instance. Any information that was changed is highlighted.

**Note**

If you copy information between two different configurations, DeltaV FBxConnect configuration software shows an exception message with details about any objects or parameters that cannot be copied to the current configuration.

**Figure 10. Copy/Paste Exception**

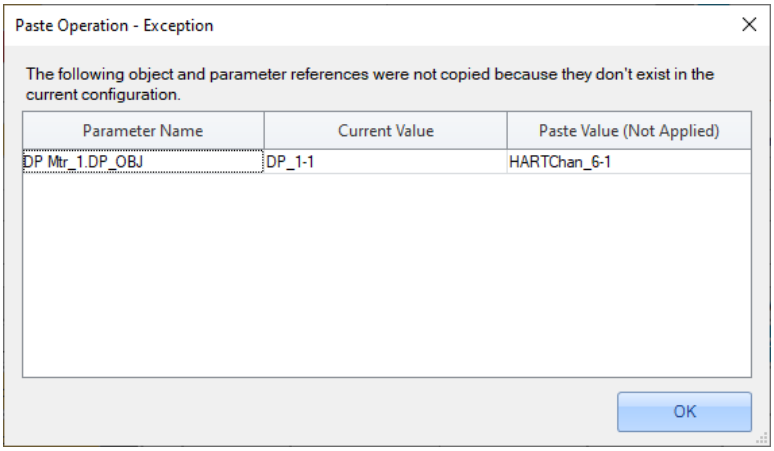
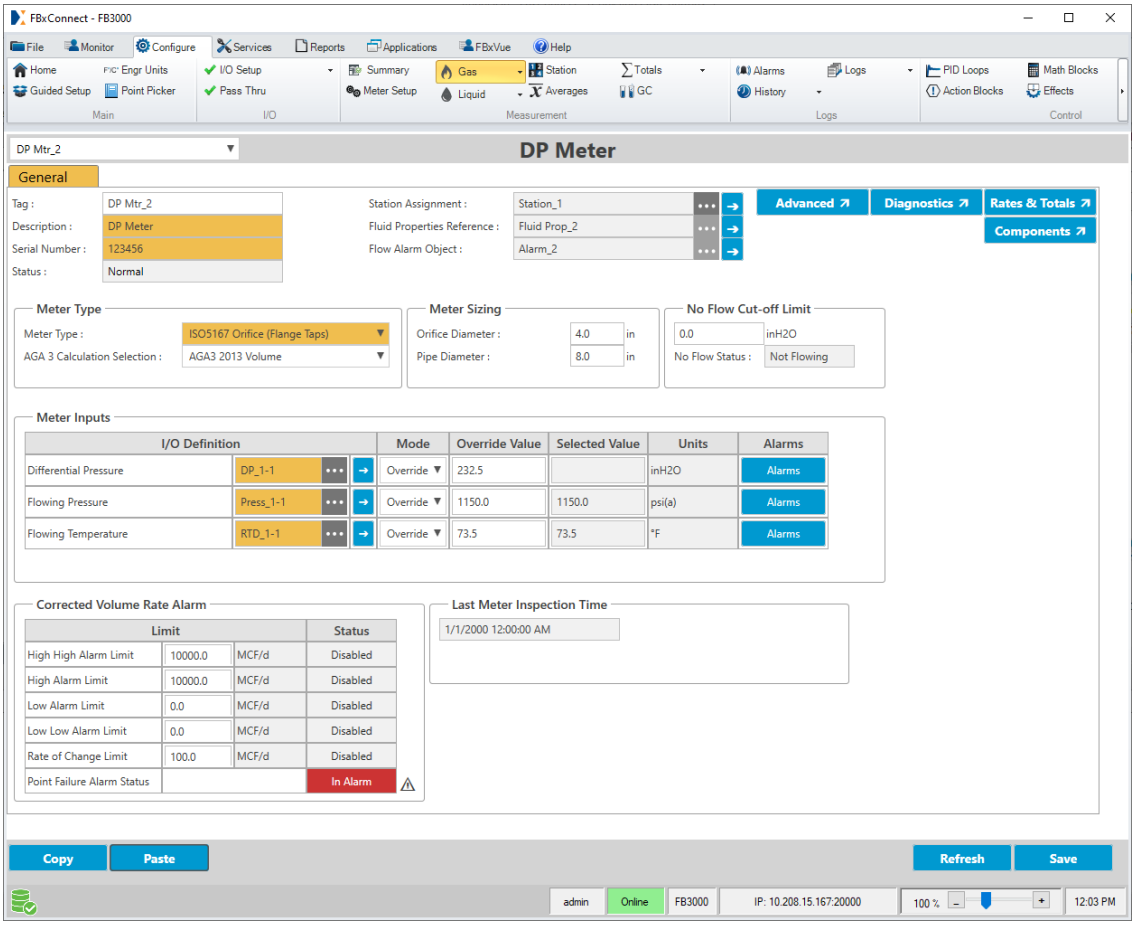


**Figure 11. Display Showing Copied Information**



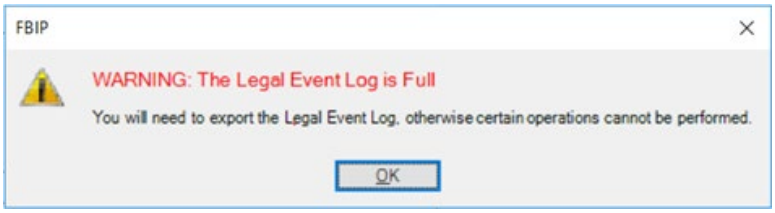

6. Review the information and then select **Save** to save your changes.

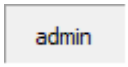
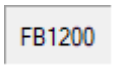
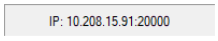
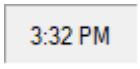
## 1.2.6 Status Bar

The Status Bar is located at the bottom of the display and provides general information about the connection to the FB Series product. Information includes the database build status, your username, connection status, device type, and type of connection.

**Figure 12. Status Bar**



| Field | Description |
|---|---|
| **Database Build Status**  | Shows the status of the FB Series product database. When the database build is complete, the icon is green. When the database build is not complete, the icon is red. |
| **SAv5 Enabled**  | This icon appears when DNP3 Secure Authentication version 5 (SAv5) is enabled on the FB Series product. For more information, refer to Apply Security File. |
| **Active Directory Enabled**  | This icon appears when Active Directory is enabled on the FB Series product. For more information, refer to Enable Active Directory. |
| **Remote SAv5 Key Updates Enabled**  | This icon appears when Remote SAv5 Key Updates are enabled on the FB Series product. For more information, refer to Enable Remote SAv5 Key Updates. |
| **Device is Sealed**  | This icon appears when the FB Series product is considered sealed. Firmware downloads, cold starts, and solution downloads are prohibited when a device is sealed. For more information, refer to System. |
| **Lock Status**   | This field appears when the Event Log Configuration Type is set to Separate Verifiable & Exportable Logs and the legal event log becomes full.<br>**Note**<br>• When the legal event log is full, a warning message appears and the device no longer accepts changes to legal parameters, firmware updates, calibrations, or configuration downloads. For more information, refer to Event Setup.<br>  <br>• If your FB Series product becomes locked due to a full event log, refer to Export Events. |

| Field | Description |
|---|---|
| **System Verification**<br>  | This color-coded field shows the status of the FB Series product as Verified (green) or Unverified (red).<br>**Note**<br>This information appears only if you select Separate Verifiable & Exportable Logs on the Event Setup display. |
| **Username**<br>  | Shows the username currently logged into DeltaV FBxConnect. |
| **Communications Status**<br>  | Shows the communications status between the FB Series product and DeltaV FBxConnect. When the connection to the FB Series product is good, the icon says "Online" and the color is green. When communications have been interrupted, the icon says "Comm Error" and the color is red. When viewing a configuration without being connected to an FB Series product, the icon says "Offline" and the color is grey. |
| **Device Type**<br>  | Shows the FB Series product type currently connected through DeltaV FBxConnect. |
| **CPU Communications Port and Speed**<br>  | Shows the communications port being used for communications by DeltaV FBxConnect. |
| **Zoom**<br>  | Use the slider to adjust the zoom level of the DeltaV FBxConnect display.<br>**Note**<br>You can also hover your mouse pointer over the slider and move the scroll wheel to adjust the zoom level. |
| **Device Time**<br>  | Shows the current time of the FB Series product's clock. |

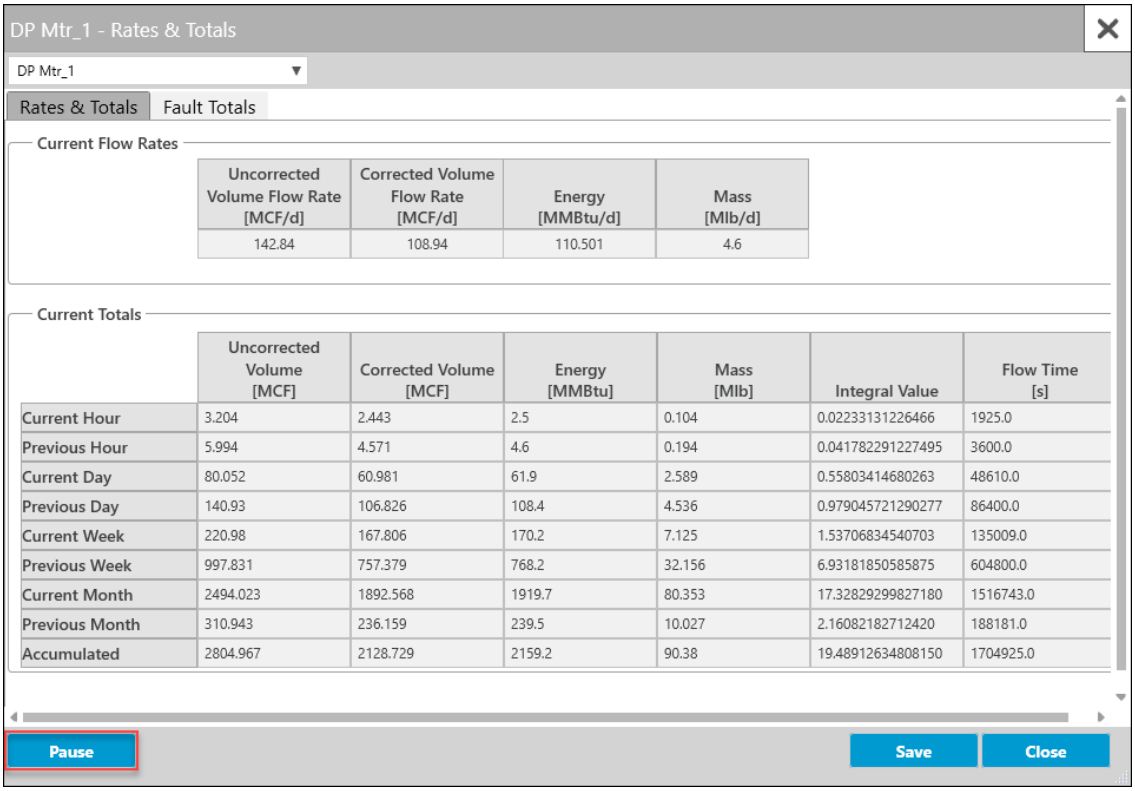
## 1.2.7 Pause/Resume Button

Use the Pause/Resume button to prevent or restart automatically refreshing the values shown on the display. The Pause/Resume button appears on displays with values that are constantly updated.

For example:

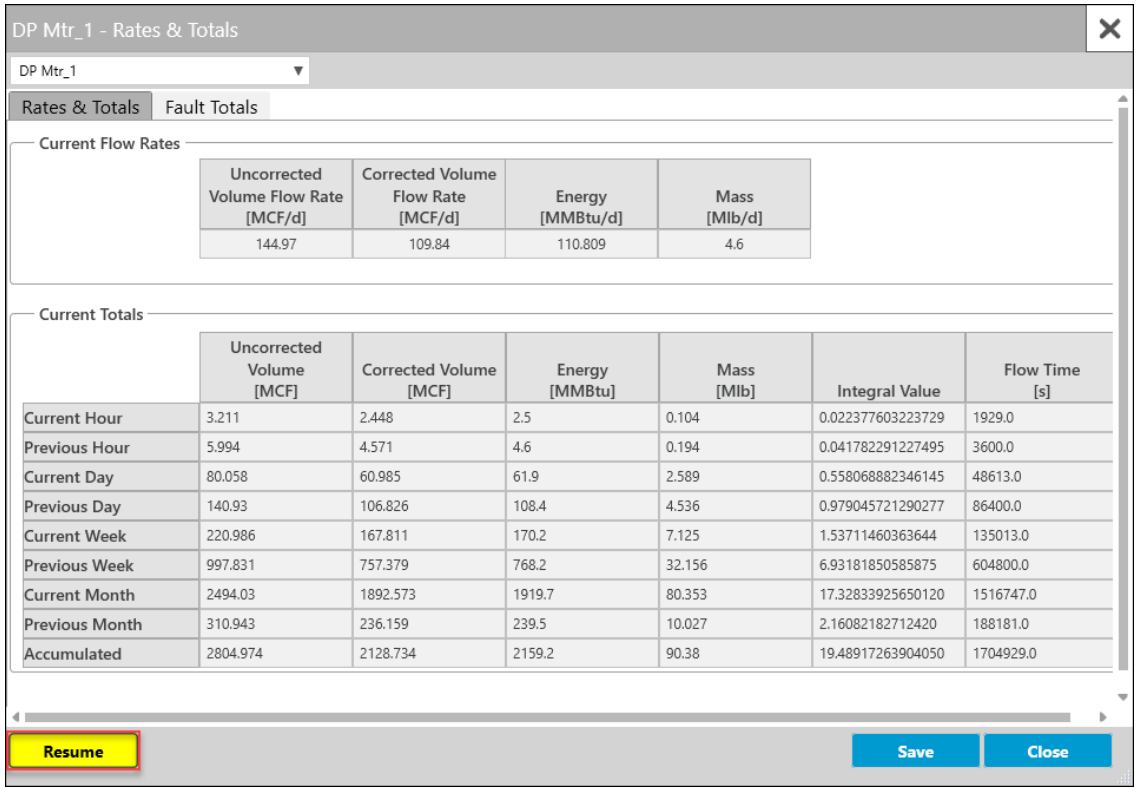
1. Select **Configure > Gas > DP Meter**. The DP Meter opens showing the General tab.
2. Select the **Rates & Totals** button. The DP Rates & Totals pop-up display opens showing the Rate & Totals tab.

**Figure 13. DP Meter Rates & Totals – Pause Button**




3. Select the **Pause** button to prevent values shown on the display from automatically refreshing.

**Figure 14. DP Meter Rates & Totals – Resume Button**




4. Select the **Resume** button to restart automatically refreshing the values shown on the display.

5. Review the information and then select **Close** to return to the previous display.

## 1.2.8 Keyboard Shortcuts

DeltaV FBxConnect configuration software supports keyboard shortcuts that provide an alternate way of performing

an action. Below is the list of supported keyboard shortcuts:

**Table 1. Keyboard Shortcuts**

| Shortcut | Description |
|---|---|
| **Ctrl** | When creating a display in FBxVue, press and hold to select multiple objects on the canvas. |
| **Ctrl+C** | Copy the selected text to the clipboard. |
| **Ctrl+O** | Export all parameter values on a display to a CSV file. |

| Shortcut | Description |
|---|---|
| **Ctrl+P** | Switch between viewing the parameter description or the parameter name in the Parameter column of the Point Picker.<br>**Note**<br>Your cursor **must** be in the Objects and Instances column for this function to work correctly. |
| **Ctrl+s** | Save any changes made to a display. |
| **Ctrl+U** | Open a pop-up version of the User Data display without closing the display you're currently viewing. |
| **Ctrl+V** | Paste text from the clipboard. |

# 1.3 Solution Files

You can save the FB Series product configuration as a solution to a file on your PC. A solution file contains the device configuration (read/write database parameters) and other optional components, such as protocol maps, application files, etc. When uploaded (saved) to a PC, a solution is saved as a single file and given an extension of .ZSL (zipped solution). You can use this file to apply the configuration and other optional components to the same device, or you can send the file to another user to apply to a similar device.

**Note**

When you open a solution file on a PC, the solution is expanded into two parts: the .ZSL file and a file folder of the same name. The file folder is the unzipped contents of the .ZSL file and provides easy access to the solution components.

## Device Configuration

Every solution file contains the read/write database parameters from the FB Series product. This includes items such as the meter configuration, control block configuration, and application-specific configuration.

**Note**

These items are saved to flash memory and subsequently restored from flash after a cold start or catastrophic failure **only** if you download the solution to flash memory and select restore from flash either on the Cold Start display or the System display.

### Optional Components

Beyond the configuration, there are optional components of a solution file that may or may not be automatically included, depending on the design of the system. In a live system, these exist as files on the device's flash file system. When a solution file is saved for backup or offline use, these files are included within the .ZSL file. These components include:

- Application files (executables/displays/etc.)
- DNP3 custom map files/OMT files
- Modbus map CSV files
- FBxVue stand-alone display files
- Report template files
- Other miscellaneous and application-specific files

**Note**

A separate backup copy of these files is **not** saved to flash memory and subsequently is **not** restored from flash after a cold start or catastrophic failure. Instead, the files are left as-is at the time of the system restore and are not removed or replaced. If you wish to restore these additional components, refer to Upload a Solution and Download a Solution.

## 1.4 File Formats

The following table describes the file formats used by DeltaV FBxConnect configuration software and FBxDesigner™:

**Table 2. File Formats**

| File Extension | Software | Description |
|---|---|---|
| .bina | DeltaV FBxConnect | Encrypted FBxVue display file that is a user interface. The display file cannot be edited via DeltaV FBxConnect configuration software. |
| .csv | DeltaV FBxConnect | Option for report generation in DeltaV FBxConnect configuration software (Alarms, Events, History, etc.). |
| .ets | DeltaV FBxConnect | License file generated via Licensing Tool and imported to a device via DeltaV FBxConnect configuration software. |

| File Extension | Software | Description |
|---|---|---|
| .mwt | FBxDesigner™ | Main FBxDesigner™ project file. |
| .pak | DeltaV FBxConnect | Individual firmware image (CPU, I/O Modules, etc.). |
| .pdf | DeltaV FBxConnect | Option for report generation in DeltaV FBxConnect configuration software (Alarms, Events, History, etc.). |
| .ptc | DeltaV FBxConnect | Partial configuration file for FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU saved via DeltaV FBxConnect configuration software. |
| .xml | DeltaV FBxConnect | Multiple uses:<br>• Configuration file for FB Series flow computers and is saved via DeltaV FBxConnect configuration software.<br>• Unencrypted FBxVue display file that is a user interface. The display file can be edited and viewed via DeltaV FBxConnect configuration software. |
| .zap | DeltaV FBxConnect | Zipped application package that contains an IEC61131 project and components. |
| .zip | DeltaV FBxConnect | System firmware image that contains all firmware images required for the DeltaV FB3000 (CPU, I/O Modules, etc.). |
| .zsl | DeltaV FBxConnect | Zipped Solution that contains the configuration for a FB Series product and is saved via DeltaV FBxConnect configuration software. For more information, refer to Solution Files. |
| .zwt | FBxDesigner™ | Zipped FBxDesigner™ project file that contains all files needed for a project. |

## 1.5 Native Data Types

Values stored within FB Series devices exist as parameters in an internal database. Each of these parameters has a native data type that best fits the purpose of the data. Many of these data types are industry standard, such as signed integers, unsigned integers, 32-bit floats, and 64-bit doubles. However, more unusual and specialized native data types, such

as ENUM16, BIN8, and BYTE4 are also used throughout the device. Data type definitions, their size (in bytes), and typical use or range is defined in the table below.

Understanding the native data types is important for configuration exercises, such as mapping Modbus registers and custom DNP3 maps. External systems do not often have the same native data types as an FB Series device. Choosing appropriate remote data type conversions (Modbus) or Tables (DNP3) will depend on the size, range, and purpose of the native data types.

**Note**

- **ENUM16** – The ENUM16 data type is used extensively throughout the internal database. It is an integer which represents an enumeration where each value (0, 1, 2, etc.) has a different meaning. This data type is the same as a UINT16 (unsigned 16-bit integer) and should be treated as such for mapping to external systems.
- **BIN** – The BIN data types (BIN8, BIN16, BIN32) are integers where each bit of the value has a specific meaning. A BIN8 (which is the same as a UINT8) has 8 bits, a BIN16 (same as a UINT16) has up to 16 bits, and a BIN32 (same as a UINT32) has up to 32 bits (note that not all bits may be used). Treat these data types as their associated unsigned integers (UINT8, UINT16, UINT32) when mapping to external systems.
- **BYTE** – The BYTE data types (BYTE4, BYTE6, BYTE32) represent a series of bytes which are all related, but do not typically form an integer. Use of these data types is rare, and they do not typically have an analogous data type in external systems.
- **PRMREF** and **OBJREF** – The PRMREF and OBJREF data types are used throughout the system for linking data and groups of data together. These references can be used to point to other parameters (or objects) sometimes as defined by the user, and other times in a fixed manner. Because of the “tag” based nature of accessing parameters in FB Series devices, a PRMREF is essentially a UC40 (40-character string), and an OBJREF is essentially a UC20 (20-characters string). Treat these data types as their associated strings (UC40 and UC20) when mapping to external systems.

**Table 3. FB Series Device Native Data Types**

| Data Type (Protocol Name)[1] | Data Type (DeltaV FBxConnect Name)[2] | # of Bytes | Database Block Size | Definition |
|---|---|---|---|---|
| UINT8 | INTEGER 8 | 1 | Small | Unsigned 8-bit integer.<br>Range of 0 to 255. |

| Data Type (Protocol Name)[1] | Data Type (DeltaV FBxConnect Name)[2] | # of Bytes | Database Block Size | Definition |
|---|---|---|---|---|
| INT8 | INTEGER 8 | 1 | Small | Signed 8-bit integer.<br>Range of -128 to 127. |
| UINT16 | INTEGER 16 | 2 | Small | Unsigned 16-bit integer.<br>Range of 0 to 65,353. |
| INT16 | INTEGER 16 | 2 | Small | Signed 16-bit integer.<br>Range of -32,768 to 32,767. |
| UINT32 | INTEGER 32 | 4 | Small | Unsigned 32-bit integer.<br>Range of 0 to 4,294,967,296. |
| INT32 | INTEGER 32 | 4 | Small | Signed 32-bit integer.<br>Range of -2,147,483,648 to 2,147,483,647. |
| UINT64 | INTEGER 64 | 8 | Small | Unsigned 64-bit integer. |
| INT64 | INTEGER 64 | 8 | Small | Signed 64-bit integer. |
| FLOAT | FLOAT | 4 | Small | 32-bit IEEE floating-point number. |
| DOUBLE | DOUBLE | 8 | Small | 64-bit IEEE floating-point number. |
| UC10 | STRING 10 | 11 | Medium | 10-character string with null termination. |
| UC20 | STRING 20 | 21 | Medium | 20-character string with null termination. |
| UC30 | STRING 30 | 31 | Large | 30-character string with null termination. |
| UC40 | STRING 40 | 41 | Large | 40-character string with null termination. |
| BYTE4 | BYTE 4 | 4 | Small | Byte array with 4 bytes (i.e., an IP address). |
| BYTE6 | BYTE 6 | 6 | Small | Byte array with 6 bytes (i.e., a MAC address). |
| BYTE32 | BYTE 32 | 32 | Large | Byte array with 32 bytes. |
| TIME | INTEGER 64 | 8 | Small | Bytes 1 thru 4 – Seconds since Jan 1, 2000. |

| Data Type (Protocol Name)[1] | Data Type (DeltaV FBxConnect Name)[2] | # of Bytes | Database Block Size | Definition |
|---|---|---|---|---|
| ENUM16 | ENUM | 2 | Small | 16-bit unsigned integer, which represents an enumeration. |
| BIN8 | BIN 8 | 1 | Small | 8-bit binary value (bitwise indication). |
| BIN16 | BIN 16 | 2 | Small | 16-bit binary value (bitwise indication). |
| BIN32 | BIN 32 | 4 | Small | 32-bit binary value (bitwise indication). |
| PRMREF | PRMREF | 41 | Large | Parameter Reference. |
| OBJREF | OBJREF | 21 | Medium | Object Reference. |

**Note**

1. The **Data Type (Protocol Name)** column lists the data type name shown in the *DNP3 Protocol Specifications Manual (for Emerson DeltaV FB3000 RTUs)* (D310858X012).
2. The **Data Type (DeltaV FBxConnect Name)** column lists the data type name shown in DeltaV FBxConnect configuration software.

## 1.6 Calculation Library Limit Checks

FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU support multiple calculation libraries for both gas and liquid measurements. Each calculation library is subject to unique limits. Refer to the following tables based on the fluid you are measuring and the calculation you have selected:

**Natural Gas Compressibility & Density Limit Checks**

- AGA 8 2017
- AGA 8 1992 + ISO 12213-2 2006
- AGA NX-19 1962 + AGA NX-19 MOD 1966 + AGA NX-19 MOD BR KORR 1982 + VDI/VDE 2040 Part 2 1987
- GERG TM5 1991 (SGERG) + ISO 12213-3 2006
- GOST 30319-3 2015

**Natural Gas Calorific Value (CV) Limit Checks**

- ISO 6976 1995 + Amendment 1997
- GPA 2172 1996/2009 + GPA 2145 1996/2000/2003/2009/2016

**Natural Gas Flow Measurement Limit Checks**

- AGA 3 1994
- GOST 8.586 2005
- ISO 5167 1991/1998/2003
- Rosemount 1595 Conditioning Orifice Plate, 405 Compact Orifice Plate
- Rosemount Annubar
- V-CONE (McCrometer and NuFlo)

**Liquid Limit Checks**

- API Ch. 11.1 2007
- API 11.2.2
- GPA 8117
- GPA 8217

### 1.6.1 Natural Gas Compressibility & Density Limit Checks

Refer to the following tables for information about specific limit checks for the following calculations:

- AGA 8 2017
- AGA 8 1992 + ISO 12213-2 2006
- AGA NX-19 1962 + AGA NX-19 MOD 1966 + AGA NX-19 MOD BR KORR 1982 + VDI/VDE 2040 Part 2 1987
- GERG TM5 1991 (SGERG) + ISO 12213-3 2006
- GOST 30319-3 2015

## AGA 8 2017

**Table 4. AGA 8 Part 1 Detail method**

| | Range A | Range B | Range C |
|---|---|---|---|
| Lower temperature limit | >= 25.0°F<br>>= –4.0°C | 25.0°F<br>–4.0°C | 17.0°F<br>–8.0°C |
| Upper pressure limit | <=1500.0 psia<br><=10.3 MPa | 300.0 psia<br>2.1 MPa | 3000.0 psia<br>21.0 MPa |
| Gross heating value† | 23.5 – 44.7 MJ/m3 | 25.3 – 56.0 MJ/m3 | 35.8 – 40.6 MJ/m3 |
| Relative density† | 0.554 – 0.91 | 0.47 – 0.91 | 0.554 – 0.64 |
| Upper composition limits: | | | |
| Methane | <= 100.0% | 100.0% | 100.0% |
| Nitrogen | <= 50.0% | 50.0% | 3.0% |
| Carbon dioxide | <= 30.0%* | 80.0% | 3.0% |
| Ethane | <= 10.0% | 25.0% | 4.0% |
| Propane | <= 4.0% | 6.0% | 2.0% |
| Isobutane | <= 0.4% | 1.5% | 0.1% |
| n-Butane | <= 0.6 | 6.0% | 0.4% |
| Isopentane | <= 0.3% | 2.0% | 0.1% |
| n-Pentane | <= 0.3% | 2.0% | 0.1% |
| *Total pentanes* | <= 0.3% | 2.0% | |
| n-Hexane | <= 0.12% | 0.2% | 0.03% |
| n-Heptane | <= 0.04% | 0.2% | 0.01% |
| n-Octane | <= 0.03% | 0.2% | 0.003% |
| n-Nonane | <= 0.03% | 0.2% | 0.003% |
| n-Decane | <= 0.03% | 0.2% | 0.003% |
| *Total hexanes plus* | <= 0.15% | | |
| *Total heptanes plus* | <= 0.04% | | |
| Hydrogen | <= 5.0% | 100.0% | 1.0% |

| | Range A | Range B | Range C |
|---|---|---|---|
| Oxygen | <= 0.2% | 1.0% | 0.2% |
| Carbon monoxide | <= 1.0% | 10.0% | 1.0% |
| Water | <= 0.05% | 1.4% | 0.005% |
| Hydrogen sulfide | <= 0.1% | 4.0% | 0.1% |
| Helium | <= 0.4% | 5.0% | 0.4% |
| Argon | <= 0.2% | | |

† Values are based on a methane lower limit composition of 60 mole percent.

*The mole percent of carbon dioxide upper limit is reduced for the following conditions for Range A:

- Carbon Dioxide <= 20.0% when Nitrogen > 7.0%
- Carbon Dioxide <= 10.0% when Nitrogen > 15.0%
- Carbon Dioxide <= 7.0% when Propane > 1.0%
- Carbon Dioxide <= 5.0% when Propane > 2.0%
- Carbon Dioxide <= 10.0% when Isobutane > 0.1%
- Carbon Dioxide <= 10.0% when n-Butane > 0.3%

**Table 5. AGA 8 Part 1 Gross Method 1 & 2**

| | Range 1 | Range 2 |
|---|---|---|
| Lower Temperature | >=25.0°F<br>>=-4.0°C | 17.0°F<br>-8.0°C |
| Min Temperature | <=143.0°F<br><=62.0°C | 143.0°F<br>62.0°C |
| Max Pressure | <=1500.0 psia<br><=10.3 MPa | 600.0 psia<br>4.1 MPa |
| Gross heating value | 34.7 – 38.7 MJ/m3 | 24.8 – 41 MJ/m3 |
| Relative density | 0.554 – 0.63 | 0.554 – 0.89 |
| Upper composition limits: | | |
| Carbon Dioxide | <= 3.0% | 25.0% |
| Hydrogen | <= 0.2% | 2.0% |
| Nitrogen | <= 7.0% | 20.0% |

**Table 6. AGA 8 Part 2 GERG Method**

| | |
|---|---|
| Upper Temperature | <=800.0°F<br><=700.0 K |
| Maximum Pressure | <=10150.0 psia<br><=70.0 MPa |

**Note**
Composition limits are not considered since the “model is also applicable to each of the pure natural gas components and to numerous binary and multi-component mixtures” (AGA 8 Part 2 pg. 1). Mixtures with high compositions of water, hydrogen, or helium may be subject to errors (AGA 8 Part 2 pg. 23).

## AGA 8 1992 + ISO 12213-2 2006

**Table 7. AGA 8 Detail method (Normal Range)**

| | |
|---|---|
| Pressure | 0.0 – 275.79 MPa<br>0.0 – 40000 psia |
| Temperature | 144.26 – 677.60 K<br>-200.0 – 760.0°F |
| Methane | 45.0 – 100.0% |
| Nitrogen | <= 50.0% |
| Carbon Dioxide | <= 30.0% |
| Ethane | <= 10.0% |
| Propane | <= 4.0% |
| iC4 + nC4 | <= 1.0% |
| iC5 + nC5 | <= 0.3% |
| nC6 + nC7 + nC8 + nC9 + nC10 | <= 0.2% |
| Helium | <= 0.2% |
| Hydrogen | <= 10.0% |
| Carbon Monoxide | <= 3.0% |
| Argon | <= 0.1% |
| Oxygen | <= 0.1% |

| | |
|---|---|
| Water | <= 0.05% |
| Hydrogen Sulfide | <= 0.02% |

**Table 8. AGA 8 Gross 1 method**

| | |
|---|---|
| Pressure | 0.0 – 12.07 MPa<br>0.0 – 1750.0 psia |
| Temperature | 265.0 – 335.0 K<br>17.0 - 143.0°F |
| Specific Gravity | 0.554 – 0.87 |
| Gross Heating Value | 18.7 – 45.1 MJ |
| Carbon Dioxide | <= 30.0% |
| Hydrogen | <= 10.0% |

**Table 9. AGA 8 Gross 2 method**

| | |
|---|---|
| Pressure | 0.0 – 12.07 MPa (0.0 – 1750.0 psia) |
| Temperature | 265.0 – 335.0 K (17.0 - 143.0°F) |
| Specific Gravity | 0.554 – 0.87 |
| Nitrogen | <= 53.6% |
| Carbon Dioxide | <= 30.0% |
| Hydrogen | <= 10.0% |

**Table 10. ISO 12213-2 AGA8 Detail method (Wide Range)**

| | |
|---|---|
| Pressure | 0.0 – 65.0 MPa |
| Temperature | 225.00 – 335.00 K |

**Table 11. ISO 12213-2 AGA8 Detail method (Pipeline Quality)**

| | |
|---|---|
| Methane | 70.0 – 100.0% |
| Nitrogen | <= 20.0% |
| Carbon Dioxide | <= 20.0% |
| Ethane | <= 10.0% |

| | |
|---|---|
| Propane | <= 3.5% |
| iC4 + nC4 | <= 1.5% |
| iC5 + nC5 | <= 0.5% |
| nC6 | <= 0.1% |
| nC7 | <= 0.05% |
| nC8 + nC9 + nC10 | <= 0.05% |
| Helium | <= 0.5% |
| Hydrogen | <= 10.0% |
| Carbon Monoxide | <= 3.0% |
| Argon | <= 0.02% |
| Oxygen | <= 0.02% |
| Water | <= 0.015% |
| Hydrogen Sulfide | <= 0.02% |

## AGA NX-19 1962 + AGA NX-19 MOD 1966 + AGA NX-19 MOD BR KORR 1982 + VDI/VDE 2040 Part 2 1987

**Table 12. AGA NX-19 1962 / NX-19 MOD**

| | |
|---|---|
| Pressure | 0.01 – 34.58 MPa (0.0 – 5000.0 psig) |
| Temperature | 233.14 – 388.76 K (-40.0 – 240.0°F) |
| Relative Density | 0.554 – 1.0 |
| Nitrogen | 0.0 – 15.0% |
| Carbon Dioxide | 0.0 – 15.0% |

**Table 13. AGA NX-19 MOD BR KORR**

| | |
|---|---|
| Pressure | 0.01 – 34.58 MPa (0.0 – 5000.0 psig) |
| Temperature | 233.14 – 388.76 K (-40.0 – 240.0°F) |
| Relative Density | 0.554 – 1.0 |
| Heating Value | 39.8 – 46.2 MJ/m3 |
| Nitrogen | 0.0 – 15.0% |

| | |
|---|---|
| Carbon Dioxide | 0.0 – 15.0% |

**Table 14. AGA NX-19 VDI/VDE 2040**

| | |
|---|---|
| Pressure | 0.001 – 13.79 MPa |
| Temperature | 233.14 – 388.76 K (-40.15 – 115.6°C) |
| Relative Density | 0.554 – 0.75 |
| Nitrogen | 0.0 – 15.0% |
| Carbon Dioxide | 0.0 – 15.0% |

## GERG TM5 1991 (SGERG) + ISO 12213-3 2006

**Table 15. SGERG Methods 1 - 4**

| | |
|---|---|
| Pressure | 0.01 – 12.0 MPa |
| Temperature | 265.0 – 335.0 K (-8.15 – 61.85°C) |
| Relative Density | 0.55 – 0.90 |
| Heating Value | 19.0 – 48.0 MJ/m3 |
| Nitrogen | 0.0 – 50.0% |
| Carbon Dioxide | 0.0 – 30.0% |
| Hydrogen | 0.0 – 10.0% |

**Table 16. ISO 12213-3 Data Sets 1 - 4**

| | |
|---|---|
| Pressure | 0.01 – 12.0 MPa |
| Temperature | 263.0 – 338.0 K |
| Relative Density | 0.55 – 0.90 |
| Heating Value | 20.0 – 48.0 MJ/m3 |
| Nitrogen | 0.0 – 50.0% |
| Carbon Dioxide | 0.0 – 30.0% |
| Hydrogen | 0.0 – 10.0% |

### GOST 30319-3 2015

**Table 17. GOST 30319-3 2015**

| | |
|---|---|
| Pressure | 0.0 – 30.0 MPa<br>0.0 – 4351 psia |
| Temperature | 250.0 – 350.0 K<br>-9.67 – 170.33°F |
| Methane | 70.0 – 100.0% |
| Nitrogen | <= 20.0% |
| Carbon Dioxide | <= 20.0% |
| Ethane | <= 10.0% |
| Propane | <= 3.5% |
| iC4 + nC4 | <= 1.5% |
| iC5 + nC5 | <= 0.5% |
| nC6 + nC7 + nC8 | <= 0.1% |
| Helium | <= 0.5% |
| Hydrogen | <= 10.0% |
| C7 + C8 + O2 + Ar | <= 0.15% |
| All Others | = 0.0% |

## 1.6.2 Natural Gas Calorific Value (CV) Limit Checks

Refer to the following tables for information about specific limit checks for the following calculations:

- ISO 6976 1995 + Amendment 1997
- GPA 2172 1996/2009 + GPA 2145 1996/2000/2003/2009/2016

### ISO 6976 1995 + Amendment 1997

**Table 18. ISO6976 1995**

| | |
|---|---|
| Pressure | 0.001 – 13.79 MPa |
| Base Temperature (t2) | -10.0 – 30.0°C |
| Each Component | 0.0 – 100.0% |
| Component Sum | 99.9 – 100.1% |

### GPA 2172 1996/2009 + GPA 2145 1996/2000/2003/2009/2016

**Table 19. GPA 2172 1996 / GPA 2172 2009**

| | |
|---|---|
| Pressure | 0.0 – 30.0 psia |
| Temperature | -10.0 – 30.0°C |
| Each Component | 0.0 – 100.0% |
| Component Sum | 99.9 – 100.1% |

## 1.6.3 Natural Gas Flow Measurement Limit Checks

Refer to the following tables for information about specific limit checks for the following calculations:

- AGA 3 1994
- GOST 8.586 2005
- ISO 5167 1991/1998/2003
- Rosemount 1595 Conditioning Orifice Plate, 405 Compact Orifice Plate
- Rosemount Annubar
- V-CONE

## AGA 3 1994

**Table 20. AGA 3 1994, FLANGE, CORNER, and D-D/2**

| | |
|---|---|
| Pressure | 0.0 – 100000.0 psia |
| Differential Pressure | < Pressure |
| Pressure Ratio | >= 0.75 |
| Temperature | -400.0 – 1000.0°F |
| Relative Density | 0.1 – 2.0 |
| Flowing Density | 0.001 – 100.0 lbm/ft3 |
| Pipe Diameter | 2.0 – 100.0 in |
| Orifice Diameter | 0.45 – 100.0 in |
| Orifice Diameter | < Pipe diameter |
| Isentropic Exponent | > 0.0 |
| Viscosity | > 0.0 |
| Beta Ratio | 0.1 – 0.75 |
| Reynolds Number | 4000.0 – 1.0e10 |
| Gravity | 30.0 – 40.0 ft/sec2 |
| Elevation | -10000.0 – 50000.0 ft |

## GOST 8.586 2005

**Table 21. GOST 8.586 2005**

| | |
|---|---|
| Upstream Pressure | >= 1.0e-10 Kpa |
| Differential Pressure | < Upstream pressure |
| Pressure Ratio | >= 0.75 |
| Upstream Temperature | -200.0 – 1000.0°C |
| Upstream Density | 0.01 – 2000.0 kg/m3 |
| Orifice Diameter | < Pipe diameter |
| Isentropic Exponent | > 1.0e-10 |
| Viscosity | > 1.0e-10 |

**Table 22. FLANGE**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter (D) | 50.0 – 1000.0 mm |
| Beta Ratio (B) | 0.1 – 0.75 |
| Reynolds Number | >= 5000.0 & >= 170.0*B*B*D |

**Table 23. CORNER**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter | 50.0 – 1000.0 mm |
| Beta Ratio (B) | 0.1 – 0.75 |
| Reynolds Number | > 5000.0 for B in 0.1 – 0.56<br>> 16000.0*B*B for B > 0.56 |

**Table 24. D-D/2**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter | 50.0 – 1000.0 mm |
| Beta Ratio (B) | 0.1 – 0.75 |
| Reynolds Number | > 5000.0 for B in 0.1 – 0.56<br>> 16000.0*B*B for B > 0.56 |

## ISO 5167 1991/1998/2003

**Table 25. ISO5167 1991, ISO5167 1998, and ISO5167 2003**

| | |
|---|---|
| Upstream Pressure | >= 1.0e-10 |
| Differential Pressure | < Upstream pressure |
| Pressure Ratio | >= 0.75 |
| Upstream Temperature | -200.0 – 1000.0°C |
| Upstream Density | 0.01 – 2000.0 kg/m3 |
| Orifice Diameter | < Pipe diameter |
| Isentropic Exponent | > 1.0e-10 |
| Viscosity | > 1.0e-10 |

**Table 26. FLANGE**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter (D) | 50.0 – 1000.0 mm |
| Beta Ratio (B) | 0.2 – 0.75 (ISO5167 1991)<br>0.1 – 0.75 (ISO5167 1998, 2003) |
| Reynolds Number | >= 1260.0*B*B*D (ISO5167 1991)<br>>= 4000.0 & >= 170.0*B*B*D (ISO5167 1998)<br>>= 5000.0 & >= 170.0*B*B*D (ISO5167 2003) |

**Table 27. CORNER**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter | 50.0 – 1000.0 mm |
| Beta Ratio (B) | 0.2 – 0.75 - ISO5167 1991<br>0.1 – 0.75 - ISO5167 1998, 2003 |
| Reynolds Number | > 5000.0 for B in 0.2 – 0.45 (ISO5167 1991)<br>> 10000.0 for B > 0.45 (ISO5167 1991)<br>> 4000.0 for B in 0.1 – 0.5 (ISO5167 1998)<br>> 16000.0*B*B for B > 0.5 (ISO5167 1998)<br>> 5000.0 for B in 0.1 – 0.56 (ISO5167 2003)<br>> 16000.0*B*B for B > 0.56 (ISO5167 2003) |

**Table 28. D-D/2**

| | |
|---|---|
| Orifice Diameter | >= 12.5 mm |
| Pipe Diameter | 50.0 – 1000.0 mm |

| | |
|---|---|
| Beta Ratio (B) | 0.2 – 0.75 - ISO5167 1991<br>0.1 – 0.75 - ISO5167 1998, 2003 |
| Reynolds Number | >= 1260.0*B*B*D (ISO5167 1991)<br>> 4000.0 for B in 0.1 – 0.5 (ISO5167 1998)<br>> 16000.0*B*B for B > 0.5 (ISO5167 1998)<br>> 5000.0 for B in 0.1 – 0.56 (ISO5167 2003)<br>> 16000.0*B*B for B > 0.56 (ISO5167 2003) |

**Table 29. NOZZLE 1932**

| | |
|---|---|
| Pipe diameter | 50.0 – 500.0 mm |
| Orifice diameter | >= 0.0 mm |
| Beta Ratio (B) | 0.3 – 0.8 |
| Reynolds number | 70000.0 – 10000000.0 for B 0.3 – 0.44<br>20000.0 – 10000000.0 for B >= 0.44 |

**Table 30. NOZZLE LONG RADIUS**

| | |
|---|---|
| Pipe Diameter | 50.0 – 630.0 mm |
| Orifice Diameter | >= 0.0 mm |
| Beta Ratio | 0.2 – 0.8 |
| Reynolds Number | 10000.0 – 10000000.0 |

**Table 31. VENTURI NOZZLE**

| | |
|---|---|
| Pipe Diameter | 65.0 – 500.0 mm |
| Orifice Diameter | >= 50.0 mm |
| Beta Ratio | 0.316 – 0.775 |
| Reynolds Number | 150000.0 – 2000000.0 |

**Table 32. VENTURI TUBE AS CAST**

| | |
|---|---|
| Pipe Diameter | 100.0 – 800.0 mm |
| Orifice Diameter | >= 0.0 mm |
| Beta Ratio | 0.3 – 0.75 |
| Reynolds Number | 200000.0 – 2000000.0 |

**Table 33. VENTURI TUBE MACHINED**

| | |
|---|---|
| Pipe Diameter | 50.0 – 250.0 mm |
| Orifice Diameter | >= 0.0 mm |
| Beta Ratio | 0.3 – 0.75 |
| Reynolds Number | 200000.0 – 1000000.0 |

**Table 34. VENTURI TUBE ROUGH WELD**

| | |
|---|---|
| Pipe diameter | 200.0 – 1200.0 mm |
| Orifice diameter | >= 0.0 mm |
| Beta Ratio | 0.4 – 0.70 |
| Reynolds number | 200000.0 – 2000000.0 |

## Rosemount 1595 Conditioning Orifice Plate, 405 Compact Orifice Plate

**Table 35. RSMT1595 2003, RSMT405C 2003, RSMT405P 2003**

| | |
|---|---|
| Upstream Pressure | >= 1.0e-10 |
| Differential Pressure | < Upstream pressure |
| Pressure Ratio | >= 0.75 |
| Upstream Temperature | -200.0 – 1000.0°C |
| Upstream Density | 0.01 – 2000.0 kg/m3 |
| Orifice Diameter | < Pipe diameter |
| Isentropic Exponent | > 1.0e-10 |
| Viscosity | > 1.0e-10 |

## Rosemount Annubar

**Table 36. Rosemount 485, 585**

| | |
|---|---|
| Upstream Pressure | > 0 to 1.0e8 Pa(a) |
| Differential Pressure | < Upstream pressure |
| Upstream Temperature | -200.0 – 1000.0°C |
| Upstream Density | 0.01 – 2000.0 kg/m3 |
| Isentropic Exponent | > 0 |
| Viscosity | > 0 |
| Pipe Diameter | 0.02 to10.0 meters,<br>> probe width for selected model |
| Blockage Factor | 0.4 to 0.9 |
| Reynolds Number | 4000 to 1.0e10 |

## V-CONE (McCrometer, NuFlo)

**Table 37. McCROMETER 2.3 1997, McCROMETER 3.0 2001, NUFLO 2007, and NUFLO 2013**

| | |
|---|---|
| Upstream Pressure | >= 1.0e-10 |
| Differential Pressure | < Upstream pressure |
| Pressure Ratio | >= 0.75 |
| Upstream Temperature | -200.0 – 1000.0°C |
| Upstream Density | 0.01 – 2000.0 kg/m3 |
| Orifice Diameter | < Pipe diameter |
| Isentropic Exponent | > 1.0e-10 |
| Viscosity | > 1.0e-10 |
| Pipe Diameter | 10.0 – 4000.0 mm |
| Orifice Diameter | >= 0.0 mm |
| Beta Ratio | 0.1 – 0.95 |
| Reynolds Number | 20000.0 – 2000000.0 |

## 1.6.4 Liquid Limit Checks

Refer to the following tables for information about specific limit checks for the following calculations:

- API Ch. 11.1 2007
- API 11.2.2
- GPA 8117
- GPA 8217

### API Ch. 11.1 2007

**Table 38. Crude Oil**

| | |
|---|---|
| Density (observed) | 470.5 – 1201.8 kg/m3 |
| Density @ 60°F | 610.0 – 1163.5 kg/m3 |
| Temperature | -50.00 – 150.00°C (-58.0 – 302.0°F) |
| Pressure | 0.0 – 1,500.0 psig |
| α60z | 0.000230 – 0.000930 per °F |

**Table 39. Refined Products**

| | |
|---|---|
| Density (observed) | 470.4 – 1209.5 kg/m3 |
| Density @ 60°F | 610.0 – 1163.5 kg/m3 |
| Temperature | -50.00 – 150.00°C |
| Pressure | 0.0 – 1,500.0 psig |
| α60z | 0.000230 – 0.000930 per °F |

**Table 40. Lubricating Oils**

| | |
|---|---|
| Density (observed) | 714.3 – 1208.3 kg/m3 |
| Density @ 60°F | 800.9 – 1163.5 kg/m3 |
| Temperature | -50.00 – 150.00°C |
| Pressure | 0 – 1,500 psig |

| | |
|---|---|
| α60z | 0.000230 – 0.000930 per °F |

**Table 41. Specific Refined Products (Density @ 60°F)**

| | |
|---|---|
| Fuel Oils | 838.3127 – 1163.5 kg/m3 |
| Jet Fuels | 787.5195 – 838.3127 kg/m3 |
| Transition Zone | 770.3520 – 787.5195 kg/m3 |
| Gasolines | 610.6 – 770.3520 kg/m3 |

## API 11.2.2

**Table 42. API 11.2.2**

| | |
|---|---|
| Rel. Density @ 60°F | 0.350 – 0.637 RD |
| Temperature | -50.0 – 140.0°F |
| Tmax | 0.96Tcritical ; Tcritical = 621.418 - 822.686 * RD60 + 1737.86 * RD602 |
| Pressure Difference | 0.0 – 2,200.0 psig |

## GPA 8117

**Table 43. GPA 8117**

| | |
|---|---|
| Rel. Density @ 60°F | 0.350 – 0.676 RD |
| Temperature | -50.0 – 140.0 °F |
| **Note**<br>If RD60 < 0.425 then Tmax = (695.51 * RD60 - 155.51)°F | |

## GPA 8217

**Table 44. GPA 8217**

| | |
|---|---|
| Density (observed) | 0.2100 – 0.7400 RD |
| Density @ 60°F | 0.3500 – 0.6880 RD |
| Temperature | -50.8 – 199.4 °F |

# 1.7 Troubleshooting Pop-Up Displays

You may encounter an issue where pop-up displays (such as DP Meter – Diagnostics or Liquid Linear Meter – Rates and Totals) fail to open. DeltaV FBxConnect configuration software uses the system registry to monitor application memory, and this behavior can occur when performance counters in the system registry become corrupted and DeltaV FBxConnect configuration software is unable to determine the memory consumption. You can fix this issue by rebuilding the performance counters in the system registry.

To rebuild the performance counters:

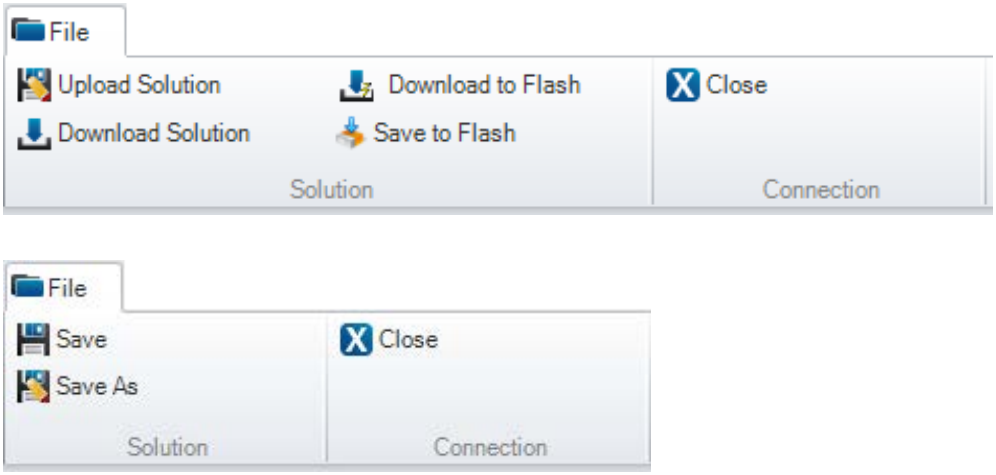
1. Click **Start** and type **CMD** to perform a search for the Command Prompt.
2. Select **Command Prompt** from the search results. The Command Prompt windows opens.
3. Type **cd c:\windows\system32** and press **Enter**.
4. Type **lodctr /R** and press **Enter**.
5. Type **cd c:\windows\sysWOW64** and press **Enter**.
6. Type **lodctr /R** and press **Enter**.

After performing these steps, you have rebuilt the performance counters and can open pop-up displays in DeltaV FBxConnect configuration software.

# Section 2: File Menu

Use the options in this menu to save an FB Series product configuration file to your PC, save an FB Series product configuration to flash memory, load a saved configuration to the FB Series product, or close the current connection to the FB Series product.

**Figure 15. File Menu (online and offline)**




The File menu contains the following options:

Save – Save changes when modifying a solution's configuration file in offline mode (not connected to an FB Series product).

Save As – Save changes when modifying a solution's configuration file in offline mode (not connected to an FB Series product) to a new file on your PC.

Upload Solution – Package application and configuration data from your FB Series product and save it on your PC.

Download Solution – Load a previously saved configuration file or solution to the connected FB Series product.

Download to Flash – Save a previously saved configuration file to the flash memory of the connected FB Series product.

Save to Flash – Save the current configuration to the flash memory of the connected FB Series product.

Close – Close the current connection and exit DeltaV FBxConnect configuration software.

# 2.1 Save (Offline Mode)

Use the Save option to save changes when modifying a solution's configuration file in offline mode (not connected to an FB Series product). It is good practice to save your configuration whenever you make a change to the file.

When you save a solution's configuration, a file is saved to your PC. This allows you to reload the solution's configuration if something should corrupt your device.

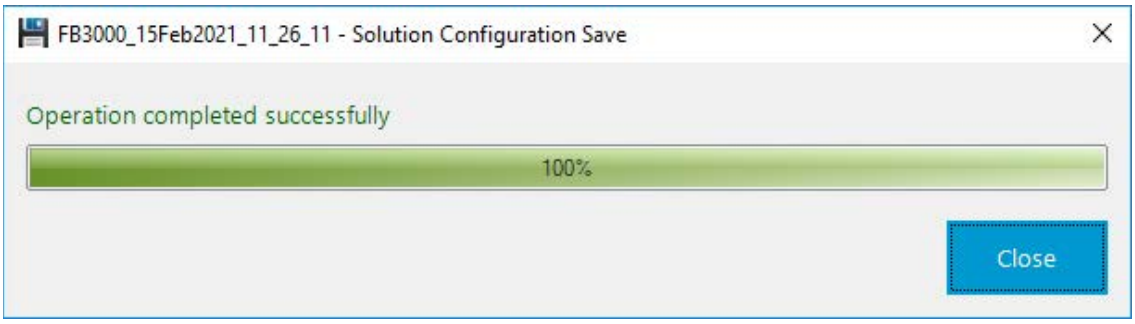
**Note**

When working in offline mode from a newly created DeltaV FBxConnect software configuration file, read-only output parameters are **not** included in the configuration file and are instead displayed as default values.

To save a solution's configuration file in offline mode:

1. Open an FB Series product configuration file in DeltaV FBxConnect Launchpad, and make the required changes.
2. Select **File > Save** from the DeltaV FBxConnect configuration software main menu. The Solution Configuration Save dialog opens and shows the progress of saving your solution's configuration.

**Figure 16. Solution Saved Successfully**




3. Select **Close** to exit the Solution Configuration Save dialog.

## 2.2 Save As (Offline Mode)

Use the Save As option to save a copy of the current solution's configuration file and specify a new file name or location. This option is **only** available while in offline mode (not connected to an FB Series product).

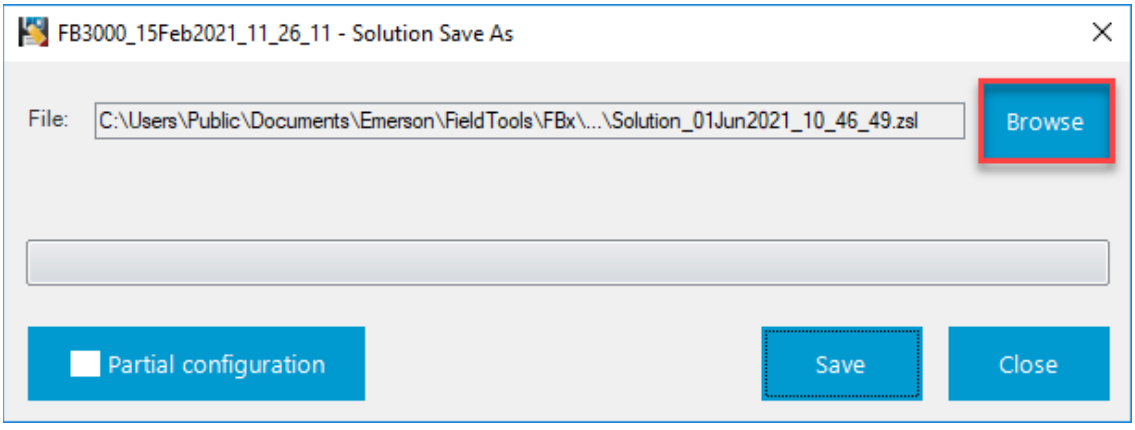
**Note**

- When working in offline mode from a newly created DeltaV FBxConnect software configuration file, read-only output parameters are **not** included in the configuration file and are instead displayed as default values.
- After you create a backup configuration file, you can load it onto a device using Download Solution and save it to the device's flash memory using Download to Flash.

To save a copy of a solution's configuration to a file on your PC:

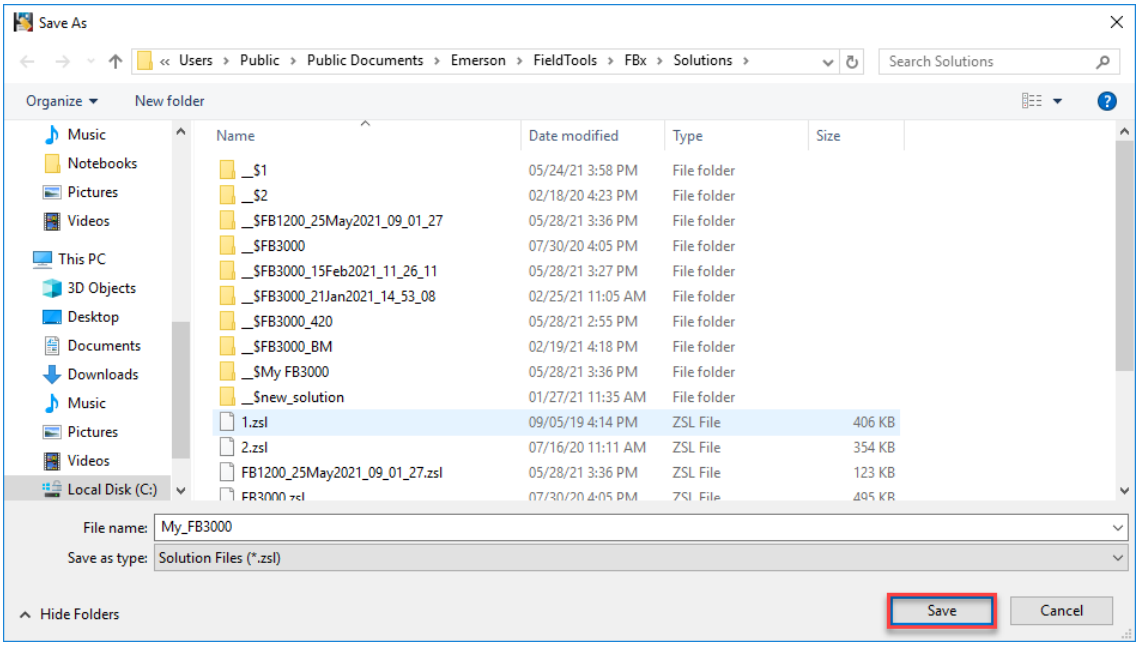
1. Open an FB Series product configuration file in DeltaV FBxConnect Launchpad, and then make the required changes.
2. Select **File > Save As** from the DeltaV FBxConnect configuration software main menu. The Configuration Save As dialog displays:

**Figure 17. Solution Configuration Save As**




3. Select **Browse** to open a file explorer window.

**Figure 18. Save As**

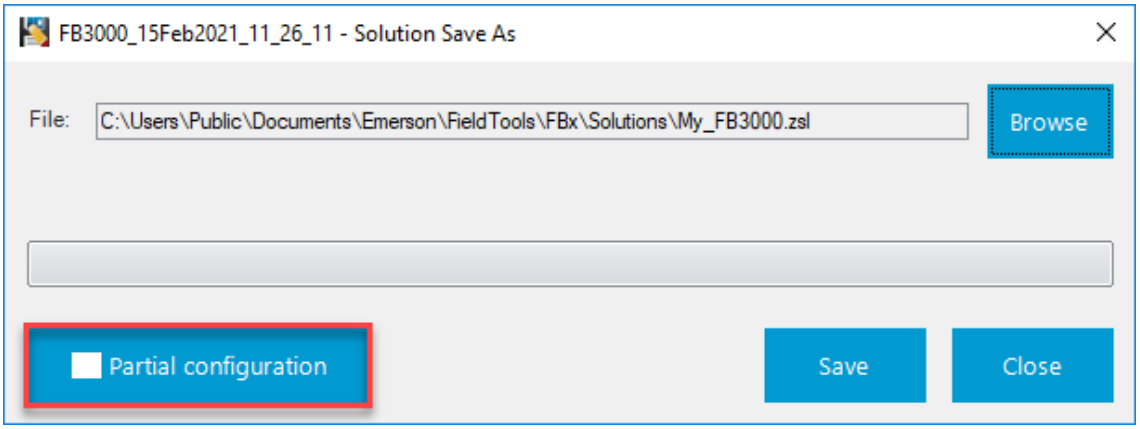



4. Navigate to a location on your PC you wish to save the configuration file, enter a name for the file, and then select **Save**. The Configuration Save As screen re-displays.

**Note**

- The default file name includes the connection/device name, report type, and timestamp of report creation (*ConnectionName_ReportType_YYMMDDThhmmss*).
- The default location for saved configuration files is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Solutions*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.

**Figure 19. Partial configuration**

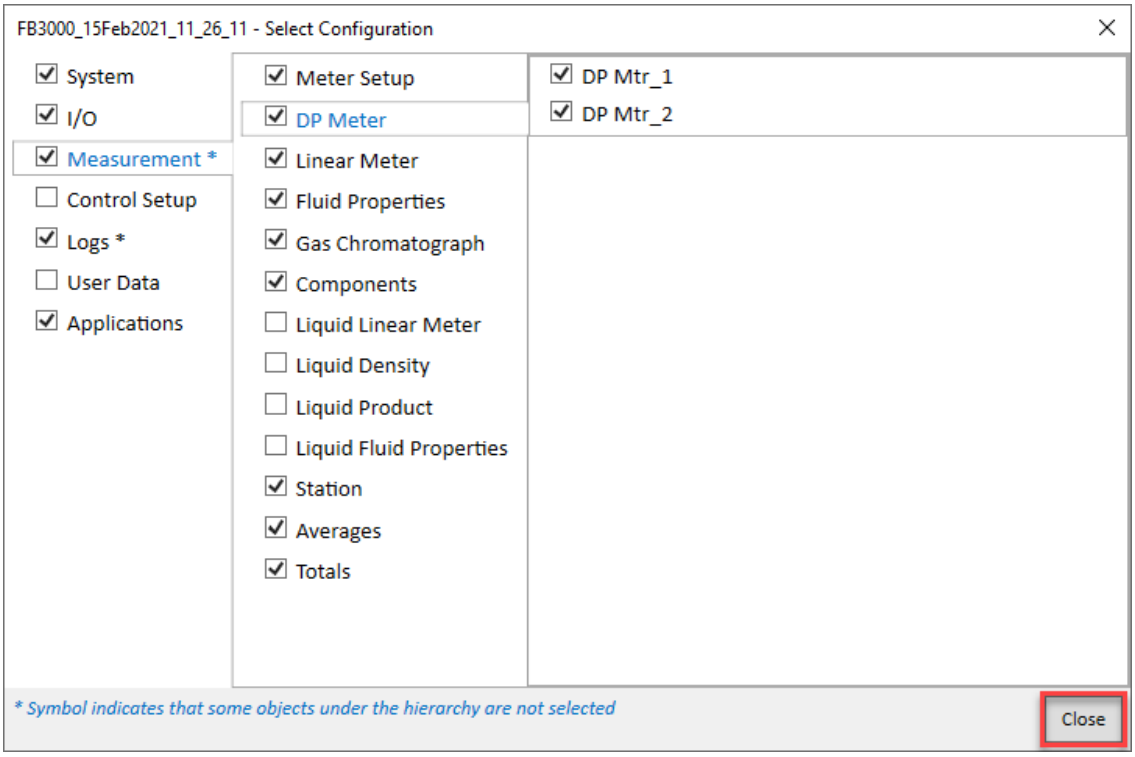



5. If you want to manually select which Objects and Instances are saved in the configuration file, select **Partial Upload**. The Select Configuration dialog opens.

**Note**

The Partial configuration option requires firmware version 2.7 or later.

**Figure 20. Select Configuration**

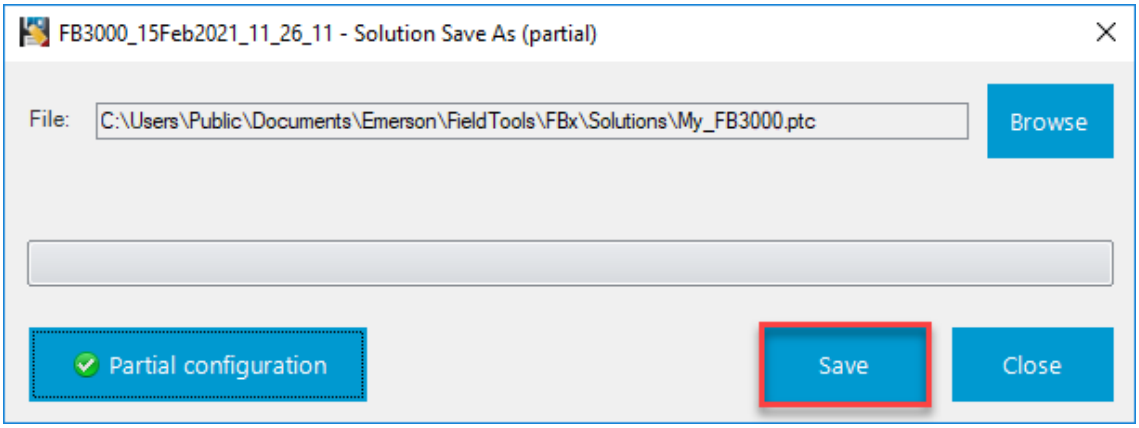



6. Place a check mark next to the specific Objects and Instances you wish to save in the configuration file and click **Close**. The Configuration Upload dialog re-displays.

**Note**

- Select an object in the left most column to show the associated objects/instances in the next column. Continue this process for the subsequent columns to select which parameters to include in the configuration. For example, select Measurement in the left-hand column and Fluid Properties in the middle column to display the configured Fluid Properties instances in the right-hand column.
- An asterisk (*) next to an object indicates that only a partial set of parameters is selected for that particular object.
- Partial configuration files are stored with the file extension **.PTC**.

**Figure 21. Save**



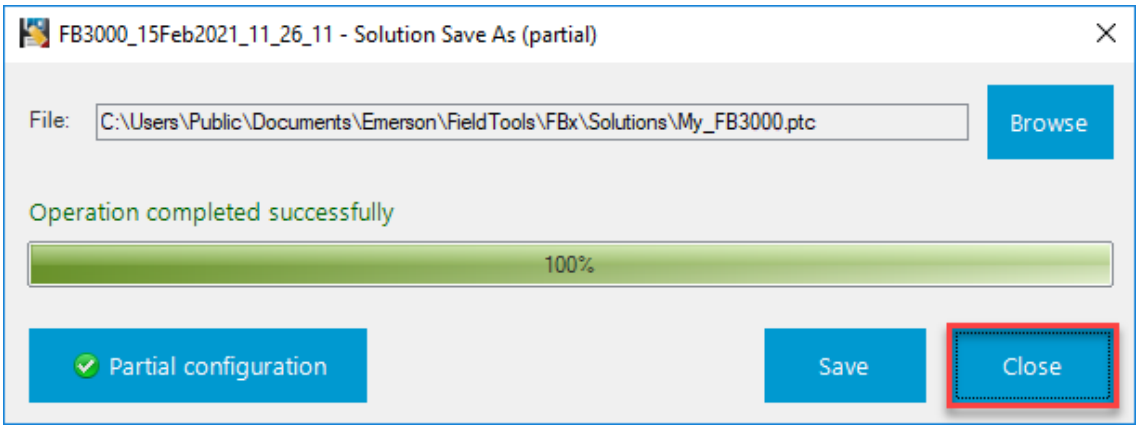

7. Select **Save** to save your device configuration to a file on your PC.

**Note**

A progress bar displays the status of the configuration save process.

8. When the configuration save process is complete, select **Close** to return to the main DeltaV FBxConnect configuration software display.

**Figure 22. Solution Saved Successfully**



# 2.3 Upload Solution

A Solution contains application and configuration data for an FB Series product. When you Upload a Solution, the system packages application and configuration data from your FB Series product and saves it on your PC.

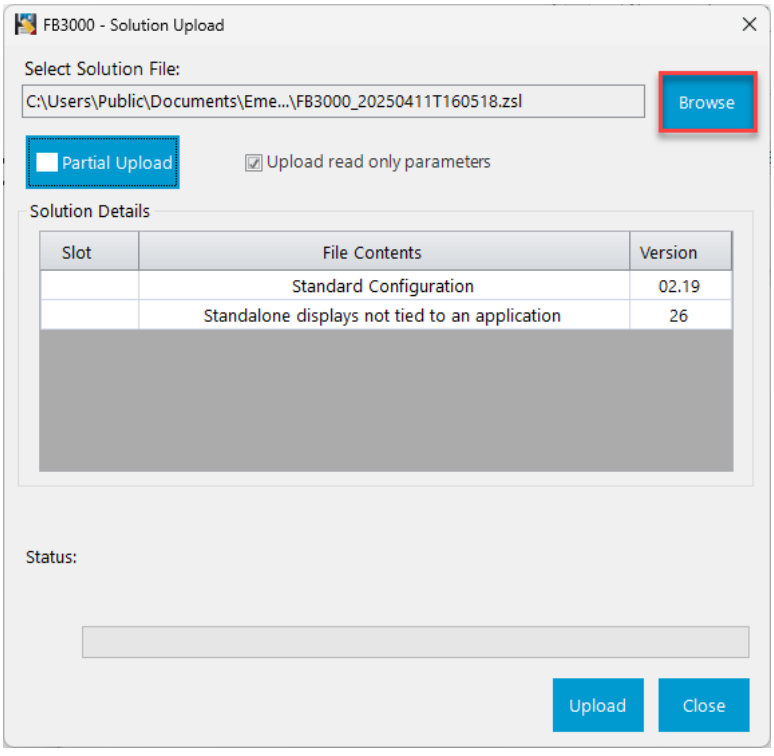
**Note**

For more information about solution files, refer to Solution Files.

To upload a Solution to your PC:

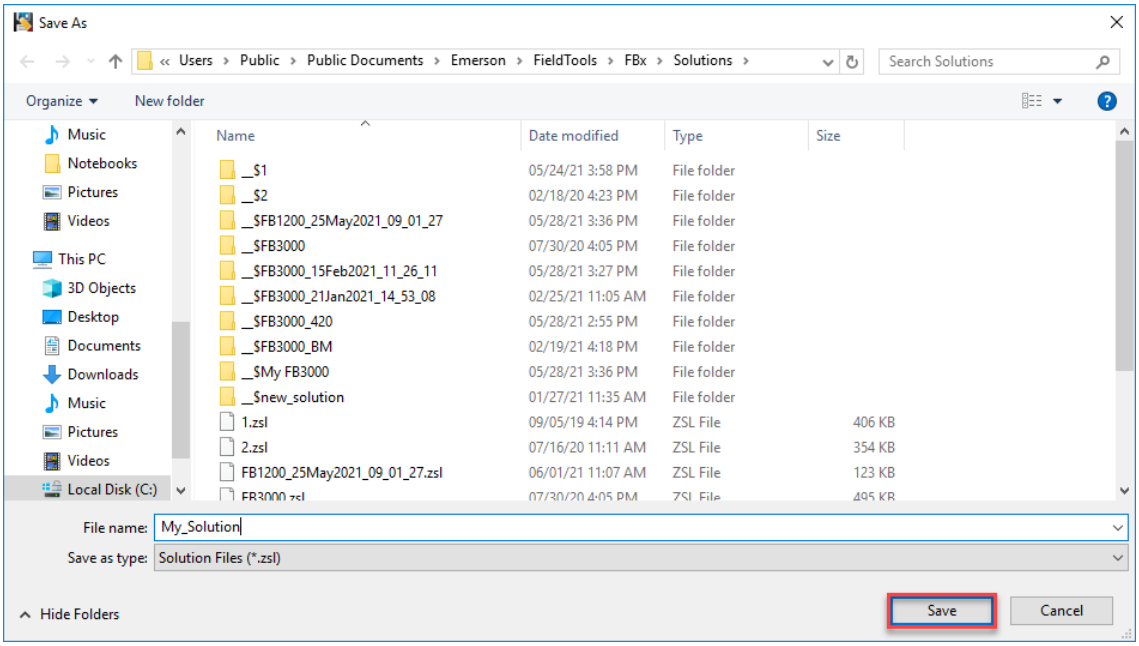
1. Select **File > Upload Solution** for the DeltaV FBxConnect configuration software main menu. The Solution Upload screen displays.

**Figure 23. Solution Upload**




2. Select **Browse** to open a file explorer window.

**Figure 24. Save As**

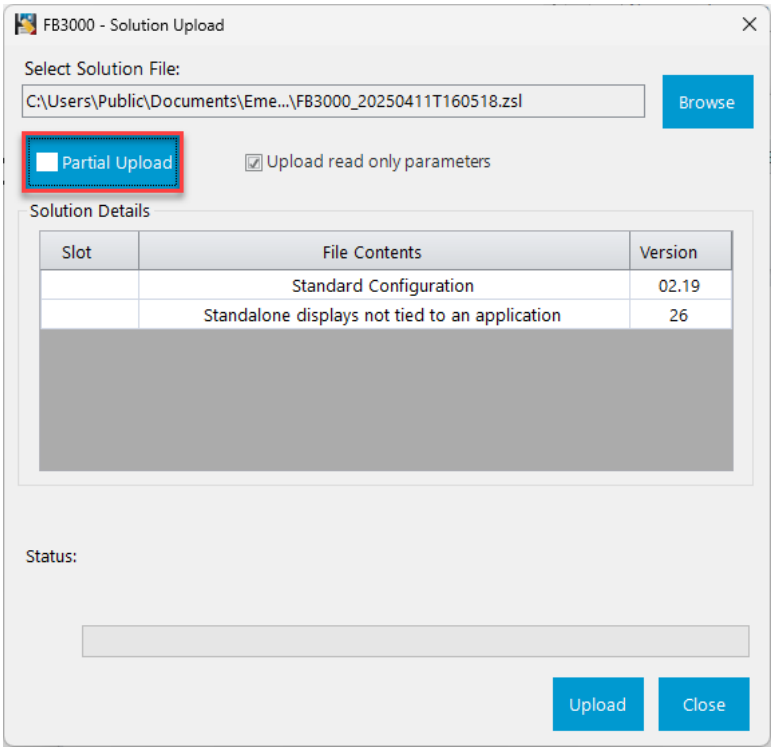



3. Navigate to a location on your PC you wish to save the Solution, enter a name for the Solution, and then select **Save**. The Solution Upload screen re-displays.

**Note**

- The default file name includes the connection/device name, report type, and timestamp of report creation (*ConnectionName_ReportType_YYMMDDThhmmss*).
- The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Solutions*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.

**Figure 25. Partial Upload**

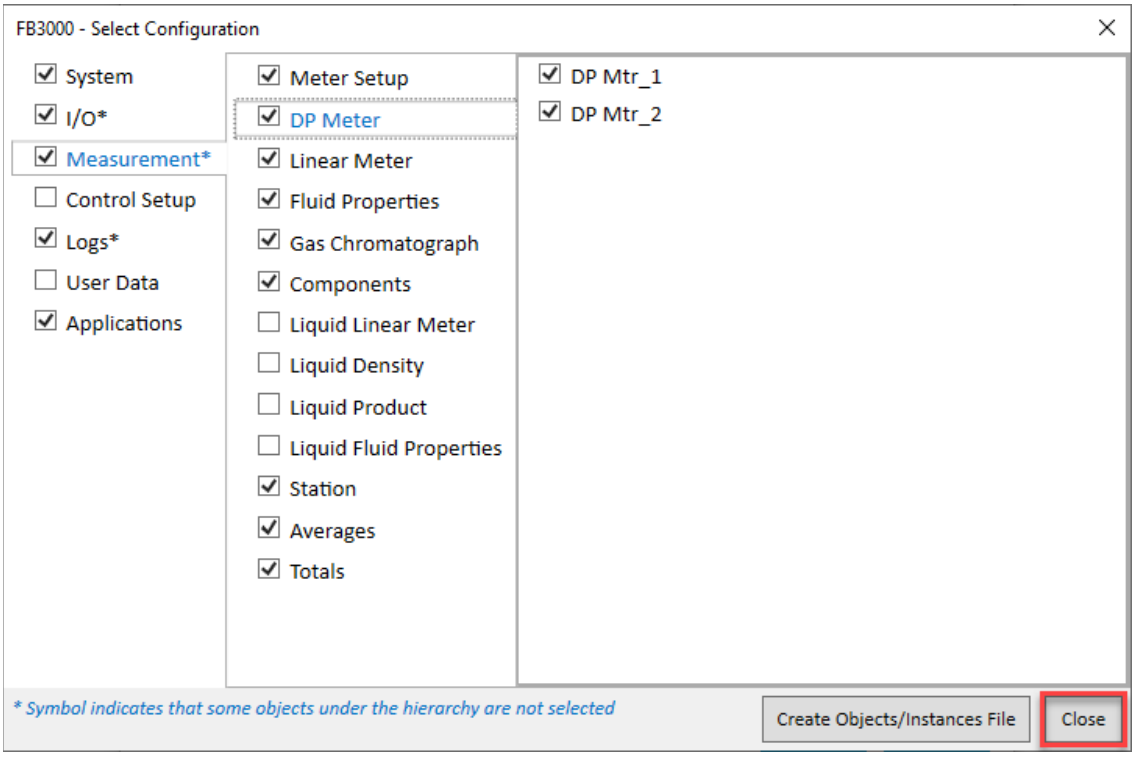



4. If you want to manually select which Objects and Instances are saved in the configuration file, select **Partial Upload**. The Select Configuration dialog opens.

**Note**

The Partial Upload option requires firmware version 2.7 or later.

**Figure 26. Select Configuration**




5. Place a check mark next to the specific Objects and Instances you wish to save in the configuration file and click **Close**. The Configuration Upload dialog re-displays.

**Note**

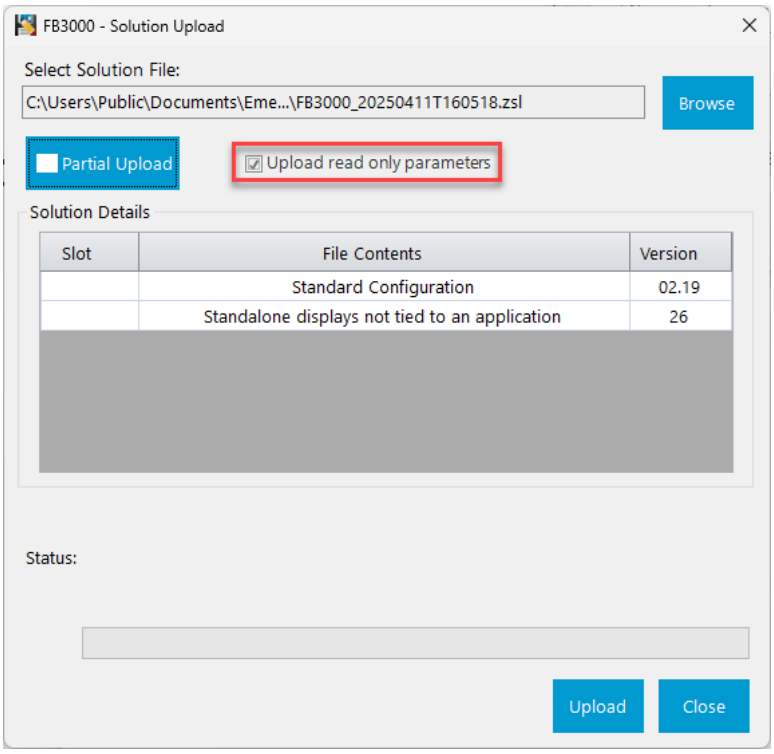
- Select an object in the left most column to show the associated objects/instances in the next column. Continue this process for the subsequent columns to select which parameters to include in the configuration. For example, select Measurement in the left-hand column and Fluid Properties in the middle column to display the configured Fluid Properties instances in the right-hand column.
- An asterisk (*) next to an object indicates that only a partial set of parameters is selected for that particular object.
- Partial configuration files are stored with the file extension **.PTC**.
- Select the **Create Objects/Instances File** button to create a file with an .OIF file extension that contains the object names and instance numbers for the selected objects. You can use this file to upload a partial configuration using the UPLOAD_PARTIAL command in the FBx Script Developer tool. **This file is not used by DeltaV FBxConnect**.

6. Select **Upload read only parameters** to include all **read-only** parameters in the configuration file. This option provides a snapshot of the FB Series product, and the resulting configuration file includes flow rates, totals, and diagnostic values. This option is useful when troubleshooting a device.

**Note**

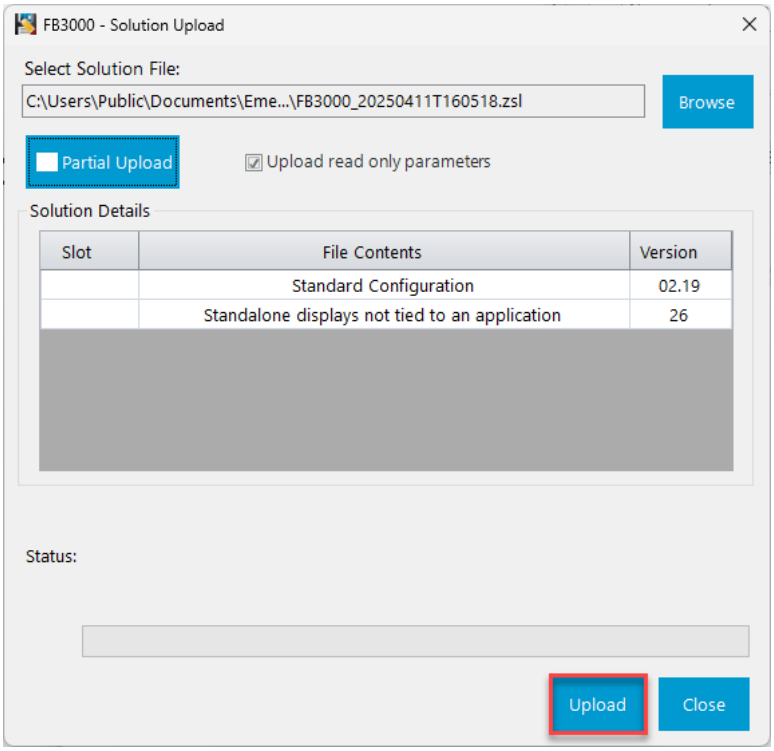
This option is **not** available if you select **Partial Upload**.

**Figure 27. Upload read only parameters**




7. Select **Upload**. DeltaV FBxConnect configuration software saves the selected Solution to your PC.

**Figure 28. Upload**

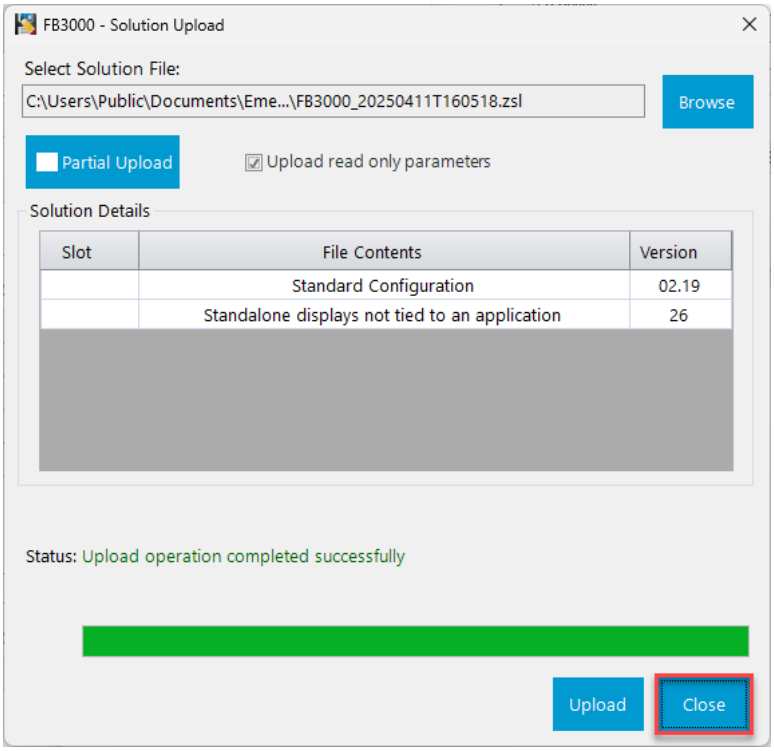



**Note**

A progress bar displays the status of the Solution save process.

8. When the Solution upload process is complete, select **Close** to return to the main DeltaV FBxConnect configuration software screen.

**Figure 29. Solution Saved Successfully**




## 2.4 Download Solution

You can download a solution file to your FB Series product after you have saved the solution file to your PC. A Solution contains application and configuration data for an FB Series product. When you Download a Solution, the system transfers application and configuration data from your PC and loads it into your FB Series product.

**Note**

For more information about solution files, refer to Solution Files.

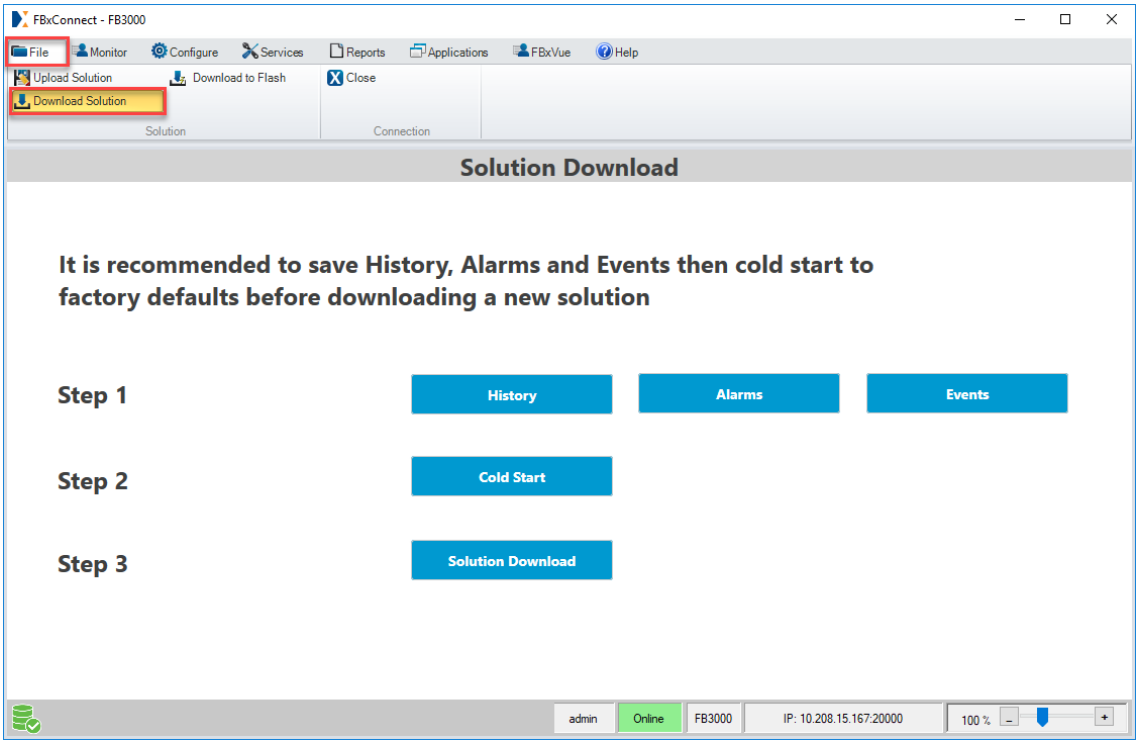
To download a Solution to your FB Series product:

1. Select **File > Download Solution** from the DeltaV FBxConnect configuration software menu. The Solution Download display opens.

**Note**

Emerson recommends performing step 1 and step 2 prior to downloading a solution.

**Figure 30. Solution Download**



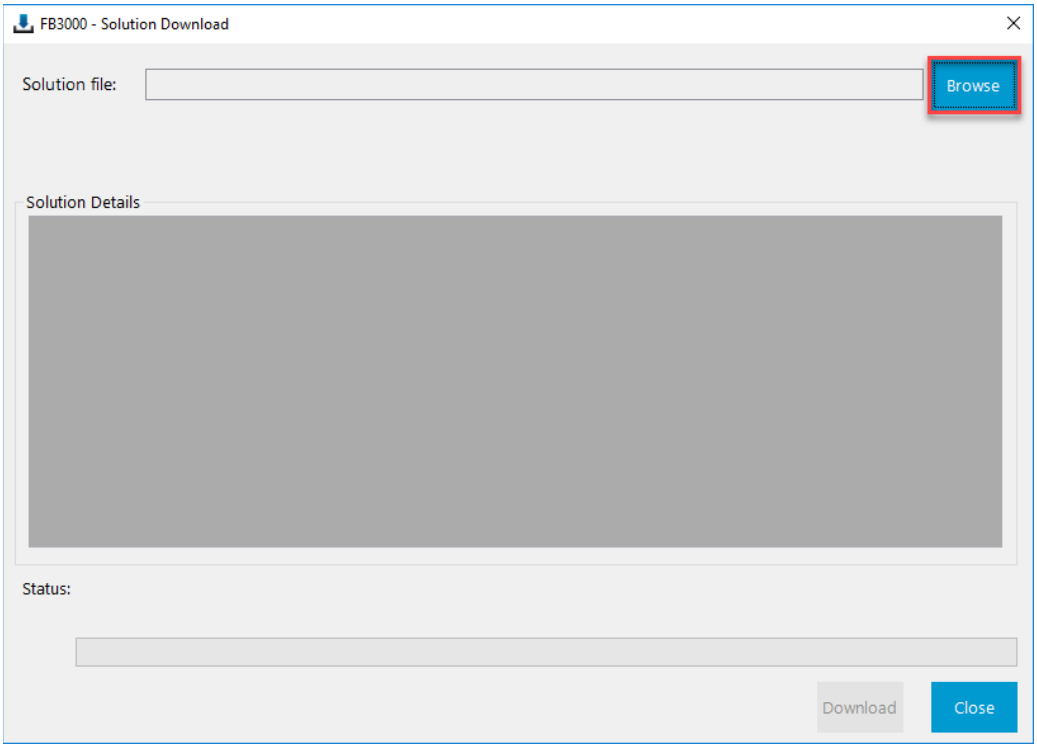

2. Select **History** to save history data. The History Report display opens. For more information, refer to History Report.
3. Select **Alarms** to save alarm data. The Alarm Report display opens. For more information, refer to Alarm Report.
4. Select **Events** to save event data. The Event Report display opens. For more information, refer to Event Report.
5. Select **Cold Start**. The Cold Start display opens. For more information, refer to Cold Start.

**Note**

Be sure to select **Database is re-initialized with factory defaults**.

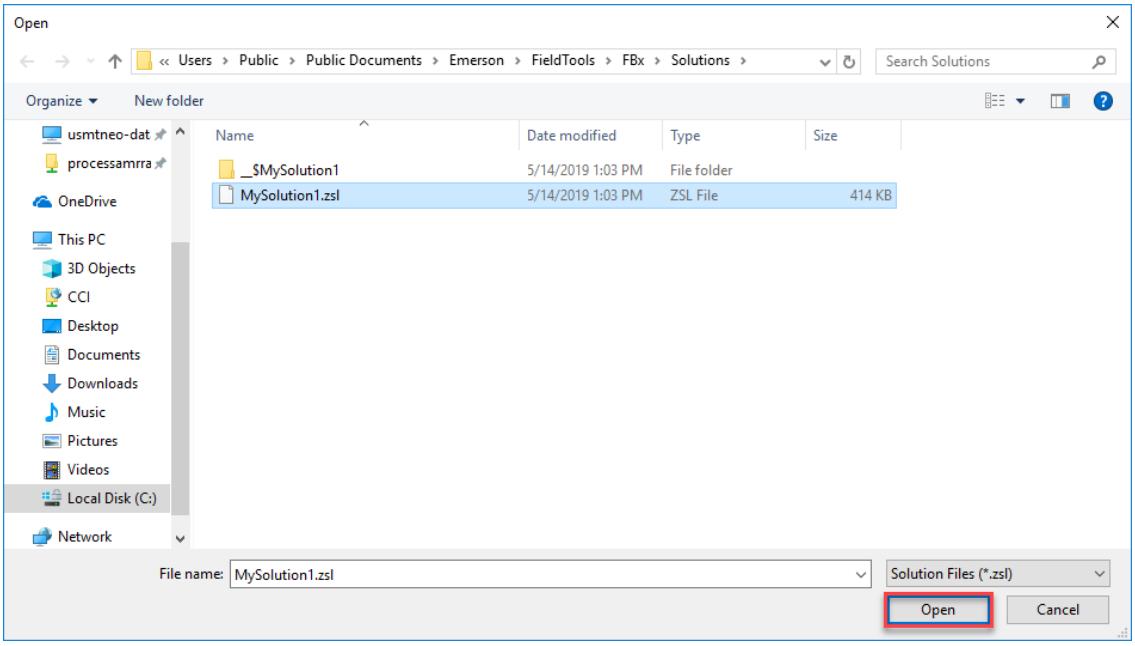
6. Select **Solution Download**. The Solution Download dialog displays:

**Figure 31. Solution Download**




7. Select **Browse** to open a file explorer window.

**Figure 32. Open**



8. Navigate to a location on your PC of the saved configuration file and select **Open**. The Solution Download screen re-displays.

**Note**

- The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Solutions*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.
- Partial configuration files are stored with the file extension **.PTC**. To view partial configuration files, you **must** select PTC files in the file type drop-down.

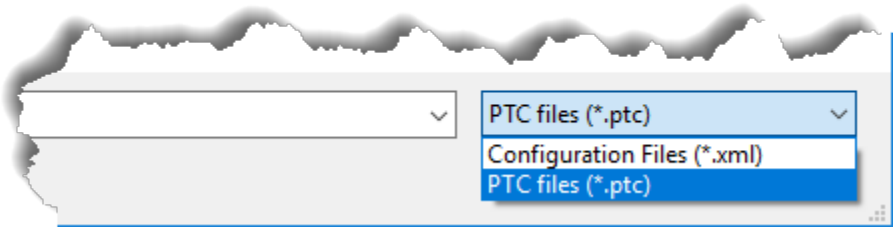
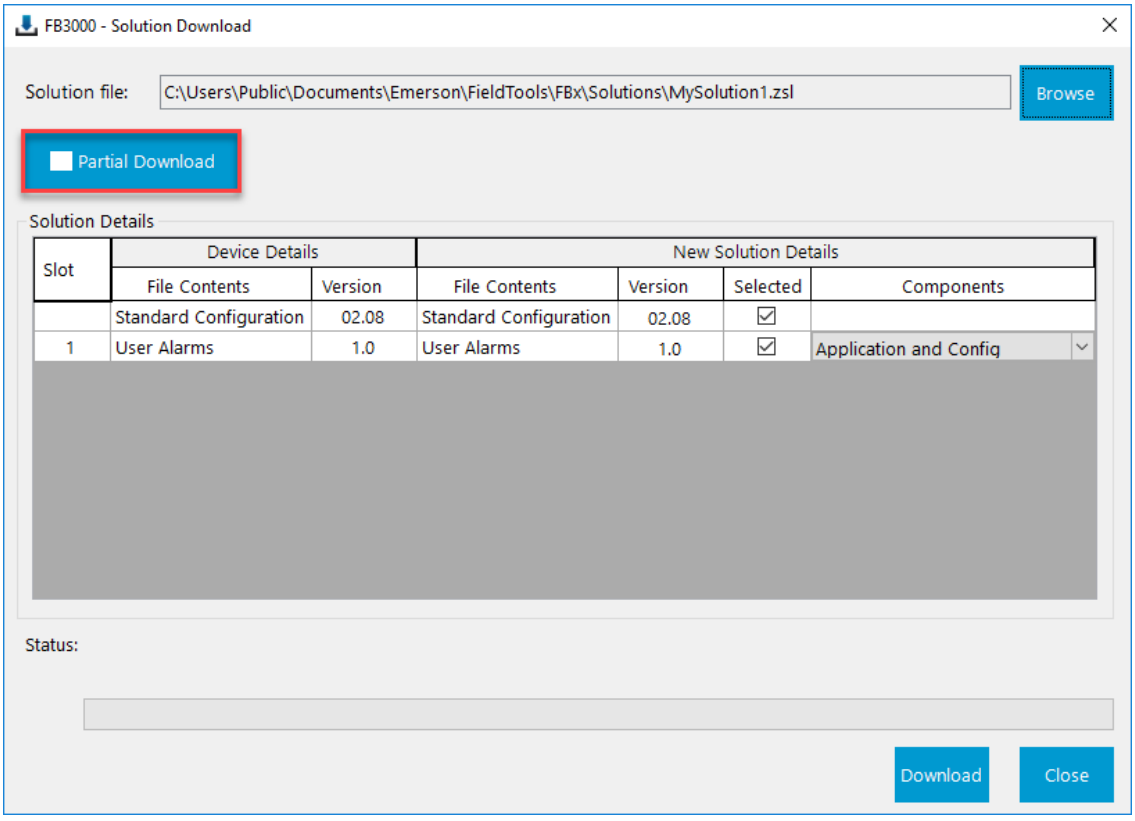



**Figure 33. Partial Download**

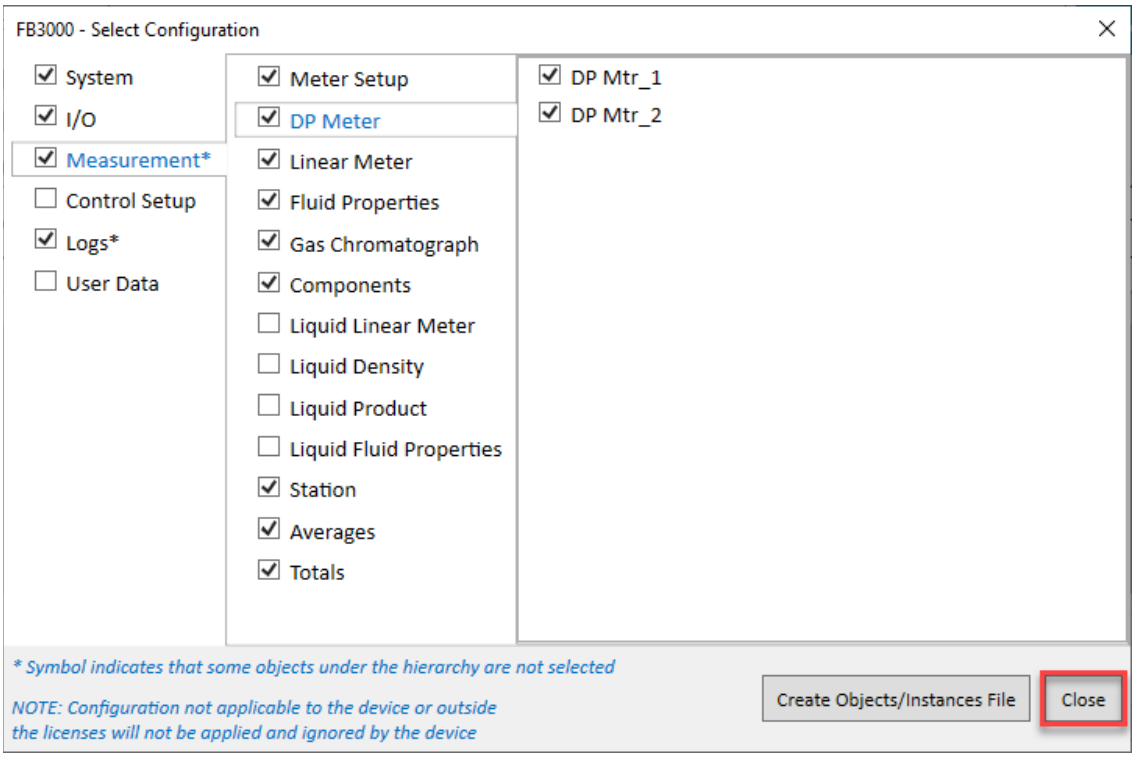


9. If you want to manually select which Objects and Instances are saved in the configuration file, select **Partial Download**. The Select Configuration dialog opens.

**Note**

The Partial Download option requires firmware version 2.7 or later.

**Figure 34. Select Configuration**



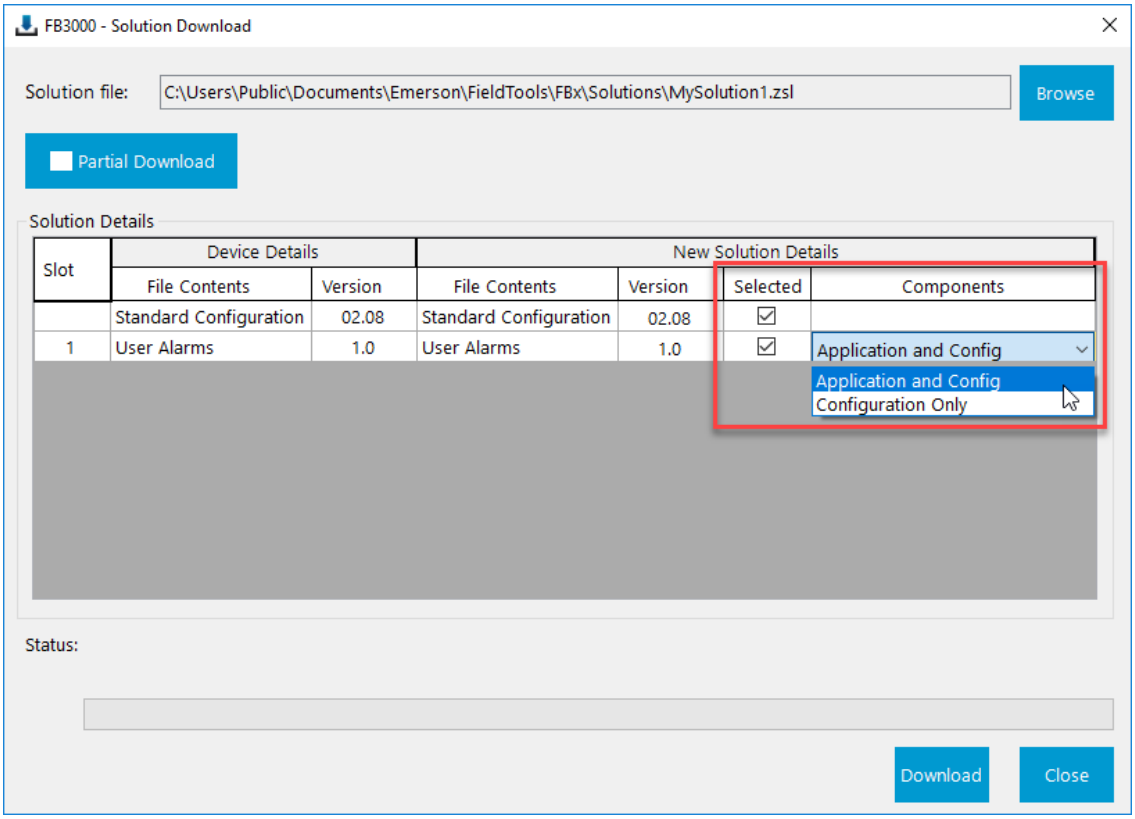

10. Place a check mark next to the specific Objects and Instances you wish to download to your FB Series product and click **Close**. The Solution Download dialog re-displays.

**Note**

- Select an object in the left most column to show the associated objects/instances in the next column. Continue this process for the subsequent columns to select which parameters to include in the configuration. For example, select Measurement in the left-hand column and Fluid Properties in the middle column to display the configured Fluid Properties instances in the right-hand column.
- An asterisk (*) next to an object indicates that only a partial set of parameters is selected for that particular object.

- The system **does not** download objects and instances that require features or licenses not present in the FB Series product.
- Select the **Create Objects/Instances File** button to create a file with an .OIF file extension that contains the object names and instance numbers for the selected objects. You can use this file to upload a partial configuration using the UPLOAD_PARTIAL command in the FBx Script Developer tool. **This file is not used by DeltaV FBxConnect**.

**Figure 35. Selected Components**

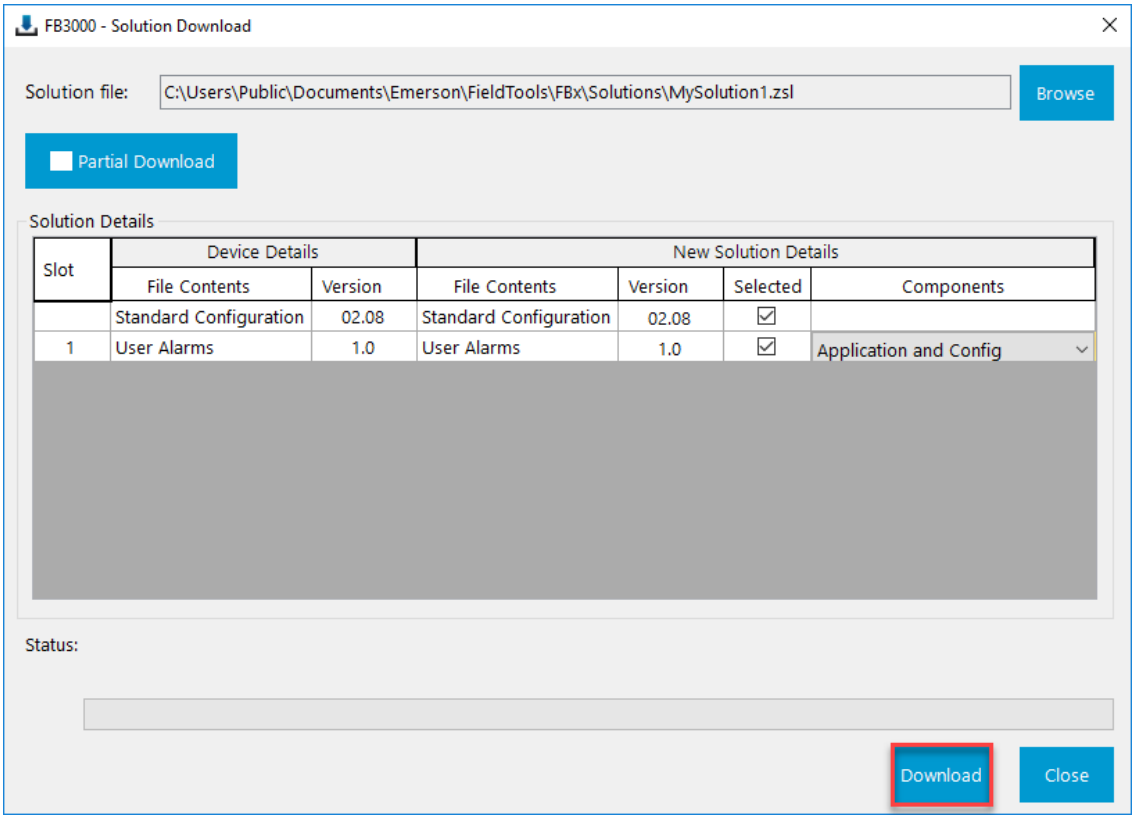



**11.** A solution file may contain multiple items, including the standard FB Series product configuration and various applications. Place a check mark in the Selected column for any item you want to download to the FB Series product.

**Note**

If you include any applications in the download, use the drop-down menu in the **Components** column to select either the application and configuration or the only the configuration.

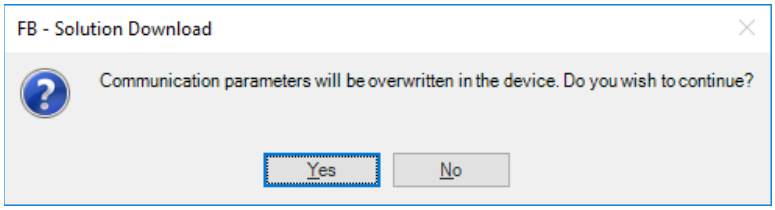
**Figure 36. Download**




**12.** Select **Download** to download your Solution to your FB Series product.

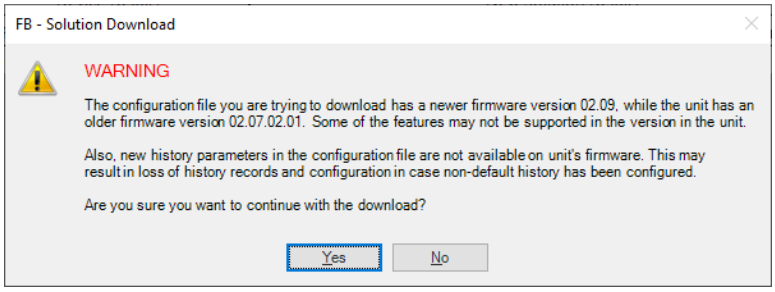
### Note

- A progress bar displays the status of the Solution download process.
- A warning dialog opens when you try to download a Solution that includes configured communications parameters. You can potentially lose connection with the FB Series product if you change the parameters on the port to which you are currently connected. Select **Yes** to continue loading the Solution with the new communications configuration. Select **No** to return to the Solution Download screen.



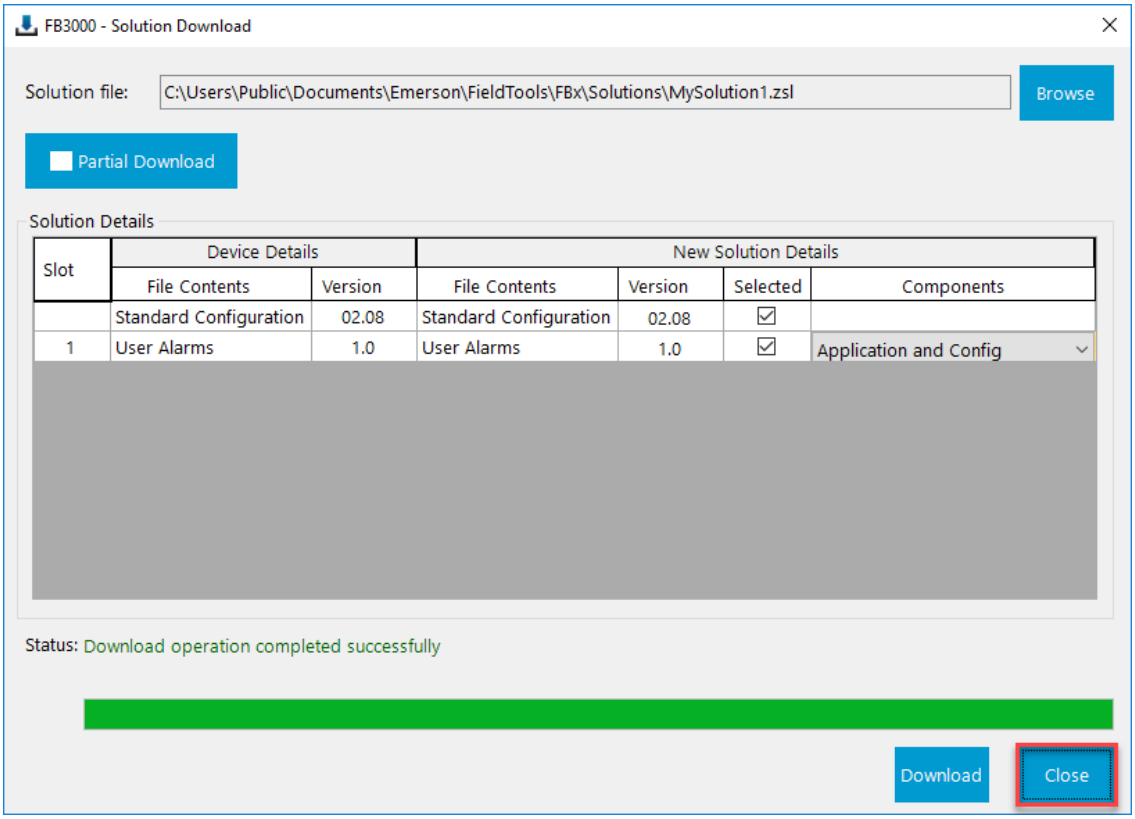

- A warning dialog opens if you attempt to download a solution created with a newer firmware version to an FB Series product with an older firmware version. Some features and parameters may not be present in older versions of firmware.

Downloading the configuration may result in the loss of history records and configuration. Select **Yes** to continue or **No** to cancel the download.




13. When the Solution download is complete, select **Close** to return to the main DeltaV FBxConnect configuration software screen.

**Figure 37. Solution Downloaded Successfully**




## 2.5 Download to Flash

Use this option to load a previously saved solution's configuration file to the flash memory of the connected FB Series product. The FB Series product can then load the

solution's configuration file saved in flash memory when performing a cold start or rebuilding the FB Series product database after corruption.

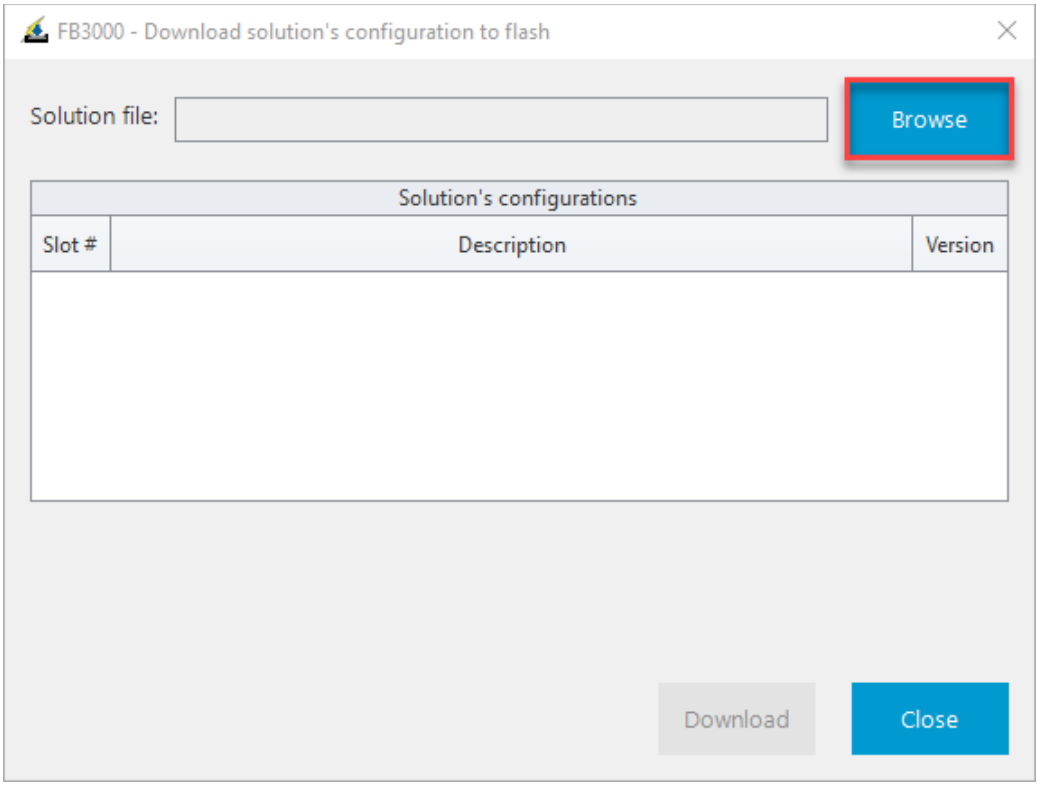
**Note**

You **must** save a solution's configuration file to your PC **before** you can download a solution's configuration file to flash memory. For information on saving a solution's configuration file to your PC, refer to Upload Solution and Save As.

To download a previously saved solution's configuration file to flash memory:

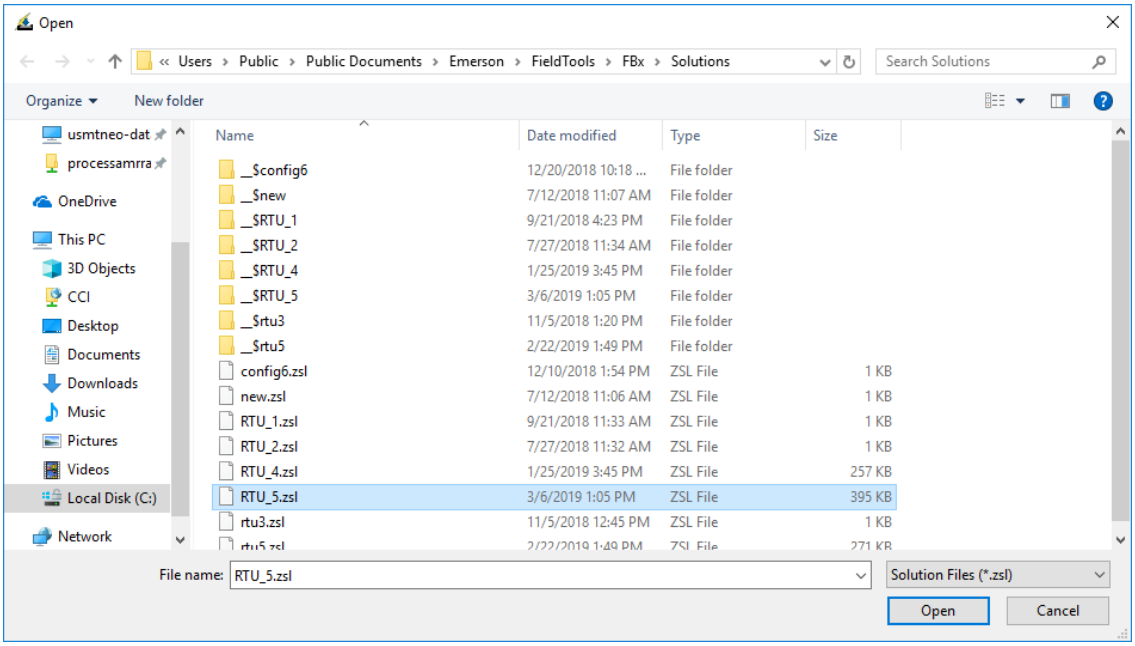
1. Select **File > Download to Flash** from the DeltaV FBxConnect configuration software main menu. The Download solution's configuration to flash dialog displays.

**Figure 38. Browse**



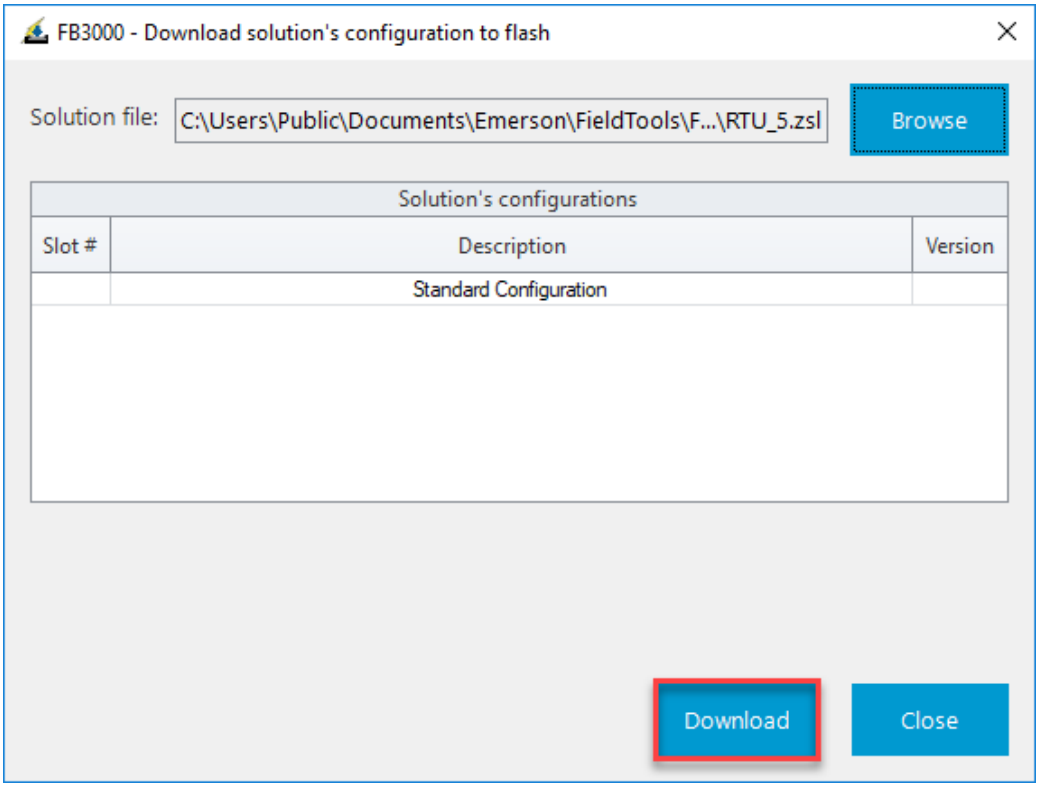

2. Select **Browse** to open a file explorer window.

**Figure 39. Open Configuration File**




**3.** Navigate to the location of your saved configuration file and select **Open**.

**Figure 40. Download**



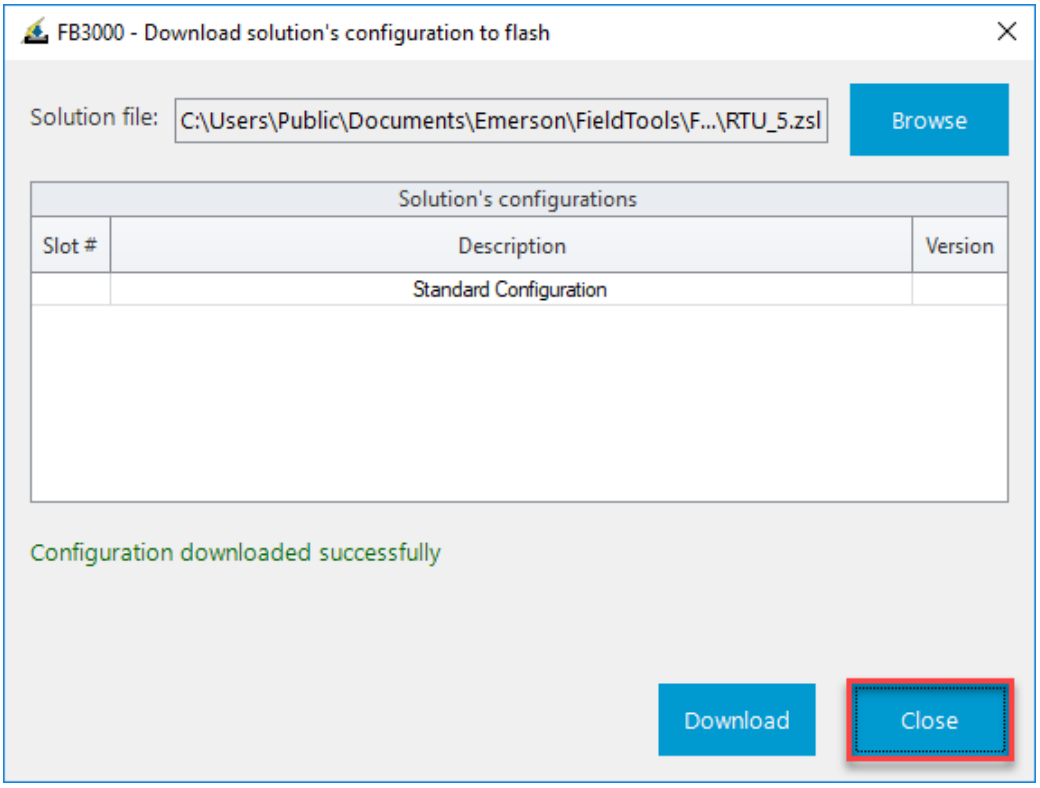
4. Select **Download**. DeltaV FBxConnect configuration software downloads the selected configuration to the FB Series product and saves the configuration to flash memory.

**Note**

A progress bar displays the status of the configuration save process.

5. When the configuration download to flash process is complete, select **Close** to return to the main DeltaV FBxConnect configuration software screen.

**Figure 41. Configuration Downloaded Successfully**

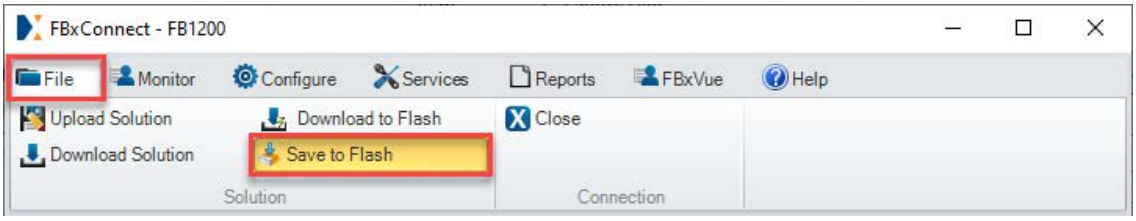



## 2.6 Save to Flash

Use this option to save the current configuration to the flash memory of the connected FB Series product. The FB Series product can then load the configuration file saved in flash memory when performing a cold start or rebuilding the FB Series product database after corruption.

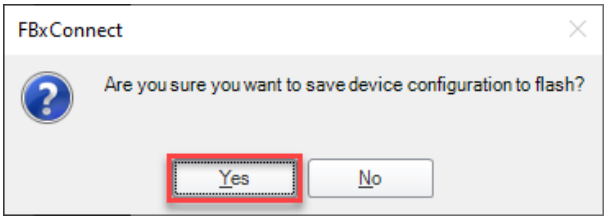
To save a configuration to flash memory:

**Figure 42. Save to Flash**




1. Select **File > Save to Flash** from the DeltaV FBxConnect configuration software main menu. A confirmation message opens.

**Figure 43. Save to Flash – Confirmation Message**




2. Select **Yes** to save your configuration to flash memory.

**Note**

- A progress window displays the status of the configuration save process.
- After saving your configuration to flash memory, you should verify the timestamp of the configuration file loaded to flash memory on the Configure > System display to ensure the process completed successfully.

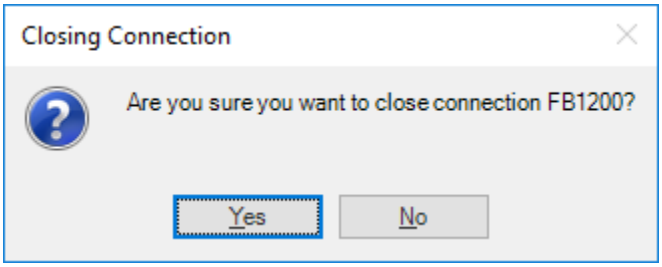
## 2.7 Close

Use this option to close the current connection or configuration and exit DeltaV FBxConnect configuration software.

To close DeltaV FBxConnect:

1. Select **File > Close** from the DeltaV FBxConnect configuration software main menu. A confirmation dialog opens.

**Figure 44. Closing Connection**

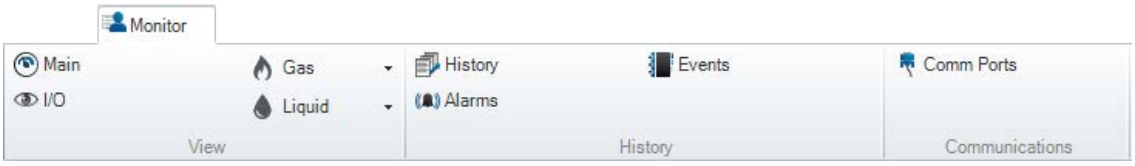



2. Select **Yes** to close the connection.

# Section 3: Monitor Menu

Use the options in this menu to view the current flowing conditions, communication port status, FB Series product history, alarms, and events.

**Figure 45. Monitor Menu**




The Monitor menu contains the following options:

Main – Shows an graphical representation of your RTU.

I/O – View data about the currently installed I/O points and currently configured PID loops.

**Gas**

DP Meter – View the current flow rates and totals for gas differential pressure meters.

Linear Meter – View the current flow rates and totals for gas linear meters.

**Liquid**

**Note**

These options appear **only** if the FB Series product has a Liquid Calculation license installed.

Liquid Linear Meter – View the current flow rates and totals for liquid linear meters.

Liquid Batching – Use this display to view the current batch totals for a liquid linear meter with batching enabled.

**History**

Periodic History – View user periodic, hourly, daily, weekly, and monthly history data stored on the connected FB Series product.

Transaction History – View data from each configured transaction history group.

Alarms – View alarms stored on the connected FB Series product.

Events – View events stored on the connected FB Series product.

Comm Ports – View the status and configuration of the communications ports located on the connected FB Series product.

# 3.1 Main

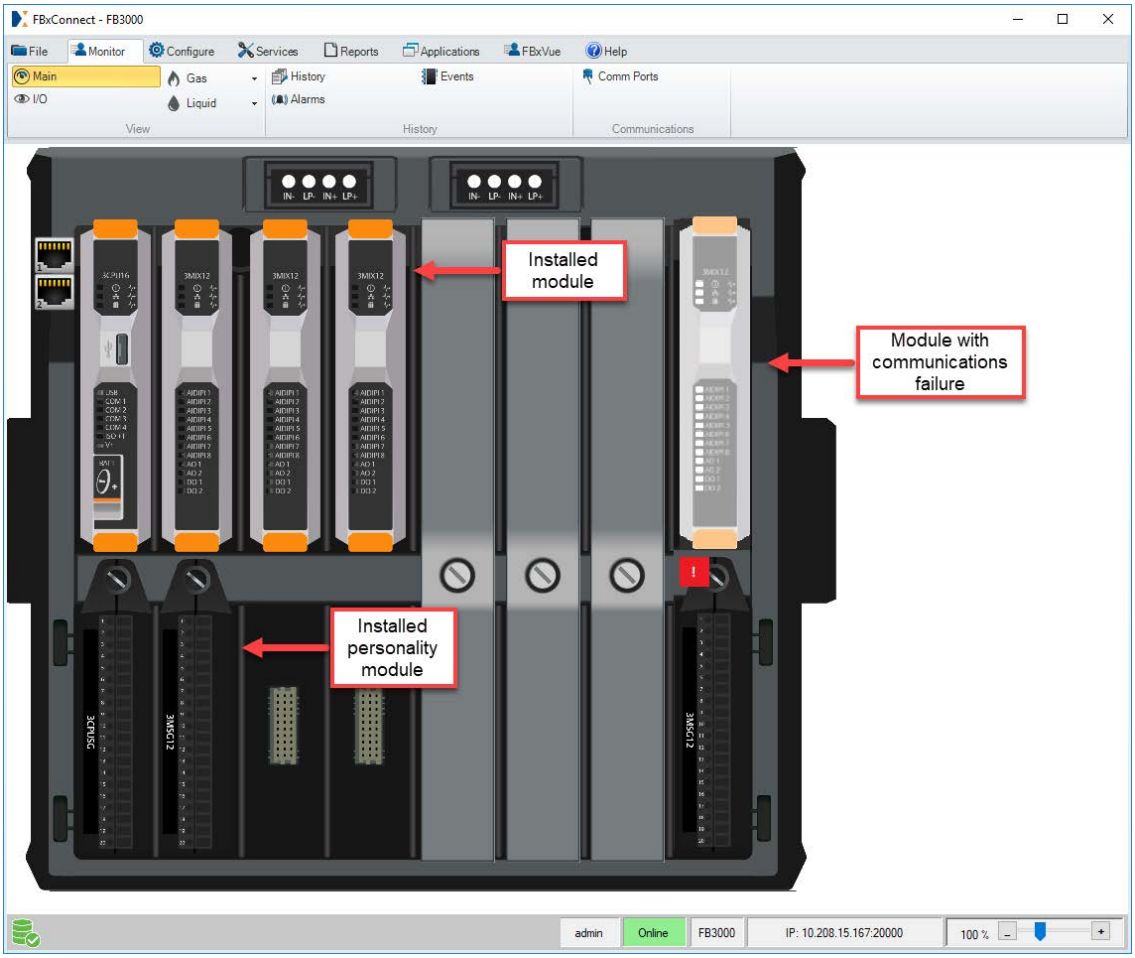
The Main display shows a graphical representation of your RTU. The system displays a yellow line around objects that are links when you hover your cursor over them and a tool-tip description of each object. Click on an object to open the DeltaV FBxConnect software configuration display for the selected object.

**Note**

- Click on a personality module to open the online help and view communications and I/O wiring diagrams.
- If a module encounters a communications failure (such as when a previously configured module has been removed), the graphical representation of that module is dimmed and a red box with an exclamation mark appears under the module. Click the red box to uninstall the module.

To access this display, select **Monitor > Main** from the DeltaV FBxConnect configuration software main menu.

**Figure 46. Main**




## 3.2 I/O

Use The I/O display to view data about the currently installed I/O modules. I/O data includes the type of I/O, engineering units to use with the point, and the current value of the point. Channels with an alarm currently raised are highlighted in red. Channels that are disabled are highlighted in yellow.

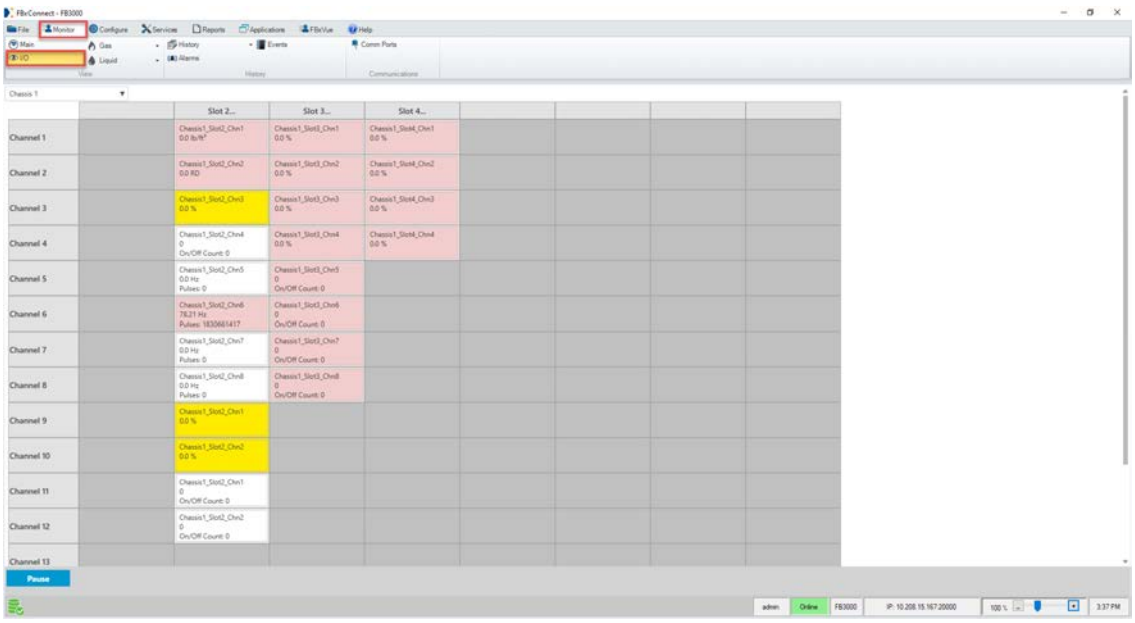
To access this display, select **Monitor > I/O** from the DeltaV FBxConnect configuration software main menu. The I/O Overview display opens.

**Note**

- The amount of I/O points shown on this display will vary depending on the type and number of modules installed.
- Fields highlighted in red are an indication of a value in an alarm state.

- Fields highlighted in yellow indicate a disabled channel.

**Figure 47. I/O**



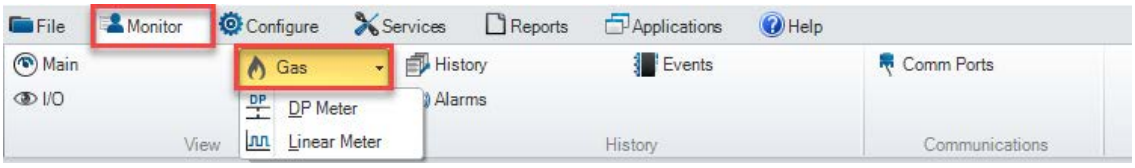
## 3.3 Gas

Use the Gas drop-down in the Monitor menu to view flow rates and totals for gas differential pressure and gas linear meters.

**Note**

The Gas drop-down items display **only** if you have previously configured at least one gas differential pressure or linear meter on the Meter Setup display.

**Figure 48. Monitor Gas**




The Gas drop-down contains the following options:

DP Meter – Use the Monitor Gas DP Meter display to view the current flow rates and totals for gas differential pressure meters.

Linear Meter – Use the Monitor Gas Linear Meter display to view the current flow rates and totals for gas linear meters.

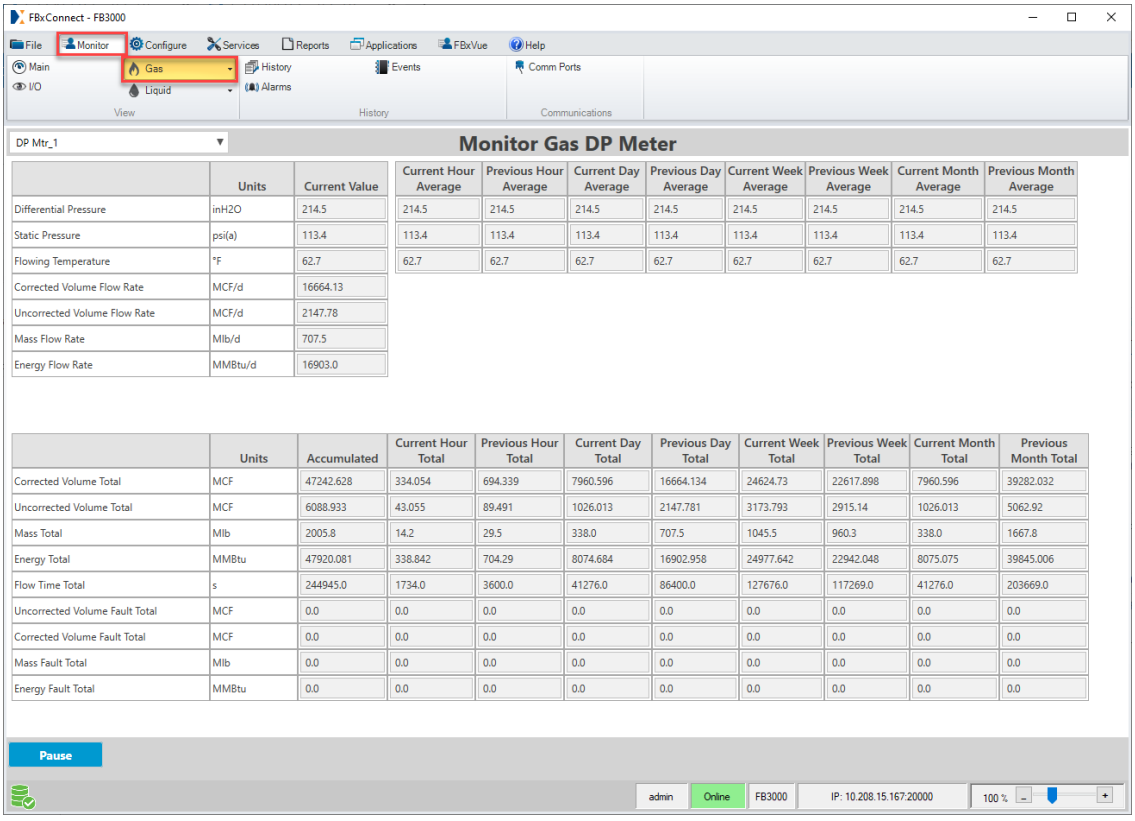
## 3.3.1 DP Meter

Use the Monitor Gas DP Meter display to view the current flow rates and totals for gas differential pressure meters. DeltaV FBxConnect configuration software provides you with real-time values, as well as values for the current hour, previous hour, current day, and previous day.

To access this display:

1. Select **Monitor > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu. The Monitor Gas DP Meter display opens.
2. Click ▼ to select a meter to view.

**Figure 49. Monitor Gas DP Meter**




| | Units | Current Value | Current Hour Average | Previous Hour Average | Current Day Average | Previous Day Average | Current Week Average | Previous Week Average | Current Month Average | Previous Month Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Differential Pressure | inH2O | 214.5 | 214.5 | 214.5 | 214.5 | 214.5 | 214.5 | 214.5 | 214.5 | 214.5 |
| Static Pressure | psi(a) | 113.4 | 113.4 | 113.4 | 113.4 | 113.4 | 113.4 | 113.4 | 113.4 | 113.4 |
| Flowing Temperature | °F | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 | 62.7 |
| Corrected Volume Flow Rate | MCF/d | 16664.13 | | | | | | | | |
| Uncorrected Volume Flow Rate | MCF/d | 2147.78 | | | | | | | | |
| Mass Flow Rate | Mlb/d | 707.5 | | | | | | | | |
| Energy Flow Rate | MMBtu/d | 16903.0 | | | | | | | | |

| | Units | Accumulated | Current Hour Total | Previous Hour Total | Current Day Total | Previous Day Total | Current Week Total | Previous Week Total | Current Month Total | Previous Month Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Corrected Volume Total | MCF | 47242.628 | 334.054 | 694.339 | 7960.596 | 16664.134 | 24624.73 | 22617.898 | 7960.596 | 39282.032 |
| Uncorrected Volume Total | MCF | 6088.933 | 43.055 | 89.491 | 1026.013 | 2147.781 | 3173.793 | 2915.14 | 1026.013 | 5062.92 |
| Mass Total | Mlb | 2005.8 | 14.2 | 29.5 | 338.0 | 707.5 | 1045.5 | 960.3 | 338.0 | 1667.8 |
| Energy Total | MMBtu | 47920.081 | 338.842 | 704.29 | 8074.684 | 16902.958 | 24977.642 | 22942.048 | 8075.075 | 39845.006 |
| Flow Time Total | s | 244945.0 | 1734.0 | 3600.0 | 41276.0 | 86400.0 | 127676.0 | 117269.0 | 41276.0 | 203669.0 |
| Uncorrected Volume Fault Total | MCF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Corrected Volume Fault Total | MCF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mass Fault Total | Mlb | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy Fault Total | MMBtu | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

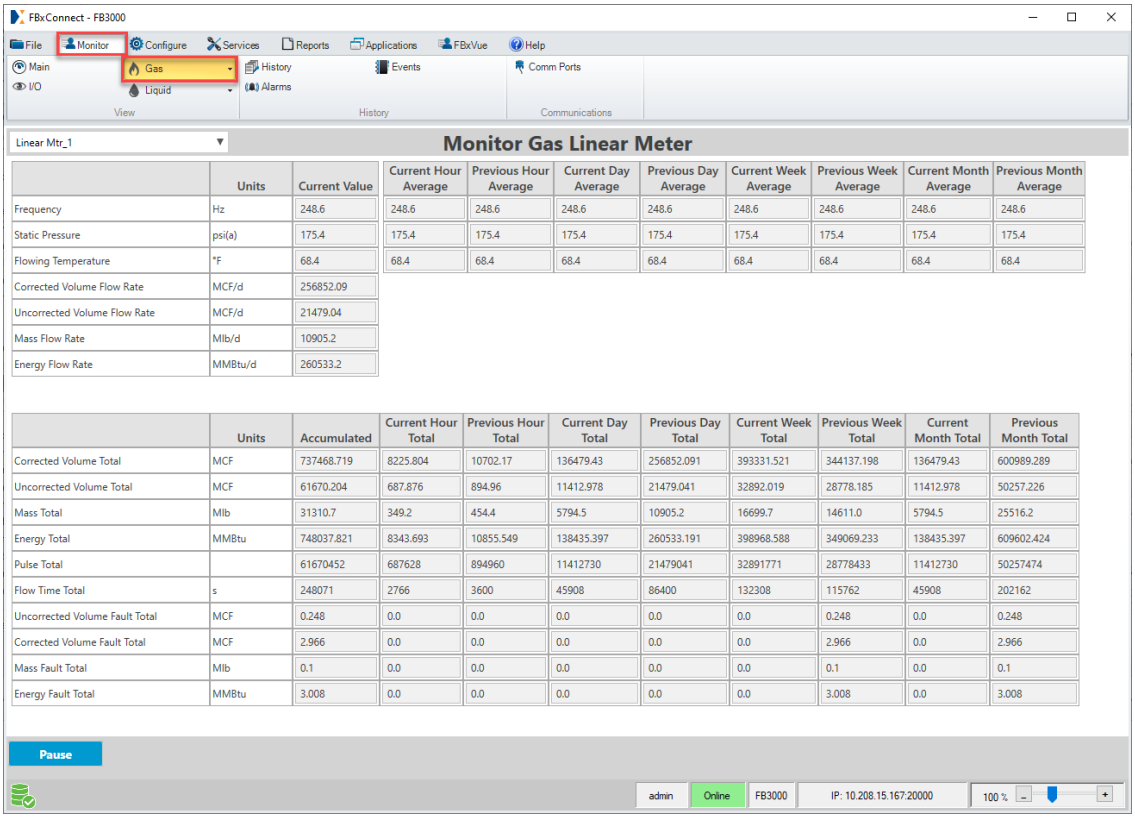
## 3.3.2 Linear Meter

Use the Monitor Gas Linear Meter display to view the current flow rates and totals for gas linear meters. DeltaV FBxConnect configuration software provides you with real-time values, as well as values for the current hour, previous hour, current day, and previous day.

To access this display:

1. Select **Monitor >Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu. The Monitor Gas Linear Meter display opens.
2. Click ▼ to select a meter to view.

**Figure 50. Monitor Gas Linear Meter**




| | Units | Current Value | Current Hour Average | Previous Hour Average | Current Day Average | Previous Day Average | Current Week Average | Previous Week Average | Current Month Average | Previous Month Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | Hz | 248.6 | 248.6 | 248.6 | 248.6 | 248.6 | 248.6 | 248.6 | 248.6 | 248.6 |
| Static Pressure | psi(a) | 175.4 | 175.4 | 175.4 | 175.4 | 175.4 | 175.4 | 175.4 | 175.4 | 175.4 |
| Flowing Temperature | °F | 68.4 | 68.4 | 68.4 | 68.4 | 68.4 | 68.4 | 68.4 | 68.4 | 68.4 |
| Corrected Volume Flow Rate | MCF/d | 256852.09 | | | | | | | | |
| Uncorrected Volume Flow Rate | MCF/d | 21479.04 | | | | | | | | |
| Mass Flow Rate | Mlb/d | 10905.2 | | | | | | | | |
| Energy Flow Rate | MMBtu/d | 260533.2 | | | | | | | | |

| | Units | Accumulated | Current Hour Total | Previous Hour Total | Current Day Total | Previous Day Total | Current Week Total | Previous Week Total | Current Month Total | Previous Month Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Corrected Volume Total | MCF | 737468.719 | 8225.804 | 10702.17 | 136479.43 | 256852.091 | 393331.521 | 344137.198 | 136479.43 | 600989.289 |
| Uncorrected Volume Total | MCF | 61670.204 | 687.876 | 894.96 | 11412.978 | 21479.041 | 32892.019 | 28778.185 | 11412.978 | 50257.226 |
| Mass Total | Mlb | 31310.7 | 349.2 | 454.4 | 5794.5 | 10905.2 | 16699.7 | 14611.0 | 5794.5 | 25516.2 |
| Energy Total | MMBtu | 748037.821 | 8343.693 | 10855.549 | 138435.397 | 260533.191 | 398968.588 | 349069.233 | 138435.397 | 609602.424 |
| Pulse Total | | 61670452 | 687628 | 894960 | 11412730 | 21479041 | 32891771 | 28778433 | 11412730 | 50257474 |
| Flow Time Total | s | 248071 | 2766 | 3600 | 45908 | 86400 | 132308 | 115762 | 45908 | 202162 |
| Uncorrected Volume Fault Total | MCF | 0.248 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.248 | 0.0 | 0.248 |
| Corrected Volume Fault Total | MCF | 2.966 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.966 | 0.0 | 2.966 |
| Mass Fault Total | Mlb | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 |
| Energy Fault Total | MMBtu | 3.008 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.008 | 0.0 | 3.008 |

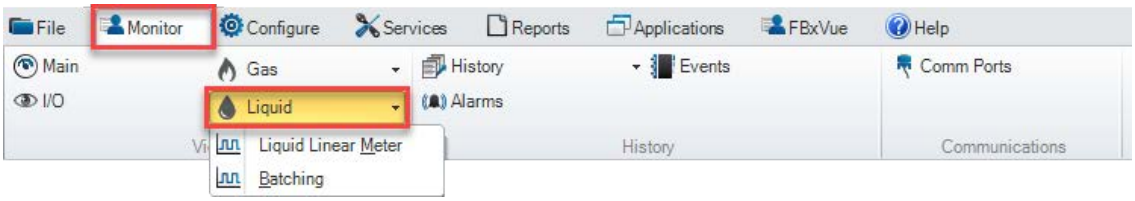
# 3.4 Liquid

Use the Liquid drop-down in the Monitor menu to view flow rates and totals for liquid linear meters.

**Note**

- This option appears **only** if the FB Series product has a Liquid Calculation license installed.
- The Liquid drop-down displays **only** if you have previously configured at least one liquid meter on the Meter Setup display.

**Figure 51. Monitor Liquid**




The Liquid drop-down contains the following options:

Liquid Linear Meter – Use this display to view the current flow rates and totals for liquid linear meters.

Liquid Batching – Use this display to view the current batch totals for a liquid linear meter with batching enabled.

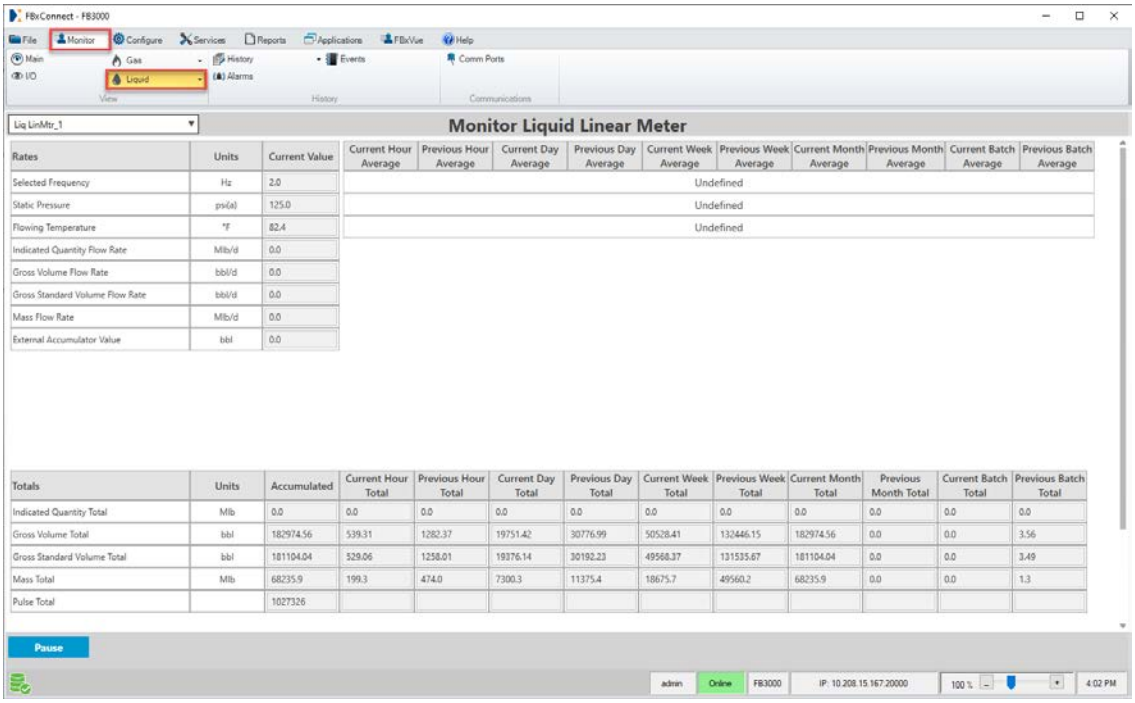
## 3.4.1 Liquid Linear Meter

Use this display to view the current flow rates and totals for liquid linear meters. DeltaV FBxConnect configuration software provides you with the current values, as well as values for the current and previous hour, day, week, month, and batch.

To access this display, select **Monitor > Liquid > Liquid Linear Meter**. The Monitor Liquid Linear Meter display opens.

Click ▼ in the drop-down list at the top of the display to select a liquid linear meter to view.

**Figure 52. Monitor Liquid Linear Meter**



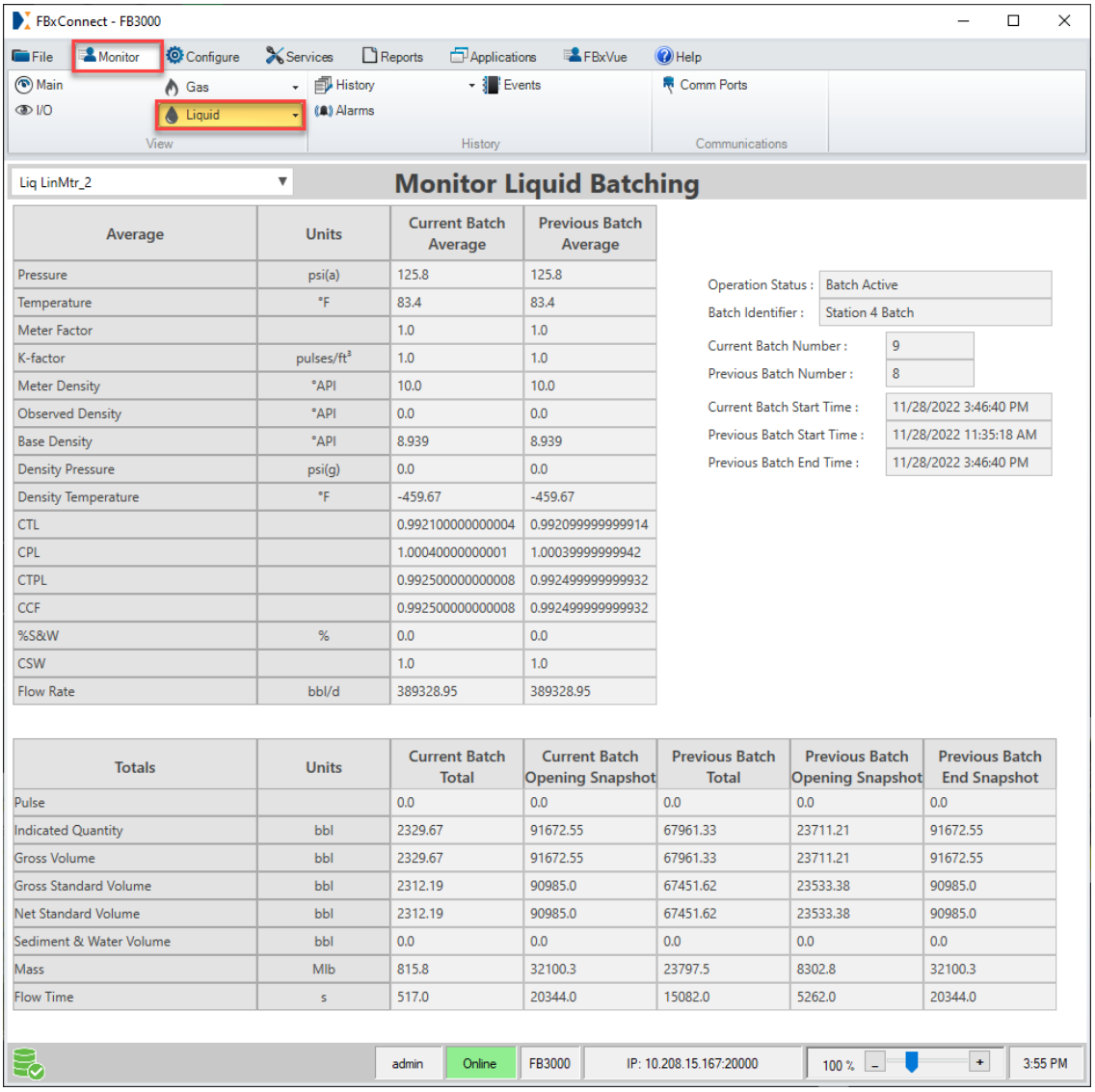

## 3.4.2 Liquid Batching

Use this display to view the current batch totals for a liquid linear meter with batching enabled. DeltaV FBxConnect configuration software provides you with the current and previous batch averages and totals.

To access this display, select **Monitor > Liquid > Batching**. The Monitor Liquid Batching display opens.

Click ▼ in the drop-down list at the top of the display to select a liquid linear meter to view.

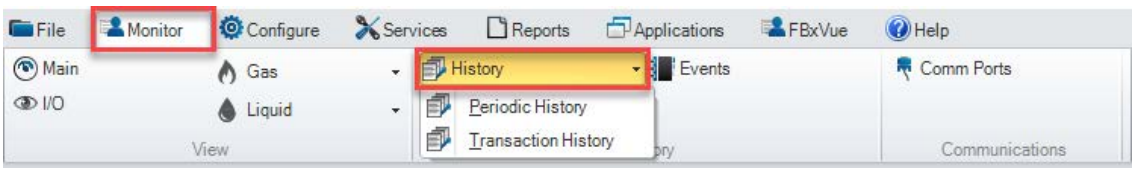
**Figure 53. Monitor Liquid Linear Meter**




## 3.5 History

Use the History drop-down in the Monitor menu to view history data stored in your FB Series product.

**Figure 54. Monitor History**



The History drop-down contains the following options:

Periodic History – Use this display to view the current flow rates and totals for liquid linear meters.

Transaction History – Use this display to view the current flow rates and totals for liquid linear meters.

## 3.5.1 Periodic History

Use the Periodic History option to view user periodic, hourly, daily, weekly, and monthly history data. You can view data from each periodic history group, including User Periodic, General, and Station History.

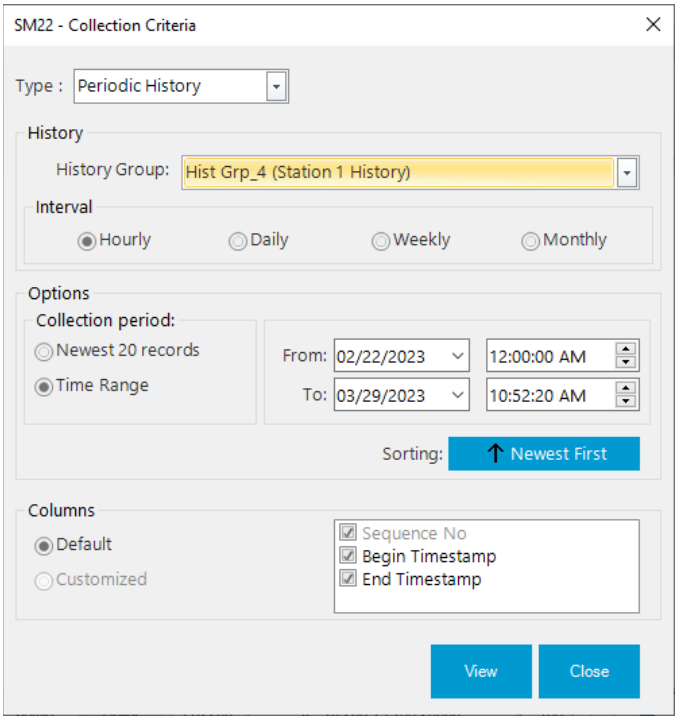
**Note**

- You **must** first configure history points before viewing history data. For more information, refer to Configure – History.
- The integrity of each history record is checked, and only history records with good integrity are shown.
- Each history record has an associated sequence number. A missing history record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To view periodic history data stored on an FB Series product:

1. Select **Monitor >History> Periodic History** from the DeltaV FBxConnect configuration software main menu. The Collection Criteria dialog displays.

**Figure 55. Collection Criteria – Periodic History**




2. Click ▼ in the **History Group** field to select the history group you want to view. Possible options are User Periodic 1, User Periodic 2, General History, Station History 1, or Station History 2.

3. If you select **General History**, **Station History 1**, or **Station History 2** in the History Group field, select a time frequency for the collected data in the **Interval** field. Possible options are **Hourly**, **Daily**, **Weekly**, or **Monthly**.

4. In the Collection period field, select **Oldest 20 records/Newest 20 Records** to view the twenty oldest/newest history records or select **Time Range** to view history records from a specific time and date range.

### Note

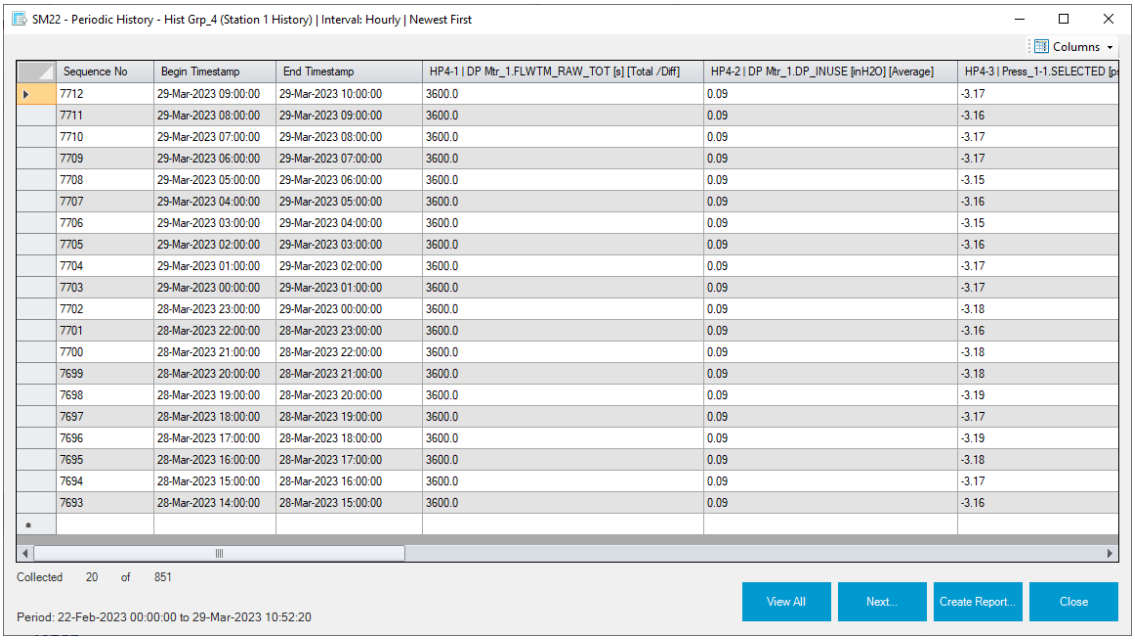
Your selection in the **Sorting** field controls the options presented in this field.

5. Click the button in the in the **Sorting** field to control the order of records in the history report. Possible options are:

   - **Newest First** – Records are sorted from the newest to the oldest.
   - **Oldest First** – Records are sorted from the oldest to the newest.

6. If you select **Time Range** in the Collection period field, enter a beginning and ending date and time in the **From** and **To** fields.
7. In the Columns field, select or deselect the columns you want to include in the default report view.
8. Click **View** to view the selected history.

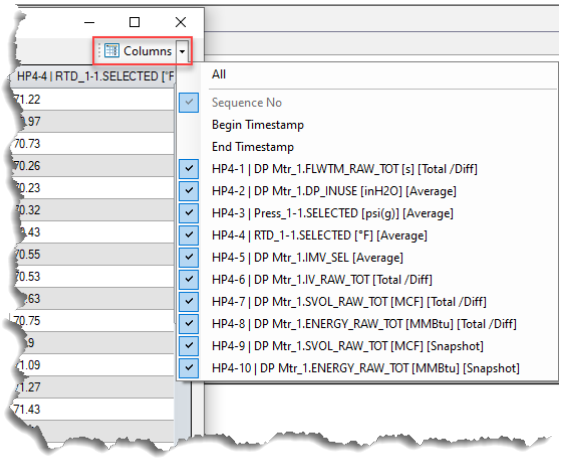
**Figure 56. Periodic History**




| Sequence No | Begin Timestamp | End Timestamp | HP4-1 \| DP Mtr_1.FLWTM_RAW_TOT [s] [Total /Diff] | HP4-2 \| DP Mtr_1.DP_INUSE [inH2O] [Average] | HP4-3 \| Press_1-1.SELECTED [p |
|---|---|---|---|---|---|
| 7712 | 29-Mar-2023 09:00:00 | 29-Mar-2023 10:00:00 | 3600.0 | 0.09 | -3.17 |
| 7711 | 29-Mar-2023 08:00:00 | 29-Mar-2023 09:00:00 | 3600.0 | 0.09 | -3.16 |
| 7710 | 29-Mar-2023 07:00:00 | 29-Mar-2023 08:00:00 | 3600.0 | 0.09 | -3.17 |
| 7709 | 29-Mar-2023 06:00:00 | 29-Mar-2023 07:00:00 | 3600.0 | 0.09 | -3.17 |
| 7708 | 29-Mar-2023 05:00:00 | 29-Mar-2023 06:00:00 | 3600.0 | 0.09 | -3.15 |
| 7707 | 29-Mar-2023 04:00:00 | 29-Mar-2023 05:00:00 | 3600.0 | 0.09 | -3.16 |
| 7706 | 29-Mar-2023 03:00:00 | 29-Mar-2023 04:00:00 | 3600.0 | 0.09 | -3.15 |
| 7705 | 29-Mar-2023 02:00:00 | 29-Mar-2023 03:00:00 | 3600.0 | 0.09 | -3.16 |
| 7704 | 29-Mar-2023 01:00:00 | 29-Mar-2023 02:00:00 | 3600.0 | 0.09 | -3.17 |
| 7703 | 29-Mar-2023 00:00:00 | 29-Mar-2023 01:00:00 | 3600.0 | 0.09 | -3.17 |
| 7702 | 28-Mar-2023 23:00:00 | 29-Mar-2023 00:00:00 | 3600.0 | 0.09 | -3.18 |
| 7701 | 28-Mar-2023 22:00:00 | 28-Mar-2023 23:00:00 | 3600.0 | 0.09 | -3.16 |
| 7700 | 28-Mar-2023 21:00:00 | 28-Mar-2023 22:00:00 | 3600.0 | 0.09 | -3.18 |
| 7699 | 28-Mar-2023 20:00:00 | 28-Mar-2023 21:00:00 | 3600.0 | 0.09 | -3.18 |
| 7698 | 28-Mar-2023 19:00:00 | 28-Mar-2023 20:00:00 | 3600.0 | 0.09 | -3.19 |
| 7697 | 28-Mar-2023 18:00:00 | 28-Mar-2023 19:00:00 | 3600.0 | 0.09 | -3.17 |
| 7696 | 28-Mar-2023 17:00:00 | 28-Mar-2023 18:00:00 | 3600.0 | 0.09 | -3.19 |
| 7695 | 28-Mar-2023 16:00:00 | 28-Mar-2023 17:00:00 | 3600.0 | 0.09 | -3.18 |
| 7694 | 28-Mar-2023 15:00:00 | 28-Mar-2023 16:00:00 | 3600.0 | 0.09 | -3.17 |
| 7693 | 28-Mar-2023 14:00:00 | 28-Mar-2023 15:00:00 | 3600.0 | 0.09 | -3.16 |

## Note

- Click ▼ in the Columns field to show or hide additional report columns.



- Every calculated parameter in meter runs has a health attribute. The status of this attribute is determined by a combination of the inputs used to calculate the parameter and the status of the calculation. Values with questionable data integrity are highlighted in pink, and a symbol is placed after the value. Hover your cursor over a highlighted value to view the reason for the highlighting. The symbol definitions are below:
  **?** = In Fault
  **#** = In Override
  **X** = Unverified Value
  **!** = In Alarm
  **>** = Over Range Limit
  **^** = Stale Value
  **&** = Inactive
  ***** = Invalid History
  **@** = Undefined History

9. Click the **Next** button to retrieve 40 additional history records.
10. Click **View All** to retrieve all data stored in the flow computer.
11. Click the **Create Report** button to open the History Report dialog and save a history report to your computer. For more information, refer to History Report.
12. Click the **Select New** button to return to step 1 and select new collection criteria.

## 3.5.2 Transaction History

Use the Transaction History option to view data from each configured transaction history group.

**Note**

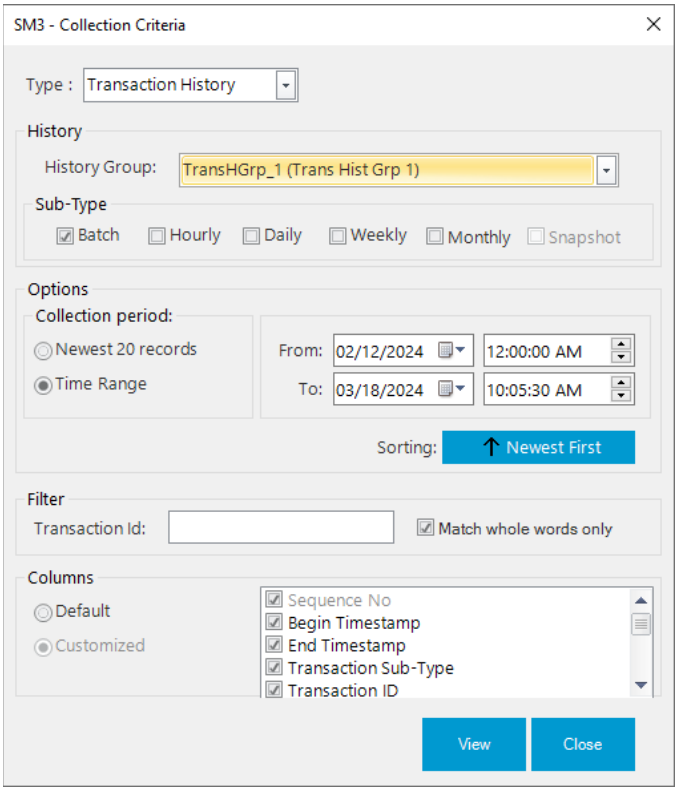
- You **must** first configure history points before viewing history data. For more information, refer to Configure – History.
- The integrity of each history record is checked, and only history records with good integrity are shown.
- Each history record has an associated sequence number. A missing history record sequence number indicates a deleted or lost record.

- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To view transaction history data stored on an FB Series product:

1. Select **Monitor > History > Transaction History** from the DeltaV FBxConnect configuration software main menu. The Collection Criteria dialog displays.

**Figure 57. Collection Criteria – Transaction History**




2. Click ▼ in the **History Group** field to select the transaction history group you want to view.

3. In the **Sub-Type** field, select the type of history to include in the report. The default selection is **Batch**.

**Note**

- If you select **Hourly**, **Daily**, **Weekly**, or **Monthly** in the **Sub-Type** field, you **must** have previously configured transaction history to include periodic data in the **Periodic Data Logging in Transaction History** field on the Station – Batching Tab

**and** configured transaction history to include this data on the Transaction History Group Configuration display.

- The **Snapshot** Sub-Type is **not selectable** for transaction history groups configured for liquid linear meter batching.

4. In the **Collection period** field, select **Oldest 20 records/Newest 20 Records** to view the twenty oldest/newest history records or select **Time Range** to view history records from a specific time and date range.

**Note**

Your selection in the **Sorting** field controls the options presented in this field.

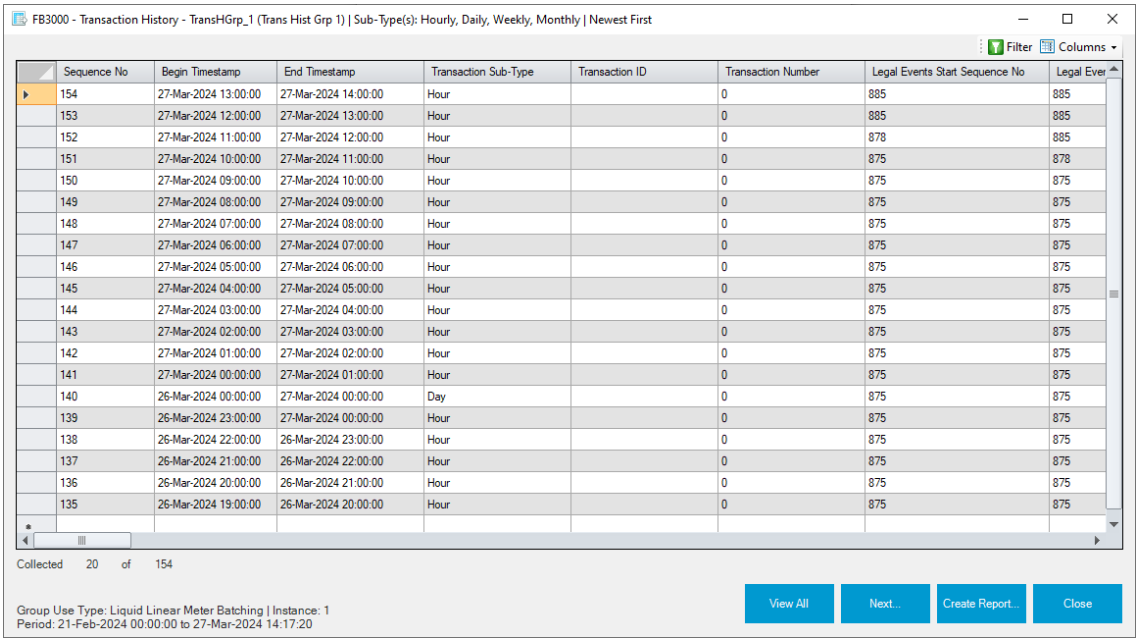
5. Click the button in the in the **Sorting** field to control the order of records in the history report. Possible options are:
   - **Newest First** – Records are sorted from the newest to the oldest.
   - **Oldest First** – Records are sorted from the oldest to the newest.
6. In the **Filter** field, enter a Transaction ID to narrow the results to show **only** specific transactions.

**Note**

- This field is **not** case sensitive.
- For transactions assigned to a meter, you configure the Transaction ID in the **Batch Identifier** field on the Station – Batching display.
- For transactions **not** assigned to a meter, you configure the Transaction ID in the **Transaction ID** field on the Transaction History Group Configuration display.

7. Place a check mark in the **Match whole words only** field to search **only** for Transaction IDs that contain the entire word you entered in the **Filter** field.
8. If you select **Time Range** in the Collection period field, enter a beginning and ending date and time in the **From** and **To** fields.
9. In the Columns field, select or deselect the columns you want to include in the default report view.
10. Click **View** to view the selected history.

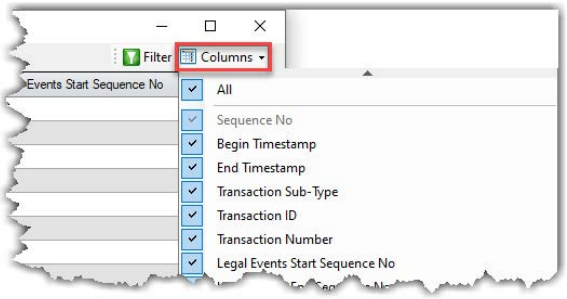
**Figure 58. Transaction History**




| Sequence No | Begin Timestamp | End Timestamp | Transaction Sub-Type | Transaction ID | Transaction Number | Legal Events Start Sequence No | Legal Ever |
|---|---|---|---|---|---|---|---|
| 154 | 27-Mar-2024 13:00:00 | 27-Mar-2024 14:00:00 | Hour | | 0 | 885 | 885 |
| 153 | 27-Mar-2024 12:00:00 | 27-Mar-2024 13:00:00 | Hour | | 0 | 885 | 885 |
| 152 | 27-Mar-2024 11:00:00 | 27-Mar-2024 12:00:00 | Hour | | 0 | 878 | 885 |
| 151 | 27-Mar-2024 10:00:00 | 27-Mar-2024 11:00:00 | Hour | | 0 | 875 | 878 |
| 150 | 27-Mar-2024 09:00:00 | 27-Mar-2024 10:00:00 | Hour | | 0 | 875 | 875 |
| 149 | 27-Mar-2024 08:00:00 | 27-Mar-2024 09:00:00 | Hour | | 0 | 875 | 875 |
| 148 | 27-Mar-2024 07:00:00 | 27-Mar-2024 08:00:00 | Hour | | 0 | 875 | 875 |
| 147 | 27-Mar-2024 06:00:00 | 27-Mar-2024 07:00:00 | Hour | | 0 | 875 | 875 |
| 146 | 27-Mar-2024 05:00:00 | 27-Mar-2024 06:00:00 | Hour | | 0 | 875 | 875 |
| 145 | 27-Mar-2024 04:00:00 | 27-Mar-2024 05:00:00 | Hour | | 0 | 875 | 875 |
| 144 | 27-Mar-2024 03:00:00 | 27-Mar-2024 04:00:00 | Hour | | 0 | 875 | 875 |
| 143 | 27-Mar-2024 02:00:00 | 27-Mar-2024 03:00:00 | Hour | | 0 | 875 | 875 |
| 142 | 27-Mar-2024 01:00:00 | 27-Mar-2024 02:00:00 | Hour | | 0 | 875 | 875 |
| 141 | 27-Mar-2024 00:00:00 | 27-Mar-2024 01:00:00 | Hour | | 0 | 875 | 875 |
| 140 | 26-Mar-2024 00:00:00 | 27-Mar-2024 00:00:00 | Day | | 0 | 875 | 875 |
| 139 | 26-Mar-2024 23:00:00 | 27-Mar-2024 00:00:00 | Hour | | 0 | 875 | 875 |
| 138 | 26-Mar-2024 22:00:00 | 26-Mar-2024 23:00:00 | Hour | | 0 | 875 | 875 |
| 137 | 26-Mar-2024 21:00:00 | 26-Mar-2024 22:00:00 | Hour | | 0 | 875 | 875 |
| 136 | 26-Mar-2024 20:00:00 | 26-Mar-2024 21:00:00 | Hour | | 0 | 875 | 875 |
| 135 | 26-Mar-2024 19:00:00 | 26-Mar-2024 20:00:00 | Hour | | 0 | 875 | 875 |

## Note

- Click **Columns** at the top-right of the display to show or hide additional report columns. Use the up (▲) and down (▼) arrows at the top and bottom of the list to view any additional columns.




- Click **Filter** at the top-right of the display to open a Filter Options dialogue where you can refine the results by entering a Transaction ID.
- Every calculated parameter in meter runs has a health attribute. The status of this attribute is determined by a combination of the inputs used to calculate the parameter and the status of the calculation. Values with questionable data integrity are highlighted in pink, and a symbol is placed after the value. Hover your cursor over a highlighted value to view the reason for the highlighting. The symbol definitions are below:

  **?** = In Fault

**#** = In Override
**X** = Unverified Value
**!** = In Alarm
**>** = Over Range Limit
**^** = Stale Value
**&** = Inactive
***** = Invalid History
**@** = Undefined History

11. Click the **Next** button to retrieve 40 additional history records.
12. Click **View All** to retrieve all data stored in the flow computer.
13. Click the **Create Report** button to open the History Report dialog and save a history report to your computer. For more information, refer to History Report.
14. Click the **Select New** button to return to step 1 and select new collection criteria.

## 3.6 Alarms

Use the Alarms screen to view any currently active alarms on your device.

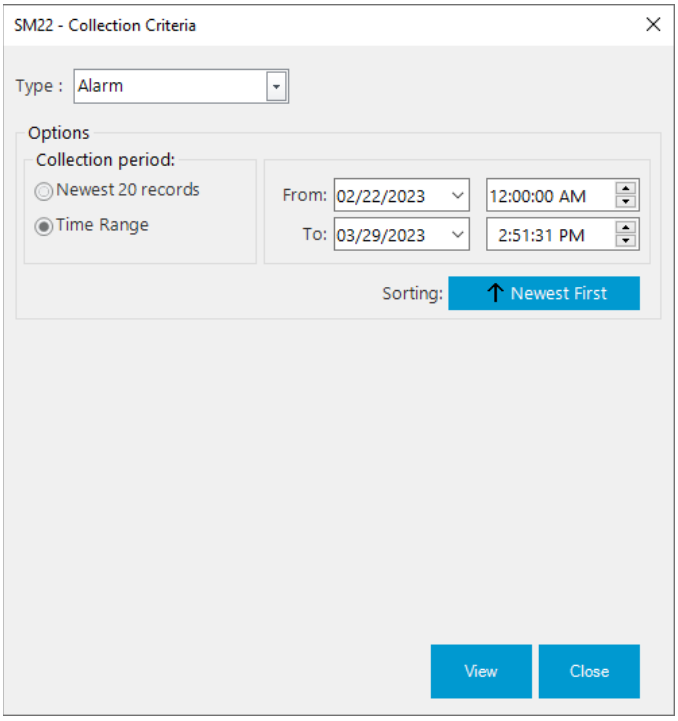
**Note**

- The integrity of each alarm record is checked, and only alarm records with good integrity are shown.
- Each alarm record has an associated sequence number. A missing alarm record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To view alarms stored on the device:

1. Select **Monitor > Alarms** from the DeltaV FBxConnect configuration software main menu. The Collection Criteria dialog displays.

**Figure 59. Collection Criteria – Alarm**



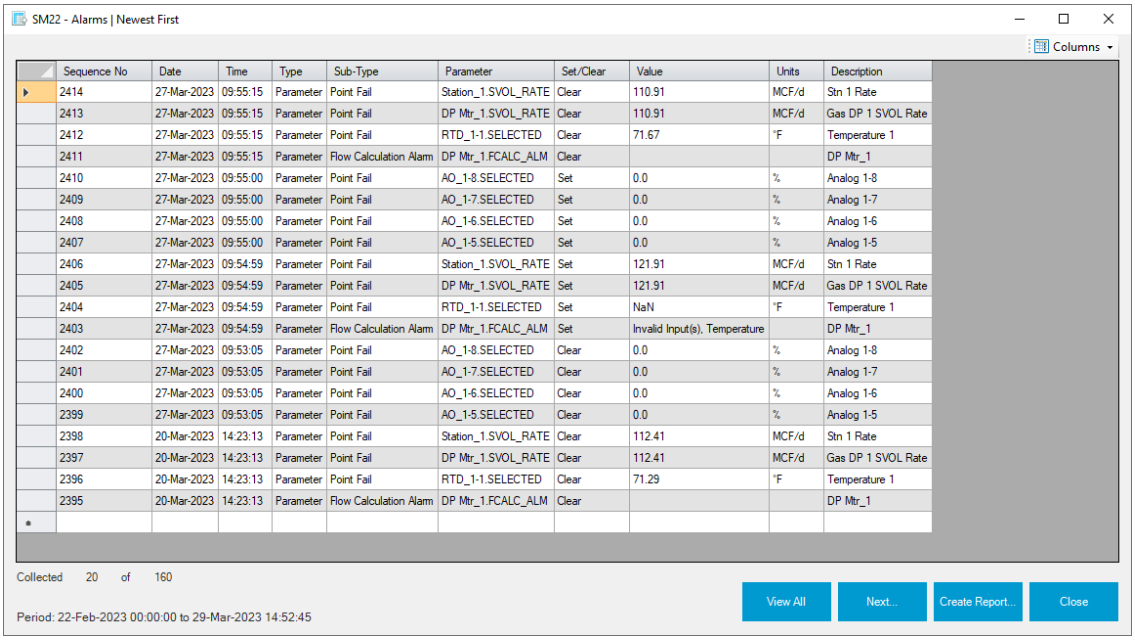

2. In the Collection period field, select **Oldest 20 records/Newest 20 Records** to view the twenty oldest/newest alarm records or select **Time Range** to view alarm records from a specific time and date range.

**Note**

Your selection in the **Sorting** field controls the options presented in this field.

3. Click the button in the in the **Sorting** field to control the order of records in the history report. Possible options are:
   - **Newest First** – Records are sorted from the newest to the oldest.
   - **Oldest First** – Records are sorted from the oldest to the newest.
4. If you select **Time Range** in the Collection period field, enter a beginning and ending date and time in the **From** and **To** fields.
5. Click **View** to view the selected alarms.

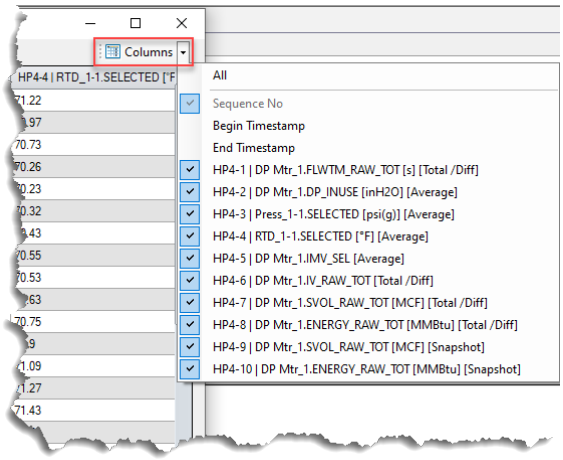
**Figure 60. Alarms**




| Sequence No | Date | Time | Type | Sub-Type | Parameter | Set/Clear | Value | Units | Description |
|---|---|---|---|---|---|---|---|---|---|
| 2414 | 27-Mar-2023 | 09:55:15 | Parameter | Point Fail | Station_1.SVOL_RATE | Clear | 110.91 | MCF/d | Stn 1 Rate |
| 2413 | 27-Mar-2023 | 09:55:15 | Parameter | Point Fail | DP Mtr_1.SVOL_RATE | Clear | 110.91 | MCF/d | Gas DP 1 SVOL Rate |
| 2412 | 27-Mar-2023 | 09:55:15 | Parameter | Point Fail | RTD_1-1.SELECTED | Clear | 71.67 | °F | Temperature 1 |
| 2411 | 27-Mar-2023 | 09:55:15 | Parameter | Flow Calculation Alarm | DP Mtr_1.FCALC_ALM | Clear | | | DP Mtr_1 |
| 2410 | 27-Mar-2023 | 09:55:00 | Parameter | Point Fail | AO_1-8.SELECTED | Set | 0.0 | % | Analog 1-8 |
| 2409 | 27-Mar-2023 | 09:55:00 | Parameter | Point Fail | AO_1-7.SELECTED | Set | 0.0 | % | Analog 1-7 |
| 2408 | 27-Mar-2023 | 09:55:00 | Parameter | Point Fail | AO_1-6.SELECTED | Set | 0.0 | % | Analog 1-6 |
| 2407 | 27-Mar-2023 | 09:55:00 | Parameter | Point Fail | AO_1-5.SELECTED | Set | 0.0 | % | Analog 1-5 |
| 2406 | 27-Mar-2023 | 09:54:59 | Parameter | Point Fail | Station_1.SVOL_RATE | Set | 121.91 | MCF/d | Stn 1 Rate |
| 2405 | 27-Mar-2023 | 09:54:59 | Parameter | Point Fail | DP Mtr_1.SVOL_RATE | Set | 121.91 | MCF/d | Gas DP 1 SVOL Rate |
| 2404 | 27-Mar-2023 | 09:54:59 | Parameter | Point Fail | RTD_1-1.SELECTED | Set | NaN | °F | Temperature 1 |
| 2403 | 27-Mar-2023 | 09:54:59 | Parameter | Flow Calculation Alarm | DP Mtr_1.FCALC_ALM | Set | Invalid Input(s), Temperature | | DP Mtr_1 |
| 2402 | 27-Mar-2023 | 09:53:05 | Parameter | Point Fail | AO_1-8.SELECTED | Clear | 0.0 | % | Analog 1-8 |
| 2401 | 27-Mar-2023 | 09:53:05 | Parameter | Point Fail | AO_1-7.SELECTED | Clear | 0.0 | % | Analog 1-7 |
| 2400 | 27-Mar-2023 | 09:53:05 | Parameter | Point Fail | AO_1-6.SELECTED | Clear | 0.0 | % | Analog 1-6 |
| 2399 | 27-Mar-2023 | 09:53:05 | Parameter | Point Fail | AO_1-5.SELECTED | Clear | 0.0 | % | Analog 1-5 |
| 2398 | 20-Mar-2023 | 14:23:13 | Parameter | Point Fail | Station_1.SVOL_RATE | Clear | 112.41 | MCF/d | Stn 1 Rate |
| 2397 | 20-Mar-2023 | 14:23:13 | Parameter | Point Fail | DP Mtr_1.SVOL_RATE | Clear | 112.41 | MCF/d | Gas DP 1 SVOL Rate |
| 2396 | 20-Mar-2023 | 14:23:13 | Parameter | Point Fail | RTD_1-1.SELECTED | Clear | 71.29 | °F | Temperature 1 |
| 2395 | 20-Mar-2023 | 14:23:13 | Parameter | Flow Calculation Alarm | DP Mtr_1.FCALC_ALM | Clear | | | DP Mtr_1 |

## Note

Click ▼ in the Columns field to show or hide additional report columns.




6. Click the **Next** button to retrieve 50 additional alarm records.

7. Click **View All** to retrieve all data stored in the flow computer.

## Note

Double-click on the first column of a row that contains a Flow/Property Calculation Alarm to view information for any raised flow or property calculation alarm codes.

8. Click the **Create Report** button to open the Alarm Report dialog and save an alarm report to your computer. For more information, refer to Alarm Report.
9. Click the **Select New** button to return to step 1 and select new collection criteria.

## 3.7 Events

Use the Events screen to view events stored in device memory.

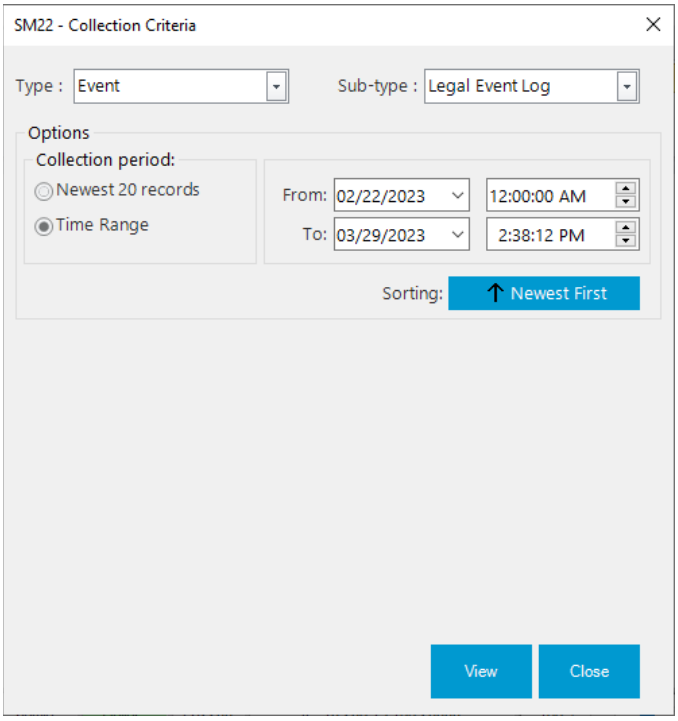
**Note**

- The integrity of each event record is checked, and only event records with good integrity are shown.
- Each event record has an associated sequence number. A missing event record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To access this screen:

1. Select **Monitor > Events** from the DeltaV FBxConnect configuration software main menu. The Collection Criteria dialog displays.

**Figure 61. Collection Criteria – Event**




2. In the **Sub-type** field, select if you want to view legal or non-legal events.

**Note**

You **must** configure your FB Series product to keep separate legal and non-legal event logs on the Configure – System screen to view this field.

3. In the **Collection period** field, select **Oldest 20 records/Newest 20 Records** to view the twenty oldest/newest event records or select **Time Range** to view event records from a specific time and date range.

**Note**

Your selection in the **Sorting** field controls the options presented in this field.

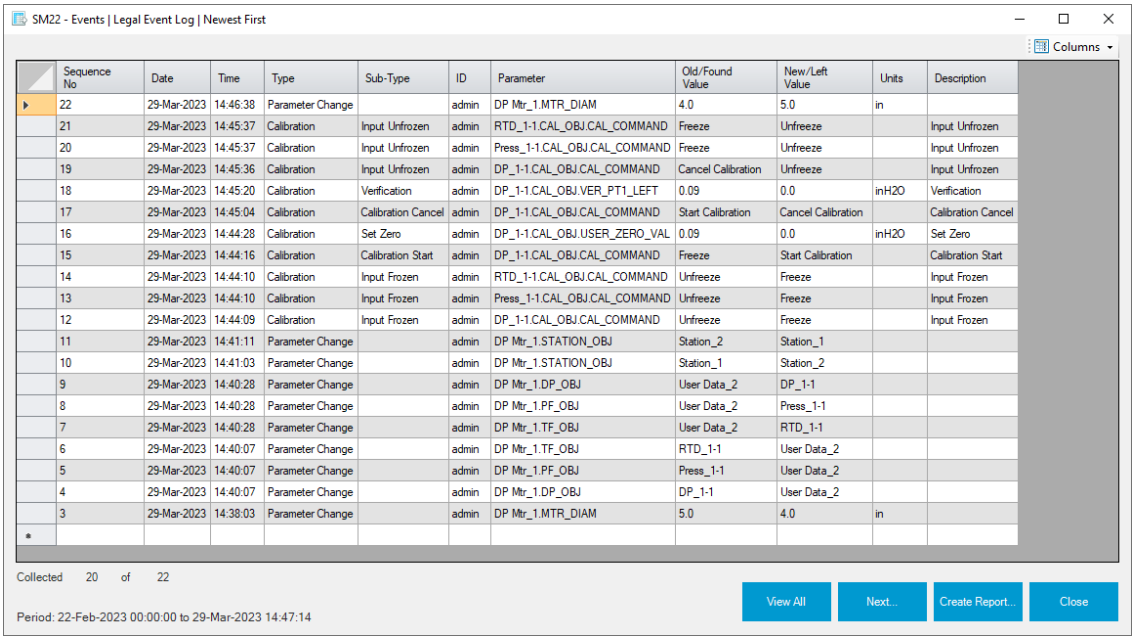
4. Click the button in the in the **Sorting** field to control the order of records in the history report. Possible options are:

   - **Newest First** – Records are sorted from the newest to the oldest.
   - **Oldest First** – Records are sorted from the oldest to the newest.

5. If you select **Time Range** in the Collection period field, enter a beginning and ending date and time in the **From** and **To** fields.

6. Click **View** to view the selected events.

**Figure 62. Events**




| Sequence No | Date | Time | Type | Sub-Type | ID | Parameter | Old/Found Value | New/Left Value | Units | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 29-Mar-2023 | 14:46:38 | Parameter Change | | admin | DP Mtr_1.MTR_DIAM | 4.0 | 5.0 | in | |
| 21 | 29-Mar-2023 | 14:45:37 | Calibration | Input Unfrozen | admin | RTD_1-1.CAL_OBJ.CAL_COMMAND | Freeze | Unfreeze | | Input Unfrozen |
| 20 | 29-Mar-2023 | 14:45:37 | Calibration | Input Unfrozen | admin | Press_1-1.CAL_OBJ.CAL_COMMAND | Freeze | Unfreeze | | Input Unfrozen |
| 19 | 29-Mar-2023 | 14:45:36 | Calibration | Input Unfrozen | admin | DP_1-1.CAL_OBJ.CAL_COMMAND | Cancel Calibration | Unfreeze | | Input Unfrozen |
| 18 | 29-Mar-2023 | 14:45:20 | Calibration | Verification | admin | DP_1-1.CAL_OBJ.VER_PT1_LEFT | 0.09 | 0.0 | inH2O | Verification |
| 17 | 29-Mar-2023 | 14:45:04 | Calibration | Calibration Cancel | admin | DP_1-1.CAL_OBJ.CAL_COMMAND | Start Calibration | Cancel Calibration | | Calibration Cancel |
| 16 | 29-Mar-2023 | 14:44:28 | Calibration | Set Zero | admin | DP_1-1.CAL_OBJ.USER_ZERO_VAL | 0.09 | 0.0 | inH2O | Set Zero |
| 15 | 29-Mar-2023 | 14:44:16 | Calibration | Calibration Start | admin | DP_1-1.CAL_OBJ.CAL_COMMAND | Freeze | Start Calibration | | Calibration Start |
| 14 | 29-Mar-2023 | 14:44:10 | Calibration | Input Frozen | admin | RTD_1-1.CAL_OBJ.CAL_COMMAND | Unfreeze | Freeze | | Input Frozen |
| 13 | 29-Mar-2023 | 14:44:10 | Calibration | Input Frozen | admin | Press_1-1.CAL_OBJ.CAL_COMMAND | Unfreeze | Freeze | | Input Frozen |
| 12 | 29-Mar-2023 | 14:44:09 | Calibration | Input Frozen | admin | DP_1-1.CAL_OBJ.CAL_COMMAND | Unfreeze | Freeze | | Input Frozen |
| 11 | 29-Mar-2023 | 14:41:11 | Parameter Change | | admin | DP Mtr_1.STATION_OBJ | Station_2 | Station_1 | | |
| 10 | 29-Mar-2023 | 14:41:03 | Parameter Change | | admin | DP Mtr_1.STATION_OBJ | Station_1 | Station_2 | | |
| 9 | 29-Mar-2023 | 14:40:28 | Parameter Change | | admin | DP Mtr_1.DP_OBJ | User Data_2 | DP_1-1 | | |
| 8 | 29-Mar-2023 | 14:40:28 | Parameter Change | | admin | DP Mtr_1.PF_OBJ | User Data_2 | Press_1-1 | | |
| 7 | 29-Mar-2023 | 14:40:28 | Parameter Change | | admin | DP Mtr_1.TF_OBJ | User Data_2 | RTD_1-1 | | |
| 6 | 29-Mar-2023 | 14:40:07 | Parameter Change | | admin | DP Mtr_1.TF_OBJ | RTD_1-1 | User Data_2 | | |
| 5 | 29-Mar-2023 | 14:40:07 | Parameter Change | | admin | DP Mtr_1.PF_OBJ | Press_1-1 | User Data_2 | | |
| 4 | 29-Mar-2023 | 14:40:07 | Parameter Change | | admin | DP Mtr_1.DP_OBJ | DP_1-1 | User Data_2 | | |
| 3 | 29-Mar-2023 | 14:38:03 | Parameter Change | | admin | DP Mtr_1.MTR_DIAM | 5.0 | 4.0 | in | |

7. Click **View All** to retrieve all data stored in the flow computer.

8. Click **Next** to retrieve 50 additional event records.

9. Click **Create Report** to open the Event Report dialog and save an event report to your computer. For more information, refer to Event Report.

10. Click **Select New** to return to step 1 and select new collection criteria.

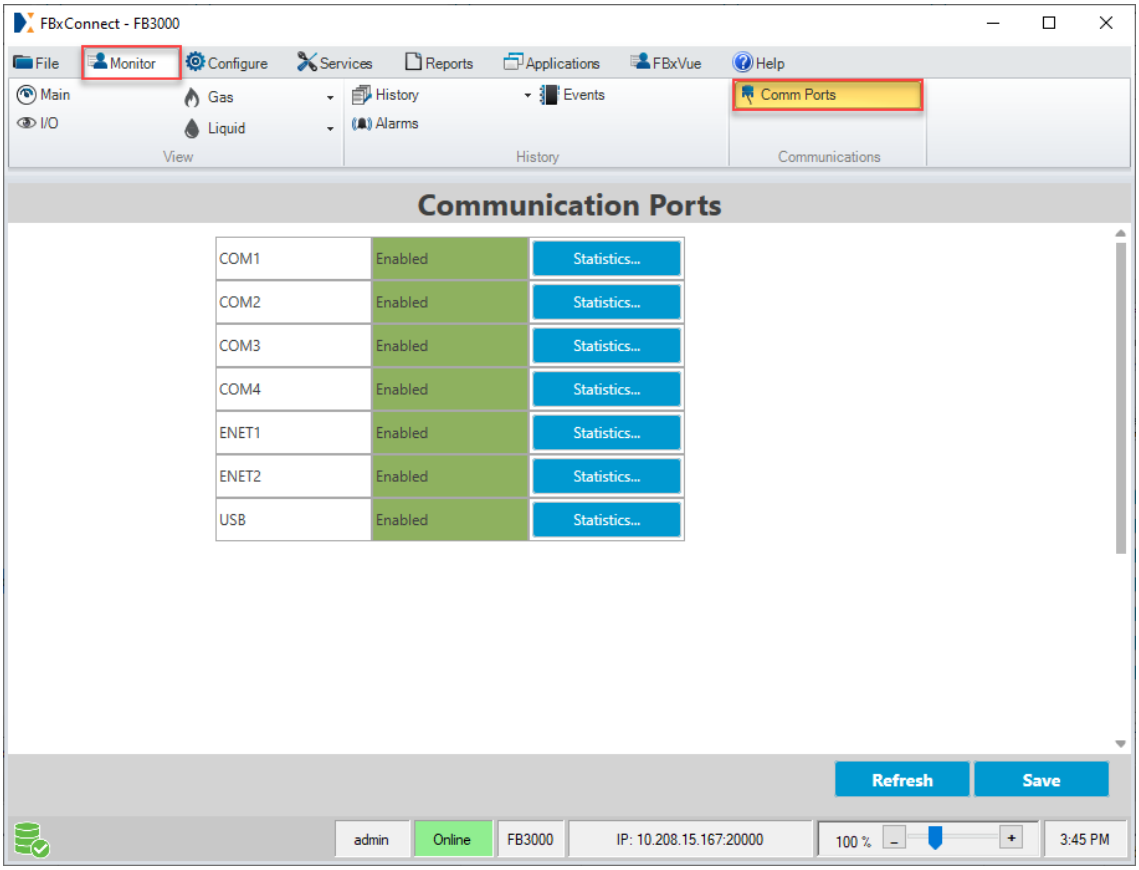
## 3.8 Comm Ports

Use the Comm Ports display to view the **read-only** status and configuration of each communications port on the FB Series product.

To access this display:

1. Select **Monitor > Comm Ports**. The Communication Ports display opens showing the Overview tab.

**Figure 63. Comm Ports**

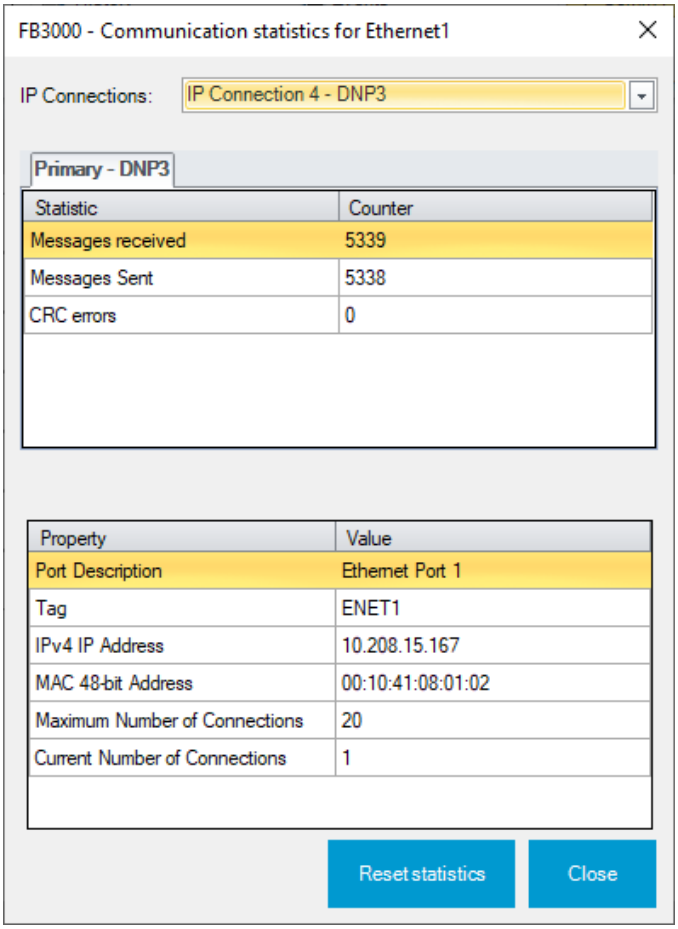



2. Review the status of each port (Enabled or Disabled).
3. Click **Statistics** to open a **Communication statistics** pop-up display and view the number of messages sent and received on the selected communications port.

**Note**

- For serial ports, a separate tab shows statistics for each configured Port Owner (DNP3, Modbus Slave, and Modbus Master). For more information, refer to Communications – General.
- For Ethernet ports, use the IP Connections drop-down to view statistics for each IP connection. For more information, refer to Communications – General.

**Figure 64. Communication statistics**




4. Click **Reset statistics** to reset the message counters for the selected communications port.

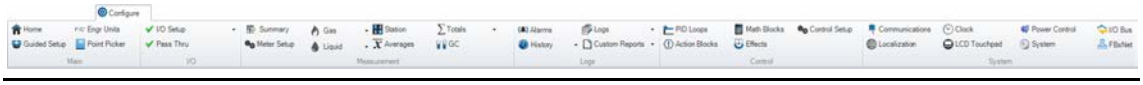
**Note**

For Ethernet ports, you **must** reset statistics for each IP Connection individually.

# Section 4: Configure Menu

Use the options in this menu to configure FB Series product parameters, including meter runs, I/O, fluid properties, and history.

**Figure 65. Configure Menu**



The Configure menu contains the following options:

Home – Set a site name, set your home screen, and view general product information about your device.

Guided Setup – Configure the DeltaV FB3000 using a guide that directs you through the configuration process.

Engr Units – Configure the engineering units used in calculations.

Point Picker –View internal database parameters in the FB Series product.

I/O Setup – Configure the inputs and outputs of the flow computer.

Pass Thru – Configure parameters used when communicating with other Ethernet enabled FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU and remote I/O racks.

Summary – Shows an overview of all configured stations and assigned meters.

Meter Setup – Configure general meter run settings, including the number of DP and linear meter runs.

**Gas**

DP Meter – Configure differential pressure meters in your device.

Linear Meter – Configure linear meters in your device.

Fluid Properties – Define the physical properties of the fluid flowing through each meter.

Components – Configure how the system calculates fluid composition and the different components of the fluid flowing through the meter.

**Liquid**

Liquid Linear Meter – Configure liquid linear meters in your FB Series product.

Liquid Product – Define liquid products and their fluid properties.

Liquid Density – Configure liquid density inputs.

Station – Configure parameters for stations.

Averages – Configure which inputs the system uses to calculate averages, and view the results of those calculations.

Totals – Configure which inputs the system totalizes, and to view the results of those calculations.

GC – Configure gas chromatograph options for each meter, and to view the data from each configured gas chromatograph.

Prover – Configure and operate a prover from your DeltaV FB3000 RTU.

Alarms – Configure which parameters need to be monitored, and which alarms need to be raised when limits are reached.

History – Configure history points, to enable and disable history logging for the history groups, to configure user period for user periodic history group types and to configure contract time for standard history group types.

Logs – Configure the options for history, alarm, and event logs.

Custom Reports – Configure custom reports that are generated by your DeltaV FB3000 RTU and configure a network printer used for the custom reports.

PID Loops – Configure Proportional, Integral, and Derivative (PID) controls.

Action Blocks – Configure Action Blocks.

Math Blocks – Configure up to 10 instances of Math Blocks.

Effects – Configure custom logic components that drive a selected device parameter to a user defined value.

Control Setup – Configure the number of Action Blocks, Math Blocks, Effects, and PID Loops instances available.

Communications – Configure the communications ports on your device.

Localization – Configure the time and date format for each localization profile.

Clock – Set the device clock and configure daylight savings time options.

LCD Touchpad – Use this display to configure the functionality of a connected DeltaV FB3000 RTU Touchpad.

Power Control – Conserve battery power to a radio or any other communicating device.

System – Configure your event log type and database recovery options.

I/O Bus – Configure the polling interval and view statistics for each I/O module installed in an DeltaV FB3000 RTU.

FBxNet – Configure the FB Series product to communicate over FBxNet.

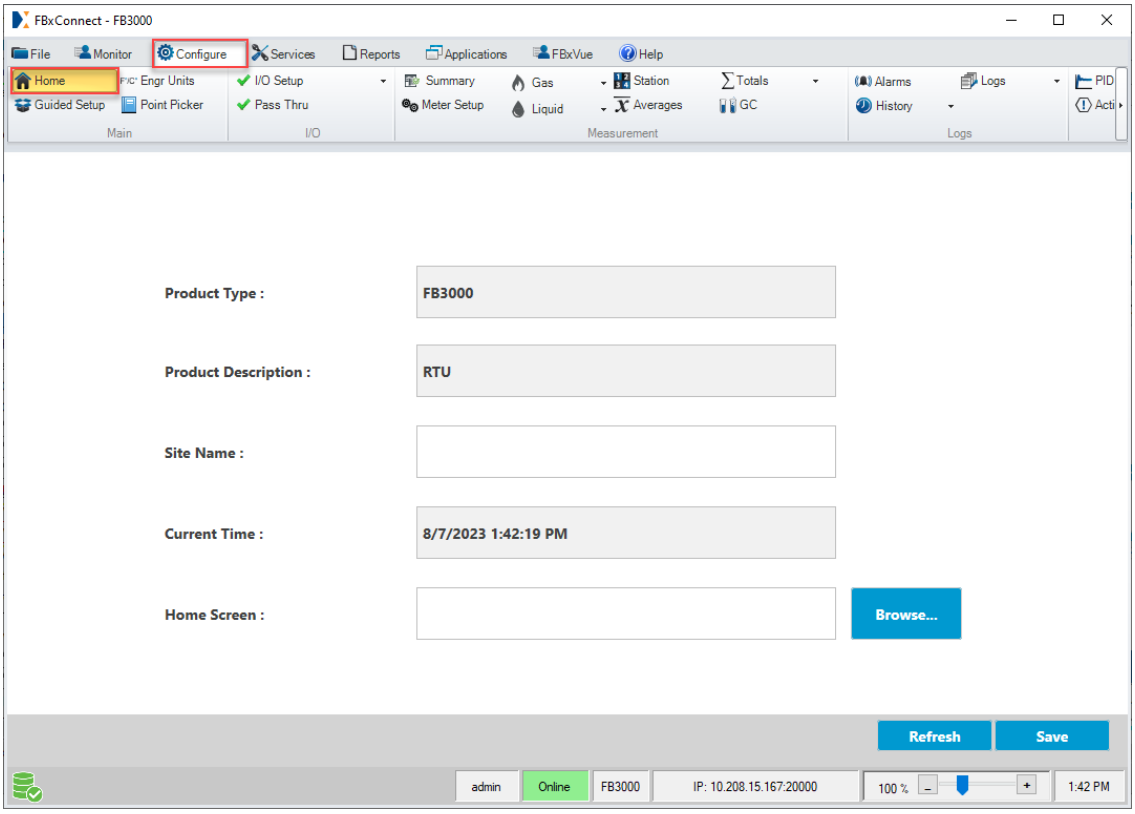
# 4.1 Home

Use this display to enter a site name, modify which display opens when you first connect to the FB Series product, and view general product information.

To access this display:

1. Select **Configure > Home**. The Configure Home display opens.

**Figure 66. Configure – Home**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Product Type** | This **read-only** field shows the type of FB Series product to which you are connected (online) or the configuration you are viewing (offline). |
| **Product Description** | This **read-only** field shows information about the FB Series product type. |
| **Site Name** | Enter a unique site name for the FB Series product. |
| **Current Time** | This **read-only** field shows the current time and date of the FB Series product's clock.<br>**Note**<br>This field appears **only** for FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU with a communication status of **Online**. |
| **Firmware Version** | This **read-only** field shows firmware version for the FB Series product configuration you are currently viewing.<br>**Note**<br>This field appears **only** for FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU with a communication status of **Offline**. |
| **Home Screen** | Select the **Browse** button a choose a specific display to open when you first connect to the FB Series product. For more information, refer to Configuring the Home Screen. |

3. Select **Save** to save any changes you make to this tab.

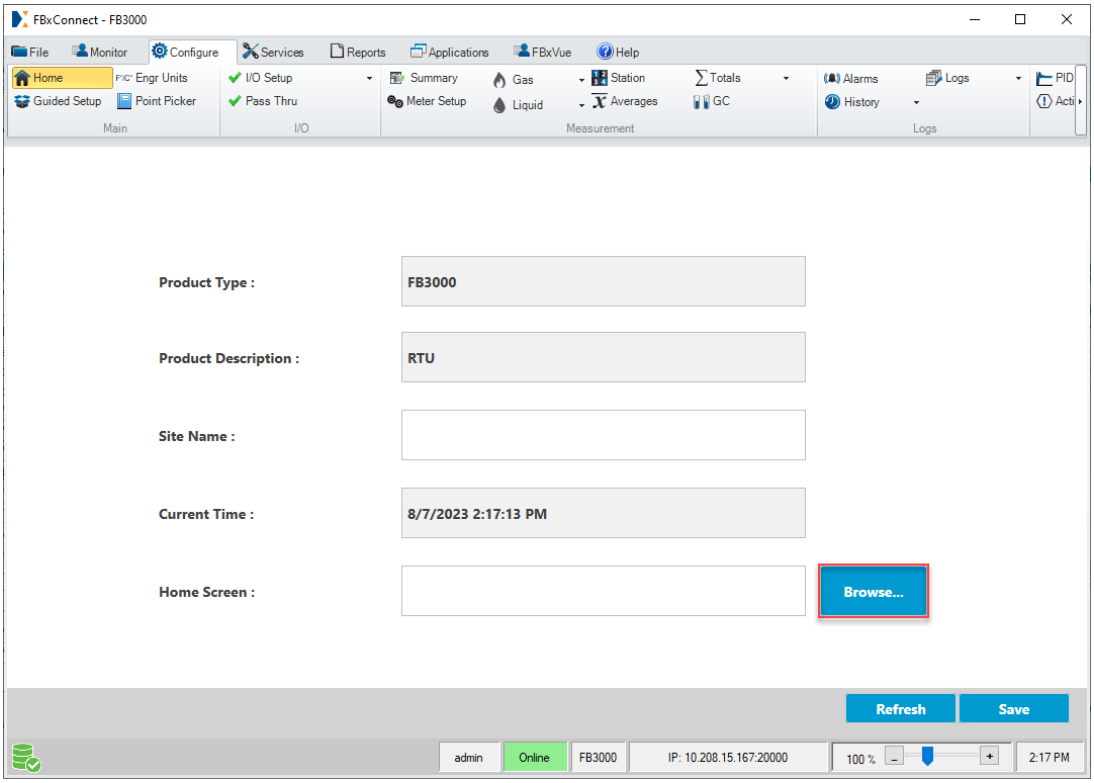
### 4.1.1 Configuring the Home Screen

You can configure a specific display to open when you first connect to the FB Series product. The default is the Main display in the Monitor Menu, but you can configure any application display, standalone display, or factory display located in the *C:\Users\Public\Documents\Emerson\FieldTools\FBx\CommonDisplays* folder.

To set the home screen display:

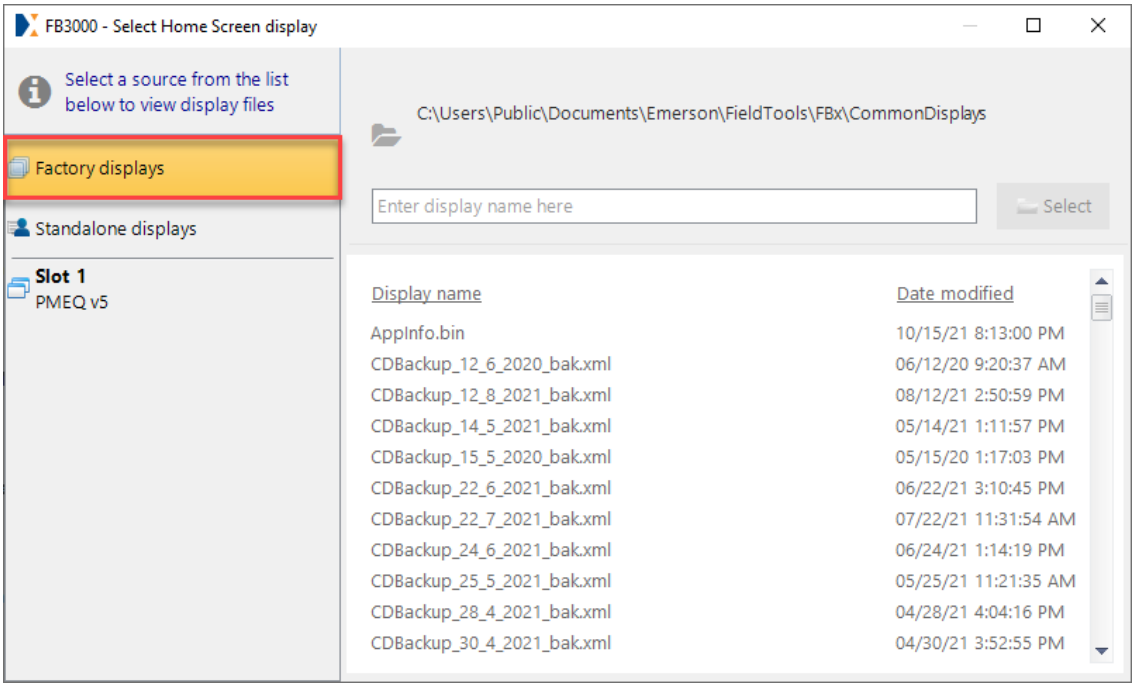
1. Select **Configure > Home**. The Home display opens.

**Figure 67. Configure – Home**



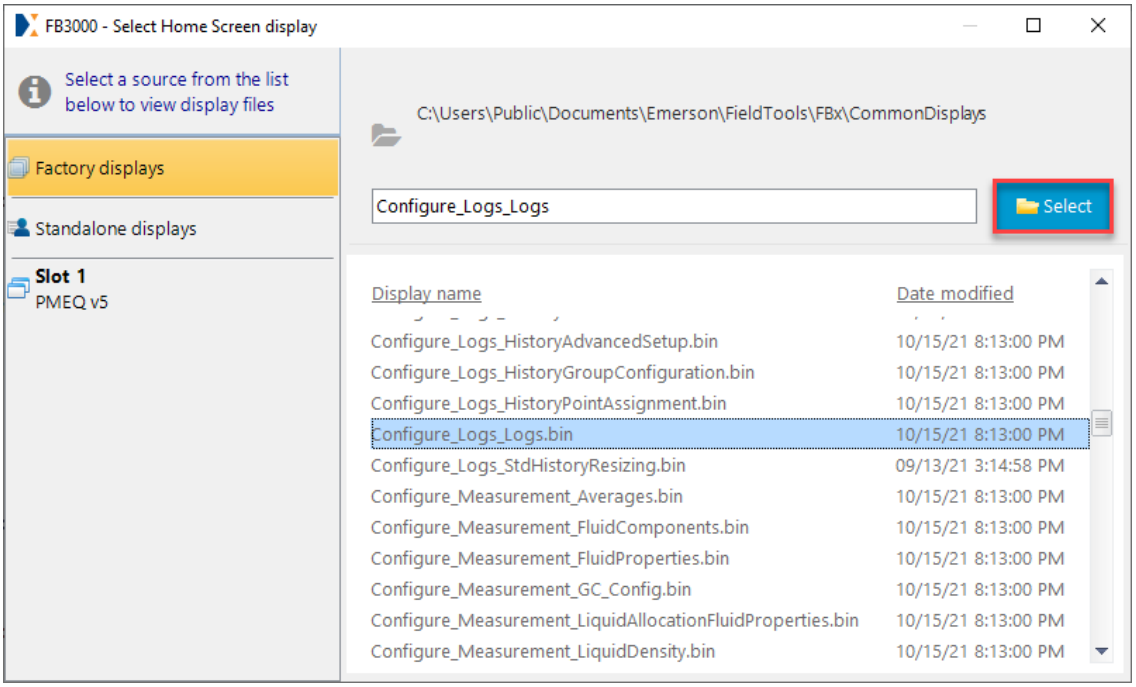

2. Select the **Browse** button. The Select Home Screen display opens.

**Figure 68. Select Home Screen display**



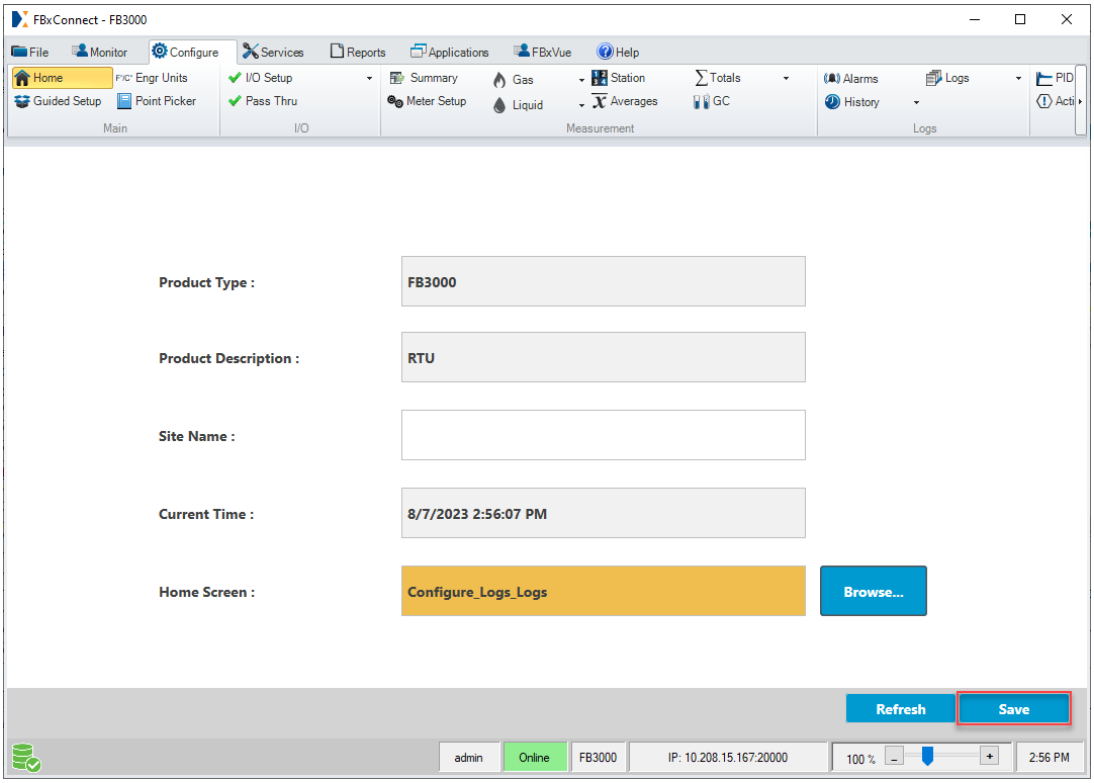

3. From the list on the left-side of the display, select what type of display (factory, standalone, or application) you want to open when you first connect to the FB Series product. A list of possible displays shows on the right-side of the display.

**Figure 69. Select Home Screen display – Select Button**




4. Navigate to your desired display, highlight the display, and select the **Select** button. The Select Home Screen display closes showing the Configure Home display.

**Figure 70. Configure – Home**




5. Select **Save** to save your changes. The next time you connect to the FB Series product, the display you selected will be the first display that opens.

**Note**

You can also configure the display to show a specific instance when it opens. To do this, add a colon (:) after the display name followed by the instance. For example, the third instance of the Logs display opens if you enter **Configure_Logs_Logs:Log_3**.

# 4.2 Guided Setup

Use **Guided Setup** to configure an DeltaV FB3000 for the first time. Guided Setup directs you through the process of configuring your DeltaV FB3000's measurement and I/O functionality, and automatically configures history points needed by API 21.1.

**Note**

- The steps available in the Guided Setup differ based on your FB Series product type and purchased options. This document shows all possible steps.

- If you need help on a specific display of Guided Setup, press **F1** to open the online help system for that particular display.

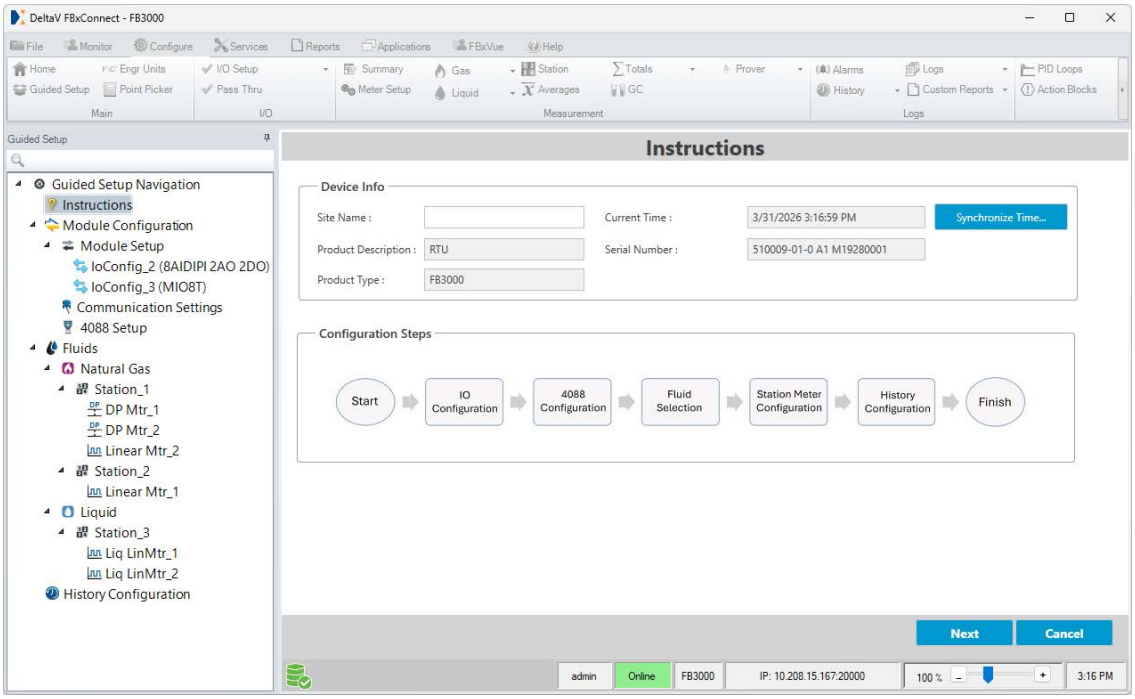
## CAUTION

Guided Setup may change your history configuration. If you have previously configured your DeltaV FB3000, collect history data before proceeding.

To access Guided Setup:

1. Select **Configure > Guided Setup**. The first page of Guided Setup opens.

**Figure 71. Guided Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Site Name** | Sets the name of the active connection in DeltaV FBxConnect Launchpad. |
| **Product Description** | This **read-only** field shows the description of the FB Series product you are currently configuring. |

| Field | Description |
|---|---|
| **Product Type** | This **read-only** field shows the product type of the FB Series product you are currently configuring. |
| **Current Time** | This **read-only** field shows current time and date of the FB Series product clock. |
| **Synchronize Time** | Select this button to synchronize the FB Series product clock with your PC clock. |
| **Serial Number** | This **read-only** field shows the serial number of the FB Series product you are configuring. |
| **Configuration Steps** | Shows the steps involved in the Guided Setup process. |

3. Select **Next** to advance to the next step in the Guided Setup.

### 4.2.1 Guided Setup: I\O Configuration

Use this display to configure the input and output types available on your DeltaV FB3000 RTU. You can configure an input to operate as an analog input (AI), digital input (DI), or pulse input (PI).

**Note**

- A separate **I/O Configuration** display is available for each installed I/O module.
- There is **not** a separate display for communications modules. You configure communications modules during the **Communications Settings** step of the Guided Setup
- The number of I/O points shown on this display varies depending on the device type and installed options.
- You can **right-click** on the Module Setup node or individual modules in the navigation tree to add or remove a module, and you can also copy and paste the configuration of

one module to another.

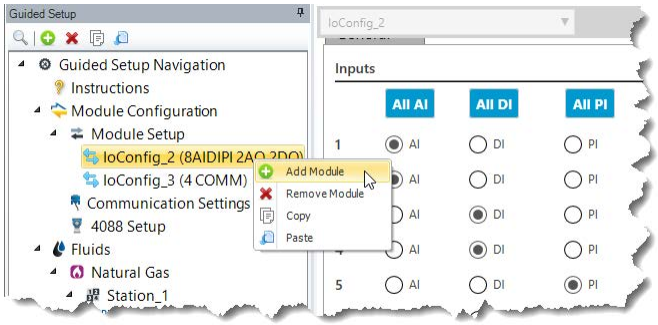
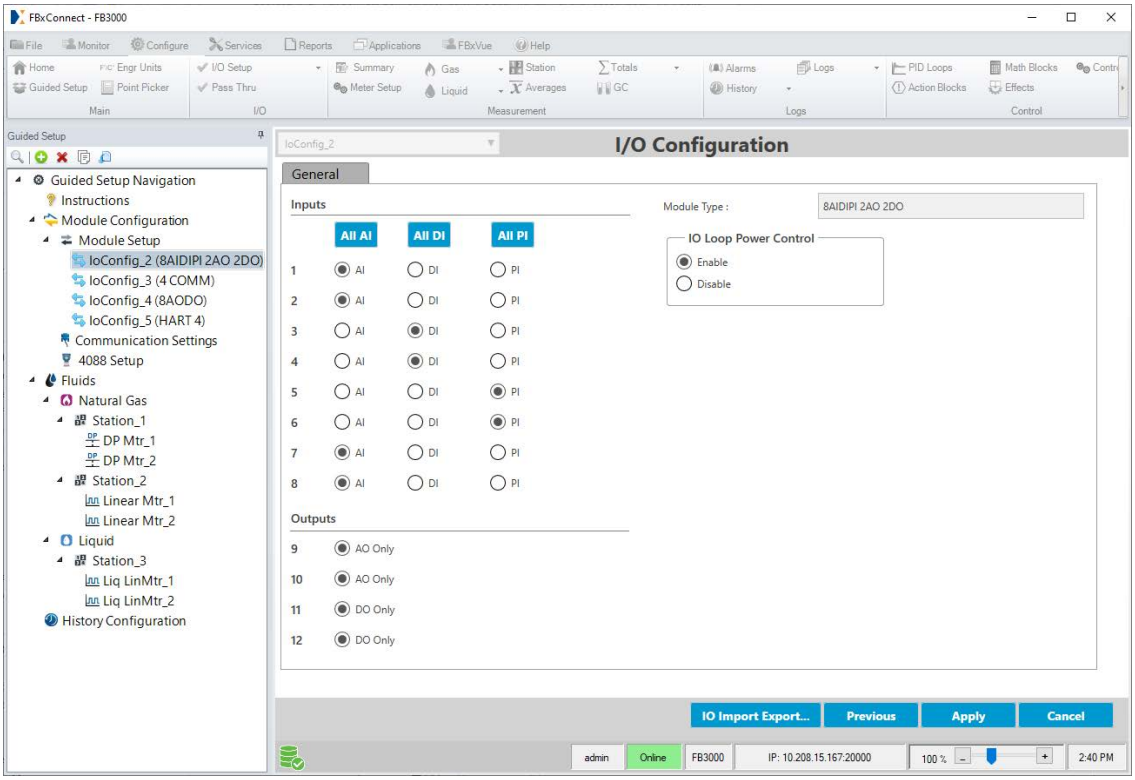



**Figure 72. Guided Setup: I/O Configuration**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Module Type** | This **read-only** field shows the I/O module type installed in the selected slot. The fields available for each module type are described below: |

| Field | Description | |
|---|---|---|
| **8AIDIPI 2AO 2DO Module** | The 8AIDIPI 2AO 2DO (3MIX12) module provides eight input channels and four output channels. You can configure each input channel as either an analog input (AI), digital input (DI), or pulse input (PI). The output channels are comprised of two analog outputs (AO) and two digital outputs (DO). | |
| | **Inputs** | Sets each input channel as either an analog input, digital input, or pulse input.<br>**Note**<br>Select either **All AI**, **All DI**, or **All PI** to configure all input channels as either analog inputs, digital inputs, or pulse inputs, respectively. |
| | **Outputs** | Shows the available output channels on the selected I/O module. |
| | **IO Loop Power Control** | Enables or disables the 24-Volt loop power feature. |
| **8AODO Module** | The 8AODO module provides eight output channels. You can configure each output channel as either an analog output (AO) or digital output (DO). | |
| | **Outputs** | Sets each output channel as either an analog output, digital input, or pulse input.<br>**Note**<br>Select either **All AO** or **All DO** to configure all output channels as either analog outputs or digital outputs, respectively. |
| **4 COMM** | The 4-port serial communications module (COM04) provides additional serial communication channels beyond those available on the CPU module.<br>**Note**<br>To make configuration changes to this module, refer to Communications – General. | |
| **16DIPI Module** | The 16DIPI module provides sixteen input channels. You can configure each input channel as either a digital input (DI) or a pulse input (PI). | |

| Field | Description | |
|---|---|---|
| | **Inputs** | Sets each input channel as either a digital input or a pulse input.<br>**Note**<br>Select either **All DI** or **All PI** to configure all input channels as either digital inputs or pulse inputs, respectively. |
| **16DO Module** | The 16DO module (3DOH16) provides sixteen digital output channels able to drive inductive loads, solenoids, and any other digital output device. | |
| **HART 4 Module** | The HART 4 (HRT04) module provides four input/output channels used to communicate with HART devices using the HART protocol. You can configure each channel as either an analog input (AI) or analog output (AO). A channel set as an input can be configured for use in point-to-point or multi-drop mode. A channel set as an output can be configured for use in point-to-point mode only. | |
| | **Analog** | Sets each channel as either an analog input (AI) or analog output (AO). |
| **MIO6X Module** | The MIO6X module provides four input channels and two output channels. You can individually configure two of the input channels as either an analog input (AI), a digital input (DI), or a pulse input (PI). You can individually configure the other two input channels as either a digital input (DI) or a pulse input (PI). You can configure one output channel as either an analog output (AO) or a digital output (DO). The remaining output channel is a dedicated digital output (DO). | |
| | **Inputs** | Sets input channels 1 and 2 as either an analog input, a digital input, or a pulse input. Sets input channels 3 and 4 as either digital input or a pulse input.<br>**Note**<br>Select **All AI**, **All DI**, or **All PI** to configure all input channels as either analog inputs, digital inputs, or pulse inputs. If you select All AI, then only channels 1 and 2 are configured as analog inputs. You still need to configure channels 3 and 4 separately as either a digital input or a pulse input. |

| Field | Description | |
|---|---|---|
| | **Outputs** | Sets channel 5 as either an analog output (AO) or a digital output (DO). Channel 6 is a dedicated digital output (DO) and the channel type is not configurable. |
| **MIO8T Module** | The MIO8T module provides four input channels, two output channels, and two dedicated RTD channels. You can individually configure two of the input channels as either an analog input (AI), a digital input (DI), or a pulse input (PI). You can individually configure the other two input channels as either a digital input (DI) or a pulse input (PI). You can configure one output channel as either an analog output (AO) or a digital output (DO). The remaining output channel is a dedicated digital output (DO). | |
| | **Inputs** | Sets input channels 1 and 2 as either an analog input, a digital input, or a pulse input. Sets input channels 3 and 4 as either digital input or a pulse input.<br>**Note**<br>Select **All AI**, **All DI**, or **All PI** to configure all input channels as either analog inputs, digital inputs, or pulse inputs. If you select **All AI**, then only channels 1 and 2 are configured as analog inputs. You still need to configure channels 3 and 4 separately as either a digital input or a pulse input. |
| | **Outputs** | Sets channel 5 as either an analog output (AO) or a digital output (DO). Channel 6 is a dedicated digital output (DO) and the channel type is not configurable. |
| | **RTD Inputs** | Shows the available RTD input channels on the selected I/O module. |
| **I/O Import Export** | Select this button to import a CSV file containing a new I/O configuration or export you current I/O configuration to a CSV file. For more information, refer to Importing I/O Configuration CSV Files, Exporting I/O Configuration CSV Files, and Creating I/O Configuration CSV Files. | |

2. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

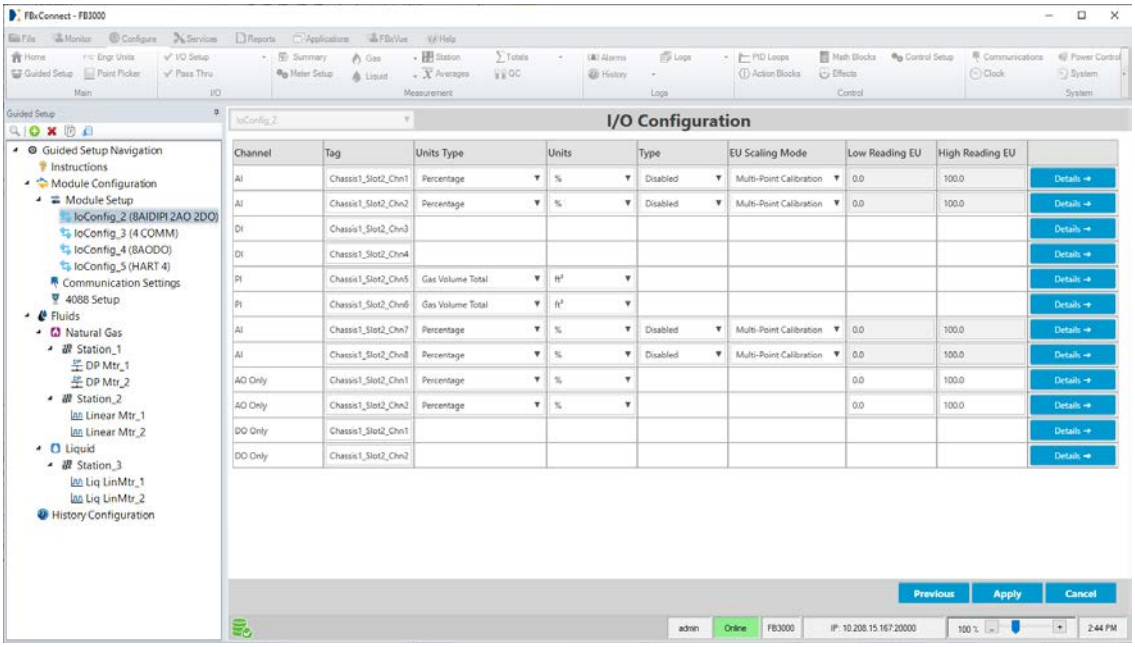
## 4.2.2 Guided Setup: I\O Configuration Details

Use this display to select what input and output types are available on your device. You can configure inputs to operate as an analog input (AI), digital input (DI), or pulse input (PI).

**Note**

- A separate **I/O Configuration** display is available for each installed I/O module.
- The number of I/O points shown on this display varies depending on the device type and installed options.

**Figure 73. Guided Setup: I/O Config**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Channel** | This **read-only** column shows the type of I/O you selected for each channel on the previous page. |
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |

| Field | Description |
|---|---|
| **Units Type** | Select ▼ to set the measurement type used for the selected channel.<br>**Note**<br>This field appears **only** for channels configured as analog inputs, analog outputs, or pulse inputs. |
| **Units** | Select ▼ to set the engineering units used for the selected channel.<br>**Note**<br>This field appears **only** for channels configured as analog inputs, analog outputs, pulse inputs, or RTDs. |
| **Type** | Select ▼ to set if the channel measures either current input, voltage input, or is disabled.<br>**Note**<br>• This field appears **only** for channels configured as analog inputs or analog outputs.<br>• The default selection is **Disabled**.<br>• For analog inputs, you **must** select either Current or Voltage before the AI will scan a field device.<br>• For analog inputs with Current Input selected, an on-board software switchable 250-ohm resistor is enabled for the selected channel. |
| **EU Scaling Mode** | Select ▼ to set how the EU scaling parameters are determined.<br>**Note**<br>This field appears **only** for channels configured as analog inputs. |
| | **Multi-Point Calibration**: EU scaling parameters are determined by the calibration. You cannot modify the EU scaling parameters (Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent) directly. You must use the calibration wizard to adjust the scaling of the AI.<br>**Note**<br>If you download a configuration file that has Multi-Point Calibration selected, the calibration on your device remains unchanged. |

| Field | Description | | |
|---|---|---|---|
| | **EU Scaling** | EU scaling parameters are determined by the values you enter in the Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent fields.<br>**Note**<br>If you download a configuration file that has EU Scaling selected, the existing calibration on your device is overwritten using the EU scaling parameters. | |
| **Low Reading EU** | Sets the minimum value (in A/D counts) that the analog input can measure.<br>**Note**<br>You **must** select EU Scaling in the EU Scaling Mode field to enable entry in this field. | | |
| **High Reading EU** | Sets the maximum value (in A/D counts) that the analog input can measure.<br>**Note**<br>You **must** select EU Scaling in the EU Scaling Mode field to enable entry in this field. | | |
| **Details** | Select this button to open the selected I/O channel configuration display. Select  to return to Guided Setup. | | |
| **HART Channel Configuration** | Use these fields to configure the HART I/O module.<br>**Note**<br>These fields show **only** if your configuration contains a **HART I/O** module. | | |
| | **HART Channel** | This **read-only** field displays the name of the channel on the HART module. | |
| | **HART Comm Mode** | Sets the communication mode for the selected channel. Possible options are: | |
| | | **Disabled** | Stop all HART communication. |
| | | **Point to Point** | Enables the channel to communication with one HART device per channel. |

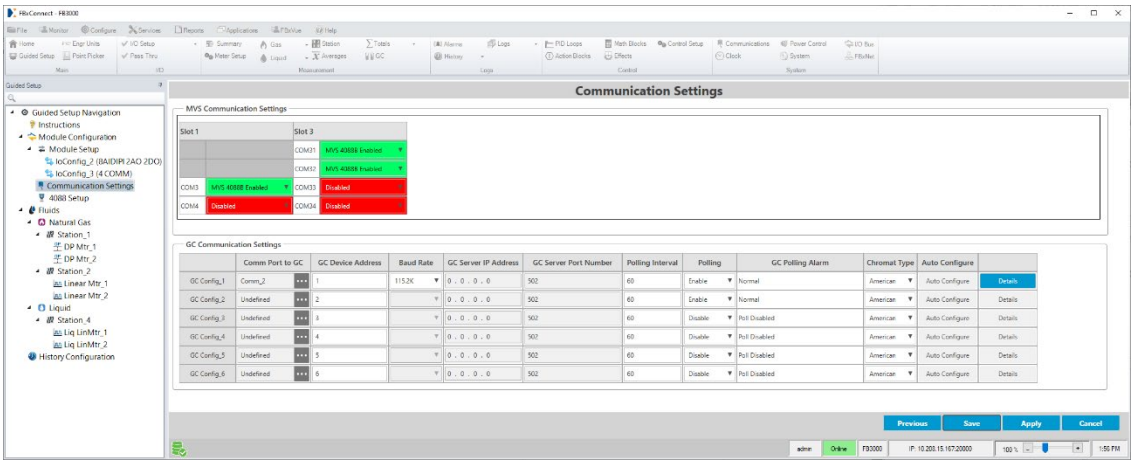
| Field | Description | | |
|---|---|---|---|
| | | **MultiDrop** | Enables the channel to communicate with up to five HART devices connected in parallel.<br>**Note**<br>This option is available **only** for channels configured as **analog inputs** (AI). |
| | **Number of Devices** | Sets the number of HART devices connected in parallel.<br>**Note**<br>This field appears **only** if you select **MultiDrop** in the HART Comm Mode field. | |
| | **Details** | Select to open the HART I/O display and configure the selected HART channel. | |

2. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

## 4.2.3 Guided Setup: Communication Settings

Use this display to enable communications with Rosemount™ 4088B MultiVariable™ Transmitters and configure gas chromatographs.

**Figure 74. Guided Setup: Communication Settings**



1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **MVS Communication Settings** | Select ▼ to enable or disable Rosemount™ 4088B MultiVariable™ Transmitter communications on the selected communications port.<br>**Note**<br>If you have a Sensor Personality Module installed, the COM4 row is **read-only** and Integral Sensor is selected. |
| **Comm Port to GC** | Select ••• to open a Point Picker dialog and define which communications port on the FB Series product is connected to the gas chromatograph. |
| **GC Device Address** | Sets the Modbus address the FB Series product uses to communicate with the gas chromatograph. You must set this value before the program can poll data and write it to the meter run. |
| **Baud Rate** | Sets the baud rate of communications over the selected port.<br>**Note**<br>This field applies **only** to GC connections using a serial port. |
| **GC Server IP Address** | Specifies the IP address of the GC.<br>**Note**<br>This field applies **only** to GC connections using an Ethernet port. |
| **GC Server Port Number** | Specifies port number used by the GC.<br>**Note**<br>This field applies **only** to GC connections using an Ethernet port. |
| **Polling Interval** | Sets the delay (in seconds) the system waits before asking the gas chromatograph for the next set of results. |
| **Polling** | Select ▼ to enable or disable polling of the gas chromatograph. |
| **GC Polling Alarm** | This **read-only** field shows the status of the poll result. Possible statuses are:<br>• Normal<br>• Poll Failed<br>• Comp Code Match Error<br>• Poll Disabled<br>• Auto config Failed |

| Field | Description |
|---|---|
| **Chromat Type** | Specifies either the American or European version of the SIM-2251 Modbus map and polling sequences. |
| **Auto Configure** | Select this button to automatically configure the selected communications port and Modbus parameters necessary to poll the gas chromatograph. The port owner is automatically changed to Modbus Master for selected communications port.<br>**Note**<br>• This field is **only** available if you are connected to an FB Series product.<br>• **Before** selecting the Auto Configure button, you must first specify a communications port in the **Comm Port to GC** field and an address in the **GC Modbus Address** field, select **Disabled** in the **Polling** field, and then click **Save** to write these settings to the FB Series product.<br>• To view which parameters are automatically configured when you select Auto Configure, refer to Automatically Configured Parameters. |
| **Details** | Select this button to open the Communications configuration display for the communications port configured in the Comm Port to GC field. Select  to return to Guided Setup.<br>**Note**<br>You **must** configure the **Comm Port to GC** field before this button is active. |

2. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

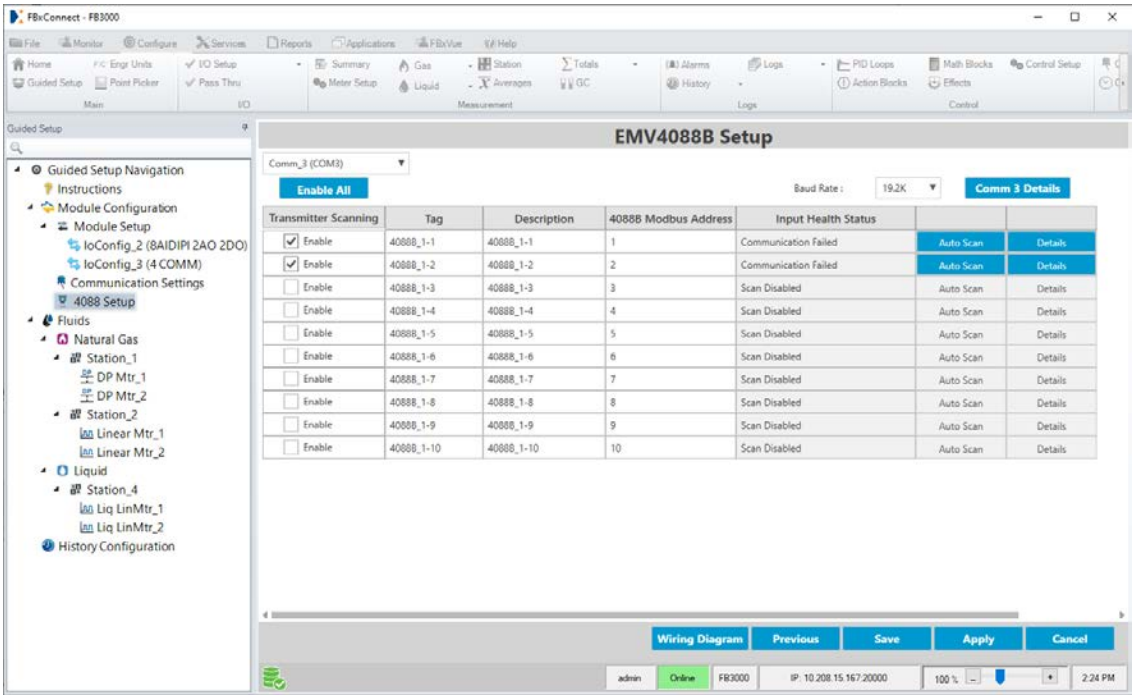
## 4.2.4 Guided Setup: 4088 Setup

Use this display to enable communications with a Rosemount™ 4088B MultiVariable™ Transmitter on selected communications ports.

**Note**

When communicating with more than six Rosemount™ 4088B MultiVariable™ Transmitters at 9600 baud, update times exceed once per second.

**Figure 75. Guided Setup: 4088 Setup**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Communications Port Instance** | Click ▼ to select a communications port on which to enable multivariable transmitters.<br>**Note**<br>Only communications ports with the Port Owner field configured as MVS4088B are shown. |
| **Enable All** | Select to enable communications for all transmitters. |
| **Baud Rate** | Sets the baud rate for 4088B communications using the selected port. |
| **Comm Details** | Select this button to open the Communications configuration display for the communications port configured in the Comm Port to GC field. Select  to return to Guided Setup. |
| **Transmitter Scanning** | Place a check mark to enable the system to scan the selected 4088B for data. |
| **Tag** | Sets a name (up to 8-alphanumeric characters) for the selected 4088B. |

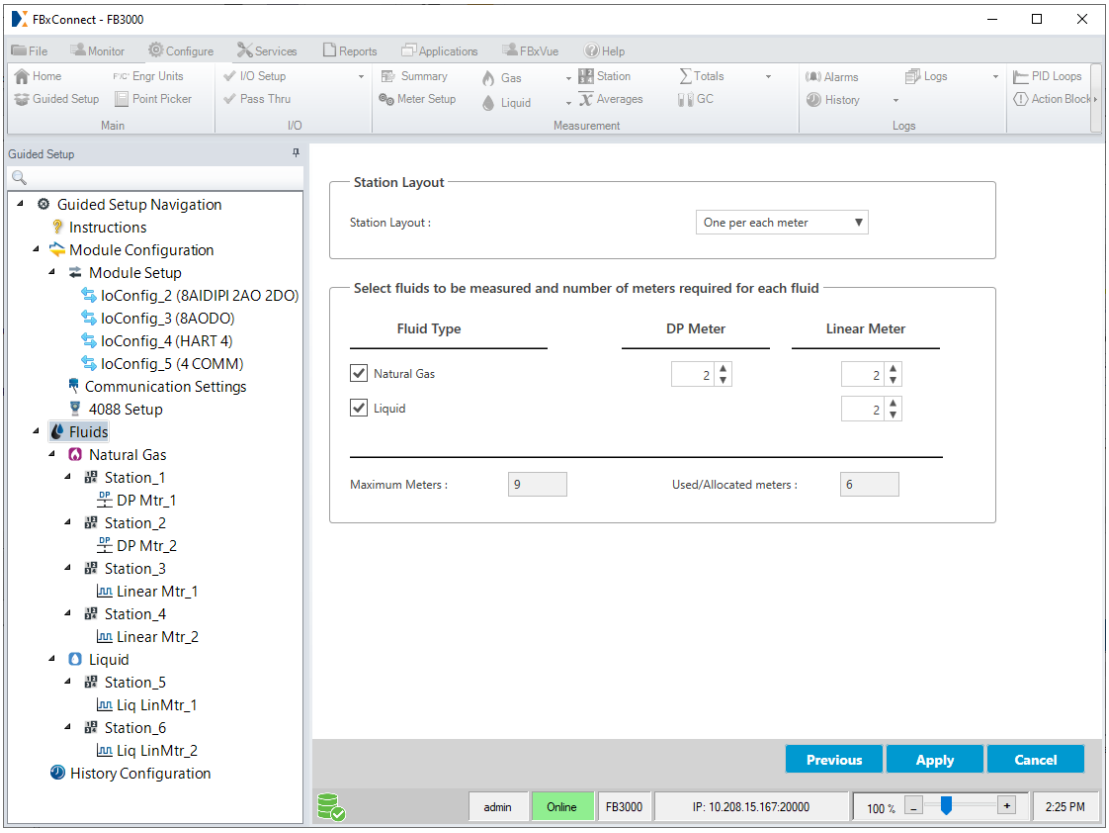
| Field | Description |
|---|---|
| **Description** | Sets a description (up to 16-alphanumeric characters) for the selected 4088B. |
| **4088B Modbus Address** | Sets the unique Modbus address for the selected 4088B multivariable transmitter. The default address is **1**. If the 4088B is used in the multi-drop mode, each 4088B must have a unique address. Use Address **240** to poll the sensor to determine the address of the connected sensor. This is similar to polling a device using Address and Group 240. When Address 240 is used, the sensor responds with its address by updating the Address field. |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected 4088B. |
| **Auto Scan** | Select to have the system automatically scan the baud rates for the 4088B with the indicated Modbus address.<br>**Note**<br>• The baud rate of the transmitter is changed to the baud rate configured in the **Baud Rate** field.<br>• You **must** select the **Enable** checkbox in the **Transmitter Scanning** field to activate this button. |
| **Details** | Select this button to open the 4088B configuration display for the selected transmitter. Select  to return to Guided Setup.<br>**Note**<br>You **must** select the **Enable** checkbox in the **Transmitter Scanning** field to activate this button. |
| **Wiring Diagram** | Click to open a 4088B wiring diagram for the selected communications port. |

2. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

## 4.2.5 Guided Setup: Fluid Selection

Use this display to select the station layout, and to assign number and types of meters for each fluid type.

**Figure 76. Guided Setup: Fluid Selection**




1. Review – and change as necessary – the values in the following fields:

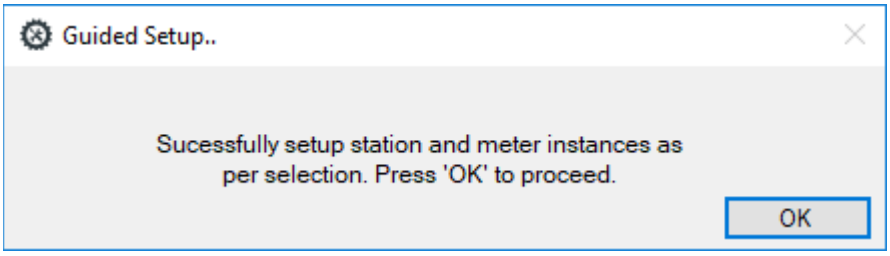
| Field | Description | |
|---|---|---|
| **Station Layout** | Select how meters are assigned to stations. | |
| | **One per each meter** | Each meter is assigned to a separate station. |
| | **One per fluid type** | Each fluid type is assigned to a separate station. |
| | **Custom** | Select **Custom** and select **Apply** to open the Custom Station Layout Configuration display. This display allows you to specify the number of stations, assign the fluid type for each station, and configure the number and types of meters assigned to each station. |

| Field | Description |
|---|---|
| | **Note**<br>This field is **read-only** and set to **Custom** if you have previously configured **any** meter in your FB Series product. |
| **Fluid Type** | Select the type of fluids being measured. |
| **DP Meters** | Set the number of differential pressure meters for each fluid type. |
| **Linear Meters** | Set the number of linear meters for each fluid type. |
| **Maximum Meters** | This **read-only** field shows the number of meters available in your DeltaV FB3000. |
| **Used/Allocated Meters** | This **read-only** field shows the number of meters currently assigned in your DeltaV FB3000. |

2. Complete the following step based on your selections:

- If you select either **One per each meter** or **One per each fluid type** in the **Station Layout** field, select **Apply** to save your selections to the FB Series product. A confirmation dialog opens. Select **OK** to advance to Engineering Units.

**Figure 77. Confirmation**




- If you select **Custom** in the **Station Layout** field and you **do not** have any meters currently assigned to a station, select **Next** to open the Custom Station Layout Configuration pop-up display.
- If you select **Custom** in the **Station Layout** field and you **do** have any meters currently assigned to a station, select **Next** to open the Station Assignment display.

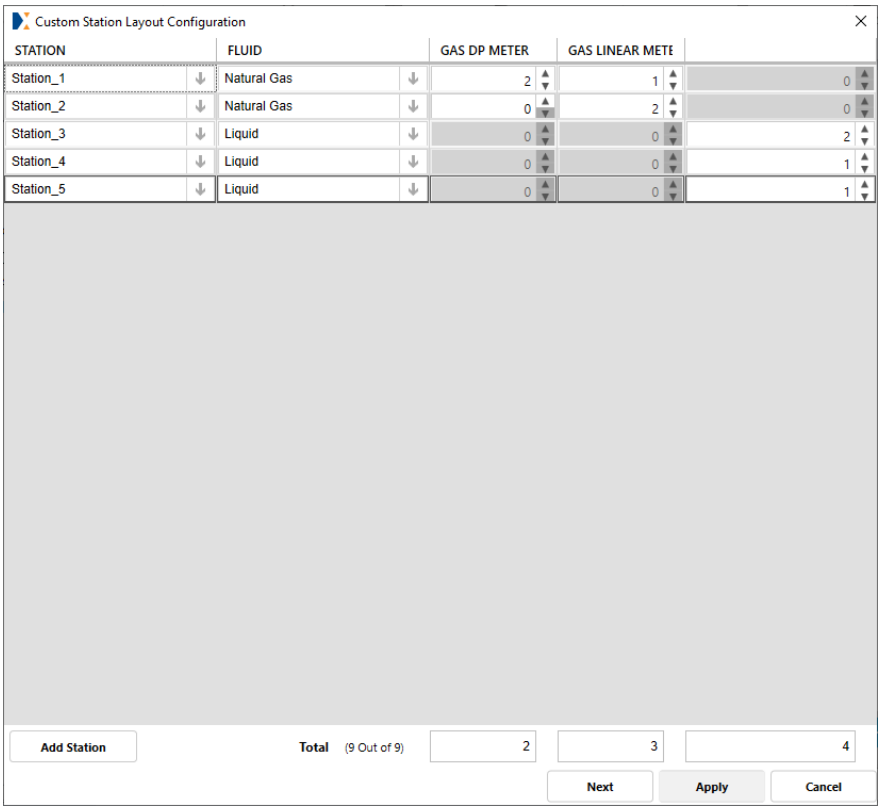
## 4.2.6 Guided Setup: Custom Station Layout Configuration

Use this display to manually customize your station layout. You can select the type of fluid being measured by the station, and the number and type of meters belonging to each station.

**Note**

This display opens **only** if you select **Custom** in the **Station Layout** field on the Fluid Selection display and you **do not** have any meters currently assigned to a station.

**Figure 78. Guided Setup: Custom Station Layout Configuration**




1. Select **Add Station** to add a station and configure its properties.
2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Station** | Select ↓ to select a station iteration to configure. |

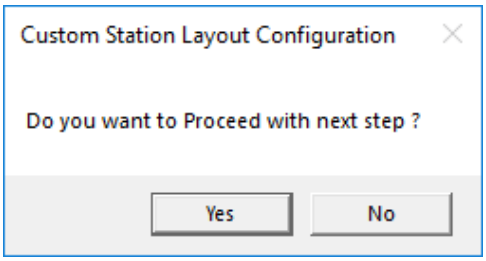
| Field | Description |
|---|---|
| **Fluid** | Select ↓ to set the type of fluids being measured by the selected station. |
| **Gas DP Meter** | Select ▲▼ to set the number of gas differential pressure meters being measured by the selected station.<br>**Note**<br>You **must** select **Natural Gas** in the Fluid field to enable this field. |
| **Gas Linear Meter** | Select ▲▼ to set the number of gas linear meters being measured by the selected station.<br>**Note**<br>You **must** select **Natural Gas** in the Fluid field to enable this field. |
| **Liquid Linear Meter** | Select ▲▼ to set the number of liquid linear meters being measured by the selected station.<br>**Note**<br>You **must** select Liquid in the Fluid field to enable this field. |
| **Totals** | These **read-only** fields show the total number of each meter type currently assigned to station. |

3. Select **Apply** to save any changes you make to this display. A confirmation dialog opens.

**Note**

Stations without at least one meter type assigned are automatically removed from the list.

**Figure 79. Confirmation**




4. Select **Yes** to advance to the next step in the Guided Setup.

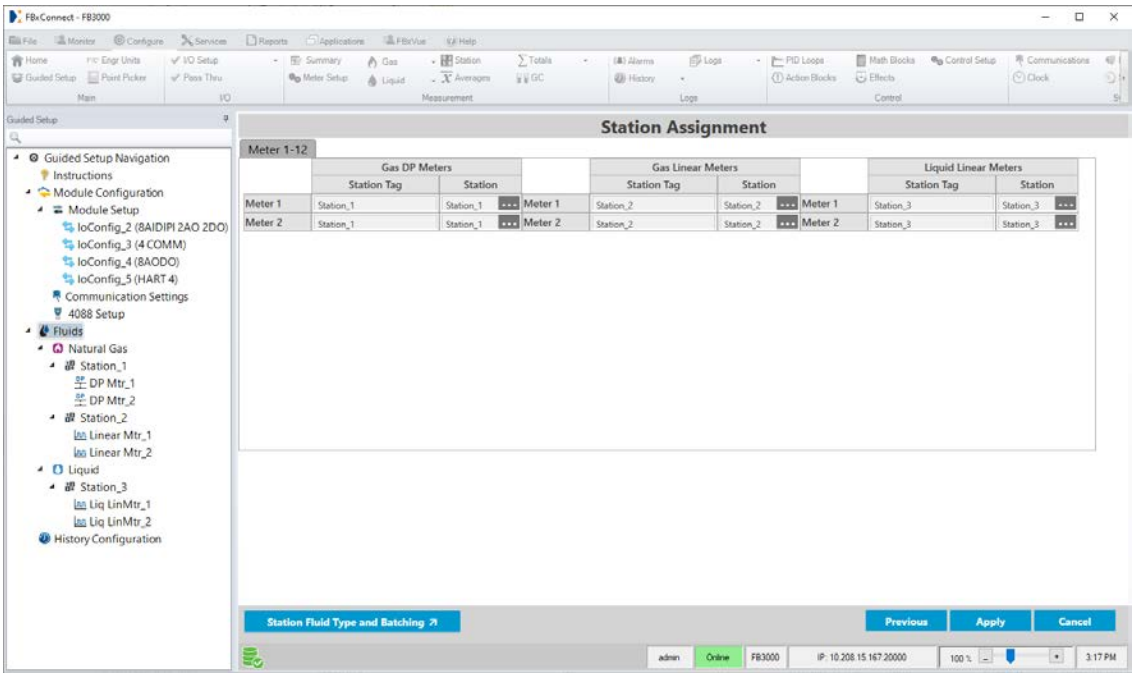
## 4.2.7 Guided Setup: Station Assignment

Use this display to manually customize your station layout. You can select the type of fluid being measured by the station, and the number and type of meters belonging to each station.

**Note**

This display opens **only** if you select **Custom** in the **Station Layout** field on the Fluid Selection display and you **do** have any meters currently assigned to a station.

**Figure 80. Guided Setup: Station Assignment**




1. Tabs appear at the top of the display. Each tab consists of up to 12 meters. Select the tab that contains the meters you want to assign to a specific station.
2. Select ••• to open a Point Picker dialog and assign each meter to a specific station.

**Note**

Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised.

3. Select **Station Fluid Type and Batching** to configure the fluid type measured by each station and to enable batching on liquid stations.

**Note**

You **cannot** change the fluid type of a station if a meter is already assigned to that station. In this case, you **must** first remove any meters assigned to the selected station before you are able to change the Fluid Type field.

4. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

### 4.2.8 Guided Setup: Engineering Units

Use this display to configure the engineering units used by the station for measurements. You can select Set all to US/Imperial, Set all to Metric, Set all to Canadian, or configure each measurement type individually. You can also configure how many decimal places are used for each measurement value.

Conversion factors for the different engineering units are taken from the following standards:

- IEEE/ASTM SI 10-2002 - IEEE/ASTM Standard for Use of the International System of Units (SI): The Modern Metric System
- Manual of Petroleum Measurement Standards Chapter 15—Guidelines for the Use of the International System of Units (SI) in the Petroleum and Allied Industries
- ANSI/API MPMS Ch. 14.3.3/AGA Report No. 3

**Note**

- **FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU use full-resolution data for all calculations.** The **Decimal Places** fields on this display are used **only** for viewing data in DeltaV FBxConnect configuration software.
- Fields on this display differ based on what fluid type the selected station is measuring (Natural Gas or Liquid).
- Changes to engineering units are applied to the station and all meters assigned to the selected station, even if a meter has previously been configured. Additionally, any I/O associated with the station or its meters is also updated. Refer to Configure – Summary to view which meters are assigned to each station.

- You can configure the number of decimal places shown on history reports using the **Settings** menu option in the DeltaV FBxConnect Launchpad menu bar.

Molar mass units are dependent upon the density units:

| Density Unit | Molar Mass Unit |
|---|---|
| $lb/ft^3$ | lb/lb-mol |
| lb/MMCF | lb/lb-mol |
| lb/US gal | lb/lb-mol |
| lb/bbl | lb/lb-mol |
| RD | lb/lb-mol |
| °API | lb/lb-mol |
| $kg/m^3$ | kg/kmol |
| kg/L | kg/kmol |
| g/cc | g/mol |

Joule Thomson units are dependent upon the pressure units:

| Pressure Unit | Joule Thompson Unit |
|---|---|
| psi | °F/psi |
| kPa | K/kPa |
| bar | °C/bar |
| MPa | K/MPa |
| $kg/cm^2$ | K/MPa |

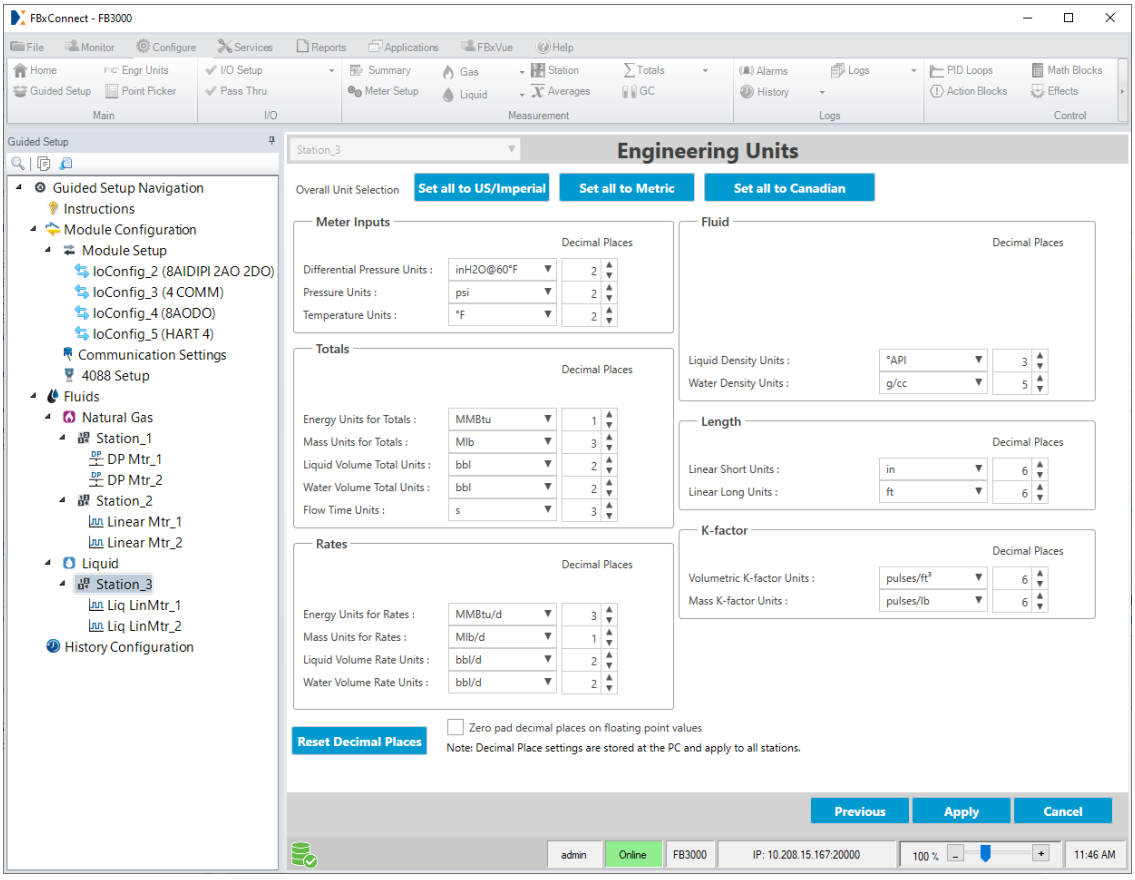
Acceleration units are dependent upon the linear long units:

| Linear Long Unit | Acceleration Unit |
|---|---|
| ft | $ft/s^2$ |
| m | $m/s^2$ |

**Note**

The 4088 **does not** support temperature units of Kelvin.

**Figure 81. Guided Setup: Engineering Units (Liquid Station shown)**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Set all to US/Imperial** | Select to automatically configure the selected station to use US/Imperial units for all measurements and calculations. |
| **Set all to Metric** | Select to automatically configure the selected station to use metric units for all measurements and calculations. |
| **Set all to Canadian** | Select to automatically configure the selected station to use Canadian units for all measurements and calculations. |
| **Meter Inputs** | Select ▼ to choose the measurement units used with each meter input and the number of decimal places shown in DeltaV FBxConnect configuration software. Meter Inputs include differential pressure units, static pressure units, and temperature units. |

| Field | Description |
|---|---|
| **Totals** | Select ▼ to choose the measurement units used when calculating totals and the number of decimal places shown in DeltaV FBxConnect configuration software. Totals include gas volume units, energy units, mass units, liquid volume units, water volume units, and flow time units. |
| **Rates** | Select ▼ to choose the measurement units used when displaying rate and the number of decimal places shown in DeltaV FBxConnect configuration software. Rates include gas volume units, energy units, mass units, liquid volume units, and water volume units. |
| **Fluid** | Select ▼ to choose the measurement units used when performing fluid calculations and the number of decimal places shown in DeltaV FBxConnect configuration software. Fluid properties include dynamic viscosity, density, volume-based heating value, mass-based heating value, water density, and oil density. |
| **Length** | Select ▼ to choose the measurement units used for distance and the number of decimal places shown in DeltaV FBxConnect configuration software. Length includes linear short and linear long. |
| **K-Factor** | Select ▼ to choose the measurement units used when calculating the K-factor and the number of decimal places shown in DeltaV FBxConnect configuration software. K-factor includes volumetric and mass. |
| **Other** | Select ▼ to choose the measurement units used for other calculations, including water content, and the number of decimal places shown in DeltaV FBxConnect configuration software. |
| **Reset Decimal Places** | Select to revert all measurement units to show the default number of decimal places in DeltaV FBxConnect configuration software. |

2. Select **Apply** to save your selections to the FB Series product and advance to the next step in the Guided Setup.

### 4.2.9 Guided Setup: Station

Use this display to configure parameters for the selected station.

**Note**

- Available station parameters are slightly different based on the measured fluid type. All possible fields are described below.
- You can **right-click** on the Station node in the navigation tree to copy or paste the configuration of one station to another.

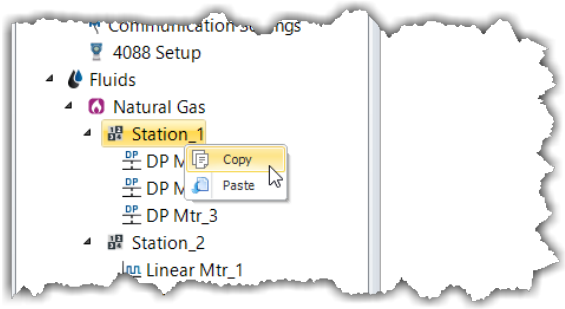
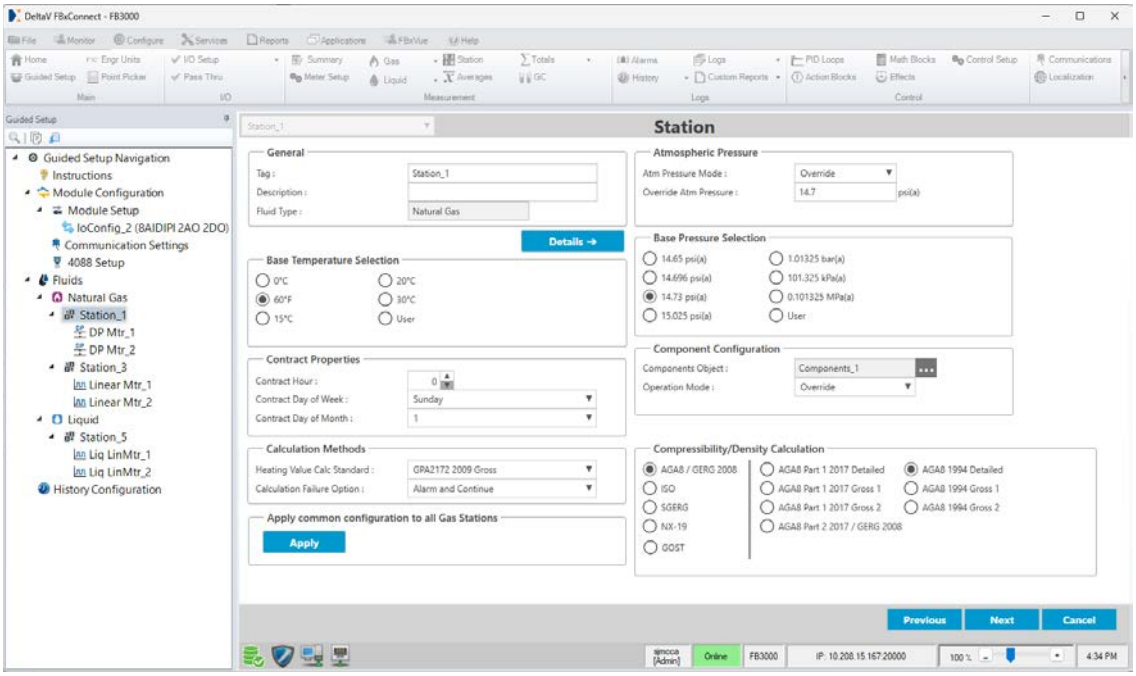



**Figure 82. Guided Setup: Station (Natural Gas shown)**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **General** | **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected station. |
| | **Description** | Sets a description (up to 20-alphanumeric characters) for the selected station. |
| | **Fluid Type** | This **read-only** field shows the type of fluid measured by the selected station. |
| **Details** | Select this button to open the standard Station configuration display. Select  to return to Guided Setup. | |
| **Atmospheric Pressure** | **Atm Pressure Mode** | Click ▼ to set how the system acquires the atmospheric pressure value used in calculations. Possible options are: |
| | | **Override** — The system uses a value you define in the Override Atm Pressure field. |
| | | **Calculated** — The system calculates the atmospheric pressure value. |
| | **Override Atm Pressure** | Sets a value to use for the atmospheric pressure in calculations when Override is selected in the Atm Pressure Mode field. |
| **Base Temperature Selection** | Sets the flow measurement Base Temperature specified in the gas contract. The temperature units are in degrees Fahrenheit or degrees Celsius.<br>**Note**<br>Select **User** to enter a custom temperature value. | |
| **Base Pressure Selection** | Sets the flow measurement Base Pressure specified in the gas contract. The pressure units are in psi(a) or kPa.<br>**Note**<br>• Select **User** to enter a custom pressure value.<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Contract Properties** | **Contract Hour** | Sets the hour at which daily, weekly, and totals rollover and history records are logged (for daily-based, weekly-based, or monthly-based reports). |

| Field | Description | | |
|---|---|---|---|
| | **Contract Day of Week** | Sets the day of the week at which totals rollover and history records are logged (for weekly-based reports). | |
| | **Contract Day of Month** | Sets the day of the month at which totals rollover and history records are logged (for monthly-based reports). | |
| **Component Configuration** | **Note**<br>These fields appears **only** for stations with a **Fluid Type** of **Natural Gas**. | | |
| | **Components Object** | Click ••• to open a Point Picker dialog and select a Components object from the database that the station uses to calculate fluid composition. | |
| | **Operation Mode** | Sets how the system acquires the component information. Possible options are: | |
| | | **Measured** | Selected composition is obtained from the LIVE parameters updated from a gas chromatograph. |
| | | **Override** | Selected composition is obtained from the OVRD parameters entered by a user. Changes to OVRD parameters are logged to the event log. |
| | | **Remote Download** | Selected composition is obtained from the OVRD parameters downloaded from a SCADA host or other remote master. Changes to OVRD parameters are not logged to the event log. |
| | **GC Data Object** | Select ••• to open a Point Picker dialog and define which GC Data instance is associated with each Components instance.<br>**Note**<br>This field appears **only** if you select **Measured** in the **Operation Mode** field. | |

| Field | Description | |
|---|---|---|
| | **Stream Number** | Sets the Stream number associated with each GC Data instance configured in the GC Data Object field.<br>**Note**<br>This field appears **only** if you select **Measured** in the **Operation Mode** field. |
| **Calculation Methods** | **Heating Value Calc Standard** | Sets the calculation standard used in heating value, relative density of the gas to air, and Wobbe Index calculations. Options are GPA 2172 2009 Gross, ISO 6976 1995 Superior, ISO 6976 1995 Inferior, AGA5 2009 Gross, and AGA5 2009 Net.<br>**Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas.**<br>• GPA 2172 2009 uses GPA 2145 2016.<br>• ISO 6976 1995 Superior and ISO 6976 1995 Inferior use the base compressibility (Zb) value calculated per ISO 6976 in the heating value calculation when base temperature selection is 0°C, 15°C, or 20°C; in these cases a base pressure of 1.01325 bar is used for the real Heating Value and Real Relative density. For other base temperature selections, the selected Zb from the compressibility calculation is used. The base pressure for combustion is always 1.01325 bar.<br>• If the base compressibility method is dependent upon the Heating value or relative density, GPA 2172 uses the Base Compressibility using the GPA 2172 2009 method. Otherwise, GPA 2172 2009 uses the Selected Base Compressibility value found on the Fluid Properties – Advanced tab in the heating value calculation. |

| Field | Description | | |
|---|---|---|---|
| | | • If the base compressibility method is dependent upon the heating value or relative density, then GPA 2172 2009 Gross, AGA5 2009 Gross, and AGA5 2009 Net use the base compressibility from their respective internal compressibility method. Otherwise, GPA 2172 2009 Gross, AGA5 2009 Gross, and AGA5 2009 Net use the Selected Base Compressibility value found on the Fluid Properties – Advanced tab in the heating value calculation.<br>• Although AGA5 says the base temperature and the combustion temperature shall be the same, the calculation will handle any base temperature and combustion temperature combination.<br>• Since the components Benzene and Toluene are not included in AGA5, their properties are calculated separately. This calculation closely follows *Example Process for Supporting Additional Compounds* in Appendix A of AGA5 2009.<br>• The AGA5 2009 Net (Inferior / Lower) heating value option assumes that the water formed in the combustion reaction remains in the ideal (gaseous) state. The AGA5 2009 Gross (Superior / Higher) heating value option assumes that water formed in the combustion reaction condenses totally to the liquid state. For fiscal measurement applications, the gross heating value is more commonly used. |
| | **Calculation Failure Option** | Sets how the FB Series product responds if a calculation failure occurs. Possible options are: | |
| | | **Alarm Disabled** | No alarm is logged if a calculation failure occurs. |

| Field | Description | | |
|---|---|---|---|
| | | **Alarm and Continue** | An alarm is logged and the calculation continues if a calculation failure occurs. |
| | | **Alarm and Halt Calculation** | An alarm is logged and the calculation stops if a calculation failure occurs. |
| **Compressibility / Density Calculation** | Sets the desired compressibility/density calculation for the selected station. Select a standard from the list on the left, and then select a version/method to use from the list on the right.<br>**Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**.<br>• **AGA8 2017 Part 2 / GERG 2008** can be used for both natural gas and pure gas measurement. For more information about pure gas measurement, refer to Measuring Pure Gas.<br>• If you select **AGA8 2017 Gross 1** or **Gross 2**, **AGA8 1994 Gross 1** or **Gross 2**, any **SGERG**, any **ISO 12213-3**, or any **NX-19** option, the real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field.<br>• Some compressibility/density standards are based on a specific set of reference conditions. For the most accurate results, ensure the following reference conditions are configured based on the Compressibility/Density Calculation you select:<br>**AGA8**<br>▪ Any reference conditions.<br>**ISO 12213-2 2006**<br>▪ Any reference conditions.<br>**SGERG 1991 Std, CV/RD/N2/H2 or CV/N2/CO2/H2**<br>▪ The Base Temperature Selection field is set to 0°C.<br>▪ The Base Pressure Selection field is set to 1.01325 bar.<br>▪ The Heating Value Combustion Temperature field is set to 25°C.<br>**ISO 12213-3 2006 Pref, Set B or Set D** | | |

| Field | Description |
|---|---|
| | ▪ The Base Temperature Selection field is set to 0°C.<br>▪ The Base Pressure Selection field is set to 1.01325 bar.<br>▪ The Heating Value Combustion Temperature field is set to 25°C.<br>**SGERG 1991 RD/N2/CO2/H2 or ISO 12213-3 2006 Set C**<br>▪ The Base Temperature Selection field is set to 0°C.<br>▪ The Base Pressure Selection field is set to 1.01325 bar.<br>**NX-19 1962**<br>▪ The Base Temperature Selection field is set to 60°F.<br>▪ The Base Pressure Selection field is set to 14.73 psi(a).<br>**NX-19 Mod or NX-19 VDE/VDI**<br>▪ The Base Temperature Selection field is set to 0°C.<br>▪ The Base Pressure Selection field is set to 1.01325 bar.<br>**GOST**<br>▪ Any reference conditions. |
| **Apply** | Select to apply the currently selected station configuration to all other stations with the same fluid type.<br>**Note**<br>This field appears **only** if you have multiple stations with the same fluid type. |

2. Select **Next** to advance to the next step in the Guided Setup.

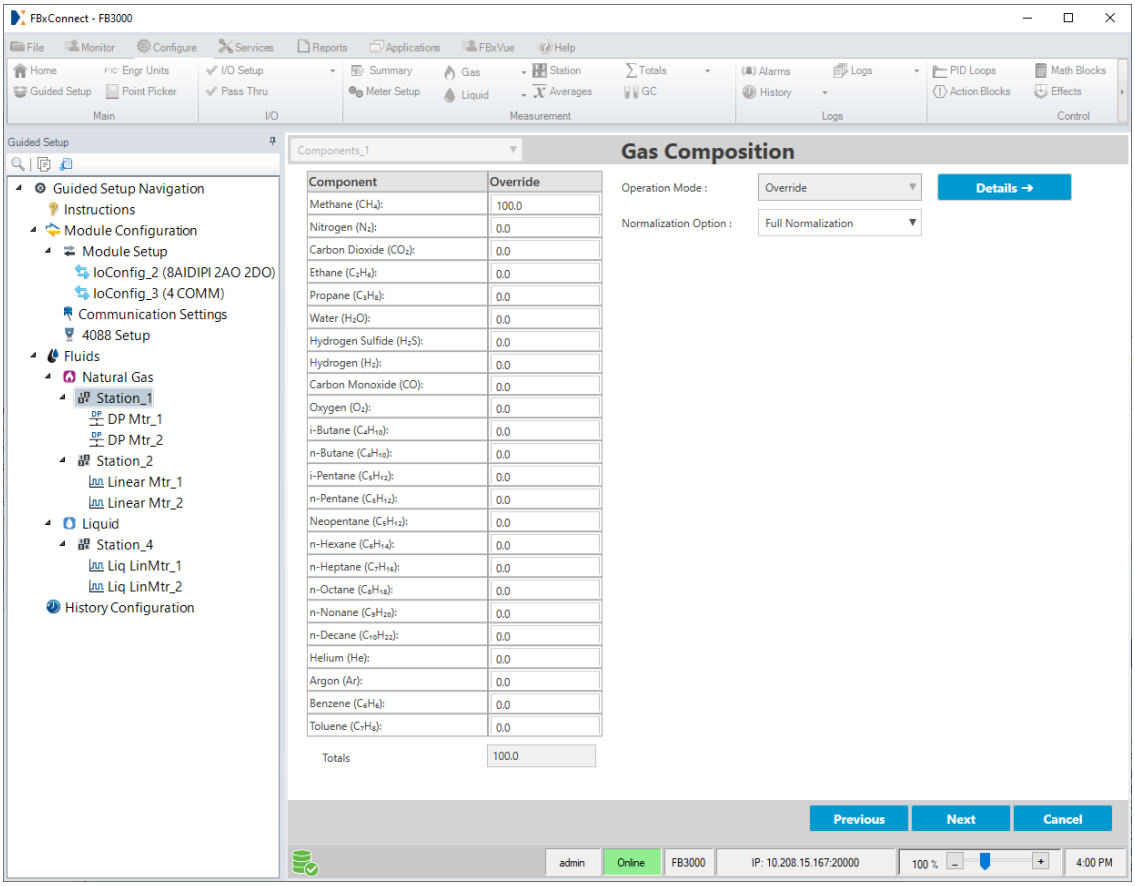
## 4.2.10 Guided Setup: Gas Composition

Use this display to configure gas composition parameters for the selected station.

**Note**

This display is applicable **only** for stations with a fluid type set to **Natural Gas**.

**Figure 83. Guided Setup: Gas Composition**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Operation Mode** | This **read-only** field shows how the system acquires the component information. Possible options are: | |
| | **Measured** | Selected composition is obtained from the LIVE parameters updated from a gas chromatograph. |
| | **Override** | Selected composition is obtained from the OVRD parameters entered by a user. Changes to OVRD parameters are logged to the event log. |
| | **Remote Download** | Selected composition is obtained from the OVRD parameters downloaded from a SCADA host or other remote master. Changes to OVRD parameters are not logged to the event log. |

| Field | Description | |
|---|---|---|
| **Details** | Select this button to open the Component configuration display.<br>Select  to return to Guided Setup. | |
| **Normalization Option** | Sets what action is taken if the total of the gas mole percentages does not add up to 100%. | |
| | **None** | No action is taken if the total does not equal 100%. |
| | **Full Normalization** | The system automatically adjusts each component proportionally so that the total adds up to 100%. |
| | **Methane Adjust** | The system automatically adjusts the methane mole percent up or down so that the total adds up to 100%. |
| **Override** | Sets the mole percent of each fluid component (as a percentage) to use in calculations when **Override** is selected in the **Operation Mode** field. | |
| **Totals** | This **read-only** field shows the total mole percent of all fluid components. | |

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.11 Guided Setup: DP Meter

Use this display to configure parameters for the selected differential pressure meter.

**Note**

You can **right-click** on a DP Meter node in the navigation tree to copy or paste the configuration of one meter to another.

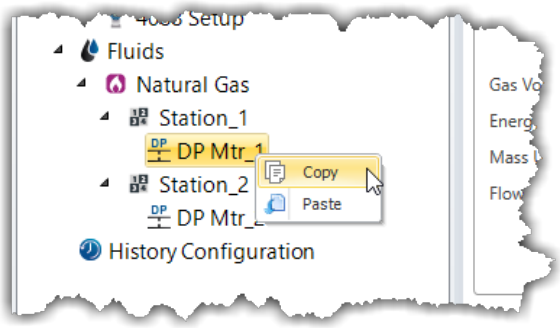
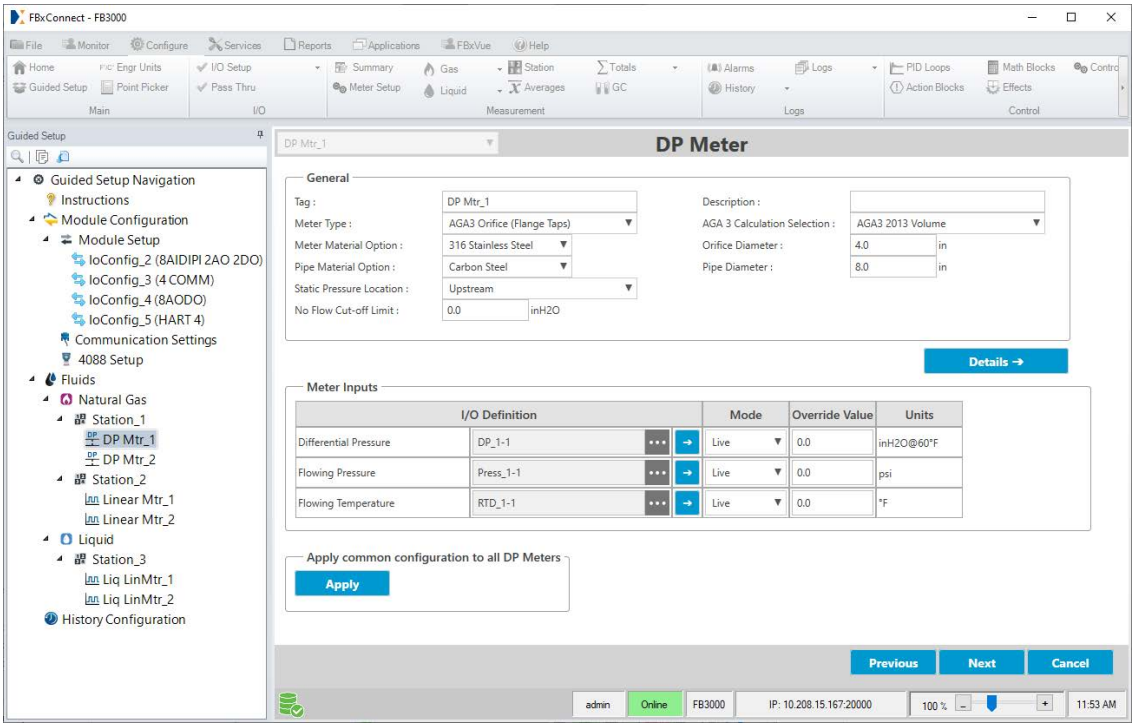


**Figure 84. Guided Setup: DP Meter**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. |
| **Meter Type** | Click ▼ to specify the type of differential pressure meter you are configuring, and the calculation to use for the selected meter. |
| **AGA 3 Calculation Selection** | Click ▼ to specify the calculation to use for the selected meter.<br>**Note**<br>This field shows **only** if you select an **AGA3 Orifice** meter in the **Meter Type** field. |
| **ISO 5167 Calculation Selection** | Click ▼ to specify the calculation to use for the selected meter.<br>**Note**<br>This field shows **only** if you select an **ISO5167** meter in the **Meter Type** field. |

| Field | Description |
|---|---|
| **Rosemont Orifice Calculation** | Click ▼ to specify the calculation to use for the selected meter.<br>**Note**<br>This field shows **only** if you select a **1595 Conditioning Orifice** or **405C Compact Orifice** meter in the **Meter Type** field. |
| **Meter Material Option** | Indicates the material from which the orifice (or other meter element) is made. Nearly all natural gas applications use stainless steel orifice plates. |
| **Orifice Diameter** | Specifies the orifice plate bore diameter.<br>**Note**<br>This field appears **only** if you select an **orifice meter** in the **Meter Type** field. |
| **Throat Diameter** | Specifies the Venturi tube throat diameter.<br>**Note**<br>This field appears **only** if you select a **Venturi meter** in the **Meter Type** field. |
| **Nozzle Diameter** | Specifies the nozzle throat diameter.<br>**Note**<br>This field appears **only** if you select a **nozzle meter** in the **Meter Type** field. |
| **Orifice Diameter (single hole)** | Specifies the typical orifice hole size (single hole).<br>**Note**<br>This field appears **only** if you select a **conditioning orifice meter** in the **Meter Type** field. |
| **Cone Diameter** | Specifies the cone diameter.<br>**Note**<br>This field appears **only** if you select a **cone meter** in the **Meter Type** field. |
| **Rosemount Annubar Type** | Specifies the type and size of the Rosemount Annubar Primary Element.<br>**Note**<br>This field appears **only** if you select a **Rosemount Annubar** in the **Meter Type** field. |

| Field | Description | |
|---|---|---|
| **Pipe Material Option** | Indicates the material from which the meter tube is constructed. Nearly all natural gas applications use a carbon steel meter tube. | |
| **Pipe Diameter** | Specifies the inside diameter of the pipe in which the meter is installed. | |
| **Static Pressure Location** | Sets the location of the static pressure tap in relation to the meter and normal flow. | |
| | **Upstream** | The static pressure tap is located upstream in relation to the meter and normal flow. |
| | **Downstream** | The static pressure tap is located downstream in relation to the meter and normal flow. |
| **Pressure Transmitter Type** | Indicates the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select a **User Data** instance in the **Flowing Pressure** I/O Definition field. | |
| **No Flow Cut-off Limit** | Sets the low flow cutoff point. When the live differential pressure of the metering device is less than this value, the meter flow rates will be set to zero. | |
| **Details** | Select this button to open the DP Meter configuration display. Select  to return to Guided Setup. | |

| Field | Description | |
|---|---|---|
| **Differential Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the differential pressure input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• DP object (Forward) – SELECTED VALUE<br>• DP object (Reverse) – REVERSE DIFFERENTIAL PRESSURE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data object – DOUBLE FLOATING POINT 1. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not** available if you select a **User Data** object. |
| | **Override Value** | Sets the differential pressure value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not** available if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Flowing Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter. |

| Field | Description | |
|---|---|---|
| | | If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input.<br>If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field. The value is assumed to be in the pressure units selected for the associated station.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not** available if you select a **User Data** object. |
| | **Override Value** | Sets the static pressure value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not** available if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Flowing Temperature** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not** available if you select a **User Data** object. |
| | **Override Value** | Sets the flowing temperature value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not** available if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description |
| --- | --- |
| **Apply** | Select to apply the currently selected meter configuration to all other meters with the same meter type.<br>**Note**<br>This field appears **only** for the first instance of multiple meters with the same meter type. |

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.12 Guided Setup: Linear Meter

Use this display to configure parameters for the selected linear meter.

### Note

You can **right-click** on a Linear Meter node in the navigation tree to copy or paste the configuration of one meter to another.

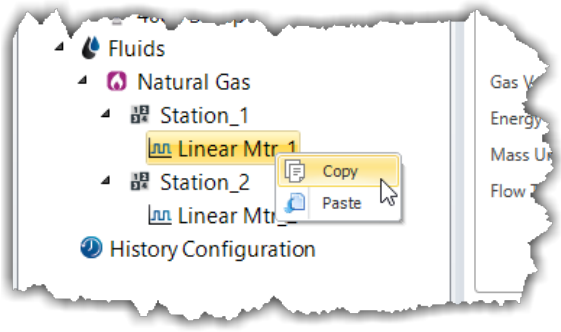
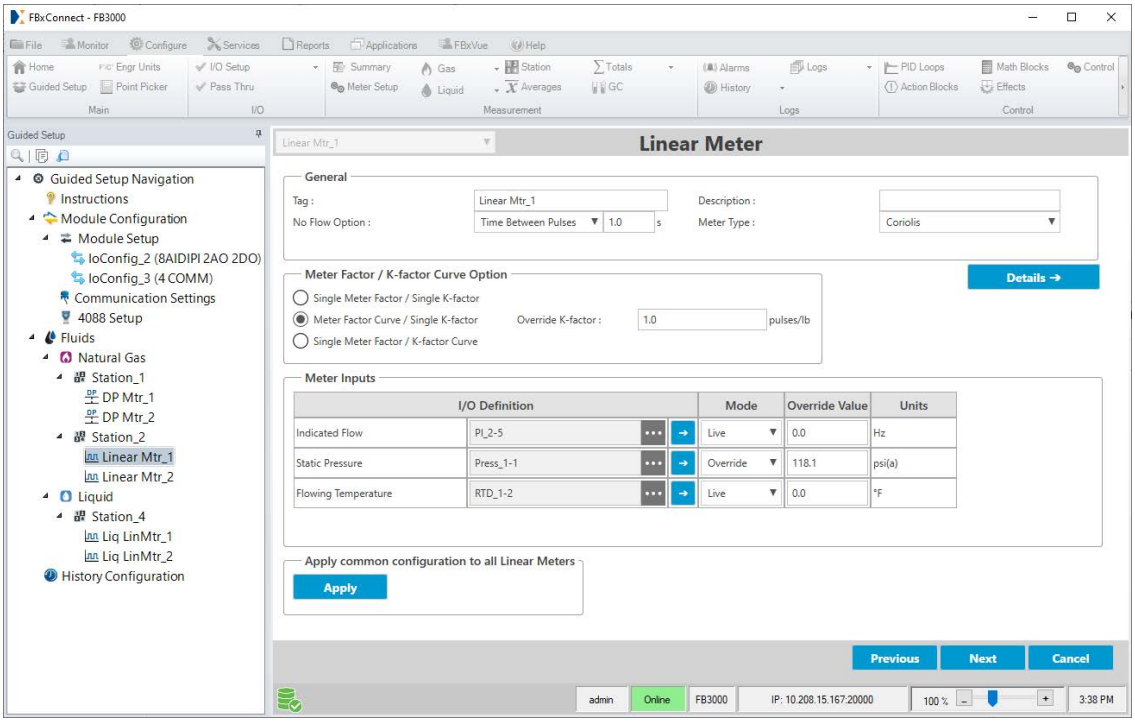



**Figure 85. Guided Setup: Linear Meter**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. | |
| **No Flow Option** | Sets how the system calculates a "no flow" condition for the meter. Possible options are: | |
| | **Time Between Pulses** | The system determines a "no flow" condition for the meter based on the amount of time between successive pulses. The calculated flow is set equal to zero.<br>**Note**<br>• This field applies **only** if you select a **pulse input** object in the **Indicated Flow** field.<br>• You **must** enter a time (in seconds) for the system to use in the text field. |
| | **Flow Cut-off** | When the value of the uncorrected volume input is less than or equal to the Low Flow Cutoff value, the calculated flow is set equal to zero.<br>**Note**<br>You **must** enter a value (in Hz) for the system to use in the text field. |
| **Meter Type** | Specifies the type of linear meter you are configuring. Possible options are: | |
| | **Turbine** | Select if measuring flow through a turbine meter or other linear meter with a frequency or analog signal representing actual volumetric flow rate. |
| | **Coriolis** | Select if measuring flow through a Coriolis meter or other linear meter with a frequency or analog signal representing a mass flow rate. |
| | **Auto-Adjust** | Select if measuring flow through an Auto-Adjust meter. This meter type requires 2 pulse inputs, one representing the main rotor and one representing the sensing rotor. |

| Field | Description | |
|---|---|---|
| | **Ultrasonic** | Select if measuring flow through an ultrasonic meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| | **Positive Displacement** | Select if measuring flow through a positive displacement meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| **Pressure Transmitter Type** | Indicates the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select a **User Data** instance in the **Static Pressure I/O Definition** field. | |
| **Details** | Select this button to open the Linear Meter configuration display.<br>Select  to return to Guided Setup. | |
| **Meter Factor / K-factor Curve Option** | Sets how system uses calculates K-factors or Meter Factors in the flow calculation. Possible options are: | |
| | **Single Meter Factor / Single K-factor** | Uses a single Meter Factor and a single K-factor for the meter. This is the simplest choice and means that a value for the meter factor and a value for the K-factor are fixed for all flow rates and the values are taken from the last prove or an entered value. Select this option when using either the K-factor or meter factor proving, as long as neither the K-factor or meter factor will vary with flow rate or product.<br>**Note**<br>This option appears **only** if you select **Turbine** or **Coriolis** in the **Meter Type** field. |

| Field | Description | |
|---|---|---|
| | **Meter Factor Curve / Single K-factor** | A meter factor calculates for the current flow rate based on a linear interpolation of the meter factor versus flow rate values entered under the Factor Curve heading, but the K-factor will be fixed. Select this option when using meter factor proving if proving is done at multiple flow rates.<br>**Note**<br>This option appears **only** if you select **Turbine** or **Coriolis** in the **Meter Type** field. |
| | **Single Meter Factor / K-factor Curve** | A K-factor calculates for the current flow input frequency based on a linear interpolation of the meter factor versus frequency values entered under the Factor Curve, but the meter factor will be a single value from the last prove or entered value. The K-factor curve can come from multiple proves at different flow rates with a meter factor of 1.0 (K-factor proving) or the K-factor curve can come from factory calibration and a single meter factor from a prove (meter factor proving).<br>**Note**<br>This option appears **only** if you select **Turbine** or **Coriolis** in the **Meter Type** field. |
| **Override Meter Factor** | Sets a fixed meter factor value to use in calculations.<br>**Note**<br>This field appears **only** if you select either **Single Meter Factor / Single K-factor** or **Single Meter Factor / K-factor Curve** in the **Meter Factor / K-factor Curve Option** field. | |
| **Override K-factor** | Sets the discharge coefficient value to use in calculations.<br>**Note**<br>This field appears **only** if you select either **Single Meter Factor / Single K-factor** or **Meter Factor Curve / Single K-factor** in the **Meter Factor / K-factor Curve Option** field. | |

| Field | Description | |
|---|---|---|
| **Calibration Curve Option** | Sets how the system uses the Adjusted Uncorrected Volume Factor (AUVF) in calculations. Possible options are:<br>**Note**<br>These options appear **only** if you select **Auto-Adjust** in the **Meter Type** field. | |
| | **Disable** | The system does not use the AUVF in calculations (which is equal to an AUVF of 1.00).<br>**Note**<br>If you disable the calibration curve, the adjusted volume rate reflects the result of the auto-adjust algorithm with no correction for the calibration curve. |
| | **Enable** | The system includes the Adjusted Uncorrected Volume Factor (AUVF) in calculations.<br>**Note**<br>You **must** enter information from the calibration report in the % Error and AAT Volume fields. The program applies the AUVF to the result of the auto-adjust algorithm to calculate the adjusted volume rate at flowing conditions. |
| **Indicated Flow** | **I/O Definition** | Click ... to open a Point Picker dialog and select an indicated flow input to use for the selected meter. This field represents the Pulse Frequency for a Turbine or Coriolis meter type, and the Main Rotor Frequency for an Auto-Adjust meter type.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• PI object – SELECTED FREQUENCY and ACCUMULATED PULSES<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible |

| Field | Description | |
|---|---|---|
| | | in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 1. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Secondary Flow Input Object** | **I/O Definition** | Click ... to open a Point Picker dialog and select the secondary flow object to use for the selected meter. The secondary flow object represents the Sensing Rotor Frequency and must be a PI object. This field is currently **only** used for an **Auto-Adjust** meter type.<br>**Note**<br>Only an object is chosen, and the Auto-Adjust algorithm reads the SELECTED FREQUENCY and ACCUMULATED PULSES parameters from the selected PI object. |

| Field | Description | |
|---|---|---|
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Note**<br>These fields appear **only** if you select **Auto-Adjust** in the **Meter Type** field. | |
| **Static Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input.<br>If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field. The value is assumed to be in the pressure units selected for the associated station.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object. |

| Field | Description | |
|---|---|---|
| | | • Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Flowing Temperature** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use |

| Field | Description | |
|---|---|---|
| | | the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Apply** | Select to apply the currently selected meter configuration to all other meters with the same meter type.<br>**Note**<br>This field appears **only** for the first instance of multiple meters with the same meter type. | |

2. Select **Next** to advance to the next step in the Guided Setup.

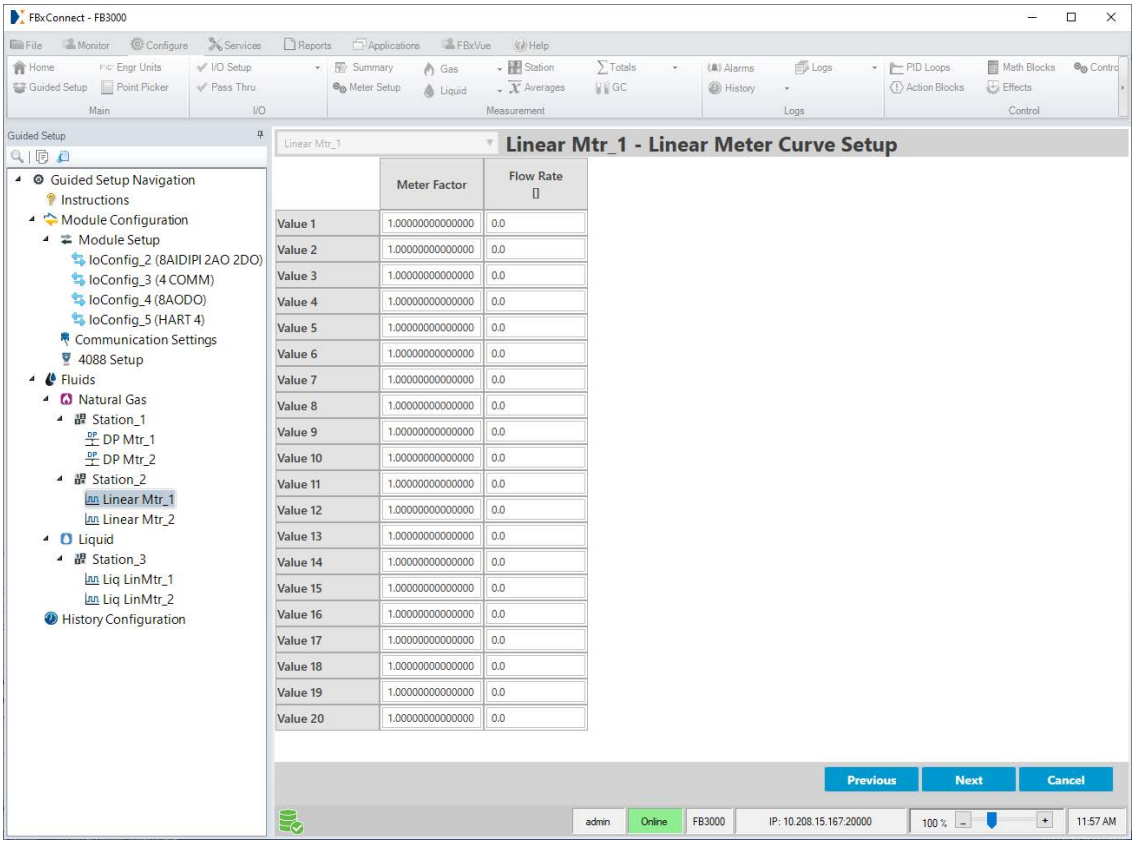
## 4.2.13 Guided Setup: Linear Meter Curve Setup

Use this display to enter a meter factor curve or K-factor curve.

**Note**

This display appears **only** if you select Meter Factor Curve/Single K-factor or Single Meter Factor/K-factor Curve in the Meter Factor/K-factor Curve Option field on the previous display.

**Figure 86. Guided Setup: Linear Meter Curve Setup**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **K-factor / Frequency** | If you selected **Meter Factor Curve / Single K-factor** in the Meter Factor / K-factor Curve Option field on the previous display, enter up to 20 points on the curve (pairs of meter factor and flow rate) and a meter factor is calculated for use in the flow equation by linear interpolation of the current indicated quantity flow rate. |
| **Meter Factor / Flow Rate** | If you selected **Single Meter Factor / K-factor Curve** in the Meter Factor / K-factor Curve Option field on the previous display, enter up to 20 points on the curve (pairs of K-factor and frequency) and a K-factor is calculated for use in the flow equation by linear interpolation of the current flow meter input frequency. |

| Field | Description |
|---|---|
| **% Error / AAT Volume** | If you selected **Auto-Adjust** in the Meter Type field on the previous display, enter up to 20 points on the curve (pairs of % Error and AAT Volume {the volumetric flow rate calculated by the Auto-Adjust Turbine algorithm}). The adjusted Uncorrected Volume Factor is calculated for use in the flow equation by using linear interpolation of the AAT Volume to determine % Error and then the AUVF is calculated as follows: $$AUVF = \frac{1}{\left(\frac{\%\ Error}{100}\right)+1}$$ |

**Note**

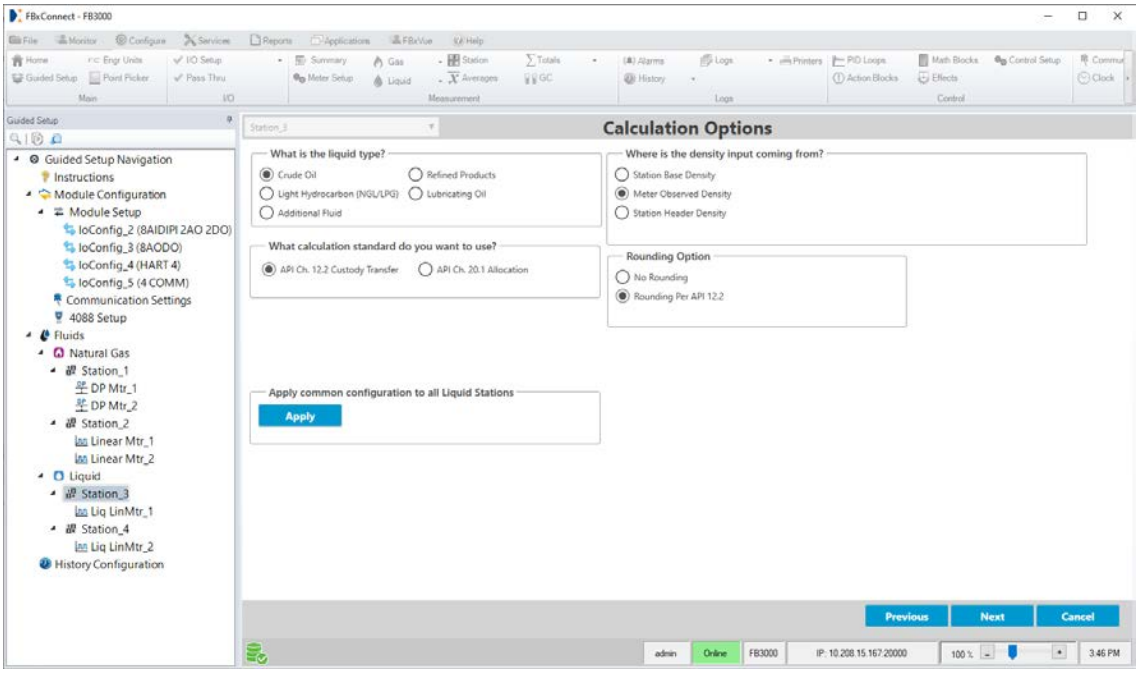
A valid point **must** have a non-zero flow rate/frequency and a non-zero factor. The points may be entered in any order and will be internally sorted by flow rate (MF curve) or frequency (K-Factor Curve), discarding any invalid points. No extrapolation is done beyond the lowest and highest points on the curve. If the flow rate/frequency is less than the lowest point on the curve, the calculated factor will be the factor for the lowest point on the curve. If the flow rate/frequency is greater than the highest point on the curve, the calculated factor will be the factor for the highest point on the curve.

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.14 Guided Setup: Calculation Options

Use this display to set the flow calculation methodology used to calculate crude oil, crude oil byproducts, water quantities, and density input for the selected liquid linear meter.

**Figure 87. Guided Setup: Calculation Options**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **What is the liquid type?** | Sets the specific type of hydrocarbon fluid for the selected product instance. Possible options are: | |
| | **Crude Oil** | A liquid hydrocarbon is generally considered to be a crude oil if its density falls between approximately 0.61120 to 1.16464 relative density (100 to −10 °API). Crude oils that have been stabilized for transportation or storage purposes with API gravities within this range are considered to be part of this group. |
| | **Light Hydrocarbon** | A liquid hydrocarbon is generally considered to be a light hydrocarbon if its density falls between approximately 0.3500 to 0.6880 relative density (272.8 to 72.2 °API). Light hydrocarbons are often referred to as LPGs (Liquified Petroleum Gases) or NGLs (Natural Gas Liquids) and are predominantly composed of lighter hydrocarbons, such as methane, ethane, butane, and propane. |

| Field | Description | |
|---|---|---|
| | **Refined Products** | A liquid hydrocarbon is generally considered to be a refined product if it falls into one of the following product groups:<br>• **Gasoline** – Motor gasoline and unfinished gasoline blending stock with a base density range between approximately 50° API and 85° API.<br>• **Jet Fuels** – Jet fuels, kerosene, and Stoddard solvents with a base density range between approximately 37° API and 50° API.<br>• **Fuel Oils** – Diesel oils, heating oils and fuel oils with a base density range between approximately -10° API and 37° API. |
| | **Lubricating Oil** | A liquid hydrocarbon is generally considered to be a lubricating oil if it is a base stock derived from crude oil fractions by distillation or asphalt precipitation. Lubricating oils have densities in the range between approximately -10 to 45° API. |
| | **Additional Fluid** | Any fluid not covered by the other options. If a measured density is available and the base density is known, then the volume correction factor for temperature and pressure (CTPL) is calculated as the ratio of the measured density to the base density. If a measured density is not available, then the CTPL is set to 1.0 and no volume correction for temperature or pressure is calculated. The density options below are chosen via the **Density Option** field on the Station – General display:<br>**Station Base Density**<br>▪ meter observed density = station base density<br>▪ CTPL = 1.0<br>**Meter Observed Density**<br>▪ CTPL = meter observed density / station base density |

| Field | Description | |
|---|---|---|
| | | **Station Header Density**<br>▪ meter observed density = station header density<br>▪ CTPL = meter observed density / station base density<br>**Note**<br>Even though independent temperature (CTL) and pressure (CPL) correction factors cannot be calculated, CTL is set equal to CTPL and CPL is set equal to 1.0 to provide support for systems that do not recognize or use CTPL. |
| **What calculation standard do you want to use?** | Sets the flow calculation methodology used to calculate crude oil, crude oil byproducts, and water quantities. Possible options are: | |
| | **API Ch. 12.2 Custody Transfer** | Meters assigned to the selected station use API Ch. 12.2 for oil measurement. This standard is typically used for custody transfer but can also be utilized for allocation applications. The standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, gross standard volume, net standard volume, water volume, and mass. CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6.<br>**Note**<br>CTL, CPL, CCF, and Meter Factor (MF) are rounded as per API Ch. 12.2 Table 6. The associated Station provides flow rates and accumulations representing gross volume, net standard volume, water volume, and mass. |

| Field | Description | |
|---|---|---|
| | **API Ch. 20.1 Allocation** | Meters assigned to the selected station use API Ch. 20.1 standard for allocation measurement. The standard handles unstable crude oil and/or higher water cases. The standard is partitioned by its water volume correction methodology.<br>**Note**<br>This field **appears** only if you select **Crude Oil** in the previous field. |
| **Water Factor** | Sets how the system calculates the water volume correction.<br>**Note**<br>This field appears only if you select **API Ch. 20.1** in the previous field. | |
| | **Apply S&W% at end (to base conditions)** | Meters assigned to the selected station use API Ch. 20.1 Procedure A for oil measurement. The standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes. API Ch. 20.1 (2016) suggests using this method when the sediment and water is generally **less** than 5.0 percent.<br>The meter calculates the same quantities as the API Ch. 12.2 Custody Transfer Meter, but a shrinkage factor is applied to the gross standard volume. If the shrinkage factor includes a correction for temperature, the CTL should be set to override mode with a value of 1.0, otherwise it should be set to calculated mode. If pressure correction is included in the SF or pressure correction is not required, CPL should be set to override mode at 1.0, otherwise CPL should be set to calculated mode. CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6. The water fraction is calculated using the in-use CSW.<br>**Note** |

| Field | Description | |
|---|---|---|
| | | CTL, CPL, CCF, and Meter Factor (MF) are rounded as per API Ch. 12.2 Table 6. Station quantity calculations are not supported for allocation meters. |
| | **Apply % Water to Gross Volume (oil and water volumes corrected separately)** | Meters assigned to the selected station use API Ch. 20.1 Procedure C for oil measurement. The oil and water have separate volume correction factors and are split before volume correction is applied. API Ch. 20.1 (2016) suggests using this method when the sediment and water is generally **greater** than 5.0 percent.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, oil unshrunk volume, net standard volume, water metered volume and water net volume. Additionally, a flash gas net volume and an NGL net volume may be calculated by entering an override flash gas factor and NGL factor.<br>The correction factor for the oil is entered via an override or external shrinkage factor (SF). The Shrinkage Factor is assumed to include any correction for shrinkage, temperature, and pressure. CTL, CPL, CTPL, CCF and CSW are assumed to be 1.0 The correction factor for water is calculated according to API Ch. 20.1 A.1 (2016).<br>**Note**<br>The flow calculation uses unrounded correction factors. Station quantity calculations are not supported for allocation meters. |
| **Where is the density input coming from?** | Sets where the density measurement is occurring. Possible options are:<br>**Note**<br>This field appear **only** if you select either **API Ch. 12.2 Custody Transfer** or **API Ch. 20.1 Allocation** and **Apply S&W% at end (to base conditions)**. | |

| Field | Description | | |
|---|---|---|---|
| | **Station Base Density** | Use the static density value you define in the **Base Density** field. No densitometer is at the meter. A base to alternate calculation occurs using the meter temperature and pressure as the alternate conditions.<br>**Note**<br>If the base density and temperature units are different than the station's base conditions, the system converts the value to the station's base conditions. | |
| | | **Base Density** | Enter a base density value to use in calculations.<br>**Note**<br>This field appears **only** if you select **Station Base Density** as the density input source. |
| | **Meter Observed Density** | Use the dynamic density value measured at the meter by a densitometer you configure in the **Flowing Density Parameter** field. The observed to base density calculation uses the meter temperature and pressure as the observed density conditions. In most cases where the meters have individual live density measurement, there is only one temperature measurement and one pressure measurement to cover both the density and the meter. This means that the meter density is set equal to the observed density and only an observed to base calculation is performed. | |
| | **Station Header Density** | Use the dynamic density value measured at the station/header (with header temperature and pressure). You configure the measurement source in the **Header Density Object** field. | |

| Field | Description | | |
|---|---|---|---|
| | | **Header Density Object** | Sets the Liquid Density instance associated with the selected station.<br>Select ••• to open a Point Picker dialog and choose the liquid density instance used by the selected station.<br>**Note**<br>This field appears **only** if you select **Station Header Density** as the density input source. |
| **Rounding Option** | Sets the rounding used by the system for volume correction factors. | | |
| | **Rounding According to API 12.2.2** | Calculation outputs are rounded according to API 12.2.2. | |
| | **No Rounding** | No rounding is performed on intermediate or final calculated variables, and values display in full double precision. | |
| **Apply** | Select to apply the currently selected station configuration to all other stations with the same fluid type.<br>**Note**<br>This field appears **only** for the first instance of multiple stations with the same fluid type. | | |

2. Select **Next** to advance to the next step in the Guided Setup.

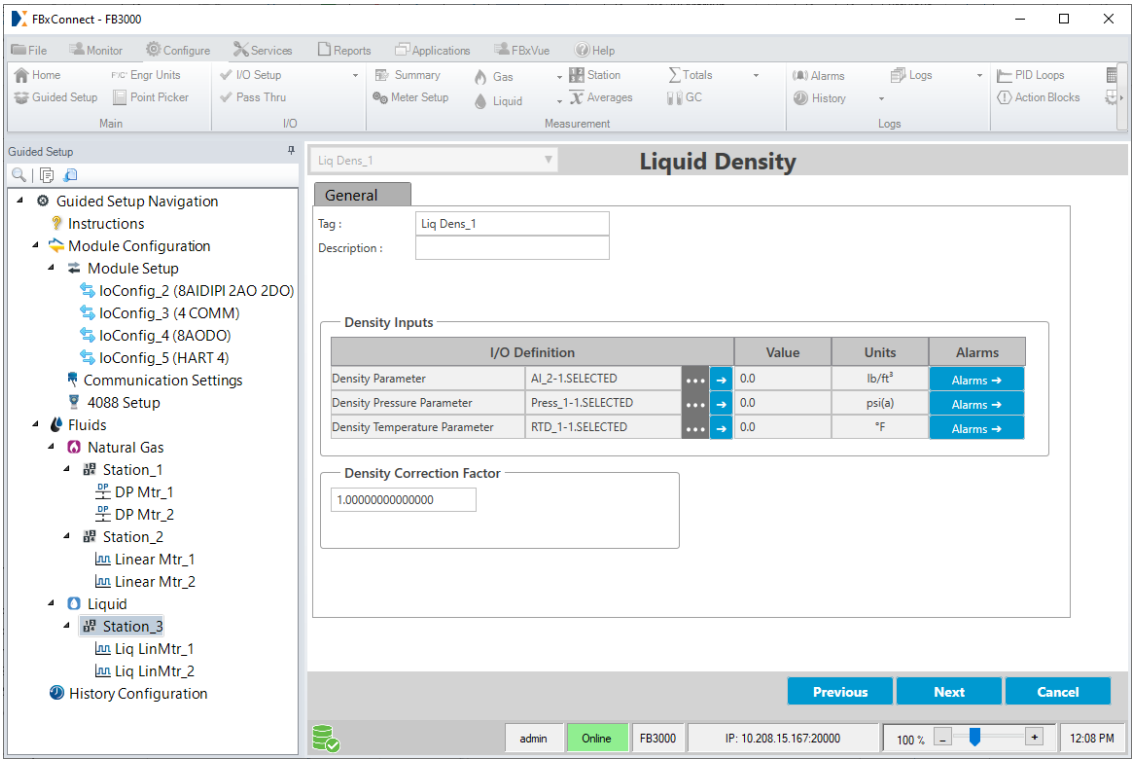
## 4.2.15 Guided Setup: Liquid Density

If you select **Station Header Density** in the Calculation Options step of the Guided Setup, use this display to configure the station header density input.

**Note**

- You **must** configure the **Density Parameter** field.
- The **Density Pressure Parameter** and **Density Temperature Parameter** fields are optional, but a property calculation alarm is raised at any associated liquid linear meter if the **Density Temperature Parameter** is Undefined.

**Figure 88. Guided Setup: Liquid Density**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected product instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected product instance. |

| Field | Description | |
|---|---|---|
| **Density Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density input to use for the selected Liquid Density instance.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure > Alarms display for the User Data value. |

| Field | Description | |
|---|---|---|
| **Density Pressure Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density pressure input to use for the Liquid Density instance.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• Press object – SELECTED VALUE<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure > Alarms display for the User Data value. |

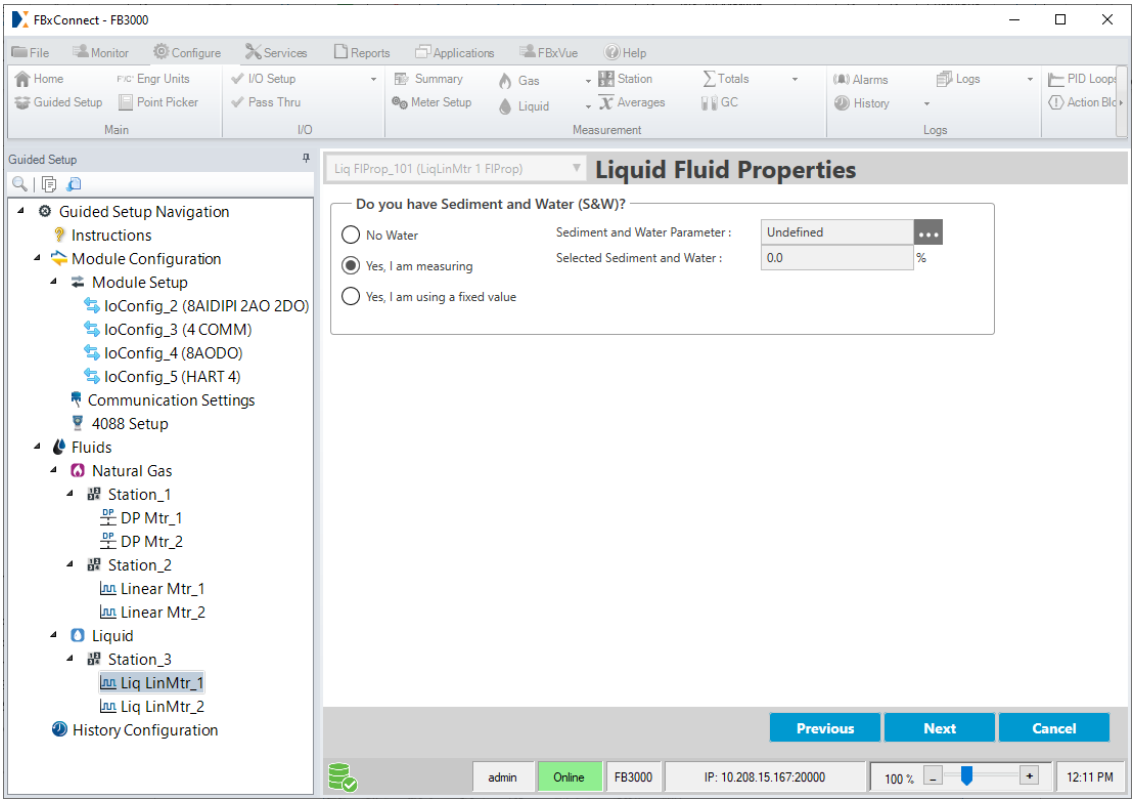
| Field | Description | |
|---|---|---|
| **Density Temperature Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density temperature input to use for the Liquid Density instance.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• RTD object – SELECTED VALUE<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure > Alarms display for the User Data value. |
| **Density Correction Factor** | Sets the multiplier value to correct the observed density provided by a pycnometer or similar device. The Density Correction Factor (sometimes referred to as DCF) is a unitless scaler used to adjust the density referenced by the density parameter. | |

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.16 Guided Setup: Liquid Fluid Properties (Sediment and Water)

If you select **Crude Oil** as the liquid type and you select either **API Ch. 12.2 Custody Transfer** or **API Ch. 20.1 Allocation** and **Apply S&W% at end (to base conditions)** in the Calculation Options step, use this display to configure the sediment and water value parameters for the selected liquid linear meter.

**Figure 89. Guided Setup: Liquid Fluid Properties (Sediment and Water)**



1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Do you have Sediment and Water?** | Determines if calculations include corrections for sediment and water volumes. | |
| | **No Water** | Select this option if you do not have any sediment or water flowing through the meter. |
| | **Yes, I'm measuring** | Select this option if you have sediment water flowing through the meter, and the amount is being measured. |
| | **Yes, I'm using a fixed value** | Select this option to use an override value for the percent of sediment and water flowing through the meter. |
| **Sediment and Water Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the sediment and water value for the selected meter.<br>**Note**<br>This field appears **only** if you select **Yes, I'm measuring**. | |
| **Override Sediment and Water** | Sets, in percent, a fixed sediment and water value to use in calculations for the selected meter.<br>**Note**<br>This field appears **only** if you select **Yes, I'm using a fixed value**. | |
| **Selected Sediment and Water** | This **read-only** field shows the current sediment and water value, based on the selected options, used in calculations.<br>**Note**<br>This field appears **only** if you select **Yes, I'm measuring** or select **Yes, I'm using a fixed value**. | |

2. Select **Next** to advance to the next step in the Guided Setup.

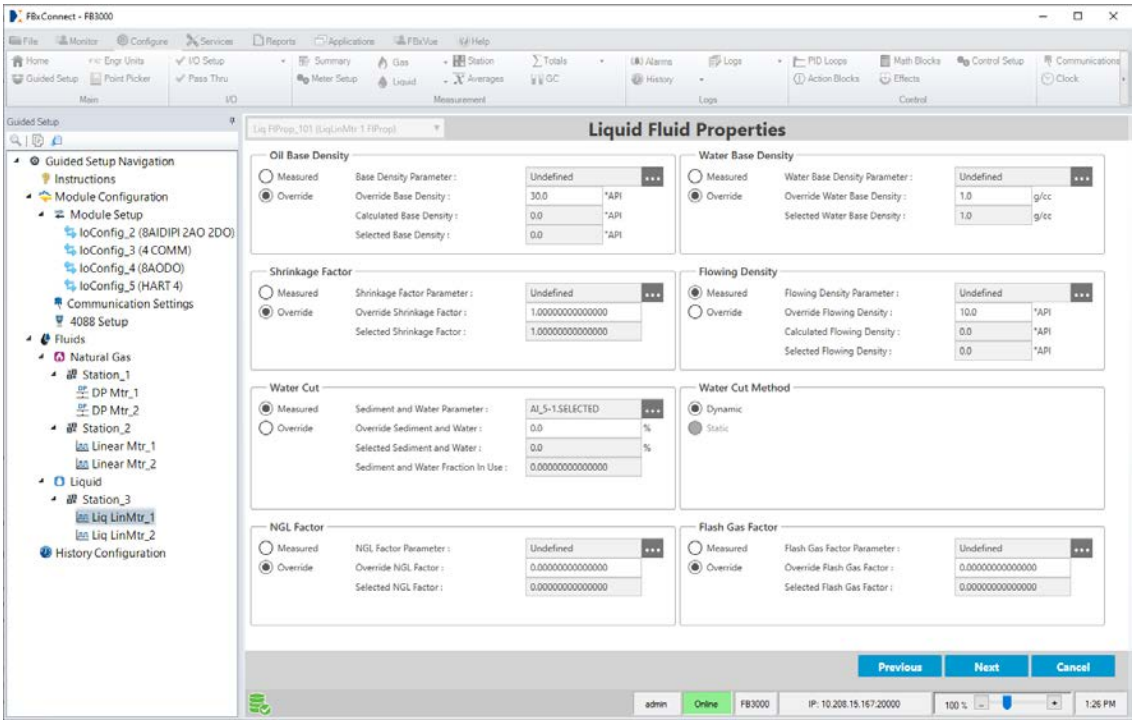
## 4.2.17 Guided Setup: Liquid Fluid Properties (Additional Factors)

If you select **Crude Oil** as the liquid type and you select **API Ch. 20.1 Allocation** in the Calculation Options step of the Guided Setup, use this display to configure general fluid properties and additional factors for the fluid being measured.

**Note**

- The fields shown on this display are determined by your answer to the question **What calculation standard do you want to use?** in the Calculation Options step of the Guided Setup.
- Physically impossible inputs may be clamped at a high or low limit value in order to ensure reasonable results. If a value is clamped at a high or low limit, a corresponding flow or property alarm is raised.

**Figure 90. Guided Setup: Liquid Fluid Properties (Additional Factors)**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Oil Base Density** | Sets how the system acquires the oil base density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Oil Base Density Parameter** field to acquire the value. |

| Field | Description | |
|---|---|---|
| | **Override** | The system uses the value you define in the **Override Oil Base Density** field. |
| **Base Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the oil base density value. | |
| **Override Base Density** | Sets the oil base density value to use in calculations when **Override** is selected in the **Oil Base Density Mode** field. | |
| **Calculated Base Density** | This **read-only** field shows the oil base density value as calculated by the system. | |
| **Selected Base Density** | This **read-only** field shows the current oil base density value, based on the selected options, used in calculations. | |
| **Water Base Density** | Sets how the system acquires the water base density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Water Base Density Parameter** field to acquire the value.<br>**Note**<br>The system ignores invalid measured water base density values and uses a value of 0 instead. |
| | **Override** | The system uses the value you define in the **Override Water Base Density** field. |
| **Water Base Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the water base density value. | |
| **Override Water Base Density** | Sets the water base density value to use in calculations when **Override** is selected in the **Water Base Density Mode** field. | |
| **Selected Water Base Density** | This **read-only** field shows the current water base density value, based on the selected options, used in calculations. | |
| **Shrinkage Factor** | Sets how the system acquires the shrinkage factor value. The shrinkage factor is the ratio of hydrocarbon liquid at base conditions to the hydrocarbon liquid at metering conditions. Possible options are: | |

| Field | Description | |
|---|---|---|
| | **Measured** | The system uses a parameter you configure in the **Shrinkage Factor Parameter** field to acquire the value.<br>**Note**<br>Valid values are between 0 and 1. The system ignores an invalid measured shrinkage factor values and uses a value of 0 instead. |
| | **Override** | The system uses the value you define in the **Override Shrinkage Factor** field. |
| **Shrinkage Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the shrinkage factor value. | |
| **Override Shrinkage Factor** | Sets the shrinkage factor value to use in calculations when **Override** is selected in the **Shrinkage Factor Mode** field. | |
| **Selected Shrinkage Factor** | This **read-only** field shows the current shrinkage factor value, based on the selected options, used in calculations. | |
| **Flowing Density** | Sets how the system acquires the flowing density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Flowing Density Parameter** field to acquire the value.<br>**Note**<br>The system ignores invalid measured emulsion density values and uses a value of 0 instead. |
| | **Override** | The system uses the value you define in the **Override Flowing Density** field. |
| **Flowing Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the flowing density value. | |
| **Override Flowing Density** | Sets the flowing density value to use in calculations when **Override** is selected in the **Flowing Density Mode** field. | |
| **Calculated Flowing Density** | This **read-only** field shows the flowing density value as calculated by the system. | |

| Field | Description | |
|---|---|---|
| **Selected Flowing Density** | This **read-only** field shows the current flowing density value, based on the selected options, used in calculations. | |
| **Water Cut** | Sets how the system acquires the water cut value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Water Cut Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid measured water cut values and uses a value of 0% instead. Water cut values greater than 100% are treated as 100% |
| | **Override** | The system uses the value you define in the **Water Cut Override** field. |
| **Sediment and Water Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the sediment and water value. | |
| **Override Sediment and Water** | Sets the sediment and water value to use in calculations when **Override** is selected in the **Water Cut Mode** field. | |
| **Selected Water Cut** | This **read-only** field shows the current sediment and water value, based on the selected options, used in calculations. | |
| **Sediment and Water Fraction In Use** | This **readd-**only field shows the volume fraction of water applied to the gross volume of fluid measured to determine uncorrected (actual) water volume at metering conditions. | |
| **Water Cut Method** | Sets how the water cut value is obtained. | |
| | **Dynamic** | Live reading of water cut at metering conditions. |
| | **Static** | Off-line reading of water cut at laboratory conditions (needs to be corrected to metering conditions before using in the calculation). |
| **NGL Factor** | Sets how the system acquires the NGL factor value. The NGL factor is the ratio of the natural gas liquids at metering conditions to the hydrocarbon liquids at base conditions. Possible options are: | |

| Field | Description | |
|---|---|---|
| | **Measured** | The system uses a parameter you configure in the **NGL Factor Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid NGL factor values and uses a value of 0 instead. |
| | **Override** | The system uses the value you define in the **Override NGL Factor** field. |
| **NGL Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the NGL factor value. | |
| **Override NGL Factor** | Sets the NGL factor value to use in calculations when **Override** is selected in the **NGL Factor Mode** field. | |
| **Selected NGL Factor** | This **read-only** field shows the current NGL factor value, based on the selected options, used in calculations. | |
| **Flash Gas Factor** | Sets how the system acquires the flash gas factor value. The flash gas factor is the ratio of the flash gas at metering conditions to the hydrocarbon liquids at base conditions. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Flash Gas Factor Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid flash gas factor values and uses a value of 0 instead. |
| | **Override** | The system uses the value you define in the **Override NGL Factor** field. |
| **Flash Gas Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the flash gas factor value. | |
| **Override Flash Gas Factor** | Sets the flash gas factor value to use in calculations when **Override** is selected in the **Flash Gas Factor Mode** field. | |
| **Selected Flash Gas Factor** | This **read-only** field shows the current flash gas factor value, based on the selected options, used in calculations. | |

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.18 Guided Setup: Liquid Linear Meter

Use this display to configure parameters for the selected liquid linear meter.

**Note**

You can **right-click** on a Liquid Linear Meter node in the navigation tree to copy or paste the configuration of one meter to another.

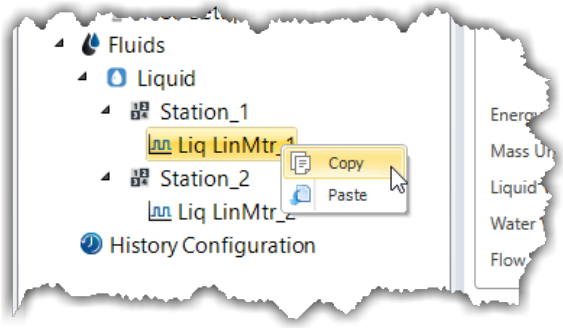
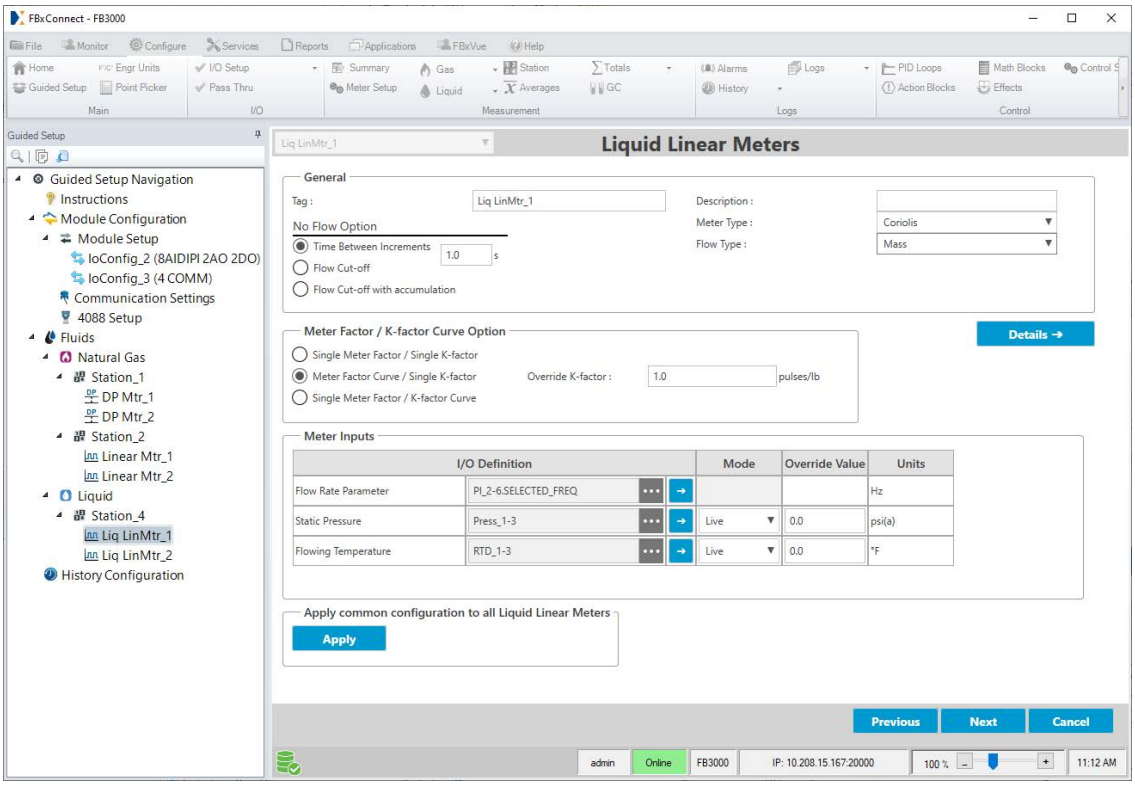



**Figure 91. Guided Setup: Liquid Linear Meter**



1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. | |
| **No Flow Option** | Sets how the system calculates a "no flow" condition for the meter. Possible options are: | |
| | **Time Between Pulses / Increments** | If the amount of time between pulses/increments is greater than or equal to the time you enter in the text field, then system sets the calculated flow equal to zero.<br>**Note**<br>• This option applies **only** if you select a **PI** object in the **Flow Rate Parameter** field.<br>• You **must** enter a time (in seconds) for the system to use in the text field.<br>• The label of this option changes based on your selection in the **Flow Input Option** field of the **Liquid Linear Meter** display accessed through the **Details** button. If you select **Flow Input Only**, then the label shows **Time Between Pulses**. If you select **External Accumulator** or **External Accumulator with Flow Rate**, then the label shows **Time Between Increments**. |

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td></td><td>Flow Cut-off</td><td>If the value of the uncorrected volume or mass input is less than or equal to the value you enter in the text field, then the system sets the calculated flow rates equal to zero. Enter a value (in units based on the table below) for the system to use in the text field.
<table>
<tr><th>Indicated Flow Input Type</th><th>Meter Type</th><th>Unit Type</th></tr>
<tr><td rowspan="2">Pulse Input</td><td>Turbine</td><td>Hz</td></tr>
<tr><td>Coriolis</td><td>Hz</td></tr>
<tr><td rowspan="2">AI or User Data</td><td>Turbine</td><td>Volume Rate</td></tr>
<tr><td>Coriolis</td><td>Mass Rate</td></tr>
</table>
Note
<ul>
<li>You must enter a value (in the indicated units) in the text field for the system to use.</li>
<li>The lowest frequency the system can accurately measure is 1 divided by the PI Scan Period (configured on the Pulse Input display). Flow control may be erratic below this threshold.</li>
</ul></td></tr>
<tr><td></td><td>Flow Cut-off with accumulation</td><td>If the value of the uncorrected volume or mass input is less than or equal to the value you enter in the text field, then the system sets the calculated flow rates equal to zero, but any accumulations are still counted.
Note
<ul>
<li>You must enter a value (in the indicated units) in the text field for the system to use.</li>
<li>For details on the unit types used by different indicated flow input and meter types, refer to the table in the Flow Cut-off field description.</li>
</ul></td></tr>
<tr><td>Meter Type</td><td colspan="2">Specifies the type of liquid linear meter you are configuring. Possible options are:</td></tr>
</table>

| Field | Description | |
|---|---|---|
| | **Turbine** | Select if measuring flow through a turbine meter or other linear meter with a frequency or analog signal representing actual volumetric flow rate. |
| | **Coriolis** | Select if measuring flow through a Coriolis meter or other linear meter with a frequency or analog signal representing a mass flow rate. |
| | **Ultrasonic** | Select if measuring flow through an ultrasonic meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| | **Positive Displacement** | Select if measuring flow through a positive displacement meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| **Flow Type** | Click ▼ to specify the type of flow rate you are measuring through the meter. Possible options are:<br>**Note**<br>This field appears **only** if you select **Coriolis** in the **Meter Type** field. | |
| | **Volume** | Select if you are measuring volume flow rate. |
| | **Mass** | Select if you are measuring mass flow rate. |
| **Pressure Transmitter Type** | Indicates the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select a **User Data** instance in the **Static Pressure I/O Definition** field. | |
| **Details** | Select this button to open the Liquid Linear Meter display. Select  to return to Guided Setup. | |

| Field | Description | |
|---|---|---|
| **Meter Factor / K-factor Curve Option** | Sets how system uses calculates K-factors or Meter Factors in the flow calculation. Possible options are: | |
| | **Single Meter Factor / Single K-factor** | Uses a single Meter Factor and a single K-factor for the meter. This is the simplest choice and means that a value for the meter factor and a value for the K-factor are fixed for all flow rates and the values are taken from the last prove or an entered value. Select this option when using either the K-factor or meter factor proving, as long as neither the K-factor or meter factor will vary with flow rate or product. |
| | **Meter Factor Curve / Single K-factor** | A meter factor calculates for the current flow rate based on a linear interpolation of the meter factor versus flow rate values entered under the Factor Curve heading, but the K-factor will be fixed. Select this option when using meter factor proving if proving is done at multiple flow rates. |
| | **Single Meter Factor / K-factor Curve** | A K-factor calculates for the current flow input frequency based on a linear interpolation of the meter factor versus frequency values entered under the Factor Curve, but the meter factor will be a single value from the last prove or entered value. The K-factor curve can come from multiple proves at different flow rates with a meter factor of 1.0 (K-factor proving) or the K-factor curve can come from factory calibration and a single meter factor from a prove (meter factor proving). |
| **Override Meter Factor** | Sets a fixed meter factor value to use in calculations.<br>**Note**<br>This field appears **only** if you select either **Single Meter Factor / Single K-factor** or **Single Meter Factor / K-factor Curve** in the **Meter Factor / K-factor Curve Option** field. | |

| Field | | Description |
|---|---|---|
| **Override K-factor** | | Sets a fixed discharge coefficient value to use in calculations.<br>**Note**<br>This field appears **only** if you select either **Single Meter Factor / Single K-factor** or **Meter Factor Curve / Single K-factor** in the **Meter Factor / K-factor Curve Option** field. |
| **Flow Rate Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select a flow rate input to use for the selected meter. This field represents the Pulse Frequency for a Turbine or Coriolis meter type.<br>• PI object – RATE or SELECTED FREQUENCY<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – Any parameter. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description | |
|---|---|---|
| **Static Pressure Object** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input.<br>If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field. The value is assumed to be in the pressure units selected for the associated station.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Flowing Temperature Object** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| **Meter Density Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – Any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |

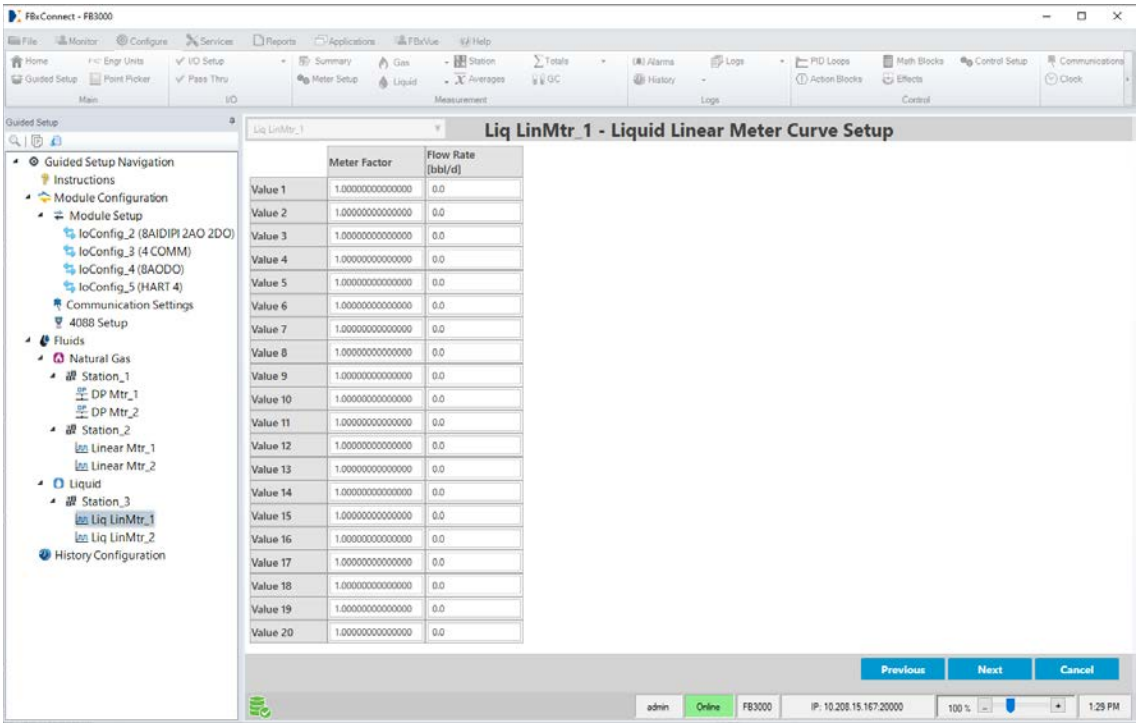
| Field | Description | |
|---|---|---|
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Note**<br>This field appears **only** in certain configuration scenarios:<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **Crude Oil** (configured on the Liquid Product display), the Density Option is set to **Meter Observed Density**, and the Crude Oil Option is set to **API Ch. 12.2** or **API Ch. 20.1** with **Use Oil Correction Factor for Water**.<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **Crude Oil** (configured on the Liquid Product display), the Crude Oil Options is set to **API Ch. 20.1** and **Use Separate Correction Factor for Water**, and the Meter Type is set to **Coriolis**.<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **anything other than Crude Oil** (configured on the Liquid Product display) and the Density Option is set to **Meter Observed Density**. | |
| **Apply** | Select to apply the currently selected meter configuration to all other meters with the same meter type.<br>**Note**<br>This field appears **only** for the first instance of multiple meters with the same meter type. | |

2. Select **Next** to advance to the next step in the Guided Setup.

## 4.2.19 Guided Setup: Liquid Meter Curve Setup

Use this display to enter a meter factor curve or K-factor curve.

**Figure 92. Guided Setup: Liquid Meter Curve Setup**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **K-factor / Frequency** | If you selected **Meter Factor Curve / Single K-factor** on the previous display, enter up to 20 points on the curve (pairs of meter factor and flow rate) and a meter factor is calculated for use in the flow equation by linear interpolation of the current indicated quantity flow rate. |
| **Meter Factor / Flow Rate** | If you selected **Single Meter Factor / K-factor Curve** on the previous display, enter up to 20 points on the curve (pairs of K-factor and frequency) and a K-factor is calculated for use in the flow equation by linear interpolation of the current flow meter input frequency. |

**Note**

A valid point **must** have a non-zero flow rate/frequency and a non-zero factor. The points may be entered in any order and will be internally sorted by flow rate (MF curve) or frequency (K-Factor Curve), discarding any invalid points. No extrapolation is done beyond the lowest and highest points on the curve. If the flow rate/frequency is less than the lowest point on the curve, the calculated factor will be the factor for the lowest point on the curve. If the flow rate/frequency is greater than the highest point on the curve, the calculated factor will be the factor for the highest point on the curve.

2. Select **Next** to advance to the next step in the Guided Setup.

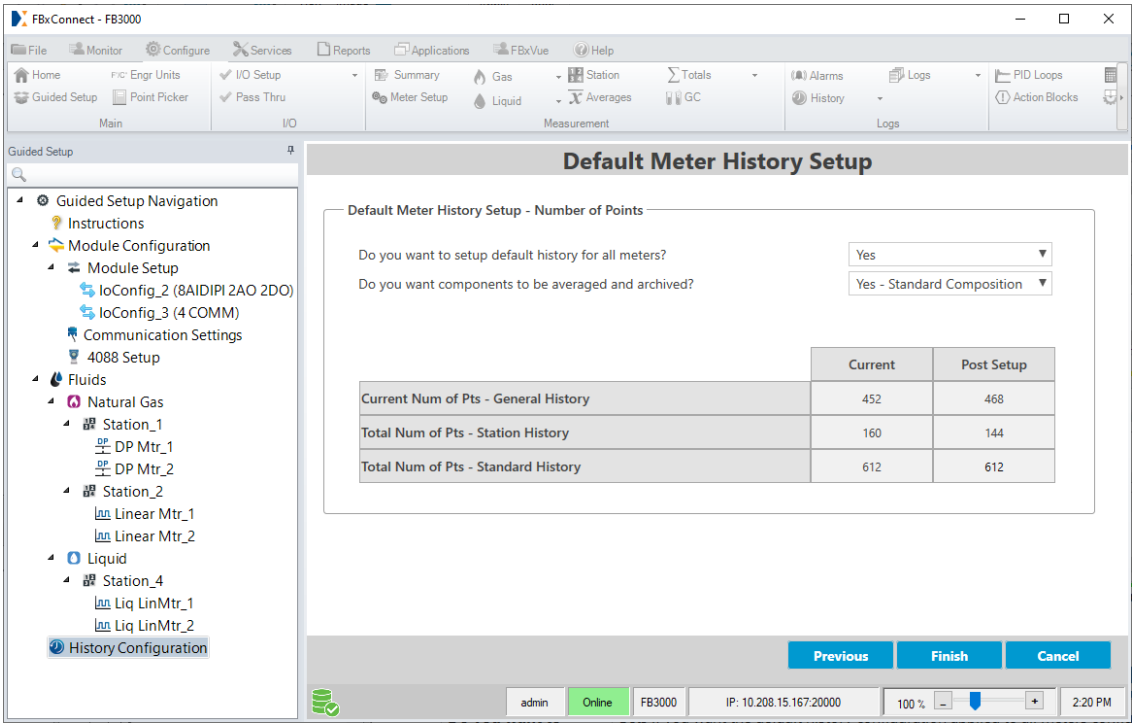
## 4.2.20 Guided Setup: Default Meter History Setup

Use this display to configure history points in your DeltaV FB3000 RTU using the default history values.

**Note**

- For more information about the structure of history stored in the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU, refer to History Overview.
- If liquid batching is enabled on any meters, then you **cannot** configure history using the Guided Setup Wizard. In this case, you **must** use the standard Default History Setup display to configure history.

**Figure 93. Guided Setup: Default Meter History Setup**




1. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Do you want to setup default history for all meters?** | Sets if you want the default history configuration applied to all meters configured in the DeltaV FB3000. | |
| | **No** | DeltaV FBxConnect configuration software does **not** configure history for any meters in the DeltaV FB3000. |
| | **Yes** | DeltaV FBxConnect configuration software configures the default history for all meters in the DeltaV FB3000. |
| **Do you want components averaged and archived?** | Sets if you want the DeltaV FB3000 to average and archive components in history. | |
| | **No** | Components are **not** averaged and archived in history. |
| | **Yes – Standard Composition** | The FB Series product archives standard composition component averages for gas meters. |

| Field | Description | |
|---|---|---|
| | **Yes – Extended Composition** | The FB Series product archives extended composition (includes C7, C8, C9, and C10) component averages for gas meters. |
| **Total Num of Available Standard Points** | This **read-only** field shows the total number of history points allocated to the standard group both before (Current) and after (Post Setup) applying the default history setup. | |
| **Number of Points used for Meter History Groups** | This **read-only** field shows the total number of history points allocated to the station history groups both before (Current) and after (Post Setup) applying the default history setup. | |
| **Standard General Current Num of Pts** | This **read-only** field shows the total number of history points allocated to the standard group both before (Current) and after (Post Setup) applying the default history setup. | |

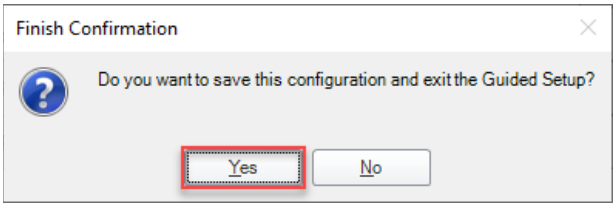
2. Select **Finish** to complete the Guided Setup. A confirmation message opens.

**Note**

A message appears if have previously sized history and the FB Series product does not have the number of history points required to perform the default history setup. If this occurs, you must first increase the number of points on the History Setup – Advanced – Standard History Sizing Tab before you perform the default history setup.

3. Select **Yes** to save the configuration and exit the Guided Setup.

**Figure 94. Finish Confirmation**



# 4.3 Engineering Units

Use this display to configure the engineering units used by the station for measurements. You can select Set all to US/Imperial, Set all to Metric, Set all to Canadian, or configure each measurement type individually. You can also configure how many decimal places are used for each measurement value.

Conversion factors for the different engineering units are taken from the following standards:

- IEEE/ASTM SI 10-2002 - IEEE/ASTM Standard for Use of the International System of Units (SI): The Modern Metric System
- Manual of Petroleum Measurement Standards Chapter 15—Guidelines for the Use of the International System of Units (SI) in the Petroleum and Allied Industries
- ANSI/API MPMS Ch. 14.3.3/AGA Report No. 3

**Note**

- **FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU use full-resolution data for all calculations.** The **Decimal Places** fields on this display are used **only** for viewing data in DeltaV FBxConnect configuration software.
- Fields on this display differ based on what fluid type the selected station is measuring (Natural Gas or Liquid).
- Changes to engineering units are applied to the station and all meters assigned to the selected station, even if a meter has previously been configured. Additionally, any I/O associated with the station or its meters is also updated. Refer to Configure – Summary to view which meters are assigned to each station.
- You can configure the number of decimal places shown on history reports using the **Settings** menu option in the DeltaV FBxConnect Launchpad menu bar.

Molar mass units are dependent upon the density units:

| Density Unit | Molar Mass Unit |
|---|---|
| lb/ft$^3$ | lb/lb-mol |
| lb/MMCF | lb/lb-mol |
| lb/US gal | lb/lb-mol |
| lb/bbl | lb/lb-mol |
| RD | lb/lb-mol |

| Density Unit | Molar Mass Unit |
|---|---|
| °API | lb/lb-mol |
| $kg/m^3$ | kg/kmol |
| kg/L | kg/kmol |
| g/cc | g/mol |

Joule Thomson units are dependent upon the pressure units:

| Pressure Unit | Joule Thompson Unit |
|---|---|
| psi | °F/psi |
| kPa | K/kPa |
| bar | °C/bar |
| MPa | K/MPa |
| $kg/cm^2$ | K/MPa |

Acceleration units are dependent upon the linear long units:

| Linear Long Unit | Acceleration Unit |
|---|---|
| ft | $ft/s^2$ |
| m | $m/s^2$ |

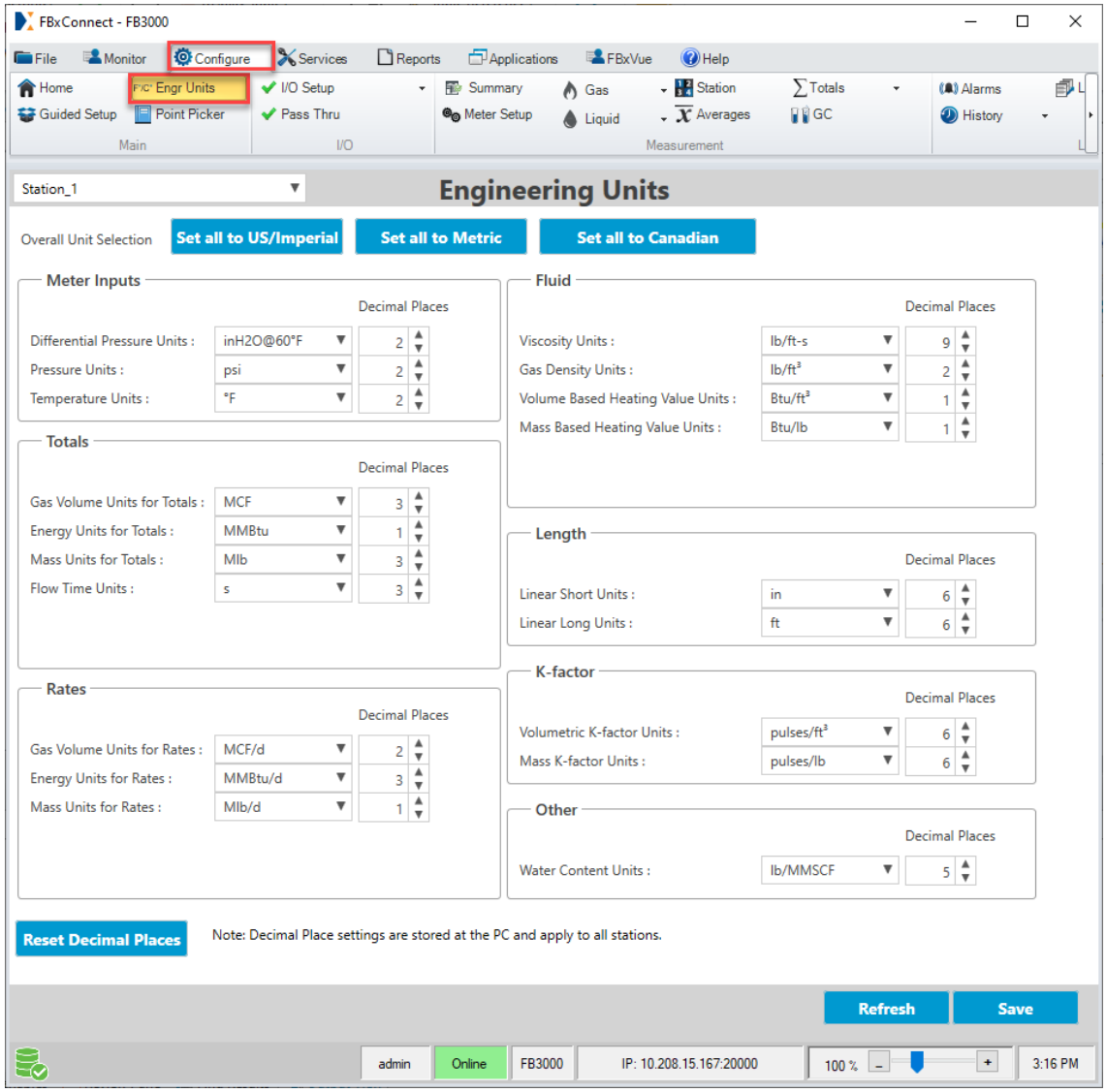
**Note**

The Rosemount™ 4088B MultiVariable™ Transmitter **does not** support temperature units of Kelvin.

To access this display:

1. Select **Configure > Engr Units**. from the DeltaV FBxConnect configuration software main menu. The Engineering Units display opens:

**Figure 95. Engineering Units (Gas Station shown)**




2. Click ▼ in the **Station** drop-down list to select the station to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Set all to US/Imperial** | Select to automatically configure the selected station to use US/Imperial units for all measurements and calculations. |
| **Set all to Metric** | Select to automatically configure the selected station to use metric units for all measurements and calculations. |

| Field | Description |
|---|---|
| **Set all to Canadian** | Select to automatically configure the selected station to use Canadian units for all measurements and calculations. |
| **Meter Inputs** | Select ▼ to choose the measurement units used with each meter input and the number of decimal places shown in DeltaV FBxConnect configuration software. Meter Inputs include differential pressure units, static pressure units, and temperature units. |
| **Totals** | Select ▼ to choose the measurement units used when calculating totals and the number of decimal places shown in DeltaV FBxConnect configuration software. Totals include gas volume units, energy units, mass units, liquid volume units, water volume units, and flow time units. |
| **Rates** | Select ▼ to choose the measurement units used when displaying rates and the number of decimal places shown in DeltaV FBxConnect configuration software. Rates include volume units, energy units, mass units, liquid volume units, and water volume units, |
| **Fluid** | Select ▼ to choose the measurement units used when performing fluid calculations and the number of decimal places shown in DeltaV FBxConnect configuration software. Fluid properties include dynamic viscosity, density, volume-based heating value, mass-based heating value, liquid density, and water density. |
| **Length** | Select ▼ to choose the measurement units used for distance and the number of decimal places shown in DeltaV FBxConnect configuration software. Length includes linear short and linear long. |
| **K-Factor** | Select ▼ to choose the measurement units used when calculating the K-factor and the number of decimal places shown in DeltaV FBxConnect configuration software. K-factor includes volumetric and mass. |
| **Other** | Select ▼ to choose the measurement units used for other calculations, including water content, and the number of decimal places shown in DeltaV FBxConnect configuration software. |
| **Reset Decimal Places** | Select to revert all measurement units to show the default number of decimal places in DeltaV FBxConnect configuration software. |

4. Select **Save** to save any changes you make to this display.

# 4.4 Point Picker

Use this display to view internal database parameters in the FB Series product.

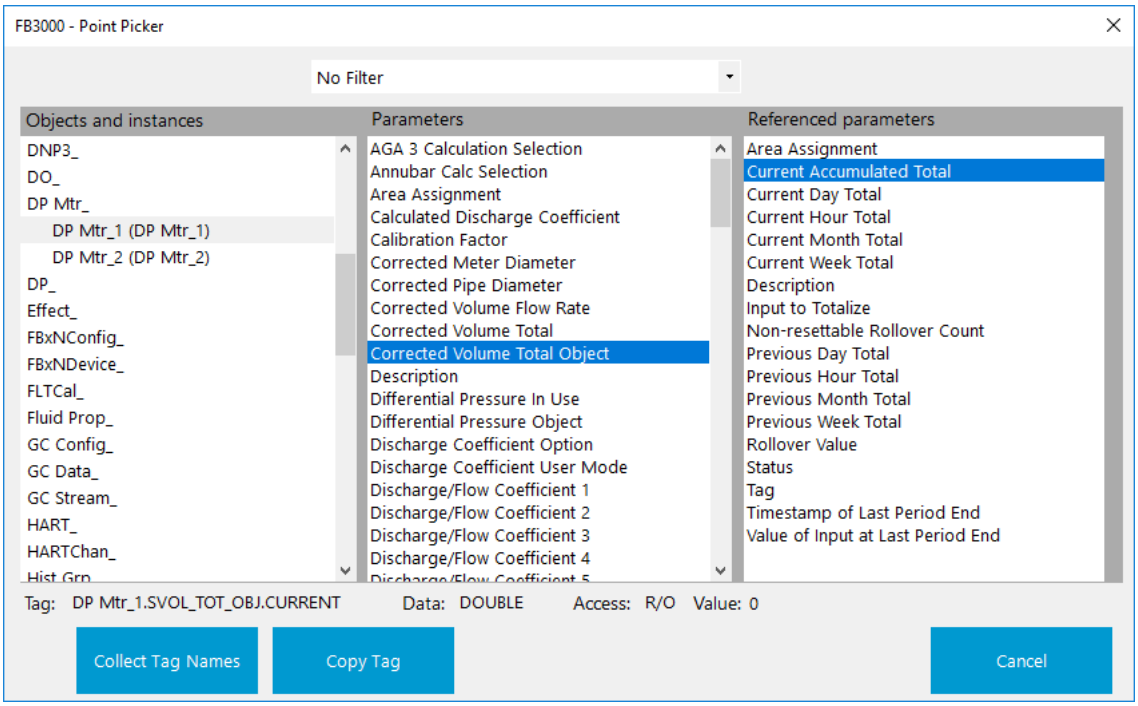
**Note**

Refer to User Interface – Point Picker for more information.

To access this display:

1. Select **Configure > Point Picker** from the DeltaV FBxConnect configuration software main menu. The Point Picker dialog opens.

**Figure 96. Point Picker (Parameter Reference)**




2. Review the values in the following fields:

| Field | Description |
|---|---|
| **Filter** | Select ▼ to change which objects and parameters are displayed. Filters may be based on object type, measurement type, or data type.<br>**Note**<br>Select **No Filter** to view all available Objects. |

| Field | Description | |
|---|---|---|
| **Object and Instances** | **Object** | A group of configuration settings and calculated or measured values related to a specific function. For example, all values associated with the device clock (second, hour, day, etc.) are part of an Object named Clock. From the first column, select the object type you wish to reference. |
| | **Instance** | There may be one or more occurrences of each type of object with its own set of configuration settings and values. Each occurrence of an object is called an instance. For example, there are multiple instances of the object named Comm, and each instance represents one of the FB Series product's communication ports. After clicking on the object you wish to reference, the available instances are displayed. Select the instance you wish to reference. |
| **Parameter** | One of the configuration settings, calculated values, or measured values that is a part of the object. Each parameter has a value as well as a set of attributes that define it, such as data type, R/W access, measurement type, units, and parameter health. After clicking on the object and instance you wish to reference, the available parameters are displayed. Select the parameter you wish to reference.<br>**Note**<br>This column appears **only** if you select the Point Picker for a **Parameter Reference**. | |

| Field | Description |
|---|---|
| **Referenced Parameter** | If the point picker is used to pick a parameter reference, you can pick a parameter directly from the object to which it belongs, or you can pick the parameter through an object reference in a related object. For instance, to pick a parameter to assign to an Average object, you can pick the DP Mtr_1 object and the Station Assignment parameter and then the third column displays all of the parameters that are available from the Station object that is assigned to DP Mtr_1. This is useful because even if the station assignment later changes, the Average object is always associated with DP Mtr_1.<br>**Note**<br>This column appears **only** if you select the Point Picker for a **Parameter Reference**. |
| **Tag** | This **read-only** field shows the name of the selected parameter. |
| **Data** | This **read-only** field shows the data type of the selected parameter. For more information, refer to Native Data Types. |
| **Access** | This **read-only** field shows the read/write access of the selected parameter. |
| **Value** | This **read-only** field shows the value of the selected parameter. |
| **Collect Tag Names** | Select this button to query the FB Series product and display any unique tag names you have assigned to individual parameters.<br>**Note**<br>You can perform this action at any time to reflect recent configuration changes. |
| **Copy Tag** | Select this button to copy the currently selected tag to the computer's clipboard. You can then paste the selected tag into a different application, such as FBxDesigner™. |

3. Select **Close** to exit the Point Picker dialog.

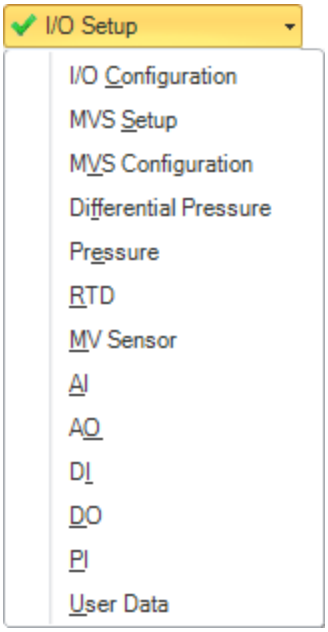
## 4.5 I/O Setup

The I/O Setup drop-down menu provides an interface to configure each I/O point. Each I/O type is configured using a separate display.

To access these configuration displays:

1. Select the **Configure** menu
2. Select the down arrow (▼) next to **I/O Setup**.
3. Select the I/O type you want to configure.

**Figure 97. I/O Setup Drop-Down Menu**




The I/O Setup drop-down menu contains the following options (depending on your hardware specifications and current configuration):

I/O Configuration – Use this display to configure the I/O type (AI/AO/DI/DO/PI) and to view module properties.

MVS Setup – Use this display to enable communications with Rosemount™ 4088B MultiVariable™ Transmitters on either COM3 or COM4 of your DeltaV FB3000 RTU.

MVS Configuration – Use this display to view and configure various parameters of a multivariable sensor.

HART I/O –Use this display configure a HART® module to process input from field-based HART devices.

Differential Pressure – Use this display to view and configure general parameters associated with the differential pressure input.

Pressure – Use this display to view and configure general parameters associated with the static pressure input.

RTD – Use this display to view and configure general RTD parameters.

MV Sensor – Use this display to view multivariable sensor values and properties for both the integral sensor and Rosemount™ 4088B MultiVariable™ Transmitter.

AI – Use this display to configure the analog inputs (AI).

AO – Use this display to configure analog outputs (AO).

DI – Use this display to configure digital inputs (DI).

DO – Use this display to configure digital outputs (DO).

PI – Use this display to configure pulse inputs (PI).

PI Pair – Use this display to configure pulse input pairs.

PO – Use this display to configure pulse outputs (PO).

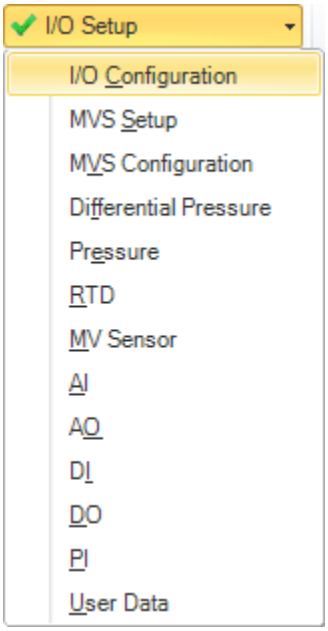
User Data – Use this display as a generic data storage area that any application can use.

### 4.5.1 I/O Configuration

Use the I/O Configuration display to configure the type of inputs and outputs available on your FB Series product and to view module properties.

To access this display, select **Configure > I/O Setup > I/O Configuration** from the DeltaV FBxConnect configuration software main menu.

**Figure 98. I/O Setup – I/O Configuration**



The I/O Configuration display has the following tabs:

General – Use this tab to configure the type of inputs and outputs available on your FB Series product.

Properties – Use this tab to view details of the modules installed in your FB Series product, including the module type and the number of channels available on the module.

#### 4.5.1.1 I/O Configuration – General Tab

Use the General tab on the I/O Configuration display to select what input and output types are available on your FB Series product.

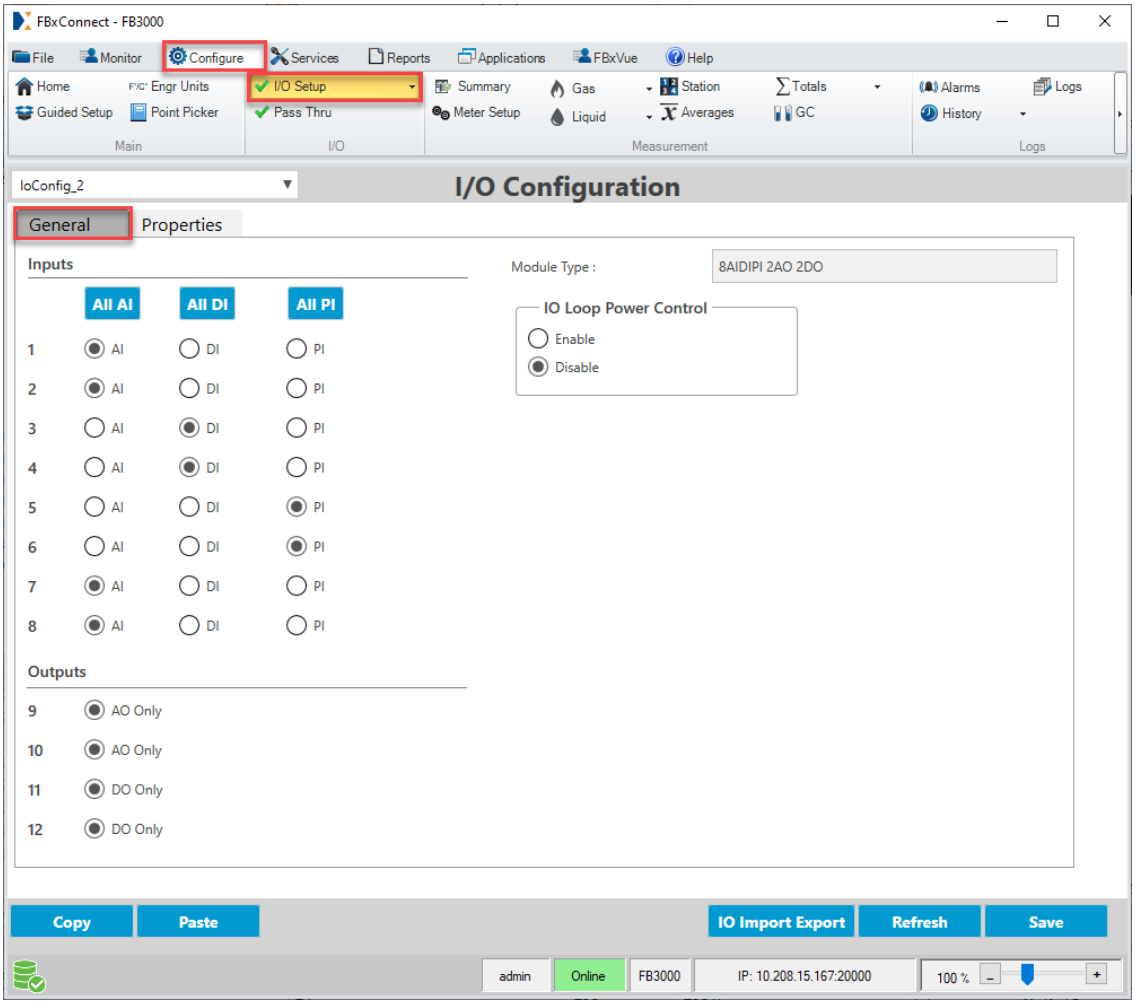
**Note**

- A separate **I/O Configuration** display is available for each installed module.
- The amount of I/O points and available fields shown on this display varies depending on the device type and installed options.

To access this display:

1. Select **Configure > I/O Setup > I/O Configuration**. The I/O Configuration display opens showing the **General** tab.

**Figure 99. I/O Configuration – General Tab**




2. Click ▼ in the drop-down list at the top of the display to select a I/O module slot to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Module Type** | This **read-only** field shows the I/O module type installed in the selected slot. |
| **8AIDIPI 2AO 2DO** | The 8AIDIPI 2AO 2DO module (3MIX12) provides eight input channels and four output channels. You can configure each input channel as either an analog input (AI), a digital input (DI), or a pulse input (PI). The output channels are comprised of two analog outputs (AO) and two digital outputs (DO). |

| Field | Description | |
|---|---|---|
| | **Inputs** | Sets each input channel as either an analog input, a digital input, or a pulse input.<br>**Note**<br>Select either **All AI**, **All DI**, or **All PI** to configure all input channels as either AI, DI, or PI respectively. |
| | **Outputs** | Shows the available output channels on the selected I/O module. |
| | **IO Loop Power Control** | Enables or disables the 24-Volt loop power feature. |
| **8AODO** | The 8AODO module provides eight output channels. You can configure each output channel as either an analog output (AO) or a digital output (DO). | |
| | **Outputs** | Sets each output channel as either an analog output or a digital output.<br>**Note**<br>Select **All AO** or **All DO** to set all channels as either analog outputs or digital outputs, respectively. |
| **5APM** | The 5APM module (3APM05) provides four input channels and one output channel. You can configure each input channel as either a digital input (DI), pulse input (PI), or pulse input pair. You can configure the output channel as either a digital output (DO) or pulse output (PO). | |
| | **Inputs** | Sets each input channel as either a digital input, pulse input, or pulse input pair.<br>**Note**<br>• Select **All DI** or **All PI** to configure all input channels as either digital inputs or pulse inputs, respectively.<br>• Select **All Pair** to configure pulse input 1 & 2 and 3 & 4 as pulse input pairs.<br>• When you configure pulse inputs as pulse input pairs, the system copies the configuration from the first pulse input in the pair to the second pulse input. |

| Field | Description | |
|---|---|---|
| | **Outputs** | Sets the output channel as either a digital output or pulse output. |
| **10APM** | The 10APM module (3APM10) provides eight input channels and two output channels. You can configure each input channel as either a digital input (DI), pulse input (PI), or pulse input pair. You can configure each output channel as either a digital output (DO) or pulse output (PO). | |
| | **Inputs** | Sets each input channel as either a digital input, pulse input, or pulse input pair.<br>**Note**<br>• Select **All DI** or **All PI** to configure all input channels as either digital inputs or pulse inputs, respectively.<br>• Select **All Pair** to configure pulse input 1 & 2, 3 & 4, 5 & 6,and 7 & 8 as pulse input pairs.<br>• When you configure pulse inputs as pulse input pairs, the system copies the configuration from the first pulse input in the pair to the second pulse input. |
| | **Outputs** | Set seach output channel as either a digital output or pulse output. |
| **4 COMM** | The 4-port serial communications module (COM04) provides additional serial communication channels beyond those available on the CPU module.<br>**Note**<br>To make configuration changes to this module, refer to Communications – General. | |
| **16DIPI** | The 16DIPI module provides sixteen input channels. You can configure each input channel as either a digital input (DI) or a pulse input (PI). | |
| | **Inputs** | Sets each input channel as either a digital input or a pulse input.<br>**Note**<br>Select **All DI** or **All PI** to set all channels as either digital inputs or pulse inputs, respectively. |

| Field | Description | |
|---|---|---|
| **16DO** | The 16DO module (3DOH16)provides sixteen digital output channels able to drive inductive loads, solenoids, and any other digital output device. | |
| **HART 4** | The HART 4 module (HRT04) provides four input/output channels used to communicate with HART devices using the HART protocol. You can configure each channel as either an analog input (AI) or analog output (AO). A channel set as an input can be configured for use in point-to-point or multi-drop mode. A channel set as an output can be configured for use in point-to-point mode only. | |
| | **Analog** | Sets each channel as either and analog input (AI) or analog output (AO). |
| **MIO6X** | The MIO6X module provides four input channels and two output channels. You can individually configure two of the input channels as either an analog input (AI), a digital input (DI), or a pulse input (PI). You can individually configure the other two input channels as either a digital input (DI) or a pulse input (PI). You can configure one output channel as either an analog output (AO) or a digital output (DO). The remaining output channel is a dedicated digital output (DO). | |
| | **Inputs** | Sets input channels 1 and 2 as either an analog input, a digital input, or a pulse input. Sets input channels 3 and 4 as either digital input or a pulse input.<br>**Note**<br>Select **All AI**, **All DI**, or **All PI** to configure all input channels as either analog inputs, digital inputs, or pulse inputs. If you select **All AI**, then only channels 1 and 2 are configured as analog inputs. You still need to configure channels 3 and 4 separately as either a digital input or a pulse input. |
| | **Outputs** | Sets channel 5 as either an analog output (AO) or a digital output (DO). Channel 6 is a dedicated digital output (DO) and the channel type is not configurable. |

| Field | Description | |
|---|---|---|
| **MIO8T** | The MIO8T module provides four input channels, two output Channels, and two dedicated RTD channels. You can individually configure two of the input channels as either an analog input (AI), a digital input (DI), or a pulse input (PI). You can individually configure the other two input channels as either a digital input (DI) or a pulse input (PI). You can configure one output channel as either an analog output (AO) or a digital output (DO). The remaining output channel is a dedicated digital output (DO). | |
| | **Inputs** | Sets input channels 1 and 2 as either an analog input, a digital input, or a pulse input. Sets input channels 3 and 4 as either digital input or a pulse input.<br>**Note**<br>Select **All AI**, **All DI**, or **All PI** to configure all input channels as either analog inputs, digital inputs, or pulse inputs. If you select **All AI**, then only channels 1 and 2 are configured as analog inputs. You still need to configure channels 3 and 4 separately as either a digital input or a pulse input. |
| | **Outputs** | Sets channel 5 as either an analog output (AO) or a digital output (DO). Channel 6 is a dedicated digital output (DO) and the channel type is not configurable. |
| | **RTD Inputs** | Shows the available RTD input channels on the selected I/O module. |
| **I/O Import Export** | Select this button to import a CSV file containing a new I/O configuration or export your current I/O configuration to a CSV file. For more information, refer to Importing I/O Configuration CSV Files, Exporting I/O Configuration CSV Files, and Creating I/O Configuration CSV Files. | |

4. Select **Save** to save any changes you make to this display.

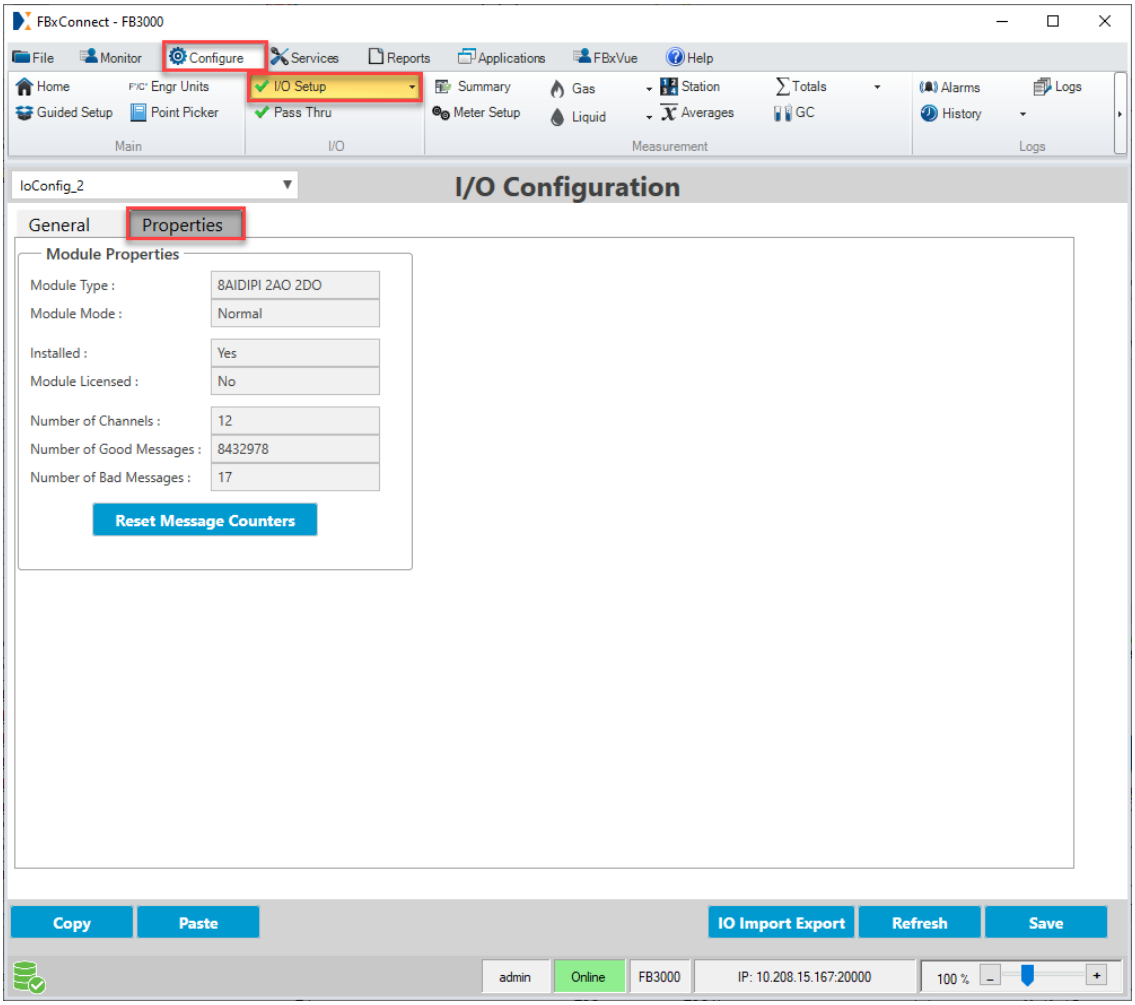
### 4.5.1.2 I/O Configuration – Properties Tab

Use this tab to view details of the modules installed in your FB Series product, including the module type and the number of channels available on the module. You can also reset the message counters of each module.

To access this tab:

1. Select **Configure > I/O Setup > I/O Configuration**. The I/O Configuration display opens.
2. Click ▼ in the drop-down list at the top of the display to select a I/O module slot to configure.
3. Select the **Properties** tab.

**Figure 100. I/O Configuration – Properties Tab**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Module Type** | This **read-only** field shows the kind of module installed in the FB Series product. | |
| **Module Mode** | This **read-only** field shows the operational status of the module. Possible statuses are: | |
| | **Not Installed** | No module is installed in the selected module slot. |
| | **Boot** | The selected module is operating in startup mode (boot), and will not function properly until the module firmware is loaded. |
| | **Normal** | The selected module is operating as expected. |
| | **Not Licensed** | No license for the selected module exists on the FB Series product. The module will not run. |
| | **Communication Failure** | The selected module slot is known to contain a module, but the module is no longer communicating with the main CPU module. |
| | **Module Failure** | The selected module has failed and requires service. |
| | **Termination Missing** | The selected module slot does not contain the required termination module. |
| | **Firmware Mismatch** | The CPU firmware version and the module firmware version are not compatible. Firmware for one (or both) module must be upgraded. |
| | **Note**<br>For CPU firmware version 2.1 or lower, the Module Mode field toggles between **Normal**, **Communication Failure**, and **Boot** if the CPU firmware version **does not** match with the I/O module firmware version. | |
| **Installed** | This **read-only** field shows the installation status of the module. | |
| **Module Licensed** | This **read-only** field shows if a license is present in the FB Series product for the module. | |
| **Number of Channels** | This **read-only** field shows the number of channels present on the module. | |

| Field | Description |
|---|---|
| **Number of Good Messages** | This **read-only** field shows the number of messages successfully received by the module. |
| **Number of Bad Messages** | This **read-only** field shows the number of messages that failed to be received by the module. |
| **Reset Message Counters** | Click to reset to zero the number of good and the number of bad messages.<br>**Note**<br>Each Reset Message Counters button affects **only** the selected module. |
| **I/O Import Export** | Select this button to import a CSV file containing a new I/O configuration or export you current I/O configuration to a CSV file. For more information, refer to Importing I/O Configuration CSV Files, Exporting I/O Configuration CSV Files, and Creating I/O Configuration CSV Files. |

5. Select **Save** to save any changes you make to this tab.

### 4.5.1.3 IO Import Export

Use this pop-up display to import or export CSV files that contain the I/O configuration for your FB Series product. The FB Series product uses one CSV file that contains information about all modules in the configuration (module type, rack location, and channel information) and separate CSV files that contain the configuration information for each I/O type (analog inputs, analog outputs, digital inputs, digital outputs, and pulse inputs).

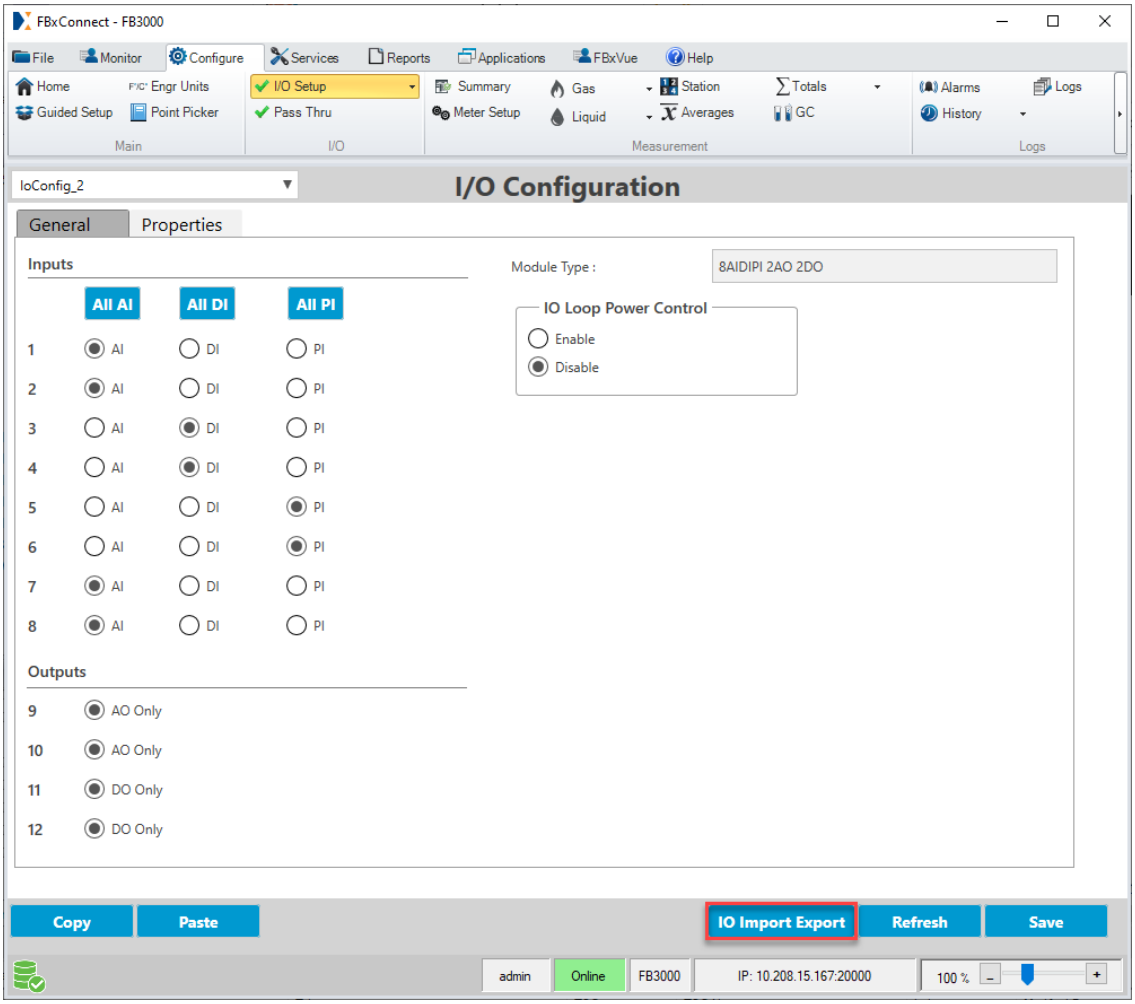
**Note**

For more information about creating your own I/O configuration CSV file, refer to Creating I/O Configuration CSV Files.

To access this pop-up display:

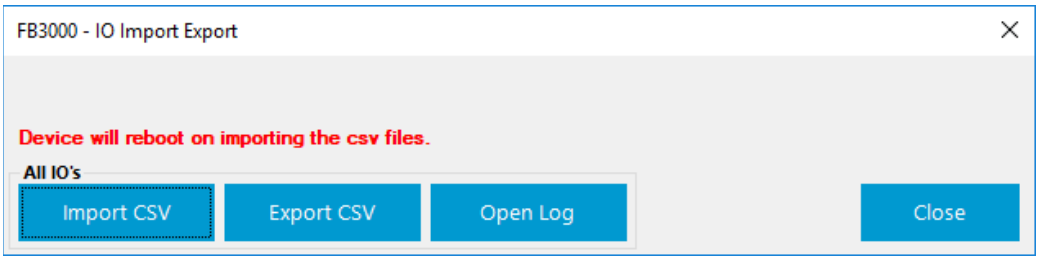
1. Select **Configure > I/O Setup > I/O Configuration**. The I/O Configuration display opens.

**Figure 101. IO Import Export**




2. Select the **IO Import Export** button. The IO Import Export pop-up display opens.

**Figure 102. IO Import Export**




3. Use the buttons on this display to perform the following actions:

| Field | Description |
|---|---|
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired I/O configuration. Navigate to the folder location that contains the CSV files and select **OK** to start the import process. For more information, refer to Importing I/O Configuration CSV Files.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. |
| **Export CSV** | Click to save CSV files to your computer that contains the current I/O configuration of your FB Series product. A Select Table dialog opens where you can select which I/O modules and which I/O types to include in the export. Click **Start**, navigate to a folder on your computer where the CSV files will be saved, and click **OK** to begin the export process. For more information, refer to Exporting I/O Configuration CSV Files. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>The log file name includes the date and time the log was created. |

4. Select **Close** to exit the pop-up display.

#### 4.5.1.3.1 Importing I/O Configuration CSV Files

You can import CSV files that contain the I/O configuration for your FB Series product. The FB Series product uses one CSV file that contains information about all modules in the configuration (module type, rack location, and channel information) and separate CSV files that contain the configuration information for each I/O type (analog inputs, analog outputs, digital inputs, digital outputs, and pulse inputs).

**Note**

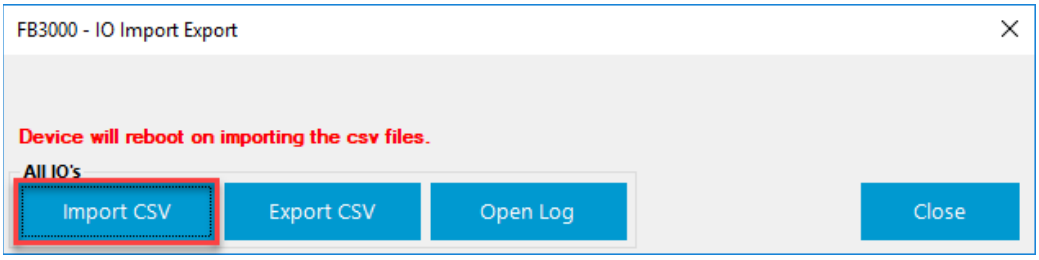
- For more information about creating your own I/O configuration CSV file, refer to Creating I/O Configuration CSV Files.
- For more information about exporting a CSV file that contains the FB Series product's current I/O configuration, refer to Exporting I/O Configuration CSV Files.

- If you want to remove a previously imported I/O configuration, perform a Cold Start and select **Database is re-initialized with factory defaults**.

To import I/O Configuration CSV files:

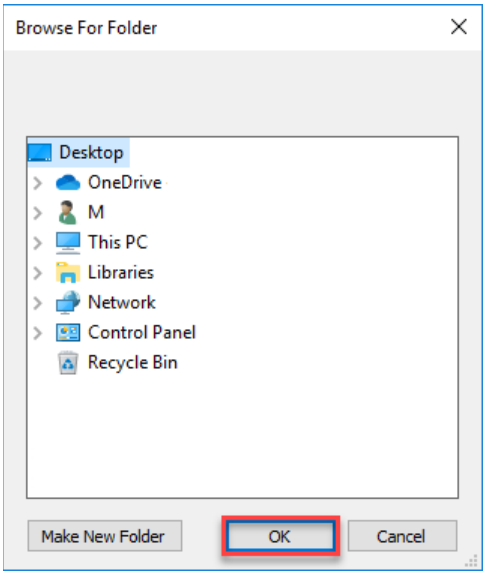
1. Select **Configure > I/O Setup > I/O Configuration**. The I/O Configuration display opens.
2. Select the **IO Import Export** button. The IO Import Export pop-up display opens.

**Figure 103. IO Import Export**




3. Select the **Import CSV** button.

**Figure 104. Browse For Folder**

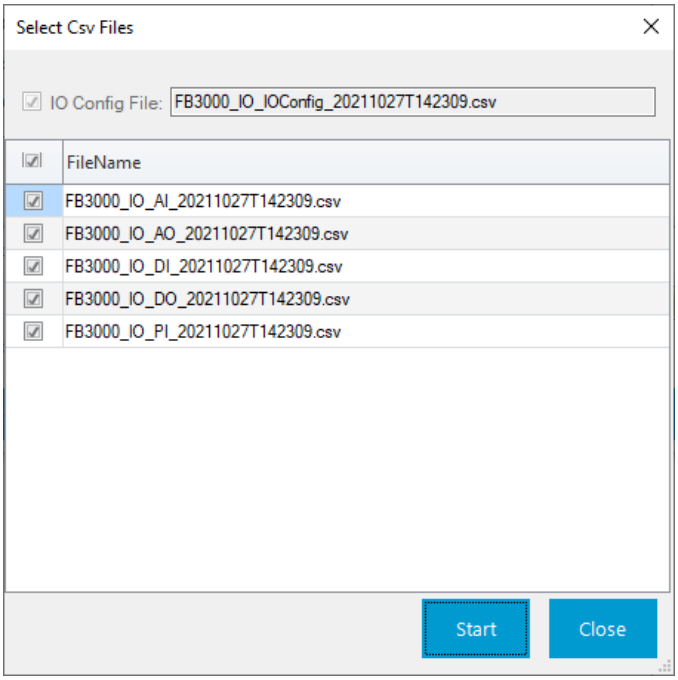



4. Navigate to the folder with your I/O configuration CSV files and select **OK**. The Select CSV File display opens showing the available I/O configuration CSV files in the selected folder.

**Note**

In order to successfully import any I/O Configuration CSV files, the folder you select **must** include one I/O Config CSV file and no more than one CSV file for each I/O type (analog inputs, analog outputs, digital inputs, digital outputs, and pulse inputs).

**Figure 105. Select CSV Files**




5. Place a check mark next to the CSV files you want to import.

**Note**

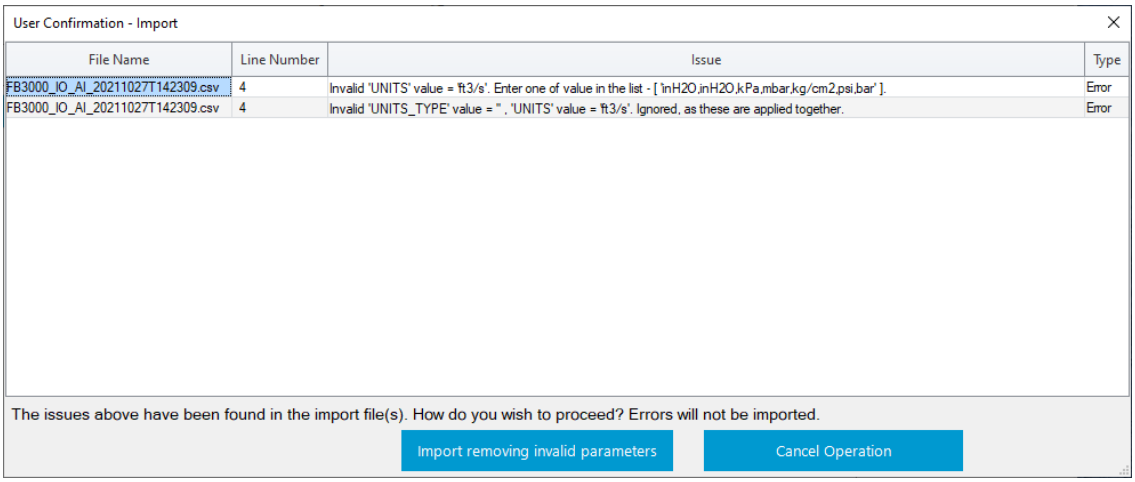
The IO Config File is **always** selected.

6. Select **Start** to import the selected files. The files are downloaded, the FB Series product performs a warm start, and a confirmation message opens.

**Note**

- The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

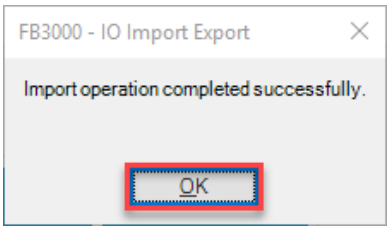
**Figure 106. Example Import I/O Errors**




- **Low Reading EU** and **High Reading EU** values are **not** imported for online devices with **AI** channels where the **EU Scaling Mode** is set to **Multi-Point Calibration**.

7. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Figure 107. Import Successful**




### 4.5.1.3.2 Exporting I/O Configuration CSV Files

You can export the current I/O configuration of your FB Series product as CSV file saved to your computer. You can then modify the files on your computer or import them into another device. The FB Series product uses one CSV file that contains information about all modules in the configuration (module type, rack location, and channel information) and separate CSV files that contain the configuration information for each I/O type (analog inputs, analog outputs, digital inputs, digital outputs, and pulse inputs).

**Note**

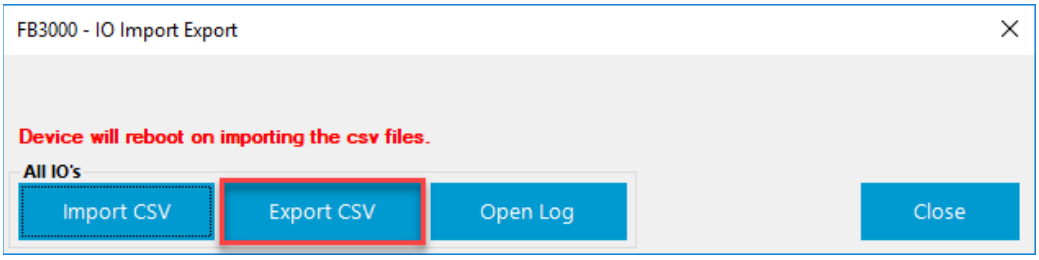
- For more information about creating your own I/O configuration CSV file, refer to Creating I/O Configuration CSV Files.

- For more information about importing a CSV file that contains the FB Series product's current I/O configuration, refer to Importing I/O Configuration CSV Files.

To export I/O Configuration CSV files:

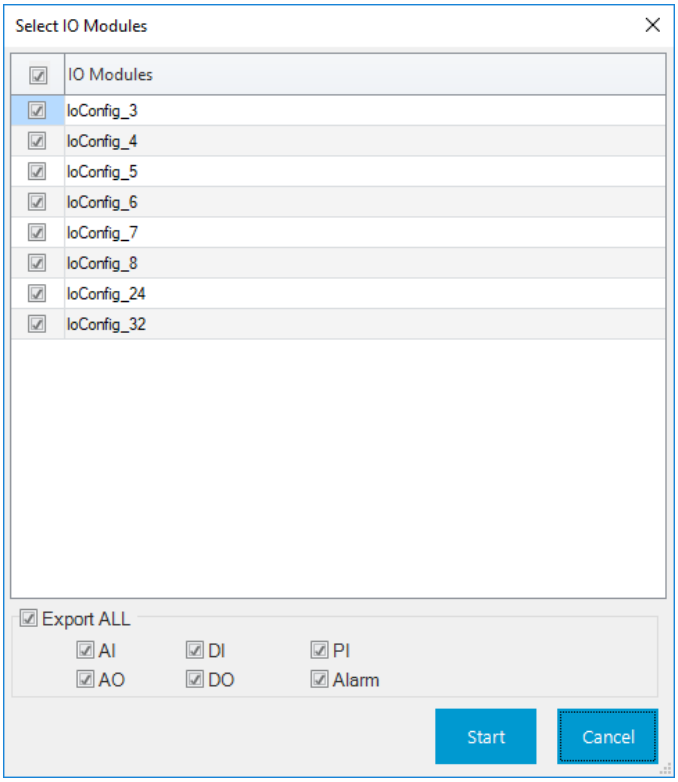
1. Select **Configure > I/O Setup > I/O Configuration**. The I/O Configuration display opens.
2. Select the **IO Import Export** button. The IO Import Export pop-up display opens.

**Figure 108. IO Import Export**




3. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 109. Select Table**



4. Place a check mark next to each module slot whose configuration you want to export.

**Note**

A single CSV file is created for all selected modules.

5. Place a check mark next to each I/O type (**Export ALL**, **AI**, **AO**, **DI**, and/or **DO**) whose configuration you want to export.

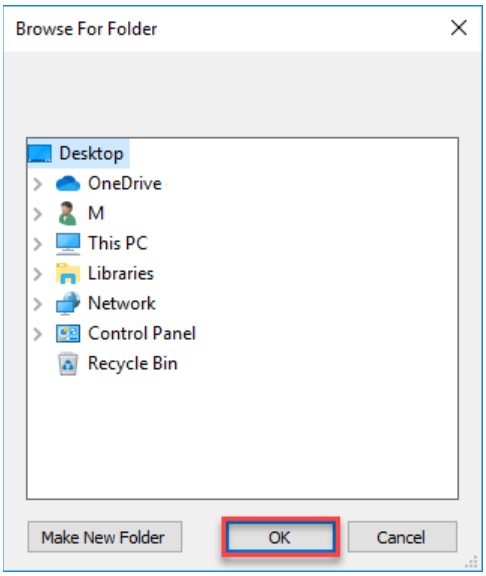
**Note**

Separate CSV files are created for each selected I/O type.

6. Place a check mark next to **Alarm** if you want to include alarm configuration data in the CSV files for each selected I/O type.

7. Select **Start**. A Browse For Folder windows opens.

**Figure 110. Browse For Folder**



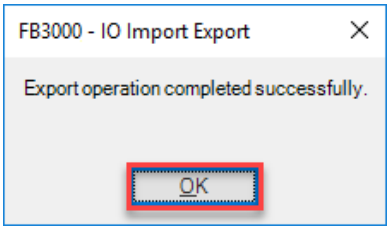

8. Navigate to the folder where the I/O configuration CSV files will be saved and Select **OK** to begin the export process.

**Note**

Each time you export I/O configuration CSV files, save the files to a unique folder that **does not** contain any other I/O configuration CSV files.

9. When the process completes, a confirmation dialog opens. Select **OK**.

**Figure 111. Confirmation**




### 4.5.1.3.3 Creating I/O Configuration CSV Files

You can create a CSV file that contains your I/O configuration on your computer and then import the CSV file for use in the FB Series product. If your I/O configuration contains a large number of channels, it may be easier to create a CSV file on your computer than it is to configure each I/O channel individually in DeltaV FBxConnect configuration software. The FB Series product uses one CSV file that contains information about all modules in the configuration (module type, rack location, and channel information) and separate CSV files that contain the configuration information for each I/O type (analog inputs, analog outputs, digital inputs, digital outputs, and pulse inputs).

**Note**

- The system automatically corrects for incorrect capitalization and missing special characters, such as the degree symbol (°) and superscripts ($^3$), in the created I/O configuration CSV files. This means you can enter **F** or **C** without the degrees symbol in the I/O configuration CSV file and the system automatically corrects the entry to **°F** or **°C**, and you can enter **KG/M3** or **mpa(a)** and the system automatically corrects the entry to **kg/m$^3$** or **MPa(a)**.
- The easiest way to begin creating a custom map is to export I/O configuration CSV files that contain the current configuration and then edit that file. For more information about exporting I/O Configuration CSV files, refer to Exporting I/O Configuration CSV Files.

**Figure 112. Example Analog Input Configuration CSV Format**

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Channel | Tag | DESC | UNITS_TYPE | UNITS | CONV_TYPE | SCALE_MODE | LOW_EU | HIGH_EU | USER_MODE | OVRD | FAULT_MO |
| 2 | '2-1' | Chassis1_Slot2_Chn1 | AI_2-1 | Percentage | % | Disabled | Multi-Point Calibration | 0 | 100 | Live | 0 | Fault |
| 3 | '2-2' | Chassis1_Slot2_Chn2 | AI_2-2 | Percentage | % | Disabled | Multi-Point Calibration | 0 | 100 | Live | 0 | Fault |
| 4 | '2-7' | Chassis1_Slot2_Chn7 | AI_2-7 | Percentage | % | Disabled | Multi-Point Calibration | 0 | 100 | Live | 0 | Fault |
| 5 | '2-8' | Chassis1_Slot2_Chn8 | AI_2-8 | Percentage | % | Disabled | Multi-Point Calibration | 0 | 100 | Live | 0 | Fault |
| 6 | | | | | | | | | | | | |

To create CSV files that contain your I/O configuration:

1. Open a blank spreadsheet (or open a previously exported I/O configuration CSV file).
2. Review – and change as necessary – the values for each CSV file according to the tables below (I/O Configuration CSV File Format, Analog Input CSV File Format, Analog Output CSV File Format, Digital Input CSV File Format, Digital Output CSV File Format, and Pulse Input CSV File Format):

## I/O Configuration CSV File Format

The I/O configuration CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel. Each row corresponds to a different channel on the module.

**Note**

- All columns **must** be present in the I/O Configuration CSV file.
- The I/O configuration CSV file **must** include **_IOConfig_** in the file name in order to be successfully imported.
- The system ignores any invalid lines in the CSV file and data currently in the FB Series device is maintained.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |
| **Card Type** | Identifies the type of I/O module installed. Possible options are:<br>• 4 COMM<br>• 8AIDIPI 2AI 2DO<br>• 8AODO<br>• 16DIPI<br>• 16DO<br>• HART 4<br>• MIO6X<br>• MIO8T |

| Column Heading | Description |
| --- | --- |
| **Selected IO Type** | Sets the input or output type for the selected channel. Possible options are:<br>**4 COMM Module**<br>None<br>**8AIDIPI 2A0 2DO Module**<br>Channels 1 through 8<br>• AI<br>• DI<br>• PI<br>Channels 9 and 10<br>• AO<br>Channels 11 and 12<br>• DO<br>**8AODO Module**<br>Channels 1 through 8<br>• AO<br>• DO<br>**16DIPI Module**<br>Channels 1 through 16<br>• DI<br>• PI<br>**16DO Module**<br>Channels 1 through 16<br>• DO<br>**HART 4 Module**<br>Channels 1 through 4<br>• AI<br>• AO<br>**MIO6X Module**<br>Channels 1 and 2<br>• AI<br>• DI<br>• PI |

| Column Heading | Description |
|---|---|
| | Channels 3 and 4<br>• DI<br>• PI<br>Channel 5<br>• AO<br>• DO<br>Channel 6<br>• DO<br>**MIO8T Module**<br>Channels 1 and 2<br>• AI<br>• DI<br>• PI<br>Channels 3 and 4<br>• DI<br>• PI<br>Channel 5<br>• AO<br>• DO<br>Channel 6<br>• DO<br>Channels 7 and 8<br>• RTD |

## Analog Input CSV File Format

The analog input CSV file contains

**Note**

- The **Channel** column **must** be present in the Analog Input CSV file. All other columns are optional.
- The I/O configuration CSV file **must** include **_AI_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **UNITS_TYPE** | Sets the measurement type used for the selected channel. Possible options are:<br>• Unitless<br>• Absolute Pressure<br>• Temperature<br>• Gas Density<br>• Volume Heating Value<br>• Dynamic Viscosity<br>• Linear (Short)<br>• Linear (Long)<br>• Gas Volume Rate<br>• Mass Rate<br>• Energy Rate<br>• Current<br>• Voltage<br>• Percentage<br>• Acceleration<br>• Water Content<br>• Resistance<br>• Differential Pressure<br>• Gauge Pressure<br>• Mass Heating Value<br>• Liquid Density<br>• Water Density<br>• Liquid Volume<br>• Water Volume<br>• Liquid Rate<br>• Water Rate |

| Column Heading | Description |
|---|---|
| | • Relative Density<br>**Note**<br>If you populate this column, you must also populate the **UNITS** column. |
| **UNITS** | Sets the engineering units used for the selected channel. Options change based the selected UNITS_TYPE option. Possible options are:<br>**Unitless**<br>• N/A<br>**Absolute Pressure**<br>• psi(a)<br>• kPa(a)<br>• MPa(a)<br>• bar(a)<br>• $kg/cm^2(a)$<br>**Temperature**<br>• °F<br>• °C<br>• K<br>**Gas Density**<br>• $lb/ft^3$<br>• $kg/m^3$<br>• g/cc<br>• lb/MMCF<br>• lb/US gal<br>• kg/L<br>• lb/bbl<br>• RD(liq)<br>• °API<br>**Volume Heating Value**<br>• $Btu/ft^3$<br>• $kWh/m^3$<br>• $MJ/m^3$ |

**Dynamic Viscosity**

- cP
- lb/ft-s

**Linear (Short)**

- in
- mm

**Linear (Long)**

- ft
- m

**Gas Volume Rate**

- $ft^3/s$
- $ft^3/min$
- $ft^3/h$
- $ft^3/d$
- MCF/s
- MCF/min
- MCF/f
- MCF/d
- $m^3/s$
- $m^3/min$
- $m^3/h$
- $m^3/d$
- $(k)m^3/s$
- $(k)m^3/min$
- $(k)m^3/h$
- $(k)m^3/d$
- MMCF/s
- MMCF/min
- MMCF/h
- MMCF/d
- BCF/s
- BCF/min
- BCF/h
- BCF/d

| Column Heading | Description |
|---|---|
| | • L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Mass Rate**<br>• lb/s<br>• lb/min<br>• lb/h<br>• lb/d<br>• Mlb<br>• kg/s<br>• kg/min<br>• kg/h<br>• kg/d<br>• tonne/s<br>• tonne/min<br>• tonne/h<br>• tonne/d<br>• ton/s<br>• ton/min<br>• ton/h<br>• ton/d<br>**Energy Rate**<br>• Btu/s<br>• Btu/min |

| Column Heading | Description |
| --- | --- |
| | • Btu/h<br>• Btu/d<br>• kWh/s<br>• kWh/min<br>• kWh/h<br>• kWh/d<br>• MMBtu/s<br>• MMBtu/min<br>• MMBtu/h<br>• MMBtu/d<br>• J/s<br>• J/min<br>• J/h<br>• J/d<br>• MJ/s<br>• MJ/min<br>• MJ/h<br>• MJ/d<br>• GJ/s<br>• GJ/min<br>• GJ/h<br>• GJ/d<br>• Dth/s<br>• Dth/min<br>• Dth/h<br>• Dth/d<br>• TJ/s<br>• TJ/min<br>• TJ/h<br>• TJ/d<br>• PJ/s<br>• PJ/min<br>• PJ/h |

| Column Heading | Description |
|---|---|
| | • PJ/d<br>**Current**<br>• mA<br>• A<br>**Voltage**<br>• V<br>• kV<br>**Percentage**<br>• %<br>• ppm<br>**Acceleration**<br>• $ft/s^2$<br>• $m/s^2$<br>**Water Content**<br>• lb/MMSCF<br>• $kg/(k)m^3$<br>**Resistance**<br>• ohms<br>**Differential Pressure**<br>• inH2O@60°F<br>• inH2O@68°F<br>• mmH2O@68F<br>• kPa<br>• mbar<br>• $kg/cm^2$<br>• psi<br>• bar<br>**Gauge Pressure**<br>• psi(g)<br>• kPa(g)<br>• MPa(g)<br>• bar(g)<br>• $kg/cm^2(g)$ |

**Mass Heating Value**

- Btu/lb
- kWh/kg
- MJ/kg

**Liquid Density**

- lb/ft$^3$
- kg/m$^3$
- g/cc
- lb/MMCF
- lb/US gal
- kg/L
- lb/bbl
- RD
- °API

**Water Density**

- lb/ft$^3$
- kg/m$^3$
- g/cc
- lb/MMCF
- lb/US gal
- kg/L
- lb/bbl
- RD
- °API

**Liquid Volume**

- ft$^3$
- m$^3$
- MCF
- (k)m$^3$
- MMCF
- BCF
- L
- US gal

| Column Heading | Description |
|---|---|
| | • bbl<br>**Water Volume**<br>• $ft^3$<br>• $m^3$<br>• MCF<br>• (k)$m^3$<br>• MMCF<br>• BCF<br>• L<br>• US gal<br>• bbl<br>**Liquid Rate**<br>• $ft^3/s$<br>• $ft^3/min$<br>• $ft^3/h$<br>• $ft^3/d$<br>• MCF/s<br>• MCF/min<br>• MCF/h<br>• MCF/d<br>• $m^3/s$<br>• $m^3/min$<br>• $m^3/h$<br>• $m^3/d$<br>• (k)$m^3/s$<br>• (k)$m^3/min$<br>• (k)$m^3/h$<br>• (k)$m^3/d$<br>• MMCF/s<br>• MMCF/min<br>• MMCF/h<br>• MMCF/d<br>• BCF/s |

| Column Heading | Description |
|---|---|
| | • BCF/min<br>• BCF/h<br>• BCF/d<br>• L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Water Rate**<br>• $ft^3/s$<br>• $ft^3/min$<br>• $ft^3/h$<br>• $ft^3/d$<br>• MCF/s<br>• MCF/min<br>• MCF/h<br>• MCF/d<br>• $m^3/s$<br>• $m^3/min$<br>• $m^3/h$<br>• $m^3/d$<br>• (k)$m^3/s$<br>• (k)$m^3/min$<br>• (k)$m^3/h$<br>• (k)$m^3/d$<br>• MMCF/s |

| Column Heading | Description |
|---|---|
| | • MMCF/min<br>• MMCF/h<br>• MMCF/d<br>• BCF/s<br>• BCF/min<br>• BCF/h<br>• BCF/d<br>• L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Relative Density**<br>• RD<br>**Note**<br>If you populate this column, you must also populate the **UNITS_TYPE** column. |
| **CONV_TYPE** | Sets if the channel measures either current input, voltage input or is disabled. Possible options are:<br>• **Current** – The channel measure current.<br>• **Voltage** – The channel measures voltage.<br>• **Disabled** – The channel is disabled.<br>For channels on a **HART module**, the **only** available options are **Disabled** and **Current**. |

| Column Heading | Description |
|---|---|
| **SCALE_MODE** | Specifies how the EU scaling parameters are determined. Possible options are:<br>• **Multi-Point Calibration** – EU scaling parameters are determined by the calibration. You cannot modify the EU scaling parameters (Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent) directly. You must use the calibration wizard to adjust the scaling of the AI.<br>**Note**<br>If you download a configuration file that has Multi-Point Calibration selected, the calibration on your device remains unchanged.<br>• **EU Scaling** – EU scaling parameters are determined by the values you enter in the Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent fields.<br>**Note**<br>If you download a configuration file that has EU Scaling selected, the existing calibration on your device is overwritten using the EU scaling parameters. |
| **LOW_EU** | Sets the low reading (in engineering units) that is equal to zero percent input. For example, if a temperature transmitter is connected to the analog input with a range of –40 to 160 degrees F, the Low field would be set to –40.<br>**Note**<br>If you enter a value in this column, you **must** also populate the **CONV_TYPE** column with either **Voltage** or **Current** and the **SCALE_MODE** column with **EU Scaling**. |
| **HIGH_EU** | Sets the high reading (in engineering units) that is equal to 100 percent input. For example, if a temperature transmitter is connected to the analog input with a range of – 40 to 160 degrees F, the High field would be set to 160.<br>**Note**<br>If you enter a value in this column, you **must** also populate the **CONV_TYPE** column with either **Voltage** or **Current** and the **SCALE_MODE** column with **EU Scaling**. |

| Column Heading | Description |
|---|---|
| **USER_MODE** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are:<br>• **Live** – The system copies the Live Value to the Selected Value parameter.<br>• **Override** – The system copies the value set in the Override Value (OVRD) field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the **operation mode** (USER_MODE) is set to **Override**, the Selected Value parameter is set to the **Override Value** (OVRD) and is not set based on the Fault Mode. |
| **OVRD** | Sets the value (in engineering units) written to the Selected Value field when the Operation Mode is set to Override. |
| **FAULT_MODE** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. Possible options are:<br>• **Fault** – The system copies the value set in the Fault Value field to the Selected Value parameter.<br>• **Last Good** – The system copies the value of the Last Good Value field to the Selected Value parameter. |
| **FAULT** | Sets the value (in engineering units) that is written to the Selected Value parameter when a fault occurs on the selected sensor and the Fault Mode is set to Fault. |
| **CLIP_MODE** | Sets if clipping occurs on the selected input. Clipping forces the Selected Value to stay within a range defined by the Low Clipping Limit and High Clipping Limit. Clipping is only applied when there is not a fault. Possible options are:<br>• **Enable** – Clipping does occur.<br>**Note**<br>You must enter a value in the **CLIP_LOW_LIMIT** and **CLIP_HIGH_LIMIT** fields.<br>• **Disable** – Clipping does not occur. |
| **CLIP_LOW_LIMIT** | When clipping (CLIP_MODE) is enabled, sets the lower limit of the Selected Value parameter. |

| Column Heading | Description |
|---|---|
| **CLIP_HIGH_LIMIT** | When clipping (CLIP_MODE) is enabled, sets the upper limit of the Selected Value parameter. |
| **DAMPING_FACTOR** | Sets a time (in seconds) used to dampen the reading of the AI. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the value previous read. A value of 0.0 will disable damping. |
| **AVG_PERIOD** | When the **Operation Mode** (USER_MODE) is set to **Live**, this field defines the period of time (in seconds) over which the Live Value will be averaged before it is written to the Selected Value. |
| **Alarm Tag** | Set an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **ALM_DESC** | Set a description (up to 20-alphanumeric characters) for the selected instance. |
| **HIHI_ENB** | Sets if the system monitors the point for the specified the High High alarm limit (HIHI_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – the system ignores the specified alarm limit. |
| **HIHI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High High alarm. |
| **HI_ENB** | Sets if the system monitors the point for the specified the High alarm limit (HI_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **HI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High alarm. |
| **LO_ENB** | Sets if the system monitors the point for the specified the Low alarm limit (LO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |

| Column Heading | Description |
|---|---|
| **LO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low alarm. |
| **LOLO_ENB** | Sets if the system monitors the point for the specified the Low Low alarm limit (LOLO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **LOLO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low Low alarm. |
| **PF_ENB** | Sets if an alarm is raised on a point failure. Possible options are:<br>• **Enable** – An alarm is raised if the selected channel reports a point failure.<br>• **Disable** – No alarm is raised if the selected channel reports a point failure. |
| **DEADBAND** | Sets the value (in engineering units) that is an inactive zone above the low alarm and below the high alarm. |
| **ROC_MODE** | Use this section to configure alarming based on the speed of variability in the value of the alarm input. Possible options are:<br>• **Disabled** – The system does not monitor the input for rate of change alarming.<br>• **Alarm on Positive Changes** – An alarm is raised if the value increases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Negative Changes** – An alarm is raised if the value decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Both** – An alarm is raised if the value increases or decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM). |
| **ROC_LIM** | Sets a limit value (in engineering units) to which the input must rise or fall during the configured time period to generate an alarm. |
| **ROC_TM** | Sets the time duration (in seconds) that the system uses to determine the Rate of Change for an input. |

## Analog Output CSV File Format

The analog output CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel.

**Note**

- The **Channel** column **must** be present in the Analog Output CSV file. All other columns are optional.
- The I/O configuration CSV file **must** include **_AO_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **UNITS_TYPE** | Sets the measurement type used for the selected channel. Possible options are:<br>• Unitless<br>• Absolute Pressure<br>• Temperature<br>• Gas Density<br>• Volume Heating Value<br>• Dynamic Viscosity<br>• Linear (Short)<br>• Linear (Long)<br>• Gas Volume Rate<br>• Mass Rate<br>• Energy Rate<br>• Current<br>• Voltage<br>• Percentage<br>• Acceleration |

| Column Heading | Description |
|---|---|
| | • Resistance<br>• Differential Pressure<br>• Gauge Pressure<br>• Mass Heating Value<br>• Liquid Density<br>• Water Density<br>• Liquid Volume<br>• Water Volume<br>• Liquid Rate<br>• Water Rate<br>• Relative Density<br>**Note**<br>If you populate this column, you **must** also populate the **UNITS** column. |
| **UNITS** | Sets the engineering units used for the selected channel. Possible options are:<br>**Unitless**<br>• N/A<br>**Absolute Pressure**<br>• psi(a)<br>• kPa(a)<br>• MPa(a)<br>• bar(a)<br>• $kg/cm^2(a)$<br>**Temperature**<br>• °F<br>• °C<br>• K<br>**Gas Density**<br>• $lb/ft^3$<br>• $kg/m^3$<br>• g/cc<br>• lb/MMCF |

| Column Heading | Description |
|---|---|
| | • lb/US gal<br>• kg/L<br>• lb/bbl<br>• RD(liq)<br>• °API<br>**Volume Heating Value**<br>• Btu/ft$^3$<br>• kWh/m$^3$<br>• MJ/m$^3$<br>**Dynamic Viscosity**<br>• cP<br>• lb/ft-s<br>**Linear (Short)**<br>• in<br>• mm<br>**Linear (Long)**<br>• ft<br>• m<br>**Gas Volume Rate**<br>• ft$^3$/s<br>• ft$^3$/min<br>• ft$^3$/h<br>• ft$^3$/d<br>• MCF/s<br>• MCF/min<br>• MCF/f<br>• MCF/d<br>• m$^3$/s<br>• m$^3$/min<br>• m$^3$/h<br>• m$^3$/d<br>• (k)m$^3$/s<br>• (k)m$^3$/min |

| Column Heading | Description |
| --- | --- |
| | • (k)$m^3$/h<br>• (k)$m^3$/d<br>• MMCF/s<br>• MMCF/min<br>• MMCF/h<br>• MMCF/d<br>• BCF/s<br>• BCF/min<br>• BCF/h<br>• BCF/d<br>• L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Mass Rate**<br>• lb/s<br>• lb/min<br>• lb/h<br>• lb/d<br>• Mlb<br>• kg/s<br>• kg/min<br>• kg/h<br>• kg/d<br>• tonne/s |

| Column Heading | Description |
| --- | --- |
| | • tonne/min<br>• tonne/h<br>• tonne/d<br>• ton/s<br>• ton/min<br>• ton/h<br>• ton/d<br>**Energy Rate**<br>• Btu/s<br>• Btu/min<br>• Btu/h<br>• Btu/d<br>• kWh/s<br>• kWh/min<br>• kWh/h<br>• kWh/d<br>• MMBtu/s<br>• MMBtu/min<br>• MMBtu/h<br>• MMBtu/d<br>• J/s<br>• J/min<br>• J/h<br>• J/d<br>• MJ/s<br>• MJ/min<br>• MJ/h<br>• MJ/d<br>• GJ/s<br>• GJ/min<br>• GJ/h<br>• GJ/d<br>• Dth/s |

| Column Heading | Description |
| --- | --- |
| | • Dth/min<br>• Dth/h<br>• Dth/d<br>• TJ/s<br>• TJ/min<br>• TJ/h<br>• TJ/d<br>• PJ/s<br>• PJ/min<br>• PJ/h<br>• PJ/d<br>**Current**<br>• mA<br>• A<br>**Voltage**<br>• V<br>• kV<br>**Percentage**<br>• %<br>• ppm<br>**Acceleration**<br>• ft/s$^2$<br>• m/s$^2$<br>**Resistance**<br>• ohms<br>**Differential Pressure**<br>• inH2O@60°F<br>• inH2O@68°F<br>• mmH2O@68F<br>• kPa<br>• mbar<br>• kg/cm$^2$<br>• psi |

| Column Heading | Description |
| --- | --- |
| | • bar<br>**Gauge Pressure**<br>• psi(g)<br>• kPa(g)<br>• MPa(g)<br>• bar(g)<br>• kg/cm$^2$(g)<br>**Mass Heating Value**<br>• Btu/lb<br>• kWh/kg<br>• MJ/kg<br>**Liquid Density**<br>• lb/ft$^3$<br>• kg/m$^3$<br>• g/cc<br>• lb/MMCF<br>• lb/US gal<br>• kg/L<br>• lb/bbl<br>• RD<br>• °API<br>**Water Density**<br>• lb/ft$^3$<br>• kg/m$^3$<br>• g/cc<br>• lb/MMCF<br>• lb/US gal<br>• kg/L<br>• lb/bbl<br>• RD<br>• °API<br>**Liquid Volume**<br>• ft$^3$ |

| Column Heading | Description |
| --- | --- |
| | • $m^3$<br>• MCF<br>• (k)$m^3$<br>• MMCF<br>• BCF<br>• L<br>• US gal<br>• bbl<br>**Water Volume**<br>• $ft^3$<br>• $m^3$<br>• MCF<br>• (k)$m^3$<br>• MMCF<br>• BCF<br>• L<br>• US gal<br>• bbl<br>**Liquid Rate**<br>• $ft^3/s$<br>• $ft^3/min$<br>• $ft^3/h$<br>• $ft^3/d$<br>• MCF/s<br>• MCF/min<br>• MCF/h<br>• MCF/d<br>• $m^3/s$<br>• $m^3/min$<br>• $m^3/h$<br>• $m^3/d$<br>• (k)$m^3/s$<br>• (k)$m^3/min$ |

| Column Heading | Description |
| --- | --- |
| | • (k)$m^3$/h<br>• (k)$m^3$/d<br>• MMCF/s<br>• MMCF/min<br>• MMCF/h<br>• MMCF/d<br>• BCF/s<br>• BCF/min<br>• BCF/h<br>• BCF/d<br>• L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Water Rate**<br>• $ft^3$/s<br>• $ft^3$/min<br>• $ft^3$/h<br>• $ft^3$/d<br>• MCF/s<br>• MCF/min<br>• MCF/h<br>• MCF/d<br>• $m^3$/s<br>• $m^3$/min |

| Column Heading | Description |
|---|---|
| | • $m^3/h$<br>• $m^3/d$<br>• (k)$m^3/s$<br>• (k)$m^3/min$<br>• (k)$m^3/h$<br>• (k)$m^3/d$<br>• MMCF/s<br>• MMCF/min<br>• MMCF/h<br>• MMCF/d<br>• BCF/s<br>• BCF/min<br>• BCF/h<br>• BCF/d<br>• L/s<br>• L/min<br>• L/h<br>• L/d<br>• US gal/s<br>• US gal/min<br>• US gal/h<br>• US gal/d<br>• bbl/s<br>• bbl/min<br>• bbl/h<br>• bbl/d<br>**Relative Density**<br>• RD<br>**Note**<br>If you populate this column, you **must** also populate the **UNITS_TYPE** column. |

| Column Heading | Description |
|---|---|
| **CONV_TYPE** | Sets if the channel measures either current input, voltage input or is disabled. Possible options are:<br>• **Current** – The channel measure current.<br>• **Voltage** – The channel measures voltage.<br>• **Disabled** – The channel is disabled.<br>For channels on a **HART module**, the **only** available options are **Disabled** and **Current**. |
| **LOW_EU** | Sets the value (in engineering units) that is equal to zero percent output (low end of the EU range). |
| **HIGH_EU** | Sets the value (in engineering units) that is equal to 100 percent output (high end of the EU range). |
| **USER_MODE** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are:<br>• **Auto** – The system copies the value in the Auto Value (AUTO) field to the Selected Value parameter.<br>• **Override** – The system copies the value set in the Override Value (OVRD) field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the **operation mode** (USER_MODE) is set to **Override**, the Selected Value parameter is set to the **Override Value** (OVRD) and is not set based on the Fault Mode.<br>• **Auto Read** – The system copies the value of the parameter you configure in the Auto Read Parameter Reference (AUTO_READ_PARAM) field to the Selected Value parameter. This value is updated once per second.<br>**Note**<br>When setting the Operation Mode (USER_MODE) to Auto Read, make sure that the units and scaling are correct for the referenced parameter. |
| **AUTO** | Sets the value (in engineering units) to use for the selected channel when the Operation Mode (USER_MODE) is set to Auto. |

| Column Heading | Description |
|---|---|
| **AUTO_READ_PARAM** | Enter a parameter from the FB Series internal database to use as the analog output value when the Operation Mode (USER_MODE) is set to Auto Read. |
| **OVD** | Sets the value (in engineering units) that is written to the Selected Value field when the Operation Mode (USER_MODE) is set to Override. |
| **FAULT_MODE** | Sets the value to use when the output experiences a fault condition. Possible options are:<br>• **Fault** – The system uses the value set in the Fault Value (FAULT) field.<br>• **Last Good Value** – The system uses the last good value received before the fault occurred.<br>• **Last Hour Average** – The system uses the last hourly average before the fault occurred.<br>• **Ramp To Fault Value** – The system ramps the output to the value you configure in the Fault Value (FAULT) field over the time configured in the Ramp Duration (RAMP_DURATION) field.<br>• **Ramp To Last Hour Avg** – The system ramps the output to the value shown in the Last Hour Average Value field over the time configured in the Ramp Duration (RAMP_DURATION) field. |
| **FAULT** | Sets the value (in engineering units) to use when a fault occurs on the selected channel and the Fault Mode (FAULT_MODE) is set to Fault. |
| **RAMP_DURATION** | Sets, in seconds, the amount of time the system takes after a fault has occurred to ramp the output to the new value. |

| Column Heading | Description |
|---|---|
| **RESET_MODE** | Sets the value to use for the channel after a power cycle occurs. Possible options are:<br>• **Fault** – Use the value you set in the Fault Value (FAULT) field.<br>• **Last Good** – Use the last known good value.<br>**Note**<br>• During a power cycle, an analog output generates 0mA while the FB Series product is restarting. Once the FB Series product has completed the restart, then the Action on CPU Restart is applied.<br>• If only the 12MIO restarts, then the Action on CPU Restart is applied until communication is established with main CPU. |
| **CLIP_MODE** | Sets if clipping occurs on the selected input. Clipping forces the Selected Value to stay within a range defined by the Low Clipping Limit and High Clipping Limit. Clipping is only applied when there is not a fault. Possible Values are:<br>• **Disable** – Clipping does not occur.<br>• **Enable** – Clipping does occur.<br>**Note**<br>You must enter a value in the **Low Clipping Limit** (CLIP_LOW_LIMIT) and **High Clipping Limit** (CLIP_HIGH_LIMIT) fields. |
| **CLIP_LOW_LIMIT** | When clipping is enabled, this field sets the lower limit of the Selected Value parameter. |
| **CLIP_HIGH_LIMIT** | When clipping is enabled, this field sets the upper limit of the Selected Value parameter. |
| **Alarm Tag** | Set an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **ALM_DESC** | Set a description (up to 20-alphanumeric characters) for the selected instance. |

| Column Heading | Description |
|---|---|
| **HIHI_ENB** | Sets if the system monitors the point for the specified the High High alarm limit (HIHI_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **HIHI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High High alarm. |
| **HI_ENB** | Sets if the system monitors the point for the specified the High alarm limit (HI_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit<br>• **Disable** – The system ignores the specified alarm limit. |
| **HI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High alarm. |
| **LO_ENB** | Sets if the system monitors the point for the specified the Low alarm limit (LO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit<br>• **Disable** – The system ignores the specified alarm limit. |
| **LO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low alarm. |
| **LOLO_ENB** | Sets if the system monitors the point for the specified the Low Low alarm limit (LOLO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit<br>• **Disable** – The system ignores the specified alarm limit. |
| **LOLO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low Low alarm. |
| **PF_ENB** | Sets if an alarm is raised on a point failure. Possible options are:<br>• **Enable** – An alarm is raised if the selected channel reports a point failure.<br>• **Disable** – No alarm is raised if the selected channel reports a point failure. |

| Column Heading | Description |
|---|---|
| **DEADBAND** | Sets the value (in engineering units) that is an inactive zone above the low alarm and below the high alarm. |
| **ROC_MODE** | Use this section to configure alarming based on the speed of variability in the value of the alarm input. Possible options are:<br>• **Disabled** – The system does not monitor the input for rate of change alarming.<br>• **Alarm on Positive Changes** – An alarm is raised if the value increases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Negative Changes** – An alarm is raised if the value decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Both** – An alarm is raised if the value increases or decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM). |
| **ROC_LIM** | Sets a limit value (in engineering units) to which the input must rise or fall during the configured time period to generate an alarm. |
| **ROC_TM** | Sets the time duration (in seconds) that the system uses to determine the Rate of Change for an input. |

## Digital Input CSV File Format

The digital input CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel.

**Note**

- The **Channel** column **must** be present in the Digital Input CSV file. All other columns are optional.
- The I/O configuration CSV file **must** include **_DI_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |

| Column Heading | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **DI_TYPE** | Set how the digital inputs function when the **Operation Mode** is set to **Live**. Possible options are:<br>• **Normal** – The Selected Value is updated based on the Live Value.<br>• **Latched** – When the Live parameter transitions from off to on, the selected parameter remains on, until the latch is cleared using the Reset Latch parameter. |
| **USER_MODE** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are:<br>• **Live** – The system copies the Live Value to the Selected Value parameter.<br>• **Override** – The system copies the value you select in the Override Value field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the **Operation Mode** (USER_MODE) is set to **Override**, the Selected Value parameter is set to the **Override Value** (OVRD) and is not set based on the Fault Mode. |
| **OVRD** | Sets the value that is written to the Selected Value field when the **Operation Mode** (USER_MODE) is set to **Override**. Possible options are:<br>• **Off** – The selected channel is set to Off when the Operation Mode is set to Override.<br>• **On** – The selected channel is set to On when the Operation Mode is set to Override. |
| **FAULT_MODE** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs.<br>• **Fault** – The system copies the value set in the Fault Value field to the Selected Value parameter.<br>• **Last Good** – The system copies the value of the Last Good Value field to the Selected Value parameter. |

| Column Heading | Description |
|---|---|
| **FAULT** | Sets the value to use when a fault occurs on the selected channel and the **Fault Mode** (FAULT_MODE) is set to **Fault**. Possible options are:<br>• **Off** – The channel is set to Off when a fault occurs on the selected channel and the Fault Mode is set to Fault.<br>• **On** – The channel is set to On when a fault occurs on the selected channel and the Fault Mode is set to Fault. |
| **ZERO_DESC** | Enter a short description (up to 10-alphanumeric characters) for the digital input off state. |
| **ONE_DESC** | Enter a short description (up to 10-alphanumeric characters) for the digital input on state. |
| **LOGIC_LEVEL** | Sets the amount of current that the channel sources. Pick the appropriate setting based on the digital input device used with this channel. Possible options are:<br>• **66 microamps** – The input will source 66 microamps.<br>• **2 milliamps** – The input will source 2 milliamps.<br>**Note**<br>This field applies to the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. |
| **INVERT** | Sets whether the system will invert the Live value before writing it to the Selected value. Possible options are:<br>• **Disable** – The Selected Value will be set to the Live value.<br>• **Enable** – The Selected Value will be set to the inverse of the Live value. For example, if the Live value is "Off" then the Selected value will be "On."<br>**Note**<br>This mode only works when the **Operation Mode** (USER_MODE) is set to **Live** and there is not a fault. |
| **FILTER_TIME** | Sets the amount of time (in seconds) the discrete input must remain in the On (high) state before it is recognized as such. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition. |

| Column Heading | Description |
|---|---|
| **ALARM_MODE** | Sets alarming for the digital input. Possible options are:<br>• **Off** – No alarms are logged.<br>• **On** – A Set Alarm is logged when the Selected value transitions from “off” to “on.” A Clear Alarm is logged when the digital input transitions from “on” to “off.” |
| **RESISTOR_TYPE** | Activates a pull-up or pull-down resistor to maintain input in a deterministic state when no input is applied.<br>• **Pull Up** – Maintain signal High when no input is applied.<br>• **Pull Down** – Maintain signal Low when no input is applied.<br>**Note**<br>Open collector circuit configuration is not supported with a pull-down resistor.<br>**Note**<br>This field applies to the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. |

## Digital Output CSV File Format

The digital output CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel.

**Note**

- The **Channel** column **must** be present in the Digital Output CSV file. All other columns are optional.
- The I/O configuration CSV file **must** include **_DO_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number of the I/O point. |
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |

| Column Heading | Description |
|---|---|
| **DO_TYPE** | Select the function of the digital output when the Operation Mode is Auto or Auto Read and there is no fault. Digital outputs are high/low outputs used to turn equipment on and off. Possible options are:<br>• **Latching** – The discrete output turns on when the Auto or Auto Read Value, depending on Operation mode, is on. The output remains on until the Auto or Auto Read value turns off.<br>• **Momentary** – When the Auto or Auto Read Value transitions from off to on, the discrete output will turn the discrete output on for the amount of time defined in the Time On field. The Auto parameter will be automatically set to 0 (off) when the discrete output generates the momentary output.<br>**Note**<br>The discrete output will not set the Auto Read Value back to 0.<br>• **Toggle** – Enables a square-wave output for which both the time on and time off are defined by the value in the Time On and Time Off parameters, respectively.<br>• **Timed Duration Output Momentary** – Enables the discrete output to complete one cycle based on the time related parameters in the Time Duration Output frame, and the Auto EU value. Once a cycle is completed, the DO will remain off until the Auto EU value is modified, starting a new cycle.<br>• **Timed Duration Output Toggle** – Enables the discrete output to continuously repeat in a cycle defined by the value in the Cycle Time field on the TDO Parameters Tab where the EU Value controls the on-time duration. The current cycle will be completed before a new Auto EU value takes effect.<br>• **Scaled Pulse Output** – Enables the discrete output to be turned on for the amount of time defined in the Time On field each time an accumulation limit is reached. This could be used to send a pulse output to another device, such as |

| Column Heading | Description |
|---|---|
| | an odorizer, or to turn a sampler on each time a certain amount of flow is accumulated. |
| **USER_MODE** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are:<br>• **Auto** – The system copies the value in the Auto Value field to the Selected Value parameter.<br>• **Override** – The system copies the value set in the Override Value field to the Selected Value parameter.<br>• **Auto Read** – The system copies the value of the parameter you configure in the Auto Read Parameter Reference field to the Selected Value parameter.<br>**Note**<br>This field applies only if you select **Latching** or **Momentary** in the **Digital Output Type** (DO_TYPE) field. |
| **AUTO** | Sets the value to use for the selected channel when the Operation Mode (USER_MODE) is set to Auto. Possible options are:<br>• **Off** – The system copies a value of Off to the Selected Value parameter.<br>• **On** – The system copies a value of On to the Selected Value parameter.<br>**Note**<br>This field applies only if you select **Latching** or **Momentary** in the **Digital Output Type** (DO_TYPE) field. |
| **AUTO_READ_PARAM** | Enter a parameter from the FB Series product's internal database to use as the digital output value when the Operation Mode (USER_MODE) is set to Auto Read.<br>**Note**<br>This field applies only if you select **Latching** or **Momentary** in the **Digital Output Type** (DO_TYPE) field. |

| Column Heading | Description |
|---|---|
| **OVRD** | Sets the value that is written to the Selected Value field when the Operation Mode (USER_MODE) is set to Override. Possible options are:<br>• **Off** – The system copies a value of Off to the Selected Value parameter.<br>• **On** – The system copies a value of On to the Selected Value parameter. |
| **FAULT_MODE** | Sets the value to use when the output experiences a fault condition. Possible options are:<br>• **Fault** – The system uses the value set in the Fault Value field.<br>• **Last Good** – The system uses the last good value output before the fault occurred.<br>**Note**<br>If the **Digital Output Type** (DO_TYPE) is **TDO momentary**, **TDO toggle**, or **SPO**, the DO will be set to off instead of set based on the fault mode. |
| **FAULT** | Sets the value to use when a fault occurs on the selected channel and the Fault Mode (FAULT_MODE) is set to Fault. Possible options are:<br>• **Off** – The channel is set to off when a fault occurs on the selected channel and the Fault Mode is set to Fault.<br>• **On** – The channel is set to on when a fault occurs on the selected channel and the Fault Mode is set to Fault. |
| **ZERO_DESC** | Enter a short description (up to 10-alphanumeric characters) for the Off state of the digital output.<br>**Note**<br>This field applies **only** if you select **Latching**, **Momentary**, **Toggle**, **Time Duration Output Momentary**, or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |

| Column Heading | Description |
|---|---|
| **ONE_DESC** | Enter a short description (up to 10-alphanumeric characters) for the On state of the digital output.<br>**Note**<br>This field applies **only** if you select **Latching**, **Momentary**, **Toggle**, **Time Duration Output Momentary**, or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |
| **ALARM_MODE** | Sets Alarming for the digital output.<br>• **Off** – No alarms are logged.<br>• **On** – A Set Alarm is logged when the Selected value transitions from “off” to “on.” A Clear Alarm is logged when the digital output transitions from “on” to “off.” |
| **RESET_MODE** | For **Latched DO's**, sets the value to use for the channel after a power cycle occurs.<br>For **Momentary DO's**, the output is set to Off and no momentary pulse is generated.<br>For **all other DO's**, the output is set based on the behavior described in the Digital Output Type parameter section.<br>Possible options are:<br>• **Fault** – The system uses the value set in the Fault Value field.<br>• **Last Good** – The system uses the last good value output before the fault occurred.<br>**Note**<br>• During a power cycle, a discrete output is set to Off while the FB Series product is restarting. Once the FB Series product has completed the restart, then the action on power cycle is applied.<br>• This field applies **only** if you select **Latching** in the **Digital Output Type** (DO_TYPE) field and **Auto** in the **Operation Mode** (USER_MODE) field.<br>• If only the 12MIO restarts, then the Action on CPU Restart is applied until communication is established with main CPU. |

| Column Heading | Description |
|---|---|
| **TIME_ON** | Sets the amount of time, in seconds, an output is set to On. The minimum On and Off time is 0.01 seconds, resulting in a maximum frequency of 50 Hz. The default value is 1.0 seconds.<br>• In **Momentary** mode, this is the amount of time (in seconds) that the output is energized.<br>• In **Toggle** mode, this is the amount of time (in seconds) between switching On or Off.<br>• In **Scaled Pulse Output** mode, this is the amount of time (in seconds) that the output is energized each time the change in the Scaled Pulse Output Value is greater than the Pulse Output Significance. For example, if the Scaled Pulse Output Value is 950 MCF when the scaled pulse output functionality is enabled and the Pulse Output Significance is 1000 MCF, the DO will be energized when the Scaled Pulse Output Value reaches 1950 MCF.<br>**Note**<br>This field applies **only** if you select **Momentary**, **Toggle**, or **Scaled Pulse Output** in the **Digital Output Type** (DO_TYPE) field. |
| **TIME_OFF** | Sets the amount of time, in seconds, the output is set to Off. The minimum On and Off time is 0.01 seconds, resulting in a maximum frequency of 50 Hz. The default value is 1.0 seconds.<br>**Note**<br>This field applies **only** if you select **Toggle** in the **Digital Output Type** (DO_TYPE) field. |

| Column Heading | Description |
|---|---|
| **TDO_CYCLE_TIME** | Sets the total amount of time (in seconds) the cycle spends in the On and Off positions. The Cycle Time entry is used to define the Off Time in the Time Duration Output Toggle mode. The Off Time is calculated by the formula:<br>Off Time = Cycle Time - On Time<br>Example:<br>A Time Duration Output is used to emulate a field instrument measuring flow. The Time Duration Output outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow. The output is repeated every 15 seconds.<br>If the Cycle Time is less than, or equal to the On Time, the Off Time is set to one. Care must be taken in configuration to ensure that the Cycle Time remains greater than the calculated On Time for proper operation.<br>**Note**<br>This field applies **only** if you select **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |
| **TDO_LOW_EU** | Sets the value for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.<br>**Note**<br>This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |
| **TDO_HIGH_EU** | Sets the value for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.<br>**Note**<br>This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |

| Column Heading | Description |
|---|---|
| **TDO_0%_TIME** | Sets the amount of time (in seconds) the cycle is in the On position when the EU is at zero percent.<br>Note<br>• 0% and 100% should be less than or equal to the Cycle Time.<br>• This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |
| **TDO_100%_TIME** | Sets the amount of time (in seconds) the cycle is in the on position when the EU is at 100 percent.<br>**Note**<br>• 0% and 100% should be less than or equal to the Cycle Time.<br>• This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** (DO_TYPE) field. |
| **SPO_INPUT_PRM** | This parameter chooses the parameter the digital output will monitor for changes so that it can turn the digital output on for the amount of time specified by the Time On parameter each time it changes by the amount specified in the Pulse Output Significance parameter.<br>**Note**<br>• Choose a parameter with an incremental value.<br>• This field applies **only** if you select **Scaled Pulse Output** in the **Digital Output Type** (DO_TYPE) field. |
| **SPO_ACCUM_LIMIT** | This field defines the amount of change that must occur in the Scaled Pulse Output parameter before a pulse will be generated.<br>**Note**<br>• This parameter is in the same units as the Scaled Pulse Output Value.<br>• This field applies **only** if you select **Scaled Pulse Output** in the **Digital Output Type** (DO_TYPE) field. |

| Column Heading | Description |
|---|---|
| **LOW_SIDE_SWITCH** | Sets if the digital output is internally connected to or isolated from ground. Possible options are:<br>• **Enabled** – The DO_LO pin is internally connected to ground and provides a grounded output (50 mA current limit).<br>• **Disabled** – The DO_LO pin is internally isolated from ground and acts as a contact closure. |

## Pulse Input CSV File Format

The pulse input CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel.

**Note**

- The **Channel** column **must** be present in the Pulse Input CSV file. All other columns are optional.
- The I/O configuration CSV file **must** include **_PI_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **UNITS_TYPE** | Sets the measurement type used for the selected channel.<br>**Note**<br>If you populate this column, you **must** also populate the **UNITS** column. |
| **UNITS** | Sets the engineering units used for the selected channel.<br>**Note**<br>If you populate this column, you **must** also populate the **UNITS_TYPE** column. |

| Column Heading | Description |
|---|---|
| **CONV_FACTOR** | Sets the ratio of the number of pulses per engineering unit.<br>**Note**<br>This field applies **only** if the selected pulse input channel is **not** assigned to a **Gas** or **Liquid Linear Meter Input**. |
| **CONTRACT_HR** | Click ▼ to set the hour of the day to begin the daily counted parameters. |
| **RATE_PERIOD** | Click ▼ to set the time units used for the PI scan rate. |
| **USER_MODE** | Sets the source of the selected value. Possible options are:<br>**Live** – The system uses the current value of the input.<br>**Override** – The system uses the value set in the **Override Frequency** (OVRD_FREQ) field. |
| **OVRD_FREQ** | Sets the value to use for the selected channel when the **Operation Mode** (USER_MODE) is set to **Override**. |
| **FILTER** | Sets the amount of filtering that will be applied to the pulse input. Choose a filtering mode that is appropriate for the input frequency, and the amount of noise that may be present. Possible options are:<br>• **Low Speed Filter** – Choose low speed filtering if the pulse input will be measuring frequencies less than 10Hz.<br>• **Medium Speed Filter** – Choose medium speed filtering if the pulse input will be measuring frequencies between 0 to 300Hz.<br>• **High Speed Filter** – Choose high speed filtering if the pulse input will be measuring frequencies above 300Hz. |
| **LOGIC_LEVEL** | This setting determines the amount of current that the channel sources. Pick the appropriate setting based on the pulse input device used with this channel. Possible options are:<br>• **66 microamps** – The input will source 66 microamps.<br>• **2 milliamps** – The input will source 2 milliamps.<br>**Note**<br>• This field applies to the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. |

| Column Heading | Description |
|---|---|
| | • For the PI configuration driven from an open collector stage, high speed (10KHz) is only supported with the 2 milliamps setting.<br>• For the PI configuration driven from a voltage source, 66 microamps is acceptable for low and high speed. |
| **RESISTOR_TYPE** | Activates a pull-up or pull-down resistor to maintain input in a deterministic state when no input is applied.<br>• **Pull Up** – Maintain signal High when no input is applied.<br>• **Pull Down** – Maintain signal Low when no input is applied.<br>**Note**<br>Open collector circuit configuration is not supported with a pull-down resistor.<br>**Note**<br>This field applies to the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. |
| **SCAN_PERIOD** | Sets how frequently the system scans the input (in seconds) to acquire the value. Each input updates based on their individual scan period. |
| **MONITOR_MAX** | Sets the maximum value of the pulse input gauge shown on the Monitor > Main display.<br>**Note**<br>This field applies **only** to the **FB1000** and **FB2000 Series Flow Computers**. |
| **MONITOR_MIN** | Sets the minimum value of the pulse input gauge shown on the Monitor > Main display.<br>**Note**<br>This field applies **only** to the **FB1000** and **FB2000 Series Flow Computers**. |
| **Alarm Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **ALM_DESC** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |

| Column Heading | Description |
|---|---|
| **HIHI_ENB** | Sets if the system monitors the point for the specified the High High alarm limit (HIHI_LIM). Possible options are:<br>• **Enable** – the system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **HIHI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High High alarm. |
| **HI_ENB** | Sets if the system monitors the point for the specified the High alarm limit (HI_LIM). Possible options are:<br>• **Enable** – the system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **HI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High alarm. |
| **LO_ENB** | Sets if the system monitors the point for the specified the Low alarm limit (LO_LIM). Possible options are:<br>• **Enable** – the system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **LO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low alarm. |
| **LOLO_ENB** | Sets if the system monitors the point for the specified the Low Low alarm limit (LOLO_LIM). Possible options are:<br>• **Enable** – the system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **LOLO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low Low alarm. |
| **PF_ENB** | Sets if an alarm is raised on a point failure. Possible options are:<br>• **Enable** – An alarm is raised if the selected channel reports a point failure.<br>• **Disable** – No alarm is raised if the selected channel reports a point failure. |

| Column Heading | Description |
|---|---|
| **DEADBAND** | Sets the value (in engineering units) that is an inactive zone above the low alarm and below the high alarm. |
| **ROC_MODE** | Use this section to configure alarming based on the speed of variability in the value of the alarm input. Possible options are:<br>• **Disabled** – The system does not monitor the input for rate of change alarming.<br>• **Alarm on Positive Changes** – An alarm is raised if the value increases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Negative Changes** – An alarm is raised if the value decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Both** – An alarm is raised if the value increases or decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM). |
| **ROC_LIM** | Sets a limit value (in engineering units) to which the input must rise or fall during the configured time period to generate an alarm. |
| **ROC_TM** | Sets the time duration (in seconds) that the system uses to determine the Rate of Change for an input. |

## RTD Input CSV File Format

The RTD input CSV file contains information for all I/O modules in the configuration, including the module type, installation location, and IO type configuration for each channel.

**Note**

- The **Channel** column **must** be present in the RTD Input CSV file. All other columns are optional.
- The RTD Input CSV file **must** include **_RTD_** in the file name in order to be successfully imported.

| Column Heading | Description |
|---|---|
| **Channel** | Rack position of the module and channel number. |

| Column Heading | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **DESC** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **CVD_CURVE** | Enter the Callendar-Van Dusen equation to use for the RTD. The Callendar-Van Dusen equation describes the relationship between resistance (R) and temperature (T) of a resistance temperature detector (RTD). The form of the equation is as follows:<br>$R(T) = R(0)[1 + A * T + B * T^2 + (T - 100)C * T^3]$<br>You can pick from two pre-defined sets of coefficients for the equation based on a specific material temperature coefficient of resistance (Alpha) or you can select a user set of coefficients. The Alpha value will be specified by the RTD manufacturer.<br>Possible options are:<br>• **User**<br>• **Alpha 0.00385 DIN/IEC**<br>• **Alpha 0.00392**<br>**Note**<br>If you select User, then you must enter values in the RTD_ACOEFF, RTD_BCOEFF, RTD_CCOEFF, and RTD_R0COEFF fields. |
| **DAMPING** | Sets a time (in seconds) used to dampen the reading of the signal from the sensor. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the previous read value. A value of 0.0 disables damping. |
| **FAULT** | Sets the value to use when a fault occurs on the selected channel and the Fault Mode (FAULT_MODE) is set to Fault. |

| Column Heading | Description |
|---|---|
| **FAULT_MODE** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. Possible options are:<br>• **Live/Download** – The system copies the Live Value to the Selected Value parameter.<br>• **Fault** – The system copies the Fault Value to the Selected Value parameter.<br>• **Last Good** – The system copies the Last Good Value to the Selected Value parameter. |
| **MONITOR_MIN** | RESERVED |
| **MONITOR_MAX** | RESERVED |
| **OVRD** | Sets the value to use for the selected channel when the **Operation Mode** (USER_MODE)is set to **Override**. |
| **RTD_TYPE** | Specifies the wiring and signal type of the RTD used by the FB Series product. Possible options are 2-wire, 3-wire, 4-wire, or Disabled.<br>**Note**<br>The 2-wire and Disabled options are available for the 8-Channel Mixed I/O module with 2 RTD (MIO8T) **only**. |
| **UNITS** | Sets the engineering units used for the selected channel. Possible options are:<br>• **F** – Fahrenheit<br>• **C** – Celsius |
| **USER_MODE** | Sets the source of the selected value. Possible options are:<br>• **Live** – The system uses the current value of the input.<br>• **Override** – The system uses the value set in the **Override** (OVRD) field. |
| **USR_ACOEFF** | Enter the A coefficient used in the Callendar-Van Dusen equation. |
| **USR_BCOEFF** | Enter the B coefficient used in the Callendar-Van Dusen equation. |
| **USR_CCOEFF** | Enter the C coefficient used in the Callendar-Van Dusen equation. |
| **USR_R0COEFF** | Enter the R0 coefficient used in the Callendar-Van Dusen equation. |
| **Alarm Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |

| Column Heading | Description |
|---|---|
| **ALM_DESC** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **HIHI_ENB** | Sets if the system monitors the point for the specified the High High alarm limit (HIHI_LIM). Possible options are:<br>• **Enable** – the system monitors the point for the specified alarm limit.<br>• **Disable** – the system ignores the specified alarm limit. |
| **HIHI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High High alarm. |
| **HI_ENB** | Sets if the system monitors the point for the specified the High alarm limit (HI_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **HI_LIM** | Sets a limit value (in engineering units) to which the input must rise to generate a High alarm. |
| **LO_ENB** | Sets if the system monitors the point for the specified the Low alarm limit (LO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **LO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low alarm. |
| **LOLO_ENB** | Sets if the system monitors the point for the specified the Low Low alarm limit (LOLO_LIM). Possible options are:<br>• **Enable** – The system monitors the point for the specified alarm limit.<br>• **Disable** – The system ignores the specified alarm limit. |
| **LOLO_LIM** | Sets a limit value (in engineering units) to which the input must fall to generate a Low Low alarm. |

| Column Heading | Description |
|---|---|
| **PF_ENB** | Sets if an alarm is raised on a point failure. Possible options are:<br>• **Enable** – An alarm is raised if the selected channel reports a point failure.<br>• **Disable** – No alarm is raised if the selected channel reports a point failure. |
| **DEADBAND** | Sets the value (in engineering units) that is an inactive zone above the low alarm and below the high alarm. |
| **ROC_MODE** | Use this section to configure alarming based on the speed of variability in the value of the alarm input. Possible options are:<br>• **Disabled** – The system does not monitor the input for rate of change alarming.<br>• **Alarm on Positive Changes** – An alarm is raised if the value increases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Negative Changes** – An alarm is raised if the value decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM).<br>• **Alarm on Both** – An alarm is raised if the value increases or decreases more than the limit set (ROC_LIM) over the specified period of time (ROC_TM). |
| **ROC_LIM** | Sets a limit value (in engineering units) to which the input must rise or fall during the configured time period to generate an alarm. |
| **ROC_TM** | Sets the time duration (in seconds) that the system uses to determine the Rate of Change for an input. |

3. Save your changes. You can now import your I/O configuration CSV files for use in your FB Series product. For more information, refer to Importing I/O Configuration CSV Files.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.5.2 MVS Setup

Use this display to enable communications with Rosemount™ 4088B MultiVariable™ Transmitter. You can connect a Rosemount™ 4088B MultiVariable™ Transmitter to either COM3 or COM4 on the CPU module or any serial port on 4-port communications module.

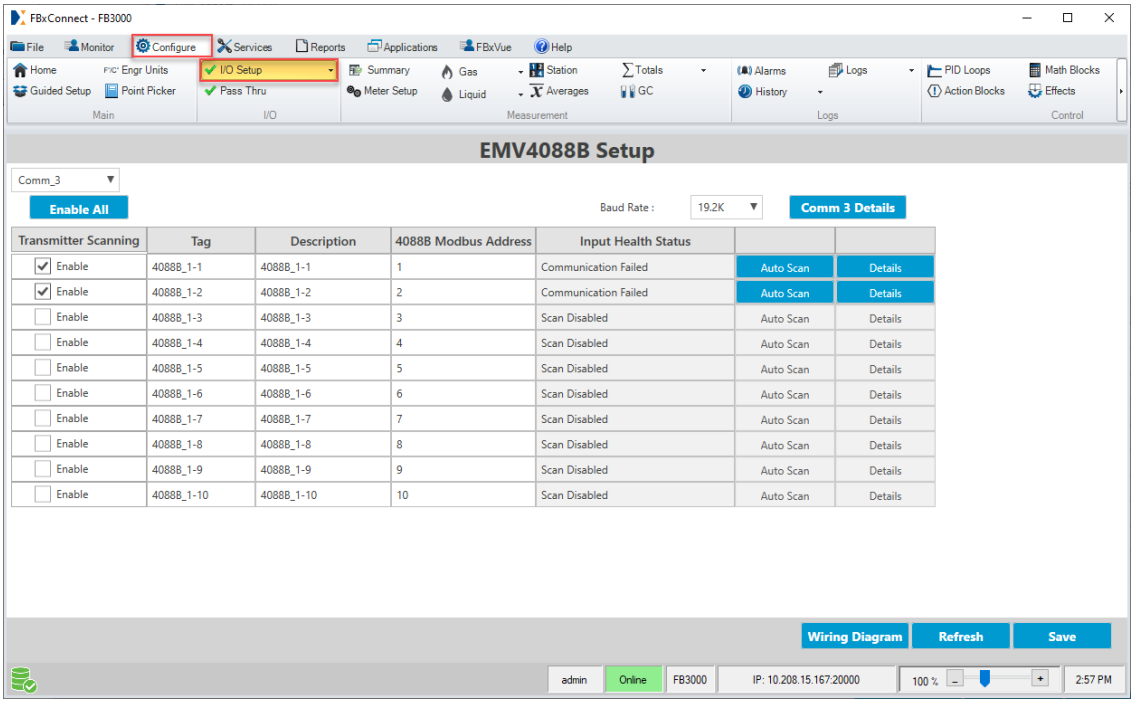
**Note**

- To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 on the CPU module or any serial port on 4-Port Communications module to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.
- If you enabled MVS4088B communications on multiple communications ports, select the different communications ports using the communications port drop-down list at the top-left of the display.
- When communicating with more than six transmitters at 9600 baud, update times exceed once per second.

To access this display:

1. Select **Configure > I/O Setup > MVS Setup** from the DeltaV FBxConnect configuration software main menu. The MVS Setup display opens.

**Figure 113. MVS Setup**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Communications Port Instance** | Click ▼ to select a communications port on which to enable multivariable transmitters.<br>**Note**<br>Only communications ports with the Port Owner field configured as MVS4088B are shown. For more information, refer the Communications – General tab. |
| **Enable All** | Select to enable communications for all multivariable transmitters. |
| **Baud Rate** | Sets the baud rate for multivariable transmitter communications using the selected port. |
| **Comm Details** | Select this button to open the Communications configuration display for the communications port configured in the Comm Port to GC field. |
| **Transmitter Scanning** | Place a check mark to enable the system to scan the selected multivariable transmitter for data. |
| **Tag** | Sets a name (up to 8-alphanumeric characters) for the selected multivariable transmitter. |

| Field | Description |
|---|---|
| **Description** | Sets a description (up to 16-alphanumeric characters) for the selected multivariable transmitter. |
| **4088B Modbus Address** | Sets the unique Modbus address for the selected multivariable transmitter. The default address is **1**. If the multivariable transmitter is used in the multi-drop mode, each multivariable transmitter must have a unique address. Use Address **240** to poll the sensor to determine the address of the connected sensor. This is similar to polling a device using Address and Group 240. When Address 240 is used, the sensor responds with its address by updating the Address field.<br>**Note**<br>This field shows only if the Port Owner field for the selected communications port is configured as MVS4088B. For more information, refer the Communications – General tab. |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected multivariable transmitter. |
| **Auto Scan** | Select to have the system automatically scan the baud rates for the multivariable transmitter with the indicated Modbus address.<br>**Note**<br>• The baud rate of the transmitter is changed to the baud rate configured in the **Baud Rate** field.<br>• You **must** select the **Enable** checkbox in the **Transmitter Scanning** field to activate this button. |
| **Details** | Select this button to open the configuration display for the selected transmitter.<br>**Note**<br>You **must** select the **Enable** checkbox in the **Transmitter Scanning** field to activate this button. |
| **Wiring Diagram** | Click to open a 4088B wiring diagram for the selected communications port. |

3. Select **Save** to save any changes you make to this display.

## 4.5.3 MVS Configuration

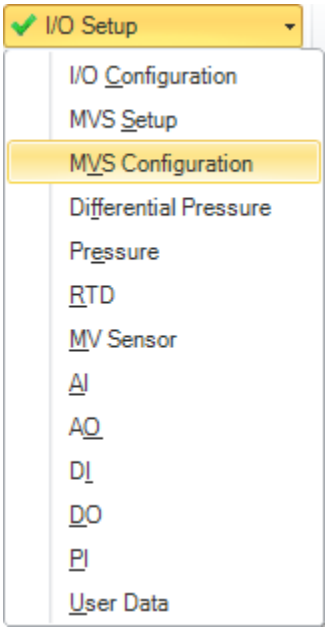
Use this display to view and configure various parameters of a Rosemount™ 4088B MultiVariable™ Transmitter.

**Note**

To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.

To access this display, select **Configure > I/O Setup > MVS Configuration** from the DeltaV FBxConnect configuration software main menu. The MVS Configuration display opens.

**Figure 114. I/O Setup – MVS Configuration**




The MVS Configuration display has the following tabs:

General – Use this tab to view and configure communication settings, and issue commands related to the Rosemount™ 4088B MultiVariable™ Transmitter.

User Defines – Use this tab to setup the user defined points in the Rosemount™ 4088B MultiVariable™ Transmitter, and what is displayed on the transmitter's LCD.

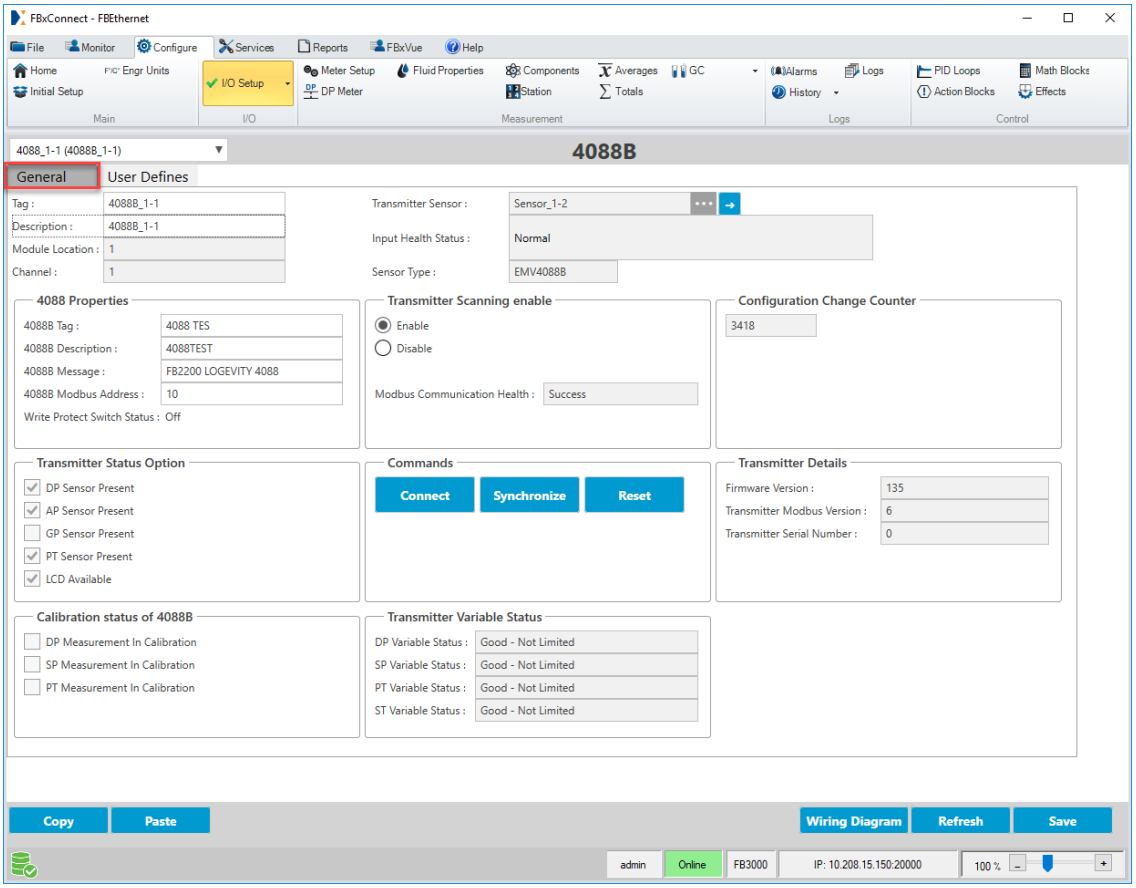
### 4.5.3.1 MVS Configuration – General Tab

Use this tab to view and configure communication settings, and issue commands related to the Rosemount™ 4088B MultiVariable™ Transmitter.

To access this tab:

1. Select **Configure > I/O Setup > MVS Configuration**. The MVS Configuration display opens showing the **General** tab.

**Figure 115. MVS Configuration – General Tab**




2. Click ▼ in the drop-down list at the top of the display to select a 4088B instance to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected 4088B instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected 4088B instance. |
| **Module Location** | This **read-only** field shows the location of the module in the FB Series product. |
| **Channel** | This **read-only** field shows the channel in the FB Series product used by the module. |
| **Transmitter Sensor** | This **read-only** field shows the sensor object associated with the selected 4088B instance. Click → to open the MV Sensor display and view sensor properties. |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected Rosemount™ 4088B MultiVariable™ Transmitter. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Communication Failed<br>• Config. Issue Due To Write Protect<br>• DP Failed<br>• Pressure Failed<br>• RTD Failed<br>• Synchronization In Progress<br>• Scan Disabled<br>• Writing Failed<br>• Reserved<br>• 4088 in Mode A<br>**Note**<br>4088A models and 4088 model in Mode A are **not** supported.<br>• Reading Device<br>• Writing Device<br>• Baud Too Low |

| Field | Description |
|---|---|
| | • Writing Baud Failed<br>• Sensor Disconnected<br>• Scanning Baud Rate 1200<br>• Scanning Baud Rate 2400<br>• Scanning Baud Rate 4800<br>• Scanning Baud Rate 9600<br>• Scanning Baud Rate 19200 |
| **Sensor Type** | This **read-only** field shows the type of multivariable transmitter connected to the FB Series product. |
| **4088B Tag** | Sets a name (up to 8-alphanumeric characters) for the selected Rosemount™ 4088B MultiVariable™ Transmitter. |
| **4088B Description** | Sets a description (up to 16-alphanumeric characters) for the selected Rosemount™ 4088B MultiVariable™ Transmitter. |
| **4088B Message** | Sets a message (up to 32-alphanumeric characters) for the selected Rosemount™ 4088B MultiVariable™ Transmitter. |
| **4088B Modbus Address** | Sets the unique Modbus address for the selected Rosemount™ 4088B MultiVariable™ Transmitter. The default address is **1**. If the Rosemount™ 4088B MultiVariable™ Transmitter is used in the multi-drop mode, each Rosemount™ 4088B MultiVariable™ Transmittermust have a unique address. Use address **240** to poll the sensor to determine the address of the connected sensor. When address 240 is used, the sensor responds with its address by updating the Address field.<br>**Note**<br>Only one Rosemount™ 4088B MultiVariable™ Transmittershould be connected to the FB Series product when polling address 240. |
| **Write Protect Switch Status** | This **read-only** field show the status of the write protect switch on the Rosemount™ 4088B MultiVariable™ Transmitter. |
| **Transmitter Scanning enable** | Sets if the system scans the Rosemount™ 4088B MultiVariable™ Transmitter for data.<br>**Disable** — The system does not scan the Rosemount™ 4088B MultiVariable™ Transmitter for data. |

| Field | Description | |
|---|---|---|
| | **Enable** | The system does scan the Rosemount™ 4088B MultiVariable™ Transmitter for data. |
| **Communication Health** | This **read-only** field shows the status of Modbus communications between the FB Series product and the Rosemount™ 4088B MultiVariable™ Transmitter. | |
| **Configuration Change Counter** | This **read-only** field shows the number of configuration changes that have been made to the Rosemount™ 4088B MultiVariable™ Transmitter. The FB Series product automatically reads the configuration of the Rosemount™ 4088B MultiVariable™ Transmitter if it detects a change in this value. | |
| **Transmitter Status Option** | This **read-only** field shows information about the capabilities of the Rosemount™ 4088B MultiVariable™ Transmitter. | |
| | **DP Sensor Present** | The box next to this field is checked if a differential pressure sensor is installed in the Rosemount™ 4088B MultiVariable™ Transmitter. |
| | **AP Sensor Present** | The box next to this field is checked if an absolute pressure sensor is installed in the Rosemount™ 4088B MultiVariable™ Transmitter. |
| | **GP Sensor Present** | The box next to this field is checked if a gauge pressure sensor is installed in the Rosemount™ 4088B MultiVariable™ Transmitter. |
| | **PT Sensor Present** | The box next to this field is checked if a process temperature RTD interface is installed in the Rosemount™ 4088B MultiVariable™ Transmitter. |
| | **LCD Available** | The box next to this field is checked if an LCD is installed in the Rosemount™ 4088B MultiVariable™ Transmitter. |

| Field | Description |
|---|---|
| **Connect** | Click to establish communications with the selected Rosemount™ 4088B MultiVariable™ Transmitter. The FB Series device automatically changes the baud rate of the communications port to attempt to locate a Rosemount™ 4088B MultiVariable™ Transmitter. Once communications are established, the system updates the transmitter's baud rate to match the baud rate selected in DeltaV FBxConnect configuration software.<br>**Note**<br>Only one Rosemount™ 4088B MultiVariable™ Transmitter should be connected to the FB Series product when using this command. |
| **Synchronize** | Click to synchronize parameters between the FB Series product and the Rosemount™ 4088B MultiVariable™ Transmitter. This command automatically executes when you enable communications. |
| **Reset** | Click to power cycle to Rosemount™ 4088B MultiVariable™ Transmitter. |
| **Firmware Version** | This **read-only** field shows the revision level of the firmware in the selected Rosemount™ 4088B MultiVariable™ Transmitter. |
| **Transmitter Modbus Version** | This **read-only** field shows the revision level of the Modbus protocol used in the selected Rosemount™ 4088B MultiVariable™ Transmitter. |
| **Transmitter Serial Number** | This **read-only** field shows the serial number of the Rosemount™ 4088B MultiVariable™ Transmitter. |
| **Calibration Status of 4088** | Shows, if checked, a calibration is currently being performed on the selected I/O point. |
| **Transmitter Variable Status** | Shows the status of each process variable. |

4. Select **Save** to save any changes you make to this tab.

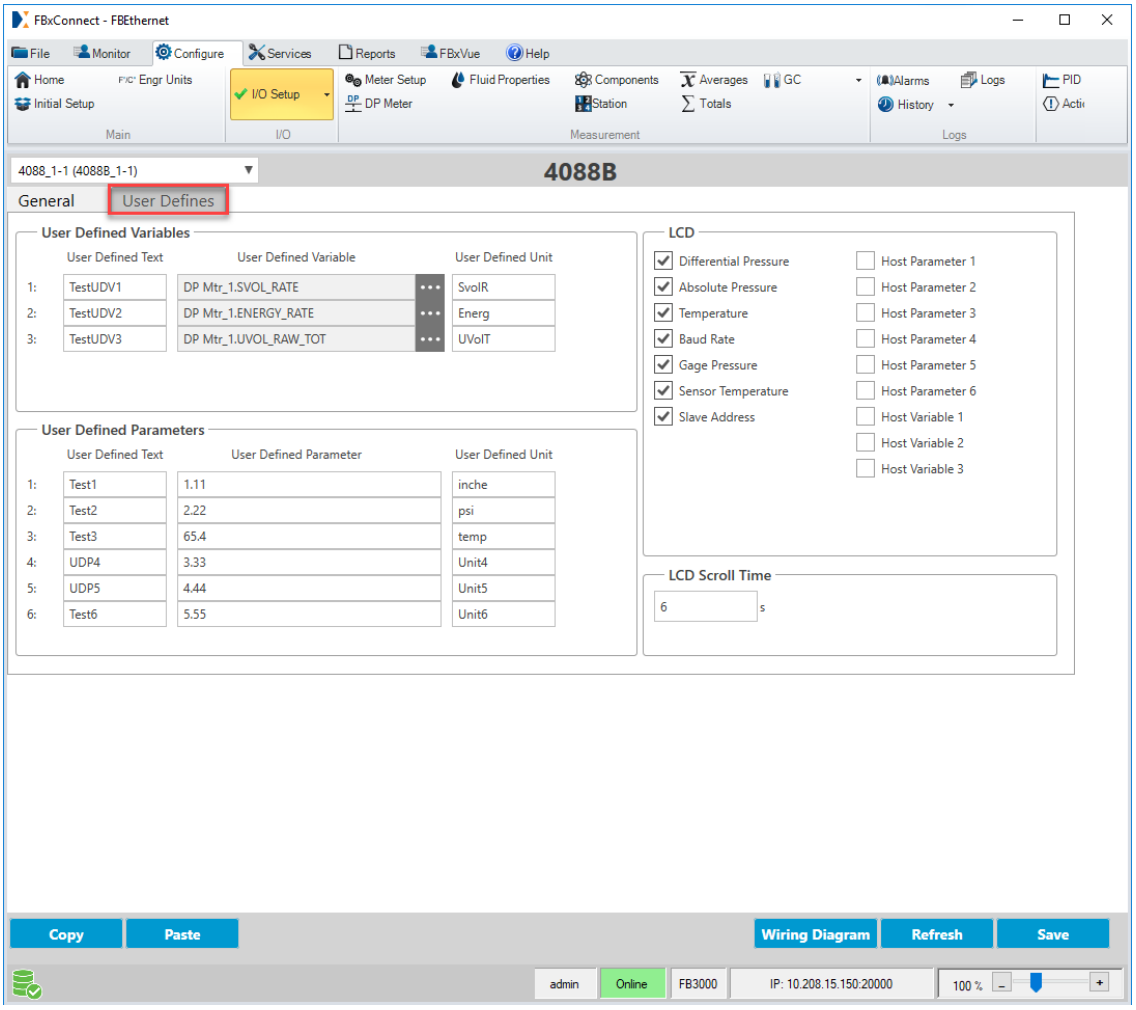
### 4.5.3.2 MVS Configuration – User Defines Tab

Use this display to setup the user defined points in the 4088B multivariable transmitter, and what is displayed on the Rosemount™ 4088B MultiVariable™ Transmitter's LCD.

To access this tab:

1. Select **Configure > I/O Setup > MVS Configuration**. The MVS Configuration display opens.
2. Select the **User Defines** tab.

**Figure 116. MVS Configuration – User Defines Tab**




3. Click ▼ in the drop-down list at the top of the display to select a 4088B instance to configure.
4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **User Defined Variables** | Use these fields to configure the three host variable screens supported by the Rosemount™ 4088B MultiVariable™ Transmitter's LCD.<br>User Defined Variables are sent to the Rosemount™ 4088B MultiVariable™ Transmitter periodically, making it possible to display parameters in the FB Series product that change frequently on the Rosemount™ 4088B MultiVariable™ Transmitter's LCD. For example, you can configure User Defined Variables to display the flow rate calculated by one of the meter runs in the FB Series product. | |
| | **User Defined Text** | Sets the text (up to 10-alphanumeric characters) displayed on the top line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD screen. |
| | **User Defined Variable** | Click ••• to set a parameter in the FB Series product whose value is written to the Rosemount™ 4088B MultiVariable™ Transmitter. This value is displayed on the middle line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD. |
| | **User Defined Unit** | Sets the text (up to 5-alphanumeric characters) that is displayed on the bottom line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD screen. |
| **User Defined Parameters** | Use these fields to configure the six host parameter screens supported by the Rosemount™ 4088B MultiVariable™ Transmitter's LCD.<br>User Defined Parameters are only sent to the Rosemount™ 4088B MultiVariable™ Transmitter when they are changed, and are meant to display values that **do not** change frequently. For example, you can configure User Defined Parameters to display the orifice plate diameter for a meter run. | |
| | **User Defined Text** | Sets the text (up to 10-alphanumeric characters) that is displayed on the top line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD screen. |
| | **User Defined Parameter** | Sets the floating-point value that is displayed on the middle line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD screen. |

| Field | Description | |
|---|---|---|
| | **User Defined Unit** | Sets the text (up to 5-alphanumeric characters) that is displayed on the bottom line of the Rosemount™ 4088B MultiVariable™ Transmitter's LCD screen. |
| **LCD** | The checkboxes inside this frame provide control over which of the available Rosemount™ 4088B MultiVariable™ Transmitter LCD screens will be displayed. | |
| **LCD Scroll Time** | Sets the amount of time the Rosemount™ 4088B MultiVariable™ Transmitter LCD remains on a screen before switching to the next. | |

5. Select **Save** to save any changes you make to this display.

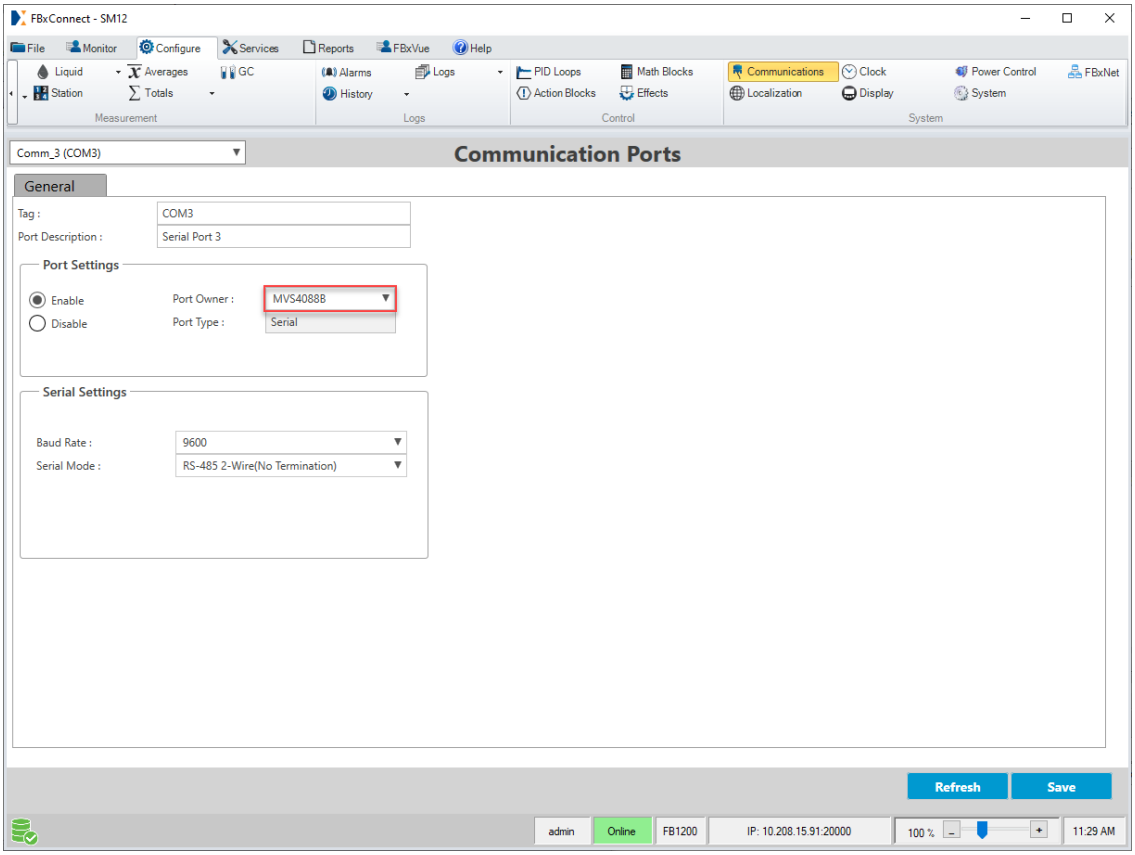
#### 4.5.3.3 Configuring Communications with a Rosemount™ 4088B MultiVariable™ Transmitter

Use these steps to configure a Rosemount™ 4088B MultiVariable™ Transmitter to communicate with your FB Series product.

To configure communications with a Rosemount™ 4088B MultiVariable™ Transmitter:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu. The Communications display opens showing the **General** tab.
2. Click ▼ in the drop-down list at the top of the display and select **COM3** or **COM3** or **COM4**.
3. Click ▼ in the **Port Owner** field and select **MVS4088B**.

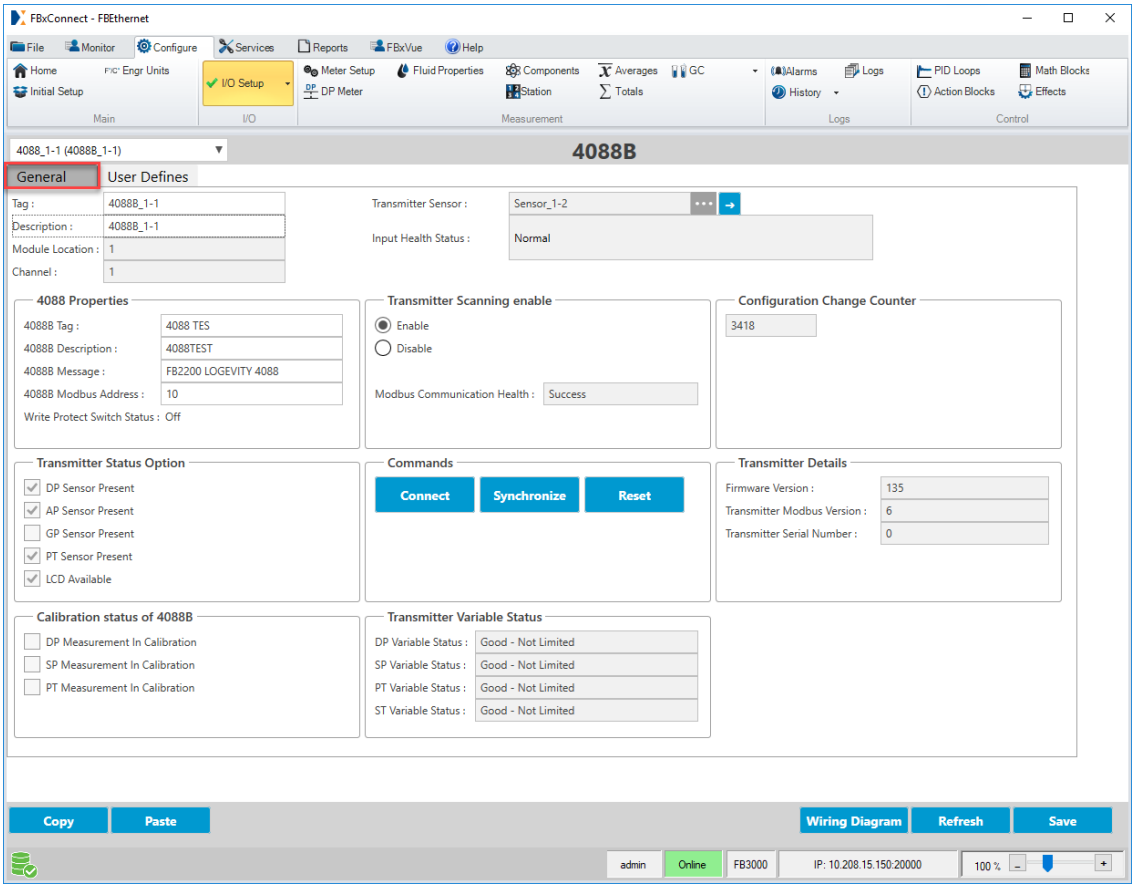
**Figure 117. Communications – General**




4. Select **Save** to save your changes.

5. Select **Configure > I/O Setup > MVS Configuration**. The **MVS Configuration** display opens showing the **General** tab.

**Figure 118. MVS Configuration – General Tab**




6. Click ▼ in the drop-down list at the top of the display to select a 4088B instance to configure.
7. In the **Tag** field, enter a name for the Rosemount™ 4088B MultiVariable™ Transmitter.
8. In the **Description** field, enter a description for the Rosemount™ 4088B MultiVariable™ Transmitter.
9. In the **4088B Modbus Address** field, enter the Modbus Address of the Rosemount™ 4088B MultiVariable™ Transmitter.
10. In the **Transmitter Scanning** field, select **Enable** to set the system to scan the Rosemount™ 4088B MultiVariable™ Transmitter for data.
11. Select **Save** to save your changes to device memory, and to retrieve data from the Rosemount™ 4088B MultiVariable™ Transmitter.

**Note**

The remaining fields are automatically populated with data retrieved from the Rosemount™ 4088B MultiVariable™ Transmitter after a successful scan. To avoid having your changes overwritten, ensure that Transmitter Scanning is successful before you configure additional fields.

12. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to MVS Configuration.
13. Select **Save** to save your changes to device memory, and to write the changes to the Rosemount™ 4088B MultiVariable™ Transmitter.
14. You can now select a 4088B instance on the Differential Pressure, Static Pressure, and RTD displays.

### 4.5.4 HART® I/O

The HART® (Highway Addressable Remote Transducer) I/O module allows an DeltaV FB3000 RTU to process input from field-based HART devices. The module has four channels that are independently selectable as either an input or output channel. You use each channel's analog input capabilities for diagnostic and primary process variable measurement. You can configure an input channel for use in point-to-point or multi-drop mode. You can configure an output channel for use in point-to-point mode only.

HART superimposes Frequency Shift Keying (FSK) signals on an analog signal. This technique allows digital information to pass to and from the HART device on a 4 to 20 mA analog signal.

In point-to-point mode, the analog signal is representative of the measured variable. This mode allows communications with one HART device per channel with up to one second updates. The scan time for one channel does not affect the scan time of any other channel. Point-to-point mode with one second updates meets API 21 requirements.

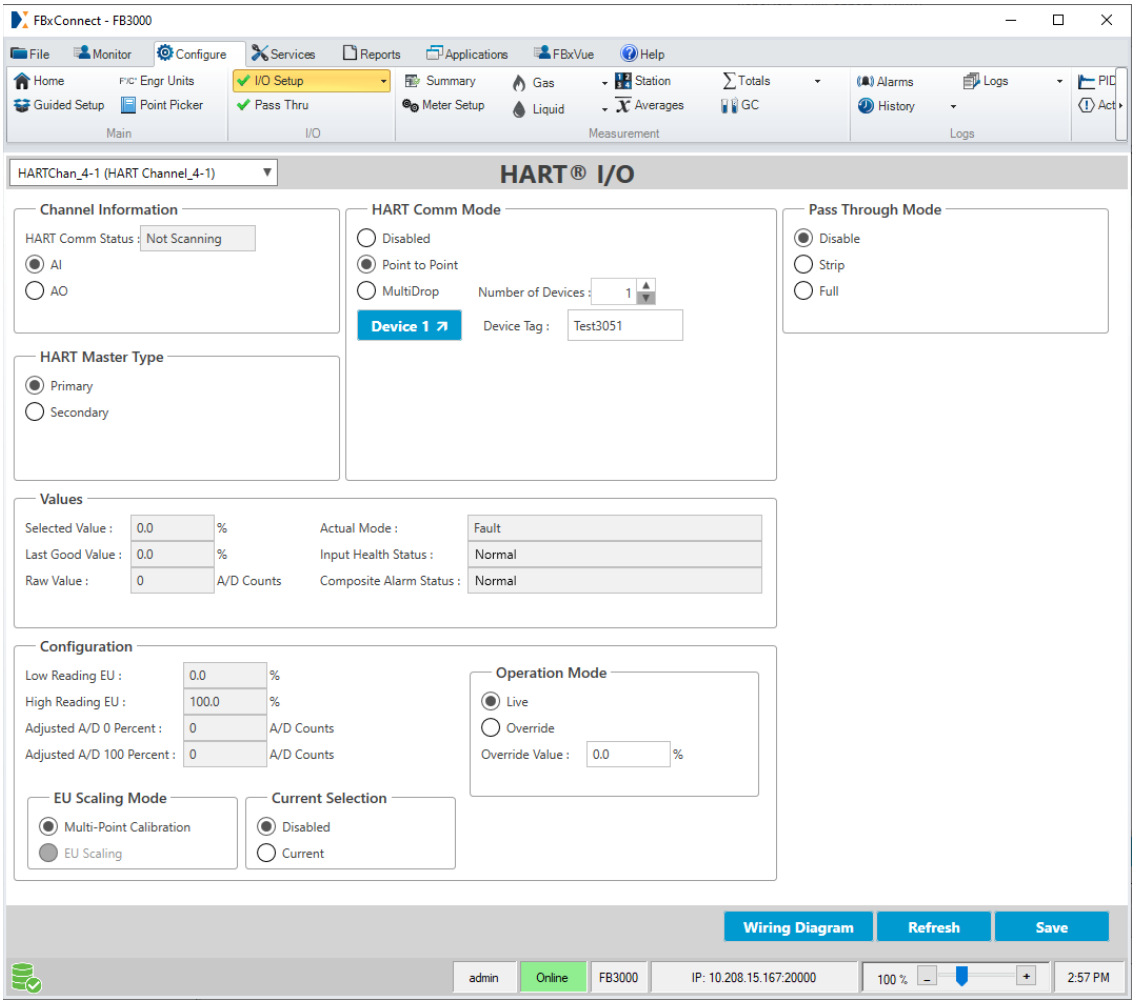
In multi-drop mode, as many as five HART devices can be connected (in parallel) to each channel. Like the point-to-point mode, digital communications are superimposed on the analog signal that is used for powering the HART devices. Each HART device in multi-drop mode requires 4mA, and the analog signal does not represent any measured variable value. With all four channels in the multi-drop mode, the DeltaV FB3000 can support a maximum of twenty HART devices.

You can configure the DeltaV FB3000 as a primary master with a Class 1 Conformance classification or as a secondary master for use in redundant applications.

To access this display:

1. Select **Configure > I/O Setup > HART I/O** from the DeltaV FBxConnect configuration software main menu. The HART display opens.

**Figure 119. HART I/O**




2. Click ▼ in the drop-down list at the top of the display to select a HART channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description | | |
|---|---|---|---|
| **Channel Information** | Sets the configuration of the selected channel. Possible options are: | | |
| | **HART Comm Status** | This **read-only** field shows the current operational state of the selected channel. Possible states are: | |
| | | **Scanning** | Indicates the channel is currently scanning the HART device(s). |
| | | **Not Scanning** | Indicates the channel is **not** currently scanning the HART device(s) because the FB Series product is currently offline or not communicating. |
| | | **Dual Master** | Indicates that the channel has another master connected. Examples of other masters include a Hand-Held Communicator.<br>When in Dual Master, the DeltaV FB3000 is not scanning the HART device, which allows communications between the other master and the devices. When the other master finishes communicating with the HART device, normal HART module scanning will automatically resume. |

| Field | Description | | |
|---|---|---|---|
| | | **Burst Mode** | Indicates that the channel has a device that is configured to be in burst mode.<br>**Note**<br>Burst mode is **not** supported by the HART module. The device should not be configured in Burst mode when connected to DeltaV FB3000. If a device is in Burst mode, use a Hand-Held Communicator to turn off Burst mode. |
| | **AI** | The channel is an analog input.<br>**Note**<br>If you want to use the selected HART channel as an analog input, you should also configure the input using the Analog Input configuration display and selecting<br>the instance (chassis, slot, and channel number) of the input. | |
| | **AO** | The channel is an analog output.<br>**Note**<br>If you want to use the selected HART channel as an analog output, you should also configure the output using the Analog Output configuration display and selecting the instance (chassis, slot, and channel number) of the output. | |
| **HART Master Type** | Sets sequencing to ensure that two masters can communicate with one slave device. | | |
| | **Primary** | The DeltaV FB3000 has priority in communications. | |
| | **Secondary** | The DeltaV FB3000 must wait until the Primary communications have completed. | |

| Field | Description | |
|---|---|---|
| **HART Comm Mode** | Sets the communication mode for the selected channel. Possible options are: | |
| | **Disabled** | Stop all HART communication. |
| | **Point to Point** | Enables the channel to communication with one HART device per channel. |
| | **MultiDrop** | Enables the channel to communicate with up to five HART devices connected in parallel.<br>**Note**<br>• This option is available **only** if you select **AI** in the **Channel Information** field.<br>• AI calibration cannot be performed in this communication mode. Calibration can **only** be performed in **Point to Point** mode. |
| **Number of Devices** | Sets the number of HART devices connected in parallel.<br>Note<br>This field applies **only** if you select **MultiDrop** in the HART Comm Mode field. | |
| **Device 1-5** | Each button represents one HART device connected to the selected channel. Select a button to open the HART Device display and configure the selected HART device.<br>**Note**<br>• The name of the HART device shows in the **Device Tag** field.<br>• A ⚠ icon next to a **Device Tag** indicates a device that is in an alarm state. | |
| **Pass Through Mode** | Sets how communications pass from a host device through the FB Series product on to the HART devices. Possible options are: | |
| | **Disable** | No pass-through communications occur. |
| | **Strip** | Removes all preamble bytes in HART protocol. |
| | **Full** | Leaves the entire message intact. |
| | **Note**<br>If you select Strip or Full, you also **must** enable HART protocol on the Ethernet port for this feature to work. For more information, refer to Communications – General Tab. | |

| Field | Description | |
|---|---|---|
| **Values** | These fields display values from the selected HART AI or AO channel. | |
| | **Selected Value** | This **read-only** field shows the value (in engineering units) based on the Operation and Fault Mode fields, as well as the health status of the selected input. It is intended to be used as an input to calculations and control logic. |
| | **Last Good Value** | This **read-only** field shows the last good value (in engineering units) received by the selected sensor. This value is written to the Selected Value parameter if a fault occurs and the Fault Mode is set to Last Good. |
| | **Raw Value** | This **read-only** field shows the current digital count directly from the Analog-to-Digital converter. |
| | **Auto Read Value** | This **read-only** field shows the current value of the parameter configured in the Auto Read Parameter Reference field.<br>**Note**<br>This field appears **only** if you select **AO** in the **Channel Information** field. |
| | **Actual Mode** | This **read-only** field shows the source of the selected value. Possible values are:<br>• Live<br>• Auto<br>• Auto Read<br>• Override<br>• Calibration<br>• Fault<br>• Last Good<br>• Last Hour Average<br>• Ramp To Fault Value<br>• Ramp To Last Hour Avg<br>• Polling Disabled |
| | **Input/Output Health Status** | This **read-only** field shows the status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive |

| Field | Description | |
|---|---|---|
| | | • Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above Calibration Limit<br>• Below Calibration Limit<br>• Input Frozen<br>• Input Clipped<br>• Factory Calibration Invalid<br>• User Calibration Invalid<br>• Disabled<br>• Termination Missing<br>• Hardware Fail<br>• HART Device Fail<br>**Note**<br>This field may temporarily show Point Fail if the **Interval to Poll I/O** field on the I/O Bus display is set to 10 ms and the AO value is changed more than 10%. |
| | **Composite Alarm Status** | This **read-only** field shows the current active alarms for the selected channel. The Composite Alarm Status is Normal if there are no active alarms. |

| Field | Description | |
|---|---|---|
| **Configuration** | Use these fields to configure the selected AI or AO channel. | |
| | **Low Reading EU** | Sets the value (in engineering units) that is equal to zero percent output (low end of the EU range).<br>Sets the low reading (in engineering units) that is equal to zero percent input. For example, if a temperature transmitter is connected to the analog input with a range of –40 to 160 degrees F, the Low field would be set to –40.<br>**Note**<br>You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |
| | **High Reading EU** | Sets the value (in engineering units) that is equal to 100 percent output (high end of the EU range).<br>Sets the high reading (in engineering units) that is equal to 100 percent input. For example, if a temperature transmitter is connected to the analog input with a range of – 40 to 160 degrees F, the High field would be set to 160.<br>**Note**<br>You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |
| | **Adjusted A/D 0 percent** | Sets the calibrated Analog-to-Digital count corresponding to zero percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the Low Reading EU value.<br>**Note**<br>• This field appears **only** if you select **AI** in the **Channel Information** field.<br>• You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |

| Field | Description | |
|---|---|---|
| | **Adjusted A/D 100 percent** | Sets the calibrated Analog-to-Digital count corresponding to 100 percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the Low Reading EU value.<br>**Note**<br>• This field appears **only** if you select **AI** in the **Channel Information** field.<br>• You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |
| | **Adjusted D/A 0 percent** | Sets the count that the digital-to-analog converter uses for zero percent output. This value scales the output to engineering units.<br>**Note**<br>• This field appears **only** if you select **AO** in the **Channel Information** field.<br>• You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |
| | **Adjusted D/A 100 percent** | Sets the count that the digital-to-analog converter uses for zero percent output. This value scales the output to engineering units.<br>**Note**<br>• This field appears **only** if you select **AO** in the **Channel Information** field.<br>• You must select **EU Scaling** in the **EU Scaling Mode** frame to modify this field. |
| | **EU Scaling Mode** | Specifies how the EU scaling parameters are determined.<br>**Note**<br>• These fields appear **only** if you select **AI** in the **Channel Information** field.<br>• You must select **Current** in the **Current/Voltage Selection** frame to modify this field. |

| Field | Description | | |
|---|---|---|---|
| | | **Multi-Point Calibration** | EU scaling parameters are determined by the calibration. You cannot modify the EU scaling parameters (Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent) directly. You must use the calibration wizard to adjust the scaling of the AI.<br>**Note**<br>If you download a configuration file that has Multi-Point Calibration selected, the calibration on your device remains unchanged. |
| | | **EU Scaling** | EU scaling parameters are determined by the values you enter in the Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent fields.<br>**Note**<br>If you download a configuration file that has EU Scaling selected, the existing calibration on your device is overwritten using the EU scaling parameters. |
| | **Current/Voltage Selection** | Sets the signal type of the selected I/O point. | |
| | | **Disabled** | No signal is present on the selected channel. |
| | | **Current** | A 4 to 20 mA signal is present on the selected channel. |

| Field | Description | | |
|---|---|---|---|
| | **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: | |
| | | **Live** | The system copies the Live Value to the Selected Value parameter.<br>**Note**<br>This field appears **only** if you select **AI** in the **Channel Information** field. |
| | | **Auto** | The system copies the value in the Auto Value field to the Selected Value parameter.<br>**Note**<br>This field appears **only** if you select **AO** in the **Channel Information** field. |
| | | **Override** | The system copies the value set in the Override Value field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| | | | **Override Value** Sets the value (in engineering units) written to the Selected Value field when the Operation Mode is set to Override. |

| Field | Description | | |
|---|---|---|---|
| | | **Auto Read** | The system copies the value of the parameter you configure in the Auto Read Parameter Reference field to the Selected Value parameter. This value is updated once per second.<br>**Note**<br>• This field appears **only** if you select **AO** in the **Channel Information** field.<br>• When setting the Operation Mode to Auto Read, make sure that the units and scaling are correct for the referenced parameter. |
| | | **Override Value** | Sets the value (in engineering units) to use when the Operation Mode is set to Override. |
| | | **Auto Value** | Sets the value (in engineering units) to use when the Operation Mode is set to Auto Read.<br>**Note**<br>This field appears **only** if you select **AO** in the **Channel Information** field. |

4. Select **Save** to save any changes you make to this tab.

#### 4.5.4.1 HART Device

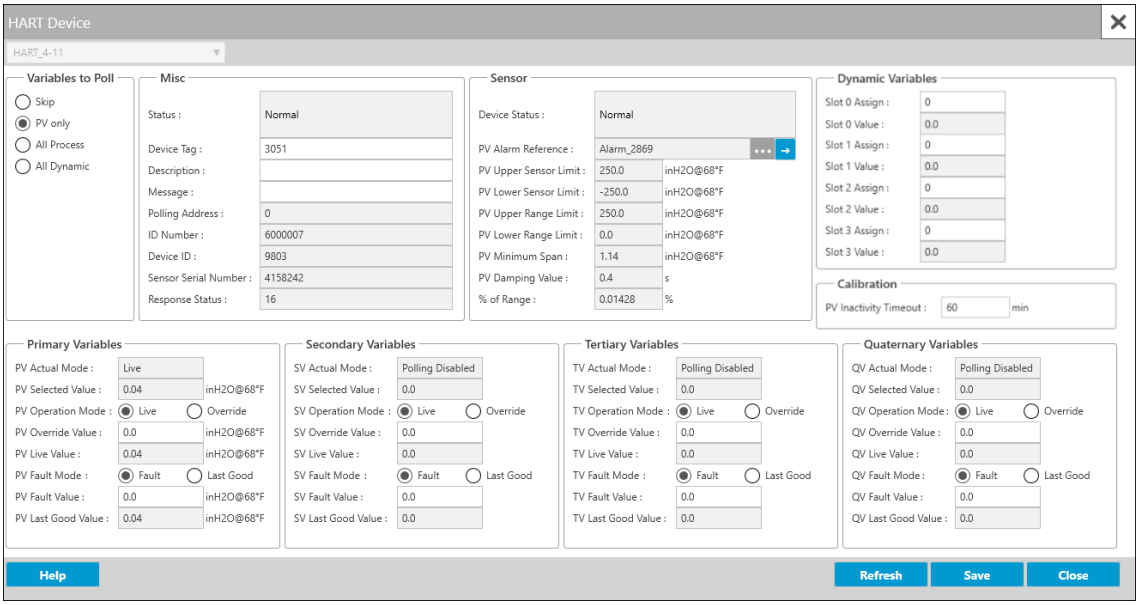
Use this pop-up display to configure parameters specific to the selected HART® device. When in MultiDrop mode, a separate Device button exists for each connected HART device.

To access this tab:

1. Select **Configure > I/O Setup > HART I/O** from the DeltaV FBxConnect configuration software main menu. The HART display opens.

2. Select the **Device** button for the device you want to configure. The HART Device pop-up display opens.

**Figure 120. HART Device**




3. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Variables to Poll** | Sets the polling behavior for this device. Possible options are: | |
| | **Skip** | Removes this device from the polling sequence |
| | **PV Only** | Poll **only** the Primary Variable value. |
| | **All Process** | Poll all process variable values (Primary, Secondary, Tertiary, Quaternary). |
| | **All Dynamic** | Poll values for all Dynamic Variables (Slot 0, Slot 1, Slot 2, and Slot 3). |
| **Misc** | These fields allow you to set and view general information about the selected HART device. | |
| | **Status** | This **read-only** field shows the state of the device. |
| | **Device Tag** | Sets the name for the HART device to identify it throughout the configuration. The tag should be 8 characters or less. When in Multidrop mode, the tag must be unique for every device. |

| Field | Description | |
|---|---|---|
| | **Description** | Provides up to 16 alphanumeric characters of information (in addition to the device Tag) to more specifically describe the device. |
| | **Message** | Defines a message (up to 32 alphanumeric characters in length) sent to and stored in the device. |
| | **Polling Address** | This **read-only** field shows the address used for this HART device. In Point to Point mode, the Poll Address is 0. In Multidrop mode, the system uses addresses between 1 and 5. |
| | **ID Number** | This **read-only** field shows a 3-byte globally unique address of the device. |
| | **Device ID** | This **read-only** field shows the coded ID that reflects the manufacturer of the device, the device type, and the device ID. |
| | **Sensor Serial Number** | This **read-only** field shows the serial number of the sensor. |
| | **Response Status** | This **read-only** field shows the response status of the device. Refer to the documentation from the transmitter manufacturer and HART specification for more information. |
| **Sensor** | These read-only fields show you general information about the sensor range and health of the HART device. | |
| | **Device Status** | This **read-only** field shows the state of the device. |
| | **PV Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the selected HART device. |
| | **PV Upper Sensor Limit** | This **read-only** field shows the upper limit on the sensor. |
| | **PV Lower Sensor Limit** | This **read-only** field shows the lower limit on the sensor. |

| Field | Description | |
|---|---|---|
| | **PV Upper Range Limit** | This **read-only** field shows the maximum value in the sensor range.<br>**Note**<br>The PV Upper Range Limit is typically a user-configurable value and should be a value less than or equal to the Upper Sensor Limit. |
| | **PV Lower Range Limit** | This **read-only** field shows the minimum value in the sensor range.<br>**Note**<br>The PV Lower Range Limit is typically a user-configurable value and should be a value greater than or equal to the Lower Sensor Limit. |
| | **PV Minimum Span** | This **read-only** field shows the minimum sensor span. |
| | **PV Damping Value** | This **read-only** field shows the damping value reported by the device for the Primary Variable. |
| | **% of Range** | This **read-only** field shows the percentage of the range currently being reported by the device. |
| **Dynamic Variables** | Use these fields to configure the dynamic variable values used by the system. | |
| | **Slot 0 Assign** | Sets a valid value according to the manufacturer specification between 0-255 to determine which variable in that slot to request. |
| | **Slot 0 Value** | This **read-only** field shows the value of the variable requested from that slot. The read-only units defined in the device are shown to the right of this field. |
| | **Slot 1 Assign** | Sets a valid value according to the manufacturer specification between 0-255 to determine which variable in that slot to request. |
| | **Slot 1 Value** | This **read-only** field shows the value of the variable requested from that slot. The read-only units defined in the device are shown to the right of this field. |

| Field | Description | |
|---|---|---|
| | **Slot 2 Assign** | Sets a valid value according to the manufacturer specification between 0-255 to determine which variable in that slot to request. |
| | **Slot 2 Value** | This **read-only** field shows the value of the variable requested from that slot. The read-only units defined in the device are shown to the right of this field. |
| | **Slot 3 Assign** | Sets a valid value according to the manufacturer specification between 0-255 to determine which variable in that slot to request. |
| | **Slot 3 Value** | This **read-only** field shows the value of the variable requested from that slot. The read-only units defined in the device are shown to the right of this field. |
| **Calibration** | Use these fields to configure values related to calibration. | |
| | **PV Inactivity Timeout** | Sets, in minutes, the time period the system waits for activity during the Calibration or Plate Change process. If no activity occurs during the specified time period, the Calibration or Plate Change process automatically ends. The default is 60 minutes.<br>**Note**<br>This applies to the primary variable (PV) of a HART device **only**. |
| **Primary Variables** | Use these fields to configure the primary variable values used by the system. | |
| | **PV Actual Mode** | This **read-only** field shows the source for the primary variable value used by the system. Possible values are: |
| | | **Polling Disabled** — The system is **not** currently polling for this variable. |
| | | **Live** — The system uses the live value received from the HART device. |
| | | **Override** — The system uses the value set in the PV Override Value field. |

| Field | Description | | |
|---|---|---|---|
| | | **Fault** | The system uses the value set in the PV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **PV Selected Value** | This **read-only** field shows the current in-use primary variable value. | |
| | **PV Operation Mode** | Sets the operation mode of the primary variable. Possible options are: | |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the PV Override Value field. |
| | **PV Override Value** | Sets the primary variable value to use when the PV Operation Mode is set to Override. | |
| | **PV Live Value** | This read-only field shows the live primary variable value received from the HART device. | |
| | **PV Fault Mode** | Sets the source of the primary variable value when a fault is encountered. Possible options are: | |
| | | **Fault** | The system uses the value set in the PV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **PV Fault Value** | Sets a value to use for the primary variable when a fault occurs and the PV Fault Mode field is set to Fault. | |
| | **PV Last Good Value** | This read-only field shows the last known good value received from the HART device. | |
| **Secondary Variables** | Use these fields to configure the secondary variable value used by the system. | | |
| | **SV Actual Mode** | This read-only field shows the source for the secondary variable value used by the system. Possible values are: | |

| Field | Description | | |
|---|---|---|---|
| | | **Polling Disabled** | The system is not currently polling for this variable. |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the SV Override Value field. |
| | | **Fault** | The system uses the value set in the SV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **SV Selected Value** | This **read-only** field shows the current in-use secondary variable value. | |
| | **SV Operation Mode** | Sets the operation mode of the secondary variable. | |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the SV Override Value field. |
| | **SV Override Value** | Sets the secondary variable value to use when the SV Operation Mode is set to Override. | |
| | **SV Live Value** | This **read-only** field shows the live secondary variable value received from the HART device. | |
| | **SV Fault Mode** | Sets the source of the secondary variable value when a fault is encountered. | |
| | | **Fault** | The system uses the value set in the SV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **SV Fault Value** | Sets a value to use for the secondary variable when a fault occurs and the SV Fault Mode field is set to Fault. | |
| | **SV Last Good Value** | This **read-only** field shows the last known good value received from the HART device. | |

| Field | Description | | |
|---|---|---|---|
| **Tertiary Variables** | Use these fields to configure the tertiary variable value used by the system. | | |
| | **TV Actual Mode** | This read-only field shows the source for the tertiary variable value used by the system. | |
| | | **Polling Disabled** | The system is **not** currently polling for this variable. |
| | | **Live** | The system uses the live value received from HART device. |
| | | **Override** | The system uses the value set in the TV Override Value field. |
| | | **Fault** | The system uses the value set in the TV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **TV Selected Value** | This **read-only** field shows the current in-use tertiary variable value. | |
| | **TV Operation Mode** | Sets the operation mode of the tertiary variable. | |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the TV Override Value field. |
| | **TV Override Value** | Sets the tertiary variable value to use when the TV Operation Mode is set to Override. | |
| | **TV Live Value** | This **read-only** field shows the live tertiary variable value received from the HART device. | |
| | **TV Fault Mode** | Sets the source of the tertiary variable value when a fault is encountered. | |
| | | **Fault** | The system uses the value set in the TV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |

| Field | Description | | |
|---|---|---|---|
| | **TV Fault Value** | Sets a value to use for the tertiary variable when a fault occurs and the TV Fault Mode field is set to Fault. | |
| | **TV Last Good Value** | This **read-only** field shows the last known good value received from the HART device. | |
| **Quaternary Variables** | Use these fields to configure the quaternary variable value used by the system. | | |
| | **QV Actual Mode** | This **read-only** field shows the source for the quaternary variable value used by the system. | |
| | | **Polling Disabled** | The system is **not** currently polling for this variable. |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the QV Override Value field. |
| | | **Fault** | The system uses the value set in the QV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **QV Selected Value** | This **read-only** field shows the current in-use quaternary variable value. | |
| | **QV Operation Mode** | Sets the operation mode of the quaternary variable. | |
| | | **Live** | The system uses the live value received from the HART device. |
| | | **Override** | The system uses the value set in the QV Override Value field. |
| | **QV Override Value** | Sets the quaternary variable value to use when the QV Operation Mode is set to Override. | |
| | **QV Live Value** | This **read-only** field shows the live quaternary variable received from the HART device. | |
| | **QV Fault Mode** | Sets the source of the quaternary value when a fault is encountered. | |

| Field | Description | | |
|---|---|---|---|
| | | **Fault** | The system uses the value set in the QV Fault Value field. |
| | | **Last Good** | The system uses the value shown in the Last Good Value field. |
| | **QV Fault Value** | Sets a value to use for the quaternary variable when a fault occurs and the QV Fault Mode field is set to Fault. | |
| | **QV Last Good Value** | This **read-only** field shows the last known good value received from the HART device. | |

4. Select **Save** to save any changes you make to this tab.

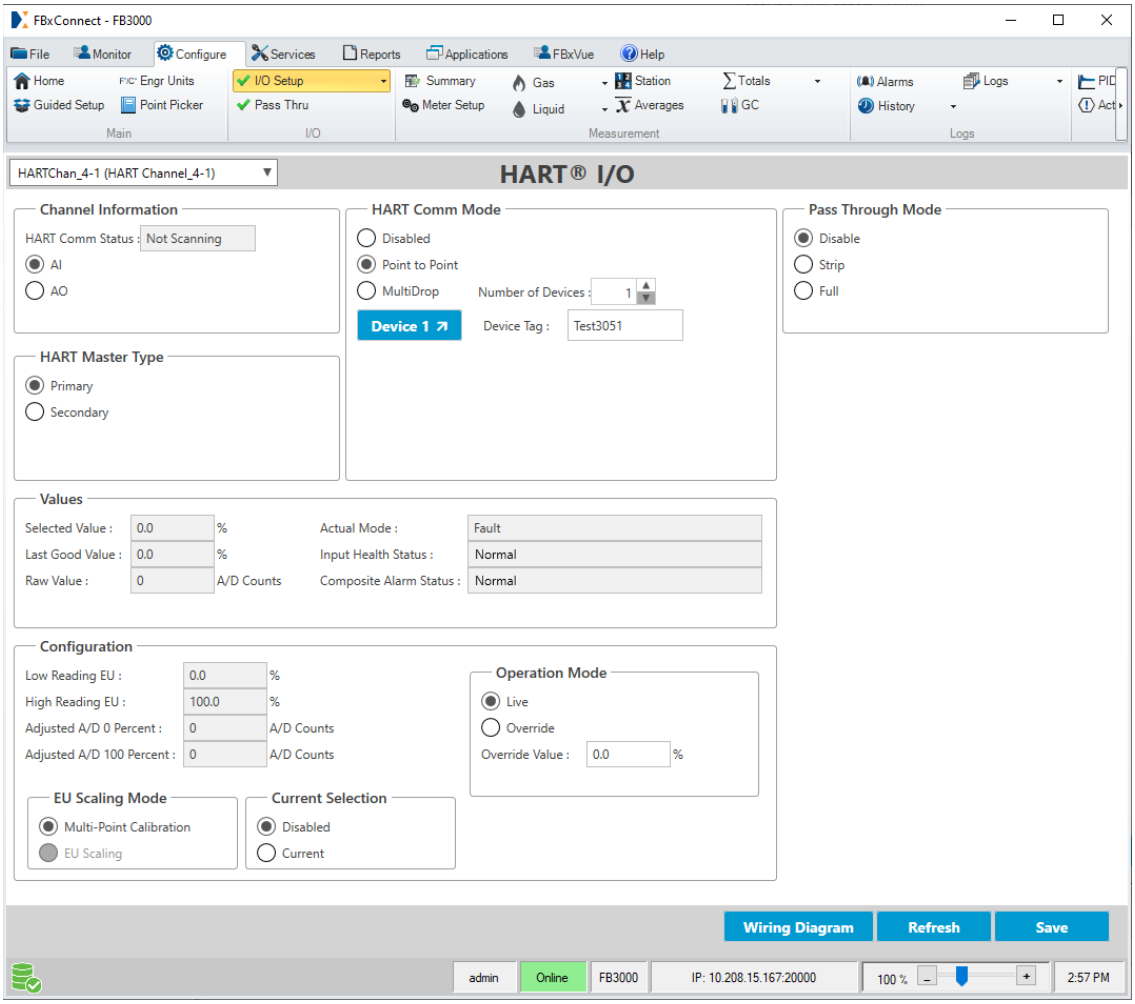
### 4.5.4.2 Configuring HART® I/O

Use these steps to configure HART® I/O on your DeltaV FB3000 RTU.

To configure HART I/O:

1. Select **Configure > I/O Setup > HART I/O** from the DeltaV FBxConnect configuration software main menu. The HART display opens.

**Figure 121. HART**




2. Click ▼ in the drop-down list at the top of the display to select a HART channel to configure; there are four HART channels per module.
3. Specify whether this is a **Primary** or **Secondary** HART Master in the **HART Master Type** field.
4. Choose the **HART Comm Mode:**
   - If you have a single HART device on the channel, select **Point to Point**.
   - If multiple devices are multi-dropped on the channel, select **Multidrop** and specify the **Number of Devices**.
5. Select if HART pass through communications are allowed and if the FB Series devices removes the preamble bytes in HART protocol (Strip) or if the entire message is forwarded (Full) in the **Pass Through Mode** field.

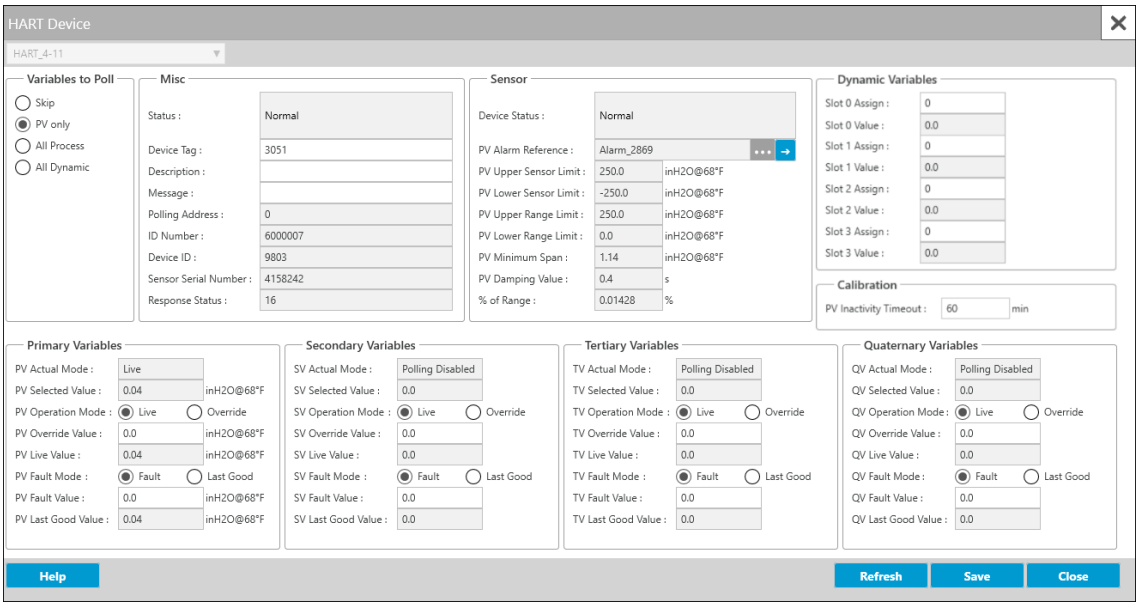
6. Click **Save**. If you chose Multidrop, the HART menu creates a button for each of the devices.

7. Click on the **Device** button to configure the HART device on this channel. The HART Device display opens.

**Note**

For more information, refer to **HART Device**.

**Figure 122. HART Device**




8. Select the variables you want to poll from the device, then click **Save** and **Close** the screen.

9. If this channel uses multi-drop, repeat steps 8 and 9 for any other connected HART devices.

## 4.5.5 Differential Pressure

Use this display to view and configure general parameters associated with the differential pressure input, set the calibration timeout period, and view calibration/verification values.

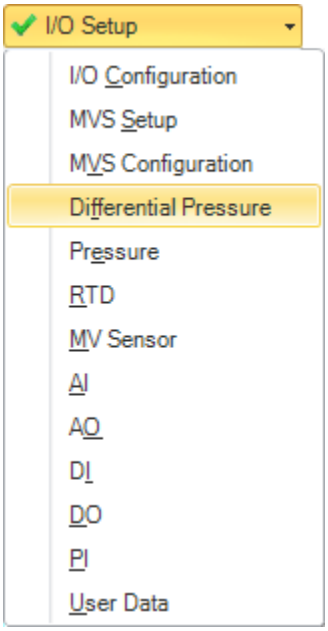
**Note**

To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 on the CPU module or any serial port

on 4-Port Communications module to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.

To access this display, select **Configure > I/O Setup > Differential Pressure** from the DeltaV FBxConnect configuration software main menu.

**Figure 123. I/O Setup – Differential Pressure**




The Differential Pressure contains the following items:

General – Use this display to view and configure general parameters associated with the differential pressure input.

Calibration Values – Use this pop-up display to set the calibration timeout period and view previous calibration/verification values.

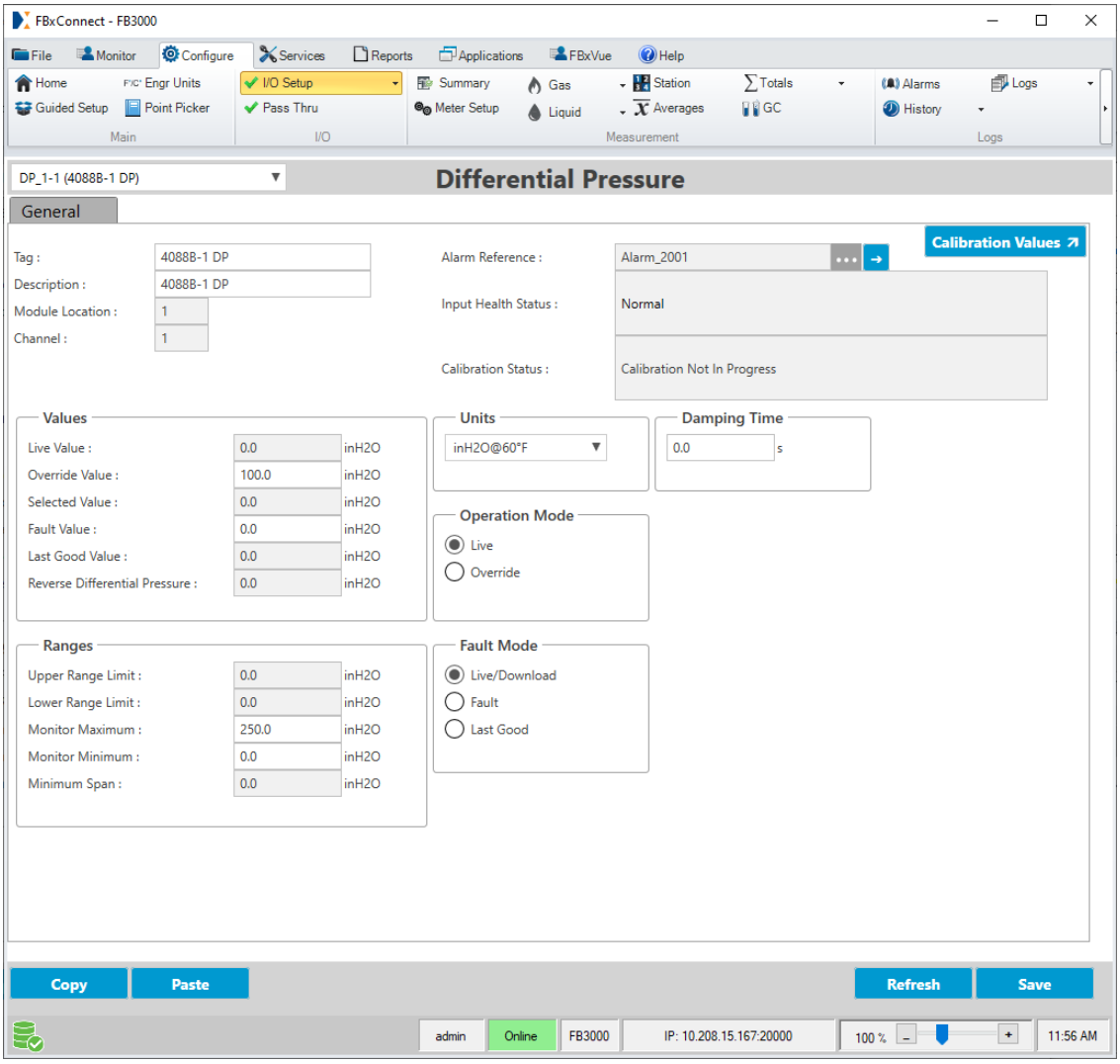
### 4.5.5.1 Differential Pressure – General

Use this display to view and configure general parameters associated with the differential pressure input.

To access this display:

1. Select **Configure > I/O Setup > Differential Pressure** from the DeltaV FBxConnect configuration software main menu. The Differential Pressure display opens.

**Figure 124. Differential Pressure – General**




2. Click ▼ in the sensor drop-down list and select the sensor you want to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected sensor. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected sensor. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |

| Field | Description |
|---|---|
| **Channel** | This **read-only** field shows the unique channel number for this differential pressure instance. |
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the point.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters. |
| **Input Health Status** | This **read-only** field shows the status of the input. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Input Frozen |
| **Calibration Status** | This **read-only** field shows the current calibration status of the selected channel. |
| **Calibration Values** | Select this button to open a pop-up display where you can set the calibration timeout period and view previous calibration/verification values. |
| **Live Value** | This **read-only** field shows the current value (in engineering units) of the selected sensor. |
| **Override Value** | Sets the value (in engineering units) written to the Selected Value field when the **Operation Mode** is set to **Override**. |
| **Selected Value** | This **read-only** field shows the value (in engineering units) based on the Operation Mode and Fault Mode fields, as well as the health status of the selected sensor. It is intended to be used as an input to calculations and control logic. |

| Field | Description |
|---|---|
| **Fault Value** | Sets the value (in engineering units) written to the Selected Value parameter when a fault occurs on the selected sensor and the Fault Mode is set to Fault. |
| **Last Good Value** | This **read-only** field shows the last good value (in engineering units) received by the selected sensor. This value is written to the Selected Value parameter if a fault occurs and the Fault Mode is set to Last Good. |
| **Reverse Differential Pressure** | This **read-only** field shows the Selected Value multiplied by −1. |
| **Upper Range Limit** | This **read-only** field shows the maximum amount of differential pressure the sensor can detect. |
| **Lower Range Limit** | This **read-only** field shows the minimum amount of differential pressure the sensor can detect. |
| **Monitor Maximum** | Sets the maximum value of the differential pressure gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |
| **Monitor Minimum** | Sets the minimum value of the differential pressure gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |
| **Minimum Span** | This **read-only** field shows the minimum span of the sensor. |
| **Units** | Sets the measurement units to use with the differential pressure input value. |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: |

| Field | Description | |
|---|---|---|
| | **Live** | The system copies the Live Value to the Selected Value parameter. |
| | **Override** | The system copies the Override Value to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| **Fault Mode** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. | |
| | **Live** | The system copies the value of the **Live Value** field to the Selected Value Parameter. |
| | **Fault** | The system copies the value set in the **Fault Value** field to the Selected Value parameter. |
| | **Last Good** | The system copies the value of the **Last Good Value** field to the Selected Value parameter. |
| **Damping Time** | Sets a time (in seconds) used to dampen the reading of the signal from the sensor. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the previous read value. A value of 0.0 disables damping. | |

4. Select **Save** to save any changes you make to this display.

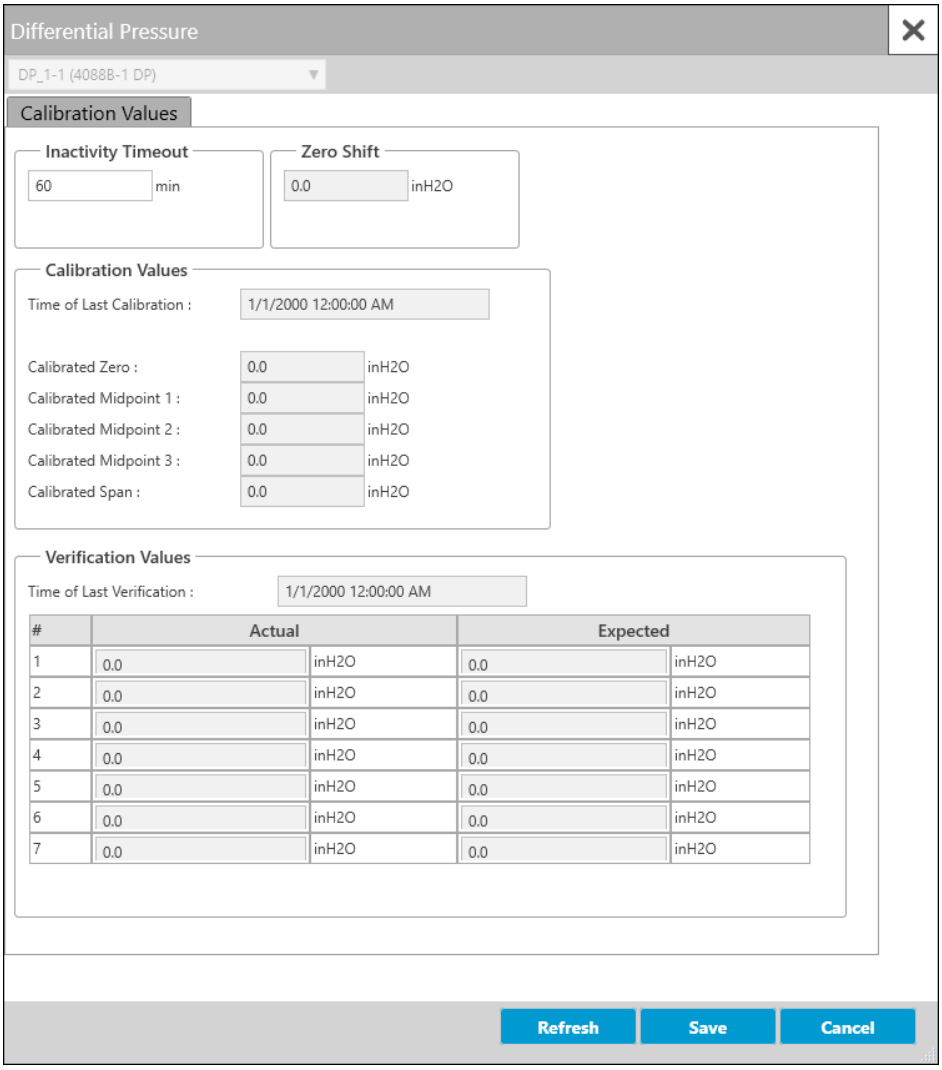
### 4.5.5.2 Differential Pressure – Calibration Values

Use this pop-up display to set the calibration timeout period and view previous calibration/verification values.

To access this pop-up display:

1. Select **Configure > I/O Setup > Differential Pressure** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the sensor drop-down list and select the sensor you want to configure.
3. Select the **Calibration Values** button. The Calibration Values pop-up display opens.

**Figure 125. Differential Pressure – Calibration Values**



4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Inactivity Timeout** | Sets the period of time (in minutes) the system waits for activity during the calibration process. If no activity occurs during the specified time period, the calibration automatically ends. The default is 60 minutes. |
| **Zero Shift** | This **read-only** field shows the offset applied to the input to compensate for environmental factors to set the reading as close to zero as possible. |
| **Calibration Values** | These **read-only** fields show the date and time of the last calibration, and the Calibrated Zero, Midpoints, and Span. |
| **Verification Values** | These **read-only** fields show the date and time of the last verification, and the Actual and Expected values of that verification. |

5. Select **Save** to save any changes you make to this tab.

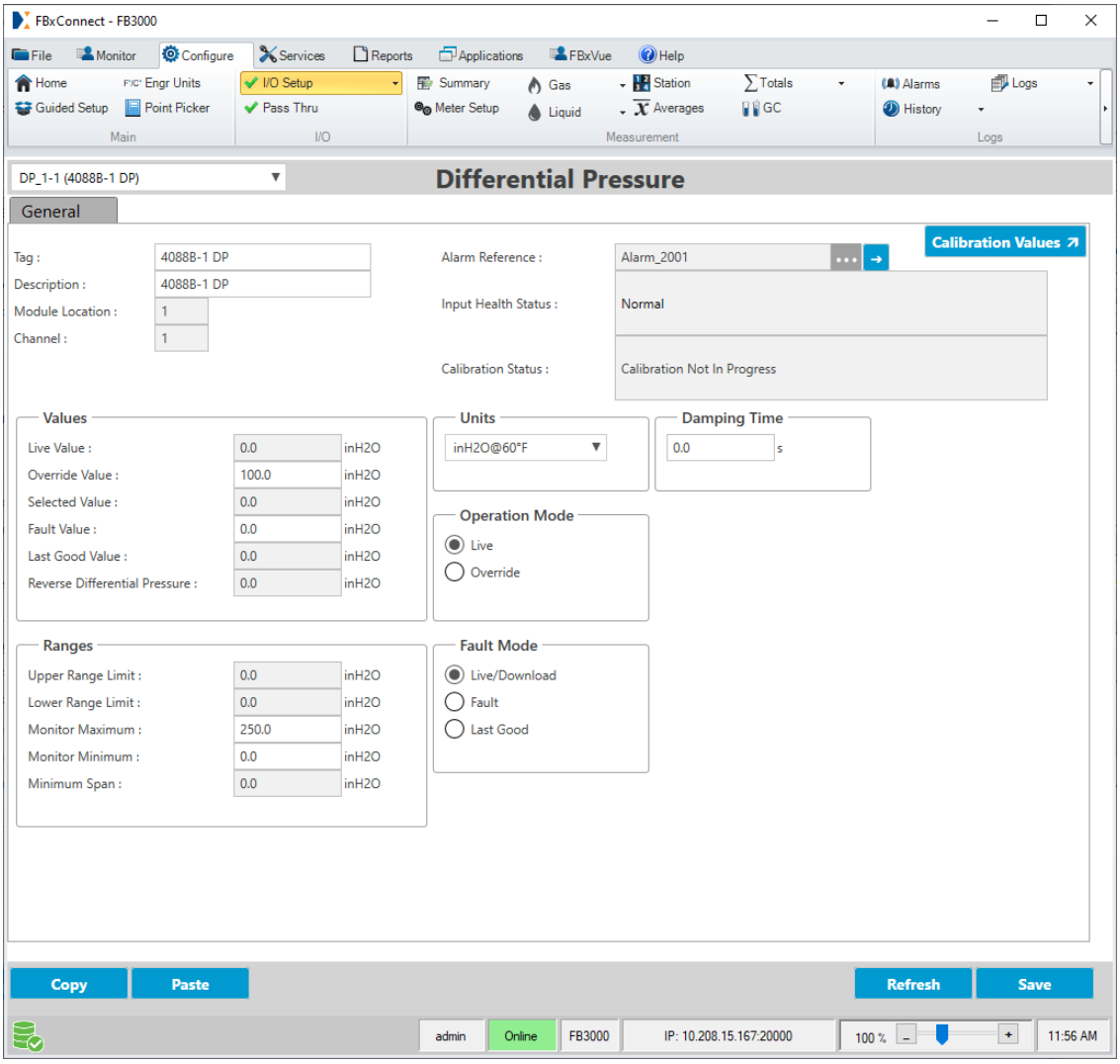
### 4.5.5.3 Configuring Differential Pressure Inputs

Use these steps to configure a differential pressure input on your FB Series product.

To configure a differential pressure input:

1. Select **Configure > I/O Setup > Differential Pressure** from the DeltaV FBxConnect configuration software main menu.

**Figure 126. Differential Pressure – General**




2. Click ▼ in the drop-down list at the top of the display to select a differential pressure input to configure.
3. In the **Tag** field, enter a name for the selected input.
4. In the **Description** field, enter a description for the selected input.
5. In the **Units** frame, set the engineering units used for the selected channel.
6. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

**Note**

If you select **Override**, you **must** enter a value in the **Override Value** field.

7. In the **Fault Mode** frame, set how the system acquires the value written to the Selected Value parameter when a fault occurs (Live, Fault, or Last Good).

**Note**

If you select **Fault**, you must enter a value in the **Fault Value** field.

8. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Differential Pressure.
9. Select **Save** to save your changes to device memory.

### 4.5.6 Pressure

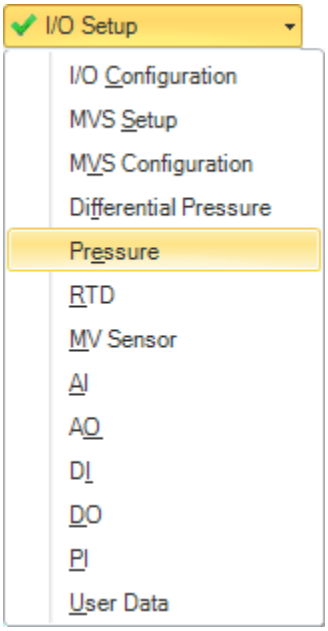
Use this display to view and configure general parameters associated with the static pressure input, set the calibration timeout period, and view calibration/verification values.

**Note**

To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 on the CPU module or any serial port on 4-Port Communications module to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.

To access this display, select **Configure > I/O Setup > Pressure** from the DeltaV FBxConnect configuration software main menu.

**Figure 127. I/O Setup – Pressure**




The Pressure display has the following sections:

General – Use this display to view and configure general parameters associated with the static pressure input.

Calibration Values – Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

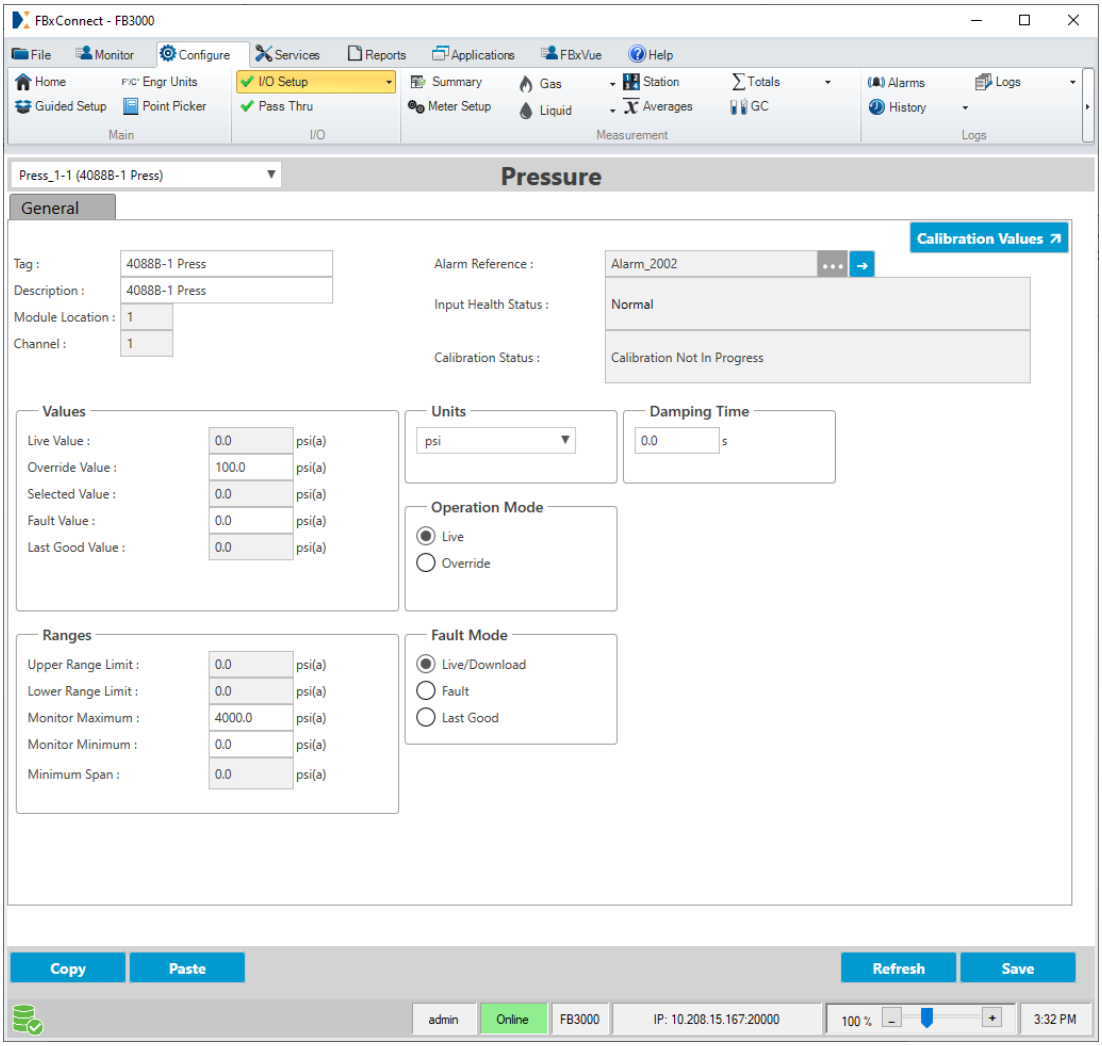
### 4.5.6.1 Pressure – General

Use this display to view and configure general parameters associated with the static pressure input.

To access this display:

1. Select **Configure > I/O Setup > Pressure** from the DeltaV FBxConnect configuration software main menu. The Pressure display opens.

**Figure 128. Pressure – General**




2. Click ▼ in the sensor drop-down list and select the sensor you want to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected sensor. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected sensor. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |

| Field | Description |
|---|---|
| **Channel** | This **read-only** field shows the unique channel number for this static pressure instance. |
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the point.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters. |
| **Input Health Status** | This **read-only** field shows the status of the input. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Input Frozen |
| **Calibration Status** | This **read-only** field shows the current calibration status of the selected channel. |
| **Calibration Values** | Select this button to open a pop-up display where you can set the calibration timeout period and view previous calibration/verification values. |
| **Live Value** | This **read-only** field shows the current value (in engineering units) of the selected sensor. |
| **Override Value** | Sets the value (in engineering units) written to the Selected Value field when the Operation Mode is set to Override. |
| **Selected Value** | This **read-only** field represents the value (in engineering units) based on the Operation Mode and Fault Mode fields, as well as the health status of the selected sensor. It is intended to be used as an input to calculations and control logic. |

| Field | Description |
|---|---|
| **Fault Value** | Sets the value (in engineering units) written to the Selected Value parameter when a fault occurs on the selected sensor and the Fault Mode is set to Fault. |
| **Last Good Value** | This **read-only** field shows the last good value (in engineering units) received by the selected sensor. This value is written to the Selected Value parameter if a fault occurs and the Fault Mode is set to Last Good. |
| **Upper Range Limit** | This **read-only** field shows the maximum amount of static pressure the sensor can detect. |
| **Lower Range Limit** | This **read-only** field shows the minimum amount of static pressure the sensor can detect. |
| **Monitor Maximum** | Sets the maximum value of the static pressure gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |
| **Monitor Minimum** | Sets the minimum value of the static pressure gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |
| **Minimum Span** | This **read-only** field shows the minimum span of the sensor. |
| **Units** | Sets the measurement units to use with the pressure input value. |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation.<br>**Live** — The system copies the Live Value to the Selected Value parameter. |

| Field | Description | |
|---|---|---|
| | **Override** | The system copies the Override Value to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| **Fault Mode** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. | |
| | **Live** | The system copies the Live Value to the Selected Value parameter. |
| | **Fault** | The system copies the Fault Value to the Selected Value parameter. |
| | **Last Good** | The system copies the Last Good Value to the Selected Value parameter. |
| **Damping Time** | Sets a time (in seconds) used to dampen the reading of the signal from the sensor. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the previous read value. A value of 0.0 disables damping. | |

4. Select **Save** to save any changes you make to this display.

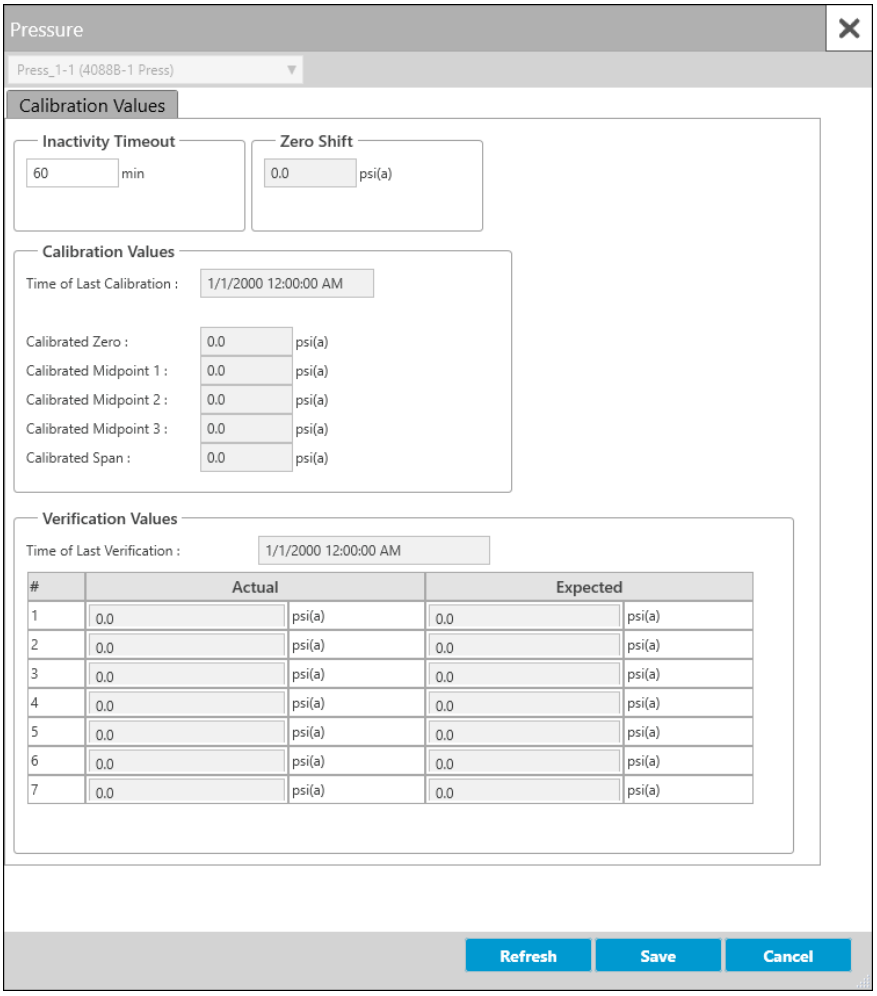
### 4.5.6.2 Pressure – Calibration Values

Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

To access this pop-up display:

1. Select **Configure > I/O Setup > Pressure** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the sensor drop-down list and select the sensor you want to configure.
3. Select the **Calibration Values** button. The Calibration Values pop-up display opens.

**Figure 129. Pressure – Calibration Values**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Inactivity Timeout** | Sets the period of time (in minutes) the system waits for activity during the calibration process. If no activity occurs during the specified time period, the calibration automatically ends. The default is 60 minutes. |
| **Zero Shift** | This **read-only** field shows the offset applied to the input to compensate for environmental factors to set the reading as close to zero as possible. |
| **Calibration Values** | These **read-only** fields show the date and time of the last calibration, and the Calibrated Zero, Midpoints, and Span. |

| Field | Description |
|---|---|
| **Verification Values** | These **read-only** fields show the date and time of the last verification, and the Actual and Expected values of that verification. |

5. Select **Save** to save any changes you make to this pop-up display.

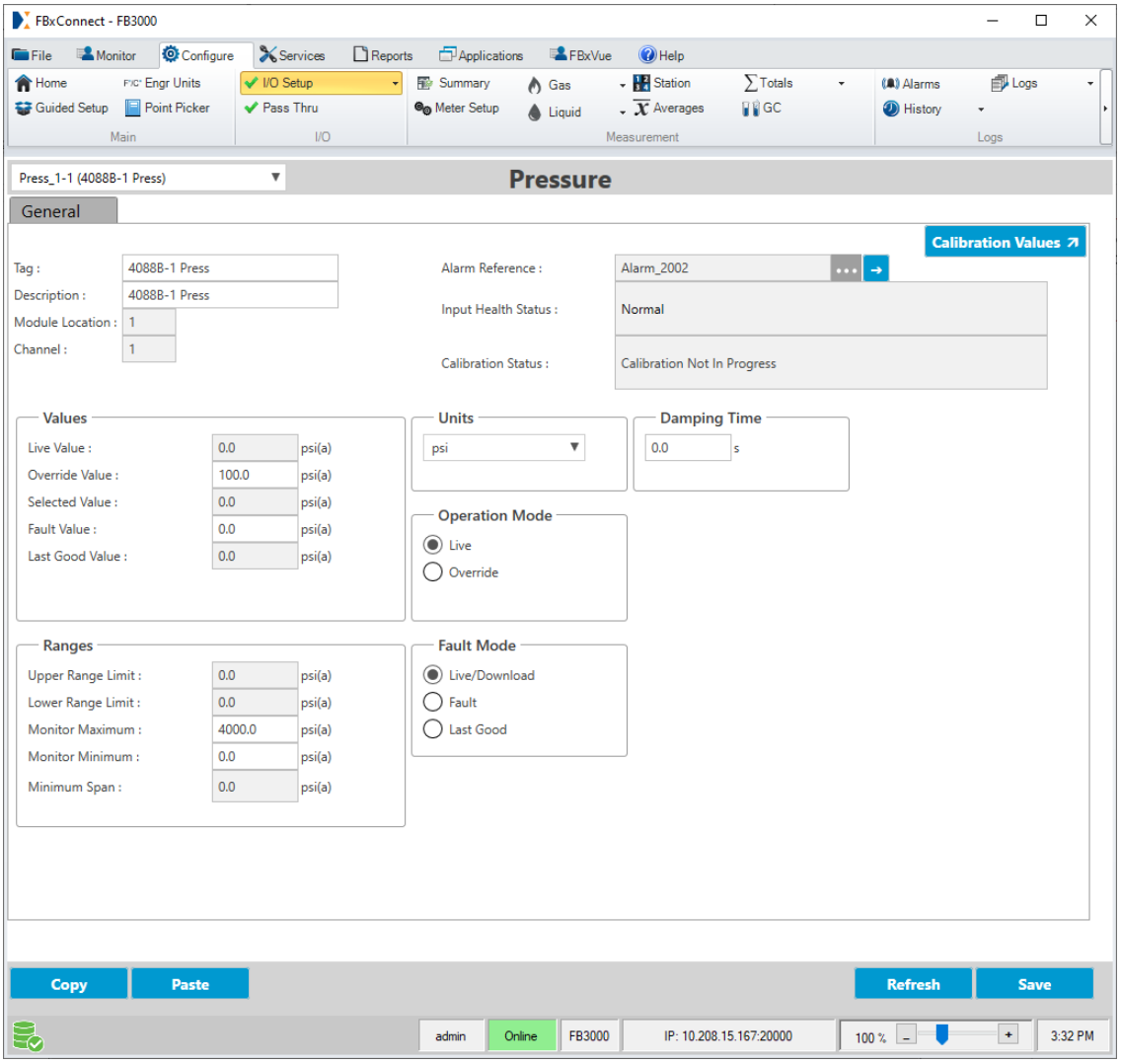
### 4.5.6.3 Configuring Static Pressure Inputs

Use these steps to configure a static pressure input on your FB Series product.

To configure a static pressure input:

1. Select **Configure > I/O Setup > Pressure** from the DeltaV FBxConnect configuration software main menu.

**Figure 130. Pressure – General**




2. Click ▼ in the drop-down list at the top of the display to select a static pressure input to configure.
3. In the **Tag** field, enter a name for the selected input.
4. In the **Description** field, enter a description for the selected input.
5. In the **Units** frame, set the engineering units used for the selected channel.
6. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

**Note**

If you select **Override**, you **must** enter a value in the **Override Value** field.

7. In the **Fault Mode** frame, set how the system acquires the value written to the Selected Value parameter when a fault occurs (Live, Fault, or Last Good).

**Note**

If you select **Fault**, you must enter a value in the **Fault Value** field.

8. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Pressure.
9. Select **Save** to save your changes to device memory.

### 4.5.7 RTD

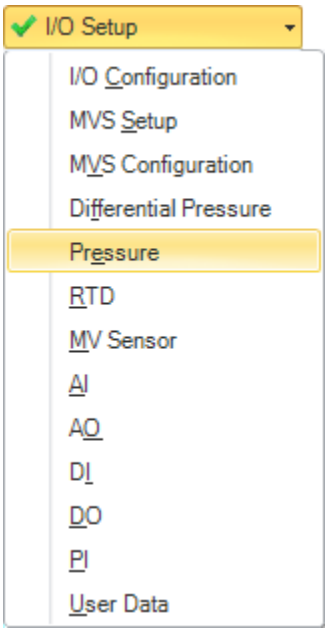
Use this display to view and configure general RTD parameters, set the calibration timeout period, and view calibration/verification values.

**Note**

To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 on the CPU module or any serial port on 4-Port Communications module to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.

To access this display, select **Configure > I/O Setup > RTD** from the DeltaV FBxConnect configuration software main menu.

**Figure 131. I/O Setup – RTD**




The RTD display contains the following items:

General – Use this display to view and configure general RTD parameters.

Calibration Values – Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

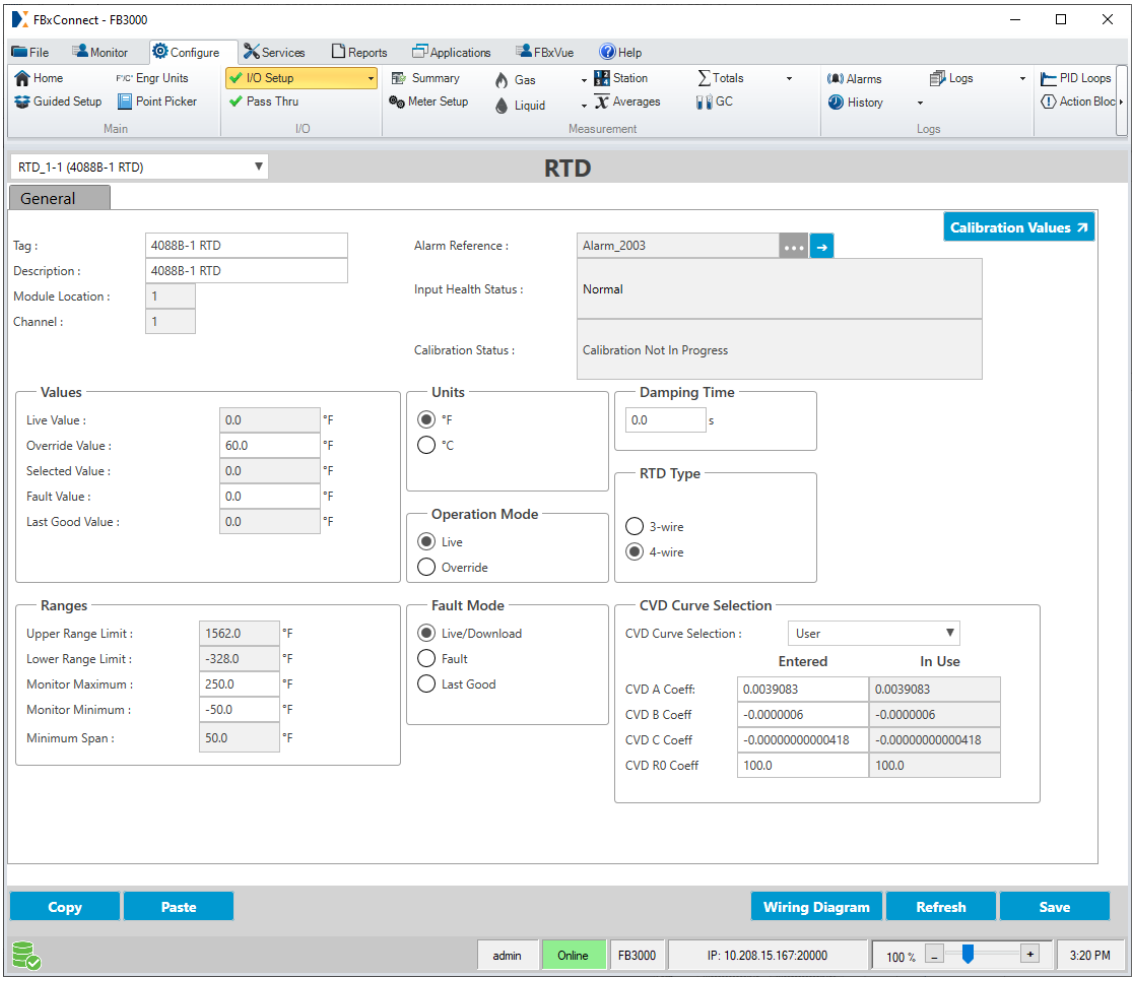
### 4.5.7.1 RTD – General

Use this display to view and configure general RTD parameters.

To access this display:

1. Select **Configure > I/O Setup > RTD** from the DeltaV FBxConnect configuration software main menu. The RTD display opens.

**Figure 132. RTD – General**




2. Click ▼ in the drop-down list at the top of the display to select an RTD to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected RTD. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected RTD. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the unique channel number for this RTD instance. |

| Field | Description |
|---|---|
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the point.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters. |
| **Input Health Status** | This **read-only** field shows the status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Input Frozen<br>• Type Mismatch |
| **Calibration Status** | This **read-only** field shows the current calibration status of the selected channel. Possible values are:<br>• Calibration Not In Progress<br>• Input Frozen<br>• Calibration In Progress<br>• Set Command Failed<br>• Timeout Occurred<br>• Span Too Small<br>• Excess Correction<br>• Passed Parameter Too Small<br>• Passed Parameter Too Large<br>• Ideal Value Too Small<br>• Ideal Value Too Large |

| Field | Description |
|---|---|
| | • Wrong Command<br>• Verification In Progress |
| **Calibration Values** | Select this button to open a pop-up display where you can set the calibration timeout period and view previous calibration/verification values. |
| **Live Value** | This **read-only** field shows the current value (in engineering units) of the RTD. |
| **Override Value** | Sets the value (in engineering units) written to the Selected Value field when the Operation Mode is set to Override. |
| **Selected Value** | This **read-only** field represents the value (in engineering units) based on the Operation Mode and Fault Mode fields, as well as the health status of the selected sensor. It is intended to be used as an input to calculations and control logic. |
| **Fault Value** | Sets the value (in engineering units) written to the Selected Value parameter when a fault occurs on the selected sensor and the Fault Mode is set to Fault. |
| **Last Good Value** | This **read-only** field shows the last good value (in engineering units) received by the selected sensor. This value is written to the Selected Value parameter if a fault occurs and the Fault Mode is set to Last Good. |
| **Minimum Span** | This **read-only** field shows the minimum difference between the zero and the span (in engineering units). When performing a calibration, the span must at least be greater than the zero by the value of this parameter. |
| **Upper Range Limit** | This **read-only** field shows the maximum temperature the RTD can detect. |
| **Lower Range Limit** | This **read-only** field shows the minimum temperature the RTD can detect. |
| **Monitor Maximum** | Sets the maximum value of the temperature gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000. |

| Field | Description | |
|---|---|---|
| | • This field applies **only** to the FB1000 and FB2000 Series Flow Computers. | |
| **Monitor Minimum** | Sets the minimum value of the temperature gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. | |
| **Minimum Span** | This **read-only** field shows the minimum span of the sensor. | |
| **Units** | Sets the measurement units to use with the RTD input value. | |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. | |
| | **Live** | The system copies the Live Value to the Selected Value parameter. |
| | **Override** | The system copies the Override Value to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| **Fault Mode** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. | |
| | **Live / Download** | The system copies the Live Value to the Selected Value parameter. |
| | **Fault** | The system copies the Fault Value to the Selected Value parameter. |
| | **Last Good** | The system copies the Last Good Value to the Selected Value parameter. |

| Field | Description |
|---|---|
| **Damping Time** | Sets a time (in seconds) used to dampen the reading of the signal from the sensor. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the previous read value. A value of 0.0 disables damping. |
| **RTD Type** | Specifies the wiring and signal type of the RTD used by the FB Series product. Possible options are 2-wire, 3-wire, 4-wire, or Disabled.<br>**Note**<br>The 2-wire and Disabled options are available for the 8-Channel Mixed I/O module with 2 RTD (MIO8T) **only**. |
| **CVD Curve Selection** | Click ▼ to select the Callendar-Van Dusen equation to use for the RTD. The Callendar-Van Dusen equation describes the relationship between resistance (R) and temperature (T) of a resistance temperature detector (RTD). The form of the equation is as follows:<br>$R(T) = R(0)[1 + A * T + B * T^2 + (T - 100)C * T^3]$<br>You can pick from two pre-defined sets of coefficients for the equation based on a specific material temperature coefficient of resistance (Alpha) or you can select a user set of coefficients. The Alpha value will be specified by the RTD manufacturer.<br>**Note**<br>If you select **User**, then you **must** enter values in the RTD_ACOEFF, RTD_BCOEFF, RTD_CCOEFF, and RTD_R0COEFF fields. |
| **CVD A Coeff** | Enter the A coefficient used in the Callendar-Van Dusen equation. |
| **CVD B Coeff** | Enter the B coefficient used in the Callendar-Van Dusen equation. |
| **CVD C Coeff** | Enter the C coefficient used in the Callendar-Van Dusen equation. |
| **CVD R0 Coeff** | Enter the R0 coefficient used in the Callendar-Van Dusen equation. |

**4.** Select **Save** to save any changes you make to this display.

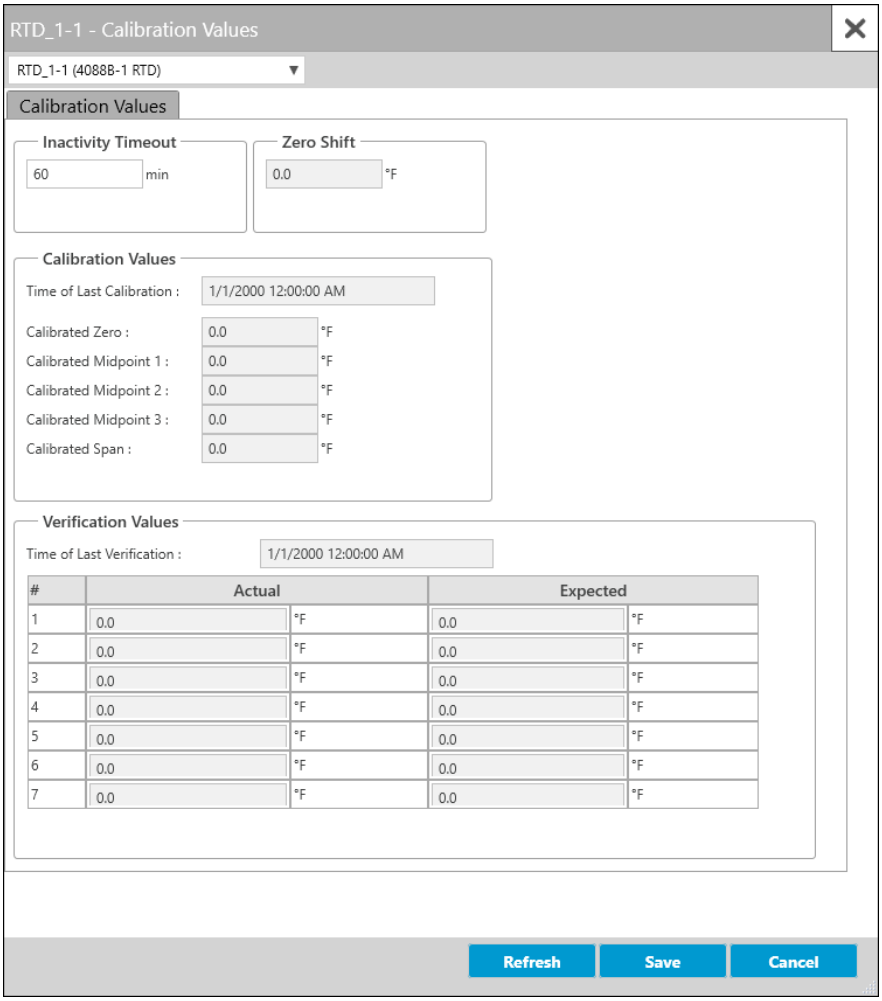
### 4.5.7.2 RTD – Calibration Values

Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

To access this pop-up display:

1. Select **Configure > I/O Setup > RTD** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select an RTD to configure.
3. Select the **Calibration Values** button. The Calibration Values pop-up display opens.

**Figure 133. RTD – Calibration Values**




4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Inactivity Timeout** | Sets the period of time (in minutes) the system waits for activity during the calibration process. If no activity occurs during the specified time period, the calibration automatically ends. The default is 60 minutes. |

| Field | Description |
|---|---|
| **Zero Shift** | This **read-only** field shows the offset applied to the input to compensate for environmental factors to set the reading as close to zero as possible. |
| **Calibration Values** | These **read-only** fields show the date and time of the last calibration, and the Ideal/Calibrated Zero, Midpoint, and Span values.<br>**Note**<br>The Ideal values show for the 8-Channel Mixed I/O module with 2 RTD (MIO8T) **only**. |
| **Verification Values** | These **read-only** fields show the date and time of the last verification, and the Actual and Expected values of that verification. |

5. Select **Save** to save any changes you make to this pop-up display.

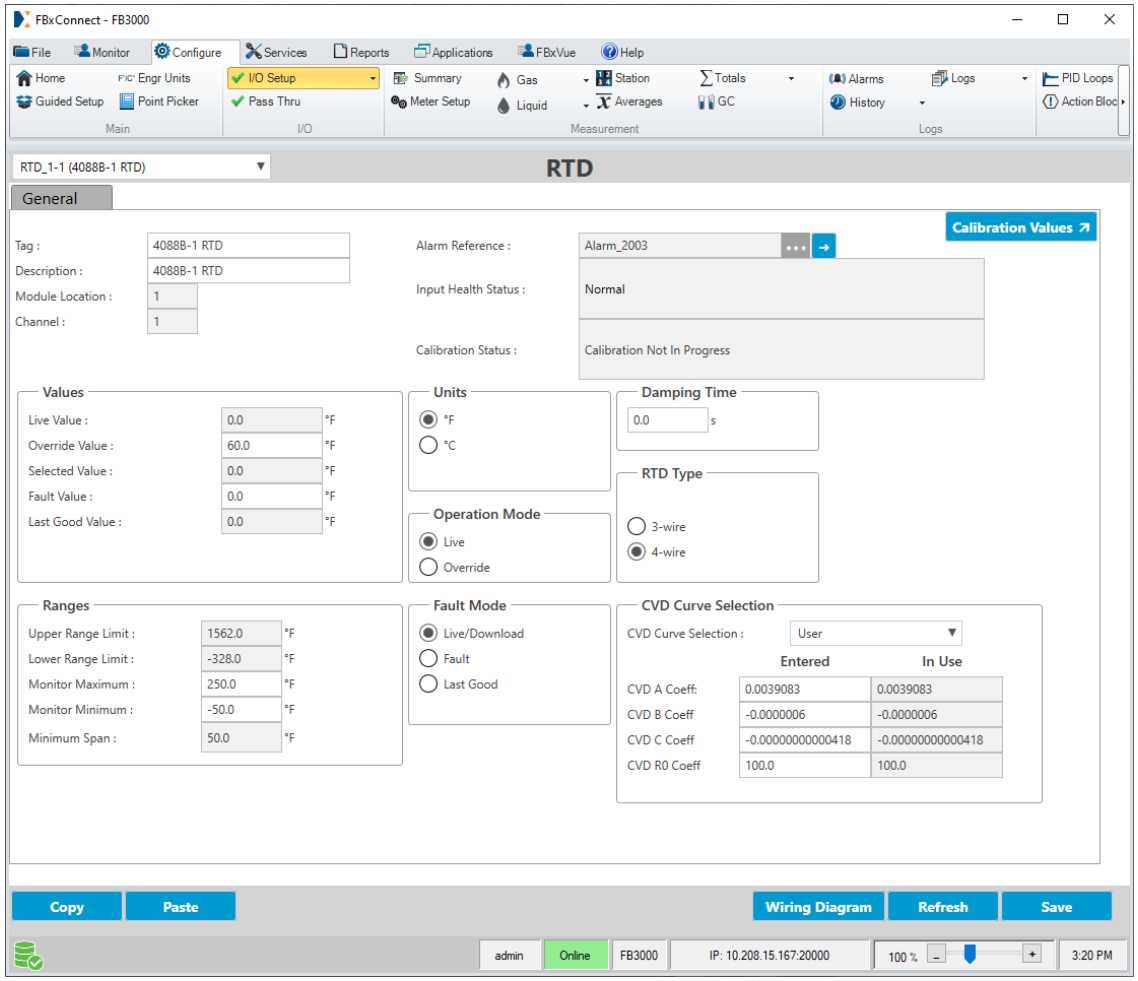
### 4.5.7.3 Configuring an RTD

Use these steps to configure an RTD on your FB Series product.

To configure an RTD:

1. Select **Configure > I/O Setup > RTD** from the DeltaV FBxConnect configuration software main menu.

**Figure 134. RTD – General**




2. Click ▼ in the drop-down list at the top of the display to select an RTD to configure.
3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **RTD Type** field, select type of RTD used by the FB Series product. Possible options are
6. In the **CVD Curve** frame, set the Callendar-Van Dusen constants to use for the RTD.
7. In the **Units** frame, set the engineering units used for the selected input.
8. In the **Operation Mode** frame, set how the system acquires the value of the selected input under normal operating conditions.

**Note**

If you select **Override**, you **must** enter a value in the **Override Value** field.

9. In the **Fault Mode** frame, set how the system acquires the value written to the Selected Value parameter when a fault occurs (Live, Fault, or Last Good).

**Note**

If you select **Fault**, you must enter a value in the **Fault Value** field.

10. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to RTD.

11. Select **Save** to save your changes to device memory.

## 4.5.8 MV Sensor

Use this display to view multivariable sensor values and properties for both the integral sensor and Rosemount™ 4088B MultiVariable™ Transmitter.

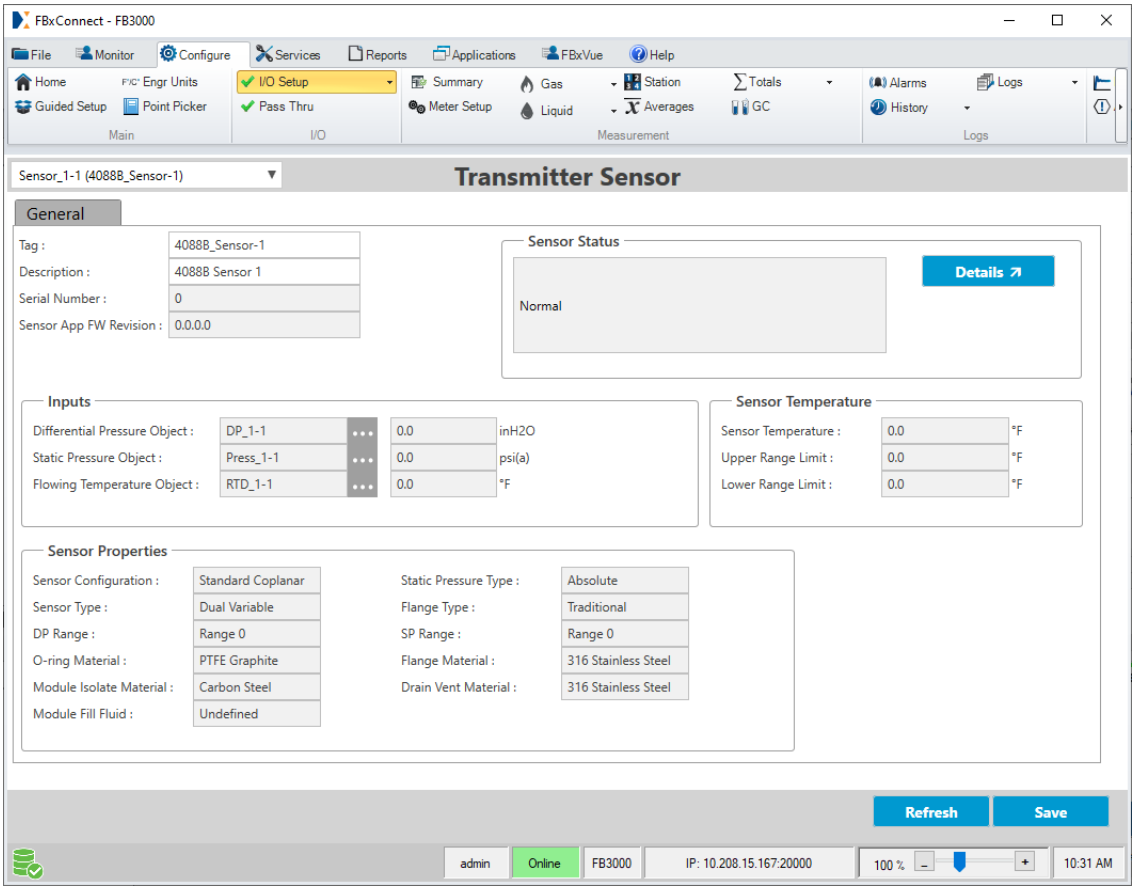
**Note**

To view this display when connected to a Rosemount™ 4088B MultiVariable™ Transmitter, you **must** first set the Port Owner of COM3 or COM4 on the CPU module or any serial port on 4-Port Communications module to MVS4088B. For more information, refer to the **Port Owner** field on the Communication – General display.

To access this display:

1. Select **Configure > I/O Setup > MV Sensor** from the DeltaV FBxConnect configuration software main menu.

**Figure 135. MV Sensor**




2. Click ▼ in the drop-down list at the top of the display to select a sensor to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected sensor. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected sensor. |
| **Serial Number** | This **read-only** field shows the serial number of the sensor. |
| **Sensor App FW Revision** | This **read-only** field shows the firmware revision level of the sensor. |
| **Sensor Status** | This **read-only** field shows the status of the sensor. |

| Field | Description | |
|---|---|---|
| | **Details** | Click open the Sensor Status Details pop-up display and view possible MV sensor status conditions.<br>**Note**<br>Current active statuses are selected with a check mark. |
| **Differential Pressure Object** | This **read-only** field shows the differential pressure parameter in the FB Series product currently configured for the selected sensor, and the current value of that parameter. | |
| **Static Pressure Object** | This **read-only** field shows the static pressure parameter in the FB Series product currently configured for the selected sensor, and the current value of that parameter. | |
| **Flowing Temperature Object** | This **read-only** field shows the temperature of the fluid in the meter.<br>**Note**<br>This field appears **only** if you select a 4088B in the MV Sensor drop-down list. | |
| **Sensor Temperature** | This **read-only** field shows the current temperature of the selected sensor.<br>**Note**<br>This field appears **only** if you select a 4088B in the MV Sensor drop-down list. | |
| **Upper Range Limit** | This **read-only** field shows the upper temperature range limit of the selected sensor.<br>**Note**<br>This field appears **only** if you select a 4088B in the MV Sensor drop-down list. | |
| **Lower Range Limit** | This **read-only** field shows the lower temperature range limit of the selected sensor.<br>**Note**<br>This field appears **only** if you select a 4088B in the MV Sensor drop-down list. | |
| **Sensor Configuration** | This **read-only** field shows the connection type of the sensor in the current configuration. | |
| **Static Pressure Type** | This **read-only** field shows the type of static pressure returned from the currently configured sensor. | |

| Field | Description |
|---|---|
| **Sensor Type** | This **read-only** field shows the type of sensor connected in the current configuration. |
| **Flange Type** | This **read-only** field shows the type of flange in the currently configured sensor. |
| **DP Range** | This **read-only** field shows the differential pressure range of the currently configured sensor. |
| **SP Range** | This **read-only** field shows the static pressure range of the currently configured sensor. |
| **O-ring Material** | This **read-only** field shows the O-ring construction material in the currently configured sensor. |
| **Flange Material** | This **read-only** field shows the flange construction material in the currently configured sensor. |
| **Module Isolate Material** | This **read-only** field shows the module isolate construction material in the currently configured sensor. |
| **Drain Vent Material** | This **read-only** field shows the drain vent construction material in the currently configured sensor. |
| **Module Fill Fluid** | This **read-only** field shows the type of module fill fluid in the currently configured sensor. |

4. Select **Save** to save any changes you make to this display.

#### 4.5.8.1 Sensor Status Details

Use this display to view status conditions associated with your multivariable sensor.

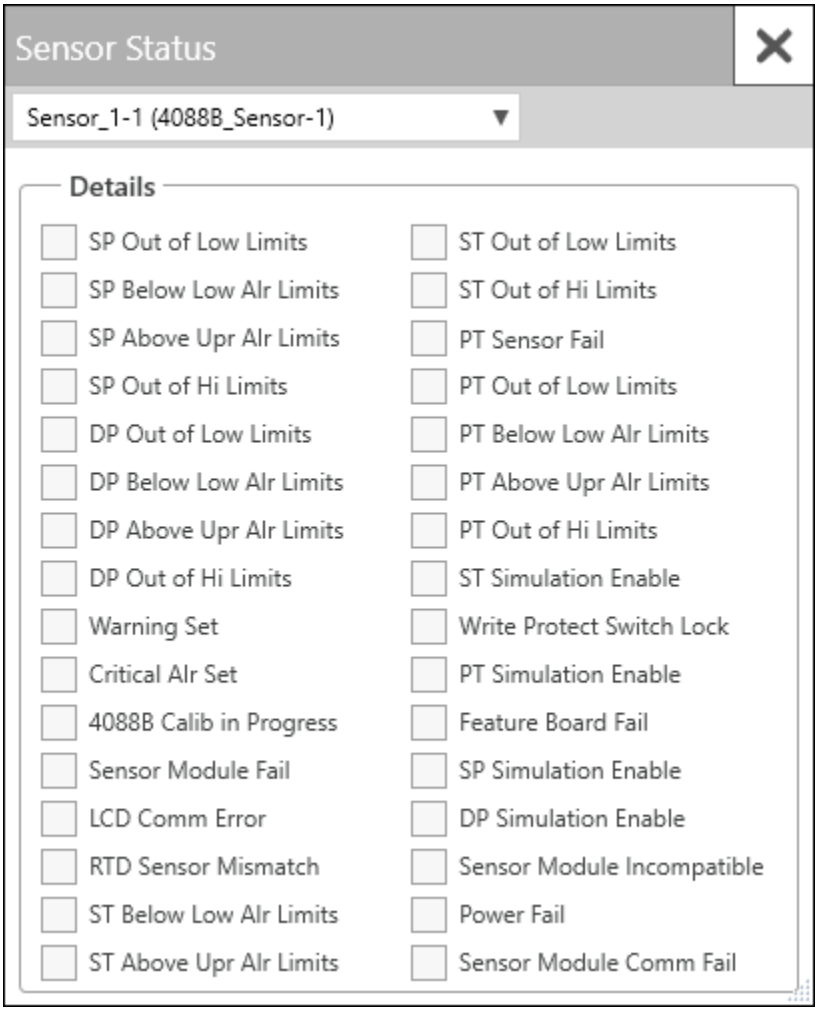
**Note**

Current active statuses are selected with a check mark.

To access this display:

1. Select **Configure > I/O Setup > MV Sensor** from the DeltaV FBxConnect configuration software main menu. The Transmitter Sensor display opens.
2. Click ▼ in the drop-down list at the top of the display to select a sensor to configure.
3. Select the **Details** button.

**Figure 136. Sensor Status**

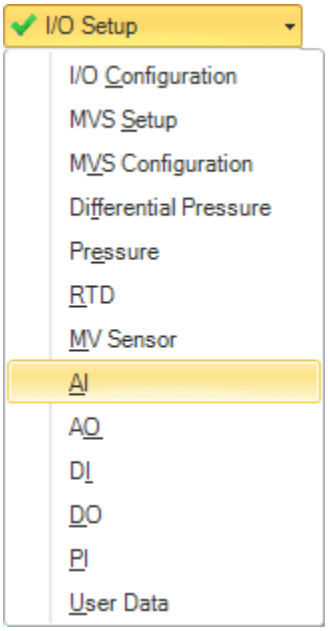



## 4.5.9 Analog Input

Use this display to view and configure general parameters associated with analog inputs.

To access this display, select **Configure > I/O Setup > AI** from the DeltaV FBxConnect configuration software main menu.

**Figure 137. I/O Setup – AI**




The Analog Input display contains the following items:

General – Use this display to configure the analog inputs.

Calibration Values – Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

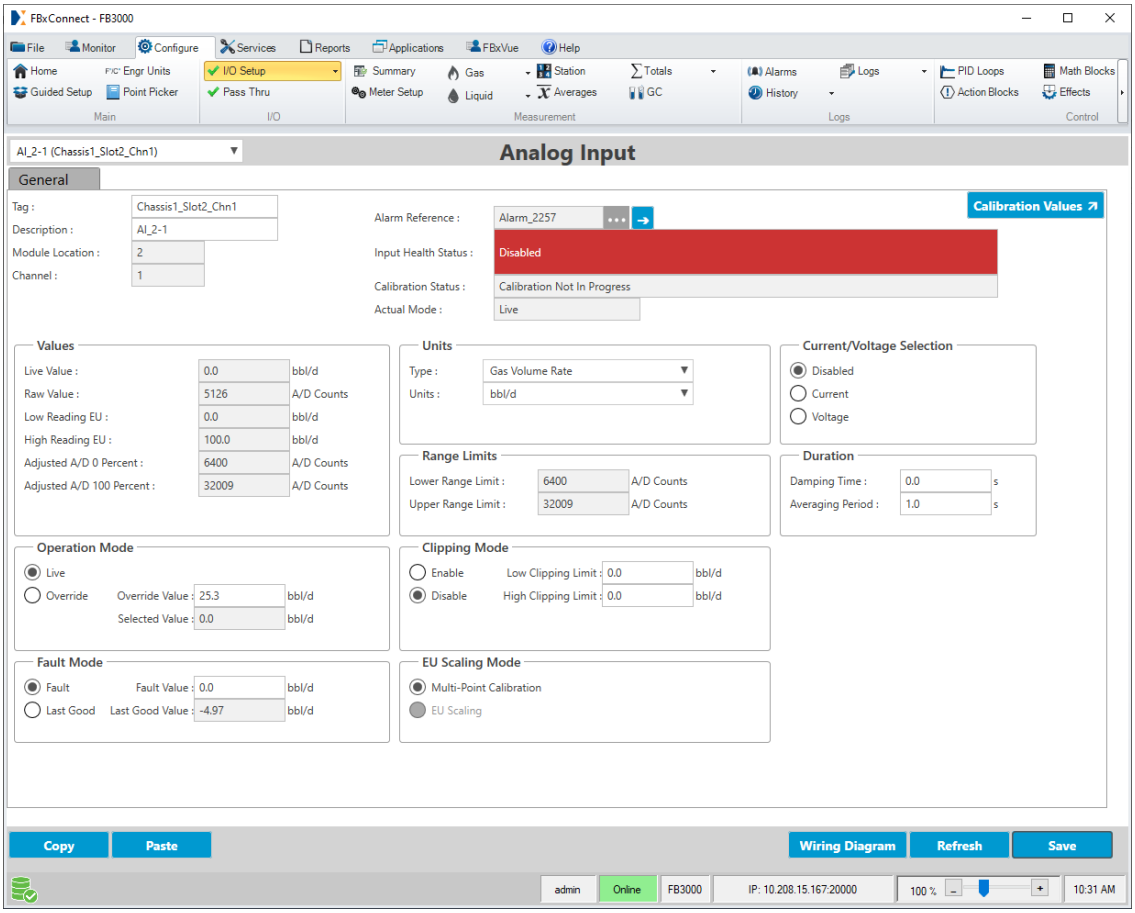
### 4.5.9.1 Analog Input – General

Use this display to configure the analog inputs. Analog inputs are analog signals that measurement devices (such as pressure and temperature transmitters, including RTD probes and pressure sensors) generate.

To access this display:

1. Select **Configure > I/O Setup > AI** from the DeltaV FBxConnect configuration software main menu. The Analog Input display opens.

**Figure 138. Analog Input – General**




2. Click ▼ in the drop-down list at the top of the display to select an analog input channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected channel. |

| Field | Description |
|---|---|
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the selected channel.<br>**Note**<br>Click  to open the Alarms display and configure the alarm parameters for the selected channel. |
| **Input Health Status** | This **read-only** field shows the status of the selected channel. Possible values are:<br>• Normal<br>• Disabled<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above CAL Limit<br>• Below CAL Limit<br>• Input Frozen<br>• Input Clipped<br>• Factory Calibration Invalid<br>• User Calibration Invalid<br>• Termination Missing<br>• Hardware Fail |
| **Calibration Status** | This **read-only** field shows the current calibration status of the selected channel. Possible values are:<br>• Calibration Not In Progress<br>• Input Frozen<br>• Calibration In Progress<br>• Set Command Failed<br>• Timeout Occurred<br>• Span Too Small |

| Field | Description |
|---|---|
| | • Excess Correction<br>• Wrong Command<br>• Verification In Progress |
| **Actual Mode** | This **read-only** field shows the source of the selected value. Possible values are:<br>• Live<br>• Override<br>• Calibration<br>• Fault<br>• Last Good |
| **Calibration Values** | Select this button to open a pop-up display where you can set the calibration timeout period and view previous calibration/verification values. |
| **Live Value** | This **read-only** field shows the current value (in engineering units) from the field device. |
| **Raw Value** | This **read-only** field shows the current digital count directly from the Analog-to-Digital converter. |
| **Low Reading EU** | Sets the low reading (in engineering units) that is equal to zero percent input. For example, if a temperature transmitter is connected to the analog input with a range of –40 to 160 degrees F, the Low field would be set to –40.<br>**Note**<br>You must select **EU Scaling** in the EU Scaling Mode frame to modify this field. |
| **High Reading EU** | Sets the high reading (in engineering units) that is equal to 100 percent input. For example, if a temperature transmitter is connected to the analog input with a range of – 40 to 160 degrees F, the High field would be set to 160.<br>**Note**<br>You must select **EU Scaling** in the EU Scaling Mode frame to modify this field. |

| Field | Description | |
|---|---|---|
| **Adjusted A/D 0 Percent** | Sets the calibrated Analog-to-Digital count corresponding to zero percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the Low Reading EU value.<br>**Note**<br>You must select **EU Scaling** in the EU Scaling Mode frame to modify this field. | |
| **Adjusted A/D 100 Percent** | Sets the calibrated Analog-to-Digital count corresponding to 100 percent input. Use this value to convert the input to engineering units. In the Calibrate function, this value is altered to set the 100 percent input exactly at the High Reading EU value.<br>**Note**<br>You must select **EU Scaling** in the EU Scaling Mode frame to modify this field. | |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: | |
| | **Live** | The system copies the Live Value to the Selected Value parameter. |
| | **Override** | The system copies the value set in the Override Value field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| **Override Value** | Sets the value (in engineering units) written to the Selected Value field when the Operation Mode is set to Override. | |
| **Selected Value** | This **read-only** field shows the value (in engineering units) based on the Operation and Fault Mode fields, as well as the health status of the selected input. It is intended to be used as an input to calculations and control logic. | |
| **Fault Mode** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. | |
| | **Fault** | The system copies the value set in the **Fault Value** field to the Selected Value parameter. |

| Field | Description | |
|---|---|---|
| | **Last Good** | The system copies the value of the **Last Good Value** field to the Selected Value parameter. |
| **Fault Value** | Sets the value (in engineering units) that is written to the Selected Value parameter when a fault occurs on the selected sensor and the Fault Mode is set to Fault. | |
| **Last Good Value** | This **read-only** field shows the last good value (in engineering units) received by the selected sensor. This value is written to the Selected Value parameter if a fault occurs and the Fault Mode is set to Last Good. | |
| **Units** | Sets the measurement type and engineering units used for the selected channel. | |
| | **Type** | Sets the measurement type used for the selected channel. |
| | **Units** | Sets the engineering units used for the selected channel.<br>**Note**<br>Changing the Units does not alter the value of parameters. |
| **Range Limits** | Shows the minimum and maximum value that the analog input can measure. | |
| | **Lower Range Limit** | This **read-only** field shows the minimum value (in A/D counts) that the analog input can measure. |
| | **Upper Range Limit** | This **read-only** field shows the maximum value (in A/D counts) that the analog input can measure. |
| **Clipping Mode** | Sets if clipping occurs on the selected input. Clipping forces the Selected Value to stay within a range defined by the Low Clipping Limit and High Clipping Limit. Clipping is only applied when there is not a fault. | |
| | **Enable** | Clipping does occur.<br>**Note**<br>You **must** enter a value in the Low Clipping Limit and High Clipping Limit fields. |

| Field | Description | |
|---|---|---|
| | **Disable** | Clipping does not occur. |
| | **Low Clipping Limit** | When clipping is enabled, this field sets the lower limit of the Selected Value parameter. |
| | **High Clipping Limit** | When clipping is enabled, this field sets the upper limit of the Selected Value parameter. |
| **EU Scaling Mode** | Specifies how the EU scaling parameters are determined. | |
| | **Multi-Point Calibration** | EU scaling parameters are determined by the calibration. You cannot modify the EU scaling parameters (Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent) directly. You must use the calibration wizard to adjust the scaling of the AI.<br>**Note**<br>If you download a configuration file that has Multi-Point Calibration selected, the calibration on your device remains unchanged. |
| | **EU Scaling** | EU scaling parameters are determined by the values you enter in the Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent fields.<br>**Note**<br>If you download a configuration file that has EU Scaling selected, the existing calibration on your device is overwritten using the EU scaling parameters. |
| **Current/Voltage Selection** | Sets if the channel measures either current input, voltage input or is disabled.<br>**Note**<br>• The default Current/Voltage Selection is disabled. You **must** select either Current or Voltage before the AI will scan a field device.<br>• When Current Input is selected, an on-board software switchable 250-ohm resistor is enabled for the selected channel. | |

| Field | Description | |
|---|---|---|
| | • For channels on a HART module, the **only** available options are **Disabled** and **Current**. | |
| **Durations** | Sets the damping time and averaging period for the input. | |
| | **Damping Time** | Sets a time (in seconds) used to dampen the reading of the AI. Small fluctuations can occur with every reading. The damping time is used to give a value that is less prone to those fluctuations, based on the value previous read. A value of 0.0 will disable damping. |
| | **Averaging Period** | When the **Operation Mode** is set to **Live**, this field defines the period over which the Live Value will be averaged before it is written to the Selected Value. |

4. Select **Save** to save any changes you make to this display.

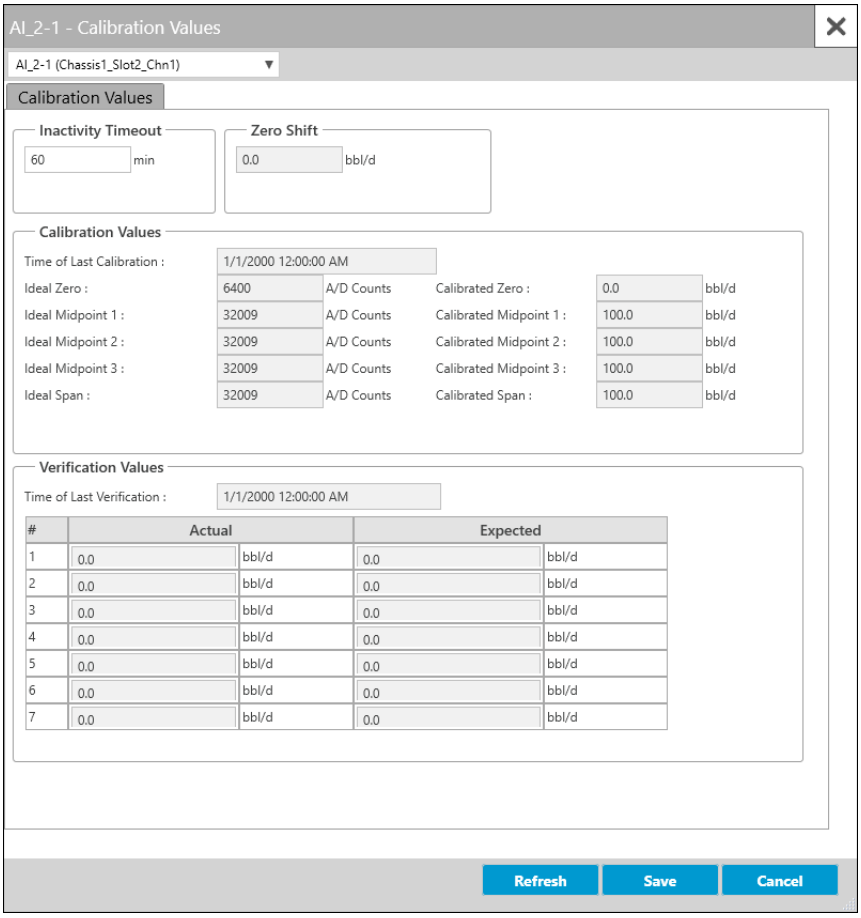
### 4.5.9.2 Analog Input – Calibration Values

Use this pop-up display to set the calibration timeout period, and to view previous calibration/verification values.

To access this pop-up display:

1. Select **Configure > I/O Setup > AI** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select an analog input channel to configure.
3. Select the **Calibration Values** button. The Calibration Values pop-up display opens.

**Figure 139. AI – Calibration Values**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Inactivity Timeout** | Sets the period of time (in minutes) the system waits for activity during the calibration process. If no activity occurs during the specified time period, the calibration automatically ends. The default is 60 minutes. |
| **Zero Shift** | This **read-only** field shows the offset applied to the input to compensate for environmental factors to set the reading as close to zero as possible. |
| **Calibration Values** | These **read-only** fields show the date and time of the last calibration, and the Calibrated Zero, Midpoints, and Span. |
| **Verification Values** | These **read-only** fields show the date and time of the last verification, and the Actual and Expected values of that verification. |

5. Select **Save** to save any changes you make to this pop-up display.

## 4.5.9.3 Configuring Analog Inputs

Use these steps to configure an analog input on your FB Series product.

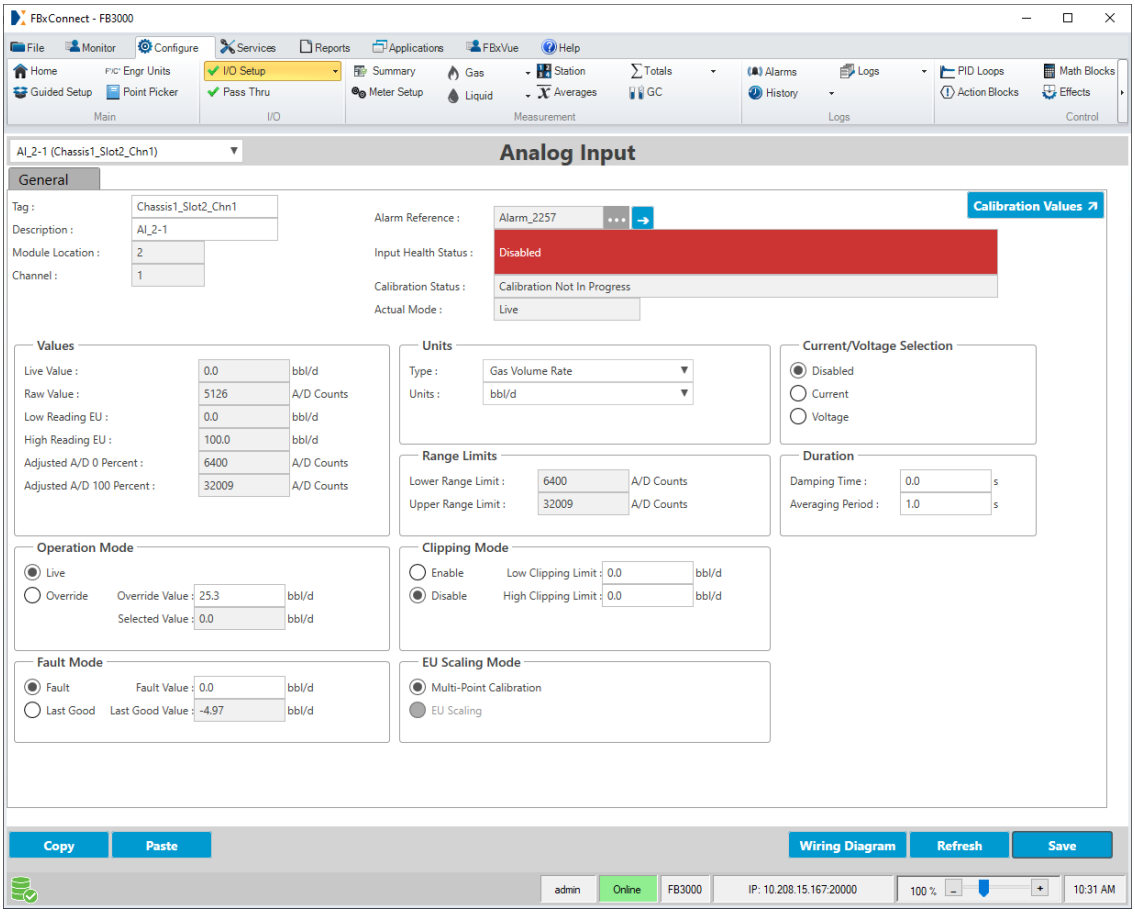
**Note**

You **must** configure I/O types before you configure I/O. For more information, refer to I/O Configuration.

To configure an analog input:

1. Select **Configure > I/O Setup > AI** from the DeltaV FBxConnect configuration software main menu.

**Figure 140. Analog Input – General**




2. Click ▼ in the drop-down list at the top of the display to select an analog input channel to configure.

3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **Current/Voltage Selection** frame, select either Current or Voltage to set if the channel measures current or voltage.

**Note**

- The default Current/Voltage Selection is disabled. You **must** select either Current or Voltage before the AI will scan a field device.
- When Current Input is selected, an on-board software switchable 250-ohm resistor is enabled for the selected channel.
- For channels on a HART module, the **only** available options are **Disabled** and **Current**.

6. Select **Save** to save your changes to device memory.
7. In the **Units** frame, set the measurement type and engineering units used for the selected channel.
8. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

**Note**

If you select **Override**, you **must** enter a value in the **Override Frequency** field.

9. In the **EU Scaling Mode** frame, set how the EU scaling parameters are determined.

**Note**

If you select **EU Scaling**, you must select **Save** and manually enter values in the Low Reading EU, High Reading EU, Adjusted A/D 0 Percent, Adjusted A/D 100 Percent fields.

10. In the **Low Reading EU** field, set the low reading that is equal to zero percent input.
11. In the **High Reading EU** field, set the high reading that is equal to 100 percent input.
12. In the **Fault Mode** frame, set how the system acquires the value written to the Selected Value parameter when a fault occurs (Fault or Last Good).

**Note**

If you select **Fault**, you must enter a value in the **Fault Value** field.

13. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Analog Input.

14. Select **Save** to save your changes to device memory.

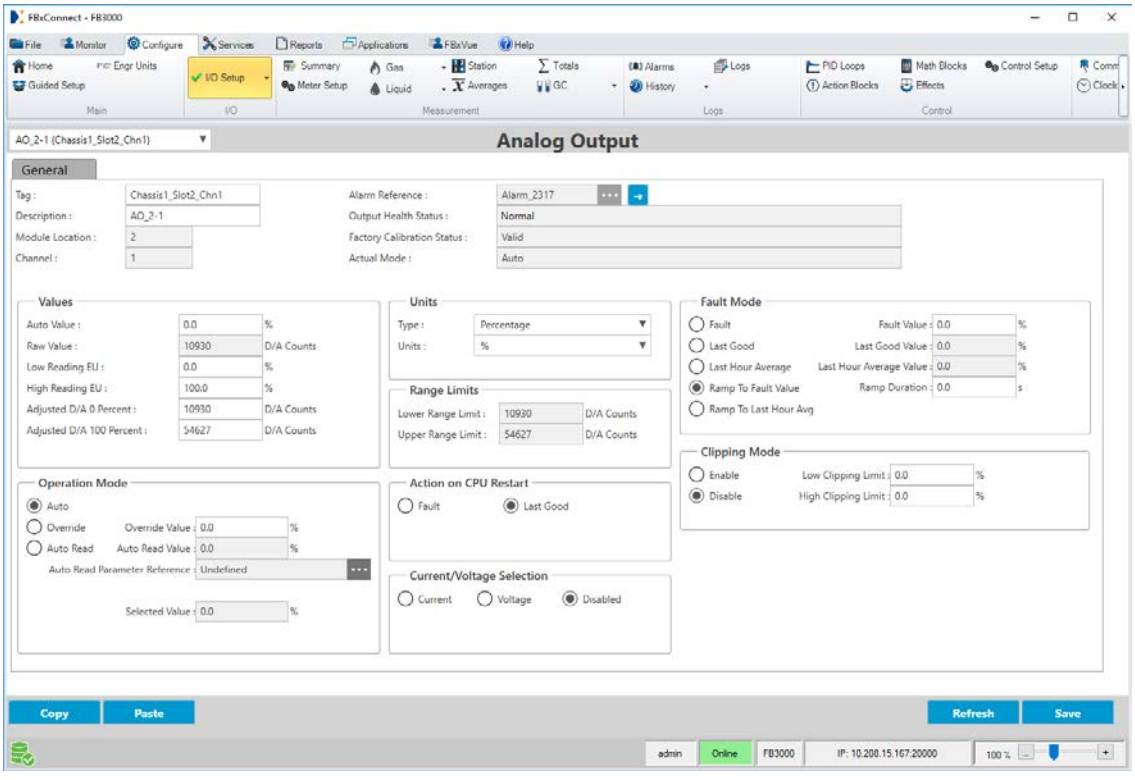
## 4.5.10 Analog Output

Use this display to configure analog outputs. Analog outputs are analog signals the FB Series product uses to generate signals sent to regulate equipment, such as any analog device requiring proportional control.

To access this display:

1. Select **Configure > I/O Setup > AO** from the DeltaV FBxConnect configuration software main menu.

**Figure 141. Analog Output**



2. Click ▼ in the drop-down list at the top of the display to select an analog output channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected module channel. |
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the selected channel.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters for the selected channel. |
| **Output Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Output Frozen<br>• Output Clipped<br>• Factory Calibration Invalid<br>• Auto Read Parameter Invalid<br>• AO Readback Failure |

| Field | Description |
|---|---|
| | • Termination Missing<br>• Disabled<br>• Hardware Fail<br>**Note**<br>This field may temporarily show Point Fail if the **Interval to Poll I/O** field on the I/O Bus display is set to 10 ms and the AO value is changed more than 10%. |
| **Factory Calibration Status** | This **read-only** field shows the current factory calibration status of the selected channel. To ensure accuracy of the Analog Output, a factory calibration is applied when an I/O module is manufactured. |
| **Actual Mode** | This **read-only** field shows the source of the selected value. Possible values are:<br>• Auto<br>• Auto Read<br>• Override<br>• Fault<br>• Last Good<br>• Last Hour Average<br>• Ramp To Fault Value<br>• Ramp To Last Hour Avg |
| **Auto Value** | Sets the value (in engineering units) to use for the selected channel when the **Operation Mode** is set to **Auto**. |
| **Raw Value** | This **read-only** field shows the current counts written directly to the Digital-to-Analog converter. |
| **Low Reading EU** | Sets the value (in engineering units) that is equal to zero percent output (low end of the EU range). |
| **High Reading EU** | Sets the value (in engineering units) that is equal to 100 percent output (high end of the EU range). |
| **Adjusted D/A 0 Percent** | Sets the count that the digital-to-analog converter uses for zero percent output. This value scales the output to engineering units. |
| **Adjusted D/A 100 Percent** | Sets the count that the digital-to-analog converter uses for 100 percent output. This value scales the output to engineering units. |

| Field | Description | |
|---|---|---|
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: | |
| | **Auto** | The system copies the value in the Auto Value field to the Selected Value parameter. |
| | **Override** | The system copies the value set in the Override Value field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| | **Auto Read** | The system copies the value of the parameter you configure in the **Auto Read Parameter Reference** field to the Selected Value parameter. This value is updated once per second.<br>**Note**<br>When setting the Operation Mode to Auto Read, make sure that the units and scaling are correct for the referenced parameter. |
| **Override Value** | Sets the value (in engineering units) that is written to the Selected Value field when the **Operation Mode** is set to **Override**. | |
| **Auto Read Value** | This **read-only** field shows the current value of the parameter configured in the Auto Read Parameter Reference field. | |
| **Auto Read Parameter Reference** | Click ••• to open a Point Picker dialog and select a parameter to use as the analog output value when the **Operation Mode** is set to **Auto Read**. | |
| **Selected Value** | This **read-only** field shows the value (in engineering units) based on the Operation Mode and Fault Mode fields, as well as the health status of the selected output. It is intended to be used as an input to calculations and control logic. | |
| **Units** | Sets the measurement type and engineering units used for the selected channel. | |

| Field | Description | |
|---|---|---|
| | **Type** | Sets the measurement type used for the selected channel.<br>**Note**<br>Click **Save** after you select the type of units to update the units available in the **Units** field. |
| | **Units** | Sets the engineering units used for the selected channel.<br>**Note**<br>Changing the Units does not alter the value of parameters. |
| **Range Limits** | Shows the minimum and maximum value that the analog output can generate. | |
| | **Lower Range Limit** | This **read-only** field shows the minimum value (in D/A counts) that the analog output can generate. |
| | **Upper Range Limit** | This **read-only** field shows the maximum value (in D/A counts) that the analog output can generate. |
| **Action on CPU Restart** | Sets the value to use for the channel after a power cycle occurs. Possible options are **Fault** (use the value you set in the **Fault Value** field) or **Last Good** (use the last known good value).<br>**Note**<br>• During a power cycle, an analog output generates 0mA while the FB Series product is restarting. Once the FB Series product has completed the restart, then the Action on CPU Restart is applied.<br>• If only the 12MIO restarts, then the Action on CPU Restart is applied until communication is established with main CPU. | |
| **Current/Voltage Selection** | Sets the signal type output by the selected channel. Possible options are: | |
| | **Current** | A 4 to 20 mA signal is output on the selected channel. |
| | **Voltage** | A 1 to 5 Vdc signal is output on the selected channel. |
| | **Disabled** | No signal is output on the selected channel. |

| Field | Description | |
|---|---|---|
| | **Note**<br>For channels on a HART module, the **only** available options are **Disabled** and **Current**. | |
| **Fault Mode** | Sets the value to use when the output experiences a fault condition. Possible options are **Fault** (the system uses the value set in the **Fault Value** field), **Last Good** (the system uses the last good value received before the fault occurred), **Last Hour Average** (the system uses the last hourly average before the fault occurred ). | |
| | **Fault Value** | Sets the value (in engineering units) to use when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. |
| | **Last Good Value** | This **read-only** field shows the last good value (in engineering units) output by the channel. This value is used if a fault occurred and the **Fault Mode** was set to **Last Good**. |
| | **Last Hour Average** | This **read-only** field shows the last hourly average value before the fault occurred. This value is used if a fault occurred and the **Fault Mode** was set to **Last Hour Average**. |
| | **Ramp To Fault Value** | The system ramps the output to the value you configure in the **Fault Value** field over the time configured in the **Ramp Duration** field. |
| | **Ramp To Last Hour Avg** | The system ramps the output to the value shown in the **Last Hour Average Value** field over the time configured in the **Ramp Duration** field. |
| | **Ramp Duration** | Sets, in seconds, the amount of time the system takes after a fault has occurred to ramp the output to the new value. |
| **Clipping Mode** | Sets if clipping occurs on the selected input. Clipping forces the Selected Value to stay within a range defined by the Low Clipping Limit and High Clipping Limit. Clipping is only applied when there is not a fault. | |
| | **Disable** | Clipping does not occur. |

| Field | Description | |
|---|---|---|
| | **Enable** | Clipping does occur.<br>**Note**<br>You **must** enter a value in the Low Clipping Limit and High Clipping Limit fields. |
| | **Low Clipping Limit** | When clipping is enabled, this field sets the lower limit of the Selected Value parameter. |
| | **High Clipping Limit** | When clipping is enabled, this field sets the upper limit of the Selected Value parameter. |

4. Select **Save** to save any changes you make to this display.

### 4.5.10.1 Configuring Analog Outputs

Use these steps to configure an analog output on your FB Series product.

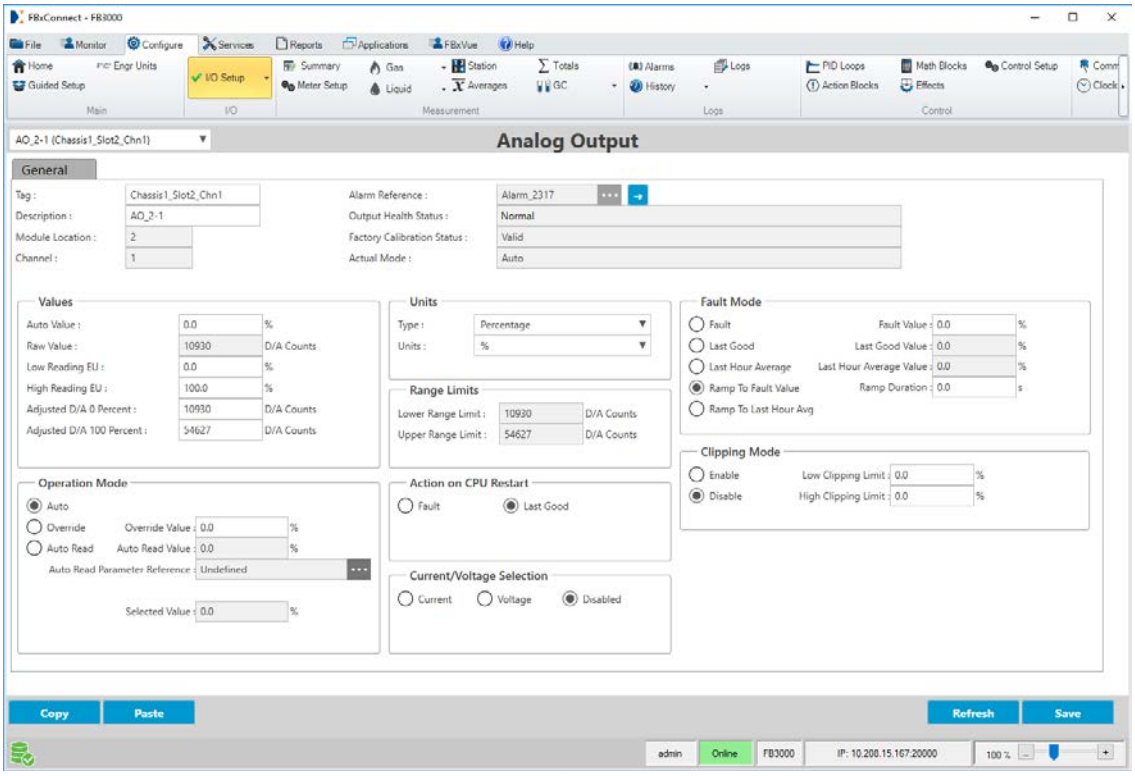
**Note**

You **must** configure I/O types before you configure I/O. For more information, refer to I/O Configuration.

To configure an analog output:

1. Select **Configure > I/O Setup > AO** from the DeltaV FBxConnect configuration software main menu.

**Figure 142. Analog Output**




2. Click ▼ in the drop-down list at the top of the display to select an analog output channel to configure.
3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **Units** frame, set the measurement type and engineering units used for the selected channel.
6. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

**Note**

- If you select **Auto**, the system copies the value in the **Auto Value** field to the Selected Value parameter.
- If you select **Override**, the system copies the value set in the **Override Value** field to the Selected Value parameter.

- If you select **Auto Read**, the system copies the value of the parameter you configure in the **Auto Read Parameter Reference** field to the Selected Value parameter.

7. In the **Fault Mode** frame, set how the system acquires the value of the selected channel when a fault occurs.

**Note**

If you select **Fault**, you must enter a value in the **Fault Value** field.

8. In the **Low Reading EU** field, set the low reading that is equal to zero percent output.
9. In the **High Reading EU** field, set the high reading that is equal to 100 percent output.
10. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Analog Output.
11. Select **Save** to save your changes to device memory.

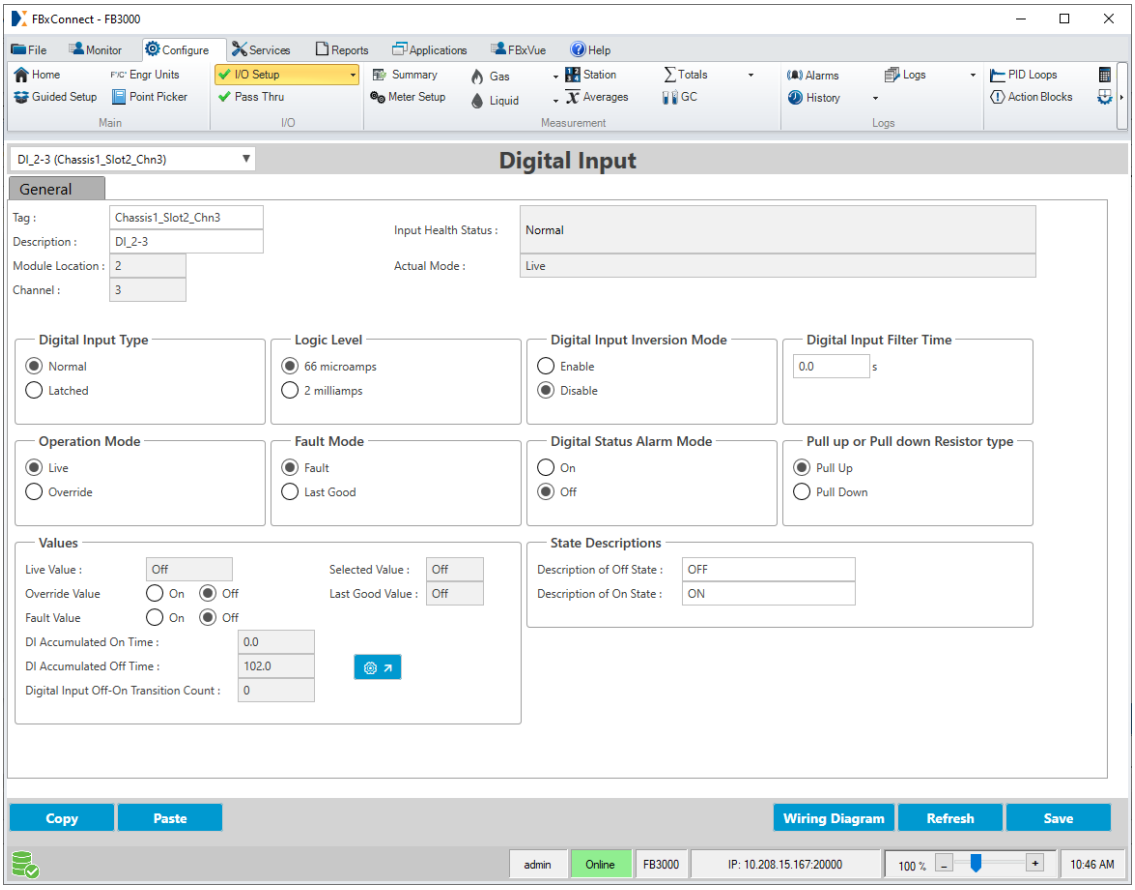
## 4.5.11 Digital Input

Use this display to configure digital inputs (DI). Digital inputs monitor the status of relays, open collector/open drain type solid-state switches, and other two-state devices. Each DI channel can also be software configured to function as a "latched" DI, which remains in the active state until reset. Other parameters can invert the field signal and gather statistical information on the number of transitions and the time accumulated in the on or off state.

To access this display:

1. Select **Configure > I/O Setup > DI** from the DeltaV FBxConnect configuration software main menu.

**Figure 143. Digital Input**




2. Click ▼ in the drop-down list at the top of the display to select a digital input channel to configure.

3. Review – and change as necessary – the values in the following fields:

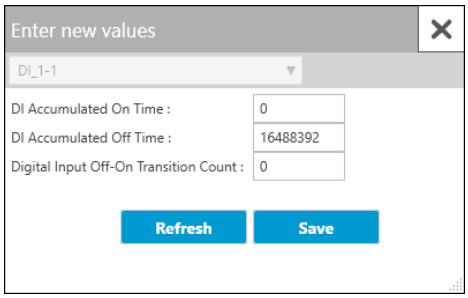
| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected module channel. |

| Field | Description | |
|---|---|---|
| **Input Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Termination Missing<br>• Status Alarm<br>• Hardware Fail | |
| **Actual Mode** | This **read-only** field shows the source of the selected value. Possible values are:<br>• Live<br>• Override<br>• Fault<br>• Last Good | |
| **Digital Input Type** | Set how the digital inputs function when the Operation Mode is set to Live. Possible options are: | |
| | **Normal** | The Selected Value is updated based on the Live Value. |
| | **Latched** | When the Live parameter transitions from off to on, the selected parameter remains on, until the latch is cleared using the Reset Latch parameter. |
| **Reset Latch** | Select to clear the latched state of the digital input.<br>**Note**<br>This field display **only** if you select **Latched** in the **Digital Input Type** frame. | |
| | **Disable** | No action is taken. |

| Field | Description | |
|---|---|---|
| | **Enable** | Clears the latched state of the digital input. The Reset Latch parameter will be reset back to Disable once the latch is cleared. |
| **Logic Level** | Sets the amount of current that the channel sources. Pick the appropriate setting based on the digital input device used with this channel.<br>**Note**<br>This field shows for the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. | |
| | **66 microamps** | The input will source 66 microamps. |
| | **2 milliamps** | The input will source 2 milliamps. |
| **Digital Input Inversion Mode** | Sets whether the system will invert the Live value before writing it to the Selected value.<br>**Note**<br>This mode only works when the Operation Mode is set to Live and there is not a fault. | |
| | **Disable** | The Selected Value will be set to the Live value. |
| | **Enable** | The Selected Value will be set to the inverse of the Live value. For example, if the Live value is "Off" then the Selected value will be "On." |
| **Digital Input Filter Time** | Sets the amount of time (in seconds) the discrete input must remain in the On (high) state before it is recognized as such. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition. | |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: | |
| | **Live** | The system copies the Live Value to the Selected Value parameter. |

| Field | Description | |
|---|---|---|
| | **Override** | The system copies the value you select in the Override Value field to the Selected Value parameter.<br>**Note**<br>If a fault occurs and the operation mode is set to Override, the Selected Value parameter is set to the Override Value and is not set based on the Fault Mode. |
| **Fault Mode** | Sets how the system acquires the value written to the Selected Value parameter when a fault occurs. | |
| | **Fault** | The system copies the value set in the **Fault Value** field to the Selected Value parameter. |
| | **Last Good** | The system copies the value of the **Last Good Value** field to the Selected Value parameter. |
| **Digital Status Alarm Mode** | Sets alarming for the digital input. | |
| | **Off** | No alarms are logged. |
| | **On** | A Set Alarm is logged when the Selected value transitions from “off” to “on.” A Clear Alarm is logged when the digital input transitions from “on” to “off.” |
| **Pull up or Pull down Resistor Type** | Activates a pull up or pull down resistor to maintain input in a deterministic state when no input is applied.<br>**Note**<br>This field shows for the 12-Channel Mixed I/O module (8AIDIPI 2AO 2DO), 6-Channel Mixed I/O module (MIO6X) and 8-Channel Mixed I/O module with 2 RTD (MIO8T) **only**. | |
| | **Pull Up** | Enables pull up resistor to pull up to +24V in the logic module hardware and maintain signal High when no input is applied. No external source is required; you can connect an external switch or relay contact which is potential free. |

| Field | Description | |
|---|---|---|
| | **Pull Down** | Enables pull down resistor to pull down to ISO GND in the logic module hardware and maintain signal Low when no input is applied. For this choice you must have an external +24VDC supply. You can connect an external switch or relay contact but it must be in series with the +24V source. |
| **Live Value** | This **read-only** field shows the state of the selected input. | |
| **Selected Value** | This **read-only** field shows the value based on the Operation Mode and Fault Mode fields, as well as the health status of the selected input. It is intended to be used as an input to calculations and control logic. | |
| **Override Value** | Sets the value that is written to the Selected Value field when the **Operation Mode** is set to **Override**. Possible options are: | |
| | **Off** | The selected channel is set to Off when the **Operation Mode** is set to **Override**. |
| | **On** | The selected channel is set to On when the **Operation Mode** is set to **Override**. |
| **Last Good Value** | This **read-only** field shows the last good value (Off or On) received by the channel. This value would be used if a fault occurred and the **Fault Mode** was set to **Last Good**. | |
| **Fault Value** | Sets the value to use when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. Possible options are: | |
| | **Off** | The channel is set to Off when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. |
| | **On** | The channel is set to On when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. |
| **DI Accumulated On Time** | Counts the number of 1-second periods when the Live Value parameter is in the On state. The On Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the On Counter by entering the desired value or clear the counter by entering **0**. | |

| Field | Description |
|---|---|
| **DI Accumulated Off Time** | Counts the number of 1-second periods when the Live Value parameter is in the Off state. The Off Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the Off Counter by entering the desired value or clear the counter by entering **0**. |
| **Digital Input Off-On Transition Count** | Sets a value for the accumulated number of off-to-on transitions for the selected channel. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desired value or clear it by entering **0**. |
|  | Click to open a pop-up display that lets you preset or reset the values for the selected digital input.<br>  |
| **DI Accumulated On Time** | You can preset the On Counter by entering the desired value or clear the counter by entering **0**. |
| **DI Accumulated Off Time** | You can preset the Off Counter by entering the desired value or clear the counter by entering **0**. |
| **Digital Input Off-On Transition Count** | You can preset the accumulator to a desired value or clear it by entering **0**. |
| **Refresh** | The values shown are frozen at the time you open this pop-up display. Select this button to update these values. |
| **Save** | Select this button to save any changes you make to the DI values and close the pop-up display. |
| **Description of Off State** | Enter a short description (up to 10-alphanumeric characters) for the digital input off state. |

| Field | Description |
|---|---|
| **Description of On State** | Enter a short description (up to 10-alphanumeric characters) for the digital input on state. |

4. Select **Save** to save any changes you make to this display.

### 4.5.11.1 Configuring Digital Inputs

Use these steps to configure a digital input on your FB Series product.

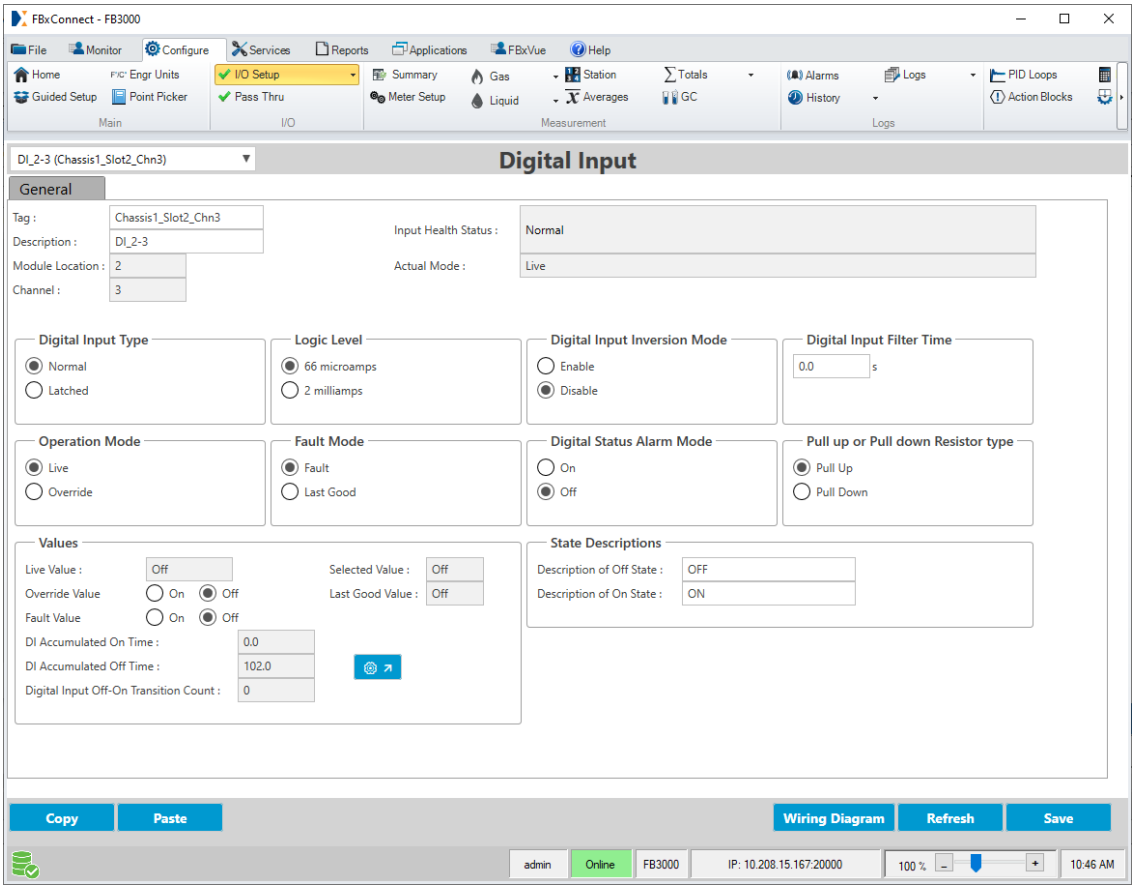
**Note**

You **must** configure I/O types before you configure I/O. For more information, refer to I/O Configuration.

To configure a digital input:

1. Select **Configure > I/O Setup > DI** from the DeltaV FBxConnect configuration software main menu.

**Figure 144. Digital Input**




2. Click ▼ in the drop-down list at the top of the display to select a digital input channel to configure.
3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **Digital Input Type** frame, select how the digital inputs function when the Operation Mode is set to Live (Normal or Latched).
6. In the **Logic Level** frame, select the amount of current sourced by the channel.

**Note**

Pick the appropriate setting based on the digital input device used with this channel.

7. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

**Note**

If you select **Override**, you **must** set a value in the **Override Value** field.

8. In the **Fault Mode** frame, set how the system acquires the value of the selected channel when a fault occurs.

**Note**

If you select **Fault**, you **must** enter a value in the **Fault Value** field.

9. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Digital Input.

10. Select **Save** to save your changes to device memory.

## 4.5.12 Digital Output

Use this display to configure digital output channels. Digital outputs are high/low outputs used to turn equipment on and off. You can set a digital output to send a pulse to a specified device. You can also configure a digital output as latching, momentary, toggle, timed duration output momentary, timed duration output toggle, or scaled pulse output with a fixed pulse width.

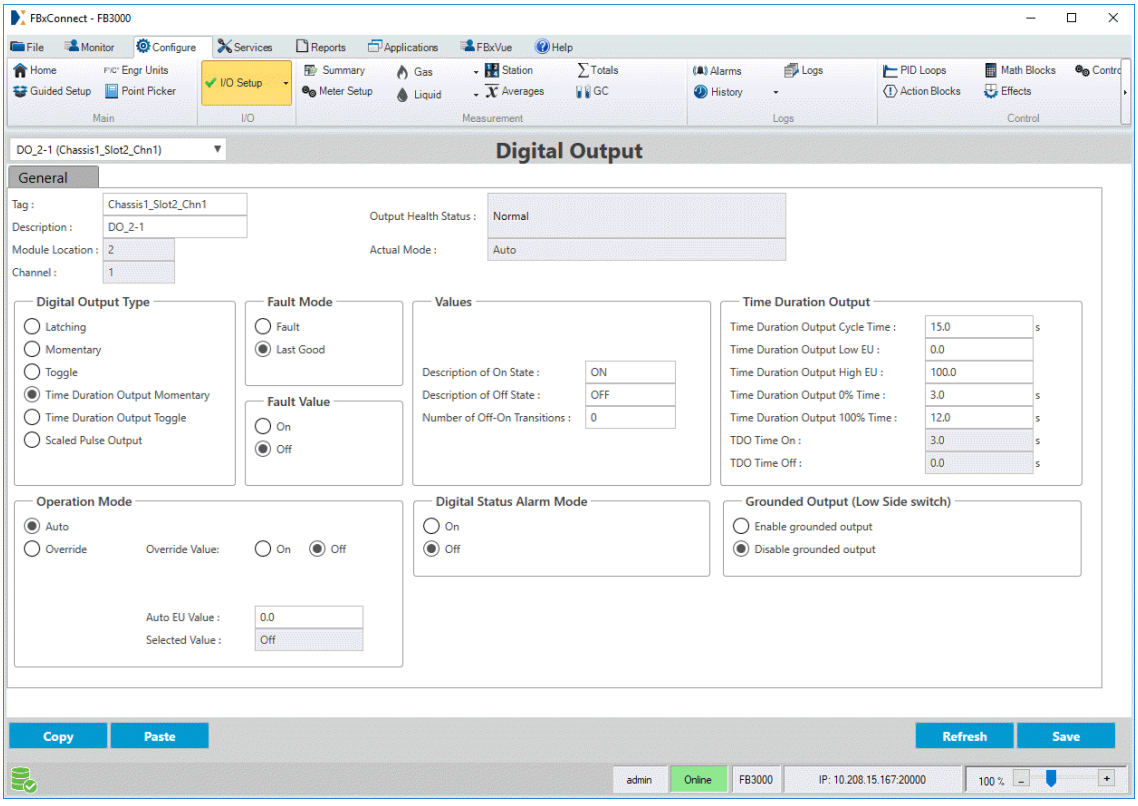
**Note**

Set the **Digital Output Type** field to **Scaled Pulse Output** to send a pulse output to another device, such as an odorizer, and to control a gas sampler for a meter run.

To access this display,

1. Select **Configure > I/O Setup > DO** from the DeltaV FBxConnect configuration software main menu.

**Figure 145. Digital Output**




2. Click ▼ in the drop-down list at the top of the display to select a digital output channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected module channel. |

| Field | Description | |
|---|---|---|
| **Output Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Instance Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Auto Read Parameter Invalid<br>• SPO Parameter Invalid<br>• Termination Missing<br>• Status Alarm<br>• Hardware Fail | |
| **Actual Mode** | This **read-only** field shows the source of the selected value. Possible values are:<br>• Auto<br>• Auto Read<br>• Override<br>• Fault<br>• Last Good | |
| **Digital Output Type** | Select the function of the digital output when the Operation mode is Auto or Auto Read and there is no fault. Digital outputs are high/low outputs used to turn equipment on and off. Possible options are: | |
| | **Latching** | The discrete output turns on when the Auto or Auto Read Value, depending on Operation mode, is on. The output remains on until the Auto or Auto Read value turns off. |

| Field | Description | |
|---|---|---|
| | **Momentary** | When the Auto or Auto Read Value transitions from off to on, the discrete output will turn the discrete output on for the amount of time defined in the Time On field. The Auto parameter will be automatically set to 0 (off) when the discrete output generates the momentary output.<br>**Note**<br>The discrete output will not set the Auto Read Value back to 0. |
| | **Toggle** | Enables a square-wave output for which both the time on and time off are defined by the value in the Time On and Time Off parameters, respectively. |
| | **Timed Duration Output Momentary** | Enables the discrete output to complete one cycle based on the time related parameters in the Time Duration Output frame, and the Auto EU value. Once a cycle is completed, the DO will remain off until the Auto EU value is modified, starting a new cycle. |
| | **Timed Duration Output Toggle** | Enables the discrete output to continuously repeat in a cycle defined by the value in the Cycle Time field on the TDO Parameters Tab where the EU Value controls the on-time duration. The current cycle will be completed before a new Auto EU value takes effect. |
| | **Scaled Pulse Output** | Enables the discrete output to be turned on for the amount of time defined in the Time On field each time an accumulation limit is reached. This could be used to send a pulse output to another device, such as an odorizer, or to turn a sampler on each time a certain amount of flow is accumulated. |
| **Fault Mode** | Sets the value to use when the output experiences a fault condition. Possible options are:<br>**Note**<br>If the DO type is TDO momentary, TDO toggle, or SPO, the DO will be set to off instead of set based on the fault mode. | |
| | **Fault** | The system uses the value set in the **Fault Value** field. |

| Field | Description | |
|---|---|---|
| | **Last Good** | The system uses the last good value output before the fault occurred. |
| **Fault Value** | Sets the value to use when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. Possible options are: | |
| | **Off** | The channel is set to off when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. |
| | **On** | The channel is set to on when a fault occurs on the selected channel and the **Fault Mode** is set to **Fault**. |
| **Operation Mode** | Sets how the system acquires the value written to the Selected Value parameter under normal operation. Possible options are: | |
| | **Auto** | The system copies the value in the **Auto Value** field to the Selected Value parameter. |
| | **Override** | The system copies the value set in the **Override Value** field to the Selected Value parameter. |
| | **Auto Read** | The system copies the value of the parameter you configure in the **Auto Read Parameter Reference** field to the Selected Value parameter.<br>**Note**<br>This field applies **only** if you select **Latching** or **Momentary** in the **Digital Output Type** frame. |
| **Auto Value** | Sets the value to use for the selected channel when the **Operation Mode** is set to **Auto**. Possible options are: | |
| | **Off** | The system copies a value of Off to the Selected Value parameter. |
| | **On** | The system copies a value of On to the Selected Value parameter. |
| | **Note**<br>This field applies **only** if you select **Latching** or **Momentary** in the **Digital Output Type** frame. | |
| **Override Value** | Sets the value that is written to the Selected Value field when the **Operation Mode** is set to **Override**. Possible options are: | |
| | **Off** | The system copies a value of Off to the Selected Value parameter. |

| Field | Description | |
|---|---|---|
| | **On** | The system copies a value of On to the Selected Value parameter. |
| **Auto Read Value** | This **read-only** field shows the current value (Off or On) of the parameter configured in the **Auto Read Parameter Reference** field.<br>**Note**<br>This field applies **only** if you select **Latching** or **Momentary** in the **Digital Output Type** frame. | |
| **Auto Read Parameter Reference** | Click ••• to open a Point Picker dialog and select a parameter to use as the digital output value when the **Operation Mode** is set to **Auto Read**.<br>**Note**<br>This field applies **only** if you select **Latching** or **Momentary** in the **Digital Output Type** frame. | |
| **Auto EU Value** | Sets the EU Value which controls the Time On. The output is set based on the magnitude of the value, as calculated by the following equation:<br>Time On = ((EU Value - Low Reading EU) / (High Reading EU - Low Reading EU) * (High Time - Low Time)) + Low Time<br>**Note**<br>This field applies only if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. | |
| **Selected Value** | This **read-only** field shows the value based on the Operation Mode and Fault Mode fields, as well as the health status of the selected input. It is intended to be used as an input to calculations and control logic.<br>**Note**<br>The Selected Value will mirror the DO's physical output. For example, the Selected Value will toggle on and off if the DO Type is set to toggle. | |

| Field | Description |
|---|---|
| **Time On** | Sets the amount of time, in seconds, an output is set to On. The minimum On and Off time is 0.01 seconds, resulting in a maximum frequency of 50 Hz. The default value is 1.0 seconds.<br>• In **Momentary** mode, this is the amount of time (in seconds) that the output is energized.<br>• In **Toggle** mode, this is the amount of time (in seconds) between switching On or Off.<br>• In **Scaled Pulse Output** mode, this is the amount of time (in seconds) that the output is energized each time the change in the Scaled Pulse Output Value is greater than the Pulse Output Significance. For example, if the Scaled Pulse Output Value is 950 MCF when the scaled pulse output functionality is enabled and the Pulse Output Significance is 1000 MCF, the DO will be energized when the Scaled Pulse Output Value reaches 1950 MCF.<br>**Note**<br>This field applies only if you select **Momentary**, **Toggle**, or **Scaled Pulse Output** in the **Digital Output Type** frame. |
| **Time Off** | Sets the amount of time, in seconds, the output is set to Off. The minimum On and Off time is 0.01 seconds, resulting in a maximum frequency of 50 Hz. The default value is 1.0 seconds.<br>**Note**<br>This field applies **only** if you select **Toggle** in the **Digital Output Type** frame. |
| **Description of On State** | Enter a short description (up to 10-alphanumeric characters) for the On state of the digital output.<br>**Note**<br>This field applies **only** if you select **Latching**, **Momentary**, **Toggle**, **Time Duration Output Momentary**, or **Time Duration Output Toggle** in the **Digital Output Type** frame. |

| Field | Description | |
|---|---|---|
| **Description of Off State** | Enter a short description (up to 10-alphanumeric characters) for the Off state of the digital output.<br>**Note**<br>This field applies **only** if you select **Latching**, **Momentary**, **Toggle**, **Time Duration Output Momentary**, or **Time Duration Output Toggle** in the **Digital Output Type** frame. | |
| **Number of Off-On Transitions** | Sets a value for the accumulated number of Off-to-On transitions for the selected channel. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desired value or clear it by entering **0**. | |
| **Digital Status Alarm Mode** | Sets Alarming for the digital output. | |
| | **Off** | No alarms are logged. |
| | **On** | A Set Alarm is logged when the Selected value transitions from “off” to “on.” A Clear Alarm is logged when the digital output transitions from “on” to “off.” |
| **Action on CPU Restart** | For **Latched DO's**, sets the value to use for the channel after a power cycle occurs.<br>For **Momentary DO's**, the output is set to Off and no momentary pulse is generated.<br>For **all other DO's**, the output is set based on the behavior described in the Digital Output Type parameter section.<br>Possible options are: | |
| | **Fault** | The system uses the value set in the **Fault Value** field. |
| | **Last Good** | The system uses the last good value output before the fault occurred. |
| | **Note**<br>• During a power cycle, a discrete output is set to Off while the FB Series product is restarting. Once the FB Series product has completed the restart, then the action on power cycle is applied.<br>• This field applies **only** if you select **Latching** in the **Digital Output Type** frame and **Auto** in the **Operation Mode** frame.<br>• If only the 12MIO restarts, then the Action on CPU Restart is applied until communication is established with main CPU. | |

| Field | Description |
|---|---|
| **Time Duration Output Cycle Time** | Sets the total amount of time (in seconds) the cycle spends in the On and Off positions.<br>The Cycle Time entry is used to define the Off Time in the Time Duration Output Toggle mode. The Off Time is calculated by the formula:<br>Off Time = Cycle Time - On Time<br>Example:<br>A Time Duration Output is used to emulate a field instrument measuring flow. The Time Duration Output outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow. The output is repeated every 15 seconds.<br>If the Cycle Time is less than, or equal to the On Time, the Off Time is set to one. Care must be taken in configuration to ensure that the Cycle Time remains greater than the calculated On Time for proper operation.<br>**Note**<br>This field applies only if you select **Time Duration Output Toggle** in the **Digital Output Type** frame. |
| **Time Duration Output Low EU** | Sets the value for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.<br>**Note**<br>This field applies only if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. |
| **Time Duration Output High EU** | Sets the value for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.<br>**Note**<br>This field applies only if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. |

| Field | Description |
|---|---|
| **Time Duration Output 0% Time** | Sets the amount of time (in seconds) the cycle is in the On position when the EU is at zero percent.<br>**Note**<br>• 0% and 100% should be less than or equal to the Cycle Time.<br>• This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. |
| **Time Duration Output 100% Time** | Sets the amount of time (in seconds) the cycle is in the on position when the EU is at 100 percent.<br>**Note**<br>• 0% and 100% should be less than or equal to the Cycle Time.<br>• This field applies **only** if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. |
| **TDO Time On** | This **read-only** field shows the value calculated from the entered Auto EU Value and the previous definitions of Low Reading Time, High Reading Time, Low Reading EU, and High Reading EU. The calculation formula is:<br>TDO Time On = ((EU Value - Low Reading EU) / (High Reading EU - Low Reading EU) * (High Time - Low Time)) + Low Time<br>**Note**<br>This field applies only if you select **Time Duration Output Momentary** or **Time Duration Output Toggle** in the **Digital Output Type** frame. |
| **TDO Time Off** | This **read-only** field shows the value calculated from the Cycle Time and the TDO Time On. The calculation formula is:<br>TDO Time Off = Cycle Time - TDO Time On<br>**Note**<br>This field applies only if you select **Time Duration Output Toggle** in the **Digital Output Type** frame. |

| Field | Description | |
|---|---|---|
| **Scaled Pulse Output Parameter Reference** | This parameter chooses the parameter the digital output will monitor for changes so that it can turn the digital output on for the amount of time specified by the Time On parameter each time it changes by the amount specified in the Pulse Output Significance parameter.<br>**Note**<br>• Choose a parameter with an incremental value.<br>• This field applies **only** if you select **Scaled Pulse Output** in the **Digital Output Type** frame. | |
| **Scaled Pulse Output Value** | This **read-only** field shows the value of the parameter configured in the Scaled Pulse Output Parameter Reference field.<br>**Note**<br>This field applies only if you select **Scaled Pulse Output** in the **Digital Output Type** frame. | |
| **Pulse Output Significance** | This field defines the amount of change that must occur in the Scaled Pulse Output parameter before a pulse will be generated.<br>**Note**<br>• This parameter is in the same units as the Scaled Pulse Output Value.<br>• This field applies **only** if you select **Scaled Pulse Output** in the **Digital Output Type** frame. | |
| **Override Value** | Sets the value that is written to the Selected Value field when the **Operation Mode** is set to **Override**. Possible options are: | |
| | **Off** | The system copies a value of Off to the Selected Value parameter. |
| | **On** | The system copies a value of On to the Selected Value parameter. |
| **Grounded Output (Low Side Switch)** | Sets if the digital output is internally connected to or isolated from ground. | |
| | **Enabled** | The DO_LO pin is internally connected to ground and provides a grounded output (50 mA current limit). |
| | **Disabled** | The DO_LO pin is internally isolated from ground and acts as a contact closure. |

| Field | Description |
|---|---|
| | **Note**<br>This field applies to the Mixed I/O module **only**. |

4. Select **Save** to save any changes you make to this display.

## 4.5.12.1 Configuring Digital Outputs

Use these steps to configure a digital output on your FB Series product.

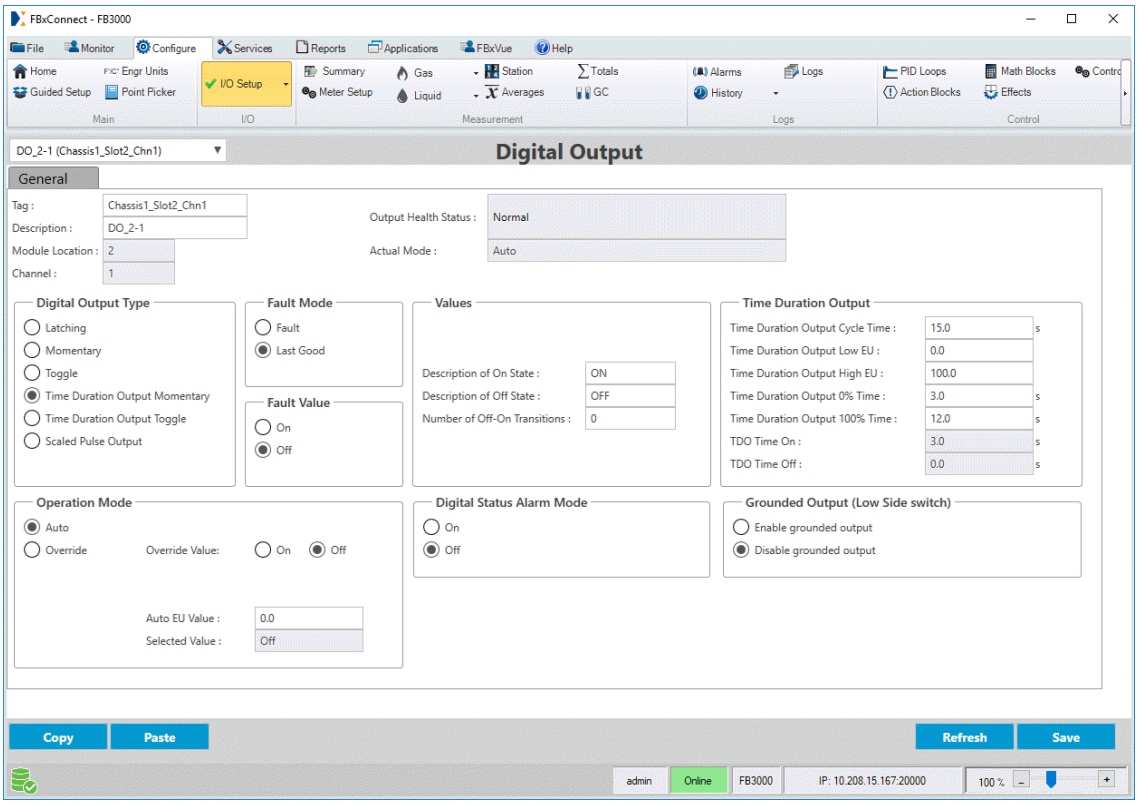
**Note**

You **must** configure I/O types before you configure I/O. For more information, refer to I/O Configuration.

To configure a digital output:

1. Select **Configure > I/O Setup > DO** from the DeltaV FBxConnect configuration software main menu.

**Figure 146. Digital Output**



2. Click ▼ in the drop-down list at the top of the display to select a digital output channel to configure.
3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **Digital Output Type** frame, select the function of the digital output when the Operation mode is Auto or Auto Read and there is no fault.
6. Select **Save** to save your changes to device memory, and update the available fields based on the selected Digital Output Type.
7. In the **Operation Mode** frame, set how the system acquires the value of the selected channel under normal operating conditions.

---

**Note**

If you select **Auto**, the system copies the value in the Auto Value field to the Selected Value parameter.
If you select **Override**, the system copies the value set in the **Override Value** field to the Selected Value parameter.
If you select **Auto Read**, the system copies the value of the parameter you configure in the **Auto Read Parameter Reference** field to the Selected Value parameter.

---

8. In the **Fault Mode** frame, set how the system acquires the value of the selected channel when a fault occurs.

---

**Note**

If you select **Fault**, you must select a value to use in the **Fault Value** frame.

---

9. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Digital Output.
10. Select **Save** to save your changes to device memory.

## 4.5.13 Pulse Input

Use this display to configure pulse inputs. Pulse inputs accept pulse trains (square wave signals) that measurement devices (such as turbine meters) generate. The pulse input accepts digital level on/off signals from an external device and accumulates the changes

over a configured period of time. Pulse inputs can also determine a rate from the accumulated pulses over a configured period of time.

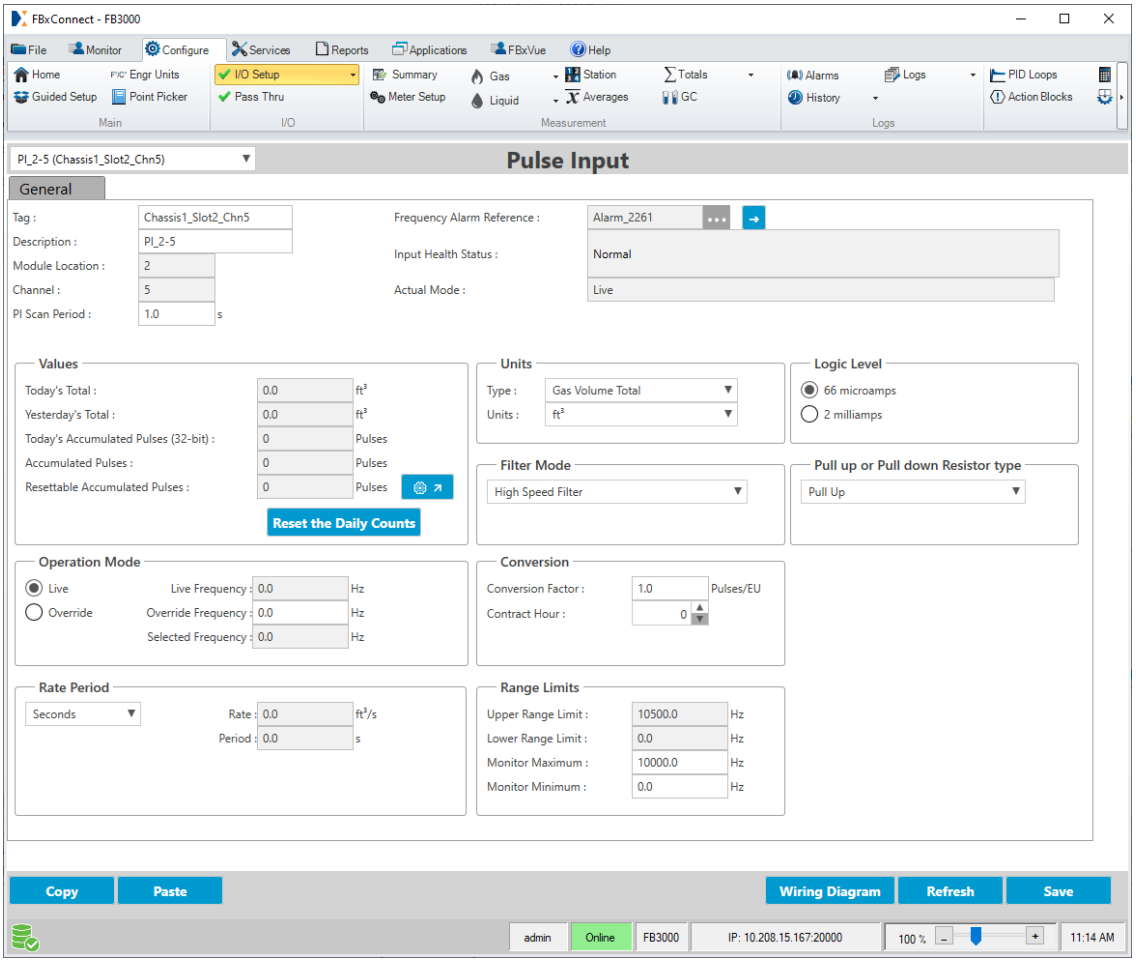
**Note**

The **lowest frequency the system can accurately measure** is 1 divided by the PI Scan Period. Flow control may be erratic below this threshold.

To access this display:

1. Select **Configure > I/O Setup > PI** from the DeltaV FBxConnect configuration software main menu.

**Figure 147. Pulse Input**




2. Click ▼ in the drop-down list at the top of the display to select a pulse input channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected module channel. |
| **PI Scan Period** | Sets how frequently the system scans the input (in seconds) to acquire the value. Each input updates based on their individual scan period. |
| **Frequency Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the point.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters. |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Termination Missing<br>• Hardware Fail |
| **Actual Mode** | This **read-only** field shows the source of the selected value. |
| **Today's Total** | This **read-only** field shows the total flow for the current day. |

| Field | Description | |
|---|---|---|
| **Yesterday's Total** | This **read-only** field shows the total flow for the previous day. | |
| **Today's Accumulated Pulses (32-bit)** | This **read-only** field shows the number of pulses stored in the accumulated value counter in firmware. For each I/O scan period (poll interval), the device determines the number of pulses that have occurred since the last I/O scan period and adds them to the accumulated value counter. | |
| **Accumulated Pulses** | This **read-only** field shows the number of raw counts stored in the accumulated value counter in firmware. For each scan period, the device determines the number of raw counts that have occurred since the last scan period and adds them to the accumulated value counter.<br>**Note**<br>The accumulated value rolls over to zero after reaching **4,294,967,296**. | |
| **Resettable Accumulated Pulses** | This **read-only** field shows the number of raw counts stored in the accumulated value counter in firmware since the last time this field was manually reset to a custom value.<br>**Note**<br>To reset this field to a custom value, click  to open a pop-up display, enter the desired number of pulses in the **Resettable Accumulated Pulses** field, and select **Save**. New pulses are added to the entered value. | |
| **Reset the Daily Counts** | Click to reset **all daily** pulse input totals [Today's Total, Yesterday's Total, and Today's Accumulated Pulses (32-bit)]. | |
| **Units** | Sets the measurement type and engineering units used for the selected channel. | |
| | **Type** | Sets the measurement type used for the selected channel.<br>**Note**<br>Click **Save** after you select the type of units to update the units available in the **Units** field. |

| Field | Description | |
|---|---|---|
| | **Units** | Sets the engineering units used for the selected channel.<br>**Note**<br>Changing the Units does not alter the value of parameters. |
| | **Note**<br>These fields are hidden when the selected pulse input channel is assigned to a Linear Meter Input. | |
| **Filter Mode** | Sets the amount of filtering that will be applied to the pulse input. Choose a filtering mode that is appropriate for the input frequency, and the amount of noise that may be present. | |
| | **Low Speed Filter** | Choose low speed filtering if the pulse input will be measuring frequencies less than 10Hz. |
| | **Medium Speed Filter** | Choose medium speed filtering if the pulse input will be measuring frequencies between 0 to 300Hz. |
| | **High Speed Filter** | Choose high speed filtering if the pulse input will be measuring frequencies above 300Hz. |
| **Logic Level** | This setting determines the amount of current that the channel sources. Pick the appropriate setting based on the pulse input device used with this channel.<br>**Note**<br>• This field shows for the **8AIDIPI 2AO 2DO** module (3MIX12) **only**.<br>• For the PI configuration driven from an open collector stage, high speed (10KHz) is **only** supported with the 2 milliamps setting.<br>• For the PI configuration driven from a voltage source, 66 microamps is acceptable for low and high speed. | |
| | **66 microamps** | The input will source 66 microamps. |
| | **2 milliamps** | The input will source 2 milliamps. |
| **Operation Mode** | Sets the source of the selected value. Possible options are: | |
| | **Live** | The system uses the current value of the input. |

| Field | Description | |
|---|---|---|
| | **Override** | The system uses the value set in the **Override Frequency** field. |
| **Live Frequency** | This **read-only** field shows the current value from the field device. | |
| **Override Frequency** | Sets the value to use for the selected channel when the **Operation Mode** is set to **Override**. | |
| **Selected Frequency** | This **read-only** field shows the current value used in calculations. | |
| **Conversion Factor** | Sets the ratio of the number of pulses per engineering unit.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Gas or Liquid Linear Meter Input. | |
| **Contract Hour** | Click ▼ to set the hour of the day to begin the daily counted parameters.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Gas or Liquid Linear Meter Input. | |
| **Rate Period** | Click ▼ to set the time units used for the PI scan rate.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Linear Meter Input. | |
| **Rate** | This **read-only** field shows the calculated rate as of the most recent scan expressed in engineering units per unit of time. The system calculates the rate at the end of each scan period by dividing the number of pulses received by the conversion value and then multiplying by the rate period.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Linear Meter Input. | |

| Field | Description |
|---|---|
| **Period** | This **read-only** field shows the amount of time between each pulse. For example, if the input frequency was 100 Hz, the period will be 0.01 seconds.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Linear Meter Input. |
| **Accumulated Pulses** | This **read-only** field shows the number of raw counts stored in the accumulated value counter in firmware. For each scan period, the FB Series product determines the number of raw counts that have occurred since the last scan period and adds them to the accumulated value counter.<br>The accumulated value rolls over to zero after reaching 4,294,967,295.<br>**Note**<br>This field is hidden when the selected pulse input channel is assigned to a Linear Meter Input. |
| **Upper Range Limit** | This **read-only** field shows the maximum frequency the pulse input can measure. |
| **Lower Range Limit** | This **read-only** field shows the minimum frequency the pulse input can measure. |
| **Monitor Maximum** | Sets the maximum value of the pulse input gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |
| **Monitor Minimum** | Sets the minimum value of the pulse input gauge shown on the Monitor > Main display.<br>**Note**<br>• To avoid prolonged display rendering times, limit the scale range to no more than 10,000.<br>• This field applies **only** to the FB1000 and FB2000 Series Flow Computers. |

| Field | Description | |
|---|---|---|
| **Pull up or Pull down Resistor Type** | Activates a pull-up or pull-down resistor to maintain input in a deterministic state when no input is applied.<br>**Note**<br>This field shows for the **8AIDIPI 2AO 2DO** module (3MIX12) **only**. | |
| | **Pull Up** | Maintain signal High when no input is applied. |
| | **Pull Down** | Maintain signal Low when no input is applied.<br>**Note**<br>Open collector circuit configuration is **not** supported with a pull down resistor. |

4. Select **Save** to save any changes you make to this display.

### 4.5.13.1 Configuring Pulse Inputs

Use these steps to configure a pulse input on your FB Series product.

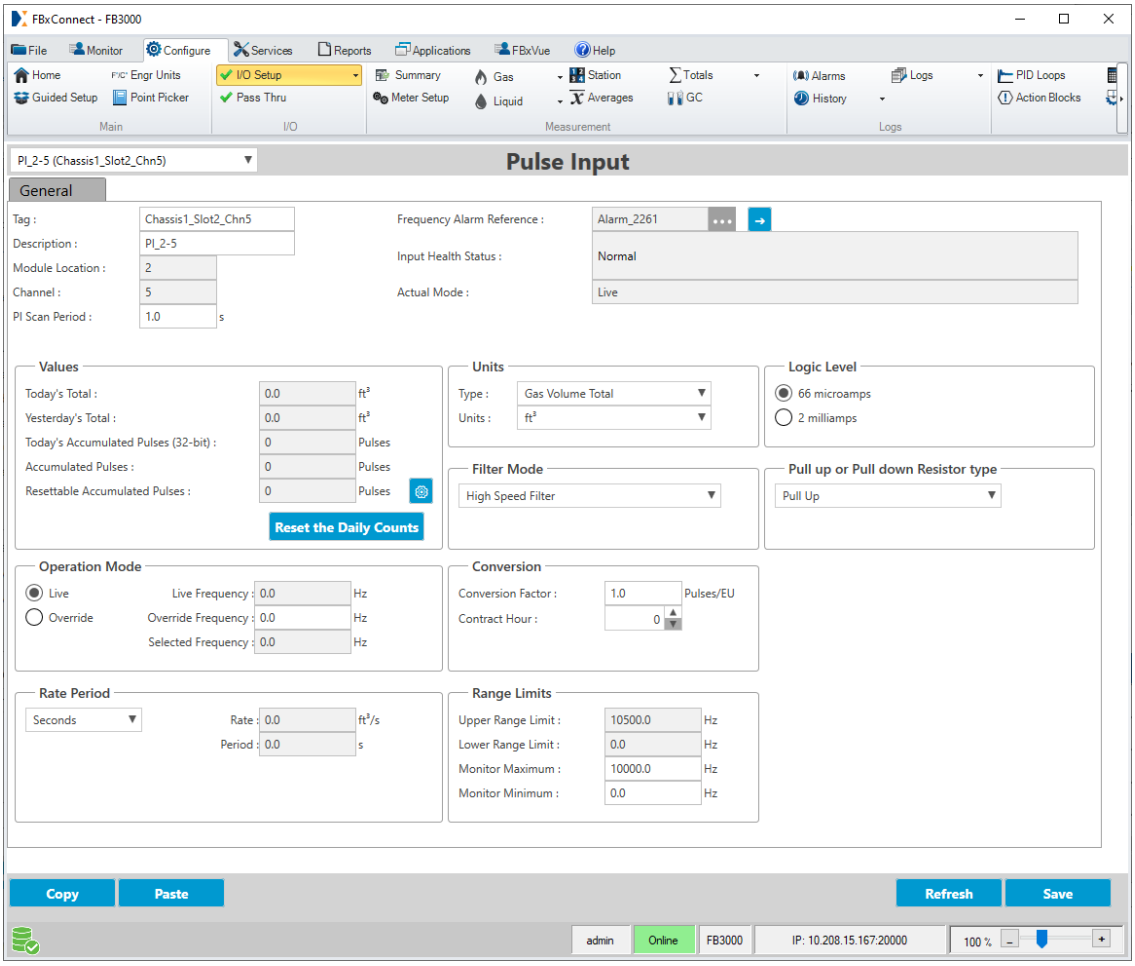
**Note**

You **must** configure I/O types before you configure I/O. For more information, refer to I/O Configuration.

To configure a pulse input:

1. Select **Configure > I/O Setup > PI** from the DeltaV FBxConnect configuration software main menu.

**Figure 148. Pulse Input**




2. Click ▼ in the drop-down list at the top of the display to select a pulse input channel to configure.
3. In the **Tag** field, enter a name for the selected channel.
4. In the **Description** field, enter a description for the selected channel.
5. In the **Units** frame, set the measurement type and engineering units used for the selected channel.
6. In the **Logic Level** frame, select the amount of current sourced by the channel.

**Note**

Pick the appropriate setting based on the pulse input device used with this channel.

7. In the **Operation Mode** frame, set the source of the selected value.

**Note**

If you select **Override**, you **must** enter a value in the **Override Frequency** field.

8. In the **Rate Period** frame, click ▼ to set the time units used for the PI scan rate.
9. In the **PI Scan Period** field, set how frequently the system scans the input to acquire the value.
10. In the **Filter Mode** frame, set the amount of filtering that will be applied to the pulse input.
11. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Pulse Input.
12. Select **Save** to save your changes to device memory.

## 4.5.14 PI Pair

Use this display to configure the fidelity and security of pulse input pairs. Pulse input pairs consist of two individual pulse inputs. You can select levels B through D for pulse integrity checking and each pulse input in the pair shares the same pulse integrity level.

- Pair 1 = Pulse Input 1 and Pulse Input 2 (3APM05 and 3APM10)
- Pair 2 = Pulse Input 3 and Pulse Input 4 (3APM05 and 3APM10)
- Pair 3 = Pulse Input 5 and Pulse Input 6 (3APM10 only)
- Pair 4 = Pulse Input 7 and Pulse Input 8 (3APM10 only)

Alarms occur if any of the level checking has failed, such as a Phase Error, Sequence Error, PI 1 Failure, and PI 2 Failure. Standards are in accordance with the American Petroleum Institute Manual of Petroleum Measurement Standards Chapter 5.5, June 1982 and ISO 6551:1982.

**Note**

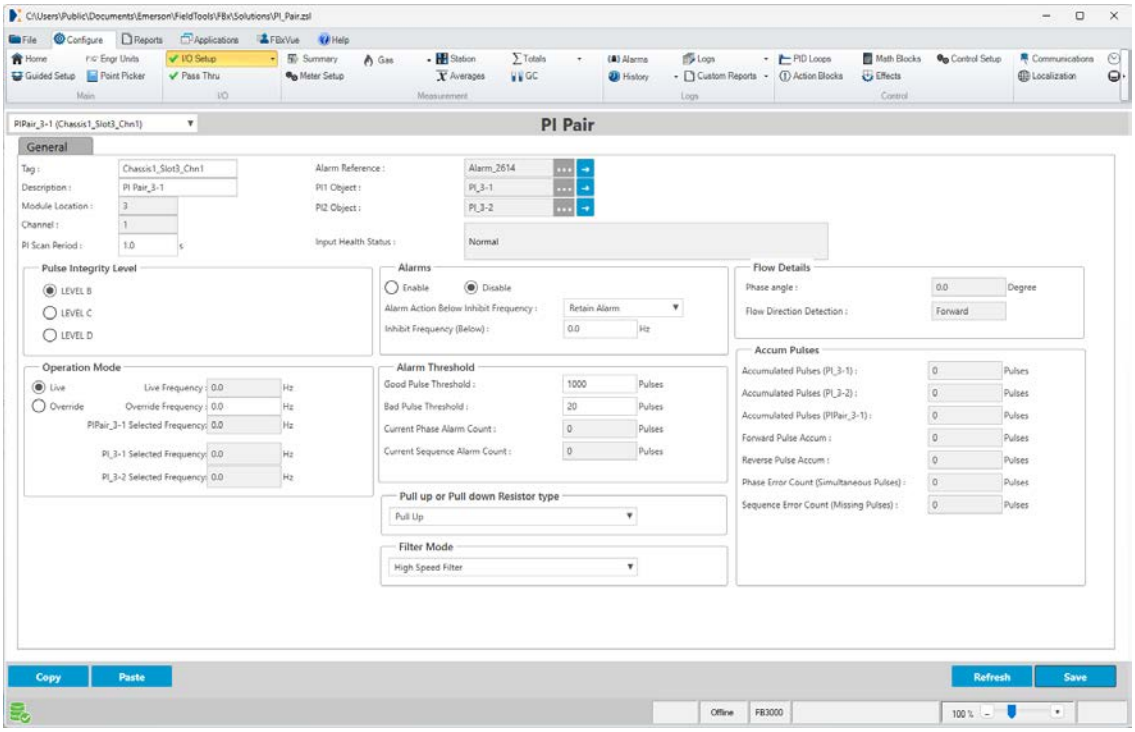
- This display is available **only** if you have an APM module (3APM05 or 3APM10) installed, and you configure the module with at least one PI Pair on the I/O Configuration – General Tab.

- The **lowest frequency the system can accurately measure** is 1Hz. Flow control may be erratic below this threshold.

To access this display:

1. Select **Configure > I/O Setup > PI Pair** from the DeltaV™ FBxConnect™ main menu.

**Figure 149. PI Pair**




2. Click ▼ in the drop-down list at the top of the display to select a pulse input pair to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |

| Field | Description |
|---|---|
| **Channel** | This **read-only** field shows the currently selected module channel. |
| **PI Scan Period** | Sets how frequently the system scans the input (in seconds) to acquire the value. |
| **Alarm Reference** | This **read-only** field shows you which alarm is currently configured for the point.<br>**Note**<br>Click → to open the Alarms display and configure the alarm parameters. |
| **PI1 Object** | This **read-only** field shows you which pulse input channel is currently configured as PI1 in the pulse input pair.<br>**Note**<br>Click → to open the PI display and configure the pulse input parameters. |
| **PI2 Object** | This **read-only** field shows you which pulse input channel is currently configured as PI2 in the pulse input pair.<br>**Note**<br>Click → to open the PI display and configure the pulse input parameters. |

| Field | Description | |
|---|---|---|
| **Input Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Disabled<br>• Sequence Error<br>• Phase Error<br>• Phase Out Of Range<br>• PI1 Failure<br>• PI2 Failure<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Termination Missing<br>• Hardware Fail | |
| **Pulse Integrity Level** | Sets the pulse fidelity level configuration for the currently selected pair. | |
| | **Level B** | This level of fidelity checking requires a dual pulse train. Two pulse inputs enable Level B to perform continuous monitoring, detecting, and warning of errors (alarming), as it compares one pulse train against the other. Continuous comparison of the pulse trains for the number, frequency, phase, and sequence occur. Level B security provides warning of transients and other spurious influences and protection against functional errors and failures. Simultaneous interfering pulses are detected and indicated. If the pulses delivered are lost or gained on either channel (PI1/PI2 or PI3/PI4), a differential counter warning occurs. |

| Field | Description | |
|---|---|---|
| | **Level C** | This level of fidelity checking requires a dual pulse train. Two pulse inputs enable Level C to automatically detect and warn when errors occur, as it compares one pulse train against the other at approximately one-second intervals. Comparison of the pulse trains occurs automatically but not continuously. Level C security provides protection against functional errors and failures. If the pulses delivered become numerically out of step, a differential counter warning occurs. |
| | **Level D** | This level of fidelity checking uses only a single pulse train and requires only one pulse input. Level D allows manual detection of errors, as the results of the pulse train calculations are compared by an operator against a mechanical readout (user supplied) at specified intervals. The manual error monitoring is at specified intervals by methods of comparison and provides amplification and frequency limiting, pulse shaping, and common mode inference rejection. The readout is visually checked against an independent totalizing system. Level D security provides protection against functional errors and failures. |
| **Operation Mode** | Sets the source of the selected value. Possible options are:<br>• **Live** – The system uses the current value of the input.<br>• **Override** – The system uses the value set in the **Override Frequency** field. | |
| | **Live Frequency** | The system uses the live frequency of PI1. |
| | **Override Frequency** | The system uses the value set in the **Override Frequency** field. |
| | **PIPair_x Selected Frequency** | Frequency for the pair as per the selected mode. |
| | **PI_x Selected Frequency** | Linked PI channel's individual frequency. |

| Field | Description | |
|---|---|---|
| **Threshold** | **Note**<br>These fields show **only** when you select **Level B** or **Level C** in the **Pulse Integrity Level** field. | |
| | **Good Pulse Threshold** | Sets the number of good pulse pairs the system can receive before counting the pulses as valid and clearing the alarm. |
| | **Bad Pulse Threshold** | Sets the number of bad pulse pairs the system can receive before triggering an alarm. |
| | **Current Phase Alarm Count** | Internal phase alarm buffer counter that increments if simultaneous pulses are received (Phase Alarm Count) until the Bad Pulse Threshold is reached. The system resets this counter each time the good pulse threshold is reached. |
| | **Current Sequence Alarm Count** | Internal sequence alarm buffer counter that increments if missing pulses are received (Sequence Alarm Count ) until the Bad Pulse Threshold is reached. The system resets this counter each time the good pulse threshold is reached. |
| **Alarms** | Enables inhibit frequency alarming on the selected PI Pair. If Alarming is set to Enabled, pulse fidelity alarms (Sequence Error, Phase Error, Phase Out Of Range, PI1 Failure, and PI2 Failure) are written to the Alarm Log when performing dual pulse integrity checking on a pair of pulses. These alarms are all dependent on what level of security is being used.<br>**Note**<br>These fields show **only** when you select **Level B** or **Level C** in the **Pulse Integrity Level** field. | |
| | **Action Below Alarm Inhibit Frequency** | Sets how the system handles alarm counters when the frequency drops below the value you configure in the **Alarm Inhibit Frequency (Below)** field. |

| Field | Description | | |
|---|---|---|---|
| | | **Retain Alarm** | For the selected PI Pair, the existing alarms and bad pulse counters **do not** clear when the frequency falls below the value you configure in the **Alarm Inhibit Frequency (Below)** field. |
| | | **Reset Alarm** | For the selected PI Pair, the existing alarms and bad pulse counters **do** clear when the frequency falls below the value you configure in the **Alarm Inhibit Frequency (Below)** field. |
| | **Alarm Inhibit Frequency (Below)** | Sets, in Hz, a frequency below which the alarm status no longer sets for the selected pair. Existing alarms clear either if you select **Reset Alarm** in the **Action Below Alarm Inhibit Frequency** field or if the number of good pulse pairs the system receives falls below the good pulse threshold for the selected PI pair. | |
| **Pull up or Pull down Resistor type** | Activates a pull-up or pull-down resistor to maintain input in a deterministic state when no input is applied. | | |
| | **Pull Up** | Maintain signal High when no input is applied. | |
| | **Pull Down** | Maintain signal Low when no input is applied.<br>**Note**<br>Open collector circuit configuration is **not** supported with a pull-down resistor. | |
| **Filter Mode** | Sets the amount of filtering that will be applied to the pulse input. Choose a filtering mode that is appropriate for the input frequency, and the amount of noise that may be present. | | |
| | **Low Speed Filter** | Choose low speed filtering if the pulse input will be measuring frequencies less than 10Hz. | |
| | **Medium Speed Filter** | Choose medium speed filtering if the pulse input will be measuring frequencies between 0 to 300Hz. | |
| | **High Speed Filter** | Choose high speed filtering if the pulse input will be measuring frequencies above 300Hz. | |

| Field | Description | |
|---|---|---|
| **Flow Details** | **Note**<br>These fields show **only** when you select **Level B** in the **Pulse Integrity Level** field. | |
| | **Phase Angle** | This **read-only** field shows the difference in phase angle between Pulse Input 1 and Pulse Input 2, based on a range of 0 to 180 degrees. Phase angles between 180 and 360 degrees are similar in pattern to 0 to 180 degrees, and are reported as such. |
| | **Flow Direction Detection** | This **read-only** field shows the direction of flow based on 180 degrees out of phase for the first and second pair of pulses. Forward indicates less than 180 degrees; Reverse indicates more than 180 degrees. The Forward and Reverse designators assume a normal operation of 45 degrees to 90 degrees out-of-phase between Pulse Input 1 and Pulse Input 2. |
| **Accum Pulses** | **Accumulated Pulses (PI1)** | This **read-only** field shows the accumulated number of pulses (forward and backward) through the level checks for pulse input one. |
| | **Accumulated Pulses(PI2)** | This **read-only** field shows the accumulated number of pulses (forward and backward) through the level checks for pulse input two. |
| | **Accumulated Pulses (PIPair)** | This **read-only** field shows the accumulated number of pulses (forward and backward) through the level checks for the selected PI pair. |
| | **Forward Pulse Accum** | This **read-only** field shows the accumulated number of forward pulses as determined by the phase angle and level checks for the selected PI pair.<br>**Note**<br>These fields show **only** when you select **Level A** or **Level B** in the **Pulse Integrity Level** field. |

| Field | Description | |
|---|---|---|
| | **Reverse Pulse Accum** | This **read-only** field shows the accumulated number of backward pulses as determined by the phase angle and level checks for the selected PI pair.<br>**Note**<br>These fields show **only** when you select **Level A** or **Level B** in the **Pulse Integrity Level** field. |
| | **Phase Alarm Count (Simultaneous Pulses)** | This **read-only** field shows the total number of phase alarms that occur. A phase alarm is triggered when the phase angle is less than five degrees. For Pulse Integrity Level A and Level B, a phase angle of more then 120 degrees is out of range but does not raise an alarm. For Pulse Integrity Level C, a phase angle above 120 degrees is not acted upon.<br>**Note**<br>These fields show **only** when you select **Level A** or **Level B** in the **Pulse Integrity Level** field. |
| | **Sequence Alarm Count (Missing Pulses)** | This **read-only** field shows the total number of the sequence alarms.<br>**Note**<br>These fields show **only** when you select **Level A**, **Level B**, or **Level C** in the **Pulse Integrity Level** field. |

4. Select **Save** to save any changes you make to this display.

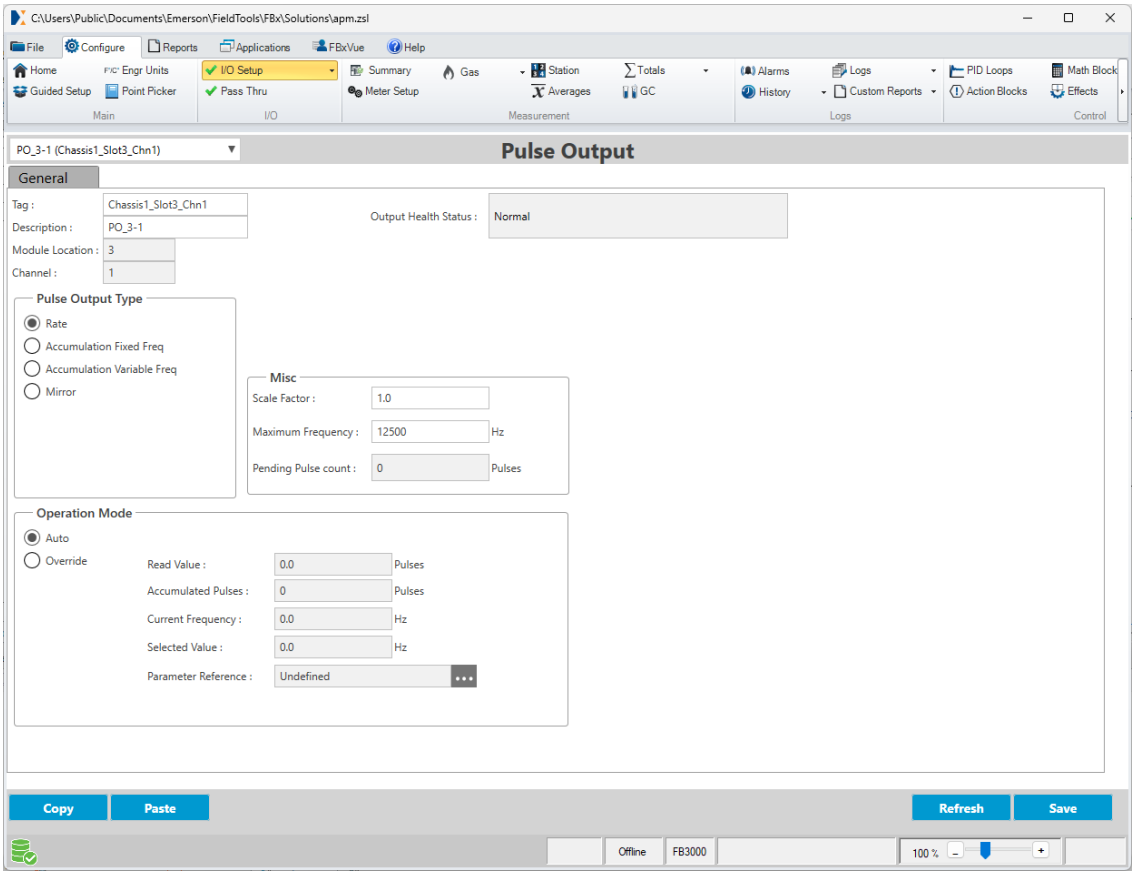
## 4.5.15 PO

Use this display to configure the pulse output parameters. You can configure each pulse output channel to represent the current flow as a frequency or as a pulse per engineering unit of accumulated product.

To access this display:

1. Select **Configure > I/O Setup > PO** from the DeltaV™ FBxConnect™ main menu.

**Figure 150. Pulse Output**




2. Click ▼ in the drop-down list at the top of the display to select a pulse output channel to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected channel. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected channel. |
| **Module Location** | This **read-only** field shows the location of the module in your FB Series product. |
| **Channel** | This **read-only** field shows the currently selected module channel. |

| Field | Description |
|---|---|
| **Output Health Status** | This **read-only** field shows the current operating status of the selected channel. Possible values are:<br>• Normal<br>• Not Licensed<br>• Inactive<br>• Comm Fail<br>• Override Active<br>• In Alarm<br>• Point Fail<br>• Above URL<br>• Below LRL<br>• Termination Missing<br>• Hardware Fail<br>• Channel Disabled<br>• Invalid PI Selection<br>**Note**<br>Valid **only** for channels with the **Pulse Output Type** field set to **Mirror Mode**.<br>• Invalid Parameter Reference<br>**Note**<br>Valid **only** for channels with the **Pulse Output Type** field set to either **Rate**, **Accumulation Fixed Freq**, or **Accumulation Variable Freq** and **Operation Mode** set to **Auto**. |
| **Pulse Output Type** | Indicates the type of signal being output on the selected channel. Possible options are:<br>• **Rate** – Pulse output type in rated frequency mode to drive continuous pulse output.<br>• **Accumulation Fixed Freq** – Sends a defined number of pulses based on changes in the reference total parameter. The pulse frequency remains constant.<br>• **Accumulation Variable Freq** – Sends a defined number of pulses based on changes in the reference total parameter. The pulse |

| Field | Description | |
|---|---|---|
| | frequency varies but stays below the configured maximum frequency.<br>• **Mirror** – –Replicates the pulse signals from a specified PI or PI Pair and outputs them through this pulse output channel.<br>**Note**<br>If you select this option, you **must** save your selection and then configure the **Mirror Channel** field. | |
| **Mirror Channel** | Sets a specific PI channel or PI Pair from which to copy the signal.<br>**Note**<br>This field appears **only** if you select **Mirror** in the **Pulse Output Type** field and then save your changes. | |
| **Misc** | **Scale Factor** | Defines the multiplier the system applies to the read value in Auto mode for both Rate and Accumulation types. The resulting scaled value is then used to determine the pulse output drive value.<br>**Note**<br>This field shows **only** if you select **Auto** in the **Operation Mode** field and save your changes. |
| | **Maximum Frequency** | Sets the maximum number of pulses per second that can be output by the pulse output (in Hz).<br>**Note**<br>• If you select **Rate** in the **Pulse Output Type** field, then it is clamped at maximum frequency and rest are ignored. For example, if you set the PO Max Frequency to 20, no more than 20 pulses are sent out within the second.<br>• If you select **Accumulation Fixed Freq** or **Accumulation Variable Freq** in the **Pulse Output Type** field and the calculated number of pulses exceeds this value, then those pulses are placed in the buffer. |

| Field | Description | |
|---|---|---|
| | **Pending Pulse Count** | This **read-only** field shows the number of pulses currently in the buffer.<br>**Note**<br>This field appears **only** if you select either **Accumulation Fixed Freq** or **Accumulation Variable Freq** in the **Pulse Output Type** field and then save your changes. |
| **Operation Mode** | Sets the source of the selected value. Possible options are:<br>• **Auto** – The system uses the current value of the parameter you select in the **Parameter Reference** field.<br>• **Override** – The system uses the value set in the Override Value field.<br>**Note**<br>This field appears **only** if you select either **Rate**, **Accumulation Fixed Freq,** or **Accumulation Variable Freq** in the **Pulse Output Type** field and then save your changes. | |
| | **Send Override** | Select this button to send the override value on the pulse output.<br>**Note**<br>This field appears **only** if you select either **Accumulation Fixed Freq** or **Accumulation Variable Freq** in the **Pulse Output Type** field, **Override** in the **Operation Mode** field, and then save your changes. |
| | **Override Value** | Sets the value (in engineering units) that is written to the Selected Value field when the **Operation Mode** is set to **Override**.<br>**Note**<br>• This field appears **only** if you select either **Rate**, **Accumulation Fixed Freq**, or **Accumulation Variable Freq** in the **Pulse Output Type** field; **Override** in the **Operation Mode** field; and then save your changes. |

| Field | Description | |
|---|---|---|
| | | • If you select **Rate** in the **Pulse Output Type** field, then the override value is applied at run time.<br>• If you select **Accumulation Fixed Freq** or **Accumulation Variable Freq** in the **Pulse Output Type** field, then the override value is applied when you select the **Send Override** button. |
| | **Read Value** | This **read-only** field shows the current value of the parameter configured in the Parameter Reference field.<br>**Note**<br>This field appears **only** if you select either **Rate**, **Accumulation Fixed Freq** or **Accumulation Variable Freq** in the **Pulse Output Type** field and then save your changes. |
| | **Accumulated Pulses** | This **read-only** field shows the accumulated number of pulses sent out. |
| | **Current Frequency** | This **read-only** field shows, in hertz, the frequency of outgoing pulses. |
| | **Selected Value** | This **read-only** field shows, in engineering units, the value based on the Operation and Fault Mode fields, as well as the health status of the selected channel. |
| | **Parameter Reference** | Click ••• to open a Point Picker dialog and select a parameter to use as the pulse output value when the **Operation Mode** is set to **Auto**.<br>**Note**<br>• This field appears **only** if you select either **Rate**, **Accumulation Fixed Freq**, or **Accumulation Variable Freq** in the **Pulse Output Type** field and then save your changes.<br>• You can select a Totals type parameter **only** and the current accumulated total is used for |

| Field | Description |
| --- | --- |
| | calculation (no other totals e.g. Daily, Hourly, etc.). |

4. Select **Save** to save any changes you make to this display.

## 4.5.16 User Data

Use this display as a global data storage area that any device or application can use. A user data entry may store the results of a specified calculation from a Math Block or an intermediate result of a specified value a Math Block acquires. 50 instances of the User Data display exist.

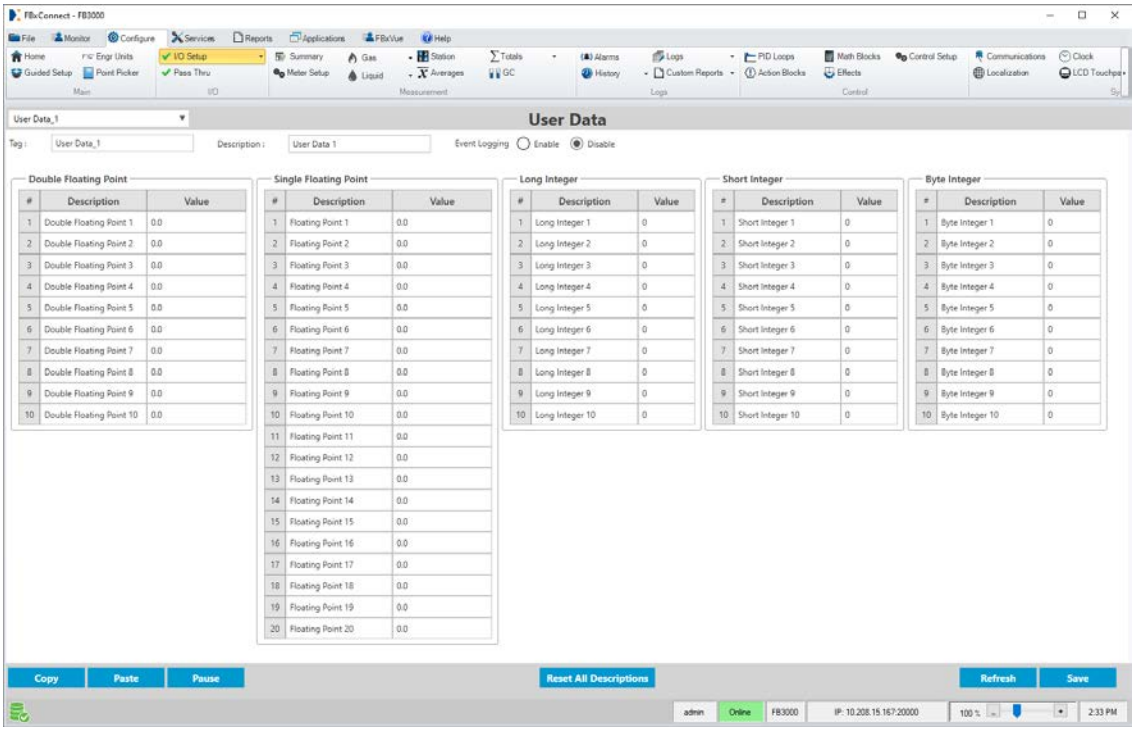
Each user data instance consists of the following:

- 1 Tag (20-alphanumeric string)
- 1 Description (40-alphanumeric string)
- 10 Double Floating Points (floating point values)
- 20 Single Floating Points (floating point values)
- 10 Long Integers (32-bit)
- 10 Short Integers (16-bit)
- 10 Byte Integers (8-bit)

To access this display:

1. Select **Configure > I/O Setup > User Data** from the DeltaV FBxConnect configuration software main menu.

**Figure 151. User Data**




2. Click ▼ in the drop-down list to select a user data instance to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected user data instance. |
| **Description** | Sets a description (up to 40-alphanumeric characters) for the selected user data instance. |
| **Event Logging** | Select to enable the system to log user data parameters changes to the event log.<br>**Note**<br>A change to this option may require up to 10 seconds to take effect. |
| **Double Floating Point** | Sets up to 10 parameters to provide storage for double precision floating point values. In the row for each parameter, use the **Description** field to describe (up to 200-alphanumeric characters) the data stored in that row. |

| Field | Description |
|---|---|
| **Single Floating Point** | Sets up to 20 parameters to provide storage for single precision floating point values. In the row for each parameter, use the **Description** field to describe (up to 200-alphanumeric characters) the data stored in that row. |
| **Long Integer** | Sets up to 10 parameters to provide storage for 32-bit unsigned integer values. In the row for each parameter, use the **Description** field to describe (up to 200-alphanumeric characters) the data stored in that row. |
| **Short Integer** | Sets up to 10 parameters to provide storage for 16-bit unsigned integer values. In the row for each parameter, use the **Description** field to describe (up to 200-alphanumeric characters) the data stored in that row. |
| **Byte Integer** | Sets up to 10 parameters to provide storage for 8-bit unsigned values. In the row for each parameter, use the Description field to describe (up to 200-alphanumeric characters) the data stored in that row. |
| **Reset All Descriptions** | Select this button to restore the default parameter descriptions for **all** user data types in **all** user data instances. A confirmation message opens asking if you are sure you want to continue. Select **Yes** to restore the default parameter descriptions. Select **No** to return to the User Data display without making changes.<br><br>**CAUTION**<br><br>This action restores the default parameter descriptions for **all** User Data types in **all** User Data instances. |

4. Select **Save** to save any changes you make to this display.

## 4.6 Pass Thru

Use this display to configure parameters used when communicating with other Ethernet enabled FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU and FBxRemote™ I/O racks.

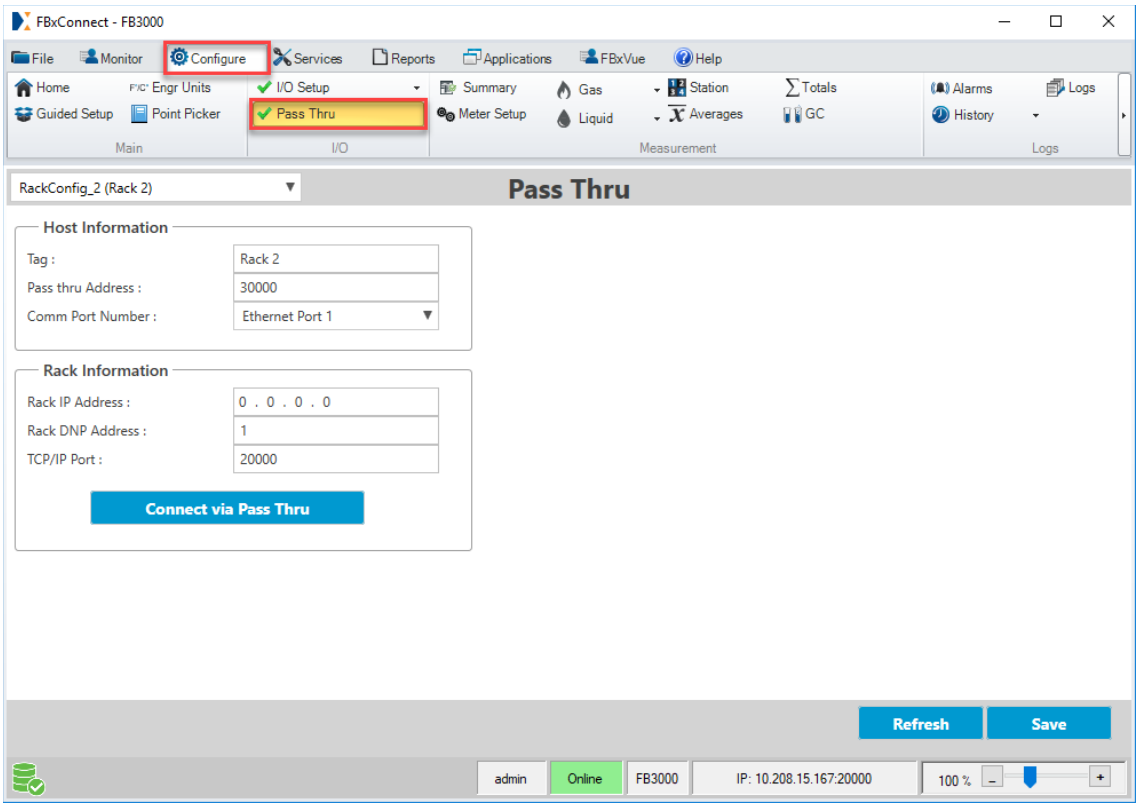
**Note:**

You can connect an FBxRemote I/O rack to an Ethernet communications port on the DeltaV FB3000 using FBxNet™, and the DeltaV FB3000 supports pass-thru communications. This allows you to connect to and configure the FBxRemote™ I/O rack through the DeltaV FB3000 (without a direct connection). After configuring communication parameters on the FBxRemote™ I/O rack and the Pass Thru display, select the Connect via Pass Thru button to connect to the FBxRemote™ I/O rack.

To access this display:

1. Select **Configure > Pass Thru**. The Pass Thru display opens.

**Figure 152. Pass Thru**




2. Click ▼ in the FBxRemote™ I/O rack drop-down list and select the rack you want to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Host Information** | Use these fields to specify communication parameters used by the host FB Series product when communicating with the selected FBxRemote™ I/O rack. | |
| | **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected FBxRemote™ I/O rack. |
| | **Pass thru Address** | Sets the TCP/IP port number that will be opened between the host and the PC running DeltaV FBxConnect configuration software. |
| | **Comm Port Number** | Click ▼ to specify which communications port to use when communication with the selected FBxRemote™ I/O rack. |
| **Rack Information** | Use these fields to specify communications parameters of the selected FBxRemote™ I/O rack. | |
| | **Rack IP Address** | Enter the IP address of the selected FBxRemote™ I/O rack. |
| | **Rack DNP Address** | Enter the DNP address of the selected FBxRemote™ I/O rack. |
| | **TCP/IP Port** | Enter the DNP3 TCP/IP port of the selected FBxRemote™ I/O rack. |
| | **Connect via Pass Thru** | Select this button to connect to the selected FBxRemote™ I/O rack. When connected, a new DeltaV FBxConnect configuration software instance opens and allows you to configure the FBxRemote™ I/O rack.<br>**Note**<br>Since FBxRemote™ I/O racks do not support the full functionality available in DeltaV FBxConnect, only a subset of menu items are available. |

4. Select **Save** to save any changes you make to this display.

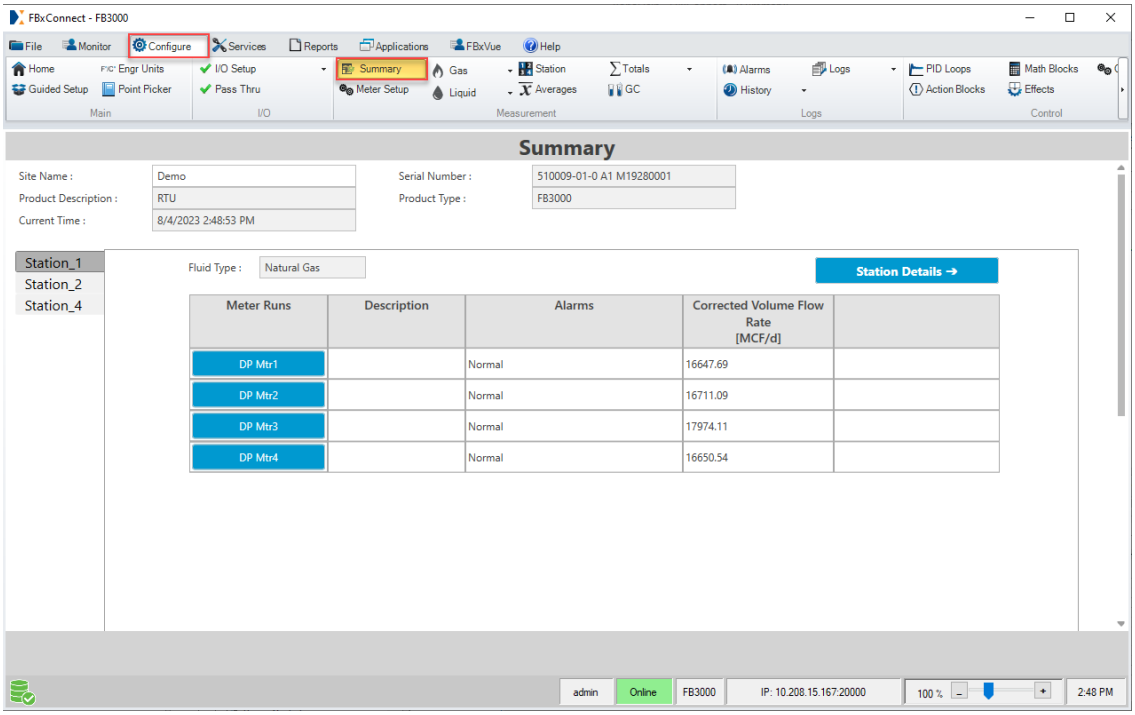
## 4.7 Summary

The Summary display shows an overview of all configured stations and assigned meters.

To access this display:

1. Select **Configure > Summary**.

**Figure 153. Summary**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Site Name** | This **read-only** field shows the configured location name of your DeltaV FB3000. |
| **Device Serial Number** | This **read-only** field shows the serial number of your DeltaV FB3000. |
| **Product Description** | This **read-only** field shows the configured description of your DeltaV FB3000. |
| **Product Type** | This **read-only** field shows FB Series product type you are configuring. |
| **Current Time** | This **read-only** field shows the current time of the clock on the DeltaV FB3000. |
| **Station Tabs** | A separate tab appears for each station you have configured. Select each station tab to view the following information. |

| Field | Description | |
|---|---|---|
| | **Fluid Type** | This **read-only** field shows the fluid type measured by each station. |
| | **Station Details** | Select this button to open the station configuration display for the selected station. Select  to return to Summary display. |
| | **Description** | This **read-only** field shows the description of each meter assigned to the selected station. |
| | **Meter Runs** | This column shows each meter assigned to the selected station. Select a meter name to open the meter configuration display for that meter. Select  to return to Summary display. |
| | **Alarms** | This **read-only** field shows any currently active alarms on the meter. |
| | **Corrected Volume Flow Rate** | This **read-only** field shows corrected Volume Flow Rate for the meter.<br>**Note**<br>This field appears **only** for gas meters. |
| | **Water Net Volume Flow Rate** | This **read-only** field shows Water Net Volume Flow Rate for the meter.<br>**Note**<br>This field appears **only** for liquid linear meters. |
| | **Oil Net Volume Flow Rate** | This **read-only** field shows Oil Net Volume Flow Rate for the meter.<br>**Note**<br>This field appears **only** for liquid linear meters. |

**3.** Select **Save** to save any changes you make to this display.

## 4.8 Meter Setup

Use this display to configure general meter run parameters, including the number of differential pressure (DP), gas linear, and liquid linear meter runs.

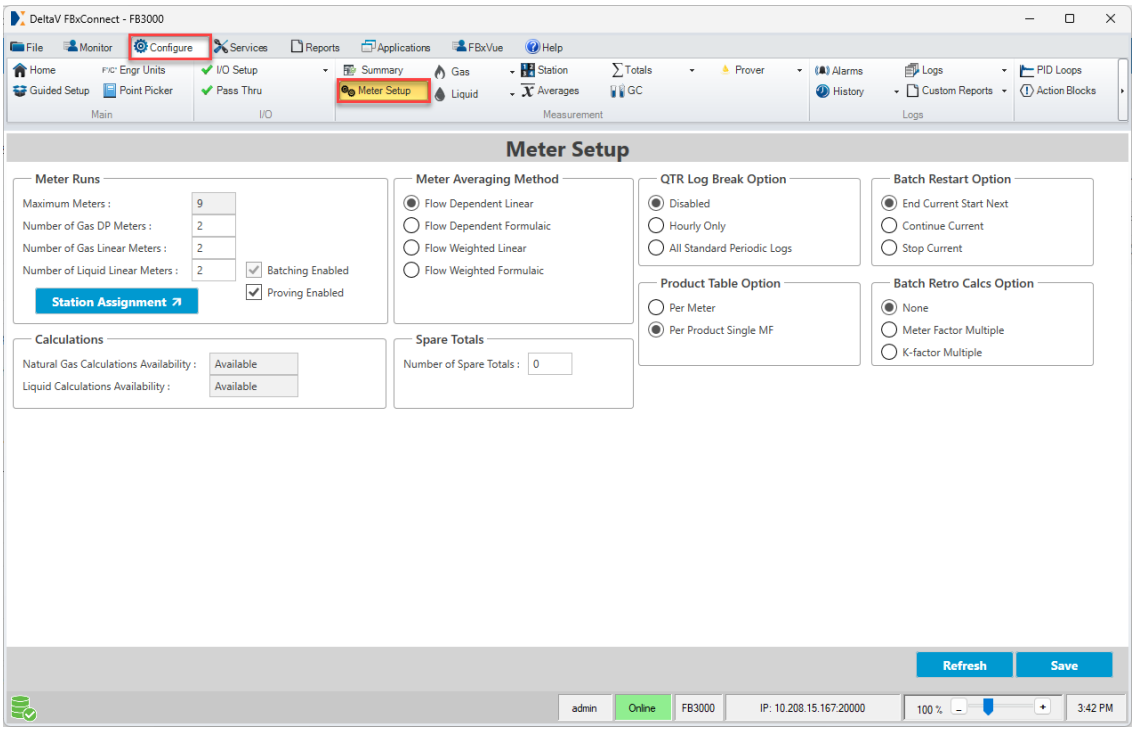
**Note**

If the system is unable to create meter runs or experiences a fatal metering error, the system logs a **Meter Task Detected Fatal Error** event to the Event log.

To access this display:

1. Select **Configure > Meter Setup**.

**Figure 154. Meter Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Maximum Meters** | This **read-only** field shows the maximum number of meter runs allowed in the FB Series product. |
| **Number of Gas DP Meters** | Sets the number of differential pressure meter runs on the currently attached FB Series product.<br>**Note**<br>This value (combined with the values in the Number of Gas Linear Meters and Number of Liquid Linear Meters fields) cannot exceed the value shown in the Maximum Meters field. |

| Field | Description |
|---|---|
| **Number of Gas Linear Meters** | Sets the number of liner meter runs on the currently attached FB Series product.<br>**Note**<br>This value (combined with the values in the Number of Gas DP Meters and Number of Liquid Linear Meters fields) cannot exceed the value shown in the Maximum Meters field. |
| **Number of Liquid Linear Meters** | Sets the number of liquid linear meter runs on the currently attached FB Series product.<br>**Note**<br>This value (combined with the values in the Number of Gas Linear Meters and Number of Active DP Meters fields) cannot exceed the value shown in the Maximum Meters field. |
| **Batching Enabled** | This **read-only** field shows if the batching feature is enabled on any liquid stations.<br>**Note**<br>• This checkbox has three possible states:<br>**Empty** – No liquid stations have the batching feature enabled.<br>**Checked** – All liquid stations have the batching feature enabled.<br>**Grayed out** – At least one liquid station has the batching feature enabled and at least one liquid station **does not** have the batching feature enabled.<br>• For more information, refer to Station Fluid Type and Batching. |

| Field | Description | |
|---|---|---|
| | **Proving Enabled** | Enables, if checked, the liquid meter prover functionality. For more information, refer to Prover.<br>**Note**<br>An error message opens if your your DeltaV FB3000 RTU resources are low and your attempt to enable Proving is unsuccessful. To fix this situation, you must first enable the **Database Save Params to Flash File** option on the System display to increase the available memory of the standard database **before** you select **Proving Enabled**. |
| **Station Assignment** | Select **Station Assignment** to configure which meters are assigned to which stations. | |
| **Calculations** | These **read-only** fields show the status of calculation types on the DeltaV FB3000 RTU. Possible statuses are:<br>• **Available** – A valid licensed is installed for the calculation type.<br>• **Not available** – A valid licensed is **not** installed for the calculation type. | |
| **Meter Averaging Method** | Sets the averaging method used by the currently attached FB Series product. The selected method is used for all averages associated with all gas meters in the FB Series product. Current and previous period averages are stored in the database by the Average object, and historical data is recorded under Station History if a history point is assigned to that Average object. For further details on the averaging techniques, see API measurement standard Chapter 21, Section 1, Appendix B (1993).<br>**Gas Averaging (API 21.1)**<br>• The current version of API Chapter 21, Section 1, Annex B (2013) states that Flow Dependent Linear averaging shall be used.<br>• If there was an intermittent flow during the averaging period (hourly, daily, etc.), then only samples during flow are included. If there is no flow for the entire averaging period, then all of the samples are included. | |

| Field | Description | |
|---|---|---|
| | **Liquid Averaging (API 12.2.2)**<br>• Averages associated with liquid linear meters are **always** flow-weighted based on API 12.2.2, and periods of no flow produce averages of 0. | |
| | **Flow Dependent Linear** | This is the simplest and most commonly used method. This method sums the included samples and divides by the number of included samples to compute the average values for the period. |
| | **Flow Dependent Formulaic** | This method raises each included sample to the lowest order power to which that particular value is used in the flow equation before averaging as above and then the result is raised to the inverse power. For averaging flowing pressure for a DP meter, for instance, where pressure is used to the 0.5 power, this means taking the square root of each sample and squaring the average of those samples. For averaging flowing pressure for a linear meter, however, where the pressure is used directly in the flow equation, the samples are taken to the “1” power, producing identical results to the flow dependent linear method. |
| | **Flow Weighted Linear** | This method determines a relative "weight" for each sample by first multiplying the sample by a flow value (the square root of the differential pressure for a DP meter and the indicated quantity flow rate for a linear meter) and then calculates a linear average by dividing the sum of the flow-weighted sample by the sum of the flow values. |
| | **Flow Weighted Formulaic** | This method raises each included sample to the lowest order power as described above for flow dependent formulaic and also multiplies each sample by a weight as described above for flow weighted linear. The resulting sum is divided by the sum of the flows and raised to the inverse power to obtain the average value. |

| Field | Description |
|---|---|
| **Number of Spare Totals** | Sets the number of additional instances of the Totals object in the FB Series product database. Change this value to dynamically increase the number of Total_x object instances in the system database, as viewed by the Point Picker. New instances of the Totals object start with Total_50001. Up to four instances per meter are supported for a maximum of 144 additional Total_x object instances.<br>**Note**<br>• Spare totals are **only** used when calculating **fault totals**. For more information about fault totals, refer the **Fault Total Enable** field on the Station – Advanced Tab.<br>• For more information about automatically configuring fault totals, refer to Totals Setup.<br>• For more information about viewing totals, refer to Totals. |
| **QTR Log Break Option** | Sets the Quantity Transaction Record (QTR) log action to be taken when a configuration parameter is changed that affects the flow calculations. Examples of such parameters include calculation selections, meter sizing, K-factor, meter factor, or meter primary input assignments. This configuration selection is applicable to all gas and liquid meter types.<br>**Note**<br>If selected, the log break action will be taken at the top of the minute following the parameter change. |
| **Disabled** | No action is taken. |
| **Hourly Only** | Upon a metrologically significant configuration change, hourly records (including totals and averages) will be recorded in the applicable station history group. The current hour total and average parameters for the meter will “rollover” into the previous hour and get reset to 0.0. Daily, Weekly, Monthly, and ongoing (non-resettable) items are not impacted and will not change. |

| Field | Description | |
|---|---|---|
| | **All Standard Period Logs** | Upon a metrologically significant configuration change, hourly, daily, weekly, and monthly records (including totals and averages) will be recorded in the applicable station history group. The current total and average parameters for the meter will “rollover” into the previous totals and averages, and the current totals and averages will get reset to 0.0. Ongoing (non-resettable) totals are not affected. |
| **Batch Restart Option** | If batching is enabled, sets how the system responds when a batch is in progress and the FB product restarts. | |
| | **End Current Start Next** | The current batch stops and a new batch automatically starts. |
| | **Continue Current** | The current batch continues. |
| | **Stop Current** | The current batch stops and a new batch **does not** automatically start. |
| **Product Table Option** | Sets how meter factors are configured.<br>**Note**<br>You must configure at least one liquid meter in the **Number of Liquid Linear Meters** field before you can view this field. | |
| | **Per Meter** | You configure a single meter factor for each liquid linear meter, and that meter factor is shared between all liquid products. |
| | **Per Product Single MF** | For each liquid linear meter, you configure a meter factor for each liquid product. |
| **Batch Retro Calcs Option** | Determines if meter factor or K-factor changes to liquid linear meters, during a batch, are retroactively applied to batch totals. | |
| | **None** | Meter factor or K-factor changes do not change the current batch totals and only affect calculated increments after the new factors are entered. |

| Field | Description | |
|---|---|---|
| | **Meter Factor Multiple** | Meter factor changes are applied retroactively to current batch totals (i.e. back to the start of the batch). Other non-batch totals (hourly, daily, weekly, monthly, ongoing) are not adjusted. The meter factor can be changed multiple times during a batch, and each change is retroactively applied to the current batch totals. K-factor changes do not change the current batch totals and only affect calculated increments after the new K-factor is entered. When this option is selected, liquid linear meters only support a single meter factor / single K-factor and the meter factor / K-factor curve options are not available. |
| | **K-Factor Multiple** | K-factor changes are applied retroactively to current batch totals (i.e. back to the start of the batch). Other non-batch totals (hourly, daily, weekly, monthly, ongoing) are not adjusted. The K-factor can be changed multiple times during a batch, and each change is retroactively applied to the current batch totals. Meter factor changes do not change the current batch totals and only affect calculated increments after the new meter factor is entered. When this option is selected, liquid linear meters only support a single meter factor / single K-factor and the meter factor / K-factor curve options are not available. |

3. Select **Save** to save any changes you make to this display.

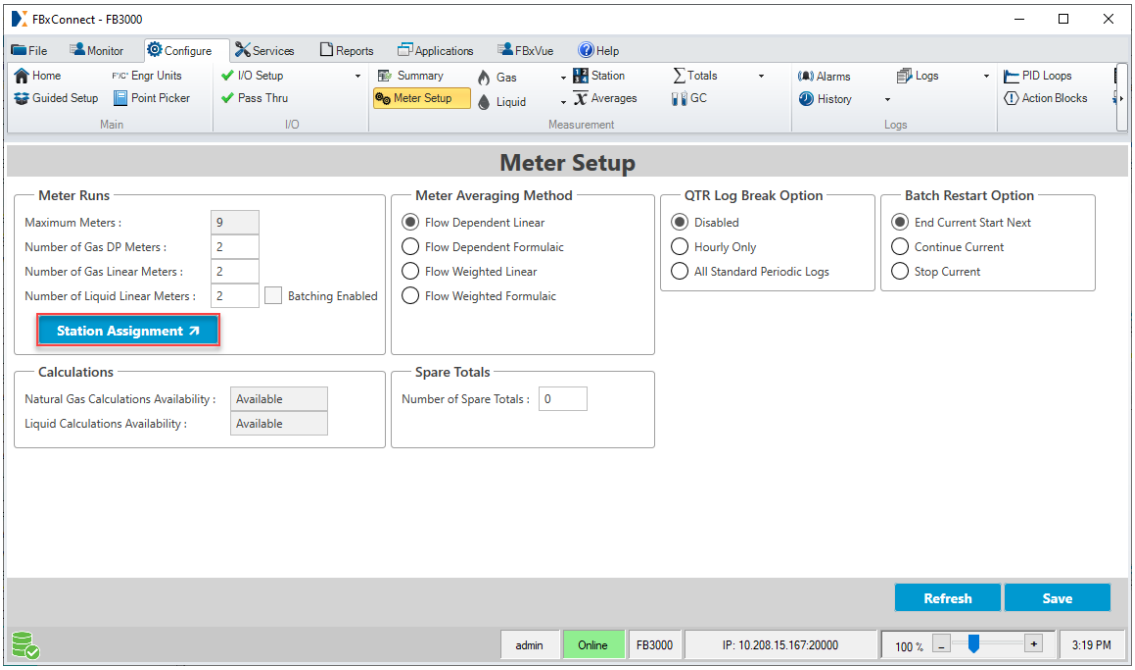
### 4.8.1 Station Assignment

Use this pop-up display to configure which meters are assigned to which station.

To access this display:

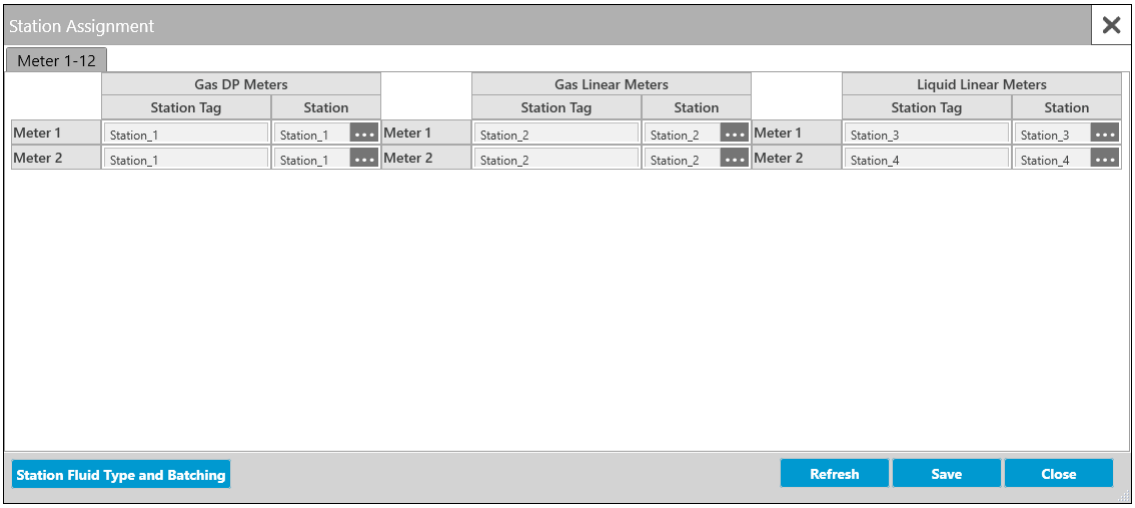
1. Select **Configure > Meter Setup**. The Meter Setup display opens.

**Figure 155. Station Assignment**




2. Select **Station Assignment**. The Station Assignment pop-up display opens.

**Figure 156. Station Assignment**




3. Tabs appear at the top of the display. Each tab consists of up to 12 meters. Select the tab that contains the meters you want to assign to a specific station.

4. In the row for each meter, select ••• to open a Point Picker dialog and assign each meter to a specific station.

**Note**

Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised.

5. Select **Station Fluid Type and Batching** to configure the fluid type measured by each station.

**Note**

You **cannot** change the fluid type of a station if a meter is already assigned to that station. In this case, you **must** first remove any meters assigned to the selected station before you are able to change the Fluid Type field.

6. Select **Save** to save any changes you make to this pop-up display.
7. Select **Close** to exit the display.

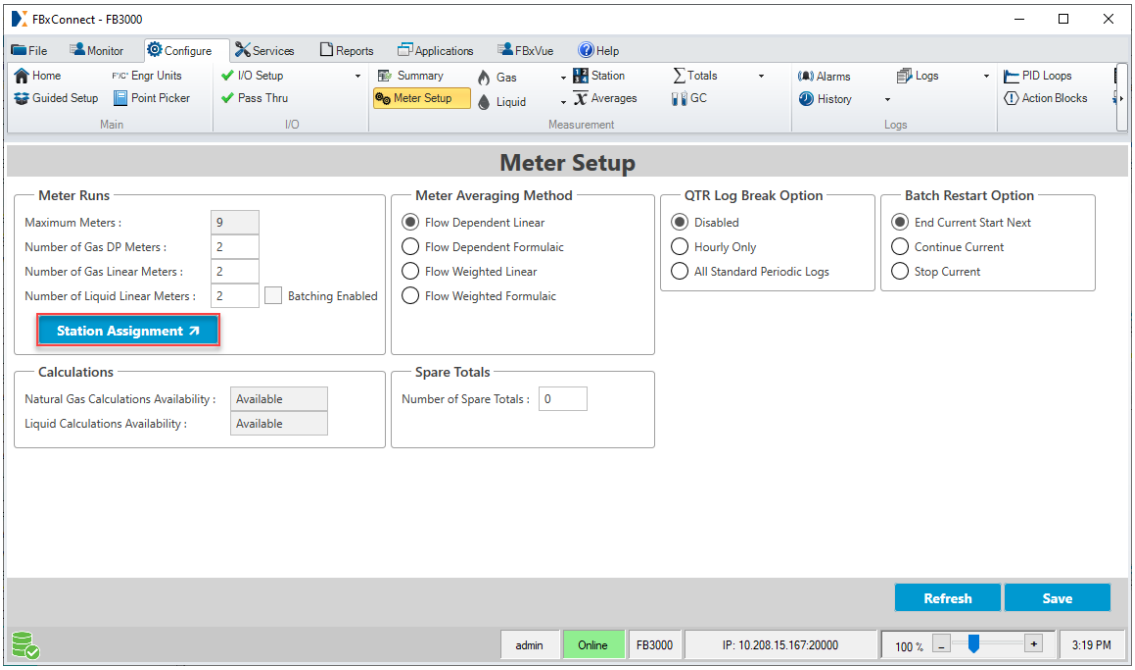
## 4.8.2 Station Fluid Type

Use this pop-up display to configure the fluid type measured by each station.

To access this display:

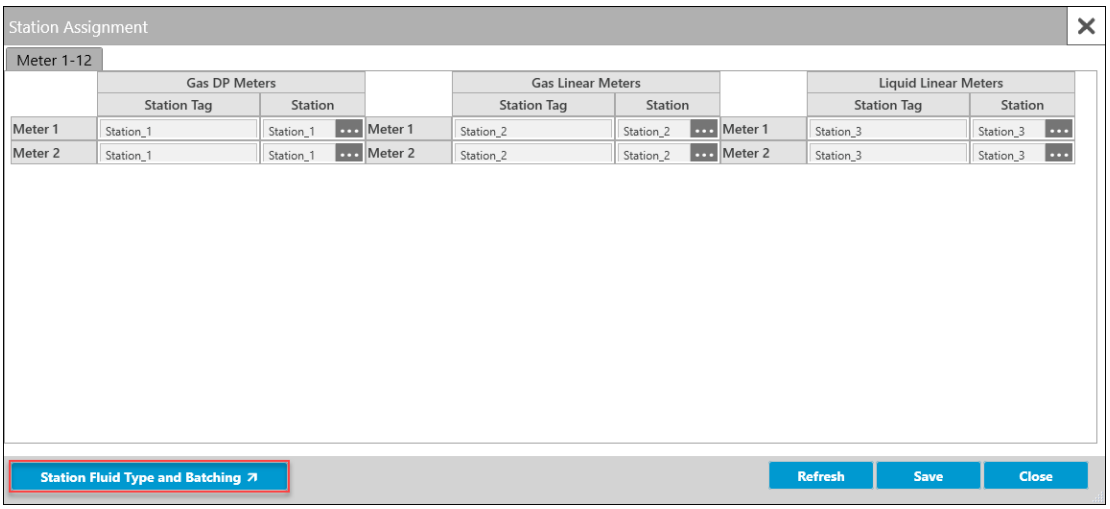
1. Select **Configure > Meter Setup**. The Meter Setup display opens.

**Figure 157. Station Assignment**



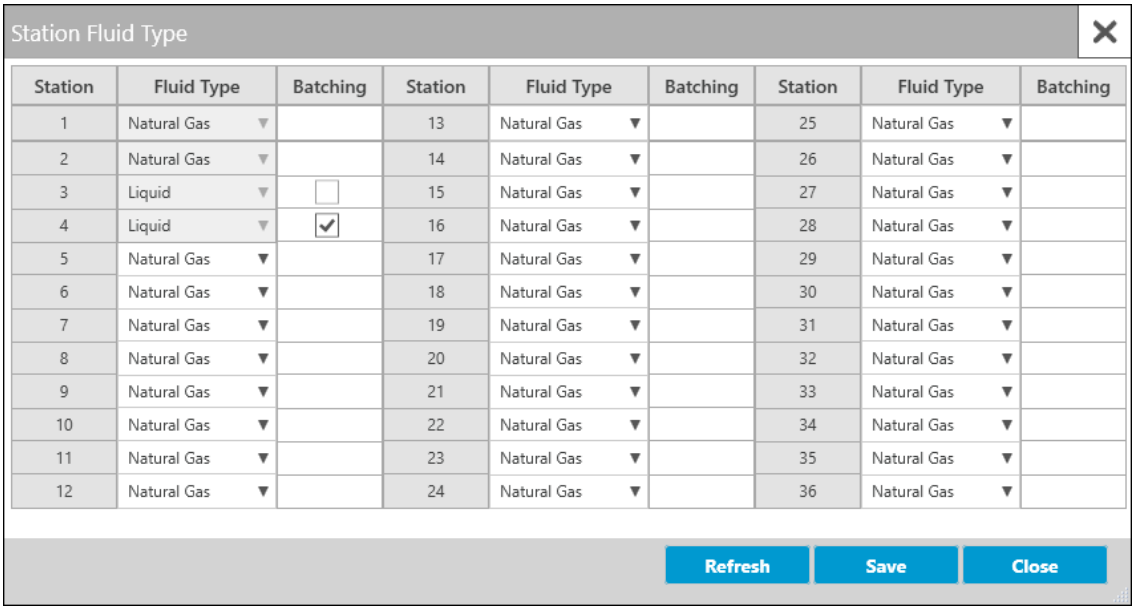

2. Select **Station Assignment**. The Station Assignment pop-up display opens.

**Figure 158. Station Assignment**




3. Select **Station Fluid Type and Batching**. The Station Fluid Type pop-up display opens showing a list of all stations.

**Figure 159. Station Fluid Type**




4. Select ▼ to assign a fluid type for each station.

**Note**

Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised.

You **cannot** change the fluid type of a station if a meter is already assigned to that station. In this case, you **must** first remove any meters assigned to the selected station before you are able to change the Fluid Type field.

5. For DeltaV FB3000 RTU liquid meters, place a check mark in the Batching column to enable the batching feature for the station configured in the selected row.

**Note**

Batching is enabled at the station level. If you enable batching for a meter assigned to a particular station, all other meters assigned to that station will also have the batching feature enabled.

6. Select **Save** to save any changes you make to this pop-up display.

7. Select **Close** to exit the display.

# 4.9 DP Meter

Use this display to configure differential pressure meters in your FB Series product.

To access this display, select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.

**Figure 160. Configure – DP Meter**




The DP Meter display contains the following items:

General – Use this display to configure the type, sizing, and inputs for the selected meter.

Advanced – Use this pop-up display to configure advanced properties for the selected meter, including meter construction material, temperature correction, and discharge coefficient options.

Diagnostics – Use this pop-up display to view **read-only** diagnostic information for the selected meter, including calculated values and alarm codes.

Rates & Totals – Use this pop-up display to view **read-only** flow rates and accumulations for the selected meter.

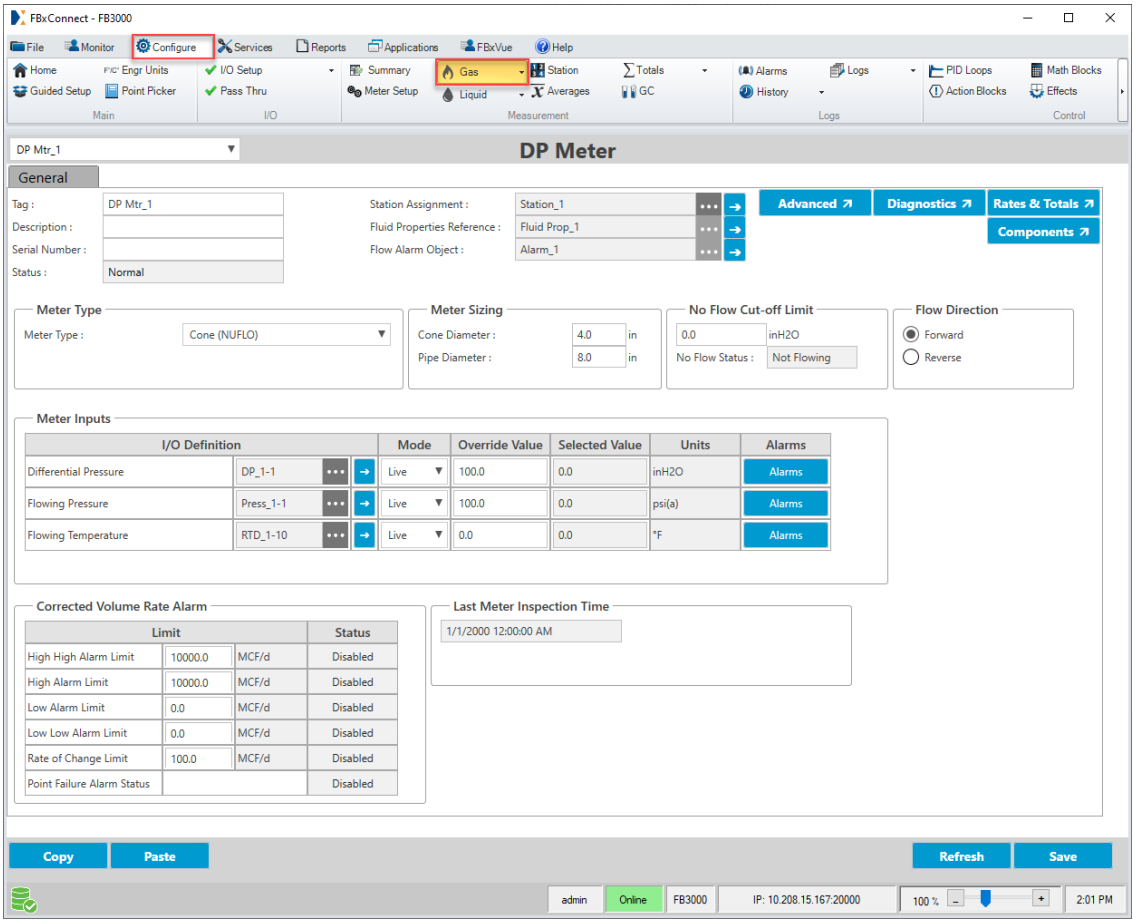
## 4.9.1 DP Meter – General

Use this display to configure the type, sizing, and inputs for the selected differential pressure meter.

To access this display:

1. Select **Configure > Gas > DP Meter**. The DP Meter opens.

**Figure 161. DP Meter – General**




2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. |
| **Serial number** | Sets a description (up to 20-alphanumeric characters) for the serial number or other identifier of the selected meter. |
| **Status** | This **read-only** field indicates the overall health of the selected meter. Possible values are: |

| Field | Description | |
|---|---|---|
| | **Normal** | Indicates the meter is **not** in an alarm, failure, or override condition. |
| | **In alarm** | Indicates an active flow rate, I/O, property calculation, or flow calculation alarm. |
| | **Failure** | Indicates a point fail on a meter input that is used in flow calculations or a severe calculation error that prevented calculations from continuing. |
| | **Override** | Indicates a meter input that is used in flow calculations in override mode that is not typically in override. |
| | **Note**<br>The status is based on the health of the uncorrected volume, corrected volume, and mass of the meter. You can configure which parameters are considered in determining the health of the meter in the **Fault Health Configuration** field on the Station – Advanced Tab.<br>The associated parameter (OBJ_STATUS) is a 32-bit binary value, where individual bits have different meaning. We currently use 3 bits. Starting from LSB (Least Significant Bit), Bit 1 represents “In Alarm,” Bit 2 represents “Failure,” and Bit 3 represents “Override.” When viewing this parameter via a host system, the value is represented as a decimal number. For example, a value of 0 means no bits are set and the meter status is Normal. A value of 1 means the meter status is In Alarm. A value of 2 means the meter status is Failure. A value of 4 means the meter status is Override. A value of 7 means Bits 1, 2, and 3 are all set, and the meter status is In Alarm, Failure, and Override. | |
| **Station Assignment** | Click ••• to open a Point Picker dialog and select the station to which this meter belongs.<br>**Note**<br>• After selecting a Station, click → to open the Station configuration display.<br>• Stations measuring different fluid types are hidden in the Point Picker. | |

| Field | Description |
|---|---|
| | • Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised. |
| **Fluid Properties Reference** | This **read-only** field shows the fluid properties instance currently assigned to the selected meter.<br>**Note**<br>Click → to open the Fluid Properties configuration display. |
| **Flow Alarm Object** | This **read-only** field shows the alarm instance currently assigned to the selected meter.<br>**Note**<br>Click → to open the Alarms configuration display. |
| **Advanced** | Click this button to open the DP Meter – Advanced pop-up display and configure advanced properties for the selected differential pressure meter. |
| **Diagnostics** | Click this button to open the DP Meter – Diagnostics pop-up display and view **read-only** diagnostic information for the selected differential pressure meter. |
| **Rates & Totals** | Click this button to open the DP Meter – Rates & Totals pop-up display and view **read-only** flow rates and accumulations and to manually configure fault totals for the selected differential pressure meter. |
| **Components** | Click this button to open the Components pop-up display and set the mole percent of each fluid component present in the meter. |
| **Meter Type** | Click ▼ to specify the type of differential pressure meter you are configuring, and the calculation to use for the selected meter. |
| **Orifice Diameter** | Specifies the orifice plate bore diameter.<br>**Note**<br>This field appears **only** if you select an **orifice meter** in the **Meter Type** field. |
| **Throat Diameter** | Specifies the Venturi tube throat diameter.<br>**Note**<br>This field appears **only** if you select a **Venturi meter** in the **Meter Type** field. |

| Field | Description |
|---|---|
| **Nozzle Diameter** | Specifies the nozzle throat diameter.<br>**Note**<br>This field appears **only** if you select a **nozzle meter** in the **Meter Type** field. |
| **Orifice Diameter (single hole)** | Specifies the typical orifice hole size (single hole).<br>**Note**<br>This field appears **only** if you select a **conditioning orifice meter** in the **Meter Type** field. |
| **Cone Diameter** | Specifies the cone diameter.<br>**Note**<br>This field appears **only** if you select a **cone meter** in the **Meter Type** field. |
| **Pipe Diameter** | Specifies the inside diameter of the pipe in which the meter is installed. |
| **Rosemount Annubar Type** | Specifies the type and size of the Rosemount Annubar Primary Element.<br>**Note**<br>This field appears **only** if you select a **Rosemount Annubar** in the **Meter Type** field. |
| **No Flow Cut-off Limit** | Sets the low flow cutoff point. When the live differential pressure of the metering device is less than this value, the meter flow rates will be set to zero. |
| **No Flow Status** | This **read-only** field shows the current flowing status of the selected meter. A differential pressure greater than or equal to the no flow cutoff is considered “flowing” and increments flow and flow time. A differential pressure below the no flow cutoff is considered “not flowing,” does not increment flow or flow time, and the **Differential Pressure In Use** field on the DP Meter – Diagnostics tab shows 0. |
| **Flow Direction** | Selects the value to be read from an integral or remote sensor DP object.<br>**Forward** — DP Value will be read from DP object’s SELECTED parameter. |

| Field | Description | |
|---|---|---|
| | **Reverse** | DP Value will be read from DP object's REV_DP parameter. |
| | **Note**<br>This selection **only** applies when a DP object is assigned as the differential pressure input. | |
| **Differential Pressure** | **I/O Definition** | Click … to open a Point Picker dialog and select the differential pressure input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• DP object (Forward) – SELECTED VALUE<br>• DP object (Reverse) – REVERSE DIFFERENTIAL PRESSURE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data object – DOUBLE FLOATING POINT 1. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station.<br>• User defined object (from an application) – SELECTED VALUE (Not valid if the user defined object does not have a SELECTED parameter). For more information, refer to the specific application user manual. |

| Field | Description | |
|---|---|---|
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the differential pressure value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This **read-only** field shows the current value of the selected differential pressure input. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Static Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input. |

| Field | Description | |
|---|---|---|
| | | If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station.<br>• User defined object (from an application) – SELECTED VALUE (Not valid if the user defined object does not have a SELECTED parameter). For more information, refer to the specific application user manual. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Override Value** | Sets the static pressure value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This **read-only** field shows the current value of the selected static pressure input. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |

| Field | Description | |
|---|---|---|
| **Flowing Temperature** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station.<br>• User defined object (from an application) – SELECTED VALUE (Not valid if the user defined object does not have a SELECTED parameter). For more information, refer to the specific application user manual. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Override Value** | Sets the flowing temperature value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This **read-only** field shows the current value of the flowing temperature input used in calculations. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Pressure Transmitter Type** | Specifies the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select an **FBxNData**, **HART**, or **User Data** instance in the **Flowing Pressure I/O Definition** field. | |
| **Corrected Volume Rate Alarm** | Sets the rate alarm limits for the corrected flow rate, and shows the status of each alarm. Possible statuses are:<br>• **Normal** – The alarm is enabled and is not in an alarm condition.<br>• **Disabled** – The alarm has been disabled.<br>• **In Alarm** – The alarm is enabled and is in an alarm condition. | |
| **Last Meter Inspection Time** | This **read-only** field shows the date and time the last meter element change event occurred in DeltaV FBxConnect configuration software for the selected meter. For more information, refer to Plate Change.<br>**Note**<br>The default is 1/1/2000 12:00:00 AM. | |

4. Select **Save** to save any changes you make to this display.

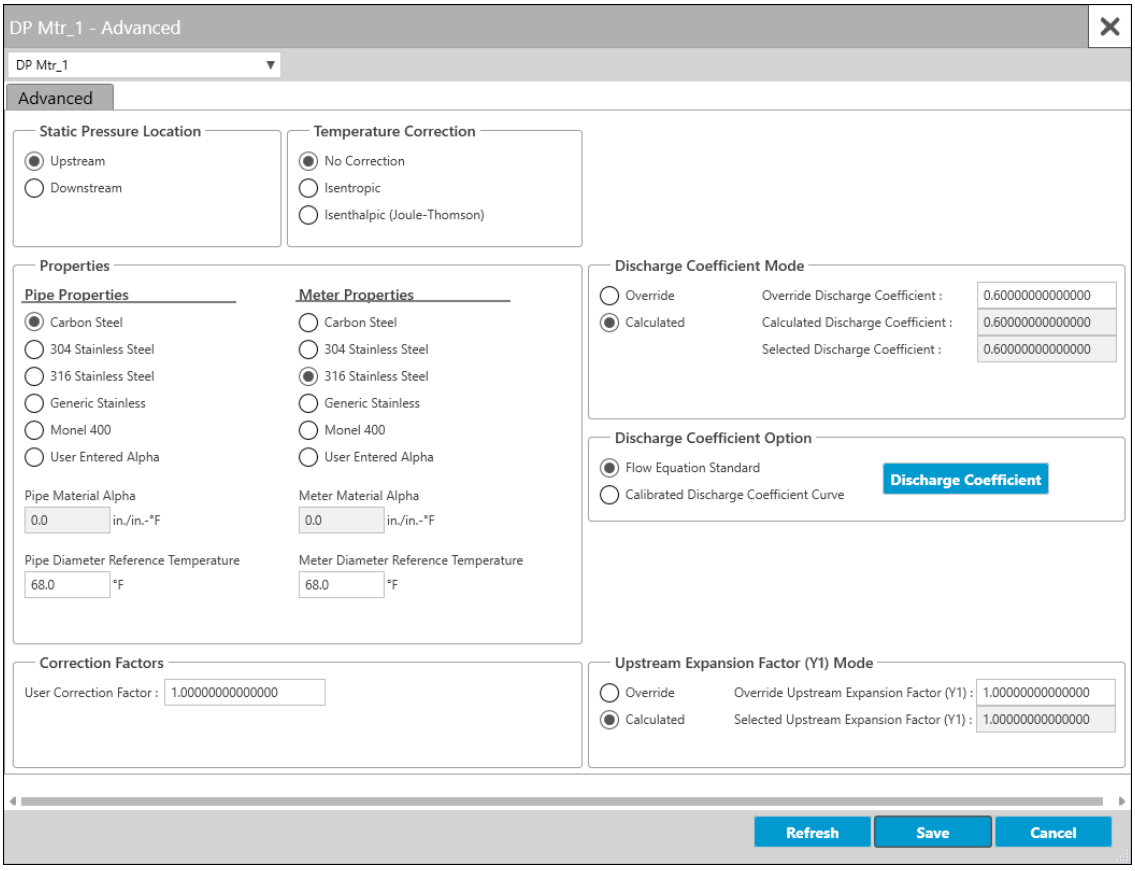
## 4.9.2 DP Meter – Advanced

Use this pop-up display to configure advanced properties for the selected differential pressure meter, including meter construction material, temperature correction, and discharge coefficient options.

To access this pop-up display:

1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu. The DP Meter display opens.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The DP Meter – Advanced pop-up display opens.

**Figure 162. DP Meter – Advanced**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Static Pressure Location** | Sets the location of the static pressure tap in relation to the meter and normal flow. | |
| | **Upstream** | The static pressure tap is located upstream in relation to the meter and normal flow. |
| | **Downstream** | The static pressure tap is located downstream in relation to the meter and normal flow. |
| **Temperature Correction** | Sets the option to correct the measured temperature to an upstream value. | |
| | **No Correction** | Temperature is either measured upstream or temperature correction is not significant and considered to be within the uncertainty of the measurement. AGA3 does not require temperature correction to upstream. |
| | **Isentropic** | Temperature correction is made based on isentropic expansion across the meter using the isentropic exponent. |
| | **Isenthalpic (Joule-Thompson)** | Temperature correction is made based on isenthalpic expansion across the meter using Joule-Thomson coefficient.<br>**Note**<br>If you select **AGA8 2017 Part 1 Detailed** or **AGA 8 2017 – Part 2 / GERG 2008** in the Compressibility/Density Calculation field for the associated station (Station – General Tab), then the Joule-Thompson coefficient is calculated per the selected standard. For all other Compressibility/Density Calculation options, the Joule-Thompson coefficient is calculated per ISO/TR 9464. |

| Field | Description | |
|---|---|---|
| **Pipe Properties** | Indicates the material from which the meter tube is constructed. Nearly all natural gas applications use a carbon steel meter tube. This selection controls the value in the Pipe Material Alpha field.<br>**Note**<br>You must also configure the **Pipe Diameter Reference Temperature** field. | |
| | **Carbon Steel** | Indicates the meter tube material as carbon steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **304 Stainless Steel** | Indicates the meter tube material as 304 stainless steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **316 Stainless Steel** | Indicates the meter tube material as 316 stainless steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |

| Field | Description | |
|---|---|---|
| | **Generic Stainless Steel** | Indicates the meter tube material as generic stainless steel. This selection uses an average alpha based on 304 and 316 stainless steel, and should be used if the exact grade is unknown.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **Monel 400** | Indicates the meter tube material as Monel 400.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **User Entered Alpha** | Select User Entered Alpha to configure your own value in the Pipe Material User Alpha field.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |

| Field | Description | |
|---|---|---|
| | **Pipe Coefficient A** | Sets the pipe material's coefficient of linear expansion for coefficient A.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient A is a value between 6.4 and 16.466. The appropriate value for your configuration can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |
| | **Pipe Coefficient B** | Sets the pipe material's coefficient of linear expansion for coefficient B.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient B is a value between 0 and 60.0. The appropriate value for your configuration can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |
| | **Pipe Coefficient C** | Sets the pipe material's coefficient of linear expansion for coefficient C.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient C is a value between -43.526 and 5.360, where negative values are accepted. The appropriate value for your configuration |

| Field | Description | |
|---|---|---|
| | | can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |
| **Pipe Material Alpha** | This field shows the coefficient of thermal expansion used to calculate the effect of temperature on the pipe. This number is shown with an implied multiplier of 1000.<br>**Note**<br>• This field is **read-only** unless you select **User Entered Alpha** in the **Pipe Properties** field.<br>• This field shows a value **only** under flowing conditions, and shows 0.0 under no flow conditions. | |
| **Pipe Diameter Reference Temperature** | Indicates the reference temperature at which the internal diameter of the pipe was measured, expressed in degrees Fahrenheit or degrees Celsius. | |
| **Meter Properties** | Indicates the material from which the orifice (or other meter element) is made. Nearly all natural gas applications use stainless steel orifice plates.<br>**Note**<br>You must also configure the **Meter Diameter Reference Temperature** field. | |
| | **Carbon Steel** | Indicates the meter element material as carbon steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |

| Field | Description | |
|---|---|---|
| | **304 Stainless Steel** | Indicates the meter element material as 304 stainless steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **316 Stainless Steel** | Indicates the meter element material as 316 stainless steel.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **Generic Stainless Steel** | Indicates the meter element material as generic stainless steel. This selection uses an average alpha based on 304 and 316 stainless steel, and should be used if the exact grade is unknown.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **Monel 400** | Indicates the meter element material as Monel 400.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |

| Field | Description | |
|---|---|---|
| | **User Entered Alpha** | Select User Entered Alpha to configure your own value in the Meter Material Alpha field.<br>**Note**<br>This field **does not** show if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display. |
| | **Meter Coefficient A** | Sets the Orifice tube material's coefficient of linear expansion for coefficient A.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient A is a value between 6.4 and 16.466. The appropriate value for your configuration can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |
| | **Meter Coefficient B** | Sets the Orifice tube material's coefficient of linear expansion for coefficient B.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient B is a value between 0 and 60.0. The appropriate value for your configuration can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |

| Field | Description | |
|---|---|---|
| | **Meter Coefficient C** | Sets the Orifice tube material's coefficient of linear expansion for coefficient C.<br>**Note**<br>• This field shows **only** if you select either **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D2 Taps)** in the **Meter Type** field on the DP Meter – General display.<br>• A typical coefficient C is a value between -43.526 and 5.360, where negative values are accepted. The appropriate value for your configuration can be found in *Appendix D* of the *GOST 8.586.1-2005* standard. |
| **Meter Material Alpha** | This field shows the coefficient of thermal expansion used to calculate the effect of temperature on the meter. This number is shown with an implied multiplier of 1000.<br>**Note**<br>• This field is **read-only** unless you select **User Entered Alpha** in the **Meter Properties** field.<br>• This field shows a value **only** under flowing conditions and shows 0.0 under no flow conditions. | |
| **Meter Diameter Reference Temperature** | Indicates the reference temperature at which the bore diameter of the orifice plate was measured (in selected temperature units). | |
| **User Correction Factor** | Sets a factor the system multiplies by the base flow equation to make a desired adjustment to the flow. The user correction factor is applied to the volume, mass, and energy flow rates and totals.<br>**Note**<br>If you use the default value of 1, the system does not apply any correction. | |

| Field | Description | |
|---|---|---|
| **Relative Pressure Loss** | Enter the ratio of permanent pressure loss to differential pressure for the Venturi meter. This value is used to determine the pressure loss shown on the diagnostic pop-up display.<br>**Note**<br>This field appears **only** if you select **ISO5167 Venturi (As Cast)**, **ISO5167 Venturi (Machined)**, or **ISO5167 Venturi (Rough Weld)** in the **Meter Type** field on the DP Meter – General display. | |
| **GOST Parameters** | Sets calculation parameters associated with GOST orifice meters.<br>**Note**<br>These fields show **only** if you select **GOST 8.586 Orifice (Flange Taps)**, **GOST 8.586 Orifice (Corner Taps)**, or **GOST 8.586 Orifice (D & D/2 Taps)** in the **Meter Type** field on the DP Meter – General display. | |
| | **Meter Inlet Edge Radius** | Enter, in units of length, the value of the edge radius at the apex (the point where the edge joins the orifice).<br>**Note**<br>The roughness correction is disabled when the Meter Inlet Edge Radius and Inspection Period fields are set to 0. |
| | **Pipe Int Roughness** | Enter, in units of length, the interior meter tube wall roughness.<br>**Note**<br>Entering 0 will disable the pipe roughness correction factor by setting Ksh to 1. |
| | **Inspection Period** | Enter, in years, the amount of time since the last orifice inspection.<br>**Note**<br>The roughness correction is disabled when the Meter Inlet Edge Radius and Inspection Period fields are set to 0. |
| **Discharge Coefficient Mode** | Sets how the system obtains the discharge coefficient value used in calculations. | |
| | **Override** | The system uses the value set in the Discharge Coefficient Override field for the discharge coefficient value. |

| Field | Description | |
|---|---|---|
| | **Calculated** | The system calculates a value for the discharge coefficient. |
| | **Calculated from Curve** | The system calculates a value for the discharge coefficient based on the values you enter. Select the Discharge Coefficient Calibration Curve Setup button to configure a 20-point discharge coefficient vs. Reynolds number curve.<br>**Note**<br>This field shows **only** if you select **Cone** in the **Meter Type** field on the DP Meter display. |
| **Override Discharge Coefficient** | Sets the discharge coefficient to use in calculations when **Override** is selected in the **Discharge Coefficient Mode** field. | |
| **Calculated Discharge Coefficient** | This **read-only** field shows the discharge coefficient calculated by the system. This value is used by the system when you select **Calculated** in the **Discharge Coefficient Mode** field. | |
| **Selected Discharge Coefficient** | This **read-only** field shows the discharge coefficient currently used in calculations based on the selected options. | |
| **Discharge Coefficient Option** | Sets the option to calculate the discharge coefficient from the selected flow calculation method or from a calibrated curve of discharge coefficient vs. Reynolds number. | |
| | **Flow Equation Standard** | The system calculates the coefficient of discharge based on the selected calculation method. |
| | **Calibrated Discharge Coefficient Curve** | The system calculates the coefficient of discharge from the user entered calibration curve. |
| | **Note**<br>This option is **not** available for cone meters. | |
| **Discharge Coefficient / Discharge Coefficient Calibration Curve Setup** | This option brings up a 20-point discharge coefficient vs. Reynolds number curve to allow you to enter values from a meter calibration report. Refer to Discharge Coeffcient. | |

| Field | Description | |
|---|---|---|
| **Pipe Schedule** | Identifies the wall thickness of the pipe.<br>**Note**<br>This field appears **only** if you select **1595 Conditioning Orifice (Flange)**, **1595 Conditioning Orifice (D and D/2)**, or **405C Compact Orifice** in the **Meter Type** field on the General tab. | |
| **Pipe Schedule Adjustment Factor** | This **read-only** field shows an adjustment factor based on the selected pipe schedule.<br>**Note**<br>This field appears **only** if you select **1595 Conditioning Orifice (Flange)**, **1595 Conditioning Orifice (D and D/2)**, or **405C Compact Orifice** in the **Meter Type** field on the General tab. | |
| **Calibration Factor** | Enter the manufacturer supplied meter calibration factor.<br>**Note**<br>This field appears **only** if you select **1595 Conditioning Orifice (Flange)**, **1595 Conditioning Orifice (D and D/2)**, or **405C Compact Orifice** in the **Meter Type** field on the General tab. | |
| **Upstream Expansion Factor (Y1) Mode** | Sets how the system obtains the Upstream Expansion Factor (Y1) value used in calculations. Possible options are: | |
| | **Override** | The system uses the value you enter in the Override Upstream Expansion Factor (Y1) field. |
| | **Calculated** | The system calculates the value per the selected DP meter standard. |
| **Override Upstream Expansion Factor (Y1)** | Sets the value to be used for the upstream expansion factor (Y1) in the calculations. Enter a value of 1.0 if the fluid measured is a liquid or a dense phase fluid. | |
| **Selected Upstream Expansion Factor (Y1)** | This **read-only** field shows the value calculated per the selected DP meter standard. Notably, ISO 5167 calculations use the Reader-Harris equation, AGA 3 1992 calculations use the Buckingham-Beane equation, and AGA 3 2013 calculations use a revised equation developed at CEESI. | |

5. Select **Save** to save any changes you make to this pop-up display .

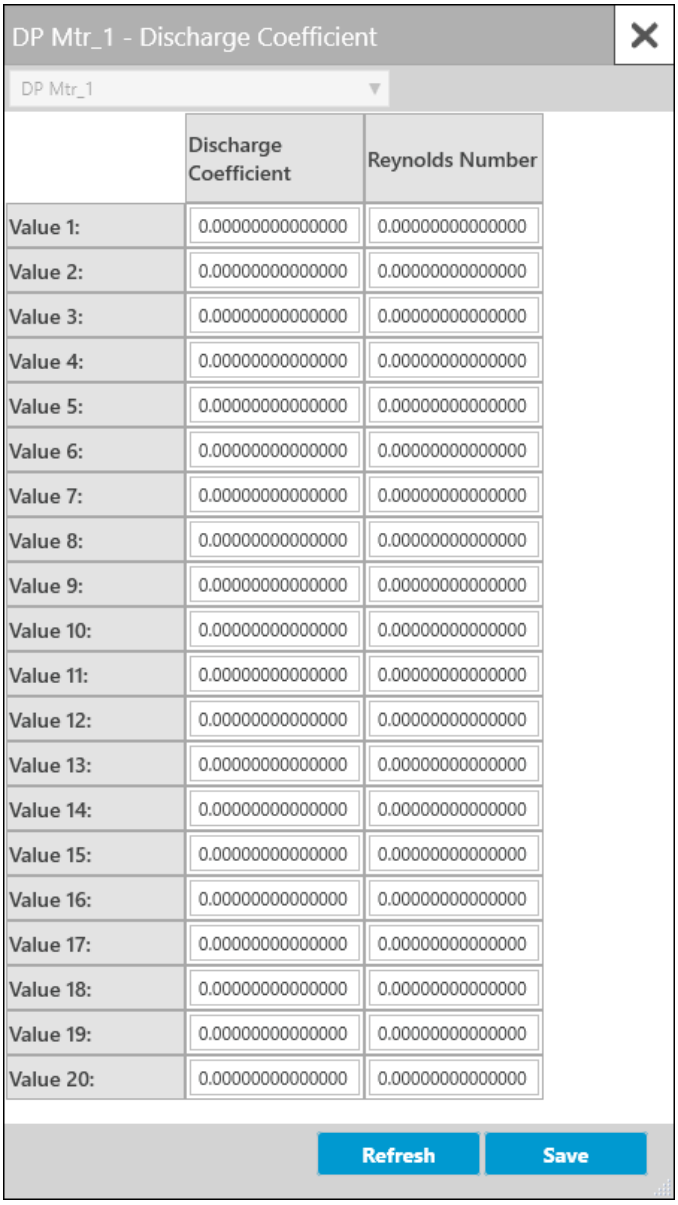
#### 4.9.2.1 Discharge Coefficient

Use this option to enter values from the meter calibration report.

To access this pop-up display:

1. Select **Configure > Gas > DP Meter** . The DP Meter display opens.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The DP Meter – Advanced pop-up display opens.
4. If present for your configured meter type, select either **Calibrated from Curve** in the Discharge Coefficient Mode frame or **Calibrated Discharge Coefficient Curve** in the Discharge Coefficient Option frame and **Save** your changes.
5. Select the **Discharge Coefficient /Discharge Coefficient Calibration Curve Setup** button. The Discharge Coefficient pop-up display opens.

**Figure 163. Discharge Coefficient**




6. Enter the Discharge Coefficient and Reynolds Number values from the meter calibration report.

**Note**

A valid point **must** have a non-zero Reynolds Number and a non-zero Discharge Coefficient. The points may be entered in any order and will be internally sorted by Reynolds Number, discarding any invalid points. No extrapolation is done beyond the lowest and highest points on the curve. If the Reynolds Number is less than the lowest

point on the curve, the calculated factor will be the factor for the lowest point on the curve. If the Reynolds Number is greater than the highest point on the curve, the calculated Discharge Coefficient will be the Discharge Coefficient for the highest point on the curve.

7. Select **Save** to save any changes you make to this pop-up display.

## 4.9.3 DP Meter Diagnostics

Use this pop-up display to view **read-only** diagnostic information for the selected differential pressure meter, including calculated factors, calculated values, and alarm codes.

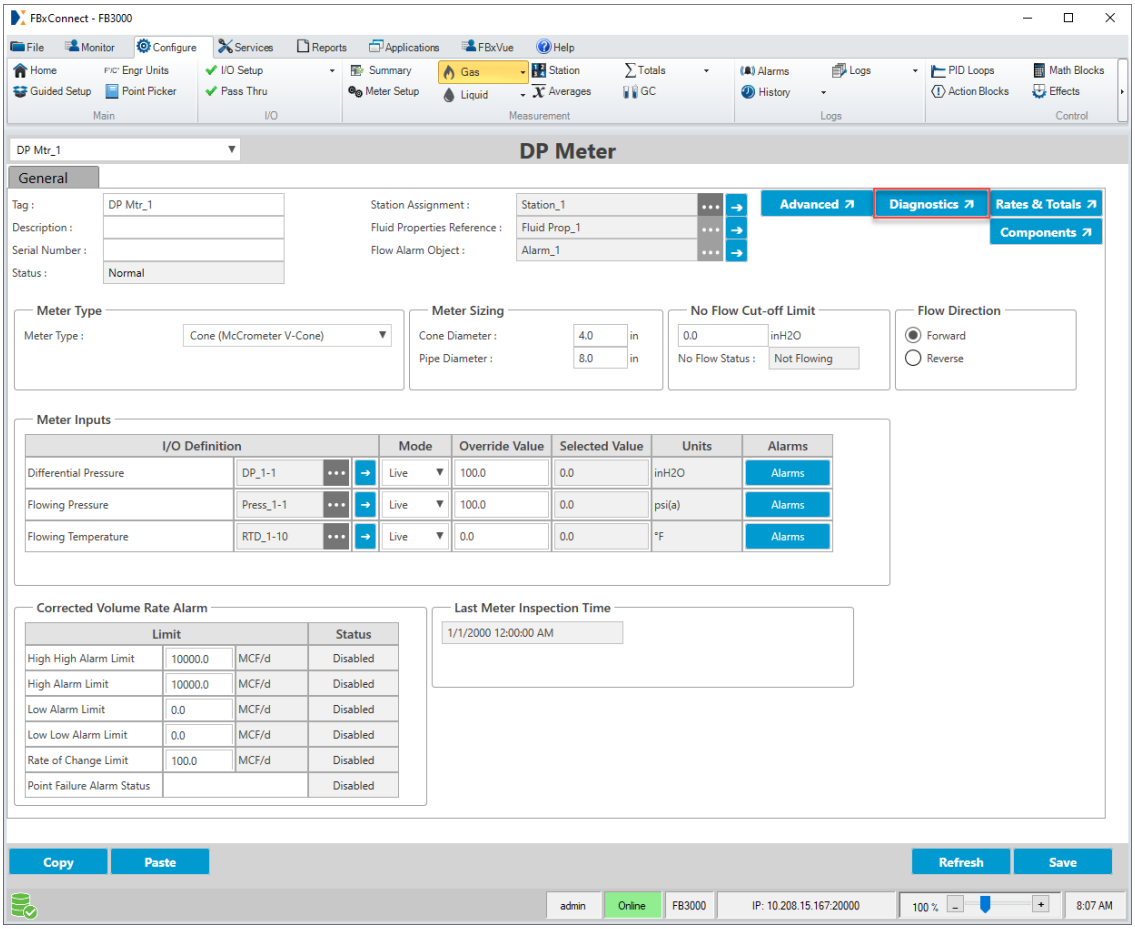
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- Physically impossible inputs may be clamped at a high or low limit value in order to ensure reasonable results. If a value is clamped at a high or low limit, a corresponding flow or property alarm is raised.

To access this pop-up display:

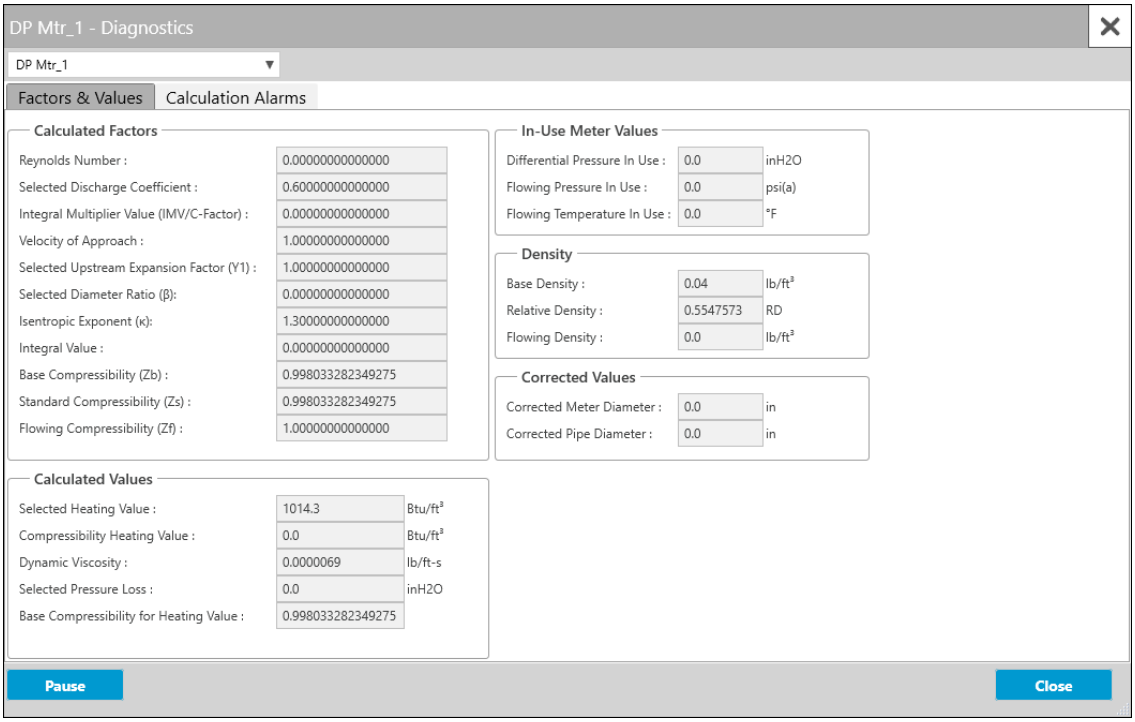
1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.

**Figure 164. DP Meter – Diagnostics Button**




3. Select the **Diagnostics** button. The DP Meter Diagnostics pop-up display opens showing the Factors & Values tab.

**Figure 165. DP Meter Diagnostics**




The DP Meter Diagnostics pop-up display contains the following tabs:

Factors and Values – This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

Calculation Alarms – This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with the meter.

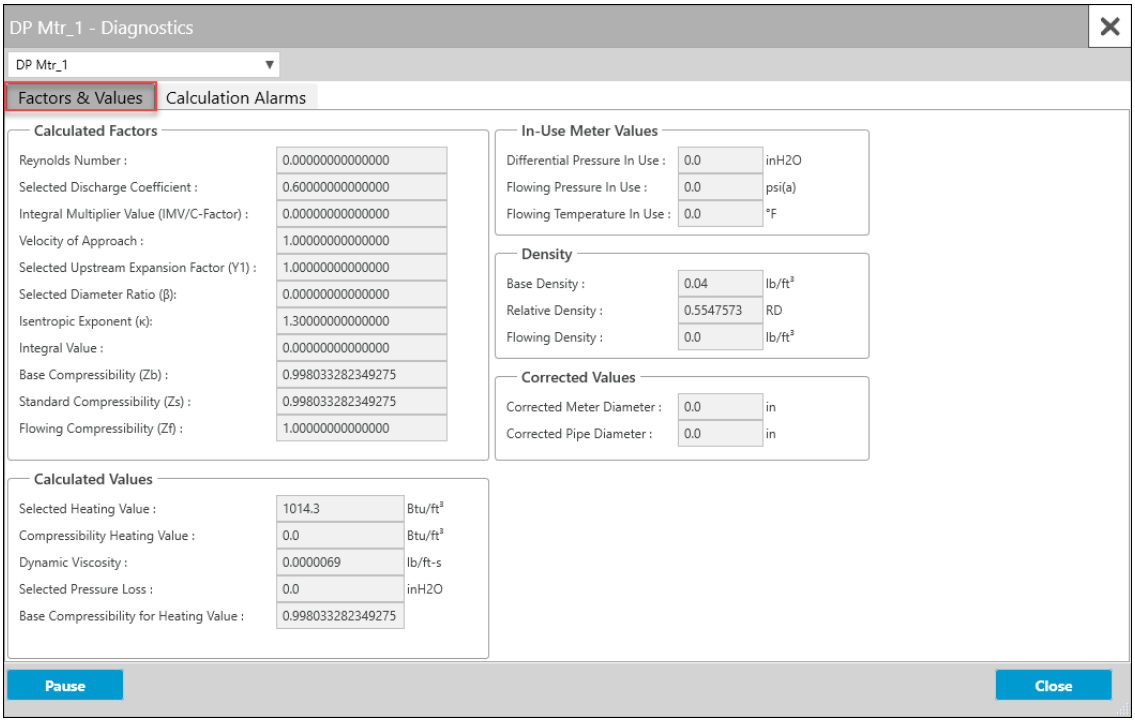
### 4.9.3.1 DP Meter Diagnostics – Factors & Values Tab

This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

To access this display:

1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The DP Meter Diagnostics pop-up display opens showing the Factors & Values tab.

**Figure 166. DP Meter Diagnostics – Factors & Values Tab**




4. Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Calculated Factors** | **Reynolds Number (Re)** | This **read-only** field shows the pipe Reynolds number, a dimensionless ratio of forces used to correlate the variations in the meter coefficient of discharge (Cd) with changes in the fluid's properties, flow rate, and meter geometry. |
| | **Selected Discharge Coefficient (Cd)** | This **read-only** field shows the meter coefficient of discharge, the ratio of the actual flow to the theoretical flow and is applied to the theoretical flow equation to obtain the actual flow. |
| | **Integral Multiplier Value (IMV/C-Factor)** | This **read-only** field shows the integral multiplier value (also known as C-prime or C-Factor). It represents the static variables in the flow equation. |

| Field | Description | |
|---|---|---|
| | **Velocity of Approach (Ev)** | This **read-only** field shows the velocity of approach factor (Ev), a mathematical expression that relates the velocity of the flowing fluid in the meter approach section (upstream meter tube) to the fluid velocity in the meter. |
| | **Upstream Expansion Factor ($Y_1$)** | This **read-only** field shows the upstream expansion factor (Y1), an empirical expression used to correct the flow rate for the reduction in fluid density that a compressible fluid experiences when it passes through the meter. |
| | **Selected Diameter Ratio (β)** | This **read-only** field shows the ratio of the temperature corrected meter diameter to the temperature corrected pipe diameter. |
| | **Isentropic Exponent (K)** | This **read-only** field shows the isentropic exponent (κ), a thermodynamic state property that establishes the relationship between an expanding fluid's pressure and density as the fluid flows through the meter. |
| | **Integral Value (IV)** | This **read-only** field shows the integral value (also known as hwPf or flow extension). It represents the dynamic variables in the flow equation and is calculated as the square root of the product of differential pressure and flowing pressure. |
| | **Base Compressibility (Zb)** | This **read-only** field shows the base compressibility (Zb), an adjustment factor used to account for the deviation from the ideal gas law at user entered base temperature and pressure. |
| | **Standard Compressibility (Zs)** | This **read-only** field shows the standard compressibility (Zs), an adjustment factor used to account for the deviation from the ideal gas law at standard temperature and pressure (60°F and 14.73 psia). This value is used in the AGA3 Volume equations only. |

| Field | Description | |
|---|---|---|
| | **Flowing Compressibility (Zf)** | This **read-only** field shows the flowing compressibility (Zf), an adjustment factor used to account for the deviation from the ideal gas law at flowing temperature and pressure. |
| **Calculated Values** | **Selected Heating Value** | This **read-only** field shows the heating value of the fluid at base conditions. The heating value represents the amount of energy transferred as heat per unit mass or unit volume from the complete, ideal combustion of the gas with oxygen at a base temperature. |
| | **Compressibility Heating Value** | If the compressibility calculation **is** dependent on the heating value, the value shown is the superior/gross volumetric heating value at the reference conditions you select on the Station – General.<br>**Note**<br>If the compressibility calculation **is not** dependent on the heating value, this field shows a value of 0. |
| | **Dynamic Viscosity** | This **read-only** field shows the dynamic (absolute) viscosity of the fluid at flowing temperature and pressure. The dynamic viscosity represents the measure of a fluid's intermolecular cohesive force's resistance to shear per unit of time. |
| | **Selected Pressure Loss** | This **read-only** field shows the permanent pressure loss due to the presence of the meter (upstream pressure less downstream pressure after recovery is complete). |
| | **Base Compressibility for Heating Value** | This **read-only** field shows the calculated base compressibility used in heating value calculations.<br>**Note**<br>For more information about the heating value calculation, refer to the Station – Advanced. |

| Field | Description | |
|---|---|---|
| **In-Use Meter Value** | **Differential Pressure In Use** | This **read-only** field shows the differential pressure being used by the flow calculation. It will reflect the value after the no-flow cutoff is applied in the selected differential pressure units of the station. |
| | **Flowing Pressure In Use** | This **read-only** field shows the flowing pressure being used by the flow calculation. It will reflect the upstream, absolute pressure in the selected pressure units of the station. |
| | **Flowing Temperature In Use** | This **read-only** field shows the flowing temperature being used by the flow calculation. It will reflect the value converted to upstream if upstream correction has been enabled in the selected temperature units of the station. |
| **Density** | **Base Density** | This **read-only** field shows the base density value currently used in calculations. The base density is the mass per unit volume of the fluid being measured at user entered base temperature and pressure in the selected density units of the station. |
| | **Relative Density** | This **read-only** field shows the relative density, the ratio of the density of the fluid to the density of air at base temperature and pressure. Relative density is a unit-less value. |
| | **Flowing Density** | This **read-only** field shows the flowing density value currently used in calculations. The flowing density is the mass per unit volume of the fluid being measured at flowing temperature and pressure in the selected density units of the station. |
| **Corrected Values** | **Corrected Meter Diameter** | This **read-only** field shows the meter diameter corrected for the difference between flowing temperature and the meter diameter reference temperature. |

| Field | Description | |
|---|---|---|
| | **Corrected Pipe Diameter** | This **read-only** field shows the pipe diameter corrected for the difference between flowing temperature and the pipe diameter reference temperature. |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | |

### 4.9.3.2 DP Meter Diagnostics – Calculation Alarms Tab

This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with the meter. Alarm codes are comprised of two parts: Alarm Category (the reason for the alarm) and Alarm Value (the part of the calculation that raised the alarm). For example, if you assign a voltage signal to a pressure input, **Invalid Input** would be selected in the **Alarm Category** frame and **Pressure** would be selected in the **Alarm Value** frame.

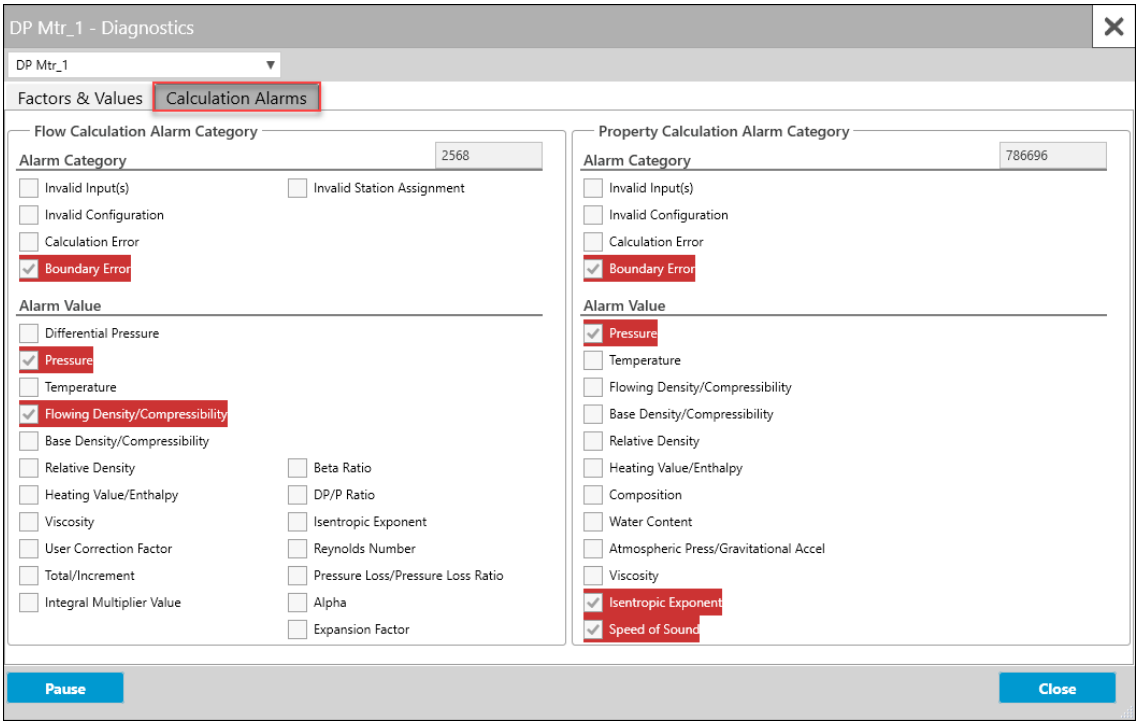
**Note**

- The alarm code is a decimal representation of which alarm bits are set. Each bit is identified in the table below.
- The error code can be a composite of one or more errors.
- Error codes are generated according to your selection in the Calculation Failure Option field on the Station – Advanced.
- Alarms are raised if calculation inputs and interim values do not fall within certain ranges based on the calculation you have selected. To view the boundary limits for calculations, refer to Calculation Library Limit Checks.

To access this display:

1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The DP Meter Diagnostics pop-up display opens.
4. Select the **Calculation Alarms** tab.

**Figure 167. DP Meter Diagnostics – Calculation Alarms Tab**




**5.** Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Flow Calculation Alarm Category** | These **read-only** fields show flow calculation alarm information. | |
| | **Alarm Code** | This **read-only** field shows a code that indicates whether the flow calculation is within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note**<br>• This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show **0** if Calculation Failure Option has been set to Alarm Disabled on the Station – Advanced. |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: |

| Field | Description | | |
|---|---|---|---|
| | | **Invalid Input(s) (Bit 0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration (Bit 1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |
| | | **Calculation Error (Bit 2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error (Bit 3)** | Something exceeded stated boundary of the calculation standard. |
| | | **Invalid Station Assignment (Bit 4)** | The meter type not is valid for the station type or station fluid type. |

| Field | Description | |
|---|---|---|
| | **Alarm Value** | These **read-only** fields show, if checked, shows which part of the flow calculation is associated with the Alarm Category.<br>• Differential Pressure (Bit 8)<br>• Pressure (Bit 9)<br>• Temperature (Bit 10)<br>• Flowing Density / Compressibility (Bit 11)<br>• Base Density / Compressibility (Bit 12)<br>• Relative Density (Bit 13)<br>• Heating Factor / Enthalpy (Bit 14)<br>• Viscosity (Bit 15)<br>• User Correction Factor (Bit 16)<br>• Total / Increment (Bit 17)<br>• Integral Multiplier Value (Bit 18)<br>• Beta Ratio (Bit 25)<br>• DP/P Ratio (Bit 26)<br>• Isentropic Exponent (Bit 27)<br>• Reynolds Number (Bit 28)<br>• Pressure Loss / Pressure Loss Ratio (Bit 29)<br>• Alpha (Bit 30)<br>• Expansion Factor (Bit 31)<br>**Note**<br>A Total alarm can occur in the following situations:<br>• A Fault Total object reference is incorrectly configured. For more information, refer to DP Meter Rates & Totals – Fault Totals Tab.<br>• An internal error has occurred while totalizing. |

| Field | Description | | |
|---|---|---|---|
| **Property Calculation Alarm Category** | These **read-only** fields show property calculation alarm information. | | |
| | **Alarm Code** | This **read-only** field shows a code that indicates whether the property calculations (density, compressibility, and heating value) are within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note**<br>• This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show **0** if Calculation Failure Option has been set to Alarm Disabled on the Station – Advanced. | |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: | |
| | | **Invalid Input(s) Bit (0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration Bit (1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |
| | | **Calculation Error Bit (2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error Bit (3)** | Something exceeded stated boundary of the calculation standard. |

| Field | Description | |
|---|---|---|
| | **Alarm Value** | These **read-only** fields show, if checked, shows which part of the flow calculation is associated with the Alarm Category.<br>• Pressure (Bit 8)<br>• Temperature (Bit 9)<br>• Flowing Density/Compressibility (Bit 10)<br>• Base Density/Compressibility (Bit 11)<br>• Relative Density (Bit 12)<br>• Heating Value/Enthalpy (Bit 13)<br>• Composition (Bit 14)<br>• Water Content (Bit 15)<br>• Atmospheric Press/Gravitational Accel (Bit 16)<br>• Viscosity (Bit 17)<br>• Isentropic Exponent (Bit 18)<br>• Speed of Sound (Bit 19) |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | |

## 4.9.4 DP Meter – Rates & Totals

Use this tab to view **read-only** flow rates and accumulations and to manually configure fault totals for the selected differential pressure meter.

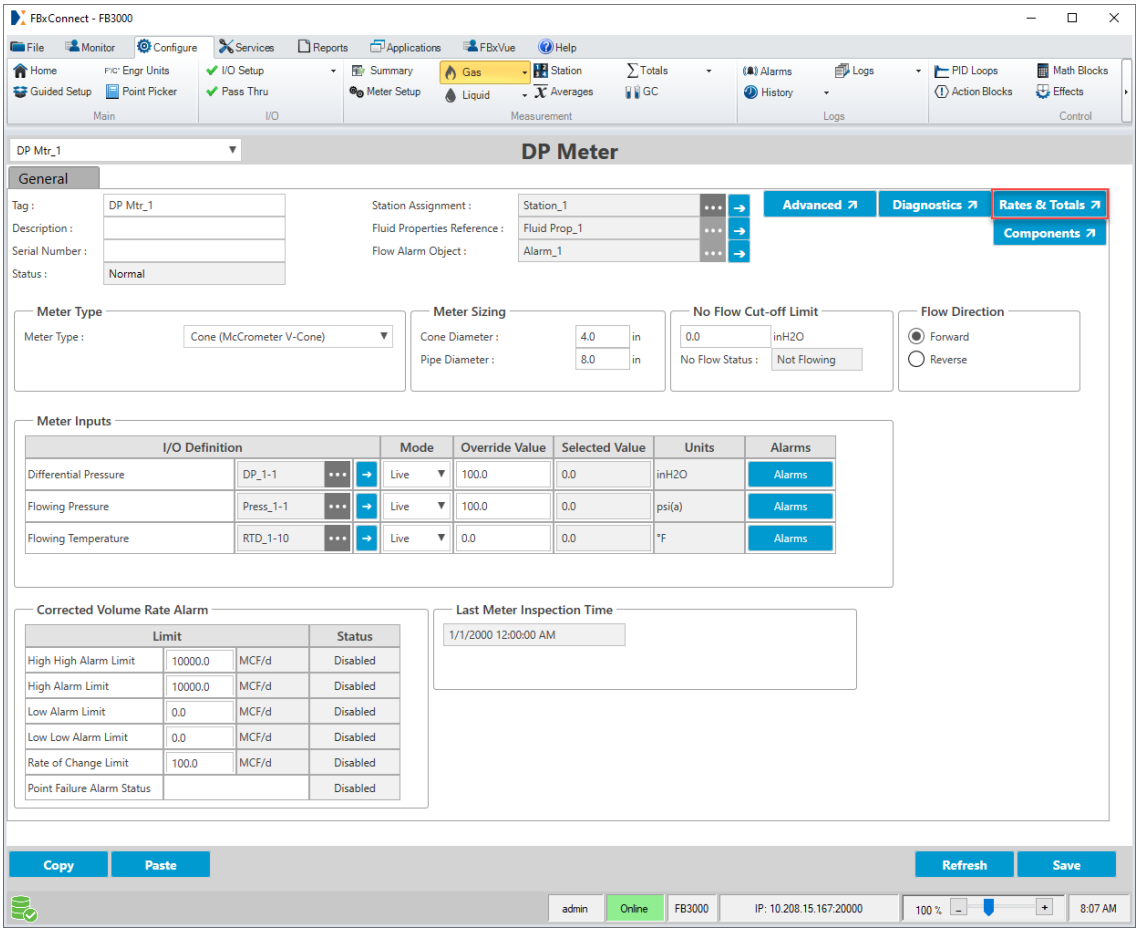
**Note**

This pop-up can remain open while you change values on the other tabs of this display.

To access this tab:

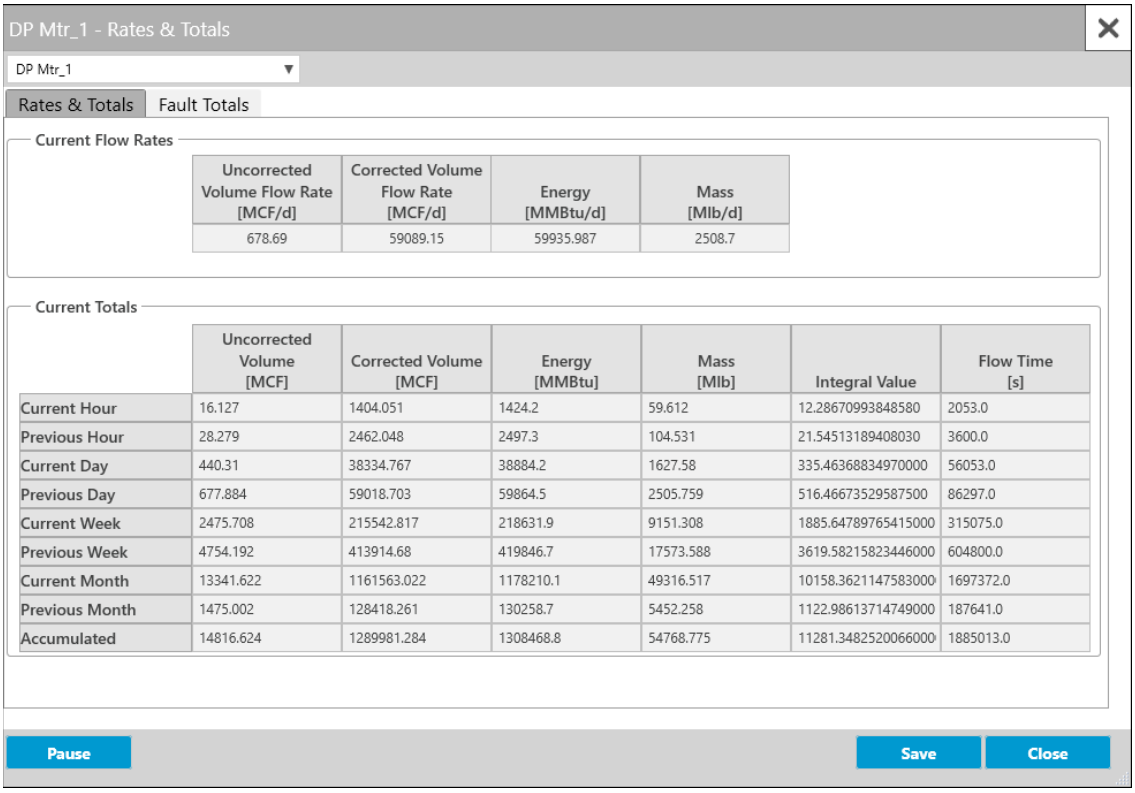
1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.

**Figure 168. DP Meter – Rates & Totals Button**




3. Select the **Rates & Totals** button. The DP Rates & Totals pop-up display opens.

**Figure 169. DP Meter Rates & Totals**




The DP Rates & Totals pop-up display contains the following tabs:

Rates & Totals – Use this tab to view **read-only** flow rates and accumulations for the selected differential pressure meter.

Fault Totals – Use this tab to manually configure which Totals objects in the FB Series product database are used to store fault totals and view **read-only** fault total accumulations for the selected differential pressure meter.

### 4.9.4.1 DP Meter Rates & Totals – Rates & Totals Tab

Use this tab to view **read-only** flow rates and accumulations for the selected differential pressure meter.

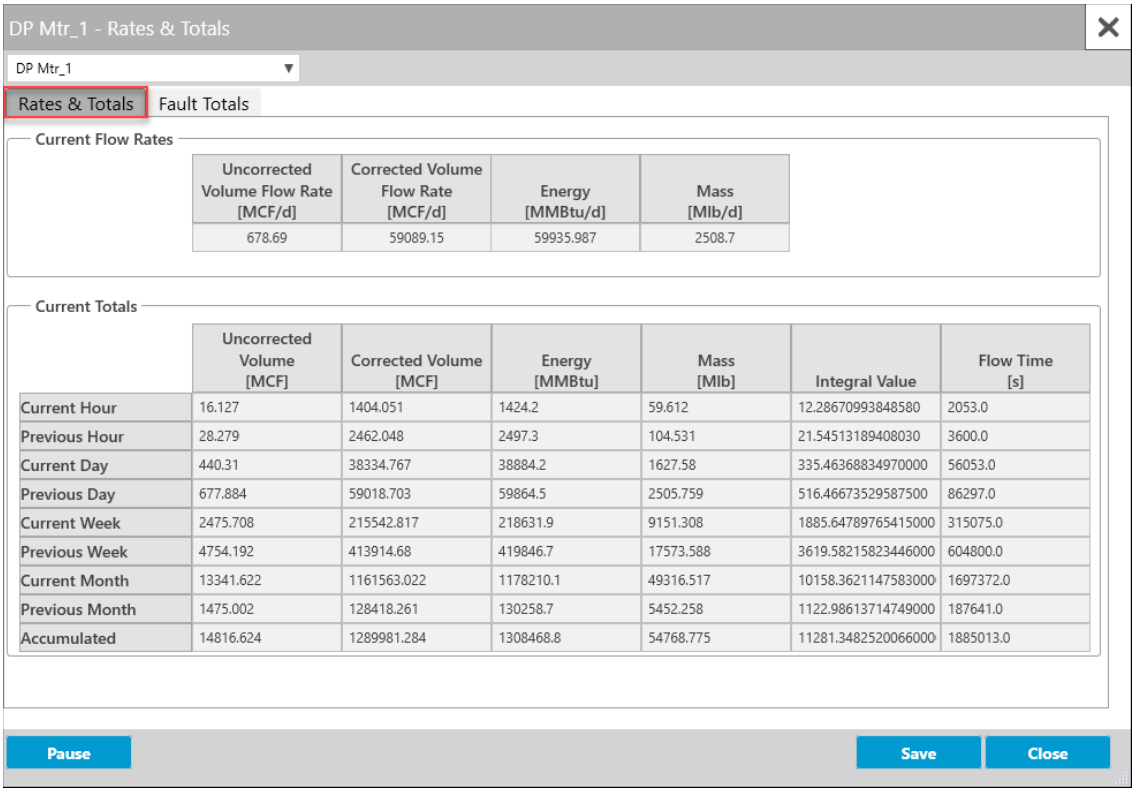
**Note**

This pop-up can remain open while you change values on the other tabs of this display.

To access this tab:

1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Rates & Totals** button. The DP Rates & Totals pop-up display opens.

**Figure 170. DP Meter Rates & Totals – Rates & Totals Tab**




4. Review the values in the following fields:

| Field | Description |
|---|---|
| **Current Flow Rates** | These **read-only** fields show the current uncorrected volume, corrected volume, energy, and mass flow rates for the selected meter. |
| **Current Totals** | These **read-only** fields show the total accumulation, as well as the current and previous hourly, daily, weekly, and monthly accumulation for the selected meter. |

| Field | Description |
|---|---|
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. |

### 4.9.4.2 DP Meter Rates & Totals – Fault Totals Tab

Use this tab to manually configure which Totals objects in the FB Series product database are used to store fault totals and view **read-only** fault total accumulations for the selected differential pressure meter.

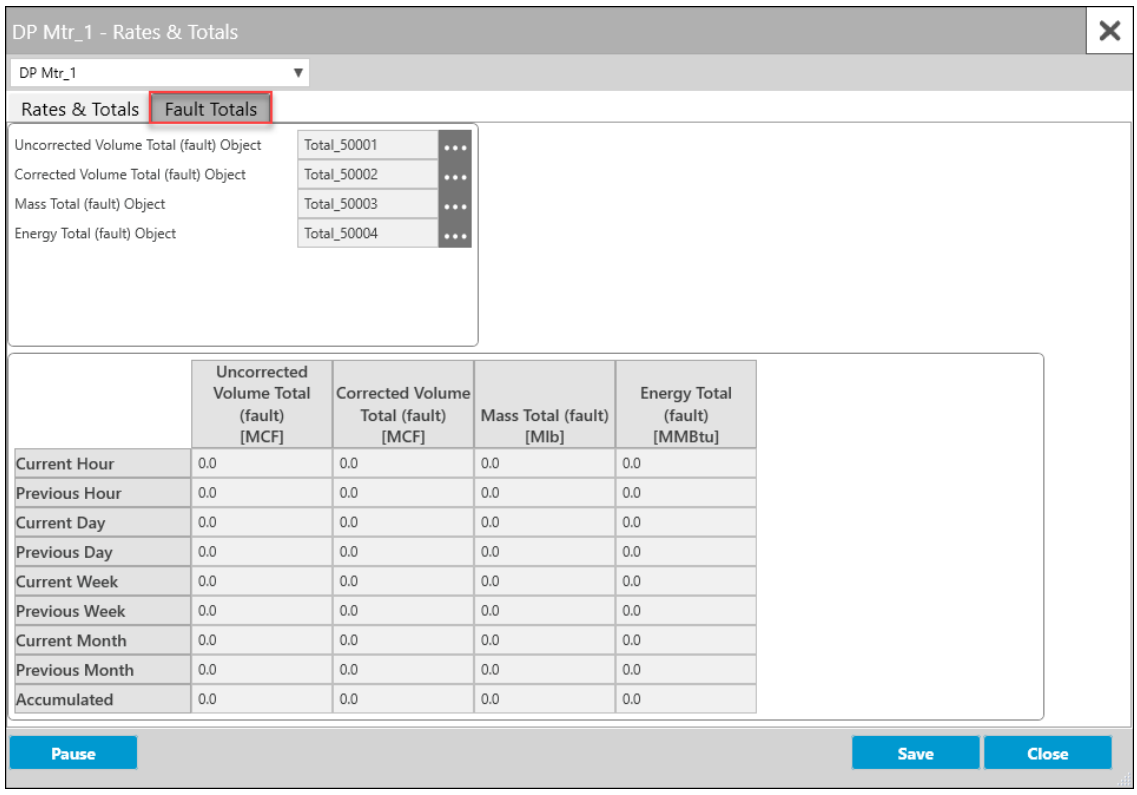
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- Fault totals are calculated when the system becomes unhealthy and can be used to determine how measurement quantities are affected by faults and alarms. To configure which faults and alarms cause the system to become unhealthy, refer to the **Fault Health Configuration** field on the Station – Advanced.
- You can automatically configure which Totals objects are associated with fault totals by using the Totals Setup wizard.
- You **must** configure additional spare Totals objects in the FB Series product database before manually configuring fault totals. For more information, refer to the **Number of Spare Totals** field on the Meter Setup display.

To access this tab:

1. Select **Configure > Gas > DP Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Rates & Totals** button. The DP Rates & Totals pop-up display opens.
4. Select the **Fault Totals** tab.

**Figure 171. DP Meter Rates & Totals – Fault Totals Tab**




**5.** Review the values in the following fields:

| Field | Description |
|---|---|
| **Uncorrected Volume Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for uncorrected volume fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |

| Field | Description |
|---|---|
| **Corrected Volume Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for corrected volume fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |
| **Mass Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for mass fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |
| **Energy Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for energy fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |

| Field | Description |
|---|---|
| **Current Fault Totals** | These **read-only** fields show the total fault total accumulation, as well as the current and previous hourly, daily, weekly, and monthly fault total accumulations for the selected meter. |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. |

# 4.10 Linear Meter

Use this display to configure linear meters in your FB Series product.

To access this display, select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.

**Figure 172. Configure – Linear Meter**




The Linear Meter display contains the following items:

General – Use this display to define basic parameters for the linear meter. The General tab displays when you first access the Linear Meter display.

Auto-Adjust – Use this pop-up display to configure and view parameters specific to an Auto-Adjust meter.

**Note**

This tab is **only** available when a **meter type** of **Auto-Adjust** is configured.

Advanced – Use this pop-up display to configure advanced properties for the selected linear meter, including meter construction material, temperature correction, and discharge coefficient options.

Diagnostics – Use this pop-up display to view **read-only** diagnostic information for the selected linear meter, including calculated values and alarm codes.

Rates & Totals – Use this pop-up display to view **read-only** flow rates and accumulations for the selected linear meter.

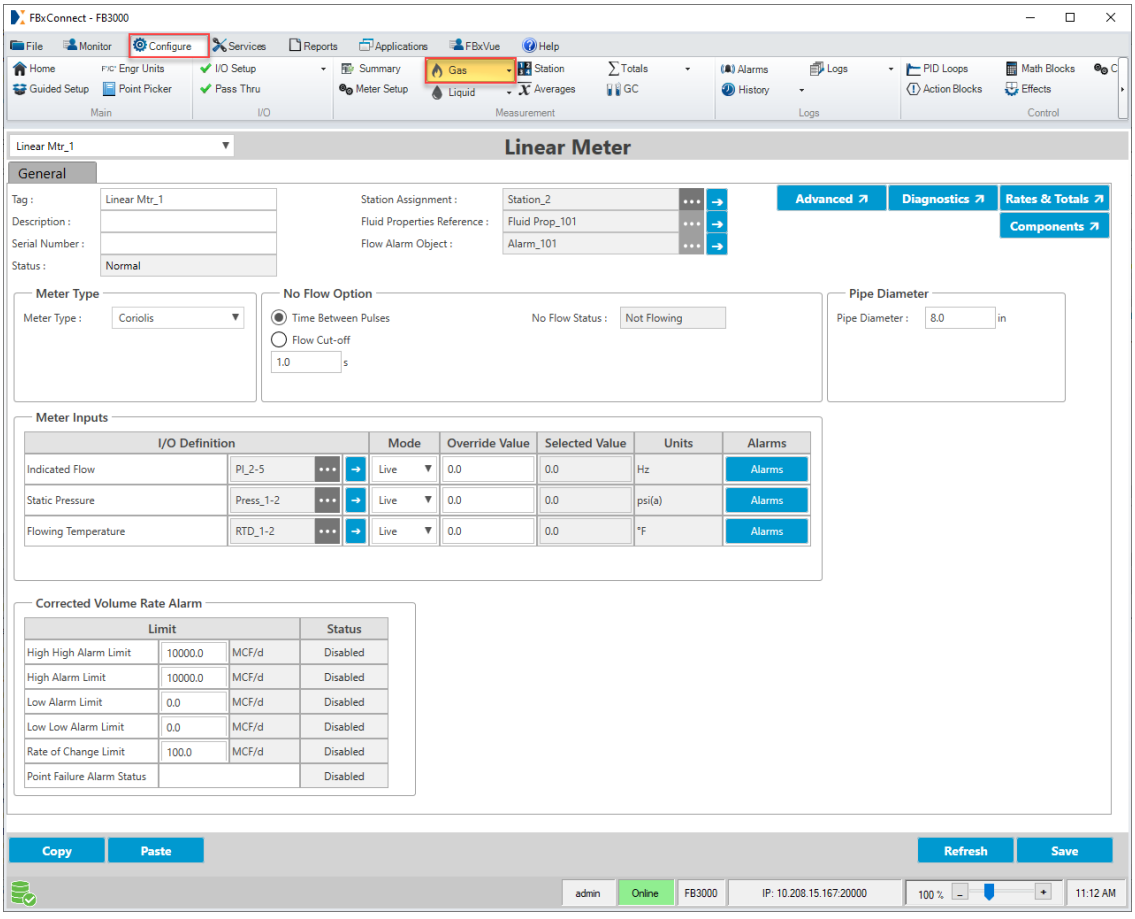
## 4.10.1 Linear Meter – General

Use this display to define basic parameters for the linear meter.

To access this display:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu. The Linear Meter display opens.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.

**Figure 173. Linear Meter – General**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. |

| Field | Description | |
|---|---|---|
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. | |
| **Serial Number** | Sets a description (up to 20-alphanumeric characters) for the serial number or other identifier of the selected meter. | |
| **Status** | This **read-only** field indicates the overall health of the selected meter. Possible values are: | |
| | **Normal** | Indicates the meter is **not** in an alarm, failure, or override condition. |
| | **In alarm** | Indicates an active flow rate, I/O, property calculation, or flow calculation alarm. |
| | **Failure** | Indicates a point fail on a meter input that is used in flow calculations or a severe calculation error that prevented calculations from continuing. |
| | **Override** | Indicates a meter input that is used in flow calculations in override mode that is not typically in override. |
| | **Note**<br>The status is based on the health of the uncorrected volume, corrected volume, and mass of the meter. You can configure which parameters determine the health of the meter in the **Fault Health Configuration** field on the Station – Advanced.<br>The associated parameter (OBJ_STATUS) is a 32-bit binary value, where individual bits have different meaning. We currently use 3 bits. Starting from LSB (Least Significant Bit), Bit 1 represents “In Alarm,” Bit 2 represents “Failure,” and Bit 3 represents “Override.” When viewing this parameter via a host system, the value is represented as a decimal number. For example, a value of 0 means no bits are set and the meter status is Normal. A value of 1 means the meter status is In Alarm. A value of 2 means the meter status is Failure. A value of 4 means the meter status is Override. A value of 7 means Bits 1, 2, and 3 are all set, and the meter status is In Alarm, Failure, and Override. | |
| **Station Assignment** | Click ••• to open a Point Picker dialog and select the station to which this meter belongs.<br>**Note** | |

| Field | Description |
|---|---|
| | • After selecting a Station, click → to open the Station configuration display.<br>• Stations measuring different fluid types are hidden in the Point Picker.<br>• Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised. |
| **Fluid Properties Reference** | This **read-only** field shows the fluid properties instance currently assigned to the selected meter.<br>**Note**<br>Click → to open the Fluid Properties configuration display. |
| **Flow Alarm Object** | This **read-only** field shows the alarm instance currently assigned to the selected meter.<br>**Note**<br>Click → to open the Alarms configuration display. |
| **Advanced** | Click this button to open the Linear Meter – Advanced pop-up display and configure advanced properties for the selected differential pressure meter. |
| **Diagnostics** | Click this button to open the Linear Meter – Diagnostics pop-up display and view **read-only** diagnostic information for the selected differential pressure meter. |
| **Rates & Totals** | Click this button to open the Linear Meter – Rates & Totals pop-up display and view **read-only** flow rates and accumulations and to manually configure fault totals for the selected differential pressure meter. |
| **Components** | Click this button to open the Components pop-up display and set the mole percent of each fluid component present in the meter. |
| **Meter Type** | Click ▼ to specify the type of linear meter you are configuring. Possible options are: |
| | **Turbine** — Select if measuring flow through a turbine meter or other linear meter with a frequency or analog signal representing actual volumetric flow rate. Flow is calculated according to AGA 7. |

| Field | Description | |
|---|---|---|
| | **Coriolis** | Select if measuring flow through a Coriolis meter or other linear meter with a frequency or analog signal representing a mass flow rate. Flow is calculated according to AGA 11. |
| | **Auto-Adjust** | Select if measuring flow through an Auto-Adjust meter. This meter type requires 2 pulse inputs, one representing the main rotor and one representing the sensing rotor. |
| | **Ultrasonic** | Select if measuring flow through an ultrasonic meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| | **Positive Displacement** | Select if measuring flow through a positive displacement meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| **No Flow Option** | Sets how the system calculates a "no flow" condition for the meter and sets the calculated flow equal to zero. Possible options are: | |
| | **Time Between Pulses** | If the amount of time between pulses is greater than or equal to the time you enter in the text field, then system sets the calculated flow equal to zero.<br>**Note**<br>• This option is available **only** if you select a **pulse input** object in the **Indicated Flow** field.<br>• You **must** enter a time (in seconds) for the system to use in the text field.<br>• This method should be used for low frequency pulse inputs. |

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td></td><td>
<ul><li>Use the method if you wish to perform a fixed count pulse input test.</li></ul>
</td></tr>
<tr><td></td><td>Flow Cut-off</td><td>If the value of the uncorrected volume input is less than or equal to the value you enter in the text field, then the system sets the calculated flow equal to zero. Enter a value (in units based on the table below) for the system to use in the text field.
<table>
<tr><th>Indicated Flow Input Type</th><th>Meter Type</th><th>Unit Type</th></tr>
<tr><td rowspan="3">Pulse Input</td><td>Turbine</td><td>Hz</td></tr>
<tr><td>Auto-Adjust</td><td>Hz</td></tr>
<tr><td>Coriolis</td><td>Hz</td></tr>
<tr><td rowspan="3">AI or User Data</td><td>Turbine</td><td>Volume Rate</td></tr>
<tr><td>Auto-Adjust</td><td>Volume Rate</td></tr>
<tr><td>Coriolis</td><td>Mass Rate</td></tr>
</table>
Note<br>The lowest frequency the system can accurately measure is 1 divided by the PI Scan Period (configured on the Pulse Input display). Flow control may be erratic below this threshold.</td></tr>
<tr><td>No Flow Status</td><td colspan="2">This read-only field shows the current flowing status of the selected meter. An indicated flow greater than or equal to the no flow cutoff is considered “flowing” and increments flow and flow time. An indicated flow below the no flow cutoff is considered “not flowing” and does not increment flow or flow time.</td></tr>
</table>

| Field | Description |
|---|---|
| **Pipe Diameter** | Indicates the pipe's approximate internal diameter in selected Linear Short units.<br>**Note**<br>• For **Auto-Adjust** meter types, the program uses this value to complete the Blade Tip Sensor Factor field on the Auto-Adjust Alarms display.<br>• For **Turbine** and **Coriolis** meter types, this field is for informational purposes. |
| **Indicated Flow** | **I/O Definition**<br>Click ••• to open a Point Picker dialog and select an indicated flow input to use for the selected meter. This field represents the Pulse Frequency for a Turbine or Coriolis meter type, and the Main Rotor Frequency for an Auto-Adjust meter type.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• PI object – SELECTED FREQUENCY and ACCUMULATED PULSES<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 1. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |

| Field | Description | |
|---|---|---|
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Secondary Flow Input** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the secondary flow input to use for the selected meter. The secondary flow input represents the Sensing Rotor Frequency and must be a PI object. This field is currently **only** used for an **Auto-Adjust** meter type.<br>**Note**<br>Only an object is chosen, and the Auto-Adjust algorithm reads the SELECTED FREQUENCY and ACCUMULATED PULSES parameters from the selected PI object. |

| Field | Description | |
|---|---|---|
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field). |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**. |
| | **Selected Value** | This field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input. |
| **Static Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input.<br>If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in |

| Field | Description | |
|---|---|---|
| | | the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |

| Field | Description | |
|---|---|---|
| **Flowing Temperature** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |

| Field | Description | |
|---|---|---|
| | **Selected Value** | This field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Pressure Transmitter Type** | Indicates the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select an **FBxNData**, **HART**, or **User Data** instance in the **Static Pressure I/O Definition** field. | |
| **Corrected Volume Rate Alarms** | Sets the rate alarm limits for the corrected flow rate, and shows the status of each alarm. Possible statuses are:<br>• **Normal** – The alarm is enabled and is not in an alarm condition.<br>• **Disabled** – The alarm has been disabled.<br>• **In Alarm** – The alarm is enabled and is in an alarm condition. | |
| **Auto Adjust Main Rotor K-factor** | Sets a scaling K-factor the program uses to convert the main rotor pulses to volume in the selected Volumetric K-factor units.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. | |
| **Auto Adjust Sensing Rotor K-factor** | Sets a scaling K-factor the program uses to convert the sensing rotor pulses to volume in the selected Volumetric K-factor units.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. | |

| Field | Description |
|---|---|
| **Auto Adjust Mechanical K-factor** | Sets a scaling K-factor in the selected Volumetric K-factor units as provided from the Equimeter calibration sheet. The program uses this value to calculate a Mechanical Volume rate or unadjusted volume, which matches the Turbo-Meter mechanical totalizer volume.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. |
| **Auto Adjust Relative Adjustment** | Indicates the average relative adjustment (as a percentage) for the auto-adjust algorithm determined at factory calibration.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. |
| **Auto Adjust Maximum Frequency** | Indicates the maximum frequency value (in Hz) the program uses when calculating the meter load, expressed as Current Frequency or Maximum Frequency.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. |
| **Calibration Mode** | Sets the rotor calibration mode. Possible options are:<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field.<br>**Disable** — Uses a self-checking cycle of 2,500 rotations<br>**Enable** — Uses the standard cycle of 25,000 rotations |
| **Details** | Select this button to open the Linear Meter – Auto Adjust pop-up display and configure options for the selected Auto-Adjust meter. |
| **Reset Algorithm** | Select this button to clear alarms and self-checking test data for the Auto-Adjust meter, and to re-start collection and analysis of the data. It is recommended to reset the algorithm after installation or after any maintenance on the meter.<br>**Note**<br>This field appears **only** if you select **Auto-Adjust** in the **Meter Type** field. |

4. **4** Select **Save** to save your changes if you modify any of the fields on this display.

## 4.10.2 Linear Meter – Auto-Adjust

Use this pop-up display to configure options for the selected Auto-Adjust meter.

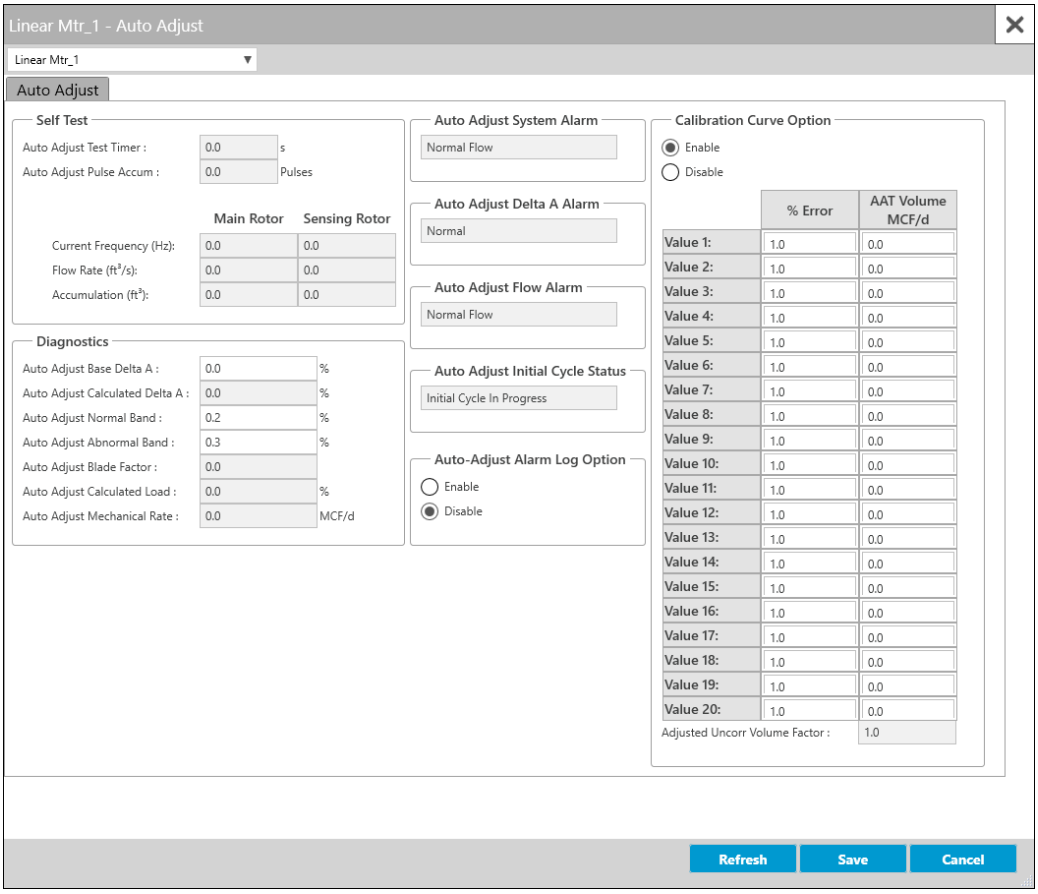
**Note**

This pop-up display is available **only** if you select **Auto-Adjust** in the **Meter Type** field.

To access this pop-up display:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Details** button in the Auto Adjust frame. The Linear Meter – Auto Adjust pop-up display opens.

**Figure 174. Linear Meter – Auto-Adjust**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Auto Adjust Test Timer** | This **read-only** field shows the number of seconds elapsed since the program last started the Auto-Adjust self-checking calculation. The program resets this value either after 512 seconds or when the main rotor reaches 25,000 pulses, whichever occurs first. |
| **Auto Adjust Pulse Accum** | This **read-only** field shows the rotor pulses accumulated during the current self-checking calculation cycle. A self-checking calculation cycle takes either 25,000 rotor rotations or 512 seconds, whichever occurs first. |
| **Current Frequency** | This **read-only** field shows the current frequency (in Hz) for both the main and sensing rotors. The program updates this value once each second. |

| Field | Description |
|---|---|
| **Flow Rate** | This **read-only** field shows the raw volumetric rate (in ft3/second or m3/second) for both the main and sensing rotors. The program calculates this value as pulse/second divided by K-factor for the rotor. |
| **Accumulation** | This **read-only** field shows the raw volume values (in ft3 or m3) for both the main and sensing rotors during the current self-adjusting calculation cycle. |
| **Auto Adjust Base Delta A** | Sets the baseline delta adjustment (Delta A) value (as a percentage) derived either from the factory calibration curve or the initial field testing.<br>**Note**<br>The program's run-time warning and alarm limits depend on this value. For example, the program calculates the low warning limit as the Baseline Delta Adjustment value minus the Normal Band value and the high alarm limit as the Baseline Delta Adjustment value plus the Abnormal Band value. |
| **Auto Adjust Calculated Delta A** | This **read-only** field shows the system-calculated delta adjustment (Delta A) value (as a percentage). This value is the amount of change that has occurred in the meter or flow condition compared to its original calibration value. The program refreshes this value at least every 512 seconds or 25,000 rotations of the main rotor. |
| **Auto Adjust Normal Band** | Sets the normal limits (as a percentage) above and below the Baseline Delta A value. The default value is 0.2. If the percentage exceeds this value, the program triggers a warning. |
| **Auto Adjust Abnormal Band** | Sets the abnormal limits (as a percentage) above and below the Baseline Delta A value. The default value is 0.3. If the percentage exceeds this value, the program triggers an alarm. |
| **Auto Adjust Blade Factor** | This **read-only** field shows a predefined factor based on the value entered in the Pipe Diameter field on the Linear Meter – General display.<br>**Note**<br>The program considers any pipe diameter between 7 and 10 inches as 8 inches, to correspond to the Equimeter meter choices of 4, 6, 8, and 12 inches. |

| Field | Description |
|---|---|
| **Auto Adjust Calculated Load** | This **read-only** field shows the instantaneous turbine load (as a percentage), calculated as the current main rotor frequency divided by the maximum frequency. The program updates this value once every second. |
| **Auto Adjust Mechanical Rate** | Indicates the unadjusted flow rate (in MCF/day or KM3/day) based on the main rotor pulses and the mechanical K-factor. The system updates this value once per second. This parameter does not have compensation from the auto-adjust algorithm.<br>**Note**<br>The AGA 7 firmware expects a flow rate (in either MCF/day or KM3/day) when reading an uncorrected value other than from a pulse input point. |
| **Auto Adjust System Alarm** | This read-only field indicates the current system status. Possible system alarms include Normal Flow, No Flow or Loss of Both Rotor, Leakage or Resonant No-Net Flow, No Main Rotor Pulses Or Leakage Or Resonant No-Net Flow, and No Sensing Rotor Pulses.<br>**Note**<br>Alarms are audited in the alarm log. |
| **Auto Adjust Delta A Alarm** | This **read-only** field shows whether the program-calculated deviation from the average relative adjustment is within normal limits. Possible Delta A alarms include Normal, Low Warning, High Warning, Low Alarm, and High Alarm.<br>**Note**<br>Alarms are audited in the alarm log. |
| **Auto Adjust Flow Alarm** | This **read-only** field shows the status of the ratio between the sensing rotor's volume and the main rotor's volume. Possible values are **Normal Flow** (the ratio is steady) or **Non-Steady Flow** (the ratios are below acceptable limits).<br>**Note**<br>Alarms are audited in the alarm log. |
| **Auto Adjust Initial Cycle Status** | This **read-only** field indicates whether the initial cycle has started or is complete. |
| | Sets whether the Auto-Adjust alarms are written to the alarm log or not. |

| Field | Description | |
|---|---|---|
| **Auto Adjust Alarm Log Option** | **Disable** | Alarm states are accessible through the alarm parameters, but alarm state changes are not logged to the alarm log. |
| | **Enable** | Alarm states are accessible through the alarm parameters and alarm state changes are logged to the alarm log. |
| **Calibration Curve Option** | Activates the Auto-Adjust Calibration Curve calculation. Valid values are: | |
| | **Enable** | The system includes the Adjusted Uncorrected Volume Factor (AUVF) in calculations.<br>**Note**<br>You **must** enter information from the calibration report in the % Error and AAT Volume fields. The program applies the AUVF to the result of the auto-adjust algorithm to calculate the adjusted volume rate at flowing conditions. |
| | **Disable** | The system does not use the AUVF in calculations (which is equal to an AUVF of 1.00).<br>**Note**<br>If you disable the calibration curve, the adjusted volume rate reflects the result of the auto-adjust algorithm with no correction for the calibration curve. |

5. Select **Save** to save your changes if you modify any of the fields on this pop-up display.

### 4.10.2.1 Calibration Curve Option (Auto-Adjust)

Use the Calibration Curve Option to enter a meter factor curve or K-factor curve for an Auto-Adjust meter.

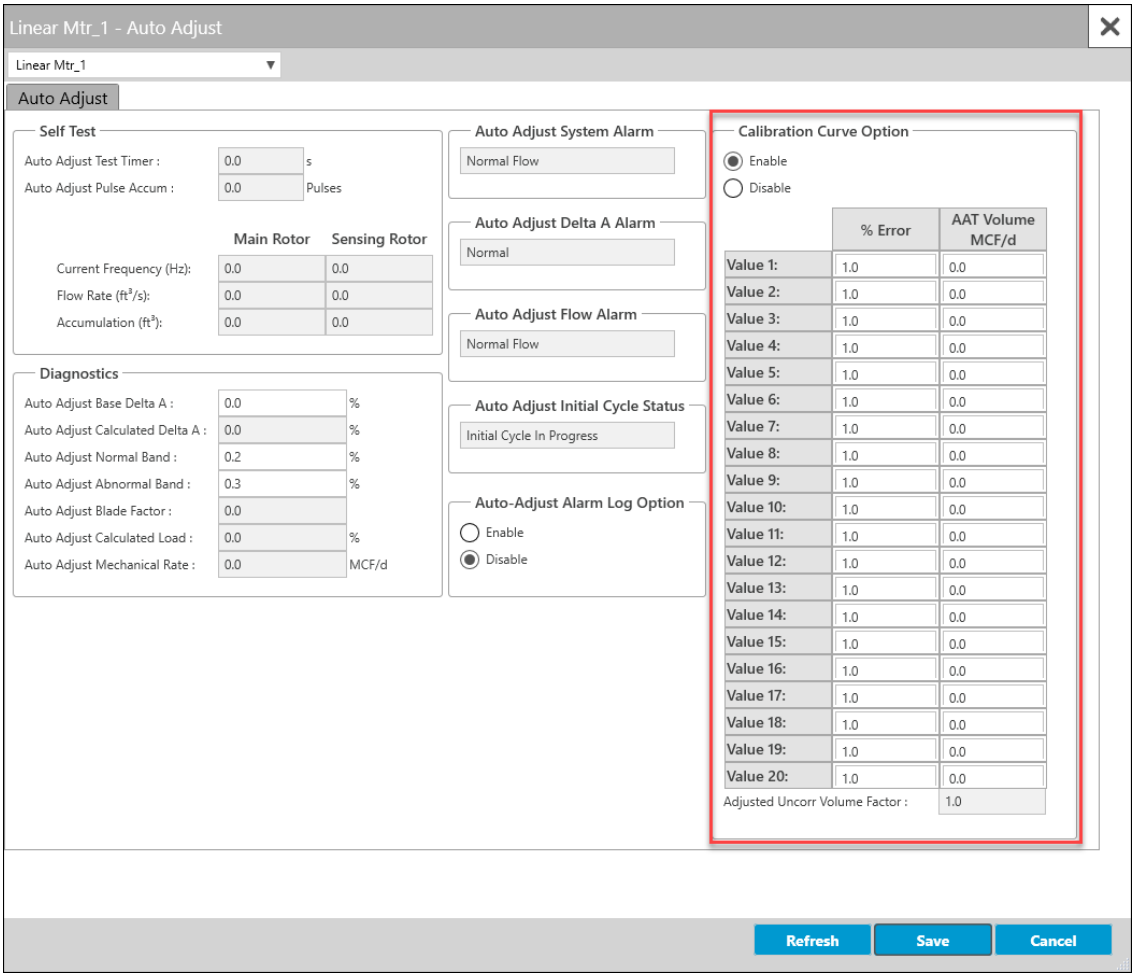
To access this option:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.

3. Select the **Details** button in the Auto Adjust frame. The Auto Adjust pop-up display opens.

4. Select **Enable** in the Calibration Curve Option frame.

**Figure 175. Linear Meter – Auto Adjust**




5. Enter up to 20 points on the curve (pairs of % Error and AAT Volume {the volumetric flow rate calculated by the Auto-Adjust Turbine algorithm}).

6. Enable the calibration curve option. The adjusted Uncorrected Volume Factor is calculated for use in the flow equation by using linear interpolation of the AAT Volume to determine % Error and then the AUVF is calculated as follows:

$$AUVF = \frac{1}{\left(\frac{\%\ Error}{100}\right)+1}$$

**Note**

A valid point **must** have an AAT Volume greater than zero. The points may be entered in any order and will be internally sorted by AAT Volume, discarding any invalid points. No extrapolation is done beyond the lowest and highest points on the curve. If the actual AAT Volume is less than the lowest point on the curve, the % Error will be the % Error for the lowest point on the curve. If the actual AAT Volume is greater than the highest point on the curve, the % Error will be the % Error for the highest point on the curve. If there are no valid points, then a default of 1.0% is used.

7. Select **Save** to save any changes you make to this pop-up display.

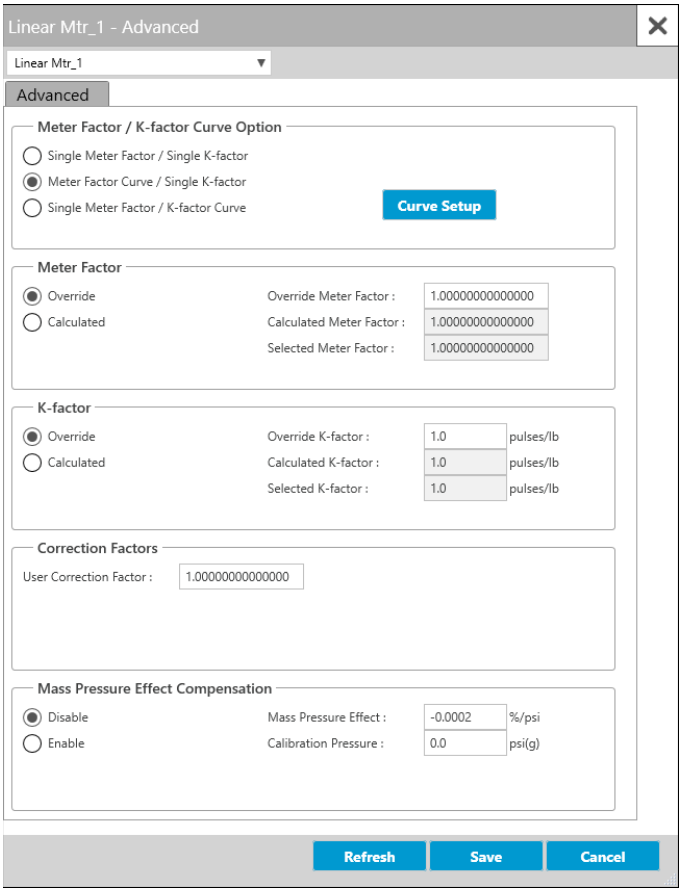
## 4.10.3 Linear Meter – Advanced

Use this pop-up display to configure advanced properties for the selected linear meter, including meter construction material, temperature correction, and discharge coefficient options.

To access this pop-up display:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The Linear Meter – Advanced pop-up display opens.

**Figure 176. Linear Meter – Advanced (Coriolis Meter Type)**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Meter Factor / K-factor Curve Option** | Sets how system uses calculates K-factors or Meter Factors in the flow calculation. Possible options are:<br>**Note**<br>This field appears **only** if you select either **Turbine**, **Coriolis**, **Ultrasonic**, or **Positive Displacement** in the **Meter Type** field on the General tab. |

| Field | Description | |
|---|---|---|
| | **Single Meter Factor / Single K-factor** | Uses a single Meter Factor and a single K-factor for the meter. This is the simplest choice and means that a value for the meter factor and a value for the K-factor are fixed for all flow rates and the values are taken from the last prove or an entered value. Select this option when using either the K-factor or meter factor proving, as long as neither the K-factor or meter factor will vary with flow rate or product. |
| | **Meter Factor Curve / Single K-factor** | A meter factor calculates for the current flow rate based on a linear interpolation of the meter factor versus flow rate values entered under the Factor Curve heading, but the K-factor will be fixed. Select this option when using meter factor proving if proving is done at multiple flow rates.<br>**Note**<br>You **must** select the **Curve Setup** button and configure the meter factor curve. |
| | **Single Meter Factor / K-factor Curve** | A K-factor calculates for the current flow input frequency based on a linear interpolation of the meter factor versus frequency values entered under the Factor Curve, but the meter factor will be a single value from the last prove or entered value. The K-factor curve can come from multiple proves at different flow rates with a meter factor of 1.0 (K-factor proving) or the K-factor curve can come from factory calibration and a single meter factor from a prove (meter factor proving).<br>**Note**<br>You **must** select the **Curve Setup** button and configure the K-factor curve. |

| Field | Description | |
|---|---|---|
| **Curve Setup** | Click to open the Curve Setup dialog and configure the meter factor/K-factor curve. For more information, refer to Curve Setup (Linear Meter).<br>**Note**<br>This field appears **only** if you select either **Meter Factor Curve / Single K-factor** or **Single Meter Factor / K-factor Curve** in the Meter Factor / K-factor Curve Option field. | |
| **Meter Factor** | Sets how the system obtains the meter factor value used in calculations. Possible options are: | |
| | **Override** | The system uses the value set in the **Override Meter Factor** field for the meter factor value. |
| | **Calculate** | The system calculates a value for the meter factor. |
| **Override Meter Factor** | Sets the meter factor value to use in calculations when you select **Override** in the **Meter Factor** field. | |
| **Calculated Meter Factor** | This **read-only** field shows the meter factor value as calculated by the system.<br>**Note**<br>This value is used by the system when you select **Calculate** in the **Meter Factor** field. | |
| **Selected Meter Factor** | This **read-only** field shows the meter factor currently used in calculations based on the selected options. | |
| **K-factor** | Sets how the system obtains the K-factor value used in calculations. Possible options are:<br>**Note**<br>This field appears **only** if you select either **Turbine**, **Coriolis**, **Ultrasonic**, or **Positive Displacement** in the **Meter Type** field on the General tab. | |
| | **Override** | The system uses the value set in the **Override K-factor** field for the K-factor value. |
| | **Calculated** | The system calculates a value for the K-factor. |
| **Override K-factor** | Sets the discharge coefficient value to use in calculations when you select **Override** in the **K-factor** field. | |

| Field | Description |
|---|---|
| **Calculated K-factor** | This **read-only** field shows the discharge coefficient value as calculated by the system.<br>**Note**<br>• This field appears **only** if you select either **Turbine**, **Coriolis**, **Ultrasonic**, or **Positive Displacement** in the **Meter Type** field on the General tab.<br>• This value is used by the system when you select **Calculate** in the **K-factor** field. |
| **Selected K-factor** | This **read-only** field shows the K-factor currently used in calculations based on the selected options.<br>**Note**<br>This field appears **only** if you select either **Turbine**, **Coriolis**, **Ultrasonic**, or **Positive Displacement** in the **Meter Type** field on the General tab. |
| **User Correction Factor** | Sets a factor the system multiplies by the base flow equation to make a desired adjustment to the flow. The user correction factor is applied to the volume, mass, and energy flow rates and totals.<br>**Note**<br>If you use the default value of 1, the system does not apply any correction. |
| **Mass Pressure Effect Compensation** | This option allows for the compensation for the effects of high pressure on the accuracy of the meter mass flow rate and accumulation. This may be necessary in applications where the operating pressure is significantly different from the meter's calibration pressure.<br>**Note**<br>This field appears **only** if you select **Coriolis** in the **Meter Type** field on the General tab. |
| **Enable** | The system compensates for the effects of pressure on accuracy.<br>**Note**<br>You must enter a value in the **Mass Pressure Effect** and **Calibration Pressure** fields. |

| Field | Description | |
|---|---|---|
| | **Disable** | The system **does not** compensate for the effects of pressure on accuracy. |
| **Mass Pressure Effect** | Enter a value (in units of per psi or per bar) to be used when performing mass pressure effect compensation.<br>**Note**<br>• This value is supplied by the manufacture of the mass meter and is typically a small negative number.<br>• This field appears **only** if you select **Coriolis** in the **Meter Type** field on the General tab. | |
| **Calibration Pressure** | Sets the pressure (in units of gauge psi or bar) of the mass meter as calibrated.<br>**Note**<br>• This value is supplied by the manufacture of the mass meter and is typically a small negative number.<br>• This field appears **only** if you select **Coriolis** in the **Meter Type** field on the General tab. | |

5. Select **Save** to save your changes if you modify any of the fields on this pop-up display.

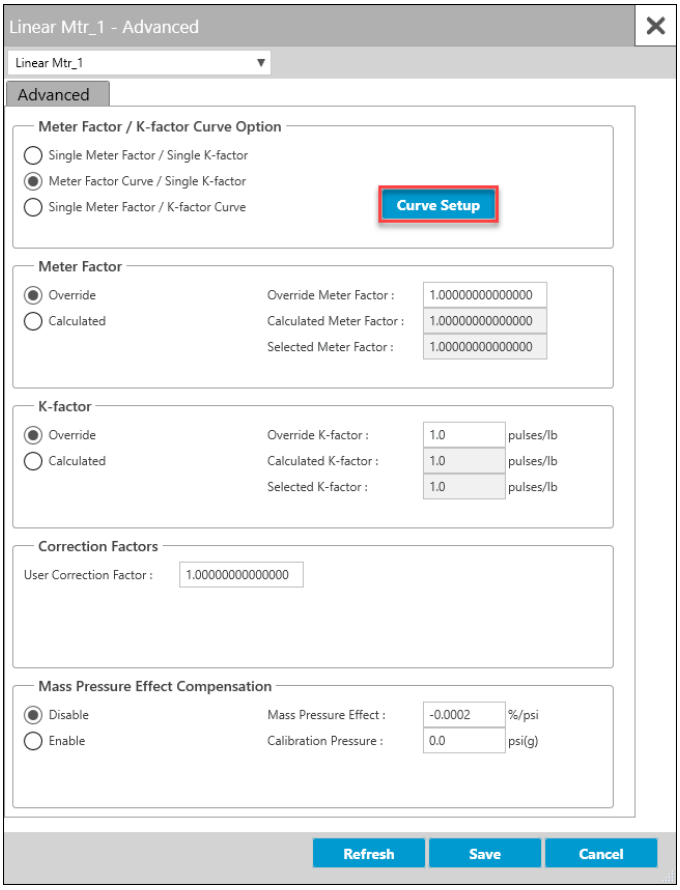
### 4.10.3.1 Curve Setup (Linear Meter)

Use this option to enter a meter factor curve or K-factor curve.

To access this pop-up display:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The Linear Meter – Advanced pop-up display opens.

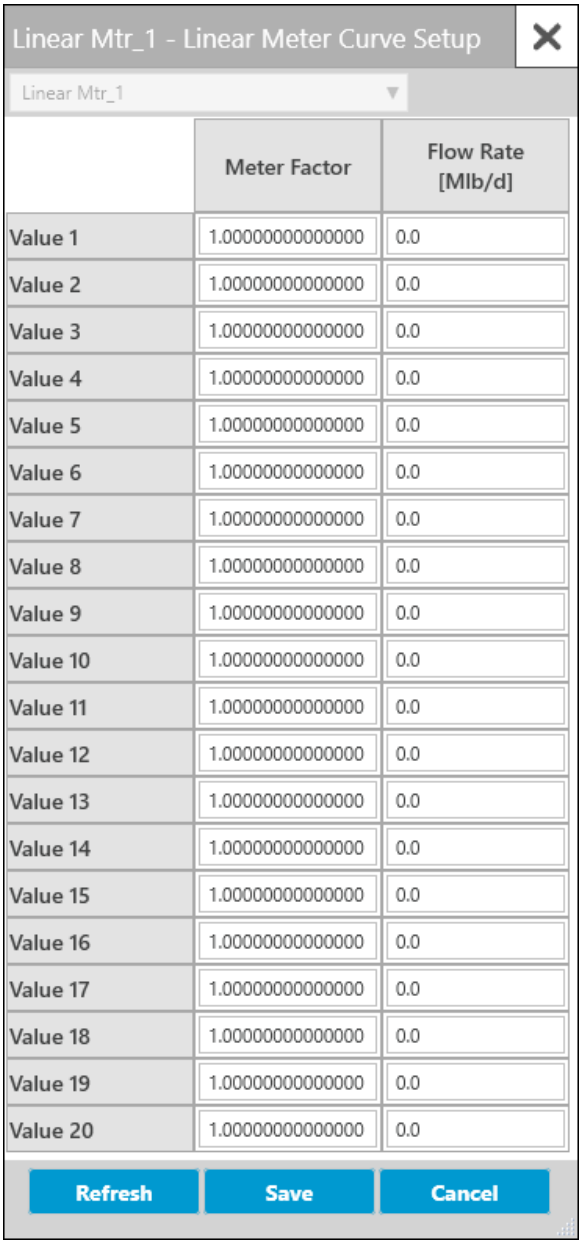
**Figure 177. Linear Meter – Advanced**




4. Select either **Meter Factor Curve / Single K-factor** or **Single Meter Factor / K-factor Curve** in the Meter Factor / K-factor Curve Option frame and **Save** your changes.

5. Select the **Curve Setup** button. The Curve Setup pop-up display opens.

**Figure 178. Curve Setup**




6. If you selected **Meter Factor Curve / Single K-factor** on the previous display, enter up to 20 points on the curve (pairs of meter factor and flow rate) and a meter factor is calculated for use in the flow equation by linear interpolation of the current indicated quantity flow rate. If you selected **Single Meter Factor / K-factor Curve** on the previous display, enter up to 20 points on the curve (pairs of K-factor and frequency) and a K-factor is calculated for use in the flow equation by linear interpolation of the current flow meter input frequency.

**Note**

A valid point **must** have a flow rate/frequency greater than zero and a factor greater than zero. The points may be entered in any order and will be internally sorted by flow rate (MF curve) or frequency (K-Factor Curve), discarding any invalid points. No extrapolation is done beyond the lowest and highest points on the curve. If the flow rate/frequency is less than the lowest point on the curve, the calculated factor will be the factor for the lowest point on the curve. If the flow rate/frequency is greater than the highest point on the curve, the calculated factor will be the factor for the highest point on the curve. If there are no valid points, then a default factor of 1.0 is used.

7. Select **Save** to save any changes you make to this pop-up display.

## 4.10.4 Linear Meter Diagnostics

Use this pop-up display to view **read-only** diagnostic information for the selected linear meter, including calculated factors, calculated values, and alarm codes.

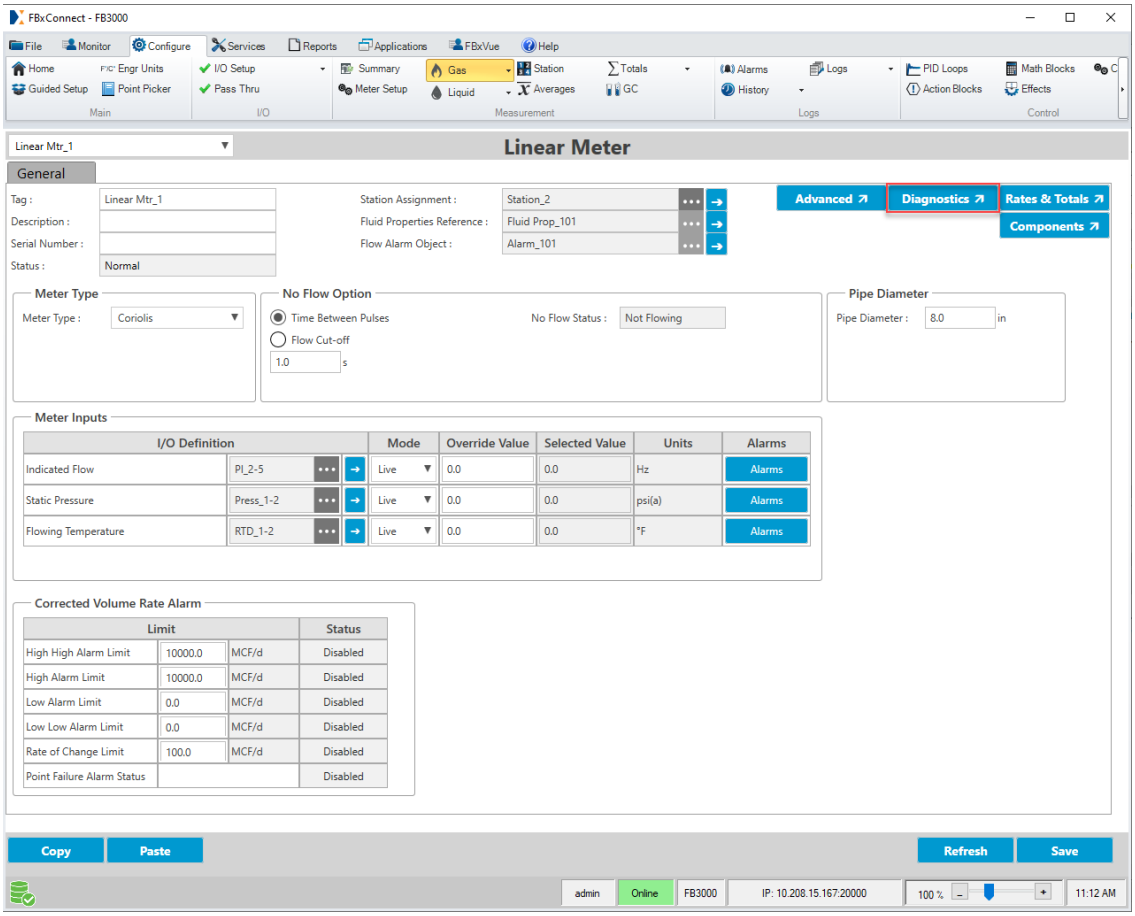
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- Physically impossible inputs may be clamped at a high or low limit value in order to ensure reasonable results. If a value is clamped at a high or low limit, a corresponding flow or property alarm is raised.

To access this pop-up display:

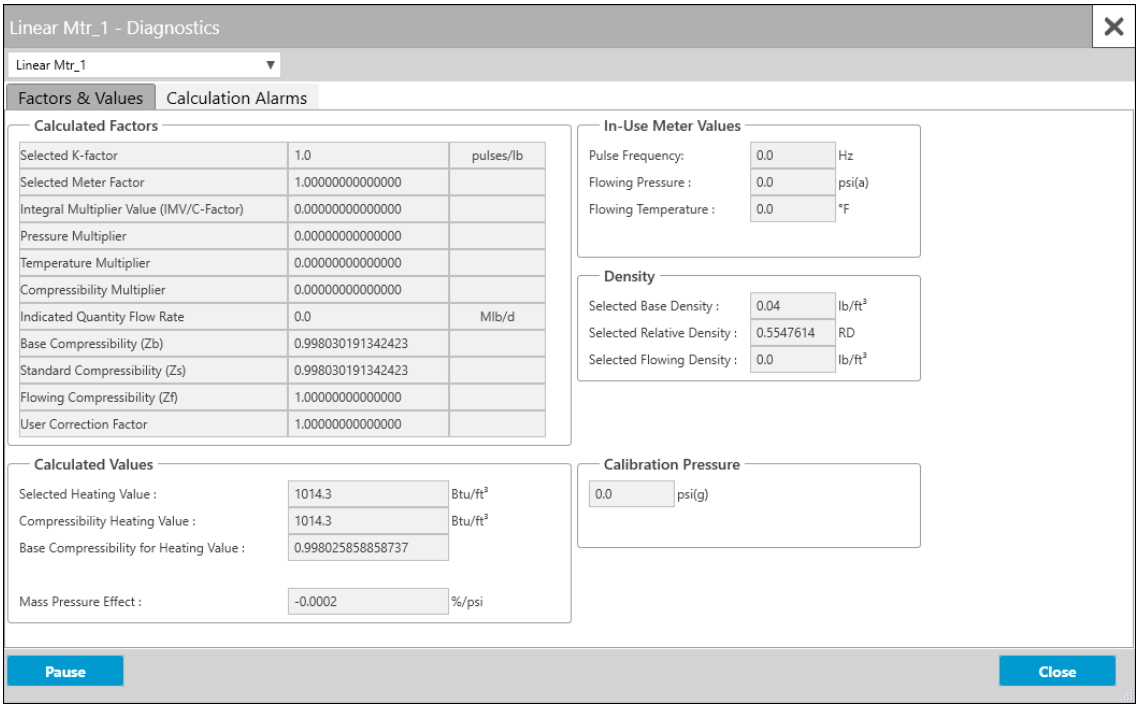
1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.

**Figure 179. Linear Meter – Diagnostics Button**




3. Select the **Diagnostics** button. The Linear Meter Diagnostics pop-up display opens showing the Factors & Values tab.

**Figure 180. Linear Meter Diagnostics**




The Linear Meter Diagnostics pop-up display contains the following tabs:

Factors and Values – This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

Calculation Alarms – This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with the meter.

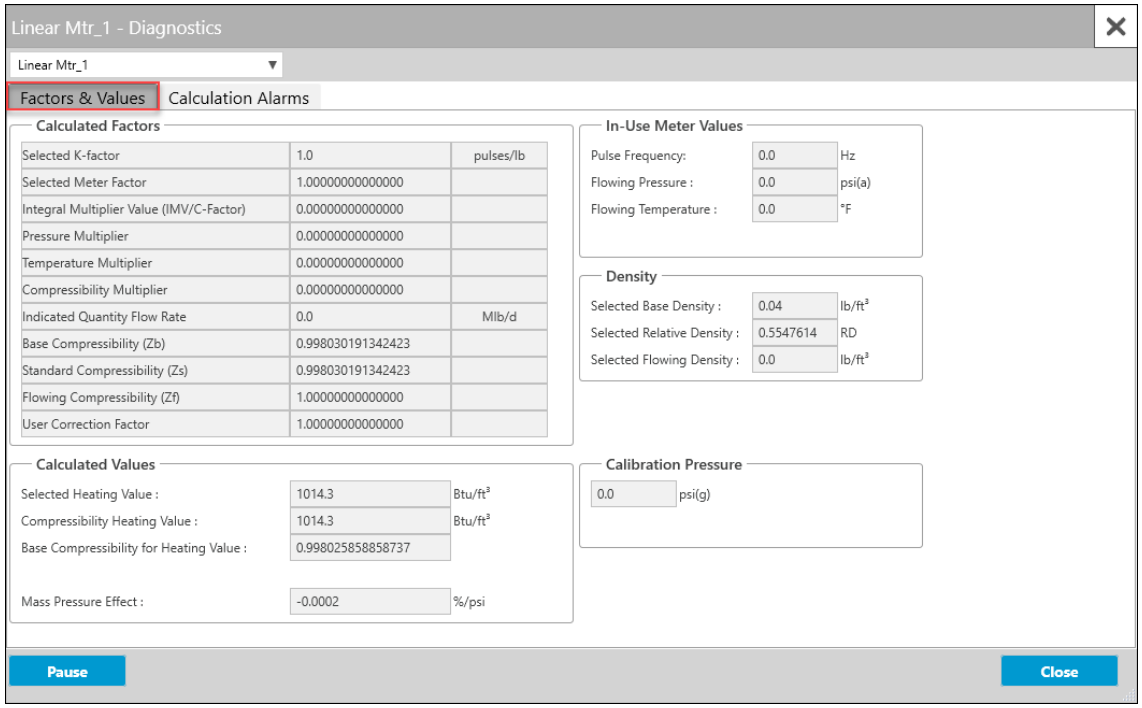
### 4.10.4.1 Linear Meter Diagnostics – Factors & Values Tab

This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

To access this tab:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The Linear Meter Diagnostics pop-up display opens showing the Factors & Values tab

**Figure 181. Linear Meter Diagnostics – Factors & Values Tab**




**4.** Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Calculated Factors** | **Selected K-factor** | This **read-only** field shows the pulses per unit quantity generated by a pulse output type flow meter (also system factor). The nominal value is determined by flow meter design and factory water flow calibration. The "average" K-factors for the flow meters are usually displayed on the flow meter nameplates. |
| | **Selected Meter Factor** | This **read-only** field shows the number obtained by dividing the actual volume of fluid passed through a flow meter during a meter proving operation by the volume registered by the flow meter. The meter factor is used in flow calculations to correct the indicated volume (end flow meter registration minus start flow meter registration) to the observed gross volume (actual flow meter throughput at operating conditions). |

| Field | Description | |
|---|---|---|
| | | Meter factor = (Meter prover volume corrected to standard conditions) / (Flow meter indicated volume corrected to standard conditions) |
| | **Integral Multiplier Value (IMV/C-Factor)** | This **read-only** field shows the combined volume correction factor which is the product of the pressure, temperature, and compressibility factors described below. |
| | **Pressure Multiplier** | This **read-only** field shows the pressure multiplier, a ratio of flowing pressure to base pressure that reflects the volume correction for pressure. |
| | **Temperature Multiplier** | This **read-only** field shows the temperature multiplier, a ratio of base temperature to flowing temperature that reflects the volume correction for temperature. |
| | **Compressibility Multiplier** | This **read-only** field shows the compressibility multiplier, a ratio of base compressibility to flowing compressibility that reflects the volume correction for non-ideal gas. |
| | **Indicated Quantity Flow Rate** | This **read-only** field shows the raw flow rate from the meter in Volumetric or Mass Flow Rate units, depending on the meter type. This value is prior to any meter factor correction. |
| | **Base Compressibility (Zb)** | This **read-only** field shows the compressibility at base conditions. |
| | **Standard Compressibility (Zs)** | This **read-only** field shows the compressibility at standard conditions. |
| | **Flowing Compressibility (Zf)** | This **read-only** field shows the compressibility at flowing conditions. |

| Field | Description | |
|---|---|---|
| | **User Correction Factor** | This **read-only** field shows a factor the system multiplies by the base volume flow equation to make a desired adjustment to the flow. The user correction factor is applied to the volume, mass, and energy flow rates and totals.<br>**Note**<br>A value of 1 does not apply any correction. |
| **Calculated Values** | **Selected Heating Value** | This **read-only** field shows the heating value of the fluid at base conditions. The heating value represents the amount of energy transferred as heat per unit mass or unit volume from the complete, ideal combustion of the gas with oxygen at a base temperature. |
| | **Compressibility Heating Value** | If the compressibility calculation **is** dependent on the heating value, this **read-only** field shows the superior/gross volumetric heating value at the reference conditions you select on the Station – General.<br>**Note**<br>If the compressibility calculation **is not** dependent on the heating value, this field shows a value of 0. |
| | **Base Compressibility for Heating Value** | This **read-only** field shows the calculated base compressibility used in heating value calculations.<br>**Note**<br>For more information about the heating value calculation, refer to the Station – Advanced. |
| | **Calculated Speed of Sound** | This **read-only** field shows the speed of sound through the fluid calculated from the gas composition, temperature, and pressure. It is commonly compared to the measured speed of sound from an ultrasonic meter for diagnostic purposes. |

| Field | Description | |
|---|---|---|
| | **Mass Pressure Effect** | This **read-only** field shows the mass pressure effect currently used in calculations. The mass pressure effect accounts for the effect of pressure on the vibrating tube of the Coriolis meter.<br>**Note**<br>This field shows **only** for Coriolis meter types. |
| **In-Use Meter Value** | **Pulse Frequency / Main Rotor Frequency** | This **read-only** field shows the value of the indicated flow input configured on the Linear Meter – General. |
| | **Sensing Rotor Frequency** | This **read-only** field shows the value of the secondary flow input configured on the Linear Meter – General. |
| | **Flowing Pressure** | This **read-only** field shows the flowing pressure being used by the flow calculation. It will reflect the absolute pressure in the selected pressure units of the station. |
| | **Flowing Temperature** | This **read-only** field shows the flowing temperature being used by the flow calculation. It will reflect the temperature in the selected temperature units of the station. |
| **Density** | **Selected Base Density** | This **read-only** field shows the base density value currently used in calculations. The base density is the mass per unit volume of the fluid being measured at user entered base temperature and pressure in the selected density units of the station. |
| | **Selected Relative Density** | This **read-only** field shows the relative density, the ratio of the density of the fluid to the density of air at base temperature and pressure. Relative density is a unit-less value. |

| Field | Description | |
|---|---|---|
| | **Selected Flowing Density** | This **read-only** field shows the flowing density value currently used in calculations. The flowing density is the mass per unit volume of the fluid being measured at flowing temperature and pressure in the selected density units of the station. |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | |

### 4.10.4.2 Linear Meter Diagnostics – Calculation Alarms Tab

This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with the meter. Alarm codes are comprised of two parts: Alarm Category (the reason for the alarm) and Alarm Value (the part of the calculation that raised the alarm). For example, if you assign a voltage signal to a pressure input, **Invalid Input** would be selected in the **Alarm Category** frame and **Pressure** would be selected in the **Alarm Value** frame.

**Note**

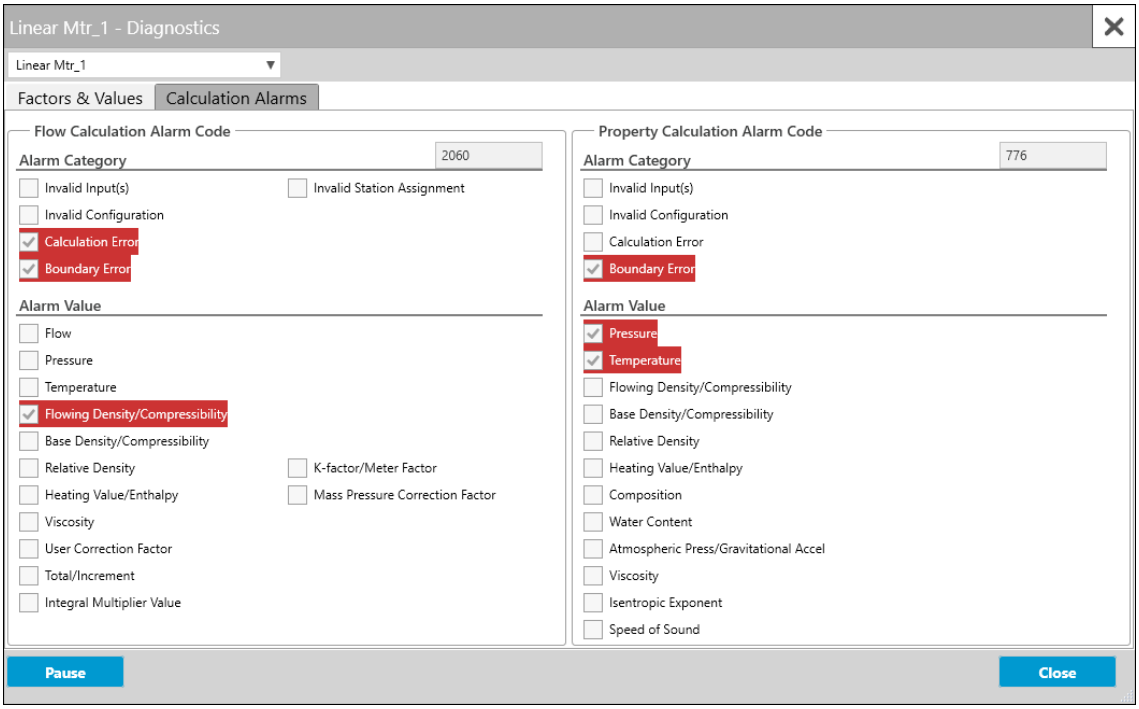
- The alarm code is a decimal representation of which alarm bits are set. Each bit is identified in the table below.
- The error code can be a composite of one or more errors.
- Error codes are generated according to your selection in the Calculation Failure Option field on the Station – Advanced.
- Alarms are raised if calculation inputs and interim values do not fall within certain ranges based on the calculation you have selected. To view the boundary limits for calculations, refer to Calculation Library Limit Checks.

To access this tab:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The Linear Meter Diagnostics pop-up display opens

4. Select the **Calculation Alarms** tab.

**Figure 182. Linear Meter Diagnostics – Calculation Alarms Tab**




5. Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Flow Calculation** | These **read-only** fields show flow calculation alarm information. | |
| | **Alarm Code** | This **read-only** field shows a code that indicates whether the flow calculation is within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note**<br>• This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show **0** if Calculation Failure Option has been set to Alarm Disabled on the Station – Advanced. |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: |

| Field | Description | | |
|---|---|---|---|
| | | **Invalid Input(s) (Bit 0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration (Bit 1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |
| | | **Calculation Error (Bit 2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error (Bit 3)** | Something exceeded stated boundary of the calculation standard. |
| | | **Invalid Station Assignment (Bit 4)** | The meter type is not valid for the station type or station fluid type. |
| | **Alarm Value** | These read-only fields show, if checked, shows which part of the flow calculation is associated with the Alarm Category.<br>• Flow (Bit 8)<br>• Pressure (Bit 9)<br>• Temperature (Bit 10)<br>• Flowing Density/Compressibility (Bit 11)<br>• Base Density/Compressibility (Bit 12)<br>• Relative Density (Bit 13)<br>• Heating Value/Enthalpy (Bit 14)<br>• Viscosity (Bit 15)<br>• User Correction Factor (Bit 16)<br>• Total/Increment (Bit 17)<br>• Integral Multiplier Value (Bit 18) | |

| Field | Description | | |
|---|---|---|---|
| | | • K-factor/Meter Factor (Bit 25)<br>• Mass Pressure Correction Factor (Bit 26)<br>**Note**<br>A Total alarm can occur in the following situations:<br>• A Fault Total object reference is incorrectly configured. For more information, refer to Linear Meter Rates & Totals – Advanced Tab.<br>• An internal error has occurred while totalizing. | |
| **Property Calculation** | These **read-only** fields show property calculation alarm information. | | |
| | **Alarm Code** | This **read-only** field shows a code that indicates whether the property calculations (density, compressibility, and heating value) are within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note**<br>• This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show **0** if Calculation Failure Option has been set to Alarm Disabled on the Station - Advanced tab. | |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: | |
| | | **Invalid Input(s) (Bit 0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration (Bit 1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |

| Field | Description | | |
|---|---|---|---|
| | | **Calculation Error (Bit 2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error (Bit3)** | Something exceeded stated boundary of the calculation standard. |
| | **Alarm Value** | These **read-only** fields show, if checked, shows which part of the flow calculation is associated with the Alarm Category.<br>• Pressure (Bit 8)<br>• Temperature (Bit 9)<br>• Flowing Density/Compressibility (Bit 10)<br>• Base Density/Compressibility (Bit 11)<br>• Relative Density (Bit 12)<br>• Heating Value/Enthalpy (Bit 13)<br>• Composition (Bit 14)<br>• Water Content (Bit 15)<br>• Atmospheric Press/Gravitational Accel (Bit 16)<br>• Viscosity (Bit 17)<br>• Isentropic Exponent (Bit 18)<br>• Speed of Sound (Bit 19) | |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | | |

## 4.10.5 Linear Meter Rates & Totals

Use this pop-up display to view **read-only** flow rates and accumulations and to manually configure fault totals for the selected linear meter.

**Note**

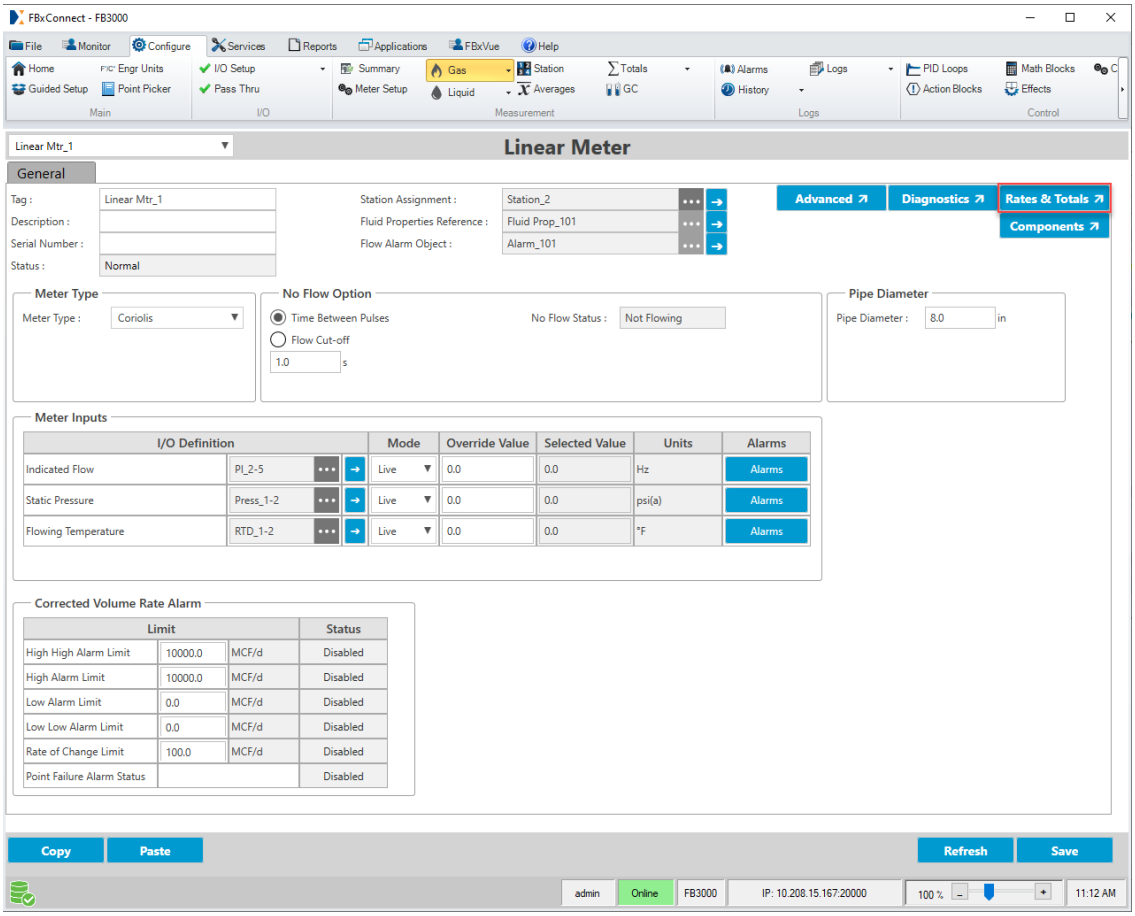
This pop-up can remain open while you change values on the other tabs of this display.

To access this pop-up display:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.

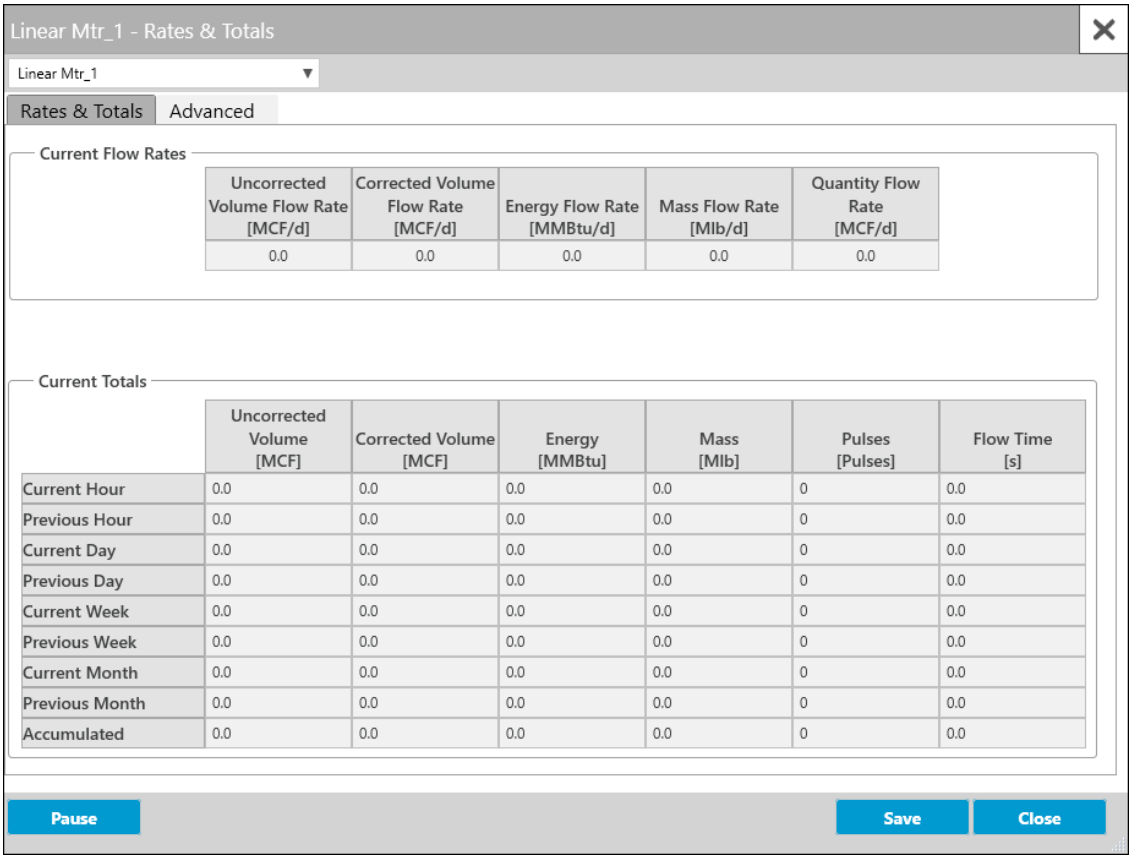
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.

**Figure 183. Linear Meter – Rates & Totals Button**




3. Select the **Rates & Totals** button. Linear Meter Rates & Totals pop-up display opens.

**Figure 184. Linear Meter Rates & Totals**




The Linear Rates & Totals pop-up display contains the following tabs:

Rates & Totals – Use this tab to view **read-only** flow rates and accumulations for the selected linear meter.

Advanced – Use this tab to manually configure which Totals objects in the FB Series product database are used to store fault totals and view read-only fault total accumulations for the selected linear meter.

### 4.10.5.1 Linear Meter Rates & Totals – Rates & Totals Tab

Use this tab to view **read-only** flow rates and accumulations for the selected linear meter.

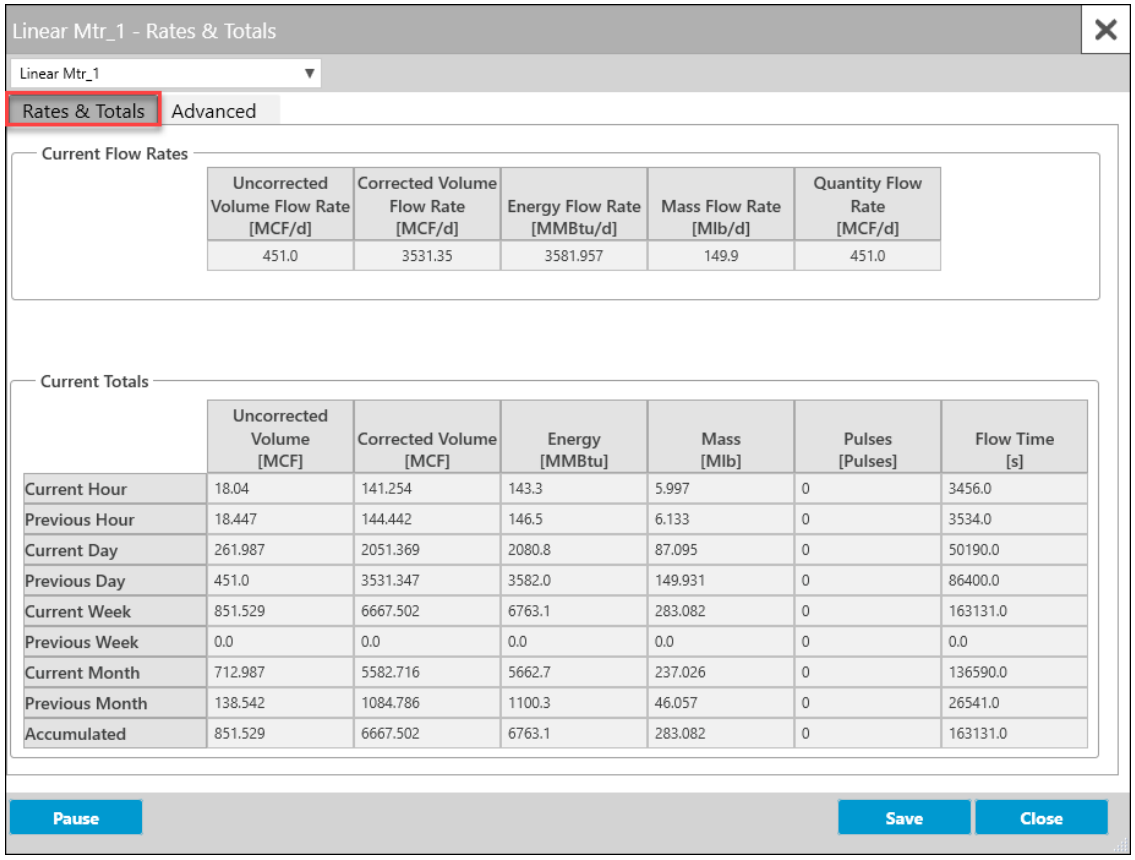
**Note**

This pop-up can remain open while you change values on the other tabs of this display.

To access this tab:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Rates & Totals** button. The Linear Meter Rates & Totals pop-up display opens showing the Rates & Totals tab.

**Figure 185. Linear Meter Rates & Totals – Rates & Totals Tab**




4. Review the values in the following fields:

| Field | Description |
|---|---|
| **Current Flow Rates** | These **read-only** fields show the current flow rates for the selected meter. |
| **Current Totals** | These **read-only** fields show the total accumulation, as well as the current and previous hourly, daily, weekly, and monthly accumulations for the selected meter. |

| Field | Description |
|---|---|
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. |

### 4.10.5.2 Linear Meter Rates & Totals – Advanced Tab

Use this tab to manually configure which Totals objects in the FB Series product database are used to store fault totals and indicated quantity totals and to view **read-only** total accumulations for the selected linear meter.

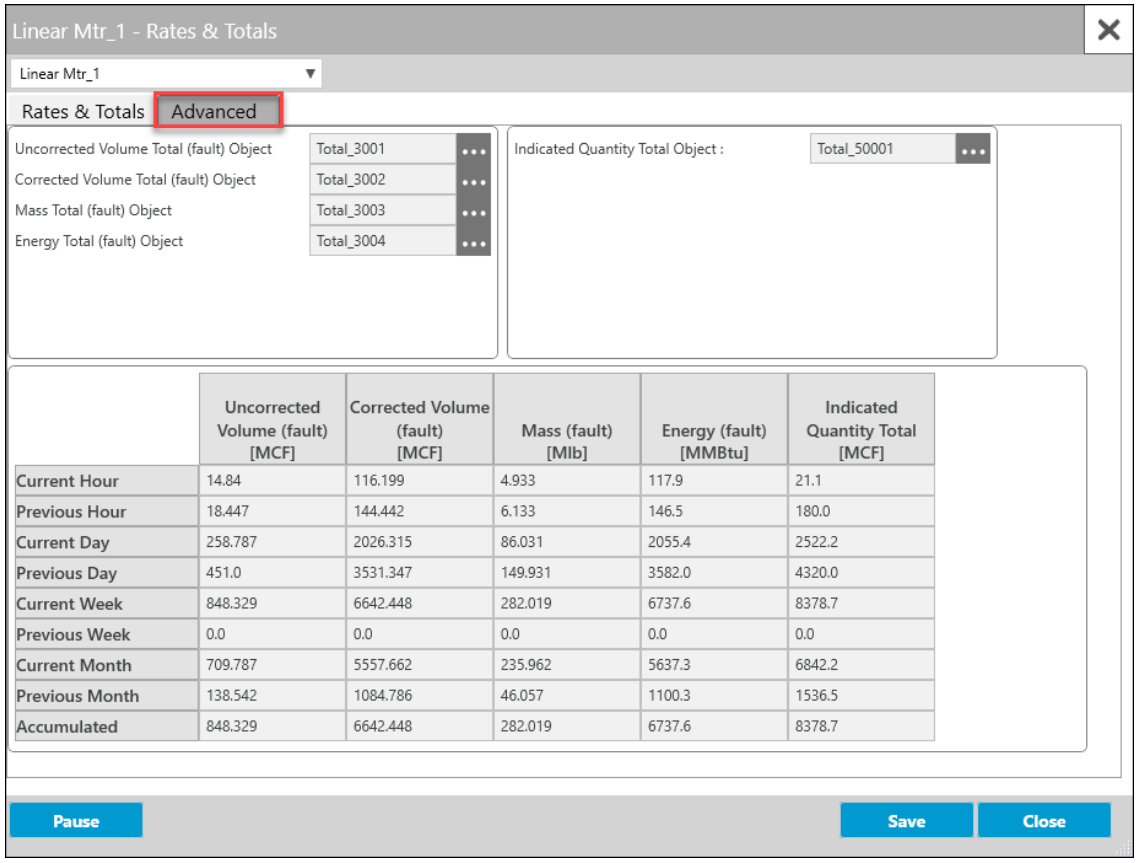
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- Fault totals are calculated when the system becomes unhealthy and can be used to determine how measurement quantities are affected by faults and alarms. To configure which faults and alarms cause the system to become unhealthy, refer to the **Fault Health Configuration** field on the Station – Advanced.
- You can automatically configure which Totals objects for fault totals by using the Totals Setup wizard.
- You **must** configure additional spare Totals objects in the FB Series product database before manually configuring fault totals. For more information, refer to the **Number of Spare Totals** field on the Meter Setup display.

To access this tab:

1. Select **Configure > Gas > Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Rates & Totals** button. The Linear Meter Rates & Totals pop-up display opens.
4. Select the **Advanced** tab.

**Figure 186. Linear Meter Rates & Totals – Advanced Tab**




**5.** Review the values in the following fields:

| Field | Description |
|---|---|
| **Uncorrected Volume Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for uncorrected volume fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |

| Field | Description |
|---|---|
| **Corrected Volume Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for corrected volume fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |
| **Mass Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for mass fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |
| **Energy Total (fault) Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for energy fault totals.<br>**Note**<br>• Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x).<br>• If you select a normal total that is already used elsewhere, a total increment alarm is raised at the meter and the normal total increments when a fault condition occurs.<br>• If a fault total is Undefined, the normal total increments when a fault condition occurs. |

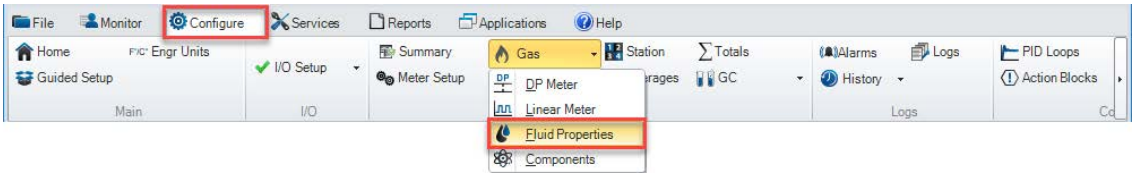
| Field | Description |
|---|---|
| **Indicated Quantity Total Object** | Click ••• to open a Point Picker dialog and select a Totals object from the FB Series product database to use for indicated quantity totals.<br>**Note**<br>Advanced users may select their own totals objects, but you **must** ensure you select a spare total (Total_5000x). |
| **Current Flow Rates** | These **read-only** fields show the current flow rates for the selected meter. |
| **Current Totals** | These **read-only** fields show the total accumulation, as well as the current and previous hourly, daily, weekly, and monthly accumulations for the selected meter. |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. |

## 4.11 Fluid Properties

Use this display to define the physical properties of the fluid flowing through each meter.

To access this display, select **Configure > Gas > Fluid Properties**.

**Figure 187. Configure – Fluid Properties**




The Fluid Properties display contains the following items:

General – Use this display to configure general fluid properties, including relative density, base density, and heating value of the fluid being measured.

Advanced – Use this pop-up display to configure advanced fluid properties, including water content, compressibility, and viscosity of the fluid being measured.

Components – Use this pop-up display to view the currently configured components for each meter.

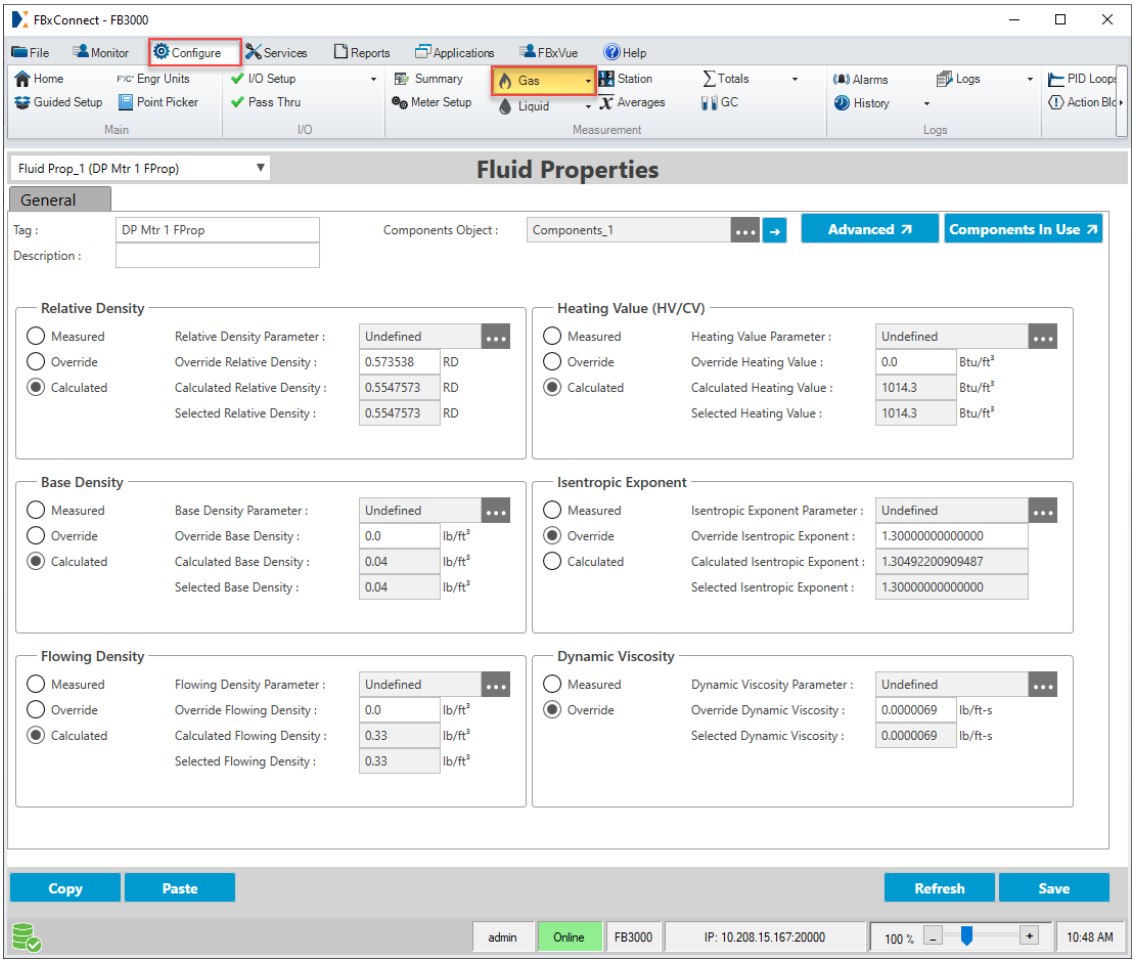
## 4.11.1 Fluid Properties – General

Use this display to configure general fluid properties, including relative density, base density, and heating value of the fluid being measured.

To access this display:

1. Select **Configure > Gas > Fluid Properties** from the DeltaV FBxConnect configuration software main menu. The Fluid Properties display opens.
2. Click ▼ in the drop-down list and select a Fluid Properties instance to configure.

**Figure 188. Fluid Properties – General**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Components Object** | Click ••• to open a Point Picker dialog and select the components instance parameter associated with the selected fluid properties instance.<br>Select → to open the **Components** display and configure the operation mode, normalization option, and mole percentage of each fluid component flowing through the meter. |
| **Advanced** | Click this button to open the Fluid Properties – Advanced pop-up display and configure advanced fluid properties, including water content, compressibility, and viscosity of the fluid being measured. |
| **Components In Use** | Click this button to open the Fluid Properties – Components In Use pop-up display and view **read-only** in-use values for the currently configured components. |
| **Relative Density** | Sets how the system acquires the real relative density (specific gravity) value, which is the ratio of the density of the flowing gas to the density of the reference gas. Possible options are: |

| Field | Description | |
|---|---|---|
| | **Measured** | The system acquires the real relative density value from a gas chromatograph input you configure in the **Relative Density Parameter** field.<br>**Note**<br>• For the most accurate measurement of flow and fluid properties the measured relative density parameter **must** match the **Base Temperature Selection** and **Base Pressure Selection** fields on the Station – General display.<br>• You **must** also define a gas chromatograph input in the **Relative Density Parameter** field.<br>• If the compressibility calculation is dependent on the relative density, the calculation updates every time the input changes. If the input is an analog input, the threshold before the calculation updates is 0.05%. |
| | **Override** | The system uses a value you define in the **Override Relative Density** field. |
| | **Calculated** | The system calculates the relative density value. |
| **Relative Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the real relative density value. | |
| **Override Relative Density** | Sets a value to use for the relative density in calculations when **Override** is selected in the **Relative Density** field.<br>**Note**<br>If the compressibility calculation is dependent on the relative density, the value you enter must **match** the reference conditions expected by the **Compressibility / Density Calculation** option you select. For more information, refer to the Station – General display. | |
| **Calculated Relative Density** | This **read-only** field shows the relative density value as calculated by the system. | |
| **Selected Relative Density** | This **read-only** field shows the current relative density value, based on the selected options, used in calculations. | |

| Field | Description | |
|---|---|---|
| **Base Density** | Sets how the system acquires the real base density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Base Density Parameter** field to acquire the real base density value.<br>**Note**<br>For the most accurate measurement of flow and fluid properties the measured base density parameter **must** match the **Base Temperature Selection** and **Base Pressure Selection** fields on the Station – General display. |
| | **Override** | The system uses a value you define in the **Override Base Density** field. |
| | **Calculated** | The system calculates the base density value. |
| **Base Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the real base density value. | |
| **Override Base Density** | Sets a value to use for the base density in calculations when **Override** is selected in the **Base Density** field. | |
| **Calculated Base Density** | This **read-only** field shows the base density value as calculated by the system. | |
| **Selected Base Density** | This **read-only** field shows the current base density value, based on the selected options, used in calculations. | |
| **Flowing Density** | Sets how the system acquires the flowing density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Flowing Density Parameter** field to acquire the flowing density value. |
| | **Override** | The system uses a value you define in the **Override Flowing Density** field. |
| | **Calculated** | The system calculates the flowing density value. |
| **Flowing Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the flowing density value. | |

| Field | Description |
|---|---|
| **Override Flowing Density** | Sets a value to use for the flowing density in calculations when Override is selected in the Flowing Density field. |
| **Calculated Flowing Density** | This **read-only** field shows the flowing density value as calculated by the system. |
| **Selected Flowing Density** | This **read-only** field shows the current flowing density value, based on the selected options, used in calculations. |
| **Heating Value (HV/CV)** | Sets how the system acquires the heating value of the measured fluid at base conditions. When the Heating value basis is volume, this value represents the real heating value, rather than the ideal heating value. When the heating value basis is mass, this value represents the mass heating value. Possible options are: |
| | **Measured** — The system uses a parameter you configure in the **Heating Value Parameter** field to acquire the heating value.<br>**Note**<br>• The measured heating value parameter **must** match the **Heating Value Measurement Basis**. For the most accurate measurement of flow & fluid properties the measured heating value parameter should match the **Base Temperature Selection**, **Base Pressure Selection** , and **Heating Value Combustion Temperature** fields on the Station – General display.<br>• If the compressibility calculation is dependent on the heating value, the measured heating value **must** be gross / superior volumetric heating value. The compressibility calculation updates every time the input changes. If the input is an analog input, the threshold before the calculation updates is 0.05%.<br>• Negative or invalid heating values are rejected, and the calculation uses a heating value of 0. |

| Field | Description | |
|---|---|---|
| | **Override** | The system uses the value you define in the **Override Heating Value** field to calculate the energy flow rates, regardless of the selected station heating value calculation standard.<br>**Note**<br>• You **must** enter a value in the **Override Heating Value** field.<br>• If the compressibility calculation is dependent upon the heating value, the override **must** be the override gross / superior heating value.<br>• The value entered **must** match the reference conditions expected by the compressibility calculation you select in the **Compressibility/Density Calculation** field on the Station – General display. |
| | **Calculated** | The system calculates the heating value based on your selection in the **Heating Value Calc Standard** field on the Station – General display. |
| **Heating Value Parameter** | Click ••• to open a Point Picker dialog and select a parameter used to acquire the heating value. | |
| **Override Heating Value** | Sets the heating value used in calculations when **Override** is selected in the **Heating Value (HV/CV)** field. | |
| **Calculated Heating Value** | This **read-only** field shows the heating value as calculated by the system. | |
| **Selected Heating Value** | This **read-only** field shows the current heating value, based on the selected options, used in energy calculations. If the compressibility calculation is dependent on the heating value, the value used by the calculation is shown in **Compressibility Heating Value** field on the DP Meter – Diagnostics display or the Linear Meter – Diagnostics display. | |

| Field | Description | |
|---|---|---|
| **Isentropic Exponent** | Sets how the system acquires the isentropic exponent. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Isentropic Exponent Parameter** field to acquire the isentropic exponent. |
| | **Override** | The system uses a value you define in the **Override Isentropic Exponent** field. |
| | **Calculated** | The system calculates the isentropic exponent at flowing conditions.<br>**Note**<br>You **must** select **AGA8 1994 Detailed** or **ISO 12213-2 2006** in the **Compressibility/Density Calculation** field on the Station – General display in order for the system to calculate the Isentropic Exponent. |
| | **Note**<br>It is often accepted practice to use the specific heat ratio (Cp/Cv = ratio of specific heat at constant pressure to the specific heat at constant volume) in place of the isentropic exponent, as in many applications they are nearly identical. To enter a specific heat ratio, set the isentropic exponent mode to **Override** and enter the specific heat ratio value in the **Override Isentropic Exponent** field. | |
| **Isentropic Exponent Parameter** | Click ••• to open a Point Picker dialog and select a parameter used to acquire the isentropic exponent. | |
| **Override Isentropic Exponent** | Sets the isentropic exponent used in calculations when **Override** is selected in the **Isentropic Exponent** field.<br>**Note**<br>This field appears **only** for differential pressure meters. | |
| **Calculated Isentropic Exponent** | This **read-only** field shows the isentropic exponent as calculated by the system.<br>**Note**<br>This field appears **only** for differential pressure meters. | |

| Field | Description | |
|---|---|---|
| **Selected Isentropic Exponent** | This **read-only** field shows the current isentropic exponent value, based on the selected options, used in calculations.<br>**Note**<br>This field appears **only** for differential pressure meters. | |
| **Dynamic Vicosity** | Sets how the system acquires the dynamic viscosity. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Dynamic Viscosity Parameter** field to acquire the dynamic viscosity. |
| | **Override** | The system uses a value you define in the **Override Dyanamic Viscosity** field. |
| **Dynamic Viscosity Parameter** | Click ••• to open a Point Picker dialog and select a parameter used to acquire the dynamic viscosity. | |
| **Override Dynamic Viscosity** | Sets the dynamic viscosity used in calculations when **Override** is selected in the **Dynamic Viscosity** field. | |
| **Selected Dynamic Viscosity** | This **read-only** field shows the current dynamic viscosity value, based on the selected options, used in calculations. | |

4. Select **Save** to save any changes you make to this display.

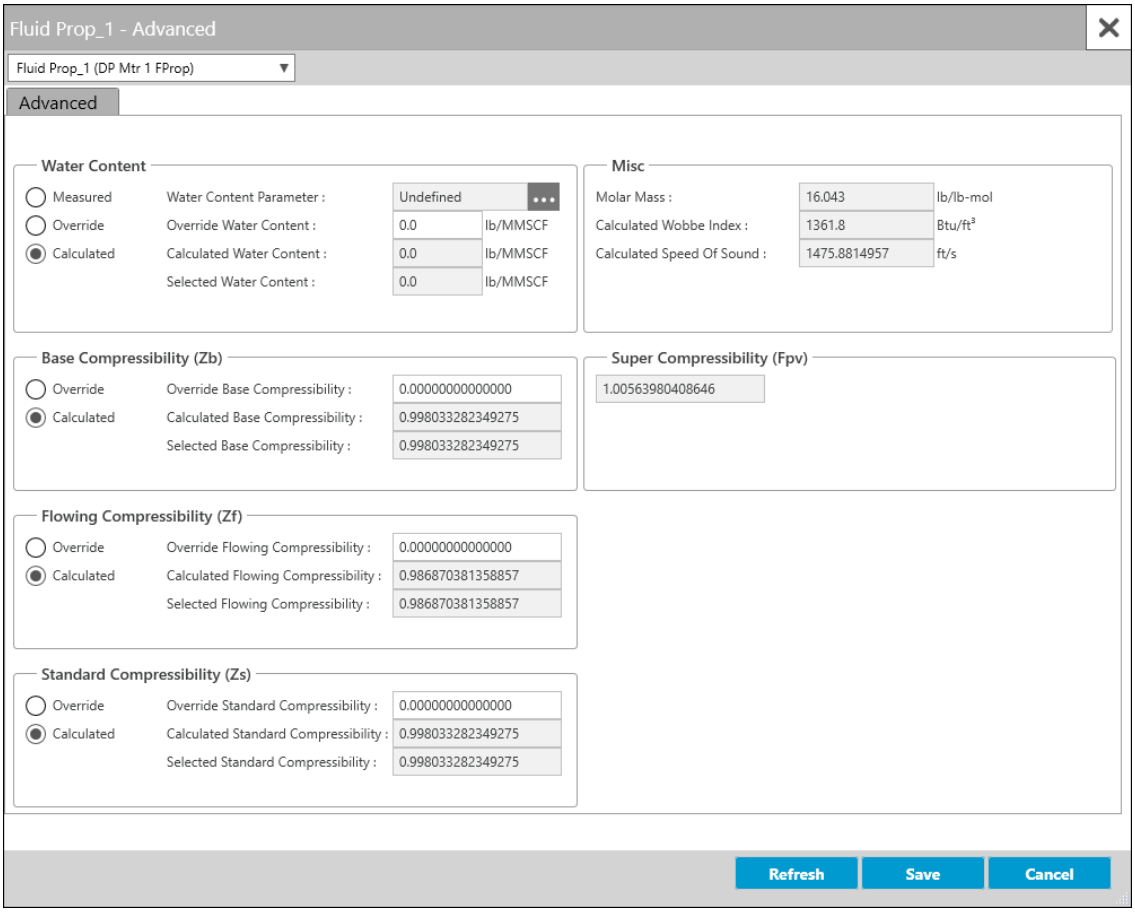
## 4.11.2 Fluid Properties – Advanced

Use this display to configure advanced fluid properties, including water content, compressibility, and viscosity of the fluid being measured.

To access this display:

1. Select **Configure > Gas > Fluid Properties** from the DeltaV FBxConnect configuration software main menu. The Fluid Properties display opens showing the General tab.
2. Click ▼ in the drop-down list and select a fluid properties instance to configure.
3. Select the **Advanced** button. The Fluid Properties – Advanced pop-up display opens.

**Figure 189. Fluid Properties – Advanced**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Water Content** | Sets how the system acquires the water content value used in calculations. Possible options are: |

| Field | Description | |
|---|---|---|
| | **Measured** | The system acquires the water content value from the parameter you configure in the **Water Content Parameter** field.<br>**Note**<br>Measured Water Content is read every calculation cycle, but is only used to adjust gas composition if all of the following conditions are met.<br>• The **Water Content Basis** field is set to **Saturated at Base Conditions**.<br>• The **Water Adjustment Option** field is set to **Adjust Composition**.<br>• The gas composition is updated.<br>The gas composition is updated in the following circumstances:<br>• The **Operation Mode** field on the Components – General display is set to **Override**, and you select the **Apply Override Values** on the Components – Component display.<br>• The **Operation Mode** field on the Components – General display is set to **Measured**, and a new valid gas composition is received from a GC.<br>• The **Operation Mode** field on the Components – General display is set to **Remote Download**, and the **Apply Override Values** parameter is set to **Accept Composition** (see protocol manual). |
| | **Override** | The system uses a value you define in the **Override Water Content** field. |
| | **Calculated** | Selected water content is calculated from the configured method. |
| **Water Content Parameter** | Click ••• to open a Point Picker dialog and select a parameter used to acquire the water content value. | |
| **Override Water Content** | Sets a value to use for the water content in calculations when Override is selected in the Water Content field. | |

| Field | Description | |
|---|---|---|
| **Calculated Water Content** | This **read-only** field shows the current water content value as calculated by the system. | |
| **Selected Water Content** | This **read-only** field shows the current water content value used in calculations based on the selected options. | |
| **Base Compressibility (Zb)** | Sets how the system acquires the base compressibility value used in calculations. Possible options are: | |
| | **Override** | The system uses a value you define in the Override Base Compressibility field. |
| | **Calculated** | The system calculates the base compressibility value. |
| **Override Base Compressibility** | Sets a value to use for the base compressibility in calculations when Override is selected in the Base Compressibility field. | |
| **Calculated Base Compressibility** | This **read-only** field shows the current base compressibility value as calculated by the system. | |
| **Selected Base Compressibility** | This **read-only** field shows the current base density value used in calculations based on the selected options. | |
| **Flowing Compressibility (Zf)** | Sets how the system acquires the flowing compressibility value used in calculations. Possible options are: | |
| | **Override** | The system uses a value you define in the Override Flowing Compressibility field. |
| | **Calculated** | The system calculates the flowing compressibility value. |
| **Override Flowing Compressibility** | Sets a value to use for the flowing compressibility in calculations when Override is selected in the Flowing Compressibility field. | |
| **Calculated Flowing Compressibility** | This **read-only** field shows the current flowing compressibility value as calculated by the system. | |
| **Selected Flowing Compressibility** | This **read-only** field shows the current flowing compressibility value used in calculations based on the selected options. | |
| **Standard Compressibility (Zs)** | Sets how the system acquires the standard compressibility value used in calculations. Possible options are: | |
| | **Override** | The system uses a value you define in the **Override Standard Compressibility** field. |

| Field | Description |
|---|---|
| | **Calculated** The system calculates the standard compressibility value. |
| **Override Standard Compressibility** | Sets a value to use for the standard compressibility in calculations when **Override** is selected in the **Standard Compressibility** field. |
| **Calculated Standard Compressibility** | This **read-only** field shows the standard compressibility as calculated by the system. |
| **Selected Standard Compressibility** | This **read-only** field shows the current standard compressibility value used in calculations based on the selected options. |
| **Molar Mass** | This **read-only** field shows the average molar mass of the fluid. Units are based on selected density units for the station (e.g. density units selection of lb/ft3 would display molar mass in units of lb/lb-mol). |
| **Calculated Wobbe Index** | This **read-only** field shows the Wobbe Index of the fluid as calculated by the system. The Wobbe Index is the BTU per cubic foot divided by the square root of the specific gravity. |
| **Calculated Speed Of Sound** | This **read-only** field shows the result of the speed of sound calculation. The system calculates speed of sound in the fluid in feet per second or meter per second based on the Pressure, Temperature, and Gas Composition.<br>**Note**<br>• You **must** select **AGA8 1994 Detailed**, **AGA8 2017 Part 1 Detailed**, **AGA8 Part 2 2017 / GERG 2008**, or **ISO 12213-2 2006** in the **Compressibility/Density Calculation** field on the Station – General display in order for the system to calculate the speed of sound.<br>• If you select **AGA8 1994 Detailed** or **ISO 12213-2 2006**, then the system uses the **AGA10** standard to calculate the speed of sound.<br>• If you select **AGA8 2017 Part 1 Detailed** or **AGA8 2017 Part 2 / GERG 2008**, then the system uses the selected standard to calculate the speed of sound. |

| Field | Description | |
|---|---|---|
| **Super Compressibility (Fpv)** | This **read-only** field shows a correction factor used in certain compressibility calculations, such as NX-19 1962. For calculations without it, the factor is calculated as the square root of the ratio of base compressibility to flowing compressibility (per AGA3 1985). | |
| **Joule-Thomson** | Sets how the system acquires the Joule-Thomson coefficient. Possible options are: | |
| | **Override** | The system uses a value you define in the **Override Joule-Thomson** field. |
| | **Calculated** | The system calculates the Joule-Thomson coefficient at flowing conditions. |
| | **Note**<br>• This field appears **only** for differential pressure meters if you select **Isenthalpic (Joule-Thomson)** in the **Temperature Correction** field on the DP Meter – Advanced display.<br>• If you select **AGA 8 Part 1 2017 Detailed** or **AGA 8 Part 2 2017 / GERG 2008** in the **Compressibility/Density Calculation** field on the Station – General display, then the Joule-Thomson coefficient is calculated by the selected standard.<br>• For all other **Compressibility/Density Calculation** selections, it is calculated by **ISO 9464**. | |
| **Override Joule-Thomson** | Sets the Joule-Thomson coefficient used in calculations when **Override** is selected in the **Joule-Thomson** field.<br>**Note**<br>This field appears **only** for differential pressure meters if you select **Isenthalpic (Joule-Thomson)** in the **Temperature Correction** field on the DP Meter – Advanced display. | |
| **Calculated Joule-Thomson** | This **read-only** field shows the Joule-Thomson coefficient as calculated by the system.<br>**Note**<br>This field appears **only** for differential pressure meters if you select **Isenthalpic (Joule-Thomson)** in the **Temperature Correction** field on the DP Meter – Advanced display. | |

| Field | Description |
|---|---|
| **Selected Joule-Thomson** | This **read-only** field shows the current Joule-Thomson coefficient value, based on the selected options, used in calculations.<br>**Note**<br>This field appears **only** for differential pressure meters if you select **Isenthalpic (Joule-Thomson)** in the **Temperature Correction** field on the DP Meter – Advanced display. |

5. Select **Save** to save any changes you make to this tab.

## 4.11.3 Fluid Properties – Components

Use this display to view **read-only** in-use values for the currently configured components for each meter.

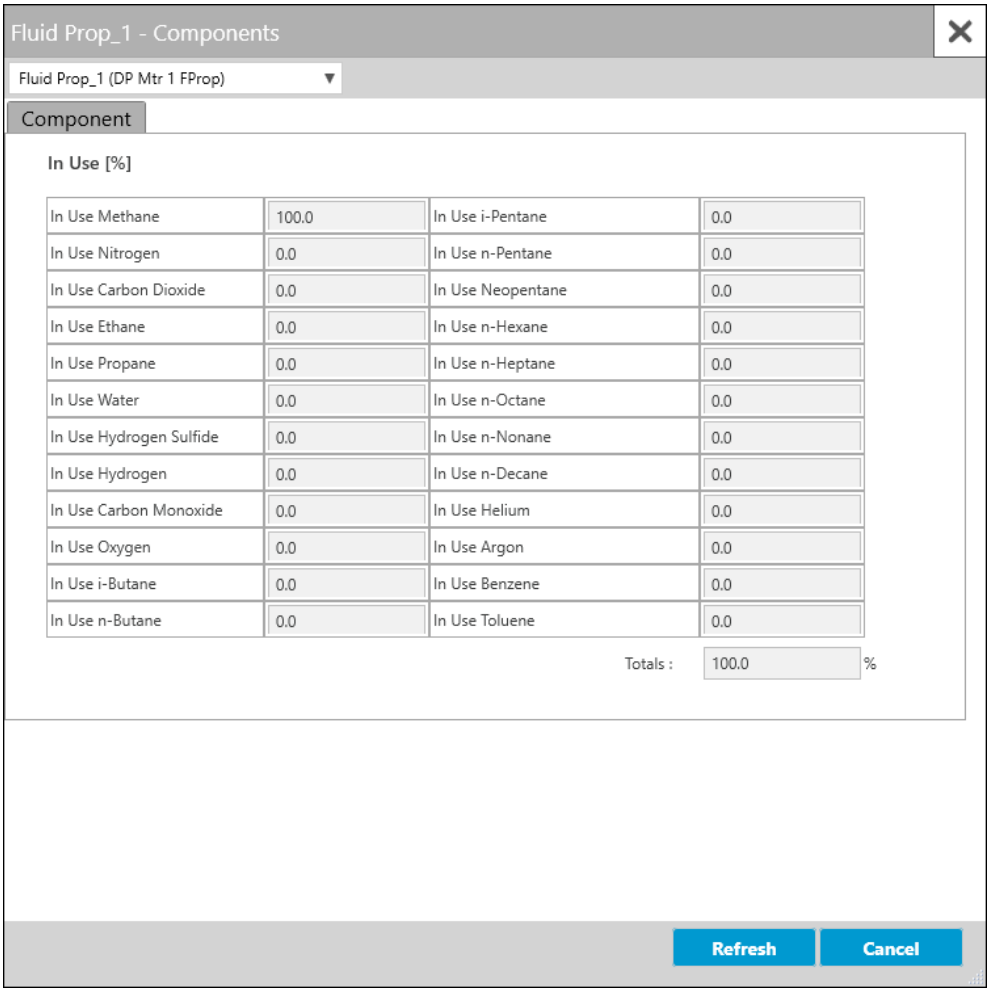
**Note**

- The in-use values are adjusted according to your selections in the **Water Content Basis** and **Water Adjustment Option** fields on the Station – Advanced display.
- You configure the components of the fluid being measure on the Components display.

To access this display:

1. Select **Configure > Gas > Fluid Properties** from the DeltaV FBxConnect configuration software main menu. The Fluid Properties display opens showing the General tab.
2. Click ▼ in the drop-down list and select an instance to view the configured components.
3. Select the **Components In Use** button. The Fluid Properties – Components pop-up display opens.

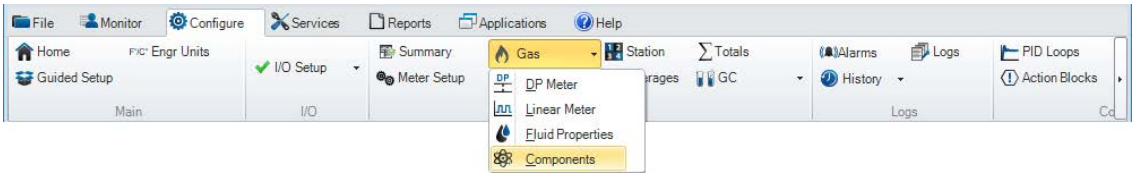
**Figure 190. Fluid Properties – Components**




# 4.12 Component

Use this display to configure how the system calculates fluid composition and the different components of the fluid flowing through the meter.

**Figure 191. Configure – Components**



The Component display contains the following items:

General – Use this display to configure how the system calculates fluid composition.

Components – Use this pop-up display to set the mole percent of each fluid component present in the meter.

Component Import Export – Use this button to import a new gas composition from a CSV file or export the current gas composition to a CSV file.

Apply Override Values – Use this button to manually override the in-use gas composition.

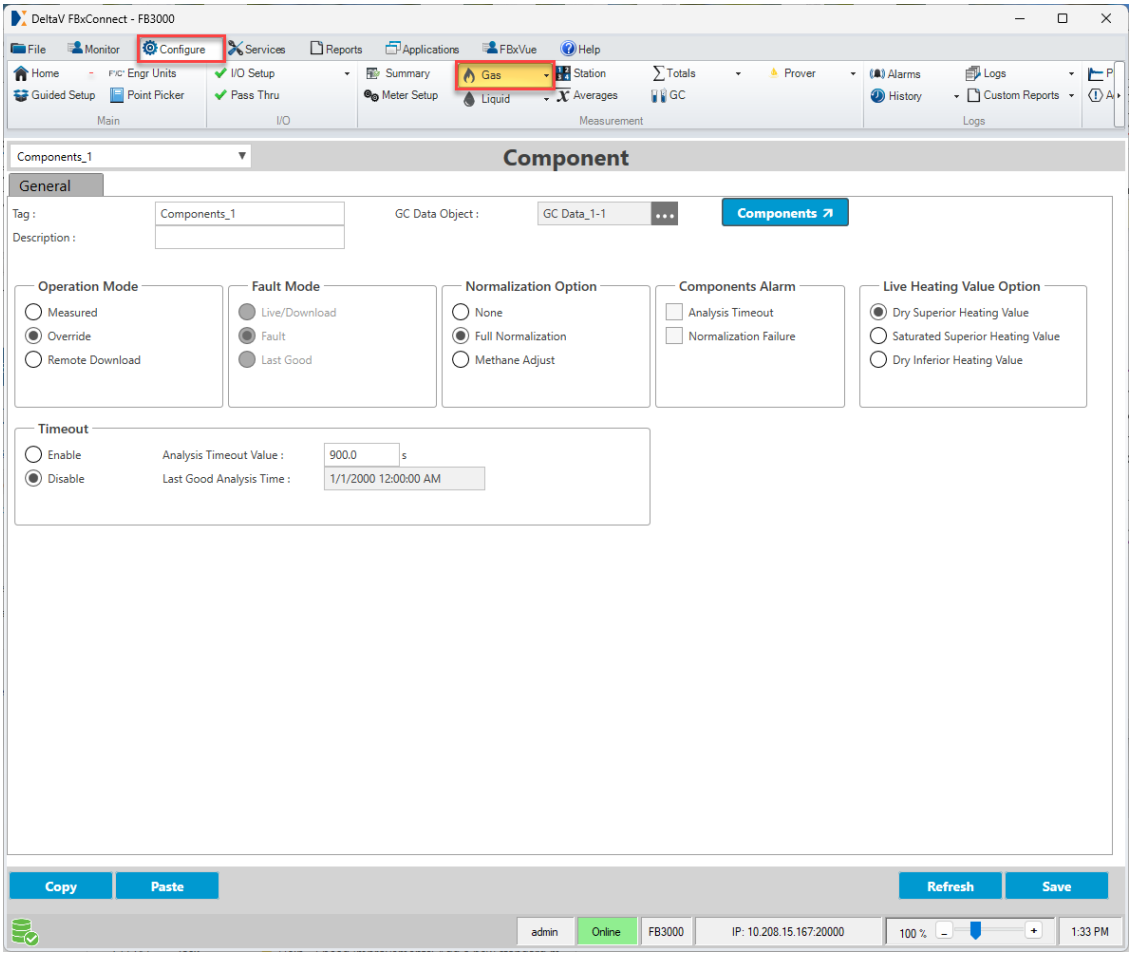
### 4.12.1 Component – General

Use this display to configure how the system calculates fluid composition.

To access this display:

1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Components display opens.
2. Click ▼ in the drop-down list at the top of the display and select a Components instance to configure.

**Figure 192. Component – General**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **GC Data Object** | Click ... to open a Point Picker dialog and select a parameter used to acquire the gas chromatograph data. |
| **Components** | Click this button to open the Component – Components pop-up display and set the mole percent of each fluid component present in the meter. |

| Field | Description | |
|---|---|---|
| **Operation Mode** | Sets how the system acquires the component information. Possible options are: | |
| | **Measured** | Selected composition is obtained from a gas chromatograph and shown in the Live Value fields on the Component – Components display. If an analysis timeout alarm occurs, the selected composition updates according to the fault mode. The analysis timeout alarm resets on a system restart or on the receipt of a new measured gas composition that satisfies the gas chromatograph alarm/range checks (see Gas Chromatograph – Configuration Tab). |
| | **Override** | Selected composition is obtained from the Override values you enter on the Component – Components display, even when a timeout alarm is active. Use of the **Apply Override Values** button, changes to the Override values, and changes resulting from normalization are logged to the event log. The analysis timeout alarm resets on a system restart or whenever you select the **Apply Override Values** button.<br>**Note**<br>If you enable the **QTR Log Break Option** on the Meter Setup display, then selecting the **Apply Override Values** button also triggers a QTR log break. |

| Field | Description | |
|---|---|---|
| | **Remote Download** | Selected composition is obtained from the Override values downloaded from a SCADA host or other remote master. Changes to Override values are not logged to the event log. If an analysis timeout alarm occurs, the selected composition updates according to the fault mode. The analysis timeout alarm resets on a system restart or whenever you select the **Apply Override Values** button.<br>**Note**<br>Whenever the operation mode changes, the analysis timeout timer restarts and the current selected values are copied to the last good composition. |
| **Fault Mode** | Sets how the system responds if the Operation Mode field is set to **Measured** or **Remote Download** and an analysis timeout occurs. A measured analysis timeout may be due to a communications failure with the gas chromatograph or a failure of the returned data to pass the validity test. A remote download timeout occurs if the time since the last composition accepted exceeds the timeout limit.<br>**Note**<br>This field is **read-only** if you select **Override** in the Operation Mode field. | |
| | **Live / Download** | If you select **Measured** in the Operation Mode field, the selected composition continues to obtain values from a gas chromatograph. If you select **Remote Download** in the Operation Mode field, the selected composition continues to obtain values from a SCADA host or other remote master. |
| | **Fault** | Selected composition is obtained from the user entered FAULT values. |

| Field | Description | |
|---|---|---|
| | **Last Good** | Selected composition retains the last value prior to the analysis timeout. If the Operation Mode field is set to **Measured**, the last good composition is **only** updated on the receipt of a new measured gas composition that satisfies the gas chromatograph alarm/range checks (see Gas Chromatograph – Configuration Tab). If the Operation Mode field is set to **Remote Download**, the last good composition is **only** updated if the override composition can be normalized according to the current normalization option. |
| **Normalization Option** | Sets what action is taken if the total of the gas mole percentages does not add up to 100%. | |
| | **None** | No action is taken if the total does not equal 100%. |
| | **Full Normalization** | The system automatically adjusts each component proportionally so that the total adds up to 100%. |
| | **Methane Adjust** | The system automatically adjusts the methane mole percent up or down so that the total adds up to 100%. |
| **Components Alarm** | **Analysis Timeout** | If enabled, this alarm indicates the selected composition has not been updated with a valid set of data in the amount of time specified by the user in Analysis Timeout Value. |
| | **Normalization Failure** | This alarm indicates the composition did not add up to 100% and could not be normalized. This will only occur if a normalization option of Methane Adjust is selected and adjustment of methane does not make up the difference required to have the total composition add up to 100%. |

| Field | Description | |
|---|---|---|
| **Live Heating Value Option** | The gas chromatograph interface reads dry superior and saturated superior heating values when configured as an American type and additionally reads a dry inferior heating value when configured as a European type. This option selects which of those values from the gas chromatograph will be used as the live reading for the Components heating value parameter and in turn be available as the measured heating value for gas fluid properties.<br>**Note**<br>When a live gas chromatograph is **not** used, then this selection has no impact. | |
| | **Dry Superior Heating Value** | Superior (Gross) heating value with no water vapor present in the gas. |
| | **Saturated Superior Heating Value** | Superior (Gross) heating value with saturated water vapor present in the gas. |
| | **Dry Inferior Heating Value** | Inferior (Net) heating value with no water vapor present in the gas. |
| **Timeout** | Sets the option to alarm on an analysis timeout. | |
| | **Analysis Timeout Value** | Sets an amount of time (in seconds) to wait for a valid update to the selected composition before setting the analysis timeout alarm. |
| | **Last Good Analysis Time** | This **read-only** field shows the date and time of the last good analysis. |
| **Component Import Export** | Select this button to import a new gas composition from a CSV file or export the current gas composition to a CSV file. For more information, refer to Component Import Export. | |
| **Apply Override Values** | Select this button to manually override the in-use gas composition. For more information, refer to Apply Override Values. | |

4. Select **Save** to save any changes you make to this display.

## 4.12.2 Component – Components

Use this pop-up display to set the mole percent of each fluid component present in the meter, the heating value, and the relative density. This value is required to calculate the compressibility of gas using the AGA 8 detailed method.

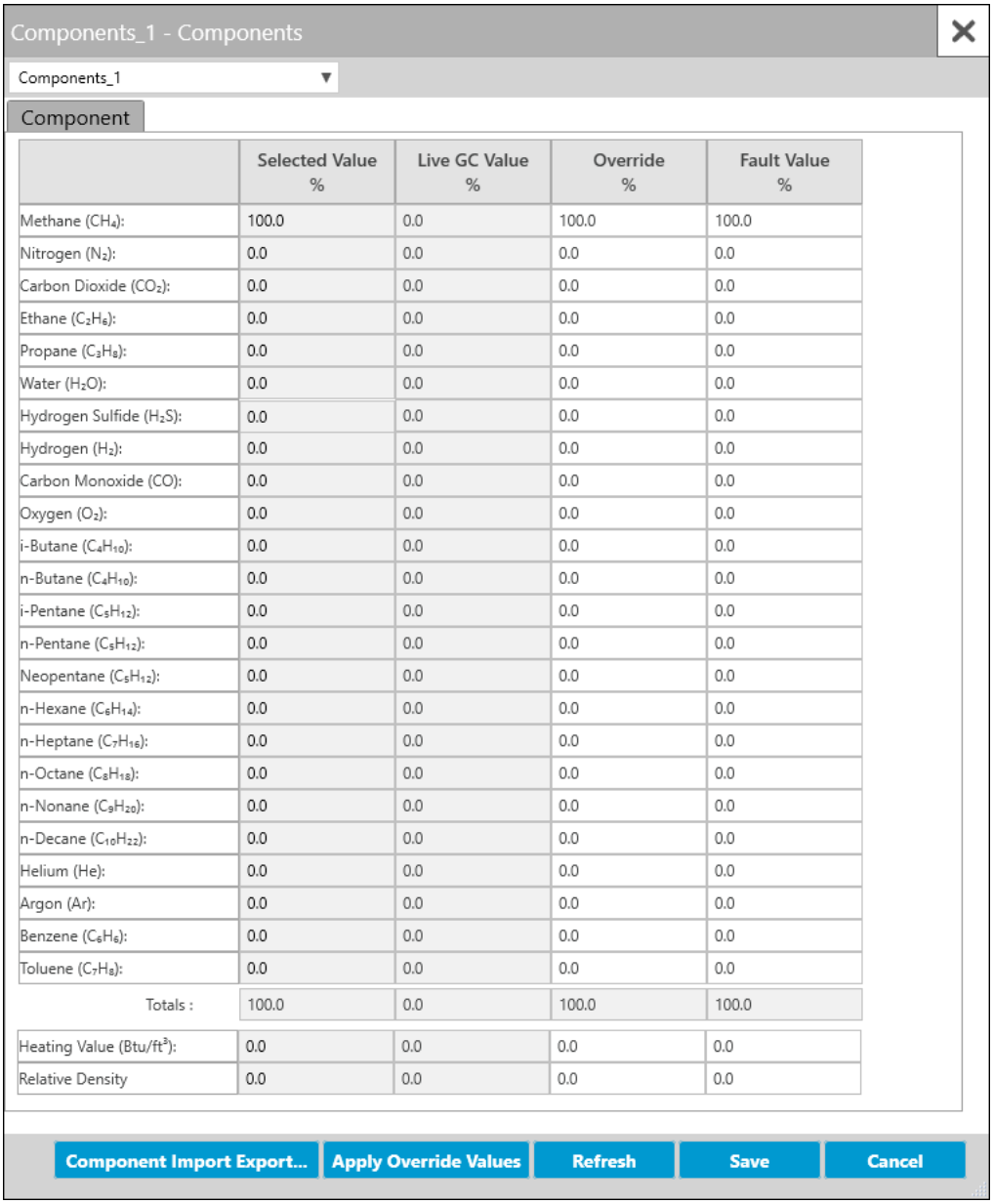
**Note**

You can save values on this display at any time, but the new values are not used in until you select the **Apply Override Values** button. This prevents a partial set of data from being processed by the meter.

To access this pop-up display:

1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Component display opens.
2. Click ▼ in the drop-down list at the top of the display and select a Components instance to configure.
3. Select the **Components** button. The Component – Components pop-up display opens.

**Figure 193. Component – Components**




| | Selected Value % | Live GC Value % | Override % | Fault Value % |
|---|---|---|---|---|
| Methane ($CH_4$): | 100.0 | 0.0 | 100.0 | 100.0 |
| Nitrogen ($N_2$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Carbon Dioxide ($CO_2$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Ethane ($C_2H_6$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Propane ($C_3H_8$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Water ($H_2O$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Hydrogen Sulfide ($H_2S$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Hydrogen ($H_2$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Carbon Monoxide (CO): | 0.0 | 0.0 | 0.0 | 0.0 |
| Oxygen ($O_2$): | 0.0 | 0.0 | 0.0 | 0.0 |
| i-Butane ($C_4H_{10}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Butane ($C_4H_{10}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| i-Pentane ($C_5H_{12}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Pentane ($C_5H_{12}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Neopentane ($C_5H_{12}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Hexane ($C_6H_{14}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Heptane ($C_7H_{16}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Octane ($C_8H_{18}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Nonane ($C_9H_{20}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| n-Decane ($C_{10}H_{22}$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Helium (He): | 0.0 | 0.0 | 0.0 | 0.0 |
| Argon (Ar): | 0.0 | 0.0 | 0.0 | 0.0 |
| Benzene ($C_6H_6$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Toluene ($C_7H_8$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Totals : | 100.0 | 0.0 | 100.0 | 100.0 |
| Heating Value (Btu/$ft^3$): | 0.0 | 0.0 | 0.0 | 0.0 |
| Relative Density | 0.0 | 0.0 | 0.0 | 0.0 |

**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Selected Value %** | This **read-only** field shows the current gas quality readings, relative density, and heating value before any water content or water adjustment option has been applied.<br>**Note**<br>Fields in this column turn red if there is a validation alarm associated with the selected component. |
| **Live GC Value %** | This **read-only** field shows gas quality readings, relative density, and heating value from the configured gas chromatograph. |
| **Override %** | Sets the mole percent of each fluid component (as a percentage), relative density, and heating value to use in calculations when **Override** is selected in the **Operation** field on the Component – General display.<br>**Note**<br>You can save values on this display at any time, but the new values are not used in until you select the **Apply Override Values** button. This prevents a partial set of data from being processed by the meter. |
| **Fault Value %** | Sets the mole percent of each fluid component (as a percentage), relative density, and heating value to use in calculations when **Fault** is selected in the **Fault Mode** field on the Component – General display and a fault occurs.<br>**Note**<br>You can save values on this display at any time, but the new values are not used in until you select the **Apply Override Values** button. This prevents a partial set of data from being processed by the meter. |
| **Totals** | This **read-only** field shows the total mole percent of all fluid components. |
| **Component Import Export** | Select this button to import a new gas composition from a CSV file or export the current gas composition to a CSV file. For more information, refer to Component Import Export. |
| **Apply Override Values** | Select this button to manually override the in-use gas composition. For more information, refer to Apply Override Values. |

5. Select **Save** to save any changes you make to this display.

**Note**

A warning icon shows if the **Selected Value** field and **Override Value** field **do not** match.

## 4.12.3 Component Import Export

Use this pop-up display to import gas component values from a CSV file or export the current gas component values to a CSV file.

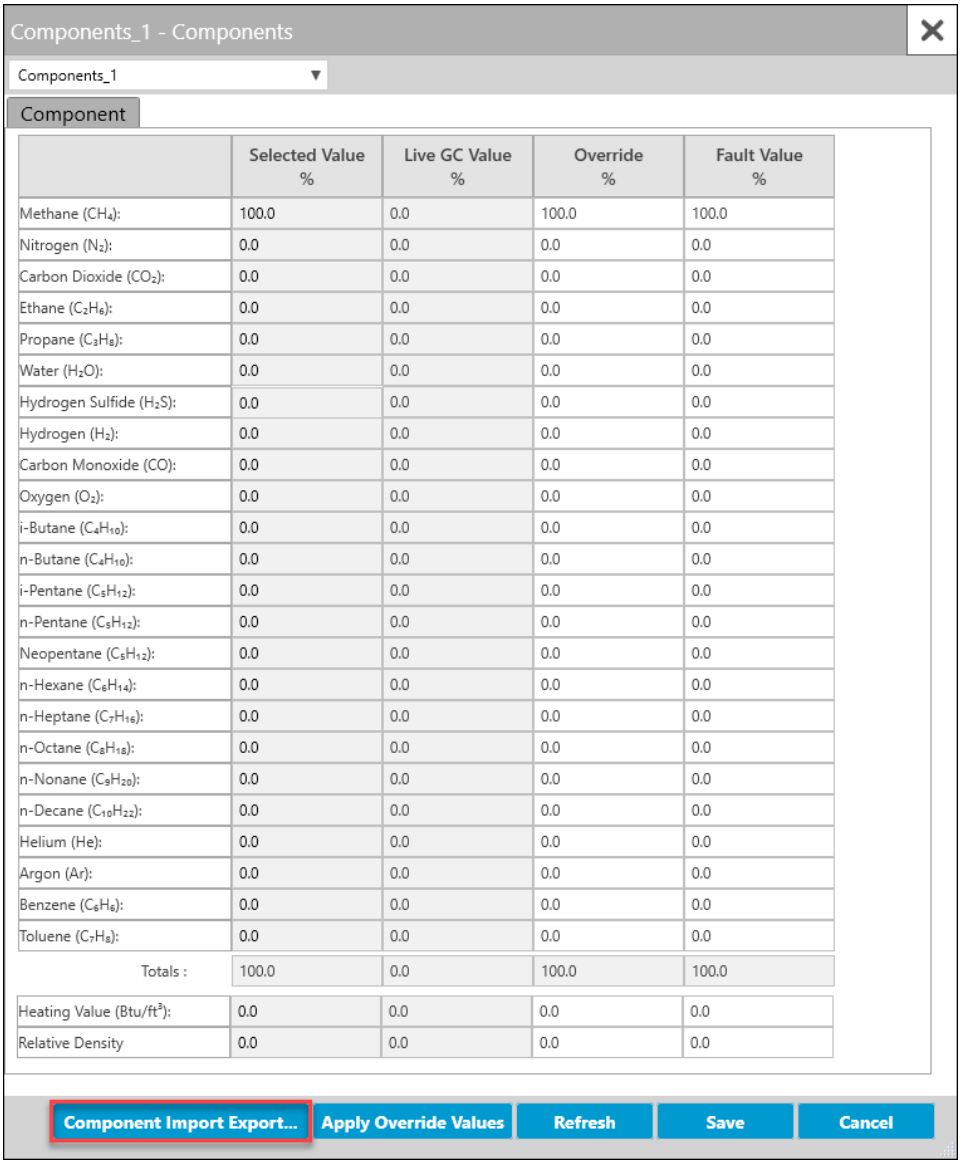
**Note**

For more information about creating your own gas component CSV files, refer to Creating Gas Component CSV Files.

To access this pop-up display:

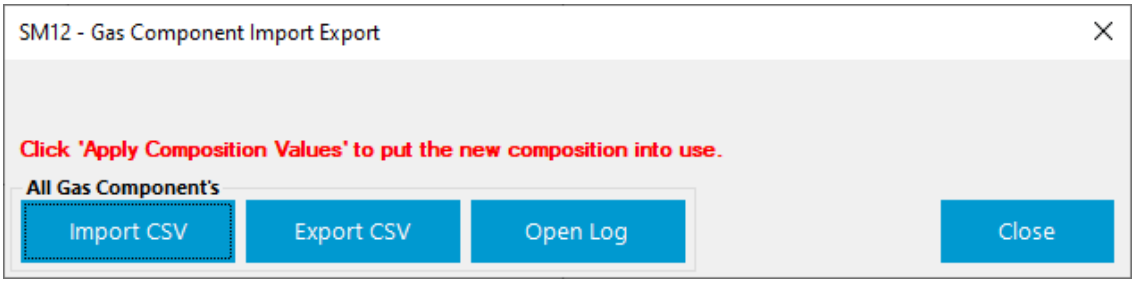
1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Component display opens.
2. Select the **Components** button. The Component – Components pop-up display opens.

**Figure 194. Component Import Export**




3. Select the **Component Import Export** button. The Gas Component Import Export pop-up display opens.

**Figure 195. Gas Component Import Export**




4. Use the buttons on this display to perform the following actions:

| Field | Description |
|---|---|
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your gas component values. Navigate to the location on your computer that contains the CSV files and select **OK** to start the import process. For more information, refer to Importing Gas Component CSV Files.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. |
| **Export CSV** | Click to save CSV files to your computer that contain the current gas component values used by your FB Series product. A Select Table dialog opens that allows you to select which Components instances to include in the export. Click **Start**, navigate to a folder on your computer where the CSV files will be saved, and click **Save** to begin the export process. For more information, refer to Exporting Gas Component CSV Files.<br>**Note**<br>Never modify the names or the order of the Gas Components in an exported CSV file. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |

5. Select **Close** to exit the pop-up display.

### 4.12.3.1 Importing a Gas Composition CSV File

You can import CSV files that contain your gas component values. You can include gas component values for all Components instances in a single CSV file or separate CSV files for each instance.

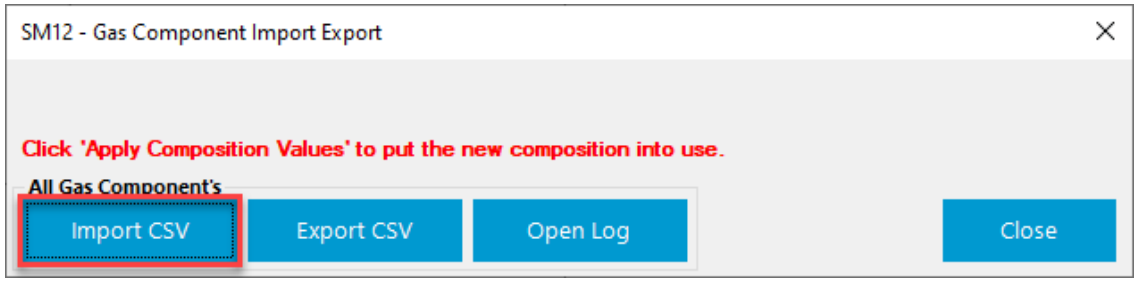
**Note**

- For more information about creating your own gas component CSV files, refer to Creating Gas Component CSV Files.
- For more information about exporting CSV files that contains the FB Series product's current gas component values, refer to Exporting Gas Component CSV Files.
- Never modify the names or the order of the Gas Components in an exported CSV file.
- If you want to remove previously imported gas component values, perform a Cold Start and select **Database is re-**initialized **with factory defaults**.

To import gas component CSV files:

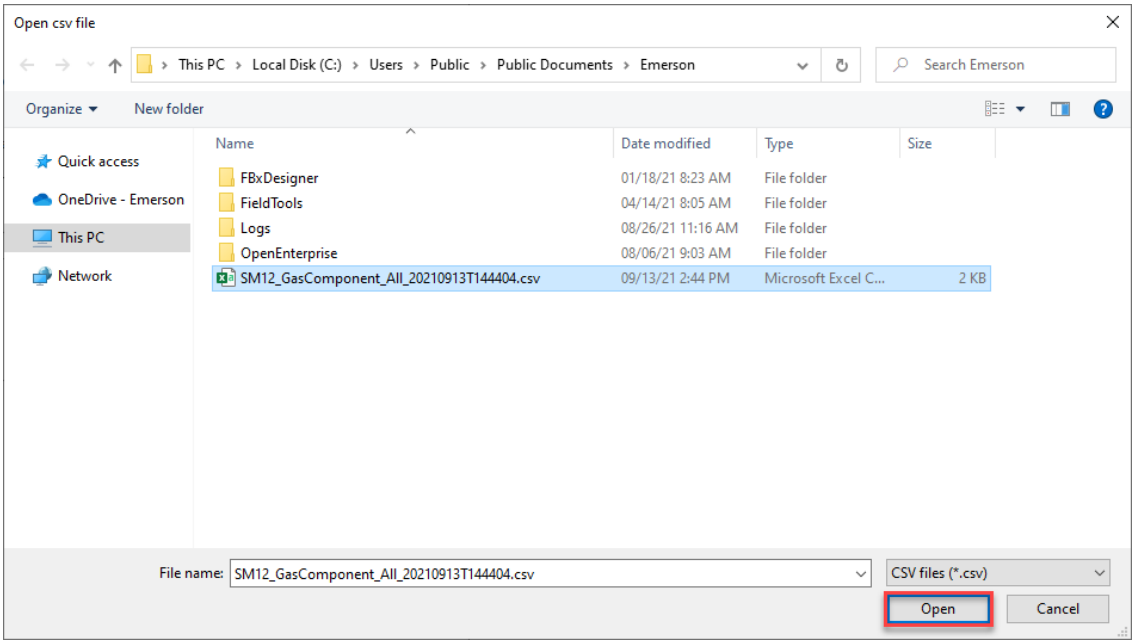
1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Components display opens.
2. Select the **Components** button. The Component – Components pop-up display opens.
3. Select the **Component Import Export** button. The Gas Component Import Export pop-up display opens.

**Figure 196. Gas Component Import Export**




4. Select the **Import CSV** button. The Open csv File window opens.

**Figure 197. Open csv File**

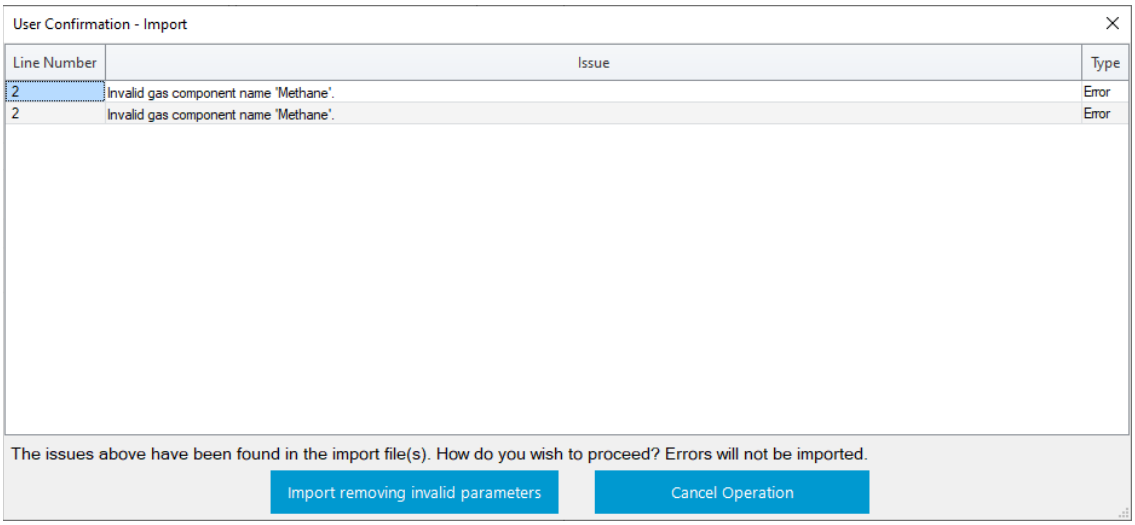



5. Navigate to the location of your gas composition CSV file, highlight the file, and select **Open**.

**Note**

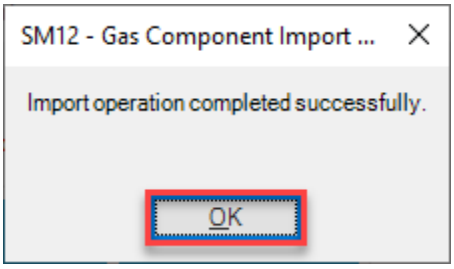
The system verifies the integrity of the CSV file and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

**Figure 198. Example Import Gas Composition Errors**




6. A confirmation message displays after importing the CSV file. Select **OK** to complete the process.

**Figure 199. Import Successful**




**Note**

You **must** click the **Apply Override Values** button after importing a gas component CSV file before any changes take effect.

## 4.12.3.2 Exporting a Gas Composition CSV File

You can export CSV files to your computer that contain the current gas component values used by your FB Series product. You can then modify the files on your computer or import them into another device. You can export gas component values to one CSV file that contains information for all Components instances or export separate CSV files for each instance.

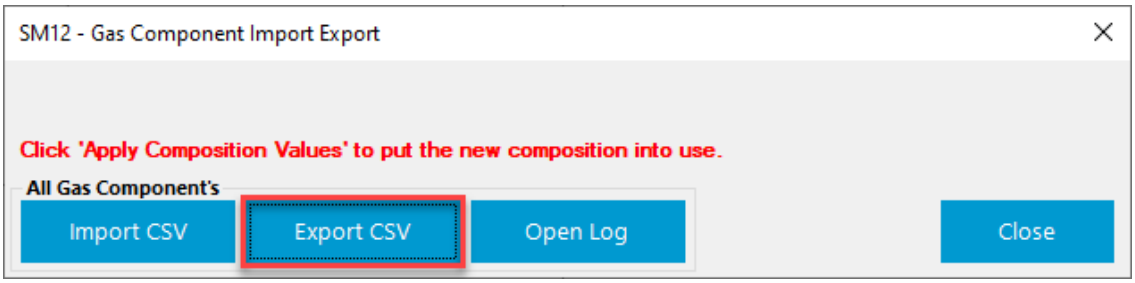
**Note**

- For more information about creating your own gas component CSV files, refer to Creating Gas Component CSV Files.
- For more information about importing CSV files that contains gas component values, refer to Importing Gas Component CSV Files.
- Never modify the names or the order of the Gas Components in an exported CSV file.

To export gas component CSV files:

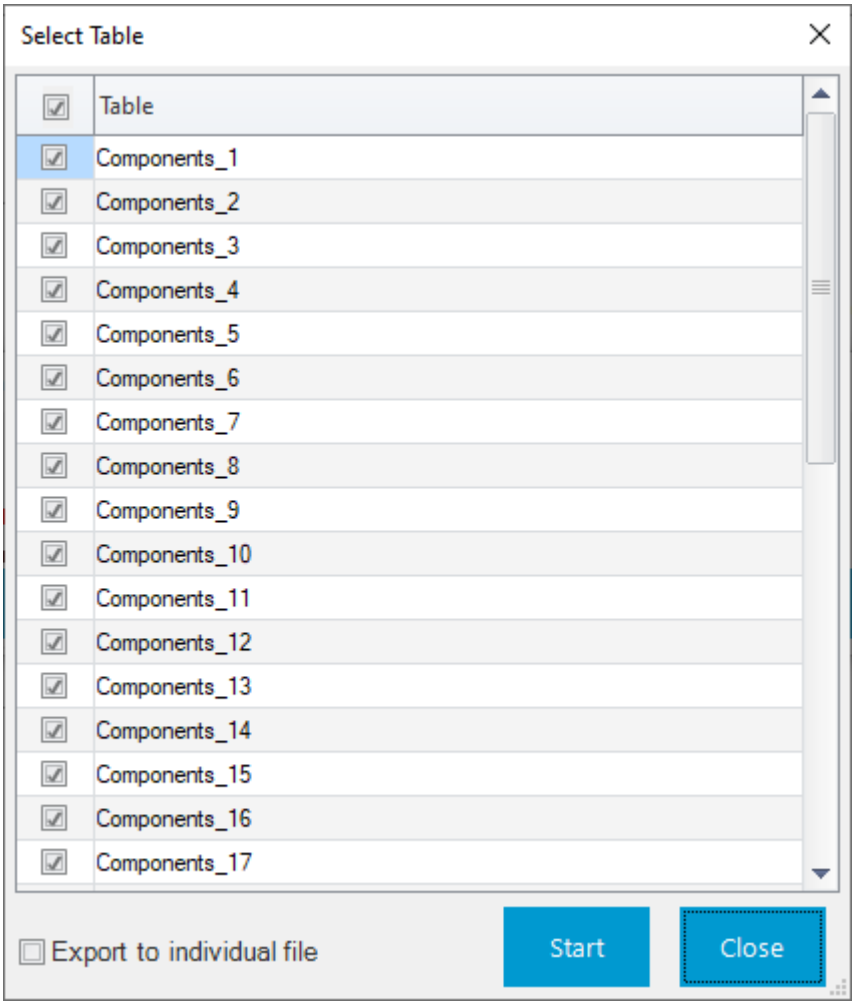
1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Components display opens.
2. Select the **Components** button. The Component – Components pop-up display opens.
3. Select the **Component Import Export** button. The Gas Component Import Export pop-up display opens.

**Figure 200. Gas Component Import Export**




4. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 201. Select Table**



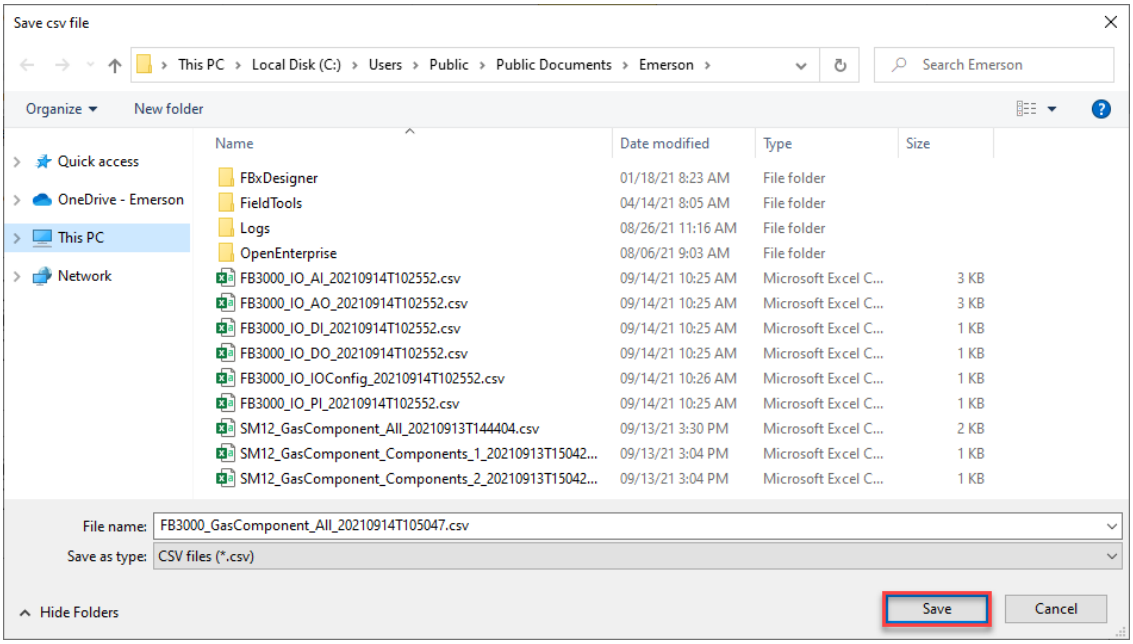

5. Place a check mark next to each Components instance you want to export.

**Note**

By default, the FB Series device exports all Components instances to a single CSV file. Place a check mark next to **Export to individual file** to export separate CSV files for each selected Components instance.

6. Select **Start**. A Save csv file windows opens.

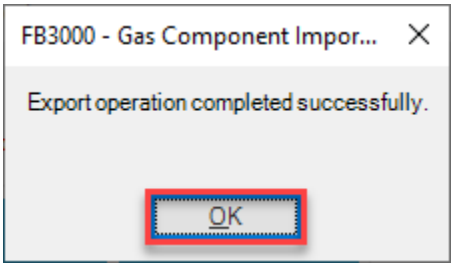
**Figure 202. Save csv file**




7. Navigate to the folder where the Gas Component CSV files will be saved and select **Save** to begin the export process.

8. When the process completes, a confirmation dialog opens. Select **OK**.

**Figure 203. Confirmation**



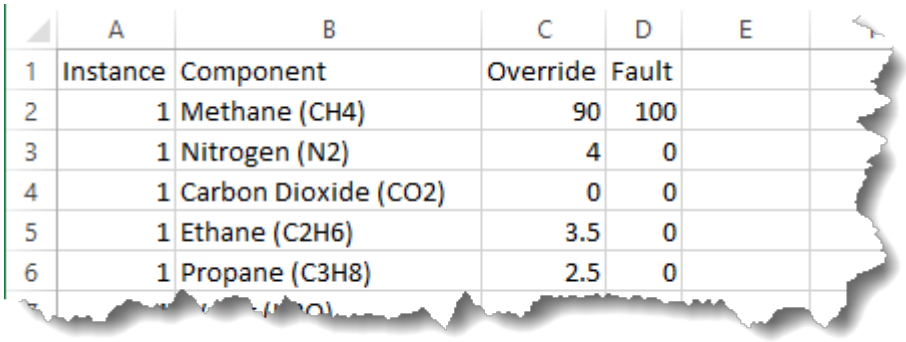

## 4.12.3.3 Creating a Gas Composition CSV File

You can create CSV files that contain your gas component values on your computer and then import the CSV files for use in the FB Series product. If your gas components configuration contains a large number of instances, it may be easier to create CSV files on your computer than it is to configure each Components instance individually in DeltaV FBxConnect. You can create either one CSV file that contains information about all Components instances or separate CSV files for each instance.

**Note**

- The system automatically corrects for incorrect capitalization in the created gas components CSV files. This means you can enter **methane (ch4)** and the system automatically corrects the entry to **Methane (CH4)**.
- The easiest way to begin creating a custom map is to export gas component CSV files that contain the current values and then edit that file. For more information about exporting a Gas Component CSV files, refer to Exporting Gas Component CSV Files.

**Figure 204. Example Gas Component CSV Format**



| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Instance | Component | Override | Fault | |
| 2 | 1 | Methane (CH4) | 90 | 100 | |
| 3 | 1 | Nitrogen (N2) | 4 | 0 | |
| 4 | 1 | Carbon Dioxide (CO2) | 0 | 0 | |
| 5 | 1 | Ethane (C2H6) | 3.5 | 0 | |
| 6 | 1 | Propane (C3H8) | 2.5 | 0 | |

To create CSV files that contain gas component values:

1. Open a blank spreadsheet (or open a previously exported gas component CSV file).
2. Review – and change as necessary – the values for each CSV file according to the tables below:

| Field | Description |
|---|---|
| **Instance** | Enter the Components instance number in the rows below this column. Possible Values are 1 through 36.<br>**Note**<br>You can include multiple instances in a single CSV file or create separate CSV files for each instance. |

| Field | Description |
|---|---|
| **Component** | Enter the name for each component to include in your gas composition. You are not required to enter every possible component, but the names **must** match the list below. Possible options are:<br>• Methane (CH4)<br>• Nitrogen (N2)<br>• Carbon Dioxide (CO2)<br>• Ethane (C2H6)<br>• Propane (C3H8)<br>• Hydrogen Sulfide (H2S)<br>• Hydrogen (H2)<br>• Carbon Monoxide (CO)<br>• Oxygen (O2)<br>• i-Butane (C4H10)<br>• n-Butane (C4H10)<br>• i-Pentane (C5H12)<br>• n-Pentane (C5H12)<br>• n-Hexane (C6H14)<br>• n-Heptane (C7H16)<br>• n-Octane (C8H18)<br>• n-Nonane (C9H20)<br>• n-Decane (C10H22)<br>• Helium (He)<br>• Argon (Ar)<br>• Neopentane (C5H12)<br>• Benzene (C6H6)<br>• Toluene (C7H8) |
| **Override** | Enter the mole percent of each fluid component (as a percentage) to use in calculations when **Override** is selected in the **Operation** field on the Components – General tab. |
| **Fault** | Enter the mole percent of each fluid component (as a percentage) to use in calculations when **Fault** is selected in the **Fault Mode** field on the Components – General tab and a fault occurs. |

3. Save your changes. You can now import your gas component CSV files for use in your FB Series product. For more information, refer to Importing Gas Component CSV Files.

**Note**

Make sure to save the file with a **.csv** file extension.

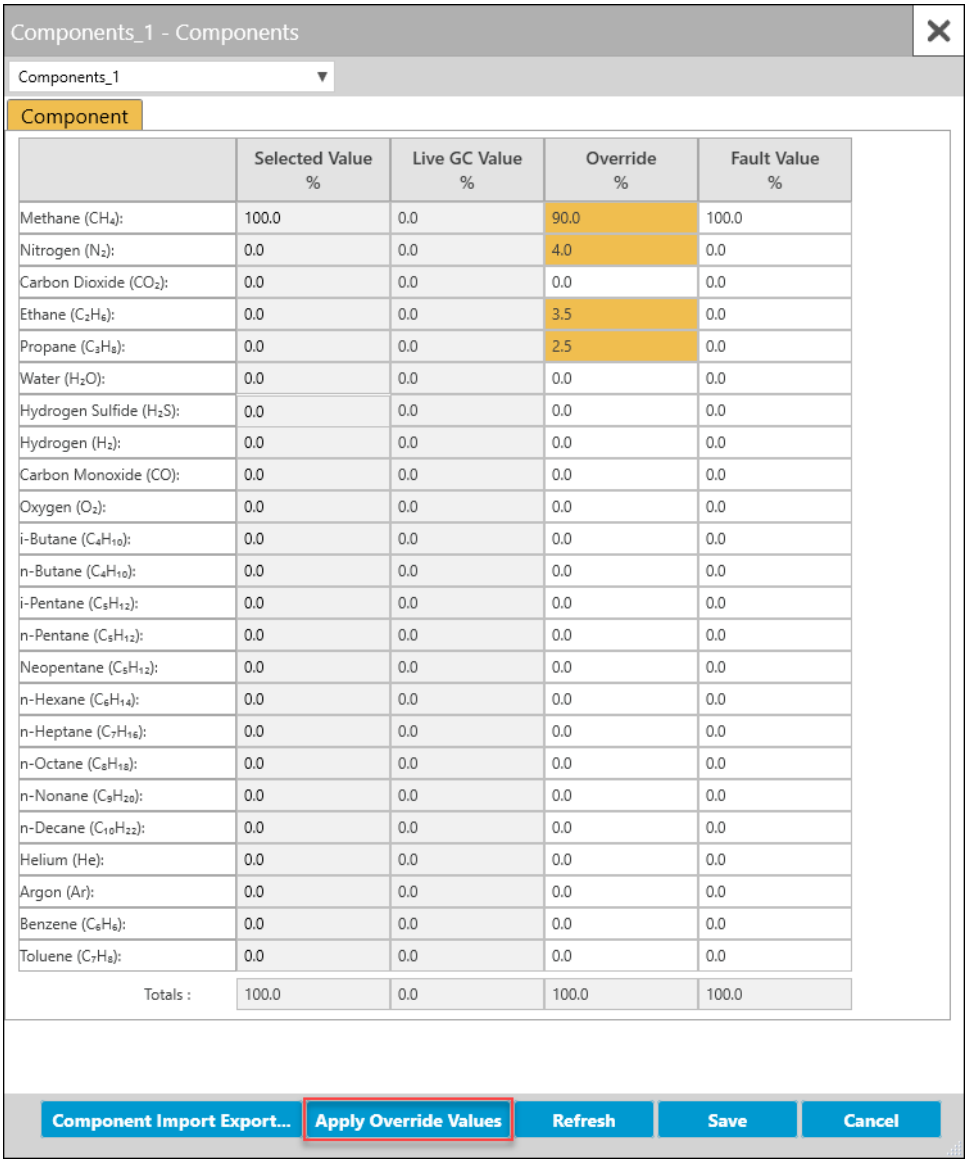
### 4.12.4 Apply Override Values

Use this display to manually set mole percentages of each fluid component.

To manually apply composition values:

1. Select **Configure > Gas > Components** from the DeltaV FBxConnect configuration software main menu. The Components display opens showing the General tab.
2. Click ▼ in the drop-down list at the top of the display and select the Components instance you wish to configure.
3. Select the **Components** button. The Component – Components pop-up display opens.

**Figure 205. Apply Override Values**



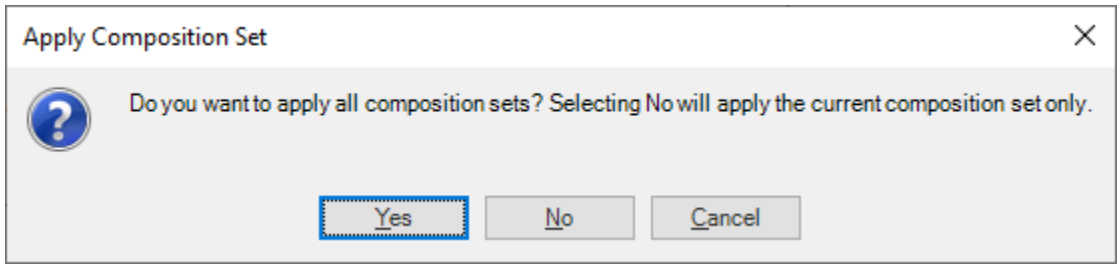

4. Enter the mole percent of each fluid component.

5. Once you have reviewed the override composition set and verified that the composition adds up to 100%, select **Apply Override Values** to put the new Override composition into use. A confirmation dialog opens:

**Note**

**When remotely updating components via Modbus**, you need to map the **Apply Override Values** button to a map table register and write a value of 1 to that register before the changes take effect.

**Figure 206. Apply Composition Set**




6. Select one of the following three options on the confirmation dialog:
   - Select **Yes** to apply the composition changes to **all** Components instances.
   - Select **No** to apply the composition changes to the currently selected Components instance **only**.
   - Select **Cancel** to close the dialog without applying composition changes to any Components instance.

## 4.13 Liquid Linear Meter

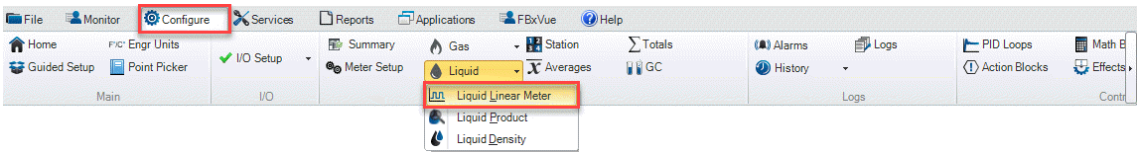
Use this display to configure liquid linear meters in the DeltaV FB3000.

**Note**

- You **must** configure at least one Liquid Linear Meter on the Meter Setup display before you can access this display.
- The system uses different calculations based on three possible configurations. Refer to Liquid Linear Meter Calculations for a list of flow calculations used with different configurations.

To access this display, select **Configure > Liquid > Liquid Linear Meter**.

**Figure 207. Configure – Liquid Linear Meter**




The Liquid Linear Meter display contains the following items:

**Note**

The available pop-up displays vary based on your selection in the **Crude Oil Options** field on the Station – General display.

General – Use this display to define basic parameters for liquid linear meters. The General tab opens when you first access the Liquid Linear Configuration display.

Liquid Factor Reference – Use this display to configure liquid factors.

Advanced – Use this pop-up display to configure advanced properties for liquid linear meters, including meter factor and K-factor.

Diagnostics – Use this pop-up display to view **read-only** diagnostic information for liquid linear meters, including calculated values and alarm codes.

Rates and Totals – Use this pop-up display to view **read-only** flow rates and accumulations for liquid linear meters.

Water – Use this pop-up display to configure correction options for sediment in water present in the selected liquid linear meter.

Liquid Factors – Use this pop-up display to configure a single meter factor for each liquid product flowing through the selected liquid meter.

Volume Correction – Use this pop-up display to configure temperature and pressure volume correction options for the selected liquid linear meter.

Additional Factors – Use this pop-up display to configure additional properties for the fluid flowing through the meter, including NGL, shrinkage, and flash gas factors.

## 4.13.1 Liquid Linear Meter Flow Calculations

**Error! Bookmark not defined.**You can configure liquid linear meters a number of different ways based on your specific application. The system uses different flow calculations based on three possible configurations:

| Use-Case | Description |
|---|---|
| **Crude Oil Custody Transfer** | For custody transfer applications:<br>Select **Crude Oil** in the **Liquid Product Type** field on the Liquid Product display and select **API Ch. 12.2** in the **Crude Oil Options** field on the Station – General display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>• GSV = GV * CTL * CPL<br>• NSV = GSV * (1 – SW / 100)<br>• S&W = GSV * SW / 100<br>• Mass (Turbine Meter) = GV * Meter Density<br>• Mass (Coriolis Meter) = IQ * MF |
| **Crude Oil Allocation – Low Water** | For Crude Oil Allocation – Low Water applications:<br>Select **Crude Oil** in the **Liquid Product Type** field on the Liquid Product display, and select both **API Ch. 20.1** and **Use Oil Correction for Water** in the **Crude Oil Options** fields on the Station – General display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>When SF applied to gross standard volume:<br>• GSV = GV * SF * CTL * CPL<br>• NSV = GSV * (1 – SW / 100)<br>When SF applied to net standard volume:<br>• GSV = GV * CTL * CPL<br>• NSV = GSV * (1 – SW/100) * SF<br>• S&W = GSV * SW / 100 |

| Use-Case | Description |
|---|---|
| | • Mass (Turbine Meter) = GV * Meter Density<br>• Mass (Coriolis Meter) = IQ * MF |
| **Crude Oil Allocation – High Water** | For Crude Oil Allocation – High Water applications:<br>Select **Crude Oil** in the **Liquid Product Type** field on the Liquid Product display, and select both **API Ch. 20.1** and **Use Separate Correction Factor for Water** in the **Crude Oil Options** field on the Station – General display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>• $GV_{Oil}$ = GV * (1 – Xw)<br>• $GSV_{Oil}$ = $GV_{Oil}$ * SF<br>• $GV_{Water}$ = GV * Xw<br>• $GSV_{Water}$ = $GV_{Water}$ * CTL<br>• FGN = $GSV_{Oil}$ * FGF<br>• NGL = $GSV_{Oil}$ * NGLF |
| **Refined Products / Lubricating Oil** | For Refined Products/Lubricating Oil applications:<br>Select **Refined Products / Lubricating Oil** in the **Liquid Product Type** field on the Liquid Product display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>• GSV = GV * CTL * CPL<br>• Mass (Turbine Meter) = GV * Meter Density<br>• Mass (Coriolis Meter) = IQ * MF |

| Use-Case | Description |
|---|---|
| **Light Hydrocarbon** | For Light Hydrocarbon applications:<br>Select **Light Hydrocarbon** in the **Liquid Product Type** field on the Liquid Product display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>• GSV = GV * CTL * CPL<br>• Mass (Turbine Meter) = GV * Meter Density<br>• Mass (Coriolis Meter) = IQ * MF |
| **Additional Fluid** | For applications of other fluids with a measured Flowing Density and known Base Density:<br>Select **Additional Fluid** in the **Liquid Product Type** field on the Liquid Product display.<br>**Calculations**<br>• IQ = Pulses / K-Factor<br>• GV (Turbine Meter) = IQ * MF<br>• GV (Coriolis Meter) = IQ * MF / Meter Density<br>• CTPL = Meter Density / Base Density<br>• GSV = GV * CTPL<br>• Mass (Turbine Meter) = GV * Meter Density<br>• Mass (Coriolis Meter) = IQ * MF |
| **Where:**<br>CTL = Correction for the effect of temperature on the liquid<br>CPL = Correction for the effect of pressure on the liquid<br>FGF = Flash Gas Factor<br>FGN = Flash Gas Volume<br>GV = Gross Volume<br>GSV = Gross Std Volume<br>IQ = Indicated Quantity | |

| Use-Case | Description |
|---|---|
| MF = Meter Factor | |
| NGL = Natural Gas Liquids Volume | |
| NGLF = Natural Gas Liquids Factor | |
| NSV = Net Standard Volume | |
| SF = Shrinkage Factor | |
| SW = Sediment and Water Percent | |
| S&W = Sediment and Water Volume | |
| Xw = Water Cut | |

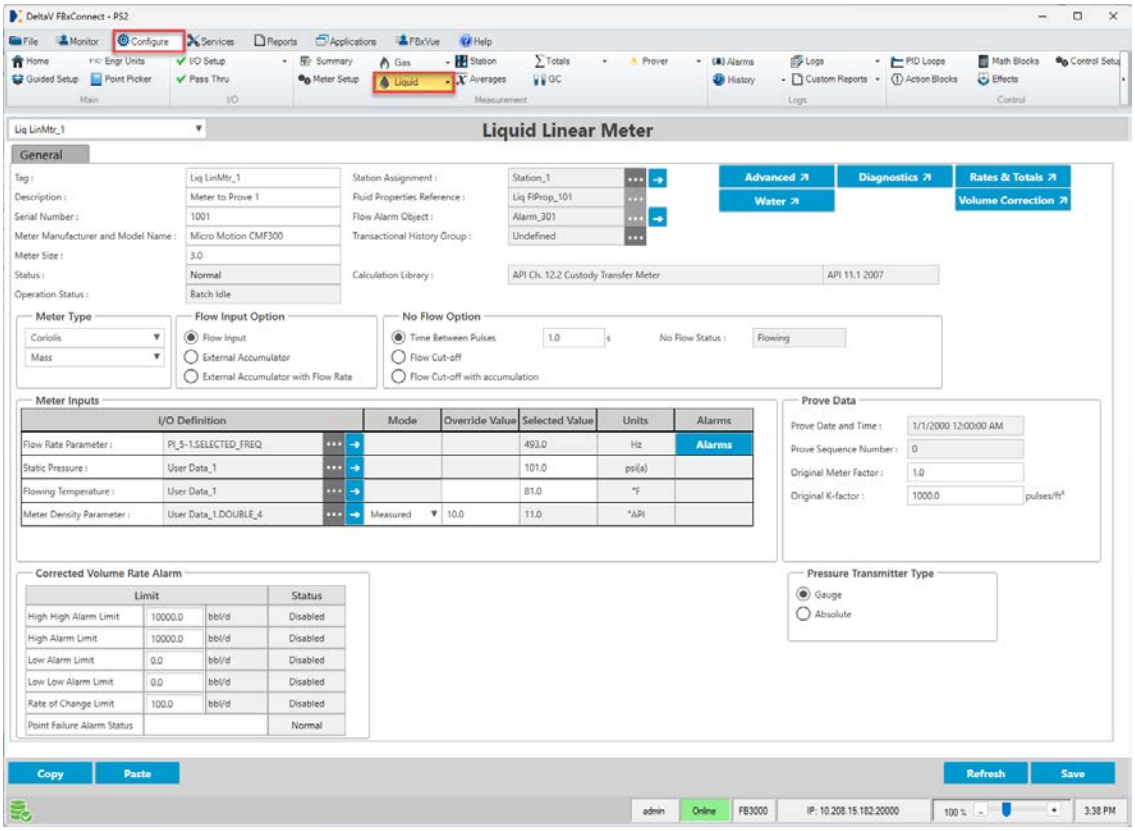
## 4.13.2 Liquid Linear Meter – General

Use this tab to define basic parameters for liquid linear meters.

To access this display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu. The Liquid Linear Meter display opens.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.

**Figure 208. Liquid Linear Meter– General**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected meter. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected meter. |
| **Serial Number** | Enter a description (up to 20-alphanumeric characters) for the serial number or other identifier of the selected meter. |
| **Meter Manufacturer and Model Name** | Sets a description (up to 20-alphanumeric characters) that further identifies or provides information about this meter, such as the model name or number. |

| Field | Description | |
|---|---|---|
| **Meter Size** | Enter the size of the meter.<br>**Note**<br>The system **does not** use this value in any calculations, but you can use it for reports. | |
| **Status** | This **read-only** field indicates the overall health of the selected meter. Possible values are: | |
| | **Normal** | Indicates the meter is **not** in an alarm, failure, or override condition. |
| | **In alarm** | Indicates an active flow rate, I/O, property calculation, or flow calculation alarm. |
| | **Failure** | Indicates a point fail on a meter input that is used in flow calculations or a severe calculation error that prevented calculations from continuing. |
| | **Override** | Indicates a meter input that is used in flow calculations in override mode that is not typically in override. |
| | **Note**<br>The status is based on the health of the uncorrected volume, corrected volume, and mass of the meter. You can configure which parameters determine the health of the meter in the **Fault Health Configuration** field on the Station – Advanced display.<br>The associated parameter (OBJ_STATUS) is a 32-bit binary value, where individual bits have different meaning. We currently use 3 bits. Starting from LSB (Least Significant Bit), Bit 1 represents “In Alarm,” Bit 2 represents “Failure,” and Bit 3 represents “Override.” When viewing this parameter via a host system, the value is represented as a decimal number. For example, a value of 0 means no bits are set and the meter status is Normal. A value of 1 means the meter status is In Alarm. A value of 2 means the meter status is Failure. A value of 4 means the meter status is Override. A value of 7 means Bits 1, 2, and 3 are all set, and the meter status is In Alarm, Failure, and Override. | |

| Field | Description |
|---|---|
| **Operation Status** | This **read-only** field shows the current state of the batch. Possible values are Batch Idle or Batch Active.<br>**Note**<br>• This field applies **only** for Stations with a **Fluid Type** of **Liquid**.<br>• For more information about starting or stopping a batch, refer to the Station – Batching display. |
| **Station Assignment** | Click ••• to open a Point Picker dialog and select the station to which this meter belongs.<br>**Note**<br>• After selecting a Station, click → to open the **Station** configuration display.<br>• Stations measuring different fluid types are hidden in the Point Picker.<br>• Gas meters and liquid meters **cannot** belong to the same station. If you assign a gas meter to a liquid station or a liquid meter to a gas station, a Flow Calculation alarm is raised. |
| **Fluid Properties Reference** | This **read-only** field shows the fluid properties instance currently assigned to the selected meter. |
| **Flow Alarm Object** | This **read-only** field shows the alarm instance currently assigned to the selected meter. |
| **Transactional History Group** | Click ••• to open a Point Picker dialog and select the transaction history group to use for the selected instance.<br>**Note**<br>You **must** enable Transaction History on the History – Advanced Setup display **before** you can select a Transaction History group. |
| **Liquid Factor Reference** | This **read-only** field shows the liquid factor instance currently assigned to the selected meter. Click → to open the Liquid Factor Reference display.<br>**Note**<br>This field shows **only** for the first 12 instances of the liquid linear meters. |

| Field | Description |
|---|---|
| **Calculation Library** | These **read-only** fields show the flow and property calculation methodologies used to calculate the liquid flow rates and quantities for the selected meter. The flow calculation is shown in the left-hand field, and the property calculation is shown in the right-hand field.<br>**Note**<br>• For crude oil, the flow calculation shown is determined at the station level by your selection in the **Crude Oil Options** fields on the Station – General display. For all other liquid products, the flow calculation will use API Ch. 12.2 Custody Transfer Meter flow calculations.<br>• For crude oil, the property calculation shown is determined at the station level by your selection in the **Crude Oil Options** field on the Station – General display. For all other liquid products, the property calculation shown is determined by the liquid product type selection on the Liquid Product display. |
| **API Ch. 12.2 Custody Transfer Meter** | This meter uses API Ch. 12.2 for liquid measurement. This standard is typically used for custody transfer but can also be utilized for crude oil allocation applications. For crude oil, the standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes. The same calculation is used for refined products and lubricating oils with % water set to 0.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, gross standard volume, net standard volume, water volume, and mass. CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6.<br>**Note** |

| Field | Description | |
|---|---|---|
| | | CTL, CPL, CCF, and Meter Factor (MF) are rounded as per API Ch. 12.2 Table 6. The associated Station provides flow rates and accumulations representing gross volume, net standard volume, water volume, and mass. |
| | **API Ch. 20.1 Procedure A (Oil Correction Factor Used for Water)** | This meter uses API Ch. 20.1 Procedure A for oil measurement. The standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes. API Ch. 20.1 (2016) suggests using this method when the sediment and water is generally **less** than 5.0 percent.<br>The meter calculates the same quantities as the API Ch. 12.2 Custody Transfer Meter, but a shrinkage factor is applied to the gross standard volume. If the shrinkage factor includes a correction for temperature, the CTL should be set to override mode with a value of 1.0, otherwise it should be set to calculated mode. If pressure correction is included in the SF or pressure correction is not required, CPL should be set to override mode at 1.0, otherwise CPL should be set to calculated mode. CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6. The water fraction is calculated using the in-use CSW.<br>**Note**<br>CTL, CPL, CCF, and Meter Factor (MF) are rounded as per API Ch. 12.2 Table 6. Station quantity calculations are **not** supported for allocation meters. |

| Field | Description | |
|---|---|---|
| | **API Ch. 20.1 Procedure C (Separate Correction Factor Used for Water)** | This meter uses API Ch. 20.1 Procedure C for oil measurement. The oil and water have separate volume correction factors and are split before volume correction is applied. API Ch. 20.1 (2016) suggests using this method when the sediment and water is generally **greater** than 5.0 percent.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, oil unshrunk volume, net standard volume, water metered volume and water net volume. Additionally, a flash gas net volume and an NGL net volume may be calculated by entering an override flash gas factor and NGL factor.<br>The correction factor for the oil is entered via an override or external shrinkage factor (SF). The Shrinkage Factor is assumed to include any correction for shrinkage, temperature, and pressure. CTL, CPL, CTPL, CCF and CSW are assumed to be 1.0. The correction factor for water is calculated according to API Ch. 20.1 A.1 (2016).<br>**Note**<br>The flow calculation uses unrounded correction factors. Station quantity calculations are **not** supported for allocation meters. |
| | **API 11.1 2007** | This meter uses the 2007 version of the API / ASTM / IP Volume Correction tables. |

| Field | Description | |
|---|---|---|
| | **GPA 8217 / API 11.24** | This meter uses GPA 8217 / API 11.2.4 Volume Correction Tables (formerly GPA TP-27).<br>This method uses the following set of standards:<br>• **Temperature Correction** – GPA 8217 / API 11.2.4 Standard (2019) (formerly GPA TP-27)<br>• **Pressure Correction** – API 11.2.2 (1986) and API 11.1 (2007)<br>• **Equilibrium Pressure** – GPA 8117 / API 11.2.5 (2017) (formerly GPA TP-15) |
| | **Allocation Measurement** | This meter is configured for allocation measurement. For flow calculations, refer to the API Ch. 20.1 Procedure A (Oil Correction Factor Used for Water) description. For property calculations, refer to API Ch. 20.1 Procedure C (Separate Correction Factor Used for Water) description. |
| | **Additional Fluid** | This meter uses a ratio of the measured density to the base density to calculate volume correction.<br>**Note**<br>For more information, refer to the **Liquid Product Type** field on the Liquid Product display. |
| **Advanced** | Click this button to open the Liquid Linear Meter – Advanced pop-up display and configure advanced properties for the selected liquid linear meter, including meter factor and K-factor. | |
| **Diagnostics** | Click this button to open the Liquid Linear Meter – Diagnostics pop-up display and view read-only diagnostic information for the selected liquid linear meter, including calculated factors, calculated values, and alarm codes. | |
| **Rates & Totals** | Click this button to open the Liquid Linear Meter – Rates & Totals pop-up display and view read-only flow rates and accumulations for the selected liquid linear meter. | |

| Field | Description | |
|---|---|---|
| **Water** | Click this button to open the Liquid Linear Meter – Water pop-up display and configure correction options for sediment in water present in the selected liquid linear meter. | |
| **Liquid Factors** | Click this button to open the Liquid Linear Meter – Liquid Factors pop-up display and configure a single meter factor for each liquid product, on a per meter basis. | |
| **Volume Correction** | Click this button to open the Liquid Linear Meter – Volume Correction pop-up display and configure temperature and pressure volume correction options for the selected liquid linear meter. | |
| **Additional Factors** | Click this button to open the Liquid Linear Meter – Additional Factors pop-up display and configure additional properties for the fluid flowing through the meter, including NGL, shrinkage, and flash gas factors. | |
| **Meter Type** | Click ▼ to specify the type of liquid linear meter you are configuring. Possible options are: | |
| | **Turbine** | Select if measuring flow through a turbine meter or other linear meter with a frequency or analog signal representing actual volumetric flow rate. |
| | **Coriolis** | Select if measuring flow through a Coriolis meter or other linear meter with a frequency or analog signal representing a mass or volume flow rate.<br>**Note**<br>If you select Coriolis, a new field appears directly below. Click ▼ to specify if you are measuring mass or volume flow rate. |

| Field | Description | |
|---|---|---|
| | **Ultrasonic** | Select if measuring flow through an ultrasonic meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| | **Positive Displacement** | Select if measuring flow through a positive displacement meter. This meter type option performs the same flow calculations as the Turbine option, and this option is provided for equipment identification. CFX files generated by DeltaV FBxConnect configuration software include this option in the configuration section of the CFX file. |
| **Flow Input Option** | Sets how instantaneous flow rates and totals are calculated by the system. Possible options are: | |
| | **Flow Input Only** | Instantaneous flow rates and totals are determined by the selected Flow Rate Parameter. If the selected Flow Rate Parameter is associated with a pulse input object, the instantaneous flow rates are calculated from the frequency and the totals are calculated from the pulse accumulation. If the selected Flow Rate Parameter is associated with any other object type, the instantaneous flow rates are calculated from the selected parameter and the totals are calculated by integrating the instantaneous rates.<br>**Note**<br>An External Accumulator Parameter is **not** required. |
| | **External Accumulator Only** | Instantaneous flow rates and totals are determined by the selected External Accumulator Parameter. The instantaneous |

| Field | Description | |
|---|---|---|
| | | flow rates are calculated from the increment in the external accumulator value over time and the totals are calculated by summing the increments.<br>**Note**<br>A Flow Rate Parameter is **not** required. |
| | **External Accumulator with Flow Rate** | Instantaneous flow rates are calculated from the selected Flow Rate Parameter and totals are calculated from the selected External Accumulator Parameter.<br>**Note**<br>Both the Flow Rate Parameter and External Accumulator Parameter **must** be defined. |
| **No Flow Option** | Sets how the system calculates a "no flow" condition for the meter, and sets the calculated flow equal to zero. Possible options are: | |
| | **Time Between Pulses / Increments** | If the amount of time between pulses is greater than or equal to the time you enter in the text field, then system sets the calculated flow equal to zero.<br>**Note**<br>• This option is available **only** if you select a **pulse input** object in the **Indicated Flow** field.<br>• You **must** enter a time (in seconds) for the system to use in the text field.<br>• The label of this option changes based on your selection in the **Flow Input Option** field. If you select **Flow Input Only**, then the label shows **Time Between Pulses**. If you select **External Accumulator** or **External Accumulator with Flow Rate**, then the label shows **Time Between Increments**. |

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td></td><td>Flow Cut-off</td><td>If the value of the uncorrected volume or mass input is less than or equal to the value you enter in the text field, then the system sets the calculated flow rates equal to zero. Enter a value (in units based on the table below) for the system to use in the text field.
<table>
<tr><th>Indicated Flow Input Type</th><th>Meter Type</th><th>Unit Type</th></tr>
<tr><td rowspan="2">Pulse Input</td><td>Turbine</td><td>Hz</td></tr>
<tr><td>Coriolis</td><td>Hz</td></tr>
<tr><td rowspan="2">AI or User Data</td><td>Turbine</td><td>Volume Rate</td></tr>
<tr><td>Coriolis</td><td>Mass Rate</td></tr>
</table>
Note
<ul>
<li>You must enter a value (in the indicated units) in the text field for the system to use.</li>
<li>The lowest frequency the system can accurately measure is 1 divided by the PI Scan Period (configured on the Pulse Input display). Flow control may be erratic below this threshold.</li>
</ul></td></tr>
<tr><td></td><td>Flow Cut-off with accumulation</td><td>If the value of the uncorrected volume or mass input is less than or equal to the value you enter in the text field, then the system sets the calculated flow rates equal to zero, but any accumulations are still counted.
Note
<ul>
<li>You must enter a value (in the indicated units) in the text field for the system to use.</li>
<li>For details on the unit types used by different indicated flow input and meter</li>
</ul></td></tr>
</table>

| Field | Description | |
|---|---|---|
| | | types, refer to the table in the **Flow Cut-off** field description. |
| **No Flow Status** | This **read-only** field shows the current flowing status of the selected meter. | |
| **Flow Rate Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select a flow rate input to use for the selected meter. This field represents the Pulse Frequency for a Turbine or Coriolis meter type.<br>• PI object – RATE or SELECTED FREQUENCY<br>**Note**<br>A Pulse Input (PI) is **not** a valid selection for the Flow Rate Parameter if you select **External Accumulator with Flow Rate** in the Flow Input Option field.<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – Any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Selected Value** | This **read-only** field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description | |
|---|---|---|
| **Static Pressure** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the static pressure input to use for the selected meter.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>If you select an **AI object**, the firmware determines the pressure input type from the configurable Units Type selection that is associated with the selected analog input.<br>If you select a **User Data object**, you must indicate the pressure input type in the Pressure Transmitter Type field.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• Press object – SELECTED VALUE<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 2. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |

| Field | Description | |
|---|---|---|
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This **read-only** field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Flowing Temperature** | **I/O Definition** | Click ... to open a Point Picker dialog and select the flowing temperature input to use for the selected meter.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• RTD object – SELECTED VALUE |

| Field | Description | |
|---|---|---|
| | | • AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – DOUBLE FLOATING POINT 3. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field).<br>**Note**<br>This option is **not available** if you select a **User Data** object. |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**.<br>**Note**<br>This value is **not available** if you select a **User Data** object. |
| | **Selected Value** | This **read-only** field shows the value currently used in calculations based on the selected options. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description | |
|---|---|---|
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| **Meter Density Parameter** | **I/O Definition** | Click ... to open a Point Picker dialog and select the meter density input to use for the selected meter.<br>• AI object – SELECTED VALUE<br>**Note**<br>You **must** first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• FBxNData object – SELECTED DOUBLE. For more information, refer to FBxNet.<br>• HART object – PV SELECTED VALUE<br>• User Data – Any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | Click ▼ to set how the system acquires this value. Possible options are **Live** (the system uses the current value of the input) or **Override** (the system uses the value you set in the override field). |
| | **Override Value** | Sets the value to use in calculations when the **Mode** field is set to **Override**. |
| | **Selected Value** | This **read-only** field shows the value currently used in calculations based on the selected options. |

| Field | Description | |
|---|---|---|
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure – Alarms display for the User Data value. |
| | **Note**<br>This field appears **only** in certain configuration scenarios:<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **Crude Oil** (configured on the Liquid Product display), the Density Option is set to **Meter Observed Density**, and the Crude Oil Option is set to **API Ch. 12.2** or **API Ch. 20.1** with **Use Oil Correction Factor for Water**.<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **Crude Oil** (configured on the Liquid Product display), the Crude Oil Options is set to **API Ch. 20.1** and **Use Separate Correction Factor for Water**, and the Meter Type is set to **Coriolis**.<br>• If the selected meter is assigned to a Station where the Liquid Product Reference is configured with a Liquid Product Type set to **anything other than Crude Oil** (configured on the Liquid Product display) and the Density Option is set to **Meter Observed Density**. | |

| Field | Description | |
|---|---|---|
| **External Accumulator Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select a flow accumulator input to use for the selected meter. This field represents the accumulated volume for a turbine meter type or accumulated mass for a Coriolis meter type.<br>• FBxNData object – Any parameter. For more information, refer to FBxNet.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station.<br>• User Data – Any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Mode** | This selection is **not available**. |
| | **Override Value** | This selection is **not available**. |
| | **Selected Value** | This **read-only** field shows the current value of the external accumulator being read from the selected parameter. |
| | **Units** | This **read-only** field shows the shows the accumulator engineering units. |
| | **Alarms** | This selection is **not available**; however, you can configure an alarm object separately on the Configure – Alarms display for the selected parameter. |
| | **Note**<br>This field appears **only** if you select either **External Accumulator Only** or **External Accumulator with Flow Rate** in the Flow Input Option frame. | |

| Field | Description | |
|---|---|---|
| **Prove Data** | **Prove Date and Time** | This **read-only** field shows the date of the last successful prove for this meter. The Proving operation populates this field when you accept and transfer factors for a completed prove. |
| | **Prove Sequence Number** | This **read-only** field shows the sequence number of the last prove for this meter. The Proving operation populates this field when you accept and transfer factors for a completed prove. |
| | **Original Meter Factor** | Enter the Meter Factor from the initial installation and commissioning of the system. It provides an optional reference to compare against when performing liquid meter proving within the device. When a prove is successfully completed, the resulting meter factor must be within an acceptable user-configured variation from this original number before you can accept and transfer it into use. |
| | **Original K-factor** | Enter the K- factor from the initial installation and commissioning of the system. It provides an optional reference to compare against when performing liquid meter proving within the device. When a prove is successfully completed, the resulting K-factor must be within an acceptable user-configured variation from this original number before you can accept and transfer it into use. |
| | **Note**<br>These fields show **only** if you select **Proving Enabled** on the Meter Setup display. | |
| **Corrected Volume Rate Alarm** | Sets the rate alarm limits for the corrected flow rate, and shows the status of each alarm. Possible statuses are:<br>• **Normal** – The alarm is enabled and is not in an alarm condition.<br>• **Disabled** – The alarm has been disabled.<br>• **In Alarm** – The alarm is enabled and is in an alarm condition. | |

| Field | Description | |
|---|---|---|
| **External Accumulator** | Indicates the rollover value and maximum flow rate for the accumulator. | |
| | **External Accumulator Rollover** | Value at which the external accumulator will reset to 0. Set the value to 0 if the external accumulator does not rollover or the rollover value is unknown. |
| | **Maximum Indicated Quantity Flow Rate** | Maximum rate the physical meter run was designed to measure. This is used as an integrity check against the accumulator increment. Set the value to 0 if this integrity check is not required. |
| **Pressure Transmitter Type** | Indicates the type of static pressure transmitter (absolute or gauge) configured for the selected meter.<br>**Note**<br>This field appears **only** if you select an **FBxNData**, **HART**, or **User Data** instance in the **Static Pressure Object I/O Definition** field. | |

4. Select **Save** to save your changes if you modify any of the fields on this display.

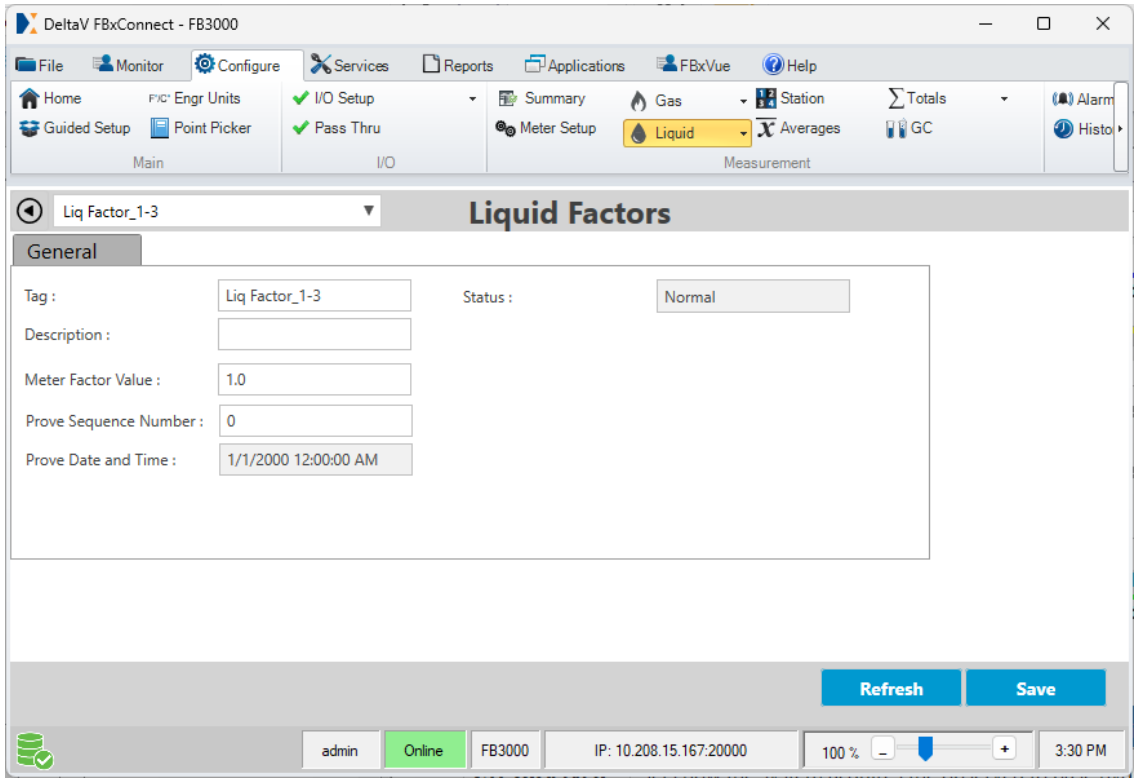
## 4.13.3 Liquid Linear Meter – Liquid Factor Reference

Use this pop-up display to configure liquid factors.

To access this display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the → button. The Liquid Linear Meter – Liquid Factor Reference display opens.

**Figure 209. Liquid Linear Meter – Liquid Factor Reference**




4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected liquid factor instance. |
| **Description** | Sets an identifier (up to 20-alphanumeric characters) for the selected liquid factor instance. |
| **Meter Factor Value** | Sets the value of the meter factor for this product on the indicated meter. |
| **Prove Sequence Number** | Enter the prove sequence identifier for this meter factor for the selected meter. |
| **Prove Date and Time** | This **read-only** field shows the time and date stamp of the last successful prove for this meter flowing this product. |
| **Status** | This **read-only** field shows the current status of the selected liquid factor. |

5. Select **Save** to save your changes if you modify any of the fields on this display.

6. Select  to return to the previous display.

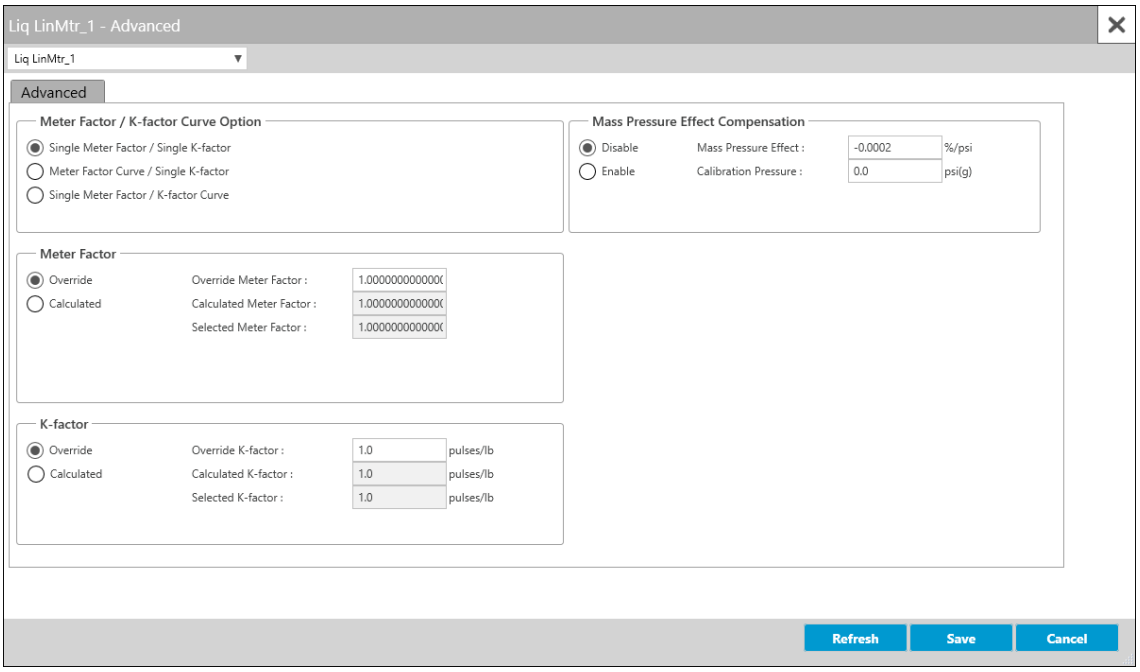
## 4.13.4 Liquid Linear Meter – Advanced

Use this pop-up display to configure advanced properties for the selected liquid linear meter, including meter factor and K-factor.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The Liquid Linear Meter – Advanced pop-up display opens.

**Figure 210. Liquid Linear Meter – Advanced**



4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Meter Factor / K-factor Curve Option** | Sets how system uses K-factors or Meter Factors in the flow calculation. Possible options are:<br>**Note**<br>• These fields show **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display.<br>• These fields **do not** show if you select either **Meter Factor Multiple** or **K-factor Multiple** in the **Batch Retro Calcs Option** field on the Meter Setup display. | |
| | **Single Meter Factor / Single K-factor** | Uses a single Meter Factor and a single K-factor for the meter. This is the simplest choice and means that a value for the meter factor and a value for the K-factor are fixed for all flow rates and the values are taken from the last prove or an entered value. Select this option when using either the K-factor or meter factor proving, as long as neither the K-factor or meter factor will vary with flow rate or product. |
| | **Meter Factor Curve / Single K-factor** | A meter factor calculates for the current flow rate based on a linear interpolation of the meter factor versus flow rate values entered under the Factor Curve heading, but the K-factor will be fixed. Select this option when using meter factor proving if proving is done at multiple flow rates. |
| | **Single Meter Factor / K-factor Curve** | A K-factor calculates for the current flow input frequency based on a linear interpolation of the meter factor versus frequency values entered under the Factor Curve, but the meter factor will be a single value from the last prove or entered value. The K-factor curve can come from multiple proves at different flow rates with a meter factor of 1.0 (K-factor proving) or the K-factor curve can come from factory calibration and a single meter factor from a prove (meter factor proving). |

| Field | Description |
|---|---|
| **Curve Setup** | Click to open the Curve Setup dialog and configure the meter factor/K-factor curve. For more information, refer to Curve Setup (Liquid Linear Meter).<br>**Note**<br>• This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display.<br>• This field shows **only** if you select either **Meter Factor Curve / Single K-factor** or **Single Meter Factor / K-factor Curve** in the **Meter Factor / K-factor Curve Option** field. |
| **Meter Factor** | Sets how the system obtains the meter factor value used in calculations. Possible options are:<br>**Note**<br>This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display.<br>**Override** — The system uses the value set in the **Override Meter Factor** field for the meter factor value.<br>**Calculate** — The system calculates a value for the meter factor. |
| **Override Meter Factor** | Sets the meter factor value to use in calculations when you select **Override** in the **Meter Factor** field.<br>**Note**<br>This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display. |
| **Calculated Meter Factor** | This **read-only** field shows the meter factor value as calculated by the system.<br>**Note**<br>• This value is used by the system when you select **Calculated** in the **Meter factor** field.<br>• This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display. |
| **Selected Meter Factor** | This **read-only** field shows the meter factor currently used in calculations based on the selected options. |

| Field | Description |
|---|---|
| **Selected Meter Factor from Product Table** | Click → to open the Liquid Linear Meter – Liquid Factors display and configure a single meter factor for each liquid product flowing through the selected liquid meter.<br>**Note**<br>This field shows **only** if you select **Per Product Single MF** in the **Product Table Option** field on the Meter Setup display. |
| **K-factor** | Sets how the system obtains the K-factor value used in calculations. Possible options are:<br>**Note**<br>This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display.<br>**Override** — The system uses the value set in the **Override K-factor** field for the K-factor value.<br>**Calculated** — The system calculates a value for the K-factor. |
| **Override K-factor** | Sets the discharge coefficient value to use in calculations when you select **Override** in the **K-factor** field. |
| **Calculated K-factor** | This **read-only** field shows the discharge coefficient value as calculated by the system.<br>**Note**<br>• This value is used by the system when you select **Calculated** in the **K-factor** field.<br>• This field shows **only** if you select **Per Meter** in the **Product Table Option** field on the Meter Setup display. |
| **Selected K-factor** | This **read-only** field shows the K-factor currently used in calculations based on the selected options. |
| **Mass Pressure Effect Compensation** | This option allows for the compensation for the effects of high pressure on the accuracy of the meter mass flow rate and accumulation. This may be necessary in applications where the operating pressure is significantly different from the meter's calibration pressure.<br>**Note**<br>This field appears **only** if you select **Coriolis** as the **Meter Type** on the Liquid Linear Meter – General display. |

| Field | Description | |
|---|---|---|
| | **Enable** | The system compensates for the effects of pressure on accuracy.<br>**Note**<br>You must enter a value in the **Mass Pressure Effect** and **Calibration Pressure** fields. |
| | **Disable** | The system **does not** compensate for the effects of pressure on accuracy. |
| **Mass Pressure Effect** | Enter a value (in units of per psi or per bar) to be used when performing mass pressure effect compensation.<br>**Note**<br>• This value is supplied by the manufacture of the mass meter and is typically a small negative number.<br>• This field appears **only** if you select **Coriolis** as the **Meter Type** on the Liquid Linear Meter – General display. | |
| **Calibration Pressure** | Sets the pressure (in units of gauge psi or bar) of the mass meter as calibrated.<br>**Note**<br>• This value is supplied by the manufacture of the mass meter and is typically a small negative number.<br>• This field appears **only** if you select **Coriolis** as the **Meter Type** on the Liquid Linear Meter – General display. | |

5. Select **Save** to save your changes if you modify any of the fields on this display.

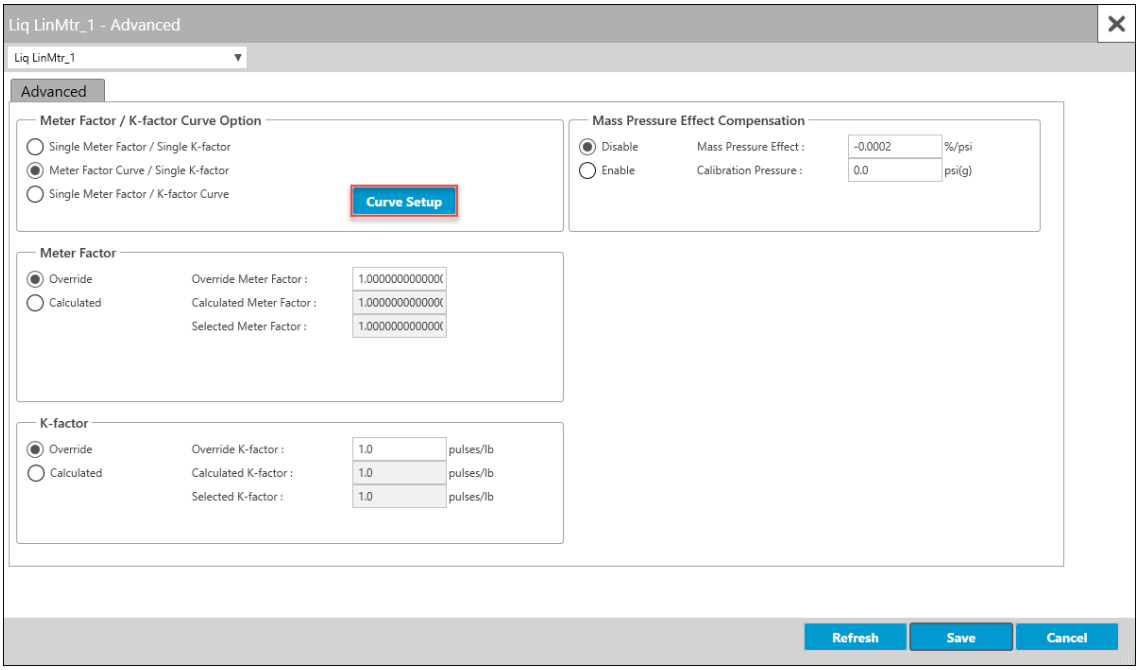
### 4.13.4.1 Curve Setup (Liquid Linear Meter)

Use this option to enter a meter factor curve or K-factor curve.

To access this option:

1. Select **Configure > Liquid > Liquid Linear Meter**. The Liquid Linear Meter display opens showing the General tab.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.
3. Select the **Advanced** button. The Liquid Linear Meter – Advance pop-up display opens.

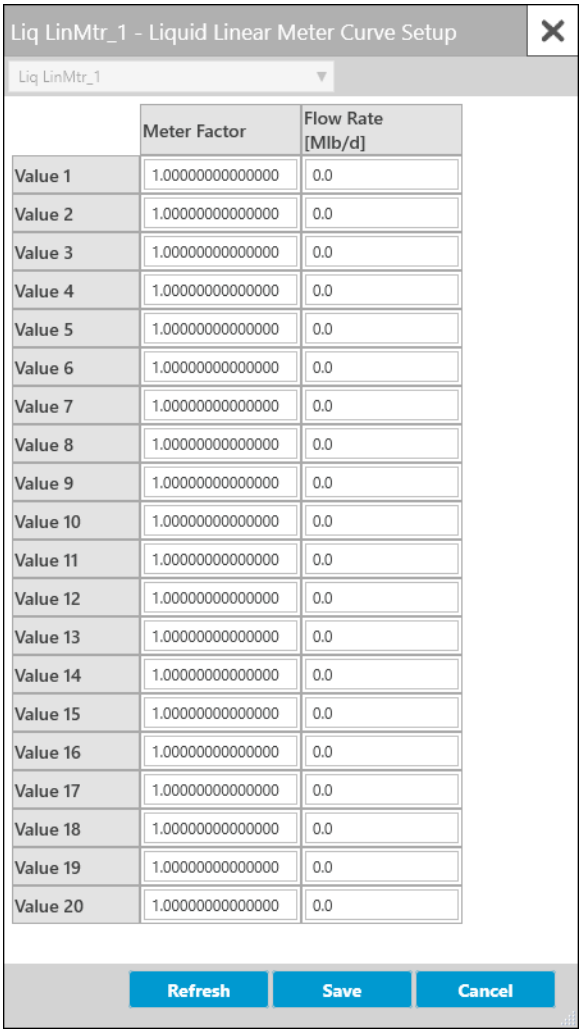
**Figure 211. Liquid Linear Meter – Advanced**




4. Select either **Meter Factor Curve / Single K-factor** or **Single Meter Factor / K-factor Curve** in the Meter Factor / K-factor Curve Option frame and **Save** your changes.

5. Select the **Curve Setup** button. The Curve Setup pop-up display opens.

**Figure 212. Curve Setup**




6. If you selected **Meter Factor Curve / Single K-factor** on the previous display, enter up to 20 points on the curve (pairs of meter factor and flow rate) and a meter factor is calculated for use in the flow equation by linear interpolation of the current indicated quantity flow rate. If you selected **Single Meter Factor / K-factor Curve** on the previous display, enter up to 20 points on the curve (pairs of K-factor and frequency) and a K-factor is calculated for use in the flow equation by linear interpolation of the current flow meter input frequency.

### Note

A valid point **must** have a flow rate/frequency greater than zero and a factor greater than zero. The points may be entered in any order and will be internally sorted by flow rate (MF curve) or frequency (K-Factor Curve), discarding any invalid points. No extrapolation is

done beyond the lowest and highest points on the curve. If the flow rate/frequency is less than the lowest point on the curve, the calculated factor will be the factor for the lowest point on the curve. If the flow rate/frequency is greater than the highest point on the curve, the calculated factor will be the factor for the highest point on the curve. If there are no valid points, then a default factor of 1.0 is used.

7. Select **Save** to save any changes you make to this pop-up display.

## 4.13.5 Liquid Linear Meter – Diagnostics

Use this pop-up display to view **read-only** diagnostic information for the selected liquid linear meter, including calculated factors, calculated values, and alarm codes.

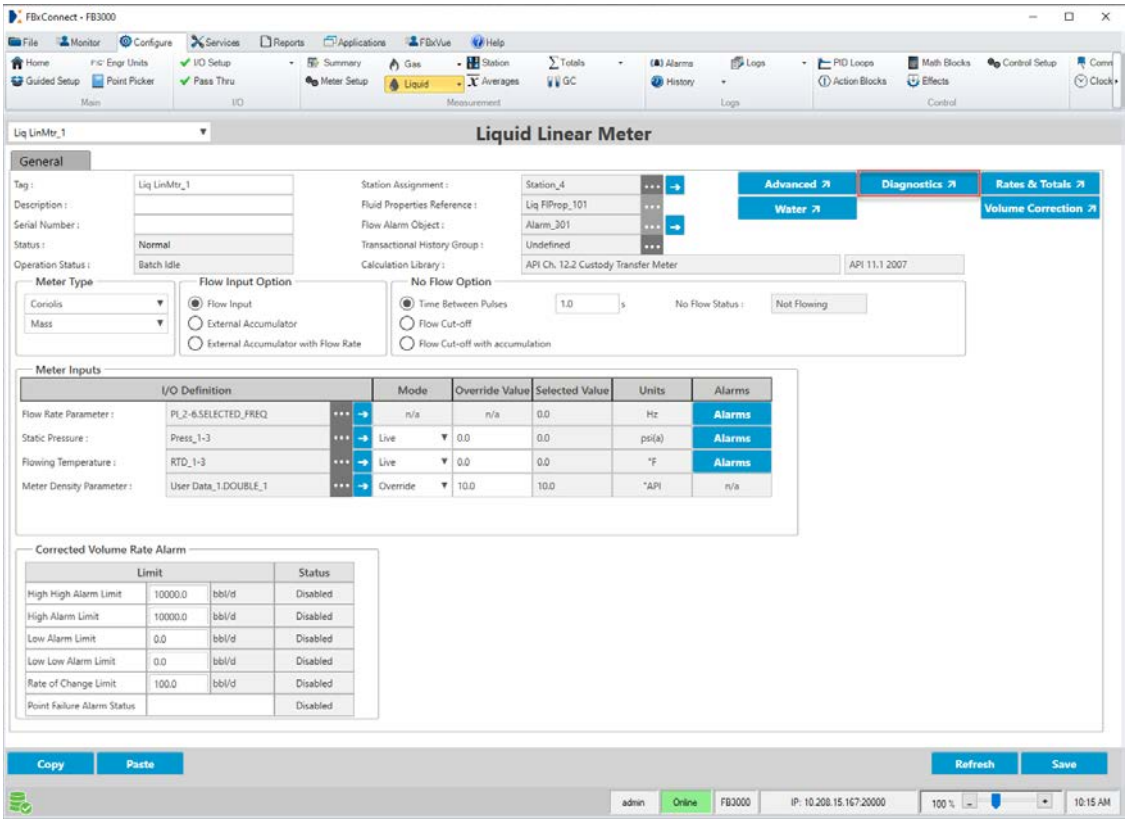
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- Physically impossible inputs may be clamped at a high or low limit value in order to ensure reasonable results. If a value is clamped at a high or low limit, a corresponding flow or property alarm is raised.

To access this display:

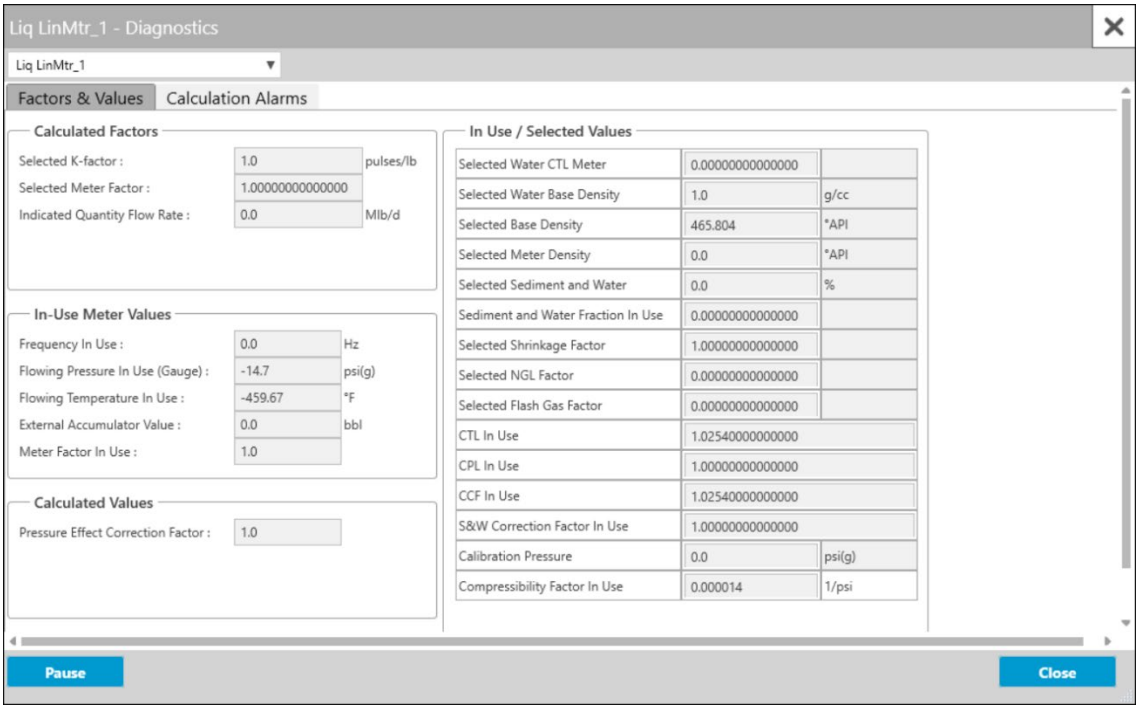
1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.

**Figure 213. Liquid Linear Meter – Diagnostics Button**




3. Select the **Diagnostics** button. The Liquid Linear Meter Diagnostics display opens showing the Factors and Values tab.

**Figure 214. Liquid Linear Meter Diagnostics**




The Liquid Linear Meter Diagnostics display contains the following tabs:

Factors and Values – This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

Calculation Alarms – This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with the meter.

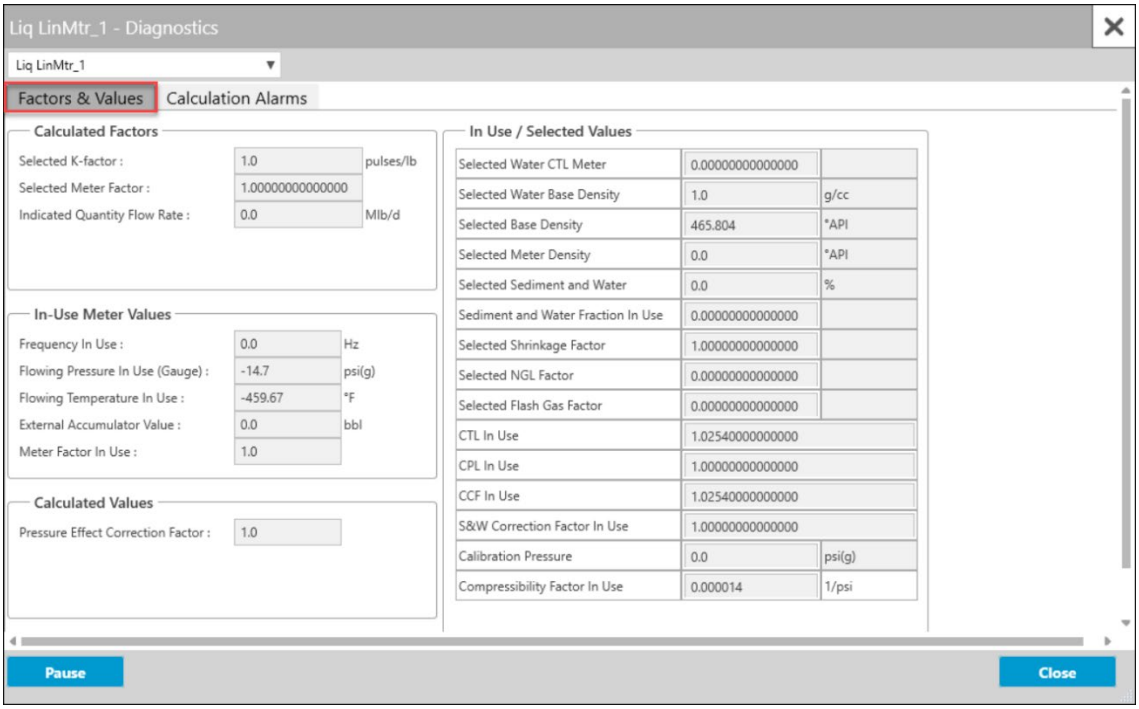
### 4.13.5.1 Liquid Linear Meter Diagnostics – Factors and Values Tab

This tab displays the **read-only** current values for inputs and interim figures used for the meter calculations.

To access this display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The Liquid Linear Meter Diagnostics display opens showing the Factors and Values tab.

**Figure 215. Liquid Linear Meter Diagnostics – Factors and Values Tab**




**4.** Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Calculated Factors** | **Selected K-factor** | This **read-only** field shows the pulses per unit quantity generated by a pulse output type flow meter (also system factor). The nominal value is determined by flow meter design and factory water flow calibration. The "average" K-factors for the flow meters are usually displayed on the flow meter nameplates. |
| | **Selected Meter Factor** | This **read-only** field shows the number obtained by dividing the actual volume of liquid passed through a flow meter during a meter proving operation by the volume registered by the flow meter. The meter factor is used in flow calculations to correct the indicated volume (end flow meter registration minus start flow meter registration) to the observed gross volume (actual flow meter throughput at operating conditions). |

| Field | Description | |
|---|---|---|
| | | Meter factor = (Meter prover volume corrected to standard conditions) / (Flow meter indicated volume corrected to standard conditions) |
| | **Indicated Quantity Flow Rate** | This **read-only** field shows the raw flow rate from the meter in Volumetric or Mass Flow Rate units, depending on the meter type. This value is prior to any meter factor correction. |
| **In-Use Meter Value** | **Frequency In Use** | This **read-only** field shows the value of the indicated flow input configured on the Liquid Linear Meter – General display. |
| | **Flowing Pressure In Use (Gauge)** | This **read-only** field shows the flowing gauge pressure being used by the flow calculation. It will reflect the absolute pressure in the selected pressure units of the station. |
| | **Flowing Temperature In Use** | This **read-only** field shows the flowing temperature being used by the flow calculation. It will reflect the temperature in the selected temperature units of the station. |
| | **External Accumulator Value** | This **read-only** field shows the flow accumulator value being used by the flow calculation. This field represents the accumulatedNew field description. (TFS 140685) volume for a turbine meter type or accumulated mass for a Coriolis meter type. |
| | **Meter Factor In Use** | This **read-only** field shows the meter factor value being used by the flow calculation.<br>**Note**<br>If you have enabled rounding, then this field contains the meter factor after rounding and may be different than the selected value. This may prevent a retroactive calculation.<br>For example, suppose rounding is enabled, the current meter factor is equal to 1.0, and the new meter factor is equal to 1.000001. After rounding, both meter factors will be equal to 1.0 and no retroactive calculation will occur. |

| Field | Description | |
|---|---|---|
| **Calculated Values** | **Pressure Effect Correction Factor** | This **read-only** field shows the calculated factor used to adjust the flow rates and totals for the effect of pressure on the Coriolis meter. |
| **In Use / Selected Values** | These **read-only** fields show the current values being used by the flow calculation.<br>**Note**<br>The In Use/Selected Values shown vary depending on your selections in the **Liquid Product Type** field on the Liquid Product display and **Crude Oil Options** field on the Station – General display. | |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | |

### 4.13.5.2 Liquid Linear Meter Diagnostics – Calculation Alarms Tab

This tab displays any current alarms that apply to the meter calculations. Use this tab to aid in the diagnosis of problems with meter. Alarm codes are comprised of two parts: Alarm Category (the reason for the alarm) and Alarm Value (the part of the calculation that raised the alarm). For example, if you assign a voltage signal to a pressure input, **Invalid Input** would be selected in the **Alarm Category** frame and **Pressure** would be selected in the **Alarm Value** frame.

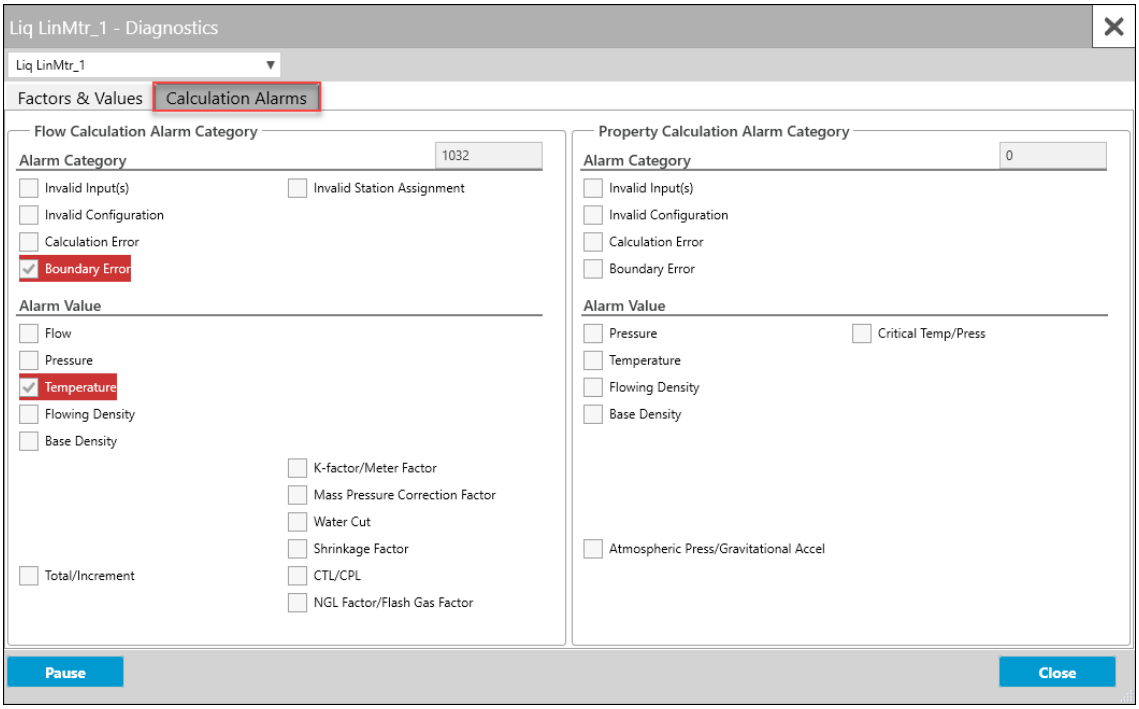
**Note**

- The fields shown on this display are determined by your selection in the **Liquid Product Type** field on the Liquid Product display.
- The alarm code is a decimal representation of which alarm bits are set. Each bit is identified in the table below.
- The error code can be a composite of one or more errors.
- Error codes are generated according to your selection in the **Calculation Failure Option** field on the Station – Advanced display.
- Alarms are raised if calculation inputs and interim values do not fall within certain ranges based on the calculation you have selected. To view the boundary limits for calculations, refer to Calculation Library Limit Checks.

To access this display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Diagnostics** button. The Liquid Linear Meter Diagnostics display opens.
4. Select the **Calculation Alarms** tab.

**Figure 216. Liquid Linear Meter Diagnostics – Calculation Alarms Tab**




5. Review the values in the following fields:

| Field | Description | |
|---|---|---|
| **Flow Calculation Alarm Category** | These **read-only** fields show flow calculation alarm information. | |
| | **Flow Calculation Alarm Code** | This **read-only** field shows a code that indicates whether the flow calculation is within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note** |

| Field | Description | | |
|---|---|---|---|
| | | • This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show 0 if Calculation Failure Option has been set to Alarm Disabled on the Station – Advanced display. | |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: | |
| | | **Invalid Input(s) (Bit 0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration (Bit 1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |
| | | **Calculation Error (Bit 2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error (Bit 3)** | Something exceeded stated boundary of the calculation standard. |
| | | **Invalid Station Assignment (Bit 4)** | The meter type not is valid for the station type or station fluid type. |
| | **Alarm Value** | These **read-only** fields show, if checked, which part of the flow calculation is associated with the Alarm Category.<br>• Flow (Bit 8)<br>• Pressure (Bit 9)<br>• Temperature (Bit 10)<br>• Flowing Density (Bit 11) | |

| Field | Description | | |
|---|---|---|---|
| | | • Base Density (Bit 12)<br>• Total/Increment (Bit 17)<br>• K-factor / Meter Factor (Bit 25)<br>• Mass Pressure Correction Factor (Bit 26)<br>• Water Cut (Bit 27)<br>• Shrinkage Factor (Bit 28)<br>• CTL (Bit 29)<br>• NGL/Flash Gas Factor (Bit 30) | |
| **Property Calculation Alarm Category** | These **read-only** fields show property calculation alarm information. | | |
| | **Property Calculation Alarm Code** | This **read-only** field shows a code that indicates whether the property calculations (density, compressibility, and heating value) are within the specified boundaries of the selected method. The alarm code is a decimal representation of which alarm bits are set.<br>**Note**<br>• This is the same alarm code shown in the Alarm report.<br>• The Alarm Code may show **0** if Calculation Failure Option has been set to Alarm Disabled on the Station – Advanced display. | |
| | **Alarm Category** | These **read-only** fields show, if checked, a general reason an alarm condition exists. Possible categories are: | |
| | | **Invalid Input(s) (Bit 0)** | A required input is undefined, bad object type, wrong measurement type, measured input is not a valid floating-point number, or invalid combination of selections. |
| | | **Invalid Configuration (Bit 1)** | Database or program corruption.<br>**Note**<br>If detected, this alarm is asserted even when calculation alarms are disabled. |

| Field | Description | | |
|---|---|---|---|
| | | **Calculation Error (Bit 2)** | An error occurred in a calculation. Possible reasons are a conversion error, failure to converge, iteration limit, or divide by 0. |
| | | **Boundary Error (Bit 3)** | Something exceeded stated boundary of the calculation standard. |
| | **Alarm Value** | These **read-only** fields show, if checked, shows which part of the flow calculation is associated with the Alarm Category.<br>• Pressure (Bit 8)<br>• Temperature (Bit 9)<br>• Flowing Density (Bit 10)<br>• Base Density (Bit 11)<br>• Atmospheric Press/Gravitational Accel (Bit 16)<br>• Critical Temp/Press (Bit 20) | |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | | |

## 4.13.6 Liquid Linear Meter – Rates & Totals

Use this pop-up display to view **read-only** flow rates and accumulations for the selected liquid linear meter.

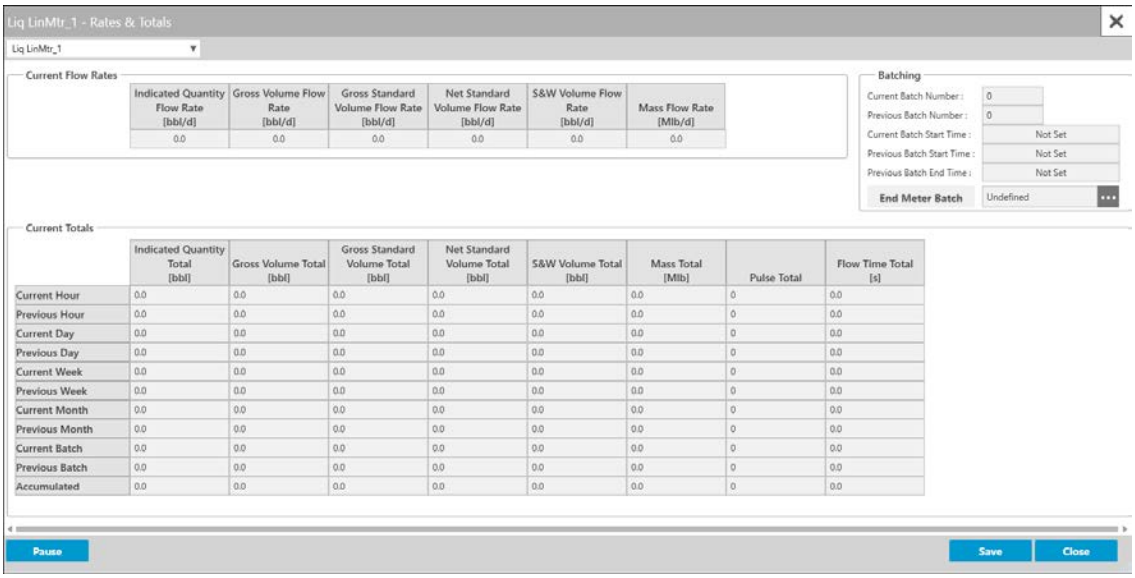
**Note**

- This pop-up can remain open while you change values on the other tabs of this display.
- The flow rates and totals shown vary depending on you selections in the **Liquid Product Type** field on the Liquid Product display and **Crude Oil Options** field on the Station – General tab.
- The system uses different calculations based on three possible configurations. Refer to Liquid Linear Meter Flow Calculations for a list of flow calculations used with different configurations.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Rates & Totals** button. Liquid Linear Meter Rates & Totals display opens.

**Figure 217. Liquid Linear Meter Rates & Totals**




4. Review the values in the following fields:

| Field | Description |
|---|---|
| **Current Flow Rates** | These **read-only** fields show the current flow rates for the selected meter. |
| **Current Totals** | These **read-only** fields show the total accumulation, as well as the current and previous hourly, daily, weekly, monthly, and batch accumulations for the selected meter. |
| **Batching** | These **read-only** fields show the current and previous batch numbers, batch start times, and previous batch end time.<br>**Note**<br>These fields show **only** if the **Batch Option** field is set to **Enable** on the Station – General display. |

| Field | Description | |
|---|---|---|
| | **End Meter Batch** | Select this button to end a currently running batch. Click ••• to open a Point Picker dialog and select a numeric read/write parameter used by an external host to end a batch when the value is non-zero.<br>**Note**<br>If you select a parameter, a non-zero value is interpreted as a command and a zero value is interpreted as an idle state. After reading a non-zero value and taking the specified action (start or end), the DeltaV FB3000 resets the command by setting the parameter back to 0 if the parameter selected is a R/W parameter. If you select a discrete input, it is recommended that the discrete input is configured as latched. After reading an "on" status from the discrete input and taking the specified action (start or end), the DeltaV FB3000 sends a reset latch command to the discrete input. |
| **Pause/Resume** | Select the Pause button to prevent the values on this display from updating. Select the Resume button to restart automatically refreshing the values shown on the display. | |

## 4.13.7 Liquid Linear Meter – Water

Use this pop-up display to configure correction options for sediment in water present in the selected liquid linear meter.

**Note**

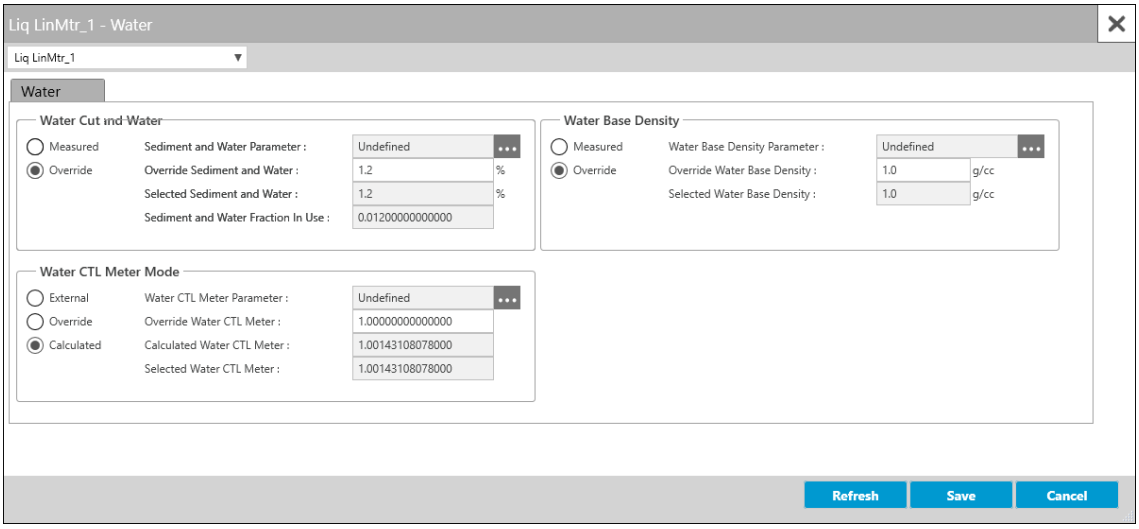
The **Water** button appears **only** if you select **Crude Oil** in the **Liquid Product Type** field on the Liquid Product display.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to configure.

3. Select the **Water** button. The Liquid Linear Meter – Water pop-up display opens.

**Figure 218. Liquid Linear Meter – Water**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Sediment and Water / Water Cut** | Sets how the system acquires the sediment and water or water cut value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Sediment and Water Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid sediment and water values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override Sediment and Water** field. |
| | **Note**<br>The label changes based on your selection in the **Crude Oil Options** fields on the Station – General display. If you select **API Ch. 20.1** and **Use Separate Correction Factor for Water**, this field is labeled **Water Cut**. | |
| **Sediment and Water Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the sediment and water value. | |

| Field | Description | |
|---|---|---|
| **Override Sediment and Water** | Sets a fixed sediment and water value to use in calculations when **Override** is selected in the **Sediment and Water** field. | |
| **Selected Sediment and Water** | This **read-only** field shows the current sediment and water value, based on the selected mode option. This is the sediment and water value in-use by the calculations. | |
| **Sediment and Water Fraction In Use** | This **read-only** field shows the volume fraction of water applied to the gross volume of fluid measured to determine uncorrected (actual) water volume at metering conditions. | |
| **Water CTL Meter Mode** | Sets how the system acquires the water CTL meter value. The water CTL meter is the ratio of water at allocation point temperature to the water at base temperature. Possible options are: | |
| | **External** | The system uses a parameter you configure in the **Water CTL Meter Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid water CTL meter values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override Water CTL Meter** field. |
| | **Calculated** | The system calculates the water CTL meter value. |
| | **Note**<br>These fields appear **only** if you select **API Ch. 20.1** and **Use Separate Correction Factor for Water** in the **Crude Oil Option** fields on the selection on the Station – General display. | |
| **Water CTL Meter Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the water CTL meter value. | |
| **Override Water CTL Meter** | Sets the water CTL meter value to use in calculations when **Override** is selected in the **Water CTL Meter Mode** field. | |
| **Calculated Water CTL Meter** | This **read-only** field shows the water CTL meter value as calculated by the system. | |

| Field | Description | |
|---|---|---|
| **Selected Water CTL Meter** | This **read-only** field shows the current water CTL meter value, based of the selected options, used in calculations. | |
| **Water Base Density** | Sets how the system acquires the water base density value. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Water Base Density Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid water base density values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override Water Base Density** field. |
| | **Note**<br>These fields appear **only** if you select **API Ch. 20.1** and **Use Separate Correction Factor for Water** in the **Crude Oil Option** fields on the selection on the Station – General display. | |
| **Water Base Density Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the water base density value. | |
| **Override Water Base Density** | Sets the water base density value to use in calculations when **Override** is selected in the **Water Base Density** field. | |
| **Selected Water Base Density** | This **read-only** field shows the current water base density value, based of the selected options, used in calculations. | |

**5.** Select **Save** to save your changes if you modify any of the fields on this display.

## 4.13.8 Liquid Linear Meter – Liquid Factors

Use this pop-up display to configure a single meter factor for each liquid product flowing through the selected liquid meter. For each liquid meter, you can configure meter factors for up to 36 liquid products.

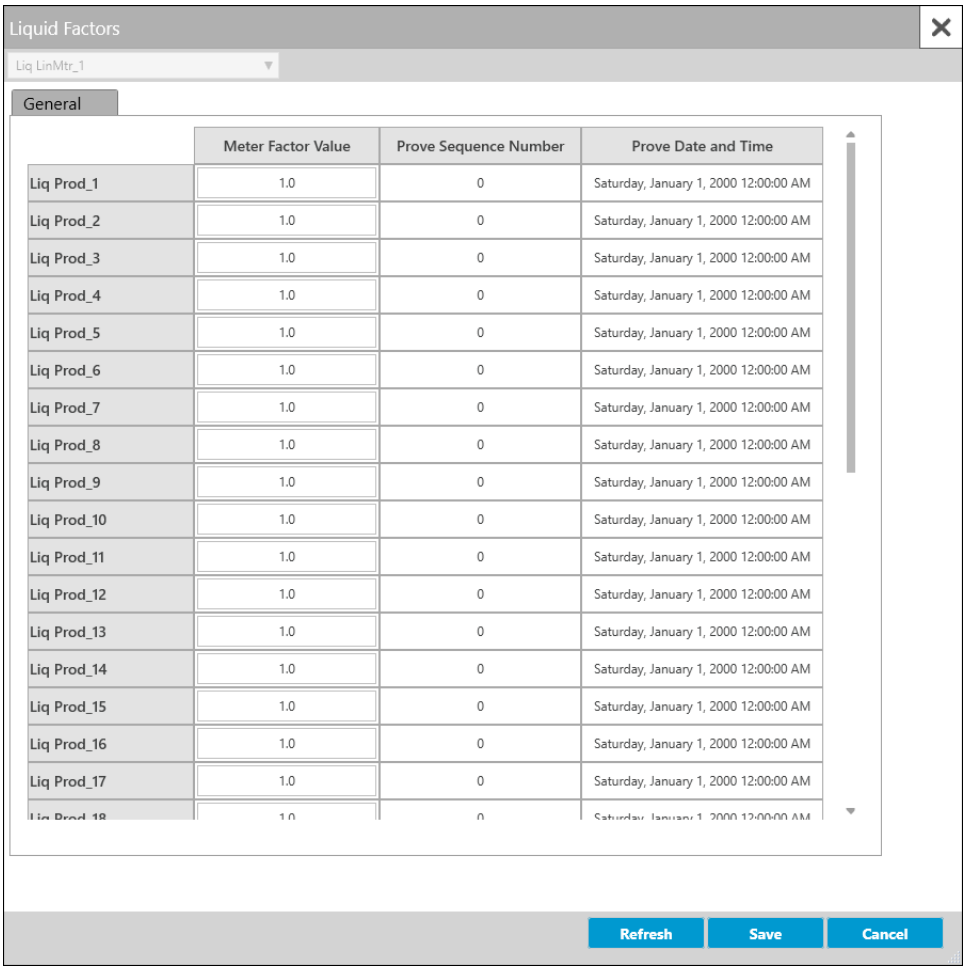
**Note**

This display is available only if you select **Per Product Single MF** in the **Product Table Option** field on the Meter Setup display.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Liquid Factors** button. The Liquid Linear Meter – Liquid Factors pop-up display opens.

**Figure 219. Liquid Linear Meter – Liquid Factors**



4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Meter Factor Value** | For the selected Liquid Linear Meter instance, sets a single meter factor for each product. |
| **Prove Sequence Number** | This **read-only** field shows the prove sequence identifier for this meter factor for the selected meter. |
| **Prove Date and Time** | This **read-only** field shows the time and date stamp of the last successful prove for this meter flowing this product. |

5. Select **Save** to save your changes if you modify any of the fields on this display.

## 4.13.9 Liquid Linear Meter – Additional Factors

Use this pop-up display to configure additional properties for the fluid flowing through the meter, including NGL, shrinkage, and flash gas factors.

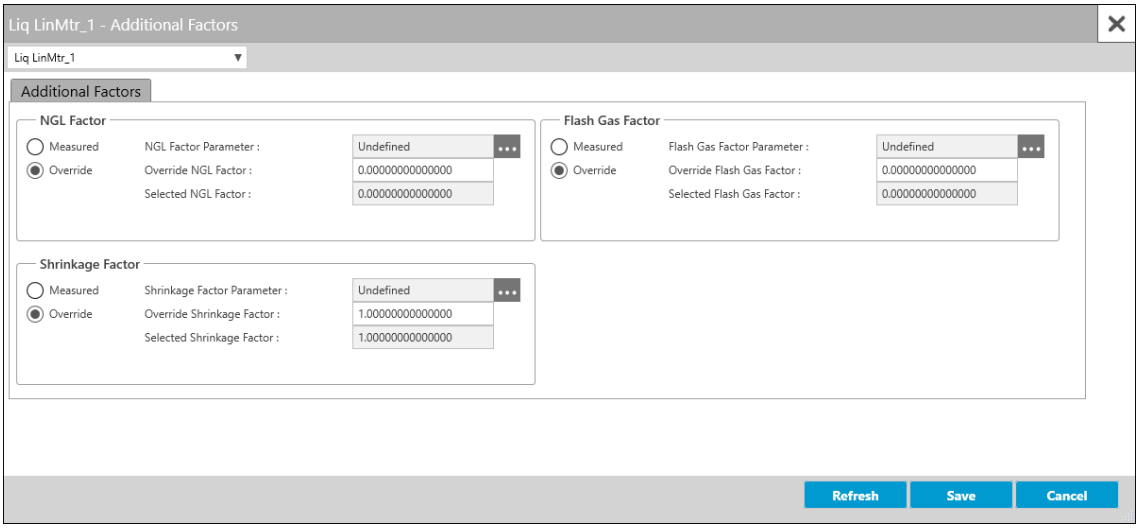
**Note**

The **Additional Factors** button appears **only** if you select **Crude Oil** in the **Liquid Product Type** field on the Liquid Product display and **API Ch. 20.1** in the **Crude Oil Options** field on the Station – General display.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Additional Factors** button. The Liquid Linear Meter – Additional Factors pop-up display opens.

**Figure 220. Liquid Linear Meter – Additional Factors**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **NGL Factor** | Sets how the system acquires the NGL factor. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **NGL Factor Parameter** field to acquire the value. |
| | **Override** | The system uses the fixed value you define in the **Override NGL Factor** field. |
| | **Note**<br>These fields appear **only** if you select **API Ch. 20.1** and **Use Oil Correction for Water** in the **Crude Oil Options** field on the Station – General display. | |
| **NGL Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the NGL factor value. | |
| **Override NGL Factor** | Sets the NGL Factor value to use in calculations when **Override** is selected in the **NGL Factor** field. | |
| **Selected NGL Factor** | This **read-only** field shows the current NGL factor value, based of the selected options, used in calculations. | |
| **Shrinkage Factor** | Sets how the system acquires the shrinkage factor. Possible options are: | |

| Field | Description | |
|---|---|---|
| | **Measured** | The system uses a parameter you configure in the **Shrinkage Factor Parameter** field to acquire the value. |
| | **Override** | The system uses the fixed value you define in **the Override Shrinkage Factor** field. |
| **Shrinkage Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the shrinkage factor value. | |
| **Override Shrinkage Factor** | Sets the shrinkage factor value to use in calculations when **Override** is selected in the **Shrinkage Factor** field. | |
| **Selected Shrinkage Factor** | This **read-only** field shows the current shrinkage factor value, based of the selected options, used in calculations. | |
| **Flash Gas Factor** | Sets how the system acquires the flash gas factor. Possible options are: | |
| | **Measured** | The system uses a parameter you configure in the **Flash Gas Factor Parameter** field to acquire the value. |
| | **Override** | The system uses the fixed value you define in the **Override Flash Gas Factor** field. |
| | **Note**<br>These fields appear **only** if you select **API Ch. 20.1** and **Use Oil Correction for Water** in the **Crude Oil Options** field on the Station – General display. | |
| **Flash Gas Factor Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the flash gas factor value. | |
| **Override Flash Gas Factor** | Sets, in percent, the sediment and water value to use in calculations when **Override** is selected in the **Flash Gas Factor** field. | |
| **Selected Flash Gas Factor** | This **read-only** field shows the current flash gas factor value, based of the selected options, used in calculations. | |

5. Select **Save** to save your changes if you modify any of the fields on this display.

## 4.13.10 Liquid Linear Meter – Volume Correction

Use this pop-up display to configure temperature and pressure volume correction options for the selected liquid linear meter.

**Note**

- If you select a **Liquid Product Type** of **Crude Oil** (defined on the Liquid Product display), this tab appears **only** if you select **API Ch. 12.2** or **API Ch. 20.1** and **Use Oil Correction Factor for Water** in the **Crude Oil Options** fields on the Station – General display.
- If you select a **Liquid Product Type** of **Light Hydrocarbon** (defined on the Liquid Product display), the system calculates the volume correction factors and shows the calculated values in the Selected CTL/CPL fields.

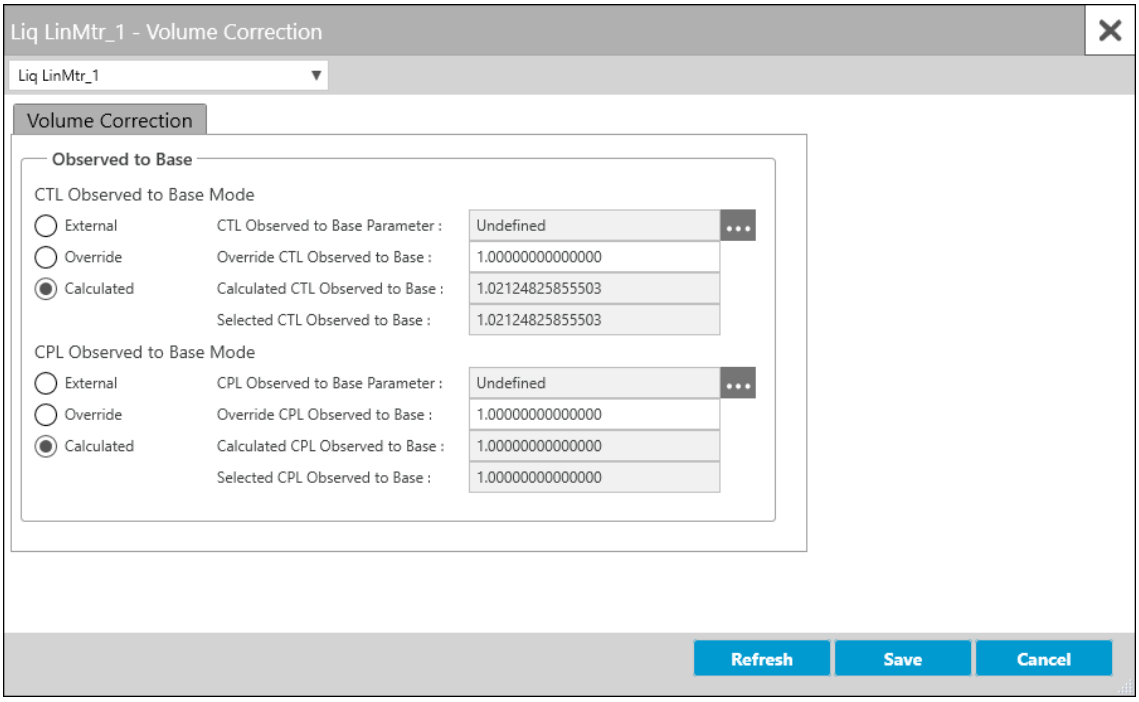
To understand the options available, you need to understand the concept of volume correction in general. Mass does not change with pressure and temperature, but we measure fluids by volume which does vary with pressure and temperature. Therefore, in order not to have your product worth less on cold days, fluids are bought and sold based on a corrected or standard volume, where the volume is calculated at some agreed upon pressure and temperature, which is the next best thing to mass. Most of the calculations require a density at some known temperature and pressure as an input. Of course, fluids are actually measured at widely varying pressures and temperatures and sometimes densities are measured at that same temperature and pressure and sometimes at a different temperature and pressure, so everything has to be converted to the agreed upon base conditions, thus the need for volume correction.

The temperature and pressure that the density is measured at is typically referred to as “observed” conditions, the agreed upon contract temperature and pressure as “base” conditions, and the conditions at the meter as “alternate” or “line” conditions. When you see references to “Observed to Base”, it is referring to the calculations involved in converting a density from the conditions it was measured at to the base conditions. When you see references to “Base to Meter”, it is referring to calculations involved in converting a density at base conditions to a density at alternate / meter / line conditions, which is the heart of volume correction, as the ratio of meter density to base density is the volume correction factor. Multiplying the measured volume at the meter by the volume correction factor gives you the base or standard volume.

To access this pop-up display:

1. Select **Configure > Liquid > Liquid Linear Meter** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a meter to view.
3. Select the **Volume Correction** button. The Liquid Linear Meter – Volume Correction pop-up display opens.

**Figure 221. Liquid Linear Meter – Volume Correction**




4. Review the values in the following fields:

| Field | Description |
|---|---|
| **CTL Observed to Base Mode** | Sets how the system acquires the observed to base hydrocarbon CTL (correction for the effect of temperature on liquid) value. This is the temperature portion of the correction from observed conditions to base conditions and is calculated from the observed temperature. Possible options are: |

| Field | Description | |
|---|---|---|
| | **External** | The system uses a parameter you configure in the **CTL Observed To Base Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid external CTL values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override CTL Observed to Base** field. |
| | **Calculated** | The system calculates the observed to base CTL value, based on the appropriate calculation method for the product. |
| **CTL Observed To Base Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the hydrocarbon CTL observed to base value. | |
| **Override CTL Observed To Base** | Sets the CTL observed to base value to use in calculations when **Override** is selected in the **CTL Observed To Base Mode** field. | |
| **Calculated CTL Observed To Base** | This **read-only** field shows the hydrocarbon CTL observed to base value as calculated by the system. | |
| **Selected CTL Observed To Base** | This **read-only** field shows the current hydrocarbon CTL observed to base value, based on the selected mode option. This is the CTL value in-use by the calculations. | |
| **CPL Observed to Base Mode** | Sets how the system acquires the observed to base hydrocarbon CPL (correction for the effect of pressure on liquid) value. This is the pressure portion of the correction from observed conditions to base conditions, and is calculated from the observed pressure. Possible options are: | |
| | **External** | The system uses a parameter you configure in the **CPL Observed To Base Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid external CPL values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override CPL Observed to Base** field. |

| Field | Description | |
|---|---|---|
| | **Calculated** | The system calculates the observed to base CPL value, based on the appropriate calculation method for the product. |
| **CPL Observed To Base Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the hydrocarbon CPL observed to base value. | |
| **Override CPL Observed To Base** | Sets the CPL observed to base value to use in calculations when **Override** is selected in the **CPL Observed To Base Mode** field. | |
| **Calculated CPL Observed To Base** | This **read-only** field shows the hydrocarbon CPL observed to base value as calculated by the system. | |
| **Selected CPL Observed To Base** | This **read-only** field shows the current hydrocarbon CPL observed to base value, based on the selected mode option. This is the CPL value in-use by the calculations. | |
| **CTL Base to Meter Mode** | Sets how the system acquires the base to meter hydrocarbon CTL (correction for the effect of temperature on liquid) value. This is the temperature portion of the correction from base conditions to meter conditions, and is calculated from the base temperature. Possible options are: | |
| | **External** | The system uses a parameter you configure in the **CTL Base to Meter Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid external CTL values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override CTL Base to Meter** field. |
| | **Calculated** | The system calculates the observed to base CTL value, based on the appropriate calculation method for the product. |
| **CTL Base to Meter Mode Parameter** | Click ••• to open a Point Picker dialog and select a parameter to acquire the hydrocarbon CTL base to meter value. | |
| **Override CTL Base to Meter Mode** | Sets the CTL base to meter value to use in calculations when **Override** is selected in the **CTL Base to Meter Mode** field. | |

| Field | Description | |
|---|---|---|
| **Calculated CTL Base to Meter Mode** | This **read-only** field shows the hydrocarbon CTL base to meter value as calculated by the system. | |
| **Selected CTL Base to Meter Mode** | This **read-only** field shows the current hydrocarbon CTL base to meter value, based on the selected mode option. This is the CTL value in-use by the calculations. | |
| **CPL Base to Meter Mode** | Sets how the system acquires the base to meter hydrocarbon CPL (correction for the effect of pressure on liquid) value. This is the pressure portion of the correction from base conditions to meter conditions, and is calculated from the base pressure. Possible options are: | |
| | **External** | The system uses a parameter you configure in the **CPL Base to Meter Parameter** field to acquire the value.<br>**Note**<br>The system ignores negative or invalid external CPL values and uses a value of 0.0 instead. |
| | **Override** | The system uses the fixed value you define in the **Override CPL Base to Meter** field. |
| | **Calculated** | The system calculates the base to meter CPL value, based on the appropriate calculation method for the product. |
| **CPL Base to Meter Mode Parameter** | Click ... to open a Point Picker dialog and select a parameter to acquire the hydrocarbon CPL base to meter value. | |
| **Override CPL Base to Meter Mode** | Sets the CPL base to meter value to use in calculations when **Override** is selected in the **CPL Base to Meter Mode** field. | |
| **Calculated CPL Base to Meter Mode** | This **read-only** field shows the hydrocarbon CPL base to meter value as calculated by the system. | |
| **Selected CPL Base to Meter Mode** | This **read-only** field shows the current hydrocarbon CPL base to meter value, based on the selected mode option. This is the CPL value in-use by the calculations. | |

5. Select **Save** to save your changes if you modify any of the fields on this display.

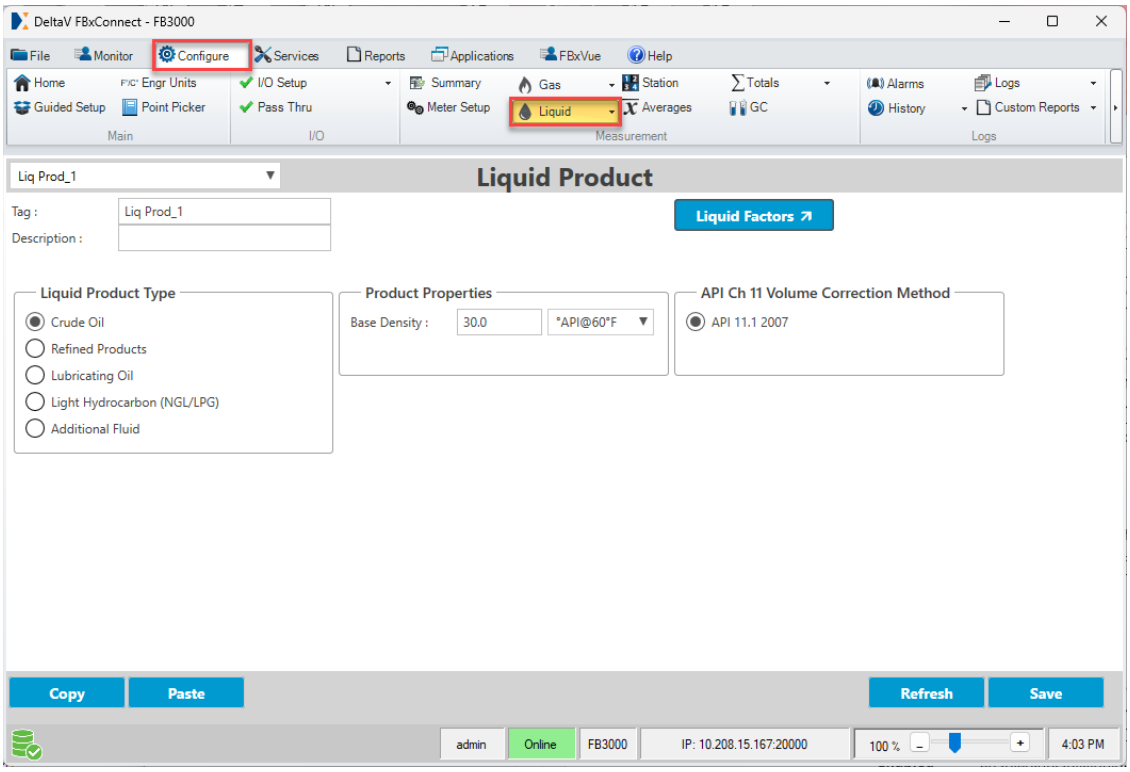
# 4.14 Liquid Product

Use this display to define up to 36 liquid products and their fluid properties. A liquid product flows through one or more meters that make up a station. In liquid pipeline applications, the product that flows through a given station may need to change dynamically. To facilitate this need for flexibility, the product definition is separate from the station definition and you assign the product to the station. At this point, you define all of the products that might ever need to be measured, even if you currently do not assign them to a station.

To access this tab:

1. Select **Configure > Liquid > Liquid Product** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a liquid product instance to configure.

**Figure 222. Liquid Product**



**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected product instance. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected product instance. | |
| **Liquid Factors** | Select this button to open the Liquid Product – Liquid Factors display and configure a single meter factor for each liquid meter for the selected liquid product.<br>**Note**<br>This button shows only if you select **Per Product Single MF** in the **Product Table Option** field on the Meter Setup display. | |
| **Liquid Product Type** | Sets the specific type of hydrocarbon fluid for the selected product instance. Possible options are: | |
| | **Crude Oil** | A liquid hydrocarbon is generally considered to be a crude oil if its density falls between approximately 0.61120 to 1.16464 relative density (100 to −10 °API). Crude oils that have been stabilized for transportation or storage purposes with API gravities within this range are considered to be part of this group. |
| | **Refined Products** | A liquid hydrocarbon is generally considered to be a refined product if it falls into one of the following product groups:<br>• **Gasoline** – Motor gasoline and unfinished gasoline blending stock with a base density range between approximately 50° API and 85° API.<br>• **Jet Fuels** – Jet fuels, kerosene, and Stoddard solvents with a base density range between approximately 37° API and 50° API.<br>• **Fuel Oils** – Diesel oils, heating oils and fuel oils with a base density range between approximately -10° API and 37° API. |

| Field | Description | |
|---|---|---|
| | **Lubricating Oil** | A liquid hydrocarbon is generally considered to be a lubricating oil if it is a base stock derived from crude oil fractions by distillation or asphalt precipitation. Lubricating oils have densities in the range between approximately -10 to 45° API. |
| | **Light Hydrocarbon (NGL/LPG)** | A liquid hydrocarbon is generally considered to be a light hydrocarbon if its density falls between approximately 0.3500 to 0.6880 relative density (272.8 to 72.2 °API). Light hydrocarbons are often referred to as LPGs (Liquified Petroleum Gases) or NGLs (Natural Gas Liquids) and are predominantly composed of lighter hydrocarbons, such as methane, ethane, butane, and propane. |
| | **Additional Fluid** | Any fluid not covered by the other options. If a measured density is available and the base density is known, then the volume correction factor for temperature and pressure (CTPL) is calculated as the ratio of the measured density to the base density. If a measured density is not available, then the CTPL is set to 1.0 and no volume correction for temperature or pressure is calculated. The density options below are chosen via the **Density Option** field on the Station – General display:<br>**Station Base Density**<br>▪ meter observed density = station base density<br>▪ CTPL = 1.0<br>**Meter Observed Density**<br>▪ CTPL = meter observed density / station base density<br>**Station Header Density**<br>▪ meter observed density = station header density<br>▪ CTPL = meter observed density / station base density<br>**Note**<br>Even though independent temperature (CTL) and |

| Field | Description |
|---|---|
| | pressure (CPL) correction factors cannot be calculated, CTL is set equal to CTPL and CPL is set equal to 1.0 to provide support for systems that do not recognize or use CTPL. |
| **Base Density** | Sets a density for the Liquid Product Type you select at contract (base) temperature and pressure. Select ▼ to set the base density units and the base temperature that apply to the entered base density value.<br>**Note**<br>If the base density and temperature units are different than the station's base conditions, the system converts the value to the station's base conditions using the option selected in the **API Ch 11 Volume Correction Method** field. |
| **API Ch 11 Volume Correction Method** | Sets the volume correction calculation used by all stations and meters associated with the selected product instance. The FBx products currently support the 2007 version of the API / ASTM / IP Volume Correction tables.<br>**Note**<br>This field appears **only** if you select **Crude Oil** in the **Liquid Product Type** field. |
| **Light Hydrocarbon Method** | Sets the volume correction calculation used by all stations and meters associated with the selected product instance. The FBx products currently support the GPA 8217 / API 11.2.4 Volume Correction Tables (formerly GPA TP-27). This method uses the following set of standards:<br>• **Temperature Correction** – GPA 8217 / API 11.2.4 Standard (2019) (formerly GPA TP-27)<br>• **Pressure Correction** – API 11.2.2 (1986) and API 11.1 (2007)<br>• **Equilibrium Pressure** – GPA 8117 / API 11.2.5 (2017) (formerly GPA TP-15)<br>**Note**<br>This field appears **only** if you select **Light Hydrocarbon** in the **Liquid Product Type** field. |

4. Select **Save** to save any changes you make to this display.

## 4.14.1 Liquid Product – Liquid Factors

Use this pop-up display to configure a single meter factor for each liquid meter for the selected liquid product. For each liquid product, you can configure meter factors for up to 12 liquid meters.

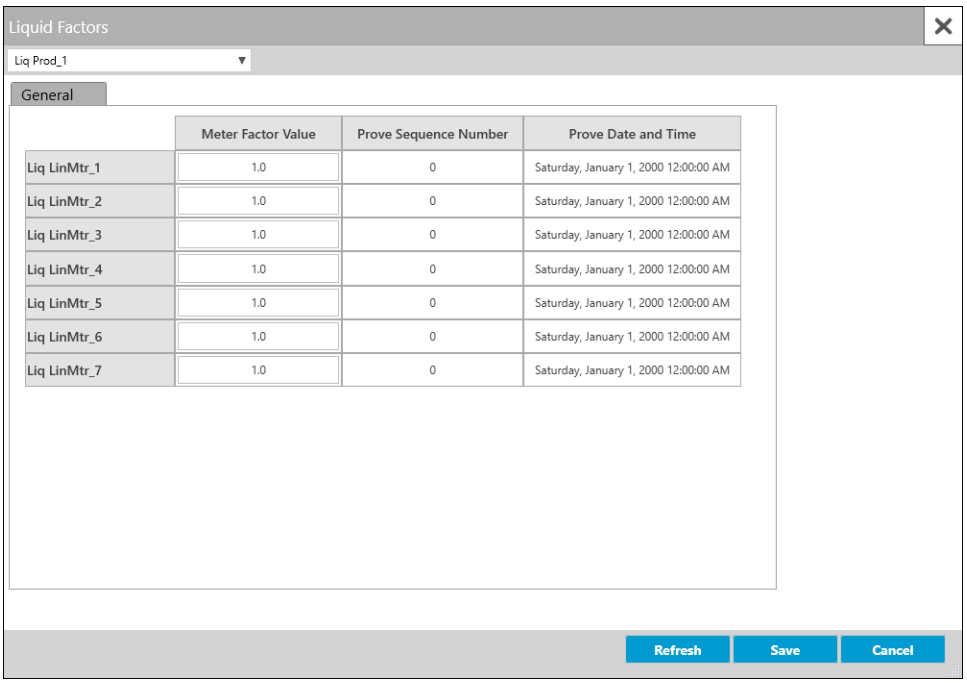
**Note**

This display is available only if you select **Per Product Single MF** in the **Product Table Option** field on the Meter Setup display.

To access this tab:

1. Select **Configure > Liquid > Liquid Product** from the DeltaV FBxConnect configuration software main menu. The Liquid Product display opens.
2. Select the **Liquid Factors** button. The Liquid Factors display opens.

**Figure 223. Liquid Factors**




3. Click ▼ in the drop-down list at the top of the display and select a liquid product instance to configure.

4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Meter Factor** | For the selected Liquid Product instance, sets a single meter factor for each meter. |
| **Prove Sequence Number** | This **read-only** field shows the prove sequence identifier for this meter factor for the selected meter. |
| **Prove Date and Time** | This **read-only** field shows the time and date stamp of the last successful prove for this meter flowing this product. |
| **Liquid Factors Import Export** | Select this button to import new liquid factors from a CSV file or export the current liquid factors to a CSV file. For more information, refer to Liquid Factors Import Export. |

5. Select **Save** to save any changes you make to this display.

## 4.14.2 Liquid Factors Import Export

Use this pop-up display to import liquid factor values from a CSV file or export the current liquid factor values to a CSV file.

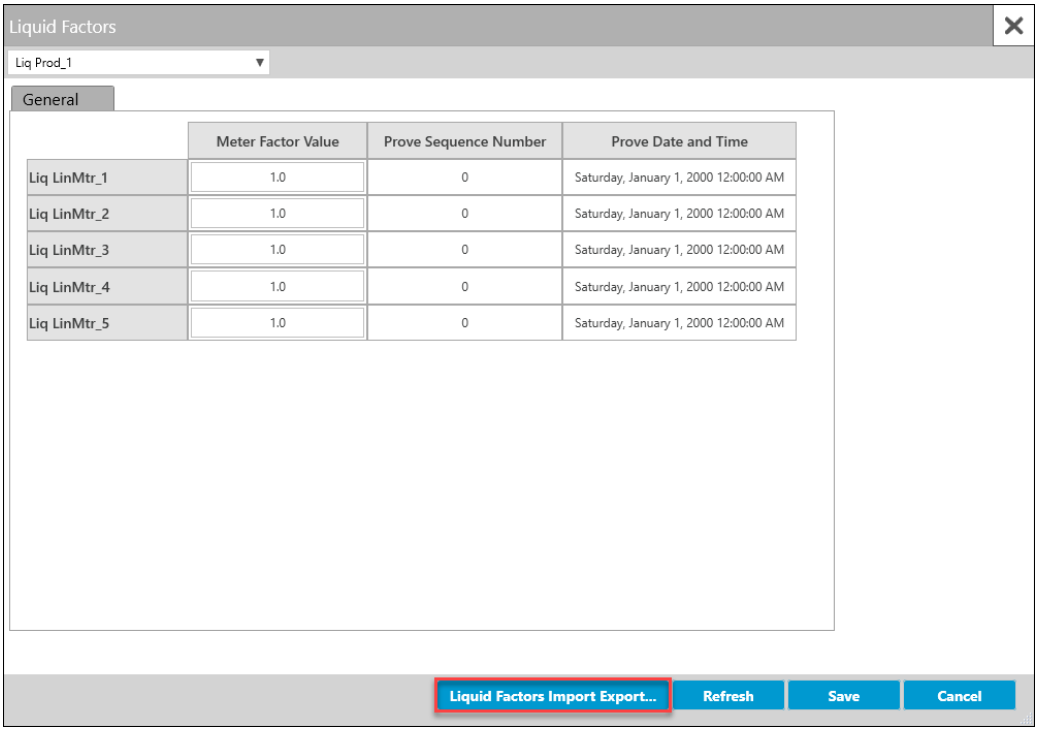
**Note**

For more information about creating your own liquid factor CSV files, refer to Creating Liquid Factor CSV Files.

To access this pop-up display:

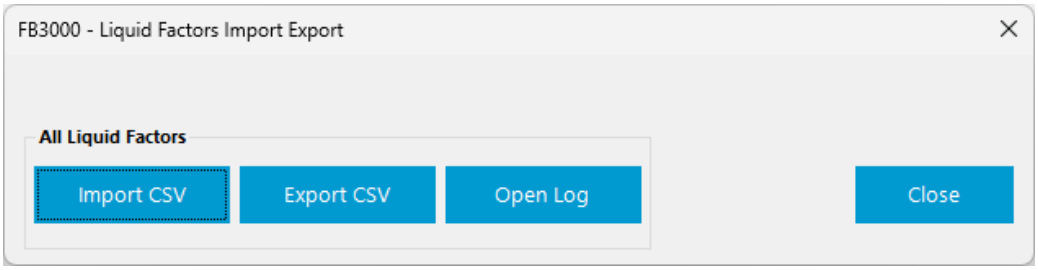
1. Select **Configure > Liquid > Liquid Product** from the DeltaV™ FBxConnect™ main menu. The Liquid Product display opens.
2. Select the **Liquid Factors** button. The Liquid Product – Liquid Factors pop-up display opens.
3. Select the **Liquid Factors Import Export** button. The Liquid Factors Import Export pop-up display opens.

**Figure 224. Liquid Factors Import Export Button**




4. Select the **Liquid Factors Import Export** button. The Liquid Factors Import Export pop-up display opens.

**Figure 225. Liquid Factors Import Export**




5. Use the buttons on this display to perform the following actions:

| Field | Description |
|---|---|
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your liquid factor values. Navigate to the location on your computer that contains the CSV files and select **OK** to start the import process. For more information, refer to Importing Liquid Factor CSV Files.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. |
| **Export CSV** | Click to save CSV files to your computer that contain the current liquid factor values used by your FB Series product. A Select Table dialog opens that allows you to select which liquid linear meter instances to include in the export. Click **Start**, navigate to a folder on your computer where the CSV files will be saved, and click **Save** to begin the export process. For more information, refer to Exporting Liquid Factor CSV Files.<br>**Note**<br>Never modify the column names or the order in an exported CSV file. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV™ FBxConnect import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |

6. Select **Close** to exit the pop-up display.

### 4.14.2.1 Importing Liquid Factor CSV Files

You can import CSV files that contain your liquid factor values. You can include liquid factor values for all Liquid Product instances in a single CSV file or separate CSV files for each instance.

**Note**

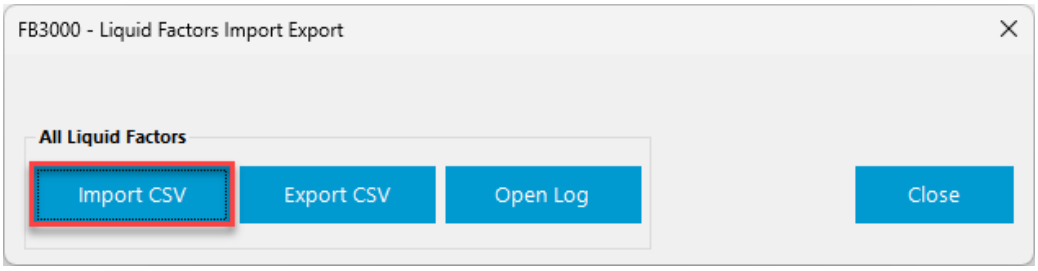
- For more information about creating your own liquid factors CSV files, refer to Creating Liquid Factor CSV Files.
- For more information about exporting CSV files that contains the FB Series product's current gas component values, refer to Exporting Liquid Factor CSV Files.
- Never modify the column names or the order in an exported CSV file.

- If you want to remove previously imported gas component values, perform a Cold Start and select **Database is re-initialized with factory defaults**.

To import liquid factors CSV files:

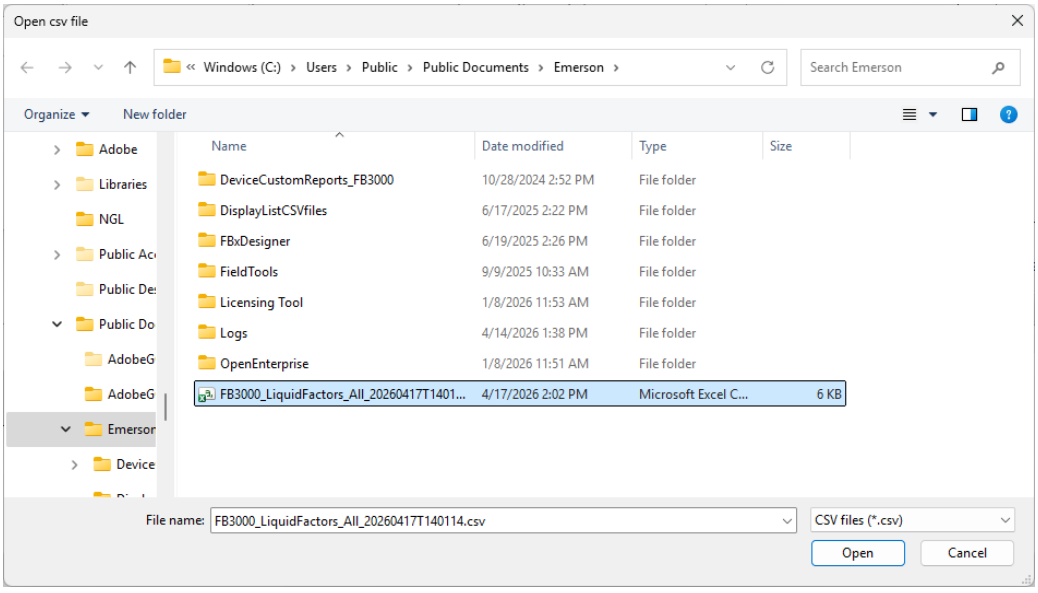
1. Select **Configure > Liquid > Liquid Product** from the DeltaV™ FBxConnect™ main menu. The Liquid Product display opens.
2. Select the **Liquid Factors** button. The Liquid Product – Liquid Factors pop-up display opens.
3. Select the **Liquid Factors Import Export** button. The Liquid Factors Import Export pop-up display opens.

**Figure 226. Gas Component Import Export**



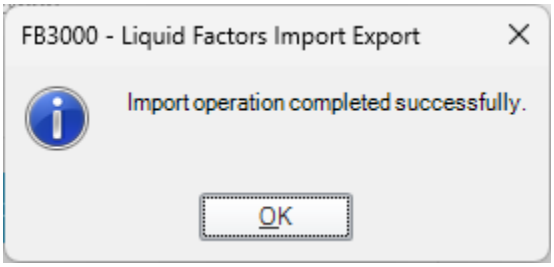

4. Select the **Import CSV** button. The Open csv File window opens.

**Figure 227. Open csv File**



5. Navigate to location of your liquid factors CSV file, highlight the file, and select **Open**.
6. A confirmation message displays after importing the CSV file. Select **OK** to complete the process.

**Figure 228. Import Successful**




### 4.14.2.2 Exporting Liquid Factor CSV Files

You can export CSV files to your computer that contain the current liquid factor values used by your FB Series product. You can then modify the files on your computer or import them into another device. You can export liquid factor values to one CSV file that contains information for all liquid linear meter instances or export separate CSV files for each instance.

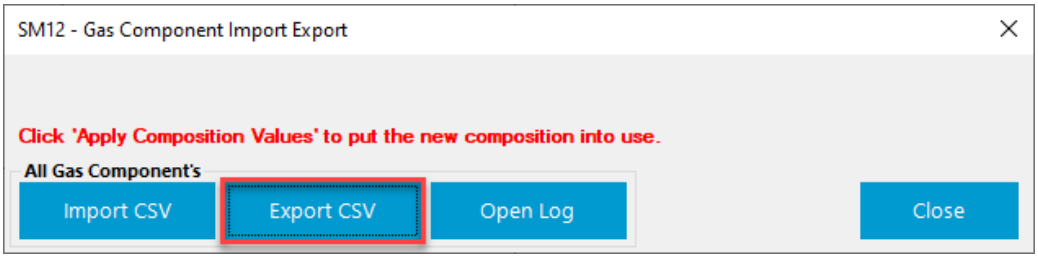
**Note**

- For more information about creating your own liquid factor CSV files, refer to Creating Liquid Factor CSV Files.
- For more information about importing CSV files that contain liquid factor values, refer to Importing Liquid Factor CSV Files.
- Never modify the column names or the order in an exported CSV file.

To export liquid factor CSV files:

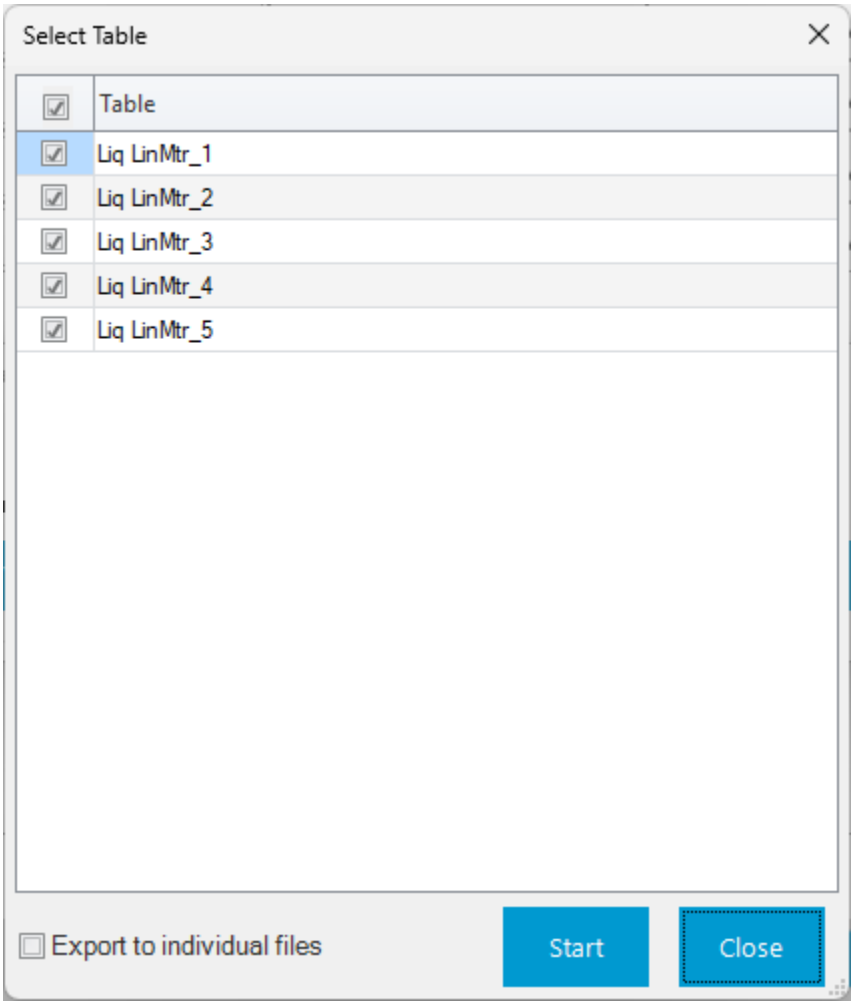
1. Select **Configure > Liquid > Liquid Product** from the DeltaV™ FBxConnect™ main menu. The Liquid Product display opens.
2. Select the **Liquid Factors** button. The Liquid Product – Liquid Factors pop-up display opens.
3. Select the **Liquid Factors Import Export** button. The Liquid Factors Import Export pop-up display opens.

**Figure 229. Gas Component Import Export**




4. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 230. Select Table**



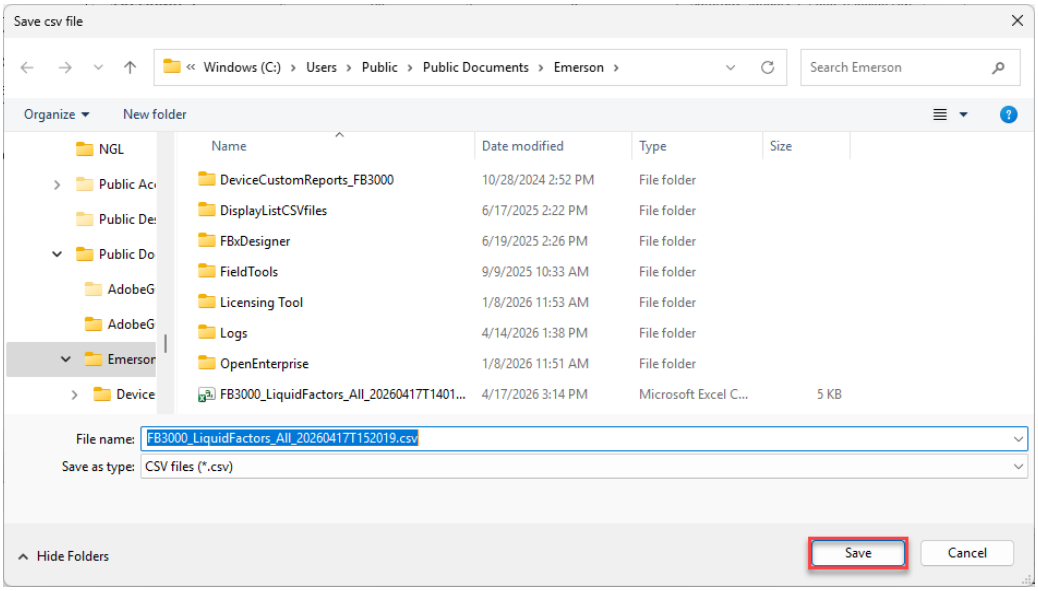

5. Place a check mark next to each Liquid Linear Meter instance you want to export.

**Note**

By default, the FB Series device exports all Liquid Linear Meter instances to a single CSV file. Place a check mark next to **Export to individual file** to export separate CSV files for each selected Liquid Linear Meter instance.

6. Select **Start**. A Save csv file windows opens.

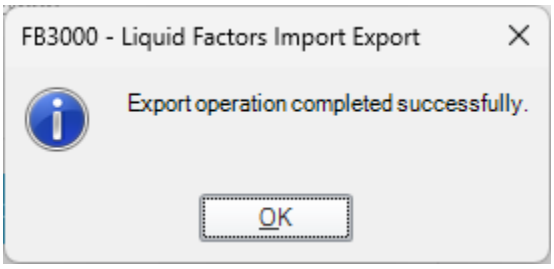
**Figure 231. Save csv file**




7. Navigate to the folder where the Gas Component CSV files will be saved and select **Save** to begin the export process.

8. When the process completes, a confirmation dialog opens. Select **OK**.

**Figure 232. Confirmation**



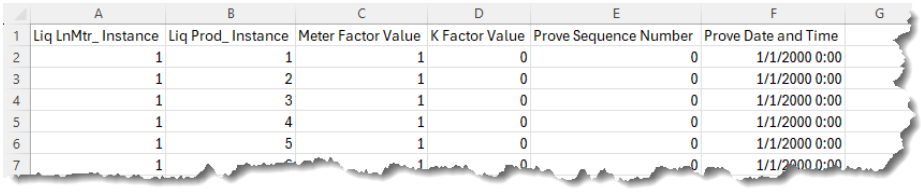
### 4.14.2.3 Creating Liquid Factor CSV Files

You can create CSV files that contain your liquid factor values on your computer and then import the CSV files for use in the FB Series product. If your liquid factor configuration contains a large number of instances, it may be easier to create CSV files on your computer than it is to configure each liquid factor individually in DeltaV™ FBxConnect. You can create either one CSV file that contains information about all liquid linear meter instances or separate CSV files for each instance.

**Note**

The easiest way to begin creating a custom map is to export liquid factor CSV files that contain the current values and then edit that file. For more information about exporting a Liquid Factor CSV file, refer to Exporting Liquid Factor CSV Files.

**Figure 233. Example Liquid Factor CSV Format**



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Liq LnMtr_ Instance | Liq Prod_ Instance | Meter Factor Value | K Factor Value | Prove Sequence Number | Prove Date and Time | |
| 2 | 1 | 1 | 1 | 0 | 0 | 1/1/2000 0:00 | |
| 3 | 1 | 2 | 1 | 0 | 0 | 1/1/2000 0:00 | |
| 4 | 1 | 3 | 1 | 0 | 0 | 1/1/2000 0:00 | |
| 5 | 1 | 4 | 1 | 0 | 0 | 1/1/2000 0:00 | |
| 6 | 1 | 5 | 1 | 0 | 0 | 1/1/2000 0:00 | |
| 7 | 1 | | 1 | 0 | 0 | 1/1/2000 0:00 | |

To create CSV files that contain liquid factor values:

1. Open a blank spreadsheet (or open a previously exported liquid factor CSV file).
2. Review – and change as necessary – the values for each CSV file according to the tables below:

| Column Heading | Description |
|---|---|
| **Liq LnMtr_Instance** | Enter the liquid meter associated with the liquid product and meter factor/K-Factor entered in this row. |
| **Liq Prod_Instance** | Enter the liquid product associated with the liquid meter and meter factor/K-Factor entered in this row. |
| **Meter Factor Value** | Enter the meter factor value associated with the liquid meter instance and liquid product entered in this row. |
| **K Factor Value** | Enter the K-Factor value associated with the liquid meter instance and liquid product entered in this row. |

| Column Heading | Description |
|---|---|
| **Prove Sequence Number** | Enter the prove sequence number for the meter factor/K-Factor entered in this row. |
| **Prove Date and Time** | Enter the date and time of the proved meter factor/K-Factor entered in this row using the following format: MM/DD/YYYY HH:MM |

3. Save your changes. You can now import your liquid factor CSV files for use in your FB Series product. For more information, refer to Importing Liquid Factor CSV Files.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.15 Liquid Density

Use this display to configure liquid density inputs. For the **DeltaV FB3000 RTU**, you can configure up to 12 Liquid Density instances.

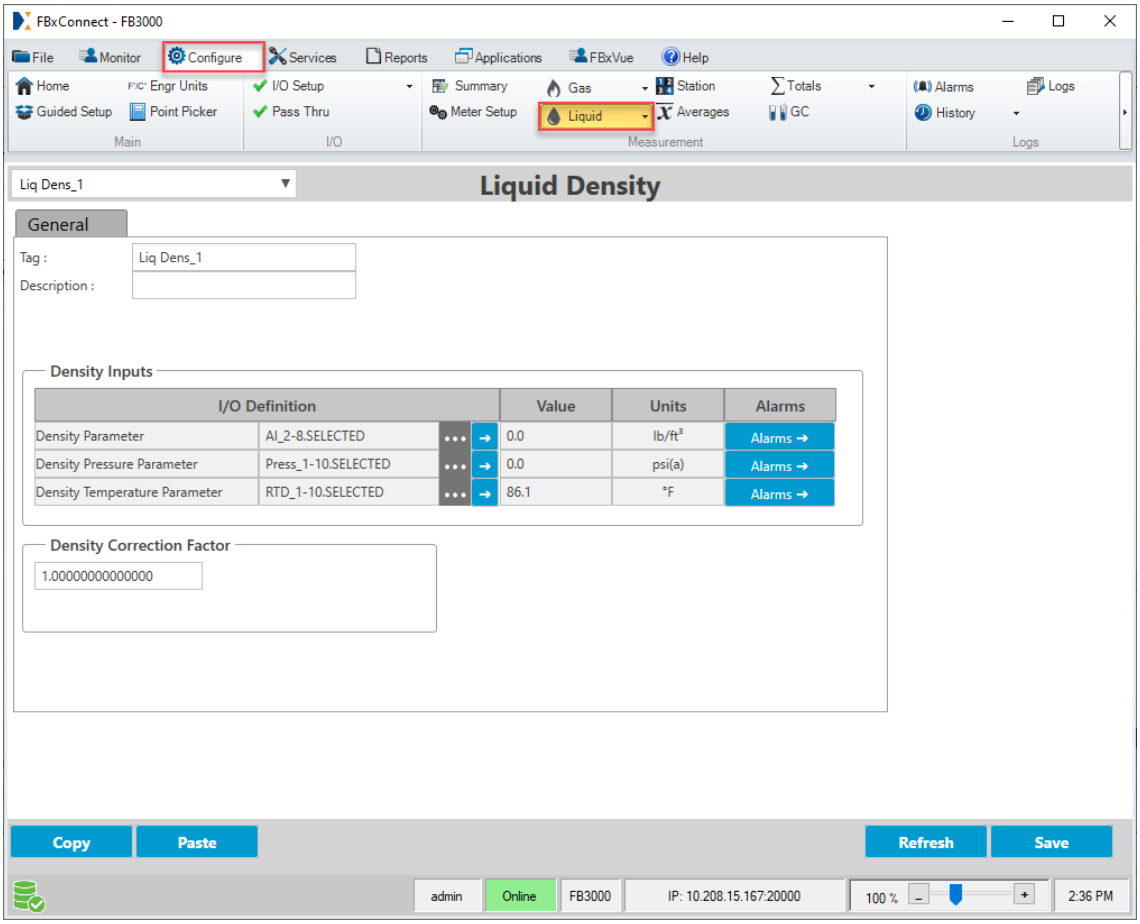
**Note**

- If you select **Station Header Density** in the **Density Option** field on the Station – General display, then you **must** configure the **Density Parameter** field.
- The **Density Pressure Parameter** and **Density Temperature Parameter** fields are **optional**, but a property calculation alarm is raised at any associated liquid linear meter if the **Density Temperature Parameter** is **Undefined**.

To access this display:

1. Select **Configure > Liquid > Liquid Density** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a liquid density instance to configure.

**Figure 234. Liquid Density**




**3.** Review the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected product instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected product instance. |

| Field | Description | |
|---|---|---|
| **Density Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density input to use for the selected Liquid Density instance.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure > Alarms display for the User Data value. |

| Field | Description | |
|---|---|---|
| **Density Pressure Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density pressure input to use for the Liquid Density instance.<br>If you select a **Press object**, the firmware determines the pressure input type (absolute or gauge) directly from the sensor.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• Press object – SELECTED VALUE<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>• The value is assumed to be in the same units (psi, kPa, etc.) selected for the associated station.<br>• When you select a parameter without explicit units, the value is assumed to be gauge pressure. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description | |
|---|---|---|
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the Configure > Alarms display for the User Data value. |
| **Density Temperature Parameter** | **I/O Definition** | Click ••• to open a Point Picker dialog and select the density temperature input to use for the Liquid Density instance.<br>**Note**<br>Only an object is chosen, and the parameter is determined by the system based on the type of object.<br>• AI object – SELECTED VALUE<br>**Note**<br>You must first configure an AI instance to use the correct measurement type before it is visible in the Point Picker. For more information, refer to AI.<br>• RTD object – SELECTED VALUE<br>• User Data – You can manually select any parameter. For more information, refer to User Data.<br>**Note**<br>The value is assumed to be in the same units selected for the associated station. |
| | **Value** | This **read-only** field shows the value currently used in calculations based on the selected options.<br>**Note**<br>If you select a **User Data** object, enter a value to use for the selected parameter. |
| | **Units** | This **read-only** field shows the engineering units used for the selected input. |

| Field | Description | |
|---|---|---|
| | **Alarms** | Click to open the Alarms display and configure the alarm currently assigned to the input.<br>**Note**<br>This selection is **not available** if you select a **User Data** object; however, you can configure an alarm object separately on the **Configure > Alarms** display for the User Data value. |
| **Density Correction Factor** | Sets the multiplier value to correct the observed density provided by a pycnometer or similar device. The Density Correction Factor (sometimes referred to as DCF) is a unitless scaler used to adjust the density referenced by the density parameter. | |

4. Select **Save** to save any changes you make to this tab.

# 4.16 Station

Use this display to configure parameters for stations. The FB Series product organizes meter runs into stations. The meter runs can be grouped among the stations in any combination based on the type of fluid being measured (natural gas or liquid). You should configure stations before you configure meter runs.

Meters are assigned to stations on the DP Meter, Linear Meter, and Liquid Linear Meter displays. Meter runs belong in the same station when they have the same gas data, calculation methods, and base/contract conditions. Each station may be given a unique Tag and Description.

To access this display, select **Configure > Station** from the DeltaV FBxConnect configuration software main menu.

**Figure 235. Configure – Station**




The Station display contains the following items:

General – Use this display to configure general station parameters, including the contract date/time, compressibility/density calculation, and base temperature/pressure.

Batching – Use this pop-up display to configure options related to batching, including the batch identifier, and batch start and end triggers.

Transaction History Log Options – Use this pop-up display to configure transaction history logging options.

Advanced – Use this pop-up display to configure advanced station options, including location of the station, water content of the fluid flowing through the meters, and heating value parameters.

Rates & Totals – Use this pop-up display to view flow rates and accumulations for the selected station.

### 4.16.1 Station – General

Use this display to configure general station parameters, including the contract date/time, compressibility/density calculation, and base temperature/pressure.

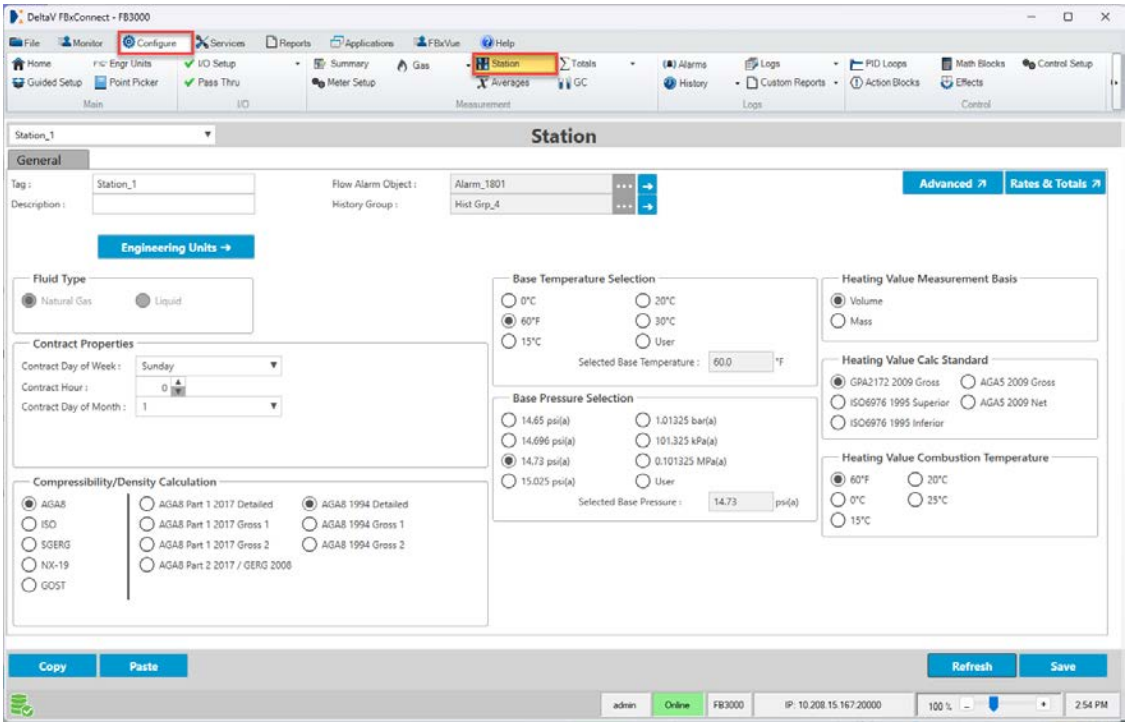
**Note**

The fields shown on this display vary based on the selected fluid type.

To access this display:

1. Select **Configure > Station** from the DeltaV FBxConnect configuration software main menu. The Station display opens.
2. Click ▼ in the drop-down list at the top of the display and select a Station instance to configure.

**Figure 236. Station – General (Natural Gas Station shown)**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Operation Status** | This **read-only** field shows the current state of the batch. Possible values are Batch Idle or Batch Active.<br>**Note**<br>• This field applies **only** for Stations with a **Fluid Type** of **Liquid**.<br>• For more information about starting or stopping a batch, refer to the Station – Batching display. |

| Field | Description |
|---|---|
| **Engineering Units** | Click to open the Engineering Units display and configure the engineering units used by the station for measurements.<br>**Note**<br>Changes to engineering units are written to all meters assigned to the selected station even if the meters have previously been configured. For the DeltaV FB3000 RTU, refer to Configure – Summary to view your meter station assignments. |
| **Flow Alarm Object** | This **read-only** field shows which alarm is associated with the selected station. Select → to open the Alarms display and configure the alarm. When you have finished configuration options, select ◀ to return to this display. |
| **History Group** | This **read-only** field shows which history group is associated with the selected station. The history group you select determines the contact hour and which history group is used to record average and periodic data for this station. Select → to open the Group Configuration display and configure the history group. When you have finished configuration options, select ◀ to return to this display.<br>**Note**<br>• If an error occurs reading the contact hour and/or history group settings, an event is logged and totalization continues using default contract settings.<br>• At the end of each reporting period, the station checks to see if the station historic data was correctly recorded. If there is an error, the system logs a **No Response From History** event to the Event log. |

| Field | Description |
|---|---|
| **Liquid Product Reference** | Sets the Liquid Product instance associated with the selected station. Click ••• to open a Point Picker dialog and choose the liquid product instance used by the selected station. Select → to open the Liquid Product display and configure the liquid product. When you have finished configuration options, select ◀ to return to this display.<br>**Note**<br>This field appears **only** for Stations with a **Fluid Type** of **Liquid**. |
| **Header Density Object** | Sets the Liquid Density instance associated with the selected station. Click ••• to open a Point Picker dialog and choose the liquid density instance used by the selected station. Select → to open the Liquid Density display and configure the liquid density parameters. When you have finished configuration options, select ◀ to return to this display.<br>**Note**<br>This field appears **only** for Stations with a **Fluid Type** of **Liquid** and a **Density Option** set to **Station Header Density**. |
| **Advanced** | Select this button to open the Station – Advanced pop-up display and configure advanced station options, including location of the station, water content of the fluid flowing through the meters, and heating value parameters. |
| **Batching** | Select this button to open the Station – Batching pop-up display and configure options related to batching, including the batch identifier, batch start and end triggers, and transaction history logging options.<br>**Note**<br>This button shows **only** for **liquid stations** on the **DeltaV FB3000 RTU** with the **Batch Option** field set to **Enable**. |
| **Rates & Totals** | Select this button to open the Station – Rates & Totals pop-up display and view gas totals and accumulations for the selected station. |

| Field | Description | |
|---|---|---|
| **Fluid Type** | Specifies the type of fluid measured by the meters assigned to the selected station. Possible options are: | |
| | **Natural Gas** | The selected station is used to for natural gas applications. Station settings apply to all meters assigned to the station. Station rates and totals are calculated based on the differential pressure and linear meters assigned to the station. |
| | **Liquid** | The selected station is used for liquid applications. Station settings apply to all meters assigned to the station. Station rates and totals **do not** calculate based on the liquid linear meters assigned to the station. |
| | **Note**<br>This field is **read-only** if you have already assigned a meter to the selected station. In this case, you **must** first remove any meters assigned to the selected station before you are able to change the Fluid Type field. | |
| **Batch Option** | Sets the status of the batching feature on the selected station. | |
| | **Enable** | Batching **is** implemented on the selected station. |
| | **Disable** | Batching **is not** implemented on the selected station. |
| | **Note**<br>This field applies **only** for Stations with a **Fluid Type** of **Liquid**. | |
| **Contract Properties** | These fields set the time at which totals rollover and history records are logged. | |
| | **Contract Day of Week** | Click ▼ to set the day of the week at which totals rollover and history records are logged (for weekly-based reports). |
| | **Contract Hour** | Click ▼ to set the hour at which daily, weekly, and totals rollover and history records are logged (for daily-based, weekly-based, or monthly-based reports). |
| | **Contract Day of Month** | Click ▼ to set the day of the month at which totals rollover and history records are logged (for monthly-based reports). |

| Field | Description | | |
|---|---|---|---|
| **Compressibility / Density Calculation** | Sets the desired compressibility/density calculation for the selected station. Select a standard from the list on the left, and then select a version/method to use from the list on the right.<br>**Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**.<br>• Some compressibility/density standards are based on a specific set of reference conditions. For the most accurate results, ensure the reference conditions outlined below are configured based on the Compressibility/Density Calculation you select. | | |
| | **AGA8** | **AGA8 Part 1 2017 Detailed** | Property calculations performed in accordance with the detailed method provided in AGA Report No. 8 - Part 1 - 2017 Edition - Thermodynamic Properties of Natural Gas and Related Gases.<br>**Reference Conditions**<br>Any reference conditions. |
| | | **AGA8 Part 1 2017 Gross 1** | Property calculations performed in accordance with the Gross 1 method provided in AGA Report No. 8 - Part 1 - 2017 Edition - Thermodynamic Properties of Natural Gas and Related Gases.<br>**Reference Conditions**<br>Any reference conditions.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **AGA8 Part 1 2017 Gross 2** | Property calculations performed in accordance with the Gross 2 method provided in AGA Report No. 8 - Part |

| Field | Description | | |
|---|---|---|---|
| | | | 1 - 2017 Edition - Thermodynamic Properties of Natural Gas and Related Gases.<br>**Reference Conditions**<br>Any reference conditions.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **AGA8 Part 2 2017 / GERG 2008** | Property calculations performed in accordance with AGA Report No. 8 - Part 2 - 2017 Edition - Thermodynamic Properties of Natural Gas and Related Gases GERG–2008 Equation of State.<br>**Reference Conditions**<br>Any reference conditions.<br>**Note**<br>AGA8 2017 Part 2 / GERG 2008 can be used for both natural gas and pure gas measurement. For more information about pure gas measurement, refer to Measuring Pure Gas. |
| | | **AGA8 Part 1 1994 Detailed** | Property calculations performed in accordance with the detailed method provided in AGA Report No. 8 1994 Edition – Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases.<br>**Reference Conditions**<br>Any reference conditions. |

| Field | Description | | |
|---|---|---|---|
| | | **AGA8 Part 1 1994 Gross 1** | Property calculations performed in accordance with the Gross 1 method provided in AGA Report No. 8 1994 Edition – Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases.<br>**Reference Conditions**<br>Any reference conditions.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **AGA8 Part 1 1994 Gross 2** | Property calculations performed in accordance with the Gross 2 method provided in AGA Report No. 8 1994 Edition – Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases.<br>**Reference Conditions**<br>Any reference conditions.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | **ISO** | **ISO12213-2 2006** | Property calculations performed in accordance with the method provided in ISO12213 Part 2 2006 Edition – Natural Gas - Calculation of compression factor - Part 2: Calculation using molar-composition analysis. |

| Field | Description | | |
|---|---|---|---|
| | | | **Reference Conditions**<br>Any reference conditions. |
| | | **ISO12213-3 2006 CV/RD/CO2/H2 (Pref)** | Property calculations performed in accordance with the preferred method using heating value, relative density, mole % CO2 and mole % H2 provided in ISO12213 Part 3 2006 Edition – Natural gas - Calculation of compression factor - Part 3: Calculation using physical properties.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>• The **Heating Value Combustion Temperature** field is set to **25°C**. |
| | | **ISO12213-3 2006 N2/CV/RD/H2 (Set B)** | Property calculations performed in accordance with the method using physical property set B (heating value, relative density, mole % N2 and mole % H2) provided in ISO12213 Part 3 2006 Edition – Natural gas - Calculation of compression factor - Part 3: Calculation using physical properties.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**. |

| Field | Description | |
|---|---|---|
| | | • The **Heating Value Combustion Temperature** field is set to **25°C**. |
| | **ISO12213-3 2006 N2/CO2/RD/H2 (Set C)** | Property calculations performed in accordance with the method using physical property set C (relative density, mole % N2, mole % CO2 and mole % H2) provided in ISO12213 Part 3 2006 Edition – Natural gas - Calculation of compression factor - Part 3: Calculation using physical properties.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**. |
| | **ISO12213-3 2006 N2/CO2/CV/H2 (Set D)** | Property calculations performed in accordance with the method using physical property set D (heating value, mole % N2, mole % CO2 and mole % H2) provided in ISO12213 Part 3 2006 Edition – Natural gas - Calculation of compression factor - Part 3: Calculation using physical properties.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>• The **Heating Value Combustion Temperature** field is set to **25°C**. |

| Field | Description | | |
|---|---|---|---|
| | **SGERG** | **SGERG 1991 CV/RD/CO2/H2 (Std)** | Property calculations performed in accordance with the standard method using heating value, relative density, mole % CO2 and mole % H2 provided in “Simplified GERG Virial Equation for Field Use” published 1991.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>• The **Heating Value Combustion Temperature** field is set to **25°C**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **SGERG 1991 CV/RD/N2/H2** | Property calculations performed in accordance with the alternative method using heating value, relative density, mole % N2 and mole % H2 provided in “Simplified GERG Virial Equation for Field Use” published 1991.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**. |

| Field | Description | |
|---|---|---|
| | | • The **Heating Value Combustion Temperature** field is set to **25°C**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | **SGERG 1991 RD/N2/CO2/H2** | Property calculations performed in accordance with the alternative method using relative density, mole % N2, mole % CO2 and mole % H2 provided in “Simplified GERG Virial Equation for Field Use” published 1991.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | **SGERG CV/N2/CO2/H2** | Property calculations performed in accordance with the alternative method using heating value, mole % N2, mole % CO2 and mole % H2 provided in “Simplified GERG Virial Equation for Field Use” published 1991.<br>**Reference Conditions** |

| Field | Description | | |
|---|---|---|---|
| | | | • The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>• The **Heating Value Combustion Temperature** field is set to **25°C**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | **NX-19** | **NX19 1962 (Z VDI/VDE)** | Fpv calculation based on PAR Research Project NX-19 1962, Zf calculation based on VDI/VDE modification of NX-19.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **60°F**.<br>• The **Base Pressure Selection** field is set to **14.73 psi(a)**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **NX-19 1962 (Z Miller)** | Fpv calculation based on PAR Research Project NX-19 1962, Zf calculation based on Flow Measurement Engineering Handbook by Richard W. Miller.<br>**Reference Conditions** |

| Field | Description | | |
|---|---|---|---|
| | | | • The **Base Temperature Selection** field is set to **60°F**.<br>• The **Base Pressure Selection** field is set to **14.73 psi(a)**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **NX-19 Mod** | Fpv and Zf calculation based on "Correction of the AGA NX-19 Mod Data Processing System for Real Gas Factors of type H Natural Gas" published in 1982.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**.<br>**Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | | **NX-19 VDI/VDE** | Fpv and Zf calculation based on "VDI/VDE 2040 Part 2" published in 1987.<br>**Reference Conditions**<br>• The **Base Temperature Selection** field is set to **0°C**.<br>• The **Base Pressure Selection** field is set to **1.01325 bar**. |

| Field | Description | | |
|---|---|---|---|
| | | | **Note**<br>The real heating value and real relative density base compressibility are calculated using your selection in the **Heating Value Calc Standard** field. |
| | **GOST** | **GOST 30319.3 2015** | Property calculations (Density, Isentropic Exponent, Compressibility, Speed of Sound) performed in accordance with *GOST 30319.3-2015 Natural Gas – Methods of Calculation of Physical Properties Based on Component Composition*. Joule Thompson is calculated in accordance with AGA 8 Part 1 2017 Detailed.<br>**Reference Conditions**<br>Any reference conditions |
| **Crude Oil Options** | Sets the flow calculation methodology used to calculate crude oil, crude oil byproducts, and water quantities. Possible options are:<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Liquid** and a **Liquid Product Type** of **Crude Oil** (defined on the Liquid Product display). | | |
| | **API Ch.12.2** | Meters assigned to the selected station use API Ch. 12.2 for liquid measurement. This standard is typically used for custody transfer but can also be utilized for crude oil allocation applications. For crude oil, the standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes. The same calculation is used for refined products and lubricating oils with % water set to 0.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, gross standard volume, net standard volume, water volume, | |

| Field | Description | | |
|---|---|---|---|
| | | | and mass. CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6.<br>**Note**<br>The associated Station provides flow rates and accumulations representing gross volume, net standard volume, water volume, and mass. |
| | **API Ch. 20.1** | | Meters assigned to the selected station use API Ch. 20.1 standard for allocation measurement. The standard handles unstable crude oil and/or higher water cases. The standard is partitioned by its water volume correction methodology. |
| | | **Use Oil Correction Factor for Water** | Meters assigned to the selected station use API Ch. 20.1 Procedure A for oil measurement. The standard assumes a low amount of water in the measured fluid and treats the water stream as an oil for volume correction purposes. API Ch. 20.1 2016 suggests using this method when the sediment and water is generally **less** than 5.0 percent.<br>The meter calculates the same quantities as the API Ch. 12.2 Custody Transfer Meter, but a shrinkage factor is applied to the gross standard volume. If the shrinkage factor includes a correction for temperature, the CTL should be set to override mode with a value of 1.0, otherwise it should be set to calculated mode. If pressure correction is included in the SF or pressure correction is not required, CPL should be set to override mode at 1.0, otherwise CPL should be set to calculated mode. |

| Field | Description | | |
|---|---|---|---|
| | | | CTPL is calculated as the product of the rounded CTL and CPL, which is in turn rounded as per correction factors in API Ch 12.2 Table 6. The water fraction is calculated using the in-use CSW.<br>**Note**<br>Station quantity calculations are **not** supported for allocation meters. |
| | | **Use Separate Correction Factor for Water** | Meters assigned to the selected station use API Ch. 20.1 Procedure C for oil measurement. The oil and water have separate volume correction factors and are split before volume correction is applied. API Ch. 20.1 2016 suggests using this method when the sediment and water is generally **greater** than 5.0 percent.<br>The meter calculates flow rates and accumulations representing indicated quantity, gross volume, oil unshrunk volume, net standard volume, water metered volume and water net volume. Additionally, a flash gas net volume and an NGL net volume may be calculated by entering an override flash gas factor and NGL factor.<br>The correction factor for the oil is entered via an override or external shrinkage factor (SF). The Shrinkage Factor is assumed to include any correction for shrinkage, temperature, and pressure. CTL, CPL, CTPL, CCF and CSW are assumed to be 1.0. The correction factor for water is |

| Field | Description | |
|---|---|---|
| | | calculated according to API Ch. 20.1 A.1 2016.<br>**Note**<br>The flow calculation uses unrounded correction factors. Station quantity calculations are **not** supported for allocation meters. |
| **Base Temperature Selection** | Sets the flow measurement Base Temperature specified in the gas contract. The temperature units are in degrees Fahrenheit or degrees Celsius.<br>**Note**<br>Select **User** to enter a custom temperature value. | |
| **Selected Base Temperature** | This **read-only** field shows the current Base Temperature value used in calculations. | |
| **Base Pressure Selection** | Sets the flow measurement Base Pressure specified in the gas contract. The pressure units are in psi(a) or kPa.<br>**Note**<br>• Select **User** to enter a custom pressure value.<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Selected Base Pressure** | This **read-only** field shows the current Base Pressure value used in calculations.<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Heating Value Measurement Basis** | Sets the option to have the heating (calorific) values represented on a volume basis or a mass basis. | |
| | **Volume** | Heating (calorific) value represents energy of combustion per unit volume at base conditions and specified combustion reference conditions, units determined by Volume Heating Value units. Energy is calculated from SVOL. |
| | **Mass** | Heating (calorific) value represents energy of combustion per unit mass and specified combustion |

| Field | Description |
| --- | --- |
| | reference conditions, units determined by Mass Heating Value units. Energy is calculated from MASS. |
| | **Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. |

| | |
|---|---|
| **Heating Value Calc Standard** | Sets the calculation standard used in heating value, relative density of the gas to air, and Wobbe Index calculations. Options are GPA 2172 2009 Gross, ISO 6976 1995 Superior, ISO 6976 1995 Inferior, AGA5 2009 Gross, and AGA5 2009 Net.<br>**Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas.**<br>• GPA 2172 2009 uses GPA 2145 2016.<br>• ISO 6976 1995 Superior and ISO 6976 1995 Inferior use the base compressibility (Zb) value calculated per ISO 6976 in the heating value calculation when base temperature selection is 0°C, 15°C, or 20°C; in these cases a base pressure of 1.01325 bar is used for the real Heating Value and Real Relative density. For other base temperature selections, the selected Zb from the compressibility calculation is used. The base pressure for combustion is always 1.01325 bar.<br>• If the base compressibility method is dependent upon the Heating value or relative density, GPA 2172 uses the Base Compressibility using the GPA 2172 2009 method. Otherwise, GPA 2172 2009 uses the Selected Base Compressibility value found on the Fluid Properties – Advanced display in the heating value calculation.<br>• If the base compressibility method is dependent upon the heating value or relative density, then GPA 2172 2009 Gross, AGA5 2009 Gross, and AGA5 2009 Net use the base compressibility from their respective internal compressibility method. Otherwise, GPA 2172 2009 Gross, AGA5 2009 Gross, and AGA5 2009 Net use the Selected Base Compressibility value found on the Fluid Properties – Advanced display in the heating value calculation.<br>• Although AGA5 says the base temperature and the combustion temperature shall be the same, the calculation will handle any base temperature and combustion temperature combination.<br>• Since the components Benzene and Toluene are not included in AGA5, their properties are calculated separately. This calculation closely follows *Example Process for Supporting Additional Compounds* in Appendix A of AGA5 2009. |

| Field | Description |
|---|---|
| | • The AGA5 2009 Net (Inferior / Lower) heating value option assumes that the water formed in the combustion reaction remains in the ideal (gaseous) state. The AGA5 2009 Gross (Superior / Higher) heating value option assumes that water formed in the combustion reaction condenses totally to the liquid state. For fiscal measurement applications, the gross heating value is more commonly used. |
| **Heating Value Combustion Temp** | Temperature at which the heating value was determined (Energy measured with reactants at this temperature prior to combustion and products returned to this temperature after combustion).<br>**Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**.<br>• GPA 2172 **only** supports heating value combustion temperatures of 60°F and 15°C. If you select a heating value combustion temperature of 0°C, 20°C or 25°C, then the heating value is calculated using a heating value combustion temperature of 15°C and base pressure selection of 101.325 kPa. |
| **Density Option** | Sets the source of the density values used in volume correction calculations. Possible options are: |
| | **Station Base Density**: Use the static density value you define for the Liquid Product instance you select in the **Liquid Product Reference** field. No densitometer is at the meter. A base to alternate calculation occurs using the meter temperature and pressure as the alternate conditions.<br>**Note**<br>If the base density and temperature units are different than the station's base conditions, the system converts the value to the station's base conditions. |
| | **Meter Observed Density**: Use the dynamic density value measured at the meter by a densitometer. You configure the densitometer in the **Meter Density Parameter** field on the Liquid Linear Meter – General display. The observed to base density calculation uses the meter temperature and |

| Field | Description | |
|---|---|---|
| | | pressure as the observed density conditions. In most cases where the meters have individual live density measurement, there is only one temperature measurement and one pressure measurement to cover both the density and the meter. This means that the meter density is set equal to the observed density and only an observed to base calculation is performed. |
| | **Station Header Density** | Use the dynamic density value measured at the station/header (with header temperature and pressure). You configure the measurement source in the **Header Density Object** field.<br>This selection performs an observed to base density calculation assuming the density, pressure, and temperature values referenced by the Header Density Object are at observed density conditions. The resulting station base density is used to perform a base to alternate calculation at each meter using the meter temperature and pressure as the alternate conditions. If the pressure is not measured at the station header, then the pressure parameter is undefined and the observed pressure is assumed to be at 0 psig. Similarly, if the temperature is not measured at the station header, then the temperature parameter is undefined and the temperature is assumed to be at the station base temperature.<br>An alarm is raised if there is no Header Density Object assigned to the station or if the Header Density Object's temperature or density is Undefined. Any parameter referenced via the Header Density Object that has no engineering unit is assumed to use the same engineering units as the station. If the pressure has no units, it is assumed to be gauge. |
| | **Note**<br>This field appears **only** for Stations with a **Fluid Type** of **Liquid**, a **Liquid Product Type** of either **Light Hydrocarbon** or **Crude Oil** | |

| Field | Description |
|---|---|
| | (defined on the Liquid Product display), and one of the following options selected in the **Crude Oil Options** field:<br>• **API Ch. 12.2**<br>• **API Ch. 20.1** and **Use Oil Correction Factor for Water** |
| **In Use Values** | These **read-only** fields show the density values used in the volume correction calculations.<br>**Note**<br>• These fields appear **only** for Stations with a **Fluid Type** of **Liquid** and a **Density Option** set to either **Station Header Density** or **Station Base Density** (Selected Density **only**).<br>• The **Header Density** value is calculated as the observed header density (from the object you select in the **Header Density Object** field) multiplied by the density correction factor (configured on the Liquid Density display). |

4. Select **Save** to save any changes you make to this tab.

## 4.16.2 Station – Batching

Use this pop-up display to configure options related to batching, including the batch identifier, and batch start and end triggers.

**Note**

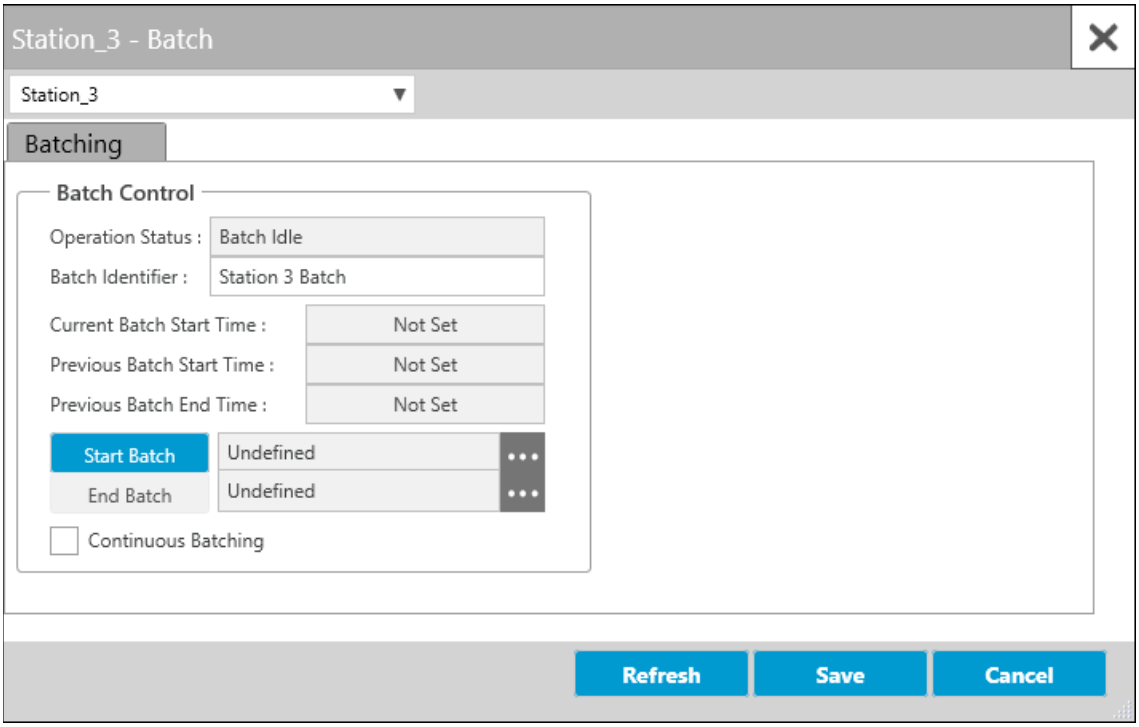
- This tab shows **only** for liquid stations with the **Batch Option** field set to **Enable** (set on the Station – General display).
- There are multiple ways to start/end a batch:
  - Use the **Start**/**End Batch** buttons available on the DeltaV FBxConnect configuration software display.
  - Write a value of 1 to the command parameters (Station_x.BATCH_START_CMD or Station_x.BATCH_END_CMD) from an application or from a SCADA/HMI.
  - Assign any numeric parameter using the point picker and set the value of the assigned parameter to a non-zero value. For example, use a push button wired to a DI.
- All batch commands and trigger parameters are reset to zero after each calculation cycle.

- Only valid commands are executed. For example, you can only start a batch if it is currently idle and only end a batch if it is currently running.

To access this pop-up display:

1. Select **Configure > Station** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a station to configure.
3. Select the **Batching** button. The Station – Batching pop-up display opens.

**Figure 237. Station – Batching**




4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Operation Status** | This **read-only** field shows the current state of the selected batch. |
| **Batch Identifier** | Sets an identifier (up to 20-alphanumeric characters) for the selected batch. The batch identifier is recorded with every batch transaction. It is also recorded with a period that is configured to 'break with batch' when the batch is active. |

| Field | Description |
|---|---|
| **Current Batch Start Time** | This **read-only** field shows the date and time that the current batch was started. If the **Operation Status** field shows **Batch Idle**, then this field shows **Not Set**. |
| **Previous Batch Start Time** | This **read-only** field shows the date and time that the previous batch was started. This field shows **Not Set** until the first batch has completed. |
| **Previous Batch End Time** | This **read-only** field shows the date and time that the previous batch was ended. This field shows **Not Set** until the first batch has completed. |
| **Start Batch** | Select this button to start a batch. Click ••• to open a Point Picker dialog and select a numeric read/write parameter used by an external input to start a batch when the value is non-zero.<br>**Note**<br>If you select a parameter, a non-zero value is interpreted as a command and a zero value is interpreted as an idle state. After reading a non-zero value and taking the specified action (start or end), the DeltaV FB3000 resets the command by setting the parameter back to 0 if the parameter selected is a R/W parameter. If you select a discrete input, it is recommended that the discrete input is configured as latched. After reading an “on” status from the discrete input and taking the specified action (start or end), the DeltaV FB3000 sends a reset latch command to the discrete input. |
| **End Batch** | Select this button to end a batch. Click ••• to open a Point Picker dialog and select a numeric read/write parameter used by an external input to end a batch when the value is non-zero.<br>**Note**<br>If you select a parameter, a non-zero value is interpreted as a command and a zero value is interpreted as an idle state. After reading a non-zero value and taking the specified action (start or end), the DeltaV FB3000 resets the command by setting the parameter back to 0 if the parameter selected is a R/W parameter. If you select a discrete input, it is recommended that the discrete input is configured as latched. After reading an “on” status from the discrete input and taking the specified action (start or end), the DeltaV FB3000 sends a reset latch command to the discrete input. |

| Field | Description |
|---|---|
| **Continuous Batching** | Select to enable the next batch to begin as soon as the current batch is ended. |

5. Select **Save** to save any changes you make to this display.

## 4.16.3 Station – Transaction History Log Options

Use this pop-up display to configure transaction history logging options.

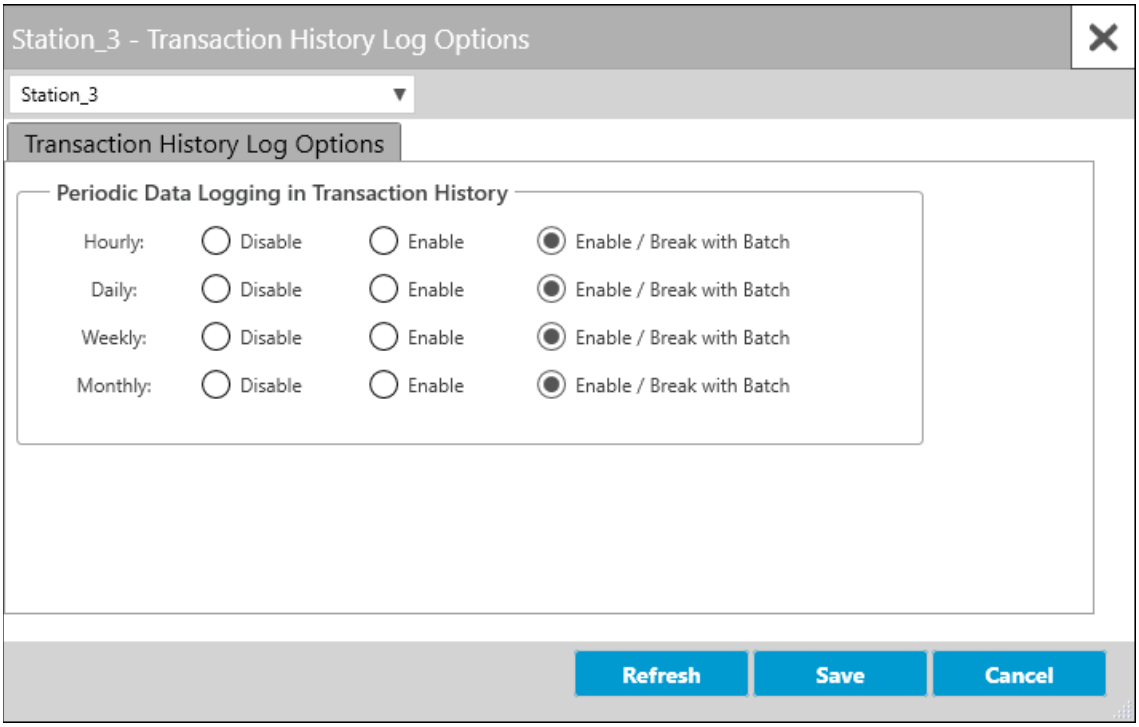
**Note**

This pop-up display shows **only** for stations on the DeltaV FB3000 RTU with the **Fluid Type** field set to **Liquid** on the Station – General display.

To access this pop-up display:

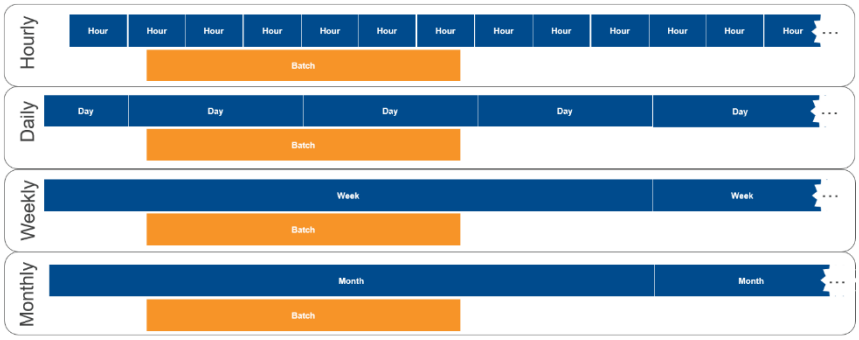
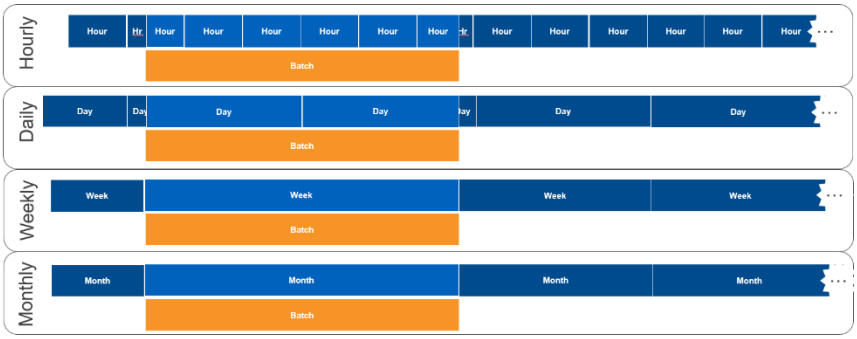
1. Select **Configure > Station** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a station to configure.
3. Select the **Log Options** button. The Station – Transaction History Log Options pop-up display opens.

**Figure 238. Station – Transaction History Log Options**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Periodic Data Logging in Transaction History** | Sets if standard periodic history is logged along with liquid batch transactions. Possible options for each period (hourly, daily, weekly, monthly) are: | |
| | **Disable** | Do not log this type of periodic history in Transaction History. If configured, this data is logged in periodic history. |
| | **Enable** | Log this type of periodic history in Transaction History based on top of hour, contract hour, contract day of week and/or contract day of month. Periodic data logging is **not** affected by batch start or batch end. Transaction history groups **must** be configured and assigned at the meter level. |

| Field | Description |
|---|---|
| |  |
| **Enable / Break with Batch** | Log this type of periodic history in Transaction history as described in the "Enable" option above, and also log when a batch starts and when a batch ends. Transaction history groups **must** be configured and assigned at the meter level. |
| |  |

5. Select **Save** to save any changes you make to this display.

## 4.16.4 Station – Advanced

Use this pop-up display to configure advanced station options, including location of the station, water content of the fluid flowing through the meters, and heating value parameters.

**Note**

The fields shown on this display vary based on the selected fluid type.

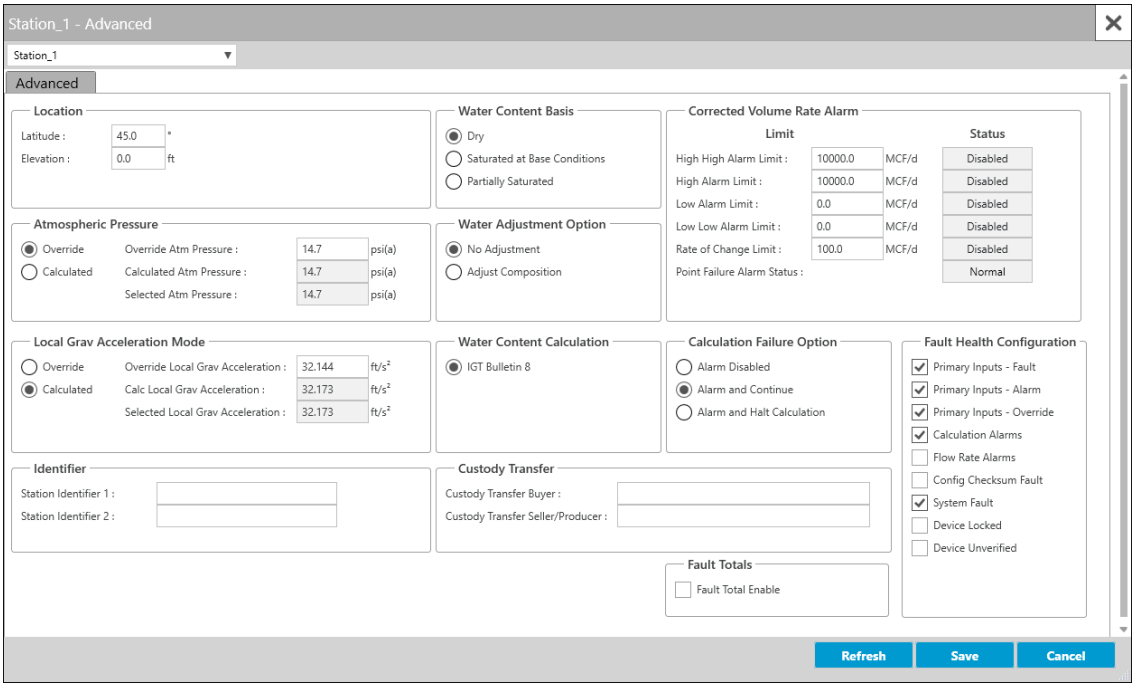
To access this pop-up display:

1. Select **Configure > Station** from the DeltaV FBxConnect configuration software main menu.

2. Click ▼ in the drop-down list at the top of the display and select a station to configure.

3. Select the **Advanced** button. The Station – Advanced pop-up display opens.

**Figure 239. Station – Advanced (Natural Gas Station shown)**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Latitude** | Specifies the geographic latitude of the metering location. The units are in degrees and minutes, separated by a decimal point. For example: 46.15. | |
| **Elevation** | Specifies the elevation or altitude of the metering location. The units are in feet or meters. | |
| **Atmospheric Pressure** | Sets how the system acquires the atmospheric pressure value used in calculations. Possible options are: | |
| | **Override** | The system uses a value you define in the **Override Atm Pressure** field. |
| | **Calculated** | The system calculates the atmospheric pressure value. |
| **Override Atm Pressure** | Sets a value to use for the atmospheric pressure in calculations when **Override** is selected in the **Atmospheric Pressure** field. | |

| Field | Description | |
|---|---|---|
| **Calculated Atm Pressure** | This **read-only** field shows the atmospheric pressure value as calculated by the system using AGA3 2012. | |
| **Selected Atm Pressure** | This **read-only** field shows the current atmospheric pressure value used in calculations based on the options you select. | |
| **Local Gravitation Acceleration Mode** | Sets how the system acquires the local gravitation acceleration value used in calculations. Possible options are: | |
| | **Override** | The system uses a value you define in the **Override Local Grav Acceleration** field. |
| | **Calculated** | The system calculates the local gravitation acceleration value. |
| | **Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Override Local Grav Acceleration** | Sets a value to use for the local gravitation acceleration in calculations when **Override** is selected in the **Local Gravitation Acceleration** field.<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Calc Local Grav Acceleration** | This **read-only** field shows the local gravitational acceleration value as calculated by the system.<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Selected Local Grav Acceleration** | This **read-only** field shows the current local gravitational acceleration value used in calculations based on the selected options.<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Rounding Option** | Sets the rounding applied to volume correction factors when calculating totals. Possible options are: | |
| | **No Rounding** | No rounding is applied to volume correction factors. |

| Field | Description | |
|---|---|---|
| | **Rounding Per API 12.2** | Rounding is applied to volume correction factors per API 12.2. This is the **default**.<br>When this option is selected, rounding is used for the following parameters:<br>• %S&W = XX.XX<br>• CSW = X.XXXXX<br>• CTL = X.XXXX<br>• CPL = X.XXXX<br>• MF = X.XXXX<br>• CMF = X.XXXX<br>• CCF = X.XXXX |
| | **Note**<br>This field appears **only** for stations with a **Fluid Type** of **Liquid**. | |
| **Water Content Basis** | Sets the option for assumptions about water content in the fluid. | |
| | **Dry** | Water content is set to 0. |
| | **Saturated at Base Conditions** | Water content is calculated based on the fluid being fully saturated at base temperature and pressure. |
| | **Partially Saturated** | Water content is entered by the user. |
| | **Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Water Adjustment Option** | Sets the option to adjust the composition based on water content. Possible options are: | |
| | **No Adjustment** | No adjustment is made to the in-use composition of the meters that are assigned to this station. |
| | **Adjust Composition** | Mole % water is calculated from water content and other component values are re-normalized to add up to 100% for the meters that are assigned to this station.<br>**Note**<br>In order for the adjustment to occur, you **must** also select **Full Normalization** in the Normalization |

| Field | Description | |
|---|---|---|
| | | Option field on the Components – General display for each Components instance used by meters assigned to this station. |
| | **Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Natural Gas**.<br>• This is a separate option from Water Content Basis, and you have option to obtain a value for water content for informational purposes without affecting the calculation. | |
| **Water Content Calculation** | Sets the calculation standard used in water content calculations.<br>**Note**<br>This field appears **only** for stations with a **Fluid Type** of **Natural Gas**. | |
| **Shrinkage Factor Option** | Selects how the shrinkage factor is applied to the flow calculation for all liquid meters assigned to the selected station. Possible options are: | |
| | **Apply to Gross Standard Volume** | The shrinkage factor is applied to the Gross Standard Volume (GSV) flow rate and totals as follows:<br>GSV = GV * CTL * CPL * SF<br>Since the Net Standard Volume and Sediment and Water Volume are calculated from the Gross Standard Volume, the shrinkage factor is accounted for in the Net Standard Volume and the Sediment and Water Volume is reduced. |
| | **Apply to Net Standard Volume** | The shrinkage factor is applied to the Net Standard Volume (GSV) flow rate and totals as follows:<br>NSV = GSV * (1 – SW / 100) * SF<br>The Gross Standard Volume is not reduced by the shrinkage factor. |
| | **Note**<br>• This field appears **only** for stations with a **Fluid Type** of **Liquid**, **Liquid Product Type** set to **Crude Oil**, and **Crude Oil Options** set to **API Ch. 20.1** and **Use Oil Correction Factor for Water**. | |

| Field | Description | |
|---|---|---|
| | This is otherwise referred to as the **Allocation – Low Water** use-case.<br>• Refer to Liquid Linear Meter Flow Calculations for a list of flow calculations used with different configurations. | |
| **Corrected Volume Rate Alarm** | These fields show the alarm limits and statuses of the volume rate alarms. | |
| **Calculation Failure Option** | Sets how the FB Series product responds if a calculation failure occurs. Possible options are: | |
| | **Alarm Disabled** | No alarm is logged if a calculation failure occurs. |
| | **Alarm and Continue** | An alarm is logged and the calculation continues if a calculation failure occurs. |
| | **Alarm and Halt Calculation** | An alarm is logged and the calculation stops if a calculation failure occurs. |
| | **Note**<br>Refer to Calculation Failure Options for more information. | |
| **Station Identifier 1** | Allows for the entry of a user specified identifier (up to 20-alphanumeric characters) for the station.<br>**Note**<br>When generating BLM reports, this field is used to specify the lease number. | |
| **Station Identifier 2** | Allows for the entry of a user specified identifier (up to 20-alphanumeric characters) for the station.<br>**Note**<br>When generating BLM reports, this field is used to specify the flow measurement point (FMP) number. | |
| **Custody Transfer Buyer** | Sets an identifier (up to 20-alphanumeric characters) for the purchaser of the fluid. | |
| **Custody Transfer Seller/Producer** | Sets an identifier (up to 20-alphanumeric characters) for the seller of the fluid. | |

| Field | Description |
|---|---|
| **Fault Total Enable** | Place a check mark to enable the system to calculate fault totals. Fault totals are used to accumulate meter quantities separately from the normal totals when the system becomes unhealthy and measurement accuracy may be compromised. Fault totals are separate for each meter. If a fault occurs for a meter assigned to a station configured to calculate fault totals, fault totals are calculated **only** for that meter. Station totals include **all** totals - they continue to increment regardless of the fault status of associated meters.<br>**Note**<br>• These fields are shown **only** for Stations with a **Fluid Type** set to **Natural Gas**.<br>• You configure which faults or alarms cause the system to become unhealthy in the **Fault Health Configuration** field. |
| **Fault Health Configuration** | Use these fields to determine which faults and alarms cause the system to become unhealthy. Each calculated station and meter parameter includes health (data quality) information (as seen on History Reports). Changes to these options determine if the parameter health takes into account the selected item.<br>**Note**<br>These fields are shown **only** for Stations with a **Fluid Type** set to **Natural Gas**. |
| | **Primary Inputs - Fault**: Place a check mark to include primary meter input parameter faults when determining health. Examples of primary input faults include a point fail on a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or a point fail on optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.). |

| Field | Description | |
|---|---|---|
| | **Primary Inputs - Alarm** | Place a check mark to include primary meter input parameter alarms when determining health. Examples of primary input alarms include Low, High High, or Rate of Change alarms on a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.). |
| | **Primary Inputs - Override** | Place a check mark to include primary input override conditions when determining health. Examples include a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.) with a value currently in override. |
| | **Calculation Alarms** | Place a check mark to include flow and property calculation alarms when determining health. For more information, refer to DP Meter Diagnostics - Calculation Alarms Tab and Linear Meter Diagnostics - Calculation Alarms Tab. |
| | **Flow Rate Alarms** | Place a check mark to include flow rate calculation alarms when determining the health. The flow rate alarms that can have an effect on the health of the totals are limited to uncorrected volume, corrected volume, and mass. For more information, refer to DP Meter Diagnostics - Calculation Alarms Tab and Linear Meter Diagnostics - Calculation Alarms Tab. |

| Field | Description | |
|---|---|---|
| | **Config Checksum Fault** | Place a check mark to calculate fault totals when the device configuration checksum comparison fails to match the previously saved value. When this fault occurs, fault totals remain active until the configuration checksum is re-baselined (refer to Event Setup). |
| | **System Fault** | Place a check mark to calculate fault totals when the device firmware checksum comparison fails (refer to Event Setup). Should the firmware checksum fail, please contact your Emerson technical support representative. |
| | **Device Locked** | Place a check mark to include the current Lock Status of the FB Series product when determining health. A device becomes locked when you select **Separate Verifiable & Exportable Logs** and the legal event log is full. This fault remains active until the legal event log is exported and additional events can be created (refer to Event Setup). |
| | **Device Unverified** | Place a check mark to include the current verification state of the FB Series product configuration when determining health. The fault remains active until the configuration is re-verified (refer to Event Setup). |

5. Select **Save** to save any changes you make to this tab.

### 4.16.4.1 Calculation Failure Options

You can set how the FB Series product responds if a calculation failure occurs on the Station – Advanced display. Note that alarms indicating a system integrity failure (e.g., firmware corruption or hardware failure) are always logged if detected. Meter inputs are always checked, and the meter status (as shown in the **Status** field on the DP Meter – General, Linear Meter – General, and Liquid Linear Meter – General displays) and meter runs parameter health attribute will indicate failure if an invalid configuration or physically impossible value is detected, but the system only logs alarms for these conditions based on the selection below. Possible calculation failure options are:

- **Alarm Disabled** – Do not log alarms and continue the calculation when parameters are outside of the published calculation limits, if possible. Use this option if you need to use flow or property calculations outside of their published limits.
- **Alarm and Continue** – Log alarms and continue the calculation when parameters are outside of the published calculation limits, if possible. Use this option if you need to be notified if a calculation is operating outside of the calculation limits.
- **Alarm and Halt** – Log alarms and stop the calculation when parameters are outside of the published calculation limits. Use this option if you need the flow or property calculation to strictly function within their published limits and need all alarms to logged.

The behavior of FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU is determined by which calculation failure option you select. Refer to the table below for more information:

**Table 45. Calculation Failure Option Behaviors**

| Behavior | Alarm Disabled | Alarm and Continue | Alarm and Halt |
|---|---|---|---|
| Raise alarm when inputs are outside of published ranges | | X | X |
| Halt when inputs are outside of published ranges | | | X |
| Raise alarm if intermediate calculation results are outside of published ranges | | X | X |
| Halt if intermediate calculation results are outside of published ranges | | | X |
| Raise alarm on fatal calculation error | | X | X |
| Halt on fatal calculation error | X | X | X |
| Raise alarm if a secondary rate calculation fails | | X | X |
| On a property calculation failure, set calculated property values to predefined defaults & attempt to continue calculating flow | X | X | |
| On a property calculation failure, set calculated property values to 0 | | | X |

| Behavior | Alarm Disabled | Alarm and Continue | Alarm and Halt |
|---|---|---|---|

**Note**

- Examples of physically impossible inputs: negative density, heating value or absolute pressure. Temperature less than absolute zero.
- Example of an invalid configuration: a temperature value assigned to a differential pressure.
- Examples of intermediate results: Reynolds number, beta.
- Examples of fatal errors: divide by zero, square root of negative number.
- Examples of primary rates: ISO 5167 mass rate, Coriolis mass rate, Turbine volume rate.
- A secondary rate is a rate derived from the primary rate. For example, turbine mass rates is calculated from volume and density.
- Example of a property calculation failure: cannot calculate because composition is invalid.
- Predefined default property values are based on methane.
- If a calculation halts, its results are set to 0 and the parameter fault bit is set.
- If a calculation continues, the results are written to the database with the parameter alarm bit set.
- Flow and properties calculated outside of the range of their respective standards must be treated with caution; the results may be inaccurate and may affect overall measurement uncertainty of the flow calculations.

### 4.16.5 Station – Rates & Totals

Use this pop-up display to view totals and accumulations for the selected station. Station rates and totals are calculated based on the differential pressure, gas linear, and liquid linear meters assigned to the station.

**Note**

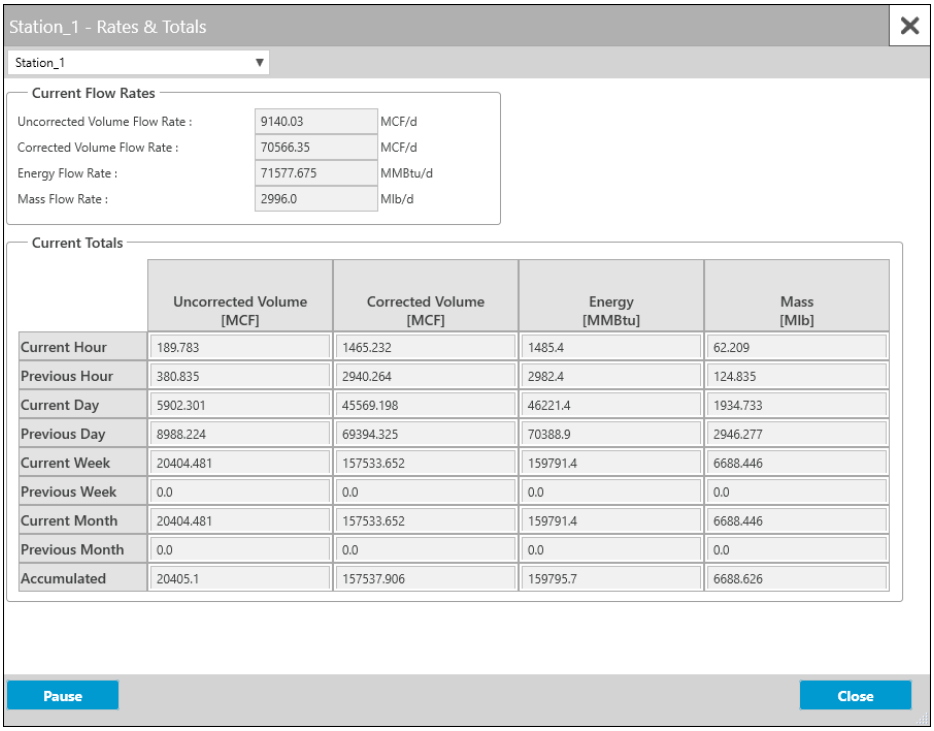
- The fields shown on this display vary based on the selected fluid type and calculation options.

- Stations **do not** keep flow rates or totals for liquid linear meters configured to use **API Ch. 20.1** flow calculation methodology. For meters configured to use API Ch. 20.1, totals are available on the Liquid Linear Meter - Rates & Totals display.

To access this pop-up display:

1. Select **Configure > Station** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a station to configure.
3. Select the **Rates & Totals** button. The Station – Rates & Totals pop-up display opens.

**Figure 240. Station – Rates & Totals (Natural Gas Station shown)**




4. Review the values in the following fields:

| Field | Description |
|---|---|
| **Current Flow Rates** | For stations measuring natural gas, these **read-only** fields show the current uncorrected volume, corrected volume, energy, and mass flow rates for the selected station.<br>For stations measuring liquids, these **read-only** fields show the current gross volume, net standard volume, sediment & water volume, and mass flow rates. |
| **Current Totals** | These **read-only** fields show the total accumulation, as well as the current and previous hourly, daily, weekly, monthly, and batch accumulations for the selected station.<br>**Note**<br>Batch accumulations are shown for liquid stations **only**. |

## 4.17 Averages

Use this display to configure which inputs the system uses to calculate averages and view the results of those calculations. For the DeltaV FB3000 RTU, up to 400 inputs are averaged.

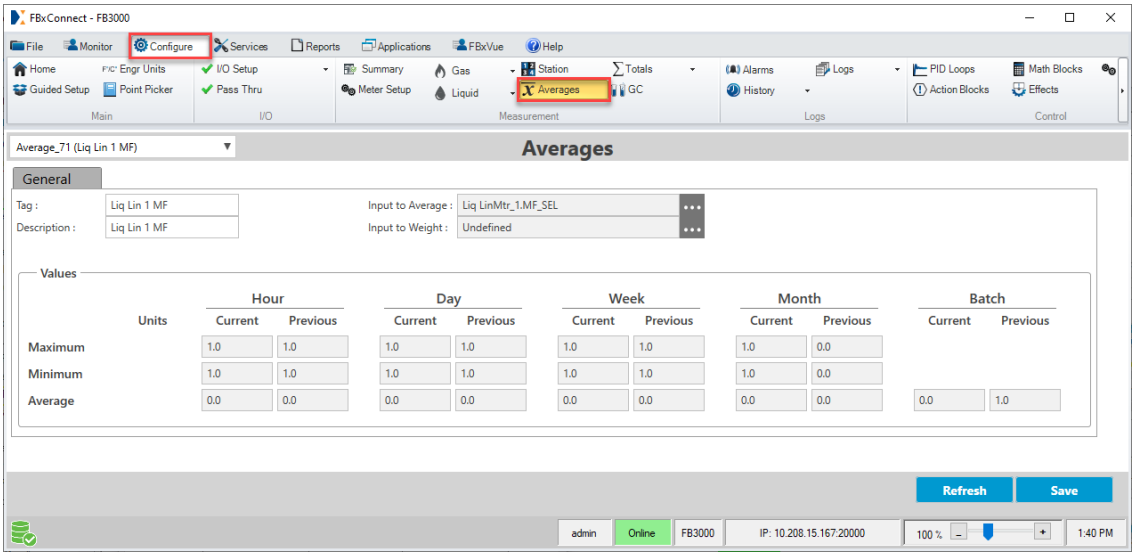
**Note**

- The average parameter health is a composite of the parameter health of every sample used to calculate the average.
- Average samples of NAN or INF are ignored.

To access this display:

1. Select **Configure > Averages** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select an Averages instance to configure.

**Figure 241. Averages**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Input to Average** | Click ••• to open a Point Picker dialog and choose an input to sample for averaging calculations.<br>**Note**<br>• Averages associated with liquid linear meters are **always** flow-weighted based on API 12.2.2, and periods of no flow produce averages of 0.<br>• In order to map history correctly in reports, select the Input to Average by first selecting the meter, then the associated reference parameter for the desired input (e.g. DP Mtr_1.DP_OBJ.SELECTED). |

**Input to Weight**

Click ••• to open a Point Picker dialog and choose a Meter Object to use as the weighting factor. If the input you select in the Input to Average field is a meter parameter (DP Mtr, Linear Mtr, or Liq LinMtr), then the average will be based on the flow rate as described below and an Input to Weight does not need to be defined. If the input you select in the Input to Average field is not a meter parameter, then either a meter can be chosen to get an average based on the flow rate or left undefined to calculate a simple linear average that is not based on a flow rate. Only an object is chosen, and the parameter is determined by the system based on the type of object. Use of the weighting factor is determined by the Meter Averaging Method specified on the Meter Setup display.

The weighting factor used is based on the configuration of the selected Meter Object :

| Meter Type | Configuration | Weighting Factor |
|---|---|---|
| **DP Meter** | AGA 3 Orifice (Volume)<br>1595 Conditioning Orifice<br>Cone | Square Root of the Differential Pressure |
| | AGA 3 (Mass)<br>AGA3 (Relative Density)<br>ISO 5167<br>405C | Mass Rate |
| **Gas Linear Meter** | Turbine<br>Auto-Adjust | Indicated Quantity (Volume) |
| | Coriolis | Indicated Quantity (Mass) |
| **Liquid Linear Meter** | Turbine | Indicated Quantity (Volume) |
| | Coriolis | Indicated Quantity (Mass) |

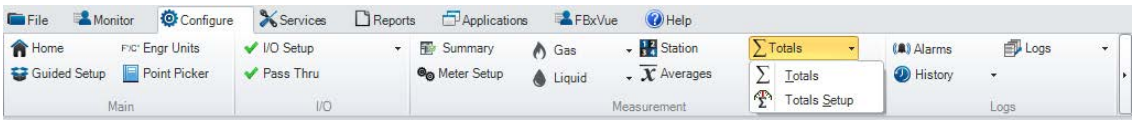
| Field | Description |
|---|---|
| **Values** | These **read-only** fields show (for the selected input) the maximum, minimum, and average values for the current and previous hour, day, week, month, and batch.<br>**Note**<br>Batch averages apply to liquid meters **only**. |

4. Select **Save** to save any changes you make to this display.

# 4.18 Totals Drop-Down Menu

Use the options in the Totals drop-down menu to view meter and station totals, and to configure fault totals. To access these displays, select **Configure > Totals** from the DeltaV FBxConnect configuration software main menu and select one of the options from the Totals drop-down menu.

**Figure 242. Totals Drop-Down Menu**




The Totals drop-down menu contains the following options:

**Totals** – Use this display to view current and previous period totals associated with meters and stations, and to set the rollover value for each total.

**Totals Setup** – Use the Totals Setup wizard to automatically configure optional fault totals in the FB Series device.

## 4.18.1 Totals

Use this display to view current and previous period totals associated with meters and stations, and to set the rollover value for each total. For the **DeltaV FB3000 RTU**, up to 456 inputs are totalized. The following totals are captured:

| Station/Meter Type | Totals |
|---|---|
| **Gas Station** | Corrected Volume |
| | Uncorrected Volume |
| | Mass |
| | Energy |
| **Gas DP Meter** | Flow Time |
| | Integral Value |
| | Corrected Volume |
| | Corrected Volume Fault |
| | Uncorrected Volume |
| | Uncorrected Volume Fault |
| | Mass |
| | Mass Fault |
| | Energy |
| | Energy Fault |
| **Gas Linear Meter** | Pulses |
| | Corrected Volume |
| | Corrected Volume Fault |
| | Uncorrected Volume |
| | Uncorrected Volume Fault |
| | Mass |
| | Mass Fault |
| | Energy |
| | Energy Fault |
| **Liquid Linear Meter** | Indicated Volume |
| | Gross Volume |
| | Oil Unshrunk Volume |
| | Oil Net Volume |
| | Water Uncorrected Volume |
| | Water Net Volume |
| | NGL Net Volume |
| | Flash Gas Net Volume |

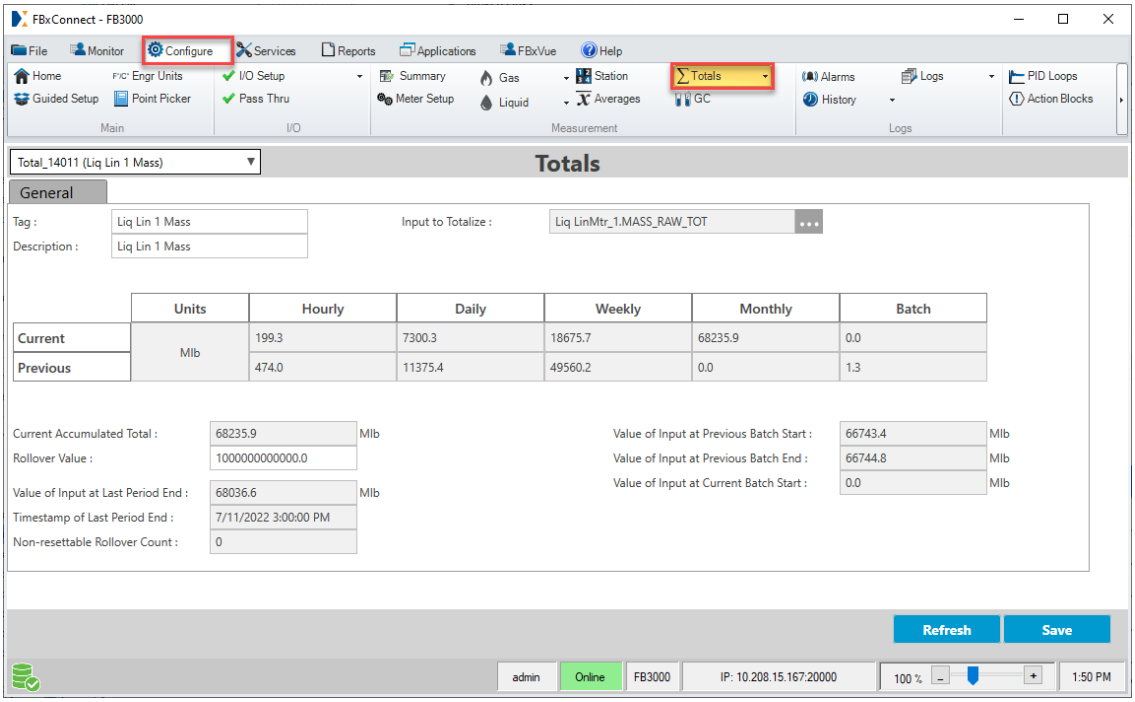
**Note**

- Totals are also provided on the Rates and Totals tab for individual gas meters, liquid meters, and gas stations.
- The total parameter health is a composite of the parameter health of every increment used to calculate the total.
- When a total rolls over, a “Total rollover” event is added to the event log. The event indicates how many times the total rolled over.
- If a totalization error occurs, a total/increment alarm is raised at the meter, regardless of the station calculation failure option.
- You can configure up to four spare totals instances per meter with a maximum of 144 instances. New instances of the Totals object start with Total_50001. For more information about spare totals, refer to the **Number of Spare Totals** field on the Meter Setup display.

To access this display:

1. Select **Configure > Totals > Totals** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select an instance to configure.

**Figure 243. Totals**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Input to Totalize** | This **read-only** field shows the input totalized by the selected instance. |
| **Current** | These **read-only** fields show the total accumulation for the current hour, day, week, month, and batch.<br>**Note**<br>Batch totals apply to liquid meters **only**. |
| **Previous** | These **read-only** fields show the total accumulation for the previous hour, day, week, month, and batch.<br>**Note**<br>Batch totals apply to liquid meters **only**. |

| Field | Description |
|---|---|
| **Current Accumulated Total** | This **read-only** field shows the total accumulation over the life of the input. This value resets only on a rollover or restart to factory defaults. |
| **Rollover Value** | Sets the value that (when reached) the Current Accumulated Total resets to 0. |
| **Value of Input at Last Period End** | This **read-only** field shows the value of the Current Accumulated Total at the time of the last period end. |
| **Timestamp of Last Period End** | This **read-only** field shows the timestamp at the time of the last period end. This will typically be top of hour, but it may be different based on configuration changes and QTR log break options specified. |
| **Non-resettable Rollover Count** | This **read-only** field shows the number of times a rollover has occurred. |
| **Value of Input at Previous Batch Start** | This **read-only** field shows the value of the selected input at the time that the previous batch was started. |
| **Value of Input at Previous Batch End** | This **read-only** field shows the value of the selected input at the time that the previous batch was ended. |
| **Value of Input at Current Batch Start** | This **read-only** field shows the value of the selected input at the time that the current batch was started. |

4. Select **Save** to save any changes you make to this display.

## 4.18.2 Totals Setup

Use the Totals Setup wizard to automatically configure optional fault totals in the FB Series device. Fault totals are calculated when the system becomes unhealthy and can be used to determine how measurement quantities are affected by faults and alarms. You can select which fault totals are calculated and which conditions cause fault totals to increase, and the Totals Setup wizard automatically configures the associated Totals instances in the FB Series product database based on your selections.

**Note**

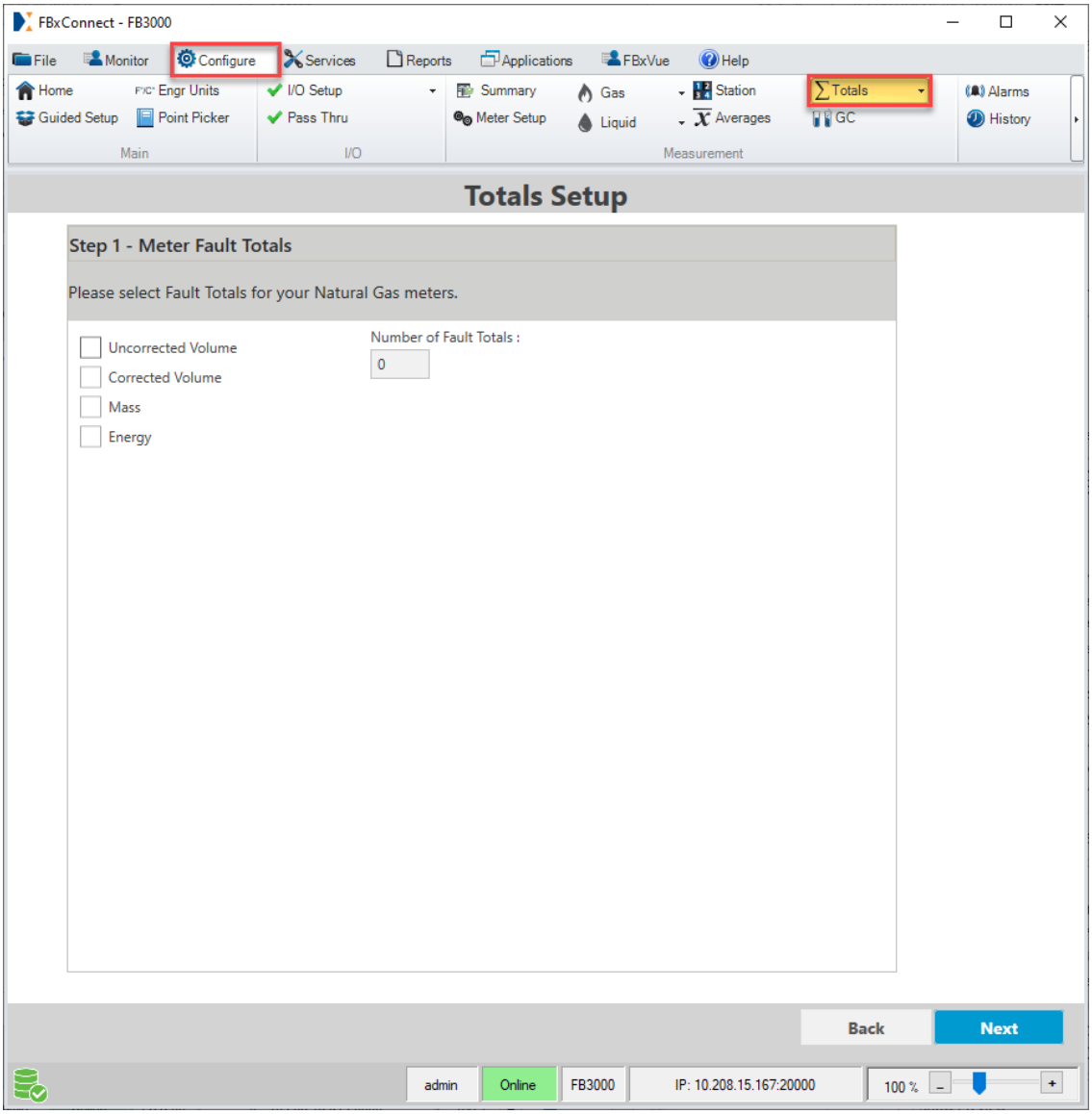
- You **must** have at least one natural gas station configured.

- Fault totals apply to **all** natural gas meters that are configured in your FB Series product.
- Fault totals are separate for each meter. If a fault occurs for a meter assigned to a station configured to calculate fault totals, fault totals are calculated **only** for that meter. Station totals include **all** totals.
- Using the Totals Setup wizard overwrites existing fault totals and may cause the total objects assignments, descriptors, and tags to be changed.

---

To access the Totals Setup wizard, select **Configure > Totals > Totals Setup** from the DeltaV FBxConnect configuration software main menu. The first page of Totals Setup wizard opens.

**Figure 244. Totals Setup**




The Totals Setup wizard contains the following steps:

Meter Fault Totals – Use this step to select which fault totals are calculated by the FB Series product.

Meter Fault Triggers – Use this step to enable fault total calculations and configure which parameter faults and alarms are considered when determining the health of a meter.

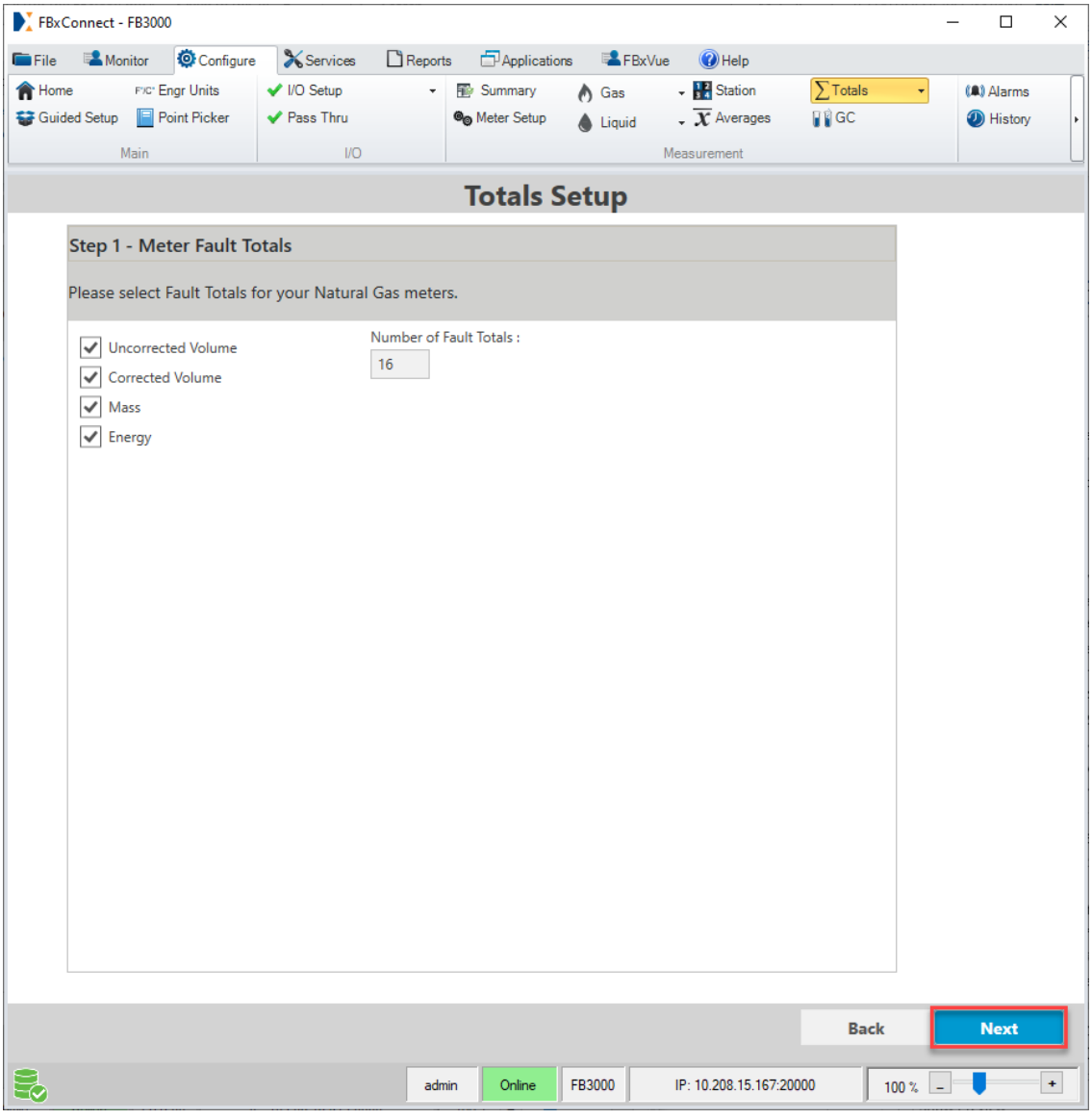
Summary – Use this step to review which instances of the Totals object will log fault totals before applying any changes to your FB Series product.

Finish – Use this step to review the configuration changes performed by the Totals Setup wizard.

### 4.18.2.1 Totals Setup – Meter Fault Totals

Use this step of the Totals Setup wizard to select which fault totals are calculated by the FB Series product. Fault Totals apply to **all** natural gas meters. This means if you have two natural gas meters configured in the FB Series product and select only one fault total type to calculate, then two instances of the Totals object in the FB Series product database will be configured to log fault totals (as shown in the **Number of Fault Totals** field).

**Figure 245. Totals Setup – Meter Fault Totals**



1. Review – and change as necessary – the values in the following fields:

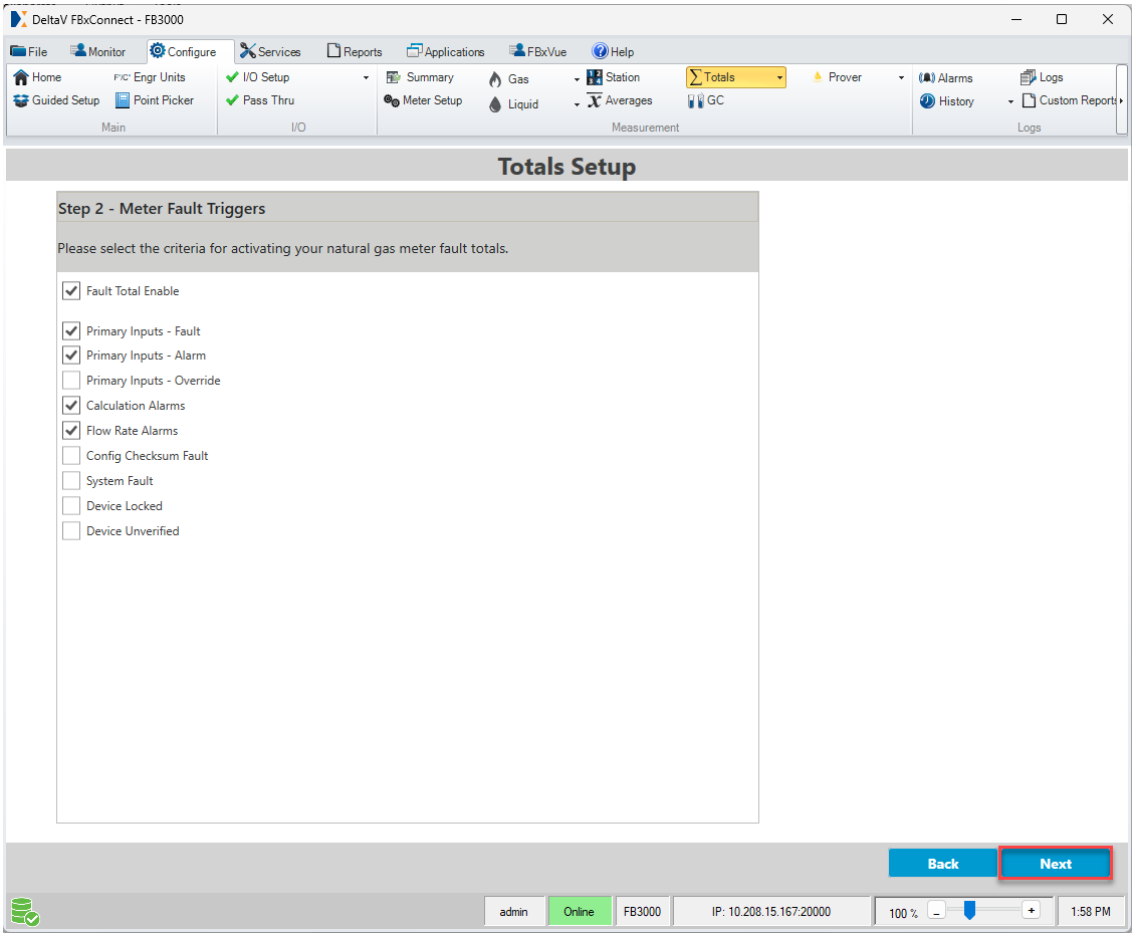
| Field | Description |
|---|---|
| **Uncorrected Volume** | Place a check mark to calculate uncorrected volume fault totals for **all** natural gas meters. |
| **Corrected Volume** | Place a check mark to calculate corrected volume fault totals for **all** natural gas meters. |
| **Mass** | Place a check mark to calculate mass fault totals for **all** natural gas meters. |
| **Energy** | Place a check mark to calculate energy fault totals for **all** natural gas meters. |
| **Number of Fault Totals** | This **read-only** field shows the number fault totals that will be configured based on the selected fault totals and the number of natural gas meters. |

2. Select **Next** to advance to the next step in the Totals Setup wizard.

### 4.18.2.2 Totals Setup – Meter Fault Triggers

Use this step of the Totals Setup wizard to enable fault total calculations and configure which parameter faults and alarms are considered when determining the health of a meter.

**Figure 246. Totals Setup – Meter Fault Triggers**




1. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Fault Total Enable** | Place a check mark to enable the system to calculate fault totals. Fault totals are calculated when the system becomes unhealthy and can be used to determine how measurement quantities are affected by faults and alarms. Fault totals are separate for each meter. If a fault occurs for a meter assigned to a station configured to calculate fault totals, fault totals are calculated **only** for that meter. Station totals include **all** totals.<br>**Note**<br>You configure which faults or alarms cause the system to become unhealthy using the fields below. |

| Field | Description |
|---|---|
| **Primary Inputs - Fault** | Place a check mark to include primary meter input parameter faults when determining health. Examples of primary input faults include a point fail on a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or a point fail on optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.). |
| **Primary Inputs - Alarm** | Place a check mark to include primary meter input parameter alarms when determining health. Examples of primary input alarms include Low, High High, or Rate of Change alarms on a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.). |
| **Primary Inputs - Override** | Place a check mark to include primary input override conditions when determining health. Examples include a meter input (for example, differential pressure, indicated flow, static pressure, or flowing temperature) or optional meter input alarm that is used in flow calculations (for example, measured relative density, measured base density, measured flowing density, measured heating value, etc.) with a value currently in override. |
| **Calculation Alarms** | Place a check mark to include flow and property calculation alarms when determining health. For more information, refer to Gas DP Meter Diagnostic – Calculation Alarms Tab and Gas Linear Meter Diagnostics – Calculation Alarms Tab. |
| **Flow Rate Alarms** | Place a check mark to include flow rate calculation alarms when determining the health. The flow rate alarms that can affect the health of the totals are limited to uncorrected volume, corrected volume, and mass. For more information, refer to Gas DP Meter Diagnostic – Calculation Alarms Tab and Gas Linear Meter Diagnostics – Calculation Alarms Tab. |
| **Config Checksum Fault** | Place a check mark to calculate fault totals when the device configuration checksum comparison fails to match the previously saved value. When this fault occurs, fault totals remain active until the configuration checksum is re-baselined (refer to Event Setup). |

| Field | Description |
|---|---|
| **System Fault** | Place a check mark to calculate fault totals when the device firmware checksum comparison fails (refer to Event Setup). Should the firmware checksum fail, please contact your Emerson technical support representative. |
| **Device Locked** | Place a check mark to include the current Lock Status of the FB Series product when determining health. A device becomes locked when you select Separate Verifiable & Exportable Logs and the legal event log is full. This fault remains active until the legal event log is exported and additional events can be created (refer to Event Setup). |
| **Device Unverified** | Place a check mark to include the current verification state of the FB Series product configuration when determining health. The fault remains active until the configuration is re-verified (refer to Event Setup). |

2. Select **Next** to advance to the next step in the Totals Setup wizard.

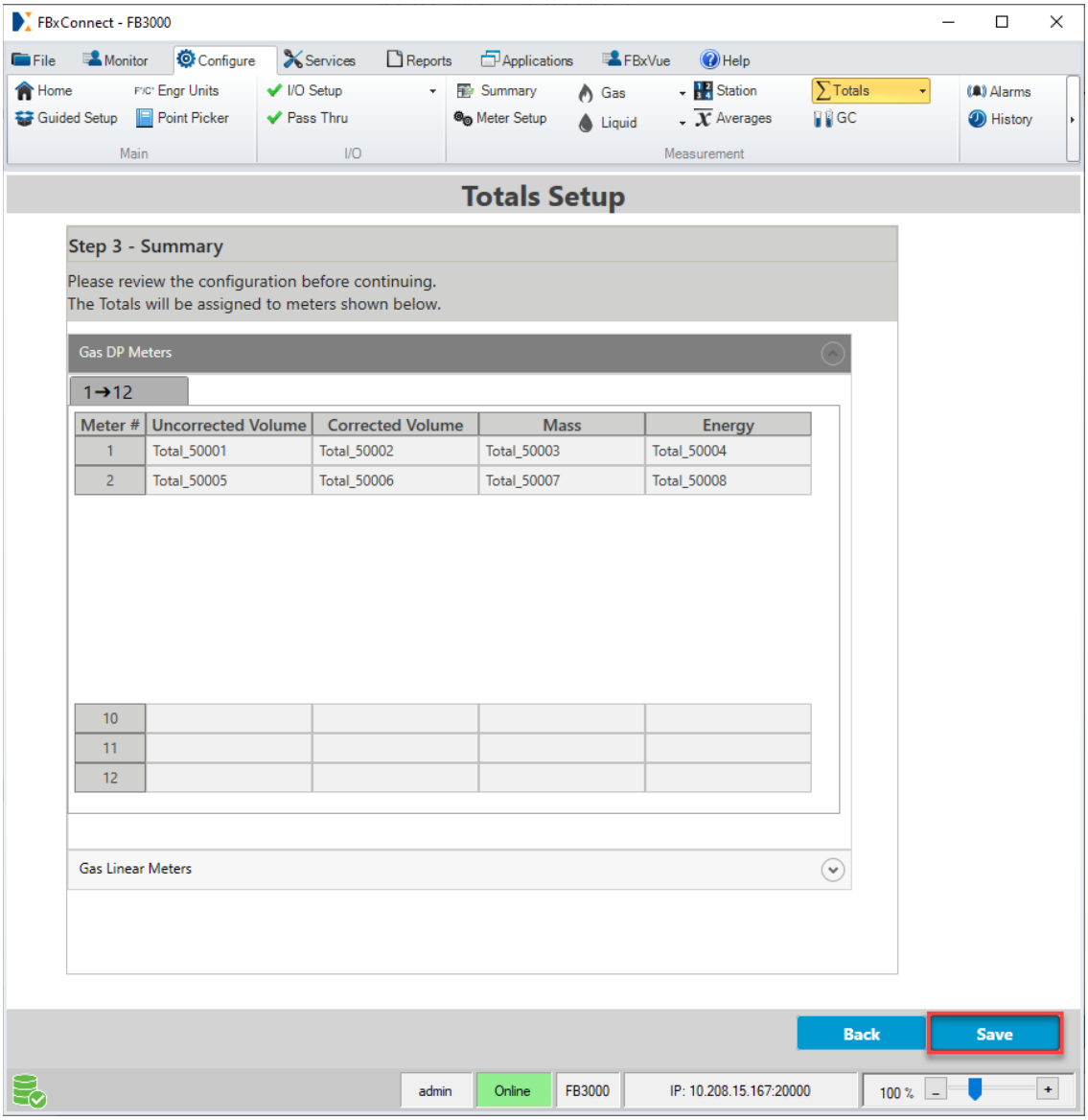
### 4.18.2.3 Totals Setup – Summary

Use this step of the Totals Setup wizard to review which instances of the Totals object will be configured to log fault totals before applying the changes to your FB Series product.

**Note**

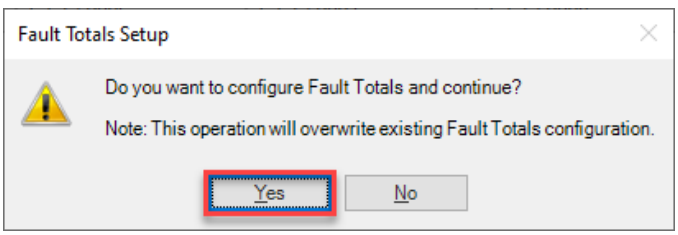
Information for Gas DP and Gas Linear Meters is contained in separate drop-down boxes. To view information each meter type, select the down arrow ( ) next to each meter type.

**Figure 247. Totals Setup – Summary**




1. Select **Next** to advance to the next step in the Totals Setup wizard. A confirmation message opens.

**Figure 248. Fault Totals Setup Confirmation**

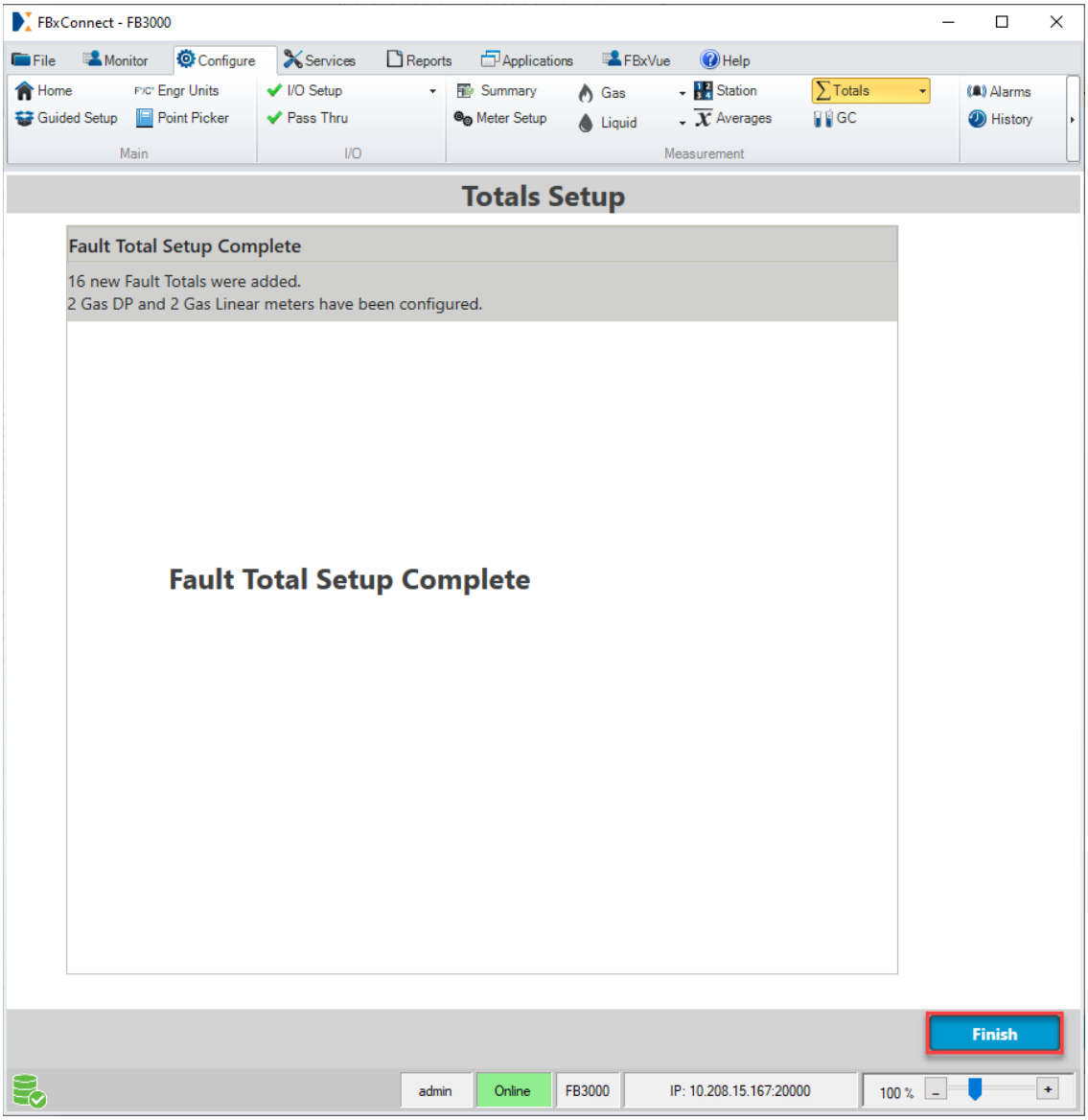


2. Select **Yes** to save your fault totals configuration.

### 4.18.2.4 Totals Setup – Finish

Use this step of the Totals Setup wizard to review the configuration changes performed by the wizard based on your selections. Select **Finish** to exit Totals Setup wizard.

**Figure 249. Totals Setup – Finish**

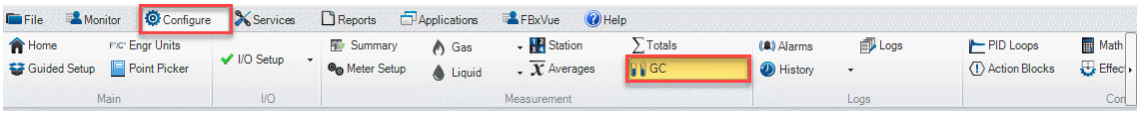


# 4.19 Gas Chromatograph

Use the Gas Chromatograph display to configure gas chromatograph options, and to view data from each configured gas chromatograph.

To access this display, select **Configure > GC** from the DeltaV FBxConnect configuration software main menu.

**Figure 250. Configure – GC**




The Gas Chromatograph display contains the following tabs:

Last Poll – Use this tab to view the mole percentage values of each component and other fluid properties returned from the gas chromatograph, set limits, and view alarms related to the gas composition.

Configuration – Use this tab to configure the parameters required to communicate with the connected gas chromatographs.

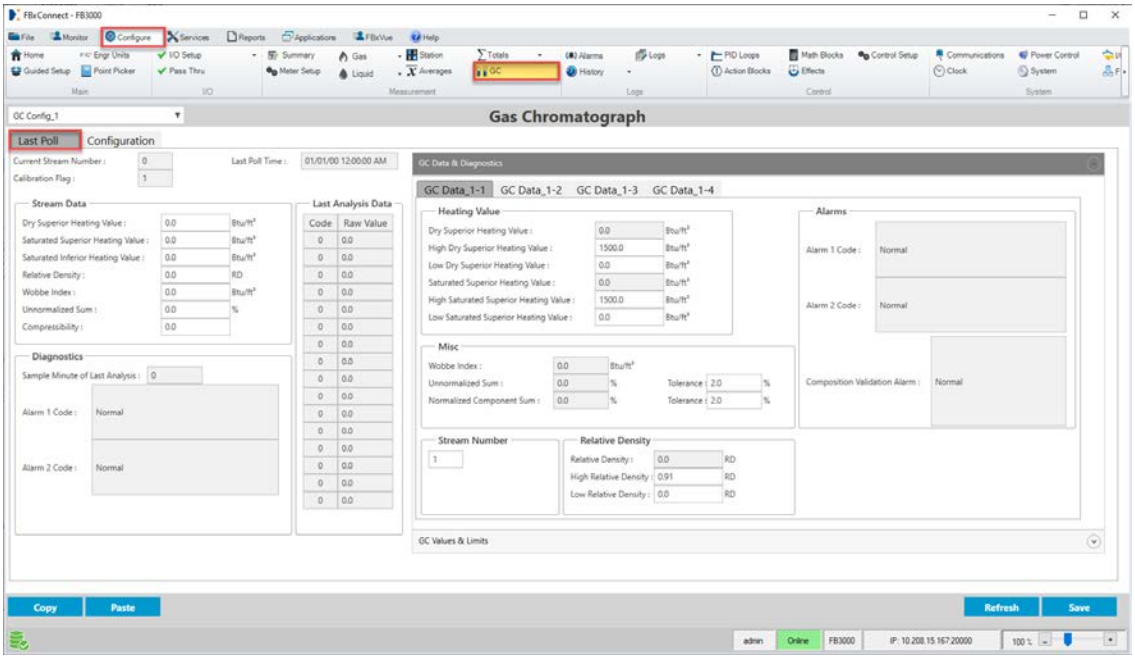
## 4.19.1 Gas Chromatograph – Last Poll Tab

Use this tab to view the mole percentage values of each component and other fluid properties returned from the gas chromatograph, set limits, and view alarms related to the gas composition.

To access this display:

1. Select **Configure > GC** from the DeltaV FBxConnect configuration software main menu. The Gas Chromatograph display opens showing the Last Poll tab.
2. Click ▼ in the drop-down list at the top of the display to select an instance to configure.

**Figure 251. Gas Chromatograph – Last Poll Tab**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Current Stream Number** | This **read-only** field shows the current cycle stream number of the gas chromatograph.<br>**Note**<br>This field appears **only** if you select American in the Chromatograph Settings field on the General tab of the GC Config display (Gas Chromatograph – Configuration Tab). |
| **Calibration Flag** | This **read-only** field shows the gas chromatograph's status. Possible statuses are Analysis or Self Calibration.<br>**Note**<br>The FB Series product **does not** copy gas analysis data if the Calibration Flag is set to **Self Calibration**. |
| **Last Poll Time** | This **read-only** field shows the time and date of the last time the system polled the external gas chromatograph. |
| **Stream Data** | Use these fields to view data from the most recent analysis returned from the gas chromatograph. |

| Field | Description | |
|---|---|---|
| | **Dry Superior Heating Value** | This **read-only** field shows the last dry superior heating value calculated and returned from the gas chromatograph. |
| | **Saturated Superior Heating Value** | This **read-only** field shows the last saturated superior heating value calculated and returned from the gas chromatograph. |
| | **Relative Density** | This **read-only** field shows the last relative density (specific gravity) calculated and returned from the gas chromatograph. |
| | **Wobbe Index** | This **read-only** field shows the last Wobbe Index value calculated and returned from the gas chromatograph. |
| | **Unnormalized Sum** | This **read-only** field shows the total un-normalized mole percent returned from gas chromatograph. |
| | **Compressibility** | This **read-only** field shows the compressibility returned from gas chromatograph. |
| **Diagnostics** | Use these fields to view alarms returned by the gas chromatograph. | |
| | **Sample Minute of Last Analysis** | This **read-only** field shows the sample minute at the start of the Modbus requests. The current sample minute must be different than the previous sample minute or the program does not copy gas analysis data to the station.<br>**Note**<br>This field appears **only** when the Chromatograph Settings field is set to **American** (Gas Chromatograph – Configuration Tab). |
| | **Alarm 1 Code** | This **read-only** field shows the current alarm 1 status returned by the gas chromatograph. |
| | **Alarm 2 Code** | This **read-only** field shows the current alarm 2 status returned by the gas chromatograph. |
| **Last Analysis Data** | These **read-only** fields show the raw data returned from the gas chromatograph. | |
| | **Component** | Sequence number to show number of components returned from gas chromatograph. |

| Field | Description | |
|---|---|---|
| | **Code** | The component ID's of different composition values read from the gas chromatograph. |
| | **Raw Value (%)** | Mole % of components read from the gas chromatograph. |
| **GC Data & Diagnostics** | Use the fields in this drop down box to set the stream number, heating value limits, relative density limits, and to view the Wobbe Index, normalized sum, un-normalized sum, and active alarms for a specified stream. A separate tab exists for each configured GC stream.<br>**Note**<br>Select the **GC Data & Diagnostics** heading to expand this section of the display. | |
| | **Dry Superior Heating Value** | This **read-only** field shows the last dry superior heating value calculated and returned from the gas chromatograph. |
| | **High Dry Superior Heating Value** | Sets the dry superior heating value high limit. If the value returned from the gas chromatograph is greater than this value, then a Composition Validation alarm is triggered. |
| | **Low Dry Superior Heating Value** | Sets the dry superior heating value low limit. If the value returned from the gas chromatograph is less than this value, then a Composition Validation alarm is triggered. |
| | **Saturated Superior Heating Value** | This **read-only** field shows the last saturated superior heating value calculated and returned from the gas chromatograph. |
| | **High Saturated Superior Heating Value** | Sets the saturated superior heating value high limit. If the value returned from the gas chromatograph is greater than this value, then a Composition Validation alarm is triggered. |
| | **Low Saturated Superior Heating Value** | Sets the saturated superior heating value low limit. If the value returned from the gas chromatograph is less than this value, then a Composition Validation alarm is triggered. |
| | **Wobbe Index** | This **read-only** field shows the last Wobbe Index value calculated and returned from the gas chromatograph. |

| Field | Description | |
|---|---|---|
| | **Unnormalized Sum** | This **read-only** field shows the total un-normalized component mole percent returned from gas chromatograph. If the un-normalized component sum returned from gas chromatograph exceeds the Unnormalized Deviation Limit set in the **GC Values & Limits** drop down box, then a Composition Validation alarm is triggered. |
| | **Normalized Component Sum** | This **read-only** field shows the normalized component sum as calculated by the FB Series product based on the values returned from the gas chromatograph. If the normalized component sum returned from gas chromatograph exceeds the Component Sum Deviation Limit set in the **GC Values & Limits**, then a Composition Validation alarm is triggered. |
| | **Stream Number** | Sets the stream number from which to retrieve data. |
| | **Relative Density** | This **read-only** field shows the last specific gravity/relative density calculated and returned from the GC. |
| | **High Relative Density** | Sets the relative density high limit. If the value returned from the gas chromatograph is greater than this value, then a Composition Validation alarm is triggered. |
| | **Low Relative Density** | Sets the relative density low limit. If the value returned from the gas chromatograph is less than this value, then a Composition Validation alarm is triggered. |
| | **Alarm 1 Code** | This **read-only** field shows the status of Alarm 1 register returned from the GC for the selected stream. If an Alarm 1 condition is present and enabled in the **GC Data & Diagnostics** drop down box, then a Composition Validation alarm is triggered. |

| Field | Description | |
|---|---|---|
| | **Alarm 2 Code** | This **read-only** field shows the status of Alarm 2 register returned from the GC for the selected stream. If an Alarm 2 condition is present and enabled in the **GC Data & Diagnostics** drop down box, then a Composition Validation alarm is triggered. |
| | **Composition Validation Alarm** | This **read-only** field shows the status of the Composition Validation alarm. If the Composition Validation alarm is Normal, the FB Series product accepts the gas chromatograph data and copies the gas composition to the Components object for use in fluid property calculations. If the Composition Validation alarm is any value other than Normal, the Components object is not updated. Possible values are:<br>• Normal<br>• Component Limit Alarm<br>• Heating Value Limit Alarm<br>• Relative Density Limit Alarm<br>• Un-normalized Mole Sum Alarm<br>• Total Mole Sum Alarm<br>• Composition Deviation Alarm<br>• Alarm 1<br>• Alarm 2 |
| **GC Values & Limits** | Use the fields in this drop down box to view the mole percentage values of each component, and to set the high component, low component, and deviation limits. A separate tab exists for each configured GC stream.<br>**Note**<br>Select the **GC Values & Limits** heading to expand this section of the display. | |
| | **Component Name** | This **read-only** field shows the name of the component. |
| | **Code** | This **read-only** field shows the code used by the gas chromatograph for this component. |

| Field | Description | |
|---|---|---|
| | **Updated** | This **read-only** field shows the update status for each component. If the box is checked, the component value is updated by the GC. If the box is unchecked, the component value is not part of the GC analysis. |
| | **Value** | This **read-only** field shows the mole percentage value returned from gas chromatograph. |
| | **High Limit** | Sets mole percentage value high limit. If the value returned from the gas chromatograph is greater than this value, then a Composition Validation alarm is triggered. |
| | **Low Limit** | Sets mole percentage value low limit. If the value returned from the gas chromatograph is less than this value, then a Composition Validation alarm is triggered. |
| | **Component Deviation Alarm Limit % of %** | Sets the allowable deviation of an individual component's mole percentage compared to the previous analysis (in percent). If the value of one of the components changes by more than this percentage from one analysis to the next, then a Composition Validation alarm is triggered. |

4. Select **Save** to save any changes you make to this tab.

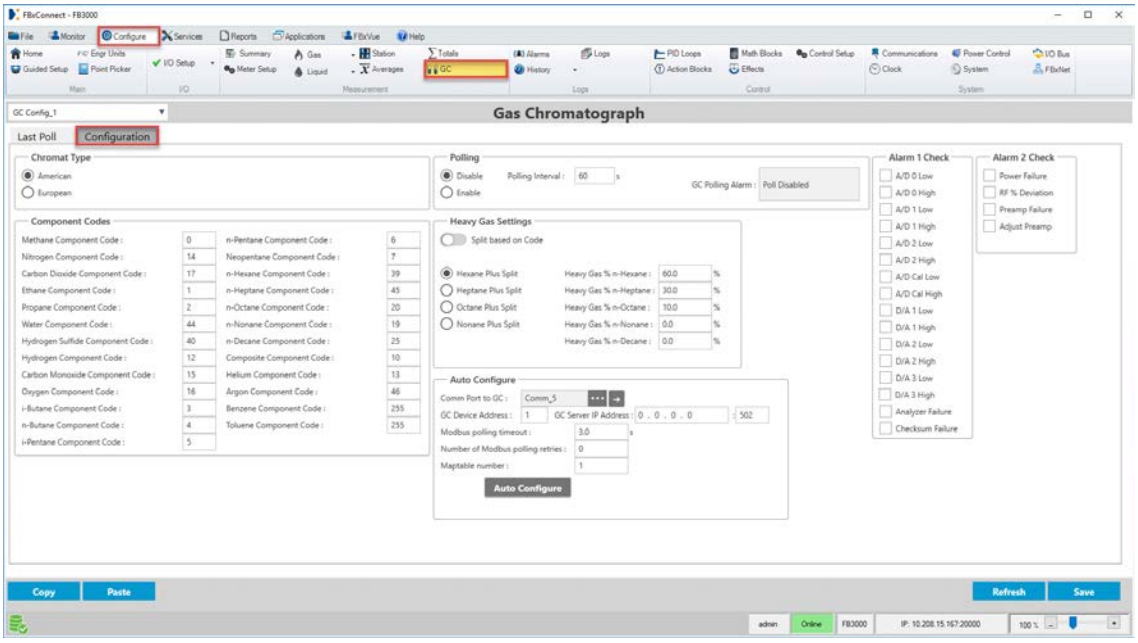
## 4.19.2 Gas Chromatograph – Configuration Tab

Use this tab to configure the parameters required to communicate with the connected gas chromatographs.

To access this tab:

1. Select **Configure > GC** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list and select an instance to configure.
3. Select the **Last Poll** tab on the Gas Chromatograph display.

**Figure 252. Gas Chromatograph – Configuration Tab**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Chromat Type** | Specifies either the American or European version of the SIM-2251 Modbus map and polling sequences. | |
| **Polling** | Enables or disables polling of the gas chromatograph. | |
| | **Polling Interval** | Sets the delay (in seconds) the system waits before asking the gas chromatograph for the next set of results. |
| | **GC Polling Alarm** | This **read-only** field shows the status of the poll result. Possible alarms are:<br>• Normal<br>• Poll Failed<br>• Comp Code Match Error<br>• Poll Disabled<br>• Auto-config Fail |

<table>
<tr><th>Field</th><th colspan="3">Description</th></tr>
<tr><td>Component Codes</td><td colspan="3">Enter the identification code for each component being measured by the gas chromatograph.<br>Note<br>The codes you enter must match the codes set in the gas chromatograph.</td></tr>
<tr><td>Heavy Gas Settings</td><td colspan="3">Use these fields to configure heavy gas options for your gas chromatograph.</td></tr>
<tr><td></td><td>Split based on code</td><td colspan="2">If enabled, the system reads the gas chromatograph's automatic split percentage for heavy gasses.</td></tr>
<tr><td></td><td></td><td>Enabled</td><td>Enables the gas chromatograph's automatic split percentage for heavy gasses. The received mole percent value split takes place based on the component code:
<table>
<tr><th>Component Code (American / European)</th><th>C6%</th><th>C7%</th><th>C8%</th></tr>
<tr><td>08 / 108</td><td>47.466</td><td>35.34</td><td>17.194</td></tr>
<tr><td>09 / 109</td><td>50</td><td>50</td><td>0</td></tr>
<tr><td>10/ 110</td><td>60</td><td>30</td><td>10</td></tr>
<tr><td>11 / 111</td><td>57.143</td><td>28.572</td><td>14.285</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>Disabled</td><td>Disables the gas chromatograph's automatic split percentage for heavy gasses. The received mole percent value split takes place based on the percentages you configure in the Heavy Gas Settings fields.</td></tr>
</table>

| Field | Description | |
|---|---|---|
| | **Hexane Plus Split** | Select for chromatographs that return a component that is a composite of hexane and heavier components. Enter the percentages that should be allocated from the composite to hexane, heptane, octane, nonane, and decane.<br>**Note**<br>The values you enter in the Heavy Gas % fields **must** add up to 100%. |
| | **Heptane Plus Split** | Select for chromatographs that return a component that is a composite of heptane and heavier components. Enter the percentages that should be allocated from the composite to heptane, octane, nonane, and decane.<br>**Note**<br>The values you enter in the Heavy Gas % fields **must** add up to 100%. |
| | **Octane Plus Split** | Select for chromatographs that return a component that is a composite of octane and heavier components. Enter the percentages that should be allocated from the composite to octane, nonane, and decane.<br>**Note**<br>The values you enter in the Heavy Gas % fields **must** add up to 100%. |
| | **Nonane Plus Split** | Select for chromatographs that return a component that is a composite of nonane and heavier components. Enter the percentages that should be allocated from the composite to nonane and decane.<br>**Note**<br>The values you enter in the Heavy Gas % fields **must** add up to 100%. |
| **Auto Configure** | Use these fields to configure parameters for communicating to your GC. | |

| Field | Description |
|---|---|
| **Comm Port to GC** | Select ••• to open a Point Picker dialog and define which communications port on the FB Series product is connected to the gas chromatograph. After you have selected a communications port, select **Save** to view additional options.<br>**Note**<br>• You must select **Save** after you configure the **Comm Port to GC** field to view additional options.<br>• Select → to open the configuration page for the selected port. |
| **GC Device Address** | Indicates the Modbus address the FB Series product uses to communicate with the gas chromatograph. You must set this value before the program can poll data and write it to the meter run.<br>**Note**<br>You **must** select **Save** after you configure the **Comm Port to GC** field to view this field. |
| **GC Server IP Address** | Specifies the IP address and port number of the GC.<br>**Note**<br>• This field applies only to GC connections using the Ethernet port.<br>• You **must** select **Save** after you configure the **Comm Port to GC** field to view this field. |
| **Modbus polling timeout** | Sets the length of time (in seconds) the system waits for the GC to respond to a Modbus poll.<br>**Note**<br>You **must** select **Save** after you configure the **Comm Port to GC** field to view this field. |
| **Number of Modbus polling retries** | Sets the number of retries the FB Series product makes without a response from the gas chromatograph before cancelling the polling request.<br>**Note**<br>You **must** select **Save** after you configure the **Comm Port to GC** field to view this field. |

| Field | Description | |
|---|---|---|
| | **Maptable number** | Identifies the number of the Modbus Map Register Table in the FB Series product where the gas chromatograph data is stored. Valid values are 1–11.<br>**Note**<br>• You must select **Save** after you configure the **Comm Port to GC** field to view this field.<br>• The program uses this value for automatic configuration.<br>• Verify the table does not contain any vital information before polling the gas chromatograph. Any information contained in the configured Modbus Map Table Register will be overwritten during gas chromatograph polling. |
| | **Auto Configure** | Select this button to automatically configure the communication ports and Modbus parameters necessary to poll the gas chromatograph. The port owner is automatically changed to Modbus Master for selected communications port. For a list of the parameters automatically configured when you select the Auto Configure button, refer to Automatically Configured Parameters.<br>**Note**<br>• This option is **not** available if you have previously selected **Use CSV Files** in the **Modbus Mapping using CSV Files** field on the Communications – Modbus Slave or Communications – Modbus Master pop-up display for any of the communications ports. To enable the Auto Configure button, set the **Modbus Mapping using CSV Files** field to **Database Objects** and save your changes.<br>• You must select **Save** after you configure the **Comm Port to GC** field to view this field.<br>• You **must** first specify an address in the **GC Modbus Address** field, select **Disabled** in the |

| Field | Description |
|---|---|
| | **Polling** field, and **Save** your changes **before** selecting the **Auto Configure** button. |
| **Alarm 1 Check** | Place a check mark next to an Alarm 1 Condition to prevent the FB Series product from updating the gas composition if that alarm condition is active.<br>**Note**<br>The FB Series product updates the gas composition if an alarm condition is unchecked and that alarm condition is active. |
| **Alarm 2 Check** | Place a check mark next to an Alarm 2 Condition to prevent the FB Series product from updating the gas composition if that alarm condition is active.<br>**Note**<br>The FB Series product updates the gas composition if an alarm condition is unchecked and that alarm condition is active. |

5. Select **Save** to save any changes you make to this tab.

## 4.19.3 Automatically Configured Parameters

When you select Auto Configure on the GC display, the automatically configures the following parameters:

### Port Settings (Serial ports only)

If you select a **serial** communications port in the **Comm Port to GC** field, the system automatically configures the following port settings:

**Note**

If you select an **Ethernet** communications port in the **Comm Port to GC** field, **no** port settings are automatically configured.

| Serial Port Settings | |
|---|---|
| Port Owner | Modbus Master |
| Baud Rate | 19,200 |
| Data Bits | 8 |

| Serial Port Settings | |
|---|---|
| Stop Bits | 1 |
| Parity | None |
| Key-on Delay | 0.0 seconds |
| Key-off Delay | 0.0 seconds |

## Master Modbus Settings

The system automatically configures the following Master Modbus settings:

| Master Modbus Settings | |
|---|---|
| Modbus Transmission Mode | RTU |
| Byte Order | MSB |
| Continuous Polling | Disabled |

**Note**

**Do not** edit the **Starting Request Number** and **Number of Requests** fields on the Master Modbus tab for the selected communications port as they are used by the polling algorithm. Each row in the poll table is requested separately, and the number of request is always 1.

## Master Modbus Poll Table Register

The system automatically configures the following Master Modbus Poll Table Registers (using the values in the Comm Port to GC and GC Device Address fields to poll the following register in the GC:

**Table 46.Master Modbus Poll Table Register**

| Register Number | Configuration |
|---|---|
| 3001–3016 | Component IDs, Table 1: |
| 3017–3032 | Component IDs, Table 2 |
| 3034 | Current Stream |
| 3035 | Mask of Streams associated with Table 1 |
| 3045 | Cycle Start Time – minutes |
| 3046 | GC Alarm 1 |

| Register Number | Configuration |
|---|---|
| 3047 | GC Alarm 2 |
| 3059 | Calibration/Analysis Flag |
| 7001–7016 | Gas Composition Values Mole % Comp 1–16 |
| 7033 | BTU (day) |
| 7034 | BTU (saturated) |
| 7035 | Specific Gravity |
| 7036 | Compressibility |
| 7037 | Wobbe Index |
| 7038 | Total Unnormalized Mole % |
| 7039 | Total GPM CF |

## GC Poll Sequence

The actual poll sequence is:

**Table 47.GC Poll Sequence**

| GC Poll Sequence |
|---|
| 3045–3047 |
| 3001–3032 |
| 3034–3035 |
| 3059 |
| 7001–7016 |
| 7033–7038 |
| 3045–3047 |

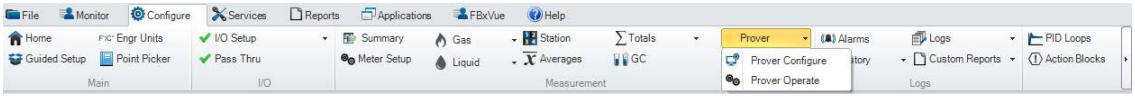
## Modbus Map Table Registers

The Modbus Map Table Registers assign parameters to registers. The system automatically maps the necessary parameters to the register table you specify in the **Maptable number** field on the GC Config display.

# 4.20 Prover

Use the options in the Prover drop-down menu to configure and perform a prove.

**Figure 253. Prover Drop-Down Menu**




The Prover drop-down menu contains the following options:

Prover Configuration – Use this display to configure your prover options.

Prover Operate – Use this display to perform a prove and view prove data.

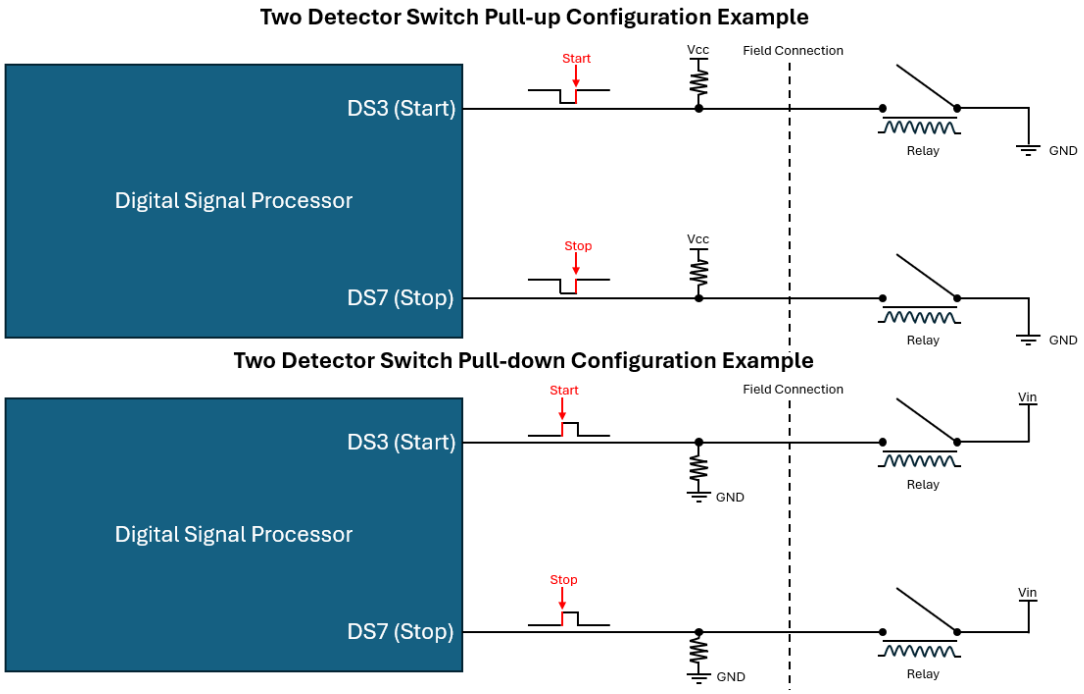
## 4.20.1 Proving Overview

During a meter proving operation, the detector switch inputs control the start and stop of the accumulated pulse counts. Both the start and stop switches are user-configurable, and a single switch may be assigned to perform both functions.

The prove sequence always begins and ends on the rising edge of the start detector switch, independent of the DI's pull-up or pull-down configuration. Because of this behavior, the start and stop detector switches must use the same pull-up/pull-down configuration to ensure consistent signal interpretation.

The system includes hardware-level debounce protection, supplemented by a user-configurable debounce setting.

**Figure 254. Pull-up/Pull-down Configuration Examples**




You can configure the proving operations to include a selected number of successful runs in a sequence (maximum of 10 runs), set various timing parameters, and maintain accord with desired repeatability standards. The system records and displays all data for a trial run in an easy-to-understand tabular format with color coding to distinguish which results are acceptable in a sequence.

The resulting Meter Factor for a sequence can be compared using both the average data and average Meter Factor method. You can also view the repeatability of a trial run based on these methods. Text alarms are provided to indicate the status of the proving sequence which allows you to monitor performance at all times.

The proving feature uses the Advance Pulse Module (APM) which supports dual pulse integrity measurements in accordance with API and ISO standards, and also provides detector switches to measure the beginning and end of a prover run.

The detector inputs can be used with relays, open collector/open drain type solid-state switches, and other two-state devices. The APM has a dedicated on-board digital signal processor for extremely precise counting of pulses, time interval calculations, and API pulse interpolation calculations.

Uni-directional, bi-directional, small volume, and master meter proving is supported. You can designate channels 9 and 10 as discrete outputs or pulse outputs for remote totalizing or to another APM for proving in mirror mode.

The module's detector input channels can be used with individually wired detector switches or detector switches that are wired in series from the prover on the same cable. The detector inputs can be used with relays, open collector/open drain type solid-state switches, and other two-state devices.

## 4.20.2 Prover Configuration

Use this display to define prover parameters and configure the prover according to its type. The system supports unidirectional large volume provers, bidirectional large volume provers, small volume provers, and master meters. The prover type configuration varies for each type of prover. Each prove is unique to a meter and a product.

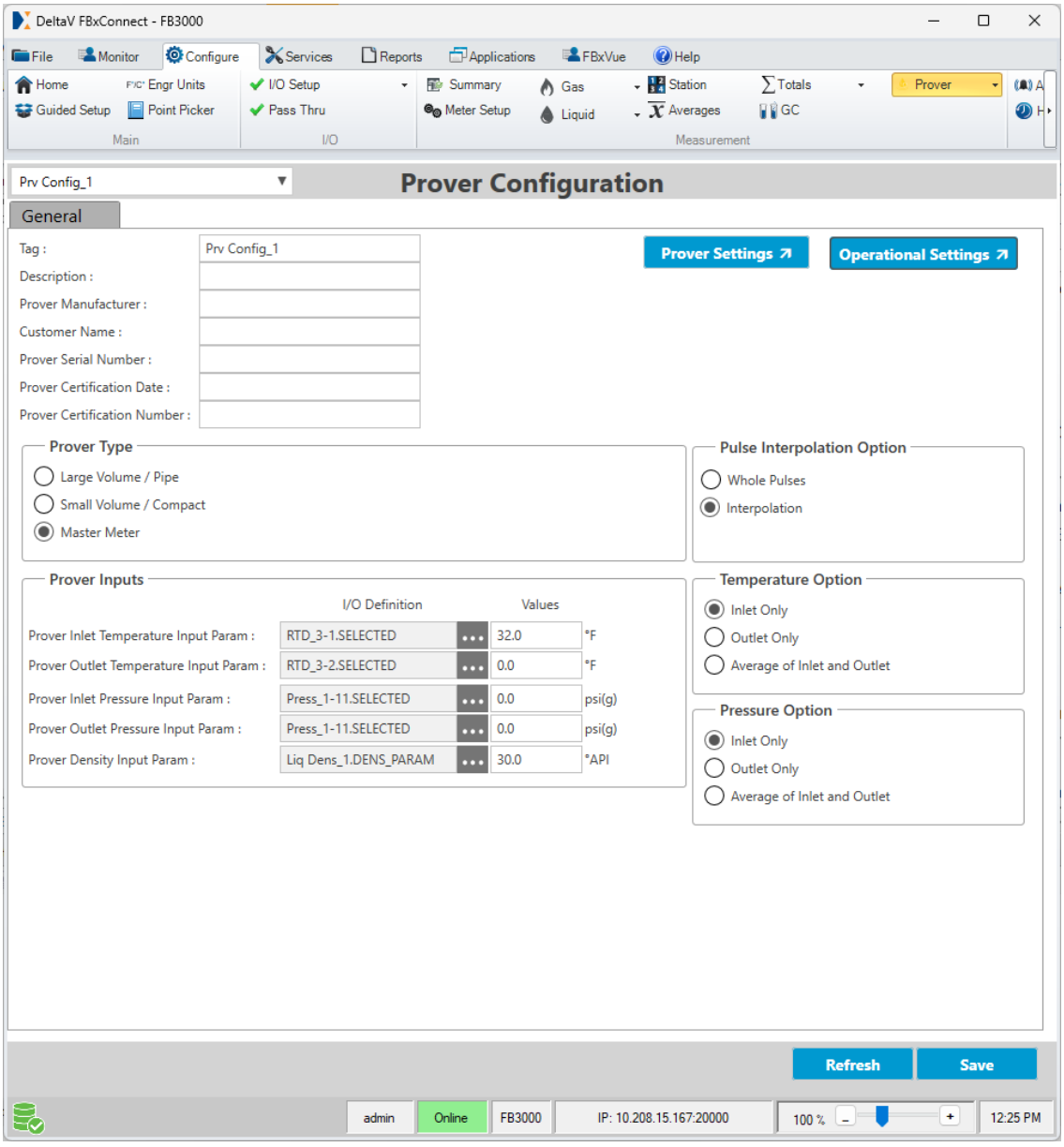
**Note**

You must add an Advanced Pulse Module to utilize meter proving, pulse fidelity, frequency densitometer, or high-speed pulse output.

To access this display:

1. Select **Configure > Prover > Prover Configure** from the DeltaV™ FBxConnect™ main menu. The Prover Configuration displays opens.

**Figure 255. Prover Configuration**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected prover. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected prover. |

| Field | Description | |
|---|---|---|
| **Prover Manufacturer** | Sets a description (up to 20-alphanumeric characters) for the manufacturer of the prover. This information can be displayed on the final prove report. | |
| **Customer Name** | Sets an identifier (up to 20-alphanumeric characters) for the customer. This information can be displayed on the final prove report. | |
| **Prover Serial Number** | Enter up to 20 characters of text to indicate the serial number of the prover. This information can be displayed on the final prove report. | |
| **Prover Certification Date** | Enter the date the prover was certified. This information can be displayed on the final prove report. | |
| **Prover Certification Number** | Enter the certification number for the last prove certification. This information can be displayed on the final prove report. | |
| **Prover Settings** | Select this button to open the Prover Settings display and configure additional settings specific to your prover. | |
| **Operational Settings** | Select this button to open the Operational Settings display and configure settings related to trial runs. | |
| **Advanced** | Select this button to open the Advanced display and configure advanced options based on your prover type. | |
| **Prover Type** | Select the category/class of the prover. Valid selections are Large Volume/Pipe, Unidirectional; Large Volume/Pipe, Bidirectional; Small Volume/Compact; and Master Meter. | |
| **Prover Inputs** | **Prover Inlet Temperature Input Param** | Click ••• to open a Point Picker dialog and select the prover inlet temperature parameter. Typical parameters include:<br>• Analog Input, EU Value<br>• HART Input, Primary Variable, Secondary Variable, etc.<br>• RTD, EU Value<br>• MVS, Temperature Reading<br>• User Data, Float or Double |

| Field | Description | |
|---|---|---|
| | | **Note**<br>If you select **Undefined** for the I/O definition, you can manually enter a value in the **Values** field. Otherwise, the program displays the value for the currently selected input. |
| | **Prover Outlet Temperature Input Param** | Click ••• to open a Point Picker dialog and select the prover output temperature parameter. Typical parameters include:<br>• Analog Input, EU Value<br>• HART Input, Primary Variable, Secondary Variable, etc.<br>• RTD, EU Value<br>• Thermocouple, EU Value<br>• MVS, Temperature Reading<br>• User Data, Float or Double<br>**Note**<br>If you select **Undefined** for the I/O definition, you can manually enter a value in the **Values** field. Otherwise, the program displays the value for the currently selected input. |
| | **Prover Inlet Pressure Input Param** | Click ••• to open a Point Picker dialog and select the prover input pressure parameter. Typical parameters include:<br>• Analog Input, EU Value<br>• HART Input, Primary Variable, Secondary Variable, etc.<br>• MVS, Temperature Reading<br>• User Data, Float or Double<br>**Note**<br>If you select **Undefined** for the I/O definition, you can manually enter a value in the **Values** field. |

| Field | Description | |
|---|---|---|
| | | Otherwise, the program displays the value for the currently selected input. |
| | **Prover Outlet Pressure Input Param** | Click ••• to open a Point Picker dialog and select the prover output pressure parameter. Typical parameters include:<br>• Analog Input, EU Value<br>• HART Input, Primary Variable, Secondary Variable, etc.<br>• MVS, Temperature Reading<br>• User Data, Float or Double<br>**Note**<br>If you select **Undefined** for the I/O definition, you can manually enter a value in the **Values** field. Otherwise, the program displays the value for the currently selected input. |
| | **Prover Density Input Param** | Click ••• to open a Point Picker dialog and select the density input parameter. This input is used to record the average prover observed density for use in mass proving. It is not used for volumetric proving. Typical parameters include:<br>• Analog Input, Selected Value<br>• HART Input, Primary Variable, Secondary Variable, etc.<br>• User Data, Float or Double<br>**Note**<br>The value is assumed to be in the same units selected for the meter to be proved and its associated station.<br>**Note**<br>If you select **Undefined** for the I/O definition, you can manually enter a value in the **Values** field. Otherwise, the program displays the value for the currently selected input. |

| Field | Description | |
|---|---|---|
| **Prover Material** | **Note**<br>These fields show **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field. | |
| | **Prover Material Option** | Click ▼ to set the material from which the prover is made. If the prover was constructed with a material that is not a valid selection, select User Entered.<br>**Note**<br>If you select **User Entered**, then you **must** also manually enter values in the **Selected Modulus of Elasticity (E)** and **Prover Linear Coeff** fields. |
| | **Selected Modulus of Elasticity (E)** | Indicates the mathematical description of the steel's tendency to be deformed elastically when force is applied to it. This field automatically updates when you select an option in the **Prover Material Option** field and save your changes.<br>**Note**<br>If you select **User Entered** in the **Prover Material Option** field, then you **must** manually enter a value in this field. |
| | **Prover Linear Coeff** | Indicates the linear coefficient of thermal expansion for the prover material. This field automatically updates when you select an option in the **Prover Material Option** field and save your changes.<br>**Note**<br>If you select **User Entered** in the **Prover Material Option** field, then you **must** manually enter a value in this field. |
| **Detector Rod Material** | **Note**<br>These fields show **only** if you select **Small Volume/Compact** in the **Prover Type** field. | |

| Field | Description | |
|---|---|---|
| | **Detector Rod Material Option** | Click ▼ to set the material from which the detector rod is made. If the detector rod was constructed with a material that is not a valid selection, select User Entered.<br>**Note**<br>If you select **User Entered**, then you **must** also manually enter a value in the **Detector Rod Linear Coeff** field. |
| | **Detector Rod Linear Coeff** | Indicates the linear coefficient of thermal expansion for the detector rod. This field automatically updates when you select an option in the **Detector Rod Material Option** field and save your changes.<br>**Note**<br>If you select **User Entered** in the **Detector Rod Material Option** field, then you **must** manually enter a value in this field. |
| **Pulse Interpolation Option** | Selects the method used to count pulses in-between detector switches. Possible options are:<br>• **Whole Pulses** – Whole numbers (integers) of pulses are recorded for each prover trial run.<br>• **Pulse Interpolation** – Fractions of a pulse are detected and included in the pulse count total for each prover trial run, which can increase meter factor accuracy.<br>**Note**<br>Interpolation is recommended for use with small volume provers. | |
| **Temperature Option** | Sets which input to use for the prover flowing temperature. This is the value averaged between detector switch trips. | |
| **Pressure Option** | Sets which input to use for the prover flowing pressure. This is the value averaged between detector switch trips. | |

**3.** Select **Save** to save any changes you make to this display.

### 4.20.2.1 Prover Configuration – Prover Settings

Use this display to configure additional settings related to your prover.

**Note**

Units are set on the Engineering Units display.

To access this display:

1. Select **Configure > Prover > Prover Configure** from the DeltaV™ FBxConnect™ main menu. The Prover Configuration displays opens.
2. Select the **Prover Settings** button. The Prover Configuration – Prover Settings pop-up display opens.

**Figure 256. Prover Configuration – Prover Settings (Large Volume/Pipe, Bidirectional)**

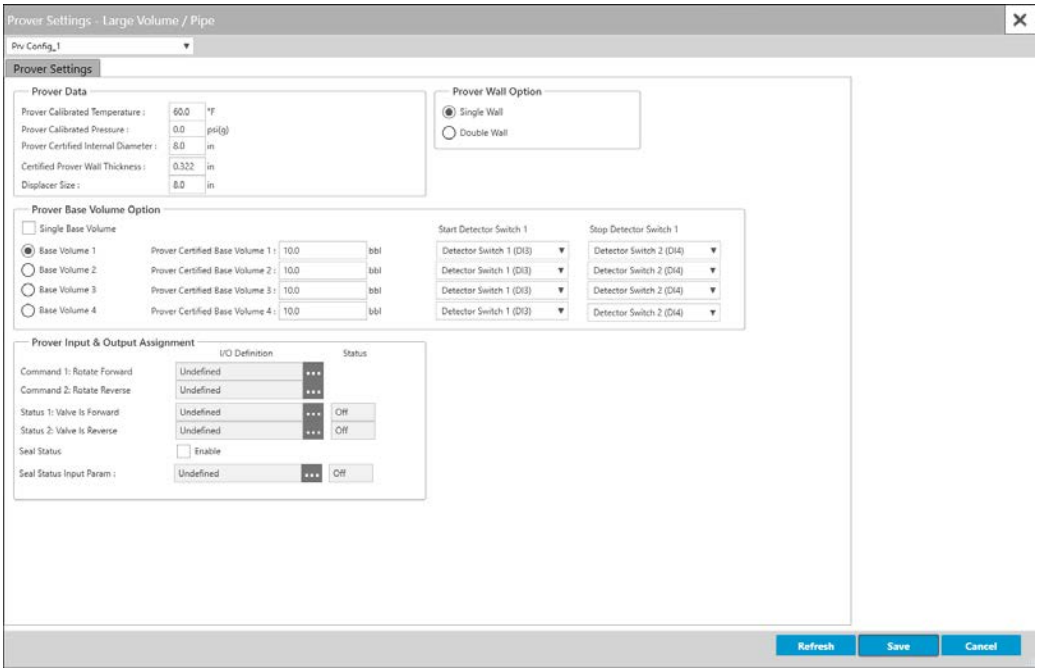


**Figure 257. Prover Configuration – Prover Settings (Small Volume/Compact)**

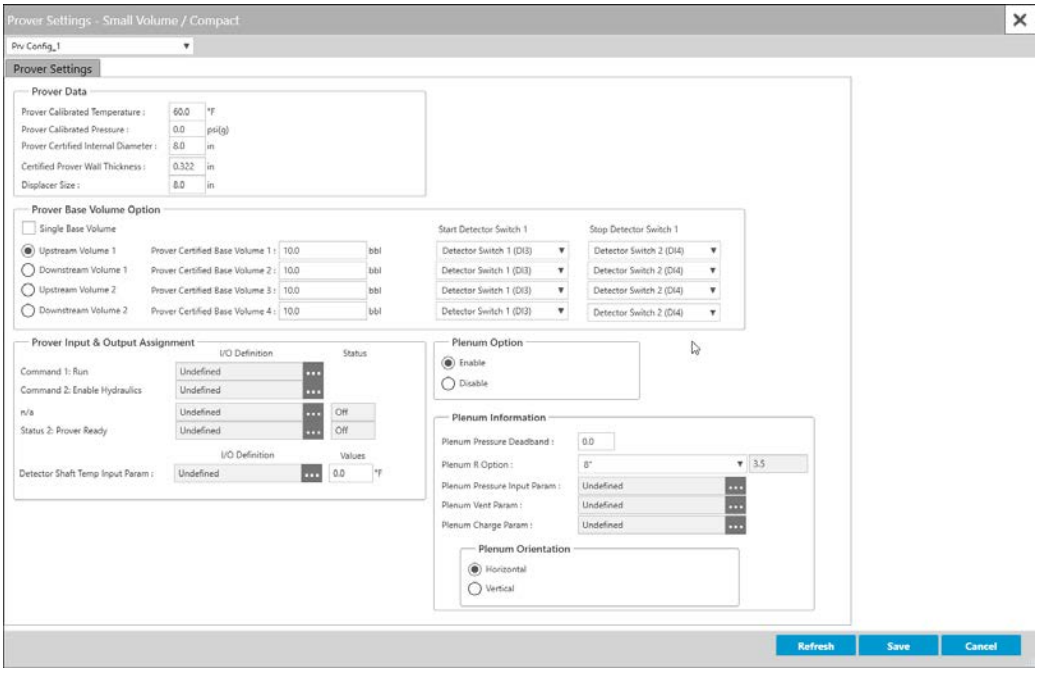
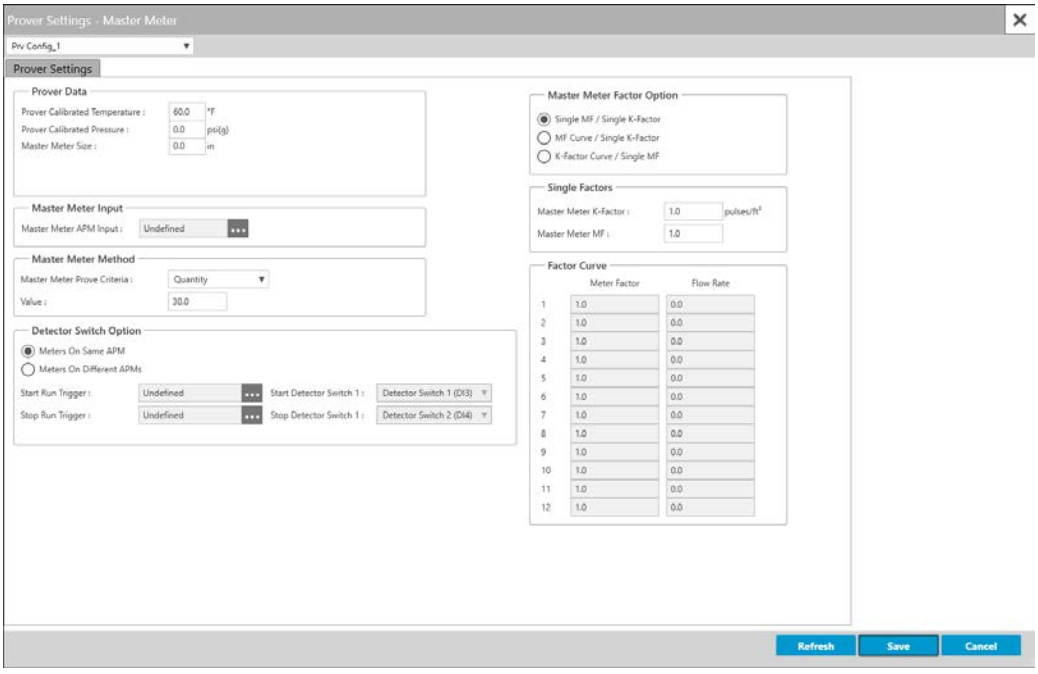



**Figure 258. Prover Configuration – Prover Settings (Master Meter)**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Prover Data** | **Prover Calibrated Temperature** | Enter the temperature of the prover at the time of calibration. Typical values are 60 Deg F, 15 Deg C, or 20 Deg C. |
| | **Prover Calibrated Pressure** | Enter the pressure of the prover at the time of calibration. Typical values are 0 PSIG or 0 kPa. |
| | **Prover Certified Internal Diameter** | Enter the internal diameter of the prover as documented by the calibration certificate.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Certified Prover Wall Thickness** | Enter the wall thickness of the prover as documented by the calibration certificate.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Displacer Size** | Enter the diameter of the displacer.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Master Meter Size** | Enter the size of the master meter. This is for informational purposes only and is not used in calculations.<br>**Note**<br>This field shows **only** if you select **Master Meter** in the **Prover Type** field of the Prover Configuration display. |

| Field | | Description |
|---|---|---|
| **Prover Wall Option** | | Select the prover wall construction type. Possible options are Single Wall or Double Wall. The default is Single Wall.<br>**Note**<br>• This field shows **only** if you select **Large Volume/Pipe** in the **Prover Type** field on the Prover Configuration display.<br>• If you select Double Wall, the system assumes the walls of the prover do not stretch elastically, and the correction for the pressure effect on steel (CPS) is 1.0. |
| **Prover Base Volume Option** | **Single Base Volume** | Place a check mark to indicate only a single base volume is required for the prove operation.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Base Volume 1 through 4** | Select the base volume amount (Base Volume 1 through 4) for the prove.<br>**Note**<br>• This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display.<br>• Only **Base Volume 1** is shown if you select the **Single Base Volume** checkbox. |
| | **Upstream / Downstream Volume 1 and Upstream / Downstream Volume 2** | Select the upstream and/or downstream volume for the prove.<br>**Note**<br>These fields show **only** if you select **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |

| Field | Description | |
|---|---|---|
| | **Prover Certified Base Volume 1 through 4** | Sets the certified prover volume. Enter up to four base volumes (Base Volume 1 through 4) with up to seven decimal places. If entering a base volume for a bidirectional prover, enter a value that represents both the forward and reverse passes.<br>**Note**<br>These fields show **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Start Detector Switch** | Click ▼ and select the start detector switch for each corresponding base volume. |
| | **Stop Detector Switch** | Click ▼ and select the stop detector switch for each corresponding base volume. |
| **Prover Input & Output Assignment** | **Command 1** | Click ••• to open a Point Picker dialog and select a parameter to issue the "rotate forward" output to conduct a trial run or prove sequence. This will typically be a discrete output status parameter.<br>• **Command 1: Launch Ram** – This is shown for **Large Volume/Pipe, Unidirectional** provers. Select a parameter to launch the displacer by energizing the ram. This command turns off at the first detector trip.<br>• **Command 1: Rotate Forward** – This is shown for **Large Volume/Pipe, Bidirectional** provers. Select a parameter to issue the rotate forward command to the 4 way valve.<br>• **Command 1: Run** – This is shown for **Small Volume/Compact** provers. Select a parameter to issue the run command.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the |

| Field | Description | |
|---|---|---|
| | | **Prover Type** field on the Prover Configuration display. |
| | **Command 2** | Click ••• to open a Point Picker dialog and select a parameter to issue the "rotate reverse" output to conduct a trial run or prove sequence.<br>• **Command 2: Start Hydraulics** – This is shown for **Large Volume/Pipe, Unidirectional** provers. Select a parameter to turn on the hydraulics commonly associated with a unidirectional prover. This command turns on at the start of a new prove sequence and stays on until the sequence finishes or is aborted<br>• **Command 2: Rotate Reverse** – This is shown for **Large Volume/Pipe, Bidirectional** provers. Select a parameter to issue the reverse launch (rotate reverse) command to the 4 way valve.<br>• **Command 2: Enable Hydraulics** – This is shown for **Small Volume/Compact** provers. Select a parameter to turn on the hydraulics commonly associated with a unidirectional prover. This command turns on at the start of a new prove sequence and stays on until the sequence finishes or is aborted.<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Status 1** | Click ••• to open a Point Picker dialog and select a parameter to set the status input for the "valve is forward" prover signal. This input indicates the valve is in the forward position or "valve is rotated forward." This is typically a discrete input status parameter. |

| Field | Description | |
|---|---|---|
| | | **Note**<br>This field shows **only** if you select **Large Volume/Pipe, Bidirectional** in the **Prover Type** field on the Prover Configuration display. |
| | **Status 2** | Click ••• to open a Point Picker dialog and select a parameter to set the status input for the “valve is reverse" prover signal. Valid values are:<br>• **Status 2: Prover Ready** – This is shown for **Large Volume/Pipe, Unidirectional** and **Small Volume/Compact** provers. Select a parameter that indicates the prover is on and ready to initiate a trial run.<br>• **Command 2: Valve Is Reverse** – This is shown for **Large Volume/Pipe, Bidirectional** provers. Select a parameter that indicates the valve is in the reverse position or “valve is rotated reverse.”<br>**Note**<br>This field shows **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| | **Seal Status** | If enabled (checked), sets the program to check the 4-way seal status between detector switches. If you enable this option and the seal is lost between detector during a trial run, the prove aborts.<br>**Note**<br>This field appears **only** if you select **Large Volume/Pipe** in the **Prover Type** field on the Prover Configuration display. |
| | **Seal Status Input Param** | Click ••• to open a Point Picker dialog and select a parameter to provide the input status where the proving valve seal signal is wired. This is typically a discrete input status parameter.<br>**Note**<br>This field appears **only** if you select **Large** |

| Field | Description | |
|---|---|---|
| | | **Volume/Pipe** in the **Prover Type** field on the Prover Configuration display. |
| | **Detector Shaft Temp Input Param** | Click ••• to open a Point Picker dialog and select a parameter to provide the input for the temperature of the shaft containing the external detector switches. CTSp uses this temperature value in its calculation (see API MPMS Chapter 12.2.3, section 10.2).<br>**Note**<br>• This field appears **only** if you select **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display.<br>• If you select **Undefined** for the I/O definition, you can manually enter a value in the Values field. Otherwise, the program displays the value for the currently selected input. |
| **Plenum Option** | Select **Enabled** if your prover has a plenum and enter parameters specific to your installation in the **Plenum Information** fields.<br>**Note**<br>This field appears **only** if you select **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. | |
| **Plenum Information** | Use these fields to enter information about your plenum, including pressure input parameter and orientation.<br>**Note**<br>These fields appear **only** if you select **Enabled** in the **Plenum Option** field. | |
| | **Plenum Pressure Deadband** | Sets a value that determines the acceptable range for plenum pressure. This is the percentage (positive only) above the calculated required pressure to allow the prove sequence to proceed. If the plenum pressure reaches a value outside the range of the target or the target plus the deadband, additional nitrogen is added or vented to bring the pressure back in range. |

| Field | Description | |
|---|---|---|
| | **Plenum R Option** | Click ▼ and select the size of the prover to set the Plenum "R" constant for the prove, which the program uses to calculate the required plenum pressure. Once you select the prover size, the program displays the appropriate R constant value in the field to the right of the size.<br>**Note**<br>If the prover size is not a valid selection, select **User Entered** and enter the constant in the supplied field. |
| | **Plenum Pressure Input Param** | Click ••• to open a Point Picker dialog and select the input for the Plenum Pressure to proceed with a prove. If the small volume prover has a manually controlled plenum, or none at all, this field should be left **Undefined**.<br>When a prove is in progress, this plenum pressure must meet the value of a calculated required pressure, which varies depending on the meter pressure of the meter under test, and is calculated as:<br>$$required = \frac{PipelineGauge}{R}\ xN2K$$<br>Where:<br>• *PipelineGauge* = The current pressure at the meter.<br>• *R* = The constant value for the size of the prover (see below).<br>• *N2K* = The constant value for the orientation and pressure units in use (see below). |

| Field | Description | |
|---|---|---|
| | **Plenum Vent Param** | Click ••• to open a Point Picker dialog and select the output to the plenum vent solenoid parameter. This output releases the pressure from the plenum on a compact prover. If you do not require computer controlled plenum pressure, leave this value as Undefined. |
| | **Plenum Charge Param** | Click ••• to open a Point Picker dialog and select the output to the plenum charge solenoid parameter on a compact prover. This output increases the pressure from the plenum on the compact prover. If you do not require computer controlled plenum pressure, leave this value as Undefined. |
| | **Plenum Orientation** | Sets the direction of the prover mounting. This determines the value of the plenum N2K number, which in combination with the pressure units, is used in calculating the required plenum pressure. |

| Units | Horizontal | Vertical |
|---|---|---|
| PSI | 60.0 | 40.0 |
| kPa | 413.6854 | 275.7903 |
| bar | 4.13685 | 2.7579 |
| $kg/cm^2$ | 4.218417 | 2.812278 |

| | | |
|---|---|---|
| **Master Meter Input** | **Master Meter APM Input** | Click ••• to open a Point Picker dialog and select a parameter to identify the slot location of the APM module attached to the meter under test. If value is N/A, then there is no APM associated with the meter. You associate an APM to a liquid meter using the **Flow Rate** field on the Liquid Linear Meter - General display.<br>**Note**<br>• This field shows **only** if you select **Master Meter** in the **Prover Type** field of the Prover Configuration display.<br>• The Master Meter input and the Meter under test **cannot** be physically located on the same pair of channels. A pair of channels are defined |

| Field | Description | |
|---|---|---|
| | | as the individual channels that are used when the inputs are defined as "Pairs".<br>For example, PI 1 & PI 2 are a pair and PI 3 & PI 4 are a separate pair. If the master meter input is assigned to PI 1 then the meter under test cannot be assigned to PI 2, but it could be assigned to any other PI on the card. |
| **Master Meter Method** | **Master Meter Prove Criteria** | Click ▼ to select the criteria used to determine a trial run. Because there are no physical detector switches in use in master meter proving, the program uses one of the following values to determine the start/stop of pulse counting. Possible options are:<br>• **Quantity** – A user-defined quantity is used to determine the completion of a trial run.<br>• **Pulses** – A user-defined number of pulses is used to determine the completion of a trial run.<br>• **Time** – A user-defined time (in seconds) is used to determine the completion of a trial run.<br>**Note**<br>This field shows **only** if you select **Master Meter** in the **Prover Type** field on the Prover Configuration display. |
| | **Value** | Sets the quantity to compare the accumulation to when conducting a Master Meter prove to end the trial run. This number is based on your selection in the Master Meter Criteria field.<br>• If the **Master Meter Prove Criteria** field is set to **Quantity**, then the quantity units are the same as selected Engineering Units display.<br>• If the **Master Meter Prove Criteria** field is set to **Pulses**, set this number greater then 10,000.<br>• If the **Master Meter Prove Criteria** field is set to **Time**, this is a number in seconds.<br>**Note** |

| Field | Description | |
|---|---|---|
| | | • This field shows **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display.<br>• A trial run will not end precisely at this value, rather at some value slightly past it. For example, if a time of 25 seconds is entered, then a trial run might end at 26 seconds. |
| **Detector Switch Option** | Select if your meters are wired to the same or different APMs.<br>**Note**<br>These fields show **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display. | |
| | **Start Run Trigger** | Click ••• to open a Point Picker dialog and select a parameter and choose the slot location of the APM module attached to the meter under test. When proving with a master meter, both the pulse in for the meter and the master meter must be on the same APM card. If value is N/A, then there is no APM associated with the meter. You associate an APM to a liquid meter using the **Flow Rate** field on the Liquid Linear Meter – General display.<br>**Note**<br>The Start and Stop Run Triggers **must** be on different pulse pairs (even if you are not using pairs). |
| | **Start Detector Switch 1** | Click ▼ and select the start detector switch for the Master Meter prover. |

| Field | Description | |
|---|---|---|
| | **Stop Run Trigger** | Click ••• to open a Point Picker dialog and select a parameter and choose the slot location of the APM module attached to the meter under test. When proving with a master meter, both the pulse in for the meter and the master meter must be on the same APM card. If value is N/A, then there is no APM associated with the meter. You associate an APM to a liquid meter using the **Flow Rate** field on the Liquid Linear Meter - General display.<br>**Note**<br>The Start and Stop Run Triggers **must** be on different pulse pairs (even if you are not using pairs). |
| | **Stop Detector Switch 1** | Click ▼ and select the start detector switch for the Master Meter prover. |
| **Meter Factor Option** | Sets the option the system uses when calculating K factors or Meter Factors. Possible options are:<br>• **Single MF/Single K factor** – Uses a single Meter Factor and a single K-factor for the master meter. Set values for each in the K-factor and Meter Factor fields. This is the default value.<br>• **MF Curve/Single K-factor –** Uses a series of Meter Factor curve values and a single K-factor. Complete the K-factor field and provide up to 12 Meter Factor and Flow Rate values in the Factor Curve frame.<br>• **K-factor Curve/Single MF** – Uses a single Meter Factor curve value and a series of K-factors. Complete the Meter Factor field and provide up to 12 K-factor and frequency values in the Factor Curve frame.<br>**Note**<br>This field shows **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display. | |

| Field | Description | |
|---|---|---|
| **Single Factors** | **Master Meter K-Factor** | Enter the K-factor of the product you select for the respective master meter.<br>**Note**<br>• This field shows **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display.<br>• This field is **only** applicable if you select either **Single MF/Single K-factor** or **K-factor Curve/Single MF** in the **Master Meter Factor Option** field. |
| | **Master Meter MF** | Enter the Meter Factor of the selected product for the respective master meter.<br>**Note**<br>• This field shows **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display.<br>• This field is **only** applicable if you select either **Single MF/Single K-factor** or **MF Curve/Single K-factor** in the **Master Meter Factor Option** field. |
| **Factor Curve** | | Enter specific Meter Factor Curve or K-factor Curve information. The Factor Curve uses straight line interpolation to calculate a Meter Factor or K-factor for the master meter, for use in calculations.<br>**Note**<br>• This field shows **only** if you select either **Master Meter** in the **Prover Type** field of the Prover Configuration display.<br>• This field is **only** applicable if you select either **MF Curve/Single K-factor** or **K-factor Curve/Single MF** in the **Master Meter Factor Option** field. |

4. Select **Save** to save any changes you make to this display.

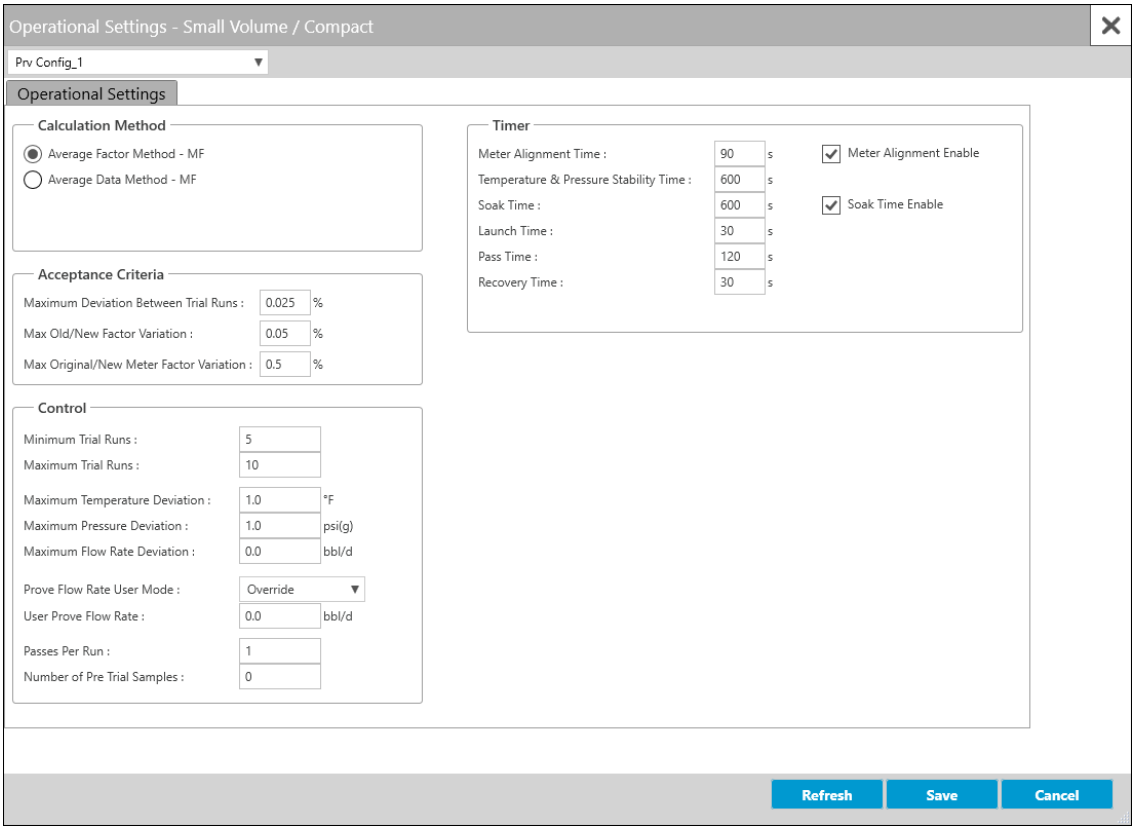
### 4.20.2.2 Prover Configuration – Operational Settings

Use this display to configure settings related to trial runs.

To access this display:

1. Select **Configure > Prover > Prover Configure** from the DeltaV™ FBxConnect™ main menu. The Prover Configuration displays opens.
2. Select the **Operational Settings** button. The Prover Configuration – Operational Settings pop-up display opens.

**Figure 259. Prover Configuration – Operational Settings (Small Volume shown)**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Calculation Method** | Defines how the repeatability applies to trial runs for the purposes of determining which trial runs the final Meter Factor calculation includes in the prove sequence. This parameter also determines which Meter Factor or K-factor is shown on the prove report as the final factor for the prove sequence.<br>Possible options are: |

| Field | Description | |
|---|---|---|
| | • **Average Factor Method - MF** – Calculates an intermediate Meter Factor for each trial run based on pulse counts, and individual temperature/pressure averages. The average (mean) of these intermediate Meter Factors is the final Meter Factor. The difference in these intermediate Meter Factors determines repeatability between trial runs.<br>• **Average Data Method - MF** – Calculates only one Meter Factor. Pulse counts, pressures and temperatures are collected for each trial run. When the required amount of good trial run occurs, these values are averaged. The Prover User Program calculates the average values for the final Meter Factor. The difference in pulse counts determines repeatability between trial runs.<br>**Note**<br>This option is valid **only** if you select either **Large Volume/Pipe** or **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. | |
| **Acceptance Criteria** | Use these fields to define the acceptable amount of variation between trial runs. | |
| | **Maximum Deviation Between Trial Runs** | Sets the maximum amount of variation/deviation from one trial run to another. If the deviation is under this value, then the trial run can be considered as valid for the prove sequence. If the variation between trial runs exceeds this amount, the trial run is considered bad. The default value is **0.025%**.<br>**Note**<br>Depending on your selection in the **Calculation Method** field, this is the repeatability between the number of pulses per trial run or the variation of the Meter Factor for that trial run. |
| | **Max Old/New Factor Variation** | Sets the maximum amount of variation allowed in a prove. If the variation of the Meter Factor or K-factor from the previously proved and accepted value exceeds this amount, the prove is considered bad and is not accepted. The default value is **0.05%**. |

| Field | Description | |
|---|---|---|
| | **Max Original/New Meter Factor Deviation** | Sets the maximum amount of variation allowed in a prove. If the variation of the Meter Factor or K-factor from the original prove exceeds this amount, the prove is considered bad and is not accepted. The default value is **0.5%**.<br>**Note**<br>The original prove values are shown in the **Prove Data** fields on the Liquid Linear Meter – General display. |
| **Control** | Use these fields to define parameters of a prove, including maximum temperature, pressure, and flow rate deviation. | |
| | **Minimum Trial Runs** | Sets the minimum number of trial runs (that must occur in order) that fall within the allowable range of repeatability. Valid selections are 1 to 20. The default is 5. |
| | **Maximum Trial Runs** | Sets the greatest number of trial runs the system attempts before aborting the prove sequence. Valid selections are 1 to 20. The default is 10. |
| | **Maximum Temperature Deviation** | Sets the greatest amount of temperature variation allowed between the prover temperature and the meter temperature. Temperature deviation is checked at the beginning of the prove sequence and must fall within the range within a user-defined time period for the sequence to continue.<br>The DeltaV® FB3000 RTU continually checks the temperature deviation throughout the prove. If the deviation is under this value, then the run can be considered as a potentially valid run for the prove sequence. If the temperature difference exceeds this value, then the prove aborts. The default is 1.0.<br>**Note**<br>The units for temperature deviation are defined by the most recent meter selected to be proved, using the station values on the Engineering Units display. |

| Field | Description | |
|---|---|---|
| | **Maximum Pressure Deviation** | Sets the greatest amount of pressure variation allowed between the prover pressure and the meter pressure. The meter pressure and the prover pressure may be from a single value or from an average of the prover inlet and prover outlet values.<br>The DeltaV® FB3000 RTU continually checks pressure deviation at the beginning and throughout the prove sequence. The pressure must fall within the range within a user-defined time period for the sequence to continue. If the pressure difference exceeds the maximum deviation, the prove is aborted. The default is 1.0.<br>**Note**<br>The units for temperature deviation are defined by the most recent meter selected to be proved, using the station values on the Engineering Units display. |
| | **Maximum Flow Rate Deviation** | Sets the amount of flow rate variation allowed during a prove when comparing the meter flow rate to the prove flow rate. Accurate proving requires a steady flow rate. The meter flow rate is recorded at the start of the prove and if the flow rate deviates greater than this amount, then the prove aborts. If you enter a value of 0.0, flow rate checks will be disabled. The default is 0.0.<br>**Note**<br>Enter the Maximum Flow Rate Deviation as absolute value. |

| Field | Description | |
|---|---|---|
| | **Prove Flow Rate User Mode** | Click ▼ to select the source of the flow rate through the prover. Possible options are:<br>• **Measured** – The flow rate through the prover is measured for the duration of the prove.<br>• **Override** – The system uses a user-entered value as the flow rate through the prover.<br>**Note**<br>If you select **Override**, then you **must** save your selection and then enter a value in the **Use Prove Flow Rate** field. |
| | **Selected/Use Prove Flow Rate** | Sets the target flow rate through the meter under test to be used during the prove. If the flow rate deviates by an amount greater than the value you configured in the **Maximum Flow Rate Deviation** field, then the prove will abort.<br>**Note**<br>If you select **Measured** in the **Prove Flow Rate User Mode** field, then this field is **read-only** and automatically populates with the current flow rate at the start of a prove. |
| | **Passes Per Run** | Sets the number of passes of the displacer which count as a single trial run. When performing small volume proving, it is typical to have multiple passes combined to form a single trial run. The default is 1.<br>**Note**<br>This field appears **only** if you select **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |

| Field | Description | |
|---|---|---|
| | **Number of Pre Trial Samples** | Sets the number of process variable samples taken to create an average of all prover variables which serve as inputs into calculations for each trial run. These samples are taken at the beginning of each trial run. The default is 0.<br>**Note**<br>This field appears **only** if you select **Small Volume/Compact** in the **Prover Type** field on the Prover Configuration display. |
| **Timer** | Use these fields to define the various timers associated with the prove sequence. | |
| | **Meter Alignment Time** | Sets the maximum time (in seconds) for the alignment of a meter to the prover before aborting the prove. Meter alignment is the first step in performing a prove. The default is 90 seconds. |
| | **Meter Alignment Time Enable** | Turns the meter alignment timer on or off. If enabled (checked), the Meter To Prove and Aligned Meter must match prior to starting a prove. |
| | **Temperature & Pressure Stability Time** | Sets the maximum time (in seconds) to achieve pressure and temperature stability before aborting the prove. Stability is defined as the prover inlet/outlet temperature and pressure values being equal to the meter temperature value within the maximum deviations. The default is 600 seconds. |
| | **Soak Time** | Sets the amount of time (in seconds) to wait for the temperature of the steel to measure closer to the temperature of the fluid. This additional time is used for the temperature of the prover to change because of the temperature of the fluid. The default is 600 seconds. |
| | **Soak Time Enable** | Sets the soak timer on or off to add time following the temperature stabilization timer. If disabled (unchecked), then this step is skipped. |

| Field | Description | |
|---|---|---|
| | **Launch Time** | Sets the maximum time (in seconds) to achieve a Prover Ready indication signal from the prover before aborting the prove. This is the allowed time between starting the prove sequence and receiving the Prover Ready indication signal. The default is 30 seconds.<br>**Note**<br>This field **does not** apply to **Master Meter** provers. |
| | **Pass Time** | Sets the maximum time (in seconds) to achieve a successful pass before aborting the prove. This is the allowed time between issuing the launch command and receiving the second detector trip for each pass. The default is 120 seconds.<br>**Note**<br>This field **does not** apply to **Master Meter** provers. |
| | **Recovery Time** | Sets the amount of time (in seconds) the program waits between receiving the second detector switch trip and starting the next pass. This time allows the prover equipment to return to a ready state. The default is 30 seconds. |

4. Select **Save** to save any changes you make to this display.

## 4.20.3 Prover Operate

Use this display to start a prove and view details about individual trial runs.

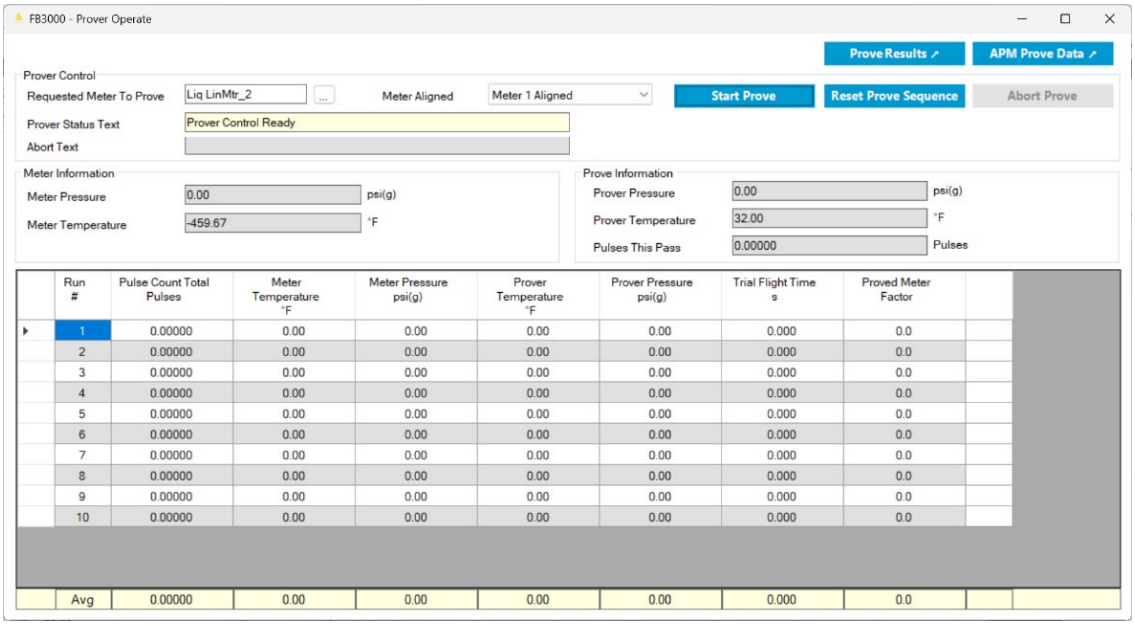
**Note**

The information on this display is updated once per second.

To access this display:

1. Select **Configure > Prover > Prover Operate** from the DeltaV™ FBxConnect™ main menu. The Prover Operate display opens.

**Figure 260. Prover Operate**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Prove Results** | Select this button to open the Prove Results display and view details of the most recent prove sequence and accept and transfer the new meter values. | |
| **APM Prove Data** | Select this button to open the APM Prove Data display and view real-time information from your APM. | |
| **Prover Control** | Use these fields to initiate a prove sequence. | |
| | **Requested Meter to Prove** | Click ••• to open a Point Picker dialog and select the meter to prove. |
| | **Meter Aligned** | Click ▼ and select the meter currently aligned. |
| | **Start Prove** | Select this button to initiate the prove sequence.<br>**Note**<br>You must click **Reset Prove Sequence** before starting the prove sequence. |

| Field | Description | |
|---|---|---|
| | **Reset Prove Sequence** | Select this button to clear all data from the last prove sequence and ready the system for the next prove.<br>**Note**<br>After issuing this command, select **Start Prove** to start a new sequence. |
| | **Abort Prove** | Select this button to stop the prove sequence.<br>**Note**<br>This button is unselectable until you initiate a prove sequence. |
| | **Prover Status Text** | This color-coded **read-only** field shows the current status of the prover. The type of prove device determines the possible values for this field.<br>The meaning of each possible color is below:<br>• Yellow – Normal<br>• Green – Prove Completed Successfully<br>• Red – Prove Aborted or Not Successful<br>Upon successful completion, one of the following messages is shown:<br>• Prove Completed, Successful<br>• Prove Completed, Previous Factor Deviation Error<br>• Prove Completed, Original Factor Deviation Error |
| | **Abort Text** | This **read-only** field shows the reason for an aborted prove sequence. This field is typically blank, and the program clears this field when you reset the prove sequence. The type of prove device determines the possible values for this field. |
| **Meter Information** | These **read-only** fields show critical information for the meter under test. Values include: | |
| | **Meter Pressure** | The current pressure of the meter under test. |

| Field | Description | |
|---|---|---|
| | **Meter Temperature** | The current temperature of the meter under test. |
| **Prove Information** | These **read-only** fields show critical information for the prover under test. Values include: | |
| | **Prover Pressure** | The current in-use pressure of the prover. This could be the inlet pressure, outlet pressure, or an average of the two based on your selection in the **Pressure Option** field on the Prover Configuration display. |
| | **Prover Temperature** | The current in-use temperature of the prover. This could be the inlet temperature, outlet temperature, or an average of the two based on your selection in the **Temperature Option** field on the Prover Configuration display. |
| | **Pulses This Pass** | The number of pulses received in the current pass. This provides an indication of the progress of a pass while a prove is in progress. |
| **Trial Run Data** | This **read-only** table shows values for each trial run, including total pulses, meter temperature/pressure, prover temperature/pressure, and the proved meter factor. | |
| | **Run #** | This **read-only** field shows the number of the trial run. |
| | **Pulse Count Total Pulses** | This **read-only** field shows the total number of pulses counted for this trial run. |
| | **Meter Temperature** | This **read-only** field shows the average calculated meter temperature while accumulating pulses for this trial run. |
| | **Prover Temperature** | This **read-only** field shows the average calculated prover temperature while accumulating pulses for this trial run. |
| | **Meter Pressure** | This **read-only** field shows the average calculated meter pressure while accumulating pulses for this trial run. |

| Field | Description | |
|---|---|---|
| | **Prover Pressure** | This **read-only** field shows the average calculated prover pressure while accumulating pulses for this trial run. |
| | **Trial Flight Time** | This **read-only** field shows the average detector to detector flight time provided by the APM for this trial run. |
| | **Proved Meter Factor** | This **read-only** field shows the proved meter factor for each trial run. |

3. Select **Save** to save any changes you make to this display.

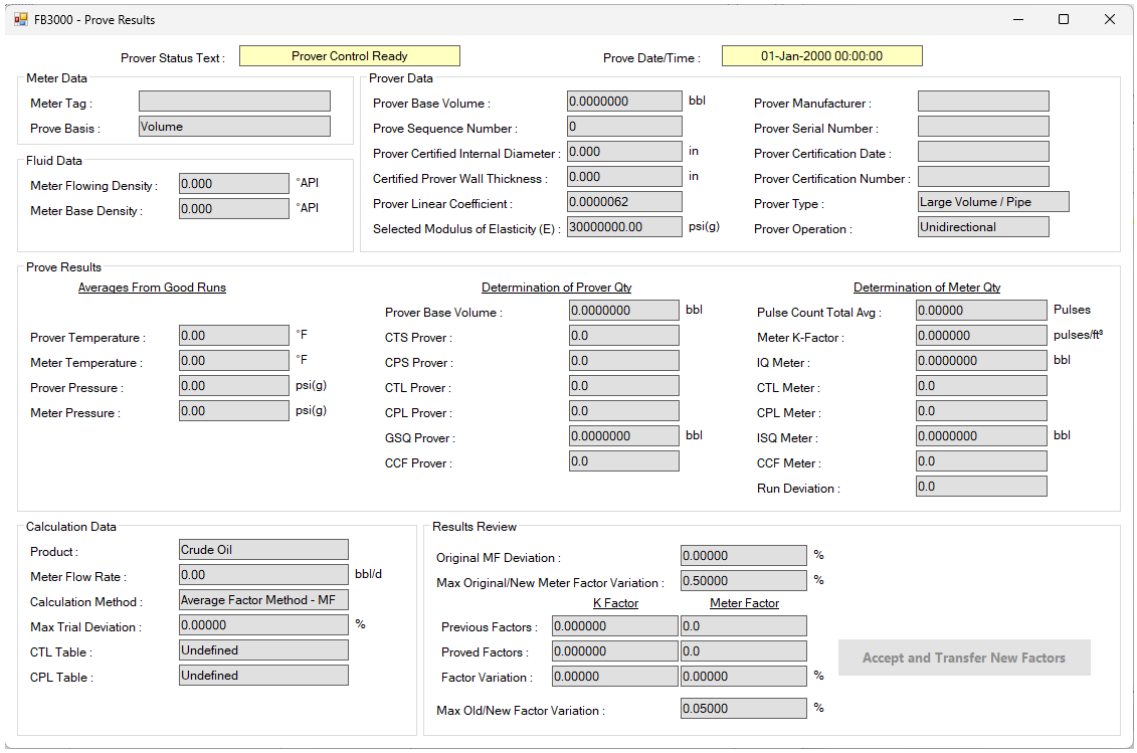
#### 4.20.3.1 Prover Operate – Prove Results

Use this display to view details of the most recent prove sequence and to accept and transfer the new values.

To access this display:

1. Select **Configure > Prover > Prover Operate** from the DeltaV™ FBxConnect™ main menu. The Prover Operate display opens
2. Select the **Prove Details** button. The Prover Operate – Prove Details pop-up display opens.

**Figure 261. Prover Operate – Prove Results**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Prover Status Text** | This **read-only** field shows the current status of the prover. The type of prove device determines the possible values for this field. | |
| **Prove Date/Time** | This **read-only** field displays the date and timestamp of the prove. | |
| **Meter Data** | These fields show information associated with the proved meter. | |
| | **Meter Tag** | This **read-only** field shows an identifier for the selected meter. |
| | **Prove Basis** | This **read-only** field shows the basis of the prove. Possible options are Volume or Mass. |
| **Fluid Data** | These fields show information about the fluid flowing through the prover. | |
| | **Meter Flowing Density** | This **read-only** field shows the average density at meter conditions of the last prove. This is the value averaged between detector switch trips. |

| Field | Description | |
|---|---|---|
| | **Meter Base Density** | This **read-only** field shows average base density of the last prove. |
| **Prover Data** | These fields show information specific to the prove device used for the last prove. | |
| | **Prover Base Volume** | This **read-only** field shows the base volume amount. |
| | **Prove Sequence Number** | This **read-only** field shows the prove sequence identifier for this meter factor and/or K-factor for the selected meter. |
| | **Prover Certified Internal Diameter** | This **read-only** field shows the internal diameter of the prover as documented by the calibration certificate. |
| | **Certified Prover Wall Thickness** | This **read-only** field shows wall thickness of the prover as documented by the calibration certificate. |
| | **Prover Linear Coefficient** | This **read-only** field shows the linear coefficient of thermal expansion for the prover material. |
| | **Selected Modulus of Elasticity (E))** | This **read-only** field shows the mathematical description of the steel's tendency to be deformed elastically when force is applied to it. |
| | **Prover Manufacturer** | This **read-only** field shows a description for the manufacturer of the prover. |
| | **Prover Serial Number** | This **read-only** field shows the serial number of the prover. |
| | **Prover Certification Date** | This **read-only** field shows the date the prover was certified. |
| | **Prover Certification Number** | This **read-only** field shows the certification number for the last calibration certificate. |
| | **Prover Type** | This **read-only** field shows the category of the prover. Possible options are Large Volume, Small Volume, or Master Meter. |

| Field | Description | | |
|---|---|---|---|
| | **Prover Operation** | This **read-only** field shows the operation method of the prover. Possible options are unidirectional and bidirectional.<br>**Note**<br>This field applies to large volume provers **only**. | |
| **Prove Results** | These fields show data associated with this prove including the Meter Factor Methods, Determination of GSQp, and Determination of ISQm at the time of the prove. | | |
| | **Averages From Good Runs** | These fields show averages from all good trial runs in the current prove sequence. | |
| | | **Prover Temperature** | This **read-only** field displays the average calculated prover temperature while accumulating pulses. |
| | | **Meter Temperature** | This **read-only** field displays the average calculated meter temperature while accumulating pulses. |
| | | **Prover Pressure** | This **read-only** field displays the average calculated prover pressure while accumulating pulses. |
| | | **Meter Pressure** | This **read-only** field displays the average calculated meter pressure while accumulating pulses. |
| | | **Pulse Count Total Avg** | This **read-only** field shows calculated average pulse count total. |
| | | **Final MF Using Average Data** | This **read-only** field shows the calculated final meter factor. |
| | **Determination of Prover Qty** | These fields show information about the gross standard quantity of the prover. | |
| | | **Prover Base Volume** | This **read-only** field shows the base prover volume used in calculations. |

| Field | Description | | |
|---|---|---|---|
| | | **CTS Prover** | This **read-only** field shows the calculated correction for the effect of temperature on the prover steel (CTSp). |
| | | **CPS Prover** | This **read-only** field shows the calculated correction for the effect of pressure on the liquid in the prover (CPSp). |
| | | **CTL Prover** | This **read-only** field shows the calculated correction for the effect of pressure on the liquid in the prover (CPLp). |
| | | **CPL Prover** | This **read-only** field shows the calculated correction for the effect of pressure on the liquid in the prover (CPLp). |
| | | **GSQ Prover** | This **read-only** field shows the calculated Gross Standard Volume for the prover (GSQp) calculated as:<br>*GSQp = Base x CTLp x CPLp x CTSp x CPSp*<br>Where:<br>*Base* = The prover base volume.<br>*CTLp* = Correction for the effect of temperature on the liquid in the prover.<br>*CPLp* = Correction for the effect of pressure on the liquid in the prover.<br>*CTSp* = Correction for the effect of temperature on the prover steel.<br>*CTSp* = Correction for the effect of pressure on the prover steel.<br>**Note** |

| Field | Description | | |
|---|---|---|---|
| | | | This field displays **only** if the Flow Meter Type is set to Volume. |
| | | **CCF Prover** | This **read-only** field shows the average Combined Correction Factor (CCF). |
| | | **Percent Run Deviation** | This **read-only** field shows the calculated variation between the trial runs. |
| **Determination of Meter Qty** | These fields show information about the Indicated Standard Quantity for the meter (ISQm). | | |
| | **Pulse Count Total Avg** | This **read-only** field shows average total pulses counted for the last prove. | |
| | **Meter K-Factor** | This **read-only** field shows the current K-factor for the meter. | |
| | **IQ Meter** | This **read-only** field shows the corrected Indicated Quantity for the meter (IQm). | |
| | **CTL Meter** | This **read-only** field shows the flow weighted average CTLm for the hour, previous hour, contract day and previous day. | |
| | **CPL Meter** | This **read-only** field shows the flow weighted average CPLm for the hour, previous hour, contract day and previous day. | |
| | **ISQ Meter** | This **read-only** field shows corrected Indicated Standard Volume for the meter (ISQm) calculated as follows:<br>$$ISQm = \frac{Pulses}{K\text{-}factor} x\ CTLm\ x\ CPLm$$<br>Where:<br>*Pulses* = Total pulses counted for the trial run.<br>*K-factor* = K-factor for the meter under test.<br>*CTLm* = Correction for the effect of temperature on the liquid in the prover.<br>*CPLm* = Correction for the effect of pressure | |

| Field | Description | |
|---|---|---|
| | **CCF Meter** | This **read-only** field shows the average Combined Correction Factor for the meter (CCFm). |
| | **Final K-Factor** | This **read-only** field shows the average value for the Meter Factor or K-factor calculated by averaging the factor value for each “good” trial run. |
| **Calculation Data** | These fields show general information about the calculations. | |
| | **Product** | This **read-only** field shows the fluid type flowing through the prover. |
| | **Meter Flow Rate** | This **read-only** field shows the average flow rate of the meter during the course of the prove. |
| | **Calculation Method** | This **read-only** field shows the calculation selected for the last prove sequence. |
| | **Max Trial Deviation** | This **read-only** field shows, in percent, the maximum allowable deviation between trial runs for the last prove sequence. |
| | **CTL Table** | This **read-only** field shows the table used in calculations when correcting for the effect of temperature on the liquid in the prover. |
| | **CPL Table** | This **read-only** field shows the table used in calculations when correcting for the effect of temperature on the liquid in the prover. |
| **Results Review** | These fields show the results from the last prove. | |
| | **Original MF Deviation %** | This **read-only** field shows the original meter factor variation. |
| | **Max Original/New Meter Factor Variation** | This **read-only** field shows the maximum allowable variation between the original and the proved meter factor. You configure this value on the Prover Configuration – Operation Settings display. |
| | **Previous Factors** | This **read-only** field shows the calculated meter factor and K-Factor before the latest prove sequence. |
| | **Proved Factors** | This **read-only** field shows the calculated meter factor and K-Factor after the latest prove sequence. |

| Field | Description | |
|---|---|---|
| | **% Factor Variation** | This **read-only** field shows the calculated variation between the previous and the proved factor. The system calculates this value as: $$Variation\ \% = \left(\frac{Proved - Previous}{Previous}\right) x\ 100$$ |
| | **Max Old/New Factor Variation** | This **read-only** field shows the maximum allowable variation between the previous and the proved factor. |
| | **Accept and Transfer New Factors** | Select this button accept the final proved factor and to put it into use for the meter that was proved. When you click this button, an event generates and the proved factor copies to the appropriate parameter in the selected meter. The new factor affects measurement immediately after acceptance.<br>**Note**<br>This button is **not** accessible when the proved factor value is outside the acceptable range. |

4. Select **Save** to save any changes you make to this display.

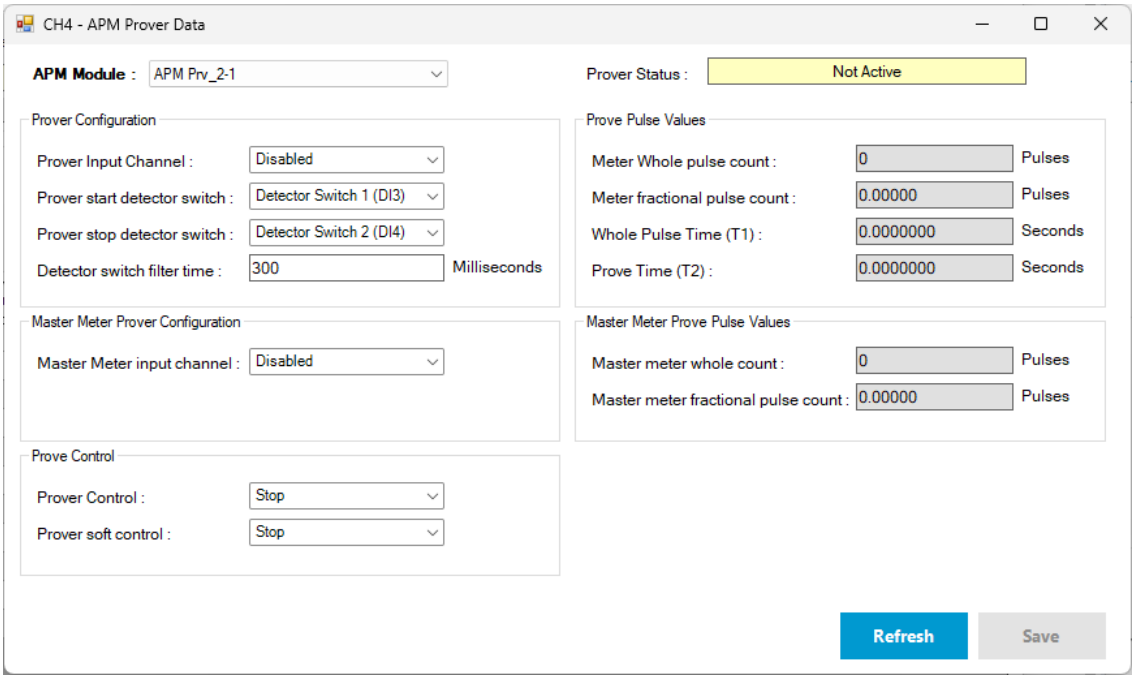
### 4.20.3.2 Prover Operate – APM Prove Data

Use this display to view information from the APM.

To access this display:

1. Select **Configure > Prover > Prover Operate** from the DeltaV™ FBxConnect™ main menu. The Prover Operate display opens
2. Select the **APM Prove Data** button. The Prover Operate – APM Prove Data pop-up display opens.

**Figure 262. Prover Operate – APM Prove Data**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **APM Module** | Click ▼ and select the APM you want to use for the prove sequence. | |
| **Prover Status** | This **read-only** field shows the current status of the prove sequence. | |
| **Prover Configuration** | Use these fields to configure the APM and detector switches used for the prove sequence. | |
| | **Prover Input Channel** | Click ▼ and select the pulse input channel on the APM to use for the prove sequence. |
| | **Prover start detector switch** | Click ▼ and select a detector switch used to start counting pulses for the prove sequence. |
| | **Prover stop detector switch** | Click ▼ and select a detector switch used to stop counting pulses for the prove sequence. |

| Field | Description | |
|---|---|---|
| | **Detector switch filter time** | Sets, in milliseconds, the time allotted after a detector switch triggers but before the next trigger occurs. This is a de-bounce filter for the detector switches to ensure that any "noise" is filtered out and is not read as another detector switch trigger. This is the maximum filter time for how long the trip waits before the pulses are read again. |
| **Master Meter Prover Configuration** | Use this field to configure the input used with Master Meter provers.<br>**Note**<br>This field shows **only** if you select **Master Meter** in the **Prover Type** field on the Prover Configuration display. | |
| | **Master Meter input channel** | Click ▼ and select the pulse input to use for the Master Meter Prove. Select this option when you are using another meter to provide the pulse counts and not an actual displacement prover. |
| **Prove Control** | These fields are used by the system proving functionality to reset and initiate APM prover pulse counting. These settings are written to and managed by the proving routine and do not need to be configured by the user. | |
| | **Prover Control** | Click ▼ to select the APM prover pulse counting control. Assuming the prover and detector switch inputs have been configured, selecting “Start” resets the APM and readies it for prover pulse counting. Selecting “Stop” concludes the prover pulse counting routine (typically done after the final detector switch) and readies the APM for the next pulse counting pass.<br>**Note**<br>This functionality is managed by the prover routine and does not need to be configured by the user. |

| Field | Description | |
|---|---|---|
| | **Prover soft control** | This field is used for pulse counting in the master meter use case when no physical detector switches are in use. It assumes that the above Prover Start Detector Switch configuration has been configured for “Soft Control”. Before this setting is operated, it is assumed the above Prover Control has been set to “Start” to begin pulse counting.<br>Click ▼ to select the APM software-based pulse counting control. Selecting “Start” represents the first software detector switch and the start of pulse counting. Selecting “Stop" represents the last software detector switch and the end of pulse counting.<br>**Note**<br>This functionality is managed by the prover routine and does not need to be configured by the user. |
| **Prove Pulse Values** | Use these fields to view data from the most recent prover pulse counting session. This data is updated and replaced multiple times during a prove, once for each prover pass. | |
| | **Meter Whole pulse count** | This **read-only** field shows the actual number of whole pulses accumulated between detector switches for the selected meter input. The value is reset to 0 when a new pulse counting pass is started, and it is populated with a pulse count after the last detector switch has been received. |
| | **Meter fractional pulse count** | This **read-only** field shows the fractional, interpolated pulses accumulated between detector switches from the selected meter input. The value is reset to 0 when a new pulse counting pass is started, and it is populated with a pulse count after the last detector switch has been received. |

| Field | Description | |
|---|---|---|
| | **Whole Pulse Time (T1)** | This **read-only** field shows the time interval (in seconds) between the first meter pulse after the first detector switch signal and the first meter pulse after the last detector switch signal. This time value is used in double-chronometry pulse interpolation, and therefore the determination of the meter fractional pulse count. |
| | **Prove Time (T2)** | This **read-only** field shows the time interval (in seconds) between the first and last detector switch signals. This time value is used in double-chronometry pulse interpolation, and therefore the determination of the meter fractional pulse count. |
| **Master Meter Pulse Values** | Use these fields to view prover pulse count data for the associated master meter prover. This data is updated and replaced multiple times during a prove, once for each prover pass.<br>**Note**<br>These fields show **only** if you select **Master Meter** in the **Prover Type** field on the Prover Configuration display. | |
| | **Master meter whole count** | This **read-only** field shows the actual number of whole pulses accumulated between detector switches from the selected master meter input, during the same time period as the meter under test. The value is reset to 0 when a new pulse counting pass is started, and it is populated with a pulse count after the last detector switch has been received. |
| | **Master meter fractional pulse count** | This **read-only** field shows the fractional, interpolated pulses accumulated between detector switches from the selected master meter input, during the same time period as the meter under test. The value is reset to 0 when a new pulse counting pass is started, and it is populated with a pulse count after the last detector switch has been received. |

4. Select **Save** to save any changes you make to this display.

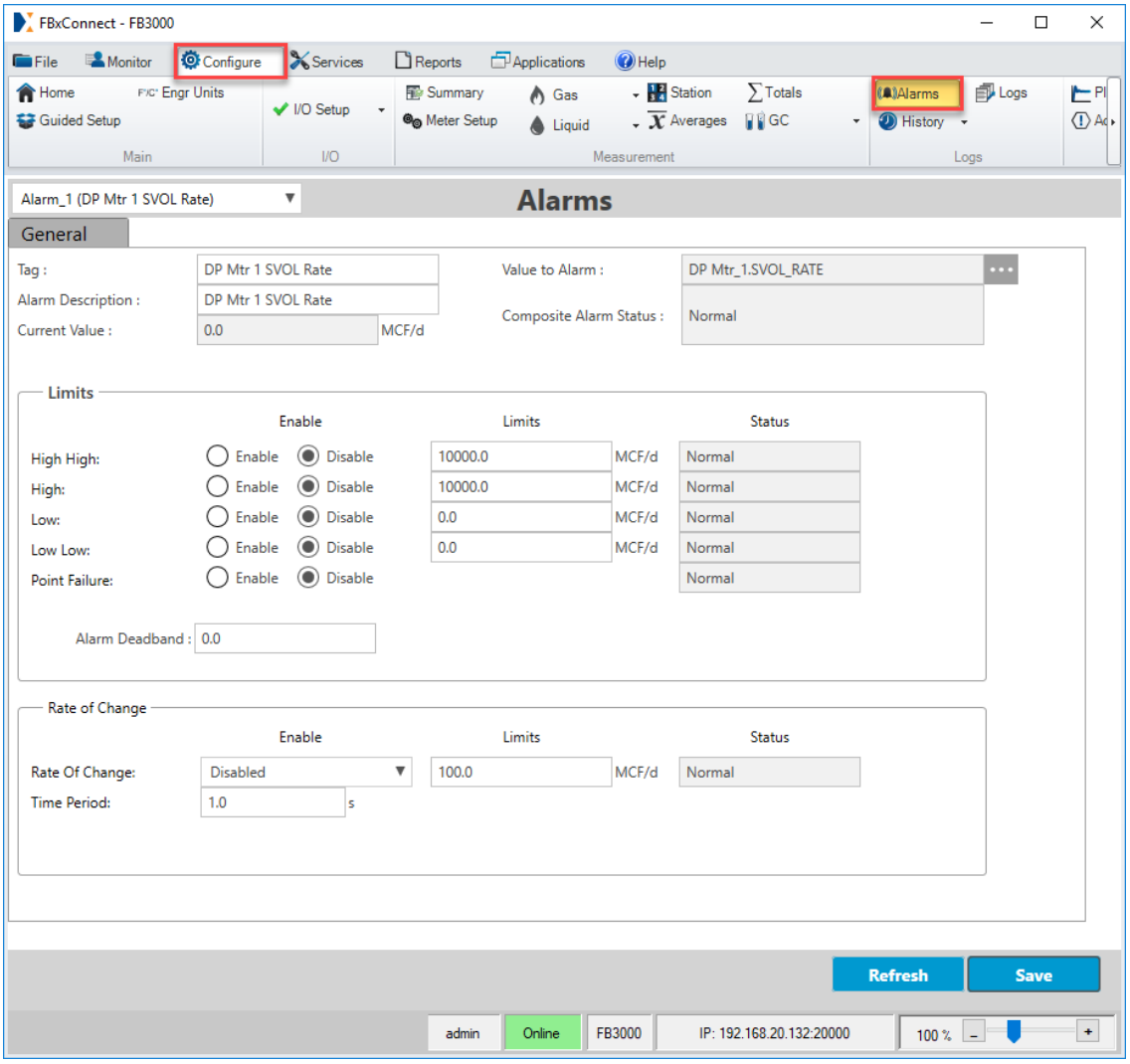
# 4.21 Alarms

Use the Alarms display to configure the alarms in your device. Various alarms are pre-configured to alarm a specific parameter based on your configuration. You can configure 50 general purpose alarms (Alarm 30001 through Alarm 30050) to alarm any parameter of your choice. You can configure the parameter to alarm, alarm limits, alarm deadband, and rate of change alarming for each parameter.

To access this screen:

1. Select **Configure > Alarms** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the alarm drop-down list to select an instance to configure.

**Figure 263. Alarms**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Set an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Alarm Description** | Set a description (up to 20-alphanumeric characters) for the selected instance. |
| **Current Value** | This **read-only** field shows the current value of the selected point in the Value to Alarm field. |

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Value to Alarm</td><td>Displays the point currently being monitored by the system. Click ••• to open a Point Picker dialog and select a parameter for the alarm to monitor.<br>Note<br>Instance 1 through 35 are preconfigured. You can configure instance 36 through 45 to monitor any point available in the device.</td></tr>
<tr><td>Composite Alarm Status</td><td>This read-only field shows the current active alarms for the selected point in the Value to Alarm field. The Composite Alarm Status is Normal if there are no active alarms. Possible composite alarm statuses are Normal, Low, Low Low, High, High High, Rate of Change and Point Fail.<br>The bitwise positions for alarm statuses are shown below:
<table>
<tr><td>Bit Position</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>Meaning</td><td>Not Used</td><td>Not Used</td><td>Point Failure</td><td>Rate of Change</td><td>High-High</td><td>High</td><td>Low-Low</td><td>Low</td></tr>
</table></td></tr>
<tr><td>Limits</td><td>Use this section to configure the alarm limits for the selected input. You can configure a High High, High, Low, and Low Low alarm limit.
<table>
<tr><td>Enable</td><td>Select Enable to allow the system to monitor the point for the specified alarm limit. Select Disable to make the system ignore the specified alarm limit.</td></tr>
<tr><td>Limit</td><td>Sets a limit value (in engineering units) to which the input must rise (High High and High) or fall (Low and Low Low) to generate an alarm.</td></tr>
<tr><td>Status</td><td>This read-only field shows the current state specified limit. Possible statuses are Disabled, Normal, and Alarm.</td></tr>
<tr><td>Alarm Deadband</td><td>Sets the value (in engineering units) that is an inactive zone above the low alarm and below the high alarm. The purpose of the Alarm Deadband is to prevent the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This also prevents the Alarm Log from being over-filled with data.</td></tr>
</table></td></tr>
<tr><td>Rate of Change</td><td>Use this section to configure alarming based on the speed of variability in the value of the alarm input.</td></tr>
</table>

| Field | Description | |
|---|---|---|
| | **Enable** | Click ▼ to configure the input value changes which trigger an alarm. Possible values are Disabled, Alarm on Positive Changes, Alarm on Negative Changes, and Alarm on Both. |
| | **Limit** | Sets a limit value (in engineering units) to which the input must rise or fall during the configured time period to generate an alarm. |
| | **Status** | This **read-only** field shows the current state Rate of Change alarm. |
| | **Time Period** | Sets the time duration (in seconds) that the system uses to determine the Rate of Change for an input. |

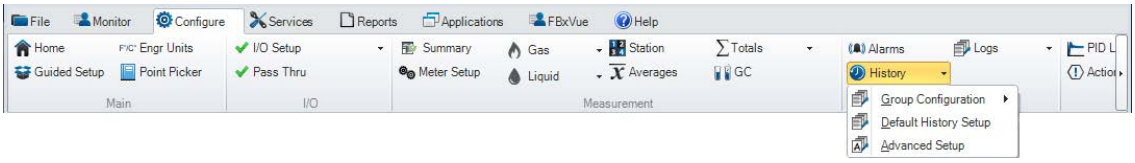
4. Select **Save** to save any changes you make to this screen.

## 4.22 History

Use the History displays to allocate the number of history points in each history group, and to configure the parameters to be archived in each group. For more information about the structure of history stored in the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU, refer to History Overview.

To access these displays, select **Configure > History** from the DeltaV FBxConnect configuration software main menu and select one of the options from the History drop-down menu.

**Figure 264. History Drop-Down Menu**




The History drop-down menu contains the following options:

Periodic History – Use this option to configure history points for each periodic history group in your FB Series product. You can also use this display to import or export your history configuration to a CSV file.

Transaction History Group Configuration – Use this option to configure history points for each transaction history group in your FB Series product. You can also use this display to import or export your transaction history configuration to a CSV file.

Default History Setup – Use this option to configure history points in your FB Series product using the default history values.

Advanced Setup – Use this option to configure the total number of history points, configure the number records (hourly, daily, weekly, and monthly), and allocate the history points among the history groups in your FB Series product.

## 4.22.1 History Overview

There are two types of history available – periodic history and transaction history. Periodic history is recorded based on regular intervals with each record beginning at the same time the previous record ends. Only numeric data can be recorded in periodic history groups. Transaction history is recorded based on a trigger that causes the interval to start and another trigger that causes the interval to stop. The next transaction may be triggered at the end of the previous transaction but can also be triggered by a separate event. Both string and numeric data can be recorded in transaction history. Before history can be configured for either periodic or transaction history, you must allocate the number of history points and the number of records required for each type of history.

### Periodic History

Periodic history is further divided into standard history and user periodic history. Standard history groups provide logging at four fixed intervals: hourly, daily, weekly, and monthly. User periodic history groups provide logging at one user-selectable interval per group.

#### Standard History

There are two types of standard history groups – general history and station history.

The DeltaV FB3000 RTU supports up to 36 stations. Each station is associated with a separate station history group. You can adjust the number of points between any of the periodic history groups. For more information about history point reallocation, refer to Advanced – Standard History Sizing Tab.

**General History** – Contains hourly, daily, weekly and monthly history not associated with a meter or station. General history groups should **not** be used to record meter totals or averages calculated by the meter run.

**Station History** – Contains hourly, daily, weekly and monthly history associated with the station and any meters assigned to the station.

**Note**

For the station history groups, Emerson recommends that you configure the inputs to average on the Averages display **before** configuring history.

Station history groups are typically used to archive metrologically significant data from the meters belonging to that station. When used together with meter data (represented via Average and Total objects), the station history groups read the previous period values calculated by the meter application and log them as configured in the history points.

Configuring station history involves selecting Average and Total objects which contain the meter data. For this reason, it is recommended to configure Averages first and then configure Station History.

The archive type for each history point is limited by which object is selected:

- Average, minimum, and maximum archive types can only be selected for an Average object.
- Total/Difference can only be selected for a Total object.
- Snapshot values can be selected for either type, as both Averages and Totals store a snapshot of the value at the last period end.

Station history also includes the ability to archive any numeric database parameters alongside meter data (for example, an ambient temperature or a well casing pressure). When adding numeric parameters directly to the station history group, you **must** select an appropriate archive type for each history point (Average, Total / Difference, Snapshot, Minimum, Maximum, Integration).

## User Periodic

There are two user periodic history groups with a fixed number of points in each group. 10 history points are allocated to the User Periodic 1 history group, and 20 history points are allocated to the User Periodic 2 history group. You can configure the logging interval independently for each group. Regardless of the selected logging interval, User Periodic 1 has a capacity of 4000 records and User Periodic 2 has a capacity of 500 records. User periodic history groups should **not** be used to record meter totals or averages calculated by the meter run.

## Averages and Totals

Fiscal averages and totals for audit trail purposes are calculated by the metering application and stored in the database. Averages and minimum/maximum values for the current and previous periods are stored in the Average object, and the cumulative total and current and previous period totals are stored in the Total object.

**Totals** – Total objects are not configurable and have been pre-defined for flowtime, uncorrected volume, corrected volume, mass, and energy for all meter types. DP meters have a pre-defined total for Integral Value (IV) and Linear meters have a pre-defined total for raw pulses.

**Averages** – The first four averages are defaulted for a single DP meter application to average DP Mtr_1 values of the DP input value, Flowing Pressure input value, Flowing Temperature input value, and Integral Multiplier Value (IMV); however, you may re-define these to point to other meters or other parameters as required by your application.

The averaging method is based on the selection in Meter Setup for Meter Averaging Method and are either flow dependent or flow weighted, which means they must be associated with a meter run. This association can either be by the selection of the Input to Average starting with the selection of a meter (DP Mtr or Linear Mtr instance), or by selecting a parameter from another object and then defining the associated meter run through the Input to Weight.

**Note**

You can select Station, Fluid Properties, or meter run input parameters by first selecting the meter, then the meter parameter that references that object (Station Assignment, Fluid Property Reference, Differential Pressure Object, Static Pressure Object, Flowing Temperature Object), then a parameter from that object.

For instance, the default configuration of Average_2 is configured as DP Mtr_1.PF_OBJ.SELECTED. This will average the raw I/O value from the input assigned to DP Mtr_1 (which might be a downstream gauge pressure value). Another option would be to select DP Mtr_1 (Instance1) and then the PF_INUSE parameter. This will average the pressure as it is used in the flow equation, so in this case converted to upstream, absolute pressure.

## Daylight Saving Time

The day that Daylight Saving Time starts, 23 hourly history records are recorded. The day that Daylight Saving Time ends, 25 hourly records are recorded. You configure Daylight Saving Time on the Clock display.

### Transaction History

Transaction history allows you to define any parameter to be recorded as part of the transaction. When a transaction starts, the start time is recorded. When a transaction ends, the stop time is recorded and a snapshot is taken of the selected parameters. Each transaction history group has independent triggers to start a transaction (Start), end a transaction (Stop) or end a transaction and immediately start another transaction (Next). You can configure up to 100 transaction history groups. Each group can contain up to 650 points with a maximum of 3100 points allowed across all transaction history groups. For more information about adjusting the number of transaction history groups and points, refer to Transaction History Sizing Tab.

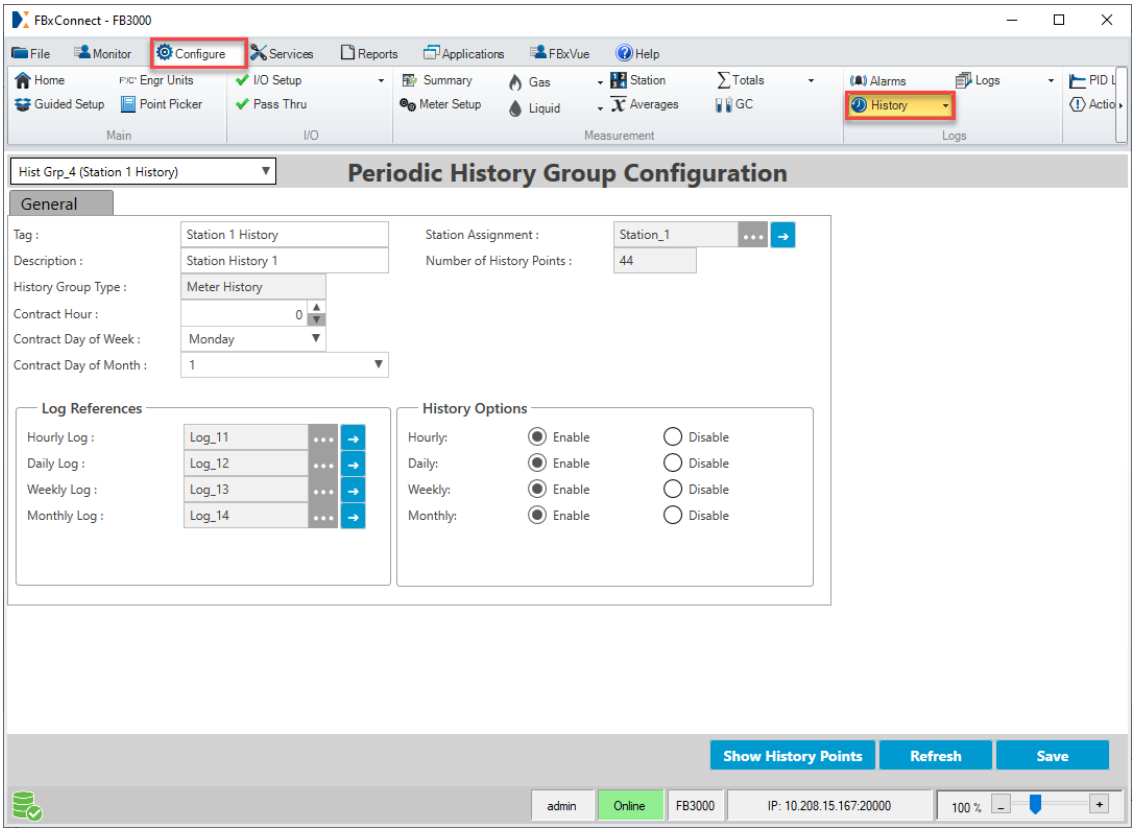
## 4.22.2 Periodic History Group Configuration

Use this display to configure history points and logging options for each periodic history group in your FB Series product.

To access this display:

1. Select **Configure > History > Group Configuration > Periodic History** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select a history group to configure.

**Figure 265. Periodic History Group Configuration**




## Note

The fields available on this display change based on the type of history group you select in the drop-down list.

**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected history group. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected history group. |
| **History Group Type** | This **read-only** field shows the history group type currently selected in drop-down list at the top of the display. Possible group types are User Periodic, General History and Meter History. |

| Field | Description |
|---|---|
| **Contract Hour** | Click ⇕ to set the hour at which daily, weekly, and totals rollover and history records are logged (for daily-based, weekly-based, or monthly-based reports).<br>**Note**<br>This field appears **only** for the **General History** and **Meter History** History Group Type. |
| **Contract Day of Week** | Click ⇕ to set the day of the week at which totals rollover and history records are logged (for weekly-based reports).<br>**Note**<br>This field appears **only** for the **General History** and **Meter History** History Group Type. |
| **Contract Day of Month** | Click ⇕ to set the day of the month at which totals rollover and history records are logged (for monthly-based reports).<br>**Note**<br>This field appears **only** for the **General History** and **Meter History** History Group Type. |
| **Station Assignment** | This **read-only** field shows which station is associated with the selected Meter history group. Select → to open the Station Configuration display and configure the station.<br>**Note**<br>This field appears **only** for the **Meter History** History Group Type. |
| **Number of History Points** | This **read-only** field shows the current number of history points allocated to the selected history group. |
| **User Period** | Sets the amount of time (in seconds) between data samples.<br>**Note**<br>This field appears **only** for the **User Periodic** History Group Type. |
| **Log References** | These fields show which logs are used for each log type (Hourly, Daily, Weekly, Monthly, and User Periodic). Click → to open the Logs display and configure logging options.<br>**Note**<br>• The Hourly, Daily, Weekly, and Monthly Log references appear **only** for the **General History** and **Meter History** History Group Types. |

| Field | Description |
|---|---|
| | • The User Periodic Log reference appears **only** for the **User Periodic** History Group Type. |
| **History Options** | Enables each of the log types (Hourly, Daily, Weekly, and Monthly).<br>**Note**<br>This field appears **only** for the **General History** and **Meter History** History Group Type. |
| **Show History Points** | Click to configure which parameters are logged and their archival type for the selected History Group Type. For more information, refer to Show History Points. |

4. Select **Save** to save any changes you make to this display.

### 4.22.2.1 Show History Points

Use this screen to configure history points of the selected history group.

To access this screen:

1. **For Periodic History:**
   Select **Configure > History > Group Configuration > Periodic History** from the DeltaV FBxConnect configuration software main menu.

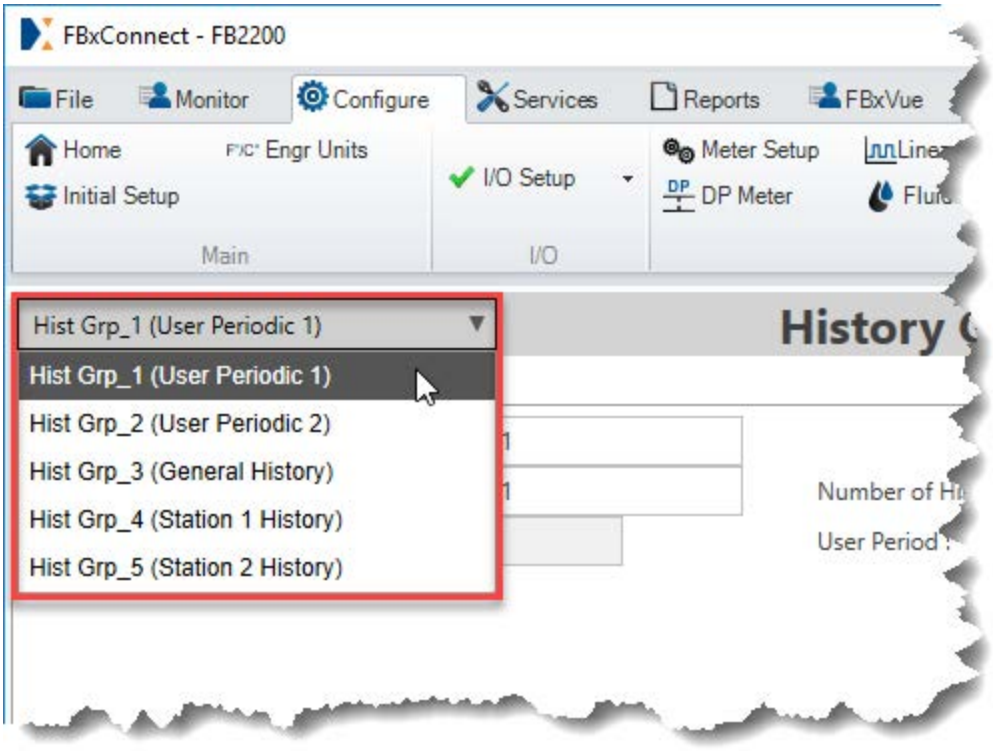
   **For Transaction History:**
   Select **Configure > History > Group Configuration > Transaction History** from the DeltaV FBxConnect configuration software main menu.

   **Note**

   You **must** enable **Transaction History** on the History Setup – Advanced display before you can access this display.

2. Click ▼ in the drop-down list at the top of the screen to select a History Group to configure.

**Figure 266. History Group Drop-Down List**




3. At the bottom of the screen, select **Show History Points**.

**Figure 267. Show History Points**

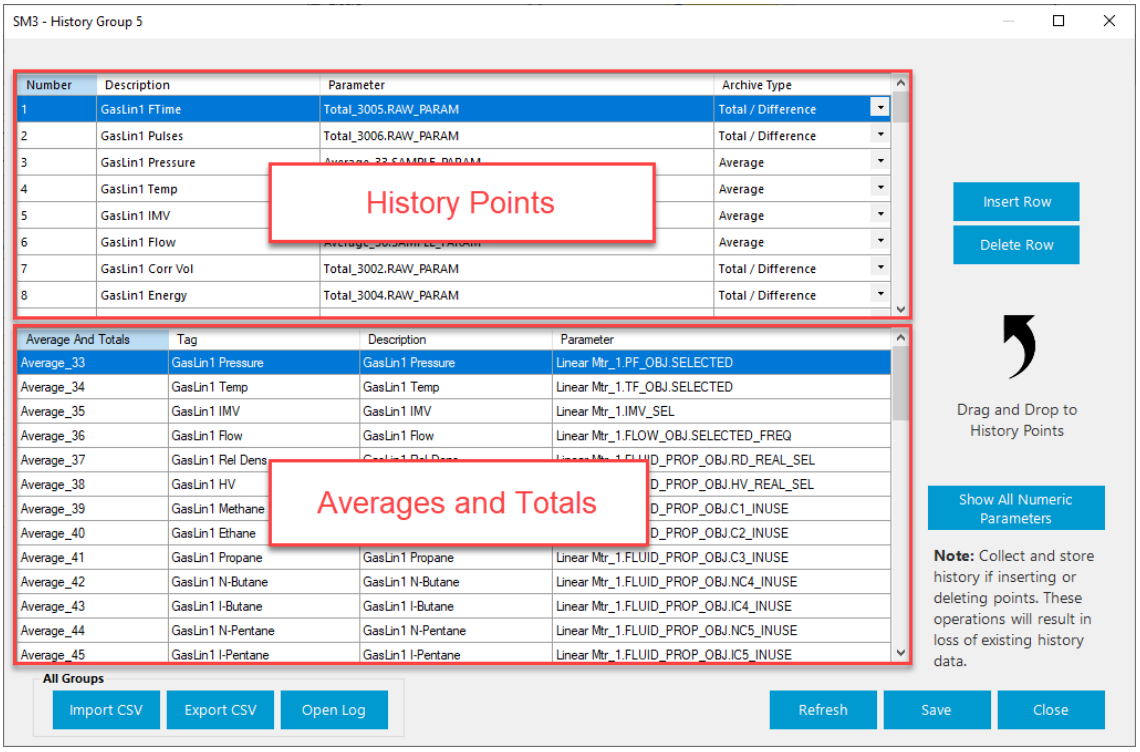



The History Group screen is divided into the following sections:

- **History Points** – This section shows for **all** History Group Types. You can configure each history point of the selected History Group, and each point's archival type. You assign a parameter to a history point by dragging an entry from either the “Averages and Totals” section or from “Objects, Instances and Parameters” section (depending on the selected History Group Type) and dropping it on to a history point.

- **Averages and Totals** – This section show **only** for **Meter History** History Group Types based on the status of the **Show All Numeric Parameters / Show Station Averages and Totals Only** button. You can drag and drop the Averages or Totals objects onto a history point in the History Points section.
- **Objects, Instances, and Parameters** – This section **always** shows for **User Periodic**, **General History**, and **Transaction History** History Group Types. This section shows for the **Meter History** History Group Type based on the status of the **Show All Numeric Parameters / Show Station Averages and Totals Only** button. You can drag and drop the selected Object, Instance or Parameter onto a history point in the History Points section.

**Figure 268. History Group (Meter History)**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **History Points** | You can configure each history point of the selected History Group, and each point's archival type. You assign a parameter to a history point by dragging an entry from either the “Averages and Totals” section or from “Objects, Instances and Parameters” section (depending on the selected History Group Type) and dropping it on to a history point. | |
| | **Description** | Enter a description of the selected parameter.<br>**Note**<br>This field is automatically populated when you select a parameter. Modify this field after you select a parameter to archive. |
| | **Parameter** | Select a parameter to be archived in history. |
| | **Archive Type** | Select ▼ to choose the archival type for the selected history point.<br>**Periodic History Archive Type Requirements**<br>Supports **Numeric Parameters** only and all archive types, with the following exceptions:<br>• For the **Total_x.RAW_PARAM** parameter, you can **only** select an Archive Type of **Snapshot** or **Total/Diff**.<br>• For the **Average_x.SAMPLE_PARAM** parameter, you can **only** select an Archive Type of **Average**, **Snapshot**, **Min**, or **Max**.<br>**Transaction History Archive Type Requirements**<br>If a Transaction History Group is assigned to a meter:<br>• Supports all **Numeric/String Parameters** with an Archive Type of **End Snapshot**, with the following exceptions:<br>o For the **Total_x.RAW_PARAM** parameter, you can **only** select an Archive Type of **Start/End Snapshot** or **Total/Diff**.<br>o For the **Average_x.SAMPLE_PARAM** parameter, you can **only** select an Archive Type of **Average**. |

| Field | Description | |
|---|---|---|
| | If a Transaction History Group is **not** assigned to a meter:<br>• Supports all **Numeric/String Parameters** with an Archive Type of **End Snapshot**.<br>**Note**<br>The Archive Type field reverts to the previous value if you attempt to save the history group with an invalid selection. | |
| | **Average** | Archives the average value of the selected parameter over the period. Any numeric parameter in the database can be selected. The values are simple linear averages with all samples included. |
| | **Total / Difference** | **For Meter History History Group Type**, archives the total accumulated value for the selected parameter.<br>**For User Periodic and General History History Group Types**, archives the difference between period start value and period end value for the selected parameter. |
| | **Snapshot** | Archives the snapshot value of the selected parameter at the end of the period.<br>**Note**<br>This option applies to **Periodic History** groups **only**. |
| | **End Snapshot** | Archives the snapshot value of the selected parameter at the end of the period.<br>**Note**<br>This option applies to **Transaction History** groups **only**. |

| Field | Description | | |
|---|---|---|---|
| | | **Minimum** | Archives the minimum value of the selected parameter over the period. |
| | | **Maximum** | Archives the maximum value of the selected parameter over the period. |
| | | **Integration** | Archives the total accumulated samples for the selected parameter over the period. |
| | | **Start Snapshot** | Archives the snapshot value of the selected parameter at the start of the period.<br>**Note**<br>This option applies to **Transaction History** groups **only**. |
| | **Data Type** | This **read-only** field shows the Data Type for each point as configured on the **Transaction History Group Details** pop-up display accessed from the Advanced Setup – Transaction History Sizing Tab.<br>**Note**<br>This field applies to **Transaction History** groups **only**. | |
| **Insert Row** | Click to insert a row before the currently selected row. | | |
| **Delete Row** | Click to delete the currently selected row from the table. | | |
| **Averages and Totals** | Drag and drop the Averages or Totals objects onto a history point in the History Points section. If you select an Average object, the values are averaged based on the Averaging Type selected on the Meter Setup display. If you select a numeric parameter, you **must** select an appropriate archive type for each history point (Average, Total / Difference, Snapshot, Minimum, Maximum, Integration).<br>**Note**<br>This section shows **only** for the **Meter History** History Group Type based on the status of the **Show All Numeric Parameters / Show Station Averages and Totals Only** button. | | |

| Field | Description |
| --- | --- |
| **Objects and Instances / Parameters / Referenced Parameters** | You can drag and drop the selected Object, Instance, Parameter, or Referenced Parameter onto a history point in the History Points section. For more information, refer to Point Picker.<br>**Note**<br>This section **always** shows for **User Periodic**, **General History**, and **Transaction History** History Group Types. This section shows for the **Meter History** History Group Type based on the status of the **Show All Numeric Parameters / Show Station Averages and Totals Only** button. |
| **Show All Numeric Parameters / Show Station Averages and Totals Only** | Click to switch between viewing **Objects and Instances / Parameters / Referenced Parameters** and viewing **Averages and Totals**.<br>**Note**<br>This button shows **only** for the **Meter History** and **Transaction History** History Group types. |
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired history configuration. Navigate to the location of the saved CSV file and select **Open** to start the import process. For more information, refer to Importing a History Configuration CSV File.<br>**Note**<br>• You **must** configure Averages **before** importing a history CSV file. The easiest way to configure Averages is by completing the Default Meter History Setup.<br>• The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. Any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained. |

| Field | Description |
|---|---|
| **Export CSV** | Click to save a CSV file to your computer that contains the current history configuration of your FB Series product. A Select Table dialog opens where you can select which history groups to include in the export. Click **Start**, select a name and location for the exported file on your computer, and click **Save** to begin the export process. For more information, refer to Exporting a History Configuration CSV File.<br>**Note**<br>By default, all selected data is exported into a single file. Select **Export to individual file** to have the system create individual files for each history group you select. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |
| **Refresh** | Click to reload the table with the data stored in the FB Series product. |
| **Save** | Click to save any changes you have made to the table. |
| **Close** | Click to close the current window. |

5. Select **Save** to save any changes you make to this screen.

#### 4.22.2.1.1 Importing a History Configuration CSV File

You can import a CSV file that contains your configuration for a single history group, multiple history groups, or your entire history configuration for use in the FB Series product.

**Note**

- For more information about history in the FB Series product, refer to History.
- You **must** configure Averages **before** importing a history CSV file. The easiest way to configure Averages is by completing the Default Meter History Setup.
- For more information about creating your own history CSV file, refer to Creating a History Configuration CSV File.

- For more information about exporting a CSV file that contains the FB Series product's current history configuration, refer to Exporting a History Configuration CSV File.

To import a CSV file that contains your history configuration:

1. **For Periodic History:**
   Select **Configure > History > Group Configuration > Periodic History** from the DeltaV FBxConnect configuration software main menu.

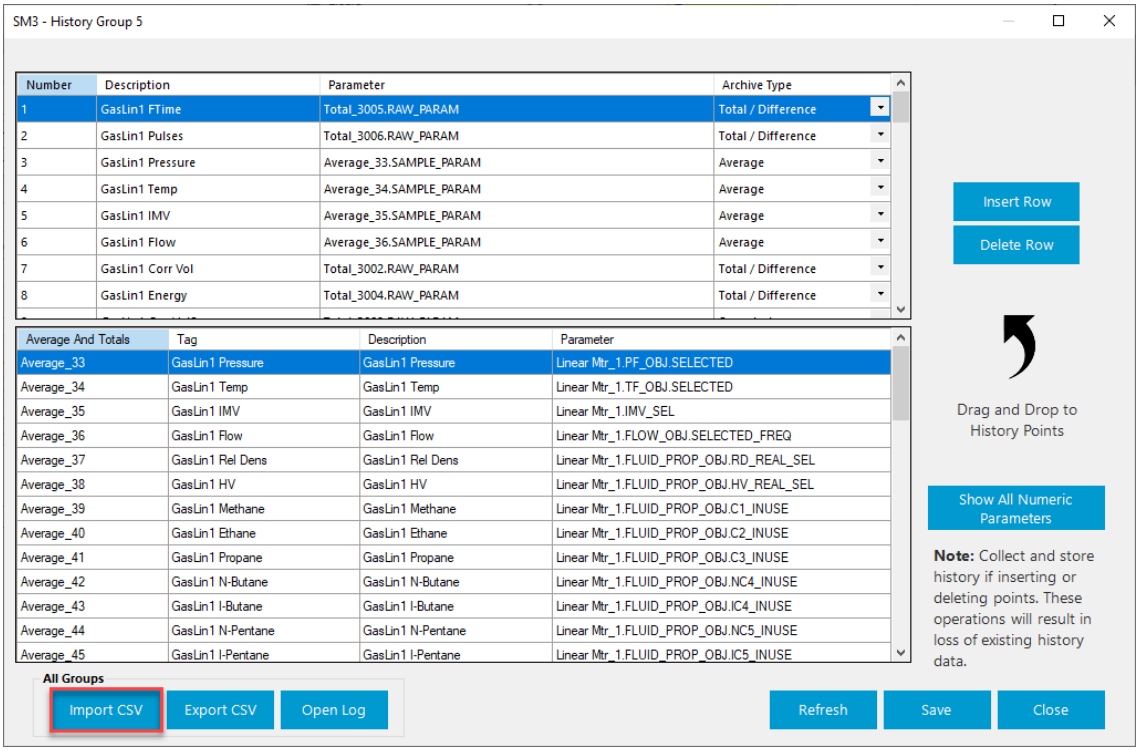
   **For Transaction History:**
   Select **Configure > History > Group Configuration > Transaction History** from the DeltaV FBxConnect configuration software main menu.

   **Note**

   You **must** enable **Transaction History** on the History Setup - Advanced display before you can access this display.

2. At the bottom of the screen, select **Show History Points**. The History Group pop-up display opens.

**Figure 269. History Group – Import CSV**



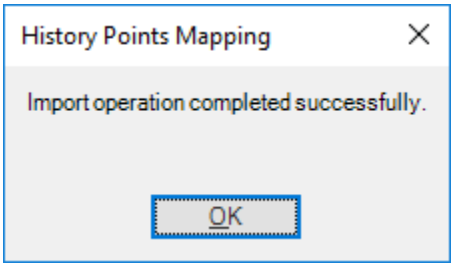
3. Select the **Import CSV** button.
4. Navigate to the file location of your CSV file and select **Open**.

**Note**

The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

5. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Figure 270. Confirmation**




### 4.22.2.1.2 Exporting a History Configuration CSV File

You can export your FB Series product's current history configuration to a CSV file saved on your computer.

**Note**

- For more information about history in the FB Series product, refer to History.
- For more information about creating your own history configuration CSV file, refer to Creating a History Configuration CSV File.
- For more information about importing a CSV file that contains the FB Series product's current history configuration, refer to Importing a History Configuration CSV File.

To export a CSV file that contains your history configuration:

1. **For Periodic History:**
   Select **Configure > History > Group Configuration > Periodic History** from the DeltaV FBxConnect configuration software main menu.

   **For Transaction History:**

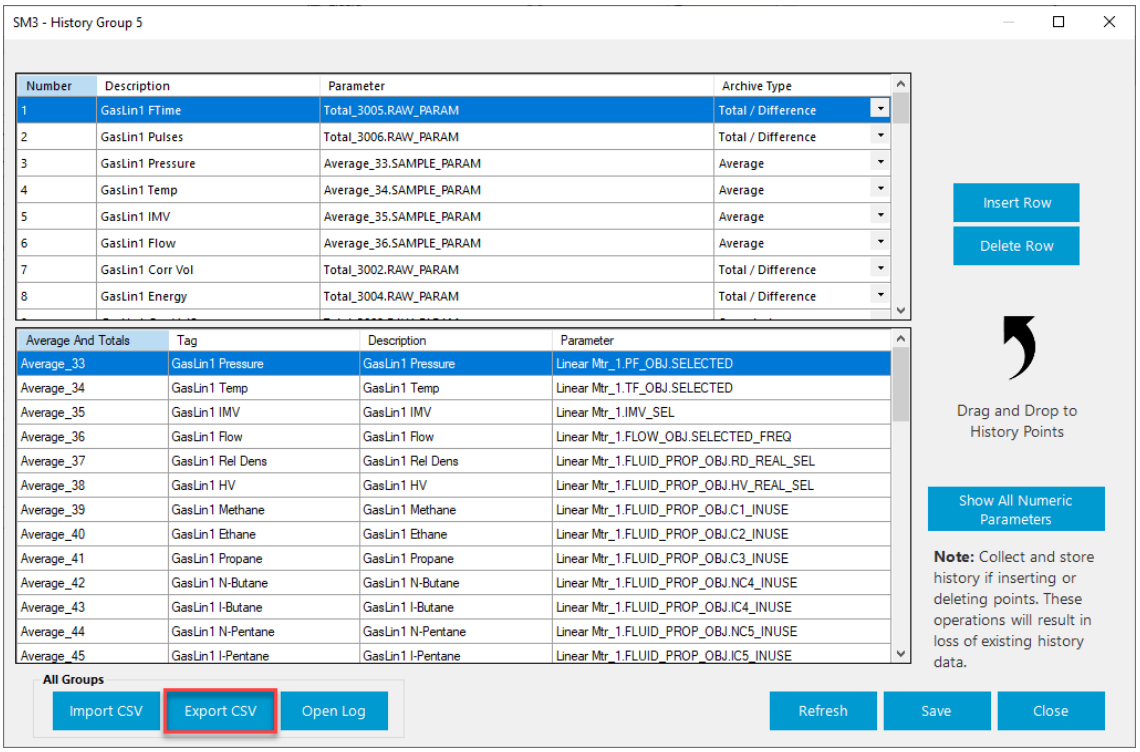
Select **Configure > History > Group Configuration > Transaction History** from the DeltaV FBxConnect configuration software main menu.

**Note**

You **must** enable **Transaction History** on the History Setup - Advanced display before you can access this display.

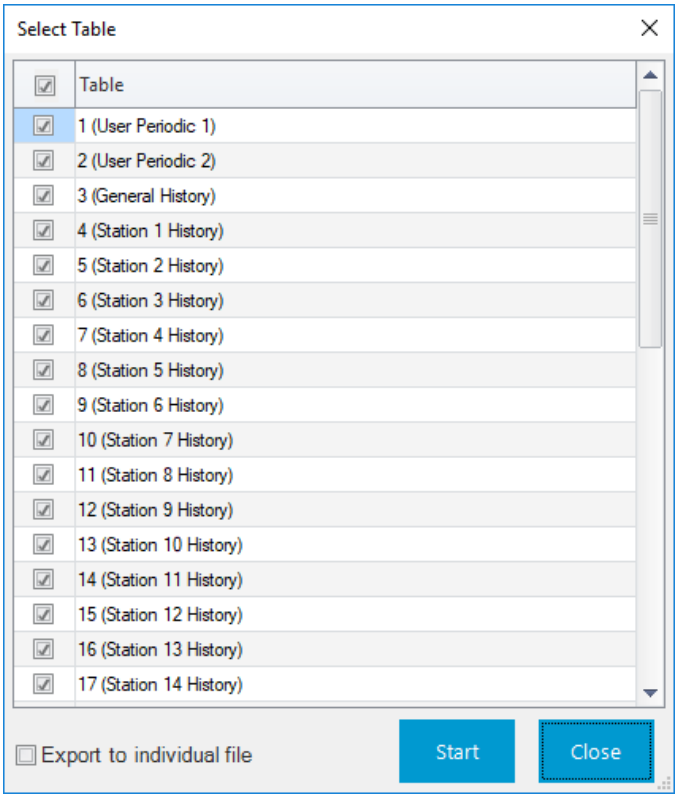
2. At the bottom of the screen, select **Show History Points**. The History Group pop-up display opens.

**Figure 271. History Group – Export CSV**




3. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 272. Select Table**



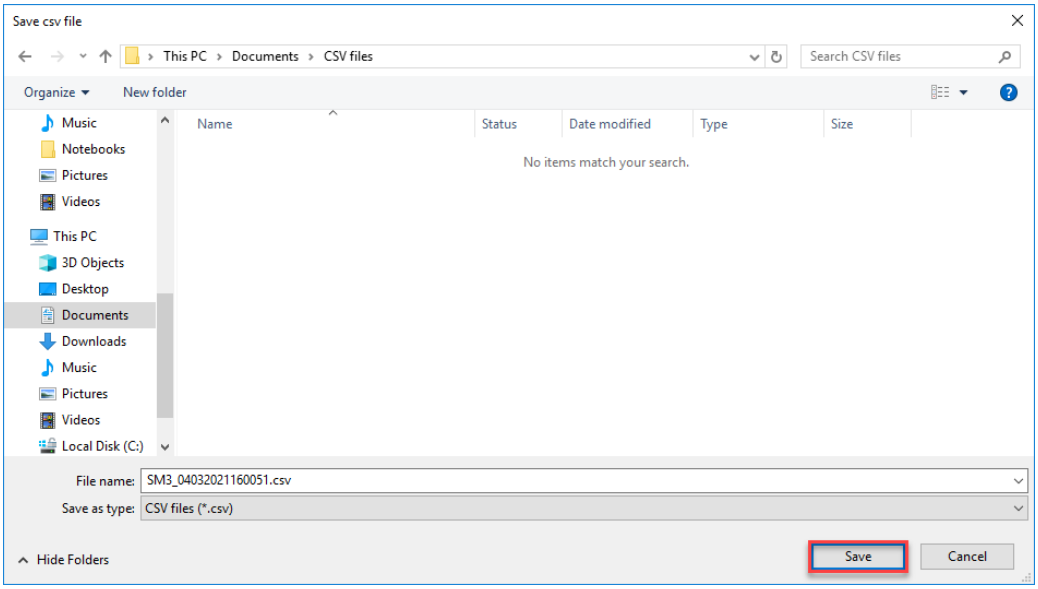

4. Place a check mark next to each table you want to export.

**Note**

By default, all selected tables are exported to a single file. If you want each selected table to be exported to individual files, place a check mark next to **Export to individual file**.

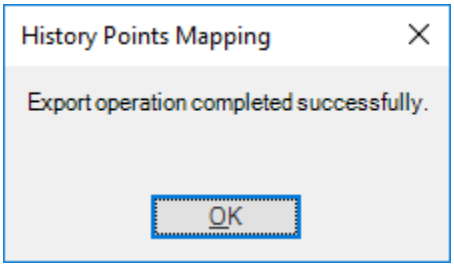
5. Select **Start**. A Save csv file window opens.

**Figure 273. Save csv file**




6. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system exports the CSV file and displays a progress bar at the top of the display.
7. A confirmation message displays after exporting the CSV file. Select **OK** to complete the process.

**Figure 274. Confirmation**




### 4.22.2.1.3 Creating a History Configuration CSV File

You can create a history configuration file on your computer and then import the file for use in the FB Series product. If your history configuration contains a large amount of points, then it may be easier to create a CSV file on your computer than it is to configure history in DeltaV FBxConnect configuration software.

**Note**

- For more information about history in the FB Series product, refer to History.

- The History CSV **must** contain the format shown below. The easiest way to begin creating a history CSV file is to export a CSV that contains the current FB Series product configuration and then edit that file. For more information about exporting a CSV file, refer to the Exporting a History CSV File.

**Figure 275. Example Periodic History CSV Format**

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Group | Point | Description | Parameter | Archive Type |
| 2 | 1 | 1 | 4088B Modbus Address | 4088_1-1.4088_ADDR | 0 |
| 3 | 1 | 2 | Actual Scan Time | 4088_1-1.ACTUAL_SXX_TIME | 0 |
| 4 | 1 | 3 | Area Assignment | 4088_1-1.OBJ_AREA | 0 |
| 5 | 1 | 4 | Channel | 4088_1-1.CHANNEL | 0 |

To create a history configuration CSV file:

1. Open a blank spreadsheet (or open your previously exported history CSV file).
2. In row one of the spreadsheet, enter the following text:
   - Column A = Group
   - Column B = Point
   - Column C = Description
   - Column D = Parameter
   - Column E = Archive Type
   - Column F = Data Type (Transaction History **only**)
3. Each additional row is used to configure a row in the history table. Enter information in each column according to the descriptions below:

| Column Heading | Description |
|---|---|
| **Group** | Enter the number corresponding to the history group the for the selected row.<br>**Periodic History**<br>**1** = User Periodic 1<br>**2** = User Periodic 2<br>**3** = General History<br>**4 – 39** = Station 1 History – Station 36 History<br>**Transaction History**<br>**1 – 100** = Transaction History |

| Column Heading | Description |
|---|---|
| **Point** | For **Periodic History**, you can adjust the number of points between any of the periodic history groups. For more information about standard history point reallocation, refer to Advanced – Standard History Sizing Tab.<br>The FB Series product also contains two groups of user periodic history points. User periodic history consists of 30 fixed history points. Ten points are allocated to the User Periodic 1 group and 20 points are allocated to the User Periodic 2 group.<br>For **Transaction History**, you can adjust the number of points with the following limitations:<br>• A maximum of 25 string points per group.<br>• A maximum of 650 string points and numeric points combined. |
| **Description** | Enter a description of the selected parameter. |
| **Parameter** | Enter a parameter from the FB Series product's database to be archived in history. |
| **Archive Type** | Enter a number that corresponds to the archival type for the selected history point. Possible options are:<br>**0** **Average**<br>Archives the average value of the selected parameter over the period.<br>**1** **Total / Difference**<br>For **Meter History** History Group Type, archives the total accumulated value for the selected parameter.<br>For **User Periodic** and **General History** History Group Types, archives the difference between period start value and period end value for the selected parameter.<br>**2** **Snapshot**<br>Archives the snapshot value of the selected parameter at the end of the period.<br>**Note**<br>For **Transaction History** groups, this is the **only** valid option. |

| Column Heading | Description | |
|---|---|---|
| | **3** | **Minimum**<br>Archives the snapshot value of the selected parameter at the end of the period. |
| | **4** | **Maximum**<br>Archives the maximum value of the selected parameter over the period. |
| | **5** | **Integration**<br>Archives the total accumulated samples for the selected parameter over the period.<br>**Note**<br>This archival type is **only** used with **User Periodic** and **General History** History Group Types. |

4. Save your changes. You can now import your CSV file for use in your FB Series product. For more information, refer to Importing a History Configuration CSV File.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.22.3 Transaction History Group Configuration

Use this display to configure which history points are logged for each transaction history group in your FB Series product and to start or stop individual transactions.

**Note**

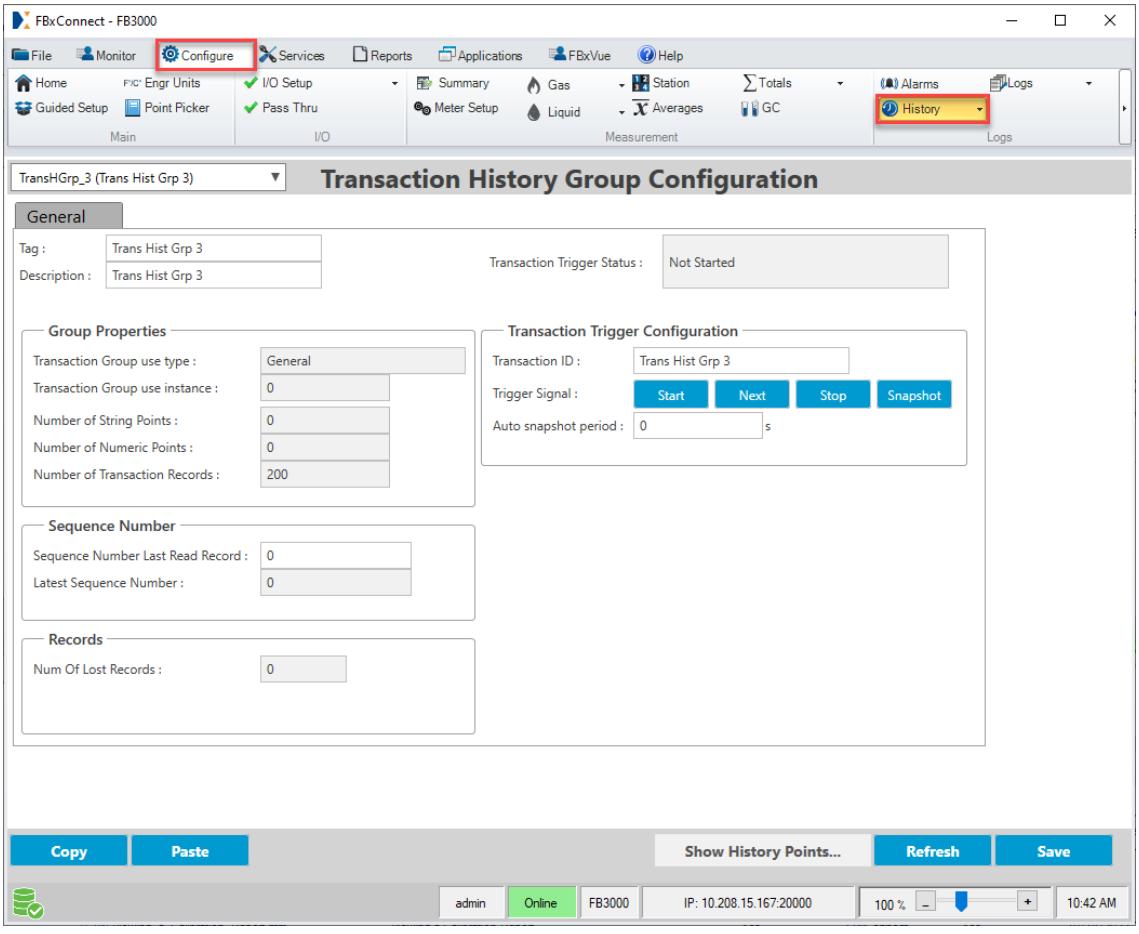
You **must** enable Transaction History on the History Setup – Advanced display before you can view this option in the DeltaV FBxConnect configuration software main menu.

To access this display:

1. Select **Configure > History > Group Configuration > Transaction History** from the DeltaV FBxConnect configuration software main menu. The Transaction History Group Configuration display opens.

2. Click ▼ in the drop-down list at the top of the display to select a transaction history group to configure.

**Figure 276. Transaction History Group Configuration**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected transaction history group. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected transaction history group. |

| Field | Description | |
|---|---|---|
| **Transaction Trigger Status** | This **read-only** field shows the stage of the currently selected transaction. Possible statuses are:<br>**Note**<br>This field **does not** show for transaction history groups configured for liquid linear meter batching. | |
| | **Not Started** | No transactions have been started. |
| | **In progress** | The transaction is currently in process. |
| | **Stopped** | The transaction is currently stopped. |
| | **Invalid Trigger** | An incorrect trigger sequence has occurred. For example, issuing a Stop trigger before issuing Start trigger or issuing a Start trigger when a transaction is already in progress. |
| | **Short Trigger** | A second trigger signal (Next or Stop) has been issued too quickly.<br>**Note**<br>A transaction **must** be in progress for at least 5 seconds before you issue a second trigger. At the end of the 5 second window, the Short Trigger status will clear and you **must** issue the command again. |
| | **No Points Added** | No history points have been configured for the selected transaction history group. |
| **Transaction Group use type** | This **read-only** field indicates the assigned purpose for the transactional history group, when configured for a standard application use-case. When not configured for a standard application use-case, this field shows the default text of General and indicates the group is either not configured or is configured for a custom user-defined data set.<br>**Note**<br>You configure this value in the **Application Assignment Group Type** column on the Transaction History Group Details pop-up display. | |

| Field | Description |
|---|---|
| **Transaction Group use instance** | This read-only field indicates which instance of the Transaction Group use type is configured for this transactional history group. Where there are multiple instances of the same data set (for example, multiple liquid meters or multiple production wells), multiple transactional history groups may be used to organize the data. The use instance identifies which use type instance applies to this transactional history group.<br>**Note**<br>You configure this value in the **Application Assignment Instance** column on the Transaction History Group Details pop-up display. |
| **Number of String Points** | This **read-only** field shows the current number of string points allocated to the selected transaction history group.<br>**Note**<br>This value is configured on the **Transaction History Group Details** pop-up display accessed from the Advanced Setup – Transaction History Sizing Tab. |
| **Number of Numeric Points** | This **read-only** field shows the current number of numeric points allocated to the selected transaction history group.<br>**Note**<br>This value is configured on the **Transaction History Group Details** pop-up display accessed from the Advanced Setup – Transaction History Sizing Tab. |

| Field | Description |
|---|---|
| **Number of Transaction Records** | This **read-only** field shows the current number of transaction records allocated to the selected transaction history group.<br>**Note**<br>• This value is configured on the **Transaction History Group Details** pop-up display accessed from the Advanced Setup – Transaction History Sizing Tab.<br>• The FB Series product retains transaction history records for at least 2 hours. The FB Series product generates a Trigger Limit Reached alarm and declines new triggers if more than N/2 transaction records are recorded in one hour (N = number of transaction records set in this field). If transactions are expected to generate at a rate faster than N/2 in one hour, then you must increase the value of N to a higher number. |
| **Sequence Number Last Read** | Sets the last record sequence number that was retrieved from the selected transaction history group.<br>**Note**<br>DeltaV FBxConnect configuration software automatically updates this field when you generate a transaction history report and select **By last sequence no.** in the Collection period field. For more information about generating transaction history reports, refer to Transaction History Reports. |
| **Latest Sequence Number** | This **read-only** field shows the last sequence number generated by the FB Series product. |
| **Num Of Lost Records** | This **read-only** field shows the number of records that occurred but were not archived in the selected transaction history group. |
| **Transaction ID** | Sets an identifier (up to 20-alphanumeric characters) for the selected transaction. |

| Field | Description | |
|---|---|---|
| **Trigger Signal** | Use these buttons to control transactions on your FB Series product.<br>**Note**<br>• These buttons are disabled for offline configurations.<br>• These buttons **do not** show for transaction history groups configured for liquid linear meter batching. For more information about starting and stopping liquid linear meter batching, refer to Station – Batching. | |
| | **Start** | Select this button to begin a transaction.<br>**Note**<br>To issue this command via an external system (such as a SCADA host), write a value of 1 to TransHGrp_x.TRANS_TRIG_SIGNAL. |
| | **Next** | Select this button to end the current transaction, archive a transaction record, and immediately start another transaction.<br>**Note**<br>To issue this command via an external system (such as a SCADA host), write a value of 2 to TransHGrp_x.TRANS_TRIG_SIGNAL. |
| | **Stop** | Select this button to end the current transaction and archive a transaction record.<br>**Note**<br>To issue this command via an external system (such as a SCADA host), write a value of 3 to TransHGrp_x.TRANS_TRIG_SIGNAL. |
| | **Snapshot** | Select this button to immediately archive a transaction record with the current values of the parameters configured in the transactional history group.<br>**Note**<br>To issue this command via an external system (such as a SCADA host), write a value of 4 to TransHGrp_x.TRANS_TRIG_SIGNAL. |

| Field | Description |
|---|---|
| **Auto snapshot period** | Sets, in seconds, the period of time the system waits before automatically archiving a transaction record with the current values of the parameters configured in the transactional history group. Valid values are **0** (disabled) and **3** – **720000**. |
| **Show History Points** | Click to open a pop-up display where you can configure which parameters are logged for the selected History Group Type. You can also set a description and archive type for each logged parameter. For more information, refer to Show History Points.<br>**Note**<br>This button is disabled if the string and numeric points for the selected transaction history group is 0 (as configured on the **Transaction History Group Details** pop-up display). For more information, refer to Transaction History Group Details. |

4. Select **Save** to save any changes you make to this display.

## 4.22.4 Default Meter History Setup

Use this display to configure history points in your DeltaV FB3000 RTU using the default history values for all configured meters.

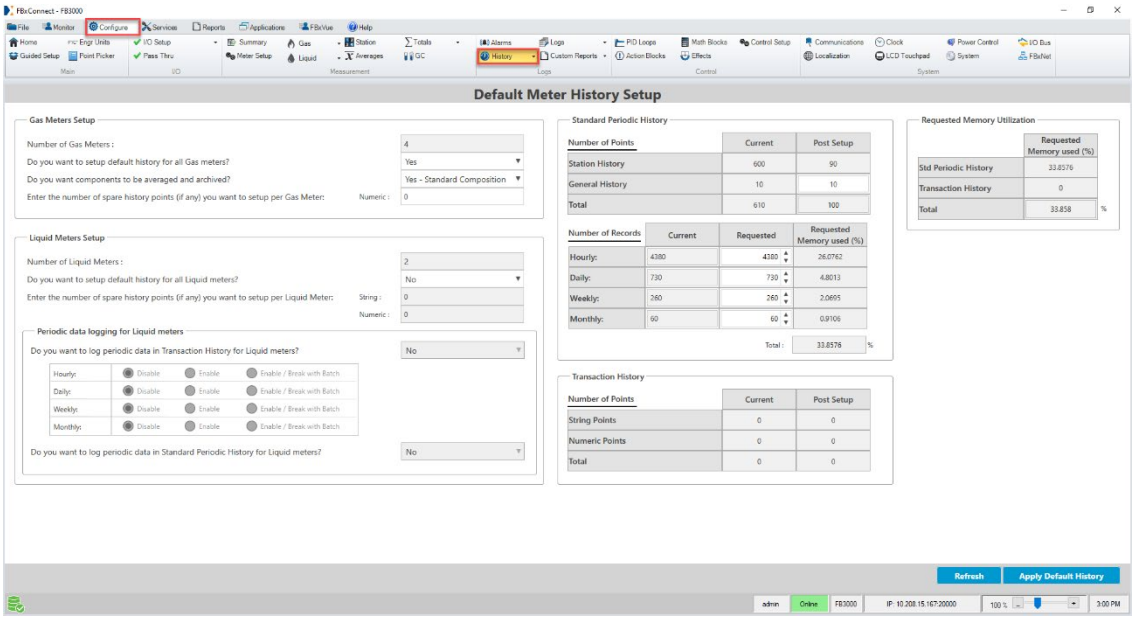
**Note**

- You **must** configure meter inputs **before** applying the default history setup.
- For more information about the structure of history store in the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU, refer to History Overview.
- To view the default configuration, refer to Default History Configuration.
- Emerson recommends verifying your history configuration after applying the default history to your FB Series product. If you run into issues with the default meter history setup not completing successfully, then you can create an offline solution file with your history configuration and download the solution file (Download Solution) to configure the history correctly.

To access this display:

1. Select **Configure > History > Default History Setup** from the DeltaV FBxConnect configuration software main menu.

**Figure 277. Default Meter History Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description | | |
|---|---|---|---|
| **Gas Meters Setup** | Use these fields to configure the gas meter history types that are archived by the FB Series product. | | |
| | **Number of Gas Meters** | This **read-only** field shows the number of gas meters configured on the Meter Setup display for your FB Series product. | |
| | **Do you want to setup default history for all Gas meters?** | | |
| | | **No** | The FB Series product **does not** archive standard periodic history for gas meters. |
| | | **Yes** | The FB Series product **does** archive standard periodic history for gas meters. |
| | **Do you want components to be averaged and archived?** | | |

| Field | Description | | |
|---|---|---|---|
| | | **No** | The FB Series product **does not** archive component averages for gas meters. |
| | | **Yes – Standard Composition** | The FB Series product **does** archive standard composition component averages for gas meters. |
| | | **Yes – Extended Composition** | The FB Series product **does** archive extended composition (includes C7, C8, C9, and C10) component averages for gas meters. |
| | **Enter the number of spare history points (if any) you want to setup per Gas Meter** | | |
| | | **Numeric** | Enter the number of additional numeric points that the system adds to the end of the standard periodic history configuration for each meter. |
| **Liquid Meters Setup** | Use these fields to configure the liquid meter history types that are archived by the FB Series product. | | |
| | **Number of Liquid Meters** | This **read-only** field shows the number of liquid meters configured on the Meter Setup display for your FB Series product. | |
| | **Do you want to setup default history for all Liquid meters?** | | |
| | | **No** | The FB Series product **does not** archive standard periodic history and/or does not archive transaction history for liquid meters. |
| | | **Yes** | The FB Series product **does** archive standard periodic history and/or does archive transaction history for liquid meters. |
| | **Enter the number of spare history points (if any) you want to setup per Liquid Meter** | | |
| | | **String** | Enter the number of additional string points that the system adds to the end of the transaction history configuration for each meter. |

| Field | Description | | |
|---|---|---|---|
| | | **Numeric** | Enter the number of additional numeric points that the system adds to the end of the standard periodic history configuration for each meter. |
| **Periodic Data Logging for Liquid meters** | Sets if standard periodic history is logged along with liquid batch transactions.<br>**Note**<br>These fields are shown **only** if you have enabled Batching on the Station Fluid Type pop-up display. | | |
| | **Do you want to log periodic data in Transaction History for Liquid meters?** | | |
| | **No** | The FB Series product **does not** archive periodic data in Transaction History for liquid meters. | |
| | **Yes** | The FB Series product **does** archive periodic data in Transaction History for liquid meters. Possible options for each period (hourly, daily, weekly, monthly) are: | |
| | | **Disable** | Do not log this type of periodic history in Transaction History. If configured, this data is logged in periodic history. |
| | | **Enable** | Log this type of periodic history in Transaction History based on top of hour, contract hour, contract day of week and/or contract day of month. Periodic data logging is **not** affected by batch start or batch end. Transaction history groups **must** be configured and assigned at the meter level. |



| Field | Description | |
|---|---|---|
| | **Enable / Break with Batch** | Log this type of periodic history in Transaction history as described in the "Enable" option above, and also log when a batch starts and when a batch ends. Transaction history groups **must** be configured and assigned at the meter level. |
| |  | |
| | **Do you want to log periodic data in Standard Periodic History for Liquid meters?** | |
| | **No** | The FB Series product **does not** archive periodic data in standard periodic history for liquid meters. |
| | **Yes** | The FB Series product **does** archive periodic data in standard periodic history for liquid meters. |
| **Standard Periodic History** | Use these fields to view and adjust the amount of history points used by standard periodic history. | |
| | **Station History** | These **read-only** fields show the number of standard history points used by the FB Series product at the present time (**Current**) and after applying the default history setup (**Post Setup**) based on your current selections. |

| Field | Description | |
|---|---|---|
| | **General History** | These fields show the number of general history points used by the FB Series product at the present time (**Current**) and after applying the default history setup (**Post Setup**) based on your current selections.<br>**Note**<br>Enter a value in the **Post Setup** column to manually adjust the total number of points allocated to standard periodic history. |
| | **Total** | These **read-only** fields show the total number of history points used by the FB Series product at the present time (**Current**) and after applying the default history setup (**Post Setup**) based on your current selections. |
| **Transaction History** | Use these fields to view the number of string points, numeric points, and total points used by transaction history.<br>**Note**<br>When applying the default history for the first time, the system configures contiguous transaction history group instances for Liquid Batching. The system configures these groups after and **does not** overwrite any history groups set to a specific application (other than General) in the **Application Assignment** field on the Transaction History Group Details display.<br>If you apply the default history more than once, the system reconfigures the transaction history groups previously set to Liquid Batching. If you add new liquid meters and apply the default history, the system first reconfigures transaction history groups previously set to Liquid Batching before adding additional history groups. | |

| Field | Description | |
|---|---|---|
| | **String Points** | These **read-only** fields show the number of string points, used by transaction history. The value in the **Current** column shows the total number of string points used by all transaction history groups at the present time. The value in the **Post Setup** column shows the total number of string points that will be used by all transaction history groups after applying the default history, and this value changes based on your selections in the Set Default Meter History and Transaction History fields. |
| | **Numeric Points** | These **read-only** fields show the number of numeric points used by transaction history. The value in the **Current** column shows the total number of numeric points used by all transaction history groups the present time. The value in the **Post Setup** column shows the total number of numeric points that will be used by all transaction history groups after applying the default history, and this value changes based on your selections in the Set Default Meter History and Transaction History fields. |
| | **Total** | These **read-only** fields show the total number points used by transaction history. The value in the **Current** column shows the total number of points used by all transaction history groups at the present time. The value in the **Post Setup** column shows the total number of points that will be used by all transaction history groups after applying the default history, and this value changes based on your selections in the Set Default Meter History and Transaction History fields. |
| **Requested Memory Utilization** | These **read-only** fields display the amount of memory that would be used based on currently requested memory allocation. Transaction history and standard periodic history share the same memory resource. The combination of memory used by transaction history and standard periodic history **must** be less than or equal to 100%. | |

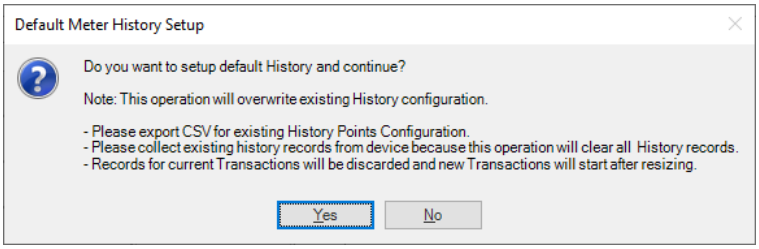
| Field | Description | |
|---|---|---|
| | **Transaction History** | Shows the amount of memory that would be used by transaction history based on the values you enter in the **Requested Number of Transaction History Groups** field on the Transaction History Sizing Tab and the **Requested** number of **String Points**, **Numeric Points**, and **Records** on the Transaction History Group Details pop-up display. |
| | **Std Periodic History** | Shows the amount of memory that would be used by standard periodic history based on the values you enter in the **Requested Number of Points** field and the **Requested Number of Records** fields on the Standard Periodic History Tab. |
| | **Total** | Shows the total amount of memory that would be used based on the currently requested transaction history and standard periodic history allocation. This value **must** be less than or equal to 100%.<br>**Note**<br>If this value is more than 100%, you **must** modify the requested transaction history and standard periodic history allocation to be less than or equal to 100% before you can successfully history sizing. |

3. Select **Apply Default History** to save the default history configuration to your DeltaV FB3000 RTU. A confirmation message opens.

## CAUTION

- Please export your current history configuration (Exporting a History Configuration CSV) in case you need to restore your FB Series product to the previous configuration.
- Changes made to history sizing results in a reallocation of device memory and erases **all** existing history data. It is recommended to save any existing history data using the Reports Menu before applying any history size changes.
- Current Transactions will be discarded and new Transactions will start after resizing.

**Figure 278. Confirmation**



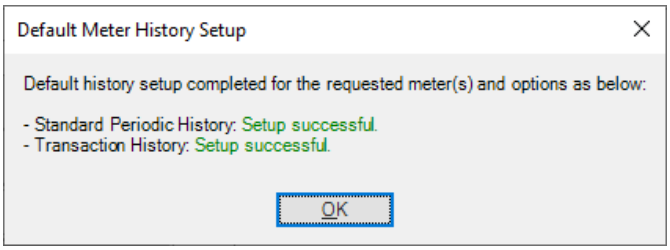

4. Select **Yes** to continue the setup.

**Note**

A message appears if have previously sized history and the FB Series product does not have the number of history points required to perform the default history setup. If this occurs, you must first increase the number of points on the History Setup – Advanced – Standard History Sizing Tab before you perform the default history setup.

5. When the setup completes, select **OK** to close the dialog.

**Figure 279. Default history successfully setup**




### 4.22.4.1 Default History Configuration

The table below shows the default history configuration for the DeltaV FB3000 RTU:

**Note**

For more information about the configured history points after using the Default History Setup feature, refer the Appendix C, Default History Setup Point Configurations.

**Table 48. Default History Configuration**

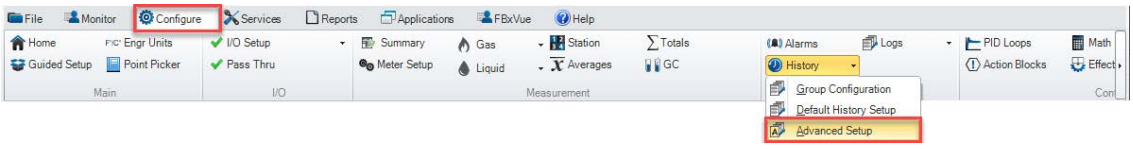
| FB Series Product Type | History Groups | | Total History Points | Total Standard History Points | Total History Points per Group | Log Intervals | Number of Records |
|---|---|---|---|---|---|---|---|
| **DeltaV FB3000 RTU** | **User Periodic** | User Periodic 1 (Group 1) | 640 | N/A | 10 | User Configurable | 4000 |
| | | User Periodic 2 (Group 2) | | | 20 | | 500 |
| | **Standard History** | General (Group 3) | | 610 | 10 | Hourly<br>Daily<br>Weekly<br>Monthly | 4380<br>730<br>260<br>60 |
| | | Station 1-24 (Group 4-27) | | | 25 per group | | |
| | | Station 25-36 (Group 28-39) | | | 0 per group | | |

## 4.22.5 History – Advanced Setup

Use the tabs on this display to configure the total number of history points, configure the number records (hourly, daily, weekly, and monthly), and allocate the history points amongst the periodic history groups in your FB Series product. You can also configure the total number of transaction history groups and the number of points and records for each group.

To access this display, select **Configure > History > Advanced Setup** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens showing the Standard History Sizing tab.

**Figure 280. History – Advanced Setup**




The History Setup – Advanced display contains the following tabs:

Transaction History Sizing – Use this tab to configure the total number of transaction history groups and the details of each group.

**Note**

You **must** select **Yes** in the **Do you want to enable Transaction History?** drop-down to view this tab.

Standard Periodic History – Use this tab to adjust the total number of history points, configure the number of records, and configure the allocation of history points amongst the standard history groups in your FB Series product.

#### 4.22.5.1 History Setup - Advanced – Transaction History Sizing Tab

Use this tab to configure the number of transaction history groups that are logged by your FB Series product.

**Note**

- You **must** select **Yes** in the **Do you want to enable Transaction History?** drop-down list to view this tab.
- You **must** have DeltaV FB3000 RTU firmware version 2.11 or later to use this feature.

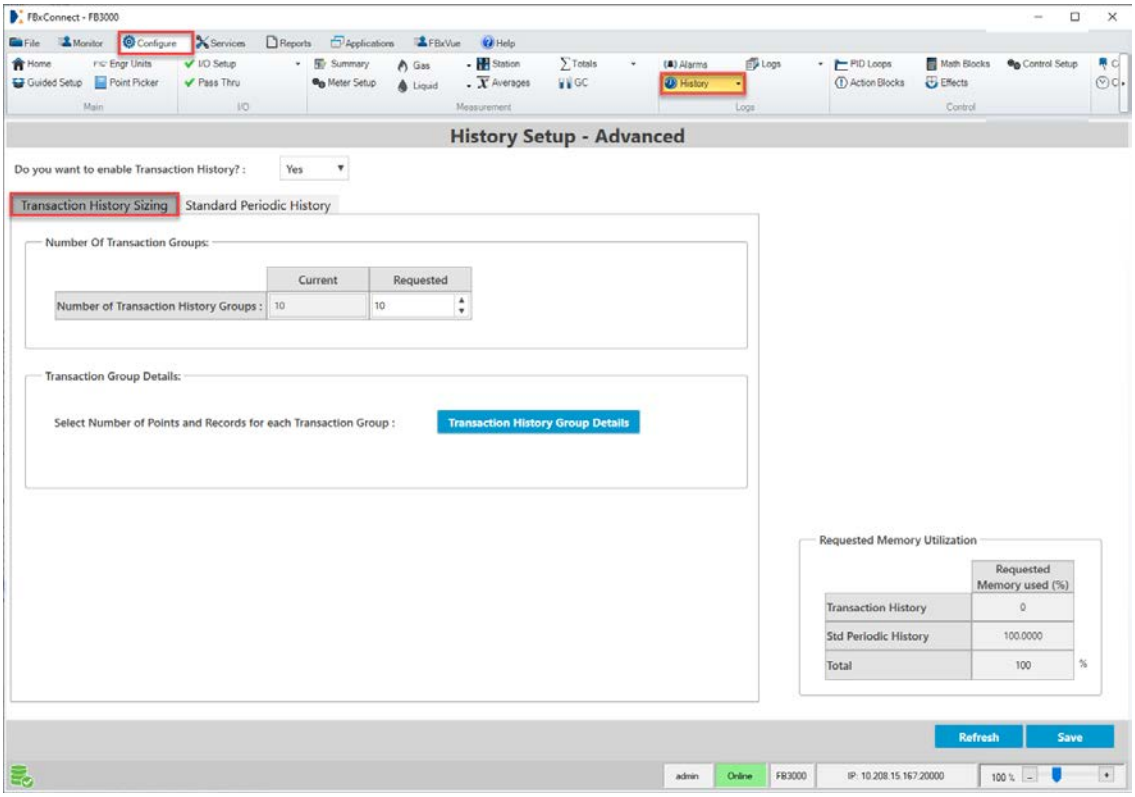
To access this display:

1. Select **Configure > History > Advanced Setup** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens.
2. Select the **Transaction History Sizing** tab.

**Note**

If you do not see this tab, select **Yes** in the **Do you want to enable Transaction History?** drop-down list.

**Figure 281. History Setup - Advanced – Transaction History Sizing Tab**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Do you want to enable Transaction History?** | Sets if transaction history will be configured on your FB Series product. Possible options are: | |
| | **Yes** | Transaction history will be configured on your FB Series product. If you select this option, a Transaction History Sizing tab appears on the display.<br>**Note**<br>You must configure the number of transaction history groups and select **Apply Number of Groups** before proceeding. |

| Field | Description | |
|---|---|---|
| | **No** | Transaction history will **not** be configured on your FB Series product. If you have previously enabled transaction history, a confirmation message opens. Select **Yes** on the confirmation message to disable transaction history. When complete, the Transaction History Sizing tab is removed and a confirmation message appears. Select **OK** to continue.<br>**Note**<br>If you previously enabled and configured transaction history, selecting this option causes history to be resized and erases **all** periodic and transaction history records. Please collect existing history records before proceeding. |
| **Number of Transaction History Groups** | Use these fields to adjust the number of transaction history groups stored in the memory of the FB Series product. | |
| | **Current** | The **read-only** field shows the number of currently enabled transaction history groups. |
| | **Requested** | Enter the desired number of transaction history groups. The maximum number of transaction history groups is 100. |
| | **Apply Number of Groups** | Select this button to adjust the number of transaction history groups based on the value set in the **Requested** column. A confirmation message displays. Select **Yes** to proceed. When complete, a confirmation message appears. Select **OK** to continue.<br>**Note**<br>• When transaction history groups are added, no string or numeric points are configured for the group. You can configure these parameters on the Transaction History Group Details pop-up display.<br>• This button appears only if you modify the number in the **Requested** column. |

| Field | Description | |
|---|---|---|
| **Transaction History Group Details** | Select this button to open the Transaction History Group Details pop-up display and configure the required number of points and records for transaction history groups. | |
| **Requested Memory Utilization** | These **read-only** fields display the amount of memory that would be used based on currently requested memory allocation. Transaction history and standard periodic history share the same memory resource. The combination of memory used by transaction history and standard periodic history **must** be less than or equal to 100%. | |
| | **Transaction History** | Shows the amount of memory that would be used by transaction history based on the values you enter in the **Requested Number of Transaction History Groups** field on the Transaction History Sizing Tab and the **Requested** number of **String Points**, **Numeric Points**, and **Records** on the Transaction History Group Details pop-up display. |
| | **Std Periodic History** | Shows the amount of memory that would be used by standard periodic history based on the values you enter in the **Requested Number of Points** field and the **Requested Number of Records** fields on the Standard Periodic History Tab. |
| | **Total** | Shows the total amount of memory that would be used based on the currently requested transaction history and standard periodic history allocation. This value **must** be less than or equal to 100%.<br>**Note**<br>If this value is more than 100%, you **must** modify the requested transaction history and standard periodic history allocation to be less than or equal to 100% before you can successfully history sizing. |

4. Select **Save** to save any changes you make to this display and commit any history allocation changes to memory in the FB Series product.

**CAUTION**

- Saving changes to the points and records allocation of transaction history groups will clear **all** periodic and transaction history records. Please collect existing history records before proceeding.
- If you adjust the total number of string points for a previously configured transaction history group, the existing configuration of numeric points for that transaction history group (as configured on the Transaction History Group Configuration display) is cleared during the resizing process.

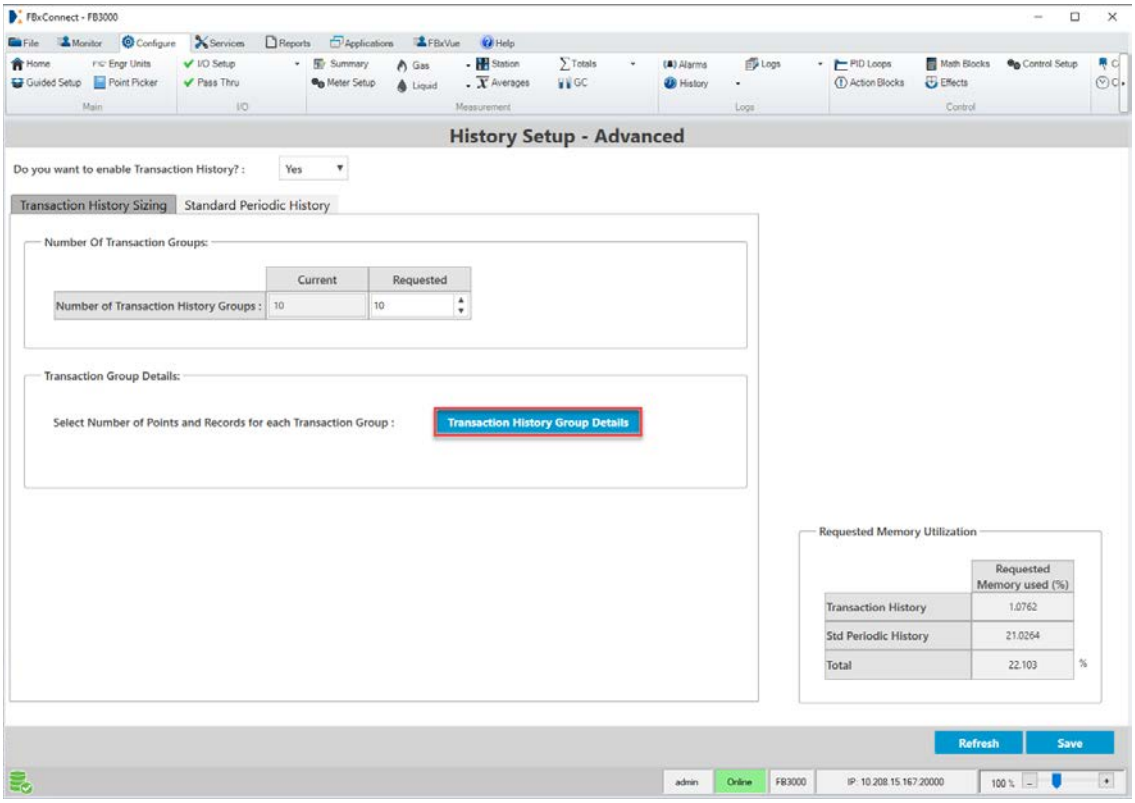
#### 4.22.5.1.1 Transaction History Group Details

Use this pop-up display to configure the type and quantity of data to be stored by each transaction history group, including the number of string points, numeric points, and transaction records. You can configure up to 100 transaction history groups, and each row on the display corresponds to a separate group. Each group can contain up to 25 string points and up to 650 numeric points as long as the total number of points in a single group **does not** exceed 650 and the total number of points in all groups **does not** exceed 3100. The default number of transaction records in each group is 200. As you are making configuration changes, the memory needed for these changes is shown at the bottom of the display.

To access this display:

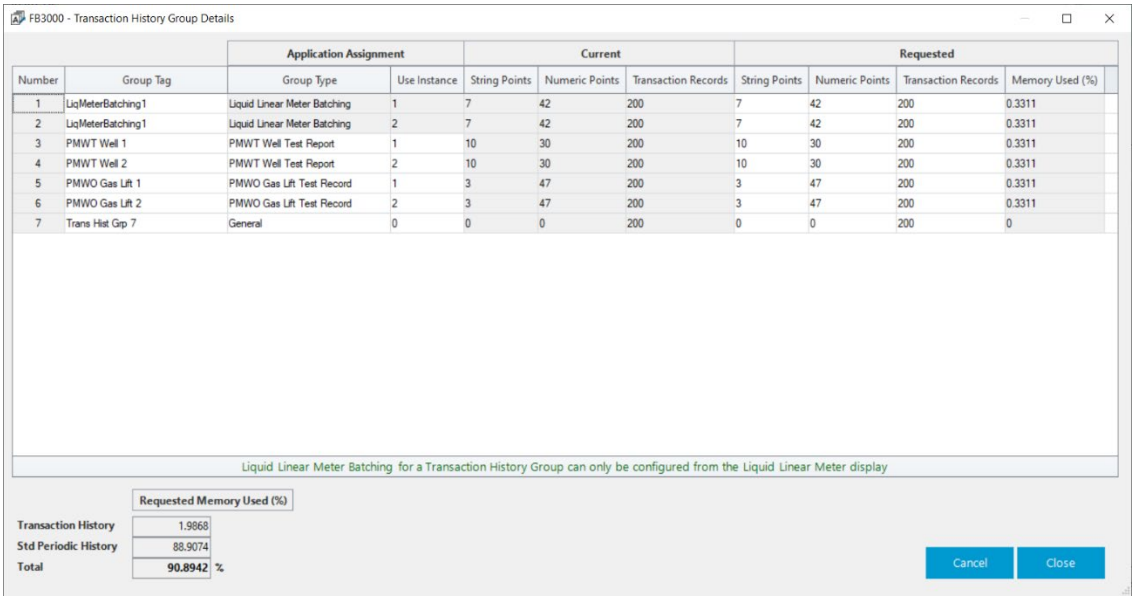
1. Select **Configure > History > Advanced Setup** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens.
2. Select the **Transaction History Sizing** tab.

**Figure 282. Transaction History Group Details Button**




3. Select the **Transaction History Group Details** button. The Transaction History Group Details pop-up display opens.

**Figure 283. Transaction History Group Details**



**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Number** | Each numbered row corresponds to a separate transaction history group in your FB Series product. | |
| **Group Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected transaction history group. | |
| **Application Assignment** | Assigns transactional history groups to standard application use cases, therefore determining the type and quantity of data to be stored. | |
| | **Group Type** | Click ▼ to select the use case for the transaction history group. Pre-defined standard application use cases are selectable. For custom user defined transactional history use cases, select a group type of General.<br>**Note**<br>To configure a transaction history group for liquid linear meter batching, you **must** set this field to **General** and then configure the **Transactional History Group** field<br>on the Liquid Linear Meter – General Tab. |
| | **Instance** | Click ▲▼ or enter the associated instance number that corresponds to the group type and intended purpose for the transactional history group. When there are multiple instances of the same functionality (for example, multiple liquid meters or multiple production wells), each instance can be stored in its own transactional history group. For example, transaction history group 1 can be used to store data for well instance 1, transaction history group 2 can be used to store data for well instance 2, etc.<br>**Note**<br>The instance is **not used** when the **Group Type** is set to **General**. |

| Field | Description |
|---|---|
| **Current** | These **read-only** fields show the total number of string points, numeric points, and transaction records configured for each transaction history group. |
| **Requested** | These fields set the total number of string points, numeric points, and transaction records for each transaction history group. To change these values, select a field in the appropriate column and type in your desired value. The amount of memory used by the new configuration is shown in the **Memory Used (%)** column for each Transaction History Group.<br>The requested number of points and records have the following limits:<br>• The maximum number of string points allowed in a single group is 25.<br>• The maximum combined number of string points and numeric points allowed in a single group is 650.<br>• The maximum combined number of string points and numeric points allowed across all transaction history groups is 3100.<br>**Note**<br>• You **must** save your changes on the Transaction History Sizing tab before the Transaction History Group Details configuration will take effect.<br>• If you adjust the total number of string points for a previously configured transaction history group, the existing configuration of numeric points for that transaction history group (as configured on the Transaction History Group Configuration display) is cleared during the resizing process. |
| **Requested Memory Utilization** | These **read-only** fields display the amount of memory that would be used based on currently requested memory allocation. Transaction history and standard periodic history share the same memory resource. The combination of memory used by transaction history and standard periodic history **must** be less than or equal to 100%. |

| Field | Description | |
|---|---|---|
| | **Transaction History** | Shows the amount of memory that would be used by transaction history based on the values you enter in the **Requested Number of Transaction History Groups** field on the Transaction History Sizing and the **Requested** number of **String Points**, **Numeric Points**, and **Records** on the Transaction History Group Details pop-up display. |
| | **Std Periodic History** | Shows the amount of memory that would be used by standard periodic history based on the values you enter in the **Requested Number of Points** field and the **Requested Number of Records** fields on the Standard Periodic History Tab. |
| | **Total** | Shows the total amount of memory that would be used based on the currently requested transaction history and standard periodic history allocation. This value **must** be less than or equal to 100%.<br>**Note**<br>If this value is more than 100%, you **must** modify the requested transaction history and standard periodic history allocation to be less than or equal to 100% before you can successfully history sizing. |

5. Select **Close** to return to the Transaction History Sizing tab.

**Note**

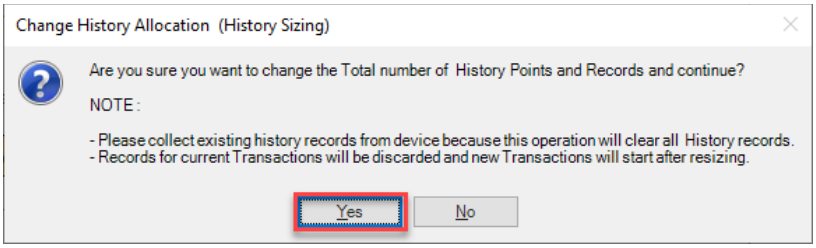
Select **Cancel** to revert any changes and return to the Transaction History Sizing tab.

6. If you made changes to the points or records allocation for any transaction history group, a note appears that reminds you to save your changes on the Transaction History Sizing tab to apply your changes to memory in the FB Series product. Select **Save**. A confirmation message displays.

**CAUTION**

- Please export your current history configuration (Exporting a History Configuration CSV) in case you need to restore your FB Series product to the previous configuration.
- Changes made to history sizing results in a reallocation of device memory and erases **all** existing history data. It is recommended to save any existing history data using the Reports Menu before applying any history size changes.
- Current Transactions will be discarded and new Transactions will start after resizing.

**Figure 284. Confirmation**




7. Select **Yes** to commit any history allocation changes to memory in the FB Series product.

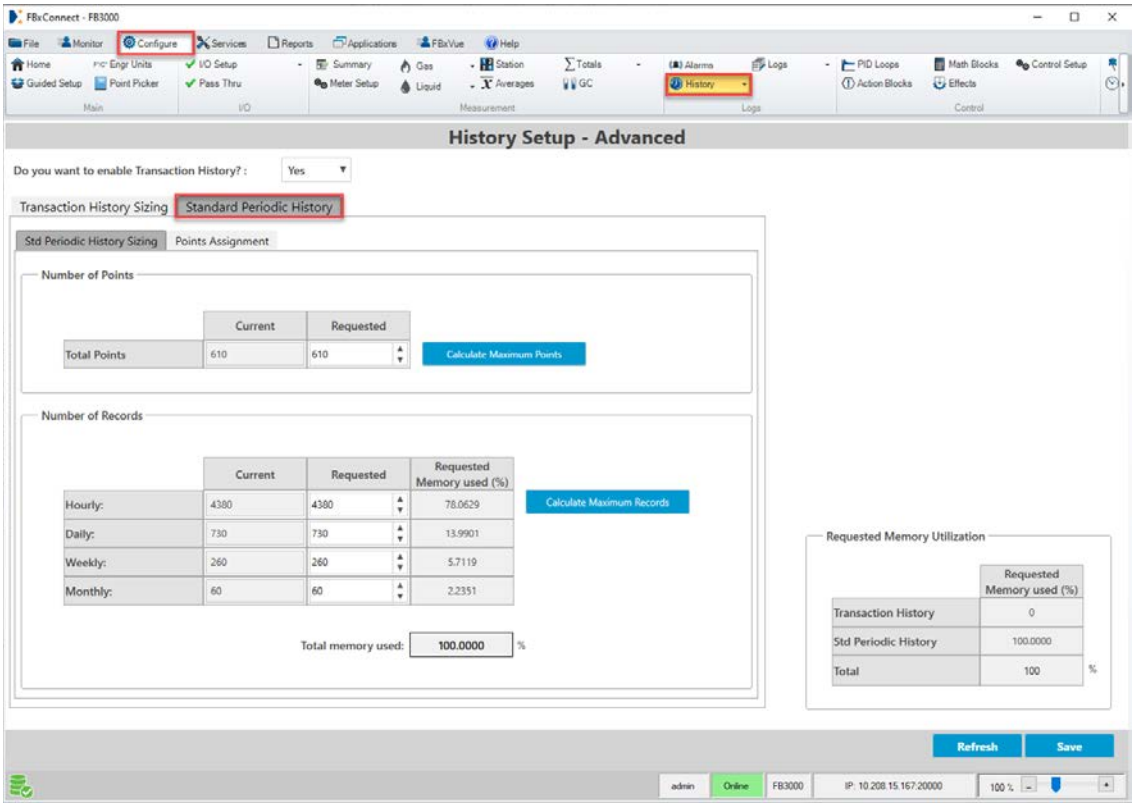
### 4.22.5.2 History Setup - Advanced – Standard Periodic History Sizing Tab

Use this tab to adjust the total number of history points, configure the number of records, and configure the allocation of history points amongst the standard periodic history groups in your FB Series product.

To access this display:

1. Select **Configure > History > Advanced Setup** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens.
2. Select the **Standard Periodic History** tab.

**Figure 285. History Setup - Advanced – Standard Periodic History Tab**




The History Setup - Advanced display contains the following tabs:

Standard History Sizing – Use this tab to adjust the total number of history points available in the standard periodic history groups and configure the number of hourly, daily, weekly, and monthly records.

Points Assignment **–** Use this tab to view and configure the allocation of history points amongst the standard periodic history groups in your FB Series product.

### 4.22.5.2.1 History Setup - Advanced – Std Periodic History Sizing Tab

Use this tab to adjust the number of history points available in the standard history groups and configure the number of hourly, daily, weekly, and monthly records. This feature allows you to configure the history memory to fit your needs. You can configure the history to store a few records (for example, 50 or 100) and store the data for a very long time (for example, over one year). Alternatively, you can configure the history to store a large number of records (for example, 1000) and store the data for a short period of time (for example, 30 days). If you only care about daily and hourly data, you can configure 0 weekly and 0 monthly records and reclaim that memory.

There are trade-offs to consider as you configure the items on this display. The maximum number of points is based the number of requested records (Hourly, Daily, Weekly, and Monthly), and the maximum number of records (Hourly, Daily, Weekly, and Monthly) is based on the number of requested points. Adjust both the number of points and records based on your organization's history requirements. Whatever you pick, it **must** fit within 100% or less of the available memory.

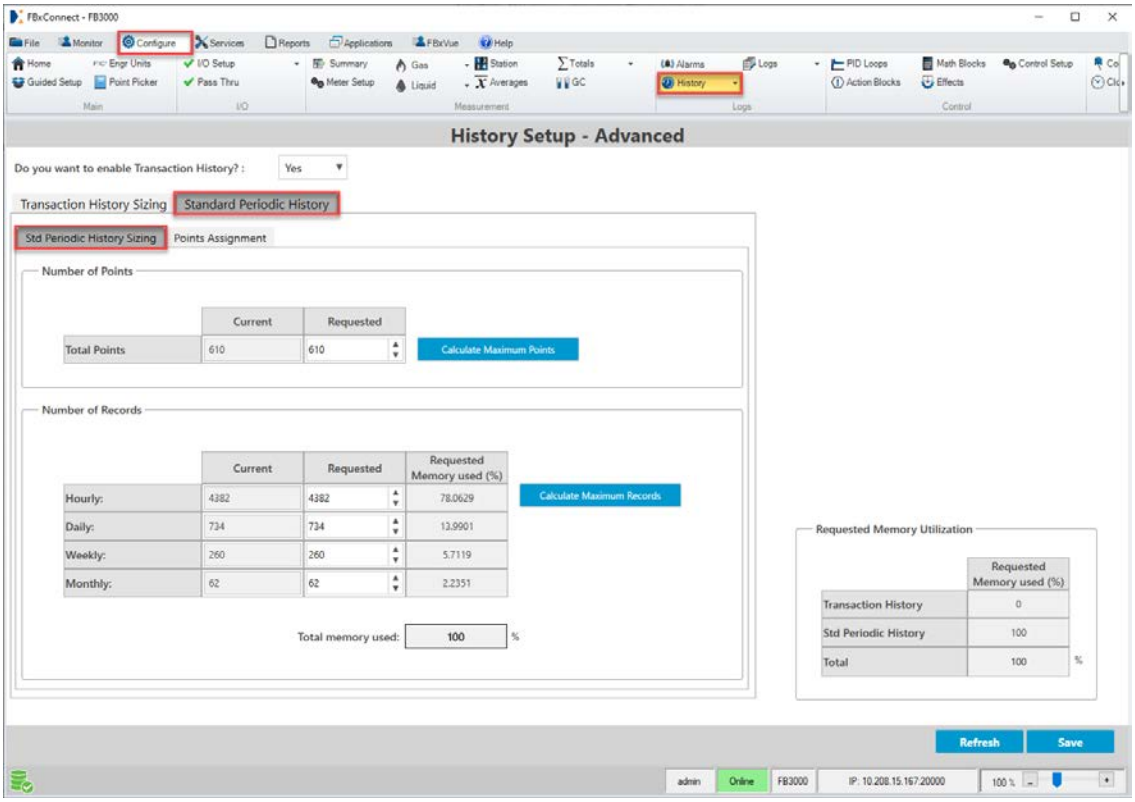
**Note**

- Changes made to history sizing results in a reallocation of device memory and erases any existing history data. It is recommended to save any existing history data before applying any history size changes.
- For more information about standard history groups, refer to History Overview.
- After sizing history, use the Points Assignment tab to view and allocate history points amongst the standard history groups.
- After sizing history, if the number of records for a history group is smaller than the values set in the **Log Nearly Full Remaining Records** or the **Log Full Remaining Records** fields on the Log Properties display, the system sets the **Log Nearly Full Remaining Records** field to **10%** and the **Log Full Remaining Records** field to **5%** of the total number of records.

To access this display:

1. Select **Configure > History > Advanced Setup** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens showing the Standard History Sizing tab.

**Figure 286. History Setup - Advanced – Standard History Sizing Tab**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Number of Points** | Use these fields to adjust the number of history points available in the standard history groups, which includes general history and station history. For example, if you are configuring a DeltaV FB3000 RTU for 24 meters and a need to historize 10 points for each meter, a minimum of 24 x 10 = 240 history points would be required. | |
| | **Current** | This **read-only** field shows the number of history points currently allocated to the standard history groups. |

| Field | Description | |
|---|---|---|
| | **Requested** | Click ▲▼ to set the number of history points to allocate for the standard history groups.<br>**Note**<br>• The maximum number of points is **1350**.<br>• The total number of points combined with the total number of records cannot cause the value in the **Total memory used** field to exceed 100%. |
| | **Calculate Maximum Points** | Select this button to calculate the maximum number history points that can be provided given the requested number of Hourly, Daily, Weekly, and Monthly records, and the **Requested** column will be updated with a value that utilizes 100% of the available history memory. Fill out the requested hourly, daily, weekly, and monthly records **before** selecting this button.<br>For example, if a long duration of history is not required, then it might be typical to save 35 days of history (which is 840 hours, 4 weeks, 2 months). You should enter these values in the **Requested** column of the **Number of Records** section first. Then, before selecting the **Save** button, select the **Calculate Maximum Points** button to determine the number of possible history points that can be allocated for the selected configuration. |
| **Number of Records** | Use these fields to reallocate the number of records stored in the memory of the FB Series product. These selections determine the duration that history is stored for the various available record types. Note that the various record types are not required to be equal in duration. For example, if weekly and monthly history are not required, then the number of weekly and monthly records can be set to 0. | |
| | **Current** | This **read-only** field shows the number of hourly, daily, weekly, and monthly history records currently allocated to the standard history groups. |

| Field | Description | |
|---|---|---|
| | **Requested** | Click ▲▼ to set the number of records to allocate for the hourly, daily, weekly, and monthly history logs.<br>**Note**<br>The total number of points combined with the total number of records cannot cause the value in the Total memory used field to exceed 100%. |
| | **Requested Memory Used** | These **read-only** fields show, in percentage, the amount of FB Series product memory used by the hourly, daily, weekly, and monthly records based on the number of Requested Points and the number of Requested Records. |
| | **Total memory used** | This **read-only** field shows, in percentage, the total amount of FB Series device memory used by the combined total number of Requested Points and the total number of Requested Records.<br>**Note**<br>The Total memory used is **not** required to equal 100%, only that it is less than or equal to 100%. |
| | **Calculate Maximum Records** | Select this button to calculate the maximum number of records (Hourly, Daily, Weekly, and Monthly) that can be provided given the requested number points, and the **Requested** column will be updated with a value that utilizes 100% of the available history memory. Fill out the above requested total points **before** selecting this button.<br>For example, if 500 history points will be required to store meter and station audit trial data, then you should enter a value of 500 in the **Requested** column of the **Number of Points** section first. Then, before selecting the **Save** button, select the **Calculate Maximum Records** button to determine the number of possible records (duration) that can be allocated for the selected configuration. |

| Field | Description |
|---|---|
| **Total Points** | This **read-only** field shows the total number of standard history points (General, Station 1, Station 2) in the FB Series product, and the total number of requested history points. |

3. Select **Save** to save any changes you make to this display.

## CAUTION

Changes made to history sizing results in a reallocation of device memory and erases any existing history data. It is recommended to save any existing history data before applying any history size changes.

### 4.22.5.2.2 History Setup - Advanced – Points Assignment Tab

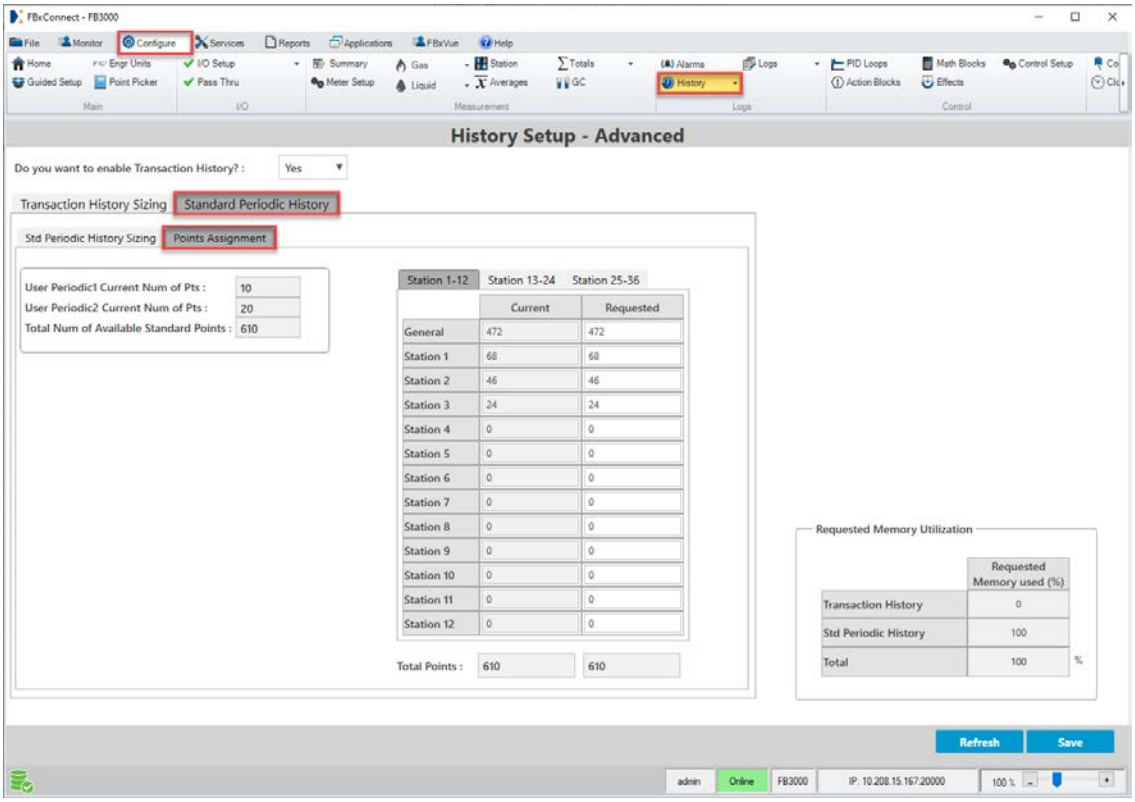
Use this tab to view and allocate history points amongst the standard history groups in your FB Series product.

The FB Series product also contains two groups of user periodic history points. User periodic history consists of 30 fixed history points. Ten points are allocated to the User Periodic 1 group and 20 points are allocated to the User Periodic 2 group.

To access this display:

1. Select **Configure > History > Advanced Setup > Points Assignment** from the DeltaV FBxConnect configuration software main menu. The History Setup - Advanced display opens showing the Standard History Sizing tab.
2. Select the **Points Assignment** tab.

**Figure 287. History Setup - Advanced – Points Assignment Tab**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **User Periodic1 Current Num of Pts** | This **read-only** field shows the total number of user history points allocated to the User Periodic 1 group. |
| **User Periodic 2 Current Num of Pts** | This **read-only** field shows the total number of user history points allocated to the User Periodic 2 group. |
| **Total Num of Available Standard Points** | This **read-only** field shows the number of available history points not currently allocated to a standard history group. |
| **Station 1-12, Station 13-24, and Station 25-36 tabs** | Select a tab to configure history points assigned to each respective station.<br>**Note**<br>The Station 1-12 tab also shows the history points assigned to the General history group. |

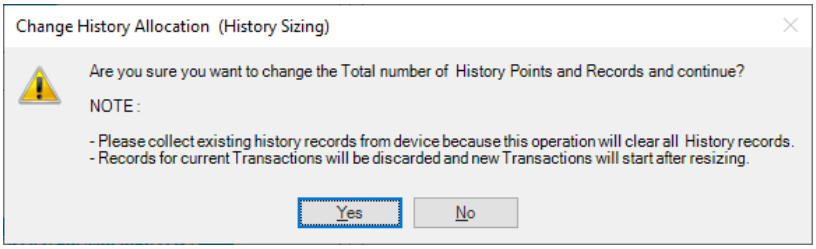
| Field | Description | |
|---|---|---|
| **General** | The General history group contains hourly, daily, weekly, and monthly history not associated with a meter or station. | |
| | **Current** | This **read-only** field shows the number of history points currently allocated to the Standard General history group. |
| | **Requested** | Sets the number of history points to allocate for the Standard General history group.<br>**Note**<br>The total allocated number of standard history points cannot exceed the value in the Total Standard Points field. |
| **Station (#)** | The Station (#) history group contains hourly, daily, weekly, and monthly history associated with Station x and any meters assigned to Station x. | |
| | **Current** | This **read-only** field shows the number of history points currently allocated to the Standard Station x history group. |
| | **Requested** | Sets the number of history points to allocate for the Standard Station x history group.<br>**Note**<br>The total allocated number of standard history points cannot exceed the value in the Total Standard Points field. |
| **Total Points** | This **read-only** field shows the total number of standard history points (General, Station 1, Station 2) in the FB Series product, and the total number of requested history points. | |

4. Select **Save** to save any changes you make to this display and commit any history allocation changes to memory in the FB Series product. A confirmation message opens.

**CAUTION**

- Changes made to history sizing results in a reallocation of device memory and erases **all** existing history data. It is recommended to save any existing history data using the Reports Menu before applying any history size changes.
- Current Transactions will be discarded and new Transactions will start after resizing.

**Figure 288. Confirmation**




5. Select **Yes** to continue the setup.

# 4.23 Logs

Use the displays in the Logs drop-down menu to configure how logs are created in your FB Series product. You can configure if the FB Series product creates separate or combined legal and non-legal event logs, enable or disable various logs, and verify the system.

To access these displays, select **Configure > Logs** from the DeltaV FBxConnect configuration software main menu and select one of the options from the Logs drop-down menu.

**Figure 289. Logs Drop-Down Menu**




Refer to the following topics for more information:

Event Setup – Use this display to configure how event logs are created by the FB Series product.

Log Properties – Use this display to configure options for history, alarm, and event logs.

Log Descriptions – View a description of each log created by the FB Series product.

## 4.23.1 Event Setup

Use this display to configure how event logs are created by your FB Series product. You can configure the system to create a single event log that contains both legal and non-legal events, to create separate event logs for legal and non-legal events, or to create separate event logs for legal and non-legal events that are verifiable and exportable.

**Note**

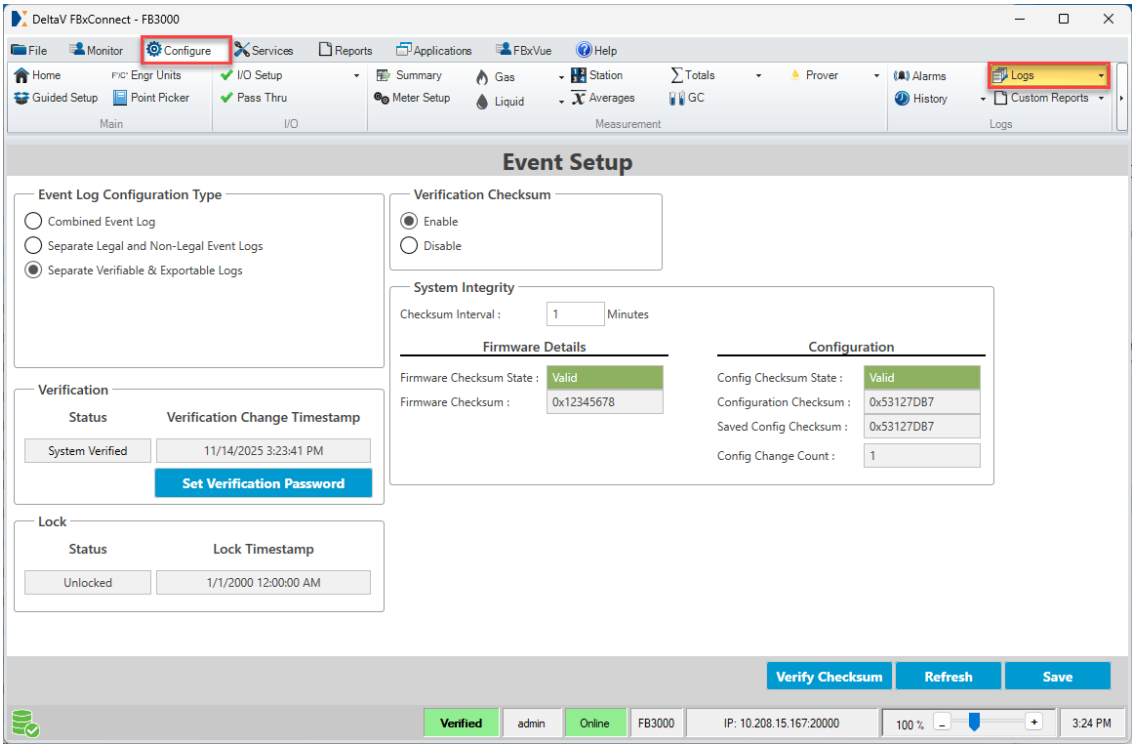
If you chose to have verifiable logs, this display allows you to verify the system configuration.

Another feature is the ability to verify the integrity of the system using a set of checksums (32-bit CRC, Cyclic Redundancy Check) values. After enabling this feature in the **Verification Checksum** field, you can configure how often the system performs these checks, view the current state of the firmware and configuration checksums, and view the number of times the system configuration checksum has changed.

To access this display:

1. Select **Configure > Logs > Event Setup** from the DeltaV FBxConnect configuration software main menu.

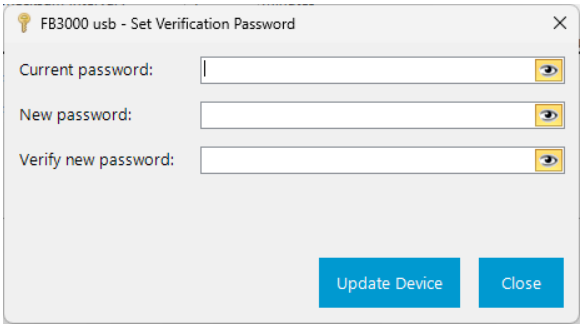
**Figure 290. Event Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Event Log Configuration Type** | Sets the type of event log created by the FB Series product.<br>**Note**<br>Changing the Event Log Configuration Type between a combined log type (Combined Event) and a separate log type (Separate Legal and Non-Legal Event Logs or Separate Verifiable & Exportable Logs) will clear the Event Log. | |
| | **Combined Event Log** | The FB Series product creates one event log that contains both legal and non-legal events. The combined event log consists of 8000 entries. |
| | **Separate Legal and Non-Legal Event Logs** | The FB Series product creates two event logs: one for legal events and one for non-legal events. Each event log consists of 4000 entries. |

| Field | Description | |
|---|---|---|
| | **Separate Verifiable & Exportable Logs** | The FB Series product creates two event logs: one for legal events and one for non-legal events. Each event log consists of 4000 entries.<br>When the legal event log is full, the Lock Status changes to Locked and a warning message appears. The device no longer accepts changes to legal parameters, firmware updates, calibration, or configuration download. The legal event log **must** be exported before these actions are permitted and additional events can be created.<br>**Note**<br>• After you save your changes, a color-coded verification status field appears in the DeltaV FBxConnect configuration software status bar. This field allows you to quickly determine the verification status of your FB Series product when viewing any display within DeltaV FBxConnect configuration software.<br>• If your FB Series product becomes locked due to a full event log, refer to Export Events.<br>• DeltaV FBxConnect configuration software calculates the generated file's MD5 hash and stores the result as a new event in the FB Series product's legal event log. This allows you to verify the integrity of the event report by calculating the file's MD5 hash and comparing the results with the MD5 hash stored in the FB Series product's legal event log. |
| **Verification** | Use these fields to verify the configuration of your FB Series product.<br>**Note**<br>These fields appear **only** if you either select **Separate Verifiable & Exportable Logs** in the **Event Log Configuration Type** field or select **Enable** in the **Verification Checksum** field. | |

| Field | Description | |
|---|---|---|
| | **Status** | This **read-only** field shows the current verification state of the FB Series product. Possible options are System Unverified or System Verified.<br>**Note**<br>• A verification icon is also visible in the DeltaV FBxConnect configuration software status bar at the bottom of the screen.<br>• You can add the status to the LCD Touchpad via the System_1. VERIFICATION_STATUS parameter. |
| | **Verification Change Timestamp** | This **read-only** field shows the time and date of the last change to the Verification Status field. |
| | **Set Verification Password** | Select this button to open the **Set Verification Password** display and configure a password you **must** enter before verifying a configuration via the **Verify Checksum** button.<br>  <br>**Note**<br>• Click the eye icon ( ) to toggle password visibility.<br>• If you have not previously configured a password, leave the **Current password** field blank.<br>• To disable the verification password, enter the current password and enter a new blank password.<br>• Changes to the verification password are recorded in the event log. |

| Field | Description | |
|---|---|---|
| | | • If the security configuration lock out is set to timed, entering the incorrect password will cause the password to be disabled for the lock out period. An alarm will be raised for the duration of the lockout.<br>• The verification password can be set by a user with a role assigned the Legal Event Verification permission. Refer to Permissions for more information. |
| **Lock** | Use these fields to view information about your FB Series product's current lock status. An FB Series product becomes locked when the Event Log Configuration Type is set to **Separate Verifiable & Exportable Logs** and the legal event log becomes full. When the legal event log is full, the Lock Status changes to Locked and a warning message appears. The device no longer accepts changes to legal parameters, firmware updates, calibrations, or configuration downloads. To unlock the device, you **must** export the legal event log to allow additional events to be created.<br>**Note**<br>• These fields appear **only** if you select **Separate Verifiable & Exportable Logs**.<br>• If your FB Series product becomes locked due to a full event log, refer to Export Events. | |
| | **Status** | This **read-only** field shows the current state of the legal event log. Possible options are Unlocked or Locked.<br>**Note**<br>• When the device is locked, a color-coded status field is also visible in the DeltaV™ FBxConnect status bar at the bottom of the screen.<br>• You can add the status to the LCD Touchpad via the System_1. LEGAL_EVT_LOCK_STAT parameter. |
| | **Lock Timestamp** | This **read-only** field shows the time and date of the last change to the Lock Status field. |

| Field | Description | |
|---|---|---|
| **Verification Checksum** | Sets if the system performs integrity checks on the firmware installed on the FB Series product and on the metrologically significant configuration items.<br>**Note**<br>Enabling the Verification Checksum option additionally enables integrity checks on database access. With the Verification Checksum option disabled, database integrity checking is only done on system startup. With Verification Checksum enabled, database integrity checks are performed for parameters with each database access during runtime. | |
| | **Enable** | The system performs integrity checks on the firmware in the FB Series product and the metrologically significant configuration items on a configurable periodic interval.<br>**Note**<br>The integrity check is performed in the background with unused processor time. |
| | **Disable** | The system **does not** perform integrity checks on the firmware in the FB Series product or the metrologically significant configuration items. |
| **System Integrity** | These fields allow you to configure the time between each integrity check and view the integrity status of the FB Series product. Integrity checking consists of a pair of checksum values which are constantly reevaluated, one for the executing firmware image and one for the metrologically significant configuration items. | |
| | **Checksum Interval** | Sets, in minutes, the length of time the system waits between each integrity check. |
| | **Firmware Checksum State** | This **read-only** field displays the status of the firmware integrity check. Possible states are Disabled, Not Checked, Valid, and Fail. When a failure occurs, an entry is placed in the event log and an indication is seen in the DeltaV FBxConnect Status bar at the bottom of the screen. |

| Field | Description | |
|---|---|---|
| | **Firmware Checksum** | This **read-only** field shows the checksum generated by the firmware. |
| | **Config Checksum State** | This **read-only** field displays the status of the firmware integrity check. Possible states are Disabled, Not Checked, Computing, Valid, and Fail. When a failure occurs, an entry is placed in the event log and an indication is seen in the DeltaV FBxConnect Status bar at the bottom of the screen.<br>**Note**<br>This field remains in a state of **Not Checked** until the configuration has been baselined using the **Verify Checksum** button below. |
| | **Configuration Checksum** | This **read-only** field shows the checksum generated by the current FB Series product configuration. |
| | **Saved Config Checksum** | This **read-only** field shows the configuration checksum that was generated the last time a **Verify Checksum** was performed.<br>**Note**<br>This field remains at a value of **0x00000000** until the configuration has been baselined using the **Verify Checksum** button below. |
| | **Config Change Count** | This **read-only** field shows the number of times the checksum of the metrologically significant configuration items has been calculated and resulted in a different value. This value is reset to 0 when the Verification Checksum option is disabled. |

| Field | Description |
|---|---|
| **Verify Checksum** | Use this button to baseline the configuration after you have reviewed the metrology aspects of the system and verified that they are correct. When a confirmation pop-up window appears, select **OK** to verify the system and generate the saved configuration checksum. The Verification Status field changes to System Verified and a verification field appears in the DeltaV FBxConnect status bar at the bottom of the screen.<br>**Note**<br>If you have configured a password via the **Set Verification Password** button, then you **must** enter the correct password and select **OK** before you can verify the system. |

3. Select **Save** to save any changes you make to this display.

## 4.23.2 Log Properties

Use this display to configure options for history, alarm, and event logs. You can enable/disable individual logs, and configure the number of remaining records before an alarm is raised.

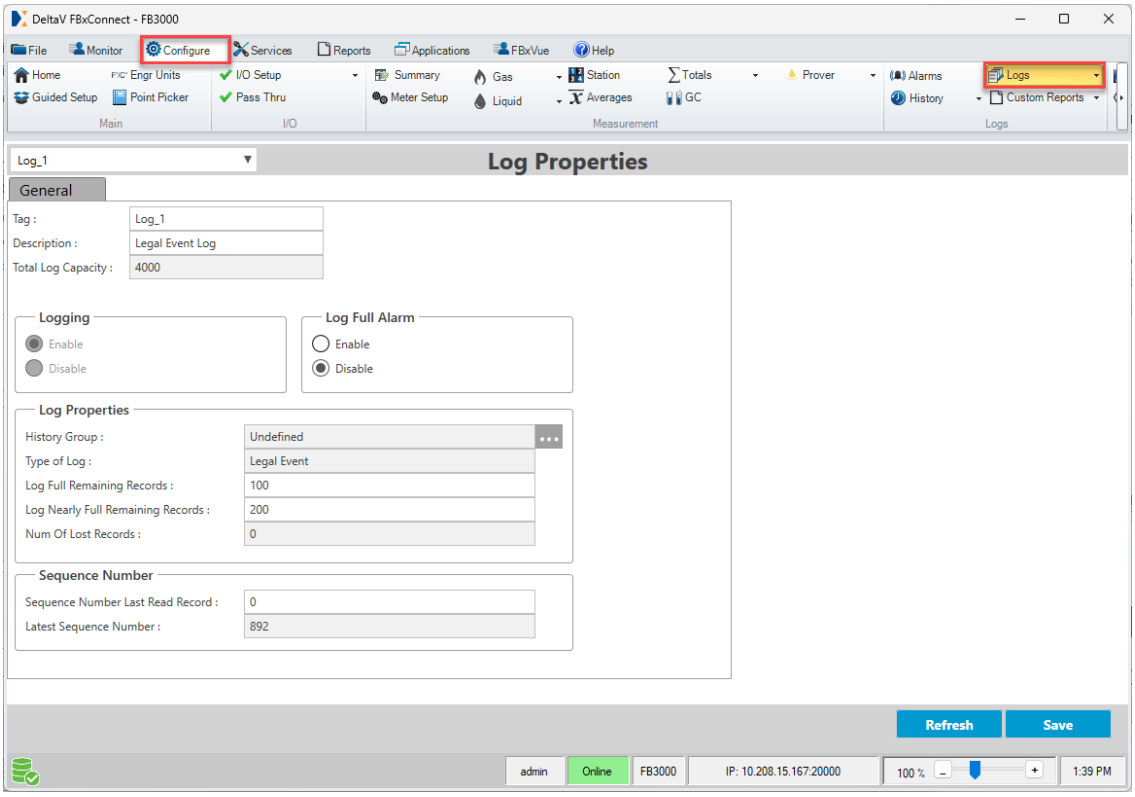
To access this display:

1. Select **Configure > Logs > Log Properties** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display to select an instance to configure.

**Note**

Refer to Log Descriptions for more information.

**Figure 291. Log Properties**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Total Log Capacity** | This **read-only** field shows the maximum number of records that can be stored in the currently selected log. |
| **Logging** | Enables the system to collect data for the selected log. |
| **Log Full Alarm** | Enables the system to log **Log Nearly Full**, **Log Full** and **Log Integrity** alarms for the selected log. |
| **History Group** | This **read-only** field shows the History Group Object Reference to which the selected log belongs. Possible History Group Object References are Hist Grp_1, Hist Grp_2, Hist Grp_3, Hist Grp_4, Hist Grp_5 and Undefined. |

| Field | Description |
|---|---|
| **Type of Log** | This **read-only** field shows the Log Type of the selected log. Possible Log Types are Legal Event, Non Legal Event, Legal Alarm, Non Legal Alarm, Legal History and Non Legal History. |
| **Log Full Remaining Records** | Sets a limit value to which the number of remaining records in the selected log must fall to log a Log Full alarm. |
| **Log Nearly Full Remaining Records** | Sets a limit value to which the number of remaining records in the selected log must fall to log a Log Nearly Full alarm.<br>**Note**<br>The Log Nearly Full limit should be greater than or equal to the Log Full Limit. |
| **Num Of Lost Records** | This **read-only** field shows the number of records that have been lost. Lost records are an indication that the audit trail has been compromised. |
| **Sequence Number Last Read Record** | This parameter allows the SCADA host to store the sequence number of the last successfully read alarm, event, or history record in the FB Series product. The system then uses this number to determine the number of remaining records using the formula:<br>Remaining Records = Total Records - Unread Records<br>Where:<br>Unread Records = Sequence Number of Newest Record - Sequence Number Last Read |
| **Latest Sequence Number** | This **read-only** field shows the last sequence number generated by the FB Series product. |

**4.** Select **Save** to save any changes you make to this display.

## 4.23.3 Log Descriptions

The DeltaV FB3000 RTU stores a total of 154 logs. Refer to the table below for a description of each log.

**Table 49. Log Descriptions**

| Log | Description |
|---|---|
| Log 1 | Legal Event Log |
| Log 2 | Non Legal Event Log |
| Log 3 | Alarm Log |
| Log 4 | Undefined |
| Log 5 | User Periodic 1 Log |
| Log 6 | User Periodic 2 Log |
| Log 7 | General Hourly Log |
| Log 8 | General Daily Log |
| Log 9 | General Weekly Log |
| Log 10 | General Monthly Log |
| Logs 11 – 14 | Station 1's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 15 – 18 | Station 2's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 19 – 22 | Station 3's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 23 – 26 | Station 4's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 27 – 30 | Station 5's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 31 – 34 | Station 6's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 35 – 38 | Station 7's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 39 – 42 | Station 8's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 43 – 46 | Station 9's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 47 – 50 | Station 10's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 51 – 54 | Station 11's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 55 – 58 | Station 12's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 59 – 62 | Station 13's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 63 – 66 | Station 14's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 67 – 70 | Station 15's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 71 – 74 | Station 16's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 75 – 78 | Station 17's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 79 – 82 | Station 18's Hourly, Daily, Weekly, and Monthly Logs |

| Log | Description |
|---|---|
| Logs 83 – 86 | Station 19's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 87 – 90 | Station 20's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 91 – 94 | Station 21's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 95 – 98 | Station 22's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 99 – 102 | Station 23's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 103 – 106 | Station 24's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 107 – 110 | Station 25's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 111 – 114 | Station 26's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 115 – 118 | Station 27's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 119 – 122 | Station 28's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 123 – 126 | Station 29's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 127 – 130 | Station 30's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 131 – 134 | Station 31's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 135 – 138 | Station 32's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 139 – 142 | Station 33's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 143 – 146 | Station 34's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 147 – 150 | Station 35's Hourly, Daily, Weekly, and Monthly Logs |
| Logs 151 – 154 | Station 36's Hourly, Daily, Weekly, and Monthly Logs |

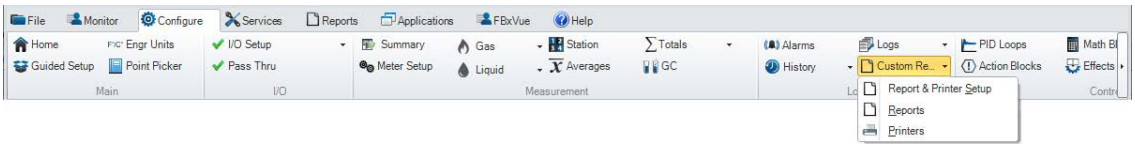
## 4.24 Custom Reports

Use the displays in the Custom Reports drop-down menu to configure customized reports that are generated by your DeltaV FB3000 RTU based on a template that you create. You can configure a report template to include real-time data (date, time, meter number, quantity, etc.) or historical data (Snapshot, Hourly, Daily, Monthly, or Batch). Reports can be generated manually or automatically using the layout from your custom report template.

Generated report files are stored as .txt files in the FB Series product's flash memory. The report content and formatting are based on a custom report template that you create. You can download these reports using DeltaV FBxConnect configuration software or you can configure a network printer to print your reports.

To access these displays, select **Configure > Custom Reports** from the DeltaV FBxConnect configuration software main menu and select one of the options from the Custom Reports drop-down menu.

**Figure 292. Custom Reports Drop-Down Menu**




Refer to the following topics for more information:

Report and Printer Setup – Use this display to configure the number of custom reports and the number of printers used by the FB Series product.

Reports – Use this display to configure the custom report name, import a custom report template, and generate the custom report.

Template Management – Use this dialog to import a template that the system uses to create a custom report.

Template Editor – Use this option to launch the Custom Report Template Editor and create a custom report template that determines the layout and content of the report.

Printers – Use this display to configure a network printer used for custom reports.

Printer Alarms/Errors – Explanation of printer alarm log entries.

Generating Custom Reports – Follow these steps to generate a custom report.

Viewing Custom Reports – Download and view the generated report from the FB Series product's memory to your PC.

Deleting Custom Report Files and Templates – Delete custom report files and templates that are stored in the FB Series product's flash memory.

Creating a Custom Report Template – Details the required file structure used to create your own custom template.

## 4.24.1 Report and Printer Setup

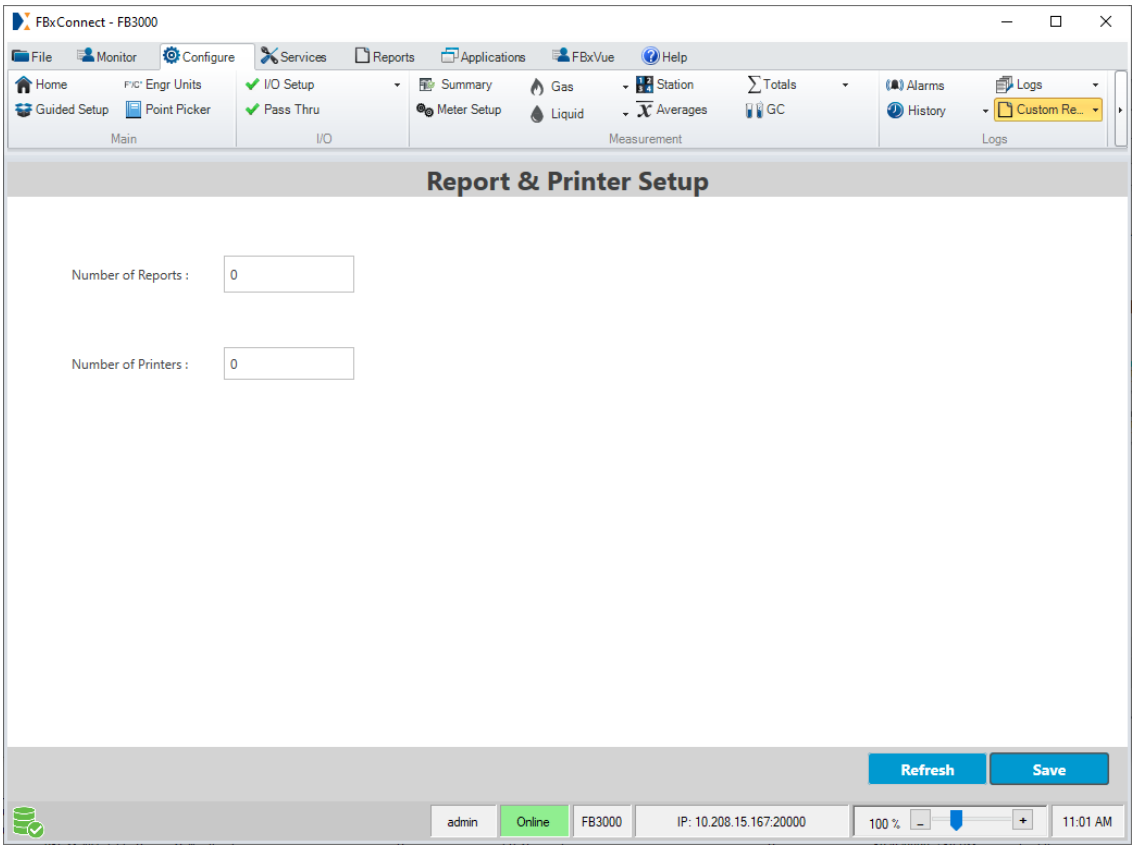
Use this display to configure the number of custom report instances that can be configured to generate report files that are stored in the FB Series product's flash memory, and to configure the number of printers used by the FB Series product to print the custom reports. A maximum of 36 instances of the Reports object exist, and the FB Series product's flash memory can store up to the last 8 report files (.txt) for each

instance. Each report file name includes a unique report sequence number, a user-entered file name prefix, and the time and date.

To access this display:

1. Select **Configure > Custom Reports > Report and Printer Setup** from the DeltaV FBxConnect configuration software main menu.

**Figure 293. Report and Printer Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Number of Reports** | Enter the number of custom report instances used to store reports in the FB Series product's flash memory. Possible values are 0 to 36.<br>**Note**<br>• You **must** configure at least one report on this display before you can access the Reports display.<br>• The FB Series product's flash memory can store a maximum of **8** report files (.txt) for each Report instance. |

| Field | Description |
|---|---|
| **Number of Printers** | Enter the number of printers used by your FB Series product to print custom reports. The maximum number of printers is **2**.<br>**Note**<br>You **must** configure at least one printer before you can access the Printers display. |

3. Select **Save** to save any changes you make to this display.

## 4.24.2 Reports

Use this display to configure the custom report name, import custom report templates, and generate the custom report. 36 instances of the Reports object exist and the FB Series product's flash memory can store the last 8 report files (.txt) for each instance.

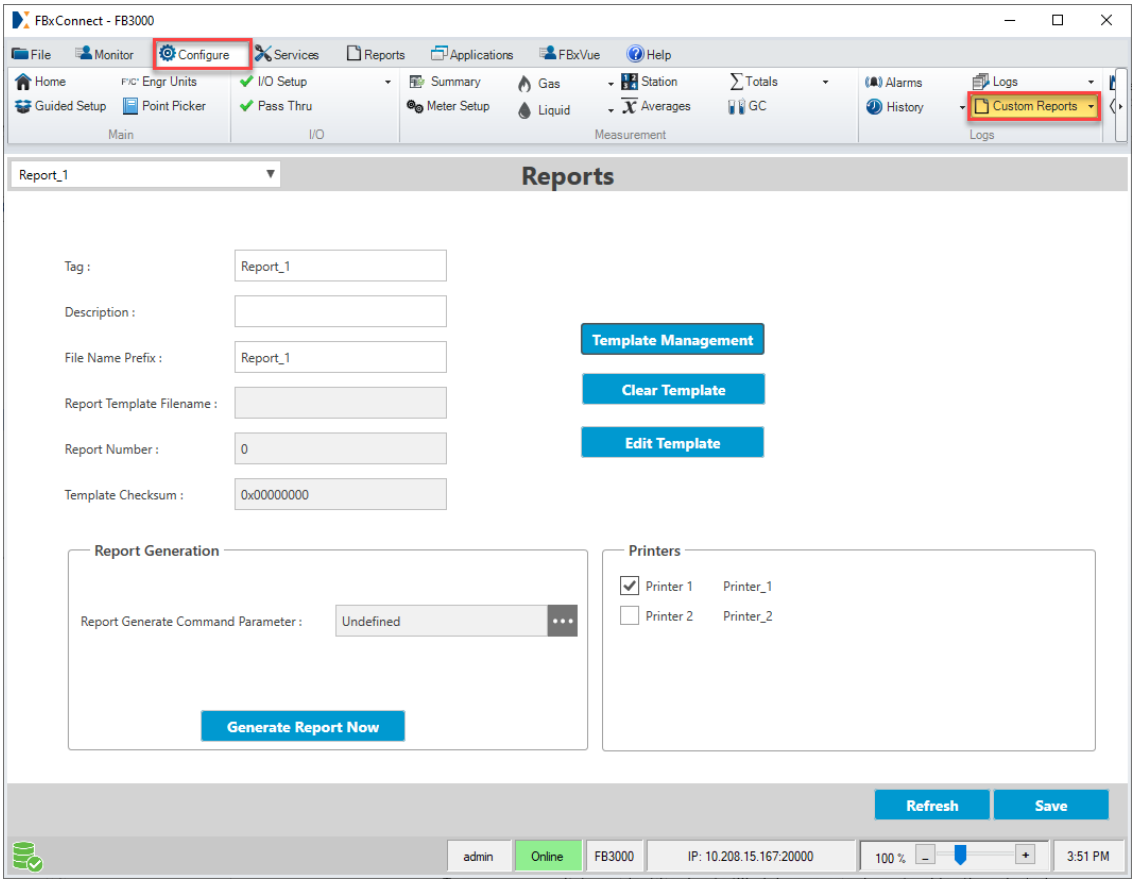
**Note**

You **must** configure at least one report in the **Number of Reports** field on the Report and Printer Setup display before you can access this display.

To access this display:

1. Select **Configure > Custom Reports > Reports** from the DeltaV FBxConnect configuration software main menu.

**Figure 294. Reports**




2. Click ▼ in the drop-down list at the top of the display to select a Reports instance to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected reports instance.<br>**Note**<br>The Tag can be printed on a custom report by selecting **REPORT_NAME** in the **Type** field on the Placement Properties window. For more information, refer to Template Editor – Placement Properties. |

| Field | Description |
|---|---|
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected reports instance.<br>**Note**<br>The Description can be printed on a custom report by selecting **REPORT_DESC** in the **Type** field on the Placement Properties window. For more information, refer to Template Editor – Placement Properties. |
| **File Name Prefix** | Enter text (up to 15-alphanumeric characters) that the system includes in the file name of the saved report. The File Name Prefix is placed before the date and after the report number. For example, the bold text in the following file name is the File Name Prefix: 00001_**Report_1**_20240702100211.txt<br>**Note**<br>Valid special characters are an underscore (_), dash (**-**) or period (**.**). |
| **Report Template Filename** | Enter the file name of a custom report template to use with the selected Reports instance.<br>**Note**<br>• Rather than typing in a template file name, you can use the **Template Management** button to select a template using DeltaV FBxConnect configuration software.<br>• Valid special characters are an underscore (_), dash (**-**) or period (**.**). A period cannot be used as the last character in the Report Template Filename. |
| **Report Number** | This **read-only** field shows a unique number that is automatically generated by the system when a report file is successfully generated. Valid values are 0 to 99999. The report number appears at the beginning of the file name. For example, the bold text in the following file name is the Report Number: **00001**_Report_1_20240702100211.txt<br>**Note**<br>The Report Number can be printed on a custom report by selecting **REPORT_NUM** in the **Type** field on the Placement Properties window. For more information, refer to Template Editor – Placement Properties. |

| Field | Description |
|---|---|
| **Template Checksum** | This **read-only** field shows the checksum of the custom report template currently used for the selected Reports instance. The checksum is automatically generated from the structure of the template file and can be used for revision control. If it is not possible to calculate the checksum, a value of 0 is displayed.<br>**Note**<br>The checksum is **not** calculated when DeltaV FBxConnect configuration software is operating offline. |
| **Template Management** | Select this button to open the Custom Report Templates window and select a template to use with the selected Reports instance. DeltaV FBxConnect configuration software verifies the file structure before importing the template. If errors are found in the selected template, an error message opens and the template is not imported.<br>**Note**<br>• Emerson provides sample custom report templates with DeltaV FBxConnect configuration software. The default location for the custom report templates is: C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates.<br>• For information about creating your own template, refer to Creating a Custom Report Template. |
| **Clear Template** | Select this button to remove the custom report template currently used for the selected Reports instance. |
| **Edit Template** | Select this button to open the Custom Report Template Editor and modify the custom report template currently used for the selected Reports instance.<br>**Note**<br>This option modifies a custom report template file located on the FB Series product. Any modifications are downloaded to the FB Series product when you save your changes. |
| **Report Generate Command Parameter** | Click  to open a Point Picker dialog and select a parameter that generates the selected report whenever the value of the parameter changes. Parameters used for this function are often based on a specific period of time. For example, the following parameters can be used to generate period, day, week, month, and batch reports: |

| Field | Description |
|---|---|
| | • **End of period** – Liq LinMtr_x.PREV_PER_END_TM or Station_x.PREV_PER_END_TM<br>• **End of day** – Liq LinMtr_x.PREV_DAY_END_TM or Station_x.PREV_DAY_END_TM<br>• **End of week** – Liq LinMtr_x.PREV_WK_END_TM or Station_x.PREV_WK_END_TM<br>• **End of month** – Liq LinMtr_x.PREV_MNTH_END_TM or Station_x.PREV_MNTH_END_TM<br>• **End of batch** – Liq LinMtr_x.PREV_BATCH_END_TM or Station_x.PREV_BATCH_END_TM<br>**Note**<br>• Any parameter belonging to the **Clock_1** object is **not** a valid parameter for this field.<br>• If a time-based parameter is used as a trigger, the generated report file name includes the time from that parameter. If non-time-based parameter is used as a trigger, the generated report file name includes the time that the report was generated.<br>• On heavily loaded solutions, it can take up to 10 seconds to fully process a report. |
| **Generate Report Now** | Select this button to instantly start generating the selected report.<br>**Note**<br>• On heavily loaded solutions, it can take up to 10 seconds to fully process a report.<br>• If a report can be automatically triggered via the Report Generate Command Parameter, the report template **must** only use historic parameters; this is to ensure that duplicate tickets include the same data.<br>• If an error occurs when generating the report, an event is logged in the event log. |
| **Printer 1** and **Printer 2** | If checked, sends the generated report to the selected printer.<br>**Note**<br>If the printer status is “offline” when a report is generated, any reports that were not printed (up to the previous eight reports) are sent to the printer when the status returns to “online” (Ethernet printers **only**). |

4. Select **Save** to save any changes you make to this display.

### 4.24.2.1 Template Management

Use this dialog to import a template that the system uses to create a custom report. The custom report template determines the layout and content of the report.

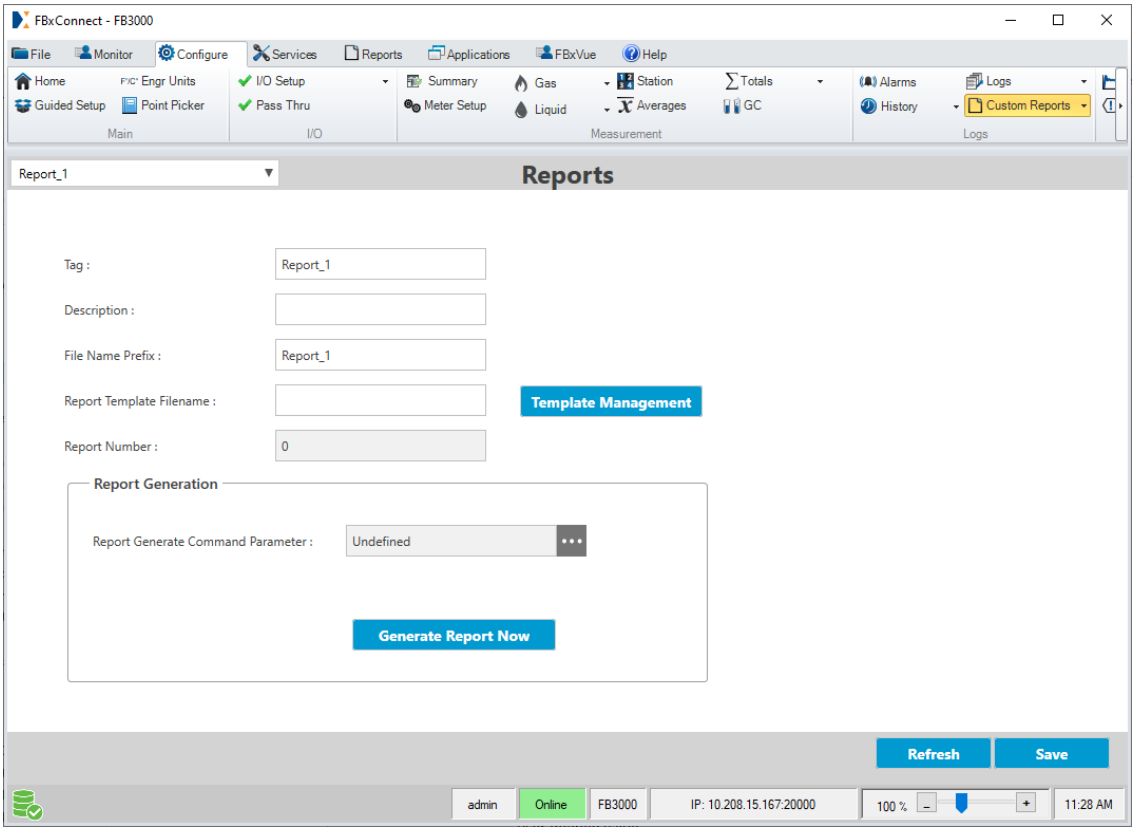
**Note**

- Emerson provides sample custom report templates with DeltaV FBxConnect configuration software. The default location for the custom report templates is: C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates.
- For information about creating your own template, refer to Creating a Custom Report Template.
- Templates stored in the FB Series product's flash memory are saved as part of your solution file when you Upload a Solution.

To access this display:

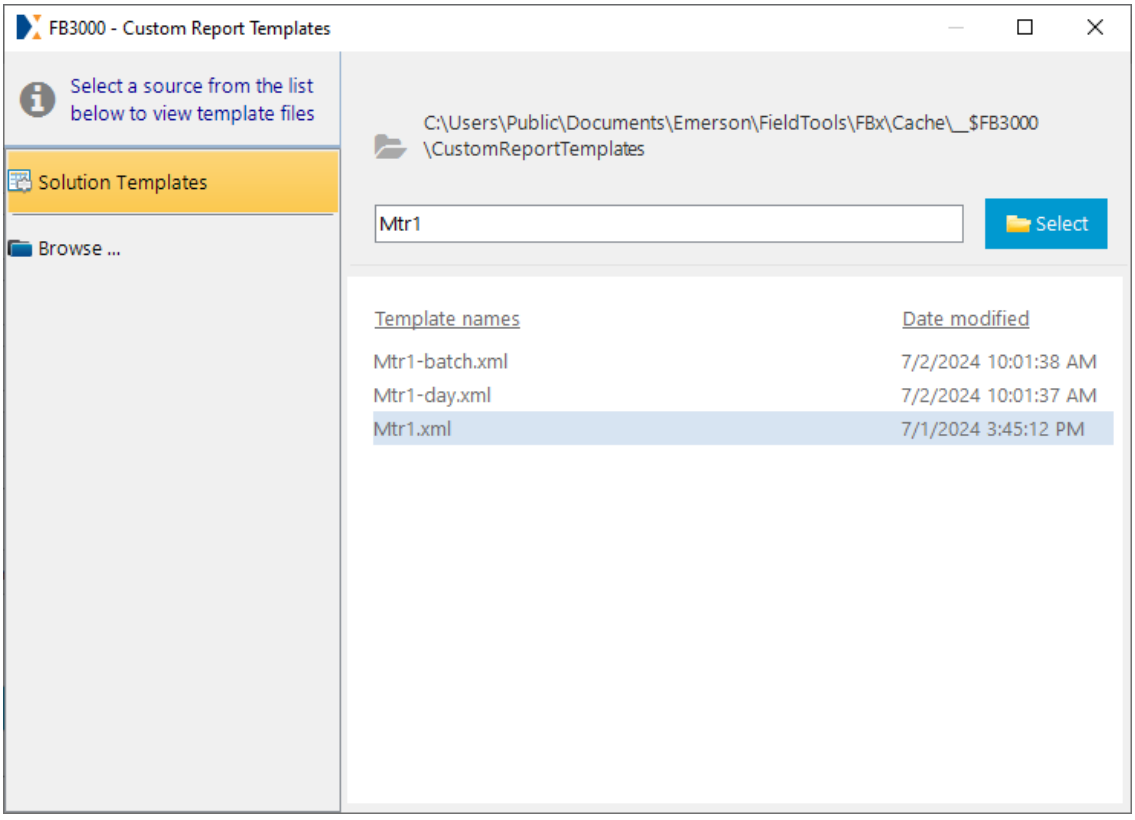
1. Select **Configure > Custom Reports > Reports** from the DeltaV FBxConnect configuration software main menu. The Reports display opens.

**Figure 295. Reports**




2. Select the **Template Management** button. The Custom Report Templates dialog opens.

**Figure 296. Custom Report Templates**




3. Select **Solution Templates** as the source on the left side of the dialog. A list of templates stored FB Series product's flash file system shows on the right side of the dialog.

4. Select a custom report template from the list and click **Select**. The dialog closes and the system shows the name of the template you selected in the **Report Template Filename** field.

**Note**

- To select a custom report template file saved on your PC, select **Browse** as the source on the left side of the dialog to open a File Explorer window. Navigate to the location of the template on your PC, select the custom report template file, and select **Open**.
- Once the file has been transferred to the FB Series product, the checksum of the template is calculated (Report_x.TEMPLATE_CHECK parameter). The checksum is automatically generated from the structure of the template file and can be used for revision control. If it is not possible to calculate the checksum, a value of 0 is displayed. The checksum is **not** calculated when DeltaV FBxConnect configuration

software is operating offline. The TEMPLATE_CHECK parameter is periodically verified to confirm that there are no unexpected changes to the template file. If a change occurs, an unexpected change event is recorded in the event log.

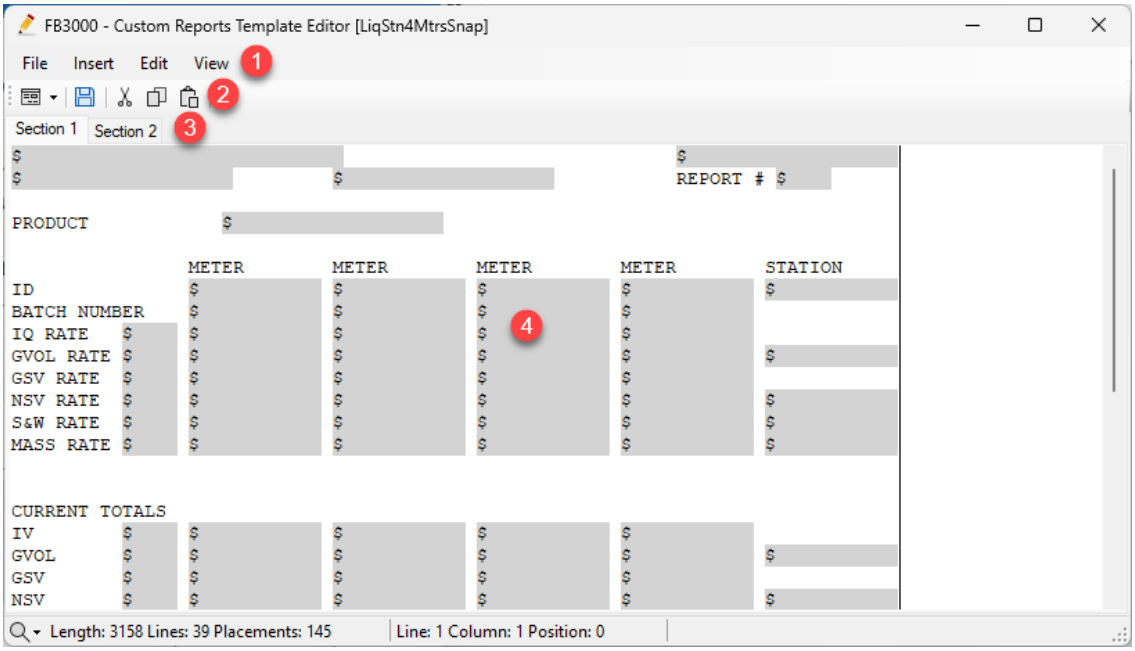
- To delete a template stored on the device, right-click on the template name to reveal the option to delete the template.
- To edit a template stored on the device, right-click on the template name to reveal the option to edit the template.
- To export a template stored on the device, right-click on the template name to reveal the option to export the template to the PC.

## 4.24.3 Template Editor

Use this option to launch the Custom Report Template Editor and create a custom report template that determines the layout and content of your report.

To launch the Custom Report Template Editor, select **Configure > Custom Reports > Template Editor** from the DeltaV FBxConnect configuration software main menu. The Custom Report Template Editor opens.

**Figure 297. Custom Report Template Editor**




The user interface of the Custom Report Template Editor consists of the following:

| Field | Description |
|---|---|
| 1 | **Menu Bar** – Use the Menu Bar to access options that allow you customize, save, and print your report. For more information, refer to Template Editor – Menu Bar. |
| 2 | **Toolbar** – Use these icons to control the reports printed size, placement of items on the report, the number of report sections, and use the save/copy/cut/paste tools when creating your report template. For more information, refer to Template Editor – Toolbar. |
| 3 | **Section Tabs** – Each section tab represents a unique portion of the report template. A single report template can consist of multiple sections. |
| 4 | **Section Editor** – Enter text and placements (data from the FB Series product's internal database) in the section editor to customize the data shown in each section of the generated report. |

#### 4.24.3.1 Template Editor Basics

The Template Editor allows you to easily create a custom report template without having to create your own XML file. You can simply add the text and the data from the FB Series product's internal database that you want to appear on the generated report using the Template Editor, and the system creates a valid XML file with the tags and metadata required to generate the report. Successfully creating a report template requires an understanding of the elements of a report template and the features provided by the Template Editor. A report template consists of three elements that you can customize based on the information you want to show on the report: a template, sections, and placements.

**Note**

You can access the Custom Report Template Editor through the DeltaV FBxConnect main menu by selecting **Configure > Custom Reports > Template Editor** or by selecting the **Edit Template** button on the Reports display. If you access the Custom Report Template Editor through the DeltaV FBxConnect main menu, then you are creating or modifying a custom report template file located on your PC. You then need to download the modified custom report template file to the FB Series product using the Reports display. If you access the Custom Report Template Editor through the **Edit Template** button, then you are modifying a custom report template file located on the FB Series product. Any modifications are downloaded to the FB Series product when you save your changes.

DeltaV FBxConnect ships with multiple default report templates for daily, batch, and snapshot reports. These default report templates are located in the following folder on your PC:
`C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates`

## Template

A template is used by the system to generate a custom report. You can make a custom report template specific to a single FB Series product, or you can create a custom report template that is used by multiple FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. You can track the different variations of your report template by assigning a unique version to a template and specify the default values that the system uses when adding new data placements to the report template. For more information, refer to Template Editor – Report Template Properties.

## Section

Sections allow you to group data together on the report and contain the lines of text and data references (placements) you want to appear on the generated report. A template contains one of more sections, and each section appears as a separate tab in the Template Editor. Each line in a section is 80 characters long. You can add new lines, text, and data references (placements) directly to a section using the Template Editor. You can customize the names of each section, the section order on the generated report, and the symbols used for unavailable data in each section. For more information, refer to Template Editor – Report Section Properties.

## Placement

Placements are references to data in the FB Series product's internal database. You add placements to sections of your report template, and those placements are replaced with data from the FB Series product's internal database on the generated report. When adding a placement to the report template, you can configure a specific parameter in the FB Series product's database (OPI) or use a generalized reference to the desired data (Map ID and Meter ID) to have the system automatically locate the data in the FB Series product database without specifying a specific parameter. You can configure the type of data and the presentation of the data on you generated report.

There are several ways to add a Placement to a Section. You can select **Insert > Placement** from the Template Editor menu bar, right-click the section editor and select **Insert Placement**, or simply type the delimiter symbol (**$**) directly in the section editor to add a placement at the current cursor location. You can select the width of the data placement on the generated report. If a placement is not wide enough for the data, a

hash mark (#) is used on the generated report instead. For more information, refer to Template Editor – Placement Properties.

You can configure a Placement to reference data using either an OPI or a Map ID and Meter ID.

**Note**

You can also pick REPORT_DESC, REPORT_NAME or REPORT_NUM in the **Type** field on the Template Editor – Placement Properties window to reference the report description, report name, or report number. In these cases, the OPI and Map ID fields are **not** used.

**OPI**

An OPI is a reference to a specific object, parameter, and instance in the FB Series product. You use the Point Picker just like you would for configuring meter inputs on a regular DeltaV FBxConnect configuration display. OPIs are device specific, and different FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU can have different OPIs depending on the configuration.

**Map ID and Meter ID**

Map IDs and Meter IDs are a way to reference data without specifying a specific OPI.

When configuring a Map ID, you select a Map ID (for example, Meter Tag Name) and the system automatically locates the correct data is the FB Series product's database without having to configure a specific OPI. For a list of Map IDs and the equivalent FB Series product parameters for gas differential pressure meters, gas linear meters, and liquid linear meters, refer to Template Editor – Map ID Descriptions.

The Meter ID works in a similar way to the Map ID. When configuring a Meter ID, you select a meter's position in a station (for example, the second meter in the station) and the system automatically locates the correct meter. This method of referencing data is particularly useful for creating report templates that can be shared between multiple stations and multiple meters with different configurations.

To allow a report template to be shared across different meters, the Meter ID should **not** be specified; in this case the Meter ID defaults to the meter directly referenced by the **Report Generate Command Parameter** (see Reports). If the Report Generate Command Parameter references a station parameter, the meter ID defaults to the first meter in the station.

## 4.24.3.2 Creating a Custom Report Template

Follow these steps to create a custom report template that generates a report containing only the data relevant to your operations. You can use the Template Editor to edit an existing report template or create a report template from scratch. The following steps show the creation of a simple report template and demonstrate how to add different elements to a report template. Repeat these steps to add additional data to create a more complex report.

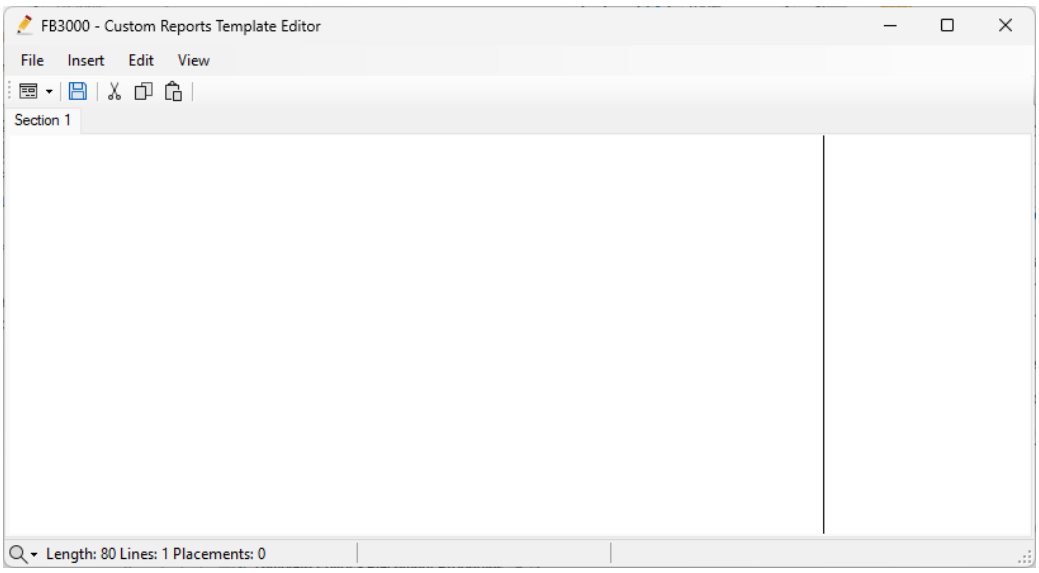
**Note**

- For an overview of the elements of a report template and the features provided by the Template Editor, refer to Template Editor Basics.
- To create a report template with the maximum amount of flexibility/reuse, data should be referenced via Map IDs and Meter IDs rather than OPIs.
- If you are reusing a report template on stations with differing numbers of meters, then it may be advisable to change the symbol used in the **Unavailable** field to a space on the Template Editor – Report Section Properties window.

To launch the Custom Report Template Editor:

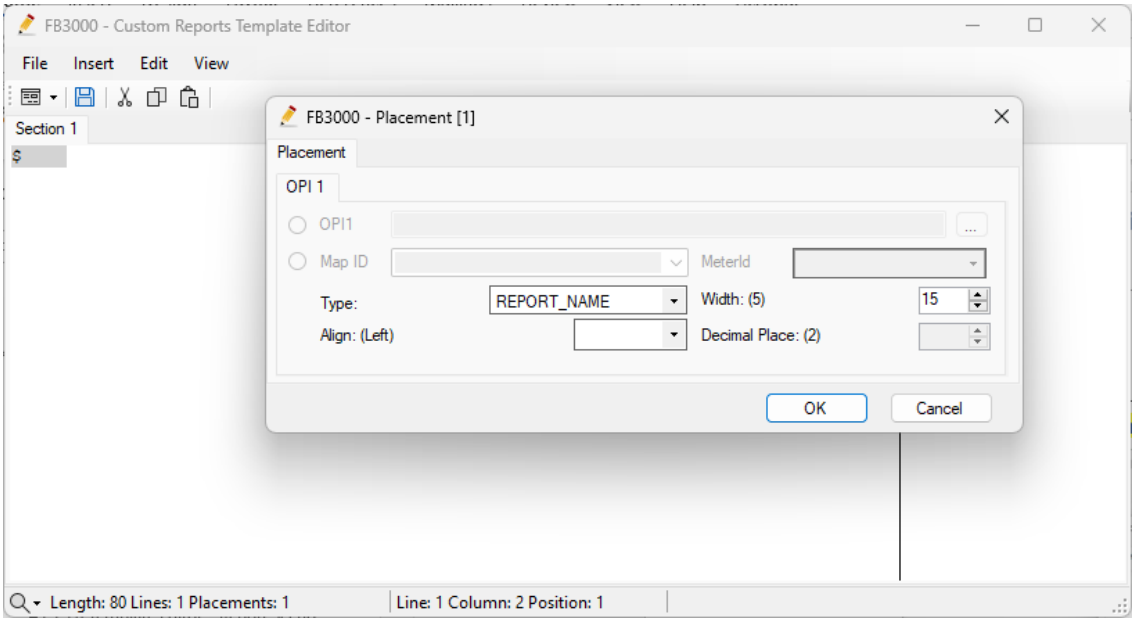
1. Select **Configure > Custom Reports > Template Editor** from the DeltaV FBxConnect configuration software main menu. The Custom Report Template Editor opens and shows a blank report template.

**Figure 298. Custom Report Template Editor**



2. Enter a dollar sign (**$)** in the first character of the first line to add a placement and open the Placement Properties window.

**Figure 299. Placement Properties – Report Name**




3. Click ▼ in the **Type** field and select **REPORT_NAME** from the drop-down list. This configures the generated report to show the text in the Tag field on the Reports display to be printed for the selected instance using the report template.

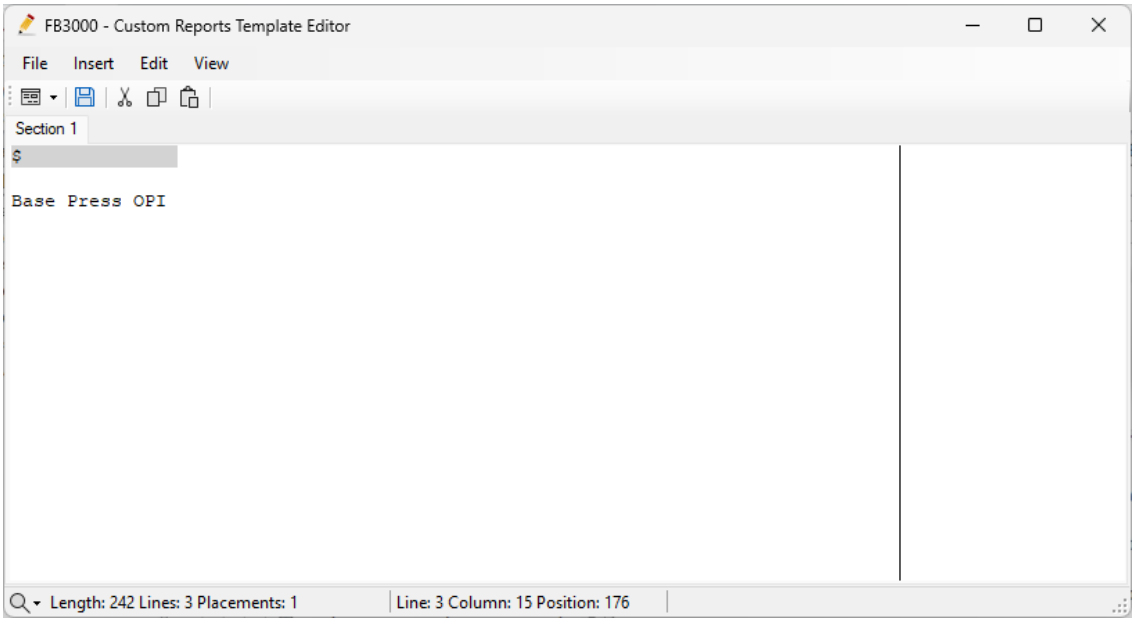
4. Enter **15** in with **Width** field. This sets the number of characters that are reserved on the generated report for showing the REPORT_NAME value.

5. Select **OK** to close the window and return to the Custom Report Editor.

6. Press the **Enter** key twice to insert two new lines.

7. Enter **Base Press OPI** on the third line. This text will print on the generated report.

**Figure 300. Base Press OPI Text**



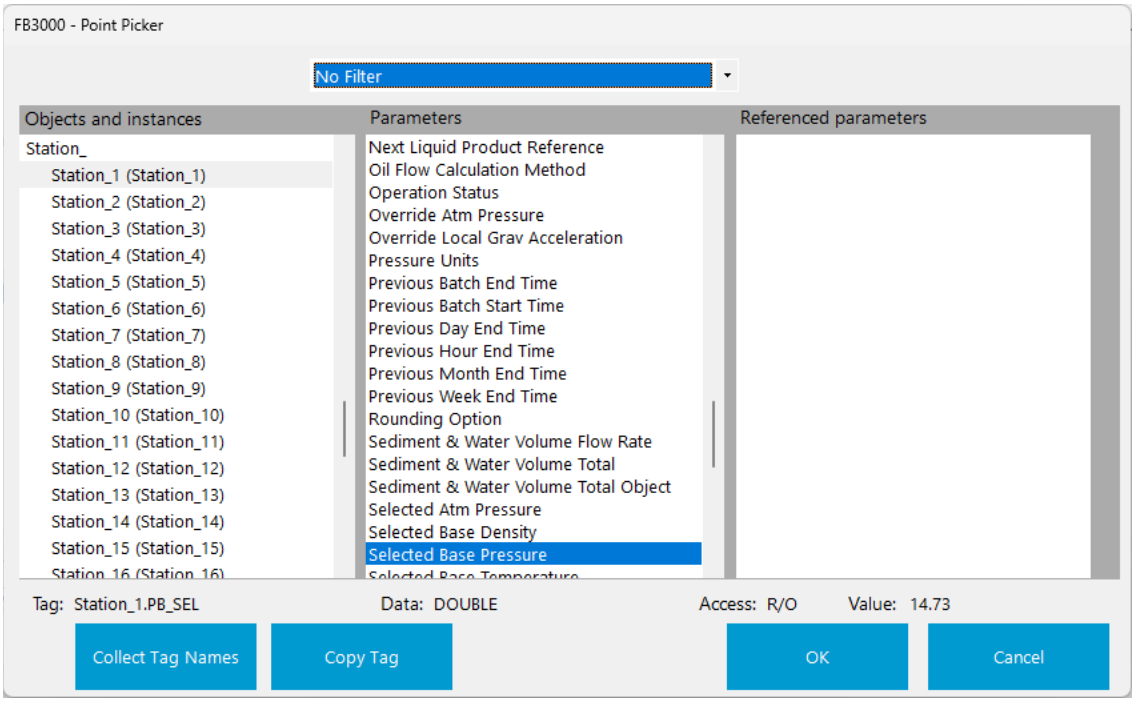

8. Arrow over five spaces and enter the dollar sign symbol (**$**). This gives you a five-character space after the text you entered in the previous step and inserts a new placement.

9. With the **OPI** radio button selected, select the browse button ( ... ). The Point Picker dialog opens.

**Note**

The OPI option adds a parameter directly from the FB Series product's internal database to the report template. Since the database parameters and configuration may be different between devices, a report template with this type of data placement is used for a single device. Parameters shown in this example may be different on your device.

**Figure 301. Point Picker**

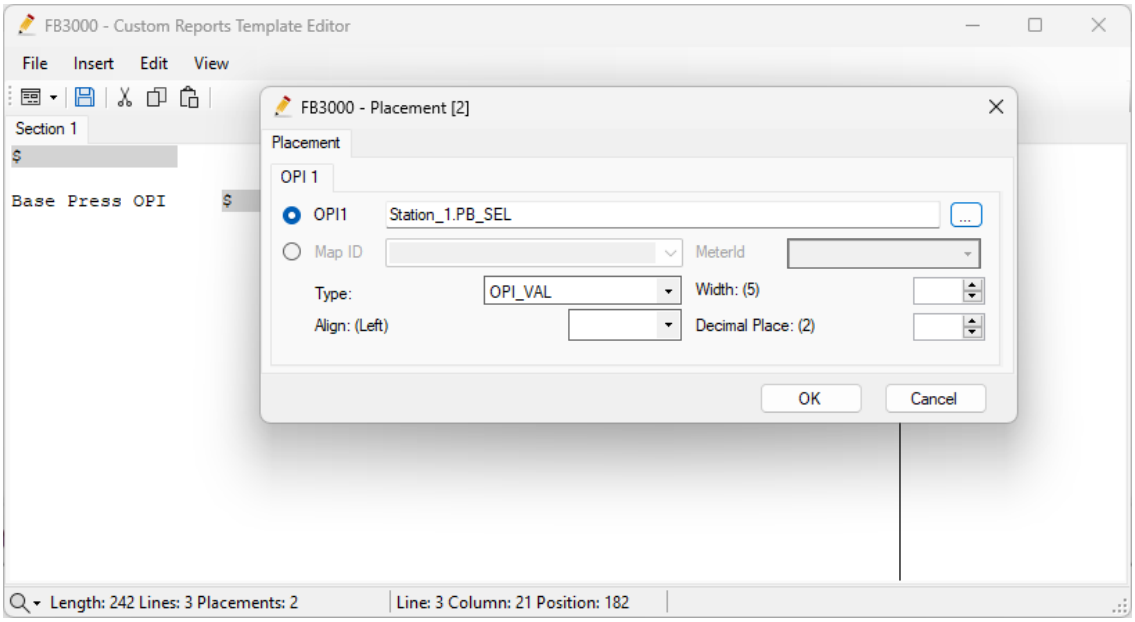



10. Select **Station_1** in the **Objects and instances** list.

11. Select **Selected Base Pressure** in the **Parameters** list.

12. Select **OK** to close the Point Picker.

**Figure 302. Placement Properties – OPI**




13. Click ▼ in the **Type** field and select **OPI_VAL**. This will print the value of the selected OPI on the generated report.
14. Enter **10** in the Width field. This sets the number of characters that are reserved on the generated report for showing the Selected Base Pressure value.
15. Click ▼ and select **Right** in the Align field. This right-aligns the value in the placement on the generated report.
16. Enter **4** in the Decimal Place field. This prints four digits after the decimal place on the generated report.
17. Select **OK** to close the Placement Properties window and return to the editor. A new placement is added to your report template.
18. Select **Insert > Section** to add a new section to the report template.

**Note**

Sections are a way to group information on your report. For simplicity and an introduction to the concept of sections, this example shows only a single placement in each section. Normally you would continue to add multiple placements to a single section, and multiple sections are completely optional.

19. Select the **Section 2** tab to start editing the new section.

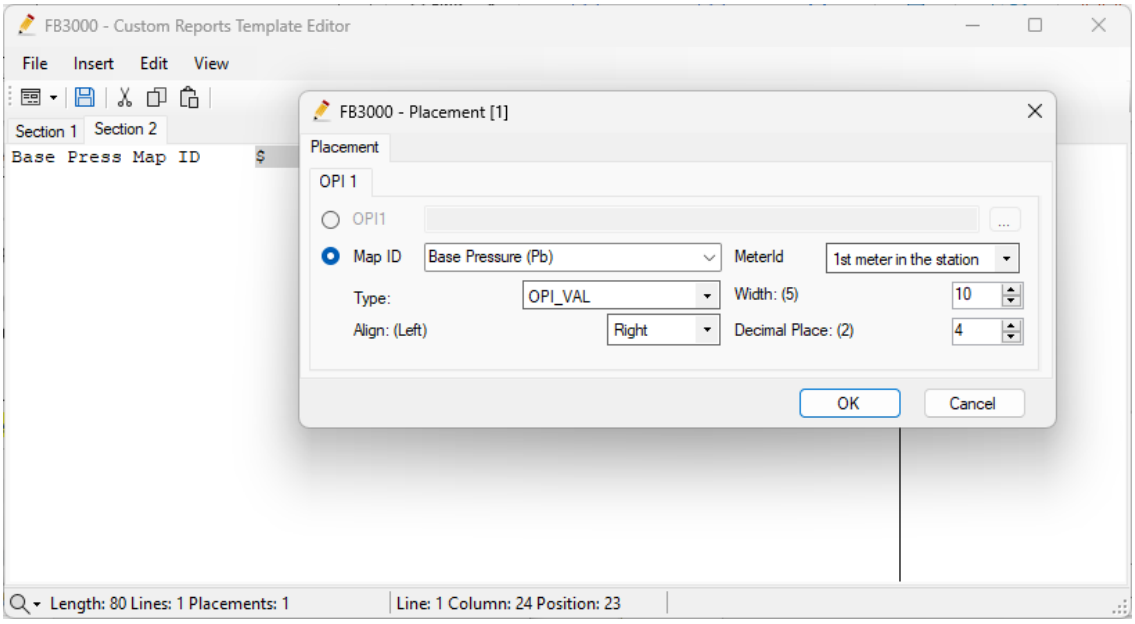
**Figure 303. Report Template – Section 2**




20. Enter **Base Press Map ID** on the first character of the first line. This text will print on the generated report.

21. Arrow over five spaces and enter a dollar sign symbol (**$**). This gives you a five-character space after the text you entered in the previous step and inserts a new placement.

**Figure 304. Placement Properties – Map ID**



22. Select the **Map ID** radio button.

**Note**

The Map ID option adds an abstracted parameter reference to the report template and the system automatically locates the correct parameter in the FB Series product's internal database. Since you are not configuring a specific parameter and instead configuring an abstracted reference, a report template with this type of data placement can be used for multiple devices.

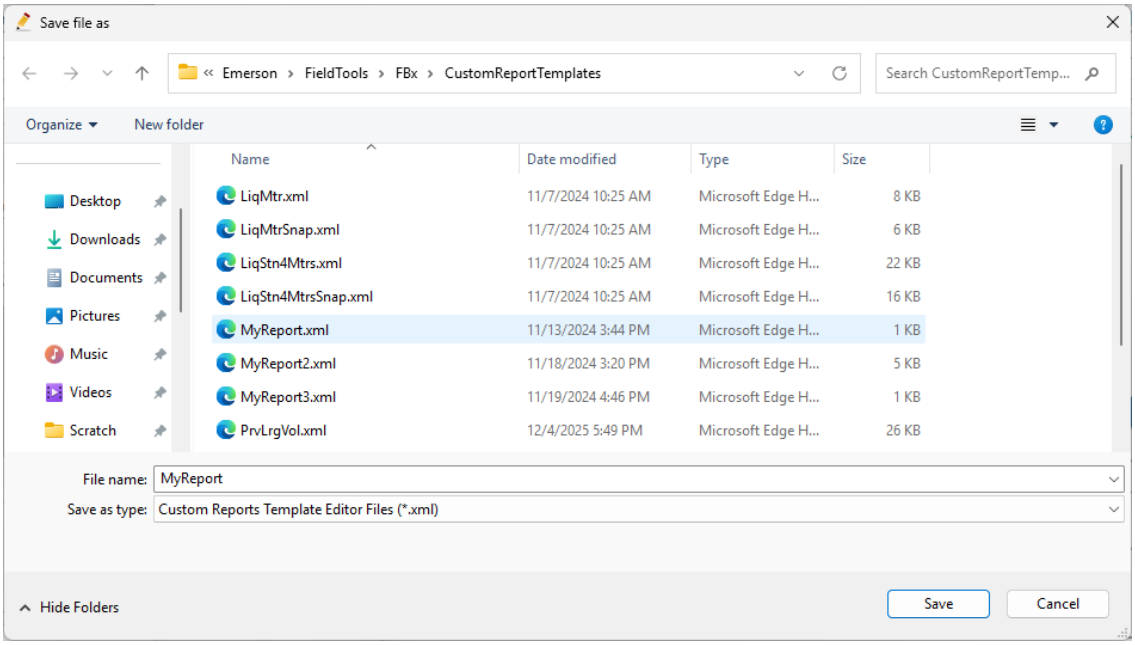
23. Click ▼ in the **Map ID** field and select **Base Pressure (Pb)**.

**Note**

This adds the same parameter as you selected using the Point Picker in the previous steps. For a list of Map IDs and the equivalent FB Series product parameters for gas differential pressure meters, gas linear meters, and liquid linear meters, refer to Template Editor – Map ID Descriptions.

24. Click ▼ in the **Meter ID** field and select **1st meter in the station**.
25. Click ▼ in the **Type** field and select **OPI_VAL**. This will print the value of the selected Map ID on the generated report.
26. Enter **10** in the **Width** field. This sets the number of characters that are reserved on the generated report for showing the Selected Base Pressure value.
27. Click ▼ and select **Right** in the Align field. This right-aligns the value in the placement on the generated report.
28. Enter **4** in the Decimal Place field. This prints four digits after the decimal place on the generated report.
29. Select **OK** to close the Placement Properties window and return to the editor.
30. Select **File > Save As** to save your report template to your PC. A **Save file as** dialog opens.

**Figure 305. Save file as**




**31.** Type a unique name into the File name field and select **Save**.

**Note**

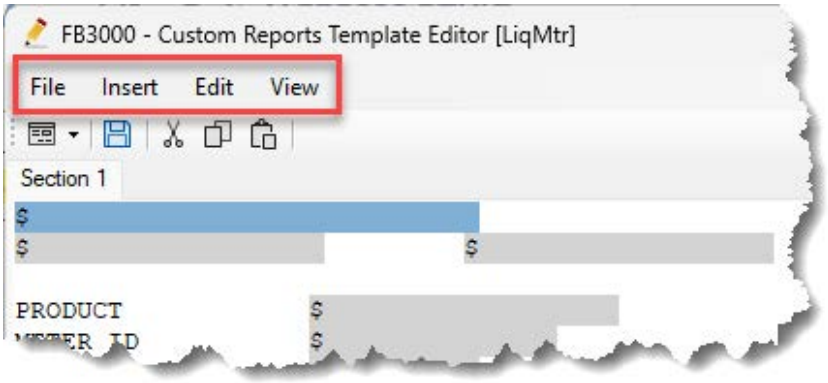
The file name **cannot** contain any spaces or special characters.

You have now created your own report template. You can continue to add multiple sections and parameters to your report template. When you have completed building your report template and are ready to print a report, refer to Generating Custom Reports.

### 4.24.3.3 Template Editor – Menu Bar

Use the Menu Bar to access tools that allow you to customize your report template.

**Figure 306. Custom Report Template Editor – Menu Bar**




| Menu | Description | |
|---|---|---|
| **File** | Use these options to create a new report template, open an existing report template or save the currently opened report template. | |
| | **New** | Opens a blank template. |
| | **Open** | Opens an existing template. Templates can be saved as individual files or as part of a solution file. The default templates are located in the following folder: `C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates` |
| | **Open in Windows** | Opens the current template in Windows using your choice of XML editor.<br>**Note**<br>The custom report template **must** already have a file name (either saved by you or a pre-existing template) to use this feature. |
| | **Save to Device** | Saves the report template file to memory on your FB Series product. |
| | **Save As** | Opens the Save As dialog which allows you to enter a unique file name and specify a location on your PC to save the report template file.<br>**Note**<br>The file name cannot contain any spaces or special characters. |

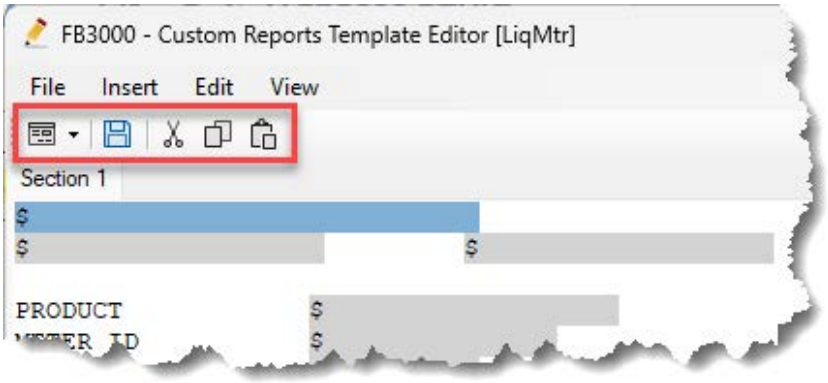
| Menu | Description | |
|---|---|---|
| | **Print** | Opens the Print dialog which allows you to print the currently opened report template. |
| | **Exit** | Closes the Custom Report Template Editor. |
| **Insert** | Use these options to customize the data that is shown on your report. | |
| | **Placement** | Inserts a data placement at the current cursor location.<br>**Note**<br>You can also right-click the report template and select **Insert Placement** to perform this task. |
| | **Line** | Inserts a new line below the current cursor location.<br>**Note**<br>You can also right-click the report template and select **Insert Line** to perform this task. |
| | **Section** | Adds a new section tab before the currently selected section tab. To customize the order, name, and add or remove a section, refer to Template Editor – Report Section Properties. |
| **Edit** | Use these options to modify the text and placements on your report template. | |
| | **Cut** | Cut the information currently selected in your report template and place it on the clipboard. |
| | **Copy** | Copy the information currently selected in your report template to the clipboard. |
| | **Paste** | Paste the information from the clipboard that you previously cut or copied. |
| | **Refresh** | Reloads the last saved copy of the current report template. |
| | **Select All** | Selects all information on the report template. |
| **View** | Use these options to view various properties and adjust the viewing size of the report template. | |
| | **Template Info** | Opens the Report Template Properties window. For more information, refer to Template Editor – Report Template Properties. |

| Menu | Description | |
|---|---|---|
| | **Section Info** | Opens the Report Section Properties window. For more information, refer to Template Editor – Report Section Properties. |
| | **Placement Info** | Opens the Placement Properties window. For more information, refer to Template Editor – Placement Properties. |
| | **Zoom In** | Increase the viewing size of the report template in the Custom Report Template Editor window.<br>**Note**<br>You can also use **ctrl + mouse wheel** to control the zoom. |
| | **Zoom Default** | Restore the default viewing size of the report template in the Custom Report Template Editor window. |

### 4.24.3.4 Template Editor – Toolbar

Use the toolbar icons as shortcuts to commonly used features in the Custom Report Template Editor window.

**Figure 307. Custom Report Template Editor – Toolbar**




| Field | Description |
|---|---|
| **Placement** ( ▾) | Opens the Placement Properties window when your cursor is located in an existing placement. You can also click ▼ and select one of the options below: |

| Field | Description | |
|---|---|---|
| | **Template & Defaults** | Opens the Report Template Properties window which allows you to update the version number of the template and modify the default values the system uses when adding new placements to the currently opened report template. For more information, refer to Template Editor – Report Template Properties. |
| | **Sections** | Opens the Report Section Properties window which allows you to add, remove, and customize the sections in your report template. For more information, refer to Template Editor – Report Section Properties. |
| **Save** ( ) | Saves the currently opened report template to a file on your PC.<br>**Note**<br>• If the current template **does not** have a file name, selecting this option opens the Save As dialog.<br>• If you access the Custom Report Template Editor from the **Edit Template** button on the Custom Reports – Reports display, this option downloads the report to the FB Series product and saves the template to the FB Series product's flash memory. | |
| **Cut** ( ) | Cut the information currently selected in your report template and place it on the clipboard. | |
| **Copy** ( ) | Copy the information currently selected in your report template to the clipboard. | |
| **Paste** ( ) | Paste the information from the clipboard that you previously cut or copied. | |

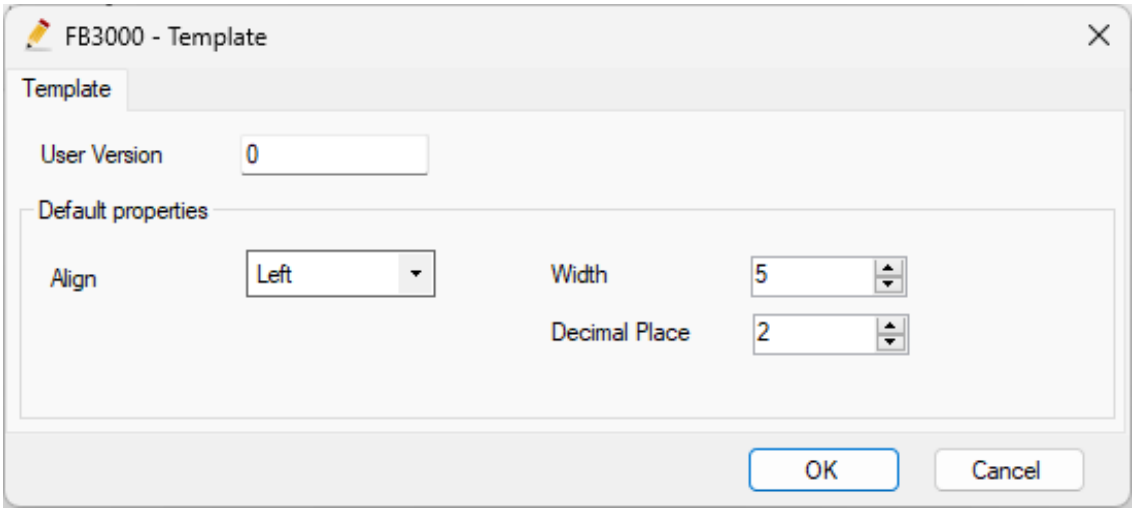
## 4.24.3.5 Template Editor – Report Template Properties

Use the Report Template Properties pop-up window to update the version number of the template and modify the default values the system uses when adding new placements to the currently opened report template.

To open the Report Template Properties pop-up window:

1. Either select **View > Template Info** from the Template Editor Menu Bar or select the **Placement** icon ( ) and select **Template & Defaults**. The Report Template Properties pop-up window opens.

**Figure 308. Report Template Properties**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **User Version** | Enter a unique number for this version of the report template. | |
| **Default Properties** | Use these fields to specify the default values when adding placements to the template.<br>**Note**<br>These are just the defaults. You can customize these values later when adding each placement to your report template. | |
| | **Align** | Click ▼ and select the alignment of data shown in the placement on the generated report. Possible options are Left and Right. |
| | **Width** | Sets the number of characters on the report for the placement value. Valid values are 0 – 80. The default is **5**.<br>**Note**<br>If the placement value is longer than the value set in the Width field, then the pound sign (#) is shown on the generated report and indicates that the width is insufficient to display the value. Enter a larger value in the Width field to avoid data loss. |

| Field | Description | |
|---|---|---|
| | **Decimal Place** | Sets the number of digits that should print after decimal on the generated report. Valid values are 0 – 80. The default is **2**. |

3. Select **OK** to save any changes you make to this window.

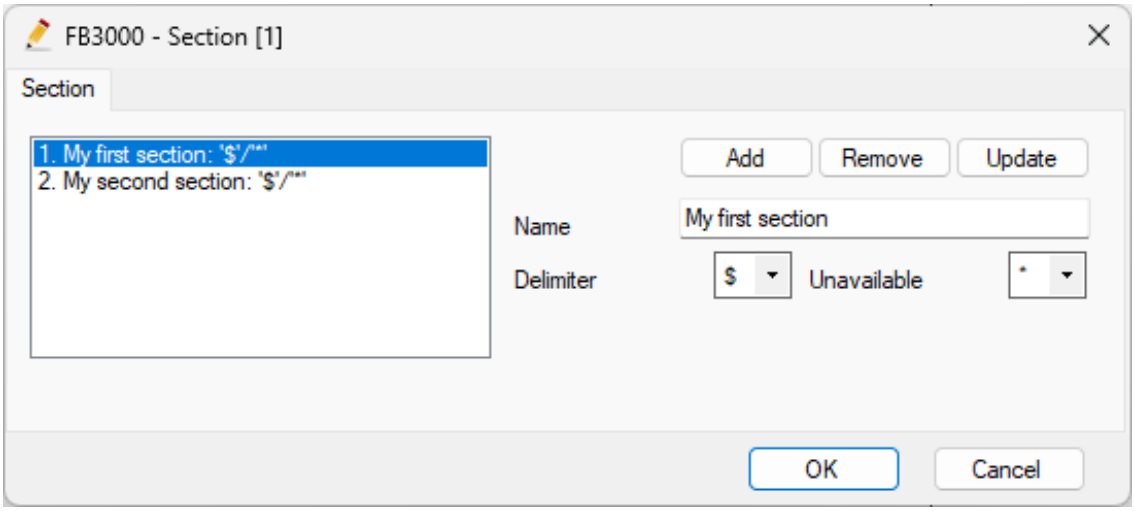
### 4.24.3.6 Template Editor – Report Section Properties

Use the Report Section Properties pop-up window to add, remove, and customize the sections in your report template. You can modify the name, order, delimiter symbol, and unavailble data symbol used for each section.

To open the Report Section Properties pop-up window:

1. Either select **View > Section Info** from the Template Editor Menu Bar or select the **Placement** icon ( ) and select **Sections**. The Report Section Properties pop-up window opens.

**Figure 309. Report Section Properties**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Sections List** | Shows a list of the sections in the report template. Each row consists of the current section position, name, delimiter symbol, and unavailable symbol. Use the up and down arrows to reorder the sections in your report template. |

| Field | Description |
|---|---|
| **Add** | Creates a new section at the end of the current sections. |
| **Remove** | Deletes the currently selected section from the report template. |
| **Update** | Saves any modifications you have made to the selected sections name, delimiter symbol, or unavailable symbol. |
| **Name** | Enter a unique name for the currently selected section.<br>**Note**<br>You **must** select **Update** before selecting a different section from the section list to save your changes. |
| **Delimiter** | Click ▼ to select a symbol to use as a delimiter for the currently selected section. A delimiter is used to indicate the placement of data when designing your report template. Possible options are currently limited to **$**.<br>**Note**<br>You **must** select **Update** before selecting a different section from the section list to save your changes. |
| **Unavailable** | Click ▼ to select a symbol to use when report data is unavailable from the FB Series product. This symbol will appear if a data placement is included in the report template, but the requested data is not in the FB Series product's database. For example, if the report template includes a placement for a liquid meter tag but your FB Series product does not contain a liquid meter, then this symbol will appear on the custom report. Valid options are ***** or **blank** ( ).<br>**Note**<br>You **must** select **Update** before selecting a different section from the section list to save your changes. |

3. Select **OK** to save any changes you make to this window.

## 4.24.3.7 Template Editor – Placement Properties

The Placement Properties window allows you to specify the data show on the generated report.

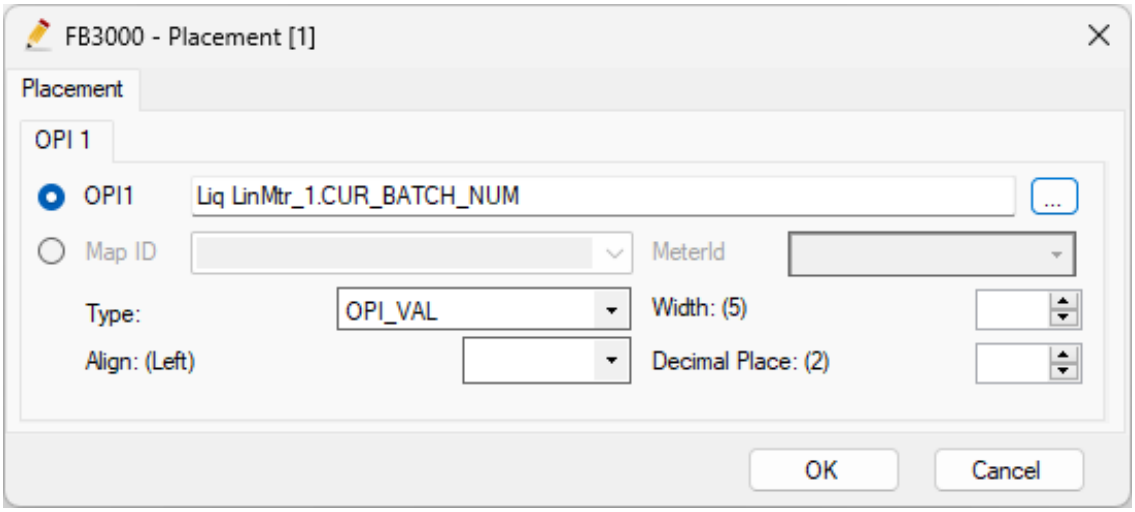
To open the Placement Properties window:

1. **For a new placement**, either select **Insert > Placement** from the DeltaV FBxConnect configuration software main menu or type the delimiter symbol (**$**) to insert a new

data placement at the current cursor location and a Placement Properties windows open for the new placement.

**For an existing placement**, either select **View > Placement Info** when your cursor is in an existing placement, select the Placement icon ( ) when your cursor is in an existing placement, or double-click a placement in the Template Editor to open the Placement Properties window for an existing placement.

**Figure 310. Placement Properties**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **OPI** | Select this radio button and select browse ( ) to open the Point Picker dialog and choose a parameter from the FB Series product internal database to show on the report.<br>**Note**<br>• This field is unavailable if you select the **Map ID radio** button.<br>• This field is unavailable if you select **REPORT_NAME**, **REPORT_DESC**, or **REPORT_NUM** in the **Type** field. |

| Field | Description |
|---|---|
| **Map ID** | Select this radio button and click ▼ to select a generalized reference (Map ID) to show on the report. When the report is generated, the system automatically locates the correct data in the FB Series product database based on the selected Map ID without the need to configure a specific OPI. For more information, refer to Template Editor Basics.<br>**Note**<br>• This field is unavailable if you select the **OPI** radio button.<br>• This field is unavailable if you select **REPORT_NAME**, **REPORT_DESC**, or **REPORT_NUM** in the **Type** field.<br>• You can search the drop-down list by typing in a keyword in Map ID field to narrow the possible options to Map IDs containing the entered text.<br>• For a list of possible Map IDs and their associated parameters in the FB Series product, refer to Template Editor – Map ID Descriptions. |
| **Meter ID** | Click ▼ and select which meter in the station contains the data configured in the **Map ID** field. When the report is generated, the system automatically locates the correct data in the FB Series product database based on the selected Meter ID without the need to configure a specific OPI. Possible options are **Undefined** and **1st meter in the station** through **36th meter in the station**.<br>**Note**<br>• This field is unavailable if you select the **OPI** radio button.<br>• This field is unavailable if you select **REPORT_NAME**, **REPORT_DESC**, or **REPORT_NUM** in the **Type** field. |

| Field | Description |
|---|---|
| **Type** | Click ▼ and select the type of data to show on the generated report. Possible values are OPI_VAL, OPI_UNIT, OPI_ENUM_SHORT, OPI_TIME, OPI_DATE, REPORT_DESC, REPORT_NAME, and REPORT_NUM.<br>• **OPI_VAL** is used to show a value of a parameter of type FLOAT, DOUBLE, INT8/16/32/64, UINT8/16/32/64, ENUM16, UC10/20/30/40, TIME, BIN8/16/32. Types BINARY, BYTEARRAY4/6/32, MEMREF, OBJREF, PRMREF, UDT are not supported. TIME values are displayed as the date followed by the time according to the configured localization format (refer to Localization).<br>• **OPI_UNIT** is used to show the engineering unit (if any) associated with the OPI or Map ID parameter.<br>• **OPI_ENUM_SHORT** is used to show the enumerated string (if any) associated with the OPI or Map ID parameter. For example, Liq Prod_x.LIQ_TYPE.<br>• **OPI_TIME** is used to show only the hour, minute, and seconds for an OPI / Map ID value that is a 'time' type. The value is shown according to the configured localization format (refer to Localization).<br>• **OPI_DATE** is used to show only the day, month, and year for an OPI / Map ID value that is a 'time' type. The value is shown according to the configured localization format (refer to Localization).<br>• **REPORT_DESC** is used to show the Report Description for the report you are editing.<br>• **REPORT_NAME** is used to show the Report Name for the report you are editing.<br>• **REPORT_NUM** is used to show the Report Number for the report you are editing. |
| **Align** | Click ▼ and select the alignment of data shown in the placement on the generated report. Possible options are Left and Right.<br>**Note**<br>If you do **not** specify a value, the system uses the default value (shown in parentheses) configured on the Template Editor – Report Template Properties window. |

| Field | Description |
|---|---|
| **Width** | Sets the number of characters on the report for the placement value. Valid values are 0 – 80. The default is **5**.<br>**Note**<br>If you do **not** specify a value, the system uses the default value (shown in parentheses) configured on the Template Editor – Report Template Properties window.<br>If the placement value is longer than the value set in the Width field, then the pound sign (#) is shown on the generated report and indicates that the width is insufficient to display the value. Enter a larger value in the Width field to avoid data loss. |
| **Decimal** | Sets the number of digits that should print after decimal on the generated report. Valid values are 0 – 80. The default is **2**.<br>**Note**<br>If you do **not** specify a value, the system uses the default value (shown in parentheses) configured on the Template Editor – Report Template Properties window. |

3. Select **OK** to save any changes you make to this display.

## 4.24.4 Printers

Use this display to configure a network or serial printer used for custom reports.

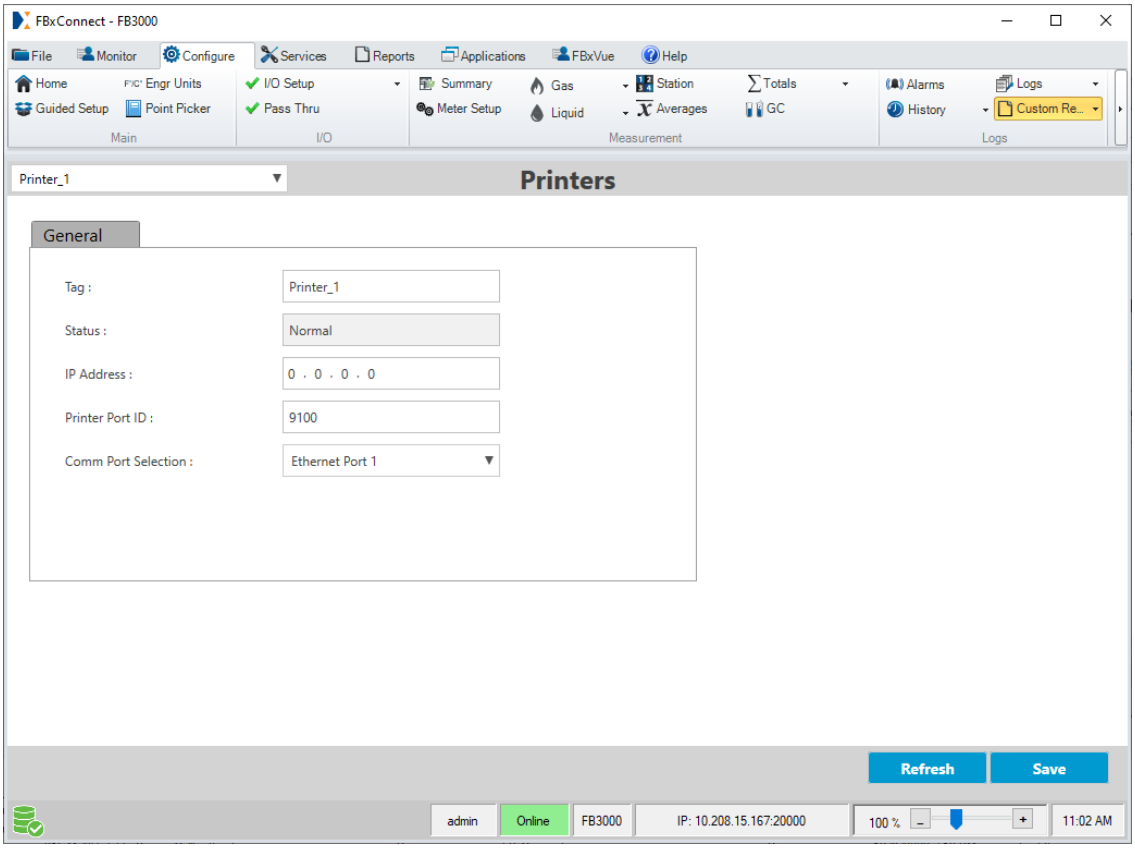
**Note**

- You must configure at least one printer in the Number of Printers field on the Report and Printer Setup display before you can access this display.
- Network printer support is provided using Raw TCP/IP Printing (Port 9100).
- Serial printer support without handshaking is supported via the main CPU personality module **only**.
- Both serial and network printers provide support for ASCII characters **only** and a limited subset of UTF-8 characters. Unsupported characters are printed as a blank space.
- An event is **not** logged if a report does **not** print.

To access this display:

1. Select **Configure > Custom Reports > Printers** from the DeltaV FBxConnect configuration software main menu.

**Figure 311. Printers**




2. Click ▼ in the drop-down list at the top of the display to select a Printers instance to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected printer. |
| **Status** | This **read-only** field indicates the overall health of the selected printer. The status indicates *Link error* in the event of a printer communication problem. |

| Field | Description |
|---|---|
| **IP Address** | Enter the IP Address of the selected printer.<br>**Note**<br>This field shows **only** if you select either **Ethernet Port 1** or **Ethernet Port 2** in the Comm Port Selection field and save your changes. |
| **Printer Port ID** | Enter the TCP/IP port of the selected printer.<br>**Note**<br>This field shows **only** if you select either **Ethernet Port 1** or **Ethernet Port 2** in the Comm Port Selection field and save your changes. |
| **Comm Port Selection** | Click ▼ to select an Ethernet or serial communications port on the FB Series product that is used to send data to the connected printer. |

#### 4.24.4.1 Printer Alarms/Errors

If the configured printer is offline (misconfigured IP Address, printer power is off, etc.), then the system writes a Set Alarm record to the alarm log. When the printer comes back online, then the system writes a Clear Alarm record to the alarm log.

**Figure 312. Printer Alarms**

| Sequence No | Date | Time | Type | Sub-Type | Parameter | Set/Clear | Value | Units | Description |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 14-Jun-2024 | 18:00:45 | Application | Printer Link | | Set | | | Printer_1 |
| 2 | 14-Jun-2024 | 17:53:36 | Application | Printer Link | | Clear | | | Printer_1 |
| 1 | 14-Jun-2024 | 17:22:20 | Application | Printer Link | | Set | | | Printer_1 |
| | | | | | | | | | |

If you try to print a custom report and the configured printer is offline, the report is stored in a queue. The printer queue can store a maximum of 200 print commands. If you exceed this limit, then the system logs a printer queue alarm in the alarm log.

**Note**

In the event of a power fail, unprinted reports are **not** automatically printed.

### 4.24.5 Generating Custom Reports

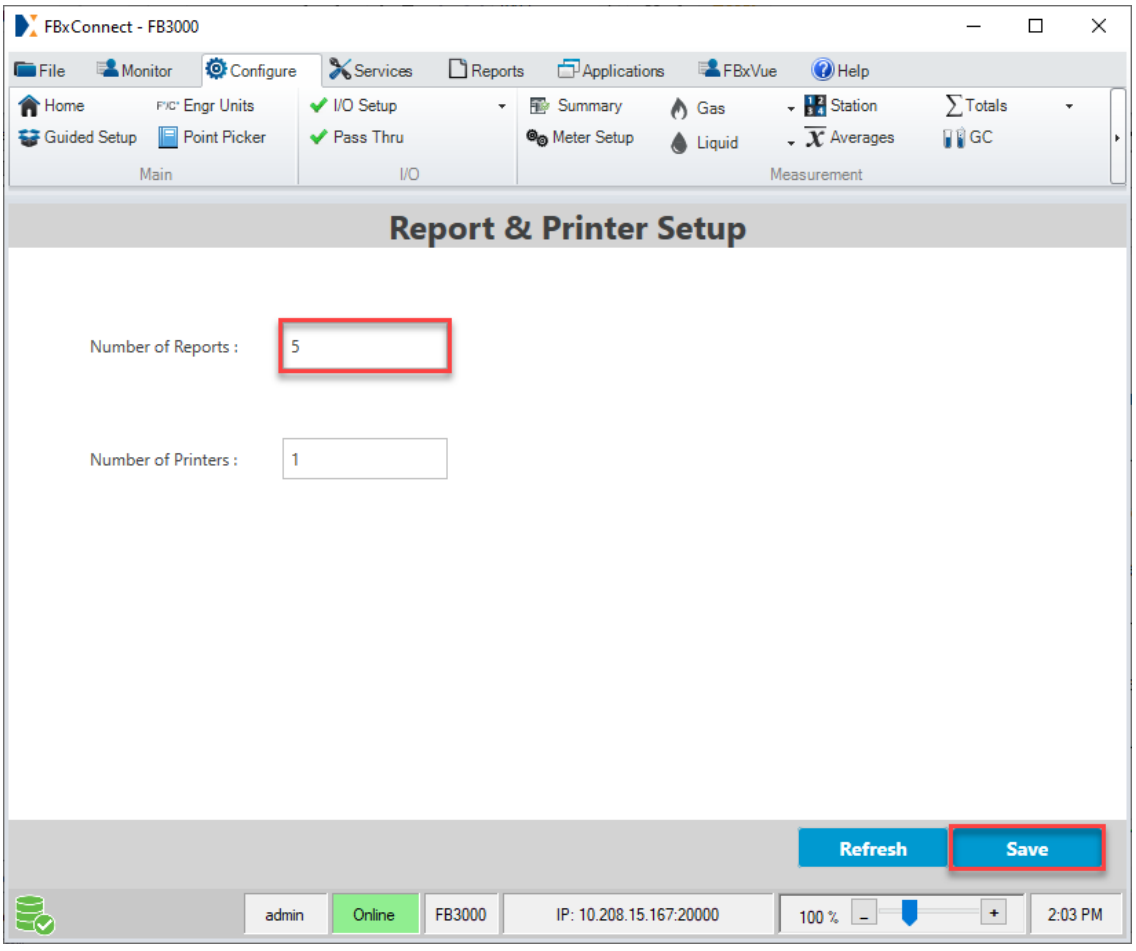
To generate a custom report:

**Note**

- To generate a custom report, you must have FB Series product firmware version 2.17 or later and DeltaV FBxConnect Launchpad version 3.17 or later.
- You must import a custom report template before you can generate a custom report. Emerson provides sample custom report templates with DeltaV FBxConnect configuration software. The default location for the custom report templates is: C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates.
- For information about creating your own template, refer to Creating a Custom Report Template.

1. Select **Configure > Custom Reports > Report and Printer Setup** from the DeltaV FBxConnect configuration software main menu. The Report and Printer Setup display opens.

**Figure 313. Report and Printer Setup**

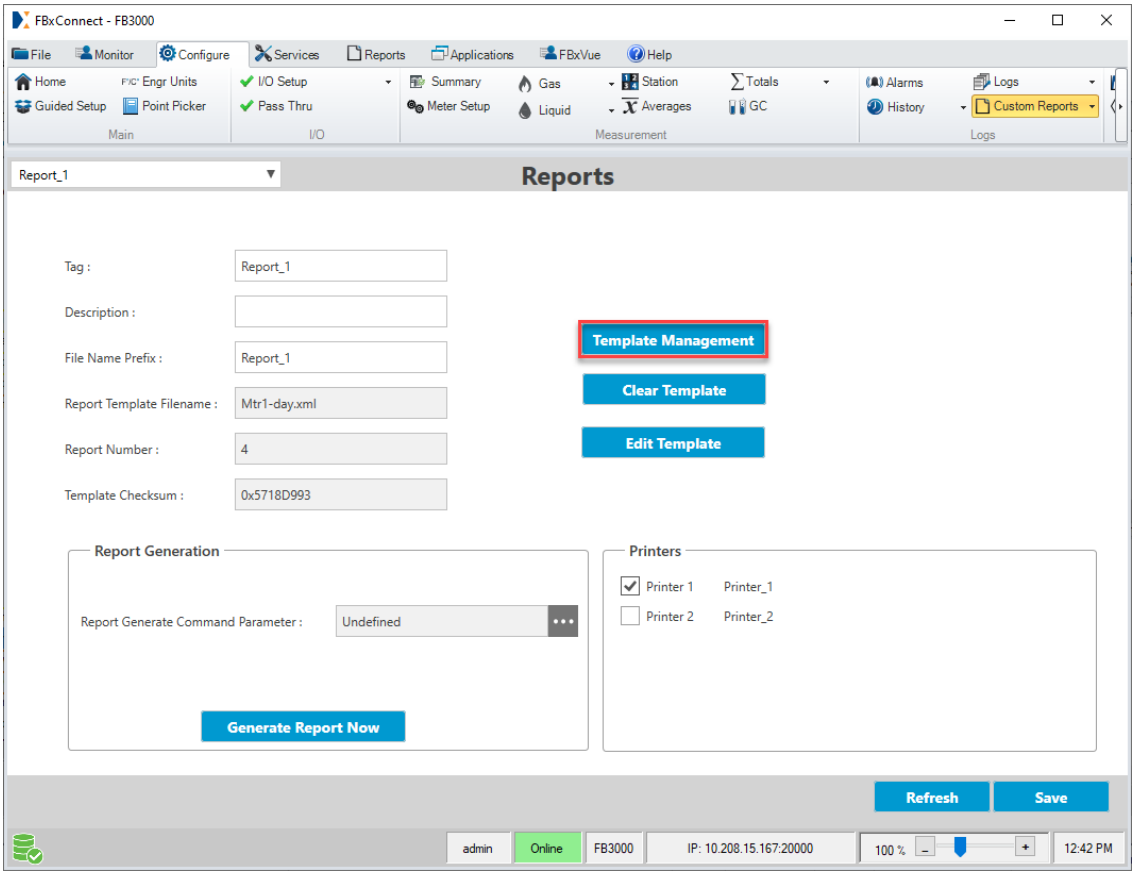


2. To enable reporting feature, enter a number from 1 to 36 in the **Number of Reports** field.

3. Select **Save** to save your changes.

4. Select **Configure > Custom Reports > Reports** from the DeltaV FBxConnect configuration software main menu. The Reports display opens.

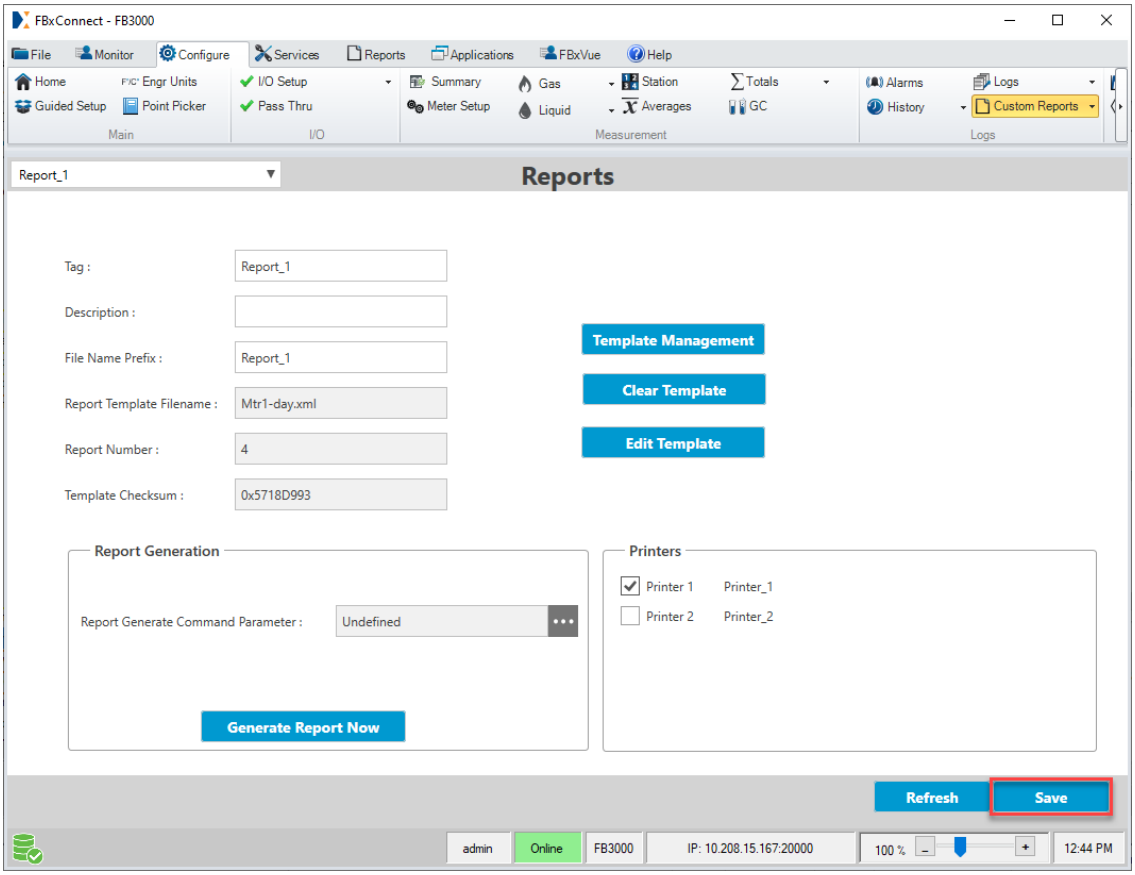
**Figure 314. Template Management Button**




5. (Optional) Add a description for the selected report instance in the **Description** field.

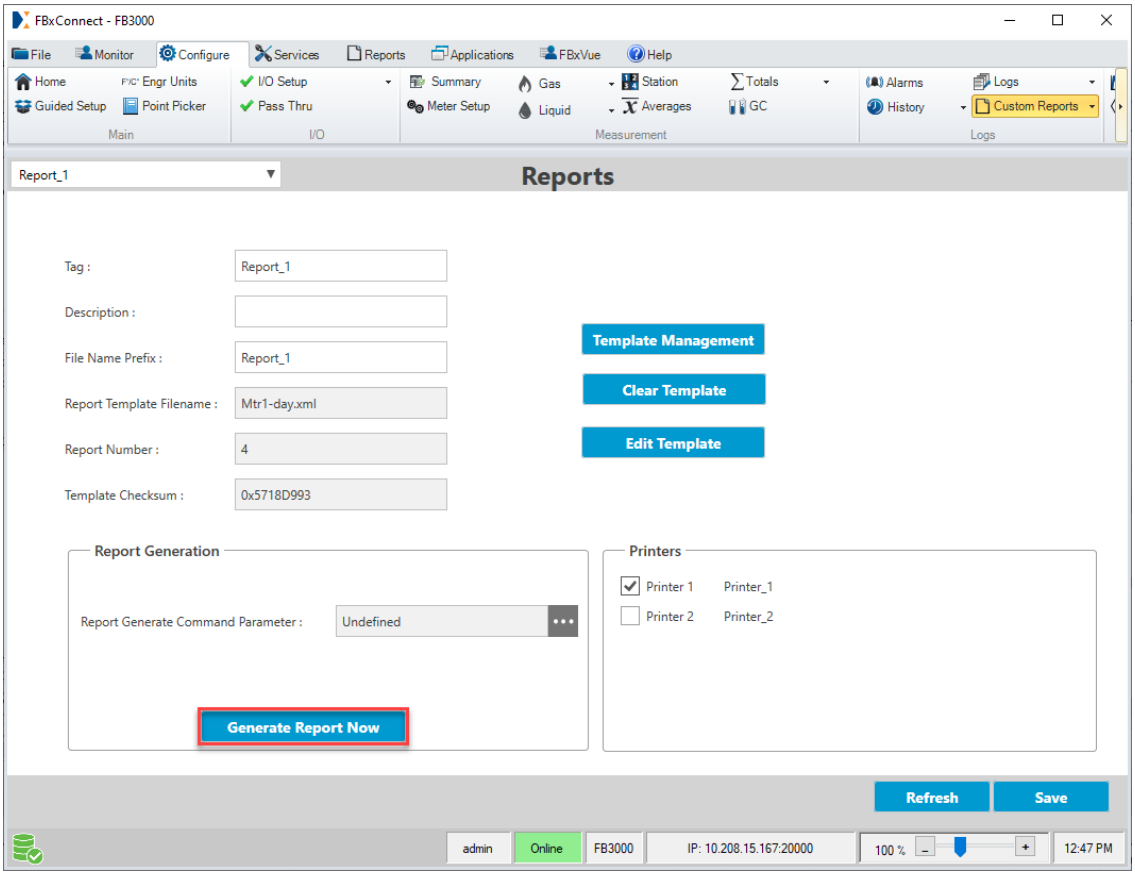
6. Select the **Template Management** button to open the Custom Report Template dialog and select your custom report template. For more information about the Custom Report Templates dialog, refer to Template Management.

**Figure 315. Reports – Save**



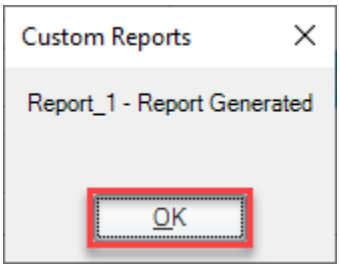

7. Select **Save** to save your changes. You now have a custom report template loaded in the FB Series product and can generate a custom report.

**Figure 316. Generate Report Now**




8. Select the **Generate Report Now** button. A confirmation message opens after generating the report successfully.

**Figure 317. Confirmation**




9. Select **OK** to close the message.

**Note**

- If an error occurs while generating the report, a “Report failed” message is displayed.

- For information about viewing custom reports, refer to Viewing Custom Reports.

## 4.24.6 Viewing Custom Reports

After you have generated a report, you can download the report from the FB Series product's memory to your PC using the Upload Custom Reports option located in the **Reports** menu or File Transfer option located in the **Services** menu.

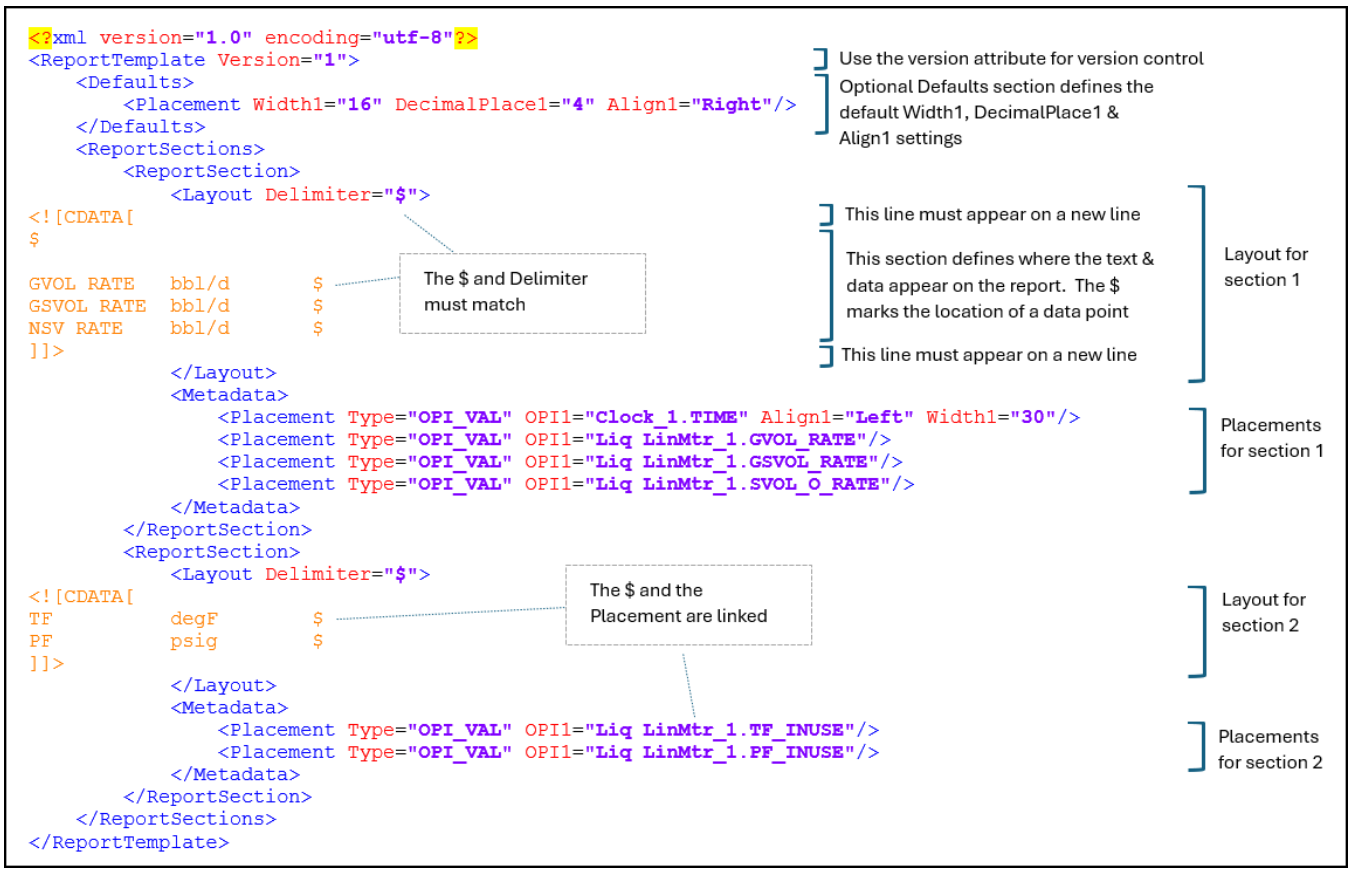
## 4.24.7 Deleting Custom Report Files and Templates

You can delete reports that are stored in the FB Series product's flash memory by performing a Cold Start and selecting either **Database is re-initialized with factory defaults** (this option deletes all custom report files and all custom report templates) or **Leave database unchanged** and **Clear History** (this option deletes all custom report files but does **not** delete any custom report templates).

## 4.24.8 Manually Creating a Custom Report Template XML File

The custom report template is an XML file that determines the layout and content of your custom report. The custom report template XML schema contains the rules, elements, and attributes you must follow when creating a custom report template XML file. When importing your custom report template, DeltaV FBxConnect configuration software validates the file to verify it contains the required XML schema. You must strictly follow this schema to successfully import a custom report template. Failure to follow this schema results in an error when you try to import the template.

**Figure 318. Custom Report Template XML File Example**




When importing a custom report template, DeltaV FBxConnect configuration software performs the following validations:

- Template is a valid XML format.
- Only one XML tag appears per line.
- Does not contain Tabs.
- Has Report Sections and each report section has Layout and Metadata.
- XML attributes (such as Align1, Type, etc.) have valid values.
- An OPI placement of OPI1.
- Object name of an OPI exists in the database.
- Parameter name of an OPI exists in the database (does not apply to object references).
- Number of delimiters in the Layout element is equal to the number of placements in the Metadata element.

- Delimiter must be 1 character long. Delimiter **must** be a punctuation character, but it cannot be any of the following: <>[]
- String XML Attributes must have a value when specified.
- Validation of widths. For example:
  - The number of characters between two delimiters is less than Width1.
  - The width would not cause the length of the line to exceed 80 characters.

**Note**

- You should have a working knowledge of XML files before attempting to create your own custom report template.
- Emerson provides sample custom report templates with DeltaV FBxConnect configuration software. The easiest way to get started creating your own custom report templates is to modify one of the sample templates. The default location for the custom report templates is C:\Users\Public\Documents\Emerson\FieldTools\FBx\CustomReportTemplates.
- Templates stored in the FB Series product's flash memory are saved as part of your solution file when you Upload a Solution.

To create your own custom report template, use **only** the following elements and attributes in your custom report template XML file:

| Element | Description |
|---|---|
| **<ReportTemplate>** | Provides a way to version the template file.<br>Example: <ReportTemplate Version="1"> |
| **<Defaults>** | Optional. Use this element to set the default values for Width1, DecimalPlace1, and Align1. If you do not set a value for these parameters, default values are used for report formatting. The Defaults element is a child element of the ReportTemplate element and a sibling element of the ReportSections element. |
| **<ReportSections>** | Every template file has a single ReportSections. The single ReportSections element can consists of multiple ReportSection child elements. |

| Element | Description | |
|---|---|---|
| **<ReportSection>** | A single section of the report. The ReportSection element contains the information for the layout (contained in the Layout element) and data (contained in the Metadata element) of a single section of the report. The ReportSection element is a child element of the ReportSections element. You can add multiple ReportSection elements to the ReportSections element. Each ReportSection element consists of Layout element and a Metadata element. | |
| **<Layout>** | The page location of data on the generated report. The Layout element is a child element of the ReportSection element.<br>**Note**<br>Lines in the Layout element **cannot** exceed 80 characters. | |
| | **Delimiter** | An attribute of the Layout element. A single special symbol (for example, $ or #) used to indicate the placement of data when designing your layout. This symbol is replaced with an actual value on the generated report. Each delimiter is associated with a Placement element and its value. For example, the second delimiter used in the Layout element is associated with the second Placement element.<br>**Note**<br>The configured symbol should **not** be used elsewhere in the Layout element. |
| **<Metadata>** | A container element for information about the parameter values and formatting contained in the generated report. | |
| **<Placement>** | Defines the data contained in the generated report and the formatting of that data. The Placement element is a child element of the Metadata element. You can add multiple Placement elements to each ReportSection element. You control the data shown on the report by configuring attributes of the Placement element. Each configured attribute in the Placement element must have a corresponding delimiter in the Layout element. Possible attributes are Type, OPI1, MapId1, Mtr1, Width1, DecimalPlace1, Align1. | |

| Element | Description | |
|---|---|---|
| | **Type** | Sets the type of data to show on the generated report. Possible values are OPI_VAL, OPI_UNIT, OPI_ENUM_SHORT, OPI_TIME, OPI_DATE, REPORT_DESC, REPORT_NAME, and REPORT_NUM.<br>• **OPI_VAL** is used to show a value of a parameter of type FLOAT, DOUBLE, INT8/16/32/64, UINT8/16/32/64, ENUM16, UC10/20/30/40, TIME, BIN8/16/32. Types BINARY, BYTEARRAY4/6/32, MEMREF, OBJREF, PRMREF, UDT are not supported. TIME values are displayed as the date followed by the time according to the configured localization format (refer to Localization).<br>• **OPI_UNIT** is used to show the engineering unit (if any) associated with the OPI or Map ID parameter.<br>• **OPI_ENUM_SHORT** is used to show the enumerated string (if any) associated with the OPI or Map ID parameter. For example, Liq Prod_x.LIQ_TYPE.<br>• **OPI_TIME** is used to show only the hour, minute, and seconds for an OPI / Map ID value that is a 'time' type. The value is shown according to the configured localization format (refer to Localization).<br>• **OPI_DATE** is used to show only the day, month, and year for an OPI / Map ID value that is a 'time' type. The value is shown according to the configured localization format (refer to Localization).<br>• **REPORT_DESC** is used to show the Report Description for the report you are editing. |

| Element | Description | |
|---|---|---|
| | | • **REPORT_NAME** is used to show the Report Name for the report you are editing.<br>• **REPORT_NUM** is used to show the Report Number for the report you are editing. |
| | **OPI1** | Enter the Tag from the FB Series product database for the OPI value to show the on the generated report.<br>**Note**<br>If you configure an invalid OPI in the template, then an asterisk (*) is shown on the generated report. |
| | **MapId1** | Sets the specific parameter information to be placed, without having to specify an OPI tag. This can be advantageous when developing report templates to generic and work with multiple instances or multiple report types (Batch, Hourly, Daily, etc). The Map ID is a unique number which is not typically entered manually. Instead, these numbers can be applied to the template XML file using the Custom Report Template Editor.<br>**Note**<br>This attribute is **not** used with a direct OPI (OPI1) attribute. |
| | **Mtr1** | Sets the meter instance to be used. This attribute is used when a report includes data for multiple meter instances at once. Valid values are 1 through 36.<br>**Note**<br>This attribute is applicable only when used in conjunction with a Map ID (MapId1). This attribute is **not** used with a direct OPI (OPI1) attribute. |

| Element | Description | |
|---|---|---|
| | **Width1** | Sets the number of characters on the report for the OPI value. Valid values are 0 – 80. The default is **1**.<br>**Note**<br>• If the OPI value is longer than the Width1 value, the pound sign (#) is shown on the generated report and indicates that the width is insufficient to display the value. Enter a larger Width1 value to avoid data loss.<br>• If the Width1 value is not specified, the Width1 value from the Defaults element is used. |
| | **DecimalPlace1** | Sets the number of digits that should print after decimal on the generated report. Valid values are 0 – 80. The default is **0**.<br>**Note**<br>If the DecimalPlace1 value is not specified, the DecimalPlace1 value from the Defaults element is used. |
| | **Align1** | Sets the alignment. Possible values are Left or Right. The default is **Left**.<br>**Note**<br>If the Align1 value is not specified, the Align1 value from the Defaults element is used. |
| **</Metadata>** | Metadata section end tag. | |
| **</Layout>** | Layout section end tag. | |
| **</ReportSection>** | ReportSection section end tag. | |
| **</ReportSections>** | ReportSections section end tag. | |
| **</Defaults>** | Default section end tag. | |

| Element | Description |
|---|---|
| **<!--Comment-->** | A single line comment (replace Comment with your own plain text.<br>**Note**<br>• Multi-line comments are **not** supported.<br>• A comment must **not** include any special XML characters such as <, >, etc. |

# 4.25 PID Loops

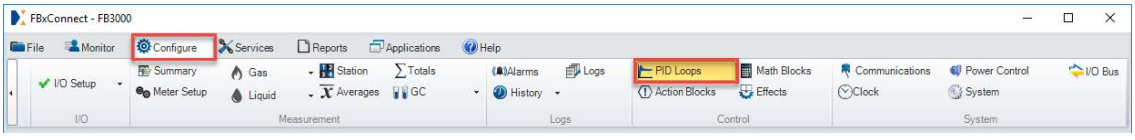
Proportional, Integral, and Derivative (PID) controls enable you to provide smooth and stable operation for feedback control loops that employ a regulating device, such as a control valve or a motor. The typical use for PID is to control a process variable to a setpoint. DeltaV FB3000 RTUs allow you to dynamically resize the number of instances to fit your specific needs on the Control Setup display.

PID is the most common control methodology in process control. PID is a continuous feedback loop that keeps the process flowing normally by taking corrective action whenever any deviation from the desired value (setpoint) of the process variable (rate of flow, temperature, voltage, and such) occurs. An "error" occurs when an operator manually changes the setpoint or when an event (such as a valve opening or closing) or a disturbance changes the load, thus causing a change in the process variable.

The PID controller receives signals from sensors and computes corrective action to the actuators from a computation based on the error (proportional), the sum of all previous errors (integral) and the rate of change of the error (derivative).

To access this display, select **Configure > PID Loops** from the DeltaV FBxConnect configuration software main menu.

**Figure 319. PID Loops**




The PID Loops display contains the following items:

General – Use this display to configure general PID loop parameters, including enabling the PID loop, selecting the PID loop type, and configuring the setpoints.

Inputs/Outputs – Use this pop-up display to configure the inputs and outputs of the PID loop.

Advanced – Use this pop-up display to configure advanced PID parameters, including the loop period, ramp rates, and output deadband.

Tuning – Use this pop-up display to configure the PID tuning parameters.

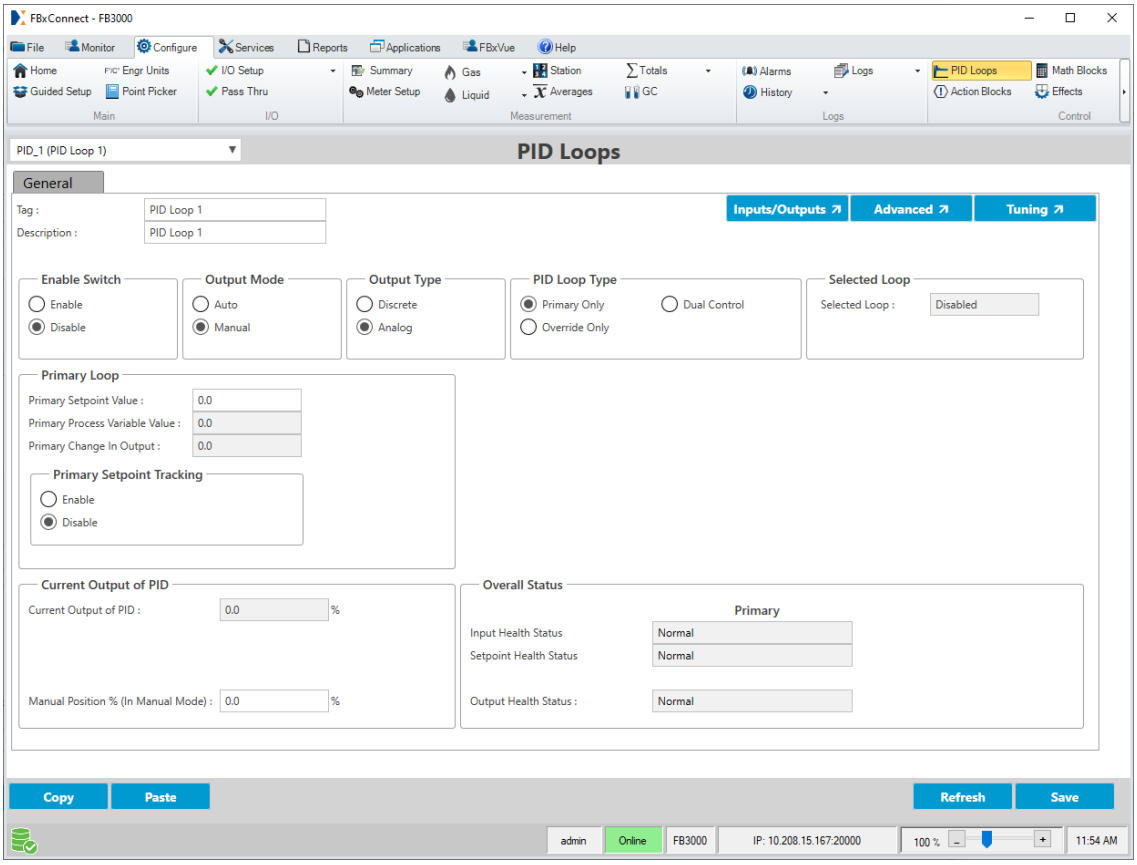
### 4.25.1 PID Loops – General

Use this display to configure general PID loop parameters, including enabling the PID loop, selecting the PID loop type, and configuring the setpoints.

To access this display:

1. Select **Configure > PID Loops** from the DeltaV FBxConnect configuration software main menu. The PID Loops display opens showing the General tab.
2. Click ▼ in the drop-down list at the top of the display to select an instance to configure.

**Figure 320. PID Loops – General**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. | |
| **Enable Switch** | Sets the status of the selected PID loop instance. | |
| | **Enable** | The PID loop **is** active. |
| | **Disable** | The PID loop **is not** active, no inputs are updated, and no calculations are performed. |
| **Output Mode** | Sets the output mode of the selected PID loop instance. Possible options are: | |

| Field | Description | |
|---|---|---|
| | **Auto** | Active control is performed. You enter a setpoint and the system automatically sends the calculated output to the configured output point.<br>**Note**<br>You cannot set the output mode to auto, until a valid process variable input and control output have been defined on the Inputs/Outputs tab. |
| | **Manual** | No active control is performed. The PID control output is assigned to the value you enter for the manual position. |
| **Output Type** | Sets the output type for the PID loop. Possible options are: | |
| | **Discrete** | The system writes the PID control output to the assigned DO used to raise the control element if the change in output is positive, or write to the assigned DO used to lower the control element if the change in output is negative. |
| | **Analog** | The system writes the PID control output to the assigned analog output point, or equivalent analog style parameter. |
| | **Note**<br>The system calculates the change in output using the following algorithm:<br>Change in Output = DF * PG * (errCng + (IG * ALP * err) + (DG * ΔRPC))<br>Where:<br>DF = Direction Factor (forward = 1.0 and reverses = -1.0)<br>PG = Proportional Gain (entered by user)<br>IG = Integral Gain (entered by user)<br>DG = Derivative Gain (entered by user)<br>errCng = Error Change (error – last error)<br>ALP = Actual Loop Period (measured in minutes)<br>err = Error (Process Variable – Setpoint)<br>ΔRPC = Delta Rate of Process Variable Change (Rate of PV Change – Last Rate of PV Change) | |

| Field | Description | |
|---|---|---|
| **PID Loop Type** | Sets the control type for PID loop. Possible options are: | |
| | **Primary Only** | Sets the Primary loop as the only active loop. The system uses the output the Primary loop calculates to adjust the control output. |
| | **Override Only** | Sets the Override loop as the only active loop. The system uses the output the Override loop calculates to adjust the control output.<br>**Note**<br>This control type is used mainly for tuning the Override loop, or when the loop selection is controlled by other logic external to the PID algorithm. |
| | **Dual Control** | Sets both the Primary and Override loops as active. The system compares the outputs from the two loops and uses either the lesser or greater of the two outputs (based on the selection in the Override Type Select field) to adjust the control output. |
| **Selected Loop** | This **read-only** field shows the status of the selected PID loop instance. | |
| **Primary/Override Setpoint Value** | Sets a setpoint value for controlling the Primary PID loop's process variable and the Override PID loop's process variable. | |
| **Primary/Override Process Variable Value** | This **read-only** field shows the current value of the primary and override process variables.<br>**Note**<br>The process variables are configured on the PID Loops – Inputs/Outputs pop-up display. | |
| **Primary/Override Change in Output** | This **read-only** field shows the calculated change in output from the associated loop. | |
| **Primary/Override Setpoint Tracking** | Sets how the system tracks setpoint and process variable values when moving between Auto and Manual modes in the **Output Mode** field. Possible options are: | |

| Field | Description | |
|---|---|---|
| | **Enable** | If **Setpoint Tracking** is set to **Enable** and the **Output Mode** is **Auto**, then the system sets the value in the **Manual Position** field equal to the current output value.<br>If **Setpoint Tracking** is set to **Enable** and the **Output Mode** is **Manual**, then the system sets the value in the Setpoint field equal to the process variable. |
| | **Disable** | If **Setpoint Tracking** is set to **Disable** and the **Output Mode** is **Auto**, then the value in the **Current Output** field is copied to the **Manual Position** field to provide for a bumpless transfer when switching from Auto to Manual mode.<br>If **Setpoint Tracking** is set to **Disable** and the **Output Mode** is **Manual**, then the setpoint value remains unchanged and the system sets the integral action field to the value required to maintain the current position. |
| **Override Threshold Value** | Sets the threshold to prevent premature selection of the Override loop. If the Override process variable is outside of this threshold on the safe side of the Override setpoint, the system always selects the Primary loop. However, if the Override process variable is within the threshold of the Override setpoint or is on the unsafe side of that setpoint, the system can select the Override loop.<br>**Note**<br>If you set the **Override Threshold Value** to 0.0, the system uses the high/low value of the **Override Type Select** field to select the appropriate change, regardless of the error in the Override loop. | |
| **Override Type Select** | Sets the control output for the Override Type. Possible options are: | |
| | **High** | Selects as the change in the control output either the **higher of** the **Primary Change In Output** value or the **Override Change In Output** value. |
| | **Low** | Selects as the change in the control output either the **lesser of** the **Primary Change In Output** value or the **Override Change In Output** value. |

| Field | Description |
|---|---|
| **Current Output of PID** | This **read-only** field shows the value of the PID loop. |
| **Digital Output 1 (Raise)** | This **read-only** field shows the value of the Digital Output (Raise) configured on the PID Loops – Inputs/Outputs pop-up display.<br>**Note**<br>This field appears **only** if you select **Discrete** in the **Output Type** field. |
| **Digital Output 2 (Lower)** | This **read-only** field shows the value of the Digital Output (Lower) configured on the PID Loops – Inputs/Outputs pop-up display.<br>**Note**<br>This field appears **only** if you select **Discrete** in the **Output Type** field. |
| **Manual Position % (In Manual Mode)** | Sets the value that will be assigned to the PID control output when the **Output Mode** is set to **Manual**. |
| **Input Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Primary/Override Process Variable Input** field on the PID Loops – Inputs/Outputs pop-up display. |
| **Setpoint Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Primary/Override Setpoint Input** field on the PID Loops – Inputs/Outputs pop-up display.<br>**Note**<br>These fields show **only** if you define a parameter in the **Primary/Override Setpoint Input** field. |
| **Output Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Analog Output Point** field on the PID Loops – Inputs/Outputs pop-up display.<br>**Note**<br>This field appears **only** if you select **Analog** in the **Output Type** field. |

4. Select **Save** to save any changes you make to this display.

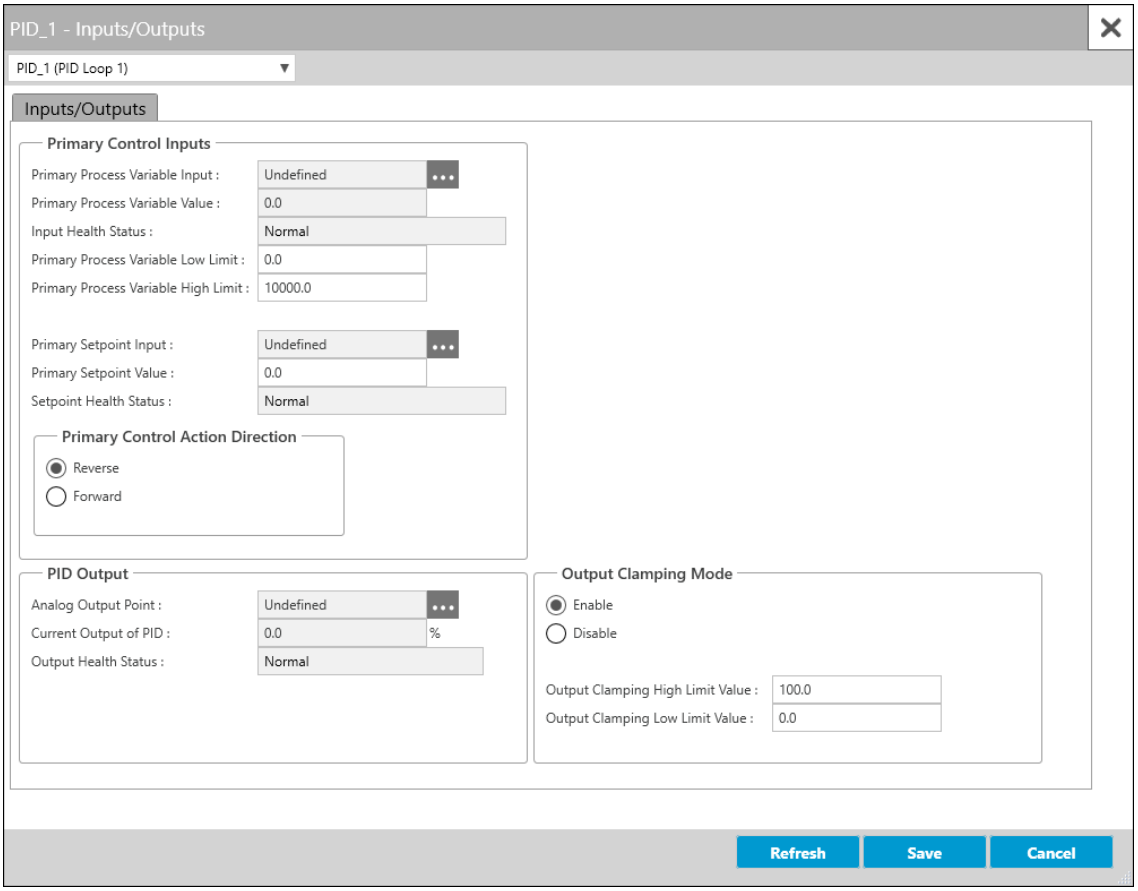
## 4.25.2 PID Loops – Inputs/Outputs

Use this pop-up display to configure the inputs and outputs of the PID loop.

To access this tab:

1. Select **Configure > PID Loops** from the DeltaV FBxConnect configuration software main menu. The PID Loops display opens.
2. Click ▼ in the drop-down list at the top of the display to select a PID loop to configure.
3. Select the **Inputs/Outputs** button. The PID Loops – Inputs/Outputs pop-up display opens.

**Figure 321. PID Loops – Inputs/Outputs**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Primary / Override Process Variable Input** | Click ••• to open a Point Picker dialog and select a parameter to use as the primary and override process variable. | |
| **Primary / Override Process Variable Value** | This **read-only** field shows the current value of the parameter selected in the **Primary/Override Process Variable Input** field. | |
| **Input Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Primary/Override Process Variable Input** field. | |
| **Primary / Override Process Variable Low Limit** | Sets the low limit for the process variable in the same engineering units of the process variable. | |
| **Primary / Override Process Variable High Limit** | Sets the high limit for the process variable in the same engineering units of the process variable. | |
| **Primary / Override Setpoint Input** | Click ••• to open a Point Picker dialog and select a parameter to use as the setpoint. | |
| **Primary / Override Setpoint Value** | If a parameter is defined in the Primary/Override Setpoint Input field, this **read-only** field shows the value of that parameter. If the Primary/Override Setpoint Input field is Undefined, enter a setpoint value. | |
| **Primary / Override Setpoint Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Primary/Override Setpoint Input** field. | |
| **Primary / Override Control Action Direction** | Selects the direction in which the PID control loop will act. | |
| | **Reverse** | The control output decreases as the process variable increases. |
| | **Forward** | The control output increases as the process variable increases. |

| Field | Description |
|---|---|
| **Analog Output Point** | Click ••• to open a Point Picker dialog and select an analog output point for the loop.<br>**Note**<br>This field appears **only** if you select **Analog** in the **Output Type** field on the PID Loops – General display. |
| **Current Output of PID** | This **read-only** field shows the current value of the parameter selected in the **Analog Output Point** field.<br>**Note**<br>This field appears **only** if you select **Analog** in the **Output Type** field on the PID Loops – General display. |
| **Output Health Status** | This **read-only** field shows the quality of the data received from the parameter selected in the **Analog Output Point** field.<br>**Note**<br>This field appears **only** if you select **Analog** in the **Output Type** field on the PID Loops – General display. |
| **Digital Output 1 (Raise)** | Click ••• to open a Point Picker dialog and select an open point for the loop.<br>**Note**<br>• The Digital Output (Raise) and Digital Output (Lower) values, respectively, open or close the valve or other device.<br>• This field appears **only** if you select **Discrete** in the **Output Type** field on the PID Loops – General display. |
| **Digital Output 2 (Lower)** | Click ••• to open a Point Picker dialog and select a close point for the loop.<br>**Note**<br>• The Digital Output (Raise) and Digital Output (Lower) values, respectively, open or close the valve or other device.<br>• This field appears **only** if you select **Discrete** in the **Output Type** field on the PID Loops – General display. |
| **Output Clamping Mode** | Select to prevent the output from going above the value set in the High Limit field or falling below the value set in the Low Limit field.<br>**Enable** — Output value is limited to values between the output Low Limit and the High Limit (recommended). |

| Field | Description |
|---|---|
| | **Disable** Output value is not limited. |
| | **Note**<br>This field appears **only** if you select **Analog** in the **Output Type** field on the PID Loops – General display. |
| **Output Clamping High Limit Value** | Sets the high limit for the analog. If a change in output causes the current value to rise above this value, the system sets the output to High Limit value. |
| **Output Clamping Low Limit Value** | Sets the low limit for the analog. If a change in output causes the current value to fall below this value, the system sets the output to the Low Limit value. |

5. Select **Save** to save any changes you make to this display.

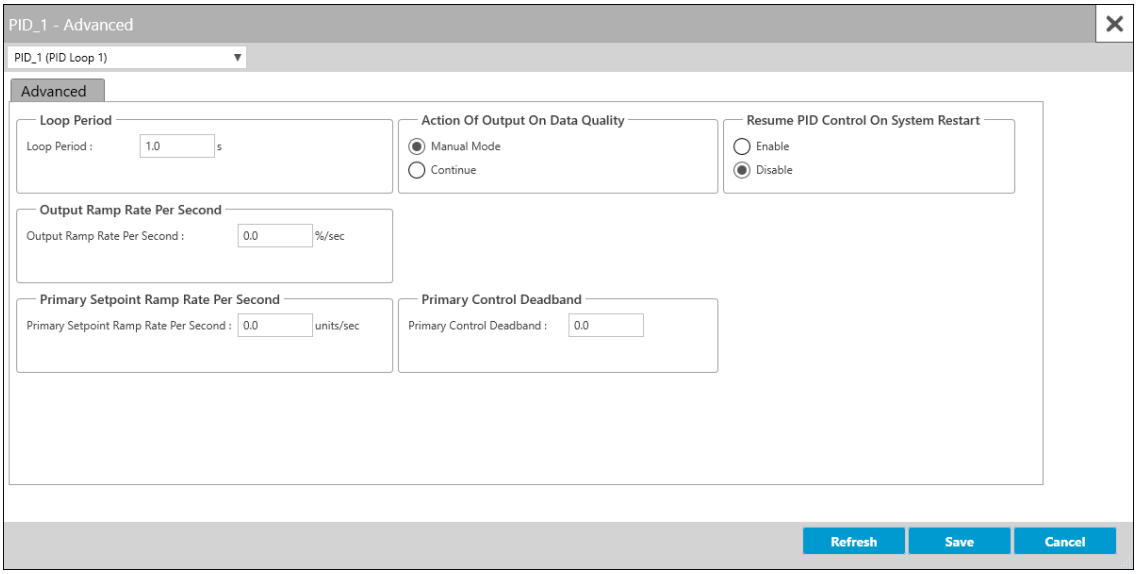
## 4.25.3 PID Loops – Advanced

Use this pop-up display to configure advanced PID parameters, including the loop period, ramp rates, and output deadband.

To access this pop-up display:

1. Select **Configure > PID Loops** from the DeltaV FBxConnect configuration software main menu. The PID Loops display opens.
2. Click ▼ in the drop-down list at the top of the display to select a PID loop instance to configure.
3. Select the **Advanced** button. The PID Loops – Advanced pop-up display opens.

**Figure 322. PID Loops – Advanced**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Loop Period** | Sets the period (in seconds) of time between executions of the PID algorithm. This is the amount of time between executions from the beginning of one execution to the beginning of the next.<br>**Note**<br>If you select Dual Control, both loops are executed in this time period. | |
| **Action of Output on Unhealthy Data Quality** | Selects the action to be taken when the process variable or live setpoint values report a data quality of Fault.<br>**Note**<br>This feature does not apply to data quality indications of Override or Alarm. | |
| | **Manual Mode** | The **Output Mode** is changed to **Manual** and the value you configure in the Manual Position field (PID Loops – General) is applied to the control output. |
| | **Continue** | The PID control loop continues in the current output mode and no action is taken. |

| Field | Description | |
|---|---|---|
| **Resume PID Control On System Restart** | Sets if the PID loop automatically resumes when the system restarts. | |
| | **Enable** | The PID loop **does** automatically resume when the system restarts. |
| | **Disable** | The PID loop **does not** automatically resume when the system restarts. |
| **Output Ramp Rate Per Second** | Sets the allowed limit of change in the control output from one cycle to the next. A value of zero disables this feature. | |
| **Primary Setpoint Ramp Rate Per Second** | Sets a length of time (in seconds) the maximum rate at which the Primary PID setpoint can ramp to a new value. | |
| **Primary Control Deadband** | Sets a "window" around the setpoint for the Primary PID loop. When the process variable is within this window, the system does not apply the calculated change in output. If you enter 5, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output. | |
| **Override Setpoint Ramp Rate Per Second** | Sets a length of time (in seconds) the maximum rate at which the Override PID setpoint can ramp to a new value. | |
| **Override Control Deadband** | Sets a "window" around the setpoint for the Override PID loop. When the process variable is within this window, the system does not apply the calculated change in output. If you enter 5, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output | |

5. Select **Save** to save any changes you make to this display.

## 4.25.4 PID Loops – Tuning

Use this pop-up display to configure the PID tuning parameters. The trend appears in a chart at the bottom of the display.

**Note**

- If you select **Primary Only** in the **PID Loop Type** field on the **PID – General** display, the Primary Process Variable Value, Primary Setpoint Value, and Current Output of PID are shown in the chart.
- If you select **Override Only** in the **PID Loop Type** field on the **PID – General** display, the Override Process Variable Value, Override Setpoint Value, and Current Output of PID are shown in the chart.
- If you select **Dual Control** in the **PID Loop Type** field on the **PID – General** display, the Primary Process Variable Value, Primary Setpoint Value, Override Process Variable Value, Override Setpoint Value, and Current Output of PID are shown in the chart.

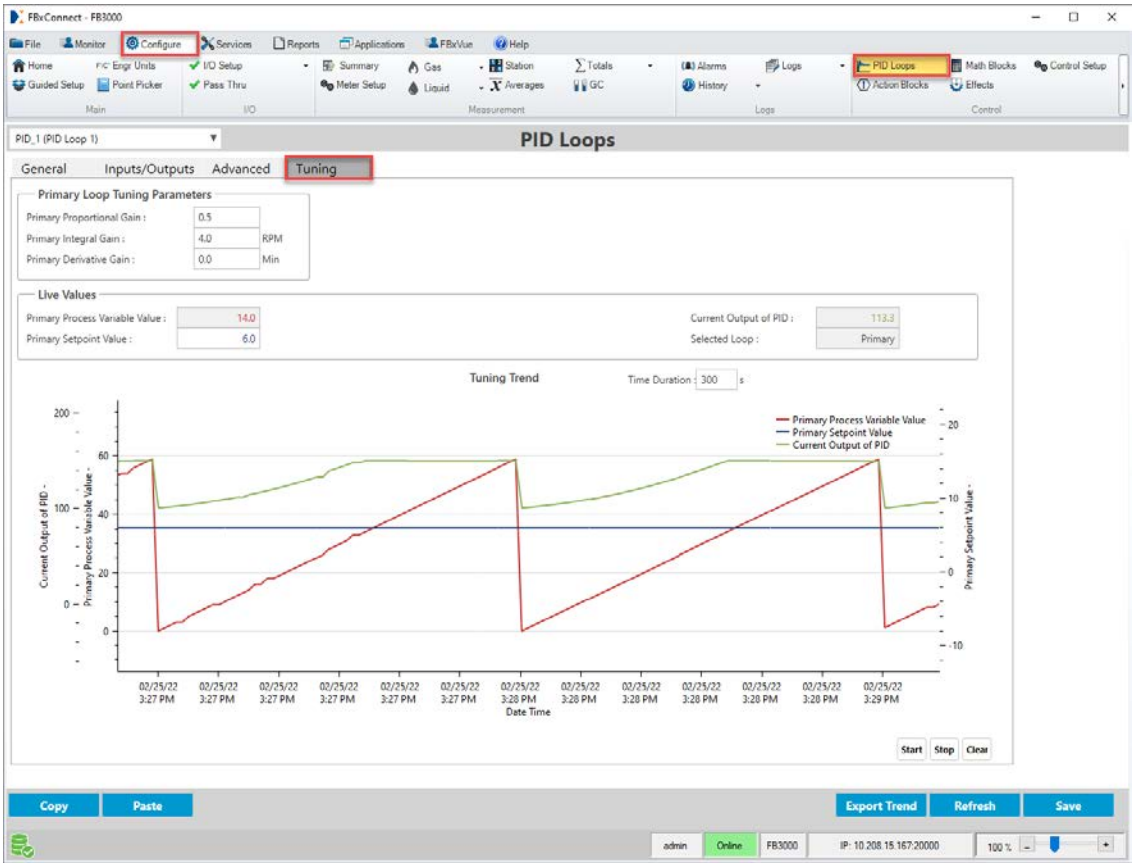
When viewing a chart on the display, your mouse has the following functionality:

- **Mouse Wheel** – Scroll the mouse wheel to zoom the x-axis and y-axis based on your cursor position. You can zoom each axis individually (by placing your cursor over a single axis) or simultaneously (by placing your cursor over the chart).
- **Right Button** – Click and drag the right mouse button to pan the chart. You can pan each axis individually (by placing your cursor over a single axis) or simultaneously (by placing your cursor over the chart).

To access this pop-up display:

1. Select **Configure > PID Loops** from the DeltaV FBxConnect configuration software main menu. The PID Loops display opens .
2. Click ▼ in the drop-down list at the top of the display to select a PID loop instance to configure.
3. Select the **Tuning** button. The PID Loops – Tuning pop-up display.

**Figure 323. PID Loops – Tuning**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Primary / Override Proportional Gain** | Sets proportional gain as the ratio of the change in output to the change in the error. |
| **Primary / Override Integral Gain** | Sets integral gain as the ratio of the change in output to the change in the integral of the error with respect to time. This value is in terms of repeats per minute.<br>Typically calculated as either (Primary Process Variable – Primary Setpoint) or (Override Process Variable – Override Setpoint). |

| Field | Description |
|---|---|
| **Primary / Override Derivative Gain** | Sets the derivative gain as the ratio of the change in output to the change in the error with respect to time. This value is in terms of minutes.<br>Typically calculated as either (Primary Process Variable / Primary Setpoint) or (Override Process Variable / Override Setpoint). |
| **Live Values** | Theses fields show the current value of the configured PID loop parameters. |
| **Time Duration** | Enter the amount of time (in seconds) to display data in the Tuning Trend chart. After the configured amount of time has elapsed, this rolling chart adds new samples to the end of the chart and removes the oldest data. The **default** is **300**. |
| **Start** | Select this button to begin displaying data in the chart. |
| **Stop** | Select this button to prevent new data from being added to the chart. Data collected before selecting this button is preserved in the chart. |
| **Clear** | Select this button to remove all data from the chart. |
| **Export Trend** | Select this button to extract PID trend data and save it to a file on your computer. The extracted data is saved in a CSV file to your computer's home directory using the current year, month, date, hour, minute, second, and millisecond for naming convention (YYYY-MM-DD HH-MM-SS.FFF.csv). |

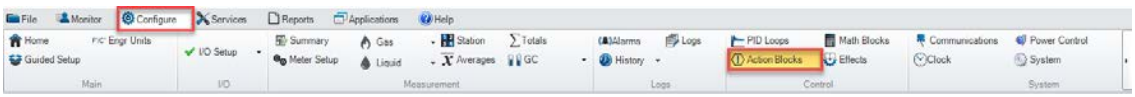
5. Select **Save** to save any changes you make to this display.

# 4.26 Action Blocks

Action Blocks are configurable programming components that check a basic logic condition, and use the result to activate effects or perform other actions (such as opening or closing a valve). DeltaV FB3000 RTUs allow you to dynamically resize the number of instances to fit your specific needs on the Control Setup display.

To access this display, select **Configure > Action Blocks** from the DeltaV FBxConnect configuration software main menu.

**Figure 324. Action Blocks**



The Action Blocks display contains the following items:

General – Use this display to configure the logic performed by each Action Block, and what action the system takes when the Action Block is active.

Bypass – Use this pop-up display to configure temporary overrides for the result of the raw action block logic.

Chain – Use this pop-up display to logically link one action block to another.

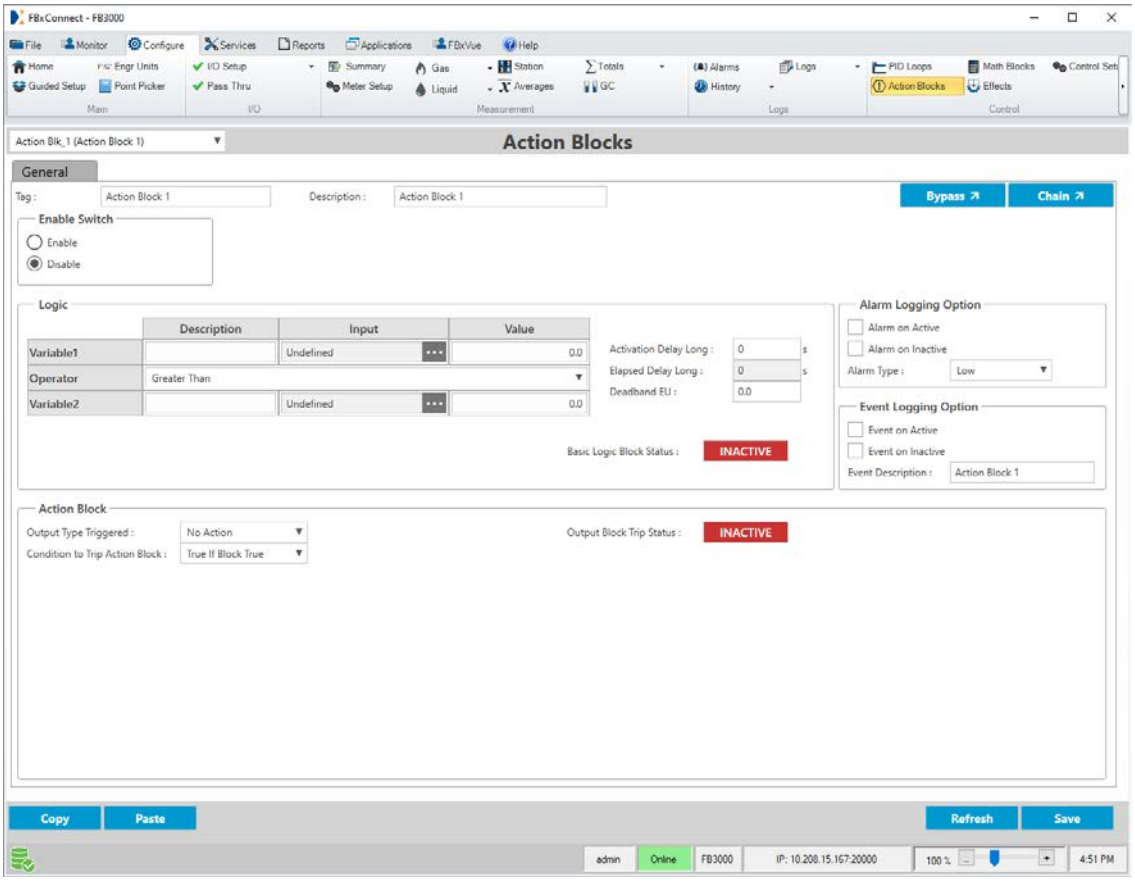
## 4.26.1 Action Blocks – General

Use this display to configure the logic performed by each Action Block, and what action the system takes when the Action Block is active.

To access this display:

1. Select **Configure > Action Blocks** from the DeltaV FBxConnect configuration software main menu. The Action Blocks display opens.
2. Click ▼ in the drop-down list at the top of the display to select an instance to configure.

**Figure 325. Action Blocks – General**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. | |
| **Enable Switch** | Sets the status of the selected Action Block instance. | |
| | **Enable** | The Action Block **is** evaluated and logic is performed. |
| | **Disable** | The Action Block **is not** evaluated and **no** logic is performed. |
| **Logic** | The fields in this section configure the logic performed by the Action Block. | |
| | **Variable 1** | Defines the first variable to use in the Action Block. |

| Field | Description | | |
|---|---|---|---|
| | | **Description** | Sets an identifier (up to 20-alphanumeric characters) for the selected variable. |
| | | **Input** | Click ••• to open a Point Picker dialog and select a parameter from the FB Series product database used as the first variable in a logic expression, as defined by the action block operator. Any read/write numerical parameter from the FB Series product's database can be selected. |
| | | **Value** | Shows the value of the selected parameter. If you leave the parameter undefined, you can manually enter a value in this field. |
| | **Operator** | **Greater Than** | If Variable 1 is greater than the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **Less Than** | If Variable 1 is less than the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **Equal To** | If Variable 1 is equal to the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **Greater Than Or Equal To** | If Variable 1 is greater than or equal to the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **Not Equal To** | If Variable 1 is not equal to the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |

| Field | Description | | |
|---|---|---|---|
| | | **Less Than Or Equal To** | If Variable 1 is less than or equal to the Variable 2 value for the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **AND (Bitwise)** | Compares each bit in Variable 1 to each bit in Variable 2. If ALL of the bits set in Variable 2 are also set in Variable 1, the **Logic Trip Status** is set to active. |
| | | **OR (Bitwise)** | Compares each bit in Variable 1 to each bit in Variable 2. If ANY of the bits set in Variable 2 are also set in Variable 1, the **Logic Trip Status** is set to active. |
| | | **Watchdog** | Monitors the Variable 1 value for a transition. When a transition occurs, the watchdog counter starts over. If the counter reaches the time defined in the **Activation Delay** time, the **Logic Trip Status** is set to active. |
| | | **Soft Timer** | Monitors the Variable 1 Value for a transition from 0 to any number. Once this transition occurs the block is set true and a time delay starts for the amount of seconds specified in the **Activation Delay** field. When the timer expires the block is set to inactive and the Variable 1 Value is forced back to a zero. |
| | **Variable 2** | Defines the second variable to use in the Action Block. | |
| | | **Description** | Sets an identifier (up to 20-alphanumeric characters) for the selected variable.<br>**Note**<br>This field applies only if you select **Greater Than**, **Less Than**, **Equal To**, **Greater Than Or Equal To**, **Not Equal** |

| Field | Description | | |
|---|---|---|---|
| | | | **To**, **Less Than Or Equal To**, **AND (Bitwise)**, or **OR (Bitwise)** in the **Operator** field. |
| | | **Input** | Click ••• to open a Point Picker dialog and select a parameter from the FB Series product database which will be used as the second variable in a logic expression, as defined by the action block operator. Any read/write numerical parameter from the FB Series product's database can be selected.<br>**Note**<br>This field applies only if you select **Greater Than**, **Less Than**, **Equal To**, **Greater Than Or Equal To**, **Not Equal To**, **Less Than Or Equal To**, **AND (Bitwise)**, or **OR (Bitwise)** in the **Operator** field. |
| | | **Value** | Shows the value of the selected parameter. If you leave the parameter undefined, you can manually enter a value in this field.<br>**Note**<br>This field applies only if you select **Greater Than**, **Less Than**, **Equal To**, **Greater Than Or Equal To**, **Not Equal To**, **Less Than Or Equal To**, **AND (Bitwise)**, or **OR (Bitwise)** in the **Operator** field. |

| Field | Description | |
|---|---|---|
| | **Activation Delay** | Sets the delay in seconds. This delay acts as either a delay before logic functions set the **Logic Trip Status** to an active state, or as the time for the soft timer and watchdog operations.<br>**Note**<br>For more information about the **Activation Delay**, refer to the **Operator** description. |
| | **Elapsed Delay** | This **read-only** field shows the time delay that has elapsed in seconds, starts by counting up from zero to the **Activation Delay** time and the action block trip status changes when the **Activation Delay** time is reached. |
| | **Deadband EU** | Sets the deadband (in engineering units) used when comparing Variable 1 and Variable 2.<br>**Note**<br>This field applies only if you select **Greater Than**, **Less Than**, **Greater Than Or Equal To**, or **Less Than Or Equal To** in the **Operator** field. |
| | **Basic Logic Block Status** | This **read-only** field shows the status of the action block based only on the block logic operation, and before any bypasses are applied. Possible values are Active or Inactive |
| **Action Block** | The fields in this section determine the behavior of the action block trip status, and what action (if any) is taken when the action block trip status is active. | |
| | **Output Type Triggered** | Selects what output (if any) is desired from this action block when it is active. Possible options are:<br>**No Action** — No output action will take place when the **Basic Logic Block Status** is active. |

| Field | Description | | |
|---|---|---|---|
| | | **Effect** | One or more associated effects is activated when the **Basic Logic Block Status** is active.<br>**Note**<br>See **Trip Effect Links** for additional configuration. |
| | | **Binary Action** | A value of 1 or 0 will be written out to the selected parameter when the **Basic Logic Block Status** is active. Typically used with a discrete output.<br>**Note**<br>See the Output Boolean Behavior for additional configuration. |
| | | **Move Value** | The input variable 1 is moved to the output action point when the **Basic Logic Block Status** is active. |
| | | **Load Value** | Saves the value in the output action point into the internal result register when the **Basic Logic Block Status** is active. |
| | | **Write Value** | Retrieves the internal result register value, and writes it to the parameter defined for the output action point when the **Basic Logic Block Status** is active. |
| | **Condition to Trip Action Block** | Sets how the **Basic Logic Block Status** is determined. Possible options are: | |
| | | **True If Block True** | The **Basic Logic Block Status** is active if the basic block logic trip status is active, and no bypasses are active. |
| | | **True If Chain True** | The **Basic Logic Block Status** is active if the chain trip status is active. |

| Field | Description | | |
|---|---|---|---|
| | | **True If Either True** | The **Basic Logic Block Status** is active if either the Chain trip status, or the Bypass block trip status is active. |
| | | **True If Both True** | The **Basic Logic Block Status** is active only if the Chain trip status and the Bypass block trip status is active. |
| | **Trip Effect Links** | Each Action Block can trigger up to 20 Effect instances. Click ▼ and select an Effect instance that is triggered by this Action Block.<br>**Note**<br>This field appears **only** when the **Action Type** is set to **Effect**. | |
| | **Output Actions** | The fields in this section configure the output parameters for the action block. | |
| | | **Output Action Point** | Click ••• to open a Point Picker dialog and select a parameter from the FB Series product database to be used in one of the action types.<br>**Note**<br>This field appears only when the **Action Type** is set to **Binary Action**, **Move Value**, **Load Value**, or **Write Value**. |
| | | **Output Boolean Behavior** | Sets the discrete signal style written to the selected output parameter, where “Poke” means write a value once, and “Force” means to write a value continuously. Possible options are:<br>• Force 1 If True & 0 If False<br>• Force 0 If True & 1 If False<br>• Poke 1 If True<br>• Poke 0 If True<br>• Poke 1 If True & 0 If False<br>• Poke 0 If True & 1 If False<br>• Force 1 If True & Poke 0 If False |

| Field | Description | |
|---|---|---|
| | | • Force 0 If True & Poke 1 If False<br>• Force 1 If True<br>• Force 0 If True<br>**Note**<br>This field appears **only** when the **Action Type** is set to **Binary Action**. |
| | **Output Block Trip Status** | This **read-only** field shows the status of the action block, and determines if any action is taken by the action block (such as moving a value or activating an effect). Possible values are Active or Inactive |
| **Alarm Logging Option** | Sets if the system writes to the Alarm Log with the action block.<br>**Note**<br>The text of the action block description string is used for each entry in the alarm log created by the action block. | |
| | **Alarm on Active** | Action block transitions from inactive to active will write a Set Alarm record to the alarm log. |
| | **Alarm on Inactive** | Action block transitions from active to inactive will write a Clear Alarm record to the alarm log. |
| | **Alarm Type** | Click ▼ to select what type of application alarm is written to the FB Series product alarm log. Possible options are Low, Low Low, High, High High, Rate of Change, and Other. |
| **Event Logging Option** | Sets if the system writes to the Event Log with the action block. | |
| | **Event on Active** | Action block transitions from inactive to active will create a record in the event log. |
| | **Event on Inactive** | Action block transitions from active to inactive will create a record in the event log. |
| | **Event Description** | This 40-character message will appear with any event created by the action block. The default value is “Action Block X”, where X is the instance number (1 through 30). |

4. Select **Save** to save any changes you make to this display.

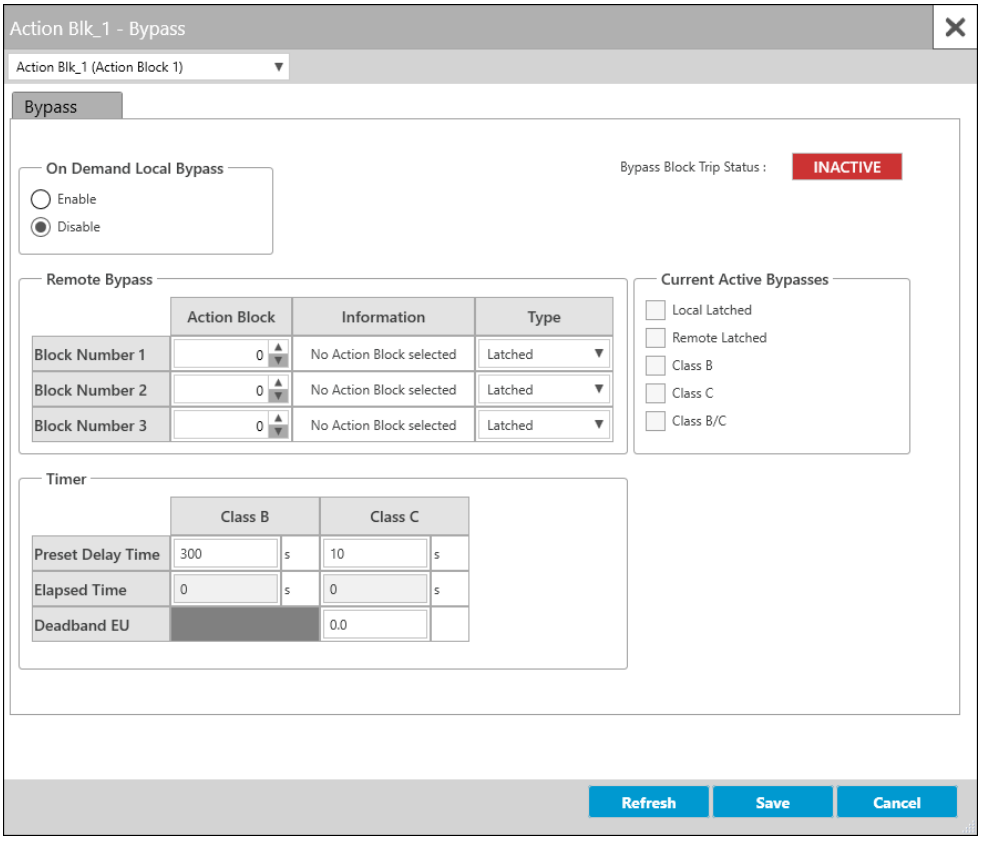
## 4.26.2 Action Blocks – Bypass

Use this pop-up display to configure temporary overrides for the result of the raw action block logic.

To access this pop-up display:

1. Select **Configure > Action Blocks** from the DeltaV FBxConnect configuration software main menu. The Action Blocks display opens.
2. Click ▼ in the drop-down list at the top of the display to select an Action Block instance to configure.
3. Select the **Bypass** button. The Action Blocks – Bypass pop-up display opens.

**Figure 326. Action Block – Bypass**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Bypass Block Trip Status** | This **read-only** field shows the combination of the **Basic Logic Block Status** and any active bypasses. If any bypass is active, this trip status shows a state of Inactive. If no bypasses are active, then this field can either have a state of Active or a state of Inactive, depending on the basic logic. | |
| **On Demand Local Bypass** | Controls the manual latched bypass. This value could be set or removed from an HMI, host system, or from another action block. | |
| | **Enable** | The manual latched bypass is active. |
| | **Disable** | The manual latched bypass is inactive. |
| **Remote Bypass** | Allows you to use other action blocks to define bypass functionality. When the remote action block is true, the bypass for this block is true. | |
| | **Action Block** | Click ⇕ to select a remote action block to serve as the trigger to enter a bypass state. When the remote action block is active, the bypass for this block is active. |
| | **Information** | This **read-only** field shows the user-defined tag associated with the selected action block. When no block is selected, this field reads “NO BLOCK ASSOCIATED”. |
| | **Type** | Click ▼ to select the type of bypass you desire. Possible options are:<br>• **Latched** – Bypassed while the Remote Bypass block is active.<br>• **Class B** – Bypassed for the amount of time set in the Class B Timer field once the Remote Bypass block is active.<br>• **Class C** – Bypassed until the block clears once the Remote Bypass block is active.<br>• **Class B/C** – Bypassed for the amount of time in the Class B Timer field or unless the Block clears before the timer expires once the Remote Bypass block is active. |
| **Current Bypass Active** | Shows a check mark next to all currently active bypasses. Note that there can be more than one bypass active simultaneously. | |

| Field | Description | |
|---|---|---|
| | **Local Latched** | Activates the manual latched bypass when selected. This value could be set or removed from an action block. |
| | **Remote Latched** | Bypassed while the Remote Bypass block is true. |
| | **Class B** | Bypassed for the amount of time in the Class B Timer field once the Remote Bypass block is true. |
| | **Class C** | Bypassed until the block clears once the Remote Bypass block is true. |
| | **Class B/C** | Bypassed for the amount of time in the Class B Timer field or unless the Block clears before the timer expires once the Remote Bypass block is true. |
| **Timer** | Sets the timers used with Class B and Class C bypasses. | |
| | **Class B Preset Delay Time** | Sets the amount of time (in seconds) that a Class B status should be clear, before the bypass is no longer active. |
| | **Class B Elapsed Time** | Shows the elapsed time (in seconds) for a Class B bypass. |
| | **Class C Preset Delay Time** | Sets the amount of time (in seconds) that a Class C status should be clear, before the bypass is no longer active. |
| | **Class C Elapsed Time** | Shows the elapsed time (in seconds) for a Class C bypass. |
| | **Class C Deadband EU Value** | Sets the deadband for Class C bypass. |

**5.** Select **Save** to save any changes you make to this display.

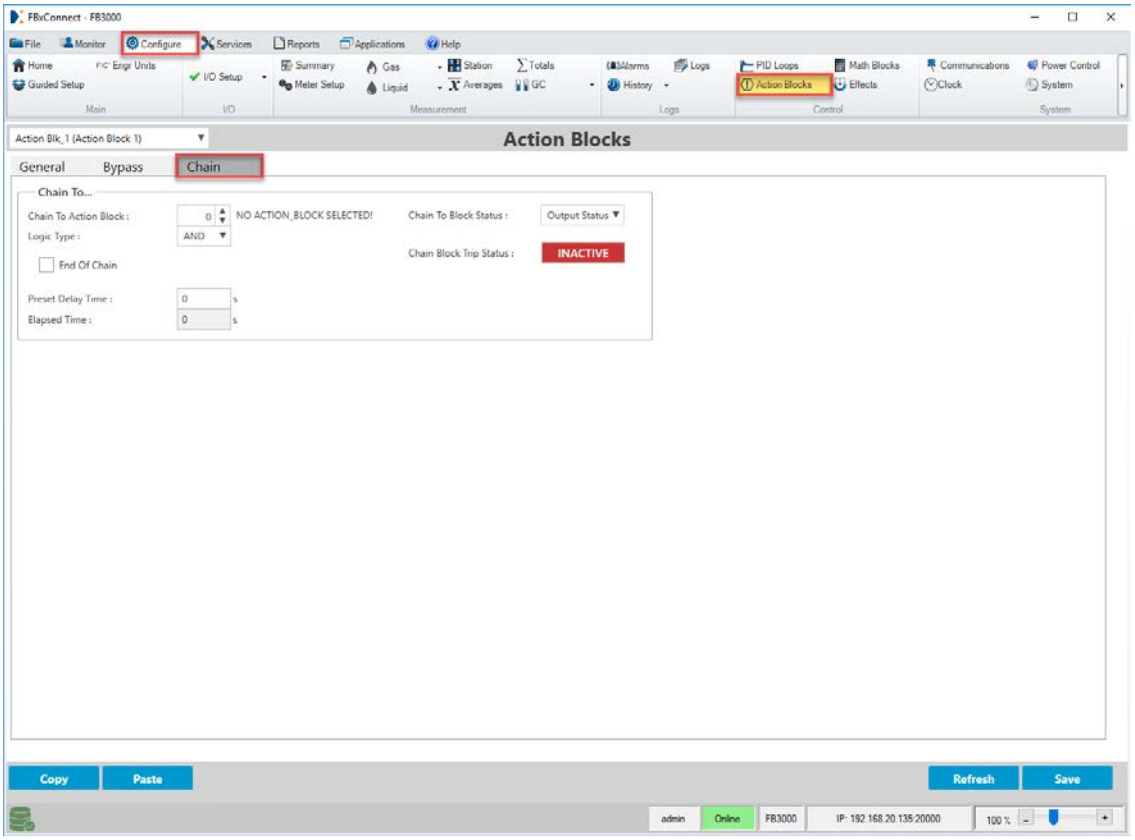
## 4.26.3 Action Blocks – Chain

Use this pop-up display to logically link one action block to another.

To access this pop-up display:

1. Select **Configure > Action Blocks** from the DeltaV FBxConnect configuration software main menu. The Action Blocks display opens.
2. Click ▼ in the drop-down list at the top of the display to select an Action Block instance to configure.
3. Select the **Chain** button. The Action Blocks – Chain pop-up display opens.

**Figure 327. Action Blocks – Chain**




4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Action Block** | Click ▼ to select an Action Block instance to be chained to this one. The results of the two action blocks (this action block and the action block you select) are compared using the logic you select in the **Using Operation** field. |

| Field | Description | |
|---|---|---|
| **Using Operation** | Selects the logic to be used to chain the user-configured trip status (set in the **Chain Selected Block Status** field) of an action block (set in the **Action Block** field) to the current action block's **Bypass Block Trip Status** (shown on the Bypass tab). Possible options are: | |
| | **AND** | If the Action Trip Status of the chained Action Block instance and the current Action Block instance are both Active, the Chain Block Trip Status is set to Active. |
| | **OR** | If either the Action Trip Status of the chained Action Block instance or the current Action Block instance are Active, the Chain Block Trip Status is set to Active. |
| | **NAND** | If the Action Trip Status of the chained Action Block instance and the current Action Block instance are both Active, the Chain Block Trip Status is set to Inactive. Any other combination of Active and Inactive causes the Chain Block Trip Status to be Active. |
| **Chain Preset Delay Time** | Sets the value for the delay timer in seconds. This is the number of seconds that a chain combination must remain active, before the **Chain Block Trip Status** becomes active. | |
| **Chain Elapsed Delay Time** | Shows the delay time elapsed in seconds. | |
| **This Block Is The End Of The Chain** | Indicates the current action block is the last in the chain. | |
| **Chain Selected Block Status** | Selects which status (from the action block selected in the **Action Block** field) chained to this action block. | |
| | **Block Status** | The **Logic Trip Status** defined on the Action Block – General display. |
| | **Chain Status** | The **Chain Block Trip Status** defined on the Action Block – Chain display.<br>**Note**<br>This is typically used in chains of more than two action blocks. |
| | **Output Status** | The **Action Trip Status** defined on the Action Block – General display. |

| Field | Description |
|---|---|
| **Chain Block Trip Status** | This **read-only** field shows the status of this action block result, with the action block it is chained to. Possible values are Active or Inactive. |

5. Select **Save** to save any changes you make to this display.

# 4.27 Math Blocks

Math Blocks perform mathematical equations using live variables from the system as inputs. Each calculation is updated once per second. The Math Blocks display is divided into three sections: Input Variables, Calculation, and Results. DeltaV FB3000 RTUs allow you to dynamically resize the number of instances to fit your specific needs on the Control Setup display.

**Input Variables** – Use this section to define up to four parameters to be used as variables (A, B, C, and D) in the Calculation section. You can enter a description for each variable.

**Calculation** – Use this section to enter up to three mathematical equations (X, Y, and Z) using variables defined in the Input Variables section (A, B, C, or D), constants, and operators. Equations can be up to 40 characters in length. Each equation is checked for correct syntax before it can be evaluated. You can use standard math functions (POW, EXP, LOG, SQRT, etc.), and double precision floating point math is used throughout the equation.

**Note**

Boolean logic is **not** supported.

**Results** – Use this section to display the results of each equation (X, Y, and Z) entered into the Calculation section. You can enter a description for each result. You can also configure the system to write the result value to a specific parameter in the database.

**Note**

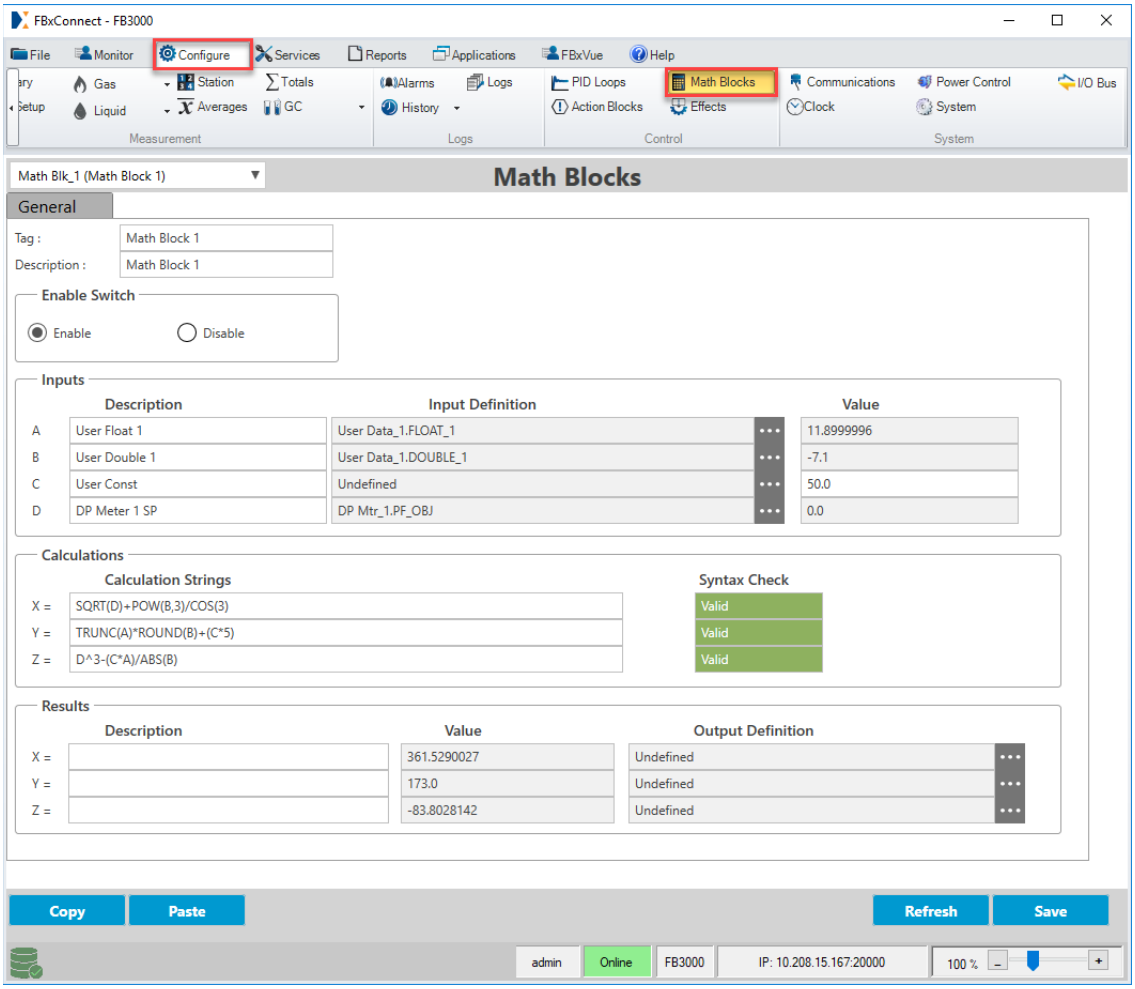
Logic and syntax validity checks are **not** performed until you select **Enable** in the **Enable Switch** field.

To access this display:

1. Select **Configure > Math Blocks** from the DeltaV FBxConnect configuration software main menu.

2. Click ▼ in the drop-down list at the top of the display and select an instance to configure.

**Figure 328. Math Blocks**




3. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. | |
| **User Enable Switch** | Sets the status of the current math block instance. | |
| | **Enable** | Input variables are updated and calculations are performed. |

| Field | Description | |
|---|---|---|
| | **Disable** | No input variables are updated and no calculations are performed. |
| **Input Variables** | Use the fields in this section to configure up to four variables (**A**, **B**, **C**, and **D**) for use in math block calculations. You can use a parameter to automatically provide a value or manually enter a value to use as the variable. | |
| | **Description** | Sets a 20-character text description for the input variable. |
| | **Input Definition** | Click ••• to open a Point Picker dialog and select a live input to use in the calculation. You can select any numerical parameter from the FB Series product database. When integers are selected, they are converted to floating point values.<br>**Note**<br>When an input is not required, this field should be set to **Undefined**. |
| | **Value** | When a parameter is defined in the Input Definition field, this **read-only** field shows the value of the defined parameter. When no parameter is defined in the Input Definition field, enter a value to use as an input variable. |
| **Calculation** | Use this section to configure up to three equations (**X**, **Y**, and **Z**). | |
| | **Enter Calculation String** | Enter the calculation to be solved using Input Variables (**A**, **B**, **C**, **D**, **X**, **Y**, **and Z**), constants, operators, and functions. For more details on the available operators and functions, refer to Supported Operators and Functions. |
| | **Validity Check** | The syntax is checked for validity when the **Enable Switch** field is set to **Enable**. Possible values are Valid (the calculation string has no issues) or Invalid (the calculation string has a problem or is empty). |
| **Results** | This section shows the results for the three equations entered in the Calculation section (**X**, **Y**, and **Z**). | |

| Field | Description | |
|---|---|---|
| | **Description** | Sets a description (up to 20-characters) for the calculation result value. |
| | **Value** | This **read-only** field shows the numerical result for the equation.<br>**Note**<br>When an equation is considered invalid, the value is set to 0.0. |
| | **Optional Output Definition** | Used to "push" the result value out to a user selected parameter somewhere else in the database (for example, a User Data float, or an Analog Output override value). Click ••• to open a Point Picker dialog and select a parameter. Any read/write numerical parameter from the FB Series product's database can be selected. |

4. Select **Save** to save any changes you make to this display.

## 4.27.1 Supported Operators and Functions

You can use the following operators and functions in math block calculation strings:

**Table 50. Supported Operators**

| Symbol | Function | Description | Example |
|---|---|---|---|
| + | Addition | Add two numbers | A+B or (A+B)+C |
| - | Subtraction | Subtract two numbers | A-B or (A-B)-C |
| * | Multiplication | Multiply two numbers | A*B or (A*B)*C |
| / | Division | Divide two numbers | A/B or (A/B)/C |
| ^ | Exponent | Take one number to the power of another | A^B |

**Table 51. Supported Functions**

| Abbreviation | Function | Description | Example |
|---|---|---|---|
| ABS | Absolute Value | Returns the absolute value of a number | ABS(A) |
| SQRT | Square Root | Returns the square root of a number | SQRT(A) |
| LOG10 | Base 10 Log | Returns the logarithm (base 10) of a number | LOG10(A) |
| LOG | Natural Log | Returns the logarithm (base e) of a number | LOG(A) |
| EXP | Exponent | Returns the value of an “e” to the power of a number | EXP(A) |
| POW | Power | Returns the result of a number raised to a power | POW(A,B) |
| MOD | Modulus | Returns the remainder of division | MOD(A,B) |
| ROUND | Round | Rounds a value to the nearest whole number | ROUND(A) |
| TRUNC | Truncate | Truncates a value to a whole number | TRUNC(A) |
| SIN | Sine | Returns the sine of the number | SIN(A) |
| COS | Cosine | Returns the cosine of the number | COS(A) |
| TAN | Tangent | Returns the tangent of the number | TAN(A) |

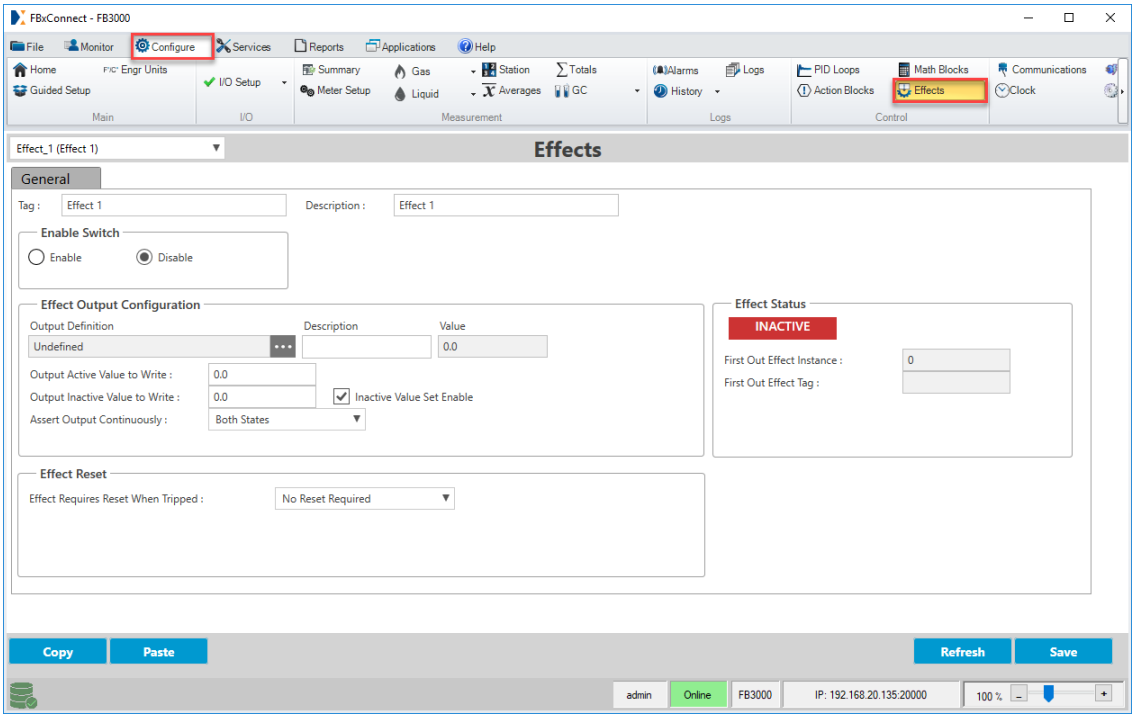
# 4.28 Effects

Effects are configurable custom logic components that drive a selected FB Series product parameter to a user defined value. They are similar to the concept of “cause and effect,” where the action block replaces the “cause” and is used to activate one or more effects. DeltaV FB3000 RTUs allow you to dynamically resize the number of instances to fit your specific needs on the Control Setup display.

To access this display:

1. Select **Configure > Effects** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select an instance to configure.

**Figure 329. Effects**




3. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. | |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. | |
| **Enable Switch** | Sets the status of the selected Effects instance. | |
| | **Enable** | The effect is evaluated and logic is performed. |
| | **Disable** | No logic is performed. |

| Field | Description | |
|---|---|---|
| **Effect Output Configuration** | Use the fields in this section to configure an output parameter driven by the effect. | |
| | **Output Definition** | Click ••• to open a Point Picker dialog and select an output parameter to be driven by the effect. You can select any read/write numerical parameter from the FB Series product's database. If you select an integer, they are converted to floating point values.<br>**Note**<br>When an output is not required, this field should be set to **Undefined**. |
| | **Description** | Sets a description (up to 20-alphanumeric characters) for the output parameter. |
| | **Value** | This **read-only** field shows the current numerical value of the defined output parameter. |
| | **Output Active Value to Write** | Sets the value written to the **Output Variable Param Reference** when the effect is tripped (Active). |
| | **Output Inactive Value to Write** | Sets the value written to the **Output Variable Param Reference** when the effect is not tripped (Inactive). |
| | **Inactive Value Set Enable** | Selects if the value configured in the **Output Inactive Value to Write** field is used. If unchecked, this value is not written to the defined output parameter when the effect is not tripped (inactive). |
| | **Assert Output Continuously** | Click ▼ to select how the system writes the values defined in the **Output Active Value to Write** and **Output Inactive Value to Write** fields to the effect output parameter defined in the **Output Variable Parameter Reference** field.<br>• **Neither State** – The system writes the value configured in the **Output Active Value to Write** field to the output parameter one time when the **Effect Status** changes to **Active**. and writes the value configured in the **Output Inactive Value** |

| Field | Description | |
|---|---|---|
| | | **to Write** field to the output parameter one time when the **Effect Status** changes to **Inactive**.<br>• **Active State Only** – The system continuously writes the value configured in the **Output Active Value to Write** field to the output parameter while the **Effect Status** is **Active**.<br>• **Inactive State Only** – The system continuously writes the value configured in the **Output Inactive Value to Write** field to the output parameter while the **Effect Status** is **Inactive**.<br>• **Both States** – The system continuously writes the value configured in the **Output Active Value to Write** field to the output parameter while the **Effect Status** is **Active**, and continuously writes the value configured in the **Output Inactive Value to Write** field to the output parameter while the **Effect Status** is **Inactive**. |
| **Effect Status** | Shows the current trip status of the effect. Possible values are Active or Inactive. | |
| | **First Out Effect Instance** | Shows the numerical value of the associated Action Block (1 through 30) that first tripped this effect to go active. If the effect is associated with multiple action blocks (all of which could be active), this field indicates which Action Block was active first. |
| | **First Out Effect Tag** | Shows the tag of the associated Action Block that first tripped this effect to go active. |
| **Effect Reset** | Use the fields in this section to configure parameters used to manually reset the effect. | |
| | **Effect Requires Reset When Tripped** | Select this option if the effect requires a manual reset (user intervention). When selected, the effect will not leave the active state until explicitly told to do so via a reset. If this option is not selected, the effect moves to the inactive state automatically when the action block(s) that tripped it become inactive. |

| Field | Description | |
|---|---|---|
| | **Reset Definition** | Click ••• to open a Point Picker dialog and select a parameter used to force a manual reset of the active effect. When the effect is ready to be reset, any non-zero value written to the referenced parameter resets the effect. For example, you might select a discrete input or a User Data byte value. Any read/write numerical parameter from the FB Series product's database can be selected.<br>**Note**<br>You **must** select **Reset Required** in the **Effect Requires Reset When Tripped** field and **Save** your changes to view this field. |
| | **Reset Command** | If a dynamic external input is not required to reset a "latched" effect, this field can be used to reset the effect. Any non-zero value written to this parameter will perform the effect reset.<br>**Note**<br>You **must** select **Reset Required** in the **Effect Requires Reset When Tripped** field and **Save** your changes to view this field. |

4. Select **Save** to save any changes you make to this display.

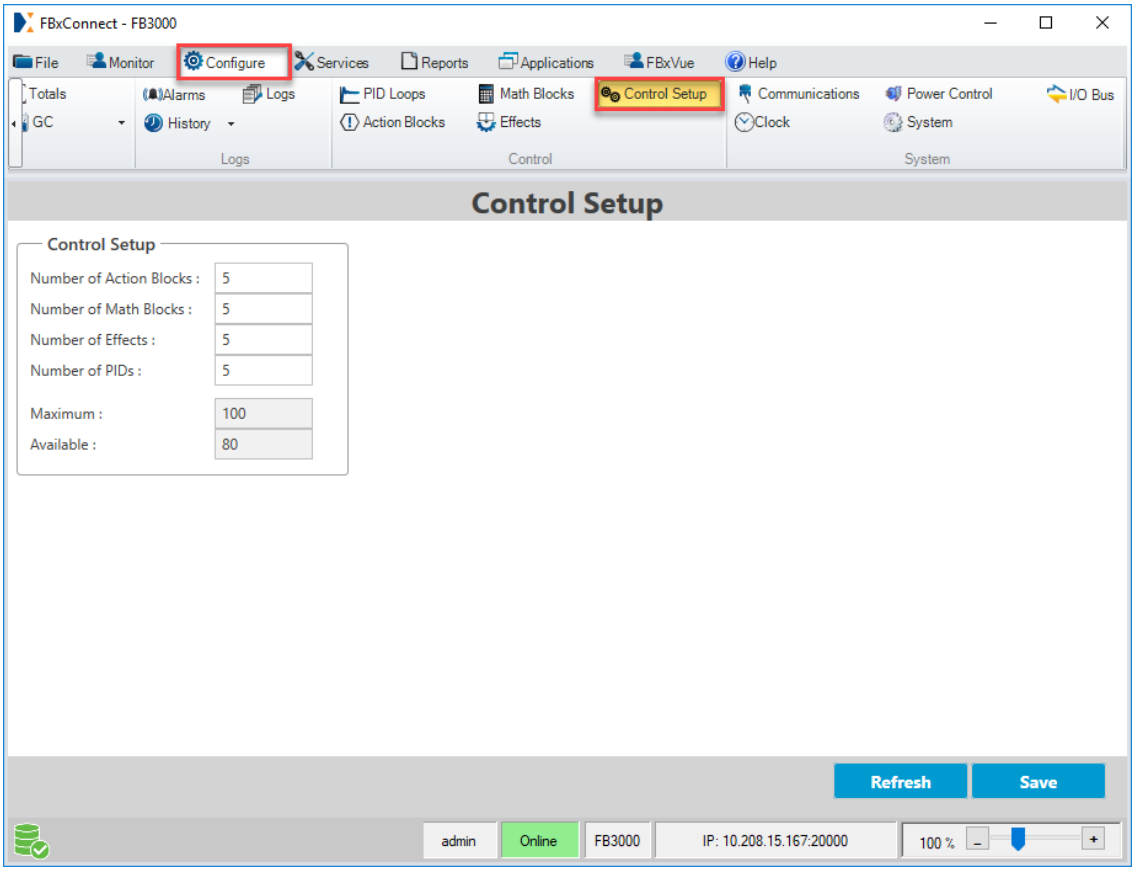
## 4.29 Control Setup

Use this display to configure the number of Action Blocks, Math Blocks, Effects, and PID Loops instances available on your DeltaV FB3000 RTU. The DeltaV FB3000 RTU allows you to dynamically resize the number of instances for each control type (Action Blocks, Math Blocks, Effects, and PID Loops) to fit your specific needs. Enter the number of desired instances for each control type and save your changes.

To access this display:

1. Select **Configure > Control Setup** from the DeltaV FBxConnect configuration software main menu.

**Figure 330. Control Setup**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Number of Action Blocks** | Sets the number of Action Blocks instances available on your DeltaV FB3000. |
| **Number of Math Blocks** | Sets the number of Math Blocks instances available on your DeltaV FB3000. |
| **Number of Effects** | Sets the number of Effects instances available on your DeltaV FB3000. |
| **Number of PIDs** | Sets the number of PID Loops instances available on your DeltaV FB3000. |

| Field | Description |
|---|---|
| **Maximum** | This **read-only** field shows the total number of control instances you can configure on your DeltaV FB3000. You can assign these instances to Action Blocks, Math Blocks, Effects, and PID Loops in any combination using the fields above, but the total of those instances cannot exceed this number. |
| **Available** | This **read-only** field shows the remaining control instances not yet assigned to Action Blocks, Math Blocks, Effects, or PID Loops. |

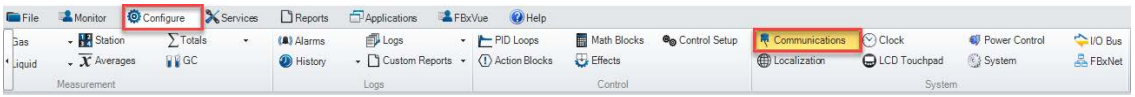
3. Select **Save** to save any changes you make to this display.

# 4.30 Communications

Use this display to configure the communications ports on your FB Series product.

To access this display, select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.

**Figure 331. Communications**




**CAUTION**

When making multiple DeltaV FBxConnect configuration software connections to the same FB Series product (as with a remote and a local connection), be aware that the changes one connection makes to the FB Series product may not be immediately visible to other connections and may even require the other connections to restart DeltaV FBxConnect configuration software before changes become visible. For example, simple changes (such as changes to setpoints) may be immediately visible to all connections, but changing the number of meters, configuring I/O, adding/deleting menu items, or other major configuration changes may require re-establishing the connection using DeltaV FBxConnect configuration software.

The Communications display contains the following items:

General – Use this display configure general settings for the selected port, including enabling the port and setting the protocol used by the port.

DNP3 – Use this pop-up display to configure protocol options for communications ports using DNP3 protocol.

Modbus Slave – Use this pop-up display to configure protocol options for communications ports using Modbus Slave protocol.

Modbus Master – Use this pop-up display to configure protocol options for communications ports using Modbus Master protocol.

### 4.30.1 Communications – General

Use this display to configure general settings for the selected port, including enabling the port and setting the protocol.

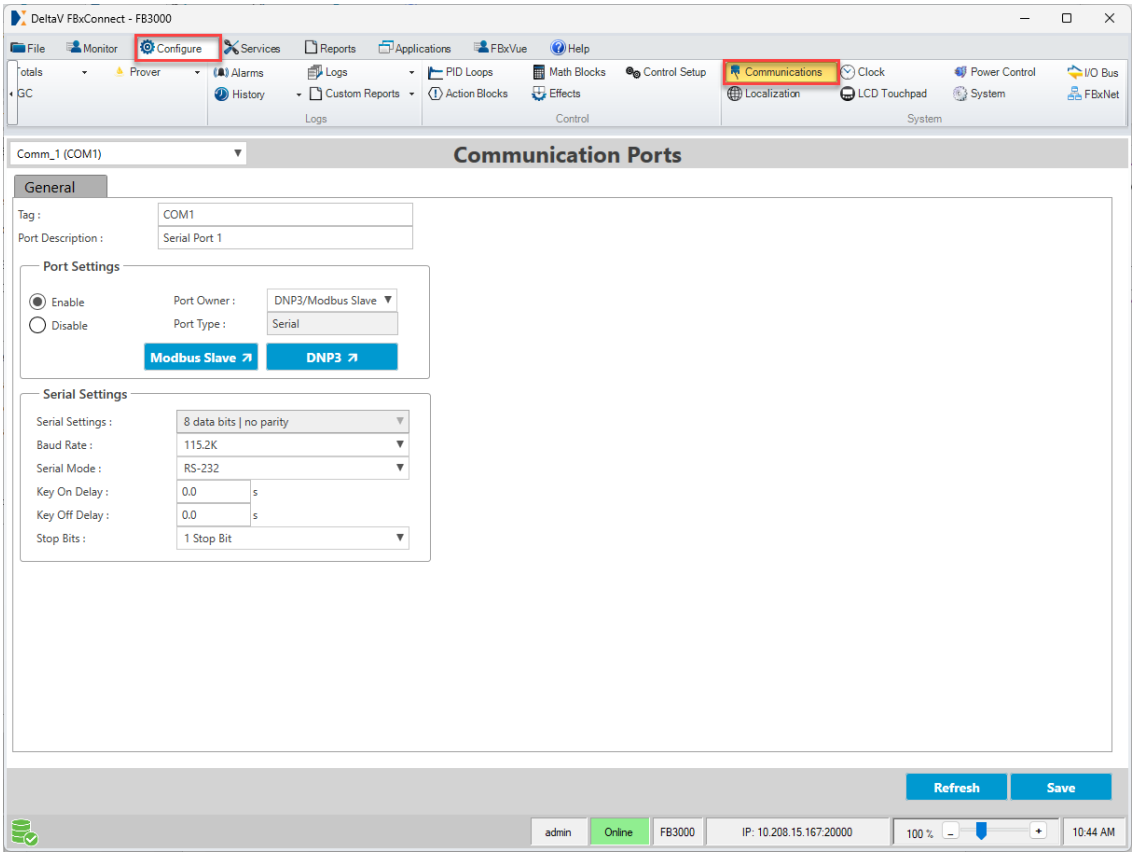
To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the drop-down list at the top of the display and choose a communications port to configure.

**Note**

FBxDesigner™ connections are currently supported **only** on **Comm5 (ENET1)**.

**Figure 332. Communications – General (Serial port)**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected communications port. | |
| **Port Description** | Sets a description (up to 20-alphanumeric characters) for the selected communications port. | |
| **Port Settings** | Sets if communications are allowed using the selected port. | |
| | **Enable** | Allow communications using the selected port. |

| Field | Description | |
|---|---|---|
| | **Disable** | Prevent communications using the selected port.<br><br>**WARNING**<br><br>To prevent flow calculation errors, do not disable a communications port when the Port Owner is MVS4088B and the 4088B's inputs are used for flow calculations. If you need to temporarily disable a specific 4088B, you can select **Disable** in the **Transmitter Scanning** field for that single 4088B. For more information, refer to 4088B – General tab. |
| **Port Owner** | Click ▼ to set the communications protocol used on the selected port. Possible protocols include:<br>**Note**<br>This field applies **only** to **Serial** and **Wi-Fi** communications ports. | |
| | **DNP3/ Modbus Slave** | Sets the selected port to **only** communicate using DNP3 protocol messages and to act as a Modbus slave device. |
| | **DNP3** | Sets the selected port to **only** communicate using DNP3 protocol messages. |
| | **Modbus Slave** | Sets the selected port to allow the FB Series product to act **only** as a Modbus slave device. |
| | **Master Modbus** | Sets the selected port to allow the FB Series product to poll Modbus devices. |
| | **MVS4088B** | Sets the selected port to **only** communicate with 4088B devices. The FB Series product automatically configures settings to match the defaults of the 4088B's serial port.<br>**Note**<br>This field applies **only** to the **Com3** or **Com4** communications port. |
| | **Application Master** | Sets the selected port to **only** communicate as a master device for an installed application. |

| Field | Description | |
|---|---|---|
| | **Application Slave** | Sets the selected port to **only** communicate as a slave device for an installed application. |
| | **LCD Touchpad** | Sets the selected port to **only** communicate with an attached display. |
| | **Printer** | Sets the selected port to **only** communicate with an attached printer. |
| **Port Type** | This **read-only** field shows the type of communications port currently selected. | |
| **Modbus Slave** | Select this button to open the Modbus Slave pop-up display and configure Modbus Slave protocol options.<br>**Note**<br>This button appears **only** if you select either **DNP3/Modbus Slave** or **Modbus Slave** in the **Port Owner** field. | |
| **DNP3** | Select this button to open the DNP3 pop-up display and configure DNP3 Slave protocol options.<br>**Note**<br>This button appears **only** if you select either **DNP3/Modbus Slave** or **DNP3** in the **Port Owner** field. | |
| **Modbus Master** | Select this button to open the Modbus Master pop-up display and configure Modbus Master protocol options.<br>**Note**<br>This button appears **only** if you select **Modbus Master** in the **Port Owner** field. | |
| **Serial Settings** | Use these fields to configure the selected serial port.<br>**Note**<br>These fields appear **only** if you select a **Serial** port in the Communications drop-down list. | |

| Field | Description | |
|---|---|---|
| | **Serial Settings** | Click ▼ to set the number of data bits contained in an asynchronous byte and the parity value used for communications on the port.<br>**Note**<br>Communications with DeltaV FBxConnect configuration software support **only** the default option of **8 data bits/no parity**. |
| | **Baud Rate** | Click ▼ to set the transmit and receive data baud rate (in bits per second) for the communications port. |
| | **Serial Mode** | Click ▼ to set the type of interface used by the communications port. Possible options are RS-232, RS-485 2-Wire (No Termination), RS-485 2-Wire (Terminated), RS-485 4-Wire (No Termination), and RS-485 4-Wire (Terminated).<br>**Note**<br>Comm_1 and Comm_2 **must** have the same setting for Serial Mode. |
| | **Key On Delay** | Sets the time (in seconds) from RTS signal activation to the transmission of the first character.<br>**Note**<br>This field **does not** appear if you select **MVS4088B** in the Port Owner field. |
| | **Key Off Delay** | Sets the time (in seconds) from the transmission of the last character to RTS signal de-activation.<br>**Note**<br>This field **does not** appear if you select **MVS4088B** in the Port Owner field. |
| | **Stop Bits** | Sets the number of stop bits contained in an asynchronous byte, or character. The default is **1**.<br>**Note**<br>This field appears **only** if you select either **DNP3/Modbus Slave**, **Modbus Slave**, **Modbus Master**, **Application Master**, **Application Slave**, or **Printer** in the **Port Owner** field. |

| Field | Description | |
|---|---|---|
| **IP Settings** | Use these fields to configure the selected Ethernet port.<br>**Note**<br>These fields appear **only** if you select the **Ethernet** port in the Communications drop-down list. | |
| | **IPv4 IP Address** | Sets the IP address for the FB Series product when using the Ethernet port.<br>**Note**<br>You **must** have separate IP Addresses for each Ethernet port. |
| | **Gateway Address (IPv4)** | Sets the gateway address for the FB Series product. The gateway address identifies the network node that serves as an entrance to the network on which the FB Series product resides. |
| | **Subnet Mask (IPv4)** | Sets a value for the subnet mask portion of the IP address. The subnet mask indicates the subnet to which an IP address belongs. |
| | **MAC 48-bit Address** | This **read-only** field shows the MAC address for the FB Series product when using the Ethernet port. |
| **Properties** | Use these fields to enable or disable communications protocols on the Ethernet port, and to set the IP port number used by each protocol.<br>**Note**<br>These fields appear **only** if you select the **Ethernet** port in the Communications drop-down list**.** | |
| | **Protocol** | Place a check mark next to the communications protocols that are enabled on the Ethernet port. Possible options are DNP3, Modbus Slave, HART_IP (slave), and Modbus Master.<br>**Note**<br>• You **must** have a physical HART module to enable HART protocol.<br>• If you enable HART protocol on the port, you also **must** enable Pass Through Mode on the HART module for the HART pass through feature to work. For more information, refer to HART I/O. |

| Field | Description | |
|---|---|---|
| | **Port #** | Sets the IP port number to be used by the protocol.<br>**Note**<br>**Do not** enter **9009** for this number; it is reserved by FBxNet. |
| | **Enable** | Place a check mark next to each protocol to enable the FB Series product to use the selected communication protocol on the Ethernet port. Removing a check mark disables use of the selected protocol on the Ethernet port. |
| | **Allow Application Use of Port** | Place a check mark next to this option to allow applications installed on your DeltaV FB3000 RTU to communicate using the selected Ethernet port. |
| **IP Connections** | Use these fields to configure the number of connections and the protocols used with communications over the Ethernet ports.<br>**Note**<br>• These fields appear **only** if you select either **Comm_5** or **Comm_6** in the Communications drop-down list.<br>• FBxNet and Modbus Master Ethernet connections are managed separately and **do not** count towards the Maximum Number of Connections. | |
| | **Maximum Number of Connections** | This **read-only** field shows the maximum number of connections allowed on the selected Ethernet port. |
| | **Current Number of Connections** | This **read-only** field shows the current number of connections active on the selected Ethernet port. |
| | **Reserved** | Sets, for each protocol, the minimum number of connections dedicated to using only that protocol on the selected Ethernet port. For example, if you enter 6 in the DNP3 row, you reserve at least 6 DNP3 connections of DNP3 type, leaving 14 connections (20 max - 6 reserved) available to use with any type of protocol, including DNP3. |

| Field | Description | |
|---|---|---|
| | **Active** | This **read-only** field shows, for each protocol, the current number of connections using the protocol on the selected Ethernet port. |
| | **Current Application Connections** | This **read-only** field shows the current number of application connections active on the selected Ethernet port.<br>**Note**<br>These connections **do not** count towards the maximum number of connections. |

**4.** Select **Save** to save any changes you make to this display.

### 4.30.1.1 Port Owners

You can configure the port owner (communications protocol) used by each communications port. Possible options for each communications port type are listed below:

**Table 52. Port Owners**

| Communications Port Type | Port Owner |
|---|---|
| **Serial** | • DNP3<br>• DNP3/Modbus Slave<br>• Modbus Slave<br>• Modbus Master<br>• MVS4088B<br>• Application Master<br>• Application Slave<br>• LCD Touchpad<br>• Printer |

| Communications Port Type | Port Owner |
|---|---|
| **Ethernet** | One session dedicated to:<br>• Modbus Master<br>Six sessions configurable as:<br>• DNP3<br>• Modbus Slave<br>• HART IP Slave |

**Note**

For a detailed description of the **DNP3 protocol** usage, refer to the *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000 RTU)* (D301858X012).

## 4.30.2 Communications – DNP3

Use this pop-up display to configure options when using the DNP3 protocol. FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU can be implemented as DNP3 outstations for communication and configuration with DeltaV FBxConnect Launchpad software and SCADA hosts. DNP3 is an open and public protocol used to ensure standards-based inter-operability between DNP3 outstations and a SCADA host.

FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU use DNP3 tunnel command messaging for RDI data collection and FB Series product configuration. A single message size can be 4096 bytes in size. Messages tunnel using the DNP3 string object (group 110).

**Note**

- This pop-up display is available **only** if you select either **DNP3** or **DNP3/Modbus Slave** in the **Port Owner** drop-down list on the Communications – General display.
- For a detailed description of the **DNP3 protocol** usage, refer to the *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000RTU)* (D301858X012).

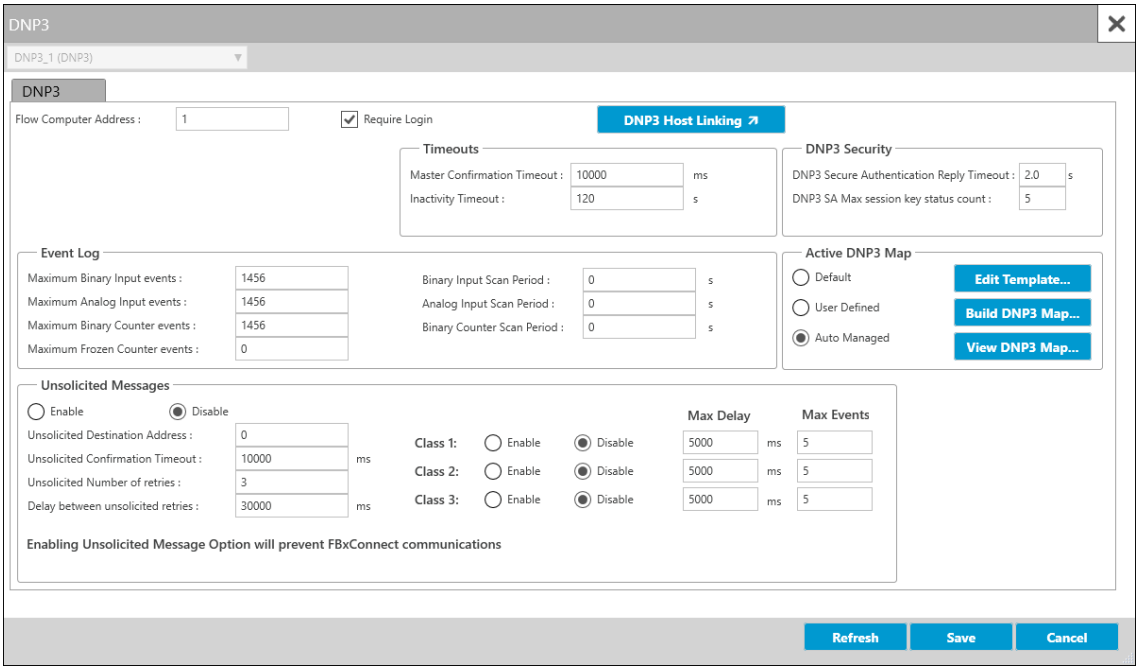
To access this pop-up display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.

2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.

3. Select the **DNP3** button. The DNP3 pop-up display opens.

**Figure 333. Communications – DNP3**




4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Flow Computer Address** | Sets the address of the FB Series product. Valid values are 0 – 65519. |
| **Require Login** | Place a check mark to require login credentials be entered for all requests using DNP3 protocol on the selected communication port.<br>**Note**<br>If Require Login is Disabled, activity for the selected communication port is logged under user account UNSECURED_DNP3. |

| Field | Description |
|---|---|
| **DNP3 Host Linking** | Select to open the DNP3 Host Linking display and define which communications ports on the FB Series product are used to communicate with SCADA hosts using DNP3 protocol. For more information, refer to DNP3 Host Information.<br>**Note**<br>• Events are divided evenly between each configured host.<br>• The maximum number of events (configured in the **Event Log** frame) for each communications port decreases for each DNP3 Host Link you add. |
| **TCP/IP** | Enables or disables DNP3 protocol communications for this port.<br>**Note**<br>This field applies **only** to the Ethernet port. |
| **TCP/IP Port** | Sets the communications IP port number on the FB Series product to be used by DNP3 protocol.<br>**Note**<br>• This field applies **only** to the Ethernet port.<br>• **Do not** enter **9009** for this number; it is reserved by FBxNet. |
| **Master Confirmation Timeout** | Sets the length of time (in milliseconds) the slave DNP3 device waits for a confirmation message from the master for a response sent to a master device before retrying the request. The default is 10000 milliseconds. |
| **Inactivity Timeout** | Sets the length of time (in seconds) without a valid DNP3 message being received before the user login is timed out. The default is 120 seconds. |
| **DNP3 Secure Authentication Reply Timeout** | Sets the length of time (in seconds) the system waits for the master to respond to a request.<br>**Note**<br>• This field is applicable only if you have SAv5 enabled. For more information, refer to Apply Security File.<br>• For security, the length of time you enter should be kept as short as possible.<br>• Care needs to be taken when tuning this parameter as setting the value too short relative to the network speed can cause failure to communicate with hosts. |

| Field | Description |
|---|---|
| **DNP3 SA Max session key status count** | Sets the number of session key exchanges that, when exceeded, causes the system to log an event in the security log. |
| **Maximum Binary Input Events** | Sets the number of binary events to be maintained for a host device to request. Events are intended to be retrieved periodically. If the event buffers become full, then the device stops collecting events until existing events are retrieved.<br>The maximum number of events via database parameters are:<br>• DeltaV FB3000 RTU = 1456<br>The maximum number of events via Host Linking are:<br>• DeltaV FB3000 RTU = 65535<br>Refer to *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000RTU)* (D301858X012) for a list of supported binary input points.<br>**Note**<br>• If the desired maximum number of events is 0, then the **Binary Input Scan Period** field should be set to 0 (disabled).<br>• The maximum number of events decreases for each DNP3 Host Link you add (configured on the DNP3 Host Linking display). |
| **Maximum Analog Input Events** | Sets the number of analog input events to be maintained for a host to request. Events are intended to be retrieved periodically. If the event buffers become full, then the device stops collecting events until existing events are retrieved.<br>The maximum number of events via database parameters are:<br>• DeltaV FB3000 RTU = 1456<br>The maximum number of events via Host Linking are:<br>• DeltaV FB3000 RTU = 65535<br>**Note**<br>• If the desired maximum number of events is 0, then the **Analog Input Scan Period** field should be set to 0 (disabled).<br>• The maximum number of events decreases for each DNP3 Host Link you add (configured on the DNP3 Host Linking display). |

| Field | Description |
|---|---|
| **Maximum Binary Counter Events** | Sets the number of binary counter events to be maintained for a host to request. Events are intended to be retrieved periodically. If the event buffers become full, then the device stops collecting events until existing events are retrieved.<br>The maximum number of events via database parameters are:<br>• DeltaV FB3000 RTU = 1456<br>The maximum number of events via Host Linking are:<br>• DeltaV FB3000 RTU = 65535<br>**Note**<br>• If the desired maximum number of events is 0, then the **Binary Counter Scan Period** field should be set to 0 (disabled).<br>• The maximum number of events decreases for each DNP3 Host Link you add (configured on the DNP3 Host Linking display). |
| **Maximum Frozen Counter Events** | Sets the number of the most recent frozen counter events to be maintained for a host to request.<br>**Note**<br>This feature is **not** currently supported. |
| **Binary Input Scan Period** | Sets the scan period (in seconds) for the binary input group. A value of 1 indicates that all supported binary input points are scanned for changes every one second. The default is 0 (scanning disabled). Refer to *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000RTU)* (D301858X012) for a list of supported binary input points.<br>**Note**<br>Scanning the database increases CPU loading. |
| **Analog Input Scan Period** | Sets the scan period (in seconds) for the analog input group. A value of 1 indicates that all supported analog input points are scanned for changes every one second. Refer to *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000RTU)* (D301858X012) for a list of supported analog input points. |
| **Binary Counter Scan Period** | Sets the scan period (in seconds) for the counter group. A value of 1 indicates that all supported binary input points are scanned for changes every one second. |

| Field | Description | | |
|---|---|---|---|
| **Active DNP3 Map** | Specifies the DNP3 map used by the FB Series product.<br>**Note**<br>Changing this option will also change the DNP3 map index used by the FB Series product. After saving your changes, you **must** update your SCADA system with the new DNP3 map to ensure uninterrupted communication. | | |
| | **Default** | The FB Series product uses the default DNP3 map. | |
| | **User Defined** | The FB Series product uses a user-defined DNP3 map. If you select this option, save your changes and use the button below to define the DNP3 mapping used by the FB Series product. | |
| | | **DNP3 Mapping** | Select to open the DNP3 Map Table and define the DNP3 mapping used by the FB Series product. For more information, refer to DNP3 Map Table.<br>**Note**<br>This button appears **only** if you select **User Defined** and **Save** your changes. |
| | **Auto Managed** | The FB Series product uses Object Mapping Template files to define the DNP3 map. If you select this option, save your changes, and use the buttons below to define the DNP3 mapping used by the FB Series product.<br>**Note**<br>The following buttons appear **only** if you select **Auto Managed** and **Save** your changes. | |
| | | **Edit Template** | Select this button to open the Object Mapping Template Editor and edit the template. For more information, refer to Creating an Object Mapping Template. |

| Field | Description | | |
|---|---|---|---|
| | | **Build DNP3 Map** | Select this button to open the DNP3 Map Generator and immediately begin building the DNP3 map based on the currently configured Object Mapping Template files. For more information, refer to Building a DNP3 Map. |
| | | **View DNP3 Map** | Select this button to open a **read-only** version of the currently configured DNP3 map. For more information, refer to Viewing a DNP3 Map. |
| **Unsolicited Messages** | Enables the FB Series product to send unsolicited messages on the selected port.<br>**Note**<br>Enabling unsolicited messages will prevent DeltaV FBxConnect configuration software communications on the selected port. | | |
| **Unsolicited Destination Address** | Sets the destination device address to use when sending unsolicited messages to a host system. | | |
| **Unsolicited Confirmation Timeout** | Sets the length of time (in milliseconds) the FB Series product waits for a confirmation message from the host device for an unsolicited data transmission before marking the message as retry needed. | | |
| **Unsolicited Number of Retries** | Specifies the maximum number of unsolicited retries to the host before discarding the message. | | |
| **Delay Between Unsolicited Retries** | Sets the length of time (in milliseconds) to wait after an unsolicited confirmation from the host before retrying the unsolicited message to the host device. | | |
| **Class 1/2/3** | Enables unsolicited messages for class 1 (highest importance), class 2, and class 3 (lowest importance) events. Sends out an unsolicited message based on the maximum time (in milliseconds) or when the maximum number of events have been queued for transmission. | | |

| Field | Description |
|---|---|
| **Max Delay** | Sets the maximum amount of time (in milliseconds) before an unsolicited message is generated and sent to the host for class 1, class 2, and class 3 event categories. If this value is set to 5000, the FB Series product sends an unsolicited message to the host every five seconds with any events changes since the last unsolicited message. |
| **Max Events** | Specifies the maximum number of events that will be queued before an unsolicited message is generated and sent to the host for class 1, class 2, and class 3 event categories. |

5. Select **Save** to save any changes you make to this pop-up display.

### 4.30.2.1 DNP3 Host Information

Use this pop-up display to define which communications ports on the FB Series product are used to communicate with SCADA hosts using DNP3 protocol. For the DeltaV FB3000 RTU, you can define up to ten communications ports.

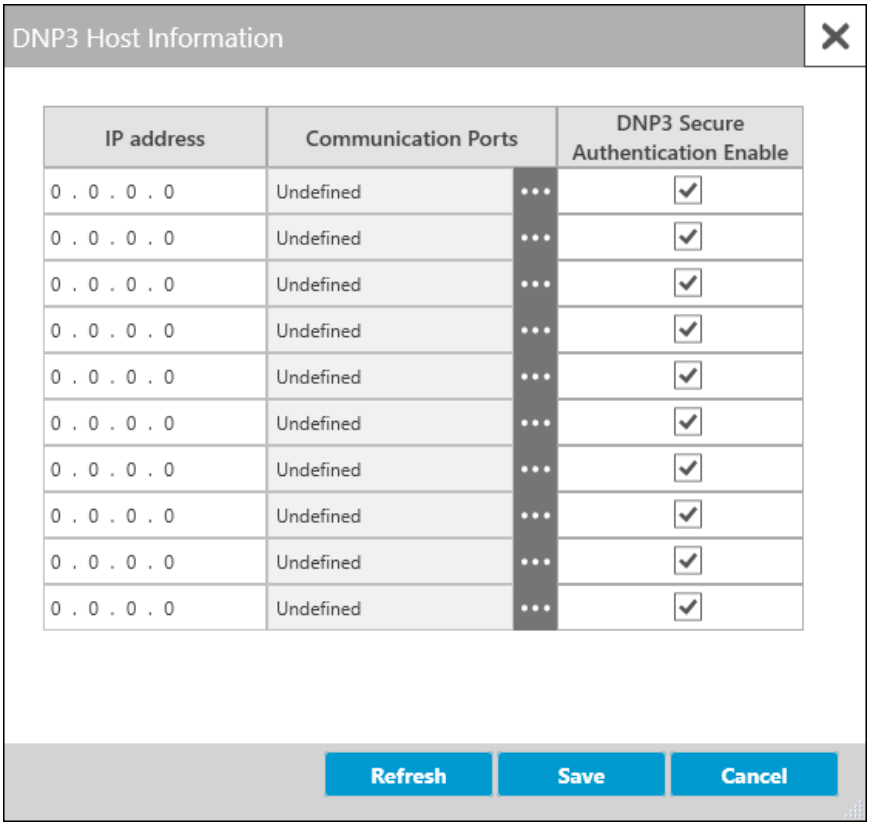
**Note**

It is possible to exceed the maximum number of DNP3 connections (as configured on the Communications – General display) when adding multiple IP addresses to the DNP3 Host Information display without saving between each entry. If you exceed the allowed number, the connections will appear to save but will not work. To avoid this issue, you should save the DNP3 Host Information display after each IP address you enter.

To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port that is configured to use the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.
4. Select the **DNP3 Host Linking** button. The DNP3 Host Information display opens.

**Figure 334. DNP3 Host Information**




5. Click ••• in the Communication Ports field to open a Point Picker dialog and select the desired communications port.

**Note**

- The Port Owner of each selected communications port **must** be set to DNP3 or DNP3/Modbus Slave.
- If you select an Ethernet port, you **must** enter the IP address of the SCADA host in the IP address field.
- Events are divided evenly between each configured host.
- The maximum number of events (configured in the **Event Log** frame on the Communications – DNP3 pop-up display) for each communications port decreases for each DNP3 Host Link you add.

6. The **DNP3 Secure Authentication Enable** checkbox sets if SAv5 is enabled (checked) or disabled (unchecked) for all DNP3 traffic on individual serial ports or specific IP

addresses on Ethernet ports. This is useful if you need to communicate with a host/device that does not support SAv5. The default is checked.

**Note**

This field appears **only** if you have enabled SAv5 on the FB Series product. For more information, refer to Apply Security File.

7. Select **Save** to save any changes you make to this pop-up display.

### 4.30.2.2 DNP3 Map Table

Use this pop-up display to configure the DNP3 groups and point indexes stored in the FB Series product. You can add a parameter to the DNP3 map table by clicking and dragging the parameter onto the desired position in the table or selecting the desired parameter (or referenced parameter) and clicking the **Add** button.

**Note**

For a description of the data types contained in the internal FB Series product database, refer to Native Data Types.

#### DNP3 Mapping Basics

- Different signal types have separate map tables.
- Each entry in a map table is identified by its Point Index.
- You add a device parameter to a Point Index.
- You assign a class to each added parameter. Each class can have a user-defined significance based on your own definition.
- Each parameter belongs to a certain group. Groups enable you to classify the data types within a message. Each group number shares a common point type and a common method of data generation, creation, and collection.
- Variations are different encoding formats for the data types within a group.
- Static data refers to a point's current or most recently recorded value. For binary input points, "static data" refers to the present on/off condition.
- Events are associations with changes in points, such as state changes, measurement at some threshold, or an analog input changing by more than its defined dead band.

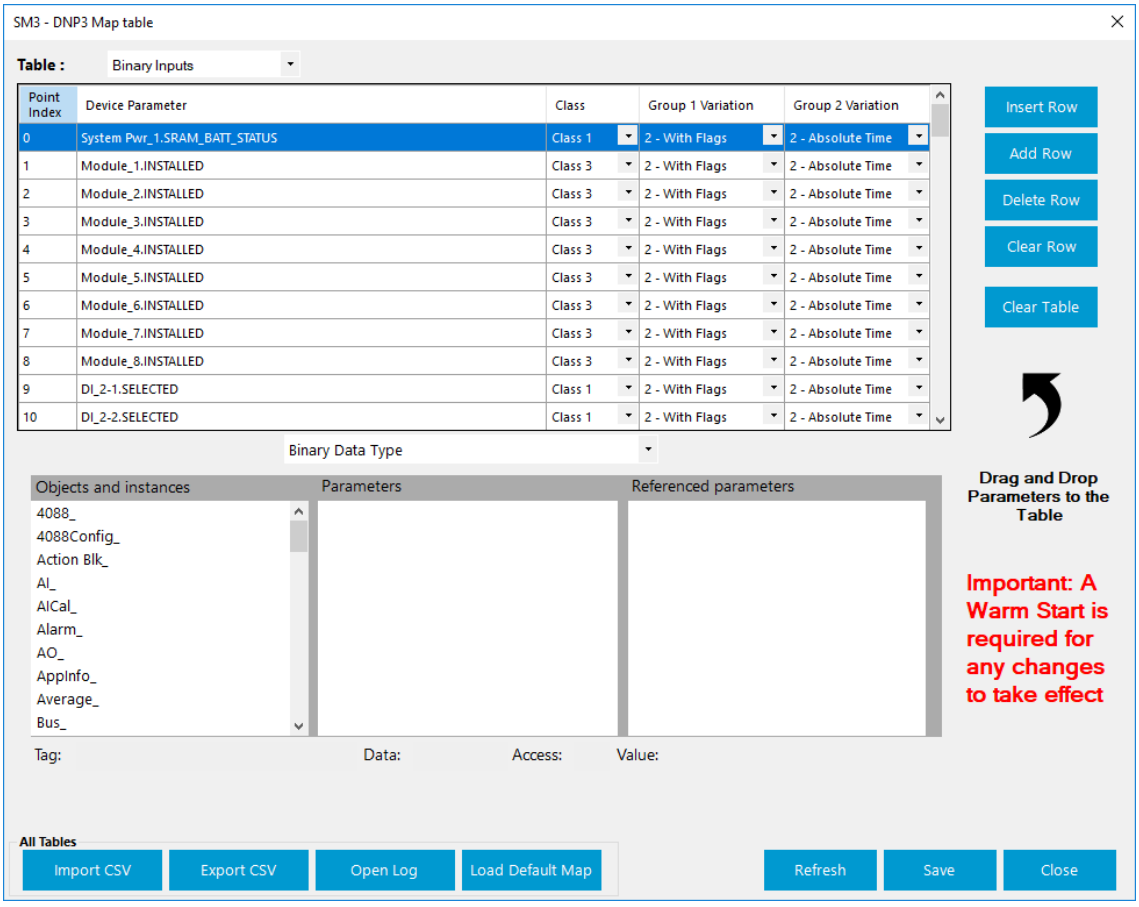
**Note**

For a complete description of DNP3 implementation in the FB Series devices, refer to the *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000RTU)* (D301858X012).

To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.
4. Select **User Defined** in the Active DNP3 Map field.
5. Select **Save** to save your changes. A DNP3 Mapping button appears.
6. Select the **DNP3 Mapping** button. The DNP3 Map Table display opens.

**Figure 335. DNP3 Map Table**




7. A separate map table is used for different signal types. Select ▼ in the Table drop-down list and choose the table with the signal type you want to map. Possible options and the maximum number of points are:

   - Binary Inputs – 65535 points
   - Binary Outputs – 65535 points
   - Analog Inputs – 65535 points
   - Analog Outputs – 65535 points
   - Counters – 65535 points
   - Strings – 65535 points

8. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Point Index** | Identifies the point in the selected table. |

| Field | Description |
|---|---|
| **Device Parameter** | Identifies the parameter in the DeltaV FB3000 RTU. |
| **Class** | Class 1, 2, and 3 are event classes. DNP3 does not assign significance to these event classes. Implementations can use different strategies around these classes, such as assigning highest priority events to class 1 and lowest priority events to class 3. Host devices may request events from one or more of these classes.<br>Click ▼ to assign the selected parameter to a class. Possible options are:<br>• Class 1<br>• Class 2<br>• Class 3<br>• All |
| **Group 1 Variation** | Binary Input Static. Used to report the current value of a binary input point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = CHATTER_FILTER<br>Bit 6 = Reserved, always 0<br>Bit 7 = STATE<br>**Note**<br>This field appears **only** if you select **Binary Inputs** in the Table field. |
| **None** | No variation |
| **1 - Packed Format** | Package format having single bit binary input state. |
| **2 - With Flags** | Package format having single bit binary input state, with status flags. |

| Field | Description |
|---|---|
| **Group 2 Variation** | Binary Input Events. Used to report events related to a binary input point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = CHATT_FILTER<br>Bit 6 = Reserved, always 0<br>Bit 7 = STATE<br>**Note**<br>This field appears **only** if you select **Binary Inputs** in the Table field. |
| **None** | No variation |
| **1 - Without Time** | Package format having single bit binary input state, with status flags |
| **2 - Absolute Time** | Package format having single bit binary input state, with status flags, and the absolute time when the event occurred. |
| **3 - Relative Time** | Package format having single bit binary input state, with status flags, and the relative time when the event occurred. |
| **Group 10 Variation** | Binary Output Static. Used to control or report the state of one or more binary output points. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = Reserved, always 0<br>Bit 6 = Reserved, always 0<br>Bit 7 = STATE<br>**Note**<br>This field appears only if you select **Binary Outputs** in the Table field. |

| Field | Description | |
|---|---|---|
| | **None** | No variation |
| | **1 - Packed Format** | Package format having single bit binary output state. |
| | **2 - With Flags** | Package format having single bit binary output state, with status flags |
| **Group 12 Variation** | Binary Output Command or Control Relay Output Block. Used to perform digital control operations at binary output points.<br>**Note**<br>This field appears **only** if you select **Binary Outputs** in the Table field. | |
| | **None** | No variation |
| | **1 - CROB** | Control Relay Output Block |
| | **2 - PCB** | Pattern Control Block (PCB); this variation is not supported. |
| | **3 - Pattern Mask** | Pattern Control Mask; this variation is not supported. |
| **Group 30 Variation** | Analog Input Static. Used to report the current value of an analog input point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = OVER_RANGE<br>Bit 6 = REFERENCE_ERR<br>Bit 7 = Reserved, always 0<br>**Note**<br>This field appears **only** if you select **Analog Inputs** in the Table field. | |
| | **None** | No variation |
| | **1 - 32 bit w Flag** | Package format containing a 32-bit signed integer, with status flags. |
| | **2 - 16 bit w Flag** | Package format containing a 16-bit signed integer, with status flags. |

| Field | Description | |
|---|---|---|
| | **3 - 32 bit wo Flag** | Package format containing a 32-bit signed integer. |
| | **4 - 16 bit wo Flag** | Package format containing a 16-bit signed integer. |
| | **5 - Float w Flag** | Package format containing a single precision floating point value, with status flags. |
| | **6 - Double w Flag** | Package format containing a double precision floating point value, with status flags. |
| **Group 32 Variation** | Analog Input Events. Used to report events related to an analog input point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = OVER_RANGE<br>Bit 6 = REFERENCE_ERR<br>Bit 7 = Reserved, always 0<br>**Note**<br>This field appears **only** if you select **Analog Inputs** in the Table field. | |
| | **None** | No variation |
| | **1 - 32 bit wo Time** | Package format containing a 32-bit signed integer, with status flags. |
| | **2 - 16 bit wo Time** | Package format containing a 16-bit signed integer, with status flags. |
| | **3 - 32 bit w Time** | Package format containing a 32-bit signed integer, with status flags, and the time when the event occurred. |
| | **4 - 16 bit w Time** | Package format containing a 16-bit signed integer, with status flags, and the time when the event occurred. |
| | **5 - Float wo Time** | Package format containing a single precision floating point value. |

| Field | Description | |
|---|---|---|
| | **6 - Double wo Time** | Package format containing a double precision floating point value. |
| | **7 - Float w Time** | Package format containing a single precision floating point value, and the time when the event occurred. |
| | **8 - Double w Time** | Package format containing a double precision floating point value, and the time when the event occurred. |
| **Group 40 Variation** | Analog Output Status. Used to report the status of an analog output point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = OVER_RANGE<br>Bit 6 = REFERENCE_ERR<br>Bit 7 = Reserved, always 0<br>**Note**<br>This field appears **only** if you select **Analog Outputs** in the Table field. | |
| | **1 - 32 bit w Flag** | Package format containing a 32-bit signed integer, with status flags. |
| | **2 - 16 bit w Flag** | Package format containing a 16-bit signed integer, with status flags. |
| | **3 - Float w Flag** | Package format containing a single precision floating point value, with status flags. |
| | **4 - Double w Flag** | Package format containing a double precision floating point value, with status flags. |
| **Group 41 Variation** | Analog Outputs. Used to set an analog output point.<br>**Note**<br>This field appears **only** if you select **Analog Outputs** in the Table field. | |
| | **1 - 32 bit** | Package format containing a 32-bit signed integer. |
| | **2 - 16 bit** | Package format containing a 16-bit signed integer. |

| Field | Description | |
|---|---|---|
| | **3 - Float** | Package format containing a single precision floating point value. |
| | **4 - Double** | Package format containing a double precision floating point value. |
| **Group 20 Variation** | Counters Static. Used to report the current value of a counter point. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = ROLLOVER<br>Bit 6 = DISCONTINUITY<br>Bit 7 = Reserved, always 0<br>**Note**<br>This field appears **only** if you select **Counters** in the Table field. | |
| | **None** | No variation |
| | **1 - 32 bit w Flag** | Package format containing a 32-bit unsigned integer, with status flags. |
| | **2 - 16 bit w Flag** | Package format containing a 16-bit unsigned integer, with status flags. |
| | **5 - 32 bit wo Flag** | Package format containing a 32-bit unsigned integer. |
| | **6 - 16 bit wo Flag** | Package format containing a 16-bit unsigned integer. |

| Field | Description |
|---|---|
| **Group 22 Variation** | Counters Events. Used to report the value of a counter point after the count has changed. Possible status flags include:<br>Bit 0 = ONLINE<br>Bit 1 = RESTART<br>Bit 2 = COMM_LOST<br>Bit 3 = REMOTE_FORCED<br>Bit 4 = LOCAL_FORCED<br>Bit 5 = ROLLOVER<br>Bit 6 = Reserved, always 0<br>Bit 7 = Reserved, always 0<br>**Note**<br>This field appears **only** if you select **Counters** in the Table field. |
| **None** | No variation |
| **1 - 32 bit w Flag** | Package format containing a 32-bit unsigned integer, with status flags. |
| **2 - 16 bit w Flag** | Package format containing a 16-bit unsigned integer, with status flags. |
| **5 - 32 bit w Time & Flag** | Package format containing a 32-bit unsigned integer, with status flags, and the time when the event occurred. |
| **6 - 16 bit w Time & Flag** | Package format containing a 16-bit unsigned integer, with status flags, and the time when the event occurred. |
| **Operation** | Click ▼ to select the operation type for the selected parameter. Possible options are:<br>**Note**<br>• This field appears **only** if you select either **Binary Outputs** or **Analog Outputs** in the Table field.<br>• Click ▼ in the column heading and select a value that is copied to **all** rows of the currently selected table. |
| **None** | Control modes are not allowed on the point. |
| **Select Control** | Control commands are accepted only if a point is selected. |

| Field | Description | |
|---|---|---|
| | **Direct Control** | Control commands are accepted even if a point is not selected. |
| **Deadband Type** | Click ▼ to select the type of deadband to use with the selected parameter. Possible options are:<br>**Note**<br>• This field appears **only** if you select **Analog Inputs** in the Table field.<br>• Click ▼ in the column heading and select a value that is copied to **all** rows of the currently selected table. | |
| | **None** | No deadband applies to this parameter. |
| | **Absolute** | Sets the deadband range as a single value. If a new value differs from the last logged value by an amount that is less than the absolute value, then the new value is not recorded as a DNP3 event. If a new value differs from the baseline value by an amount that is greater than the absolute value, then the new value is recorded as a DNP3 event and becomes the new baseline for the absolute deadband.<br>`(Last Event Value - Current Value) > Deadband Value`<br>`If true, then a DNP3 event is generated.`<br>`If false, then no DNP3 event is generated.` |
| | **Percentage** | Sets the deadband range as a percent of the last logged value. If a new value differs from the last logged value by an amount that is less than the percentage value, then the new value is not recorded as a DNP3 event. If a new value differs from the last logged value by an amount that is greater than the percentage value, then the new value is recorded as a DNP3 event and becomes the new baseline for the percentage deadband.<br>`((Last Event Value - Current Value)/(Current Value))*100 >= Deadband Value`<br>`If true, then a DNP3 event is generated.`<br>`If false, then no DNP3 event is generated.` |

| Field | Description |
|---|---|
| **Deadband Value** | Enter a value to use as the deadband with the currently selected parameter. The deadband is a value that is an inactive zone above the low limits and below the high limits. The purpose of the deadband is to prevent a value (such as an alarm) from being set and cleared continuously when the input value is oscillating around the specified limit. This also prevents the logs or data storage location from being over-filled with data.<br>**Note**<br>• This field appears **only** if you select **Analog Inputs** in the Table field.<br>• Click ▼ in the column heading and enter a value that is copied to **all** rows of the currently selected table. |
| **Insert Row** | Click to insert a row before the currently selected row. |
| **Add Row** | Click to add a new row at the end of the selected table. |
| **Delete Row** | Click to delete the currently selected row from the table. |
| **Clear Row** | Click to delete the information in the currently selected row. |
| **Clear Table** | Click to delete the current configuration for the selected table. |
| **Filter** | Click ▼ to narrow the number of parameters shown in the parameter list by object type. |
| **Object and instances** | Lists the available database objects (types) and instances (iterations) of each object. Select an Object and Instance to view the available parameters. |
| **Parameters** | Lists the available parameters (properties) for the selected object and instance. |
| **Referenced Parameters** | Lists the available parameters for the referenced object, when the data type of the parameter in the Parameters column is an OBJREF. |
| **Tag** | This **read-only** field shows the name of the parameter selected in the parameter list. |
| **Data Type** | This **read-only** field shows the data type of the parameter selected in the parameter list. |
| **Access Type** | This **read-only** field shows the read/write access of the parameter selected in the parameter list. |

| Field | Description |
|---|---|
| **Value** | This **read-only** field shows the value of the parameter selected in the parameter list. |
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired DNP3 configuration. Navigate to the location of the saved CSV file and select **Open** to start the import process.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. Any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained. |
| **Export CSV** | Click to save a CSV file to your computer that contains the current DNP3 configuration of your FB Series product. A Select Table dialog opens where you can select which DNP3 tables to include in the export. Click **Start**, select a name and location for the exported file on your computer, and click **Save** to begin the export process.<br>**Note**<br>By default, all selected data is exported into a single file. Select **Export to individual file** to have the system create individual files for each DNP3 table you select. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |
| **Load Default Map** | Click to load the default DNP3 map into your FB Series product. |
| **Refresh** | Reloads the table with the data stored in the FB Series product. |
| **Save** | Saves any changes you have made to the selected table. |
| **Close** | Closes the current display. |

9. Select an Object and Instance of that Object from the **Objects and instances** frame. A list of available parameters appears in the Parameters frame.

10. Click and drag a parameter from the **Parameters** frame (or the Referenced Parameters frame) to the desired Point Index in selected the Map Table.

11. Click ▼ in the **Class** column to assign a Class to the selected parameter.
12. Click ▼ in the **Variations** columns to assign the required variations to the selected parameter.
13. Select **Save** to save any changes you make to this pop-up display.

**Note**

A Warm Start is required before changes take effect.

#### 4.30.2.2.1 Importing a DNP3 Map Table CSV File

You can import a CSV file that contains your DNP3 map table configuration for use in your FB Series product.

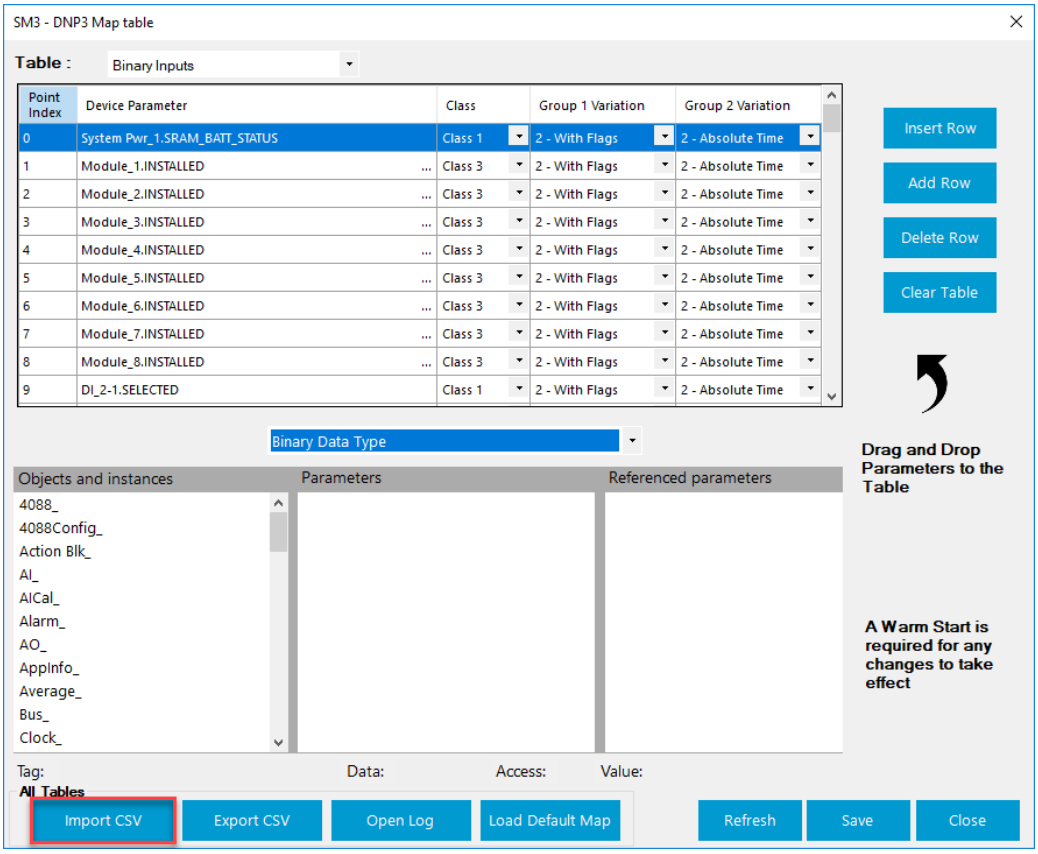
**Note**

- For more information about DNP3 map tables in the FB Series product, refer to DNP3 Map Table.
- For more information about creating your own DNP3 map table CSV file, refer to Creating a DNP3 Map Table CSV File.
- For more information about exporting a CSV file that contains the FB Series product's current Modbus poll table configuration, refer to Exporting a DNP3 Map Table CSV File.

To import a CSV file that contains your DNP3 map table configuration:

1. Select Configu**re > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.
4. Set the Active DNP3 Map field to **User Defined**.
5. Select **Save** to save the changes to the display.
6. Select the **DNP3 Mapping** button. The DNP3 Map Table pop-up display opens.

**Figure 336. DNP3 Map Table – Import CSV**




7. Select the **Import CSV** button.
8. Navigate to the file location of your CSV file and select **Open**.

**Note**

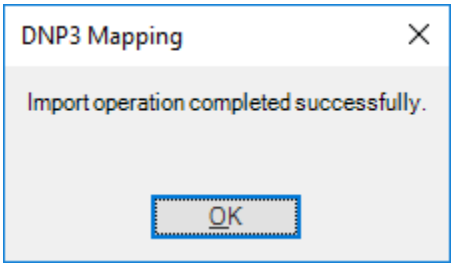
The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

9. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Note**

A Warm Start is required before changes take effect.

**Figure 337. Confirmation**




#### 4.30.2.2.2 Exporting a DNP3 Map Table CSV File

You can export your FB Series product's current DNP3 map table configuration to a CSV file saved on your computer.

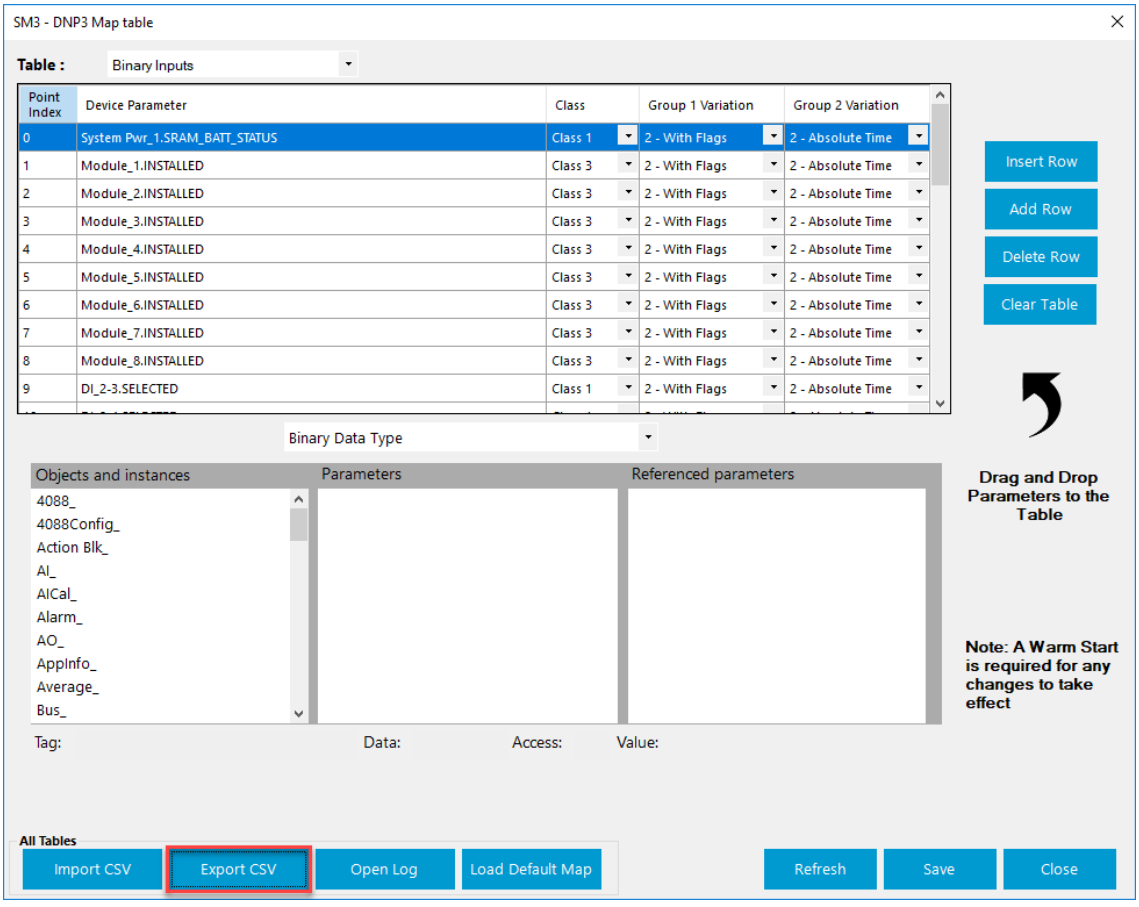
**Note**

- For more information about DNP3 map tables in the FB Series product, refer to DNP3 Map Table.
- For more information about creating your own DNP3 map table CSV file, refer to Creating a DNP3 Map Table CSV File.
- For more information about importing a CSV file that contains your DNP3 map table configuration for use in your FB Series product, refer to Importing a DNP3 Map Table CSV File.

To export a CSV file that contains your DNP3 map table configuration:

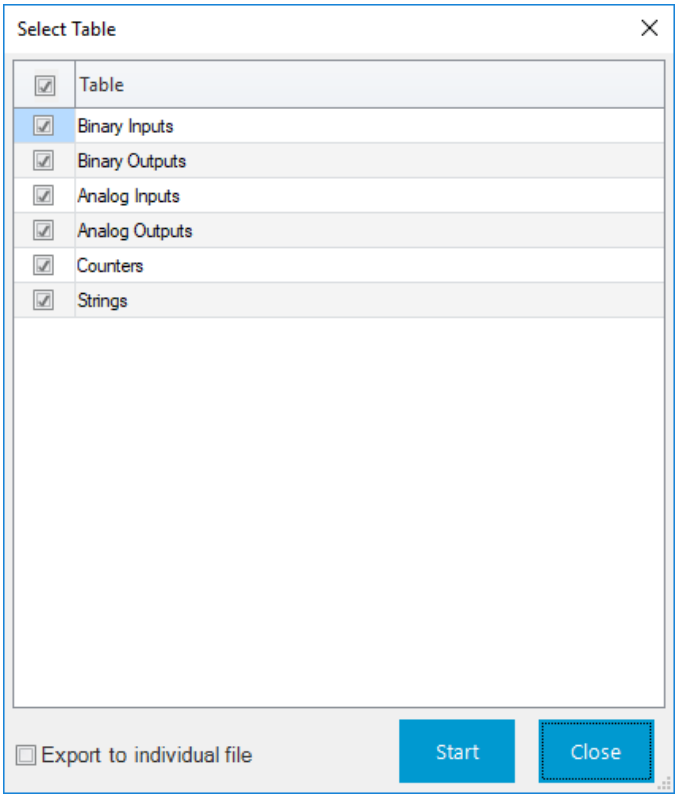
1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.
4. Set the Active DNP3 Map field to **User Defined**.
5. Select **Save** to save the changes to the display.
6. Select the **DNP3 Mapping button**. The DNP3 Map Table pop-up display opens.

**Figure 338. DNP3 Map Table – Export CSV**




7. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 339. Select Table**



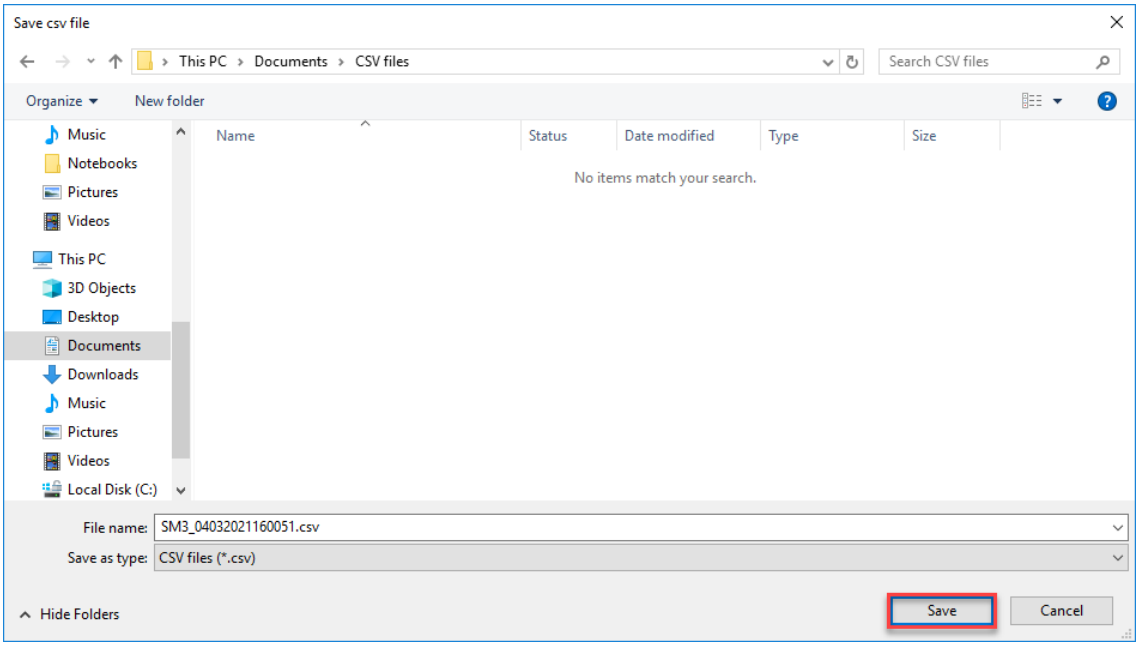

8. Place a check mark next to each table you want to export.

**Note**

By default, all selected tables are exported to a single file. If you want each selected table to be exported to individual files, place a check mark next to **Export to individual file**.

9. Select **Start**. A Save csv file window opens.

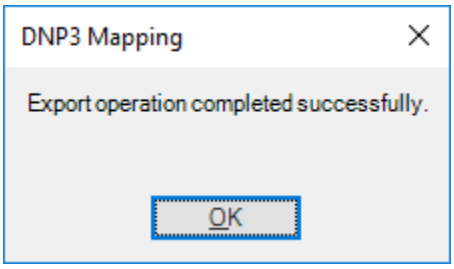
**Figure 340. Save csv file**




10. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system exports the CSV file and displays a progress bar at the top of the display.

11. A confirmation message displays after exporting the CSV file. Select **OK** to complete the process.

**Figure 341. Confirmation**




### 4.30.2.2.3 Creating a DNP3 Map Table CSV File

You can create a CSV file that contains your DNP3 map table on your computer, and then import the CSV file for use in the FB Series product. If your DNP3 map is large, it may be easier to create a CSV file on your computer than it is to configure the table in DeltaV FBxConnect configuration software.

**Note**

- For more information about DNP3 map tables, refer to DNP3 Map Table.
- For more information about importing CSV file that contains your DNP3 map table configuration for use in your FB Series product, refer to Importing a DNP3 Map Table CSV File.
- The DNP3 map CSV **must** contain the format shown below. The easiest way to begin creating a custom map is to export a CSV that contains the current configuration and then edit that file. For more information about exporting a CSV file, refer to Exporting a DNP3 Map Table CSV File.

  **Figure 342. Example DNP3 Map CSV Format**

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Table | Point Index | Device Parameter | Class | Variation 1 | Variation 2 |
| 2 | Binary Inputs | 0 | Action Blk_1.ALARM_TYPE | 0 | 0 | 0 |
| 3 | Binary Inputs | 1 | Action Blk_1.ALARM_TYPE | 1 | 0 | 0 |
| 4 | Binary Inputs | 2 | Action Blk_1.ALARM_TYPE | 1 | 2 | 2 |
| 5 | Binary Inputs | 3 | Action Blk_1.ALARM_TYPE | 1 | 2 | 2 |
| 6 | Binary Inputs | 4 | Action Blk_1.ALARM_TYPE | 1 | 2 | 2 |
| 7 | Binary Inputs | 5 | Action Blk_1.ALARM_TYPE | 1 | 2 | 2 |
| 8 | Binary Inputs | 6 | Action Blk_1.ALARM_TYPE | 1 | 2 | 2 |

To create a CSV file that contains your Modbus map table configuration:

1. Open a blank spreadsheet (or open your previously exported Modbus poll table CSV file).
2. In row one of the spreadsheet, enter the following text:
   - Column A = Table
   - Column B = Point Index
   - Column C = Device Parameter
   - Column D = Class
   - Column E = Variation 1
   - Column F = Variation 2
3. In the proceeding rows, enter information for each table entry according to the descriptions below:

**Note**

Drop-down lists on the DeltaV FBxConnect configuration software display are represented as numbers in the CSV file. See the descriptions below for a description for each number.

| Column Heading | Description |
|---|---|
| **Table** | Specifies which DNP3 table the selected row belongs to. Valid values and the number of points available in each table are listed below:<br>• Binary Inputs – 65535 points<br>• Binary Outputs – 65535 points<br>• Analog Inputs – 65535 points<br>• Analog Outputs – 65535 points<br>• Counters – 65535 points<br>• Strings – 65535 points |
| **Point Index** | Enter a number to specify the point in the selected table. |
| **Device Parameter** | Enter a parameter from the FB Series product's database. |
| **Class** | Enter a number to assign the selected parameter to a class. Possible options are:<br>**0** None<br>**1** Class 1<br>**2** Class 2<br>**4** Class 3<br>**7** All |
| **Variation 1** | Group variations are associated with different table types. Enter a number that corresponds to a bit for the selected table type. Refer to DNP3 Map Table for a complete list of variations and their associated bits. The variations for each table type are below:<br>• Binary Input = Group 1 Variation<br>• Binary Output = Group 10 Variation<br>• Analog Input = Group 30 Variation<br>• Analog Output = Group 40 Variation<br>• Counters = Group 20 Variation |

| Column Heading | Description |
|---|---|
| **Variation 2** | Group variations are associated with different table types. Enter a number that corresponds to a bit for the selected table type. Refer to DNP3 Map Table for a complete list of variations and their associated bits.<br>• Binary Input = Group 2 Variation<br>• Binary Output = Group 12 Variation<br>• Analog Input = Group 32 Variation<br>• Analog Output = Group 41 Variation<br>• Counters = Group 22 Variation |

4. Save your changes. You can now import your CSV file for use in your FB Series product. For more information, refer to Importing a DNP3 Map Table CSV File.

**Note**

Make sure to save the file with a **.csv** file extension.

### 4.30.2.3 Auto Managed DNP3 Map

Use the Auto Managed Object DNP3 Map option to create templates that map parameters in the FB Series product database to DNP3 data points. You can generate a DNP3 map file based on these templates and then import the DNP3 map file into your SCADA system to easily retrieve information contained in your FB Series product.

There are two types of files used in the Auto Managed Object Mapping process: an Object Mapping Template file and a generated DNP3 Map file.

#### Object Mapping Template

An Object Mapping Template file is needed as the first step in the Auto Managed DNP3 Mapping process. An Object Mapping Template file contains parameters from the FB Series product database that are mapped to DNP3 data types. A default Object Mapping Template file (DefaultOMT.omt) is included with DeltaV FBxConnect configuration software that contains default mapping for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. You can edit this Object Mapping Template file and/or create your own Object Mapping Template files that contain mapping only for the specific object parameters you select. You can then import the template files into different FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU and easily create consistent DNP3 maps.

Applications installed on an DeltaV FB3000 RTU may include their own template file. An application template is a file that contains application parameter names that are mapped to DNP3 data types. Application templates are created by the application developer and copied to your FB Series product when you install the application. If an application does not contain a template, you can create your own template for the parameters used by the application.

**Note**

- The default location for the default Standard Configuration Object Mapping Template file (DefaultOMT.omt) is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\DNP3 Map Templates*.
- For more information about creating your own Object Mapping Template file(s), refer to Creating an Object Mapping Template.
- Application templates are created by the application developer and are **not** included with every application.

## DNP3 Map

A DNP3 map is the final output of the Auto Managed DNP3 Mapping process. A DNP3 map is a set of binary files that contain parameters mapped to DNP3 points. There is a DNP3 binary file for each DNP3 group (Binary Inputs, Binary Outputs, Analog Inputs, Analog Outputs, Counters and Strings. You can import these files into your SCADA system to identify which parameters you want to include in your SCADA database. This process saves you time and reduces the need to manually configure these parameters within your SCADA system.

**Note**

- Referenced parameters are **not currently** supported when building a DNP3 map from an Object Mapping Template file.
- Not all SCADA systems support DNP3 maps. Please check with your SCADA vendor to see if this feature is supported.

To create this file, select which parameters you want to include from your Object Mapping Template(s) and then either select the **Build DNP3 Map** button on the Communications – DNP3 pop-up display or the **Generate DNP3 Map files** on the Object Mapping Template Editor dialog box. The system builds a DNP3 Map based on the configured Object Mapping Template and either replaces the current DNP3 map or merges any newly defined parameters to the existing map, dependent on the option you select, in the connected FB Series product.

**Note**

- If you add meters to an FB Series product after mapping your device, you **must** generate a new DNP3 Map.
- For more information about creating a DNP3 map, refer to Building a DNP3 Map.
- To remove an existing DNP3 Map file from the FB Series product, either perform a Cold Start and select **Clear user protocol maps** or delete the DNP3 Map files (located in the *protocol* > *dnp3* > *map_1* folder) using the File Transfer dialog box.

For more information, refer to the following topics:

Object Mapping Template Editor

Creating an Object Mapping Template

Building a DNP3 Map

Viewing a DNP3 Map

### 4.30.2.4 Object Mapping Template Editor

Use this dialog box to create an Object Mapping Template file that contains parameters in your FB Series product that are mapped to DNP3 Map Groups.

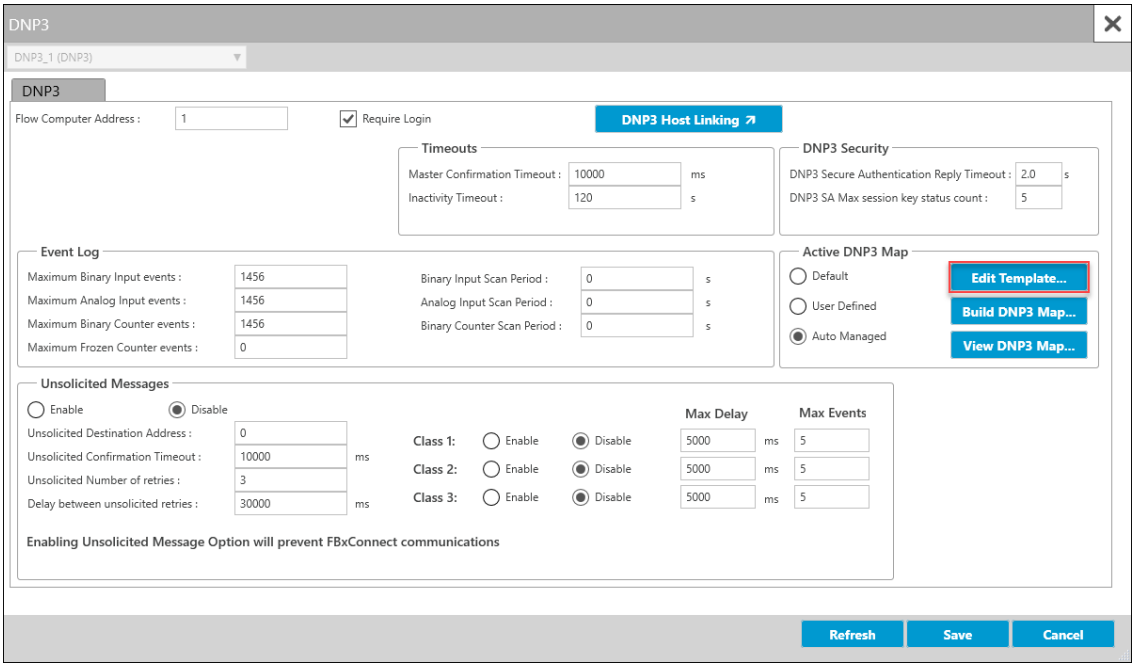
**Note**

- This topic contains field descriptions for the Object Mapping Template Editor dialog box. For more information on the process of creating an Object Mapping Template, refer to Creating an Object Mapping Template.
- If you add meters to an FB Series product after mapping your device, you **must** generate a new DNP3 map.
- To remove an existing DNP3 Map file from the FB Series product, perform a Cold Start and select **Clear user protocol maps**.

To access this pop-up display:

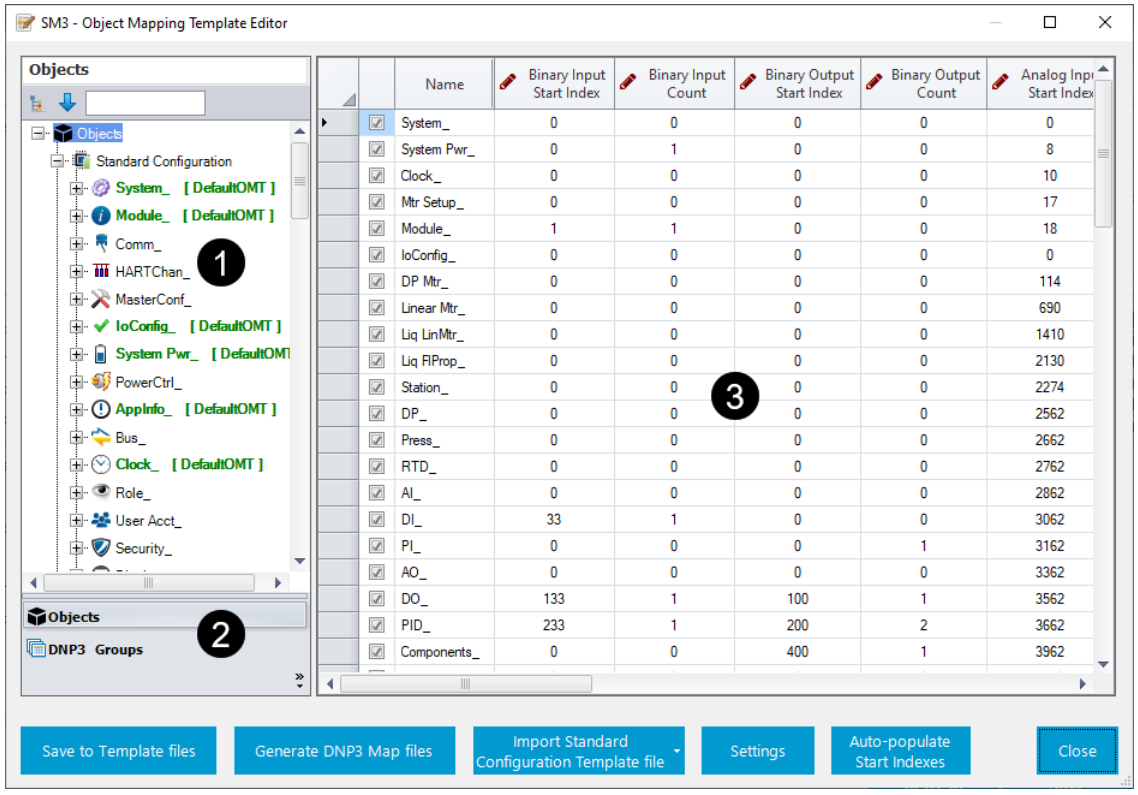
1. Select **Configure > Communications** for the DeltaV FBxConnect configuration software main menu. The Communications display opens.
2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.

**Figure 343. DNP3 – Edit Template Button**




4. Select **Auto Managed** in the Active DNP3 Map field.
5. Select **Save** to save your selection.
6. Select the **Edit Template** button. The Object Mapping Template Editor dialog box opens.

**Figure 344. Object Mapping Template Editor**




| # | Description |
|---|---|
| **1** | Objects Tree / DNP3 Groups Tree |
| **2** | Objects / DNP3 Groups Buttons |
| **3** | Information Grid |

**7.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Objects Tree** | Shows the Objects in the FB Series product internal database and the Objects in any installed applications.<br>**Note**<br>Objects that you have included in the Object Mapping Template file are shown using the color green. |
| **DNP3 Groups Tree** | Shows the DNP3 map currently in the FB Series product. |
| **Objects Button** | Select this button to show the Objects tree on the Object Mapping Template Editor dialog box. |

| Field | Description |
|---|---|
| **DNP3 Groups Button** | Select this button to show the DNP3 Groups tree on the Object Mapping Template Editor dialog box. |
| **Information Grid** | Shows information associated with your selection in the Objects Tree or DNP3 Tree. For more information, refer to Objects Grid, Object Attributes Grid, Parameters Grid, and Viewing a DNP3 Map. |
| **Save to Template files** | Select this button to save the currently defined Object Mapping to a template file(s).<br>**Note**<br>Template files are stored as part of the solution file. |
| **Generate DNP3 Map files** | Select this button to build a DNP3 map based on an Object Mapping Template and transfer the DNP3 map to the connected FB Series product. For more information, refer to Building a DNP3 Map. |
| **Import Template file** | Select this button to load a previously saved standard configuration Object Mapping Template file or application Object Mapping Template file into the Object Mapping Template Editor. The import functionality supports two different modes:<br>• **Merge** – Merges the new template with existing templates. This is the default option.<br>• **Replace** – Replace existing templates with the new template. Click ▼ to select this option.<br>**Note**<br>• A default standard configuration Object Mapping Template file (DefaultOMT.omt) is included with DeltaV FBxConnect configuration software that contains default mapping for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.<br>• When loading an application Object Mapping Template file, the application **must** contain the same Objects that are used in the template file. If the Objects used in the template file are **not** present in the application, the system does **not** import the template file data for the missing Objects. |
| **Settings** | Select this button to open the Object Mapping Template Editor Settings dialog box and customize the layout of the Object Mapping Template Editor and to configure the mapping of FBx data types to DNP data types. |

| Field | Description |
| --- | --- |
| **Auto-populate Start Indexes** | Select this button to automatically generate OMT map start indexes for each selected Object based on the number of reserved entries for each Object. |

8. Select **Close** to exit the Object Mapping Template Editor dialog box.

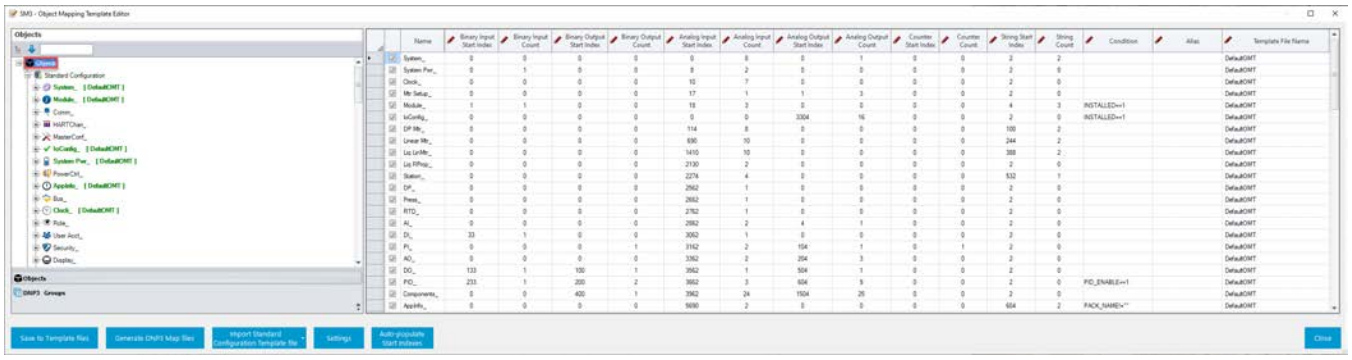
### 4.30.2.4.1 Objects Grid (Object Mapping Template Editor)

Use the Objects Grid to select which objects from the FB Series product are included in the Object Mapping Template and to configure how each object is mapped to the DNP3 map groups.

To access the Objects Grid:

1. From the Object Mapping Template Editor dialog box, select the **Objects Button** at the bottom left-hand side of the dialog box to show the Objects tree.
2. Select the **Objects** node in the Objects tree. The Objects Grid lists all Objects in the right-hand side of the dialog box.

**Figure 345. Objects Grid**



3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Checkbox** | Place a check mark in the row next to the Object name to include the Object in the Object Mapping Template. |
| **Name** | This column shows the Object names from the FB Series product's internal database and any installed applications. |
| **Binary Input Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **Binary Input Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Binary Output Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |

| Field | Description |
|---|---|
| **Binary Output Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Analog Input Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **Analog Input Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Analog Output Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **Analog Output Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Counter Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **Counter Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **String Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **String Count** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Condition** | Enter a simple logical expression that indicates when the selected object is included in the resulting DNP3 Map. Valid logical operators are: ==, !=, >, <, >=, <=. For example, when the expression is PID_ENABLE==1, the PID parameters are included in the DNP3 Map only when the value of the PID_1.PID_ENABLE parameter is 1. For more information, refer to *4.30.2.4.2, Object Attributes Grid (Object Mapping Template Editor)*. |
| **Alias** | Enter an alternate name used by your SCADA system when polling for the selected object. |

| Field | Description |
|---|---|
| **Template File Name** | Click ▼ and select an existing Object Mapping Template file or enter a file name to create a new Object Mapping Template file that the system uses to save the object mapping configuration for the selected row. |

#### 4.30.2.4.2 Object Attributes Grid (Object Mapping Template Editor)

Use the Objects Attributes Grid to configure if the selected Object is included in an Object Mapping Template and to configure how the selected Object is mapped to the DNP3 map groups.

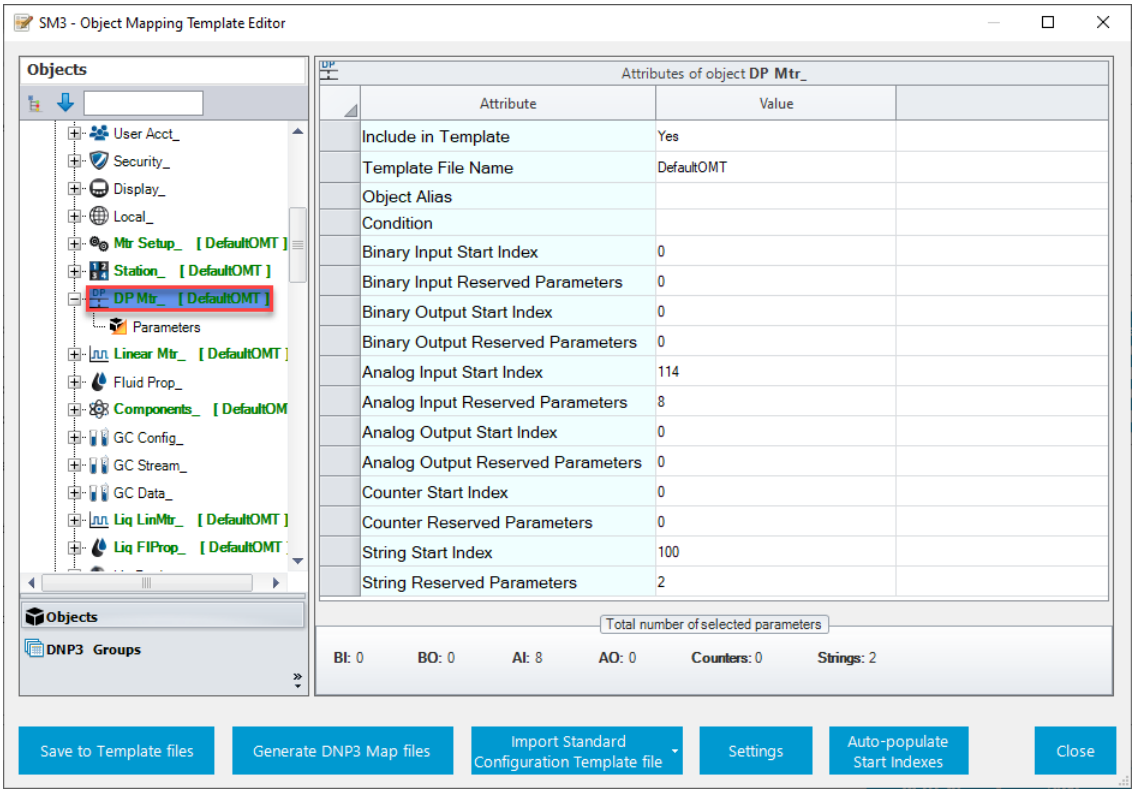
**Note**

You can also configure the Object parameters for multiple Objects from the Objects Grid.

To access the Objects Attributes Grid:

1. From the Object Mapping Template Editor dialog box, select the **Objects Button** at the bottom left-hand side of the dialog box to show the Objects tree.
2. Select an object name from the Object tree (**DP Mtr_** in the example below). The Object Attributes Grid lists all attributes for the selected Object in the right-hand side of the dialog box.

**Figure 346. Object Attributes Grid**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Include in Template** | Click ▼ to configure if the selected Object is included in the Object Mapping Template (Yes) or not (No). |
| **Template File Name** | Click ▼ and select an existing Object Mapping Template file or enter a file name to create a new Object Mapping Template file that the system uses to save the object mapping configuration for the selected row. |
| **Object Alias** | Enter an alternate name used by your SCADA system when polling for the selected object. |
| **Condition** | Enter a simple logical expression that indicates when the selected object is included in the resulting DNP3 Map. Valid logical operators are: ==, !=, >, <, >=, <=. For example, when the expression is PID_ENABLE==1, the PID parameters are included in the DNP3 Map only when the value of the PID_1.PID_ENABLE parameter is 1. |

| Field | Description |
|---|---|
| | You can also add a condition that only returns certain instances of an object. In this case, substitute the word INSTANCE for the parameter in the condition format below. For example, when the expression is INSTANCE>10, all instances of the selected object that are greater than 10 are included in the DNP3 Map.<br>The expression format can consist of one of the following three options:<br>1. **Condition** – one condition<br>2. **Condition AND Condition** – two conditions separated by the AND operator (both conditions must match)<br>3. **Condition OR Condition** – two conditions separated by the OR operator (either condition must match)<br>**Condition Format:**<br>Each condition is comprised of three parts:<br>▪ *Parameter Operator Value*<br>**Parameter Format:**<br>▪ A parameter in the current instance (i.e. PID_ENABLE)<br>▪ A parameter in another fixed object (i.e. Station_1.FLD_TYPE)<br>▪ A parameter in another associated object (i.e. Station_{i}.FLD_TYPE)<br>**Note**<br>{i} is replaced with the current instance number.<br>**Operator Format:**<br>▪ For strings: == !=<br>▪ For integers: == != < <= > >=<br>▪ Analogs are not supported<br>**Value Format:**<br>▪ Use double quotes around the value (“*Value*”) to indicate a string parameter.<br>**Examples:** |

| Field | Description |
|---|---|
| | ▪ INSTALLED==1<br>▪ DESC==”Analog Input 3”<br>▪ INSTALLED==1 AND ENABLED==1<br>▪ INSTALLED==1 OR ENABLED==1<br>▪ DP Mtr_1.MTR_TYPE==2<br>▪ DP Mtr_{i}.MTR_TYPE==2<br>▪ INSTANCE<20 |
| **Binary Input Start Index** | Click ⇕ to set the selected Object's starting position in the DNP3 map group. |
| **Binary Input Reserved Parameters** | Click ⇕ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Binary Output Start Index** | Click ⇕ to set the selected Object's starting position in the DNP3 map group. |
| **Binary Output Reserved Parameters** | Click ⇕ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Analog Input Start Index** | Click ⇕ to set the selected Object's starting position in the DNP3 map group. |
| **Analog Input Reserved Parameters** | Click ⇕ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Analog Output Start Index** | Click ⇕ to set the selected Object's starting position in the DNP3 map group. |
| **Analog Output Reserved Parameters** | Click ⇕ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Counter Start Index** | Click ⇕ to set the selected Object's starting position in the DNP3 map group. |

| Field | Description |
|---|---|
| **Counter Reserved Parameters** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **String Start Index** | Click ▲▼ to set the selected Object's starting position in the DNP3 map group. |
| **String Reserved Parameters** | Click ▲▼ to set the number of entries reserved for the selected Object in the DNP3 map group. |
| **Total number of selected parameters** | Shows the total number of binary input (BI), binary output (BO), analog input (AI), analog output (AO), counter, and string parameters that are included in the template for the currently selected Object. |

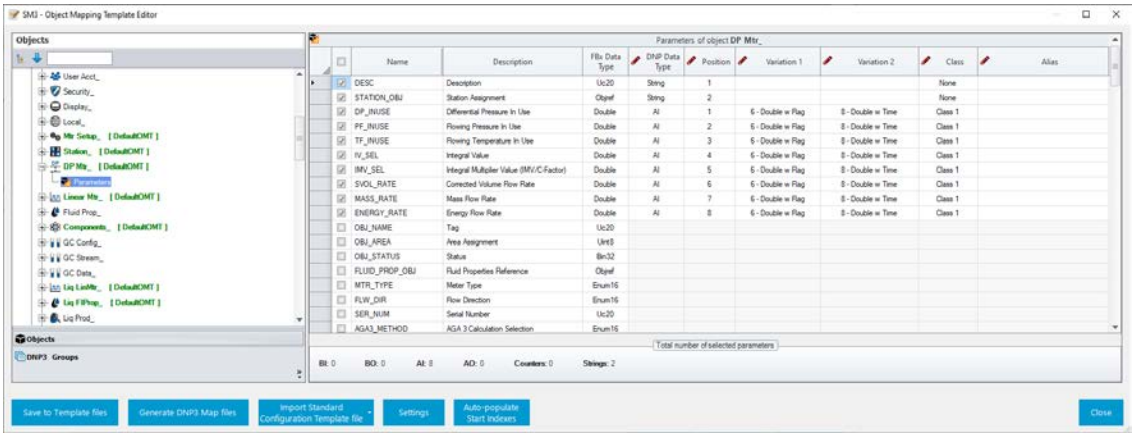
#### 4.30.2.4.3 Parameters Grid (Object Mapping Template Editor)

Use the Parameters Grid to configure if individual parameters for the selected Object are included in an Object Mapping Template and how each parameter is mapped to the DNP3 map groups.

To view the Parameters Grid:

1. From the Object Mapping Template Editor dialog box, select the **Objects Button** at the bottom left-hand side of the dialog box to show the Objects tree.
2. Click ⊕ next an Object Name in the Object tree to expand the Object (**DP Mtr**_ in the example below).
3. Select **Parameters** underneath the expanded Object. The Parameters Grid lists all parameters for the selected Object in the right-hand side of the dialog box.

**Figure 347. Parameters Grid**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Checkbox** | Place a check mark in the row next to a Parameter Name to include the parameter in your Object Mapping Template.<br>**Note**<br>Place a check mark in the column heading row to select all parameters belonging to the selected object. |
| **Name** | This **read-only** column shows the name of the parameter in the FB Series product's internal database for the selected row. |
| **Description** | This **read-only** column shows a description of the parameter in the FB Series product's internal database for the selected row. |
| **FBx Data Type** | This **read-only** column shows the data type of the parameter in the FB Series product's internal database for the selected row. |
| **DNP Data Type** | Click ▼ to select the data type stored in the DNP3 map for the selected row. |

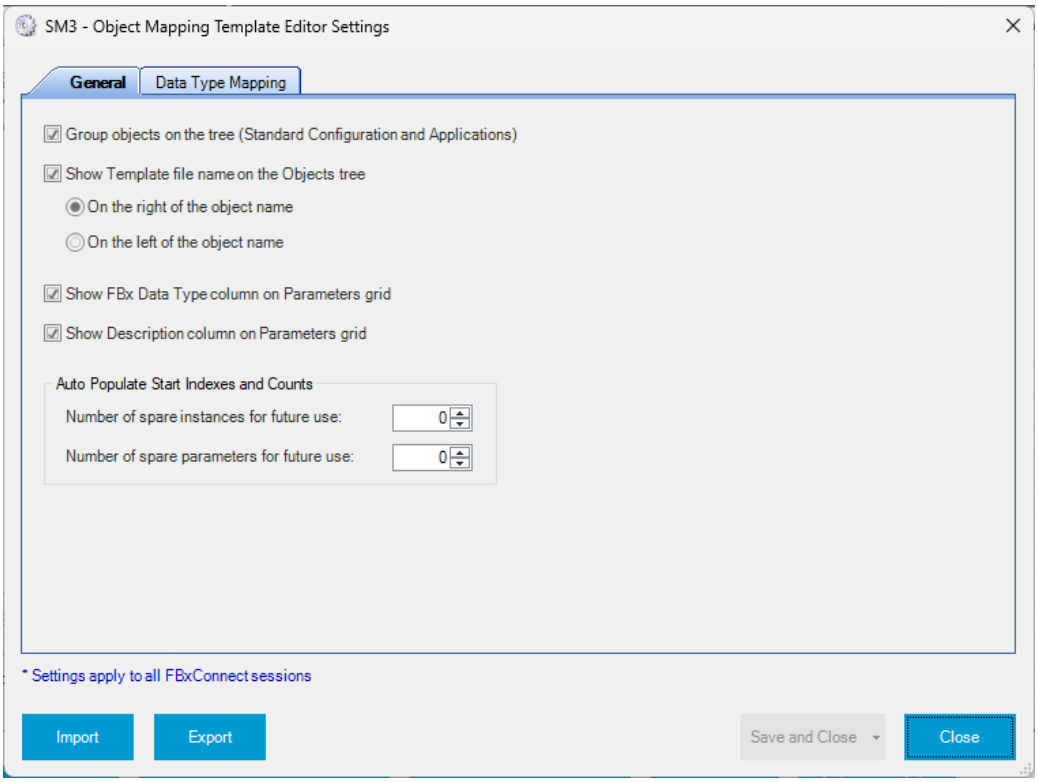
| Field | Description |
|---|---|
| **Position** | Click ⇕ to set the position in the DNP3 map group of the data in the selected row.<br>**Note**<br>• Positions **must** start at 1 and **must** be consecutive.<br>• The system automatically increments the position number for each DNP3 map group when you select a parameter for inclusion in the template.<br>• Different signal types have separate map groups, and each map group has its own positions. For example, if you have two parameters with a DNP Data Type of AI and three parameters with a DNP Data Type of Counter, then the AI positions would be 1 and 2 and the Counter positions would be 1, 2, and 3. |
| **Variation 1** | Click ▼ to set the data type encoding formats for the data types. For more information on the different variations for different data types, refer to DNP3 Map Table. |
| **Variation 2** | Click ▼ to set the data type encoding formats for the data types. For more information on the different variations for different data types, refer to DNP3 Map Table. |
| **Class** | Click ▼ to set an event class for the selected parameter. For more information on the different variations for different data types, refer to DNP3 Map Table. |
| **Control Operation** | Click ▼ to set the control operation type for the selected parameter. For more information, refer to DNP3 Map Table. |
| **Deadband Type** | Click ▼ to set the deadband type for the selected parameter. For more information, refer to DNP3 Map Table. |
| **Deadband Value** | Click ▼ to set the deadband value for the selected parameter. For more information, refer to DNP3 Map Table. |
| **Alias** | Enter an alternate name used by your SCADA system when polling for the selected parameter. |
| **Total number of selected parameters** | Shows the total number of binary input (BI), binary output (BO), analog input (AI), analog output (AO), counter, and string parameters that are included in the template for the currently selected Object. |

## 4.30.2.5 Object Mapping Template Editor Settings

Use this dialog box to customize the layout of the Object Mapping Template Editor and to configure the mapping of FBx data types to DNP data types.

To customize the Object Mapping Template Editor, select the **Settings** button on the Object Mapping Template Editor dialog box. The Object Mapping Template Editor Settings dialog box opens showing the General tab.

**Figure 348. Object Mapping Template Editor Settings**




The Object Mapping Template Editor Settings display contains the following tabs:

General – Use this tab to customize the layout of the Object Mapping Template Editor.

Data Type Mapping – Use this tab to customize how data types in the FB Series product's internal database (FBx Data Type) are mapped to DNP3 data types.

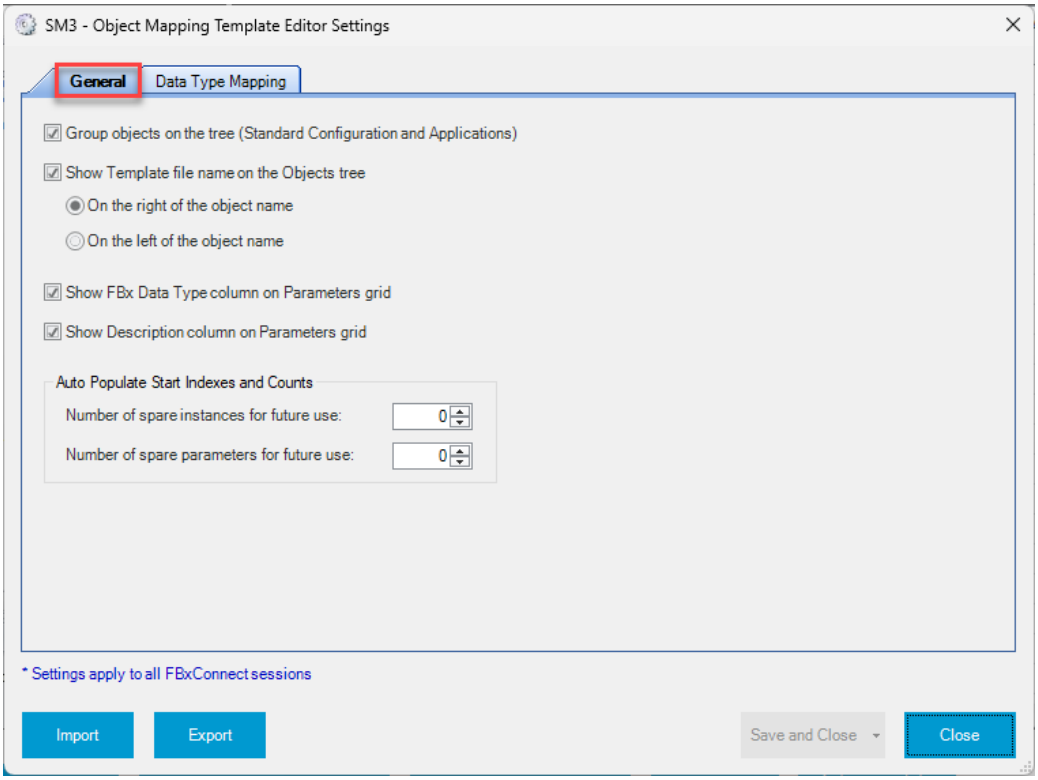
### 4.30.2.5.1 Object Mapping Template Editor Settings – General Tab

Use this tab to customize the layout of the Object Mapping Template Editor.

To customize the Object Mapping Template Editor dialog box:

1. Select the **Settings** button on the Object Mapping Template Editor dialog box. The Object Mapping Template Editor Settings showing the General tab.

**Figure 349. Object Mapping Template Editor Settings – General Tab**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Group objects on the tree (Standard Configuration and Applications)** | Place a check mark to have the objects shown in the Objects tree be separated based on if the objects are included in the standard FB Series product configuration or if the objects are included in applications.<br>**Note**<br>If this option is **not** selected, all objects are shown in the Objects tree with no grouping. |
| **Show template file name on the Objects tree** | Place a check mark to show the Object Mapping Template name next to the object name in the Objects tree. You can also configure if you want the name to appear on the left-hand side or right-hand side of the Object name in the Objects tree. |

| Field | Description |
|---|---|
| **Show FBx Data Type column on the Parameters grid** | Place a check mark to show the FBxData Type column when viewing the Parameters grid. |
| **Show Description column on the Parameters grid** | Place a check mark to show the Description column when viewing the Parameters grid. |
| **Number of spare instances for future use** | Enter the number of extra instances created for each object when you select the **Auto-populate Start Indexes** button. |
| **Number of spare parameters for future use** | Enter the number of extra parameters created for each object when you select the **Auto-populate Start Indexes** button. |
| **Import** | Select this button to import a saved Object Mapping Template Editor Settings file.<br>**Note**<br>Importing an Object Mapping Template Editor Settings file applies to all DeltaV FBxConnect configuration software sessions on this PC. |
| **Export** | Select this button to export your Object Mapping Template Editor Settings to a file on your PC. The exported file uses the file extension .OMTS. |

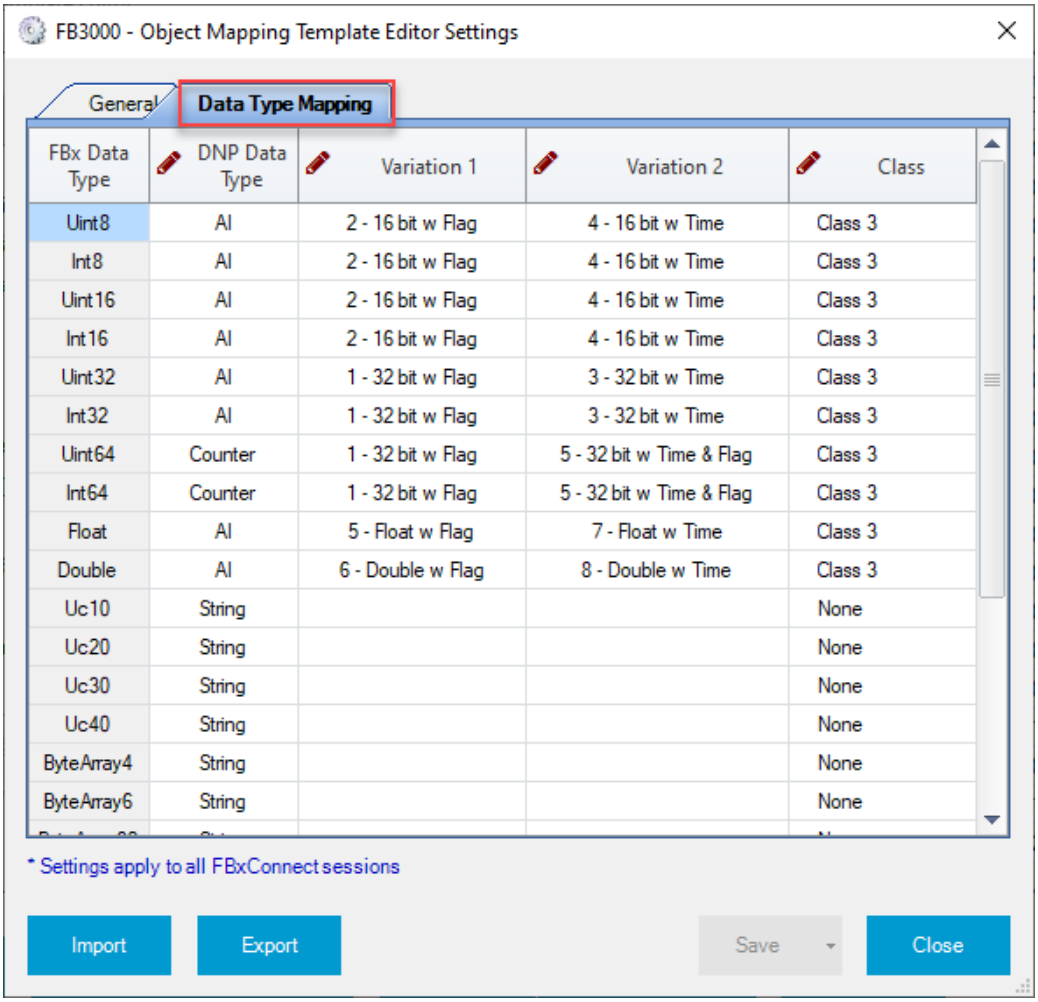
#### 4.30.2.5.2 Object Mapping Template Editor Settings – Data Type Mapping Tab

Use this tab to customize how data types in the FB Series product's internal database (FBx Data Type) are mapped to DNP3 data types.

To customize the Object Mapping Template Editor dialog box:

1. Select the **Settings** button on the Object Mapping Template Editor dialog box. The Object Mapping Template Editor Settings dialog box opens showing the General tab.
2. Select the **Data Type Mapping** tab.

**Figure 350. Object Mapping Template Settings – Data Type Mapping Tab**




3. In the rows for each FBx Data Type, select what type of data is stored in the DNP3 Map when converting data from FBx Data Types to DNP Data Types.
4. Select **Close** to exit the Object Mapping Template Settings dialog box.

## 4.30.2.6 Creating an Object Mapping Template

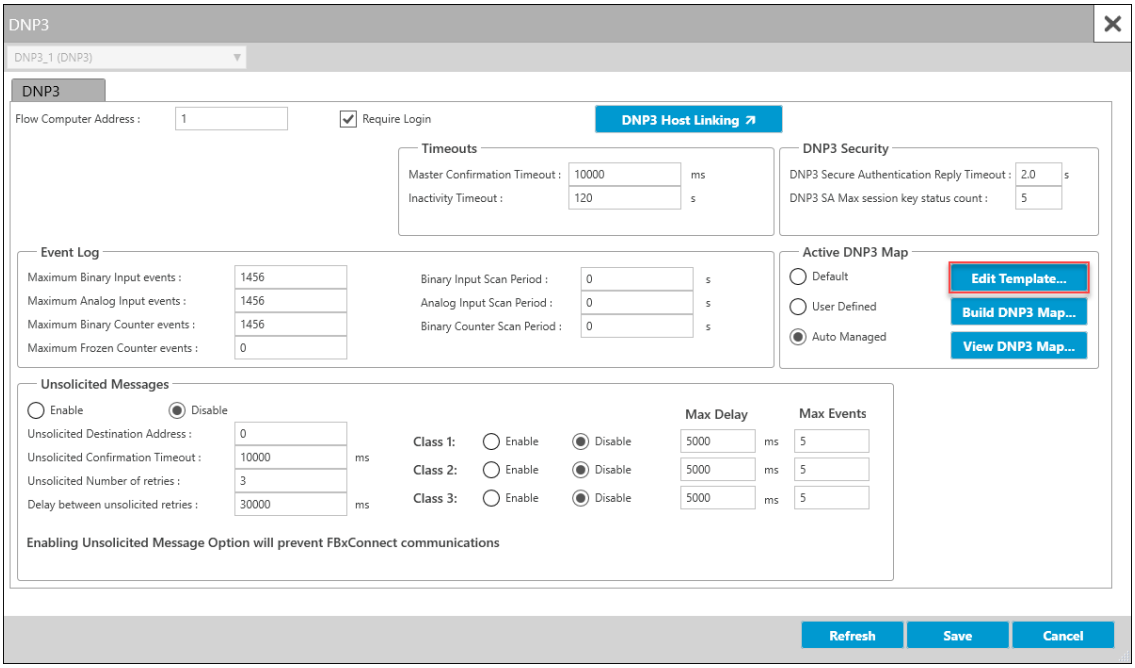
Use the Object Mapping Template Editor to create a template file that maps parameters in the FB Series product database to DNP3 data types. Creating an Object Mapping Template file is the first step that is required to generate an Auto Managed DNP3 Map.

You can select which objects and parameters from the FB Series product database that you want to include in the Object Mapping Template file. After you have created the Object Mapping Template file, you can then use the file to create DNP3 maps for multiple FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. For more information, refer to Generating a DNP3 Map.

To create an Object Mapping Template file:

1. Select **Configure > Communications** for the DeltaV FBxConnect configuration software main menu. The Communications display opens.
2. Select ▼ in the Communications drop-down list and choose a communications port using the DNP3 protocol.
3. Select the **DNP3** button. The DNP3 pop-up display opens.

**Figure 351. DNP3 – Edit Template Button**




4. Select **Auto Managed** in the Active DNP3 Map field.
5. Select **Save** to save your selection.
6. Select the **Edit Template** button. The Object Mapping Template Editor opens showing the Objects tree.

### Note

If you do not currently have an Object Mapping Template configured, a message opens asking if you would like to import a default template. Select **Yes** to import the default template or a template you have previously created on another FB Series product. Select **No** to start from an empty template with no Objects or Parameters selected.

**Figure 352. Use Default Question**

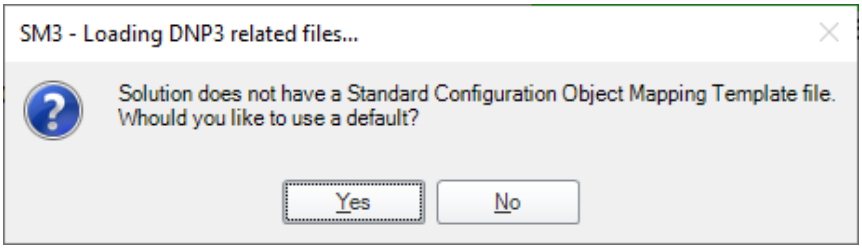
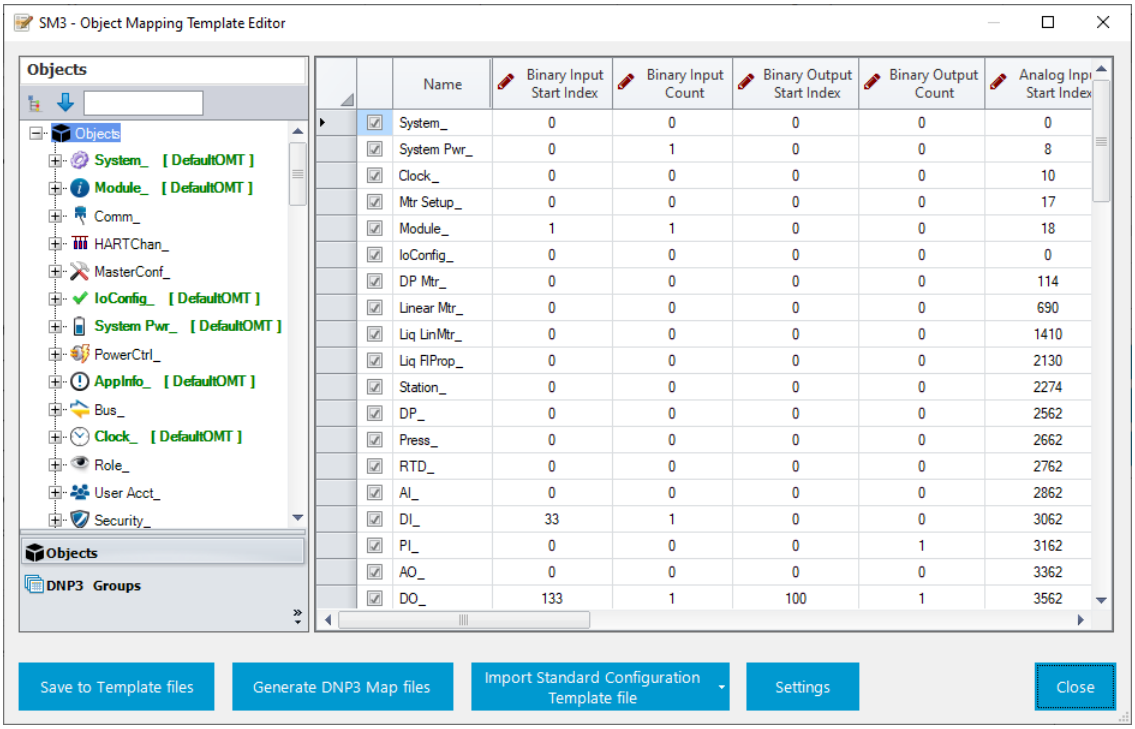



**Figure 353. Object Mapping Template Editor**




7. Place a check mark next to an **Object Name** for each Object you want to include in the DNP3 map.

8. For each selected Object, enter the **Start Index** to set the starting position in the DNP3 map for each DNP3 map group (Binary Input, Binary Output, Analog Input, Analog Output, Counters, and Strings).

9. For the selected Object, enter the **Count** to set the number of entries that are reserved for the Object in the DNP3 map groups.

10. For the selected Object, click ▼ in the **Template File Name** column and select an existing Object Mapping Template file or enter a file name to create a new Object Mapping Template file that the system uses to save the object mapping configuration.

**Note**

For descriptions of the other columns, refer to the Objects Grid or Object Attributes Grid topics.

11. Click ⊕ next an Object Name in the Object tree to expand the Object (**DP Mtr_** in the example below).

12. Select **Parameters** underneath the expanded Object. The Parameters Grid shows in the right-hand side of the dialog box listing all parameters for the selected Object.

13. Place a check mark next to each parameter name you want the include in the DNP3 Map.

**Note**

For descriptions of the other columns, refer to the Parameters Grid topic.

14. When you have finished configuring which Objects and Parameters to add to your template, select the **Save to Template files** button. The system saves your configuration to the file name(s) you configured in the Template File Name field for each object. You can now build a DNP3 Map that contains DNP3 data types that are mapped to parameters in your FB Series product. For more information, refer to Building a DNP3 Map.

## 4.30.2.7 Building a DNP3 Map

Use this feature to create an DNP3 Map file that contains DNP3 data types that are mapped to parameters in your FB Series product.

**Note**

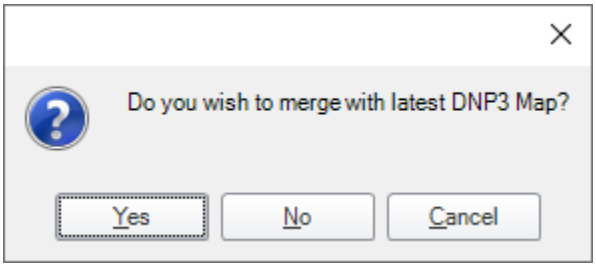
- Before you can build a DNP3 map, you first need to either create a Object Mapping Template file or select a default Object Mapping Template file.

- If you add meters to an FB Series product after mapping your device, you **must** edit your Object Mapping Template and generate a new DNP3 map.
- Referenced parameters are **not currently** supported when building a DNP3 map from an Object Mapping Template file.
- To remove an existing DNP3 Map file from the FB Series product, perform a Cold Start and select **Clear user protocol maps**.

To generate a DNP3 map:

1. From the Communications – DNP3 pop-up display: Select the **Build DNP3 Map** button. DeltaV FBxConnect configuration software uploads the current DNP3 map from the FB Series product to compare it against the new map.
   **or**
   From the Object Template Mapping Editor dialog box: Select the **Generate DNP3 Map files** button. DeltaV FBxConnect configuration software uploads the current DNP3 map from the FB Series product to compare it against the new map.

**Figure 354. Merge Dialog**

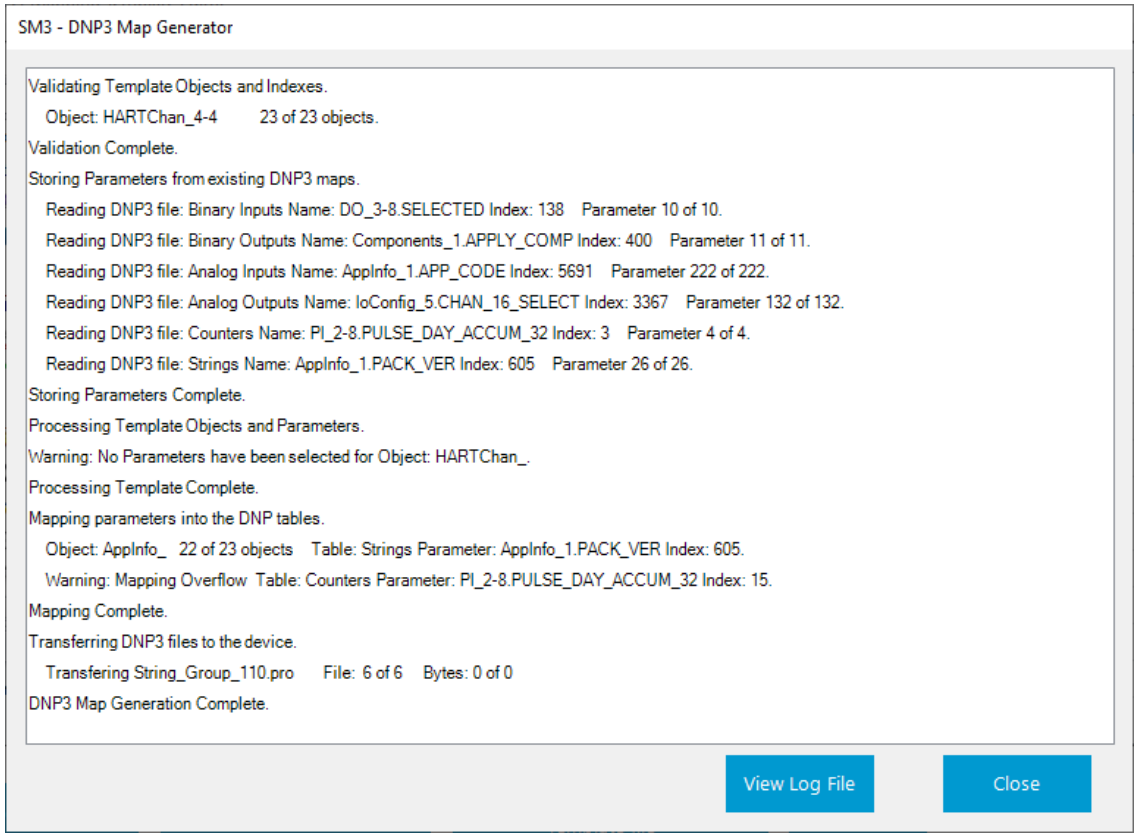



2. A message box opens asking if you want to merge the map currently in the FB Series product with the newest map.
   - Select **Yes** to keep the map currently in the FB series product and add any new information to the end of the map. The DNP3 Map Generator dialog box opens.
   - Select **No** to replace the map currently in the FB Series product with the newest map. The DNP3 Map Generator dialog box opens.
   - Select **Cancel** to return to the DNP3 display.
3. If you select **Yes** or **No** in the previous step, the DNP3 Map Generator opens and processes your request to either merge or replace the DNP3 map in the FB Series product. When the process is finished and the DNP3 map is transferred to the FB Series product, a message on the DNP3 Map Generator says **DNP3 Map Generation Complete**.

### Note

Select **Close** on the DNP3 Map Generator display at any time before the process is complete to cancel the DNP3 map generation.

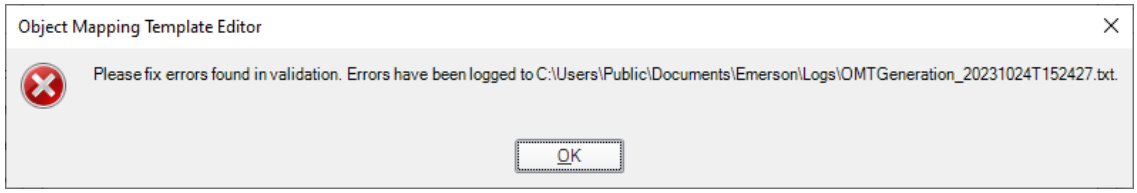
**Figure 355. DNP3 Map Generator**




### Note

An error messages opens if the system encounters any errors when building the DNP3. Select **OK** to close this error message and select the **View Log File** button on the DNP3 Map Generator dialog box to open a log file and view the results of building the DNP3 map.

**Figure 356. Object Mapping Template Error Message**



4. Select **Close** to exit the DNP3 Map Generator dialog box.

**Note**

A Warm Start is required before changes take effect.

### 4.30.2.8 Viewing a DNP3 Map

Use this feature to view the DNP3 map currently used by the FB Series product.

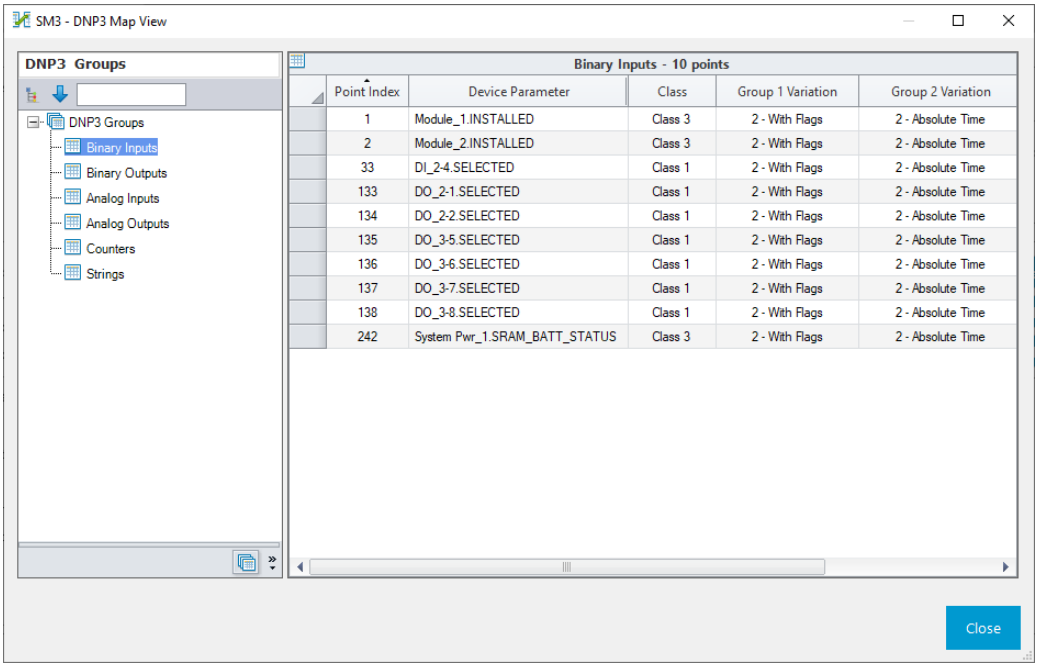
**Note**

You can also view the DNP3 Map by selecting the **DNP3 Groups** button on from the Object Mapping Template Editor dialog box.

To view the current DNP3 map:

1. From the Communications – DNP3 pop-up display: Select the **View DNP3 Map** button. The DNP3 Map View dialog box opens.
   **or**
   From the Object Template Mapping Editor dialog box: Select the **View DNP3 Map** button. The DNP3 Map View dialog box opens.

**Figure 357. DNP3 Map View**



2. Select a DNP3 data type from the tree on the left-hand side of the dialog box to view **read-only** information about the DNP3 map currently in use.

**Note**

- You **must** select a DNP3 data type (Binary Inputs, Analog Outputs, etc.) before information is shown in the right-hand side of the dialog box.
- You **must** build a DNP3 map before any information is shown on this dialog box. If you do not build a DNP3 before viewing this dialog box, no information is shown when you select a DNP3 data type.

3. Select **Close** to exit the DNP3 Map View dialog box.

## 4.30.3 Communications – Modbus Slave

Use this pop-up display to configure Modbus Slave protocol options for each communications port that is configured to use Modbus Slave protocol.

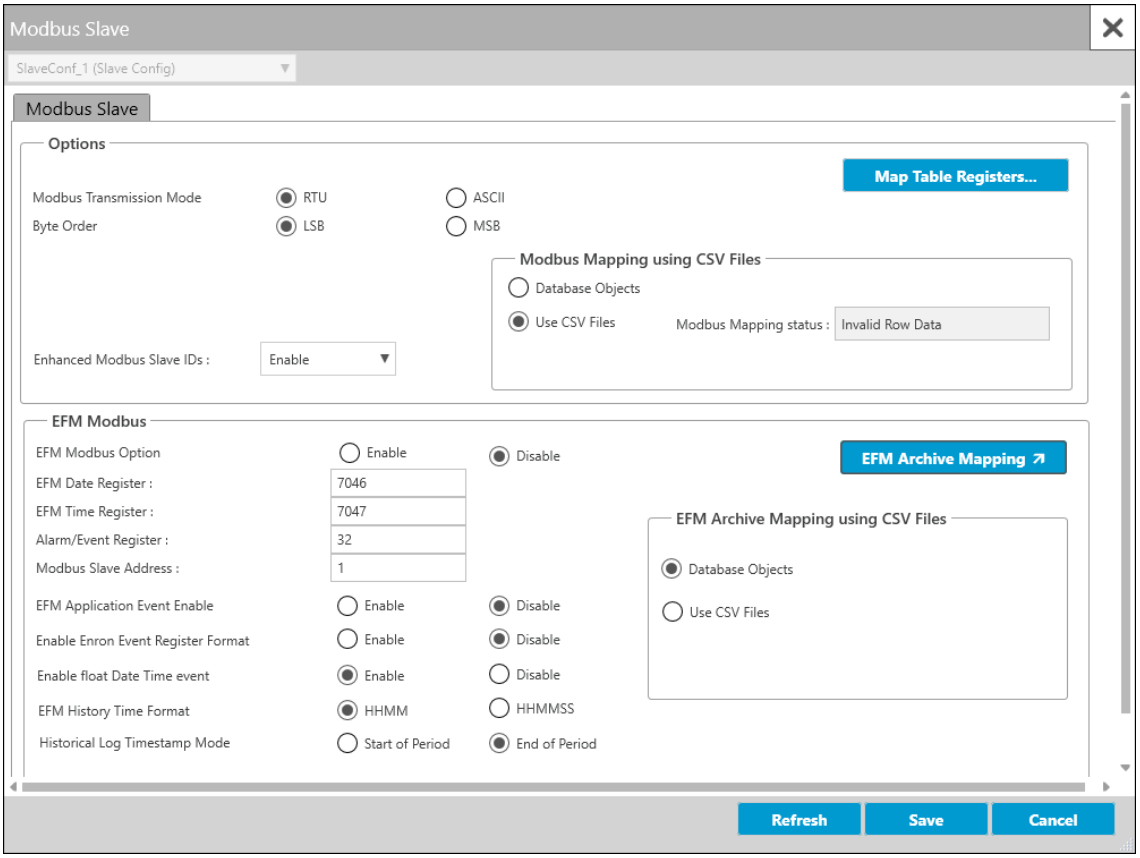
**Note**

This pop-up display is available only if you select either **Modbus Slave** or **DNP3/Modbus Slave** in the **Port Owner** drop-down list on the Communications – General display.

To access this pop-up display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.
3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.

**Figure 358. Communications – Modbus Slave**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Modbus TCP Enable/Disable** | Sets if Modbus messages are recognized on the Ethernet port.<br>**Note**<br>This field applies **only** to the Ethernet port. | |
| | **Enable** | Modbus messages **are** recognized on the Ethernet port. |
| | **Disable** | Modbus messages **are not** recognized on the Ethernet port. |

| Field | Description | |
|---|---|---|
| **Modbus Transmission Mode** | Sets the communications mode for the selected communications port.<br>**Note**<br>You must configure all devices in the same communications network with the same mode of transmission. Additionally, in either ASCII or RTU mode, the transmitting device places the Modbus message into a frame that has a known beginning and ending point. | |
| | **RTU** | Remote Terminal Unit mode allows for greater character density and better data throughput than ASCII for the same baud rate. Each message is transmitted in a continuous stream. Data is sent in 8-bit binary characters. RTU mode uses Cyclic Redundancy Check (CRC) error checking. By default, RTU is enabled. |
| | **ASCII** | American Standard Code for Information Interchange mode represents each 8-bit byte of data as two ASCII characters that are the hexadecimal representation of the value. This allows the messages to be read with the use of a dumb terminal but uses twice as many characters as the RTU mode. Each character sent is composed of a start bit, 7 or 8 data bits, and one or two stop bits with Even, Odd, or No parity. ASCII mode uses Longitudinal Redundancy Checking (LRC) error checking. |
| | **TCP** | Adds a 6-byte header to Modbus messages, and then encapsulates it for transmission over TCP/IP. The header consists of the following:<br>• A 2-byte transaction ID that increments for each packet sent.<br>• A 2-byte protocol ID. The protocol ID for Modbus is 0.<br>• A 2-byte indicator of the packet length.<br>**Note**<br>This field applies **only** to the **Ethernet** port. |

| Field | Description | |
|---|---|---|
| **Byte Order** | Sets the order of data bytes in a transmission or requests, which can be reversed. This only affects the Data field of a Modbus message and has no effect on the data bytes for Function Codes 01, 02, and 05. | |
| | **LSB** | Least Significant Byte First (places the Least Significant Byte first). This is the default value. |
| | **MSB** | Most Significant Byte First (places the Most Significant Byte first). |
| **Modbus Slave Address** | Sets the Modbus Slave address for the selected communications port on the FB Series product.<br>**Note**<br>• This field changes positions on the display based on your selection in the **Modbus Mapping using CSV Files** field. If you select **Database Objects**, then the field shows in the **Options** section of the display. If you select **Use CSV Files**, then the field shows in the **EFM Modbus** section of the display.<br>• If you set the **Enhanced Modbus Slave IDs** field to **Enable**, then this field applies to requests for Modbus EFM registers **only**. | |
| **Modbus TCP Port Num** | Sets the TCP port to use for Modbus messages on the Ethernet port. The default is **502.**<br>**Note**<br>• This field applies **only** to the Ethernet port.<br>• **Do not** enter **9009** for this number; it is reserved by FBxNet. | |

| Field | Description |
|---|---|
| **Enhanced Modbus Slave IDs** | Click ▼ and select **Enable** to allow the FB Series product to respond to multiple slave IDs on a single communications port. For example, if you enable this feature and configure the Map Table Register using Slave IDs 1, 3, and 5, then the FB Series product would only respond to Modbus requests using Slave IDs 1, 3, and 5 and ignore all other Slave ID requests.<br>**Note**<br>• This field shows **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field.<br>• To access the EFM Hourly Registers and EFM Daily Registers after you enable **Enhanced Mode Slave IDs**, you **must** configure at least one row in the Map Table Register using the same Slave ID as the ID you configured in the **Modbus Slave Address** field. |
| **Map Table Registers** | Click to open the Map Table Register pop-up display and configure the Modbus registers stored in the FB Series product.<br>**Note**<br>• Map Table Registers are shared between **all** communications ports that are configured to use either Modbus Slave or Modbus Master protocol.<br>• You can create a Modbus Map Table as a CSV file on your computer and then import the CSV file for use in the FB Series product. For more information about creating, importing, and exporting your own Modbus Map Table CSV files, refer to Creating a Modbus Map Table CSV File, Importing a Modbus Map Table CSV File, and Exporting a Modbus Map Table CSV File and Remote Data Types. |
| **Modbus Mapping using CSV Files** | Sets the location where the Modbus map table is stored by the FB Series product.<br>**Note**<br>• If you change this option, you **must** perform a warm start before any changes are applied.<br>• Your selection applies to **both** Modbus Slave and Modbus Master protocols. |

| Field | Description | | |
|---|---|---|---|
| | **Database Objects** | Select this radio button to store the Modbus map table in the FB Series product's internal database. | |
| | **Use CSV Files** | Select this radio button to store the Modbus map table as CSV files in the FB Series product.<br>**Note**<br>• This option removes the Modbus map table from the internal database and increases the available amount of memory in the FB Series product.<br>• To avoid losing data, export your current Modbus map table **before** you select this option. For more information, refer to Exporting a Modbus Map Table CSV File. | |
| | **Modbus Mapping Status** | This **read-only** field shows the current condition of the Modbus map table. Possible values are: | |
| | | **No Error (0)** | The CSV file is valid. |
| | | **No Mapping Found (1)** | There is no mapping file currently on the device. |
| | | **Column Mismatch (2)** | The CSV file is not formatted correctly. Some rows have more or less columns than the header. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Missing Req Column (3)** | The CSV file is missing a required column. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Exceeded Max Data (4)** | The CSV file contained more rows than the firmware supports. |
| | | **Invalid Row Data (5)** | The CSV file contains a row with invalid data. This can be out of range data or mappings that cannot be processed. Open the Log within the EFM Registers window for a detailed analysis. |

| Field | Description | | |
|---|---|---|---|
| | | **Duplicate Data (7)** | The CSV file contains two mappings with similar data or identical register numbers. Open the Log within the EFM Registers window for a detailed analysis. |
| **EFM Modbus Option** | Sets whether the selected communications port supports EFM Modbus reporting. | | |
| | **Enable** | The selected port supports EFM Modbus reporting. | |
| | **Disable** | The selected port supports standard Modbus reporting. | |
| **EFM Date Register** | Sets the Modbus register used to access (read/write) the date when using the selected communications port.<br>**Note**<br>The Current Date value identifies the current date from the FB Series product. This may be useful when you desire the date as a floating-point number. | | |
| **EFM Time Register** | Sets the Modbus register used to access (read/write) the time when using the selected communications port.<br>**Note**<br>The Current Time value identifies the current time from the FB Series product. This may be useful when you desire the time as a floating-point number. | | |
| **Alarm/Event Register** | Sets the Modbus Register Number used to acquire the most current unacknowledged Event and Alarms Log entries when using the selected communications port. | | |
| **EFM Application Event Enable** | Sets whether the selected communications port supports retrieval of Application Events, User Application Events, String Events, Application Alarms, and User Application Alarms contained in the Event and Alarm logs via Modbus. For a list of the Modbus registers used when retrieving EFM Application Events, refer to Modbus Registers for EFM Application Events. | | |
| | **Enable** | Allows these Events and Alarms to be retrieved via Modbus. | |

| Field | Description | |
|---|---|---|
| | **Disable** | Does not allow these Events and Alarms to be retrieved via Modbus. |
| **Enable Enron Modbus Register Format** | Sets the type of EFM Modbus register mapping used for the selected communications port. | |
| | **Enable** | Multiple FB Series product events are mapped to one Modbus register. For more information, contact Emerson technical support. |
| | **Disable** | One FB Series product event is mapped to one Modbus register. This is the default. |
| **Enable Float Date Time Event** | Sets if date and time changes are added to the event log when a time sync request is received via Modbus.<br>**Note**<br>Enable Float Date Time Event settings are shared between **all** communications ports that are configured to use Modbus Slave protocol. | |
| | **Enable** | When a time sync request is received, the following three events are added to the event log. The date and time events are retrievable via Modbus:<br>• Clock_1.TIME – Change<br>• Clock_1.FLOAT_DATE<br>• Clock_1.FLOAT_TIME<br>**Note**<br>• The Clock_1.FLOAT_DATE event is added to the event log **only** if the date is changed.<br>• The Clock_1.FLOAT_TIME event is added to the event log **only** if the time is changed. |
| | **Disable** | When a time sync request is received, the following event is added to the event log. The data and time events are not retrievable via Modbus:<br>• Clock_1.TIME – Change |
| **EFM History Time Format** | Sets the EFM history timestamp format used for the selected communications port. | |
| | **HHMM** | Two-digit hour and two-digit minute. |

| Field | Description | |
|---|---|---|
| | **HHMMSS** | Two-digit hour, two-digit minute, and two-digit second. |
| **Historical Log Timestamp Mode** | Sets whether the system logs (stamps) history data with the time from the beginning of a period or from the end of the period. | |
| | **Start of Period** | The system logs history data with the time from the beginning of the period. For example, the system time-stamps data it collects from 8:00 to 9:00 as 8:00. |
| | **End of Period** | The system logs history data with the time from the end of the period. For example, the system time-stamps data it collects from 8:00 to 9:00 as 9:00. |
| **EFM Archive Mapping** | Click to open an EFM archive mapping pop-up display that allows you to configure the EFM archive mapping used for the selected communications port.<br>**Note**<br>The display that opens is dependent on your selection in the EFM Archive Mapping using CSV Files field. If you select **Database Objects** in the EFM Archive Mapping using CSV Files field, the EFM Archive Mapping pop-up display opens. If you select **Use CSV Files** in the EFM Archive Mapping using CSV Files field, the EFM Registers pop-up display opens. | |
| **EFM Archive Mapping using CSV Files** | Sets the location where the EFM archive mapping table is stored by the FB Series product.<br>**Note**<br>If you change this option, you **must** perform a warm start before any changes are applied. | |
| | **Database Objects** | Select this radio button to store the EFM Archive Mapping table in the FB Series product's internal database. EFM Archive Mapping using this option is unique for each communications port. This allows you to access different history data through each communications port. |

| Field | Description | | |
|---|---|---|---|
| | **Use CSV Files** | Select this radio button to store the EFM Archive Mapping table as a CSV file in the FB Series product. EFM Archive Mapping using this option is shared between **all** communications ports. | |
| | **EFM Archive Mapping file status** | This **read-only** field shows the current condition of the EFM Archive Mapping in the FB Series product. Possible values are: | |
| | | **No Mapping Found** | There is no mapping file currently on the device. |
| | | **Column Mismatch** | The CSV file is not formatted correctly. Some rows have more or less columns than the header. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Missing Req Column** | The CSV file is missing a required column. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Exceeded Max Data** | The CSV file contained more rows than the firmware supports. |
| | | **Invalid Row Data** | The CSV file contains a row with invalid data. This can be out of range data or mappings that cannot be processed. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Duplicate Data** | The CSV file contains two mappings with similar data or identical register numbers. Open the Log within the EFM Registers window for a detailed analysis. |

5. Select **Save** to save any changes you make to this pop-up display.

### 4.30.3.1 Map Table Register

Use this pop-up display to configure the Modbus registers stored in the FB Series product. Map Table Registers can store values received from FB Series product parameters or values received from remote devices. A SCADA system can then retrieve data stored in the FB Series product from the Map Table Register.

**Note**

Register tables are shared by all communication ports, and by both Modbus slave and master port owners.

Your selection (**Database Objects** or **Use CSV Files**) in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display affects the functionality and fields shown on this display.

- If you select **Database Objects**, each register map is contained in separate register tables and stored in the FB Series product's internal database. You can configure 48 register tables. Each register table is comprised of 15 individual register entries (rows). Indexing allows for each entry to configure multiple registers (i.e., a single entry can represent 10 contiguous registers).
- If you select **Use CSV Files**, information for all register maps is contained in a single CSV file that is stored in the FB Series product. The register table can contain up to 65,535 rows.

You can map one line in the Map Table Register to more than one register or parameter pair by using either Point Indexing or Parameter Indexing.

- **Point Indexing** – Maps the same parameter for multiple instances of an object.
- **Parameter Indexing** – Maps consecutive parameters for the same instance of an object.

**Note**

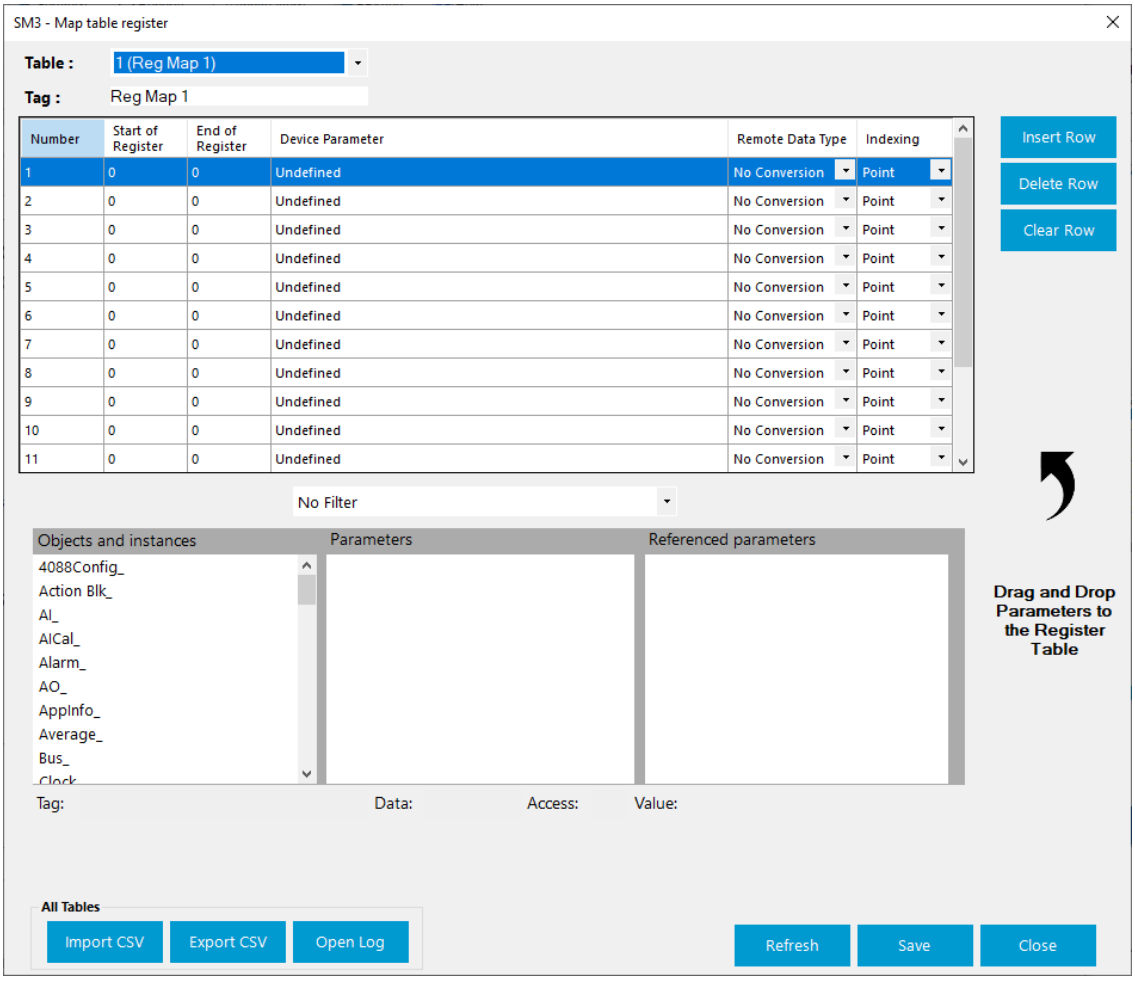
The order of parameters in the database can change from one firmware version to the next.

You can add a parameter to the register table by clicking and dragging the parameter onto the desired position in the table.

To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.
3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select the **Map Table Registers** button. The Map Table Register pop-up display opens.

**Figure 359. Map Table Register (configured to use Database Objects)**




5. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Table** | Click ▼ to select a map table register to configure.<br>**Note**<br>This field is shown **only** if you select **Database Objects** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. |
| **Tag** | Sets a name for the selected instance of the map table.<br>**Note**<br>This field is shown **only** if you select **Database Objects** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. |
| **Slave ID** (drop-down) | Click ▼ to filter the Map Table Register rows based on the Slave ID field. Select All to view all rows or select a Slave ID to only view rows configured with the selected Slave ID.<br>**Note**<br>This field is shown **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display and set the **Enhanced Slave IDs** field to **Enable** on the the Communications – Modbus Slave pop-up display. |
| **Number** | This **read-only** field shows the instance of the map table being accessed. |

| Field | Description |
|---|---|
| **Start of Register** | Sets the first data register in the address span. Any number from 0 to 65535 is valid. You can duplicate register numbers as long as you assign them to separate communication ports. Number the tables from smallest to largest.<br>For example, configure a starting register of 400 and an ending register of 700. When the host device requests starting register 500 through ending register 700, all the host-requested register numbers (500 through 700) are valid and elicit responses: the requested register numbers (500 through 700) match (or fall between) the starting register and ending register numbers (400 through 700).<br>**Note**<br>In certain Modbus Host devices, the register 40101 is actually transmitted as "100". The value "100" should be placed in this field as the FB Series product uses the actual number sent by the host. |
| **End of Register** | Sets the last register in the address span. Compute the value for this field by adding the total number of registers used to the Start or Starting Register number and subtracting 1. |
| **Device Parameter** | Defines the parameter of the object and instance in the database to set or to acquire. Be aware of the different data types (Character, Integer, Long, Float) and the size of the data types. |
| **Remote Data Type** | Click ▼ to select the data format sent to and received from the remote device. The FB Series product automatically converts the data as transmitted to/from the remote device to the correct data type for the parameter defined in the Device Parameter field. For more information, see Remote Data Types.<br>**Note**<br>No conversion sends the data type as stored in the FB Series product. |
| **Indexing** | Sets a block of register values as successive Logical Point Numbers or Parameters without having to define each separately. Possible options are:<br>**Point** — Maps the Start or Starting Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Object and Parameter, and increment the Instance. |

| Field | Description | |
|---|---|---|
| | **Parameter** | Maps the Start or Starting Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Object and Instance, and increment the Parameter Number.<br>**Note**<br>The order of parameters in the database can change from one firmware version to the next. |
| **Read/Write** | Click ▼ to set if the data in the selected row of the map table register can be modified by a remote device. Possible options are:<br>**Note**<br>This field is shown **only** if you select **Use CSV Files** in **the Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. | |
| | **Read Only** | The data **cannot** be modified by a remote device. |
| | **Read/Write** | The data can be modified by a remote device. |
| **Ports** | Click this cell to open a **Select Comm port instance** pop-up display and configure which communications ports instances that a remote device **must** use to access data in the selected row of the map table register. Place a check mark next each allowed communications port. Select **OK** to save your changes and return to the previous display.<br>**Note**<br>This field is shown **only** if you select **Use CSV Files** in **the Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. | |
| **Slave ID** (field) | Enter the Modbus Slave ID that the FB Series product will respond to when a device requests data contained in the selected Map Table Register. If the requesting device is configured with a different Modbus Slave ID, then the FB Series product ignores the request.<br>**Note**<br>This field is shown **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display and set the **Enhanced Slave IDs** field to **Enable** on the the Communications – Modbus Slave pop-up display. | |

| Field | Description |
|---|---|
| **Insert Row** | Select to add a new row to the map table register at the location of the currently highlighted row. Existing entries are moved down one row.<br>**Note**<br>If you select **Database Objects** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display, then the last row in the Map Table Register (row 15) is overwritten by the previous row (row 14). |
| **Delete Row** | Select to remove the currently highlighted row from the map table register. Existing entries are moved up one row.<br>**Note**<br>If you select **Database Objects** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display, then an empty row is added to the last row in the Map Table Register (row 15). |
| **Clear Row** | Select to remove data from the currently highlighted row of the map table register. |
| **Add Row** | Select to add a row to the end of the map table register.<br>**Note**<br>This field is shown **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. |
| **Filter** | Click ▼ to narrow the number of parameters by object type. |
| **Object and instances** | Lists the available database objects (types) and instances (iterations) of each object. Select an Object and Instance to view the available parameters. |
| **Parameters** | Lists the available parameters (properties) for the selected object and instance. |
| **Referenced Parameters** | Lists the available parameters for the referenced object, when the data type of the parameter in the Parameters column is an OBJREF. |
| **Parameter's Tag** | This **read-only** field shows the name of the selected parameter. |
| **Data Type** | This **read-only** field shows the data type of the selected parameter. |

| Field | Description |
|---|---|
| **Access Type** | This **read-only** field shows the read/write access of the selected parameter. |
| **Value** | This **read-only** field shows the value of the selected parameter. |
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired Modbus configuration. Navigate to the location of the saved CSV file and select **Open** to start the import process. For more information, refer to Importing a Modbus Map Table CSV File.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. Any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained. |
| **Export CSV** | Click to save a CSV file to your computer that contains the current Modbus configuration of your FB Series product. A Select Table dialog opens where you can select which Modbus tables to include in the export. Click **Start**, select a name and location for the exported file on your computer, and click **Save** to begin the export process. For more information, refer to Exporting a Modbus Map Table CSV File.<br>**Note**<br>By default, all selected data is exported into a single file. Select **Export to individual file** to have the system create individual files for each Modbus table you select. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |
| **Refresh** | Select to re-display the map table entries currently stored in memory of the FB Series product. |
| **Save** | Select to save the current map table and any changes to memory in the FB Series product. |
| **Close** | Select to exit the Map Table Register display. |

6. If you're starting from a blank map table, click **Add Row** to add a new row to the map table.
7. Select an Object and Instance of that Object from the **Objects and instances** frame. A list of available parameters displays in the Parameters frame.
8. Click and drag a parameter from the **Parameters** frame to the desired register number in selected the Map Table.
9. Enter the first data register in the address span in the **Start of Register** field.
10. Enter the last register in the address span in the **End of Register** field.
11. Click ▼ in the **Remote Data Type** field to set the data format sent to and received from the remote device.
12. Click ▼ in the **Indexing** field to set a block of register values as successive Object Numbers or Parameters.
13. Click ▼ to set if the data in the selected row of the map table register can be either read (Read Only) or modified (Read/Write) by a remote device.
    **Note**
    This field is shown **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display.
14. Click the **Ports** cell to open a **Select Comm port instance** display and configure which communications ports instances that a remote device is allowed to use to access the data in the selected row of the map table register. Place a check mark next each allowed communications port. Select **OK** to save your changes and return to the previous display.
    **Note**
    This field is shown **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display.
15. Select **Save** to save any changes you make to this pop-up display.

**Note**

If you selected **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display, you **must** perform a warm start before any changes take effect.

#### 4.30.3.1.1 Importing a Modbus Map Table CSV File

You can import a CSV file that contains your Modbus map table configuration for use in your FB Series product.

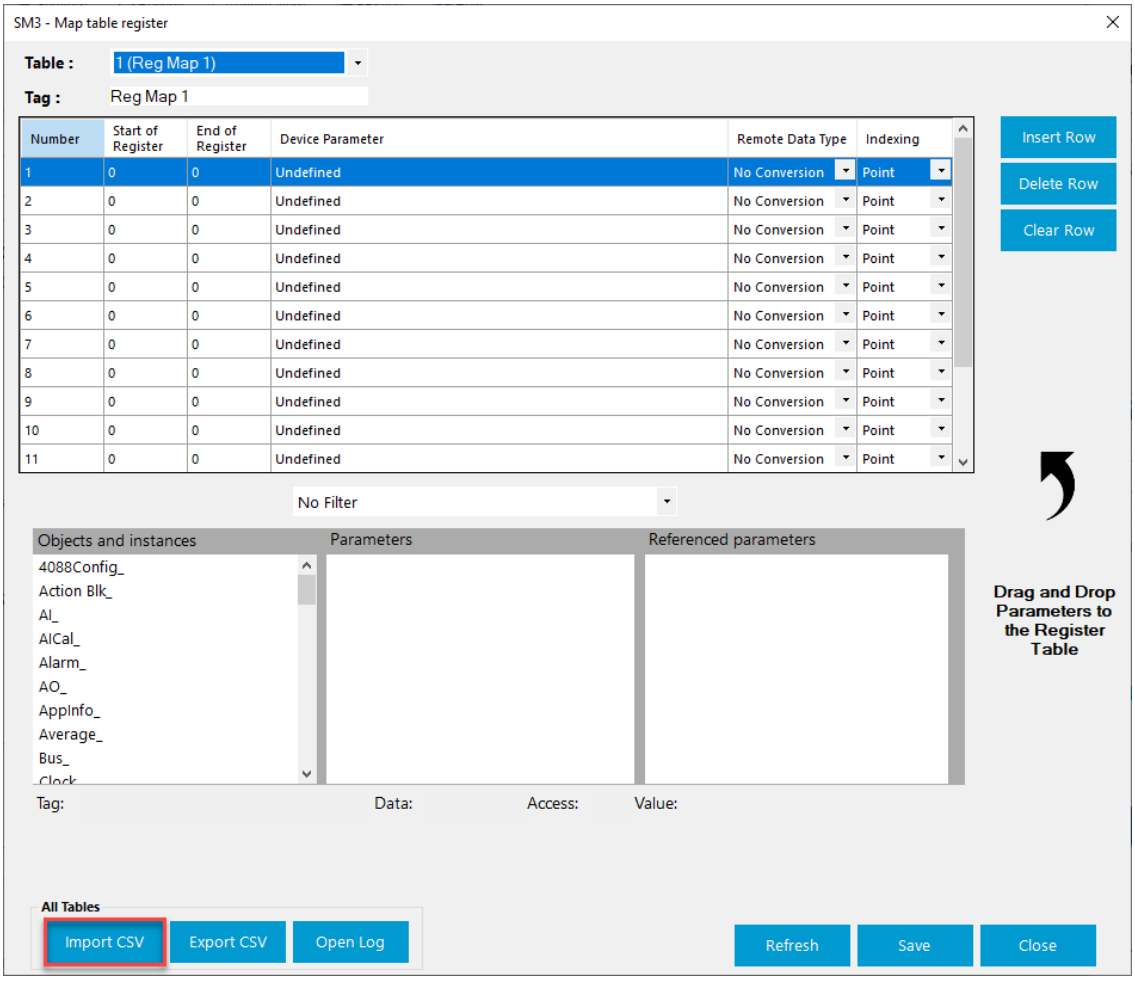
**Note**

- For more information about Modbus map tables in the FB Series product, refer to Map Table Register.
- For more information about creating your own Modbus map table CSV file, refer to Creating a Modbus Map Table CSV File.
- For more information about exporting a CSV file that contains the FB Series product's current Modbus map table configuration, refer to Exporting a Modbus Map Table CSV File.
- Your selection in the **Modbus Mapping using CSV files** field (either **Database Objects** or **Use CSV Files**) affects the format of Modbus map table. To import a CSV file that was created by an FB Series product with a different selection in the **Modbus Mapping using CSV files** field, then you **must** first modify the CSV file to have the correct format. For more information about the format required for each selection (either **Database Objects** or **Use CSV Files**), refer to Creating a Modbus Map Table CSV File.

To import a CSV file that contains your Modbus map table configuration:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave or Modbus Master protocol.
3. Depending on the protocol used by the selected communications port, select either the **Modbus Slave** or **Modbus Master** button. The Modbus Slave or Modbus Master pop-up display opens.
4. Select the **Map Table Registers** button. The Map Table Register pop-up display opens.

**Figure 360. Map Table Register – Import CSV**

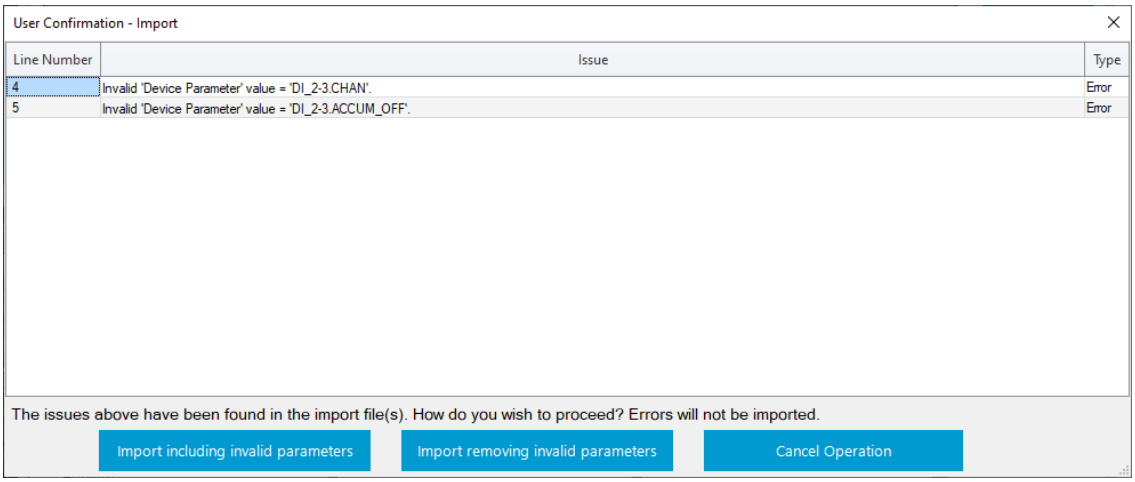



5. Select the **Import CSV** button.
6. Navigate to the file location of your CSV file and select **Open**.

### Note

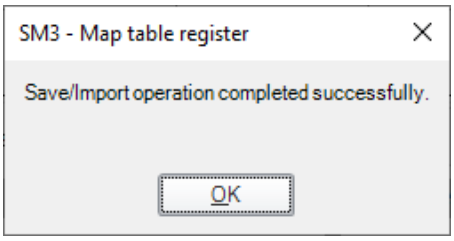
The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

**Figure 361. Example Import Map Table Errors**




7. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Figure 362. Confirmation**




### 4.30.3.1.2 Exporting a Modbus Map Table CSV File

You can export your FB Series product's current Modbus map table configuration to a CSV file saved on your computer.

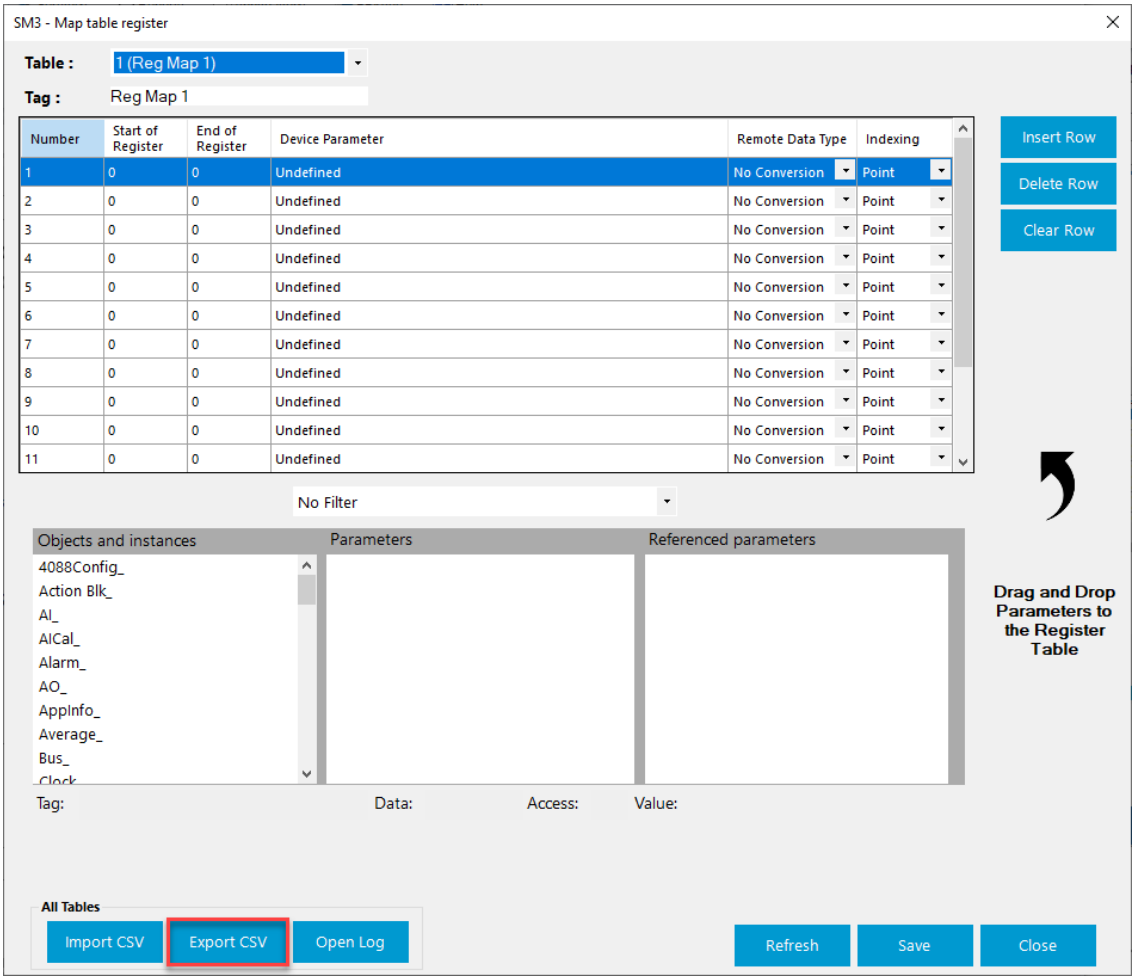
**Note**

- For more information about Modbus map tables in the FB Series product, refer to Map Table Register.
- For more information about creating your own Modbus map table CSV file, refer to Creating a Modbus Map Table CSV File.
- For more information about importing a CSV file that contains the FB Series product's current Modbus map table configuration, refer to Importing a Modbus Map Table CSV File.

To export a CSV file that contains your Modbus map table configuration:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave or Modbus Master protocol.
3. Depending on the protocol used by the selected communications port, select either the **Modbus Slave** or **Modbus Master** button. The Modbus Slave or Modbus Master pop-up display opens.
4. Select the **Map Table Registers** button. The Map Table Register pop-up display opens.

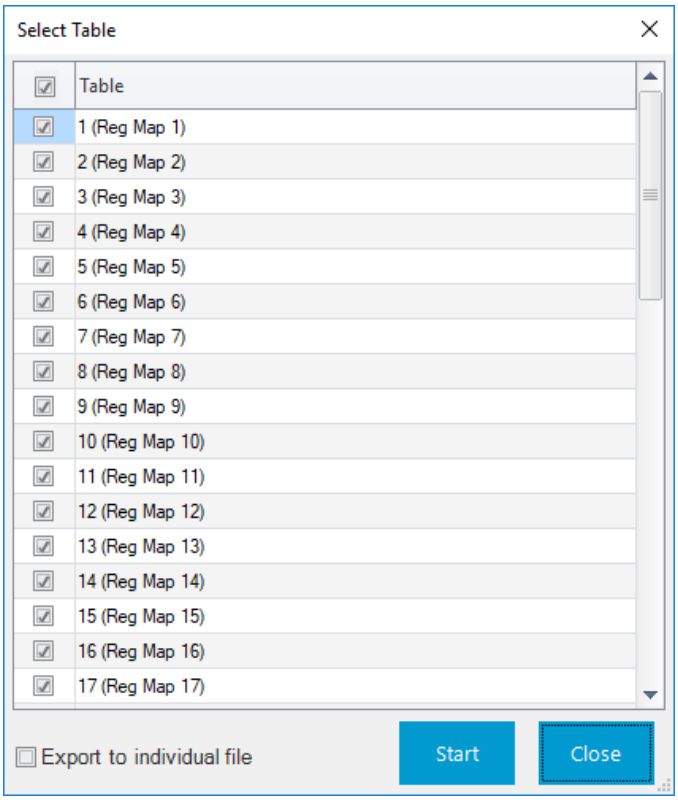
**Figure 363. Map Table Register – Export CSV**



5. Select the **Export CSV** button. One of two things happens based on your selection in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display:

   - If you select **Database Objects**, the Select Table pop-up display opens. Proceed to step 6.
   - If you select **Use CSV Files**, the Save csv File window opens. Proceed to step 8.

**Figure 364. Select Table**



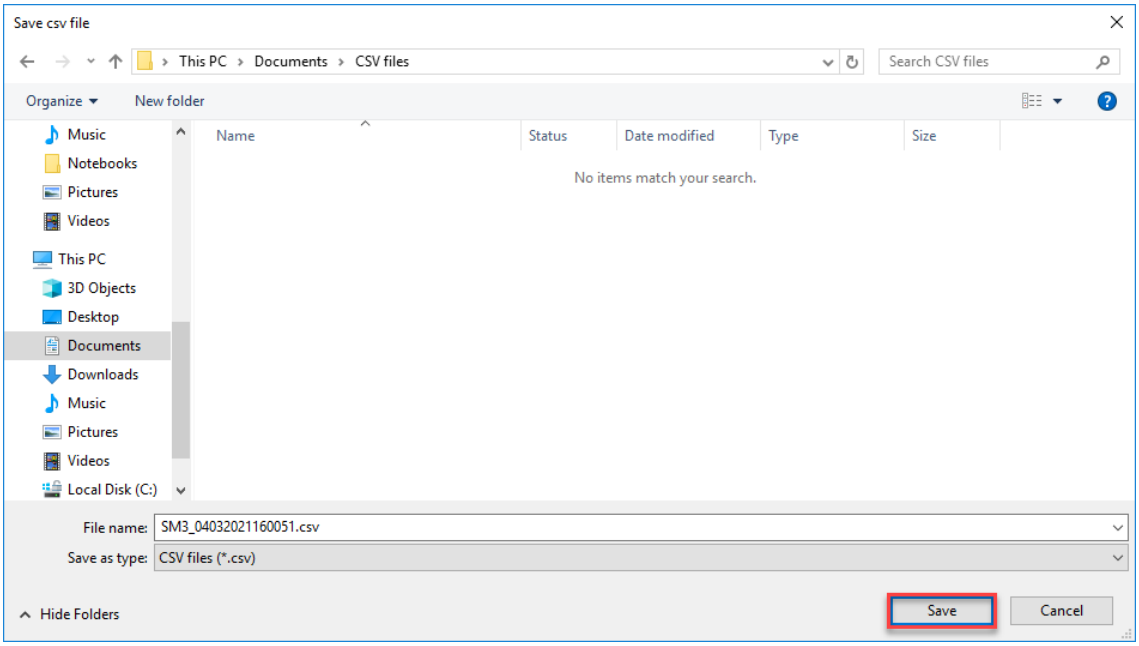

6. Place a check mark next to each table you want to export.

**Note**

By default, all selected tables are exported to a single file. If you want each selected table to be exported to individual files, place a check mark next to Export to individual file.

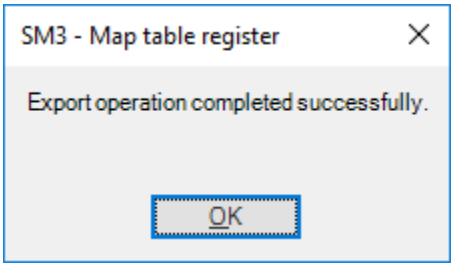
7. Select **Start**. A Save csv file window opens.

**Figure 365. Save csv file**




8. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system exports the CSV file and displays a progress bar at the top of the display.
9. A confirmation message displays after exporting the CSV file. Select OK to complete the process.

**Figure 366. Confirmation**




### 4.30.3.1.3 Creating a Modbus Map Table CSV File

You can create a Modbus Map Table on your computer and then import the file for use in the FB Series product. If your Modbus Map Table contains a large amount of points, it may be easier to create a CSV file on your computer than it is to configure the table in DeltaV FBxConnect configuration software.

**Note**

- For more information about Modbus Map Tables, refer to Map Table Register.
- The easiest way to begin creating a custom map is to export a CSV that contains the current configuration and then edit that file. For more information about exporting a CSV file, refer to the Exporting a Modbus Map Table CSV File.

**Figure 367. Example Modbus Map Table CSV Format (configured to use CSV Files)**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Number | Start of Register | End of Register | Device Parameter | Remote Data Type | Indexing | Read/Write | Ports | Slave ID |
| 2 | 1 | 105 | 108 | Alarm_1.PROCESS_ALM | 0 | 0 | 0 | All | 0 |
| 3 | 2 | 110 | 113 | Alarm_1.HIHI_ST | 0 | 0 | 0 | Comm_1;Comm_4;Comm_5 | 0 |
| 4 | 3 | 115 | 118 | Alarm_1.HI_ST | 0 | 0 | 0 | Comm_1;Comm_4;Comm_5 | 0 |
| 5 | 4 | 120 | 123 | Alarm_1.LO_ST | 0 | 0 | 0 | Comm_1;Comm_4;Comm_5 | 0 |
| 6 | 5 | 125 | 128 | Alarm_1.LOLO_ST | 0 | 0 | 0 | Comm_1;Comm_4;Comm_5 | 0 |
| 7 | 6 | 130 | 133 | Alarm_1.PF_ST | 0 | 0 | 0 | Comm_4;Comm_5 | 42 |

To create a CSV file that contains your Modbus map table configuration:

1. Open a blank spreadsheet (or open your previously exported Modbus poll table CSV file).
2. Your selection (**Database Objects** or **Use CSV Files**) in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display affects the format of the CSV file. In row one of the spreadsheet, enter the following text based on your configuration:

   **Table 53. Modbus Map Table CSV Headers**

| Database Objects | Use CSV Files |
|---|---|
| • Column A = Table<br>• Column B = Number<br>• Column C = Start of Register<br>• Column D = End of Register<br>• Column E = Device Parameter<br>• Column F = Remote Data Type<br>• Column G = Indexing | • Column A = Number<br>• Column B = Start of Register<br>• Column C = End of Register<br>• Column D = Device Parameter<br>• Column E = Remote Data Type<br>• Column F = Indexing<br>• Column G = Read/Write<br>• Column F = Ports<br>• Column I = Slave ID |

3. In the proceeding rows, enter information for each table entry according to the descriptions below:

**Note**

Drop-down lists on the DeltaV FBxConnect configuration software display are represented as numbers in the CSV file. See the descriptions below for a description for each number.

| Column Heading | Description |
|---|---|
| **Table** | Indicates the map table register for the selected row. Valid values are:<br>**1** through **48**<br>**Note**<br>• Register tables are shared by all communication ports, and by both Modbus Slave and Master port owners.<br>• This column is required **only** if you select **Database Objects** in the **Modbus Mapping using CSV Files** option on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. For more information, refer to Map Table Register. |
| **Number** | Enter the row of the selected map table register. The number of possible rows is dependent on your selection in the **Database Objects** in the **Modbus Mapping using CSV Files** option on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display:<br>• If you select **Database Objects**, valid values are 1 through 15.<br>• If you select **Use CSV Files**, valid values are 1 through 65,000. |
| **Start of Register** | Enter the first data register in the address span. Any number from 0 to 65535 is valid. You can duplicate register numbers as long as you assign them to separate communication ports. Number the tables from smallest to largest.<br>For example, configure a starting register of 400 and an ending register of 700. When the host device requests starting register 500 through ending register 700, all the host-requested register numbers (500 through 700) are valid and elicit responses: the requested register numbers (500 through 700) match (or fall between) the starting register and ending register numbers (400 through 700).<br>**Note** |

| Column Heading | Description |
|---|---|
| | In certain Modbus Host devices, the register 40101 is actually transmitted as "100". The value "100" should be placed in this field as the FB Series product uses the actual number sent by the host. |
| **End of Register** | Enter the last register in the address span. Compute the value for this field by adding the total number of registers used to the Start or Starting Register number and subtracting 1. Any number from 0 to 65535 is valid. |
| **Device Parameter** | Enter the parameter of the object and instance in the database to set or to acquire. Be aware of the different data types (Character, Integer, Long, Float) and the size of the data types. |
| **Remote Data Type** | Enter the number that corresponds to the data format sent to and received from the remote device. The FB Series product automatically converts the data as transmitted to/from the remote device to the correct data type for the parameter defined in the Device Parameter field. For more information, refer to the CSV Value field in the Remote Data Types topic.<br>**Note**<br>No conversion sends the data type as stored in the FB Series product. |
| **Indexing** | Sets a block of register values as successive Logical Point Numbers or Parameters without having to define each separately. Possible options are:<br>**0 Point**<br>Maps the Start or Starting Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Object and Parameter, and increment the Instance.<br>**1 Parameter**<br>Maps the Start or Starting Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Object and Instance, and increment the Parameter Number.<br>**Note**<br>The order of parameters in the database can change from one firmware version to the next. |

| Column Heading | Description |
|---|---|
| **Read/Write** | Sets if the data in the selected row of the map table register can be modified by a remote device. Possible options are:<br>**Note**<br>This column is required **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. For more information, refer to Map Table Register. |
| | **0** Read Only (the data cannot be modified) |
| | **1** Read/Write (the data can be modified) |
| **Ports** | Enter the communications port instances that a remote device **must** use to access the data in the selected row of the map table register.<br>**Note**<br>• At least one communications port instance **must** be defined.<br>• To allow multiple communications ports access to the data, place a semicolon between each instance (for example, Comm_1;Comm_4;Comm_5).<br>• Typing **All** enables all communications port instances to access the data.<br>• This column is required **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display. For more information, refer to Map Table Register. |
| **Slave ID** | The values in this column apply **only** if you select **Use CSV Files** in the **Modbus Mapping using CSV Files** field on either the Communications – Modbus Slave or Communications – Modbus Master pop-up display and set the **Enhanced Slave IDs** field to **Enable** on the Communications – Modbus Slave pop-up display. |

4. Save your changes. You can now import your CSV file for use in your FB Series product. For more information, refer to Importing a Modbus Map Table CSV File.

**Note**

Make sure to save the file with a **.csv** file extension.

#### 4.30.3.1.4 Remote Data Types

Remote data types in the Modbus register table tell the FB Series product what data type to send to and receive from the remote device. The FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU support the following remote data types.

**Table 54. Remote Data Types**

| CSV Value | Data Type | Description |
|---|---|---|
| **0** | **No Conversion** | Format of selected parameter (byte order determined by LSB/MSB option). |
| **1** | **UINT8** | 8-bit unsigned integer. |
| **2** | **INT8** | 8-bit signed integer. |
| **3** | **UINT16** | 16-bit unsigned integer (byte order determined by LSB/MSB option). |
| **4** | **INT16** | 16-bit signed integer (byte order determined by LSB/MSB option). |
| **5** | **UINT32 (2 Registers 0-1-2-3)** | 32-bit unsigned integer value to be sent or received in two Modbus registers with byte order of 0-1-2-3 (where 0 is the least significant byte). |
| **6** | **UINT32 (2 Registers 1-0-3-2)** | 32-bit unsigned integer value to be sent or received in two Modbus registers with byte order of 1-0-3-2 (where 0 is the least significant byte). |
| **7** | **UINT32 (2 Registers 2-3-0-1)** | 32-bit unsigned integer value to be sent or received in two Modbus registers with byte order of 2-3-0-1 (where 0 is the least significant byte). |
| **8** | **UINT32 (2 Registers 3-2-1-0)** | 32-bit unsigned integer value to be sent or received in two Modbus registers with byte order of 3-2-1-0 (where 0 is the least significant byte). |
| **9** | **INT32 (2 Registers 0-1-2-3)** | 32-bit signed integer value to be sent or received in two Modbus registers with byte order of 0-1-2-3 (where 0 is the least significant byte). |

| CSV Value | Data Type | Description |
|---|---|---|
| **10** | **INT32 (2 Registers 1-0-3-2)** | 32-bit signed integer value to be sent or received in two Modbus registers with byte order of 1-0-3-2 (where 0 is the least significant byte). |
| **11** | **INT32 (2 Registers 2-3-0-1)** | 32-bit signed integer value to be sent or received in two Modbus registers with byte order of 2-3-0-1 (where 0 is the least significant byte). |
| **12** | **INT32 (2 Registers 3-2-1-0)** | 32-bit signed integer value to be sent or received in two Modbus registers with byte order of 3-2-1-0 (where 0 is the least significant byte). |
| **13** | **UINT64 (4 Registers 0-1-2-3-4-5-6-7)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 0-1-2-3-4-5-6-7 (where 0 is the least significant byte). |
| **14** | **UINT64 (4 Registers 2-3-0-1-6-7-4-5)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 2-3-0-1-6-7-4-5 (where 0 is the least significant byte). |
| **15** | **UINT64 (4 Registers 4-5-6-7-0-1-2-3)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 4-5-6-7-0-1-2-3 (where 0 is the least significant byte). |
| **16** | **UINT64 (4 Registers 6-7-4-5-2-3-0-1)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 6-7-4-5-2-3-0-1 (where 0 is the least significant byte). |
| **17** | **UINT64 (4 Registers 1-0-3-2-5-4-7-6)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 1-0-3-2-5-4-7-6 (where 0 is the least significant byte). |
| **18** | **UINT64 (4 Registers 3-2-1-0-7-6-5-4)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 3-2-1-0-7-6-5-4 (where 0 is the least significant byte). |
| **19** | **UINT64 (4 Registers 5-4-7-6-1-0-3-2)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 5-4-7-6-1-0-3-2 (where 0 is the least significant byte). |
| **20** | **UINT64 (4 Registers 7-6-5-4-3-2-1-0)** | 64-bit unsigned integer value to be sent or received in four Modbus registers with byte order of 7-6-5-4-3-2-1-0 (where 0 is the least significant byte). |

| CSV Value | Data Type | Description |
|---|---|---|
| **21** | **INT64 (4 Registers 0-1-2-3-4-5-6-7)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 0-1-2-3-4-5-6-7 (where 0 is the least significant byte). |
| **22** | **INT64 (4 Registers 2-3-0-1-6-7-4-5)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 2-3-0-1-6-7-4-5 (where 0 is the least significant byte). |
| **23** | **INT64 (4 Registers 4-5-6-7-0-1-2-3)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 4-5-6-7-0-1-2-3 (where 0 is the least significant byte). |
| **24** | **INT64 (4 Registers 6-7-4-5-2-3-0-1)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 6-7-4-5-2-3-0-1 (where 0 is the least significant byte). |
| **25** | **INT64 (4 Registers 1-0-3-2-5-4-7-6)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 1-0-3-2-5-4-7-6 (where 0 is the least significant byte). |
| **26** | **INT64 (4 Registers 3-2-1-0-7-6-5-4)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 3-2-1-0-7-6-5-4 (where 0 is the least significant byte). |
| **27** | **INT64 (4 Registers 5-4-7-6-1-0-3-2)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 5-4-7-6-1-0-3-2 (where 0 is the least significant byte). |
| **28** | **INT64 (4 Registers 7-6-5-4-3-2-1-0)** | 64-bit signed integer value to be sent or received in four Modbus registers with byte order of 7-6-5-4-3-2-1-0 (where 0 is the least significant byte). |
| **29** | **FLOAT (2 Registers 0-1-2-3)** | 32-bit single precision floating point value to be sent or received in two Modbus registers with byte order of 0-1-2-3 (where 0 is the least significant byte). |
| **30** | **FLOAT (2 Registers 1-0-3-2)** | 32-bit single precision floating point value to be sent or received in two Modbus registers with byte order of 1-0-3-2 (where 0 is the least significant byte). |
| **31** | **FLOAT (2 Registers 2-3-0-1)** | 32-bit single precision floating point value to be sent or received in two Modbus registers with byte order of 2-3-0-1 (where 0 is the least significant byte). |

| CSV Value | Data Type | Description |
|---|---|---|
| **32** | **FLOAT (2 Registers 3-2-1-0)** | 32-bit single precision floating point value to be sent or received in two Modbus registers with byte order of 3-2-1-0 (where 0 is the least significant byte). |
| **33** | **DOUBLE (4 Registers 0-1-2-3-4-5-6-7)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 0-1-2-3-4-5-6-7 (where 0 is the least significant byte). |
| **34** | **DOUBLE (4 Registers 2-3-0-1-6-7-4-5)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 2-3-0-1-6-7-4-5 (where 0 is the least significant byte). |
| **35** | **DOUBLE (4 Registers 4-5-6-7-0-1-2-3)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 4-5-6-7-0-1-2-3 (where 0 is the least significant byte). |
| **36** | **DOUBLE (4 Registers 6-7-4-5-2-3-0-1)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 6-7-4-5-2-3-0-1 (where 0 is the least significant byte). |
| **37** | **DOUBLE (4 Registers 1-0-3-2-5-4-7-6)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 1-0-3-2-5-4-7-6 (where 0 is the least significant byte). |
| **38** | **DOUBLE (4 Registers 3-2-1-0-7-6-5-4)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 3-2-1-0-7-6-5-4 (where 0 is the least significant byte). |
| **39** | **DOUBLE (4 Registers 5-4-7-6-1-0-3-2)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 5-4-7-6-1-0-3-2 (where 0 is the least significant byte). |
| **40** | **DOUBLE (4 Registers 7-6-5-4-3-2-1-0)** | 64-bit double precision floating point value to be sent or received in four Modbus registers with byte order of 7-6-5-4-3-2-1-0 (where 0 is the least significant byte). |
| **41** | **SINGLE REGISTER FLOATING POINT** | 32-bit single precision floating point value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |
| **42** | **SINGLE REGISTER DOUBLE** | 64-bit double precision floating point value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |

| CSV Value | Data Type | Description |
|---|---|---|
| **43** | **SINGLE REGISTER INT32** | 32-bit signed integer value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |
| **44** | **SINGLE REGISTER UINT32** | 32-bit unsigned integer value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |
| **45** | **SINGLE REGISTER INT64** | 64-bit signed integer value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |
| **46** | **SINGLE REGISTER UINT64** | 64-bit unsigned integer value to be sent or received as a single Modbus register (byte order determined by LSB/MSB option). |
| **47** | **STRING (10 Characters)** | A 10-character string value provided as two characters per consecutive register. To be sent or received as five Modbus registers. Strings with less than 10 characters are padded with extra space characters to become 10 characters in length. |
| **48** | **STRING (20 Characters)** | A 20-character string value provided as two characters per consecutive register. To be sent or received as ten Modbus registers. Strings with less than 20 characters are padded with extra space characters to become 20 characters in length. |
| **49** | **STRING (30 Characters)** | A 30-character string value provided as two characters per consecutive register. To be sent or received as fifteen Modbus registers. Strings with less than 30 characters are padded with extra space characters to become 30 characters in length. |
| **50** | **STRING (40 Characters)** | A 40-character string value provided as two characters per consecutive register. To be sent or received as twenty Modbus registers. Strings with less than 40 characters are padded with extra space characters to become 40 characters in length. |

### 4.30.3.2 Modbus Registers for EFM Application Events

The following registers are used when you enable EFM Application Events and retrieve events via Modbus.

**Table 55. Application Events**

| Register | Description |
|---|---|
| **60000** | String Event |
| **61001** | Power Applied |
| **61002** | Power Removed |
| **61003** | Battery Changed |
| **61004** | Firmware Update Start |
| **61005** | Firmware Apply Package Version |
| **61006** | Firmware Update Complete |
| **61007** | Firmware Update Package Restore Fail |
| **61008** | Task Restarted |
| **61009** | CPU Module Changed |
| **61010** | PM Module Changed |
| **61011** | CPU Module Previous |
| **61012** | PM Module Previous |
| **61013** | Schedule Slip Detected |
| **61014** | Event Type 14 |
| **61015** | Event Type 15 |
| **61016** | Login Success |
| **61017** | Login Fail Invalid Credentials |
| **61018** | Account Locked |
| **61019** | Logout |
| **61020** | Account Added |
| **61021** | Account Removed |
| **61022** | Account Modified |
| **61023** | Log Clear |
| **61024** | Log Clear Due to CRC Corrupt |

| Register | Description |
|---|---|
| **61025** | History Point Cleared |
| **61026** | System Down |
| **61027** | Action Block Trip Status Changed |
| **61028** | Database Initialized |
| **61029** | Daylight Saving Time Change |
| **61030** | Total Rollover |
| **61031** | System Restart |
| **61032** | Pulse Accum Rollover |
| **61033** | Firmware Apply Image Version |
| **61034** | Firmware I/O Board Disabled |
| **61035** | Restart During Calc Cycle |
| **61036** | Configuration Counter Changed |
| **61037** | Log Clear for Combined Event Log |
| **61038** | Log Clear for Separate Event Logs |
| **61039** | History Clear |
| **61040** | Alarm Clear |
| **61041** | Event Clear |
| **61042** | History Records Lost |
| **61043** | Alarm Records Lost |
| **61044** | Event Records Lost |
| **61045** | Standard History Point Archival Reset |
| **61046** | GC Data Read Failed |
| **61047** | Hist Group Read Failed |
| **61048** | Application Clear |
| **61049** | Users Clear |
| **61050 - 62000** | Reserved for Future Events |
| **62001** | Informational |
| **62002** | Error |
| **62003** | Status |

| Register | Description |
|---|---|
| **62004** | Calculated Factor |
| **62005** | Message |
| **62006** | Data |
| **62007** | Notice |
| **62008** | Feedback |
| **62009** | Confirmation |
| **62010** | Program Adjusted |
| **62011** | Estimated Result |
| **62012** | User Input |
| **62013** | System Change |
| **62014** | HMI Input |
| **62015** | Other |
| **62016 - 63000** | Reserved for Future Events |
| **63001** | Low |
| **63002** | Low Low |
| **63003** | High |
| **63004** | High High |
| **63005** | Rate of Change |
| **63006** | User Account Locked |
| **63007** | Log Full Limit Exceeded |
| **63008** | Log Nearly Full Limit Exceeded |
| **63009** | Log Integrity Failure |
| **63010** | Battery Status |
| **63011** | Low Voltage |
| **63012** | Override |
| **63013** | Point Fail |
| **63014** | Digital ON Status Alarm |
| **63015** | No Response From History |
| **63016** | Analysis Timeout |

| Register | Description |
|---|---|
| **63017** | Normalization Failure |
| **63018** | Flow Calculation Alarm |
| **63019** | Properties Calculation Alarm |
| **63020** | Auto-Adjust System Alarm |
| **63021** | Auto-Adjust Flow Alarm |
| **63022** | Auto-Adjust Delta A Alarm |
| **63023** | History Point Movement Failure |
| **63024** | Door Open Status Alarm |
| **63025** | Other |
| **63026** | Flow Calc Alarm: Invalid Input(s) |
| **63027** | Flow Calc Alarm: Invalid Config |
| **63028** | Flow Calc Alarm: Calculation Error |
| **63029** | Flow Calc Alarm: Boundary Error |
| **63030** | Flow Calc Alarm: Invalid Station Assign |
| **63031** | Flow Calc Alarm: Reserved |
| **63032** | Flow Calc Alarm: Reserved |
| **63033** | Flow Calc Alarm: Reserved |
| **63034** | Flow Calc Alarm: DP/Flow |
| **63035** | Flow Calc Alarm: Pressure |
| **63036** | Flow Calc Alarm: Temperature |
| **63037** | Flow Calc Alarm: Flowing Density/Z |
| **63038** | Flow Calc Alarm: Base Density/Z |
| **63039** | Flow Calc Alarm: Relative Density |
| **63040** | Flow Calc Alarm: HV/Enthalpy |
| **63041** | Flow Calc Alarm: Viscosity |
| **63042** | Flow Calc Alarm: User Corr Factor |
| **63043** | Flow Calc Alarm: Total/Incement |
| **63044** | Flow Calc Alarm: Integral Mult Value |
| **63045** | Flow Calc Alarm: Reserved |

| Register | Description |
|---|---|
| **63046** | Flow Calc Alarm: Reserved |
| **63047** | Flow Calc Alarm: Reserved |
| **63048** | Flow Calc Alarm: Reserved |
| **63049** | Flow Calc Alarm: Reserved |
| **63050** | Flow Calc Alarm: Reserved |
| **63051** | Flow Calc Alarm: Beta Ratio |
| **63052** | Flow Calc Alarm: DP/P Ratio |
| **63053** | Flow Calc Alarm: Isentropic Exponent |
| **63054** | Flow Calc Alarm: Reynolds Number |
| **63055** | Flow Calc Alarm: Pressure Loss/Ratio |
| **63056** | Flow Calc Alarm: Alpha |
| **63057** | Flow Calc Alarm: Expansion Factor |
| **63058** | Flow Calc Alarm: K-factor/Meter Factor |
| **63059** | Flow Calc Alarm: Mass Press Corr Factor |
| **63060** | Flow Calc Alarm: Reserved |
| **63061** | Flow Calc Alarm: Reserved |
| **63062** | Flow Calc Alarm: Reserved |
| **63063** | Flow Calc Alarm: Reserved |
| **63064** | Flow Calc Alarm: Reserved |
| **63065** | Flow Calc Alarm: K-factor/Meter Factor |
| **63066** | Flow Calc Alarm: Mass Press Corr Factor |
| **63067** | Flow Calc Alarm: Water Cut |
| **63068** | Flow Calc Alarm: Shrinkage Factor |
| **63069** | Flow Calc Alarm: CTL |
| **63070** | Flow Calc Alarm: NGL Factor/Flash Fctr |
| **63071** | Flow Calc Alarm: Reserved |
| **63072** | Prop Calc Alarm: Invalid Input(s) |
| **63073** | Prop Calc Alarm: Invalid Config |
| **63074** | Prop Calc Alarm: Calculation Error |

| Register | Description |
|---|---|
| **63075** | Prop Calc Alarm: Boundary Error |
| **63076** | Prop Calc Alarm: Reserved |
| **63077** | Prop Calc Alarm: Reserved |
| **63078** | Prop Calc Alarm: Reserved |
| **63079** | Prop Calc Alarm: Reserved |
| **63080** | Prop Calc Alarm: Pressure |
| **63081** | Prop Calc Alarm: Temperature |
| **63082** | Prop Calc Alarm: Flowing Density/Z |
| **63083** | Prop Calc Alarm: Base Density/Z |
| **63084** | Prop Calc Alarm: Relative Density |
| **63085** | Prop Calc Alarm: HV/Enthalpy |
| **63086** | Prop Calc Alarm: Composition |
| **63087** | Prop Calc Alarm: Water Content |
| **63088** | Prop Calc Alarm: Atm Press/Grav Accel |
| **63089** | Prop Calc Alarm: Viscosity |
| **63090** | Prop Calc Alarm: Isentropic Exponent |
| **63091** | Prop Calc Alarm: Speed of Sound |
| **63092** | Prop Calc Alarm: Reserved |
| **63093** | Prop Calc Alarm: Reserved |
| **63094** | Prop Calc Alarm: Reserved |
| **63095** | Prop Calc Alarm: Reserved |
| **63096** | Prop Calc Alarm: Reserved |
| **63097** | Prop Calc Alarm: Reserved |
| **63098** | Prop Calc Alarm: Reserved |
| **63099** | Prop Calc Alarm: Reserved |
| **63100** | Prop Calc Alarm: Reserved |
| **63101** | Prop Calc Alarm: Reserved |
| **63102** | Prop Calc Alarm: Reserved |
| **63103** | Prop Calc Alarm: Reserved |

| Register | Description |
|---|---|
| **63104** | Parameter Health Status |
| **63105** | Meter Task Detected Fatal Error |
| **63106 - 64000** | Reserved for Future Alarms |
| **64001** | Low |
| **64002** | Low Low |
| **64003** | High |
| **64004** | High High |
| **64005** | Rate of Change |
| **64006** | Discrete |
| **64007** | Calculation |
| **64008** | Manual |
| **64009** | Scanning Disabled |
| **64010** | Calibration |
| **64011** | Failure |
| **64012** | Failsafe |
| **64013** | Permanent Shutdown |
| **64014** | Temporary Shutdown |
| **64015** | Action On Failure |
| **64016** | Other |
| **64017 - 65000** | Reserved for Future Alarms |

### 4.30.3.3 Modbus Events and Alarms

The record formats for the event log and alarm log are the same size and have similar contents. The first word in a record is a bit map in which bit 9 indicates if the log record is an Event (1) or an Alarm (0). The meanings of the other bits are specific to either the Event or the Alarm Log records. Refer to Event & Alarm Change Bit Map Contents.

The FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU support the Modbus with EFM extensions method for retrieving alarms and events. When the FB Series product receives a Function Code 03 request referencing defined Events and Alarms Register (usually 32), the FB Series product begins to collect records from first the

Event Log and then the Alarm Log, starting where the last poll left off. The FB Series product collects records until either there are not any more new events, alarms, or it collects the maximum of 12 records. The FB Series product sends the information back to the Host, which in return replies with Function Code 05, referencing the same Events and Alarms Register, indicating that the points have been received and that the Host is ready for the next 12 records.

The following paragraphs detail how FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU place event log and alarms log information in Modbus event and alarm messages, and how (or what) is generated upon the event or alarm condition.

### Normal Event Record

A normal Event record format:

| Bit Map | | Register | | | Time as float | | | Date as float | | | | Old Value as float | | | | New Value as float | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

### System Text Events

When you set the System Command Change Bit (bit 7) in the Operator Change Bit Map of the Event, it sets the Register number for all System Command Change events to the Event/Alarm Register number (default is **32**).

| Bit Map | | Register | | | Time as float | | | Date as float | | | | Code | New Value as float | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

Refer to the following topics for more information:

Reading Events and Alarms

Acknowledging Events and Alarms

Event and Alarm Change Bit Map Contents

## 4.30.3.3.1 Reading Events and Alarms Register

The Modbus request to read the Event Log and Alarm Log uses the standard read Function Codes 03 or 04 and the Register Number defined in the Alarm/Event field on the Communications – Modbus Slave pop-up display. In this request, the number of Registers is included to maintain format compatibility but is ignored by the receiving FB Series product.

Twenty bytes are returned for each event and alarm in the response. Up to 12 events and alarms can be returned in a single response. If no events and alarms have occurred since the last collection, the response contains 0 data bytes.

For the date stamp in the events and alarms returned, the year (YY) is really the number of years since 1980. For example, if the current year is 2007, the year (YY) for the date stamp would be 27.

Following is an example of a request for events and alarms with the history access event/alarm register defined as 32 (0x0020 hex).

**Table 56. Host Event/Alarm Request Example Message**

| Message Field | Device Address | Function Code | Register Offset | | Num Reads (ignored) | | Error Check | |
|---|---|---|---|---|---|---|---|---|
| Bytes | 1 | 1 | 2 | | 2 | | 2 | |
| TX Order | | | MS | LS | MS | LS | LS | MS |
| Value | 01H | 03H | 00H | 20H | 00H | 01H | CRC-16 | |

The following example shows a response returning three events and alarms.

**Table 57. Event/Alarm Response Example Message**

| Message Field | Device Address | Function Code | Byte Count | Data | | Error Check | |
|---|---|---|---|---|---|---|---|
| Bytes | 1 | 1 | 1 | (20 bytes per event or alarm) | | 2 | |
| TX Order | | | | Integers — MS | LS | LS | MS |
| | | | | Floats — Selectable | | | |
| Value | 01H | 03H | 3CH | CRC-16 | | | |

### 4.30.3.3.2 Acknowledging Events and Alarms

After receiving event and alarm data, the host transmits an acknowledgement message to the FB Series product to clear these events and alarms from the Modbus buffer. Until an acknowledgement message is received, the FB Series product continues to send the same event and alarm records to the host. The Modbus acknowledgement (to clear the Event Log and Alarm Log buffer) uses Function Code 05 and the Register Number defined in the History Access configuration. In this request, the data value is always one (1).

**Table 58. Event and Alarm Acknowledgement Response Example Message**

| Message Field | Device Address | Function Code | Register | | Data | | Error Check | |
|---|---|---|---|---|---|---|---|---|
| Bytes | 1 | 1 | 2 | | 2 | | 2 | |
| TX Order | MS | LS | MS | LS | MS | LS | MS | LS |
| Value | 01H | 05H | 00H | 20H | FFH | 00H | CRC-16 | |

#### 4.30.3.3.3 Event & Alarm Change Bit Map Contents

The following table shows the contents of event and alarm bit maps.

**Table 59. Event and Alarm Change Bit Map Contents**

| Bit | Operator Change Bit Map | Alarm Change Bit Map |
|---|---|---|
| 0 | Fixed value – change to an EU value on an I/O point in Manual Mode | Not Used |
| 1 | Zero scale – change to the 0% Adjusted on an AO or AI | Not Used |
| 2 | Full scale – change to the 100% Adjusted on an AO or AI | Not Used |
| 3 | Operator entry work value – change to any parameter other than those described | Not Used |
| 4 | Boolean fixed bit – change to Status in DO or DI | Not Used |
| 5 | Fixed/variable flag – change to Manual Mode for an I/O point | Manual Alarm |
| 6 | Table entry change – change to Modbus Function Tables | Status Change Alarm |
| 7 | System command change – events logged by system (Power up) | No Flow Alarm |
| 8 | Not Used | Point Fail Alarm |
| 9 | Operator change (Event Log) identifier bit | 0 for Alarm |

| Bit | Operator Change Bit Map | Alarm Change Bit Map |
|---|---|---|
| 10 | Low Low Limit – change to Low Low Alarm parameter | Low Low Alarm |
| 11 | Low Limit – change to Low Alarm parameter | Low Alarm |
| 12 | High Limit – change to High Alarm parameter | High Alarm |
| 13 | High High Limit – change to High High Alarm parameter | High High Alarm |
| 14 | Rate of Change Limit – change to Rate Alarm parameter | Rate Alarm |
| 15 | Not Used | Set/Clear Alarm (1 = Set or 0 = Clear) |

### 4.30.3.4 EFM Archive Mapping

Use this pop-up display to configure EFM Archive Mapping for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. EFM archive mapping allows you to access history data stored on the FB Series product.

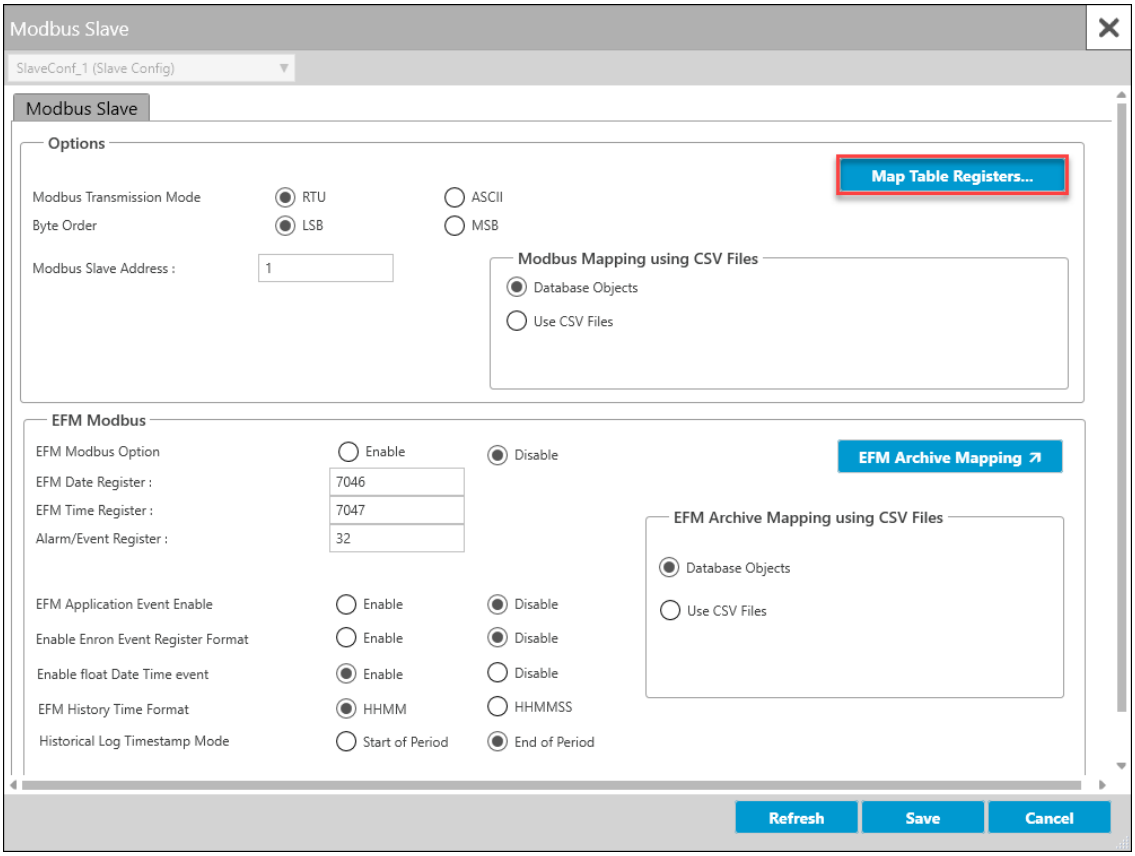
**Note**

- EFM Archive Mapping using **Database Objects** is unique for each communications port.
- EFM Archive Mapping using **CSV Files** is shared between **all** communications ports.

To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.
3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select **Database Objects** in the EFM Archive Mapping using CSV Files frame.
5. Select the **EFM Archive Mapping** button.

**Figure 368. EFM Archive Mapping Button**




Depending on your selection in the EFM Archive Mapping using CSV Files frame, one of the following two displays will open:

EFM Archive Mapping Display – Use this pop-up display to configure EFM Archive Mapping using database objects for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. Mapping is unique for each communications port.

EFM Registers – Use this pop-up display to configure EFM Archive Mapping using CSV files for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU. Mapping is shared between **all** communications ports.

**Note**

- For more information about importing a CSV file that contains EFM Archive Mapping, refer to Importing an EFM Archive Mapping CSV File.
- For more information about exporting a CSV file that contains the FB Series product's current EFM Archive Mapping, refer to Exporting an EFM Archive Mapping CSV File.

- For more information about creating your own EFM Archive Mapping using CSV files, refer to Creating an EFM Archive Mapping CSV File.

#### 4.30.3.4.1 EFM Archive Mapping Display

Use this pop-up display to configure EFM archive mapping for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.

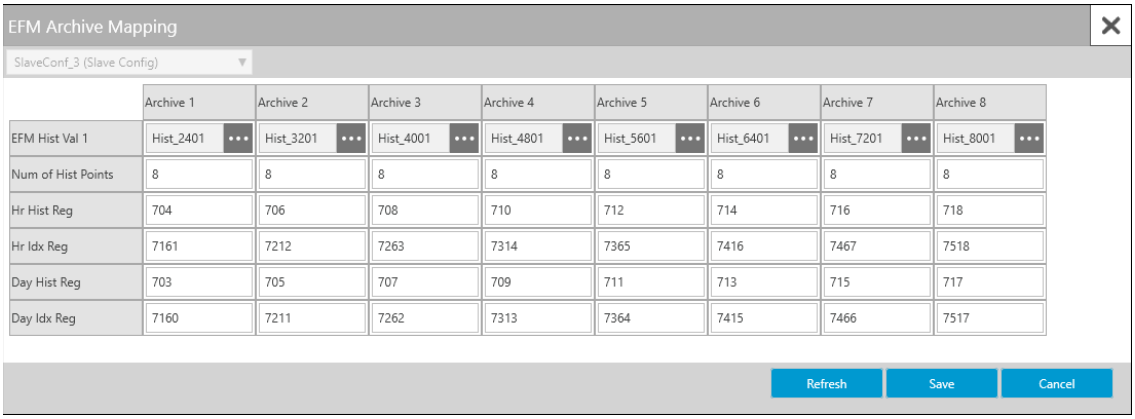
**Note**

EFM Archive Mapping using database objects is unique for each communications port (unlike the EFM Archive Mapping using CSV files, which is shared between all communications ports). This allows you to access different history data through each communications port.

To access this pop-up display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.
3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select **Database Objects** in the EFM Archive Mapping using CSV Files frame.
5. Select the **EFM Station Mapping** button.

**Figure 369. EFM Archive Mapping Display**




6. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **EFM Hist Val 1** | Click ••• to open a Point Picker dialog and select the a history. This selection defines the first history point returned when you request history data with an hourly or daily history register.<br>**Note**<br>Each history group is offset by 800 points. History group 1 starts at Hist_1, history group 2 starts at Hist_801, history group 3 starts at Hist_1601, history group 4 starts at Hist_2401, and so on. |
| **Num of Hist Points** | Sets the number of history points to collect. This selection defines how many history values are returned when you request history data with an hourly or daily history register.<br>**Note**<br>The starting history point is the point configured in the EFM History Value 1 field. |
| **Hr Hist Reg** | Sets the Modbus Register Number to acquire hourly history values. |
| **Hr Idx Reg** | Sets the Modbus Register Number to acquire the hourly index value. |
| **Day Hist Reg** | Sets the Modbus Register Number to acquire daily history values. |
| **Day Idx Reg** | Sets the Modbus Register Number to acquire the daily index value. |

7. Select **Save** to save any changes you make to this pop-up display.

### 4.30.3.4.2 EFM Registers

Use this pop-up display to configure EFM Archive Mapping using CSV files for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.

**Note**

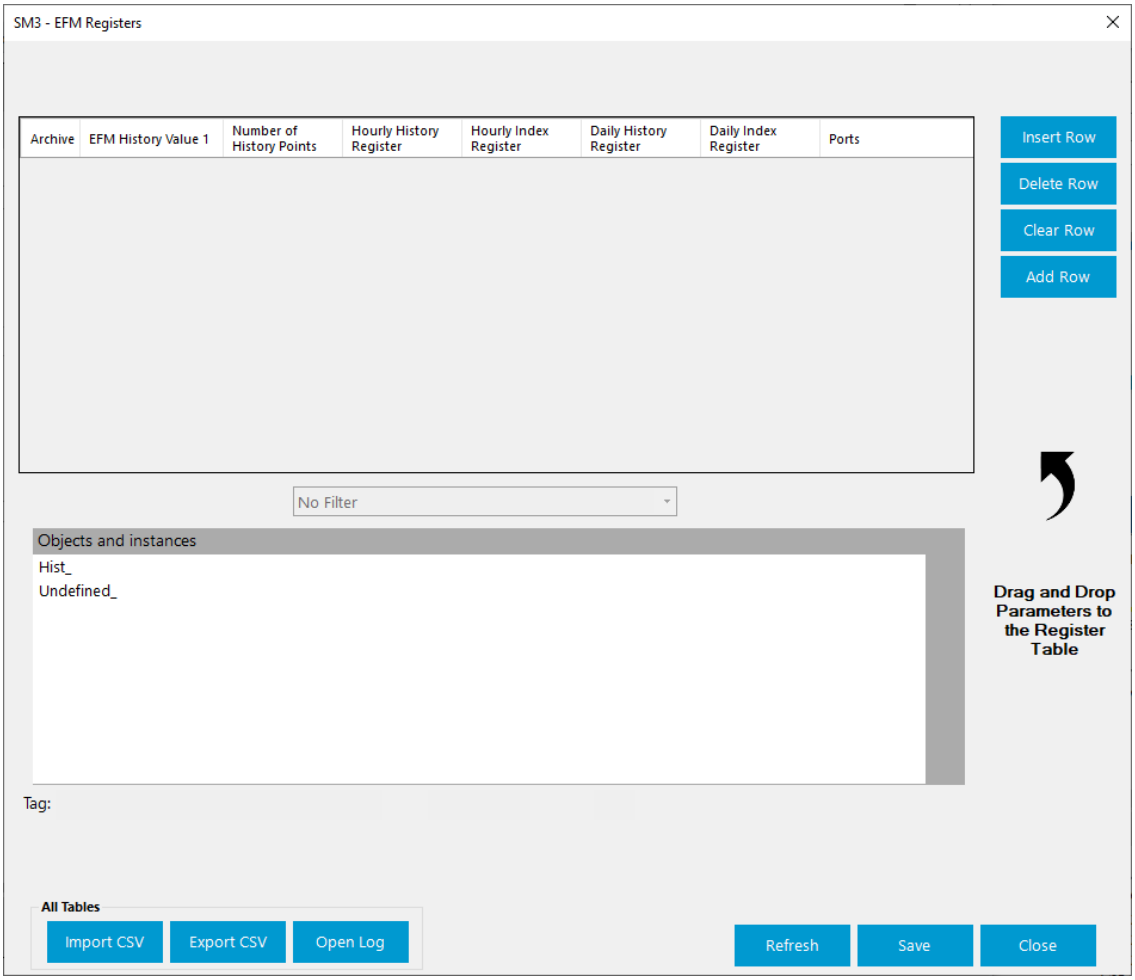
- EFM Archive Mapping using CSV files is shared between **all** communications ports.
- You can configure a maximum of **100** rows for the EFM Registers table.

To access this pop-up display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.

3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select **Use CSV Files** in the EFM Archive Mapping using CSV Files frame.
5. Select the **EFM Archive Mapping** button. The EFM Registers pop-up display opens.

**Figure 370. EFM Registers**




6. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **EFM History Value 1** | This field defines the first history point returned when you request history data with an hourly or daily history register.<br>**Note**<br>Each history group is offset by 800 points. History group 1 starts at Hist_1, history group 2 starts at Hist_801, history group 3 starts at Hist_1601, history group starts at Hist_2401, and so on. |
| **Number of History Points** | Sets the number of history points to collect. This selection defines how many history values are returned when you request history data with an hourly or daily history register.<br>**Note**<br>The starting history point is the point configured in the EFM History Value 1 field. |
| **Hourly History Register** | Sets the Modbus Register Number to acquire hourly history values. |
| **Hourly Index Register** | Sets the Modbus Register Number to acquire the hourly index values. |
| **Daily History Register** | Sets the Modbus Register Number to acquire daily history values. |
| **Daily Index Register** | Sets the Modbus Register Number to acquire the daily index value. |
| **Ports** | Click this cell to open a **Select Comm port instance** pop-up display and configure which communications ports instances that a remote device **must** use to access data in the selected row of the map table register. Place a check mark next each allowed communications port. Select **OK** to save your changes and return to the previous display. |
| **Insert Row** | Select to add a new row to the EFM register at the location of the currently highlighted row. Existing entries are moved down one row. |
| **Delete Row** | Select to remove the currently highlighted row from the EFM register. Existing entries are moved up one row. |
| **Clear Row** | Select to remove data from the currently highlighted row of the EFM register. |
| **Add Row** | Select to add a row to the end of the EFM register. |
| **Object and instances** | Lists the available database objects (types) and instances (iterations) of each object. |

| Field | Description |
|---|---|
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired EFM archive mapping configuration. Navigate to the location of the saved CSV file and select **Open** to start the import process. For more information, refer to Importing an EFM Archive Mapping CSV File.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. Any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained. |
| **Export CSV** | Click to save a CSV file to your computer that contains the current Modbus map table configuration of your FB Series product. A Select Table dialog opens where you can select which Modbus tables to include in the export. Click **Start**, select a name and location for the exported file on your computer, and click **Save** to begin the export process. For more information, refer to Exporting an EFM Archive Mapping CSV File. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |
| **Refresh** | Select to re-display the table entries currently stored in memory of the FB Series product. |
| **Save** | Select to save the current table and any changes to memory in the FB Series product. |
| **Close** | Select to exit the Map Table Register display. |

7. Select the History object (**Hist_**) in the **Objects and instances** frame to view a list of history instances in the FB Series product.
8. Select the history instance you want to include in your EFM archive mapping.
9. Drag and drop the instance from the Objects and instances frame to the Register Table frame. A new row is added to the Register Table frame.

10. Enter the number of history points to collect in the **Number of History Points** field.
11. Enter the Modbus Register Number to acquire the hourly index values in the **Hourly History Register** field.
12. Enter the Modbus Register Number to acquire hourly index values in the **Hourly Index Register** field.
13. Enter the Modbus Register Number to acquire daily history values in the **Daily History Register** field.
14. Enter the Modbus Register Number to acquire daily index values in the **Daily Index Register** field.
15. Click the **Ports** cell to open a **Select Comm port instance** pop-up display and configure which communications ports instances that a remote device **must** use to access data in the selected row of the map table register. Place a check mark next each allowed communications port. Select **OK** to save your changes and return to the previous display.
16. Select **Save** to save any changes you make to this pop-up display.

#### 4.30.3.4.3 Importing an EFM Archive Mapping CSV File

You can import a CSV file that contains your Modbus poll table configuration for use in your FB Series product.

**Note**

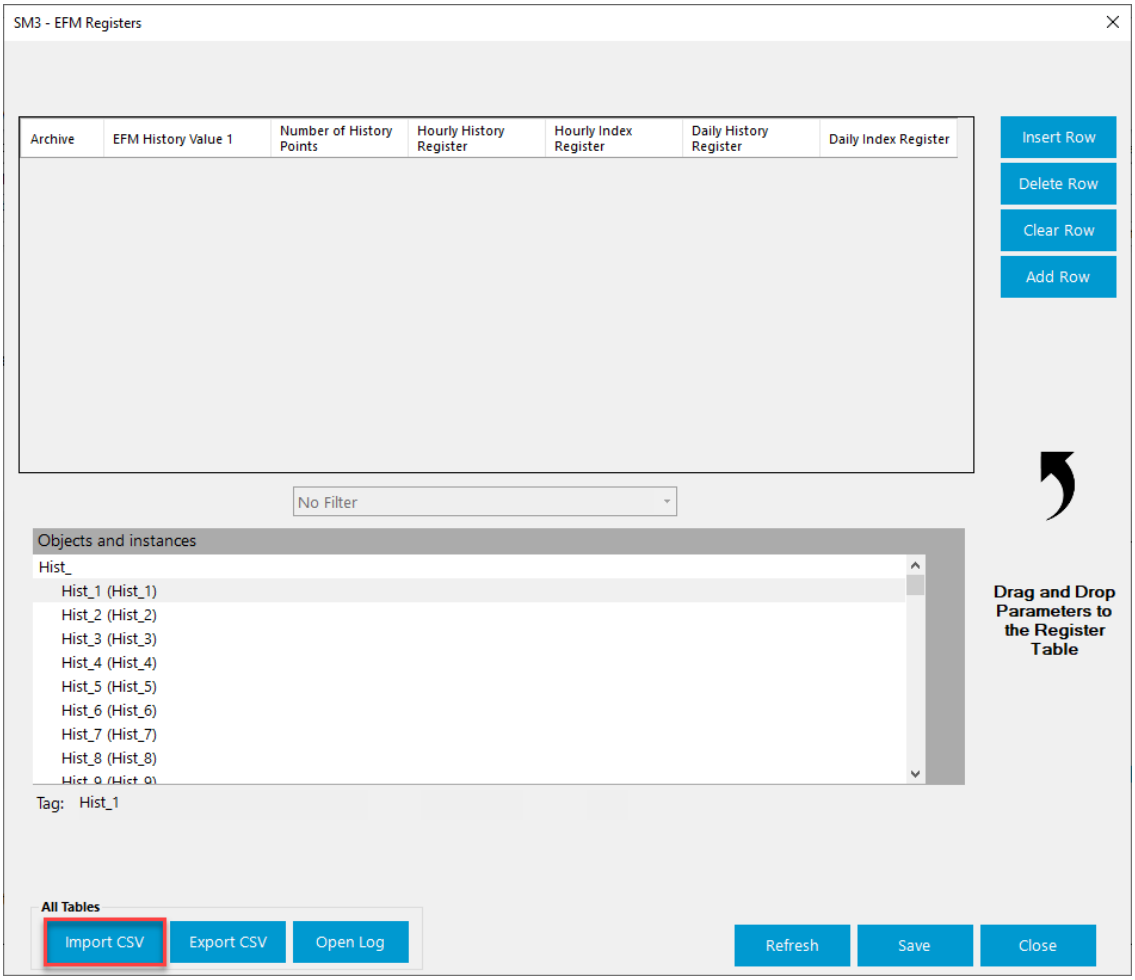
- For more information about EFM Archive Mapping using CSV file, refer to EFM Registers.
- For more information about creating your own EFM Archive Mapping using CSV files, refer to Creating an EFM Archive Mapping CSV File.
- For more information about exporting a CSV file that contains the FB Series product's current EFM Archive Mapping, refer to Exporting an EFM Archive Mapping CSV File.

To import a CSV file that contains your Modbus poll table configuration:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave protocol.

3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select **Use CSV Files** in the EFM Archive Mapping using CSV Files frame.
5. Select the **EFM Archive Mapping** button. The EFM Registers pop-up display opens.

**Figure 371. EFM Registers – Import CSV**



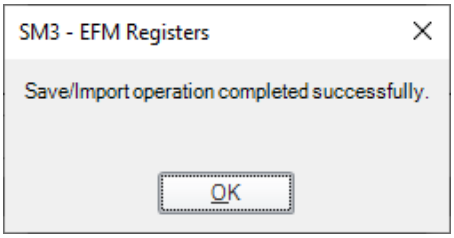

6. Select the **Import CSV** button.
7. Navigate to the file location of your CSV file and select **Open**.

**Note**

The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

8. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Figure 372. Confirmation**




#### 4.30.3.4.4 Exporting an EFM Archive Mapping CSV File

You can export your FB Series product's current EFM archive mapping to a CSV file saved on your computer.

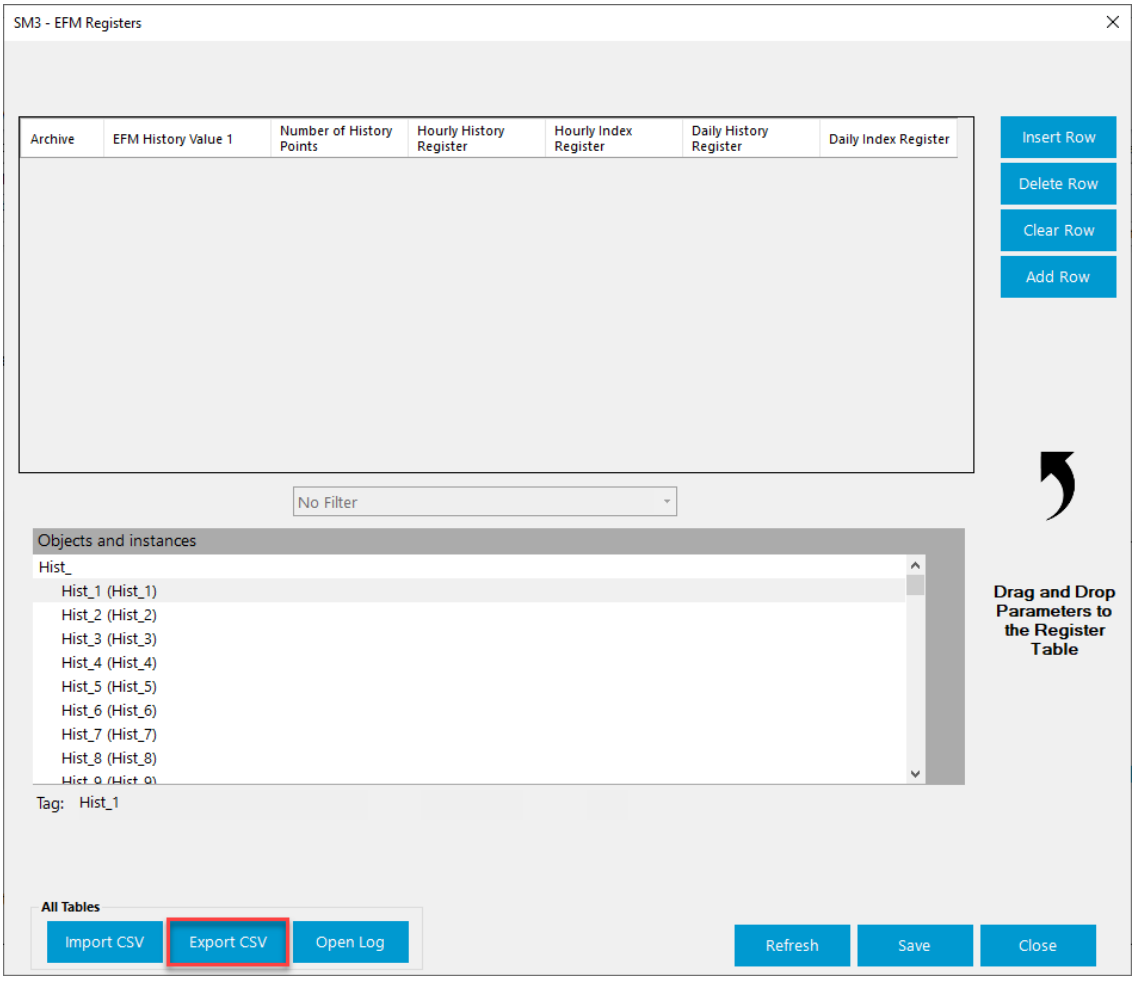
**Note**

- For more information about EFM Archive Mapping using CSV file, refer to EFM Registers.
- For more information about creating your own EFM Archive Mapping using CSV files, refer to Creating an EFM Archive Mapping CSV File.
- For more information about importing a CSV file that contains EFM Archive Mapping, refer to Importing an EFM Archive Mapping CSV File.

To export a CSV file that contains your EFM archive mapping:

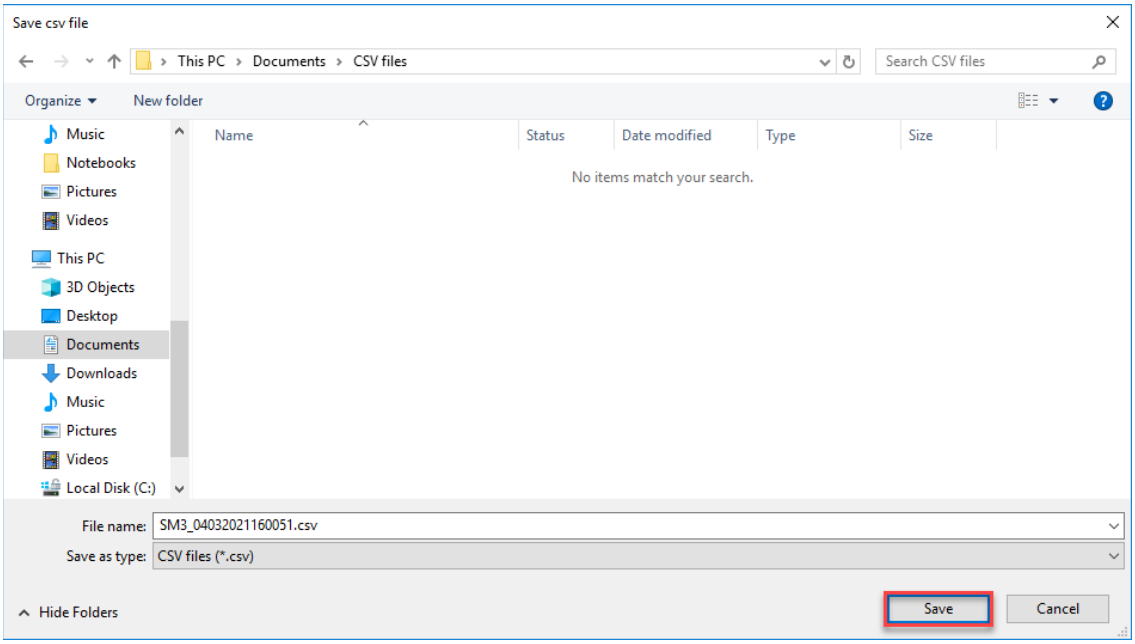
1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Slave or Modbus Master protocol.
3. Select the **Modbus Slave** button. The Modbus Slave pop-up display opens.
4. Select **Use CSV Files** in the EFM Archive Mapping using CSV Files frame.
5. Select the **EFM Archive Mapping** button. The EFM Registers pop-up display opens.

**Figure 373. EFM Registers – Export CSV**




6. Select the **Export CSV** button. A Save csv file window opens.

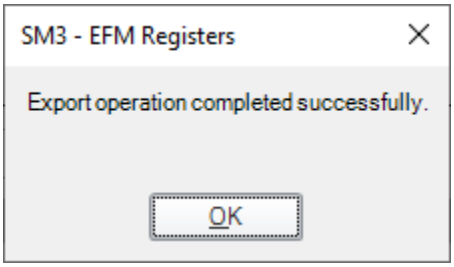
**Figure 374. Save csv file**




7. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system exports the CSV file and displays a progress bar at the top of the display.

8. A confirmation message displays after exporting the CSV file. Select **OK** to complete the process.

**Figure 375. Confirmation**




### 4.30.3.4.5 Creating an EFM Archive Mapping CSV File

You can create an EFM Archive Map on your computer and then import the file for use in the FB Series product. If your EFM Archive Map contains a large amount of points, it may be easier to create a CSV file on your computer than it is to configure the map in DeltaV FBxConnect configuration software.

**Note**

- For more information about EFM Archive Mapping using CSV file, refer to EFM Registers.
- For more information about importing a CSV file that contains the FB Series product's current EFM Archive Mapping, refer to Importing an EFM Archive Mapping CSV File.
- The easiest way to begin creating a custom map is to export a CSV that contains the current configuration and then edit that file. For more information about exporting a CSV file, refer to Exporting an EFM Archive Mapping CSV File.

**Figure 376. Example EFM Archive Map CSV Format**

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Archive | EFM Hist Val 1 | Num of Hist Points | Hr Hist Reg | Hr Idx Reg | Day Hist Reg | Day Idx Reg | Ports |
| 2 | 1 | Hist_2401 | 8 | 704 | 7161 | 703 | 7160 | All |
| 3 | 2 | Hist_2402 | 8 | 706 | 7212 | 705 | 7211 | All |
| 4 | 3 | Hist_2403 | 8 | 708 | 7263 | 707 | 7262 | Comm_1;Comm_2;Comm_5 |
| 5 | 4 | Hist_3201 | 8 | 710 | 7314 | 709 | 7313 | Comm_1;Comm_2;Comm_5 |
| 6 | 5 | Hist_3202 | 8 | 712 | 7365 | 711 | 7364 | Comm_1;Comm_2;Comm_5 |
| 7 | 6 | Hist_3203 | 8 | 714 | 7416 | 713 | 7415 | All |
| 8 | 7 | Hist_4801 | 8 | 716 | 7467 | 715 | 7466 | All |
| 9 | 8 | Hist_4802 | 8 | 718 | 7518 | 717 | 7517 | All |

To create a CSV file that contains your EFM archive mapping:

1. Open a blank spreadsheet (or open your previously exported EFM Registers CSV file).
2. In row one of the spreadsheet, enter the following text based on your configuration:
   - Column A = Archive
   - Column B = EFM Hist Val 1
   - Column C = Num of Hist Points
   - Column D = Hr Hist Reg
   - Column E = Hr Idx Reg
   - Column F = Day Hist Reg
   - Column G = Day Idx Reg
   - Column H = Ports
3. In the proceeding rows, enter information for each table entry according to the descriptions below:

| Column Heading | Description |
|---|---|
| **Archive** | The row number of the EFM register table as displayed in DeltaV FBxConnect configuration software.<br>**Note**<br>You can configure a maximum of **100** rows for the EFM Registers table (rows 2-101 in the CSV file). |
| **EFM Hist Val 1** | This column defines the first history point returned when you request history data with an hourly or daily history register.<br>**Note**<br>Each history group is offset by 800 points. History group 1 starts at Hist_1, history group 2 starts at Hist_801, history group 3 starts at Hist_1601, history group 4 starts at Hist_2401, and so on. |
| **Num of Hist Points** | Sets the number of history points to collect. This selection defines how many history values are returned when you request history data with an hourly or daily history register.<br>**Note**<br>The starting history point is the point configured in the EFM Hist Val 1 column. |
| **Hr Hist Reg** | Sets the Modbus Register Number to acquire hourly history values. |
| **Hr Idx Reg** | Sets the Modbus Register Number to acquire the hourly index values. |
| **Day Hist Reg** | Sets the Modbus Register Number to acquire daily history values. |
| **Day Idx Reg** | Sets the Modbus Register Number to acquire the daily index value. |

| Column Heading | Description |
|---|---|
| **Ports** | Enter the communications port instances that a remote device must use to access the data in the selected row of the EFM archive.<br>**Note**<br>• At least one communications port instance must be defined.<br>• To allow multiple communications ports access to the data, place a semicolon between each instance (for example, Comm_1;Comm_4;Comm_5).<br>• Typing **All** enables all communications port instances to access the data. |

4. Save your changes. You can now import your CSV file for use in your FB Series product. For more information, refer to Importing an EFM Archive CSV File.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.30.4 Communications – Modbus Master

Use this pop-up display to configure communications ports using Modbus Master protocol. The Modbus Master mode of operation allows the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU to simulate a master device that can poll other devices for data and to store that data in Modbus registers within the FB Series product. The FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU can also send commands to set outputs and write data to a slave device. Each command can transmit or receive up to 240 bytes of data.

Each master request you configure uses data read from or written to registers defined in the Modbus Table Registers. When using Modbus function codes 1, 2, 3, and 4, the FB Series product reads data from a slave device and writes it to the parameter specified in the Modbus Registers table. When using Modbus function codes 5, 6, 15, and 16, the FB Series product reads data from the parameter specified in the Modbus Registers table and writes it to the slave device.

You can configure the Modbus Master functionality on the serial or Ethernet ports.

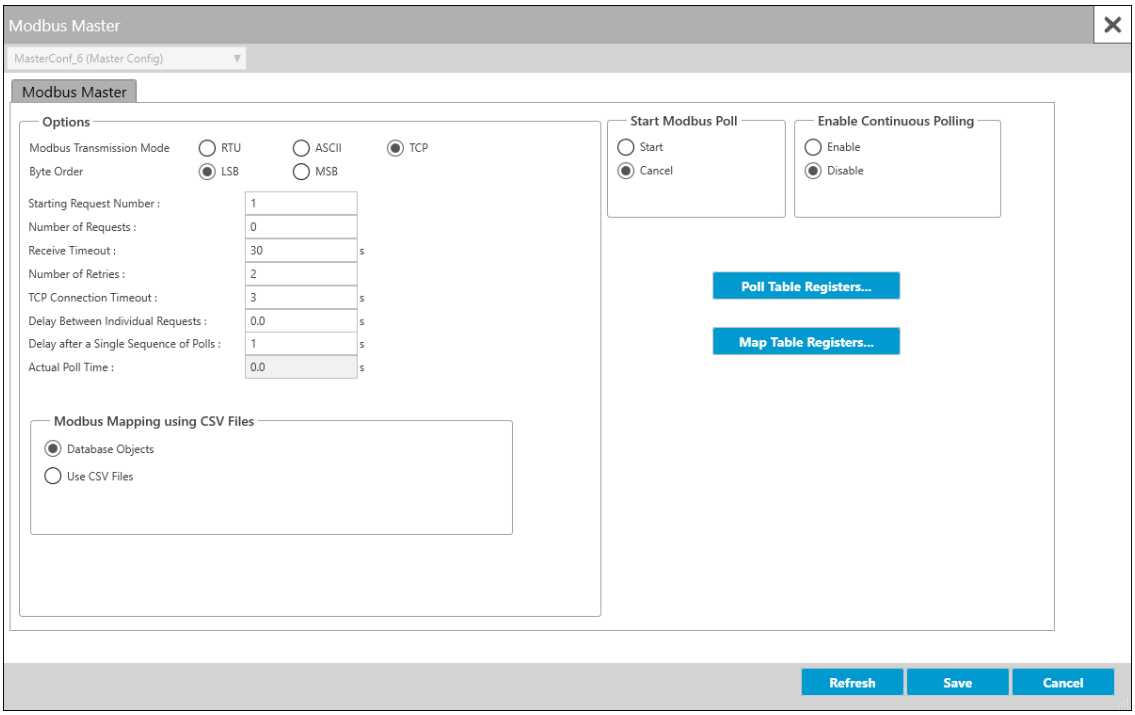
**Note**

This pop-up display is available **only** if you select **Modbus Master** in the **Port Owner** drop-down list on the Communications – General display.

To access this pop-up display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Master protocol.
3. Select the **Modbus Master** button. The Modbus Master pop-up display opens.

**Figure 377. Communications – Modbus Master**




4. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Modbus Transmission Mode** | Sets the communications mode for the selected communications port. The Modbus protocol supports two modes of transmission, ASCII and RTU. RTU is the default.<br>**Note**<br>You must configure all devices in the same communications network with the same mode of transmission. Additionally, in either ASCII or RTU mode, the transmitting device places the Modbus message into a frame that has a known beginning and ending point. | |
| | **RTU** | Remote Terminal Unit mode allows for greater character density and better data throughput than ASCII for the same baud rate. Each message is transmitted in a continuous stream. Data is sent in 8-bit binary characters. RTU mode uses Cyclic Redundancy Check (CRC) error checking. By default, RTU is enabled. |
| | **ASCII** | American Standard Code for Information Interchange mode represents each 8-bit byte of data as two ASCII characters that are the hexadecimal representation of the value. This allows the messages to be read with the use of a dumb terminal but uses twice as many characters as the RTU mode. Each character sent is composed of a start bit, 7 or 8 data bits, and one or two stop bits with Even, Odd, or No parity. ASCII mode uses Longitudinal Redundancy Checking (LRC) error checking. |
| | **TCP** | Adds a 6-byte header to Modbus messages, and then encapsulates it for transmission over TCP/IP. The header consists of the following:<br>• A 2-byte transaction ID that increments for each packet sent.<br>• A 2-byte protocol ID. The protocol ID for Modbus is 0.<br>• A 2-byte indicator of the packet length.<br>**Note**<br>This field appears **only** for the **Ethernet** port. |

| Field | Description | |
|---|---|---|
| **Byte Order** | Sets the order of data bytes in a transmission or requests, which can be reversed. This only affects the Data field of a Modbus message and has no effect on the data bytes for Function Codes 01, 02, and 05. Possible options are: | |
| | **LSB** | Least Significant Byte First (places the Least Significant Byte first). This is the default value. |
| | **MSB** | Most Significant Byte First (places the Most Significant Byte first). |
| **Starting Request Number** | Sets a beginning value from which the Modbus Master polling sequence begins. This number corresponds to a line number on the Modbus Master Poll Table associated with this comm port. | |
| **Number of Requests** | Sets the total number of requests (polls) the Modbus Master makes for this polling sequence. This value specifies the total number of lines in the Master polling tables on which to execute the polls. The default value 0 prevents the polling from occurring.<br>**Note**<br>You can define up to six Modbus Master tables for each communications port. Each Modbus Master table is comprised of 25 lines. The tables are contiguous. If you indicate more requests than are on a single table, the system accesses the subsequent table to complete the request. | |
| **Receive Timeout** | Sets the amount of time (in seconds) that the Master (Host) waits to receive a valid message after the FB Series product sends a request to a device. The default is 30 seconds. | |
| **Number of Retries** | Sets the number of times (after the initial try) that the FB Series product attempts to establish communications with the specified device before reporting a timeout error. The default is 2. | |
| **TCP Connection Timeout** | Sets the time (in seconds) the system waits for a valid Modbus Master protocol message before closing the TCP/IP connection. The timeout resets after each valid message. The default is 3.<br>**Note**<br>This field applies **only** to the Ethernet port. | |

| Field | Description |
|---|---|
| **Delay Between Individual Requests** | Sets a delay time (in seconds) between individual polling requests. The default is 0.0.<br>**Note**<br>The system considers each line in a Modbus Master Polling Table as a request. |
| **Delay after a Single Sequence of Polls** | Sets a delay time (in seconds) between polling request sequences. This field is valid only when you enable Continuous Polling. The default is 1.0. |
| **Actual Poll Time** | This **read-only** field shows (in seconds) the actual time required to complete the polling sequence. |
| **Modbus Mapping using CSV Files** | Sets the location where the Modbus map table is stored by the FB Series product.<br>**Note**<br>• If you change this option, you **must** perform a warm start before any changes are applied.<br>• Your selection applies to **both** Modbus Slave and Modbus Master protocols. |
| **Database Objects** | Select this radio button to store the Modbus map table in the FB Series product's internal database. |
| **Use CSV Files** | Select this radio button to store the Modbus map table as CSV files in the FB Series product.<br>**Note**<br>• Using this option removes the Modbus map table from the internal database and increases the available amount of memory in the FB Series product.<br>• To avoid losing data, export your current Modbus map table **before** you select this option. For more information, refer to Exporting a Modbus Map Table CSV File. |
| **Modbus Mapping Status** | This **read-only** field shows the current condition of the Modbus map table. Possible values are:<br>**No Error (0)** The CSV file is valid. |

| Field | Description | | |
|---|---|---|---|
| | | **No Mapping Found (1)** | There is no mapping file currently on the device. |
| | | **Column Mismatch (2)** | The CSV file is not formatted correctly. Some rows have more or less columns than the header. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Missing Req Column (3)** | The CSV file is missing a required column. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Exceeded Max Data (4)** | The CSV file contained more rows than the firmware supports. |
| | | **Invalid Row Data (5)** | The CSV file contains a row with invalid data. This can be out of range data or mappings that cannot be processed. Open the Log within the EFM Registers window for a detailed analysis. |
| | | **Duplicate Data (7)** | The CSV file contains two mappings with similar data or identical register numbers. Open the Log within the EFM Registers window for a detailed analysis. |
| **Start Modbus Poll** | Controls whether the system begins a Modbus Master polling sequence. | | |
| | **Start** | Select **Start** and **Save** to begin a Modbus Master polling sequence. The system clears this field when the polling sequence completes. | |
| | **Cancel** | Select **Cancel** and **Save** to discontinue a Modbus Master polling sequence. | |

| Field | Description | |
|---|---|---|
| **Enable Continuous Polling** | Indicates whether the system continually executes the Modbus Master polling sequence. | |
| | **Enable** | The system **does** continually execute the Modbus Master polling sequence as defined in the polling table. |
| | **Disable** | The system **does not** continually execute the Modbus Master polling sequence. |
| **Poll Table Registers** | Click to open the Poll Table Register pop-up display and map parameters in remote devices to Modbus Map Table Registers in the FB Series product.<br>**Note**<br>You can create a Modbus Poll Table as a CSV file on your computer and then import the CSV file for use in the FB Series product. For more information about creating, importing, and exporting your own Modbus Poll Table CSV files, refer to Creating a Modbus Poll Table CSV File, Importing a Modbus Poll Table CSV File, and Exporting a Modbus Poll Table CSV File. | |
| **Map Table Registers** | Click to open the Map Table Register pop-up display and configure the Modbus registers stored in the FB Series product.<br>**Note**<br>• To view documentation for the Modbus Master Map Table Register pop-up display, refer to Modbus Slave Map Table Register.<br>• Map Table Registers are shared between **all** communications ports that are configured to use either Modbus Slave or Modbus Master protocol.<br>• You can create a Modbus Map Table as a CSV file on your computer and then import the CSV file for use in the FB Series product. For more information about creating, importing, and exporting your own Modbus Map Table CSV files, refer to Creating a Modbus Map Table CSV File, Importing a Modbus Map Table CSV File, Exporting a Modbus Map Table CSV File, and Remote Data Types. | |

5. Select **Save** to save any changes you make to this pop-up display.

### 4.30.4.1 Poll Table Register

Use this pop-up display to configure the Modbus Poll Table Register. The Modbus Poll Table Register maps Modbus registers in slave devices to the Modbus register in the FB Series product. Each communications port with Modbus Master support is assigned its own tables, and each table contains 25 available entries:

- **COM1** – Tables 1 through 6
- **COM2** – Tables 7 through 12
- **COM3** – Tables 13 through 18
- **COM4** – Tables 19 through 24
- **Ethernet 1** – Tables 25 through 30
- **Ethernet 2** – Tables 31 through 36

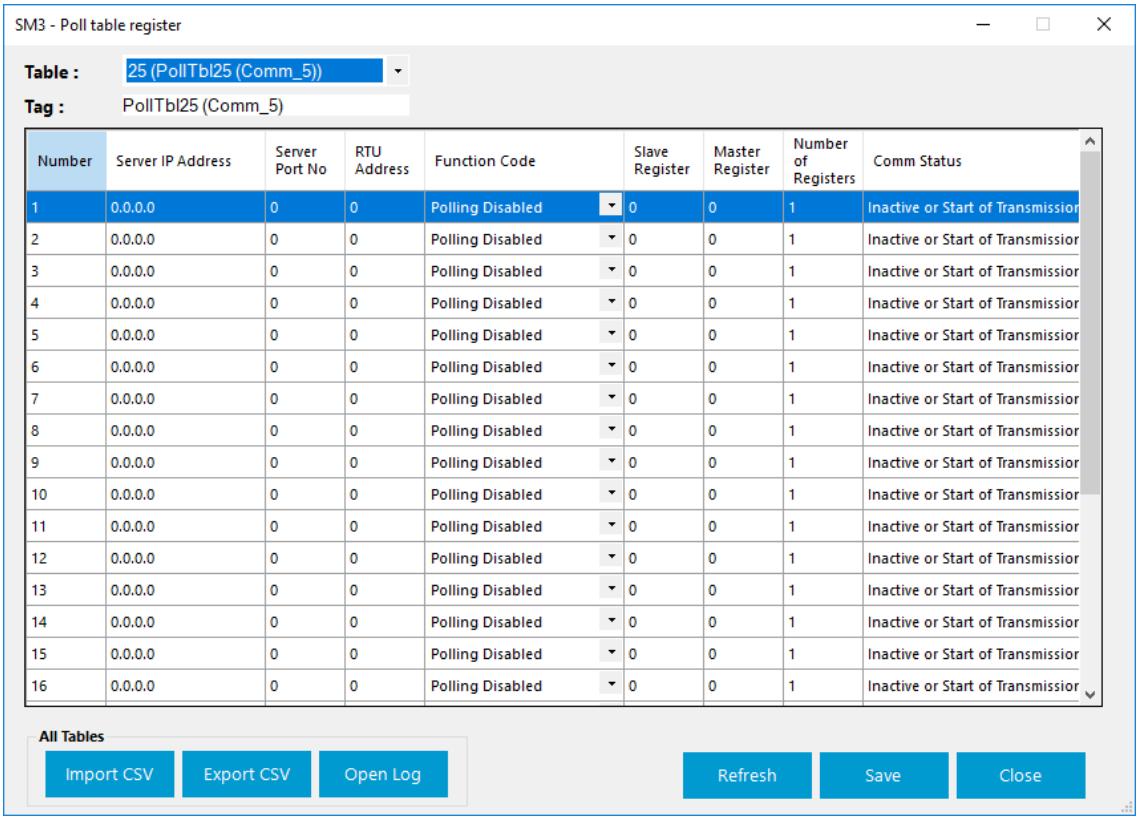
For additional communication modules, the system assigns tables in numerical order based on the slot number and the next six consecutive tables to each port. For example, an DeltaV FB3000 with a single 4-port ommunications module installed in slot 3 would be assigned the following tables:

- **COM31** – Tables 37 through 42
- **COM32** – Tables 43 through 48
- **COM33** – Tables 49 through 54
- **COM34** – Tables 55 through 60

To access this display:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Master protocol.
3. Select the **Modbus Master** button. The Modbus Master pop-up display opens.
4. Select the **Poll Table Registers** button. The Poll Table Register pop-up display opens.

**Figure 378. Poll Table Register**




**5.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Table** | Click ▼ to select a poll table register to configure. |
| **Tag** | Sets a name for the selected poll table register. |
| **Number** | This **read-only** field shows the poll request number. |
| **Server IP Address** | Specifies the IP address of the device to be polled.<br>**Note**<br>This field applies **only** to the Ethernet communications port. |
| **Server Port No** | Specifies the IP port number of the device to be polled.<br>**Note**<br>This field applies **only** to the Ethernet communications port. |
| **RTU Address** | Specifies the Modbus RTU address of the device to be polled. |
| **Function Code** | Click ▼ to select the Modbus function code to be sent to the slave device. Possible options are: |

| Field | Description | |
|---|---|---|
| | **Polling Disabled** | This line in the polling table will be skipped. |
| | **Read Coil Status** | Function code 1 – Read coil status. |
| | **Read Input Status** | Function code 2 – Read input status. |
| | **Read Holding Registers** | Function code 3 – Read holding registers. |
| | **Read Input Registers** | Function code 4 – Read Input registers. |
| | **Force Single Coil** | Function code 5 – Force single coil. |
| | **Set Single Register** | Function code 6 – Set single register. |
| | **Force Multiple Coils** | Function code 15 – Force multiple coils. |
| | **Set Multiple Registers** | Function code 16 – Set multiple registers. |
| **Slave Register** | Sets the starting register number from which data is drawn from or to which data is written in the slave device. | |
| **Master Register** | Sets the starting register number in the FB Series product to which data is stored, as defined in the Modbus Map Table. | |
| **Number of Registers** | Sets the total number of registers to poll (read/write) in a single request. | |
| **Comm Status** | This **read-only** field shows the status of the selected poll. Possible statuses are:<br>• Inactive or Start of Transmission<br>• Response Timeout<br>• Function Code Error<br>• Invalid Register Error<br>• Invalid Request Data Error<br>• Exception Error Code Received<br>• Mapping Table Error | |

| Field | Description |
|---|---|
| | • Invalid Response Received<br>• CRC or LRC Check Error<br>• Database Read Error<br>• Valid Response Received<br>• Request Framing Error<br>• Transmit Timeout Error<br>• Database Write Error<br>• Broadcast Request Transmitted |
| **Import CSV** | Click to import a CSV file into your FB Series product that contains your desired Modbus poll table configuration. Navigate to the location of the saved CSV file and select **Open** to start the import process. For more information, refer to Importing a Modbus Poll Table CSV File.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. Any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained. |
| **Export CSV** | Click to save a CSV file to your computer that contains the current Modbus poll table configuration of your FB Series product. A Select Table dialog opens where you can select which tables to include in the export. Click **Start**, select a name and location for the exported file on your computer, and click **Save** to begin the export process. For more information, refer to Exporting a Modbus Poll Table CSV File.<br>**Note**<br>By default, all selected data is exported into a single file. Select **Export to individual file** to have the system create individual files for each table you select. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV FBxConnect configuration software import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>Log file name includes the date and time the log was created. |

| Field | Description |
|---|---|
| **Refresh** | Select to re-display the table entries currently stored in memory of the FB Series product. |
| **Save** | Select to save the current table and any changes to memory in the FB Series product. |
| **Close** | Select to exit the Poll Table Register display. |

6. Select **Save** to save any changes you make to this pop-up display.

#### 4.30.4.1.1 Importing a Modbus Poll Table CSV File

You can import a CSV file that contains your Modbus poll table configuration for use in your FB Series product.

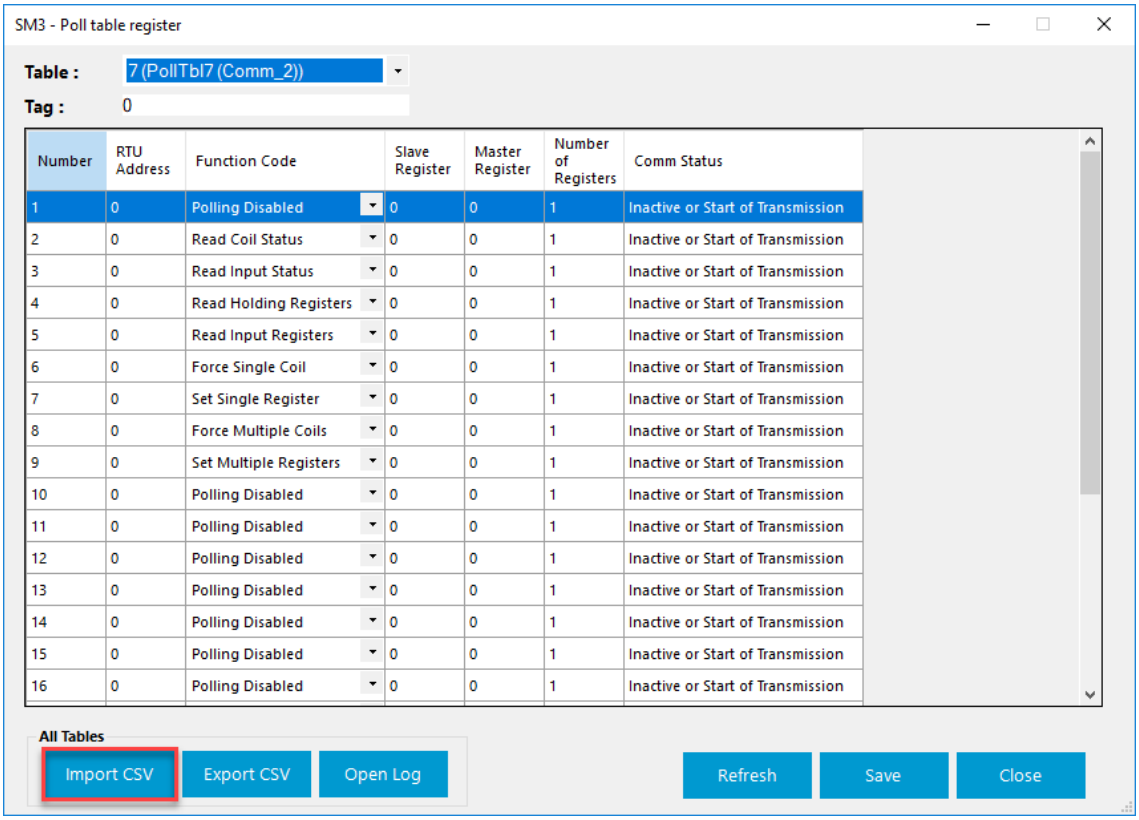
**Note**

- For more information about Modbus poll tables in the FB Series product, refer to Poll Table Register.
- For more information about creating your own Modbus poll table CSV file, refer to Creating a Modbus Poll Table CSV File.
- For more information about exporting a CSV file that contains the FB Series product's current Modbus poll table configuration, refer to Exporting a Modbus Poll Table CSV File.

To import a CSV file that contains your Modbus poll table configuration:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Master protocol.
3. Select the **Modbus Master** button. The Modbus Master pop-up display opens.
4. Select the **Poll Table Registers** button. The Poll Table Register pop-up display opens.

**Figure 379. Poll Table Register – Import CSV**




5. Select the **Import CSV** button.

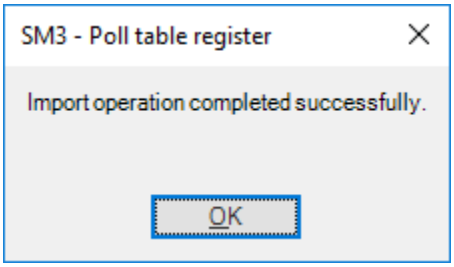
6. Navigate to the file location of your CSV file and select **Open**.

### Note

The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. If you select **Import removing invalid parameters**, any invalid lines in the CSV file are ignored and data currently in the FB Series device is maintained.

7. A confirmation message displays after importing the CSV. Select **OK** to complete the process.

**Figure 380. Confirmation**




#### 4.30.4.1.2 Exporting a Modbus Poll Table CSV File

You can export your FB Series product's current Modbus poll table configuration to a CSV file saved on your computer.

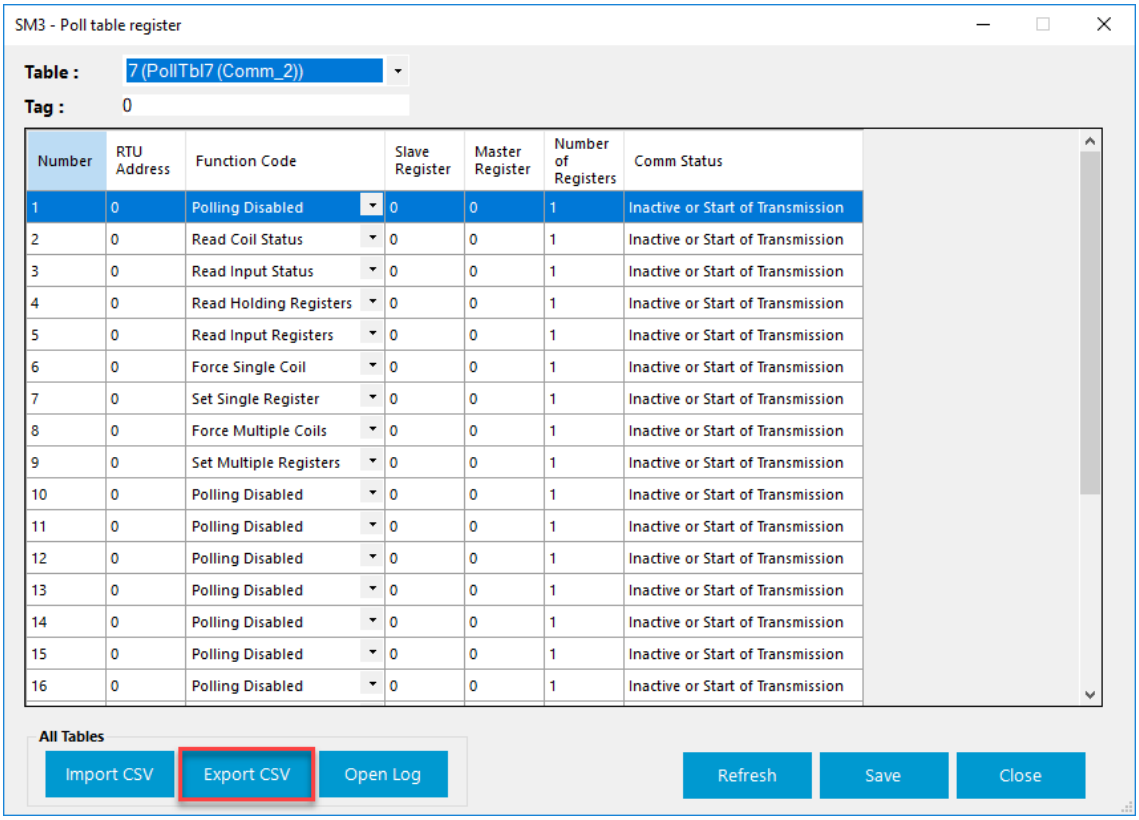
**Note**

- For more information about Modbus poll tables in the FB Series product, refer to Poll Table Register.
- For more information about creating your own Modbus poll table CSV file, refer to Creating a Modbus Poll Table CSV File.
- For more information about importing a CSV file that contains the FB Series product's current Modbus poll table configuration, refer to Importing a Modbus Poll Table CSV File.

To export a CSV file that contains your Modbus poll table configuration:

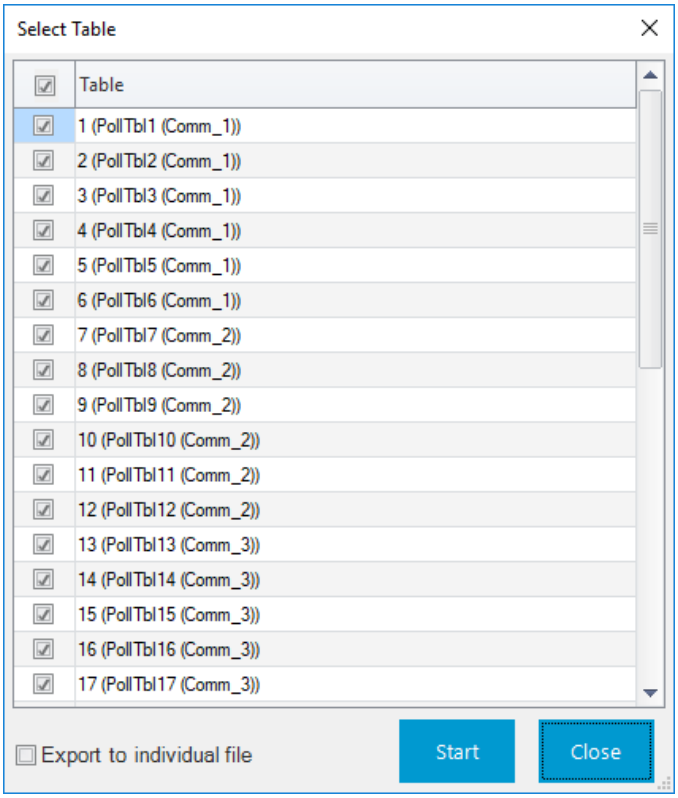
1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Select ▼ in the Communications drop-down list and choose a communications port using the Modbus Master protocol.
3. Select the **Modbus Master** button. The Modbus Master pop-up display opens.
4. Select the **Poll Table Registers** button. The Poll Table Register pop-up display opens.

**Figure 381. Poll Table Register – Export CSV**




5. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 382. Select Table**



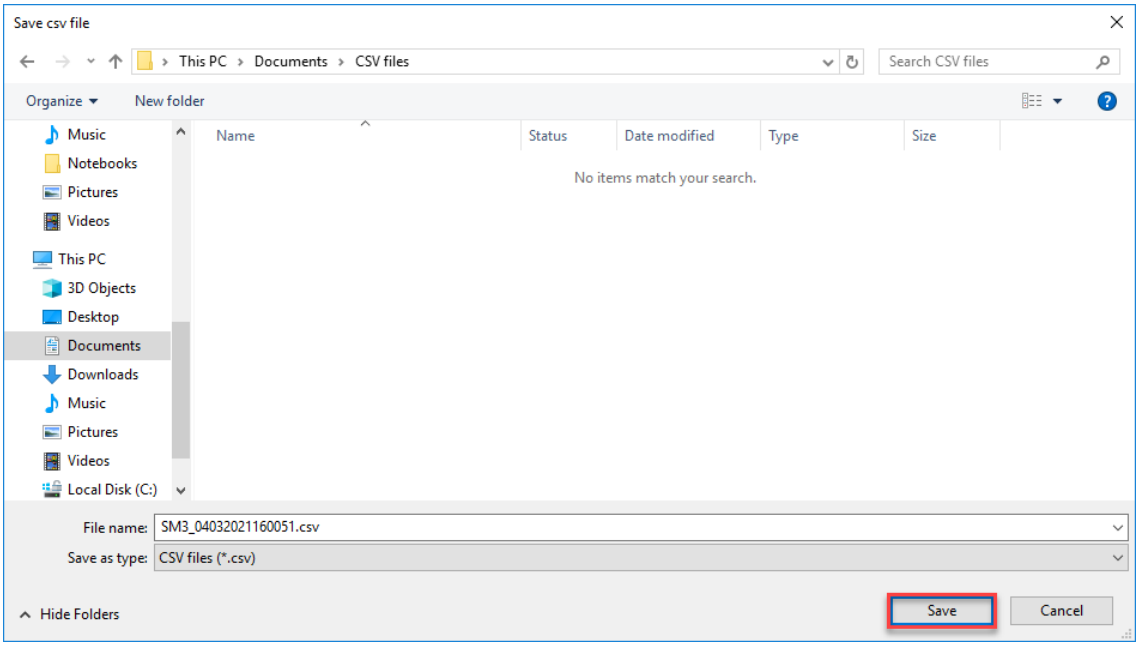

6. Place a check mark next to each table you want to export.

**Note**

By default, all selected tables are exported to a single file. If you want each selected table to be exported to individual files, place a check mark next to **Export to individual file**.

7. Select **Start**. A Save csv file window opens.

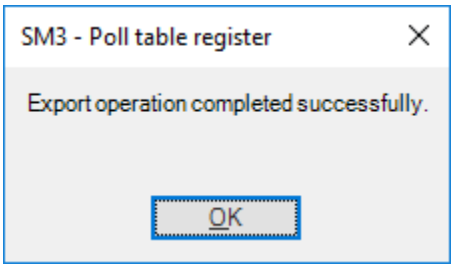
**Figure 383. Save csv file**




8. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system exports the CSV file and displays a progress bar at the top of the display.

9. A confirmation message displays after exporting the CSV file. Select **OK** to complete the process.

**Figure 384. Confirmation**




### 4.30.4.1.3 Creating a Modbus Poll Table CSV File

You can create a Modbus poll table on your computer and then import the file for use in the FB Series product. If your Modbus poll table contains a large amount of points, then it may be easier to create a CSV file on your computer than it is to configure the table in DeltaV FBxConnect configuration software.

**Note**

- For more information about Modbus poll tables, refer to Poll Table Register.
- The Modbus poll table CSV **must** contain the format shown below. The easiest way to begin creating a custom map is to export a CSV that contains the current configuration and then edit that file. For more information about exporting a CSV file, refer to the Exporting a Modbus Poll Table CSV File.

**Figure 385. Example Modbus Poll Table CSV Format**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Table | Number | Server IP Address | Server Port No | RTU Address | Function Code | Slave Register | Master Register | Number of Registers |
| 2 | 1 | 1 | 1.1.1.1 | 1 | 200 | 0 | 200 | 205 | 10 |
| 3 | 1 | 2 | 1.1.1.2 | 2 | 199 | 1 | 199 | 204 | 10 |
| 4 | 1 | 3 | 1.1.1.3 | 3 | 198 | 2 | 198 | 203 | 10 |
| 5 | 1 | 4 | 1.1.1.4 | 4 | 197 | 3 | 197 | 202 | 10 |
| 6 | 1 | 5 | 1.1.1.5 | 5 | 196 | 4 | 196 | 201 | 10 |
| 7 | 1 | 6 | 1.1.1.6 | 6 | 195 | 5 | 195 | 200 | 10 |
| 8 | 1 | 7 | 1.1.1.7 | 7 | 194 | 6 | 194 | 199 | 10 |
| 9 | 1 | 8 | 1.1.1.8 | 8 | 193 | 0 | 193 | 198 | 10 |
| 10 | 1 | 9 | 1.1.1.9 | 9 | 192 | 1 | 192 | 197 | 10 |
| 11 | 1 | 10 | 1.1.1.10 | 10 | 191 | 2 | 191 | 196 | 10 |

To create a CSV file that contains your Modbus poll table configuration:

1. Open a blank spreadsheet (or open your previously exported Modbus poll table CSV file).
2. In row one of the spreadsheet, enter the following text:
   - Column A = Table
   - Column B = Number
   - Column C = Server IP Address
   - Column D = Server Port No
   - Column E = RTU Address
   - Column F = Function Code
   - Column G = Slave Register
   - Column H = Master Register
   - Column I = Number of Registers
3. In the proceeding rows, enter information for each table entry according to the descriptions below:

**Note**

Drop-down lists on the DeltaV FBxConnect configuration software display are represented as numbers in the CSV file. See the descriptions below for a description for each number.

| Column Heading | Description |
|---|---|
| **Table** | Enter a number that specifies which poll register table number the selected row belongs to. Each communications port with Modbus Master support is assigned its own tables. Valid values are:<br>• **1** through **6** = Com1<br>• **7** through **12** = Com2<br>• **13** through **18** = Com3<br>• **19** through **24** = Com4 s<br>• **25** through **30** = Ethernet 1<br>• **31** through **36** = Ethernet 2 |
| **Number** | Enter a number that specifies the poll request number (or row) for table number you entered in the previous column. Each table contains up to 25 poll request numbers. Valid values are 1 through 25. |
| **Server IP Address** | Enter the IP address of the device to be polled.<br>**Note**<br>This field applies **only** to the **Ethernet** communications port. |
| **Server Port No** | Enter the IP port number of the device to be polled.<br>**Note**<br>This field applies **only** to the **Ethernet** communications port. |
| **RTU Address** | Enter the Modbus RTU address of the device to be polled. |
| **Function Code** | Specifies the Modbus function code to be sent to the slave device. Only a number is entered and corresponds to the following values:<br>• **0** = Polling Disabled. This line in the polling table will be skipped.<br>• **1** = Read Coil Status<br>• **2** = Read Input Status<br>• **3** = Read Holding Registers<br>• **4** = Read Input Registers<br>• **5** = Force Single Coil<br>• **6** = Set Single Register<br>• **15** = Force Multiple Coils<br>• **16** = Set Multiple Registers |
| **Slave Register** | Enter the starting register number from which data is drawn from or to which data is written in the slave device. |

| Column Heading | Description |
|---|---|
| **Master Register** | Enter the starting register number in the FB Series product to which data is stored, as defined in the Modbus Map Table. |
| **Number of Registers** | Enter the total number of registers to poll (read/write) in a single request. |

4. Save your changes. You can now import your CSV file for use in your FB Series product. For more information, refer to Importing a Modbus Poll Table CSV File.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.30.5 Configuring Communications Ports

Use these steps to configure a communications port.

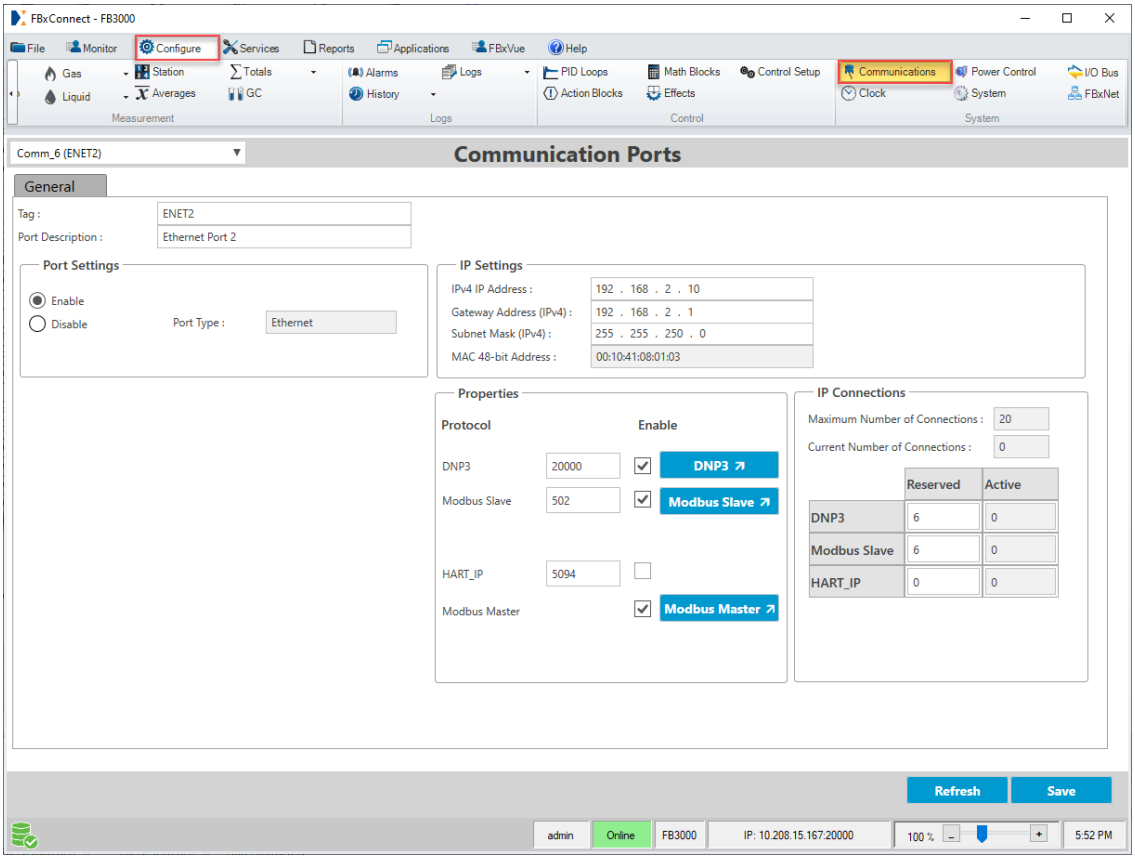
**CAUTION**

When making multiple DeltaV FBxConnect configuration software connections to the same FB Series product (as with a remote and a local connection), be aware that the changes one connection makes to the FB Series product may not be immediately visible to other connections, and may even require the other connections to restart DeltaV FBxConnect configuration software before changes become visible. For example, simple changes (such as changes to setpoints) may be immediately visible to all connections, but changing the number of meters, configuring I/O, adding/deleting menu items, or other major configuration changes may require re-establishing the connection using DeltaV FBxConnect configuration software.

To configure a communications port:

1. Select **Configure > Communications** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select a communications port to configure.

**Figure 386. Communications – General (Ethernet port)**




3. In the **Tag** field, enter a name for the selected communications port.
4. In the **Port Description** field, enter a description for the selected communications port.
5. In the **Port Settings** frame, select **Enable** to allow communications on the selected port.
6. **For Serial communications ports**, click ▼ in the **Port Owner** drop-down list and select the communications protocol used by selected communications port.
7. Review – and change as necessary – the values in the remaining fields. For more information about the available fields, refer to Communications – General display.
8. Select **Save** to save your changes to device memory and enable additional pop-up displays for the selected protocols. You **must** also configure the additional pop-up displays for each selected protocol.

For more information about the additional pop-up displays, refer to the following topics:

Communications – DNP3

Communications – Modbus Slave

Communications – Modbus Master

## 4.31 Localization

Use the Localization screen to configure the time and date format for to three localization profiles.

**Note**

You assign localization profiles to users on the User Management screen.

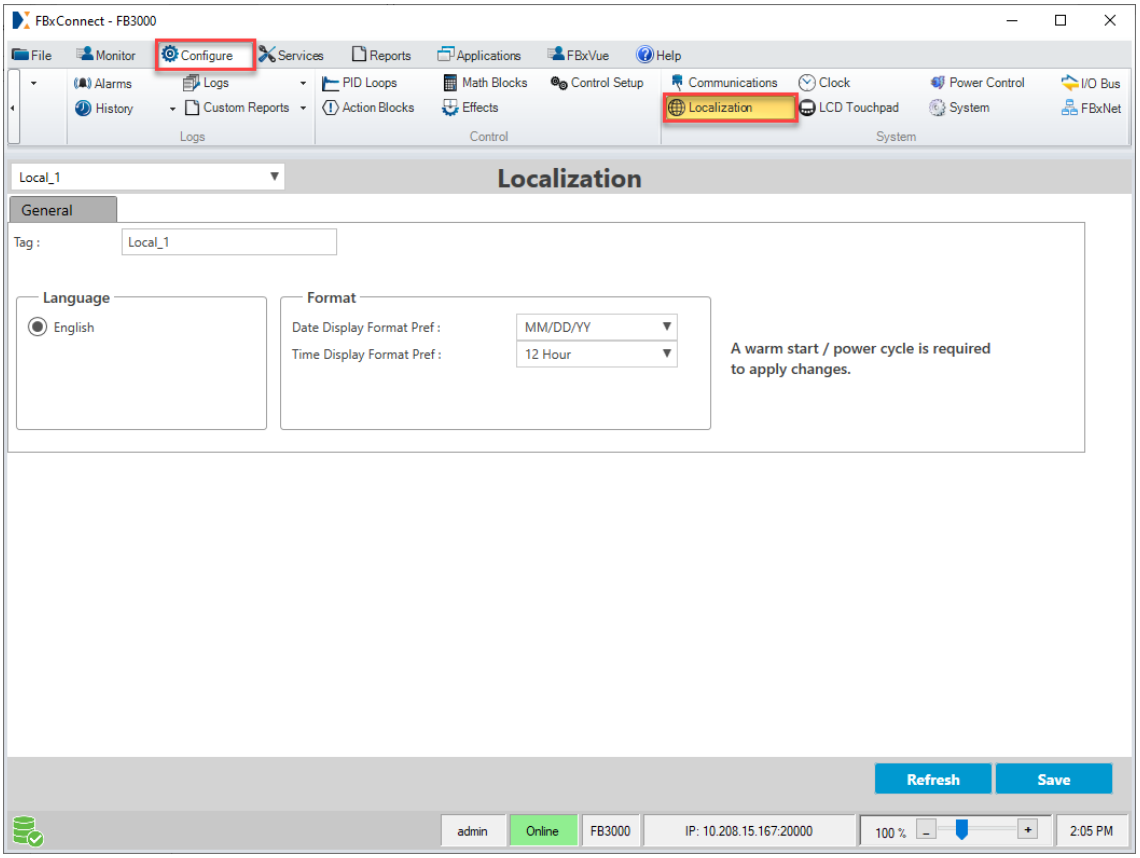
To access this screen:

1. Select **Configure > Localization** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the screen to choose a localization profile to modify.

**Note**

Any changes made on this screen apply **only** to the selected localization profile.

**Figure 387. Localization**




3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected localization profile. |
| **Language** | Select the language to use with the selected localization profile. |
| **Date Format** | Click ▼ to configure the date format to use with the selected localization profile. |
| **Time Format** | Click ▼ to configure the time format to use with the selected localization profile. |

4. Select **Save** to save your changes if you modify any of the fields on this screen.

**Note**

You **must** perform a Warm Start to apply your changes to the FB Series product.

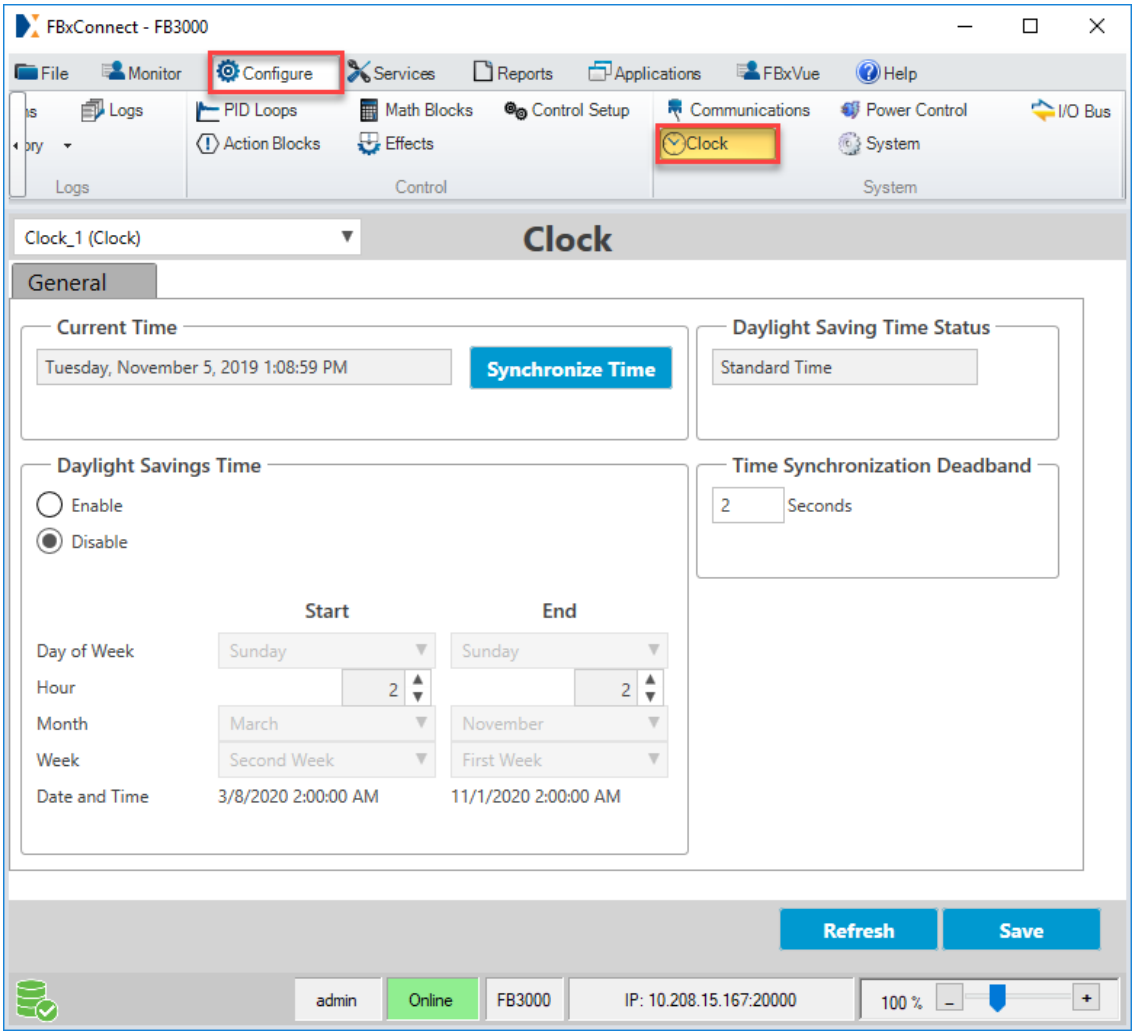
# 4.32 Clock

Use the Clock screen to set the clock in the FB Series product, and to configure daylight saving time options.

To access this screen:

1. Select **Configure > Clock** from the DeltaV FBxConnect configuration software main menu. The Clock screen displays:

**Figure 388. Clock**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Current Time** | Shows the current time and date of the device clock. |
| **Synchronize Time** | Select this button to synchronize the device clock with your PC clock. Refer to Time Sync. |
| **Daylight Saving Time Status** | This **read-only** field displays if daylight saving time is currently in effect. Possible values are Standard Time (Daylight Saving Time is not in effect), Saving Time (Daylight Saving Time is in effect), or Gift Time (the extra hour from 1AM to 2AM after the clock is set back one hour). |
| **Daylight Savings Time** | Enable or disable Daylight Saving Time clock changes.<br>**Note**<br>If you enable Daylight Saving Time, select **Save** and configure the starting and ending times for Daylight Saving Time in the Start and End columns. |
| **Day of the Week** | Click ▼ to select the day of the week to start and end Daylight Saving Time. |
| **Hour** | Click ▼ to select the hour to start and end Daylight Saving Time.<br>**Note**<br>Entered in military time (0 through 23). |
| **Month** | Click ▼ to select the month to start and end Daylight Saving Time.<br>**Note**<br>1 = January, 2 = February, 3 = March, 4 = April, etc. |
| **Week** | Click ▼ to select the week of the month to start and end Daylight Saving Time.<br>**Note**<br>The **Last Week** option configures Daylight Saving Time on the last week of the month, regardless of what week that falls on. |

| Field | Description | |
|---|---|---|
| | **Date and Time** | These **read-only** fields show the next pending Daylight Savings Time start and end times for validation of the above configuration. As these start and end time pass, these fields will be automatically updated with the new start and end times for the next year.<br>**Note**<br>You **must** save any changes to update this field. |
| | **Note**<br>For example, suppose you make the following Daylight Saving Start configuration:<br>• Day of Week = Sunday<br>• Hour = 2<br>• Month = 3<br>• Week of Month = Second Week<br>Daylight Saving Time would begin at 2:00 am on the second Sunday of March. | |
| **Time Synchronization Deadband** | Enter a time (in seconds) that a new time must be different than the old time to be accepted by the FB Series product. Any request to synch/write time that does not exceed the deadband is ignored. Valid values are 0 through 30. | |

**3.** Select **Save** to save your changes if you modify any of the fields on this screen.

## 4.33 LCD Touchpad

Use this display to customize the functionality of a connected DeltaV FB3000 RTU LCD Touchpad. In addition to the pre-defined menus available on the LCD Touchpad (Meters, System, etc.), you can also view user-configurable charts that show historical or real-time data and view two different kinds of user-configurable display lists (User Lists and List Mode) that show parameter descriptions and their associated values.

**Note**

- After wiring your LCD Touchpad to a communications port on the DeltaV FB3000, you **must** select **LCD Touchpad** in the Port Owner field and **19.2K** in the Baud Rate field

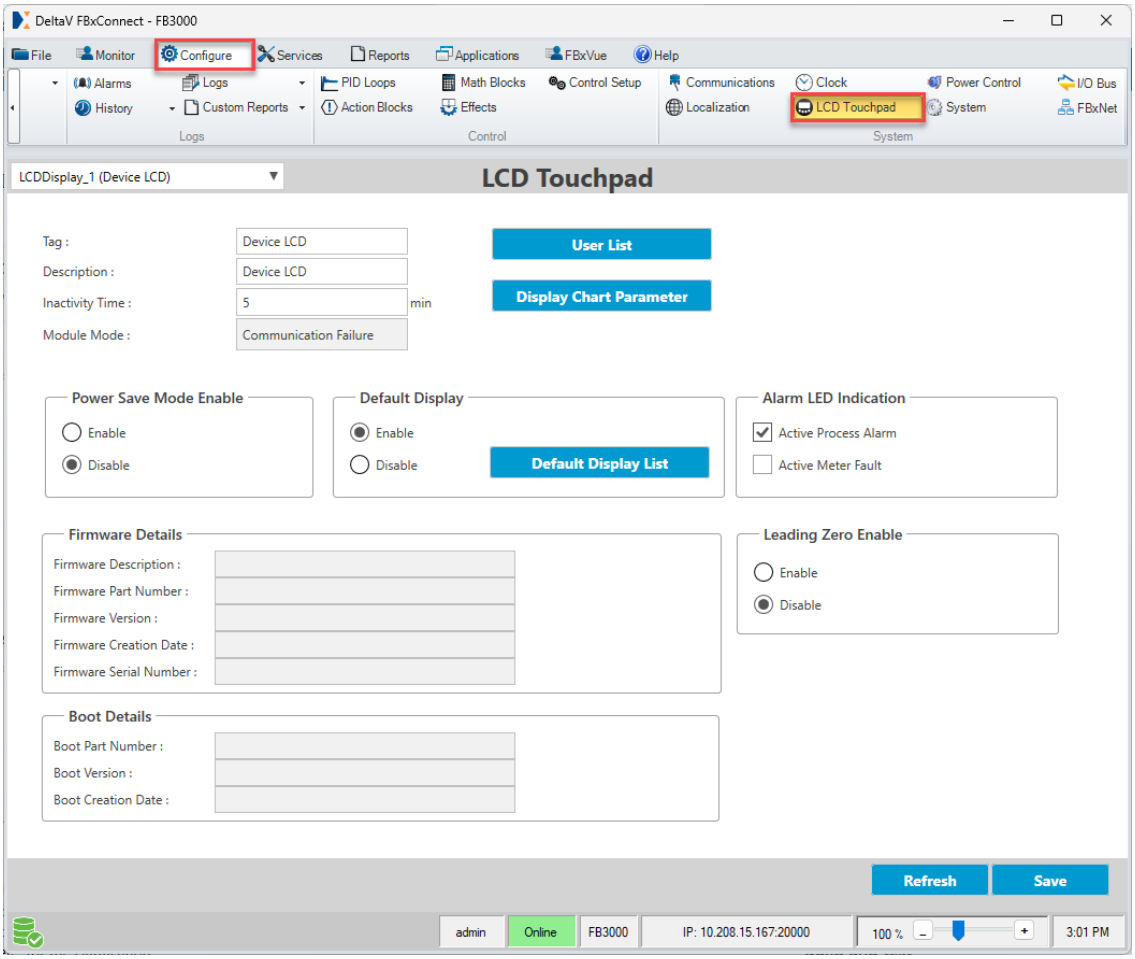
on the Communications – General display for the selected communications port instance.

- For more information about specific features of the LCD Touchpad, refer to *DeltaV FB3000 LCD Touchpad User Manual* (D301935X012).

To access this display:

1. Select **Configure > LCD Touchpad** from the DeltaV FBxConnect configuration software main menu. The LCD Touchpad display opens.

**Figure 389. LCD Touchpad**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected instance. |
| **Inactivity Time** | Sets, in minutes, the amount of time that the system waits without activity before triggering the "idle state" screen. The "idle state" screen shows either the Emerson logo (Power Save Mode disabled) or a blank screen (Power Save Mode enabled). The default is 5. |
| **Module Mode** | This **read-only** field shows the current status of the LCD Touchpad. |
| **User List** | Select this button to open the User List Display List pop-up display and configure which parameters are shown in the User Lists on the LCD Touchpad. The User Lists are user-configured auto-scrolling lists of data that are accessible after you log in to the LCD Touchpad. You can configure up to 12 User Lists, each with up to 16 parameters. You can view read-only parameters and view or change read/write parameters directly from the LCD Touchpad.<br>**Note**<br>• You **must** log in to the LCD Touchpad before you can access the User Lists.<br>• You **must** have the appropriate permissions to save changes to parameter values on the LCD Touchpad. For more information, refer to Permissions. |
| **Display Chart Parameter** | Select this button to open the Display Chart Parameter pop-up display and configure which parameters are shown as real-time dynamic charts on the LCD Touchpad.<br>**Note**<br>You **must** log in to the LCD Touchpad before you can view Display Chart Parameters. |
| **Power Save Mode Enable** | Enables or disables the LCD Touchpad power-savings mode, which activates whenever you trigger the idle state screen. The power savings mode works with either Normal or List Mode. |

| Field | Description | |
|---|---|---|
| | **Disable** | The "idle screen" shows the Emerson logo. The screen is constantly active. |
| | **Enable** | The "idle screen" is blank to save power. The green LED blinks once every three seconds to indicate the LCD Touchpad is still active.<br>**Note**<br>Select **Enable** and then select **Save** to apply your changes. The DeltaV FB3000 performs a warm start and reboots the LCD Touchpad. |
| **Default Display** | Enables or disables a default list of parameters from being shown on the LCD Touchpad. The Default Display List is a user-configured auto-scrolling list of **read-only** data that is shown before you are required to log in to the LCD Touchpad.<br>**Note**<br>Default Display List parameters are shown **without** logging in to the LCD Touchpad. | |
| | **Disable** | Default Display List parameters do **not** show on the LCD Touchpad. |
| | **Enable** | Default Display List parameters show on the LCD Touchpad. |
| | **Default Display List** | Select this button to open the Default Display List Display List pop-up display and configure which parameters are shown in Default Display List on the LCD Touchpad.<br>**Note**<br>You **must** select **Enable** and save your changes before you can access this button. |
| **Alarm LED Indication** | Configures what conditions cause the Alarm LED to illuminate on the LCD Touchpad. | |
| | **Active Process Alarm** | Sets (if checked) the Alarm LED to illuminate when there are active process alarms on the DeltaV FB3000 RTU. |

| Field | Description | |
|---|---|---|
| | **Active Meter Alarm** | Sets (if checked) the Alarm LED to illuminate when there are active meter alarms on the DeltaV FB3000 RTU. |
| **Leading Zero Enable** | Determines the format used for total parameters. | |
| | **Enable** | The system does show leading zeros to the left of the significant digit for all total parameters.<br>**Note**<br>The number of leading zeros is correlated to the rollover value of the selected totals object. |
| | **Disable** | The system does not show leading zeros to the left of the significant digit for all total parameters. |
| **Firmware Details** | **Firmware Description** | This **read-only** field shows the description of the firmware installed on the LCD Touchpad. |
| | **Firmware Part Number** | This **read-only** field shows the part number of the installed version of firmware. |
| | **Firmware Version** | This **read-only** field shows the version of the firmware installed on the LCD Touchpad. |
| | **Firmware Creation Date** | This **read-only** field shows the date and time that the installed version of firmware was created. |
| | **Firmware Serial Number** | This **read-only** field shows the serial number of the firmware installed on the LCD Touchpad. |
| **Boot Details** | **Boot Part Number** | This **read-only** field shows the part number of the installed boot firmware. |
| | **Boot Version** | This **read-only** field shows the version of the boot firmware installed on the FB Series product. |
| | **Boot Creation Date** | This **read-only** field shows the date and time that the installed boot firmware was created. |

**3.** Select **Save** to save any changes you make to this display.

## 4.33.1 Display List

Use this pop-up display to configure both the User List parameters that are accessible after logging in to the LCD Touchpad and the Default Display List parameters that are shown before logging in to the LCD Touchpad.

### User List

You can configure up to 192 parameters (12 instances, each with 16 parameters) to show on the LCD Touchpad after logging in and selecting a User List. The system automatically scrolls through the configured parameters and their values at a user-defined time interval. You can view or change the parameter values shown in the User List directly from the LCD Touchpad.

**Note**

- You **must** log in to the LCD Touchpad before you can access User Lists.
- 12 user list instances (DispList_1 through DispList_4 and DispList_8 through DispList_15) make up the 12 User Lists.

### Default Display List

You can configure up to 48 parameters (three instances, each with 16 parameters) to show on the LCD Touchpad without logging in. The system automatically scrolls through the configured parameters and their values at a user-defined time interval. Parameter values shown are **read-only**. This mode allows service technicians to quickly review a dynamic display of current values without requiring them to log into the LCD Touchpad.

**Note**

- You **must** set the **Default Display** field to **Enable** (LCD Touchpad) to view Default Display List parameters on the LCD Touchpad.
- The system does **not** require you to log in to the LCD Touchpad to view the configured Default Display List parameters.
- Three instances (DispList_5, DispList_6, and DispList_7) make up the single Default Display List.

To access the **User List** pop-up display:

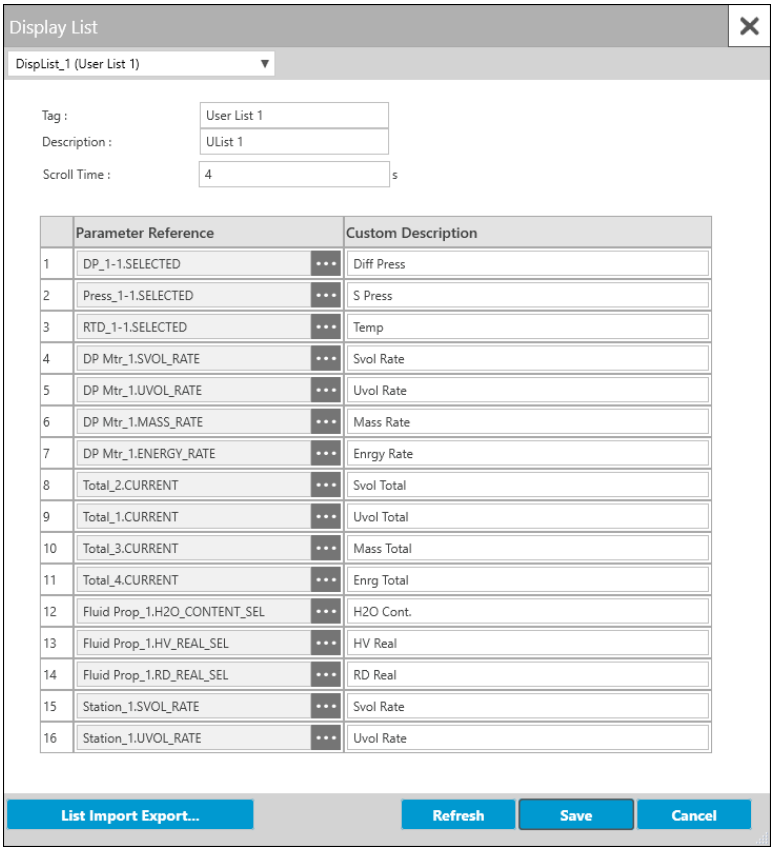
1. Select **Configure > LCD Touchpad** from the DeltaV FBxConnect configuration software main menu. The LCD Touchpad display opens.

2. Select the **User List** button. The Display List (User List) pop-up display opens. Continue to step 7.

To access the **Default Display List** pop-up display:

3. Select **Configure > LCD Touchpad** from the DeltaV FBxConnect configuration software main menu. The LCD Touchpad display opens.
4. Select **Enable** in the **Default Display** frame.
5. Select **Save** to apply your changes.
6. Select the **Default Display List** button in the **Default Display** frame. The Display List (Default Display List) pop-up display opens.
7. Click ▼ in the drop-down list at the top of the display and select an instance to configure.

**Figure 390. Display List (User List)**




8. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance.<br><br>**Note**<br>The value of this field is the same for the DispList_5, DispList_6, or DispList_7 instances. DeltaV FBxConnect configuration software shows this field as **read-only** for the DispList_6 and DispList_7 instances. If SCADA changes this parameter for either the DispList_5, DispList_6, or DispList_7 instance, then the remaining instances (DispList_5, DispList_6, or DispList_7) are also changed to the new value. |
| **Description** | Sets a description (up to 10-alphanumeric characters) for the selected instance.<br><br>**Note**<br>The value of this field is the same for the DispList_5, DispList_6, or DispList_7 instances. DeltaV FBxConnect configuration software shows this field as **read-only** for the DispList_6 and DispList_7 instances. If SCADA changes this parameter for either the DispList_5, DispList_6, or DispList_7 instance, then the remaining instances (DispList_5, DispList_6, or DispList_7) are also changed to the new value. |
| **Scroll Time** | Sets, in seconds, the amount of time the LCD Touchpad shows each configured parameter set before scrolling to the next parameter set. (The screen displays up to two parameters at a time.) Valid values are 1 to 255. The default is 4.<br><br>**Note**<br>The value of this field is the same for the DispList_5, DispList_6, or DispList_7 instances. DeltaV FBxConnect configuration software shows this field as **read-only** for the DispList_6 and DispList_7 instances. If SCADA changes this parameter for either the DispList_5, DispList_6, or DispList_7 instance, then the remaining instances (DispList_5, DispList_6, or DispList_7) are also changed to the new value. |
| **Parameter Reference** | Click ••• to open a Point Picker dialog and select a parameter to show in the Display List on the LCD Touchpad. |
| **Custom Description** | Sets a description (up to 10-alphanumeric characters) to show on the LCD Touchpad for the selected parameter reference. If set, this description is shown instead of the parameter name. |

| Field | Description |
|---|---|
| **List Import Export** | Select this button to import a CSV file containing a new display list or export your current display list to a CSV file. For more information, refer to Importing Display List CSV Files, Exporting Display List CSV Files, and Creating Display List CSV Files. |

9. Select **Save** to save any changes you make to this display.

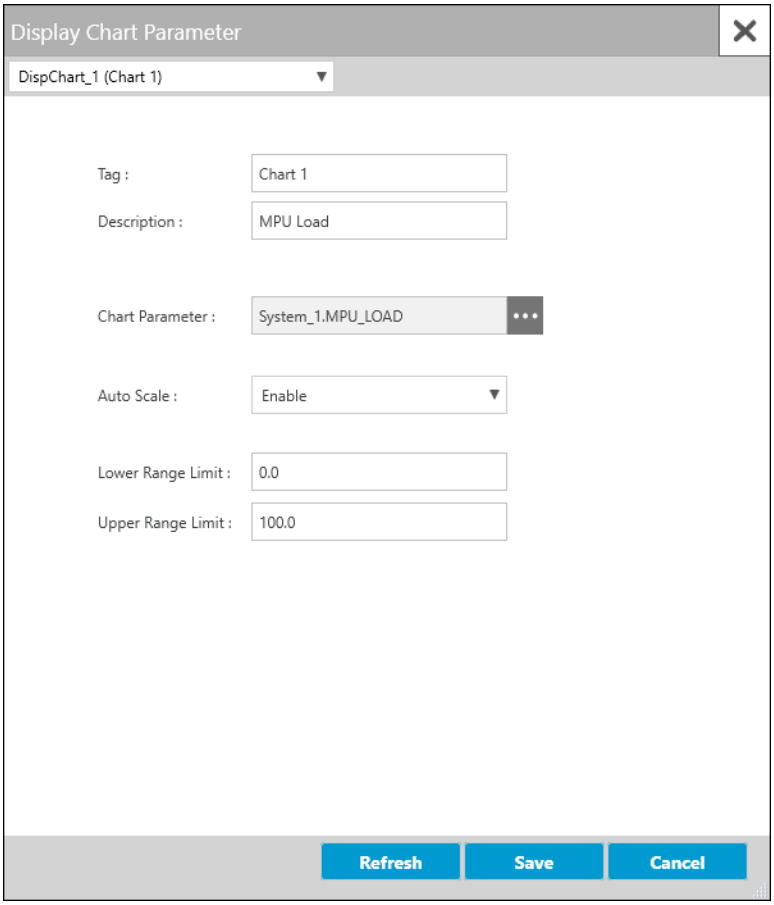
## 4.33.2 Display Chart Parameters

Use this pop-up display to configure the parameters that show, in a chart recorder format, historical or dynamic values on the LCD Touchpad. Each chart corresponds to one instance of the DispChart_ object, and you can configure up to 24 instances.

To access this display:

1. Select **Configure > LCD Touchpad** from the DeltaV FBxConnect configuration software main menu. The LCD Touchpad display opens.
2. Select the **Display Chart Parameters** button. The Display Chart Parameter pop-up display opens.
3. Click ▼ in the drop-down list at the top of the display, and select an instance to configure.

**Figure 391. Display Chart Parameter**




**4.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected instance. | |
| **Description** | Sets a description (up to 10-alphanumeric characters) for the selected instance. | |
| **Chart Parameter** | Click ••• to open a Point Picker dialog and select a parameter to show as a dynamic chart on the LCD Touchpad. | |
| **Auto Scale** | Controls the resolution of the vertical axis for the chart shown on the LCD Touchpad. | |
| | **Disable** | The system uses the values set in the Lower Range Limit and Upper Range Limit fields as the minimum and maximum values of the chart's vertical axis. |

| Field | Description | |
|---|---|---|
| | **Enable** | The system overrides the values you configure in the Lower Range Limit and Upper Range Limit fields and automatically sets minimum and maximum values of the chart's vertical axis based on the sampling of the data it gathers. |
| **Lower Range Limit** | Sets the minimum value of the chart's vertical axis. | |
| **Upper Range Limit** | Sets the maximum value of the chart's vertical axis. | |

5. Select **Save** to save any changes you make to this display.

### 4.33.2.1 Display List Import Export

Use this pop-up display to import or export CSV files that contain the display list configuration for your DeltaV FB3000 RTU. Each CSV file can contain the configuration for one or more display list instances.

**Note**

For more information about creating your own display list CSV file, refer to Creating Display List CSV Files.

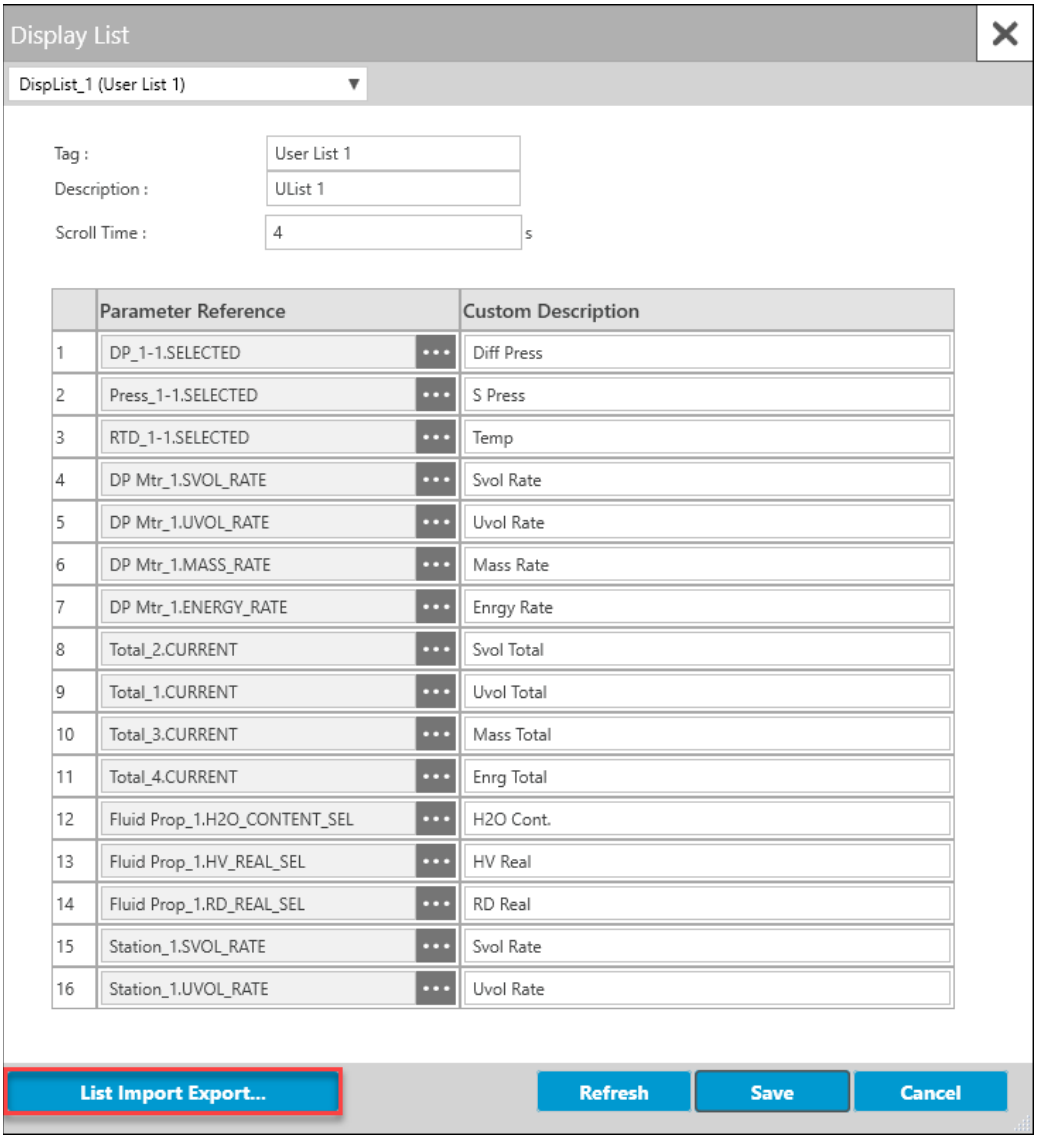
To access the **User List** pop-up display:

1. Select **Configure > LCD Touchpad** from the DeltaV™ FBxConnect™ main menu. The LCD Touchpad display opens.
2. Select the **User List** button. The Display List (User List) pop-up display opens. Continue to step 7.

To access **Default Display List** pop-up display:

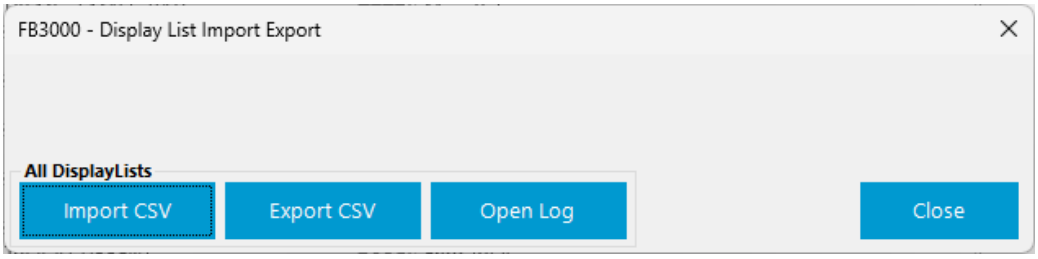
3. Select **Configure > LCD Touchpad** from the DeltaV™ FBxConnect™ main menu. The LCD Touchpad display opens.
4. Select **Enable** in the **Default Display** frame.
5. Select **Save** to apply your changes.
6. Select the **Default Display Lists** button in the **Default Display** frame. The Display List (Default Display List) pop-up display opens.

**Figure 392. List Import Export**




7. Select the **List Import Export** button. The Display List Import Export pop-up display opens.

**Figure 393. Display List Import Export**



8. Use the buttons on this display to perform the following actions:

| Field | Description |
|---|---|
| **Import CSV** | Click to import a CSV file into your DeltaV FB3000 RTU that contains your desired display list configuration. Navigate to the folder location that contains the CSV files and select **OK** to start the import process. For more information, refer to Importing Display List CSV Files.<br>**Note**<br>The system verifies the integrity of the CSV and asks for confirmation before continuing if any errors are found. |
| **Export CSV** | Click to save CSV files to your computer that contains the current display list configuration of your DeltaV FB3000 RTU. A Select Table dialog opens where you can select which display lists to include in the export. Click **Start**, navigate to a folder on your computer where the CSV files will be saved, and click **OK** to begin the export process. For more information, refer to Exporting Display List CSV Files. |
| **Open Log** | Click to open the *ImportExportLogs* folder on your computer that contains DeltaV™ FBxConnect import/export error logs. Any errors encountered when importing a CSV file are stored in a log in this folder.<br>**Note**<br>The log file name includes the date and time the log was created. |

9. Select **Close** to exit the pop-up display.

#### 4.33.2.1.1 Importing Display List CSV Files

You can import CSV files that contain the Display List configuration for your DeltaV FB3000 RTU. You can import a single CSV file that contains the Display List configuration for a single Display List or a single CSV file that contains the Display List configuration for all Display List instances.

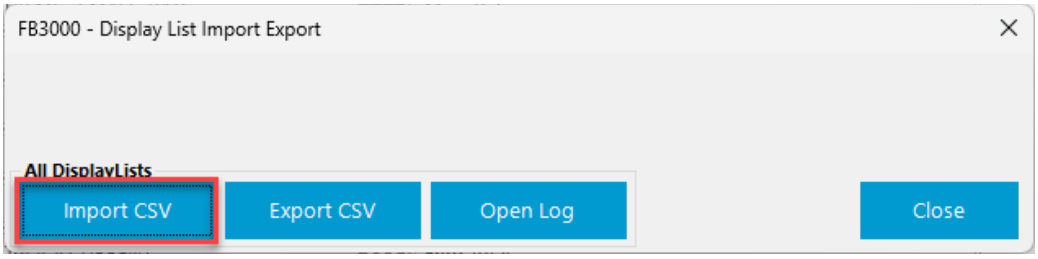
**Note**

- For more information about creating your own Display List CSV file, refer to Creating Display List CSV Files.
- For more information about exporting a CSV file that contains a Display List configuration, refer to Exporting Display List CSV Files.

To import Display List CSV files:

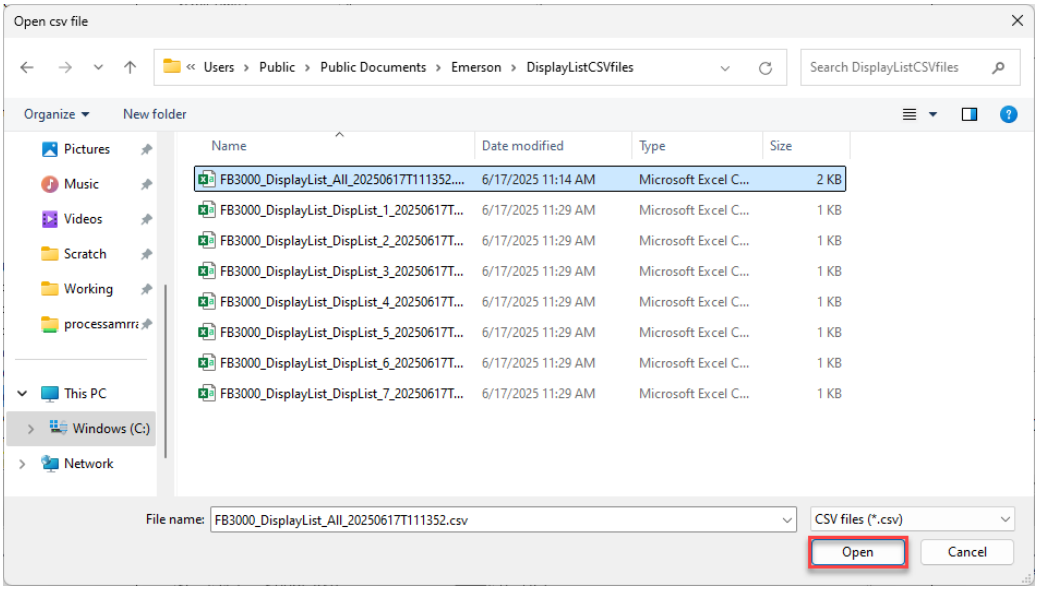
1. From the Display List display, select the **List Import Export** button. The Display List Import Export pop-up display opens.

**Figure 394. Display List Import Export**




2. Select the **Import CSV** button.

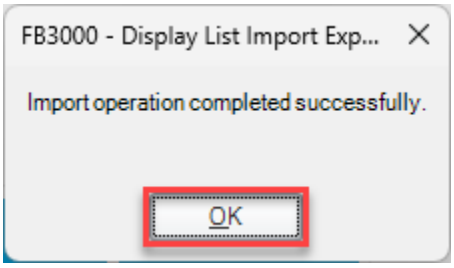
**Figure 395. Open csv file**




3. Navigate to the folder with your Display List CSV files, select a CSV file to import, and select **Open**. The system begins the process of exporting the CSV file and shows a progress bar on the display.

4. A confirmation dialog opens when the process completes. Select **OK** to close the dialog.

**Figure 396. Import Successful**




### 4.33.2.1.2 Exporting Display List CSV Files

You can export the current Display List of your DeltaV FB3000 RTU as CSV file saved to your computer. DeltaV FBxConnect can create a single CSV file that contains all of your Display Lists or separate CSV files for each Display List. You can then modify the files on your computer or import them into another device.

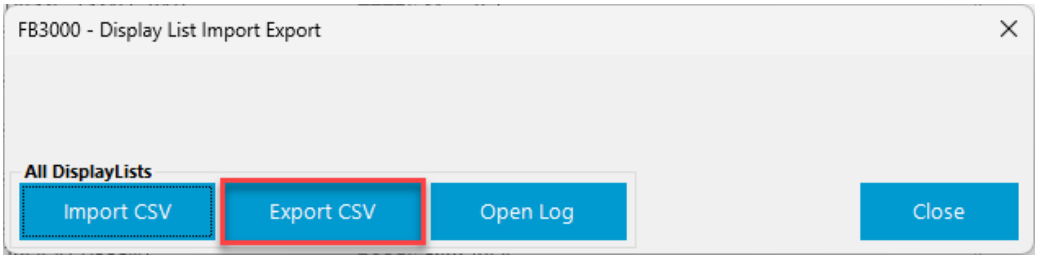
**Note**

- For more information about creating your own Display List CSV file, refer to Creating Display List CSV Files.
- For more information about importing a CSV file that a Display List configuration, refer to Importing Display List CSV Files.

To export Display List CSV files:

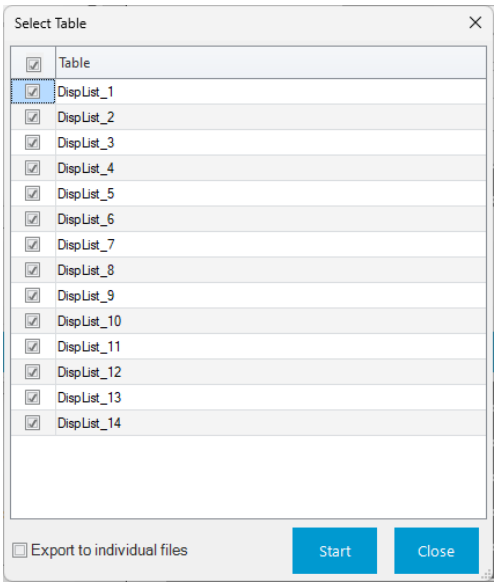
1. From the Display List display, select the **List Import Export** button. The Display List Import Export pop-up display opens.

**Figure 397. Display List Import Export**




2. Select the **Export CSV** button. The Select Table pop-up display opens.

**Figure 398. Select Table**



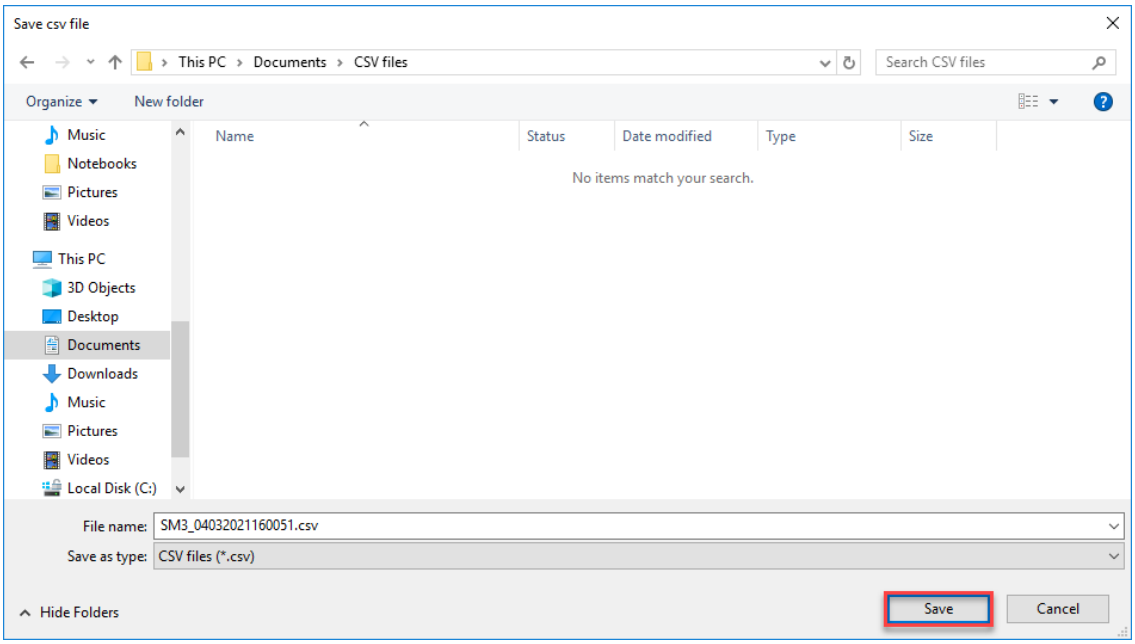

3. Place a check mark next to each display list you want to export.

**Note**

A single CSV file is created for all selected display lists. If you want separate CSV files for each selected display list, place a check mark next to **Export to individual file**.

4. Select **Start**. A Save csv file windows opens.

**Figure 399. Save csv file**

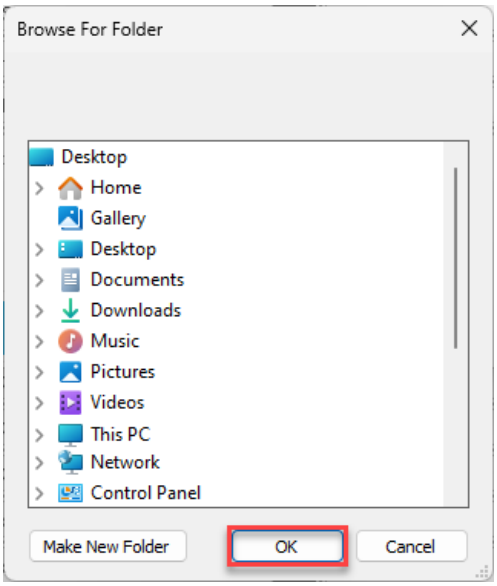



5. Navigate to a location on your computer to save your exported CSV file and select **Save**. The system begins the process of exporting the CSV file and shows a progress bar on the display.

**Note**

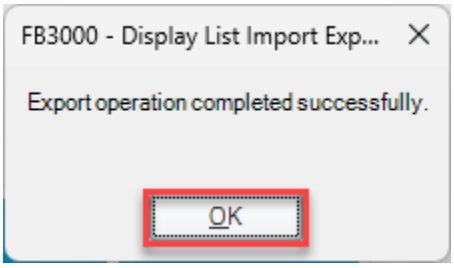
If you selected **Export to individual file**, then a Browse For Folder window opens. Navigate to the folder where the I/O configuration CSV files will be saved and select **OK** to begin the export process.

**Figure 400. Browse For Folder**




6. A confirmation dialog opens when the process completes. Select **OK** to close the dialog.

**Figure 401. Confirmation**



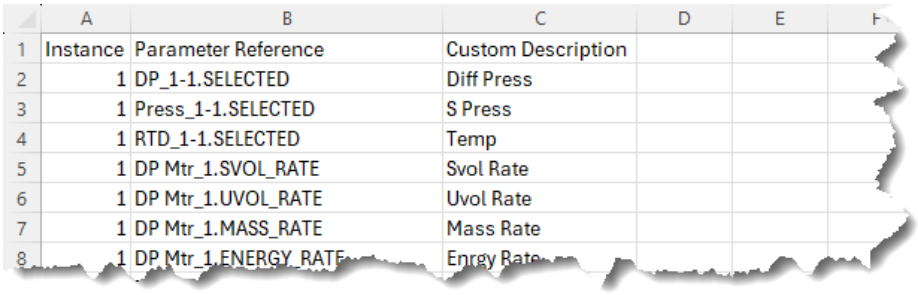

#### 4.33.2.1.3 Creating Display List CSV Files

You can create a CSV file that contains your Display List configuration on your computer and then import the CSV file for use in the DeltaV FB3000 RTU.

**Note**

The easiest way to begin creating a custom map is to export Display List CSV files that contain the current configuration and then edit that file. For more information about exporting Display List CSV files, refer to Exporting Display List CSV Files.

**Figure 402. Example Display List CSV Format**



| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Instance | Parameter Reference | Custom Description | | | |
| 2 | 1 | DP_1-1.SELECTED | Diff Press | | | |
| 3 | 1 | Press_1-1.SELECTED | S Press | | | |
| 4 | 1 | RTD_1-1.SELECTED | Temp | | | |
| 5 | 1 | DP Mtr_1.SVOL_RATE | Svol Rate | | | |
| 6 | 1 | DP Mtr_1.UVOL_RATE | Uvol Rate | | | |
| 7 | 1 | DP Mtr_1.MASS_RATE | Mass Rate | | | |
| 8 | 1 | DP Mtr_1.ENERGY_RATE | Engy Rate | | | |

To create CSV files that contain your Display List configuration:

1. Open a blank spreadsheet (or open a previously exported Display List CSV file).
2. In row one of the spreadsheet, enter the following text:
   - Column A = Instance
   - Column B = Parameter Reference
   - Column C = Custom Description
3. In the proceeding rows, enter information for each Display List item according to the descriptions below:

| Field | Description |
|---|---|
| **Instance** | Enter the Display List instance for the data in the selected row.<br>**Note**<br>• A single CSV file can contain information for one or more Display List instance (up to 14).<br>• You can configure up to 16 rows for each instance. |
| **Parameter Reference** | Enter a parameter from the FB Series product's database to show on the LCD Touchpad. |
| **Custom Description** | Enter a description (up to 10-alphanumeric characters) to show on the LCD Touchpad for the selected parameter reference. If set, this description is shown instead of the parameter name. |

4. Save your changes. You can now import your I/O configuration CSV files for use in your DeltaV FB3000 RTU. For more information, refer to Importing Display List CSV Files.

**Note**

Make sure to save the file with a **.csv** file extension.

## 4.34 Power Control

Use the Power Control screen to enable and disable power to a radio or other device via a DO or other I/O, as well as wake the device from low power to communicate. You can configure three separate power control instances, and each instance can be configured with independent timer values and output parameters.

For each Power Control instance, the power cycling can be configured to automatically change four times a day. During each of these four periods (Time 1, Time 2, Time 3, and Time 4), the ON (Time On) and OFF (Time Off) times can be set up to operate at various intervals to conserve battery power.

During the **ON** time:

- The selected Control to Toggle is set to ON.

During the **OFF** time:

- The selected Control to Toggle is set to OFF.

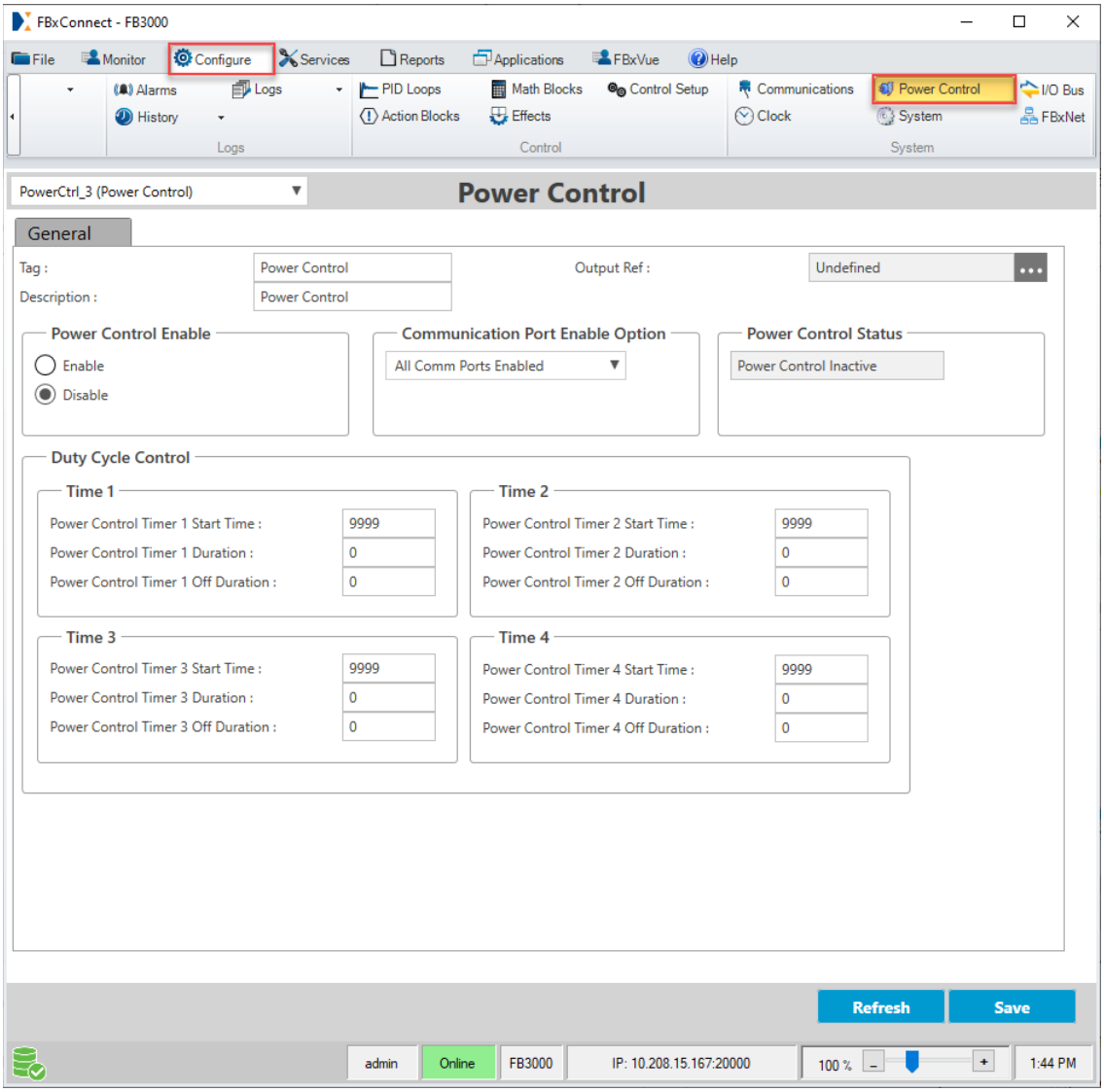
If communications occur during the ON time, the ON time is extended by the idle timeout of the communicating device.

Set a value in the Low Battery Shutoff Voltage field to automatically disable Radio Power Control if the input voltage to the device falls below this value. Radio Power Control is automatically re-enabled when the input voltage rises to this value.

To access this screen:

1. Select **Configure > Power Control** from the DeltaV FBxConnect configuration software main menu.
2. Click ▼ in the drop-down list at the top of the display and select an instance to configure.

**Figure 403. Power Control**




**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Set an identifier (up to 20-alphanumeric characters) for the selected instance. |
| **Description** | Set a description (up to 20-alphanumeric characters) for the selected instance. |
| **Output Ref** | Click ••• to open the point picker dialog and choose an output that is controlled by the selected power control instance. |

| Field | Description |
|---|---|
| **Power Control Enable** | Enables or disables the selected power control instance. |
| **Communication Port Enable Option** | Click ▼ to select the communications ports controlled by the selected power control instance. |
| **Power Control Status** | This **read-only** field shows the status of the selected power control instance. |
| **Power Control Timer Start Time** | Sets the time of day (in hours and minutes, HHMM) that the selected power control instance starts. You can configure up to four separate Start Times (Time 1, Time 2, Time 3, and Time 4) for each power control instance. Each Start Time configuration stays active until the next Start Time occurs.<br>**Note**<br>The Start Time's Time On and Time Off alternate throughout the period the Start Time is active. Enter a non-zero Time On or Time Off if you wish power control to remain on or off. |
| **Power Control Timer Duration** | Sets the length of time (in seconds) power control remains on while it's Start Time (Time 1, Time 2, Time 3, and Time 4) is active. |
| **Power Control Timer Off Duration** | Sets the length of time (in seconds) power control remains off while it's Start Time (Time 1, Time 2, Time 3, and Time 4) is active. |

4. Select **Save** to save your changes if you modify any of the fields on this screen.

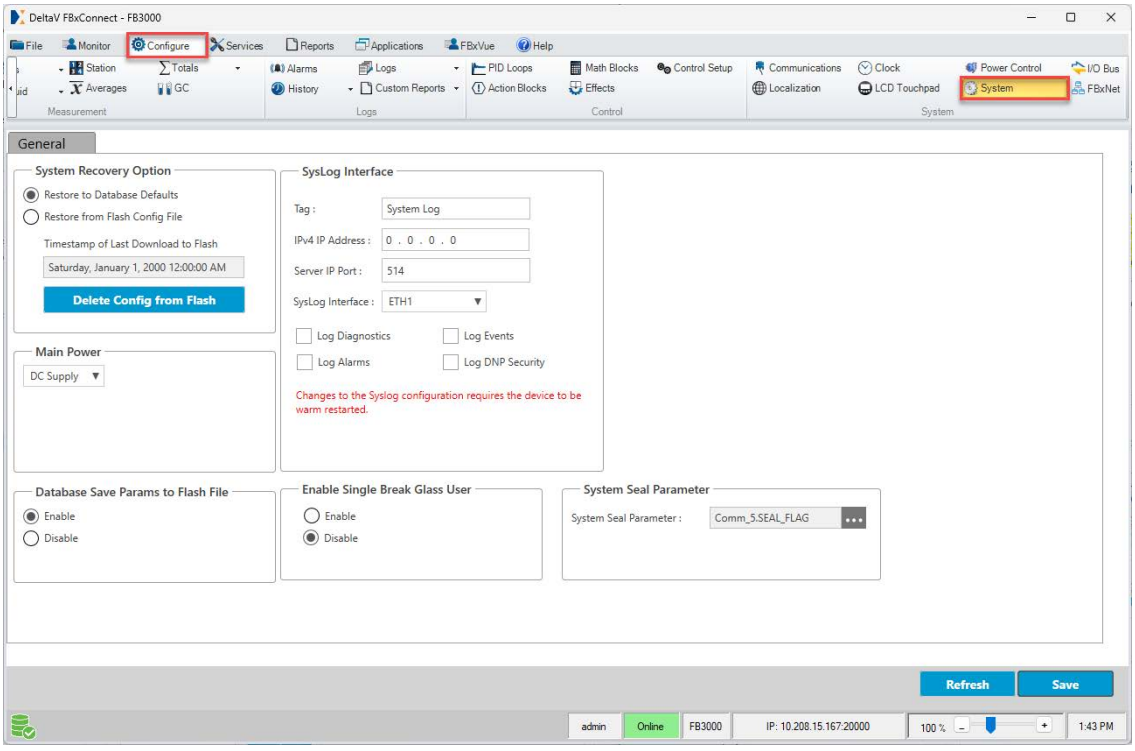
## 4.35 System

Use the System screen to configure how your FB Series product restores the device database after a failure, save the database parameters to flash memory, set the minimum voltage required to power the device, configure the system seal parameter, and configure SysLog Interface parameters.

To access this screen:

1. Select **Configure > System** from the DeltaV FBxConnect configuration software main menu.

**Figure 404. System**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **System Recovery Option** | Sets how the FB Series product restores the device database after a failure. Failures can happen for several reasons including static electricity, radiation, software issues, etc. Possible recovery options are: | |
| | **Restore to Database Defaults** | Restores the FB Series product configuration to the original defaults after a failure. |

| Field | Description | |
|---|---|---|
| | **Restore from Flash Config File** | Restores **read-only** values to the FB Series product defaults and read/write values from a configuration file previously stored in flash memory of the FB Series product (if one exists).<br>**Note**<br>• If you select this option, you **must** save a configuration file to flash memory. For more information, refer to Download to Flash.<br>• For more information about what components are restored from flash memory, refer to Solution Files. |
| | **Timestamp of Last Download to Flash** | This **read-only** field shows the date and time when the configuration file for restoring the system was loaded to flash memory.<br>**Note**<br>When no configuration has been saved to flash, this field shows a time of Saturday, January 1, 2000 12:00:00 AM. |
| | **Delete Config from Flash** | Select to remove the currently saved configuration from flash memory. |
| **Main Power** | Click ▼ to set the set the minimum voltage required to power the device. Possible options are Solar Supply (powered by solar panel) and DC Supply (powered by a DC power supply).<br>There are two trip points for the DeltaV FB3000: a power fail trip point and a shutdown trip point. If power drops to the power fail trip point, the RTU firmware initiates an orderly shutdown procedure. If power falls below that to the shutdown trip point, hardware shuts down abruptly. The trip points for each option are as follows:<br>**Solar Supply**<br>Power Fail Trip Point = 10.49 V<br>Shutdown Trip Point = 10.19 V<br>**DC Supply**<br>Power Fail Trip Point = 9.38 V<br>Shutdown Trip Point = 8.5 V | |

| Field | Description | |
|---|---|---|
| | **Note**<br>Because of variation in power measurements, the trip points are approximate. | |
| **Database save Params to Flash File** | Enables the FB Series product to use memory from the flash file system as an extension of the standard database memory. This allows certain configuration parameters to be removed from the database and stored as files on the FB Series product's flash file system. This setting is useful if the overall product features and installed applications exceed the standard database memory allocation (as viewed on the Services – Service Info display).<br>**Note**<br>If you change this option, you **must** perform a Warm Start before any changes are applied. | |
| | **Enable** | Certain parameters are stored in the flash file system resulting in an increase to the available memory of the standard database. You may need to enable this option when installing large applications or enabling a large number of features.<br>**Note**<br>Parameters stored in this manner are pre-determined and not selectable. These are typically configuration parameters of larger data types, such as strings or parameter references. The files used to store this data are not visible, but they do consume a portion of the flash file system (as viewed on the Services – Service Info display). |

| Field | Description | | |
|---|---|---|---|
| | **Disable** | All parameters are stored in the default standard database. Although this limits the amount of memory available for the standard database, it is sufficient for the majority of configuration scenarios. This is the default.<br>**Note**<br>If you select Disable after the feature has been enabled, then the database is reset to defaults. To prevent loss of data, you should save your configuration (refer to Upload Solution) and collect history (History Report). | |
| **SysLog** | Use these fields to configure parameters used to communicate with a SysLog server for system management and auditing purposes.<br>**Note**<br>If you change the SysLog configuration, you **must** perform a Warm Start before any changes are applied. | | |
| | **Tag** | Sets an identifier (up to 20-alphanumeric characters) that the FB Series product will use when logging to the SysLog server. | |
| | **IPv4 IP Address** | Enter the IP address of the SysLog server used for communications. | |
| | **Server IP Port** | Enter the TCP/IP port number of the SysLog server used for communications. | |
| | **SysLog Interface** | Click ▼ to set which communications port on the FB Series product is used to send messages to the SysLog server. Possible options are: | |
| | | **ETH1** | Use Ethernet 1 to send messages to the SysLog server. |
| | | **ETH2** | Use Ethernet 2 to send messages to the SysLog server. |
| | **Log Diagnostics** | Place a check mark to include diagnostic log information when sending messages to the SysLog server. | |

| Field | Description | |
|---|---|---|
| | **Log Events** | Place a check mark to include event log information when sending messages to the SysLog server. |
| | **Log Alarms** | Place a check mark to include alarm log information when sending messages to the SysLog server. |
| **Enable Single Break Glass User** | Enables a single DNP3 user to be configured as the break glass credentials.<br>**Note**<br>This setting is available **only** if Active Directory is enabled on the FB Series product | |
| | **Enable** | Allows you to configure a single DNP3 user as the break glass credentials. The next time you add a DNP3 user after enabling this feature, all other DNP3 users are removed leaving the newly added user as the only DNP3 user in the FB Series product.<br>**Note**<br>This setting applies to **DNP3 users only** and has no effect on FBxNet, BSAP, ROC users. |
| | **Disable** | All DNP3 users are managed through the User Management display. |
| **System Seal Parameter** | Click ••• to open a Point Picker dialog and select a numeric parameter to use as an indication that the FB Series product has been sealed. Emerson recommends using:<br>• **Comm_x.SEAL_FLAG** (Serial or Ethernet ports on the main CPU only) – The system is considered unsealed when there is an active connection with FBxConnect and sealed when there is no active connection with FBxConnect on the selected port.<br>**Note**<br>Some metrological approvals may require physical access to be restricted to the selected port.<br>• **Module_3.CFG_OPT_1** (FB2000 Series Flow Computer door switch input) – The system is considered unsealed when the door is open and sealed when the door is closed. | |

| Field | Description |
|---|---|
| | When choosing to configure an alternative parameter, the FB Series product is considered sealed when the parameter has a nonzero value and unsealed when the parameter has a value of 0.<br><br>**WARNING**<br><br>Before changing the System Seal Parameter, ensure that the value of the parameter referenced can be changed to 0 and nonzero; failure to do so may require a factory reset to unseal the FB Series product.<br><br>Once a parameter is assigned, changes to the seal status are audited in the event log. If the FB Series product is sealed, then a system seal icon shows in the status bar and access the following displays/actions is prohibited:<br>• Firmware Update<br>• Download Solution<br>• Download to Flash<br>• Save to Flash<br>• Cold Start<br>• Meter Setup<br>• Device License<br>**Note**<br>• You should **not** change the system seal status while using any of the displays/functions listed above.<br>• You can change the system seal parameter **only** when the device is unsealed.<br>• The seal status can be displayed on LCD via the System_1.SYSTEM_SEAL_STATUS parameter. |

**3.** Select **Save** to save your changes if you modify any of the fields on this screen.

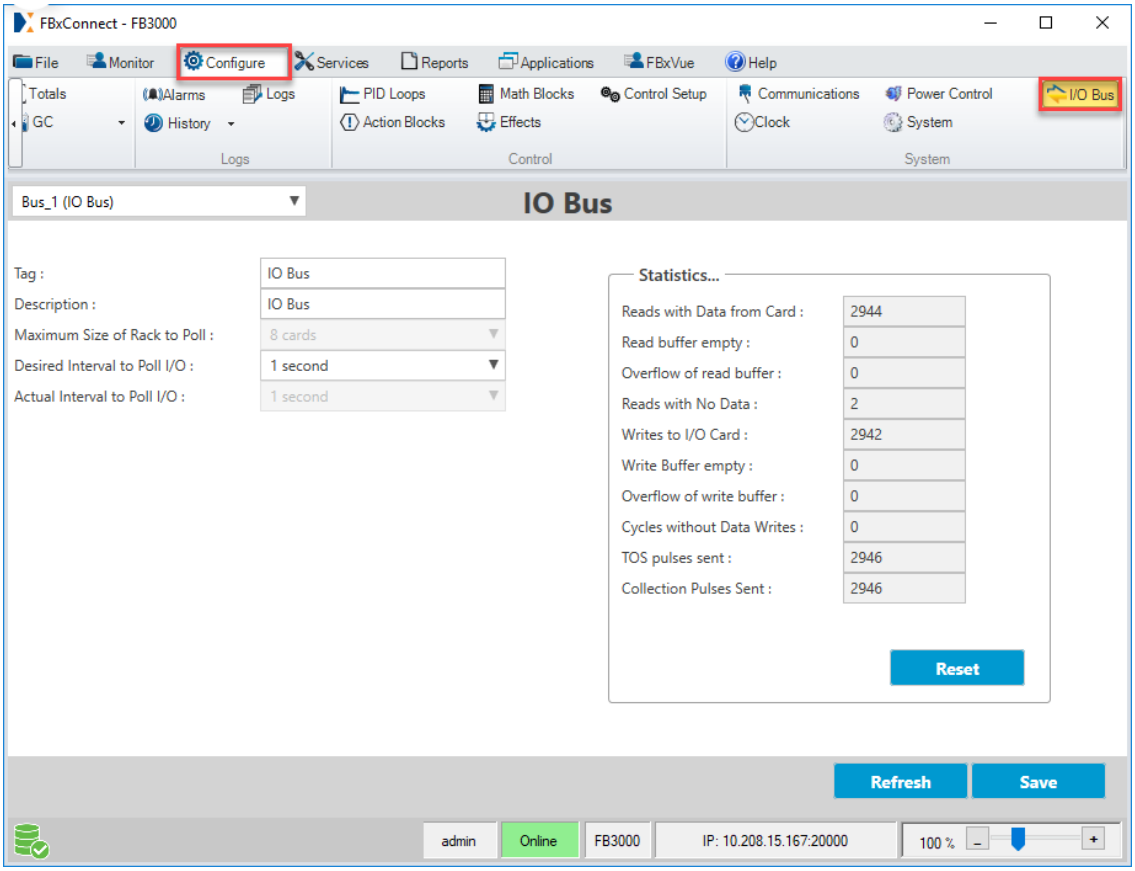
## 4.36 I/O Bus

Use the I/O Bus display to configure the polling interval and view statistics for each I/O module installed in an DeltaV FB3000 RTU.

To access this display:

1. Select **Configure > I/O Bus** from the DeltaV FBxConnect configuration software main menu. The I/O Bus display opens:

**Figure 405. I/O Bus**




2. Click ▼ in the drop-down list at the top of the display to select a I/O bus to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected I/O bus. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected I/O bus. |

| Field | Description |
|---|---|
| **Maximum Size of Rack to Poll** | This **read-only** field shows the maximum number of I/O cards you can install.<br>**Note**<br>The system auto-detects the size of the rack based on an I/O module's physical slot location. For example, if there is only one I/O module and it is installed in slot 19, then system detects the rack size as 24. Every extended rack can house a maximum 8 I/O modules. |
| **Desired Interval to Poll I/O** | Sets the time the system waits between reads of the I/O modules.<br>**Note**<br>This is your desired interval. The actual interval is based on your requested interval and the maximum frequency allowed based on the number of installed racks. |
| **Actual Interval to Poll I/O** | This **read-only** field shows the actual time the system waits between reads of the I/O modules.<br>**Note**<br>This time may differ from you desired Interval to Poll I/O. The actual interval is based on your requested interval and the maximum frequency allowed based on the number of installed racks. |
| **Statistics** | These **read-only** fields show statistical information for the currently selected I/O bus. |
| **Reset** | Select to zero-out the information contained in the Statistics fields. |

4. Select **Save** to save your changes if you modify any of the fields on this display.

## 4.37 FBxNet

Use the this display to configure the FB Series product to communicate over FBxNet. FBxNet is a peer-to-peer communication network for exchanging data between Emerson RTUs and flow computers over Ethernet connections. The network consists of publishers and subscribers. You can configure the **DeltaV FB3000 RTU** as an FBxNet publisher or FBxNet subscriber.

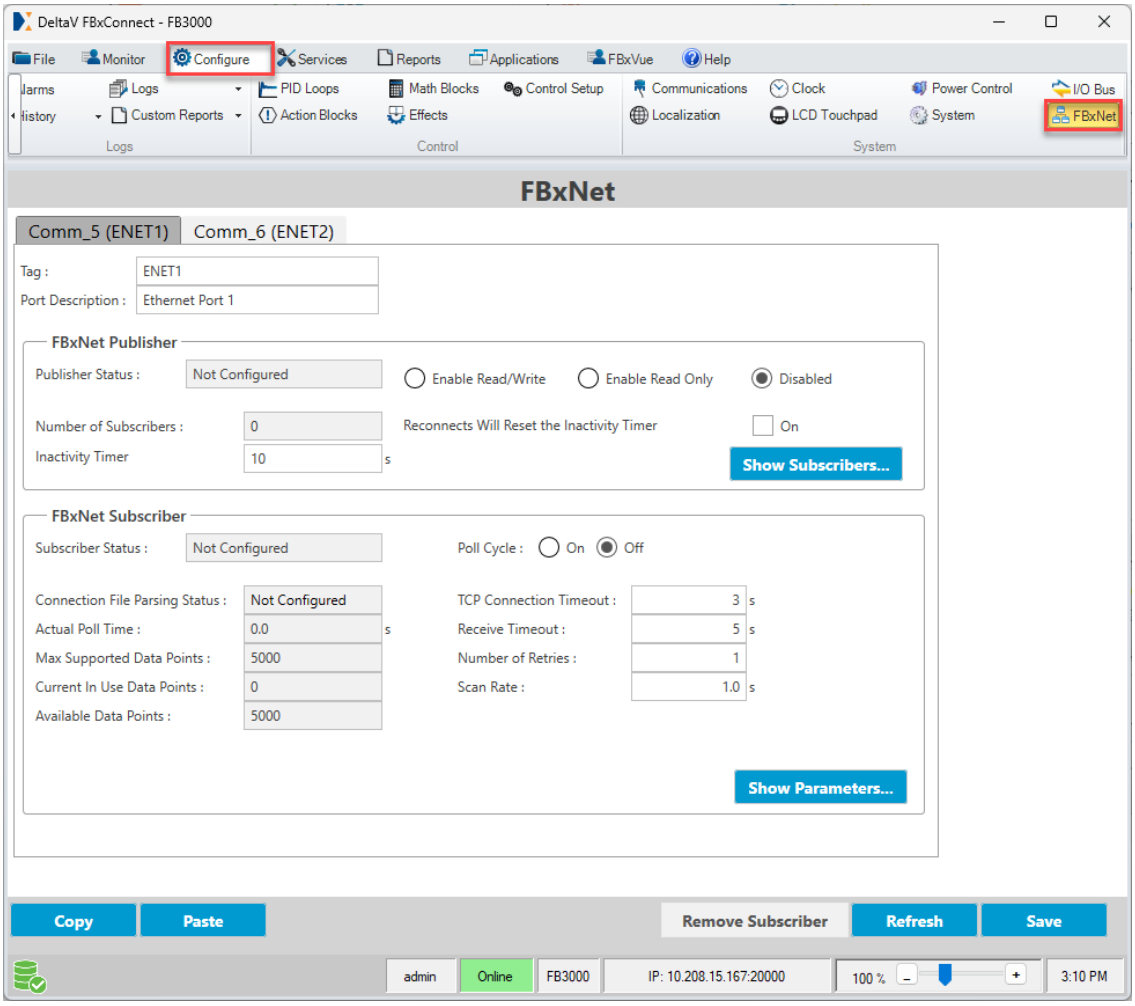
**Note**

For more information about FBxNet, refer to *DeltaV FBxConnect Launchpad Quick Start Guid*e (D301703X412).

To access this display:

1. Select **Configure > FBxNet** from the DeltaV FBxConnect configuration software main menu. The FBxNet display opens.

**Figure 406. FBxNet**




2. A tab shows at the top of the display for each communications port that supports FBxNet communications. Select the tab corresponding to the communications port you want to configure.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected communications port. |

| Field | Description | |
|---|---|---|
| **Port Description** | Sets a description (up to 20-alphanumeric characters) for the selected communications port. | |
| **FBxNet Publisher** | These fields display parameters associated with FBxNet publishers. | |
| | **Publisher Status** | This **read-only** field shows if the FB Series device is currently configured as an FBxNet publisher. |
| | **Enable Read/Write** | Select to enable subscribers to read data from and write data to this device. |
| | **Enable Read Only** | Select to enable subscribers to **only** read data from this device. |
| | **Disabled** | Select to prevent subscribers from reading data from or writing data to the device. |
| | **Number of Subscribers** | This **read-only** field shows the number of FBxNet subscribers configured to receive information from the currently connected FB Series product. |
| | **Inactivity Timer** | Sets the amount of time, in seconds, that a publisher must receive an update from a subscriber before determining that the subscriber has stopped communication. If this timer expires, any applicable fault modes are applied and the subscriber must re-authenticate with the publisher. |

| Field | Description | | |
|---|---|---|---|
| | **Reconnects Will Reset the Inactivity Timer** | Sets (if checked) the Publisher or Subscriber fault handling logic to allow TCP/IP disconnects if the connection is re-established before the time configured in the **Inactivity Timer** field. For Subscriber devices, it also causes the offline device recovery logic to initiate every 5 seconds rather than every 15 seconds.<br>If checked, use the following formula to calculate the minimum value to enter in the Publisher Watchdog Timer field:<br>`InactivityMinValue = (Subscriber TCP Connection Timeout) * 2 + (1 + Subscriber Number of Retries) * (Subscriber Receive Timeout) + Device Recovery Timer`<br>**Note**<br>The state you select (checked or unchecked) is reflected in all other instances of this parameter. | |
| | **Show Subscribers** | Select this button to open a pop-up display that contains a list of IP addresses belonging to the FBxNet subscribers configured to receive information from the currently connected FB Series product. | |
| **FBxNet Subscriber** | These fields display parameters associated with FBxNet subscribers. | | |
| | **Subscriber Status** | This **read-only** field shows if the FB Series device is currently configured as an FBxNet subscriber. | |
| | **Poll Cycle** | Enables/disables polling for the selected port. | |
| | **Connection File Parsing Status** | This **read-only** field shows the current parsing status of the publisher device's parameter mapping file. Possible status messages include: | |
| | | **No Error** | Parse was successful. |
| | | **File Open Fail** | Could not open the file or the file is corrupt. |
| | | **Column Mismatch** | Column of the file is invalid. Can be either in the connection or map file. |

| Field | Description | | |
|---|---|---|---|
| | | **Missing Required Column** | Missing required column. Can be either in the connection or map file. |
| | | **Too Much Data** | The number of entries in the map file exceed the number supported. |
| | | **Invalid Subscriber Tag** | There is a subscriber tag in the file that is invalid (see diagnostic log for details). |
| | | **Invalid FBx Instance Number** | There is an entry in the file that has an invalid FBx Instance Number (see diagnostic log for details). |
| | | **Missing or Invalid Required Value** | One of the values in the FBxData columns (i.e., mode, fault value, instance number) is missing or invalid (see diagnostics log for details). |
| | | **Duplicate FBx Instance Number** | There are duplicate entries in the file. Each fault handling number must be unique. |
| | | **Parse Not Configured** | There is no connection or map file configured for the given port. |
| | **Actual Poll Time** | This **read-only** field shows the time (in seconds) to complete the poll. | |
| | **Max Supported Data Points** | This **read-only** field shows the maximum number of data points possible. | |
| | **Current In Use Data Points** | This **read-only** field shows the number of data points currently in use. | |
| | **Available Data Points** | This **read-only** field shows the number of data points still available to be used. | |
| | **TCP Connection Timeout** | Sets the number of seconds the subscriber waits for a response from a connection request before a timeout occurs. | |

| Field | Description | |
|---|---|---|
| | **Receive Timeout** | Sets the number of seconds the subscriber waits for a response from the publisher after the connection has been established. |
| | **Number of Retries** | Sets the number of retry attempts when a timeout occurs. |
| | **Scan Rate** | Sets the frequency (in seconds) at which the subscriber polls its publishers. |

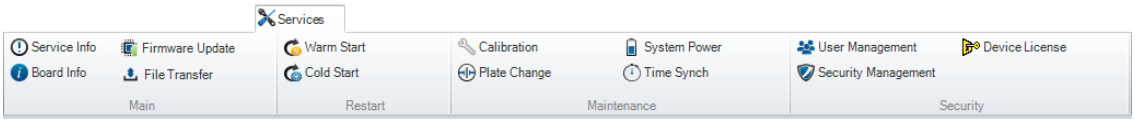
4. Select **Save** to save your changes if you modify any of the fields on this display.

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# Section 5: Services Menu

Use the options in this menu to access utilities and perform maintenance on your FB Series product, such as user management, firmware updates, and calibration.

**Figure 407. Services Menu**




The Services menu contains the following options:

Service Info – View information about the connected FB Series product, including the part number, application version, and creation date.

Board Info – Set a name and description for each module installed in your FB Series product and view general information for each module.

Firmware Update – Update the firmware on your FB Series product.

File Transfer – Upload a file from the FB Series product to your computer, download a file from your computer to the FB Series product, or delete a file from the FB Series product.

Warm Start – Perform a warm start on the connected FB Series product.

Cold Start – Perform a cold start on your FB Series product.

Calibration – Opens the Calibration Wizard to calibrate various I/O points.

Plate Change – Opens the Plate Change Wizard which walks you through the steps to successfully change the size of an orifice plate under flowing or non-flowing conditions.

System Power – View battery diagnostics and reset battery timers.

Time Synch – Use this pop-up display to synchronize the FB Series product clock with your PC clock.

User Management – Add, delete, and modify the user accounts able to log in to the FB Series product.

Security Management – Set a minimum password length and configure the lock out functionality.

Device License – Manage licenses for your device.

Apply Security File (Enavle Sav5) – Use this option to enable DNP3 Secure Authentication version 5 (SAv5) on the FB Series product.

**Note**

This appears **only** if you are physically connected via the USB port.

Disable Sav5 – Use this option to turn off DNP3 Secure Authentication version 5 (SAv5) on the FB Series product.

**Note**

This option appears **only** after you have enabled SAv5 of the FB Series product and are physically connected via the USB port.

Enable Active Directory – Turn on Active Directory on the FB Series product.

Disable Active Directory – Turn off Active Directory on the FB Series product.

Enable Remote SAv5 Key Updates – Turn on remote SAv5 key updates on the FB Series product.

Disable Remote SAv5 Key Updates – Turn off remote SAv5 key updates on the FB Series product.

# 5.1 Service Info

Use this display to view **read-only** information about the connected FB Series product, including the part number, firmware version, and system resources.

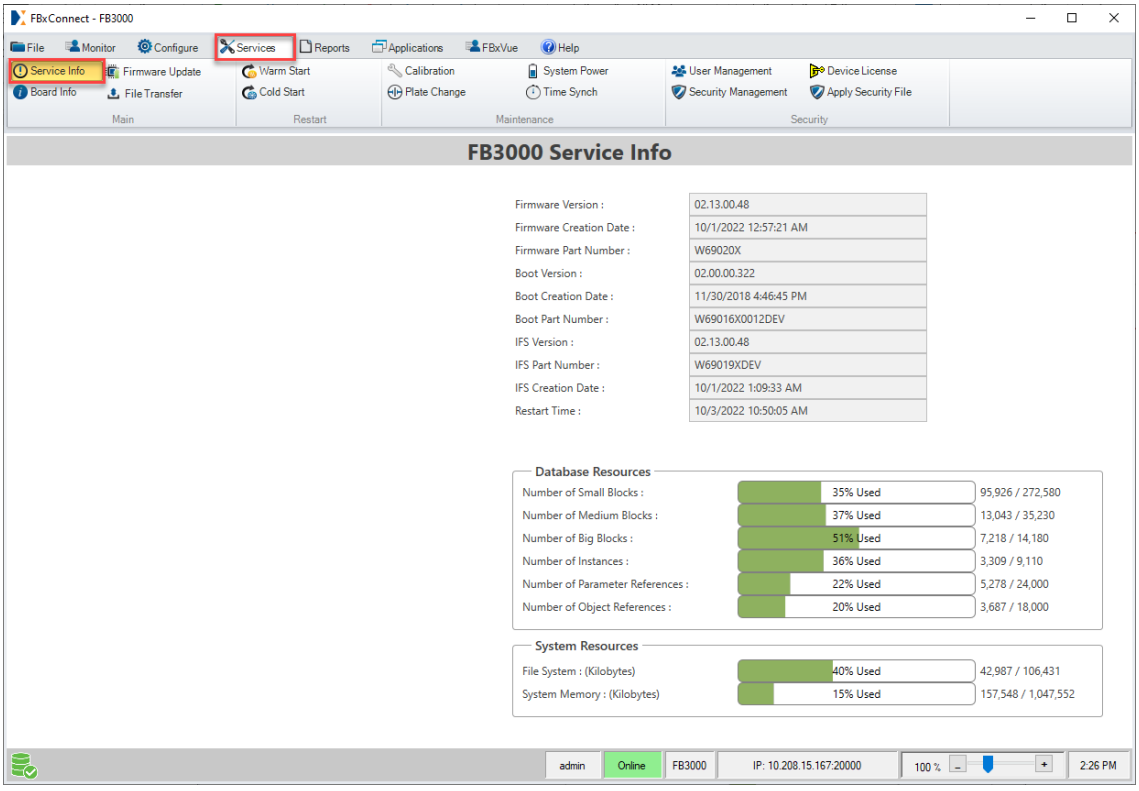
**Note**

The Restart Time field shows the date and time the FB Series product last finished rebooting following a restart (warm start, cold start, etc.). Restarts that are not user-initiated, such as a power failure, are recorded in the Event Log. Refer to Event Report for more information about retrieving Event Log data.

To access this display:

1. Select **Services > Service Info** from the DeltaV FBxConnect configuration software main menu. The Service Info display opens.

**Figure 408. Service Info**




**2.** Review the values in the following fields:

| Field | Description |
|---|---|
| **Firmware Version** | This **read-only** field shows the version of the firmware installed in the FB Series product. |
| **Firmware Creation Date** | This **read-only** field shows the date and time that the installed version of firmware was created. |
| **Firmware Part Number** | This **read-only** field shows the part number of the installed version of firmware. |
| **Boot Version** | This **read-only** field shows the version of the boot firmware installed in the FB Series product. |
| **Boot Creation Date** | This **read-only** field shows the date and time that the installed boot firmware was created. |
| **Boot Part Number** | This **read-only** field shows the part number of the installed boot firmware. |

| Field | Description |
|---|---|
| **IFS Version** | This **read-only** field shows the version of the initial file system installed in the FB Series product. |
| **IFS Creation Date** | This **read-only** field shows the date and time that the installed initial file system was created. |
| **IFS Part Number** | This **read-only** field shows the part number of the installed initial file system. |
| **Restart Time** | The Restart Time field shows the date and time the FB Series product last finished rebooting following a restart (warm start, cold start, etc.).<br>**Note**<br>Restarts that are **not** user-initiated, such as a power failure, are recorded in the Event Log. Refer to Event Report for more information about retrieving Event Log data. |

| Field | Description |
|---|---|
| **Database Resources** | These **read-only** fields represent the status of the system database. The database is a shared resource that is common to all DeltaV FB3000 functionality. While the memory allocated for the database is sufficient for the vast majority of use-cases, caution is advised for larger systems. Additional database resources are used whenever the number of meters is increased, the number of history points is increased, or new I/O modules are installed. The same is true when adding applications with user defined objects. When you commission a new system, or expand the functionality of an existing system, you should review these fields for any areas of concern.<br>The color of these fields change based on the following conditions:<br>• **Green** = This color shows if the resource usage is between 0-74%.<br>• **Orange** – This color shows if the resource usage is between 75-89%.<br>• **Red** – This color shows if the resource usage is between 90-100%.<br>**Note**<br>A **red** field is not necessarily a problem for operation, but increasing the system functionality (additional meters, history, IO, applications, etc.) may not be possible. |
| **Number of Small Blocks** | This field shows the current and maximum possible usage of “small” data type parameters in the database. These parameters are 8 bytes or less in size and consist of the following data types: UINT8, INT8, UINT16, INT16, UINT32, INT32, UINT64, INT64, FLOAT, DOUBLE, ENUM16, BIN8, BIN16, BIN32, and TIME. For more information about native system data types, refer to Native Data Types. |

| Field | Description | |
|---|---|---|
| | **Number of Medium Blocks** | This field shows the current and maximum possible usage of “medium” data type parameters in the database. These parameters are 10 or 20 bytes in length and consist of the following data types: UC10 (String 10), UC20 (String 20), and OBJREF. For more information about native system data types, refer to Native Data Types. |
| | **Number of Big Blocks** | This field shows the current and maximum possible usage of “Large” (or Big) data type parameters in the database. These parameters are 30 bytes or greater in length and consist of the following data types: UC30 (String 30), UC40 (String 40), BYTE32 and PRMREF. For more information about native system data types, refer to Native Data Types. |
| | **Number of Instances** | This field shows the current and maximum possible usage of database object instances. For every database object, there is at least one instance. For most database objects, there are multiple instances. The total number of instances (for both firmware objects and application objects) must **not** exceed the limit shown here. |
| | **Number of Parameter References** | This field shows the current and maximum possible usage of parameter reference database parameters in the database. Parameter reference parameters (often represented in DeltaV FBxConnect configuration software via a [•••] button) are a special type of database parameter used throughout the system for pointing to or linking to an individual piece of data. Sometimes these links are defined by the user and other times they are predefined in a fixed manner. |

| Field | Description | |
|---|---|---|
| | **Number of Object References** | This field shows the current and maximum possible usage of object reference database parameters in the database. Object Reference parameters (often represented in DeltaV FBxConnect configuration software via a [•••] button) are a special type of database parameter used throughout the system for linking data and groups of data together. These references are used to point to other related objects. Sometimes these links are defined by the user and other times they are predefined in a fixed manner. |
| **System Resources** | These fields represent the memory utilization for the system.<br>The color of these fields change based on the following conditions:<br>• **Green** = This color shows if the resource usage is between 0-74%.<br>• **Orange** – This color shows if the resource usage is between 75-89%.<br>• **Red** – This color shows if the resource usage is between 90-100%. | |
| | **File System** | This field represents the usage of the FB Series product's flash file system. Data stored in flash is persistent, meaning it is retained following a power cycle or restart. This memory is used for application files, protocol files, license files, and other system related or user stored files. The contents of the flash file system can be viewed via the File Transfer display. |
| | **System Memory** | This field represents the usage of the FB Series product's SDRAM. SDRAM (synchronous DRAM) is non-persistent, meaning data is not retained upon a power cycle or restart. This memory is used for firmware and application execution, variables, stacks, and heaps. |

# 5.2 Board Info

Use this display to set a name and description for each module installed in your FB Series product and view general information for each module. Displayed information includes details about the module type, firmware version, and boot code. Each module is assigned a number by DeltaV FBxConnect configuration software, and you can select each module from the drop-down list at the top of the display.

**Note**

All flow calculations, alarms, events, and history reside in the main CPU (Module_1).

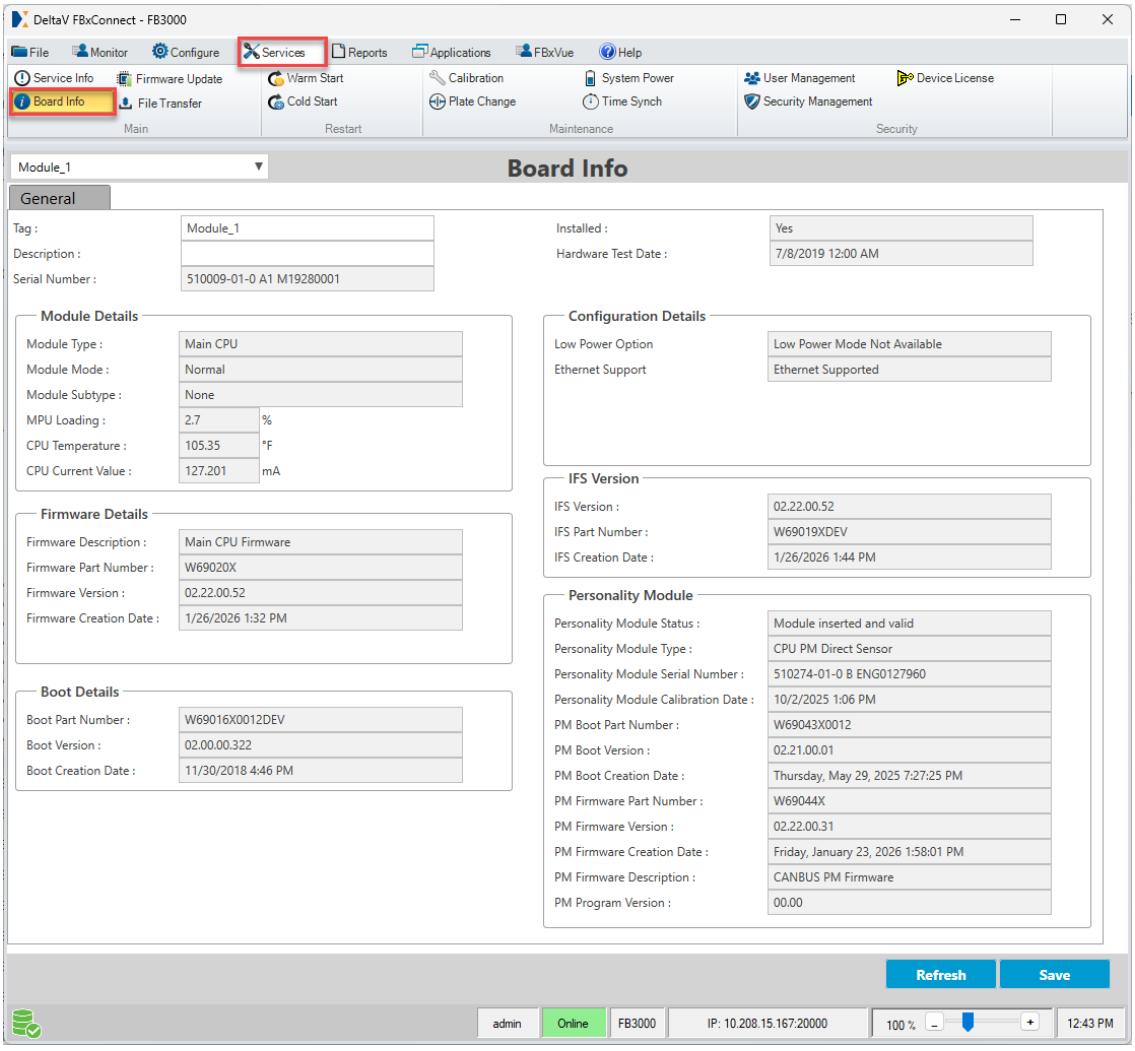
The module number assignments are listed below:

- Module_1 – CPU
- Module_2 through Module_32 – I/O Cards

To access this display:

1. Select **Services > Board Info** from the DeltaV FBxConnect configuration software main menu. The Board Info display opens.

**Figure 409. Board Info (Module 1 - CPU)**




2. Click ▼ to select a module from the drop-down list at the top of the display.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected module. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected module. |
| **Serial Number** | This **read-only** field shows the serial number assigned to the selected module. |

| Field | Description | |
|---|---|---|
| **Installed** | This **read-only** field shows if the module is installed. | |
| **Hardware Test Date** | This **read-only** field shows the date and time of the hardware test. | |
| **Module Details** | **Module Type** | This **read-only** field shows the module type. Possible options are Unknown, Main CPU, I/O Cards, HMI, On-Board I/O, Optional I/O, and Expanded I/O. |
| | **Module Mode** | This **read-only** field shows the status of the selected module. For more information about possible statuses, refer to I/O Configuration – Properties Tab. |
| | **Module Subtype** | This **read-only** field shows the module subtype. |
| | **MPU Loading** | This **read-only** field shows the current MPU loading of the system.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **CPU Temperature** | This **read-only** field shows the current temperate of the CPU.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **CPU Current Value** | This **read-only** field shows the current value, in mA, of the CPU.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| **Firmware Details** | **Firmware Description** | This **read-only** field shows the description for the firmware of the selected module. |
| | **Firmware Part Number** | This **read-only** field shows the part number for the firmware installed on the selected module. |

| Field | Description | |
|---|---|---|
| | **Firmware Version** | This **read-only** field shows the current firmware version installed on the selected module.<br>**Note**<br>The firmware, boot and IFS version numbers are displayed in the following format w.x.y.z<br>Where:<br>w = major release<br>x = minor (feature) release<br>y = issue release<br>z = build number |
| | **Firmware Creation Date** | This **read-only** field shows the date and time the current firmware version was created. |
| | **FPGA Program Version** | This **read-only** field shows the version of the program for the FPGA (Field Programmable Gate Array) in-use on the selected module.<br>**Note**<br>This field appears **only** for **I/O modules**. |
| **Boot Details** | **Boot Part Number** | This **read-only** field shows the part number for the boot installed on the selected module. |
| | **Boot Version** | This **read-only** field shows the current boot version installed on the selected module. |
| | **Boot Creation Date** | This **read-only** field shows the date and time the current boot version was created. |
| **Configuration Details** | **Low Power Option** | This **read-only** field shows if the low power mode is available.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **Ethernet Support** | This **read-only** field shows if Ethernet support is available.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| **IFS Version** | **IFS Version** | This **read-only** field shows the current IFS version installed on the selected module. |

| Field | Description | |
|---|---|---|
| | **IFS Part Number** | This **read-only** field shows the part number for the IFS installed on the selected module. |
| | **IFS Creation Date** | This **read-only** field shows the date and time the current boot version was created. |
| **Personality Module** | **Personality Module Status** | This **read-only** field shows the status of the personality module installed for the selected module. |
| | **Personality Module Type** | This **read-only** field shows the type of personality module installed for the selected module. |
| | **Personality Module Serial Number** | This **read-only** field shows the serial number of the personality module installed for the selected module. |
| | **Personality Module Calibration Date** | This **read-only** field shows the date and time the personality module was calibrated by the factory. |
| | **PM Boot Part Number** | This **read-only** field shows part number for the boot firmware installed on the selected module.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Boot Version** | This **read-only** field shows the current boot firmware version installed on the selected module.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Boot Creation Date** | This **read-only** field shows the date and time the current boot firmware version was created.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Firmware Part Number** | This **read-only** field shows part number for the firmware installed on the selected module.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |

| Field | Description | |
|---|---|---|
| | **PM Firmware Version** | This **read-only** field shows the current firmware version installed on the selected module.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Firmware Creation Date** | This **read-only** field shows the date and time the current firmware version was created.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Firmware Description** | This **read-only** field shows a description of the firmware installed on the selected module.<br>**Note**<br>This field appears **only** for Module 1 (Main CPU). |
| | **PM Program Version** | This **read-only** field shows the version of the program installed on the selected module.<br>**Note**<br>This field appears **only** for certain modules. |

4. Select **Save** to save any changes you make to this display.

## 5.3 Firmware Update

Use this option to update the firmware on your device. The firmware update functionality is used for updates to the main CPU application firmware, as well as the firmware for any IO logic or personality modules.

**Note**

- Firmware updates and versions are audited in the Event log via the following events: Firmware Update Start, Firmware Update Complete, Firmware Apply Image Version, and Firmware Apply Package Version.
- The FB Series product continues to operate as normal while firmware is being downloaded. Once the firmware download is complete, the FB Series product goes offline, applies the downloaded firmware, and restarts.
- For a list of possible firmware update error codes and their solutions, refer to Firmware Update Error Codes.

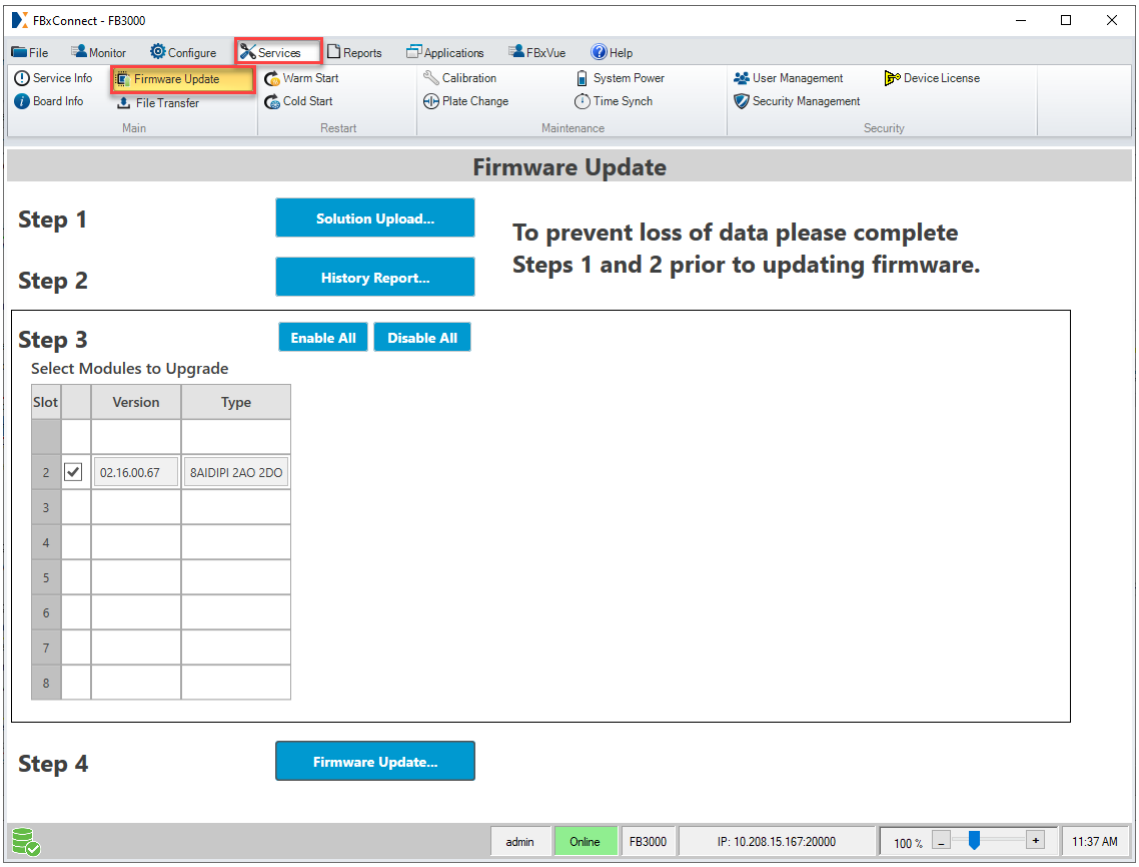
To access this screen:

1. Select **Services > Firmware Update** from the DeltaV FBxConnect configuration software main menu. The Firmware Update screen opens.

**Note**

To prevent loss of data, perform steps 1 and 2 prior to updating firmware.

**Figure 410. Firmware Update**




2. Select **Solution Upload** to save application and configuration data from your FB Series product to your PC. The Solution Upload display opens. For more information, refer to Upload Solution.

3. Select **History Report** to generate a report from the periodic history data stored in your FB Series product. The History Report display opens. For more information, refer to History Report.

4. Place a check mark next to each module slot number you want to update. Module slot numbers without a check mark will not be updated.

**Note**

The current firmware version number installed in the module and the module type are shown next to each module slot number.

5. Select **Firmware Update**. The Firmware download display opens.
6. Select **Browse...** to open a file explorer window.
7. Navigate to the location on your PC of the firmware file and select **Open**.

**Note**

DeltaV FBxConnect creates a temporary folder during the firmware update process. In certain scenarios, DeltaV FBxConnect lacks the necessary permissions to delete this temporary folder. You will receive an error message if you are updating firmware using a version that you have previously downloaded and DeltaV FBxConnect was unable to delete the temporary folder. If you receive this error, manually delete the temporary folder and try again.

**Figure 411. Firmware Update Error Message**

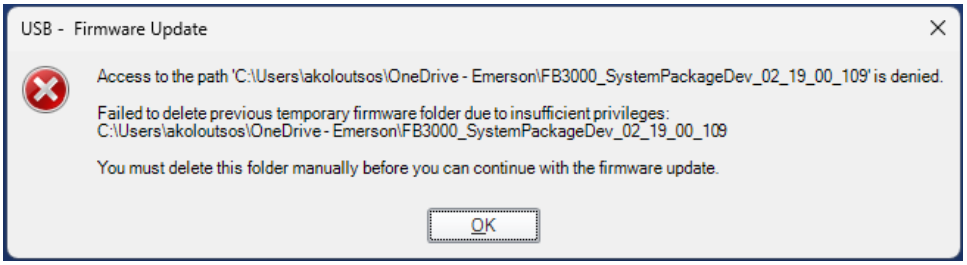
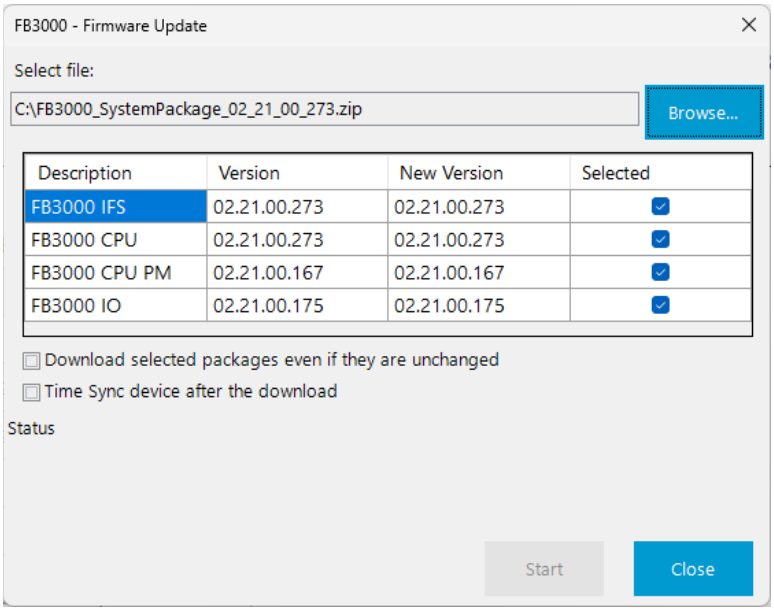
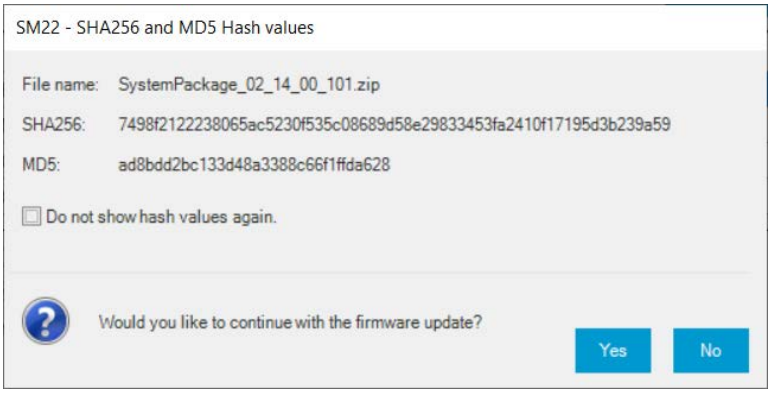


**Figure 412. Firmware Update**




8. A firmware package may contain multiple firmware components. Place a check mark in the **Selected** column of the firmware you want to download.
9. Place a check mark next to **Download even if unchanged** to update the firmware even if it is the same version already in the device.
10. Place a check mark next to **Time Synch device after the download** to synchronize the device clock with your PC clock after the firmware update is complete.
11. Select **Start** to begin the firmware update process. A dialog opens showing the SHA256 and MD5 Hash values of the firmware package.

**Figure 413. Hash Values Dialog**



12. After confirming the hash values of the package, select **Yes** to begin the firmware update. A progress bar shows you the status of the update process.

**Note**

- Place a check mark next to **Do not show hash values again** to prevent DeltaV FBxConnect configuration software from showing the hash values dialog during future firmware updates. To show this dialog again after turning it off, refer to the Settings menu in DeltaV FBxConnect Launchpad.
- A warning dialog opens if you attempt to download an older version of firmware to the FB Series device. Some features and parameters may not be present in older versions of firmware. Downgrading firmware may result in the loss of history records and configuration. Select **Yes** to continue or **No** to cancel the download. If you continue, you **must** perform a cold start and clear history after the download completes.

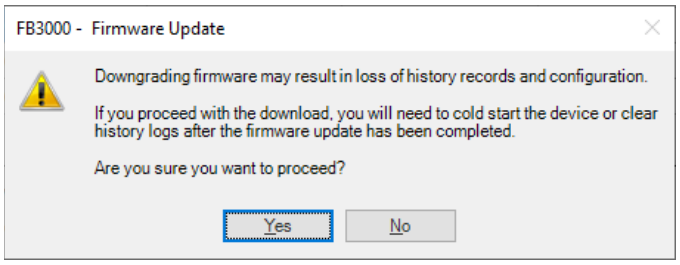
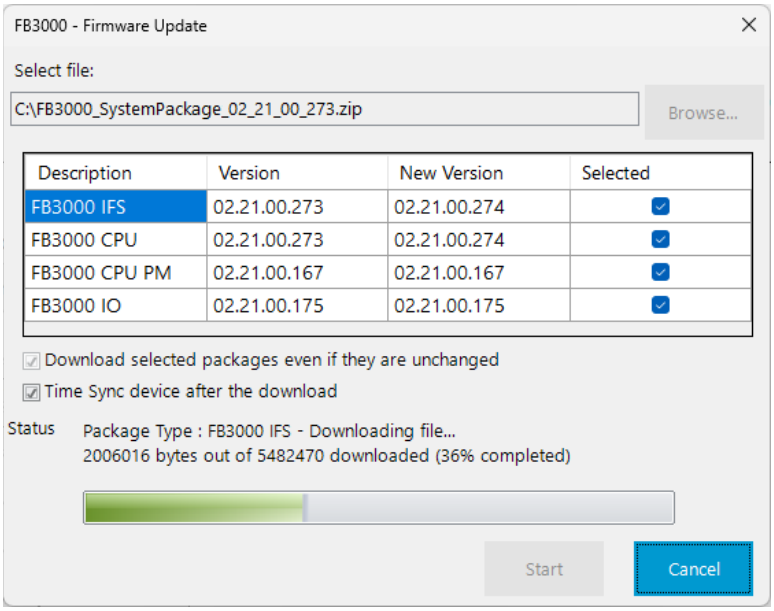
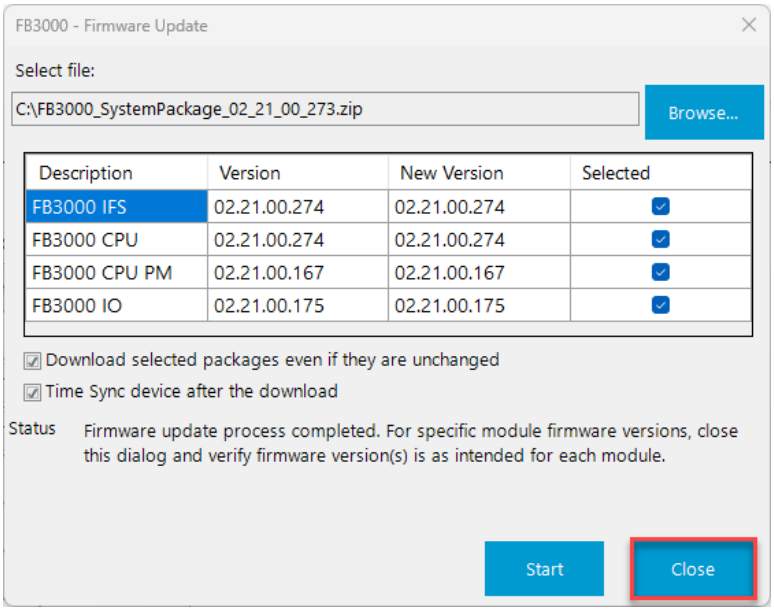



**Figure 414. Status**



13. A status message displays saying the firmware update has completed. Select **Close** to return to the Firmware Update screen.

**Figure 415. Firmware Update Completed**




## 5.3.1 Firmware Update Error Codes

An error code appears if you encounter problems updating the firmware on your FB Series product. Possible error codes and the steps you can take to correct the errors are listed below:

- **Error Code: 18 – The device has received too much data which cannot process**

  The device flash file system likely does not have sufficient space to download and manage the new firmware image. Review the contents of the flash file system for items that can be manually removed to free up more space.

- **Error Code: 206 – The CRC check of the package file has failed**

  The firmware image downloaded to the FB Series product is incorrect for the device type or has otherwise become corrupted. Contact your local Emerson representative for a new version of the file.

- **Error Code: 207 – File system error occurred during firmware update**

  There was a problem when opening or writing files on the FB Series product's flash file system. Power cycle the FB Series device to free up resources for the process to complete successfully.

**Note**

You **must** power cycle the FB Series product to restart the operating system. The operating system does not restart during a warm start or cold start.

- **Error Code: 208 – File system write failure during firmware update**

  The device flash file system likely does not have sufficient space to unzip and manage the new firmware image. Review the contents of the flash file system for items that can be manually removed to free up more space.

**Note**

You can view the status of the system database in the Database Resources fields on the Services > Service Info display.

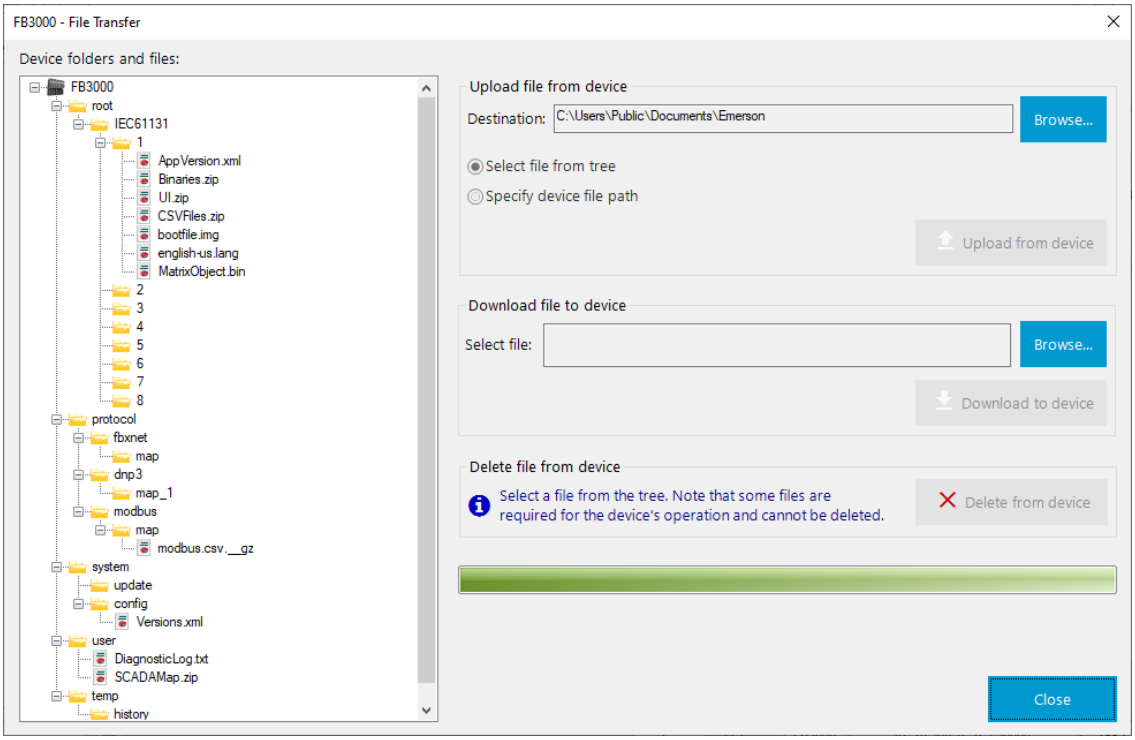
## 5.4 File Transfer

Use this pop-up display to upload a file from the FB Series product to your computer, download a file from your computer to the FB Series product, or delete a file from the FB Series product. This display is mainly used by developers to verify files that are transferred to and from the FB Series product programmatically.

To access this display:

1. Select **Services > File Transfer**. The File Transfer pop-up display opens.

**Figure 416. File Transfer**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Device folders and files** | This frame shows the file tree of the FB Series product. | |
| **Upload file from device** | Use these fields to transfer a file from your FB Series product to your computer. | |
| | **Destination** | This field shows the folder location on your computer to save the uploaded file. The default location is *C:\Users\Public\Documents\Emerson*. To choose a different folder, select **Browse** to open a Browse For Folder window and navigate to a location on your computer to save the file. |
| | **Select file from tree** | Select this radio button to choose a file to upload to your computer by selecting it from the file tree on the left side of the display. |
| | **Specify device file path** | Select this radio button to choose which file to upload to your computer by manually entering the file path. |

| Field | Description | |
|---|---|---|
| | **Upload from device** | Select this button to transfer the chosen file from you FB Series product to the destination on your computer. |
| **Download file to device** | Use these fields to transfer a file from your computer to your FB Series product. | |
| | **Select file** | This field shows the file path on your computer of the file to transfer to the FB Series product. Select **Browse** to open a window and navigate to the desired file. |
| | **Download to device** | Select this button to transfer the file specified in the Select file field from your computer to your FB Series product. |
| **Delete file from device** | Select a file from the file tree on the left side of the display and select **Delete from device** to permanently remove the file from the FB Series product.<br>**Note**<br>You cannot delete files from the FB Series product that are required for operation. | |

3. Select **Close** to exit the File Transfer pop-up display.

## 5.5 Warm Start

Use this option to force the FB Series product to perform a warm start. A warm start resets the FB Series product's processor and restarts all tasks. Database values **are not** reset to default.

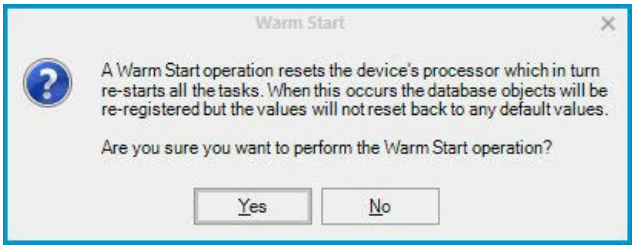
**Note**

When a warm start occurs, the system logs a **System Restart** event to the Event log. Additionally, the system logs a **System Down** event along with the number of seconds that the system was offline.

To perform a warm start:

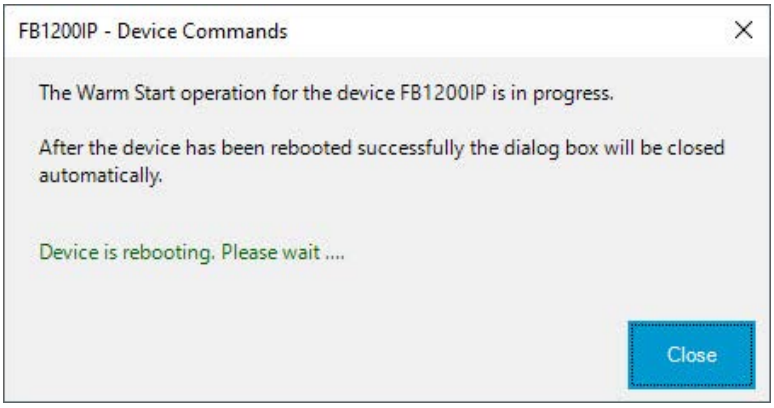
1. Select **Services > Warm Start** from the DeltaV FBxConnect configuration software main menu. A confirmation dialog displays.

**Figure 417. Warm Start Confirmation Dialog**




2. Select **Yes** to perform a warm start on the connected FB Series product. The system resets the processor and displays the following dialog.

**Figure 418. Warm Start In Progress**




3. Select **Close** and wait for the FB Series product to restart or wait for the FB Series product to restart and the dialog automatically closes.

## 5.6 Cold Start

Use this option to force the FB Series product to perform a cold start. You can configure the actions a cold start performs including clearing of alarm, event, and history logs. You can also configure if the FB Series product parameters are restored using previously saved values or reset to default values.

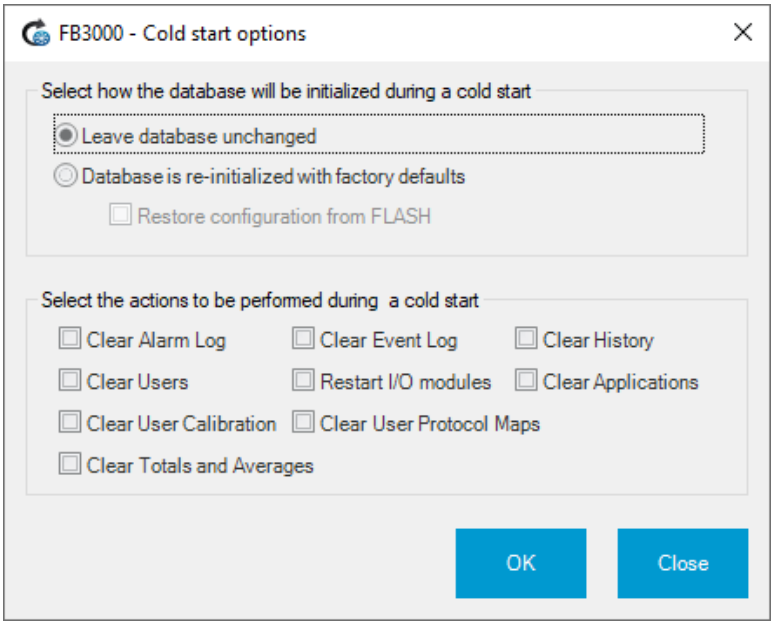
**Note**

When a cold start occurs, the system logs a **System Restart** event to the Event log. Additionally, the system logs a **System Down** event along with the number of seconds that the system was offline.

To perform a cold start:

1. Select **Services > Cold Start** from the DeltaV FBxConnect configuration software main menu. The Cold start options display opens.

**Figure 419. Cold Start Options**




2. Select the radio button next to your desired database initialization option. Possible options are:

   - **Leave database unchanged** – No changes are made to the read/write database parameters.
   - **Database is re-initialized with factory defaults** – The read/write database parameters restored to factory defaults.

     **Note**

     This option clears Alarm, Event, and History logs. It also clears any stored calibration reports, custom reports, and custom report templates.

   - **Configuration restored from FLASH** – The read/write database parameters are restored from a configuration stored in flash memory of the FB Series product.

     **Note**

     - This option is **only** available if you have previously saved a configuration file to flash memory. For more information, refer to Download to Flash.

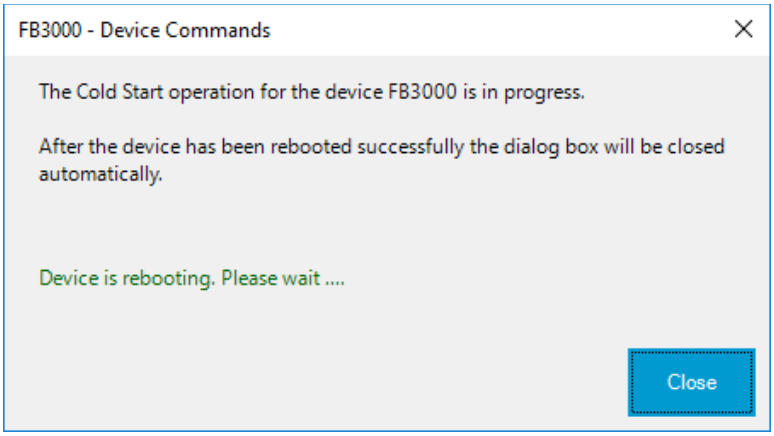
- This option restores the read/write database parameters (configuration) **only** and **not** your entire solution. For more information about what components are restored from flash memory, refer to Solution Files.

3. Place a check mark next to the additional actions you want the system to perform during the cold start. Possible options are:

   - **Clear alarm log** – Deletes all entries in the alarm log, and logs an **Alarm Clear** event to the Event log.
   - **Clear event log** – Deletes all entries in the event log, and logs an **Event Clear** event to the Event log.
   - **Clear history** – Deletes all entries in the history log, any stored custom reports, and logs a **History Clear** event to the Event log.
   - **Clear users** – Deletes all user log on information.
   - **Reset I/O modules** – Restarts the firmware in the I/O modules. Module configuration remains unchanged.
   - **Clear applications** – Removes all installed applications.
   - **Clear user calibration** – Removes any previous input point calibration and restores the factory defaults. Deletes any stored calibration reports
   - **Clear user protocol maps** – Removes any custom DNP3 or Modbus maps and restores the factory defaults.
   - **Clear Totals and Averages** – Deletes all station and meter totals and averages.

4. Select **OK** to perform the cold start using the selected options. The following dialog displays.

**Figure 420. Cold Start In Progress**



5. Select **Close** and wait for the FB Series product to restart or wait for the FB Series product to restart and the dialog automatically closes.

## 5.7 Calibration

Use the Calibration Wizard to calibrate various input points on your FB Series product, verify a current calibration, or set the zero shift. You can perform a calibration in one of two ways: By Meter and By Point. Calibration By Meter allows you to calibrate all inputs for a specific meter. Calibration By Point allows you to calibrate a specific I/O point.

The test equipment used to perform a calibration should be at least three times more accurate than the device being calibrated. You may actually achieve better results with the factory default calibration, rather than narrowing the calibrated span using equipment that is only accurate to +/- 1%.

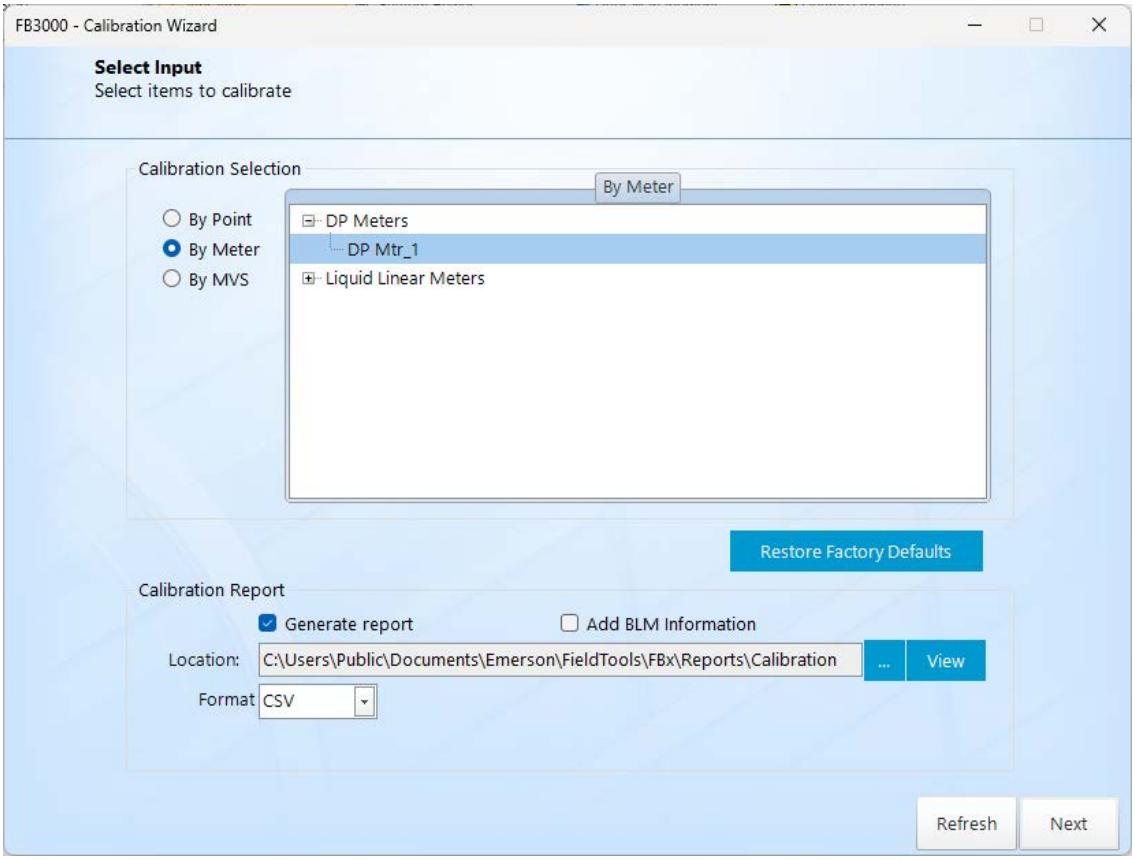
In some instances, it may be more meaningful to simply verify an existing calibration instead of performing a complete calibration. If the existing calibration is good, then there is no need to spend unnecessary time and risk replacing a good calibration with a bad calibration.

**Note**

- The default location for calibration reports is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Calibration*.
- Often, performing a zero shift will account for out of tolerance readings and a full calibration is **not** required.
- If the input you want to select **does not** show in the Calibration Selection field, select the **Refresh** button to rescan your FB Series product for all available inputs.

To open the Calibration Wizard, select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard displays.

**Figure 421. Calibration Wizard**




For more information, refer to the following topics:

BLM Required Information – Configure information included on calibration reports required by the Bureau of Land Management (BLM).

Calibrating Inputs – Calibrate analog inputs, static pressure inputs, differential pressure inputs, and remote temperature devices.

Verifying a Calibration – Verify the calibration for analog inputs, static pressure inputs, differential pressure inputs, and remote temperature devices.

Setting Zero Shift – Use the Zero Shift to set a value (offset) to compensate for any slight errors in your input readings.

Resetting a Calibration – Use this option to clear a previous calibration and restore the factory defaults.

Viewing a Calibration Report – Follow these steps to view a previously generated calibration report.

Calibration Errors – Possible errors you may encounter during the calibration process.

## 5.7.1 BLM Required Information

Use this pop-up display to configure information included on calibration reports required by the Bureau of Land Management (BLM). DeltaV FBxConnect configuration software stores BLM information on your PC, and unique BLM information is associated with each device connection in DeltaV FBxConnect Launchpad. If the BLM information is similar between device connections, you can copy information associated with a device connection into the current calibration report.

**Note**

For more information about device connections, refer to the "Using the Connections List Pane" topic in DeltaV FBxConnect Launchpad's online help file.

To access this display:

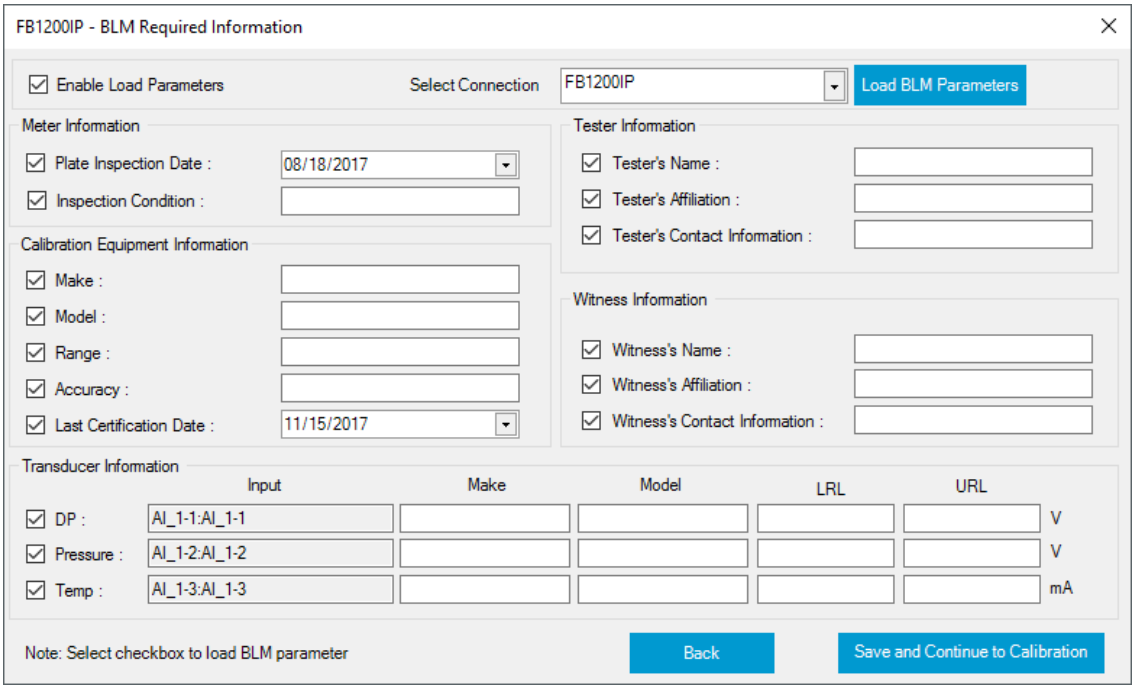
1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu.
2. Select the **By Meter** radio button and select the meter you wish to calibrate.
3. Place a check mark next to **Generate report** in the Calibration Report frame to have DeltaV FBxConnect configuration software create a calibration report that details the calibration results.
4. Place a check mark next to **Add BLM Information** in the Calibration Report frame to have DeltaV FBxConnect configuration software include Bureau of Land Management information on the calibration report.

   **Note**

   This option shows **only** if you select **By Meter** in the Calibration Selection field.

5. Select **Next**. The BLM Required Information display opens.

**Figure 422. BLM Required Information**




**6.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Enable Load Parameters** | Select this checkbox to enable the Select Connection drop-down, the Load BLM Parameters button, and checkboxes next to each field to be copied from BLM information associated with a device connection to this calibration report.<br>**Note**<br>To enable this checkbox, you **must** have previously created a calibration report containing BLM information on this PC for the device. |
| **Select Connection** | Select ▼ to choose a device connection associated with the BLM information you want to copy to the current calibration report.<br>**Note**<br>For information to be successfully copied from a device connection, you **must** have previously created a calibration report containing BLM information on this PC for the device you select in the Select Connection drop-down. |

| Field | Description |
|---|---|
| **Load BLM Parameters** | Select to copy BLM information associated with the device connection you select in the Select Connection drop-down to the current calibration report.<br>**Note**<br>For information to be successfully copied from a device connection, you **must** have previously created a calibration report containing BLM information on this PC for the device you select in the Select Connection drop-down. |
| **Meter Information** | Enter information about the meter being inspected. |
| **Calibration Equipment Information** | Enter information about the equipment used in the calibration process. |
| **Tester Information** | Enter information about the person who is performing the calibration process. |
| **Witness Information** | Enter information about the person who is observing the calibration process. |
| **Transducer Information** | Enter information about the differential pressure, static pressure, and temperature sensors.<br>**Note**<br>The LRL (Lower Range Limit) and URL (Upper Range Limit) columns display **only** if you select analog inputs for use as meter inputs. |

7. Select **Save** to save any changes you make to this pop-up display.

## 5.7.2 Calibrating Inputs

Follow these steps to calibrate analog inputs, static pressure inputs, differential pressure inputs, and remote temperature devices. During the calibration process, you can create a calibration report to keep a record of your calibration. The default location for calibration reports is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Calibration*.

**Note**

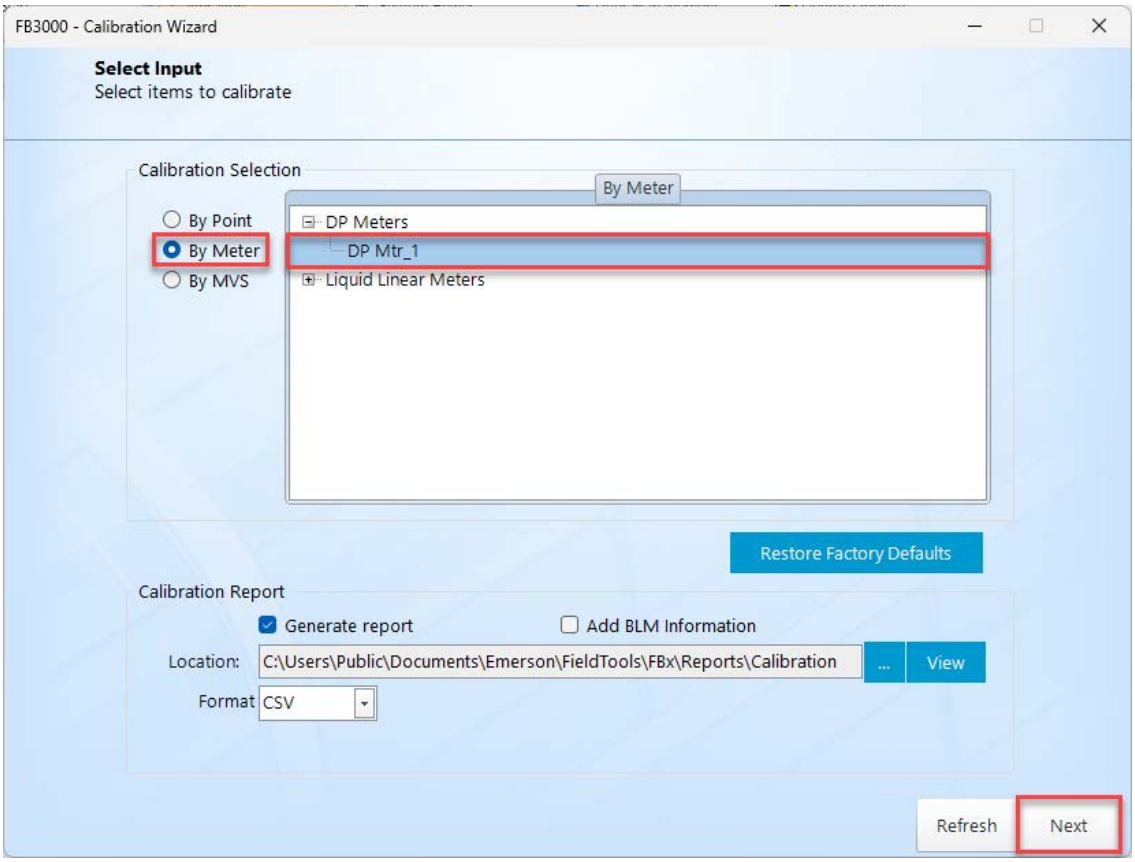
- Performing a calibration clears the current zero shift setting.
- You cannot calibrate a Rosemount™ 4088B MultiVariable™ Transmitter if the Transmitter Security switch on the device is enabled.

- HART inputs **only** support freezing and unfreezing the input value.
- The Rosemount™ 4088B MultiVariable™ Transmitter provides range checking on input values. The calibration process fails if the input values deviate to an extent that would degrade sensor performance. Use an input source that is at least three times more accurate than the transmitter and allow the input to stabilize for 10 seconds before entering any values.
- If you have a Rosemount™ 4088B MultiVariable™ Transmitter and click **Cancel** at any time during the calibration process, you must start the calibration process over from the beginning.
- If you still have trouble calibrating a Rosemount™ 4088B MultiVariable™ Transmitter, power cycle the transmitter and try the calibration again.

To calibrate an input:

1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard opens.

**Figure 423. Calibration Wizard**



2. In the Calibration Selection field, select **By Meter** to group all inputs together for a specific meter, **By Point** to group all inputs together by input type, or **By MVS** to group inputs by 4088 instance.

---

**Note**

- The process is the same for each Calibration Selection option. The only difference is how each input is grouped. This example shows **By Meter** in the Calibration Selection field.
- If the input you want to select **does not** show in the Calibration Selection field, select the **Refresh** button to rescan your FB Series product for all available inputs.
- If you select **By Meter** in the Calibration Selection field, select a meter and the system automatically selects the meter inputs.
- If you select **By Point** in the Calibration Selection field, place a check mark next to one or more inputs.
- If you select **By MVS** in the Calibration Selection field, select the communications port connected to the MVS and select the 4088 instance. The system automatically selects the inputs of the 4088 instance.

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3. Select ⊞ next to the type of meter you want to calibrate to show all available meters of that type.
4. Select a meter to calibrate.
5. Place a check mark next to **Generate report** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to create a calibration report.
6. Place a check mark next to **Add BLM Information** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to include Bureau of Land Management information on the calibration report.

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**Note**

This option shows **only** if you select **By Meter** in the Calibration Selection field.

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7. Select a format for the generated report in the **Format** field. Possible options are CSV or PDF.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the Secure PDF box and entering a password.

8. The calibration report is saved to a default location on your PC. If you want to save the report to a different location, select **Browse** and navigate to your desired location.

**Note**

DeltaV FB3000 RTUs with firmware version 2.15 or later also save CSV versions of the previous five calibration reports to internal memory. The reports are stored in the "/user/calibration" folder using the following naming convention: Calibration_Report_D[YYYYMMDD]-T[hhmmss].csv.

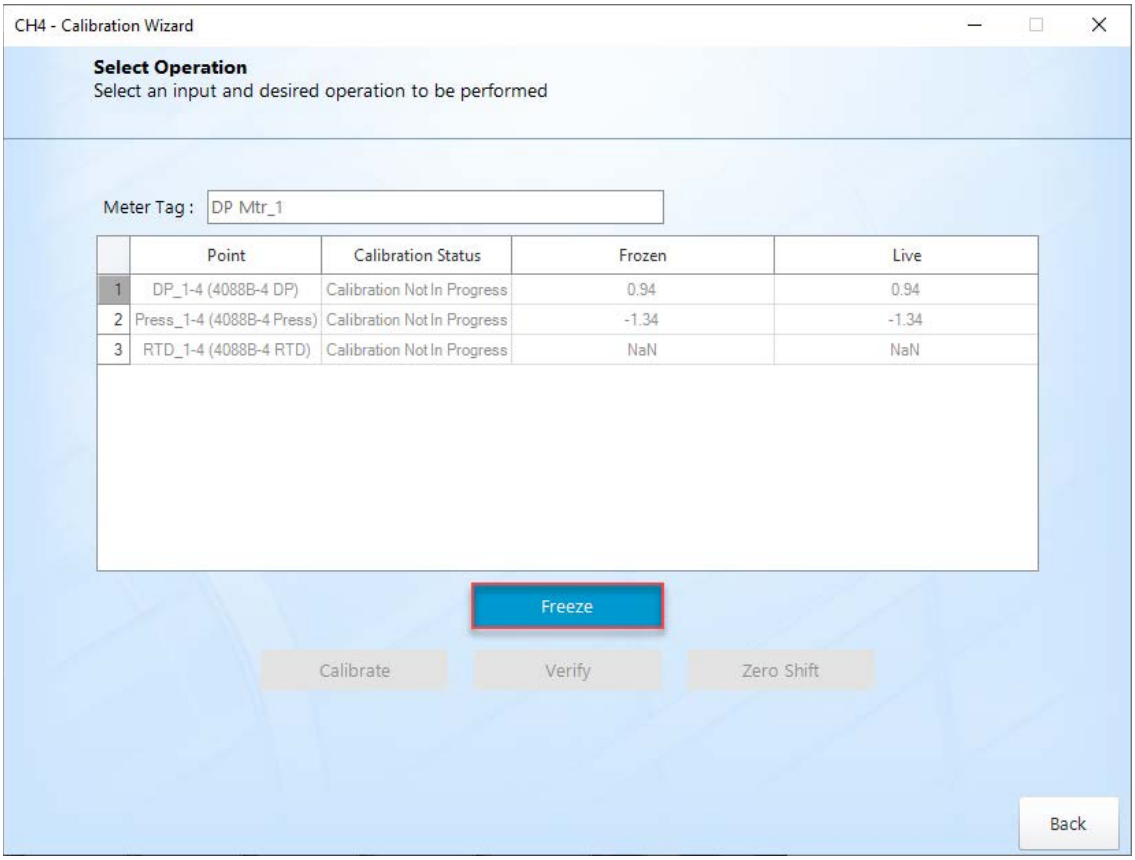
9. Select **View** to open a saved calibration report. This is useful to compare previous calibration values against the current values.
10. Select **Next**.
11. If you selected BLM Info option, enter the required BLM information and select **Save and Continue to Calibration**.

**Note**

For more information, refer to BLM Required Information.

12. The Calibration Wizard shows all inputs associated with the selected meter (or the selected channel).

**Figure 424. Freeze**

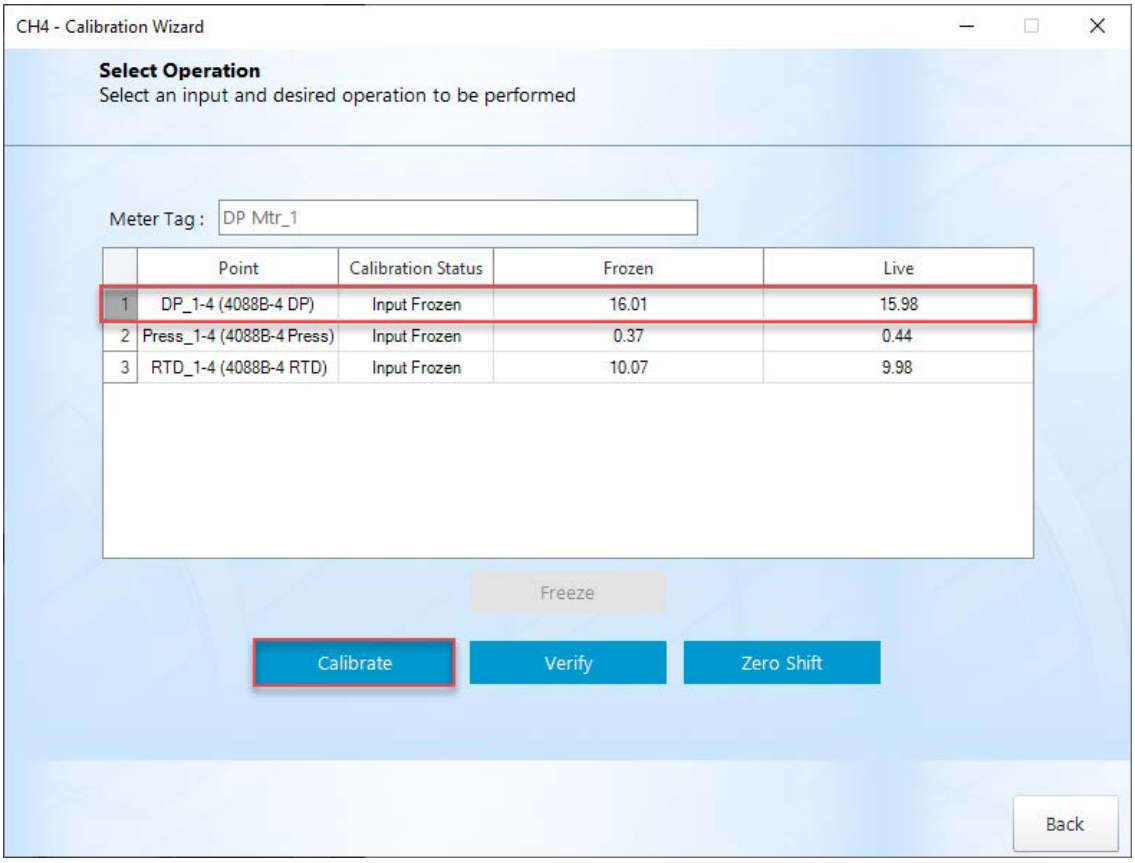



13. Select **Freeze** to freeze all inputs listed in the table and stop the values from being updated during the calibration process.

**Note**

If you selected the BLM Report option, select **Modify BLM Info** to open the BLM Required Information display and revise any report information.

**Figure 425. Calibrate**



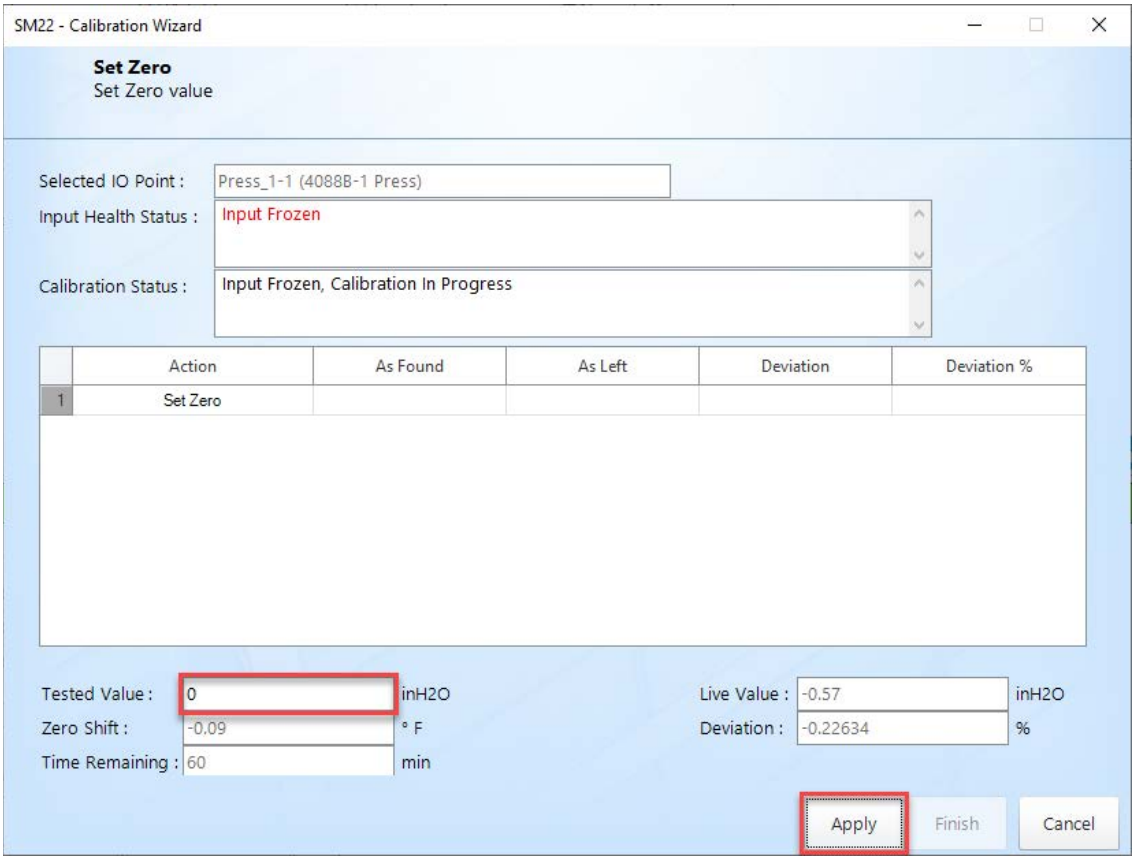

14. Select the input you want to calibrate and select **Calibrate**.
15. For the selected input, disconnect the field sensor and connect a decade box (or comparable equipment) to the terminals of the device.

**Note**

You can also use a pocket current source or another deadweight test input source to test this value.

16. Set the test equipment to produce a value equal to zero.
17. Enter the value produced by the test equipment in the **Tested Value** field and select **Apply**.

**Figure 426. Set Zero**



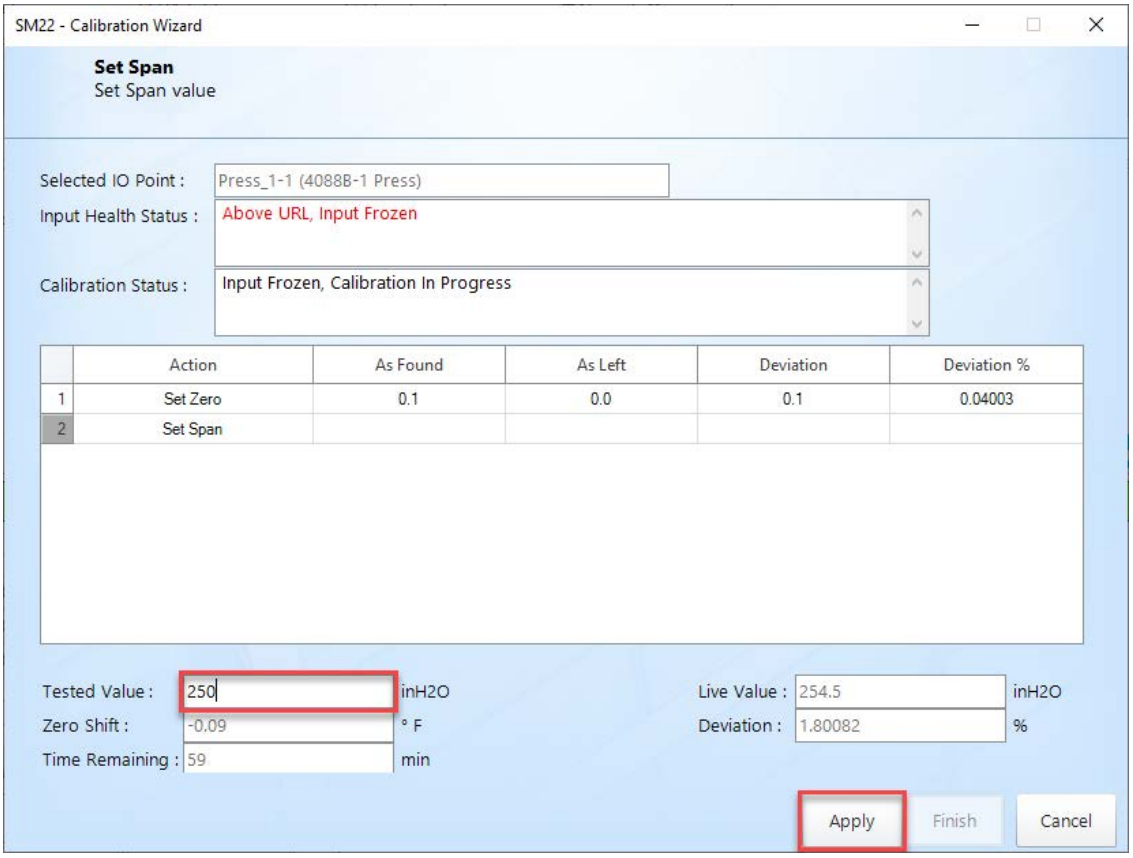

| Field | Description | |
|---|---|---|
| **Selected I/O Point** | This **read-only** field shows the name of the currently selected input. | |
| **Calibration Status** | This **read-only** field shows the current calibration status. | |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected channel. | |
| **Action Grid** | This grid reflects the calibration commands that have been performed on the selected input. | |
| | **Action** | Indicates the current action and shows any previous actions you have taken. |
| | **As Found** | This **read-only** field shows the value of the input before any adjustments have been applied. |
| | **As Left** | This **read-only** field shows the value entered in the **Tested Value** field. |

| Field | Description | |
|---|---|---|
| | **Deviation** | This **read-only** field shows the amount of deviation between the **As Found** and **As Left** values. |
| | **Deviation %** | This **read-only** field shows a percentage deviation between the **As Found** and **As Left** values. |
| **Tested Value** | Enter the value produced by the test equipment. | |
| **Live Value** | This **read-only** field shows the current value of the input. | |
| **Zero Shift** | This **read-only** field shows the current Zero Shift value applied to the input. | |
| **Deviation** | This **read-only** field shows a percentage deviation between the **Tested Value** and **Live Value** fields. | |
| **Apply** | Select to log the value entered in the **Tested Value** field. | |
| **Finish** | Select to end the current calibration process. | |
| **Cancel** | Select to exit the Calibration Wizard and restore the previous calibration. | |

**18.** Set your test equipment to produce a value for the span.

**19.** Enter the value produced by the test equipment and select **Apply**.

**Figure 427. Set Span**

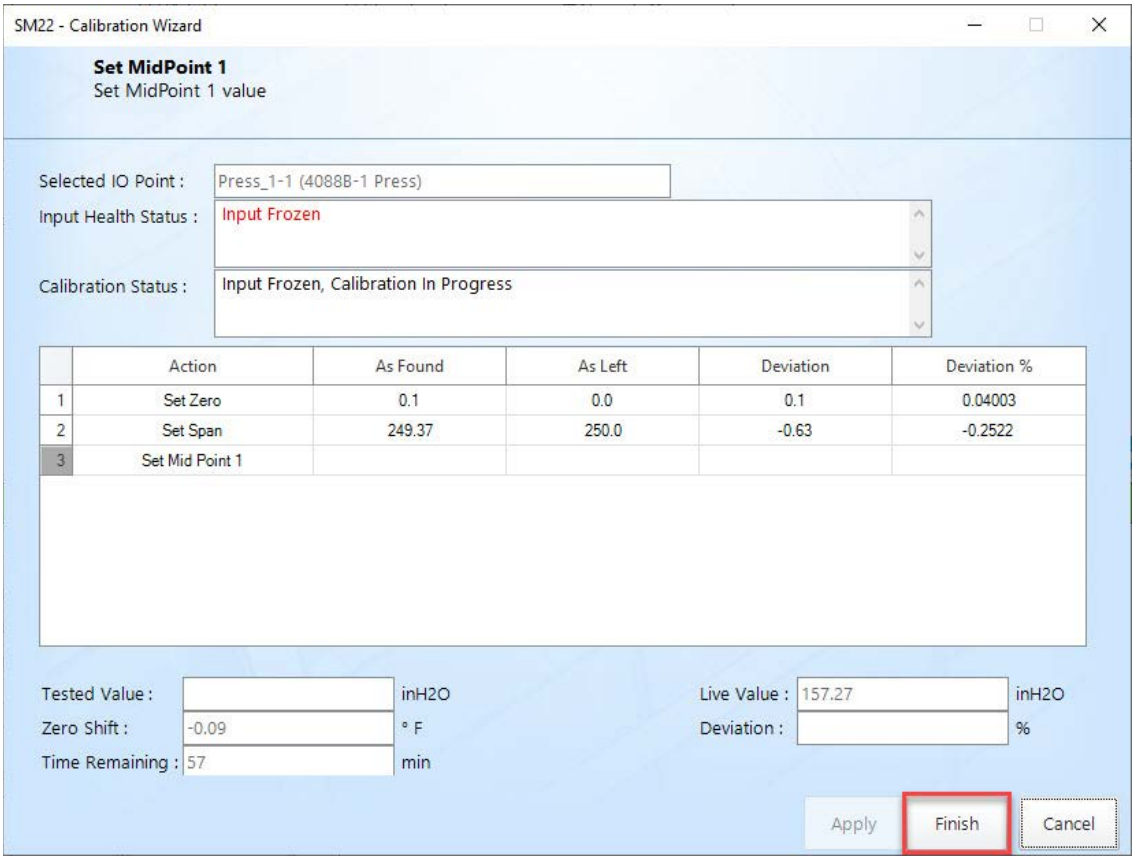



**Note**

A calibration requires only two points (zero and span). Your organization determines whether additional points (up to five) are necessary for a calibration.

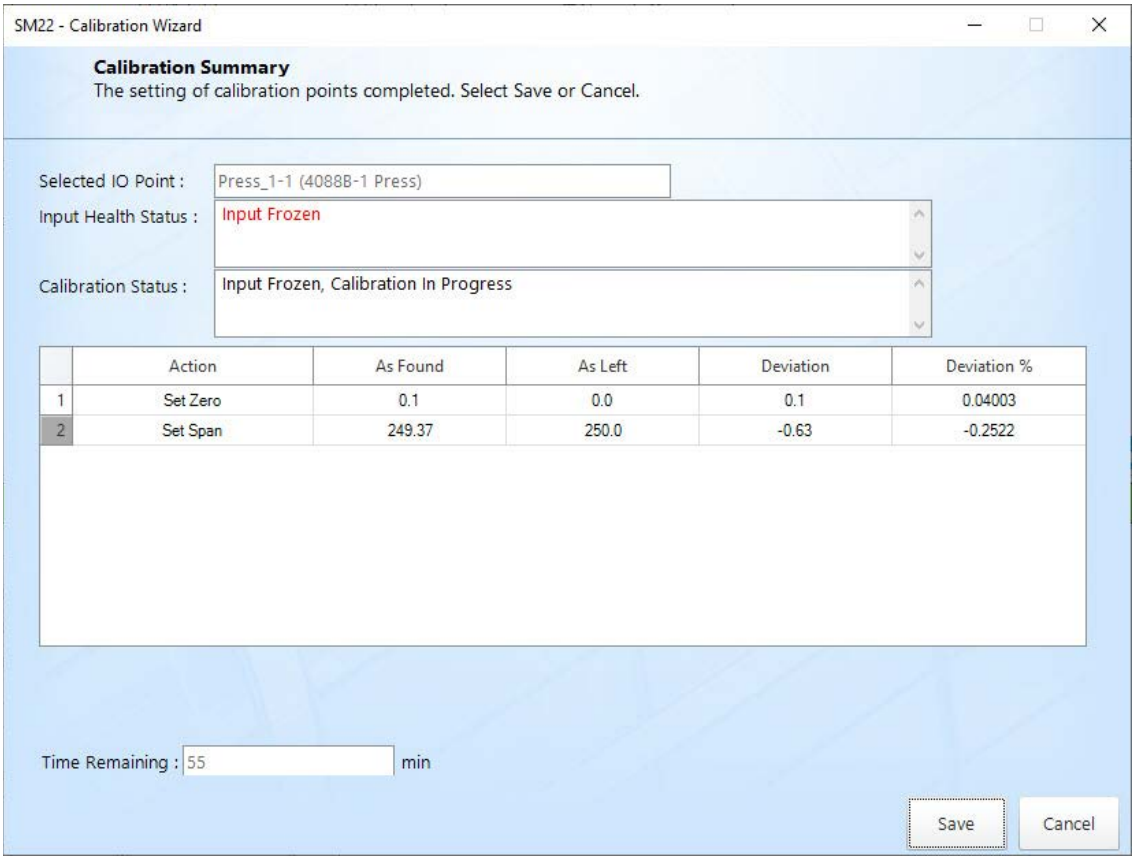
**20.** After you are done entering midpoint values, select **Finish**.

**Figure 428. Set Midpoint 1**



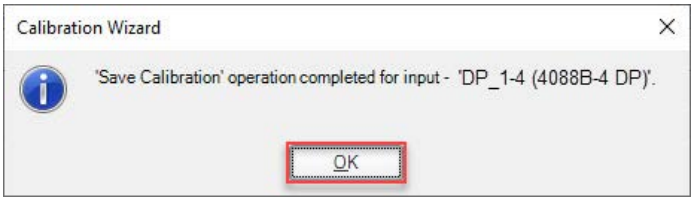

**21.** Select **Save** if you are satisfied with the calibration.

**Figure 429. Calibration Summary**



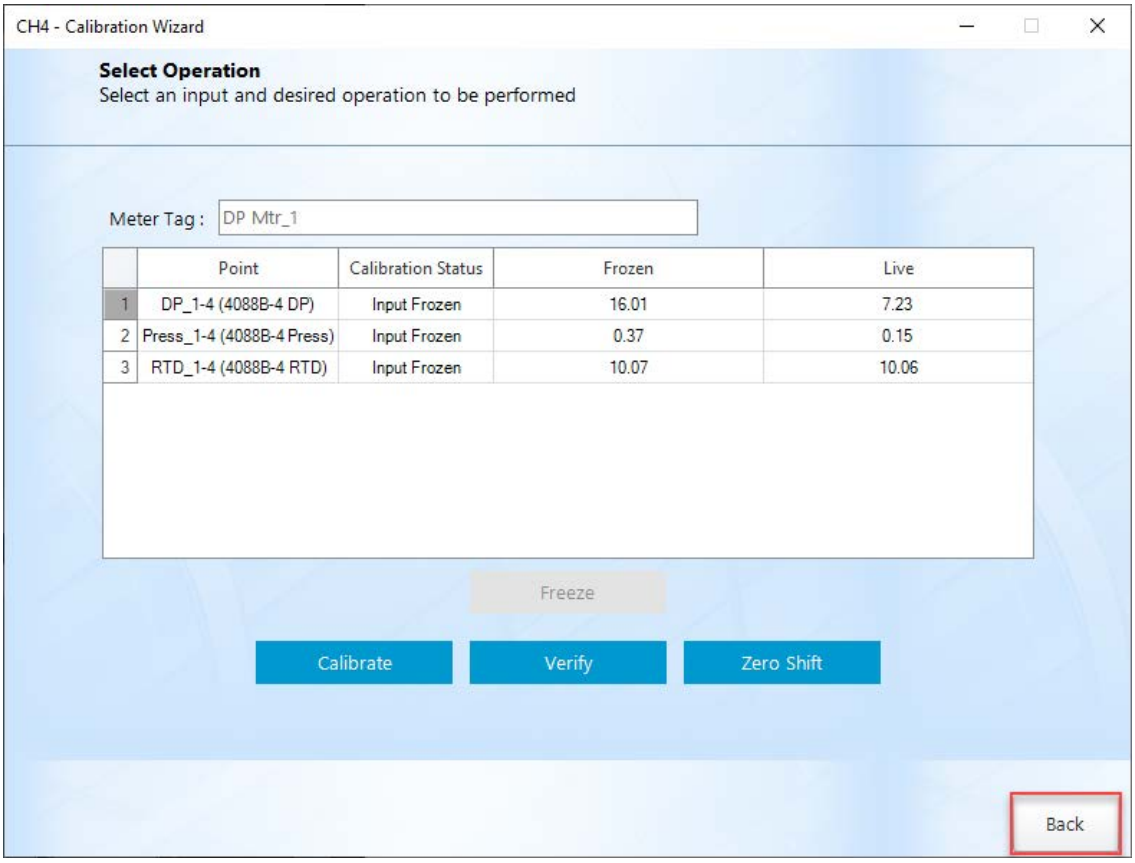

**22.** Select **OK** to close the dialog and return to the Select Operation display.

**Figure 430. Calibration Completed**



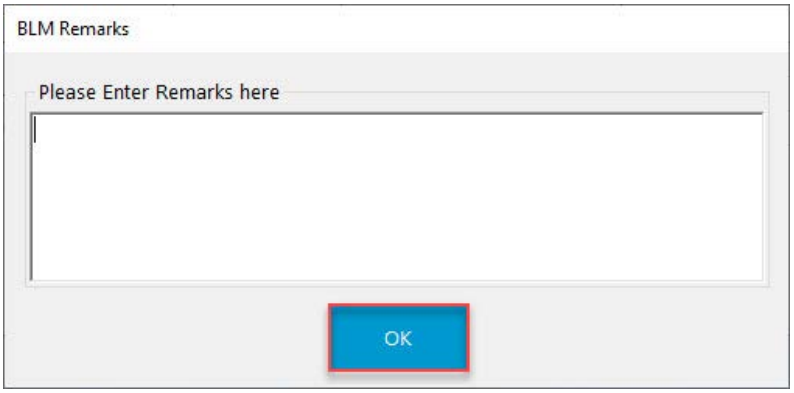

**23.** You can now perform a verification (Verifying a Calibration) or set the offset (Setting Zero Shift) of the input. Select **Back** to exit the Calibration Wizard.

**Figure 431. Calibration Wizard**




**24.** If you selected to include BLM Info on your calibration report, a BLM Remarks display opens. Enter any additional information to be included in the report.

**Figure 432. BLM Remarks**




**25.** Select **OK** when you are finished to create your calibration report.

## 5.7.3 Verifying a Calibration

Use this process to verify that the input is within operating limits. Typically, you verify the same points you calibrate. Temperature might be an example (–100, 200, 50). For each test point, you set your test equipment to produce a certain value, enter that value in the Tested Value field, wait for the live input to stabilize, and then log the value. You can verify up to seven verification points.

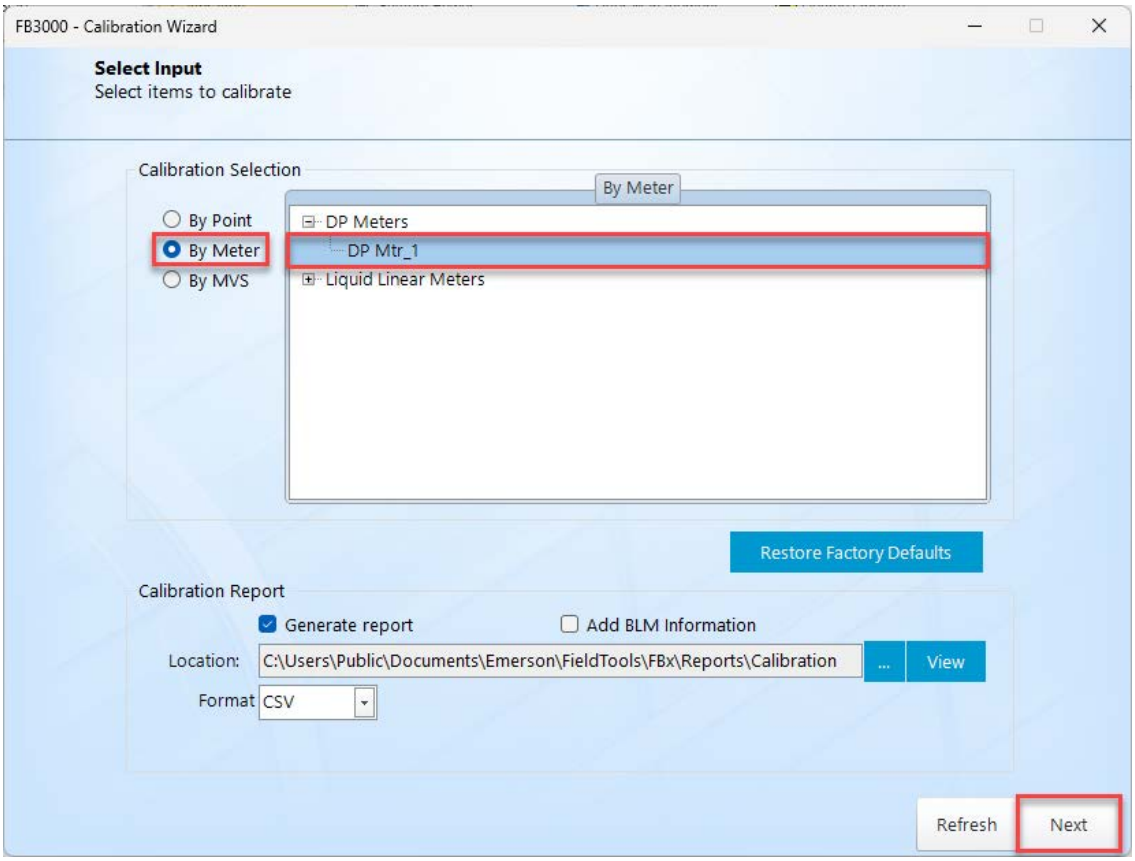
**Note**

If the value is incorrect, calibrate the input.

To verify an input:

1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard displays.

**Figure 433. Calibration Wizard**



2. In the Calibration Selection field, select **By Meter** to group all inputs together for a specific meter, **By Point** to group all inputs together by input type, or **By MVS** to group inputs by 4088 instance.

**Note**

- The process is the same for each Calibration Selection option. The only difference is how each input is grouped. This example shows **By Meter** in the Calibration Selection field.
- If the input you want to select **does not** show in the Calibration Selection field, select the **Refresh** button to rescan your FB Series product for all available inputs.
- If you select **By Meter** in the Calibration Selection field, select a meter and the system automatically selects the meter inputs.
- If you select **By Point** in the Calibration Selection field, place a check mark next to one or more inputs.
- If you select **By MVS** in the Calibration Selection field, select the communications port connected to the MVS and select the 4088 instance. The system automatically selects the inputs of the 4088 instance.

3. Select ⊞ next to the type of meter you want to calibrate to show all available meters of that type.
4. Select a meter to calibrate.
5. Place a check mark next to **Generate report** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to create a calibration report.
6. Place a check mark next to **Add BLM Information** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to include Bureau of Land Management information on the calibration report.

**Note**

This option shows **only** if you select **By Meter** in the Calibration Selection field.

7. Select a format for the generated report in the **Format** field. Possible options are CSV or PDF.

**Note**

If you select **PDF**, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

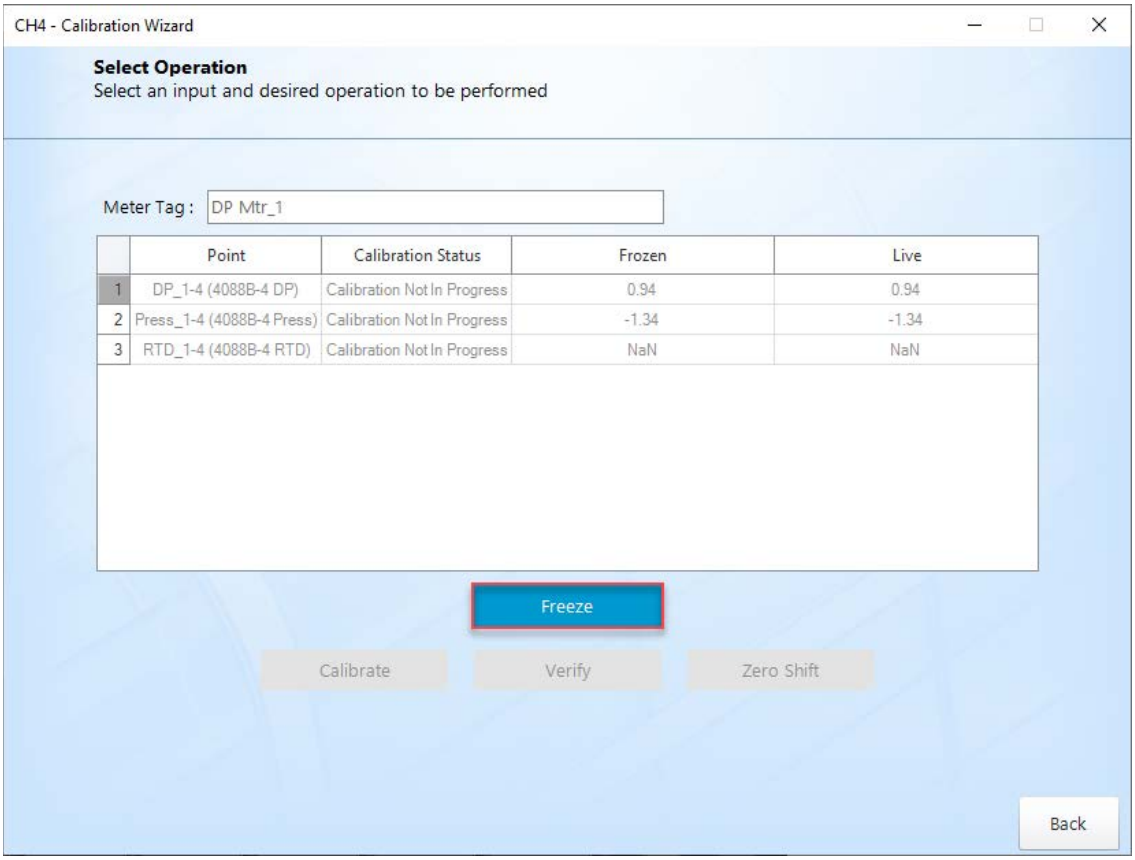
8. The calibration report is saved to a default location on your PC. If you want to save the report to a different location, click **Browse** and navigate to your desired location.
9. Select **View** to open a saved calibration report. This is useful to compare previous calibration values against the current values.
10. Click **Next**.
11. If you selected BLM Info option, enter the required BLM information and select **Save and Continue to Calibration**.

**Note**

For more information, refer to BLM Required Information.

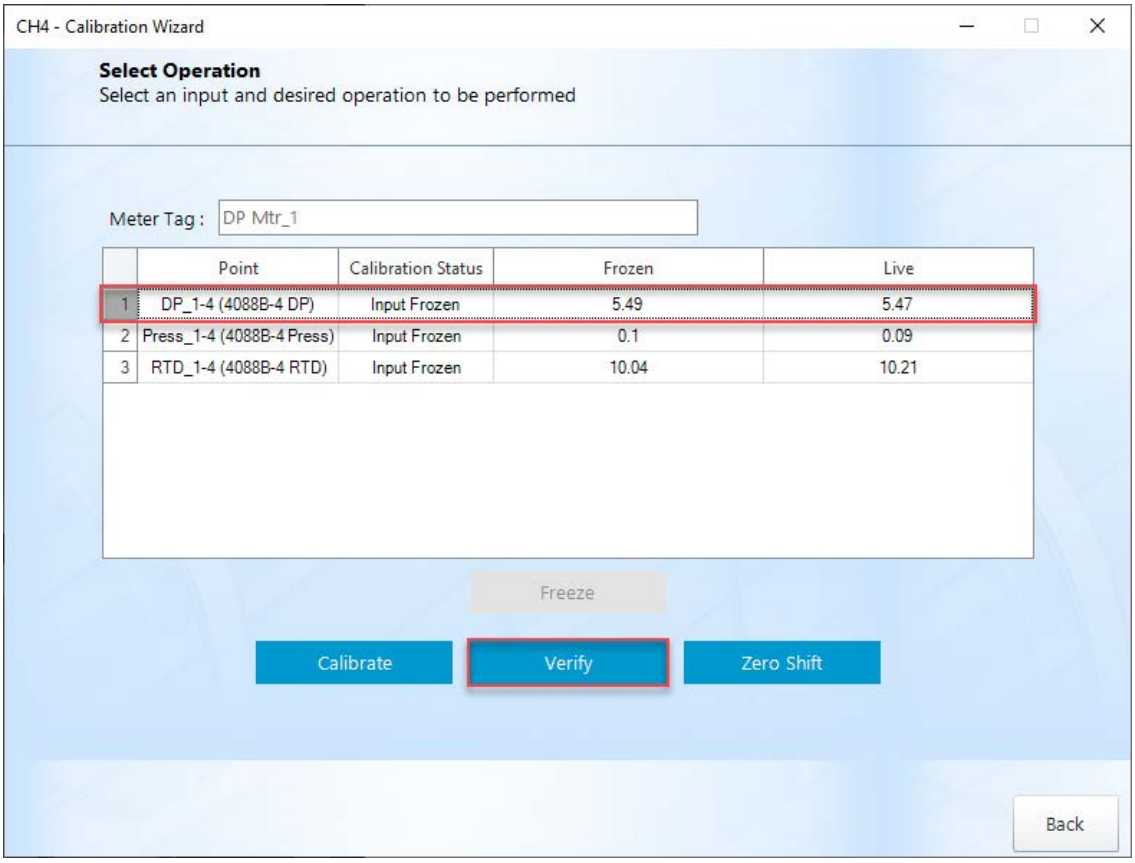
12. The Calibration Wizard displays all inputs associated with the selected meter.

**Figure 434. Freeze**



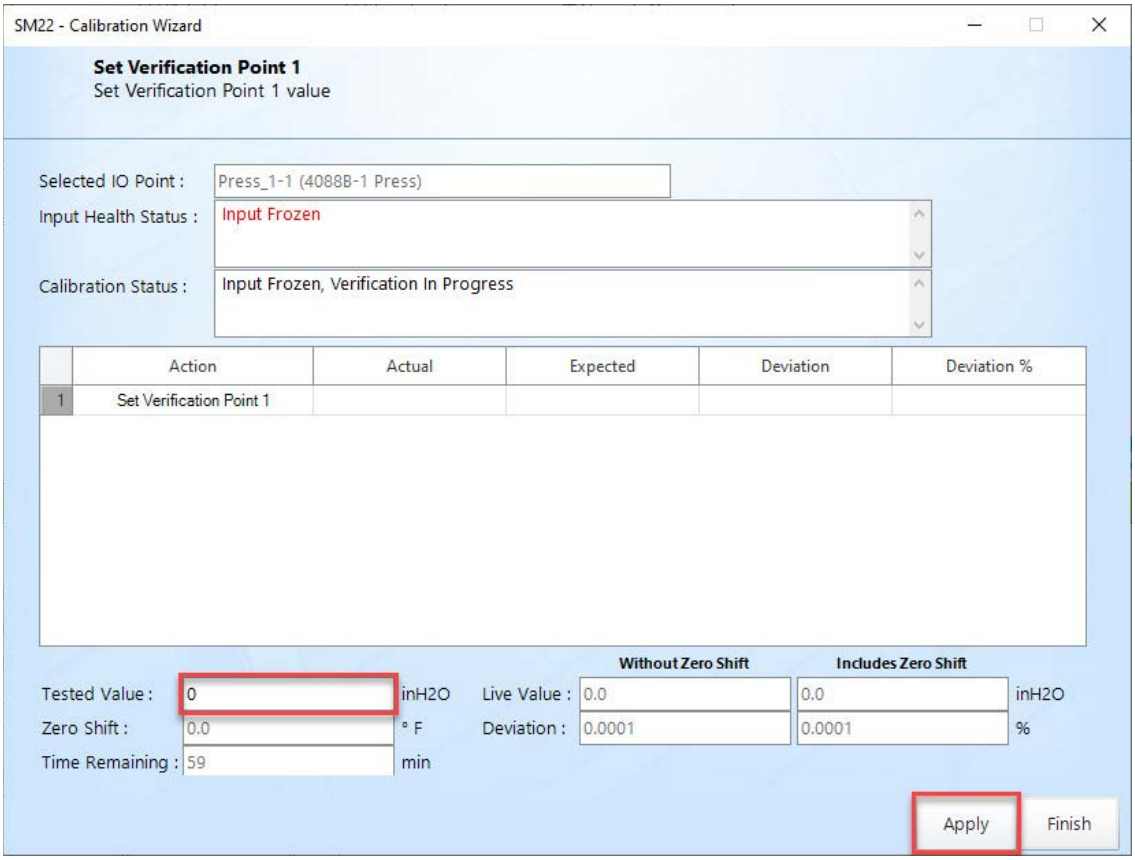

**13.** Select **Freeze** to stop the values from being updated during the calibration process.

**Figure 435. Verify**




**14.** Select the input you want to verify and select **Verify**.

**Figure 436. Set Verification Point 1**



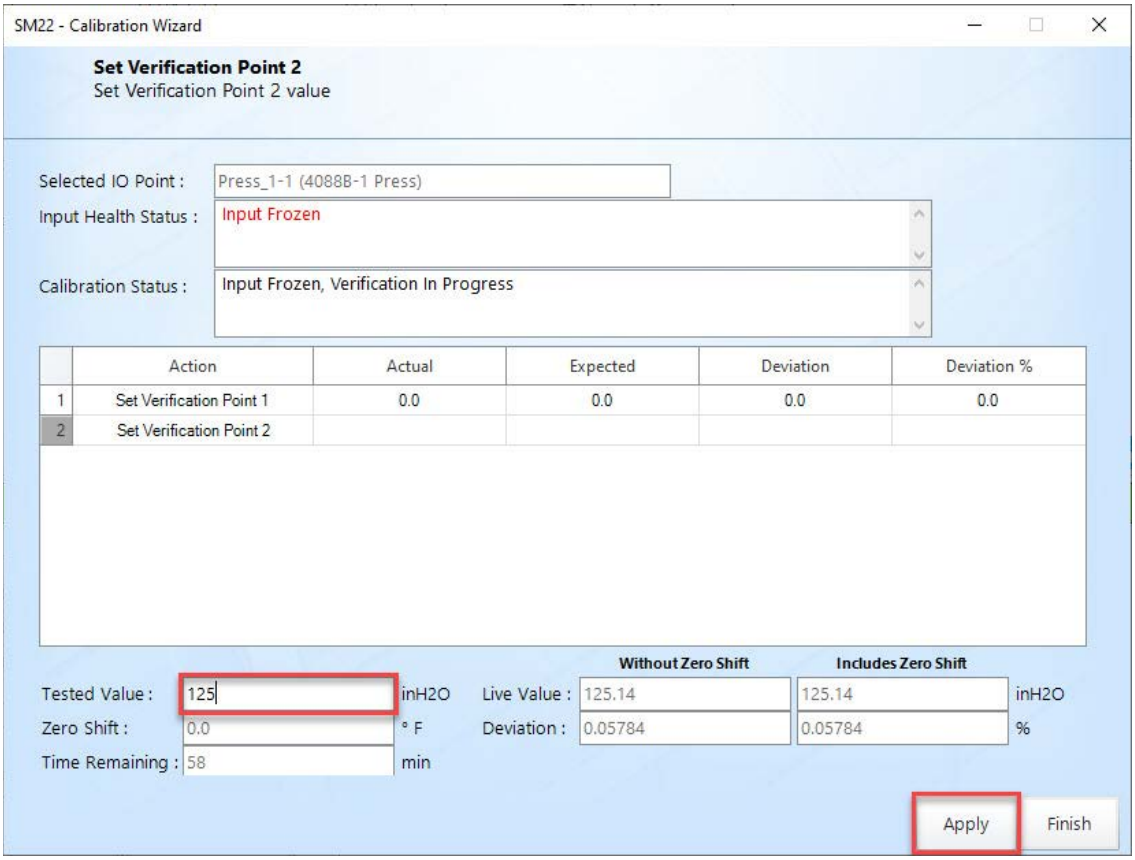

| Field | Description | |
|---|---|---|
| **Selected I/O Point** | This **read-only** field shows the name of the currently selected input. | |
| **Calibration Status** | This **read-only** field shows the current calibration status. | |
| **Input Health Status** | This **read-only** field shows the current operating status of the selected channel. | |
| **Action Grid** | This grid reflects the calibration commands that have been performed on the selected input. | |
| | **Action** | Indicates the current action, and shows any previous actions you have taken. |
| | **Expected** | This **read-only** field shows the value of the input before any adjustments have been applied. |
| | **Actual** | This **read-only** field shows the value entered in the **Tested Value** field. |

| Field | Description | |
|---|---|---|
| | **Deviation** | This **read-only** field shows the amount of deviation between the **As Found** and **As Left** values. |
| | **Deviation %** | This **read-only** field shows a percentage deviation between the **As Found** and **As Left** values. |
| **Tested Value** | Enter the value produced by the test equipment. | |
| **Live Value** | This **read-only** field shows the current value of the input both with and without the Zero Shift applied. | |
| **Zero Shift** | This **read-only** field shows the current Zero Shift value applied to the input. | |
| **Deviation** | This **read-only** field shows a percentage deviation between the **Tested Value** and **Live Value** fields both with and without the Zero Shift applied. | |
| **Apply** | Click to log the value entered in the **Tested Value** field. | |
| **Finish** | Click to end the current calibration process. | |
| **Cancel** | Click to exit the Calibration Wizard and restore the previous calibration. | |

**15.** Set the test equipment to produce a value equal to the desired verification point.

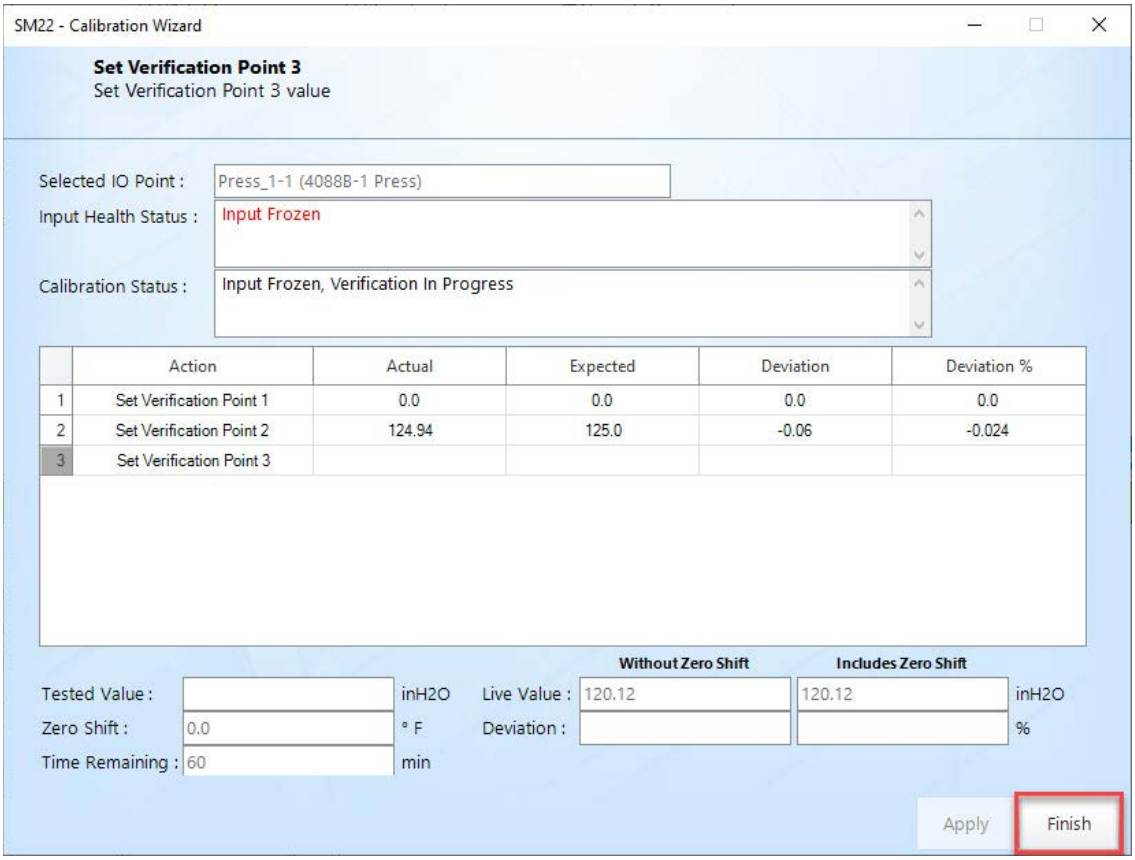
**16.** Enter the value produced by the test equipment and click **Apply**.

**Figure 437. Set Verification Point 2**



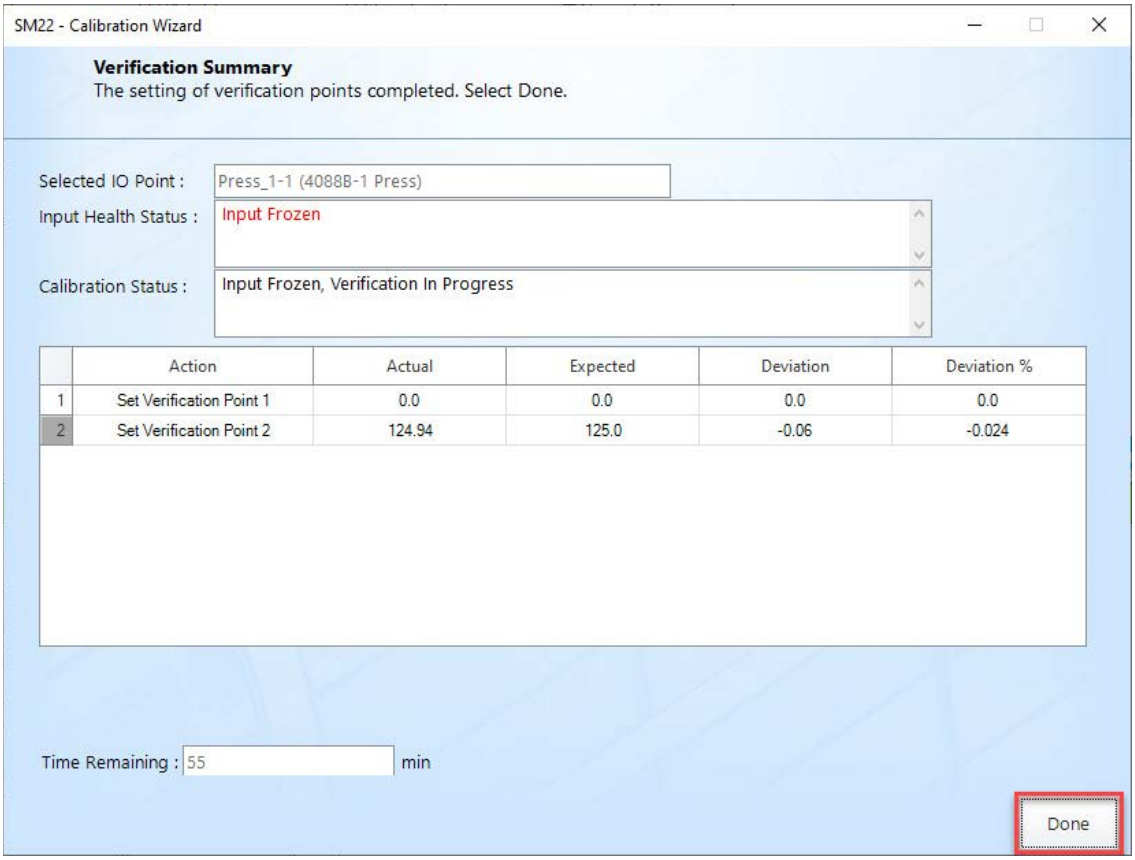

**17.** Repeat the previous two steps for as many verification points as are required

**Figure 438. Finish**



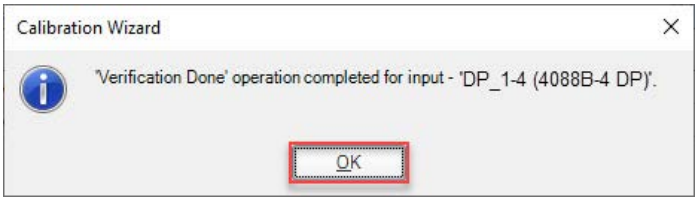

**18.** After you are done entering verification points, click **Finish**. A summary of the verification displays.

**Figure 439. Verification Summary**




**19.** Click **Done** to exit the Calibration Wizard.

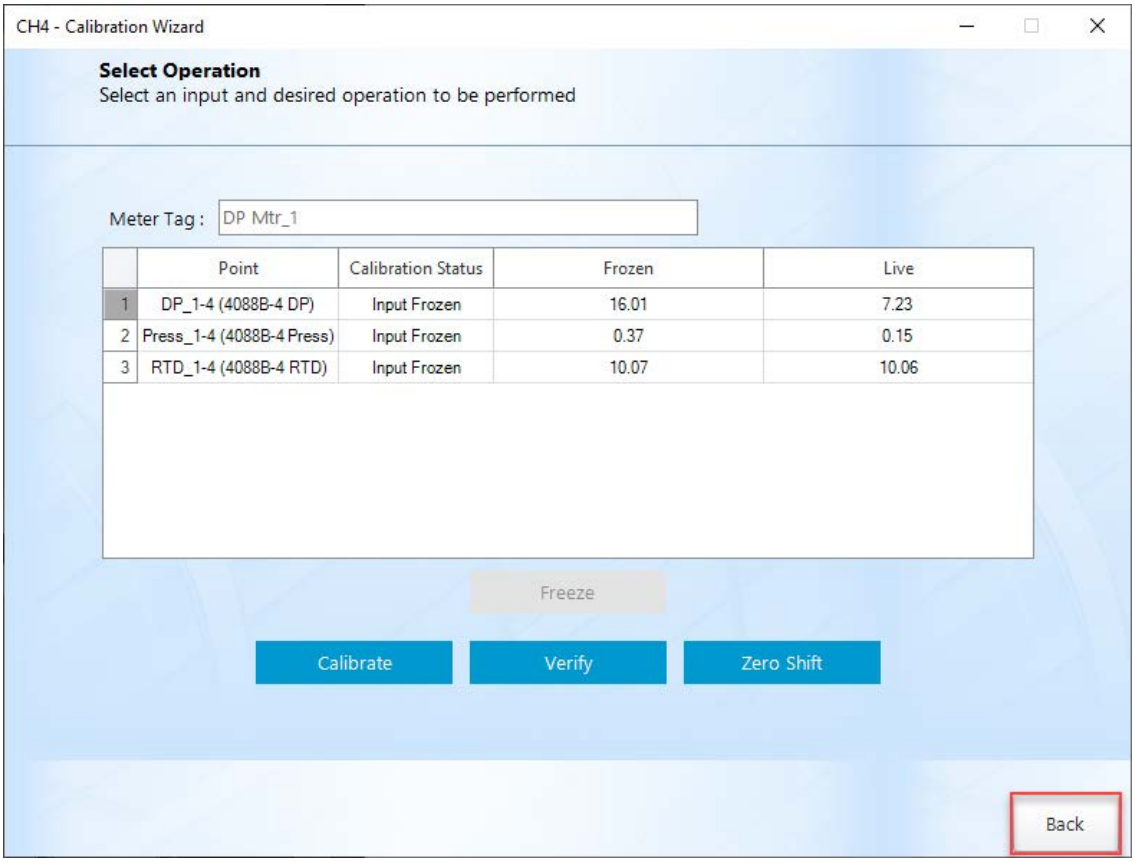
**Figure 440. Verification Confirmation**




**20.** Click **OK** to exit the dialog to return to the Select Operation display.

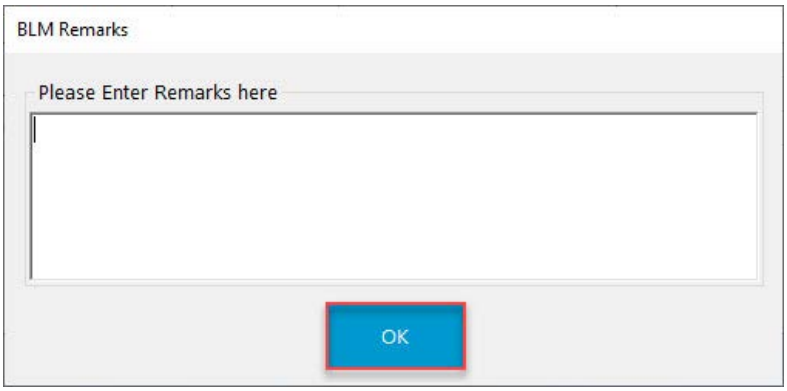
**21.** You can now perform a new calibration (Calibrating Inputs) or set the offset (Setting Zero Shift) of the input. Select **Back** to exit the Calibration Wizard.

**Figure 441. Calibration Wizard**




**22.** If you selected to include BLM Info on your calibration report, a BLM Remarks display opens. Enter any additional information to be included in the report.

**Figure 442. BLM Remarks**




**23.** Select **OK** when you are finished to create your calibration report.

## 5.7.4 Setting Zero Shift

Use the Zero Shift to eliminate any bias that has shifted the calibration curve, such as static pressure effect on differential pressure or ambient temperature effect.

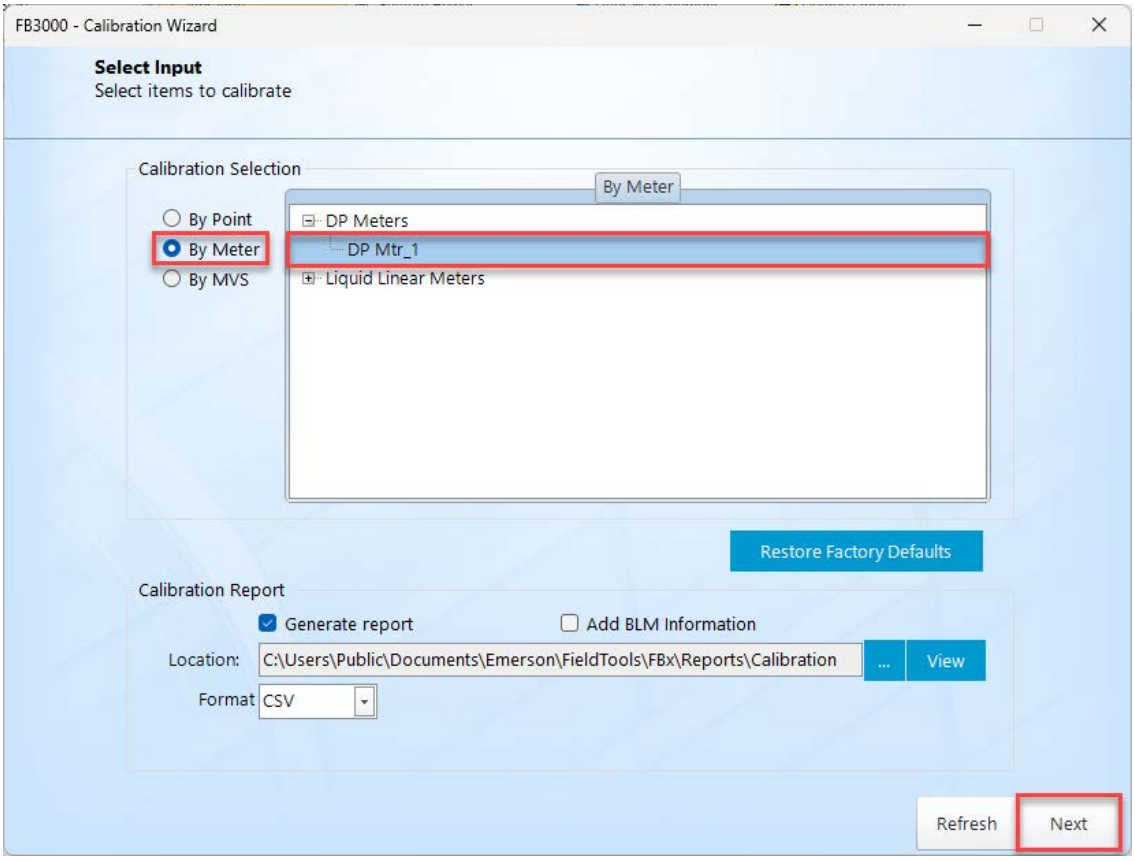
**Note**

- HART inputs **only** support freezing and unfreezing the input value.
- Performing a calibration clears the current zero shift setting.

To set the zero shift:

1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard displays.

**Figure 443. Calibration Wizard**




2. In the Calibration Selection field, select **By Meter** to group all inputs together for a specific meter, **By Point** to group all inputs together by input type, or **By MVS** to group inputs by 4088 instance.

**Note**

- The process is the same for each Calibration Selection option. The only difference is how each input is grouped. This example shows **By Meter** in the Calibration Selection field.
- If the input you want to select **does not** show in the Calibration Selection field, select the **Refresh** button to rescan your FB Series product for all available inputs.
- If you select **By Meter** in the Calibration Selection field, select a meter and the system automatically selects the meter inputs.
- If you select **By Point** in the Calibration Selection field, place a check mark next to one or more inputs.
- If you select **By MVS** in the Calibration Selection field, select the communications port connected to the MVS and select the 4088 instance. The system automatically selects the inputs of the 4088 instance.

3. Select ⊞ next to the type of meter you want to calibrate to show all available meters of that type.
4. Select a meter to calibrate.
5. Place a check mark next to **Generate report** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to create a calibration report.
6. Place a check mark next to **Add BLM Information** in the Calibration Report frame if you want DeltaV FBxConnect configuration software to include Bureau of Land Management information on the calibration report.

**Note**

This option shows **only** if you select **By Meter** in the Calibration Selection field.

7. Select a format for the generated report in the **Format** field. Possible options are CSV or PDF.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the Secure PDF box and entering a password.

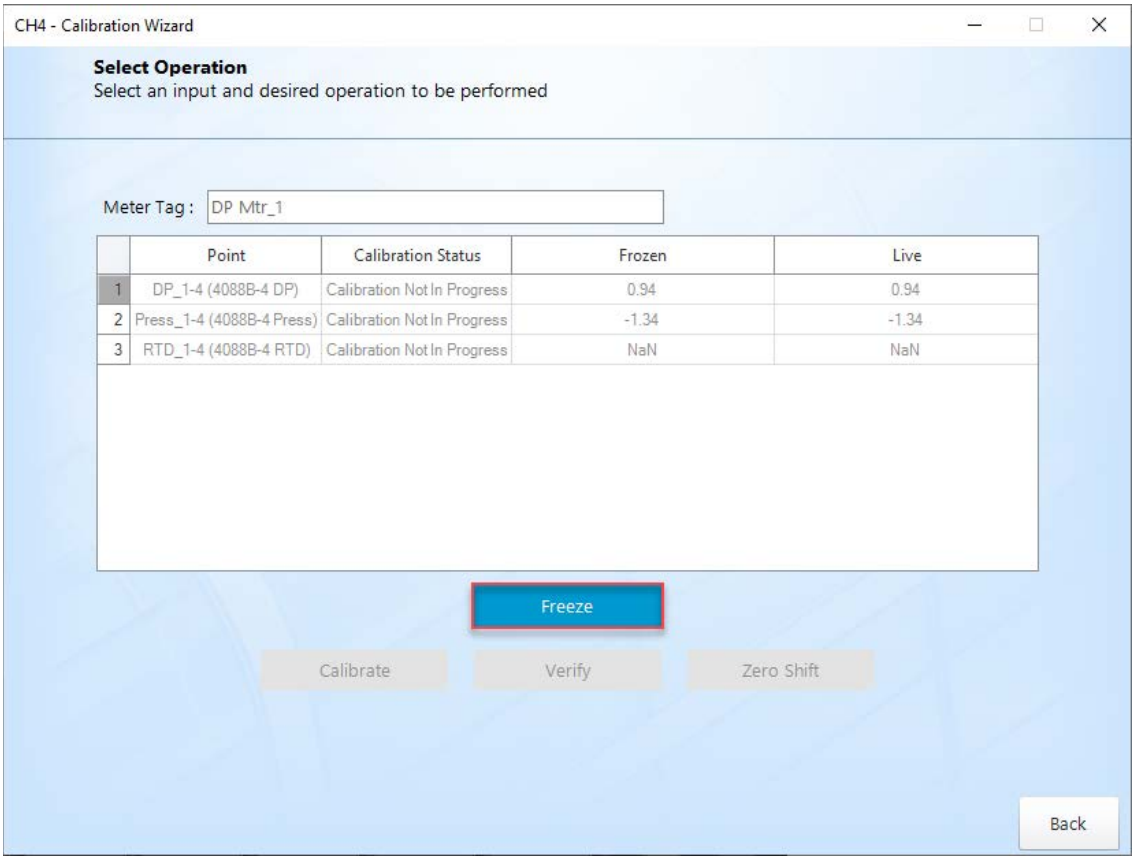
8. The calibration report is saved to a default location on your PC. If you want to save the report to a different location, click **Browse** and navigate to your desired location.
9. Select **View** to open a saved calibration report. This is useful to compare previous calibration values against the current values.
10. Click **Next**.
11. If you selected BLM Info option, enter the required BLM information and select **Save and Continue to Calibration**.

**Note**

For more information, refer to BLM Required Information.

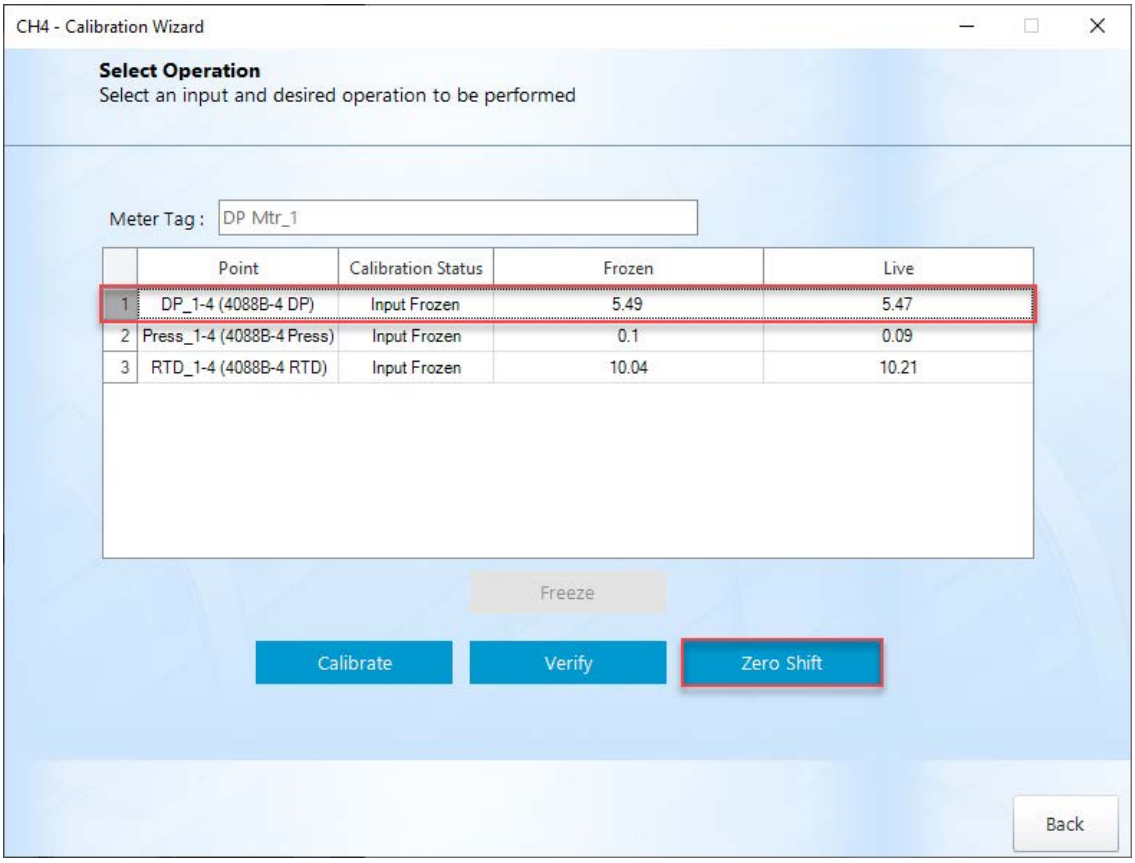
12. The Calibration Wizard displays all inputs associated with the selected meter.

**Figure 444. Freeze**



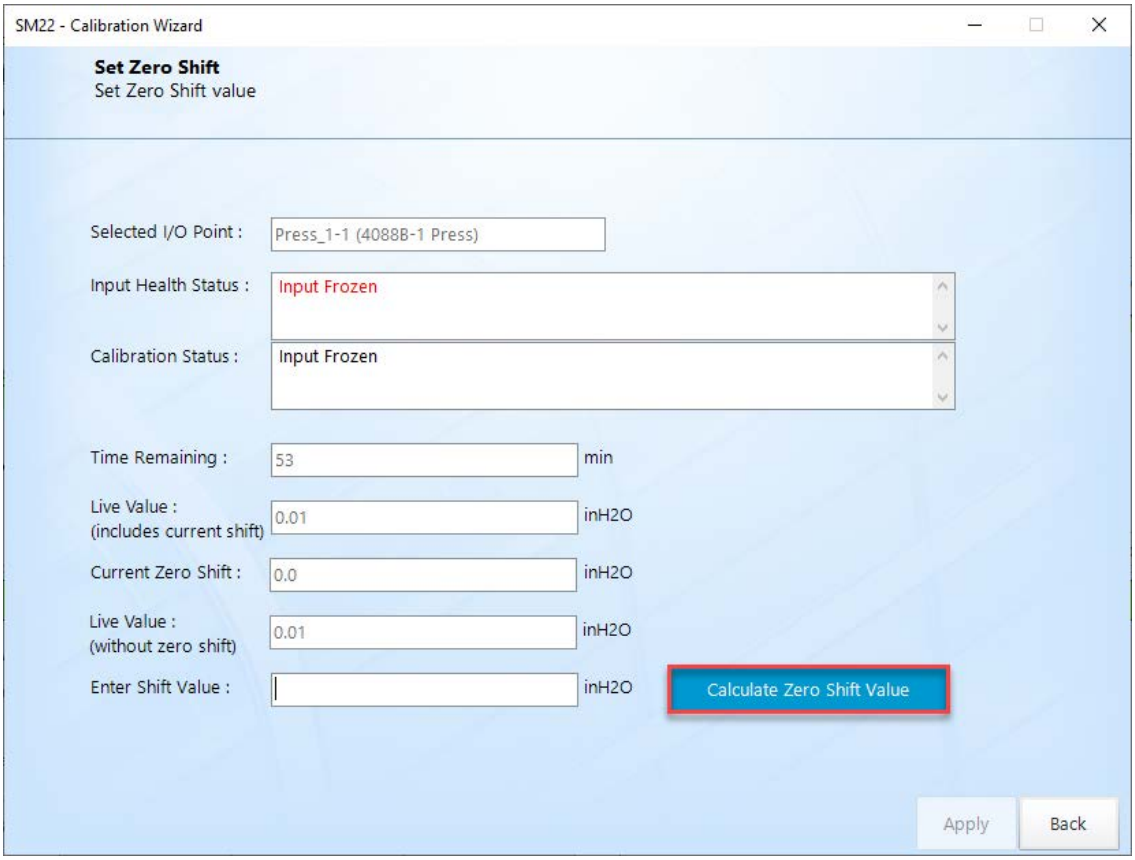

13. Select **Freeze** to stop the values from being updated during the calibration process.

**Figure 445. Set Zero Shift**




**14.** Select the input you want to calibrate and select **Set Zero Shift**.

**Figure 446. Set Zero Shift Value**

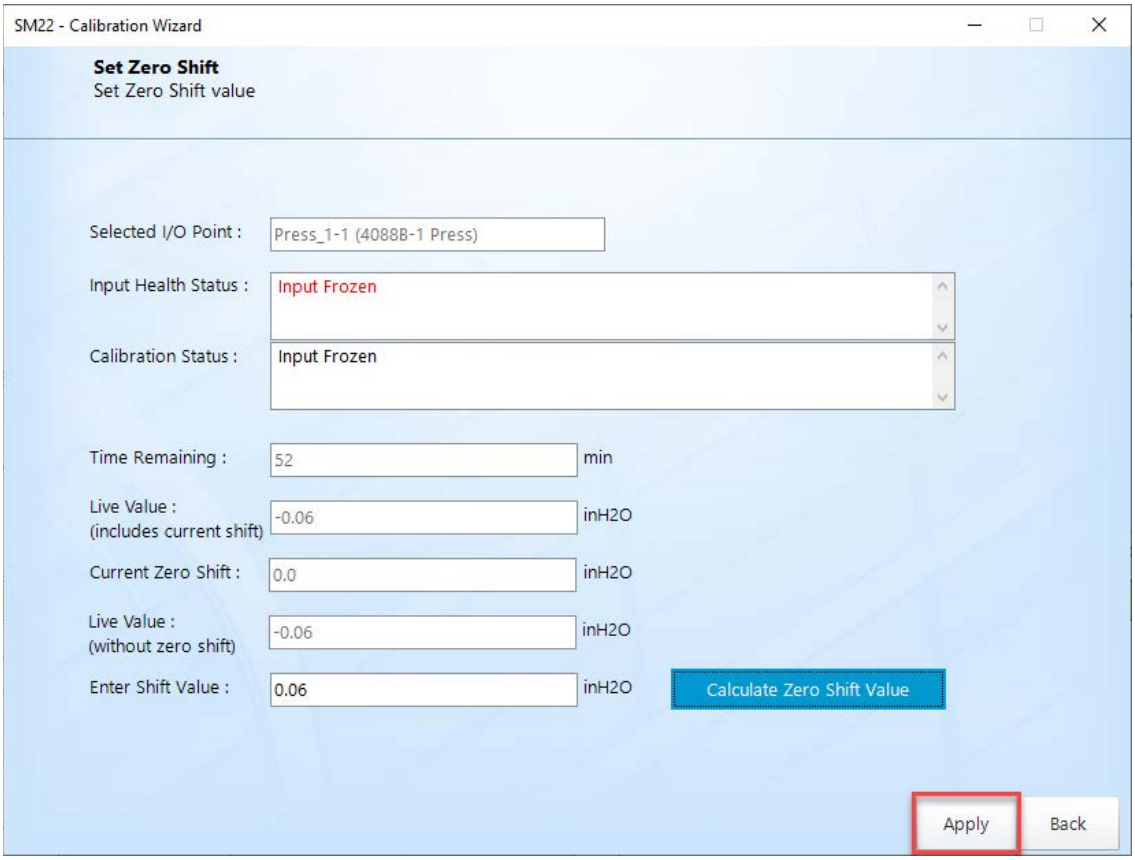



15. Select the **Calculate Zero Shift Value** button to automatically fill in the **Enter Shift Value** field with a value that offsets the current **Live Value** field, so it is equal to zero.

**Note**

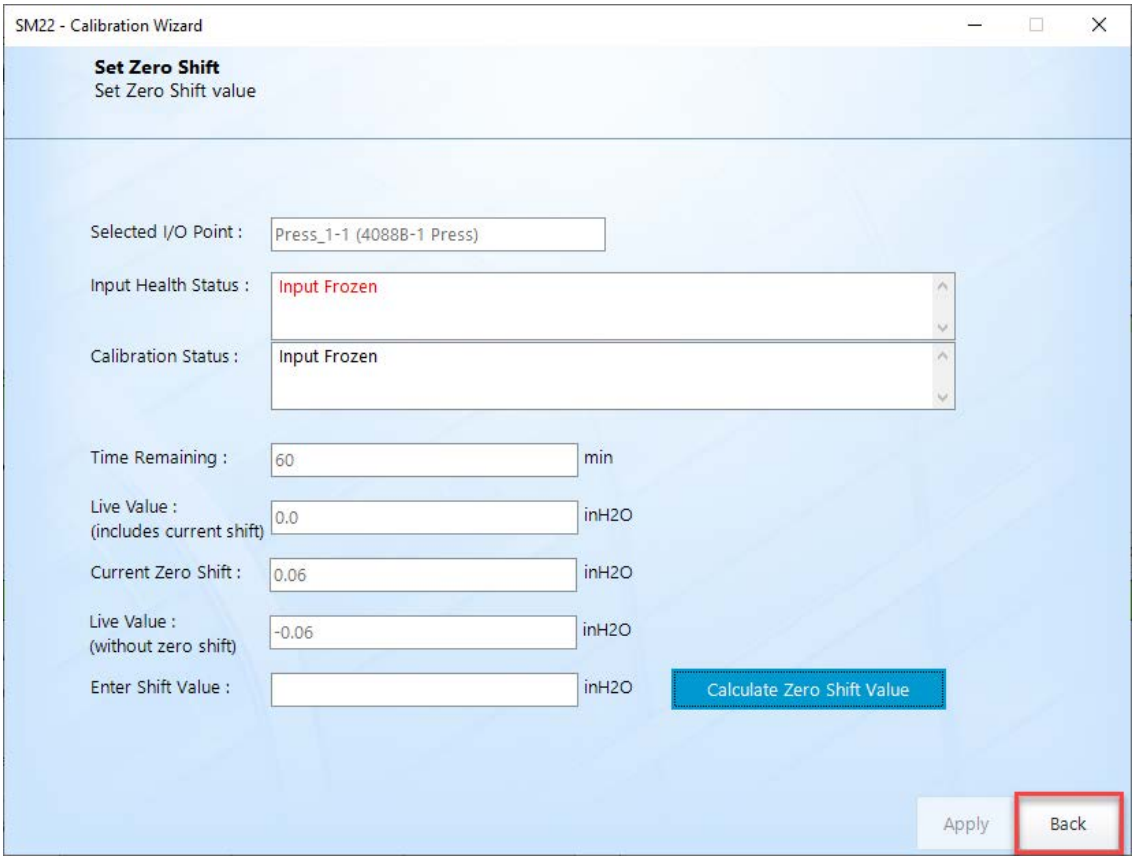
You can also manually enter a value in the **Enter Shift Value** field.

**Figure 447. Zero Shift Applied**



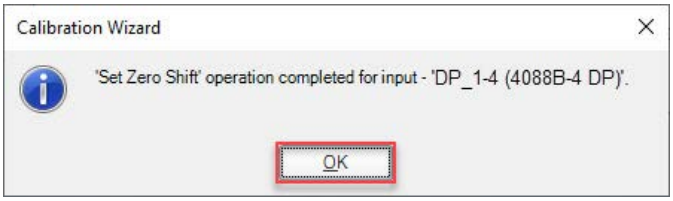

**16.** Select **Apply** to set the Zero Shift Value.

**Figure 448. Zero Shift Applied**




**17.** Click **Back** to exit the display. A confirmation dialog displays.

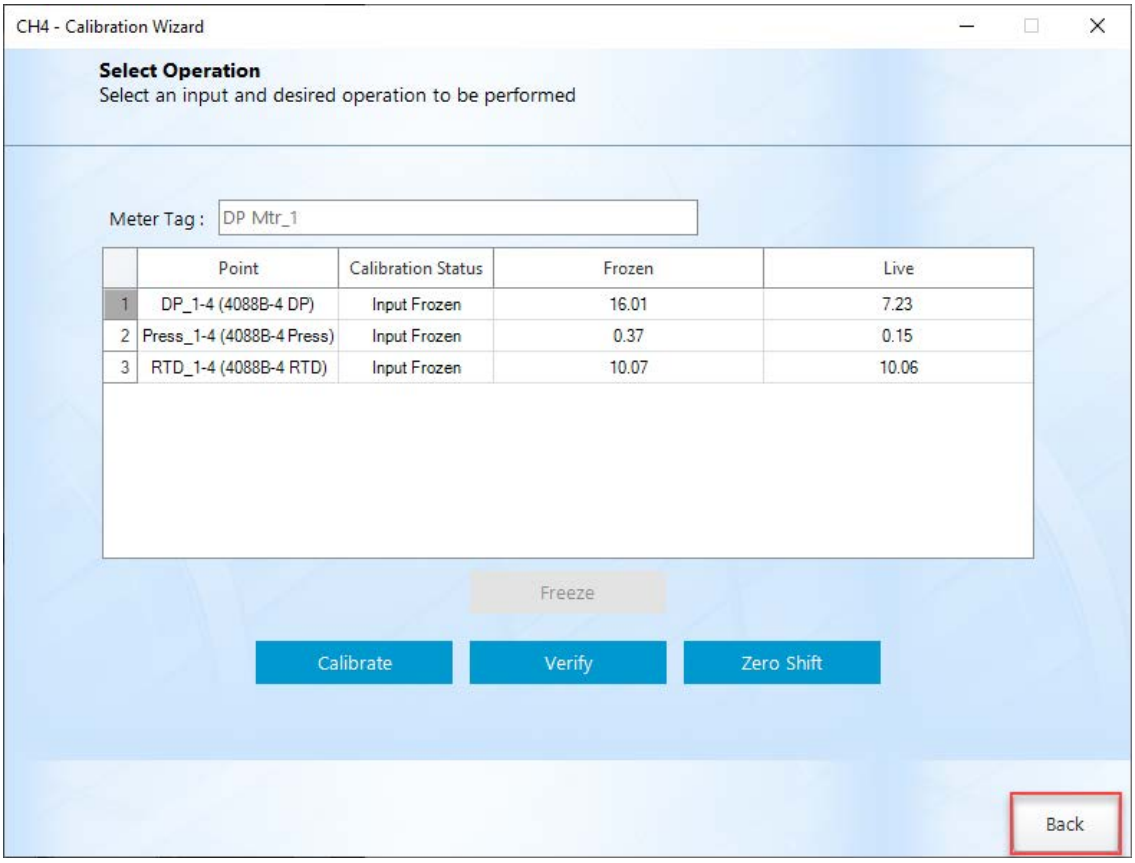
**Figure 449. Confirmation Dialog**




**18.** Click **OK** to exit the dialog and return to the Select Operation display.

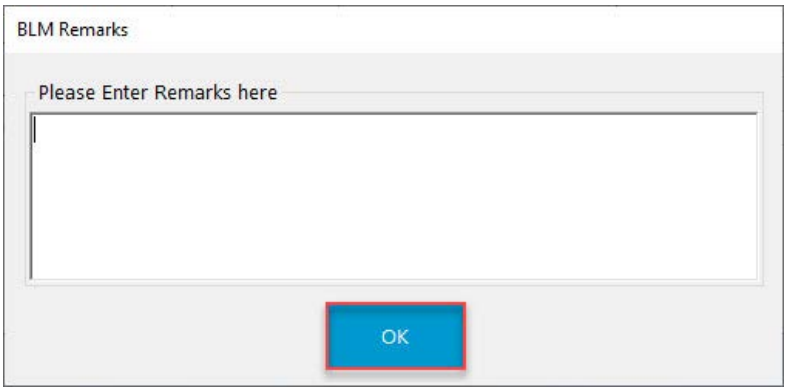
**19.** You can now perform a verification (Verifying a Calibration) of the input. Select **Back** to exit the Calibration Wizard.

**Figure 450. Calibration Wizard**




**20.** If you selected to include BLM Info on your calibration report, a BLM Remarks display opens. Enter any additional information to be included in the report.

**Figure 451. BLM Remarks**




**21.** Select **OK** when you are finished to create your calibration report.

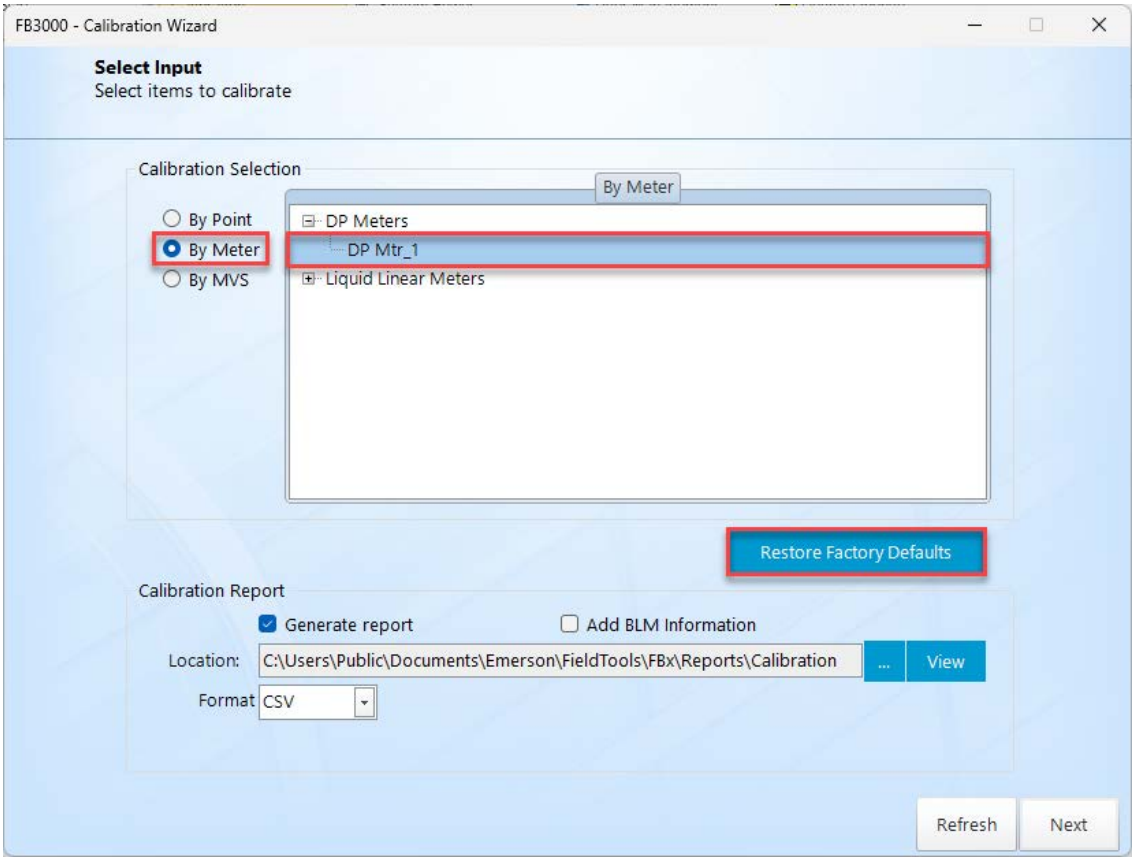
## 5.7.5 Resetting a Calibration

Use this option to clear a previous calibration and restore the factory defaults.

To reset a calibration:

1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard displays.

**Figure 452. Calibration Wizard**




2. In the Calibration Selection field, select **By Meter** to group all inputs together for a specific meter, **By Point** to group all inputs together by input type, or **By MVS** to group inputs by 4088 instance.

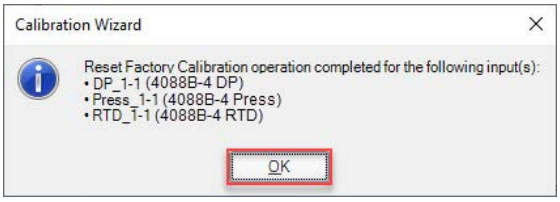
**Note**

- The process is the same for each Calibration Selection option. The only difference is how each input is grouped. This example shows **By Meter** in the Calibration Selection field.

- If the input you want to select **does not** show in the Calibration Selection field, select the **Refresh** button to rescan your FB Series product for all available inputs.
- If you select **By Meter** in the Calibration Selection field, select a meter and the system automatically selects the meter inputs.
- If you select **By Point** in the Calibration Selection field, place a check mark next to one or more inputs.
- If you select **By MVS** in the Calibration Selection field, select the communications port connected to the MVS and select the 4088 instance. The system automatically selects the inputs of the 4088 instance.

3. Select ⊞ next to the type of meter you want to reset calibration data for to show all of the available meters of that type.
4. Select a meter to reset.
5. Select **Restore Factory Defaults**:
   - If you selected **By meter** in the Calibration Selection field, the system resets the inputs configured for the selected meter to factory defaults values.
   - If you selected **By point** in the Calibration Selection field, the system resets the selected input channel(s) to factory default values.
   - If you selected **By MVS** in the Calibration Selection field, the system resets the inputs configured for the selected MVS instance to factory default values.
6. DeltaV FBxConnect configuration software restores the factory default calibration and displays a confirmation dialog.

**Figure 453. Confirmation**




7. Select **OK** to close the dialog.

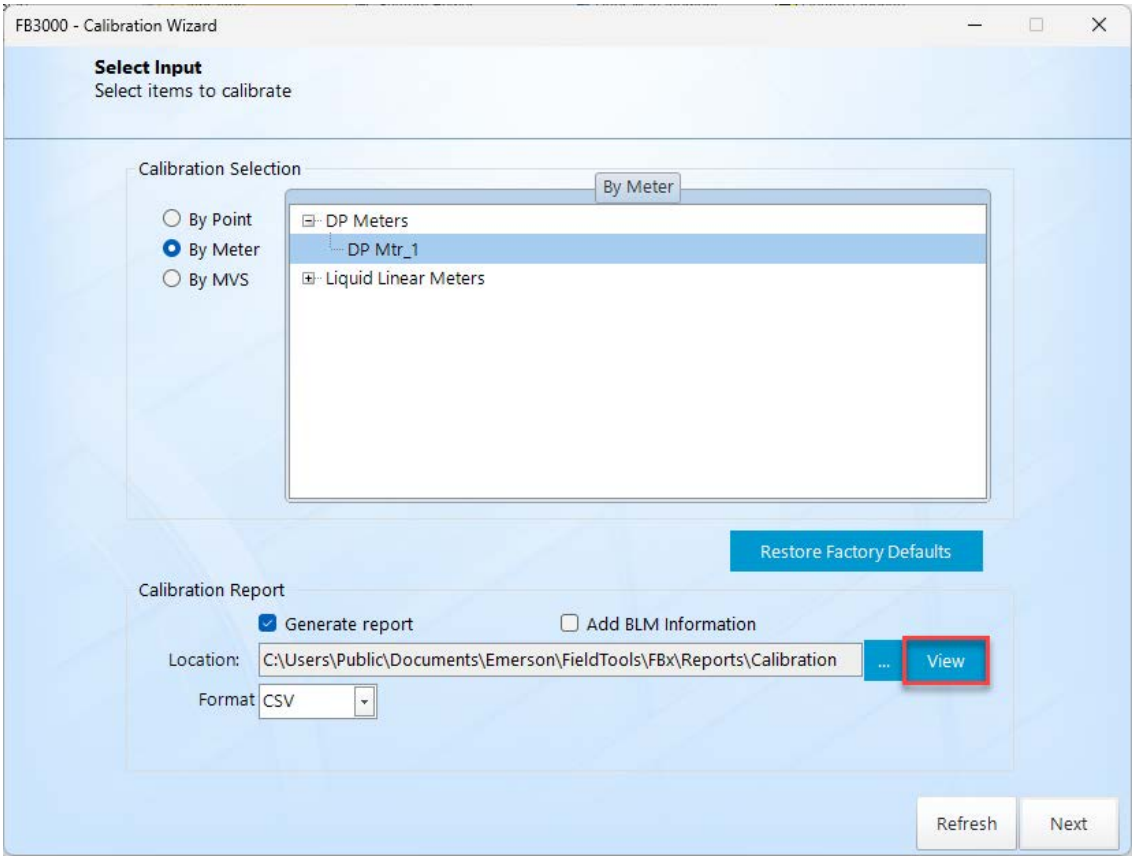
## 5.7.6 Viewing a Calibration Report

Follow these steps to view a previously generated calibration report.

To view a calibration report:

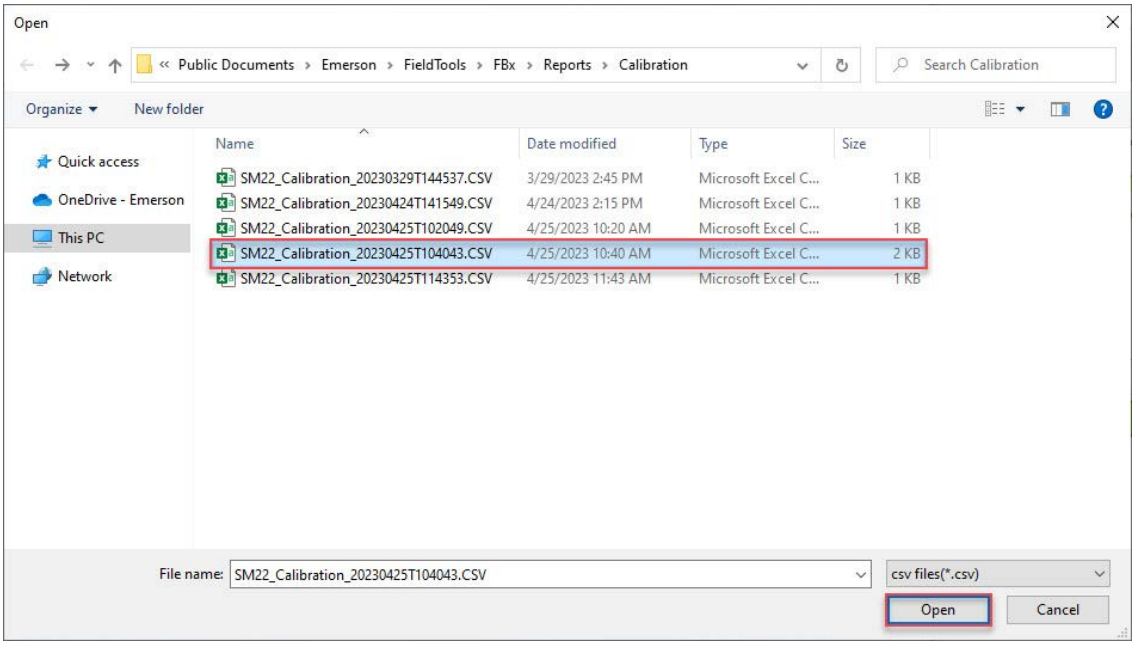
1. Select **Services > Calibration** from the DeltaV FBxConnect configuration software main menu. The Calibration Wizard displays.

**Figure 454. Calibration Wizard**




2. Select **View**. A window opens showing the default location for calibration reports.

### Figure 455. Default Calibration Report File Location




**3.** Select the report you want to view and select **Open** to view the calibration report.

### Figure 456. Calibration Report Example

| | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| 1 | Calibration Report | | | | | |
| 2 | Device Information | | | | | |
| 3 | Site Name | | | | | |
| 4 | Manufacturer ID | Emerson | | Device Date Time | 4/25/2023 10:40 | |
| 5 | Device | FB2200 | | Operator | ADMIN | |
| 6 | Product Description | Field Mountable Flow Computer | | | | |
| 7 | | | | | | |
| 8 | Producer | | | Purchaser | | |
| 9 | Lease Number | | | FMP Number | | |
| 10 | Station | Station_1 | | | | |
| 11 | | | | | | |
| 12 | Calibration Equipment | | | | | |
| 13 | Make: | | | Range: | | |
| 14 | Model: | | | Last Cert Date: | 25-Apr-23 | |
| 15 | Accuracy: | | | | | |
| 16 | | | | | | |
| 17 | Meter Parameters | | | | | |
| 18 | Parameter | Value | Unit | Parameter | Value | Unit |
| 19 | Meter Tag: | DP Mtr_1 | | Meter Serial No: | | |
| 20 | Meter Type: | AGA3 Orifice (Flange Taps) | | Static Pressure Tap: | Upstream | |
| 21 | Specific Gravity: | 0.5547573 | | Atmospheric Pressure: | 14.7 | psi |
| 22 | Last Meter Inspection Date: | 1-Jan-00 | | Inspection Condition: | | |
| 23 | Meter Diameter: | 5 | in | Meter Reference Temp: | 68 | °F |
| 24 | Pipe Diameter: | 8 | in | Pipe Reference Temp: | 68 | °F |
| 25 | Beta Ratio: | 0.625005448 | | SP Transmitter Type: | Gauge | |
| 26 | | | | | | |
| 27 | Transducer data: | Make | Model | Last Verification Date | Last Calibration Date | |
| 28 | Diff Pressure: | | | 3/29/2023 14:45 | 4/25/2023 9:56 | |

## 5.7.7 Calibration Errors

When calibrating your equipment, you may encounter a variety of errors based on your selected calibration point. Refer to the following error descriptions for each I/O type.

Analog Input (AI) Calibration Errors

4088B Calibration Errors

215 MultiVariable ™ Sensor Calibration Errors

### 5.7.7.1 Analog Input (AI) Calibration Errors

The following list provides possible errors you may encounter while calibrating an analog input (AI).

| Bit | Error | Description |
|---|---|---|
| **No Bit Set** | Calibration Not In Progress | Set when no calibration is performed. |
| **0** | Input Frozen | Set when a live value is frozen. |
| **1** | Calibration In Progress | Set after the Start Calibration command is issued and remains until the Save or Cancel command is issued. |
| **2** | Reserved | Not used. |
| **3** | Set Command Failed | Set when the last command failed due to an error. |
| **4** | Timeout Occurred | Set when the calibration has timed out due to inactivity. |
| **5** | Span Too Small | Not used. |
| **6** | Excess Correction | Set when the slope of applied value is out +/- 5% of range limits. |
| **7** | Passed Parameter Too Small | Not used. |
| **8** | Passed Parameter Too Large | Not used. |
| **9** | Ideal Value Too Small | Not used. |
| **10** | Ideal Value Too Large | Not used. |

| Bit | Error | Description |
|---|---|---|
| **11** | Wrong Command | This error is set for the following reasons:<br>• The channel is disabled.<br>• The module is in point fail due to communication failure or termination missing.<br>• The last command issued is not as per calibration command sequence. |
| **12** | Verification In Progress | When verification is in progress. |

### 5.7.7.2 4088B Calibration Errors

The following list provides possible errors you may encounter while calibrating a 4088B.

| Bit | Error | Description |
|---|---|---|
| **No Bit Set** | Calibration Not In Progress | Set when no calibration is performed. |
| **0** | Input Frozen | Set when a live value is frozen. |
| **1** | Calibration In Progress | Set after the Start Calibration command is issued and remains until the Save or Cancel command is issued. |
| **2** | Reserved | Not used. |
| **3** | Set Command Failed | This error is set for the following reasons:<br>• 4088 Polling is disable.<br>• The command failed due to a<br>• Communications error during calibration.<br>Or when one of the following exceptions is returned from 4088B:<br>• Illegal command or value<br>• Slave fail or busy<br>• Transmitter sensor error<br>• Write protect switch ON<br>• Out of sensor limits |

| Bit | Error | Description |
|---|---|---|
| | | • Measurement in point fail<br>• Transmitter in communication failure. |
| **4** | Timeout Occurred | Set when the calibration has timed out due to inactivity. |
| **5** | Span Too Small | Set when one of the following exceptions is returned from the 4088B:<br>• Span less than zero<br>• Midpoint less than zero |
| **6** | Excess Correction | Not used. |
| **7** | Passed Parameter Too Small | Not used. |
| **8** | Passed Parameter Too Large | Not used. |
| **9** | Ideal Value Too Small | Not used. |
| **10** | Ideal Value Too Large | Not used. |
| **11** | Wrong Command | Set when one of the following exceptions is returned from 4088B:<br>• Measurement not supported<br>• Calibration already in progress<br>• Measurement in simulation<br>• Invalid calibration sequence<br>• Invalid command |
| **12** | Verification In Progress | When verification is in progress. |

### 5.7.7.3 215 MultiVariable™ Sensor Calibration Errors

The following list provides possible errors you may encounter while calibrating the integral 215 MultiVariable™ Sensor.

| Bit | Error | Description |
|---|---|---|
| **No Bit Set** | Calibration Not In Progress | Set when no calibration is performed. |
| **0** | Input Frozen | Set when a live value is frozen. |

| Bit | Error | Description |
|---|---|---|
| **1** | Calibration In Progress | Set after the Start Calibration command is issued and remains until the Save or Cancel command is issued. |
| **2** | Reserved | Not used. |
| **3** | Set Command Failed | Set when the last command failed due to an error or point fail. |
| **4** | Timeout Occurred | Set when the calibration has timed out due to inactivity. |
| **5** | Span Too Small | Set when the Span is less than zero, the Midpoint is less than zero, or the difference of span and zero is less than the minimum span. |
| **6** | Excess Correction | Set when the slope of applied value is out +/- 5% of range limits. |
| **7** | Passed Parameter Too Small | **DP/SP**<br>Set when the value is less than Lower range limit.<br>**RTD**<br>Set when the value < LRL+5% of LRL. |
| **8** | Passed Parameter Too Large | **DP/SP**<br>Set when the value is greater than Upper range limit.<br>**RTD**<br>Set when the value > URL+5% of URL. |
| **9** | Ideal Value Too Small | **DP/SP**<br>Set when the value is less than LRL+ 5% of LRL.<br>**RTD**<br>Not used. |

| Bit | Error | Description |
|---|---|---|
| **10** | Ideal Value Too Large | **DP/SP**<br>Set when the value is greater than URL+ 5% of<br>URL.<br>**RTD**<br>Not used. |
| **11** | Wrong Command | Set when the last commend issued is not as per calibration command sequence. The channel is disabled. |
| **12** | Verification In Progress | When verification is in progress. |

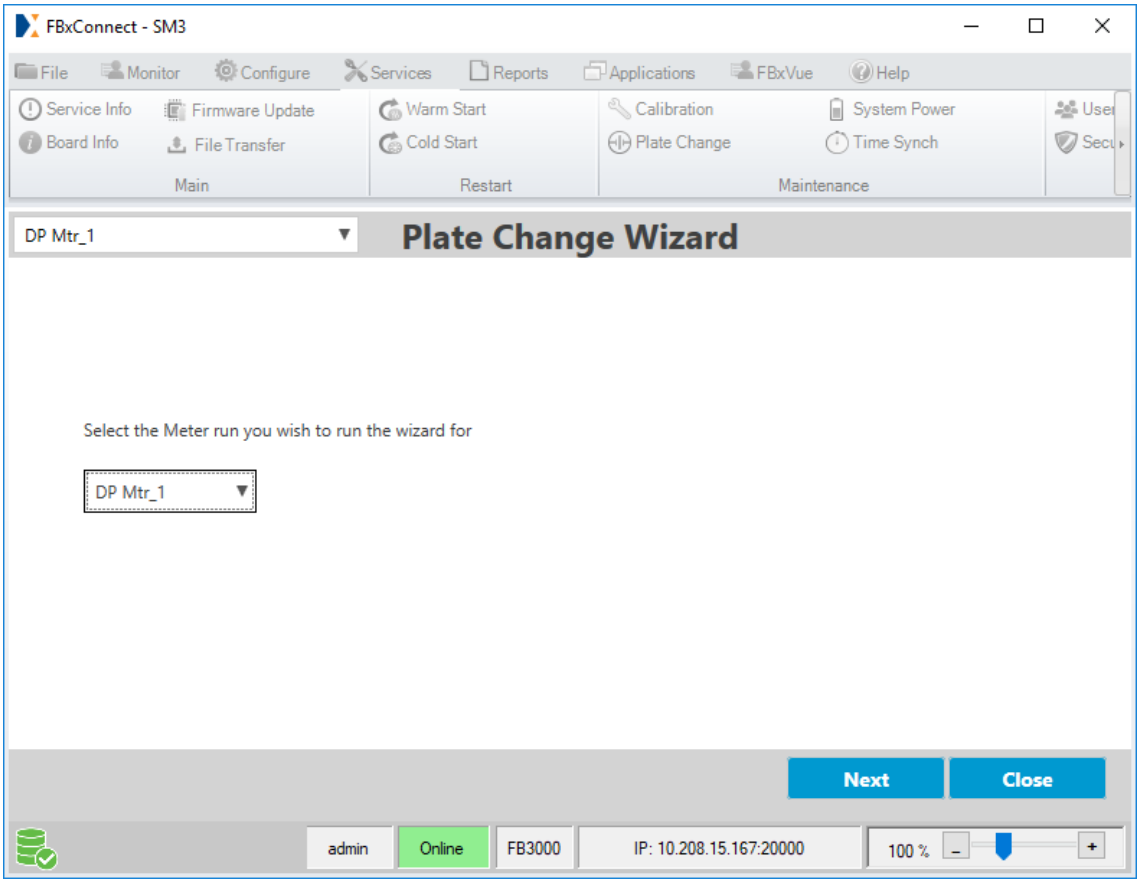
## 5.8 Plate Change

The Plate Change Wizard allows you to change the size of an orifice plate under flowing or non-flowing conditions.

To perform a plate change:

1. Select **Services > Plate Change** from the DeltaV FBxConnect configuration software main menu. The Plate Change Wizard display opens.

**Figure 457. Plate Change Wizard - Select Meter**

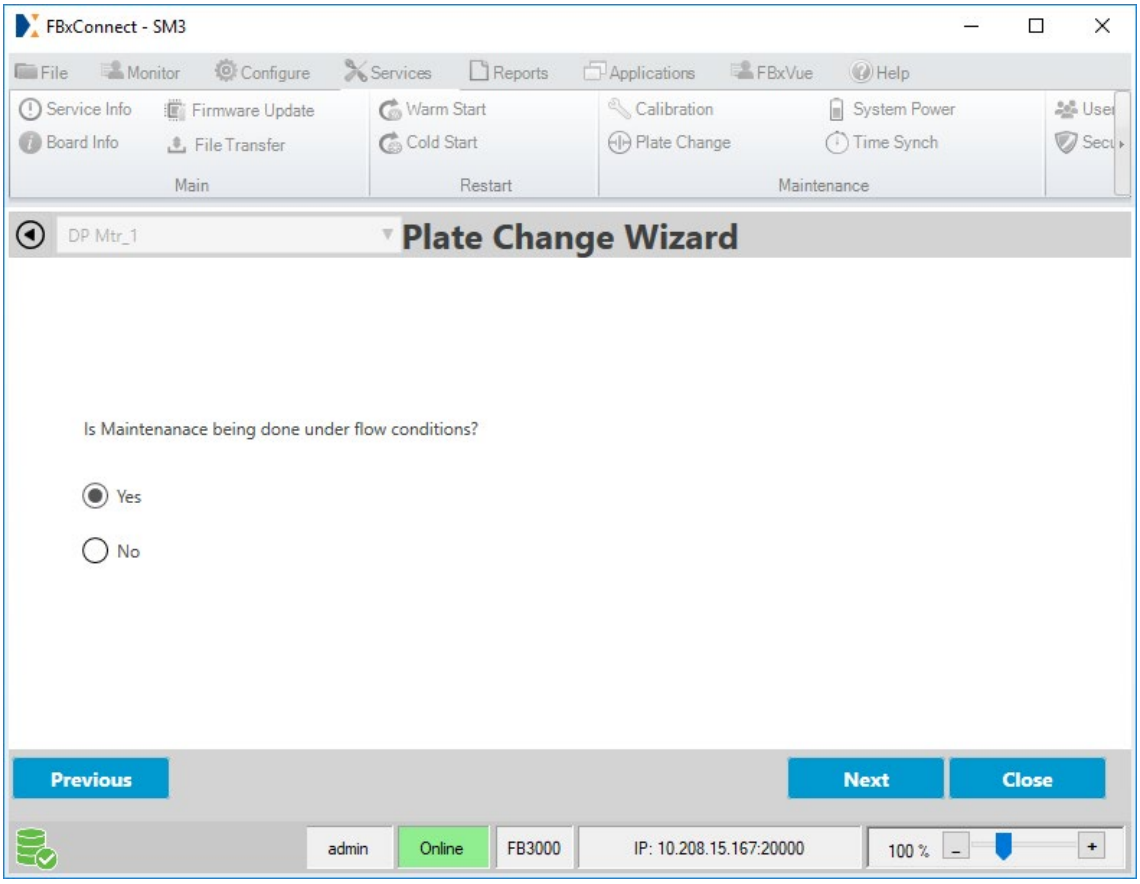



2. Select ▼ to choose the meter with the plate you want to change and select **Next**.

**Note**

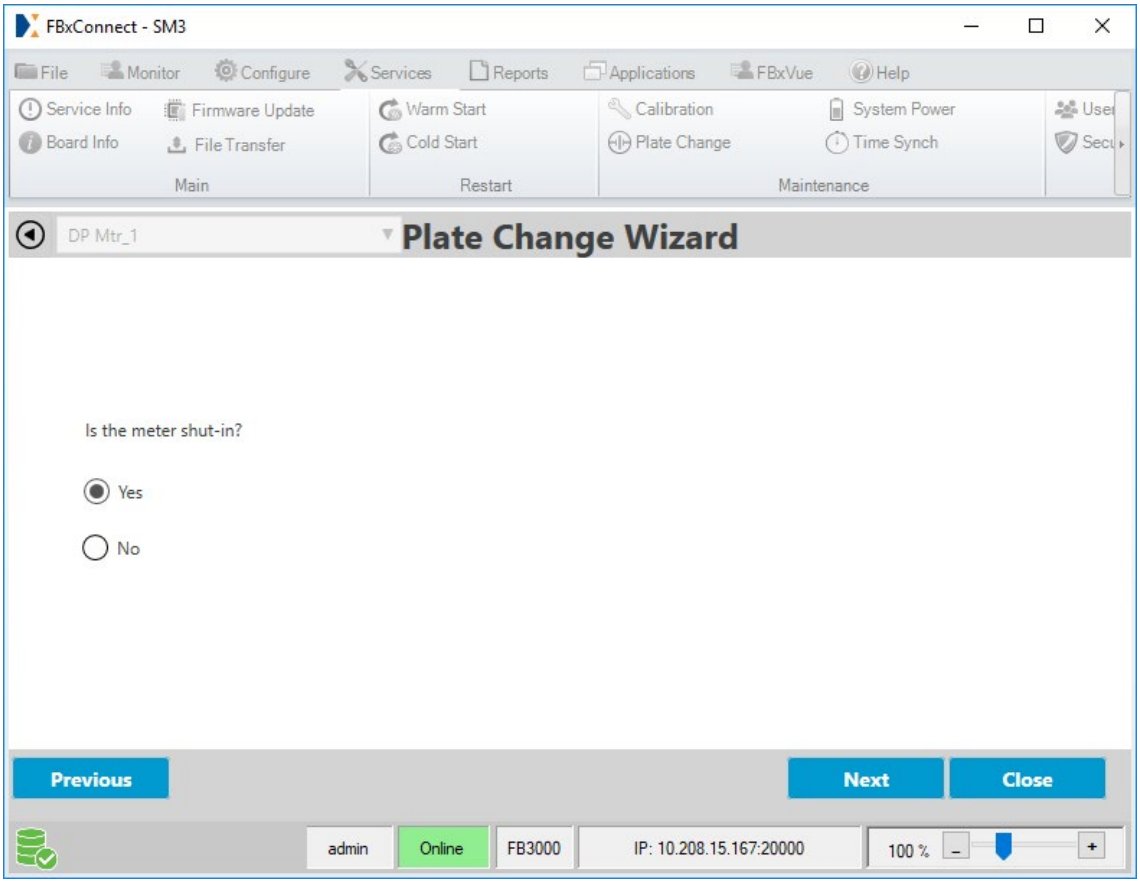
For meters with inputs assigned to a HART input, HART inputs **must** be enabled and configured with a **Poll Mode** set to either **PV only** or **All Process**.

**Figure 458. Plate Change Wizard - Flowing Conditions**



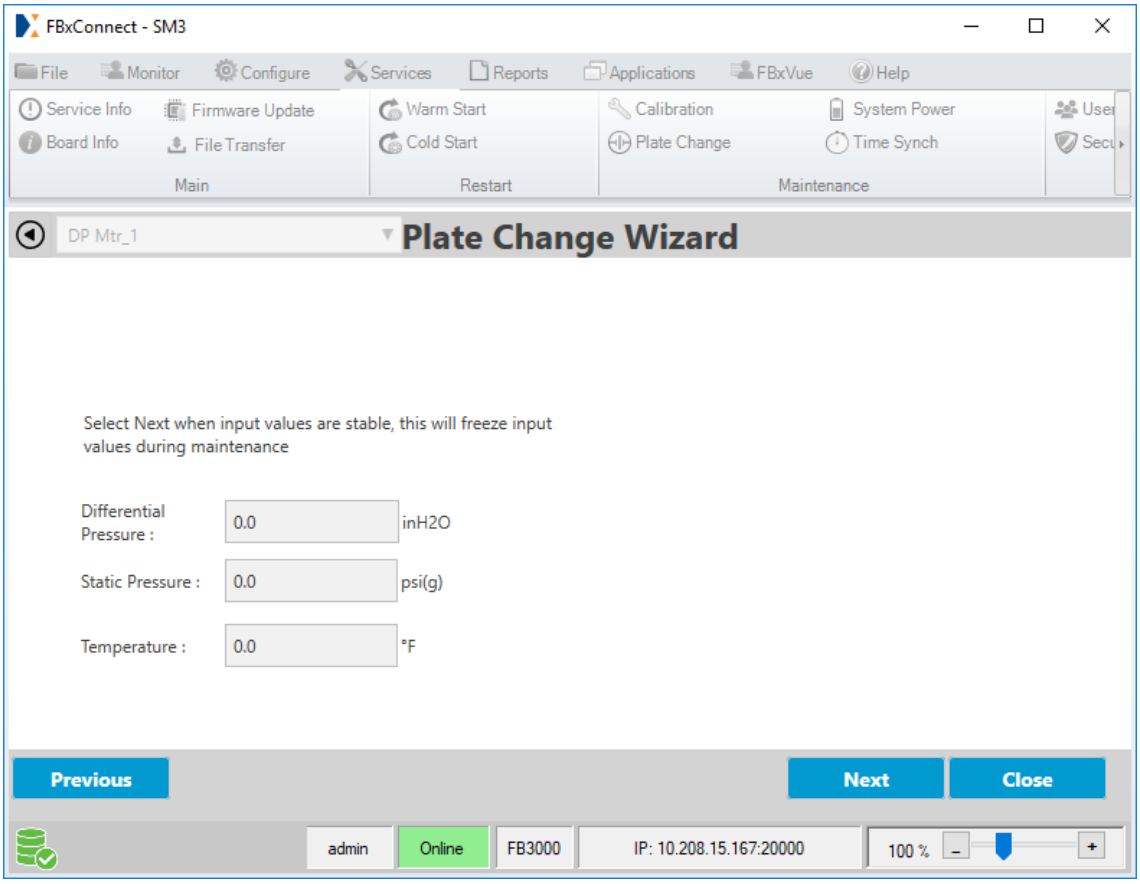

3. Select **Yes** if the plate change occurs during flowing conditions. You will be allowed to freeze the inputs for the duration of the Plate Change process. Select **Next** and **proceed to step 5**.
   or
   Select **No** if the plate change occurs during non-flowing conditions. Select **Next** and **proceed to step 4**.

**Figure 459. Plate Change Wizard - Meter Shut-In**



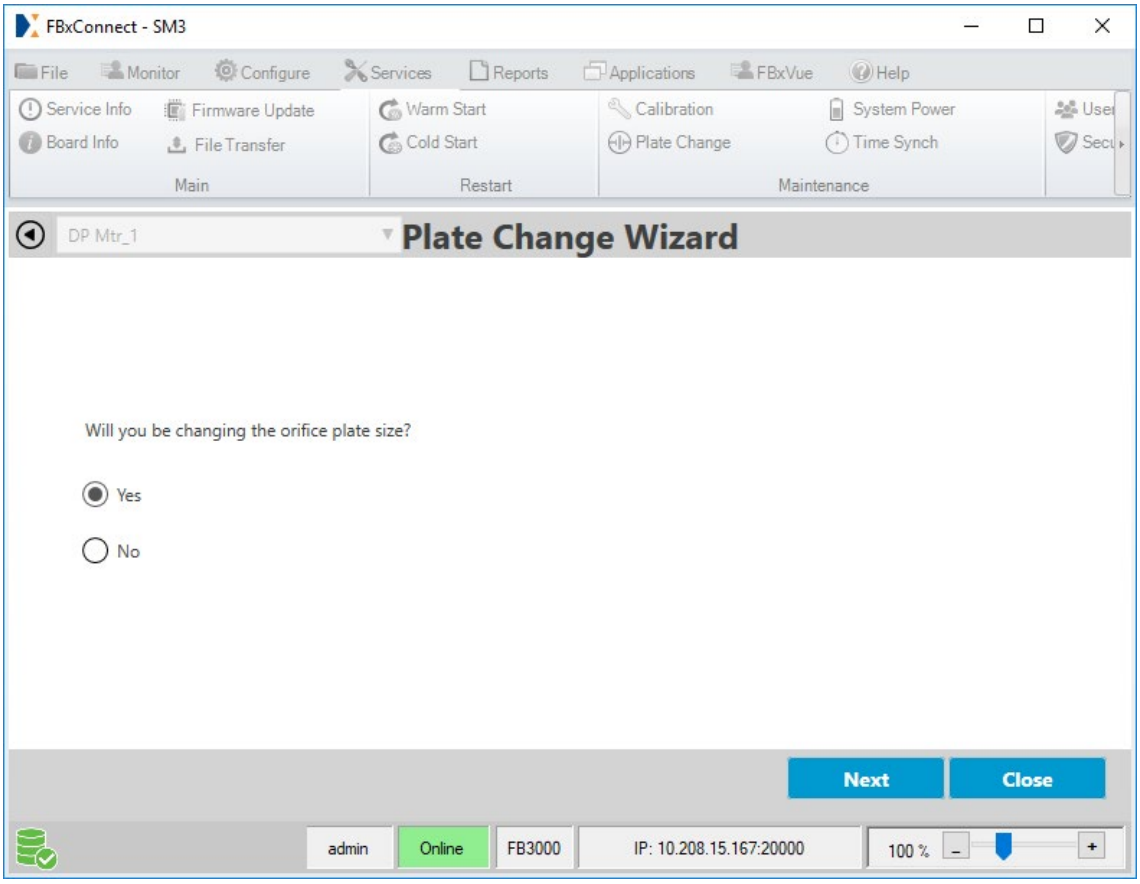

4. Select **Yes** if the meter is shut-in. Select **Next** and **proceed to step 6**.
   or
   Select **No** if the meter is not shut-in. Select **Next** and **proceed to step 9**.

**Figure 460. Plate Change Wizard - Next When Stable**




5. Wait until the input values are stable, and then select **Next** to freeze the values.

**Figure 461. Plate Change Wizard - Orifice Plate Size**

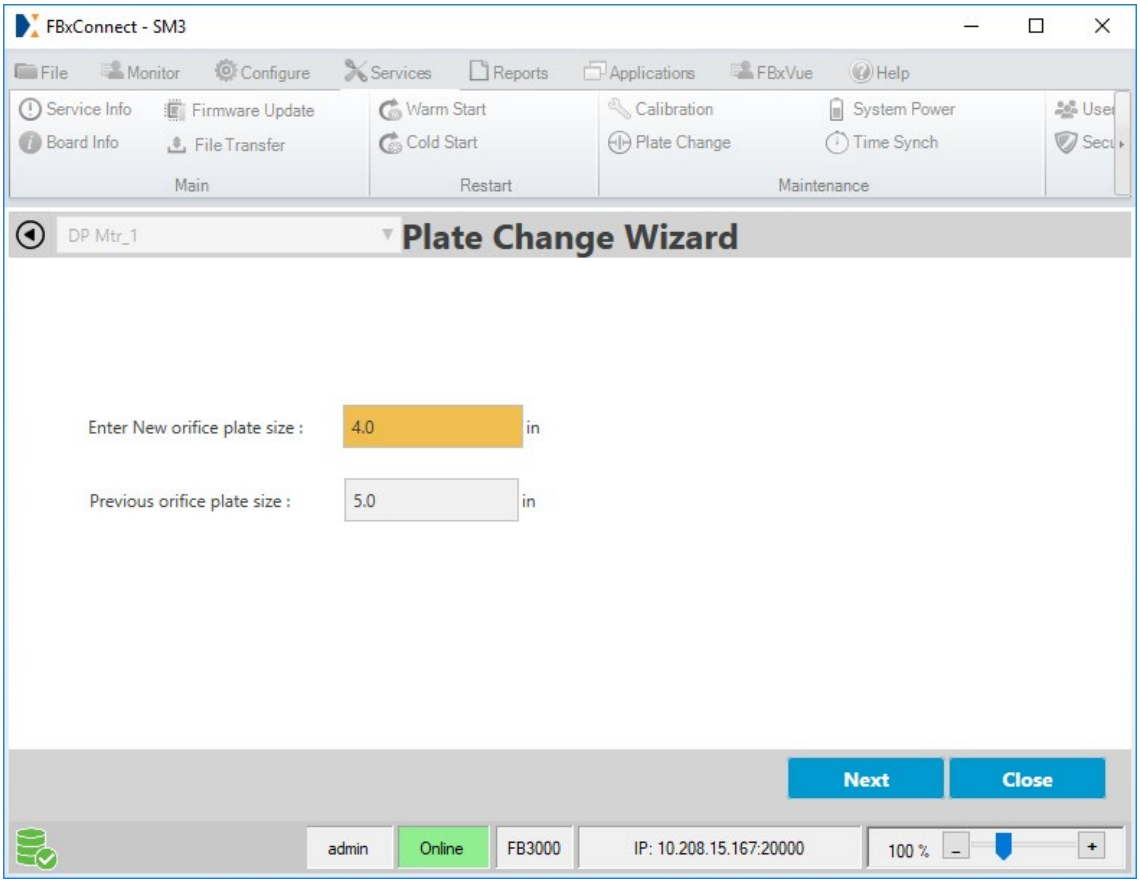



6. Select **Yes** if you are changing the size of the orifice. Select **Next** and **proceed to step 7**.

   or

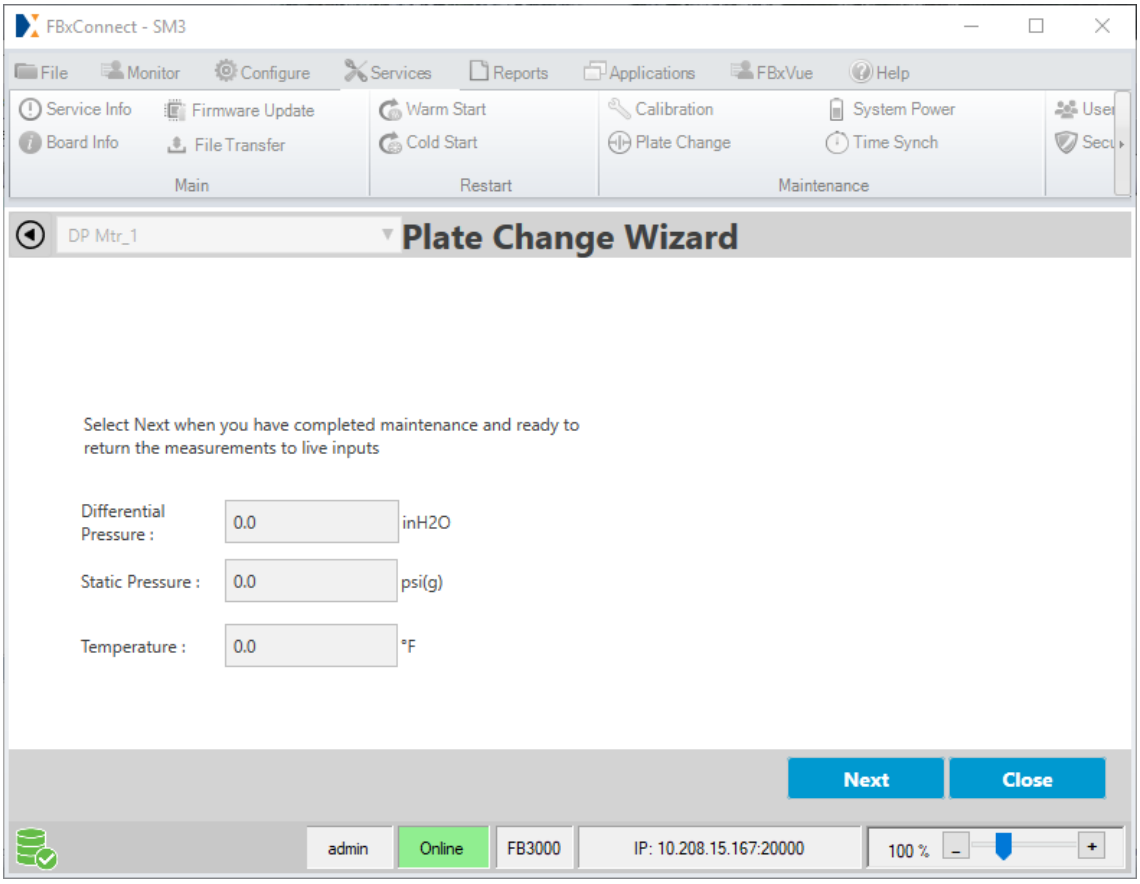
   Select **No** if you are installing a new plate with the same size orifice as the old plate. Select **Next** and **proceed to step 10**.

**Figure 462. Plate Change Wizard - New Orifice Plate Size**



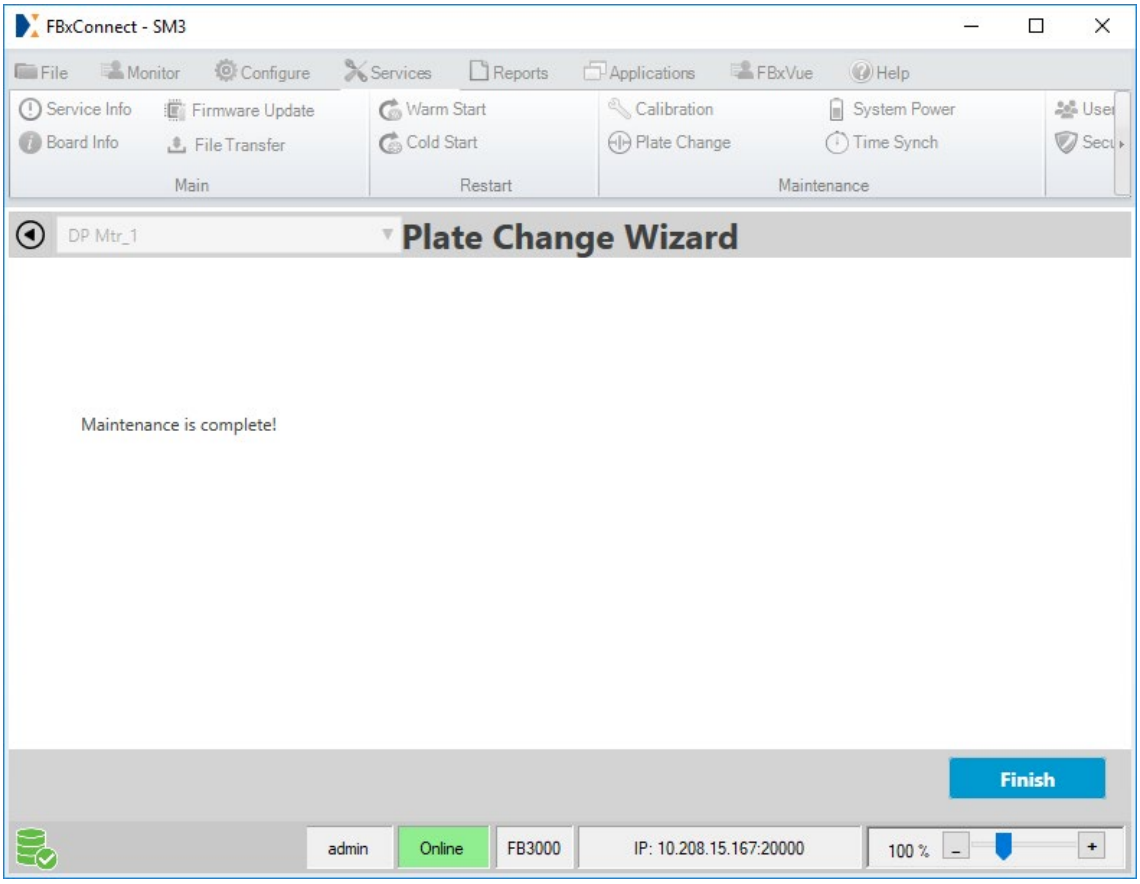

**7.** Enter the size of the new orifice plate and select **Next**.

**Figure 463. Plate Change Wizard - Next to Complete**




8. Select **Next** after you have completed maintenance of the meter and you are ready to return to live inputs.

**Figure 464. Plate Change Wizard - Maintenance Complete**




**9.** Select **Finish** to close the Plate Change Wizard. A Confirmation message appears.

**Figure 465. Plate Change Wizard - Maintenance Complete**




**10.** Select **Yes** to exit the Plate Change Wizard.

# 5.9 System Power

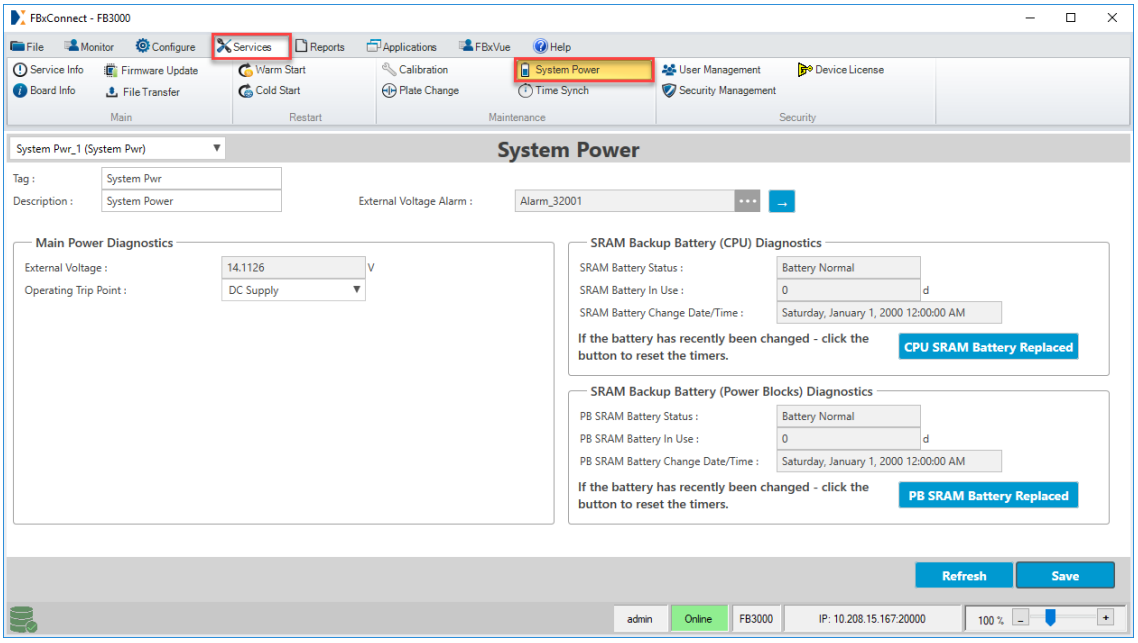
DeltaV FBxConnect configuration software monitors battery health and displays battery diagnostics, including the last time the battery was changed. If you change the device battery or SRAM battery, you should reset the timers displayed in DeltaV FBxConnect configuration software.

You can also set the operating trip point. The operating trip point is the external voltage required to power the device. The device enters a low-power mode when the external and battery (if applicable) voltage falls below the operating trip point.

To access this screen:

1. Select **Services > System Power** from the DeltaV FBxConnect configuration software main menu. The System Power screen displays.

**Figure 466. System Power**




2. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Enter a short name (up to 20-alphanumeric characters) for the point. |
| **Description** | Enter a short description (up to 20-alphanumeric characters) for the point. |

| Field | Description |
|---|---|
| **External Voltage Alarm** | This **read-only** field shows you which alarm is currently configured for the external voltage.<br>**Note**<br>Click → to open the Alarms screen and configure the alarm parameters. |
| **External Voltage** | This **read-only** field shows the current voltage from the external power source. |
| **Operating Trip Point** | Click ▼ to set the set the minimum voltage required to power the device. The device enters a low power mode when the voltage falls below the configured trip point. Possible options are Solar Supply (powered by solar panel) and DC Supply (powered by a DC power supply). |
| **SRAM Battery Status** | This **read-only** field shows the status of the CPU SRAM battery. Possible statuses include Battery Normal and Battery Failure or Removal.<br>**Note**<br>This field is updated once per day at 8 a.m. and when the FB Series product is power cycled. |
| **SRAM Battery In Use** | This **read-only** field shows the number of days the CPU SRAM battery has been in use. The CPU SRAM battery is considered in use when the external voltage and battery voltage are too low to power the device. |
| **SRAM Battery Change Date/Time** | This **read-only** field shows the date for the last time the user indicated a CPU SRAM battery change. |
| **CPU SRAM Battery Replaced** | Click to indicate the CPU SRAM battery has been replaced. The software updates the Backup Battery Diagnostics and Battery Change Events fields, including resetting the CPU SRAM battery runtime. |
| **PB SRAM Battery Status** | This **read-only** field shows the status of the Power Blocks (PB) SRAM battery. Possible statuses include Battery Normal and Battery Failure or Removal.<br>**Note**<br>This field is updated once per day at 8 a.m. and when the FB Series product is power cycled. |

| Field | Description |
|---|---|
| **PB SRAM Battery In Use** | This **read-only** field shows the number of days the PB SRAM battery has been in use. The PB SRAM battery is considered in use when the external voltage and battery voltage are too low to power the device. |
| **PB SRAM Battery Change Date/Time** | This **read-only** field shows the date for the last time the user indicated a PB SRAM battery change. |
| **PB SRAM Battery Replaced** | Click to indicate the PB SRAM battery has been replaced. The software updates the Backup Battery Diagnostics and Battery Change Events fields, including resetting the CPU SRAM battery runtime. |

3. Select **Save** to save any changes you make to this screen.

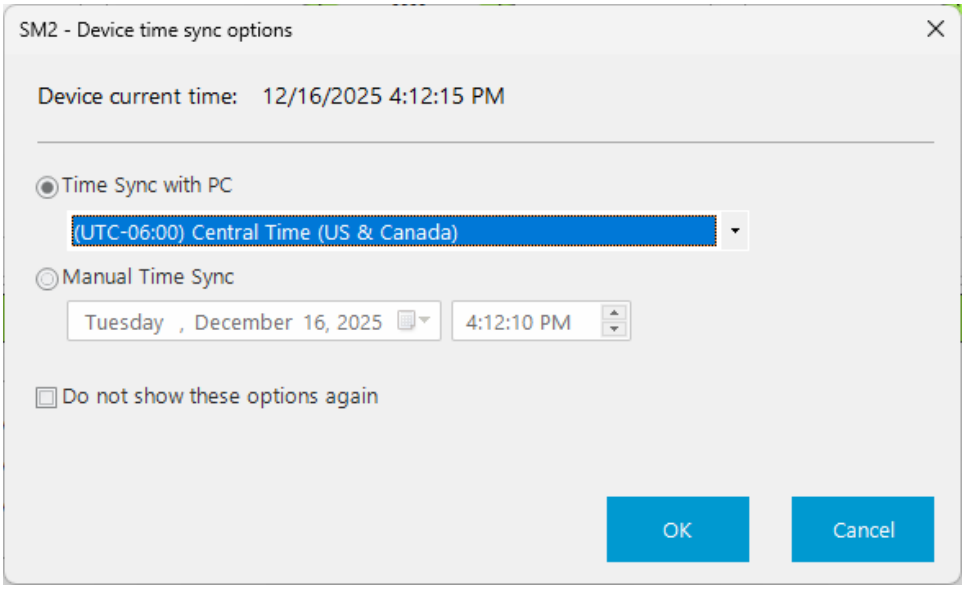
## 5.10 Time Sync

Use this pop-up display to synchronize the FB Series product clock with your PC clock.

To synchronize the FB Series product clock with your PC clock:

1. Select **Services > Time Sync** from the DeltaV FBxConnect configuration software main menu. The following display opens.

**Figure 467. Time Sync**




2. Select a time sync option. Possible options are:

- **Time Sync with PC** – Copy the PC clock time to the FB Series product.

**Note**

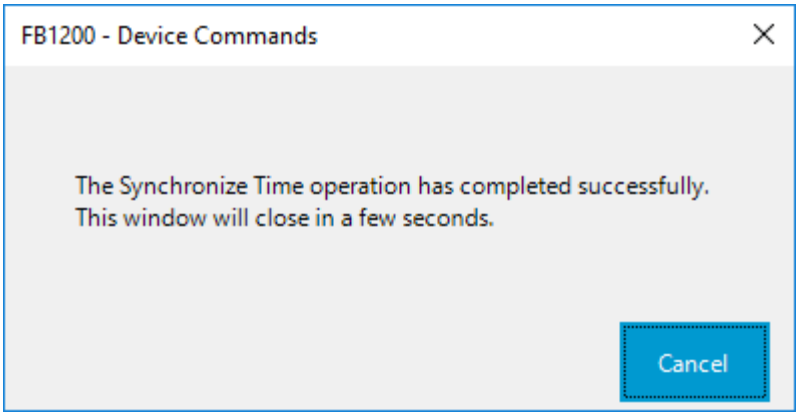
If the time zone displayed is incorrect, select ▼ to in the drop-down list and select your desired time zone.

- **Manual Time Sync** – Manually set the date and time of the FB Series product.

3. Place a check mark in the box next to **Do not show these options again** if you do not want to have the option to manually change the time when synchronizing the time in the future.

4. Select **OK** to synchronize the clock. A confirmation message displays stating the synchronization operation completed successfully.

**Figure 468. Confirmation Message**




## 5.11 User Management

Use the User Management display to add, delete, and modify user accounts that are able to log in to the FB Series product. The username and password defined in the FB Series product should match the username and password used to log into DeltaV FBxConnect Launchpad. For more information about creating and modifying a username or password in DeltaV FBxConnect Launchpad, refer to the DeltaV FBxConnect Launchpad online help.

**Note**

- Changes to user accounts are audited in the event log via the Account Added, Account Removed, Account Modified and Account Locked events.

- Whenever a user logs in or logs out of the system, Login Success and Logout events are recorded in the event log along with the username.
- Unsuccessful login attempts are recorded in the event log as Login Fail Invalid Credentials.
- The “admin” user account is created by default and is counted towards your total number of user accounts. You must be logged in using a different username that is assigned a Role of Admin in order to delete the “admin” user account.

---

The **DeltaV FB3000 RTU** supports a total of 100 user accounts. The total number of user accounts **does not** include the internal user accounts (SEC_DISABLE_DNP3, SEC_DISABLE_MODBUS, and FBxNet_Internal), and you **cannot** delete the internal user accounts from the Accounts list.

The Accounts list shows internal user accounts **only** if a communications port is configured to use that particular internal user account. The internal user accounts are used in the following situations:

- The **SEC_DISABLE_DNP3** user account is used when DNP3 protocol communications occur on a communications port with security disabled. Event log entries show changes were performed by the SEC_DISABLE_DNP3 user account.
- The **SEC_DISABLE_MODBUS** user account is used when MODBUS protocol communications occur on a communications port with security disabled. Event log entries show changes were performed by the SEC_DISABLE_MODBUS user account.
- The **FBxNet_Internal** user account is used when FBxNet read/write operations occur. Event log entries show changes were performed by the FBxNet_Internal user account.

## CAUTION

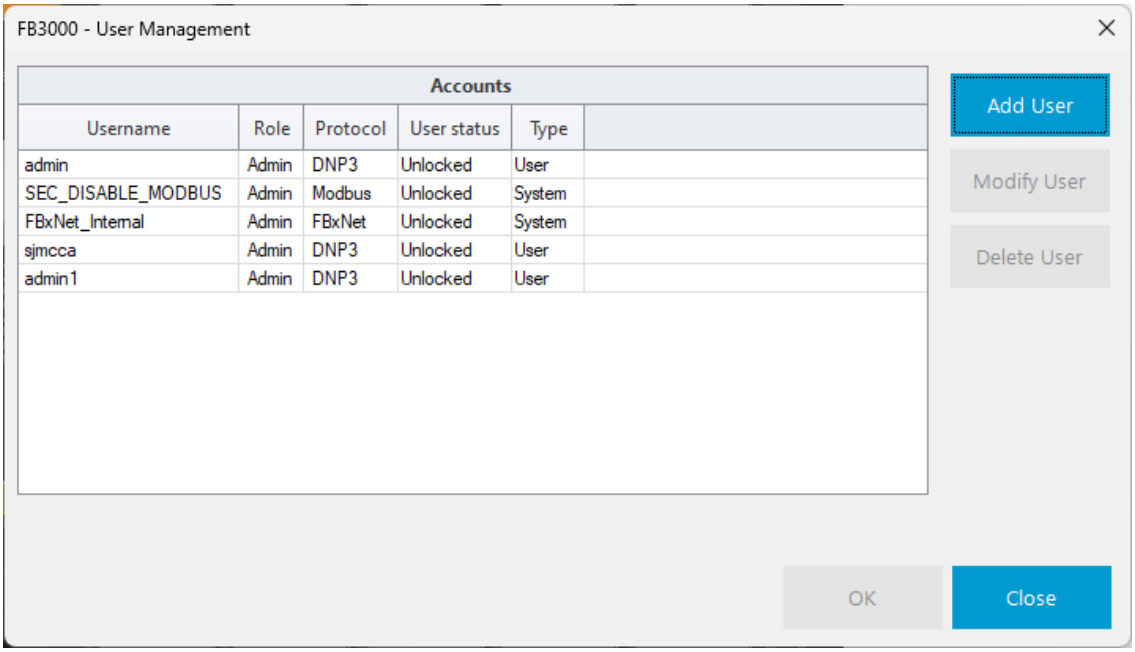
If you require changes to be made on-site **only**, configure the internal user accounts with a Role of Auditor. This prevents anyone from logging in remotely and changing your configuration. Refer to Roles for more information.

---

To access this display:

1. Select **Services > User Management** from the DeltaV FBxConnect configuration software main menu.

**Figure 469. User Management**




**2.** Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Accounts** | Shows a list of all currently configured user accounts on the FB Series product.<br>**Note**<br>The Accounts list shows internal user accounts **only** if a communications port is configured to use that particular internal user account. | |
| | **Username** | This **read-only** field shows the name configured for the user account. |
| | **Role** | This **read-only** field shows the organizational role assigned to the user account. Roles limit the access a user account has to the system. For example, the Admin role has full R/W access to parameters while the Auditor role has read-only access to parameters. For more information, refer to Roles. |

| Field | Description | |
|---|---|---|
| | **Protocol** | This **read-only** field shows what protocol type is used to log on to the FB Series product with the user account. Possible options are DNP3, Modbus, and FBxNet. |
| | **User Status** | This **read-only** field shows the status of the selected user account. Possible options are Unlocked and Locked. |
| | **Type** | Shows if the user account was created by a user (User) or is a default internal user account (System). |
| **Add User** | Select this button to add a new user account to the FB Series product. For more information, refer to Adding a User. | |
| **Modify User** | Select a user account from the Accounts list and select this button to modify the selected user account. For more information, refer to Modifying a User. | |
| **Delete User** | Select a user account from the Accounts list and select this button to remove the selected user account from the FB Series product. For more information, refer to Deleting a User. | |
| **OK** | Select this button to save any user account changes to FB Series product memory and exit the display. | |
| **Close** | Select this button to exit the display. | |

3. Select **Close** to exit this display.

## 5.11.1 Adding a User

You must first add a user account for them to be able to log in to the FB Series product. When adding a user account, you can configure the user name, password, and organizational role. The DeltaV FB3000 supports a total of 100 user accounts.

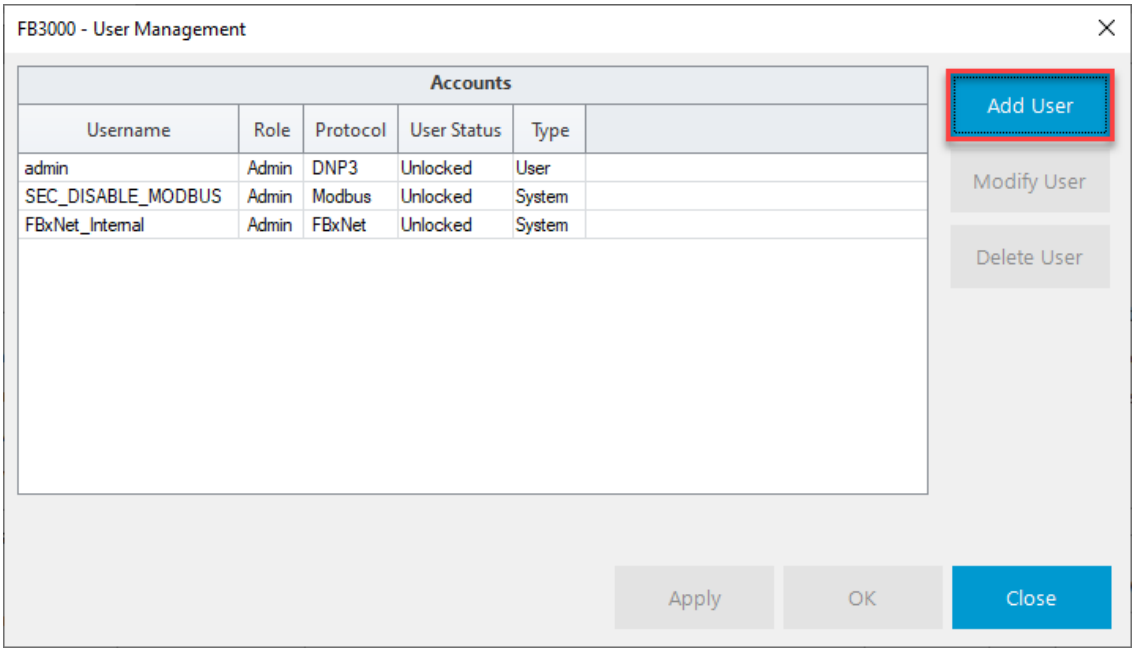
**Note**

The total number of user accounts includes the **does not** include the default user accounts.

To add a new user:

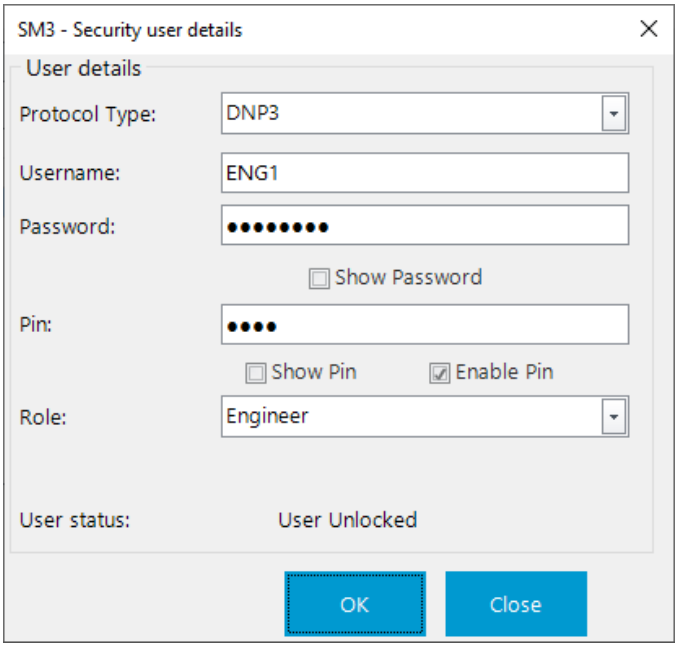
1. Select **Services > User Management** from the DeltaV FBxConnect configuration software main menu. The User Management display opens.

**Figure 470. User Management**




2. Select **Add User**. The Security user details display opens.

**Figure 471. Security user details**



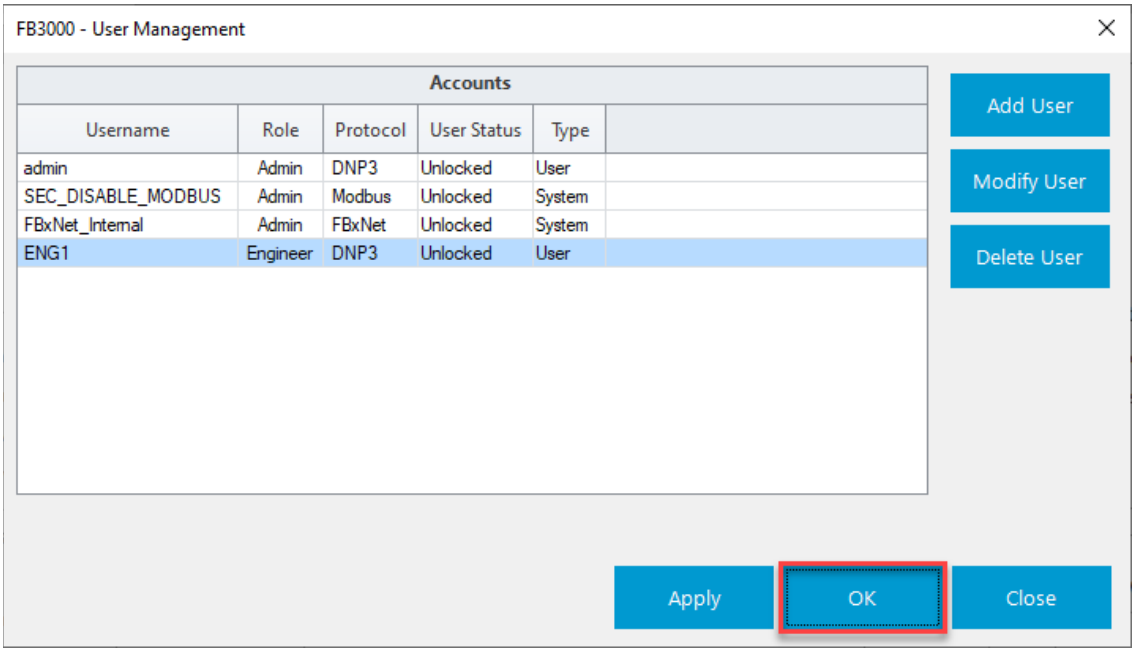

**3.** Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Protocol Type** | Click ▼ to select the what protocol type is used to log on to the FB Series product. Possible options are:<br>• DNP3 – Login through DeltaV FBxConnect configuration software or another DNP3 host.<br>• FBxNet – Login through FBxNet connections.<br>**Note**<br>If you are modifying an existing user account, this field is **read-only**. |
| **Username** | Enter a name for the new user account.<br>• DNP3 – Up to 30-alphanumeric characters.<br>• FBxNet – Up to 30-alphanumeric characters.<br>**Note**<br>If you are modifying an existing user account, this field is **read-only**. |

| Field | Description |
|---|---|
| **Password** | Enter a password for the new user account.<br>• DNP3 – Up to 32-alphanumeric characters.<br>• FBxNet – Up to 32-alphanumeric characters.<br>**Note**<br>The minimum password is set on the Security Management display. |
| **Show Password** | Place a check mark to display the characters entered in the Password field. |
| **Pin** | Enter up to four numerical characters to use as a personal identification number (Pin) for the selected user account. A Pin is used when you log in to a device through the LCD.<br>**Note**<br>• If you want a use account to use a PIN, you **must** place a check mark next to **Enable PIN**.<br>• This option is **only** applicable if select DNP3 in the Protocol Type field. |
| **Show Pin** | Place a check mark to display the characters entered in the Pin field. |
| **Enable Pin** | Place a check mark to enable the user account to log in through a device's LCD using the configured Pin. |
| **Role** | Click ▼ to assign an organizational role for the user account. Roles limit the access a user account has to the system. For example, the Admin role has full R/W access to parameters while the Auditor role has **read-only** access to parameters. For more information, refer to Roles. |
| **Localization Profile** | Click ▼ to assign a Localization profile to use when the selected user account logs in to the device. For more information, refer to Localization. |
| **User Status** | This **read-only** field displays the status of the selected user account. Possible options are User unlocked and User locked. |

4. Press **OK** to close the Security user details display. The User Management display opens showing the newly added user account in the Accounts frame.

**Figure 472. User Management**




5. Select **OK** to save your changes and close the User Management display.

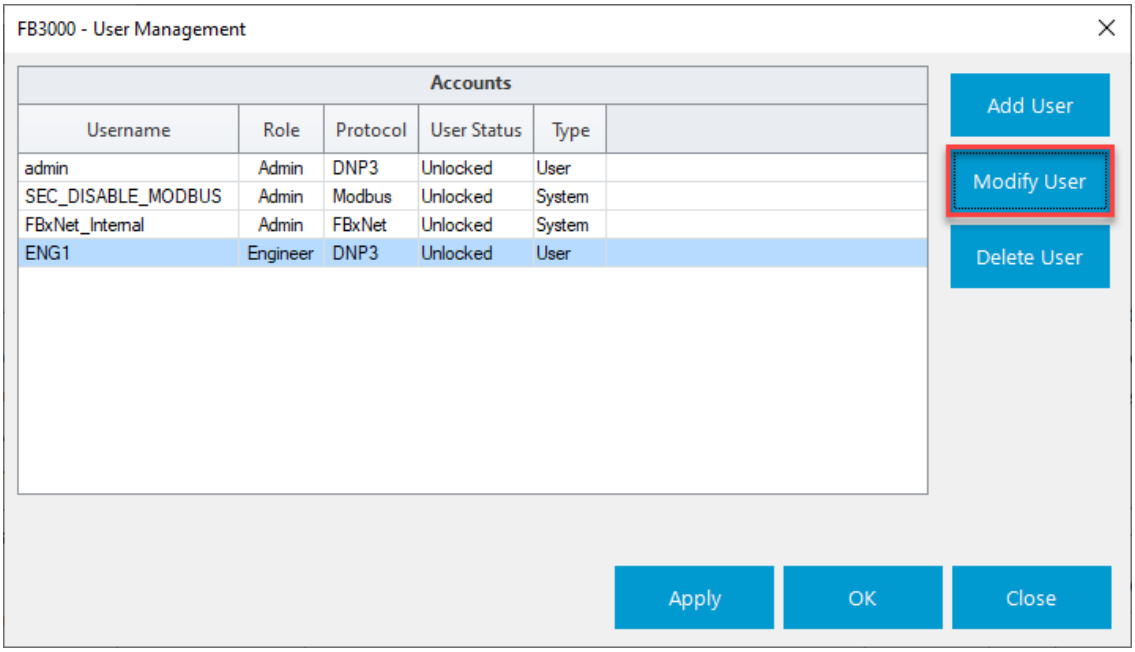
## 5.11.2 Modifying a User

Use this option to change the login details of a user account.

To modify a user:

1. Select **Services > User Management** from the DeltaV FBxConnect configuration software main menu. The User Management display opens.

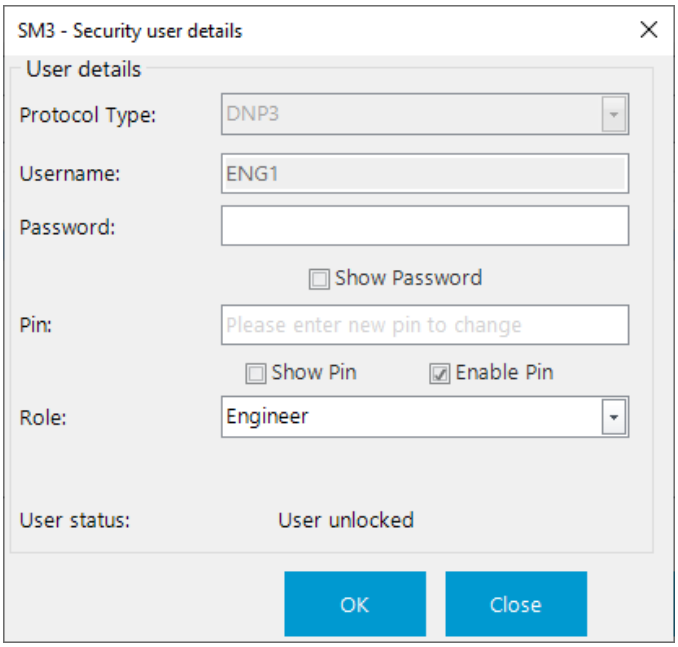
**Figure 473. User Management**




2. Select the user account whose login details you want to change.

3. Select **Modify User**. The Security user details display opens.

**Figure 474. Security User Details**



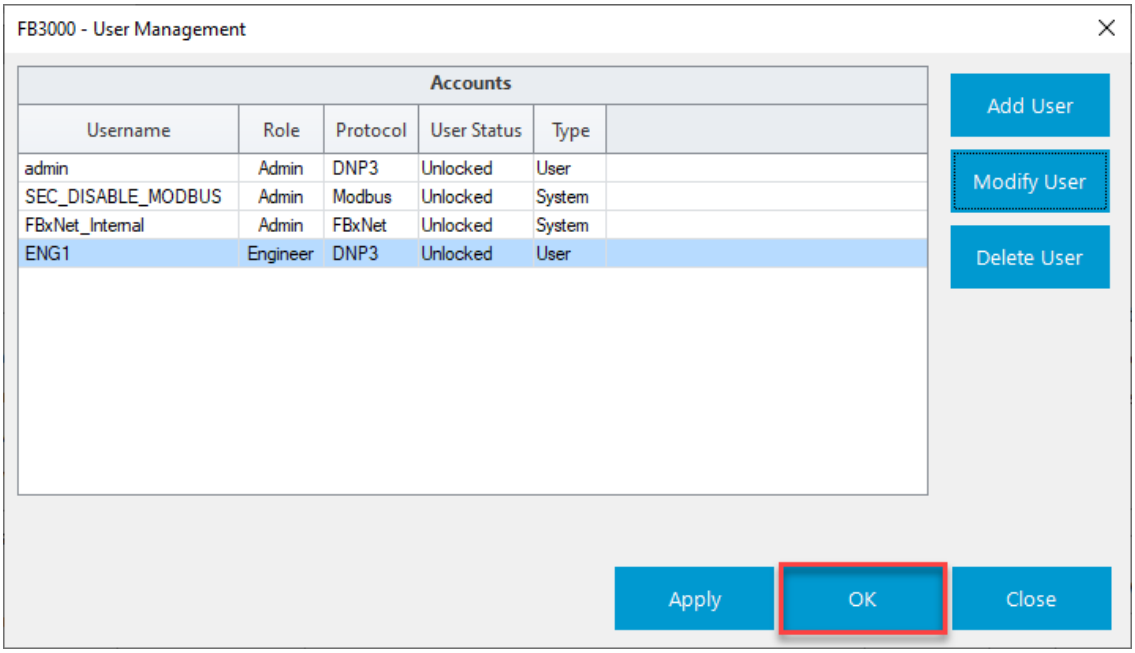
4. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Protocol Type** | Click ▼ to select the what protocol type is used to log on to the FB Series product. Possible options are:<br>• DNP3 – Login through DeltaV FBxConnect configuration software or another DNP3 host.<br>• FBxNet – Login through FBxNet connections.<br>**Note**<br>If you are modifying an existing user account, this field is **read-only**. |
| **Username** | Enter a name for the new user account.<br>• DNP3 – Up to 30-alphanumeric characters.<br>• FBxNet – Up to 30-alphanumeric characters.<br>**Note**<br>If you are modifying an existing user account, this field is **read-only**. |
| **Password** | Enter a password for the new user account.<br>• DNP3 – Up to 32-alphanumeric characters.<br>• FBxNet – Up to 32-alphanumeric characters.<br>**Note**<br>The minimum password is set on the Security Management display. |
| **Show Password** | Place a check mark to display the characters entered in the Password field. |
| **Pin** | Enter up to four numerical characters to use as a PIN for the selected user account. A Pin is used when you log in to a device through the LCD.<br>**Note**<br>• If you want a user to use a PIN, you **must** place a check mark next to **Enable PIN**.<br>• This option is **only** applicable if select DNP3 in the Protocol Type field. |
| **Enable Pin** | Place a check mark to display the characters entered in the Pin field. |
| **Show Pin** | Place a check mark to enable the user account to log in through a device's LCD using the configured Pin. |

| Field | Description |
|---|---|
| **Role** | Click ▼ to assign an organizational role for the user account. Roles limit the access a user account has to the system. For example, the Admin role has full R/W access to parameters while the Auditor role has **read-only** access to parameters. For more information, refer to Roles. |
| **User Status** | This **read-only** field displays the status of the selected user account. Possible options are User unlocked and User locked. |

5. Select **OK** when you are finished modifying the user account details. The display closes and DeltaV FBxConnect configuration software shows the User Management display.

**Figure 475. User Management**




6. Select **OK** to save your modifications and exit the User Management display.

## 5.11.3 Deleting a User

You can prevent users from logging into the FB Series product by removing their user accounts from the Accounts list.

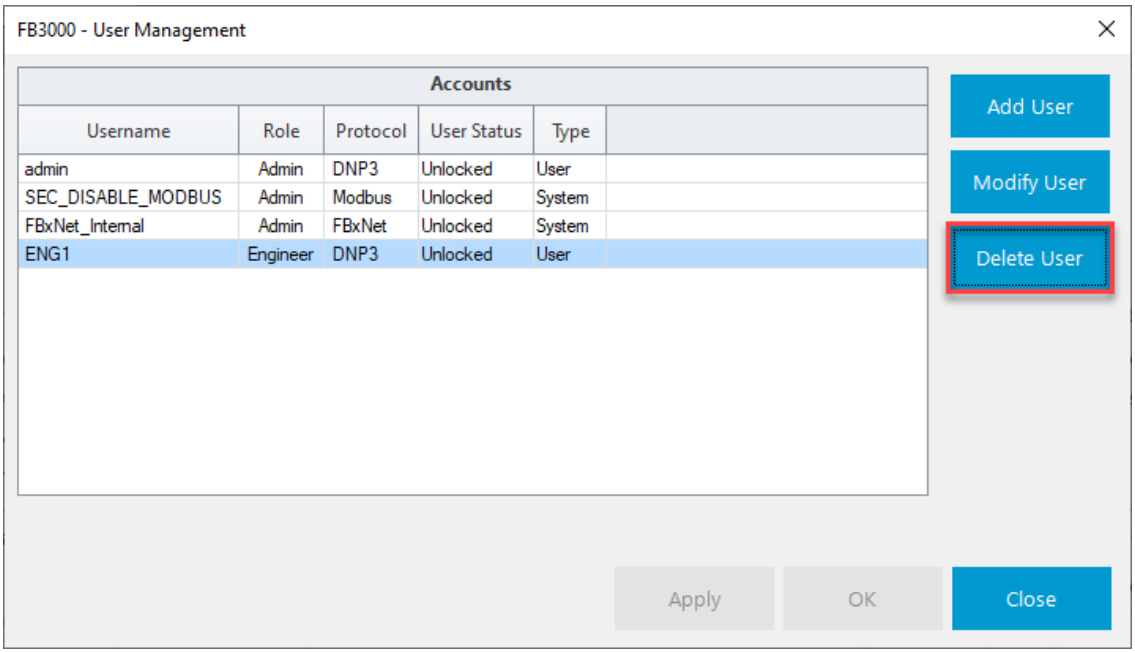
**Note**

You **cannot** delete the default user accounts from the Accounts list.

To delete a user:

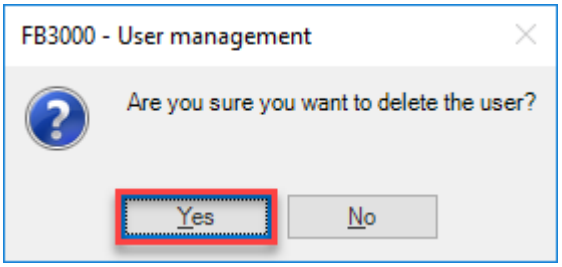
1. Select **Services > User Management** from the DeltaV FBxConnect configuration software main menu. The User Management display opens.

**Figure 476. User Management**



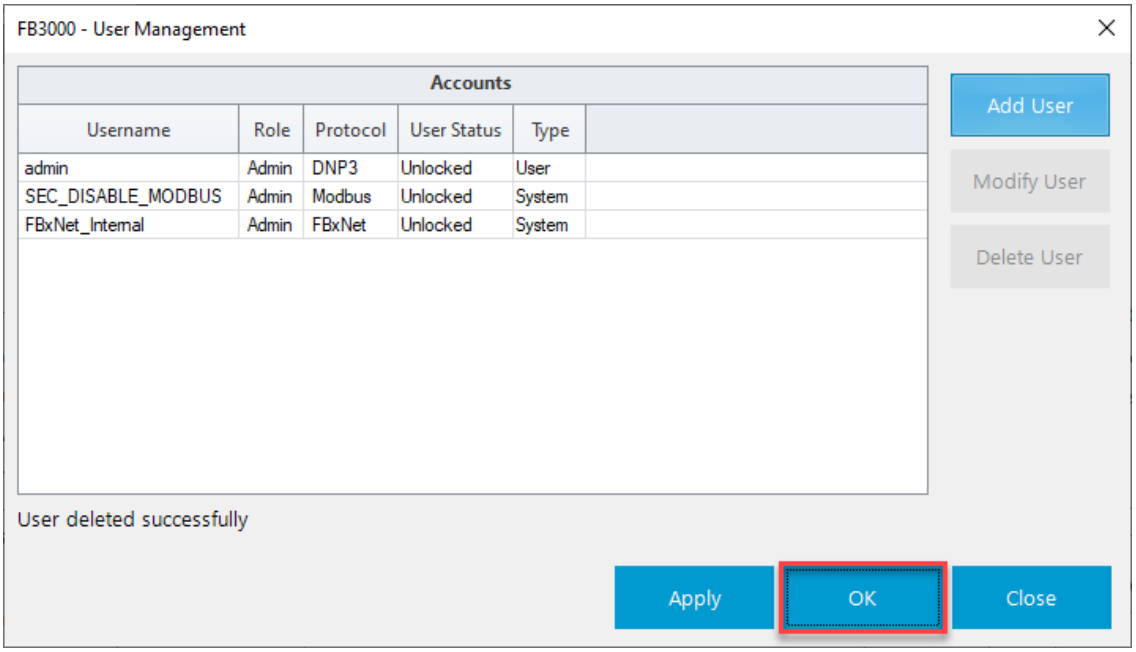

2. Select the user account you want to remove.
3. Select **Delete User**. A confirmation dialog opens.

**Figure 477. Delete User Confirmation**




4. Select **Yes**. The system removes the user account from the Accounts list.

**Figure 478. User Deleted Successfully**




5. Select **OK** to save your changes and exit the display.

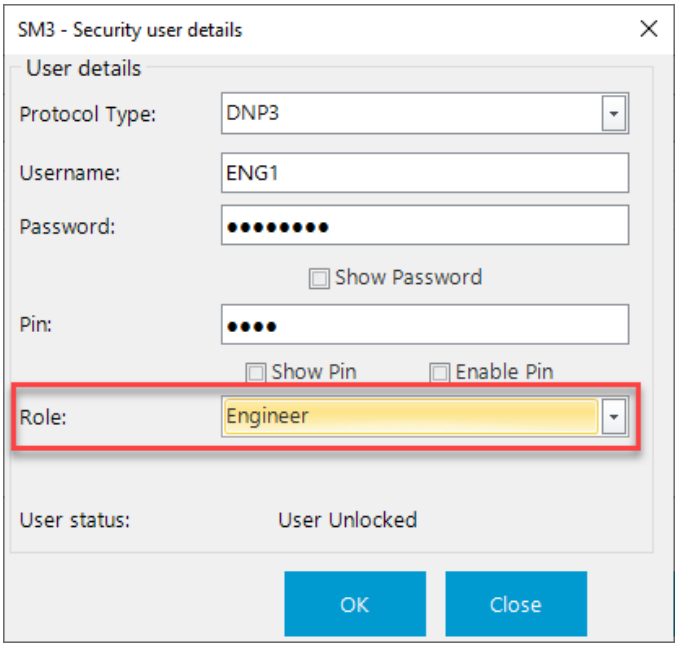
## 5.11.4 Roles

Roles control access to specific parameters in the FB Series product. You assign a "role" to each user account in DeltaV FBxConnect configuration software, and each parameter in the FB Series product also has a "role" attribute. For example, a user account with a role set to Admin has access to all read/write parameters in the FB Series product. A user account with a role set to Auditor has read-only access to all parameters in the FB Series product.

**Note**

- The role assigned to each parameter is detailed in the *DNP3 Protocol Specifications Manual (for the Emerson DeltaV FB3000 RTU)* (D301858X012).
- Functions not associated with one specific parameter (such as firmware update or configuration download) are controlled by Permissions. Use the Permissions display to configure which roles have access to perform these functions in DeltaV FBxConnect configuration software.

**Figure 479. Security User Details – Role**




The following table outlines the permissions available to each role:

**Note**

At least one user account needs to be assigned a role of **Admin**.

| Role | Description |
|---|---|
| **Admin** | Access to all R/W parameters; setup user accounts; download configurations; update firmware; update the FB Series product clock; collect data; clear alarms, events, history, and totals. |
| **Engineer** | Same access as Admin, but cannot setup user accounts or configure roles. |
| **Measurement Tech** | Same access as Engineer. |
| **Operator** | Access to collect data, adjust alarm limits, and permission to configure PID setpoints, modes, and manual output values. |
| **Auditor** | Access to **only** view data. |

# 5.12 Security Management

Use this pop-up display to configure password and login requirements for users logging into the FB Series product, and to configure which user roles have access to perform specific functions in the software.

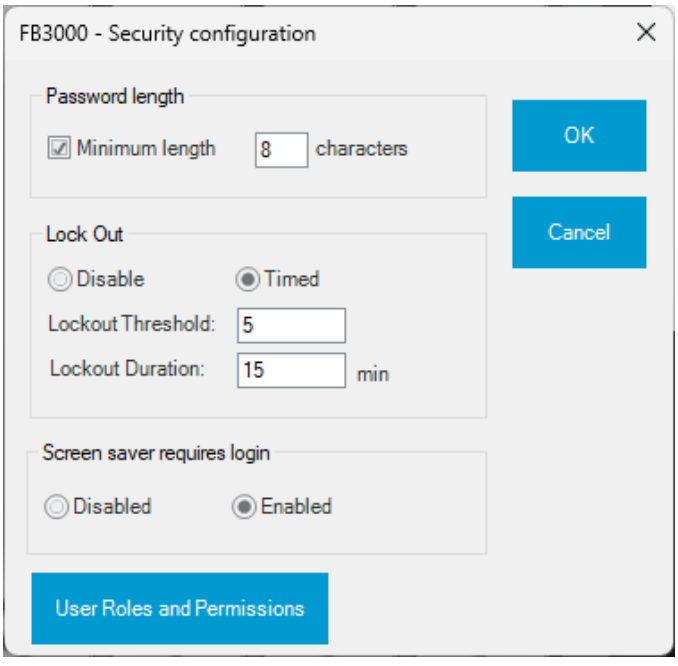
**Note**

Changes made to the Security Configuration display apply to **all** users on the FB Series product.

To access this display:

1. Select **Services > Security Management**. The Security Configuration display opens:

**Figure 480. Security Configuration**




2. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Password length** | Sets a required minimum number of characters for a valid user password. To enable this feature, place a check mark in the **Minimum length** field and enter the required number of characters in the **characters** field.<br>**Note**<br>• Modifying this field does not affect existing passwords.<br>• This field applies **only** to passwords set through DeltaV FBxConnect configuration software. | |
| **Lock Out** | The lock out feature prevents an account from logging in to an FB Series product if that account's credentials have been incorrectly entered a pre-configured number of times. | |
| | **Disabled** | Prevents a user from becoming locked out. |
| | **Timed** | Enables a user to be locked out for a configurable amount of time. |
| | **Note**<br>An alarm is active on the FB Series product for the Lock Out duration. | |
| **Lockout Threshold** | Sets the number of consecutive invalid login attempts that must occur before the account becomes locked. | |
| **Lockout Duration** | Sets the length of time (in minutes) you must wait after being locked out before you can successfully log in.<br>**Note**<br>You can cancel the Lockout Duration by restarting the FB Series product. | |
| **Screen saver requires login** | Select **Enabled** to require a user name and password to be entered when waking from the sleep mode. | |
| **User Roles and Permissions** | Select to open the Permissions pop-up and configure which user Roles have access to specific functions in the software. | |

3. Select **OK** to save any changes and close this display.

## 5.12.1 Permissions

Permissions allow you to control access to functions not associated with one specific parameter in the FB Series product (such as firmware update or configuration download).

Use this display to configure which user roles have access to perform these functions in DeltaV FBxConnect configuration software.

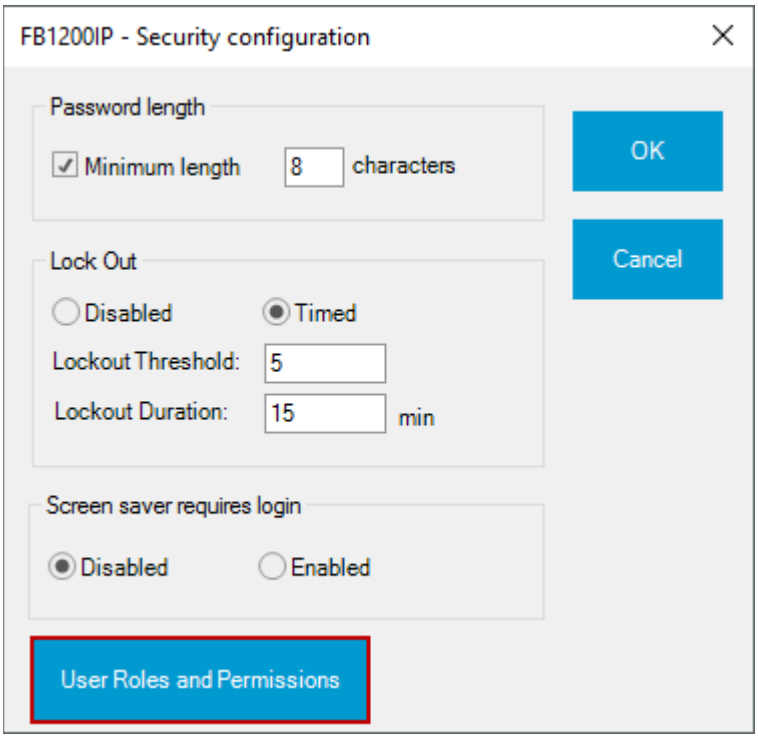
**Note**

- Refer to Roles for more information about which roles have access to what parameters in the FB Series product.
- Refer to User Management to configure which role is assigned to a user.

To access this display:

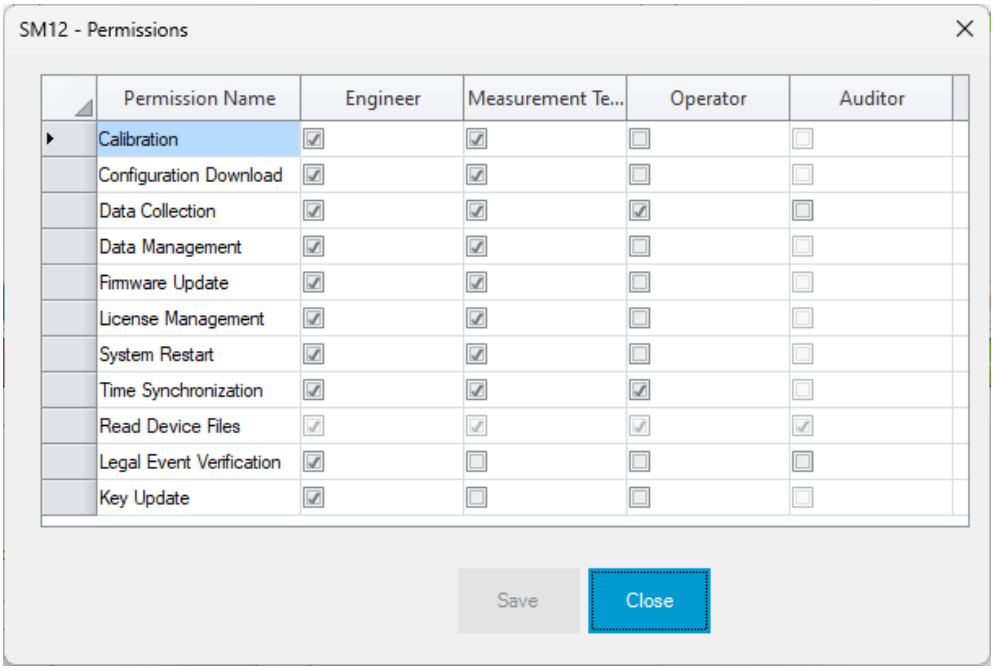
1. Select **Services > Security Management**. The Security Configuration display opens:

**Figure 481. Security Configuration**




2. Select **User Roles and Permissions**. The Permissions display opens:

**Figure 482. Permissions**




3. To grant functional permissions to user roles, place a check mark in the user role column for each Permission Name. In the graphic above, the Engineer and Measurement Tech have permission to all system functions, while the Operator has permissions only for Data Collection, Time Synchronization, and Read Device Files. Any user you assign to those roles have those permissions.

   Functions associated with each Permission Name are as follows:

| Permission Name | Description |
|---|---|
| **Calibration** | Allows you to calibrate an input, verify a calibration, reset a calibration, set zero shift, and perform a plate change. |
| **Configuration Download** | Allows you to download a configuration to the FB Series product.<br>**Note**<br>You must also select **Data Management** for a user role to be able to successfully download a configuration. |
| **Data Collection** | Allows you to create history, alarm, and event reports from the FB Series product; access the Upload Custom Reports display. |

| Permission Name | Description |
|---|---|
| **Data Management** | Allows you to create diagnostic reports and clear alarm, event, and history data from the FB Series product; access the Custom Reports menu options. |
| **Firmware Update** | Allows you to update the firmware on the FB Series product.<br>**Note**<br>You must also select **Data Management** for a user role to be able to successfully apply a update firmware. |
| **License Management** | Allows you to add and remove product licenses from the FB Series product. |
| **System Restart** | Allows you to perform a warm or cold start on the FB Series product. |
| **Time Synchronization** | Allows you to adjust the clock on the FB Series product. |
| **Read Device Files** | Allows you **read-only** access to the files stored on the FB Series product. |
| **Legal Event Verification** | Allows you to verify the configuration of the FB Series product. |
| **Key Update** | Allows you to enable/disable Active Directory, apply a security file, disable an SAv5 key, and enable/disable remote SAv5 Key updates. |

4. Select **Save** to save any changes you make to this display
5. Select **Close** to return to the previous display.

## 5.13 Device License

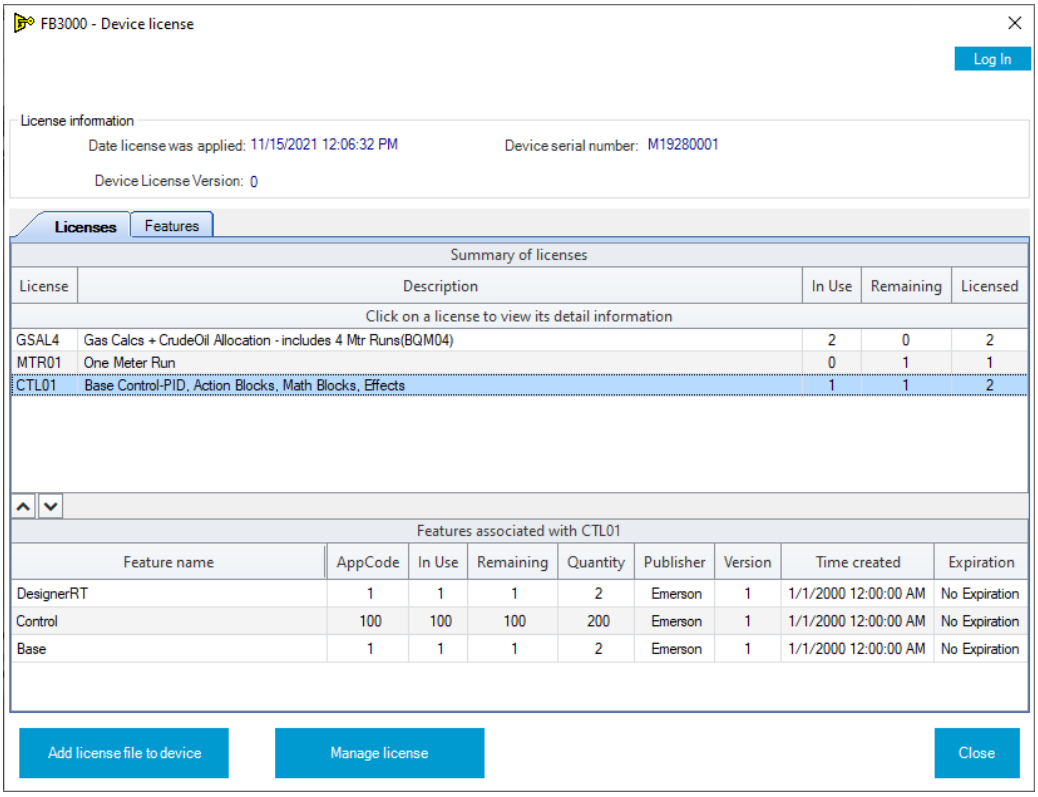
Use the Device License pop-up display to view products licensed on your DeltaV FB3000 RTU, add a previously downloaded license file to your DeltaV FB3000 RTU, or login to Licensing Tool to manage licenses for your device.

The Device License display has two tabs (Products and Features), and each tab is split into an upper (Summary of Products/Features) and lower (Associated Products/Features) section. Select a Product or Feature in the upper section to display the corresponding product or features in the lower section.

To access this display:

1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 483. Device License**




2. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Sign in** | Select to login to Licensing Tool and manage the software licenses assigned to your account. | |
| **License Information** | Show information related to the license installed on your FB Series product. | |
| | **Date license was applied** | This **read-only** field shows the date and time the license was added to the FB Series product. |
| | **Device License Version** | This **read-only** field shows the license version currently installed in the FB Series product. |

| Field | Description | |
|---|---|---|
| | **Device serial number** | This **read-only** field shows the serial number of the currently connected FB Series product. |
| **Summary of Licenses / Features** | Shows a table of licenses/features currently assigned to the DeltaV FB3000 RTU. Each row of the table contains information specific to the license/feature described in that row. Select on a Licenses/Features row to view information about the associated product/features in the section below. | |
| | **Product Name** | This **read-only** field shows the code of the product licensed on the FB Series device.<br>**Note**<br>This column appears **only** for the Products tab. |
| | **Description** | This **read-only** field shows a description of the product/feature licensed on the FB Series device. |
| | **In Use** | This **read-only** field shows the number of product/features currently used by the FB Series product. |
| | **Remaining** | This **read-only** field shows the number of product/features not currently used by the FB Series product. |
| | **Licensed** | This **read-only** field shows the total number of product/features licensed on the FB Series product. |
| **Features Associated with a Product/ Products Associated with a Feature** | Shows the information for the product or feature selected in the Summary section. | |
| | **Feature Name/ Product Name** | This **read-only** field shows the product name or feature description associated with the product/feature selected in the Summary section. |
| | **AppCode** | This **read-only** field shows a code the vendor or developer has associated with the particular application. Refer to the vendor's application documentation for a meaning of the application code.<br>**Note**<br>Do not mistake the AppCode for the license quantity. |

| Field | Description | |
|---|---|---|
| | **In Use** | This **read-only** field shows the number of a product/feature currently used by the FB Series product. |
| | **Remaining** | This **read-only** field shows the allowed number of a product/feature not currently used by the FB Series product. |
| | **Quantity** | This **read-only** field shows the total number of a product/feature available of the FB Series product. |
| | **Publisher** | This **read-only** field shows the organization who issued the license for a product/feature. |
| | **Version** | This **read-only** field shows the revision level of the product/feature. |
| | **Time Created** | This **read-only** field shows the date and time the license was created for a product/feature. |
| | **Expiration** | This **read-only** field shows the date and time the license will expire for a product/feature. |
| **Add license file to device** | Select to add a license file to your DeltaV FB3000 RTU.<br>**Note**<br>License files are downloaded from the Emerson license website. For more information, refer to Add License File to Device. | |
| **Manage license** | Select to log in to Licensing Tool (if not already logged in) and open the License Management display. The License Management display allows you to move product licenses between Licensing Tool servers and the FB Series product. For more information, refer to License Management. | |
| **Close** | Click to close the Device License display. | |

## 5.13.1 Add a License File to Device

Use this option to add a previously downloaded license file to your DeltaV FB3000.

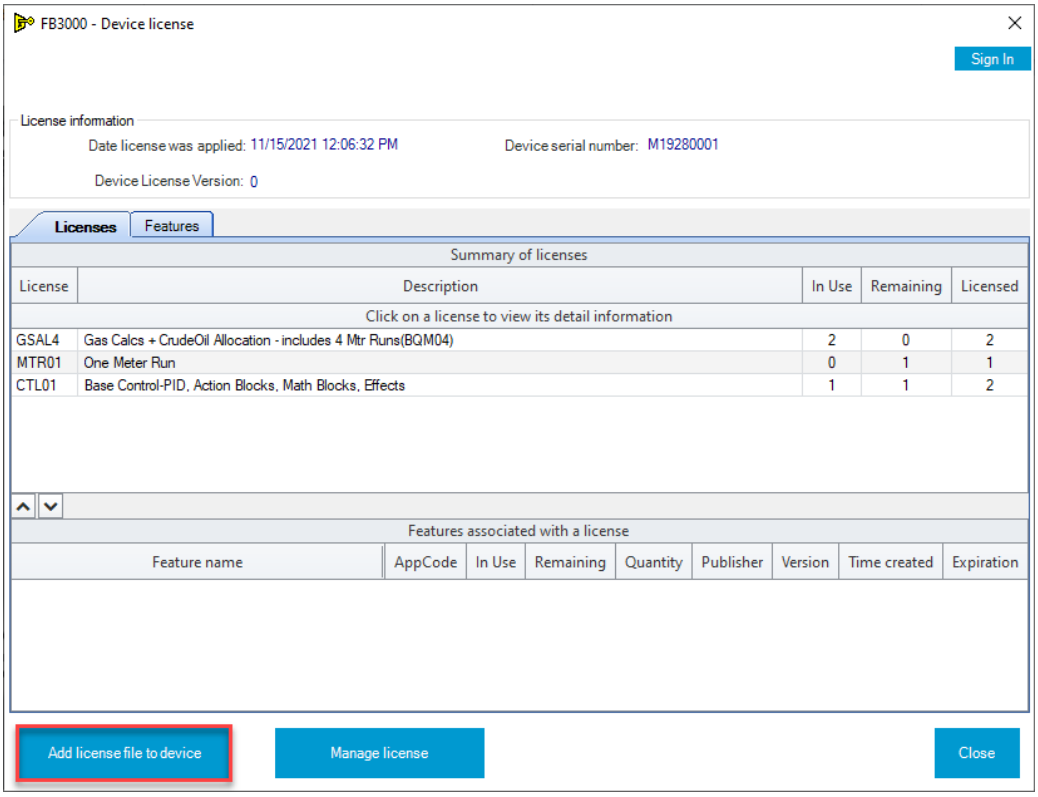
**Note**

You can download a license file through Licensing Tool.

To add a license file to your device:

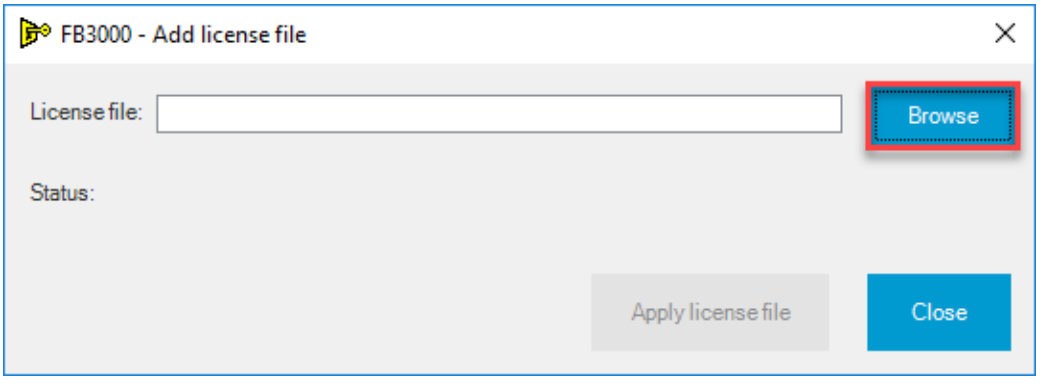
1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 484. Device License**



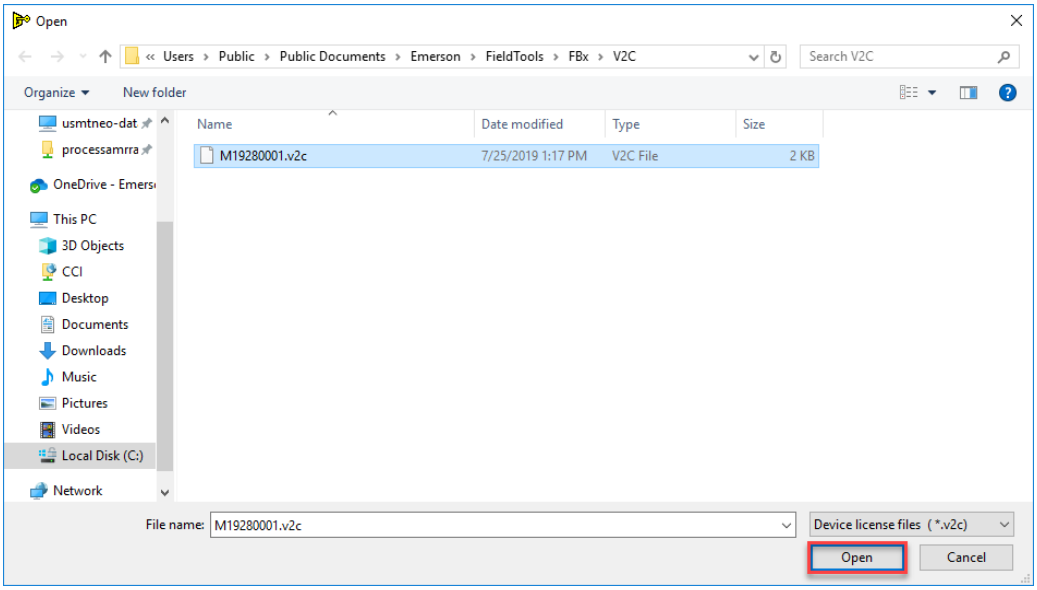

2. Select **Add license file to device**. The Add license file pop-up opens.

**Figure 485. Add license file**



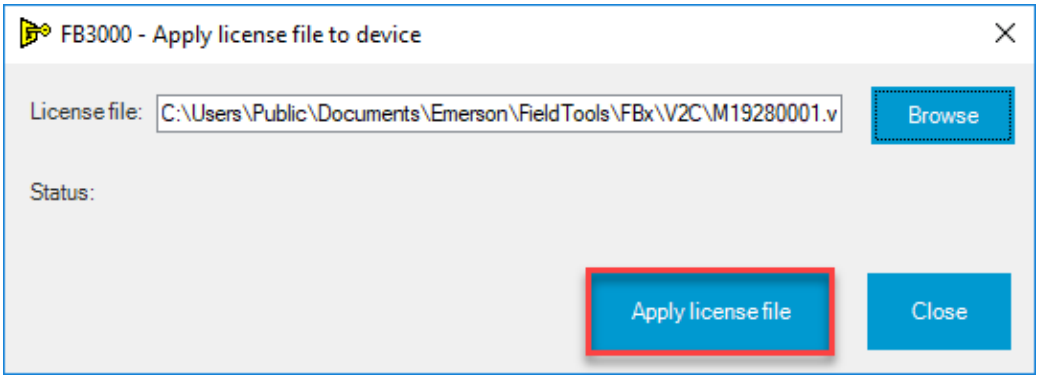

3. Select **Browse**. A file window dialog opens.

**Figure 486. Add license file**



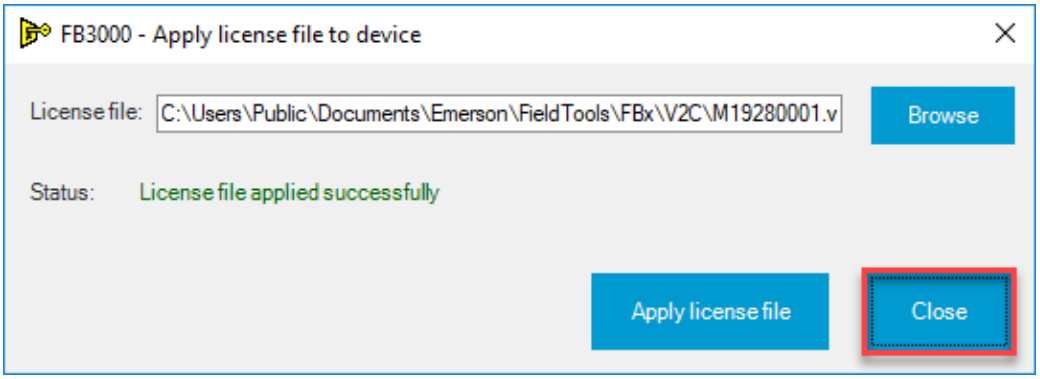

4. Navigate to the location of the downloaded license file on your PC, select the file, and then select **Open**.

**Figure 487. Add license file**




5. Select **Apply license file** to add the selected license file to your device. The system applies the license to your device and updates the Status field.

**Figure 488. License File Applied Successfully**




6. Select **Close** to return to the previous screen.

## 5.13.2 License Management

The License Management pop-up display allows you move product licenses between Licensing Tool and the FB Series product. After you make a change to the products licensed to your FB Series device, a new license file is downloaded from Licensing Tool servers and applied to your device.

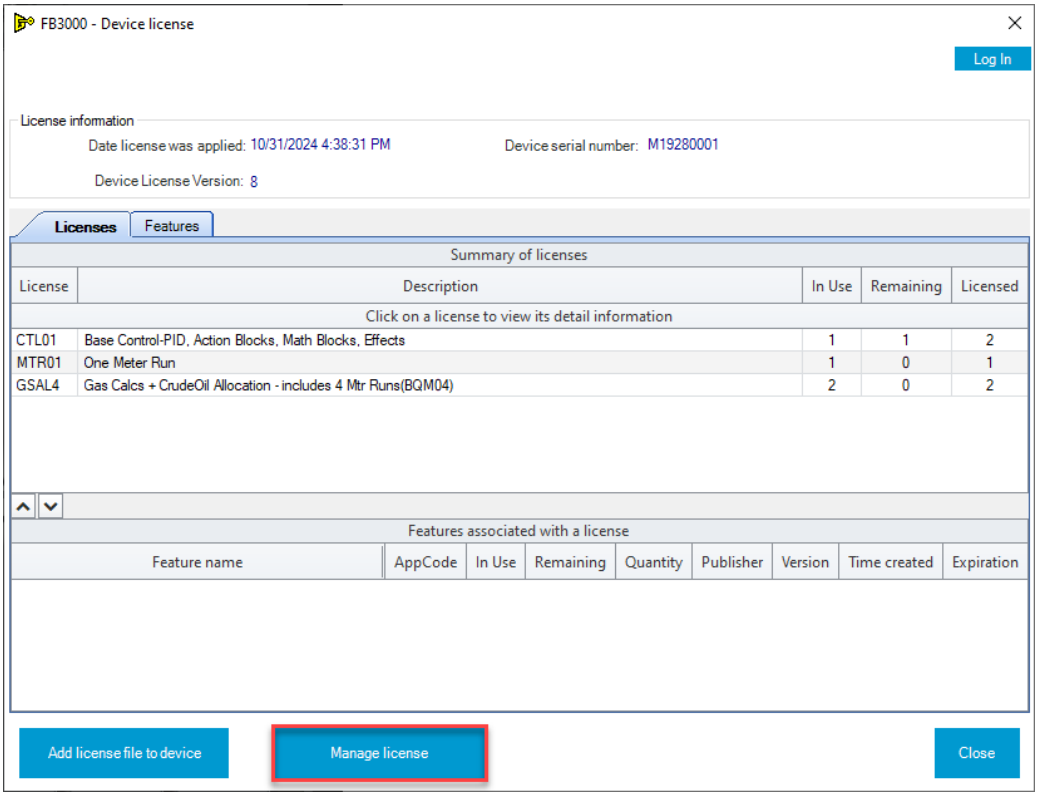
**Note**

If the license information becomes corrupt on your device, use the **Restore** feature to download and apply a new license file based on the information stored in Licensing Tool servers.

To open the License Management pop-up display:

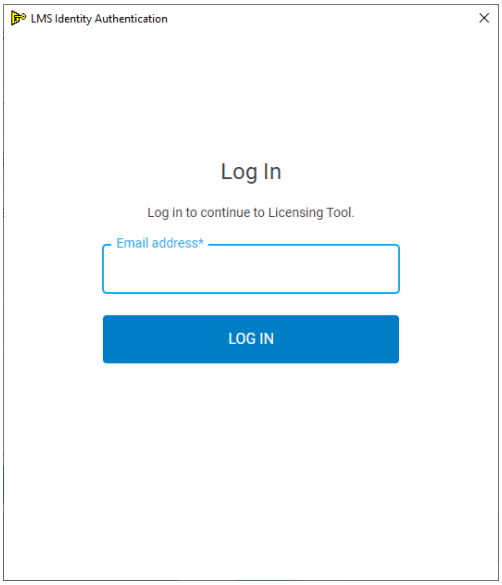
1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 489. Device License**



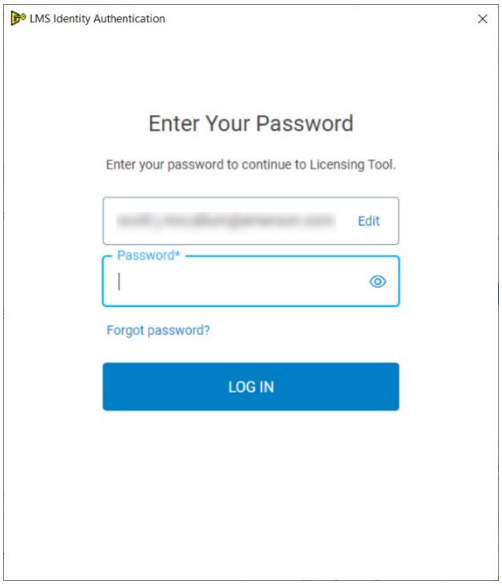

**2.** Select **Manage license**. The Licensing Tool log in dialog opens.

**Figure 490. Licensing Tool Log In – Email address**



3. Enter the e-mail address required to log in to Licensing Tool, and select **LOG IN**.

**Figure 491. Licensing Tool Log In – Password**

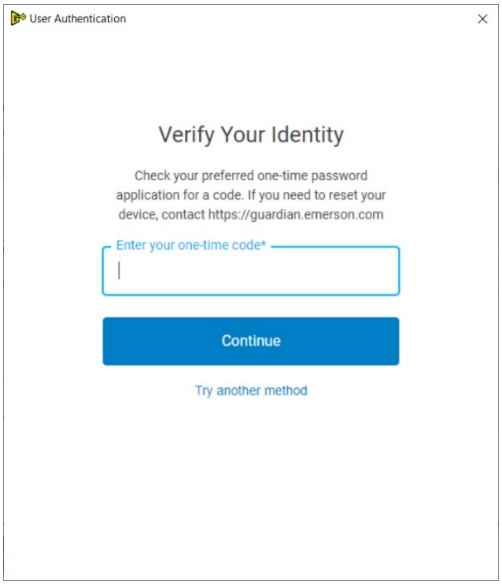



4. Enter the password required to login to Licensing Tool, and select **LOG IN**. A User Authentication dialog opens.

**Note**

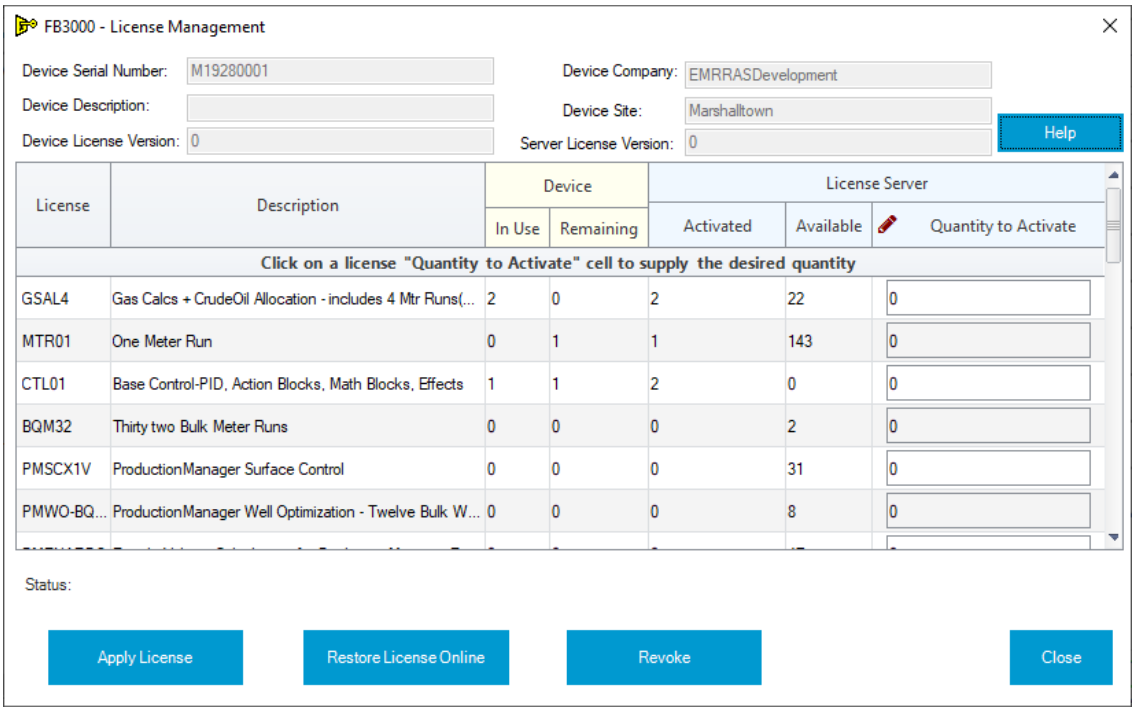
If this is your first time logging in, then a QR code appears. Scan the QR code in your preferred authenticator app and enter the provided one-time code.

**Figure 492. Licensing Tool Log In – User Authentication**




5. Enter the code from your preferred authenticator app and select **Continue**. The License Management pop-up display opens.

**Figure 493. License Management**




6. Review – and change as necessary – the values in the following fields:

| Field | Description | |
|---|---|---|
| **Device Serial Number** | This **read-only** field shows the serial number of the currently connected FB Series product. | |
| **Device Description** | This **read-only** field shows the tag of the currently connected FB Series product. | |
| **Device License Version** | This **read-only** field shows the license version currently installed in the FB Series product. | |
| **Device Company** | This **read-only** field shows the name of your company as configured in Licensing Tool. | |
| **Device Site** | This **read-only** field shows the name of your company as configured in Licensing Tool. | |
| **Server License Version** | This **read-only** field shows the license version available in the Licensing Tool server. | |
| **Help** | Select to open the online help for the License Management display. | |
| **License** | This **read-only** field shows the product code for a software application/feature assigned to the selected site. | |
| **Description** | Shows an explanation of the product code. | |
| **Device** | These columns show the products currently activated on your FB Series product. | |
| | **In Use** | This **read-only** field shows the number of products currently activated and being used by the FB Series product. |
| | **Remaining** | This **read-only** field shows the number of products activated, but **not** currently being used by the FB Series product. |
| **License Server** | These columns show products currently available for your FB Series product through the License Tool servers. | |
| | **Activated** | This **read-only** field shows the number of licenses currently activated. |
| | **Available** | This **read-only** field shows the number of products on Licensing Tool servers that are availble to activate. |
| | **Quantity to Activate** | In the row for the product you want to activate, double click this field and enter the number of licenses to assign to the FB Series product. |

| Field | Description |
|---|---|
| **Apply License** | Select to activate the products you configured in the Quantity to Activate column, download, and then apply a new license file to your FB Series product. For more information, refer to Add a Product License from Licensing Tool. |
| **Restore License Online** | Select to download and apply a new license file based on the information associated with your serial number that is stored in the Licensing Tool servers. For more information, refer to Restore License Info from Licensing Tool. |
| **Revoke** | Select to open the License Revocation pop-up display and remove products currently activated on your FB Series product, transfer them to Licensing Tool servers, and download a new license file. For more information, refer to Remove a Product License. |
| **Close** | Select **Close** to return to the previous display. |

7. Select **Close** to return to the Device License pop-up display.

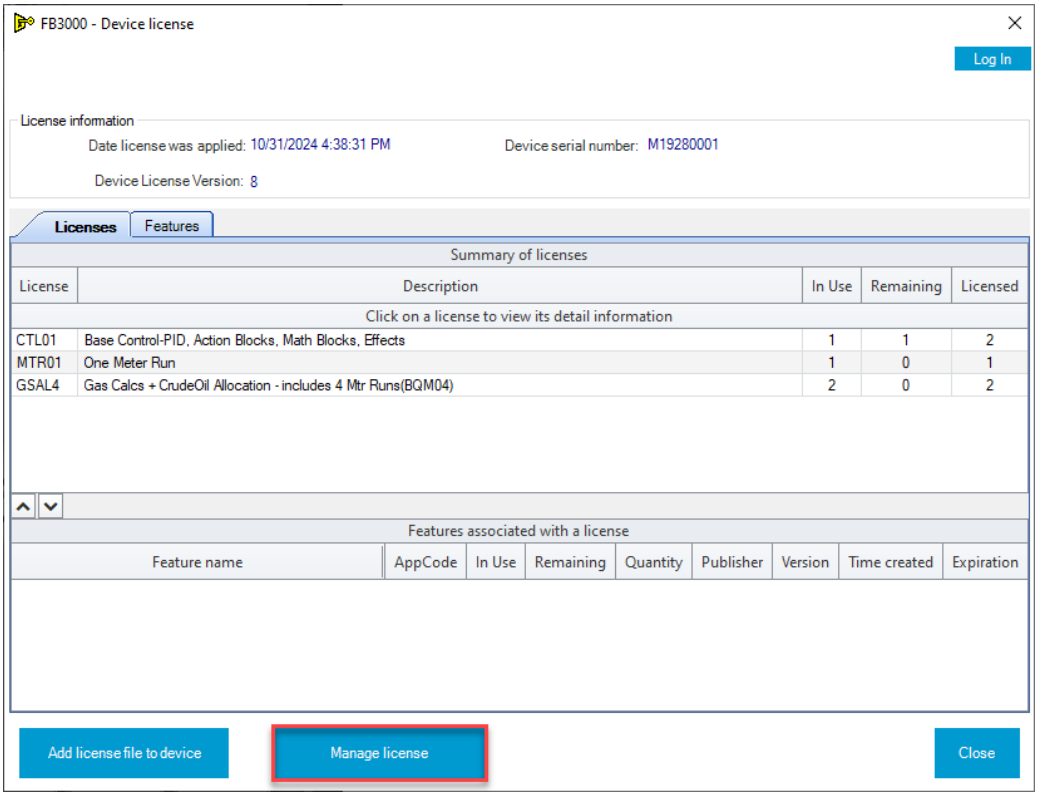
### 5.13.2.1 Add a Product License from Licensing Tool

You can login to the Licensing Tool directly from within DeltaV FBxConnect configuration software. This allows you to add products and features to your FB Series product, download a new license file from the Licensing Tool servers, and apply the new license file to your device.

To add a product license from Licensing Tool:

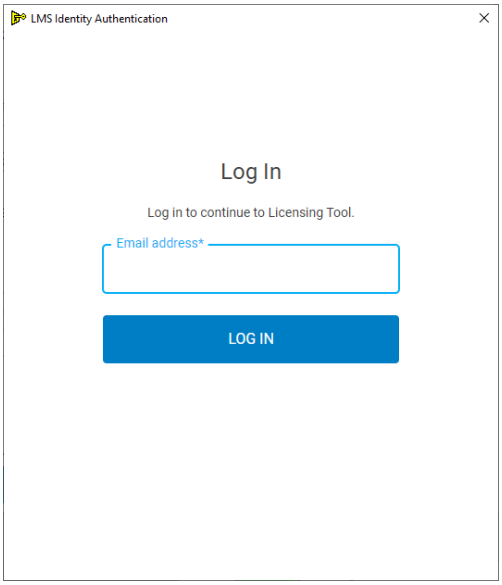
1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 494. Device License**



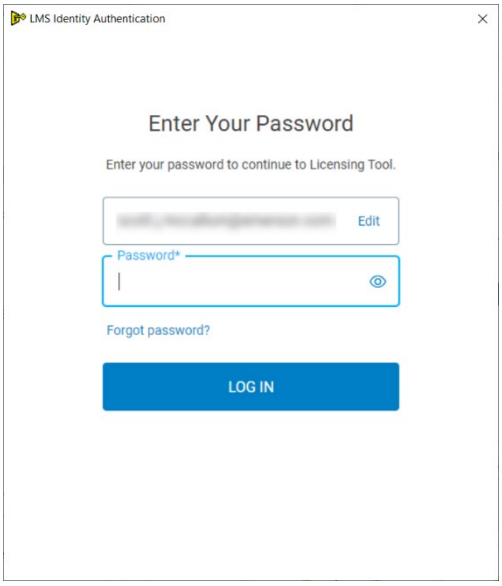

**2.** Select **Manage license**. The Licensing Tool log in dialog opens.

**Figure 495. Licensing Tool Log In – Email address**



3. Enter the e-mail address required to log in to Licensing Tool, and select **LOG IN**.

**Figure 496. Licensing Tool Log In – Password**

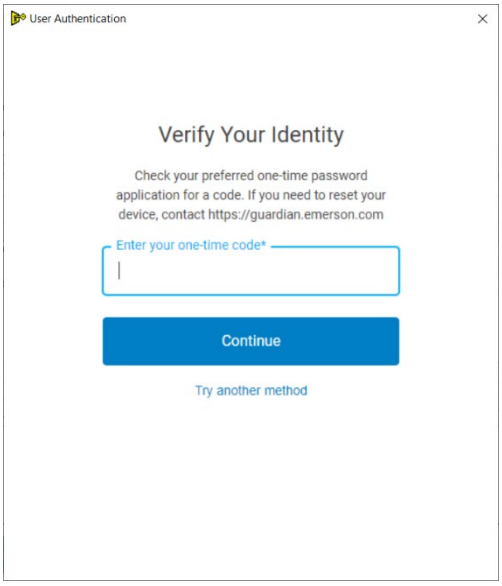



4. Enter the password required to login to Licensing Tool, and select **LOG IN**. A User Authentication dialog opens.

**Note**

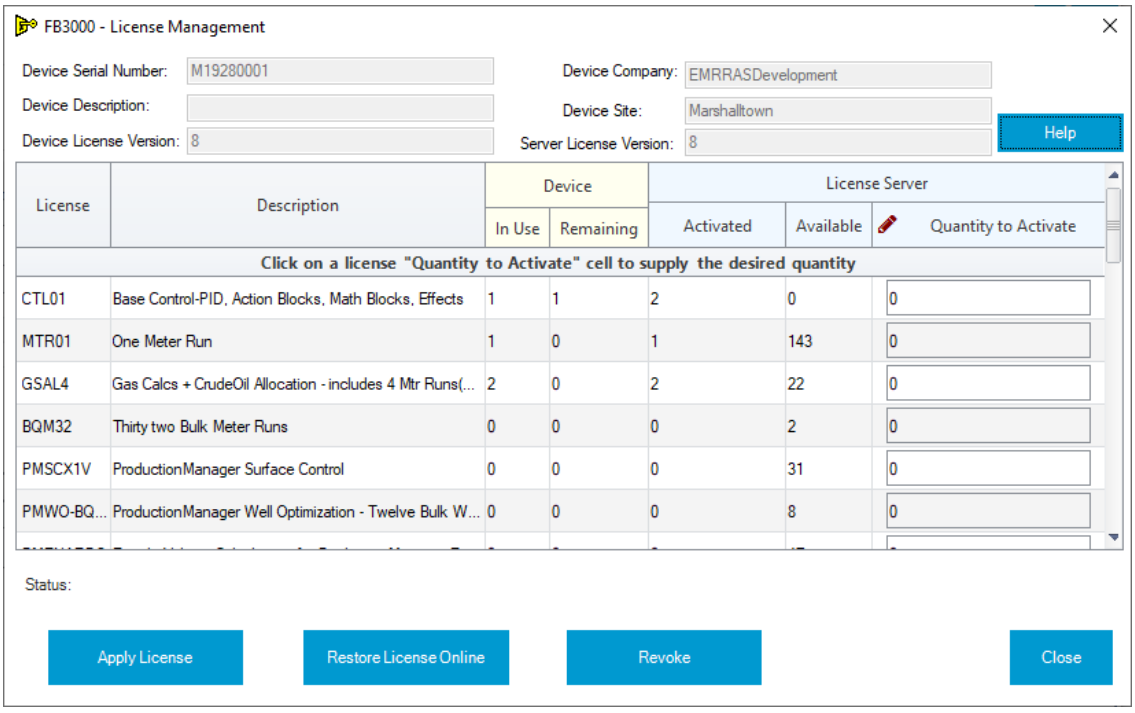
If this is your first time logging in, then a QR code appears. Scan the QR code in your preferred authenticator app and enter the provided one-time code.

**Figure 497. Licensing Tool Log In – User Authentication**



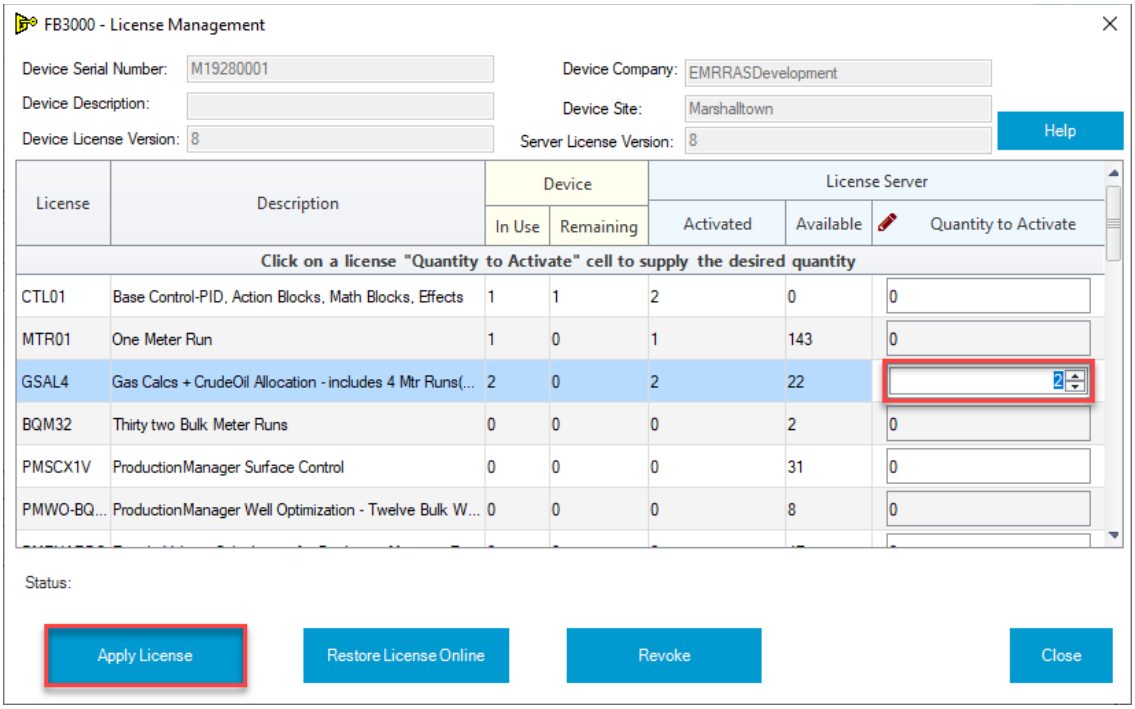

5. Enter the code from your preferred authenticator app and select **Continue**. The License Management pop-up display opens.

**Figure 498. License Management**



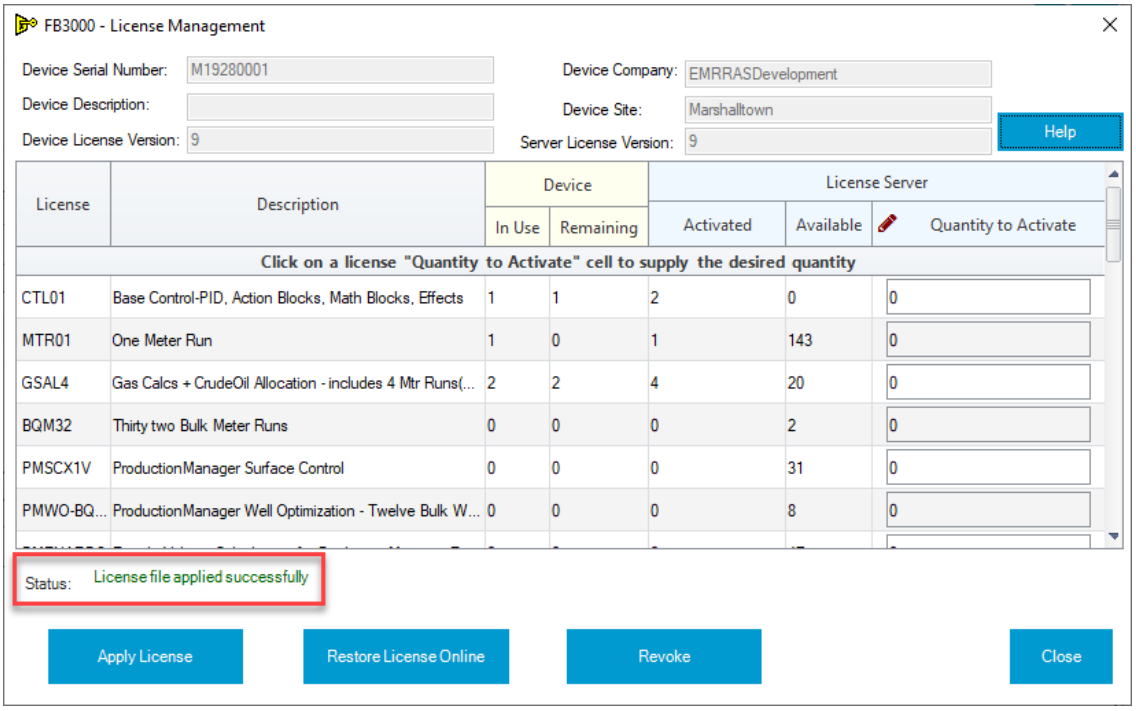
6. The **Device** columns show the products currently licensed on your device. The **License Server** columns show products currently available for your device through Licensing Tool. In the row for the product you want to activate, select the **Quantity to Activate** column and enter the number of licenses to assign to the serial number of the connected FB Series product.

**Figure 499. Apply License**



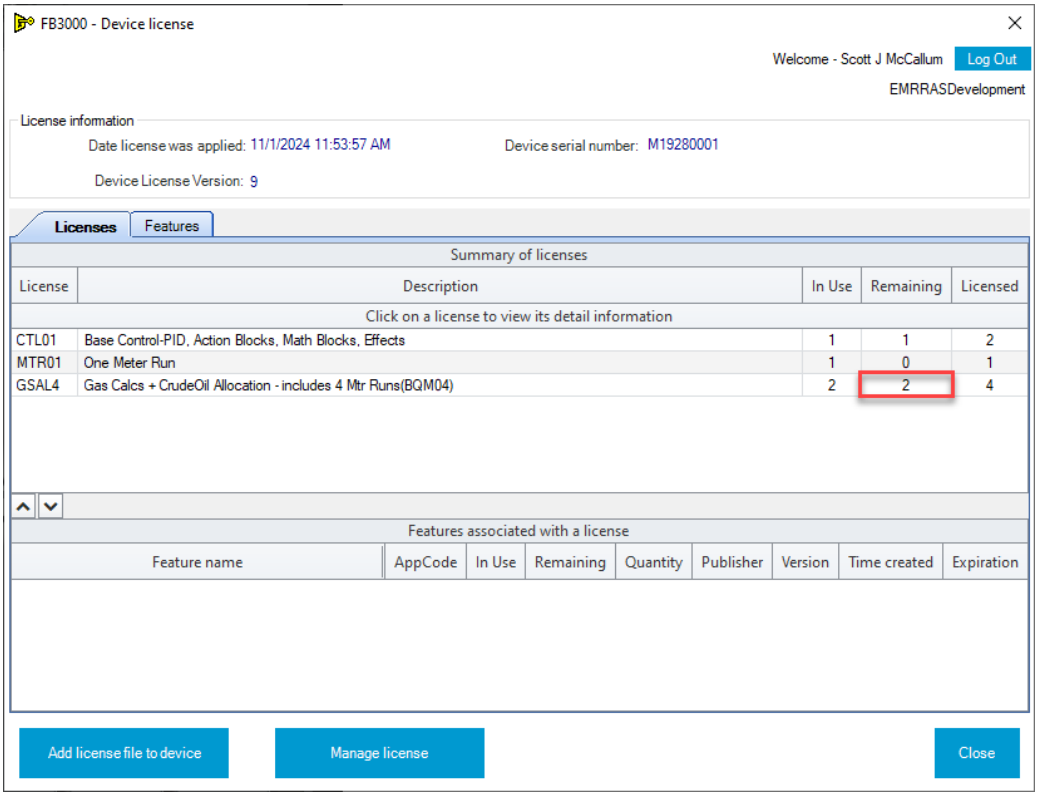

7. Select **Apply License** to activate the selected product/feature on your FB Series product. The system downloads a new license file and applies it to the FB Series product. When the transfer is complete, the Status field shows **License file applied successfully**.

**Figure 500. License File Applied Successfully**




8. Select **Close** to exit the License Management display. The Device License display now shows the new license on your FB Series product.

**Figure 501. Device License**



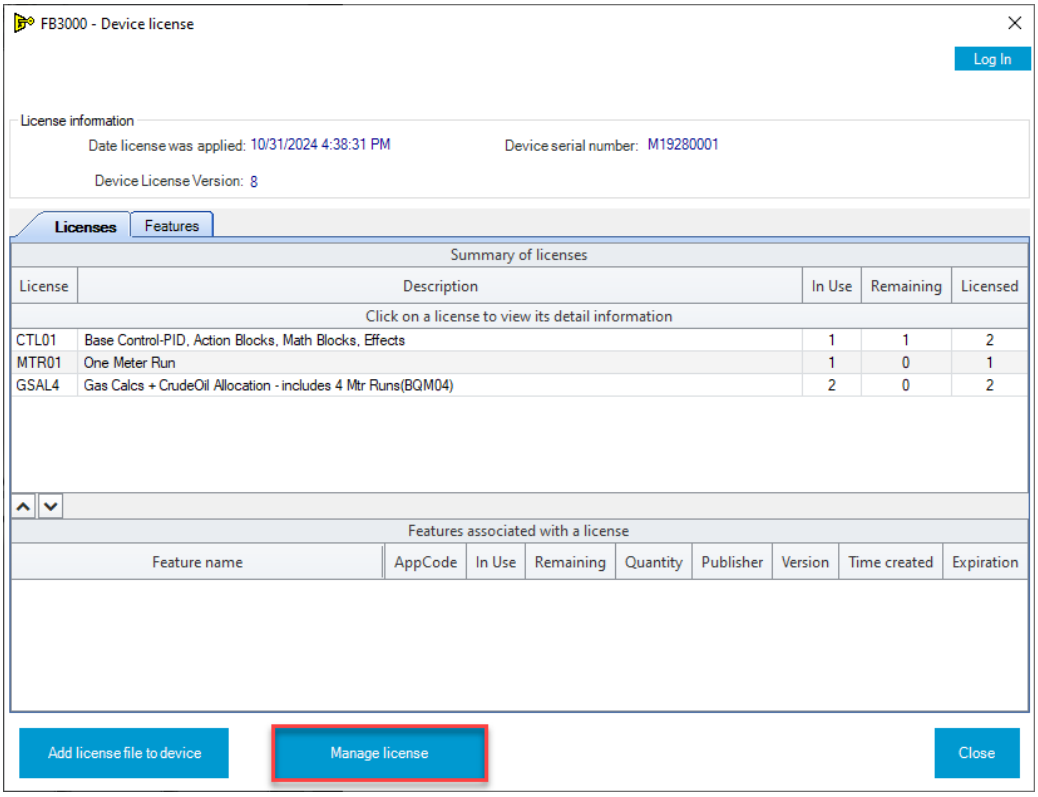

## 5.13.2.2 Restore License Info from Licensing Tool

Use this feature to download and apply a new license file based the information stored in Licensing Tool servers for your FB Series product's serial number.

To restore a license:

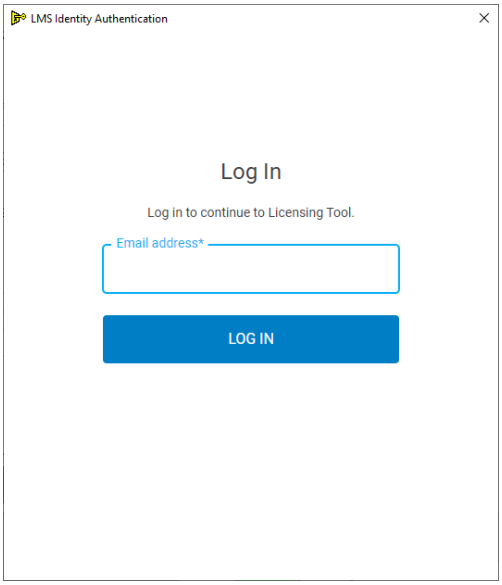
1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 502. Device License**



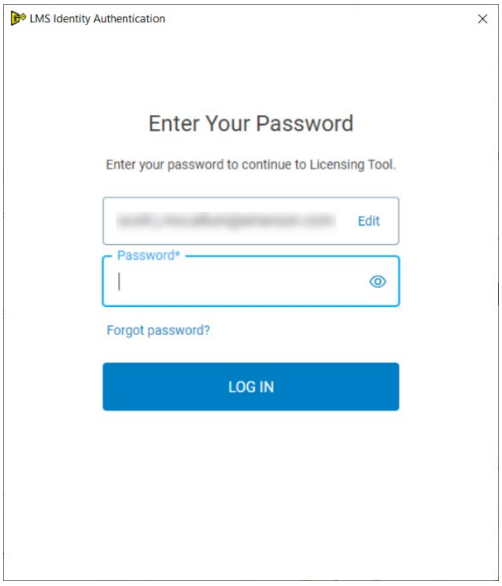

**2.** Select **Manage license**. The Licensing Tool log in dialog opens.

**Figure 503. Licensing Tool Log In – Email address**



3. Enter the e-mail address required to log in to Licensing Tool, and select **LOG IN**.

**Figure 504. Licensing Tool Log In – Password**

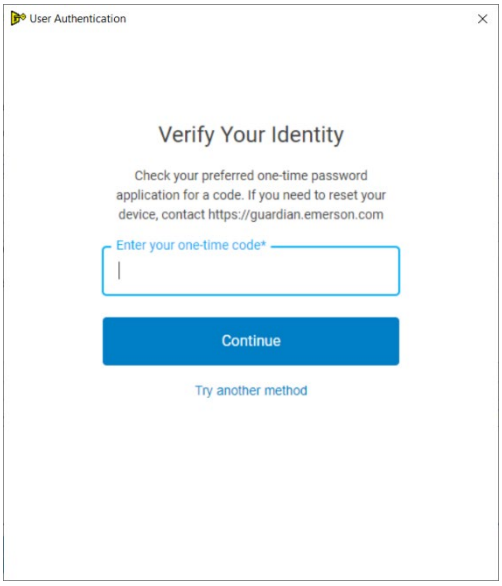



4. Enter the password required to login to Licensing Tool, and select **LOG IN**. A User Authentication dialog opens.

**Note**

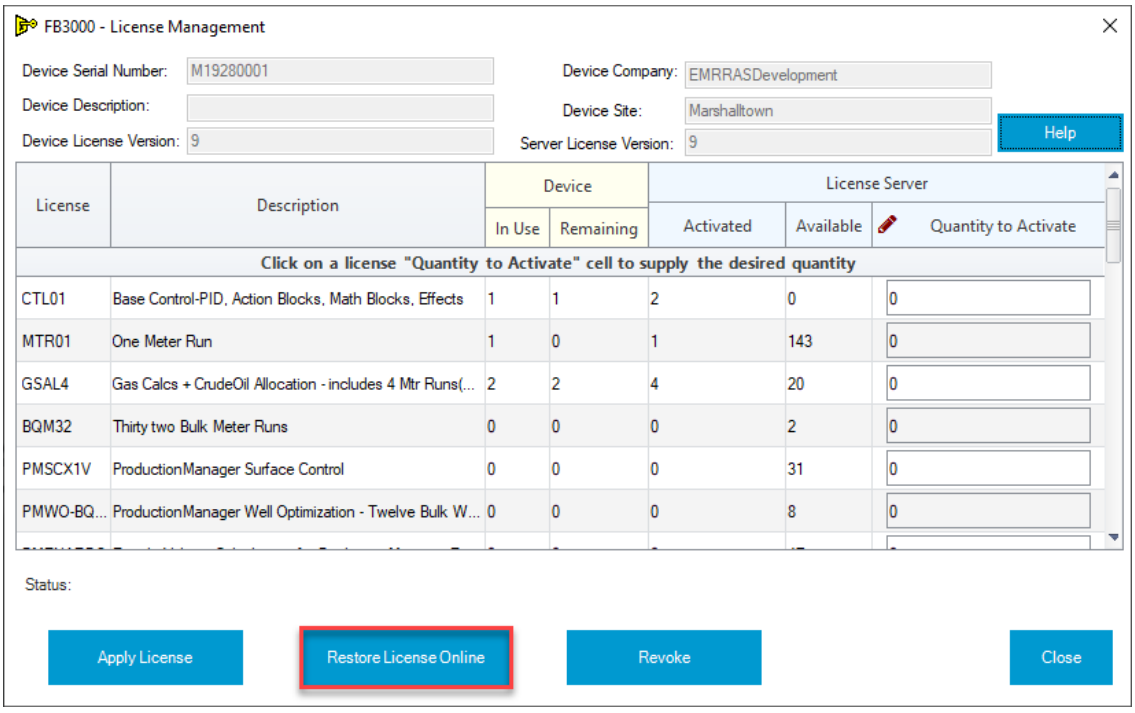
If this is your first time logging in, then a QR code appears. Scan the QR code in your preferred authenticator app and enter the provided one-time code.

**Figure 505. Licensing Tool Log In – User Authentication**



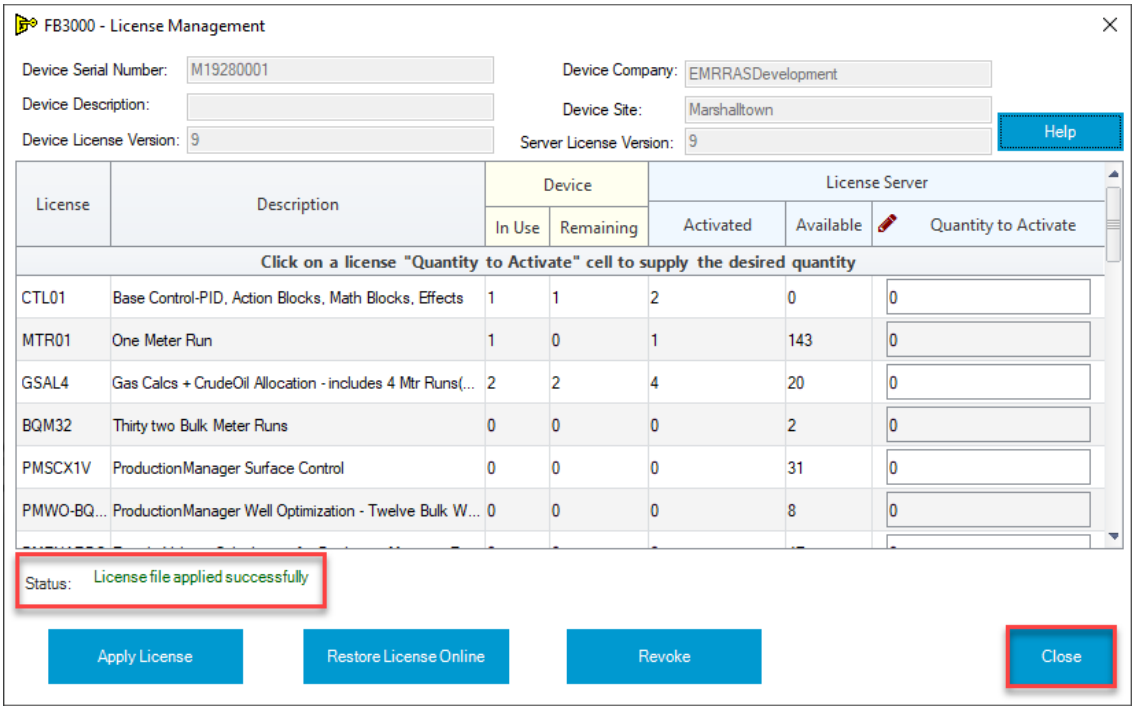

5. Enter the code from your preferred authenticator app and select **Continue**. The License Management pop-up display opens.

**Figure 506. License Management**



6. Click **Restore License Online**. The system downloads a new license file and applies it to the FB Series product. When the transfer is complete, the Status field shows **License file applied successfully**.

**Figure 507. License File Applied Successfully**




7. Select **Close** to return to the previous screen.

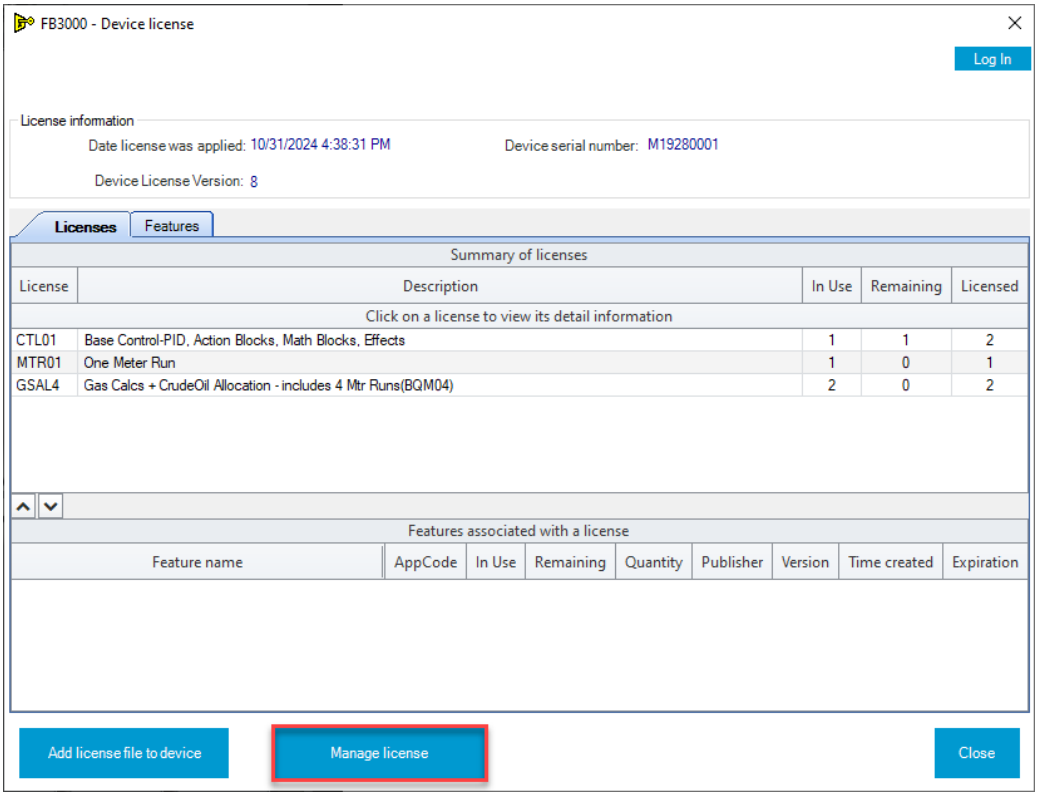
## 5.13.2.3 Remove a Product License

Use the License Revocation pop-up display to remove user-activated product licenses from your FB Series product.

To remove a product license:

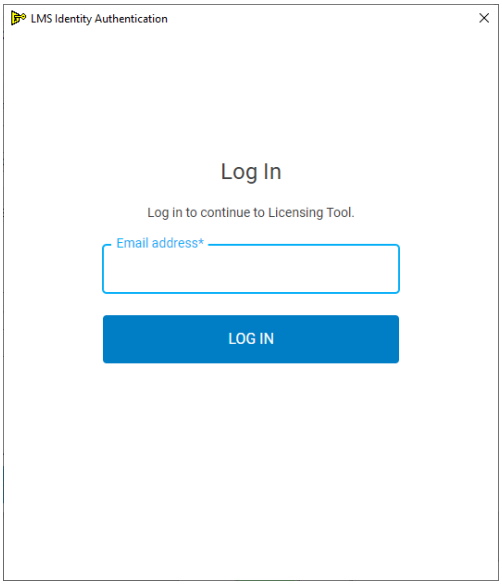
1. Select **Services > Device License** from the DeltaV FBxConnect configuration software main menu. The Device License display opens.

**Figure 508. Device License**



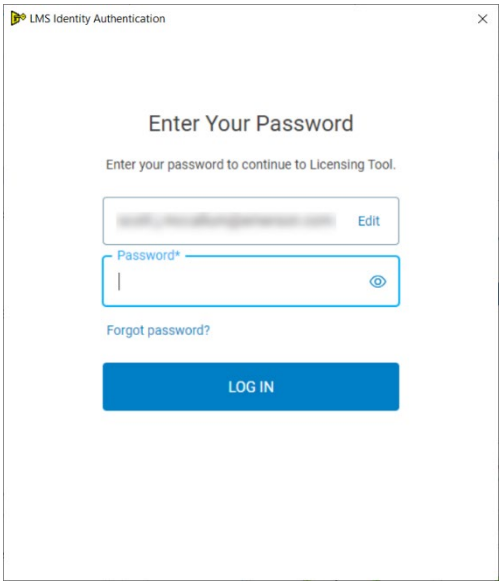

**2.** Select **Manage license**. The Licensing Tool log in dialog opens.

**Figure 509. Licensing Tool Log In – Email address**



3. Enter the e-mail address required to log in to Licensing Tool, and select **LOG IN**.

**Figure 510. Licensing Tool Log In – Password**

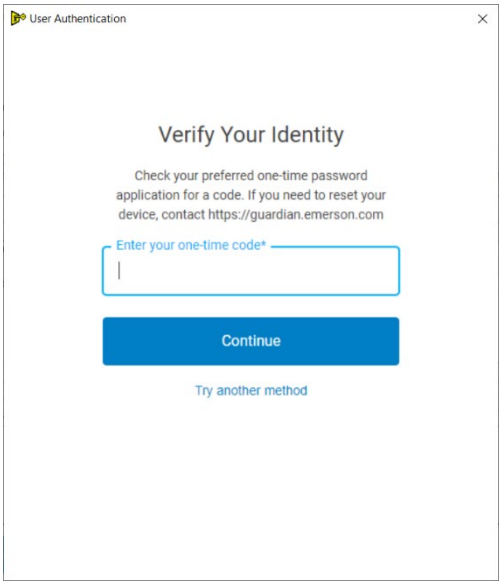



4. Enter the password required to login to Licensing Tool, and select **LOG IN**. A User Authentication dialog opens.

**Note**

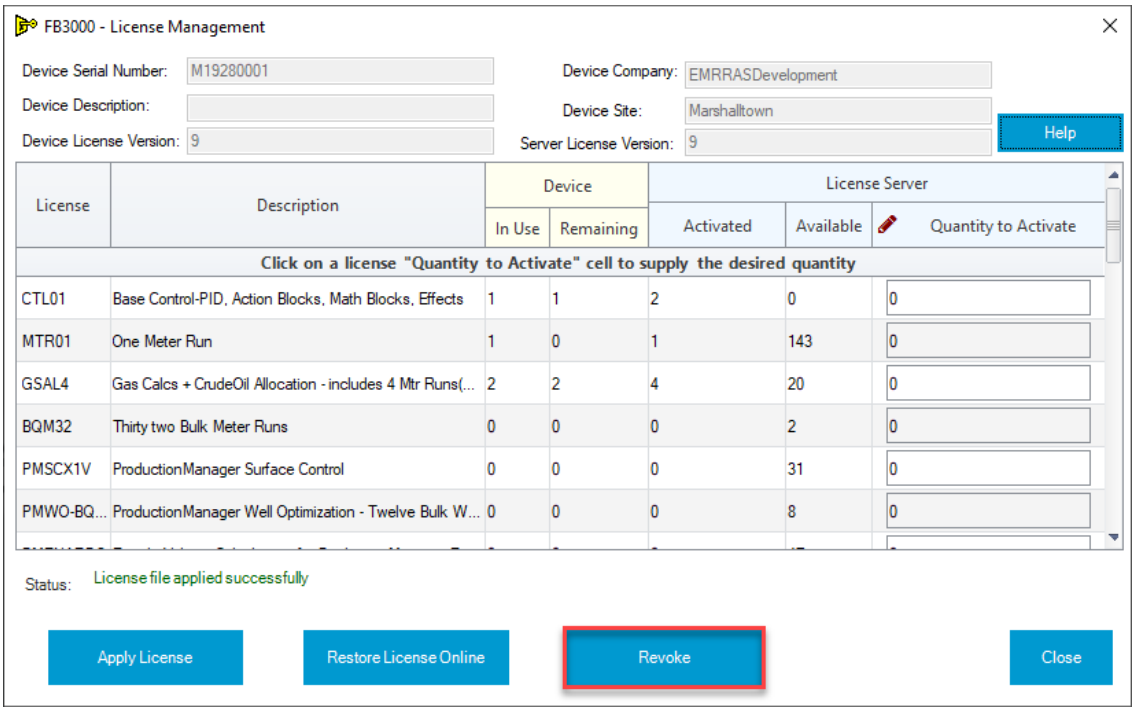
If this is your first time logging in, then a QR code appears. Scan the QR code in your preferred authenticator app and enter the provided one-time code.

**Figure 511. Licensing Tool Log In – User Authentication**




5. Enter the code from your preferred authenticator app and select **Continue**. The License Management pop-up display opens.

**Figure 512. License Management**

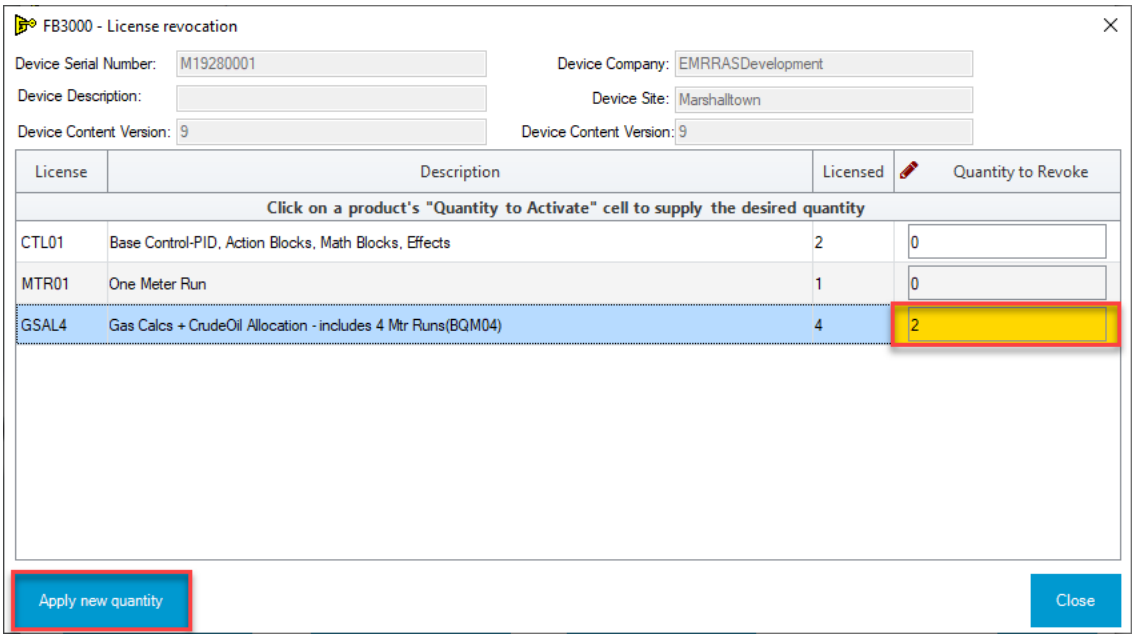


6. Select **Revoke**. The License Revocation pop-up display opens showing the user activated products that may be removed in the bottom portion of the display.

**Note**

You can **only** remove user activated products, not factory configured products.

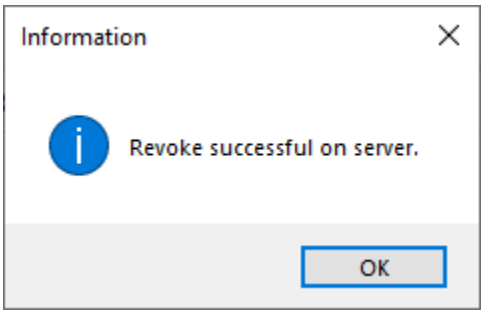
**Figure 513. License Revocation**




7. In the row of the product you want to remove, enter the number of licenses to remove in the **New Quantity** column.

8. Select **Apply New Quantity** to remove selected products from your FB Series product and transfer them back to Licensing Tool servers. A confirmation message opens.

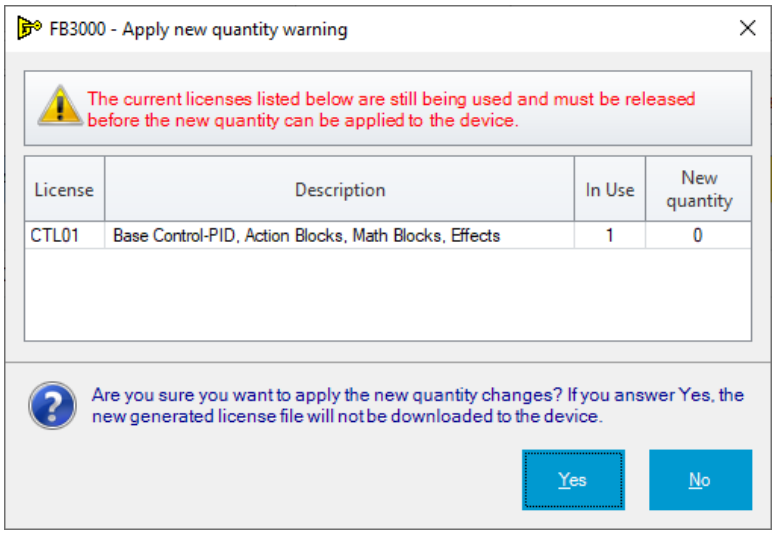
**Figure 514. License Revocation Confirmation**



**Note**

- In order for the system to apply a license successfully, the new license file **must** contain a minimum quantity of currently configured features. For example, if you have three gas meters currently configured, the new license file **must** contain at least three meter runs and gas calculations. If you attempt to revoke a license for a product that is currently configured in the FB Series product, the following error message opens:

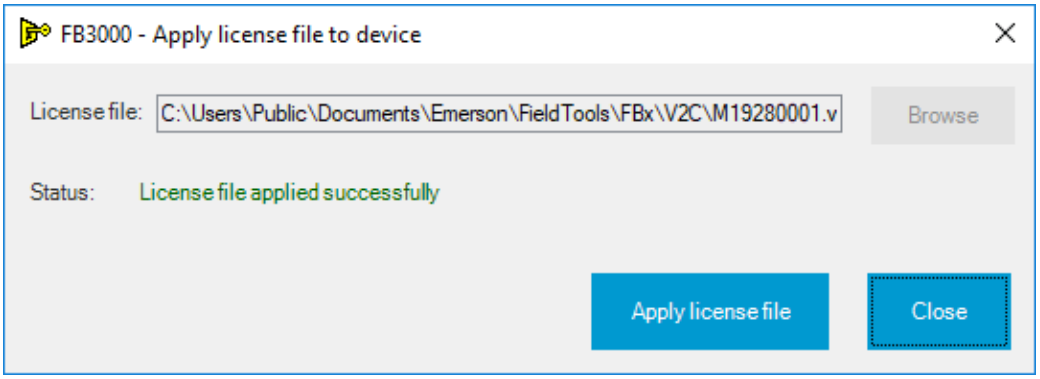
  **Figure 515. New Quantity Warning**




- If a downloaded license fails to apply, reconfigure your device with **only** the products contained in the new license before you apply the new license file. For more information about adding a previously downloaded license to an FB Series product, refer to Add License File to Device.

9. Select **OK**. The Apply License File to Device display opens and automatically applies the updated license file to your FB Series product. When the transfer is complete, the Status field shows **License file applied successfully**.

**Figure 516. License File Applied Successfully**




**10.** Select **Close** to return to the License Management display.

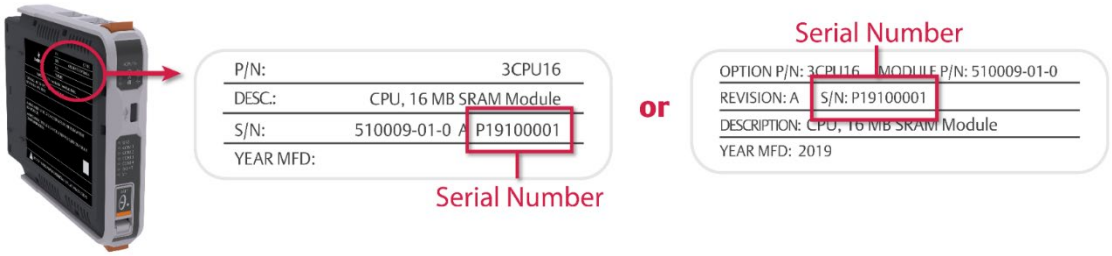
### 5.13.3 Serial Number Location

The serial number is located on the side of your module. The serial number will be one of two formats. The picture below shows the location and possible formats of a module serial number.

**Note**

The serial number is case-sensitive.

**Figure 517. Serial Number Location**




## 5.14 Apply Security File

Use this option to enable DNP3 Secure Authentication version 5 (SAv5), enable Active Directory, and transfer Break Glass credentials to the FB Series product. You create the security file using DeltaV FBxConnect Launchpad and apply the file to the FB Series product using DeltaV FBxConnect configuration software.

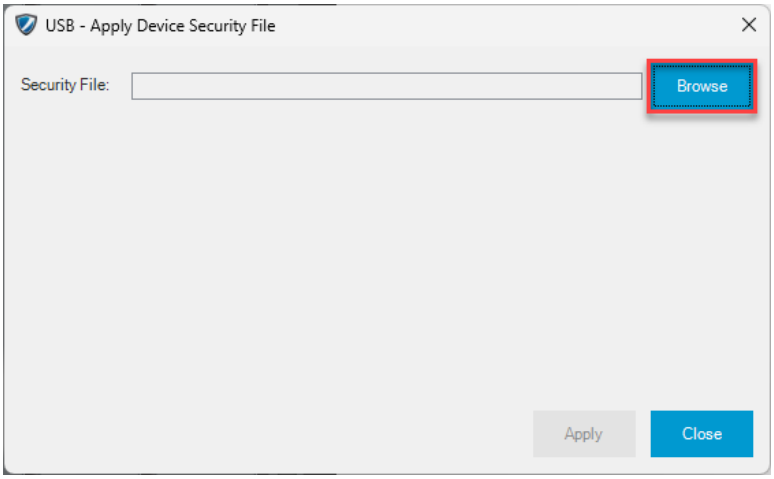
**Note**

- For more information about creating the security file using DeltaV FBxConnect Launchpad, refer to *D301703X412, DeltaV FBxConnect Launchpad Quick Start Guide*.
- This appears **only** if you are physically connected via the USB port.
- This appears **only** if the user signed in to the FB Series product is assigned the **Key Update** permission. For more information about assigning permissions to users, refer to Permissions.

To add a SAv5 security file to your device:

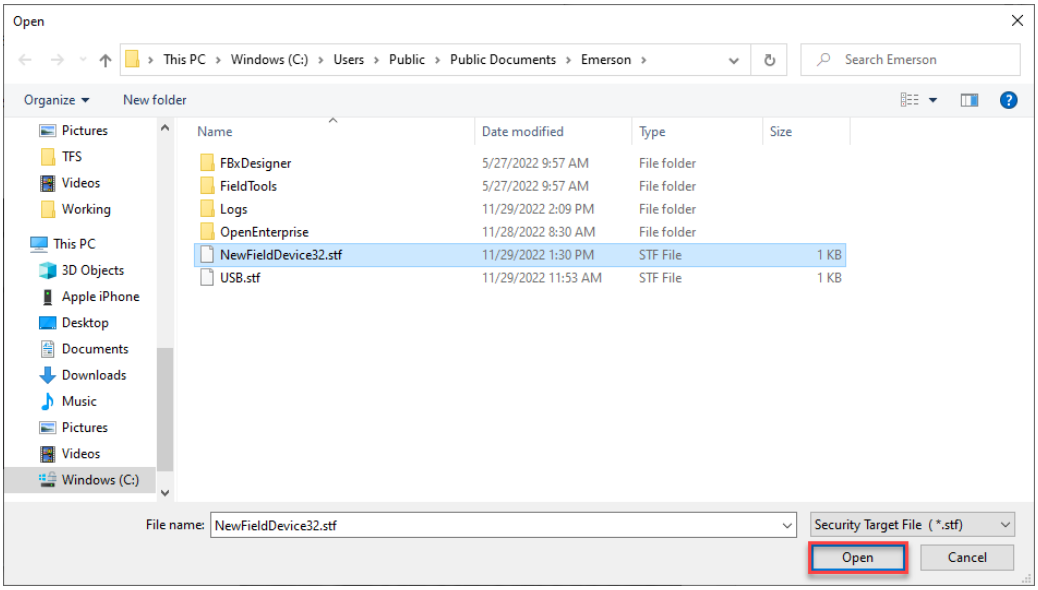
1. Select **Services > Apply Security File** from the DeltaV FBxConnect configuration software main menu. The Apply Device Security File pop-up display opens.

**Figure 518. Browse**



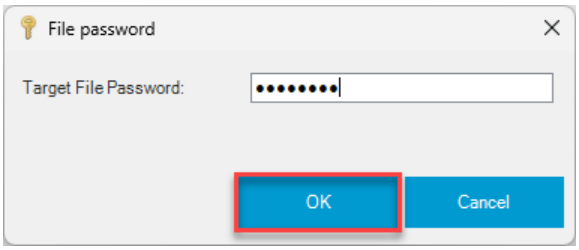

2. Select **Browse**. A file window dialog opens.

**Figure 519. Open**




3. Navigate to the location of the security file on your PC, select the file, and select **Open**.

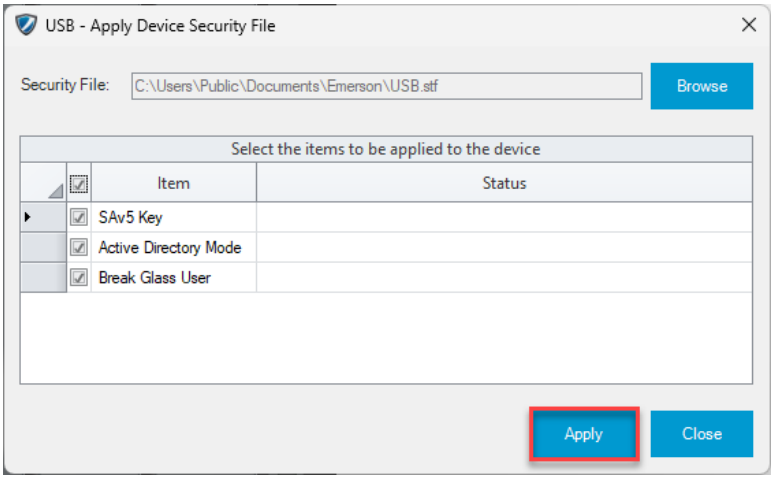
**Figure 520. Password**




4. Enter the file password and click **OK**.

5. Place a check mark next to the security configuration items you want to apply to the FB Series product.

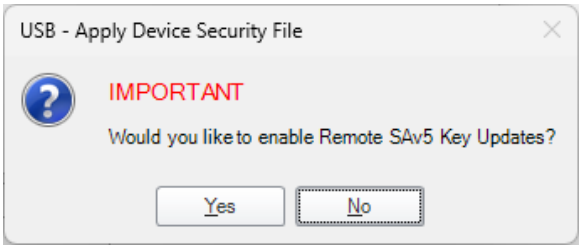
**Figure 521. Apply**




6. Select **Apply**. An Enable Remote SAv5 Key Updates dialog opens.

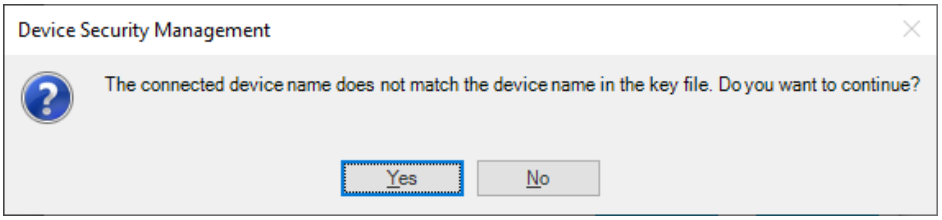
7. Based on your organization's requirements, select either **Yes** to enable or **No** to disable remote SAv5 key updates .

**Figure 522. Enable Remote SAv5 Dialog**



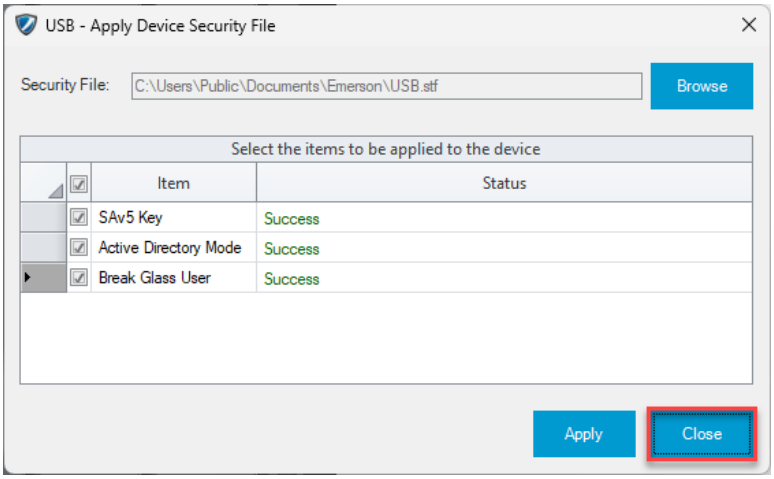

**Note**

An error appears if the connected device name does not match the device name in the security file. Click **Yes** to continue applying the security file to the connected device. Click **No** to cancel the operation and select a new security file.




8. The Status column updates for each selected security configuration item and shows Success when the process is complete. Select **Close** to return to the previous screen.

**Figure 523. Security Key Applied Successfully**




**Note**

If you apply a security file to an FB Series product that previously had security disabled, the FB Series product performs a warm start.

## 5.15 Disable SAv5

Use this option to turn off DNP3 Secure Authentication version 5 (SAv5) on the FB Series product.

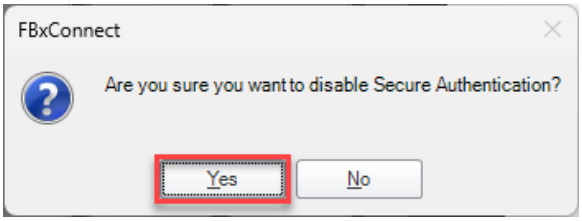
**Note**

This option appears **only** after you have enabled SAv5 of the FB Series product and are physically connected via the USB port. For more information, refer to Apply Security File.

To disable SAv5:

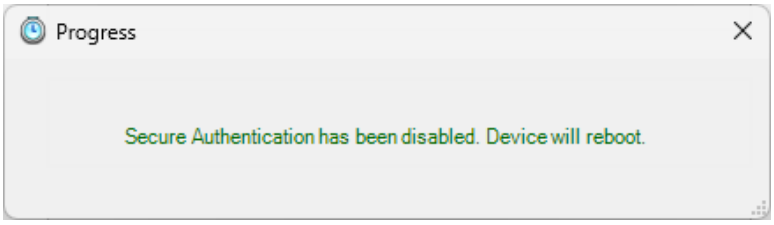
1. Select **Services > Disable SAv5** from the DeltaV FBxConnect configuration software main menu. A confirmation message opens.

**Figure 524. Disable SAv5 Confirmation**



2. Select **Yes** to disable SAv5 security. A progress dialog opens confirming that secure authentication has been disabled, and the FB Series product performs a warm start.

**Figure 525. Disable SAv5 Progress**




## 5.16 Enable Active Directory

Use this option to turn on Active Directory on the FB Series product.

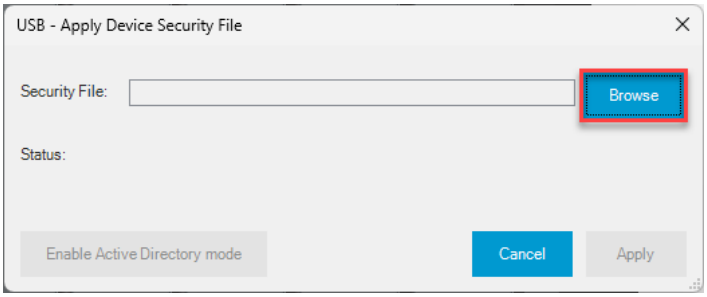
**Note**

You can select this option **only** after you have enabled SAv5 on the FB Series product and are physically connected via the USB port (DeltaV™ DeltaV FB3000 RTU) or COM1 (FB Series Flow Computer). For more information, refer to Apply Security File.

To enable Active Directory:

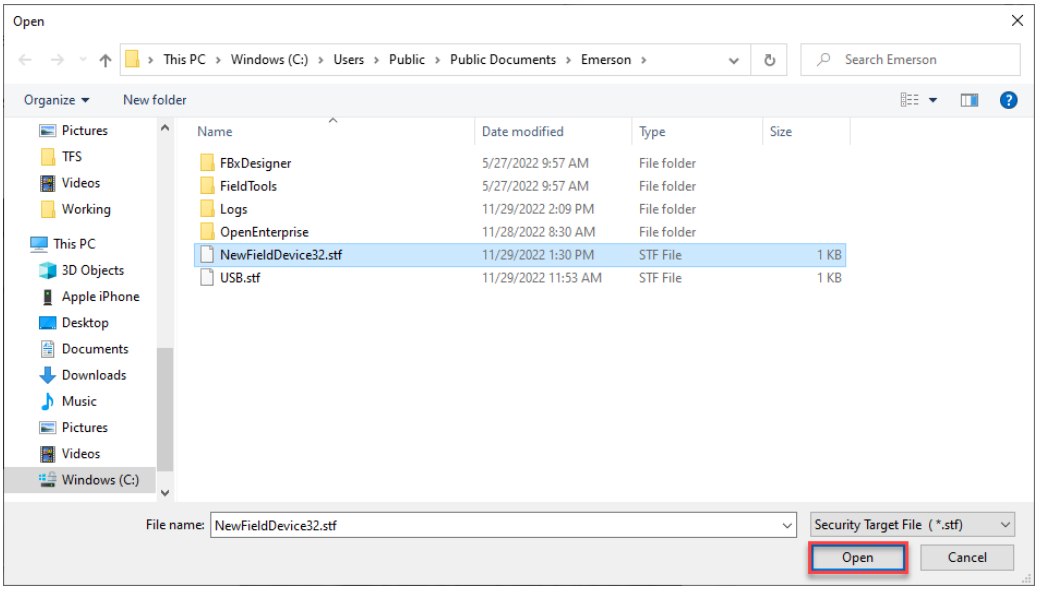
1. Select **Services >Apply Security File** from the DeltaV™ FBxConnect™ main menu. The Apply Device Security File pop-up display opens.

**Figure 526. Browse**



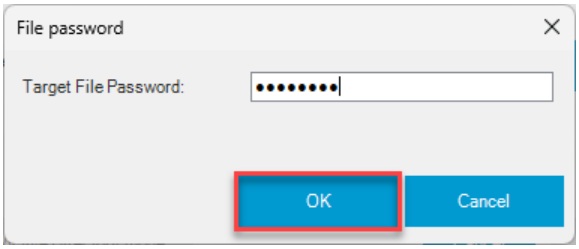

2. Select **Browse**. A file window dialog opens.

**Figure 527. Open**



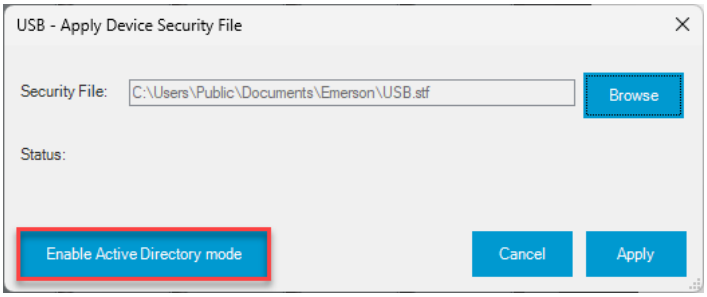

3. Navigate to the location of the security file on your PC, select the file, and select **Open**.

**Figure 528. Password**



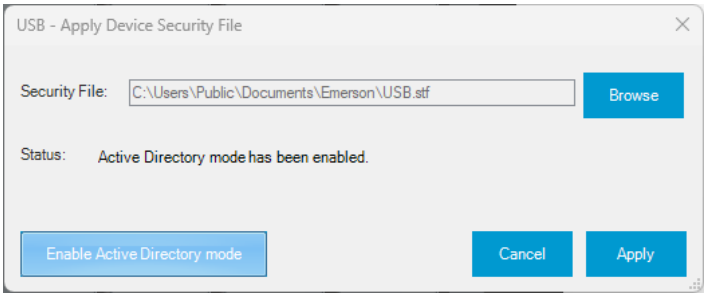

4. Enter the file password and click **OK**.

**Figure 529. Enable Active Directory mode**




5. Select **Enable Active Directory**. The Status field shows a message confirming that Active Directory has been enabled.

**Figure 530. Enable Active Directory Confirmation**




6. Select **Cancel** to exit the close the Apply Device Security File pop-up display.

## 5.17 Disable Active Directory

Use this option to turn off Active Directory on the FB Series product.

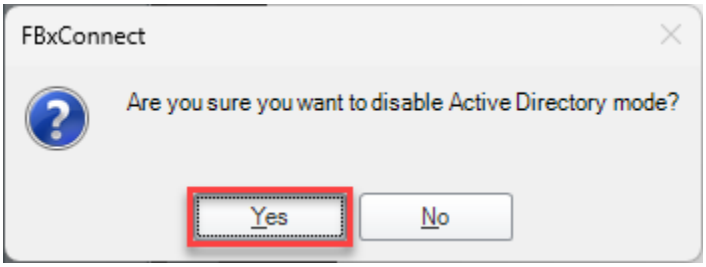
**Note**

You can select this option **only** after you have enabled SAv5 of the FB Series product, are physically connected via the USB port (DeltaV™ DeltaV FB3000 RTU) or COM1 (FB Series Flow Computer), and you have previously enabled Active Directory. For more information, refer to Enable Active Directory.

To disable SAv5:

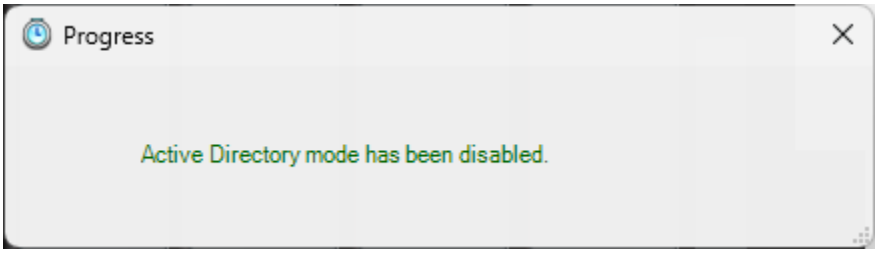
1. Select **Services > Disable SAv5** from the DeltaV™ FBxConnect™ main menu. A confirmation message opens.

**Figure 531. Disable Active Directory Confirmation**




2. Select **Yes** to disable Active Directory. A progress dialog opens confirming that Active Directory has been disabled.

**Figure 532. Disable Active Directory Progress**




## 5.18 Enable Remote SAv5 Key Updates

Use this option to turn on remote SAv5 key updates on the FB Series product.

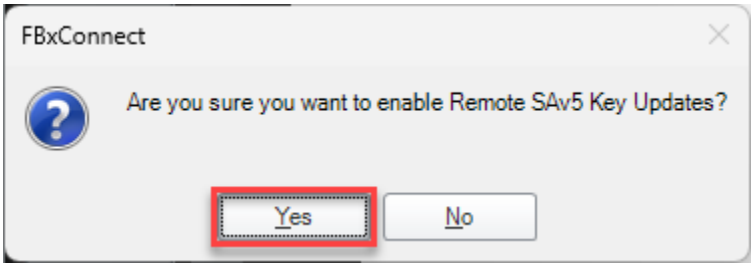
**Note**

You can select this option **only** after you have enabled SAv5 of the FB Series product and are physically connected via the USB port (DeltaV™ DeltaV FB3000 RTU) or COM1 (FB Series Flow Computer), but you have not already enabled remote SAv5 key updates. For more information, refer to Apply Security File.

To disable SAv5:

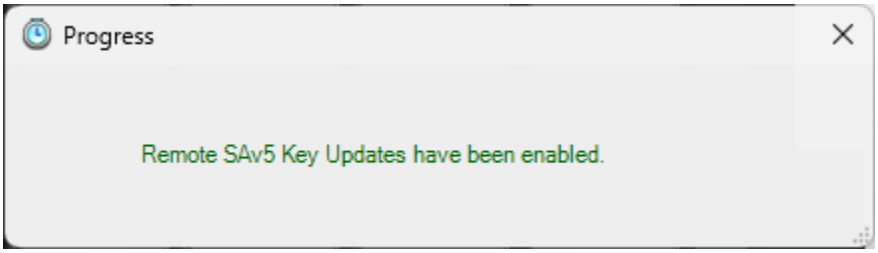
1. Select **Services > Enable Remote SAv5 Key Updates** from the DeltaV™ FBxConnect™ main menu. A confirmation message opens.

**Figure 533. Enable Remote SAv5 Key Updates Confirmation**




2. Select **Yes** to enable remote SAv5 key updates. A progress dialog opens confirming that remote SAv5 key updates has been enabled.

**Figure 534. Enable Remote SAv5 Key Updates Progress**




## 5.19 Disable Remote SAv5 Key Updates

Use this option to turn off remote SAv5 key updates on the FB Series product.

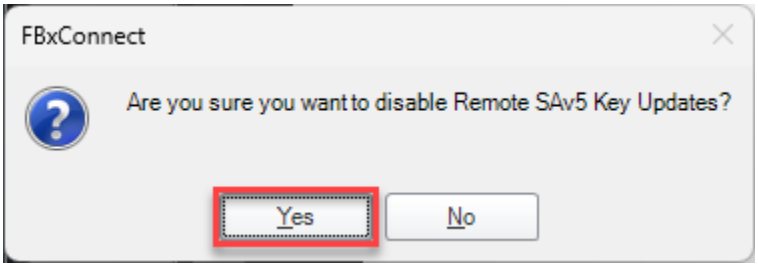
**Note**

You can select this option **only** after you have enabled SAv5 of the FB Series product and are physically connected via the USB port (DeltaV™ DeltaV FB3000 RTU) or COM1 (FB Series Flow Computer). For more information, refer to Enable Remote SAv5 Key Updates.

To disable SAv5:

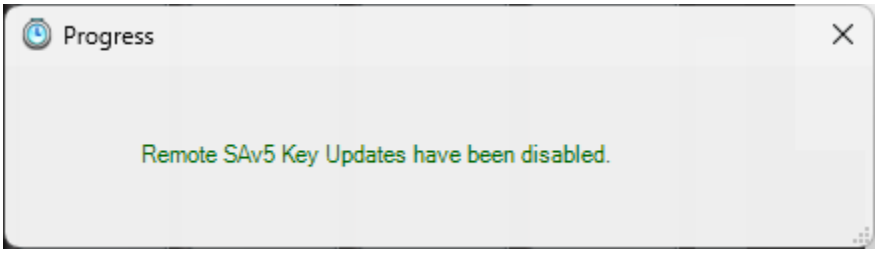
1. Select **Services > Disable Remote SAv5 Key Updates** from the DeltaV™ FBxConnect™ main menu. A confirmation message opens.

**Figure 535. Disable Remote SAv5 Key Updates Confirmation**




2. Select **Yes** to disable remote SAv5 key updates. A progress dialog opens confirming that remote SAv5 key updates has been disabled.

**Figure 536. Disable Remote SAv5 Key Updates Progress**



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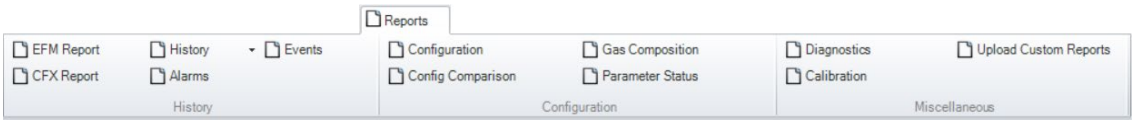
# Section 6: Reports Menu

Use the Reports menu to collect data from the FB Series product and create various history, configuration, calibration, and diagnostic reports.

**Note**

- If you change the time zone of your PC, you **must** restart your PC before reports include the updated time zone.
- Report file names include the connection/device name, report type, and timestamp of report creation.

**Figure 537. Reports Menu**




The Reports menu contains the following options:

EFM Report – Generates an Electronic Flow Measurement (EFM) report from the data stored in your FB Series product.

CFX Report – Generates a CFX (Flow-Cal) report from the data stored in your FB Series product.

**History**

Periodic History – Generates a report from the periodic history data stored in your FB Series product.

Transaction History – Generates a report from the transaction history data stored in your FB Series product.

Alarms – Generates an alarm report from the data stored in your FB Series product.

Events – Generates an event report from the data stored in your FB Series product.

Export Events – Exports events stored in the legal event log of your FB Series product as a CSV or PDF file.

Configuration – Generates a report that shows you all of the parameters and parameter values in the connected FB Series product.

Config Comparison – Generates a report that compares multiple device configurations.

Gas Composition – Generates a report that details the gas components and mole percentages of the fluid flowing through each station and meter.

Parameter Status – Generates a report showing the status of all parameters in the FB Series product.

Diagnostics – Generates a report that is used to assist Emerson's technical support team when investigating issues with an FB Series product.

Calibration – View previously generated calibration reports.

Upload Custom Reports – Use this option to upload custom reports that are stored on your FB Series product to your PC.

## 6.1 EFM Report

Use the EFM Report option to generate an electronic flow measurement (EFM) report from the data stored in your device. An EFM report is a combination of meter configuration, history, alarms and events.

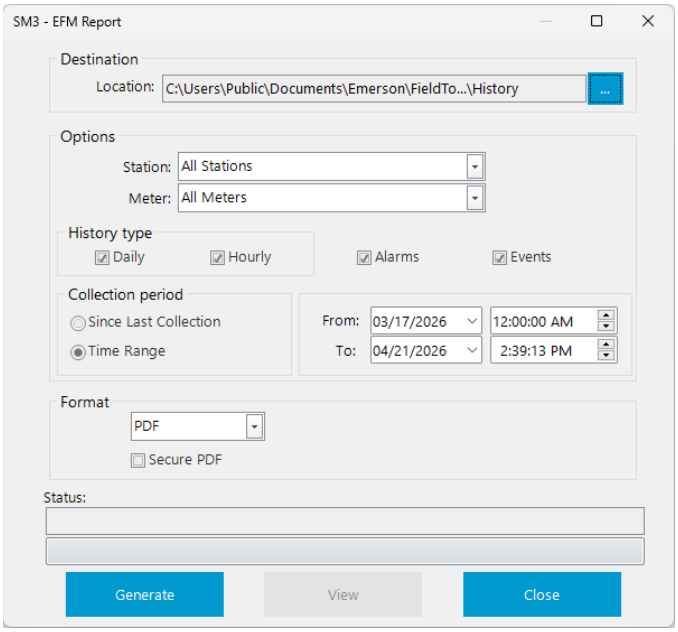
**Note**

You can configure the number of decimal places shown on history reports using the Settings menu option in the DeltaV FBxConnect Launchpad menu bar.

To generate an EFM Report:

1. Click **Reports > EFM Report** from the DeltaV FBxConnect configuration software main menu. The EFM Report screen displays.

**Figure 538. EFM Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\History*.

3. Click ▼ in the **Station** field and select the station that contains the data you want to collect.
4. Click ▼ in the **Meter** field and select the meter that contains the data you want to collect.
5. Select the time frequencies (Daily and/or Hourly) of the collected data in the **History Type** field.
6. Place a check mark in the box next to **Alarms** if you want alarm data to be included in the report.
7. Place a check mark in the box next to **Events** if you want event data to be included in the report.
8. Select a **Collection period** in the Options frame. Possible options are:

- **Since last collection** – Collects all EFM data created since the last EFM report was generated.
- **Time range** – Collects all EFM data created during the time frame you specify in the **From** and **To** fields.

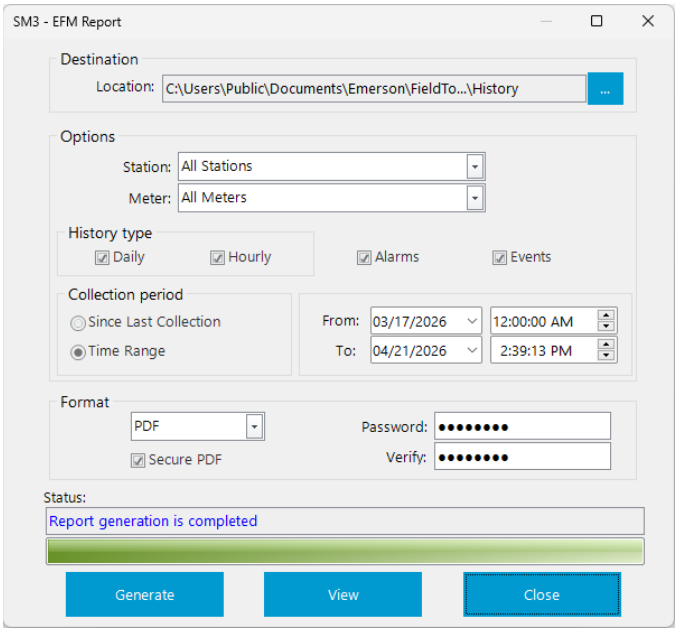
9. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

10. Click **Generate**. A status bar provides you with the current progress of the report creation.

**Figure 539. EFM Report Generation Completed**




11. After the report is generated, click **View** to open the completed report.

12. Click **Close** to return to the previous screen.

# 6.2 CFX Report

Use the CFX Report option to generate a CFX (Flow-Cal) report from the data stored in your device. You can generate reports using CFX version 5 (gas), CFX version 7 (gas or liquid), or CFX version 8 (gas) formats.

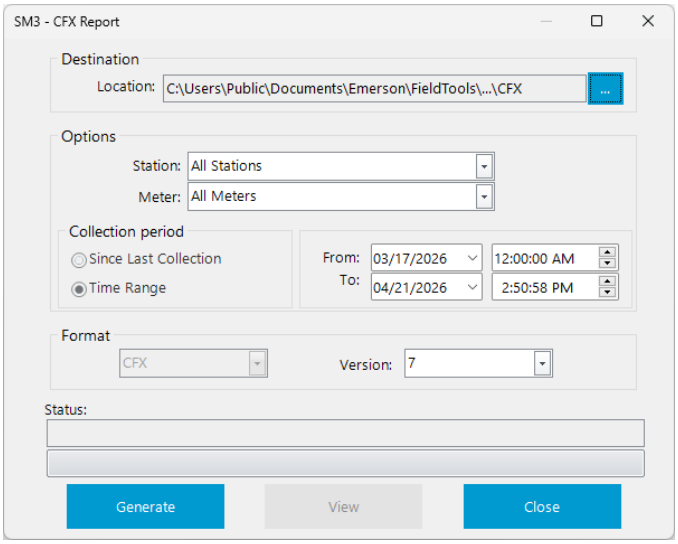
**Note**

- Some fields on the report may be blank if you incorrectly configure the **Input to Average** in your FB Series product. For more information, refer to Averages.
- CFX reports are **not** generated for GOST meter types.
- CFX version 8 reports require firmware version 2.19 or greater.

To collect a CFX Report:

1. Click **Reports > CFX Report** from the DeltaV FBxConnect configuration software main menu. The CFX Report screen displays.

**Figure 540. CFX Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

- The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\History\CFX*.

- The file name of the saved CFX report includes Station and Meter Tags. Invalid characters (\, /, :, *, ?, <, >, |) in Station and Meter Tags are replaced by an underscore (_) in the CFX report file name.

3. Click ▼ in the **Station** field and select the station that contains the data you want to collect.
4. Click ▼ in the **Meter** field and select the meter that contains the data you want to collect.
5. Select a **Collection period** in the Options frame. Possible options are:
   - **Since last collection** – Collects all CFX data created since the last CFX report was generated.
   - **Time range** – Collects all CFX data created during the start and end date you specify in the **From** and **To** fields.

**Note**

If you select CFX file version **8** in the Version field, then the Collection period field is automatically configured with **Last 35 Days**.

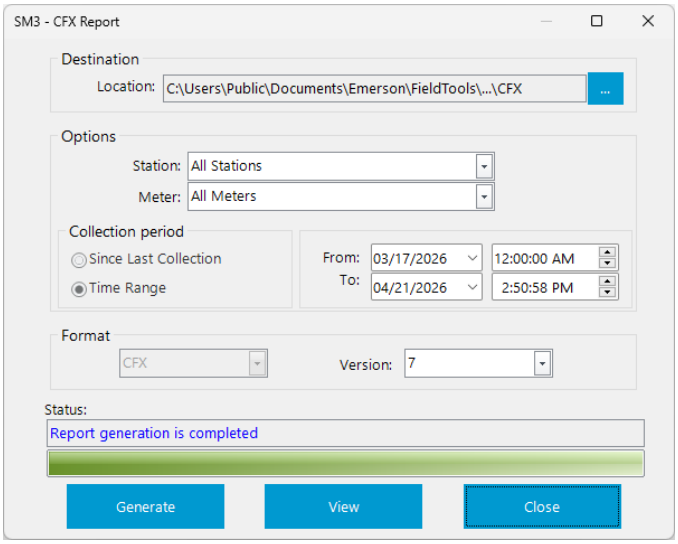
6. Click ▼ in the **Version** field to select the CFX version of the generated report .

**Note**

Liquid linear meters support CFX file version 7 **only**.

7. Click **Generate**. A status bar provides you with the current progress of the report creation.

**Figure 541. CFX Report Generation Completed**




8. After the report is generated, click **View** to open the location on your PC of the completed report.
9. Click **Close** to return to the previous screen.

## 6.3 Periodic History Report

Use the Periodic History Report option to generate a report from the periodic history data stored in your FB Series product. You can configure the report to include only periodic history data that occurred during a specific time period or to include periodic history data that has occurred since the last periodic history report was generated. You can generate reports using CSV or PDF formats.

**Note**

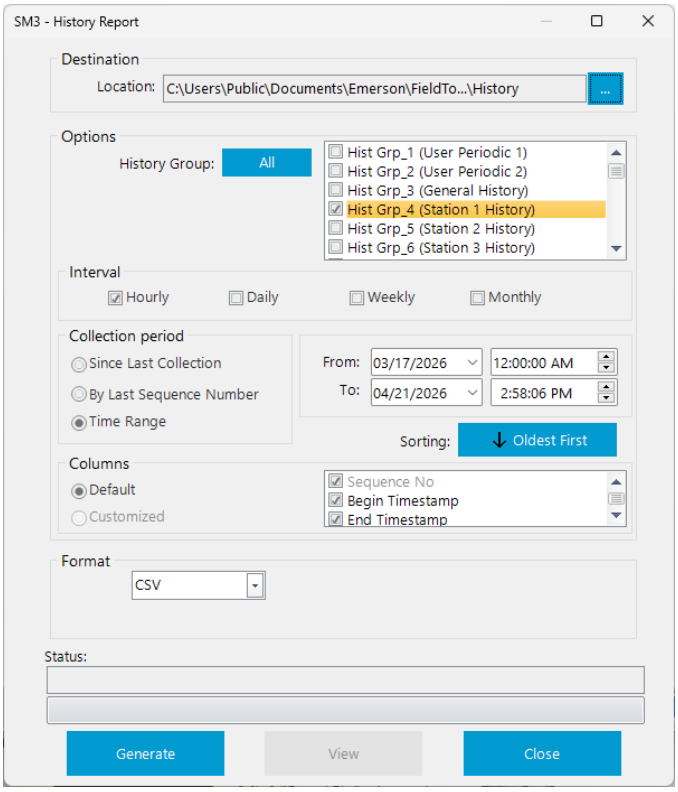
- You **must** first configure history in the device before creating a history report. For more information, refer to Configure – History.
- The integrity of each history record is checked, and only history records with good integrity are shown.
- Each history record has an associated sequence number. A missing history record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

- You can configure the number of decimal places shown on history reports using the Settings menu option in the DeltaV FBxConnect Launchpad menu bar.

To generate a Periodic History Report:

1. Click **Reports > History > Periodic History** from the DeltaV FBxConnect configuration software main menu. The Periodic History Report screen displays.

**Figure 542. Periodic History Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\History*.

3. Place a check mark next to the history groups to include in the report in the **History Group** field.

**Note**

Select the **All** button to automatically select all available history groups.

4. Select the time frequency of the collected data in the **Interval** field.

**Note**

You can select more than one time frequency in the **Interval** field.

5. Select a **Collection period** in the Options frame. Possible options are:

   - **Since last collection** – Collects all history data created since the last history report was generated.
   - **By last sequence no.** – Collects all history data from the Last Sequence Number which is contained in the FB Series product. Once completed, DeltaV FBxConnect configuration software sets the Last Sequence Number in the FB Series product.

     **Note**

     The Historical, Event, Alarm logs each have their own last sequence number.

   - **Time range** – Collects all history data created during the start and end date you specify in the **From** and **To** fields.

6. Click the **Sorting** button to configure the order of information in the generated report. Possible options are:

   - **Oldest to newest** – The report presents data showing the oldest entries first and the newest entries last.
   - **Newest to oldest** – The report presents data showing the newest entries first and the oldest entries last.

7. In the Columns field, select or deselect the columns you want to include in the report.

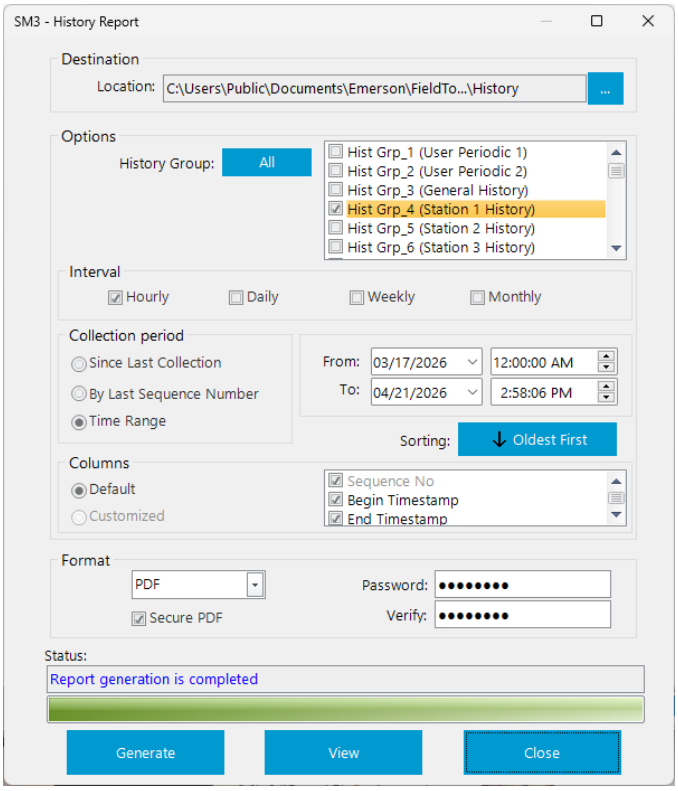
8. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

9. Click **Generate**. A status bar provides you with the current progress of the report creation.

**Figure 543. Periodic History Report Generation Completed**




10. After the report is generated, click **View** to open the completed report.

### Note

Every calculated parameter in meter runs has a health attribute. The status of this attribute is determined by a combination of the inputs used to calculate the parameter and the status of the calculation. A symbol is placed after values with questionable data integrity. The top of the report contains a legend that explains the meaning of the symbols. The symbol definitions are below:

**?** = In Fault

**#** = In Override

**X** = Unverified Value

**!** = In Alarm

**>** = Over Range Limit

**^** = Stale Value

**&** = Inactive

***** = Invalid History
**@** = Undefined History

**11.** Click **Close** to return to the previous screen.

## 6.4 Transaction History Report

Use the Transaction History Report option to generate a report from the transaction history data stored in your FB Series product. You can configure the report to include only transaction history data that occurred during a specific time period or to include transaction history data that has occurred since the last transaction history report was generated. You can generate reports using CSV or PDF formats.

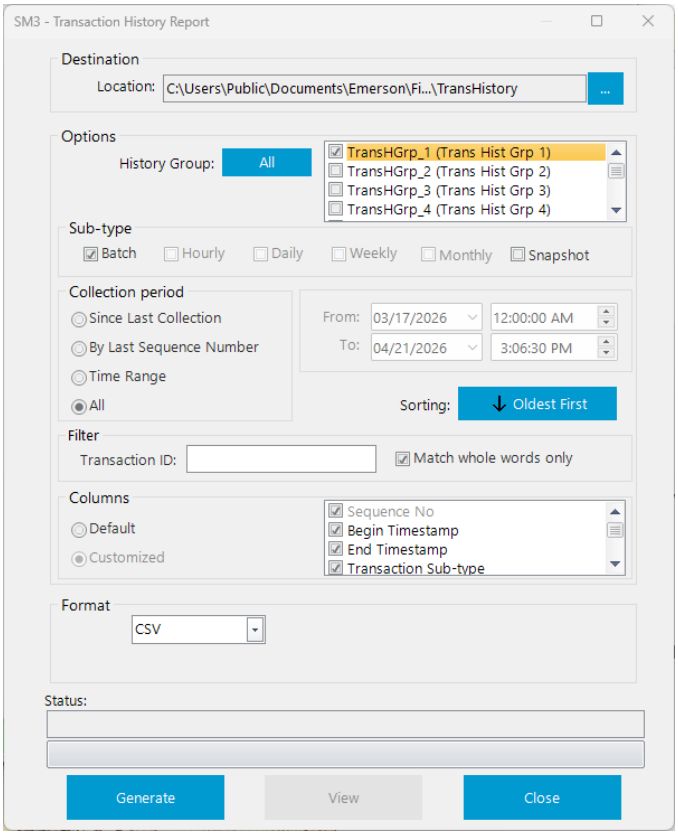
**Note**

- You **must** first configure history in the device before creating a history report. For more information, refer to Configure – History.
- The integrity of each history record is checked, and only history records with good integrity are shown.
- Each history record has an associated sequence number. A missing history record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.
- You can configure the number of decimal places shown on history reports using the Settings menu option in the DeltaV FBxConnect Launchpad menu bar.

To generate a Transaction History Report:

**1.** Click **Reports > History > Transaction History** from the DeltaV FBxConnect configuration software main menu. The Transaction History Report display opens.

**Figure 544. Transaction History Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\TransHistory*.

3. Place a check mark next to the history groups to include in the report in the **History Group** field.

**Note**

Select the **All** button to automatically select all available history groups.

4. In the **Sub-Type** field, select the type of history to include in the report. The default selection is **Batch**.

**Note**

- If you select **Hourly**, **Daily**, **Weekly**, or **Monthly** in the **Sub-Type** field, you **must** have previously configured transaction history to include periodic data in the **Periodic Data Logging in Transaction History** field on the Station – Batching Tab **and** configured transaction history to include this data on the Transaction History Group Configuration display.
- The **Snapshot** Sub-Type is **not selectable** for transaction history groups configured for liquid linear meter batching.

5. Select a **Collection period** in the Options frame. Possible options are:
   - **Since last collection** – Collects all transaction history data created since the last history report was generated.
   - **By last sequence no.** – Collects all transaction history data from the Last Sequence Number which is contained in the FB Series product. Once completed, DeltaV FBxConnect configuration software sets the Last Sequence Number in the FB Series product.

     **Note**

     The Historical, Event, Alarm logs each have their own last sequence number.

   - **Time range** – Collects all transaction history data created during the start and end date you specify in the **From** and **To** fields.
   - **All –** Collects all transaction history data stored in the FB Series product.
6. Click the **Sorting** button to configure the order of information in the generated report. Possible options are:
   - **Oldest to newest** – The report presents data showing the oldest entries first and the newest entries last.
   - **Newest to oldest** – The report presents data showing the newest entries first and the oldest entries last.
7. In the **Filter** field, enter a Transaction ID to narrow the results to show **only** specific transactions.

**Note**

- This field is **not** case sensitive.

- For transactions assigned to a meter, you configure the Transaction ID in the **Batch Identifier** field on the Station – Batching display.
- For transactions **not** assigned to a meter, you configure the Transaction ID in the **Transaction ID** field on the Transaction History Group Configuration display.

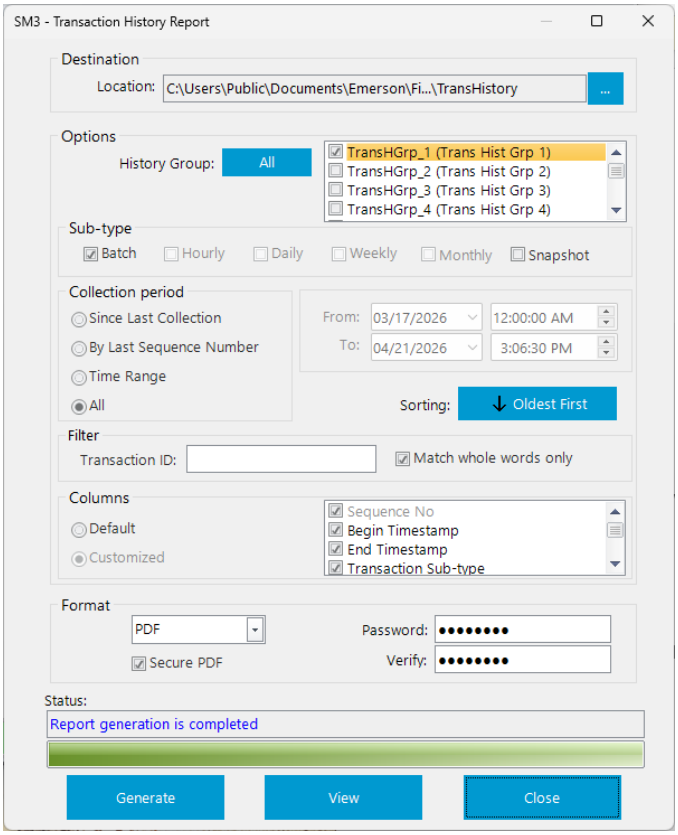
8. Place a check mark in the **Match whole words only** field to search **only** for Transaction IDs that contain the entire word you entered in the **Filter** field.
9. In the **Columns** field, select or deselect the columns you want to include in the report.
10. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

11. Click **Generate**. A status bar provides you with the current progress of the report creation.

**Figure 545. Transaction History Report Generation Completed**




**12.** After the report is generated, click **View** to open the completed report.

### Note

Every calculated parameter in meter runs has a health attribute. The status of this attribute is determined by a combination of the inputs used to calculate the parameter and the status of the calculation. A symbol is placed after values with questionable data integrity. The top of the report contains a legend that explains the meaning of the symbols. The symbol definitions are below:

**?** = In Fault

**#** = In Override

**X** = Unverified Value

**!** = In Alarm

**>** = Over Range Limit

**&** = Inactive

**^** = Stale Value

***** = Invalid History
**@** = Undefined History

**13.** Click **Close** to return to the previous screen.

## 6.5 Alarms Report

Use the Alarms Report option to generate a report from the alarm data stored in your device. You can configure the report to include only alarm data that occurred during a specific time period or to include alarm data that has occurred since the last alarm report was generated. You can generate reports using CSV or PDF formats.

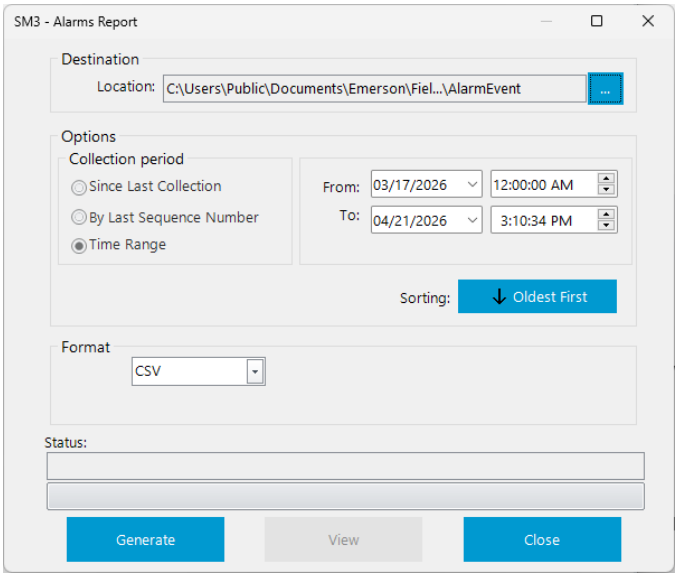
**Note**

- The integrity of each alarm record is checked, and only alarm records with good integrity are shown.
- Each alarm record has an associated sequence number. A missing alarm record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To generate an Alarms Report:

**1.** Click **Reports > Alarms** from the DeltaV FBxConnect configuration software main menu. The Alarms Report screen displays.

**Figure 546. Alarms Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\AlarmEvent*.

3. Select a **Collection period** in the Options frame. Possible options are:

   - **Since last collection** – Collects all history data created since the last history report was generated.
   - **By last sequence no.** – Collects from the Last Sequence Number which is contained in the device. Once completed DeltaV FBxConnect configuration software sets the Last Sequence Number in the device.

   **Note**

   The Historical, Event, Alarm logs each have their own last sequence number.

   - **Time range** – Collects all history data created during the start and end date you specify in the **From** and **To** fields.

4. Click the **Sorting** button to configure the order of information in the generated report. Possible options are:

- **Oldest to newest** – The report presents data showing the oldest entries first and the newest entries last.
- **Newest to oldest** – The report presents data showing the newest entries first and the oldest entries last.

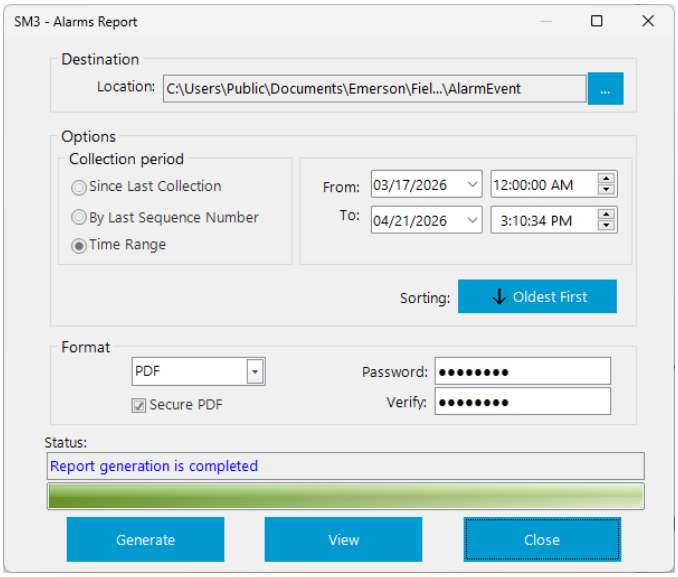
5. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

6. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 547. Alarms Report Generation Completed**




7. After the report is generated, click **View** to open the completed report.

8. Click **Close** to return to the previous screen.

## 6.6 Events Report

Use the Events Report option to generate a report that from the event data stored in your device. You can configure the report to include only events that occurred during a specific

time period or to include events that occurred since the last event report was generated. You can generate reports using CSV or PDF formats.

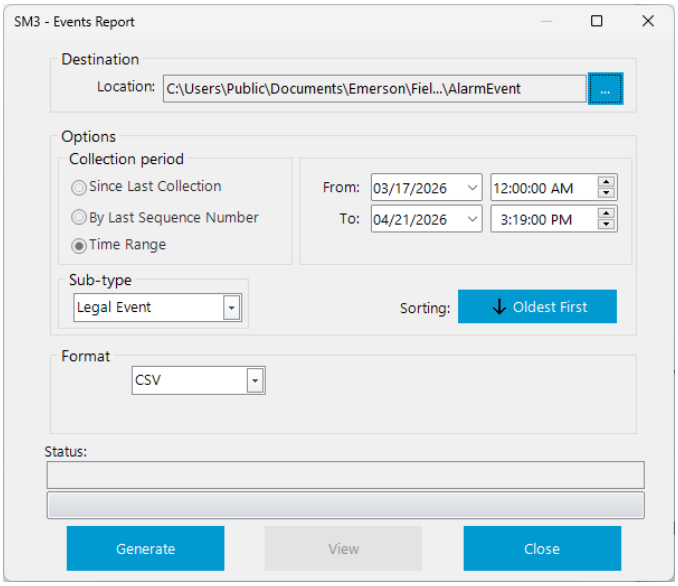
**Note**

- The integrity of each event record is checked, and only event records with good integrity are shown.
- Each event record has an associated sequence number. A missing event record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.

To generate an Events Report:

1. Click **Reports > Events** from the DeltaV FBxConnect configuration software main menu. The Events Report screen displays.

**Figure 548. Events Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\AlarmEvent*.

3. Select a **Collection period** in the Options frame. Possible options are:

   - **Since last collection** – Collects all history data created since the last history report was generated.
   - **By last sequence no.** – Collects from the Last Sequence Number which is contained in the device. Once completed DeltaV FBxConnect configuration software sets the Last Sequence Number in the device.

     **Note**

     - This option is available **only** if you select **Non Legal Event Log** in the **Sub-Type** field.
     - The Historical, Event, Alarm logs each have their own last sequence number.

   - **Time range** – Collects all history data created during the start and end date you specify in the **From** and **To** fields.

4. Click the **Sorting** button to configure the order of information in the generated report. Possible options are:

   - **Oldest to newest** – The report presents data showing the oldest entries first and the newest entries last.
   - **Newest to oldest** – The report presents data showing the newest entries first and the oldest entries last.

5. In the **Sub-type** field, select if you want to view legal or non-legal events.

**Note**

You **must** configure your FB Series product to keep separate legal and non-legal event logs on the Configure – System screen to view this field.

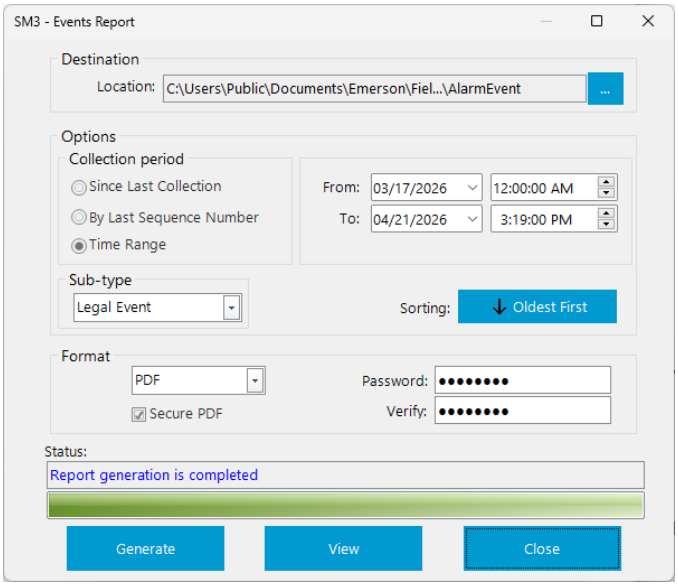
6. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

7. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 549. Events Report Generation Completed**




8. After the report is generated, click **View** to open the completed report.
9. Click **Close** to return to the previous screen.

## 6.7 Export Events Report

Use the Export Events Report option to export events stored in the legal event log of your device. The Export Events Report differs from the regular Events Report and is used to permanently acknowledge and export a set of legal events from the device. Once exported, events included in the report are marked as “read” in the device and will be overwritten by new events. Therefore, it should **only** be performed by an appropriate authority and the generated report should be archived externally in the host system for audit trial purposes.

The Export Events Report is also used to unlock a device which has become locked due to a full legal event log. After an Export Events Report is generated, sufficient event log space is freed to allow for additional legal events and the FB Series product is unlocked.

**Note**

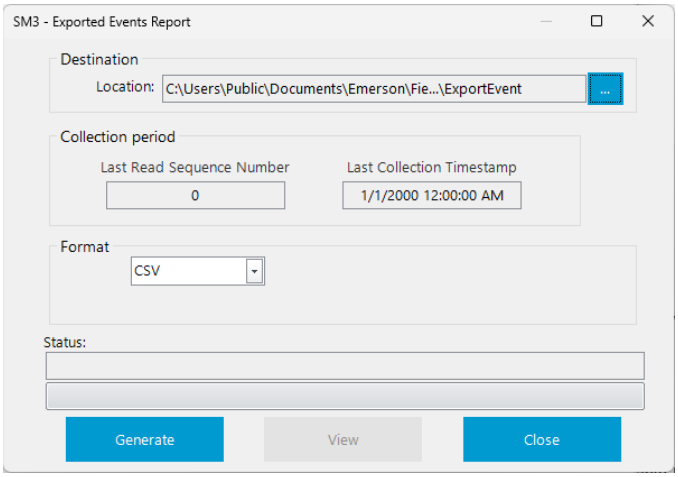
- This option is available **only** when the Event Log Configuration Type is set to **Separate Verifiable & Exportable Logs**. For more information, refer to Event Setup.
- The integrity of each event record is checked, and only event records with good integrity are shown.

- Each event record has an associated sequence number. A missing event record sequence number indicates a deleted or lost record.
- If you change the time zone of your PC, you **must** restart your PC before reports reflect the updated time zone.
- DeltaV FBxConnect configuration software calculates the generated file's MD5 hash and stores the result as a new event in the FB Series product's legal event log. This allows you to verify the integrity of the event report by calculating the file's MD5 hash and comparing the results with the MD5 hash stored in the FB Series product's legal event log.

To generate an Export Events Report:

1. Click **Reports** > **Export Events** from the DeltaV FBxConnect configuration software main menu. The Export Events Report screen displays.

**Figure 550. Export Events Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\ExportEvent*.

3. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

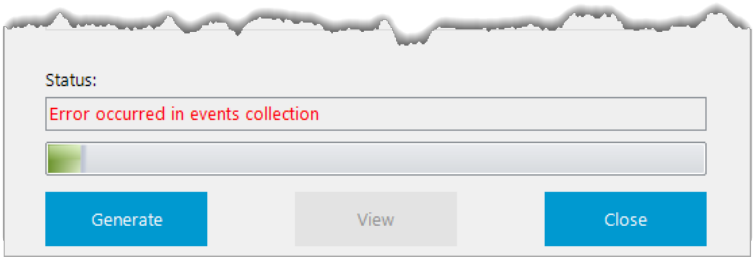
4. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation, and a dialog opens after the report is created.

**Figure 551. Archive Dialog**



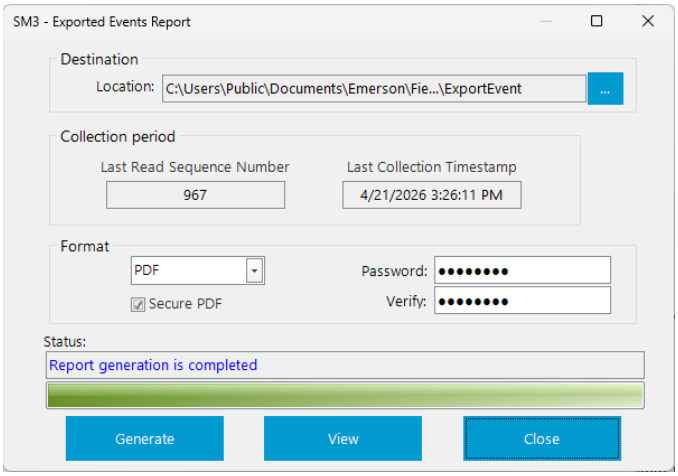

**Note**

- Remember to archive the generated report file for audit purposes.
- DeltaV FBxConnect configuration software calculates the generated file's MD5 hash and stores the result as a new event in the FB Series product's legal event log. This allows you to verify the integrity of the event report by calculating the file's MD5 hash and comparing the results with the MD5 hash stored in the FB Series product's legal event log.
- If the report cannot be generated, an error message appears in the status bar.




5. Select **OK** to acknowledge the message and close the dialog.

**Figure 552. Export Events Report Generation Completed**




6. After the report is generated, click **View** to open the completed report.

7. Click **Close** to return to the previous screen.

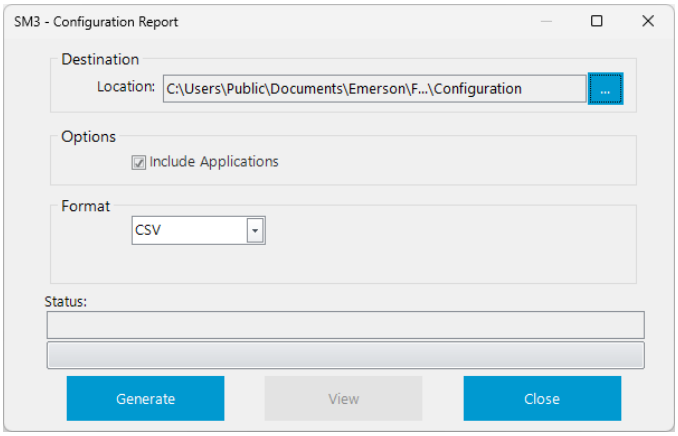
## 6.8 Configuration Report

Use the Configuration Report option to generate a report that shows you all of the parameters and parameter values in the connected device. You can generate reports using CSV or PDF formats.

To generate a Configuration Report:

1. Select **Reports > Configuration** from the DeltaV FBxConnect configuration software main menu. The Configuration Report screen displays.

**Figure 553. Configuration Report**



2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Configuration*.

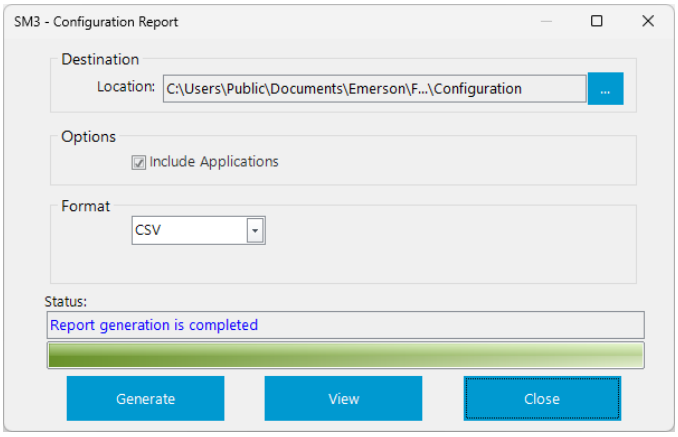
3. Place a check mark next to **Include Applications** if you want the generated report to include the configuration of applications installed on your device.
4. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

5. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 554. Configuration Report Generation Completed**




6. After the report is generated, click **View** to open the completed report.
7. Click **Close** to return to the previous screen.

# 6.9 Configuration Comparison Report

Use the Configuration Comparison Report option to generate a report that compares multiple configurations for a single device type. You can compare two previously saved configuration files or compare the configuration of the currently connected device to a saved configuration file. Reports can be generated in CSV or PDF file formats.

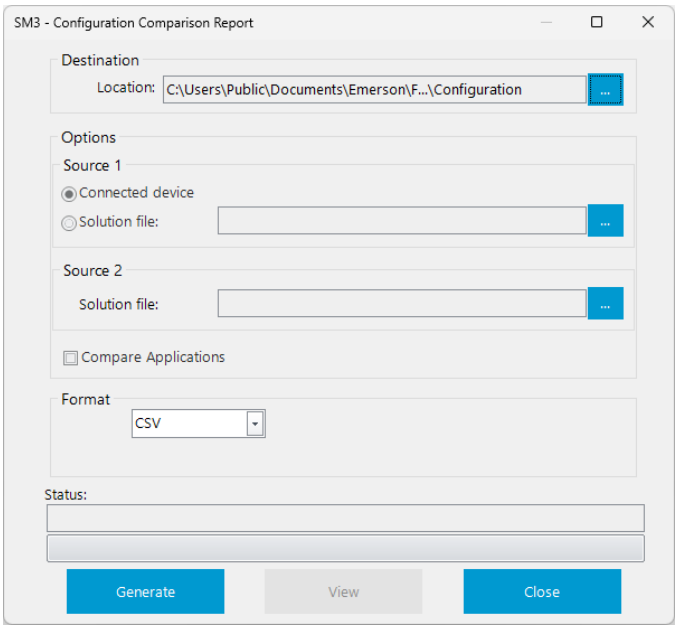
**Note**

- The completed report contains **only** the R/W parameters which are different between the two configurations.
- The device types **must** match between the selected configurations. For example, you can compare two FB1200 configurations, but you **cannot** compare an FB1200 and DeltaV FB3000 configuration.

To generate a Configuration Comparison Report:

1. Select **Reports > Config Comparison**. The Configuration Comparison Report dialog displays.

**Figure 555. Configuration Comparison Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Configuration*.

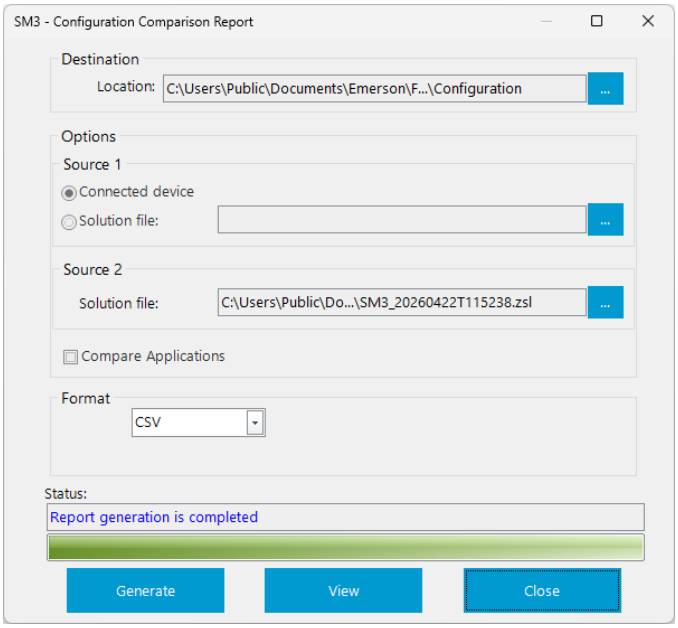
3. In the **Source 1** frame, select the first configuration as either **Connected device** (the currently connected device) or **Solution** (a solution file stored on your PC).
4. If you select Configuration, select ... and navigate to a configuration file stored on your PC to use in the comparison.
5. In the **Source 2** frame, select ... and navigate to a solution or configuration file stored on your PC to use in the comparison.
6. Place a check mark in the **Compare Applications** field to compare the applications installed in each configuration.
7. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

8. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 556. Configuration Comparison Report Generation Completed**




9. After the report is generated, click **View** to open the completed report. The report lists only parameters that are different between the two configurations.

10. Click **Close** to return to the previous screen.

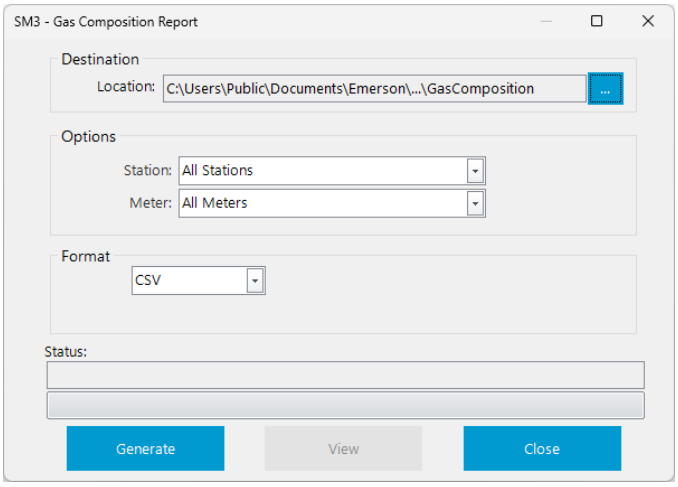
## 6.10 Gas Composition Report

Use the Gas Composition Report option to generate a report that details the gas components and mole percentages of the fluid flowing through each station and meter. You can generate reports using CSV or PDF formats.

To generate a Gas Composition Report:

1. Select **Reports > Gas Composition** from the DeltaV FBxConnect configuration software main menu. The Gas Composition Report dialog displays.

**Figure 557. Gas Composition Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Operations\GasComposition*.

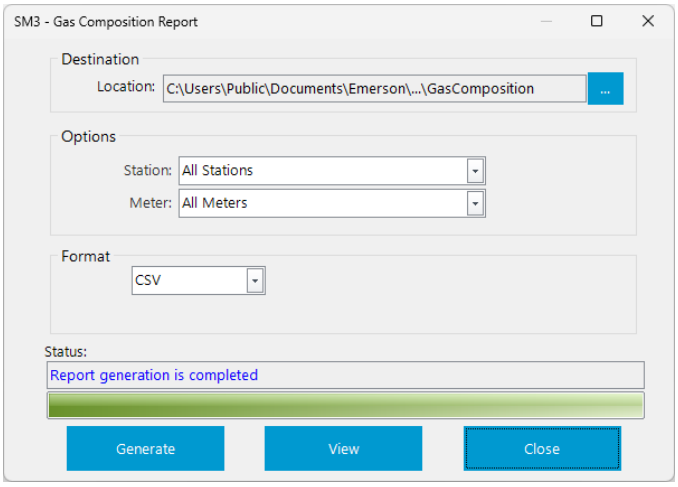
3. Click ▼ in the **Station** field and select the station that contains the data you want to collect.
4. Click ▼ in the **Meter** field and select the meter that contains the data you want to collect.
5. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

6. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 558. Gas Composition Report Generation is Completed**




7. After the report is generated, click **View** to open the completed report.
8. Click **Close** to return to the previous screen.

## 6.11 Parameter Status Report

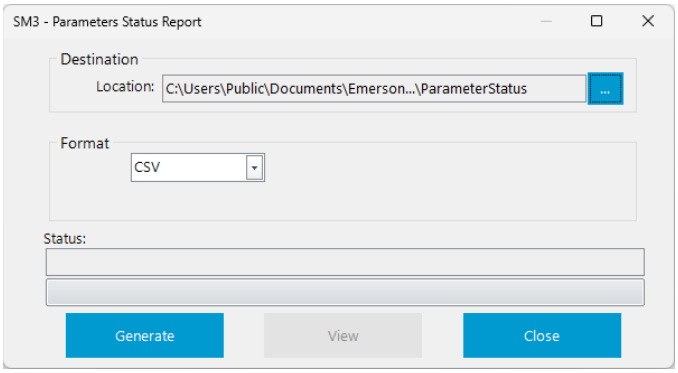
Use the Parameter Status report to help identify measurement issues with your FB Series product. The Parameter Status report contains a list of parameters in the following conditions:

- **Override** – A list of all selectable options that could be "live" but are instead in override.
- **Fault** – A list of all selectable items (parameters that end in "_SEL") with the fault bit set in the data quality attribute (PrmStatus).
- **Default** – A list of metrology parameters that have **not** been changed from their default values.

To generate a Parameter Status Report:

1. Select **Reports > Parameter Status** from the DeltaV FBxConnect configuration software main menu. The Parameter Status Report dialog displays.

**Figure 559. Parameter Status Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Configuration\ParameterStatus*.

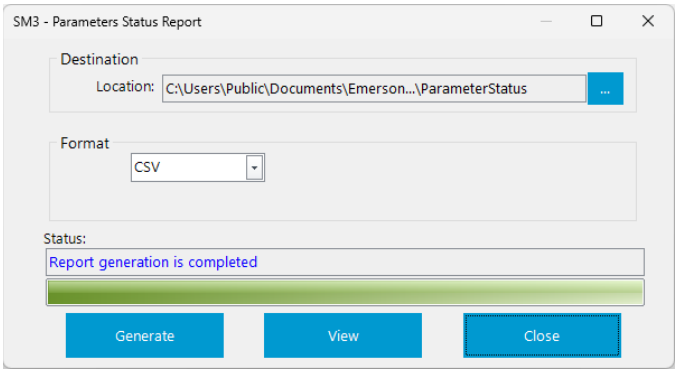
3. Click ▼ in the **Format** field to select the file type of the created report. Options include CSV or PDF formats.

**Note**

If you select PDF, you can password protect the file by placing a check mark in the **Secure PDF** box and entering a password.

4. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 560. Parameter Status Report Generation Completed**



5. After the report is generated, click **View** to open the completed report.
6. Click **Close** to return to the previous screen.

## 6.12 Diagnostic Report

Use the Diagnostic Report option to generate a report used to aid in investigations by Emerson's technical support team.

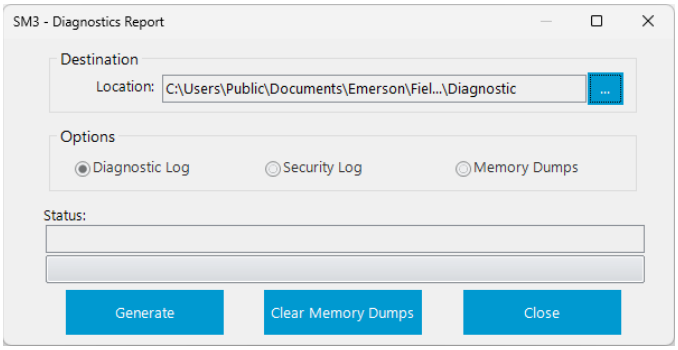
**Note**

The Diagnostic Report option creates an encrypted file that is **only** useful to Emerson's technical support team.

To generate a Diagnostic Report:

1. Select **Reports > Diagnostics** from the DeltaV FBxConnect configuration software main menu. The Diagnostic Report dialog displays.

**Figure 561. Diagnostic Report**




2. Click ... in the Destination field to open a Save As dialog and navigate to a location on your PC to store the report.

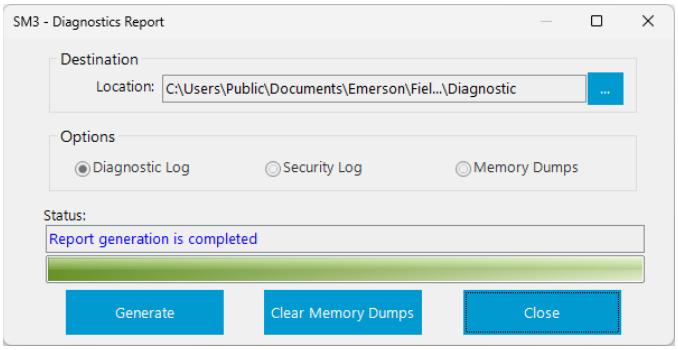
**Note**

The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Operations\Diagnostic*.

3. Select the type of report you want to generate. Possible options are **Diagnostic log**, **Security log** ,or **Memory dumps**.

4. Click **Generate** to create the report. A status bar provides you with the current progress of the report creation.

**Figure 562. Diagnostic Report Generation Completed**




**Note**

Select the **Clear memory dumps** button to permanently delete any memory dumps on your device.

5. After the report is generated, click **Close** to return to the previous screen.

## 6.13 Calibration Report

Use this option to view previously generated calibration reports stored on your PC.

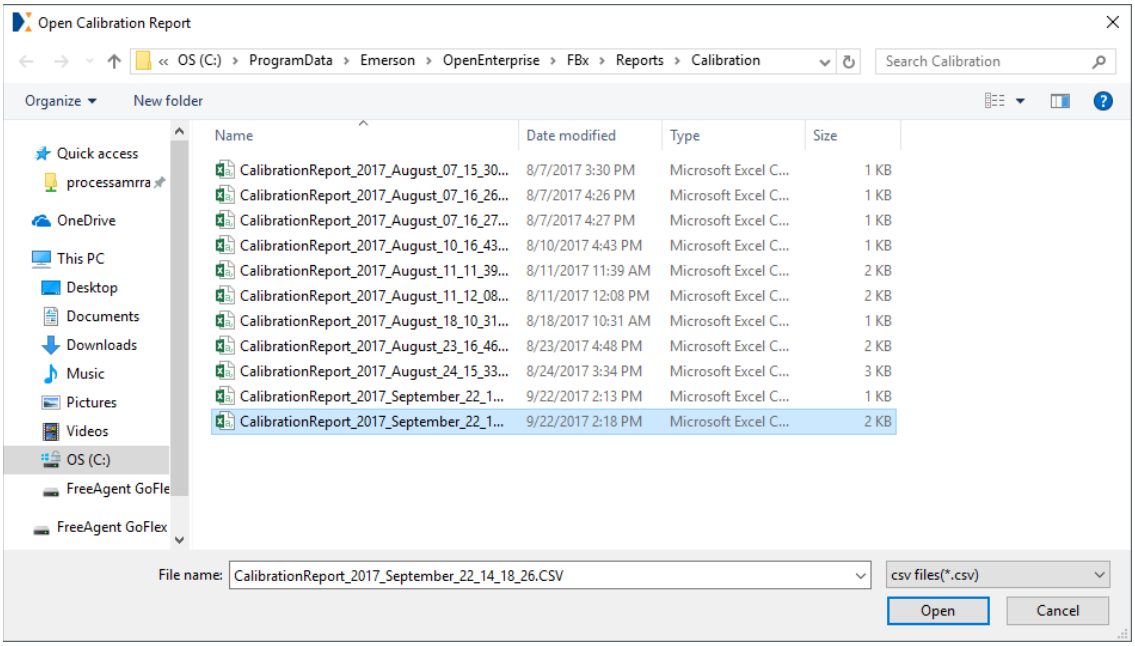
To view a Calibration Report:

1. Select **Reports > Calibration** from the DeltaV FBxConnect configuration software main menu. A file explorer window displays showing calibration reports stored on your PC.

**Note**

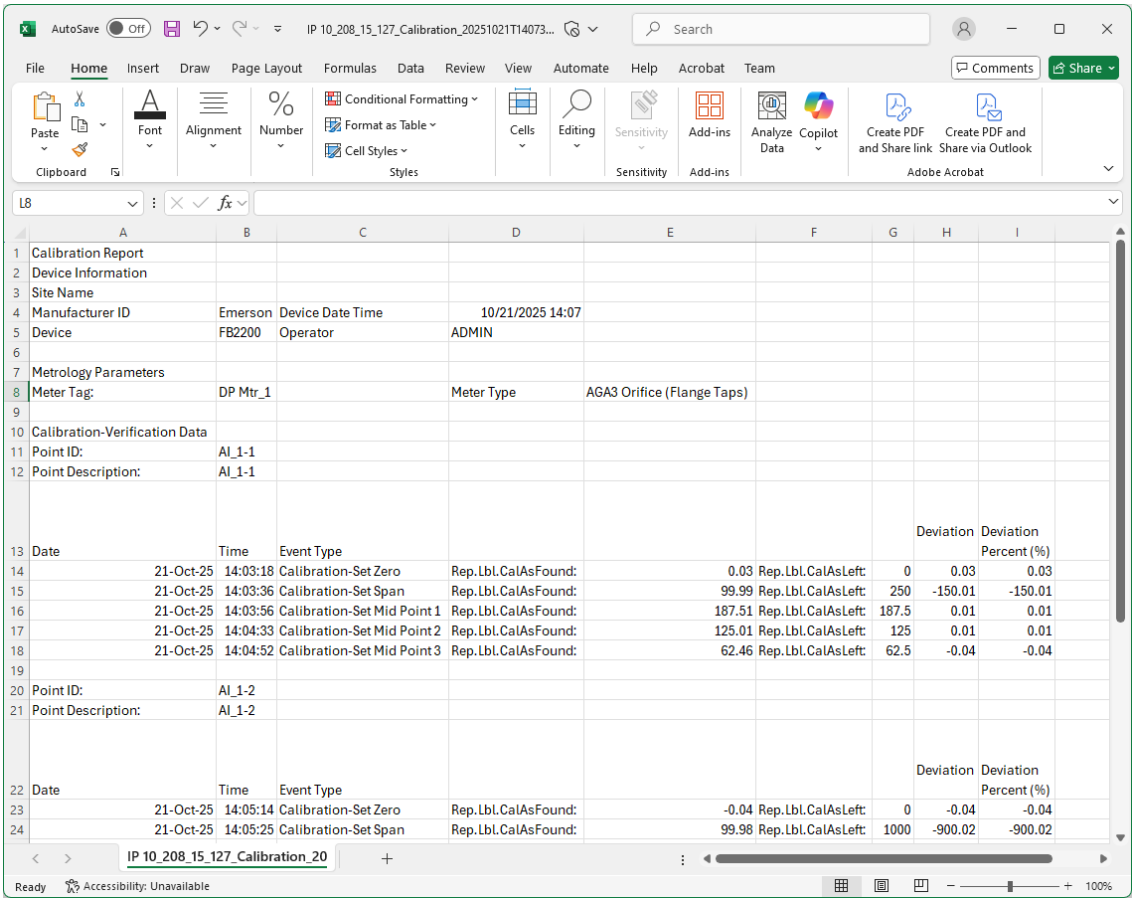
The default location is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Reports\Calibration*.

**Figure 563. Open Calibration Report**




2. Select a calibration report and select **Open**. The calibration report displays.

**Figure 564. Calibration Report**



| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Calibration Report | | | | | | | | |
| 2 | Device Information | | | | | | | | |
| 3 | Site Name | | | | | | | | |
| 4 | Manufacturer ID | Emerson | Device Date Time | 10/21/2025 14:07 | | | | | |
| 5 | Device | FB2200 | Operator | ADMIN | | | | | |
| 6 | | | | | | | | | |
| 7 | Metrology Parameters | | | | | | | | |
| 8 | Meter Tag: | DP Mtr_1 | | Meter Type | AGA3 Orifice (Flange Taps) | | | | |
| 9 | | | | | | | | | |
| 10 | Calibration-Verification Data | | | | | | | | |
| 11 | Point ID: | AI_1-1 | | | | | | | |
| 12 | Point Description: | AI_1-1 | | | | | | | |
| 13 | Date | Time | Event Type | | | | | Deviation | Deviation Percent (%) |
| 14 | 21-Oct-25 | 14:03:18 | Calibration-Set Zero | Rep.Lbl.CalAsFound: | 0.03 | Rep.Lbl.CalAsLeft: | 0 | 0.03 | 0.03 |
| 15 | 21-Oct-25 | 14:03:36 | Calibration-Set Span | Rep.Lbl.CalAsFound: | 99.99 | Rep.Lbl.CalAsLeft: | 250 | -150.01 | -150.01 |
| 16 | 21-Oct-25 | 14:03:56 | Calibration-Set Mid Point 1 | Rep.Lbl.CalAsFound: | 187.51 | Rep.Lbl.CalAsLeft: | 187.5 | 0.01 | 0.01 |
| 17 | 21-Oct-25 | 14:04:33 | Calibration-Set Mid Point 2 | Rep.Lbl.CalAsFound: | 125.01 | Rep.Lbl.CalAsLeft: | 125 | 0.01 | 0.01 |
| 18 | 21-Oct-25 | 14:04:52 | Calibration-Set Mid Point 3 | Rep.Lbl.CalAsFound: | 62.46 | Rep.Lbl.CalAsLeft: | 62.5 | -0.04 | -0.04 |
| 19 | | | | | | | | | |
| 20 | Point ID: | AI_1-2 | | | | | | | |
| 21 | Point Description: | AI_1-2 | | | | | | | |
| 22 | Date | Time | Event Type | | | | | Deviation | Deviation Percent (%) |
| 23 | 21-Oct-25 | 14:05:14 | Calibration-Set Zero | Rep.Lbl.CalAsFound: | -0.04 | Rep.Lbl.CalAsLeft: | 0 | -0.04 | -0.04 |
| 24 | 21-Oct-25 | 14:05:25 | Calibration-Set Span | Rep.Lbl.CalAsFound: | 99.98 | Rep.Lbl.CalAsLeft: | 1000 | -900.02 | -900.02 |



# 6.14 Upload Custom Reports

Use this option to upload custom reports that are stored on your FB Series product to your PC.

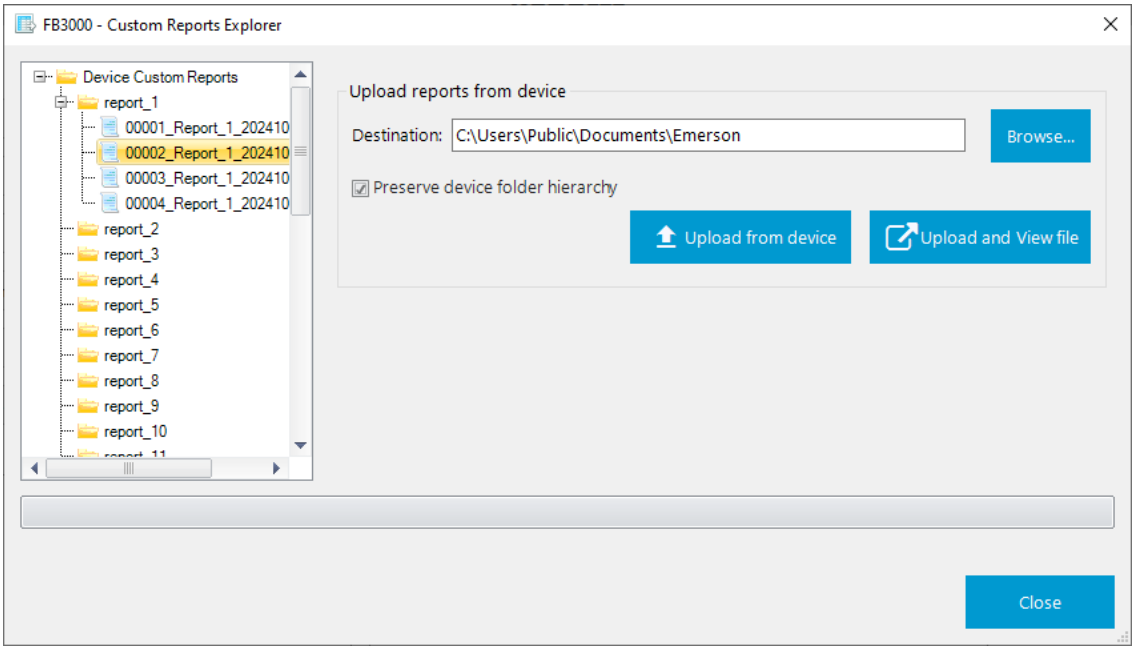
**Note**

You cannot delete individual custom reports from your FB Series product from this display. To delete your custom reports, refer to Cold Start.

To open the Custom Reports Explorer:

1. Select **Reports > Upload Custom Reports** from the DeltaV FBxConnect configuration software main menu. The Custom Reports Explorer dialog opens.

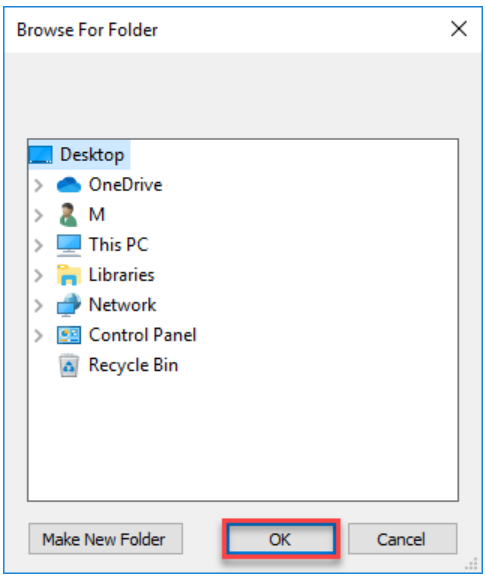
**Figure 565. Custom Reports Explorer**




2. Select an individual report or a report folder to transfer to your PC from the report hierarchy on the left-side of the dialog.

3. Select **Browse** to open a Browse For Folder window.

**Figure 566. Browse For Folder**




4. Navigate to the folder where you want to save the reports and select **OK**.

5. Place a check mark next to **Preserve device folder hierarchy** to copy the folder structure from your device to your PC.

**Note**

If you do **not** select this option, only the selected reports are copied to your PC.

6. Select **Upload from device** to copy the selected custom reports from the FB Series product to the selected folder on your PC.

**Note**

If you select **only** one report from the report hierarchy on the left-side of the dialog, select **Upload and View file** to copy the selected custom report from the FB Series product to the selected folder and open the copied file in a text editor on your PC.

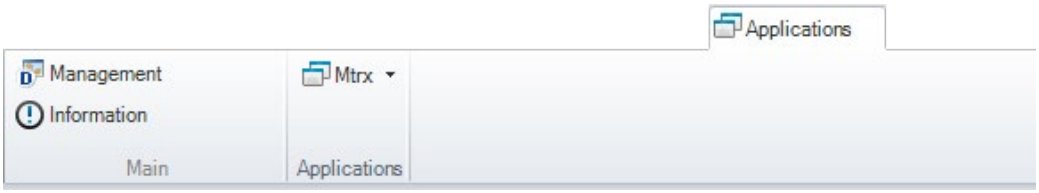
7. Select **Close** to exit the dialog.

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# Section 7: Applications Menu

Use the Applications menu to install, remove, and view information about each application installed on your DeltaV FB3000.

**Figure 567. Applications Menu**




The Applications menu contains the following options:

Management – Add, remove, or export applications.

Information – View information for each application installed in the DeltaV FB3000 including resource usage, starting, and stopping the application.

**Note**

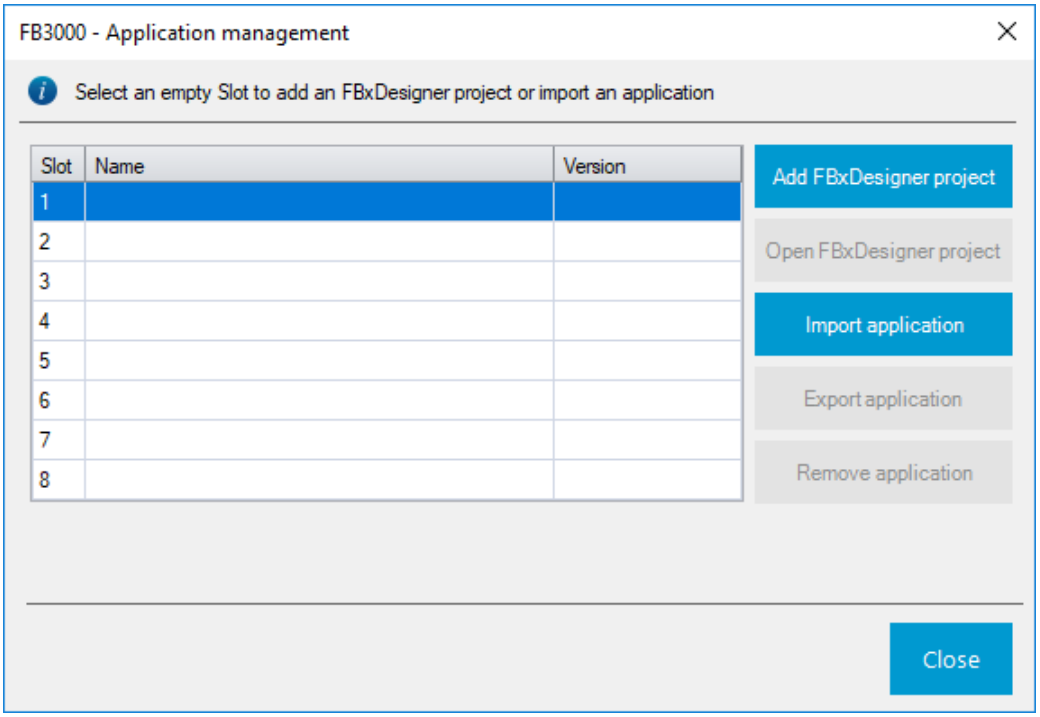
Any installed applications also display in this menu. For instructions about a specific application, refer to that application's documentation.

## 7.1 Management

Applications allow your DeltaV FB3000 RTU to perform additional functions. You can create a custom application using FBxDesigner™ or import an application and load it into your FB Series product. The Application management window allows you to add, remove, or export applications.

To access this display, select **Applications > Management** from the DeltaV FBxConnect configuration software main menu. The Application management window opens.

**Figure 568. Application management**




You can perform the following actions with the Application management window:

Add FBxDesigner Project – Add a project created in FBxDesigner™ to your DeltaV FB3000, and optionally include user defined objects and/or user displays made using FBxVue.

Open FBxDesigner Project – Open an existing FBxDesigner™ project for editing.

Import Application – Import and start an application package (.zap).

Update Application – Update an application without removing the previous version first.

Export Application – Export an application package (.zap).

Remove Application – Remove an application package, including the FBxDesigner™ program, user defined objects and user displays.

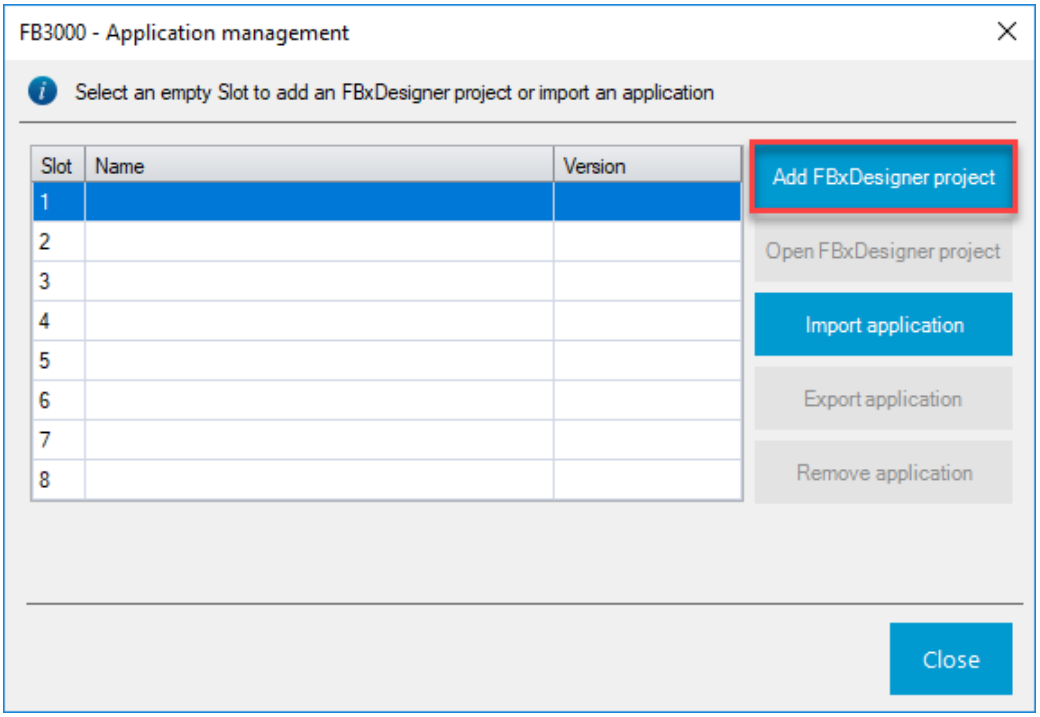
### 7.1.1 Add FBxDesigner™ Project

You can create custom applications in FBxDesigner™ and then load them in an FB Series product. Use this option to load an FBxDesigner™ project on your DeltaV FB3000, and optionally include user defined objects and/or user displays created using FBxVue.

To add an FBxDesigner™ project:

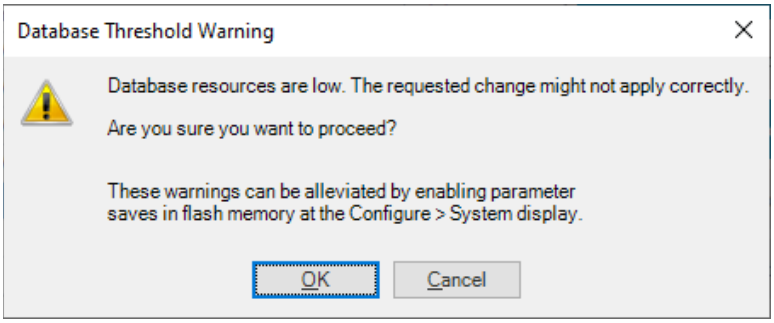
1. Select **Applications > Management** from the DeltaV FBxConnect configuration software main menu. The Application management window opens.

**Figure 569. Add FBxDesigner™ project**



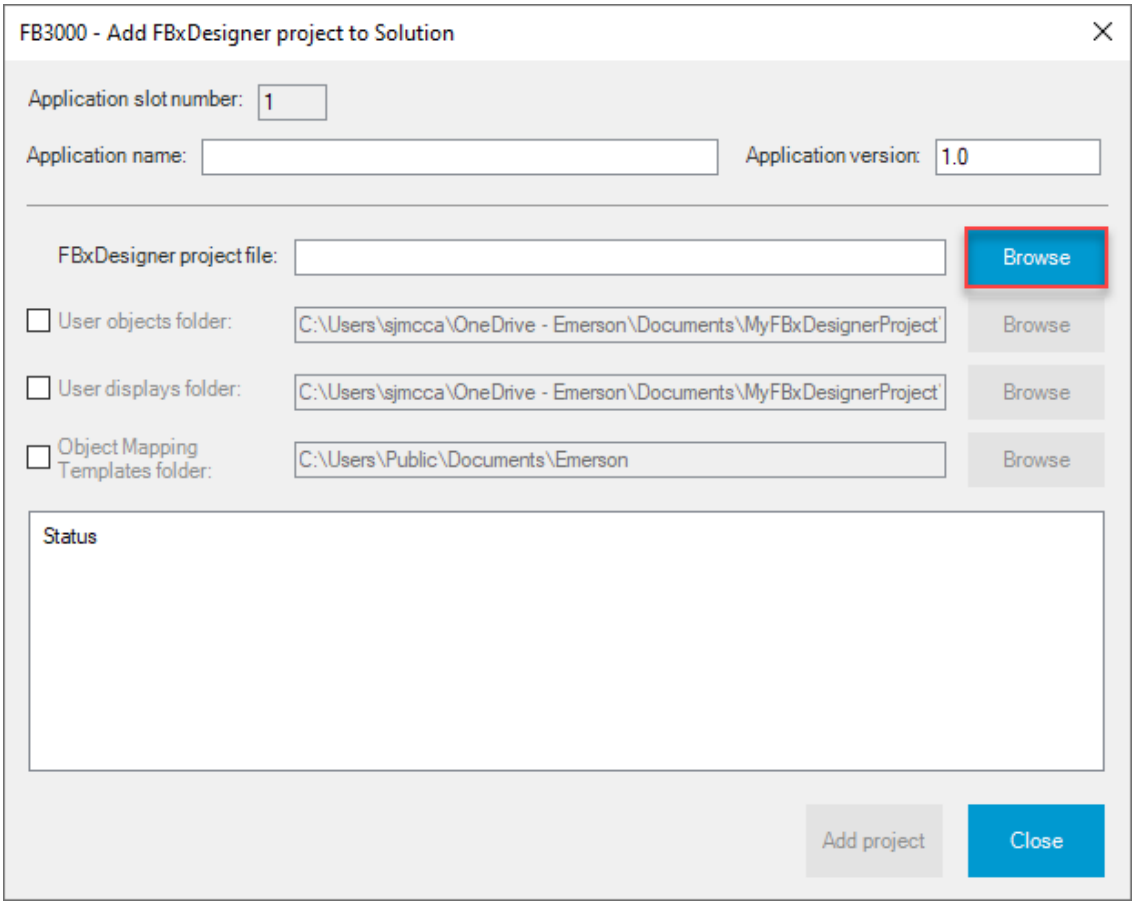

**Note**

The following warning appears if your FB Series product's database resources are low. You can free up database resources by removing certain configuration parameters from the database and storing those parameters as files on the FB Series product's flash file system. For more information, refer to the **Database save Params to Flash File** field on the Configure – System display.



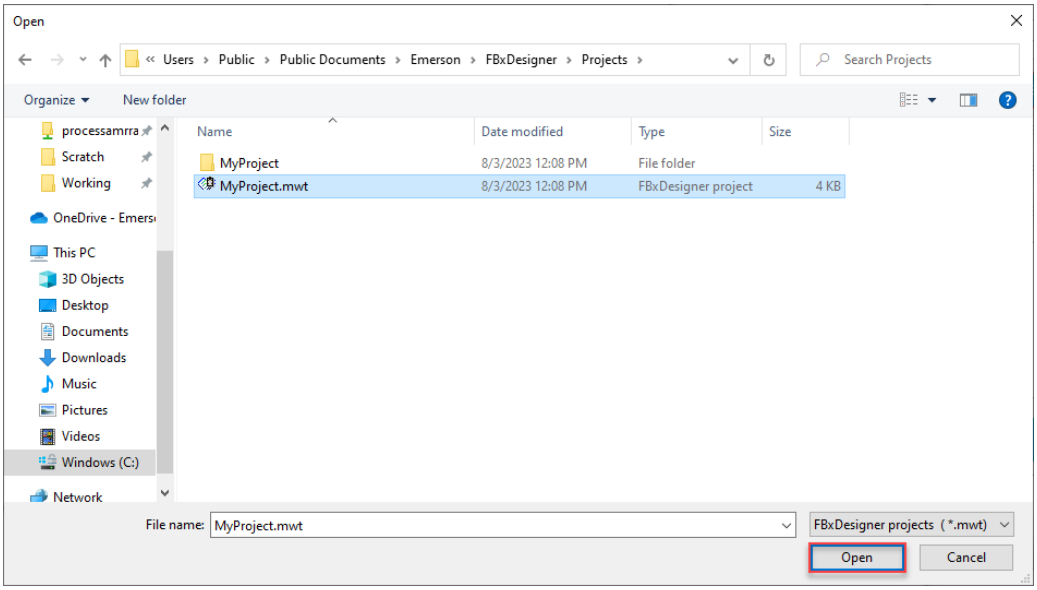

2. Select which slot the FBxDesigner™ project should be loaded into and select **Add FBxDesigner project**. The Add FBxDesigner project to Solution pop-up display opens.

**Figure 570. Add FBxDesigner™ project to Solution**




3. Select **Browse** in the FBxDesigner project file field. A file explorer window opens.

**Figure 571. Open**




4. Navigate to the location of the FBxDesigner™ project file on your PC, select the file, and then select **Open**.

**Note**

The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FBxDesigner\Projects*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.

5. To add user defined objects to your FBxDesigner™ project, place a check mark next to **User objects folder**, select **Browse**, select the folder on you PC that contains the user defined objects, and then select **OK**.

**Note**

- Adding user defined objects is optional.
- Creating user defined objects is an advanced feature of the DeltaV FB3000. For more information about the steps involved in creating user defined objects, please contact technical support.

6. To add displays created with FBxVue to your FBxDesigner™ project, place a check mark next to **User displays folder**, select **Browse**, select the folder on you PC that contains the custom displays, and then select **OK**.

**Note**

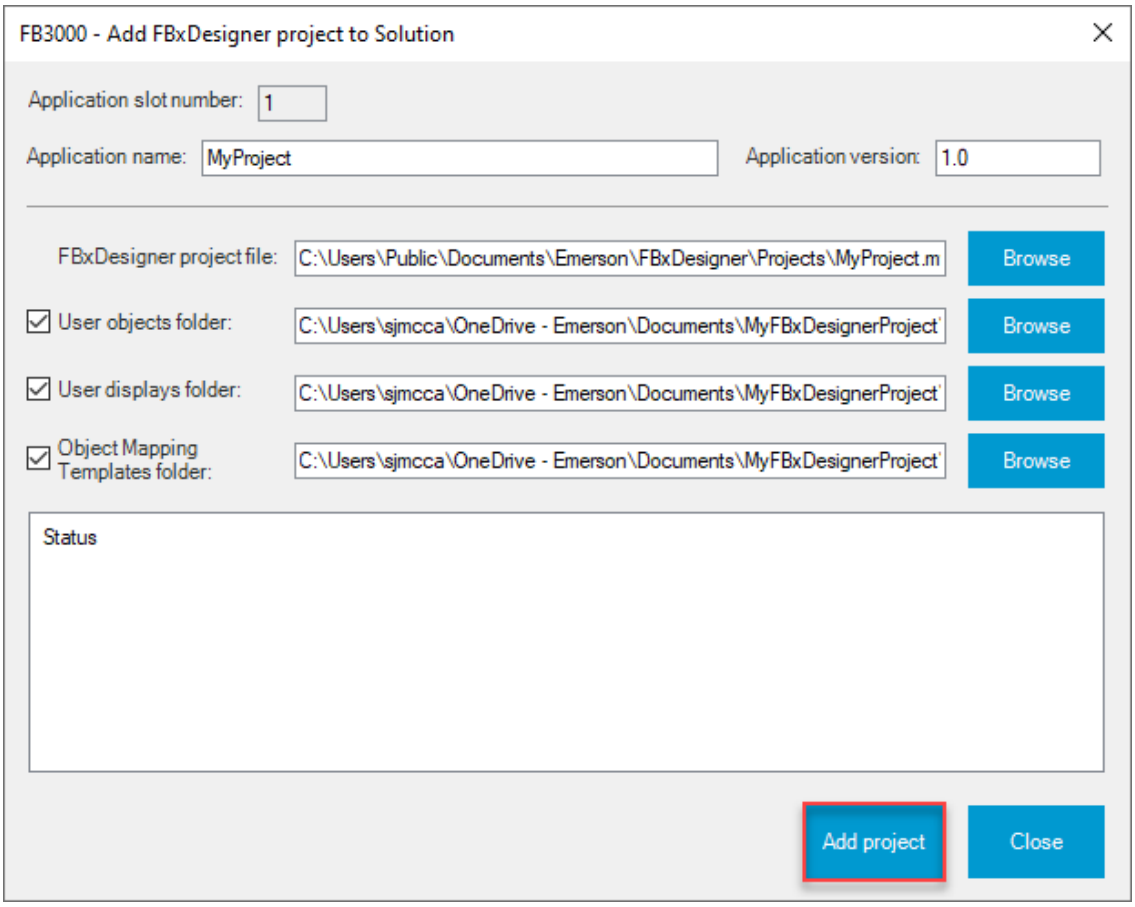
Adding displays is optional.

7. To add object mapping templates to your FBxDesigner™ project, place a check mark next to **Object Mapping Templates folder**, select **Browse**, select the folder on you PC that contains the custom Object Mapping Templates (OMT), and then select **OK**.

**Note**

Adding Object Mapping Templates is optional.

**Figure 572. Add project**

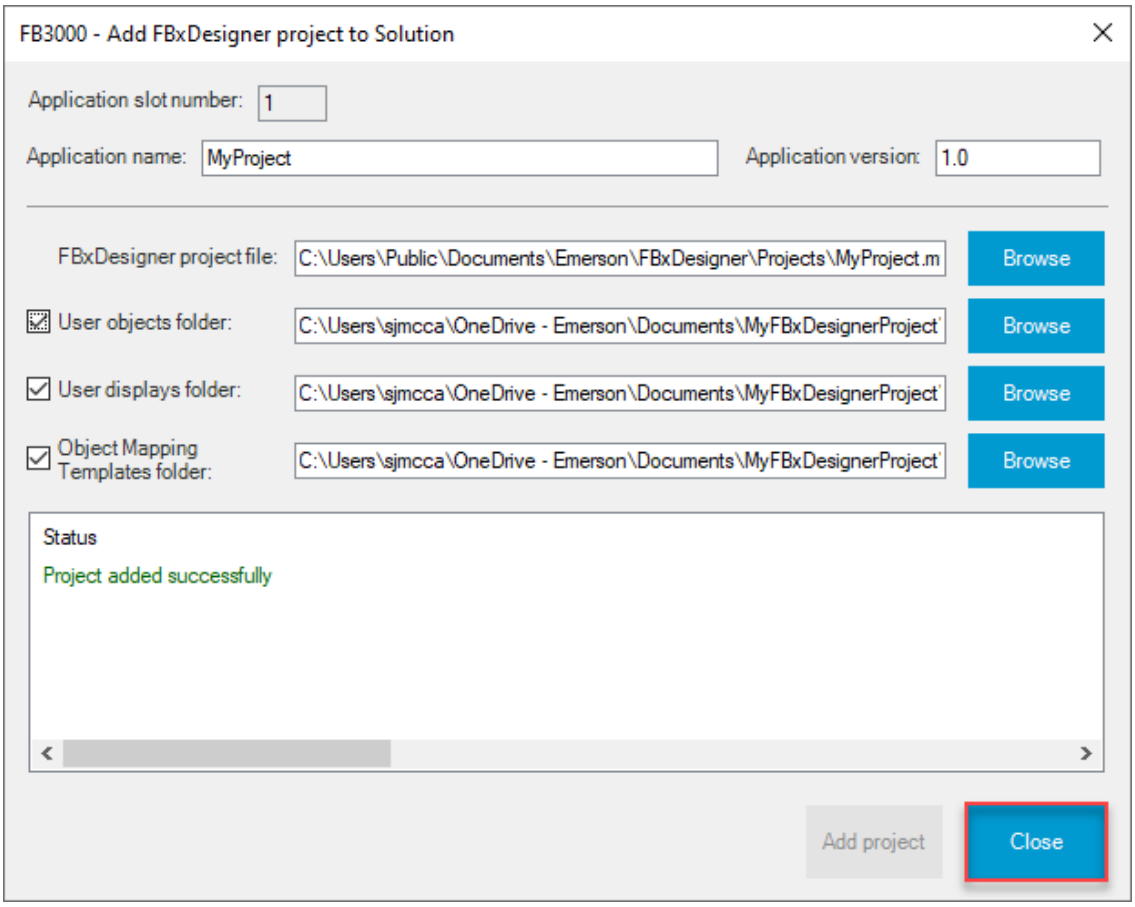



8. Select **Add project** to add the FBxDesigner™ project to your DeltaV FB3000. The Status field shows Project added successfully.

**Note**

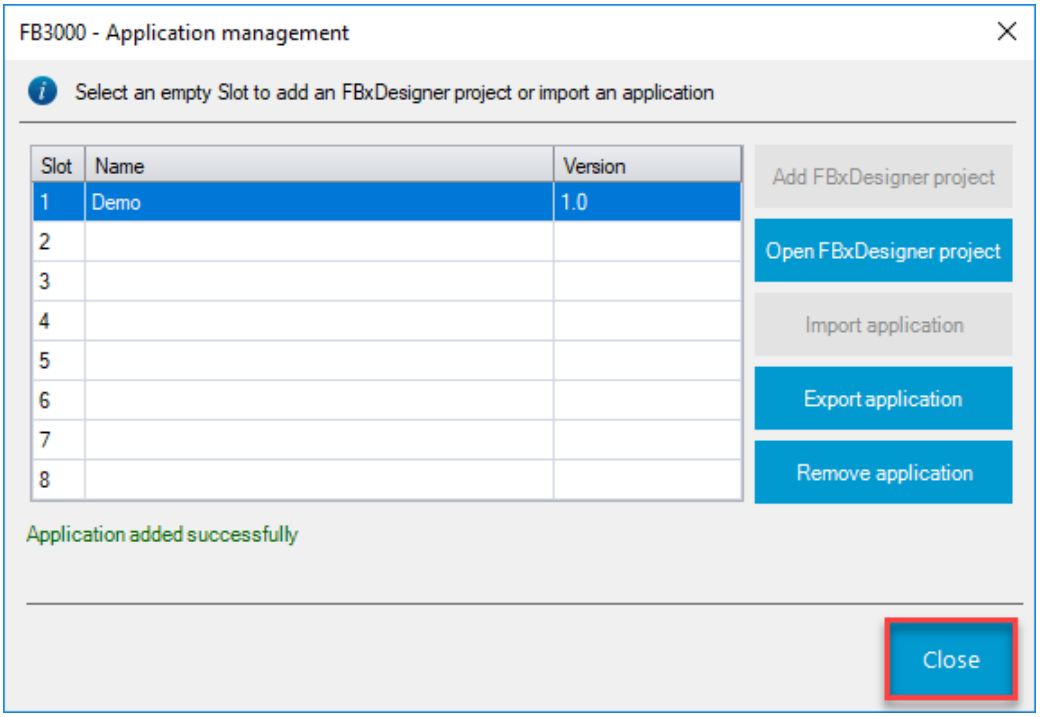
An error message appears if the FBxDesigner project contains an object with a major and/or minor version equal to zero (as defined in the application's Objects.csv file). To fix this error, update the major and/or minor version in the application's Objects.csv file to a number greater than zero and try again.

**Figure 573. Project Added Successfully**



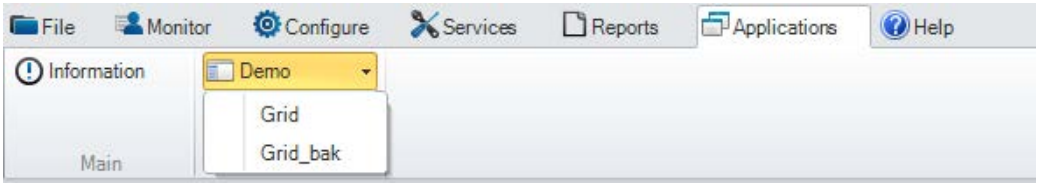

9. Select **Close** to return to the main Application management window.

**Figure 574. Application Added Successfully**




**10.** DeltaV FBxConnect configuration software downloads the FBxDesigner™ project to your DeltaV FB3000. Select **Close** to exit the Application management window. Any user displays are now available from the Application menu.

**Figure 575. Application Showing User Displays**




**Note**

When creating a display, the system periodically creates a backup copy (_bak) of your display. You can safely remove the application, delete the file from the display folder, and re-add the application to the DeltaV FB3000 to prevent this from showing in the UI.

### 7.1.1.1 Add FBxDesigner™ Project Help Files

You can include a help file for your FBxDesigner™ project. This help file opens when you press **F1** while an application display is open in DeltaV FBxConnect.

For DeltaV FBxConnect configuration software to open the help file for your FBxDesigner™ project, you **must** include the following two files:

- **Apphelp.chm** – A compiled HTML file that contains your help content. You create this file with the help authoring tool of your choice.
- **Apphelp.csv** – A map file that associates specific displays in your application with specific topics in the Apphelp.chm file. If you do not include a map file, then the help file always shows the default help screen of DeltaV FBxConnect.

The Apphelp.csv file **must** be formatted according to the following rules for DeltaV FBxConnect configuration software to open the correct help topic. The file contains only two columns. Column A contains the display file name and column B contains the map ID. Enter **Display** in the first cell of column A. Enter **ID** in the first cell of column B. In the proceeding rows, enter the name of the display files used in your application in column A and the corresponding map ID for that display in column B.

**Note**

- When building the display for your application, you **must** enter the map ID in the TOPIC ID field (located in the PROPERTIES pane when the Canvas is selected in FBxVue).
- When creating your compiled HTML file, you **must** associate the corresponding map ID to a help topic using your help authoring tool.

**Figure 576. Apphelp.csv Format Example**

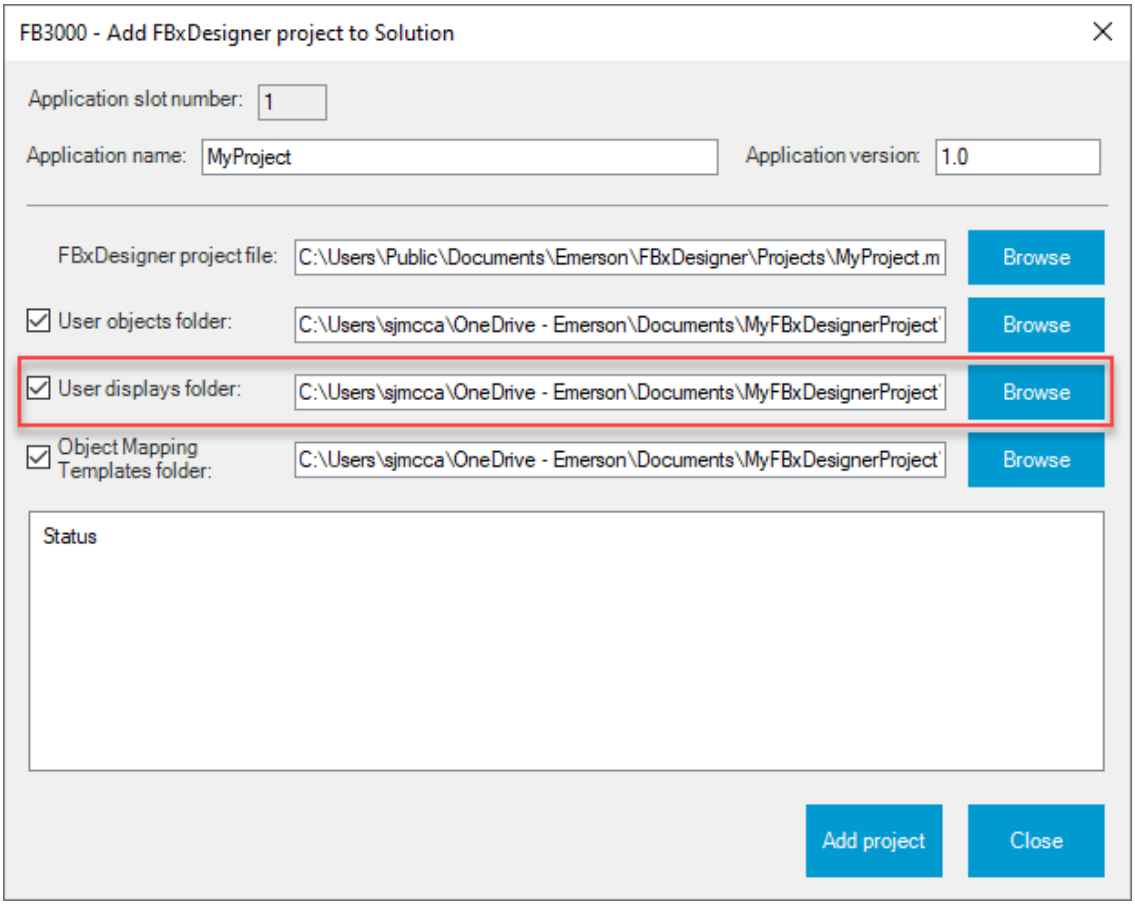
| | A | B | C | D |
|---|---|---|---|---|
| 1 | Display | ID | | |
| 2 | BiDi Popup | 29 | | |
| 3 | Cutoff popup | 38 | | |
| 4 | CV IO | 39 | | |
| 5 | CV Mapping | 40 | | |
| 6 | MPPID Tuning | 44 | | |
| 7 | PID Tuning | 45 | | |
| 8 | PipeDiam popup | 46 | | |
| 9 | RCV IO | 47 | | |
| 10 | UserPV popup | 51 | | |

**Note**

You **must** name the files **Apphelp.chm** and **Apphelp.csv**.

When loading an FBxDesigner project, these help files **must** be present in the folder you select in **User displays folder** field.

**Figure 577. User Displays Folder**



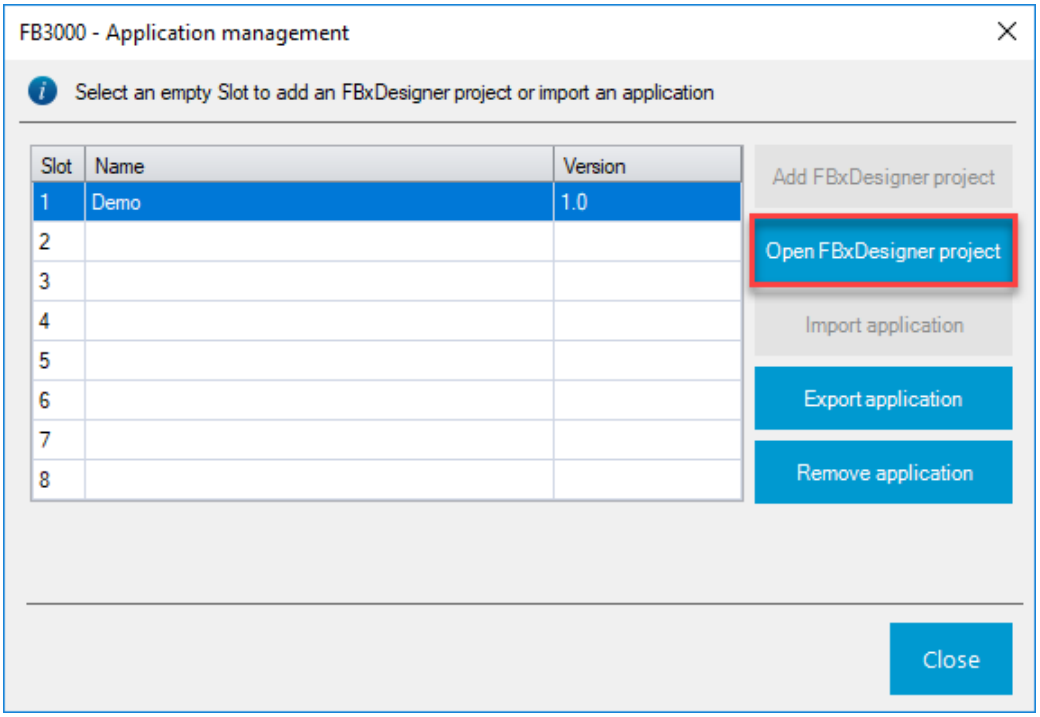

## 7.1.2 Open FBxDesigner Project

You can open and edit an existing FBxDesigner™ project that is loaded in you DeltaV FB3000.

To open an FBxDesigner™ project:

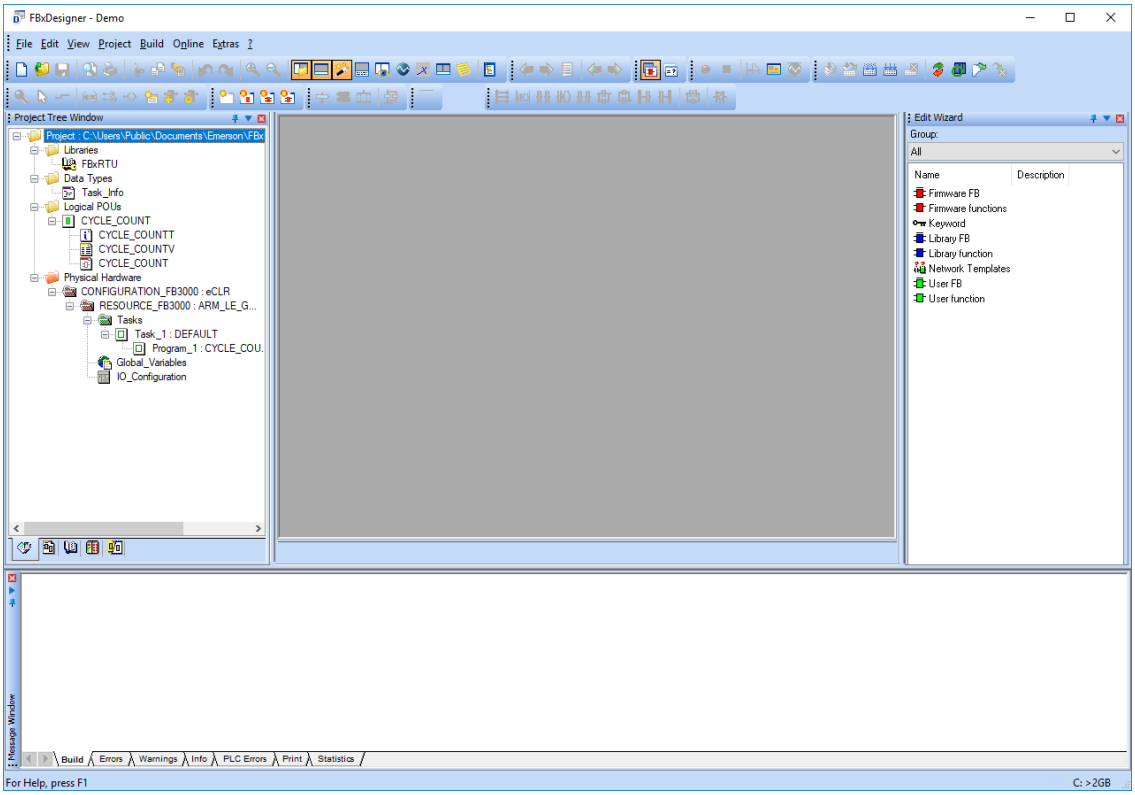
1. Select **File > Manage Applications** from the DeltaV FBxConnect configuration software main menu. The Application Management window opens.

**Figure 578. Open FBxDesigner project**




2. Select the slot that contains the FBxDesigner™ project and select **Open FBxDesigner project**. The project opens in FBxDesigner™.

**Figure 579. Open**




3. You can now view and modify the FBxDesigner™ project.

**Note**

You **must** save any changes you make to the FBxDesigner™ project to a new project file, and then add the new project file to the FB Series product.

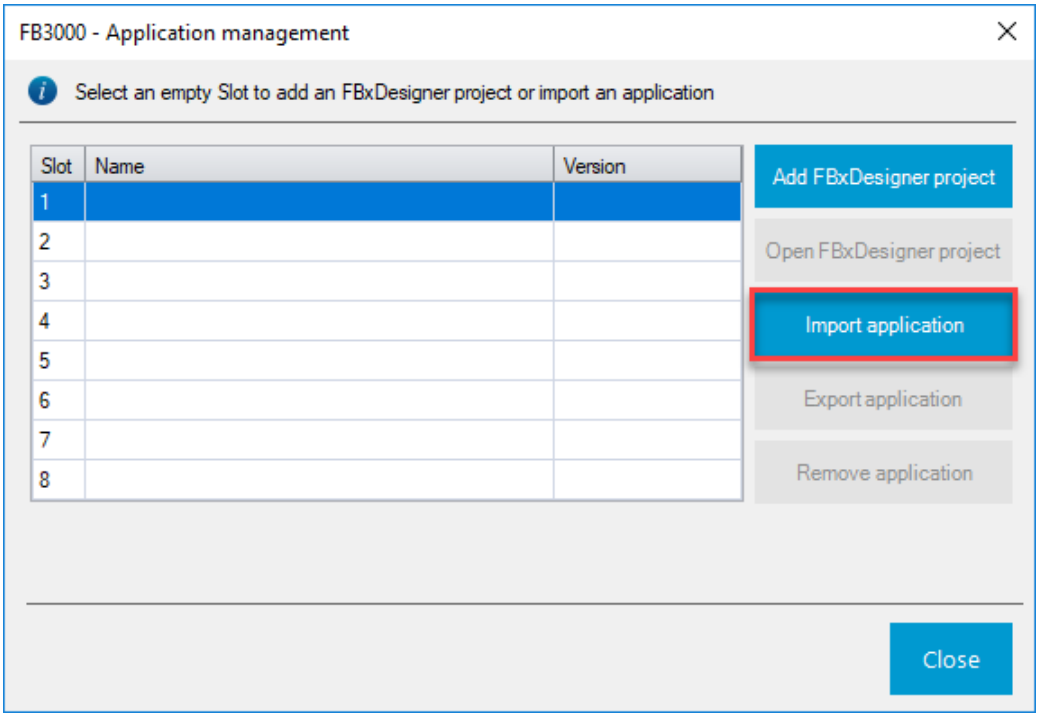
## 7.1.3 Import Application

Applications allow your FB Series product to perform additional functions. Use this option to import and start an application (.zap) package.

To import an application:

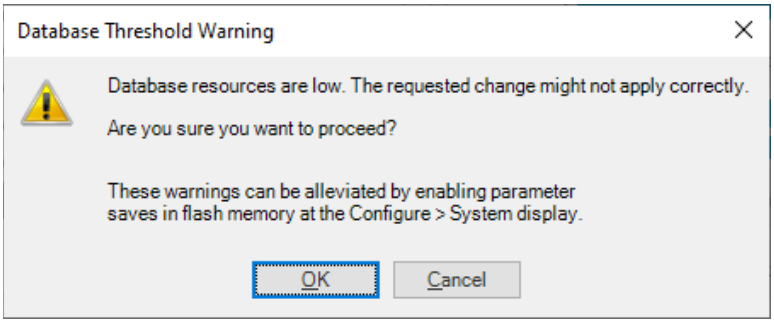
1. Select **File > Manage Applications** from the DeltaV FBxConnect configuration software main menu. The Application management window opens.

**Figure 580. Import Application**



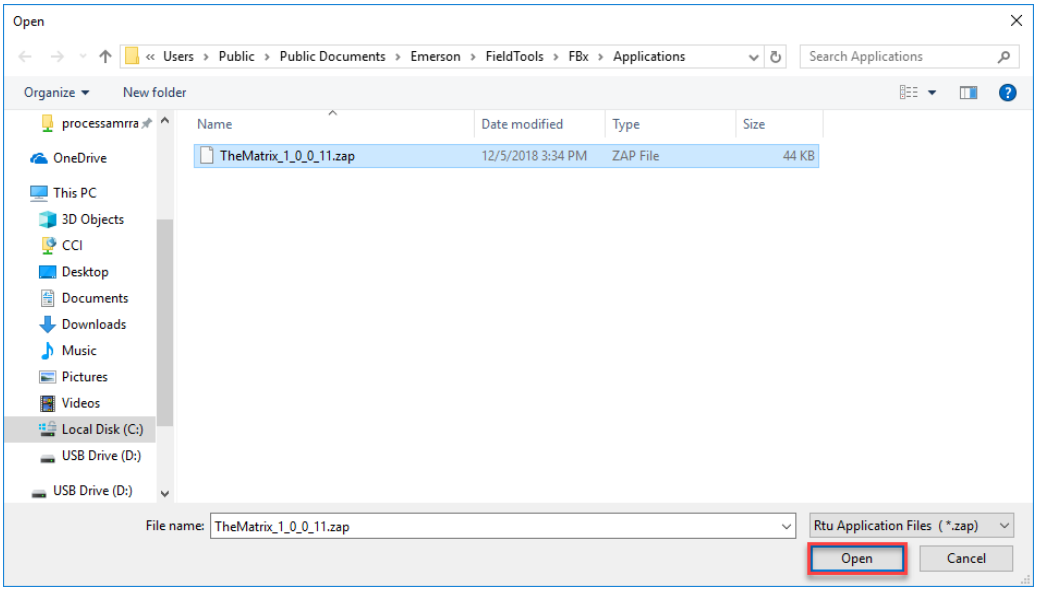

**Note**

The following warning appears if your FB Series product's database resources are low. You can free up database resources by removing certain configuration parameters from the database and storing those parameters as files on the FB Series product's flash file system. For more information, refer to the **Database save Params to Flash File** field on the Configure – System display.




2. Select which slot the application should be loaded into and select **Import Application**. A file explorer window opens.

**Figure 581. Open**

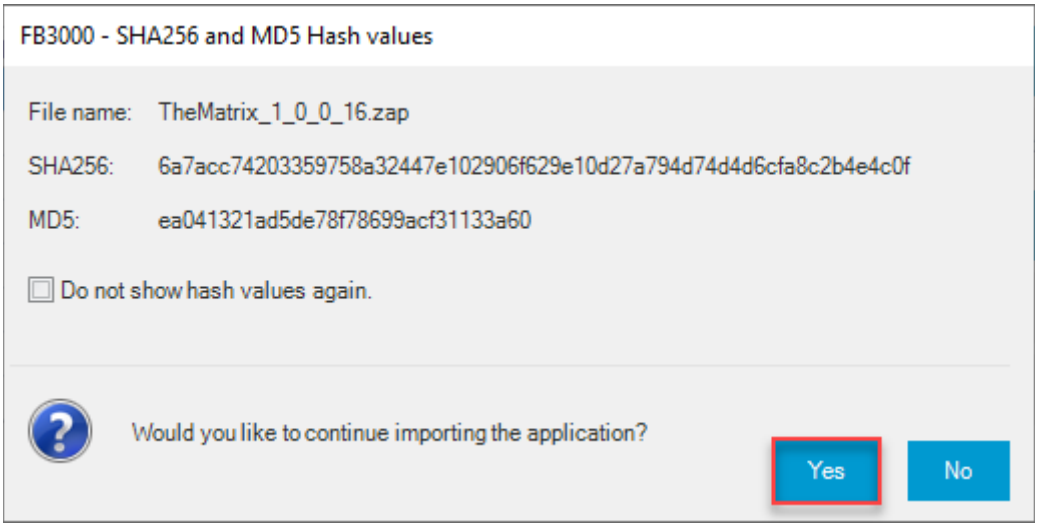



3. Navigate to the location of the application file on your PC, select the file, and then select **Open**. A dialog opens showing the SHA256 and MD5 Hash values of the application file.

**Note**

The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Applications*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.

**Figure 582. Hash Values Dialog**



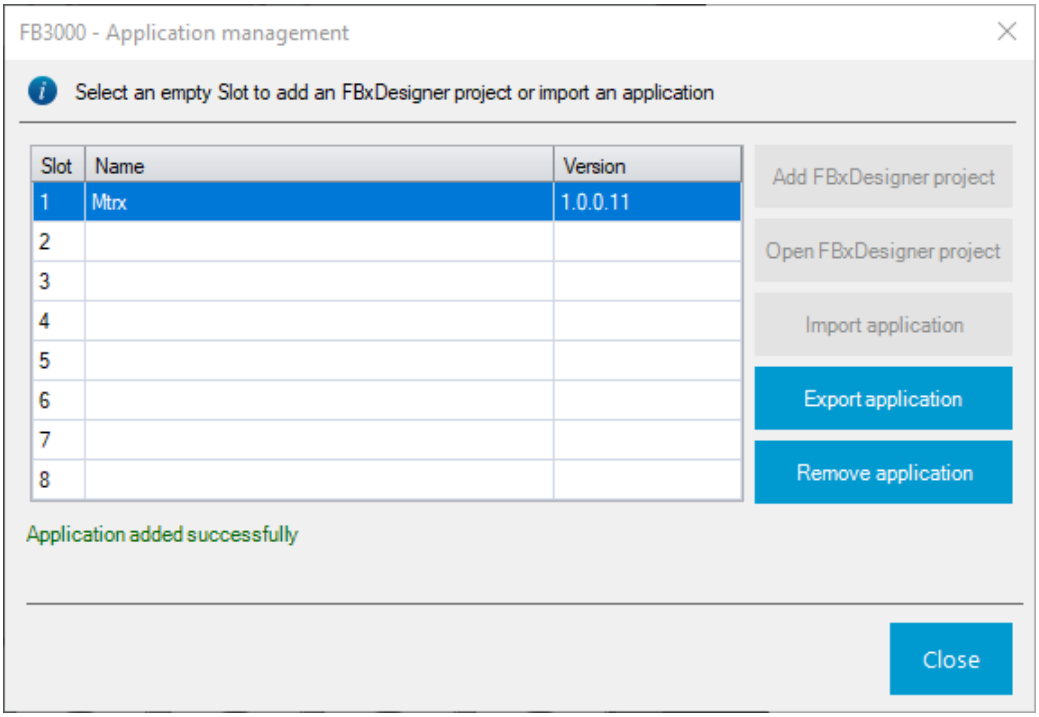

4. After confirming the hash values of the package, select **Yes** to begin the firmware update. A progress bar shows you the status of the update process.

**Note**

- The application is immediately loaded on your FB Series product.
- An error message appears if the new application contains an object with a major and/or minor version equal to zero (as defined in the application's Objects.csv file). To fix this error, update the major and/or minor version in the application's Objects.csv file to a number greater than zero and try again.

5. When the application is added successfully, select **Close** to return to the main DeltaV FBxConnect configuration software display.

**Figure 583. Application Added Successfully**



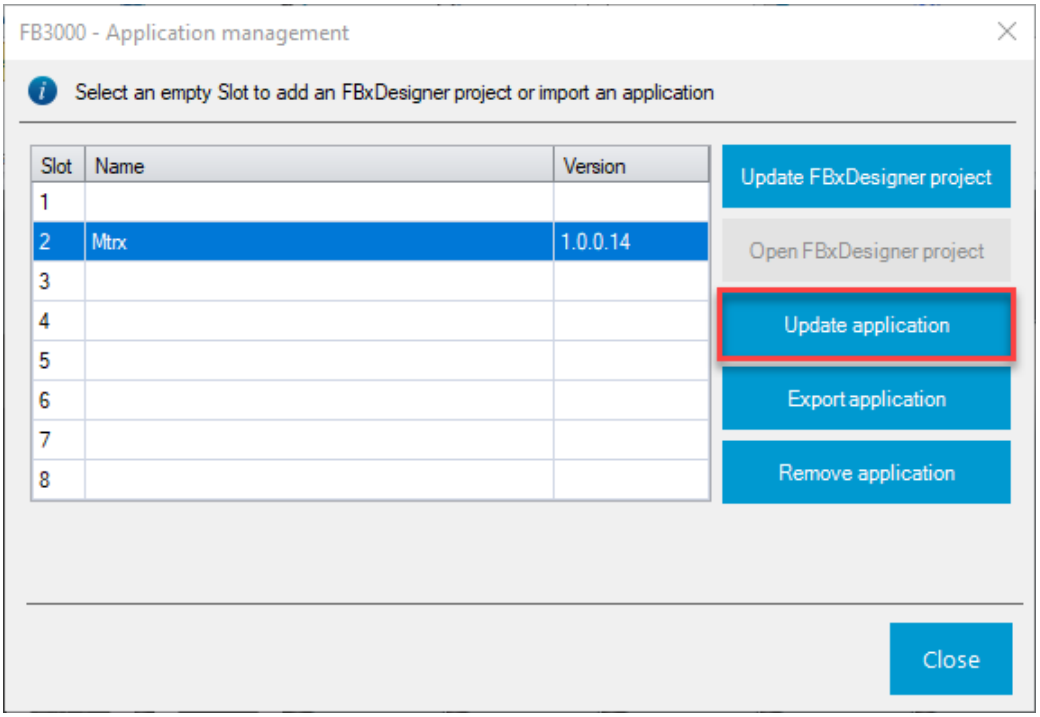

## 7.1.4 Update Application

You can update applications installed on your FB Series product without the need to remove the previous version first. This allows you to keep any configured program data when installing the new version.

To update an application:

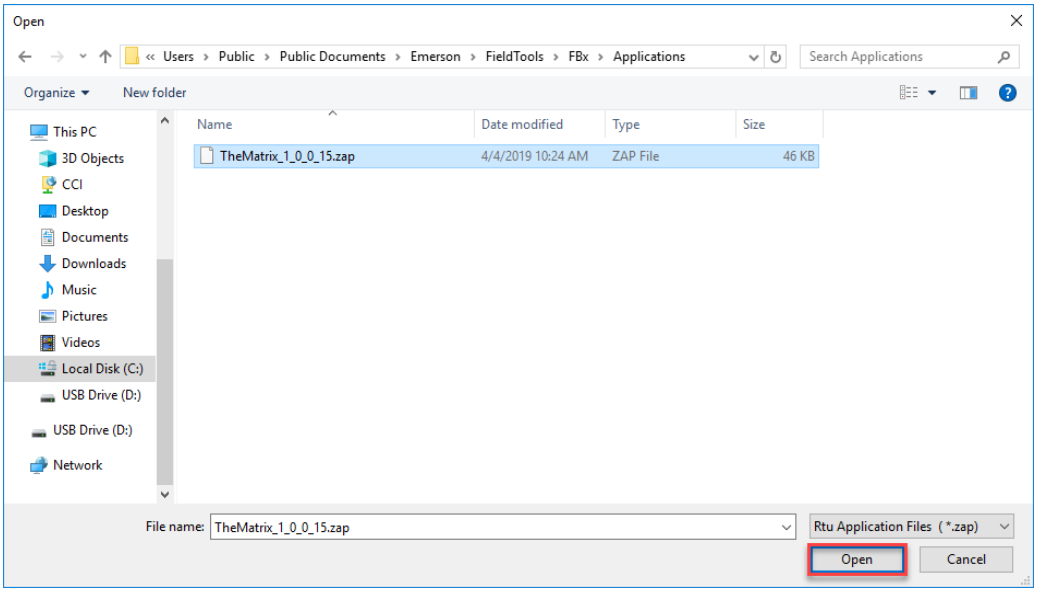
1. Select **File > Manage Applications** from the DeltaV FBxConnect configuration software main menu. The Application management window displays.
2. Select the slot containing the application you want to update.

**Figure 584. Update Application**




3. Select **Update Application**. A file explorer window opens.

**Figure 585. Open**

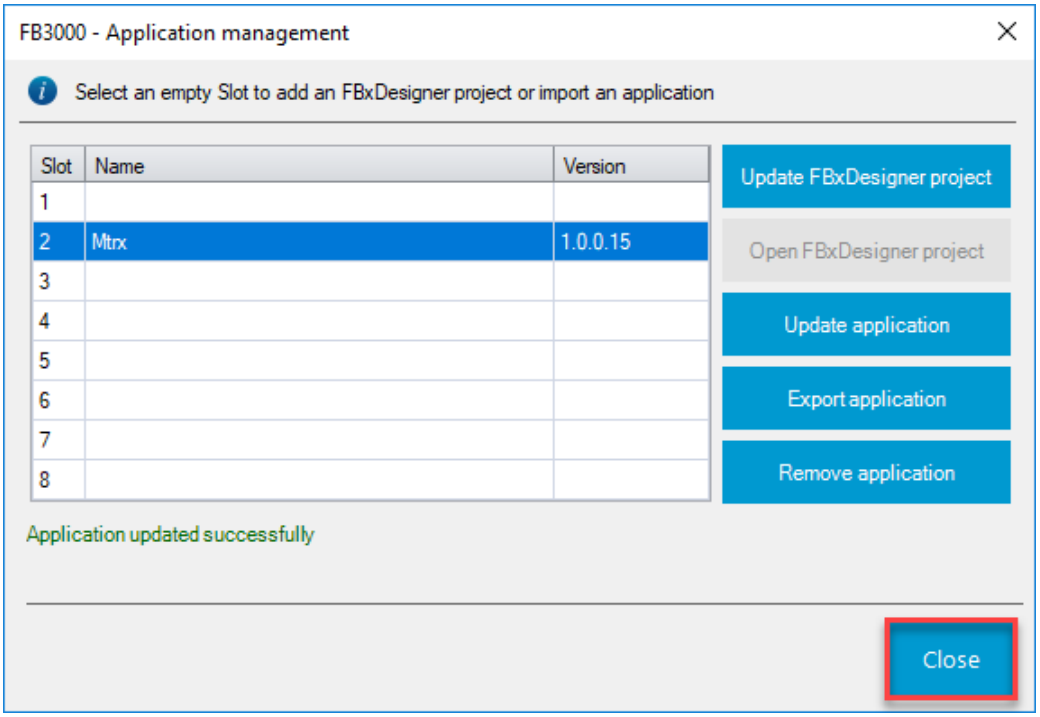



4. Navigate to the location of the new version of the application file on your PC, select the file, and then select **Open**.

**Note**

- The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Applications*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.
- The application is immediately loaded on your FB Series product.
- An error message appears if the new application contains an object with a major and/or minor version equal to zero (as defined in the application's Objects.csv file). To fix this error, update the major and/or minor version in the application's Objects.csv file to a number greater than zero and try again.

**Figure 586. Application Updated Successfully**




5. When the application is updated successfully, select **Close** to return to the main DeltaV FBxConnect configuration software display.

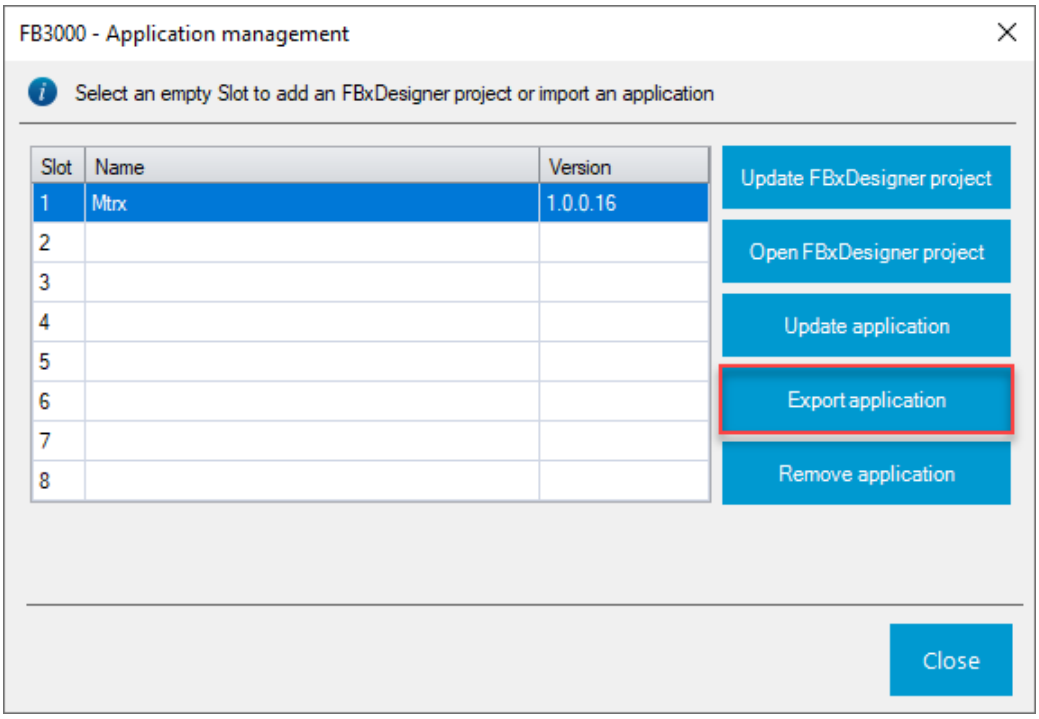
## 7.1.5 Export Application

You can export applications from an FB Series product and save them as solution files on your PC. Use this option to export an application package (.zap), select the destination path, and assign an application version number to the exported application package.

To export an application package:

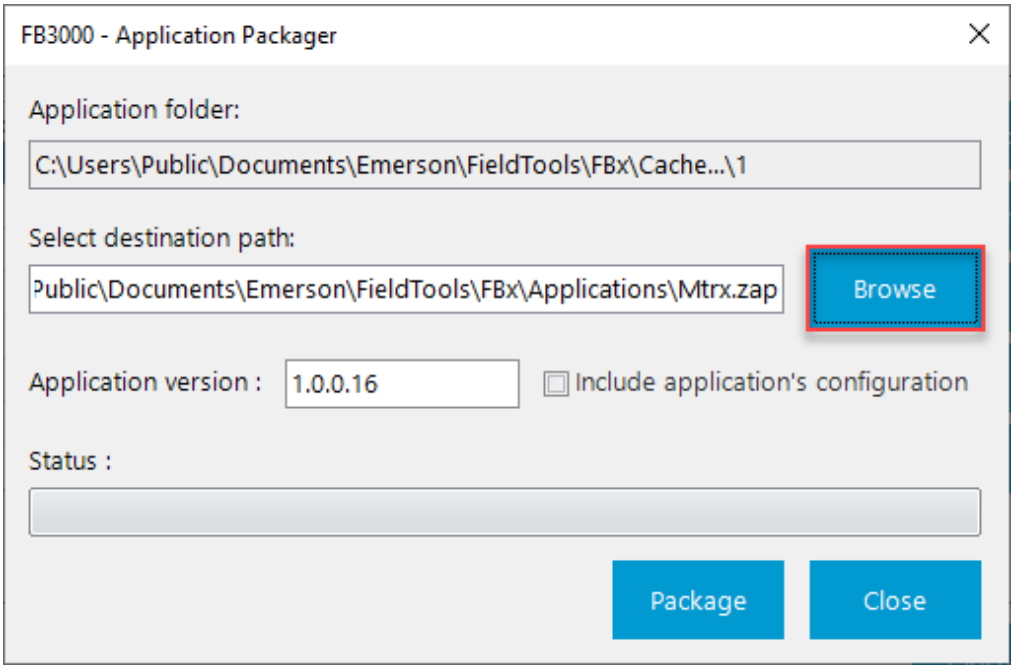
1. Select **File > Manage Applications** from the DeltaV FBxConnect configuration software main menu. The Application management window opens.

**Figure 587. Export Application**




2. Select the slot with the application you want to export and click **Export application**. The Application Packager window opens.

**Figure 588. Application Packager**



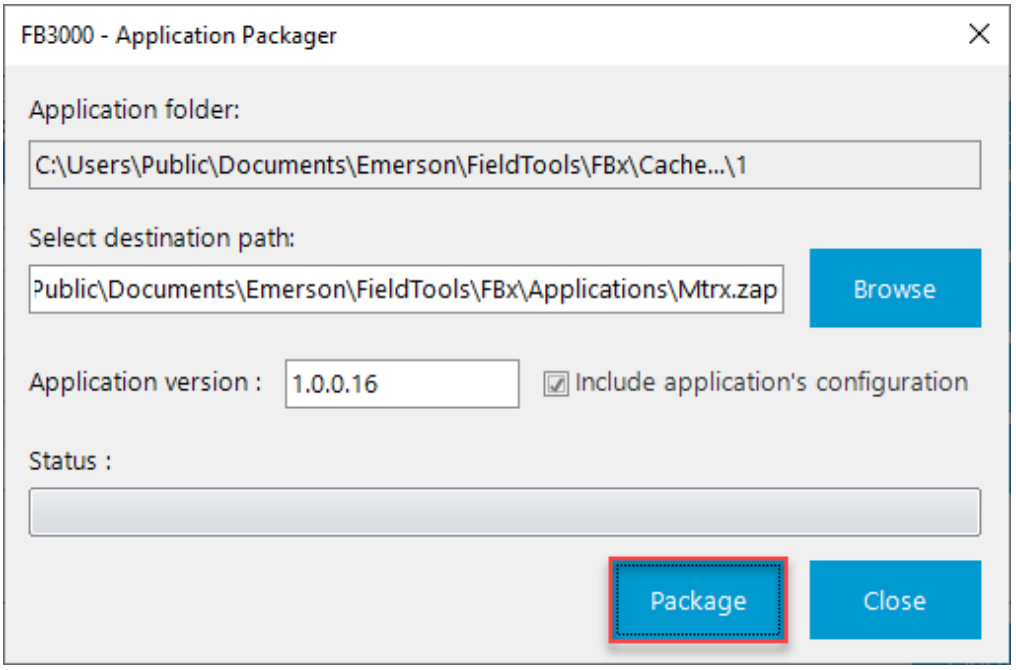

3. Select **Browse** to open a File Explorer window.
4. Navigate to the location on your PC you want to save the application, enter a name for the file and select **Save**.

**Note**

The default location for saved Solutions is *C:\Users\Public\Documents\Emerson\FieldTools\FBx\Applications*. This location is in a hidden folder, and you may need to select "show hidden files" on your computer to view this folder.

5. Enter a version number in the **Application Version** field.
6. Place a check mark next to **Include application's configuration** if you want to include your customized configuration in the application package.
7. Select **Package** to save the application in a Solution file on your PC.

**Figure 589. Application Packager**

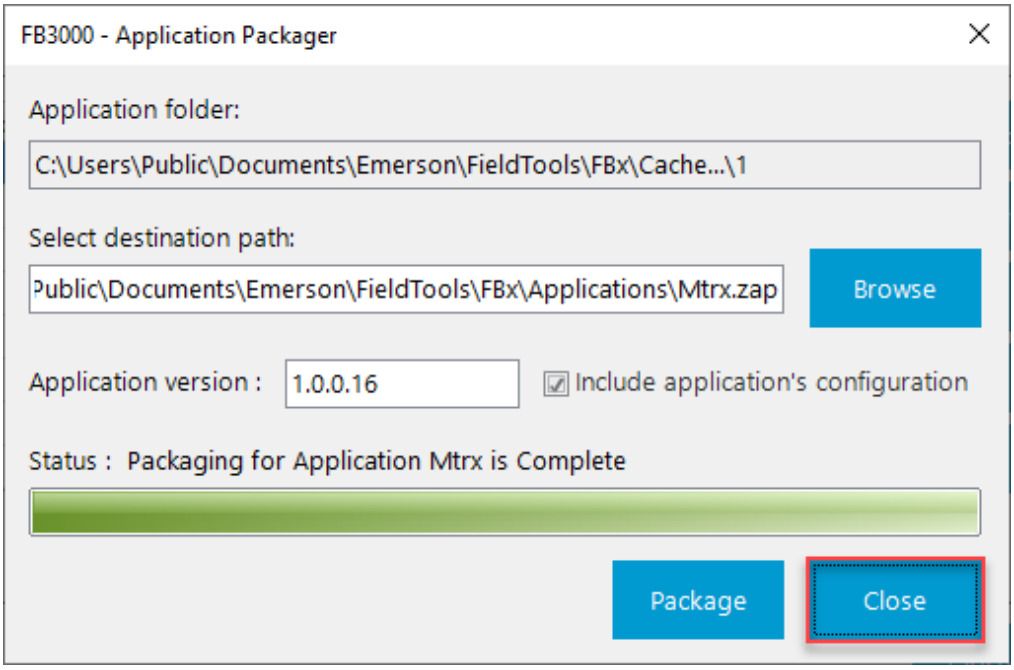



**Note**

- If the application package file name already exists on your computer, the system asks you want to overwrite the existing file. Select **Yes** to overwrite the file or select **No** to cancel the operation and enter a unique name for this application package.
- An error message appears if any application object contains a major and/or minor version equal to zero (as defined in the application's Objects.csv file). If this occurs, you cannot export the application.

8. Select **Close** to return to the main DeltaV FBxConnect configuration software display.

**Figure 590. Application Exported Successfully**



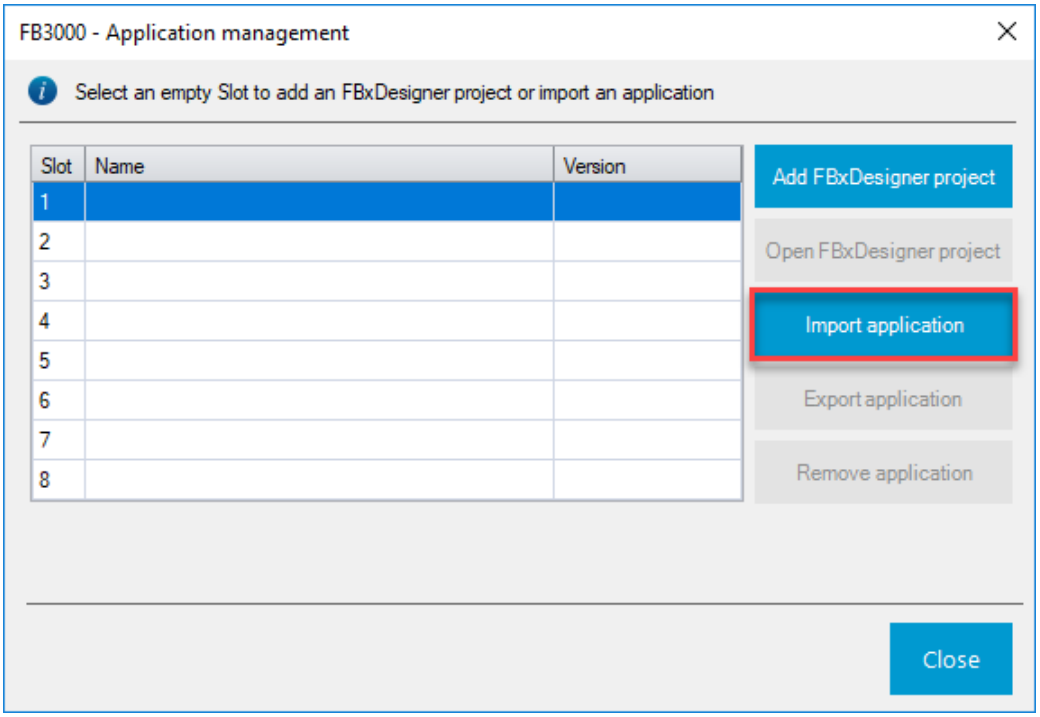

## 7.1.6 Remove Application

Use this option to remove an application package from the device, including the FBxDesigner™ program, user defined objects and user displays.

To remove an application:

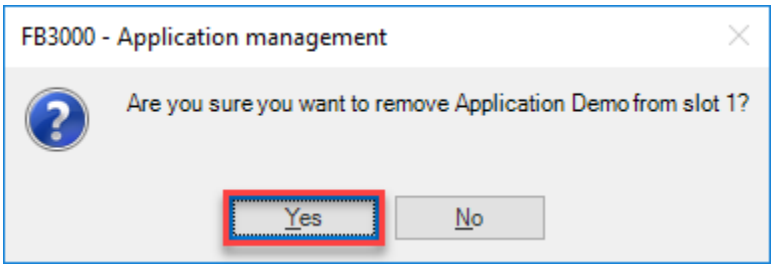
1. Select **File > Manage Applications** from the DeltaV FBxConnect configuration software main menu. The Application management window opens.

**Figure 591. Application management**



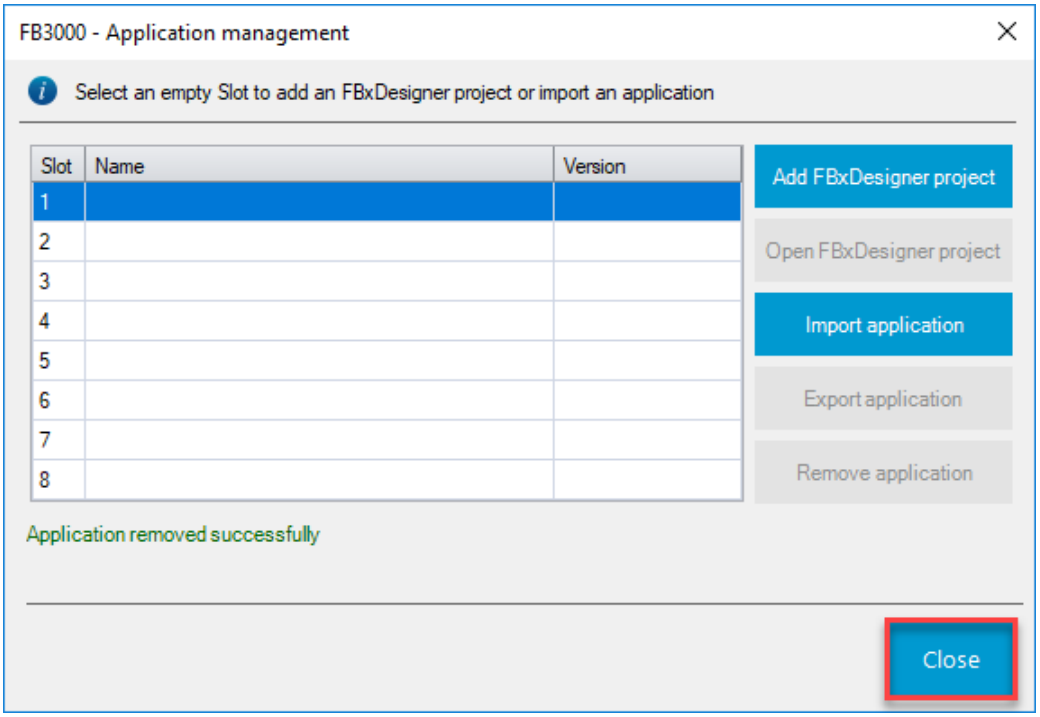

2. Select the slot that contains the application you want to remove.
3. Select **Remove application**. A confirmation dialog opens.

**Figure 592. Remove Confirmation**




4. Select **Yes**. The Application management window shows Application removed successfully.

**Figure 593. Removed Successfully**




5. Select **Close** to exit the Application management window.

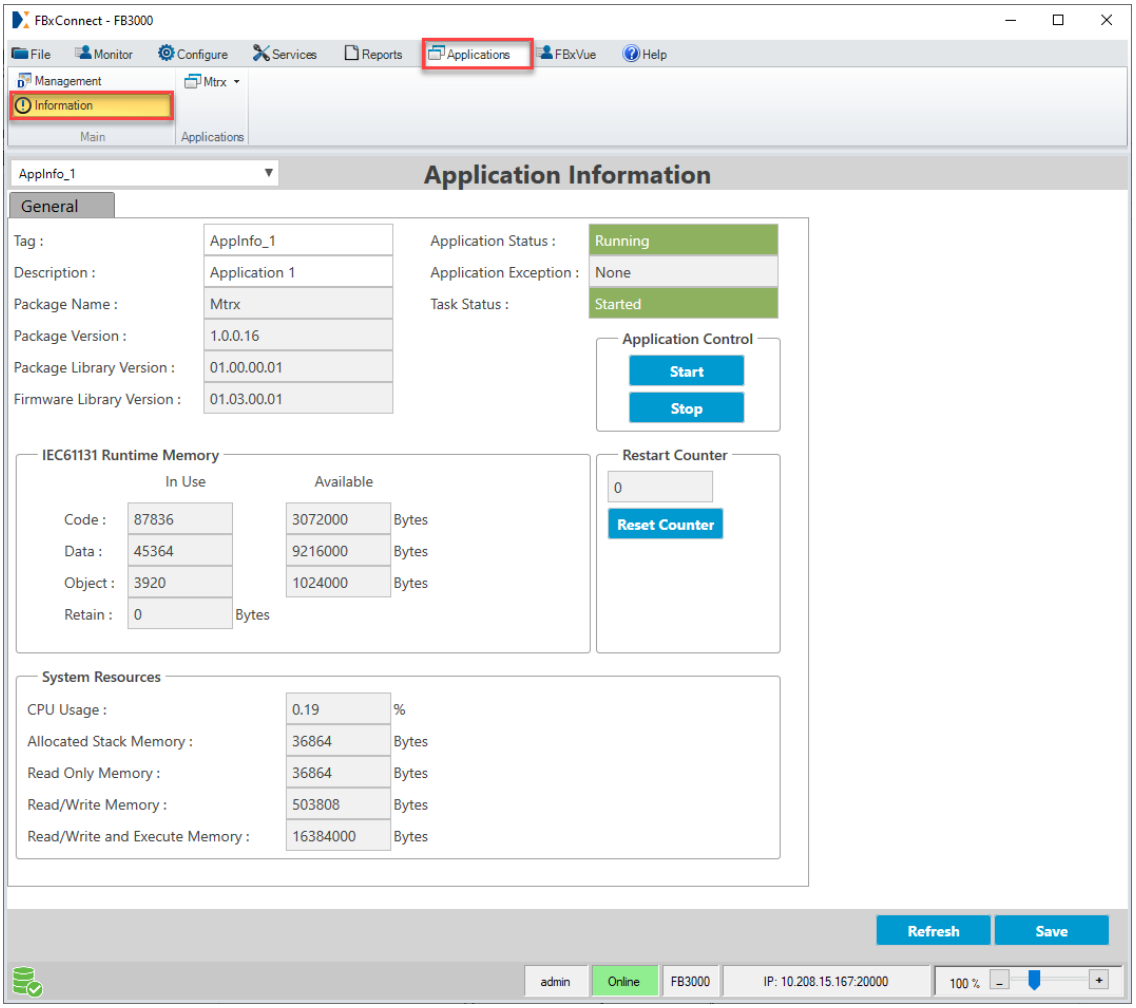
## 7.2 Application Information

Use this display to start or stop an application from executing, and to view information for each application installed in the DeltaV FB3000.

To access this display:

1. Select **Applications > Information**. The Application Information display opens.

**Figure 594. Application Information**




2. Click ▼ in the drop-down list at the top of the display to select an application slot that contains the application information you want to view.

3. Review – and change as necessary – the values in the following fields:

| Field | Description |
|---|---|
| **Tag** | Sets an identifier (up to 20-alphanumeric characters) for the selected application slot. |
| **Description** | Sets a description (up to 20-alphanumeric characters) for the selected application slot. |
| **Package Name** | This **read-only** field shows the name of the application package installed in the selected application slot. |

| Field | Description | |
|---|---|---|
| **Package Version** | This **read-only** field shows the version number of the installed application package. | |
| **Package Library Version** | This **read-only** field shows the DeltaV FB3000 RTU firmware library version that the application package was compiled with. The Package Library Version needs to be less than or equal to the Application Library Version in order for the application to run. | |
| **Firmware Library Version** | This **read-only** field shows the DeltaV FB3000 RTU firmware library version that is currently supported by firmware. | |
| **Application Status** | This **read-only** field shows the status of the application runtime regarding application packages (.zap files) in the selected application slot. When an application package is installed via DeltaV FBxConnect configuration software, this color-coded field provides an indication of the status for that application package. If an IEC61131 project is loaded separately via FBxDesigner™ (without an application package), then this field is considered not applicable. | |
| | **Unloaded** | No application is loaded in the selected application slot |
| | **Loaded** | An application is loaded in the selected application slot but has not been started. The field showing this status is colored red. |
| | **Running** | An application is currently executing in the selected application slot. The field showing this status is colored green. |
| | **Stopped** | An application is currently stopped but was previously running in the selected application slot. The field showing this status is colored red. |
| **Application Exception** | This **read-only** field shows any errors that occur when running the application. Possible values are: | |
| | **None** | No errors have occurred. |
| | **String Error** | An error occurred during runtime while performing string manipulation. Review any application code involving string data types for correct usage. |

| Field | Description | |
|---|---|---|
| | **Watchdog Exceeded** | Applications which execute on a cyclic basis (once per 100 milliseconds, once per second, etc.) can be developed with an optional watchdog timer. If the amount of time the application code takes to run exceeds the configured watchdog time, then this exception occurs. Consider increasing the watchdog time or revising the application code to execute within the configured time. |
| | **Max CPU Load Exceeded** | The maximum allowed CPU strain for an application has been exceeded. Consider revising the application code or splitting it across multiple applications. |
| | **System Error** | An internal runtime error has occurred. Retrieve the device's diagnostic log and contact technical support. |
| **Task Status** | This **read-only** field shows the status of the IEC 61131 runtime task in the firmware. IEC 61131 projects can be loaded into the device as an application package (via DeltaV FBxConnect configuration software) or as a raw project via FBxDesigner™. When IEC 61131 application code is loaded in the device, this color-coded field provides an indication if the programmed logic is executing. | |
| | **Stopped** | The application **is not** currently executing. The field showing this status is colored red. |
| | **Started** | The application **is** currently executing. The field showing this status is colored green. |
| | **No License** | The application requires a license to be installed before it will run. The field showing this status is colored red. |
| **Application Control** | Use these buttons to start and stop the application in the selected application slot.<br><br>**WARNING**<br><br>Stopping an application can result in disabling functionality and have control impacts. | |

| Field | Description | |
|---|---|---|
| **IEC61131 Runtime Memory** | These **read-only** fields show the amount of IEC61131 runtime memory currently being used and the maximum amount of memory available by the application loaded in the selected application slot. | |
| **Restart Counter** | This **read-only** field shows the number of times the selected application has been restarted. When an application encounters an error during execution, rather than halting the application, the application is restarted. This can happen if the runtime encounters an exception (such as watchdog timer being exceeded) or if the runtime itself restarts due to an unexpected fault.<br>When this sort of restart occurs, an entry is created in the device event log. If the restart counter increments to a value of 10, then it is assumed there is a significant problem with the application, and the application is not restarted automatically until the counter has been manually reset. | |
| | **Reset Counter Button** | Click to zero out the value in the Restart Counter field. |
| **System Resources** | These **read-only** fields show the system memory and CPU used by the application loaded in the selected application slot. | |

4. Select **Save** to save any changes you make to this display.

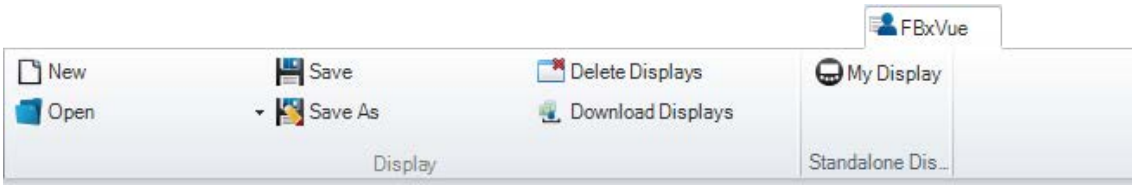
# Section 8: FBxVue Menu

Use the FBxVue menu to create customized displays for the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.

**Note**

FBxVue allows you to create customized displays using the C# programming language and store them as files on your PC or FB Series product, load and edit displays from a file, or include custom displays as part of a Solution file. You can add controls to a custom display to monitor flow, I/O points, and other object or parameter references. For detailed instructions about using the features in FBxVue, refer to the *FBxVue User Manual* (D301925X012).

**Figure 595. FBxVue Menu**




The FBxVue menu contains the following options:

New – Create a new custom display using FBxVue.

Open – Open and edit a previously saved display file in FBxVue.

Save – Save the currently opened display to your PC.

Save As – Specify a file name and location when saving the currently opened display.

Delete Displays – Remove displays from the FB Series product and your PC.

Download Displays – Download displays to the FB Series product.

Standalone Displays – View displays not tied to a specific application.

## 8.1 New Display

Use this option to create a new custom display using FBxVue. Select **FBxVue > New** from the DeltaV FBxConnect configuration software main menu. A blank canvas opens in FBxVue.

**Note**

For more information about managing display files, refer to FBxVue Overview.

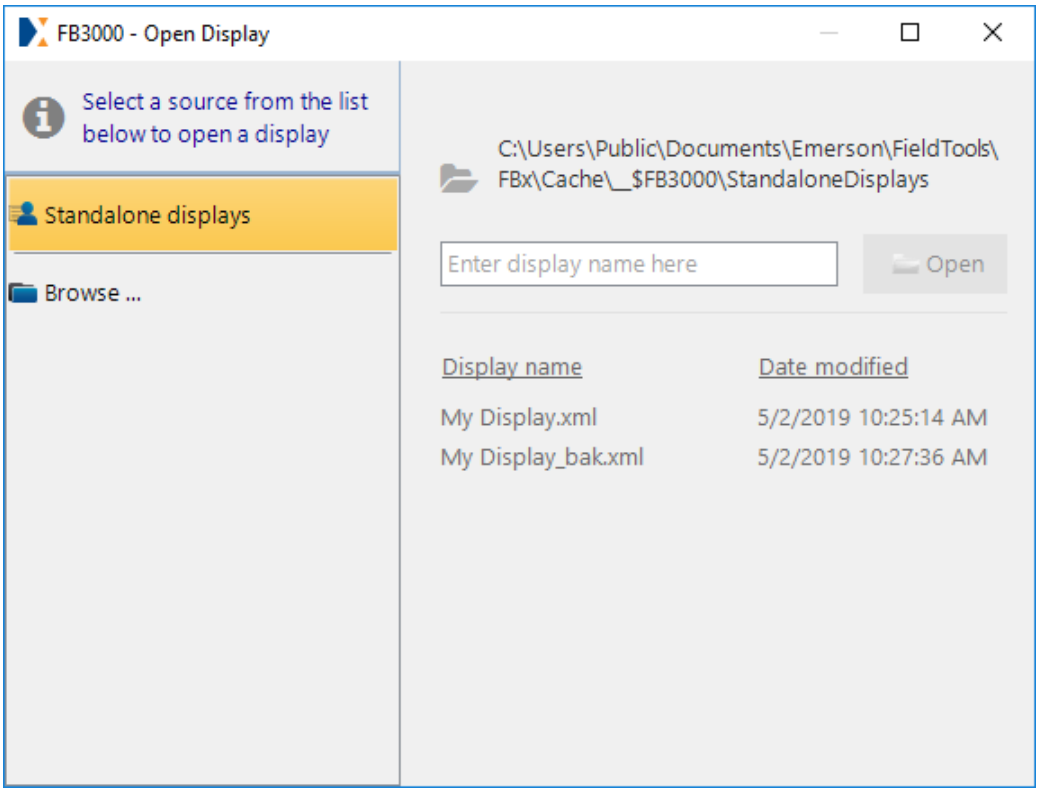
## 8.2 Open Display

Use this option to open and edit a previously saved display file in FBxVue.

To open a display file:

1. Select **FBxVue > Open > Browse** from the DeltaV FBxConnect configuration software main menu. The Open Display dialog opens.

**Figure 596. Open Display**




2. Select **Standalone displays** as the source on the left side of the dialog. A list of displays stored in the default location on your PC shows on the right side of the dialog.

3. Select a display from the list and select **Open**. The display file opens in FBxVue.

**Note**

To open a display file not saved in the default location, select **Browse** to open a File Explorer window. Navigate to a location on your PC, select the display file, and then select **Open**. The display file opens in FBxVue.

## 8.3 Save Display

Use this option to save the currently opened display to your PC. With a display file opened in FBxVue, select **FBxVue > Save** to save the display file.

**Note**

If this is your first time saving the display, the Save Display As dialog opens.

## 8.4 Save Display As

Use this option to specify a file name and location when saving the currently opened display. You can save a display as a standalone file or as part of an installed application.

You can save displays using two different file extensions (.XML and .BINA):

- **.XML** – The file extension used when you save a display file and **do not** select the encryption option. You can open and edit the saved display file using FBxVue.
- **.BINA** – The file extension used when you save a display file and **do** select the encryption option. You **cannot** open or edit the saved file using FBxVue.

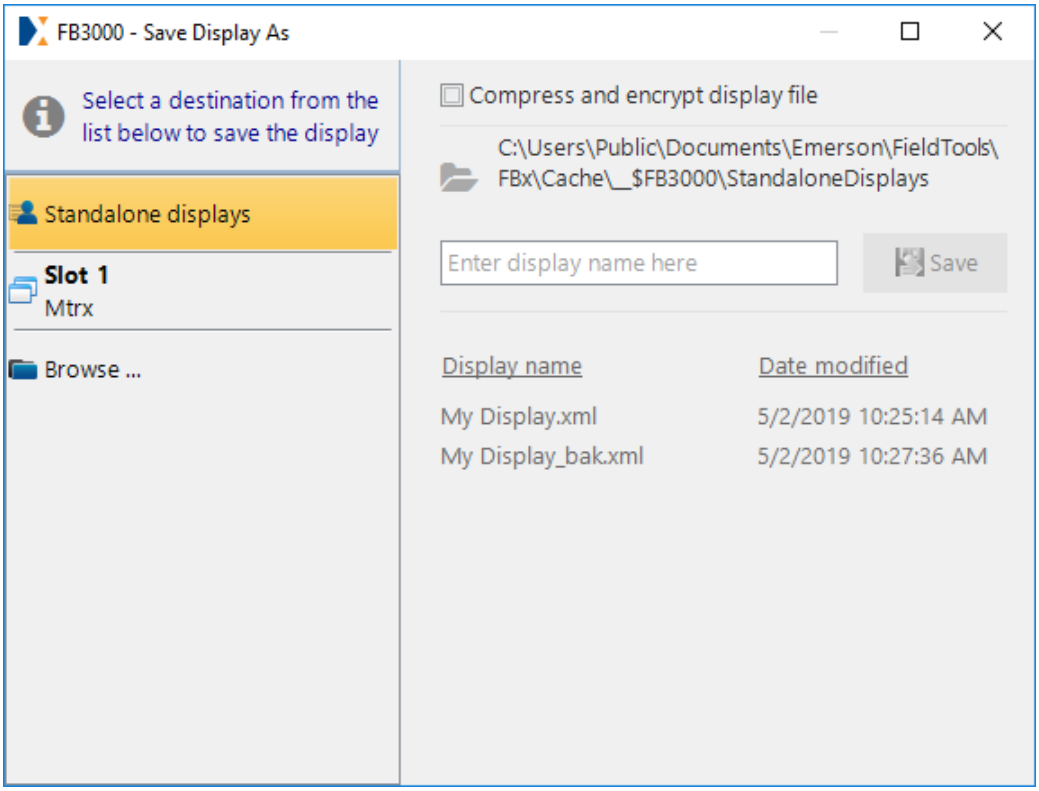
**Note**

Older versions of DeltaV FBxConnect saved encrypted display files using the .BIN extension.

To save a display file:

1. Select **FBxVue > Save As** from the DeltaV FBxConnect configuration software main menu. The Save Display As dialog opens.

**Figure 597. Save Display As**




2. Optional - Place a check mark next to the **Compress and encrypt display file** option to reduce the size and save an encrypted display file (.BINA).

**Note**

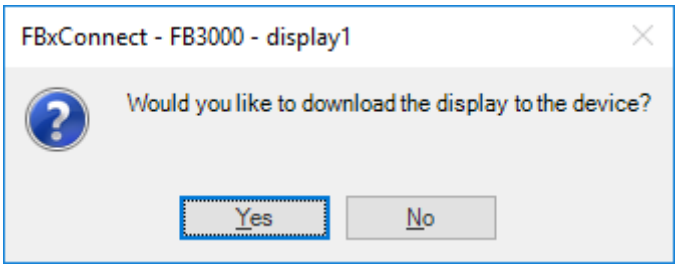
Emerson recommends you save an unencrypted version (.XML) of your display **before** you save an encrypted version. You **cannot** open or edit a display file after it has been encrypted.

3. Select the location of the saved display. Possible options are:

   - **Standalone Displays** – Saves the display to the default location on your PC for DeltaV FB3000 RTU displays not associated with an application. Displays stored as standalone displays are available from the Standalone displays group in the FBxVue menu.
   - **Slot #** – Saves the display to the folder on you PC associated with the application installed in the selected application slot. Displays stored as part of an application are accessible from the Applications menu.
   - **Browse** – Navigate to a location on your PC to save the file.

4. Enter the name of the display in the file name box.
5. Select **Save** to save the display.
6. If you select **Standalone Displays** or a **Slot #** as the location of the saved display, a dialog asks if you want to download the display to the FB Series product. Select **Yes** to allow the display to reside on the FB Series product and not be tied a particular PC. Select **No** to **only** have the display available on your PC.

**Figure 598. Download Display Confirmation**



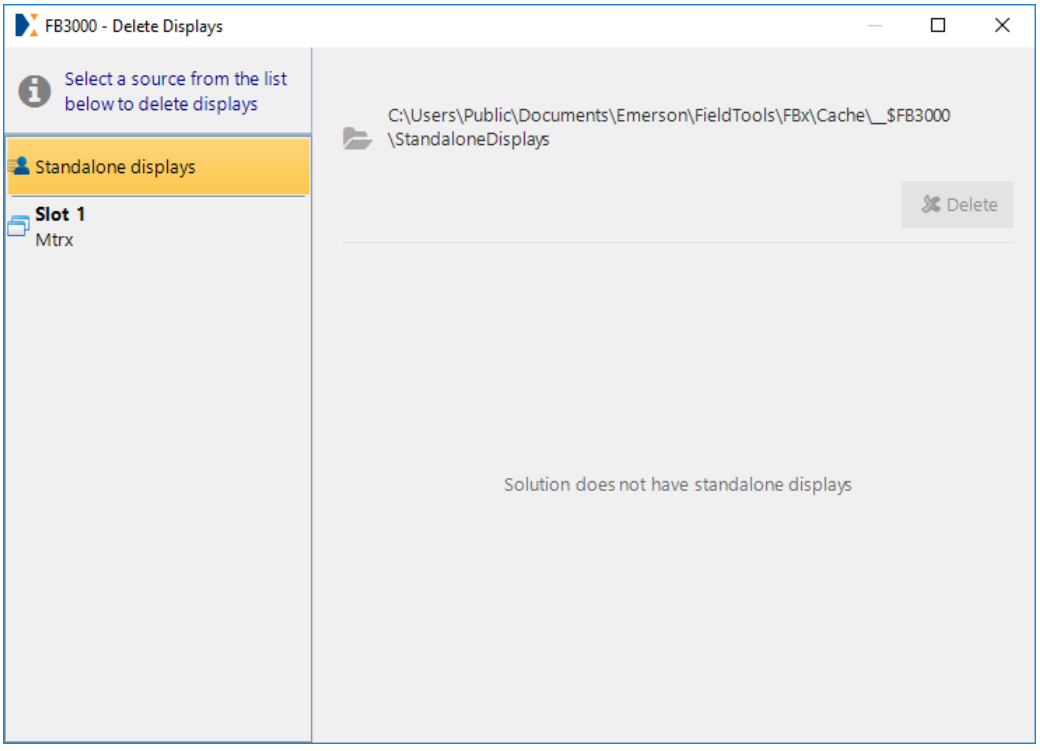

## 8.5 Delete Displays

Use this option to remove displays from the FB Series product and your PC. You can delete both standalone displays and displays tied to an application.

To delete a display:

1. Select **FBxVue > Delete Displays** from the DeltaV FBxConnect configuration software main menu.

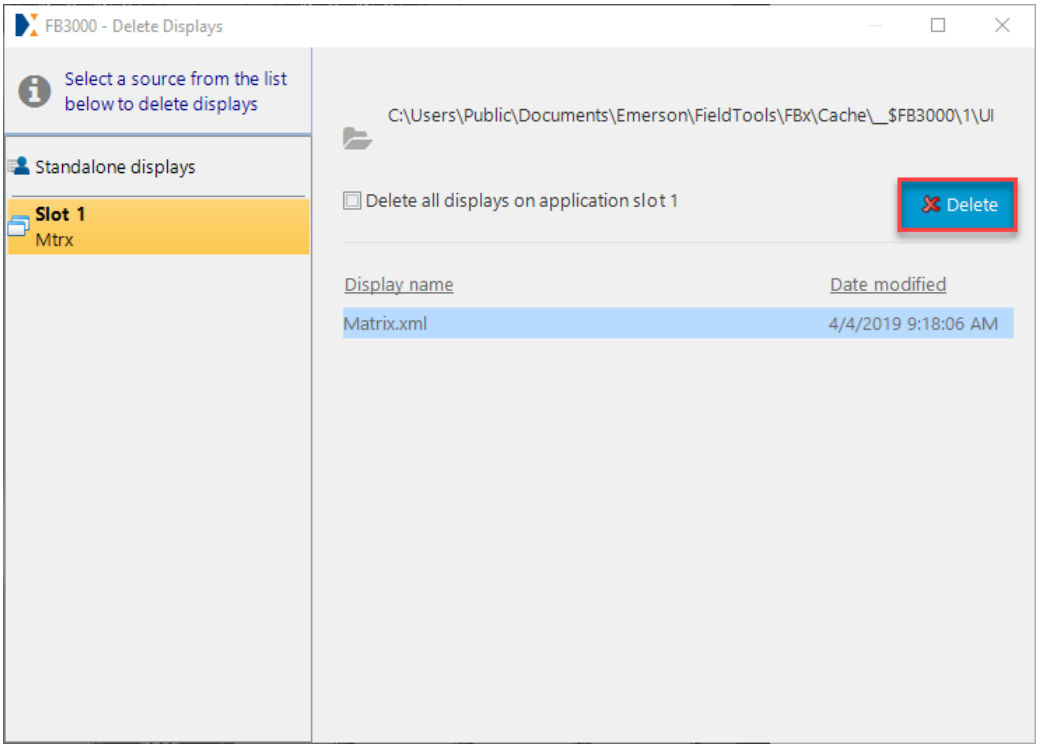
**Figure 599. Delete Displays**




2. Select the location of the display that you want to delete from the list on the left. Possible options are:

   - **Standalone displays** – Displays not associated with an application.
   - **Slot #** – Displays associated with the application installed in the selected application slot.

**Figure 600. Delete Displays – Delete**

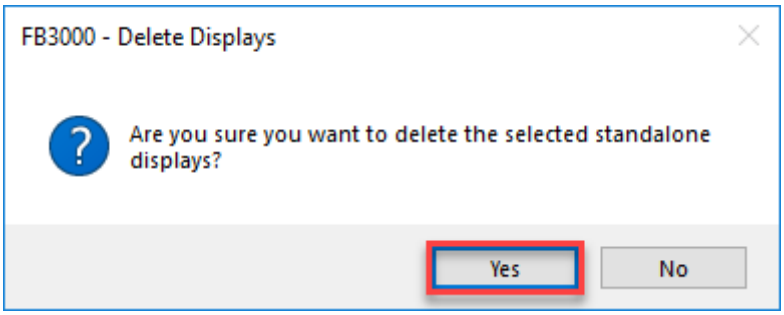



3. Choose a **Display name** from the list on the right and select **Delete** to remove the selected display. A confirmation dialog displays.

**Note**

Select the **Delete all** checkbox to remove all standalone/application slot displays from your computer and the FB Series product.

**Figure 601. Delete Confirmation**




4. Select **Yes** to remove the display from your computer and FB Series product.

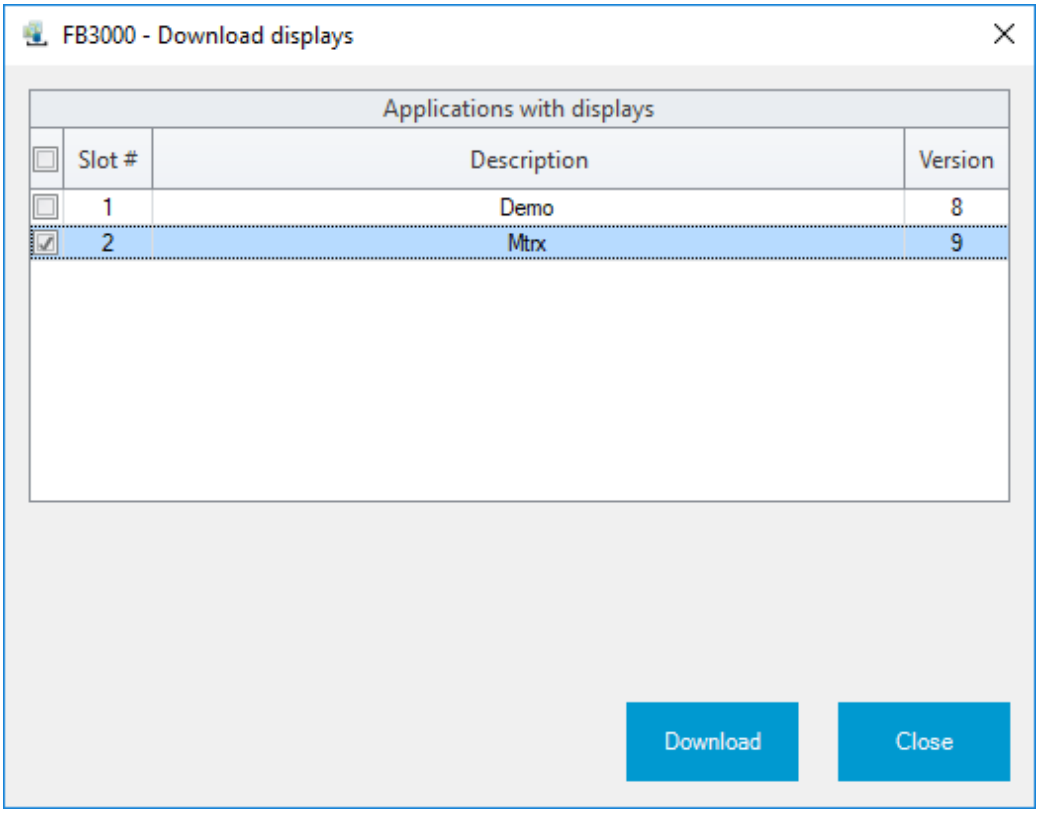
# 8.6 Download Displays

Use this option to download displays to the FB Series product. This allows the display to reside on the FB Series product and not be tied a particular PC. Any custom controls and text styles are also downloaded to the FB Series product, and anyone who connects to the device can access the display.

To download a display:

1. Select **FBxVue > Download Displays** from the DeltaV FBxConnect configuration software main menu.

**Figure 602. Download Displays**

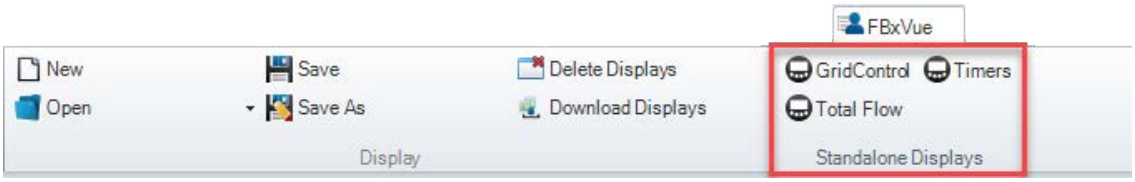



2. Place a check mark next to the application that contains the display(s) you want to download to your FB Series product.
3. Select **Download** to download the displays. Downloaded displays are accessible from the FBxVue menu tab.

# 8.7 Standalone Displays

Use this option to open a previously saved display file not tied to a specific application. To open a standalone display, select **FBxVue** from the DeltaV FBxConnect configuration software main menu and choose a display from the **Standalone Displays** group.

**Figure 603. Standalone Displays**



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# Section 9: Help Menu

Use the Help menu to access the online help system and view software version information about DeltaV FBxConnect Launchpad.

**Figure 604. Help Menu**




The Help menu contains the following options:

Online – DeltaV FBxConnect configuration software includes a comprehensive help system that describes the features and functions of the software.

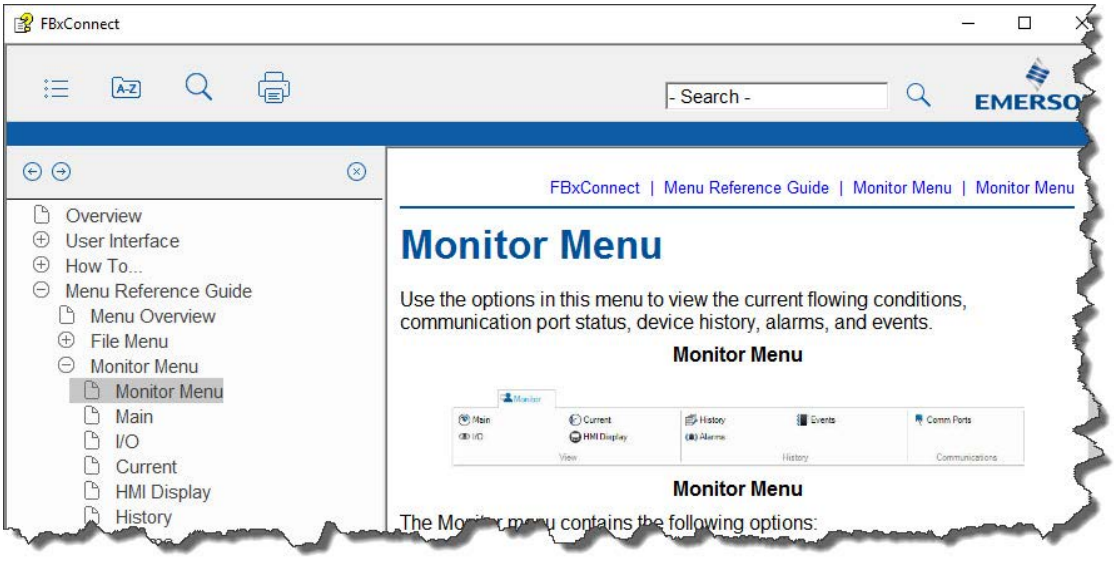
About – View information about the DeltaV FBxConnect Launchpad software versions installed on your computer.

## 9.1 Online

DeltaV FBxConnect configuration software includes a comprehensive help system that describes the features and functions of the software. Press **F1** while viewing a DeltaV FBxConnect configuration software display to display context-sensitive help for that display.

Select **Help > Online** to display the DeltaV FBxConnect configuration software help system:

**Figure 605. DeltaV FBxConnect Configuration Software Online Help**

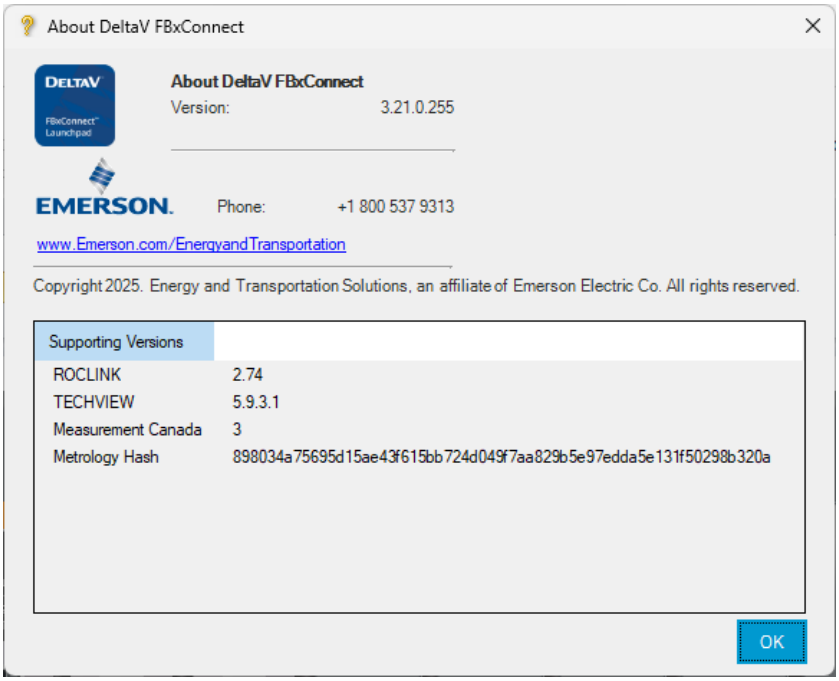



## 9.2 About

Use this display to view software version information for DeltaV FBxConnect Launchpad. The display also shows a metrology hash that you can use to verify the integrity of the DeltaV FBxConnect Launchpad installation.

To access this display, select **Help > About**. The About DeltaV FBxConnect display opens.

**Figure 606. About DeltaV FBxConnect**



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# Appendix A: Measuring Pure Gas

Pure gas measurement is supported by the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU.

To measure pure gases:

1. Select the **AGA8 Part 2 2017 / GERG 2008** in the **Compressibility/Density Calculation** field on the Station – General Tab.
2. Enter the required gas composition on the Components – Component Tab.

The following gases, temperature ranges, and maximum pressures are supported:

**Note**

Pure gas calculations in the FB1000 and FB2000 Series Flow Computers and the DeltaV FB3000 RTU can measure both Gaseous CO2 as well as Dense Phase CO2.

**Table 60. Supported Pure Gas Measurements**

| Gas | Temperature Range | Maximum Pressure |
|---|---|---|
| • Methane<br>• Nitrogen<br>• Carbon Dioxide<br>• Ethane<br>• Propane<br>• Isobutane<br>• n-Butane<br>• Isopentane<br>• n-pentane<br>• n-Hexane<br>• n-Heptane<br>• Octane<br>• Nonane<br>• Decane<br>• Hydrogen<br>• Oxygen | -297.7 to 800°F<br>90 to 700 K<br>-183 to 426.85°C | ≤ 10,150 psia<br>≤ 70.0 MPa<br>≤ 700 Bara |

| Gas | Temperature Range | Maximum Pressure |
|---|---|---|
| • Carbon monoxide<br>• Water<br>• Hydrogen sulfide<br>• Helium<br>• Argon | | |

# Appendix B: Liquid / Dense Phase Measursement Using a Gas DP Meter

Differential Pressure (or DP) meters are perhaps most commonly used in gas measurement; however, the same basic concept is applicable to liquid measurement as well. You can configure the FB Series Gas DP meters for use with liquid phase or dense phase fluids - with certain caveats and considerations. The following provides background information for this concept, and configuration considerations for using FB Series Gas DP meters with liquid or dense phase fluids.

The basic equation for measuring fluid through a differential pressure meter is given as follows:

$$q_m = C_d E_v Y (\pi/4) d^2 \sqrt{2 g_c \rho_{t,p} \Delta P}$$

Where:

- $C_d$ is the orifice plate coefficient of discharge;
- $d$ is the orifice plate bore diameter calculated at flowing temperature $T_f$;
- $\Delta P$ is the orifice differential pressure;
- $E_v$ is the velocity of approach factor;
- $g_c$ is the dimensional conversion constant;
- $\pi$ is the universal constant 3.14159;
- $q_m$ is the mass flow rate;
- $\rho_{t,p}$ is the density of the fluid at flowing conditions $(P_f T_f)$;
- $Y$ is the expansion factor;

Corrected volume quantities are calculated from the mass and the base density as follows:

$$q_b = \frac{q_m}{\rho_b}$$

Where:

$q_b$ is the corrected volume flowrate;

$q_m$ is the mass flowrate;

$\rho_b$ is the base density.

This equation is applicable to measuring single-phase gas, liquid, or dense phase (supercritical) fluids. The expansion factor (Y) corrects the flow rate for the effects of the density change caused by the pressure drop through a differential pressure type meter. Because incompressible or slightly compressible fluids do not undergo a significant density change across the meter, the expansion factor is set equal to 1 for liquid and dense phase fluids. For this reason, the Gas DP Meter can be used for liquids and dense phase fluids with the following considerations:

- The flowing density and base density are known – AGA 8 Part 2 (GERG) supports all phases for pure gas or gas mixtures. Other density sources may be configured by setting flowing density and base density to measured mode (set on the Fluid Properties – General display)and defining the database parameters to read for these values.
- The mass form of the equation above is used which includes the flowing density as an input and does not use relative density – for a meter type of AGA 3 Orifice (Flange Taps), select either AGA 3 Mass 1992 or AGA 3 Mass 2013. The following combinations for meter type and AGA 3 Calculation Selection can **not** be used:
  - AGA 3 Orifice (Flange) – AGA 3 1992 Volume
  - AGA 3 Orifice (Flange) – AGA 3 1992 Relative Density
  - AGA 3 Orifice (Flange) – AGA 3 2013 Volume
  - AGA 3 Orifice (Flange) – AGA 3 2013 Relative Density

  All other differential pressure meter types use a form of the mass equation and can be used. For more information, refer to the Meter Type field on the DP Meter – General display.
- The expansion factor is set to override mode with an override value = 1.0. For more information, refer to the **Upstream Expansion Factor (Y1) Mode** field on the DP Meter – Advanced display.
- Set the station fluid type to gas. For more information, refer to the Fluid Type field on the Station – General display.
- Set the units for the station as desired for properties and calculated quantities. For more information, refer the Engineering Units.

**Note**

The gas DP meter **must** be assigned to a station with fluid type of gas, but you can set the engineering units for gas density, gas volume, and gas volume rate that are used by the station to the appropriate liquid units.

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# Appendix C: Default History Setup Point Configurations

The tables in this section detail the history point configuration after running the Default History Setup wizard.


- Gas Differential Pressure Meter – Default History Setup Point Configuration
- Gas Linear Meter – Default History Setup Point Configuration
- Liquid Linear Meter – Default History Setup Point Configuration
- Liquid Linear Meter – Default Transaction History Setup Point Configuration

# C.1 Gas DP Meter – Default History Setup Point Configurations

The table below shows the history point configuration for gas differential pressure meters after using the default history setup feature.

**Note**

- For Totals, the Total_X.RAW_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Total/Diff or Snapshot.
- For Averages, the Average_X.SAMPLE_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Average.

**Table 61. Gas DP Meter – Default History Setup Point Configurations**

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 1 | FTime | DP Mtr_X.FLWTM_RAW_TOT | Total / Diff | | | | GasDPxx FTime |
| 2 | DP | DP Mtr_X.DP_INUSE | Average | | | | GasDPxx DP |
| 3 | Pressure | DP Mtr_X.PF_OBJ.SELECTED | Average | | | • If PF_OBJ is assigned to User Data_ object then average DOUBLE_2.<br>• If PF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE. | GasDPxx Pressure |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| | | | | | | • If PF_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| 4 | Temp | DP Mtr_X.TF_OBJ.SELECTED | Average | | | • If TF_OBJ is assigned to User Data_ object then average DOUBLE_3.<br>• If TF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>• If TF_OBJ is assigned to HART_ object then average PV_SELECTED. | GasDPxx Temp |
| 5 | IMV | DP Mtr_X.IMV_SEL | Average | | | | GasDPxx IMV |
| 6 | IV | DP Mtr_X.IV_RAW_TOT | Total / Diff | | | | GasDPxx IV |
| 7 | Corr Vol | DP Mtr_X.SVOL_RAW_TOT | Total / Diff | | | | GasDPxx Corr Vol |
| 8 | Energy | DP Mtr_X.ENERGY_RAW_TOT | Total / Diff | | | | GasDPxx Energy |
| 9 | CorrVol Snap | DP Mtr_X.SVOL_RAW_TOT | Snapshot | | | | GasDPxx CorrVol Snap |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 10 | Energy Snap | DP Mtr_X.ENERGY_RAW_TOT | Snapshot | | | | GasDPxx Energy Snap |
| 11 | Rel Dens | DP Mtr_X.FLUID_PROP_OBJ.RD_REAL_SEL | Average | **Yes** | **Yes** | | GasDPxx Rel Dens |
| 12 | HV | DP Mtr_X.FLUID_PROP_OBJ.HV_REAL_SEL | Average | **Yes** | **Yes** | | GasDPxx HV |
| 13 | Methane | DP Mtr_X.FLUID_PROP_OBJ.C1_INUSE | Average | **Yes** | **Yes** | | GasDPxx Methane |
| 14 | Ethane | DP Mtr_X.FLUID_PROP_OBJ.C2_INUSE | Average | **Yes** | **Yes** | | GasDPxx Ethane |
| 15 | Propane | DP Mtr_X.FLUID_PROP_OBJ.C3_INUSE | Average | **Yes** | **Yes** | | GasDPxx Propane |
| 16 | N-Butane | DP Mtr_X.FLUID_PROP_OBJ.NC4_INUSE | Average | **Yes** | **Yes** | | GasDPxx N-Butane |
| 17 | I-Butane | DP Mtr_X.FLUID_PROP_OBJ.IC4_INUSE | Average | **Yes** | **Yes** | | GasDPxx I-Butane |
| 18 | N-Pentane | DP Mtr_X.FLUID_PROP_OBJ.NC5_INUSE | Average | **Yes** | **Yes** | | GasDPxx N-Pentane |
| 19 | I-Pentane | DP Mtr_X.FLUID_PROP_OBJ.IC5_INUSE | Average | **Yes** | **Yes** | | GasDPxx I-Pentane |
| 20 | N-Hexane | DP Mtr_X.FLUID_PROP_OBJ.C6_INUSE | Average | **Yes** | **Yes** | | GasDPxx N-Hexane |
| 21 | Heptane | DP Mtr_X.FLUID_PROP_OBJ.C7_INUSE | Average | No | **Yes** | | GasDPxx Heptane |
| 22 | Octane | DP Mtr_X.FLUID_PROP_OBJ.C8_INUSE | Average | No | **Yes** | | GasDPxx Octane |
| 23 | Nonane | DP Mtr_X.FLUID_PROP_OBJ.C9_INUSE | Average | No | **Yes** | | GasDPxx Nonane |
| 24 | Decane | DP Mtr_X.FLUID_PROP_OBJ.C10_INUSE | Average | No | **Yes** | | GasDPxx Decane |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 25 | Nitrogen | DP Mtr_X.FLUID_PROP_OBJ.N2_INUSE | Average | **Yes** | **Yes** | | GasDPxx Nitrogen |
| 26 | C02 | DP Mtr_X.FLUID_PROP_OBJ.CO2_INUSE | Average | **Yes** | **Yes** | | GasDPxx C02 |

# C.2 Gas Linear Meter – Default History Setup Point Configurations

The table below shows the history point configuration for gas linear meters after using the default history setup feature.

**Note**

- For Totals, the Total_X.RAW_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Total/Diff or Snapshot.
- For Averages, the Average_X.SAMPLE_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Average.

**Table 62. Gas Linear Meter – Default History Setup Point Configurations**

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 1 | FTime | Linear Mtr_X.FLWTM_RAW_TOT | Total / Diff | | | | GasLinxx FTime |
| 2 | Pulses | Linear Mtr_X.PULSE_RAW_TOT | Total / Diff | | | | GasLinxx Pulses |
| 3 | Pressure | Linear Mtr_X.PF_OBJ.SELECTED | Average | | | • If PF_OBJ is assigned to User Data_ object then average DOUBLE_2.<br>• If PF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE. | GasLinxx Pressure |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| | | | | | | • If PF_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| 4 | Temp | Linear Mtr_X.TF_OBJ.SELECTED | Average | | | • If TF_OBJ is assigned to User Data_ object then average DOUBLE_3.<br>• If TF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>• If TF_OBJ is assigned to HART_ object then average PV_SELECTED. | GasLinxx Temp |
| 5 | MF | Linear Mtr_X.MF_SEL | Average | | | Meter type = Turbine (0) or Ultrasonic (3) or PD (4) or Coriolis (1) ] and Curve Option = 1 (Meter Factor Curve / Single K-factor) | GasLinxx MF |
| 5 | KF | Linear Mtr_X.KF_SEL | Average | | | Meter type = Turbine (0) or Ultrasonic (3) or PD (4) or Coriolis (1) ] and | GasLinxx KF |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| | | | | | | Curve Option = 2 (Single Meter Factor / K-factor Curve)<br>• If FLOW_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>• If FLOW_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| 5 | Flow | Linear Mtr_X.FLOW_OBJ.SELECTED | Average | | | For all other conditions:<br>• If FLOW_OBJ is assigned to PI_ object then average SELECTED_FREQ.<br>• If FLOW_OBJ is assigned to User Data_ object then average DOUBLE1. | GasLinxx Flow |
| 6 | Corr Vol | Linear Mtr_X.SVOL_RAW_TOT | Total / Diff | | | | GasLinxx Corr Vol |
| 7 | Energy | Linear Mtr_X.ENERGY_RAW_TOT | Total / Diff | | | | GasLinxx Energy |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 8 | CorrVolSnap | Linear Mtr_X.SVOL_RAW_TOT | Snapshot | | | | GasLinxx CorrVolSnap |
| 9 | Energy Snap | Linear Mtr_X.ENERGY_RAW_TOT | Snapshot | | | | GasLinxx Energy Snap |
| 10 | UVol | Linear Mtr_X.UVOL_RAW_TOT | Total / Diff | | | Meter type = Turbine (0), Auto-Adjust (2), Ultrasonic (3), PD(4) | GasLinxx UVol |
| 11 | Mass | Linear Mtr_X.MASS_RAW_TOT | Total / Diff | | | Meter type = Coriolis (1) | GasLinxx Mass |
| 12 | Rel Dens | Linear Mtr_X.FLUID_PROP_OBJ.RD_REAL_SEL | Average | **Yes** | **Yes** | | GasLinxx Rel Dens |
| 13 | HV | Linear Mtr_X.FLUID_PROP_OBJ.HV_REAL_SEL | Average | **Yes** | **Yes** | | GasLinxx HV |
| 14 | Methane | Linear Mtr_X.FLUID_PROP_OBJ.C1_INUSE | Average | **Yes** | **Yes** | | GasLinxx Methane |
| 15 | Ethane | Linear Mtr_X.FLUID_PROP_OBJ.C2_INUSE | Average | **Yes** | **Yes** | | GasLinxx Ethane |
| 16 | Propane | Linear Mtr_X.FLUID_PROP_OBJ.C3_INUSE | Average | **Yes** | **Yes** | | GasLinxx Propane |
| 17 | N-Butane | Linear Mtr_X.FLUID_PROP_OBJ.NC4_INUSE | Average | **Yes** | **Yes** | | GasLinxx N-Butane |
| 18 | I-Butane | Linear Mtr_X.FLUID_PROP_OBJ.IC4_INUSE | Average | **Yes** | **Yes** | | GasLinxx I-Butane |
| 19 | N-Pentane | Linear Mtr_X.FLUID_PROP_OBJ.NC5_INUSE | Average | **Yes** | **Yes** | | GasLinxx N-Pentane |

| ID | History Point (Description) | Parameter | Archive Type | Components Average (Standard Composition) | Components Average (Extended Composition) | Condition | Full Description |
|---|---|---|---|---|---|---|---|
| 20 | I-Pentane | Linear Mtr_X.FLUID_PROP_OBJ.IC5_INUSE | Average | **Yes** | **Yes** | | GasLinxx I-Pentane |
| 21 | N-Hexane | Linear Mtr_X.FLUID_PROP_OBJ.C6_INUSE | Average | **Yes** | **Yes** | | GasLinxx N-Hexane |
| 22 | Heptane | Linear Mtr_X.FLUID_PROP_OBJ.C7_INUSE | Average | No | **Yes** | | GasLinxx Heptane |
| 23 | Octane | Linear Mtr_X.FLUID_PROP_OBJ.C8_INUSE | Average | No | **Yes** | | GasLinxx Octane |
| 24 | Nonane | Linear Mtr_X.FLUID_PROP_OBJ.C9_INUSE | Average | No | **Yes** | | GasLinxx Nonane |
| 25 | Decane | Linear Mtr_X.FLUID_PROP_OBJ.C10_INUSE | Average | No | **Yes** | | GasLinxx Decane |
| 26 | Nitrogen | Linear Mtr_X.FLUID_PROP_OBJ.N2_INUSE | Average | **Yes** | **Yes** | | GasLinxx Nitrogen |
| 27 | C02 | Linear Mtr_X.FLUID_PROP_OBJ.CO2_INUSE | Average | **Yes** | **Yes** | | GasLinxx C02 |

# C.3 Liquid Linear Meter – Default History Setup Point Configurations

The tables below show the compact and expanded history point configurations for liquid linear meters, based on your selected liquid product configuration (Use Case), after using the default history setup feature.

DeltaV FBxConnect configuration software first attempts to configure the FB Series product's default history using the points described in the Expanded Liquid History table below. If the FB Series product does not have sufficient memory to log all the points in expanded history, then DeltaV FBxConnect configuration software configures the FB Series product's default history using the points described in the Compact Liquid History table below.

The history points logged are also dependant on the use case/liquid product configuration of your FB Series product:

**Note**

- For Totals, the Total_X.RAW_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Total/Diff or Snapshot.
- For Averages, the Average_X.SAMPLE_PARAM signal is used to set Hist_Y.HIST_PARAM. The Archive Type is set as Average.

**Table 63. Use Case**

| Use Case | Liquid Product Configuration | Compact History | Expanded History |
|---|---|---|---|
| **Crude Oil Custody Transfer** | • Crude Oil (Liq Prod_X.LIQ_TYPE = 0)<br>• API Ch.12.2 (Station_X.OIL_METHOD = 0) | **Yes** | **Yes** |
| **Crude Oil Allocation - Low Water** | • Crude Oil (Liq Prod_X.LIQ_TYPE = 0)<br>• API Ch.20.1 (Station_X.OIL_METHOD = 1)<br>• Station_X.WATER_OPT = 0 | **Yes** | No |
| **Crude Oil Allocation - High Water** | • Crude Oil (Liq Prod_X.LIQ_TYPE = 0)<br>• API Ch.20.1 (Station_X.OIL_METHOD = 1)<br>• Station_X.WATER_OPT = 1 | **Yes** | No |

| Use Case | Liquid Product Configuration | Compact History | Expanded History |
|---|---|---|---|
| **Refined Products / Lubricating Oil** | • Refined Products / Lubricating Oil (Liq Prod_X.LIQ_TYPE = 1 or 3) | **Yes** | **Yes** |
| **Light Hydrocarbons** | • Light Hydrocarbon - NGL/LPG (Liq Prod_X.LIQ_TYPE = 6) | **Yes** | **Yes** |
| **Additional Fluids** | • Additional Fluid (Liq Prod_X.LIQ_TYPE = 7) | **Yes** | **Yes** |

### Table 64. Compact Liquid History

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Crude Oil Allocation – Low Water | Crude Oil Allocation – High Water | Refined Products / Lubricating Oil | Light Hydrocarbons | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FDensity | Liq LinMtr_X.FLUID_PROP_OBJ.DENSF_SEL | Average | **Yes** | **Yes** | • Coriolis = **Yes**<br>• Turbine = No<br>• Ultrasonic = No<br>• Positive Displacement = No | **Yes** | **Yes** | **Yes** | | LiqLinxx FDensity |
| 2 | Pressure | Liq LinMtr_X.PF_OBJ.SELECTED | Average | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | • If PF_OBJ is assigned to User Data_ object then average DOUBLE_2.<br>• If PF_OBJ is assigned to FBxNData_ object then average | LiqLinxx Pressure |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Crude Oil Allocation – Low Water | Crude Oil Allocation – High Water | Refined Products / Lubricating Oil | Light Hydrocarbons | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | SELECTED_DOUBLE<br>• If PF_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| 3 | Temp | Liq LinMtr_X.TF_OBJ.SELECTED | Average | Yes | Yes | Yes | Yes | Yes | **Yes** | • If TF_OBJ is assigned to User Data_ object then average DOUBLE_3.<br>• If TF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE<br>• If TF_OBJ is assigned to HART_ object then average PV_SELECTED. | LiqLinxx Temp |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Crude Oil Allocation – Low Water | Crude Oil Allocation – High Water | Refined Products / Lubricating Oil | Light Hydrocarbons | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | MF or KF | Liq LinMtr_X.MF_SEL or KF_SEL | Average | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | • Set to MF_SEL when FACTOR_CURVE_OPT = 0 or 1 (Single MF/KF or MF Curve)<br>• Set to KF_SEL when FACTOR_CURVE_OPT = 2 (KF Curve) | | LiqLinxx MF or KF |
| 5 | IQ | Liq LinMtr_X.IQ_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx IQ |
| 6 | IQ Snap | Liq LinMtr_X.IQ_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx IQ Snap |
| 7 | Oil UVol | UVol Liq LinMtr_X.UVOL_O_RAW_TOT | Total / Diff | No | No | **Yes** | No | No | No | | LiqLinxx Oil UVol |
| 7 | GS Vol | Liq LinMtr_X.GSVOL_RAW_TOT | Total / Diff | **Yes** | **Yes** | No | **Yes** | **Yes** | **Yes** | | LiqLinxx GS Vol |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Crude Oil Allocation – Low Water | Crude Oil Allocation – High Water | Refined Products / Lubricating Oil | Light Hydrocarbons | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | GS Vol Snap | Liq LinMtr_X.GSVOL_RAW_TOT | Snapshot | No | No | No | **Yes** | **Yes** | **Yes** | | LiqLinxx GS Vol Snap |
| 8 | Oil SVol | Liq LinMtr_X.SVOL_O_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | No | No | No | | LiqLinxx Oil SVol |
| 9 | OilSVolSnap | Liq LinMtr_X.SVOL_O_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | No | No | No | | LiqLinxx OilSVolSnap |
| 10 | CSW | Liq LinMtr_X.CSW_INUSE | Average | **Yes** | **Yes** | No | No | No | No | | LiqLinxx CSW |
| 10 | S&W % | Liq LinMtr_X.FLUID_PROP_OBJ.WC_SEL | Average | No | No | **Yes** | No | No | No | | LiqLinxx S&W % |
| 10 | Pe | Liq LinMtr_X.FLUID_PROP_OBJ.PE_INUSE | Average | No | No | No | No | **Yes** | No | | LiqLinxx Pe |
| 11 | CTL | Liq LinMtr_X.CTL_INUSE | Average | **Yes** | **Yes** | No | **Yes** | **Yes** | No | | LiqLinxx CTL |
| 12 | CPL | Liq LinMtr_X.CPL_INUSE | Average | **Yes** | **Yes** | No | **Yes** | **Yes** | No | | LiqLinxx CPL |
| 13 | CTPL | Liq LinMtr_X.CTPL_INUSE | Average | No | No | No | No | No | **Yes** | | LiqLinxx CTPL |
| 14 | Mass | Liq LinMtr_X.MASS_RAW_TOT | Total / Diff | **Yes** | No | No | **Yes** | **Yes** | **Yes** | | LiqLinxx Mass |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Crude Oil Allocation – Low Water | Crude Oil Allocation – High Water | Refined Products / Lubricating Oil | Light Hydrocarbons | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | HDens | Liq LinMtr_X.STATION_OBJ.DENSH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HDens |
| 16 | HPres | Liq LinMtr_X.STATION_OBJ.PH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HPres |
| 17 | HTemp | Liq LinMtr_X.STATION_OBJ.TH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HTemp |

## Table 65. Expanded Liquid History

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Refined Products / Lubricating Oil | Light Hydrocarbon | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Pulses | Liq LinMtr_X.PULSE_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx Pulses |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Refined Products / Lubricating Oil | Light Hydrocarbon | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Pulses Snap | Liq LinMtr_X.PULSE_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx Pulses Snap |
| 3 | IQ | Liq LinMtr_X.IQ_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx IQ |
| 4 | IQ Snap | Liq LinMtr_X.IQ_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx IQ Snap |
| 5 | FDensity | Liq LinMtr_X.FLUID_PROP_OBJ.DENSF_SEL | Average | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx FDensity |
| 6 | Pressure | Liq LinMtr_X.PF_OBJ.SELECTED | Average | **Yes** | **Yes** | **Yes** | • **Yes** | • If PF_OBJ is assigned to User Data_ object then average DOUBLE_2.<br>• If PF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>• If PF_OBJ is assigned to HART_ object then average PV_SELECTED. | LiqLinxx Pressure |
| 7 | Temp | Liq LinMtr_X.TF_OBJ.SELECTED | Average | **Yes** | **Yes** | **Yes** | • **Yes** | • If TF_OBJ is assigned to User Data_ object then average DOUBLE_3. | LiqLinxx Temp |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Refined Products / Lubricating Oil | Light Hydrocarbon | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | • If TF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>• If TF_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| 8 | MF | Liq LinMtr_X.MF_SEL | Average | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx MF |
| 9 | KF | Liq LinMtr_X.KF_SEL | Average | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx KF |
| 10 | S&W % | Liq LinMtr_X.FLUID_PROP_OBJ.WC_SEL | Average | **Yes** | No | No | No | | LiqLinxx S&W % |
| 10 | Pe | Liq LinMtr_X.FLUID_PROP_OBJ.PE_SEL | Average | No | No | **Yes** | No | | LiqLinxx Pe |
| 11 | CSW | Liq LinMtr_X.CSW_INUSE | Average | **Yes** | No | No | No | | LiqLinxx CSW |
| 12 | CTL | Liq LinMtr_X.CTL_INUSE | Average | **Yes** | **Yes** | **Yes** | No | | LiqLinxx CTL |
| 13 | CPL | Liq LinMtr_X.CPL_INUSE | Average | **Yes** | **Yes** | **Yes** | No | | LiqLinxx CPL |
| 14 | CTPL | Liq LinMtr_X.CTPL_INUSE | Average | No | No | No | **Yes** | | LiqLinxx CTPL |
| 15 | CCF | Liq LinMtr_X.CCF_INUSE | Average | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx CCF |
| 16 | GVol | Liq LinMtr_X.GVOL_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx GVol |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Refined Products / Lubricating Oil | Light Hydrocarbon | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|
| 17 | GS Vol | Liq LinMtr_X.GSVOL_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx GS Vol |
| 18 | Oil SVol | Liq LinMtr_X.SVOL_O_RAW_TOT | Total / Diff | **Yes** | No | No | No | | LiqLinxx Oil SVol |
| 19 | Wtr SVol | Liq LinMtr_X.SVOL_W_RAW_TOT | Total / Diff | **Yes** | No | No | No | | LiqLinxx Wtr SVol |
| 20 | Mass | Liq LinMtr_X.MASS_RAW_TOT | Total / Diff | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx Mass |
| 21 | GVol Snap | Liq LinMtr_X.GVOL_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx GVol Snap |
| 22 | GSVol Snap | Liq LinMtr_X.GSVOL_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx GSVol Snap |
| 23 | OilSVolSnap | Liq LinMtr_X.SVOL_O_RAW_TOT | Snapshot | **Yes** | No | No | No | | LiqLinxx OilSVolSnap |
| 24 | WtrSVolSnap | Liq LinMtr_X.SVOL_W_RAW_TOT | Snapshot | **Yes** | No | No | No | | LiqLinxx WtrSVolSnap |
| 25 | Mass Snap | Liq LinMtr_X.MASS_RAW_TOT | Snapshot | **Yes** | **Yes** | **Yes** | **Yes** | | LiqLinxx Mass Snap |
| 26 | HDens | Liq LinMtr_X.STATION_OBJ.DENSH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HDens |
| 27 | HPres | Liq LinMtr_X.STATION_OBJ.PH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HPres |

| ID | History Point (Description) | Parameter | Archive Type | Crude Oil Custody Transfer | Refined Products / Lubricating Oil | Light Hydrocarbon | Additional Fluids | Condition | Full Description |
|---|---|---|---|---|---|---|---|---|---|
| 28 | HTemp | Liq LinMtr_X.STATION_OBJ.TH_INUSE | Average | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | Set when Station_X.DENS_OPT = 2 (Station Header Density) | No | | LiqLinxx HTemp |

## C.4 Liquid Linear Meter – Default Transaction History Setup Point Configurations

The tables below show the default transaction history parameters for Strings, Totals, and Averages.

### Table 66. Default Transaction Hisotory Setup – Strings

| Batch Ticket | Description | Parameter | Archive Type | Full Description |
|---|---|---|---|---|
| Device ID | Device ID | System_1.OBJ_NAME | Snapshot End | Device ID |
| Meter ID | Meter ID | Liq LMtr_X.OBJ_NAME | Snapshot End | LiqLinxx Meter ID |
| Product Number | Prod Num | Liq LMtr_X.STATION_OBJ.LIQ_PROD_OBJ | Snapshot End | LiqLinxx Prod Num |
| Product ID | Prod ID | Future | Snapshot End | LiqLinxx Prod ID |
| Product Table | Prod Tbl | Future | Snapshot End | LiqLinxx Prod Tbl |

### Table 67. Default Transaction Hisotory Setup – Totals

| Batch Ticket | Description | Parameter | Archive Type | Full Description |
|---|---|---|---|---|
| Opening Reading (Pulses) | PulsesStart | Liq LinMtr_X.PULSE_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx PulsesStart |
| Closing Reading (Pulses) | Pulses End | Liq LinMtr_X.PULSE_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx Pulses End |
| Pulses | Pulses | Liq LinMtr_X.PULSE_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx Pulses |
| Opening Reading (IQ) | IQ Start | Liq LinMtr_X.IQ_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx IQ Start |
| Closing Reading (IQ) | IQ End | Liq LinMtr_X.IQ_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx IQ End |
| Indicated Quantity | IQ | Liq LinMtr_X.IQ_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx IQ |
| Opening Reading (GV) | GVol Start | Liq LinMtr_X.GV_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx GVol Start |
| Closing Reading (GV) | GVol End | Liq LinMtr_X.GV_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx GVol End |
| GV | GVol | Liq LinMtr_X.GV_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx GVol |
| Opening Reading (GSV) | GSVol Start | Liq LinMtr_X.GSV_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx GSVol Start |
| Closing Reading (GSV) | GSVol End | Liq LinMtr_X.GSV_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx GSVol End |
| GSV | GSVol | Liq LinMtr_X.GSV_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx GSVol |
| Opening Reading (NSV) | NSVol Start | Liq LinMtr_X.SVOL_O_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx NSVol Start |
| Closing Reading (NSV) | NSVol End | Liq LinMtr_X.SVOL_O_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx NSVol End |
| NSV | Net SVol | Liq LinMtr_X.SVOL_O_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx Net SVol |
| Opening Reading (S&W) | S&W Start | Liq LinMtr_X.SVOL_W_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx S&W Start |
| Closing Reading (S&W) | S&W End | Liq LinMtr_X.SVOL_W_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx S&W End |
| S&W | S&W | Liq LinMtr_X.SVOL_W_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx S&W |
| Opening Reading (Mass) | Mass Start | Liq LinMtr_X.MASS_TOT_OBJ.RAW_PARAM | Snapshot Start | LiqLinxx Mass Start |
| Closing Reading (Mass) | Mass End | Liq LinMtr_X.MASS_TOT_OBJ.RAW_PARAM | Snapshot End | LiqLinxx Mass End |
| Mass | Mass | Liq LinMtr_X.MASS_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx Mass |

| Batch Ticket | Description | Parameter | Archive Type | Full Description |
|---|---|---|---|---|
| Flow Time | Flow Time | Liq LinMtr_X.FLWTM_TOT_OBJ.RAW_PARAM | Total/Difference | LiqLinxx Flow Time |

### Table 68. Default Transaction History Setup – Averages

| Batch Ticket | Description | Average Parameter | History Parameter | Archive Type | Condition | Full Description |
|---|---|---|---|---|---|---|
| FWA Pressure | Pressure | Liq LinMtr_X.PF_OBJ.NNNNN | Average_X.SAMPLE_PARAM | Average | If PF_OBJ is assigned to User Data_ object then average DOUBLE_2.<br>If PF_OBJ is assigned to FBxNData_ object then average SELECTED_DOUBLE.<br>If PF_OBJ is assigned to HART_ object then average PV_SELECTED. | LiqLinxx Pressure |
| FWA Temperature | Temp | Liq LinMtr_X.TF_OBJ.NNNNN | Average_X.SAMPLE_PARAM | Average | If TF_OBJ is assigned to User Data_ object then average DOUBLE_3.<br>If TF_OBJ is assigned to FBxNData_ object then average | LiqLinxx Temp |

| Batch Ticket | Description | Average Parameter | History Parameter | Archive Type | Condition | Full Description |
|---|---|---|---|---|---|---|
| | | | | | SELECTED_DOUBLE.<br>If TF_OBJ is assigned to HART_ object then average PV_SELECTED. | |
| Average Meter Factor | MF | Liq LinMtr_X.MF_SEL | Average_X.SAMPLE_PARAM | Average | | LiqLinxx MF |
| Average K-Factor | KF | Liq LinMtr_X.KF_SEL | Average_X.SAMPLE_PARAM | Average | | LiqLinxx KF |
| Average CTL | CTL | Liq LinMtr_X.CTL_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx CTL |
| Average CPL | CPL | Liq LinMtr_X.CPL_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx CPL |
| Average CTPL | CTPL | Liq LinMtr_X.CTPL_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx CTPL |
| Average CCF | CCF | Liq LinMtr_X.CCF_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx CCF |
| Average %S&W | S&W % | Liq LinMtr_X.FLUID_PROP_OBJ.WC_SEL | Average_X.SAMPLE_PARAM | Average | | LiqLinxx S&W % |
| Average CSW | CSW | Liq LinMtr_X.CSW_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx CSW |
| Average Meter Density | FDensity | Liq LinMtr_X.FLUID_PROP_OBJ.DENSF_SEL | Average_X.SAMPLE_PARAM | Average | | LiqLinxx FDensity |
| Average Observed Density | HDens | Liq LinMtr_X.STATION_OBJ.DENSH_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx HDens |

| Batch Ticket | Description | Average Parameter | History Parameter | Archive Type | Condition | Full Description |
|---|---|---|---|---|---|---|
| Average Density Pressure | HPres | Liq LinMtr_X.STATION_OBJ.PH_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx HPres |
| Average Density Temperature | HTemp | Liq LinMtr_X.STATION_OBJ.TH_INUSE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx HTemp |
| Average Base Density | Base Dens | Liq LinMtr_X.FLUID_PROP_OBJ.DENSB_O_SEL | Average_X.SAMPLE_PARAM | Average | | LiqLinxx Base Dens |
| Average Flow Rate | Flow Rate | Liq LinMtr_X.GV_RATE | Average_X.SAMPLE_PARAM | Average | | LiqLinxx Flow Rate |
| Average Indicated Density | IDens | Future | | | | LiqLinxx IDens |
| Average Density Correction Factor | Dens CF | Future | | | | LiqLinxx Dens CF |

# Appendix D: Template Editor Map ID Descriptions

The following table describes the possible Map IDs used by the Template Editor and the equivalent FB Series product parameters for gas differential pressure meters, gas linear meters, and liquid linear meters.

**Table 69. Template Editor Map ID Descriptions**

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **No Mapping** | N/A | N/A | N/A |
| **Meter Tag Name** | DP Mtr_x.OBJ_NAME | Linear Mtr_x.OBJ_NAME | Liq LinMtr_x.OBJ_NAME |
| **Meter Description** | DP Mtr_x.DESC | Linear Mtr_x.DESC | Liq LinMtr_x.DESC |
| **Meter Serial Number** | DP Mtr_x.SER_NUM | Linear Mtr_x.SER_NUM | Liq LinMtr_x.SER_NUM |
| **Meter Type** | DP Mtr_x.MTR_TYPE | Linear Mtr_x.MTR_TYPE | Liq LinMtr_x.MTR_TYPE |
| **Base Pressure (Pb)** | Station_x.PB_SEL | Station_x.PB_SEL | Station_x.PB_SEL |
| **Base Temperature (Tb)** | Station_x.TB_SEL | Station_x.TB_SEL | Station_x.TB_SEL |
| **Latitude** | Station_x.LATITUDE | Station_x.LATITUDE | Station_x.LATITUDE |
| **Elevation** | Station_x.ELEVATION | Station_x.ELEVATION | Station_x.ELEVATION |
| **Contract Hour** | Hist Grp_x.CONTRACT_HR | Hist Grp_x.CONTRACT_HR | Hist Grp_x.CONTRACT_HR |
| **Contract Day of Month** | Hist Grp_x.CONTRACT_DAY | Hist Grp_x.CONTRACT_DAY | Hist Grp_x.CONTRACT_DAY |
| **Meter Pressure Type Gauge or Absolute** | DP Mtr_x.PRESS_TYPE | Linear Mtr_x.PRESS_TYPE | Liq LinMtr_x.PRESS_TYPE |
| **Low Flow Cutoff** | DP Mtr_x.NO_FLOW_LIM | Linear Mtr_x.NO_FLOW_LIM | Liq LinMtr_x.NO_FLOW_LIM |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Meter Static Pressure** | Press_x-y.SELECTED or AI_x-y.SELECTED | Press_x-y.SELECTED or AI_x-y.SELECTED | Press_x-y.SELECTED or AI_x-y.SELECTED |
| **Meter Temperature** | RTD_x-y.SELECTED or AI_x-y.SELECTED | RTD_x-y.SELECTED or AI_x-y.SELECTED | RTD_x-y.SELECTED or AI_x-y.SELECTED |
| **Atmospheric Pressure** | Station_x.ATMPR_SEL | Station_x.ATMPR_SEL | Station_x.ATMPR_SEL |
| **Meter Factor** | | Linear Mtr_x.MF_SEL | Liq LinMtr_x.MF_SEL |
| **K-Factor** | | Linear Mtr_x.KF_SEL | Liq LinMtr_x.KF_SEL |
| **Factor Curve Type** | | Linear Mtr_x.FACTOR_CURVE_OPT | Liq LinMtr_x.FACTOR_CURVE_OPT |
| **Mass Pressure Effect Option** | | Linear Mtr_x.MASS_CORR_PF_OPT | Liq LinMtr_x.MASS_CORR_PF_OPT |
| **Mass Pressure Effect Coefficient** | | Linear Mtr_x.MASS_CORR_PF_COEFF | Liq LinMtr_x.MASS_CORR_PF_COEFF |
| **Coriolis Calibration Pressure** | | Linear Mtr_x.PCAL | Liq LinMtr_x.PCAL |
| **Shrinkage Factor** | | | Liq FlProp_x.SF_SEL |
| **Meter Base Density of Oil** | | | Liq FlProp_x.DENSB_O_SEL |
| **Accum Current Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.CURRENT |
| **Meter Rate** | | AI_x-y.SELECTED or PI_x-y.SELECTED_FREQ or User Data_x.DOUBLE_1 | AI_x-y.SELECTED or PI_x-y.SELECTED_FREQ or User Data_x.DOUBLE_1 |
| **Density Correction Factor** | | | Liq Dens_x.DENS_FACTOR |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Meter Sediment & Water %** | | | Liq FlProp_x.WC_SEL |
| **Station Object Reference** | DP Mtr_x.STATION_OBJ | Linear Mtr_x.STATION_OBJ | Liq LinMtr_x.STATION_OBJ |
| **Fluid Property Object Reference** | DP Mtr_x.FLUID_PROP_OBJ | Linear Mtr_x.FLUID_PROP_OBJ | Liq LinMtr_x.FLUID_PROP_OBJ |
| **Meter Flow Alarm Object Reference** | DP Mtr_x.FLW_ALM_OBJ | Linear Mtr_x.FLW_ALM_OBJ | Liq LinMtr_x.FLW_ALM_OBJ |
| **Periodic History Object Reference** | Station_x.HIST_GRP_OBJ | Station_x.HIST_GRP_OBJ | Station_x.HIST_GRP_OBJ |
| **Transactional History Object Reference** | | | Liq LinMtr_x.TRANSHGRP_OBJ |
| **Liquid Product Object Reference** | | | Station_x.LIQ_PROD_OBJ |
| **Liquid Density Object Reference** | | | Station_x.DENSH_OBJ |
| **Linear Meter Flow Type Mass or Volume** | | | Liq LinMtr_x.FLOW_TYPE |
| **Meter PE** | | | Liq_FlProp_x.PE_INUSE |
| **Liquid Oil Method** | | | Station_x.OIL_METHOD |
| **Liquid Water Option** | | | Station_x.WATER_OPT |
| **Liquid Density Option** | | | Station_x.DENS_OPT |
| **Liquid Product Name** | | | Liq Prod_x.OBJ_NAME |
| **Liquid Product Type** | | | Liq Prod_x.LIQ_TYPE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Liquid Product Base Density** | | | Liq Prod_x.DENSB |
| **Liquid Product Base Density Units** | | | Liq Prod_x.DENSB_UNITS_TB |
| **Meter FG Factor** | | | Liq FlProp_x.GASF_SEL |
| **Meter Density** | | | Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **CTLmw** | | | Liq LinMtr_x.CTLM_W_SEL |
| **Header Pressure** | | | Station_x.PH_INUSE |
| **Header Temperature** | | | Station_x.TH_INUSE |
| **Header Density** | | | Station_x.DENSH_INUSE |
| **Meter Frequency** | | | Liq LinMtr_x.FREQ_INUSE |
| **Flowing Pressure (A)** | | | Liq LinMtr_x.PF_INUSE |
| **Flowing Pressure (G)** | | | Liq LinMtr_x.PF_INUSE_G |
| **Flowing Temperature** | | | Liq LinMtr_x.TF_INUSE |
| **Meter CTL** | | | Liq LinMtr_x.CTL_INUSE |
| **Meter CPL** | | | Liq LinMtr_x.CPL_INUSE |
| **Meter CTPL** | | | Liq LinMtr_x.CTPL_INUSE |
| **Meter CCF** | | | Liq LinMtr_x.CCF_INUSE |
| **Meter S&W Correction Factor** | | | Liq LinMtr_x.CSW_INUSE |
| **Meter Current Batch Number** | | | Liq LinMtr_x.CUR_BATCH_NUM |
| **Station Batch ID** | | | Station_x.BATCH_ID |
| **Meter IQ Rate** | | | Liq LinMtr_x.IQ_RATE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Meter GV Rate** | | | Liq LinMtr_x.GVOL_RATE |
| **Meter GSV Rate** | | | Liq LinMtr_x.GSVOL_RATE |
| **Meter Unshrunk Vol Rate** | | | Liq LinMtr_x.UVOL_O_RATE |
| **Meter NSV Rate** | | | Liq LinMtr_x.SVOL_O_RATE |
| **Meter Water UVol Rate** | | | Liq LinMtr_x.UVOL_W_RATE |
| **Meter SWV Rate** | | | Liq LinMtr_x.SVOL_W_RATE |
| **Meter FG Net Vol Rate** | | | Liq LinMtr_x.SVOL_FG_RATE |
| **Meter NGL Net Vol Rate** | | | Liq LinMtr_x.SVOL_NGL_RATE |
| **Meter Mass Rate** | | | Liq LinMtr_x.MASS_RATE |
| **Accum Current Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.CURRENT |
| **Accum Current Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.CURRENT |
| **Accum Current Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.CURRENT |
| **Accum Current Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.CURRENT |
| **Accum Current Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.CURRENT |
| **Accum Current Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.CURRENT |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Accum Current Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.CURRENT |
| **Accum Current Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.CURRENT |
| **Accum Current Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.CURRENT |
| **Accum Current Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.CURRENT |
| **Accum Current Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.CURRENT |
| **Prev Period End Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter Water Vol** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.SNAPSHOT |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Period End Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.SNAPSHOT |
| **Prev Period End Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.SNAPSHOT |
| **Prev Hour Meter Start Time** | | | Liq LinMtr_x.PREV_PER_START_TM |
| **Prev Hour Meter End Time** | | | Liq LinMtr_x.PREV_PER_END_TM |
| **Prev Hour Start Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter UVOL** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_PER_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Hour Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_PER |
| **Prev Hour Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_PER |
| **Prev Hour Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_PER |
| **Prev Hour Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_PER |
| **Prev Hour Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_PER |
| **Prev Hour Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_PER |
| **Prev Hour Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_PER |
| **Prev Hour Meter Static Pressure Avg** | | | Hourly average Liq LinMtr_x.PF_OBJ |
| **Prev Hour Meter Temperature Avg** | | | Hourly average Liq LinMtr_x.TF_OBJ |
| **Prev Hour Meter Density Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **Prev Hour Meter Factor Avg** | | | Hourly average Liq LinMtr_x.MF_SEL |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Hour K-factor Avg** | | | Hourly average Liq LinMtr_x.KF_SEL |
| **Prev Hour CTLmw Avg** | | | Hourly average Liq LinMtr_x.CTLM_W_SEL |
| **Prev Hour Shrinkage Factor Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.SF_SEL |
| **Prev Hour Meter Base Density Oil Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSB_O_SEL |
| **Prev Hour S&W% Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.WC_SEL |
| **Prev Hour Meter FG Factor Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.GASF_SEL |
| **Prev Hour Header Pressure Avg** | | | Hourly average Station_x.PH_INUSE |
| **Prev Hour Header Temperature Avg** | | | Hourly average Station_x.TH_INUSE |
| **Prev Hour Header Density Avg** | | | Hourly average Station_x.DENSH_INUSE |
| **Prev Hour Meter Frequency Avg** | | | Hourly average Liq LinMtr_x.FREQ_INUSE |
| **Prev Hour Flowing Pressure (A) Avg** | | | Hourly average Liq LinMtr_x.PF_INUSE |
| **Prev Hour Flowing Pressure (G) Avg** | | | Hourly average Liq LinMtr_x.PF_INUSE_G |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Hour Flowing Temperature Avg** | | | Hourly average Liq LinMtr_x.TF_INUSE |
| **Prev Hour Meter PE Avg** | | | Hourly average Liq LinMtr_x.FLUID_PROP_OBJ.PE_INUSE |
| **Prev Hour Meter CTL Avg** | | | Hourly average Liq LinMtr_x.CTL_INUSE |
| **Prev Hour Meter CPL Avg** | | | Hourly average Liq LinMtr_x.CPL_INUSE |
| **Prev Hour Meter CTPL Avg** | | | Hourly average Liq LinMtr_x.CTPL_INUSE |
| **Prev Hour Meter CCF Avg** | | | Hourly average Liq LinMtr_x.CCF_INUSE |
| **Prev Hour S&W Correction Factor Avg** | | | Hourly average Liq LinMtr_x.CSW_INUSE |
| **Prev Hour Meter Factor Avg** | | | Hourly average Liq LinMtr_x.MF_INUSE |
| **Prev Hour Meter IQ Rate Avg** | | | Hourly average Liq LinMtr_x.IQ_RATE |
| **Prev Hour Meter GV Rate Avg** | | | Hourly average Liq LinMtr_x.GVOL_RATE |
| **Prev Hour Meter GSV Rate Avg** | | | Hourly average Liq LinMtr_x.GSVOL_RATE |
| **Prev Hour Meter Unshrunk Vol Rate Avg** | | | Hourly average Liq LinMtr_x.UVOL_O_RATE |
| **Prev Hour Meter NSV Rate Avg** | | | Hourly average Liq LinMtr_x.SVOL_O_RATE |
| **Prev Hour Meter Water Vol Rate Avg** | | | Hourly average Liq LinMtr_x.UVOL_W_RATE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Hour Meter SWV Rate Avg** | | | Hourly average Liq LinMtr_x.SVOL_W_RATE |
| **Prev Hour Meter FG Net Vol Rate Avg** | | | Hourly average Liq LinMtr_x.SVOL_FG_RATE |
| **Prev Hour Meter NGL Net Vol Rate Avg** | | | Hourly average Liq LinMtr_x.SVOL_NGL_RATE |
| **Prev Hour Meter Mass Rate Avg** | | | Hourly average Liq LinMtr_x.MASS_RATE |
| **Prev Day Start Time** | | | Liq LinMtr_x.PREV_DAY_START_TM |
| **Prev Day End Time** | | | Liq LinMtr_x.PREV_DAY_END_TM |
| **Prev Day Start IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start UVol** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_DAY_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Day Start Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_DAY_START |
| **Prev Day Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_DAY |
| **Prev Day Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_DAY |
| **Prev Day Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_DAY |
| **Prev Day Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_DAY |
| **Prev Day Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_DAY |
| **Prev Day Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_DAY |
| **Prev Day Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_DAY |
| **Prev Day Meter Static Pressure Avg** | | | Daily average Liq LinMtr_x.PF_OBJ |
| **Prev Day Meter Temperature Avg** | | | Daily average Liq LinMtr_x.TF_OBJ |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Day Meter Density Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **Prev Day Meter Factor Avg** | | | Daily average Liq LinMtr_x.MF_SEL |
| **Prev Day K-factor Avg** | | | Daily average Liq LinMtr_x.KF_SEL |
| **Prev Day CTLmw Avg** | | | Daily average Liq LinMtr_x.CTLM_W_SEL |
| **Prev Day Shrinkage Factor Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.SF_SEL |
| **Prev Day Meter Base Density Oil Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.DENSB_O_SEL |
| **Prev Day S&W% Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.WC_SEL |
| **Prev Day Meter FG Factor Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.GASF_SEL |
| **Prev Day Header Pressure Avg** | | | Daily average Station_x.PH_INUSE |
| **Prev Day Header Temperature Avg** | | | Daily average Station_x.TH_INUSE |
| **Prev Day Header Density Avg** | | | Daily average Station_x.DENSH_INUSE |
| **Prev Day Meter Frequency Avg** | | | Daily average Liq LinMtr_x.FREQ_INUSE |
| **Prev Day Flowing Pressure (A) Avg** | | | Daily average Liq LinMtr_x.PF_INUSE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Day Flowing Pressure (G) Avg** | | | Daily average Liq LinMtr_x.PF_INUSE_G |
| **Prev Day Flowing Temperature Avg** | | | Daily average Liq LinMtr_x.TF_INUSE |
| **Prev Day Meter PE Avg** | | | Daily average Liq LinMtr_x.FLUID_PROP_OBJ.PE_INUSE |
| **Prev Day Meter CTL Avg** | | | Daily average Liq LinMtr_x.CTL_INUSE |
| **Prev Day Meter CPL Avg** | | | Daily average Liq LinMtr_x.CPL_INUSE |
| **Prev Day Meter CTPL Avg** | | | Daily average Liq LinMtr_x.CTPL_INUSE |
| **Prev Day Meter CCF Avg** | | | Daily average Liq LinMtr_x.CCF_INUSE |
| **Prev Day S&W Correction Factor Avg** | | | Daily average Liq LinMtr_x.CSW_INUSE |
| **Prev Day Meter Factor Avg** | | | Daily average Liq LinMtr_x.MF_INUSE |
| **Prev Day Meter IQ Rate Avg** | | | Daily average Liq LinMtr_x.IQ_RATE |
| **Prev Day Meter GV Rate Avg** | | | Daily average Liq LinMtr_x.GVOL_RATE |
| **Prev Day Meter GSV Rate Avg** | | | Daily average Liq LinMtr_x.GSVOL_RATE |
| **Prev Day Meter Unshrunk Vol Rate Avg** | | | Daily average Liq LinMtr_x.UVOL_O_RATE |
| **Prev Day Meter NSV Rate Avg** | | | Daily average Liq LinMtr_x.SVOL_O_RATE |
| **Prev Day Meter Water Vol Rate Avg** | | | Daily average Liq LinMtr_x.UVOL_W_RATE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Day Meter SWV Rate Avg** | | | Daily average Liq LinMtr_x.SVOL_W_RATE |
| **Prev Day Meter FG Net Vol Rate Avg** | | | Daily average Liq LinMtr_x.SVOL_FG_RATE |
| **Prev Day Meter NGL Net Vol Rate Avg** | | | Daily average Liq LinMtr_x.SVOL_NGL_RATE |
| **Prev Day Meter Mass Rate Avg** | | | Daily average Liq LinMtr_x.MASS_RATE |
| **Prev Week Meter Start Time** | | | Liq LinMtr_x.PREV_WK_START_TM |
| **Prev Week Meter End Time** | | | Liq LinMtr_x.PREV_WK_END_TM |
| **Prev Week Start Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter UVOL** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_WK_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Week Start Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_WK_START |
| **Prev Week Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_WK |
| **Prev Week Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_WK |
| **Prev Week Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_WK |
| **Prev Week Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_WK |
| **Prev Week Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_WK |
| **Prev Week Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_WK |
| **Prev Week Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_WK |
| **Prev Week Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_WK |
| **Prev Week Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_WK |
| **Prev Week Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_WK |
| **Prev Week Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_WK |
| **Prev Week Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_WK |
| **Prev Week Meter Static Pressure Avg** | | | Weekly average Liq LinMtr_x.PF_OBJ |
| **Prev Week Meter Temperature Avg** | | | Weekly average Liq LinMtr_x.TF_OBJ |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Week Meter Density Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **Prev Week Meter Factor Avg** | | | Weekly average Liq LinMtr_x.MF_SEL |
| **Prev Week K-factor Avg** | | | Weekly average Liq LinMtr_x.KF_SEL |
| **Prev Week CTLmw Avg** | | | Weekly average Liq LinMtr_x.CTLM_W_SEL |
| **Prev Week Shrinkage Factor Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.SF_SEL |
| **Prev Week Meter Base Density Oil Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSB_O_SEL |
| **Prev Week S&W% Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.WC_SEL |
| **Prev Week Meter FG Factor Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.GASF_SEL |
| **Prev Week Header Pressure Avg** | | | Weekly average Station_x.PH_INUSE |
| **Prev Week Header Temperature Avg** | | | Weekly average Station_x.TH_INUSE |
| **Prev Week Header Density Avg** | | | Weekly average Station_x.DENSH_INUSE |
| **Prev Week Meter Frequency Avg** | | | Weekly average Liq LinMtr_x.FREQ_INUSE |
| **Prev Week Flowing Pressure (A) Avg** | | | Weekly average Liq LinMtr_x.PF_INUSE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Week Flowing Pressure (G) Avg** | | | Weekly average Liq LinMtr_x.PF_INUSE_G |
| **Prev Week Flowing Temperature Avg** | | | Weekly average Liq LinMtr_x.TF_INUSE |
| **Prev Week Meter PE Avg** | | | Weekly average Liq LinMtr_x.FLUID_PROP_OBJ.PE_INUSE |
| **Prev Week Meter CTL Avg** | | | Weekly average Liq LinMtr_x.CTL_INUSE |
| **Prev Week Meter CPL Avg** | | | Weekly average Liq LinMtr_x.CPL_INUSE |
| **Prev Week Meter CTPL Avg** | | | Weekly average Liq LinMtr_x.CTPL_INUSE |
| **Prev Week Meter CCF Avg** | | | Weekly average Liq LinMtr_x.CCF_INUSE |
| **Prev Week S&W Correction Factor Avg** | | | Weekly average Liq LinMtr_x.CSW_INUSE |
| **Prev Week Meter Factor Avg** | | | Weekly average Liq LinMtr_x.MF_INUSE |
| **Prev Week Meter IQ Rate Avg** | | | Weekly average Liq LinMtr_x.IQ_RATE |
| **Prev Week Meter GV Rate Avg** | | | Weekly average Liq LinMtr_x.GVOL_RATE |
| **Prev Week Meter GSV Rate Avg** | | | Weekly average Liq LinMtr_x.GSVOL_RATE |
| **Prev Week Meter Unshrunk Vol Rate Avg** | | | Weekly average Liq LinMtr_x.UVOL_O_RATE |
| **Prev Week Meter NSV Rate Avg** | | | Weekly average Liq LinMtr_x.SVOL_O_RATE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Week Meter Water Vol Rate Avg** | | | Weekly average Liq LinMtr_x.UVOL_W_RATE |
| **Prev Week Meter SWV Rate Avg** | | | Weekly average Liq LinMtr_x.SVOL_W_RATE |
| **Prev Week Meter FG Net Vol Rate Avg** | | | Weekly average Liq LinMtr_x.SVOL_FG_RATE |
| **Prev Week Meter NGL Net Vol Rate Avg** | | | Weekly average Liq LinMtr_x.SVOL_NGL_RATE |
| **Prev Week Meter Mass Rate Avg** | | | Weekly average Liq LinMtr_x.MASS_RATE |
| **Prev Month Meter Start Time** | | | Liq LinMtr_x.PREV_MNTH_START_TM |
| **Prev Month Meter End Time** | | | Liq LinMtr_x.PREV_MNTH_END_TM |
| **Prev Month Start Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter UVOL** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_MNTH_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Month Start Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_MNTH |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Month Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_MNTH |
| **Prev Month Meter Static Pressure Avg** | | | Monthly average Liq LinMtr_x.PF_OBJ |
| **Prev Month Meter Temperature Avg** | | | Monthly average Liq LinMtr_x.TF_OBJ |
| **Prev Month Meter Density Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **Prev Month Meter Factor Avg** | | | Monthly average Liq LinMtr_x.MF_SEL |
| **Prev Month K-factor Avg** | | | Monthly average Liq LinMtr_x.KF_SEL |
| **Prev Month CTLmw Avg** | | | Monthly average Liq LinMtr_x.CTLM_W_SEL |
| **Prev Month Shrinkage Factor Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.SF_SEL |
| **Prev Month Meter Base Density Oil Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.DENSB_O_SEL |
| **Prev Month S&W% Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.WC_SEL |
| **Prev Month Meter FG Factor Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.GASF_SEL |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Month Header Pressure Avg** | | | Monthly average Station_x.PH_INUSE |
| **Prev Month Header Temperature Avg** | | | Monthly average Station_x.TH_INUSE |
| **Prev Month Header Density Avg** | | | Monthly average Station_x.DENSH_INUSE |
| **Prev Month Meter Frequency Avg** | | | Monthly average Liq LinMtr_x.FREQ_INUSE |
| **Prev Month Flowing Pressure (A) Avg** | | | Monthly average Liq LinMtr_x.PF_INUSE |
| **Prev Month Flowing Pressure (G) Avg** | | | Monthly average Liq LinMtr_x.PF_INUSE_G |
| **Prev Month Flowing Temperature Avg** | | | Monthly average Liq LinMtr_x.TF_INUSE |
| **Prev Month Meter PE Avg** | | | Monthly average Liq LinMtr_x.FLUID_PROP_OBJ.PE_INUSE |
| **Prev Month Meter CTL Avg** | | | Monthly average Liq LinMtr_x.CTL_INUSE |
| **Prev Month Meter CPL Avg** | | | Monthly average Liq LinMtr_x.CPL_INUSE |
| **Prev Month Meter CTPL Avg** | | | Monthly average Liq LinMtr_x.CTPL_INUSE |
| **Prev Month Meter CCF Avg** | | | Monthly average Liq LinMtr_x.CCF_INUSE |
| **Prev Month S&W Correction Factor Avg** | | | Monthly average Liq LinMtr_x.CSW_INUSE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Month Meter Factor Avg** | | | Monthly average Liq LinMtr_x.MF_INUSE |
| **Prev Month Meter IQ Rate Avg** | | | Monthly average Liq LinMtr_x.IQ_RATE |
| **Prev Month Meter GV Rate Avg** | | | Monthly average Liq LinMtr_x.GVOL_RATE |
| **Prev Month Meter GSV Rate Avg** | | | Monthly average Liq LinMtr_x.GSVOL_RATE |
| **Prev Month Meter Unshrunk Vol Rate Avg** | | | Monthly average Liq LinMtr_x.UVOL_O_RATE |
| **Prev Month Meter NSV Rate Avg** | | | Monthly average Liq LinMtr_x.SVOL_O_RATE |
| **Prev Month Meter Water Vol Rate Avg** | | | Monthly average Liq LinMtr_x.UVOL_W_RATE |
| **Prev Month Meter SWV Rate Avg** | | | Monthly average Liq LinMtr_x.SVOL_W_RATE |
| **Prev Month Meter FG Net Vol Rate Avg** | | | Monthly average Liq LinMtr_x.SVOL_FG_RATE |
| **Prev Month Meter NGL Net Vol Rate Avg** | | | Monthly average Liq LinMtr_x.SVOL_NGL_RATE |
| **Prev Month Meter Mass Rate Avg** | | | Monthly average Liq LinMtr_x.MASS_RATE |
| **Prev Batch Meter Batch Number** | | | Liq LinMtr_x.PREV_BATCH_NUM |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch Meter Start Time** | | | Liq LinMtr_x.PREV_BATCH_START_TM |
| **Prev Batch Meter End Time** | | | Liq LinMtr_x.PREV_BATCH_END_TM |
| **Prev Batch Start Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter UVOL** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch End Meter IQ** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_BATCH_END |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch End Meter GV** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter GSV** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter Unshrunk Vol** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter NSV** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter UVOL** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter SWV** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter FG** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter NGL** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter Flow Time** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter Pulse** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Meter Mass** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch Meter IQ Total** | | | Liq LinMtr_x.IQ_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter GV Total** | | | Liq LinMtr_x.GVOL_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter GSV Total** | | | Liq LinMtr_x.GSVOL_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter Unshrunk Vol Total** | | | Liq LinMtr_x.UVOL_O_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter NSV Total** | | | Liq LinMtr_x.SVOL_O_TOT_OBJ.PREV_BATCH |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch Meter Water Vol Total** | | | Liq LinMtr_x.UVOL_W_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter SWV Total** | | | Liq LinMtr_x.SVOL_W_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter FG Total** | | | Liq LinMtr_x.SVOL_FG_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter NGL Total** | | | Liq LinMtr_x.SVOL_NGL_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter Flow Time Total** | | | Liq LinMtr_x.FLWTM_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter Pulse Total** | | | Liq LinMtr_x.PULSE_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter Mass Total** | | | Liq LinMtr_x.MASS_TOT_OBJ.PREV_BATCH |
| **Prev Batch Meter Static Pressure Avg** | | | Batch average Liq LinMtr_x.PF_OBJ |
| **Prev Batch Meter Temperature Avg** | | | Batch average Liq LinMtr_x.TF_OBJ |
| **Prev Batch Meter Density Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.DENSF_SEL |
| **Prev Batch Meter Factor Avg** | | | Batch average Liq LinMtr_x.MF_SEL |
| **Prev Batch K-factor Avg** | | | Batch average Liq LinMtr_x.KF_SEL |
| **Prev Batch CTLmw Avg** | | | Batch average Liq LinMtr_x.CTLM_W_SEL |
| **Prev Batch Shrinkage Factor Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.SF_SEL |
| **Prev Batch Meter Base Density Oil Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.DENSB_O_SEL |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch S&W% Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.WC_SEL |
| **Prev Batch Meter FG Factor Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.GASF_SEL |
| **Prev Batch Header Pressure Avg** | | | Batch average Station_x.PH_INUSE |
| **Prev Batch Header Temperature Avg** | | | Batch average Station_x.TH_INUSE |
| **Prev Batch Header Density Avg** | | | Batch average Station_x.DENSH_INUSE |
| **Prev Batch Meter Frequency Avg** | | | Batch average Liq LinMtr_x.FREQ_INUSE |
| **Prev Batch Flowing Pressure (A) Avg** | | | Batch average Liq LinMtr_x.PF_INUSE |
| **Prev Batch Flowing Pressure (G) Avg** | | | Batch average Liq LinMtr_x.PF_INUSE_G |
| **Prev Batch Flowing Temperature Avg** | | | Batch average Liq LinMtr_x.TF_INUSE |
| **Prev Batch Meter PE Avg** | | | Batch average Liq LinMtr_x.FLUID_PROP_OBJ.PE_INUSE |
| **Prev Batch Meter CTL Avg** | | | Batch average Liq LinMtr_x.CTL_INUSE |
| **Prev Batch Meter CPL Avg** | | | Batch average Liq LinMtr_x.CPL_INUSE |
| **Prev Batch Meter CTPL Avg** | | | Batch average Liq LinMtr_x.CTPL_INUSE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch Meter CCF Avg** | | | Batch average Liq LinMtr_x.CCF_INUSE |
| **Prev Batch S&W Correction Factor Avg** | | | Batch average Liq LinMtr_x.CSW_INUSE |
| **Prev Batch Meter Factor Avg** | | | Batch average Liq LinMtr_x.MF_INUSE |
| **Prev Batch Meter IQ Rate Avg** | | | Batch average Liq LinMtr_x.IQ_RATE |
| **Prev Batch Meter GV Rate Avg** | | | Batch average Liq LinMtr_x.GVOL_RATE |
| **Prev Batch Meter GSV Rate Avg** | | | Batch average Liq LinMtr_x.GSVOL_RATE |
| **Prev Batch Meter Unshrunk Vol Rate Avg** | | | Batch average Liq LinMtr_x.UVOL_O_RATE |
| **Prev Batch Meter NSV Rate Avg** | | | Batch average Liq LinMtr_x.SVOL_O_RATE |
| **Prev Batch Meter Water Vol Rate Avg** | | | Batch average Liq LinMtr_x.UVOL_W_RATE |
| **Prev Batch Meter SWV Rate Avg** | | | Batch average Liq LinMtr_x.SVOL_W_RATE |
| **Prev Batch Meter FG Net Vol Rate Avg** | | | Batch average Liq LinMtr_x.SVOL_FG_RATE |
| **Prev Batch Meter NGL Net Vol Rate Avg** | | | Batch average Liq LinMtr_x.SVOL_NGL_RATE |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch Meter Mass Rate Avg** | | | Batch average Liq LinMtr_x.MASS_RATE |
| **Station GV Rate** | | | Station_x.GVOL_RATE |
| **Station NSV Rate** | | | Station_x.SVOL_O_RATE |
| **Station SWV Rate** | | | Station_x.SVOL_W_RATE |
| **Station Mass Rate** | | | Station_x.MASS_RATE |
| **Accum Current Station GV Total** | | | Station_x.GVOL_TOT_OBJ.CURRENT |
| **Accum Current Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.CURRENT |
| **Accum Current Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.CURRENT |
| **Accum Current Station Mass Total** | | | Station_x.MASS_TOT_OBJ.CURRENT |
| **Prev Period End Station GV** | | | Station_x.GVOL_TOT_OBJ.SNAPSHOT |
| **Prev Period End Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.SNAPSHOT |
| **Prev Period End Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.SNAPSHOT |
| **Prev Period End Station Mass** | | | Station_x.MASS_TOT_OBJ.SNAPSHOT |
| **Prev Hour Station End Time** | | | Station_x.PREV_PER_END_TM |
| **Prev Hour Start Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_PER_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Hour Start Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_PER_START |
| **Prev Hour Start Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_PER_START |
| **Prev Hour Station GV Total** | | | Station_x.GVOL_TOT_OBJ.PREV_PER |
| **Prev Hour Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.PREV_PER |
| **Prev Hour Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.PREV_PER |
| **Prev Hour Station Mass Total** | | | Station_x.MASS_TOT_OBJ.PREV_PER |
| **Prev Day Station End Time** | | | Station_x.PREV_DAY_END_TM |
| **Prev Day Start Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_DAY_START |
| **Prev Day Start Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_DAY_START |
| **Prev Day Station GV Total** | | | Station_x.GVOL_TOT_OBJ.PREV_DAY |
| **Prev Day Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.PREV_DAY |
| **Prev Day Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.PREV_DAY |
| **Prev Day Station Mass Total** | | | Station_x.MASS_TOT_OBJ.PREV_DAY |
| **Prev Week Station End Time** | | | Station_x.PREV_WK_END_TM |
| **Prev Week Start Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_WK_START |
| **Prev Week Start Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_WK_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Week Station GV Total** | | | Station_x.GVOL_TOT_OBJ.PREV_WK |
| **Prev Week Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.PREV_WK |
| **Prev Week Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.PREV_WK |
| **Prev Week Station Mass Total** | | | Station_x.MASS_TOT_OBJ.PREV_WK |
| **Prev Month Station End Time** | | | Station_x.PREV_MNTH_END_TM |
| **Prev Month Start Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Start Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_MNTH_START |
| **Prev Month Station GV Total** | | | Station_x.GVOL_TOT_OBJ.PREV_MNTH |
| **Prev Month Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.PREV_MNTH |
| **Prev Month Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.PREV_MNTH |
| **Prev Month Station Mass Total** | | | Station_x.MASS_TOT_OBJ.PREV_MNTH |
| **Prev Batch Station Start Time** | | | Station_x.PREV_BATCH_START_TM |
| **Prev Batch Station End Time** | | | Station_x.PREV_BATCH_END_TM |
| **Prev Batch Start Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_BATCH_START |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Batch Start Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch Start Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_BATCH_START |
| **Prev Batch End Station GV** | | | Station_x.GVOL_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Station NSV** | | | Station_x.SVOL_O_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Station SWV** | | | Station_x.SVOL_W_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch End Station Mass** | | | Station_x.MASS_TOT_OBJ.PREV_BATCH_END |
| **Prev Batch Station GV Total** | | | Station_x.GVOL_TOT_OBJ.PREV_BATCH |
| **Prev Batch Station NSV Total** | | | Station_x.SVOL_O_TOT_OBJ.PREV_BATCH |
| **Prev Batch Station SWV Total** | | | Station_x.SVOL_W_TOT_OBJ.PREV_BATCH |
| **Prev Batch Station Mass Total** | | | Station_x.MASS_TOT_OBJ.PREV_BATCH |
| **Prev Meter Start Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter End Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter IQ** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Start Meter GV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter GSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter Unshrunk Vol** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter NSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter UVol** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter SWV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter FG** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter NGL** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Start Meter Flow Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter Pulse** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Meter Mass** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter IQ** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter GV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter GSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter Unshrunk Vol** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter NSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev End Meter UVol** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter SWV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter FG** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter NGL** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter Flow Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter Pulse** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev End Meter Mass** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter IQ Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Meter GV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter GSV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Unshrunk Vol Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter NSV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Water Vol Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter SWV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter FG Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter NGL Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Meter Flow Time Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Pulse Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Mass Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Static Pressure Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Flowing Temperature Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Density Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev K-factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev CTLmw Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Shrinkage Factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Base Density Oil Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev S&W% Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter FG Factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Header Pressure Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Header Temperature Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Header Density Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Meter Frequency Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Flowing Pressure (A) Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Flowing Pressure (G) Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Flowing Temperature Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter PE Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter CTL Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter CPL Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter CTPL Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Meter CCF Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev S&W Correction Factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Factor Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter IQ Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter GV Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter GSV Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Unshrunk Vol Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter NSV Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Meter Water Vol Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter SWV Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter FG Net Vol Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter NGL Net Vol Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Mass Rate Avg** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Station Start Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Meter Station End Time** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Station GV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Prev Start Station NSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Station SWV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Prev Start Station Mass** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev End Station GV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev End Station NSV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev End Station SWV** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev End Station Mass** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev GV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

| Map ID | Gas DP Meter Equivalent | Gas Linear Meter Equivalent | Liquid Linear Meter Equivalent |
|---|---|---|---|
| **Station Prev NSV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev SWV Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |
| **Station Prev Mass Total** | | | Parameter depends upon the **Report Generate Command Parameter**. For more information, refer to Reports. |

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# DeltaV™ FBxConnect™ Configuration Software User Manual (for DeltaV FB3000 RTU)

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For customer service and technical support, visit *Emerson.com/Guardian*.

**North America and Latin America:**
Emerson Energy and Transportation Solutions
6005 Rogerdale Road
Houston, TX 77072 U.S.A.
T +1 888 889 9170
*Emerson.com/SCADAforEnergy*

**United Kingdom:**
Emerson Process Management Limited
Fosse House, 6 Smith Way
Grove Park, Enderby
Leicester LE19 1SX UK
T +44 0 870 240 1978

**Europe:**
Emerson S.R.L
Company number J12/88/2006
Emerson 4 Street
Cluj-Napoca, Cluj
Romania
T: +40 374 132 000

**Middle East/Africa:**
Emerson Energy and Transportation Solutions
Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone – South 2
Dubai U.A.E.
T +971 4 8118100 | F +971 4 8865465

**Asia-Pacific:**
Emerson Energy and Transportation Solutions
1 Pandan Crescent
Singapore 128461
T +65 6777 8211| F +65 6777 0947

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