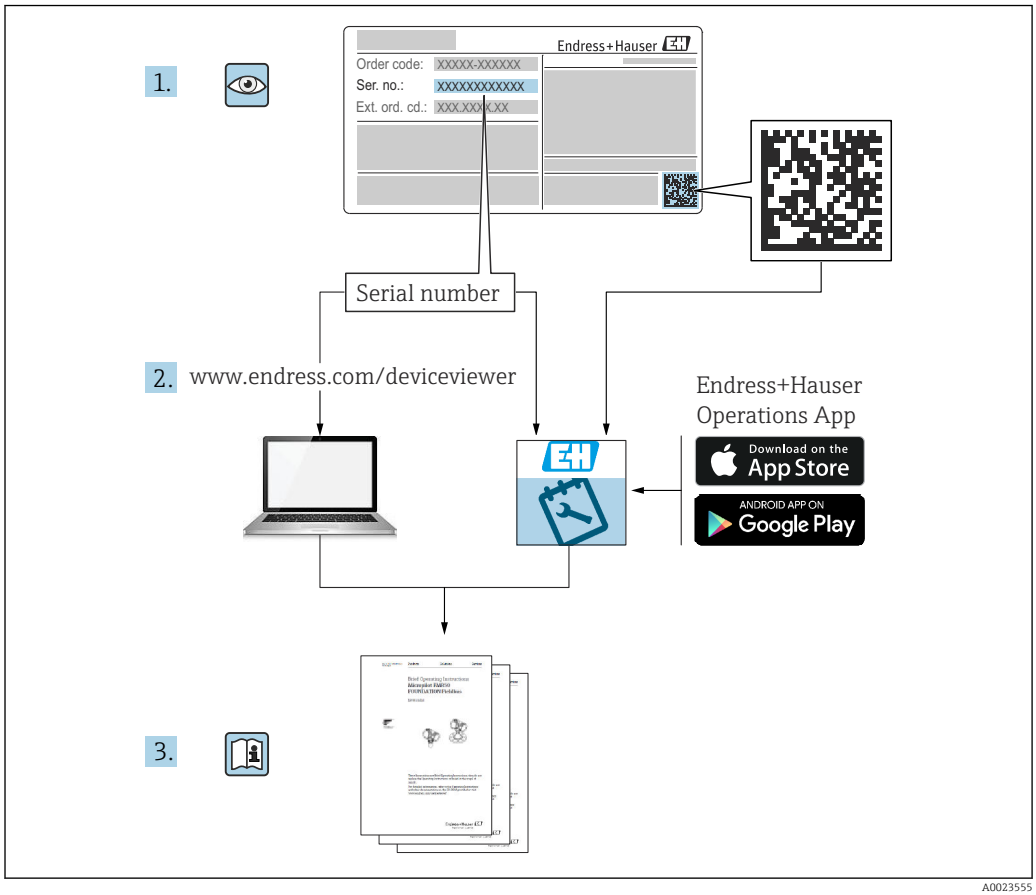
BA00390G/00/EN/22.25-00
71727009
2025-12-31

Valid as of version
18.3.4

Operating Instructions
Tankvision Professional NXA85
Tankvision LMS NXA86B

Tank Gauging
System Configuration

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.

Change history

BA00390G_18.18
- Valid for software version: 18.1.1
- Changes to the previous version:
  Compatibility with Windows 10 and Windows Server 2016

BA00390G_19.20
- Valid for software version: 18.3.1
- Changes to the previous version:
  Function added: Remote Radio Client Configuration

BA00390G_20.22
- Valid for software version: 18.3.2
- Changes to the previous version:
  Pipeline volumes as part of tank volumes selectable.
  Function removed: Web server

BA00390G_21.23-00
- 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

BA00390G_22.25-00
- Valid for software version: 18.3.4
- Changes to the previous version:
  - Function added: License Manager, Alarm Event Viewer: Sorting
  - Appendix D added

Table of contents

1 About this document 7
1.1 Document function 7
1.2 Target audience 7
1.3 Software versions and certification 7
1.4 Symbols 7
1.5 List of abbreviations 8
1.6 Documentation 9
1.7 Registered trademarks 9

2 Basic safety instructions 10
2.1 Requirements for the personnel 10
2.2 Intended use 10
2.3 IT security 11

3 Incoming acceptance and product identification 12
3.1 Incoming acceptance 12
3.2 Product identification 12

4 System Configuration 13

5 License Manager 14
5.1 License Manager 14

6 Tank Capacity Data Configuration . . 18
6.1 Tank Capacity Data Configuration Introduction 18
6.2 Loading the Tank Capacity Table Module 18
6.3 Adding a new Tank Capacity Table 19
6.4 Importing a Tank Capacity Table 20
6.5 Viewing Existing Tables 21
6.6 Editing Values in an Existing Table 21
6.7 Inserting an Extra Row 22
6.8 Adding an Extra Row 23
6.9 Deleting Rows 23
6.10 Validity of Data 23

7 Density Table Configuration 24
7.1 Density Table Configuration Introduction 24
7.2 Loading the Density Table Module 24
7.3 Adding a Density Table 25
7.4 Importing a Density Table 26
7.5 Viewing Existing Tables 27
7.6 Editing Values in an Existing Table 27
7.7 Inserting an Extra Row 27
7.8 Deleting Rows 28
7.9 Validity of Data 28

8 Configuration Tool 29
8.1 Inter-relation of configuration items 29
8.2 Launching the Configuration Tool 30
8.3 DCC Configuration 30
8.4 Tank Configuration 31

9 Alarm Configuration 51
9.1 Alarm Overview 51
9.2 Event Server Configuration 51
9.3 Alarm Event Viewer Configuration 61
9.4 Programmable Alarm Configuration 69
9.5 User Defined Alarms 84
9.6 User Defined Alarms (Gauge) 86

10 Product Configuration 88
10.1 Product Types 88
10.2 Launching Product Configuration 88
10.3 Allocating Products to Tanks 94

11 Security 95
11.1 Security Settings 95
11.2 User Maintenance 96
11.3 User Group Maintenance 98

12 System Settings 101
12.1 Using System Settings 101
12.2 Default Tank Manual Data 101
12.3 Ambient Conditions 101
12.4 Security Settings 102
12.5 Calculations 102
12.6 Tank Settings 102
12.7 Manual Level Entry 103

13 Auto Startup Configuration 104
13.1 Description 104
13.2 Launching 104
13.3 Configuring 105

14 Manual Data 107
14.1 Launching the Manual Data Entry Module . . 107
14.2 Entering Manual Data 109
14.3 Putting a Variable into Manual Mode 109
14.4 Shortcut to Manual Data 110

15 Tanks by User 111
15.1 Setting Tanks a User Can View or Modify . . . 111

16 Trending Configuration 113
16.1 General Tab 113
16.2 Threshold Tab 113
16.3 Filter Tab 114
16.4 Advanced Filter 115

16.5 Monitoring Alarms 116

17 Device Command Scheduler 119

17.1 Launching the Device Command Scheduler . . 119
17.2 Configuring Scheduled Commands 119

18 Report Scheduler 121

18.1 Report Scheduler Service 121
18.2 Spooling of Scheduled Reports 121
18.3 Report Scheduler Configuration 121

19 Messaging 130

19.1 Message Service 130
19.2 Configuring Audio Messages 139

20 Appendix 142

20.1 Appendix A – Standard for Calculation default flags 142
20.2 Appendix B – Product Inventory Flags 143
20.3 Appendix C – Tank Inventory Flags 144
20.4 Appendix D – Special Considerations for Volume Correction Methods 145

1 About this document

1.1 Document function

This manual should support during the configuration of Tankvision Professional NXA85 and LMS NXA86B.

1.2 Target audience

Beside basic PC operating knowledge no special training is needed to perform the Tank Gauging 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 Electrical symbols

⎓ Direct current

∼ Alternating current

⏚

Ground connection

A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

⏚ Protective earth (PE)
Ground terminals, which must be grounded prior to establishing any other connections. The ground terminals are located on the inside and outside of the device.

1.4.3 Symbols for certain types of information

Tip
Indicates additional information

Reference to documentation

Notice or individual step to be observed

1., 2., 3.
Series of steps

Result of a step

1.4.4 Symbols in graphics

1, 2, 3, ...
Item numbers

1., 2., 3.
Series of steps

A, B, C, ...
Views

1.5 List of abbreviations

- COR
  Carrier On Relay
- DCF
  Density Correction Factor
- GOV
  Gross Observed Volume
- GSV
  Gross Standard Volume
- GUI
  Graphical User Interface
- JIS
  Japanese Industrial Standards
- MDP
  Marine Digital Platform
- ODBC
  Open Database Connectivity
- PTT
  Push-to-Talk
- ROB
  Radio Output Board
- RTDB
  Real-time Database
- TCF
  Temperature Correction Factor
- TOV
  Total Observed Volume
- VCF
  Volume Correction Factor
- WCF
  Weight Correction Factor

1.6 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.

1.7 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

Enraf, Honeywell, Rosemount, Emerson, L&J, GPE, Varec are registered trademarks and trademarks of these organizations and companies.

All other marks are property of their respective owners.

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.

2.2.2 Intended use of Tankvision LMS NXA86B software

Tankvision LMS is a total LNG Tank Storage and Management solution for Peak Shaving, Receiving and Production LNG facilities. The LMS system has been designed to interface to all instruments commonly found on LNG storage tanks, and to collect and present the instrument data through a range of intuitive graphical user interfaces. A typical LNG Tank will have a wide range of measurement instruments to measure Liquid Level, Liquid Density, Liquid and Vapour Temperature, Liquid and Vapour Pressure, Skin Temperature and much more.

Typically each tank would be fitted with an LTD gauge, two further level gauges configured as a Primary and Secondary, and an Alarm Gauge. The LTD gauge is a servo operated unit mounted on the tank roof. The purpose of the LTD gauge is to take accurate profiles of temperature and density throughout the liquid, and whilst not profiling provide continuous liquid level, temperature and density measurement. The Primary and Secondary gauges can be either servo and or radar operated units also mounted on the tank roof. The purpose of these gauges is to provide continuous liquid level measurement, and average liquid temperature measurement. They provide redundancy on the measurement of level and temperature. The average liquid temperature is derived from a

multi point temperature sensor device. The alarm gauge is often a servo or radar based gauge configured to provide volt free contact alarm status to an independent system.

An LMS system can operate in a simple standalone configuration or as a fully redundant system where security and integrity are of paramount importance. The LMS system has a flexible and scalable architecture allowing it to be tailored to a number of different applications easily.

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.

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.

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

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 System Configuration

The System is provided with a suite of configuration tools allowing the user to create and configure their own database to reflect their own site configuration.

It is however recommended that any user wishing to configure a complete system attends a recognised training course at an approved support centre.

This manual assumes that the system software has been correctly installed in accordance with the Installation manual and any other release notes and instructions provided by the software manufacturer.

In order to successfully configure a system the following information will be required as a minimum:

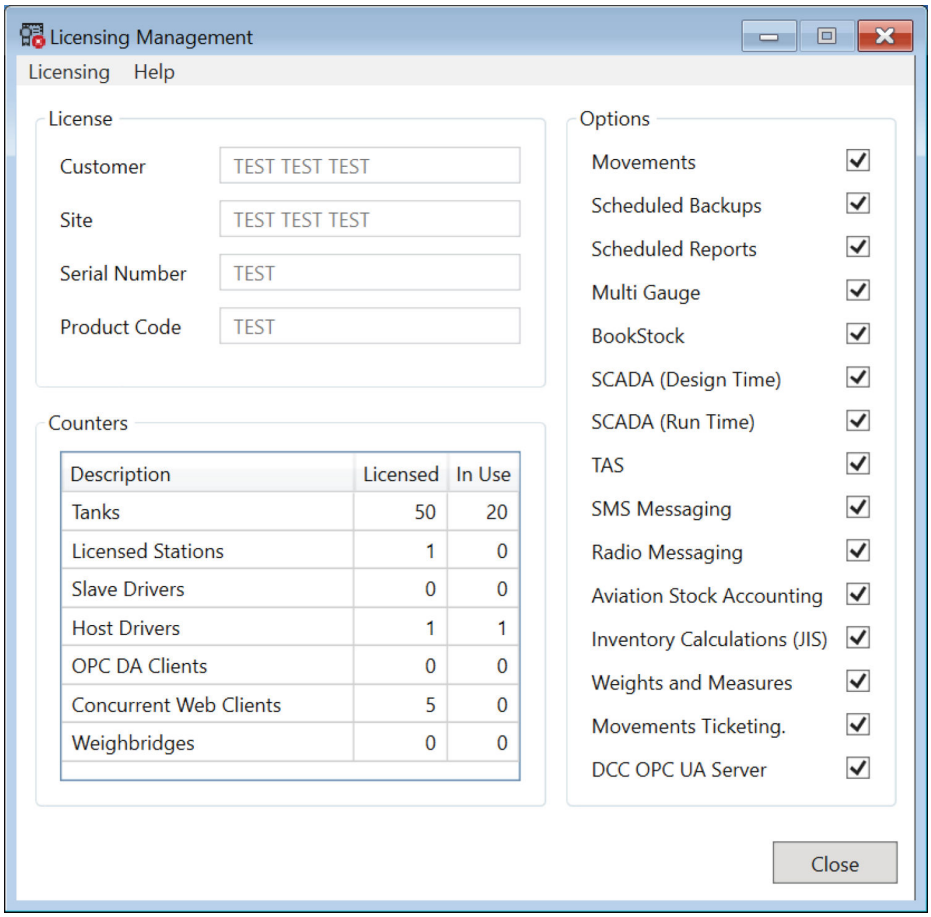
- **Tank details** such as:
  - Tank Identity
  - Tank Shape
  - Tank Operating Parameters
  - Alarm set-points
  - Calibration Table
  - Product Name
- **Gauge details** such as:
  - Gauge Type
  - Gauge Address
  - Data Items supported

5 License Manager

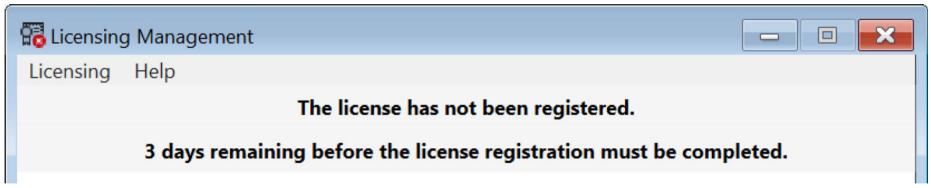
5.1 License Manager

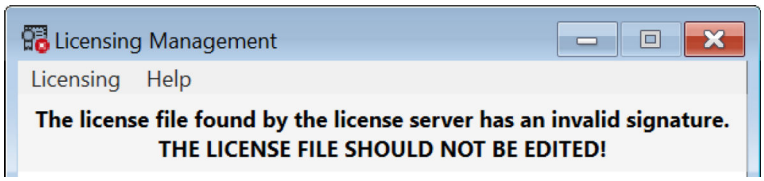
The system is supplied with a License Manager application to allow the user to view details of licensed features and to upgrade the license if required.

- To launch the application select **Help** → **License Manager** from the main menu.
  - The License Manager window is show:



If there is an issue with the license, a message will be displayed at the top of the window, under the menu:



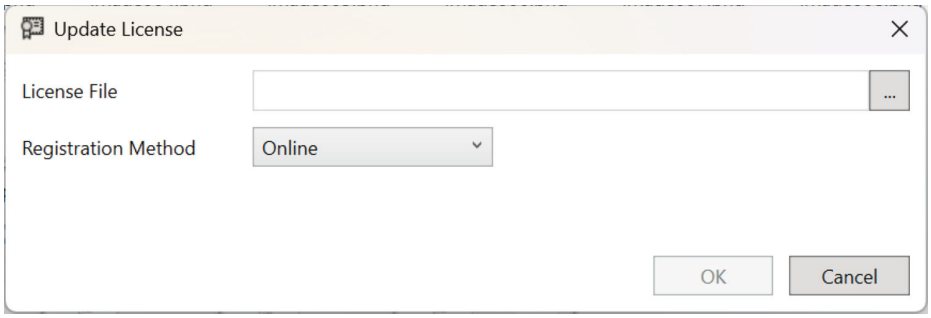


The **License** group shows the basic details for the license.

The **Counters** group shows the licensable features that apply to specific configurable types within the product. It also shows how many of each type can be configured/used and how many are currently in use.

The **Options** group shows the available features for the product. If the feature is currently licensed, there will be a check mark against it.

5.1.1 Upgrade License

1. To upgrade the license, select **Licensing** → **Upgrade License** from the menu.
   ↳ 

2. To select the license file for the product, click on the button to the right of the **License File** box.
   ↳ A standard Windows "Open File" dialog will be shown to allow the license file to be selected.
   The license can be read from a shared network drive, a USB flash drive or a floppy disk.

There are 3 options to register the new license, along with an additional choice to defer registration.

Online

If the machine has a connection to the internet it is possible to update the product registration online.

- Select the **Online** registration method and click the **OK** button.

A message will be displayed indicating if registration was successful or not. If registration fails you will need to contact your supplier.

Create Request File

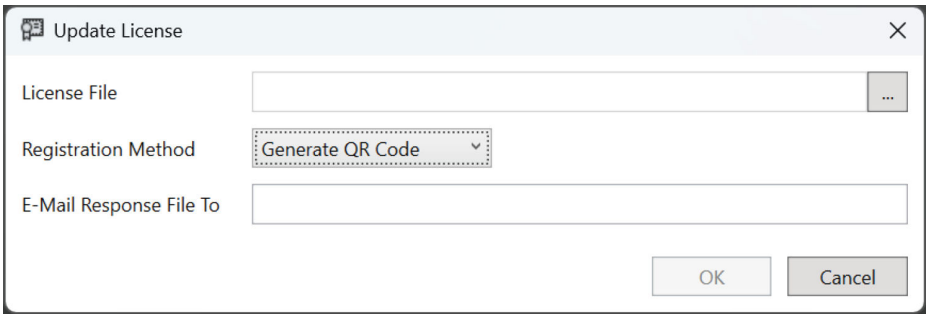
It is also possible to update the product registration offline.

- Select the **Create Request File** registration method and click the **OK** button.

A standard Windows "Save File" dialog will be shown to allow the request file to be saved. The request file needs to be sent to your supplier for them to register your product and they will send you a response file which will need to be applied to your machine using the **Complete License Registration** menu option.

Generate QR Code

If the machine is not connected to the internet, but it is possible to access the internet via a handheld device with a camera (such as a mobile phone), the product registration can be updated using a QR code.

1. Selecting **Generate QR Code** will cause an additional field to be displayed: Enter the email address of the person who is to receive the response file.
   ↳ 

2. Click the **OK** button.
   ↳ Another dialog will be displayed containing a QR code.
3. Scan the QR code using your handheld device and open the link in a browser.
   ↳ This will update the registration for the product and generate a response file which will be sent to the email address that has been entered.
   If the response file is not received, please check your junk mail and quarantine folders.

The response file must be copied to the machine on which the product has been installed and can then be applied using the **Complete License Registration** menu option.

Register Later

- Click the **OK** button and the license will be applied to the product but it will not be registered.

If the license is not registered using the **Licensing Management** facility within **3 days** the product will stop working.

5.1.2 Register License

If a new license has been applied for the product, but has not been registered, then it can be registered by selecting one of the options from the **Licensing** → **Register License** menu.

Online

If the machine has a connection to the internet it is possible to update the product registration online.

- Select the **Online** menu option.

A message will be displayed indicating if registration was successful or not. If registration fails you will need to contact your supplier.

Create Request File

It is also possible to update the product registration offline.

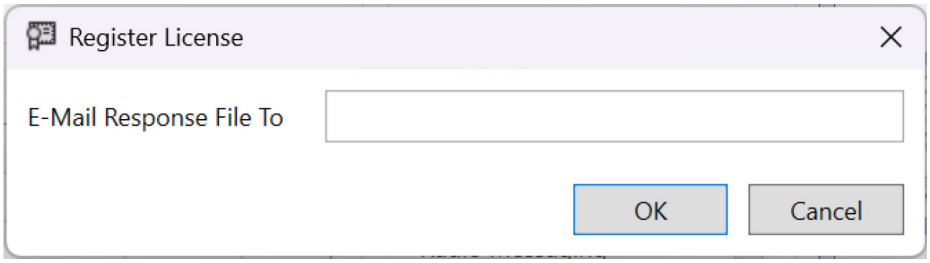
- Select the **Create Request File** menu option.

A standard Windows "Save File" dialog will be shown to allow the request file to be saved. The request file needs to be sent to your supplier for them to register your product and they will send you a response file which will need to be applied to your machine using the **Complete License Registration** menu option.

Generate QR Code

If the machine is not connected to the internet, but it is possible to access the internet via a handheld device with a camera (such as a mobile phone), the license can be registered using a QR code.

1. Selecting the **Generate QR Code** menu option.
   ↳ A new window will be displayed to allow for the entry of an email address:



2. Enter the email address of the person who is to receive the response file.
3. Click the **OK** button.
   ↳ Another dialog will be displayed containing a QR code.
4. Scan the QR code using your handheld device and open the link in a browser.
   ↳ This will update the registration for the product and generate a response file which will be sent to the email address that has been entered.
   If the response file is not received, please check your junk mail and quarantine folders.

The response file must be copied to the machine on which the product has been installed and can then be applied using the **Complete License Registration** menu option.

5.1.3 Complete License Registration

- To complete license registration with a license registration response file, select **Licensing** → **Complete License Registration** from the menu.
  ↳ A standard Windows "Open File" dialog will be shown to allow the license file to be selected.
  The license can be read from a shared network drive, a USB flash drive or a floppy disk.

If the license registration was unsuccessful a message be displayed and you will need to contact your supplier.

6 Tank Capacity Data Configuration

6.1 Tank Capacity Data Configuration Introduction

Tank capacity tables are required to enable the system to calculate inventory data. Each capacity table needs to be either entered manually or imported from a comma separated value (.CSV) format text file.

The accuracy of the volumes calculated by the system is dependent upon the accuracy of the tank capacity points provided.

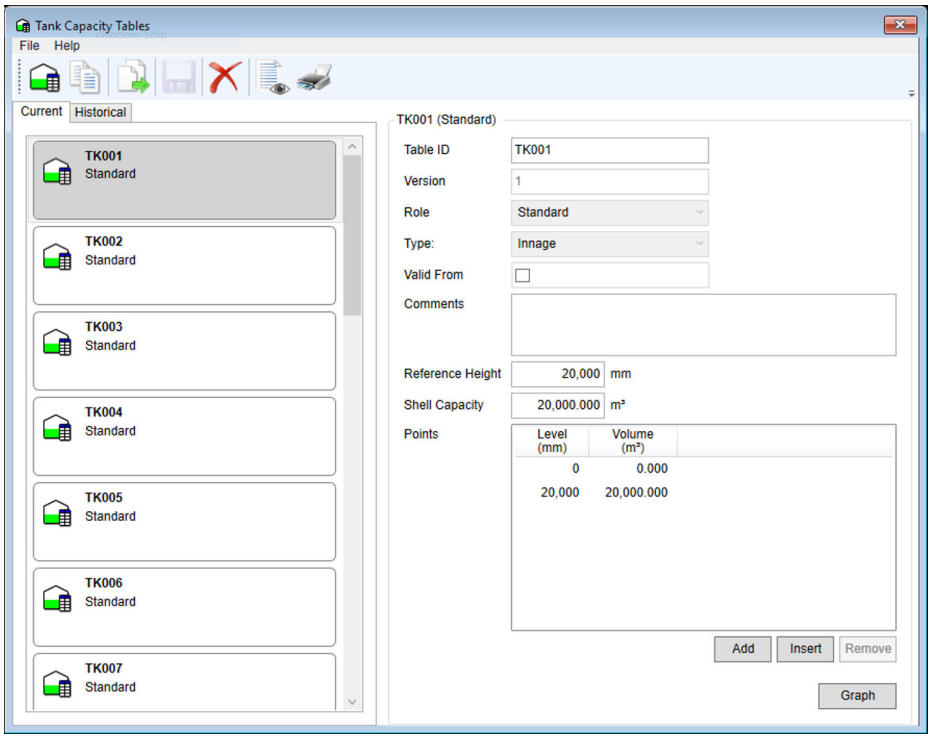
The utmost care must be taken when selecting the capacity points to be used. Where possible the original tank strap points should be entered to get the best accuracy. Access to this feature can be managed by the security system.

It is not necessary to use the same name for the Tank and the tank capacity table but this nomenclature has been used for the demonstration tables for simplicity.

6.2 Loading the Tank Capacity Table Module

To load the Tank Capacity Table Module, proceed as follows:

- Select **Configuration** → **Tank Capacity Tables** from the main menu.
  - The Tank Capacity Table module main window will be loaded as follows:



The list of tables will be populated with all tank capacity tables currently configured

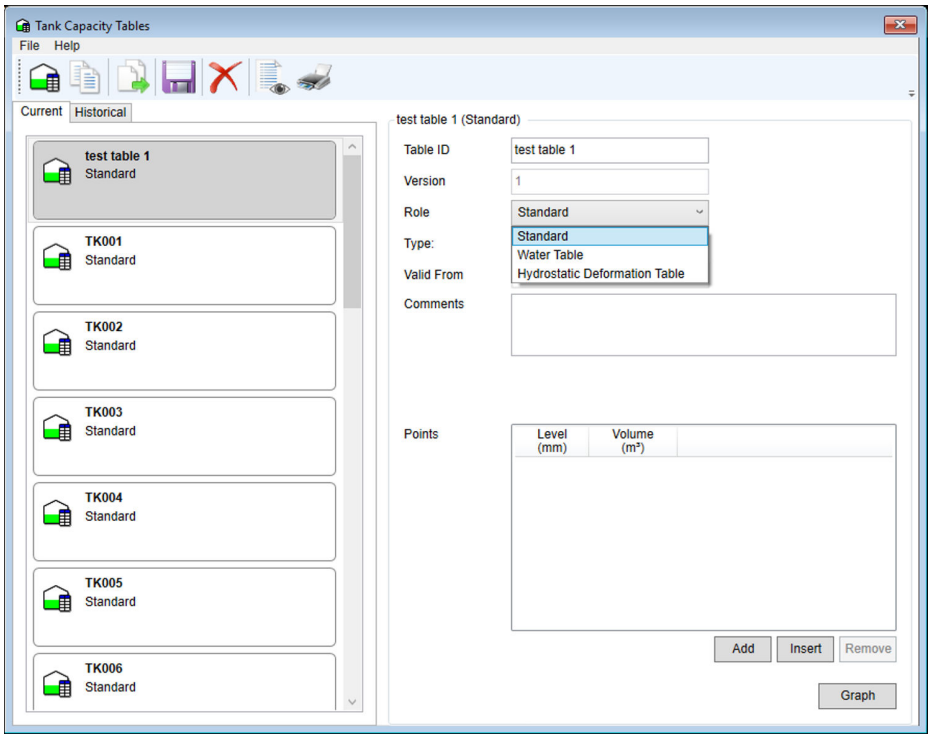
Tank Capacity Tables are assigned to tanks in the **Configuration** → **Configuration** menu option.

- Selecting **File** → **New** from the menu will allow naming and editing of options and data to create a new tank capacity table.
- Selecting **File** → **Import Points** will cause the import points screen to be displayed for import of a CSV file.

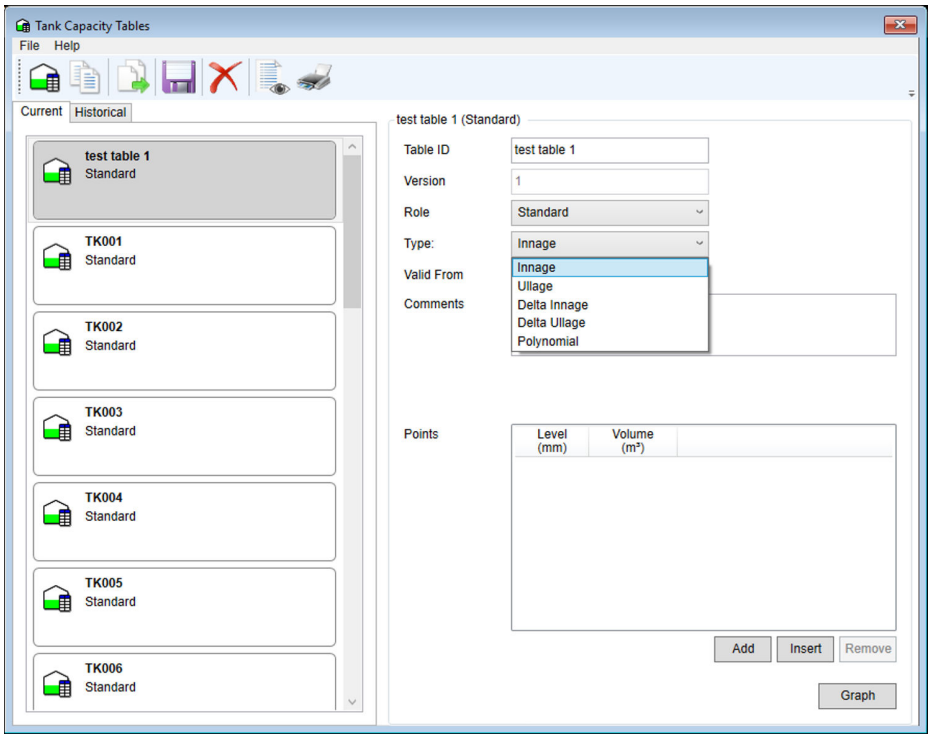
6.3 Adding a new Tank Capacity Table

To add a new tank capacity table, proceed as follows:

1. Select **File** → **New**.
   ↳ The new **Tank Capacity Tables** window opens as follows:



2. In the **Table ID** field enter a name for the new table and select whether the table role is **Standard**, **Water** or **Hydrostatic Deformation**.
   ↳



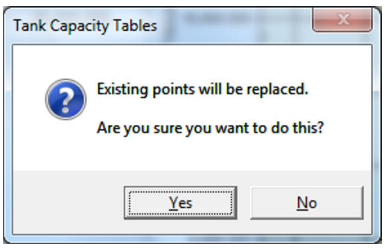
3. Then select **Type**: **Innage**, **Ullage**, **Delta Innage**, **Delta Ullage** or **Polynomial**.
4. Enter a **Valid From** date in the format 01/04/2011 00:00 (invalid format is ignored).

5. Finally enter or import the **Points** (up to 60,000) for the tank and then select **File** → **Save**.

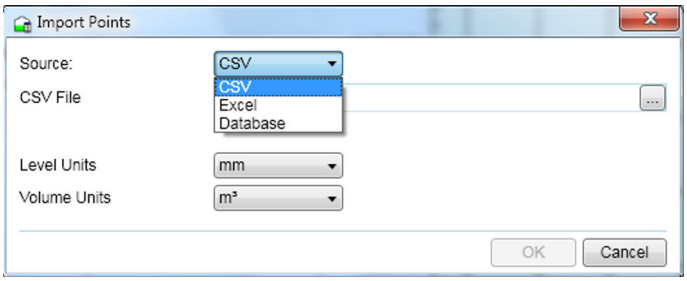
6.4 Importing a Tank Capacity Table

To import a tank capacity table, proceed as follows:

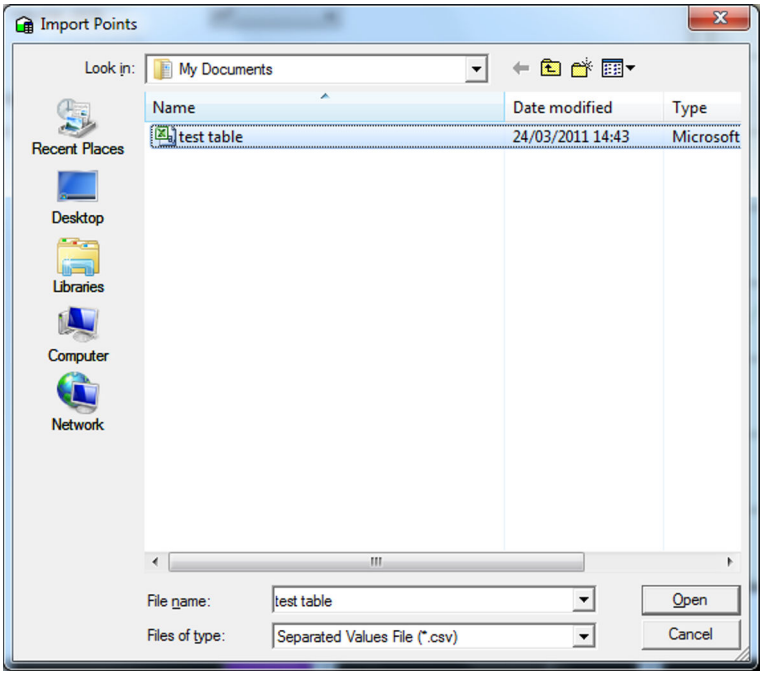
1. Click the **Import Points** icon ( ).
   ↳ A dialog box will appear warning that any existing points will be replaced if you continue.



If you choose to continue you will be prompted to enter a choice of **CSV**, **Excel** or **Database** for the source data and given an option to change the engineering units for level and volume.

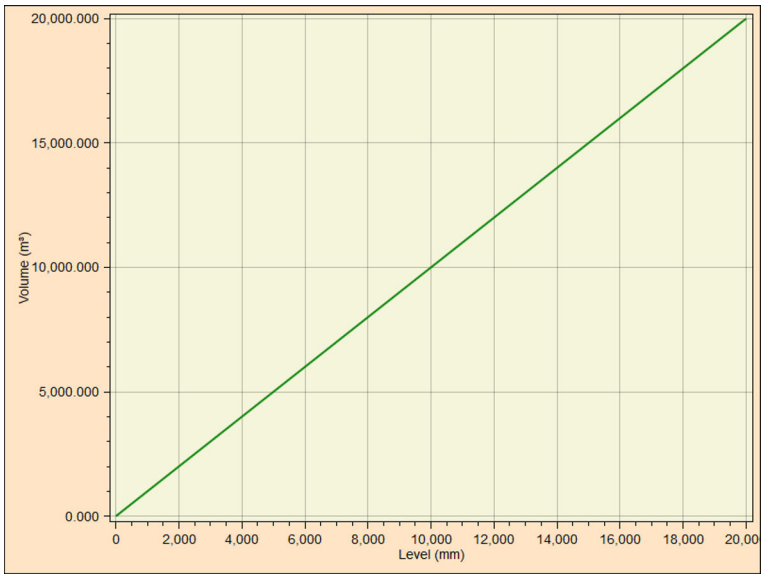


2. Enter the path or browse to the location source data file.
   ↳



3. Select the relevant file and click the **Open** button to import the calibration data into the database.

Any problems encountered while processing the data will be reported to the user. You will notice in the screenshots above a button labelled **Graph**. This opens a simple chart plot showing the characteristic of the calibration data. This is a useful aid to spot any erroneous data.



The plotted characteristic should be almost linear for vertical cylindrical tanks. For spherical and horizontal cylindrical tanks the plotted chart should exhibit a non-linear characteristic.

6.5 Viewing Existing Tables

1. Select **Configuration** → **Tank Capacity Tables** from the main menu.
   ↳ The Tank Capacity Module will be loaded.
2. Select a Capacity Table to view the points and data.

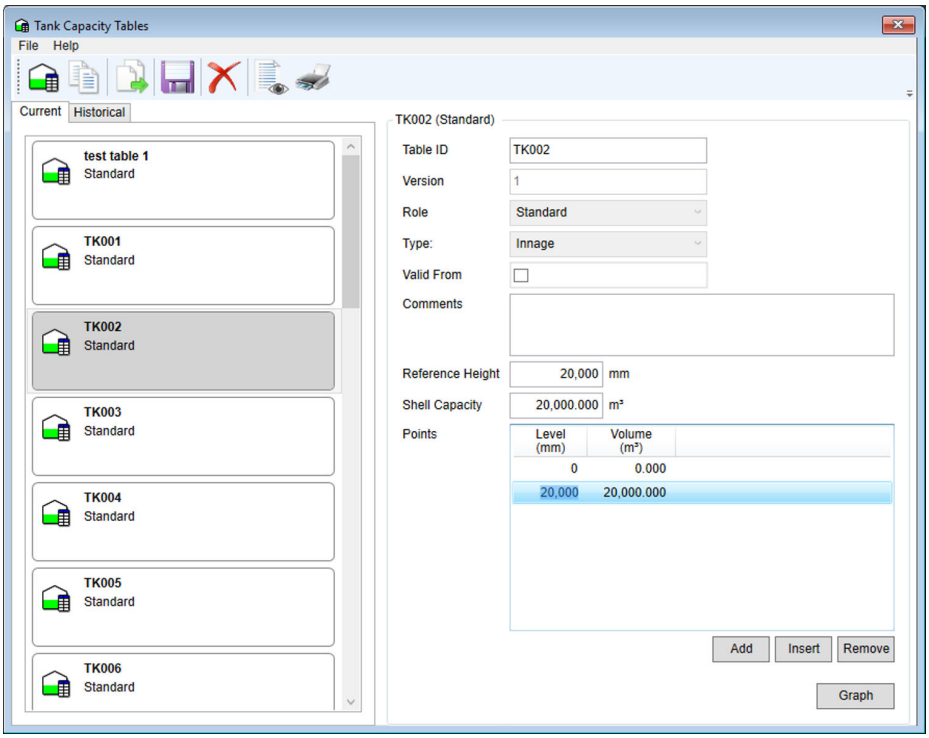
Tables which have been superseded by use of the **Valid From** field can be seen in the history tab.

6.6 Editing Values in an Existing Table

To edit values in an existing capacity table, proceed as follows:

1. Select the table to be edited from the list.
   ↳ If you have the necessary security access rights you will be able to edit the table of values.

2. Type in the new value and move off the row to save the changes locally to the table.



3. To save the changes to the database click the icon on the toolbar.

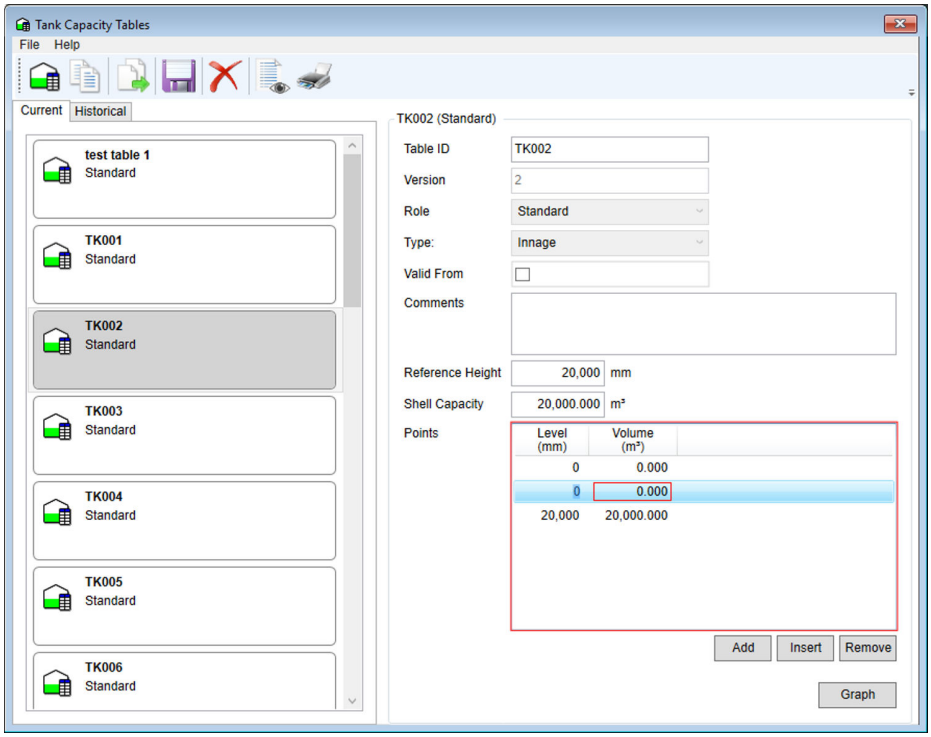
If the application is closed prior to saving the changes you will be prompted to save the changes.

6.7 Inserting an Extra Row

To insert an extra row, proceed as follows:

1. Select the row at which a record needs to be inserted by clicking with the left mouse button on the left hand side of the row.

2. Select the **Insert** option.
   ↳ A new row will be inserted.



3. Enter the data for the new row.
4. To save the changes to the database click the icon on the toolbar.

If the application is closed prior to saving the changes you will be prompted to save the changes.

6.8 Adding an Extra Row

Adding using the **Add** button is much the same as inserting but appends a row to the end.

6.9 Deleting Rows

To delete a row, proceed as follows:

1. Select the row which needs to be deleted by clicking with the left mouse button on the left hand side of the row.
2. Select the **Remove** option.
   ↳ The row will be deleted.
3. To save the changes to the database click the icon on the toolbar.

If the application is closed prior to saving the changes you will be prompted to save the changes.

6.10 Validity of Data

The user is not allowed to enter points in the wrong order, all levels and volumes must be larger than the previous one. The border around the data entry points will remain red until entered data is valid.

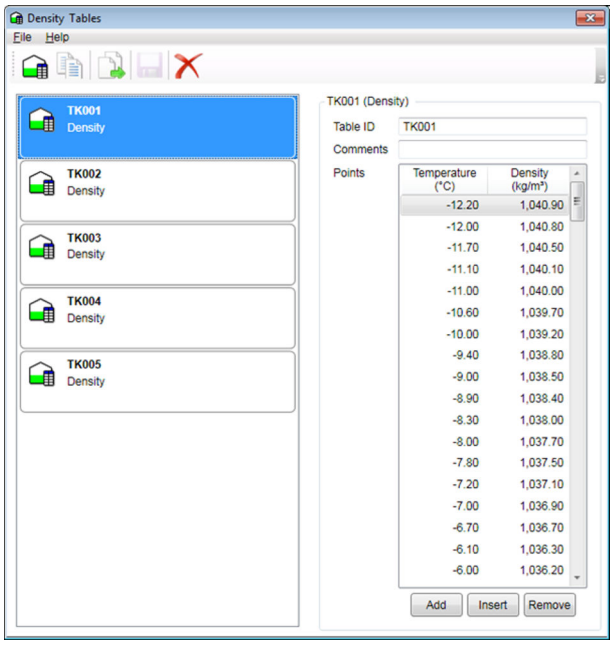
7 Density Table Configuration

7.1 Density Table Configuration Introduction

Density tables are required if the user has selected **Density Table** as a volume correction method. The utmost care must be taken when selecting the density points to be used to get the best accuracy. The use of this feature can be controlled by the security system.

7.2 Loading the Density Table Module

- Select **Configuration** → **Density Tables** from the main menu.
  - ↳ The Density Table module main window will be loaded as follows:



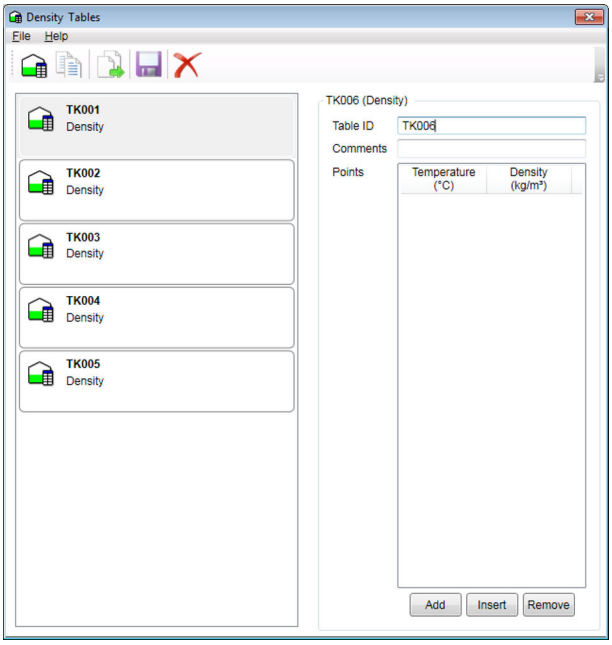
The list of tables will be populated with all density tables currently configured.

Density tables are assigned to tanks in the **Configuration** → **Configuration** menu option.

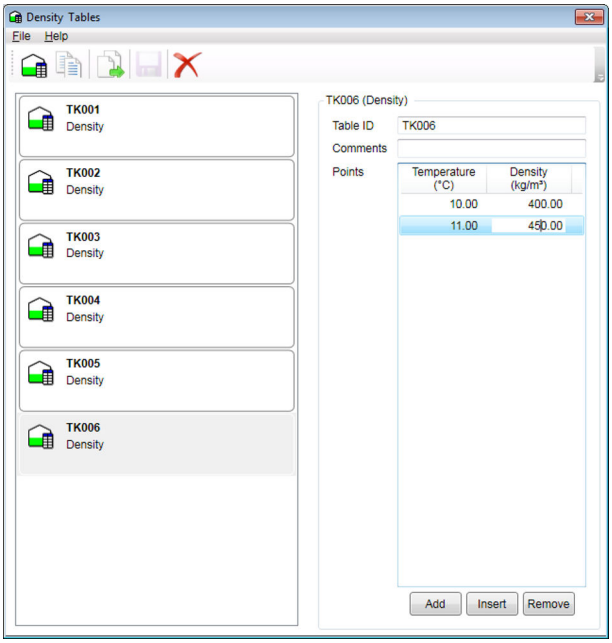
- Selecting **File** → **New** from the menu will allow naming and editing of options and data to create a new density table.
- Selecting **File** → **Import Points** will cause the import points screen to be displayed for import of a CSV file.

7.3 Adding a Density Table

1. Select **File** → **New**.
   ↳ The new **Density Tables** window opens as follows:



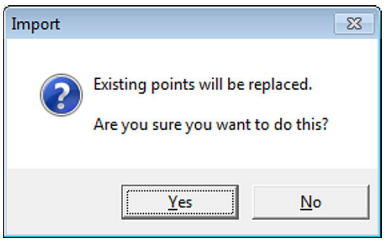
2. In the **Table ID** field enter a name for the new table.
   ↳



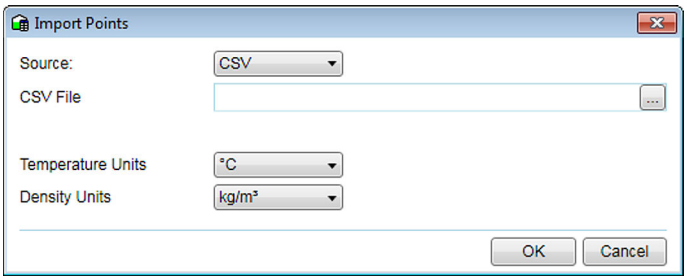
3. Finally enter or import the **Points** (up to 200) for the tank and then click **File** → **Save**.

7.4 Importing a Density Table

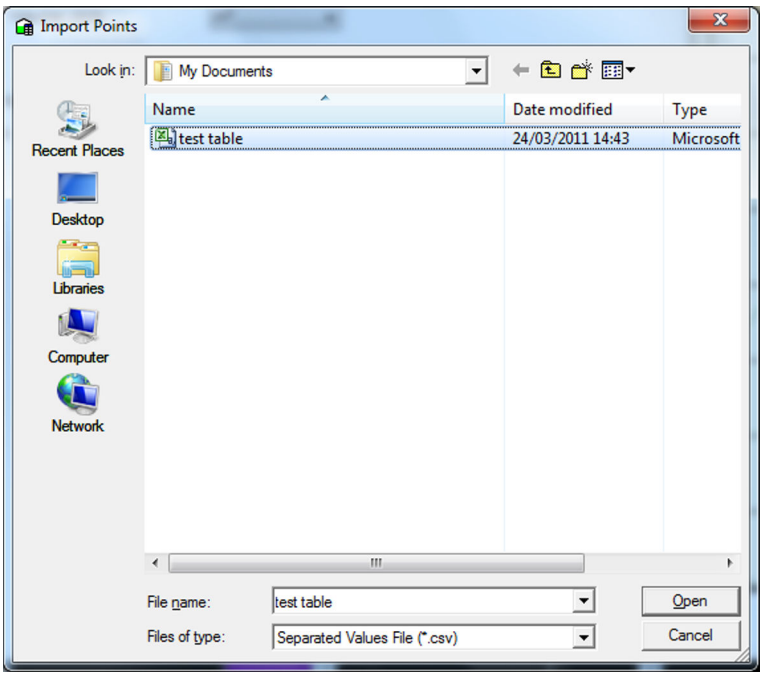
1. Select **Table** → **Import**.
   ↳ A dialog box will appear warning that any existing points will be replaced if you continue.



If you choose to continue, you will be prompted to choose the CSV file containing the source data and given an option to change the engineering units for level and volume.



Enter or browse for the source data file details.

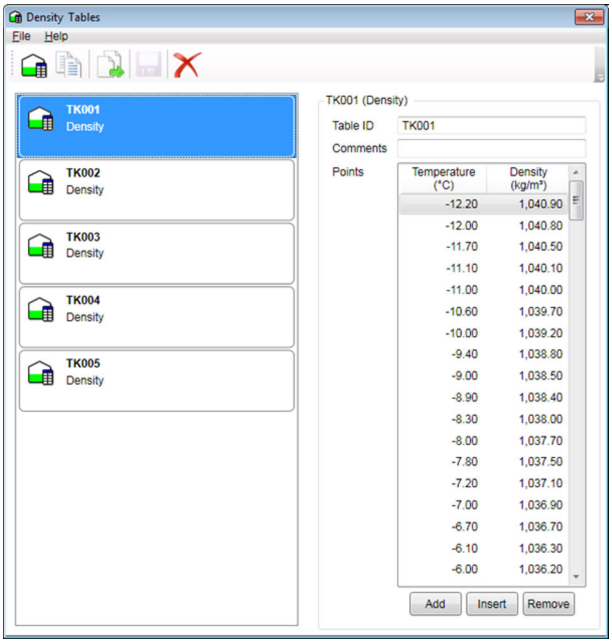


2. Select the relevant file and click the **Open** button to import the calibration data into the database.

Any problems encountered whilst processing the data will be reported to the user.

7.5 Viewing Existing Tables

1. Select **Configuration** → **Density Tables** from the main menu.
   ↳ The Density Table Module will be loaded as follows:



2. Select a Density Table to view the points and data.

7.6 Editing Values in an Existing Table

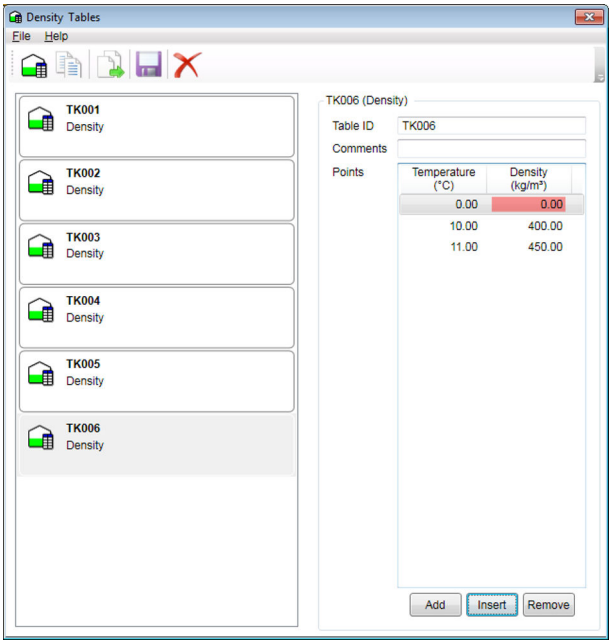
1. Select the table to be edited from the list.
   ↳ If you have the necessary security access rights you will be able to edit the table of values.
2. Type in the new value and move off the row to save the changes locally to the table.
   ↳ The row will be updated.
3. To save the changes to the database click the icon on the toolbar.

If the application is closed prior to saving the changes you will be prompted to save the changes.

7.7 Inserting an Extra Row

1. Select the row at which a record needs to be inserted by clicking with the left mouse button on the left hand side of the row.

2. Select the **Insert** option.
   ↳ A new row will be inserted.



3. Enter the data for the new row.
4. To save the changes to the database click the icon on the toolbar.

If the application is closed prior to saving the changes you will be prompted to save the changes.

Adding is much the same as inserting but appends a row to the end of the list of points.

7.8 Deleting Rows

1. Select the row which needs to be deleted by clicking with the left mouse button on the left hand side of the row.
2. Select the **Remove** option.
   ↳ The row will be deleted.
3. To save the changes to the database click the icon on the toolbar.

If the application is closed prior to saving the changes you will be prompted to save the changes.

7.9 Validity of Data

The user is not allowed to enter points that are out of the temperature or density range. The border around the data entry points will remain red until entered data is valid.

8 Configuration Tool

The configuration tool allows entry and editing of the main tank, device and inventory operating parameters.

It is essential that all applicable parts of this configuration are configured correctly and accurately. Failure to do so may result in loss of field communications and/or inaccurate inventory calculations.

The configuration tool can be notionally divided into several sections:

- 1. DCC Configuration
  - DCC Host Settings
  - Port Settings
- 2. Tank Configuration
  Sites
  - ▸ Tanks
    - – Tank Properties
    - – Tank Capacity Table assignments
    - – Tank Metrics
    - – Hybrid Settings
    - – Device Mappings
    - – Alternate Live Data Sources
    - – Product Characteristics
    - – Tank Inventory Control Settings

Within the configuration tool some data items are dependent on other settings. Indeed some fields are not visible or enabled until they are called for by the setting of another parameter. These are briefly listed below.

The use of this feature can be controlled by the security system.

8.1 Inter-relation of configuration items

Some settings are specific to certain calculation methods, these are listed below.

8.1.1 Product Characteristics screen

Details Section

- **JIS Calculation Method** is only enabled when a JIS Volume Correction Method and a floating roof tank shape are selected.
- Selecting **GBT** or **GBT(Direct_Weight)** implies that a Hydrostatic deformation Table is in use. Not applying such a table will result in the failure of calculated values.

VCF Settings Section

- Enraf polynomial constants A and B require the EnrafChem2Poly or EnrafChemPoly1 volume correction method. Constants C, D and E are only available when EnrafChemPoly1 is selected.
- The label **Chemical Concentration** changes to **Alcohol strength by volume** or **Alcohol strength by mass** depending on the type of chemical calculation selected and should always be entered as a percentage.

Type of calculation	Label
HMD, Nitric	Chemical Concentration
OIML R22 STRxVOL	Alcohol strength by volume
JIS K2250 STRxVOL	Alcohol strength by volume
OIML R22 STRxMASS	Alcohol strength by mass

- Product Reference Temperature can only be changed if the selected volume correction method does not specify a fixed reference temperature to be used.
- Temperature Correction Factor and Density Correction Factor can only be specified if the corresponding volume correction methods of **TCF** or **DCF** (respectively) are selected.

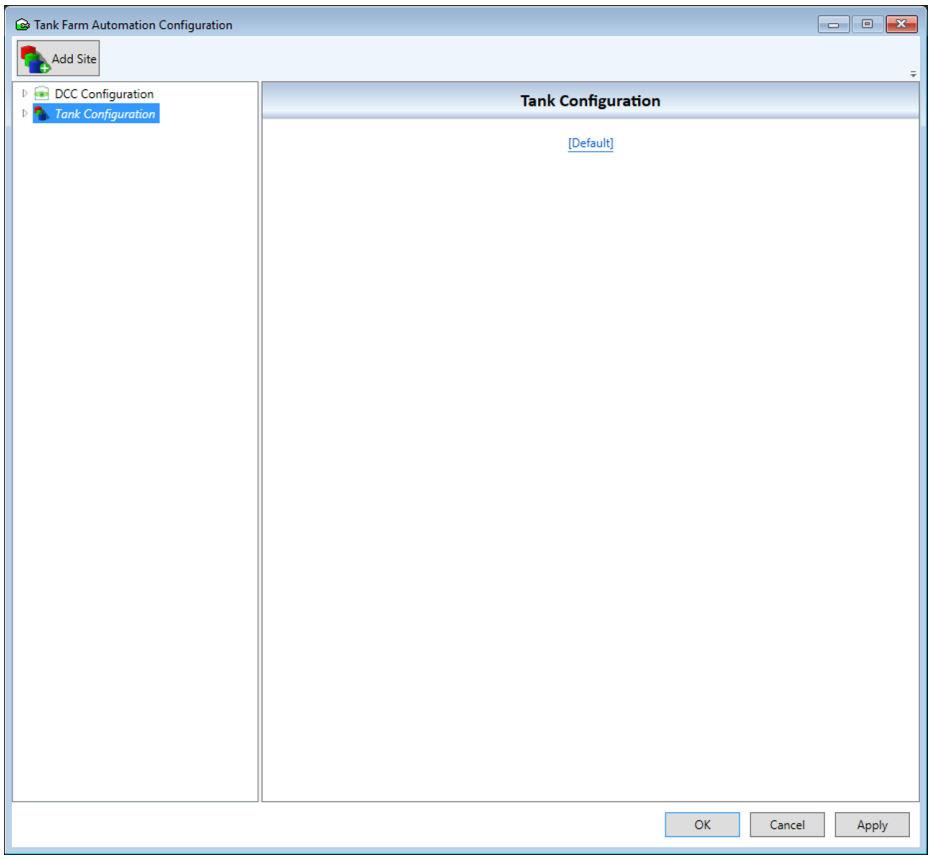
All Sections
It is possible to allocate certain characteristics to products using the Product Configuration tool (see chapter "Product Configuration"). If such a product is selected in the Details Section then the characteristics of that product will override and disable the corresponding settings in this configuration tool. This is made clear to the user and will be demonstrated later in this manual.

8.1.2 Tank Metrics screen

Floating roof settings are only enabled if the tank shape is set as **Vertical Cylinder (Floating Roof)**.

8.2 Launching the Configuration Tool

▶ Select the **Configuration** → **Configuration** option from the main menu.
↳ The initial display is shown below.



Each part of the configuration tool will be dealt with below in the order shown above.

8.3 DCC Configuration

8.3.1 DCC Host Settings

Please refer to the DCC Configuration manual BA00391G.

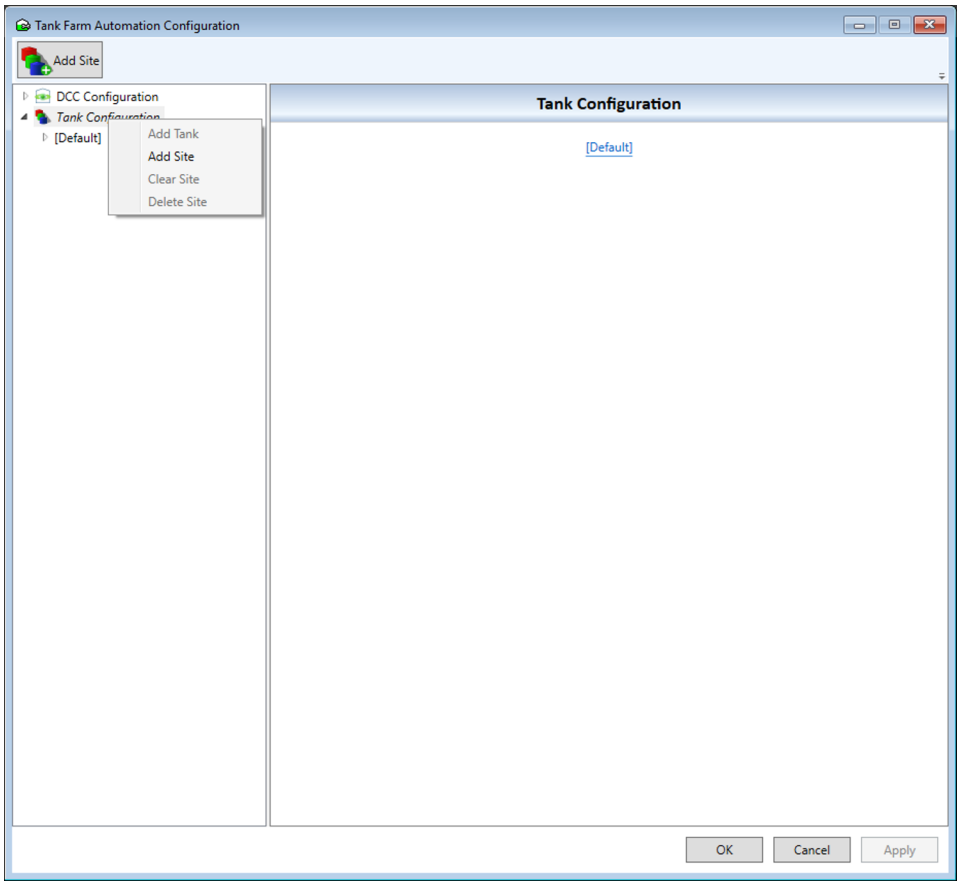
8.4 Tank Configuration

8.4.1 Sites

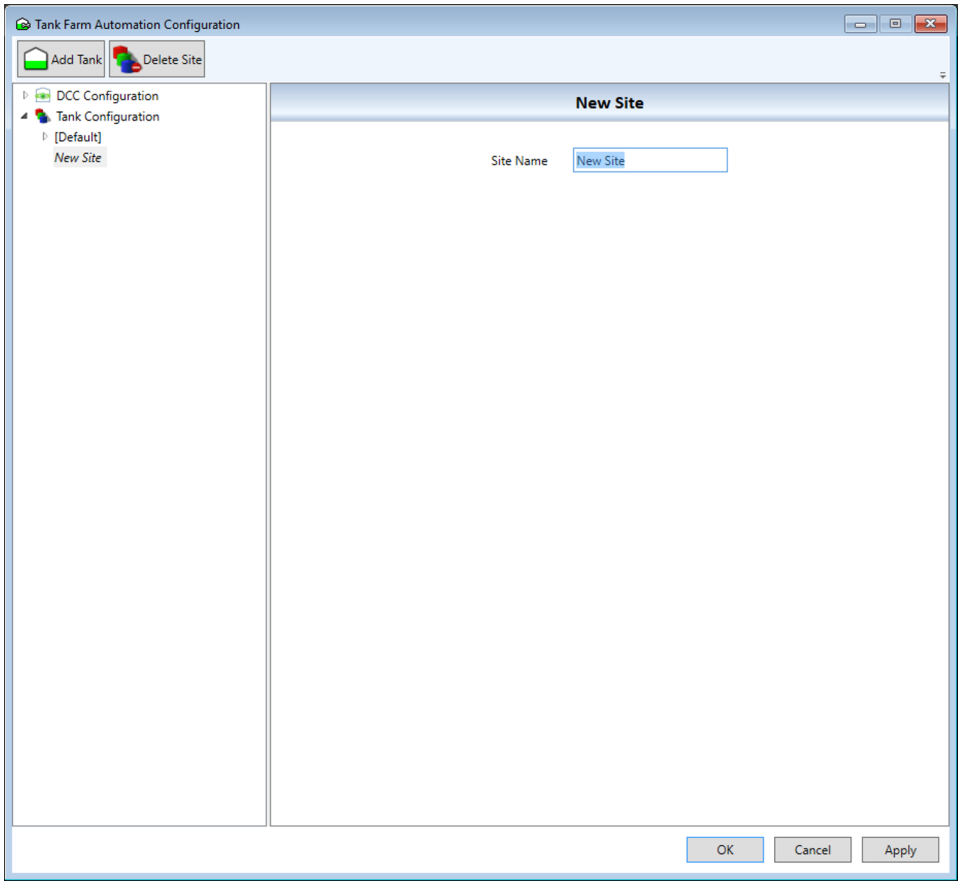
In Tankvision Professional/LMS tanks are always associated with a site which may be a user defined site or the system provided **Default** site.

Adding a site

New sites can be added either by right-clicking on the **Tank Configuration** tree item or by selecting the **Tank Configuration** tree item and clicking the **Add Site** toolbar button (see below).



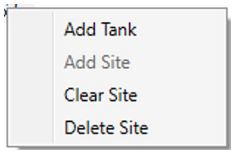
Once added the site name should be changed to reflect the users' preference (see below).



Maintaining a site

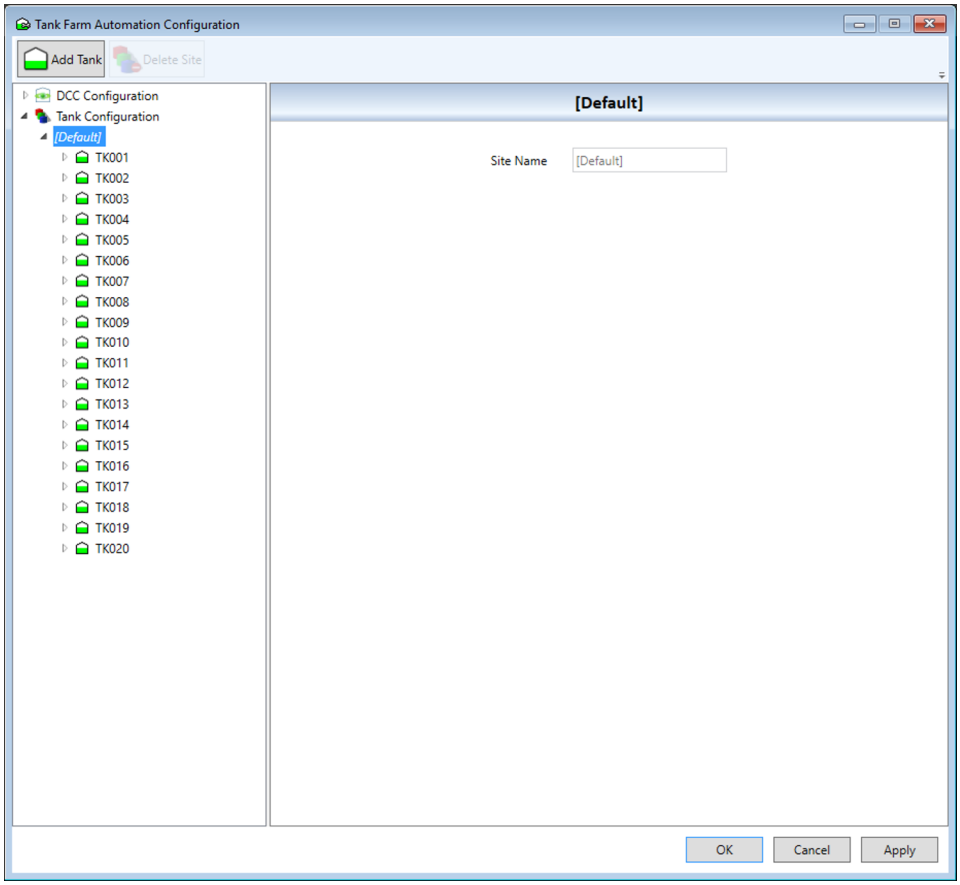
There are a number of options available to maintain a site.

- **Add Tank**
  Add a new tank to an existing site.
  Either select the desired site and click the **Add Tank** toolbar option or right-click the desired site and select **Add Tank**.
- **Clear Site**
  Clear the site of all tanks.
  Right-click the desired site and select **Clear Site**.
- **Delete Site**
  Delete the site completely.
  Either select the desired site and click the **Delete Site** toolbar option or right-click the desired site and select **Delete Site**. The user will be presented with a warning before the site is actually deleted.



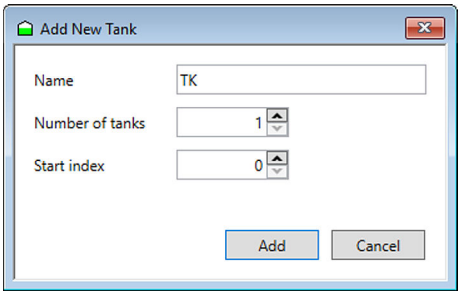
8.4.2 Tanks

Expanding a site under the **Tank Configuration** section will display all currently configured tanks attached to that site.



Adding a Tank

- To add a new tank to the tree view, right-click on the site you wish to add the tank to, then click **Add Tank**.
  - The dialog box below will be displayed:



Name

A template which the application uses to add multiple tanks at once. When adding multiple tanks, the tank prefix follows a specific syntax; any text characters in the field will be added to the prefix of the tank name. Any 0's indicate the trailing zeros after the prefix. E.g. if the tank prefix was 'TK000' and 10 tanks were added, they would be given the following names:

- TK001
- TK002
- TK003
- TK004
- TK005
- TK006
- TK007

- TK008
- TK009
- TK010

Number of tanks
The number of tanks that will be added. A maximum of 100 tanks can be added at once, and 5000 tanks can be added in total.

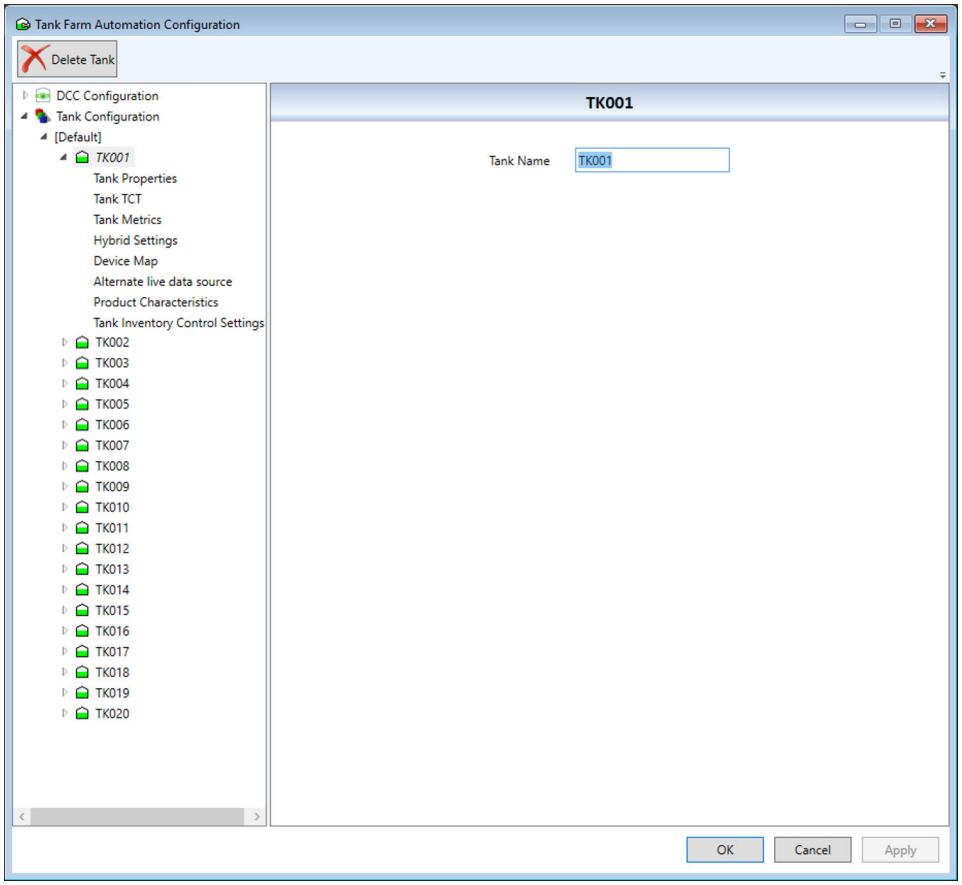
Start index
The number at which the new added tanks will start at. E.g. if the tank start count was 10 and 5 new tanks were added, the new tanks would start at 10 and count up 5 to 14.

Removing a tank

A tank can be removed by selecting the desired tank and clicking the **Delete Tank** toolbar button or by right-clicking the desired tank and selecting **Delete Tank** from the pop-up menu.

Configuring a tank

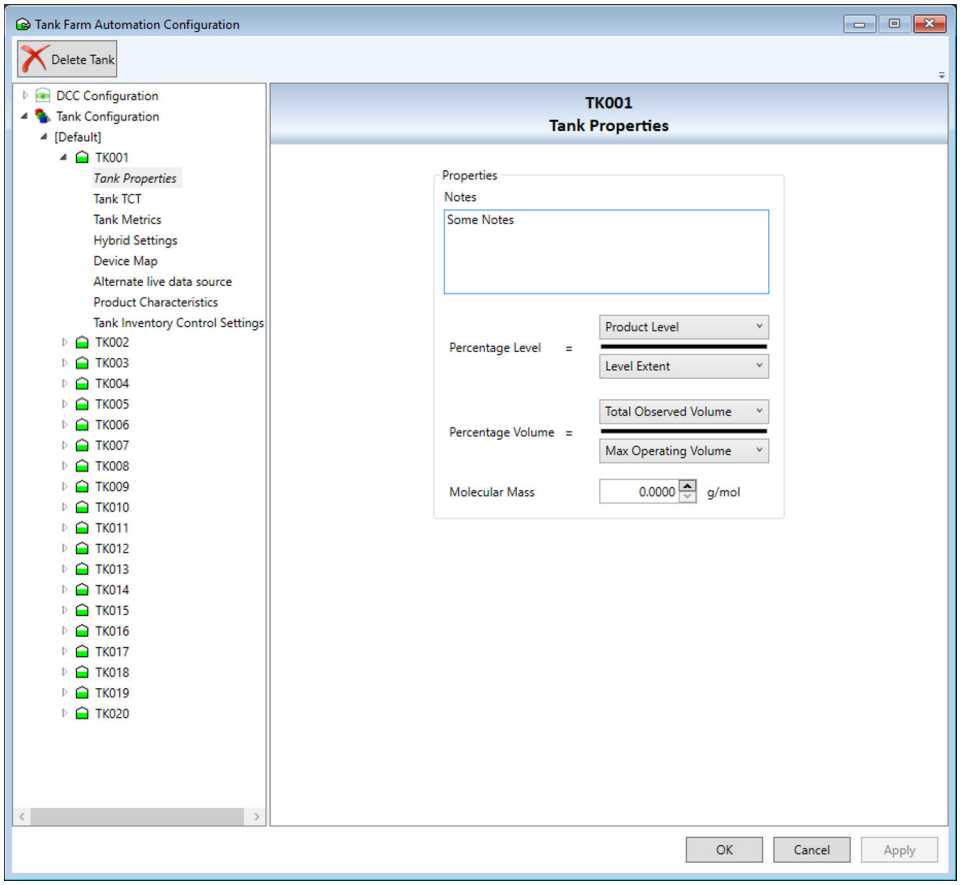
Clicking on a tank expands the various configurable properties for that tank (see below).



In the initial screen the tank name can be edited. Clicking on any item below the tank opens the corresponding configuration section.

Tank Properties

Configure various generic properties of the tank.



Notes

Allows the user to record notes in relation to the tank. A time-stamp is recorded whenever the notes are edited.

Percentage Level

Determines which data parameters are used to produce the percentage level data value. For the settings shown in the screenshot above:
*Percentage Level = (Product Level / Level Extent) * 100*

Percentage Volume

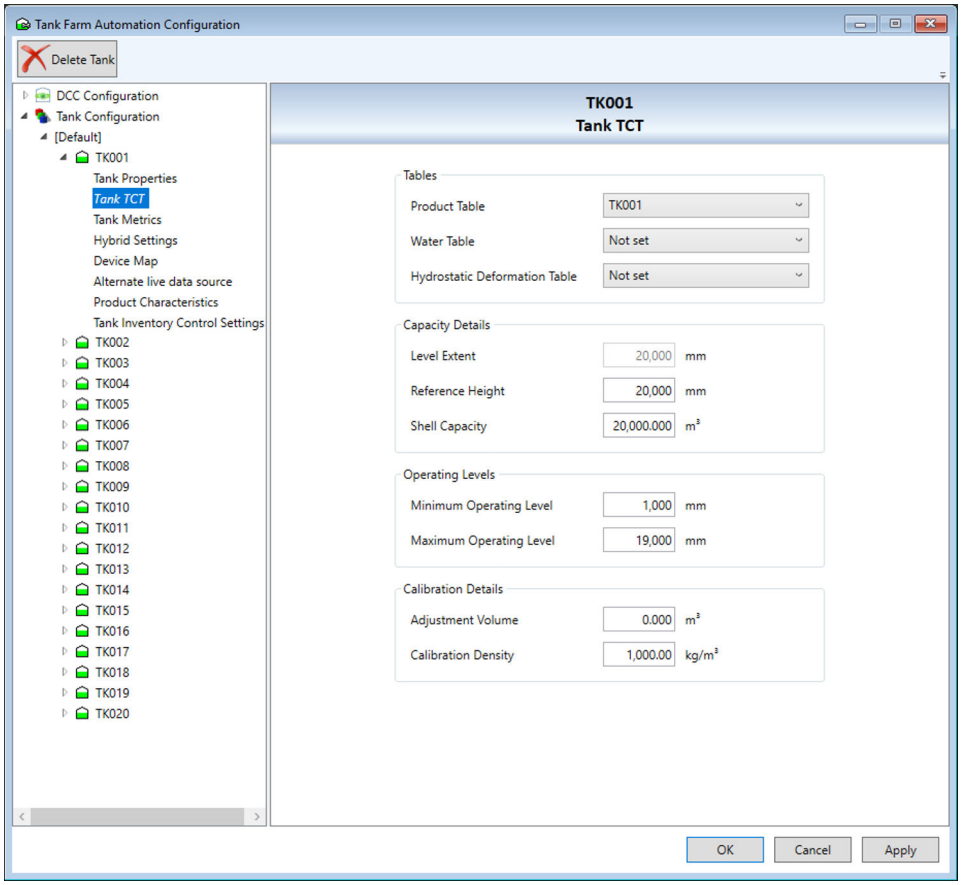
Determines which data parameters are used to produce the percentage volume data value. For the settings shown in the screenshot above:
*Percentage Volume = (Total Observed Volume / Maximum Operating Volume) * 100*

Molecular Mass

The molecular mass of product in the tank.

Tank TCT

Configure properties related to tank capacity tables.



Tables

- **Product Table**
  Selects the product tank capacity table to apply to this tank.
- **Water Table**
  Selects the water tank capacity table to apply to this tank.
- **Hydrostatic Deformation Table**
  Selects the hydrostatic deformation table to be used with this tank.

Capacity Details

- **Level Extent**
  This field is not editable. It displays the highest level value in the currently selected product tank capacity table for reference only.
- **Reference Height**
  The reference height for this tank.
- **Shell Capacity**
  The capacity of the entire tank shell.

Operating Levels

- **Minimum Operating Level**
  The defined minimum operating level of the tank. The accuracy of this value is important as it used to determine the minimum operating volume and consequently the amount of Usable Volume in the Tank.
- **Maximum Operating Level**
  The defined maximum operating level of the tank. The accuracy of this value is important as it used to determine the maximum operating volume and consequently the amount of Ullage Volume (Available Room) in the Tank.

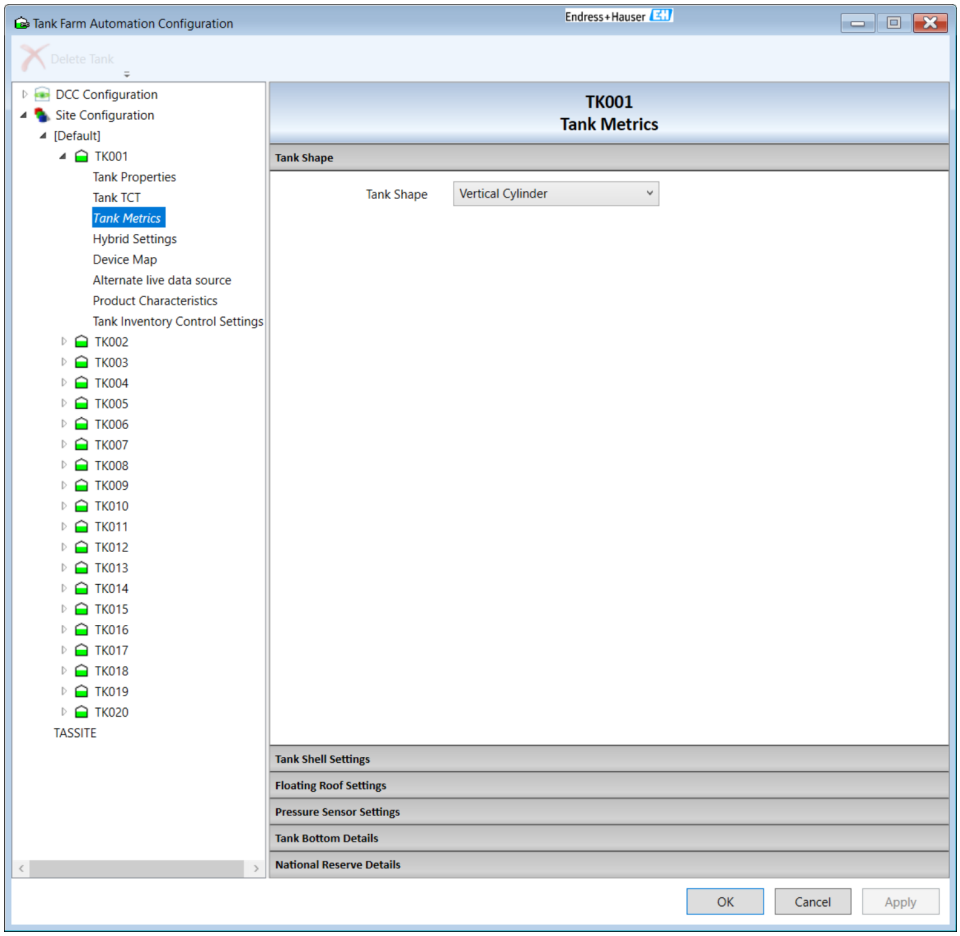
Calibration Details

- **Adjustment Volume**
  A fixed volumetric adjustment (either positive or negative) applied to the volume obtained from the Tank Capacity table. This accounts for any manifold or pipeline volume to be added or any deadwood to be removed.
- **Calibration Density**
  The density of the medium in a tank when that tank was calibrated. This setting is only relevant in JIS based calculations.

Tank Metrics

Configure settings regarding the physical properties of the tank itself.

Tank Shape

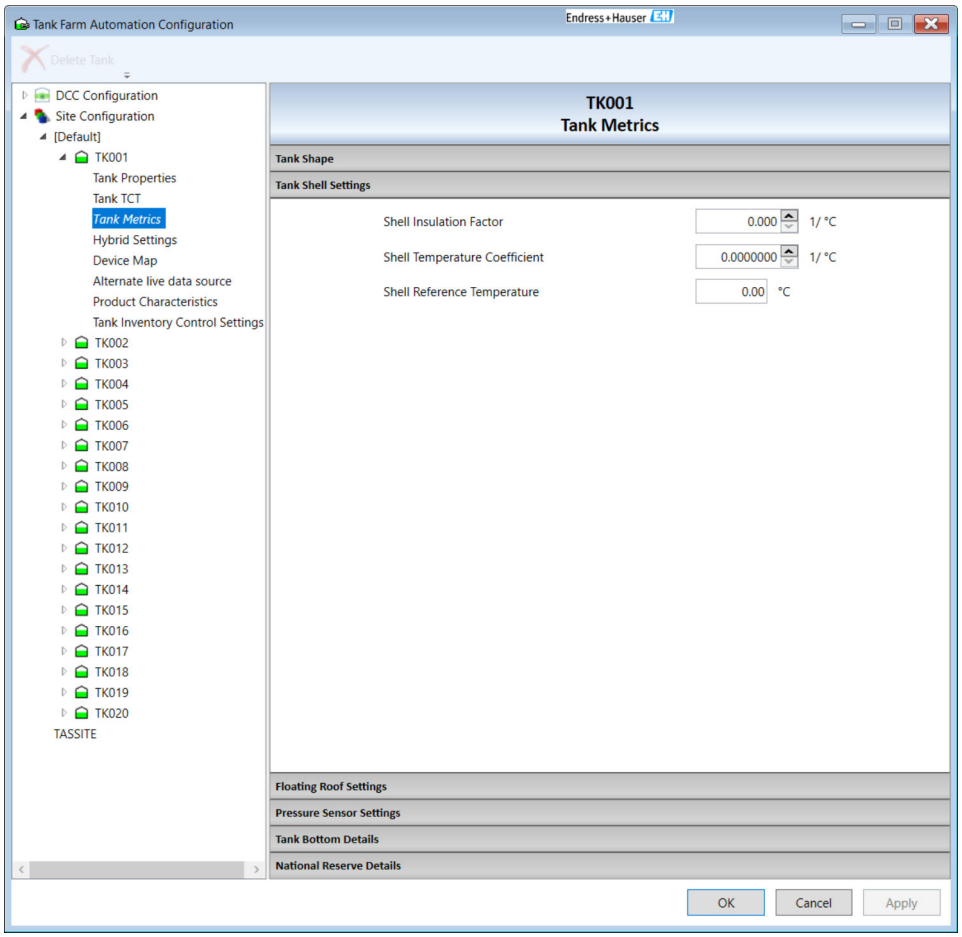


The physical shape of the tank. 4 principle tank shapes are supported:
- Vertical Cylinder
- Horizontal Cylinder
- Vertical Cylinder (Floating Roof)
- Sphere

There are other similar tank shapes; however, most should fall into one of the above types. Vertical Cylinders that have internal floating blankets/decks should be configured as Vertical Cylinder (Floating Roof).

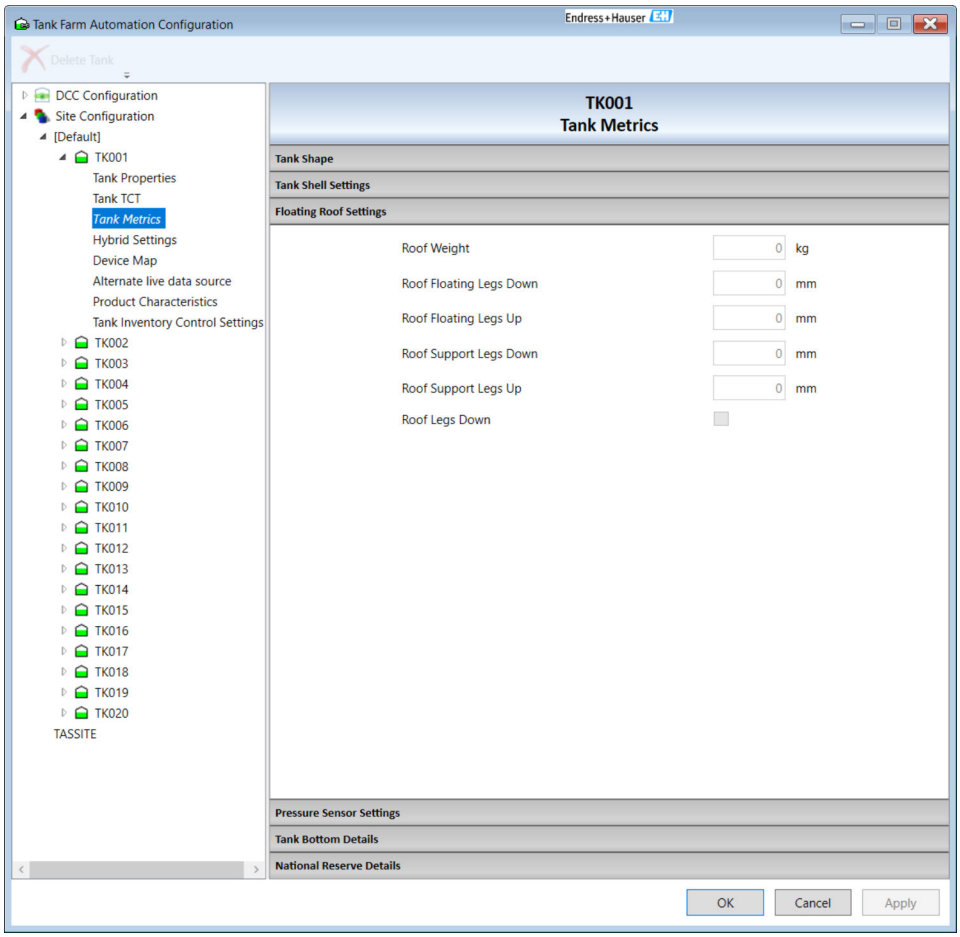
It is essential that the tank shape is entered correctly as this affects the inventory calculation algorithms.

Tank Shell Settings



- **Shell Insulation Factor**
  For completely insulated storage. 0.875 is a typical value (0 for non-insulated storage).
- **Shell Temperature Coefficient**
  Expansion coefficient of the material the tank is constructed from. e.g. 0.0000112 for mild steel.
- **Shell Reference Temperature**
  Normally the same reference temperature used for your VCF calculations (usually either 15 °C or 30 °C).

Floating Roof Settings



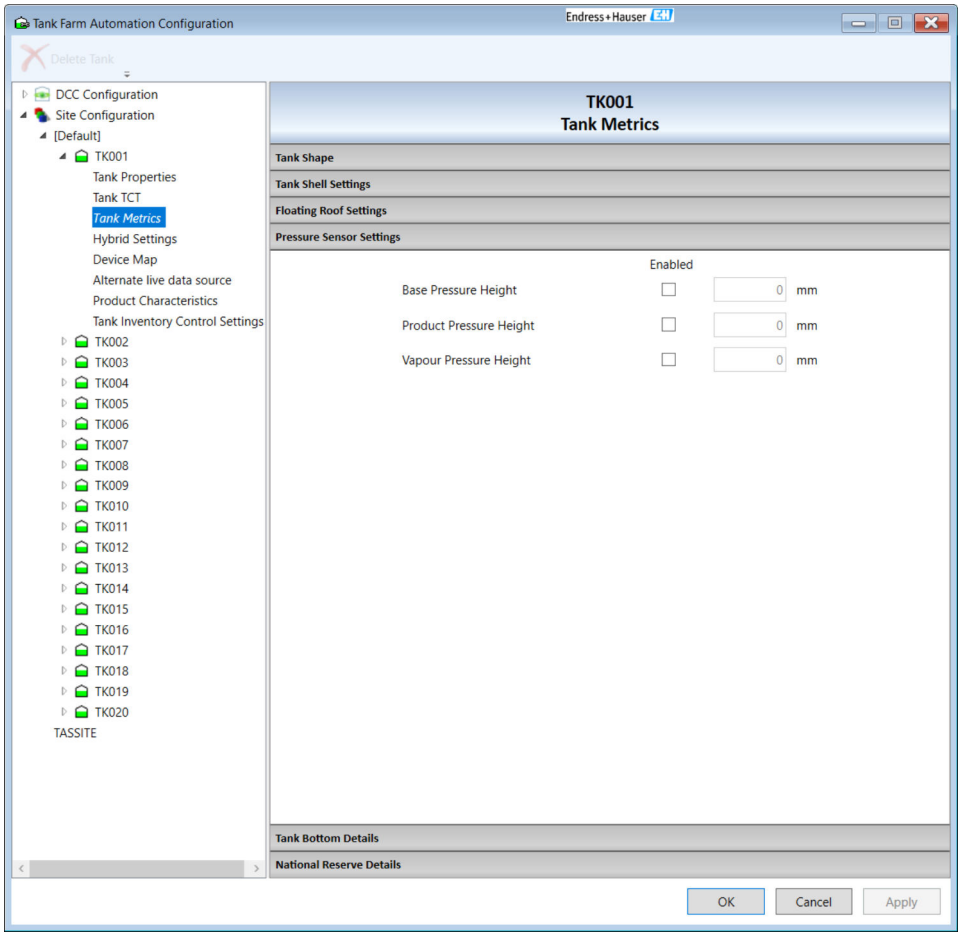
Some floating roofs have legs which may be set at 2 positions, thus altering the level at which the roof floats or is supported on the legs. Since the legs are usually attached to the floating roof, the "up" position of the legs allows the roof to descend to a lower level in the tank, and is the setting used in normal operation, whereas the "down" position causes the roof to become supported on its legs at a higher level and is the setting used for maintenance purposes. Where a tank has a floating roof with fixed or one - position legs, it is advisable to set the "Legs Up" and "Legs Down" levels to be the same, so that the Legs "Up/Down" selection becomes irrelevant.

- **Roof Weight**
  The weight of the floating roof.
- **Roof Floating Legs Down**
  The point at which the roof just ceases to be resting on its legs when the legs are in the "down" or maintenance position, such that the whole weight of the roof is being supported by its buoyancy in the product. Above this level, compensation is made for the displacement of the product by the full weight of the roof.
- **Roof Floating Legs Up**
  The point at which the roof just ceases to be resting on its legs when the legs are in the "up" or operational position, such that the whole weight of the roof is being supported by its buoyancy in the product. Above this level, compensation is made for the displacement of the product by the full weight of the roof.

- **Roof Support Legs Down**
  The point at which the roof legs are supporting the full weight of the roof when the legs are in the "down" or maintenance position. Below this level, no compensation is made for product displacement caused by roof weight.
- **Roof Support Legs Up**
  The point at which the roof legs are supporting the full weight of the roof when the legs are in the "up" or operational position. Below this level, no compensation is made for product displacement caused by roof weight.
- **Roof Legs Down**
  Indicates that the legs are in the up or down position.

The area between the Fully Supported and Fully Floating levels is generally referred to as the roof transition zone. Between these levels it is difficult to determine the proportion of the roof's weight which is being held by the legs and therefore difficult to calculate the displacement of product by the roof. For this reason this region of the tank is normally avoided during normal operation.

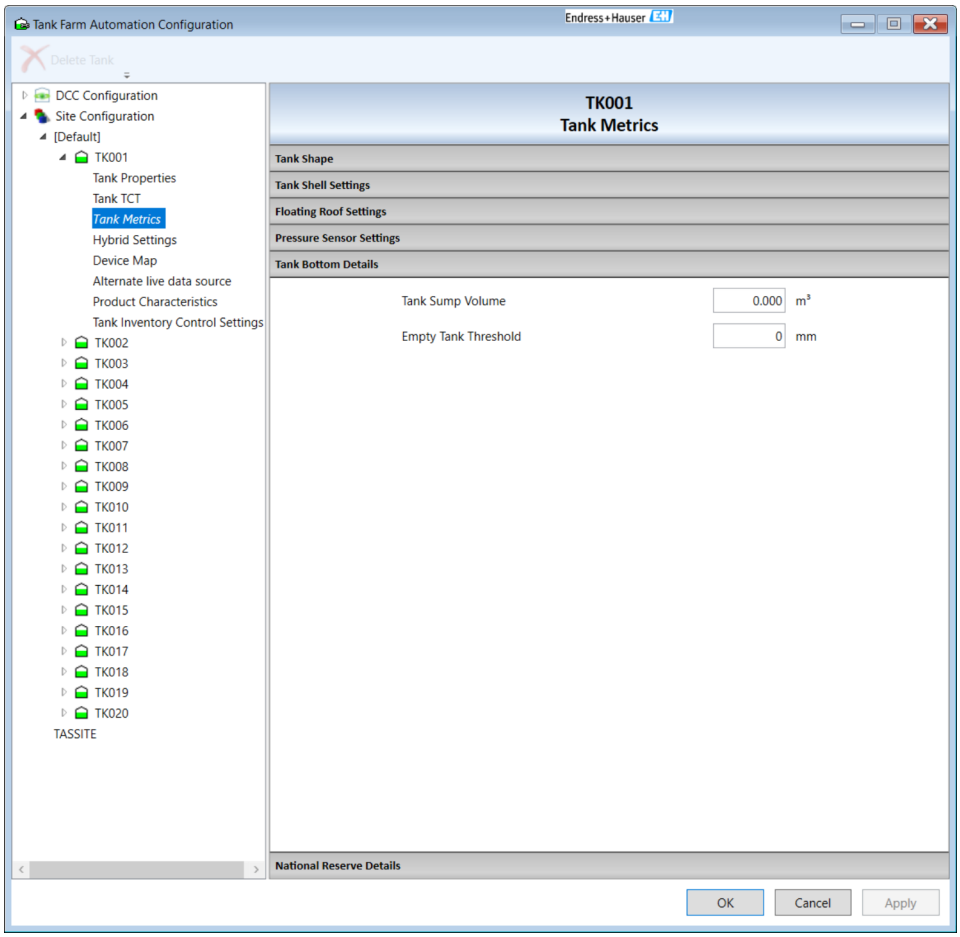
Pressure Sensor Settings



A pressure sensor must be enabled by selecting the check-box before it's configuration can be changed.

- **Base Pressure Height**
  The level at which the Base Pressure sensor is physically mounted.
- **Product Pressure Height**
  The level at which the Product Pressure sensor is physically mounted.
- **Vapour Pressure Height**
  The level at which the Vapour Pressure sensor is physically mounted.

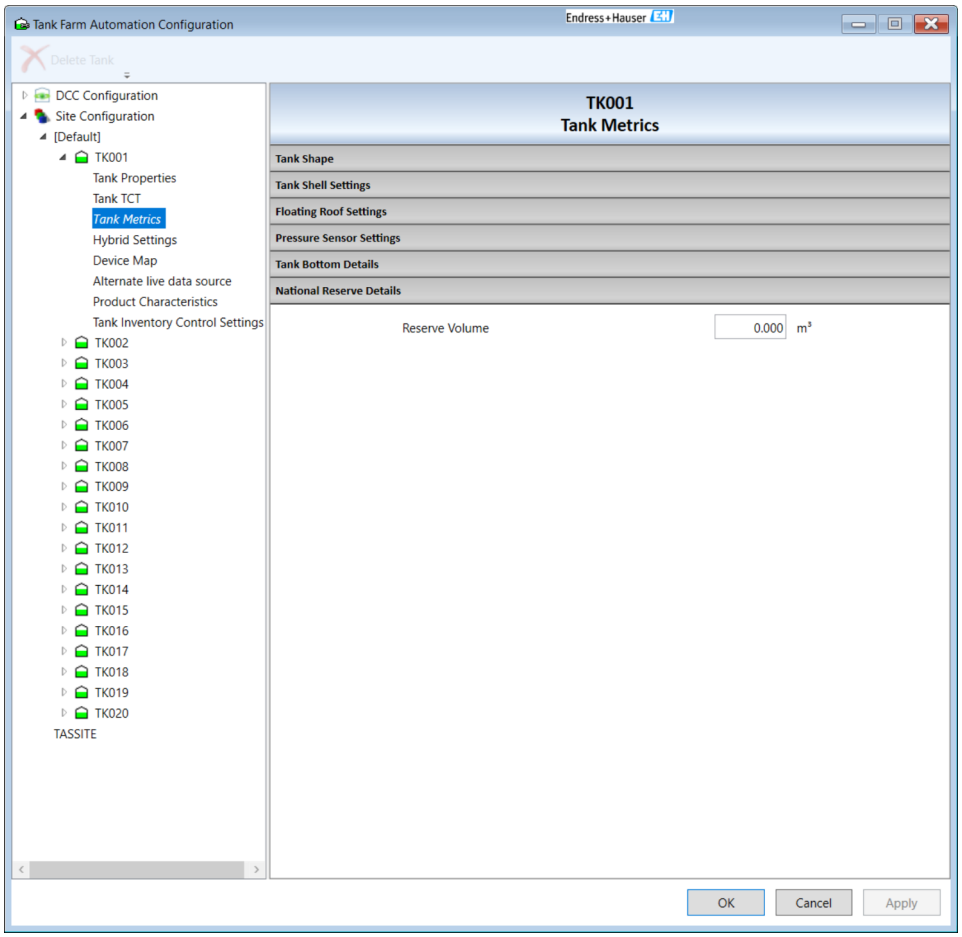
Tank Bottom Details



- **Tank Sump Volume**
  The volume of product in the bottom sump of the tank, below the measured range of the level gauge (typically below a product level of 0 mm (0 in)). The application of this value is dependant on the current tank mode. If the current tank mode includes the ”Exclude Sump from Inventory” option, the value will be added to ullage volumes, otherwise it will be applied to the innage volumes.
- **Empty Tank Threshold**
  The level used to check the tank mode state if the ”Automatic Reversion to Default Tank Mode” flag is set for the current tank mode. When the product level moves above this threshold the tank mode will automatically revert back to the Default mode.

Any value entered in the **Tank Sump Volume** field will always be applied in some way to volumes in the system. Customers whose sump volume is already included in their tank capacity tables should set this value to zero.

National Reserve Details

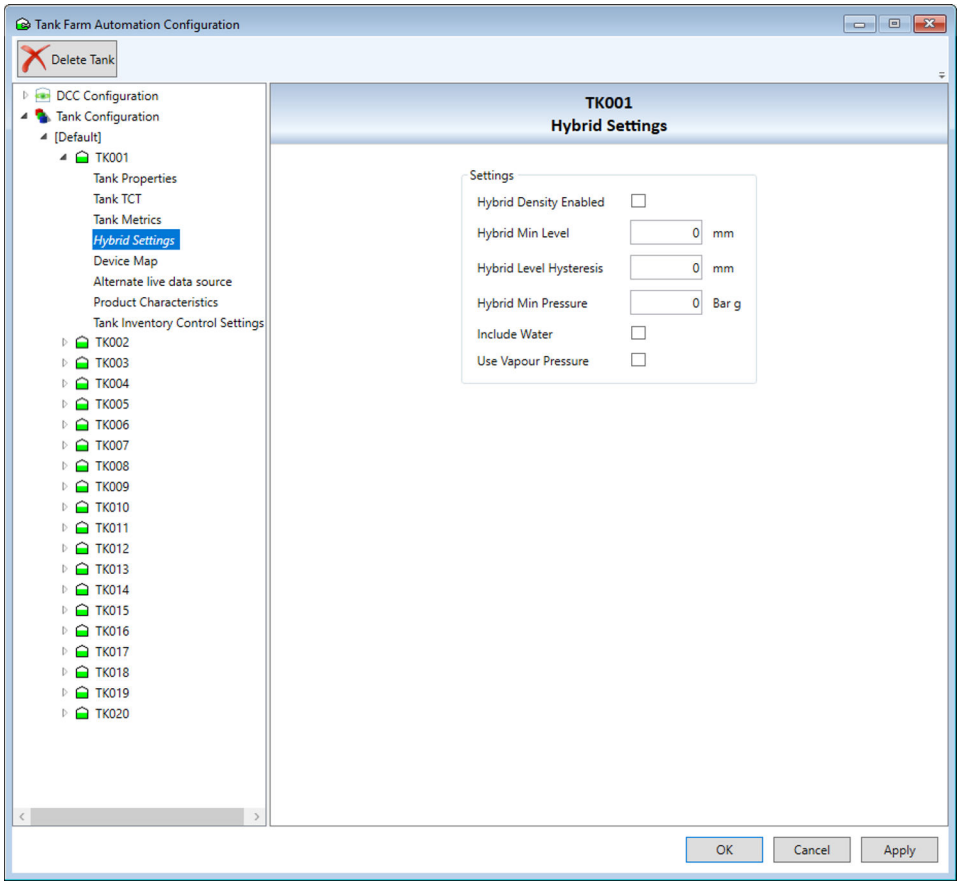


Reserve Volume

The volume of product that should be held for national reserves.

Hybrid Settings

Configure settings for hybrid (pressure derived) density calculations.

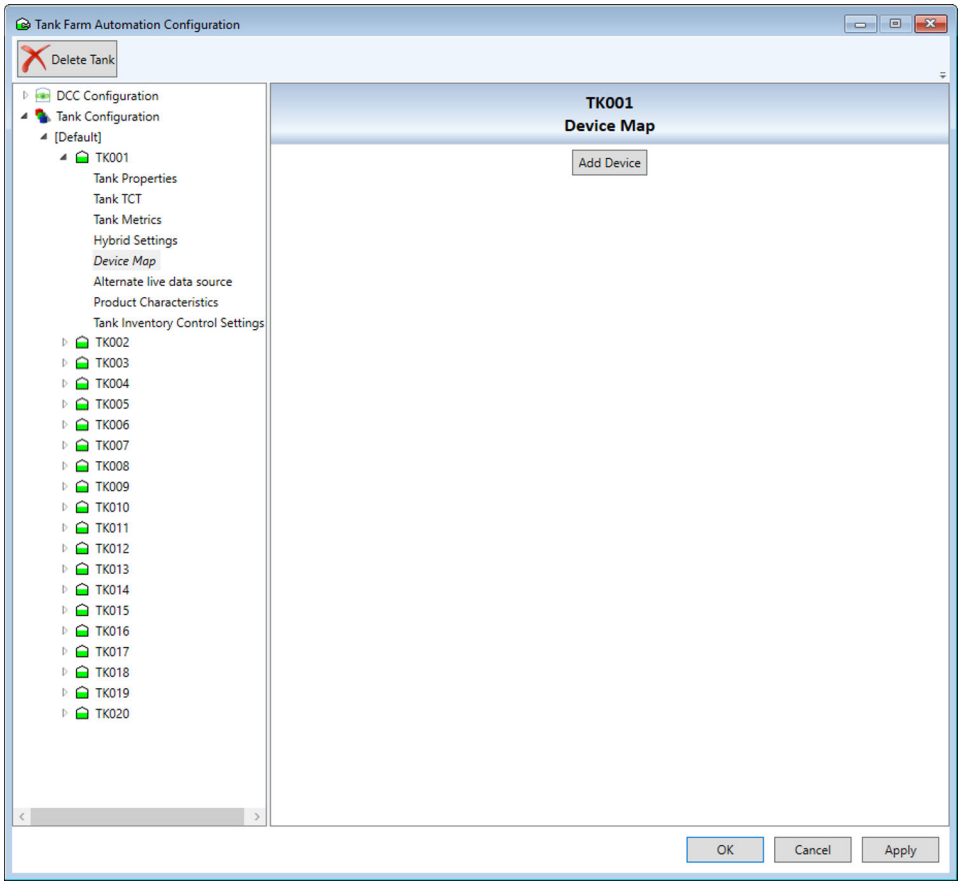


Settings

- **Hybrid Density Enabled**
  Enables calculation of observed density from pressure data.
- **Hybrid Min Level**
  The minimum level above which the hybrid calculation will be carried out.
- **Hybrid Level Hysteresis**
  Hysteresis for the **Hybrid Min Level** value.
- **Hybrid Min Pressure**
  The minimum pressure above which the hybrid calculation will be carried out.
- **Include Water**
  Take account of water level in the hybrid calculation.
- **Use Vapour Pressure**
  Include vapour pressure data in the hybrid calculation.

Device Mapping

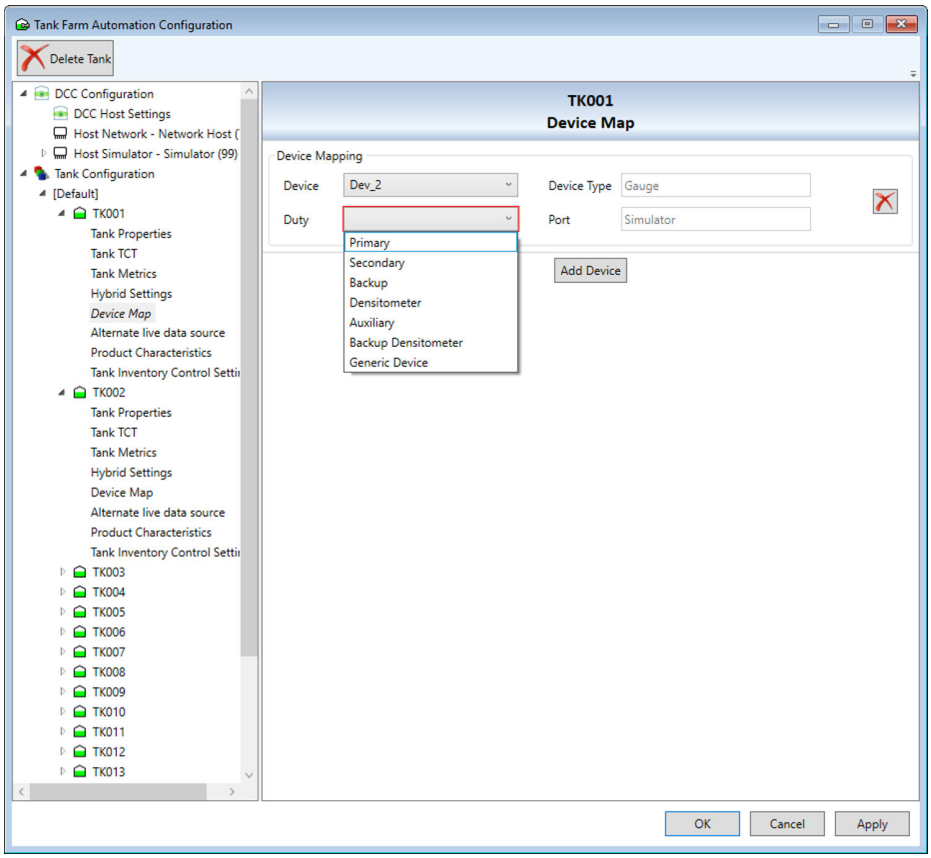
The **Device Map** section allows the user to map previously configured devices to tanks.



To map a device to the current tank:

1. Click the **Add Device** button (see screenshot above).
   ↳ A device mapping entry will appear and the **Device** selection box will be populated with currently unassigned devices.

2. Select the required device and select its **Duty**.



3. Continue adding devices as necessary.

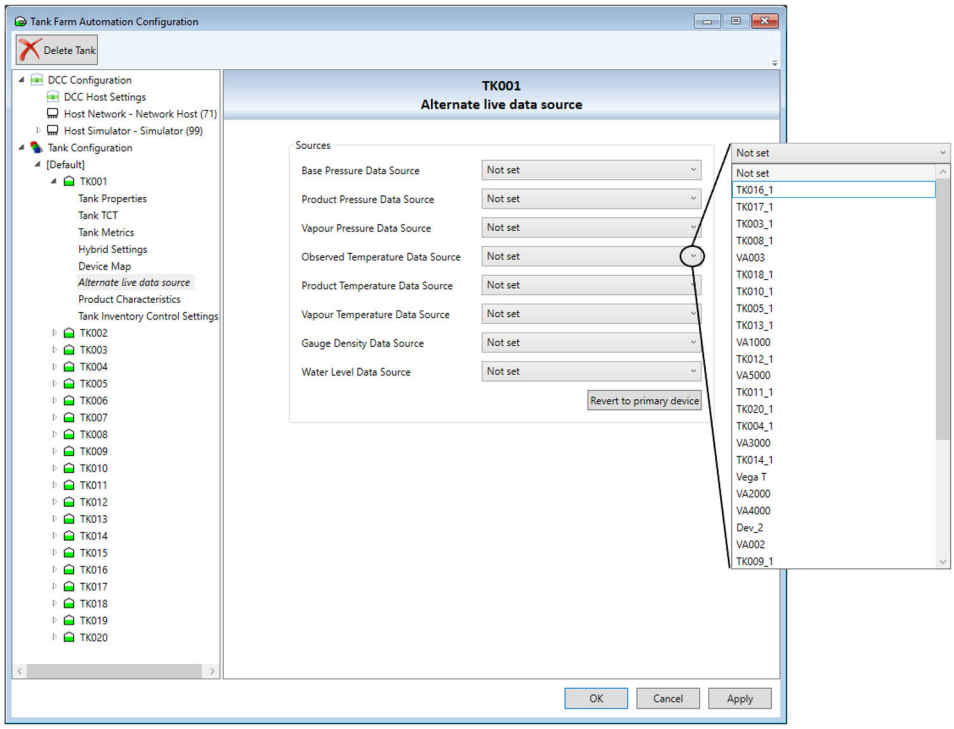
Alternate Live Data Source

These settings allow the data source for a specific data item to be changed to originate from a different device to that attached to the current tank.

Clicking one of the drop down selection boxes displays a list of available devices. Clicking **Revert to primary device** resets all the fields to their defaults.

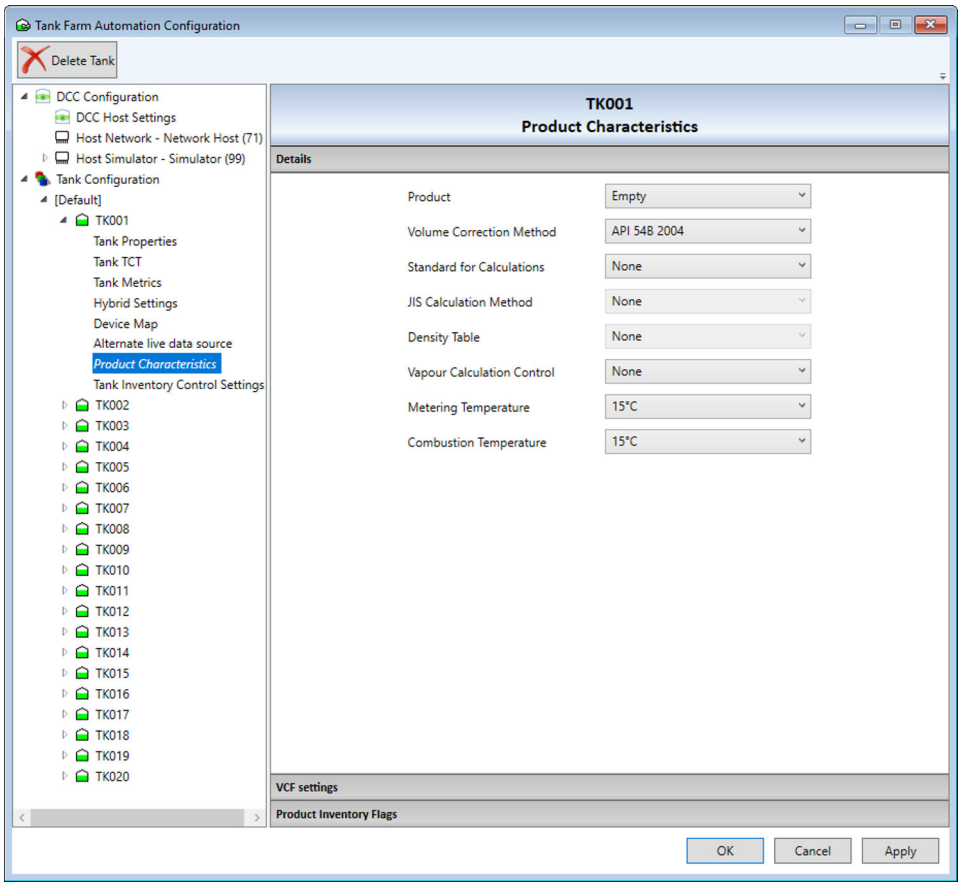
For example, it is possible to direct the system to read Observed Temperature for tank **TK001** from the primary device on **TK007** by selecting the relevant device for **TK007** in the **Observed Temperature Data Source**. This will instruct the system to override any value read from **TK001** devices for this data value and instead use the value from the selected device on **TK007**.

The system will use the value from the alternate device even if the device does not support the data item or the data item is invalid.



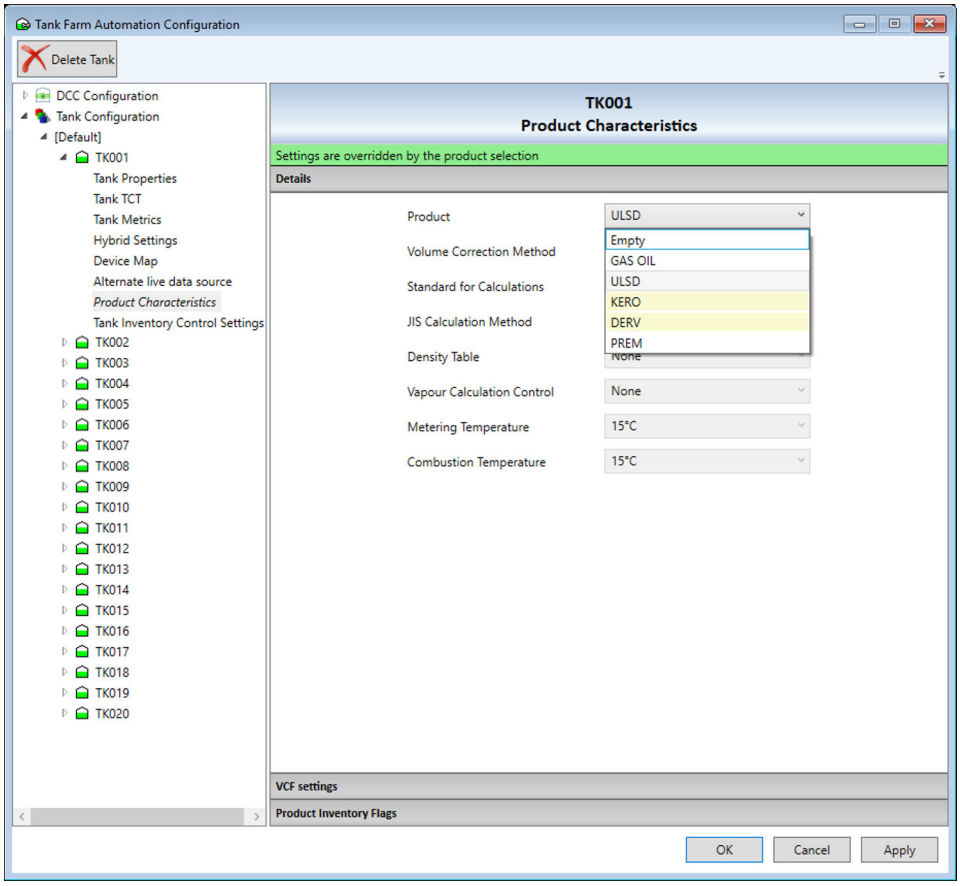
Product Characteristics

Configuration items relevant to the product contained in the tank.



Details

Product
Specifies the pre-configured product to be stored in the selected tank. Products can be configured to have certain pre-selected characteristics attached to them. Products with characteristics are identified by being highlighted in yellow. Selecting a product with characteristics will override and disable certain settings within the configurator tool an alert message is displayed in green at the top of the window to warn the user of this as shown below. The values that will be overridden are those configured as product characteristics in section "Product Configuration".



Volume Correction Method
Here the method to use for volume calculations is chosen. It is essential that the volume correction method is selected correctly as this affects the inventory calculation algorithms.

Some volume correction methods have special considerations. See Appendix D.

Standard for Calculations
By selecting a suitable calculation method, the user can cause some of the calculation settings to be pre-set to values which are the accepted (or defined) default for the relevant standards body or type or type as shown in "Appendix A". These settings are then locked. If the user wishes to change these locked values, the Standard for Calculations must be reset to **None**. Certain calculation types rely on this setting. For example, Hydrostatic Deformation will only be included if the Method of Calculation has been set to GBT or GBT (Direct Weight).

In the case of JIS MDP calculations, setting the control flag **VCF is restricted** forces the rounding of input data to use ±0.002 kg/l and ±0.25 °C for density and temperature respectively.

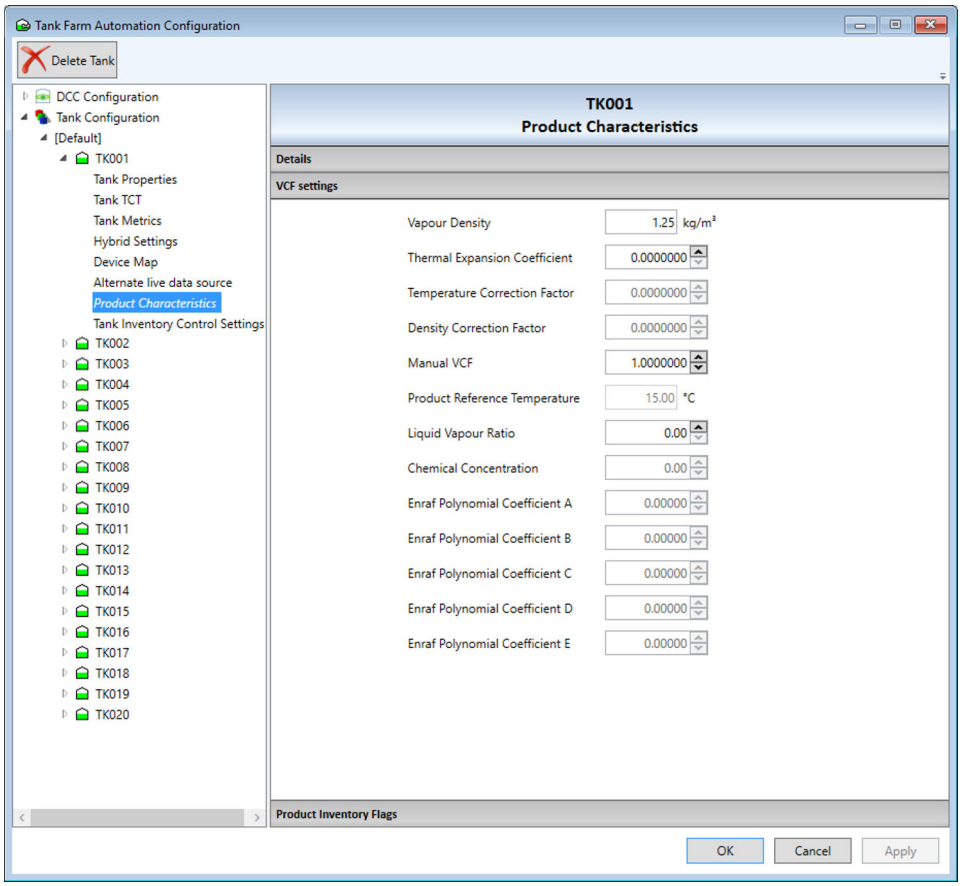
JIS Calculation Method
Specifies the handling of floating roof corrections within JIS calculations. This option is only available upon selection of a floating roof tank shape and a JIS volume correction method.

Density Table
Specifies the density table to be assigned to this tank. This setting is only available if a Density Table **Volume Correction Method** is chosen.

Vapour Calculation Control
Specifies the vapour correction calculations that will be performed as part of the inventory calculations. None means that no vapour correction will be performed.

Metering Temperature / Combustion Temperature
The specified temperature at which the amount of fuel to be burned is notionally determined for calorific calculations.

VCF Settings



Vapour Density
The Average density of vapour above product.

Thermal Expansion Coefficient
The volumetric expansion coefficient (or alpha) factor of the product in the tank.

Temperature Correction Factor
The temperature correction factor for the product.

Density Correction Factor
The density correction factor for the product.

Manual VCF
Volume Correction Factor that will be used if the Manual volume correction method is selected.

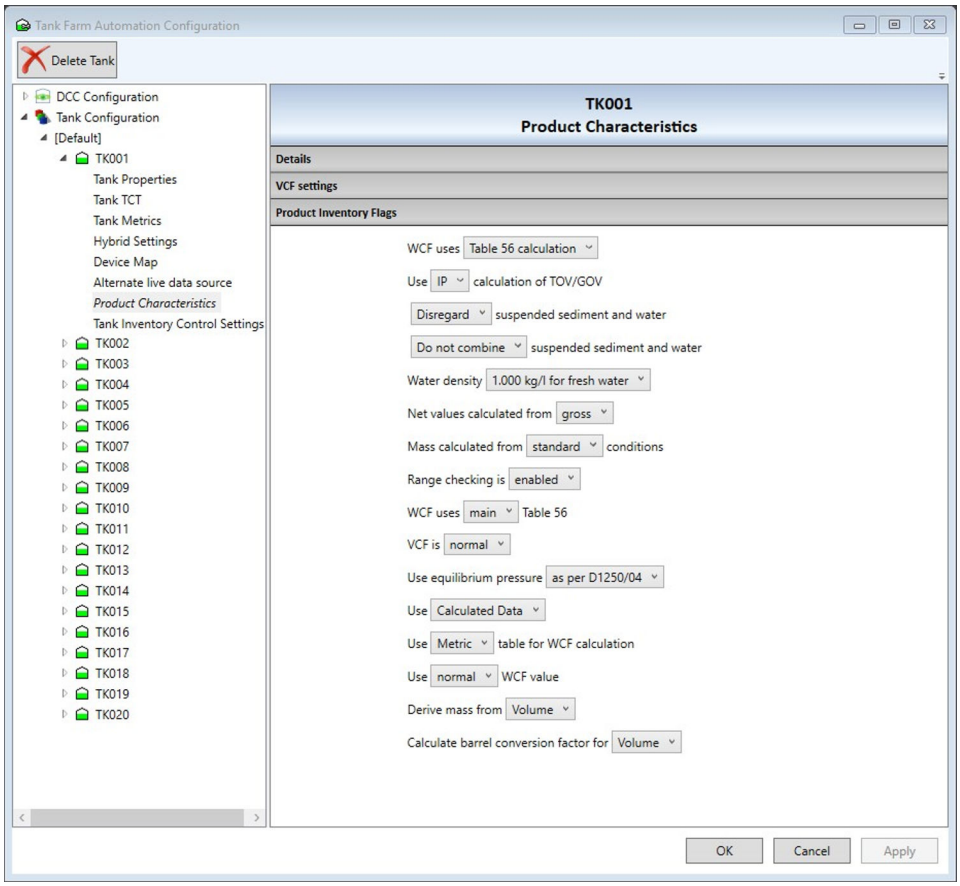
Product Reference Temperature
A custom reference temperature for the selected volume correction method. This may only be changed if the volume correction method chosen does not specify a product reference temperature.

Liquid Vapour Ratio
The ratio of liquid to vapour.

Chemical Concentration
The 'strength' of the product. This may also be displayed as **Strength by Volume** or **Strength by Mass** depending on the choice of volume correction method (see "Inter-relation of configuration items").

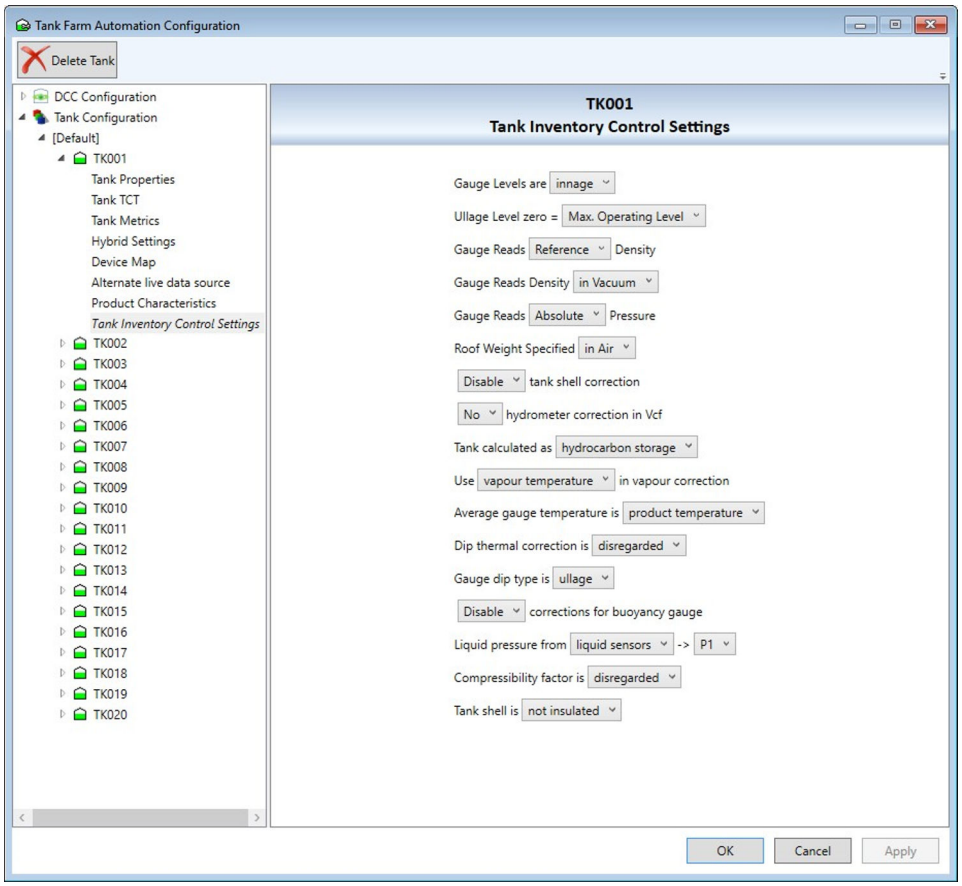
Enraf Polynomial Coefficients A-E
Coefficients defining a curve fit of tank capacity table data.

Product Inventory Flags



These settings control the way the inventory calculations are performed in relation to the product in the tank (see "Appendix B").

Tank Inventory Control Settings



These settings control the way the inventory calculations are performed in relation to the tank itself (see "Appendix C").

9 Alarm Configuration

The alarm/event subsystem included with the system is highly configurable. Access to the feature can be controlled by the security system.

9.1 Alarm Overview

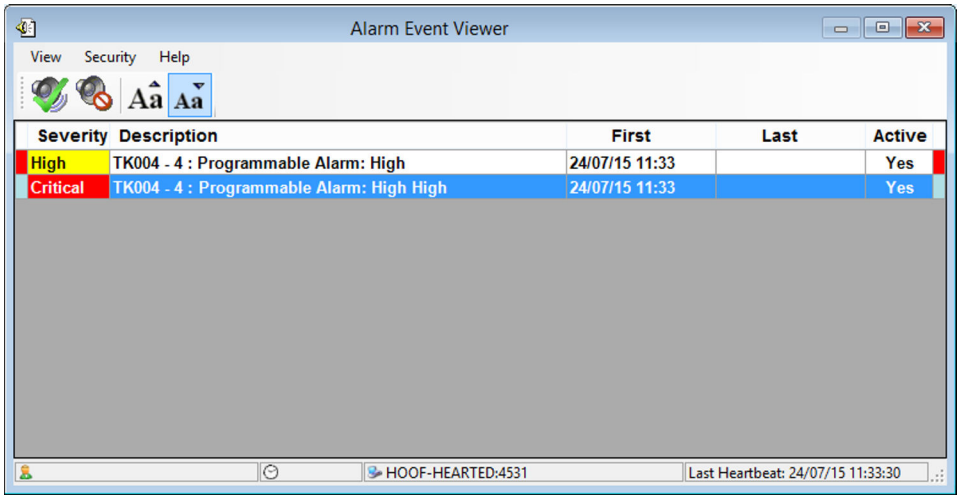
The alarm and event subsystem is based on a Windows service.

The alarm system consists of an Event Server which distributes alarms and events as they occur to any connected Alarm Event Viewer clients.

The Event Server may be configured to distribute only a subset of alarms to individual Alarm Event Viewer clients and each client may be configured to display and annunciate alarms as required.

The Alarm Event Viewer is the principle way of viewing alarms and only one instance runs per machine, although multiple client machines may connect to a single Event Server.

The following is a typical view of an Alarm Event Viewer:



9.2 Event Server Configuration

The Event Server's role is to send new alarm notifications to any Alarm Event Viewer clients connected to the system. These could be locally on the same PC or on networked client PCs.

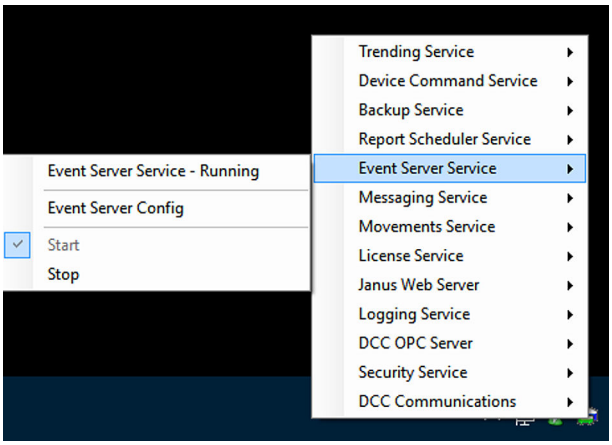
The Event Server may be configured for a range of functions, including:
- Defining the severity of alarms
- Defining what text to display for an alarm
- Determining what alarms are sent to individual clients

The Event Server also monitors the health of the alarm sub-system and if any of the following services fail, then an Event Subsystem Failed alarm will be sent to all client viewers:
- DCC Host Service
- DCC Olympus Service

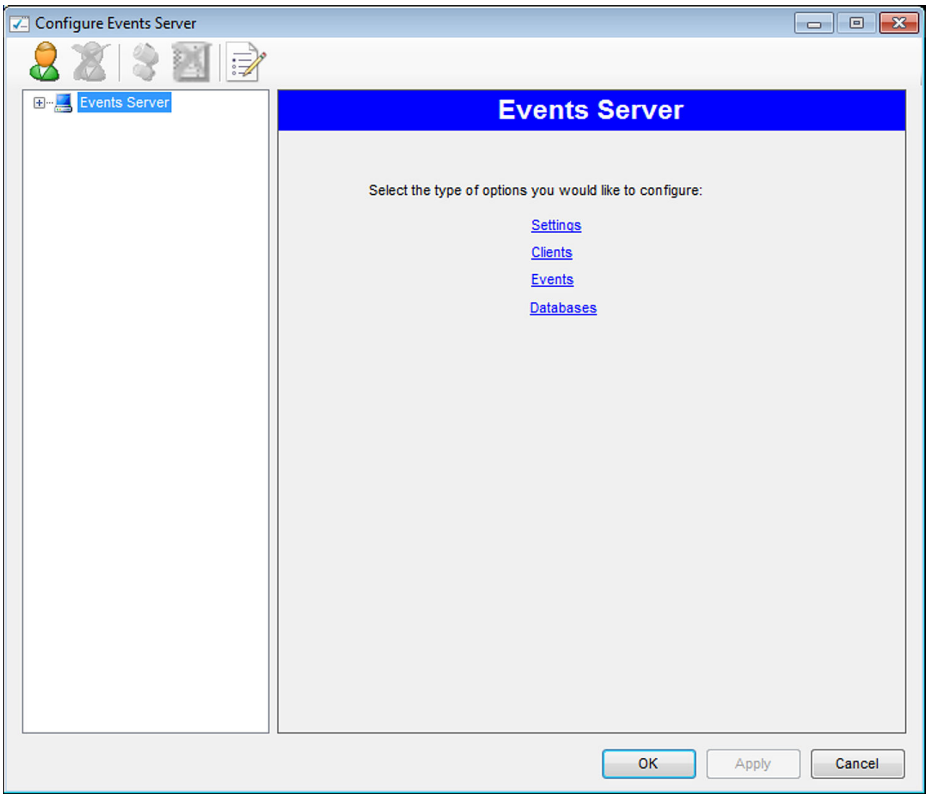
9.2.1 Configuring the Event Server

To configure the Event Server, proceed as follows:

1. Right click on the **Service Manager** icon in the Windows system tray and select the **Event Server Service** → **Event Server Config** option.



2. Expand the left hand panel to select one of the areas to edit, or click on the underlined item in the right hand panel.

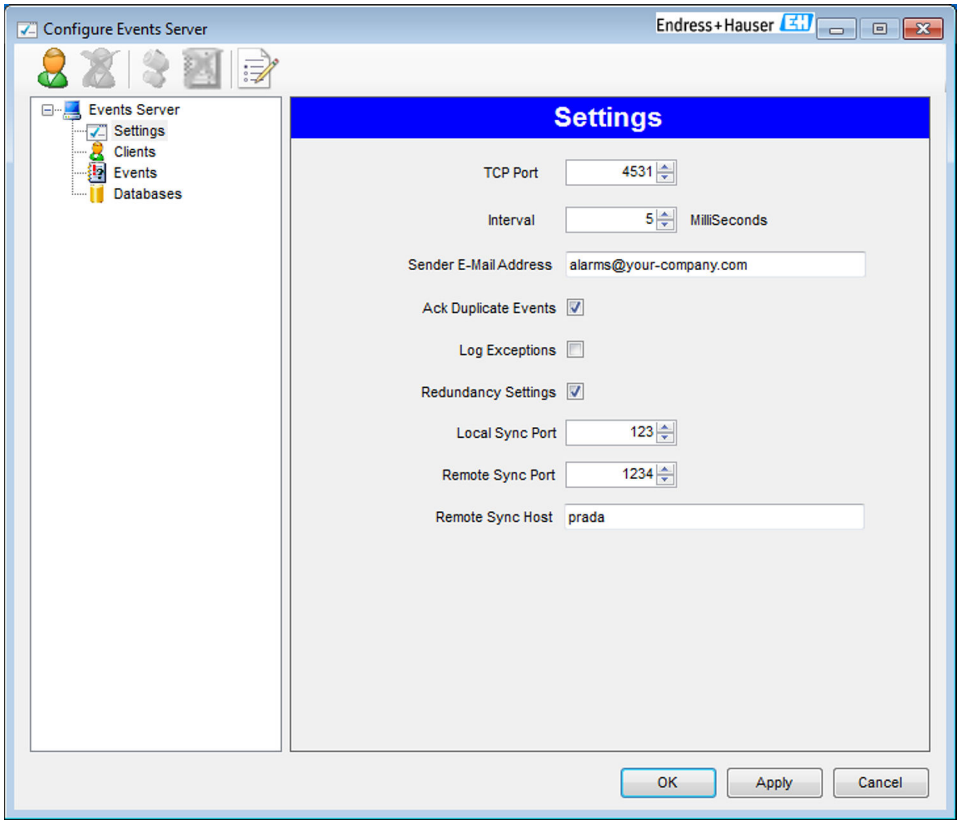


The 4 selections are:
- **Settings**: Configure the internal settings for the Event Server
- **Clients**: Configure any unique client definitions
- **Events**: Configure the definition for each alarm/event type
- **Databases**: Configure the database maintenance parameters

There are toolbar icons to add/remove a client, override or remove override for an alarm and to change event options.

9.2.2 Settings

This page allows various settings for the Event Server itself to be configured. Generally speaking, most of these should be left as their default values.



The following settings may be configured:

TCP Port
This is the network port used to listen for connections from Alarm Event Viewer clients. If this is changed then any Alarm Event Viewer client should have their configuration changed to match it. This value should only be changed if there is a clash with some other software running on the PC.

Interval
This is the update time for the server, increasing it will slow down alarm updates. It should not be changed unless the PC is running at a very slow speed.

Sender E-Mail Address
This is the e-mail address displayed in the sender field of any e-mails that are sent containing alarm details.

Ack Duplicate Events
By default this item is ticked, in which case if there are multiple occurrences of the same alarm in the database then acknowledging one will acknowledge all of them. If this item is unticked then each alarm has to be individually acknowledged. This should only be unticked if clients are using the Legacy Mode for events.

Log Exceptions
If this is ticked then any problems that the server encounters will be logged to a file on the hard drive. The file will be called Event.Server.Exceptions.txt and will be located in the standard install directory for tank gauging.
It may be useful to log errors to assist in diagnosing network access problems.
For instance if a remote client on the network is not receiving automatic updates of events then it may be due to a number of problems such as the Windows firewall blocking on the client. This would show up in the log file on the server.

Redundancy Settings
This setting needs to be configured to create alarm synchronization among the redundant pairs. Alarm synchronization means that acknowledging alarms on one server

automatically acknowledges the alarms on the second server. By default this option is unticked. Selecting this option enables the following options.

Local Sync Port
Port number used by the local Event Server to listen for connections from the remote Event Server on the redundant partner machine. This can be any number and that needs to be provided as the **Remote Sync Port** in another server.

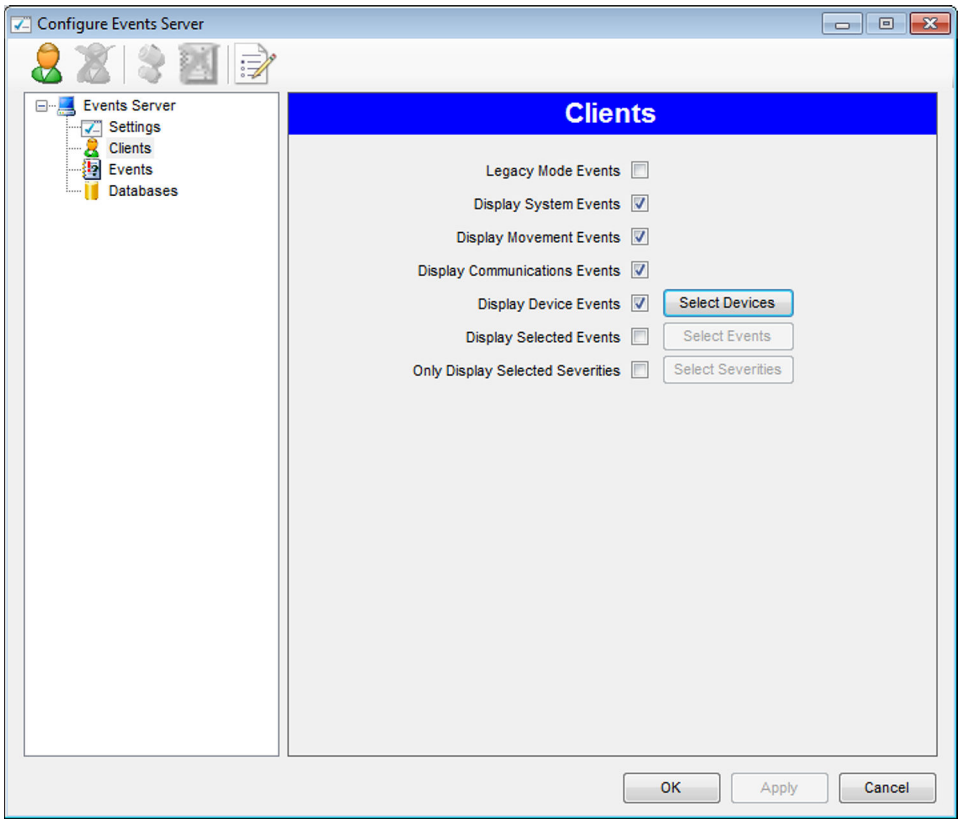
Remote Sync Port
Remote port number used by the local event server to listen for connections from the local Event Server on the redundant partner machine. This number should be same as the **Local Sync Port** on the other server.

Remote Sync Host
Host Name of the redundancy partner.

The above settings must be completed on both servers of a redundant pair.

9.2.3 Client Definitions

This page allows the alarm/event sources for clients to be configured. For example, clients can be configured to only receive alarms for a sub-set of the tanks, or to receive nothing at all.



The client name is either:
- The name of the client PC on the network (including the name of the PC that the server runs on, as the Alarm Event Viewer on that machine counts as a client), and must be unique.
- The telephone number of a mobile telephone which is to be used as an SMS client.
- The e-mail address which is to be used as a client for e-mailing alarms.

- The port name which is connected to an ASCII printer which is to be used to output alarms.
- The telephone number of a telephone which is to be used as a voice client.
- The name of a radio network (configured in the messaging service or network radio module) which is to be used to broadcast alarms as radio messages.

Add Client

Clients may be added or deleted as required.

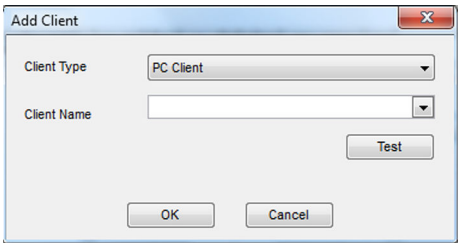
There is always a client called **default** which cannot be deleted and this is used as the definition for a connecting client if one does not exist. For most standalone systems no extra client definitions are required, as the default will be used.

To display a client definition:

▶ Select it from the **Show settings for** list. All parameters on the screen will be set to the selected client.

To add a new client definition:

1. Click on the **Add Client** button which will open a dialog.



2. Select the type of client required.

Client Type – Identity

- **PC Client – Client Name**
  The name of the client PC on the network. This can either be typed in, or selected from the dropdown list of available PCs.
- **Mobile Phone (SMS) – Phone Number**
  Only available if the feature is licensed. The telephone number of the mobile phone which is to act as an SMS client.
- **E-Mail (Plain Text) – E-Mail Address**
  The e-mail address which is to act as a recipient of plain text e-mail messages containing alarm details.
- **E-Mail (HTML) – E-Mail Address**
  The e-mail address which is to act as a recipient of HTML e-mail messages containing alarm details.
- **ASCII Printer – Port Name**
  The name of the COM port the ASCII printer is connected to.
- **Radio – Radio**
  Only available if the feature is licensed. Selected from a dropdown list of the radio networks configured in the messaging configuration.
- **Network Radio – Radio**
  See "Network Radio Client Configuration" for details.
- **Telephone – Phone Number**
  Only available if the feature is licensed. The telephone number of a phone which is to act as a voice client. There is an additional field (Use Outside Line) which indicates if an outside line is to be used as configured in the messaging service configuration.

3. Click **OK** and the new client will be displayed in the list and the parameters will be cleared.

Delete Client

To delete a client definition:

▶ Select the client in the list and click on the **Delete Client** button.

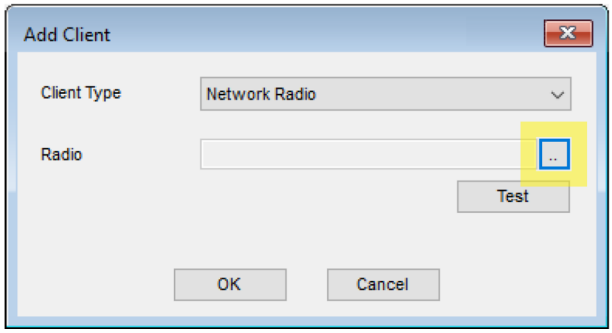
Deleting a PC client definition will not stop the client from receiving alarms. It will simply use the default definition.

Client Configuration

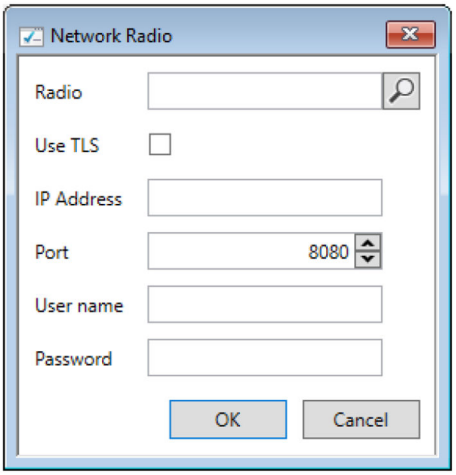
For each client the following parameters may be configured:

Network Radio Client Configuration

The network radio client is a special case and requires additional configuration when being added. The client is a standalone Radio Module which connects to the site radio and is available separately from your supplier. When the **Network Radio** option is selected, a button is available which gives access to the configuration parameters:



Clicking this button will display the network radio settings screen.

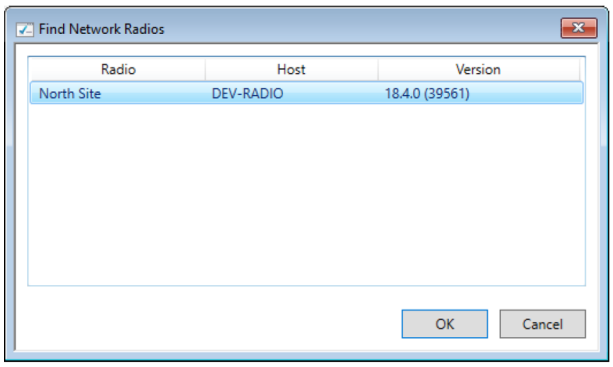


The configuration fields are:

- **Radio**
  The name of the radio to be used to broadcast the alarm. This must match the name of the radio configured in the Radio Module at the given address.
- **Use TLS**
  Indicates whether transport layer security is to be used to connect to the Radio Module.
- **IP Address**
  The network address of the Radio Module.

- **Port**
  The port used to connect to the Radio Module. This must match the number of the port configured in the Radio Module at the given address.
- **User Name**
  The user name required for operations if the Radio Module has been configured to use operation security.
- **Password**
  The password required for operations if the Radio Module has been configured to use operation security.

It is also possible to search for Radio Modules that are connected to the network. To do this, click the **Search** button. This will display the **Find Network Radios** screen:



Selecting the required radio and then clicking the **OK** button will close the screen and populate the configuration screen with the radio details.

This does not include the user name and password. If these are required they must still be entered manually.

Legacy Mode Events
This sets the client in the same mode as used on older versions of the tank gauging system, where multiple occurrences of the same alarm will each have their own entry displayed and will have to be acknowledged individually.

Display System Events
Certain alarms or events are defined as system events, such as system failure events etc. The annunciation of these can be prevented on a client by unticking this box.

Display Movement Events
Events generated by the Movement Server service can be stopped from being annunciated on a client by unticking this box.

Display Communications Events
The DCC Host service generates a range of communication events, such as Communication Failure events, or Failed to Connect events etc. These can be stopped from being annunciated on a client by unticking this box.

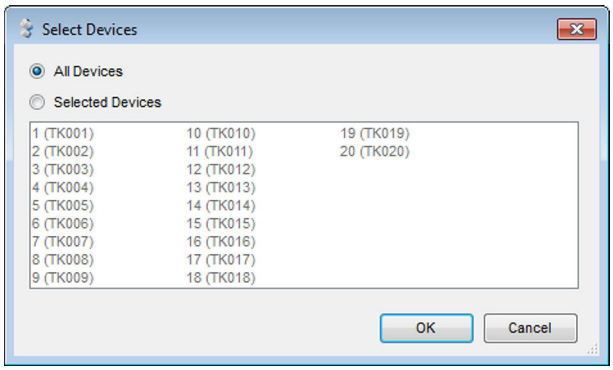
Display Device Events
Device events are the main set of alarms generated for tanks, such as Level Alarms, Temperature alarms etc. These can be stopped from being annunciated on a client by unticking this box. These represent the main events in the tank gauging system and generally should not be disabled.

Display Selected Events
This allows the filtering of events so that only specified events are sent to the client.

Only Display Selected Severities
This allows the filtering of events so that only events of specified severities are sent to the client.

Select Devices

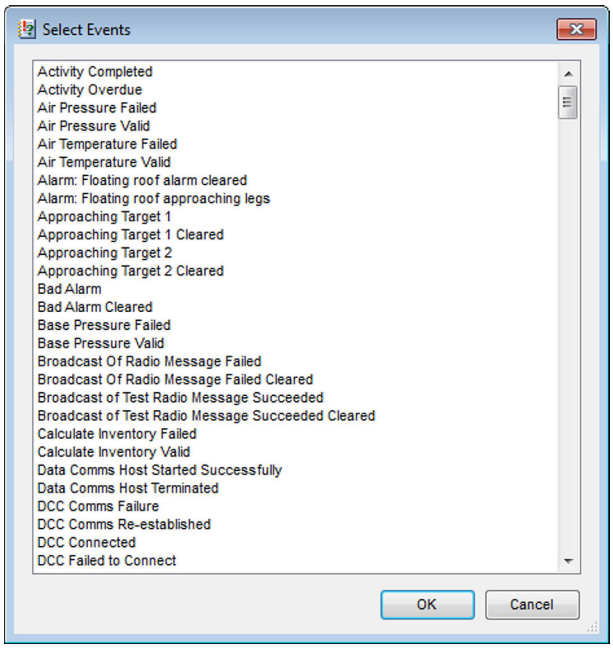
It is possible to configure a client to only receive events from specific devices/gauges. These can be specified by clicking on the **Select Devices** button.
This will launch the **Select Devices** screen:



To add a device, choose the **Selected Devices** button, highlight it on the list and click the **OK** button. To delete a device, deselect it in the list and click the **OK** button.

Select Events

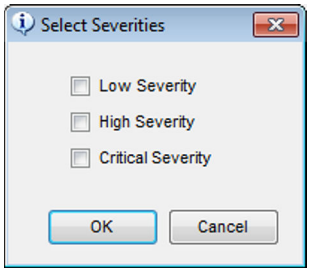
It is possible to configure a client to only receive specified events. These can be specified by clicking on the **Select Events** button (only available when the **Display Selected Events** field has been ticked).
This will launch the **Select Events** screen:



To add an event, select it from the list and click **OK** button. To delete an event, deselect it in the list and click the **OK** button.

Select Severities

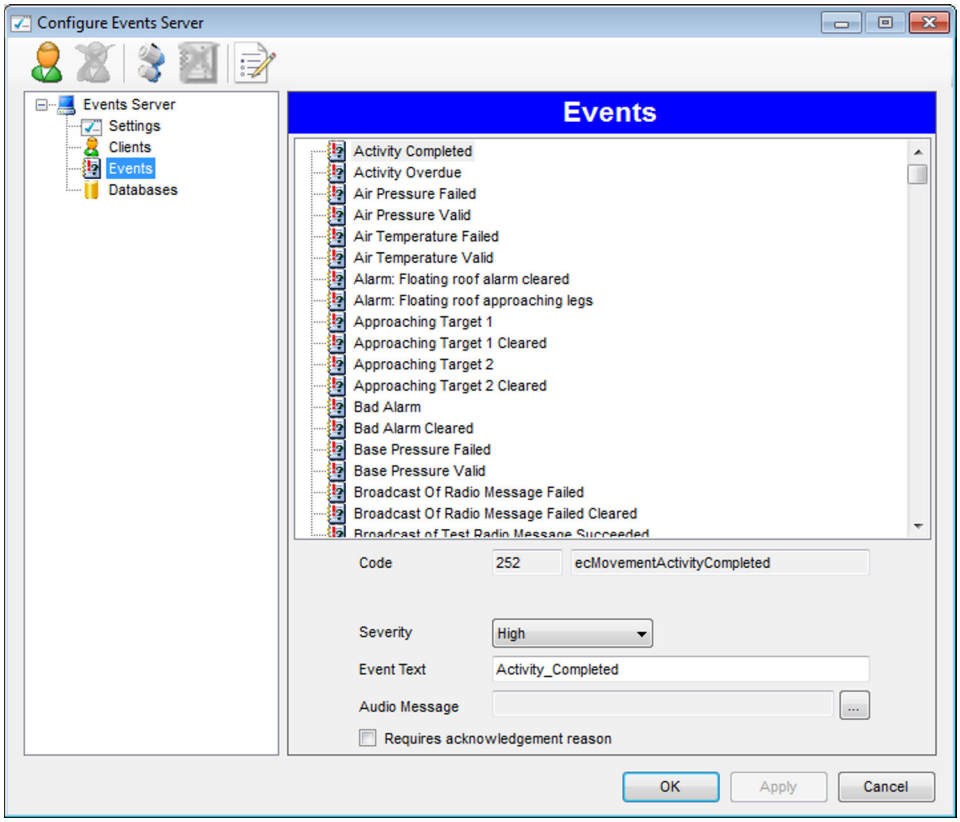
It is possible to configure a client to only receive events of specified severities. These can be specified by clicking on the **Select Severities** button (only available when the **Only Display Selected Severities** field has been ticked).
This will launch the **Select Severities** screen:



To add a severity, tick the relevant item in the list and click the **OK** button. To delete a severity, untick the relevant item in the list and click the **OK** button.

9.2.4 Event Definitions

This page allows the definition for each event (an alarm is just a type of event) to be configured. This includes the event/alarm text to be displayed on screen and its severity.

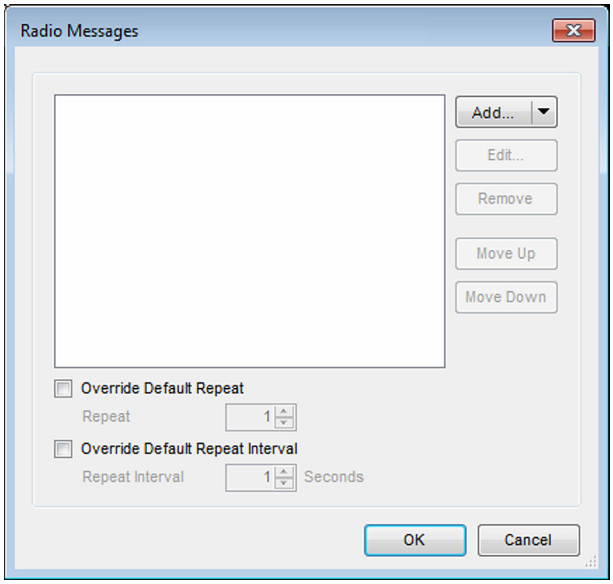


All the possible events that the system can generate are displayed in the list. Selecting an event will show its settings in the fields at the bottom of the window.

For each event the following may be configured:

Event Text
This is the text that will be logged to the events database and displayed on the **Event Viewer** screen.

Audio Message
This is the message which will be annunciated for radio and telephone voice clients. If no message is set up, the event will not be annunciated.
To edit the message click on the ... button next to the field. This will bring up an audio messaging edit screen:



For more details on configuring audio messages, see "Configuring Audio Messages". The number of times that the message is repeated and the interval at which the message is repeated can be overridden (only relevant for radio messaging, not telephone messaging).

To override the number of times the message is repeated, tick the **Override Default Repeat** field and then select the number of times the message is to be repeated. Similarly to override the repeat interval for the message, tick the **Override Default Repeat Interval** and select the interval at which the message is to be repeated. Telephone messages will only ever be annunciated once regardless of these settings.

Severity
There are 4 options:
- **Critical**
- **High**
- **Low**
- **Log Only**

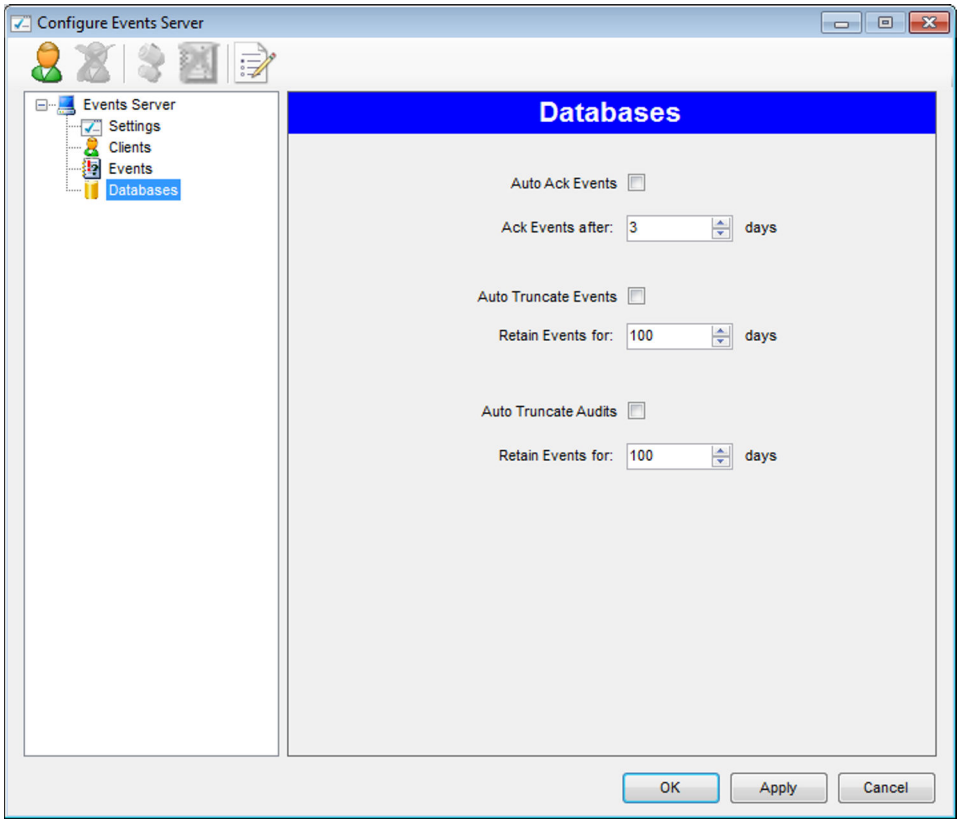
These refer to the priority given to the alarm.

LogOnly alarms will never be displayed in any **Alarm Event Viewer** clients, but will be saved in the events database and may be viewed in the **Event Search** screen. They are automatically acknowledged by the system.

Requires acknowledgement reason
If this box is ticked, the user will be required to enter an acknowledgement reason when they acknowledge this type of alarm.

9.2.5 Database Maintenance

This page allows parameters to be specified to prevent the events database growing to an unmanageable size.



Auto Ack Events
This field is to be ticked if events are to be automatically acknowledged after a given time period. This should only really be used on redundant systems where it is possible that no client machines are connected to a particular server and hence the events will never be acknowledged, or the user may be swamped with events when a server changeover occurs.

Ack Events after
This field is to be ticked if events are to be deleted from the events database after a given period.

Auto Truncate Events
This field is to be ticked if events are to be deleted from the events database after a given period.

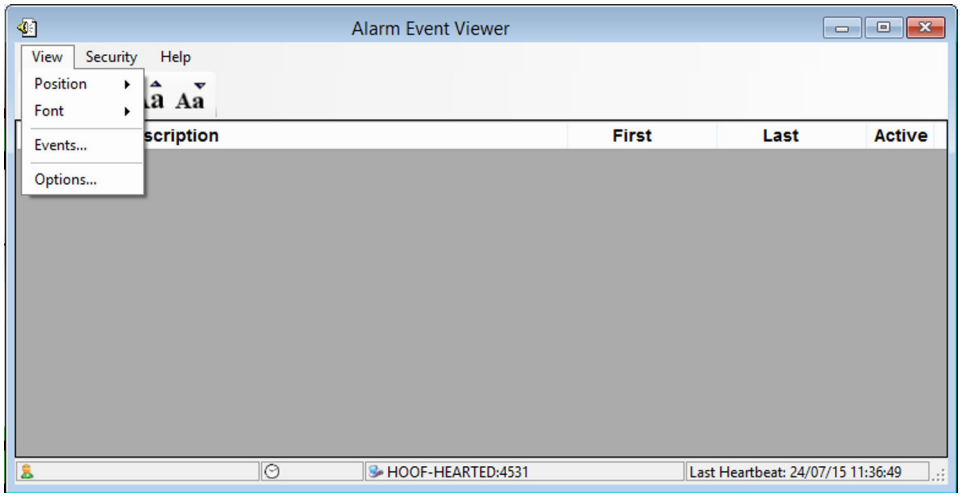
Retain Events for
This field is used to specify the number of days after which events should be deleted from the events database.

Auto Truncate Audits
This field is to be ticked if audit events are to be deleted from the events database after a given period.

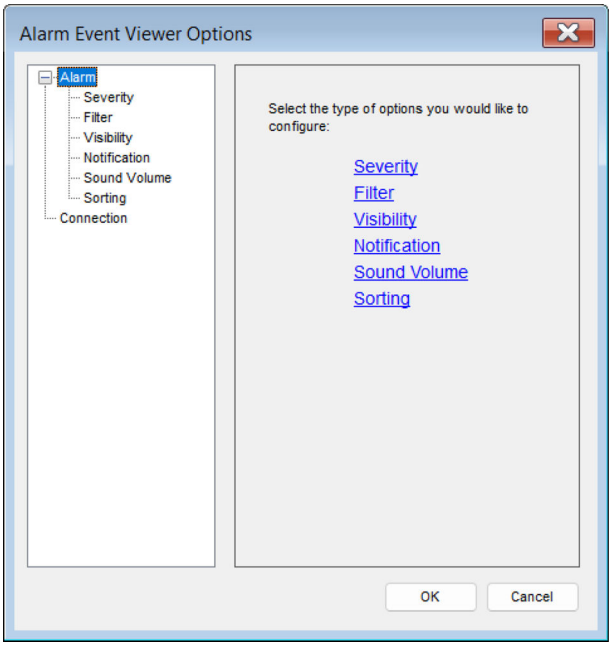
Retain Events for
This field is used to specify the number of days after which audit events should be deleted from the events database.

9.3 Alarm Event Viewer Configuration

To configure the Alarm Event Viewer, proceed as follows:

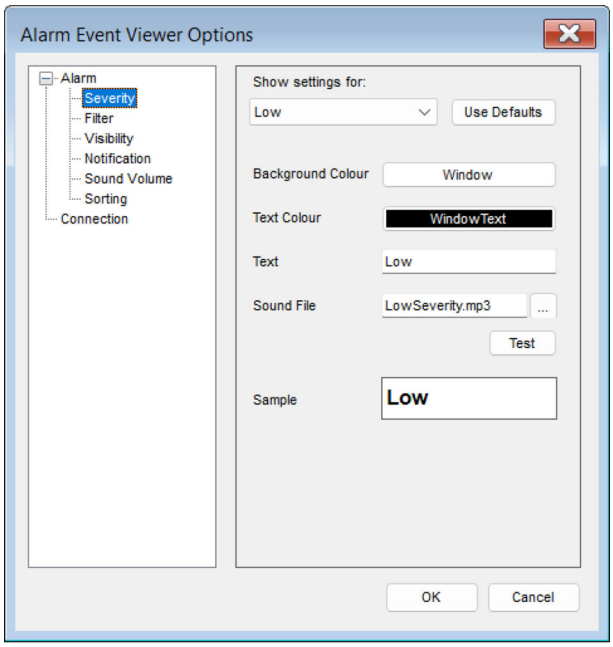


1. Choose **View** → **Options** from the menu.
   ↳ The following screen will be displayed:



2. To choose the type of options to configure, either select them from the list on the left or click on the relevant text on the right.

9.3.1 Severity Options



Show settings for
The drop down list at the top of the page is used to select the severity of the alarm for which the options are to be set. Changing the options will only affect the alarms of that severity.

Use Defaults
Reverts all the options for the severity back to their default values.

Background Colour
The background colour to be used to display the severity of an alarm.

Text Colour
The text colour to be used to display the severity of an alarm.

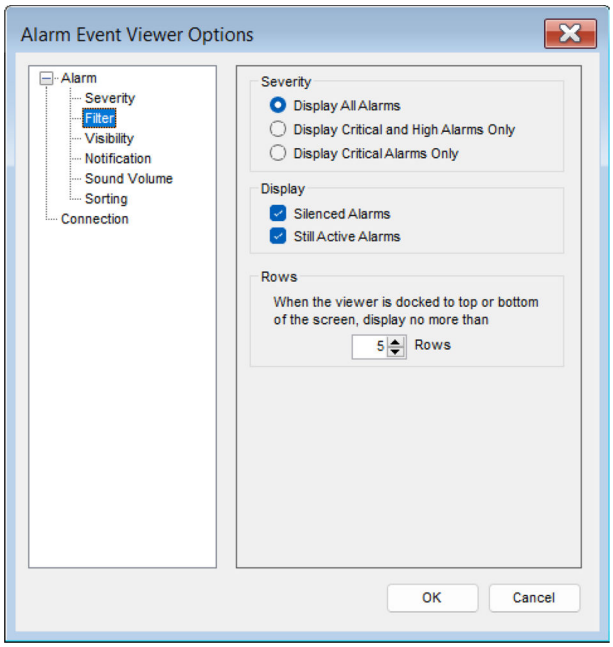
Text
The text to be displayed to indicate the severity of an alarm.

Sound File
The sound file to be played when an alarm of this severity is the highest priority and sound is enabled (see "Notification Options"). If no directory is supplied the file must exist in the Media directory contained in the application directory.
To browse for a new sound file click on the ... button to the right of the sound file field.

Test
To play the currently selected sound file click on the **Test** button.

Sample
Indicates how the severity of the alarm will be displayed in the list of alarms.

9.3.2 Filter Options



These options specify how the alarms will be filtered within the alarm event viewer.

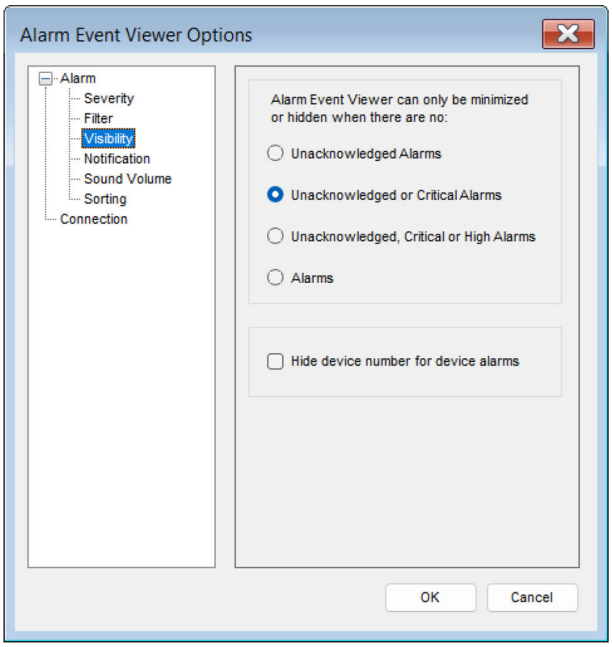
Severity
This section allows the filtering of alarms based on their severity.

Display

- **Silenced Alarms**
  If this option is ticked, alarms that have been silenced but not acknowledged will be displayed in the list. Otherwise the alarm will be removed from the list when it has been silenced even if it has not been acknowledged.
- **Still Active Alarms**
  If this option is ticked, alarms that have been acknowledged but are still active will be displayed in the list. Otherwise the alarm will be removed from the list when it has been acknowledged even if it is still active.

Rows
Allows the user to specify the maximum number of rows to be visible in the list when the alarm event viewer is docked at the top or bottom of the screen. All alarms will still be present in the list and if the number of alarms is more than the value entered a scroll bar will be displayed to allow the user to view details of all the alarms.

9.3.3 Visibility Options



The first panel on this page allows the user to specify the conditions under which the **Alarm Event Viewer** can be minimized or hidden. This also works in reverse, in that if a new alarm is raised which does not meet these conditions the **Alarm Event Viewer** is redisplayed on the screen if it is hidden or minimized.

Hide device number for device alarms alters the description displayed on the main **Alarm Event Viewer** window to either show or hide the Device ID. See screenshots below. If your site has only one level gauge per tank, then showing the Device ID may be unnecessary.

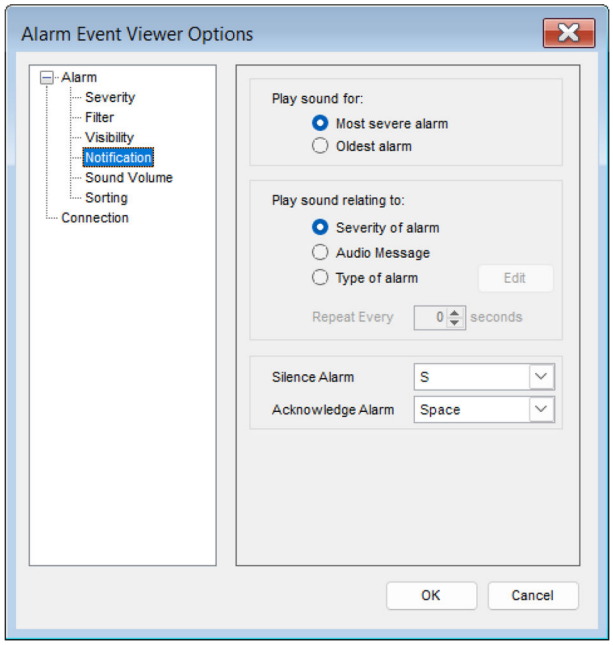
Alarm Event Viewer with Device ID hidden:

Severity	Description	First	Last	Active
Low	T002 : Level Leak Detected	01/05/2015 09:46		Yes
High	T003 : Tank Low Level Alarm	01/05/2015 09:46		Yes
High	T003 : Tank Low Low Level Alarm	01/05/2015 09:46		Yes
High	T004 : Tank Low Level Alarm	01/05/2015 09:46		Yes
High	T004 : Tank Low Low Level Alarm	01/05/2015 09:46		Yes

Alarm Event Viewer with Device ID shown:

Severity	Description	First	Last	Active
Low	T002 - 2 : Level Leak Detected	01/05/2015 09:46		Yes
High	T003 - 3 : Tank Low Level Alarm	01/05/2015 09:46		Yes
High	T003 - 3 : Tank Low Low Level Alarm	01/05/2015 09:46		Yes
High	T004 - 4 : Tank Low Level Alarm	01/05/2015 09:46		Yes
High	T004 - 4 : Tank Low Low Level Alarm	01/05/2015 09:46		Yes

9.3.4 Notification Options

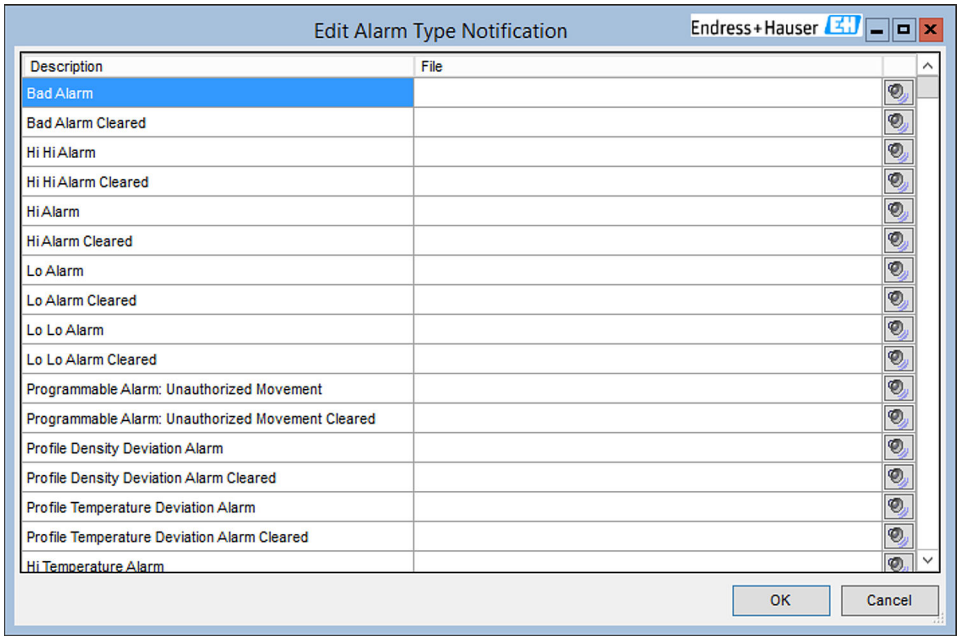


Play sound for

- **Most severe alarm**
  The 'active' alarm is considered to be the oldest unacknowledged alarm of the highest severity, i.e. there may be older unacknowledged alarms but these are of a lower severity than the 'active' one.
- **Oldest alarm**
  The 'active' alarm is considered to be the oldest unacknowledged alarm irrespective of severity.

Play sound relating to

- **Severity of alarm**
  The sound relating to the severity of the 'active' alarm (see "Severity Options") is continuously played until the alarm is acknowledged.
- **Audio message**
  The audio message configured for the alarm (see events configuration) is played once.
- **Type of alarm**
  The sound relating to the type of the 'active' alarm is played once. This is typically an annunciation of the alarm type. These sounds can be edited by pressing the **Edit** button (which is only available when this option is selected).
  Pressing the **Edit** button causes the following screen to be displayed:



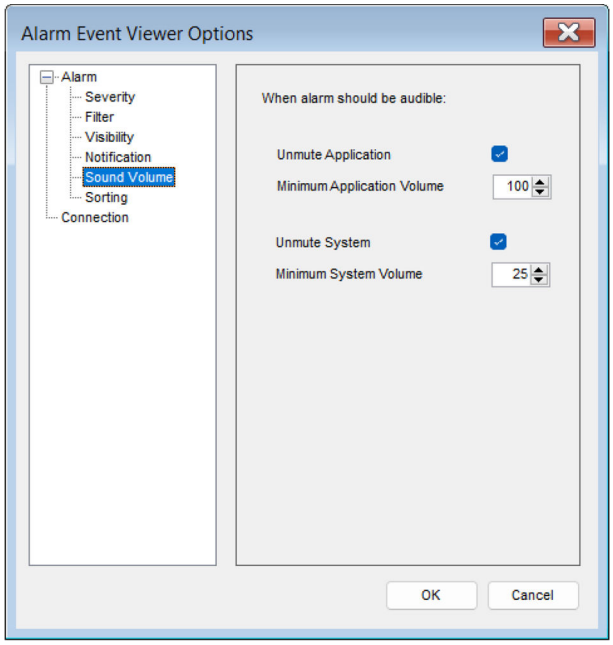
This list indicates the sound file that will be used for each type of alarm. The file can be changed by typing the new file name into the relevant field. Alternatively a new file can be selected by clicking on the button which is available when a file name is being edited. If no file is entered for an alarm type, the text for the alarm type will be annunciated using the Windows Speech Engine. To test the sound that will be played for an alarm type click on the button in the row for that alarm.

Silence Alarm
Allows the user to change the combination of keys that can be used to silence the currently selected alarm.

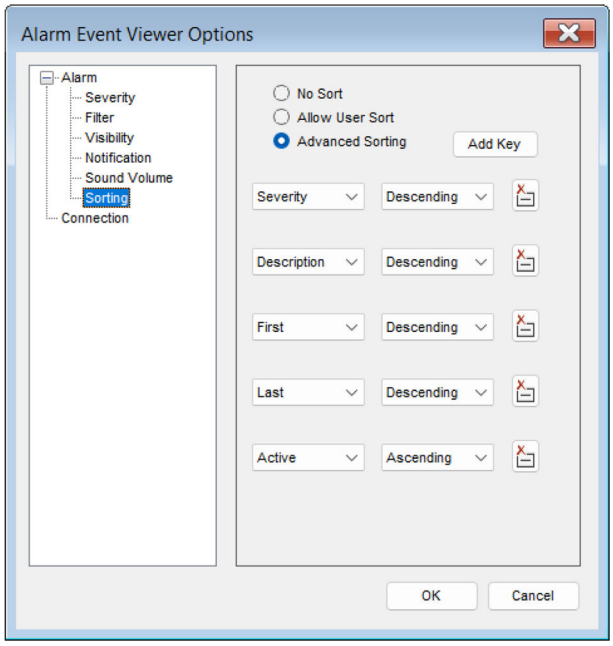
Acknowledge Alarm
Allows the user to change the combination of keys that can be used to acknowledge the currently selected alarm.

9.3.5 Sound Volumes

The alarm volumes can be altered or muted using the Sound Volumes screen.



9.3.6 Sorting



This section provides an Advanced Sorting feature, which allows the user to specify a combination of columns to sort the events.

The page will allow the user to select between the options:
- **No Sort**
- **Allow User Sort**
- **Advanced Sorting**

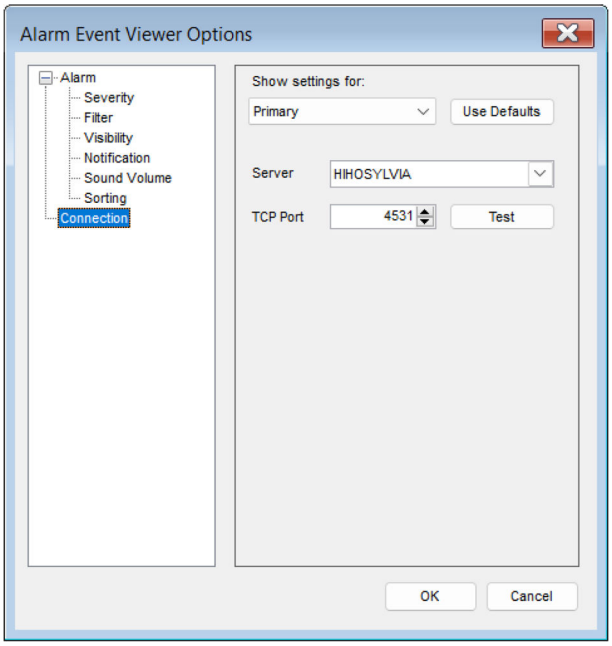
If **No Sort** is selected, the main UI will not allow the user to change the sorting clicking on the column header.

If **Allow User Sort** is selected, the user can change the sorting clicking on the column header.

If **Advanced Sorting** is selected, a number of columns may be selected for sorting, each column having the sort order (ascending/descending) and the priority. Advanced sorting

will not allow the user to change the sorting unless from this page. Once configured, clicking on the column headers will have no effect on the sorting.

9.3.7 Connection Options



Show settings for
The drop down list at the top of the page is used to select the server type for which the options are to be set. Changing the options on the page will only affect the settings for that server type.

Use Defaults
Reverts all the options for the server type back to their default values.

Server
The name of the server to be used for this server type. This can either be typed in directly, or selected from the drop down list. Depending on the speed and configuration of the network this list can take some time to be fully populated.

TCP Port
The TCP port on which the events service is running on the specified server.

Test
Tests that the events service can be found on the given combination of server and TCP port.

9.4 Programmable Alarm Configuration

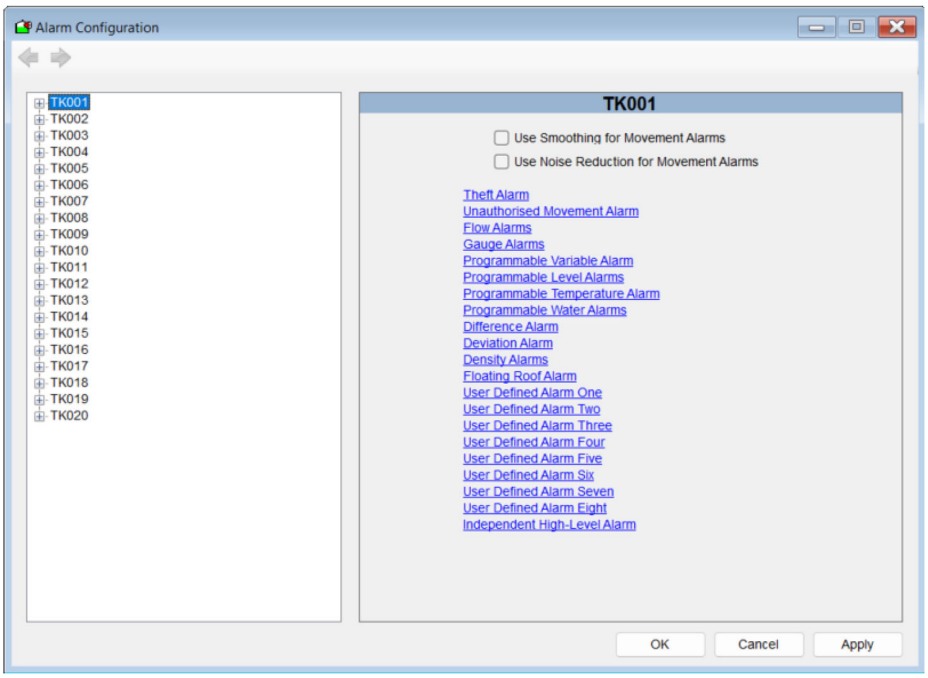
An integrated part of the system is the Alarm Configuration module.

A wide range of programmable alarms are provided allowing the operator/user to have control over product movement.

9.4.1 Launching Alarm Configuration

To launch the Alarm Configuration module, proceed as follows:

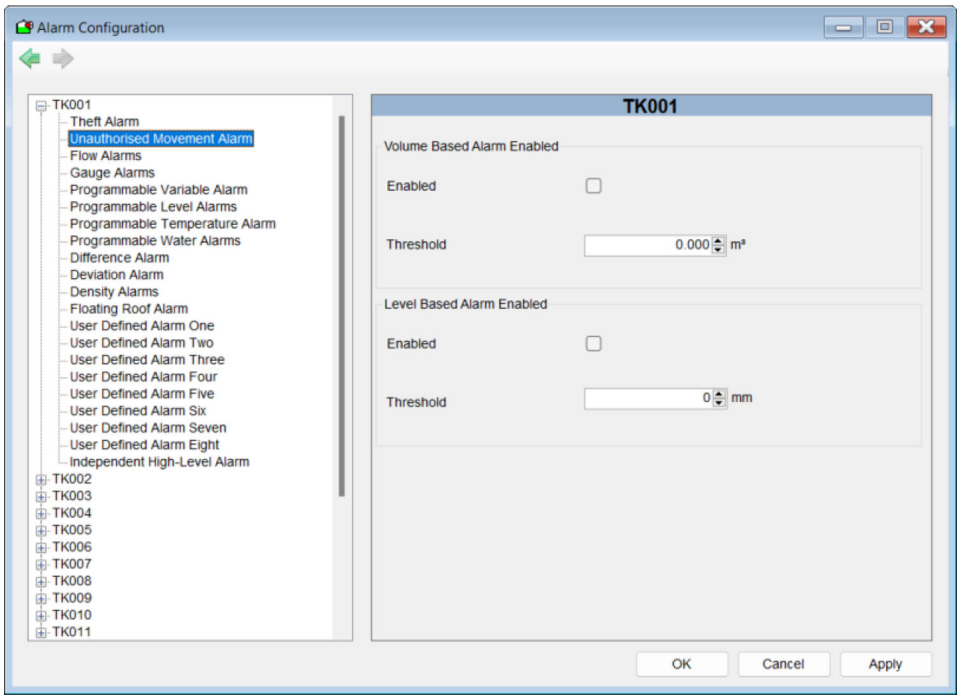
1. Select the **Alarm Configuration** option from the **Configuration** menu.



If tanks by user is enabled (see Chapter "Tanks by User"), only the tanks allocated to the user will be displayed in the list of tanks.

2. Expand the Tank to show the different types of alarms that can be configured.
   - Only the types of alarm that the current user has permissions to view will be shown.
3. Select one of the alarm types.
   - If the current user does not have permission to modify the alarm type, then the alarm details will be displayed but will not be editable. Similarly, if tanks by user is enabled (see Chapter "Tanks by User") and the current user does not have read/write access for a tank, then the alarm details for that tank will not be editable when they are displayed.

Unauthorised Movement Alarm



The unauthorised movement alarm protects against inadvertent movement of product in static tanks. This alarm should be enabled when the tank is to remain static, this has the action of internally storing the current GSV for the tank, should the GSV in the tank change beyond the predefined threshold limit, then the alarm will be triggered. The alarm should be disabled when movement of product into or out of the tank is being done.

The monitoring supports 2 different methods of detecting unauthorised movements, by standard volume and by level. If your tanks are equipped with temperature measurement, it is recommended that you use the volume based alarm, as temperature correction is incorporated into the calculations and should therefore result in fewer false-positive detections. The level based alarm is driven solely by changes in product level, which removes a number of other factors from the detection; it could be viewed a crude alternative or a much simplified implementation of the volume based alarm depending on your perspective.

Both can be used at the same time, but it will result in twice the number of alarms.

Automatic Control of Unauthorised Movement Alarms

Manual control of the unauthorised movement alarms involves operators deciding when a tank's levels should or should not change and remembering to enable and disable the alarm accordingly. This is prone to error unless rigorously administered. The tank gauging system has a number of mechanisms which allow for automatic control.

Full and Simple Movements

Set the **Automatically generate unauthorised movements** flag in the system settings (see "Automatically Generate Unauthorised Movements") and the action of starting and stopping a movement on a tank will deactivate and activate the unauthorised movement detection on the system. Typically sites adopting this approach mandate that all site activities that involve moving product in or out of a tank must be run through the tank gauging movements packages. When the **Automatically generate unauthorised movements** flag is set, enabling the unauthorised movement alarm on a particular tank just makes it possible that a tank will be monitored, if the alarm is unset no monitoring of the specific tank takes place. This feature is used by sites that have "day" tanks that are

permanently open to road loading bays, where it is not possible to determine when the product level in the tank should or should not be moving.

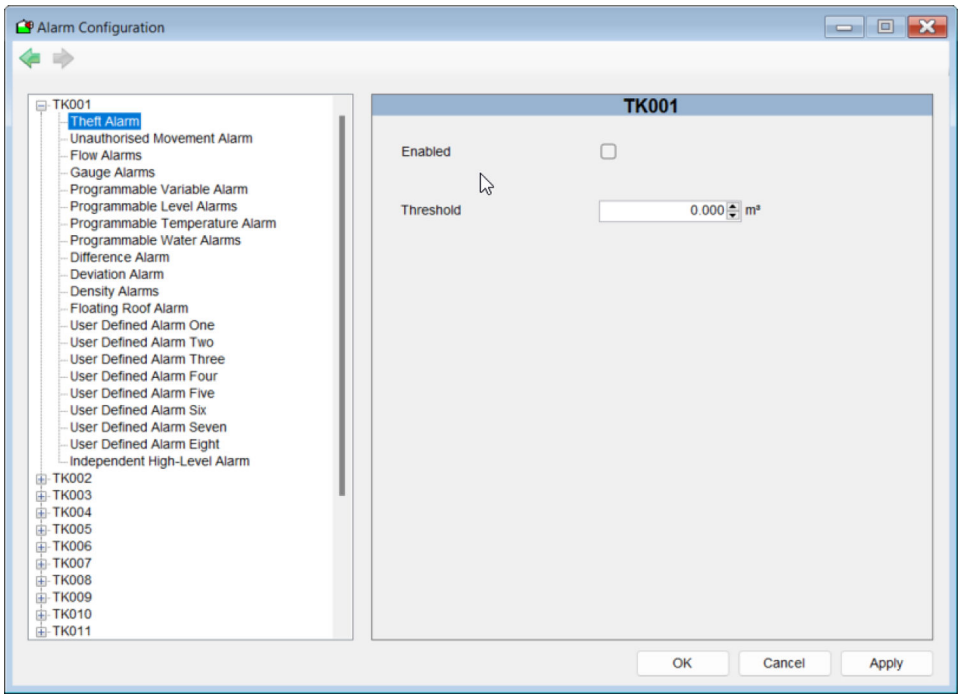
TAD Tank Modes

Tank modes can be defined that suppress the unauthorised movement monitoring (see System Operation manual BA00396G). Modes that have the **Alarms Suppressed** flag set will cause tanks assigned that mode to not be monitored for unauthorised movements. Changing the mode from an **Alarms Suppressed** mode to one that isn't causes the start level or volume to be recorded as the starting point for the monitoring.

This alarm is often referred to as a "Leak Alarm" although it equally refers to a gain of product as well as a leak.

There is only one configuration item for each of the unauthorised movement alarms. The major consideration when selecting a threshold for the alarm is to balance the utility in warning operators of possible leaks on site and the number of false-positives created by the alarms. Allowances need to be made for "swing" in windy weather, temperature fluctuations and the size of the tank: there is no substitute for experience in determining these values.

Theft Alarm



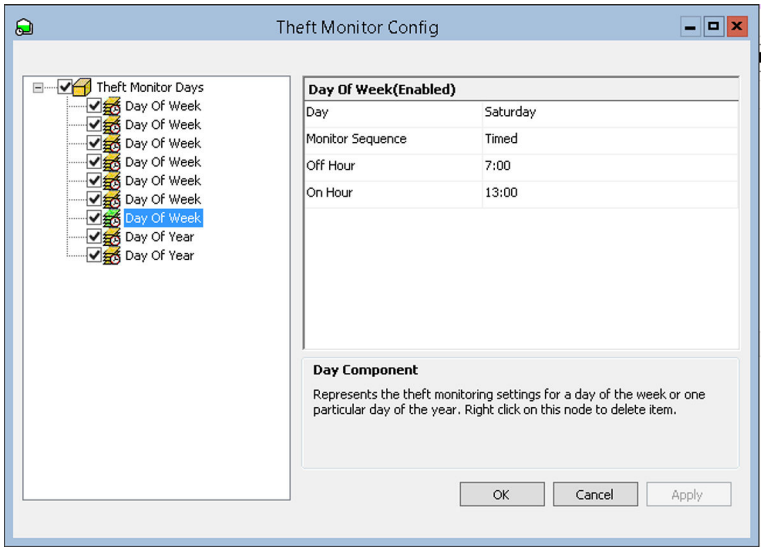
The **Theft Alarm** is similar to the **Unauthorised Movement Alarm** except that it only detects a loss of product and ignores gains. It also has a number of extra features, specific to theft monitoring. When the alarm is enabled the current GSV is stored as a starting value and any reduction in the volume greater than the threshold figure will then trigger the alarm. If the GSV increases then the starting value will be set to the new GSV value, thus it will automatically take account of any receipts of product. Once a Theft Alarm has been triggered it will reset itself after a user defined period and re-arm with the current GSV as a starting value.

There is just one tank configuration item for the theft alarm, **Threshold**, which dictates the amount of loss that must occur in order to activate the alarm. The amount is defined as a volume at standard temperature and conditions. The major consideration to make when choosing a threshold is finding a balance between too many false detections caused by thermal contractions as the product cools overnight and the timeliness of alerts to theft.

Larger tanks without temperature measurement and inaccurate gauges will require larger thresholds.

Theft Alarm Schedule and Reset Time

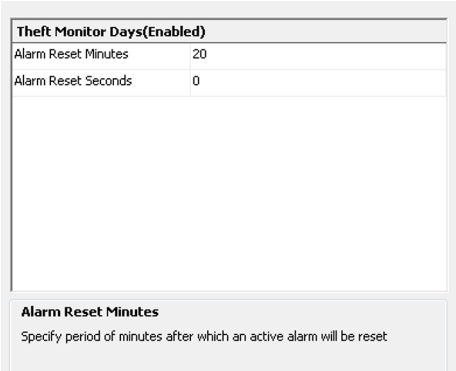
The **Theft Alarm** will only be monitored during user defined periods (i.e. during nights and weekends); outside of these periods no alarm will be generated even if the theft alarm is enabled. To configure the monitoring periods and the alarm reset period, the software tool **Theft Monitor Config** is used. This tool is only installed on tank gauging servers not clients, and can be accessed from the Home Page configuration menu. See figure below.



After using this tool it is necessary to start and stop services using the service manager utility to set up the alarm.

Alarm Reset

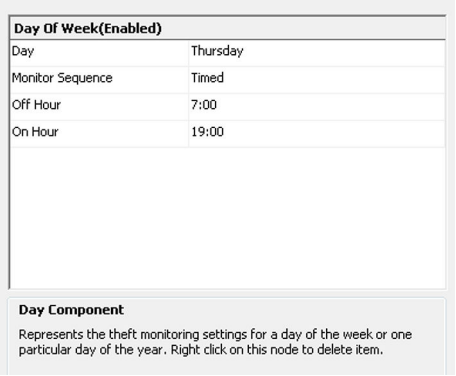
The time in minutes and seconds before alarm is reset. Shown in figure below.



When a theft is detected the alarm will remain active for the reset period (assuming that the alarm is not reset before then by an operator) after which alarm is cleared, thus re-arming the system to monitor for further losses. Should the thieves return a second time to take further fuel the system will then sound a second time. A reset time of 15 to 30 minutes is a typical value for this setting. This setting is accessed by selecting the **Theft Monitor Days** node on the left hand panel.

Day of week

Defines a schedule for the alarm on a particular day of the week as shown in figure below.



The alarm can be configured to be off for the whole day, be on for the whole day or conform to a particular timed schedule. Normally the alarm is deactivated during working hours, for example if the site working hours are between 7 am and 5 pm the **Off Hour** will be set at 7:00 and the **On Hour** at 17:00.

It is not possible to define more than one schedule for a particular day of the week and that the **Off Hour** must be earlier than the **On Hour**.

Day of year

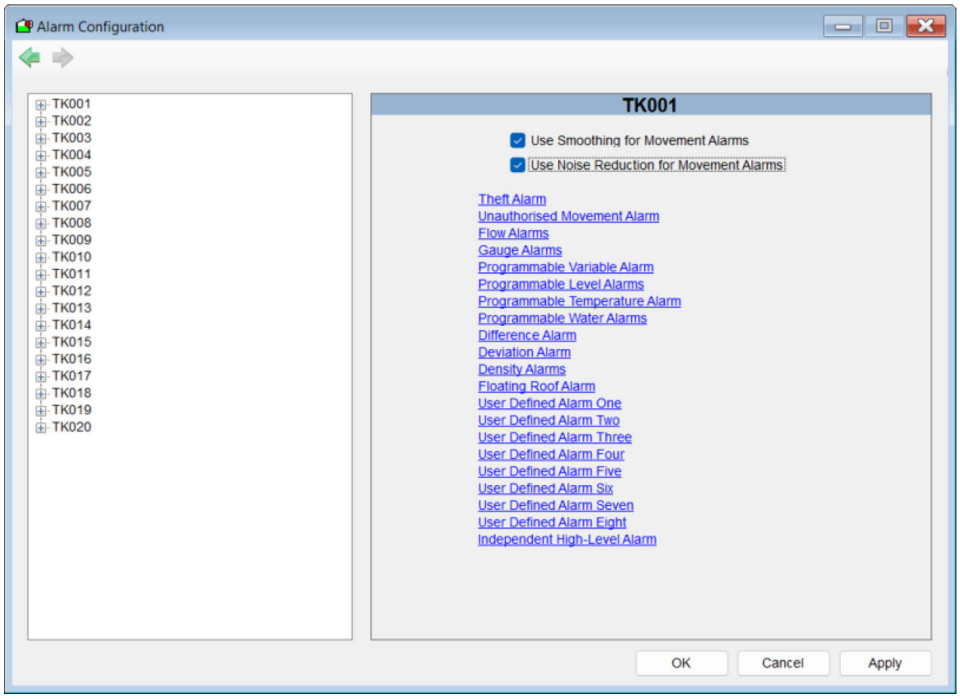
This defines the schedule for a particular day of the year, and overrides the schedule for the day of the week. It is similar to the day of week settings in that the hours are defined in an identical fashion. The difference is that the date defines a specific day of the year, e.g. Christmas day; 25th December. The same caveats apply as for Day of Week: only the first schedule for a particular day is considered, if multiples are defined, and the Off time must be before the On time.

After using this tool it is necessary to start and stop services using the service manager tool to set up the alarm.

Movement Alarms

In some circumstances it is necessary to reduce the sensitivity of the Unauthorized Movement and Theft Alarms.

Typical reasons are that radar gauges on empty tanks can give spurious jumps in level that would be detected as an Unauthorized Movement or that high winds acting on a floating roof tank cause the levels to "swing". In such situations the Unauthorized Movement and Theft Alarms can become a nuisance, distracting the operators from the real dangers on their site.

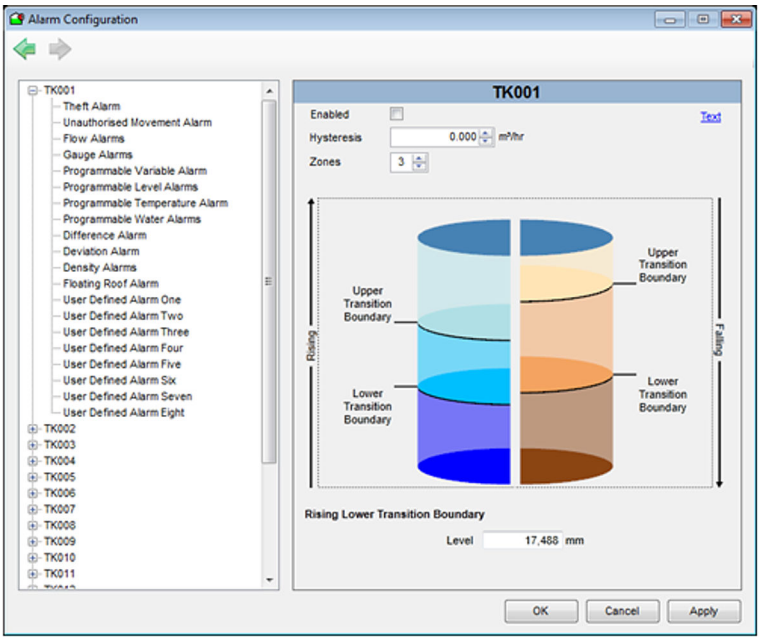


Use Smoothing for Movement Alarms
Apply smoothing to the volume and level used to test for the **Unauthorised Movement Alarm** and the **Theft Alarm**. The smoothing uses the same parameters entered for the flow calculations, i.e. Flow Rate Damping and Flow Rate Integration. These are entered in the **Device Configuration** screens.

Use Noise Reduction for Movement
Is similar to the above, but employs a 2 out of 3 voting mechanism to discard "jumps" in level which can be caused by radar gauges. Each successive level reading from the gauge is compared with the previous 2 readings, the most extreme reading is discarded and the level in the tank is considered to be the average of the 2 remaining. In this way outlier readings (i.e. jumps in gauged level) are discarded.

These settings have no effect on the product level and dependent inventory volumes and masses, it is only the levels and volumes used by the Unauthorised Movement and the Theft Alarm detection mechanism that are altered.

Flow Alarms



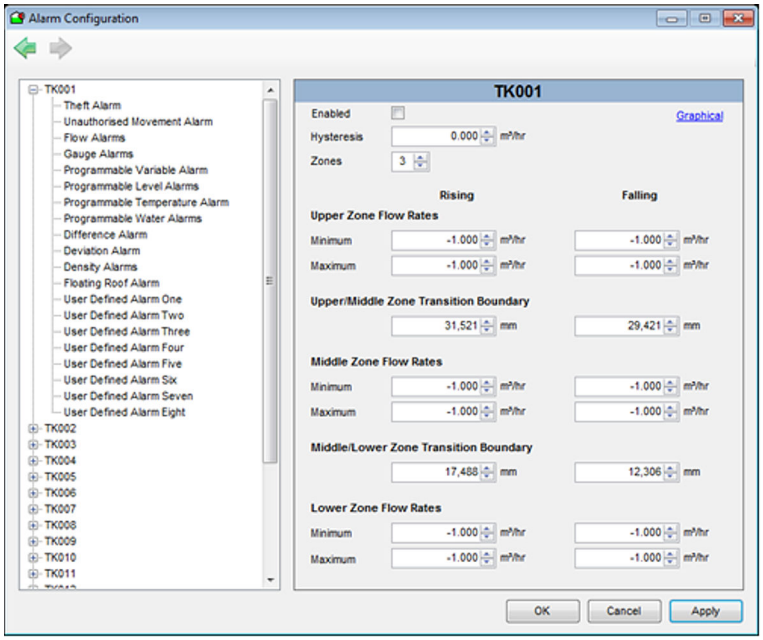
The flow alarms are intended for use when tanks are moving. They are useful to detect that flow has exceeded a tank or pipeline design limit or that flow has reduced or stopped perhaps due to some fault.

The alarms are configurable for up to 3 zones. The zone transition boundaries for Rising level alarms and Falling level alarms can be independently configured.

Transition boundaries may be dragged to the required level or selected and the required level typed into the **Level** entry field.

Flow rates for each zone may be entered by selecting the required zone and typing the **Min Flow Rate** and **Max Flow Rate** into the appropriate entry field.

Alternatively, clicking the **Text** link in the top right of the window switches from Graphical to Text entry.



Entering a negative flow rate value disables an alarm.

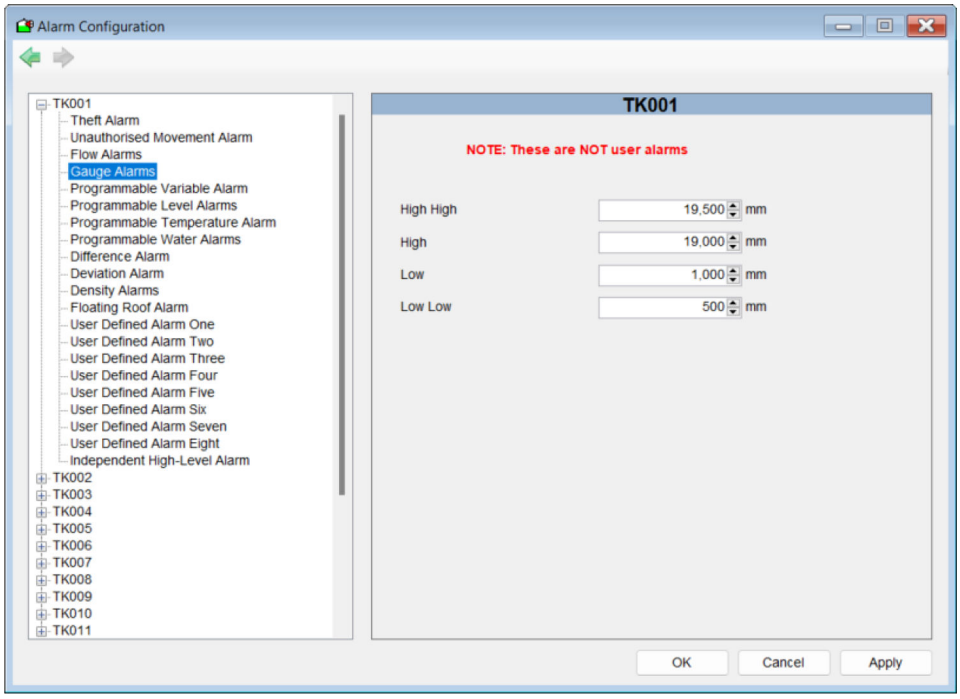
NOTICE

Set the boundaries correctly!

Failure to do so may result in alarms not being triggered.

- If only 2 zones are in use then both the lower transition boundaries must be set to zero.
- If only one zone is in use then all transition boundaries must be set to zero.

Gauge Alarms



Gauge alarms are those alarms that are generated by the gauging instrument itself. The alarm levels displayed here are normally only there for reference purposes.

On some modern technology gauges it is possible to read the gauge alarm settings from the gauge automatically.

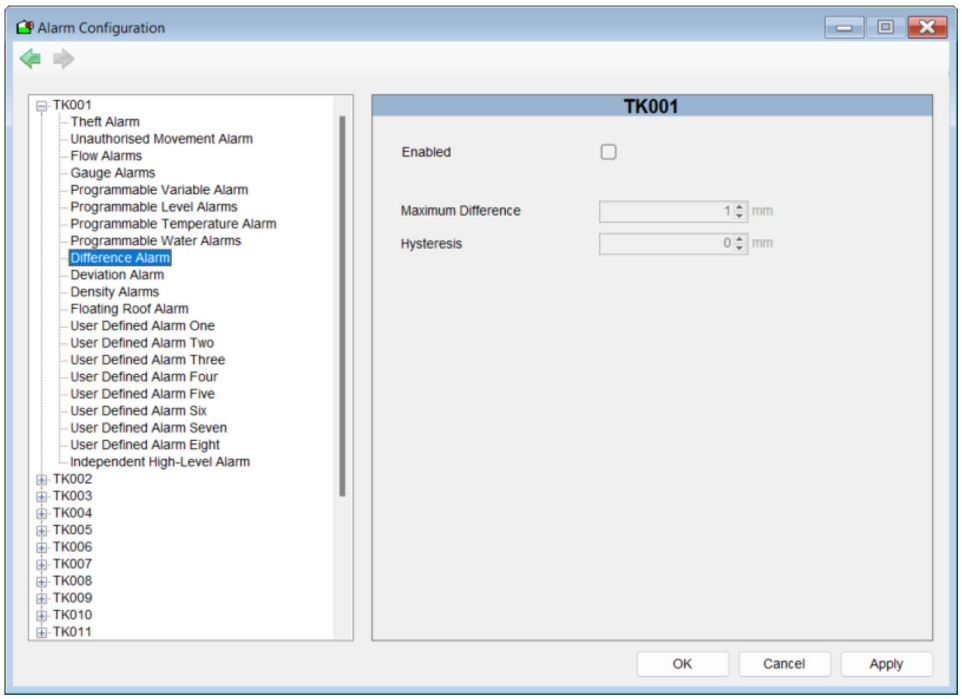
On older gauges this is not possible and provision is made to enter these manually within through this module.

Detection of gauge alarms is done by the gauging instrument and not by the Tankvision Professional/LMS software. Tankvision Professional/LMS merely reads the status of the alarm bits transmitted to it by the gauge.

Gauge alarm settings are normally set by the gauge commissioning engineer.

- **Gauge Alarm High High** - The gauge high high level alarm setting.
- **Gauge Alarm High** - The gauge high level alarm setting.
- **Gauge Alarm Low** - The gauge low level alarm setting.
- **Gauge Alarm Low Low** - The gauge low low level alarm setting.
- **Gauge Alarm Enable** - An operator configurable enable flag.

Difference Alarms



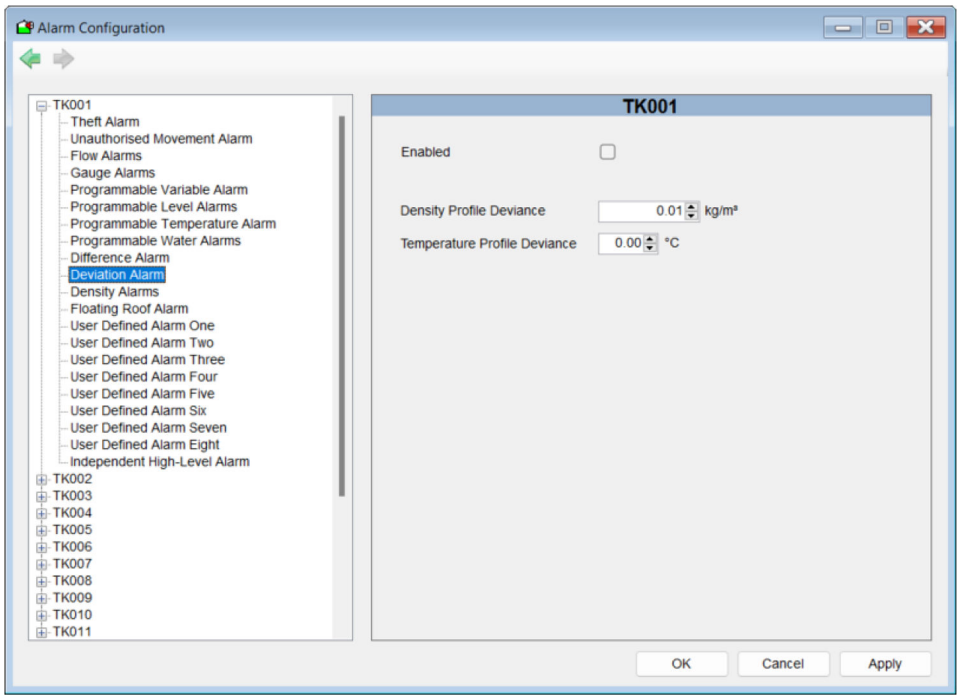
For example a tank fitted with 2 gauges will have one nominated as the primary gauge and the second as a secondary gauge. The system can then monitor the difference between the 2 gauge levels, and compare the difference to the allowable tolerance set by the user. If the difference exceeds the tolerance a difference alarm will be generated.

- **Difference Alarm Enable** - an operator settable signal to determine if the alarm is enabled or not.
- **Difference Alarm** - an operator configurable difference alarm.
- **Difference Alarm Hysteresis** - operator configurable hysteresis for difference alarm. If a hysteresis value above the Allowable Tolerance is entered then the following warning message is displayed: **Hysteresis is above the Allowable Tolerance!**

▶ Click the **OK** button to clear the warning.

↳ A hysteresis value below the Allowable Tolerance must be entered.

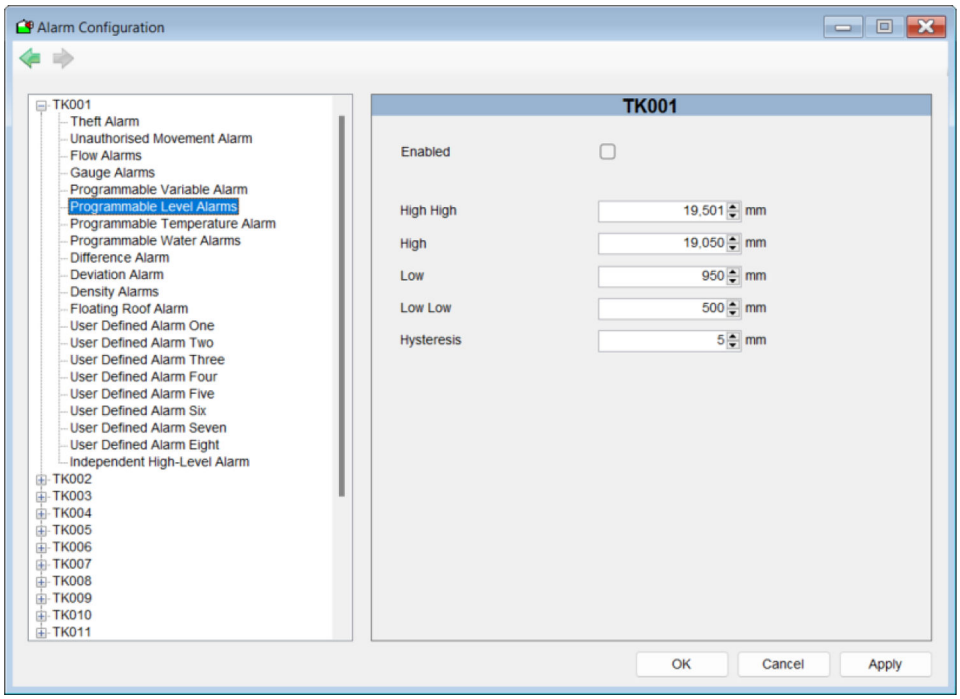
Deviation Alarms



The deviation alarm is used to alert operators to layering occurring in the tank. When 2 consecutive profile points deviate by the specified amount, either in their density readings or temperature, an alarm will be generated. This alarm requires the use of gauges capable of returning density profiles.

- **Deviation Alarm Enable** - Enables and disables the alarm.
- **Density Profile Deviation** - Deviation amount, for density points.
- **Temperature Profile Deviation** - Deviation amount, for temperature points.

Programmable Level Alarms



Programmable level alarms are triggered according to the gauged level, they can be used on gauges where hardware alarms are not available or used in addition to the gauge hardware alarms.

- **Level Alarm High High** - an operator configurable level alarm denoted High High.
- **Level Alarm High** - an operator configurable level alarm denoted High.
- **Level Alarm Low** - an operator configurable level alarm denoted Low.
- **Level Alarm Low Low** - an operator configurable level alarm denoted Low Low.
- **Level Alarm Hysteresis** - an operator configurable hysteresis value.
- **Level Alarm Enable** - an operator configurable enable flag.

The term **High High** is normally associated with the extreme upper limit to which a tank would be filled. Under normal operating conditions it would be unusual to trigger this alarm.

Consequently the term High is not as extreme as **High High** and is normally set a small distance below the **High High** limit.

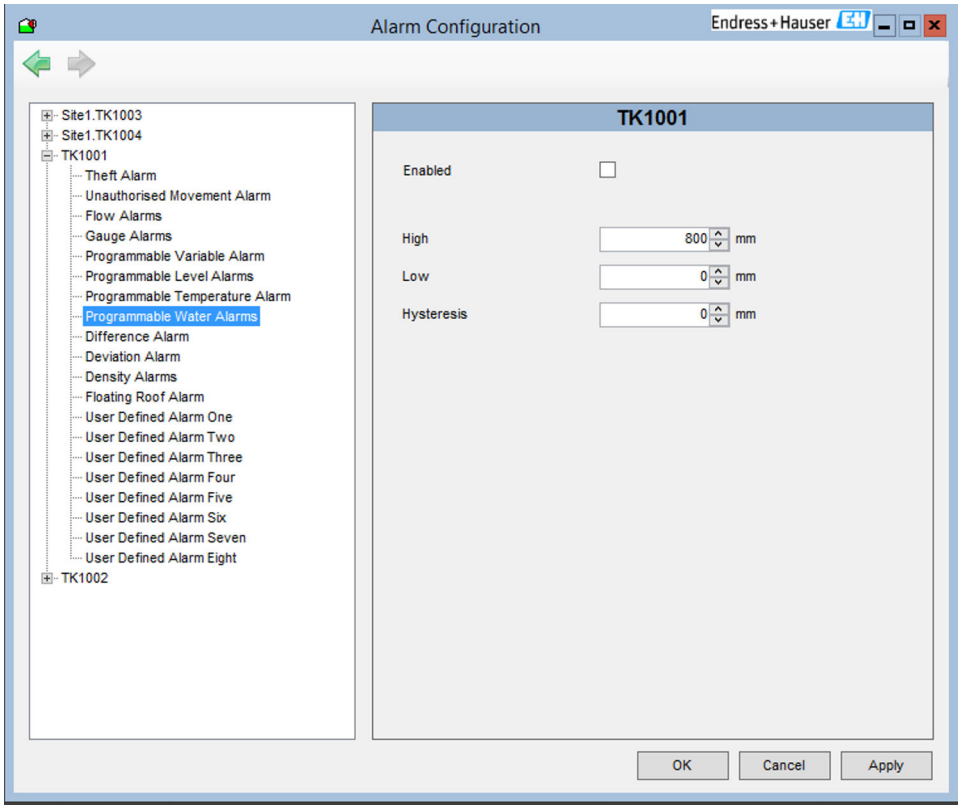
The term **Low Low** is normally associated with the extreme lower limit to which a tank would be emptied. Under normal operating conditions it would be unusual to trigger this alarm.

Consequently the term Low is not as extreme as **Low Low** and is normally set a small distance above the **Low Low** limit.

Clearly it is essential that all the alarms being used are configured correctly.

The programmable level alarms have equivalent gauge alarms. The programmable alarms would normally be set slightly below and slightly above there respective gauge alarm values. The programmable alarms would normally be used as early warnings to the gauge alarms. However the user can choose to use them as required although it is recommended that they are used within the context of the definition of the alarm to avoid confusion.

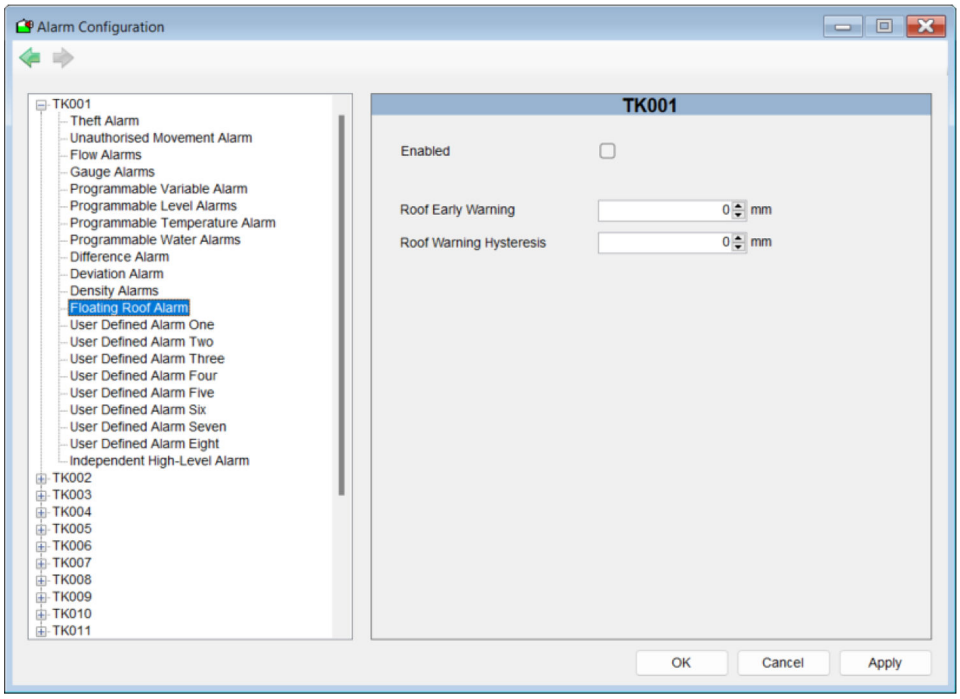
Programmable Water Alarms



Water alarms are triggered when tank water levels exceed the limits specified. If you do not require a low water alarm, set the low level to a negative value.

- **High Water Level** - an operator configurable free water level, above which the alarm will be triggered.
- **Low Water Level** - an operator configurable free water level, below which the alarm will be triggered - If a low water warning is not required set this to a negative value, to prevent it occurring.

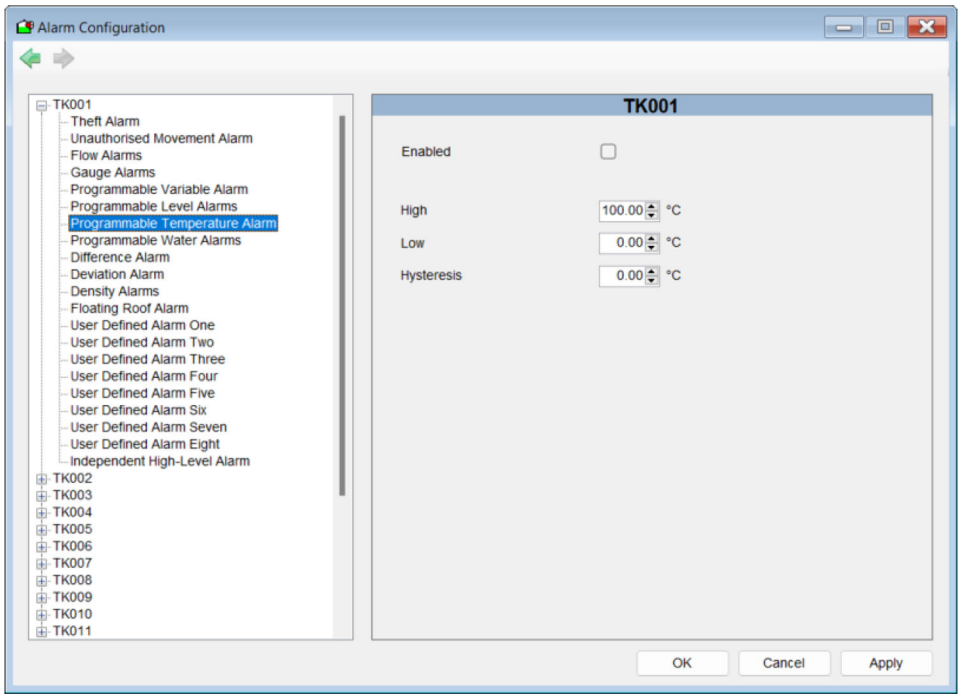
Floating Roof Alarm



The purpose of the Floating Roof alarm is to provide the operator with the option of generating a warning when the product level starts to approach the point where the roof starts to rest on its legs. Under normal operating conditions this is generally undesirable; therefore the alarm has been provided for that purpose.

- **Enabled** - when selected, the Floating Roof Alarm will be activated when the product level falls below the Roof Early Warning Level. The alarm will be cleared when the product level rises above the Roof Early Warning Level by more than the Roof Warning Hysteresis.
- **Roof Early Warning** - an operator configurable set point determining at what level the alarm will be generated. The level would normally be programmed above the Roof Fully Floating level set in the configuration tool.
- **Roof Warning Hysteresis** - the operator configurable distance by which the product level must return above the Roof Early Warning Level in order to clear the Roof Early Warning Alarm.

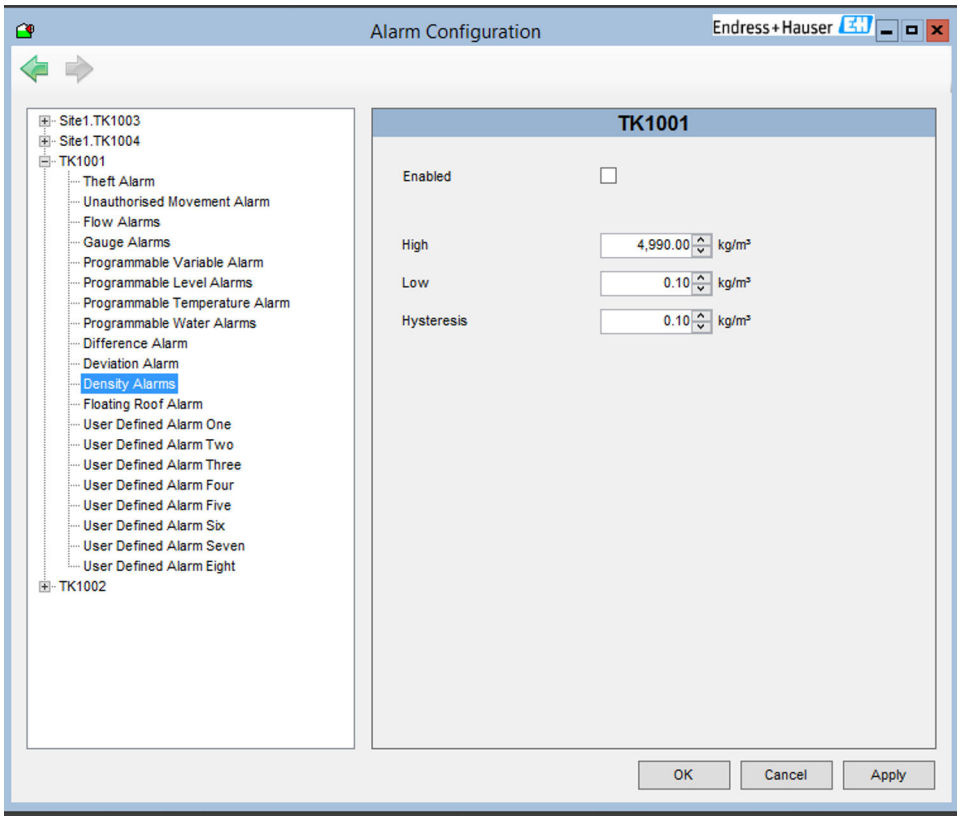
Programmable Temperature Alarms



These are operator programmable temperature alarms.

- **High** - an operator configurable high temperature alarm.
- **Low** - an operator configurable low temperature alarm.
- **Hysteresis** - an operator configurable temperature hysteresis.
- **Enabled** - an operator configurable temperature alarm enable.

Density Alarms



These are operator programmable density alarms.

- **High** - an operator configurable high density alarm.
- **Low** - an operator configurable low density alarm.
- **Hysteresis** - an operator configurable density hysteresis.
- **Enabled** - enables and disables the alarm.

9.4.2 Modifying Data within Alarm Configuration

To modify data within the Alarm Configuration module, proceed as follows:

1. Select the tank to be modified from the list and the type of alarm to be modified. The current details for the alarm for that tank will be displayed.

Take note that if this is the first time Alarm Configuration has been loaded after installing the system it will be displaying default values. It is essential that default values are replaced with the correct operating values.

2. Select the field to be edited and type in the new data values.

Each field is validated both during data entry and just before the data is saved to the database. You can use the **TAB** key to move to the next entry field.

3. If the changes made are correct and you want to save them, press the **Apply** button to save the changes to the database.

To edit further tanks follow the same procedure.

4. If you want to abandon any changes made since the last time the **Apply** button was pressed, press the **Cancel** button.
   ↳ This will also exit the application.

5. To exit the application, either close the Window or press the **Cancel** or **OK** buttons.

9.4.3 Generation of Alarms

Normally in a standalone configuration the alarms are detected and generated by the Data Communications Control module. It is this module that sees the changes in gauge data first. In a client-server system it is the same module that detects and reports the alarms although it is important to note that this module will only be running on the server.

Any client connected to the server will therefore see the same alarms.

Some events may be generated locally by each client. These are normally events in response to abnormal operating data or transient or irrecoverable data access errors.

9.4.4 Enabling and Disabling Alarms

Enabling an alarm means that the variable associated with the alarm will be monitored against its set limits and when it deviates outside of those set limits an alarm will occur.

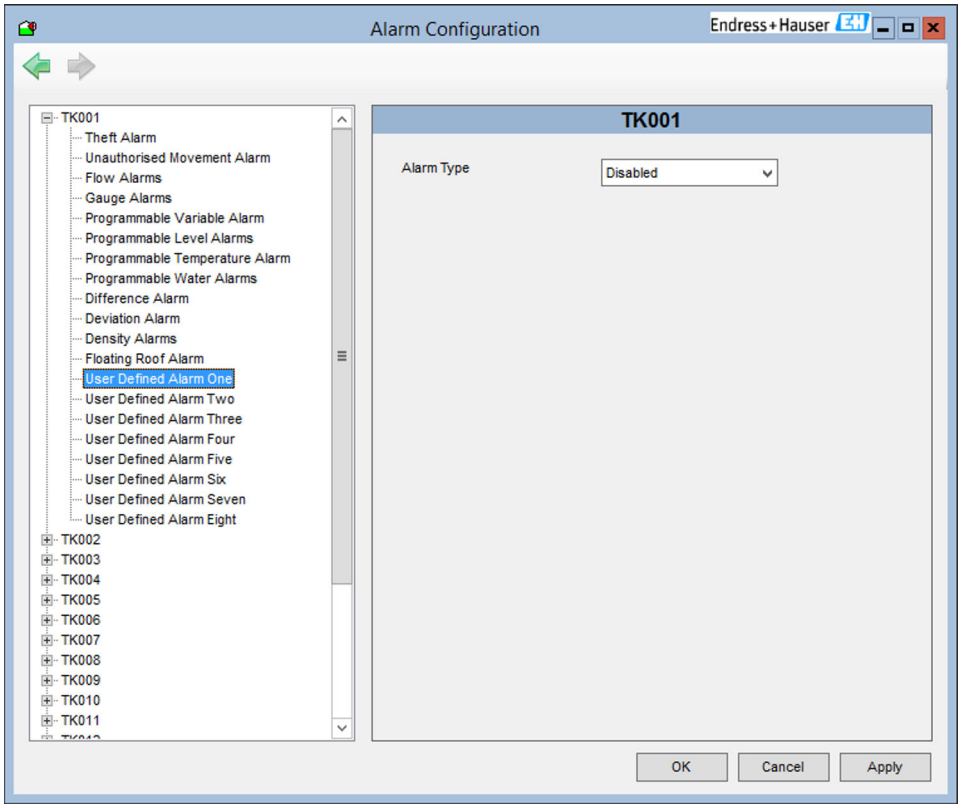
Disabling an alarm means that no alarm processing will take place for the disabled alarm and therefore no event, audible signal or otherwise will be generated if the variable goes outside of its set limits.

Alarms can generally be enabled or disabled in one of 2 ways:
- The alarm configuration display provides a check box within each tab for enabling or disabling the alarm.
- Alternatively, the pop-up menu allows the user to enable and disable the alarms.

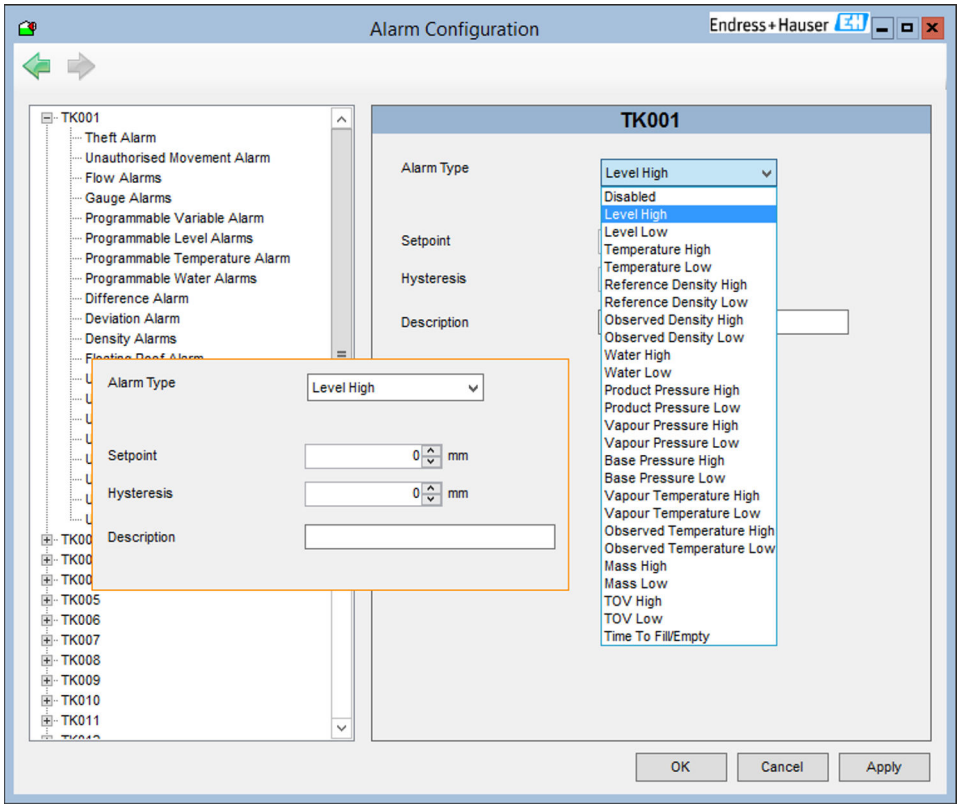
The enabling and disabling of alarms is logged to the audit trail file.

9.5 User Defined Alarms

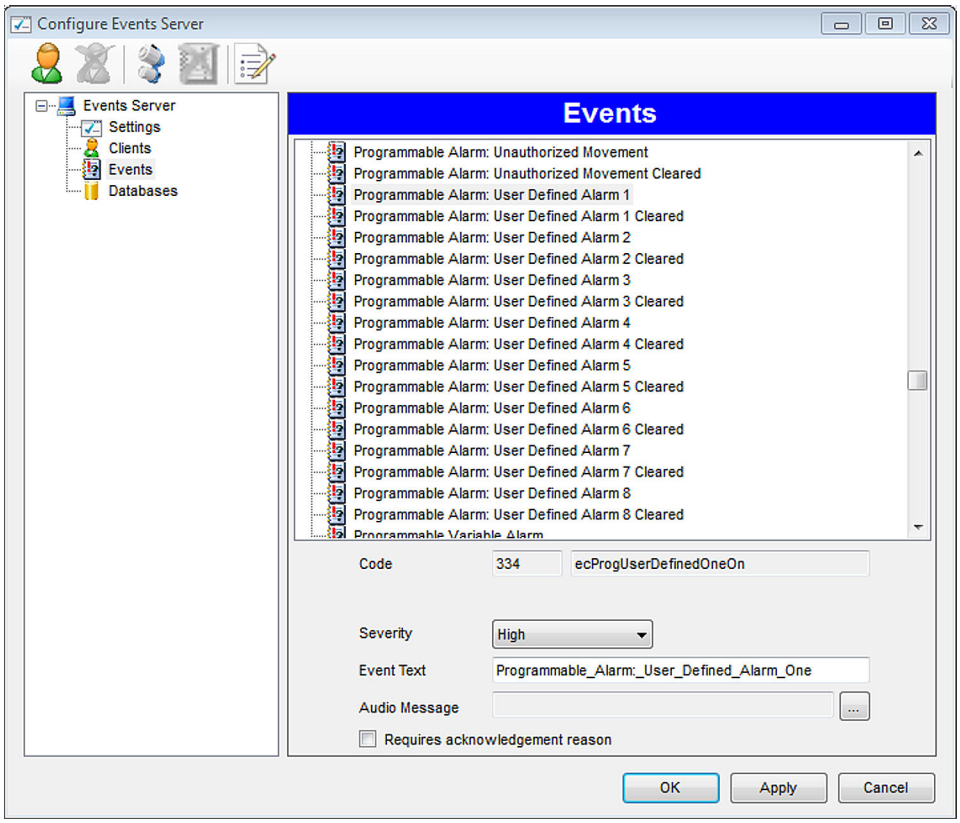
User Defined Alarms (Programmable) are a set of alarms which the user may configure based on a set point and hysteresis. There are 8 alarms **User Defined Alarm One** to **User Defined Alarm Eight**.



There is a drop-down box to select the alarm type and a text box to enter the alarm description.



The text that is displayed when the alarm is activated or cleared and the severity is set in Event Server Configuration.

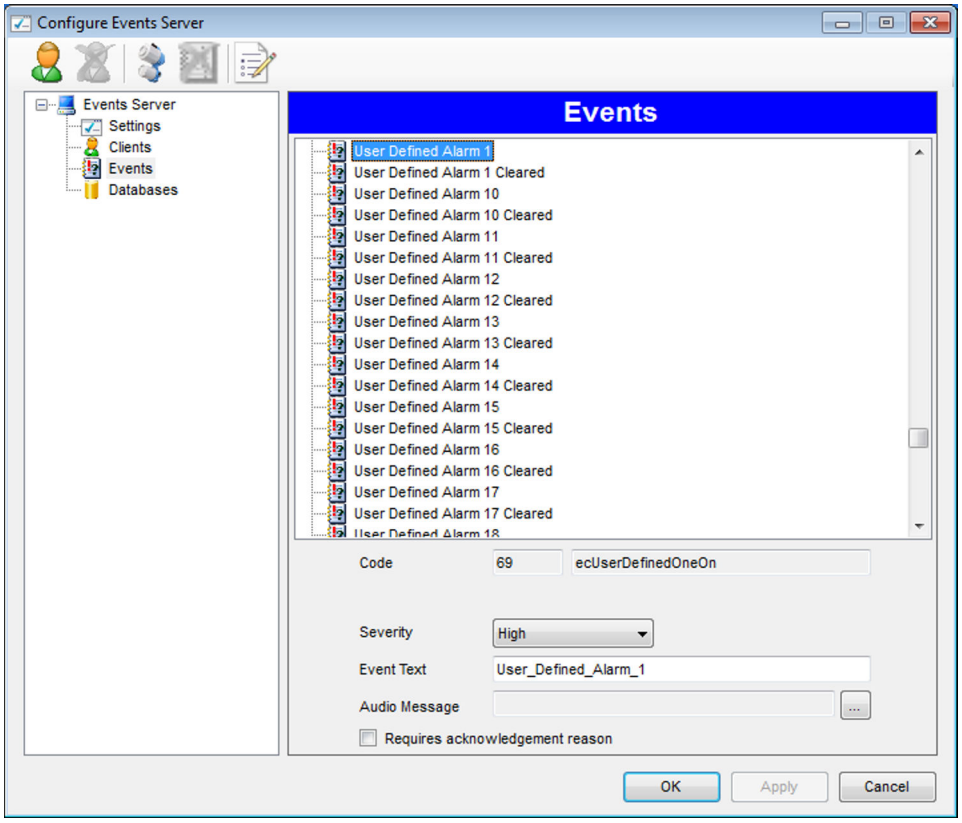


9.6 User Defined Alarms (Gauge)

User Defined Alarms (Gauge) are a set of alarms generated by certain gauge types, Bit pattern data is received by the application from a Modbus or OPC host which must be configured in DCC (see DCC config document). The user may configure the text to be displayed when the alarm is activated and cleared.

There are 32 such alarms per gauge:
- User Defined Alarm 1
- User Defined Alarm 2
- User Defined Alarm 3
- Etc. etc. up to;
- User Defined Alarm 32

The alarms are available in the database for all gauge types which support Modbus or OPC. To configure the text and severity, display the **Events** page of the **Event Server Configuration** utility.



From this page the settings for each alarm in the system can be defined.

▶ To show the settings select the alarm from the list.

The user defined alarms are:
- **User Defined Alarm 1**
- **User Defined Alarm 1 Cleared**
- **User Defined Alarm 2**
- **User Defined Alarm 2 Cleared**
- **User Defined Alarm 3**
- **User Defined Alarm 3 Cleared**
- Etc. etc. up to;
- **User Defined Alarm 32**
- **User Defined Alarm 32 Cleared**

The On and Cleared parameters define what text is displayed when the alarm is activated and cleared. These should be modified by the user to the required text.

The severity may be set by the user as required.

The Event Server should be restarted to load any new alarm definitions. Use the service manager utility to do this.

10 Product Configuration

When first installed, the system has no product information.

This function is used to enter the names of the products stored on-site.

Product Configuration can be launched at any time in order to edit and modify existing products as well as add new products or delete existing products. Each product needs to be allocated to a product type. By default, a **GENERAL** product type exists. Other product types can be created using this function.

The use of this feature can be controlled by the security system.

10.1 Product Types

Product Types allow the user to group products that have similar characteristics.

For example, general product types might be configured as:
- DISTILLATES
- SPIRITS
- CRUDE
- HEAVY OILS
- FUEL OIL

The following products may for example be members of the DISTILLATES product type:
- DERV
- KERO
- GAS
- OIL
- JET A1

Similarly, the following products may be members of the SPIRITS product type:
- ULMS
- LRP
- UL 95
- UL 98

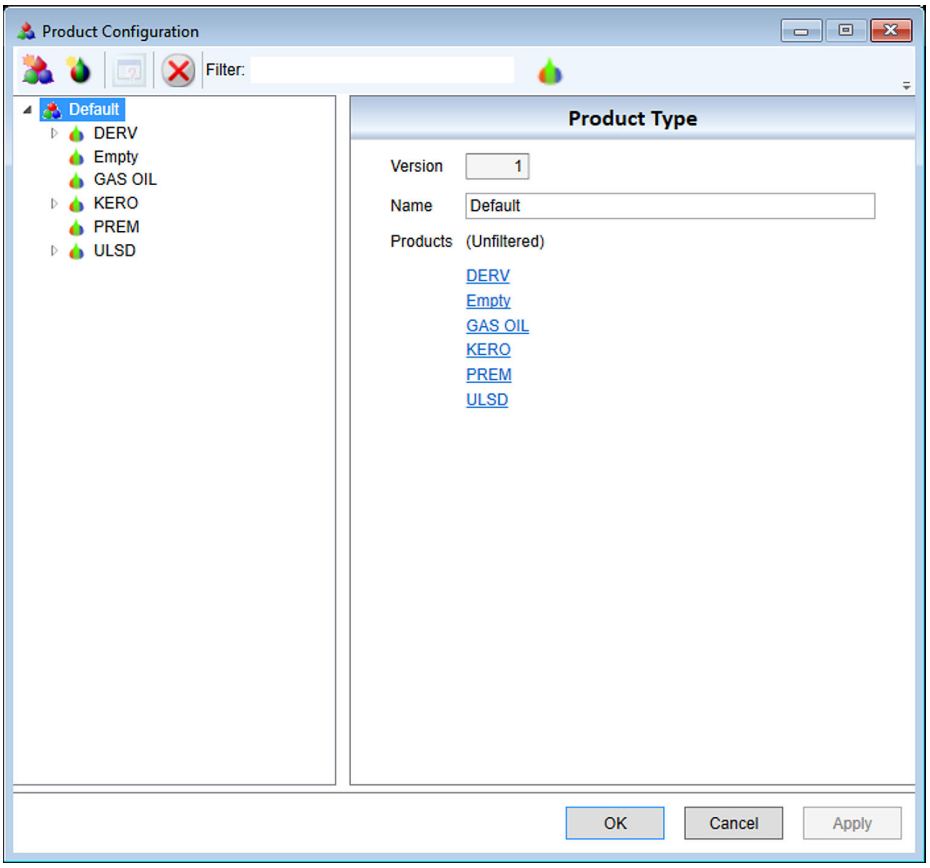
And so on.

The system provides features that allow the user to view tanks by product type.

10.2 Launching Product Configuration

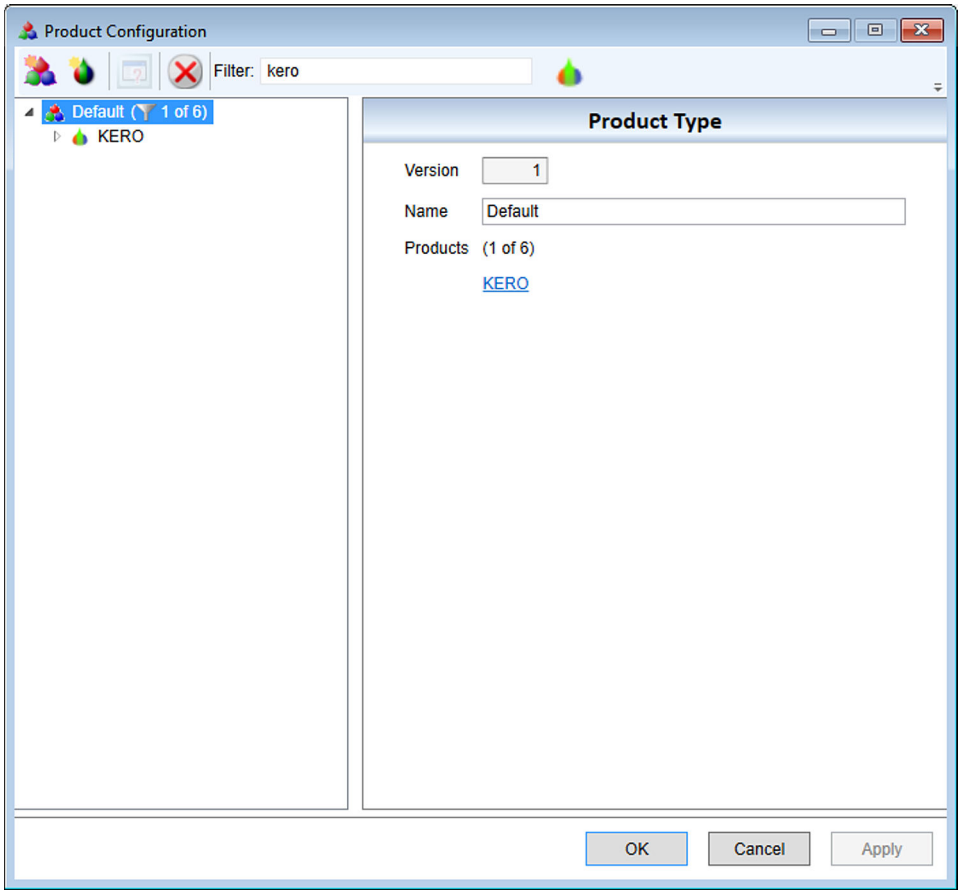
To launch the Product Configuration module, proceed as follows:

- Select the **Product Configuration** option from the **Configuration** menu.



The details of the product or product type selected from the list are displayed in the righthand pane.

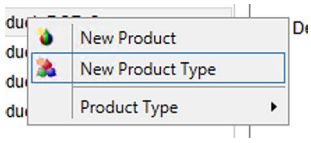
A filter has been provided, as shown in the figure below. This can be useful for locating a particular product when a large number of products have been configured. To filter the products, type the filter criteria into the text box in the toolbar. Any products whose name contains the filter text will be displayed. There is an indication of the number of products included in the filter shown in the product/product type list and also on the product type details pane.



10.2.1 Creating a Product Type

To create a product type, proceed as follows:

1. Click on the **New Product Type** toolbar button.
2. Enter a name for the product type.
3. Click **Apply** or **OK** to save the new configuration.
4. Alternatively click on any entry in the product or product type list with the right mouse button and select **New Product Type** from the menu.

   ↳ 

   The new product type will be created and inserted into the list.

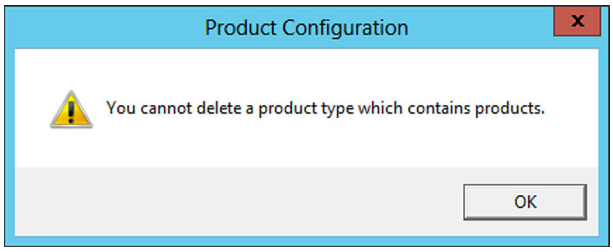
10.2.2 Modifying a Product Type

The only item that can be modified for a product type is the name. To modify the name, proceed as follows:

1. Select the product type from the list of product types.
   ↳ The existing details will be displayed in the right hand pane.
2. Edit the name as required and click **Apply** or **OK** to save the new name.
   ↳ The version number will automatically increment.

10.2.3 Delete Product Type

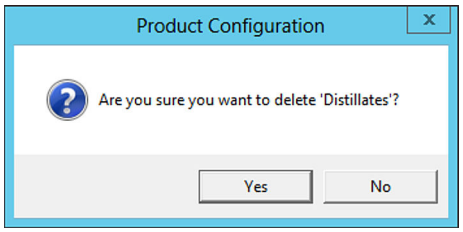
Product types that contain products cannot be deleted. Attempting to delete a product type which contains products will result in the following error message.



In order to delete a product type, all products within the product type must first be deleted or moved to a different location.

To delete a product type, proceed as follows:

1. Select it from the list of product types and click the **Delete** toolbar button.
2. Confirm that the product type is to be deleted in the pop-up.



The **GENERAL** product type cannot be deleted.

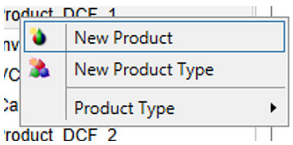
10.2.4 Creating a New Product

To create a new product, proceed as follows:

1. Select the product type that will contain the product and click on the **New Product** toolbar button.
2. Enter a name for the product, select a colour to represent the product and, optionally, add a product code (up to 8 characters) and a description.
3. Click **Apply** or **OK** to save the configuration.
   ↳ The new product will be created and inserted into the list under the currently selected product type.

The use of colour is determined by options configured in the **System Settings** module. Please refer to this section for a description of these settings.

Alternatively click on any product type, or entry within the product type, with the right mouse button and select **New Product** from the menu to create a new product in the selected product type.



10.2.5 Modifying a Product

To modify a product, proceed as follows:

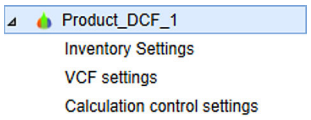
1. Select the product from the list. The existing details for the product will be displayed in the right hand pane. The name, colour and description for the product can then be modified.

A product can also have a set of characteristics configured which will override the corresponding settings in the configuration tool which will then appear grayed out and will be fixed for use with the selected product. This is not an exhaustive set of characteristics and should not be considered an alternative to configuring characteristics for individual tanks. It is, however, useful for fixing a set of characteristics for a particular product.

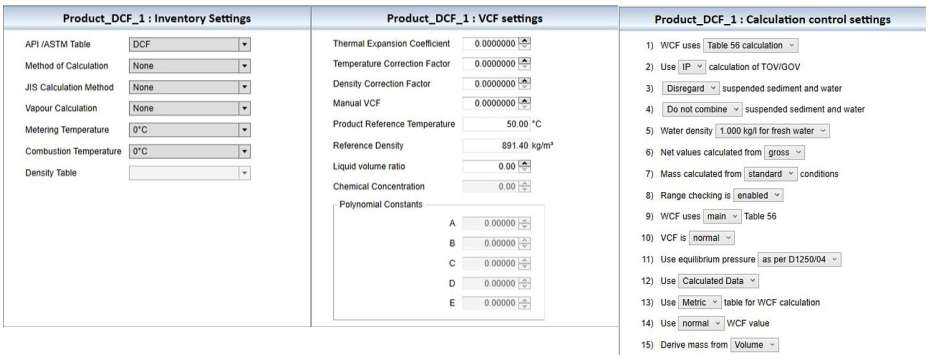
2. To add characteristics select the product and then click the **Add Characteristics** toolbar button. If a product already has characteristics, then the toolbar button is displayed differently and can be used to remove the characteristics.

If characteristics are removed they will then need to be set on each tank containing the product.

A product which has characteristics set can be expanded to show additional entries:



3. Select the entry to show the settings available for each heading.



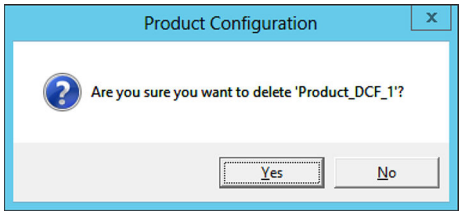
Refer to the section on the configuration tool for more details on these settings.

4. Click the **Apply** or **OK** button to save the settings.

10.2.6 Deleting a Product

To delete a product, proceed as follows:

1. Select the product from the list and click the **Delete** toolbar button.
2. Confirm the product is to be deleted in the pop-up.

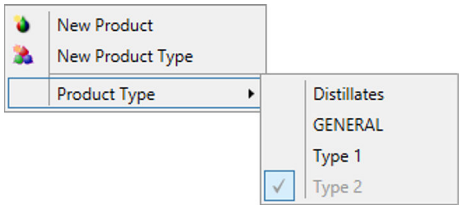


The **Empty** product is required as the default when creating new tanks so cannot be deleted, also products which are currently allocated to a tank cannot be deleted.

10.2.7 Relocating a Product

To relocate a product, proceed as follows:

- To move a product from one product type to another it can either be dragged with the mouse from its current product type to the new product type, or it can be clicked with the right mouse button and the new product type selected from the menu.



10.2.8 Displaying Product Codes

Products may be selected using either Product Names or Product Codes.

To change between names and codes, proceed as follows:

- Click on the toggle (/) button in the Product Configuration menu bar. This will affect product selection in the configuration tool, on the Home page and in the SCADA screens.

10.2.9 Saving Changes

To save changes made to products and/or product types, proceed as follows:

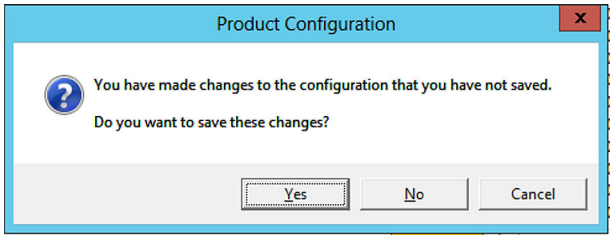
- Click either the **Apply** or **OK** button.
  - Clicking **Apply** will save the changes and keep the product configuration screen open allowing for further editing.
    Clicking **OK** will save the changes and then close the product configuration screen.

If a product with characteristics has been modified, then any characteristics of the product will be applied to all the tanks that have that product allocated when the product changes are saved.

10.2.10 Discarding Changes

To discard any changes made, proceed as follows:

- Click the **Cancel** button.
  - The following message will be displayed if there are any unsaved changes.



10.3 Allocating Products to Tanks

Once all the product information has been entered the products can then be allocated to their operational tanks.

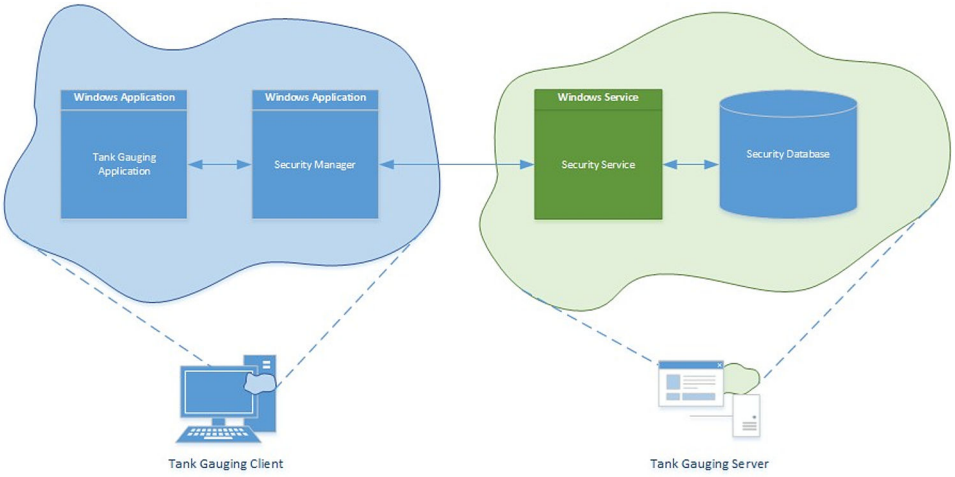
The Configurator tool module is used to allocate a product to a tank. See the section detailing the Configurator tool module for a full and complete description.

Alternatively, the product allocated to a tank can be changed from the Home Page, Single Tank Overview and SCADA screens. See the relevant sections in the Operations Manual for more details.

11 Security

The application is provided with its own security and user administration functions. It is not dependent on Windows system security for access to its features.

The tank gauging applications check that the current user has access privileges for the features in the module by communicating with the Security Manager running in their Windows session. This in turn communicates with the Security Service on the Tank Gauging server, if the system is a standalone one, then the service will be running in the background on the same machine, otherwise it may be running on a remote server over the local area network. This service stores the security information in a database called "TGSecurity" on the server. The figure below represents this architecture.



When troubleshooting security problems it is important to consider all the pieces in the security system, the problem might lie in the communications between the Security Manager on the client and the Security Service on the server, or with the connection between the Security Service and the database.

Redundant Systems
If your system is a redundant one there are instances of the Security Service running on both servers, each system also has a copy of the TGSecurity database. In normal operation when both servers are available Security Manager will communicate with one of the servers: there is no way to determine which server the Security Manager is using, nor is there a way to command the Security Manager to connect to a particular server.
In the event that one of the servers fails, the Security Manager will connect to whichever of the servers it can. While in the failed state users can continue to log in and out of the system and features such as automatic log out are maintained. However, in such a state, the security system will prevent security settings from changing, the alteration of users and groups and users changing their passwords. This is in order to preserve the synchronisation of the TGSecurity databases on the 2 systems.

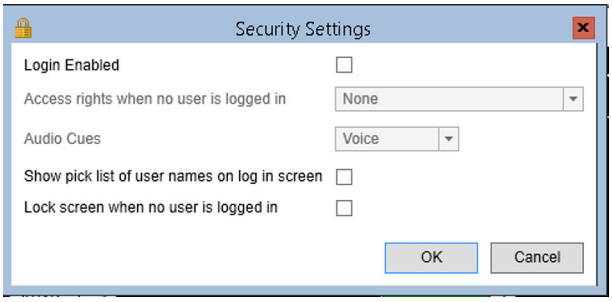
Initial Set up
During initial installation an Administrative account is created as part of the Set-up procedure. Thereafter additional user accounts can be created by a user with administrative privileges.
The security maintenance features are accessed via the Security menu.
The security features should be used carefully to ensure users have the correct access rights for their day to day tasks yet prevent unauthorised access to the other features.

11.1 Security Settings

In order to adjust the security settings, proceed as follows:

1. Log on to system as an administrator.

2. Select the **Security Settings** option from the **Security** menu.
   ↳ The following screen appears:



User Access rights (from User group) are only applied if **Login Enabled** is enabled.

3. Adjust the settings according to the explanations below.

Login Enabled
Determines whether the use of logins should be disabled throughout the whole application. If this option is checked, the system will prompt for a User name and Password before providing access.
If this option is not enabled, no login prompt will appear.
Clearly this option needs to be treated with care.

Access rights when no user logged in
If Login is enabled, there is obviously a state when the user logs out or when the system starts up. You can assign a user group for this state and then define what actions the system will accept without a user being logged on. For instance you may allow users to change the arrangement of tanks on the screen without logging on, but require that users log in to acknowledge an alarm.

Audio Cues
Changes the way that users are informed of a need to log in.
- **Voice**: A spoken announcement is made, currently the only language spoken is English.
- **Sound**: A simple beep noise is given.
- **None**: There is no audible indication of a need to log on.

Show pick list of user names on log in screen
Determines whether a pick list of user names is displayed on the log in screen instead of the user name text field. Use of this setting is not recommended since it reduces security.

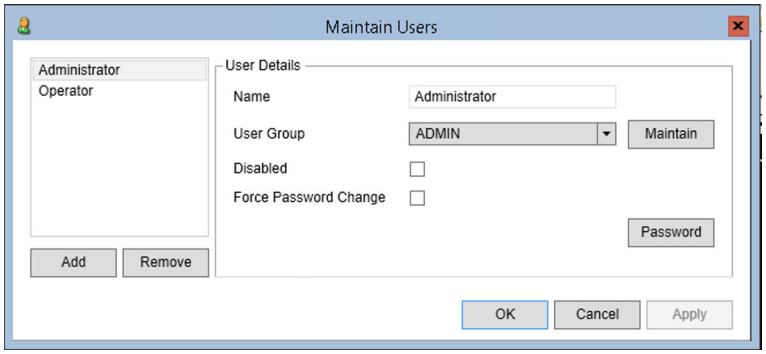
Lock screen when no user is logged in
Determines whether the screen is locked when no user is logged in. If this option is ticked the screen is locked when the user logs out. Before anything can be accessed on the computer, a user must log in.

11.2 User Maintenance

In order to launch the User Maintenance module, proceed as follows:

1. Log on to system as an administrator.

2. Select the **Maintain Users** option from the **Security** menu.
   ↳ The following dialog opens:



11.2.1 View or Edit Details of an Existing User

To view or edit details of an existing user, select the user in the list. Details of the user will be displayed in the **User Details** area.

If you have access rights to edit users, the following details can be edited.

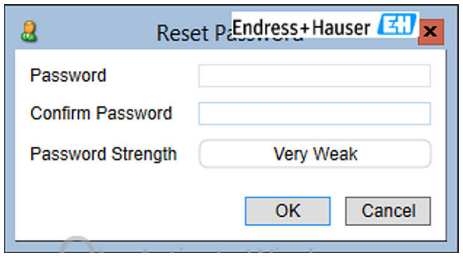
Name
The name of the user.

User Group
The user group that the user belongs to. It is the user group that determines the areas that the user has access to. To edit user groups click the **Maintain** button.

Disabled
Determines whether the log in for the user is disabled. This can be set explicitly on this screen, or automatically by the system depending on the user group when the user incorrectly enters their password. To re-enable this user, untick the box.

Force Password Change
Forces the user to change their password the next time that they log in. This can be used in conjunction with the **Password** button to reset their password, but force them to change it the next time they log in, so that the administrator doesn't know their password.

Password
Click this button to reset the password for the user:



11.2.2 Adding a New User

To add a new user, click the **Add** button. A new user will be added to the list and selected ready for editing.

11.2.3 Deleting a User

To delete a user, select them in the list and click the **Remove** button. If the user is currently logged in you will be unable to delete them.

11.2.4 Saving Changes

To save the changes to the users click the **Apply** button. To save the changes and close the screen click the **OK** button.

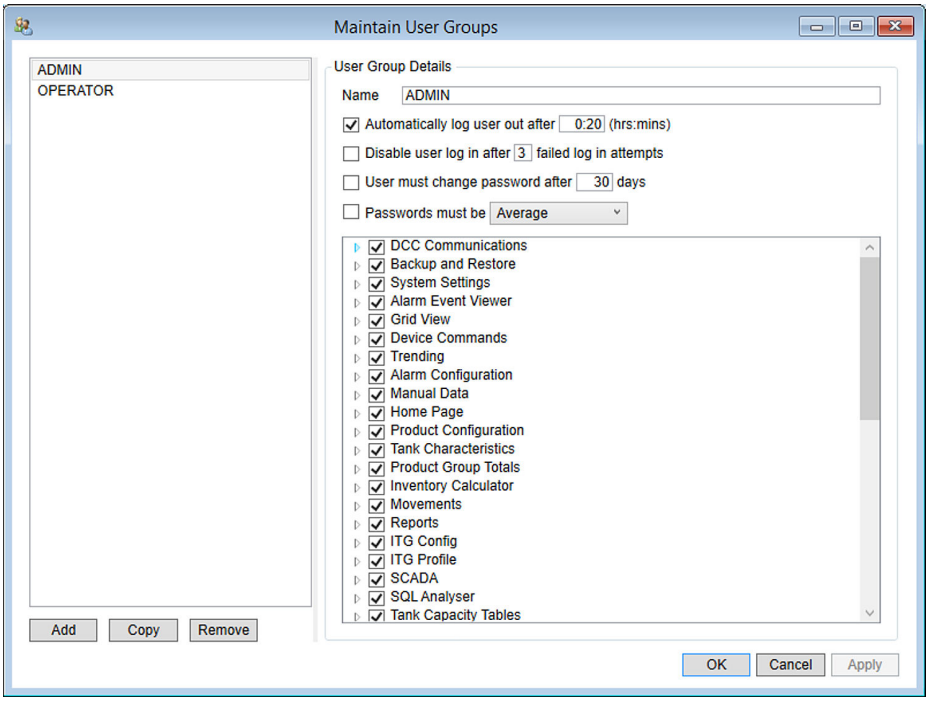
11.2.5 Discarding Changes

To discard the changes to the users click the **Cancel** button. This will discard the changes and close the screen.

11.3 User Group Maintenance

To launch the User Group Maintenance module, proceed as follows:

1. Log on to system as an administrator.
2. Select the **Maintain User Groups** option from the **Security** menu.
   ↳ The following dialog opens:



11.3.1 View or Edit Details of an Existing User Group

To view or edit details of an existing user group, select the user group in the list. Details of the user group will be displayed in the **User Group Details** area.

If you have access rights to edit user groups, the details can be edited.

Name
The name of the user group.

Automatically Log User Out
Determines whether users belonging to the user group will automatically be logged out after a given period of inactivity.

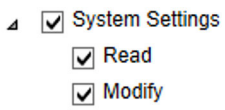
Disable User Log In
Determines whether users belonging to the user group will have their accounts disabled if they incorrectly enter their password the specified number of times.

User Must Change Password after
Determines whether users belonging to the user group will be forced to change their password after the given number of days.

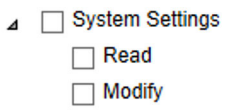
Password Strength
Determines whether users belonging to the user group will be forced to use passwords of the given strength.

If this option is used, passwords are case sensitive, otherwise passwords are case insensitive.

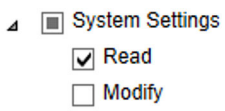
Access rights
To view details of a specific access right click on the ▷ button to the left of it. This will show further details:



Access rights granted for a user group are indicated by a tick. To remove or grant an access right click on the box next to it. This will toggle whether it is granted to the user group. Clicking on a 'parent' access right (for example **System Settings** above) will remove or grant access to all the options underneath it. So, for example, to prevent a user accessing the **System Settings** area, you could untick the box next to **System Settings** and this would remove the ticks from the **Read** and **Modify** boxes underneath it.



If the access rights under a 'parent' access right are in a mixed state (some ticked and some unticked), the box for the 'parent' access right will be filled in:



User Access rights (from User group) are only applied if **Login Enabled** is enabled.

11.3.2 Adding a New User Group

To add a new user group, click the **Add** button. A new user group will be added to the list and selected ready for editing.

11.3.3 Copying a New User Group

A new user group can be copied from an existing one, to make setting up access rights easier. Select an existing user group and then click the **Copy** button. A new user group will be added to the list, with the same details as the existing user group, and selected ready for editing.

11.3.4 Deleting a User Group

To delete a user group, select it in the list and click the **Remove** button. If any users are a member of the user group you will be unable to delete it.

11.3.5 Saving Changes

To save the changes to the user groups click the **Apply** button. To save the changes and close the screen click the **OK** button.

11.3.6 Discarding Changes

To discard the changes to the user groups click the **Cancel** button. This will discard the changes and close the screen.

12 System Settings

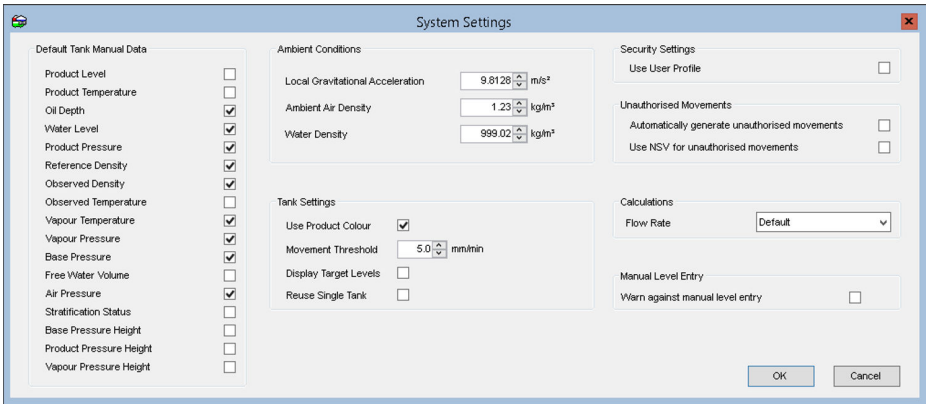
System Settings affect the operation of the entire system. The **System Settings** option is available under the **Admin** menu.

The use of this feature can be controlled by the security system.

12.1 Using System Settings

To launch the System settings module, proceed as follows:

- Select the **Admin** → **System Settings** option from the main menu bar.



To change system settings, proceed as follows:

1. Enter the required data or change the current settings. For the meaning of the individual items refer to the explanations below.
2. Press the **OK** button.
   - The window will close and the changes will be saved to the database.

12.2 Default Tank Manual Data

Determines which data items will be set to manual status by default.

Selecting a data item in this section will force the corresponding item to be set to manual status by default when a new device is added to the system.

12.3 Ambient Conditions

These settings influence the hybrid-hydrostatic and hydrostatic calculations, and permit adjustment of the constants in these calculations to match the local conditions.

12.3.1 Local Gravitational Acceleration

The acceleration due to gravity expressed in m/s^2. Default: 9.8126 m/s^2.

12.3.2 Ambient Air density

The density of air at the site's location expressed in the density units prevalent to the local system. Default: 1.23 kg/m^3.

12.3.3 Water Density

The density of water typically found suspended in the products in the tank, expressed in the density units prevalent to the local system. Default: 999.02 kg/m^3.

12.4 Security Settings

12.4.1 Use User Profile

Determines whether a user profile should be used. The user profile is limited to determining which tanks can be viewed by a user.

When checked the user will be asked to logon at start-up on the assumption that the user only has access to a limited number of tanks programmed into the system. If the user has not been previously configured with a group of tanks no tanks will be in view at start up.

When not checked the system will be started with the default profile which is show all tanks programmed into the system.

See the **Tanks By User** feature on how to configure a user profile.

12.4.2 Automatically Generate Unauthorised Movements

Determines whether the movements subsystem should enable and disable the unauthorised movement alarm.

If this option is checked the movements subsystem will disable the unauthorised movement alarm when a movement is opened for a tank. Similarly the movements subsystem will reenable the unauthorized movement alarm when a movement is closed and there are no more open movements for a tank.

12.5 Calculations

12.5.1 Flow Rate

The flow rate calculation can be made to mimic an MDP system.

12.6 Tank Settings

12.6.1 Use Product Colour

Determines the strategy for use of colour in the tank windows.

When selected the colour representing the product level in the tank will be that which was selected for the product in the tank. See the **Configuration** → **Product Configuration** options which allows the user to configure the colour a product will be displayed in.

When not selected the colour of the tanks is represented by the tank status. For example, if the tank is filling the colour of the product is displayed in blue, if the tank is emptying the colour of the product is displayed in brown, and if the tank is static the colour is displayed in green.

12.6.2 Movement Threshold

Determines the minimum level flow rate that is deemed significant enough to mark a tank as moving.

A flow rate of 5 mm/min is correct for most installations, but if your particular site has a lot of large crude tanks, for instance, you might want to use a smaller value. The threshold level is used to drive the up and down arrows on the tank mimic screens on the main page.

12.6.3 Display Target Levels

Determines if a target level is displayed in the homepage when using simple movements.

12.7 Manual Level Entry

12.7.1 Warn Against Manual Level Entry

Determines whether the user should be warned if they attempt to enter a manual level entry that would fall outside the normal operating range of the tank.

For example above the High High level or below the Low Low level.

13 Auto Startup Configuration

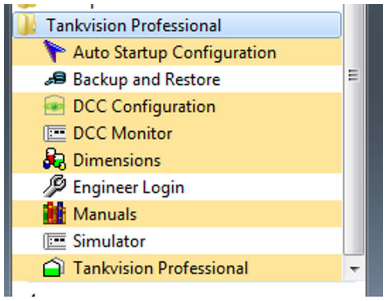
13.1 Description

The Auto Startup Configuration allows the user to start any application within the system when the PC is rebooted or restarted. This is useful after a power trip for example. Any other program on the PC can also be added via the browse option. There is an overall delay (to allow for the database and services to start) and each application can be further delayed separately. Parameters or arguments may be passed to any application on start-up.

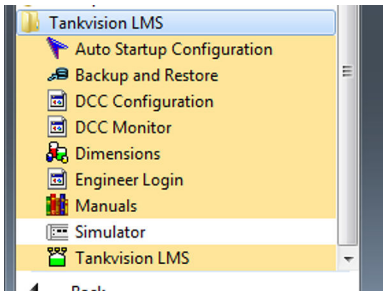
13.2 Launching

The **Auto Startup Configuration** is launched from the windows start menu.

Windows start menu for Tankvision Professional:

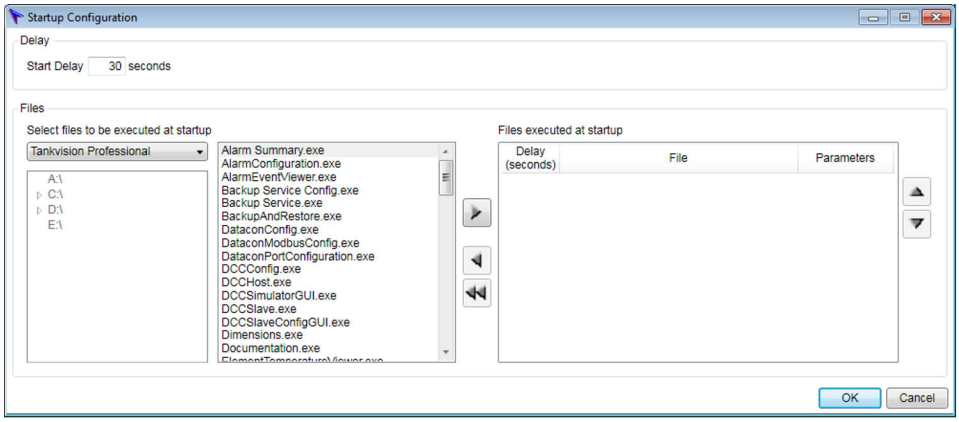


Windows start menu for Tankvision LMS:

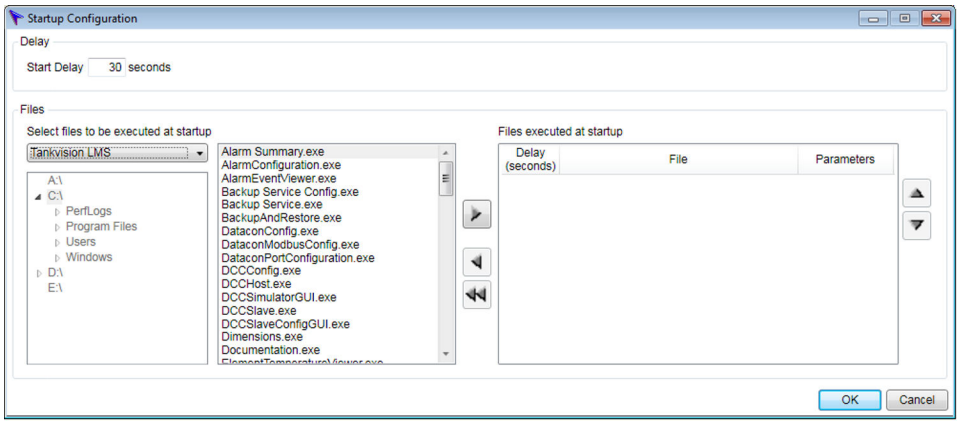


The configuration window below is opened:

Configuration window for Tankvision Professional:



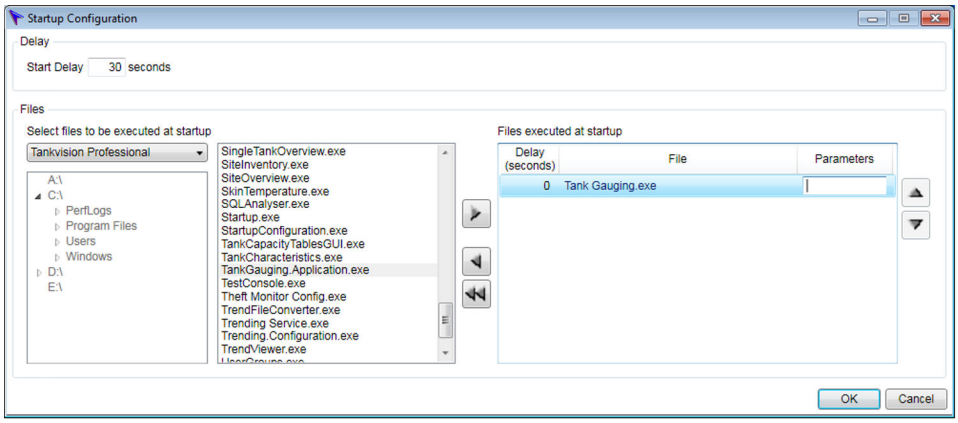
Configuration window for Tankvision LMS:



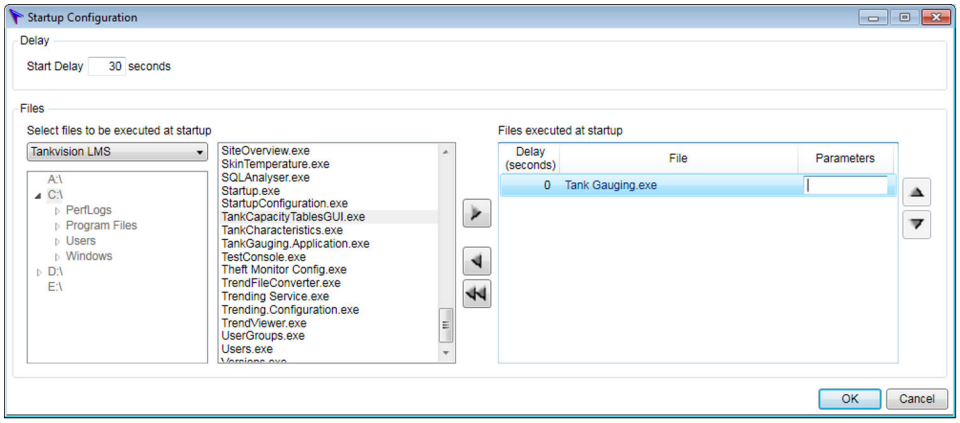
13.3 Configuring

Any application from the tank gauging system can be selected.

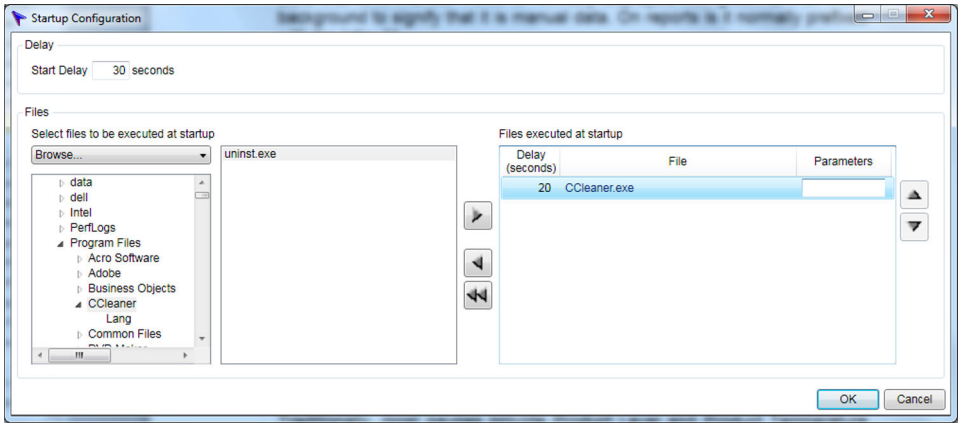
Applications for Tankvision Professional:



Applications for Tankvision LMS:



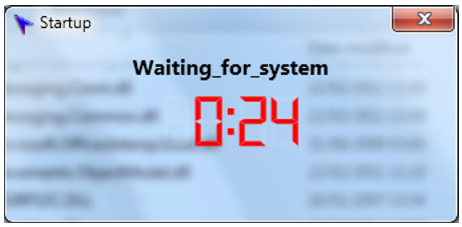
In the example shown above the main screen with multi tank view has been selected. The default delay is 30 seconds and no further delay has been added. The dialog for adding arguments or parameters is shown opened.



In the example shown above a custom application has been added.

The default delay is 30 seconds and a further delay off 20 seconds has been added. The dialog for adding arguments or parameters is shown opened.

During start-up a countdown window is displayed.



14 Manual Data

Normally tank data is collected from the field instruments automatically.

Where primary data values are not available or no longer available due to a gauge fault, data values can be switched from automatic mode to manual mode.

When in manual mode the data values have to be provided by the operator. Data that is in manual mode is normally displayed with green text on black background to signify that it is manual data. On reports is it normally prefixed with the letter **M**.

Where tanks are not fitted with gauges but they are still required on the system, the tank may be operated with all of its primary data values in manual mode. In this way at least the tank inventory is still calculated.

Gauges that have both level and temperature in manual mode will not be polled by the communications layer.

Primary data values are those measurements made by the tank gauging instrument such as:
- Product Level
- Water Level
- Product Temperature
- Product Density
- Pressure

Traditionally, most gauges provide Product Level and Product Temperature measurement capability. It is quite common to find that the rest are entered as manual data.

More modern gauging instruments have the capability to measure water level, density and pressure automatically. In this case the values would be collected automatically.

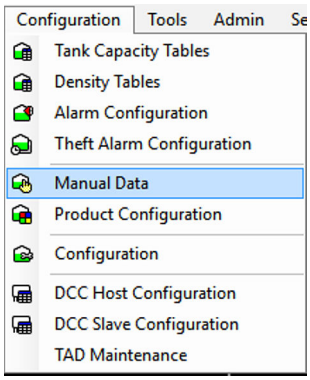
The use of this feature can be controlled by the security system.

By default a manual value will not trigger a programmable alarm, **DCC Host** → **Options** → **Configure** ticking the option for alarms on manual data will reverse this functionality.

14.1 Launching the Manual Data Entry Module

To launch the Manual Data Entry Module, proceed as follows:

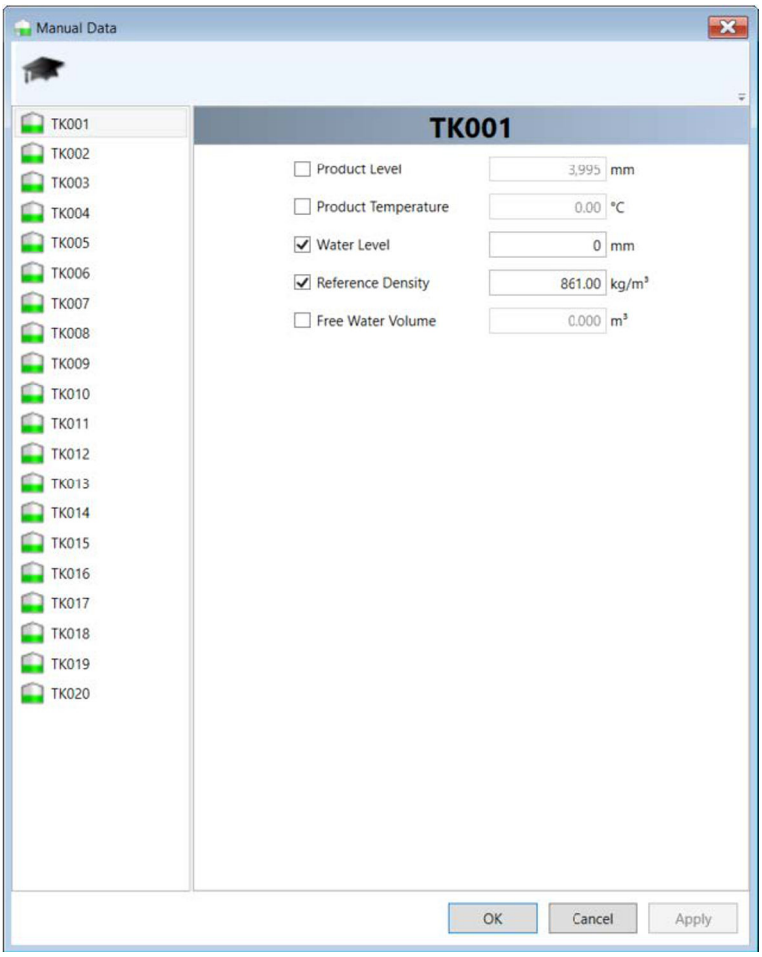
▶ Select from the main application window menu **Configuration** → **Manual Data**.



The following display is typical.

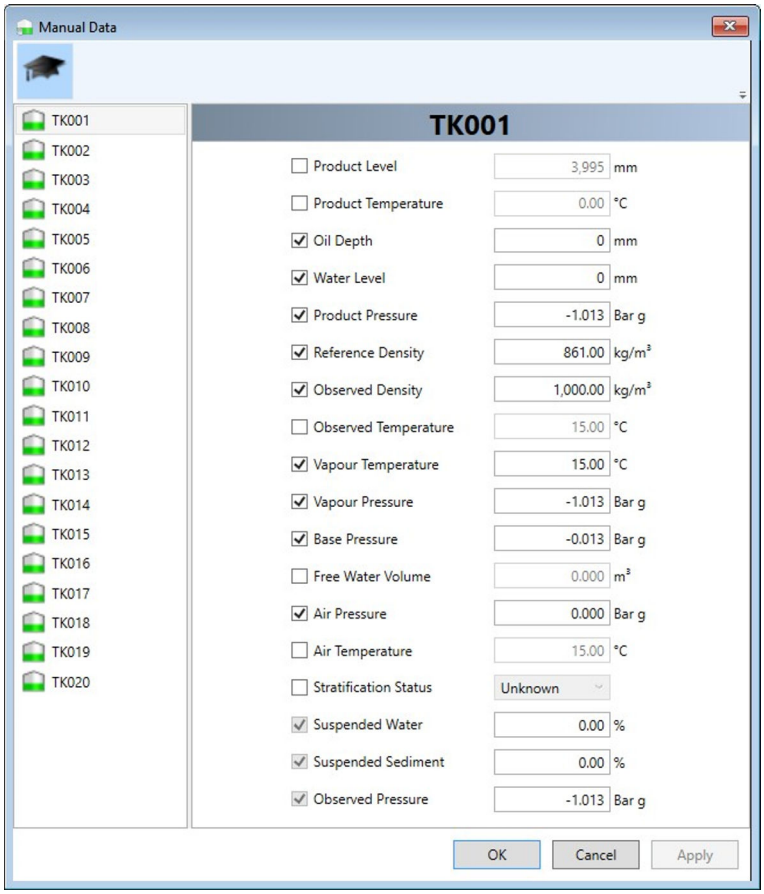
A list of all tanks will be displayed on the left, together with the manual data entry fields for the selected tank.

By default a reduced set of the most common fields will be displayed.



To view the additional fields for a tank click on the advanced button which will extend the display to show additional values as shown below.

By default any changes to the manual data for a tank will apply to ALL gauges on that tank.



14.2 Entering Manual Data

To enter manual data, proceed as follows:

1. Select the required tank or gauge from the list.
2. Edit the value.
3. If the variable is not already in manual mode tick the **Enabled** tick box.
   ↳ When saved this will switch the value to manual mode.
4. After all required data has been entered, press the **Apply** button to save the changes to the database.

Any problems in writing the data to the database will be reported to the user via the Status bar of the display.

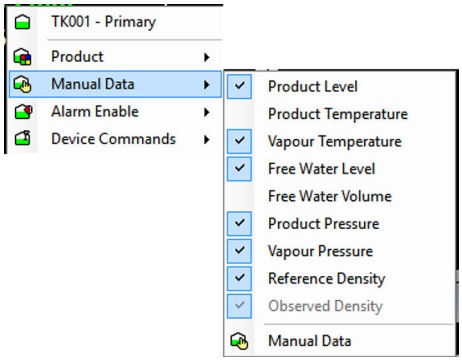
5. Press the **Cancel** button to discard any changes and exit the application.

14.3 Putting a Variable into Manual Mode

Manual data can be modified regardless of whether the value being modified is in manual mode or not.

When a parameter is switched to manual mode, the current data stored in the manual value will be utilised. The inventory data will also be calculated using values that are in manual mode.

There are essentially 2 techniques to putting a parameter into manual mode:
- Checking the tick box adjacent to the parameter in the manual data entry module
- Selecting the **Manual Data** option from the pop-up menu on the tank graphic view (see below).



Either method has the same effect.

If the pop-up menu is used, the current manual data will replace the automatic value. If the current manual values are incorrect you would need to use the **Configuration** → **Manual Data** module or select **Manual Data** → **Manual Data** from the pop-up menu to update them.

14.4 Shortcut to Manual Data

When a parameter is set to manual mode, its data is displayed with blue text and black background colour.

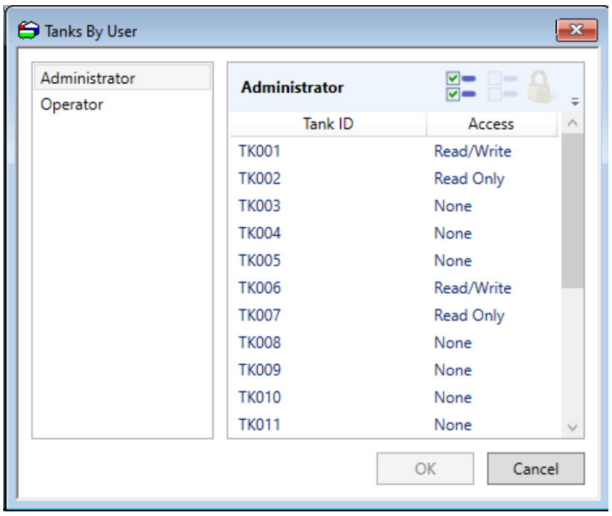
- Double click the parameter in manual mode.
  - This will launch the manual data entry module for the selected tank.

15 Tanks by User

This function provides an administrator with the ability to configure which tanks a user login can view and modify.

This is quite useful on larger multi-user systems where tank operations are split between different users, and a user may be responsible for looking after a specific set of tanks.

- Select the **Tanks By User** option from the **Admin** menu.
  - ↳ The **Tanks By User** display will be loaded.

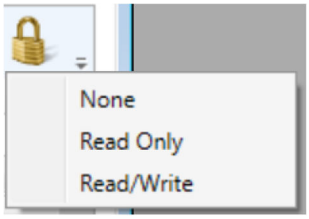


This display comprises 2 list boxes. One list containing the currently configured users and the other the full list of tanks with the tanks currently assigned to the selected user indicating whether the user has 'Read Only' or 'Read/Write' access to them.

15.1 Setting Tanks a User Can View or Modify

To set the tanks a user can view, proceed as follows:

1. Select the user from the list.
   - ↳ The list of tanks will be refreshed to show the access that the user has to the tanks.
2. Select the tanks for which the access for the user is to be modified.
   - ↳ A single tank can be selected by clicking on the row for that tank. If more than one tank is to be selected, hold down the **Ctrl** key whilst clicking on the other tanks to be selected.
     To select all tanks, click the **Select All** ( ) button. To deselect all tanks, click on the **Clear Selection** ( ) button.
3. Once the required tanks have been selected, click on the **Set Access** ( ) button.
   - ↳ The following menu will be displayed:



4. Click on the required access to set the user access for the selected tanks.
5. Click the **OK** button to save the changes and close the **Tanks by User** screen.

6. To exit the screen without saving the changes click the **Cancel** button.

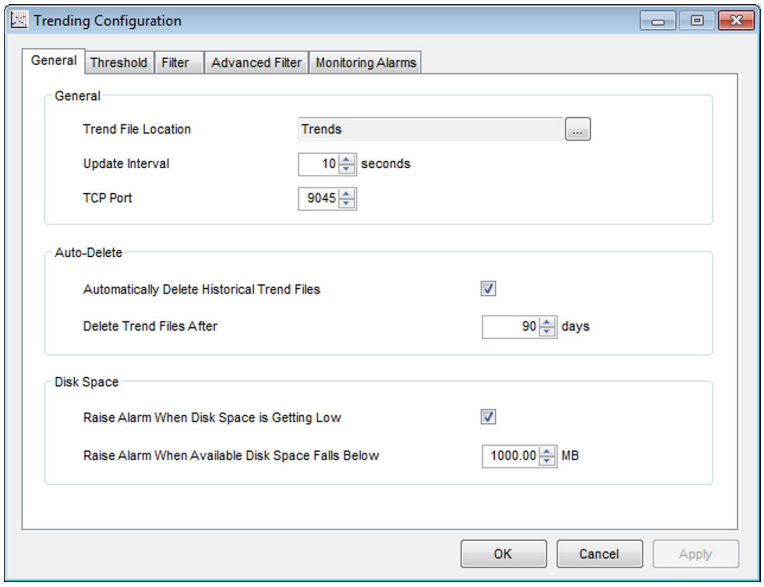
For Tanks by User to work **Use User Profile** must be selected in **Security Settings**. It is also recommended that **Login Enabled** is selected in **Security Settings**.

16 Trending Configuration

Trending configuration is done on a server or standalone station. It is accessed via the Service Manager in the Windows system tray. The display is a multi-tabbed dialog as shown below.

16.1 General Tab

This contains configuration options relating to the trending service and housekeeping of the trend files.



Trend File Location
A directory where the trend files will be stored. This location is relative to the Application directory.

Update Interval
The interval at which the tank data is checked to see if it has changed.
The trend server analyses the live tank gauging data by polling the RTDB on a timer based trigger. This value is the number of seconds between successive poll triggers.

TCP Port
The TCP port to be used by clients to communicate with the trending service.

Automatically Delete Historical Trend Files
If this option is checked historical trend files will be deleted after the time specified below.

Delete Trend Files After
The age the files need to be before they are deleted, if this feature is enabled.

Raise Alarm When Disk Space is Getting Low
If this option is checked an alarm will be raised through the events subsystem when the available disk space falls below the defined threshold.

Raise Alarm When Available Disk Space Falls Below
The available disk space below which an alarm is to be raised.

16.2 Threshold Tab

The **Threshold** tab allows the sensitivity of the trending to be modified. In order to reduce the volume of data written to disk and therefore the size of the dataset the service only writes data items when they have changed significantly from their previous value. The

threshold of each type of field is defined in the service configuration individually and it is this threshold that determines when a value is written.

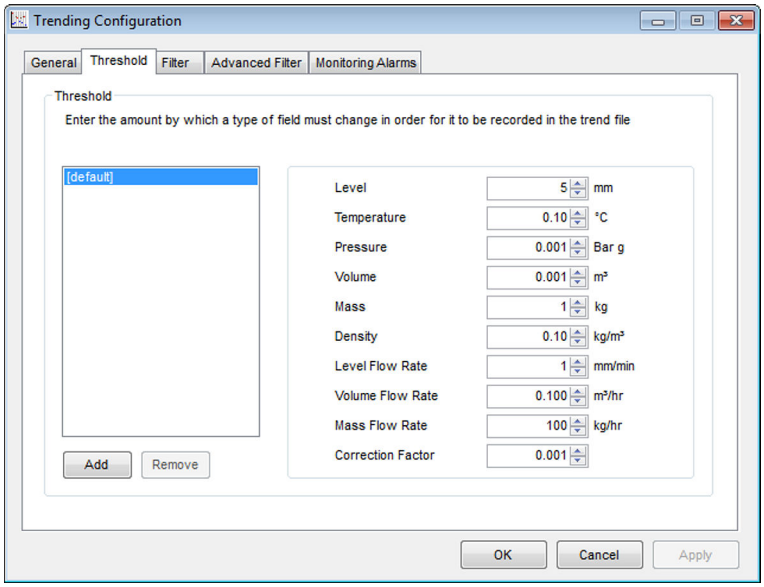
If we take level as an example, a threshold of 0 millimetres will result in every level reading from the gauges being written to disk, doing so means there are more data point records in the trend files and a commensurate increase in time spent writing the data and reading it again to display in the trending client. It is therefore recommended that thresholds of 0 are not used. When deciding on a threshold setting; approach it from the aspect of selecting what accuracy you need for your historical data on the graphical displays, not from trying to determine exact inventory conditions on the site at any given time. The trending data from the tank gauging system is not intended to provide verifiable custody transfer information.

16.2.1 Quantised data

Conceptually the domain of values for a given tank parameter are divided into discrete quanta. Each value in the domain maps to a single quantum. When a tank parameter's value changes so that the quantum the value maps to is different from the previous tank parameter's quantum, then the trending service records a value in the trend file. The quanta are calculated as follows:

$Q = value / ((treshhold \times \sqrt{2}) + \varepsilon)$

Observe the factor of $\sqrt{2}$, this included so as to render the volume of data collected compatible with earlier versions of the software before quanta.

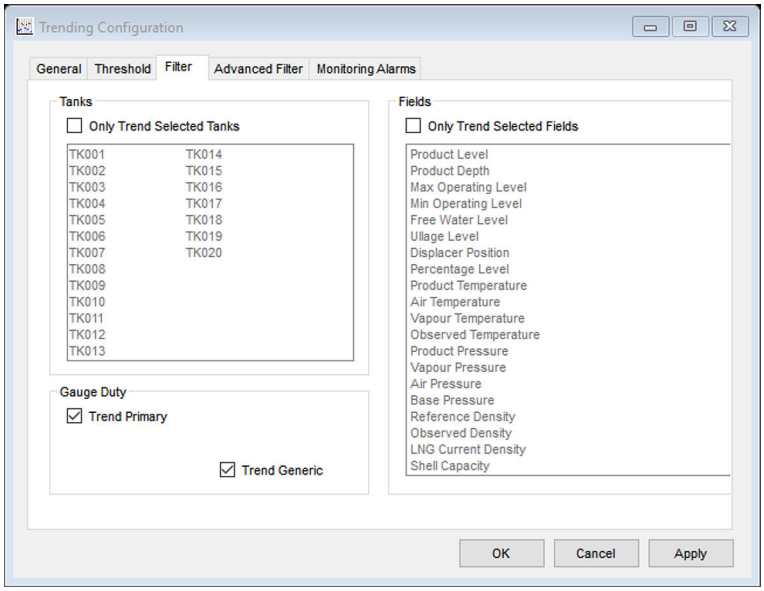


The threshold values can be overridden for individual tanks to allow for the different behavior of different products and/or tank shapes. To override the threshold values for a tank click on the **Add** button and select the tank from the list of tanks displayed. The tank will then appear in the list of tanks. Ensure that the tank is highlighted and then amend the threshold values.

Similarly to remove the override for the tank ensure that it is highlighted in the list and then click on the **Remove** button.

16.3 Filter Tab

The **Filter** tab allows the data to be trended for each tank/gauge to be unique. By default all tanks, gauge duties and fields are trended.



Only Trend Selected Tanks
If this option is checked, only the data for the tanks highlighted in the list of tanks will be trended. Otherwise the data for all of the tanks will be trended.

Trend Primary
If this option is checked, the data for the primary gauges will be trended.

Trend Secondary
This option will only be visible if one or more tanks in the system has a secondary gauge configured. If this option is checked, the data for the secondary gauges will be trended.

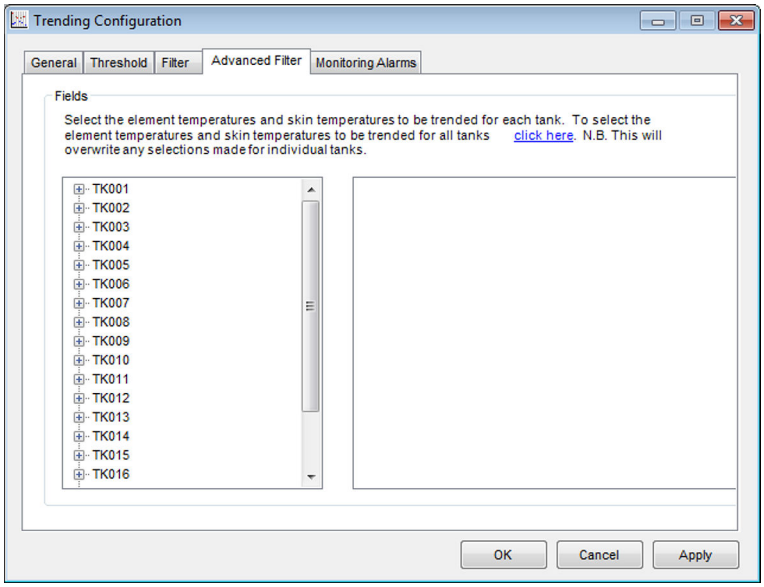
Trend Backup
This option will only be visible if one or more tanks in the system has a backup gauge configured. If this option is checked, the data for the backup gauges will be trended.

Trend Densitometer
This option will only be visible if one or more tanks in the system has a densitometer configured. If this option is checked, the data for the densitometers will be trended.

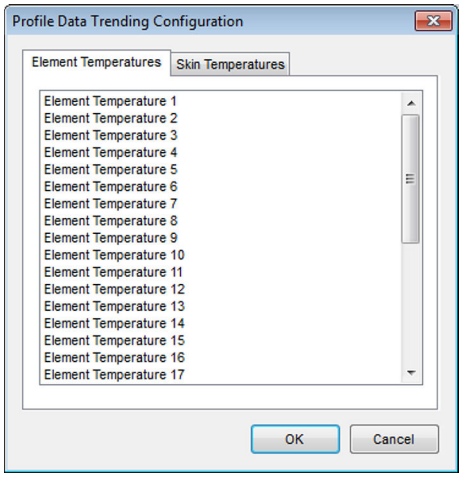
Only Trend Selected Fields
If this option is checked, only the data for the fields highlighted in the list of fields will be trended. Otherwise all the fields in the list will be trended.

16.4 Advanced Filter

The **Advanced Filter** tab of the trending configuration screen allows trending options to be set for element temperatures and skin temperatures (if appropriate). By default, element temperatures and skin temperatures are not trended.



To set the element temperatures and/or skin temperatures to be trended on all gauges click on the click here hyperlink in the description. This will display the following screen:

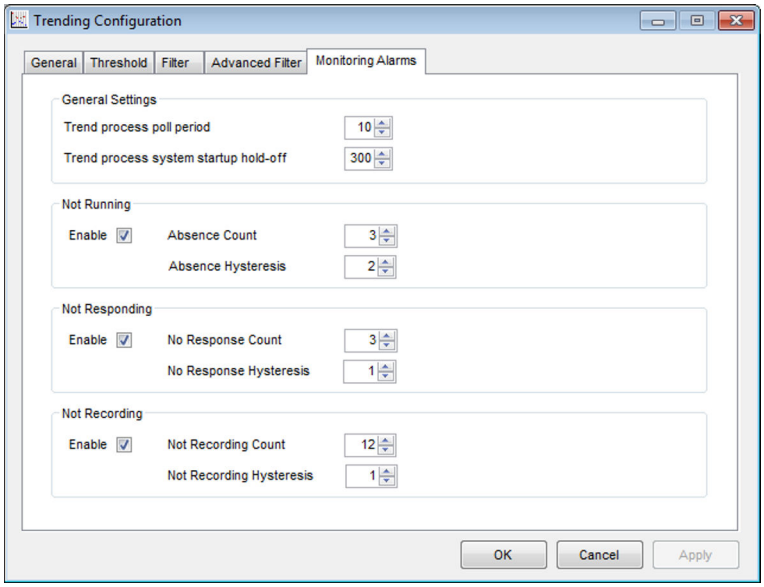


Highlight the element temperatures and skin temperatures to be trended and click the **OK** button. Note that this will overwrite the existing selected element temperatures and skin temperatures for all gauges.

To set the element temperatures and skin temperatures to be trended for an individual tank, double-click the tank in the tanks list. If the tank has multiple gauges, double-click the gauge for which the element temperature and skin temperatures are to be trended. If the element temperatures can be trended for a gauge, the entry **Element Temperatures** will appear under the gauge. Similarly if the skin temperatures can be trended for a gauge, the entry **Skin Temperatures** will appear under the gauge. Select either **Element Temperatures** or **Skin Temperatures** and the list on the right hand side of the screen will be populated with the element temperatures or skin temperatures respectively. The temperatures to be trended will be highlighted. To modify the temperatures to be trended, highlight the temperatures to be trended.

16.5 Monitoring Alarms

The **Monitoring Alarms** tab of the trending configuration screen is used to configure and Enable or Disable the various trending alarms.



General Settings

- **Trend process poll period** - The frequency, in seconds, that the trend service is polled to check the status of the alarm conditions.
- **Trend process system startup hold-off** - The delay, in seconds, after the system starts to allow the Trend service to stabilize. No alarms are raised during this time.

Not Running

If the Trending Service is not running no trend data will be generated. If enabled a "Trending Service not running" alarm will be raised in the Alarm Event Viewer. The following items are configurable:

- **Enable** - If this option is checked an alarm will be raised through the events subsystem if the Trending service stops running for the specified time (Poll period × Absence Count). If this option is not checked none of the alarms will be enabled and it will not be possible to configure any "count" or "hysteresis" values.
- **Absence Count** – Use this option to set the number of successive polls that must not detect that the trending service is running before an alarm is raised.
- **Absence Hysteresis** - Use this option to set the number of successive polls that must detect a running trending service before an alarm is cleared.

Not Responding

If the Trending Service stops responding to requests there will be a loss of "Real Time" trending data, "Historic" trend data may still be generated. If enabled a "Trending Service not responding" alarm will be raised in the Alarm Event Viewer. The following items are configurable:

- **Enable** - If this option is checked an alarm will be raised through the events subsystem if the Trending service stops running for the specified time (Poll period × No Response Count).
- **No Response Count** - Use this option to set the number of successive polls that must not detect a response from the trending service before an alarm is raised.
- **No Response Hysteresis** - Use this option to set the number of successive polls that must detect a response from the trending service before an alarm is cleared.

Not Recording

If the Trending Service stops recording there will be a loss of "Historic" trend data, "Real Time" trending data may still be available. If enabled a "Trending Service not recording" alarm will be raised in the Alarm Event Viewer. The following items are configurable:

- **Enable** - If this option is checked an alarm will be raised through the events subsystem if the Trending service stops recording for the specified time (Poll period × Not Recording Count).
- **Not Recording Count** - Use this option to set the number of successive polls that must not detect the trending service is recording before an alarm is raised.
- **Not Recording Hysteresis** - Use this option to set the number of successive polls that must detect that the trending service is recording before an alarm is cleared.

17 Device Command Scheduler

The Device Command Scheduler is a Windows service that can be configured to send device commands at a specific time of day on a recurring basis.

The Device Commands can be sent to a Single Tank, all Tanks, or a group of tanks generally specified by Gauge Type or Tank Group.

Care should be exercised when scheduling device commands, particularly those that affect a gauges primary measuring capability, as the tank may be involved in some sort of critical operation such as receiving product from a ship or similar.

17.1 Launching the Device Command Scheduler

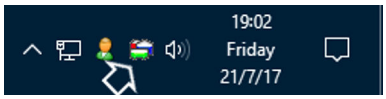
The Windows service part of the scheduler, which sends the commands at the scheduled time, automatically starts up when Windows boots. The service can be monitored, as with all Windows services via the control panel, or using the application Service Manager, which is present as an icon in the system tray.

17.2 Configuring Scheduled Commands

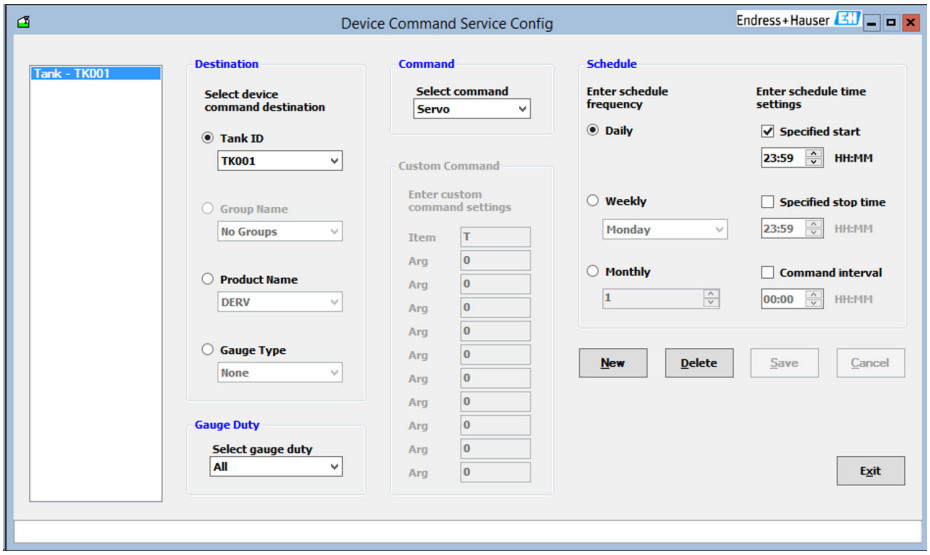
The schedule by which the commands are executed is configured from the Command Scheduler GUI.

To configure scheduled commands, proceed as follows:

1. Right click on the Service Manager icon in the Windows system tray:



2. Select **Device Command Service** → **Device Command Config**.
   ↳ This will bring up the configuration application, which you can use to view and edit the scheduled commands.



3. Select a scheduled entry from the list on the left of the window or create a new entry by clicking the **New** button.
4. Adjust the parameters according to the explanations below (see "Scheduled Commands Parameters").

5. Click **Save** to commit the changes to the database, or **Cancel** to discard them.

You can also delete an entry from the database by selecting it from the list and clicking the **Delete** button.

Scheduled entries are listed on the left of the window, selecting one of these entries will display the details of the entry in the controls on the right.

17.2.1 Scheduled Commands Parameters

Destination
Denotes the way the gauges can be selected for scheduling, either by a specific Tank ID, or collectively by Product Group Name, or by Product or by Gauge Type.

Gauge Duty
Where tanks are fitted with more than one gauge, you can specify which gauge on the tank is to perform the command.

Command
Sets the command to be executed by the gauge or gauges.

Custom Command
Enables you to configure a custom command.

Schedule
A scheduled command can be configured to send a series of commands between 2 specified times and a specified frequency. For example to send a command every hour between the hours of 01:00 and 04:00 you would set the start time as 01:00, the stop time 04:00 and the interval as 01:00.

When you make changes to the schedule's detail, click **Save** to commit the changes to the database, or **Cancel** to discard them.

Clicking **New** will clear the currently selected entry's details, allowing you configure a new one. Clicking Save commits the entry to the database.

Delete will remove the currently selected entry from the database.

18 Report Scheduler

The report scheduler facilitates the printing and exporting of reports and report documents in various formats at defined moments in time.

The report scheduler consists of 2 independent components:
- A background Report Scheduler Windows Service which executes the reports at the appropriate time(s)
- The Report Scheduler Configuration tool, used for configuring the reports

The report configuration data is held in the file ReportSchedulerConfig.xml located in the same directory as the ReportSchedulerService.exe service executable.

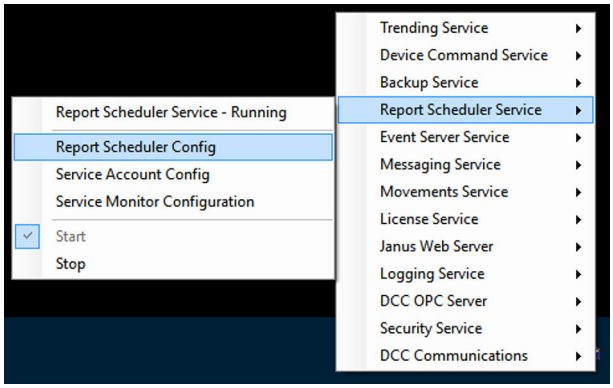
This file is used by both of the above components. The configuration tool is used to edit the contents of the file for the desired user configuration. The service then loads this file to determine its actions.

18.1 Report Scheduler Service

The Report Scheduler service runs automatically as a Windows service, executing all scheduled reports at the appropriate times. It will run in the background and has no user interface.

The service will start automatically whenever the computer is rebooted and should therefore always be running.

The status of the service can be viewed by right clicking on the Tank Gauging Service Manager icon in the system tray and selecting the Report Scheduler Service item from the pop-up menu.



The service may also be started or stopped using this menu.

18.2 Spooling of Scheduled Reports

Reports that are printed by the service are spooled to a directory where they are stored for a period of 7 days before being deleted. This enables an administrator to obtain any time critical reports that have failed to print for any reason.

The location of the spool directory can be specified by the user by using the configuration tool to change the **Spool Directory** settings of the Area component.

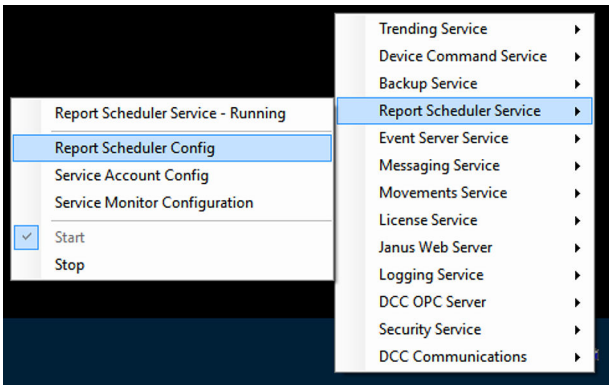
Spooling does not occur if the reports are printed directly from the configuration tool.

18.3 Report Scheduler Configuration

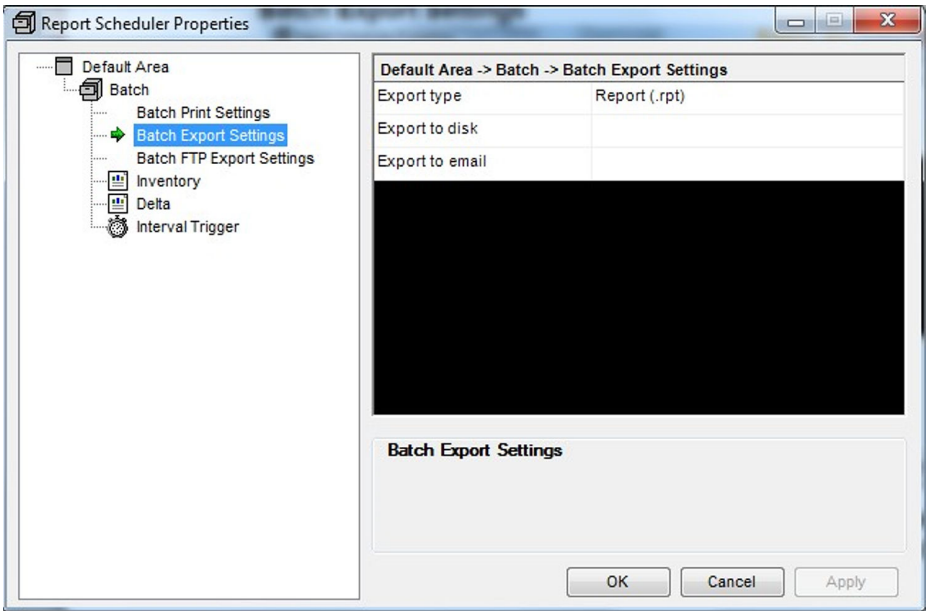
The Report Scheduler Configuration tool allows the user to configure the reports and report documents for a system.

To configure the report scheduler, proceed as follows:

1. Right-click on the **Tank Gauging Service Manager** icon in the system tray.
2. Select the **Report Scheduler Config** item from the **Report Scheduler Service** menu:



The following window opens:



3. From the tree on the left select the component you are going to edit. The tree view control on the left hand side of the configuration tool represents the components which exist on the system.

The following types of components can appear in the tree view:
- Areas
- Batches
- Reports
- Report Documents
- Triggers

The grid view adjacent to the tree view represents the settings for each of these components. For a description of these types of components refer to the sections below.

4. Enter the required values into the grid view on the right.
5. Click **Apply** to confirm your changes or **Cancel** to discard them.

6. If all the necessary changes have been made, click **OK** to close the window.

Any changes which are made to the report scheduler configuration will only be written to the ReportSchedulerConfig.xml when the user hits **OK** or **Apply**. If the user hits **Cancel** all changes to the configuration will be lost.

18.3.1 Area Component

The reporting system is represented by the root component of the tree, called an Area.

Renaming an Area component

The Area component can be renamed to reflect the name of the site and/or system. To do so, right-click on the Area component and select **Rename**.

The Transaction log

The Area component also defines settings which determine the location of the transaction log. The transaction log stores information about the execution of the reports that the system processes and any consequent abnormal operating conditions. Right-click on the Area component and select **Transaction Log** to view the log using Wordpad.

The System Reports directory

Also defined by the Area component is the System Reports directory. This is the directory which contains the predefined reports associated with the tank automation system. Both the Transaction Log directory and the System Report directory are set to sensible defaults upon installation, but can be easily changed if necessary.

18.3.2 Batch Component

Report, Report Document and Trigger components are contained within Batches. An Area can contain one or more Batches.

A Batch defines various settings which describe the printing/export behaviour of the Report and Report Document components that it contains.

Adding Batches

In order to add a Report or Trigger to the system, we must first add a Batch. Right-click on the Area node and select **Add Batch** from the menu. This adds a Batch to the Area.

Renaming or deleting Batches

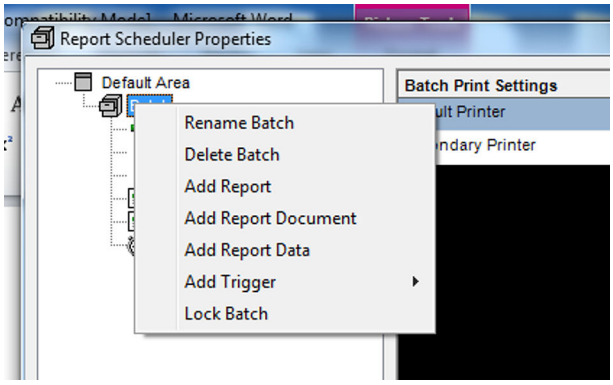
The Batch can be renamed if required by right clicking on the Batch and selecting **Rename Batch** from the menu. A batch can be deleted from the Area in a similar way.

Locking and Unlocking Batches

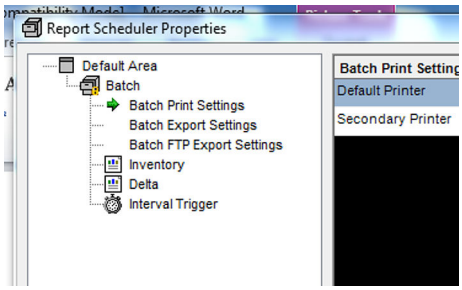
Batches can be locked to prevent unauthorized users from deleting or modifying them. In order for a user to be able to lock or unlock a batch that user must be granted 'Full' Report

Scheduler privileges. Users with 'Modify' privileges will be able to create, delete and maintain unlocked batches, but they won't be able to remove or place a lock on a batch.

In order to lock a batch, right-click on an unlocked batch and choose **Lock Batch** from the context menu, the unlocking process is similar except you choose **Unlock Batch** instead. A locked batch can't be altered - it must be unlocked in order to be amended.

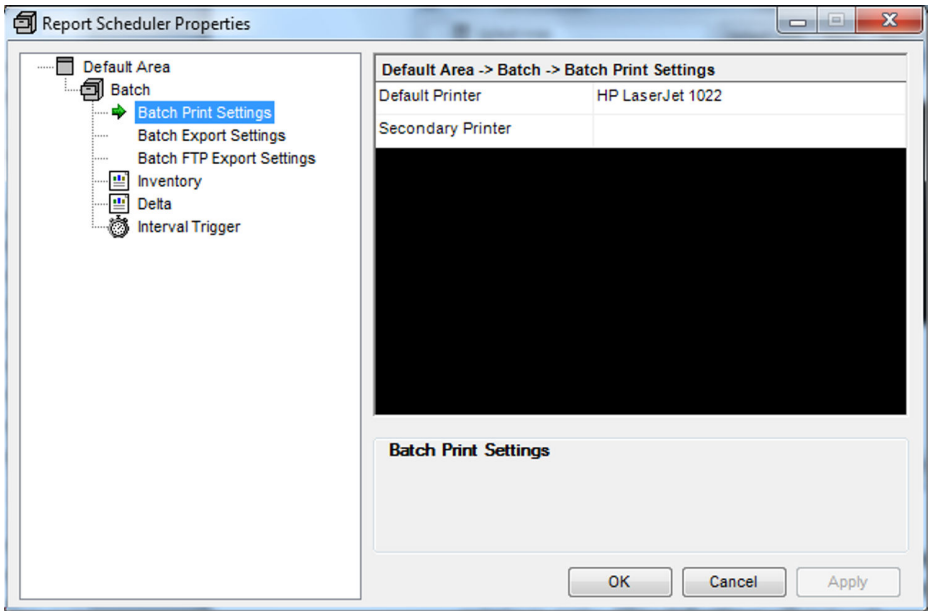


Locked batches can be identified by the lock icon superimposed over the top of the filing cabinet icon.



18.3.3 Batch Print Settings

- Click on **Batch Print Settings** to change the following parameters:



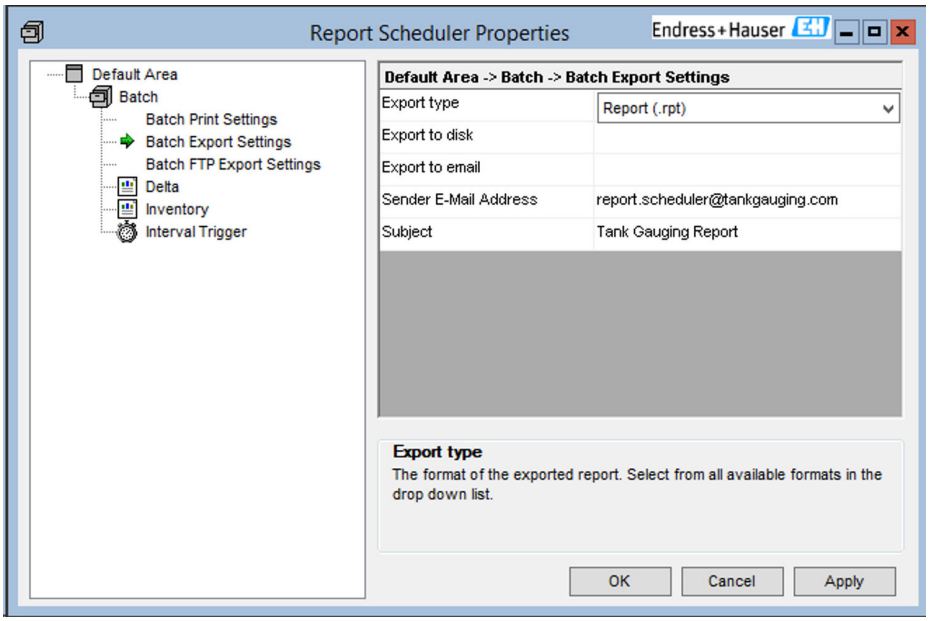
Default Printer
The default printer for report printing. Select from all installed printers in the drop down list. The list reflects the users installed printers only.
(see: **Start** → **Settings** → **Printers**)

Secondary Printer
The secondary printer is used for printing if the default printer is unavailable.

In both cases the printer must be a real printer, not a print to file device as the service does not interact with the console.

18.3.4 Batch Export Settings

- Click on **Batch Export Settings** to change the following parameters:



Export Type
The format of the exported report. Select from all available formats in the drop down list including .rpt, .xls, .pdf, .rtf and .doc.

Export to disk
Path to folder which will contain the exported report. Blank entry disables disk export.

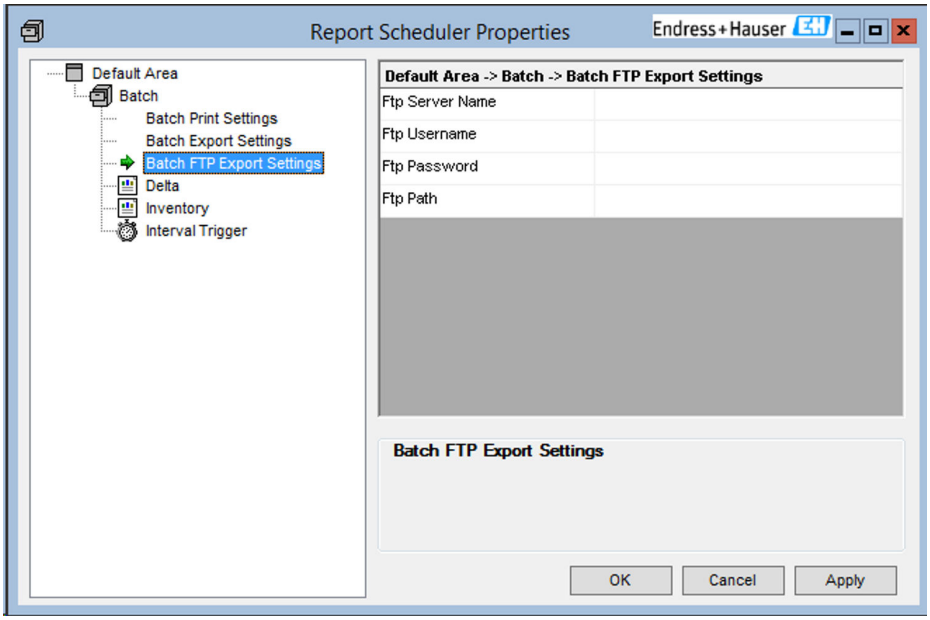
Export to email
Semicolon separated list of email addresses to which the report will be sent. Blank entry disables email export. (Users require an SMTP mail server to use this feature; the server itself is specified as an Area setting.)

Sender E-Mail Address
The address that will appear in the **From** field of received emails.

Subject
Enter the text that will appear in the **Subject** field of received emails.

18.3.5 Batch FTP Export Settings

▶ Click on **Batch FTP Export Settings** to change the following parameters:



Ftp Server Name
The full name used to identify the FTP server. Blank entry disables FTP export.

Ftp Username
User name used to log on to the FTP server.

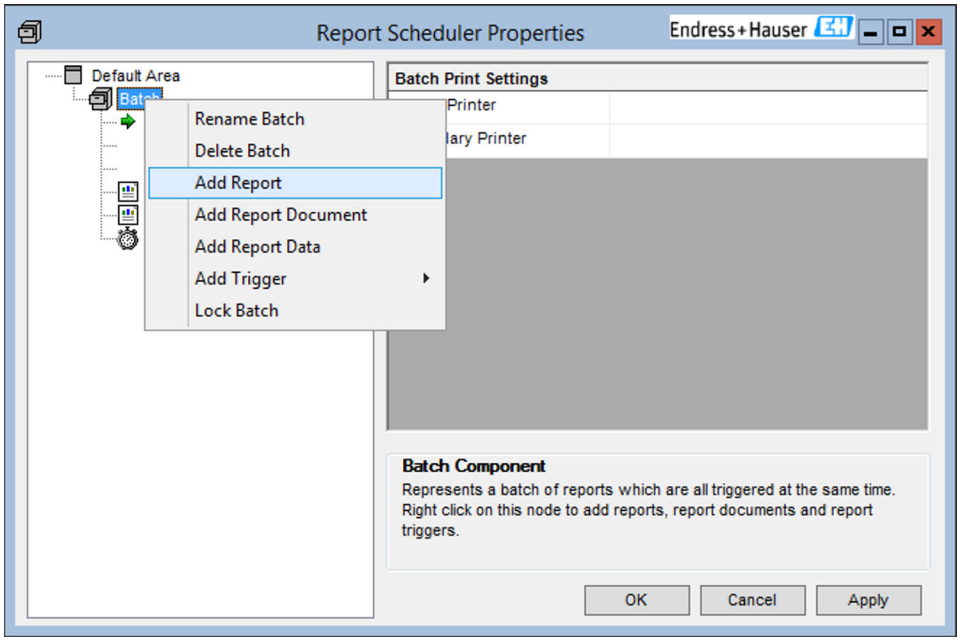
Ftp Password
Password associated with **Ftp Username**.

Ftp Path
The path to the drop directory on the FTP server.

18.3.6 Report Component

A Batch can contain one or more Report components each of which represents a Crystal Reports format report file.

To add a Report to a Batch, right-click the Batch, select **Add Report** and select a .rpt file using the **Open File** dialog box displayed.



To remove a Report from a Batch, right-click on it and select **Delete Report**.

A Report defines the following settings which describes the Reports individual behaviour independent of it's parent Batch settings:

General Settings
- **Print Enabled** – Printing enabled for this report.
- **Export Enabled** – Export enabled for this report.
- **Date Stamp Export** – If True, add the date to the file-name for the exported file.
- **Time Stamp Export** – If True, add the time to the file-name for the exported report.

Database Settings
- **Data Source Name** – Specify the ODBC data source name.
- **Database Name** – The name of the database used to generate the report.
- **User ID** – The user name used to log on to the database. The default is 'sa'.
- **Password** – The password associated with the **User ID**. The default is blank.

Parameter Settings
This section is auto-generated from the report itself. If the report gives the user the option of specifying parameters they can be entered here. The default values for each field are shown in a combo box if any are specified.

18.3.7 Report Document Component

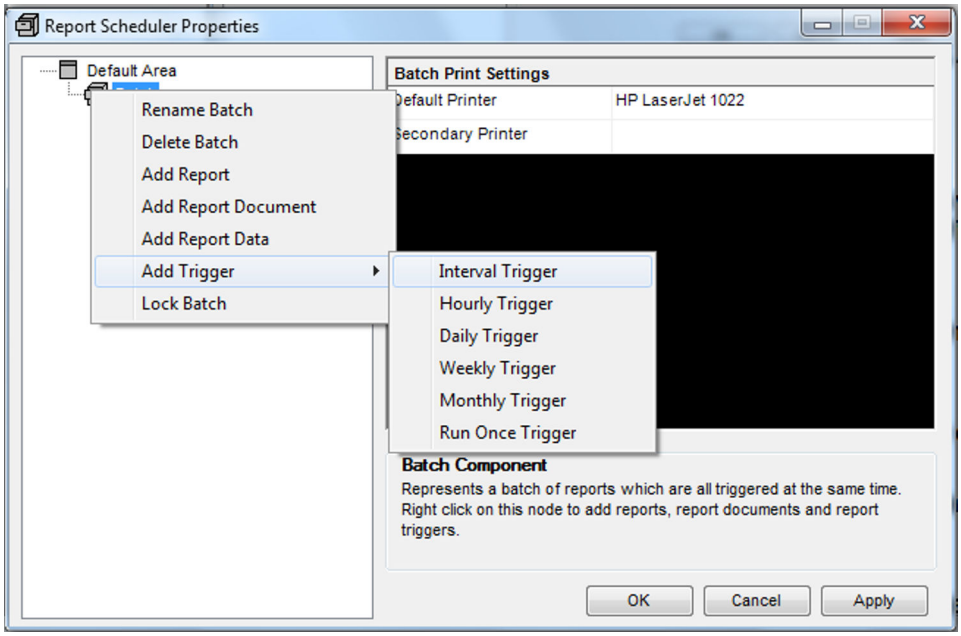
A Batch can contain one or more Report Document components. Each Report Document component represents a Word document or an Excel Workbook which conveys report data. Report and Report Document components can happily co-exist within the same Batch.

To add a Report Document to a Batch, right-click on the Batch, select **Add Report Document** and select a .doc or .xls file using the **Open File** dialog box displayed. To remove a Report Document from a Batch, right-click on it and select **Delete Report**.

In order to use Report Document components within the Report Scheduler, Microsoft Office 2003 or later must be installed.

18.3.8 Trigger Component

A batch can also contain one or more Triggers. A Trigger is a component which specifies when a Batch will run, and hence when all of its Report modules will run. Right mouse click on the Batch component to see the trigger options as shown below.



There are 6 types of Triggers:

- **Interval Trigger**
  A trigger which is fired every time interval, defined in hours and minutes. A synchronization time may also be defined, from which all interval timings will be based.
- **Hourly Trigger**
  A trigger which is fired at a specified number of minutes past every hour.
- **Daily Trigger**
  A trigger which is fired at a specified hour every day.
- **Weekly Trigger**
  A trigger which is fired on a specified day of the week, at a specified hour.
- **Monthly Trigger**
  A trigger which is fired on a specified day of the month, at a specified hour.
- **Run Once Trigger**
  A trigger which is fired once only at a specified time.

By adding Triggers to Batches it is easy to build up complex scheduling. For example, if it is required that a Batch is run 3 times a week, add 3 Weekly Triggers to a Batch, specifying a different firing day for each.

To add a Trigger to a Batch, right-click on the Batch, select **Add Trigger** and select the trigger type from the sub-menu.

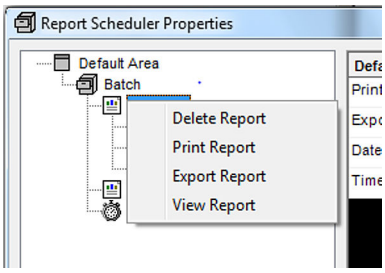
To remove a Trigger from a Batch, right-click on it and select **Delete Trigger**.

You can also specify a period of time over which a trigger will be active on the Trigger Period Settings page.

18.3.9 View, Print and Export Reports

It is possible to print, export or view a Report or Report Document directly from the GUI rather than relying upon Triggers and the service component.

- Right-click on the relevant component and select **Print**, **Export** or **View** from the menu.
  - The configuration is automatically saved should any of these commands be used.



Any changes which are made to the report scheduler configuration will only be written to the ReportSchedulerConfig.xml when the user selects **OK** or **Apply**. If the user selects **Cancel** all changes to the configuration will be lost.

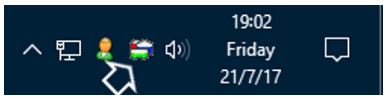
19 Messaging

19.1 Message Service

The messaging service is used to queue and distribute messages asynchronously.

Messages can be sent to:
- Email clients (SMTP mail server required)
- Mobile telephones in the form of SMS messages (GSM modem required)
- Telephones (voice modem required)
- Site Radios (specialist hardware required)

The messaging service configuration is accessed from the application Service Manager icon in the Windows system tray.

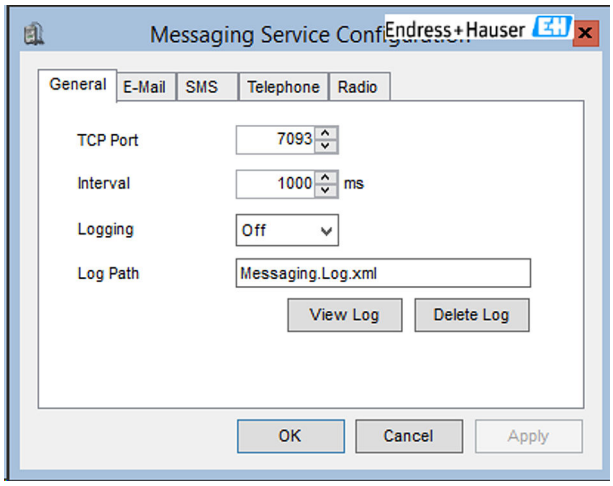


1. Click right on this icon.
2. Select **Messaging Service** → **Messaging Service Config**.
   ↳ This will bring up the configuration application, which you can use to view and edit the messaging configuration.

This application contains the following pages:
- **General**
- **E-Mail**
- **SMS** (if the SMS Messaging option has been licensed)
- **Telephone** (if the Telephone Messaging option has been licensed)
- **Radio** (if the Radio Messaging option has been licensed)

19.1.1 General

The **General** page allows configuration of settings relating to the messaging service as a whole.



TCP Port
The TCP port which is used to accept messages from client applications. This must match the TCP port configured in the messaging client configuration file.

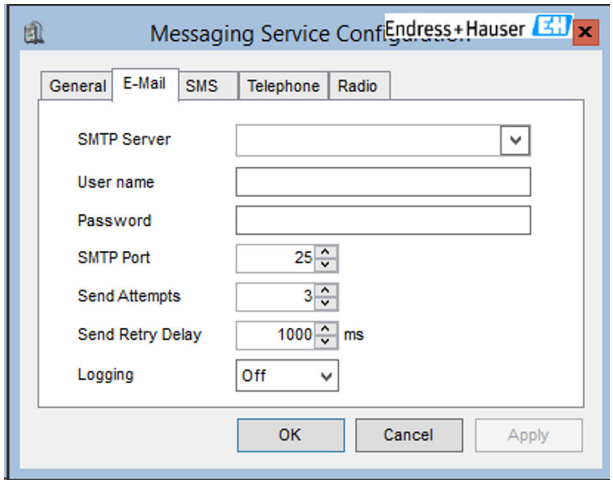
Interval
The interval in milliseconds at which the service will check for incoming messages.

Logging
The level of logging required. This is used for diagnostic purposes if there are problems with the messaging service. Generally it should be set to **Off**.

Log Path
The path to the log file.
The current log file can be viewed by clicking on the **View Log** button, or deleted by clicking on the **Delete Log** button.

19.1.2 E-Mail Configuration

The **E-Mail** page allows configuration of settings relating to sending e-mails.



SMTP Server
The SMTP server to be used to send e-mails from the messaging service. (**User name** and **Password** valid for the domain are required for external emails.)

SMTP Port
The port used by the messaging service to connect to the SMTP server.

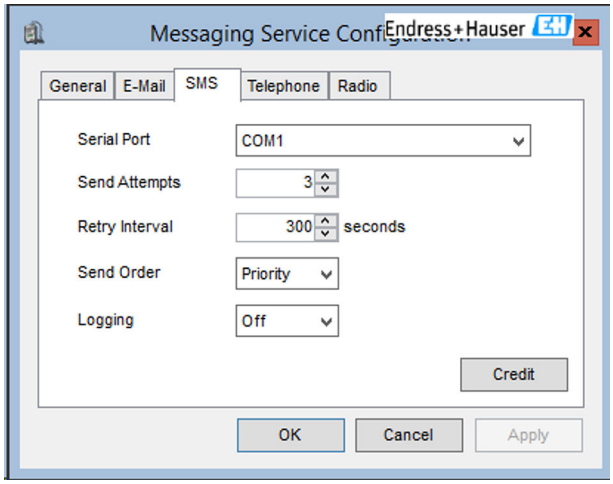
Send Attempts
The maximum number of times a message should be sent to the SMTP server if it fails for any reason on a preceding attempt.

Send Retry Delay
The interval to wait before attempting to resend a message to the SMTP server following a failure.

Logging
The level of logging required. This is used for diagnostic purposes if there are problems with the e-mail part of the messaging service. Generally it should be set to **Off**.

19.1.3 SMS Configuration

The **SMS** page allows configuration of settings relating to sending SMS messages. It will only be present if the **SMS Messaging** option has been licensed.



Serial Port
The serial port to which the GSM modem to be used to send SMS messages is attached.

Send Attempts
The maximum number of times to attempt to send a message via SMS.

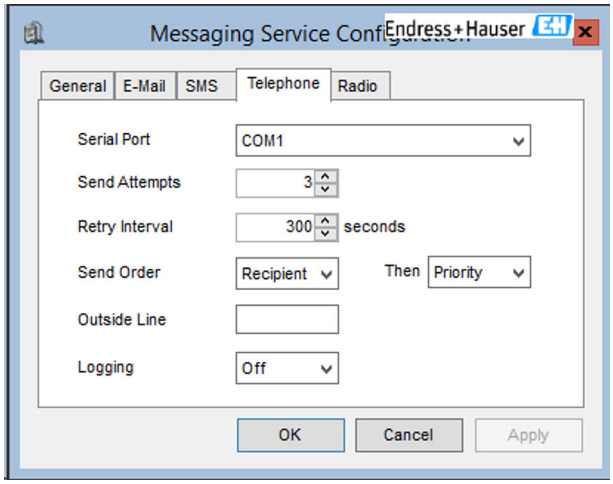
Retry Interval
The interval to wait before attempting to resend a message following a failure.

Send Order
Indicates whether messages are to be sent in priority order, or in the order in which they were received from clients.

Logging
The level of logging required. This is used for diagnostic purposes if there are problems with the SMS part of the messaging service. Generally it should be set to **Off**.

19.1.4 Telephone Configuration

The **Telephone** page allows configuration of settings relating to sending voice messages to a telephone. It will be present only if the **Telephone Messaging** option has been licensed.



Serial Port
The serial port to which the modem used to send voice messages is attached. The modem must be a voice modem.
To check if the modem is compatible with the messaging service, open HyperTerminal and connect to the modem as a serial device. Then type AT+FCLASS=?. The response should be

in the form 0,1,8,80 (followed by OK). This list of supported classes must contain 8 for the modem to be used to transmit voice messages.

Send Attempts
The maximum number of times to attempt to send a message to a telephone.

Retry Interval
The interval to wait before attempting to resend a message following a failure.

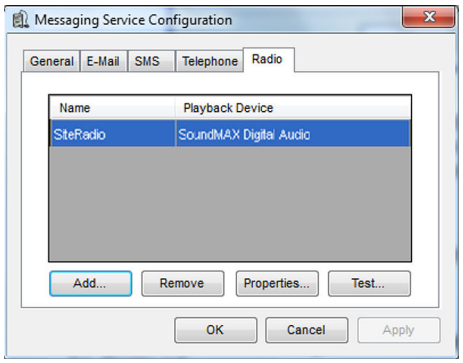
Send Order
The order in which messages are to be transmitted.

Outside Line
Some locations require a number to be dialed to access an outside line. If this is the case, enter the number in this field.

Logging
The level of logging required. This is used for diagnostic purposes if there are problems with the telephone part of the messaging service. Generally it should be set to **Off**.

19.1.5 Radio Configuration

The **Radio** page allows configuration of settings relating to broadcasting messages over a radio network. It will be present only if the Radio Messaging option has been licensed.



Adding a radio network

- To add a new radio network click the **Add** button.
  - ↳ The settings screen is displayed (see "Radio Settings").

Removing a radio network

- To delete an existing radio network select it from the list and the click the **Remove** button.

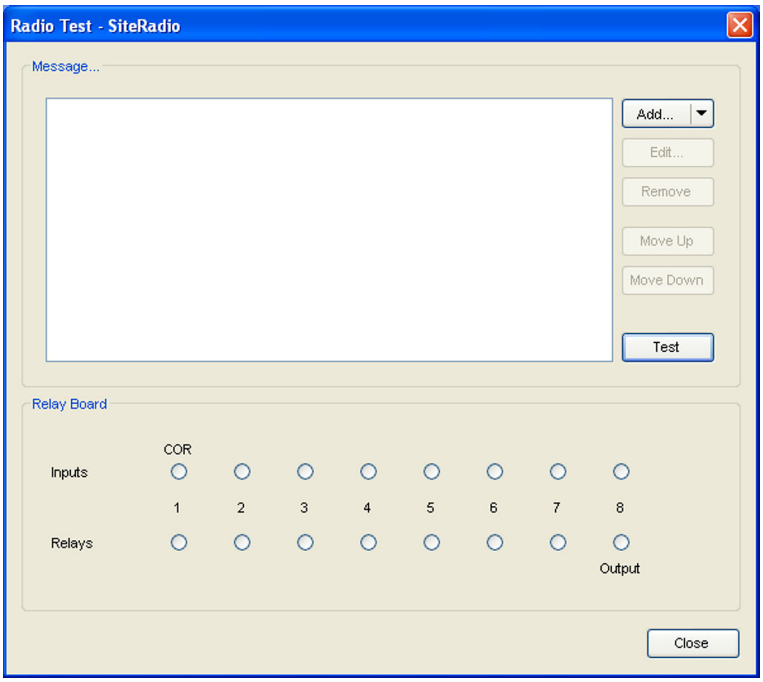
Editing a radio network

- To edit an existing radio network select it from the list and then click the **Properties** button.
  - ↳ The settings screen is displayed (see "Radio Settings").

Testing a radio network

To broadcast a test message, proceed as follows:

1. Click the **Test** button.
   ↳ The following screen will be displayed:

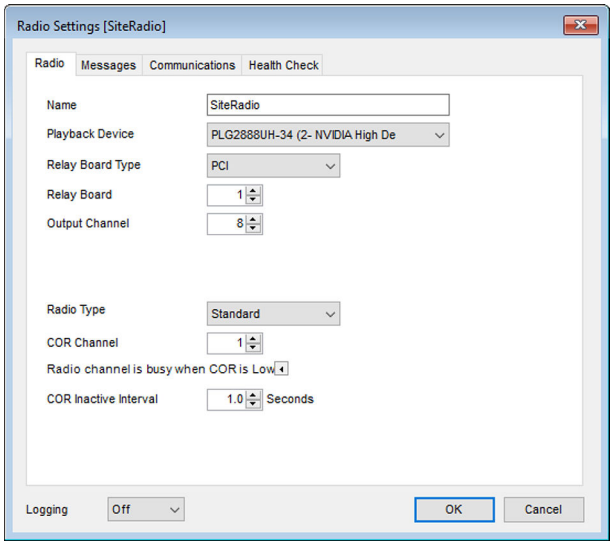


2. Configure the test message to be broadcast (for more details see "Configuring Audio Messages")
3. Click the **Test** button.
   ↳ If the radio network has been configured correctly the message should be broadcast over the site radio. The status of the relay board inputs and outputs should be indicated correctly during the broadcast. The status of the inputs and outputs can be used to determine the configuration issues if the message fails to broadcast.

19.1.6 Radio Settings

Radio Settings - Radio

The **Radio** page allows the basic configuration details for a site radio to be set up.



Name
The name used to identify this radio configuration.

Playback Device
The playback device on the PC which will be used to generated the audio to be broadcast over the radio. It is strongly recommended that this is not the default playback device for the PC, since that might lead to other audio output from the PC being inadvertently broadcast over the radio.

Radio Type
There are 3 possible types of radio configuration – simple, standard or trunking. The difference lies in the way that the COR (Carrier On Relay) input is handled. For simple radio systems the COR input is ignored and the message is broadcast immediately, ignoring any other transmissions in progress.

Relay Board
The index of the relay board which is connected to the ROB (Radio Output Board) and optionally an alarm panel and/or manual reset switch.

Output Channel
The index of the relay on the Arcom relay board which is connected to the PTT terminal of the radio output board.

COR Channel
Not applicable for simple radios. The index of the input on the relay board which is connected to the COR terminal of the radio output board.

Radio channel is busy when COR is High/Low
Not applicable for simple radios. Indicates whether the radio channel is busy when the COR input is high or low. This may vary from base station to base station.

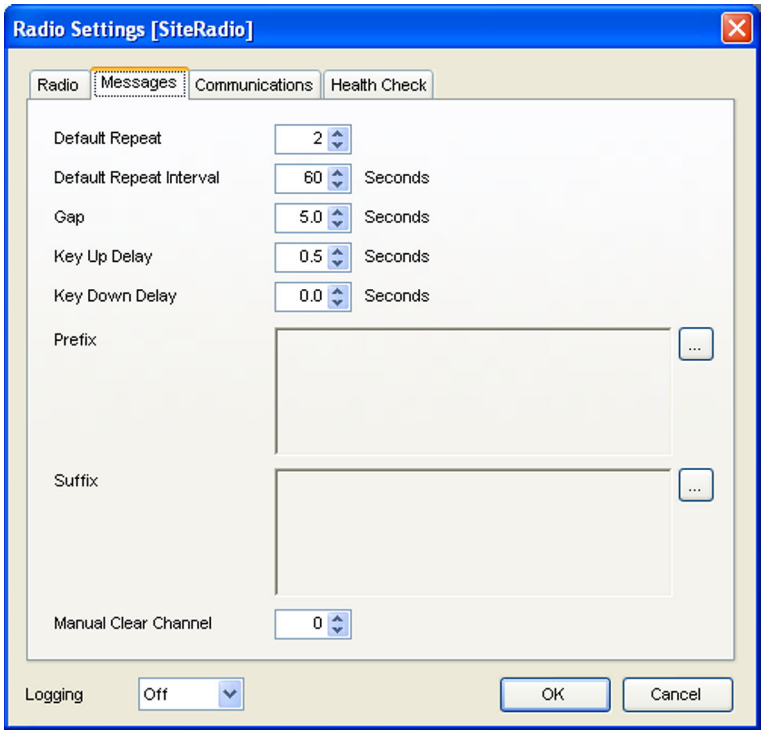
COR Inactive Interval
Not applicable for simple radios. The number of seconds the COR input needs to be inactive before an attempt is made to broadcast a message.

Wait Interval
Trunking radios only. The number of seconds to wait for the COR input to become inactive after PTT.

Wait Retry Interval
Trunking radios only. The number of seconds to wait before setting the PTT following the COR input failing to become inactive during a transmission attempt.

Radio Settings - Messages

The **Messages** page allows message configuration details to be set up.



Default Repeat
The number of times a message is to be repeated by default unless it is specifically overridden.

Default Repeat Interval
The length of time before a message is to be repeated.

Gap
The length of time to be left before broadcasting the next message.

Key Up Delay
The length of time between setting PTT and beginning to output the audio.

Key Down Delay
The length of time between completing the audio output and unsetting PTT.

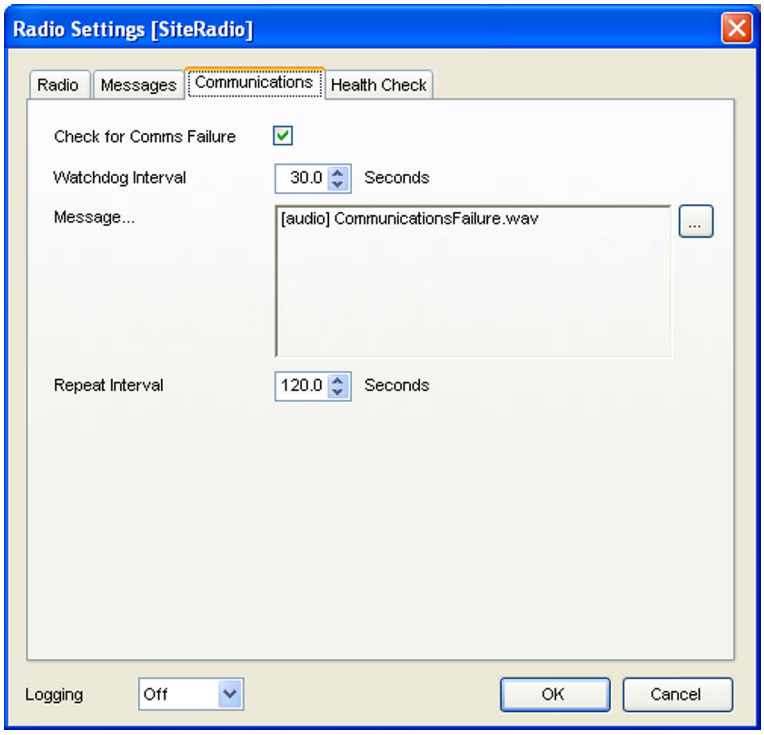
Prefix
A standard message to be prefixed to all broadcast messages. This can be used to add a standard call sign for example.
To edit this message click the ... button to the right of the field. See section on "Configuring Audio Messages" for more details.

Suffix
A standard message to be suffixed to all broadcast messages. This can be used to add a standard sign-off for example.
To edit this message click the ... button to the right of the field. See section on "Configuring Audio Messages" for more details.

Manual Clear Channel
The index of the input on the Arcom relay board to which the manual reset switch is connected. If no manual reset switch is in use, this should be set to 0.

Radio Settings - Communications

The **Communications** page allows configuration of the communications failure functionality.



Check for Comms Failure
Indicates whether the messaging service is to check whether communications with calling applications is interrupted.

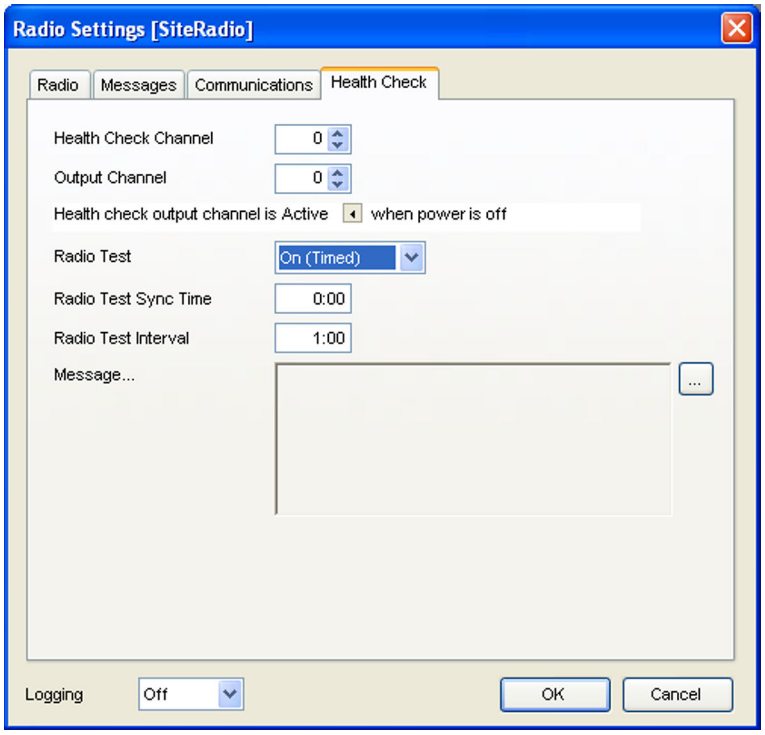
Watchdog Interval
The interval defining what constitutes a communications failure.

Message
The message to be broadcast when a communications failure is identified.
To edit this message click the ... button on the right side of the field. See section on Configuring Audio Messages for more details.

Repeat Interval
The interval at which the communications failure message is to be broadcast until communications with client applications is restored.

Radio Settings - Health Check

The **Health Check** page allows configuration of the health check functionality.



Health Check Channel
The index of the relay on the relay board which is connected to the health check terminal on the radio output board. If no health checking is to be performed, this should be set to 0.

Output Channel
The index of the relay on the relay board which is connected to an alarm indicator (such as an alarm panel). If no external alarm is being used, this should be set to 0.

Health check output channel is Active/Inactive when power is off
This field allows configuration of the default state of the external alarm indicator. This means that the system can be configured to display an external alarm if the PC is shut down.

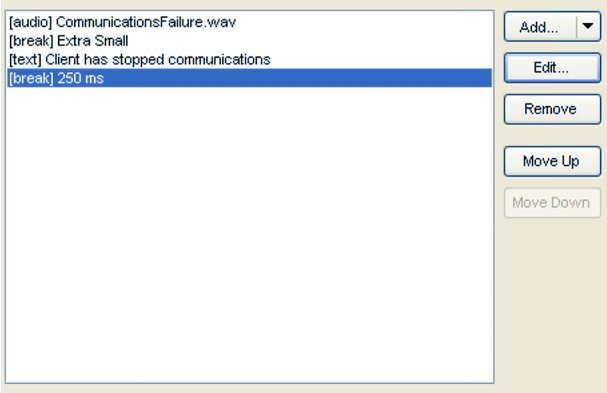
Radio Test
This field allows a periodic test to be carried out to ensure that the audio output from the PC is reaching the radio output board. This can be one of the following values:
- **Off** – No test performed.
- **On** – The test message is broadcast over the radio if no message has been broadcast in the time defined in the **Radio Test Interval** field.
- **On (Timed)** – The test message is broadcast over the radio at intervals defined by the **Radio Test Sync Time** and **Radio Test Interval** fields irrespective of when the last message was broadcast over the radio.
- **Silent** – The audio message is to be transmitted to the radio output board if no message has been broadcast in the time defined in the **Radio Test Interval** field. However, PTT is not set so the message is not actually broadcast over the radio.
- **Silent (Timed)** – The audio message is to be transmitted to the radio output board at intervals defined by the **Radio Test Sync Time** and **Radio Test Interval** fields irrespective of when the last message was broadcast over the radio. However, PTT is not set so the message is not actually broadcast over the radio.

Message
The message to be broadcast.
To edit this message click the ... button on the right side of the field. See section on Configuring Audio Messages for more details.

19.2 Configuring Audio Messages

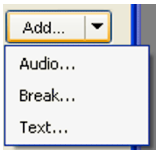
Configuring Audio Messages is a relatively simple process. However, in the interests of integrity and flexibility fields containing audio messages cannot be edited directly. Throughout the system where a message field is used, it is read-only and has a ... button next to it.

- To edit the message click on the ... button.
  - This will bring up a separate screen allowing editing of the message. Although these screens may differ in detail they will always contain the following fields:



Adding a message element

1. To add a new message element click the **Add** button.
   - Clicking on the arrow on the button will display a drop-down menu allowing selection of the element type:



   Clicking on the main part of the button automatically selects the previous message element type (defaulting to **Audio** if no previous selection has been made).
   A configuration screen for the message element will be displayed (see following sections).
2. Click the **OK** button on the configuration screen.
   - The message element is added to the message.

Editing a message element

To edit a message element, proceed as follows:

1. Select the message element in the list.
2. Click the **Edit** button.
   - The relevant configuration screen for the message element will be displayed (see following sections).
3. Click the **OK** button on the configuration screen.
   - The message element is updated.

Removing a message element

To remove a message element, proceed as follows:

1. Select the message element in the list.

2. Click the **Remove** button.

Moving a message element up or down

To move a message element to earlier in the message, proceed as follows:

1. Select the message element in the list.
2. Click the **Move Up** button until the required position is reached.

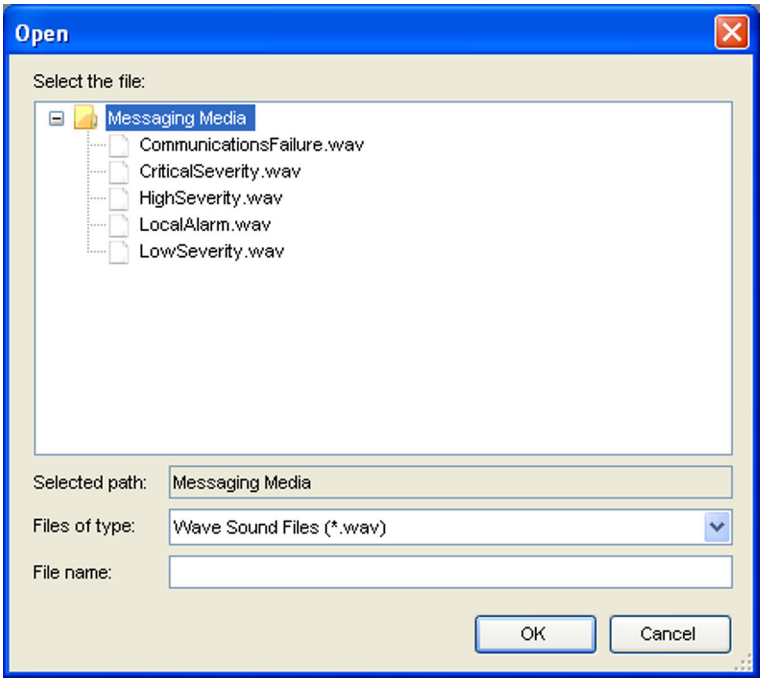
To move a message element to later in the message, proceed as follows:

1. Select the message element in the list.
2. Click the **Move Down** button until the required position is reached.

19.2.1 Audio Element

The audio element simply plays an audio file as part of the message.

1. Select the audio file on the audio configuration screen.

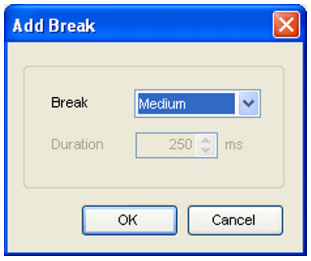


The audio files available to the messaging service are stored in a directory called **Messaging Media** which can be found under the directory that the messaging service is installed in.

2. Click the **OK** button.

19.2.2 Break Element

The Break element allows the insertion of a break between other message elements. The break can either be a pre-defined length, or explicitly specified.



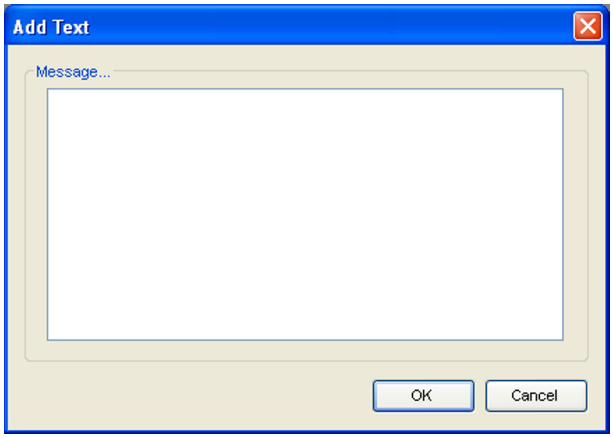
To explicitly specify the length of a break, proceed as follows:

1. Select **Timed** from the drop-down list of break types.
2. Enter the duration of the break in milliseconds in the **Duration** field.

19.2.3 Text Element

The Text element allows the use of free format text which will be synthesized using the text to speech functionality of Windows.

The standard synthesized voice in Windows may seem rather robotic and it would usually be better to record messages and use the Audio element instead.



20 Appendix

20.1 Appendix A – Standard for Calculation default flags

Industry standard	Flag
IP	▪ Roof weight specified in air ▪ Enable tank shell correction ▪ Use IP calculation of TOV/GOV ▪ Include suspended sediment and water ▪ Do not combine suspended sediment and water ▪ VCF is normal
API	▪ Roof weight specified in air ▪ Enable tank shell correction ▪ WCF uses Table 56 calculation ▪ Use API calculation of TOV/GOV ▪ Include suspended sediment and water ▪ Combine suspended sediment and water ▪ Net values calculated from gross ▪ VCF is normal
GB/T	▪ Roof weight specified in air ▪ Enable tank shell correction ▪ WCF uses fixed 0.0011 kg/l ▪ Include suspended sediment and water ▪ Combine suspended sediment and water ▪ Net values calculated from gross ▪ VCF is normal
GB/T direct weight	▪ Roof weight specified in air ▪ Enable tank shell correction ▪ WCF uses fixed 0.0011 kg/l ▪ Use API calculation of TOV/GOV ▪ Include suspended sediment and water ▪ Combine suspended sediment and water ▪ Net values calculated from gross ▪ WCF uses short Table 56 ▪ VCF is normal
GOST	▪ Roof weight specified in Vacuum (mass) ▪ Use IP calculation of TOV/GOV ▪ Net values calculated from gross ▪ WCF uses short Table 56
JIS	▪ Gauge reads reference density ▪ Roof weight specified in Vacuum (mass) ▪ WCF uses Table 56 calculation ▪ Use API calculation of TOV/GOV ▪ Disregard suspended sediment and water ▪ Water density 1.0 kg/l for fresh water ▪ Net values calculated from gross ▪ Tank shell is not insulated ▪ VCF is normal
JIS-MDP	▪ Gauge reads reference density ▪ Roof weight specified in Vacuum (mass) ▪ WCF uses Table 56 calculation ▪ Use API calculation of TOV/GOV ▪ Disregard suspended sediment and water ▪ Water density 1.0 kg/l for fresh water ▪ Net values calculated from gross ▪ Tank shell is not insulated ▪ VCF is restricted

20.2 Appendix B – Product Inventory Flags

Setting 1 (unset): WCF uses Table 56 correction
Setting 2 (Set): WCF uses fixed 0.0011 kg/l
Explanation: Select this to use a calculated WCF, which gives better accuracy when calculating WCF.

Setting 1 (unset): Use IP calculation of TOV/GOV
Setting 2 (Set): Use API calculation of TOV/GOV
Explanation: Set if you wish to use American (US) style calculations, which perform the floating roof and free water corrections at a different stage to the British calculations.

Setting 1 (unset): Disregard suspended sediment and water
Setting 2 (Set): Include suspended sediment and water
Explanation: Set if you want include sediment and water correction in your inventory calculations.

Setting 1 (unset): Combined sediment and water calculation
Setting 2 (Set): Separate sediment and water calculation
Explanation: Set if you want sediment and water correction calculated separately.

Setting 1 (unset): Water density 1.0 kg/l for fresh water
Setting 2 (Set): Water density 1.020 kg/l for sea water
Explanation: Set according to whether the water you have in your tanks is fresh or sea water.

Setting 1 (unset): Net values calculated from gross
Setting 2 (Set): Net values calculated from NOV-NSV chain
Explanation: If set, net values are calculated from gross, otherwise from prior calculated NOV and NSV values. Only applicable to IP calculation methods.

Setting 1 (unset): Mass calculated from standard conditions
Setting 2 (Set): Mass calculated from observed conditions
Explanation: –

Setting 1 (unset): Range checking is enabled
Setting 2 (Set): Range checking is disabled
Explanation: If set, checks to ensure input values are within acceptable range are turned off.

Setting 1 (unset): WCF uses main Table 56
Setting 2 (Set): WCF uses short Table 56
Explanation: Weight correction factor calculations use Table 56. This exists in a short or main version. If set, the short version will be used.

Setting 1 (unset): VCF is normal
Setting 2 (Set): VCF is restricted
Explanation: When set, VCF output is restricted to 4 decimal places.

Setting 1 (unset): Use equilibrium pressure as per D 1250-04
Setting 2 (Set): Use equilibrium pressure as per D 1250-04 addendum 1
Explanation: When set, the 2007 addendum to MPMS 11.1 D 1250-04 regarding equilibrium pressure is applied.

Setting 1 (unset): Use Calculated Data
Setting 2 (Set): Use Tabular Data
Explanation: When set, the data for WCF is obtained from a lookup table rather than being calculated.

Setting 1 (unset): Use Metric table for WCF calculation
Setting 2 (Set): Use Imperial table for WCF calculation
Explanation: Only valid if the Use Tabular Data option is set. When set, the WCF is derived from Table 57 (imperial). Otherwise Table 56 (Metric) is used.

Setting 1 (unset): Use normal WCF value
Setting 2 (Set): Use reciprocal WCF value
Explanation: Only valid if the Use Tabular Data and the Use Metric table for WCF calculation options are selected. When set, the WCF value will be obtained from the litres/ Metric Ton column of Table 56. Otherwise the Metric Ton/litre column is used.

Setting 1 (unset): Volume
Setting 2 (Set): Pressure
Explanation: Determines whether mass values are derived from volumetric data or from pressure inputs.

Setting 1 (unset): Volume
Setting 2 (Set): Mass
Explanation: The calculated Barrel Conversion Factor is to be used to convert volume or mass values.

20.3 Appendix C – Tank Inventory Flags

Setting 1 (unset): Gauge levels are innage
Setting 2 (Set): Gauge levels are ullage
Explanation: The levels returned by the gauge are innage (referenced from the bottom) or ullage (referenced from the top).

Setting 1 (unset): Ullage level zero = Max. Operating Level
Setting 2 (Set): Ullage level zero = Reference Height
Explanation: Zero ullage is taken as the highest safe working level or the maximum height of the tank.

Setting 1 (unset): Gauge reads reference density
Setting 2 (Set): Gauge reads observed density
Explanation: **Note!** Use this setting with care!
When set the inventory calculator derives the reference density from the observed density information, if you enter manual densities be aware of whether you enter a reference density or an observed density.

Setting 1 (unset): Gauge reads density in vacuum
Setting 2 (Set): Gauge reads density in air
Explanation: When set an allowance for the density of air will be made during inventory calculations.

Setting 1 (unset): Gauge reads relative pressure
Setting 2 (Set): Gauge reads absolute pressure
Explanation: Internally pressures are stored in Bar absolute, checking this option will cause the pressure stored to be calculated from the gauged value.

Setting 1 (unset): Roof weight specified in air
Setting 2 (Set): Roof weight specified in vacuum
Explanation: If you know the mass of your floating roof, set to Roof Weight Specified in vacuum.

Setting 1 (unset): Disable tank shell correction
Setting 2 (Set): Enable tank shell correction
Explanation: When checked the tank shell correction calculation will be performed, enter shell correction information on the relevant tab in this module.

Setting 1 (unset): Do not apply hydrometer correction in VCF
Setting 2 (Set): Apply hydrometer correction to VCF
Explanation: Set according to whether hydrometer correction is required or not.

Setting 1 (unset): Tank calculated as hydrocarbon storage
Setting 2 (Set): Tank calculated for ballast/slops storage
Explanation: When set movements in and out of the tank are assumed to leave a constant oil depth and vary the amount of water in the tank.

Setting 1 (unset): Use product temperature in vapour correction
Setting 2 (Set): Use vapour temperature in vapour corrections
Explanation: Sets which temperature is used by vapour corrections.

Setting 1 (unset): Average gauge temperature is product temperature
Setting 2 (Set): Average gauge temperature is vapour temperature
Explanation: Selecting vapour temperature as the source of average temperature disables product temperature.

Setting 1 (unset): Dip thermal correction is disregarded
Setting 2 (Set): Dip thermal correction is enabled
Explanation: Set if correction for temperature is applied to dip.

Setting 1 (unset): Gauge dip type is Ullage
Setting 2 (Set): Gauge dip type is Innage
Explanation: If Dip thermal correction is enabled, selects which type of gauge to apply correction to.

Setting 1 (unset): Disable correction for Buoyancy gauges
Setting 2 (Set): Enable correction for Buoyancy gauges
Explanation: When set, correction is applied for buoyancy type gauges.

Setting 1 (unset): Liquid pressure is from P1
Setting 2 (Set): Liquid pressure is from P2
Explanation: Determines where liquid pressure is read from. Can also be set to read Liquid Pressure from P3.

Setting 1 (unset): Compressibility factor is disregarded
Setting 2 (Set): Compressibility factor is applied
Explanation: If set, the compressibility factor will be applied to calculations.

Setting 1 (unset): Tank shell is not insulated
Setting 2 (Set): Tank shell is insulated
Explanation: If set, tank shell insulation will be included in calculations.

20.4 Appendix D – Special Considerations for Volume Correction Methods

Volume Correction Method
Density Table
When Density Table is selected as the volume correction method, the product reference temperature is editable. The reference density is set as the value looked up from the density table at the given product reference temperature.
Any user-entered manual reference density will be ignored.

71727009

www.addresses.endress.com

For more Endress+Hauser product please visit: www.ainstru.com
Mail: Sales@ainstru.com

Endress+Hauser
People for Process Automation