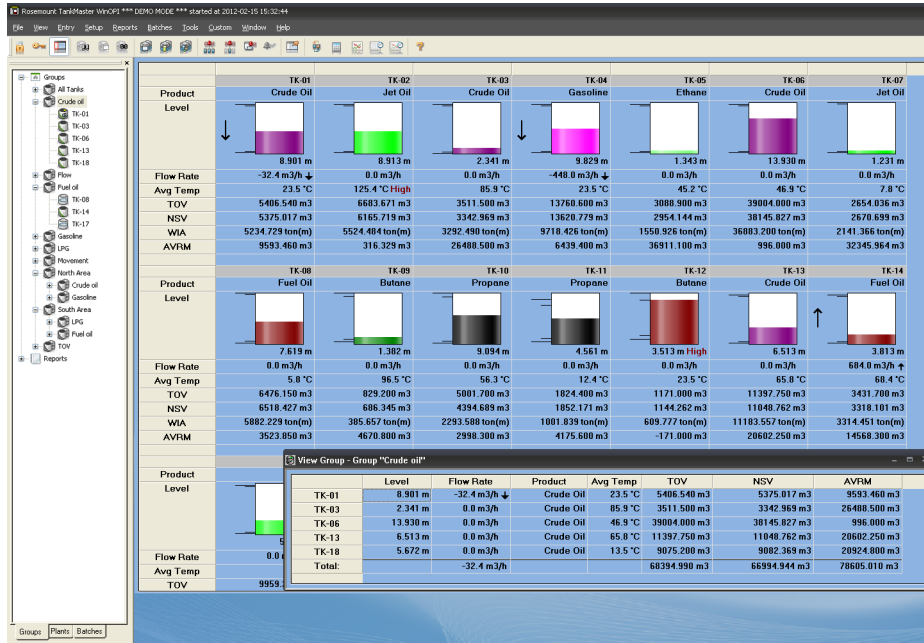


Rosemount™ TankMaster™ WinOpi Inventory Management Software

for tank gauging systems



TankMaster

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, ensure you thoroughly understand the contents before installing, using, or maintaining this product. For equipment service or support needs, contact your local Emerson representative.

Version

This manual is based on the functionality of TankMaster version 6.G1.

For older TankMaster versions all functionality described in this manual may not be available and the Graphical User Interface (GUI) may look different.

Safety messages

▲ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental in protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

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1 Introduction

Rosemount TankMaster WinOpi provides operator overview for Rosemount Tank Gauging systems.

TankMaster WinOpi is a complete custody transfer and inventory software package. All calculations are based on current API and ISO standards.

This reference manual covers the functionality of the TankMaster WinOpi software. Descriptions and examples are based on the WinOpi software user interface.

1.1 What is Rosemount TankMaster™?

The TankMaster software suite provides you with the tools that you need to configure and operate the Rosemount Tank Gauging system. The Rosemount Tank Gauging product portfolio includes a wide range of components for small and large customized tank gauging systems. The system includes various field devices, such as radar level gauges, temperature transmitters, and pressure transmitters for complete inventory control. For detailed descriptions of how to setup various devices refer to the respective reference manuals.

TankMaster is an Emerson inventory management software package for installation and configuration of level gauging equipment. It is a complete custody transfer and inventory software package that provides operator overview for Rosemount Tank Gauging systems. All calculations are based on current API and ISO standards.

TankMaster provides you with powerful and easy-to-use tools for installation and configuration of level gauging devices such as radar transmitter gauges (RTGs). The settings for protocols, devices and tanks can be changed in real time.

The graphical interface gives you a clear overview of installed devices and tanks. For each tank you can easily see the associated transmitters in the WinSetup application.

1.1.1 Key features

- Monitoring of measured data
- Clear overview of installed tanks and devices (using WinSetup)
- Simple installation using wizards (using WinSetup)
- Open connectivity
- Object-oriented, user-friendly Graphical User Interface (GUI)

TankMaster is designed to be used in a Microsoft® Windows environment, providing easy access to measurement data from any PC in your network. Measurements and data are presented in realtime and you can customize views to suit your needs.

Rosemount TankMaster lets you connect via the Ethernet TCP/IP interface. You may also use TRL2, RS232, or RS485 interfaces if needed. Other communication interfaces, such as Enraf BPM, are also supported. Rosemount TankMaster is based on the open OPC standard, allowing you to import data into other systems such as DCS:s, PLC:s, Scada systems and Microsoft Office programs.

1.1.2 Intended use of product

Rosemount TankMaster serves as a monitoring interface that provides the user with tank data such as level, temperature, pressure, volume etc. It is a custody transfer and inventory software package that supports calculations based on current API and ISO standards. See **End User License Agreement** for complete terms and conditions for using the Rosemount TankMaster software package

1.2 Manual overview

The Rosemount TankMaster WinOpi Reference Manual provides descriptions of the TankMaster WinOpi operator's interface and instructions for operating the Rosemount Tank Gauging system. The manual includes the following sections:

Chapter [Introduction](#) provides a short introduction to Rosemount TankMaster.

Chapter [The main window](#) provides an introduction to the basic features of the WinOpi operator's interface. It describes the workspace, menus, and various toolbars.

Chapter [Viewing tank data](#) provides a description of various functions for viewing tank data and inventory data.

Chapter [Installing a tank measurement system](#) provides a description of how to setup an inventory system in TankMaster WinOpi.

Chapter [Alarm handling](#) describes how to setup alarm limits, alarm groups, and how to view and accept current alarms.

Chapter [Reports](#) provides a description of how to create and distribute reports with inventory information.

Chapter [Audit log](#) provides a description of how to enable recording of operations and actions performed by a TankMaster user.

Chapter [Tank calculators](#) provides a description of how to use calculators for Density, Tank inventory, transfer, and settling.

Chapter [Customizing the layout](#) describes how to create customized menus, windows, and toolbars in TankMaster.

Chapter [Servo commands](#) describes how to send commands to servo gauges.

1.3 Technical documentation

The Rosemount Tank Gauging System includes a wide portfolio of user documentation. For a complete list, see product pages on [Emerson.com/Rosemount](https://www.emerson.com/Rosemount).

Reference manuals

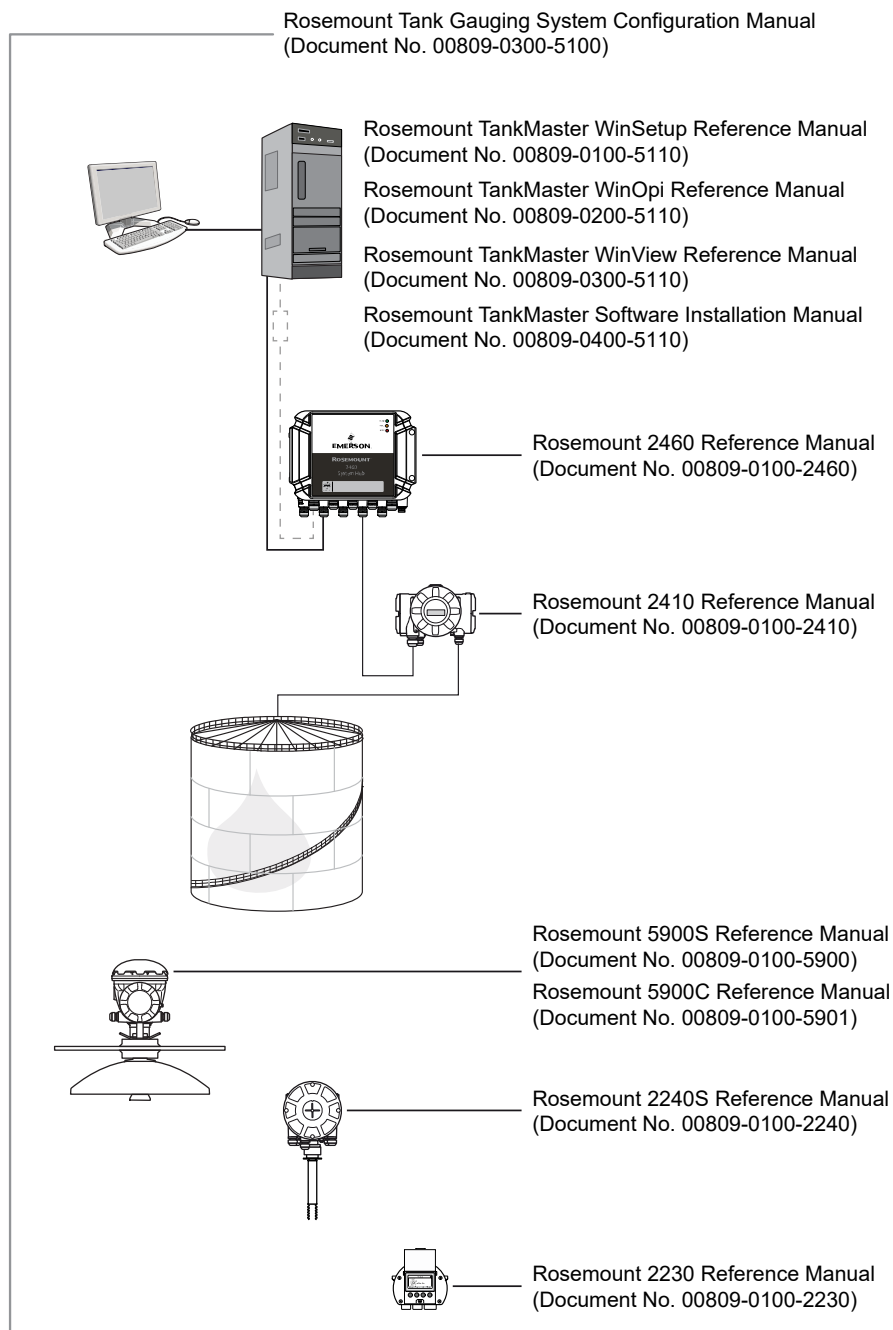
- Rosemount Tank Gauging System Configuration Manual (00809-0300-5100)
- Rosemount 2460 System Hub (00809-0100-2460)
- Rosemount 2410 Tank Hub (00809-0100-2410)
- Rosemount 5900S Radar Level Gauge (00809-0100-5900)
- Rosemount 5900C Radar Level Gauge (00809-0100-5901)
- Rosemount 2240S Multi-Input Temperature Transmitter (00809-0100-2240)
- Rosemount 2230 Graphical Field Display (00809-0100-2230)
- Rosemount 5300 Guided Wave Radar (00809-0100-4530)
- Rosemount 5408 Radar Level Transmitter (00809-0300-4408)
- Rosemount 3308 Series Wireless Guided Wave Radar (00809-0100-4308)
- Rosemount Tank Gauging Wireless System (00809-0100-5200)
- Rosemount TankMaster Software Installation Manual (00809-0400-5110)
- Rosemount TankMaster WinOpi (00809-0200-5110)
- Rosemount TankMaster WinSetup (00809-0100-5110)
- Rosemount TankMaster WinView (00809-0300-5110)
- Rosemount 5900 Proof Test with Reference Reflector (00809-0200-5900)
- Rosemount TankMaster Floating Roof Monitoring (00809-0500-5100)
- Rosemount TankMaster Full containment tanks (00809-0500-5110)
- Rosemount 5900 Radar Level Gauge and Rosemount 2410 Tank Hub Safety Manual Option S (00809-0400-5100)
- Rosemount 5900 Radar Level Gauge and Rosemount 2410 Tank Hub Safety Manual SIL3 (00809-0200-5100)
- Rosemount TankMaster Mobile User Guide (00809-0100-5120)
- Rosemount TankMaster Mobile Installation Manual (00809-0200-5120)

Product data sheets

- Rosemount Tank Gauging System ([00813-0100-5100](#))
- Rosemount TankMaster Inventory Management Software ([00813-0100-5110](#))
- Rosemount TankMaster Mobile Inventory Management Software ([00813-0100-5120](#))
- Rosemount 2460 System Hub ([00813-0100-2460](#))
- Rosemount 2410 Tank Hub ([00813-0100-2410](#))
- Rosemount 5900S Radar Level Gauge ([00813-0100-5900](#))
- Rosemount 5900C Radar Level Gauge ([00813-0100-5901](#))
- Rosemount 2240S Multi-input Temperature Transmitter ([00813-0100-2240](#))
- Rosemount 565/566/765/614 Temperature and Water Level Sensors ([00813-0100-5565](#))
- Rosemount 2230 Graphical Field Display ([00813-0100-2230](#))
- Rosemount 5300 Level Transmitter ([00813-0100-4530](#))
- Rosemount 5408 Level Transmitter ([00813-0100-4408](#))

1.3.1 System and user documentation structure

Figure 1-1: Rosemount Tank Gauging System and User Documentation Structure

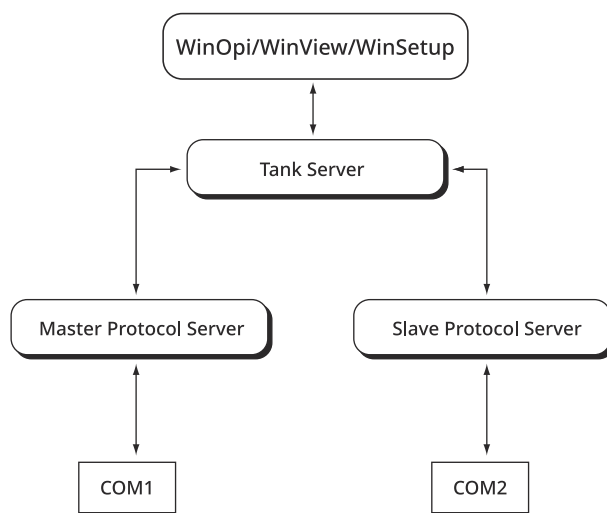


1.4 TankMaster software package

The TankMaster software package comprises the following software modules:

- WinOpi
- WinSetup
- WinView
- Batch server
- Tank server
- Master Protocol servers
- Slave Protocol servers

Figure 1-2: Software Modules



WinOpi

WinOpi is the operator interface to the tank gauging system. It communicates with the Tank Server and various protocol servers to let the user monitor measured tank data. WinOpi also provides:

- alarm handling
- automatic report distribution
- historical data sampling
- inventory calculations for volume, observed density and other parameters.

WinSetup

The WinSetup program is a graphical user interface (GUI) for installation, configuration and maintenance of level gauging devices.

WinView

WinView is a software package with basic inventory capabilities. It communicates with the Tank Server and the different protocol servers to let the user monitor measured tank data.

Tank server

The Tank Server communicates with devices via the Master Protocol Server and handles configuration data for all installed tanks and devices. Parameters stored by the Tank Server include:

- device names
- configuration data, such as antenna type
- number of connected temperature sensors
- number of connected analog inputs

The Tank Server collects data from connected devices and distributes this information to the WinOpi and WinSetup user interface.

Master protocol server

The **Master Protocol Server** transfers configuration data and measured data between the Tank Server and connected devices in the tank gauging system. The Master Protocol Server is able to communicate with various types of devices such as FCUs, the Rosemount 2410 Tank Hub, and the Rosemount 5900S Radar Level Gauge to collect measurements for, for example, level, temperature and pressure.

Slave protocol

The **Slave Protocol Server** is used to connect the TankMaster system to a host computer (DCS system). The Slave Protocol Server exchanges tank data between the Tank Server and the host computer.

OPC Server with browser

TankMaster uses **OPC Data Access 2.0** (OLE for Process Control), an open industry standard, which eliminates the need for costly customized software integration.

With the **OPC** server and the browser it is easy to import all custody transfer and inventory data to other OPC clients such as different DCS:s, PLC:s, Scada systems, or Microsoft® Office programs.

See the web site for the OPC Foundation for more information: www.opcfoundation.org.

Customized views

You can customize specific views and windows in TankMaster. Existing objects can be modified, or you can build new ones. You could, for example, create a window with an embedded image of your own plant, to give a realistic overview, and configure the window so that when you click on a specific tank in the image you can access the corresponding data for that tank.

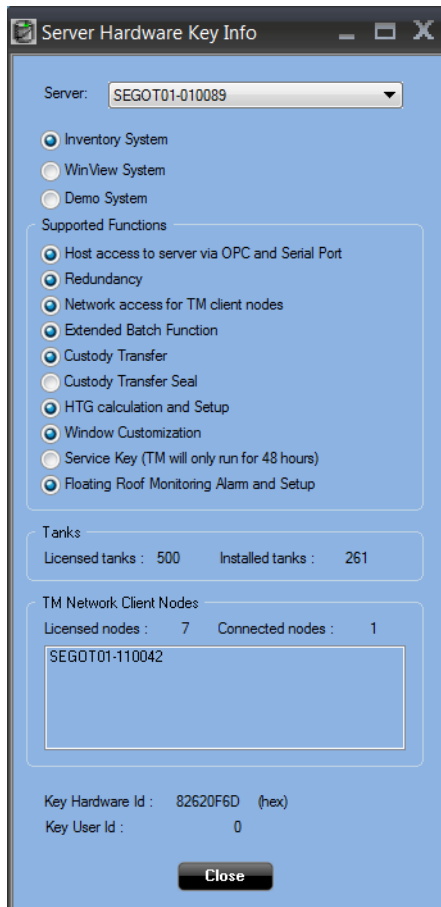
1.5 Server hardware key

The **Server Hardware Key Info** window displays the functions enabled by the TankMaster™ hardware key. The information displayed is only valid for the selected server and cannot

be altered. Also shown is the number of tanks that can be installed according to the TankMaster license, and the current number of installed tanks.

Procedure

1. Open menu option **Tools** → **View Server HW Key Info**.



2. Select the desired server to view hardware key information.
3. Click **Close** to close the **Server Hardware Key Info** window.

1.5.1 System type

System Type indicates which mode TankMaster™ is running.

Inventory system

TankMaster runs as a complete custody transfer and inventory software package. All calculations are based on current API and ISO standards.

WinView system

WinView basic inventory capabilities suitable for smaller plants and terminals.

Demo system

TankMaster is running with full functionality using simulated values.

1.5.2 Supported functions

The **Supported Functions** pane in the **Server Hardware Key Info** window shows available TankMaster™ options. Selected options indicate that the corresponding function is enabled with the current hardware key. The table below gives an overview of the available functions.

Table 1-1: Supported Functions

| Function | Explanation |
|--|--|
| Host Access to server via OPC and serial | Enables OPC and Modbus communications between TankMaster and SCADA/DCS |
| Redundancy | Enables the use of redundant servers |
| Network access for TM client nodes | Enables a TankMaster client to connect to the network and read tank and device data. |
| Extended Batch Function ⁽¹⁾ | Creates MS Access files. Stores closed batches for up to 365 days. Delivery tickets can be recalculated. Tank Transfer Calculator enabled. |
| Custody Transfer System | Setup mode for the Custody Transfer System. |
| Custody Transfer Seal | Write-protected mode. No possibility to change configuration. |
| HTG calculation and Setup | Hydrostatic Tank Gauging, Enables level and inventory data from pressure. |
| Window Customizing | Enables the creation of customized windows. |
| Service Key | Personal key for service engineers. |
| Floating Roof Monitoring | Enables TankMaster function for monitoring floating roof tilt and buoyancy. |

(1) For more information and instructions on Batch Handling, please refer to the TankMaster Batch Handling User Guide

1.5.3 Tanks

The Tanks pane shows the number of licensed tanks and the number of installed tanks.

If the number of installed tanks exceeds the number of licensed tanks, the inventory calculation option is disabled until a hardware key with a sufficient number of licensed tanks is installed, or until tanks are uninstalled and the number of installed tanks is equal to or less than the number of licensed tanks.

1.5.4 TankMaster Network client nodes

The TankMaster Network Client Nodes pane shows the number of licensed nodes and the number of connected nodes for the selected server. The number of connected nodes cannot exceed the number of licensed nodes.

If the number of connected nodes is the same as the number of licensed nodes, no more nodes will be able to connect unless currently connected nodes are first disconnected, or until a new license key with an increased number of licensed nodes is installed.

1.6 Illegal characters

The following characters should not be used when naming objects in TankMaster™ as this may cause undesirable results:

Table 1-2: Illegal Characters in TankMaster

| | |
|------------------------|-----------------------|
| \ Reverse solidus | % Percent symbol |
| / Solidus | < Less-than symbol |
| ? Question mark | > Greater-than symbol |
| * Asterisk | { Left curly bracket |
| [Left square bracket | } Right curly bracket |
|] Right square bracket | ' Apostrophe |
| Vertical line | " Quotation mark |

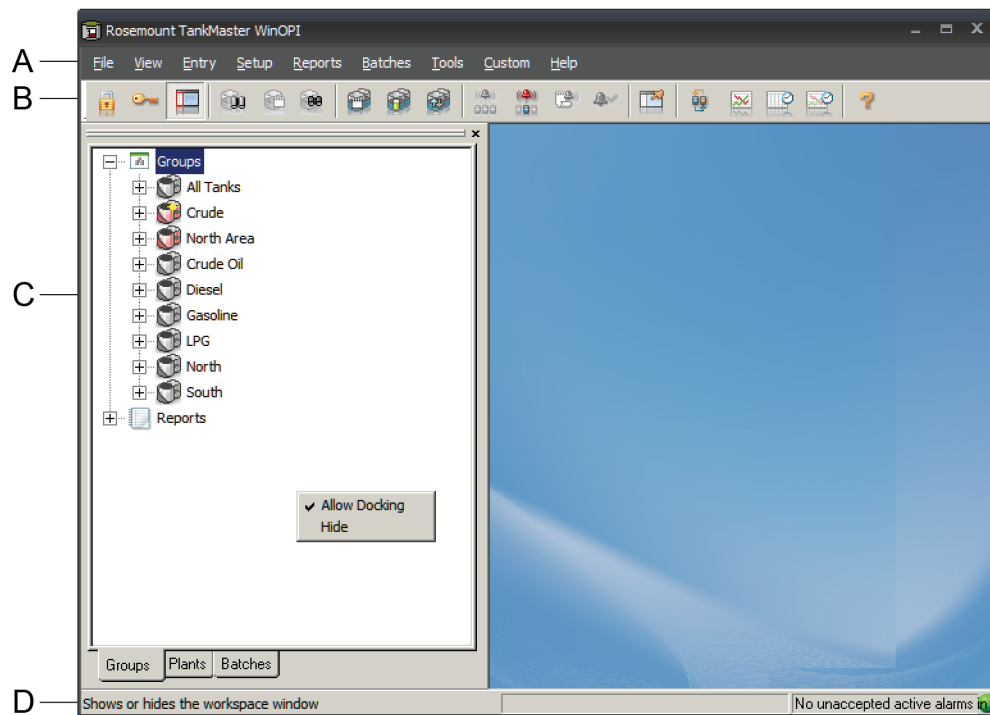
2 The main window

All tools and functionality can be accessed from the main menu bar at the top of the screen. The toolbar directly below the menu contains buttons with shortcuts to the most common operations.

The main window includes a Workspace which displays tanks, devices, alarm groups and reports. Right-clicking on objects in the workspace gives access to associated views, tools and functionality for that object.

A status bar at the bottom of the screen shows alarm and connectivity information.

Figure 2-1: WinOpi Workspace



- A. Menu bar
- B. Tool bar
- C. Workspace
- D. Status bar

The Workspace area can be docked on any side of the main window, or it can be moved anywhere in the Main window when it is floating.

Docking and floating is toggled by right-clicking in the Workspace area and selecting, or deselecting **Allow Docking**.

2.1 Menus

The menu bar at the top of the main window contains the following menus: **File**, **View**, **Entry**, **Setup**, **Reports**, **Batches**, **Tools**, **Custom**, and **Help**.

Figure 2-2: Menu Bar



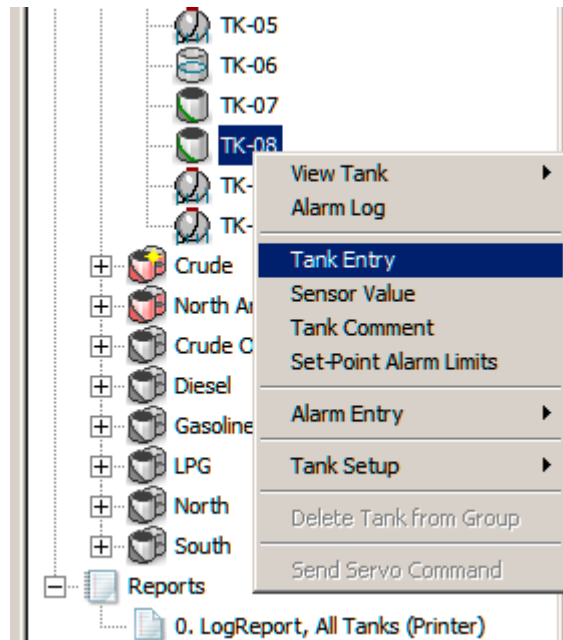
A. Menu bar

Some menu options are available by right-clicking on an object in the **Workspace** window. Available options varies depending on the type of object that is selected.

Example

The **Entry** → **Tank Entry** option in the menu bar can also be found by right-clicking on a tank icon.

Figure 2-3: Tank Entry



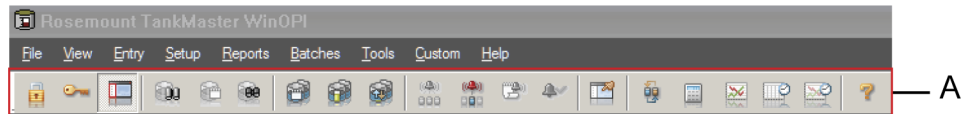
Note

For more information and instructions on the functionality in the **Batches** menu, please refer to the **TankMaster Batch Handling User Guide**.

2.2 Toolbar

The toolbar contains buttons which act as shortcuts to various tools and functionality. The toolbar can be toggled from the **View** menu.

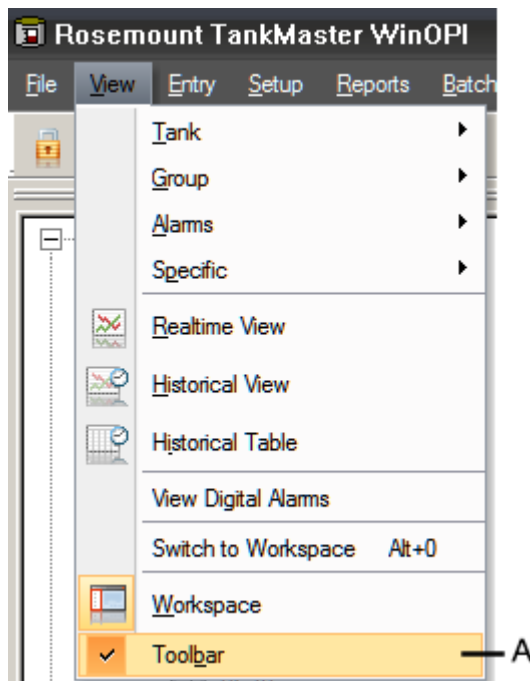
Figure 2-4: Toolbar



A. Toolbar

The toolbar can be toggled on or off from the **View** menu.

Figure 2-5: Toolbar Option in View Menu

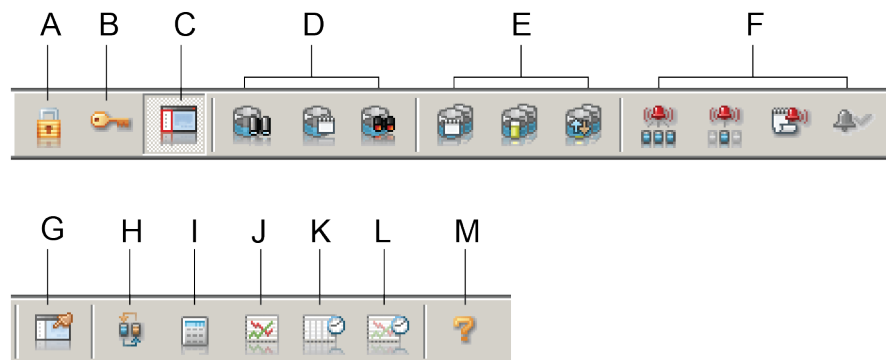


A. Toolbar option

Toolbar options

The following items are included in the standard toolbar:

Figure 2-6: Toolbar Options

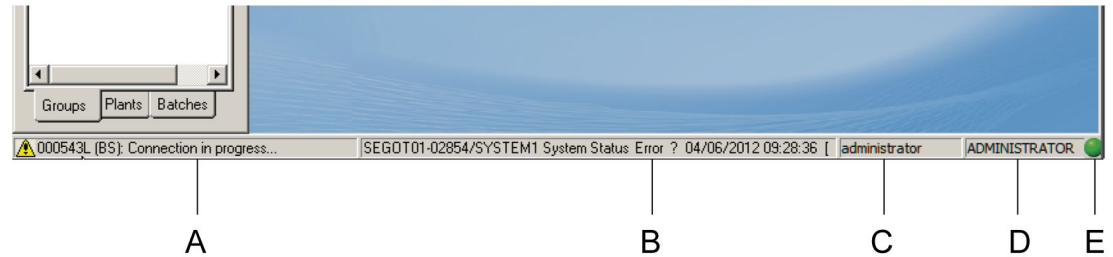


- A. Log off (View Only mode)
- B. Log on to TankMaster
- C. Toggles the Workspace window
- D. Opens the Tank View, Tank Inventory, and Extended View window for a selected tank
- E. Opens the Group View, Bar Graph Group, or Tank Movement window for a group of tanks
- F. Alarm Summary for a tank group, Alarm Summary for the current active alarm group, Alarm Log, and Accept alarm
- G. Program Options
- H. Create a new batch
- I. Density calculator
- J. Realtime View window
- K. Historical Table window
- L. Historical Data View window
- M. About WinOpi

2.3 Status bar

The status bar located at the bottom of the **TankMaster** main window displays information about connectivity, current alarms and the current protection level status (**View Only**, **Operator**, **Supervisor**, **Administrator**, and **ChiefAdmin**).

Figure 2-7: Status Bar

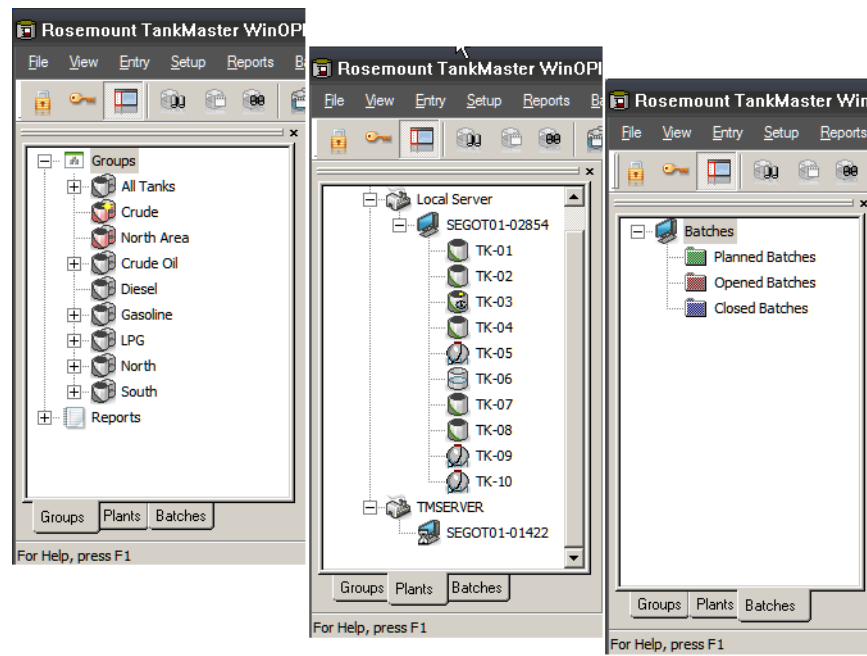


- A. Connection status
- B. Alarm status
- C. Current user
- D. Current protection level
- E. Operation status (green=normal operation)

2.4 Workspace views

The workspace offers an overview of all devices and tanks. To switch between the different views, click on a tab: Groups, Plants or Batches.

Figure 2-8: Workspace Views



The workspace lets you perform a variety of tasks from these different views, including:

- Viewing tank and inventory data.
- Viewing alarm logs and alarm summary.
- Organizing tanks in different groups.
- Monitoring alarms.
- Creating reports.
- Batch Handling

Note

For more information and instructions on working with batches, please refer to the TankMaster Batch Handling User Guide.

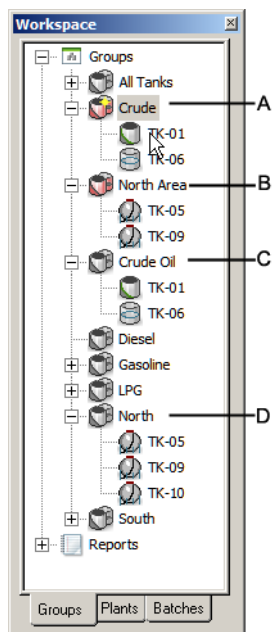
2.4.1 Viewing tanks and groups

The Workspace window shows all installed tanks and groups.

Tank Groups

Tank groups can be created to organize tanks by type, location, or by product. Tanks can also be organized in Alarm groups in order to manage alarms.

Figure 2-9: Tank Groups

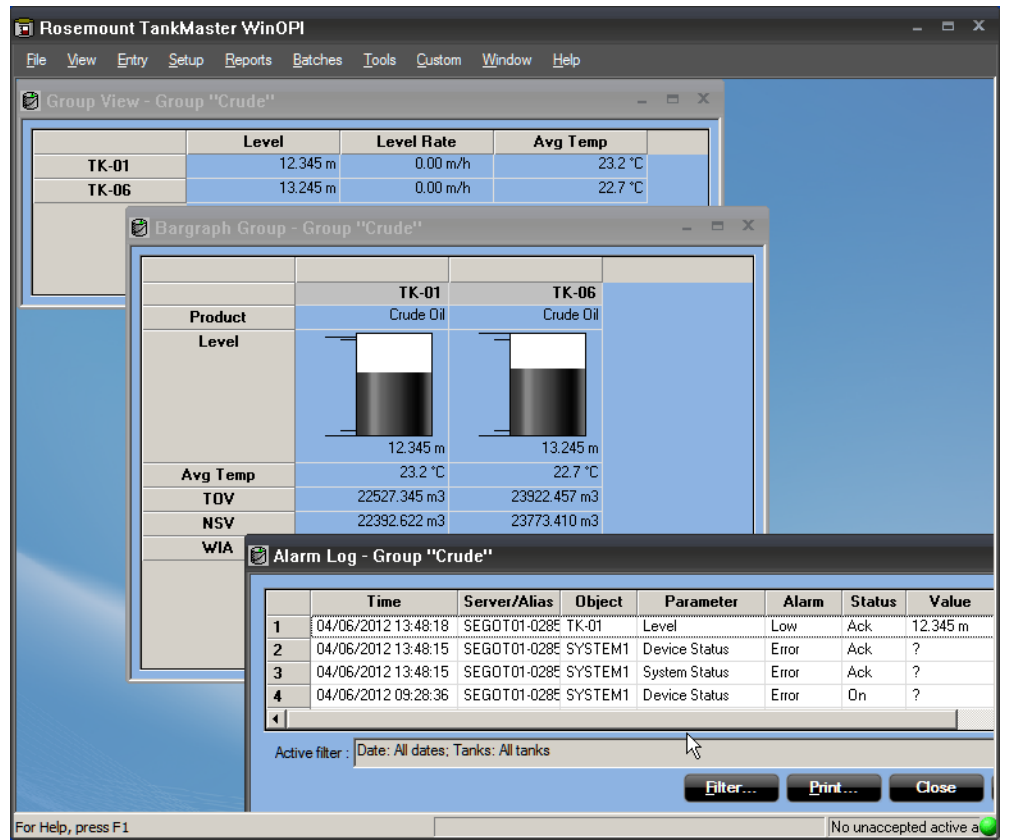


- A. Active alarm group "Crude"
 - B. Alarm group "North Area"
 - C. Tank group "Crude Oil"
 - D. Tank Group "North"
-

Data

Tank group data, such as level, temperature, inventory, and alarm logs can be monitored and displayed in the main window.

Figure 2-10: Viewing Tank Group Data



Related information

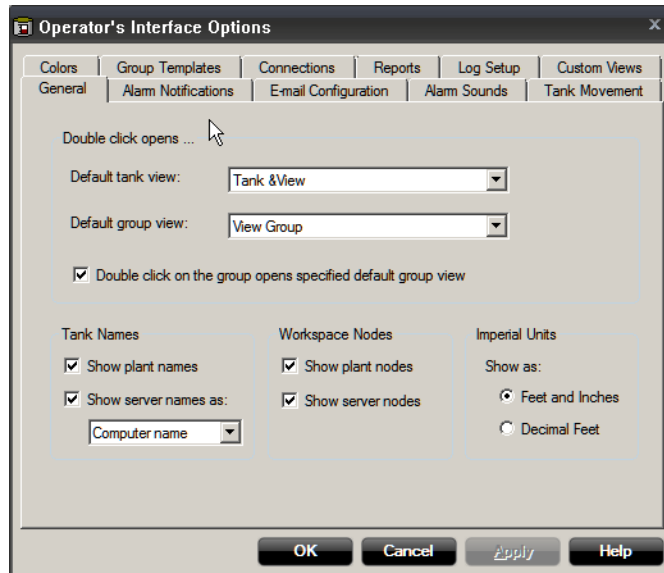
[Alarm groups](#)

2.4.2 Setting up the workspace

The WinOpi options allow you to specify how tank names, node names, and other objects will be displayed in the Workspace window.

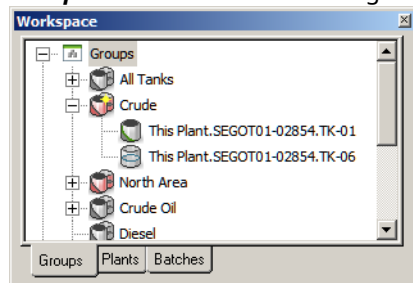
Procedure

1. From the **Tools** menu select **Options**.
2. Select the **General** tab.
3. Change the desired settings.



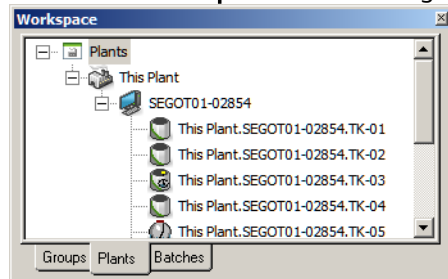
Example

Groups view **Tank Names** settings **Show plant names** and **Show server names**.



Example

Plants view **Workspace Nodes** settings **Show plant nodes** and **Show server nodes**.



4. Click **Apply** to save the changes.
5. Click **OK** to close the *Operator's Interface Options* window.

2.4.3 Create a tank group

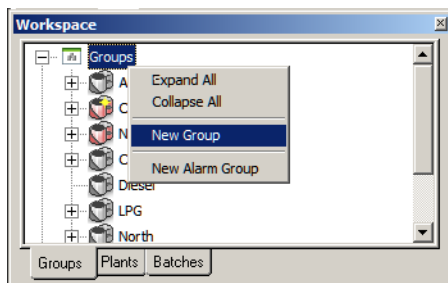
Tank groups can be a convenient way to get a better overview of, for example:

- tanks in a specific geographical area
- tanks containing a certain product
- tanks connected to the same host

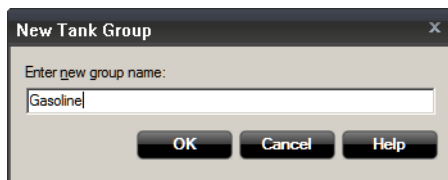
A tank may appear in more than one group and a group may contain other groups. There is no limit on the number of groups that can be created.

Procedure

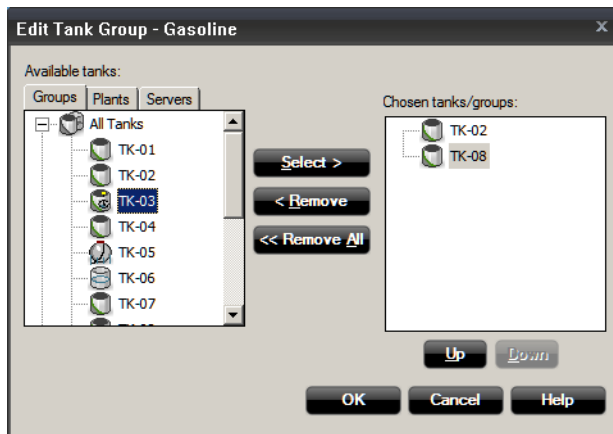
1. In the **Groups** view, do one of the following:
 - right-click on the Groups icon and select **New Group**
 - select menu option **Entry** → **New Group**



2. Type a name for the new tank group and click **OK**.

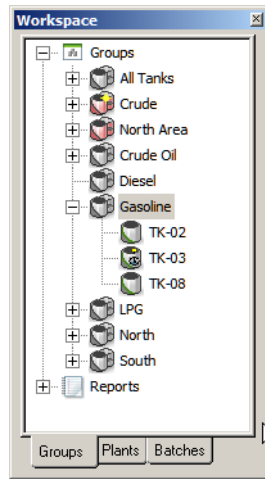


3. In the left-hand pane, select a tank or a group to add to the new group and click the **Select** button.



4. Repeat for all tanks to be added to this group.











5. Click **OK** when you have finished adding objects to the new group. The new tank group will be displayed in the Workspace window.



2.4.4 Icons

In the Workspace windows various items are represented by the following icons:

Table 2-1: Icons

| | |
|--|--|
|  Cylindrical tank |  Alarm group |
|  Floating roof tank |  Active Alarm group |
|  Spherical tank |  Plant node |
|  Horizontal tank |  Server node |
|  Tank group |  Report |

2.5 User management

TankMaster offers a number of protection levels for increased security. These levels are categorized as User Access Levels and User Access Sub Levels. The User Access Levels are:

- Administrator
- Supervisor
- Operator
- View Only
- ChiefAdmin

Each **User Access Level** has five sub levels, giving total of 20 unique access levels. The default user names and passwords for each user type are as follows:

Table 2-2: User Access Levels and Sub Levels

| User | Level | Sub Level | Default Password |
|---------------|---------------|-----------|------------------|
| View | VIEW ONLY | * | view |
| Operator | OPERATOR | * | oper |
| Supervisor | SUPERVISOR | * | super |
| Administrator | ADMINISTRATOR | * | admin |
| ChiefAdmin | ADMINISTRATOR | ***** | chief |

User authentication (log on) is required in order to change settings such as:


- Alarm limits
- System Setup
- Tank Setup

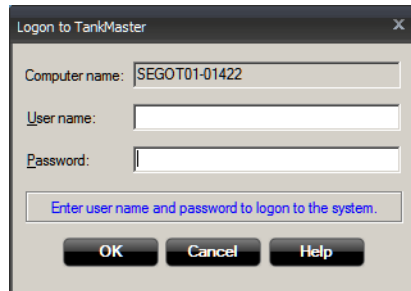
Note

Settings cannot be changed by a user in **View** mode.

2.5.1 Log on to TankMaster

Procedure

1. Select **File** → **Log On**, or click the **Log On** button  in the toolbar.
2. Type your **user name** and **password**. The password is case sensitive but the user name is not.



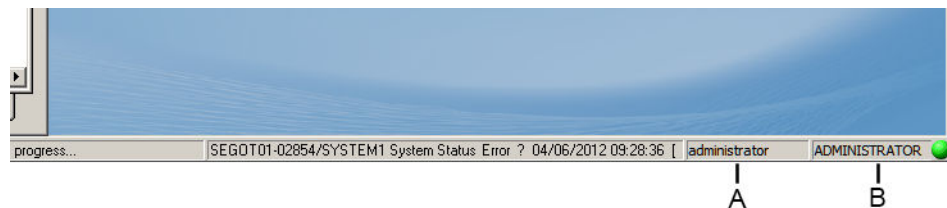
3. Click **OK**.

Note

If log on is unsuccessful after five consecutive attempts, the user account is disabled. The user account must be enabled by an Administrator.

The user type and the protection level is displayed in the status bar as well as any status messages in case there are any.

Figure 2-11: Status Bar



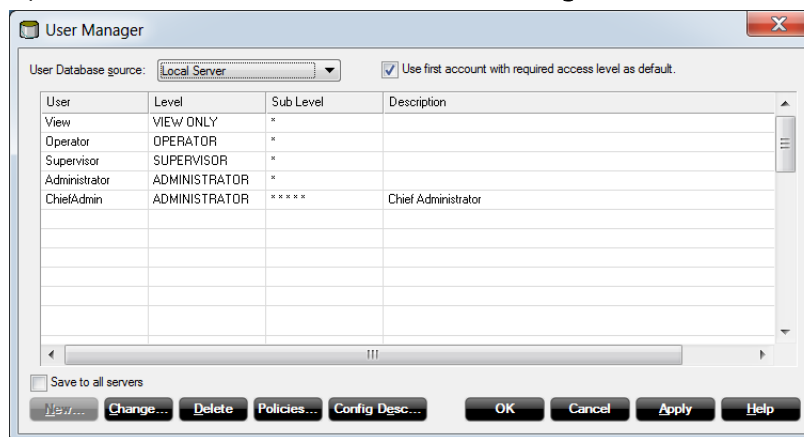
- A. User name
- B. Protection level

2.5.2 Manage user accounts

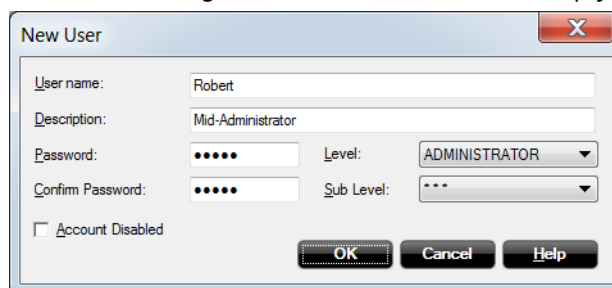
You must be logged on as Administrator in order to add new user accounts, change settings for an existing user, or to configure user levels and sub levels.

Procedure

1. Log on to TankMaster as an Administrator.
2. Open **Tools** → **Administrative Tools** → **User Manager**.



3. In the **User Manager** window select a cell in an empty row and click **New**.



4. Enter a **user name**.
5. A **description** of the new user profile is optional.
6. Enter and confirm a **password**.
7. Next, select the desired **Level** and **Sub Level** and click **OK**.
8. Verify that the new user is displayed in the **User Manager** window.
9. To make a default user name appear in the **Log On** dialog, check the box **Use first account with required access level as default**. If not selected, the **User Name** field is empty when the **Log On** dialog opens.
10. Click the **OK** button.

Related information

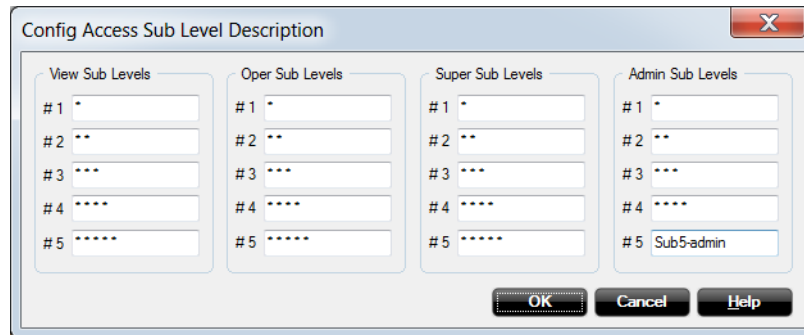
[User management](#)

2.5.3 Configure a sub level description

TankMaster allows you to change the names for Sub Levels to something more descriptive than the default settings.

Procedure

1. Open **Tools** → **Administrative Tools** → **User Manager**.
2. In the **User Manager** window, click the **Config Desc** button.



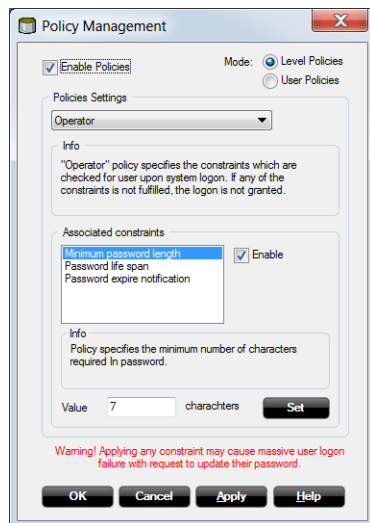
3. In the **Config Access Sub Levels Description** window enter a new description in the desired field. In the example above, the description of item number 5 of category Admin Sub Levels is changed from "*****" to "Sub5-admin".
4. Click **OK** to close the **Config Access Sub Level Description** window.

2.5.4 Policies

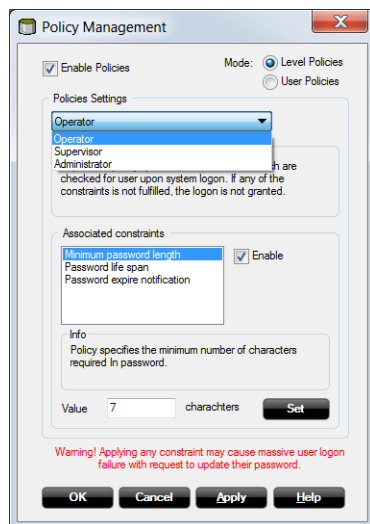
The **Policy Management** function lets you setup various constraints for access levels and user accounts.

Procedure

1. Open **Tools** → **Administrative Tools** → **User Manager**.
2. In the **User Manager** window, click the **Policies** button.



3. Select **Enable Policies** check box to activate the Policy Management function.
4. Select the desired mode to configure; **Level Policies** or **User Policies**.



5. In the **Policies Settings** drop-down list, select the desired access level or user account.
6. Select the desired **Associated constraints** item and select the **Enable** check box. Specify the constraint by entering a number in the **Value** input field.
7. Click the **Set** button.
8. Repeat for each constraint you would like to use.

9. Once finished, click the **Apply** button.
10. Click the **OK** button to close the **Policy Management** window.

Policies settings

You can specify policy password constraints for protection levels such as Operator, Supervisor, and Administrator by selecting mode **Level Policies**.

WinSetup also allows you to specify constraints for specific user accounts by selecting mode **User Policies**.

You may use a combination of **Level Policies** and **User Policies**. For example, you may set certain Level policy constraints for access level Operator, and then modify one or more constraints for a certain user account.

Policies mode

Select the desired **Mode** and configure the **Associated constraints**.

Level Policies lets you change constraints for user access levels such as Operator, Supervisor, and Administrator.

User Policies lets you change constraints for specific user accounts.

Associated constraints

The following password constraints can be set:

Table 2-3: Password Constraints

| Constraint | Description |
|-------------------------------|---|
| Minimum password length | Minimum characters required for the password |
| Password rotation period | The number of days that the password will be valid |
| Password expire notifications | Number of days before the password expires that a warning message will be shown |

2.5.5 Set required access levels

TankMaster WinOpi offers the possibility to set unique required access levels for the following actions:

- Group handling
- Alarm group handling
- Report handling
- Accepting alarms
- Exiting WinOpi
- Adding a program to the Tools menu
- Start program

For example, if you are logged on as an Operator (* * *), you are not allowed to exit WinOpi if the required exit level for this action is set to Operator (****) or higher.

To modify required access levels:

Procedure

1. Open **Tools** → **Administrative Tools** → **Set Required Access Levels**.

Note

You must be logged on as an Administrator (* * * * *) to be able to set the required access levels.

| Action | Access Level | Sub Level |
|----------------------|---------------|-----------|
| Group Handling | OPERATOR | * |
| Add Program | ADMINISTRATOR | * |
| Alarm Group Handling | SUPERVISOR | * |
| Start Program | SUPERVISOR | * |
| Report Handling | SUPERVISOR | * |
| Accepting Alarms | OPERATOR | * |
| Exit WinOPI | SUPERVISOR | * |

2. Set the required access level for each action and click **OK**.

Related information

[Manage user accounts](#)

[Add an item to the Tools menu](#)

2.5.6 Change protection levels for specific windows

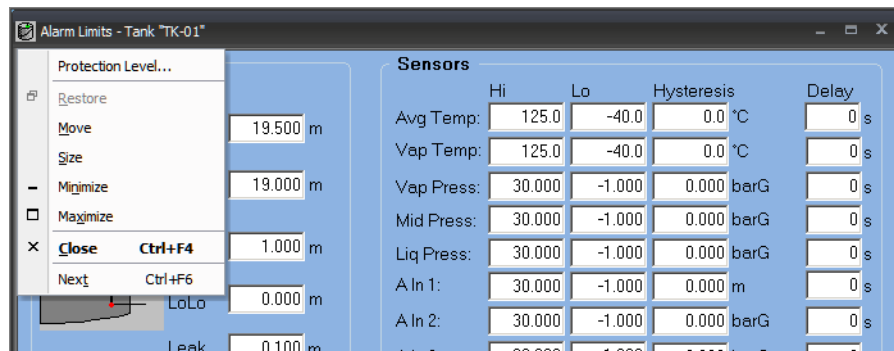
Prerequisites

To be able to change the **Protection Level**, the user must be logged on as an **Administrator (*****)**.

To set a Protection Level for a specific window, for example, Alarm Limits:

Procedure

1. Select menu option **Entry** → **Alarm Entry** → **Alarm Limits** to open the **Alarm Limits** window.
2. Click the window icon in the upper left corner of the **Alarm Limits** window.



3. Click on **Protection Level** in the menu.




4. Select the desired **Protection Level** and **Sub Level** from the menus.
5. Click **OK**.

Now the user must be logged in at the specified protection level, or a higher level, in order to make any changes to the **Alarm Limits** window.

2.5.7 Change password

Procedure

1. Go to **Tools** → **Administrative Tools** → **Set Password**.



2. Select the Tank Server which is valid for your user account.
If you are already logged on to TankMaster, the current server is already selected and your user name appears in the **User name** field.
3. If the workspace is in **View Only** mode, enter your **User name**.
4. Enter your old password and the new password.

Note

The password is case sensitive.

5. Confirm the new password and click **OK**.

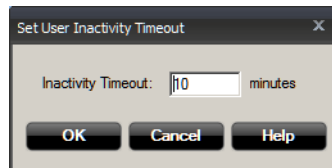
2.5.8 Change inactivity timeout

You can set a timeout after which the current user is automatically logged off after a period of inactivity.

The timeout period is reset each time the user performs an activity that requires an access level check, for example, setting a new alarm limit or logging on. You must be logged on as an **Administrator** in order to change the inactivity timeout.

Procedure

1. Go to **Tools** → **Administrative Tools** → **Set Inactivity Timeout**.



2. Enter the number of minutes to use for the inactivity timeout.
3. Click **OK**.

2.5.9 Program security options

TankMaster offers security options which can be used to restrict user privileges to run certain Windows programs or perform specific actions.

Table 2-4: TankMaster Operator's Interface

| Security option | Description |
|---|---|
| Run application maximized | The program will always run with the application window maximized. The minimize and restore buttons in the upper-right corner of the window are disabled. |
| Disable possibility to switch to other programs | Ignores keyboard commands such as Alt+Tab, Alt+Esc, Ctrl+Esc, etc. |

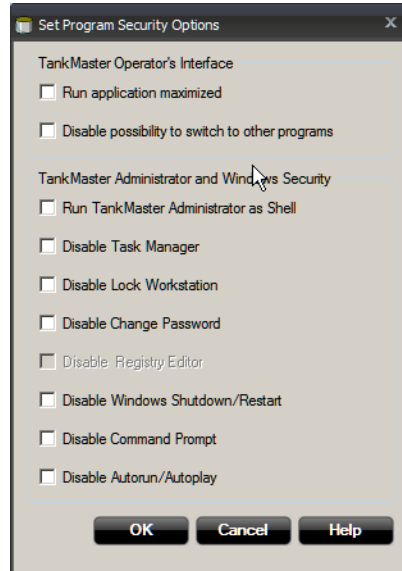
Table 2-5: TankMaster Administrator and Windows Security

| Security option | Description |
|---------------------------------------|---|
| Run TankMaster Administrator as Shell | Allows the TankMaster Administrator program to run as a Windows shell instead of the standard Windows Explorer shell. When this option is selected, all other security options in the TankMaster Administrator and Windows Security group are automatically set. You may need to restart your PC. |
| Disable Task Manager | Prevents the user from starting Task Manager (Taskmgr.exe). |
| Disable Lock Workstation | Prevents the user from locking the system (WIN+L). When Windows is locked, the desktop is hidden and the system cannot be used. Only the user who locked the system or the system administrator can unlock it. |
| Disable Change Password | Disables the Change Password button on the Windows Security dialog box (Ctrl+Alt+Del). |
| Disable Registry Editor | Disables the Windows registry editors, Regedt32.exe and Regedit.exe. If this option is selected and the user attempts to start a registry editor, a message appears explaining that a system policy prevents the action. |
| Disable Windows Shutdown/Restart | Prevents the user from shutting down or restarting Windows. This option removes the Shut Down option from the Start menu and disables the Shut Down button on the Windows Security dialog (Ctrl+Alt+Del). It does not prevent the user from running programs that may shut down Windows. |
| Disable Command Prompt | Prevents the user from running the interactive command prompt, Cmd.exe. This option also determines whether batch files (.cmd and .bat) can be run on the computer. |
| Disable Autorun/Autoplay | Disables the Autoplay feature on all drives. |

To set program security options

Procedure

1. Open **Tools** → **Administrative Tools** → **Security Options**.



2. Select the desired security options and click **OK** to apply.

3 Viewing tank data

3.1 Measured values

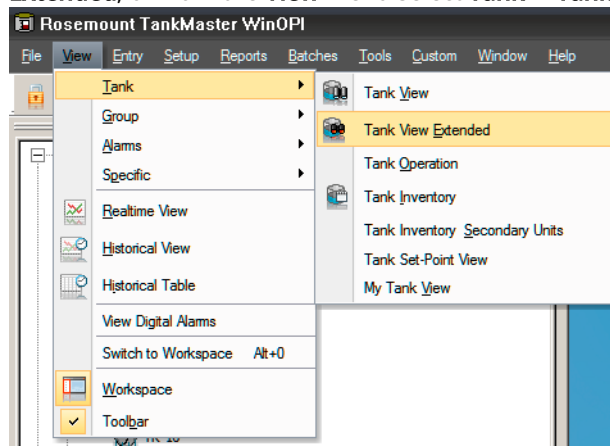
Rosemount TankMaster™ offers a number of options to view measured and calculated inventory data for individual tanks and tank groups. Windows can be created or modified with standard and manual parameters to show customized views.

3.1.1 Viewing single tank data

This is a description of how to view measurement data for a single tank.

Procedure

1. Select a tank in the **Workspace** window.
2. Right-click and select the desired view, for example **View Tank** → **Tank View Extended**, or from the **View** menu select **Tank** → **Tank View Extended**.

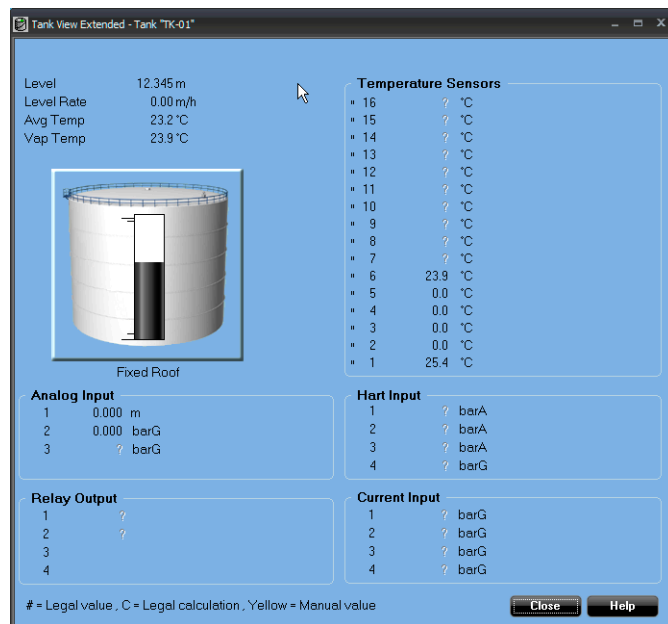


3. Optional: Select the **Tank View** option if you want to exclude information about Current Input and Relay Output data.

Example

The **Tank View Extended** window shows measurement data for a single tank. For each item the value, measurement unit, and status is displayed. For Analog inputs (AIIn), Current inputs (CIIn), Relay outputs, and Digital inputs a descriptor is shown which can be specified when the system is configured in the WinSetup program.

Figure 3-1: Tank View Extended



A **bar graph** shows the product level as well as the amount of free water at the bottom of the tank. Flow rates exceeding a certain threshold are indicated by an arrow on the left side of the bar graph.

Depending on the actual flow rate value one of two arrow types appears. The thresholds which control the arrow indication can be changed.

Temperature sensors immersed in a product are marked with a "*" symbol. The temperature sensors can be connected to a Rosemount 2240S Multi-input Temperature Transmitter or other supported devices.

Analog Input shows inputs to a Rosemount 2410 Tank Hub or a radar level gauge.

Current Input shows the current status of analog inputs to an Independent Data Acquisition Unit (IDAU).

Relay Outputs shows the current status of a relay - open or closed.

3.1.2 Viewing tank groups

Data for a group of tanks can be viewed in various windows. The windows can display values for Level, Level Status, Level Rate, Average Temperature and other parameters for all tanks in a group.

Procedure

1. Select a tank group in the **Workspace** window.
2. Do one of the following:
 - Right-click and select **View Group**
 - Open menu option **View → Group**
3. Select the desired **View Group** option:
 - **View Group**
 - **Bar graph Group**
 - **Tank Movement**

Example

A tank which is currently being filled or emptied is indicated with arrows as illustrated in [Figure 3-2](#). There are two different arrow sizes. By setting appropriate thresholds, the arrows can be used to indicate level rates within different ranges according to a predefined threshold.

Figure 3-2: Group View

| | Level | Level Rate | Avg Temp |
|-------|---------|-------------|----------|
| TK-02 | 6.351 m | 0.89 m/h ↑ | 23.5 °C |
| TK-03 | 8.298 m | 0.00 m/h | 22.9 °C |
| TK-08 | 3.652 m | -0.52 m/h ↓ | 22.8 °C |

To specify level rate thresholds, open **Tools → Options** and select the **Tank Movement** tab. Tank movements can be highlighted with different colors for flow rates and level rates.

Related information

- [Tank movement](#)
- [Editing group view templates](#)
- [Modifying group views](#)

3.1.3 Viewing bar graph groups

Data for a tank group can be presented in bar graph format.

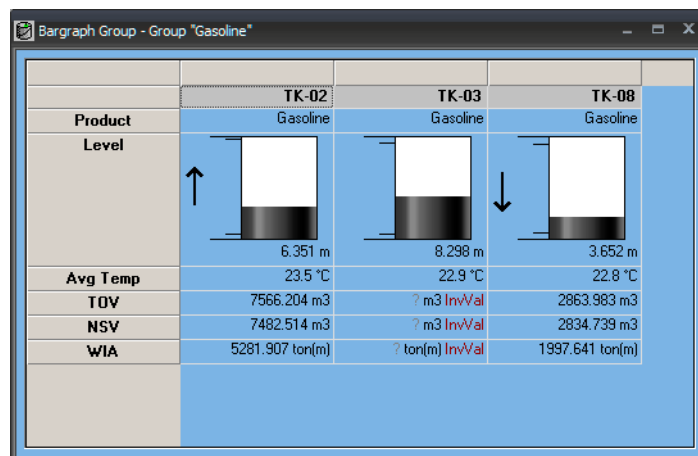
Procedure

1. Select a tank group in the **Workspace** window.
2. Do one of the following:
 - Right-click and select **View Group**
 - Open menu option **View** → **Group**
3. Select **Bar Graph Group**.

Example

In the **Bar Graph Group** window each tank in a group is represented by a bar graph showing **Product Level** and **Free Water Level** for each tank. It also indicates level changes by showing an arrow next to the bar graph.

Figure 3-3: Bar Graph Group



The **Bar Graph Group** window can be modified in the same way as the **Group View** window.

Related information

- [Tank movement](#)
- [Editing group view templates](#)
- [Modifying group views](#)

3.1.4 Editing group view templates

To change the appearance and contents of group views, do one of the following:

- open menu option **Tools** → **Options** and select the **Group Templates** tab,
- from an open group view window, select **Edit Group Template** from the shortcut menu to access editing options.

Tank comment

A comment can be added to a tank and made visible for group views.

Sorting

Contents in a group view can be sorted by clicking a column title cell.

Related information

[Modifying group views](#)

[Shortcut menu](#)

[Tank comment](#)

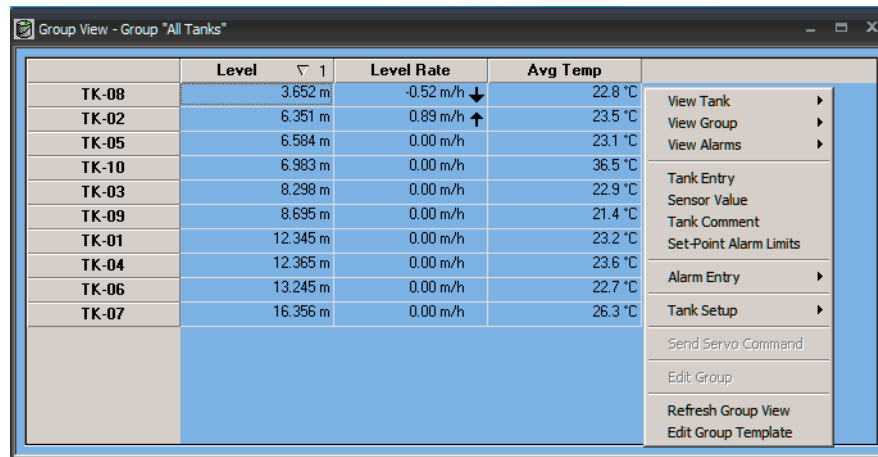
[Sorting content in a product table](#)

3.1.5 Shortcut menu

For quick access to other groups and tank views in any group view window, right-click on a tank for a shortcut menu.

The shortcut menu gives you quick access to other windows. For example, the **Observed Inventory** window may be opened by selecting **View Group** → **Observed Inventory**.

Figure 3-4: Shortcut Menu in Group View Window



Related information

[Modifying group views](#)

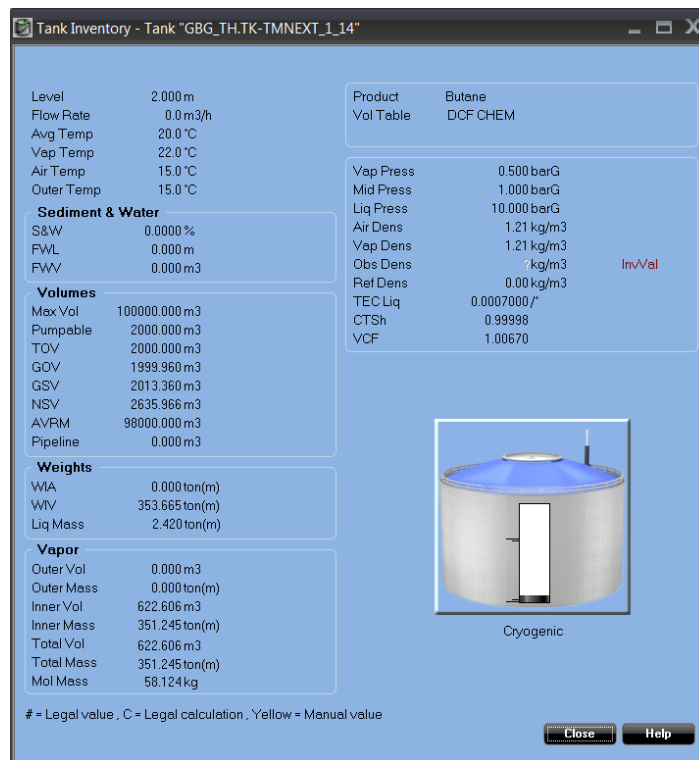
3.2 Inventory data

Product and inventory data for a tank can be conveniently viewed in one window.

3.2.1 Tank inventory

Procedure

1. In the **Workspace** window, select the desired tank.
2. Do one of the following:
 - right-click and select **View Tank** → **Tank Inventory**
 - in **View** menu, select **Tank** → **Tank Inventory**.



3. Optional: In case you wish to view a window with **secondary units**, open **View** → **Tank** → **Tank Inventory Secondary Units**.
Secondary units can be displayed for Volume, Weight, and Density.

Related information

[Inventory parameters](#)

[Tank comment](#)

[System setup](#)

Floating roof tanks

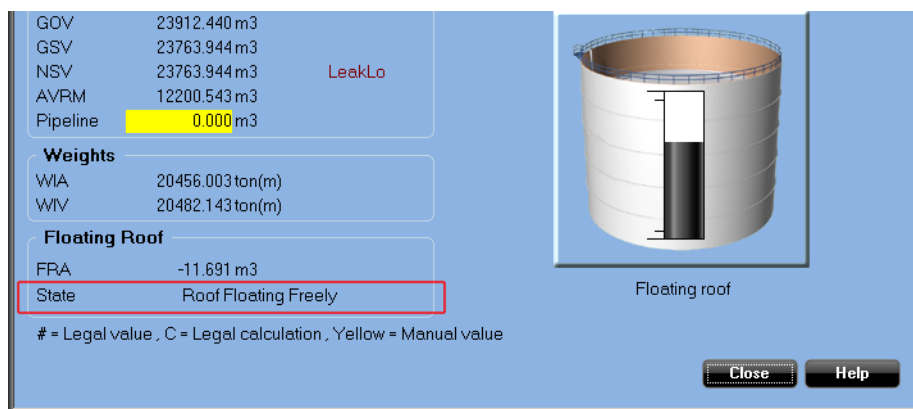
For floating roof tanks, the roof can be floating on the actual product in the tank, or standing on its own supports. The supports can either be in operational or maintenance position.

For each position there are three possible states:

1. The tank roof rests on its supports and receives no buoyancy from the liquid. This is indicated with the following symbol: (*).
2. The tank roof receives support partly from the product and partly from its own supports. This is indicated with the following symbol: (@).
3. The tank roof is floating freely on the product. No indicator is shown.

Example floating roof state

Figure 3-5: Roof Floating Freely



Related information

[Floating roof correction setup](#)

3.2.2 Observed inventory

The **Observed Inventory** window shows observed inventory values for a tank group.

For each tank in the group the following default parameters are shown:

- Product
- Free Water Volume (FWV)
- Total Observed Volume (TOV)
- Gross Observed Volume (GOV)
- Available Room (AVRM)

To view observed inventory data for a group of tanks:

Procedure

1. In the **Workspace** window, select the desired tank group.
2. Do one of the following:
 - right-click and select **View Group** → **Observed Inventory**
 - in **View** menu, select **Group** → **Observed Inventory**.

| | Product | FWL | TOV | GOV | AVRM |
|---------------|-----------|---------|--------------|--------------|--------------|
| TK-01 | Crude Oil | 0.000 m | 22527.345 m3 | 22528.922 m3 | 13596.907 m3 |
| TK-06 | Crude Oil | 0.000 m | 23922.457 m3 | 23912.440 m3 | 12200.543 m3 |
| Total: | | | 46449.802 m3 | 46441.362 m3 | 25797.450 m3 |

- The Total field shows the sum values for FWV, TOV, GOV, and AVRM.
- Measurement units are shown for each parameter.
- If a group consists of tanks using different units of volume, then the measurement unit of the first tank in the group is displayed. A unit conversion is performed to provide the correct total value when the volumes are added together.

Related information

[Installing a tank measurement system](#)

3.2.3 Net inventory

The **Net Inventory** window shows standard net inventory values for a tank group.

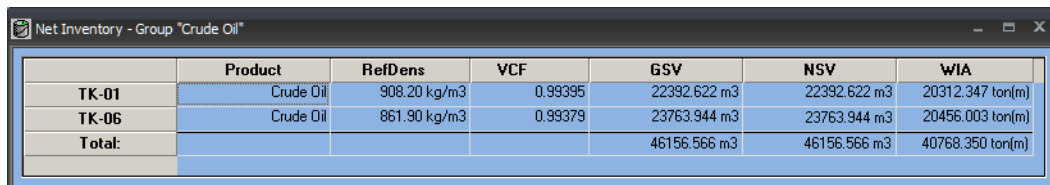
For each tank in the group the following default parameters are shown:

- Product
- Reference Density
- Volume Correction Factor
- Gross Standard Volume
- Net Standard Volume
- Weight In Air

To view net inventory data for a group of tanks:

Procedure

1. In the **Workspace** window, select the desired tank group.
2. Do one of the following:
 - right-click and select **View Group** → **Net Inventory**
 - in **View** menu, select **Group** → **Net Inventory**.



The screenshot shows a window titled "Net Inventory - Group 'Crude Oil'". It contains a table with the following data:

| | Product | RefDens | VCF | GSV | NSV | WIA |
|--------|-----------|--------------|---------|--------------|--------------|------------------|
| TK-01 | Crude Oil | 908.20 kg/m3 | 0.99395 | 22392.622 m3 | 22392.622 m3 | 20312.347 ton(m) |
| TK-06 | Crude Oil | 861.90 kg/m3 | 0.99379 | 23763.944 m3 | 23763.944 m3 | 20456.003 ton(m) |
| Total: | | | | 46156.566 m3 | 46156.566 m3 | 40768.350 ton(m) |

- The Total field shows the sum values for GSV, NSV, and WIA.
- Measurement units are shown for each parameter.

Related information

[Installing a tank measurement system](#)

3.3 Real time view

The **Real Time View** window lets you view tank parameter values for up to 4 tanks simultaneously within a specific time interval.

Procedure

1. In the **View** menu, select **Real time view**.

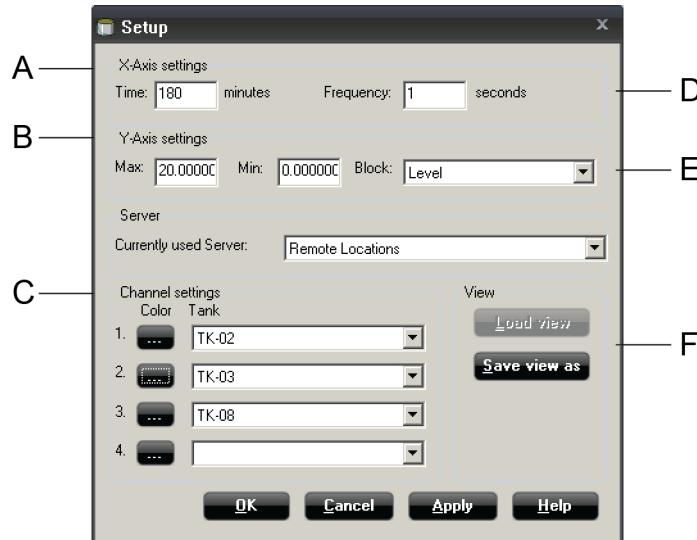


2. Click the **Setup** button to specify tanks, parameters, and scaling.
3. Use the Scroll bar on the left-hand side to find the desired view.
4. Use the Zoom handle to find the desired zoom level.

3.3.1 Setup

Use the **Setup** dialog to specify tanks and tank parameters to be displayed, and X-axis and Y-axis scaling in the **Real Time View** window.

Figure 3-6: Real Time View Setup



- A. X-axis settings
- B. Y-axis settings
- C. Channel settings
- D. Sample Frequency
- E. Block
- F. Load / Save view

X-axis settings

- Enter a value for the period that data is to be shown for
- Enter a value for the update frequency. This parameter specifies the number of seconds between each sample

Y-axis settings

- Enter appropriate values in the **Max** and **Min** fields.
- The scroll bar and the zoom slider can be used to zoom in for more details
- From the **Block** drop-menu choose which parameter to be monitored in realtime

Server

- Select the server which handles the tank data to be monitored
- You can see which tanks are connected to different servers in the workspace **Plants View**

Channel settings

- Select a tank to be monitored
- Choose a color to be used for that tank in the resulting graph

View

- Click the **Save View As** button to store the current settings
- All settings are stored except the X-Axis settings/Time value
- Click the **Load View** button to use previously saved settings

3.3.2 Save to file

The current real time view data can be saved as a file in plain text format.

Procedure

1. Open the **Real Time View** window.
2. Make sure the **Open** check box is not checked.
3. Click the **Save to File** button.

The file is stored in folder **...Rosemount\Tankmaster\Opi\Data** folder.

The file name has the following syntax:

Viewname-yyyy-mm-dd hh.mm.ss.txt

- *Viewname* is specified by the user
- *yyyy*=year
- *dd*=day
- *hh*=hour
- *mm*=minute
- *ss*=second

3.3.3 Open a real time view file

To view the contents of the current session's log file:

Procedure

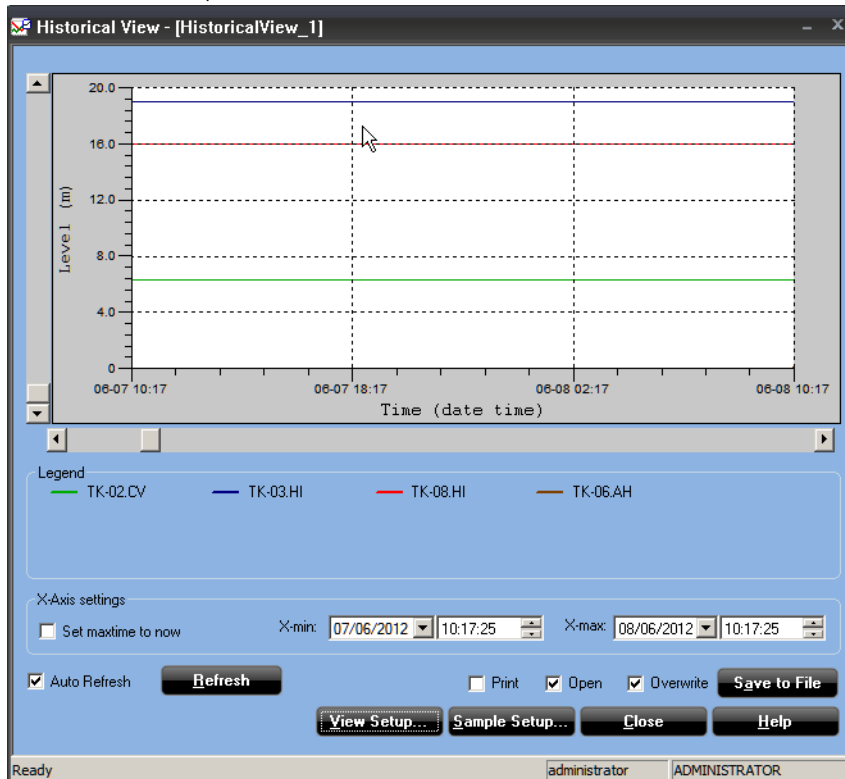
1. Select the **Open** check box.
2. Select the **Save to File** button.

3.4 Historical view

The **Historical View** shows a graph with historical tank data for a specified period.

Procedure

1. In the **View** menu, select **Historical View**.



2. Perform the desired configuration of X-axis settings and parameters to sample and view.

3.4.1 X-axis settings

Specify **X-min** and **X-max**. These values define the period to be viewed in the graph and do not affect the actual sampling.

For example, if the Level value has been sampled for the previous two days, you can view the Level data for the last hour by setting **X-min** equal to one hour ago and **X-max** equal to the current time.

To automatically set the X-max to the current time, click the **Set maxtime to now** check box. X-max is updated each time you click the **Refresh** button.

3.4.2 Refresh

Click the **Refresh** button to update the display with the latest sampled data.

Select the **Auto Refresh** check box in case you would like to automatically refresh the display every minute.

3.4.3 Save to file

Sampled data can be saved to a text file. The file contains time and measured data. Only tanks displayed in the **Historical View** window are saved and data for each tank is stored in a separate log file.

The file is stored in the following folder: ...**Rosemount\TankMaster\Opi\Data**.

Overwrite

If the **Overwrite** check box is selected, the previous file is replaced by a new one each time the **Save to File** button is pressed.

If the **Overwrite** check box is not selected, then a new file with sampled data is created each time the **Save to File** is pressed.

3.4.4 Open file

Sampled data which is stored in a file can be opened for viewing.

Procedure

1. Select the **Open** check box.
2. Select the **Save to File** button.

3.4.5 Print

Sampled data which is stored in a file can be printed.

Procedure

1. Select the **Print** check box.
2. Select the **Save to File** button.

The file is printed using the default printer for the workstation.

3.4.6 Sample setup

This window lets you specify parameters for sampling. Multiple parameters may be used for each tank, and a unique set of parameters may be specified for each tank.

The **Sample Setup** window is used to specify which parameters are sampled for the various tanks. Only parameters specified in the **Sample Setup** window can be displayed in the **Historical View** window.

Figure 3-7: Historical View Sample Setup

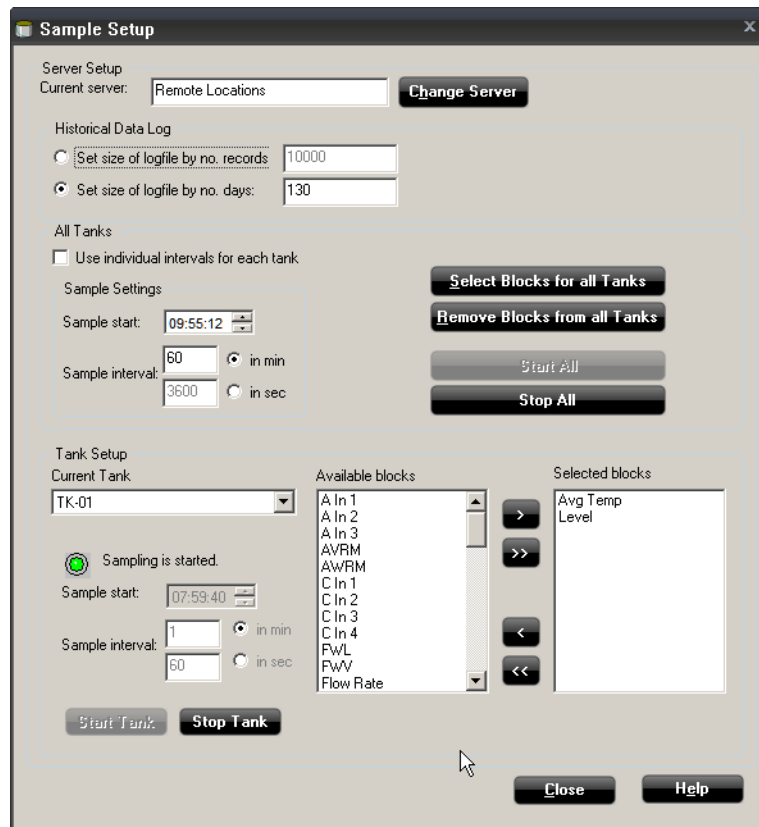


Table 3-1: Sample Setup Items

| Item | Description |
|----------------------------|--|
| Current Server | Choose a TankMaster server. Refer to the Plants view in the Workspace to see connections to servers. |
| Historical Data Log | To reduce the amount of data in the Historical Data log, specify either a maximum number of files to be stored, or a maximum number of days to be logged. If Set size of logfile by no. days is selected, the minimum sample interval is 60 seconds. |

Table 3-1: Sample Setup Items (continued)

| Item | Description |
|-------------------|--|
| All Tanks | <p>The settings outlined below apply to all tanks.</p> <ul style="list-style-type: none"> • Sample settings Sample start: Sampling can be postponed for up to 24 hours. If sampling is postponed, it still needs to be activated by pressing the Start All button Sample Interval: Choose the sampling rate. If data log option Set size of log file by no. days is selected, the minimum sample interval is 60 seconds. • Select Blocks for all Tanks button Adds selected parameters (blocks) to all tanks. Only selected parameters will be sampled, monitored and displayed. • Remove Blocks from all Tanks button Removes selected blocks from all tanks. These parameters will no longer be sampled. • Start All button Start sampling for all tanks. • Stop All button Stop sampling for all tanks. • Use individual intervals for each tank Click this check box to set individual start times and intervals for sampling of each tank. |
| Tank Setup | <p>The settings outlined below apply to individual tanks.</p> <ul style="list-style-type: none"> • Current Tank Select a tank to configure for historical data sampling. • Sample settings Sample start: Sampling can be postponed for up to 24 hours. Sample Interval: Choose the sampling rate. • Available/Selected Blocks button. Displays which parameters (blocks) can be sampled. A unique set of parameters can be sampled for each tank. • Start Tank button Starts the sampling for the selected tank. If sampling is postponed, it still needs to be activated by pressing the Start Tank button. • Stop Tank button Stops sampling of the selected tank. |

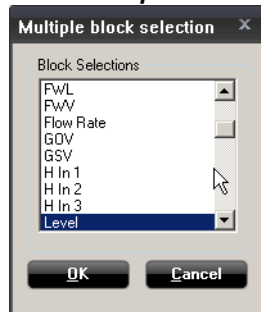
Select parameters for all tanks

The **Sample Setup** window allows you select parameters (blocks) which can be sampled for all tanks. This a convenient way to add similar parameters to all tanks simultaneously instead of repeating the operation for each tank individually.

Procedure

1. Click the **Select Blocks for all Tanks** button.

2. In the **Multiple block selection** window, select the appropriate blocks.



Multiple blocks can be selected and deselected. Scroll to view all available blocks.

3. Click **OK**.
Selected blocks can be viewed in the **Selected blocks** pane.

Remove blocks from all tanks

Procedure

1. Click the **Remove Blocks from all Tanks** button.
2. In the **Multiple block selection** window, select the parameters to be removed from the list.
3. Click **OK**.

Deselected blocks are no longer visible in the **Selected blocks** pane.

Select parameters for the current tank

Procedure

1. In the **Available Blocks** pane, select the parameters to be included in the sampling for the selected tank. Multiple blocks can be selected.
2. Click the **Add** > button to add the selected parameters, or click the **Add All** >> button to add all parameters. The blocks appear in the **Selected blocks** pane.
3. Repeat this procedure for all parameters to be sampled for the tank.
4. Click **Close**.

Start and stop data sampling

To start or stop data sampling for all tanks, click the **Start All** button, or the **Stop All** button, respectively.

To start or stop data sampling for the current tank, click the **Start Tank** button, or the **Stop Tank** button, respectively.

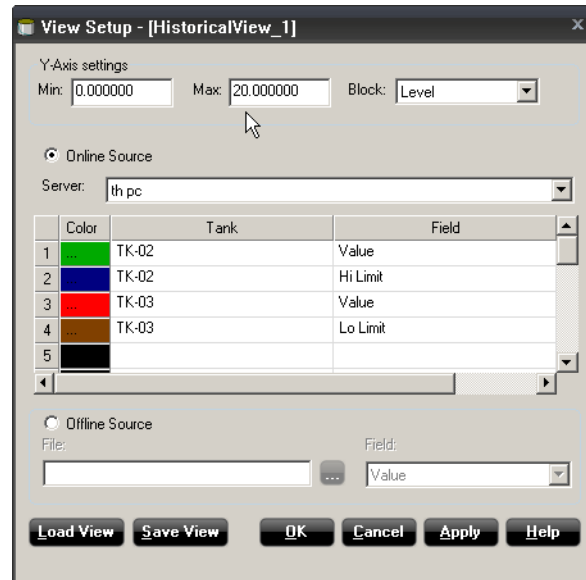
Note

If sampling is postponed, it must be activated by pressing the **Start All**, or **Start Tank** button. It will not start automatically at the given **Sample Start** time.

3.4.7 View setup

This window lets you specify how tank parameters are displayed in the **Historical View** window.

Figure 3-8: View Setup



Y-axis settings

The Y-axis scaling must be wide enough to allow entire span of measured data to be included in the display. The slider in the **Historical View** window allows you to scroll when the graph is zoomed in.

Block

Choose the parameter to be displayed in the **Historical View** window.

Note

Only parameters already included in the **Selected Blocks** pane in the **Sample Setup** window can be selected.

Online and offline source

Online source

Select the server for the tanks which are to be monitored. See the **Plants** view in the Workspace for server details.

Offline source

Select an Offline source to view a previously saved data file in the **Historical View** window. Historical View data files are stored by default in the folder: ...Rosemount\TankMaster\Opi\Data, with the file extension *.dbf.

Graph settings

The **Historical View** window can be configured to show a single parameter for many tanks, or to show various items for one tank.

- Choose a tank that is to be monitored and select a corresponding color that will be displayed in the graph.
- Choose the type of field that will be displayed in the **Historical View** window, such as the Current Value or an alarm limit (Hi Limit, Lo Limit).
- It is possible to show both a level value and a corresponding alarm limit as two separate graphs in the **Historical View** window.

Procedure

1. Select a tank from the **Tank** column.
2. Select the desired **Color**.
3. Select the desired display option, for example **Value** or **Hi Limit** (alarm) from the **Field** column.
4. Repeat for the next rows until the desired tanks and parameters are configured for display in the **Historical View** window.
5. Click **OK** to display the current tanks and parameters in the **Historical View** window.

Note

Sampling must be activated for the selected tank in the **Sample Setup** window in order to display results in the **Historical View** window.

Load and save views

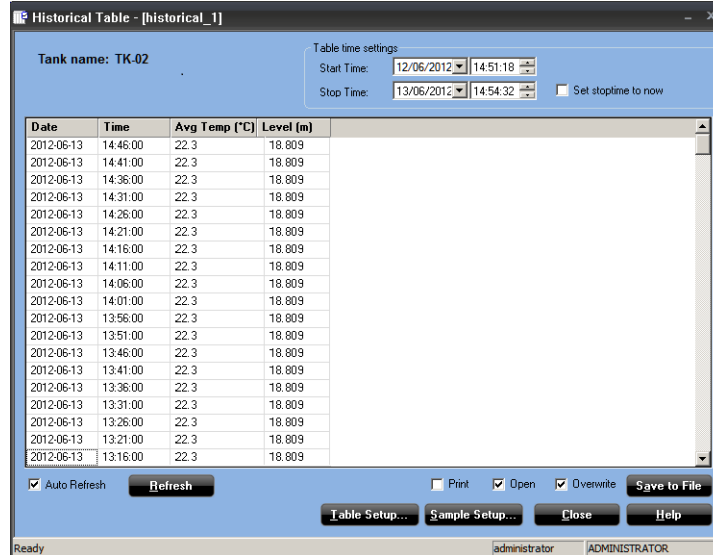
The **Save View** button allows you to store the current settings. These settings can be restored by pressing the **Load View** button.

3.5 Historical table view

The **Historical Table** window lets you sample and view historical tank data in table format.

Procedure

1. In the **View** menu, select **Historical Table**.



2. Perform the desired configuration for time settings and parameters to sample and view.

Related information

[Table setup](#)
[Sample setup](#)

3.5.1 Start stop time

Table time settings indicate the start and stop times for the period that is displayed in the Historical Table. These settings do not affect the actual sampling.

The **Set Stop time to now** check box allows you to set stop time to the current time. The stop time will be updated to the current time each time the **Refresh** button is selected.

3.5.2 Refresh

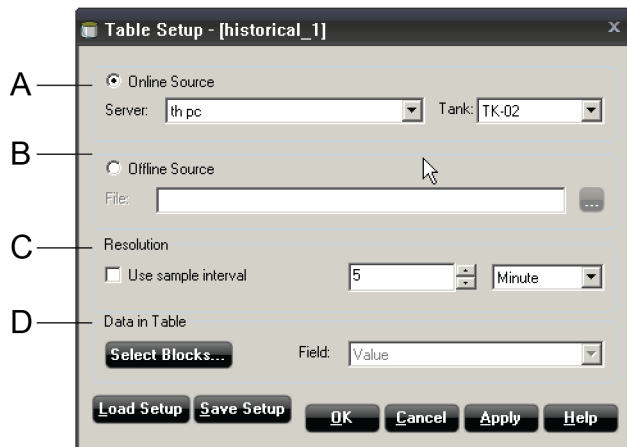
Click the **Refresh** button to update the display with the latest sampled data.

Select the **Auto Refresh** check box in case you would like to automatically refresh the display every minute.

3.5.3 Table setup

In the **Historical Table** window, click the **Table Setup** button to configure tank parameters and tanks to be displayed.

Figure 3-9: Historical Table Setup



- A. Online source
- B. Offline source
- C. Resolution
- D. Data in Table

Online and Offline source

Online

Select the server and tank to be monitored in the **Historical Table** window.

Offline

The Offline Source is a previously saved Historical Table data file, stored in the folder: ...\\Rosemount\\Tankmaster\\Opi\\Data with file extension *.dbf.

Resolution

Set the time interval between data sampling points. Enter a number and select a unit.

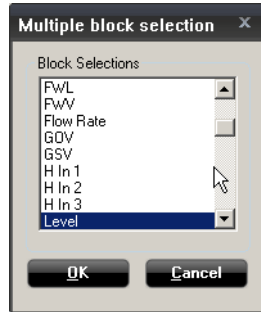
Select the **Use Sample Interval** check box in case you would like to use the sample interval defined in the **Sample Setup** window.

Data block selection

Select the parameters to be displayed in the *Historical Table* window.

Procedure

1. Click the **Select Blocks** button.



2. Select the desired parameters in the *Multiple block selection* window.
3. Scroll up or down to see all blocks.
4. Click **OK**.

Note

For data to show up in the *Historical Table* window, the *Sample Setup* window must be properly setup. This means that items must be included in the list of sampled parameters in the *Selected Blocks* pane in the *Sample Setup* window.

Load and save view

The **Save Setup** button allows you to store the current settings. These settings can be restored by pressing the **Load Setup** button.

3.6 Tank movement

The **Tank Movement** window shows the direction of the current product surface movement, including Level Rate and Flow Rate.

Procedure

1. In the **Workspace** window, select the desired tank.
2. Do one of the following:
 - right-click a tank group and select **View Group** → **Tank Movement**
 - in **View** menu, select **Group** → **Tank Movement**.

| | Level | Flow Rate | Avg Temp | Level Rate |
|-------|------------------------|----------------------|----------|------------------------|
| TK-01 | 12.345 m <i>Discon</i> | 0.0 m3/h | 23.2 °C | 0.00 m/h <i>Discon</i> |
| TK-02 | 6.351 m | 972.0 m3/h ↑ | 23.5 °C | 0.89 m/h ↑ |
| TK-03 | 8.298 m | ? m3/h <i>InvVal</i> | 22.9 °C | 0.00 m/h |
| TK-04 | 12.365 m | 0.0 m3/h | 23.6 °C | 0.00 m/h |
| TK-05 | 6.584 m | ? m3/h <i>InvVal</i> | 23.1 °C | 0.00 m/h |
| TK-06 | 13.245 m | 0.0 m3/h | 22.7 °C | 0.00 m/h |
| TK-07 | 16.356 m | 0.0 m3/h | 26.3 °C | 0.00 m/h |
| TK-08 | 3.652 m | -407.8 m3/h ↓ | 22.8 °C | -0.52 m/h ↓ |
| TK-09 | 8.695 m | 0.0 m3/h | 21.4 °C | 0.00 m/h |
| TK-10 | 6.983 m | ? m3/h <i>InvVal</i> | 36.5 °C | 0.00 m/h |

3.6.1 Movement indication

An arrow points in the direction of surface movement. A thick arrow indicates a high flow rate, or level rate. A thin arrow indicates a low flow rate, or level rate. There is no movement indication for level rates below set thresholds.

3.6.2 Limits

A limit can be set in order to exclude tanks with flow rates below a specified value. Tanks are automatically added to and removed from the **Tank Movement** window depending on flow rates.

Related information

[Flow rate thresholds](#)

3.6.3 Color highlighting

Tank movements can be highlighted using color coding to improve visibility.

Related information

[Enable color highlight](#)

3.6.4 Custom appearance

The contents of the **Tank Movement** window can be modified to show specific parameters.

Procedure

1. Open the **Tools** menu.
2. Select **Options**.
3. Select the **Group Template** tab.

Related information

[Modifying group views](#)

3.6.5 Level rate thresholds

There are two thresholds for Level Rate, **Major** and **Minor**.

Minor Level rates above this value are indicated with a thin arrow in the **Tank Movement** window.

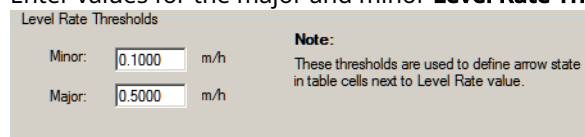
Major Level rates above this value are indicated with a thick arrow in the **Tank Movement** window.

Note

The Level Rate threshold settings apply to all windows which indicate product surface movement, such as **View Group**, and **Tank View**.

Procedure

1. Go to **Tools** → **Options**.
2. Select the **Tank Movement** tab.
3. Enter values for the major and minor **Level Rate Thresholds**.



Level Rate Thresholds

Minor: m/h

Major: m/h

Note:
These thresholds are used to define arrow state in table cells next to Level Rate value.

4. Click **Apply** to activate the new threshold values.
5. Click **OK** to close the **Options** window

3.6.6 Flow rate thresholds

Flow Rate Thresholds can be set individually for specific tanks, or as a common threshold for all tanks.

Minor Flow rates above this value are indicated with a thin arrow in the **Tank Movement** window.

Major Flow rates above this value are indicated with a thick arrow in the **Tank Movement** window.

Note

The Flow Rate threshold settings apply to all windows which indicate product surface movement, such as **View Group**, and **Tank View**.

Individual flow rate thresholds

Procedure

1. Go to **Tools** → **Options**.
2. Select the **Tank Movement** tab.
3. Select **Use individual threshold for each tank**.

Flow Rate Thresholds

Use individual threshold for each tank

Use common threshold for all tanks

Minor: m3/h

Major: m3/h

Note:
These thresholds are used to determinate whether a tank is in movement and to define arrow state in baggraphs and in table cells next to Flow Rate value.
To set individual thresholds for a tank open Tank Settling Setup window for that tank and change Flow Rate Threshold values.

4. Click **Apply**, and **OK** to close the **Options** window.
5. Right-click on a tank in the Workspace that will use individual thresholds and select **Tank Setup** → **Tank Settling Calculation**.

Tank Settling Setup - Tank "TK-02"

Settling Calculation

Disabled

Settling State : Not Settled

Tank Settled : 31/05/2012 13:24:05

Open Gauge : 28/05/2012 13:24:05

Close Gauge : ?

Flow Rate Threshold

Open Gauge (Upper): m3/h

Close Gauge (Lower): m3/h

OK Cancel Apply Help

6. Enter the required values in the **Open Gauge** and **Close Gauge** input fields.
7. Press **Apply** and **OK** to close the **Tank Settling Setup** window.
8. Repeat this procedure for each tank that will use individual thresholds.

Common flow rate thresholds

Procedure

1. Go to **Tools** → **Options**.
2. Select the **Tank Movement** tab.
3. Select **Use common threshold for all tanks**.

Flow Rate Thresholds

Use individual threshold for each tank

Use common threshold for all tanks

Minor: m3/h

Major: m3/h

Note:
These thresholds are used to determinate whether a tank is in movement and to define arrow state in baggraphs and in table cells next to Flow Rate value.
To set individual thresholds for a tank open Tank Settling Setup window for that tank and change Flow Rate Threshold values.

4. Enter the desired threshold values.

Note

Tanks with Flow Rates below the **Minor** threshold value will not appear in the **Tank Movement** window.

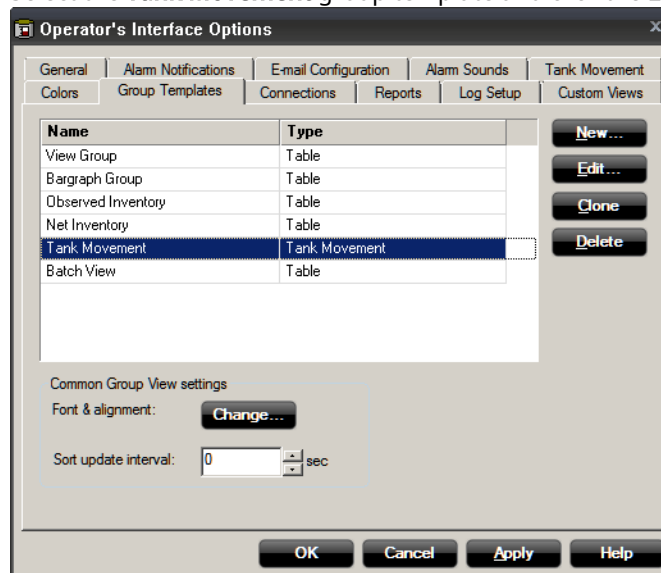
5. Click **Apply**, and **OK** to close the **Options** window.

3.6.7 Enable color highlight

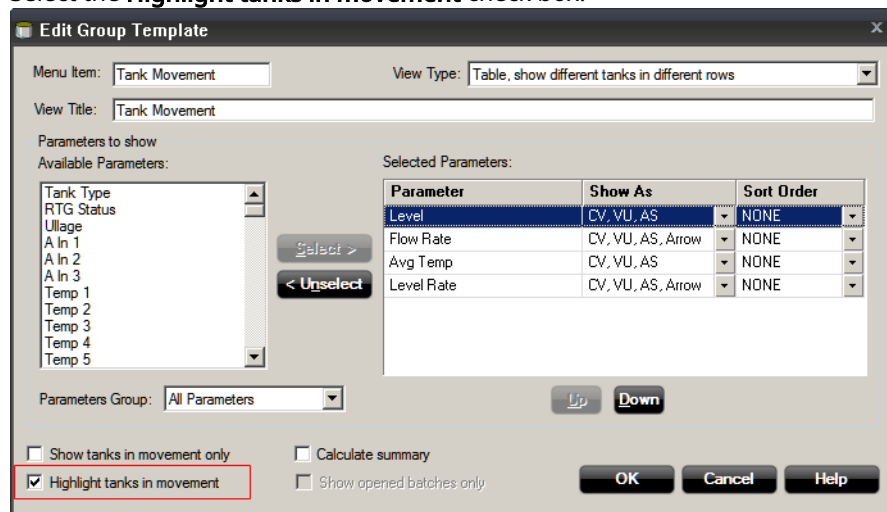
Color coding and highlighting for tank movement can be edited.

Procedure

1. In the **Tools** menu, select **Options**.
2. Select the **Group Templates** tab.
3. Select the **Tank Movement** group template and click the **Edit** button.



4. Select the **Highlight tanks in movement** check box.



5. Click **OK**.

Related information

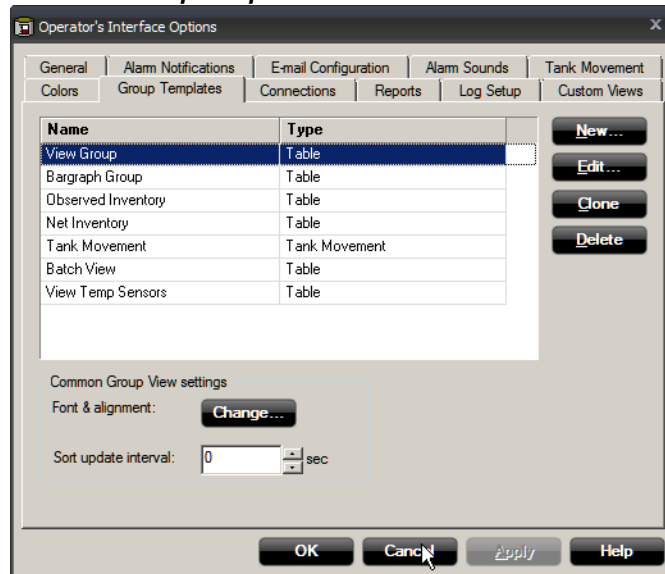
[Color settings for tank movement](#)

3.7 Modifying group views

The appearance of a group view can be changed by editing the appropriate template.

Procedure

1. In the **Tools** menu, click **Options**.
2. Select the **Group Templates** tab.



3. Select one of the following options:
 - To modify an existing group template, select the view and click **Edit**.
 - To duplicate an existing template, click the **Clone** button. This is a convenient way to create a new template by simply modifying an existing one.
 - To create a new group template, click the **New** button.
 - To remove an existing template, click the **Delete** button.

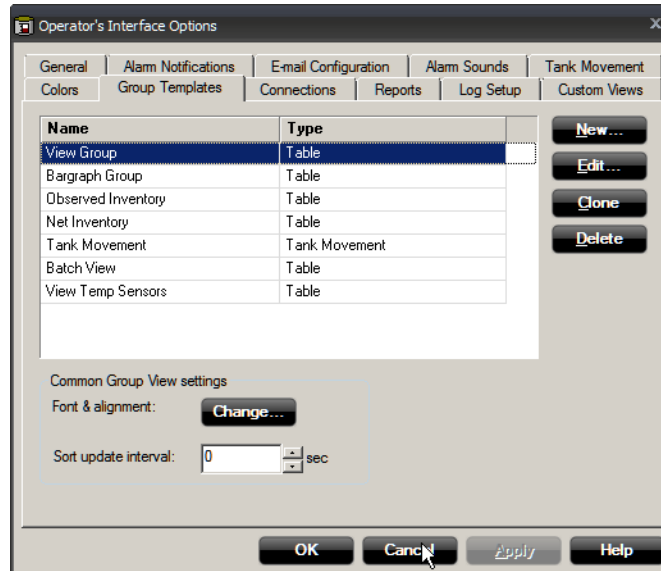
3.7.1 Example of how to create new group views

This example illustrates how to create a new group template.

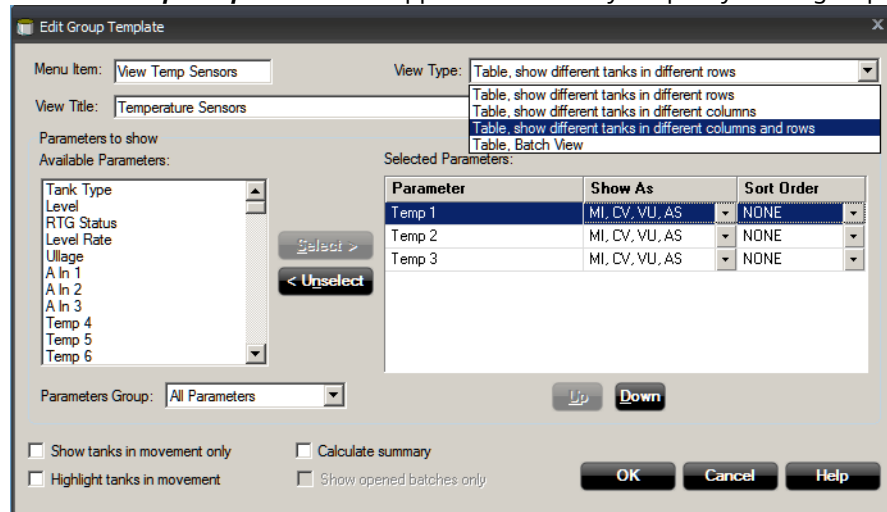
Procedure

1. Select menu option **Tools** → **Options**.

2. Select the **Group Templates** tab and click the **New** button.



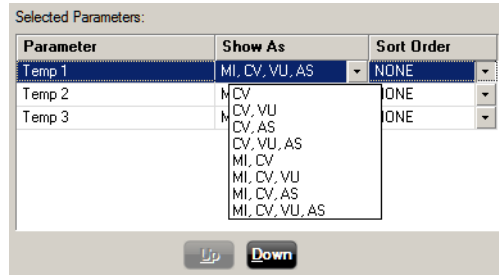
The **Edit Group Template** window appears which lets you specify a new group view:



3. In the **Menu Item** field, enter a group name as it will appear in the **View → Group** menu.
4. In the **View Title** field, type the name that will be displayed in the title bar of the new group view.
5. Next, select parameters in **Available Parameters** pane and click the **Select** button. The parameters are added to the **Selected Parameters** pane.

- In the **Show As** column, for each parameter choose the desired format for data presentation.

The **Show As** format determines how the parameter is presented in the view window.

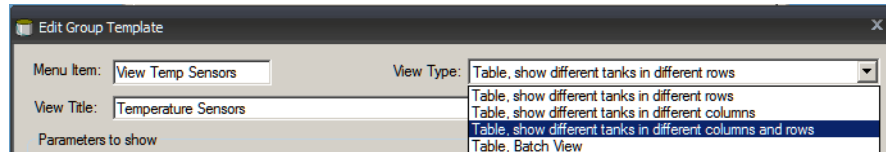


| Selected Parameters Show As | Description |
|-----------------------------|----------------------------|
| MI | Spot temperature in liquid |
| CV | Current Value |
| VU | Value Unit |
| AS | Alarm Status |

| | Level | Flow Rate | Avg Temp | Level Rate |
|-------|------------------------|------------|-----------|------------------------|
| TK-01 | 12.345 m <i>Discon</i> | 0.0 m3/h | 23.2 °C | 0.00 m/h <i>Discon</i> |
| TK-02 | 6.351 m | 972.0 m3/h | ↑ 23.5 °C | 0.89 m/h ↑ |

CV VU AS
CV VU

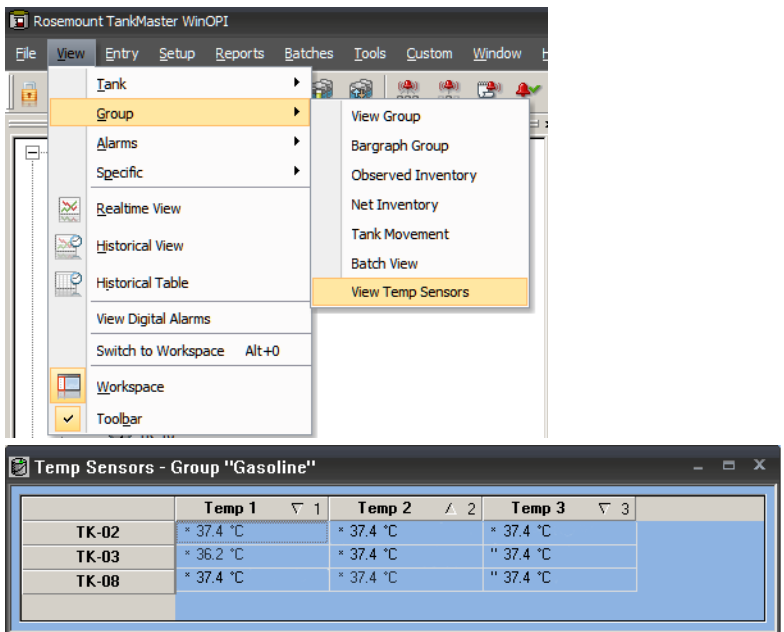
- The parameters can also be sorted in the table view as ascending or descending from the **Sort Order** column.
- Finally, in the **View Type** list, select if tanks will be presented row by row, column by column, or in both rows and columns.



- Click the **OK** button.

10. To open the new group view, do one of the following:
 - Right-click a tank group and select **View Group** → **[Menu Item]**
 - Select a tank group and in the main menu, go to **View** → **Group** → **[Menu Item]**

In this example, **[Menu Item]** is **View Temp Sensors**.



Note

The **Highlight tanks in movement** option is not enabled in this example.

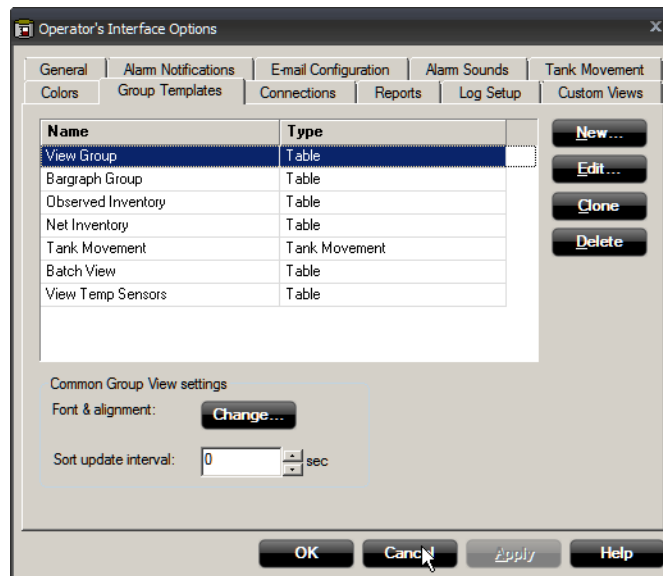
Related information
[Enable color highlight](#)

3.7.2 Changing group view appearance

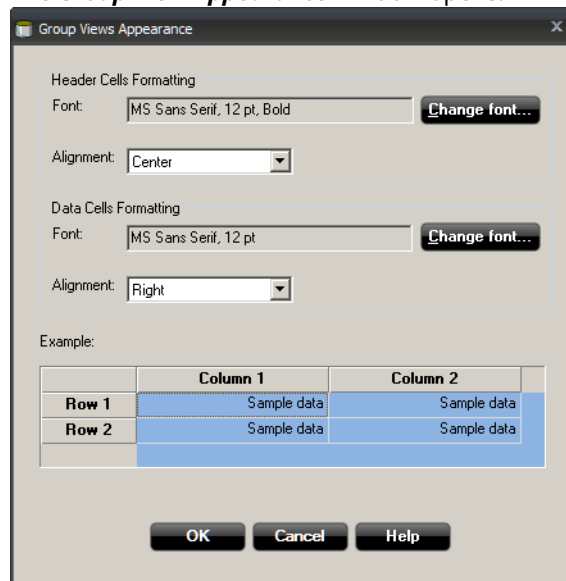
Font and text alignment can be modified for cells and headers in windows where data is presented in tables.

Procedure

1. Select menu option **Tools** → **Options** and select the **Group Templates** tab.



2. Under **Common Group View Settings**, click the **Change** button. The **Group View Appearance** window opens:



3. Select the appropriate **Change font** button to select desired fonts for table headers and cells.
4. Select desired alignment.
A preview of the formatting changes is shown in the **Example** box.

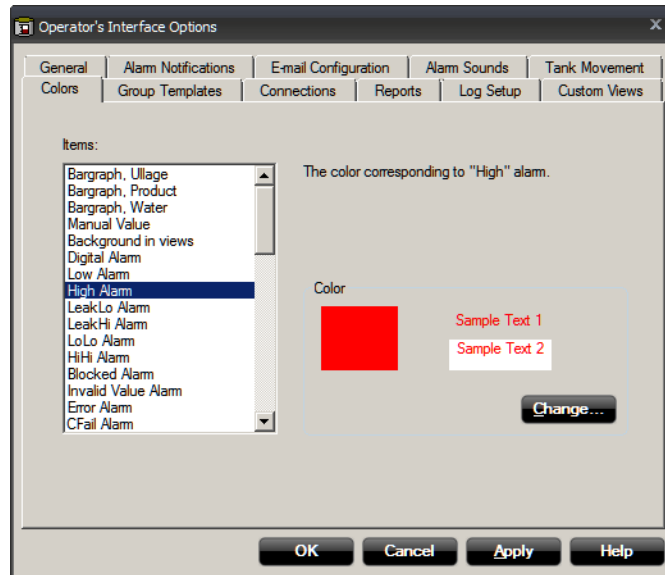
5. Click **OK** to close the **Group Views Appearance** window

3.8 Color settings

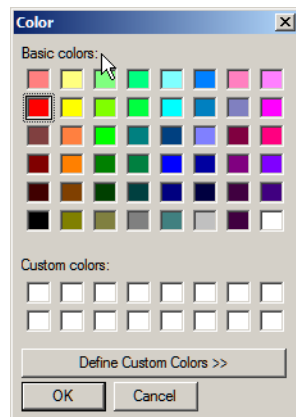
Using colors can be a useful way highlight and distinguish information. Colors can be specified for many areas, including bar graphs, backgrounds in input fields, manually entered values, alarms, and products in the Product Table.

Procedure

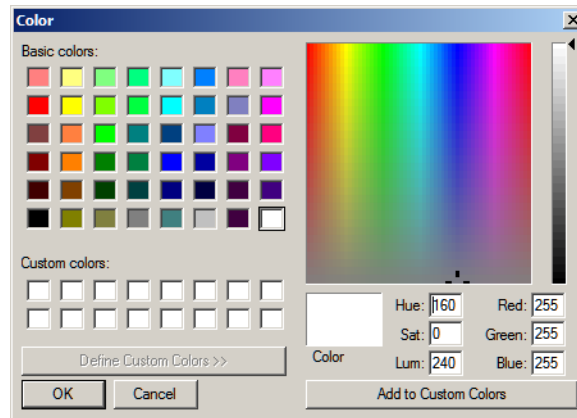
1. Open the **Tools** menu.
2. Select **Options**.
3. Select the **Colors** tab.



4. Select an item from the list.
5. Click the **Change** button to open the **Color** palette:



6. Choose a color from the palette, or click the **Define Custom Colors** button to expand the **Color** window. This allows you to add a custom color:



7. Click **OK** when the color selection is done.

Related information

[Product color](#)

[Create a product table](#)

3.8.1 Product color settings

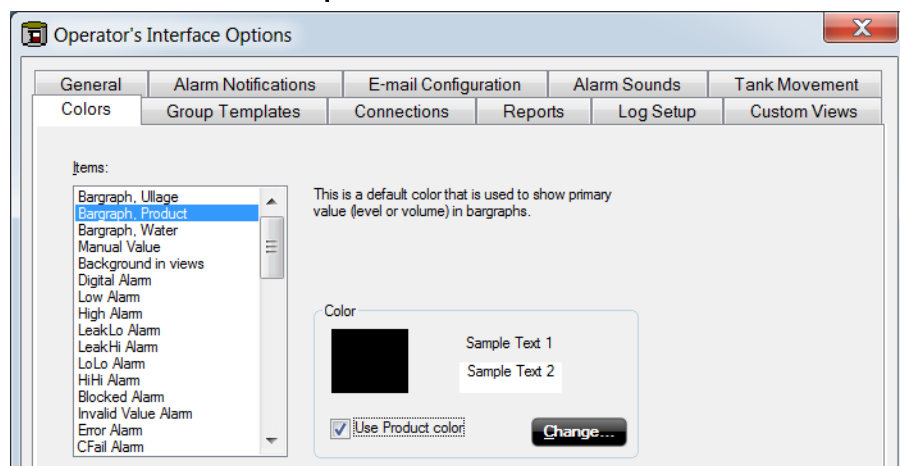
In the **Product Table**, colors can be used to represent specific products. These colors are then used in bar graphs to show the current product level.

There are two different options for product colors in bar graphs:

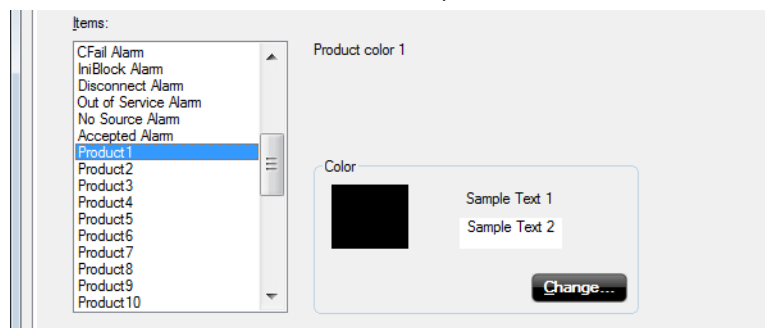
- Option 1: the same color is used for all products.
- Option 2: Each product is associated with a color according to the Product Table setup.

Procedure

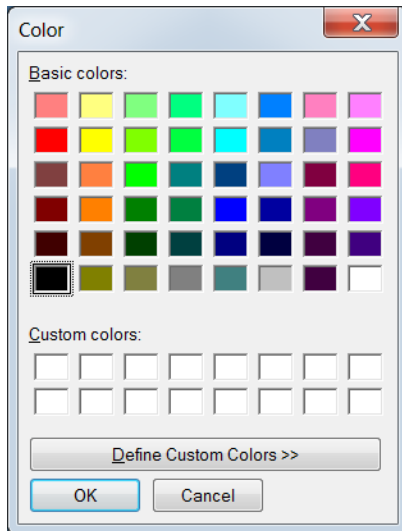
1. In the **Tools** menu, select **Options**.
2. Select the **Colors** tab.
3. Under **Items**, select **Bar Graph Product**, and select the **Use Product Color** check box.



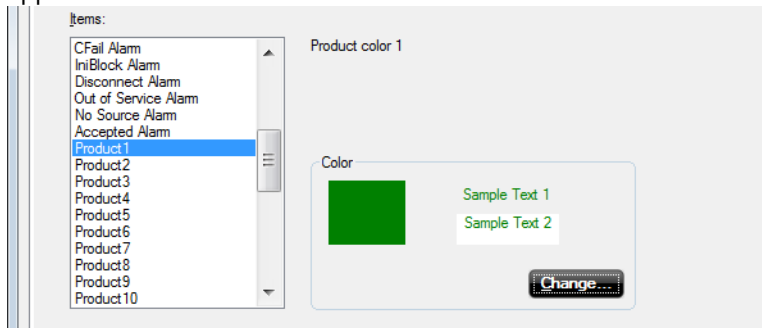
4. Scroll down the **Items** list and select a product to edit (Product1 in this example).



5. Click the **Change** button to define a product color.



6. Select the desired color and click the **OK** button. Now the new product color appears.



7. Repeat this procedure for the desired products.
8. In the **Tools Options Colors** window, click the **OK** button when you are finished.

Related information

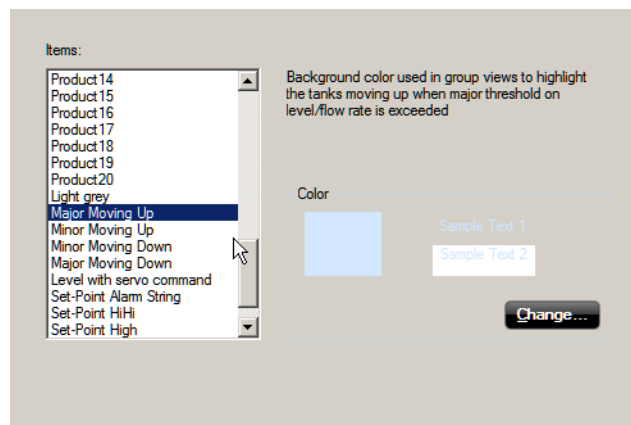
- [Product color](#)
- [Create a product table](#)

3.8.2 Color settings for tank movement

Items Major Moving Up, Major Moving Down, Minor Moving Up, and Minor Moving Down can be modified to change the colors for highlighting tank movement.

Procedure

1. Open menu option **Tools** → **Options** and select the **Color** tab.
2. Select one of the following items:
 - Major Moving Up
 - Major Moving Down
 - Minor Moving Up
 - Minor Moving Down



3. Click **Change** to edit the color settings for the selected item.
4. Click **Apply** and then **OK** to close the **Options** window.

Postrequisites

Ensure that color highlighting for tank movement is enabled.

Related information

[Enable color highlight](#)

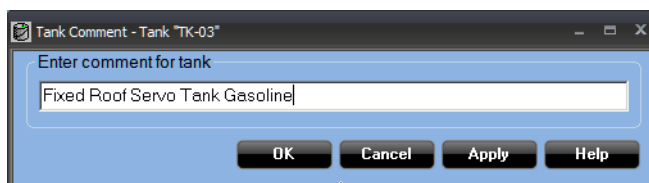
3.9 Tank comment

A custom comment field can be added to **Tank View** and **Group View** windows for each tank.

3.9.1 Add a tank comment

Procedure

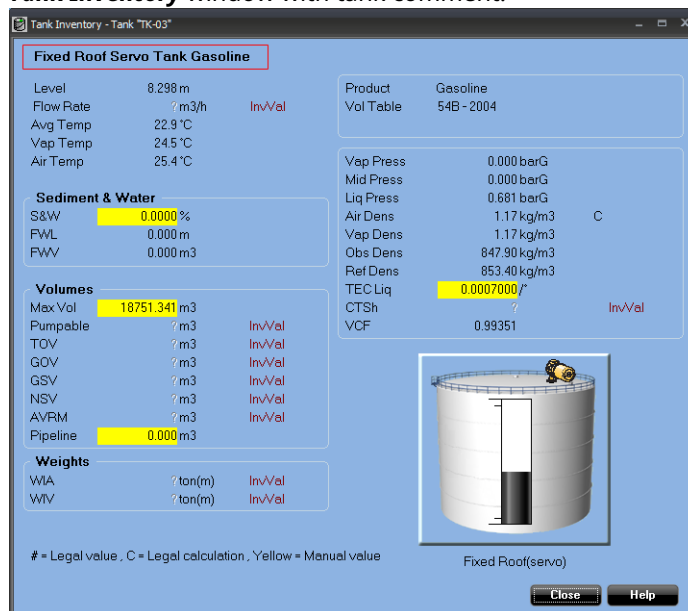
- Do one of the following:
 - right-click a tank in the TankMaster workspace and select **Tank Comment**
 - select a tank in the TankMaster workspace, and open **Tank Comment** from the **Entry** menu



- Type a comment for the selected tank and click **OK**.
The Tank Comment can be seen in any tank view window (except Tank Set-Point View).

Example

Tank Inventory window with tank comment.



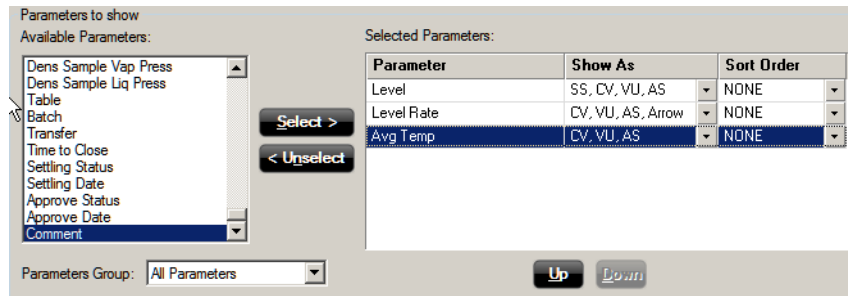
Note

Tank comments can also be used for group view windows.

3.9.2 Enable tank comment in group view

Procedure

1. Select menu option **Tools** → **Options**.
2. Select the **Groups Templates** tab, and choose the desired group view.
3. Click the **Edit** button.
The **Edit Group Template** window opens.
4. In the **Available Parameters** list, choose **Comment** and click the **Select >** button.



5. Click **OK** to close the **Edit Group Template** window.
6. Click **Apply** and **OK** to close the **Operator's Interface Options** window.

The comment field is now visible in any group view window.

| | Level | Level Rate | Avg Temp | Comment |
|-------|---------|-------------|----------|--------------------------------|
| TK-02 | 6.351 m | 0.89 m/h ↑ | 23.5 °C | |
| TK-03 | 8.298 m | 0.00 m/h | 22.9 °C | Fixed Roof Servo Tank Gasoline |
| TK-08 | 3.652 m | -0.52 m/h ↓ | 22.8 °C | |

4 Installing a tank measurement system

4.1 Installation procedure

Setting up a tank measurement system for level measurement and inventory calculation includes a few basic steps.

Procedure

1. **System setup.**
Specify measurement units and other system parameters.
2. **Set up a Tank Capacity Table.**
Specify the geometry of the tank for volume calculation by setting up a tank capacity table. This is commonly referred to as a strapping table.
3. **Create a product table.**
Specify the products to be used in the tank.
4. **Configure tank inventory parameters.**
Specify parameters for inventory calculation.
5. **Configure alarm limits.**
Specify alarm limits for level, volume, and data from external sensors.

Related information

[System setup](#)
[Setting up a tank capacity table](#)
[Create a product table](#)
[Inventory parameters](#)
[Tank inventory configuration](#)
[Alarm handling](#)

4.2 System setup

Measurement units and other system parameters for tanks can be set up manually.

Procedure

1. In the TankMaster workspace, select menu option **Setup** → **System**:

System Setup

Server: SEGOT01-02854

System Units

Level/Ullage: m Volume: m³

Temp: °C Density: kg/m³

Pressure: bar G Weight: ton(m)

Secondary Units

Level: m Volume: m³

Avg Temp: °C Density: kg/m³

Volume Table: 54A - 2004 Weight: ton(m)

Volume Correction Factor Calculation Mode

Round VCF to 4 decimals.

Round VCF to 5 decimals. According to API MPMS 12.1.1 (2001).

Local Gravity Calculation

Latitude: 45.0

Elevation: 0.0 m

Gravity: 9.8100 m/s²

Ambient Air Density Calculation

Unit: kg/m³

Base Density: 1.21 kg/m³

Air Density: 1.17 kg/m³

TCT

Type: Raw

Max points: 350

Products

Max no of products: 100

Reference Temperature

Ref Temp: 15.0 °C Used in table CUSTOM and RT_XX.

OK Cancel Apply Help

2. Select the server that the system setup changes will apply for.
3. The following system settings are available:

Table 4-1: System Setup Options

| Option | Description |
|---|---|
| System units | <p>Select the default measurement units to be used for data presentation.</p> <hr/> <p>Note Changing system units will not affect previously installed tanks. It will only affect tanks installed after the changes have been made.</p> |
| Secondary units | <p>The Volume Table drop-down list lets you choose an API table for inventory calculations.</p> <p>Select measurement units to be used for data presentation in these windows:</p> <ul style="list-style-type: none"> • Tank Inventory Secondary Units (View → Tank → Tank Inventory Secondary Units) • Tank Inventory Calculator (Tools → Tank Inventory Calculator) |
| Volume Correction Factor (VCF) calculation mode | <ul style="list-style-type: none"> • The Volume Correction Factor (VCF) is rounded to five decimals by default. • It is possible to configure TankMaster to round the VCF to four decimals places. This can be useful if the calculated VCF result will be verified against printed tables with only four decimals. |
| Local gravity calculation | <ul style="list-style-type: none"> • The local gravity calculation is used to calculate the Observed Density for hybrid tank measuring systems. • The local gravity constant is calculated when the check box is not selected. |
| Ambient air density calculation | <p>There are two options for the Ambient Air Density calculation. The Ambient Air Density can either be considered as:</p> <ol style="list-style-type: none"> a. constant, or b. calculated, based on a manually defined base density and ambient air temperature. |

Table 4-1: System Setup Options (continued)

| Option | Description |
|----------------------------|---|
| TCT | Specify the default type of Tank Capacity Table (TCT) from the TCT Type list: <ul style="list-style-type: none"> When a TCT table is created for a new tank, the type is based on the default setting in the System Setup window The TCT type can be changed in the Tank Capacity Setup window. |
| Products | Enter the maximum number of products to be used in the Product Table (the system limit is 500). Note The same maximum number of products should be used for all servers in the network. |
| Reference temperature (RT) | TankMaster performs inventory calculations according to the API Manual of Petroleum Measurement Standards Chapter 12, Section 1, at the standard reference temperature 15°C (60°F). This is the default reference temperature. Other reference temperatures can be specified in the Reference Temperature input field. The correct RT volume table, for example RT 54B-2004, shall be used for a specific product. |

Related information

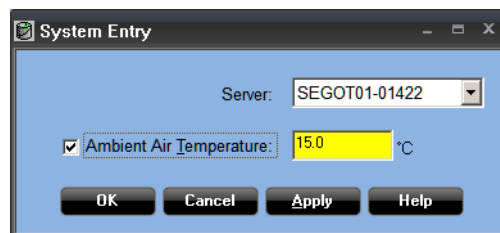
[Setting up a tank capacity table](#)

4.2.1 Ambient air temperature manual setup

This is a description of how to manually specify the Ambient Air Temperature.

Procedure

1. In the TankMaster workspace, select menu option **Entry** → **System**.



2. In the **System Entry** window, select the **server** that the Ambient Air Temperature will apply for.
3. Select the **Ambient Air Temperature** check box and enter a value.
4. Click **OK**.

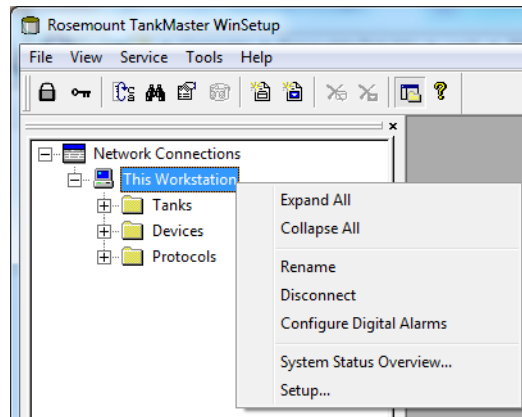
4.2.2 Automatic ambient air temperature measurement

This is a description of how to setup automatic Ambient Air Temperature measurement.

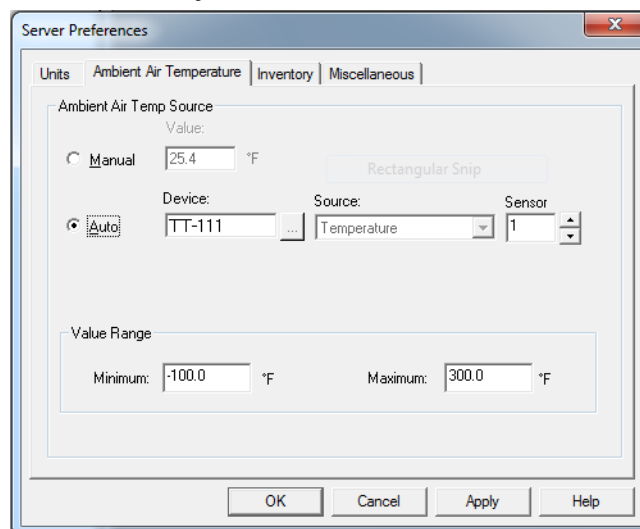
For automatic Ambient Air Temperature measurement, a sensor can be specified in the **WinSetup Server Preferences** window.

Procedure

1. Make sure that **TankMaster WinSetup** is up and running.
2. In the WinSetup workspace, select the server that the device and temperature sensors are connected to.
3. Do one of the following:
 - right-click on the server icon and select **Setup**
 - select menu option **Server** → **Setup**



4. In the **Server Preferences** window, select the **Ambient Air Temperature** tab.



5. In the **Ambient Air Temperature** tab, under **Ambient Air Temp Source**, select the **Auto** option.
6. Configure the following:
 - Select the device to which the temperature sensor is connected
 - Select the temperature source
 - Choose the sensor to be used specifically for Ambient Air Temperature
7. Press the **OK** button to close the **Server Preferences** window.

4.3 Setting up a tank capacity table

The geometry of a tank is defined in a strapping table called a Tank Capacity Table (TCT). It is used to convert a product level to the corresponding volume. The values can be entered either as absolute levels, as relative levels, or as pairs of level and volume.

There are three different types of tank capacity tables:

- Raw
- Northern (relative levels; mostly used in Sweden and Finland)
- International (absolute levels)

You can specify a default TCT type that will automatically be used for new tanks in **Setup** → **System**.

You can change the TCT type for a tank from the default setting in **Setup** → **Tank Setup** → **Tank Capacity**.

Note

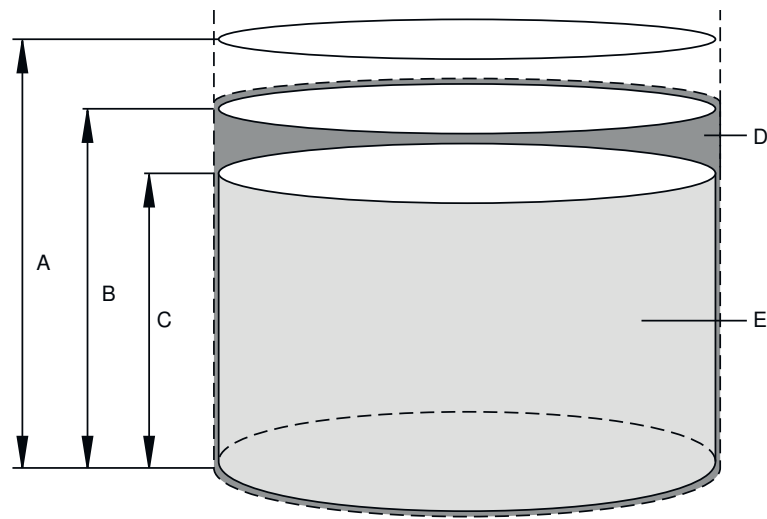
When specifying a TCT using either the Northern or International method, it is extremely important that the resulting level-volume curve is continuous. The calculated volume at the top of one interval must correspond exactly to the volume at the bottom of the next interval.

Both the relative and the absolute method of entering TCT data require four parameters at each strapping point. The Northern and the International methods do not use the same Base Volume and Tank Area Coefficient.

Table 4-2: Strapping Table Parameters

| Parameter | Description |
|-----------|--|
| From | product level at the beginning of the interval |
| To | product level at the end of the interval |
| Volume | Base Volume |
| Area | Tank Area Coefficient |

Figure 4-1: Volume Calculations Based on Strapping Table



- A. Level at end of interval
- B. Measured level
- C. Level at beginning of interval
- D. Calculated volume
- E. Base volume

4.3.1 Using the Raw method

When using the Raw method, data is entered in pairs of Level and Volume values. For each level value the corresponding standard volume must be entered.

The following table shows an example of pairs of Level and Volume values as input for TankMaster when using TCT type Raw.

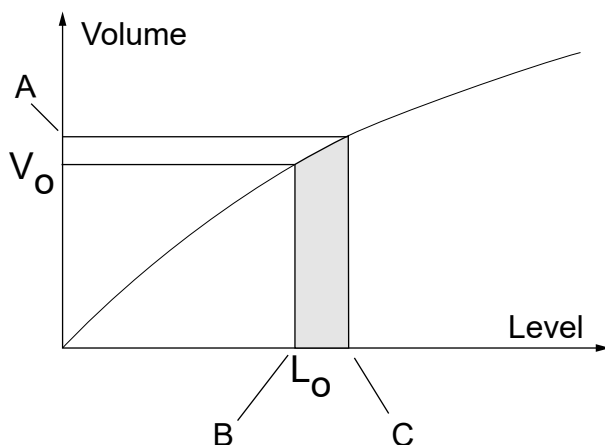
Table 4-3: Example of TCT Type Raw Table

| Level | Volume |
|-------|--------|
| 1.53 | 10 105 |
| 2.72 | 22 309 |
| 3.18 | 29 934 |
| 4.78 | 41 249 |

4.3.2 Using the International method

When using the **International** method, the **Base Volume** is the volume at the beginning of the interval. The **Tank Area Coefficient** describes how the volume varies with the level within the interval.

Figure 4-2: International Method



- A. Volume at end of interval
- B. Level at beginning of interval (From)
- C. Level at end of interval (To)

With the International Method, the desired volume is calculated as:

$$\text{Desired Volume} = V_o + \text{Area} \times (\text{Level} - L_o)$$

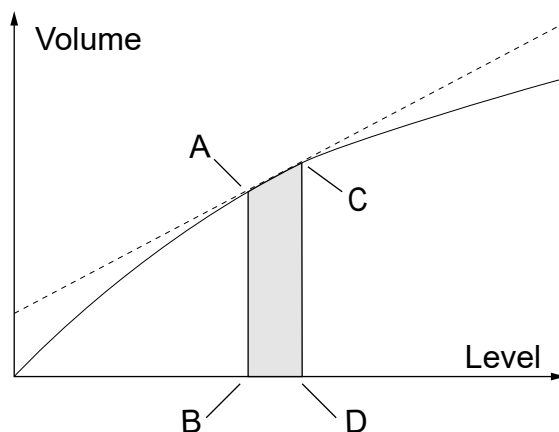
Table 4-4: International Method Parameters

| Parameter | Description |
|-----------------------|--|
| Desired Volume | Volume at the measured level |
| Level | Measured level |
| L_o | Level at the beginning of the interval |
| V_o | Base volume |
| Area | Tank Area Coefficient. This is not the surface area of the product, although the measurement unit of this parameter is the same as for a surface area (volume/length). |

4.3.3 Using the Northern method

The **Northern** method is based on the fact that within an interval, there is an approximately linear relationship between level and volume, as illustrated below.

Figure 4-3: Northern Method



- A. Volume at beginning of interval
- B. Level at beginning of interval (From)
- C. Volume at end of interval
- D. Level at end of interval (To)

The **Base Volume** corresponds to the volume at Level = 0, given by extrapolation of the linear level - volume relationship.

The **Tank Area Coefficient** describes how the volume varies with the level within the interval based on this **Base Volume**. The volume is calculated as:

$$\text{Desired Volume} = V_o + \text{Area} \times \text{Level}$$

Table 4-5: Northern Method Parameters

| Parameter | Description |
|-----------------------|--|
| Desired Volume | Volume at the measured level |
| Level | Measured level |
| V_o | Base volume |
| Area | Tank Area Coefficient. This is not the surface area of the product, although the measurement unit of this parameter is the same as for a surface area (volume/length). |

4.3.4 Create a tank capacity table

TankMaster allows you to specify a strapping table to be used for volume calculations.

- The geometry of the tank is defined in the TCT
- The TCT is used to convert a product level to the corresponding volume
- The values can be entered either as pairs of level and volume, either as absolute, or relative levels depending on the type of TCT that is used

- The TCT is stored as pairs of level and volume irrespective of the way the values are entered into the system

Procedure

- In the TankMaster workspace, right-click on the desired tank and select **Tank Setup** → **Tank Capacity**, or open menu option **Setup** → **Tank Setup** → **Tank Capacity**.

| Point | Level | Volume |
|-------|--------|-----------|
| 1 | 0.000 | 630.000 |
| 2 | 2.100 | 2989.000 |
| | 4.600 | 6978.000 |
| | 5.600 | 8967.000 |
| | 8.300 | 11956.000 |
| | 10.400 | 14946.000 |
| | 11.900 | 17935.000 |
| | 13.700 | 20924.000 |
| | 16.200 | 23913.000 |
| | 17.600 | 26903.000 |

- To change the TCT type for the current tank, or to specify the number of strapping points, click the **Change** button.

- Click **OK** to close the **TCT Table** window and apply any changes.

Note

Changing the TCT or number of points in the **TCT Table** window only affects the current tank. The default TCT type is specified in the **System Setup** window (**Setup** → **System**) and is automatically chosen when strapping tables are created for new tanks.

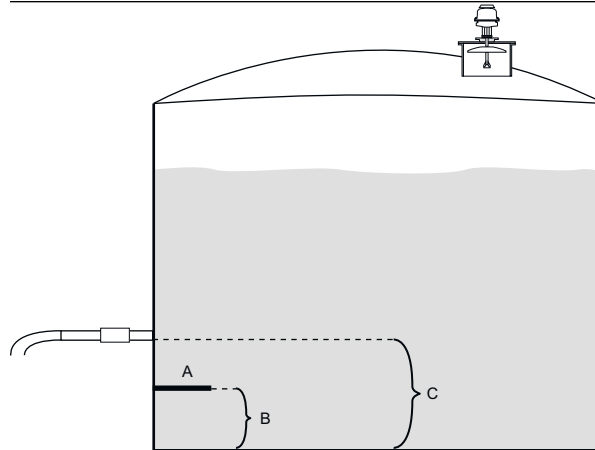
- In the **Units** pane, select measurement units for Level, Volume and Temperature. These units are also specified in the **System Setup** window as default for all tanks, but can be changed here for the current tank.
- In the **Volume** section, enter a **Maximum Volume** and a **Minimum Volume** for the current tank. The **Minimum Volume** is equal to the volume between the outlet and

the bottom of the tank. Tank Volume refers to the total volume of the tank. This parameter is used for LPG tanks in order to calculate Equivalent Liquid Volume and Vapor Mass.

- The **Sump Volume** is what is left when the tank is emptied to the Zero Level. This value may be included in the strapping table instead of the Sump Volume field. In this case, the **Base Volume** at the Zero Level is equal to the **Sump Volume**.

Note

Ensure that the **Sump Volume** is not specified in both the Sump Volume parameter and the strapping table.



- A. Zero Level
 - B. Sump
 - C. Minimum volume
-

- In the **Shell** pane, specify if the tank is insulated or not, enter the **Base Temperature** and a **Steel Expansion Coefficient**:
 - The **Base Temperature** is the temperature at which the strapping table is specified
 - Temperatures other than the Base Temperature are taken into account and compensated for when performing volume calculations.
 - If a tank is insulated the ambient temperature does not have any influence on the inventory calculations.
 - The **Steel Expansion Coefficient** is used in the calculations of Gross Observed Volume (GOV) in order to correct for the thermal expansion of the tank wall. The default value, 0.0000112/°C, is used for mild carbon steel.
- Enter numerical values for the strapping table points.
- Click **OK** to store the values and close the window.

Related information

[Inventory parameters](#)

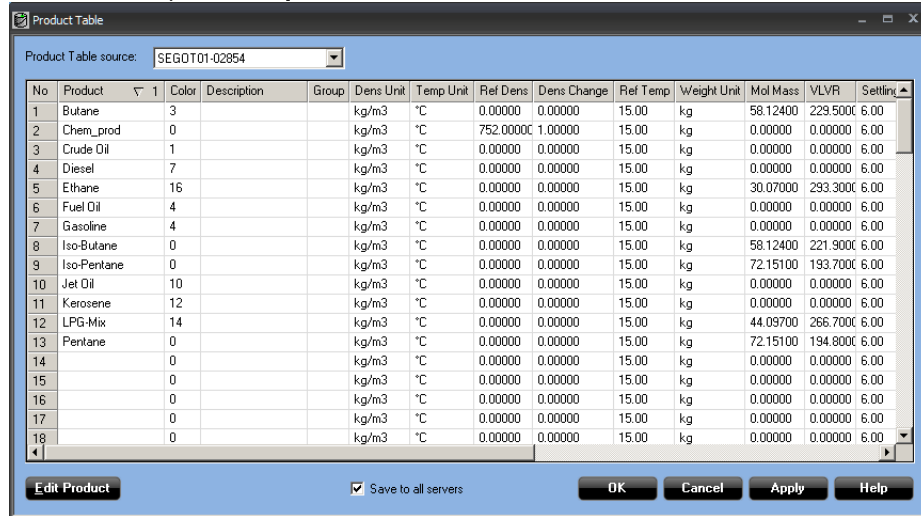
[Floating roof correction setup](#)

4.4 Create a product table

Product specific information is stored in a **Product Table**. It is possible to edit the default selection of products and also add new products to the table.

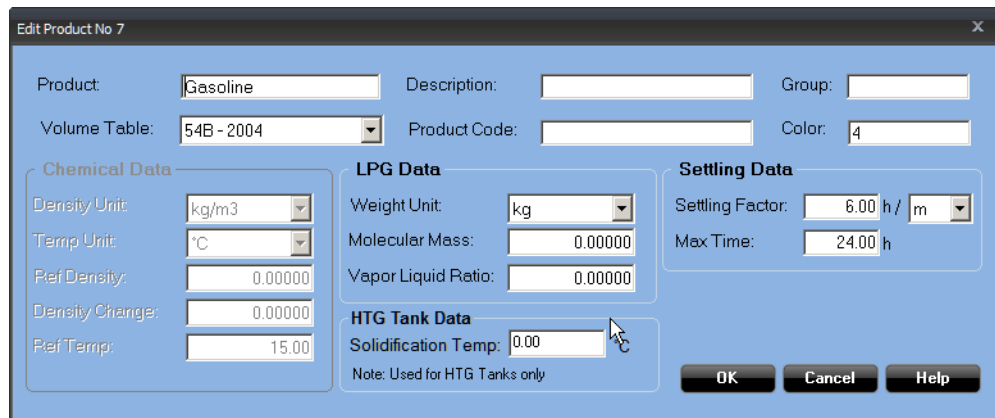
Procedure

1. Select menu option **Setup** → **Product Table**.



2. Select a **Product Table source**, i.e. a server where the product table is stored.
3. The content in the product table can be sorted.
4. To edit an item in the **Product Table**, double-click a cell, or select a cell and click the **Edit Product** button. The **Edit Product No <x>** window appears.

Example



5. Enter the appropriate product data in the **Edit Product** window.
6. Repeat the appropriate steps to add new, or edit existing products in the **Product Table**.
7. If you want to save changes to all servers, select the check box **Save to all servers** in the **Product Table** window.
8. Click **OK**.

Note

Select the **Save to all servers** check box if you like to save changes to the Product Table to all connected servers. If the check box is not selected, the Product Table is only saved to the server in the **Product Table source** field. If stored to all servers, the **Max no of products** in the **Product** section of **System Setup** must be the same for all servers. By selecting **Save to all servers** the existing data will be overwritten.

Related information

[Product color settings](#)
[Color settings](#)
[Sorting content in a product table](#)
[System setup](#)

4.4.1 Volume table

The Volume Table list lets you choose the API Table to be used for calculating the VCF. By choosing one of the RT tables you can use a reference temperature value other than the standard 15°C / 60°F. Reference temperature is specified in the **System Setup** window (**Setup** → **System**).

CHEM

When using volume table CHEM, the Observed Density is calculated by using the Reference Density from the Product Table.

Linear and Custom

For Volume Tables Linear and Custom.

Alcohol

Volume table ALCOHOL is valid for strengths between 50 and 100%, and a temperature range from 10 to 40 °C (50 to 104 °F).

User 1-10

Volume Tables USER1-10 are for users who want to order custom made volume tables from Rosemount Tank Radar AB.

Related information

[Extended volume correction table setup](#)

4.4.2 Chemical data

The **Chemical Data** section is only valid for the CHEM volume table, otherwise it cannot be edited for other products.

Reference Density

The **Reference Density** (Ref Density) is the density of the product at a specific temperature given by the **Ref Temp** value.

Reference Density in the Product Table is used to calculate the **Observed Density** for volume table **CHEM**. For other volume tables the **Reference Density** is automatically calculated or is manually entered in the **Tank Entry** window.

Density change

The **Density Change** value specifies the rate at which the density changes per 1°C. Corresponding density and temperature units must be selected.

Related information

[Tank volume calculation setup](#)

[Product parameter setup](#)

4.4.3 LPG data

For LPG/LNG tanks, manual values can be entered for Molecular Mass and Vapor Liquid Ratio. These values are used to calculate the mass of gas and the liquid equivalent volume of the vapor in the available room above the liquid surface.

4.4.4 Settling data

The Settling Factor states the level change in hours per meter. When the product level movement has dropped below the Settling Factor, and a period of time exceeding the Max Time has passed, the tank is considered settled.

4.4.5 HTG tank data

The Solidification Temperature is only used in Hydrostatic Tank Gauging (HTG) calculations.

4.4.6 Product color

Enter a number that corresponds to a product color. This requires that a set of product colors has already been defined.

Related information

[Product color settings](#)

[Color settings](#)

4.4.7 Sorting content in a product table

The Product Table can be sorted for a clear overview.

Procedure

1. To sort the table rows in ascending order for a field, click the title cell for that column.

- Click the cell again to sort the cells in descending order.

Product Table source: SEGOT01-02854

| No | Product | Color | Description | Group | Dens Unit | Temp Unit | Ref Dens | Dens Change | Ref Temp | Weight Unit | Mol Mass | VLVR | Settling |
|----|-------------|-------|-------------|-------|-----------|-----------|-----------|-------------|----------|-------------|----------|----------|----------|
| 1 | Butane | 3 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 58.12400 | 229.5000 | 6.00 |
| 2 | Chem_prod | 0 | | | kg/m3 | *C | 752.00000 | 1.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 3 | Crude Oil | 1 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 4 | Diesel | 7 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 5 | Ethane | 16 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 30.07000 | 293.3000 | 6.00 |
| 6 | Fuel Oil | 4 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 7 | Gasoline | 4 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 8 | Iso-Butane | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 58.12400 | 221.9000 | 6.00 |
| 9 | Iso-Pentane | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 72.15100 | 193.7000 | 6.00 |
| 10 | Jet Oil | 10 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 11 | Kerosene | 12 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 12 | LPG-Mix | 14 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 44.09700 | 266.7000 | 6.00 |
| 13 | Pentane | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 72.15100 | 194.8000 | 6.00 |
| 14 | | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 15 | | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 16 | | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 17 | | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |
| 18 | | 0 | | | kg/m3 | *C | 0.00000 | 0.00000 | 15.00 | kg | 0.00000 | 0.00000 | 6.00 |

Buttons: Edit Product, Save to all servers (checked), OK, Cancel, Apply, Help

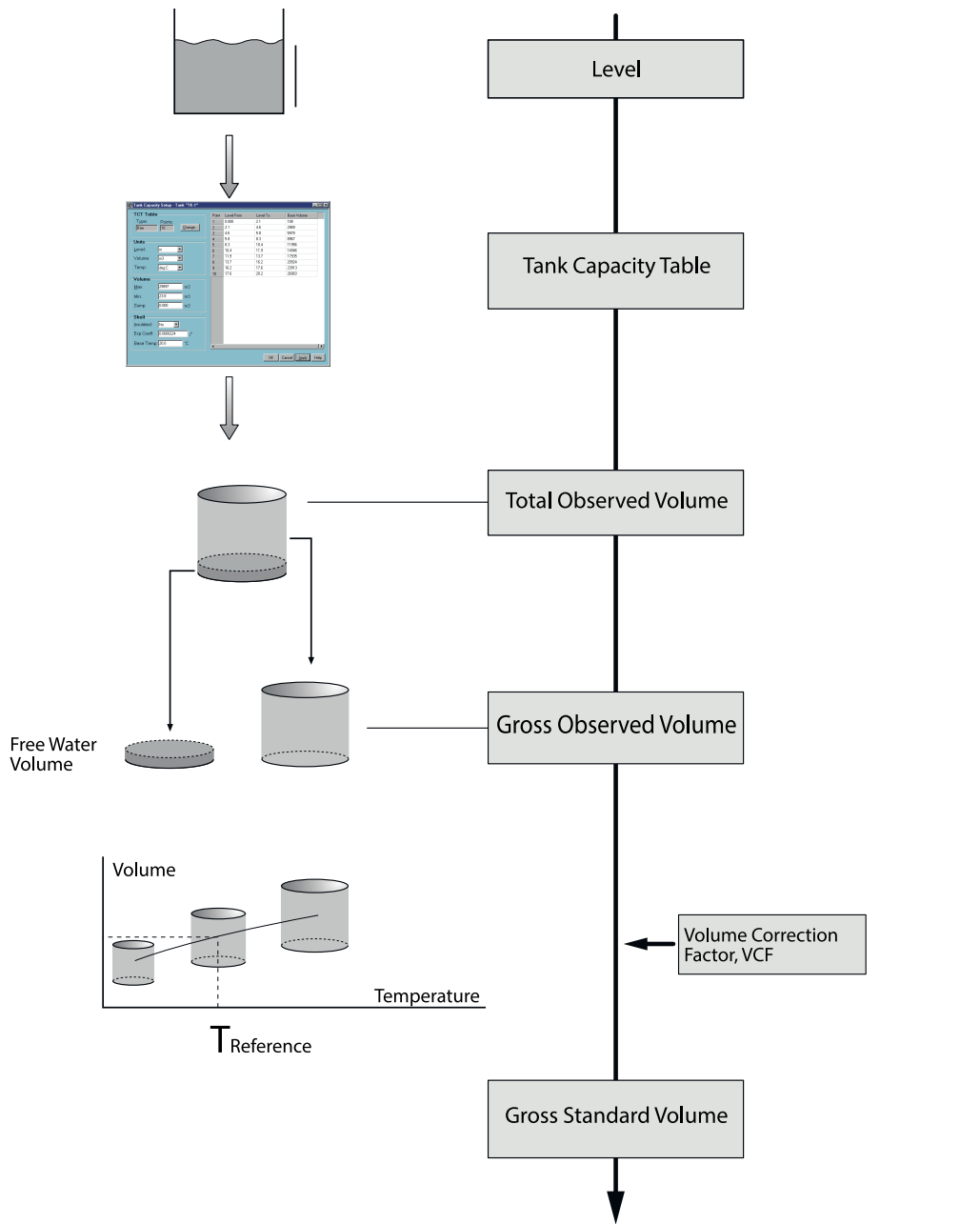
- Right click on the selected column title to reset sorting.
- Repeat this procedure until the table is sorted appropriately for your needs.

4.5 Inventory parameters

Rosemount TankMaster™ calculates inventory parameters based on input data available for the current tank.

The following figure illustrates how TankMaster converts a measured product level with given tank parameters to a standardized volume:

Figure 4-4: Standard Volumes



The following figure outlines the relationship between tank parameters and physical quantities. The main parameters are shown on the left-hand side, and input parameters on the right-hand side of the flow chart:

Figure 4-5: Tank Parameters Flow Chart

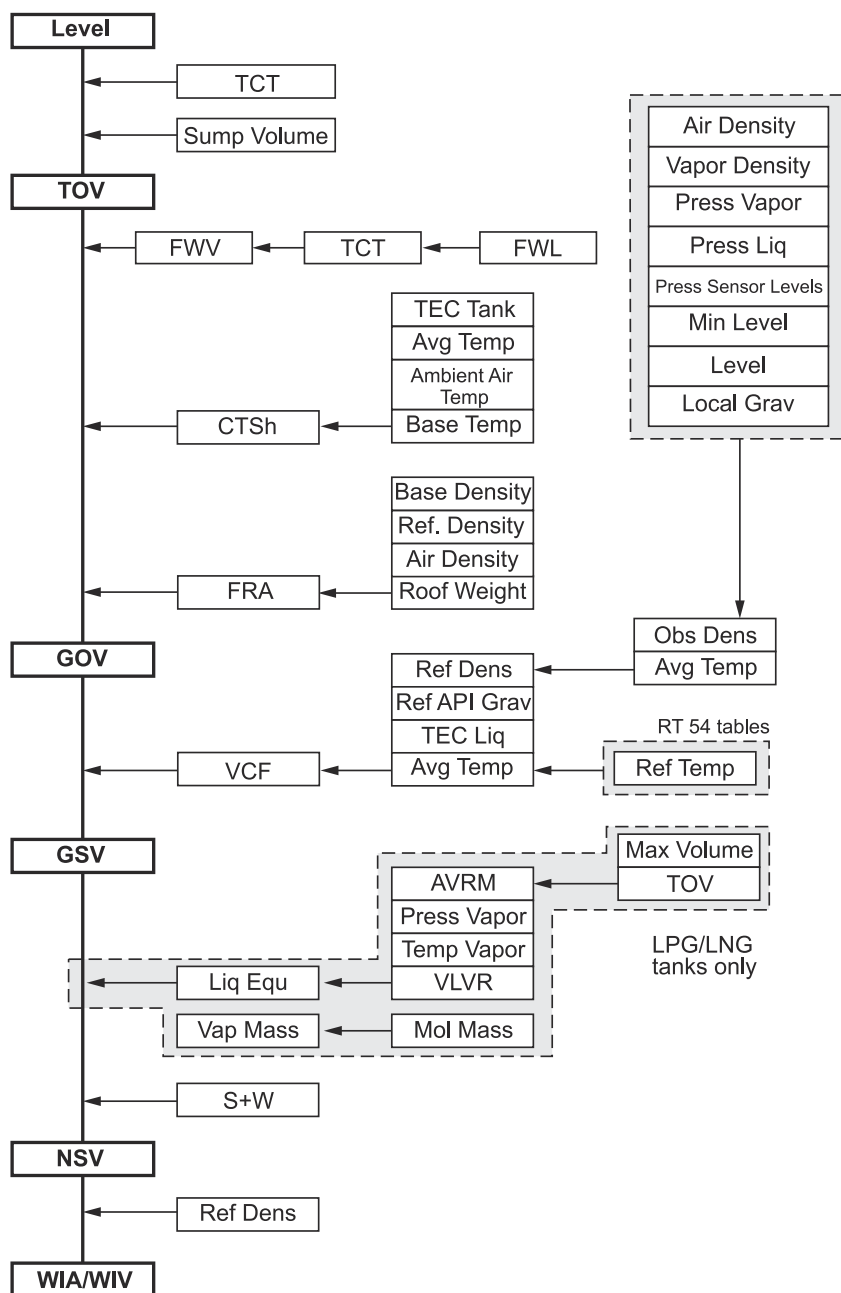


Table 4-6: Inventory Parameters

| Parameter | Description |
|----------------------------|--|
| Total Observed Volume, TOV | Calculated from strapping tables. It is the total volume at the observed temperature of the product. |

Table 4-6: Inventory Parameters (continued)

| Parameter | Description |
|---|--|
| Gross Observed Volume, GOV | Obtained by subtracting the Free Water Volume, FWV, from the total observed volume, TOV. The Free Water Volume is calculated from the Free Water Level entered by the operator or measured automatically by using a water interface sensor. |
| Gross Standard Volume, GSV | The GOV corrected to the reference temperature 15° C/60° F. The correction is made using the VCF, according to API Standard 2540. |
| Net Standard Volume, NSV | Calculated as the GSV minus the dissolved sediment and water. For liquid gas tanks the liquid equivalent volume of the gas above the product surface is added. |
| Weight in Vacuum, WIV | NSV multiplied by the Reference Density. |
| Weight Conversion Factor, WCF | Calculated from the Reference Density. |
| Weight in Air, WIA | NSV multiplied by the WCF. |
| Maximum Volume | The volume that corresponds to the maximum product level. |
| Available Room, AVR | Calculated by subtracting the TOV from the Maximum Volume of the tank. |
| Floating Roof Adjustment, FRA | Floating roof volume adjustment. |
| Sump volume | The volume that is left in a tank when emptied down to the Zero level. |
| CTSh | Used for correction of GOV to compensate for thermal expansion of the tank wall. |
| Minimum Volume | Volume between the outlet and the bottom of the tank. |
| Pumpable Volume | TOV minus the Minimum Volume. |
| Flow Rate | The Flow Rate is calculated using the level rate and the strapping tables. |
| Reference Density | The Reference Density can be automatically calculated from the Observed Density and the Average Temperature. Use automatic measurements in Hybrid Tank Gauging systems with a pressure sensor connected. |
| Thermal Expansion Coefficient, TEC Liquid | Used to calculate the VCF when using one of the 6C/24C/54C/60C or the RT_6C/54C volume correction tables. |
| Volume Correction Factor, VCF | Used to convert the volume at the current temperature to the corresponding volume at the standard reference temperature 15 °C (60 °F). The VCF is automatically calculated according to API standard 2540 if the Reference Density and the Average Temperature of the product are known. For some volume correction tables the Thermal Expansion Coefficient (TEC Liquid) must also be entered (see TEC Liquid). |
| Vapor Pressure | The current vapor pressure is displayed if a pressure sensor is available. A pressure value can also be entered manually. The Vapor Pressure source signal, i.e. the analog input to which the sensor is connected, can be specified in WinSetup. Select a tank in the workspace and go to Tanks → Properties → Configuration . |

Table 4-6: Inventory Parameters (continued)

| Parameter | Description |
|---------------------------------|--|
| Liquid Pressure | The current liquid pressure is displayed if a pressure sensor is available. A pressure value can also be entered manually. The Liquid Pressure source signal, i.e. the analog input to which the sensor is connected, can be specified in WinSetup. Select a tank in the workspace and go to Tanks → Properties → Configuration . |
| Vapor Density | The Vapor Density parameter is used in the calculation of the Observed Density. Enter the Vapor Density manually in the Tank Volume Calculation Setup window. If Vapor Density should not affect the Observed Density calculations, set the Vapor Density value as equal to the Ambient Air Density (Setup → System). |
| S&W | The percentage of sediment and water in the product. |
| Free Water Level, (FWL) | Manually entered or measured by a water interface sensor. |
| Free Water Volume, (FWV) | Calculated on the basis of the FWL and the TCT. |
| Pipeline | Estimated volume in the pipeline connected to the tank. |
| Pumpable Weight, (PW) | Calculated as Pumpable Volume (PV) multiplied by the observed density. |
| Available Weight Room, (AWRM) | Available Volume Room (AVRM) multiplied by the observed density. |
| Relative Observed Volume, (ROV) | Equal to $[TOV/Max\ Volume] * 100$ |

Related information

- [Product parameter setup](#)
- [Tank inventory configuration](#)

4.5.1 Hybrid tank measuring system

Table 4-7: Inventory parameters for liquid gas tanks

| Parameter | Description |
|-----------------------------|---|
| Air Density | Ambient air density. Default value 1.21kg/m ³ . |
| Vapor Density | Vapor density in tank. Default value 1.21kg/m ³ . |
| Vapor Pressure, Press Vapor | Vapor pressure above ambient air pressure (gauge pressure). If not available set P3 = 0. |
| Liquid Pressure, Press Liq | Liquid pressure above ambient air pressure (gauge pressure). |
| Press Sensor Levels | Distance between pressure sensor P1 and P3 (Ht). Distance from datum plate to mid of membrane of pressure sensor P1(Z). |
| Min Level | The lowest level when density calculation shall be performed. |
| Level | Liquid Level. |

Table 4-7: Inventory parameters for liquid gas tanks (continued)

| Parameter | Description |
|------------|-------------------------|
| Local Grav | Local gravity constant. |

4.5.2 Observed density

If a pressure transducer is installed in a tank, the density of the product can be calculated. This value is presented as the **Observed Density**.

In order to calculate the **Observed Density**, the correct local gravity constant must be given in WinOpi.

The **Observed Density** can also be calculated based on a manual value for **Reference Density**.

Related information

[System setup](#)

4.5.3 Reference density

The **Reference Density** is the density of a product at the standard reference temperature 15°C (60°F). This value can either be entered manually, or calculated automatically from the Average Temperature and the Observed Density, if available. Reference Density is calculated using a VCF according to API Tables 5A, 5B, 53A or 53B.

Weight calculations are performed using the calculated volumes and either a manually entered value for density or the observed density. The WIA, is calculated as the NSV multiplied by the WCF.

For floating roof tanks the volume calculations take into account if the roof is fully floating, or if it is partly resting on its supports and partly receiving some buoyancy from the product.

A Leak Alarm is available for changes to the NSV.

Related information

[Alarm handling](#)

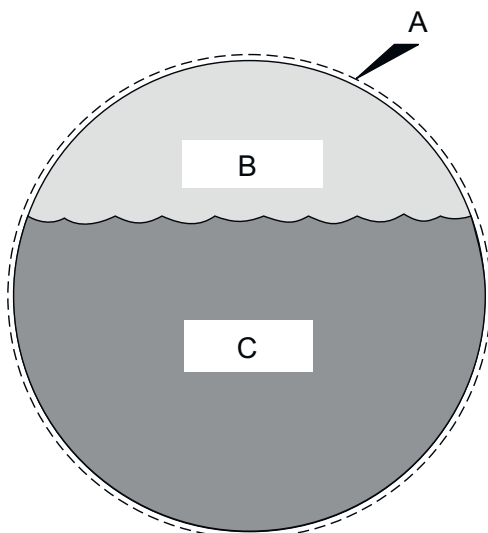
[Leak alarms](#)

4.5.4 Liquid gas tanks

For liquid gas tanks, the Molecular Mass, (MolMass), and the Vapour-Liquid-Volume Ratios (VLVR), can be entered into the product table.

For tanks containing liquid gas a number of parameters are relevant. The mass of gas (Vap Mass) in the Available Room is calculated and the corresponding liquid equivalent volume is presented as Liq Equ in the **Tank Inventory** window.

Figure 4-6: Liquid Gas Tank Inventory Parameters



- A. Maximum volume
- B. AVRM - Available Room
- C. TOV - Total Observed Volume

Table 4-8: Inventory parameters for liquid gas tanks

| Parameter | Description |
|-----------------------------------|---|
| MolMass | Molecular mass |
| Vapor-Liquid-Volume Ratios, VLVR | Volume ratio between vapor and liquid in the tank |
| Press Vapor | Vapor Pressure (gauge pressure) |
| Temp Vapor | Vapor temperature |
| Available Room, AVRM | Calculated by subtracting the TOV from the Maximum Volume of the tank |
| Vapor Mass, Vap Mass | Mass of the gas in the Available Room (AVRM) |
| Equivalent Liquid Volume, Liq Equ | The corresponding liquid volume of Vap Mass and is added to the NSV |

Related information

[Create a product table](#)

4.6 Tank inventory configuration

The following steps are included in the **Tank Inventory** configuration:

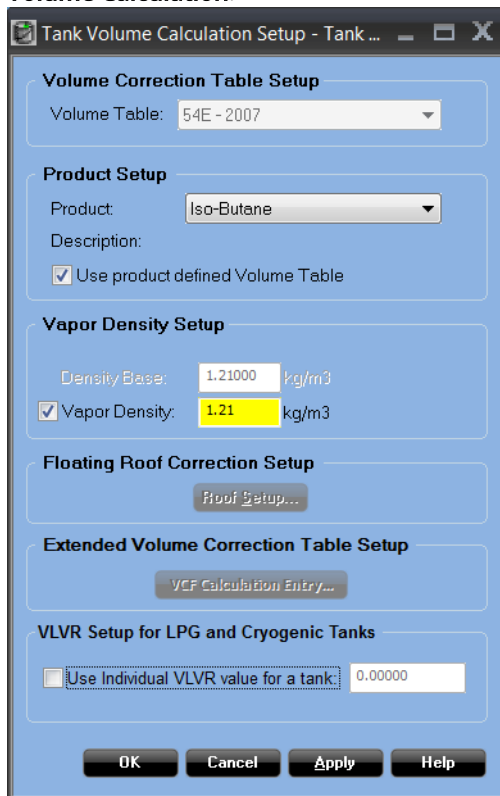
- Tank Volume Calculation Setup
- Product Parameter Setup

During operation, e.g. changing product in a tank, the setup is performed in the **Tank Volume Calculation Setup** and **Tank Entry** windows assuming that the product has been properly defined in the **Product Table**.

4.6.1 Tank volume calculation setup

Procedure

1. Right-click on a tank in the WinOpi workspace and select **Tank Setup** → **Tank Volume Calculation**, or select a tank and select menu option **Setup** → **Tank Setup** → **Tank Volume Calculation**.



2. Configure the appropriate parameters that apply on the current tank.

Volume correction table setup

In the Volume Table drop-down list, select the API Table to be used for VCF calculations.

RT tables allow you to use reference temperatures other than the standard 15 °C/60 °F. You can specify reference temperature in the **System Setup** window (**Setup** → **System**).

It is recommended to use the volume table that is defined in the Product Table.

For volume table CHEM, TankMaster WinOpi calculates the Observed Density by using the Reference Density from the Product Table.

Related information

[Create a product table](#)

Product setup

The Product Setup list contains products specified in the Product Table

For product table CHEM WinOpi uses data from the Product Table for inventory data calculations.

For LPG and Horizontal LPG tanks, the Product Table provides data to calculate vapor mass and liquid equivalent volume of vapor above the product surface. These values can be seen in the Vapor section in the **Tank Inventory** window, see menu option **View** → **Tank** → **Tank Inventory**.

Select check box **Use product defined Volume Table** in case you want to use volume tables specified in the **Product Table**. If this box is not selected, you can choose a volume table from the **Volume Table** drop-down list.

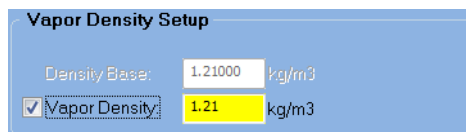
Related information

[Create a product table](#)

Vapor density setup

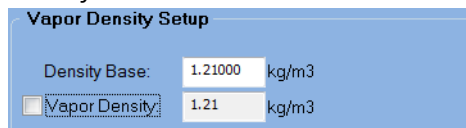
Vapor density can either be considered constant or it can be calculated:

- If the vapor density is considered constant, check the **Vapor Density** box and enter a manual value.



The screenshot shows a dialog box titled "Vapor Density Setup". It contains two rows of input fields. The first row is "Density Base:" with a text box containing "1.21000" and a unit label "kg/m3". The second row is "Vapor Density:" with a checked checkbox, a text box containing "1.21", and a unit label "kg/m3".

- If the vapor density is calculated, make sure the **Vapor Density** check box is unchecked and enter a Base Density. The Base Density is used by TankMaster to calculate Vapor Density.



The screenshot shows a dialog box titled "Vapor Density Setup". It contains two rows of input fields. The first row is "Density Base:" with a text box containing "1.21000" and a unit label "kg/m3". The second row is "Vapor Density:" with an unchecked checkbox, a text box containing "1.21", and a unit label "kg/m3".

Floating roof correction setup

For floating roof tanks, a number of roof correction parameters need to be configured in order to achieve proper volume calculations.

Open the Tank Roof Setup window

Procedure

1. Ensure that the **Tank Volume Calculation Setup** window is open.
2. In the **Tank Volume Calculation Setup** window, click the **Roof Setup** button.

The screenshot shows the 'Tank Roof Setup' dialog box with the following settings:

- Roof Correction Method:** Correction included in TCT, secondary correction calculated
- Correction calculation:** Roof Weight: 10.000 ton(m)
- Secondary correction of TCT volume:** Base Density: 980.0000 kg/m3, Volume Adjustment: 0.053 m3
- Roof Critical Zone:** Upper Level: 1.000 m, Lower Level: 0.500 m

Roof correction method

- Select the appropriate roof correction method.
- Enter the **Roof Weight** and the **Roof Critical Zone** where appropriate
- If the roof correction is calculated into the **Tank Capacity Table** (TCT) using a base density, a secondary correction must be calculated for any difference between the base density and the observed density
- If roof correction involves roof immersion, select the appropriate correction method and click the **Immersion Setup** button.



Correction calculation

Enter the weight of the floating roof.

Secondary correction of TCT volume

If the roof correction is calculated into the TCT using a base density, a secondary correction based on the **Base Density** and **Volume Adjustment** must be calculated. These parameters can be found in the TCT (tank certificate).

Roof critical zone

The effect of the calculated volume compensation in the Roof Correction Method depends on the roof position. Three intervals are used:

1. **Below Lower Level** (below Roof Critical Zone): when the roof is resting on its legs no compensation is made (indicated with a (*) symbol in the Tank Inventory window).
2. **Above Upper Level** (above Roof Critical Zone): when the roof is freely floating, full compensation is made for the volume reduction by the weight of the roof.
3. **Between Upper and Lower Level** (Roof Critical Zone): when the roof is partly floating, compensation is made through a weighted value (indicated with (@) in the Tank Inventory window).

Immersion

Floating roof immersion calculations are required for certain correction methods in order to achieve proper volume calculations.

Related information

[Immersion setup](#)

Extended volume correction table setup

The **Extended Volume Correction Table Setup** is used only for Linear and Custom volume tables. When these volume tables are selected, the **VCF Calculation Entry** button is enabled.

The Linear Volume table is used in a similar way as the CHEM volume table except it is not necessary to change the following parameters in the Product Table:

- Reference Density
- Density Change
- Reference Temperature

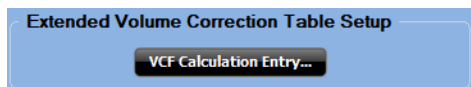
VCF calculation entry Linear

Prerequisites

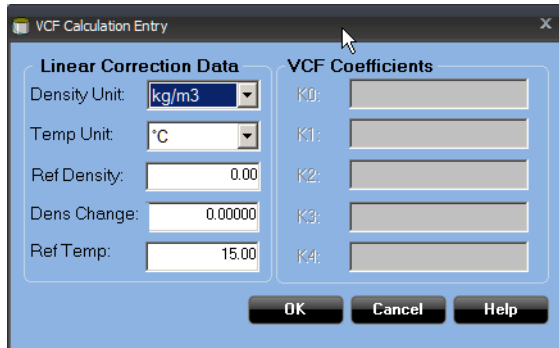
Ensure that volume table **Linear** is used.

Procedure

1. In the **Tank Volume Calculation Setup** window, click the **VCF Calculation Entry** button.



2. Enter appropriate values in the **Linear Correction Data** table.



3. Click **OK**.

VCF calculation entry Custom

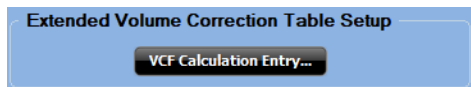
In the Custom Volume Table, a polynomial coefficient is used to calculate the Volume Correction Factor (VCF).

Prerequisites

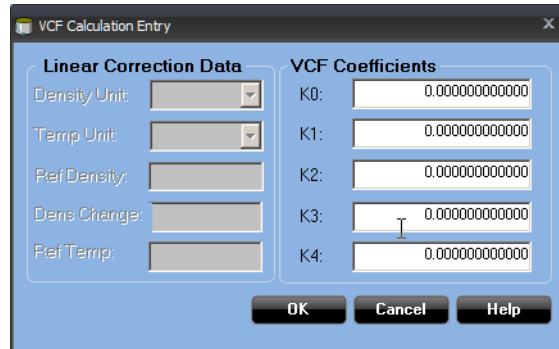
Ensure that volume table **Custom** is used.

Procedure

1. In the **Tank Volume Calculation Setup** window, click the **VCF Calculation Entry** button.



2. Enter the **VCF** coefficients.



3. Click **OK**.

VLVR setup for LPG and cryogenic tanks

The **Vapor Volume Liquid Ratio (VLVR)** is used for calculations of **Net Standard Volume (NSV)** for LPG products.

The Vapor Volume Liquid Ratio (VLVR) is one of the parameters specified in the Product Table. You may set an individual VLVR value for the current tank by selecting the check box and typing the desired VLVR value. When the check box is selected, this value will be used instead of the VLVR in the Product Table.

Related information

[Inventory parameters](#)

Immersion setup

The **Immersion Setup** window is used for configuration of floating roof immersion. This may be required for certain correction methods in order to achieve proper volume calculations.

Procedure

1. Right-click the desired floating roof tank in the WinOpi workspace
2. Select **Tank Setup** → **Tank Volume Calculation**.
3. In the **Tank Volume Calculation Setup** window, select the **Roof Setup** button.

4. In the **Tank Roof Setup** window, select the appropriate correction method for roof immersion, and click the **Immersion Setup** button.

Enter the appropriate calibration values. The sections **Calibration Values with weighing roof** and **Calibration Values without weighing roof** are enabled or disabled depending on the choice of correction method in the **Tank Roof Setup** window.

Immersion Setup

Current Immersion
Current Immersion: m

Reference Immersion (with product)
Reference Immersion: m
Timestamp:

Calibration Values (with weighing of roof)
Roof Area: m²
Water Immersion: m
Water Density: kg/m³

Calibration Values (without weighing of roof)
Connection Height: m
Roof - Wall Coefficient: m³ / m
Constant Volume: m³

Related information

[Floating roof correction setup](#)

4.6.2 Product parameter setup

TankMaster uses a number of product related parameters for the inventory calculations. To configure product parameters for a product in a specific tank.

Procedure

- In the Workspace do one of the following:
 - right-click on a tank and select **Tank Entry**
 - select a tank, and open menu option **Entry** → **Tank Entry**



- In the **Tank Entry** window you may specify a number of product parameters for inventory calculations. TankMaster can either use automatically measured data, or manually entered values, where possible.

The **Strength** parameter is used in conjunction with Volume Correction Table ALCOHOL.

FWV at zero level lets you add an offset value to the Free Water Volume.

For LPG and cryogenic tanks you may choose a method to use for Liquid Mass calculations.

To enter manual values select the corresponding check box and enter a value in the input field. Manual values are indicated by a yellow color.

Related information

[Tank volume calculation setup](#)

[Inventory parameters](#)

[Color settings](#)

4.7 Custody transfer approval

The **Custody Transfer Volume Approval** window gives an overview of the automatic and manual parameters and values used to calculate the volume of the product in the selected tank.

To open the **Custody Transfer Volume Approval** window, select **Batches** → **Custody Transfer** from the main menu.

Figure 4-7: Custody Transfer Volume Approval

| Calculation Input | |
|-------------------|-----------------|
| Tank Type | Fixed Roof |
| Level | 6.351 m |
| Avg Temp | 23.5 °C |
| Air Temp | 25.4 °C |
| Air Density | 1.17000 kg/m3 C |
| Ref Density | 707.00 kg/m3 |
| TEC Liquid | 0.0007000 /" |
| S&W | 0.0000 % |
| FWL | 0.000 m |
| Vol Table | 54B - 2004 |

| Approval Info | |
|---------------|----------|
| Approved : | Approved |
| Date : | |
| Name : | |

Buttons: OK, Cancel, Apply, Help

4.7.1 Approve volume transfer

The transfer of the product and given input values for volume calculation can be approved by authorised personnel.

Procedure

1. In the **Approval Info** section, select **Approved** from the Approved menu. The default value is Not Approved.
2. Enter a name of at least 4 characters.
3. Click **Apply**. The date and time stamp for the approval action is shown.
4. To reverse the decision:
 - a) In the **Approval Info** section, select **Not Approved** from the Approved menu.
 - b) Click **Apply**. The date and time stamp are removed.

4.8 Checklist for inventory parameter setup

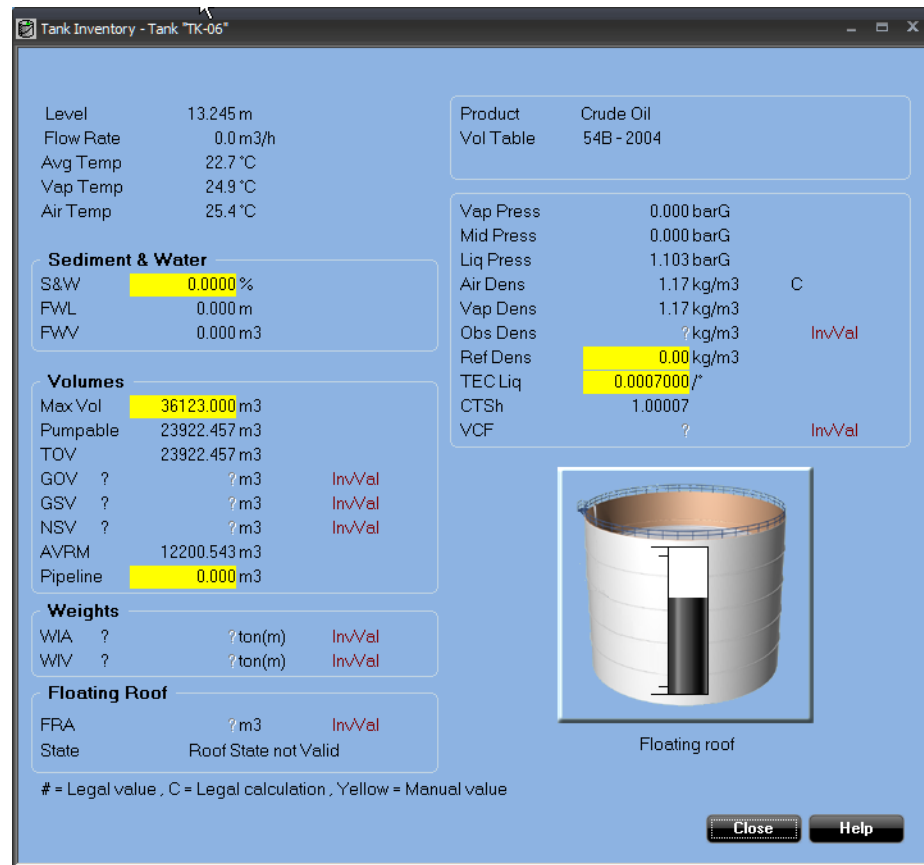
TankMaster presents inventory data based on measurements of a number of different parameters. Product level, temperature, vapor pressure, reference density, and free water level are some of the parameters included in the calculations.

If an inventory parameter is not properly presented, or if the value is outside the normal range, it may be due to missing input, or input data outside a specified range.

This checklist is intended to be used as a troubleshooting tool when inventory parameters are incorrect or missing.

If, for example, GSV is missing as shown in [Figure 4-8](#), the check list suggests parameters that should be checked. In this particular case the Reference Density is missing. As a result, the Observed Density value is outside the approved limit for products using Product Table 54B-2004.

Figure 4-8: Example of Tank Inventory Troubleshooting



The checklist refers to the following menus in TankMaster WinOpi:

Figure 4-9: Checklist Menu References

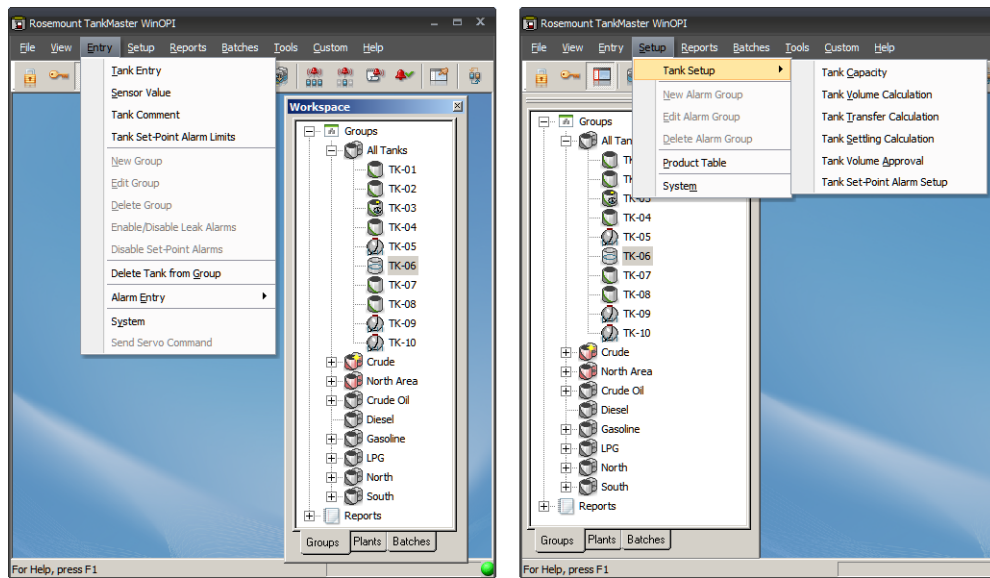


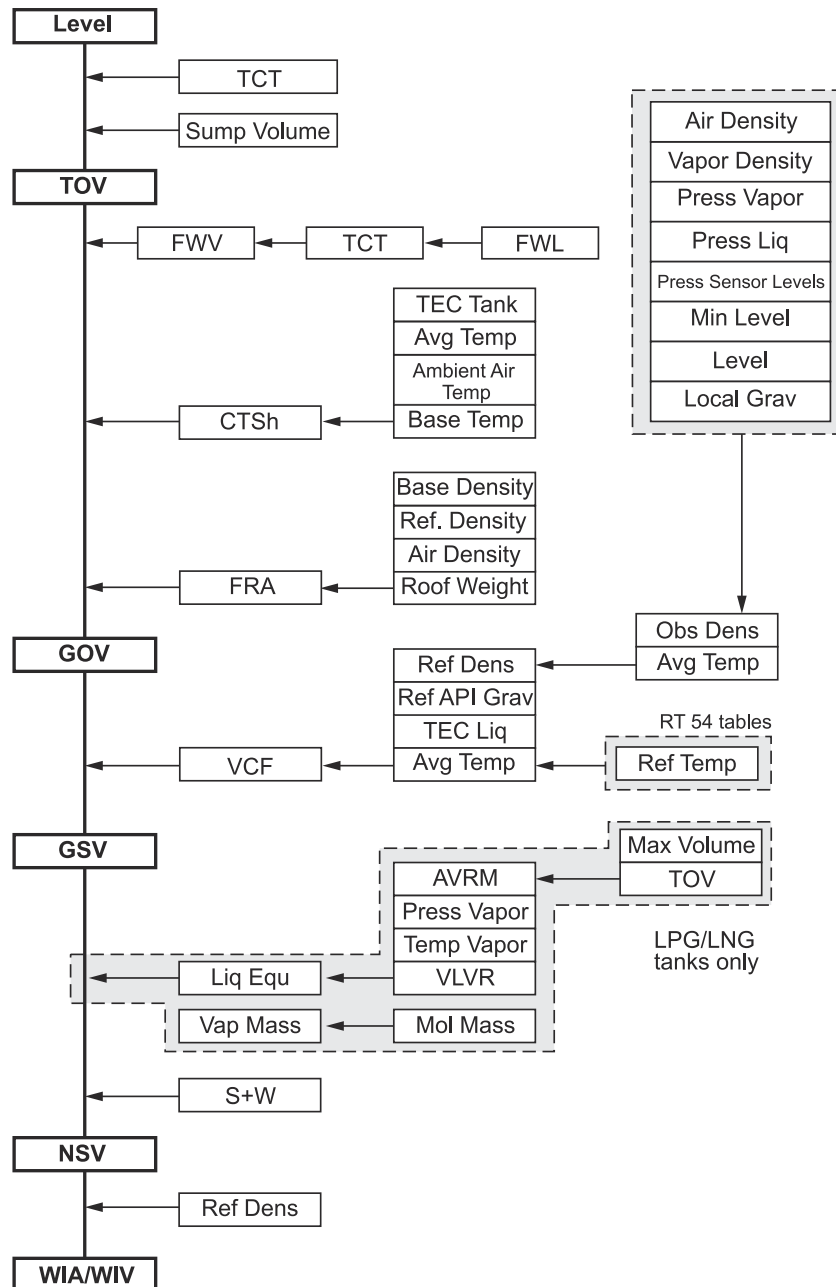
Table 4-9: Checklist Menu References

| Menu | Menu Option |
|----------------------|-------------------------|
| Entry | Tank Entry |
| | Sensor Value |
| | System |
| Setup > Tank Setup > | Product Table |
| | System |
| | Tank Capacity |
| | Tank Volume Calculation |

The checklist is based on the Tank Parameters flow chart. For each inventory parameter the checklist suggests which input parameters should be checked.

The checklist follows the reverse order in which parameters are calculated since this is the order in which errors appear.

Figure 4-10: Tank Parameters Flow Chart



4.8.1 WIA / WIV

Procedure

1. If WIA is incorrect or missing, check NSV.
2. If NSV is OK, check the following parameters:

| Parameter | WinOpi menu |
|-------------------|---------------------------|
| Reference Density | Entry → Tank Entry |

4.8.2 NSV

Procedure

1. If NSV is incorrect or missing, check GSV.
2. If GSV is OK, check the following parameters and sensors:

| Parameter | WinOpi menu |
|-----------------------------|--|
| Sediment & Water (S&W) | Entry → Tank Entry |
| LPG/LNG applications | |
| Vapor Pressure | Entry → Sensor Value <i>WinSetup menu: Service</i> → Devices → LPG Setup |
| Vapor Temperature | Entry → Sensor Value <i>WinSetup menu: Service</i> → Devices → LPG Setup |
| Product | Setup → Tank Volume Calculation |
| Vapor Liquid Ratio (VLVR) | Setup → Product Table |
| Mol Mass | Setup → Product Table |

4.8.3 GSV

Procedure

1. If GSV is incorrect or missing, check GOV.
2. If GOV is OK, check the following parameters:

| Parameter | WinOpi menu |
|---|--|
| Reference Density | Entry → Tank Entry |
| TEC Liquid (Table 6C, 24C, 54C, 60C) | Entry → Tank Entry |
| Volume Table | Setup → Tank Volume Calculation |
| Volume Table | Setup → Product Table |
| Average Temperature | Entry → Sensor Value |
| Automatic Density Measurement | |
| Ambient Air Density | Setup → System |

| Parameter | WinOpi menu |
|-----------------------------------|--|
| Vapor Density | Setup → Tank Volume Calculation |
| Vapor Pressure | Entry → Sensor Value |
| Liquid Pressure | Entry → Sensor Value |
| Pressure sensor positions | WinSetup: Service → Tanks → Tank Hybrid Calculation |
| Hybrid Minimum Level | WinSetup: Service → Tanks → Tank Hybrid Calculation |
| Local Gravity | Setup → System |
| Volume Table CHEM | |
| Reference Density | Setup → Product Table |
| Density Change | Setup → Product Table |
| Reference Temperature | Setup → Product Table |
| RT<nn> volume tables | |
| Reference Temperature | Setup → System |

4.8.4

GOV

Procedure

1. If GOV is incorrect or missing, check TOV.
2. If TOV is OK, check the following parameters:

| Parameter | WinOpi menu |
|-------------------------|---|
| Free Water Level (FWL) | Entry → Tank Entry |
| Average Temperature | Entry → Sensor Value |
| TEC Tank | Setup → Tank Capacity |
| Ambient Air Temperature | Entry → System |
| Floating Roof | |
| Roof Weight | Setup → Tank Volume Calculation / Roof Setup |
| Reference Density | Entry → Tank Entry |
| Ambient Air Density | Setup → System |
| Base Density | Setup → Tank Volume Calculation / Roof Setup |
| Volume Adjustment | Setup → Tank Volume Calculation / Roof Setup |

4.8.5 TOV

Procedure

1. If TOV is incorrect or missing, check the measured level value.
2. If Level is OK, check the following parameters:

| Parameter | WinOpi menu |
|---------------------|------------------------------|
| Tank Capacity Table | Setup → Tank Capacity |

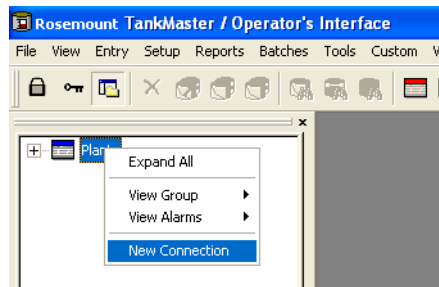
4.9 Connect WinOpi to the tank server

4.9.1 Connect WinOpi procedure

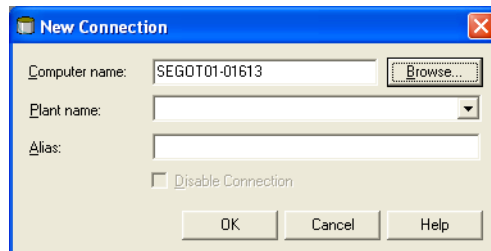
To connect TankMaster WinOpi to the Tank Server do the following:

Procedure

1. Open the **WinOpi** workspace on the client computer.
2. Select the **Plants** view.



3. Right-click the **Plants** icon and select **New connection**. The **New Connection** window appears allowing you to connect to the desired **Tank Server**.
4. Click **Browse** and select the computer where the **Tank Server** is located.



5. Type the desired **Plant name** to appear in the WinOpi workspace. **Alias** designates the name that will be used for the Tank Server in the WinOpi workspace.
6. Click **OK** when finished.

5 Alarm handling

Rosemount TankMaster lets you manage various types of alarms. You can set alarm levels as well as hysteresis and delay times for various parameters, such as Level, temperatures, and analog input signals.

An alarm status can be one of the following:

- HiHi
- High
- LoLo
- Low
- Leak Hi
- Leak Lo
- CFail (communication failure)
- Normal
- Error

The data that TankMaster receives from field devices are continuously checked against the alarm limits. Alarm limits, delay times, hysteresis and leak alarms are defined by the operator in the password protected **Alarm Limits** window.

If a value exceeds an alarm limit, the corresponding alarm will be activated after a certain delay as given by the **Delay Time** setting. The alarm status will flash bright red in, for example, the **Alarm Summary** window, or the **Tank Inventory** window until the operator accepts the alarm.

Even if conditions have returned to normal, the alarm status is not reset until the operator has accepted the alarm. In order to accept and disable an alarm, the parameter that caused the alarm must pass below the alarm limit and satisfy the **Alarm Hysteresis** value. When these conditions are satisfied, the alarm reset is delayed an amount of time given by the **Delay Time**.

When an alarm is accepted, the alarm status turns dark red by default. **Alarm colors** can be changed.

Related information

[Alarm colors](#)

[Alarm status](#)

[Color settings](#)

5.1 Leak alarms

There are two leak alarms - level leak, and volume leak.

- the level leak alarm monitors product level changes
- the volume leak alarm monitors changes in the NSV

When the Leak Limit is set, the current value for tank level, or volume, is stored. The difference between the actual value and the stored value is monitored, and the Leak Alarm is activated when this difference becomes greater than the leak limit defined by the operator.

5.2 Sensor failure

In the event of a sensor failure, for example if a temperature sensor malfunctions, then the sensor status **Error** is displayed.

5.3 Communication failure

If a Rosemount 2460 System Hub, or a Rosemount 2410 Tank Hub does not respond after three queries, the alarm status of the tank parameters are set to **Communication Failure (CFail)** and the following error message displayed in the status bar: <Tank Name> **CFail**.

All parameters associated with a unit that do not respond inherit the **CFail** status in this case. Even though the status of the alarm can be shown for a number of parameters, it is only regarded as one alarm, and therefore only needs to be accepted once for each unit.

5.4 Alarm status priority

Each parameter status has a certain priority, as shown below. If, for example a CFail alarm is activated for a specific tank, the alarm status Error will not be shown for that tank as long as the CFail status is valid.

If the parameter is disconnected then **Discon** will replace **CFail** as the parameter status.

Alarms are given the following order of priority:

1. Disconnect (Discon)
2. Communication Failure (CFail)
3. Error
4. Blocked
5. HiHi, LoLo
6. Leak Alarm Hi, Leak Alarm Lo
7. High, Low

Note

Priorities 1 to 4 are only valid for automatically measured values, not for manual values.

Related information

[Disconnecting alarms](#)

5.5 Setting alarm limits

An Operator can set up alarm limits for various parameters in the **Alarm Limits** window, including:

- Level and level rate
- Average temperature and vapor temperature
- Analog inputs
- Vapor pressure and liquid pressure

5.5.1 Alarm limits

The **Alarm Limits** window lets you specify limits for a large number of parameters.

Procedure

1. In the TankMaster workspace right-click on a tank and choose **Alarm Entry** → **Alarm Limits**, or select the same option in the **Entry** menu.

| Sensors | Hi | Lo | Hysteresis | Delay |
|-------------|--------|--------|------------|-------|
| Avg Temp: | 125.0 | -40.0 | 0.0 °C | 0 s |
| Vap Temp: | 125.0 | -40.0 | 0.0 °C | 0 s |
| Outer Temp: | 125.0 | -40.0 | 0.0 °C | 0 s |
| FWL: | 1.000 | -0.500 | 0.000 m | 0 s |
| Vap Press: | 30.000 | -1.000 | 0.000 barG | 0 s |
| Mid Press: | 30.000 | -1.000 | 0.000 barG | 0 s |
| Liq Press: | 30.000 | -1.000 | 0.000 barG | 0 s |
| A In 1: | 30.000 | -1.000 | 0.000 barG | 0 s |
| A In 2: | 30.000 | -1.000 | 0.000 barG | 0 s |
| A In 3: | 30.000 | -1.000 | 0.000 barG | 0 s |
| H In 1: | 30.000 | -1.000 | 0.000 barA | 0 s |
| H In 2: | 30.000 | -1.000 | 0.000 barA | 0 s |
| H In 3: | 30.000 | -1.000 | 0.000 barA | 0 s |
| H In 4: | 30.000 | -1.000 | 0.000 barG | 0 s |
| C In 1: | 30.000 | -1.000 | 0.000 barG | 0 s |
| C In 2: | 30.000 | -1.000 | 0.000 barG | 0 s |
| C In 3: | 30.000 | -1.000 | 0.000 barG | 0 s |
| C In 4: | 30.000 | -1.000 | 0.000 barG | 0 s |

2. Specify the desired alarm limits.

Leak Once a Leak alarm is activated, the alarm will trigger in case the level value drops the amount specified in the **Leak** entry field.

Leak alarm for **Volume** can be set in the **Volume Alarm Limits** window. A volume leak alarm monitors changes of the Net Standard Volume (NSV).

Leak alarms can be enabled and disabled for **single tanks** as well as for entire **tank groups**.

| | |
|-------------------------------|---|
| Hi, HiHi, Lo, and LoLo | These alarms can be set for Level, Level Rate, and various sensors. |
| Hysteresis | <p>Prevents alarms from activating due to turbulent surface level conditions.</p> <p>For example, the Level Hi limit is set to 10 m and the hysteresis to 0.1 m. The alarm is activated when the level exceeds 10 m and remains active until the level drops below 9.9 m. In this case, small waves on the liquid surface do not influence the Hi alarm.</p> <p>For example: the Level Rate Hi limit is set to 4,5 m/h and the hysteresis to 0.1 m/h. The alarm is activated when the level exceeds 4,5 m/h. It remains active until the level rate drops below 4,4 m/h. In this case fluctuations in the flow do not influence the Hi alarm.</p> |
| Delay | A delay time can be used to prevent temporary changes of the measurement value from activating the alarm. This value specifies the delay in seconds. |

3. When finished, click **OK** to activate the current settings and close the **Alarm Limits** window.

Related information

[Volume alarm limits](#)

[Disconnecting alarms](#)

[Enable and disable leak alarms](#)

5.5.2 Volume alarm limits

Volume alarm limits can be configured for Net Standard Volume (NSV), Flow Rate, and Flow Direction.

Procedure

1. Right-click on a tank in the workspace and select **Alarm Entry** → **Volume Alarm Limits**, or choose the same option from the **Entry** menu.

The screenshot shows a dialog box titled "Volume Alarm Limits" for "Tank: 'TK-03'". It contains three main sections:

- Net Standard Volume:** Includes a note "Note: Batch function will change Hi and Lo limits." and input fields for Hi (100000.000 m3), Lo (0.000 m3), Leak (0.100 m3), Hysteresis (0.000 m3), and Delay (0 s).
- Flow Rate:** Includes a note "Note: Batch function will enable/disable." and input fields for Hi (20000.0 m3/h), Hysteresis (0.0 m3/h), Delay (0 s), an "Enabled" checkbox, a value of 10.0 m3/h, and a Start Delay of 60 s.
- Flow Direction Alarm:** Includes a note "Note: Batch function will change option." and radio buttons for Disabled (selected), Filling, and Emptying. It also has a Leak input field set to 0.5 m3/h.

At the bottom are buttons for OK, Cancel, Apply, and Help.

2. Enter alarm limits in the appropriate input fields.
3. Click **Apply** to activate the current settings and **OK** to close the **Volume Alarm Limits** window.

Net Standard Volume

Hi, Lo

Defines alarm thresholds for high and low conditions.

Leak

A volume leak alarm monitors changes in the Net Standard Volume (NSV).

Hysteresis

A hysteresis value can be set to stop alarms activating due to turbulent surface level conditions.

Delay

The Delay time can be used to prevent temporary changes of the measurement value from activating the alarm. This value specifies the delay in seconds.

Flow rate

Hi

Defines the alarm threshold for the high condition.

Hysteresis

A hysteresis value is configured to stop alarms activating due to turbulent surface level conditions when filling or emptying a tank

For example: the Level Hi limit is set to 10 m³/h and the hysteresis to 0.1 m³/h. The alarm is activated when the level exceeds 10 m³/h. It remains active until the level drops below 9.9 m³/h. In this case small waves on the liquid surface do not influence the Hi alarm.

Delay

The Delay time can be used to prevent temporary changes of the measurement value from activating the alarm. This value specifies the delay in seconds.

Low flow

The **Low Flow** option is a safety feature which is used to verify that the correct tank is activated when filling or emptying is in progress.

Enabled enables the Flow Rate Lo alarm function. This value specifies the minimum flow in m³/h.

Start Delay the amount of time that is given to reach the maximum transfer rate. If the time limit is exceeded and the flow rate is too low, an alarm is triggered. This value specifies the delay in seconds.

Flow direction alarm

The Flow Direction Alarm monitors the direction of flow. If the flow direction is other than expected an alarm is triggered.

Disabled The Flow Direction Alarm function is disabled.

Filling If the product is pumped out of the tank, TankMaster will trigger a High Leak alarm for the flow rate parameter.

Emptying If the product is pumped into the tank, TankMaster will trigger a High Leak alarm for the flow rate parameter.

Leak

In order to avoid unnecessary alarms in turbulent conditions, for example, soon after pumping begins, a flow rate limit can be specified in the Leak input field.

If the product temporarily flows in the wrong direction, the **Flow Direction Alarm** will not be triggered as long as the flow rate remains below the **Leak** value.

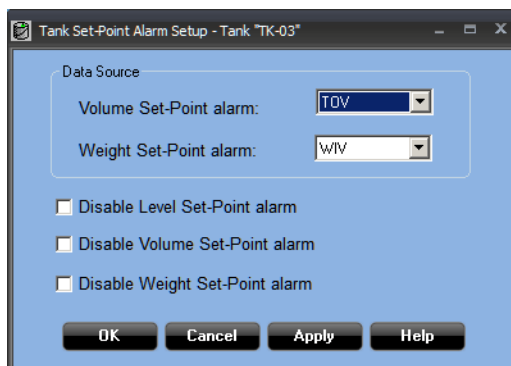
5.5.3 Set-point alarms

The **Set-point Alarms Setup** option allows you to specify alarm limits for Level, Volume and Weight parameters. Set-point alarms must first be enabled in the **Tank Set-Point Alarm Setup** window.

Set-point alarm setup

Procedure

1. In the TankMaster workspace do one of the following:
 - right-click on the desired tank and select **Tank Setup** → **Tank Set-Point Alarm Setup**
 - open the **Setup** menu and select **Tank Setup** → **Tank Set-Point Alarm Setup**.
2. In the **Tank Set-Point Alarm Setup** window you can enable or disable **Level**, **Volume**, and **Weight** set-point alarms for the selected tank.



You can also specify **Data Source** for Volume and Weight set-point alarms:

| | |
|---------------|-----------------------|
| Volume | TOV, GOV, GSV, or NSV |
| Weight | TOV, GOV, GSV, or NSV |

3. Click **OK** to close the **Tank Set-Point Alarm Setup** window and activate the selection.

Note

Only set-point alarms enabled in the **Tank Set-Point Alarm Setup** window are available in the **Set-Point Alarm Limits** window.

Related information

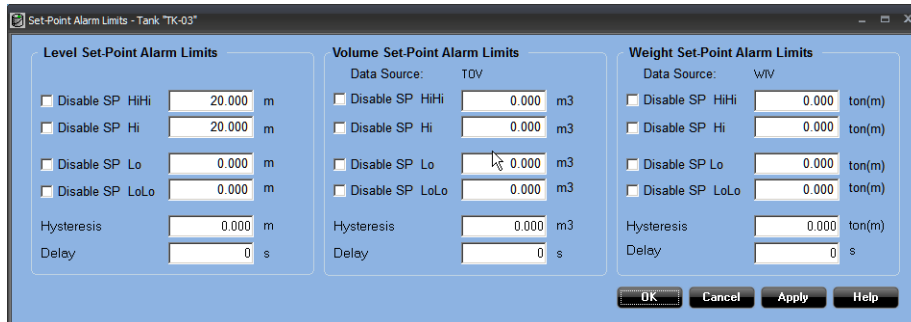
[Set point alarm limits](#)

Set point alarm limits

The **Tank Set-Point Alarm Limits** window lets you set LoLo, Lo, Hi, and HiHi alarm limits for Level, Volume, and Weight set-point alarms.

Procedure

1. In the TankMaster workspace do one of the following:
 - right-click on the desired tank and select **Tank Set-Point Alarm Limits**
 - open menu option **Entry** → **Tank Set-Point Alarm Limits**.

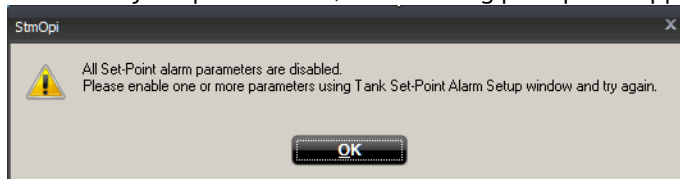


2. The **Tank Set-Point Alarm Limits** window lets you configure the desired alarm limits as well as Hysteresis and Delay for the selected tank.

Note

The **Tank Set-Point Alarm Limits** window only shows enabled alarm options.

If you attempt to open the **Tank Set-Point Alarm Limits** window before you have enabled any set-point alarms, the following prompt will appear:



Related information

[Set-point alarm setup](#)

Viewing set-point alarms for a tank

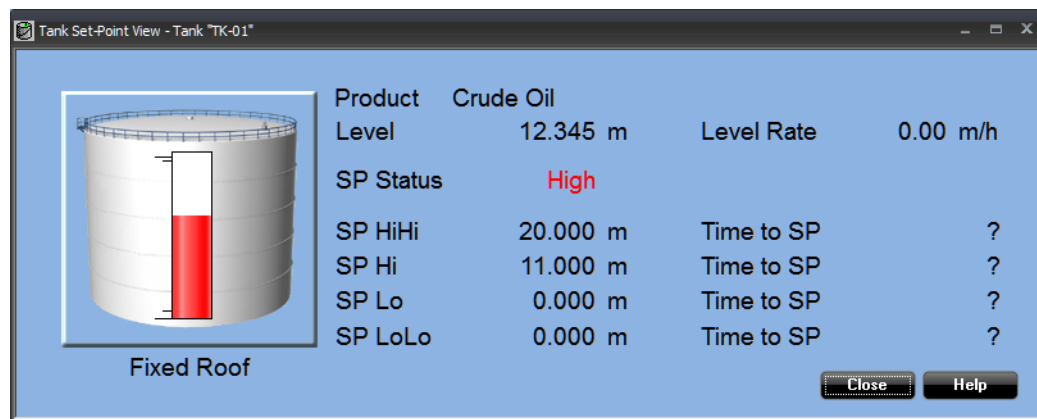
You can view set-point alarm details for a tank.

Procedure

In the TankMaster workspace do one of the following:

- right-click on the desired tank and select **View Tank** → **Tank Set-Point**
- open menu option **View** → **Tank** → **Tank Set-Point** .

Figure 5-1: Set-point View



Alarm sounds

Specific sounds can be used for set-point alarms.

Related information

[Alarm setup](#)

Alarm colors

Specific colors can be used for set-point alarms in inventory windows. You can specify colors for the different set-point alarms (LoLo, Lo, Hi, HiHi) as well as for the text string that shows alarm type, date and time.

Related information

[Alarm setup](#)

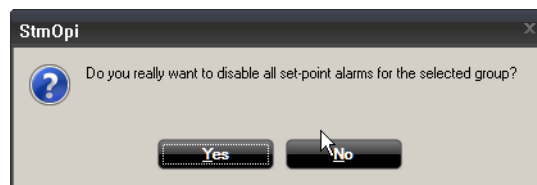
Disable set-point alarms for a tank group

You can disable set-point alarm details for a tank group.

Procedure

1. In the TankMaster workspace do one of the following:
 - right-click on the desired tank and select **Disable Set-Point Alarms**
 - open menu option **Entry** → **Disable Set-Point Alarms**.
2. You will be prompted to confirm that you want to disable all set-point alarms for the selected group.

Figure 5-2: Disable Set-point Alarm Parameters



5.6 Alarm summary

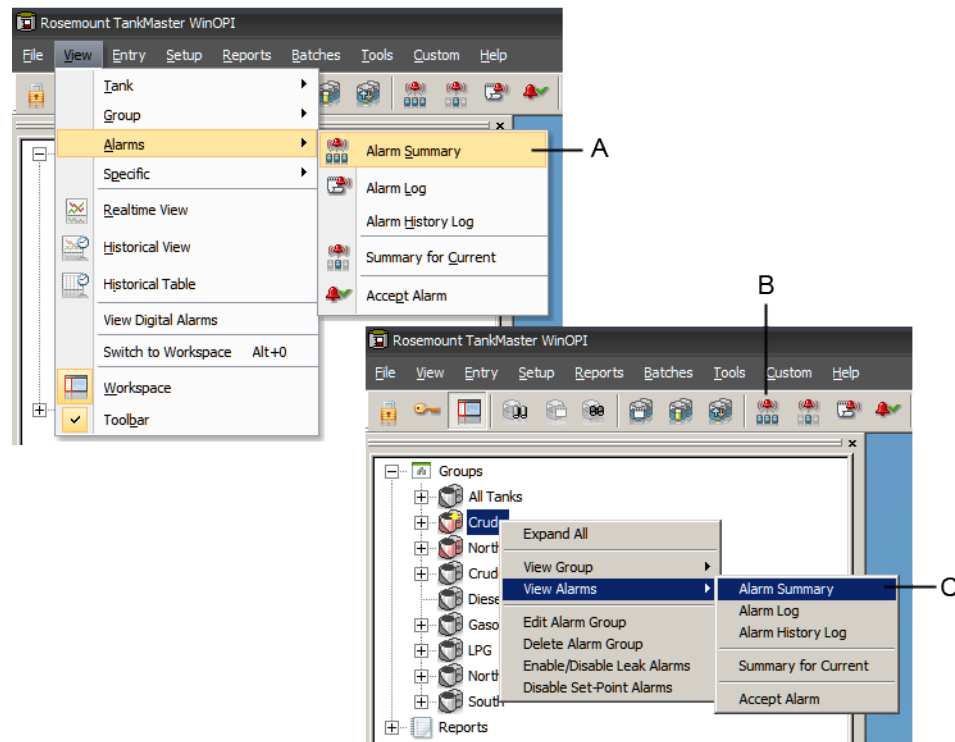
TankMaster makes it easy to view a summary of alarm details for a particular group of tanks, or for all tanks in the system.

Procedure

To view a summary of current alarms for a group, do one of the following:

- in the Workspace, select a tank group and select menu option **View Alarms** → **Alarm Summary**
- right-click on a group and select **View Alarms** → **Alarm Summary**
- click the **Alarms Summary** button in the toolbar

Figure 5-3: Alarm Summary



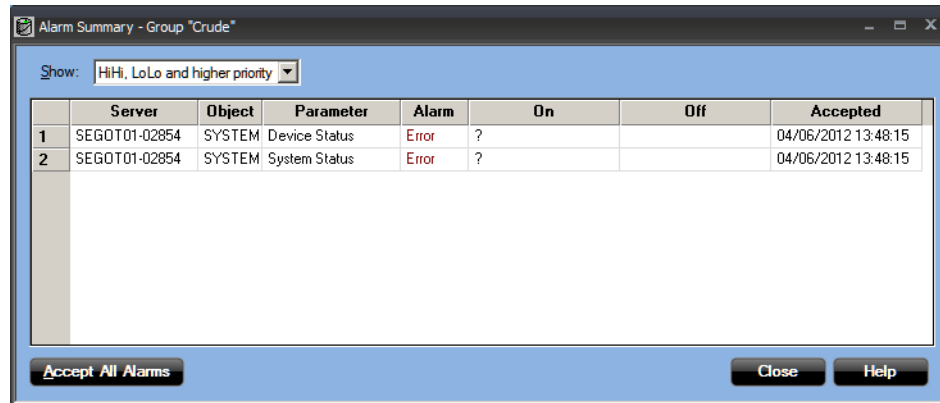
- View** → **Alarms** toolbar menu option
- Alarms Summary** shortcut button
- View Alarms** right-click menu option

5.6.1 View alarm summary

The **Alarm Summary** window shows details for active alarms including related tanks and parameters. The time when an alarm was activated is shown in the **On** column, and the time it was accepted is shown in the **Accepted** column.

An alarm is displayed until it is accepted and the cause of the alarm is resolved.

Figure 5-4: Alarm Summary



Note

A Leak Lo/Hi alarm is not removed until it has been disconnected in the **Alarm Disconnect** window.

Related information

[Disconnecting alarms](#)


5.7

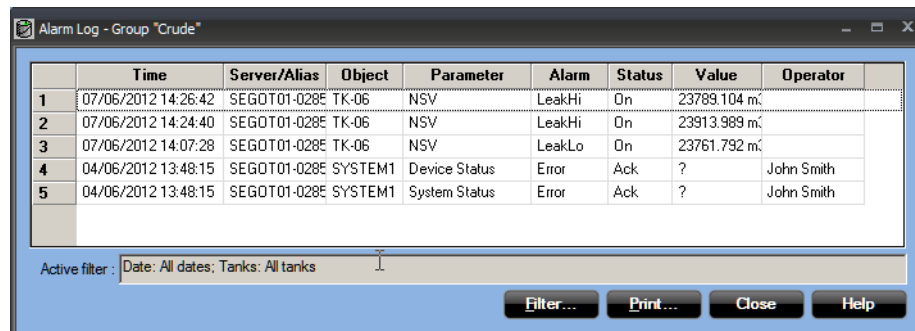
Alarm log

TankMaster has an alarm log which allows you to view the alarm history for a tank or a group of tanks. The **Alarm Log** window shows a list of logged alarms as well as other important information such as tank name, time and date, and the operator who accepted the alarm.

Procedure

To view the **Alarm Log** for a selected group, do one of the following:

- Right-click on a tank group in the TankMaster workspace and select **View Alarms** → **Alarm Log**.
- From the **View** menu, choose **View Alarms** → **Alarm Log**
- Click the **Alarm Log** button  in the toolbar



Similar to the **Alarm Summary**, the **Alarm Log** window displays the following information for each alarm:

- Alarm type (High, Low etc.).

- Tank name.
- Parameter that activated the alarm.
- Parameter value when the alarm was activated.
- Alarm status.
- Time and date when the alarm was activated and accepted.
- Operator who accepted the alarm.

5.7.1 Alarm status

The following values can be applied to the **Status** column:

- When an alarm is activated, the status column displays **On**
- When the alarm is accepted, the status changes to **Acc**

If an alarm is unaccepted, the status will continue be displayed as **On**, even if the value that activated the alarm returns to normal.

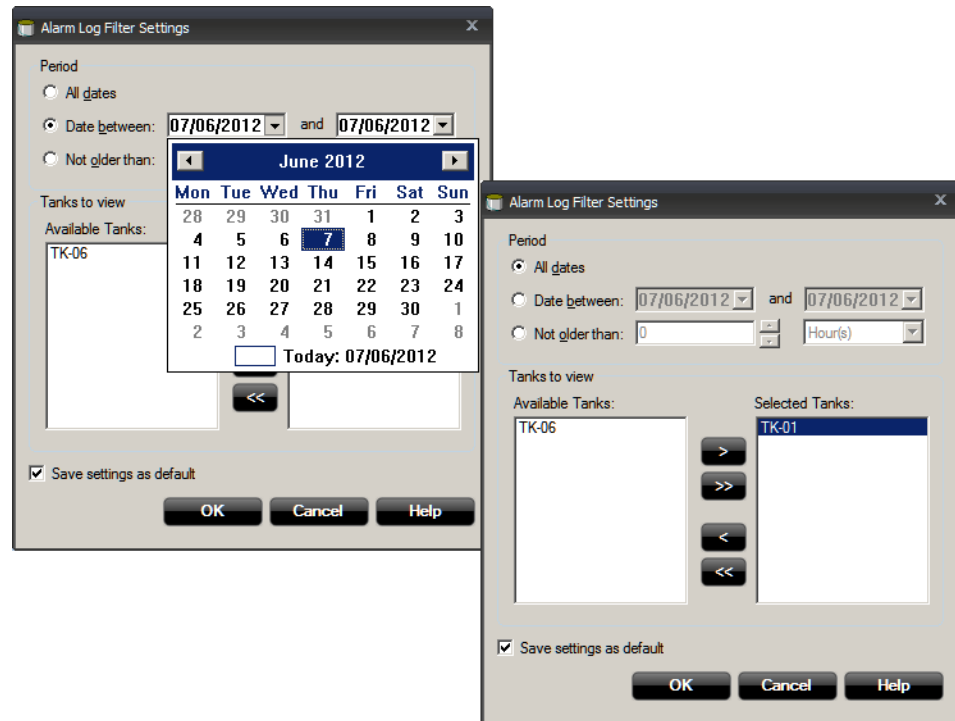
The alarm status is changed to **Off** when the corresponding alarm has been accepted and the value that activated the alarm returns to within the accepted range.

5.7.2 Filter settings

The **Alarm Log** can be filtered by tanks and time period.

Procedure

1. In the **Alarm Log** window, click the **Filter** button:



Note

In case a single tank is shown in the **Alarm Log** window, only that particular tank will appear in the **Selected Tanks** pane when the **Filter** button is pressed. All tanks will appear in the **Selected Tanks** pane if **All Tanks** option is selected in the **Alarm Log** window.

2. In the **Alarm Log Filter Settings** window, specify the desired time period:
 - a) Choose **All dates** to view every alarm that has been logged for the selected tanks.
 - b) Select **Date between** to view alarms within a specific period.
 - c) Click **Not older than** to view all alarms from a certain point until the present time.
3. To filter tanks that the alarm log will apply to, select a tank in the **Available Tanks** pane and click the **Add** button. Tanks can be removed from the **Selected Tanks** pane by clicking the **Remove** button.
4. Optional: Select the **Save settings as default** check box in case you would like to use the selected settings as default for the **Alarm Log**.
5. Click **OK**.

Related information

[Viewing the alarm history log](#)

5.7.3 Saving the alarm log to file

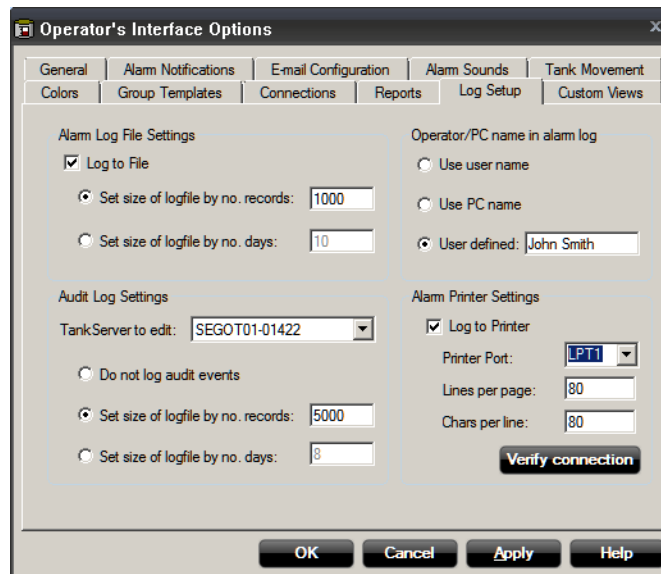
The **Alarm Log** can be saved to file and the log file can be viewed in the **Alarm History** window.

Note

The **Filter** option in the **Alarm History** window can be used to reduce the displayed number of days. This will not affect the actual number of days stored in the log file.

Procedure

1. From the **Tools** menu, choose **Options**.
2. Select the **Log Setup** tab:



3. Select the **Log to File** option.
4. Set the maximum log file size by specifying the **number of records** or the **number of days** to be logged:
 - 10 days will save all alarm events from the previous 10 days up until the current time.
 - 1000 records will save 1000 alarm events to the alarm log.
5. Click **Apply** to save the alarm log file settings.
6. Click **OK** to close the program options.

Related information

[Viewing the alarm history log](#)

5.7.4 Viewing the alarm history log

If the **Alarm Log** is saved to file, it can be viewed in the **Alarm History** window.

Procedure

- To view the alarm log history for a tank group, do one of the following:
 - Right-click on a tank group in the TankMaster workspace and select **View Alarms** → **Alarm History Log**.
 - From the **View** menu, select **Alarms** → **Alarm History Log**

| | Time | Server/Alias | Object | Parameter | Alarm | Status | Value | Operator |
|----|---------------------|--------------|--------|-----------|--------|--------|-------------|--------------|
| 1 | 07/06/2012 14:26:42 | SEGOT01-028E | TK-06 | NSV | LeakHi | On | 23789.104 m | |
| 2 | 07/06/2012 14:24:40 | SEGOT01-028E | TK-06 | NSV | LeakHi | On | 23913.989 m | |
| 3 | 07/06/2012 14:07:28 | SEGOT01-028E | TK-06 | NSV | LeakLo | On | 23761.792 m | |
| 4 | 07/06/2012 10:17:11 | SEGOT01-028E | TK-01 | Level | Low | Ack | 12.345 m | SEGOT01-028E |
| 5 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 6 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 7 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 8 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 9 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 10 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 11 | 04/06/2012 23:18:28 | SEGOT01-028E | TK-01 | Level | Low | On | 0.000 m | |
| 12 | 04/06/2012 13:48:18 | SEGOT01-028E | TK-01 | Level | Low | Ack | 12.345 m | John Smith |
| 13 | 02/06/2012 07:40:31 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |

Active filter : Date: All dates; Tanks: All tanks

Buttons: Filter..., Print..., Close, Help

- Click the **Filter** button to specify which tanks to show in the **History Log** or to change time periods.
- Click **Print** to print the alarm history log.
- Click the **Close** button to close the **Alarm History** window.

Related information

[Saving the alarm log to file](#)

[Filter settings](#)

[Alarm printer settings](#)

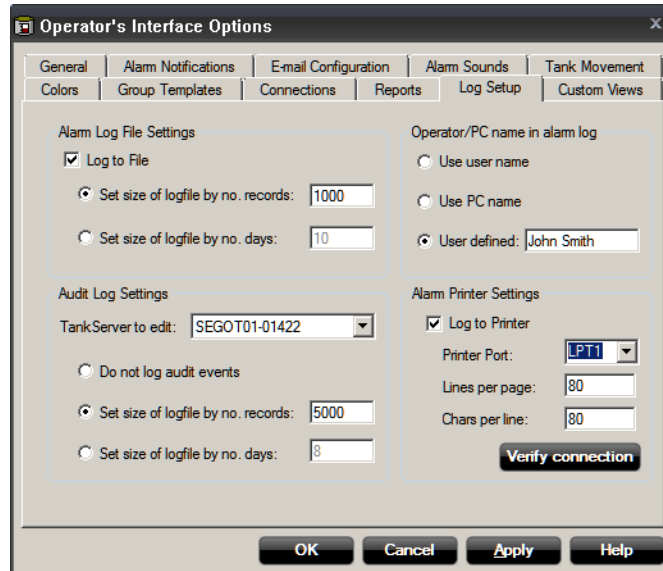
5.7.5 Alarm printer settings

Alarms can be printed directly to a printer. A print out of an alarm is executed when the alarm is activated.

Procedure

- From the **Tools** menu choose **Options**.

2. Select the **Log Setup** tab:



3. Select the **Log to Printer** check box.
4. Select the appropriate **Printer Port** option for the designated printer.
5. Enter a value for the maximum number of lines to be per printed page.
6. Enter a value for the maximum number of characters per line.
7. Click the **Verify connection** button to print a test page.
8. Click **Apply** to save the settings.
9. Click **OK** to close the program options.

Related information

[Viewing the alarm history log](#)

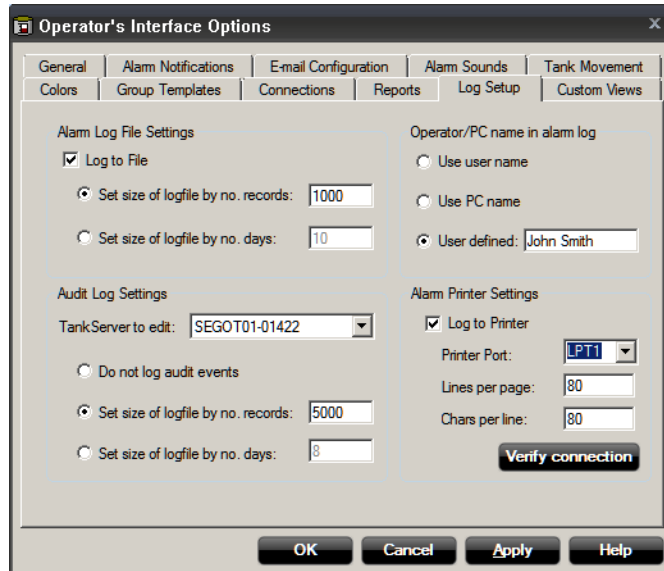
5.7.6 Changing the operator name

The Operator name can be displayed in three different ways when it is associated with accepted alarms in the **Alarm Log** window.

Procedure

1. From the **Tools** menu choose **Options**.

2. Select the **Log Setup** tab:



3. Choose one of the following:

- User name - User Id for logging in to the workstation.
- PC name - node name of the current workstation in the network.
- User defined - a custom name to be displayed in the Operator field.

4. Click **Apply** to save any changes.

5. Click the **OK** button to close the program options.

The **Alarm Log** shows which alarms have been accepted by an Operator.

Figure 5-5: Alarm History

| | Time | Server/Alias | Object | Parameter | Alarm | Status | Value | Operator |
|----|---------------------|--------------|--------|-----------|--------|--------|-------------|--------------|
| 1 | 07/06/2012 14:26:42 | SEGOT01-028E | TK-06 | NSV | LeakHi | On | 23789.104 m | |
| 2 | 07/06/2012 14:24:40 | SEGOT01-028E | TK-06 | NSV | LeakHi | On | 23913.989 m | |
| 3 | 07/06/2012 14:07:28 | SEGOT01-028E | TK-06 | NSV | LeakLo | On | 23761.792 m | |
| 4 | 07/06/2012 10:17:11 | SEGOT01-028E | TK-01 | Level | Low | Ack | 12.345 m | SEGOT01-028E |
| 5 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 6 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 7 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 8 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 9 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 10 | 04/06/2012 23:18:32 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |
| 11 | 04/06/2012 23:18:28 | SEGOT01-028E | TK-01 | Level | Low | On | 0.000 m | |
| 12 | 04/06/2012 13:48:18 | SEGOT01-028E | TK-01 | Level | Low | Ack | 12.345 m | John Smith |
| 13 | 02/06/2012 07:40:31 | SEGOT01-028E | TK-01 | Level | Low | Off | 12.345 m | |

A. PC name

B. User defined name

5.8 Alarm groups

Alarm groups can be used to distribute the authority to accept alarms. An alarm group can contain tanks with a similar type of product which can be associated with different workstations or users.

From the current workstation, alarms can only be accepted from an **Active** alarm group. Other alarms are indicated, but can not be accepted. An alarm group can be set as **Active** when it is created by selecting the **Set as active alarm group** check box in the **New Alarm Group** window, or at a later time by right-clicking on the group and selecting **Edit Alarm Group**.

5.8.1 Creating an alarm group

Procedure

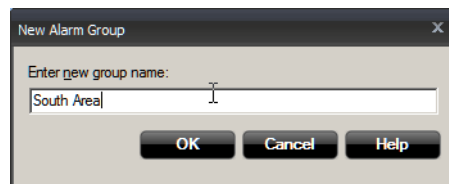
1. In the TankMaster workspace, right-click on the **Groups** icon and select **New Alarm Group**.

Note

Depending on the current protection level, a request for an access level password may appear.



2. In the **New Alarm Group** dialog, enter a name of the new group.

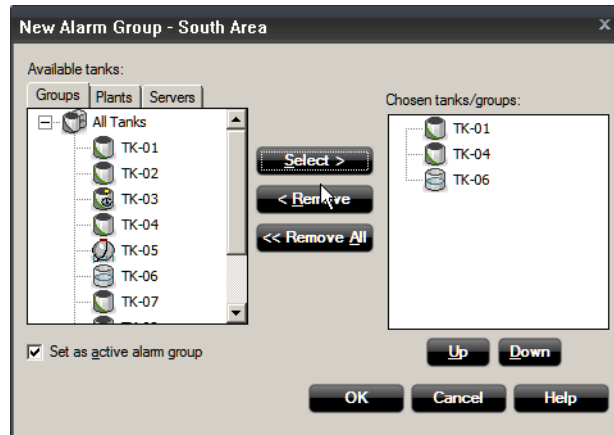


3. Click **OK**.

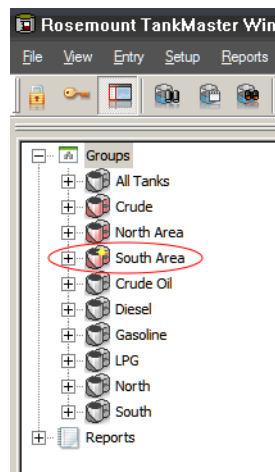
Note

An alarm group cannot have the same name as another group in the TankMaster workspace.

4. In the **New Alarm Group** window, select a tank to add to the new group and click the **Select** button.



5. Repeat for all tanks to be added to the group.
Objects can also be removed from the Chosen tanks/groups pane by using the **Remove** and **Remove All** buttons.
6. To associate the new alarm group with the current workstation, select the **Set as Active Alarm Group** check box. The current workstation will be authorized to accept alarms from tanks within the active alarm group.
7. Click the **OK** button.



More than one alarm group can be created, but only one alarm group can be active at any given time for the current workstation.

It is possible to set the group **All Tanks** as active in order to be able to accept alarms from all tanks in the current system.

Related information

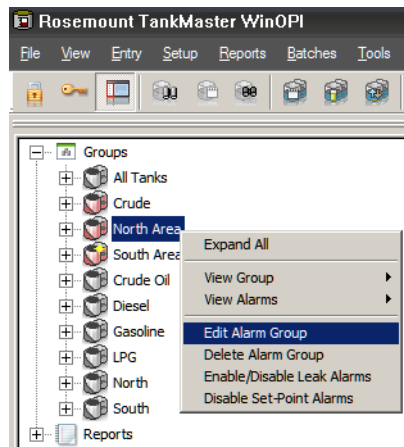
[Set required access levels](#)

5.8.2 Setting an alarm group as active

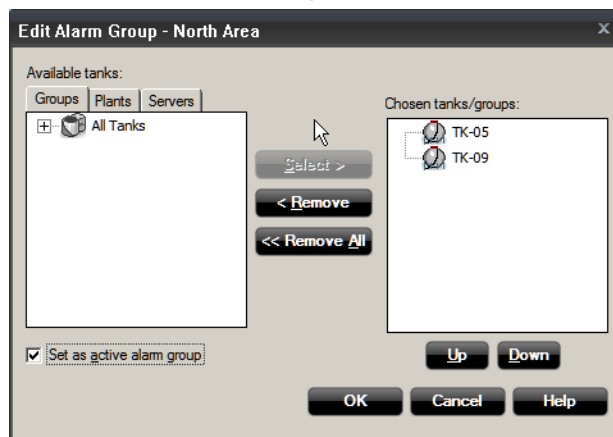
Setting an alarm group as **Active** enables the current workstation to accept alarms from tanks within that alarm group.

Procedure

1. Right click the alarm group that is to be active.



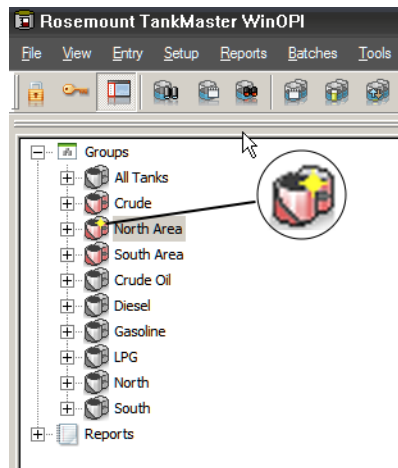
2. Select the **Edit Alarm Group** option.



3. Enable the **Set as active alarm group** check box.

4. Click **OK**.

A yellow star indicates which alarm group that is active.



5.8.3 Accepting alarms

Alarms can be accepted by the operator if the current program protection level is equal to or higher than the required access level.

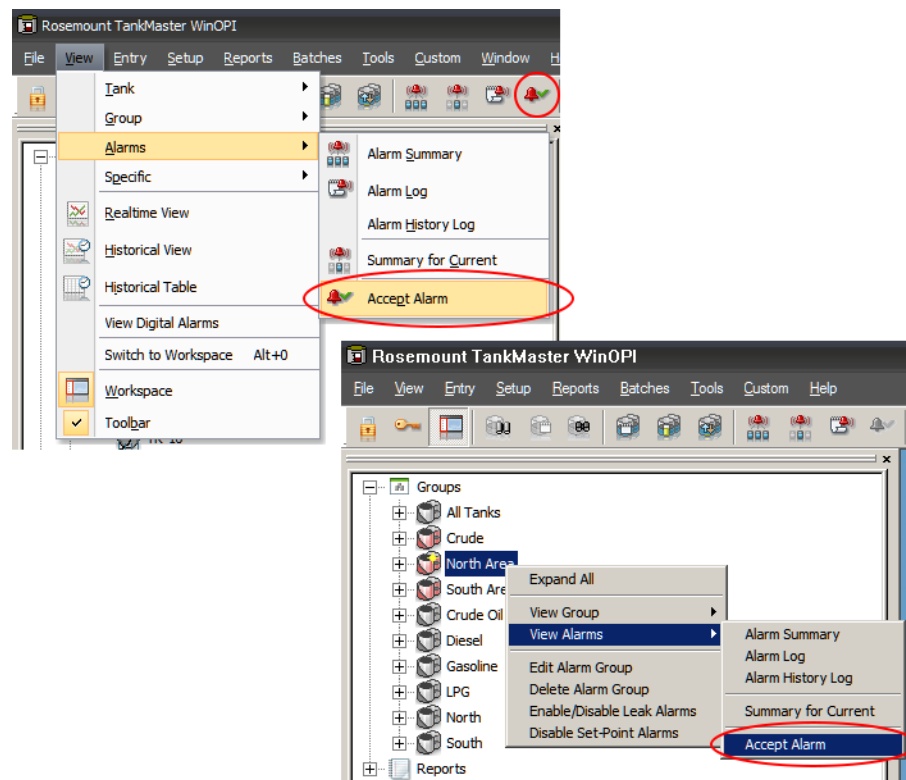
Alarms can only be accepted for tanks included in an **active** alarm group.

To accept an alarm do one of the following:

- Press <SHIFT + F9>.
- Click the **Accept** button on the toolbar.
- Open menu option **View** → **Alarms** → **Accept Alarm**.
- Right click on the active alarm group and select **View Alarms** → **Accept Alarm**.

If the current workstation is not associated with an active alarm group, alarms can be accepted for all tanks.

Figure 5-6: Accept Alarm Options



Related information

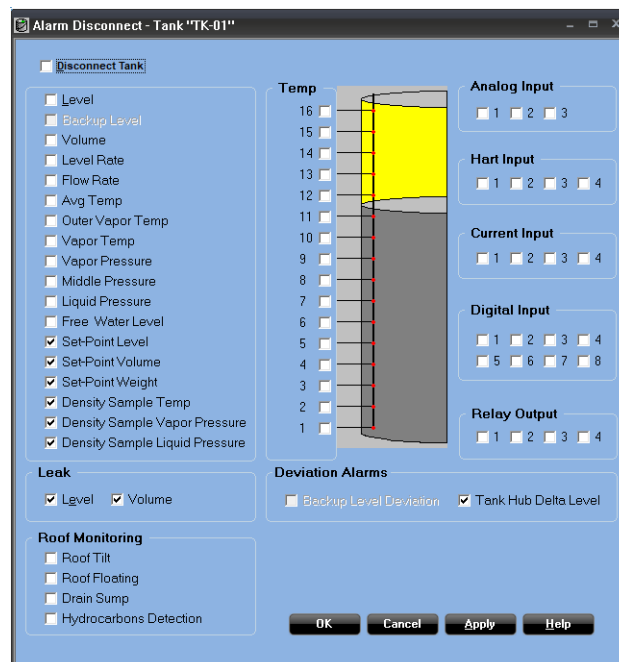
- [Set required access levels](#)
- [Setting an alarm group as active](#)

5.9 Disconnecting alarms

Disconnecting alarms can be useful during maintenance work. Specific alarms can be disconnected individually, or all alarms can be disconnected at once. The **Alarm Disconnect** window provides an overview of which alarms are active or disconnected, and allows you to specify which alarms should enabled or disabled.

Procedure

- In the TankMaster workspace, do one of the following:
 - Right-click a tank in the Workspace window and select **Alarm Entry** → **Alarm Disconnect**
 - select menu option **Entry** → **Alarm Entry** → **Alarm Disconnect**



- To disconnect an **individual alarm**, click the corresponding check box.
- Optional: To disconnect **all alarms**, select the **Disconnect Tank** check box.
- Click **Apply** to implement changes, and **OK** to close the **Alarm Disconnect** window.

Alarm status The status of a disconnected alarm is displayed as **Discon** in tank and group view windows.

Calculations WinOpi continues to monitor and update measurement values for a parameter when the corresponding alarm is disconnected. A disconnected temperature sensor is not included in the average temperature calculation.

Note

There are no error alarms for disconnected sensors. Sensor failures are not indicated for sensors with disconnected alarms.

Related information

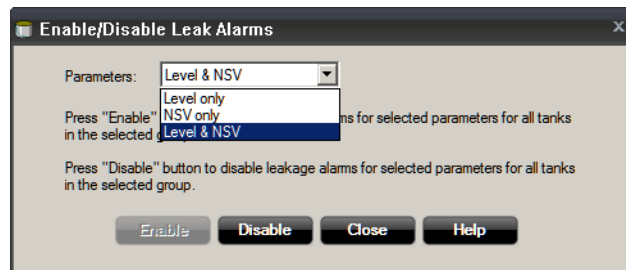
[Enable and disable leak alarms](#)

5.9.1 Enable and disable leak alarms

The **Enable/Disable Leak Alarms** function is used for enabling or disabling **leak** alarms for **entire groups**. To enable/disable alarms for individual tanks use the **Alarm Disconnect** function.

Procedure

1. In the TankMaster workspace, do one of the following:
 - Right-click a tank group in the Workspace window and select **Enable/Disable Leak Alarms**
 - select menu option **Entry** → **Enable/Disable Leak Alarms**



2. Select one of the following options from the **Parameters** list:
 - Level only
 - NSV only
 - Level & NSV
3. Click the **Enable** button to activate leak alarms for all tanks in the selected tank group.

The **Enable** button is active if one or more leak alarms for **Level** or **NSV** are disabled for the selected group.
4. Click the **Disable** button to disable the selected leak alarms for all tanks in the selected tank group.

The **Disable** button is active if one or more leak alarms for Level or NSV are enabled for the selected group.

Related information

[Disconnecting alarms](#)

5.10 Alarm setup

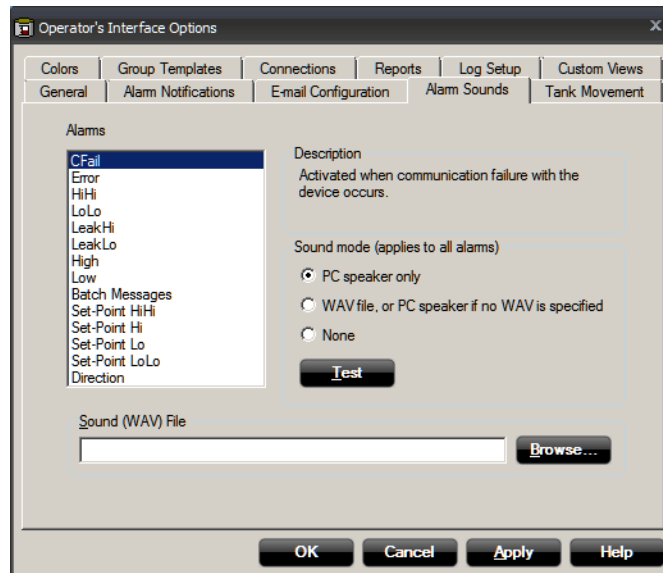
Alarms can be configured to provide unique notifications for specific alarms. Alarm settings can be customized for sounds, colors, notifications, users, and shifts.

5.10.1 Alarm sound notification

Sounds can be used to clearly distinguish between different alarm signals.

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **Options**, and then select the **Alarm Sounds** tab.



2. Select an alarm from the **Alarms** list.
3. Choose a **Sound mode** from the following options:
 - PC speaker only - this option uses Microsoft Windows sounds
 - WAV file
 - None - this option disables alarm signaling
4. Repeat [Step 2](#) to [Step 3](#) for as many alarms as required.
5. Click **Apply**, and **OK** to close the program options.

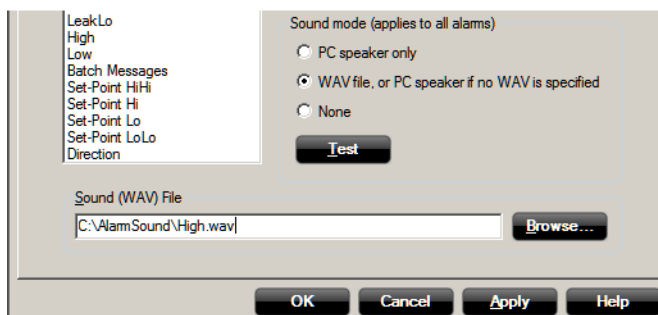
Using a WAV sound

You may use a WAV sound file as alarm signal.

Procedure

1. In the **Alarm Sounds** tab, click the **Browse** button.

2. Locate a *.WAV file. Default alarm sounds are available in the following location: . . . \Rosemount\Tankmaster\Opi\Data.



5.10.2 Alarm colors

You can configure alarms to be displayed in unique colors.

Related information

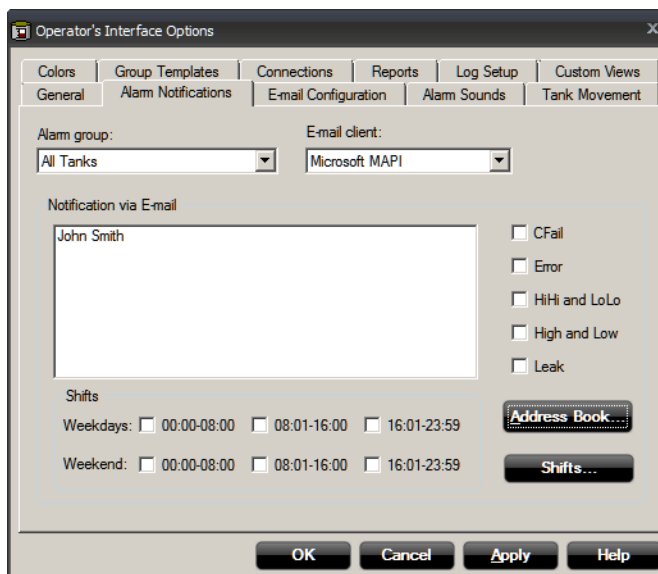
[Color settings](#)

5.10.3 Alarm notification via e-mail

WinOpi can be configured to send notifications via e-mail when an alarm is activated.

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **Options**, and then select the **Alarm Notifications** tab.

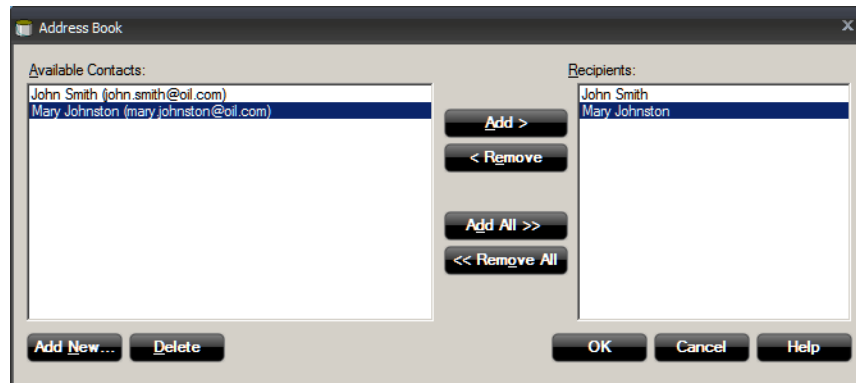


2. From the **Alarm group** drop-down list, select the desired alarm group to configure for notifications.
3. Select an E-mail client for e-mail notifications. The Microsoft MAPI does not require further configuration. To configure the Built-in e-mail client, see [E-mail client configuration](#).

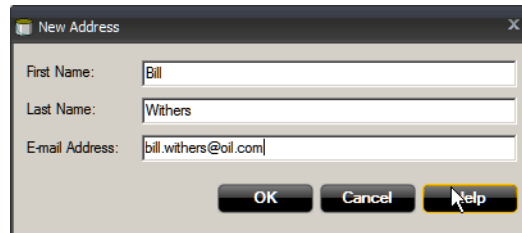
Note

On some systems the MAPI mail client generates a security warning dialog from the server when trying to send an alarm notification. On these systems, the distribution of alarm notifications requires user interaction and no alarm notifications will be sent if the security warning dialog is left unattended.

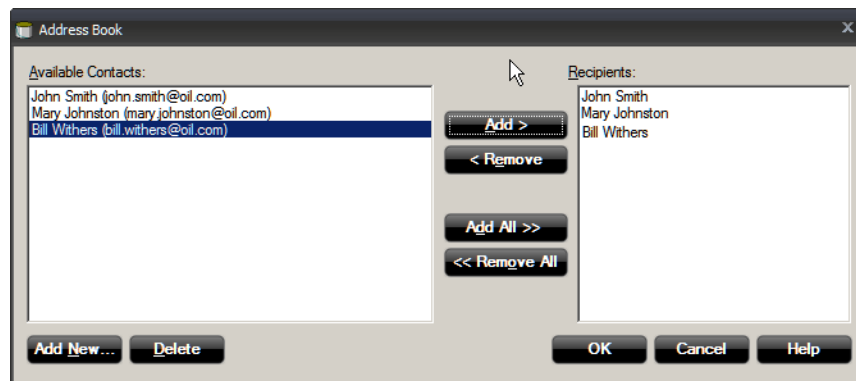
4. Click the **Address Book** button in case you need to add recipients for notification via e-mail.
5. In the **Available Contacts** pane, select a name to be included in the list of **Recipients** and click the **Add >** button.



6. Click the **Add New** button if you need to add a new contact to the Address Book.
7. Enter name and e-mail address for the new recipient and click **OK**.



8. Repeat **Step 5** to **Step 7** for all recipients to be included in the e-mail notification.

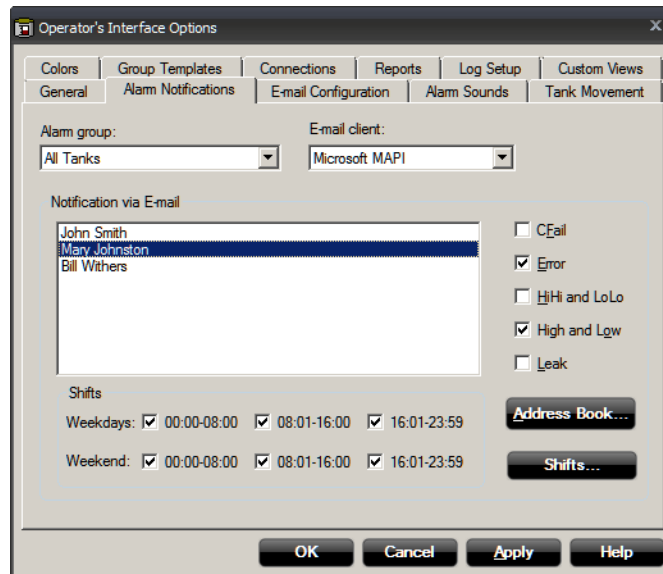


Note

To remove a recipient from the **Recipients** list, select a name and click the **Remove** button.

9. Click **OK** to save the configuration and close the **Address Book** window.

10. For each e-mail recipient, configure:
 - desired alarms to be included in the e-mail notification (CFail, Error, HiHi and LoLo, High and Low, Leak)
 - one or more weekday and weekend shifts for which the e-mail notification function will be activated



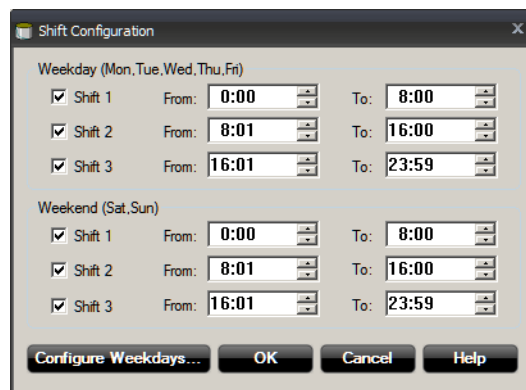
11. Select **OK** to save the current setup.

Configure shifts

This is a description on how to setup weekday and weekend shifts for e-mail alarm notifications.

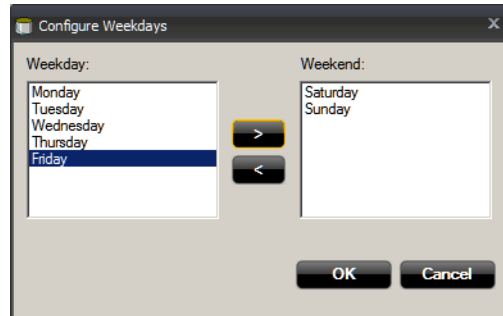
Procedure

1. In the **Alarm Notifications** tab, click the **Shifts** button.



2. Select desired shifts for which notifications will be sent.
3. Configure start and stop times for shifts using the **From** and **To** fields.

4. Click **Configure Weekdays** to specify days for **Weekday** and **Weekend**.



5. Click **OK**.

5.10.4 E-mail client configuration

Rosemount TankMaster™ has a built-in e-mail client which allows alarm notifications, reports and other e-mails without using a third-party e-mail client.

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **Options**, and then select the **E-mail Configuration** tab.

The screenshot shows the 'Operator's Interface Options' dialog box with the 'E-mail Configuration' tab selected. The 'Built-in E-mail Client General Configuration' section contains the following fields: SMTP Server (smtp.oil.com), Sender Address (john.smith@oil.com), and SMTP Port (2525). The 'Authentication Configuration' section has two checkboxes: 'Use Authentication' (unchecked) and 'Use Channel Security' (unchecked). Below these are fields for 'Login' and 'Password'. The 'Channel Security Configuration' section has two radio buttons: 'TLS' (selected) and 'SSL' (unselected). The 'Subject' field is set to 'Alarm' with a note '(used in alarm notification messages)'. At the bottom are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

2. Configure the following options:

| | |
|---------------------------------------|--|
| SMTP Server | Specify an SMTP server for outgoing messages. Contact your LAN administrator or Internet Service Provider (ISP) for details. |
| Sender Address | The e-mail account which will send e-mails from the current workstation must be located on the specified SMTP server. |
| SMTP Port | Optional. Contact your LAN administrator or ISP for details. |
| Authentication Configuration | Select this option and enter a Login name and Password if authentication is required on the mail server. Contact your LAN administrator or ISP for details. |
| Channel Security Configuration | Select this option if the e-mail client requires the use of channel security. Contact your LAN administrator or ISP for details. |
| Subject | Enter a title for an e-mail alarm notification. The subject is only used for alarm notification and is optional. This subject will not be used for other e-mails sent from the built-in e-mail client. |

3. Click **OK**.

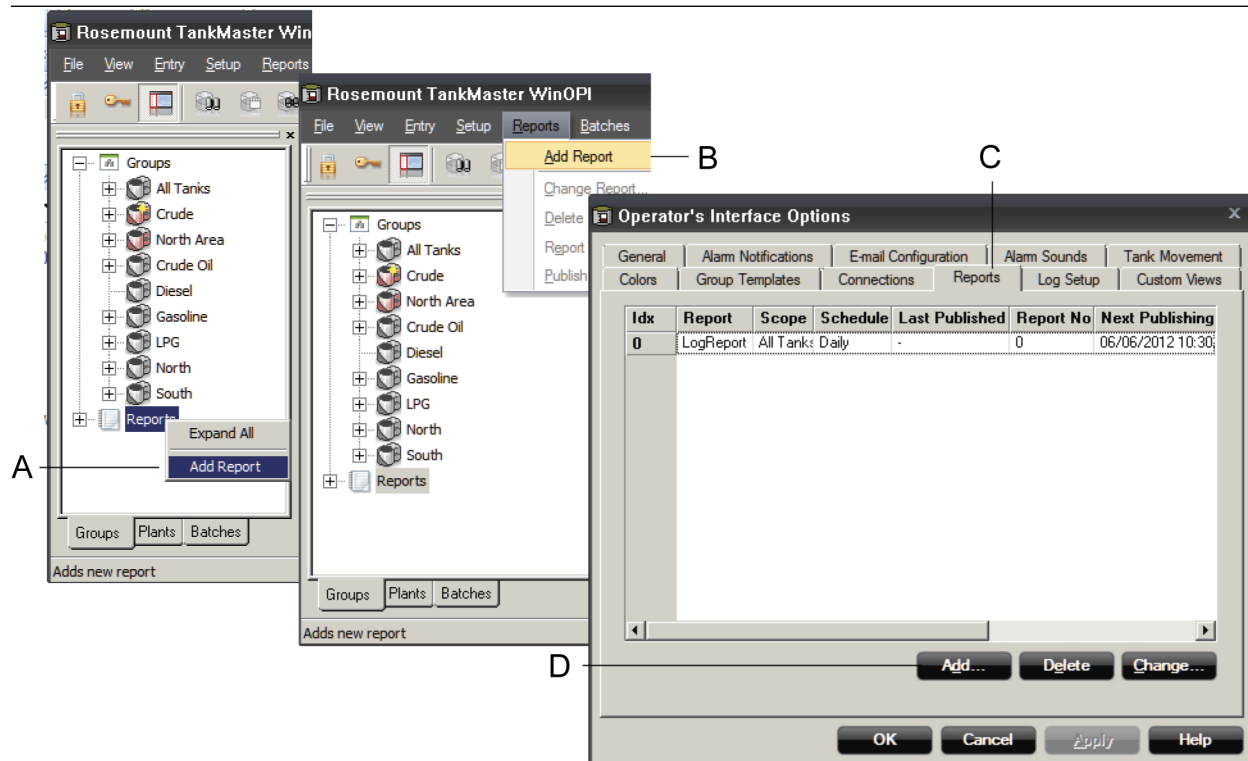
6 Reports

Rosemount TankMaster™ allows you to create reports to be scheduled for automatic distribution. The reports provide inventory information on tanks and their contents.

6.1 Set up an automatic report

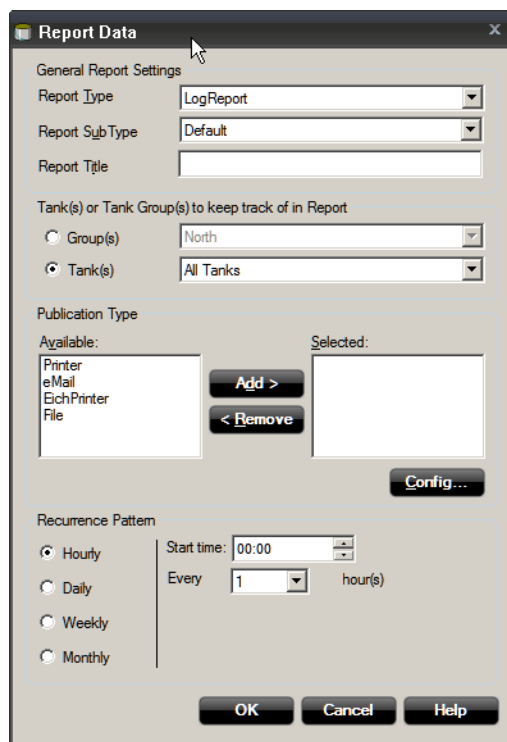
Procedure

- To set up a scheduled automatic report, do either of the following:
 - In the TankMaster workspace Groups view, right-click the **Reports** icon and select **Add Report**
 - Select the **Reports** icon in the **Groups** view and open menu option **Reports** → **Add Report**
 - Open menu option **Tools** → **Options**, select the **Reports** tab, and click **Add**



- Right-click → Add Report
- Reports → Add Report
- Tools → Options → Reports
- Add a new report

2. In the **Report Data** window specify the following for a report:
 - report type, subtype, and title
 - which tank or tank group to send reports from
 - how the report will be published and distributed
 - how often the report will be automatically distributed



6.1.1 General report settings

Under **General Report Settings**, select a **Report Type**, a **Report Sub Type**, and enter a name of the report in the **Report Title** field. These settings determine which parameters are included in the report and the report layout.

Example 1 Log Report

Table 6-1: Parameters for Log Reports

| Report SubType | Parameters shown |
|----------------|---|
| Default | Product Level Average temperature Net Standard Volume Reference Density Level status |

Table 6-1: Parameters for Log Reports (continued)

| Report SubType | Parameters shown | |
|----------------------|--|---|
| HtmlLogReport | Product Level Average temperature Net Standard Volume Reference Density Level status | |
| HtmlGroupLogReport | Average temperature Net Standard Volume Reference Density Level status | |
| HtgLogReport | Product Volume table Level Temperature Weight in Air Gross Observed Volume Level status | |
| HtmlTankInvLogReport | Product Volume table Level Free Water Level Ambient temp. Shell temperature Product temperature Total Observed Vol. Free Water Volume Shell temp. Correction factor | Floating roof adjust. Gross Observed Volume Observed density Reference density Volume Correction Factor Gross Standard Volume Sediment and Water Net Standard Volume Weight in Vacuum |
| PdfLogReport | Product Level Average Temperature Net Standard Volume Reference density Level Status | |
| PdfGroupLogReport | Product Level Net Standard Volume Average temperature Reference Density Alarm Status | |

Table 6-1: Parameters for Log Reports (continued)

| Report SubType | Parameters shown | |
|---------------------|--|---|
| PdfTankInvLogReport | Product Volume table Level Free Water Level Ambient temp. Shell temperature Product temperature Total Observed Vol. Free Water Volume Shell temp. Correction factor | Floating roof adjust. Gross Observed Volume Observed density Reference density Volume Correction Factor Gross Standard Volume Sediment and Water Net Standard Volume Weight in Vacuum |

Example 2 Mass Balance Report

Table 6-2: Parameters for Mass Balance Reports

| Report SubType | Parameters shown |
|-----------------------|---|
| Default | Product Level Average temperature Total Observed Volume Net Standard Volume Reference density Weight in Air Level status Net Standard Volume - difference since last report |
| HtmlMassbalanceReport | Product Level Average temperature Total Observed Volume Net Standard Volume Reference density Weight in Air Level status Net Standard Volume - difference since last report |
| CtMassbalanceReport | Product Volume table Level Average temperature Total Observed Volume Net Standard Volume Weight in Vacuum Level Status Net Standard Volume - difference since last report |

Table 6-2: Parameters for Mass Balance Reports (continued)

| Report SubType | Parameters shown |
|----------------------|---|
| HtgMassbalanceReport | Product Volume table Level Temperature Gross Observed Vol. Net Standard Vol. Weight in Vacuum Level status Weight in Vacuum - difference since last report |
| PdfMassbalanceReport | Product Level Average temperature Total Observed Volume Net Standard Volume Reference density Weight in Vacuum - difference since last report Level status Net Standard Volume - difference since last report |

6.1.2 Report examples

Figure 6-1: LogReport, subtype: Default

Log Report
Time : 07/06/2012 09:27:02
Tanks:All Tanks

| Tank | Prod Desc | Level | AvgTmp | NSV | DenRef | LevStat |
|-------|-----------|----------|---------|--------------|--------------|---------|
| TK-01 | Crude Oil | 12.345 m | 23.2 °C | 22392.622 m3 | 908.20 kg/m3 | Low |

Figure 6-2: LogReport, subtype: HtmlLogReport



HtmlLog Report

Date: 07/06/2012 11:12:12

Tank:TK-01

ReportNr: 1

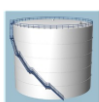
| Tank | Product | Level | Avg Temp | NSV | Ref. Density | Status |
|-------|-----------|----------|----------|--------------|--------------|--------|
| TK-01 | Crude Oil | 12.345 m | 23.2 °C | 22392.622 m3 | 908.20 kg/m3 | |

Figure 6-3: MassBalanceReport, subtype: Default

MassBalanceReport
Time : 07/06/2012 09:57:34
Last Published Time : -
Group:North Area

| Tank | Prod Desc | Level | AvgTmp | TOV | NSV | DenRef | WIA | LevStat | NSVDiff |
|-------|-----------|---------|---------|-------------|-------------|--------------|-----------------|---------|----------|
| TK-05 | LPG-Mix | 6.584 m | 23.1 °C | 6358.255 m3 | 6317.325 m3 | 526.70 kg/m3 | 3320.386 ton(m) | | 6317.325 |

Figure 6-4: MassBalanceReport, subtype: HtmlMassbalancereport



MassBalanceReport

Date: 07/06/2012 10:55:05

Last Published Date : -

Group:North Area

ReportNr: 1

| Name | Prod Desc | Level | AvgTmp | TOV | NSV | DenRef | WIA | LevStat | NSV Diff. |
|-------|-----------|---------|---------|-------------|-------------|--------------|-----------------|---------|-------------|
| TK-05 | LPG-Mix | 6.584 m | 23.1 °C | 6358.255 m3 | 6317.325 m3 | 526.70 kg/m3 | 3320.386 ton(m) | | 6317.325 m3 |
| TK-09 | LPG-Mix | 8.695 m | 21.4 °C | 5205.298 m3 | 5134.017 m3 | 513.90 kg/m3 | 2632.724 ton(m) | | 5134.017 m3 |

Note

To sum up the **NSV** field for all tanks, the **RGM.ini** file needs to be edited. For more information, please contact Emerson Automation Solutions/Rosemount Tank Gauging.

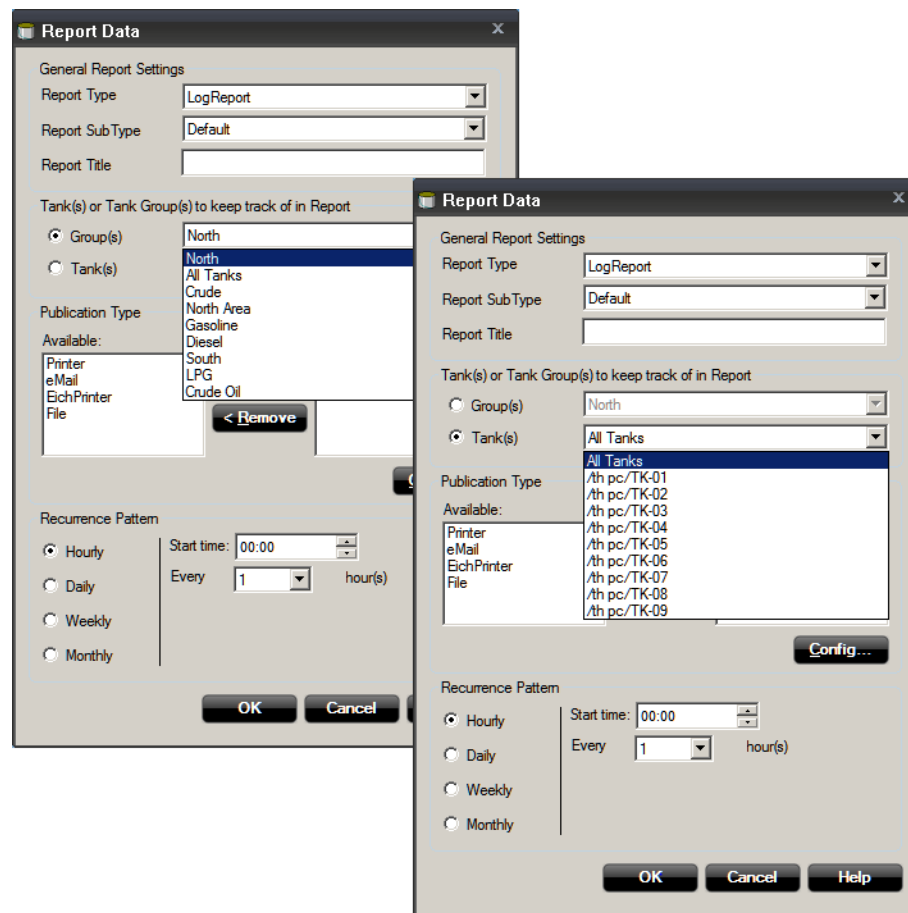
6.1.3 Adding tanks or groups to a report

The **Report Data** window lets you specify which groups or tanks that should be included in a report.

To specify which groups or tanks to include in the report, select from the available options for **Groups(s)** or **Tank(s)**.

Select All Tanks in case you want to include all tanks in the report, or choose a specific tank or tank group.

Figure 6-5: Adding Groups and Tanks to Reports



Related information

- [Create a tank group](#)
- [Set up an automatic report](#)

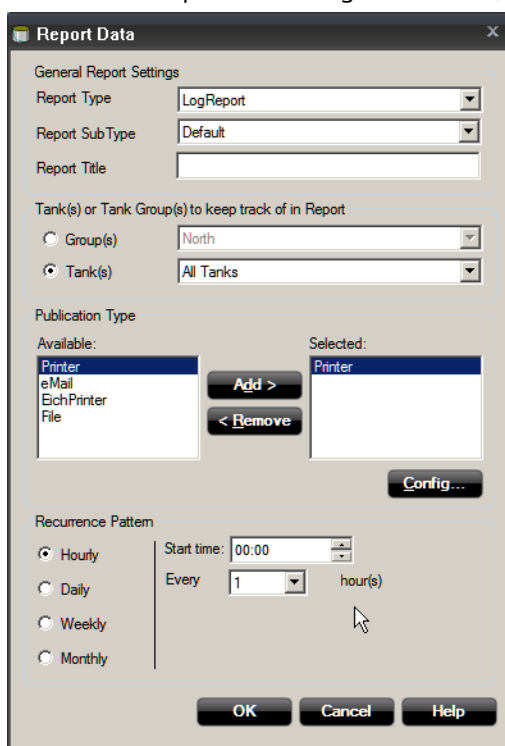
6.1.4 Configure publication type

Reports can be printed, sent by e-mail, or saved as a text file in HTML or pdf format. The report format can be configured in the **Publication Type** section in the **Report Data** window.

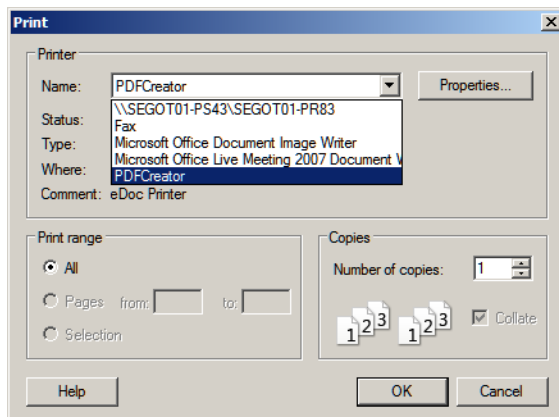
Configure printed report

Procedure

1. In the **Publication Type Available** pane, double click **Printer**, or select **Printer** and click the **Add** button.
2. In the **Selected** pane on the right-hand side, select **Printer** and click **Config**.



3. Select a specific printer for publishing the reports.

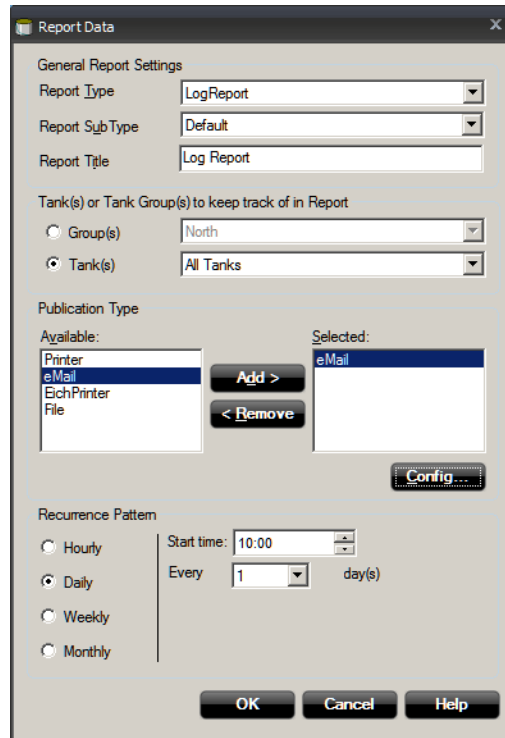


4. Click **OK**.

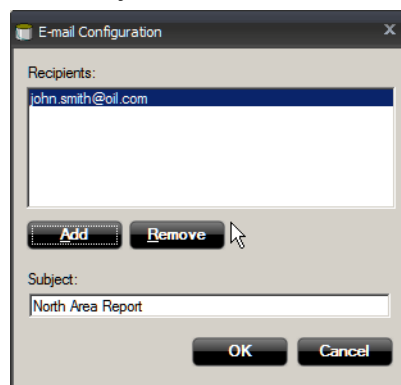
Configure email reports

Procedure

1. In the **Available** pane, double click **eMail**, or select **eMail** and click the **Add** button.



2. In the **Selected** pane on the right, select **eMail** and click the **Config** to add recipients and a subject.



3. Click **Add** to add a recipient for the e-mail report. Repeat this for each recipient.
4. Add a subject for the e-mail.
5. Click **OK**.

To create more e-mail distribution lists, repeat this procedure. The selected report will be sent to all e-mail distribution lists in the **Selected** pane on the right-hand side of the **Report Data** window.

Related information

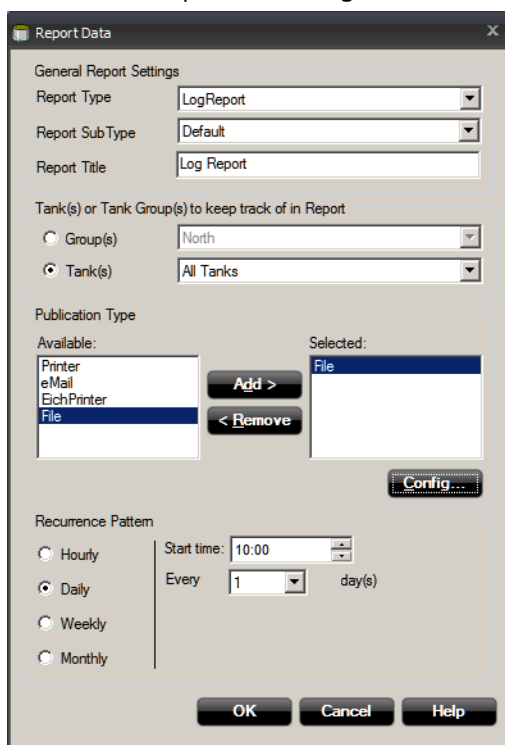
[E-mail client configuration](#)

Configure file reports

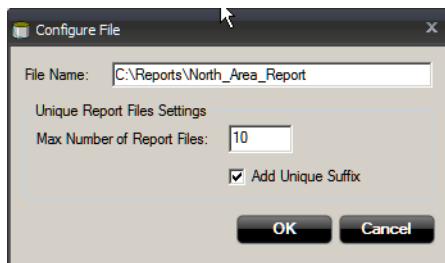
Reports can be saved as text file, HTML report, or pdf report.

Procedure

1. In the **Available** pane, double click **File**, or, select **File** and click the **Add** button.
2. In the **Selected** pane on the right, select **File** and click **Config**.



3. Enter a path to the folder where the report will be saved and a file name.



4. To add a unique suffix to the report files, check the **Add Unique Suffix** box. In this example, the first report file will be called **North Area Report_1.txt**, the second report file **North Area Report_2.txt**, and so on. When the **Max Number of Report Files** is reached, the oldest report file will be overwritten.

5. Enter a maximum number of report files to be saved. In this example, when **North Area Report_10.txt** has been created, the next file will be **North Area Report_1.txt**, and the previous file with that name will be overwritten.
6. Click **OK**.

Note

If only a file name is specified with no directory, report files are saved in the **default folder: ...\\Rosemount\\TankMaster\\Opi\\Shared**.

6.1.5 Recurrence pattern

To define how often a report will be automatically distributed:

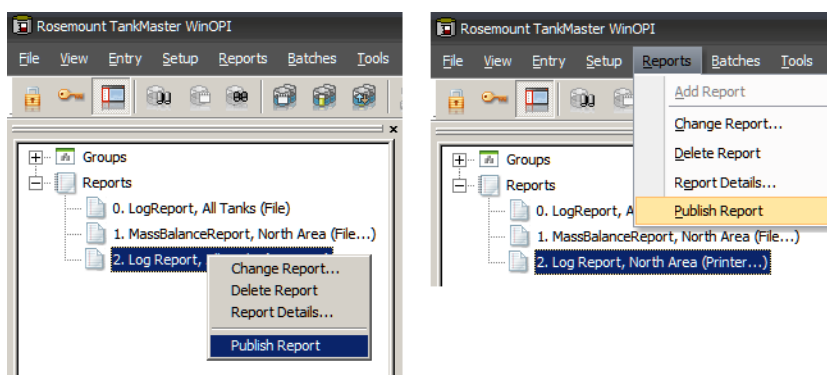
- select either hourly, daily, weekly, or monthly
- specify a start time and frequency

6.2 Publishing a report

The **Report Data** window lets you set up reports for automatic publishing according to configured settings. In addition to automatic scheduling, a report can also be manually published at any time you like using the configured settings for publication and distribution.

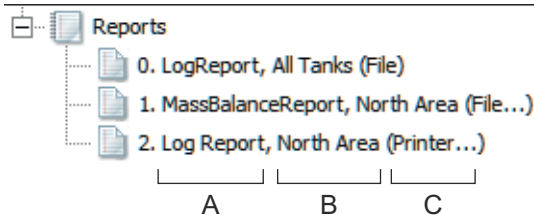
Procedure

1. In the WinOpi workspace, select the desired report.
2. Do one of the following:
 - Click the right mouse button and select **Publish Report**
 - select menu option **Reports** → **Publish Report**



The selected report will be published immediately according to the configured **Report Type** and **Publication Type** settings for that report.

In addition to the **Publish Report** option, the **Reports** menu lets you change, delete, and review reports.



- A. Report type
- B. Tank / Tank group
- C. Publication type

7 Audit log

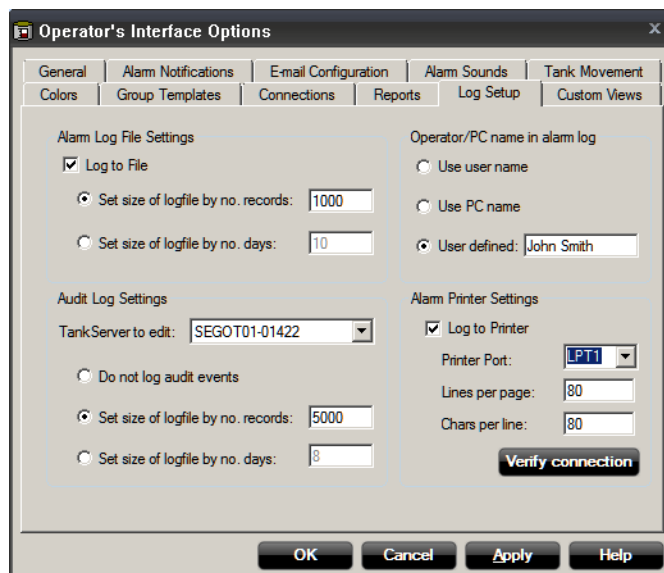
The Audit Log function enables operations performed by a Rosemount TankMaster™ user to be recorded. Audit log records can include events and actions such as changing alarm limits, logging on or off, and setting parameter values manually.

7.1 Setup an audit log

The Audit Log function can be enabled or disabled at any time.

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **Options**, and then select the **Log Setup** tab.



2. Under **Audit Log Settings**, select the desired Tankserver to be monitored by the **Audit Log** function.
3. Activate the **Audit Log** function by selecting one of the two options:
 - Set size of log file by number of records
 - Set size of log file by number of days

Either of these two options can be used to limit the size of the Audit Log file. When the file reaches its limit, the oldest records will be removed as new records are stored.

4. Click **OK**, or **Apply** to activate the new settings.

7.2 Viewing the audit log

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **View Audit Log**.
2. Select a server. The Audit Log can only be viewed for one tank server at a time.

Audit Log - Server: SEGOT01-02854

Selected server: SEGOT01-02854

| | Time | Event Type | Object | Parameter | Field | Value | Operator |
|----|---------------------|----------------|--------------------|--------------------|----------------|--------|--------------|
| 24 | 05/06/2012 16:10:50 | Logoff | Rosemount TankMast | | | | |
| 25 | 05/06/2012 16:40:35 | Logoff | Rosemount TankMast | | | | administrato |
| 26 | 05/06/2012 16:16:36 | Logon | Rosemount TankMast | | | | administrato |
| 27 | 05/06/2012 16:14:46 | Logoff | Rosemount TankMast | | | | administrato |
| 28 | 05/06/2012 16:10:30 | Logon | Rosemount TankMast | | | | Supervisor |
| 29 | 05/06/2012 16:03:43 | Logon | Rosemount TankMast | | | | administrato |
| 30 | 05/06/2012 15:56:54 | Write Database | SYSTEM1 | USER[5] | ID | | administrato |
| 31 | 05/06/2012 15:56:54 | Write Database | SYSTEM1 | USER[5] | ID | | administrato |
| 32 | 05/06/2012 15:56:54 | Write Database | SYSTEM1 | USER[5] | Current String | | administrato |
| 33 | 05/06/2012 15:56:54 | Write Database | SYSTEM1 | USER[5] | Mode Disabled | TRUE | administrato |
| 34 | 05/06/2012 15:56:26 | Logon | Rosemount TankMast | | | | administrato |
| 35 | 05/06/2012 15:54:20 | Logon | Rosemount TankMast | | | | administrato |
| 36 | 05/06/2012 15:54:10 | Logoff | Rosemount TankMast | | | | administrato |
| 37 | 05/06/2012 15:17:57 | Set Log Size | Audit Log | Rosemount TankServ | | 8 days | administrato |
| 38 | 05/06/2012 15:17:55 | Set Log Size | Audit Log | Rosemount TankServ | | 8 days | administrato |
| 39 | 05/06/2012 15:17:55 | Set Log State | Audit Log | Rosemount TankServ | | ENABLE | administrato |

Active filter : Date: All dates; Tanks: All tanks

Buttons: Filter..., Print, Close, Help

The **Audit Log** displays the time stamps for each event and the Operator who was logged on at the time.

The **Filter** button allows you to record events over a certain time period, and for specific tanks.

7.3 Filtering the audit log

The Audit Log can be set up to record events over a certain period of time and for specific tanks.

The **Filter** button in the **Audit Log** window opens the **Audit Log Filter Settings** window which allows you to record events over a certain time period, and specific tanks.

To configure desired filtering options, open menu **Tools** → **View Audit Log** and select the **Filter** button.

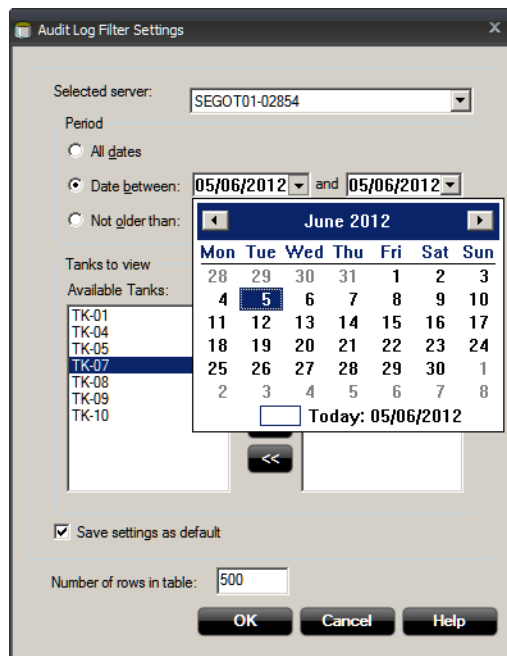
7.3.1 Filtering by date

There are three options available for date filtering:

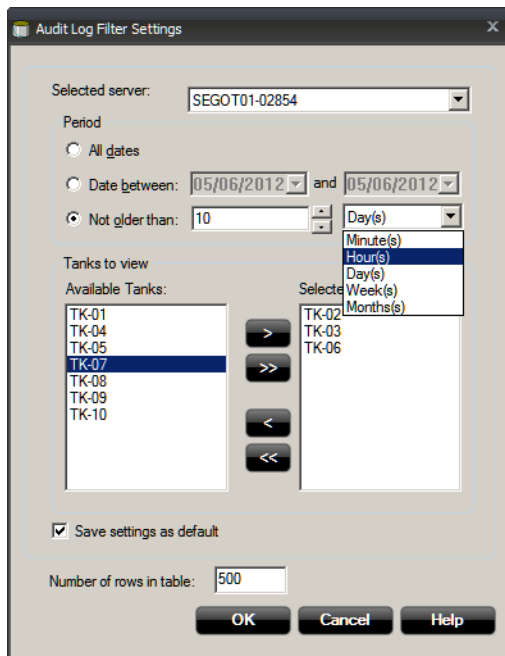
- All dates
- Date between
- Not older than

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **View Audit Log**.
2. In the **Audit Log** window, select the **Filter** button.
3. To log events within a certain period, select **Date between** and set the dates using the pop-up calendar.



- To limit the audit log to events which are not older than a specific period, select **Not older than**. The log can be limited to minutes, hours, days, weeks, or months.



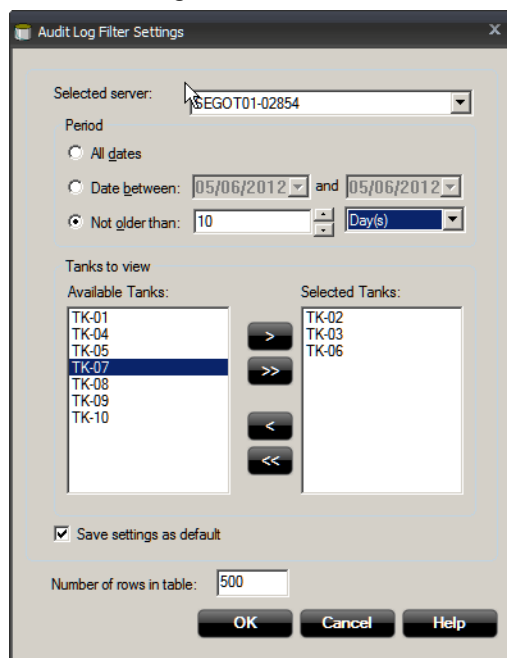
- Select **All dates** in case you want to disable filtering by date. All records regardless of date appear in the **Audit Log** window.

7.3.2 Filtering by tanks

The audit log can be filtered to display only those events which are related to specific tanks.

Procedure

1. In the TankMaster workspace, select menu option **Tools** → **View Audit Log**.
2. In the **Audit Log** window, select the **Filter** button:



3. In the **Available Tanks** pane, select a tank to be included in the audit log.
4. Click the **Add** button. The tank appears in the **Selected Tanks** pane on the right.
5. Proceed by adding the desired tanks to appear in the **Audit Log** window.
Click the **Add All** button in case you want to include all tanks.
You can remove tanks by using the **Remove** and **Remove All** buttons. Tanks can also be added and removed by double-clicking an entry.
6. To set the maximum number of rows to be displayed in an audit log, enter a number between 1 and 5000 in the **Number of rows in table** field.
7. In case you want to save the current settings as default, select the **Save settings as default** check box.
8. Click the **OK** button to save the current filtering settings.

8 Tank calculators

8.1 Density calculator

The Density Calculator is a TankMaster™ tool which calculates the reference density of petroleum products according to the API standard.

The tool converts the observed density at any temperature to the corresponding reference density at the standard temperature 15°C/60°F.

Procedure

1. Select menu option **Tools** → **Density Calculator**.

The screenshot shows the 'Rosemount TankMaster / Density Calculator' dialog box. It features the following elements:

- Units:** Two dropdown menus. 'Temp' is set to 'deg C' and 'Density' is set to 'kg/m3'.
- Sample Data:** Two input fields. 'Temp' contains '0' and 'Density' contains '0'. To the right is a 'Correction Table' dropdown menu set to '53 A - 2004'.
- Hydrometer correction of density:** A checkbox that is checked.
- Reference Density:** An input field for 'Ref Density' containing '0', a 'Calculate' button, and a 'Close' button at the bottom right.

2. Select the desired temperature unit: deg C or deg F.
3. Select the desired density unit:
 - kg/m³
 - deg API
 - 60/60 deg F
4. Under **Sample Data**, enter the temperature of the product sample.
5. Select the appropriate **Correction Table**:
 - 53, 53A, 53B, 53D, 53A20, 53B20
 - 5A, 5B, 5D
 - 23A, 23B
6. Under **Sample Data**, enter the observed **Density** of the product sample.

7. To correct for thermal expansion of the glass hydrometer, check the **Hydrometer correction of density** box.

Reference Density=(Observed Density)*HYC.

Two different formulas are used for calculating HYC. One is adapted to tables 53, 53A, 53B and 53D. The other formula is used for tables 5A, 5B, 5D, 23A and 23B.

Note

Use the Hydrometer correction to compare the calculated values with printed API tables. The reference density values in the API tables are adjusted to take glass hydrometer expansion into account.

8. Click **Calculate**.

The calculated reference density is shown. This value can be entered manually into the corresponding input field in the **Tank Entry** window (menu option **Entry** → **Tank Entry**).

Related information

[Product parameter setup](#)

8.2 Tank inventory calculator

The **Tank Inventory Calculator** generates inventory values based on manually entered product data for a specific tank. Input fields are initiated using the current tank configuration and readings from devices. The operator can change input fields and calculate new inventory values based on different scenarios.

Procedure

1. Select the desired tank.
2. Select **Tools** → **Tank Inventory Calculator**.

3. Change one or more of the parameters in the Input pane.
4. Click **Calculate** to see the results.
5. Repeat this procedure for different scenarios with alternate input values.
6. Click **Close** to exit the Tank Inventory Calculator.

8.3 Tank transfer calculator

The Tank Transfer Calculator tool allows you to calculate transferred product volume or closing values using inventory parameters such as TOV, GOV, GSV, NSV, WIA, and WIV.

Procedure

1. Select a tank in the WinOpi workspace.
2. Select menu option **Tools** → **Tank Transfer Calculator**.

Note

The Maximum Level in the WinSetup configuration for a tank should correspond to the Maximum Volume in the Tank Capacity Setup. Maximum Volume is equal to the TOV at the Maximum Level.

Tank Transfer Calculator - Tank "TK3201A"

Product : Ammonia Vol Table : DENSITY VS TEMP Tank Type : Cryogenic

| Parameter | Opening Values | Closing Values | Transferred Values |
|----------------------------|-----------------|-----------------|--------------------|
| Avg Temperature | 0.0 °C | 0.0 °C | |
| Air Temperature | 31.0 °C | 31.0 °C | |
| Air Density | 1.21 kg/m3 | 1.21 kg/m3 | |
| Ref Density | 617.50 kg/m3 | 617.50 kg/m3 | |
| TEC Liquid | 0.0000000 // | 0.0000000 // | |
| Level | 10.000 m | 5.000 m | |
| Total Observed Volume(TOV) | 5780.818 m3 | 2928.710 m3 | 2852.108 m3 |
| Water Level (FWL) | 0.000 m | 0.000 m | 0.000 m3 |
| Water Volume (FWV) | 0.000 m3 | 0.000 m3 | |
| CTSh | 1.00112 | 1.00112 | |
| Roof Adjustment (FRA) | 0.000 m3 | 0.000 m3 | |
| Gross Observed Volume(GOV) | 5787.293 m3 | 2931.990 m3 | 2855.303 m3 |
| VCF | 1.03417 | 1.03417 | |
| Gross Standard Volume(GSV) | 5985.045 m3 | 3032.176 m3 | 2952.869 m3 |
| Strength | 0.0000 % | 0.0000 % | |
| Sediment & Water (SW) | 0.0000 % | 0.0000 % | |
| Net Standard Volume (NSV) | 5994.124 m3 | 3044.642 m3 | 2949.482 m3 |
| Weight in Air (WIA) | 3695.109 ton(m) | 1877.392 ton(m) | 1817.717 ton(m) |
| Weight in Vacuum (WIV) | 3701.958 ton(m) | 1880.872 ton(m) | 1821.086 ton(m) |
| Liquid Mass (LM) | 3695.765 ton(m) | 1872.369 ton(m) | 1823.396 ton(m) |
| Vapor Temperature | 0.0 °C | 0.0 °C | |
| Outer Temperature | 2.5 °C | 2.5 °C | |
| Vapor Pressure | 0.067 barG | 0.067 barG | |
| Outer Volume | 2.831 m3 | 2.831 m3 | |
| Outer Mass | 1.931 ton(m) | 1.931 ton(m) | |
| Inner Volume | 6.248 m3 | 9.635 m3 | |
| Inner Mass | 4.262 ton(m) | 6.572 ton(m) | |
| Total Volume | 9.079 m3 | 12.466 m3 | |
| Total Mass | 6.193 ton(m) | 8.503 ton(m) | |
| Utilization | 52.3531 % | 26.5234 % | |
| Pumpable Volume | 5704.122 m3 | 2852.014 m3 | |
| Available Volume Room | 5261.166 m3 | 8113.274 m3 | |
| Pumpable Weight | 3642.652 ton(m) | 1821.296 ton(m) | |
| Available Weight Room | 3359.781 ton(m) | 5181.137 ton(m) | |

Calculation Setup

Calculate Transferred Values
 Calculate Closing values

Movement Type :

Shipping
 Receiving

Buttons: Calculate, Print..., Close, Help

8.3.1 Calculation setup for transferred values

This is a description of how to calculate values for volume and mass for a product transfer.

Procedure

1. Select a tank in the WinOpi workspace.
2. Select menu option **Tools** → **Tank Transfer Calculator**.
3. In the **Calculation Setup** pane, select **Calculate Transferred Values**.
4. In the **Opening Values** and **Closing Values** panes, select the radio button next to parameters to be used as input for the calculation:
 - Opening values indicate the value for a parameter when the product transfer begins
 - Closing values indicate the value for a parameter when the transfer is completed
5. Enter a value for the selected parameter.
6. Repeat for the other parameters as required.
7. Click **Calculate**.

The calculated volumes and mass appear in the **Transferred Values** column on the right-hand side of the **Tank Transfer Calculator** window.

8.3.2 Calculation setup for closing values

This is a description of how to calculate closing values for a product transfer.

Procedure

1. Select a tank in the WinOpi workspace.
2. Select menu option **Tools** → **Tank Transfer Calculator**.
3. In the **Calculation Setup** pane, select **Calculate Closing Values**.
4. Select the desired movement type:
 - Shipping
 - Receiving
5. In the **Opening Values** and **Transferred Values** panes, select the radio button next to a parameter to be used as input for the calculation.
6. Enter the desired value for a parameter in the **Opening Values** or **Transferred Values** column.
7. Repeat for the other parameters as required.
8. Click **Calculate**.

The resulting values for level, volume and mass appear in the Closing Values column. For a **Shipping** calculation, the closing value is always lower than opening value. For a **Receiving** calculation, the closing value is always higher than opening value.

8.3.3 Tank transfer calculation setup

The **Tank Transfer Calculation Setup** window is used to manually set up the input parameters for transfer calculations.

Procedure

1. Select menu option **Setup** → **Tank Setup** → **Tank Transfer Calculation**.

2. Enter the transfer calculation input parameters and click **Apply** to see the result in the **Transfer Calculation Output** parameters pane.
3. Click **OK** to close the window.

Table 8-1: Calculation Type

| Parameters | Description |
|--------------------|---|
| Calculation Type | TOV, GOV, GSV, NSV, WIA, and WIV. |
| Open Gauge Volume | The calculations starts at this volume (+/- volume hysteresis). |
| Close Gauge Volume | The calculations stops at this volume (+/- volume hysteresis). |
| Volume Hysteresis | Hysteresis value for Open Gauge Volume and Close Gauge Volume. |

Table 8-2: Transfer Calculation Output

| Parameters | Description |
|-----------------------|---|
| Open Gauge Date | The date when the current volume passed the Open Gauge Volume (open volume + hysteresis). |
| Elapsed Transfer Time | Elapsed time since open gauge. |
| Transfer Volume | Difference between current volume and open volume. |

Table 8-3: Estimated Parameters

| Parameters | Description |
|-------------------------|--|
| Time to Full/Empty Tank | Estimated number of days, hours and minutes until full/empty tank. |
| Time to Close Gauge | Estimated number of days, hours and minutes until the transfer is completed. |
| Full/Empty Tank Date | Estimated date (YY-MM-DD, hh:mm:ss) when the tank is full/empty. |
| Close Gauge Date | Estimated date (YY-MM-DD, hh:mm:ss) when the tank transfer is completed. |

Related information

[Inventory parameters](#)

8.3.4 Viewing transfer data

You can create your own group windows to view transfer data. For transfer data the **Transfer** parameter can be added to a group window and shown as:

- Transfer Volume
- Time to Close
- Close Date
- Time to Full/Empty

Modified windows will be available in the **View** → **Group** menu.

Related information

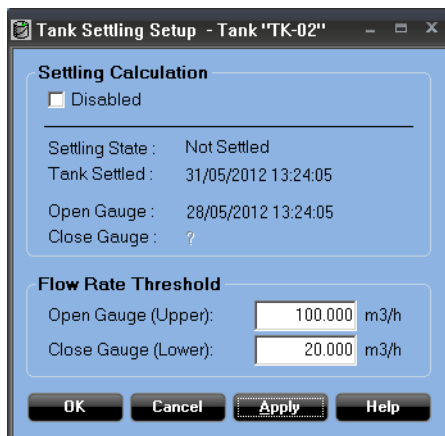
[Modifying group views](#)

8.4 Tank settling calculator

The **Tank Settling Setup** window is used to manually set up and enable the input parameters for a product transfer.

Procedure

1. Select menu option **Setup** → **Tank Setup** → **Tank Settling Calculation**.



2. Enter desired values for **flow rate threshold**:

| Parameter | Description |
|-------------|--|
| Disabled | Check this box to disable the settling calculation. |
| Open Gauge | Flow rate limit for opening gauge. The settling calculation is started when the current flow rate (absolute) value is greater then the open gauge limit. |
| Close Gauge | Flow rate limit for closing gauge. The settling date will be calculated when the current flow rate (absolute) value is smaller then the close gauge limit. |

3. Click **OK** to close the **Tank Settling Setup** window.

Related information

[Create a product table](#)

8.4.1 Settling calculation output

Table 8-4: Settling Calculation Output Parameters

| Output Parameters | Description |
|-------------------|---|
| Settling State | Defines the tank as either Settled or Not Settled . The tank is considered to be settled when a certain time has elapsed since the last movement in the tank. This calculation is based on the Settling Data in the product table. |
| Tank Settled | The calculated Settling Date, presented as YY-MM-DD, hh:mm:ss. The calculation is performed after a transfer or significant movement in the tank is observed. This calculation is based on the Settling Data in the product table. |

Table 8-4: Settling Calculation Output Parameters (continued)

| Output Parameters | Description |
|-------------------|---|
| Open Gauge | The Open Gauge Date, is when the current flow rate passed the Open Gauge Limit. |
| Close Gauge | The Close Gauge Date, is when the current flow rate passed the Close Gauge Limit. |

8.4.2 Viewing settling data

You can create your own group windows for viewing settling data. The **Settling** parameter can be added to a group window and shown as:

- Settling Status
- Settling Date

Modified windows will be available in the **View** → **Group** menu.

Related information

[Modifying group views](#)

9 Customizing the layout

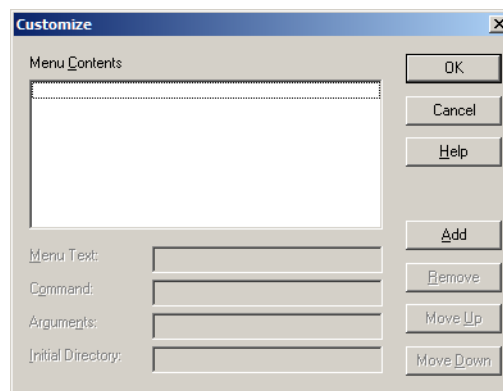
You can create customized menus, windows and tool bars. This enables you to add a menu item to the **Tools** menu for easy access to a program, such as TankMaster WinSetup, or design windows showing specific parameters.

9.1 Add an item to the Tools menu

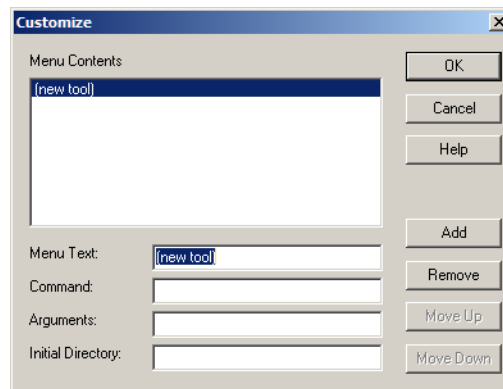
This is a description of how to add items to the **Tools** menu.

Procedure

1. Select menu option **Tools** → **Customize**.

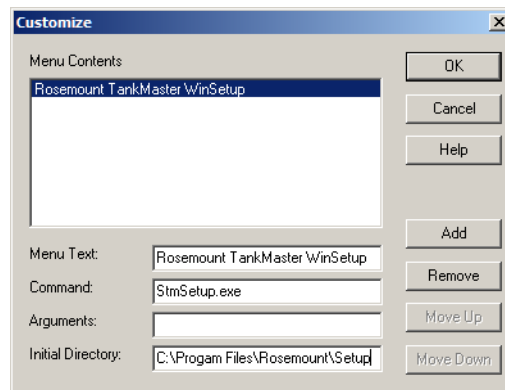


2. In the *Customize* window, click **Add**.

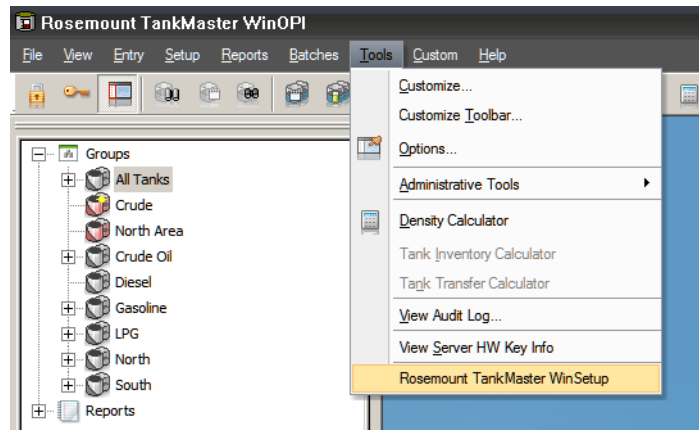


3. In the **Menu Text** field, type the name of the item as it will appear in the Tools menu.
4. In the **Command** field, type the name of the application that will be the new menu item.
5. In the **Arguments** field type any argument to be added to the command line. This is optional and can be left blank.

6. In the **Initial Directory** field type the path to the folder where the application is located.



7. Click **OK**.
8. Open the **Tools** menu and check that the new menu option is available.



9. Click the new menu option to verify that the application starts.

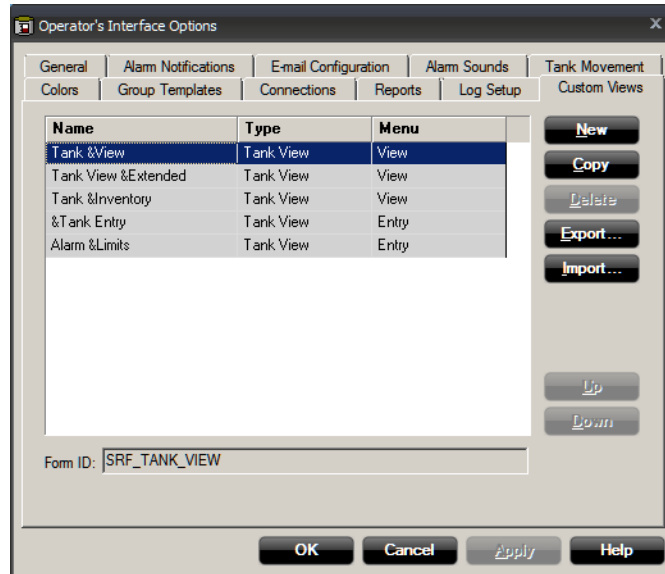
9.2 Create a customizable window

This is a description of how to create a customizable window in TankMaster WinOpi. Once it is created you may modify it to fit your requirements.

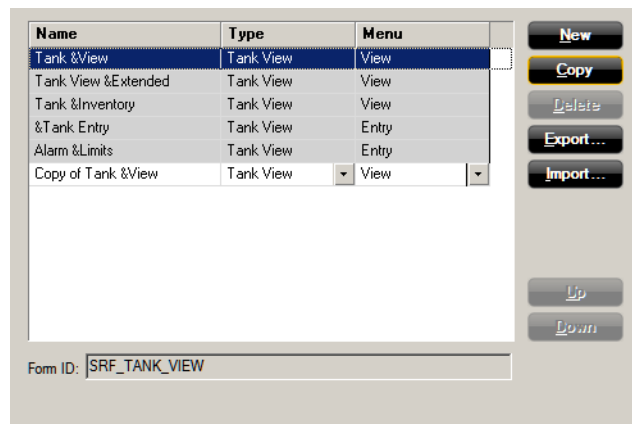
There are five default options available that you can edit to create a customizable window. You may also create an entirely new window.

Procedure

1. Select menu option **Tools** → **Options** and select the **Custom Views** tab.

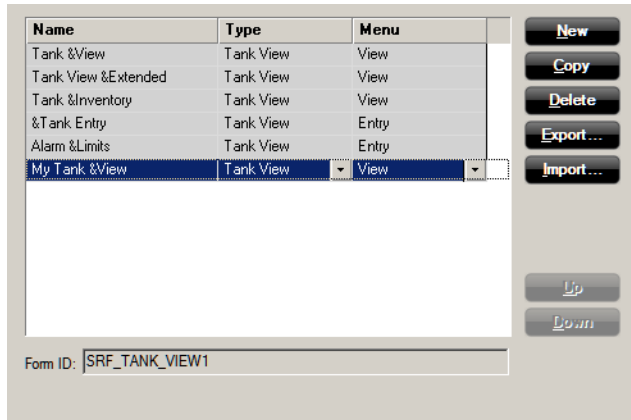


2. Select a view to edit, for example Tank &View, and click **Copy**.



3. Double-click the **Name** field and rename your customized view.

4. Enter a new name and click **OK**.



The new name appears in the **Name** column.

9.2.1 Custom views

If **Type** is set to **Tank View**, the new window is available in menu options:

- View>Tank** if Menu is set to View
- Entry>** if Menu is set to Entry

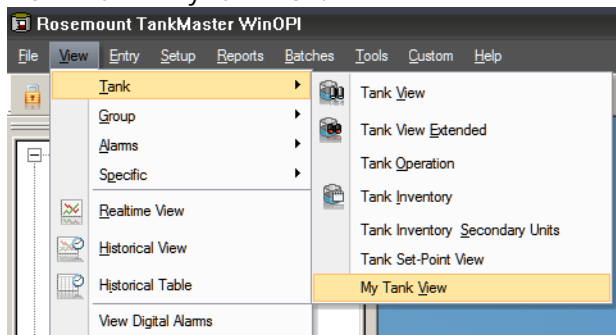
If **Type** is set to **Specific**, the new window is available in menu options:

- View>Specific** if Menu is set to View
- Entry>** if Menu is set to Entry

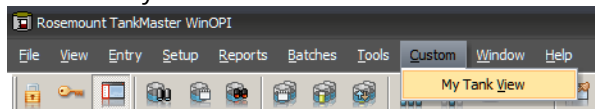
Example

In this example, the custom window is available in two locations:

1. View > Tank > My Tank View.



2. Custom > My Tank View.



9.3 Edit customizable window

A customizable window is available in the **View** menu. For TankMaster WinOpi a customizable window may also be available in the **Entry** menu, depending on the menu option chosen when creating the window.

The following description is an example of how to modify the design and appearance of a customizable window.

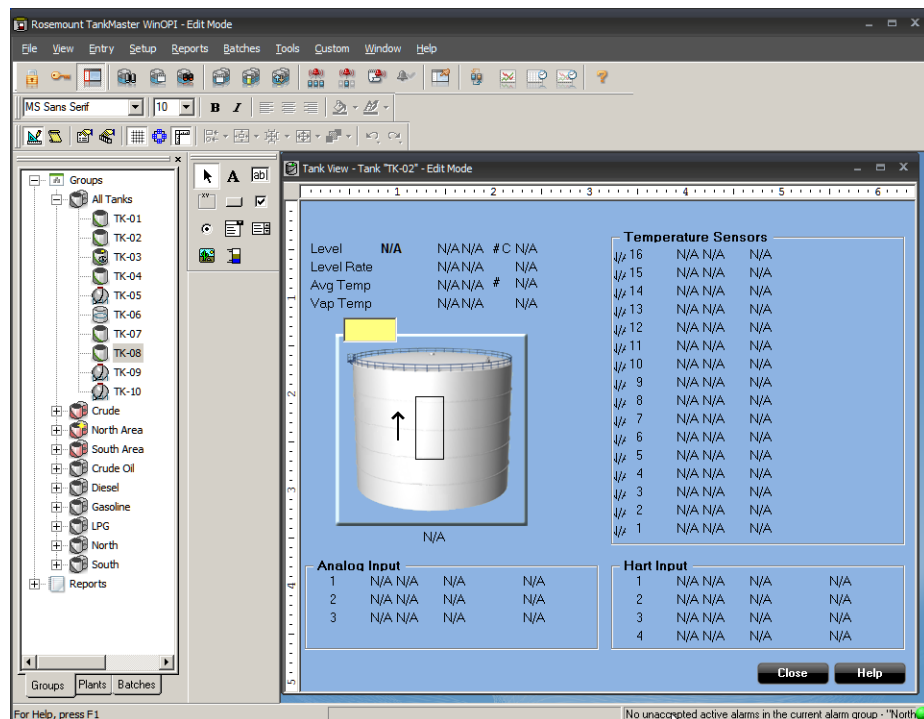
Procedure

1. Select a tank in the TankMaster workspace and open a customizable window.

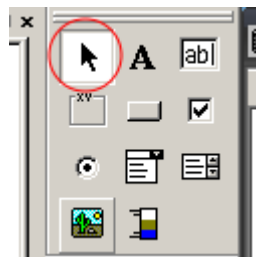
Note

Only windows which have been created as Custom Views can be edited. The Edit Tools feature is not available for standard windows.

2. Press **Ctrl+E** when the customizable window is active to open the **Edit Toolbox**:

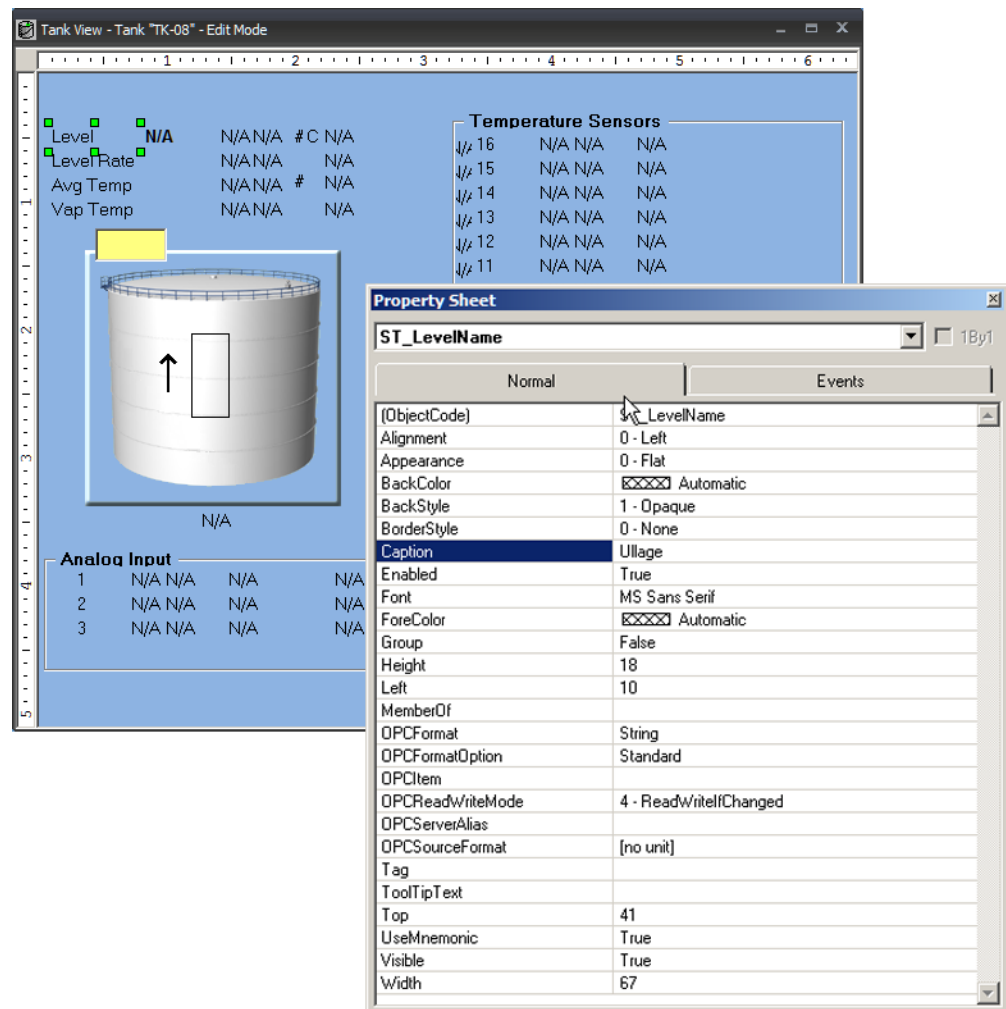


3. Choose the **Selection Tool**  in the edit toolbox.



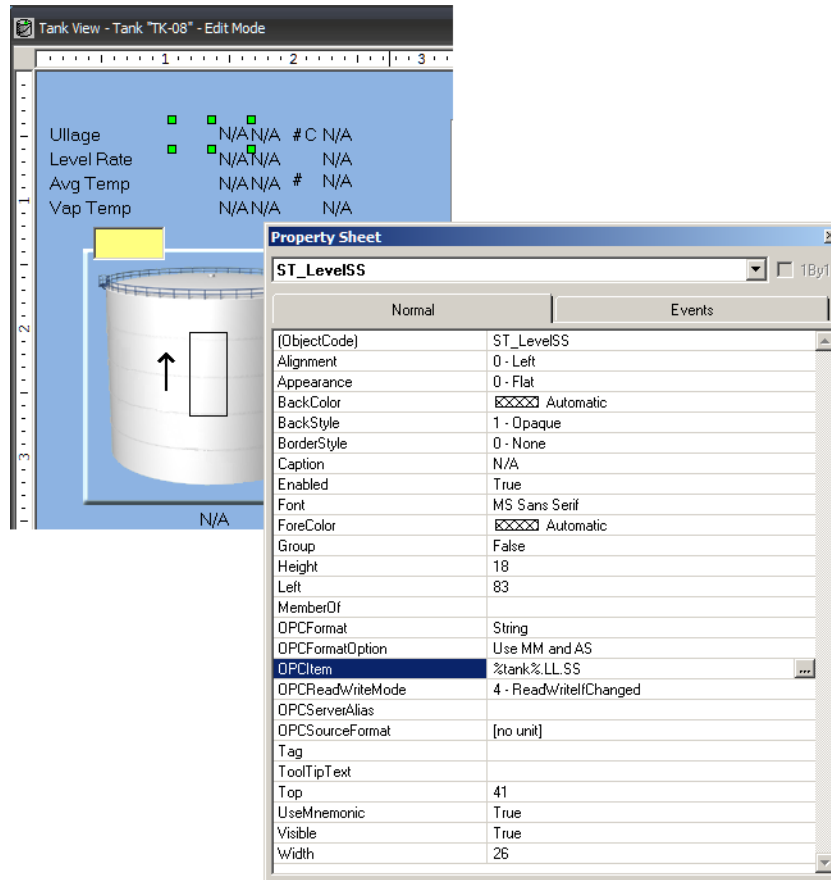
The **Selection Tool** lets you select items in the customizable window. Then you can delete or move items such as, for example, HART Input or Analog Input.

4. To change, for example, **Level** to **Ullage** in the tank view, the following actions must be performed:
 - Change the text label from **Level** to **Ullage**
 - Change the OPC item **Current Value (CV)** for level to Current Value for ullage
 - Change the OPC item **Value Unit (VU)** for level to Value Unit for ullage
 - Change the OPC item **Alarm Status (AS)** for level to Alarm Status for ullage
5. To change the text label from **Level** to **Ullage**, select the Level text block and right click to open the **Property Sheet**:



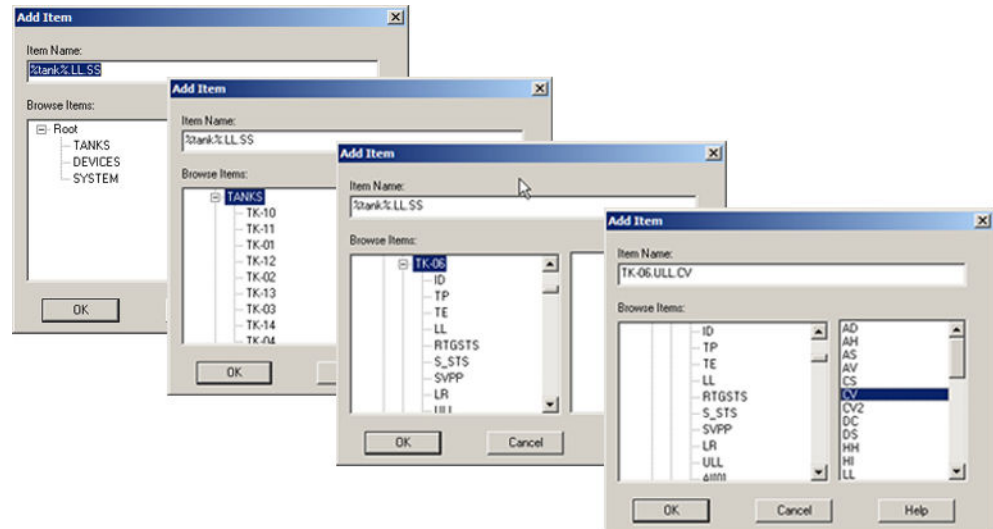
6. In the **Property Sheet**, double-click on the **Caption** entry and change **Level** to **Ullage**.
7. Close the **Property Sheet** window to verify the change.

- To change the OPC item **Current Value (CV)** for **Level** to **Current Value (CV)** for **Ullage**, right click the parameter block to bring up the **Property Sheet**:



- In the **Property Sheet**, select **OPCItem** in the left-hand column and click the browse button.

10. In the **Browse OPC Items** window, open TANKS>%tank%>ULL>CV:
 - a) Click on **TANKS** and browse to find the name of the tank to be edited. In this example, TK-06.
 - b) Select the item **ULL**.
 - c) Select the item **CV**.
 - d) The **Item Name** shown should be **%tank%.ULL.CV**. In this example; **TK-06.ULL.CV**.

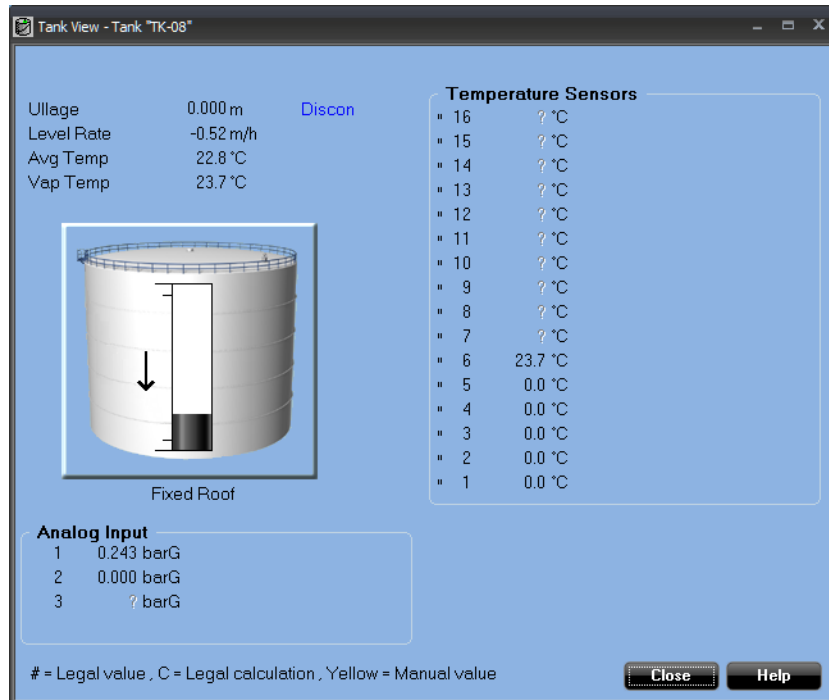


11. Click **OK**.
12. Now repeat these steps for the other OPC items in the same way. Select the corresponding parameter block, right-click to bring up the **Property Sheet**, and edit the OPC items:

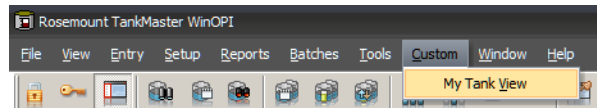
| OPC Item | Original Value | New Value |
|-------------------|----------------|---------------|
| Value Unit (VU) | %tank%.LL.VU | %tank%.ULL.VU |
| Alarm Status (AS) | %tank%.LL.AS | %tank%.ULL.AS |

13. To exit **edit** mode, press **Ctrl+E**.

14. Open the customized window from the **View** or **Entry** menu depending on the selected option when creating the customizable window, and verify the changes:



15. Optional: The customized window can also be opened from the **Custom** menu:



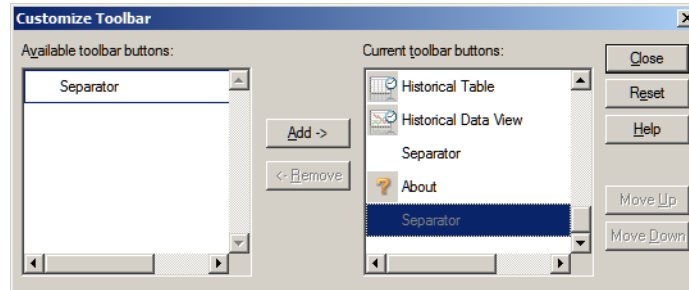
9.4 Create a custom toolbar

The Toolbar contains several buttons which act as shortcuts to actions and tools in TankMaster™ WinOpi.



Procedure

1. Select menu option **Tools** → **Customize Toolbar**.



2. Use the **Add** button to move toolbar buttons from **Available toolbar buttons** to **Current toolbar buttons**. Then they will appear in the toolbar. Use the **Remove** button for buttons you want to remove from the toolbar.

The current selection is shown in the **Current toolbar buttons** pane. The default setting shows all buttons.

You may add separators to distinguish between different categories.

Buttons can be re-organized using the **Move Up** and **Move Down** buttons.

Note

You may click **Reset** to return the toolbar to its original configuration.

10 Servo commands

For tanks configured as servo tanks, it is possible to send commands to a servo gauge using the **Servo Command** window.

10.1 Sending a servo command

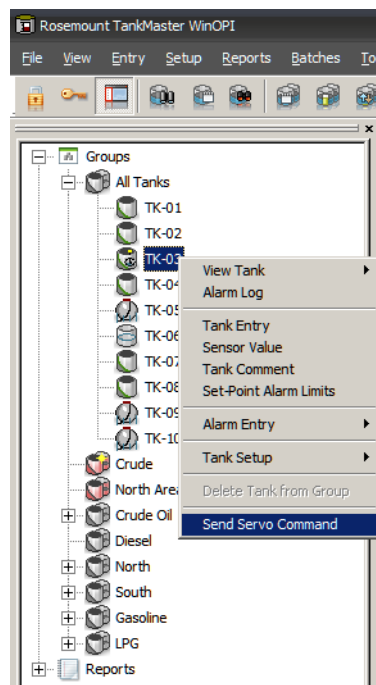
Prerequisites

To send a servo command, the tank must be configured as a servo tank.

See the Rosemount Tank Gauging System Configuration [manual](#) for more information.

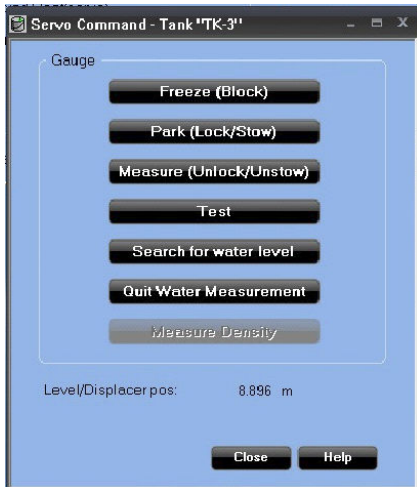
Procedure

1. Right-click on a servo tank in the Workspace window. Do one of the following:
 - Select **Send Servo Command**
 - Select main menu option **Entry** → **Send Servo Command**



The **Servo Command** window appears.

- Click the desired servo command.



When a servo command is sent, the **Level /Displacer position** field in the **Servo Command** window turns orange and the servo state is displayed to the left of the **Level /Displacer position**.

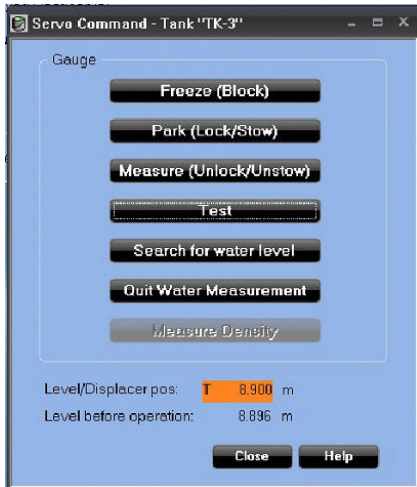
- Click **Close**.

Note

Before you close the **Servo Command** window, verify that the servo command indicator next to **Level /Displacer pos** field is cleared.

Example

For example, in case the **Test** command was sent to the gauge, ensure that **T** (Test) is not visible before you close the window.



10.1.1 Servo commands

Table 10-1: Servo Commands

| Command | Description |
|----------------|--|
| Freeze (Block) | Holds the displacer in its current position. |

Table 10-1: Servo Commands (continued)

| Command | Description |
|-------------------------|--|
| Park (Lock/Stow) | Raises the displacer to the top of the tank. |
| Measure (Unlock/Unstow) | Unlocks the gauge after Freeze or Park, and the displacer moves to the surface of the product. |
| Test | Raises the displacer and then returns it to the surface of the product. |
| Search for water level | Initiates a search for the product/water interface. |
| Quit Water Measurement | Quit measuring the water interface and return to measure the product level. |
| Measure Density | Displacer will be lowered into the product to measure the product density. |

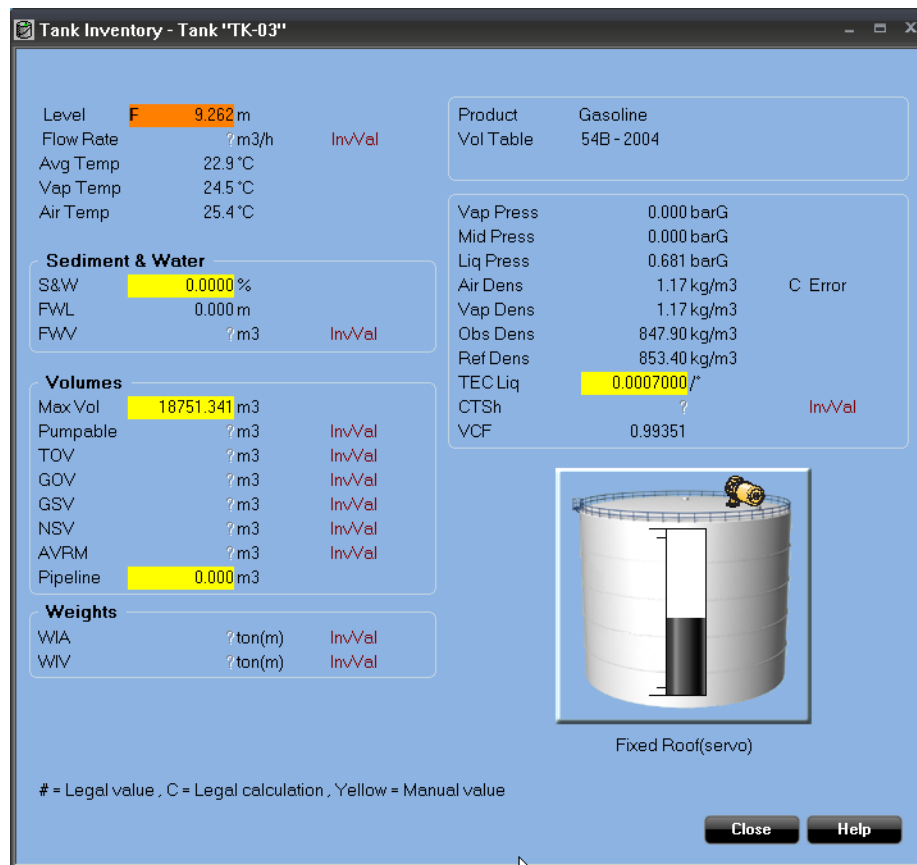
10.1.2 Tank inventory and active servo command

When a servo command is executed the **Level** position field in all **View Tank** windows turns orange. All Inventory (volume) calculations are disabled as long as the servo command is active. Only **Level** and **Temperature** values are displayed.

Note

When a servo command is active, the Level value does not show the current product level. The level shown is the current displacer level.

Figure 10-1: Tank Inventory and Active Servo Command



10.2 Servo states

The table below shows the different servo commands and servo states shown when using CIU and Rosemount 2460 System Hub.

The Up, Freeze and Down states refer to the displacer movement.

Table 10-2: Servo States

| Servo Command | Displayed servo state in Windows | | | | | |
|-------------------------|----------------------------------|--------|-------|---------------------------|--------|-------|
| | Enraf® CIU | | | Rosemount 2460 System Hub | | |
| | Raise | Freeze | Lower | Raise | Freeze | Lower |
| Freeze (Block) | - | F | - | - | F | - |
| Park (Lock/Stow) | P | F | - | P | F | - |
| Measure (Unlock/Unstow) | - | - | T | - | - | T |
| Test | T | - | T | T | - | T |
| Search for water level | - | W | ? | - | - | D |
| Water found | | | | - | W | - |
| Quit water measurement | T | - | - | T | - | - |
| Measure density | R | - | R | R | - | R |

Note

When a servo command is active and the displacer is in movement, the active device communication is prioritized.

Additional states

Table 10-3: Servo States

| Servo state character | Displayed servo state |
|-----------------------|-----------------------|
| ? | Reduced accuracy |
| M | Warning |
| ! | Unsupported status |
| T | Temperature |

OPC and Modbus

The current servo command is viewable via OPC or Modbus from a host computer.

To view the servo command status via OPC, use the **TK.xx.LL.SS** tag.

For more information: [Emerson.com/global](https://emerson.com/global)

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