

FMS Software

Version 5

User Manual



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Manual History

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About This Manual

Purpose

This manual is intended for users of FMS software. How to use the various features of FMS are described in this manual.

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CHAPTER 1

Introduction

FMS is a client server application. It is made up of different programs that communicate with each other over TCP/IP networks. Each separate program performs a limited set of tasks. However, powerful systems can be built by connecting the components together.

FMS has the following programs:

The Monitoring Engine Server	Controls equipment, collects data from the equipment, stores the results in a database, and detects alarm conditions. It performs various actions in response to a range of events.
The User Interface	This application displays the status of the system, the configuration of monitoring and OPC UA servers can be controlled, and reports can be generated from the data stored on the SQL database.
The OPC UA Server	This application exposes an OPC UA Server address space containing many of the FMS node sample points.
A SQL Database Server	The SQL server is the application that stores the collected data. There are several types of SQL servers. FMS has been tested using Microsoft® SQL and PostgreSQL® software. Applications other than FMS can also access a SQL server to generate reports. SQL servers usually have comprehensive security features to control access and can include encryption.

Although there are several different programs, only the client application has a user interface. The other applications are run in the background without needing to display any data. This means a whole system can run on just one computer. However, it is possible for each component to run on a different computer, often there are advantages to running the SQL server on a different computer.

It is possible to have more than one monitoring server running. This can be on one or more computers; for example, one monitoring server controlling particle counters and a second server controlling environmental sensors.

A single SQL server can be shared with many monitoring servers.

Each client can see all monitoring servers on a network.

Glossary

FMS	Facility Monitoring System
FMS	Software of Facility Monitoring Systems Limited
FS	Functional Specification
GAMP	Good Automated Manufacturing Practice
ISPE	International Society for Pharmaceutical Engineering
IQ	Installation Qualification
OQ	Operational Qualification
SQL	Structured Query Language
OPC UA	OPC Unified Architecture
21 CFR Part 11	21 Code of Federal Regulations - Electronic Records; Electronic Signatures

CHAPTER 2

Installing the Software

Installing FMS Software and PostgreSQL® Database

- License keys for FMS software should have been supplied.
- The following instructions assume that FMS software is being installed from an Install CD or DVD. If not, open the required files directly from the network.
- In the following instructions the name of the database will be FMS01, the Client User will be named “Client”, the Monitor User will be named “Monitor”.
- FMS software can be run on Windows® 10 Professional Edition or above, Windows® 11 Professional Edition or above, Windows® Server 2008 with R2 package, Windows® Server 2012 with R2 package operating systems, Windows® Server 2016, or Windows® Server 2019.
- Please refer to the FMS installation guide for installation details.

SQL Servers

FMS requires a SQL server for storing data. This server can be on the same computer as the monitoring system, the client system or, it can reside on another computer.

Each SQL server has its own requirements for installation and setting up.

NOTICE

It is necessary to read the SQL server's documentation to configure databases and user accounts correctly especially when setting host access and user privileges.

Any SQL server used with FMS must support the ALTER TABLE, CREATE TABLE, CREATE INDEX, and SELECT ... LIMIT commands. The SQL servers must support quoted identifiers by default. This may require altering the database server configuration. Many databases allow quoted identifiers by default, others do not (Microsoft® SQL Server® database software).

The following SQL servers are known to work with FMS, PostgreSQL and MS SQL® server.

It is important that databases are enabled to use ANSI quoting.

PostgreSQL Databases can be accessed directly and MS SQL® through ODBC. If ODBC is used, ODBC connections must be set up on each computer where either FMS Client or monitor is running.

On-line Help

There is on line help accessible by selecting the Help menu option or by pressing the **Help** buttons.

CHAPTER 3

System Maintenance

The following routine system maintenance tasks should be performed every few weeks.

Check Free Disk Space

Data records can be saved to local disk drives, to networked disk drives and/or to a SQL server. If disk space runs out, results can no longer be recorded. It is important to ensure this does not happen.

Problems may arise with determining exactly where data is being saved. Directories may be networked drives or links to other directories on different drives/network locations. In the case of storing results on a SQL server, access to the computer where the results are stored, might not be possible at all.

Free space on a networked system drive may be difficult to determine, as each user may have a different permitted level of allocated space.

Depending on how a system is configured, it is not possible to give a specific command script. Normally a site specific procedure is required to ensure that there is enough disk space.

Shutdown and Reboot

Only during operating system start-up can a hard disk be correctly checked and the file system repaired safely. Further applications and operating system functions might slowly leak resources.

For these reasons a system should be shut down and rebooted every few weeks, if possible once per week.

Robustness Features

FMS has several functions to improve the robustness of the system. The **Guard service** can monitor applications and recover from an application crashing or becoming “stuck”.

Guard Service

The Guard service is installed to start and control the monitoring tasks (nodes). These programs run in the background and have no user interface. On starting, the Guard service reads the file **Guard.ini** and runs the programs listed in it. If any of the programs fails, it is restarted. Each time the program fails, the time between restarts doubles up to a maximum of 60 seconds. If a program runs for more than one hour without failure, the restart time is reduced to one second. Additionally, the Guard service ensures every monitoring task is running correctly by requiring a watchdog clear message, a line of text printed on the standard error channel, to be sent from the program to the Guard service at least once every two minutes. If there is no watchdog clear message from the task, the guard process kills and restarts the program.

Archiving

General Notes

As results are written to a SQL database such as PostgreSQL software, it is possible to archive (dump) a database while it is in use in a safe manner. Refer to the database documentation.

It makes sense to archive a system at the same time as a routine shutdown and reboot.

Although SQL commands are almost the same between servers, there can be some differences. The main difference is the type of the date time field. This is important when transferring SQL journal files between different SQL servers.

FMS uses memory mapped files. It is possible for some archiving programs to interfere with these files by locking them. This in turn can cause FMS to fail. Therefore, it is recommended that FMS is disabled/stopped during archiving.

Options for Archiving

FMS provides various facilities for archiving results in a useful form. The options are listed below.

SQL Journal Files	<p>The SQL database can be enabled to write a copy of the SQL commands to file on a one file per day basis.</p> <p>The directory for storing these files can be on a network server. As these are daily files there is no issue with respect to archiving these files while the system is running.</p>
Using Old Data	<p>Data that is considered no longer required can be archived and removed from the database. This is a SQL server dependent process.</p> <p>If archived data is needed, it is best to restore it to a separate computer. If the node configuration from the original system is renamed appropriately (for example, "Node01" might be renamed "Node01Archive") and all units disabled in the configuration, it is then possible to create a node that has only the archived data and does not collect any data. All the reporting functions will work as expected.</p> <p>The local node configuration will also need to be altered to match the different database.</p>

PC Maintenance

Many apparent software problems are caused by faults in the hardware. The most common of these are:

CMOS Battery Exhaustion	<p>This causes the PC's clock to behave erratically and can cause other "strange" behaviors. It is recommended that the CMOS battery be replaced every year. FMS will reset automatically if the clock advances by more than 1 minute or reduces by more than 1 second.</p>
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RAM	Faulty RAM causes programs to crash. It requires only one cell to fail (in billions) to make a program crash. A typical symptom of this problem is where an application fails when a particular function is called and the problem cannot be reproduced elsewhere and it disappears when the RAM is replaced.
------------	---

Daylight Savings Time

Daylight Savings Time adjustments are often made twice per year. This usually involves advancing the clock by one hour in the Spring and reversing the clock by one hour in the Fall.

This can cause problems when recording results, such as, during the Spring change there appears to be an hour's worth of data missing and in the Fall the values for one hour have multiple readings, unless the database is time zone aware.

It is suggested that automatic Daylight Savings adjustments are disabled and that they are manually applied when necessary. Monitoring should be stopped before the clock change and restarted after the clock change.

FMS will automatically stop and restart monitoring if any date changes are detected or time changes of greater than one minute. Under Microsoft® Windows®, the act of opening the calendar can immediately change the time which can in turn cause FMS to stop and start.

21 CFR Part 11 Compliance

FMS was developed with 21 CFR Part 11 (21 CFR 11) in mind. 21 CFR 11 is a set of United States of America Federal Regulations that cover the security of digital records. This feature is enabled when FMS is installed in Pharma mode.

The key concepts behind these regulations are non-repudiation and data security. That is, with a compliant system it is difficult to claim that a record was falsified and that any data records be difficult to modify without detection and that the data be readable over a long period of time.

Software by itself cannot be 21 CFR Part 11 compliant, as it is whole systems that include equipment, people, and company structures that are involved in compliance.

FMS has the following features that can be enabled to assist an end user to comply with 21 CFR 11:

- A username and password are required for access to FMS applications.
- Passwords can be aged so they must be renewed at a selected interval.
- Users can be restricted to the functions they have access to.
- After a period of inactivity users can be logged off automatically.
- Terminals can be locked after a selected number of failed logins.
- Auditing can be enabled to log every user action that changes a configuration. The audit trail includes the item changed, the nature of the change, the full user description of the user who made the change and the user ID of the person making the change.
- Before any change to a configuration is allowed the user's password and a comment can be required.
- User actions (e.g., alarm acknowledgement) require the user's password and are logged with the user's description and user's ID.
- When saving a configuration, the configuration is saved under the given name as well as under the given name plus the date and time. That is a time stamped archive copy of a configuration is made every time a configuration is saved.
- When auditing is enabled the new and previous values of any changed attribute is recorded.
- SQL Servers can be made secure and use encryption.

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CHAPTER 4

FMS Client

The **FMS Client** application includes facilities to view, configure, and to control monitoring systems. A client can access many monitoring systems at a time. When the client application starts, all accessible monitoring systems are detected and displayed in the Node tab. The client application uses loadable modules to perform various functions.

Help

There are several layers of help available as listed in this section.

Fly By Hints

Fly By Hints are short prompts that are displayed by putting the mouse cursor over an item. These usually briefly describe what the item is for and does. Almost all items have a *Fly By Hint*.






On-line Manual

This manual is available on-line and can be viewed by selecting the Help menu item.

Clicking on the **Help** button will open the help display.

Color and Icon Coding

A color coding is used to show the alarm state of items on the system. Usually an icon is displayed on the left-hand side to symbolize the alarm state. The color coding is listed in the table below.

Icon	Text Color	Meaning
	White	Indicates an idle state. This means that the system is waiting for the first data to be received after starting. This can also mean there is a problem if an item remains white for a long period of time.
	Green	Indicates an item is OK. The currently measured values are not outside any alarm or warning limits and any associated equipment has not failed.
	Yellow	Indicates the item is in a warning state.
	Red	Indicates the item is in an alarm state. Usually when a sample point enters an alarm state, it requires acknowledgement. The item will be shown in cyan until the alarm is acknowledged. The icon associated with the item changes to reflect the current alarm state of the item.
	DARK BLUE	Marks that an item has failed. Usually there will be some Notes to indicate the reason for the failure.

Using the Client Display

The client display is divided into several parts:

1. A menu bar at the top.
2. A tool bar that offers most of the options of the menu.
3. A tab control that shows each detected monitoring system. The tab headings show the current state of each node.
4. Tables of sample points and alarm groups on the last selected node. The table cells are color coded to show the alarm state of the sample points.
5. A list of units belonging to the currently selected node. The list is color coded to show the alarm state of the unit.
6. A window display for a list of color-coded messages.

The monitoring nodes can be selected and viewed by clicking on the appropriate tab. **Please note:** *only one of these items can be viewed at any one time.*

Menus

Client

Menu Item	Description
Login/Logout	Quickly login in and logout of the client.
Client Options	This item allows the local configuration for the client to be set up.
Change Password	Allows the password of the current user to be changed. The new password must be more than five characters, it must also be the same in the New and Confirm password fields before it can be accepted. The current password is also required.
User Log	Allows general comments to be made into the event log to record observations or comments.
E-mail	Opens a simple e-mail client to send short e-mail messages to one of a restricted set of recipients. This is intended as an alternative to the user log entry function where users want to record general events or Notes. E-mailing is enabled in the local Options.
Refresh	Updates the node list to reflect current connected nodes. Nodes are only removed from the list if they have been inactive for > 1 min.
Exit	This menu option is only enabled for users with Exit privilege. When selected and confirmed, the client interface is closed. This may cause an operating system level logout or restart.

Node

Menu Item	Description
View	View Status, Maps, and Graphs associated with each monitoring node.
Report	Access all functions related to report, including generating, saving, and exporting reports.
Control	Gives access to control monitoring nodes, including unit recipe, sample point recipe, and control of current node.
Configure	Gives access to configure the last selected node.

Windows

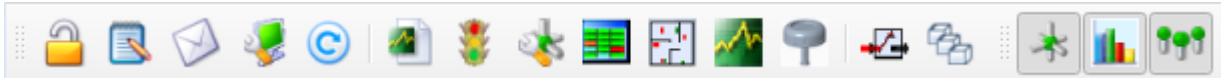
Menu Item	Description
Units	Display the status of the units associated with the currently selected node.
Statistics	Displays all the statistics associated with sample, tag, alarm limits, SPC Status, and SPC limits.
Alarm Groups	Displays the status of the alarm groups.

Help


Menu Item	Description
Help	Opens the on-line manual at the index page.
About FMS	Displays the client software copyright, version, and build date information.

Toolbar

The toolbar options are similar to those given in the menu with the following additions. Where the icon on the toolbar is the same as in the menu, the function is the same.



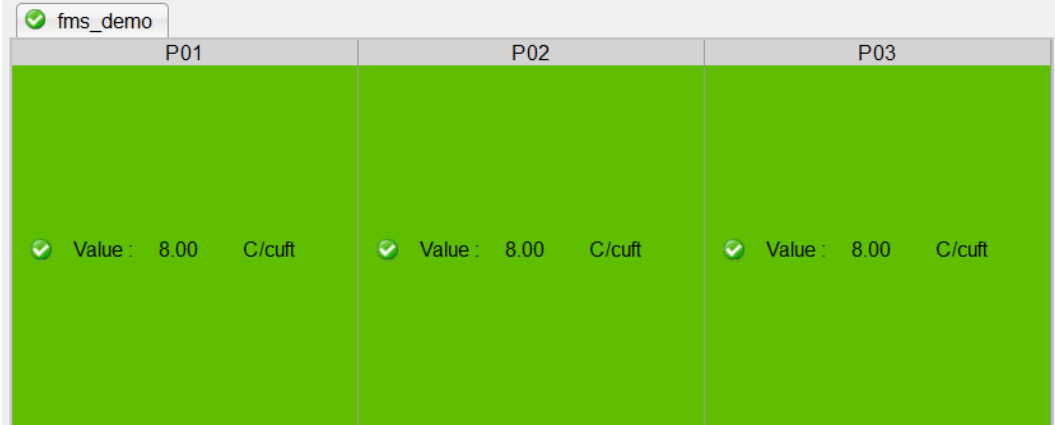
Icon	Icon Name	Description
	Login/Logout	Quickly login/out of Client.
	User Log	Enter user log.
	E-mail	Access e-mail functions.
	Client Options	Configure client options.
	Refresh	Refresh current status of the node.
	Report	Set up and configure reports.
	Control	Control each node.
	Configuration	Configure each node.
	View Status	View status view for each node.
	View Map	View map view for each node.
	View Graph	View graph view for each node.
	View AAS Status	Show AAS status view for each node..
	Output Control	View Digital Output Control for each node.
	Batch Manager	View Batch Manager for each node.
	View Units	View current status of all units connected to the selected monitoring node.
	View Statistics	View statistics of selected sample points.

Icon	Icon Name	Description
	View Alarm Group	View the alarm group status of current node.

Sample Status View

This pane shows all the sample points associated with the selected Node. This list is color coded to show the current alarm state of the sample points.

The name, state, and current reading of each sample point are displayed.



The screenshot shows a window titled 'fms_demo' with three columns labeled P01, P02, and P03. Each column contains a green checkmark icon, the text 'Value : 8.00', and the unit 'C/cuft'.

Message

This pane displays the last 250 messages from all accessible nodes. The messages are color coded for the type of message.

The **Node** column identifies the sample point node. **Date/Time** is the time stamp for the message. The **Source** column identifies the origin of the message—this can be a sample point, node, unit or some other item. The **Type** is the alarm state of the message. The **Message** field the message text.

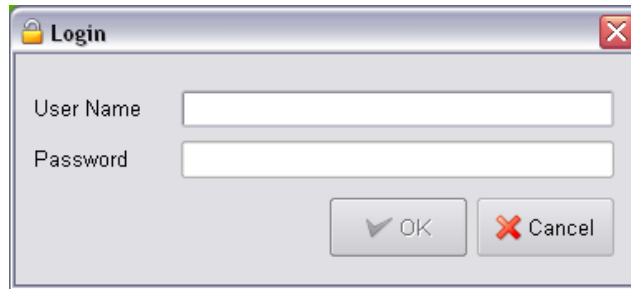
Node	Date/Time ^	Source	Type	Message
Local	17-01-2019 16:30:44	Local	Ok	Monitor Has Connected fms_demo from 10.1.4.117

Status Bar

The status bar shows the most recent message from the FMS software.

Logging into FMS

Logging on to FMS requires a valid user account for the FMS system being used.


A screenshot of a Windows-style dialog box titled "Login". The dialog box has a title bar with a lock icon on the left and a close button (X) on the right. Inside the dialog, there are two text input fields: the first is labeled "User Name" and the second is labeled "Password". Below the input fields are two buttons: "OK" with a checkmark icon and "Cancel" with a red X icon.

Each user for a particular FMS system has privileges to perform various functions. Users can be assigned permission to change the configuration, other users can be allowed to acknowledge alarms or make reports.

Password Aging

If password aging is enabled and after the given number of days have elapsed, the user will be asked to change their password using the change password dialog.

Configuring the Client

To configure a client system, a valid username and password for the FMS system in question must be used. To access the configuration facilities it is necessary to log onto the computer. Select **Client -> Client Options** or click the **Client Options** button  on the tool bar.

Identification

The screenshot shows the 'ClientOptions' dialog box with the 'Identification' tab selected. The 'Identification Settings' section contains the following fields:

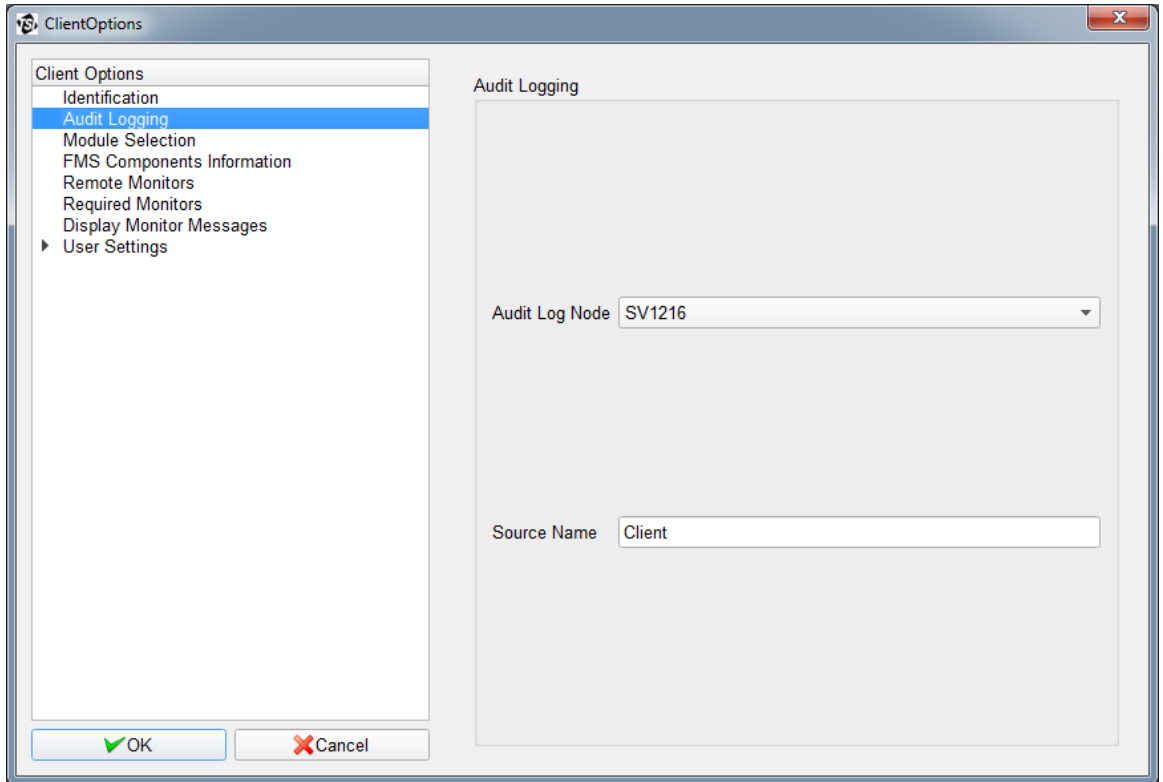
- Client Name:** Text input field containing 'Client'.
- License Key:** Empty text input field.
- Broadcast Port:** Spin box set to '4001'.
- Broadcast Using:** Dropdown menu showing 'ASIX AX88772 USB2.0 to Fast Ethernet Adapter'.
- Multicast IP Address:** Text input field containing '239.100.100.1'.
- Multicast Port:** Spin box set to '5000'.

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Client Name	Title used as the caption of the user interface.
License Key	License key issued. This controls the number of sample points that can be accessed. When a license expires, a reminder is displayed. If more than one client tries to use the same license key, these clients are disabled. License keys are FMS minor version specific. i.e., a license key that was generated for FMS 5.2.0 will only work with FMS 5.2.x systems. License keys that were generated prior to FMS 5.2.0's release are valid for all FMS 5.0.x versions and FMS 5.1.x.
Broadcast Port	The port to be used for Client broadcasts.
Broadcast Using	The network interface to be used for Client broadcasts.
Multicast IP Address	The IP address to be used for multicast network.
Multicast Port	The port to be used for multicast network.

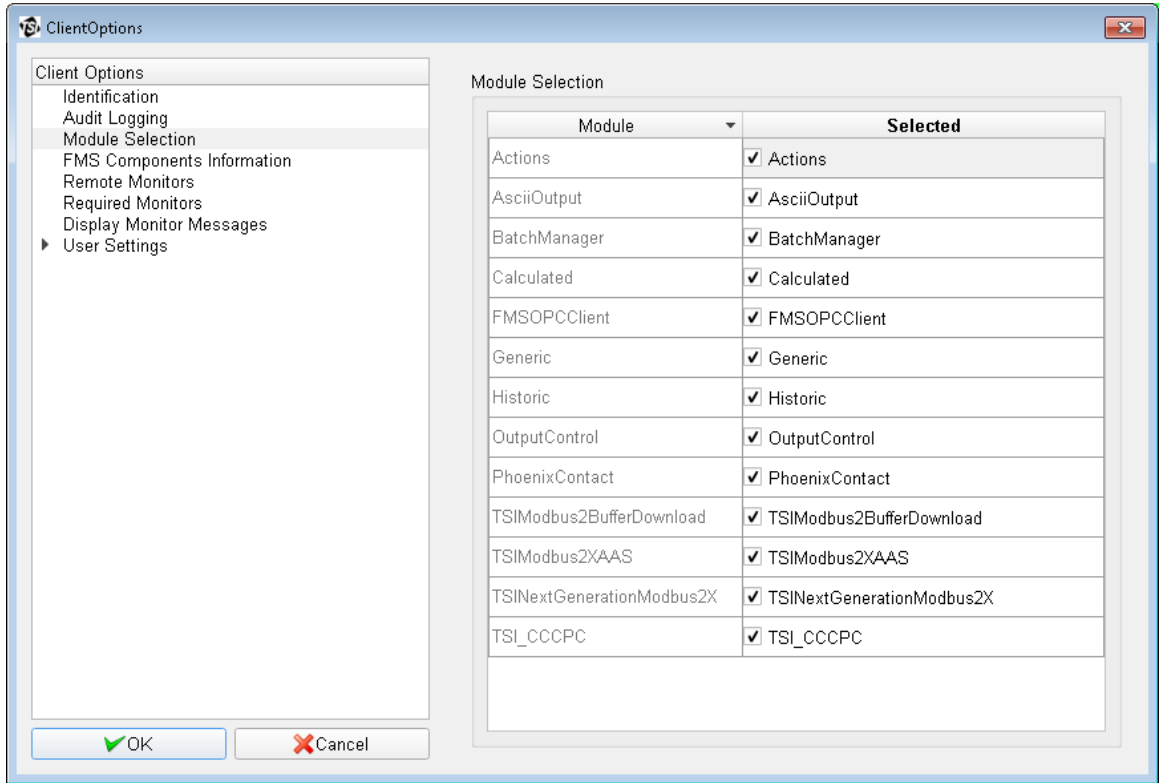
Audit Logging

This option configures the node that Audit log messages will be logged in and the text to be displayed as the source of audit log entries originating from the Client. If users are required to enter comments when changing configuration, the option exists in the Node security settings.



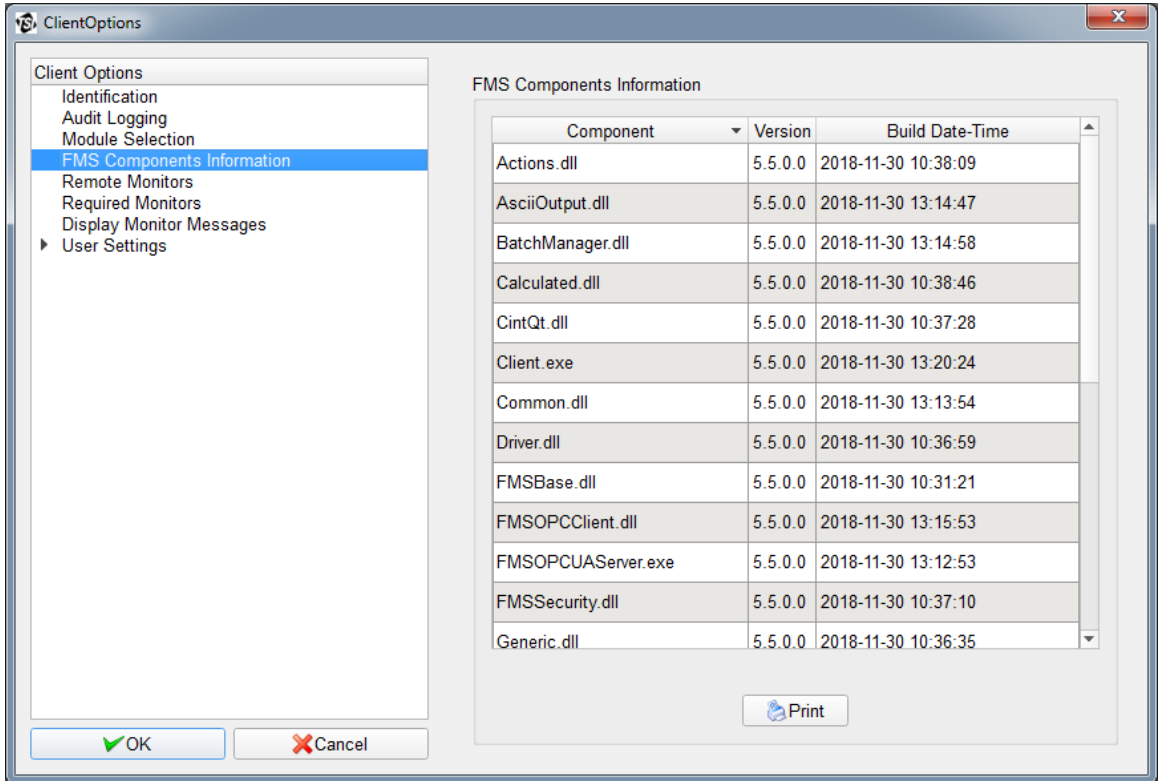
Modules

This page selects which of the loadable extension modules are to be used by the client. This feature is used to enable or disable blocks of features.



FMS Components Information

This page displays a printable table of the version numbers and builds dates of the components of the FMS software.



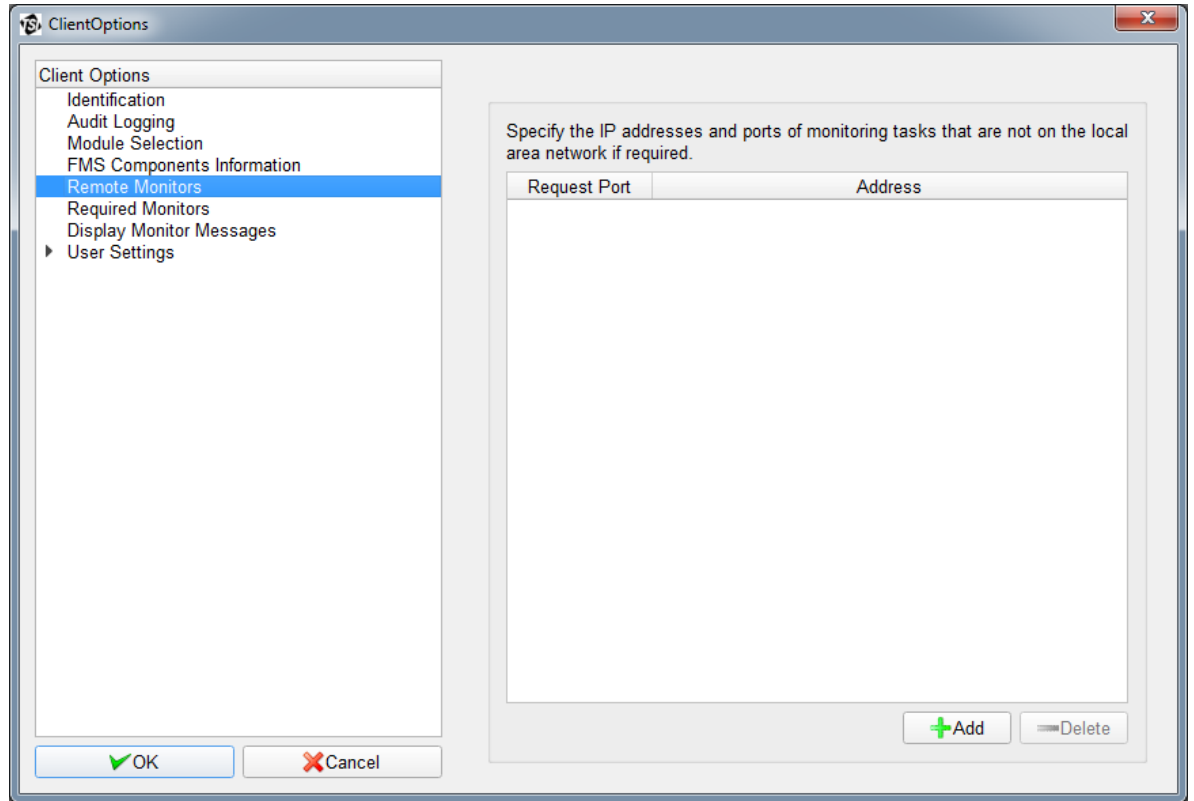
The screenshot shows the 'ClientOptions' dialog box. On the left, a tree view under 'Client Options' has 'FMS Components Information' selected. The main area displays a table of FMS components with their version numbers and build dates. A 'Print' button is located below the table. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Component	Version	Build Date-Time
Actions.dll	5.5.0.0	2018-11-30 10:38:09
AsciiOutput.dll	5.5.0.0	2018-11-30 13:14:47
BatchManager.dll	5.5.0.0	2018-11-30 13:14:58
Calculated.dll	5.5.0.0	2018-11-30 10:38:46
CintQt.dll	5.5.0.0	2018-11-30 10:37:28
Client.exe	5.5.0.0	2018-11-30 13:20:24
Common.dll	5.5.0.0	2018-11-30 13:13:54
Driver.dll	5.5.0.0	2018-11-30 10:36:59
FMSBase.dll	5.5.0.0	2018-11-30 10:31:21
FMSOPClient.dll	5.5.0.0	2018-11-30 13:15:53
FMSOPCUAServer.exe	5.5.0.0	2018-11-30 13:12:53
FMSSecurity.dll	5.5.0.0	2018-11-30 10:37:10
Generic.dll	5.5.0.0	2018-11-30 10:36:35

(screen for reference only)

Remote Monitors

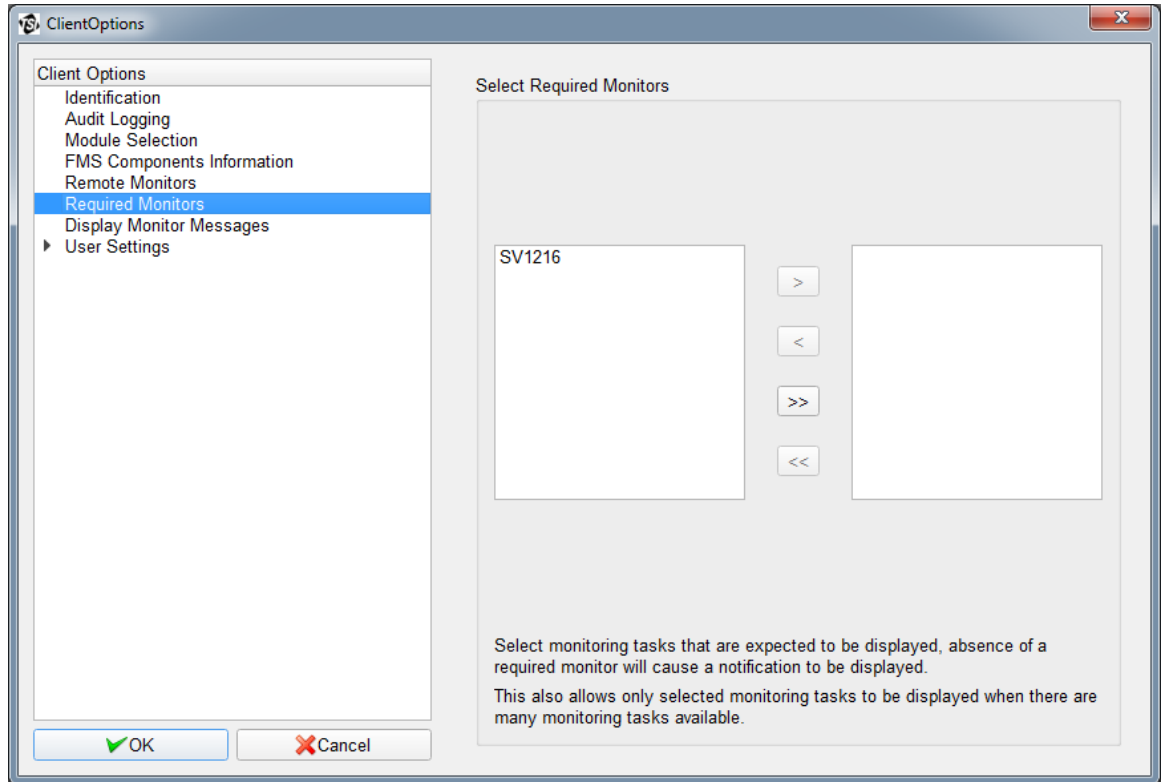
This page allows the user to define remote monitoring tasks not on the local network that the Client is to connect to. The IP address and request port of the remote monitor must be specified.



Required Monitors

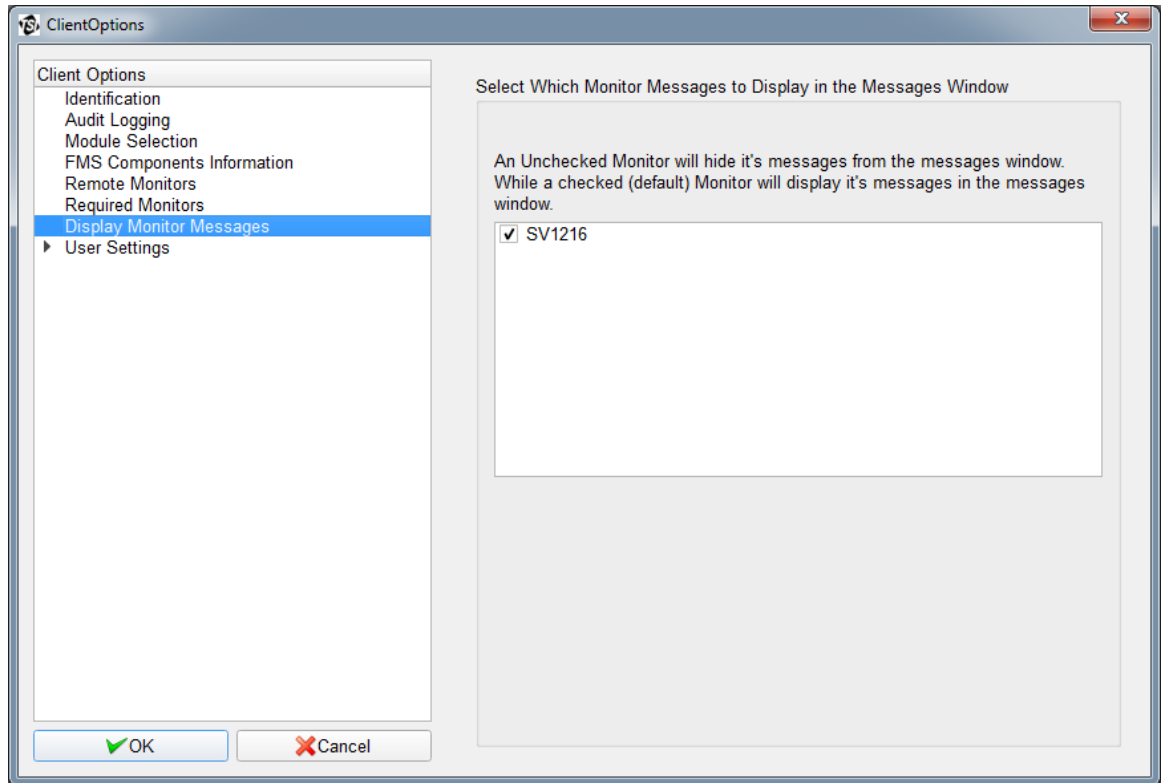
This page allows the user to define monitoring tasks that are to be displayed by this Client. If a required monitor is not present, a failure condition will be triggered.

If no required monitors are specified, all detected monitors will be displayed.



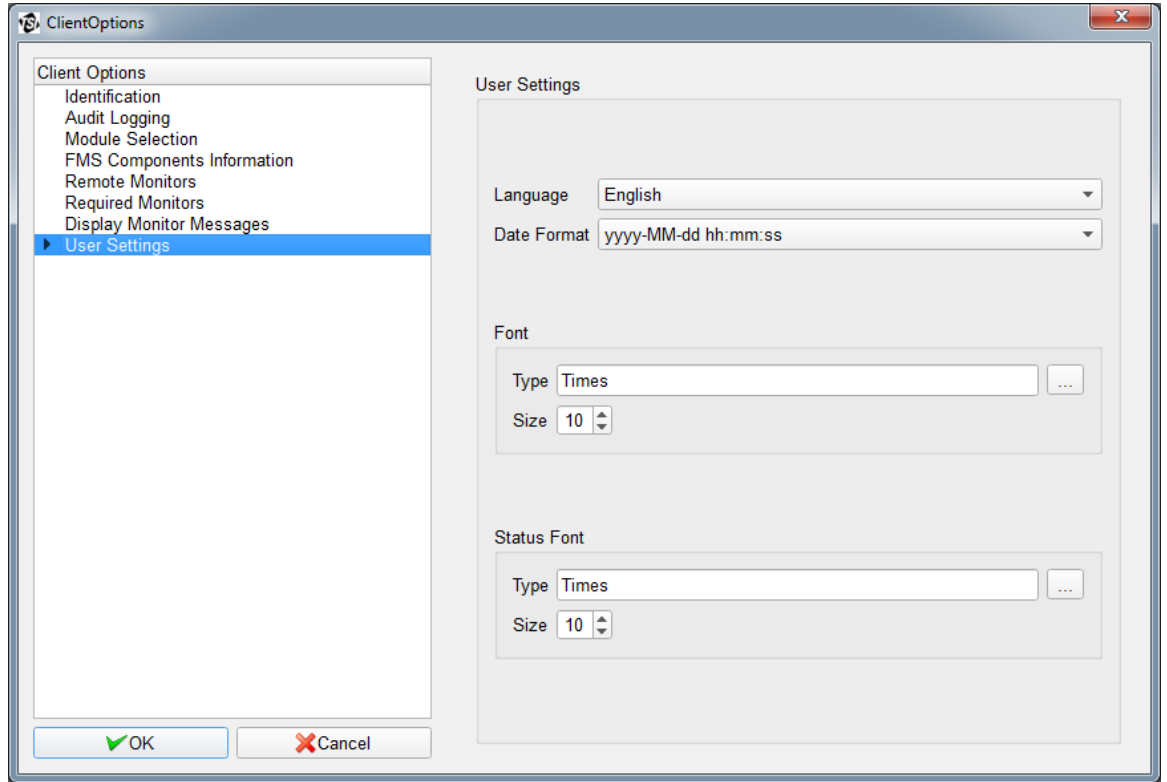
Display Monitor Messages

The messages window will display messages from the Monitors that are checked in this window. By default, all Monitors are checked.



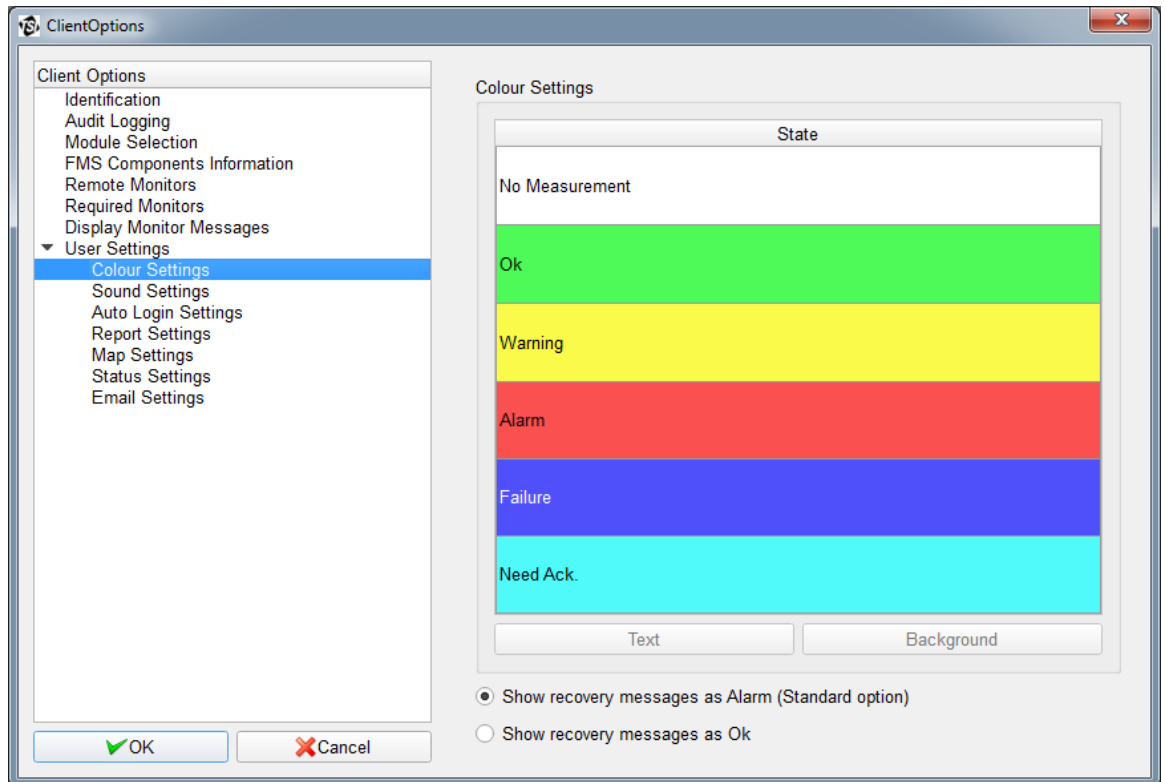
User Settings

This page selects the Language option and the Date Format option. The Font Type and Size options can be selected for the main application and for the status tables.



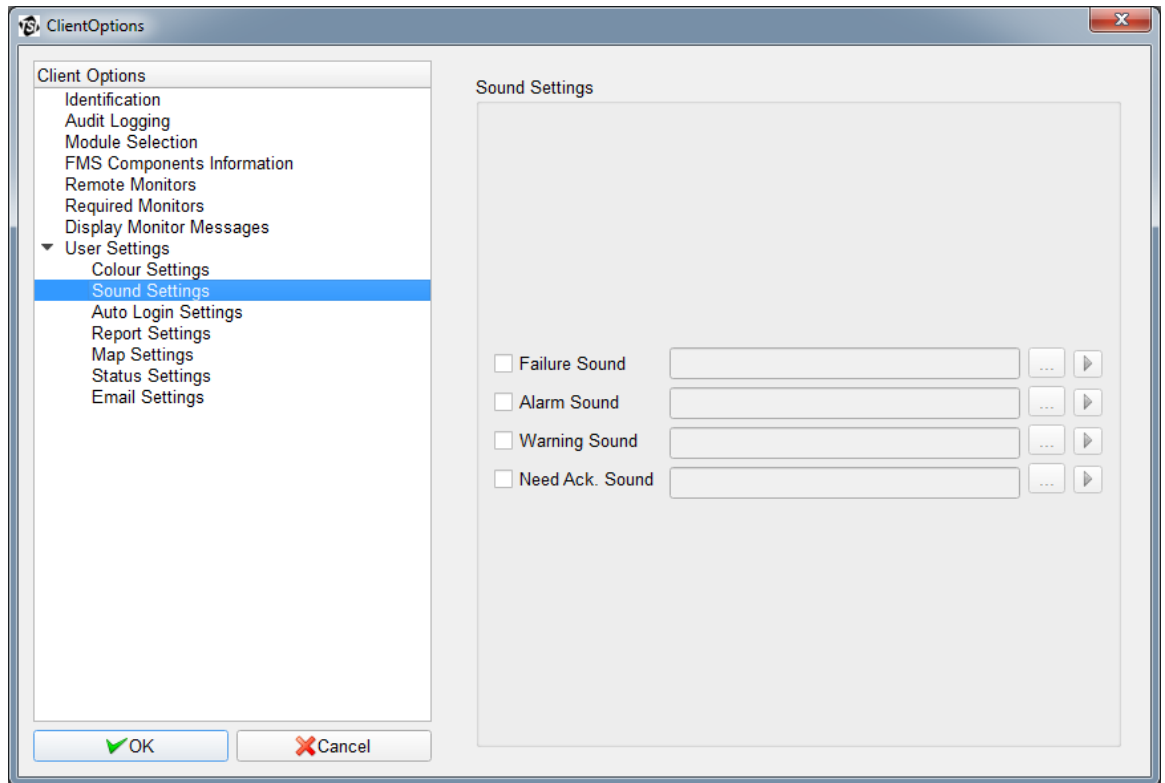
Color Settings

This page configures the colors associated with each state of the sample points. Alarm recovery messages are by default shown as Alarm notifications, select the option **Show recovery messages as Ok** to show these message types as OK in the Messages window.



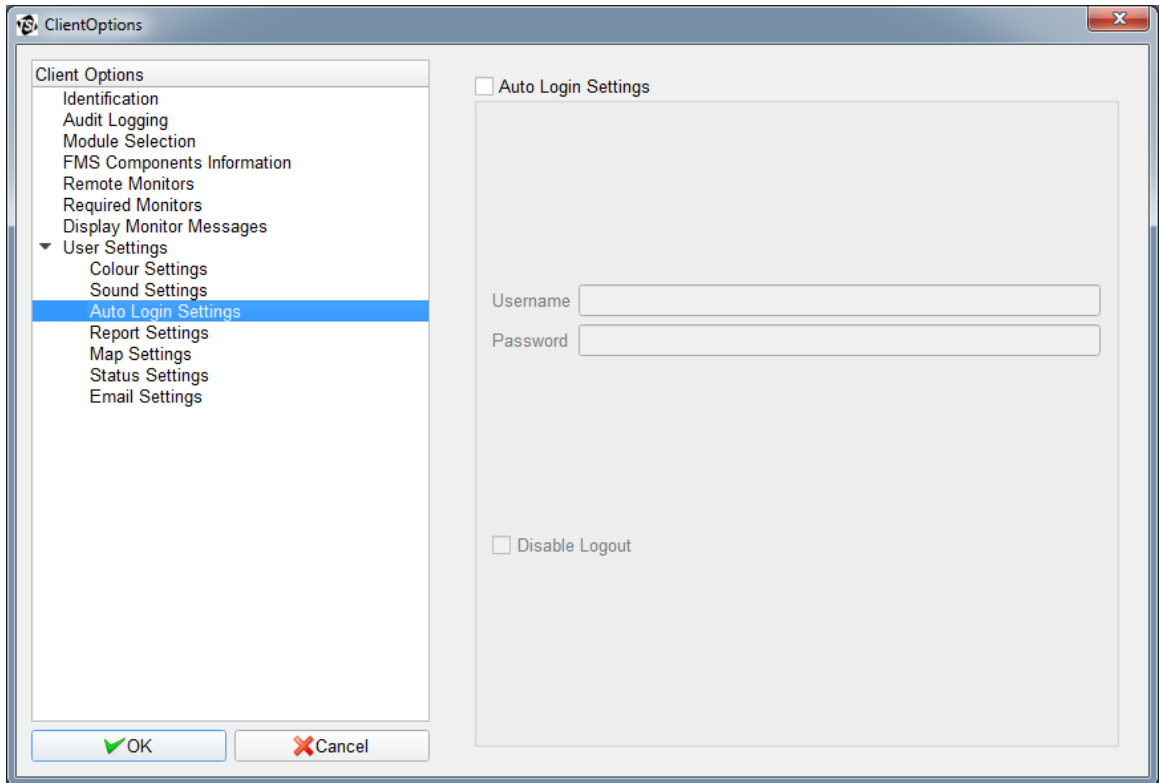
Sound Settings

This page configures the sounds played on a local computer when a node is not in an OK state. The sound played is that for the highest alarm state of all the detected monitoring systems. Select a sound to play and set the corresponding checkbox. Click the **Play** button on the far right of the filename to test a sound. Sounds are played about every 10 seconds. For this reason any sound should be less than 10 seconds in duration.



Auto Login Settings

This page sets the auto login username and password for the Client and the preferred node to be displayed on startup.

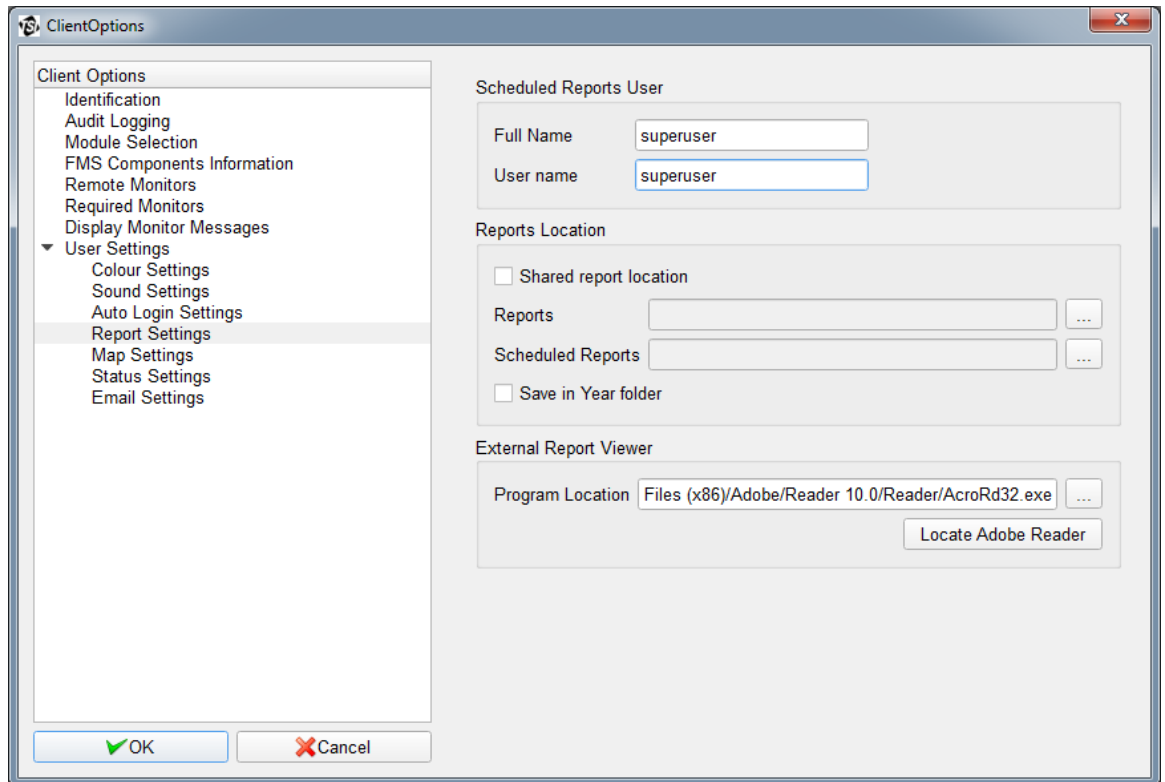


Report Settings

This page sets the scheduled report username. Scheduled reports will be generated according to the set schedule.

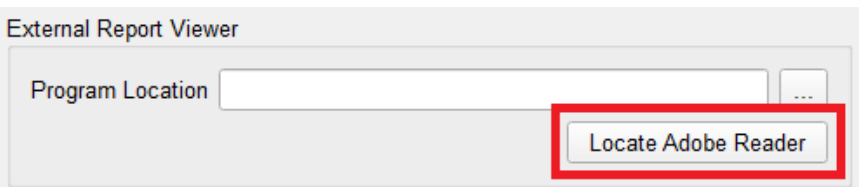
This page also sets the location where generated reports will be saved. If *Shared report location* is checked, reports generated by all users will be saved in the folders specified in the *Reports* and *Scheduled Reports* fields. If not checked, reports will be saved for each user in the Users folder.

Selecting the option **Save in Year folder** will result in reports being saved in sub-folders named according to the year the report is created in e.g., “2012”.

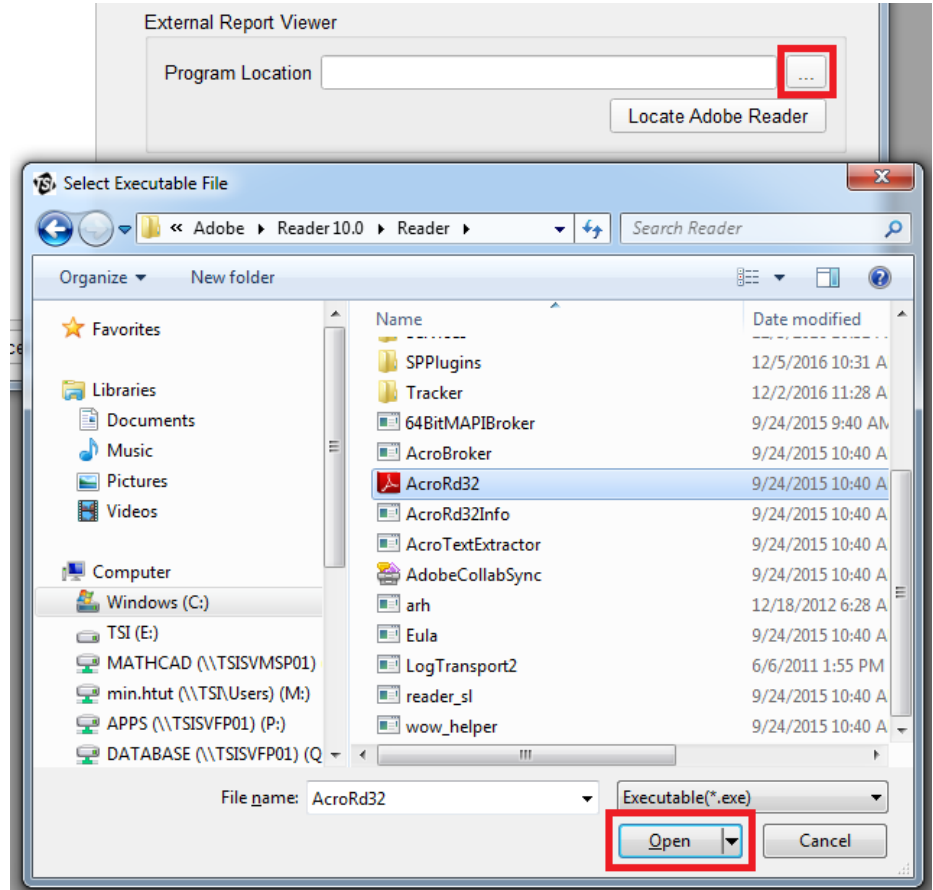


In addition, this page also configures viewing a report in an external PDF viewer such as Adobe® Reader®.

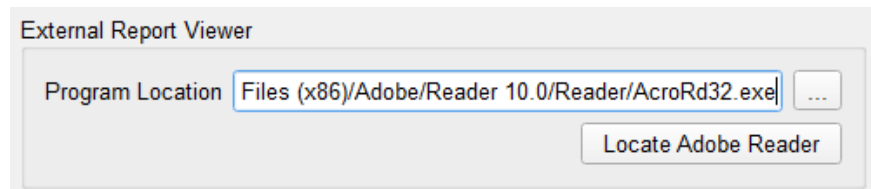
The “Locate Adobe Reader” button will attempt to automatically locate the installed Adobe Reader software.



If the “Locate Adobe Reader” fails to find Adobe® Reader®, or you want to use a different program, select the “...” button which will open a file browser, and browse to the executable file of the program that you want to open PDF reports.

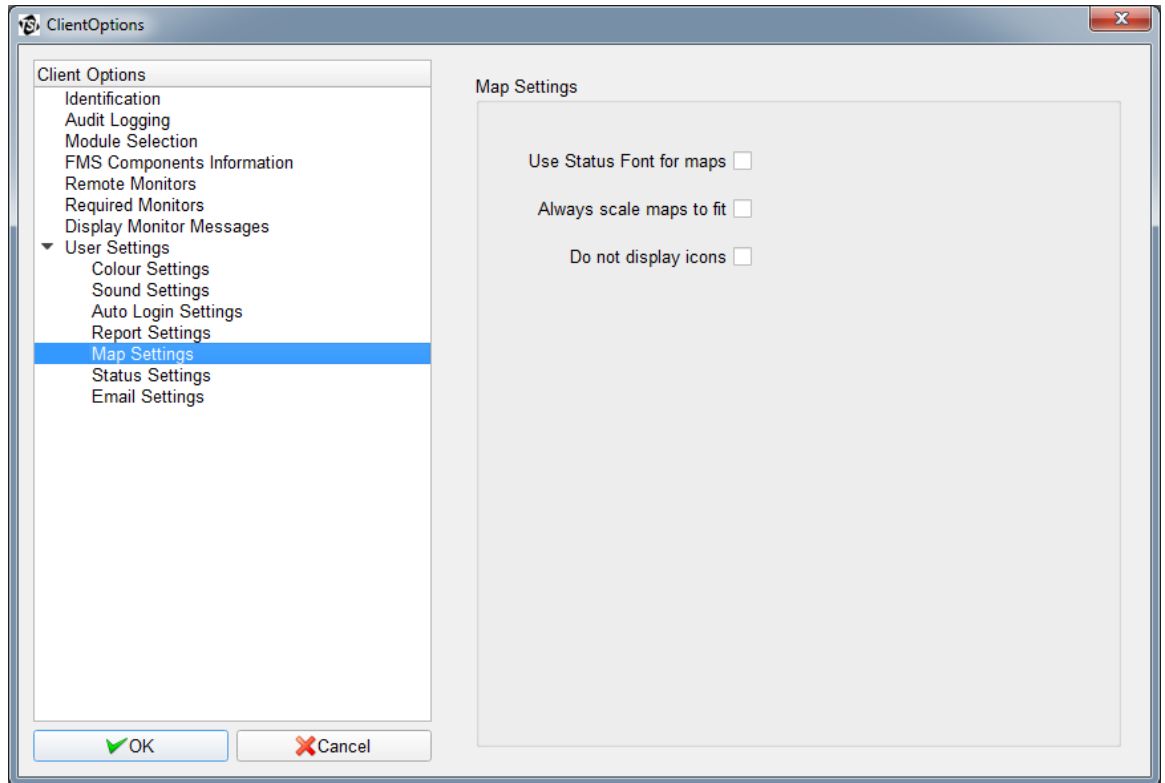


After selecting **Open**, the text field will automatically populate with the selected file path.



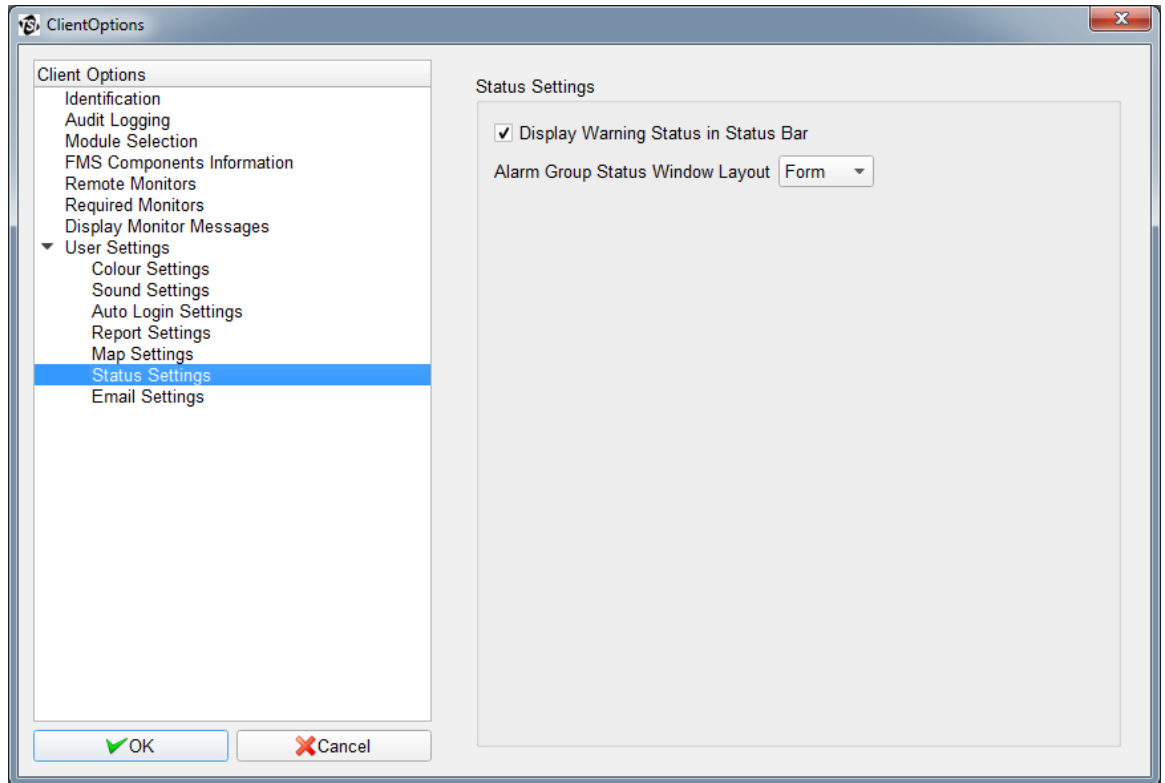
Map Settings

This page sets the map options that will be used for the map display for this Client.



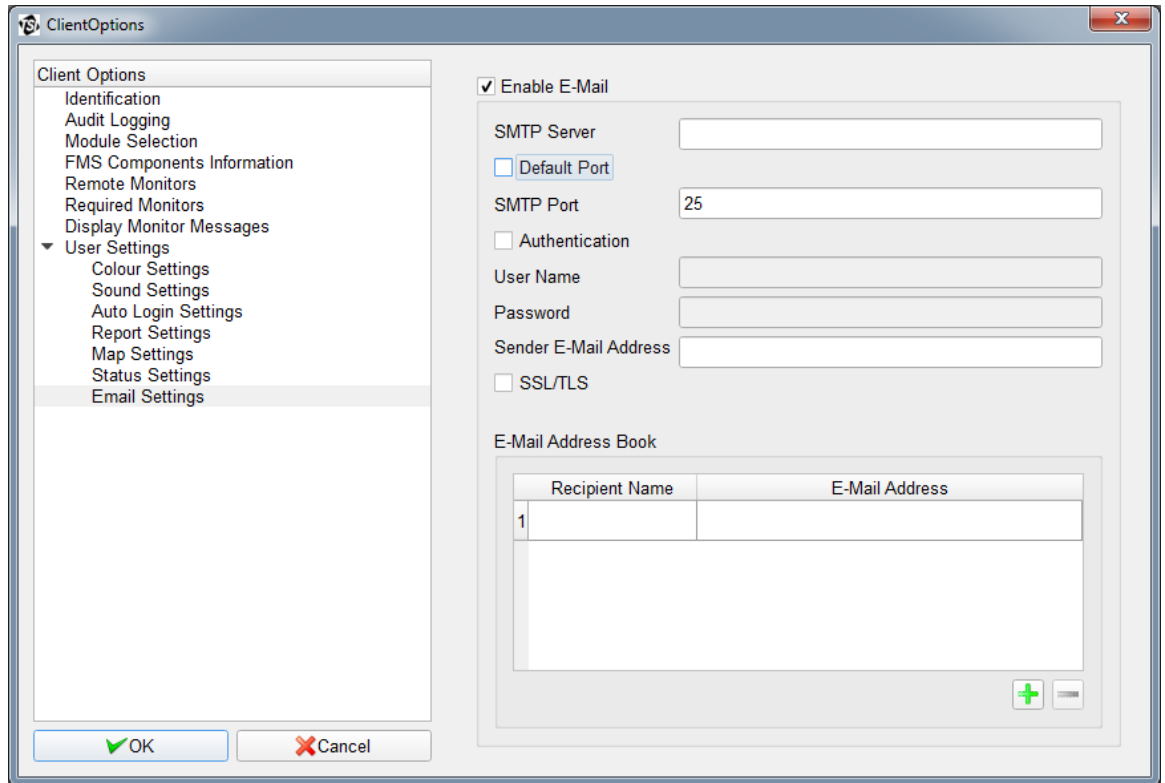
Status Settings

It is possible to configure Status Settings so warning messages are not displayed in the Status Bar.



E-mail Settings

It is possible to configure E-mail Outputs such that an e-mail is sent when an alarm group enters a particular state, for example if it starts alarming.




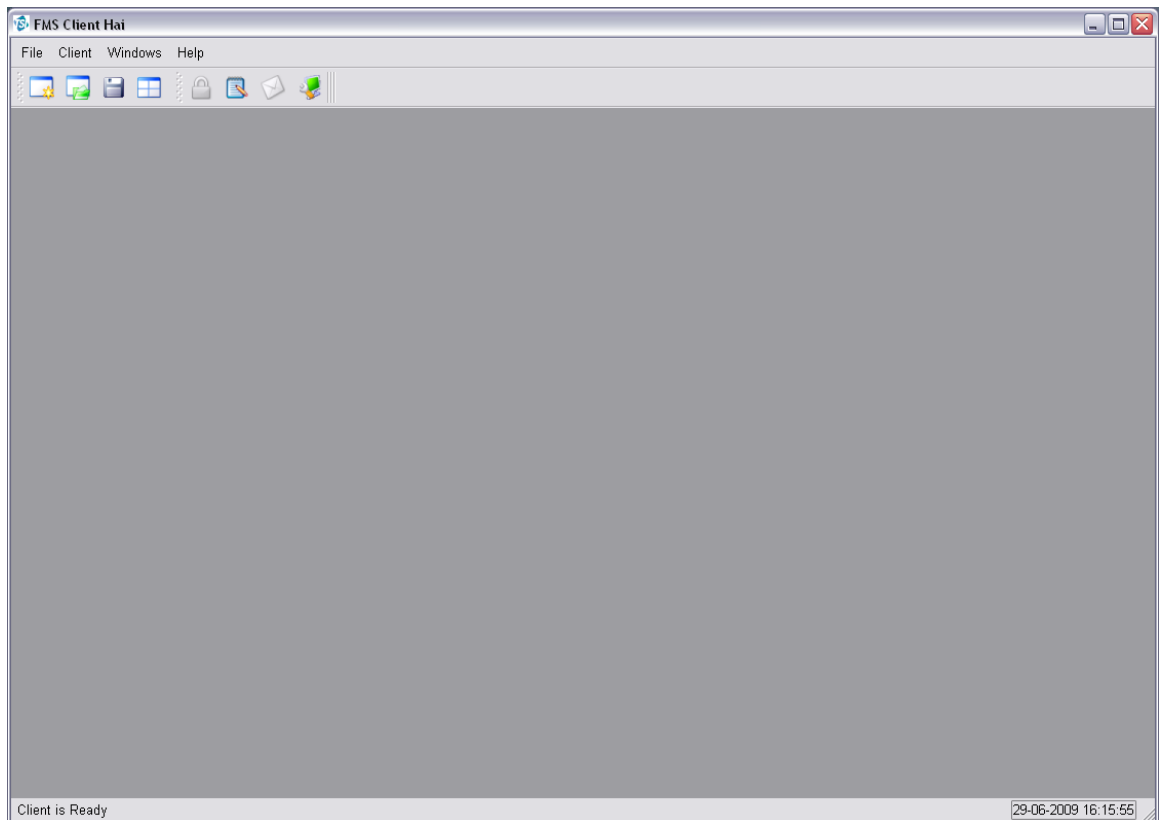
This page sets the e-mail SMTP server, the e-mail address of sender, and the list of e-mail recipients. The E-mail Output configuration options are as follows:

E-mail Option	Description
SMTP Server Name	Address of the server which will handle the e-mail.
Default Port	Use the default port for the SMTP Server.
SMTP Port	The port to use for the SMTP Server.
Authentication	Enable authentication for e-mail.
User Name	The user name to use to authenticate the e-mail.
Password	The user password to use to authenticate the e-mail.
Sender's E-mail Address	Originator's e-mail address used to identify where the e-mail came from.
SSL/TLS	Enable SSL/TLS..
Recipient E-mail Address Book	Permitted e-mail addresses to which e-mail alerts can be sent.

CHAPTER 5

Using FMS Client

FMS 5 allows software installation in standard mode. In this mode, the client will be very flexible. Multiple status, graph, and report windows can be created. Multiple map windows to monitor the status of sample points can also be created. FMS software also allows current settings to be saved and loaded later. Use **File -> New** or click the  button to create a new window after the FMS software starts.

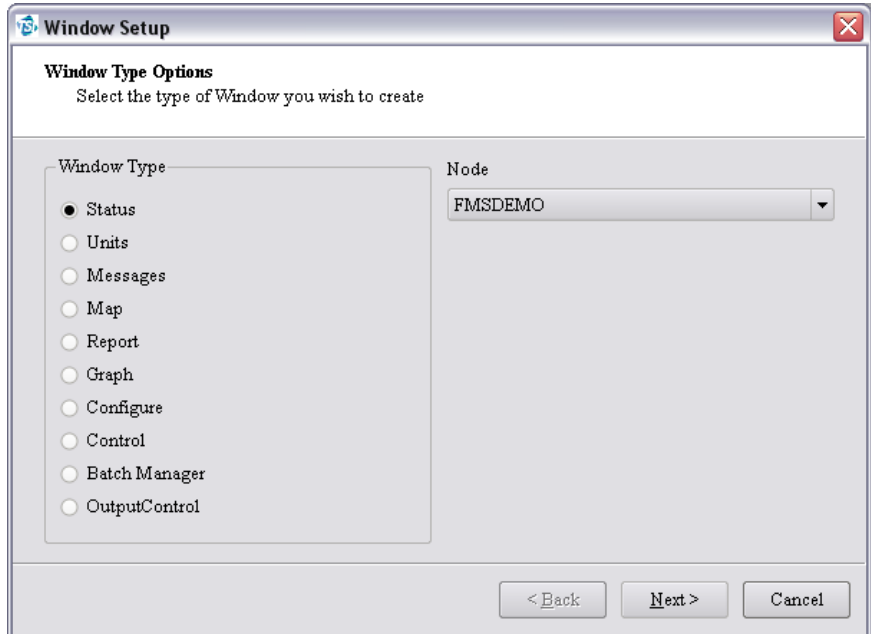


NOTICE

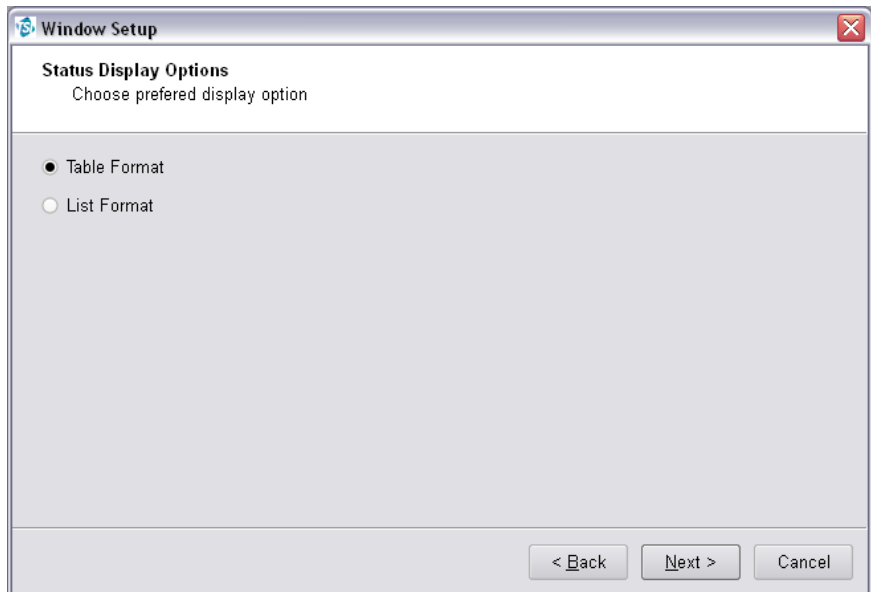
This option is not available in Pharma mode.

Create Status Window

To create a new Status window, use **File -> New** or click on the  button.



Select **Status** from the Window Type list then select the node for which the status will be displayed. Click **Next**.



In Table format, status will be displayed as table shown below. Alarm groups can be included in Table format.

P01	P02	P03
✓ Value : 5.00 C/cuft	✓ Value : 5.00 C/cuft	✓ Value : 5.00 C/cuft

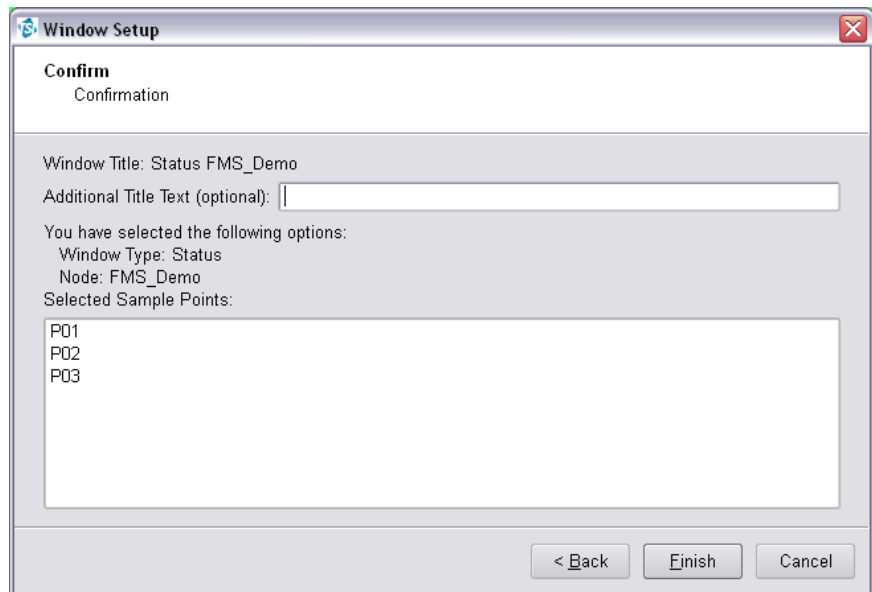
In List format, status will be displayed as list shown below. The list can be sorted by data types. Alarm groups cannot be included in List format.

Sample Point	Tag	Value	Unit
✓ P03	Value	7.00	C/cuft
✓ P02	Value	7.00	C/cuft
✓ P01	Value	7.00	C/cuft

17-01-2019 17:24:21



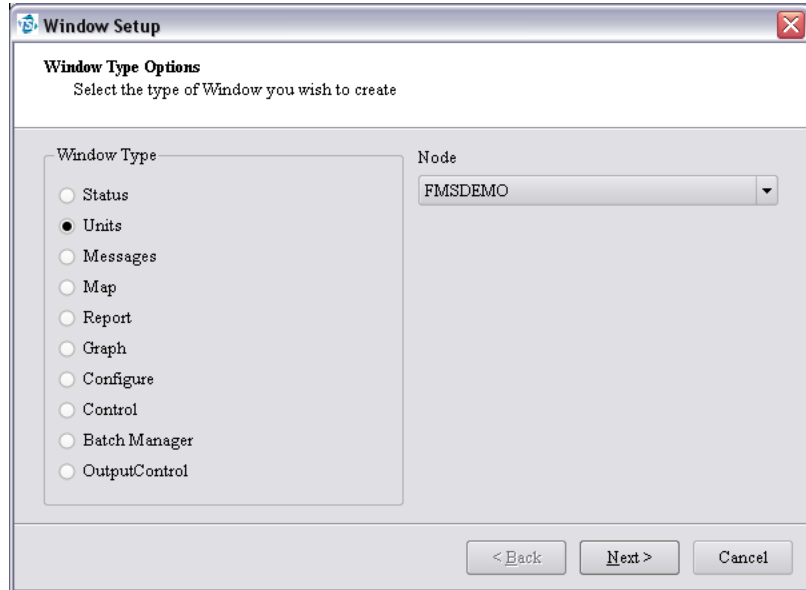
Then the sample points to be shown on the Status window should be selected. Click **Next** to go to the next step.



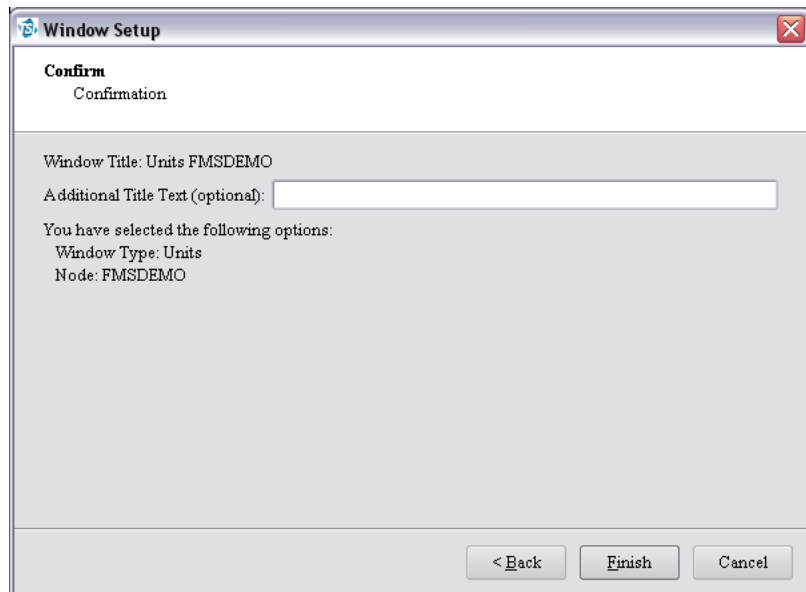
An optional "Additional Title Text" can be added to identify each Status Window. Multiple Status windows can be created and displayed at the same time.

Create Units Window

To create a new Units window, use **File -> New** or click on the  button.



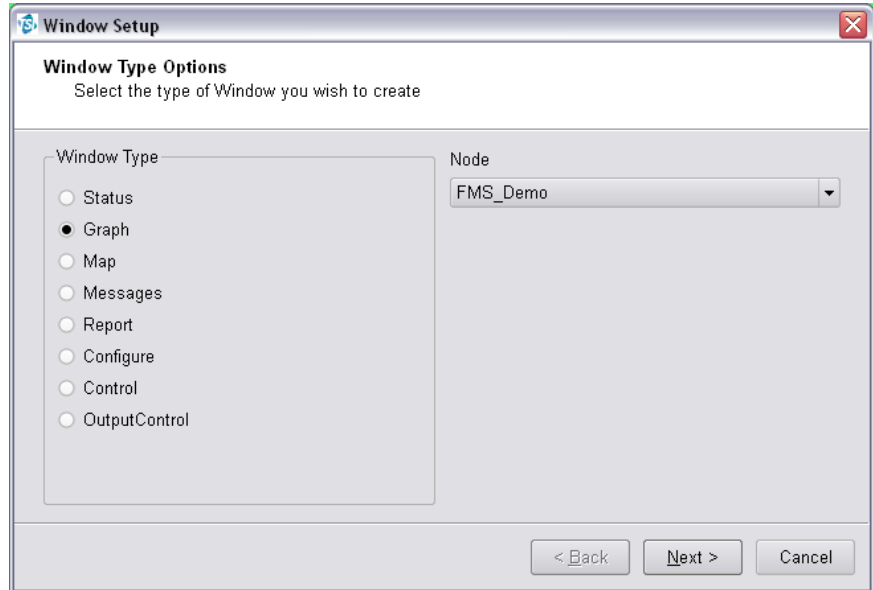
Select **Units** from the Window Type list then select the node for which the units will be displayed. Click **Next**.



An optional "Additional Title Text" can be added to identify each Units Window. Multiple Units windows can be created and displayed at the same time.

Create Graph Window

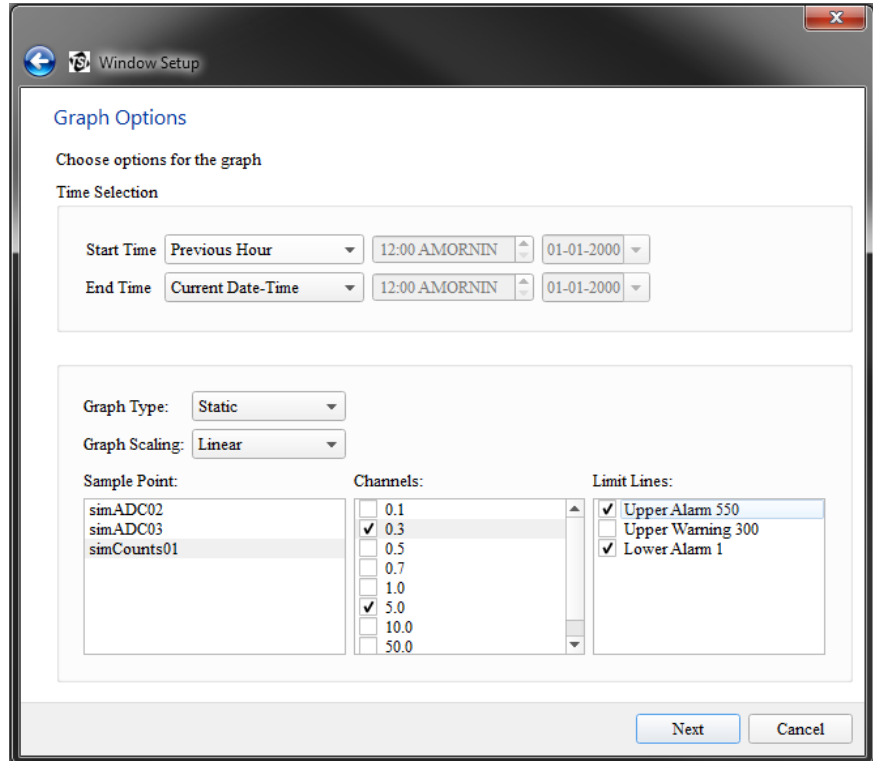
To create a new Graph window, use **File -> New** or click on the  button.



Select **Graph** from the Window Type list then select the node for which the graph will be displayed. Click **Next**.

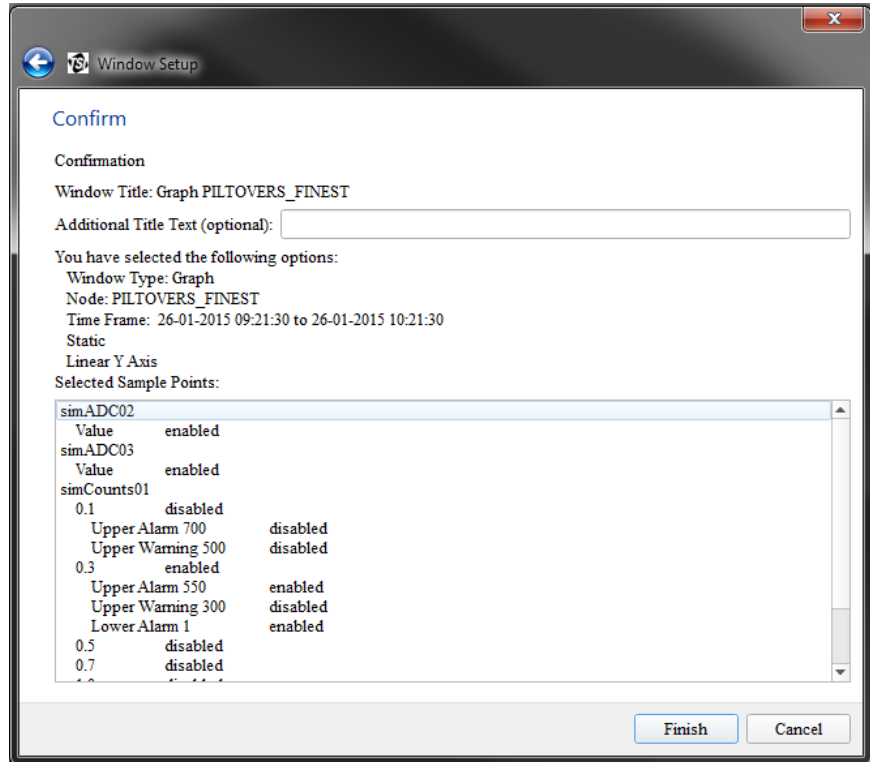


Now the sample points to be shown on the Graph window should be selected. Click **Next** to go to the next step.

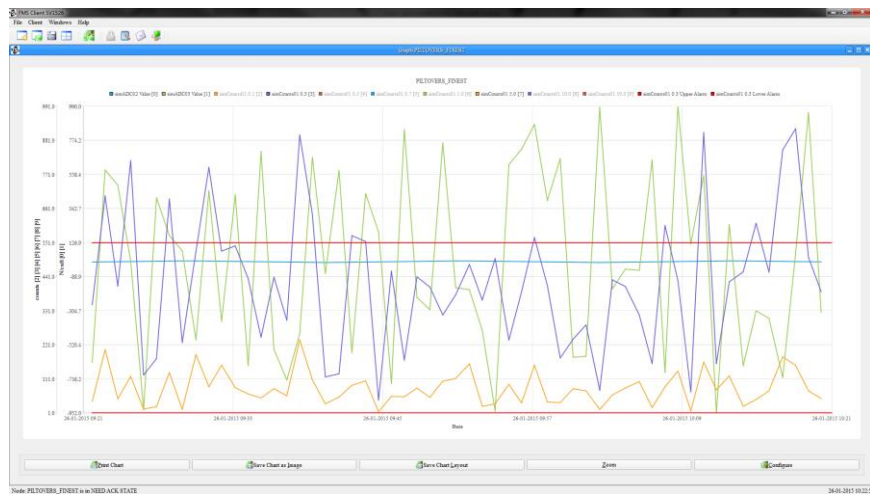


Graph options allow selection of the start and end time for graph display. It also allows configuring the graph as dynamic or using log scales, static or dynamic rolling graph. A dynamic rolling graph will maintain the previous amount of specified time on the graph. For example, a 1-hour dynamic rolling graph will maintain the previous 1 hour of data on the graph relative to the current time.


A graph can also be initially created with certain channels and limit lines enabled or disabled. By default all channels and limit lines are enabled. If a channel is disabled, all associated limit lines will automatically be disabled as well.

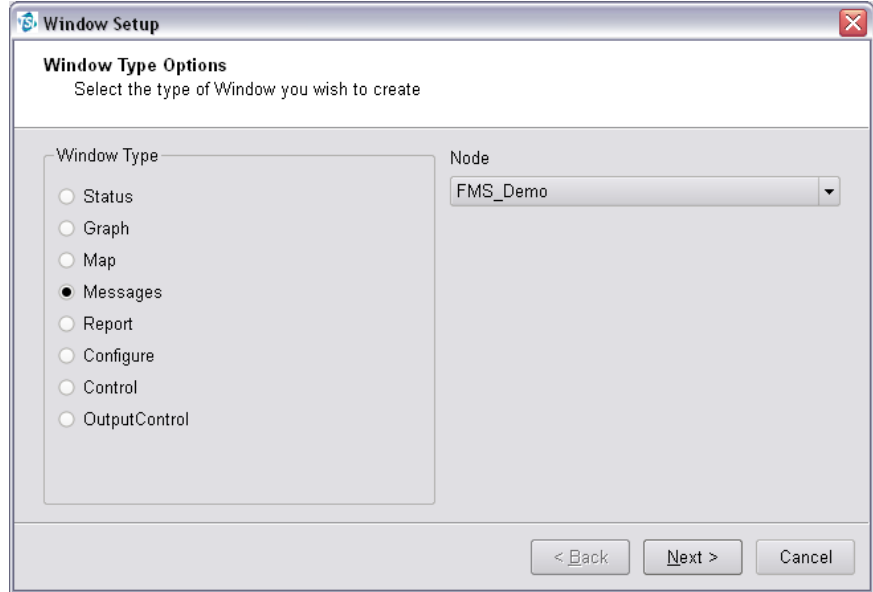


An optional “Additional Title Text” can be entered to help identify the graph display.

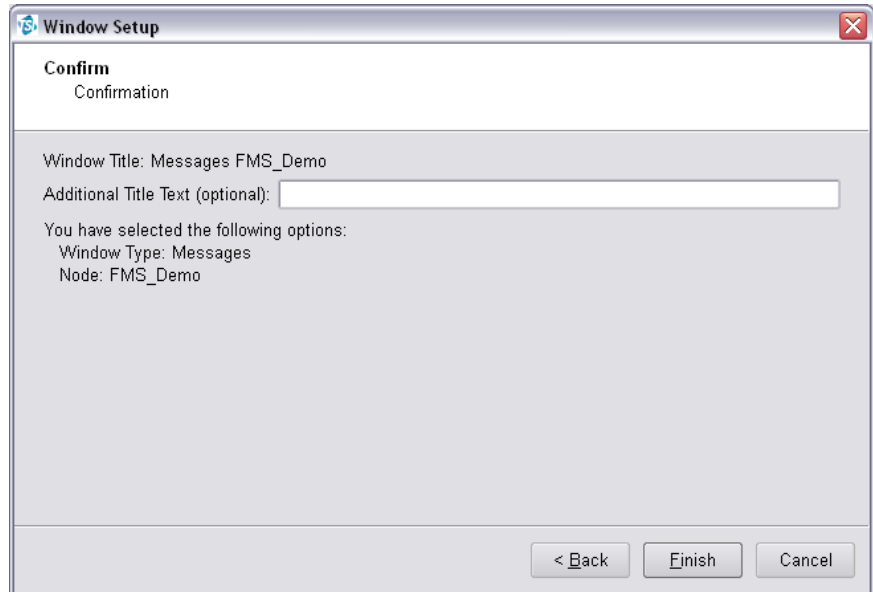


Create Message Window

To create a new Message window, use **File -> New** or click on the  button. It is only possible to open one Message window at any time.



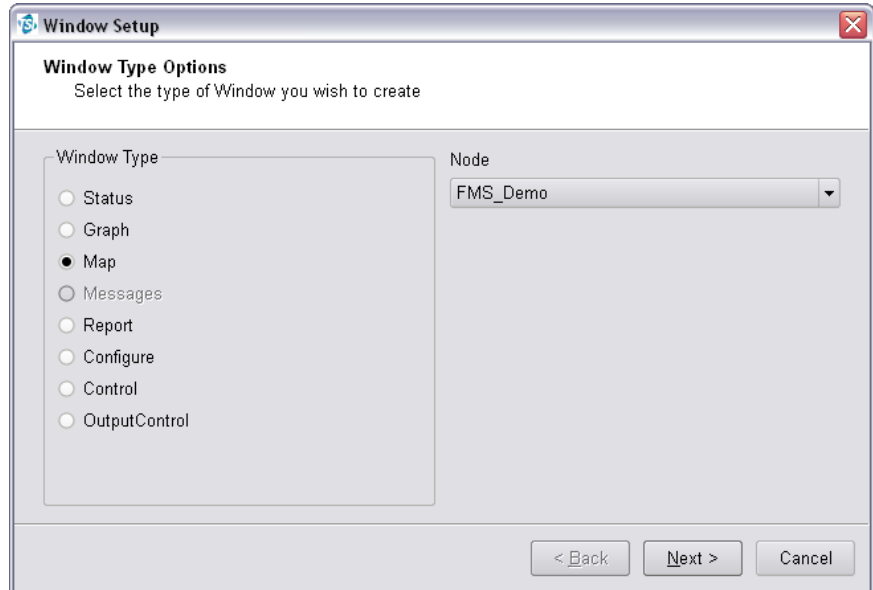
Select **Messages** from the Window Type list. Click **Next**.



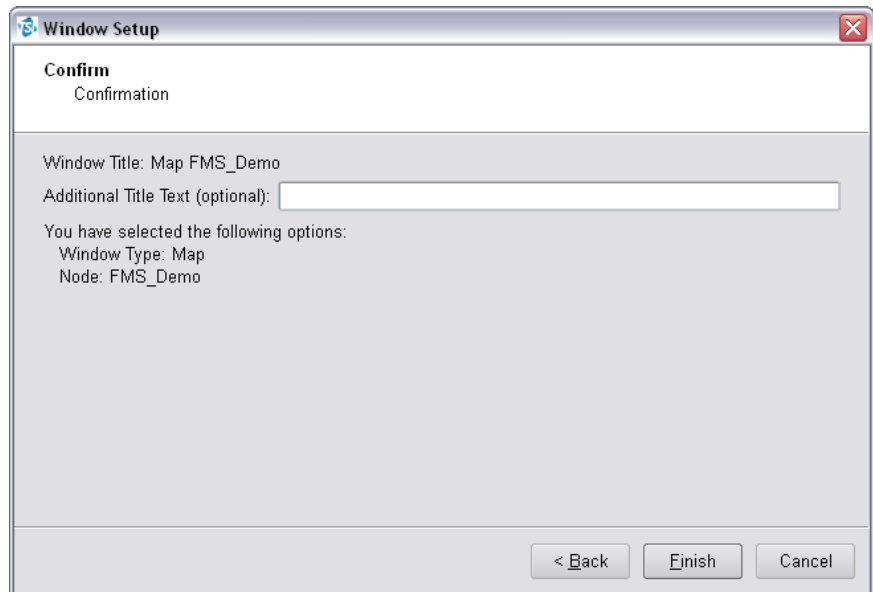
An optional “Additional Title Text” can be added to identify the Messages Window.

Create Map Window

To create a new Map window, use **File -> New** or click on the  button.



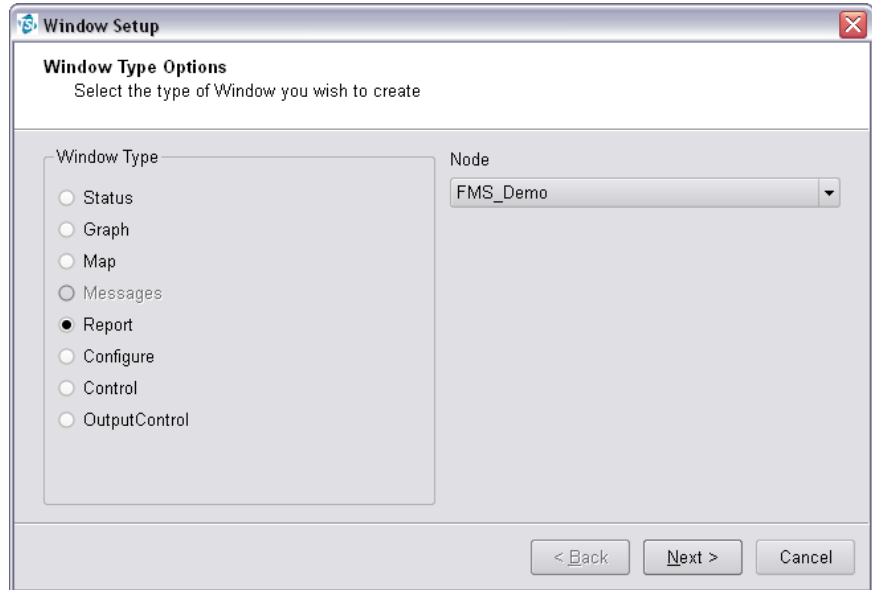
Select **Map** from the Window Type list then select the node for which the map will be displayed. Click **Next**.



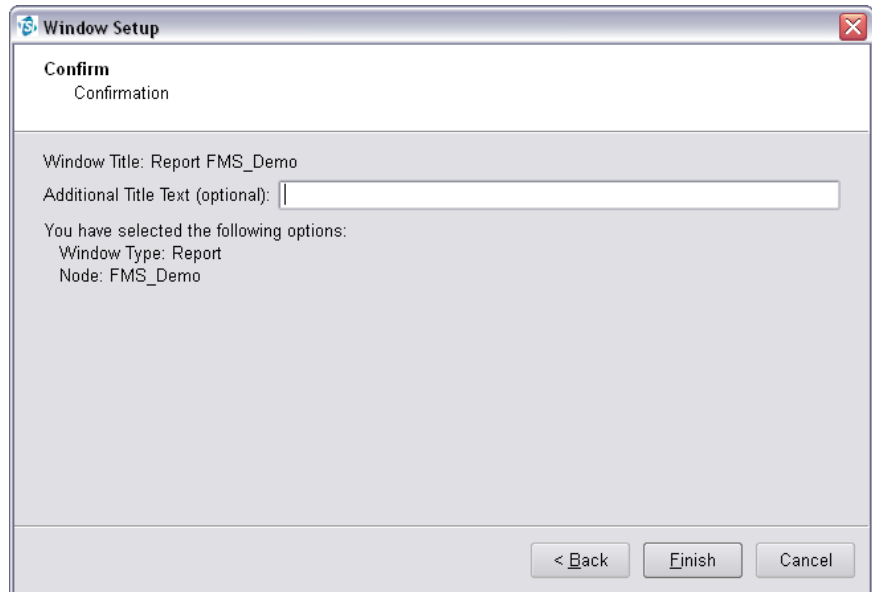
An optional "Additional Title Text" can be added to identify each Map window. Multiple Map windows can be created and displayed at the same time.

Create Report Window

To create a new Report window, use **File -> New** or click on the  button.




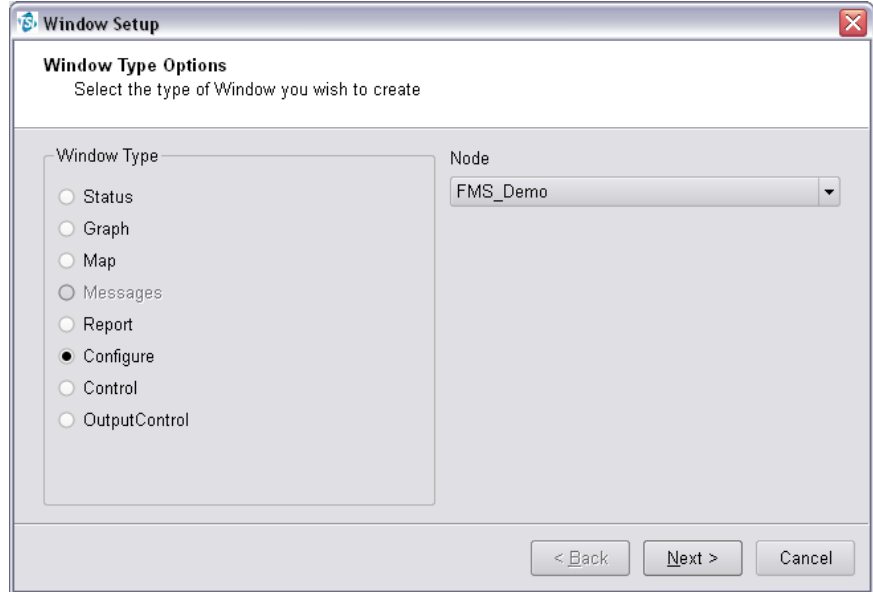
Select **Report** from the Window Type list then select the node for which the report will be displayed. Click **Next**.



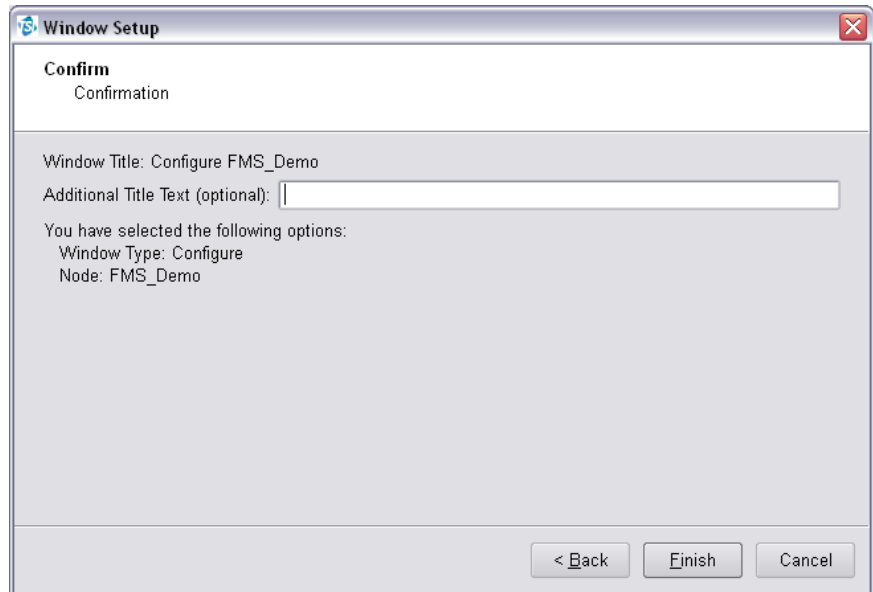
An optional "Additional Title Text" can be added to identify each Report window. Multiple Report windows can be created and displayed at the same time.

Create Configure Window

To create a new Configure window, use **File -> New** or click on the  button. It is only possible to open one Configure window at any time.



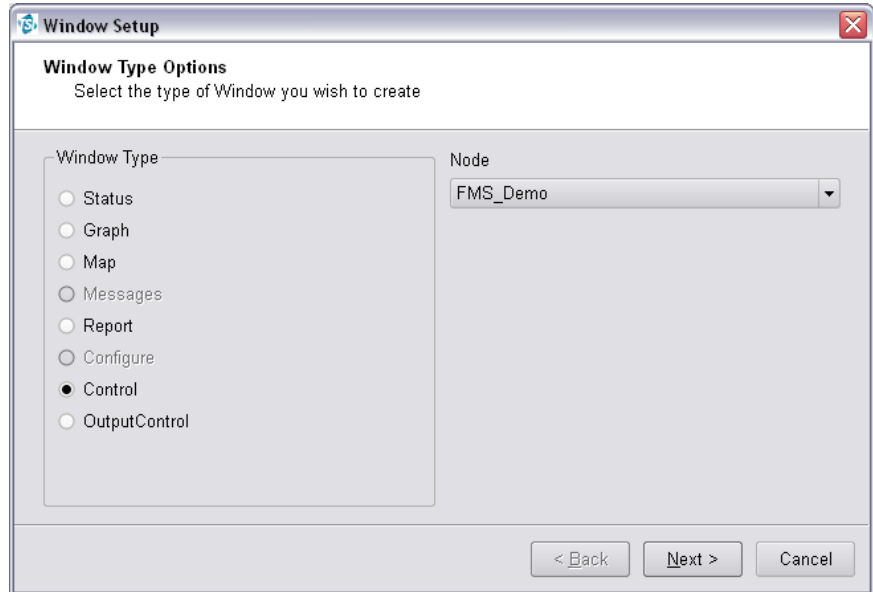
Select **Configure** from the Window Type list then select the node for which the configuration will be displayed. Click **Next**.



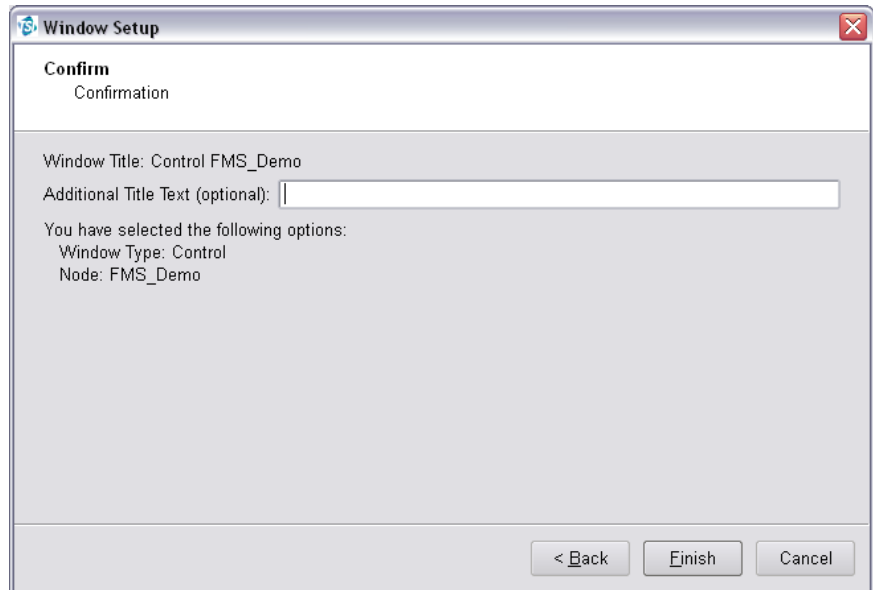
An optional “Additional Title Text” can be added to identify the Configure Window.

Create Control Window

To create a new Control window, use **File -> New** or click on the  button.




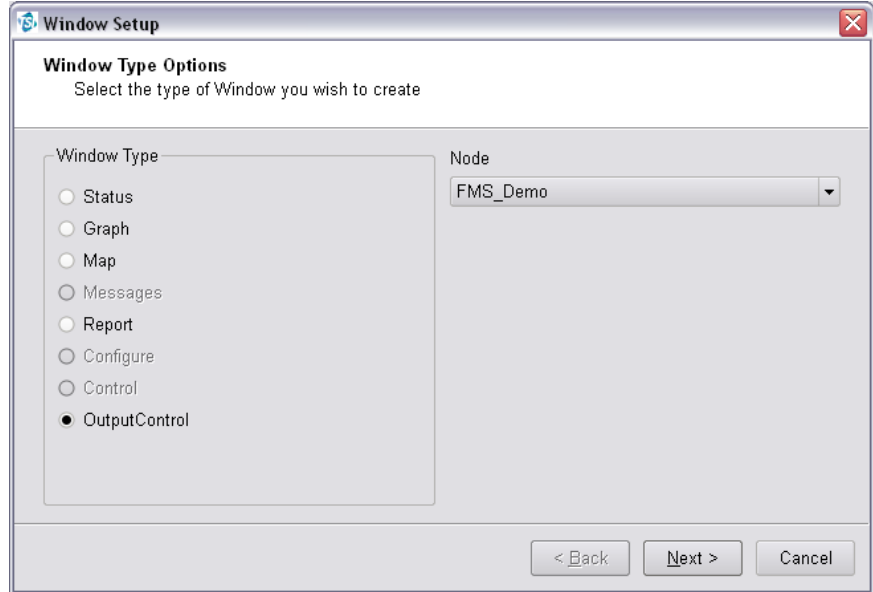
Select **Control** from the Window Type list then select the node for which the controls will be displayed. Click **Next**.



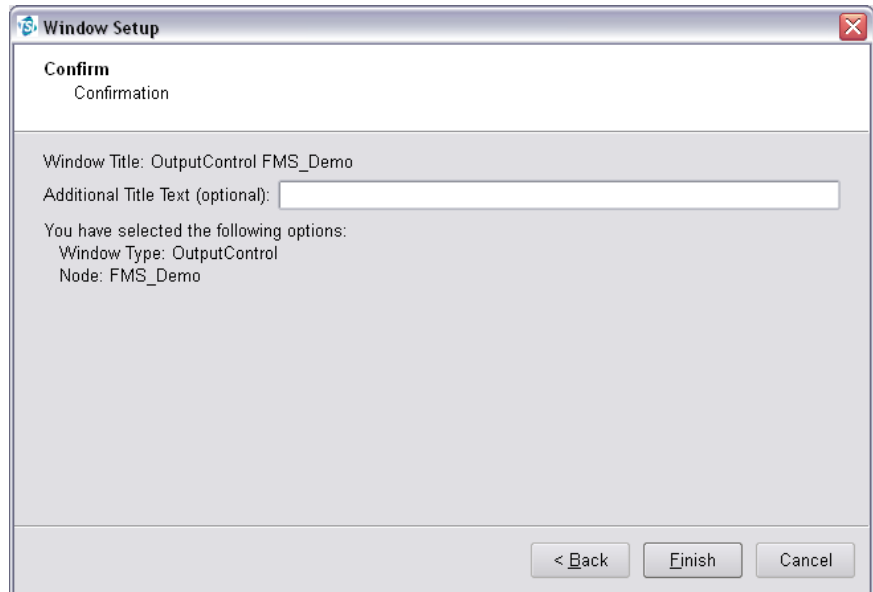
An optional "Additional Title Text" can be added to identify the Control window.

Create Output Control Window

To create a new Output Control window, use **File -> New** or click on the  button.




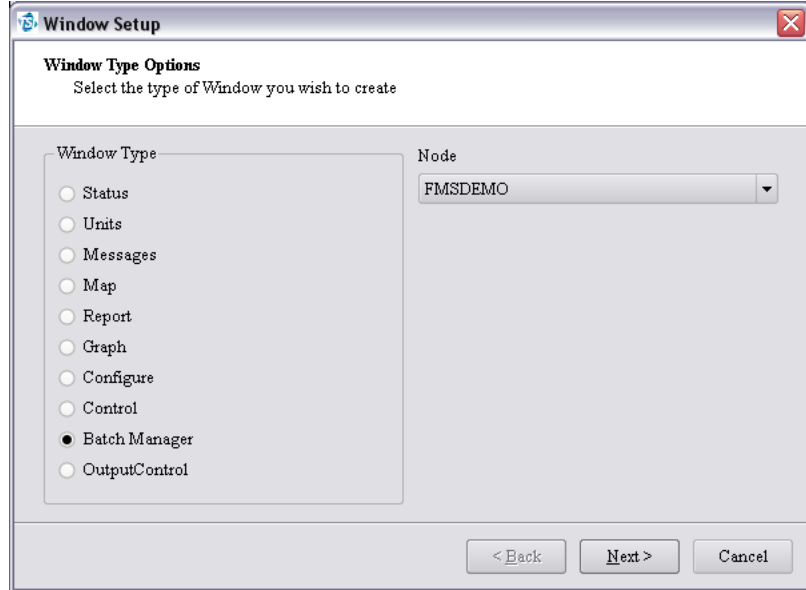
Select **Output Control** from the Window Type list then select the node for which the output controls will be displayed. Click **Next**.



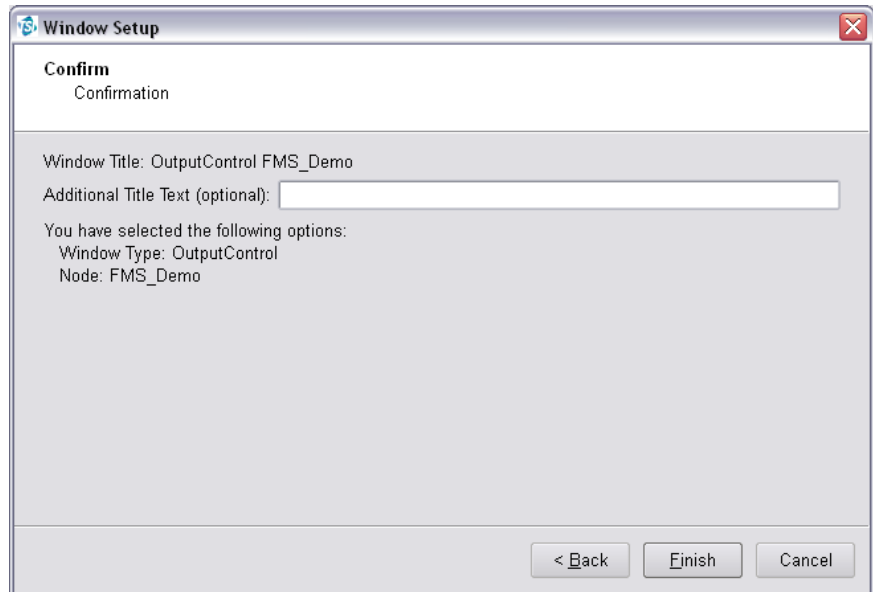
An optional “Additional Title Text” can be added to identify the Output Control window.

Create Batch Manager Window

To create a new Batch Manager window, use **File -> New** or click on the  button.



Select **Batch Manager** from the Window Type list then select the node for which the output controls will be displayed. Click **Next**.



An optional “Additional Title Text” can be added to identify the Control window.

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CHAPTER 6

Configure and View Monitoring Node

To configure a monitoring system the user must have a valid username and password for the node in question and have permission to configure that node. To access the configuration facilities it is necessary to log into the node and select the **Node -> Configure** menu option.

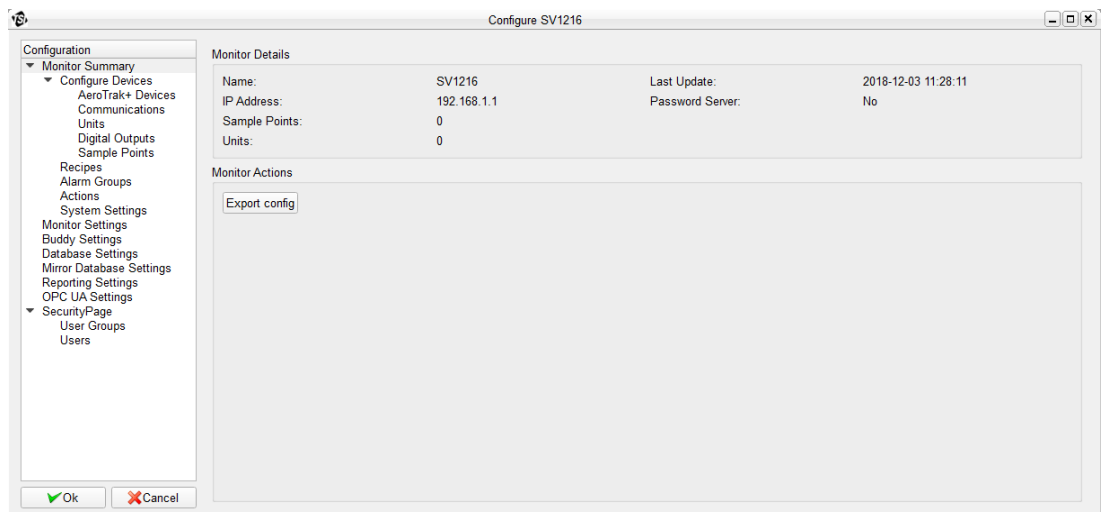
Configure Node

Only users with appropriate permissions can configure the FMS system for the node to be configured. It is possible for different clients to try and edit a given monitoring system's node at the same time. For this reason, it is preferable to have only one user with configure permission per monitoring system.

To configure a particular monitoring system, select the monitoring system in the node tab and select **Node -> Configure** from the menu; or select the node in the node tab and click on the  button on the tool bar.

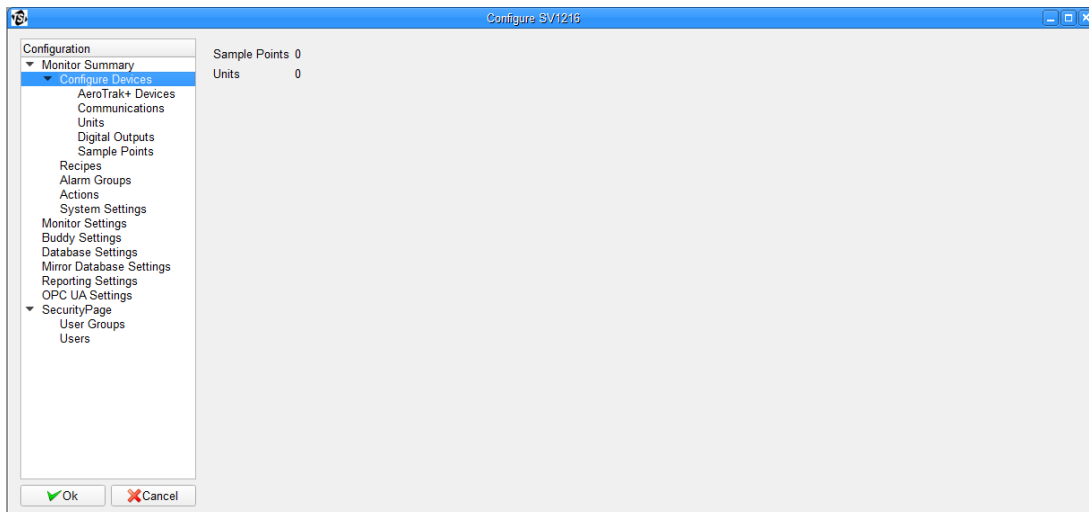
Monitor Details Page

This page displays the current settings of the monitor. The current configuration can be exported to a file.



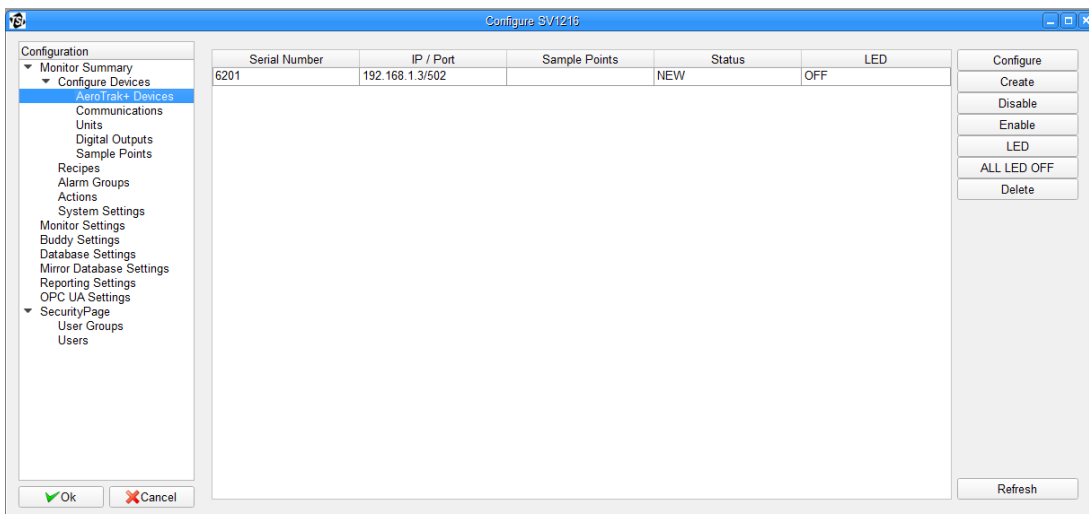
Monitor Summary -> Configure Devices

This page displays the current configured units, sample points and digital outputs.



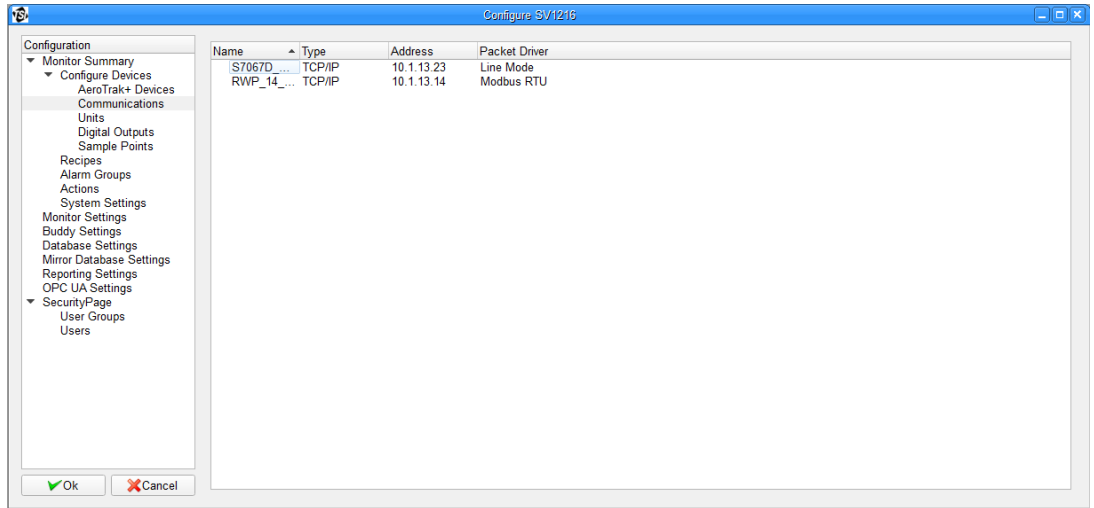
Monitor Summary -> Configure Devices -> AeroTrak+ Devices

This page manages the AeroTrak™+ device configurations. If configuring an AeroTrak™+ Remote Particle Counter please follow technical note TCC-165. If configuring an AeroTrak™+ Active Air Sampler please follow technical note TCC-187.



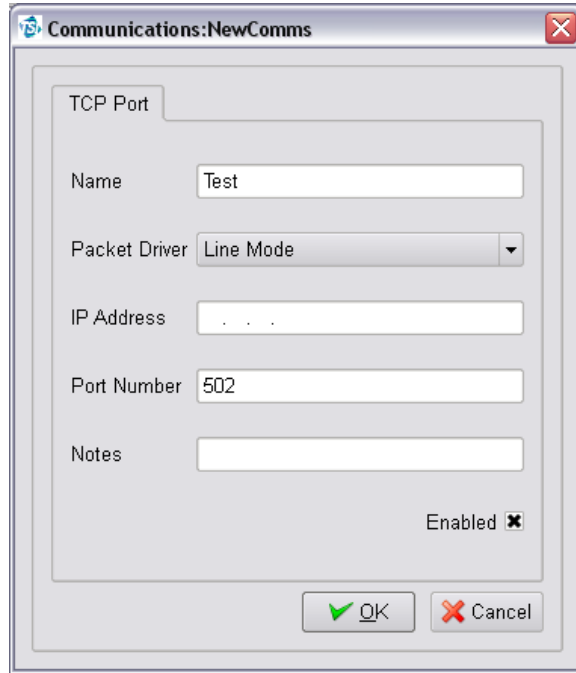
Monitor Summary -> Configure Devices -> Communication

FMS uses Communication Channels to communicate with equipment. There are two types of communication channel Ethernet using TCP/IP and serial port.



This page displays the current configured communication interfaces. An existing communication interface can be configured or create a new communication interface. To configure an existing interface, right mouse click on the selected communication and select **Properties** from the pop-up menu.

To create a new communication, right mouse click on the blank area, select **New Communication Channel** from the pop-up menu.



Field	Description
Name	Free text description of the channel.
Packet Driver	Enables selection of the preferred packet driver mode.

Ethernet Communications

In the case of Ethernet serial ports the port configuration is done using a Web Browser or Telnet interface. Ethernet devices have the advantage in that they can be independent of the computer the monitoring task is running.

Field	Description
IP Address	<p>IP address of the unit. This will often be a fixed IP address but can be a host name (e.g., serial factory) if DHCP is used to set up network addresses.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center; background-color: #0070C0; color: white; margin: 0;">IMPORTANT NOTICE</p> <p>DO NOT use any leading zeroes in the IP Address as this will not work with FMS, i.e., DO NOT use 192.168.044.56, instead use 192.168.44.56.</p> </div>
Port Number	TCP port to connect to. Refer to the Ethernet device's documentation for full details.

Serial Communications

This sets up the serial ports for the computer on which the monitoring system is running.

Communications:NewComms

Serial Port

Name Com1

Packet Driver Line Mode

COM 1

Baud Rate 19200

Data Bits 8

Stop Bits 0

Parity None

Flow Control None

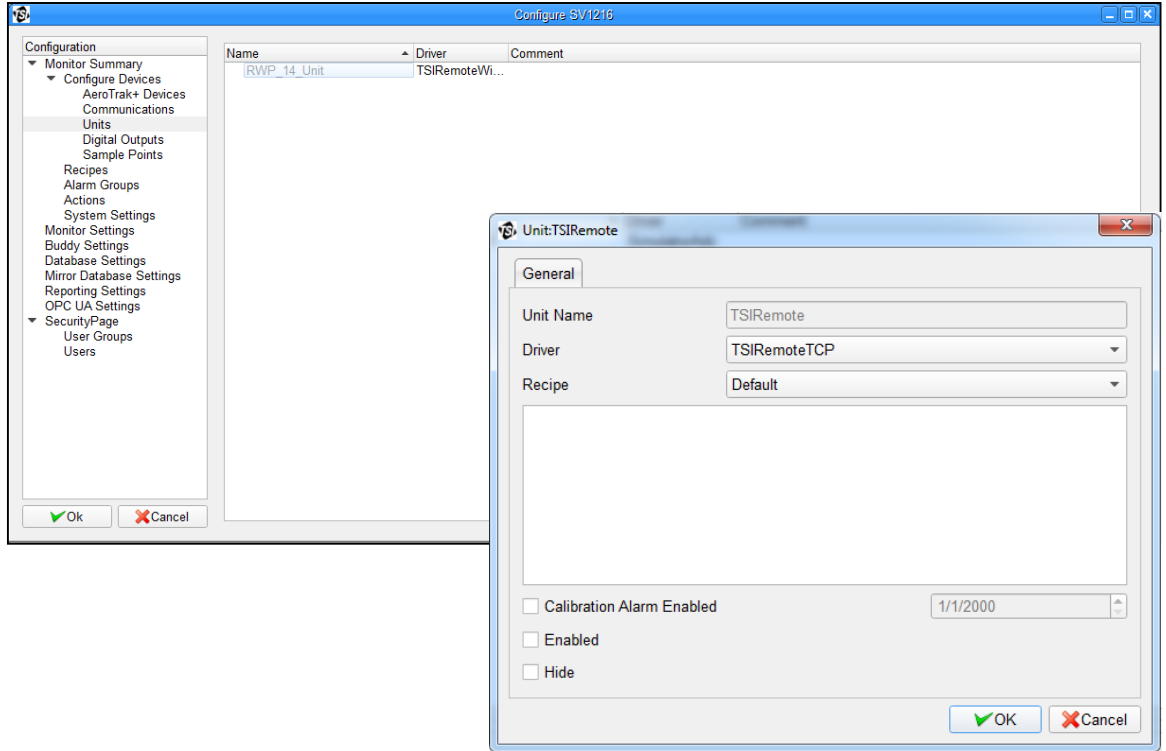
Enabled

OK Cancel

Item	Description
Name	Selects the serial port to use.
Packet Driver	Enables selection of the preferred packet driver mode.
Baud Rate	Selects the speed at which the interface is to run.
Data	Number of data bits in the serial byte. Usually this is 8.
Stop	Number of stop bits. This is usually 1.
Parity	Selects the parity bit. This is usually None.
Flow Control	Selects the type of flow control used for controlling data transmission. Usually this is None , but can be Hardware (for RTS/CTS/DTR) or Xon/Xoff .

Monitor Summary -> Configure Devices -> Units

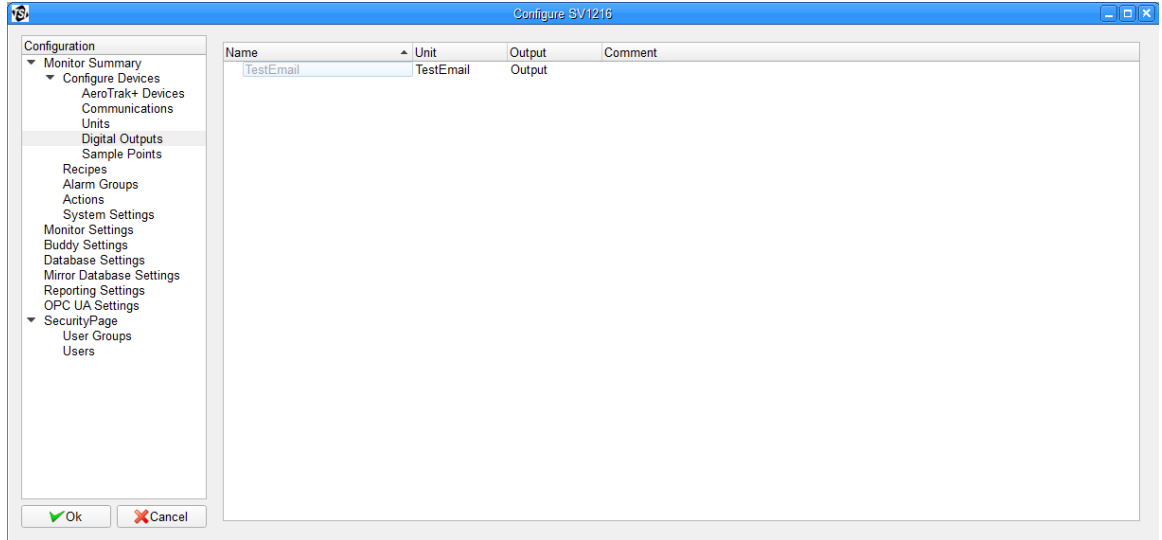
This page displays the current configured Units. An existing Unit can be configured or a new Unit created. To configure an existing Unit, right mouse click on the selected Unit and select **Properties** from the pop-up menu.



To create a new Unit, right mouse click on the blank area, select **New Unit** from the pop-up menu.

Monitor Summary -> Configure Devices -> Digital Outputs

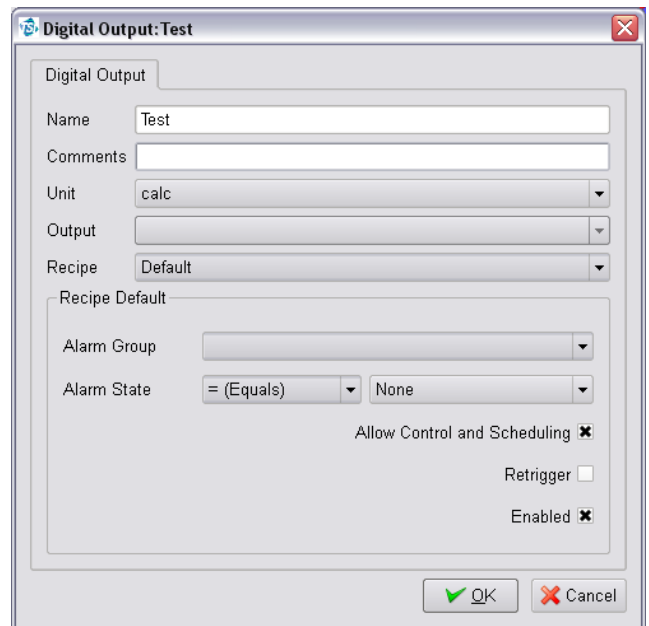
A **Digital Output** is an abstraction of an output from a unit that can be on or off. Relay outputs, that in turn control alarm beacons, is a common example.



This page displays the current configured digital output. An existing Digital Output can be configured or a new Digital Output created. To configure an existing Digital Output, right mouse click on the selected Digital Output, and select **Properties** from the pop-up menu.

To create a new digital output, right mouse click on the blank area, select **New Digital Output** from the pop-up menu.

The Digital Output forms allow mapping an alarm group to a selected unit's digital output. The device driver for the unit supplies the list of possible digital outputs.

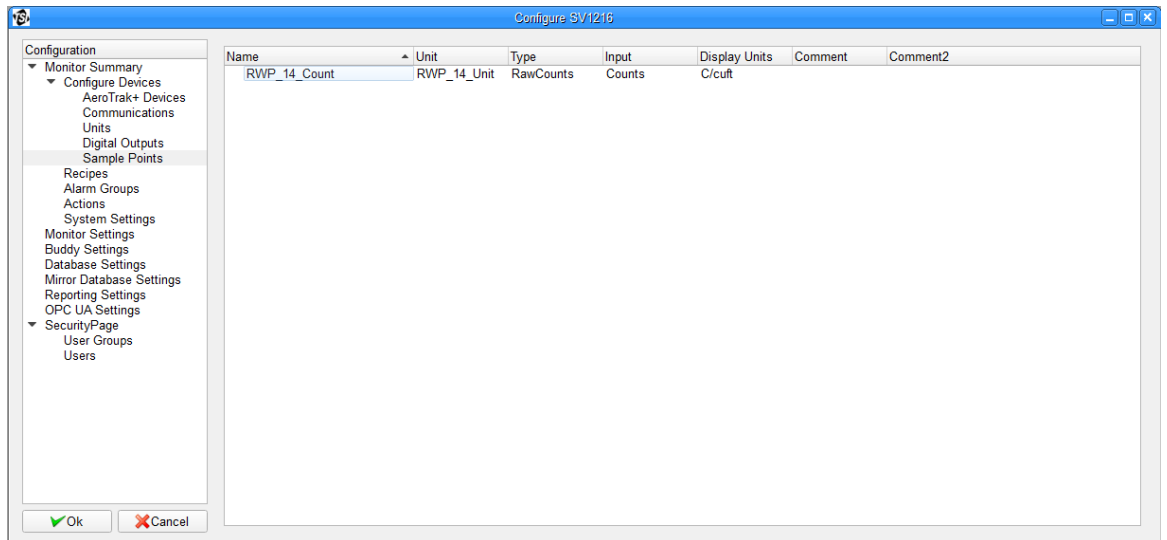


The recipe independent part of the digital output configuration has the following fields:

Field	Description
Alarm Group	Selects the alarm group that controls the digital output.
Alarm State	Sets the test used to determine if a digital output is on or off. An output is on if the expression is true; otherwise, it is off. The first field is a comparison operator (<, >, =, <>), the second field is the alarm level to compare against. The resulting expression, <alarmgroup state> <comparison operator > <alarm level> is evaluated every time the alarm group is updated, and the digital output updated according to the result.
Allow Control and Scheduling	When set the digital output can be controlled and scheduled from the Client.
Enabled	When set the output is active and the output follows the configured relationship with the alarm group. If not, it remains at the default state.
Retrigger	When set the Digital Output will force the output to refresh even if no changes have occurred. This is useful where manual silencing of alarms may be used.

Monitor Summary -> Configure Devices -> Sample Points

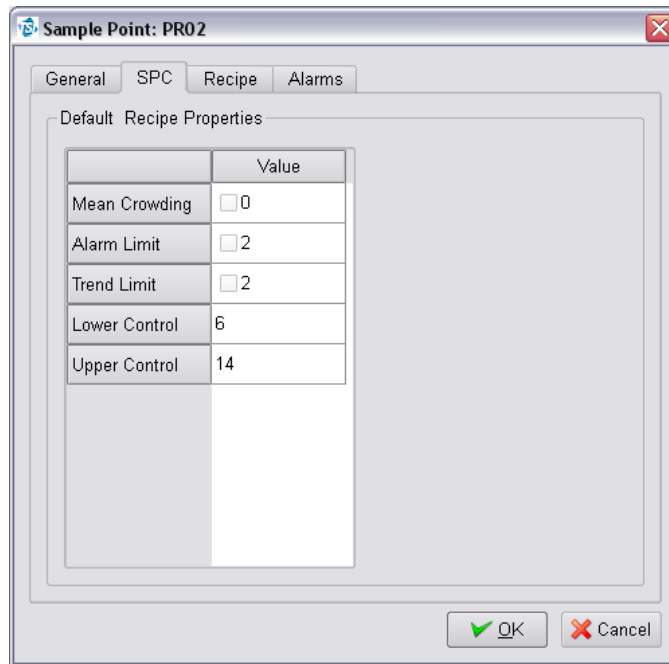
Sample Points represent measured values from units.



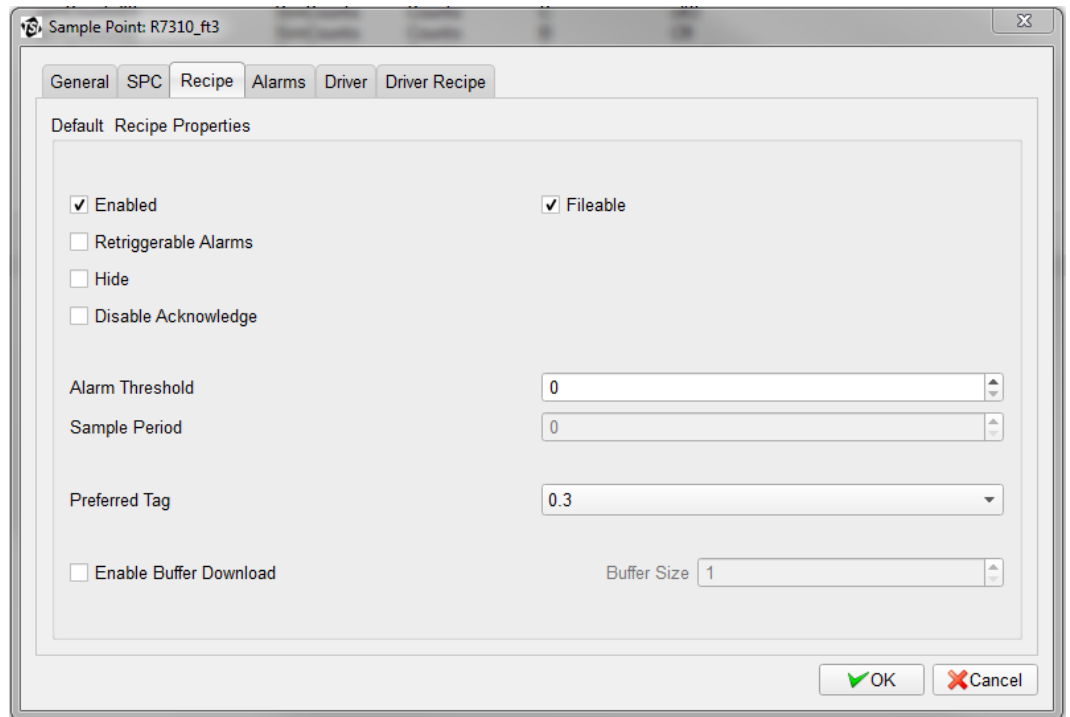
This page displays the current configured Sample Points. An existing Sample Point can be configured or a new Sample Point created. To configure an existing Sample Point, right mouse click on the selected Sample Point and select **Properties** from the pop-up menu.

Field	Description
Sample Point Name	Free text description of the sample point.
Unit	Unit associated with the sample point.
Data Type	Identifies the class of measurement. Units can often measure several types of data; for example, particle counts, environmental parameters, and instrument status.
Display Units	Free text field that allows the physical units to be set for display purposes.
Input Index	Selects the channel of a particular sample point type that is mapped to the sample point. Only the available input indices are given as choices.
Decimal Places	Selects decimal places for displaying the sample points.
Recipe	The recipe for which sample point properties are displayed.
Comments	Free text that will be displayed with the sample point name in reports and Inspect windows.
Additional Comments	Free text that will be displayed with the sample point name in reports.
Use Log Graph Scales	When set, graphical displays will use log scales when displaying any data from this sample point. Usually this is set when the data is from particle counters where the range of values is very large.
Calculate MKT	Select if the option to calculate mean kinetic temperature for reports, is required for a sample point.

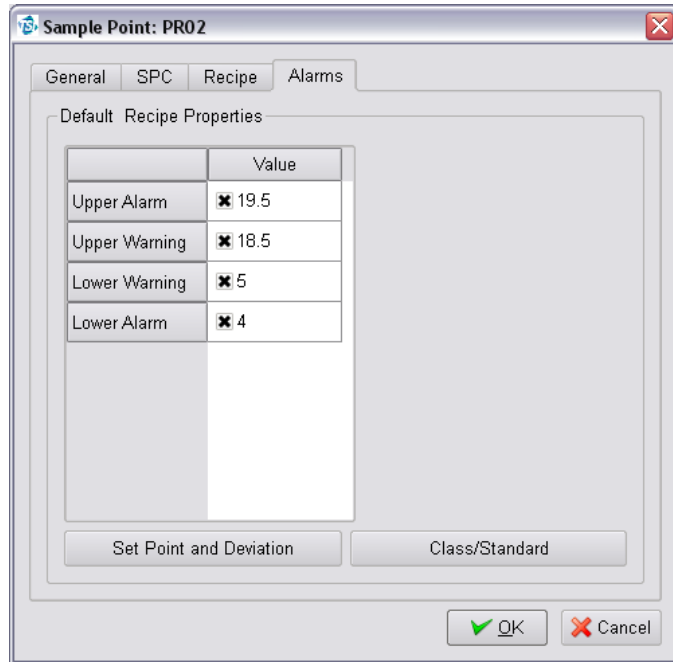
The **SPC** tab specifies the SPC alarm limits and the control limits. The Alarm limit and Mean Crowding limit only have effect if valid control limits are defined. SPC alarms are not always appropriate.



The **Recipe** tab allows selection of the **Preferred Tag** which is a hint for some displays to show values for this tag before others.



Field	Description
Enabled	When checked, the sample point is enabled and data collected for the sample point is updated and processed. If a sample point is not enabled, data will still be collected for it, but not updated or processed.
Fileable	When checked, the collected data is stored in the database, providing the sample point is also enabled. This is usually checked. However, there are cases where measured data is only for information or diagnostic purposes and not required as a part of any permanent record.
Re-triggerable Alarms	When checked, an alarm event is generated for each measurement that is in alarm. When it is clear, an alarm event is generated only when a sample point enters an alarm state. This affects the setting of the acknowledgment required flag. If this flag is set, the acknowledgment required flag gets set with each value in an alarm state.
Hide	When checked, the sample point will not be displayed in Status displays.
Disable Acknowledge	When checked, the alarm start will not be acknowledgeable.
Alarm Threshold	Number of consecutive values that are outside the alarm limits that must be measured before the sample point goes in to alarm. Until the alarm threshold is reached, the sample point is put into a warning state. This feature is useful for measurements which can have brief periods of being in alarm in normal use (such as differential pressure sensors) and so these nuisance alarms can be suppressed.
Sample Period	Sets the sample period in number of seconds. This field is only enabled when relevant.
Preferred Tag	Sets the preferred tag for the sample point.
Enable Buffer Download	When checked, FMS will perform buffer download as needed for the unit related to the sample points. Buffer size will define data points read from unit buffer.



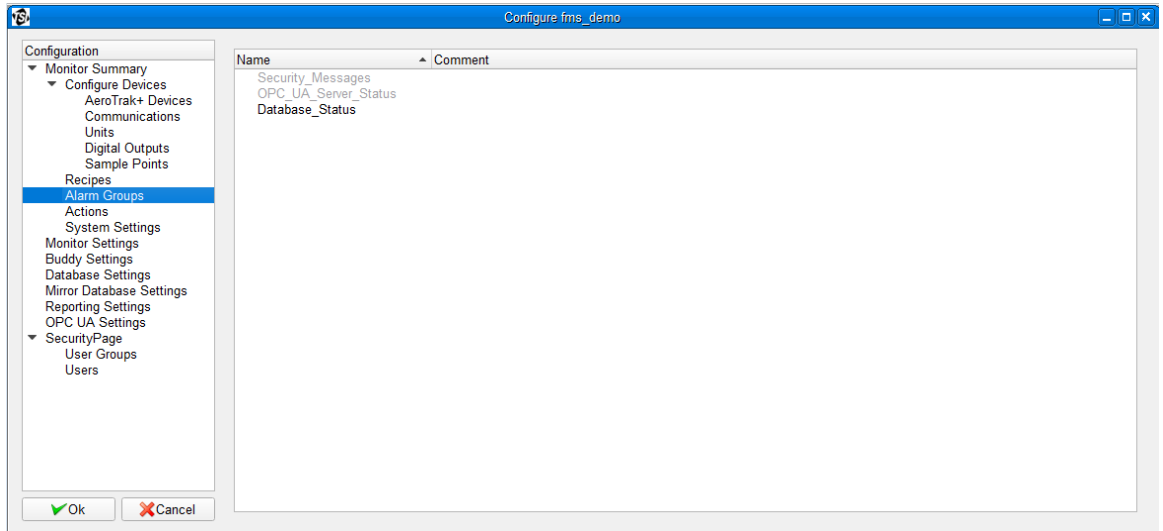
Field	Description
Alarm Limits	Table of alarm and warning thresholds for each of the possible sample point values tags. To enable a warning or alarm threshold, set the check to the right of the limit and then enter the threshold value.

The **Driver** tab allows selection of options that are specific to the type of Unit for the sample point.

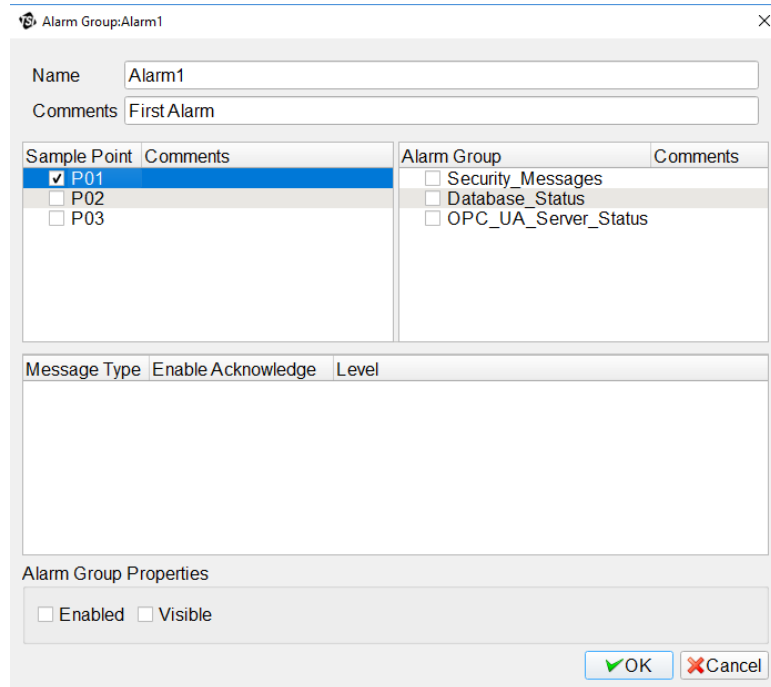
The **Driver Recipe** tab allows selection of options that are specific to the type of Unit for the sample point and that can vary dependent on which Recipe is in use.

Monitor Summary -> Configure Devices -> Alarm Groups

Alarm groups are collections of sample points and other alarm groups. The alarm state of an alarm group is the highest alarm state of any of the members. Alarm groups are useful for managing alarm enunciation and controlling events.



This dialog displays the current set alarm groups. An existing alarm group can be configured or create a new alarm group. To configure an existing alarm, right mouse click on the selected alarm, and then select the properties option from the pop-up menu.



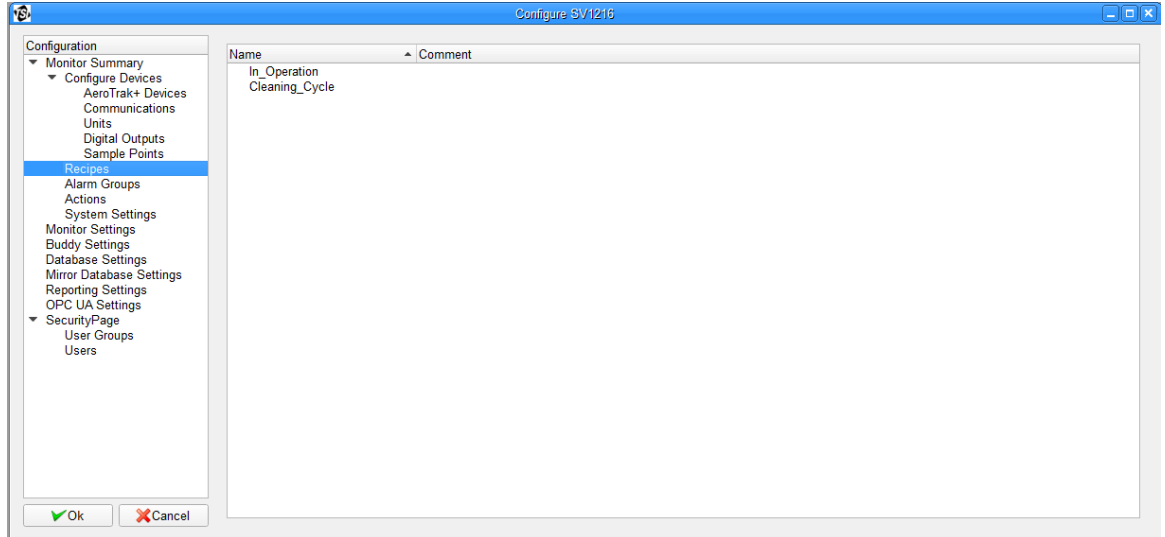
Use this screen to choose to enable or disable an alarm group. To create a new alarm group, right mouse click on the blank area and then select **New Alarm Group** from the pop-up menu.

Alarm Groups have the following recipe independent parts:

Part	Description
Comments	A free text description of the alarm group that appears in the alarm group display.
Sample Point List	Lists all sample points for the monitoring node. To include a sample point in the alarm group set the checkbox next to it. To remove a sample point from the alarm group clear the checkbox. Any one sample point can belong to any number of alarm groups.
Alarm Group List	A list of all alarm groups at the monitoring node. To include another alarm group in an alarm group, set the check next to it. To remove the alarm group, clear the check next to it. An alarm group can belong to any number of other alarm groups on the same node. It should be noted that cyclic dependencies (where an include alarm group depends on the alarm group that it is being included in) are not detected and although this will not cause any failures, the alarm group will remain at the highest alarm state.
Message Type	List of messages associated with the driver type of the selected Sample Point.
Enable Acknowledge	Require acknowledgement of the corresponding driver message.
Enable	This checkbox is recipe dependent. So it is possible to have alarm groups active only when certain recipes are enabled globally.
Visible	When this checkbox is set, the alarm group will appear on the Alarm Group Status display. This is a hint to other modules that the alarm group can be displayed.

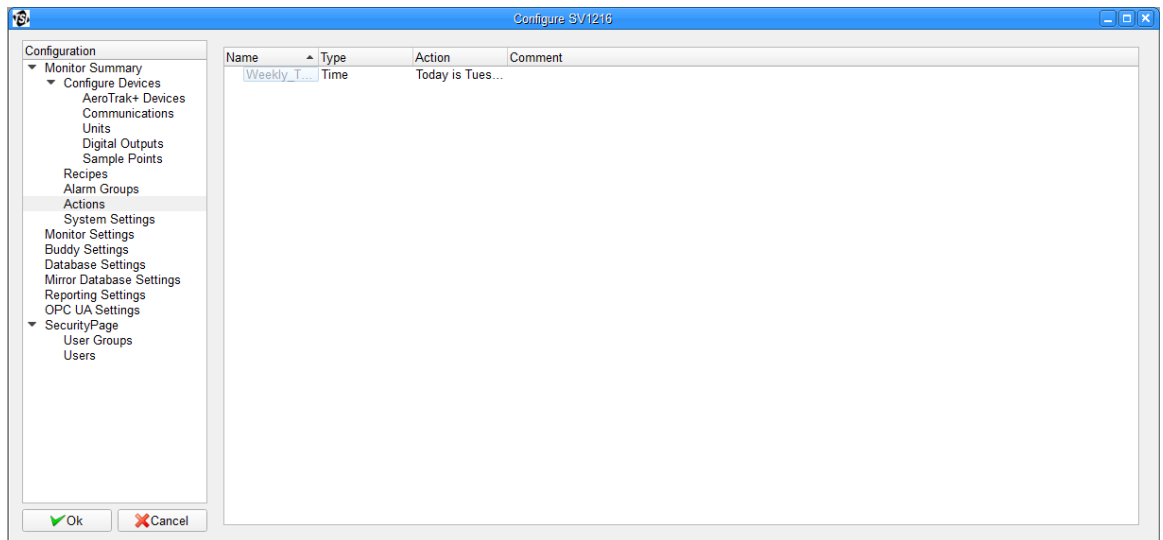
Monitor Summary -> Configure Devices -> Recipes

This page displays the current configured Recipes. An existing Recipe can be configured or a new Recipe created. To configure an existing Recipe, right mouse click on the selected Unit and select **Properties** from the pop-up menu.

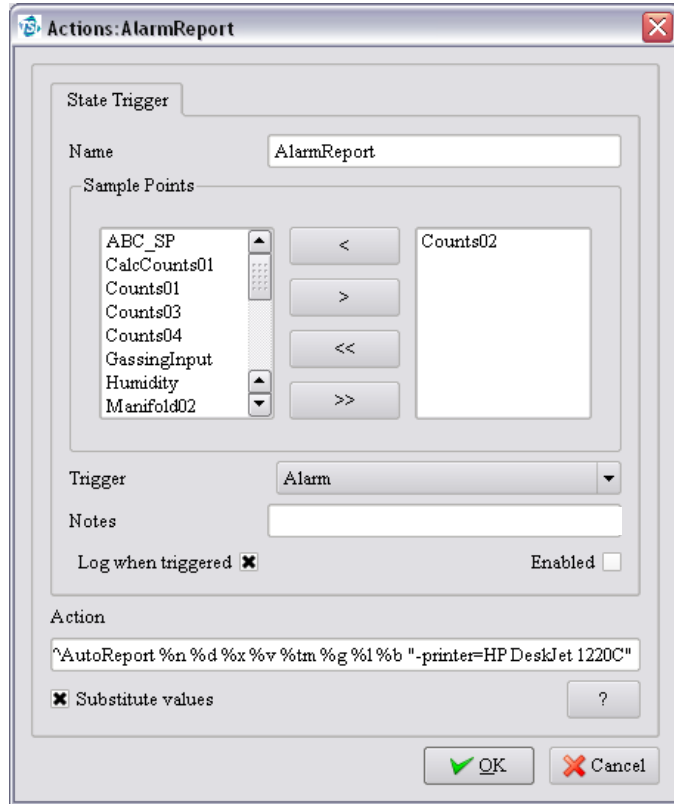


Monitor Summary -> Configure Devices -> Actions

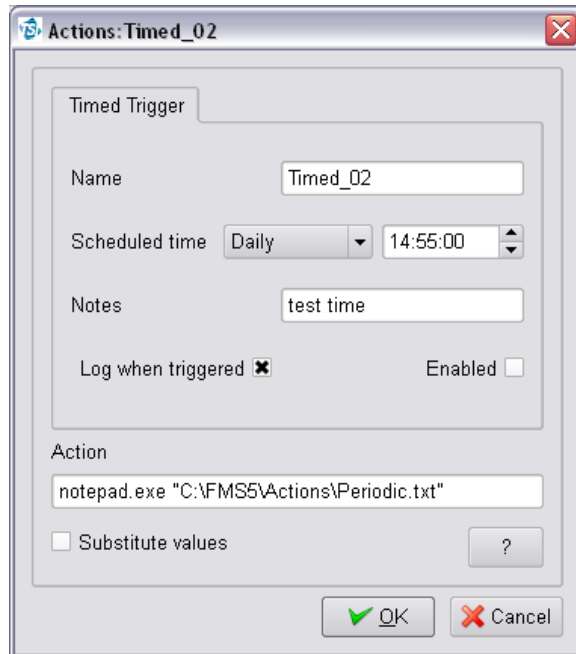
An **Action** is a task that is triggered by either a timed event or a change of sample point state.



This page displays the current configured Actions. An existing Action can be configured or a new action created. To configure an existing Action, right mouse click on the selected Action and select **Properties** from the pop-up menu.

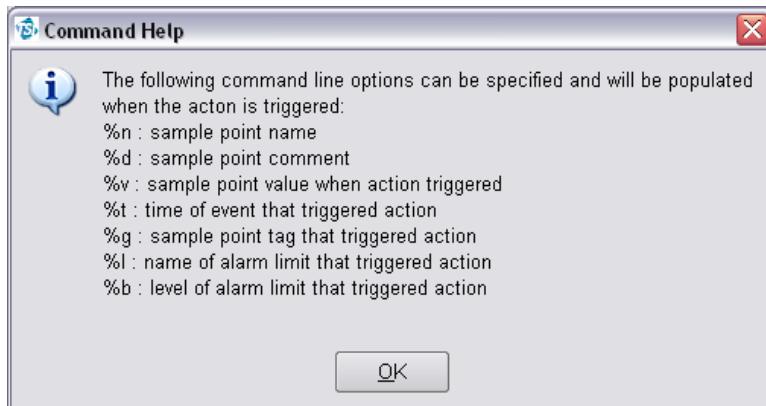


State Trigger Action



Timed Trigger Action

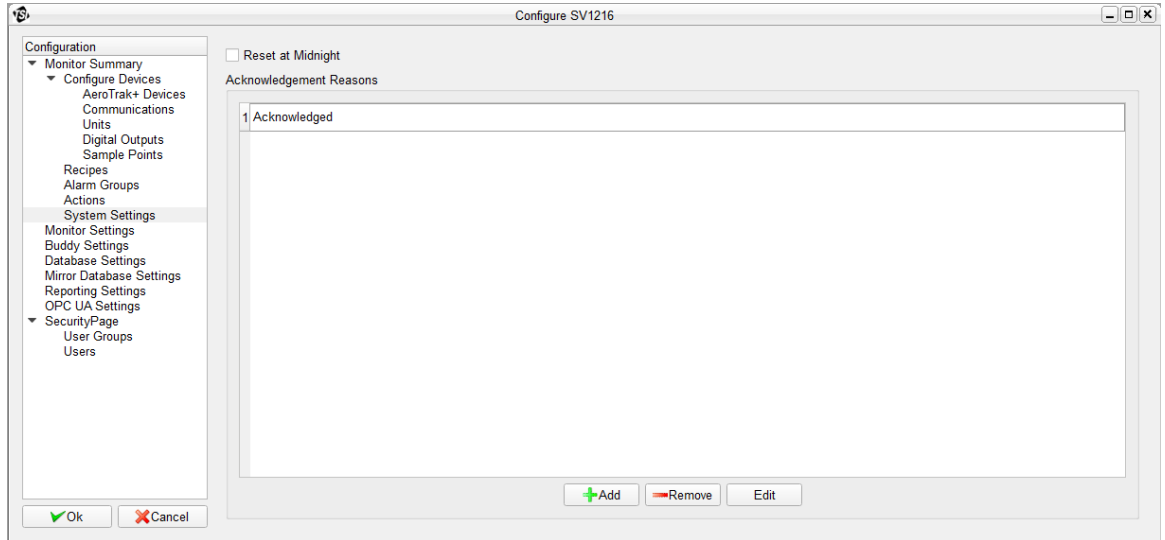
Field	Description
Name	The name of the action.
Sample points (State trigger only)	The Sample Points that can trigger the action.
Trigger (State trigger only)	The sample point event that will trigger the action. Options are Alarm or (value) Update.
Scheduled time (Timed trigger only)	The time at which the action is to be executed.
Notes	Free text field for configuration notes.
Log when triggered	When checked, the action will be logged in the event log when triggered.
Enabled	When checked the Action is enabled and can be triggered.
Action	The command to be run when the action is triggered, e.g., notepad.exe "C:\FMS5\Actions\Alarm.bat".
Substitute values	When checked fields in the Action will be replaced by actual values when the Action is triggered.
?	Select to see a table of options available for command line substitution.



Action command line substitution options

Monitor Summary-> Configure Devices -> System Settings

This page allows setting general system settings.



Field	Description
Reset at Midnight	When selected the statistics displayed in statistics windows will be zeroed at midnight.
Acknowledgement Reasons	Enter a set of standard reasons that can be selected when acknowledging alarms.

Monitor Settings

This page allows setting general settings related to the monitor.

Field	Description
Monitor Identification	Allows entering the name of the monitor node and the license key associated with the monitor node.
Monitor Language Settings	Allows configuring the language option of the monitor and text read orientation of the monitor.
Monitor Traffic Settings	Sets the port number to be used by the client and monitoring systems to broadcast messages to all other monitoring systems and clients. This must be the same for all members of a networked monitoring system; otherwise, not all members of the monitoring network will be detected. It is possible to have more than one network of monitoring systems sharing the same LAN, using different broadcast addresses to operate completely separate from one another. Where no hardware supporting UDP broadcasts are available, both the client and monitoring system must be started with the local flag.
General	Allows setting a scheduled reboot time for the monitor and SQL archive option.

Buddy Settings

This page is used to set up a buddy system. A monitor can “watch” up to three monitoring nodes and start a buddy monitor in case of failure of any of the watched nodes. For each monitor that is being watched, the command line to be used to start the buddy when a monitor fails must be specified.

The Buddy Behavior field *Take Over After* must be populated only for the watching monitor to monitor how long a watched node must be inactive before the buddy command line is executed.

The Buddy Behavior field *Exit if Node Active* must be populated only for the buddy to specify the conditions that will cause it to exit. It must not be populated for the watching monitor.

Configuration

- Monitor Summary
- Alarm Groups
- Communications
- Digital Outputs
- Sample Points
- Units
- Recipes
- Actions
- System Settings
- Monitor Settings
- Buddy Settings**
- Database Settings
- Mirror Database Settings
- Reporting Settings
- OPC UA Settings
- SecurityPage

Buddy 1

Enable

...

Buddy 2

Enable

...

Buddy 3

Enable

...

Buddy Behaviour

Take Over After (mins) 1

Exit if Node Active

node1

Ok Cancel

Database

This page sets database configurations.

Field	Description
Database Type	Sets the type of database used by the monitor.
Server Address and Port	Sets the server address and port for the database.
Database Name	Sets the name of the database used by the monitor.
Test Connection	Allows testing database connection based on current settings.
Client User and Password	Sets the Client username and password for database access. Users must have read and write permissions.
Node User and Password	Sets the node username and password for database access. Users must have read, write, and create permissions.

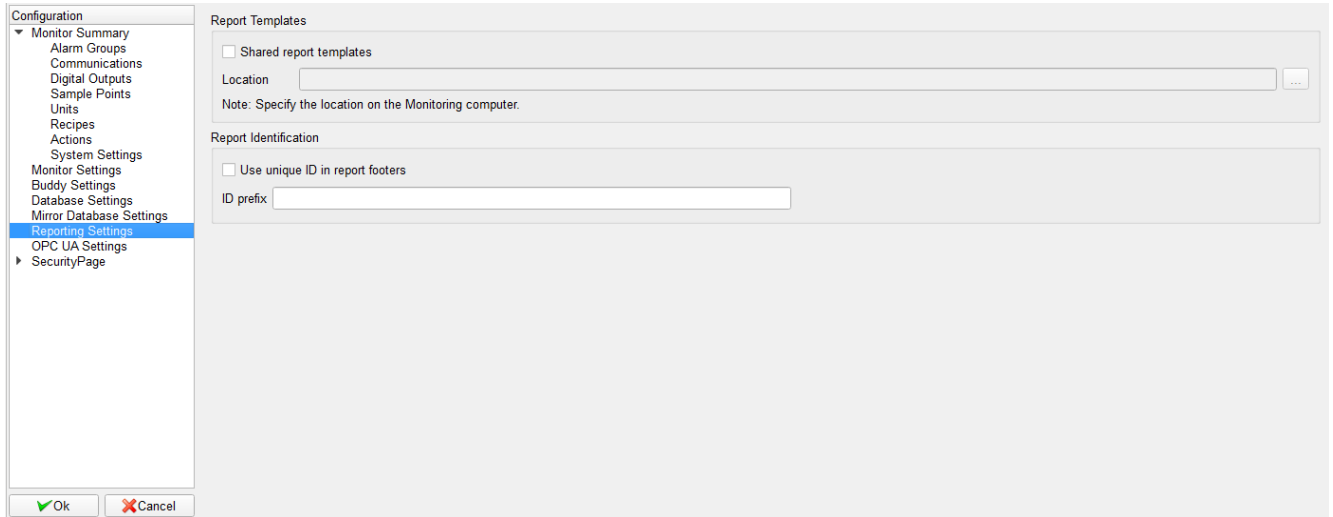
Mirror Database

This page sets the mirror database setting for the monitor node.

Reporting Settings

This page sets the report setting for the monitor node.

This page is used to determine whether all users share the same set of report templates or if each user has access only to the reports that the user has configured.



Field	Description
Shared report templates	Select this option if all users are to share report templates.
Location	The location on the monitoring computer where the report templates are to be held.
Use unique ID	Select if a unique 6 digit ID is to be displayed in the report footer for each generated report. IDs are sequential.
ID prefix	Specify a prefix to precede the ID if required.

OPC UA Settings

This page is used to change OPC UA Server settings. Please follow technical note, TCC-156 for configuring the OPC UA Server in FMS.

Configuration

- Monitor Summary
- Alarm Groups
- Communications
- Digital Outputs
- Sample Points
- Units
- Recipes
- Actions
- System Settings
- Monitor Settings
- Buddy Settings
- Database Settings
- Mirror Database Settings
- Reporting Settings
- OPC UA Settings
- SecurityPage

Local OPC UA Server Settings

License Key

Name: Node1OPCUAServer

Address: 10.1.13.5

Port: 4880

Discovery Mode: disable

Discovery URL: 10.1.13.5:4840

Redundant Mode: Hot

Service Level: 255

Language: English

Certificates

Name: cert_fms_opc_ua_server.der

Effective Date: 15-09-2017

Expiration: 14-09-2022

Contact: default_certificate

Update Certificate

Redundant OPC UA Server Settings

Name: BuddyOPCUAServer

Address: 10.1.13.2

Port: 4880

OPC UA Server Traffic Settings

Broadcast Port: 4001

Broadcast Using: Broadcom NetLink (TM) Gigabit Ethernet

Enable Debug Output Enable Only Local Nodes

Client Sessions

Ok Cancel

Security Page

This page sets the security related options.

Configuration

- Monitor Summary
- Alarm Groups
- Communications
- Digital Outputs
- Sample Points
- Units
- Recipes
- Actions
- System Settings
- Monitor Settings
- Buddy Settings
- Database Settings
- Mirror Database Settings
- Reporting Settings
- OPC UA Settings
- SecurityPage

Security Type: No Security

Enable As Password Server

Comments required for changes

Maximum Idle Time(minutes): 1

Password Duration (days): 1

Last old passwords not allowed: 1

Failed user logins allowed: 0

Failed client logins allowed: 0

Unlock Client

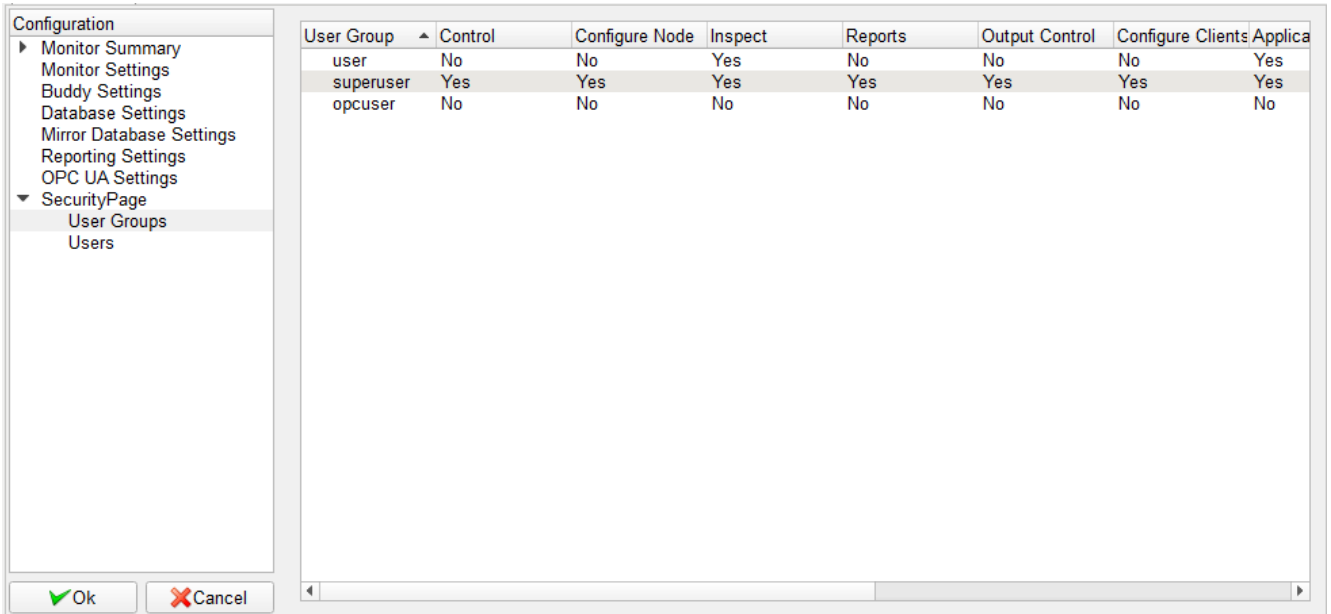
Ok Cancel

Field	Description
Enable As Password Server	Enables the monitor to be the password server.
Comments required for changes	When checked, comments are required to be entered when changes are made to the configuration.
Maximum Idle Time	Client will automatically log the user out of the client application when no keyboard or mouse activity has been detected for the given number of minutes.
Password Duration	When checked, all passwords are required to be changed if they are older than the given number of days. This is a useful security feature as it prevents discovered passwords being used for too long. This also sets if the last password is allowed.
Failed User logins allowed	<p>Sets maximum attempts for user login. The Client will be locked after the maximum failed attempts have been reached.</p> <p style="text-align: center;">NOTICE</p> <p>If Failed Client logins allowed is enabled, failed User logins allowed must be less than failed Client logins allowed.</p>
Failed Client logins allowed	<p>Sets maximum attempts for Client login. The Client will be locked after the maximum failed attempts have been reached.</p> <p style="text-align: center;">NOTICE</p> <p>If Failed User logins allowed is enabled, failed Client logins allowed must be greater than failed User logins allowed.</p>
Unlock Client	Becomes enabled if a user attempts to login and fails for the given number of times causing the client interface to lock. The system administrator is required to unlock it.

User Group

This page displays the current configured User Groups. The table contains an overview of each User Group's parent category. The User Group will have full privilege if the column displays "Yes" and no privilege if the column displays "No". If the column displays "Partial", check the User Group's properties to see which sub-categories the User Group has access to.

An existing User Group can be configured or a new User Group created. To configure an existing User Group, right mouse click on the selected User Group and select **Properties** from the pop-up menu. To create a new User Group, right mouse click on the blank area and select **New User Group** from the pop-up menu.

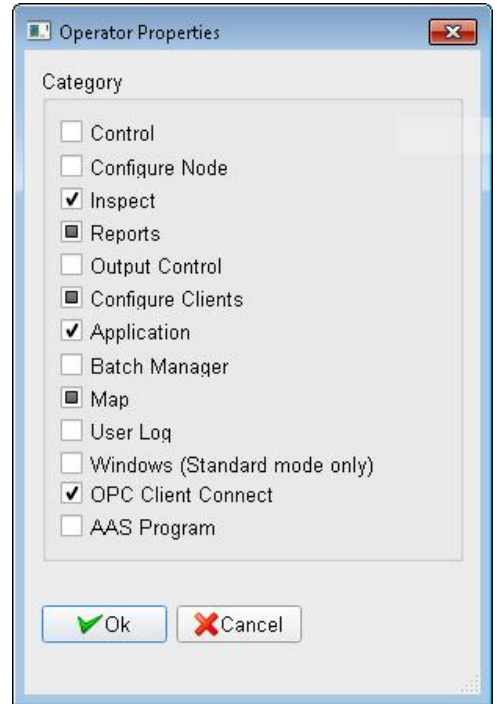


The screenshot shows a configuration window with a tree view on the left and a table on the right. The tree view is expanded to 'SecurityPage' > 'User Groups'. The table lists three user groups: 'user', 'superuser', and 'opcuser', with columns for Control, Configure Node, Inspect, Reports, Output Control, Configure Clients, and Application.

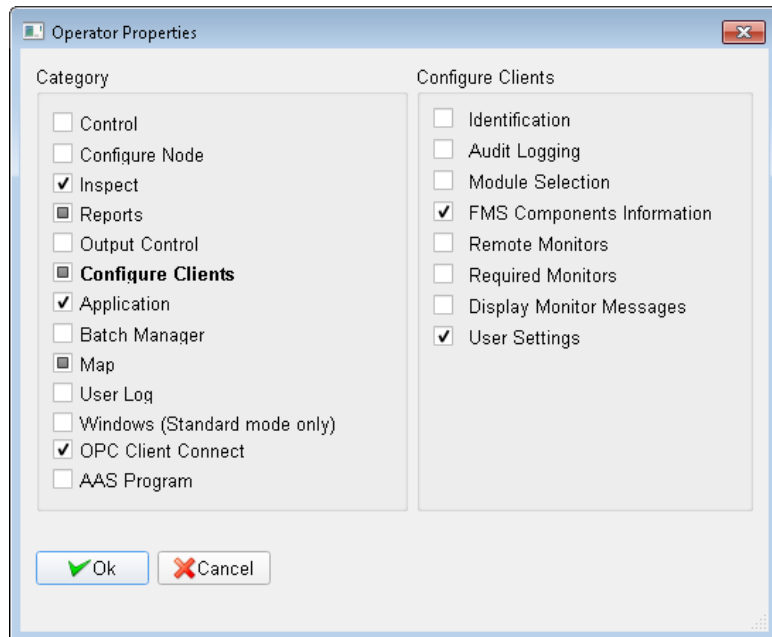
User Group	Control	Configure Node	Inspect	Reports	Output Control	Configure Clients	Applica
user	No	No	Yes	No	No	No	Yes
superuser	Yes	Yes	Yes	Yes	Yes	Yes	Yes
opcuser	No	No	No	No	No	No	No

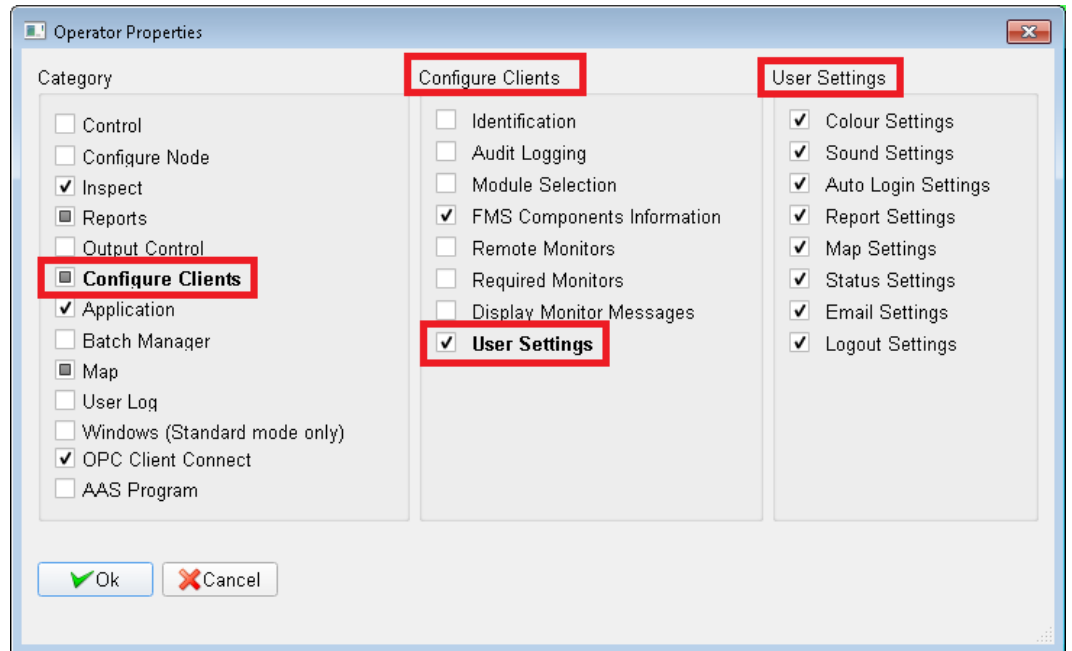
User Privileges

This is the initial window when configuring a User Group, the list of categories are the parent categories. A check indicates the User Group has full privileges to the parent category and all sub-categories, no check indicates the User Group has no privilege to the parent or any sub-category. If the check box is partially checked (Reports in the graph) means at least one but not all sub-categories are checked.

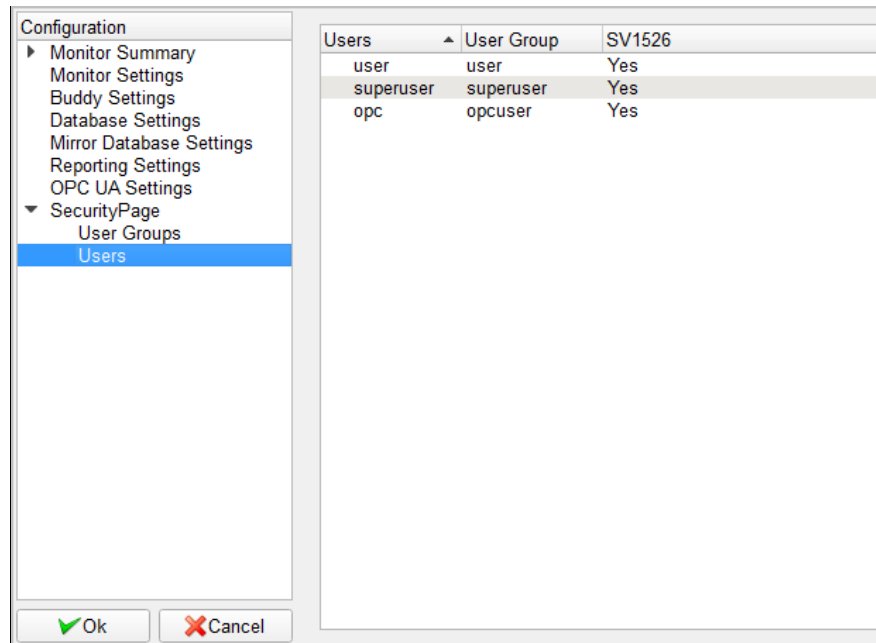


When the mouse is hovered over a category, the text will be bolded and font size slightly increased if the category has a sub-category. Click the text to display the sub-category. This applies to parent categories as well as sub-categories (some sub-categories have sub-categories).





Before any actions are taken, FMS will request a username and password and will check if the user is allowed to perform the action before proceeding.



This page displays the current configured Users. An existing User can be configured or a new User created.

To configure an existing User, right mouse click on the selected User and select **Properties** from the pop-up menu.

To create a new User, right mouse click on the blank area and select **New User** from the pop-up menu.

The screenshot shows a dialog box titled "Add New User". At the top left is a small icon and the title. Below the title bar is a checkbox labeled "Super User". Underneath are four input fields: "Full Name", "User Name", "Password", and "User Group". The "User Group" dropdown menu is currently set to "Admin". Below these fields is a section titled "Select User Nodes" which contains two empty list boxes. Between the list boxes are four navigation buttons: a right arrow (>), a left arrow (<), a double right arrow (>>), and a double left arrow (<<). At the bottom right of the dialog are two buttons: "Ok" and "Cancel".

Viewing a Monitoring Node

To view a particular monitoring system, select the node in the tab controls. The software will display all the samples points, alarm group, and statistics associated with the node. **View -> Status, Map, Graph** and **AAS Status** can also be selected.

The screenshot shows the FMS Client software interface. The main window is titled "FMS Client Hai" and has a menu bar with "Client", "Node", "Windows", and "Help". Below the menu bar is a toolbar with various icons. The main area is divided into several sections:

- Configured:** A section with a tab labeled "FMS_Demo". It contains three monitoring points:
 - P01: Value: 2.0 C/cuft
 - P02: Value: 8.0 C/cuft
 - P03: Value: 8.0 C/cuft
- Units Status:** A section with a green background and a checkmark icon, labeled "Sim".
- Statistics:** A section with a table showing various statistics for the selected node.
- Messages:** A table showing a single message from the local node.

The "Statistics" table is as follows:

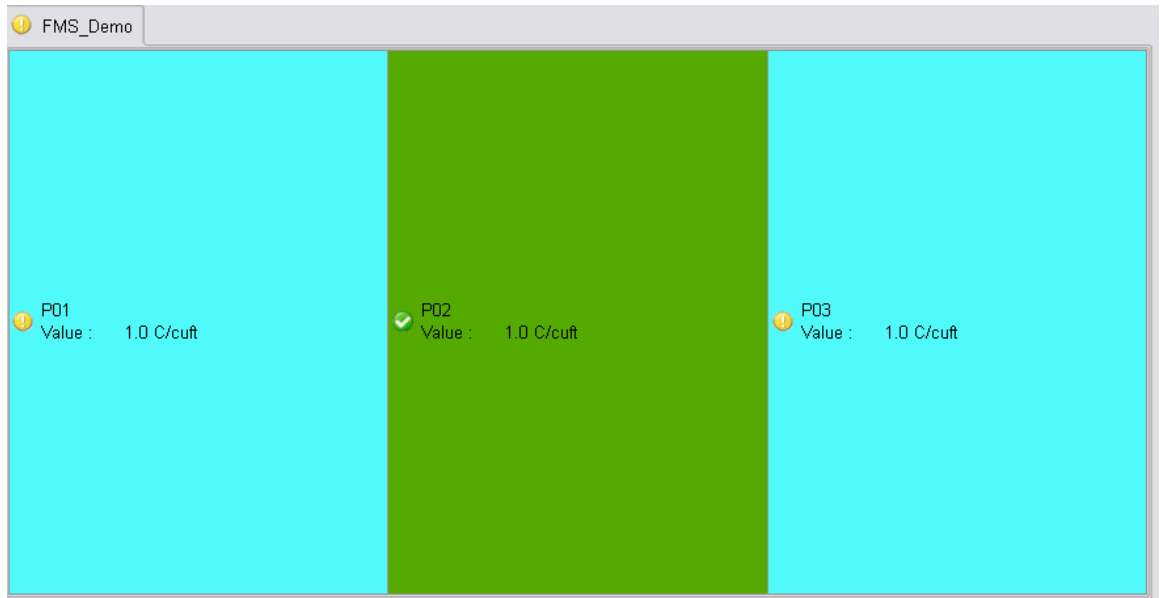
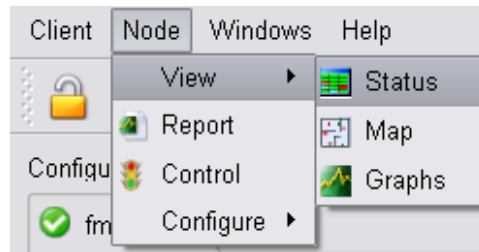
Name	Value
Last Failure	none
Last Warning	none
Last Alarm	none
Last Reading	29-06-2009 16:54:44
Last Ack.	none
Recipe	Default
Enabled	True
Ack.State	Needs acknowledg...
Warnings	0
Alarm Started	0
Alarms	0
Readings	51
Unit	Sim
Notes	
Name	P01

The "Messages" table is as follows:

Node	Date/Time	Source	Type	Message
Local	29-06-2009 16:41:04	Local	Ok	Monitor Has Connected FMS_Demo from 10.1.12.1

The bottom right corner of the window shows the date and time: 29-06-2009 16:54:56.

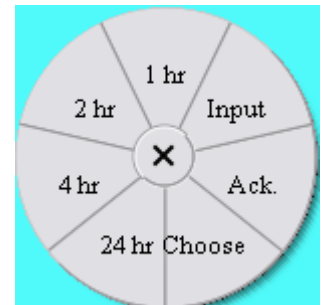
View Status



Inspect

This opens an inspection window. An inspection window is a real-time display of the current status of a sample point, plus a graphical and tabular display of historic data. The table and graph are updated as new values are collected.

Inspection windows displays the selected amount of data. As new data is received, the oldest data is discarded.



If the **Ack** option is enabled for the current user, any alarms for the selected sample point can be acknowledged as described in the following sections.

If the **Data Entry** option is enabled for the current user, data can be manually inserted for the selected sample point by selecting **Input**.

Sample Point Inspection Windows

Inspect P01

Data Graph Statistics

Date Time	State	Notes	Value
29-06-2009 16:54:44	Ok		2.0
29-06-2009 16:53:43	Ok		4.0
29-06-2009 16:52:42	Ok		7.0
29-06-2009 16:51:41	Ok		8.0
29-06-2009 16:50:40	Ok		3.0
29-06-2009 16:49:39	Ok		1.0
29-06-2009 16:48:38	Ok		1.0
29-06-2009 16:47:37	Ok		4.0
29-06-2009 16:46:36	Ok		3.0

Close

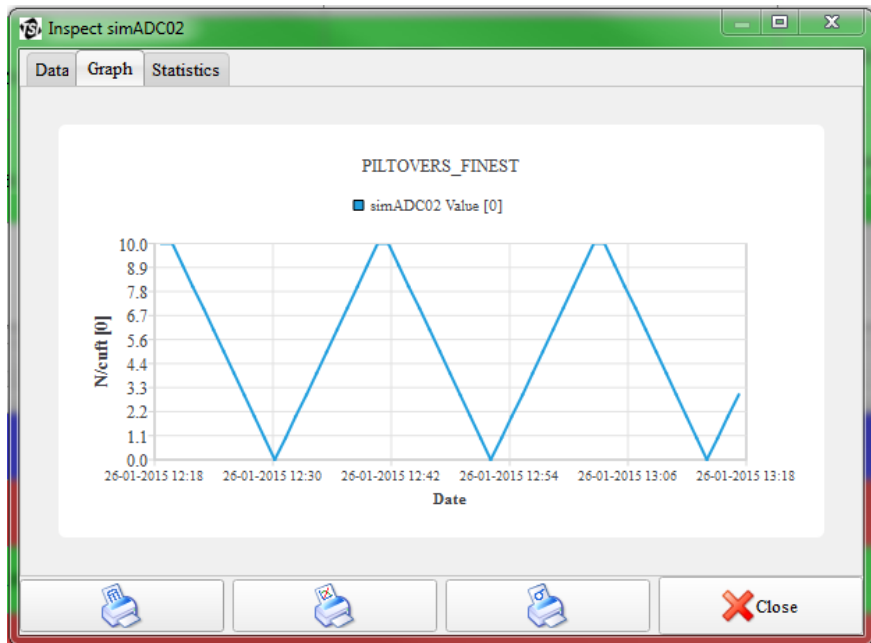
Inspect P01

Data Graph Statistics

Sample Status Tag Status Alarm Limits SPC Status SPC Limits

Name	Value
Last Failure	none
Last Warning	none
Last Alarm	none
Last Reading	29-06-2009 16:54:44
Last Ack.	none
Recipe	Default
Enabled	True
Ack.State	Needs acknowledgement
Warnings	0
Alarm Started	none
Alarms	0
Readings	51
Unit	Sim
Notes	

Close



Item	Description
Print Table	Visible part of the table is printed.
Print Graph	Graph is printed.
Print Current Statistics	Current sample point statistics are printed.
Close	Inspection window is closed.

Alarm Group Inspection Windows

The Status and Floor Plan displays allow alarm groups to be included. Clicking on an alarm group item opens an Alarm Group Inspection window. This lists the members of the alarm group.

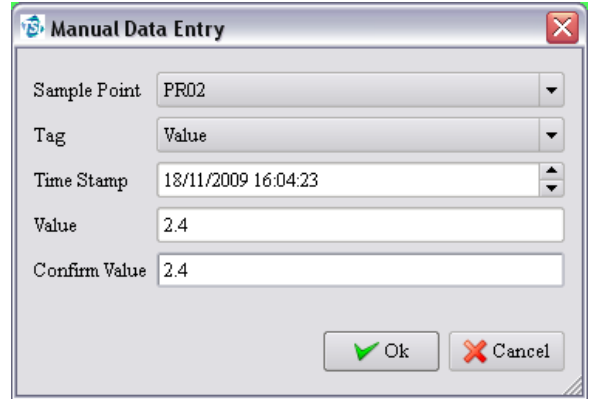
Name	Value	Comment
PR01	10.00 pH	
PR02	0.00 DegC	
PR03	3.00 DegC	Stopped Alarming - Time i...
PR04	9.00 mg/l	
PR06	80.00 %RH	

Clicking on an alarm group member makes that sample point the current sample point. Clicking on a sample point, then pressing the inspect button opens the inspect menu (described elsewhere).

The alarm group inspection window is closed by clicking on the close button.

Manual Data Entry

The Manual Data Entry feature allows entering data to the database with a timestamp. The Manual data entry dialog is available by right-clicking on a sample point in the node status page. User verification is required before the data is added to the database, and only users who have appropriate permissions will have access to this functionality.



The dialog box titled "Manual Data Entry" contains the following fields and controls:

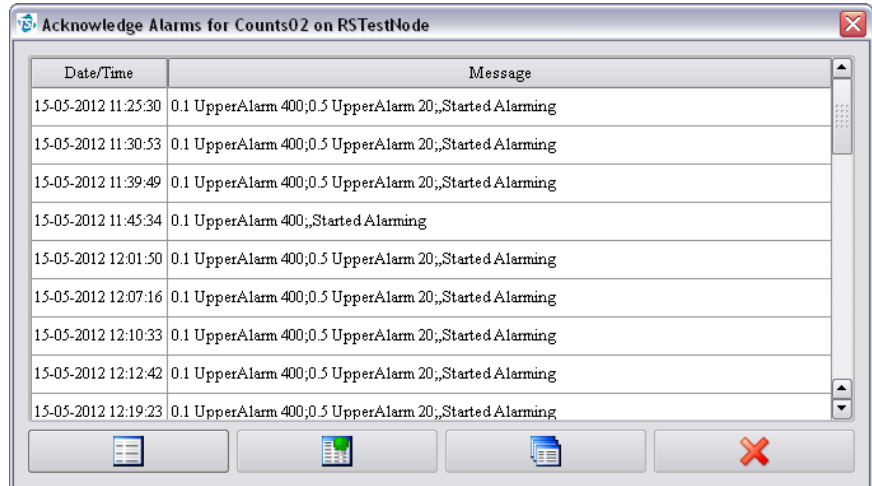
- Sample Point: PR02 (dropdown menu)
- Tag: Value (dropdown menu)
- Time Stamp: 18/11/2009 16:04:23 (dropdown menu)
- Value: 2.4 (text input field)
- Confirm Value: 2.4 (text input field)
- Buttons: Ok (with green checkmark icon) and Cancel (with red X icon)

Data entered in this way will be commented to indicate the source of the data as illustrated below.

18-11-2009 16:04:23	Ok	Data Value Inserted By manager From MV027 on 18-11-2009 16:08:49	2.4
---------------------	----	--	-----

Acknowledge Alarms

The order of the alarms listed can be changed by clicking on the header of any column.






The dialog box titled "Acknowledge Alarms for Counts02 on RSTestNode" displays a table of alarm messages:

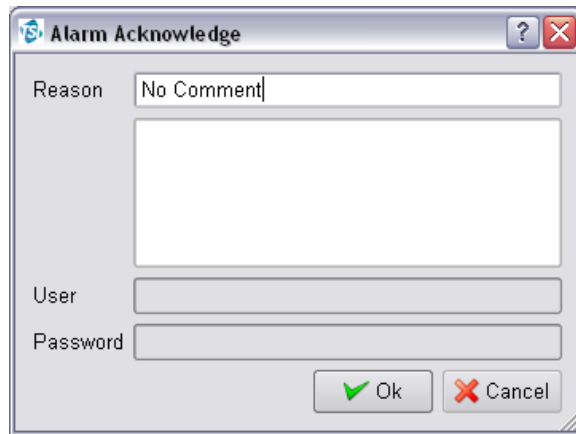
Date/Time	Message
15-05-2012 11:25:30	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 11:30:53	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 11:39:49	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 11:45:34	0.1 UpperAlarm 400,Started Alarming
15-05-2012 12:01:50	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 12:07:16	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 12:10:33	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 12:12:42	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming
15-05-2012 12:19:23	0.1 UpperAlarm 400;0.5 UpperAlarm 20,Started Alarming

At the bottom of the dialog, there are four buttons: a list icon, a calendar icon, a document icon, and a red X icon.

The alarm list dialog allows the following options:

Icon	Option Name	Description
	Ack. Selected	Alarms can be selected for acknowledgement by clicking on the corresponding row number to the left of the table.
	Ack. All for Sample Point	All alarms in the list are acknowledged.
	Ack. All Pending	All pending alarms for the selected node are acknowledged.

When acknowledging alarms the following dialog is displayed:



Field	Description
Reason	Allows a free text entry in the alarm log to be made to explain the alarm event. Preconfigured reasons can be selected if these have been entered in System Settings in the configuration.
User	Name of the user that acknowledges the alarm.
Password	Password for the user.

View Statistics

Most display windows show sample points. Left-clicking on a sample point causes the Sample Point Status display to show the current values for that sample point. Right-clicking on a sample point shows the inspect menu described previously plus an option to acknowledge any alarms also as described in a previous section.

The screenshot shows a window titled 'Statistics' with three tabs: 'Sample Status', 'Tag Status', and 'Ala'. The 'Sample Status' tab is active, displaying a table with two columns: 'Name' and 'Value'. The table contains the following data:

Name	Value
Last Failure	none
Last Warning	none
Last Alarm	none
Last Reading	07-06-2009 16:43...
Last Ack.	none
Recipe	Default
Enabled	True
Ack.State	No acknowledge...
	0
Warnings	0
Alarm Started	none
Alarms	0
Readings	40
Unit	Sim
Notes	
Name	P02

Sample Point Statistics

The Sample Point Statistics pane shows the current status of the last selected sample point, the current values, and alarm limits of that sample point.

The SPC status panes show three common SPC statistics as shown in the table below.

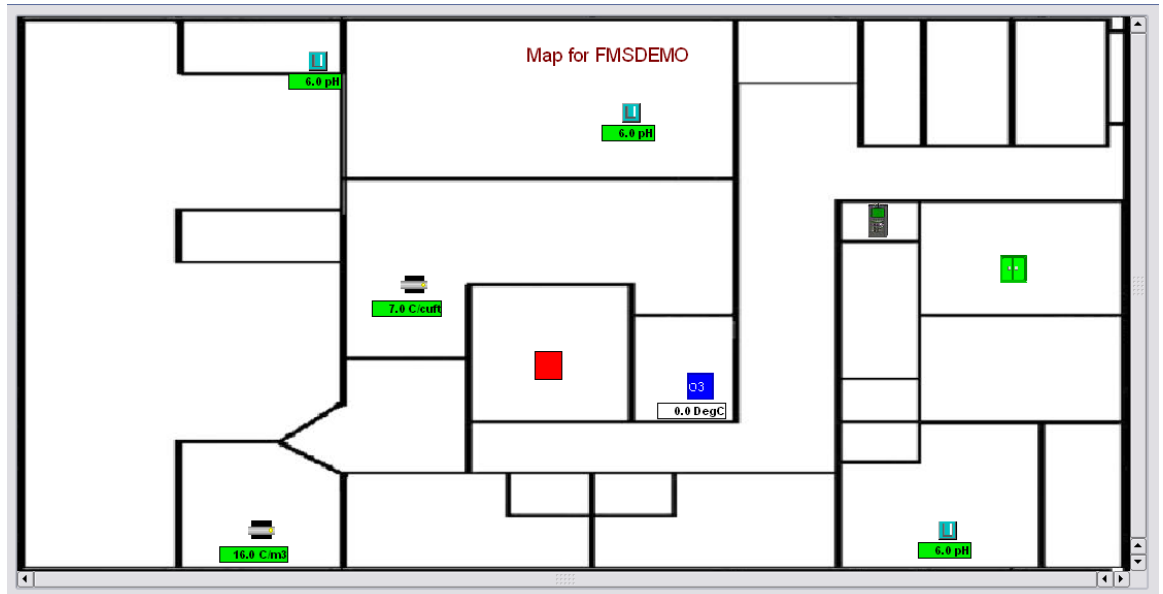
SPC Statistic	Description
Mean Crowding	Number of consecutive readings that are between the upper and lower control limits.
Alarm Number	Number of consecutive readings that lie outside the control limits.
Trend Number	Number of consecutive readings that are increasing or decreasing.

These statistics can be used to predict alarm states before they arise. An understanding of the process being monitored is necessary to know if SPC alarms are useful.

This shows the configurable items. Clicking on an item displays the associated configuration form on the right. Double-clicking on an item will show any minor items. Double-clicking again will hide any minor items. As an item is selected, the data for the item is displayed in the configuration form.

Map

The Floor Plan display can display a room/building layout designed by using a layout designed with the Map Editor and an optional background bitmap.



The maps and backgrounds are downloaded from the monitoring node as needed. The default map for a monitoring node must have the same name as the monitoring node e.g., Node1.xml for the node Node1.

These maps and backgrounds must be placed in the FMS Maps directory on the monitoring node's system.

A background bitmap can be included too. These backgrounds must be JPEG files (ending with .jpg). The naming rules are the same as the floor plan design files.

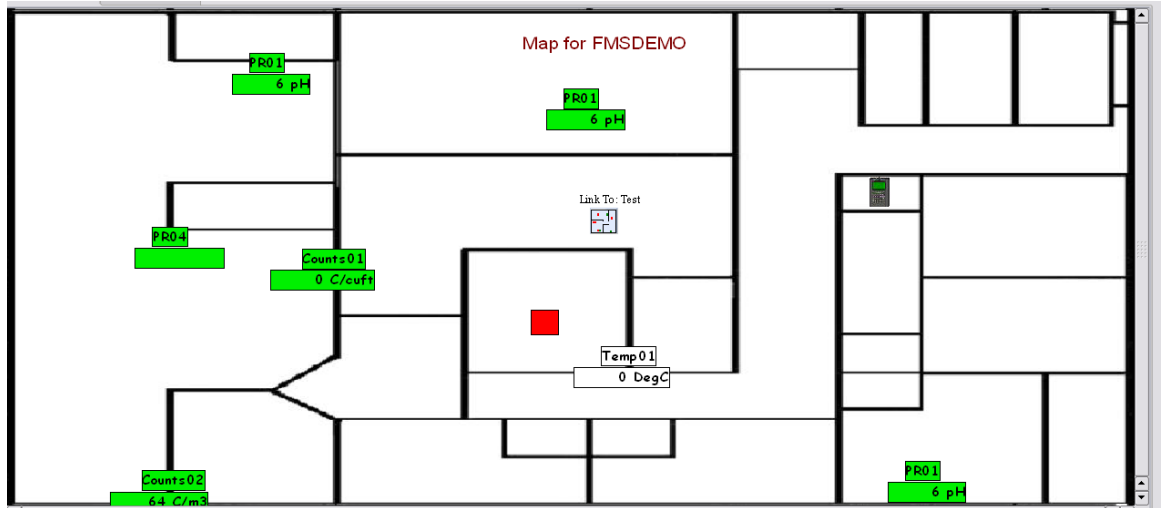
A background bitmap should be added to the FMS maps directory. This background must be a JPEG file (ending with .jpg). If additional maps are required, the bitmaps should be added to the FMS maps directory and should be named as the user's preference.

When a map is edited and saved, an Xml file for the map configuration will be created in the FMS maps directory.

Active Icons

Icons can be static or animated. All active icons have the extension .pix. A pix file is one or more XPM files. All icons must be in the **Maps** directory to be recognized.

Sample point names can be displayed instead of icons if the option is selected in **Client Options – Map Settings** or is configured on the map when the map is set up.








Map Viewer



When selecting the Map option, the icons above are added to the main tool bar.







If a map has already been configured for the node, the map will be displayed with the configured settings. Otherwise, a blank screen will be displayed and the **New Map** option allows a map to be created.

Icon	Icon Name	Description
	Zoom In	Zoom in to the map, each click makes the map larger.
	Zoom Out	Zoom out of the map, each click makes the map smaller. The map will never go smaller than the original size (users can only zoom out the same number of times as zoom in).
	Print Map	Current map display is printed.
	Edit Map	Provides Map Editing functionality.
	New Map	Create a new map.

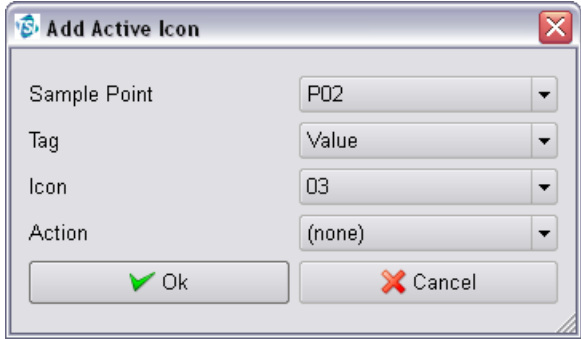
Map Editor (Plan Editor)



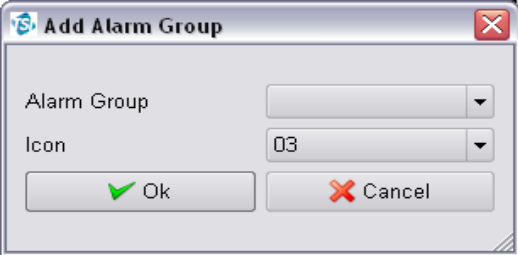
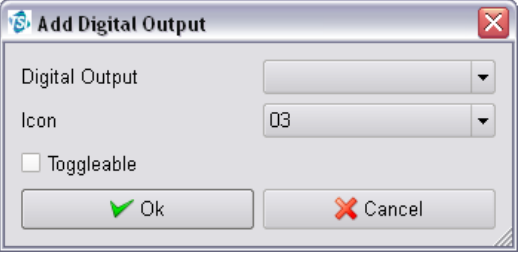
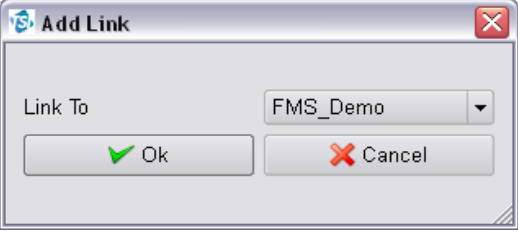
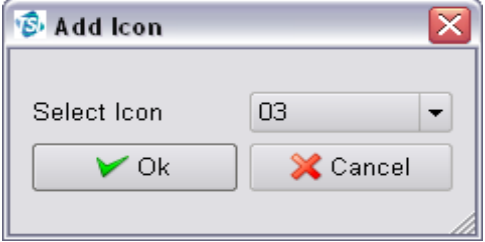
The Map Editor allows the editing of simple 2-D layouts. The tool bar along the top of the displays provides the functions described in the table below.

Icon	Icon Name	Description
	Open Map	Existing map display can be selected and loaded. The background bitmap is also loaded.
	Save Map	Current map display is saved under the given name. When starting, the user interface loads the map named <i><node name>.xml</i> .
	Clear Map	Clears the current map configuration.
	Map Text Options	Selects the text, foreground color and font for text labels.
	Change Background	Allows changing the image file being used for the background.
	Exit Edit	Exits Edit mode and prompts to save changes.

Right mouse click on the map to add monitoring functions onto the map.

Function	Description
Add Active Icon	<p>Adds an active icon at the selected position. The active icon dialog is displayed to set the object's configuration.</p> 

Field	Description
Sample Point	Sets the name of the sample point to be associated with the icon displayed on the map.
Tag	Sets which value is to be displayed under the icon on the map.
Icon	Selects the icon to use to represent the sample point on the map. Icons can be static, animated, or dynamic. When set to (none) the sample point name is displayed.
Action	Selects the action to perform when the active object is clicked. When set to (none) , no action is run.

Function	Description
Add Alarm Group	<p>Adds an alarm group to the map. The alarm group selection dialog is displayed to allow the selection of the alarm group and the icon to use.</p> 
Add Digital Output	<p>Adds digital outputs to the map. The digital output selection dialog is displayed to allow the selection of the digital output and the icon to use. If Toggleable option is selected, the digital output can be switched by clicking the icon on the map, provided the user has the appropriate permissions.</p> 
Add Link	<p>Creates a map link from one map to another. This is used to provide maps with greater detail.</p> 
Add Icon	<p>Adds an inactive icon to the map display. The selected icon is displayed. Only images in the Maps/Icons directory are selectable.</p> 

Move Objects

Objects can be moved by clicking on them and then dragging the object to the required position.


Edit Objects

Active Objects can be edited by right mouse clicking on the icon on the map and selecting the **Edit** menu option.

Delete Objects

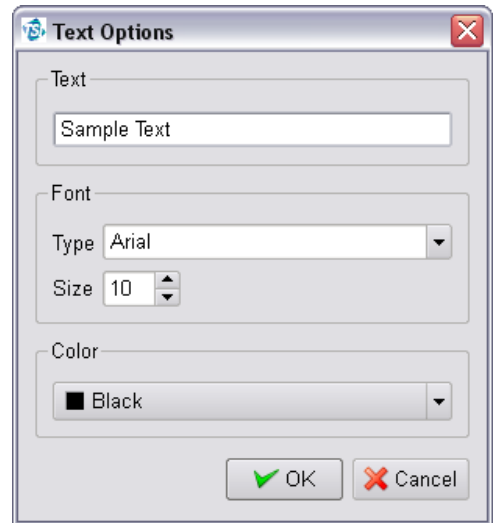
To delete an object, right mouse click on the object. Active objects are deleted by first right-clicking then selecting the **Delete** menu option.

Select Text Options

To select color, click on  **Map Text Options** icon. The Text Options dialog is displayed. Select a color and font and click **OK**. Any text that is added from now on will use the selected color.

To change the color of a selected text, select the text and then click on the map text color icon. The Text Options dialog is displayed.

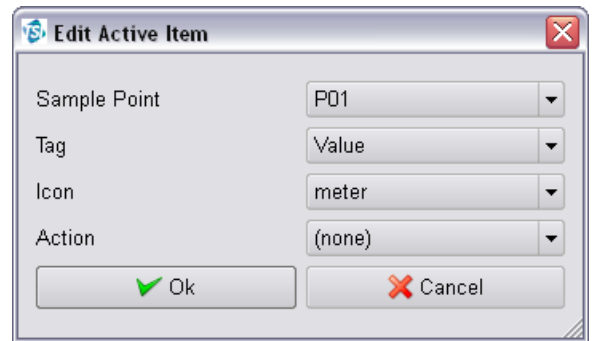
Click **OK** to accept, **Cancel** to reject.



Select Active Objects

To select an active object, right mouse click on object and then select **Edit** from the pop-up menu.


This allows an active object to be configured.



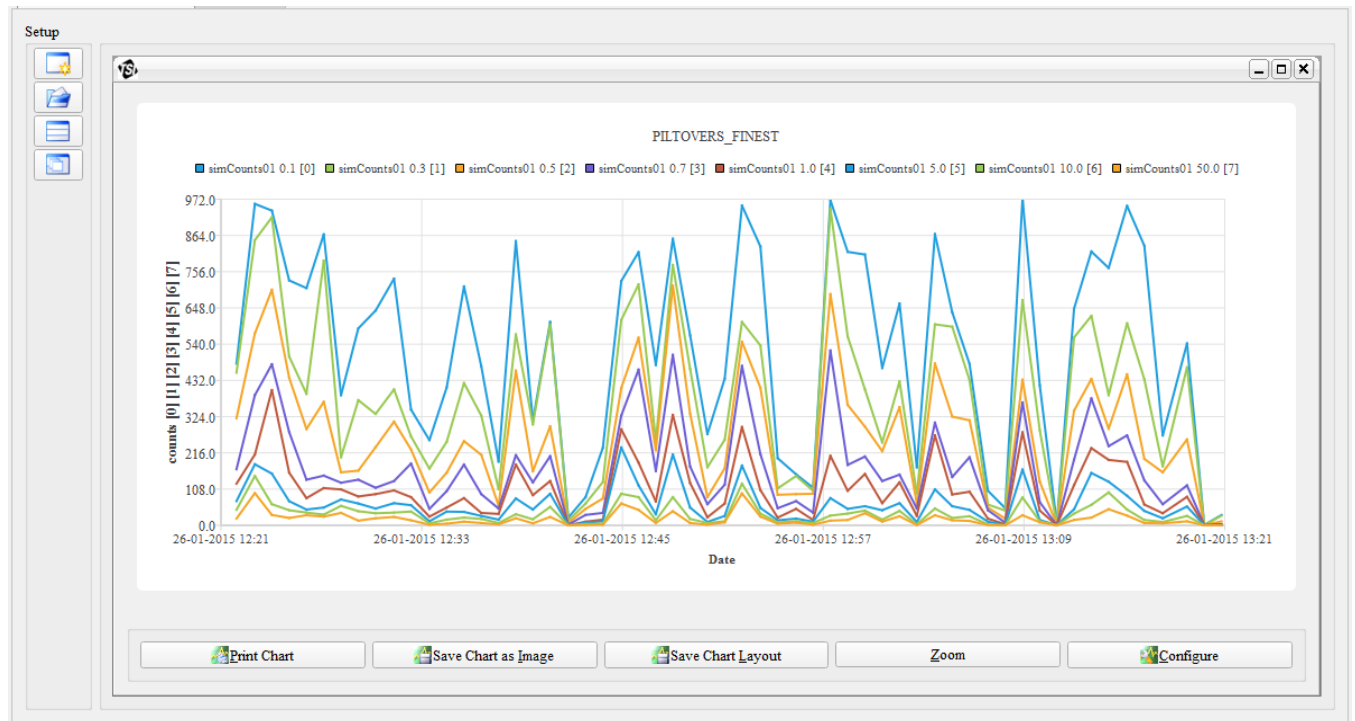
Field	Description
Sample Point	Sets the name of the sample point associated with the icon displayed on the map.
Tag	Sets which value is to be displayed under the icon on the map when in user mode.
Icon	Selects the icon to use to represent the sample point on the map. Icons can be static, animated or dynamic.
Action	Selects the action to perform when the active object is clicked. When set to (none) , no action is run.

Click **OK** to save the changes, click **Cancel** to discard the changes.

Clear Map Items

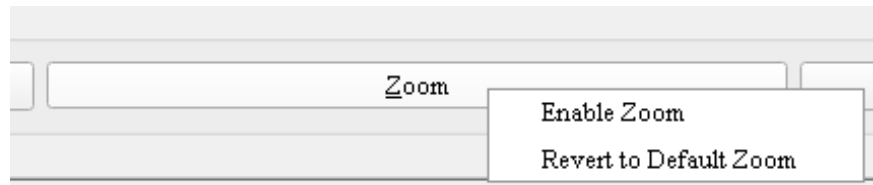
To clear all items from map, click on  **Clear Map** icon. All icons will be cleared and only the background bitmap will be left.

Graph



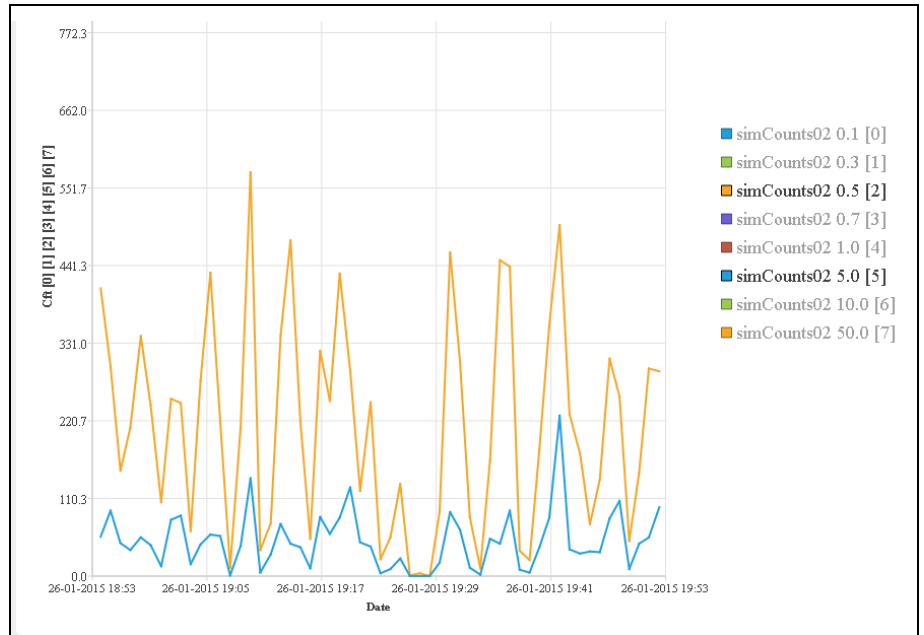
Quick Zoom

Select **Zoom** to open a quick zoom menu where the option to enable zoom as well as reverting the graph to its default zoom is available. Reverting a graph to its default zoom will not disable zoom.

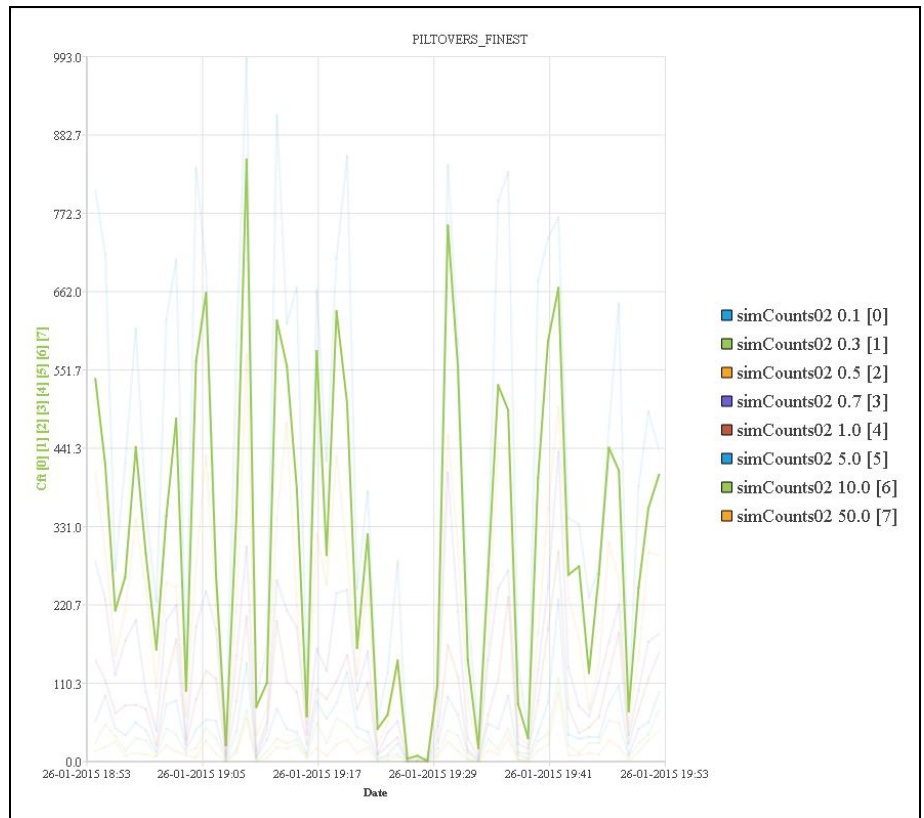


Quick Enable/Disable Lines

On the main graph window, you can left-click an entry in the legend to enable or disable the line.



Mouse hovering over a line will fade out all other lines and highlight the corresponding y-axis in the line color.



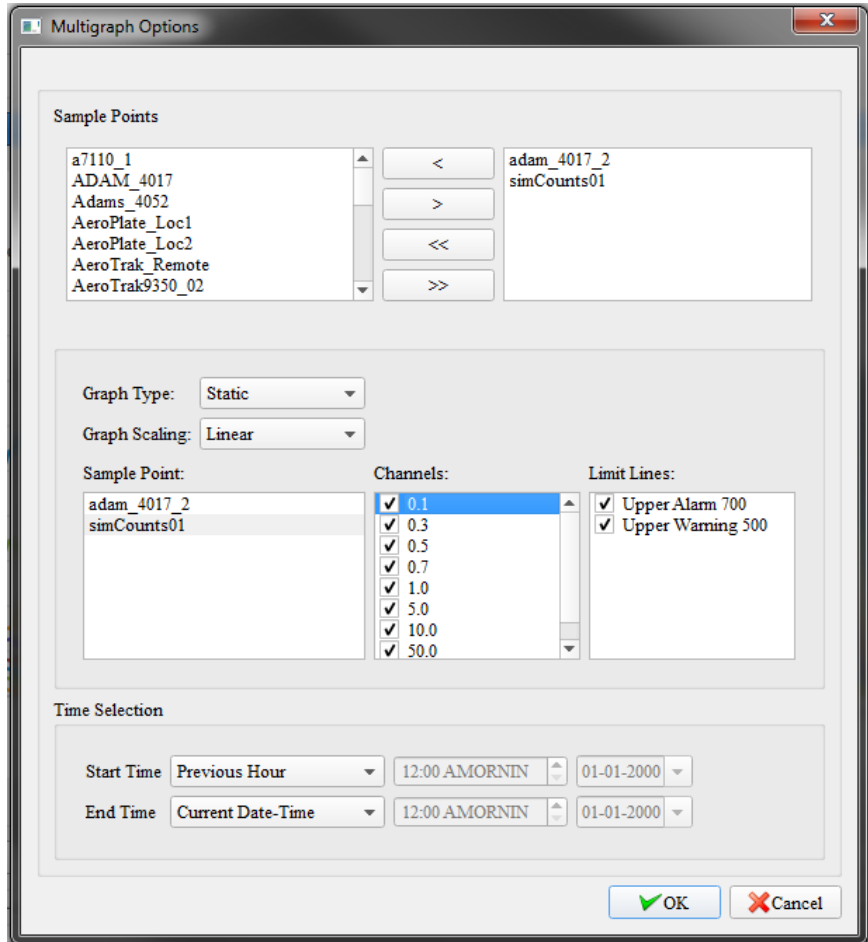
A [#] is at the end of every entry in the legend and its corresponding [#] is at the end of its y-axis label.



Icon	Description
	Create a new graph.
	Open a graph.
	Tile Graph Windows.
	Cascade Graph Windows.

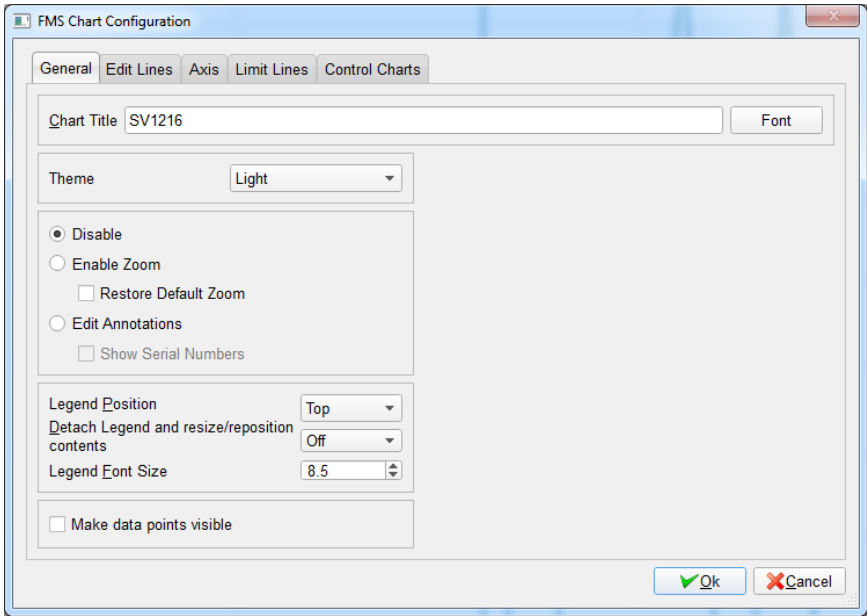
Create a Graph

Graph options allows selecting the start and end time for graph display. The graph can be configured as dynamic and/or log scales can be used.



Configure an Existing Graph

Common Tab



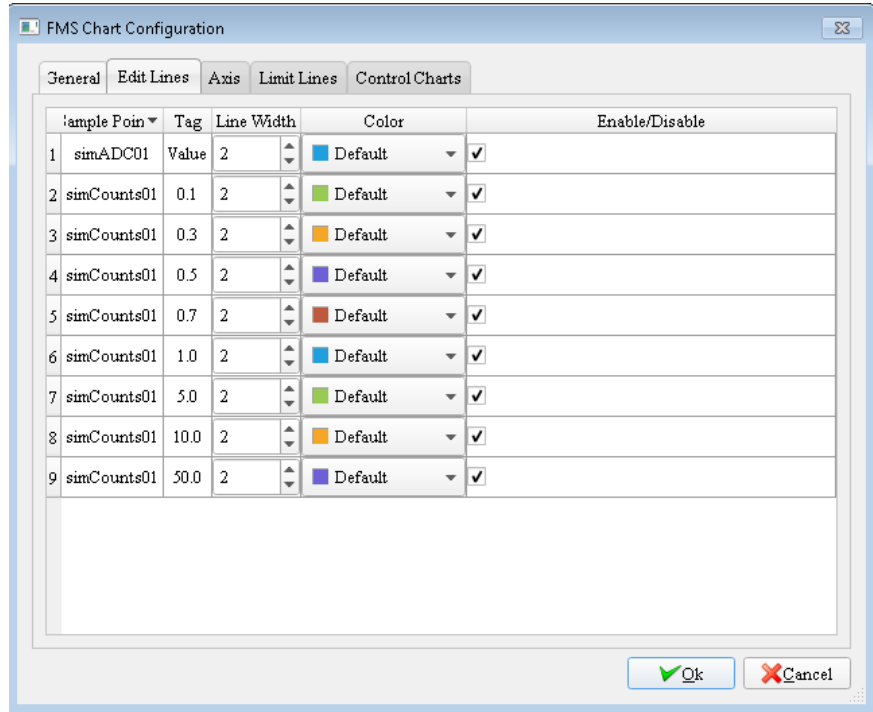
Option	Description
Chart Title	Sets the title of the graph window.
Theme	Selects the theme of the graph window.

Special **Sample Point** selections have the effects shown in the table below.

Option	Description	
Disable, Enable Zoom, Edit Annotations	Select one of three graph states:	
	Enable Zoom	Zoom in a graph by left hold click, drag the mouse to create a zoom box and release left mouse. Right-click to zoom out. By checking restore default zoom, the chart will revert to its range specified in the Axis tab.
	Edit Annotations	Mouse hover over a dataset line to create an annotation window. Click to drop the annotation on the graph, a new window will appear to enter in a note. The note can accept multiple lines of text by hitting the Enter key. Once an annotation is placed on the graph, left hold clicking on the annotation will allow you to re-position the annotation box. Note that the point of the annotation will still point to the same location. Right-click on an existing annotation to edit the text or delete the annotation from the graph. <div data-bbox="1040 926 1502 957" style="background-color: #0070C0; color: white; text-align: center; padding: 2px;">NOTICE</div> Edit annotations is intended to be used with static graphs.
	Show Serial Numbers	A special case of annotation used only for those sample points with the serial number of the instrument.
	Disable	Neither zoom nor edit annotations is allowed. In this state a left click will display a box indicating the x and y axis values of the mouse position.
Legend Position	Place the legend on the top, left, bottom, or right of the graph.	
Detach Legend and Resize/Reposition Contents	Enabling this feature will detach the legend from the graph. A detached legend can be resized and repositioned on the graph as well as scaling and translating the graph itself. Disabling this feature will revert the graph to its default scaling and position and re-attach the legend to the graph.	
Legend Font Size	Specifies the legend font size.	
Make Data Points Visible	Specifies if data markers will be drawn for each data point.	

Line Options

Line Options allows specifying the line width, selecting the color of each data line, and specifying if the line should be displayed or hidden on the graph.



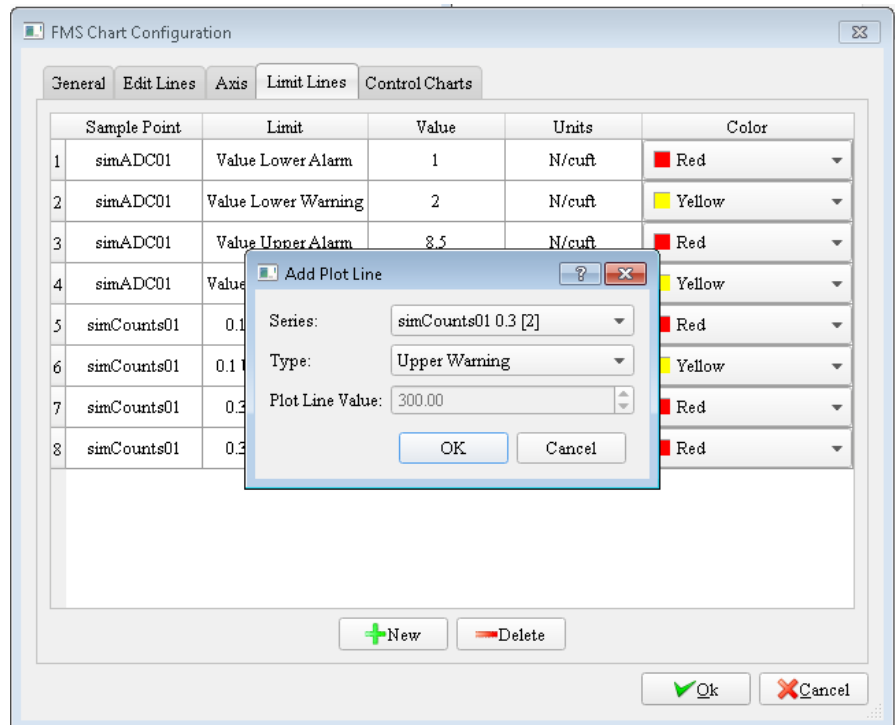
Axes

Axes allow specifying the min and max of the axis. The graph can auto scale if Auto option is selected. Specifying the tick count will change the amount of labels on a given axis. An axis can be in linear or logarithmic base 10 scale. Switching the scaling of an axis will switch the scaling for all associated plot lines. Tick count is disabled with log scaling.

	Axis	Min	Max	Auto	Tick Count	Scaling
1	Date				6	
2	N/cuft	0	10	<input checked="" type="checkbox"/>	10	Linear
3	counts	0	988	<input checked="" type="checkbox"/>	10	Linear

Limit Lines

Limit Lines allows adding **alarm limit lines** and setting the line color.



Control Charts

Control Charts allow configuration of control charts. A control chart can only be created if the graph only has one sample point.

The screenshot shows the 'FMS Chart Configuration' dialog box with the 'Control Charts' tab selected. The dialog has a title bar with a close button. Below the title bar are five tabs: 'General', 'Edit Lines', 'Axis', 'Limit Lines', and 'Control Charts'. The 'Control Charts' tab is active and contains the following controls:

- An unchecked checkbox labeled 'Enable X-Bar/R'.
- A 'Sample Size' spinner box set to the value '3'.
- A 'Standard Deviation' text input box.
- An 'X-double bar' text input box.

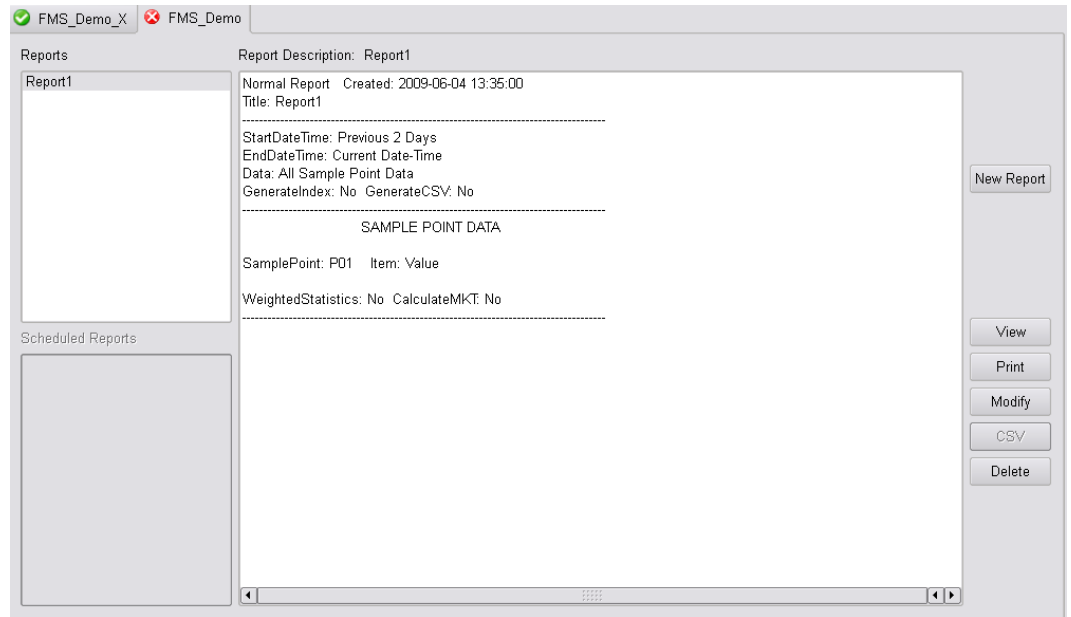
Two notes are present in the dialog:

- A note to the right of the 'Enable X-Bar/R' checkbox: "Note: Leave SD and x-double bar blank to use current statistics."
- A note to the right of the 'X-double bar' input box: "If the chart is currently dynamic, creating a control chart will make the chart static."

At the bottom right of the dialog are two buttons: 'Ok' (with a green checkmark icon) and 'Cancel' (with a red X icon).

Reports

The reporting functions are accessed from the View Node display. FMS can generate simple, functional reports from the results stored in the databases. The report designs are by default stored on the monitoring system on a per user basis, but the report pdf files are stored on a per user basis on the computer from which the request was issued. If a file Logo_report.jpg is included in the FMS5\Config folder, it will be used in the header of generated reports.



The Reports screen allows creating, viewing, printing, modifying, exporting, and deleting a report. It consists of:

- A Reports list window displaying all of the reports configured for the current user.
- A scheduled Reports list window displaying all of the scheduled reports configured for the current user.
- A Reports description window that displays a description of the currently selected report.

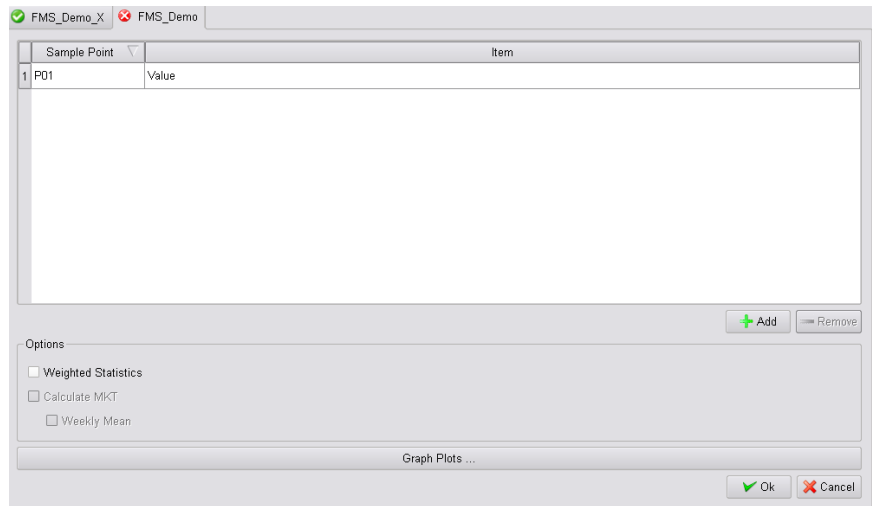
New Report/Modify Selected Report

Option	Description	
Report Name	Define the name of the report.	
Report Title	Title of the report.	
Report Type	The options are:	
	Normal Report	Select the date and time for the report time span.
	Batch Report	If Batch Manager is in use, it is possible to set up reports using batch names and events to define the start and end time of reports.
	Month Report	Select the start month and the report time span as whole or parts of months.
	Daily Report	Select the day the report time is to span.
External Report	Allows a command line to be entered to run an external report generator.	

Option	Description	
Report Data	Select what data is recorded in the report tables. Report data can be one of these:	
	No Sample Point Data	
	All Sample Point Data	
	Alarms and Warnings	Only alarm and warning events.
	Only Alarms	Only alarm events.
	Alarm Summary	Only alarm start and acknowledgement events.
	Alarm Summary with Plots	A plot for each sample point with alarm limits shown together with a table of alarm start events.
	AAS Program Data	A table for each AAS sample point and plate ID. For detail on the use of this report selection please follow technical note TCC-187.
	Other options are:	
	Stats	Include statistics tables.
	Stats Summary	Include a single statistics summary table for all report sample points.
	Compliance	Include a compliance summary.
	Index	Include a report table of contents.
	AAS Summary	Includes a single AAS Program summary table which contains Batch report details.
Start Time	Select the report start time. The correct date and time are set up in the adjacent time and date fields when an option is selected. The options are:	
	Previous Hour	Starts 1 hour before the current time.
	Previous 4 Hours	Starts 4 hours before the current time.
	Previous 24 Hours	Starts 24 hours before the current time.
	Previous 2 Days	Starts 2 days before the current time.
	Previous Week	Starts 1 week before the current time.
	Previous 2 Weeks	Starts 2 weeks before the current time.
	Previous 4 Weeks	Starts 4 weeks before the current time.
	Time of Day Today	Uses the current date and time as the start time. Allows editing time if required.
	Time of Day Yesterday	Uses the current time with yesterday's date as the start time. Allows editing the time if required.
	Exact Date-Time	Enables both the adjacent time and date fields for editing.
	The exact start date and time required can be entered.	

Option	Description	
End Time	<p>Select the report end time.</p> <p>The correct date and time are set up in the adjacent time and date fields when an option is selected. The options are:</p>	
	<p>Current Date-Time</p>	<p>End time is set up as the current date and time. This is displayed in the adjacent time and data fields.</p>
	<p>Time of Day Today</p>	<p>Uses the current date and time as the end time. Allows editing time if required.</p>
	<p>Time of Day Yesterday</p>	<p>Uses the current time with yesterday's date as the end time. Allows editing the time if required.</p>
	<p>Exact Date-Time</p>	<p>Enables both the adjacent time and date fields for editing.</p>
<p>The exact end date and time required can be entered.</p>		
CSV File Folder	<p>Check this to enable the generation of tabular results as CSV (comma separated variable) files. The directory to write the CSV files to can also be selected. CSV files can be read by spreadsheet programs.</p>	
Add Sign Off Table	<p>Add a sign off table with the specified number of signature spaces to the report.</p>	

Sample Points and AAS Sample Points



Option	Description
Sample Point Table	The sample point table displays the Sample Points and Items to be included in the report. Use the Add and Remove buttons to populate the table as required.
Add/Add All/Remove	Add, add all or remove sample points to the report.
Use Weighted Statistics	When checked, the mean, standard deviation, and confidence limits will be calculated utilizing the sampling interval in use when each sample value was taken. The statistics table in the report will display weighted values.
Calculate MKT	If selected, Mean Kinetic Temperatures will be included in the statistics tables for sample points which are configured with the MKT option.

Graph Plots

Sample Point	Item	Colour	Graph position	Grouping
1 simADC01	Value	Green	1	1
2 simCounts01	0.1	Dark cyan	1	1
3 Varus	0.1	black	1	1
4 simADC04	Value	Red	1	1

Help + Add - Remove

Plot Add-ons

Graph Position: 1 Group Number: 1 Add: None Value: Axis: Colour:

Graph Position: 1 Group #: 0 Add: Line value: 5 axis: N/cuft colour: Dark magenta
 Graph Position: 1 Group #: 0 Add: Max value: 101 axis: N/cuft
 Graph Position: 1 Group #: 0 Add: Min value: -100 axis: N/cuft

+ Add - Remove

Plot Options

Plot Mode: Mean Scaling: Linear Legend Position: Top

✓ Ok ✗ Cancel

Option	Description				
Graph Plots Table	<p>Displays the Sample Points and Items to be included in the report. Use the Add and Remove buttons to populate the table as required.</p> <p>The Color column permits selection of line colors.</p> <p>The Graph column permits specifying which graph plot a sample point is to be displayed on. This is useful if there are many graph plots selected.</p> <p>The Grouping column permits placing more than one graph on a page, a maximum of three per page is advised.</p>				
Add/Remove	Add or remove sample points to the report.				
Plot Add-ons	Specifies additional plot items to be added into the report.				
Plot Options	<p>Specifies Plot mode and Scaling for the plot to be included in the report.</p> <table border="1" style="width: 100%;"> <tr> <td>Scaling</td> <td>Select linear or logarithmic scaling for all graphs.</td> </tr> <tr> <td>Legend Position</td> <td>Select Top, Left, Bottom, or Right to position the legend on the graph.</td> </tr> </table>	Scaling	Select linear or logarithmic scaling for all graphs.	Legend Position	Select Top, Left, Bottom, or Right to position the legend on the graph.
Scaling	Select linear or logarithmic scaling for all graphs.				
Legend Position	Select Top, Left, Bottom, or Right to position the legend on the graph.				

Logs and Messages

The screenshot shows two configuration windows. The top window, titled 'Alarm Group Messages Details', has a title bar 'Report SV1216'. It contains a checkbox 'Enable Alarm Group Messages Details'. Below it are two lists: 'Exclude' (containing Database_Status, OPC-UA_Server_Status, Security_Messages, TestAG) and 'Include'. Between the lists are navigation buttons: '<', '>', '<<', and '>>'. Below the lists are dropdowns for 'Order Log By' (set to TimeDate) and 'Filter Log By' (set to None). The bottom window, titled 'Log Details', has a checkbox 'Enable Log Details'. It features a row of checkboxes for 'Include Logs': Audit Log, Alarm Log, Warning Log, Trace Log, and Event Log. Below these are dropdowns for 'Order Log By' (TimeDate) and 'Filter Log By' (None). A 'Sample Points only' checkbox is on the right. At the bottom right are 'Ok' and 'Cancel' buttons.

Option	Description
Include Logs	Select if log data should be generated in the report. The Log options are:
	Alarm Log Data includes details of alarms and acknowledgements.
	Warning Log Data includes details of warnings.
	Audit Log Data includes details of user activity.
	Trace Log Data includes diagnostic trace messages from the selected monitoring system.
Event Log Data includes system events.	
Order Log By	If a log is selected, provides options for ordering the data in the log tables. The options are: Time Date Source, Time Date Source, Messages
Filter Log By	Filter the log results by the selected equation. An equation is comprised of the filter column (Time Date, Source, or Messages), an operator and a value.
Sample Points only	If selected, only Log events relating to report sample points will be included.

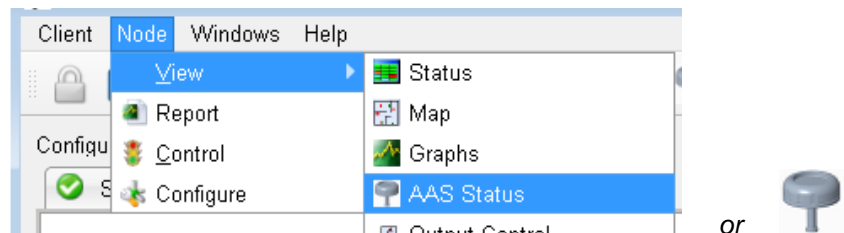
Schedule Reports

Scheduled Report allows setting up reports to be automatically generated without user invention.

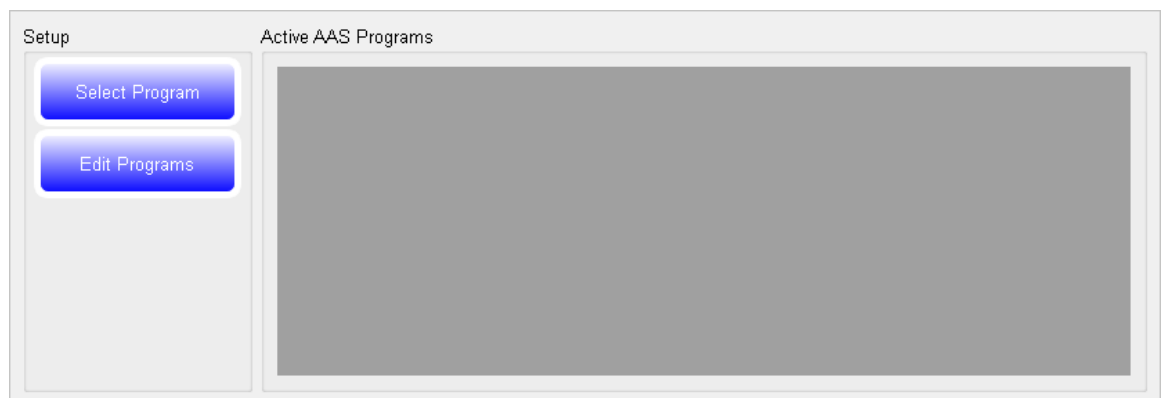
Field	Description
Generation Frequency	Provides options for report scheduling frequency.
At	Set the exact time for the report to be generated.
From	Set the starting date for report generation.
Send Report To	Specifies whether the report is to be generated as a pdf file or printed or both.
PDF File	Select to generate report and save as a pdf file. The pdf filename will be the same as the report name.
CSV File	Select to generate a csv file of the report data. Csv files will be saved in the csv file folder specified in the Report Details setup.
Printer	Select option to print the generated report.
Printer Setup	Select to set up the printer settings for the scheduled report.
Scheduled Report Options	Select what should be included in the report.
Add Comments Box	Select to add a comments box to the generated report.

Field	Description
Add Graphs	Select to add graphs to the generated report.
Add Statistics	Select to add Statistics tables to the generated report.
Add Tables	Select to add sample point data tables to the generated report.
Add Compliance Summary	Select to add compliance summary tables to the generated report.
Graphs In Landscape	Select to display graph in landscape page.
Add Signoff Table	Select to add a signoff table to the generated report. When selected the signatures field is enabled.
Signatures	Set the number of signature fields required.
Email PDF To	Select option to enable emailing of the generated pdf file.
Email Address Book	Select the Email addresses to which the pdf file is to be sent.

AAS Status



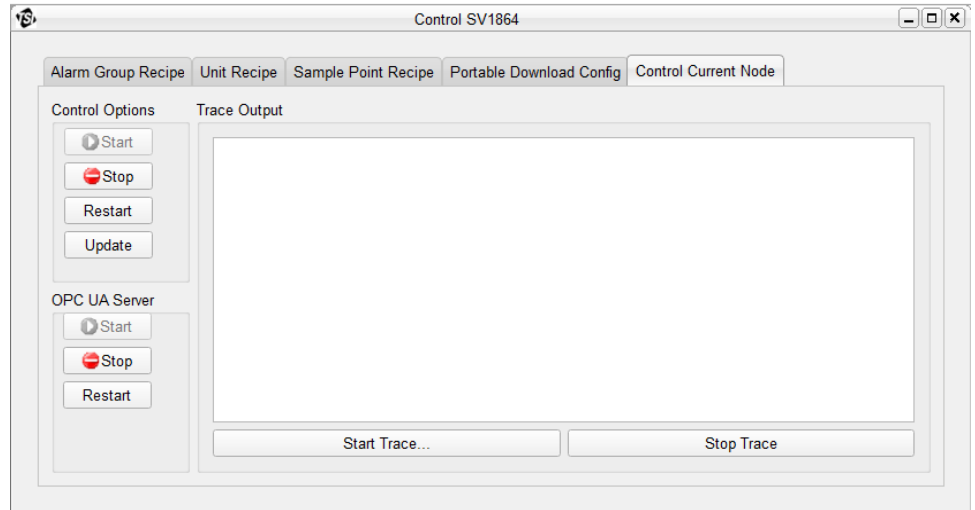
FMS can generate, edit, start and abort AAS Programs from the AAS Status screen. Rights to execute these functions can be managed via FMS Security Page.



For detail on the operation of this screen please follow technical note TCC-187.

Controlling a Monitoring System

To control an FMS system, appropriate permissions are needed for the node to be controlled. It is possible for different clients to try and control a given monitoring system's node at the same time. For this reason it is preferable to have only one administrator per monitoring system.



To control a particular monitoring system, select either the monitor node then click **Node -> Control** or click the control button on the tool bar. This function is only available to those with the **Can Control Nodes** privilege.

The control window allows for the monitoring system to be stopped and started as well as diagnostic tracing enabled.







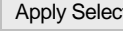
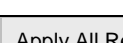
The Units recipe table displays the Unit name, the choice of recipes for the unit, and what the current unit recipe is. The sample point recipe table and the alarm group recipe table have the same columns as the unit table.

The recipe list includes the standard options listed in the table below.

Option	Description
Alarm Group Recipe	Configure the recipe for each alarm group.
Unit Recipe	Configure the recipe for each unit.
Sample Point Recipe	Configure the recipe for each sample point.
Control Current Node	Control current node.

Functions

The buttons on the control panel have the functions listed in the table below. These functions require the entry of the username and password used to log into the selected node.

Icon	Icon Name	Description
	Stop Monitoring	Monitoring is stopped. No data is collected.
	Start Monitoring	The configuration files are loaded and monitoring restarts.
	Update	The configuration files are reloaded, and monitoring is restarted.
	Restart	The monitoring node is stopped, the configuration files are reloaded, and monitoring is restarted using the Default recipe.
	Start Trace	Tracing is started. Trace messages from the selected monitoring system are broadcast to all clients. Although this is simple, it can slow down the network so this should only be used as a diagnostic tool to identify problems. If so enabled, Trace messages are saved to the selected file. Trace messages are also saved to the selected monitoring system's trace log database table, which in turn can be viewed using the Log Reports function. If the Log to File is set, the trace text is logged to the selected file.
	Stop Trace	Tracing is stopped.
	Apply Selected Recipe	Allows starting the selected recipes.
	Apply All Recipes	Allows applying all currently selected recipes.

Monitoring Task

The monitoring task is a server application that runs without a user interface. It communicates with FMS client applications via a TCP/IP network. However, some diagnostic messages are generated for some database and communication problems. Under Microsoft® Windows® the supplied Debug Viewer can be used.

Usually the monitoring task is started as a background process when the operating system starts. Under Microsoft® Windows® operating system the supplied utility **Guard** is used to start and stop the monitoring task as a Windows® service.

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CHAPTER 7

SQL Server

Introduction

FMS stores all results and messages in SQL Server® databases. It is possible to have one SQL server per monitoring system, running on the same computer as the monitoring system, or on another computer.

Alternatively, more than one monitoring system can use the same SQL server but different databases on the SQL server. This has the advantage of simplifying archiving and application management, but there is a risk of being a single point of failure. The converse is true when each monitoring node has its own SQL server, the administration is more complex but the overall system is more robust and fault tolerant.

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CHAPTER 8

Modules

Modules are loadable parts of the FMS program which provide functionality to the FMS client and monitoring programs. Without these modules, FMS would only have the top-level client display, the client configuration, and the control panel function. Some modules only provide functions to the client application, some only to the monitoring task, and others to both.

The modules used by any given computer system are configured in the Modules section of the Client Options settings. This allows only required functions to be used.

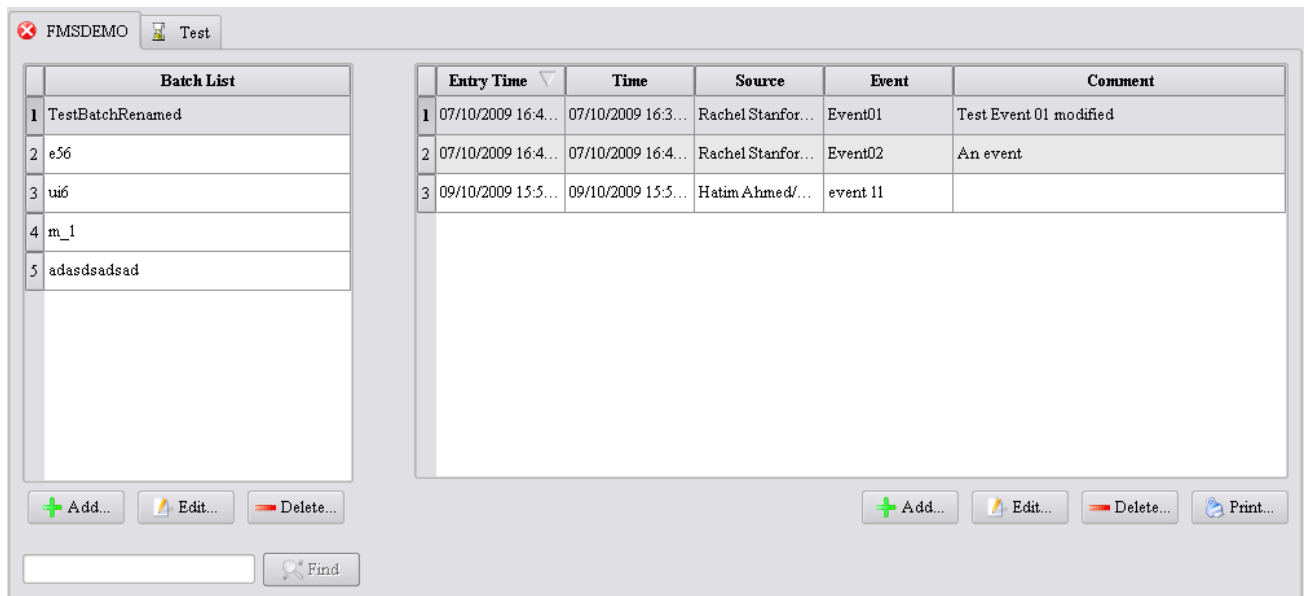
(continued on next page)

Batch Manager

The Batch Manager is an extension module that allows associating events with time.

A batch will typically consist of several events and these events can be used to generate reports for the batch.

The Batch Manager reads its data from the monitoring node database and writes to the database when saving changes. The Batch Manager performs a user validation check before committing changes to the database.



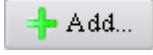
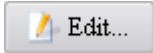


The Batch Manager window shows a Batch List and Batch Events table.

The Batch List is a list of all the batch names found in the database. Clicking on a batch name results in the event table being updated with the events for the selected batch.

Users with the required privileges can add, edit, or delete batches and events.


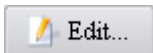


Batch List Functions

The buttons below the Batch List table have the functions listed in the table below. These functions require the entry of the username and password used to log into the selected node.

Function	Description
 Add...	Displays a text dialog for entering the batch name. When OK is clicked and user is verified, the batch name is added to the batch list.
 Edit...	Displays a text dialog for editing the currently selected batch name. When OK is clicked and user is verified, the new batch name will replace the old name.
 Delete...	Displays a Confirm Delete dialog. When OK is clicked and user is verified, the selected batch name is removed from the list.
 Find	The Find button is only enabled if text is entered in the provided box for searching. If clicked, it searches the batch list for the entered search text and when found, selects the batch in the list.

Batch Event Functions

The buttons below the Batch Events table have the functions listed in the table below. These functions require the entry of the username and password used to log into the selected node.

Function	Description
 Add...	Displays a dialog for adding the batch event. When OK is clicked and user is verified, the batch event is added to the batch events table.
 Edit...	Displays a dialog for editing the currently selected batch event. When OK is clicked and user is verified, the edited batch event will replace the old batch event.
 Delete...	Displays a Confirm Delete dialog. When OK is clicked and user is verified, the selected batch event is removed from the events table.
 Print...	Prints the contents of the events table.

Batch Reports

If Batch Manager is in use, it is possible to set up reports using batch names and events to define the start and end time of reports by selecting the Report Type to be BatchReport.

Report Details					
Name	BatchReport				<input checked="" type="checkbox"/>
Title					
Report Type	Batch Report				
Report Data	No Sample Point Data				
Start Time	TestBatch	Event01	16:37:05		07/10/2009
End Time	TestBatch	event 11	15:55:49		09/10/2009

Networking

Overview

FMS uses TCP/IP for communications between tasks. TCP/IP communications can take several forms: connection-based, where there is a permanent connection between the client server, or connectionless, where there are no permanent connections between the client and server. The server tells the client when there is new data or when some event has occurred, and the client responds accordingly.

Connection-based systems have the advantages of robust bi-directional communication, which means data can be sent between client and server with certainty that the data has been delivered over an active connection, or an error is reported. However, connection-based systems require more resources than connectionless systems and need some prior knowledge to use. In particular the host names of servers must be known beforehand.

Connectionless systems have the advantage of lower resource usage and, by using a broadcast mechanism, can to some extent auto detect all components in a system to automatically configure itself. The disadvantage of using a connectionless communication system is that there is no certainty that data will be delivered, so extra protocols are needed to confirm that data is transferred correctly.

FMS uses both types of communication in such a way to exploit the good sides of each type of protocol but to avoid the drawbacks. FMS uses broadcasts from the server and clients to notify system components of events and to self-configure. When transferring data between applications, short-life connections are made similar to HTTP. By using broadcasts, FMS applications can talk to any number of clients on the network with minimum effort. Although this makes it easy to build multiple node monitoring systems, there is the drawback that broadcast data packets are blocked by TCP/IP

routers. This means that FMS only works within a well-defined local network and cannot work over the Internet without the use of additional programs. This gives the benefit of security at the cost of distribution ability.

Setting up a Network for FMS

When setting up a TCP/IP network, ease of configuration and administration as well as security and resistance to node failure are the main considerations.

By choosing a network address of 192.168.0.x with a subnet of 255.255.255.0 up to 223 nodes (computers) can be networked together. Further by using a 192.168.x.0 network access to or from the Internet (other than through a proxy server) is not possible. It is possible for one computer to be connected to more than one network. This could be the monitoring system network and to the company network.

By choosing network addresses carefully and avoiding IP forwarding, the monitoring system can be isolated from the company network. Further the use of broadcast protocols makes access from external networks difficult.

It is important that the routing tables are correctly configured. Otherwise, client-to-server connections will not work correctly. The most common effect is that the clients can detect monitoring nodes but cannot obtain the node's configuration.

The computer host names should be as short as possible (i.e., eight characters) and made up of English letters or digits with no spaces or other characters. The host name is used to access some files so keeping it simple makes life easier. Be aware that Linux® and other UNIX®-type operating systems are case sensitive whereas Microsoft® Windows® operating system is not case sensitive, although it will “honor” the case of filenames when they are created and copied.

Refer to the operating system's documentation for more information.

Broadcast Addresses

The broadcast address is the UDP port used to send messages from applications to all other applications. Each server reserves its own TCP and UDP port for specific client-server transactions. It is important to use a UDP port that does not conflict with any others that are in use. Utilities such as “netstat” can be helpful. A port such as 4001 is usually free.

Because clients only recognize servers that use a particular broadcast port number, it is possible to have more than one monitoring system sharing the same network, working independently of one another.

Remember broadcast data packets are not always forwarded across routers. This can be both an advantage and a disadvantage. It is an advantage because access to the monitoring system from outside a well-defined network is not possible so the system is more secured. But a disadvantage for the same reason where access is required from clients outside the local network.

DHCP or Static Addresses

A static IP address will fix the network address of a computer so that it remains the same regardless. For small networks this is very simple to do and means specific computers can be identified by IP address alone. Also, using static IP addresses means the network configuration of a computer does not depend on any other computer system such as a DHCP or BIND server, so it will be immune to failures of other computer systems. The disadvantage of statically configuring a computer is that for large networks, administration becomes difficult and the possibility of mistakes that can stop a network functioning becomes more likely.

Using DHCP (with a name server) makes configuring individual systems easy, albeit with some initial effort needed when setting up the DHCP and BIND servers. However, there is the disadvantage that the DHCP and BIND servers become single points of failure. If the DHCP or BIND servers fail, the whole system can fail, in particular when a node tries to start and set up its network address.

If the monitoring system is required to withstand component failure and continue to function, a compromise strategy may have to be followed where the computers that are used for monitoring and as SQL servers use static IP addresses and clients use DHCP.

CHAPTER 9

Contacting Customer Service

This chapter gives directions for contacting people at TSI® Incorporated for technical information.

Technical Contacts

For help setting up or operating the FMS software, or technical or application questions, contact an applications engineer at TSI® Incorporated, 1-800-680-1220 (USA) or (651) 490-2860 or e-mail technical.services@tsi.com.

International Contacts

Technical Support

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