# FB1200 Flow Computer

The FB1200 flow computer measures and controls oil and gas flow for up to two meter runs. The FB1200 supports gas differential pressure, gas linear meters, and liquid linear meters. With a rugged housing and multiple I/O, communications, and power options, the FB1200 provides accurate and reliable flow measurement in the harshest conditions.

The FB1200 is part of Emerson's new field mount flow computer family that delivers a convenient approach to remote oil and gas sites by addressing challenges to power, safety, measurement reliability and accuracy.

Designed for simplified configuration and ease of use, the FB1200 is also highly configurable and supports multiple flow and fluid property calculations right out of the box. The flexible design provides exactly what is required for each application. The FB1200 can also be equipped with FBxWifi™ allowing you to configure the flow computer and retrieve site data more safely than before.

The new flow computers also come with the latest Rosemount™ sensor technology, providing high accuracy differential pressure and static pressure measurement with long term stability to help improve measurement confidence and production efficiency.

## Features

The FB1200 flow computer includes the following key features:

- Increased measurement confidence, reduced measurement uncertainty
- Industry leading differential and static pressure measurement including 0.05% of reading accuracy and 5-year stability
- High accuracy temperature measurement including curve matching via the Callendar-Van Dusen equation
- Reduced need to re-calibrate resulting in less time spent on site
- Simplified configuration and set-up with the FBxConnect™ configuration software tool
- Flexible design with configurable I/O and communication ports to meet site needs
- Standard firmware supports global calculations for orifice, cone, Venturi, nozzle, conditioning orifice, turbine, PD, Auto-Adjust and Coriolis
- Standard firmware supports Property Calculations for Natural Gas, Pure Gas, Crude Oil, and NGL/LPG
- Flexible PID control with override complimented by configurable logic blocks and effects
- Simple selection of engineering units to suit local requirements
- Global Hazardous Area Approvals – Class 1 Div 1 & 2, ATEX & IEC Ex d & Ex ec
- FBxWifi allows secure local wireless access from safe area
- Ease of integration with support for Modbus, ROC, BSAP and DNP3 protocols
- Enhanced security helps prevent unauthorized access
- Enhanced alarming and historical data storage, improved audit trail
- Superior performance gives better control of your operations and maximizes profits
- API 21.1 compliant

*Aluminum Housing* *Stainless Steel Housing*

*FB1200*

## FBxWifi™

The optional FBxWifi communications enables you to connect your laptop or tablet to the flow computer through a secure wireless connection. Once connected wirelessly, you can use FBxConnect configuration software to view process values, edit configuration parameters, and collect logs stored in the flow computer – all from within the safe area.

## Firmware

The base firmware in the FB1200 flow computer comes with all the calculations, features and functionality required to provide consistent measurement with increased confidence for gas metering and control. The flow computer measures static pressure, differential pressure or pulse frequency, and temperature for up to two meter runs.

The flow computer performs flow calculations based on the following set of user selectable global calculations. To fully satisfy local requirements the engineering units are fully user selectable between either U.S. or metric, or a combination of each.

The firmware supports the following flow calculations:

- AGA 3 1992/2013 (volume, mass/density, and mass/relative density)
- ISO 5167 1991/1998/2003 (orifice, Venturi, and nozzle)
- Rosemount 405C Compact Orifice and 1595 Conditioning Orifice Plate
- McCrometer V-Cone® and Wafer Cone®
- NUFLO™ Cone
- AGA 7 2006 (pulsed turbine, PD, and ultrasonic)
- AGA 11 2013 (Coriolis pulses)
- Auto-Adjust™ meter
- AGA 9 (Multipath Ultrasonic)
- API 20.1 Liquid Allocation Measurement
- API 12.2 Calculation of Petroleum Quantities

The firmware supports the following property calculations:

- AGA 8 1994 (Detailed, Gross 1 and Gross 2)
- AGA8 2017 Part 1 and Part 2 (GERG 2008)

  **Note:** AGA8 Part 2 / GERG provides support for the following pure gases (100%) as well as any mixtures (0% to 100%): Nitrogen, Carbon Dioxide, Hydrogen, Oxygen, Carbon Monoxide, Water Vapor, Hydrogen Sulfide, Helium, and Argon
- Speed of Sound calculated via AGA 10 and AGA 8 2017 Part 2
- NX-19 1962, MOD, VDI/VDE 2040, Miller
- ISO 12213 2006 (parts 2 and 3)
- SGERG 1991 (Std., Alt 1, Alt 2 and Alt 3)
- GPA 2172 2009 (including saturated vapor calculation)
- ISO 6976 1995 (Superior and Inferior, incorporating Technical Corrigendum 2 [1997] and 3 [1999])
- AGA 5 2009
- API 11.1 Temperature and Pressure correction for Crude Oils, Refined Products, and Lubricating Oils
- GPA 8217/API 11.2.4 Table E (formerly TP-27) Temperature Correction for NGL and LPG
- GPA 8117/API 11.2.5 (formerly TP15) Vapor Pressure and API 11.2.2, API 11.2.2M, API 11.1 Pressure Correction for NGL and LPG

The firmware accepts gas density, base density, and specific gravity from any of the following sources:

- Up to 2 gas chromatographs (GC)
- Fixed value
- Periodic download from SCADA
- An external signal, such as analog input
- Calculated based on gas composition
- For liquid meters, the flow meter signal can be provided by a pulse input, an analog flowrate, or a direct accumulation from the meter electronics.

The firmware includes the following flow rates and totals for gas DP and gas linear meters:

- Uncorrected volume
- Corrected (standard) volume
- Mass
- Energy
- Integral Value (DP meter) or Pulse Totals (linear meter)

In addition to the normal totals, the firmware also supports the following fault totals which can be enabled for a gas meter. The conditions to trigger the fault totals are user configurable:

- Uncorrected volume fault totals
- Corrected volume fault totals
- Mass fault totals
- Energy fault totals

The firmware includes the following flow rates and totals for API 12.2 and API 20.1 (low water):

- Indicated Volume / Mass
- Gross Volume
- Gross Standard Volume
- Net Standard Volume
- Water Volume

- Mass
- Flow time
- Pulses

The firmware includes the following flow rates and totals for API 20.1 (high water):

- Indicated volume / mass
- Gross Volume
- Oil (Unshrunk and Theoretical Production)
- Natural Gas Liquid
- Flashed Gas
- Water (Uncorrected and Corrected Volume)
- Flow Time
- Pulses

  **Note:** The firmware can accept a water cut from an on-line analyzer or from an off-line analyzer corrected to metering conditions.

The firmware supports a fallback mode when a process variable's value is questionable. The fallback options can be one of the following:

- Use last good value
- Use a fixed fallback value

## Alarms and Events

The flow computer supports extensive alarming capability to enhance operational efficiency and improve the audit trail. Alarms are pre-allocated to meter runs and stations for standard values such as pressure, temperature, differential pressure or frequency as well as meter run and station flow rates. In addition to these standard alarms, the FB1200 provides a number of user alarms that you can assign to other database parameters simply by “filling in the blanks” in user alarm templates in the FBxConnect configuration tool. Storage is provided for the most recent 1000 alarms in the Alarm log.

The event log stores the significant events during operation and can be configured to either store all events in a single log of 2000 events or the user can select to store the metrology/legal events in a separate log from the operational events. With the latter option the event log capacity is 1000 metrology events and 1000 operation
events.

### Automated Checksum Verification (ACV)

As an extended auditing feature, the flow computer provides an option to perform online integrity checks by generating firmware and configuration checksums. The checksum is a 32-bit CRC number which is routinely calculated and compared against the last verified checksum. If a newly calculated checksum does not match with the last verified checksum, the system generates a checksum error and the flow computer goes into an unverified state.

## History

The FB1200 features expanded and flexible history capability to ensure measurement confidence and meet the increasing demands for secure data.

The flow computer has four standard periodic logs available providing hourly, daily, weekly, and monthly history. These logs can contain up to 110 variables including flow weighted average data, totals, and gas composition. For averaging, the FB1200 supports either flow weighted or flow dependent which can be linear or formulaic.

For gas meter averages, you can choose between flow-dependent linear per API Chapter 21.1 (2013) or flow-dependent formulaic, flow-weighted linear, or flow-weighted formulaic averages per API Chapter 21.1 (1993). Liquid meter averages are flow-weighted averages per API Chapter 21.2 (2000).

The FB1200 can store the following standard periodic logs for 60 variables. With the flexible history design, the number of variables and the time duration for different periodic logs can be adjusted to meet the application requirement.

- Hourly logs 62 days or 1500 records
- Daily logs 12 months or 365 records
- Weekly logs 12 months or 52 records
- Monthly logs 60 months or 60 records

**Note**: This is only the initial default history. With the flexible history design, the number of variables and the time duration for different periodic logs can be adjusted to meet the application requirement.

The flow computer also supports two user periodic logs, the duration or period of each is user selectable between 1 second and 200 hours. The first user periodic logs include 10 parameters over 4,000 periods and the second contains 20 parameters over 500 periods.

The flow computer with FBxConnect provides pre-formatted EFM reports for hours and days. The format of the reports can be .csv, .pdf, or secure .pdf.

In addition to the above reports, the flow computers can produce FLOWCAL-complaint cfx files through the FBxConnect tool as well as calibration reports which

contain U.S. Bureau of Land Management specific parameters.

## Housing

The FB1200 includes an explosion-proof and flame-proof enclosure made of die-cast aluminum or stainless steel that can operate in an unprotected outdoor environment. Wiring for I/O, communications, and power enters the enclosure through the four conduit fittings. The front-end cap provides a viewing window for the optional LCD. The rear end cap provides access to the screw terminals with connections for communications, I/O, and power. The end caps provide the ability to fit wire security seals.

## Hazardous Area Certifications

The FB1200 has the following Global Hazardous Area Approvals:

- North American certification for Class I Division 1 Groups B, C and D (explosion proof) and Class I Division 2 Groups A, B, C and D
- ATEX and IECEx certification for Exd Zone 1 (flame proof) and Ex ec Zone 2 hazardous locations

## Power Options

The FB1200 has the following power options available:

- External DC supply
- External DC supply with internal battery back-up
- Solar panel charging internal battery, unit has built-in solar regulator

The internal battery can power the device for up to 19 days when configured to operate in Low Power Mode. Refer to the *Power Modes* section of the data sheet for more details.

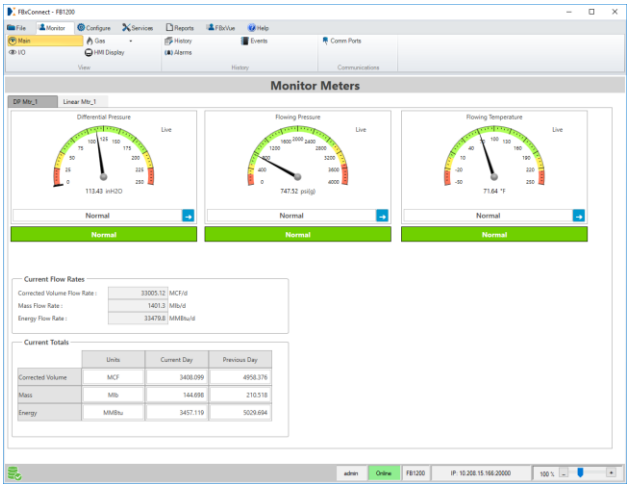
**Note:** Internal battery option is not available with ATEX or IECEx approval.

## Configuration Software

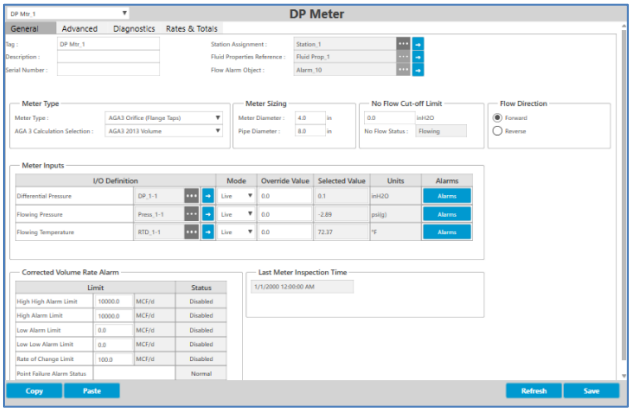
Emerson's new FBxConnect™ tool is a Microsoft® Windows®-based tool that enables you to easily monitor, configure, service, and calibrate the FB1200 flow computer. Designed for ease of use, FBxConnect provides at-a-glance monitoring, quick access to commonly performed tasks, and a guided configuration process to quickly get your measurement up and running.

The wizard-driven approach simplifies configuration and ensures that you only need to enter the required data once. Whether you are an experienced engineer or a new technician, you can be confident configuration is done correctly the first time.

FBxConnect runs on a Windows PC or tablet. You connect securely to the flow computer using one of its serial ports, Ethernet port, or optionally through the FBxWifi wireless connection. For more information, refer to product data sheet *FBxConnect* (part D301789X012).




*Monitor Screen*




*DP Meter*

## Security

To secure your valuable process and data, the FB1200 provides multi-level role-based access, user account authentication, and password encryption.

The system administrator can set a minimum password length (up to 20 characters) that accommodates lower case, upper case, numbers, and symbols, as well as configure a user lock-out feature that locks out invalid users after a defined number of failed login attempts.

Additionally, the DNP3 protocol lends itself to an added layer of security through Secure Authentication (SA). SA version 5 (SAv5) is available in the FB1200 Flow Computer as a selection in the firmware. SAv5 authenticates the devices which significantly improves resistance to outside influence.

## Integral Pressure Sensor Options

The flow computer can be supplied with one of three sensor options to suit your metering needs:

- Integral Multivariable Transmitter (MVT) measuring both Static Pressure and Differential Pressure (DP)
- Integral inline static pressure sensor
- NO integral pressure sensor – external transmitters are used

If the FB1200 has an integral sensor, it can also communicate with one remote 4088B transmitter. If it has no integral sensor it can communicate with one or two remote 4088B transmitters.

Enabled by superior sensor technology and engineered for optimal flow performance, the integral pressure sensor on the flow computer delivers unparalleled accuracy, over a wide range of operating conditions and industry leading stability to ensure you meet standards and regulations.

The pressure sensors on the flow computer can measure DPs of up to 1000” of water / 2500 mBar and static pressures, up to 4000 psi / 275 bar in either gauge or absolute with accuracies up to 0.05% of reading.

## Temperature Input (RTD/PRT)

With industry leading measurement accuracy, the temperature measurement of the FB1200 will ensure that you minimize your measurement uncertainty in all operating conditions. The input accepts 2-, 3- or 4-wire connections reducing any field wiring induced errors and supports sensor curve matching utilizing the optional Callendar-Van Dusen constants to define the unique characteristics of the RTD/PRT to further improve process temperature measurement uncertainty.

The FB1200 flow computer’s superior static pressure, DP, and temperature measurement performance and stability ensures you meet standards and regulations so you can avoid fines, penalties, leaseholder disputes, and lost revenue.

## Inputs and Outputs

### Base I/O

In addition to the integral pressure sensor, the FB1200 includes the following I/O points in the base unit:

- Two analog channels - individually software selectable as analog inputs (AI) or analog outputs (AO)
- Two discrete channels - individually software selectable as discrete inputs (DI), discrete outputs (DO), or pulse inputs (PI)
- One RTD/PRT (2-, 3-, or 4 wire)

Analog Inputs (AI) are individually software configurable for either 4 to 20 mA or 1 to 5 Vdc operation.

To keep measurement uncertainty at a minimum when external transmitters are being used, both the AI and AO channels have industry-leading measurement accuracy with an excellent performance over a wide ambient temperature range.

Each Discrete Input (DI) channel can also be software configured to function as a latched DI.

The Discrete Output (DO) channels are solid-state, normally open switches rated at 500 mA, enough to directly drive most samplers. Each DO channel can be software configured as a latched, toggled, momentary, timed duration output (TDO), or scaled pulse output.

The PI channels are most commonly used to interface with turbine meters, Coriolis meters, ultrasonic meters, and positive displacement (PD) meters. The high-speed input supports signal up to 10.5 kHz.

## Expansion I/O (optional)

In addition to the base I/O provided, the optional 6-point I/O board adds the following I/O capabilities to the FB1200:

- Two additional channels that are individually software selectable as either analog inputs or analog outputs

- Four additional channels that are individually software selectable as discrete inputs, discrete outputs, or pulse inputs

## Control

The FB1200 optionally supports control functions including PID control, basic programming through action blocks, effects, and math blocks.

**PID Control** – The FB1200 supports up to three Proportional, Integral, and Derivative (PID) control loops. Each PID instance supports a primary and an override loop. Each loop has its own user-defined input, output, and override capability.

Typically, a PID control maintains a process variable at set point. If you configure a PID override control, the primary loop is normally in control of the control device but the override loop can take over control of the process if required. A typical example would be primary flow control with a pressure override.

**Action Blocks** – The FB1200 supports up to 30 action blocks. Action blocks are used in conjunction with effect blocks to monitor a configured condition and to perform an action (effect) when the logic is "true." An action block consists of a user defined Boolean logic statement with two variables. These variables can either be live parameter values or constants.

Multiple action blocks can be chained together to create more complex logic. Each action block includes multiple bypasses, which can temporarily halt the action to be taken for maintenance and safety.

**Effects** – The FB1200 supports up to ten effects. Effects cause an action to occur when the result of one or more action blocks is active ("true"). Multiple action blocks can cause the same effect, such as shutting a valve or enabling an alert beacon.

You configure an effect by defining an output parameter and the values to write to that parameter when the effect is either active or inactive. You can also configure an active effect to be self-clearing or to require a manual reset.

**Math Blocks** – The FB1200 supports up to ten math blocks. Math blocks perform mathematical equations using user-defined variables as inputs. Each math block consists of up to four user-defined variables, three mathematical calculations, and the results of each calculation.

The result of the math block equation can be assigned to a user data point, to drive an output point, to a calculated value or to any other database parameter.

Mathematical calculations also support standard math functions (POW, EXP, LOG, SQRT, etc.), constants, and operators.

FBxConnect checks each calculation string for the correct syntax and uses double precision floating point math throughout the calculation.

**User Data Points –** User data points are configurable storage areas in the data base. These user data points can store the constants / variables that are inputs to the math blocks in addition to the calculated results of math blocks. They can also be used to represent interim calculation values or values of additional inputs or outputs etc. There are eight user data instances, each with a tag and description, 30 integers (split between byte, short and long), 20 single floating points, and 10 double floating points, providing storage for up to 480 variables.

## Communications

The FB1200 provides up to five user-selectable communications ports: three serial ports, one Ethernet port, and one optional port that supports FBxWifi (802.11 b/g) communications using DNP3 protocol.

- COM1 – 4-wire serial communications. Software selectable for EIA-232 (RS-232), EIA-422 (RS-422), or EIA-485 (RS-485) operation.
- COM2 – 2-wire serial communications. Software selectable for EIA-232 (RS-232) or EIA-485 (RS-485) operation.
- COM3 – 2-wire serial communications. Software selectable for EIA-232 (RS-232) or EIA-485 (RS-485) operation.
- COM4 –FBxWifi (802.11 b/g) communications (optional).
- COM5 – Ethernet. 10/100BASE-T twisted pair. Supports up to seven sessions.

## Communications Protocols

The FB1200 supports multiple communications protocols, including DNP3, Modbus master and slave (ASCII and RTU), BSAP, and ROC on the three serial ports and DNP3 on the FBxWifi port. In addition, the Ethernet port supports Modbus over TCP/IP protocol (master and slave), DNP3/IP, ROC, and BSAP.

## FBxNet™

FBxNet is a secure, easily configurable, peer-to-peer communication network for exchanging data between Emerson FB3000 RTUs and FB1200 and FB2200 flow computers over an Ethernet connection. FBxNet supports subscriber and publisher devices, where publishers provide data to their subscribers. The FB3000 RTUs and FB1200 and FB2200 flow computers can be publishers; only an FB3000 can be a subscriber. For more information, refer to *FBxNet* product data sheet (part D301905X012).

## Mounting Options

The FB1200 supports either direct mount to a manifold on the pipeline or indirect mounting on a two-inch pipe or pole. A mounting bracket and bolts are available for use with a traditional flange, coplanar flange, or inline static pressure options.

# FB1200 Flow Computer

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|---|---|---|---|
| **CPU Module** | | | |
| Processor | The central processing unit (CPU) of the flow computer is an NXP® Kinetis® K61 series CPU with an ARM® Cortex® M4 processor. | | |
| Memory | SRAM | 8 MB, holds current states of all variables and historical archives. | |
| | Flash | 128 MB, holds firmware image and configuration files. | |
| Clock | Type | Real-time clock | |
| | Accuracy | 0 °C to 40 °C | 60 seconds/year |
| | | -40 °C to 80 °C | 110 seconds/year |
| | Watchdog Timer | 1175 milliseconds | |
| Diagnostics | Battery voltage monitor, external voltage monitor, SRAM battery status | | |
| **Communications** | | | |
| Ports | COM1 | 4-wire serial communications.<br>Software-selectable for RS-232, RS-422, or RS-485 operation. | |
| | COM2 | 2-wire serial communications.<br>Software-selectable for RS-232 or RS-485 operation. | |
| | COM3 | 2-wire serial communications.<br>Software-selectable for RS-232 or RS-485 operation.<br>Can communicate to 4088B transmitters. | |
| | COM4 | FBxWifi (optional) 802.11 b/g | |
| | COM5 | Ethernet 10/100 Base-T supports up to 7 sessions (1 Modbus Master, up to 3 DNP3, others selectable between ROC, BSAP, and Modbus Slave) | |
| Protocols | Serial ports support DNP3, Modbus slave (ASCII or RTU), BSAP, and ROC.<br>The Ethernet port supports Modbus over TCP/IP protocol (master and slave), DNP3, BSAP, and ROC protocol.<br>Wi-Fi supports DNP3<br>DNP3 includes level 3 protocol subset | | |

**Base I/O**

The base FB1200 includes the following I/O:

- 2 channels that are individually software selectable as either analog inputs or analog outputs
- 2 channels that are individually software selectable as either discrete inputs, discrete outputs, or pulse inputs
- 1 process temperature input (RTD/PRT)

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| **Expansion I/O (optional)** | | | |
| 6 Channel I/O Board | Provides 6 additional I/O channels in addition to the base I/O.<br>**Note:** Specifications for expansion I/O channels are identical to base I/O channels except where noted. | | |
| | Analog Inputs / Analog Outputs | Quantity | 2 channels<br>Each channel is individually software selectable as an AI or AO. |

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|---|---|---|---|
| | Discrete Inputs / Discrete Outputs / Pulse Inputs | Quantity | 4 channels<br>Each channel is individually software selectable as a DI, DO, or PI. |
| **I/O Specifications** | | | |
| Analog Inputs | Type | Single-ended | |
| | Input Range | 1 to 5 Vdc or 4 to 20 mA (software-selectable) | |
| | | Over Range | 1 to 5 Vdc: 0.8 to 5.2 Vdc<br>4 to 20 mA: 3.2 to 20.8 mA |
| | Resolution | 16 bits | |
| | Scan Rate | 10 samples per second | |
| | Input Impedance | 1 to 5 Vdc Inputs | 200 kΩ |
| | | 4 to 20 mA Inputs | 250 Ω |
| | Fault Mode | User-entered default value or last good value | |
| | Software Filter | Software damping is available in FBxConnect configuration software | |
| | Input Filter | 20 HZ @ -3 dB | |
| | Surge Suppression | 30 Vdc | |
| | Reference Accuracy | +/- 0.05% of span<br>**Note:** To achieve the stated accuracy when analog inputs are used in voltage mode, you must wire analog input reference(s) to the AGND terminals *separately* from the discrete and communication ground references. | |
| | Ambient Temperature Effect | +/- 0.05% of span per 10°C (18°F) from the calibration temperature | |
| | Long Term Stability | 3 years | |
| | SNR | 87 dB | |
| | Loop Power | Base I/O | External |
| | | Optional 6-point Expansion I/O | External |
| Analog Outputs | Type | Single-ended, externally sourced | |
| | Output Range | 4 to 20 mA | |
| | Resolution | 14 bits | |
| | Surge Suppression | 30 Vdc | |

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| | Reference Accuracy | +/- 0.1% of span<br>**Note:** To achieve the stated accuracy when analog outputs are used in voltage mode, you must wire analog output reference(s) to the AGND terminals *separately* from the discrete and communication ground references. | |
| | Ambient Temperature Effect | +/- 0.05% of span per 10 °C (18 °F) from the calibration temperature | |
| | Long Term Stability | 3 years | |
| | Fault Mode | User-entered default value or last good value | |
| | Scan Rate | 1 second | |
| | Surge Suppression | 30 Vdc | |
| | Impedance | Current Mode | Configured to drive a load impedance of 0 to 900 Ω |
| | | | 250 Ω max with 10 Vdc supply |
| | | | 900 Ω max with 22.5 Vdc supply |
| | | Voltage Mode | 100 kΩ |
| | Load Loop Resistance | 0 to 900Ω | |
| | Max External Supply | 30 Vdc | |
| | Loop Power | Base I/O | External |
| | | Optional 6 point I/O | Internal |
| Discrete Inputs | Type | Dry contact or an open collector | |
| | Scan Rate | 1 second | |
| | Input Filter | 10 Hz | |
| | Input Current | Software selectable 66µA or 2mA | |
| | Voltage Rating | 30 Vdc maximum | |
| | Frequency | 10 Hz maximum | |
| | Input Type | Latched or unlatched | |
| | Loop Power | Internally sourced | |
| | Surge Suppression | 30 Vdc | |
| | Fault Mode | User-entered default value or last good value | |
| Discrete Outputs | Type | Open drain | |
| | Current | 500 mA maximum | |
| | Operating Voltage Range | 30 Vdc maximum | |

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| | Frequency | 50 Hz maximum | |
| | Output Type | Latched, momentary, toggle, TDO, or scaled pulse | |
| | Surge Suppression | 30 Vdc | |
| | Fault Mode | User-entered default value or last good value | |
| Pulse Inputs | Type | Dry contact or open collector | |
| | Frequency | Low Range | 0 to 300 Hz |
| | | High Range | 0 to 10.5 kHz |
| | Input Filter | Low Frequency | 1 ms software selectable filter |
| | | High Frequency | 30 µs software selectable filter |
| | Input Current | Software selectable 66 µA or 2 mA | |
| | Voltage Rating | 30 Vdc maximum | |
| | Loop Power | Internally sourced | |
| | Surge Suppression | 30 Vdc | |
| Temperature Input (RTD/PRT) | Type | Pt100<br>2-wire, 3-wire or 4-wire (software-selectable) | |
| | Measuring Range | -200 to +850°C (-328 to 1562 °F) | |
| | Reference Accuracy | +/- 0.07 °C from -30 to 60°C (±0.126 °F from -22 to +140 °F)<br>+/- 0.1 °C from -60 to 200°C (±0.18 °F from -76 to +392 °F) | |
| | Ambient Temperature Effect | −30 to 60°C | +/- 0.017 °C per 10 °C (+/- 0.03 °F per 18 °F) from the calibration temperature |
| | | −60 to 200°C | +/- 0.034 °C per 10 °C (+/- 0.06 °F per 18 °F) from the calibration temperature |
| | Calculation Type | User selectable between | Callendar–Van Dusen |
| | | | IEC 751/DIN 43760 (α 0.00385/°C) |
| | | | IEC (α 0.003920/°C) |
| | Scan Rate | 1 second | |
| | Voltage Input Impedance | Greater than 3 MΩ DC | |
| | Excitation Current | 205 µA | |
| | Surge Suppression | 36 Vdc | |
| | Common Mode Rejection | 100 dB at DC | |
| | Normal Mode Rejection | 100 dB at 50/60 Hz | |

## Integral Sensors

The FB1200 is available with the following integral sensor options:

- Multi-Variable Sensor – providing Differential Pressure and Static Pressure
- Static Pressure Sensor – providing Static Pressure only
- No integral sensor fitted – with interface to 4088B MVT transmitters or analog transmitters

## Multivariable Sensor(optional)

The standard Rosemount™ MultiVariable™ sensor has a stainless steel coplanar flange, a stainless steel (316L) diaphragm, and silicone fill fluid. Optional versions include:

- A Hastelloy® C-276 sensor diaphragm, a Hastelloy C-276 coplanar flange, with either NACE MRO175/ISO 15156 or MRO103 certification
- Stainless steel traditional flange, a stainless steel diaphragm, and silicon fill fluid.

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| Differential Pressure Input | DP Range 1 | −25 to 25 inches $H_2O$ (−62.16 to 62.16 mbar) | | |
| | | Reference Accuracy | ± 0.1% span;<br>For spans less than 5:1, ± (0.025+0.015 [USL/Span]) % span | |
| | | Stability | ±0.2% USL for 1 year | |
| | | Ambient Temperature Effect per 50°F (28°C) | from 1:1 to 30:1 | ± (0.2% USL + 0.25% span) |
| | | | from 30:1 to 50:1 | ± (0.24% USL + 0.15% span) |
| | | Static Pressure Effects | Zero Error | ± 0.25% USL per 1000 psi (69 bar) |
| | | | Span Error | ± 0.4% of reading per 1000 psi (69 bar) |
| | | Over Pressure Limit | SP Range G4/A4 | 2000 psi (137.89 bar) |
| | | Burst Pressure Limit | 10,000 psi (689.47 bar) | |
| | | **Notes:**<br>▪ 25-inch sensor is only available with static pressure SP Range G4/A4, maximum pressure limited to 2000 psi.<br>▪ 25-inch sensor is only available with stainless steel sensor and coplanar flange. | | |
| | DP Range 2: Standard | 0 to 250 Inches $H_2O$ (623 mbar) | | |
| | | Reference Accuracy | ± 0.1% span;<br>For spans less than 10:1, ± (0.01 [USL/Span]) % span | |
| | | Stability | ± 0.1% USL for 1 year | |
| | | Ambient Temperature Effect per 50°F (28°C) | from 1:1 to 30:1 | ± (0.15% USL) |
| | | | from 30:1 to 50:1 | ± (0.20% USL) |

| | | | |
|---|---|---|---|
| | Static Pressure Effects | Zero Error | ± 0.1% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.2 + 0.0001 * (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G6/A6 | 1600 psi (110.32 bar) |
| | | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| | **Note:** 0.1% Accuracy is not available on traditional flange. | | |
| DP Range 2: Enhanced | 0 to 250 inches $H_2O$ (623 mbar) | | |
| | Reference Accuracy | ± 0.075% span;<br>For spans less than 10:1, ± (0.025 +0.005 [USL/Span]) % span | |
| | Stability | ±0.125% USL for 5 years;<br>For ±50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure | |
| | Ambient Temperature Effect per 50°F (28°C) | ± (0.0175% USL + 0.1% span) from 1:1 to 5:1,<br>± (0.035% USL + 0.125% span) from 5:1 to 100:1 | |
| | Static Pressure Effects | Zero Error | ± 0.05% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G6/A6 | 1600 psi (110.32 bar) |
| | | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| DP Range 2: Enhanced for Flow | 0 to 250 inches $H_2O$ (623 mbar) | | |
| | Reference Accuracy | ±0.05% of reading;<br>for readings less than 8:1, ± [0.05 + 0.0023(USL / Rdg)] % reading | |

| | | | |
|---|---|---|---|
| | Stability | ±0.125% USL for 5 years;<br>For ±50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure | |
| | Ambient Temperature Effect per 50°F (28°C) | ±0.13% of reading from 1:1 to 5:1,<br>± [0.13 + 0.04 (USL / RDG)] % of reading from 5:1 to 100:1 | |
| | Static Pressure Effects | Zero Error | ± 0.05% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G6/A6 | 1600 psi (110.32 bar) |
| | | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| DP Range 2: Extended | 0 to 250 inches $H_2O$ (623 mbar) | | |
| | Reference Accuracy | ±0.075% of span for spans 25 to 250 in $H_2O$;<br>For readings above span, ±0.15% reading | |
| | Stability | ±0.125% USL for 5 years;<br>For ±50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure | |
| | Ambient Temperature Effect per 50°F (28°C) | For units spanned 75 to 250 in $H_2O$, ± (0.025% MSL + 0.125% span)<br>For pressures between span and 250 in $H_2O$, ± (0.025% MSL + 0.125% reading) | |
| | | For units spanned 25 to 75 in $H_2O$, ± (0.09% MSL + 0.03% span)<br>For pressures between span and 250 in $H_2O$, ± (0.09% MSL + 0.03% reading) | |
| | | For pressure readings above 250 in $H_2O$, ±0.15% reading | |
| | Static Pressure Effects | Zero Error | ± 0.05% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G6/A6 | 1600 psi (110.32 bar) |

| | | | |
|---|---|---|---|
| | | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| DP Range 3: Standard | 0 to 1000 inches $H_2O$ (2.5 bar) | | |
| | Reference Accuracy | ± 0.1% span;<br>For spans less than 10:1, ± (0.01 [USL/Span]) % span | |
| | Stability | ±0.1% USL for 1 year | |
| | Ambient Temperature Effect per 50°F (28°C) | from 1:1 to 30:1 | ± (0.15% USL) |
| | | from 30:1 to 50:1 | ± (0.20% USL) |
| | Static Pressure Effects | Zero Error | ± 0.1% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.2 + 0.0001* (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| | **Notes:**<br>▪ 0.1% Accuracy is **not** available on traditional flange.<br>▪ 1000" DP range with 0.1% accuracy **only** available with stainless steel sensor and coplanar flange.<br>▪ 1000" DP range is **not** available with 300 psi static pressure (SP Range 1). | | |
| DP Range 3: Enhanced | 0 to 1000 inches $H_2O$ (2.5 bar) | | |
| | Reference Accuracy | ± 0.075% span;<br>For spans less than 10:1, ± (0.025 +0.005 [USL/Span]) % span | |
| | Stability | ±0.125% USL for 5 years;<br>For ±50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure | |
| | Ambient Temperature Effect per 50°F (28°C) | ± (0.0175% USL + 0.1% span) from 1:1 to 5:1,<br>± (0.035% USL + 0.125% span) from 5:1 to 100:1 | |
| | Static Pressure Effects | Zero Error | ± 0.05% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.1 + 0.0001* (Ps - 2000)] % per 1000 psi |

| | | | |
|---|---|---|---|
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10, 000 psi (689.47 bar) |
| | **Note:** 1000" DP range is **not** available with 300 psi static pressure (SP Range 1). | | |
| DP Range 3: Enhanced for Flow | 0 to 1000 inches $H_2O$ (2.5 bar) | | |
| | Reference Accuracy | ±0.05% of reading;<br>for readings less than 8:1, ± [0.05 + 0.0023(USL / Rdg)] % reading | |
| | Stability | ±0.125% USL for 5 years;<br>For ±50 °F (28 °C) temperature changes, up to 1000 psi (68.9 bar) line pressure | |
| | Ambient Temperature Effect per 50°F (28°C) | ±0.13% of reading from 1:1 to 5:1,<br>± [0.13 + 0.04 (USL / RDG)] % of reading from 5:1 to 100:1 | |
| | Static Pressure Effects | Zero Error | ± 0.05% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.1 + 0.0001 * (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Over Pressure Limit | SP Range G7/A7 | 3626 psi (250.00 bar) |
| | | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |
| | **Note:** 1000" DP range is **not** available with 300 psi static pressure (SP Range 1). | | |
| DP Range 4: Standard | 0 to 2000 psi (137.89 bar) | | |
| | Reference Accuracy | ± 0.1% span;<br>for spans less than 10:1, ± [0.01(USL / span)] % span | |
| | Stability | ±0.1% USL for 1 year | |
| | Ambient Temperature Effect per 50°F (28°C) | ± (0.225% of USL) from 1:1 to 50:1 | |

| | | | |
|---|---|---|---|
| | Static Pressure Effects | Zero Error | ± 0.2% USL per 1000 psi (69 bar)<br>For Static Pressures above 2000 psi:<br>± [0.4 + 0.0002* (Ps - 2000)] % per 1000 psi |
| | | Span Error | ± 0.2% of reading per 1000 psi (69 bar) |
| | Standard | SP Range G4/A4 | 3626 psi (250.00 bar) |
| | Burst Pressure Limit | All SP ranges | 10,000 psi (689.47 bar) |

**Static Pressure Input**

The following details are for the static pressure measurement of the MultiVariable sensor

| | | | |
|---|---|---|---|
| | SP Range 1 | Gauge – G6 | –14.7 to 300 psig (–1.01 to 20.7 barg) |
| | | Absolute – A6 | 0 to 300 psia (–1.01 to 20.7 bara) |
| | SP Range 2 | Gauge – G7 | –14.7 to 1500 psig (–1.01 to 103.4 barg) |
| | | Absolute – A7 | 0 to 1500 psia (–1.01 to 103.4 bara) |
| | SP Range 3 | Gauge – G4 | –14.7 to 3600 psig (–1.01 to 250 barg) |
| | | Absolute – A4 | 0 to 3600 psia (–1.01 to 250 bara) |
| | Reference Accuracy | Standard | ± 0.1% span;<br>For spans less than 5:1, ± [0.017 (USL/Span)] % span |
| | | Enhanced | ± 0.075% span;<br>For spans less than 5:1, ±[0.013(USL/Span)] % span |
| | | Enhanced for Flow | ± 0.05% span;<br>For spans less than 5:1, ± [0.006(USL/Span)] % span |
| | Stability | Standard | ±0.1% USL for 1 year |
| | | Enhanced | ±0.125% USL for 5 years |
| | | Enhanced for Flow | ±0.125% USL for 5 years |
| | Ambient Temperature Effects per 28 °C (50 °F) | Standard | ± (0.175% USL) from 1:1 to 10:1,<br>± (0.225% USL) from 10:1 to 25:1 |
| | | Enhanced | ± (0.050% USL + 0.125% span) from 1:1 to 10:1,<br>± (0.060% USL + 0.175% span) from 10:1 to 25:1 |
| | | Enhanced for Flow | ± (0.040% USL + 0.060% span) from 1:1 to 10:1,<br>± (0.050% USL + 0.150% span) from 10:1 to 40:1 |

**Static Pressure Sensor (optional)**

The following section applies to the “in-line” integral static pressure sensor, without differential pressure, which would typically be used with linear meters that provide a pulsed signal for flow.

These static pressure sensors are provided in stainless steel with a 1/2 “– 14 NPT female process connection.

| | | | |
|---|---|---|---|
| Static Pressure Input | SP Range 1 | Gauge – G1 | –14.7 to 30 psig (–1.01 to 2.06 bar) |
| | | Absolute – A1 | 0 to 30 psia (0 to 2.06 bar) |
| | SP Range 2 | Gauge – G2 | –14.7 to 150 psig (–1.01 to 10.34 bar) |

| | | | |
|---|---|---|---|
| | | Absolute – G2 | 0 to 150 psia (0 to 10.34 bar) |
| | SP Range 3 | Gauge – G3 | −14.7 to 800 psig (−1.01 to 55.15 bar) |
| | | Absolute – A3 | 0 to 800 psia (0 to 55.15 bar) |
| | SP Range 4 | Gauge – G4 | −14.7 to 4000 psig (−1.01 to 275.79 bar) |
| | | Absolute – A4 | 0 to 4000 psia (0 to 275.79 bar) |
| | Reference Accuracy | Standard | ± 0.1% span<br>For spans less than 10:1, ± (0.01 [USL/Span]) % span |
| | | Enhanced | ± 0.075% span<br>For spans less than 10:1, ± (0.025 + 0.005 [USL / Span]) % span |
| | Stability | Standard | ± 0.1% USL for 1 year |
| | | Enhanced | ± 0.125% USL for 5 years |
| | Ambient Temperature Effects per 28 °C (50 °F) | Standard | ± (0.175% USL) from 1:1 to 30:1<br>± (0.225% USL) for 30:1 to 50:1 |
| | | Enhanced | ± (0.050% USL + 0.125% span) from 1:1 to 30:1<br>± (0.060% USL + 0.175% span) for 30:1 to 100:1 |
| | Over Pressure Limit | SP Range G1/A1 | 750 psi (51.71 bar) |
| | | SP Range G2/A2 | 1500 psi (103.42 bar) |
| | | SP Range G3/A3 | 1600 psi (110.32 bar) |
| | | SP Range G4/A4 | 6000 psi (413.69 bar) |
| | Burst-Pressure Limit | All SP ranges | 11,000 psi (758.42 bar) |
| **Power** | | | |
| External DC Power Supply | 5.7 Vdc to 30 Vdc external supply (Max power at 10 watts) | | |
| Optional Rechargeable Lead Acid Battery | Internal mounted 4.5 Ah 6.0 Vdc battery<br>The battery can power the unit for up to 19 days without any solar charging depending on display and communications and I/O usage, and can be charged by a 6-watt solar panel or from a DC supply for backup<br>**Note:** This option is available **only** with Class 1 Div 2 approval. | | |
| Solar Panel and Regulator Options | If ordered with the rechargeable battery option, the FB1200 includes an integral solar regulator<br>Can be supplied with an optional 6-watt 6V solar panel<br>The solar panel input is rated to a maximum of 30V and 1.5A. A minimum of 8V is required to charge the battery.<br>**Note:** This option is available **only** with Class 1 Div 2 approval. | | |
| SRAM Battery | Lithium coin cell type BR2335 or BR2330<br>Typical battery life 5-7 years with power; 10,000 hours without power | | |
| **Power Modes** | | | |

To keep power consumption to a minimum, especially for remote sites, the FB1200 can run in two different power modes, low and standard. The FB1200 normally runs in low power mode for standard metering applications.

When running in low power mode, the radio power control function is used to switch to standard power mode and enable the serial ports. During communication periods, the unit uses the standard power mode and then automatically reverts to low power mode when the communication period is over.

**Notes:**

- Serial connection to a remote 4088B MVT can run in low power mode.
- If PID control, math/logic blocks, or Ethernet communications are enabled, or a serial port set to Modbus master, or the additional 6 channel I/O board is fitted and enabled, the unit will run in the standard power mode.

The local display and FBxWifi can be configured to switch off after a period of inactivity (configurable between 1 and 60 minutes) or be permanently left on.

When running in low power mode, if you need to use more than the default number of data points for logging, consult the *Emerson FB1200 Flow Computer Instruction Manual* (D301782X012) to determine the possible impact on power consumption.

The figures below are typical power values in mW measured at room temperature.

| | | | | | |
|---|---|---|---|---|---|
| Low Power Mode | **Base unit** with integral multivariable DP and pressure sensor and temperature measurement, single meter run | | | 47 mW @ 6.1Vdc | |
| | **Base unit** with integral Static Pressure sensor and temperature measurement and pulsed input, single meter run | | | 45 mW @ 6.1Vdc | |
| | **Base unit** with integral multivariable DP and pressure sensor and temperature measurement, communicating to remote 4088 - dual meter run (4088 externally powered) | | | 82 mW @ 6.1Vdc | |
| | **Additional Load Options** | Display and Backlight active | | 292 mW @ 6.1Vdc | |
| | | FBxWifi | | 315 mW @ 6.1Vdc | |
| | | FBxWifi and Display active | | 337 mW @ 6.1Vdc | |
| | | DO active (1 Hz, 50:50 duty cycle, no load) | | 1 mW @ 6.1Vdc | |
| Standard Power Mode | **Base unit** with integral multivariable DP and pressure sensor and temperature measurement, single meter run | | 230 mW @ 6Vdc | 245 mW @ 12Vdc | 287 mW @ 24Vdc |
| | **Base unit** with integral Static Pressure sensor and temperature measurement and pulsed input), single meter run | | 244 mW @ 6Vdc | 260 mW @ 12Vdc | 305 mW @ 24Vdc |
| | **Base unit** with integral multivariable DP and pressure sensor and temperature measurement, communicating to remote 4088 - dual meter run (4088 externally powered) | | 278 mW @ 6Vdc | 306 mW @ 12Vdc | 373 mW @ 24Vdc |
| | **Additional Load Options** | Display and Backlight active | 162 mW @ 6Vdc | 168 mW @ 12Vdc | 178 mW @ 24Vdc |

| | | | |
|---|---|---|---|
| FBxWifi | 189 mW @ 6Vdc | 185 mW @ 12Vdc | 200 mW @ 24Vdc |
| FBxWifi and Display active | 204 mW @ 6Vdc | 207 mW @ 12Vdc | 221 mW @ 24Vdc |
| DO active (1 Hz, 50:50 duty cycle, no load) | 1 mW @ 6Vdc | 1 mW @ 12Vdc | 1 mW @ 24Vdc |
| PI active (10KHz, 50:50 duty square wave) | 13 mW @ 6Vdc | 14 mW @ 12Vdc | 15 mW @ 24Vdc |
| Additional 6 channel I/O board fitted | 40 mW @ 6Vdc | 49 mW @ 12Vdc | 80 mW @ 24Vdc |
| Ethernet enabled 100 Mbit | 435 mW @ 6Vdc | 421 mW @ 12Vdc | 462 mW @ 24Vdc |
| Ethernet active 100 Mbit | 459 mW @ 6Vdc | 443 mW @ 12Vdc | 489 mW @ 24Vdc |

| **Physical** | | |
|---|---|---|
| Construction | Die-cast aluminum, painted, with wire sealable end caps, or<br>Stainless steel (AISI 316/ASTM CF8M), unpainted, with wire sealable end caps | |
| Ingress Protection | IEC 60529 IP66 & NEMA 4X | |
| Dimensions | With Sensor | 11.715 in. H by 6.0 in. W by 9.426 in. D<br>(297.7 mm H by 152.4 mm W by 239.4 mm D) |
| | Without Sensor | 5.995 in. H by 6.0 in. W by 9.426 in. D<br>(152.4 mm H by 152.4 mm W by 239.4 mm D) |
| Mounting | 2 in. pipe or direct manifold | |
| Wiring | Standard | Size 12 to 28 American Wire Gauge (AWG) (0.3 to 2mm diameter) |
| | Optional | For units with optional 6-channel expansion card, size 16 to 28 AWG (0.3 to 1.3 mm diameter) |
| Wiring Access | 4 conduit entry points<br>3/4 in. NPT (standard), M20 (optional) | |
| Weight | FB1200 aluminum housing with MVS coplanar flange sensor: 6.75 Kg (14.9 lb) | |
| | FB1200 aluminum housing with static pressure sensor: 5.98 Kg (13.2 lb) | |
| | FB1200 aluminum housing without sensor: 4.22 Kg (9.3 lb) | |
| | FB1200 stainless steel housing with MVS coplanar flange sensor: 13.27 Kg (29.5 lb) | |
| | Optional Lead Acid Battery: 0.86 Kg (1.9 lb) | |
| Display | Optional backlit liquid crystal display | |
| HMI | 20 characters per line; 4 lines in display. | |

| | | |
|---|---|---|
| **Environmental** | | |
| Operating Temperature | −40 °C to +80 °C (−40 °F to +176 °F) (see ambient temps in Approvals section)<br>**Note:** Check Approvals section for any restrictions. The display exhibits increased response time and decreased contrast at temperatures below −30 °C (−22 °F). | |
| Storage Temperature | −40 to 85 °C (−40 to 185 °F) | |
| Operating Humidity | 5 to 95%, non-condensing | |
| Conformal Coating | All boards are conformal coated with a coating that complies with ANSI/ISA 71.04 Class G3 environments. | |
| Environmental Rating | Product conforms to ANSI/ISA 71.04 Class G3 environmental standards with all conduit openings sealed. | |
| Electro Magnetic Compatibility | The following EMC Emissions and Immunity are evaluated per EMC directive 2014/30/EU. Harmonized standards used:<br>EN 61326-2-3-2013 Immunity<br>N 61326-1-2013 Emissions | |
| | Immunity | EN 61000-4-2 (Electro Static Discharge)<br>EN 61000-4-3 (Radiated Immunity) *<br>EN 61000-4-4 (Fast Transients)<br>EN 61000-4-5 (Surges)<br>EN 61000-4-6 (Conducted RF)<br>EN 61000-4-8 (Power Frequency Magnetic Field)<br>EN 61000-4-17 (Voltage Ripple)<br>EN 61000-4-29 (Voltage Dips and Interrupts)<br>*Meets CE compliance at 10V/m for industrial requirements (deviations < 1% span for RTD and Pressure readings in addition to original specification) |
| | Emissions | EN 550022 Class A |
| Vibration | 2g over 10 to 150 Hz<br>1g over 150 to 200 Hz | |
| **Approvals** | | |
| Product Markings for Hazardous Locations | UL | Class 1, Div 1 Groups C, D, Temperature Code, T6<br>Class1, Div 2 Groups A, B, C, D, Temperature Code T4 |
| | | Ambient Temperature: Aluminum enclosure<br>-40 °C to +80°C (-40 °F to +176 °F) (no battery)<br>-40 °C to +80°C (-40 °F to +176 °F) (with rechargeable lead acid battery) |
| | | Evaluated per Approval Standards:<br>Per Class 1, Div 1:<br>UL 1203 5th Ed.<br>UL/IEC 61010-1 Part 1 3rd Ed.<br>CSA C22.2 No. 30-M1986<br>CSA C22.2 No. 61010-1-12 Part 1 3rd Ed.<br>Per Class 1, Div 2:<br>ANSI/ISA 12.12.01-2015<br>CSA C22.2 No. 213-15<br>CSA C22.2 NO. 61010-1-12 Part 1 3rd Ed<br>UL61010-1 Part 1 3rd Ed |

| | | | |
|---|---|---|---|
| | UL | ATEX Cert: DEMKO 15 ATEX 1349X<br>IECEx Cert: IECEx UL 15.0024X<br>Ex db IIB T4 Gb, -40°C to +80°C<br>UL22UKEX2397X | |
| | | Ambient Temperature<br>  | –40°C to +80 °C (–40 to +176 °F) |
| | |  | EMC Directive 2016 |
| | | Evaluated per Approval Standards: | Directive 2014/34/EU<br>EN IEC 60079-0:2018<br>EN 60079-0:2017<br>EN 60079-1:2014 |
| | | ATEX Cert: DEMKO 15 ATEX 1367X<br>IECEx Cert: UL 15.0044X<br>Ex ec IIC T4 Gc<br>UL22UKEX2396X | |
| | | Ambient Temperature<br>  | –40 °C to +80 °C (–40 to +176 °F) |
| | | Evaluated per Approval Standards | Directive 2014/34/EU<br>IEC 60079-0:2017<br>IEC 60079-7:2017<br>EN IEC 60079-0:2018<br>EN IEC 60079-7:2015 + A1:2018 |
| | | **Note:** ATEX and IECEx approval requires the use of an external DC power supply. | |
| Product Markings for Metrology | Measurement (Industry) Canada | Approval No.: AG-0638<br>Device Type: Conversion Device - Flow Computer<br>Approval Type: Category 3, Type B<br>Approved For: Natural Gas Fiscal Measurement | |
| Miscellaneous Approvals | Customs Union |  <br>TR CU 004/2011, TR CU 020/2011<br>Conforms to the requirements of the technical regulations of the Customs Union | |
| | RoHS2 | **Device without integral MVS or SP Sensor**:<br>RoHS (2) EU Directive 2011/65/EU<br>**Device with integral MVS or SP Sensor**:<br>RoHS (2) EU Directive 2011/65/EU: This product may be considered out-of-scope when used for the intended design purpose in a Large Scale Fixed Installation (LSFI).<br>Consult *https://www.emerson.com/compliance* for up-to-date product information. | |
| | RoHS |  | |

| | |
|---|---|
| NIMTT | China National Institute of Measurement and Testing Technology<br>Test Report: 201801001329 |
| NEPSI China | National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation<br>Cert. No. GYJ18.1015X<br>Ex d IIB T4 Gb |
| | Cert. No. GYJ17.1350X<br>Ex Na IIC T4 Gc |
| CCOE India | Chief Controller of Explosives<br>~~Approval No. A/P/HQ/MH/104/5885 (P420948)~~<br>Approval No. A/P/HQ/MH/104/7674 (P568673)<br>Ex db IIB T4 Gb |
| | Approval No. A/P/HQ/MH/104/5887 (P420946)<br>Ex Na IIC T4 Gc |
| KOREA (KC) | EMC - Broadcasting and communication Equipment<br>Cert. No. C1E5-0B70-8AB8-9CBC |
| NMi | Report Numbers: NMi-1901499-02 & 1901499-01<br>API Chapter 21.1:2013 compliance for “Flow measurement using Electronics Metering Systems – Electronic Gas Measurement” and independent verification for natural gas properties and flow calculations<br>Report Number: NMi-3646138-04<br>API Chapter 21.2:2016<br>Compliance for “Flow measurement using Electronics Metering System– Electronic Liquid Volume Measurement” using positive displacement and turbine meters |

# Ordering information

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| **Flow Computer** | | | |
| 00 | FB1200 Flow Computer | | FB1200 |
| **Hazardous Area Approvals** | | | |
| 10 | Class 1 Div1 cULus | | A1 |
| | IECEx/UKCA Ex db Flameproof | | A2 |
| | ATEX/UKCA Ex db Flameproof | | A3 |
| | Class 1 Div2 cULus | | A4 |
| | IECEx/UKCA Ex ec | | A5 |
| | ATEX/UKCA Ex ec | | A6 |
| **Metrology Approvals** | | | |
| 20 | Not required | | B0 |
| | Measurement Canada<br>**Note**: Available **only** with the following sensor options:<br>• F0 (no sensor)<br>• F1: DP Range of 250" H2O (B222, B122) and 1000" H2O (B223, B123) along with the SP Range of 1500 psi (G7, A7) or 3600 psi (G4, A4)<br>• F2: With SP Range of 150 psi (G2, A2), 800 psi (G3, A3), 4000 psi (G4, A4) | A1, A4 | B1 |
| **Housing Options** | | | |
| 30 | Coated aluminum with sensor, ¾" NPT conduit<br>**Note**:<br>Available **only** with option F1 or F2 in Segment 60 | A1, A2, A3, A4, A5, A6 | C1 |
| | Coated aluminum with sensor, 20mm conduit<br>**Note**:<br>Available **only** with option F1 or F2 in Segment 60 | A1, A2, A3, A4, A5, A6 | C2 |
| | 316 stainless steel with sensor, ¾" NPT conduit<br>**Note**:<br>Available **only** with option F1 or F2 in Segment 60 | A1, A2, A3, A4, A5, A6 | C3 |
| | 316 stainless steel with sensor, 20mm conduit<br>**Note**:<br>Available **only** with option F1 or F2 in Segment 60 | A1, A2, A3, A4, A5, A6 | C4 |
| | Coated aluminum without sensor, ¾" NPT conduit<br>**Note**:<br>Available **only** with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | C5 |
| | Coated aluminum without sensor, 20mm conduit | A1, A2, A3, A4, A5, A6 | C6 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | **Note**:<br>Available **only** with option F0 in Segment 60 | | |
| | 316 stainless steel without sensor, ¾" NPT conduit<br>**Note**:<br>Available **only** with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | C7 |
| | 316 stainless steel without sensor, 20mm conduit<br>**Note**:<br>Available **only** with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | C8 |
| **Power Options** | | | |
| 40 | DC supply with internal 6V 4.5 Ah lead acid re-chargeable back-up battery and solar regulator (solar panel supply by others) | A1, A4 | D1 |
| | DC supply (no internal battery) | A1, A2, A3, A4, A5, A6 | D2 |
| | Remote-mount 6W solar panel, 10 feet cable, internal solar regulator, and internal battery (C1 D2)<br>**Note**:<br>The 6W solar panel has C1 D2 approval only, so if option D4 is ordered with C1 D1 approval, the solar panel must still be installed in a C1 D2 area. | A1, A4 | D4 |
| | Integral mount solar panel and internal battery (C1 D2)<br>**Note**:<br>Available **only** with Hazardous Approval option A4. | A4 | D5 |
| **Local Operator Interface Display** | | | |
| 50 | Not required | A1, A2, A3, A4, A5, A6 | E0 |
| | Display included | A1, A2, A3, A4, A5, A6 | E1 |
| **Measurement Type/Pressure Sensor** | | | |
| 60 | Not Required; external transmitters being used | A1, A2, A3, A4, A5, A6 | F0 |
| | Integral Multivariable; DP & Static P | A1, A2, A3, A4, A5, A6 | F1 |
| | Integral Static Pressure Only; Inline (no DP) | A1, A2, A3, A4, A5, A6 | F2 |
| **Multivariable Sensor (includes Differential P, Static P, and Material/Flange Type Selections)** | | | |
| 70 | Multivariable Sensor (includes Differential P, Static P, and Material/Flange Selections) | | |
| **Differential Pressure Range & Accuracy** | | | |
| 71 | 25 Inches H2O (62.3 mbar) DP, 0.1% Accuracy<br>**Note**:<br>25" DP option is only available with static pressure options G4 or A4 and the maximum pressure is limited to 2000 psi | A1, A2, A3, A4, A5, A6 | B221 |
| | 250 Inches H2O (623 mbar) DP, 0.1% Accuracy | A1, A2, A3, A4, A5, A6 | B222 |
| | 250 Inches H2O (623 mbar) DP, 0.075% Accuracy | A1, A2, A3, A4, A5, A6 | B122 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | 250 Inches H2O (623 mbar) DP, 0.05% Reading Accuracy, Enhanced for Flow | A1, A2, A3, A4, A5, A6 | B322 |
| | 250 Inches H2O (623 mbar) Extended Range DP, 0.075% Accuracy<br>**Note:**<br>250" Extended Range is only available with SP range G6, A6, G7, A7 and not available with SP range G4, A4. | A1, A2, A3, A4, A5, A6 | B12A |
| | 1000 Inches H2O (2.5 bar) DP, 0.1% Accuracy<br>**Note**:<br>1000" DP range is not available with 300 psi static pressure. | A1, A2, A3, A4, A5, A6 | B223 |
| | 1000 Inches H2O (2.5 bar) DP, 0.075% Accuracy<br>**Note**:<br>1000" DP range is not available with 300 psi static pressure. | A1, A2, A3, A4, A5, A6 | B123 |
| | 1000 Inches H2O (2.5 bar) DP, 0.05% Reading Accuracy, Enhanced for Flow | A1, A2, A3, A4, A5, A6 | B323 |
| | 2000 psi (137.9 bar) DP, 0.1% Accuracy<br>**Note**:<br>2000 psi DP range is only available with SP range G4 3626 psi and Hastelloy Diaphragm 3E13. Any other SP Range including A4 is not available. | A1, A2, A3, A4, A5, A6 | B225 |
| | No Differential Pressure required, static pressure only accuracy 0.1%<br>**Note**:<br>Only available with SP sensor F2 with "Inline" connection option 2K11. | A1, A2, A3, A4, A5, A6 | B2 |
| | No Differential Pressure required, static pressure only accuracy 0.075%<br>**Note**:<br>Only available with SP sensor F2 with "Inline" connection option 2K11. | A1, A2, A3, A4, A5, A6 | B1 |
| | No Differential Pressure required, no static pressure sensor required<br>**Note**:<br>Only available with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | NN |
| **Static Pressure Range (for use with multivariable sensor B22n or B12n above)** | | | |
| 72 | MV 300 psi gauge (20.7 barg)<br>**Notes**:<br>• Only available with option F0 in Segment 60.<br>• Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the | A1, A2, A3, A4, A5, A6 | G6 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types. | | |
| | MV 300 psi absolute (20.7 bara)<br>• Only available with option F0 in Segment 60<br>• Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types. | A1, A2, A3, A4, A5, A6 | A6 |
| | MV 1500 psi gauge (103.4 barg)<br>**Note:**<br>Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types. | A1, A2, A3, A4, A5, A6 | G7 |
| | MV 1500 psi absolute (103.4 bara)<br>**Note:**<br>Enhanced For Flow sensor with the SP ranges G6, A6, G7, A7 (300/1500 psi) is only available with the Stainless Steel option 2E12 or Traditional Flange option 2F12. It is not available in the Hastelloy option 3E13. SP Range G4, A4 (3600 psi) is available in all material and flange types. | A1, A2, A3, A4, A5, A6 | A7 |
| | MV 3600 psi gauge (250 barg)<br>**Note**:<br>When used with 25" DP option, maximum working pressure is 2000 psi/137.9 Bar | A1, A2, A3, A4, A5, A6 | G4 |
| | MV 3600 psi absolute (250 bara)<br>**Note**:<br>When used with 25" DP option, maximum working pressure is 2000 psi/137.9 Bar | A1, A2, A3, A4, A5, A6 | A4 |
| **Static Pressure Range (for use with Static P sensor only, B1 or B2 above)** | | | |
| 72 | SP 30 psi gauge (2.06 barg) | A1, A2, A3, A4, A5, A6 | G1 |
| | SP 30 psi absolute (2.06 bara) | A1, A2, A3, A4, A5, A6 | A1 |
| | SP 150 psi gauge (10.34 barg) | A1, A2, A3, A4, A5, A6 | G2 |
| | SP 150 psi absolute (10.34 bara) | A1, A2, A3, A4, A5, A6 | A2 |
| | SP 800 psi gauge (55.15 barg) | A1, A2, A3, A4, A5, A6 | G3 |
| | SP 800 psi absolute (55.15 bara) | A1, A2, A3, A4, A5, A6 | A3 |
| | SP 4000 psi gauge (275.79 barg) | A1, A2, A3, A4, A5, A6 | G4 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | SP 4000 psi absolute (275.79 bara) | A1, A2, A3, A4, A5, A6 | A4 |
| | No differential pressure or static pressure sensor required<br>**Note**:<br>Only available with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | NN |
| **Sensor Material and Flange Type** | | | |
| 73 | Stainless steel sensor and coplanar flange | A1, A2, A3, A4, A5, A6 | 2E12 |
| | Hastelloy® diaphragm and Hastelloy coplanar flange<br>**Note**:<br>Not available with 25" H2O DP range and 300/1500 psi range with 0.05% reading accuracy enhanced for flow options | A1, A2, A3, A4, A5, A6 | 3E13 |
| | Stainless steel sensor and traditional flange<br>**Note**:<br>Traditional Flange is not available with 0.1% Accuracy sensors | A1, A2, A3, A4, A5, A6 | 2F12 |
| | Stainless steel inline connection 1/2" 14 NPT female-for use with option B1 or B2 above | A1, A2, A3, A4, A5, A6 | 2K11 |
| | No differential pressure or static pressure sensor required<br>**Note**:<br>Only available with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | NN |
| **Sensor Material Certificates** | | | |
| 74 | Not required | A1, A2, A3, A4, A5, A6 | Q0 |
| | 3.1 B Traceability certs to EN 10205 | A1, A2, A3, A4, A5, A6 | Q8 |
| | NACE MRO 175/ISO 15156; requires Hastelloy diaphragm option<br>**Note**:<br>Available **only** with 3E13 | A1, A2, A3, A4, A5, A6 | Q15 |
| | NACE MRO 103; requires Hastelloy diaphragm option<br>**Note**:<br>Available **only** with 3E13 | A1, A2, A3, A4, A5, A6 | Q25 |
| **Base Inputs & Outputs** | | | |
| 80 | PRT/RTD input (2, 3, or 4-wire) and 2 AI/AO & 2 DI/DO/PI | A1, A2, A3, A4, A5, A6 | G2 |
| **Additional I/O** | | | |
| 90 | Not required | A1, A2, A3, A4, A5, A6 | H0 |
| | Addition of 6-channel I/O (2 AI/AO, 4 DI/DO/PI) | A1, A2, A3, A4, A5, A6 | H1 |
| **FBxWifi™** | | | |
| 100 | Not required | A1, A2, A3, A4, A5, A6 | J0 |
| | FBxWifi with internal antenna (mounted inside enclosure) | A1, A2, A3, A4, A5, A6 | J1 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | FBxWifi with local antenna mounted on conduit entry (C1 D2, IEC Ex N, & ATEX Ex N) | A4, A5, A6 | J2 |
| **Reserved** | | | |
| 110 | Not required | | K0 |
| **Reserved** | | | |
| 120 | Not required | | L0 |
| **Sensor Calibration Certificates** | | | |
| 130 | Not required | A1, A2, A3, A4, A5, A6 | M0 |
| | Pressure/MVS (DP &/or Static P) Sensor & PRT/RTD input calibration certificate | A1, A2, A3, A4, A5, A6 | M1 |
| | Pressure/MVS (DP &/or Static P) Sensor & PRT/RTD input Analog I/O calibration certificate | A1, A2, A3, A4, A5, A6 | M2 |
| | Analog I/O & PRT/RTD input calibration certificate<br>**Note**:<br>Only available with option F0 in Segment 60 | A1, A2, A3, A4, A5, A6 | M3 |
| **Reserved** | | | |
| 140 | Not required | | N0 |
| **Reserved** | | | |
| 150 | Not required | | P0 |
| **Mounting Bracket** | | | |
| 160 | Not required | | R0 |
| | 2" Pipe & panel mounting bracket & bolts (stainless steel) for Coplanar flange, options 2E12 & 3E13, or for use with No Sensor option F0 | A1, A2, A3, A4, A5, A6 | R1 |
| | 2" Pipe mounting bracket & bolts (stainless steel) for traditional flange, for use with option 2F12 | A1, A2, A3, A4, A5, A6 | R2 |
| | 2" Pipe mounting bracket & bolts (carbon steel) for traditional flange, for use with option 2F12 | A1, A2, A3, A4, A5, A6 | R3 |
| | 2" Pipe mounting bracket & bolts (stainless steel) for inline Static Pressure Option 2K11 | A1, A2, A3, A4, A5, A6 | R4 |
| **Meter Runs (Streams)** | | | |
| 170 | Single Stream | A1, A2, A3, A4, A5, A6 | S1 |
| | Dual Stream | A1, A2, A3, A4, A5, A6 | S2 |
| **Fluid Types & Calculations** | | | |
| 180 | Natural Gas | A1, A2, A3, A4, A5, A6 | T1 |
| | Natural Gas & Liquid Hydrocarbon<br>**Note**: | A1, A2, A3, A4, A5, A6 | T3 |

| Model/ Seg | Description | Approval | Selection |
|---|---|---|---|
| | Current implementation of Liquid calculation supports Crude Oil and Light Hydrocarbons (NGL/LPG) | | |
| **Control, Additional Programming, & Customization** | | | |
| 190 | Not required | A1, A2, A3, A4, A5, A6 | U0 |
| | PID Control and Simple Logic Blocks | A1, A2, A3, A4, A5, A6 | U1 |
| **Reserved** | | | |
| 200 | Not required | | V0 |
| **Ethernet Port** | | | |
| 210 | Not enabled | A1, A2, A3, A4, A5, A6 | W0 |
| | Enabled | A1, A2, A3, A4, A5, A6 | W1 |

# Sensor Summary for FB1000 and FB2000 Series Flow Computers

The following table identifies the available possible sensor combinations for the FB1000 and FB2000 Series Flow Computers.

| | | | Coplanar Flange | | Coplanar Flange | | Traditional Flange | |
|---|---|---|---|---|---|---|---|---|
| **DP** | | **SP** | **Stainless Steel** | | **Hastelloy** | | **Stainless Steel** | |
| **Range** | **Accuracy** | **Range** | Gauge | Absolute | Gauge | Absolute | Gauge | Absolute |
| **25”** | **0.1%** | **2000 psi** | Available | Available | N/A | N/A | N/A | N/A |
| **250”** | **0.1%** | **300 psi** | Available | Available | Available | Available | N/A | N/A |
| | | **1500 psi** | Available | Available | Available | Available | N/A | N/A |
| | | **3626 psi** | Available | Available | Available | Available | N/A | N/A |
| **250”** | **0.075%** | **300 psi** | Available | Available | Available | Available | Available | Available |
| | | **1500 psi** | Available | Available | Available | Available | Available | Available |
| | | **3626 psi** | Available | Available | Available | Available | Available | Available |
| **1000”** | **0.1%** | **1500 psi** | Available | Available | N/A | N/A | N/A | N/A |
| | | **3626 psi** | Available | Available | N/A | N/A | N/A | N/A |
| **1000”** | **0.075%** | **1500 psi** | Available | Available | Available | Available | Available | Available |
| | | **3626 psi** | Available | Available | Available | Available | Available | Available |

| | | Inline Stainless Steel | |
|---|---|---|---|
| **SP Range** | **Accuracy** | Gauge | Absolute |
| **30 psi** | **0.1%** | Available | Available |
| **150 psi** | | Available | Available |
| **800 psi** | | Available | Available |
| **4000 psi** | | Available | Available |
| **30 psi** | **0.075%** | Available | Available |
| **150 psi** | | Available | Available |
| **800 psi** | | Available | Available |
| **4000 psi** | | Available | Available |

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