Operating Instructions
Tankvision Professional NXA85

System Operation

Endress+Hauser

People for Process Automation
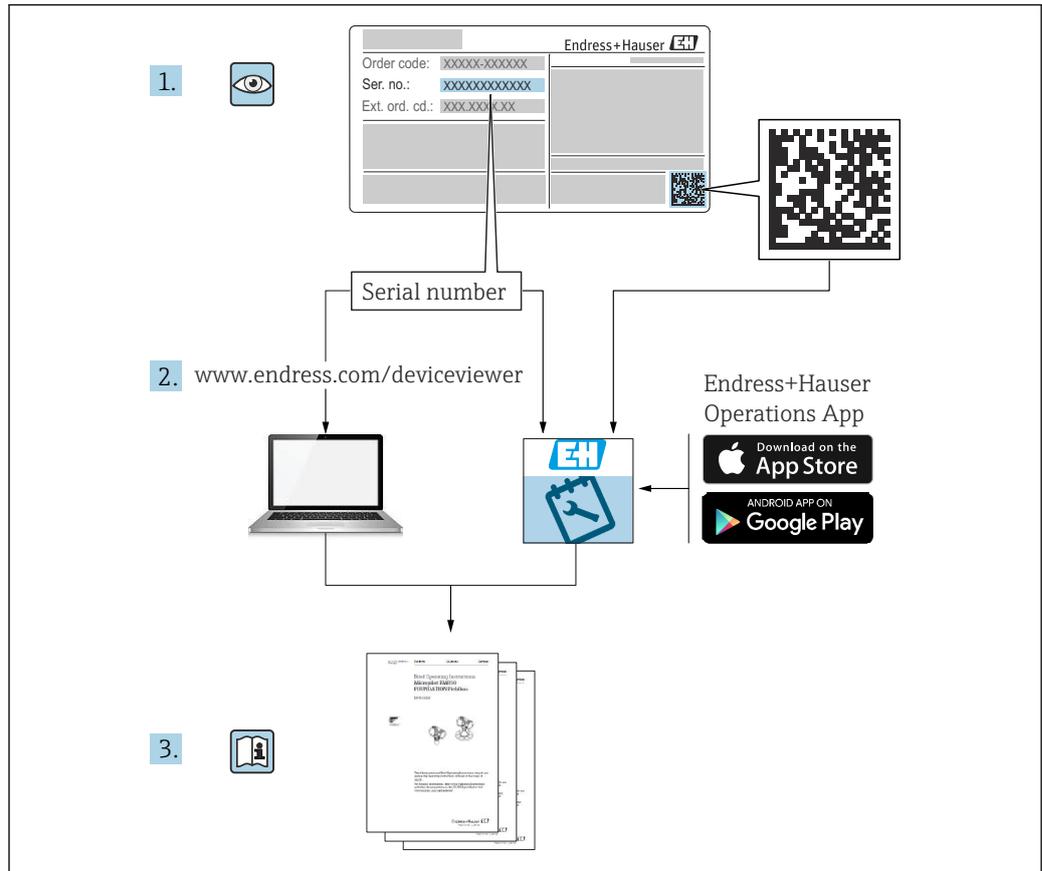
A0023555

- Make sure the document is stored in a safe place such that it is always available when working on or with the device
- Avoid danger to individuals or the facility: read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures

The manufacturer reserves the right to modify technical data without prior notice. The Endress+Hauser sales organization will supply you with current information and updates to these instructions.

Table of contents

1   About this document

1.1   Document function

This manual should support during the installation of Tankvision Professional NXA85.

It deals with the basic functions Operators have to perform during daily operation.

1.2   Target audience

Beside basic PC operating knowledge no special training is needed to perform the Tankvision Professional System operations. Nevertheless it is recommended receiving a training on the system by Endress+Hauser.

1.3   Software versions and certification

Due to the certification process with weights and measures agencies, the latest software version might only be certified at a later stage. Also some features might be incompatible with the weights and measures regulations and can therefore not be combined.

1.4   Symbols

1.4.1   Safety symbols

DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

1.4.2   Symbols for certain types of information and graphics

Tip
Indicates additional information

Reference to documentation

Reference to graphic

▶
Notice or individual step to be observed

1. , 2. , 3.
Series of steps

⌊▶
Result of a step

1, 2, 3, …
Item numbers

A, B, C, …
Views

1.5   Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads), depending on the device version:

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid for your device** The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions (KA)	**Guide that takes you quickly to the 1st measured value** The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Your reference document** The Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. These are an integral part of the Operating Instructions. The nameplate indicates which Safety Instructions (XA) apply to the device.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is a constituent part of the device documentation.

1.6   Change history

BA00396G/13.10
- Valid for software version: 18.0.0
- Initial version

BA00396G/14.14
- Valid for software version: 18.0.2 and 18.0.3
- Changes to the previous version:
  New layout; Enhanced Product, Tank and Movement functionality; Additional functions for Grid view

BA00396G/15.16
- Valid for software version: 18.0.2 and 18.0.3
- Changes to the previous version:
  New features

BA00396G/16.17
- Valid for software version: 18.1.1
- Changes to the previous version:
  Unification of the W&M and the non W&M software packages.

BA00396G/17.22
- Valid for software version: 18.3.2
- Changes to the previous version:
  Pipeline volumes as part of tank volumes selectable.

BA00396G/18.24
- Valid for software version: 18.3.3
- Changes to the previous version:
  Compatibility with Windows 11 and Windows Server 2022. Minor changes to existing functionality.

BA00396G/19.26
- Valid for software version: 18.3.4
- Changes to the previous version:
  - Visibility of tanks and gauges for the currently logged-in user depends on Read/Write access; Configuring cell colours and settings for cell types; Minor changes to existing functionality.
  - Minor changes to document structure.

1.7   Registered trademarks

Microsoft®, Windows® and Edge®
Microsoft®, Windows®, Edge® and the Microsoft logo are registered trademarks of the Microsoft Corporation.

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

Java®
Registered trademark of Sun Microsystems, Inc.

Mozilla® Firefox®
Registered trademark of the Mozilla Foundation

Apple®
Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

Android®
Android, Google Play and the Google Play logo are trademarks of Google Inc.

1.7.1   Legal notice concerning trademarks

All company/product names and/or all company logos may be trade names, trademarks and/or registered trademarks of Endress+Hauser, its affiliates or of their respective owners with which they are associated.

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
▶ Are authorized by the plant owner/operator.
▶ Are familiar with federal/national regulations.
▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
▶ Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
▶ Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
▶ Follow the instructions in this manual.

2.2 Intended use

2.2.1 Intended use of Tankvision Professional NXA85 software

Tankvision Professional is specifically designed for operators of bulk storage facilities, marketing terminals, refineries and pipelines. It is designed to handle all the data acquisition, supervisory control and monitoring required in a single fully integrated solution.

Tankvision Professional integrates all major types of tank measurement instruments into one system.

All measured and calculated tank parameters are accessible to your tank farm and terminal operators as well as to connected host systems.

Multi-user operation is provided by the inbuilt Web Server offering the opportunity to access data at any connected location (local/remote) e.g. for administrative and accounting purposes.

2.3 IT security

The manufacturer warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

Endress+Hauser

3 Incoming acceptance and product identification

3.1 Incoming acceptance

On receipt of the delivery:

1. Check the packaging for damage.
   ↳ Report all damage immediately to the manufacturer.
   Do not install damaged components.

2. Check the scope of delivery using the delivery note.

3. Compare the data on the nameplate with the order specifications on the delivery note.

4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.

ℹ️ If one of the conditions is not satisfied, contact the manufacturer.

3.2 Product identification

The following options are available for identification of the software:

- Nameplate specifications
- Order code with breakdown of the software features on the delivery note
- Enter serial numbers from nameplates in *Device Viewer* (www.endress.com/deviceviewer): All information about the software is displayed.

For an overview of the technical documentation provided, enter the serial number from the nameplate in the *Device Viewer* (www.endress.com/deviceviewer).

3.2.1 Nameplate

The information that is required by law and is relevant to the product is shown on the nameplate, e.g.:
- Manufacturer identification
- Product name
- Order code
- Extended order code
- Serial number
- Barcode

3.2.2 Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany
Place of manufacture: See nameplate.

3.2.3 Order code and product version

ℹ️ To find out the version of your software, enter the order code indicated on the nameplate in the search screen at the following address:
www.products.endress.com/order-ident

4   Home Page

When Tankvision Professional is launched from the Start menu or its desktop shortcut the Home Page is loaded.

Each tank configured in the system has its own graphical window. If **Use User Profile** has been selected in the **System Settings**, then only the tanks that have had **Read-Only** or **Read/Write** access configured in **Tanks by User** for the currently logged in user will be visible.

The Home Page has a menu bar, a tool bar, an application work space and a status bar at the bottom of the Window.

The system starts with the Home Page maximized and with all Tank windows open as shown.
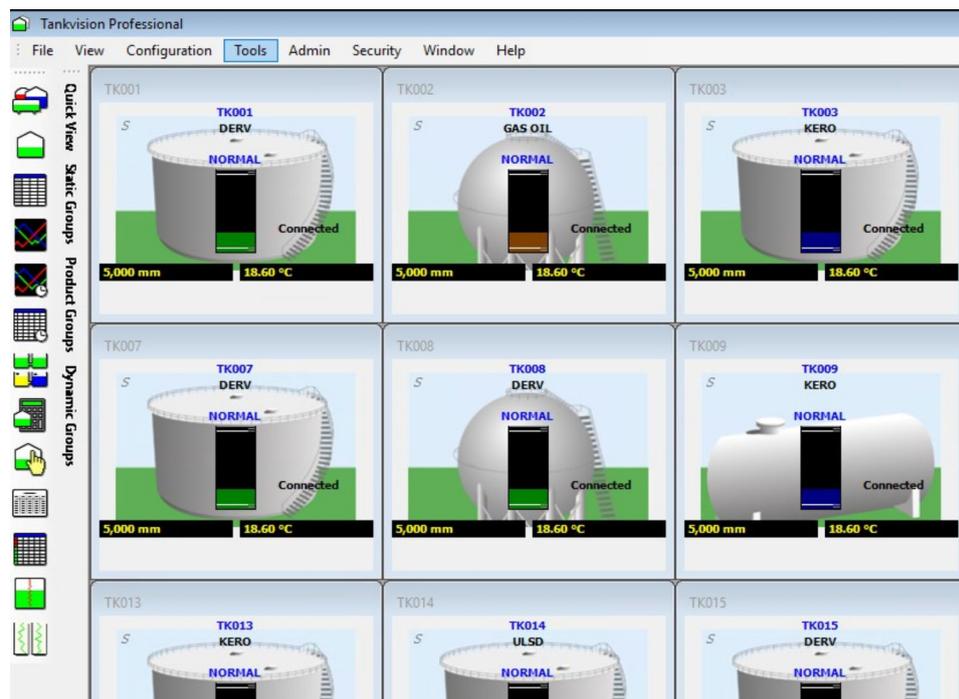
   1   Home Page

The most frequently used functions are accessed using the toolbar, the rest are accessed through the menus.

4.1 Multiple Windows
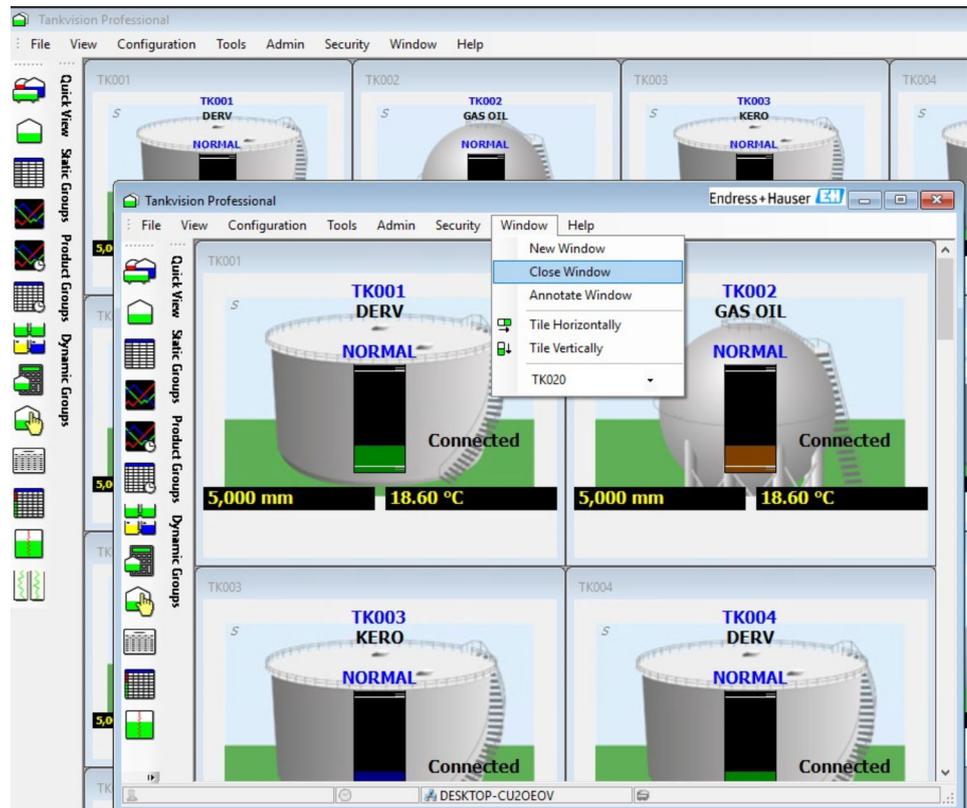
🖼 *2   Multiple Home Pages*

The menu items that control the multiple windows feature (subject to licensing restrictions) are found in the Home Page menus: **Window → New Window, Close Window** and **Annotate Window**.
- **New Window** – Opens a new window.
- **Close Window** – Closes the current window (not available on 'master' window).
- **Annotate Window** – Alters the caption of the current window.

Each instance of the home page window can be annotated with an identifying name to enable the user to identify them on the Windows taskbar. Different instances of the Home Page can be configured to show different sets of tanks. This enables, for example, general products and LPG products to be displayed in separate windows. If more than one monitor is available, the home pages can be arranged on different monitors for greater clarity.

Closing the application will close all windows. Reopening the application will cause all the windows to be restored to their original locations.

4.2 Tank View

This is the default view for individual tanks when displayed in the Home Page. See the following picture for an example.
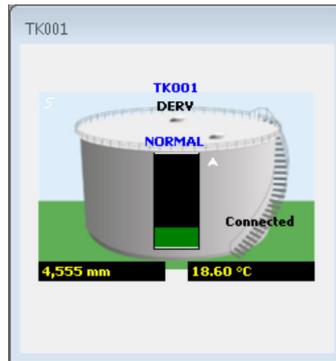
3   Typical tank mimic

Each window or tank mimic is fixed in its general appearance and size. They are scalable.

When multiple tank mimics are open they will be tiled to the available area of the Home page window. When there are more windows open than available space, scroll bars will automatically appear down the right hand side of the parent window.

The tank mimic has been equipped with a number of short-cut links to other display features, and a context sensitive pop-up menu for quick access to other features.

4.3   The Basic Tank View Window

The window shows:
- The tank number of the tank
- A graphical representation of the tank denoting the tank type, e.g. cone roof, floating roof etc.
- The product allocated to the tank
- A bar graph showing the level in the tank
- A selection of numeric and textual data fields which can be configured by the user
- Whether an alarm is currently active for the tank
- Whether the numeric data is in manual or automatic mode where relevant
- The movement status of the tank, i.e. static, filling, emptying
- The connection status of the gauge, i.e. Connected, Disconnected, Connecting, Disconnecting

> If the connection status is anything other than Connected then ALL data for the tank is from the last time it was connected and is therefore NOT LIVE.

4.3.1   Data Display in Manual Mode

Any data value in manual mode is denoted as such by being displayed as blue colored text.

The following window indicates that the product temperature is in manual mode.

The data is therefore updated by using the Manual Data Entry facility. Please refer to the Section on Manual Data Entry for further details.
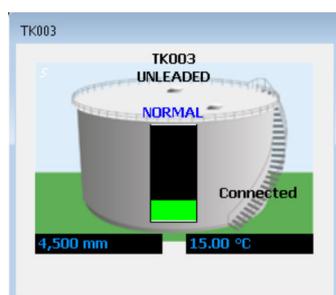
4   Tank mimic displaying a manual temperature

4.3.2   Shortcut access to Manual Data Entry

When a numeric value is in Manual Mode as shown, the user can gain quick access to the manual data entry display by double-clicking the manual data item. This will launch the Manual Data Entry module.

4.3.3   Shortcut to TAD Statuses and Modes

When one of the TAD values: **Tank Mode**, **Tank Status** and **Product Status** is displayed a double-click on the field will display a Windows dialog to permit the tank value to be changed.

For more details on TAD refer to section "TAD Maintenance".

4.3.4   Shortcut access to Single Tank Overview

If you double click the tank window the Single Tank Overview display is launched for that tank.

See the section on the Single Tank Overview module for a complete description (refer to "Single Tank Overview").

Access to Single Tank Overview is also available from the tool bar.

4.3.5   Tank in alarm

When a tank has any active alarm an alarm horn icon appears on the tank as shown.
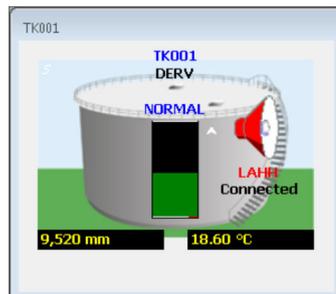
 🖾 *5   Tank mimic displaying a tank with an active alarm*

In addition an abbreviated label is placed below the horn indicating the type of alarm. If there are multiple active alarms the highest priority alarm is displayed. In the illustrated case LAHH is Level High High alarm.

See the table below for details.

Alarm Codes

Alarm Code	Alarm Description
LAHH	Level Alarm High High (Software)
LAH	Level Alarm High (Software)
LAL	Level Alarm Low (Software)
LALL	Level Alarm Low Low (Software)
HH	Level Alarm High High (Gauge)
H	Level Alarm High (Gauge)
L	Level Alarm Low (Gauge)
LL	Level Alarm Low Low (Gauge)
NO REPLY	No reply from gauge

Alarm Code	Alarm Description
BAD ALARM	Incongruous collection of alarms active (i.e. High alarm and Low alarm at the same time)
GT H	High temperature (Gauge)
GT L	Low temperature (Gauge)
PT H	High temperature (Software)
PT L	Low temperature (Software)
GD H	High density (Gauge)
GD L	Low density (Gauge)
PD H	High density (Software)
PD L	Low density (Software)
PD DA	Density deviation (Software)
PT DA	Temperature deviation (Software)
PW H	High water (Software)
PW L	Low water (Software)
PL VA	Variable alarm
PF HF	High flow
PF LF	Low flow
UMA	Unauthorised movement by volume
UMAL	Unauthorised movement by level
PL FR	Roof alarm
PL DA	Software difference alarm
PU 1...8	Programmable user defined alarm 1...8

4.3.6   Identifying the alarm after it has occurred

When an alarm first occurs, an event is generated, a horn appears on the tank and the **Alarm Event Viewer** sounds an audible warning or optionally voice message can be played.

After the alarm has been acknowledged the remaining indication is an alarm horn on the tank mimic and line in the **Alarm Event Viewer**, both of which will generally persist until the alarm condition passes. In addition the active alarm summary will also show any active alarms.

To get further information on the active alarms double click the horn icon.

The **Alarm Summary** module will be loaded. See illustration below.
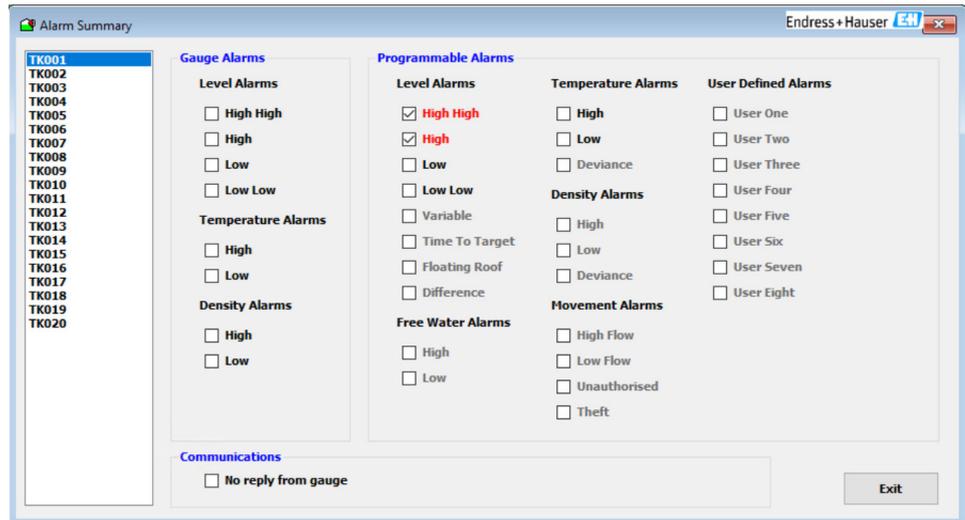
🔲 *6   Alarm Summary screen*

The **Alarm Summary** module will show each of the alarms that are active. An active alarm will have its corresponding check box ticked.

4.3.7   Identifying moving tanks

🔲 *7   Moving tank indication*

The Tank View window identifies moving tanks in several ways:
- By displaying a fill direction indicator, i.e. an arrow pointing up or down dependent on the direction of movement (as shown in the figure above).
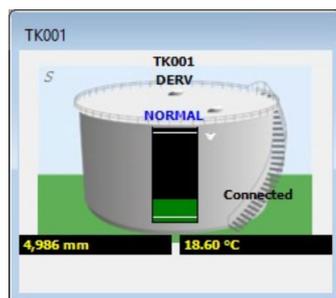- By the magnitude and sign of the Flow Rate, e.g. a positive flow rate represents filling, a negative flow rate represents emptying.
- Finally, depending on whether it is configured, the color of the product in the tank can be used to represent movement status. For example, blue represents filling, brown represents emptying, and green represents static.

📖 See the System Configuration manual BA00390G (section "System Settings", **Use Product Colour** check box) for how to enable this feature.

4.3.8   Connection status

The connection status of the tank is displayed on the right hand side.

It will be one of four states:
- **Connected**
- **Disconnecting**
- **Disconnected**
- **Connecting**

The **Connected** status means that the external devices, e.g. tank gauges, are being polled for data continuously. For modem connections data might only be requested periodically.

If the connection status is anything other than **Connected** then ALL data for the tank dates from the last time it was connected and is therefore NOT LIVE.
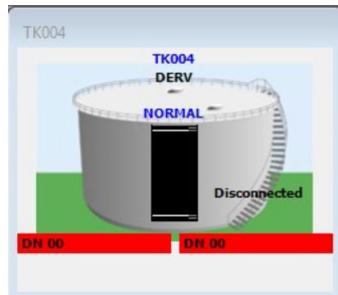
🔲 *8   Tank in disconnected state*

In the above screenshot the tank is in a **Disconnected** state and will show diagnostic code **DN00** for no reply from gauge.

4.4   Context Menu Options

A context menu is available. Right mouse click within any Tank View window and the popup menu will appear, as illustrated below.
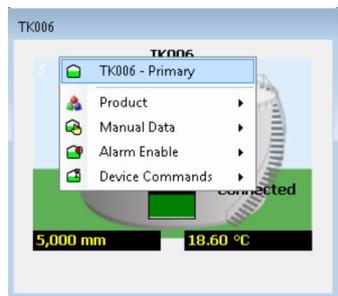
🔲 *9   Context menu in action*

Some of the options within the pop-up menu are sensitive to the configuration of the tank. These will be discussed in the remainder of this chapter.

4.4.1   Product

The **Product** menu item has a further sub-menu which contains the products sorted in order of usage (the one which is allocated to most tanks first). This option is used to change the product allocated to the tank. The currently allocated product is highlighted by an adjacent tick mark and is greyed out. If there are more than twelve products currently allocated to tanks, then there is a final entry in the menu which displays a product selection screen:
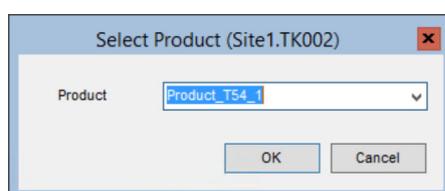
🔲 *10   Product selection screen*

A **Product** can be selected by clicking on the arrow which will display a list of all products (again sorted in order of usage). Alternatively the name of the required product can be typed in. As the product name is entered a reduced list of products matching the entered text is displayed:
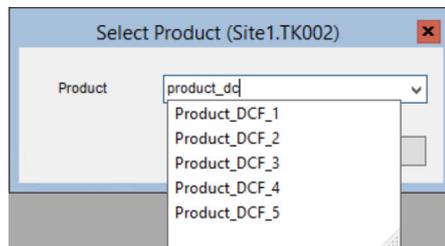
☒ 11   *Filtering product selection by name*

ℹ️ If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then the product menu will be disabled.

4.4.2   Manual data

The Manual mode menu item has a further sub-menu which contains all of the available manual mode options. This option is used to switch values between manual and automatic mode.

Any value in manual mode will be highlighted by an adjacent tick mark.

ℹ️ If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then all the manual mode options in the manual data menu will be disabled.

4.4.3   Alarm enable

If visible, this menu option leads to a sub-menu that will show whether the alarm is enabled or disabled. A tick mark will appear adjacent to the menu option showing that the alarm for that data item is enabled.

ℹ️ If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then all the alarm options in the alarm enable menu will be disabled.

4.4.4   Movements

If visible, and enabled, this menu option provides a convenient way to access the product movements for the tank. Selecting a movement listed on the sub-menu will show the details of that movement.

4.4.5   Device Commands

The **Device Commands** menu item has a further sub-menu which contains all of the available device commands within this context.
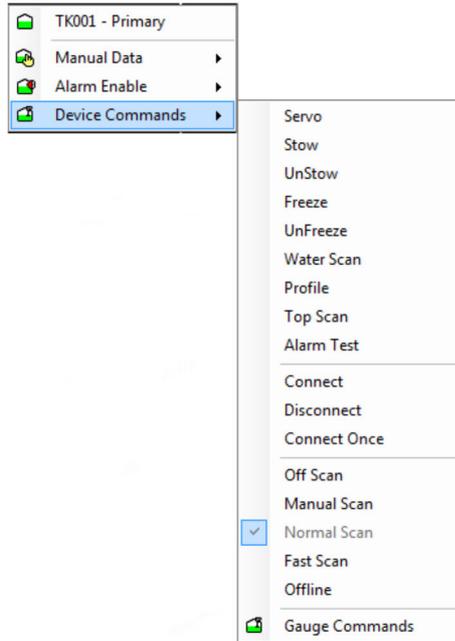
🖾 12   Device commands tank mimic

ℹ️ If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then all the device commands in the device commands menu will be disabled.

Details of the commands are given below.

Servo Check
Perform a repeatability check on a servo based gauging instrument. This command will attempt to raise the displacer by at least 300 mm and then return it to the product level. The level prior to raising the sensor is compared to the level after the sensor has returned to the product surface. If both are within the defined tolerance the servo check function is considered to have passed. If created, this will generate an event.
This command is only available to servo based gauging instruments.

Stow
Stow the sensor of the gauging instrument to the locked or top stop position. This command is only available to servo based gauging instruments.

Unstow
Cancel the **Stow** command and return the sensor to the product level. It can also be used to cancel any command currently in operation.

Freeze
Causes the displacer to remain at its current position.

Unfreeze
Releases the last **Freeze** command and allows the displacer to return to the product level.

Water Scan
Selecting this option will cause the gauge to try to find the water interface, and return the product level. Note that this command will only work if your gauge supports water scan.

Density Scan
Selecting this option will cause the gauge to perform a density profile scan, and return the average observed density. Note that this command will only work if your gauge supports density profiling.

Alarm Test

Selecting this option will raise the displacer position to the top of the tank, which will raise any enabled alarms.

NOTE: Depending on gauge type, commands can generate an alarm. Status changes can also occur during command executions.

Scan Mode

Off Scan, **Normal Scan** and **Fast Scan** are mutually exclusive options that control the frequency with which the gauge is scanned.

- **Off Scan**

  The gauge is not polled.

- **Normal Scan**

  The gauge is polled at the normal intervals.

- **Fast Scan**

  The gauge is polled every other poll (i.e. more frequently), at the expense of the other gauges.

- **Manual Scan**

  Used when the gauge is **Off Scan**, to cause it to be polled once.

Connection Status

Connect, **Disconnect**, **Connect Once** are mutually exclusive options, that determine the connection state of the interface port that the tank is connected to. Therefore if one of these commands is sent to a tank, then it will apply to ALL tanks connected to the same COM port or Modem on the PC.

- **Connect**

  The interface will connect to the COM port or Modem and continue polling the gauges for data indefinitely or until a disconnect command is sent by the user.

- **Disconnect**

  The interface will disconnect from the COM port or modem and remain disconnected. Data from the last refresh will be displayed.

- **Connect Once**

  The interface will connect to the COM port or Modem and automatically disconnect when it has retrieved all data from the gauges. Data retrieved from the connection will be displayed.

A confirmation dialog will be displayed if the **Disconnect** command is selected, as this command will stop ALL gauges on the same interface from being updated. Be aware that sending a command to one tank will affect all other tanks on the same interface and therefore these commands should be used with caution as they could lead to loss of data for critical tanks.

4.5　　Use of the function keys

Function keys can be customised to act as "one key press" shortcuts to other functions and features installed on the computer. A Function key first needs to be set to an executable, in this example gridview.

Locate the file **FunctionKey.ini** in the application folder (**C:\Program Files\Endress+Hauser\Tankvision Professional**).

Then edit the file.

text= Add the text for the menu item in this case it will be **F2 GridView**.
exe= Path name for the executable. Do not forget .exe on the end.
Icon= Path name for the icon. Do not forget .ico on the end.
hide= Use 0 to make the item appear on the Function Key menu.

Example for F2 key starts Grid view.
[F2]
text = GridView
exe = GridView.exe
icon = myicons\myicon.ico
hide = 0

Stop and restart homepage to initialize the functionality.

5   Single Tank Overview

The Single Tank Overview provides a detailed display of all data for a single tank.

It can be launched:
- By double clicking a Tank View window
- By clicking the Single Tank Overview tool bar button

Once the **Single Tank Overview** module has been loaded, further tanks can be viewed by selecting them from the list of tanks. If **Use User Profile** is selected in **System Settings**, then only the tanks that are **Read-Only** or **Read/Write** for the current user will be shown in the list. The displayed data is organised into logical groups; Primary Gauging data, Flow Rates, Inventory Data, and Alarm Settings.

The displayed data is organised into logical groups; Primary Gauging data, Flow Rates, Inventory Data, and Alarm Settings.

Any data values in manual mode will be displayed in in blue colored text.

Any data values unavailable for any reason will be replaced by a diagnostic number.

See the illustration below for a typical example.
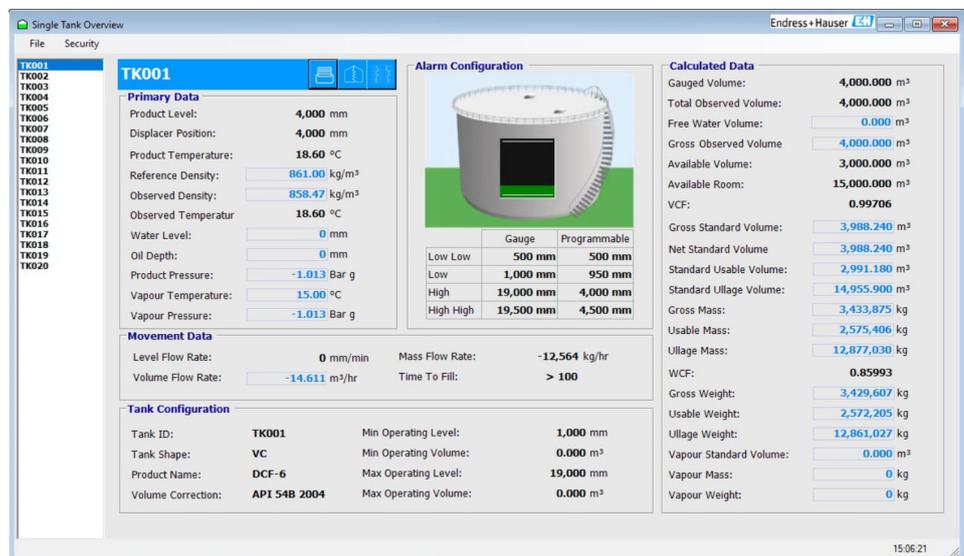
 13   *Typical Single Tank Overview screen*

Tool tips are used throughout to provide further information to the user on each of the data display fields.

5.1   Tank in alarm

If the selected tank has an active alarm, a horn icon will be displayed on the tank. The detail of which alarms are active can be determined by double clicking the horn to launch the **Alarm Summary** display.

The **Alarm Summary** will show a tick mark against each alarm that is currently active. See the illustration below.
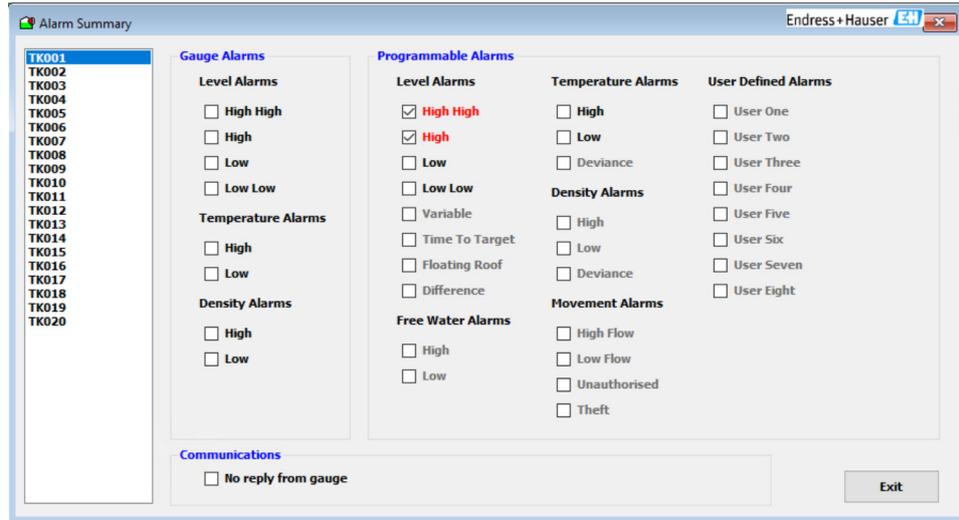
14   Alarm Summary screen showing High and High High Programmable alarms active

5.2   Viewing the Element Temperatures

Some tank gauges have the capability of measuring multiple temperature points from special temperature measurement devices. These are commonly refered to as Averaging Thermometers, Multi-spot Temperature probes etc.

Temperature profiles can only be viewed if:
- The system has been configured to poll for Element Temperatures. To do this make sure the **Average Temp. Fitted** flag is ticked for the gauge in the Device Configuration screen.
- The Trending subsystem is configured to trend the temperature elements for that gauge. This is carried out in the Trending Configuration screen.

Refer to the configuration manual for details on the above items.

To display the Temperature Profile screen click the button in the overview screen.

Right click to add a tank to the display, see below.
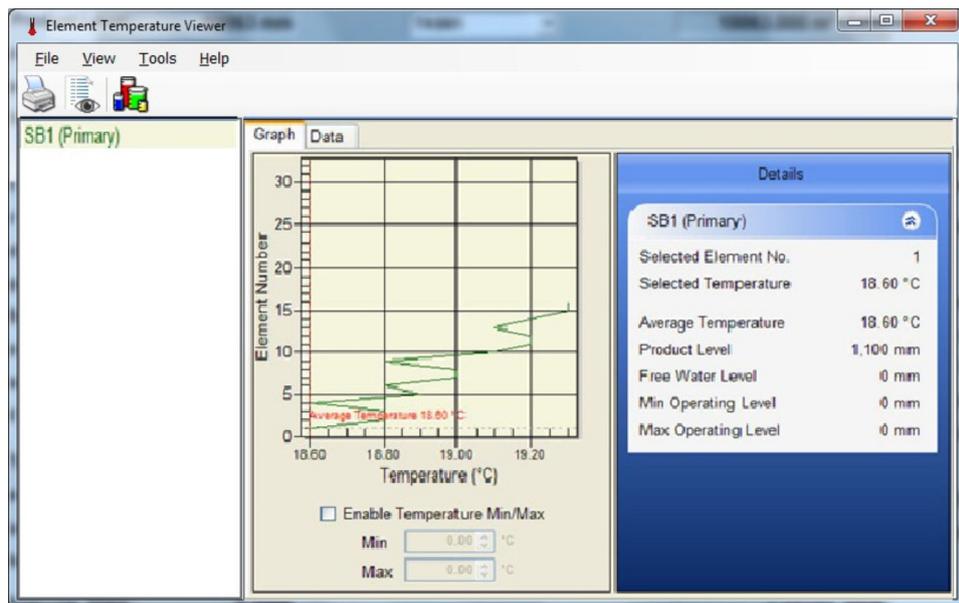
15   Typical view of element temperatures

The data can be displayed in a graphical format using the **Graph** tab. In this view extra details of the profile are also shown, such as the average value etc.

The graphical display can be configured using the following menu options:

- **View → Average Temperature**
  Tick this item to show the average temperature.
- **View → Data Points**
  Tick this item to show the individual data points on the graph.
- **View → Data Labels**
  Tick this item to show the individual data values on the graph.
- **Tools → Options**
  This displays a dialog where the colours used for the various lines on the graph can be configured.
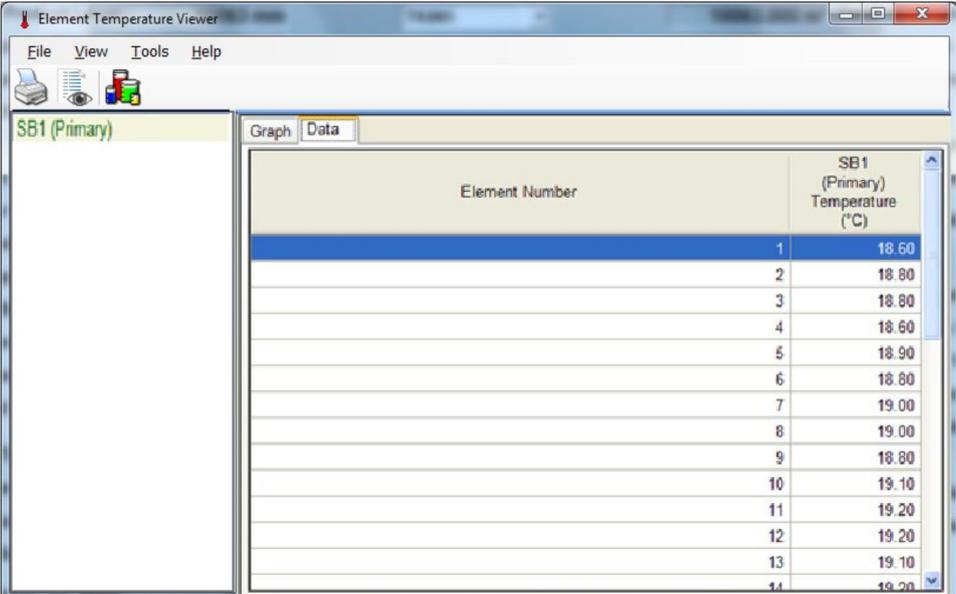- **Tools → Configure Element Levels**
  This displays a dialog where the heights of the temperature elements may be entered. These will then be used when plotting the graph, instead of the element numbers.

By default, the temperature on the graph will be scaled using the minimum and maximum values from the table. However this can sometimes give a misleading display. The range can be manually set by ticking the **Enable Temperature Min/Max** item and then entering the min and max range.

The graph can be saved to a bitmap by selecting **File → Save Graph ...**

The data can also be viewed in a tabular format by clicking on the **Data** tab.

 16 Tabular view of element temperatures

5.3 Viewing profile data

Some tank gauges have the capability of carrying out a density/temperature profile (or just density for some gauges) throughout the product.

This data can then be returned as a table of densities and temperatures (if supported) and stored in the database.

The profile data may then be viewed in a graphical or tabular format.

Single Profile Viewer
Only one profile may be displayed at a time.

Screens are opened from the **Single Tank Overview** screen.

6 Logging On

6.1 Security

Access to the features of the system can be controlled through a user account. The requirement to log on to the system can be disabled allowing any user full access to the system. If security is enabled the following sections apply.
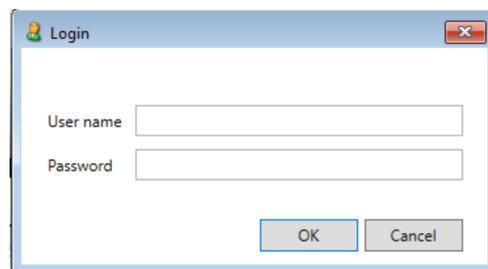
6.2 Logging In

1.
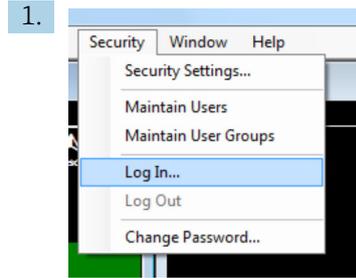
🖻 *17 Security menu on Home Page*

Select **Security → Log In...** from the main menu bar, from either the Home Page (see above) or **Alarm Event Viewer**. Other ways to log in are using the Security Manager icon in the Windows system tray, or automatically when you attempt to access a privileged feature of the system.

↳ A login dialog will appear.

🖻 *18 Login dialog*

2. Enter the necessary username and password.

↳ The details will be checked against entries in the database. If the username and password are valid the user will be logged on at their designated access level.

ℹ️ Each user account has a designated level of access to each feature. So even if a user is logged on it does not necessarily mean that they have access to all functions. A user's level of access is determined by the rights assigned to them by the System Administrator.

When a user is logged in to the system, the username is displayed in the left most panel of the status bar of the Home Page and **Alarm Event Viewer** as shown below.
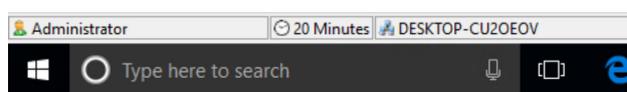
🖻 *19 Status bar of Home Page, showing logged in user*

6.3 Logging Out

Select the **Security → Log Out** option from the main menu bar.

The system will immediately log out the currently logged on user. This will prevent access to all functions requiring a logon.

6.4 Configuring New User Accounts

Please refer to Security Configuration section of the System Administrators manual for further information.

Consideration should be given to new users access rights. Not all users should be given the highest level of access. The System Administrator should be responsible for determining who has what rights.

It is recommended that most casual users be given minimal rights to start with. They can always be adjusted later as users become more familiar with the operation of the system.

7 Alarms and events

7.1 Introduction

In many sites the words alarms and events are often confused. It is worth an explanation of the terms within the context of this tank gauging system.

Simply put; Alarms give rise to events.

Take the example of a high level alarm, a set point can be defined at which the alarm will become active (this also implies that there is a point at which the alarm becomes inactive). When the alarm becomes active, an event is recorded which alerts operators to this. Not all events recorded by the system are as the result of alarms, for instance a communications failure with the field instruments is a significant event, but has no alarm behind it.

7.2 What happens when an alarm becomes active

An alarm horn icon will be displayed on the tank within the Tank View window as seen below.
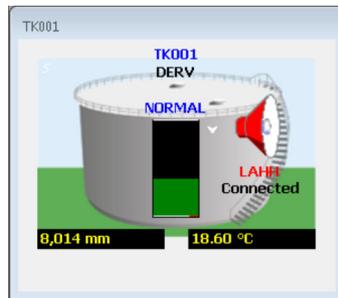
 20   Tank mimic displaying a tank with an active alarm

The alarm status description within **Grid View** and **Single Tank Overview** will change to reflect the highest priority alarm. For the abbreviated codes refer to table "Alarm Codes".

An event will be generated by the system and shown in the **Alarm Event Viewer** screen.

 21   Alarm Event Viewer

An audible signal, if enabled will be generated. This may be in the form of an internal buzzer, sound card or external klaxon dependent on the options fitted. A voice message can be played via the PC sound card if this feature has been enabled.

Alarms are silenced when they are acknowledged. If security is enabled a user must be logged on with the correct privileges to acknowledge the alarm.

All alarms and events are logged to the database. An alarm history view can be used to look at all alarms and events that have occurred.

When an alarm is acknowledged the date and time is logged to the database. The logged on user acknowledging the alarm is also logged.

7.3   Acknowledging Alarms

The **Alarm Event Viewer** displays details of alarms as shown below:
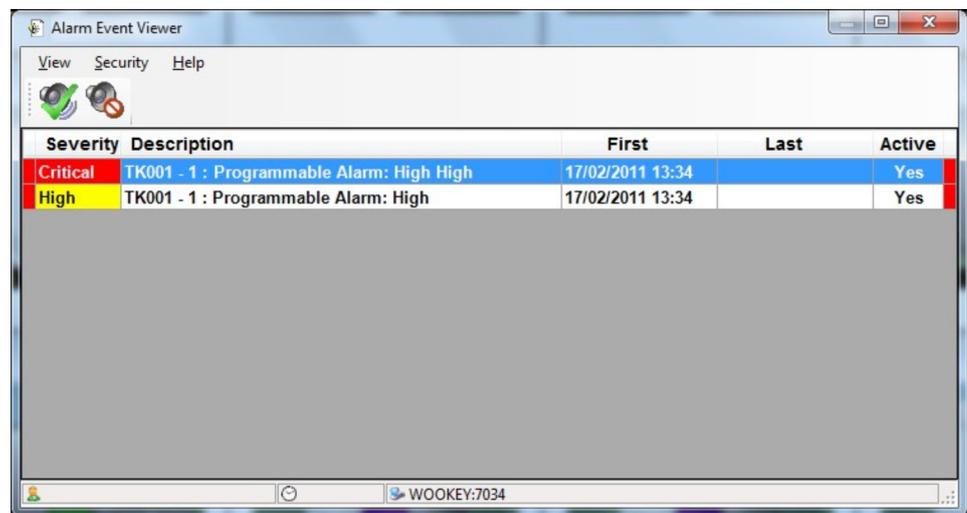
⊠ 22   Alarm Event Viewer

The status of the alarm is indicated in the leftmost and rightmost columns:
- **Red**
  Unacknowledged and un-silenced. For the 'Active' alarm this will be flashing.
- **Light Blue**
  Silenced, but unacknowledged.
- **Green**
  Acknowledged.

To silence or acknowledge an alarm it is first necessary to select it by clicking on the row with the mouse. Once the alarm is selected (indicated by the backgrond colour turning blue) it can be silenced or acknowledged. If security is enabled, it is necessary to be logged in to silence or acknowledge an alarm.

The selected alarm can be acknowledged by clicking the **Acknowledge Alarm** button (⬤) or using the keyboard shortcut.

📖 See the System Configuration manual BA00390G, section "Notification Options".

If the selected alarm has been configured to require an acknowledgement reason, an **Acknowledgement Reason** screen will be displayed:
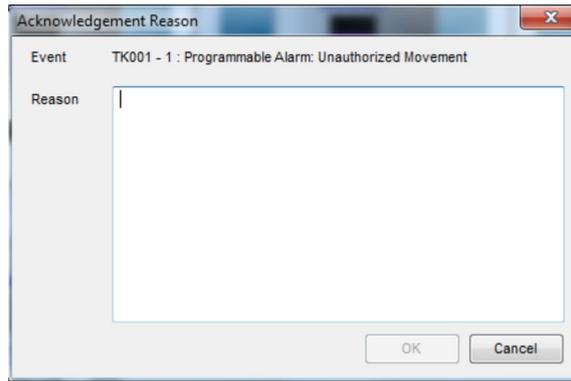
🖾 *23   Entering an acknowledgement reason*

The **OK** button is only available once a reason has been entered. The alarm can only be acknowledged by clicking the **OK** button.

7.3.1   Silencing an alarm

The selected alarm can be silenced by clicking the **Silence Alarm** button (🔇) or using the keyboard shortcut.

📖 See the System Configuration manual BA00390G, section "Notification Options".

7.3.2   Acknowledging or silencing multiple alarms

It is also possible to acknowledge or silence either single or multiple alarms by clicking on the list of alarms using the right mouse button. This will bring up a menu of options:
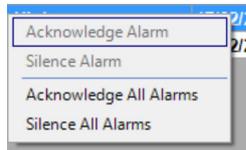
🖾 *24   Context menu for Alarm Event Viewer*

ℹ️ Operators are prevented from acknowledging multiple alarms when one or more of those alarms requires an acknowledgement reason.

The alarms requiring a reason should be acknowledged individually first.

7.4   Event History Viewer

The Event History Viewer can be launched either by clicking the relevant button on the toolbar on the home page, or by selecting **View → Events** from the menu of the **Alarm Event Viewer**.
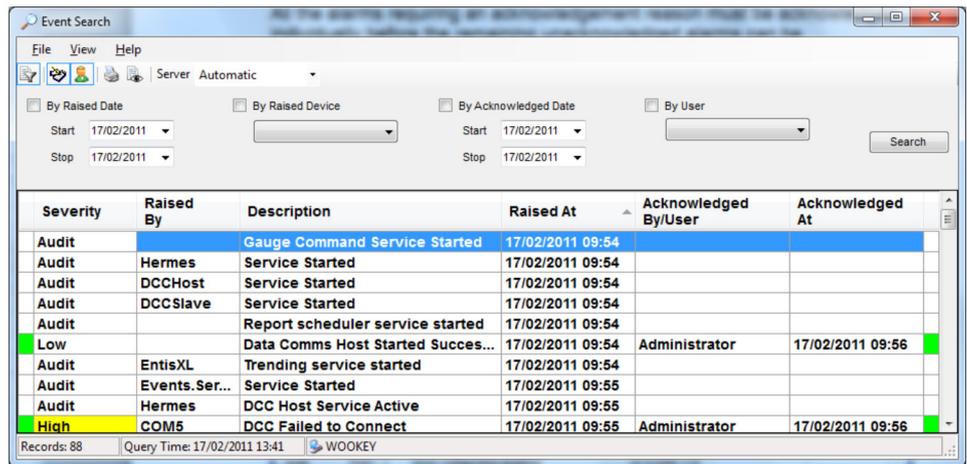
□ 25   Event History

By default all events from the current day are displayed. The events displayed can be filtered by raised date, raised device, acknowledged date and acknowledged user. For clients connected to multiple servers it is also possible to specify the server from which the events are to be taken. These settings are stored when the Event History Viewer is closed and used as the defaults the next time the Event History Viewer is launched.

The event viewer also displays details of auditable actions. It is possible to filter whether events and/or audited actions are displayed using the ⬕ and ⬕ buttons. Further details for audited actions can be displayed by double-clicking on them. This will bring up a screen detailing the changes:
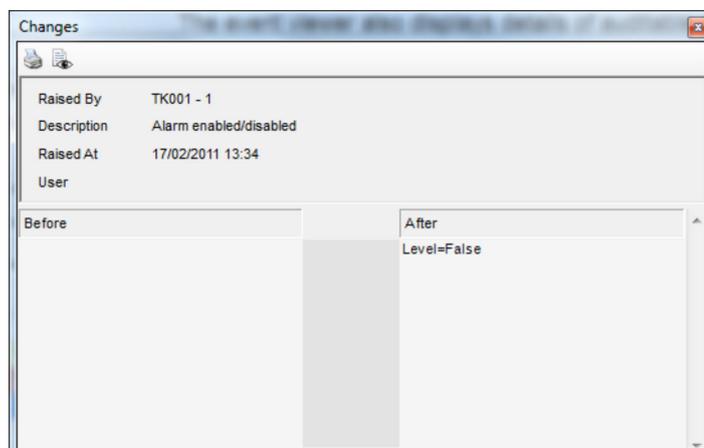
□ 26   Event History detailed audit record

8 Reports

A standard set of tank gauging and inventory reports are provided.

To access the reports, proceed as follows:

1. Choose **File → Reports** from the main Home Page menu.

27   Select report screen

2. Select report (first step in wizard).

Group Selection
A report for a user defined group of tanks.

Product Selection
A report showing a summary of all tanks containing a particular product (e.g. Jet A1).

Standard Inventory Report
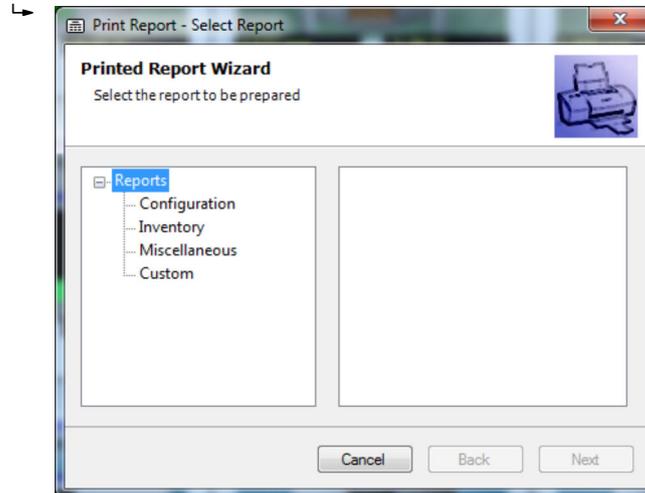Shows a standard selection of inventory data for all tanks.

Standard Summary Report
Summarizes the inventory of products for all tanks by product.

Gauge Configuration
A report showing the main gauge configuration data.

Tank Configuration
A report showing the main tank configuration data.

Custom Print
Allows the selection of a report produced by a third party, to be executed by the Tank Gauging system. You can select an RPT file from the **Custom** entry in the report tree.

3. At the next step in the wizard, if the user selected a report that requires further parameters, such as a product or static group the user will be given the chance to pick the relevant parameter. If the selected report requires no further parameters this step is missed.

4. Finally, select print or preview to produce a hard copy of the report, or an on screen preview of the report. If the user selects print, the report will be sent to the default printer configured in Windows, selecting preview and then printing will allow the user to choose the printer used.

9 Grid View

Grid View is a tabular view of tank data.

The Grid View application is customisable and incorporates a context menu for sending the common device commands.

The user can create their own data views and combine them with the standard tank grouping features to completely customise data presentation.

Grid View is launched by clicking the appropriate tool bar button.

9.1 Launching the Grid View

Click the **Grid View** tool bar button or alternatively run the GridView.exe application from the target folder. The illustration below is typical.
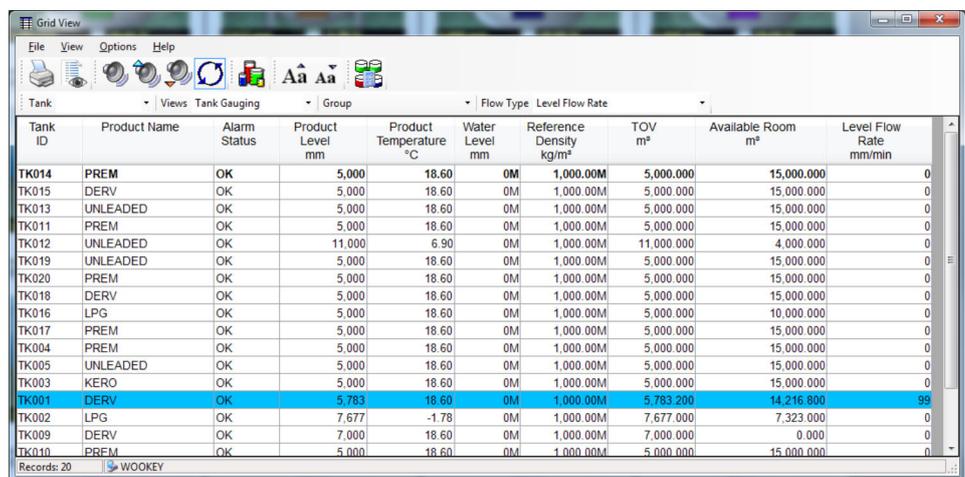
🖾 *28   Grid View*

If **Use User Profile** has been selected in **System Settings**, then only the tanks which have been selected as **Read-Only** or **Read/Write** for the current user will be displayed.

On the Grid View **File** menu there are two items for **New Window** and **Close Window** (subject to licensing restrictions).

New Window opens a new window and **Close Window** closes the current window (not available on 'master' window). The new instance can be configured to show a different set of tanks to the first. If more than one monitor is available, windows can be arranged on different monitors for greater clarity.

9.2 Selecting data views

Grid View comes as standard with several pre-defined data views. The available data views are listed in the drop down list on the tool bar. See the illustration below for information.

🖾 *29   Selecting a view in Grid View*

The fixed **Views** are:
- **Tank Gauging**
- **Tank Inventory**
- **Gauge Status**
- **Movements**

Each view contains different columns of information, other views listed will be user defined views. Further views can be configured by the user.

9.3   Selecting tank groups

By default the **Grid View** module displays all tanks.

The user can choose one of the pre-configured tank groups to display only those tanks that appear in the group.

The available groups are listed in the drop down list on the tool bar.

An example is shown in the illustration below.
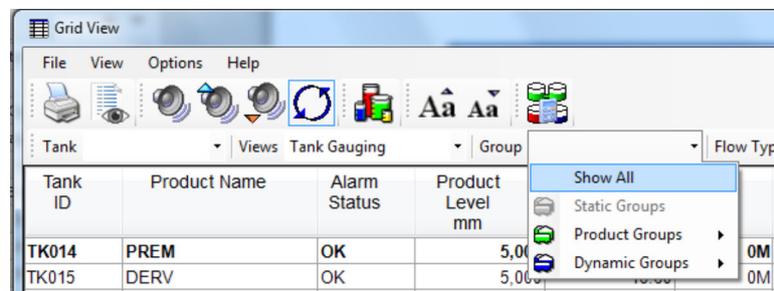
 30   *Selecting a group in Grid View*

If no groups have been configured the list will be empty other than the fixed **All Tanks** group.

9.4   Finding a specific Tank

Grid View allows the user to locate a tank within the tank list. If the tank identity is known it can be typed directly into the box provided; the grid rows will be scrolled until the chosen tank is found. Alternatively the tank can be selected from the drop down list and similarly the grid will be scrolled to display the selected tank.

9.5   Tanks in Alarm

A number of tool bar buttons are provided to quickly summarise tanks that have an active gauge alarm.

 31   *Grid View alarm state filter toolbar*

9.6   Configuring a new data view

You can produce your own customised view of the tank farm data to suit your operations. The custom view will appear on the list of views next to the pre-defined ones (refer to "Selecting data views").

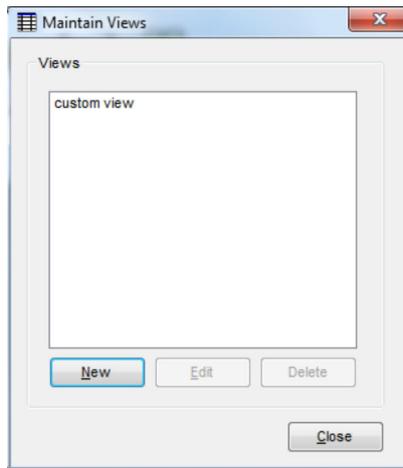1. To define a new view select **Options** → **Maintain Views...** from the **Grid View** menu.
   ↳ The **Maintain Views** screen will be displayed as shown below.

⊞ 32   Maintain views

2. Click **New**, which will open a window allowing you define the name of the view and select the columns of data you want to display.
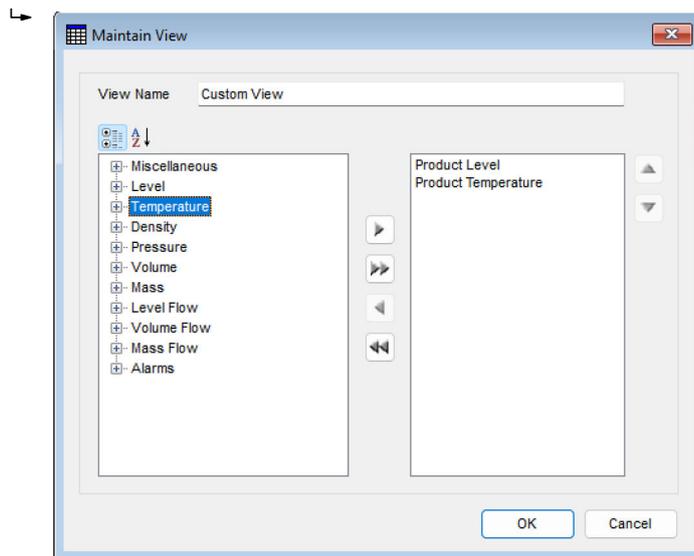
⊞ 33   Define a view in Grid View

Note that the same options will permit you to edit your views once you have defined them.

For a new view, the **View Name** will be blank, but must be entered before the view can be saved.

The list on the left is the list of fields that are available to be added to the view. This list can be sorted by type (⊞) or alphabetically (🔼).

3. To add a field to the view, either select it and click the add (▶) button, or double-click it. To add all fields of a given type to the view, select any field in the type and click the add all (⏩) button.

The list on the right is the list of fields that are currently in the view.

4. To remove a field from the view, either select it and click the remove (◀) button, or double-click it. To remove all fields from the view, click the remove all (⏪) button.

5. To save the changes and exit, click the **OK** button. To exit without saving the changes to the view click the **Cancel** button.

6. To delete a view, highlight it, and click the **Delete** button.
   ↳ The selected view will be deleted.

7. To exit from maintain views click the **Close** button.

9.7 Configuring Cell Colours

The colour of some cells can be set to indicate the current state of the data for the tank.

▶ To customise these colours, select **Options** → **Customise Colours...** from the Grid View menu.
   ↳ The customise colours screen will be displayed.
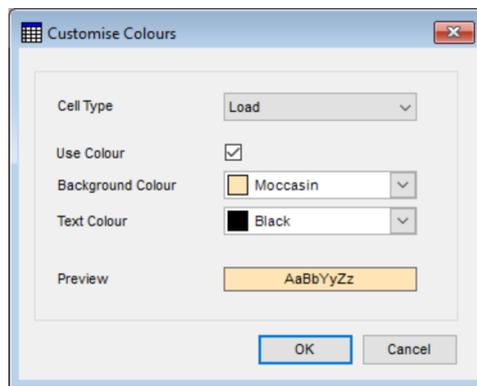
⊞ 34 Customise Colours

The settings for each cell type are:
- **Cell Type** - See list in section "Flow rate colour"
- **Use Colour** - Indicates if the configured colours are to be used for the specified cell type
- **Background Colour** - The background colour to be used for the specified cell type
- **Text Colour** - The text colour to be used for the specified cell type
- **Preview** - A preview of the configured colours. This enables the used to check that the combination of background and text colour are sufficiently different that the user is able to distinguish the text

9.8 Flow rate colour

When a flow rate column is present in the view a row displaying a moving tank is coloured either brown or blue (unless overridden with a custom colour, see section "Configuring Cell Colours"). Brown rows indicate that the level in the tank is moving downwards, blue rows indicate that the level is moving up, while static tanks are displayed in the background colour. This is illustrated in figure below.

🖭 35   *Flow rate colours showing ascending and descending tanks*

The grid maintains 3 user configurable threshold values to determine when a row should be coloured. The threshold values are used depending whether the view shows a level, mass or volume flow rate.

▶ To configure the threshold values choose **Options → Set Flow Rate Colour Thresholds…** from the menu.
    ↳ The **Flow Rate Threshold** dialog will be displayed.
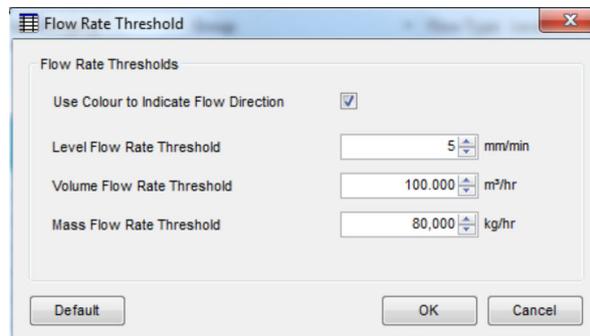
🖭 36   *Dialog for configuring flow rate thresholds*

Cell Types and Colors are described below.

Alarm
When enabled, cells displaying alarm information (**Miscellaneous → Alarm Status** column, or any columns from the **Alarms** section) will use these colours when the corresponding alarm(s) are active.
- Use Colour by Default: Yes
- Default Background Colour: Red (#FF0000)
- Default Text Colour: White (#FFFFFF)

Error
When enabled, cells displaying data which is in error (i.e. a DN value) will use these colours.
- Use Colour by Default: Yes
- Default Background Colour: Red (#FF0000)
- Default Text Colour: Black (#000000)

Failed

When enabled, cells displaying calculated data for which the calculation has failed will use these colours.
- Use Colour by Default: Yes
- Default Background Colour: Red (#FF0000)
- Default Text Colour: Black (#000000)

Manual

When enabled, cells displaying data which is in manual mode will use these colours.
- Use Colour by Default: No
- Default Background Colour: Black (#000000)
- Default Text Colour: Lime (#00FF00)

Scan Mode

When enabled, scan mode cells will use these colours when the tank is not in normal scan mode.
- Use Colour by Default: Yes
- Default Background Colour: Lawn Green (#7CFC00)
- Default Text Colour: Black (#000000)

Offline

When enabled, cells displaying data for a tank which is offline will use these colours.
- Use Colour by Default: Yes
- Default Background Colour: Red (#FF0000)
- Default Text Colour: Black (#000000)

Load

When enabled, all cells for a tank which is loading (see section "Flow rate colour") will use these colours, except for those where another custom colour is being used.
- Use Colour by Default: Yes
- Default Background Colour: Moccasin (#FFE485)
- Default Text Colour: Black (#000000)

Receipt

When enabled, all cells for a tank which is loading (see section "Flow rate colour") will use these colours, except for those where another custom colour is being used.
- Use Colour by Default: Yes
- Default Background Colour: Deep Sky Blue (#00BFFF)
- Default Text Colour: Black (#000000)

Data in High Alarm State

When enabled, these colours will be used for the following cells (unless the criteria for data in critical alarm state is also satisfied):
- **Product Level** - when the Programmable Low Level or Programmable High Level alarm is active
- **Product Temperature** - when the Programmable Low Temperature or Programmable High Temperature alarm is active
- **Product Pressure** - when any user defined alarm with alarm type **Product Pressure High** is active
- **Vapour Pressure** - when any user defined alarm with alarm type **Vapour Pressure High** is active
- **Any type of Flow** - when the Programmable High Flow alarm is active

- Use Colour by Default: No
- Default Background Colour: Orange (#FFA500)
- Default Text Colour: Black (#000000)

Data in Critical Alarm State
When enabled, these colours will be used for the following cells:
- **Product Level** - when the Programmable Low Low Level or Programmable High High Level alarm is active
- **Product Temperature** - when any user defined alarm with alarm type Temperature Low Low or Temperature High High is active
- **Product Pressure** - when any user defined alarm with alarm type **Product Pressure High High** is active
- **Vapour Pressure** - when any user defined alarm with alarm type **Vapour Pressure High High** is active

- Use Colour by Default: No
- Default Background Colour: Red (#FF0000)
- Default Text Colour: Black (#000000)

9.9   Contextual Operations

In a similar fashion to the Home Page it is possible to issue gauge commands and other operations from the grid. In most cases right-clicking on a specific tank in the grid will display a context menu from which these operations can be chosen.

9.9.1   Gauge Commands

Right-clicking on a particular tank will display a context menu of gauge commands. Note that on a tank equipped with multiple gauges, the command will be sent to the gauge with primary duty.

If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then all the device commands in the device commands menu will be disabled.

9.9.2   Simple Movements

There are options to set and stop movements from this screen. Setting a movement involves calculating the target level for the movement and configuring alarm set points to manage the operation, stopping the movement disables the alarms once the movement operation is complete. See the Simple Movements manual BA01653G for further details.

If **Use User Profile** is selected in the **System Settings** and the current user does not have **Read/Write** access to the tank, then the **Set Movement** and **Stop Movement** menu items wlll be disabled.

This does NOT apply to full movements.

9.9.3   Single Tank Overview

Double-clicking on most columns will open the **Single Tank Overview** window (refer to chapter "Single Tank Overview") focussed on the particular tank at the selected row.

9.9.4   TAD

Double-clicking on a column displaying TAD data will permit the operator to change that particular setting. For more information on TAD, refer to chapter "TAD Maintenance".

9.10   Print and print preview

The current contents of the **Grid View** can be sent to a printer, or previewed on screen.

Printing a Grid View

▶ To print the current contents of the **Grid View** either select **File → Print** from the menu, or press the print button on the toolbar.

  ↳ If the menu item is used, it is possible to change the printer and printer settings to be used to print the **Grid View**.
  If the toolbar button is used, the current contents of the **Grid View** will be printed on the default printer.

Previewing a Grid View

▶ To preview a print either select **File → Print Preview** from the menu, or press the print preview button on the toolbar.

  ↳ An example of the **Print preview** window is shown below.
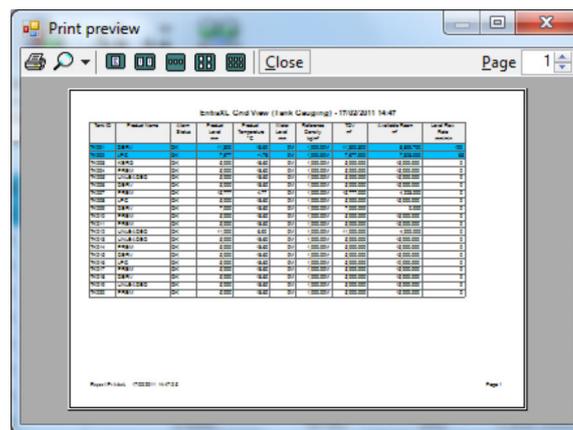
🖾 37   Previewing a print of the grid view

9.11   Select Mode

In select mode (shown in figure below) the operator is able to choose which tanks to view as well as the data for those tanks. This means that the grid view can now be used to provide an "on demand" view of tank gauging data. Put simply the operator can drag tanks he is interested in onto the view panel from a list of available tanks and order them in the way that makes most sense at that time. Once operations have finished on the tank it can be dragged off to free up the space on the screen.
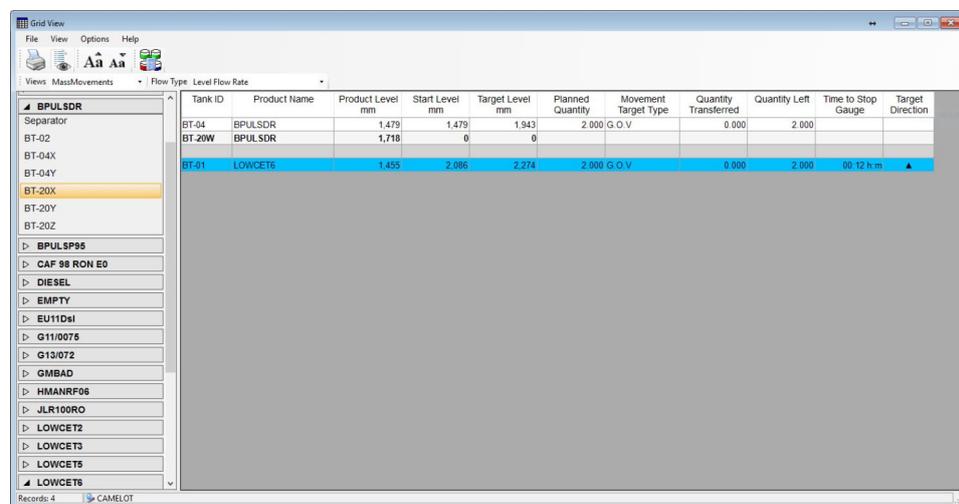
🖾 38   Grid view in select mode

Tanks are grouped into product families in the panel on the left. Tanks and separator rows can be dragged from that panel on to the grid on the right. Rows can be inserted at any point in the grid.

9.11.1   Settings

To change the mode of a **Grid View** screen choose **File → Settings** from the menu. The **Grid View Settings** dialogue will be shown.

The **Use Select Mode** option controls the mode of the grid view.

🖼 *39   Grid View Settings window*

Description
The **Description** field allows the user to name the particular instance of the Grid View window. This feature is useful for multi-screen operation where there might be a number of grids on the screen at one each fulfilling a particular role.

Use Select Mode
The **Use Select Mode** check box controls the mode the screen will display; when ticked the operator can choose which tanks to show by dragging them on to the grid. A list on the left of the screen is shown that is not present in standard mode.
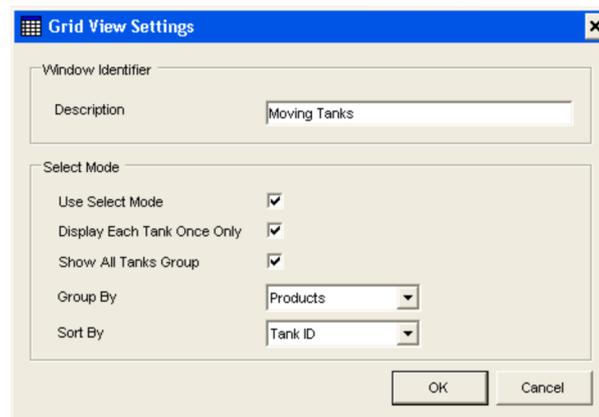
Display Each Tank Once Only
When ticked the operator will be prevented from adding the same tank to the grid more than once. This is done by removing the tank from the selection list on the left when it is added to the grid.

Show All Tanks Group
When checked the user is presented with an **All Tanks** group on the selection list on the left of the screen.

Group By
The selection list on the left of the screen typically groups the tanks together to make location of the tank to be added to the grid easier. The list can be grouped by product or static group, alternatively the list can be not grouped at all.

Sort By
The selection list on the left can either sort the tanks by name in alphabetical order, or by the tank order as defined in the **Tank Groups** screen.

> ℹ The options for filtering by alarm state, selecting groups and searching for a specific tank are all removed when in select mode. The user can add tanks to the grid either by dragging the header of a group onto the grid (in which case all the tanks in that group are added), or by expanding a group and dragging a single tank onto the grid. Each group also contains a "Separator" item to allow the user to define groups of tanks in the grid itself. The order of tanks in the grid can be changed simply by dragging a tank to a new location.

9.11.2 Multi-screen Operation

Multiple grid views can be displayed at any one time. Of these grids some can be in Select Mode, others can be in Standard Mode. The operation of the grids in Select Mode is independent of each other so you could have a select mode grid for receiving tanks and another for monitoring the loading operations on the site day tanks. Each grid can also show a different set of data columns, again configured to show data that is relevant for the operations in progress. Use **File → New Window**.

9.11.3 Adding tanks to the grid in select mode

To add a tank to the grid:

1. Locate the tank in the selection list on the left.

2. Click and drag the tank on to the grid in the desired position.
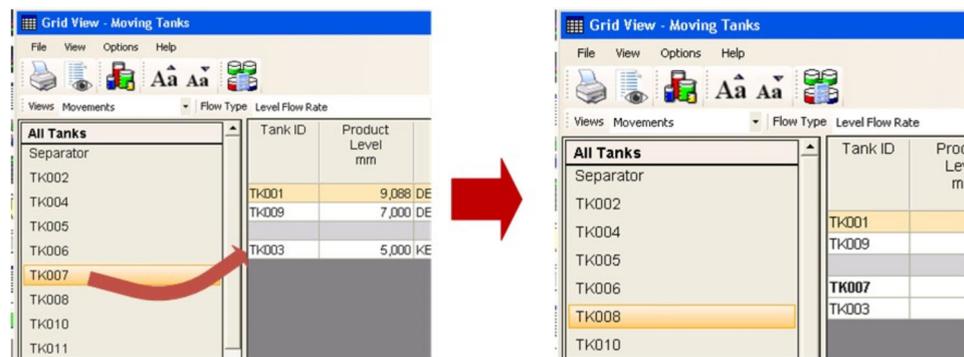
🖾 *40   Adding a tank in select mode*

9.11.4 Removing tanks from the grid in select mode

To remove a tank from the grid:

▶ Click on the row that is to be removed and drag it off the grid.
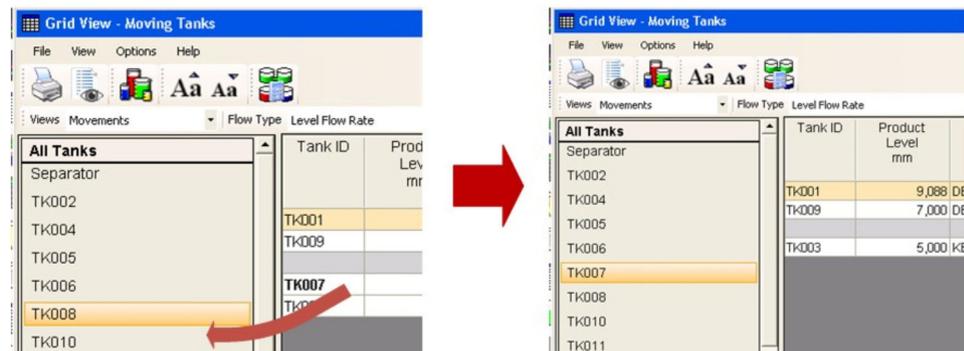
🖾 *41   Removing a tank from grid view in select mode*

9.11.5 Re-ordering tanks on the grid in select mode

To change the position of a tank on the grid:

▶ Click on the row that is to be moved and drag it into the desired position.
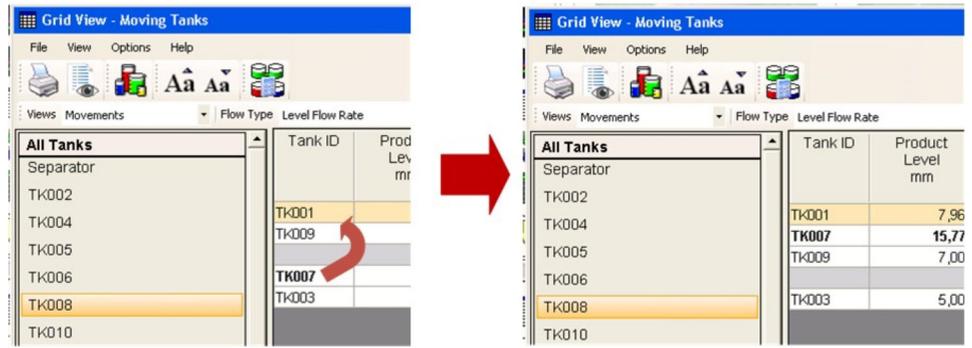
⊠ 42   *Reordering tanks in grid view in select mode*

10   Advanced device commands

Device commands can be gauge specific and therefore dependent on the gauge type.

For instance for Enraf gauges the following functions are supported:

- **Dipping**
  Provides the various interface measurement modes such as Find Water Interface, Find Product Interface, and Density Dipping features.
- **Displacement**
  Provides gauge displacer control functions.
- **Test Gauge Alarm**
  Provides the ability to auto-test the alarm set points of the 873 radar gauge.
- **Maintenance**
  Allows the user to set the reference level of the gauge.
- **Gauge Items**
  Is a general tool allowing the user to read or write any of the gauge items and view the returned data and or responses.

Other gauges may support different commands and configuration functions.

10.1   Launching Advanced Device Commands

▶ From the Home Page menu, select **Tools → Advanced Device Commands**.
  ↳ The application will automatically select the primary gauge for the tank, where the tank has more than one gauge. Users can subsequently select another gauge to operate on by clicking on the "+" next to the tank, and selecting the gauge duty.
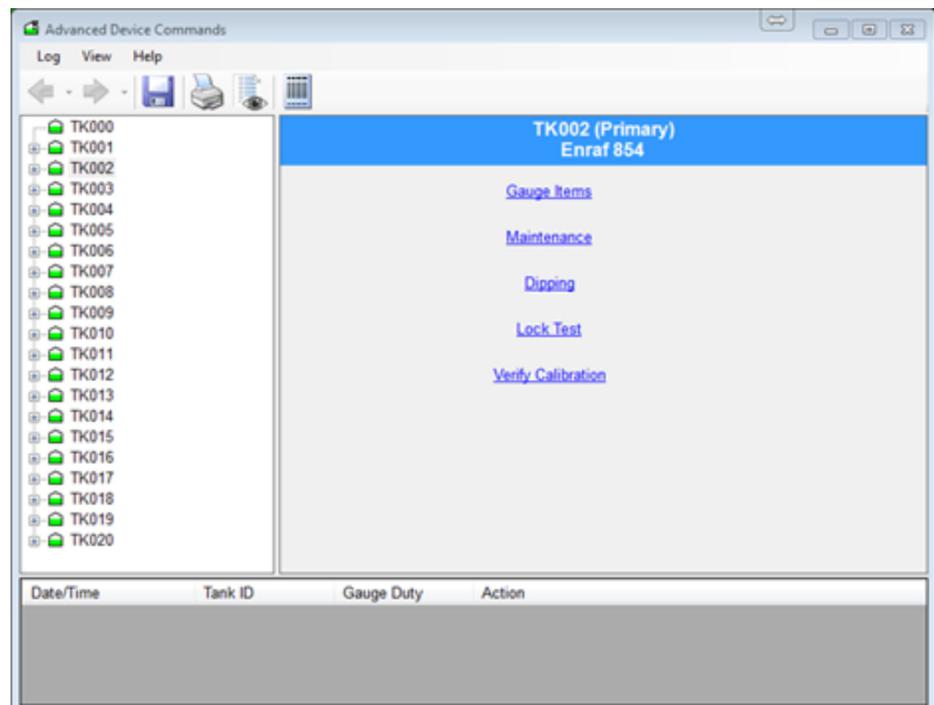
◳ 43   *The advanced gauge commands screen*

ℹ️ If **Use User Profile** is selected in the **System Settings** only the tanks that the current user has **Read/Write** access to will be displayed.

10.2   Sending commands

1. Select the tank from the list in the left hand panel. Expand the tank with the "+" symbol (select the gauge in a multi-gauge setup).
    ↳ The commands supported by the gauge will be available.
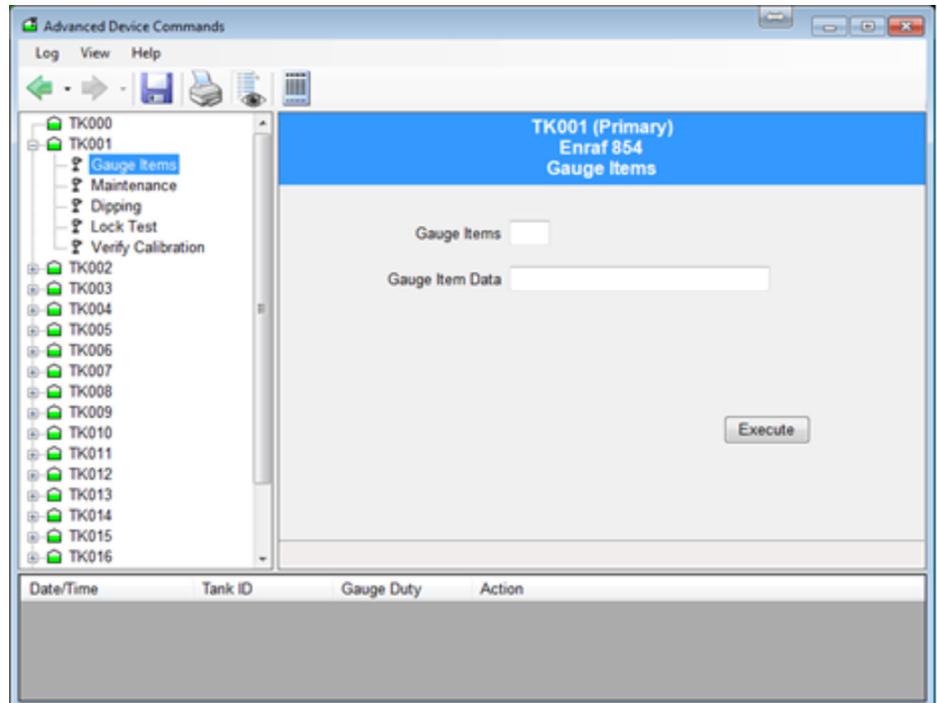
🖻 *44   Executing a gauge command*

2. Select the appropriate command from the list and set any required parameters.
3. Finally click the button to send the command.
    ↳ Information regarding the progress of the gauge's operation will be reported via the panel at the bottom of the window.

10.3   Dipping functions

These generally apply to the Enraf 854 series of servo tank gauges, as shown below.
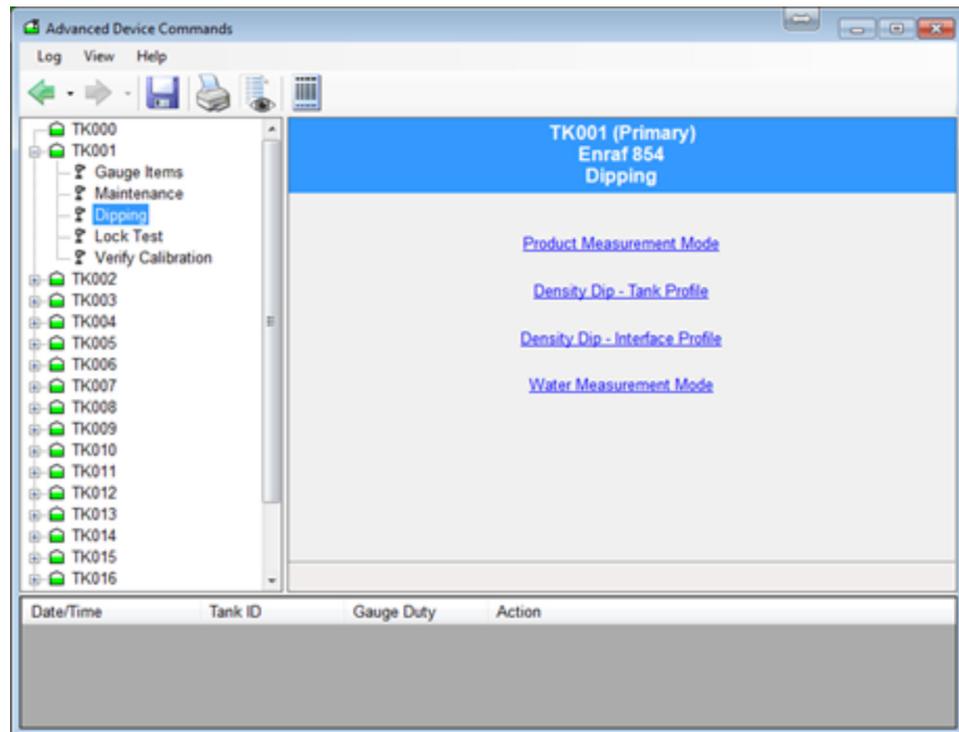
📷 45   Dipping commands with the advanced gauge command utility

Product Measurement Mode
- Sends the I1 gauge item.
- Displays the status of the gauge throughout.
- The gauge will remain at I1 until the user commands the gauge otherwise.

Density Dip
This has two options:
- Tank Profile
- Interface Profile

▶ Select the correct option and Click the **Apply** button.
  ↳ The Command will be carried out.

Water Measurement Mode
- Sends the I3 gauge item.
- Displays the status of the gauge throughout.
- The gauge will remain at I3 until the user commands the gauge otherwise.

10.4   Displacer functions

10.4.1   Lock Test

Lock the displacer at a specified level, see figure below.
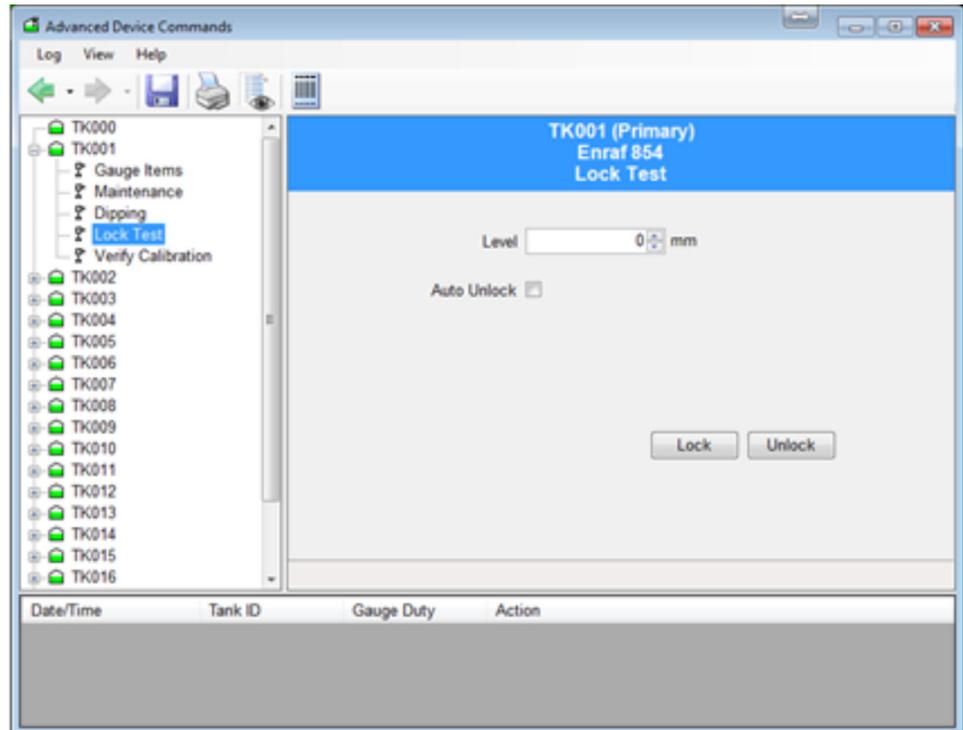
⊡ 46   *Advanced gauge command lock test*

- Uses the MZ item to set the lock level, followed by the LT command.
- The user must provide the level at which the displacer will be locked.

10.4.2   Unlock

- Unlocks the gauge from the locked or calibrate position.
- Sends the UN gauge item.

10.5   Verify Calibration

Verifies the calibration of the instrument. The displacer will be raised into the calibration chamber of the gauge.
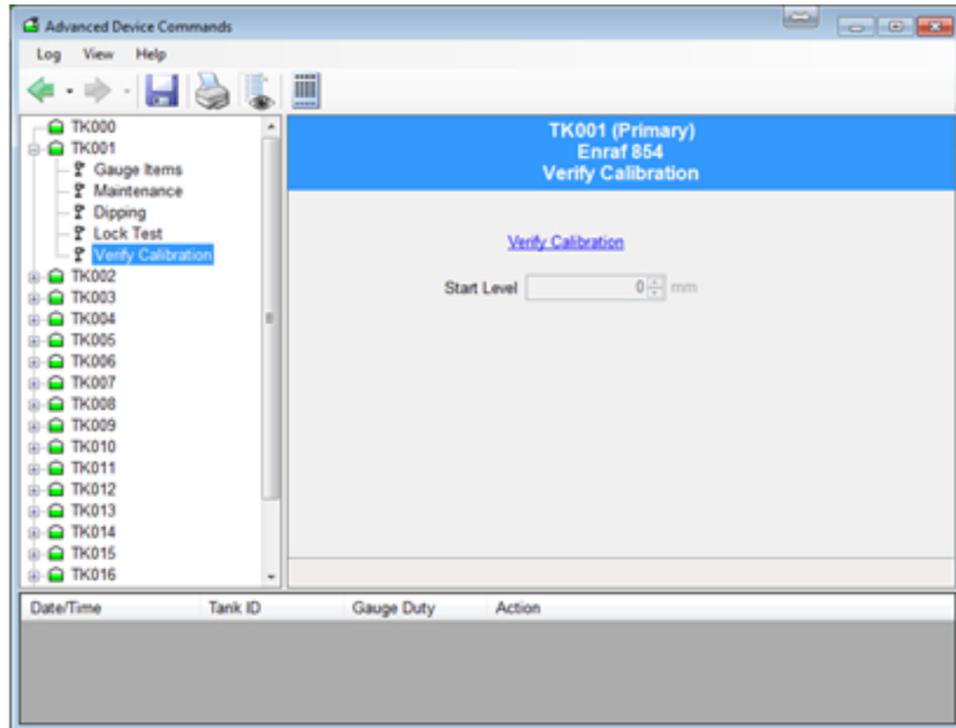
⊠ 47   Calibrating a servo gauge

- Uses the CA gauge item.
- The gauge will remain in the calibrate mode until told to do otherwise by the user.
- Stores and displays start level.
- Displays the various state changes that occur.
- Press the unlock button to have the displacer return to Product Measurement Mode.

10.6   Maintenance

Set gauge registers to adjust the device's configuration.
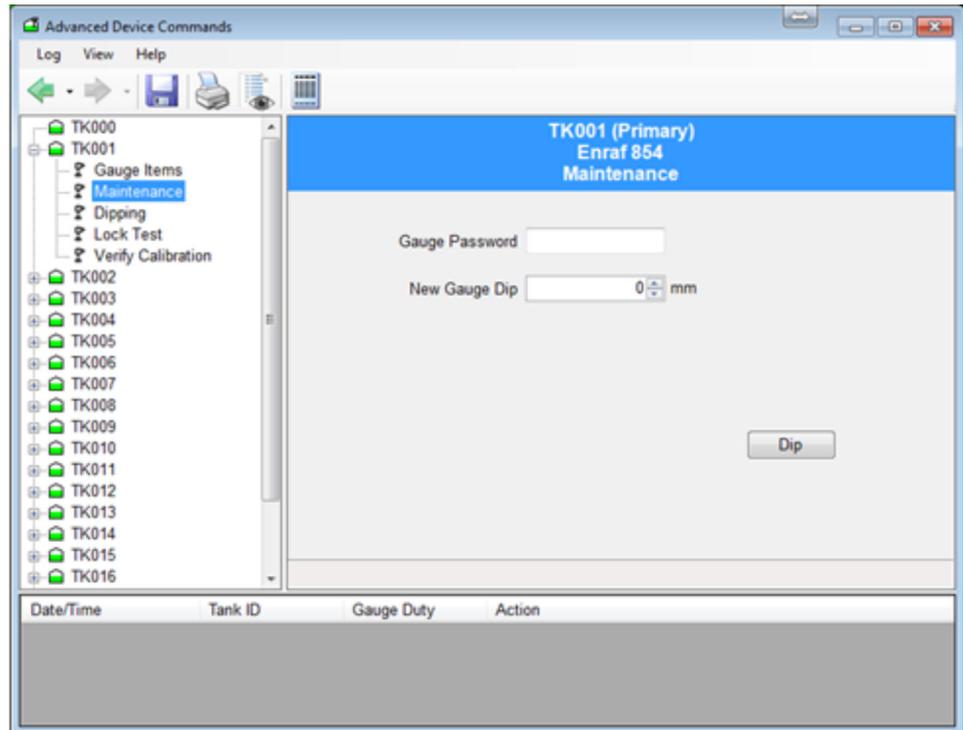
🖾 *48   Entering maintenance mode for a gauge*

10.6.1   Set the gauge to a new level dip

If the gauge differs from an operator's manual dip it is normal to re-align the gauge to the operator's dip.

The user must provide the new level dip and the password to access the gauge.

This function uses a whole sequence of gauge items as follows:

1. Set the password level using W2 gauge item.

2. Set the reference level using the RL gauge item.

3. Accept the reference level using the AR gauge item.

4. Exit and re-initialise the gauge using the EX gauge item.

5. Select the tank requiring the new level dip.

6. Enter the new gauge level.

7. Press the **Dip** button.

While the above sequence of actions shall take place, the status of each transition is displayed.

When the EX command is finally issued the gauge data may disappear for a short time while the gauge re-initialises itself. After re-initialisation the gauge level should read the new value.

10.7   Gauge Items

This feature applies to Enraf and Motherwell gauges only.
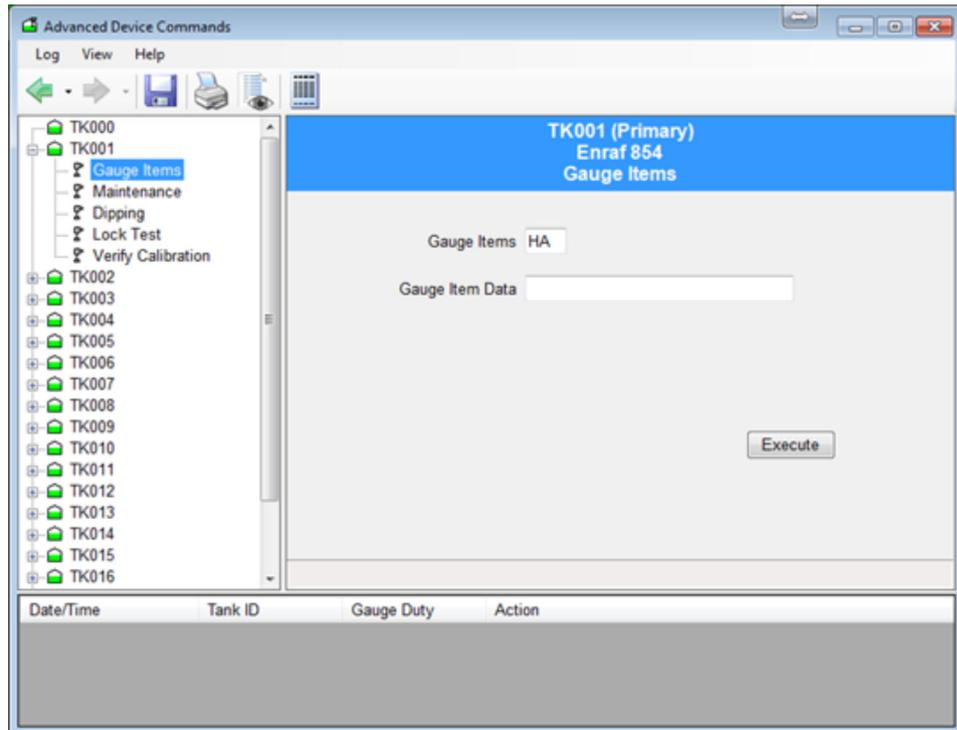
49   Reading gauge items using advanced gauge command

NOTICE

The use of this feature requires knowledge of the specific gauging equipment and its configuration.

▶ It is recommended that it is only used by competent persons.

This feature allows the user to read/write any of the gauge configuration items. To read an item enter the item and click **Apply**, the answer will be displayed. To write an item, enter the item and enter the data you want to write, and click **Apply**.

10.7.1   Enraf gauge items

Unit conversion

This tab supports units conversions from the units displayed in Tankvision LMS to units the gauge is configured to understand. In order to avoid confusion we recommend that you alter the displayed dimensions to match those used by the gauge, if at all possible. In this way, the format used for settings made via a Portable Enraf Terminal (PET) will correspond directly with the format to be used in the Gauge Items tab.

Reading a request

To read a request no Gauge Item Data needs to be supplied. The data will be converted to the current system display units before being displayed.

Data format

When setting Items, the user must enter the data value in the exact format which is appropriate for the selected Dimensions/Units, with +/- sign and appropriate number of digits before and after the decimal point. If unsure of the correct format, read the current value of the desired Item from the gauge first by leaving the Item Data "blank".

The Answer value from the gauge will be displayed in the format appropriate to the Dimensions/Units in use. Then use the same format as the returned Answer to set the

Item Data to the desired new value. An equals sign "=" must precede the data value when setting Items.

The following Dimensions/Units are supported
Key:
- **±** sign character (+/-)
- **N** numeric digit
- **.** decimal point

Level	
Units	**Format**
mm	± N N N N N N . N (default)
m	± N N N . N N N N
ft	± N N N . N N N N
in	± N N N N N . N N
f-i-s	± N N ' N N " N N

Temperature	
Units	**Format**
˚ C	± N N N . N N (default)
˚ F	± N N N . N N

Density	
Units	**Format**
kg/l	± N N . N N N N N (default)
kg/m³	± N N N N N . N N
lb/ft³	± N N N . N N N N
˚ API	± N N N N . N N N

Pressure	
Units	**Format**
Bar	± N N . N N N N N (default)
Pa	± N N N N N N . N
kPa	± N N N N . N N N
lb/in²	± N N N . N N N N

10.7.2 Motherwell Gauge Items

Motherwell gauge items do not have the same unit conversion facility applied to them. The data entered into the **Gauge Item Data** field is transmitted verbatim to the gauge. You should consult your Motherwell documentation to determine the precise format of the data.

With Motherwell gauges you can either specify a 2-digit hexadecimal item code, as described in the Motherwell gauge documentation or you can use a "shorthand" code for certain data items.

Shorthand Code	Description
UR	Upper reference level
RL	Reference level
HH	High High alarm level
HA	High alarm level
LA	Low alarm level
LL	Low Low alarm level

11   Tank grouping

The system provides a comprehensive range of tools and utilities for the organisation and grouping of tanks to user's requirements.

All the tank grouping functions are generally available from the tank grouping module.

Grouping is generally organised into static and dynamic groups.
- **Static groups** can be organised by:
  - Product
  - Product group
  - User defined Tank Group
- **Dynamic Groups** are automatically defined by their intrinsic criteria.

The tank grouping module display comprises a multi-tabbed dialogue. Each tab represents one of the modes for tank grouping.

Access to certain of the tank grouping functions is password protected. You will be requested where necessary to login.

11.1   Configuring and using a static group

1. Load the tank grouping module by clicking **Quick View → Tank Groups** on the groups menu bar.

2. Click on the **Static Groups** tab.
   ↳ The **Tank Groups** window appears as shown below:
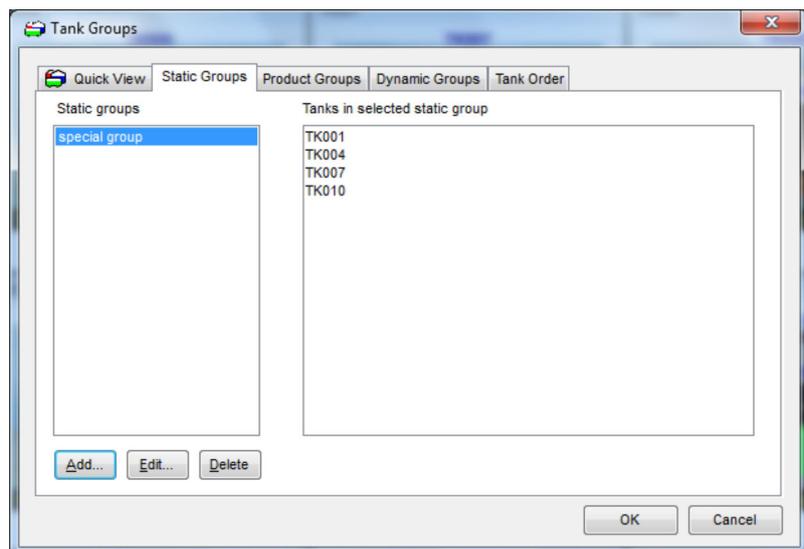
⊡ *50   Static groups configured in tank grouping dialog*

3. Press the **Add...** button.
   ↳ The **Static Groups** screen is displayed as shown below:
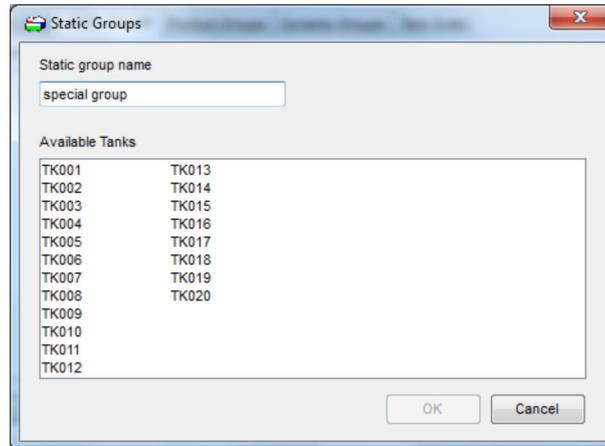
🖼 *51   Selecting tanks for a new static group*

4. Enter the name of the group and then highlight a section of the **Available Tanks** to add them to the group. To remove them from the group click them a second time to remove the highlights.

5. To save the group click the **OK** button. To lose any changes click the **Cancel** button.

6. Once back at the **Tank Groups** window save the changes to all the groups by clicking the **OK** button. To lose the changes click the **Cancel** button.
   ↳ The static group can now be used by selecting it from the **Static Groups** menu on the groups menu bar.

11.1.1   Editing an existing static group

1. Load the tank grouping module by clicking **Quick View → Tank Groups** on the groups menu bar.

2. Click on the **Static Groups** tab.

3. Select the group to be amended and press the **Edit..** button.
   ↳ The **Static Groups** screen is displayed as shown below:
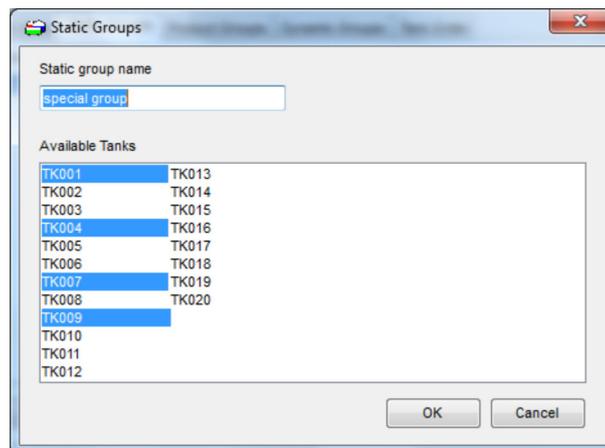
🖼 *52   Editing an existing static tank group*

4. Click on the available tanks to add or remove them from the group. Any tanks which are highlighted are members of the group.

5. To save the group click the **OK** button. To lose any changes click the **Cancel** button.

6. To save the changes to all the groups, click the **OK** button. To lose the changes click the **Cancel** button.
    ↳ The static group can now be used in its amended form by selecting it from the **Static Groups** menu on the groups menu bar.

11.1.2   Deleting an existing static group

1. Load the tank grouping module by clicking **Quick View → Tank Groups** on the groups menu bar.

2. Click on the **Static Groups** tab.

3. Select the tank group to be deleted from the group list.

4. Press the **Delete** button.

11.2   Product grouping

The system provides the user with the ability to view tanks containing a particular product.

11.2.1   Using a Product Group

1. Load the tank grouping module by clicking **Quick View → Tank Groups** on the groups menu bar.

2. Click on the **Product Groups** tab.
    ↳ The list of available products will be displayed:
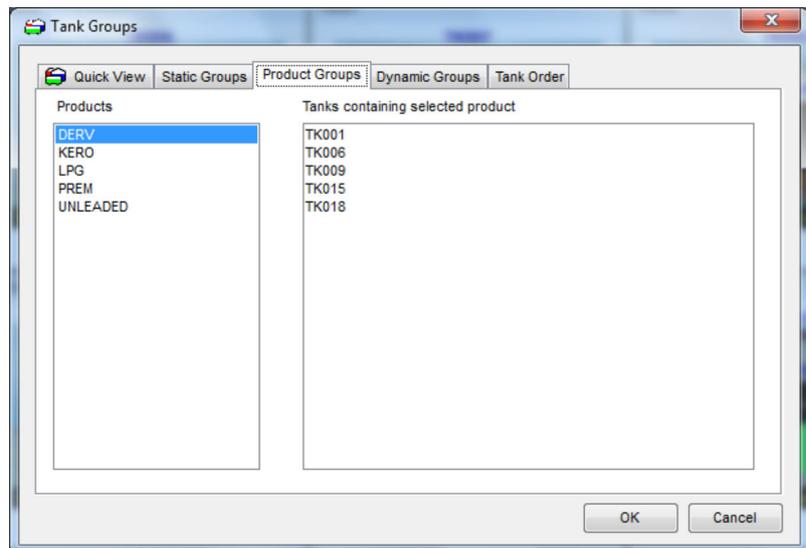
🖼 *53   Viewing product groups in tank grouping*

ℹ If there are a lot of products the window scroll bars may be needed to locate the product of interest.

3. Select the product of interest from the list.
    ↳ The tanks currently containing that product will be listed.

4. The product group can be used by selecting it from the **Product Groups** menu on the groups menu bar.

The product to be used to filter the tanks can also be used by selecting it from the **Product Groups** menu on the groups menu bar. Only products that are currently allocated to tanks are listed and are ordered by usage (the one which is allocated to most tanks first). If there

are more than 12 products currently allocated to tanks, only the 12 most used products are included along with a final entry which displays a product selection screen:
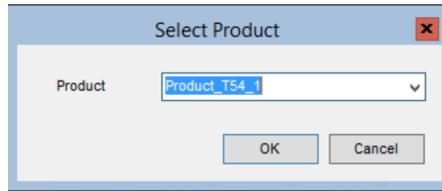
54   Selecting a product from tank grouping

5. A product can be selected by clicking on the arrow which will display a list of all products which are allocated to tanks (again sorted in order of usage). Alternatively the name of the required product can be typed in.

   ↳ As the product name is entered a reduced list of products matching the entered text is displayed:
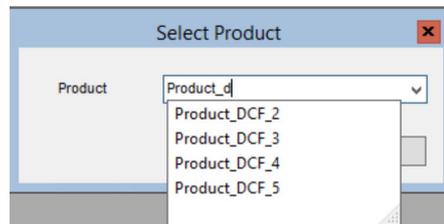
55   Filtering the list of products

11.3   Product group totaliser

The **Product Group Totaliser** is opened from the Home Page, **View → Product Group Total**. The **Product Group Totaliser** displays totalized volumes for the product groups.

See the illustration below for details.

56   Product Group Totaliser

11.4   Dynamic grouping

The system currently provides a basic dynamic grouping function which allows the user to view tanks that conform to certain dynamic criteria, e.g. moving tanks.

When a dynamic group is in use, as tanks no longer conform to the criteria they will be automatically removed from display.

The number of available dynamic groups is currently fixed. These groups are automatically defined by the system.

11.4.1 Using a dynamic group

1. Load the tank grouping module by clicking the appropriate tool bar button.

2. Click on the **Dynamic Groups** tab.
   ↳ The list of available dynamic groups will be displayed:
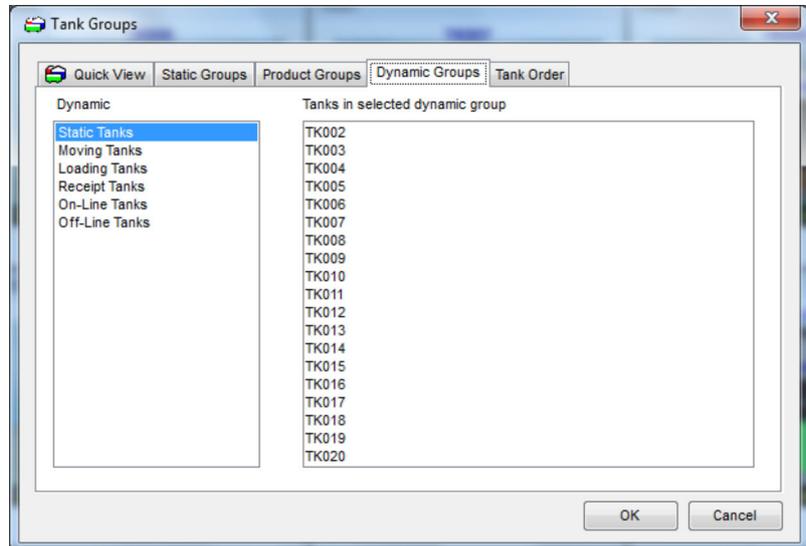
⊞ 57   Viewing dynamic tank groups

3. Select a dynamic group.
   ↳ The tanks conforming to the criteria for the specified dynamic group will be displayed. For example, **Moving Tanks** is any tank that is moving in any direction, **Receipt Tanks** are those tanks currently being filled.

11.5 Set tanks to watch

1. Load the tank grouping module by selecting **Quick View → Tank Groups**.

2. Select the **Quick View** tab.
   ↳ The **Quick View** tab shows the tanks to be shown on the Home Page, see figure below.
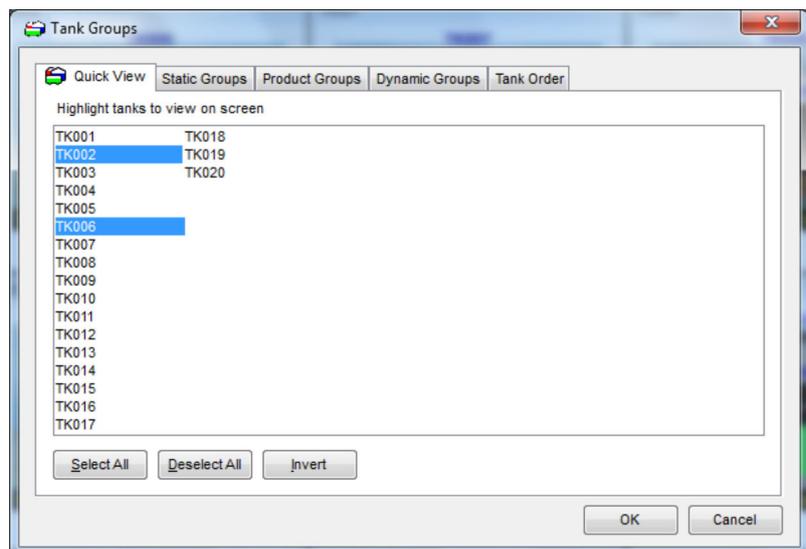
⊞ 58   Selecting tanks for the ad hoc view

3. Highlight the tanks you wish to see on your display. The highlight is toggled by clickingon the tanks in the list. The **Invert** button will toggle the highlighting on all the tanks, so tanks that were selected become de-selected and vice versa.

To select all tanks simultaneously press the **Select All** button followed by the **OK** button to display all tanks.

To de-select all tanks simultaneously press the **Deselect All** button followed by the **OK** button to minimise all the tanks.

4. Press the **OK** button to display the selected tanks.

12   Help and diagnostics

The system contains a help and diagnostics feature to aid the user.

Much of the help appears under the **Help** menu of the Home Page.

The options available under the **Help** menu are detailed in the following sections.

12.1   Diagnostics

To view the meaning of the diagnostic codes (DN numbers) that appear on the tank display, double click on them to launch the Diagnostic codes module.

12.1.1   Launching the diagnostics module

▸ Select the **Diagnostics** option from the **Help** menu on the main home page menu bar.
  ↳ See figure below.
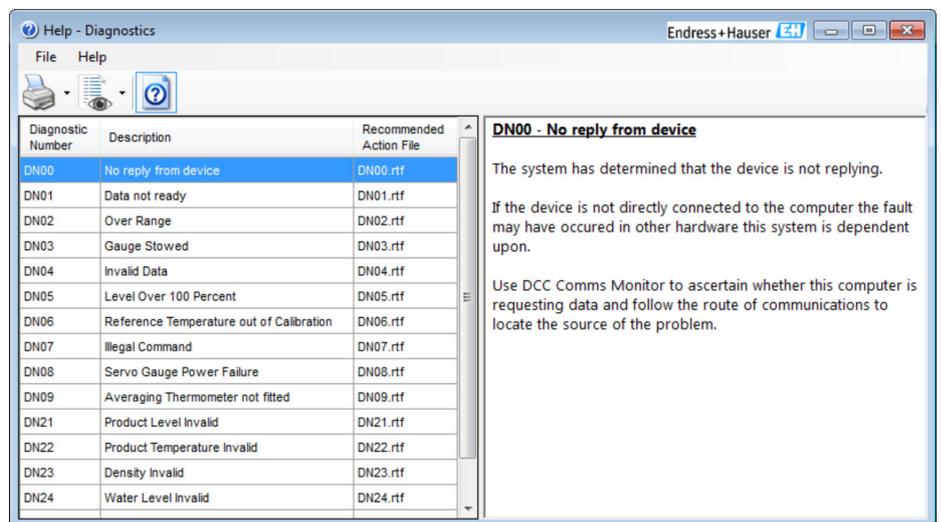
🖼 59   Diagnostic codes

The first column lists the diagnostic code, the second column contains a brief definition, and the final column references a file name that contains more detailed information on the potential causes of the Diagnostic and recommended action to identify and fix any associated problem. The right hand pane displays the contents of the file.

12.1.2   Printing the diagnostics list

The diagnostics module can prepare printed documentation of either specific error codes or a list of error codes and their brief description.

From the Diagnostics window menu choose:
- **File → Print → Diagnostics List**
- **File → Print → Recommended Action**
- **File → Print Preview → Diagnostics List**
- **File → Print Preview → Recommended Action**

The **Print** commands will send the report directly to the default Windows printer. The **Print Preview** commands will present a screen like below.
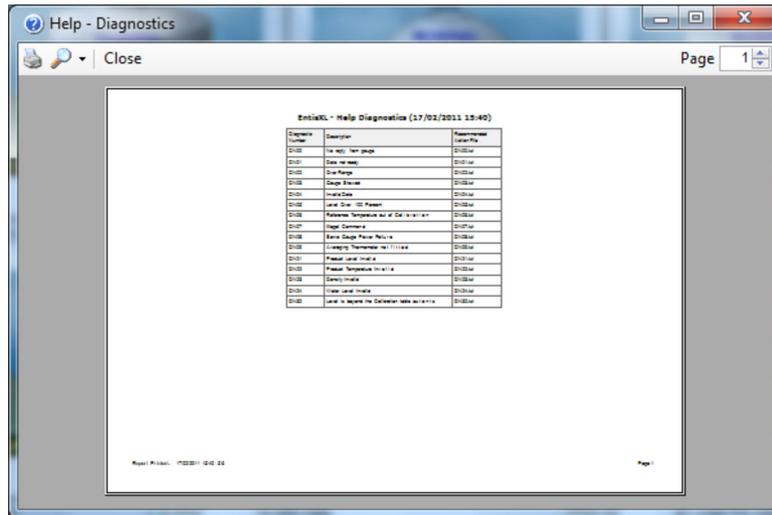
🖼 60   *Print preview of the diagnostics window*

12.1.3   Launching the recommended action file

▶ To find out more information on the Diagnostic Code, double click the row of interest.
  ↳ This will launch Windows WordPad and open the recommended action file.

See the illustration below for a typical example.
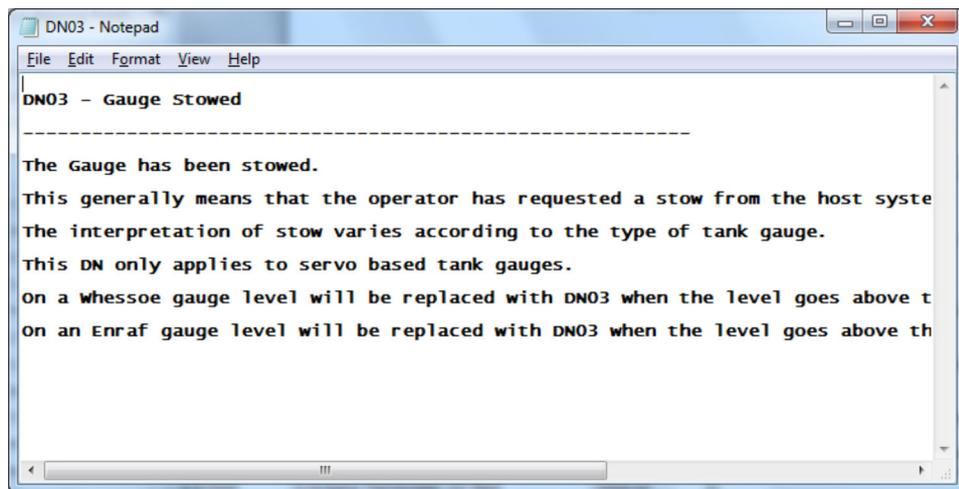
🖼 61   *Display of recommended action file*

12.2 Versions

▶ Select **Help → Versions** from the Home Page menus.

    ↳ The display below shows details of the executable files that make up the tank gauging system.

🖻 *62   Versions*

Use the scroll bars to view the details of each of the files listed.

12.2.1 Printing a report of the module versions

A hardcopy report of the information displayed on the versions screen can be made using the reporting facility built into versions. Select **File → Print and File → Print Preview** to do so.

🖻 *63   Print preview of versions*

12.3 About

The **Help** menu on the main home page menu bar contains an option labelled **About**.

When selected this menu item will load a display module showing the overall version number of your application, the licence details and the person/company the Tankvision Professional application is registered to, including a statement on copyright.

🖾 64   About screen

This information is invaluable to any technical support calls made to your supplier. One of the first questions on any support call will inevitably be who the registered user is and the license/build number of the complete application.

13   Trending

Key Features:
- Multiple simultaneous displays on one graph
- Independent or shared axes for each process variable
- Display grid for better reading
- Data cursor for reading trend values
- Supports dynamic multi-dimensions
- Drill down into data with Zoom function
- Scroll backwards and forwards in time
- Operator programmable Y axis extents
- Operator programmable time base
- Ability to save multiple trend templates
- Ability to "Publish" trend templates for use on other networked PCs
- Simultaneously view multiple trend templates

13.1   Trending and data logging

The system comes as standard with a trending package. A Trend Logger service will log trend data to the system's hard drive.

There are three user interfaces for displaying trend data:
- **Real-time** – Shows the current tank gauging parameters over a maximum of the last 12 hours.
- **Historical** – Provides a graphical plot of tank gauging parameters.
- **Historical (Tabular)** – Provides the "numbers" from the Historical graph, for export to other systems.

13.2   Real-time trending

The real-time trending function combines the ability to review up to the last 12 hours worth of historical trend data with current real-time data.

13.2.1   Starting-up real-time trending

Either:
- Click the toolbar button ▼ on the Home Page.
- Select **View → Real-time Trending** from the Home Page menus.
- Select **Real-time trending** from the Service Manager menus.

The trending parameter screen opens, as shown below.
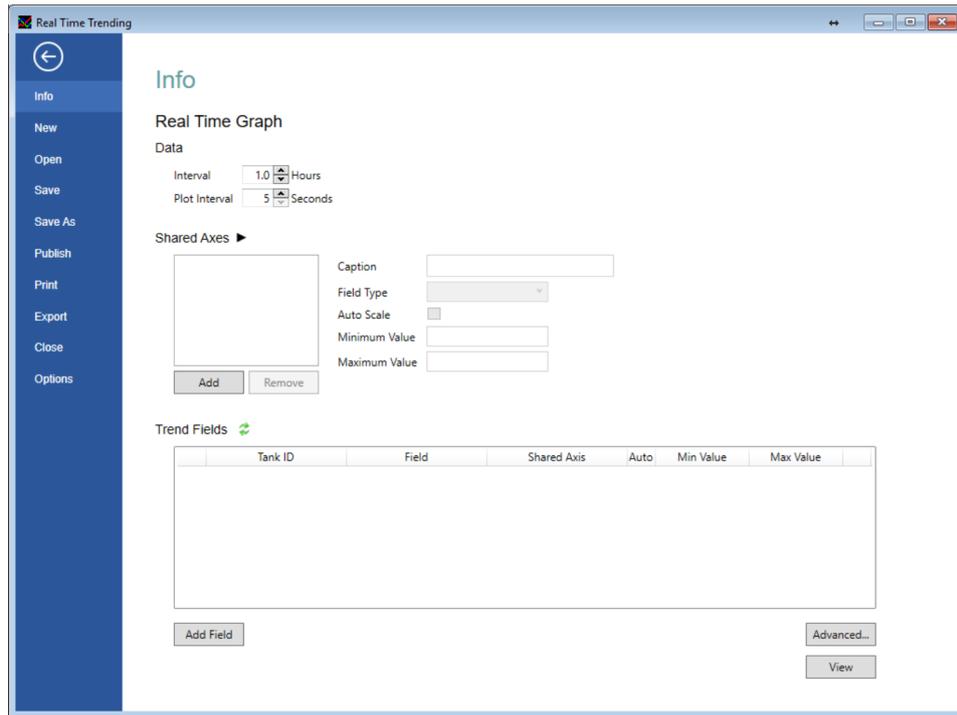
🖻 65   Real-time trending parameter selection

At its simplest the process of displaying trend data consists of selecting which tank parameters you want to view and the length of time over which you want to view these parameters. The real-time trend view is simpler than the other screens as the time frame for the view is always from now to a variable number of hours in the past.

13.2.2   Real time plot data

The first parameter input is the period that you want to plot on your graph, see figure below.

🖻 66   Entering plot intervals on single server system

The **Interval** is the number of hours into the past you want to view; the maximum possible is 12 hours.

The **Plot Interval** is the time (in seconds) between successive data points on the graph; the maximum interval is 900 seconds – there is not usually a need for finer plot interval than 30 seconds unless you have altered the configuration of your trending service.

13.2.3   Other configuration options

For details of the common configuration options, refer to section "Common trend configuration".

Redundant system options

On a redundant server setup, when running the trending client on a client system there is the additional option of choosing the source **Servers** as in figure below. You can choose either of the pair of redundant servers, or **Automatic** which uses the server the Home

Page is currently connected to as the data source. Additionally the option **Attempt to patch missing data using the other server** may be employed if the selected server has an incomplete data set for the period of the plot.

67   Entering plot intervals on a redundant server system

The patching mechanism fills in gaps in the data set of the first server using the data from the other server. If both servers have holes in their data at the same time, which is typical of a field instrument problem in the field, then the gap remains. The facility is only useful when one of the servers has been down during the trend plot period.

13.3   Historical Trending

Historical trending is similar to real-time trending, in that the aim is to produce a plot of tank gauging data over a period of time. However, it differs in that the data presented is not live (i.e. it does not scroll to the left) and there is no limit of 12 hours to the period that can be plotted.

13.3.1   Starting-up historical trending

Either:
- Click the toolbar button 📊 on the Home Page.
- Select **View → Historical Trending** from the Home Page menus.
- Select **Historical trending** from the Service Manager menus.

The trending parameter screen opens, as shown below.
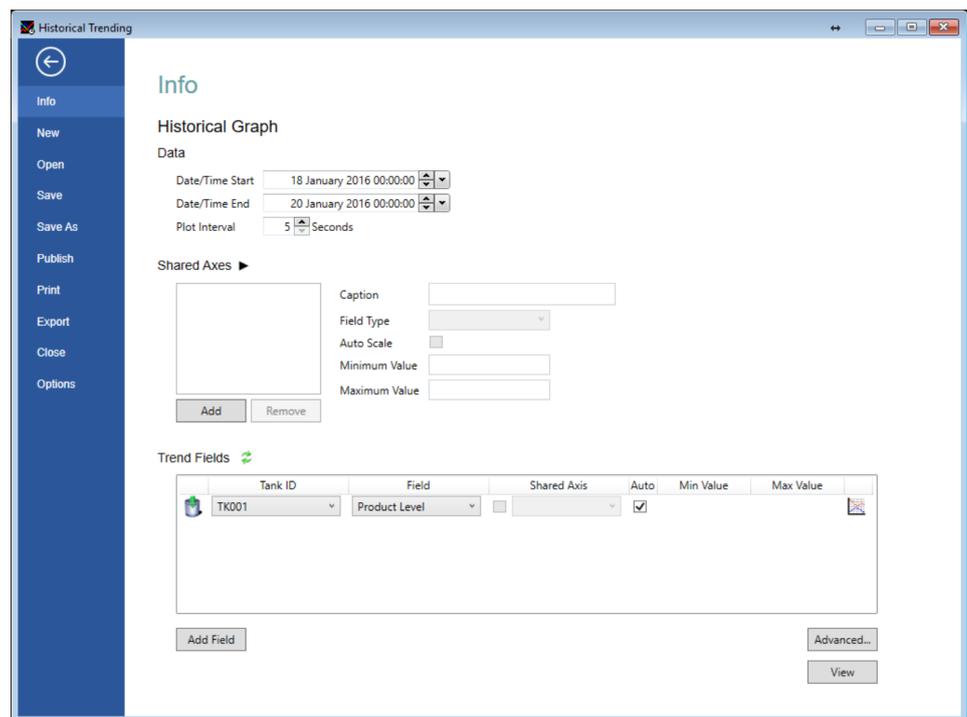
68   Historical trending parameter selection

13.3.2   Historical plot data

In order to identify the period of the data to be plotted, a **Date/Time Start**, **Date/Time End** and **Plot Interval** must be specified. The start and end time is self-explanatory and the **Plot Interval** determines the time between neighbouring points on the plot. The maximum **Plot Interval** is 900 seconds.

🖾 *69   Entering data set selection for historical trending plot*

> ℹ️ Large sets of data take a long time to plot. A month's worth of data, plotted at 5 second intervals for 20 fields, will take a long time to compile the data for your graph.

> ℹ️ The default configuration of the trending server is to delete trending data after 90 days. Selecting a time period older than the data available on the server will result in an empty graph.

13.3.3   Other configuration options

For details of the common configuration options, refer to section "Common trend configuration".

Redundant system options

If the system is a redundant one there are some additional options available, shown in figure below.

🖾 *70   Entering a data set selection for a historical trending plot on a redundant system*

It is possible to select a specific **Server** as the source of the data – or **Automatic**, which will choose whichever server the Home Page is currently using as its data source. The **Attempt to patch missing data using the other server** option allows gaps in the source server's data to be filled with data retrieved from the redundant cohort.

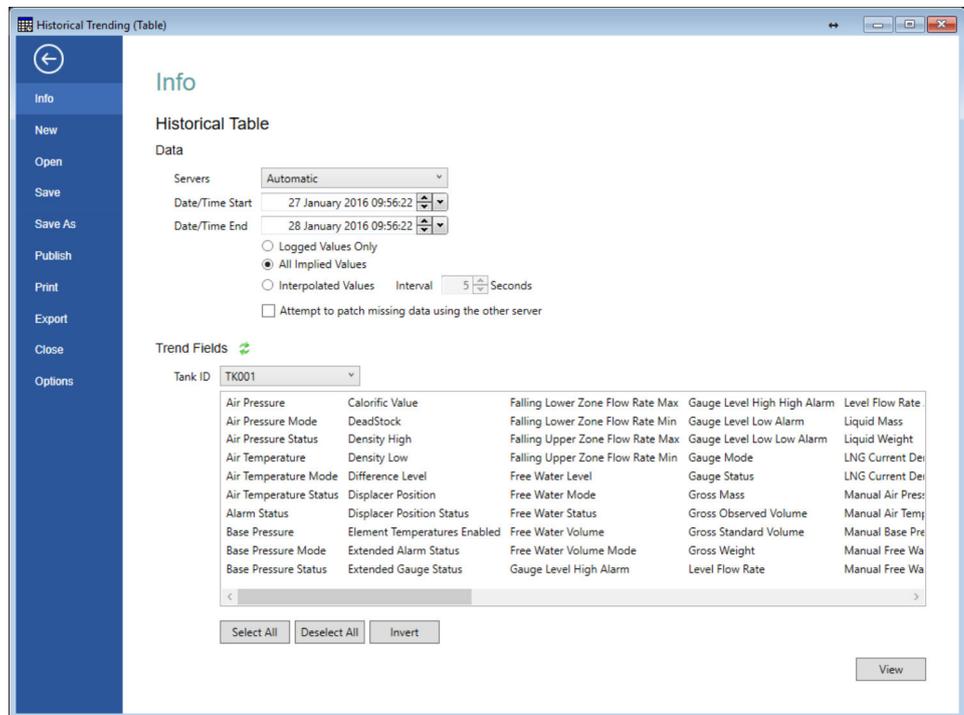## 13.4   Historical Trending (Table)

For most purposes the graphical views of the trend data provided by Real-time and Historical for visualising the activities on a tank farm are sufficient. Should further analysis of the underlying data be required, the tabular view is provided, the main function of which is, to allow data to be exported in a format where it can be consumed by other systems.

13.4.1   Starting-up Historical Trending (Table)

Either:
- Click the toolbar button ▦ on the Home Page.
- Select **View → Historical Trending (Table)** from the Home Page menus.
- Select **Historical Trending (Table)** from the Service Manager menus.

The trending parameter screen opens, as shown below.

🖼 *71   Tabular historical trending data selection*

13.4.2   Historical trend data selection for tabular view

The selection process for the tabular data is very similar to that of the graphical view (refer to section "Historical plot data"), the only difference is that you can choose how the data is reported.

Storage of tank gauging data trends

The trend data is collated and stored on the server computer, by the trending service. The service performs two tasks: it gathers the live tank gauging data and stores it in files on the computer, and it serves the data it has gathered to the client applications when requested to do so.

The method employed to gather the data is to periodically scan the available tank gauging data (typically every 10 seconds) and record just the parameters that have changed since the last 10 second scan. Taking a tank's product level as an example, if the product level hasn't changed since the last scan nothing will be recorded for the tank at this scan. This has a consequence on the data presented in the tabular historical view.

Selection of historical data

The common trend data selection options apply to this view of trend data (refer to section "Common trend configuration").

Additionally, there are 3 options presented when selecting the historical trend data selection, which cause the data returned in the tabular view to vary. The selection of these might influence the statistical value of the information.

Option:

- **Logged Values Only**
  Process variables that don't contain a value in the data record are left blank.
- **All Implied Values**
  The blank records which appear in the **Logged Values Only** data selection are filled with the last known value from previous scans.
- **Interpolated Values**
  The blank records are which appear in the **Logged Values Only** data selection are filled with a value synthesised using linear interpolation from the real values before and after this time record.

Date/Time	Product Level (mm)	Product Temperature (°C)
08/01/2015 08:58:10	4,030	18.60
08/01/2015 08:58:16	4,013	18.60
08/01/2015 08:58:26	3,996	18.60
08/01/2015 08:58:36	3,980	18.60
08/01/2015 08:58:46	3,963	18.60
08/01/2015 08:58:56	3,946	18.60
08/01/2015 08:59:06	3,930	18.60
08/01/2015 08:59:16	3,913	18.60
08/01/2015 08:59:26	3,896	18.60
08/01/2015 08:59:36	3,880	18.60
08/01/2015 08:59:47	3,863	18.60
08/01/2015 08:59:57	3,845	18.60
08/01/2015 09:00:07	3,828	18.60
08/01/2015 09:00:17	3,811	18.60
08/01/2015 09:00:27	3,795	18.60
08/01/2015 09:00:37	3,778	18.60
08/01/2015 09:00:47	3,761	18.60
08/01/2015 09:00:57	3,745	18.60
08/01/2015 09:01:07	3,728	18.60
08/01/2015 09:01:17	3,711	18.60
08/01/2015 09:01:28	3,695	18.60
08/01/2015 09:01:38	3,676	18.60
08/01/2015 09:01:48	3,660	18.60
08/01/2015 09:01:58	3,643	18.60
08/01/2015 09:02:08	3,626	18.60
08/01/2015 09:02:18	3,610	18.60
08/01/2015 09:02:28	3,593	18.60
08/01/2015 09:02:38	3,576	18.60
08/01/2015 09:02:48	3,560	18.60

🖾 *72   Tabular view of historical trend data*

13.5   Common trend configuration

Many of the techniques used to design a trend plot are common to both Real time, Historical and to a certain extent Tabular views of trending data. Those techniques are described here.

13.5.1   Shared axes

If you are plotting related pieces of information it is often desirable to plot them on a common axis so you can compare the values of the plot lines at various points in time.

For instance if you were plotting a tank's product level and free water level together you would plot both on the same axis as you would expect to see the water level some way below the product level. If you plot them on separate axes and use the auto-scale option you will typically see the water level as a flat, horizontal line in the centre of the plot, with the product level fluctuating above and below it.

By using a shared level axis you will get a free water level at the bottom of the plot with the product level fluctuating above it and in a scale with the values.

13.5.2   Adding a shared axis

To create a shared axis click **Add**. This creates a new axis, initially of type level and named **New Axis** as shown below.

🖾 *73   Creating a new shared axis*

Change the name of the axis by entering a suitable name in to the **Caption** text box and select the appropriate type for your axis. If you leave the **Auto Scale** option ticked the axis will be scaled to fill as much of the plot area as possible to fit the range of values in the trending data. This can have the effect of making small fluctuations appear much larger than they are! If you decide not to auto scale your axis, untick the option, but enter suitable minimum and maximum values for the axis.

13.5.3   Adding fields

There is no limit to the number of fields that can be displayed, however adding large numbers to the same trend template can make it difficult to interpret the data. It is better to create several templates with less trend items on each.

Click the **Add Field** button to add a trend item, as shown below.


🖾 *74   Adding a field to the trend plot*

Select a Tank from the drop down list, then select the process variable for the tank to be trended.

ℹ️ If available, a **Shared Axis** can be used for 1 or more process variables by checking the box and selecting the required shared axis from the drop down list. N.B. only Shared Axes relevant to the process variable being trended will be shown in the list, i.e. a Temperature axis will not be shown for a Level trend process.

Optional maximum and minimum values for the y axis can be entered if required. The smaller the range between the minimum and maximum values, the more detail that can be seen. To enter maximum and minimum values it is first necessary to ensure that a shared axis is not being used and to uncheck the **Auto** box for the field.

Repeat the procedure to add further trend fields.

Click on the 🗑️ button to remove a trend field from the list. The figure below is an example of a trend template.
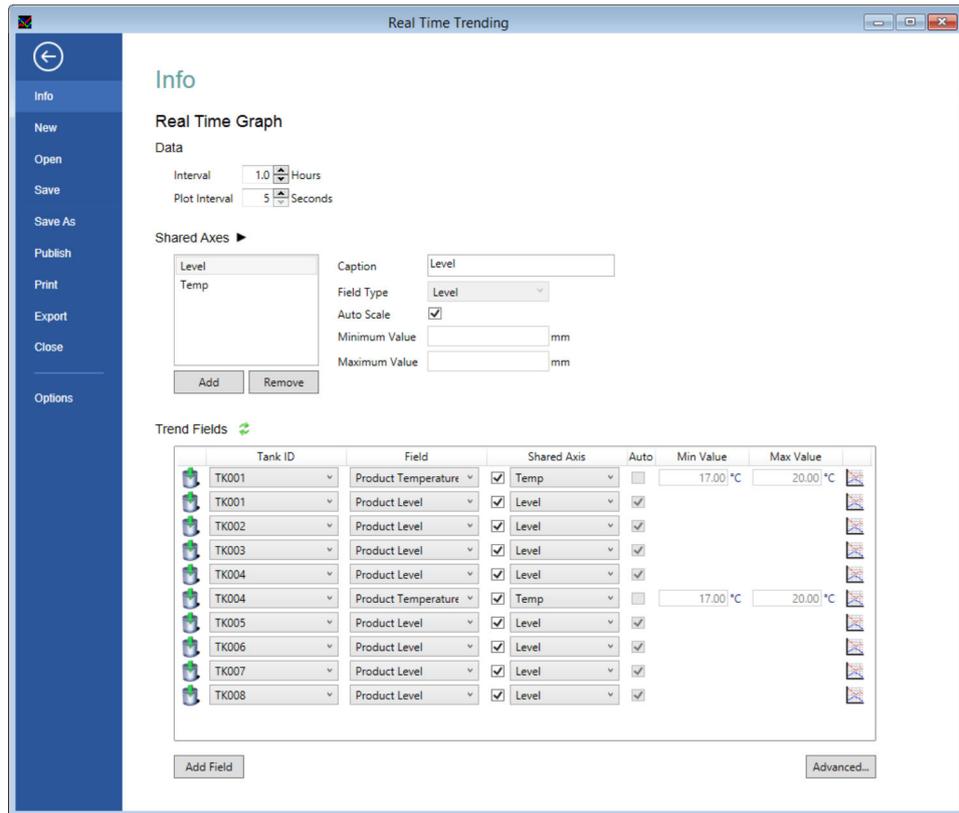
⊠ 75   An example trend field screen

Line colour and style

The colour and style of each plot line can be customized for easy identification. Click the ⊠ button at the end of the line to open the style pallette shown below.
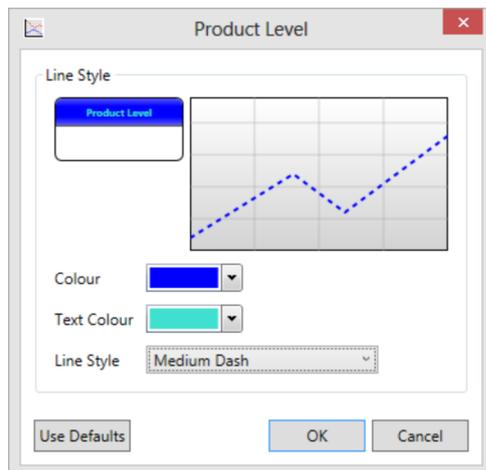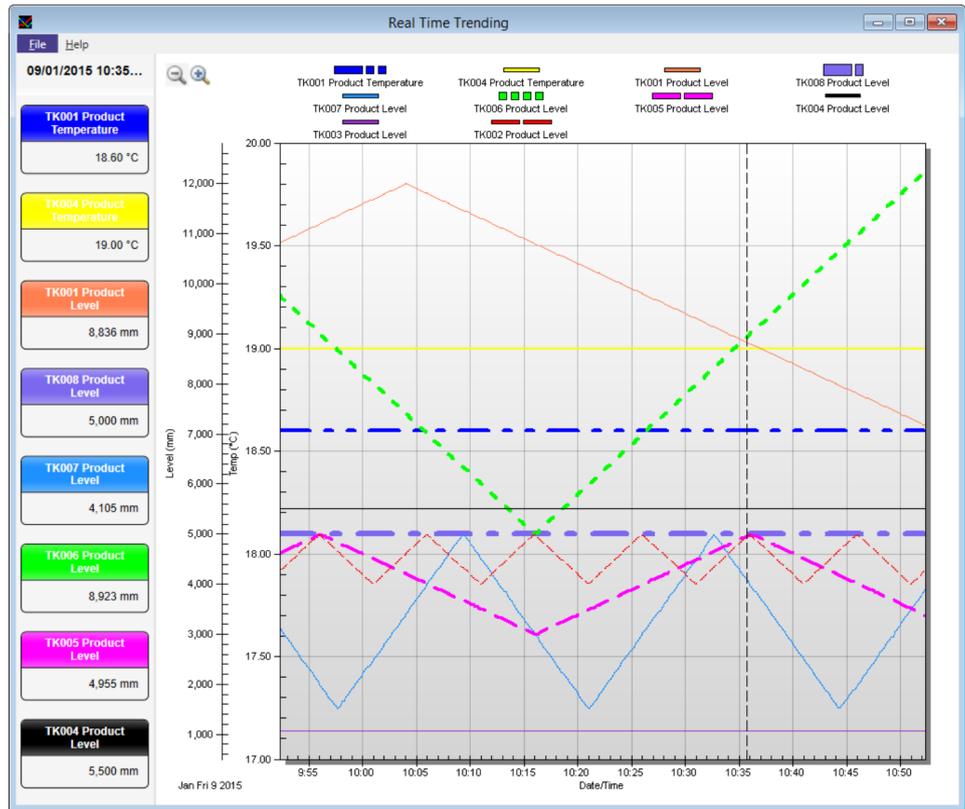

⊠ 76   Setting the colour and style of a plot line

Select the style and colour you desire and click the **OK** button. Click **Use Defaults** to return to the default style selection.

The Trend Display will be configured to display the data requested.

Viewing the trend graph

Once the fields have been configured you can display the plot by clicking the back button ⬅.

🔲 77   An example trend plot displaying a busy set of tanks

13.5.4   Finding a value on a trend

The values of process variables at a given point in time can be determined when the selection mode of the graph is not **None**. To change the selection mode of the graph, click **File** to return to the **Info** screen and select the **Advanced...** button. From the window that opens, select **Selection Mode** and then the required selection mode.
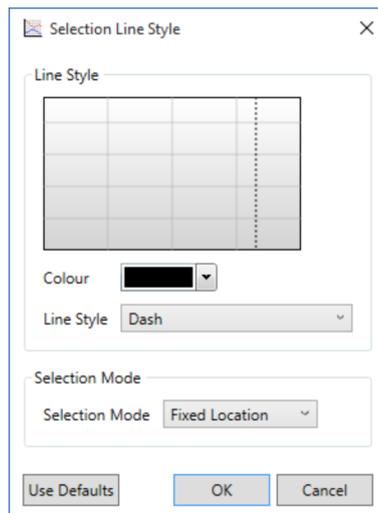
🔲 78   Selection Line Style screen
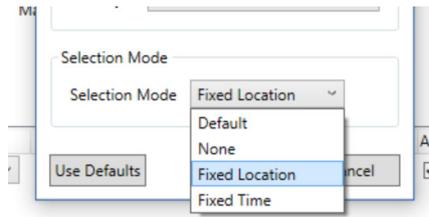
🖼 *79   Select the required selection mode*

This will be one of the following values:
- **Default** – Uses the Default selection mode (does not change the line colour and style, you need to click **Use Defaults** to set these to the default state).
- **None** – It is not possible to select a time on the graph and the value of process variable values is not displayed.
- **Fixed Time** – A time can be selected on the graph and the corresponding process variable values will be displayed on the left hand side of the display. As new values are added to the graph, the line indicating the selection will scroll across to the left, remaining at the same time.
- **Fixed Location** – A time can be selected on the graph and the corresponding process variable values will be displayed on the left hand side of the display. As new values are added to the graph, the line indicating the selection will remain in the same place with the process variable values scrolling past it.

If the **Selection Mode** is not **None**, the current selection can be moved backwards and forwards in time using the left and right arrow keys. To change the selection by a larger amount, hold down the shift key whilst using the left and right arrow keys.

13.5.5   Zooming in to more detail

The trend module allows the user to drill down into the trend data and view trends in more detail. If the current **Selection Mode** is not **None**, it is first necessary to put the graph into zoom mode by clicking the Zoom 🔍 toolbar button.

Identify the area of the trend where you require more detail

Using the mouse draw a box around the area of interest by pointing and clicking the left mouse button. While holding the left mouse button down drag the mouse pointer to the right or left and you will see a sizable box appear. Extend this box around the area of interest and release the mouse button.

The system will zoom in to the area selected. You will notice that horizontal and vertical scroll bars appear allowing you to move around the data at the current zoom level. You can zoom in further as required using the same technique.

13.5.6   Zooming out

To exit zoom mode and return to selection mode, click the Undo Zoom 🔍 toolbar button. It will now be possible to select a time on the graph when it is clicked instead of identifying an area to be zoomed in on.

13.6   Trend templates

The selection criteria and display options you specify to create the trend data views can be saved and then recalled in order to quickly recover the effort put in to devise the views.

Templates contain the selection criteria, line colour and style information and can be saved either as a file on the computer's hard disk drive or centrally in the tank gauging database.

13.6.1   Saving a trend template

Saving a template places an MTTRT file on the computer's hard disk drive. A template once saved will only be accessible from the computer it is saved on.

From the trend parameter page, click **Save** or **Save As**.

13.6.2   Publishing a trend template

Publishing the template is similar to saving it, except that the file is stored inside the tank gauging database on the server (or servers, if the system is redundant). Once published the template is accessible from all computers in the tank gauging system's network.

From the trend parameter page click **Publish**.

13.6.3   Opening a trend template

On the trend parameter page click **Open**.
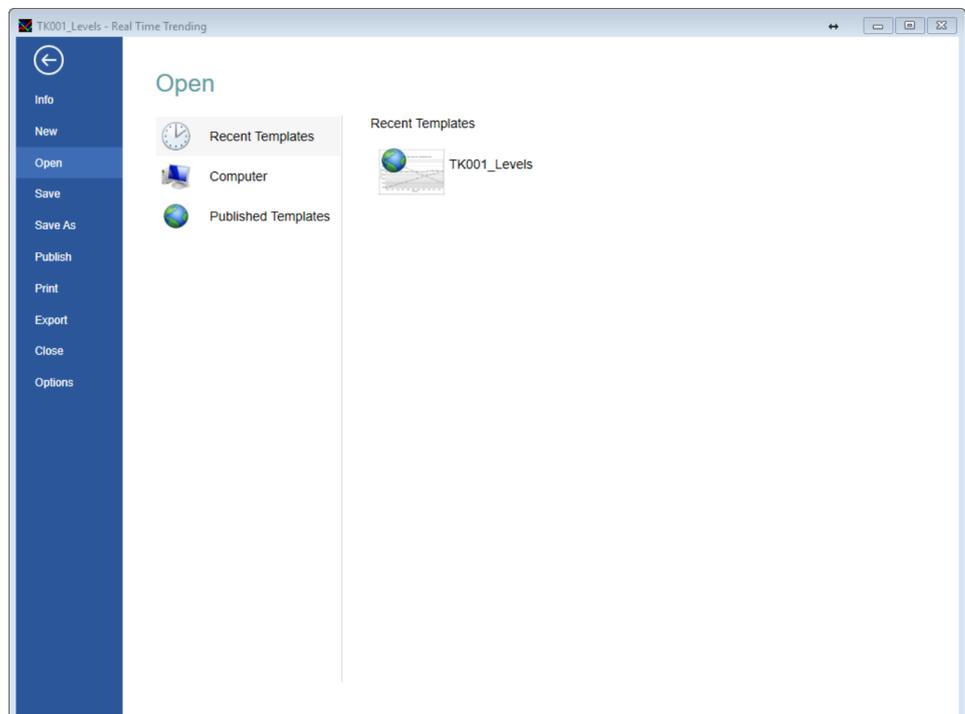
🖼 80   Opening a trend template

The system offers three options:
- **Recent Templates** – A list of recently used templates.
- **Computer** – Offers a facility to browse the computer's hard disk for previously saved MTTRT files.
- **Published Templates** – Presents a list of all templates that have been published.

13.7   Printing trend data

If a hard copy of the trend graph is required, after selecting the view required, select **Print** from the trend parameter screen. A preview of the report will be shown, from which the output can be directed to a printer.

Any time selection or zoom you have applied to the graphical view will be replicated in the print out.

13.8   Exporting trend data

The Real Time Trending and Historical Trending (Graph) can be used to export trend data in either graphical or .CSV format, Historical Trending (Table) module can only be used to export trend data as a .CSV file. Once a template has been set up for trending select **Export** from the configuration screen.

The following screen will be displayed for **Real Time Trending** and **Historical Trending** (Graph):
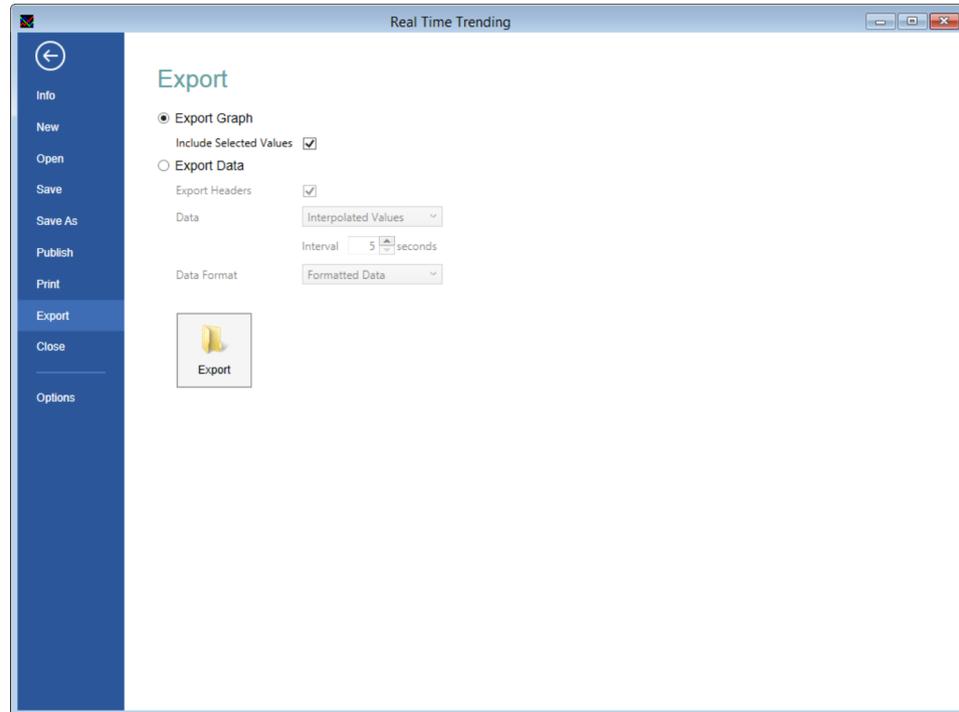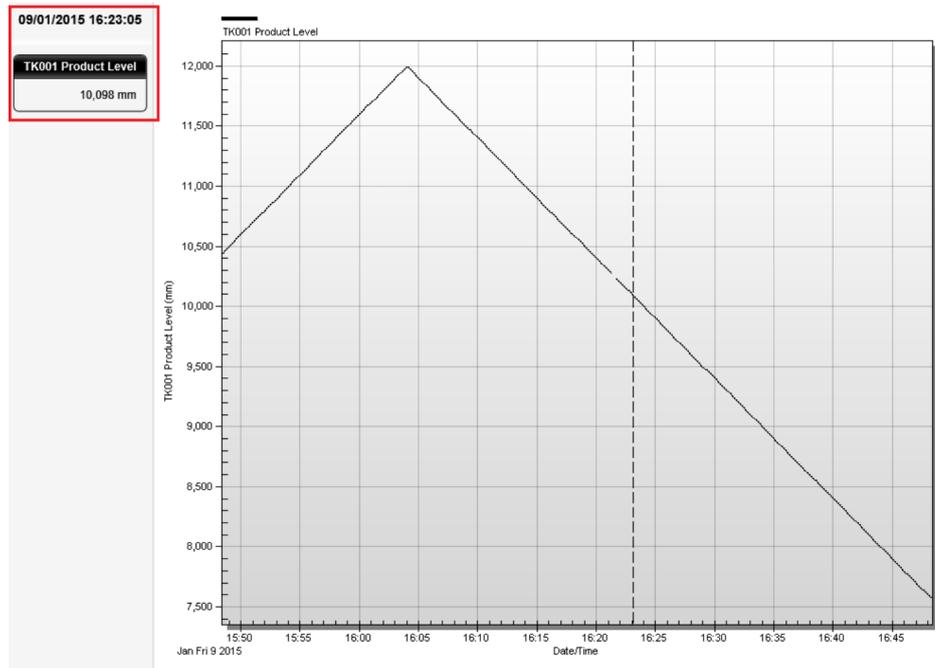

🖻 *81   Exporting data from the trend viewer*

13.8.1   Exporting Graphs

To export the data as a graph select **Export Graph** and click the **Export** button.

The normal Windows file save dialog will ensue. The option to **Include selected variables** will add the selection point and values of the plots at the given time, as shown below.

🖼 *82   Export with included selected values*

13.8.2   Exporting Data

To export data values only select **Export Data**.

ℹ **Historical Trending (Table)** can only export data so there is no option to export a graph.

🖼 *83   Export trend data options*

Export Headers
If this option is checked the first data record in the exported file will contain the headers from the table instead of data.

Data
This option controls how the data values are determined, for a discussion of the options refer to section "Historical trending (table)".

Data Format

This option controls the way that data is formatted.

- Exporting the trend data as **Formatted Data** means that the contents of the CSV file will exactly match the data displayed in the table (Note however, that if the CSV file is opened using Microsoft Excel, the application may reformat the data before it is displayed).
- Exporting the trend data as **Raw Data in Base Units** means that the contents of the CSV file will contain the raw data from the trend data file. This means that formatting information (such as number of decimal places) and value translations (such as Alarm Status) will not be exported and the CSV file will just contain numeric data.
- Exporting the trend data as **Raw Data** is the same as the previous option except that fields which contain data which can be displayed using different units (such as levels, temperatures etc.) will have their values converted using the currently selected units for that type of field.

Click the **Export** button, select a file name and location and then **Save**.

13.9 Options

By selecting the **Options** button you can control and delete Published Templates and set the Default Options for plotting trend graphs.
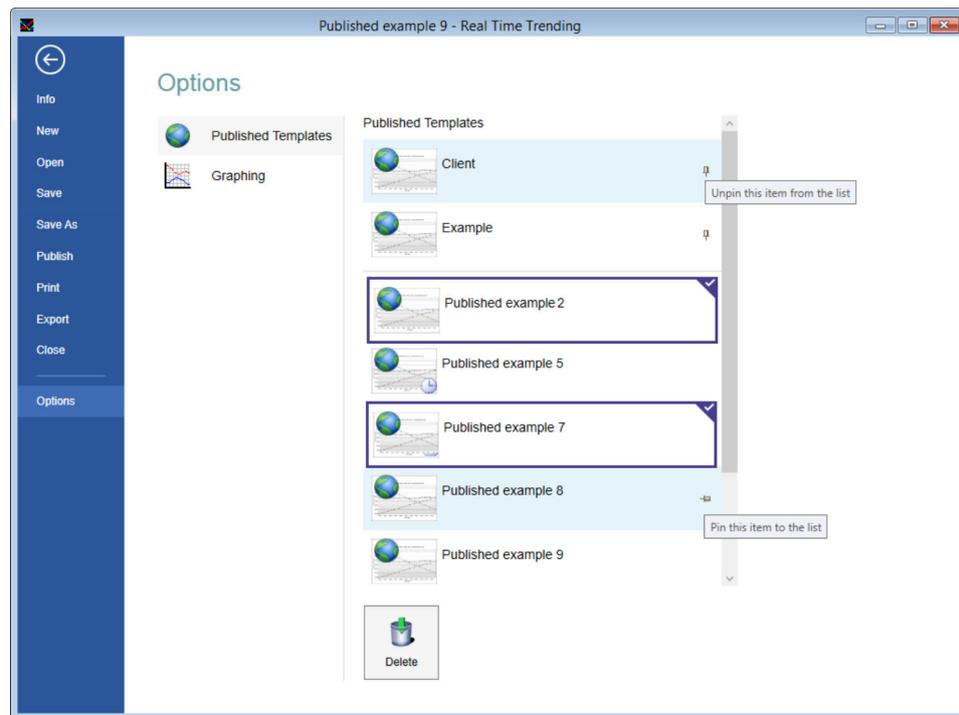
🖼 *84   Trend viewer options*

13.9.1 Pinning templates

Templates may be pinned to the top of the list to enable them to be easily located.

There are 2 ways to pin templates:
- Right click the template and click **Pin to list**.
- Hover the mouse over the required template and click on the pin icon.

Templates can be unpinned from the list by clicking on the unpin icon, which is permanently displayed on pinned templates.

13.9.2   Deleting Templates

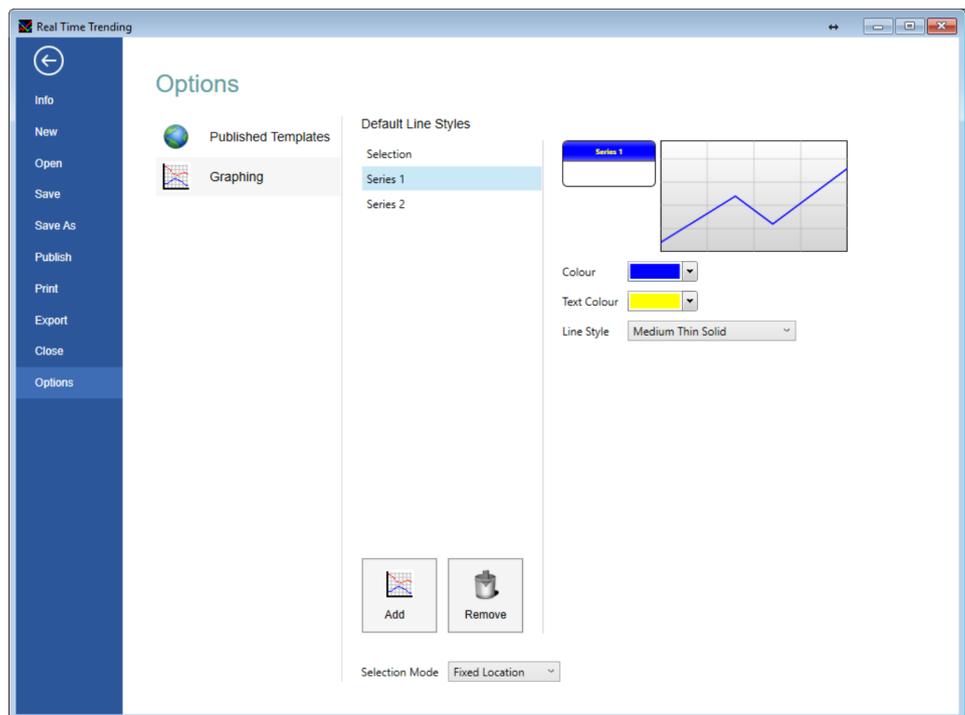Published templates that are no longer required may be deleted.

To delete a template click the template to highlight it and click the **Delete** button. Multiple templates can be deleted at the same time.
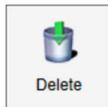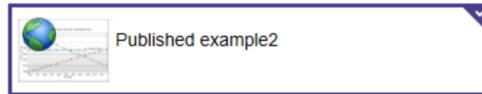
🖾 85   Deleting a published template

13.9.3   Graphing Options

The **Graphing** tab enables the user to customise the appearance of the default **Selection** and **Series** traces.

🖾 86   Defining the default style of series on graphs

Selection
- **Colour** – Select the default colour of the vertical selection line.
- **Line Style** – Select the default style of the vertical selection line.
- **Selection Mode** – Choose the default selection mode for the graphical trend representations. For more details on selection modes refer to section "Finding a value on a trend".

Series

The trend viewer is supplied with a single Series Default configured. The settings for this can be altered as follows:

- **Colour** – Selects the colour of the line plotted for the series.
- **Text Colour** – Selects the colour used to display the text on the key.
- **Line Style** – Sets the style of the line plotted for the series.

Additional series defaults can be added, click **Add** and configure in a similar way.

If your plot contains more tank gauging parameters than you have defined default series styles for, the pattern of defaults is repeated from Series 1 onwards.

14   Inventory Calculator

The system comes as standard with an Inventory Calculator.

The primary purpose of the Inventory Calculator is to provide the user with a means of calculating tank inventory for conditions that do not currently exist.
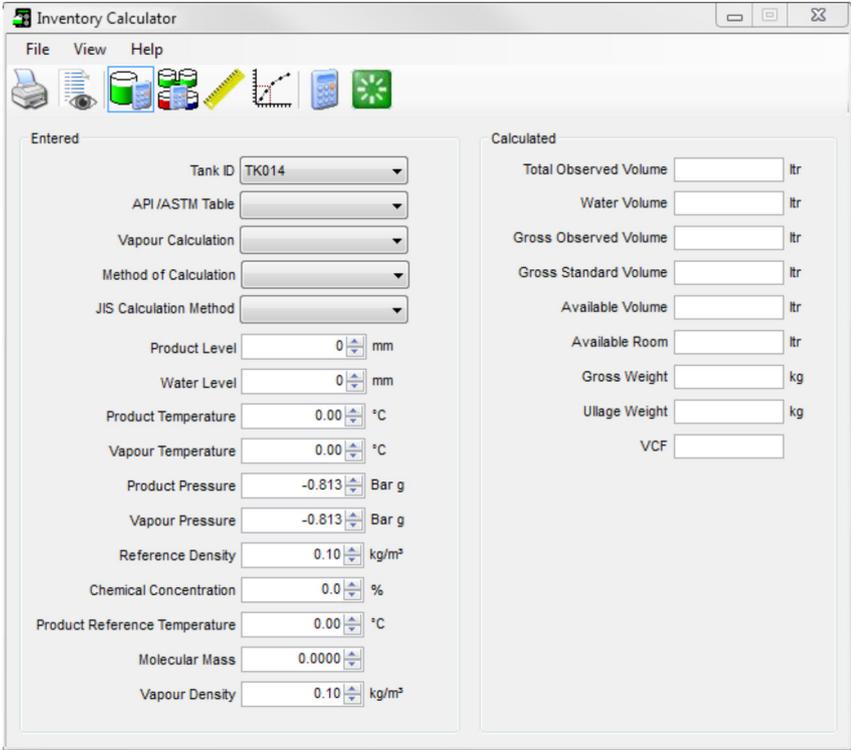
For example, it could be used as a "what happens if" calculator, if a tank were to receive or load X litres of product what would the final tank conditions be.

It may be used as a simple planning tool prior to the loading and/or receipt of product.

14.1   Launching the Inventory Calculator

Press the **Inventory Calculator** tool bar button 📇.

The **Inventory Calculator** module will be loaded. See the illustration below for a typical example. The **Inventory Calculator** is a multi-tabbed display comprising the straightforward tank calculator, the loading/receipt movement calculator, a measurement units converter and a linear interpolation calculator.

🖼 *87   Inventory Calculator window*

14.2   Tank Calculator

The tank calculator provides the user with the facility of calculating tank inventory at user specified conditions.

14.2.1   Viewing Current Tank Data

Select a tank from the drop down list.

The current tank gauging and inventory data will be displayed for the selected tank along with the API table currently configured for the tank. Some data values are dependent upon the various selections made in the drop down boxes and may not be visible in some configurations.

14.2.2 Entering the User Defined Criteria

The user can enter the following data:
- Product Level
- Product Temperature
- Product Density
- Water Level
- Pressure
- Molecular Mass
- Temperature Coefficient
- Density Correction Factor
- API Table

Some of the data fields are not always applicable. The user interface introduces new data fields as they are required by the current calculation settings.
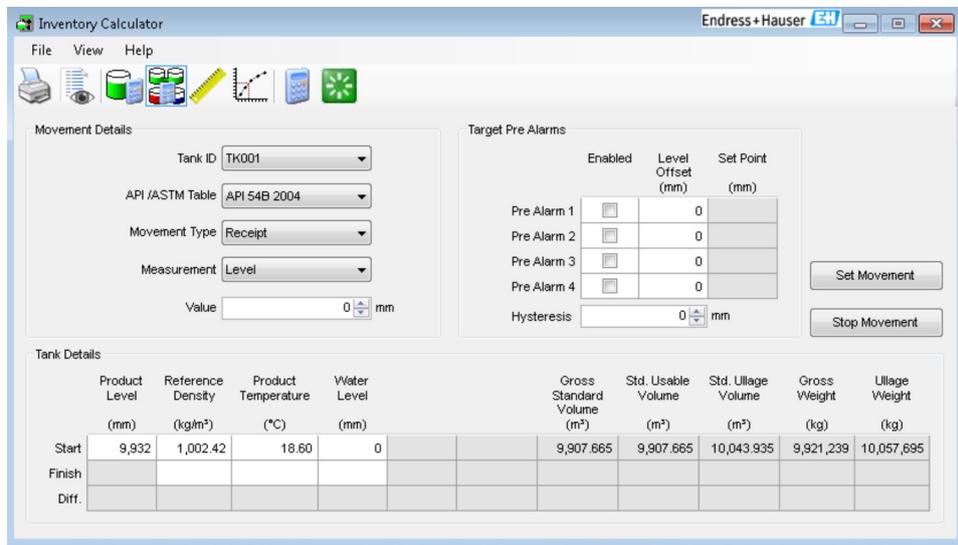
The fields that can be edited are clearly marked on the display in a white background.

To calculate data, proceed as follows:

1. Modify one of the editable fields. For example, to view the tank inventory at a different product level, simply delete or over type the current level reading with the new one.

2. Press the **Calculate** button 📑.
   ↳ The Inventory parameters will be re-calculated for the new data.

14.3 Movement calculator

The movement calculator provides the user with the facility of simulating a receipt or load of product to from the tank. Using this tool you can estimate the target level for your movement and use it to set a simple movement.

🖾 *88   Calculating a movement with the Inventory Calculator*

1. Prior to entering the movement details select a tank from the list. If **Use User Profile** is selected in **System Settings**, only the tanks for which the current user has **Read-Only** or **Read/Write** access will be available.
   ↳ The current tank conditions will be displayed.

2. Select the type of movement to be performed, **Load** (movement out), **Receipt** (movement in), **Fill** or **Empty**.

There are several methods of declaring the movement quantity, including by several different volumes, weights and masses. In most cases you can declare the movement quantity as an absolute or relative quantity as well.

There is a more comprehensive description of these options in the Simple Movements manual (BA01653G).

3. Enter the quantity to be loaded or received, unless the value is already implied by the movement type.

4. Click the **Calculate** button 📋 to calculate an estimate of the conditions in the tank after the movement have been carried out. Should you wish to carry out the calculated operation, you can enter some pre-alarm offsets and **Set Movement** to start the movement. The simple movement facility is fully documented in the Simple Movements manual (BA01653G).

5. To clear the form and reset it, use the **Clear** button 🔆.

If **Use User Profile** is selected in **System Settings** and the current tank does not have **Read/Write** access for the current user, then the **Set Movement** and **Stop Movement** buttons will be disabled.

14.4   Interpolation

The tab marked interpolation is a very simple linear interpolation calculation tool. Its purpose is to allow the user to enter data directly from a set of tank calibration charts and calculate the volume at an unknown level by linear interpolation.

🖼 *89   Interpolation calculation*

14.5   Unit conversion

The unit conversion tab contains a simple tool to allow the user to convert a value in one unit of measure into the corresponding value using different units.
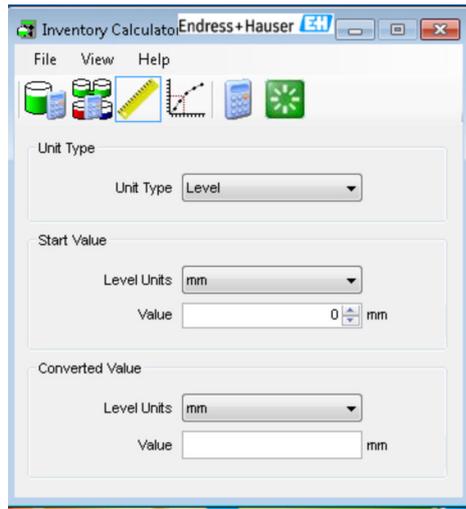
90   Unit conversion calculation

1. Select the type of value from the options on the left.

2. Select from the drop-down list the measurement units of the starting value.

3. Enter the numeric value to convert.

4. Select another measurement unit into which the value should be converted.

5. Click the **Calculate** button .

15   Scan Controller

The scanning/polling status of individual gauges may be set using the Scan Controller tool. To access the scan controller choose **Tools → Scan Controller** from the main Home Page menu.

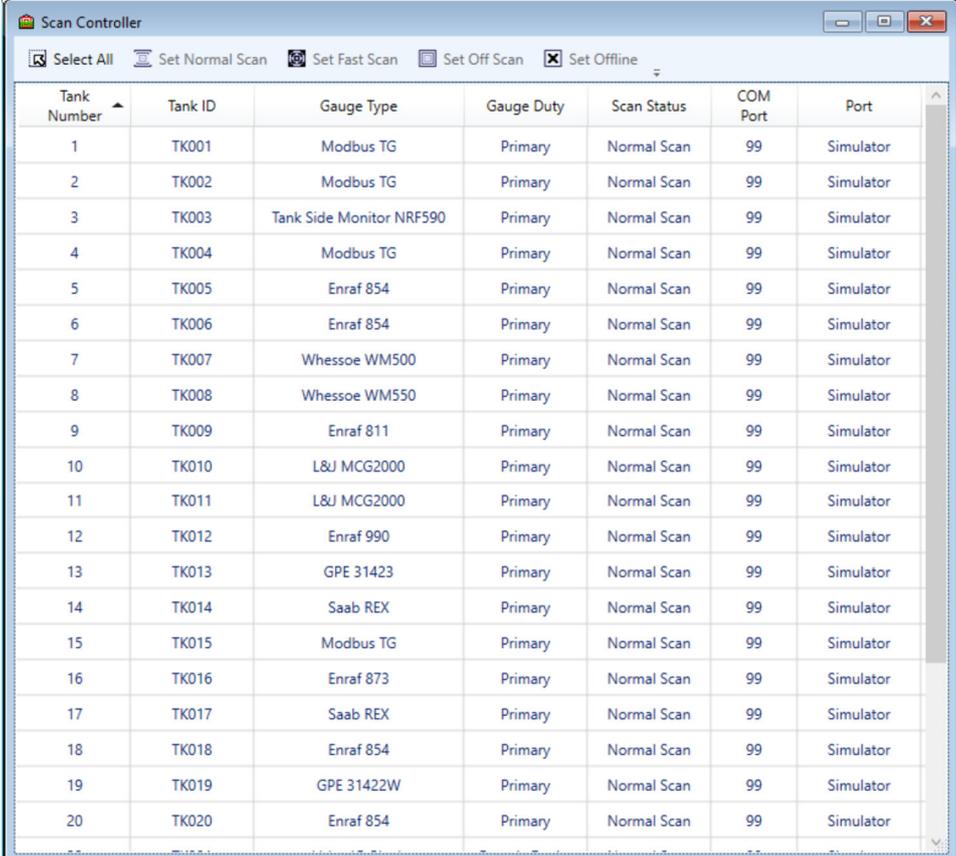| Tank Number	Tank ID	Gauge Type	Gauge Duty	Scan Status	COM Port	Port
1	TK001	Modbus TG	Primary	Normal Scan	99	Simulator
2	TK002	Modbus TG	Primary	Normal Scan	99	Simulator
3	TK003	Tank Side Monitor NRF590	Primary	Normal Scan	99	Simulator
4	TK004	Modbus TG	Primary	Normal Scan	99	Simulator
5	TK005	Enraf 854	Primary	Normal Scan	99	Simulator
6	TK006	Enraf 854	Primary	Normal Scan	99	Simulator
7	TK007	Whessoe WM500	Primary	Normal Scan	99	Simulator
8	TK008	Whessoe WM550	Primary	Normal Scan	99	Simulator
9	TK009	Enraf 811	Primary	Normal Scan	99	Simulator
10	TK010	L&J MCG2000	Primary	Normal Scan	99	Simulator
11	TK011	L&J MCG2000	Primary	Normal Scan	99	Simulator
12	TK012	Enraf 990	Primary	Normal Scan	99	Simulator
13	TK013	GPE 31423	Primary	Normal Scan	99	Simulator
14	TK014	Saab REX	Primary	Normal Scan	99	Simulator
15	TK015	Modbus TG	Primary	Normal Scan	99	Simulator
16	TK016	Enraf 873	Primary	Normal Scan	99	Simulator
17	TK017	Saab REX	Primary	Normal Scan	99	Simulator
18	TK018	Enraf 854	Primary	Normal Scan	99	Simulator
19	TK019	GPE 31422W	Primary	Normal Scan	99	Simulator
20	TK020	Enraf 854	Primary	Normal Scan	99	Simulator

🖻 91   Scan controller

The details of all gauges configured in the database are displayed including the current **Scan Status**. From this page one or more gauges may have their scan state set in one operation.

ℹ️ If **Use User Profile** has been selected in **System Settings**, then only gauges on tanks to which the current user has **Read-Only** or **Read/Write** access will be displayed.

Selecting Gauges

- To select a gauge, click on it in the table.
- To select more gauges, keep the **Control** key pressed and click on the line for the next gauge.
- Alternatively, click on the **Select All** button to select all gauges in the database.

Setting the scan status

To set the scan status click on one of the buttons along the top of the screen.

- **Set Normal Scan**
  Sets all highlighted gauges to the normal polling status.
- **Set Fast Scan**
  Sets all highlighted gauges to the fast polling status. Fast polling rate is determined by the Fast Scan Interleave Rate set in the Comms Monitor.
- **Set Off Scan**
  Stops polling for all the highlighted gauges. This affects any connected Mini Receivers, Multiscans and Datacons as well as the DCC communications.
- **Set Manual Scan**
  Sets all highlighted gauges to the manual polling. Gauges will only be polled when commanded by an operator.
- **Set Offline**
  Sets all highlighted gauges to the Offline mode in the DCC Comms. This affects only the DCC communications, any connected Datacons will still poll for gauges but Tankvision Professional will not poll the Datacons.

The scan status of the all gauges will be automatically updated in the Scan Controller display after any actions.
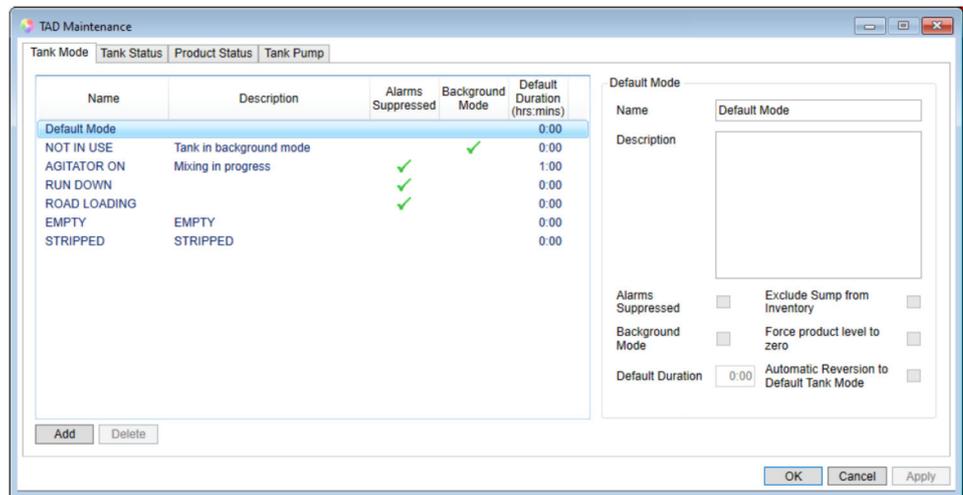
16 TAD Maintenance

The TAD (**T**ank **A**dditional **D**ata) Maintenance module serves three purposes.

- **Tank Mode** – Fluctuations in the product level or volume of a tank may generate Unauthorized Movement or Theft alarms. These alarms can be temporarily disabled on a per tank basis without the need to turn off the alarm. Tanks may also be switched into **Background Mode**, where tank data is only polled for and updated on the Background Scan. For more information refer to section "Background mode".
- **Tank/Product Status** – The module is used to specify whether or not Movements are permitted from a tank based on the status of the tank or the product it contains.
- **Tank Pump** – Pumps are defined and each pump may be allocated to a tank using the module.

TAD Maintenance is found under the **Configuration → TAD Maintenence** in the Home Page menus.

16.1 Tank Mode

🖼 *92 Tank Mode page in TAD Maintenance*

Tank modes are used to allow operators to declare that the tank in their charge are in a particular mode of usage. The modes can then be used to control the way the system treats tanks while in these modes. For instance, if a site has a regular operation required to drain free water from the bottom of the tanks, during which time it is expected that the level in the tank will fall a mode called "Water Drain-off" could be created that when set will temporarily suppress the Unauthorised Movement Alarms and with a duration of 2 hours.

When the operators determine that a water drain-off is necessary on a particular tank, the mode can be set, the drain-off commenced. After 2 hours the operators will be reminded of the drain-off mode through the **Alarm Event Viewer**, when they set the tank back into the default static mode the unauthorised movement alarms will be automatically re-enabled at the new level. As a consequence the operator does not require security clearance to change the unauthorised movement alarm settings, but can be allowed to temporarily suppress the creation of unauthorised movement alerts.

There is a fixed Default Tank Mode which does not suppress Unauthorized Movement or Theft alarms or put a tank in **Background Mode**. This mode cannot be deleted or altered but may be renamed to suit your preferences.

16.1.1 Adding a tank mode

Clicking the **Add** button will create a New Mode, configure the following attributes:
- **Name** – Give the mode a unique identifier. This name will be used for selecting the tank mode.
- **Description** – Optional description for the tank mode. This is only visible within the configuration screen.
- **Alarms Suppressed** – When ticked, tanks that have been set to this mode will not generate Unauthorized Movement or Theft alarms.
- **Background Mode** – When ticked, tanks that have been set to this mode will only be polled for data on the Background Scan.
- **Default Duration** – A non-zero value indicates that suppressing Unauthorized Movement or Theft alarms by putting a tank into **Background Mode** is only intended to be a temporary measure. An alarm will be raised to warn that the tank is still in a suppressing/background mode if not disabled within the defined time. Set a time in minutes (maximum 2880, the equivalent to 48 hours) to raise the alarm after the mode has been set. Setting this value to 0 will disable the warning alarm. The timer can only be set if either **Alarms Suppressed** and/or **Background Mode** is ticked.
- **Exclude Sump from Inventory** – When ticked, the tank sump volume entered in the Tank Metrics page will not be included in the inventory calculations.
- **Force product level to zero** – When ticked, if the value from the level gauge is invalid (DN number) or the gauge is at bottom stop then the product level for the tank will be set to 0 mm. If the **Exclude Sump from Inventory** flag is also set then the level will always be set to 0 mm regardless of the value returned from the gauge. This is normally set for a tank mode where the tank is assumed to be empty.
- **Automatic Reversion to Default Tank Mode** – When ticked, the tank mode will be automatically changed to the **Default Mode** if the product level goes above the **Empty Tank Threshold** setpoint for more than 30 seconds. The Threshold value is configured in the Tank Metrics page.

16.1.2 Background mode

Tanks in **Background Mode** will only be polled for data on the Background Scan. This can be useful for reducing system resources used for example on empty or inactive tanks.

When a Tank is in **Background Mode**, the status on the Tank in the Home Page will change to **Off Scan**.

Effect on alarms

When a tank is in **Background Mode** certain alarms are suppressed.

> **NOTICE**
>
> **Danger from deactivated Alarms**
> If the alarm is enabled in Alarm Configuration the Background Mode will override the setting and not test for the alarm condition.
> ▸ If an affected alarm is active when the mode is set, then the alarm will deactivate thus removing it from the alarm event viewer display.

This feature is particularly useful for sites interested in reducing the number of active alarms present in the **Alarm Event Viewer**.

The alarms affected are as follows:
- Programmable Low Alarm
- Programmable Low Low Alarm
- Hardware Low Alarm
- Hardware Low Low Alarm
- Programmable High Temperature Alarm
- Programmable Low Temperature Alarm
- Any Programmable User Defined Alarm based on Low Levels
- Any Programmable User Defined Alarm based on Temperature

- Programmable Variable Alarm
- [All] Flow Alarms
- Target Level Achieved
- Floating Roof Alarm
- "Simple" movement alarms (not full movements)
  - Pre Alarms 1 - 4*
  - Target Level Exceeded*

The Unauthorised Movement and Theft Alarms are not suppressed by setting a background tank mode. When the mode is set the start values are recorded; initialising these alarms. The alarms will still be evaluated when new levels are obtained, though on a less regular basis than normal.

🛈 Should an Unauthorised Movement or Theft be detected the tank mode shall be automatically set to the default mode returning the tank to normal scanning and switching all the alarms back on.

The Unauthorised Movement Alarm and Theft Alarm must be enabled in Alarm Configuration for this feature to work. If the **Tank Mode** is also flagged as suppressing Unauthorised Movement Alarms, then again this feature will not work as the suppression of these alarms overrides this feature.

Effect on "Full" movements

A tank in a **Background Mode** can be used in a planned movement. When a movement is opened on a tank in **Background Mode**, the mode is automatically changed to the **Default Mode**. However, closing a movement on a tank does not automatically change the mode back again.

Effect on "Simple" movements

When a movement is set on a tank, the mode is automatically changed to the **Default Mode**. Closing a movement on a tank will not automatically place the tank back into a **Background Mode**.

16.1.3   Deleting a Tank Mode

Highlight the required tank mode and click **Delete**.

16.1.4   Setting a Tank Mode

Tank modes are applied from the SCADA screens. It is necessary to configure a Tank Mode Data Entry item. When configured, click on the data entry item and a selection window will open showing the current tank mode.
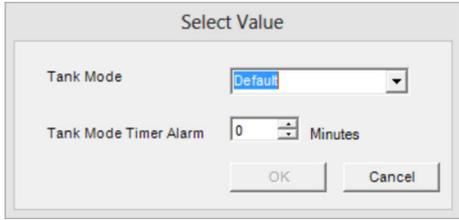

🖻 *93   Setting a Tank Mode*

Select the required **Tank Mode** from the drop down list. If a suppressing mode is selected the **Tank Mode Timer Alarm** is set to the preconfigured Timer value. This may be ammended if required.

Click **OK** to accept the changes or **Cancel** to discard them.

The selected tank mode will be shown in the Data Entry control.

Access to the Tank Mode settings is controlled by the User security system.

16.2   Tank Status
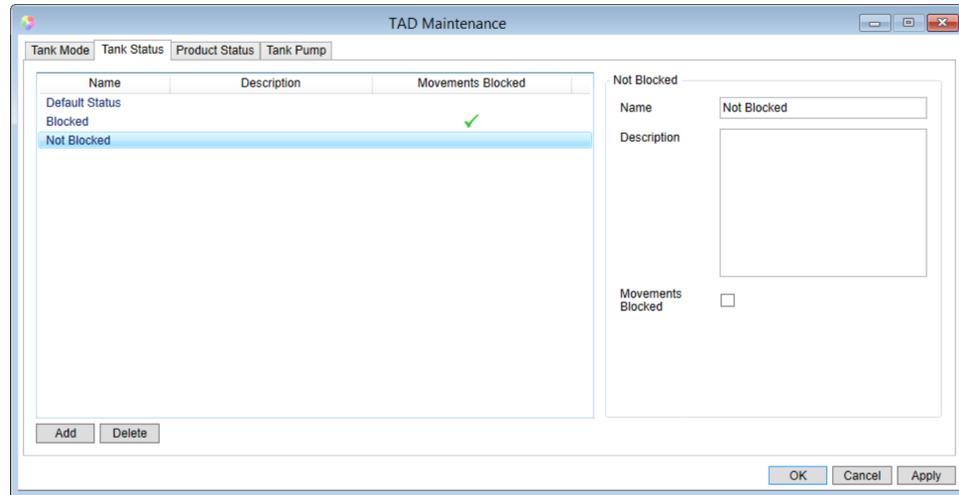
🖻 *94   Configuring Tank Status in TAD Maintenance*

There may arise a situation where it is either not possible or desirable to use a tank for loading or receiving product (e.g. the tank is undergoing maintenance). In this case a Tank Status can be set to block movements.

The Default Tank Status can not be made to block movements; neither can it be deleted, but it may be renamed to suit your preferences.

16.2.1   Adding a Tank Status

Clicking the **Add** button will create a New Status. Configure the following attributes:
- **Name** – Give the status a unique identifier. This name will be used for selecting the tank status.
- **Description** – Optional description for the tank status. This is only visible within the configuration screen.
- **Movements Blocked** – When ticked, tanks that have been set with this status will block Movements from being initiated, however an override option will be offered in the movements package.
 Note: This applies only for "Full" movements.

16.2.2   Deleting a Tank Status

Highlight the required tank status and click **Delete**.

16.2.3   Setting a Tank Status

Tank statuses are applied from SCADA screens such as Single Tank Overview. It is necessary to configure a Tank Status Data Entry item. When configured, click on the data entry item and a selection window will open showing the current **Tank Status**.
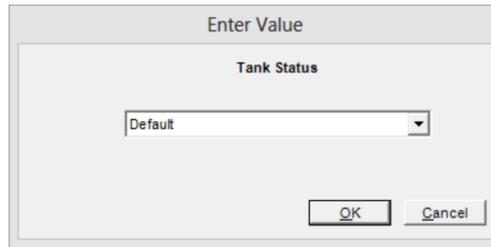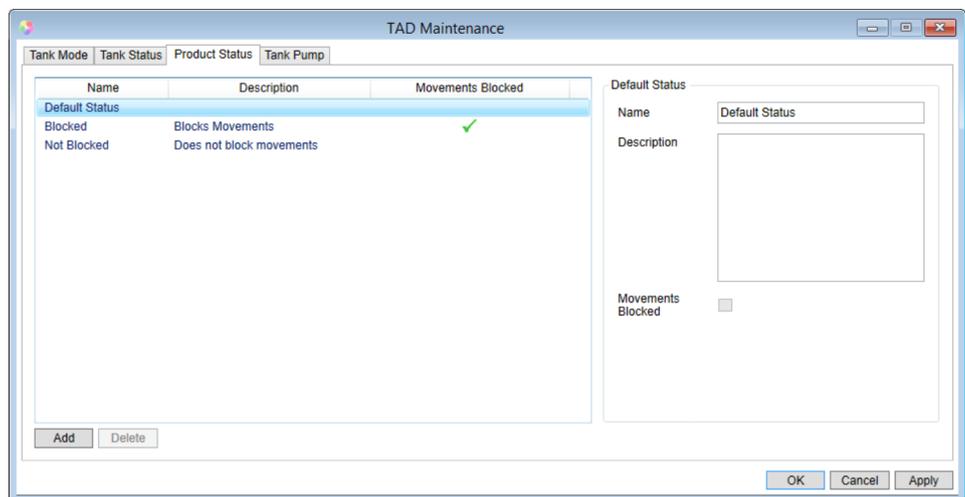
🖼 95   *Setting the Tank Status*

Select the required Status from the list and click **OK**.

The selected **Tank Status** will be shown in the Data Entry control.

Access to the Tank Status settings is controlled by the User security system.

16.3   Product Status

🖼 96   *Configuring Product Status in the TAD Maintenance*

There may arise a situation where it is either not possible or desirable to use a product within a tank (e.g. the product is contaminated). In this case a Product Status can be set to block movements.

The Default Product Status is fixed: this status cannot be deleted or altered but may be renamed to suit your preferences, neither can it be made to block movements.

16.3.1   Adding a Product Status

Clicking the **Add** button will create a New Status. Configure the following attributes:
- **Name** – Give the status a unique identifier. This name will be used for selecting the product status.
- **Description** – Optional description for the product status. This is only visible within the configuration screen.
- **Movements Blocked** – When ticked, products that have been set with this status will block Movements from being initiated, however an override option will be offered in the movements package.
  Note: This applies only for "Full" movements.

16.3.2   Deleting a Product Status

Highlight the required product status and click **Delete**.

16.3.3   Setting a Product Status

Product statuses are applied from SCADA screens such as Single Tank Overview. It is necessary to configure a Product Status Data Entry item. When configured, click on the data entry item and a selection window will open showing the current **Product Status**.

Select the required Status from the list and click **OK**.

The selected **Product Mode** will be shown in the Data Entry control.

Access to the Product Mode settings is controlled by the User security system.

16.4   Tank Pump
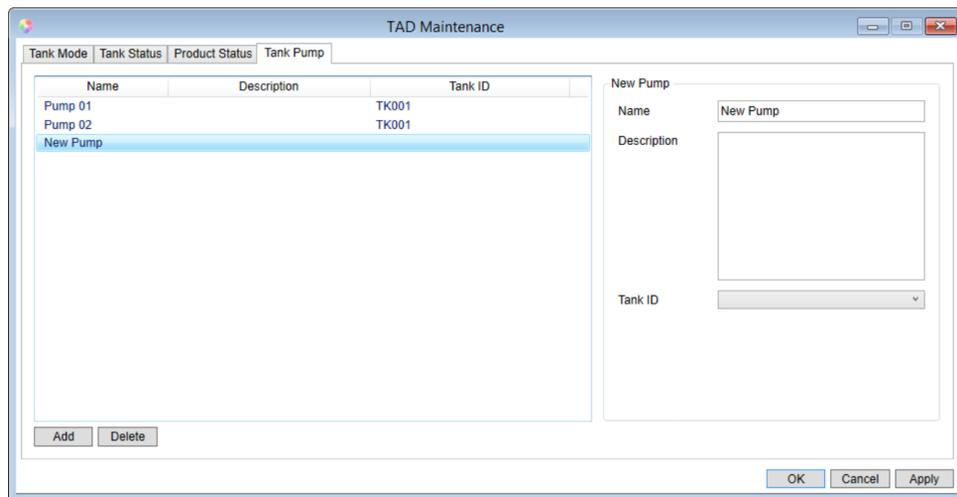
🖻 *97   Configuring Tank Pumps in TAD Maintenance*

This screen is used to show which pump is currently connected to a tank. There is no physical control over the pumps from this screen, it is for reference only.

16.4.1   Adding a Pump

Clicking the **Add** button will create a New Pump. Configure the following attributes:
- **Name** – Give the pump a unique identifier. This name will be used for assigning the pump to a tank.
- **Description** – Optional description for the pump.
- **Tank ID** – Select the tank that the pump is attached to; this should be left blank if the pump is not currently attached to a tank.

ℹ️ A pump may only be attached to one tank at a time, however multiple pumps may be attached to the same tank.

16.4.2   Deleting a Pump

Highlight the required pump and click **Delete**.

16.4.3   Assigning Pumps to Tanks

Pumps are allocated to tanks using the Single Tank SCADA screens. It is necessary to configure a Pumps Data Entry item (only one such item is supported on any SCADA screen).

When configured open the **Single Tank Overview** for the tank you wish to add a pump to and click on the Pumps data entry item. A selection window will open showing all pumps and their current allocation.
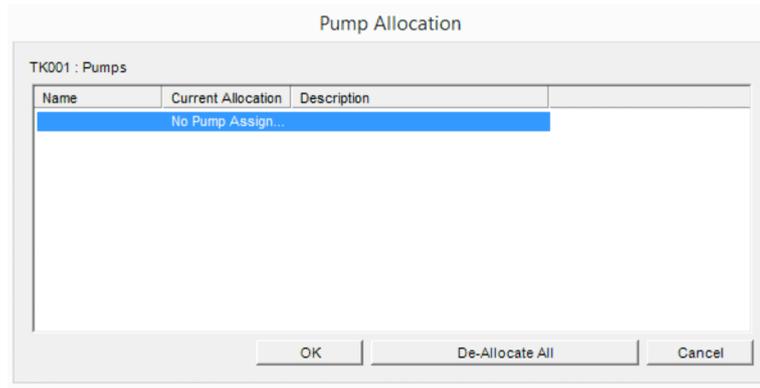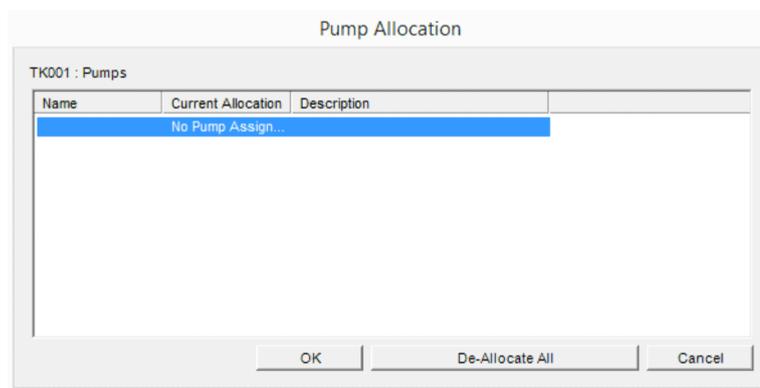
 98   Allocating/deallocating pumps to a tank

Highlight the pump(s) that you want to allocate to the current tank and click **OK**. If any pumps are already allocated to a tank they will be removed from that tank as pumps can only be allocated to one tank at a time.

The selected pump will be shown in the Data Entry control. If more than one pump is allocated to a tank only the first pump is shown followed by a plus (+) sign to indicate that there are further pumps allocated to the tank, hover the mouse over the data entry control to reveal a full list of tanks.

Access to the Pumps settings is controlled by the User Security System.

16.4.4   Removing Pump Allocation

Open the **Single Tank Overview** for the tank you wish to remove a pump from and click on the Pumps data entry item. A selection window will open showing all pumps and their current allocation.

 99   Allocating/deallocating pumps to a tank

Pumps currently allocated to the tank will be highlighted. To remove a pump from the tank press the **Ctrl** key and click the pump to remove the highlight.

Endress+Hauser

People for Process Automation

71757470