

Malvern Link II Configuration Manual

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Table of Contents

Introduction and software reference

Introduction	1-1
Logon and Starting Malvern Link II Configuration	1-4
User Interface	1-6
Process Definition	1-14
Standard Operating Procedure (SOP) and the SOP Studio	1-24
Tools	1-43
Configuration	1-49
Mimic configuration	1-73
General Actions Available in SOP Sequence	1-80
Data Converter Details	1-84

Devices

Introduction	2-1
Auger	2-2
Valve	2-5
At Line Feeder	2-8
Rotary Airlock	2-10
Liquid Sampler	2-13
Piston Sampler	2-16
Screw Sampler	2-19
Flute.	2-22
Cement LabSizer	2-25
Venturi	2-27
Pre Diluter Tank	2-30
Cascade Diluter	2-34
Ultrasonic Probe.	2-36
Pump	2-38
Wet Flow Cell.	2-40
Dry Flow Cell	2-42
Insittec	2-45

Mastersizer 2000 device 2-53

Mastersizer 3000 device 2-65

Zetasizer series device 2-70

Switch 2-75

Sensor 2-77

Output Controller 2-79

Variable Frequency Drive 2-82

Rotation Sensor 2-85

Privileges

Privileges 3-1

Security

Introduction 4-1

Managing Groups 4-2

Managing Users 4-5

Security settings 4-9

Audit features 4-12

Introduction and software reference

Introduction

The Malvern Link II Configuration Manager is one of the applications from Malvern Link II product. The purpose of the Malvern Link II Configuration Manager is to automate analyzer instruments and automation devices involved in particle size measurement and analysis. This is done by defining a process definition which consists of one or more automation devices and analyzer as per the process line.

To achieve automation, a standard operating procedure (SOP) is defined. A Standard Operating Procedure (SOP) is a template that pre-defines all the measurement settings and operating parameters and predefined actions to ensure that measurements are made in a consistent and repeatable way. A task in a sequence could be an action on the automation device, on the analyzer instrument, a user-defined script or another SOP.

A SOP will be executed to automate the particle size measurement process.

Versions of Malvern Link II Configuration

Malvern Link II product suite is available in the following versions:

- **Essential** - Standard version delivered with every system.
- **Pro** - Enables the reporting and remote control options.
- **Ultra** - Pro version including 21 CFR Part 11 compliance.
- **OEM** - Analyser control only. Allows system integrator to interface the Insittec analyser. No automation devices.
- **LITE** - Analyser control only. Allows the reporting of Status, Alarms or Process variable. The system is still controlled from the analyser software directly (RTSizer, Mastersizer, Zetasizer, ...). Malvern Link publishes the value only. It can run as a background task.

The Configuration Manager in Malvern Link II ultra also allows you configure remote reporting and controlling the SOP remotely. In addition, the configuration manager is compliant with the 21 CFR part 11 requirements. This implies that additional controls and audits are in place to ensure that data security and integrity.

Features of Malvern Link II Configuration

Malvern Link II works in configuration mode and execution mode.

- In **configuration** mode, Malvern Link II provides the environment for configuring a particular process definition, defining SOPs that are used to automate the process and configuring its control and reporting parameters.
- In **execution** mode, Malvern Link II shall execute one or more SOPs and automate the process.

Malvern Link II configuration Manager interfaces with Global Security Service for user authentication and authorization based of privileges.

Malvern Link II configuration Manager interfaces with automation cabinet that uses Malvern Automation Cabinet Modbus OPC Server for OPC tag mapping to automation devices. It also has the feature to allow automation devices input/output mapping to any external OPC server

Malvern Link II configuration Manager in Malvern Link II PRO or ULTRA version allows you to configure data for remote reporting and controlling of SOPs from Malvern Link II OPC server.

User Roles

This section describes the roles and responsibilities of the various users that Malvern Link II Configuration supports.

Administrator is the default user that is created and belongs to the Administrators group. The administrator user cannot be deleted either separately or from the Administrators group.

In this application, the rights and privileges are assigned to the groups and not the users. Hence, when a user is created they must be also be assigned to a group; either a default group, as defined below, or a user-defined group. If this is not done the user will not be able to work with the application.

The default groups that are available in Malvern Link II configuration are:

Administrators:

This group has the maximum privileges. These privileges **cannot** be changed. The default user **Administrator** is by default a member of this group.

Supervisor:

The **Supervisor** group has fewer privileges as compared to the administrators group. A majority of privileges are assigned to this group by default. Privileges can be added or removed for this group.

Operator:

The **Operator** group has the least privileges as compared to the Administrators and Supervisors group. Only minimal privileges are assigned to this group by default. Privileges can be added or removed for this group.

To add and assign users and manage group privileges, refer to the **Security** section of this manual for details. Also refer to **Chapter 5: Privileges table** later on in this manual; this table indicates all the default privileges that are assigned to the three default groups.

Accompanying software and manuals

The **Malvern Link II** software is used in conjunction with the **system application** software to control the system installation and provide a simplified user interface for both automated and manual systems.

- **The Malvern Link II software is described within the Malvern Link II set of manuals.**

The system installation is controlled by the application software supplied with the system. The system applications are described in their respective manuals.

- **RTSizer and Insittec analyser user manual**
RTSizer is the analysis application used to measure the particle size of the process sample being delivered through the Insittec analyser.
- **Mastersizer 2000 user manuals**
- **Mastersizer 3000 user manuals**
- **Zetasizer user manuals**

The information in the system **user manuals** describe and identify the main features of the system components, and describe how to use the system to perform measurements, view the results, perform basic maintenance procedures and diagnose simple problems.


The system user operating manuals detail the systems covered by the manual, operator access to the instrument and software, and **health and safety** precautions.

The information given in **this** manual complements the information given in the above mentioned manuals. All manuals should be read in conjunction, where appropriate, for an understanding of the process system, and application software.

Logon and Starting Malvern Link II Configuration


This topic describes how to logon and start Malvern link II Configuration

To start the Application

Double-click the desktop shortcut icon  created for the Malvern Link II configuration, (**Configuration Manager**). The application will start and the **Logon** window is displayed.

Alternatively go to **Start-All Programs-Malvern Instruments-Malvern Link II-Configuration Manager**. The application will start and the following Logon window is displayed:.



Type the **username** and **password** into the logon dialogue and select , or press the **Enter** key.

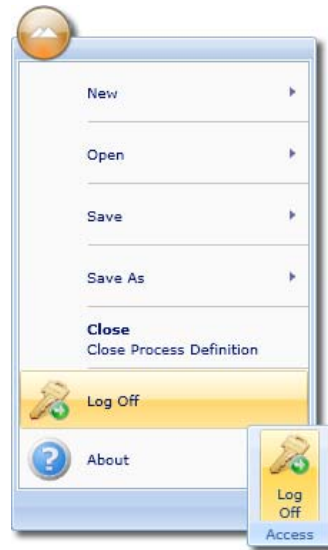
On Successful login the main application window will be displayed, with the logged on username displayed at the bottom left corner of the window.



To Logout and Quit the Application

To log out the application:

Click **Log Off** from the **Main menu**  or from the **Access** group on the **Security** command ribbon.






You are logged off and the Logon window is displayed.

All functions and commands will now be unavailable both on the Malvern Link II configuration. Note that the Logon dialog box will appear allowing a user to logon again.

To quit the application:

Log Off from the main menu (It is not necessary to Log out the application before quitting)

The logon window will be displayed; select  in the **Logon** window, and then click **Close**  in the top right corner of the application window. The application will now be closed.

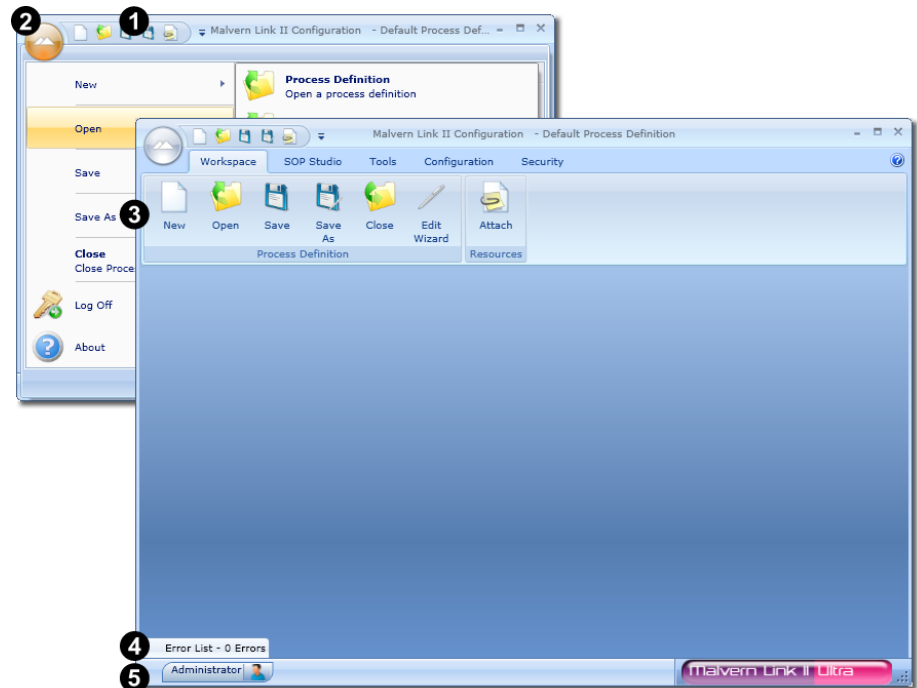
Alternatively click **Close**  in the top right corner of the application window. The application will now be closed.

A dialogue window may appear asking “Do you want to save the changes to Definition”

User Interface

This topic describes the user interface used with the Malvern link II application.

The main items of the user interface are shown in the below diagram. Details on the use of each item or associated buttons are described in the later topics.



① Quick access toolbar

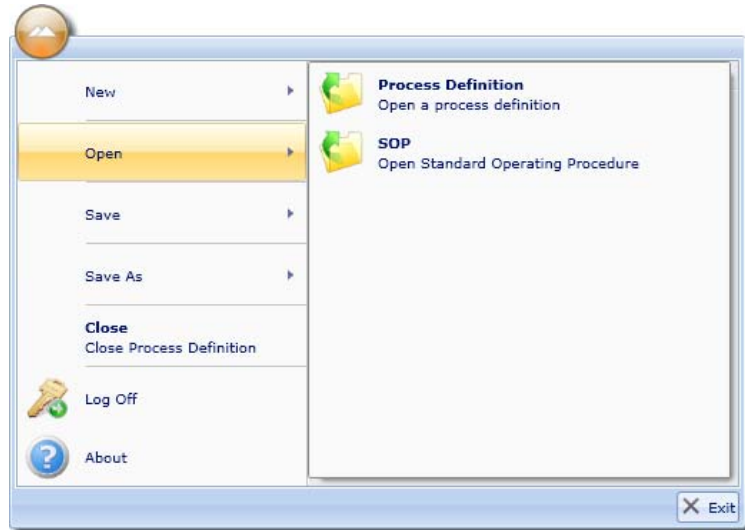


The quick access toolbar displays the most frequently used core commands that are available from the **command ribbon**. Moving the mouse pointer over each command item will display a screen tip describing the item.

The toolbar can be positioned above or below the **command ribbon** as required. Select the down arrow icon on the right of the toolbar and select **Show above/below the ribbon** as required.

② Main Menu

By selecting the Malvern button  the main menu listing will be displayed.



The commands in the menu are the same as those available in the command ribbon. The list is divided into 4 function areas: **New**, **Open**, **Save** and **Save as**. This enables each ribbon command (see below) item to be actioned directly without opening and using the ribbon itself.

These commands are described later in the command ribbon paragraphs.


Menu	Shortcut Key	Description
New Process Definition	Alt+W+NP Alt+1	Creates new process definition
Open Process Definition	Alt+W+OP Alt+2	Opens existing process definition
Save Process Definition	Alt+W+SP Alt+3	Saves process definition
Save As Process Definition	Alt+W+SA	Save as process definition
New SOP	Alt+P+NS	Creates new Standard Operating Procedure (SOP)
Open SOP	Alt+P+OS	Opens selected Standard Operating Procedure (SOP)

Save SOP	Alt+P+SO	Saves currently open Standard Operating Procedure (SOP)
Save As SOP	Alt+P+SA	Save as currently open Standard Operating Procedure (SOP)

③ Command ibbons

There are five categorised command ribbons: **Workspace**, **SOP**, **Tools**, **Configuration** and **Security**. Each command ribbon contains the command buttons used for managing the configurations within the application. The buttons in the Workspace and SOP Studio command ribbons mimic those in the main menu.

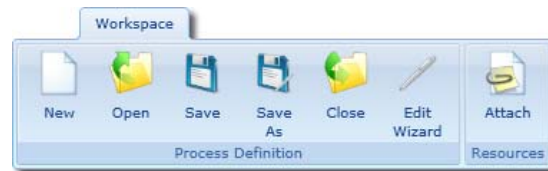
The configuration commands available are dependent upon the version of the Malvern Link II configuration installed: Standard, Pro or Ultra.

The menu bar can be positioned above or below the Home command ribbon as required. Select the down arrow  icon on the right of the toolbar and select **Show above/below the ribbon** as required.

Additionally the ribbon can be minimised and then only displayed when a command ribbon tab is selected.

Each ribbons command buttons are grouped in the ribbon dependent upon their application.

Workspace ribbon commands - description



Menu	Group	Shortcut Key	Description
New	Process Definition	Alt+W+NP Alt+1	Creates new process definition
Open	Process Definition	Alt+W+OP Alt+2	Opens existing process definition
Save	Process Definition	Alt+W+SP Alt+3	Saves process definition
Save As	Process Definition	Alt+W+SA	Save as process definition

Close	Process Definition	Alt+W+CP	Closes currently opened process definition
Delete	Process Definition	Alt+W+DP Alt+4	Deletes a process definition Not available in Ultra Version
Edit Wizard	Process Definition	Alt+W+EP	Modify the process definition device selection
Attach	Resources	Alt+W+A	Attach documents and pictures in process definition

SOP Studio ribbon commands - description



Menu	Group	Shortcut Key	Description
New	SOP	Alt+P+NS	Creates new Standard Operating Procedure (SOP)
Open	SOP	Alt+P+OS	Opens selected Standard Operating Procedure (SOP)
Save	SOP	Alt+P+SO	Saves currently open Standard Operating Procedure (SOP)
Save As	SOP	Alt+P+SA	Save as current open Standard Operating Procedure (SOP)
Delete	SOP	Alt+P+DS	Deletes a Standard Operating Procedure (SOP) Not available in Ultra Version
SOP Details	View	Alt+P+SD	View details of created SOPs
Mark SOPs	Configuration	Alt+P+MS	Mark Initialization, Safe State and Shutdown SOP
Assign Users	Configuration	Alt+P+U	Assign users to created SOPs
Change Priority	Configuration	Alt+P+P	Change system SOP priority
Schedule SOP	Configuration	Alt+P+S	Schedule system SOPs

Tools ribbon commands - description



Menu	Group	Shortcut Key	Description
Custom Data Item	Tools	Alt+T+CD	Configure Custom Data Items
Data Converter	Tools	Alt+T+D	Configure Data Converters
OPC Server List	Tools	Alt+T+O	Add/Remove OPC servers in process definition
RTSizer	Tools	Alt+T+R	Launch RTsizer application

Configuration ribbon commands - description



Menu	Group	Shortcut Key	Description
Devices	Configuration	Alt+C+D	Configure device parameter
Alarms	Configuration	Alt+C+A	Configure alarms
Mimic	Configuration	Alt+C+M	Configure an animated Mimic of the process installation
Remote Control	Configuration	Alt+C+C	Configure remote control items Not available in Standard or Pro Versions

Remote Reporting	Configuration	Alt+C+R	Configure remote reporting items Not available in Standard or Pro Versions
OPC Item Mapping	View	Alt+C+O	View mapped OPC item details

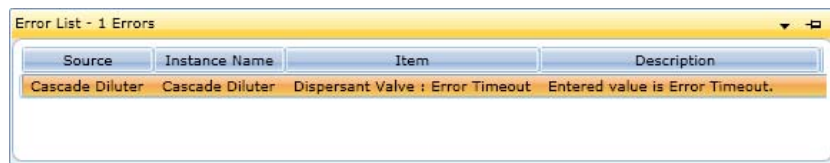
Security ribbon commands - description




Menu	Group	Shortcut Key	Description
Logon / Logoff	Access	Alt+S+L	Logon / Logoff Malvern Link II Configuration application
User Management	Configuration	Alt+S+C	Add, remove, modify user and group details
Change Password	Configuration	Alt+S+P	Change password of logged in user
Settings	Configuration	Alt+S+S	Edit security settings
Audit Trail View	Audit	Alt+S+AV	View audit records Not available in Standard or Pro Versions
Add Comment	Audit	Alt+S+AC	Add user comment Not available in Standard or Pro Versions
Audit Trail Settings	Audit	Alt+S+AS	Edit audit settings Not available in Standard or Pro Versions
User List	View	Alt+S+UL	View user details

④ Error List

During the creation and saving of the configuration, the application will check on the values of any parameters that are entered. If any errors are found, an Error list will be displayed at the bottom of the application window.



Hovering the cursor over the Error list button at the bottom of the application window will temporarily open the Error list pane.

Clicking on the Error list button will permanently display the Error list pane. To close the pane, click on the **pin**  on the right side of the pane.

Error List Field Description

Parameter	Description
Source	Configuration source Example : Device Type, SOP, Remote Reporting Configuration
Instance Name	Instance name which has errors Example : Device name, SOP name
Item	Parameter or property whose configuration is invalid Example : Device error timeout parameter, SOP name parameter
Description	Detail description of error Example : Error timeout value is not within valid range SOP name contains invalid characters

⑤ Status Bar

The status bar contains icons that display the operational state of the application and system.

Logged In User



This displays the logged on user name.

Product Edition

The status bar item indicates which version of the Malvern Link II configuration is installed.



Basic version is installed.



This includes remote reporting and control features.



This includes remote reporting control features and compliance to 21 CFR Part 11.



Analyser control only. Allows system integrator to interface the Insitec analyser. No automation devices.



Analyser only. Allows the reporting of Status, Alarms or Process variable.

Button Icons

Throughout the Malvern Link II application the following buttons may be used.

Button Tool tip	Button Icon	Button Tool tip	Button Icon	Button Tool tip	Button Icon
OK / Finish		Delete		Delete All	
Cancel		Print		Compare	
Help		Export		Back / Move	
Add		Move Up		Next / Move	
Remove		Move Down			

Process Definition

A **Process definition** is the representation of the physical process system arrangement. It is configured by the installation engineer when the process system is originally commissioned.

For each process definition an arrangement of the Insitec measuring system will have been configured consisting of a combination one or more automation devices and analyzer device based on the requirements of the process line.

This section describes the procedures involved in creating the process definition from opening and naming the definition, to assigning and configuring each automated measurement device that is used in the installation, to adding **documents** and **pictures** to use as additional reference resources.



Note

For a Process definition to be defined the installation engineer must have access to the process system drawings and documents. This is necessary to ensure that all devices are accounted for and assigned in the definition.

After a Process definition and selection of the automation devices or analyzer has been created, the following functionality can be added:

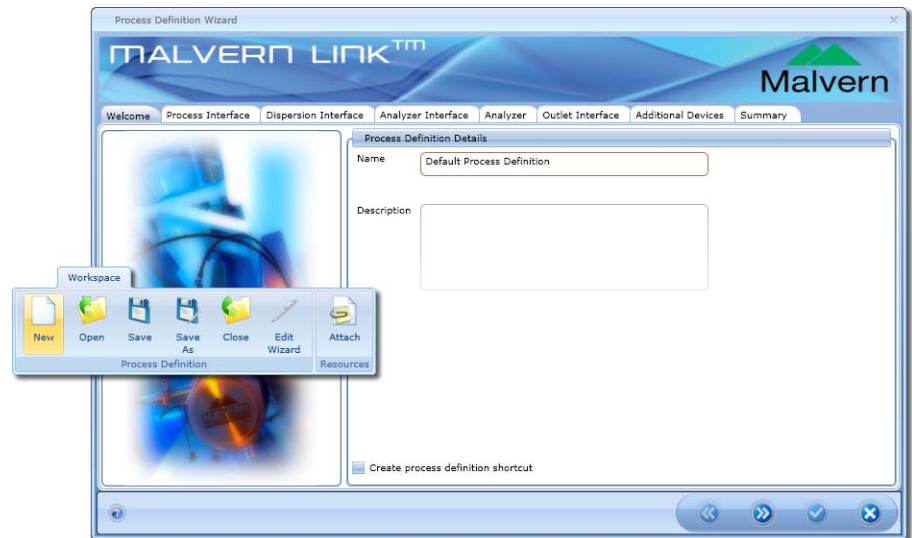
- Configuration of device parameters (**Configuration – Devices**),
- Defining of the Standard Operating Procedure (SOP) (**SOP Studio**) to achieve process automation.
- Malvern Link II SOPs can be controlled from, and real-time data can be reported to the (Object Linking and Embedding) OLE for Process Control (OPC) Refer **Remote Control Configuration** and **Remote Reporting configuration** for more details.
- Conversion of engineering values to raw values by associating and configuring **Data Converters** with each automation device and analyzer.
- Configure **Custom Data Items** to declare global variables. These variables are used in SOPs to set or get values internally or externally from Malvern Link II OPC server
- **Alarm management** feature provides the option to notify users and execute the appropriate action associated with the alarm.

**Note**

Creation and editing of Process definitions is a privilege based feature. Logged on user must have privilege to **Create/Edit/Delete Process Definition**.


Creating Process Definition

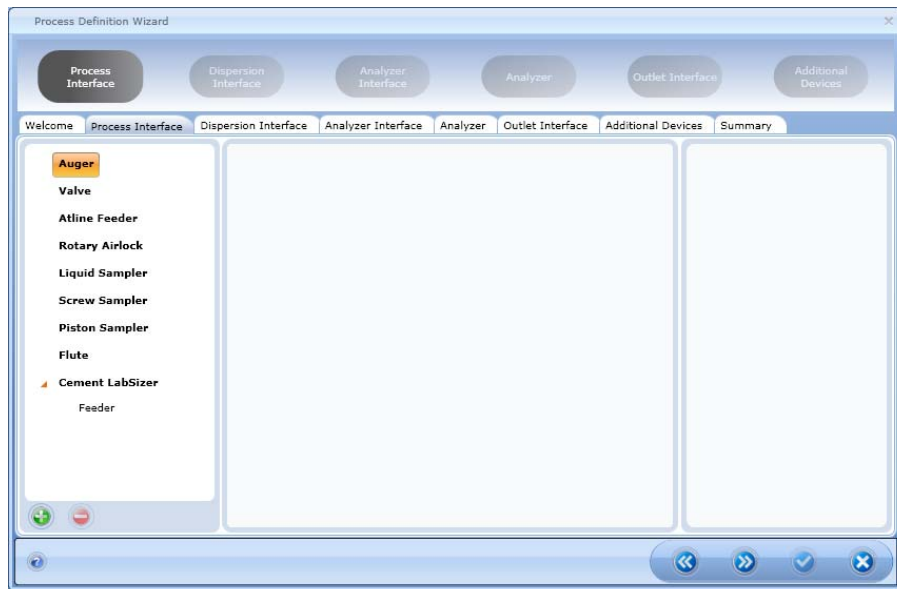
1. On the **Workspace** command ribbon, select **New** from the **Process Definition** group. The **Process Definition Wizard** dialog window is displayed:




The wizard consists of 8 tab pages:

- Welcome
- Process Interface
- Dispersion interface
- Analyzer interface
- Analyzer
- Outlet Interface
- Additional Devices
- Summary

2. On the Welcome tab page, type the **Name** and **Description** for the new process definition, then select **Next** .
3. The **Process Interface** tab is displayed:

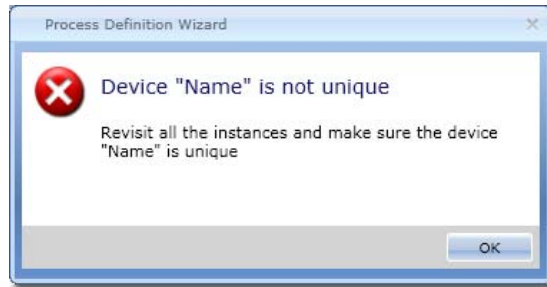



4. With reference to the physical process system arrangement, select the required device and click **Add** . The device is added, with the device selection parameters displayed. Name the device and select the input/output parameter, for each device indicated, as required.
Refer to **Chapter 2: Devices** for a description of each devices input and output parameters.
Note that some mandatory input/outputs are selected by default and cannot be modified.




Note

Ensure that each device name assigned in the Process Definition is unique, otherwise the application will display an error message when saving.



5. Repeat for each device assigned in the Process Interface arrangement. Once all devices have been modified, select **Next** .
6. Repeat the above steps for remaining tab pages adding and configuring each device as required.
7. The **Summary** tab page will detail the completed configuration:



8. Select **Finish**  to create and save the new process definition.

Managing Process definitions

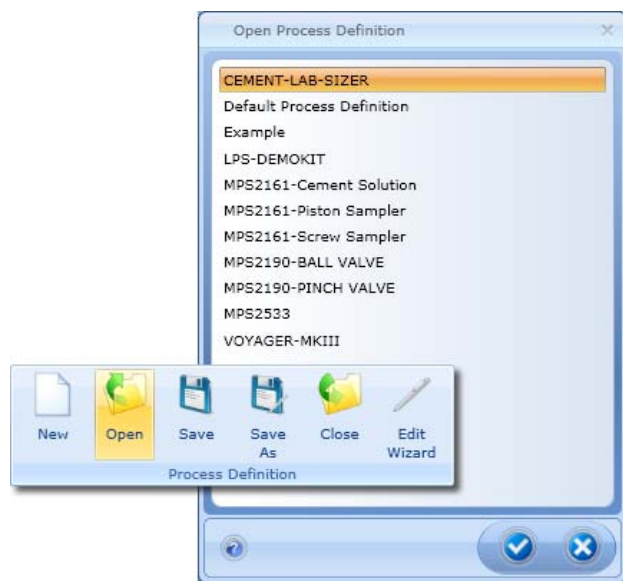
Once a process definition has been created; each definition can be opened, modified, deleted and additional resources, such as documents and pictures, added as required. This section explains the procedures to manage the process definitions in the application dealing with each procedure in turn.

**Note**

Editing and deleting process definitions are privilege based activities; the logged in User must have the privilege assigned to Create/Edit/Delete Malvern Link II Configuration.

Opening a Process Definition

1. On the **Workspace** command ribbon, select **Open** from the **Process Definition** group. A dialog window containing a list of existing process definitions is displayed.



2. Select the process definition and click **OK** , the selected process definition is opened.


Deleting a Process Definition

**Note**

This feature is disabled in Malvern Link II Ultra version.

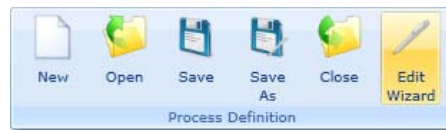
1. On the **Workspace** command ribbon, select **Delete** from the **Process Definition** group. A dialog window containing a list of existing process definitions is displayed.




2. Select the process definition and click **Delete** .
Deletion is not allowed if process definition is currently open.

Editing an existing Process Definition

This section explains the procedure for modifying an existing process definition.



1. **Open** the required Process Definition, then on the **Workspace** command ribbon, select **Edit Wizard** from the **Process Definition** group. The Process Definition Wizard dialog window for the selected Process definition will be displayed.
2. Navigate through the interface tab pages and update the device selection as required
3. Click **Finish**  on the **Summary** tab page. The process definition will be updated and saved.

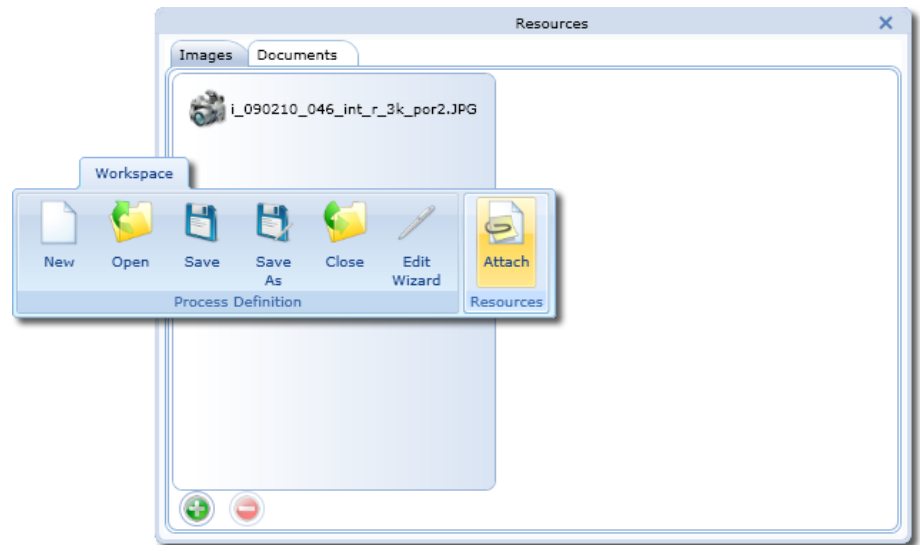
Attaching Resources


This section explains the procedure of attaching pictures and documents in a process definition.

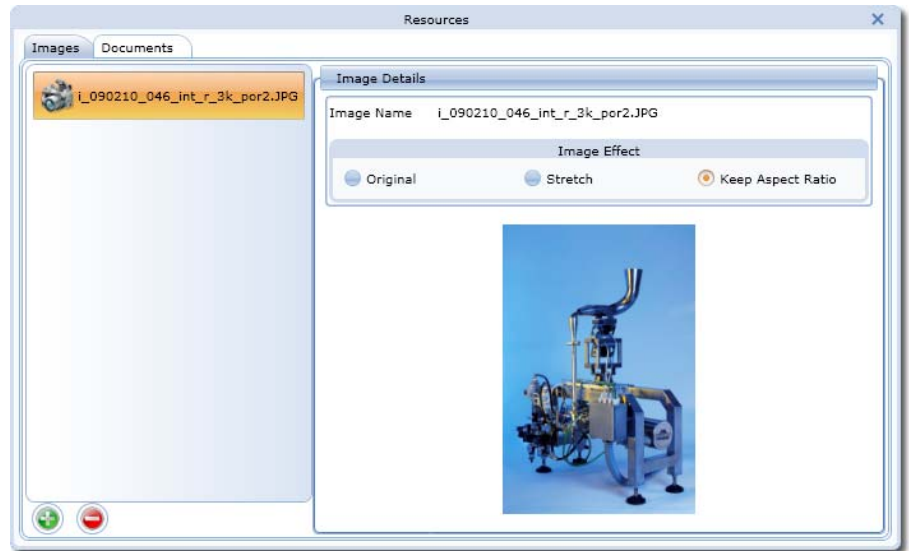
**Note**

Picture or documents with the same file name cannot be attached in a process definition; each name must be unique.

On the **Workspace** command ribbon, select **Attach** from the **Resources** group. A **Resources** pane will appear containing two tab pages: **Images** and **Documents**.


**To attach an image:**

1. Select the **Images** tab, and then select the **Add**  button at the bottom of the pane.
2. An **Open** file dialog window is displayed.
3. Select the picture to attach and click **Open**. An entry of the picture is added in the list of images, with the selected picture is displayed in the right pane of the tab page.




4. Within image effect, select how the added image will be displayed: **Original**, **Stretch**, or **Keep Aspect Ratio**.

To attach a document:

1. Select the **Documents** tab, and then select the **Add**  button at the bottom of the pane.
2. An **Open** file dialog window is displayed.
3. Select the document to attach and click **Open**. An entry of the new document is added to the list of documents, with the selected document displayed in the right pane of the tab page.

To remove a resource

Select the document or image to remove in the corresponding tab and select

Remove . The attached resource will be removed.

Saving a Process Definition

On the **Workspace** command ribbon, select **Save** from the **Process Definition** group. The process definition is validated and then saved.

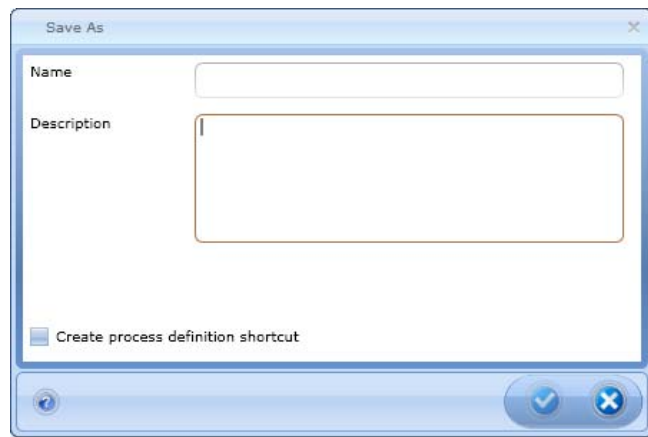
If the configured definition is invalid, error details will be displayed in the error list at bottom of the screen.

**Note**

If 21CFRPart11 is enabled, it will be necessary to add a reason for any modification to the definition.

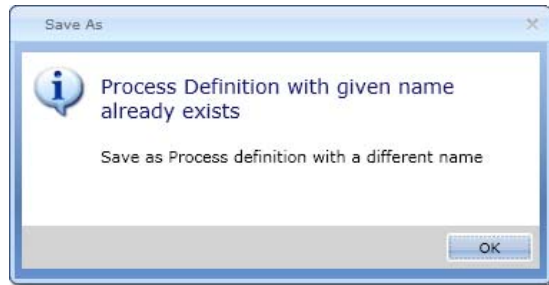
**Save As Process Definition**

To save an existing definition under a different name, select **Save as** from the **Process Definition** group.



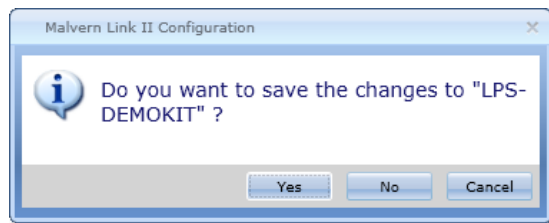
Type a valid process definition **Name** and update process definition **Description**, if required. Click **OK**. An option is available to create desktop shortcut for the new process definition. The New process definition with given name is created and opened.

If the process definition already exists, on selecting , you will be warned that the “**Configuration name already exists**”



Closing a Process Definition

On the **Workspace** command ribbon, select **Close** from the **Process Definition** group. A message to save the changes in the configuration before closing will be displayed.



Click **Yes**. The changes are saved and process definition is closed.

Standard Operating Procedure (SOP) and the SOP Studio

This section explains the Standard Operating Procedure (SOP) configuration editor- **SOP Studio** displayed in Malvern Link II application.

Operation of the Malvern Link II Application is intended to be via the use of Standing Operation Procedures or SOPs. A Standard Operating Procedure (SOP) is a template that pre-defines all the measurement settings and operating parameters to ensure that measurements are made in a consistent and repeatable way. All SOPs and the Process definition hardware devices used in the **Malvern link II Application** are setup using **SOP Studio** in the **Malvern Link II Configuration**.

Using the SOP Studio, a new SOP can be created, opened, edited, saved and deleted as required. SOPs can be scheduled to be run at a particular time, SOPs prioritised and users assigned. This is done using the **SOP Studio** command ribbon.



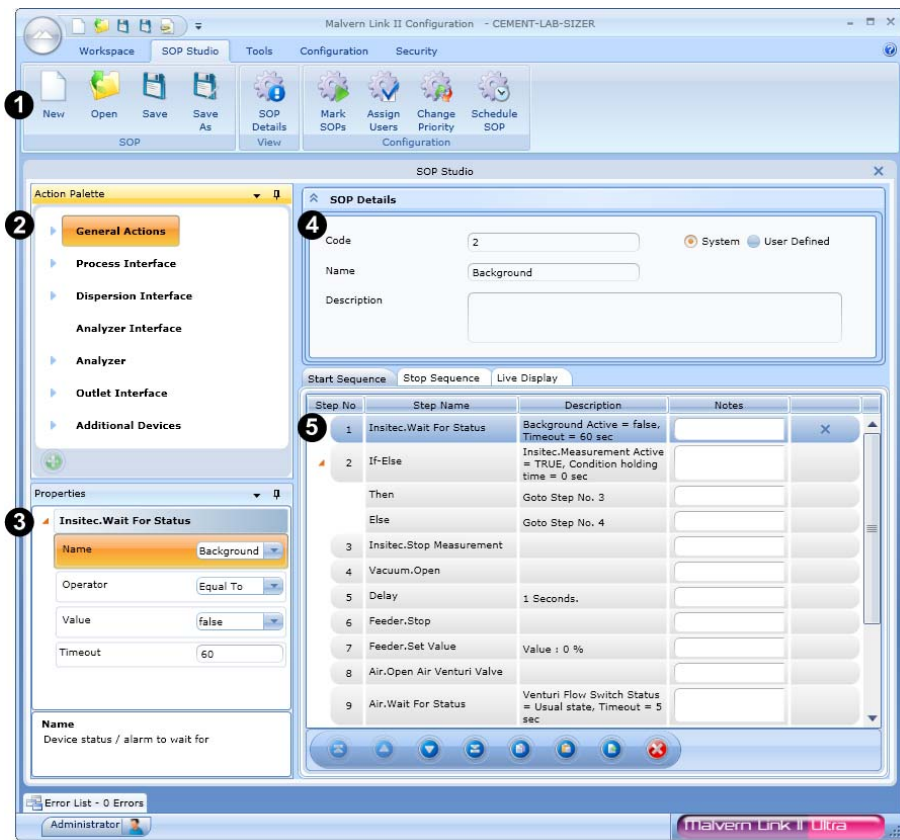
Note

SOP creation and editing is a privilege based feature. The logged on user must have a privilege to Create/Edit/Delete User Defined SOP or Create/Edit/Delete System SOP.

SOP Studio

The SOP Studio enables the creation, opening and saving of new or already defined Standard Operating Procedures.

This is done using the SOP Studio creation window.



① SOP Studio Command Ribbon

Contains all commands for managing SOPs.

② Action Palette / Live display Palette

The **Action palette** contains all devices and actions that are relevant to the predefined Process definition – the devices are grouped under the same headings as used in the definition. To construct an SOP sequence an action is dragged from the palette and placed into the sequence editor ④.

The **Live display** Palette contains 5 options for displaying real-time measurement data. To define the live display to be used, an option is dragged from the palette and placed into the Live Display editor ④.

The palette can be docked or pinned within the main SOP studio window.

③ SOP details

Indicates the main details of the SOP: Name of SOP, description.

④ SOP Sequence / Live display editor


The **SOP Sequence** editor is used to define the sequence of actions that the SOP and therefore the process system will perform. This is to either start up the measurement process (**Start sequence**) or to close down the measurement process (**Stop sequence**). The Live displays editor is used to configure how the real-time measurement is displayed.

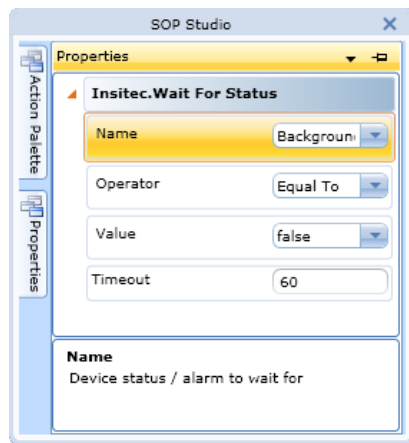
⑤ Properties

The **Properties** window is used to setup the parameters for any assign action in the Sop sequence editor; or to configure the appearance of the Live Display. The Properties window can be docked or pinned within the main SOP studio window.

Dockable windows

Within the Application it is possible to view the **Action Palette** and **Properties** of the configuration. This is via the use of dockable panels.

To display a panel, click on the required tab on the sides of the application window. The Action Palette and Properties windows can be expanded, placed and pinned () within the SOP Studio window, or attached as a tab to the edge.



These panels, and the tab options within, can also be moved and positioned by keeping the mouse pressed down on the tab title and dragging the mouse to the centre of the panel. A placement cross will appear indicating placement positions.

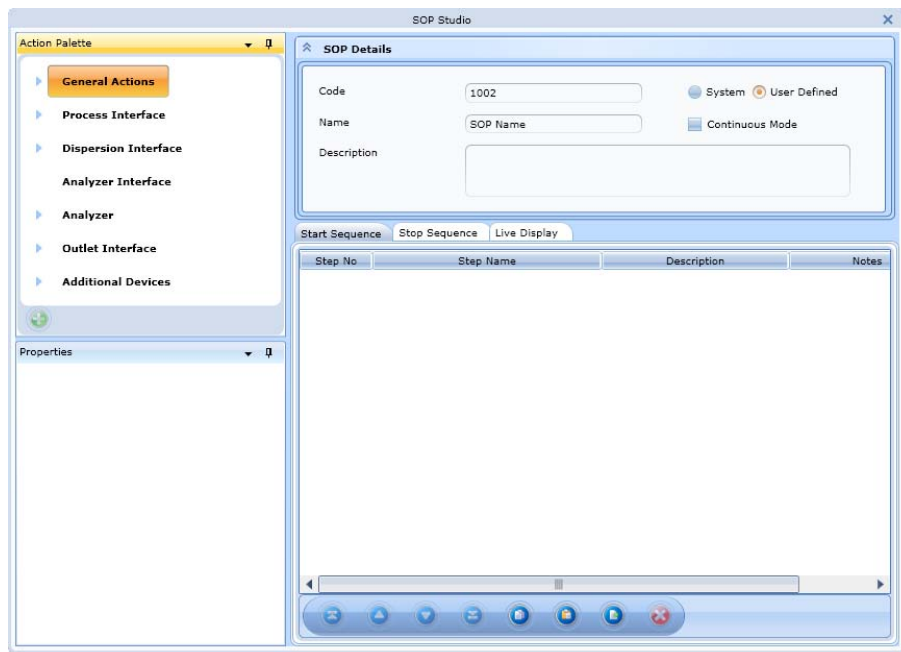


Creating a New SOP

This section explains creation of Standard Operating Procedure (SOP) for a Process definition.

The automation and analyzer devices assigned in the Process definition will be used in the SOP. Each action for a device has parameters that will need to be configured. For more information, refer to **Chapter 2: Devices**.

1. On the **SOP Studio** command ribbon, select **New** from the **SOP** group. A new SOP Studio window will be displayed, where the Standard Operating Procedure can be created.



2. Under the SOP details panel, input the **Name**, **Code** and **Description** of the new SOP
3. Select the relevant SOP type - **User Defined** or **System**.
System is used for setting up the system to a specific operating status (for example; for background or cleaning)
User defined is generally used when measuring a sample.



Note

The SOP code range for system SOP is 1 to 999. User defined Sop code must start from 1001.

4. Select **Continuous Mode** if required (only available if **User Defined** is selected)
With **Continuous Mode** selected the SOP runs continuously until the **STOP** button is pressed.
Non- Continuous (Continuous Mode **not** selected): Start and Stop sequences are connected up to run consecutively. By default a system SOP is Non-Continuous
5. Define **Start1** and **Stop** sequences; refer to the Defining a sequence section
6. Configure **Live Display** graphs and **Data Tables**; refer to the Defining a Live display

Define a Sequence

This section explains the details of defining a (start or stop) sequence for a SOP.

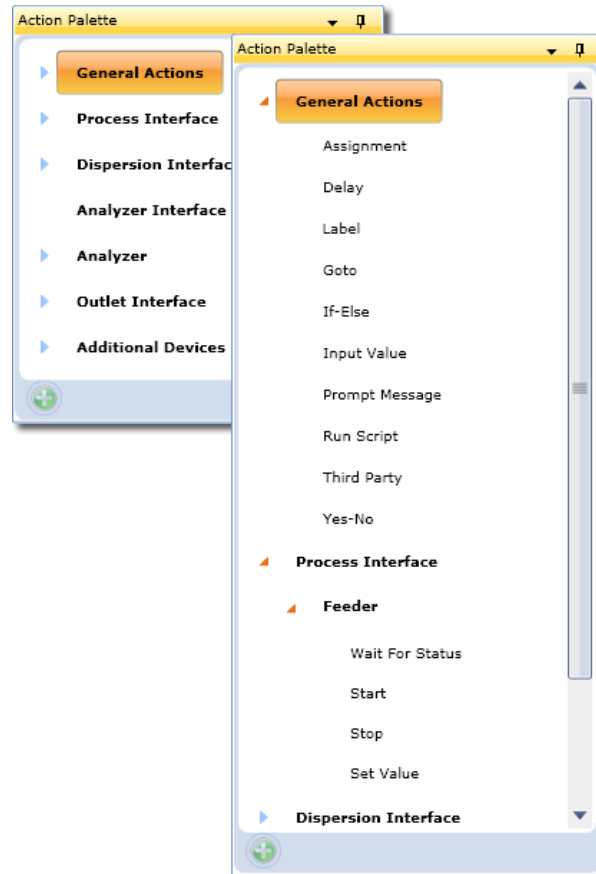
A sequence consists of number of tasks. A task could be an action on automation device, action on an analyzer instrument or a user defined script or another SOP. A task could be flow control actions such as **Goto** or **If-Else**.


It is mandatory to define at least one step in **Start sequence**. If the SOP was defined to be continuous then it is also mandatory to add at least one step in **Stop sequence**.

The Sequence editor will open with the Start Sequence tab displayed as default.

In the **Action Palette**, the actions available are listed.

- Expand **General Actions** to display the scripting actions available. For more information, refer to **General actions** later in this chapter.
- All other actions are grouped the devices are grouped under the same headings as used in the Process definition: Welcome / Process Interface / Dispersion interface / Analyzer interface / Analyzer / Outlet Interface / Additional Devices. For more information on the actions available for each device, refer to **Chapter 2: Devices**



- For each Step in the sequence, drag and drop an action from the palette into the **sequence editor** panel, or select an action and click **Add** . A new step is added in the sequence. For each step in the sequence, setup all parameters for the action in the left **Properties** pane. Input or select the required action parameter values. For more information on the actions available for each device, refer to **Chapter 2: Devices**.



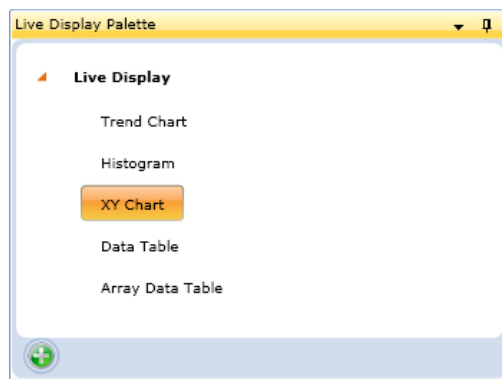
2. Repeat the above steps until the sequence configuration is completed.
3. Steps can be repositioned or deleted from the sequence using the **up**, **down**, **copy** and **delete** buttons at the bottom of the editor.



Defining the Live Display


The Live display is used to plot real-time measurement data on charts or in data tables. This section explains the details of Live Displays that are available in the SOP Studio.

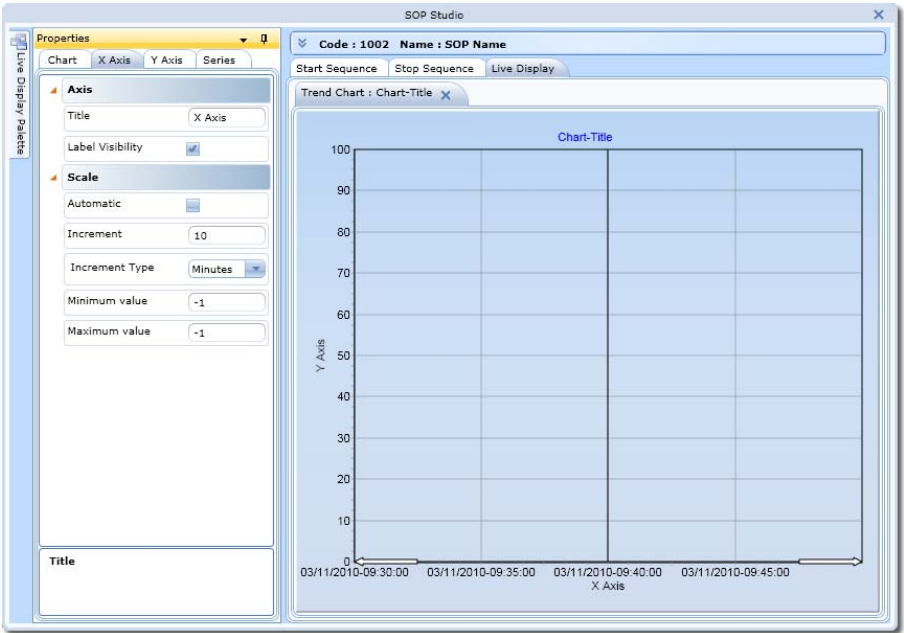
The **Live display** Palette contains 5 options for displaying real-time measurement data: Trend Chart / Histogram / XY Chart / Data Table / Array Data Table.



Note

No more than five live display components can be assigned in a Standard Operating Procedure (SOP).

1. For each live display, drag and drop the display selection from the palette into the **Live display editor** panel, or select a display and click **Add** . A new display is added to the editor.
2. Setup all parameters for the display in the left **Properties** pane. Input or select the required action parameter values. Refer to **Live display configuration parameters** section for details.



3. Repeat the above steps until the display configuration is completed.

Live Display configuration parameters

With a Display selected and placed in the Live Display Editor, setup the parameters using the **Properties** panel.




 **Note**
By default, the graph scaling is automatic.

Chart properties and setup


Chart type	Tab	Section	Parameter	Description
All	Chart	Chart	Title	Title of Chart. Display in the Header tab and top of chart
Trend	Chart	Chart	Display Legend	Select to display the legend for each plot in the chart.

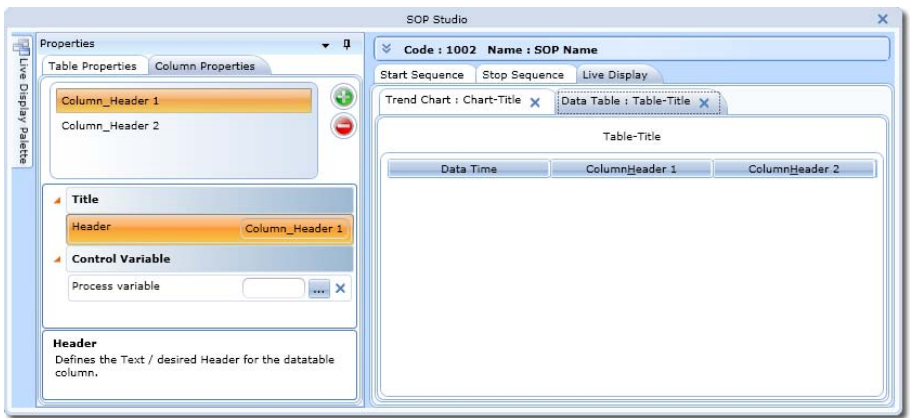
All	Chart	Chart	Duration	Duration of chart plotting before data plot is refreshed
All	X/Y Axis	Axis	Title	Title of X or Y-Axis
XY Chart	X/Y Axis	Axis	Type	Axis scaling format: Logarithmic Date Time Linear
XY Chart / Histogram	X/Y Axis	Axis	Label Format	Format of values to be displayed. Example: The displayed value is 1,410.225 when the number format is #,##0.### Here the character ',' is Thousands Separator and the character '.' is Decimal Separator
All	X/Y Axis	Axis	Label Visibility	Option to show the Axis label. (Selected as default)
All	X/Y Axis	Scale	Automatic	Option for automatic scaling of chart. (Selected as default)
All	X/Y Axis	Scale	Increment	Step value which is used to Increment the axis scale.
Trend	X/Y Axis	Scale	Increment type	Increment duration.
All	X/Y Axis	Scale	Minimum value	Minimum value of the chart scale
All	X/Y Axis	Scale	Maximum value	Maximum value of the chart scale
XY Chart	X/Y Axis	Data Source	Process variable	Process variable to be associated with the axis. Select  and select variable from the displayed PCV list dialog window

All	Series	Series	Title	Title of each series plot. Displayed in the chart legend For a Trend chart select the plot (eg series 1) from the title window, then input the new Title into entry box. A Maximum of six series can be added
Trend	Series	Series	Point Style	Required series plot point style
All	Series	Series	Colour	Colour of chart plots
Trend	Series	Series	Display Current Value	Option to display the latest value of the series plot in a tag at runtime.
Trend / Histogram	Series	Series	Process variable	Process variable to be associated with the chart. Select  and select variable from the displayed PCV list dialog window

Data Table properties and setup

Chart type	Tab	Section	Parameter	Description
All	Table properties	Table	Title	Title of Table. Displays on the top of Table
Data table	Table properties	Table	Maximum rows	Number of rows displayed in table before data in first row is refreshed.
All	Table properties	Table	Duration	Duration of data table plotting before data is refreshed
Array Data table	Table properties	Table	Index column header	Title of Title Index Column.

All	Column properties	Column header title window		Default is one Column header. For each additional column, click Add . A column will be added into the columns list. A Maximum of five columns can be added in Data Table
All	Column properties	Title	Header	Title of column. Select the required column header from the title window, then input the new column Title into entry box. The title will display on the top of each added table column. Recommended title to reflect process variable selected.
All	Column properties	Control variable	Process variable	Process variable to be associated with the column. Select  and select variable from the displayed PCV list dialog window (see below graphic).



Saving an SOP

On the **SOP Studio** command ribbon, select **Save** from the **SOP** group. The SOP is validated and then saved.

If the configured SOP is invalid, error details will be displayed in the error list at bottom of the screen.

**Note**

SOP Name and Code should be unique.

**Note**

If 21CFRPart11 is enabled, it will be necessary to add a reason for any modification to the SOP.



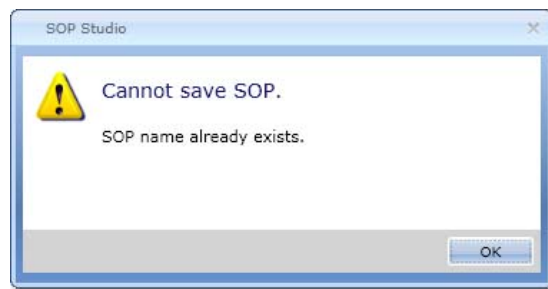
Save As SOP

To save an existing SOP under a different name, on the **SOP Studio** command ribbon, select **Save As** from the **SOP** group.

A dialog box titled "Save As SOP" with a close button (X) in the top right corner. It contains three input fields: "SOP Code" with the value "3", "Name" (empty), and "Description" (empty). At the bottom, there are three buttons: a circular icon with a question mark, a circular icon with a checkmark, and a circular icon with an X.

Type a valid SOP **Code** and **Name** and update the SOP **Description**, if required. Click **OK**. The New SOP with is created and opened.

If the SOP already exists, on selecting , you will be warned that the “SOP code/ name already exists”



Managing SOPs

Once an SOP has been created; each SOP can be opened, edited, saved and deleted as required, Additionally SOPs can be marked to run for specific functions, can be scheduled to be run at a particular time, SOPs prioritised and users assigned. This section explains the procedures to manage the SOPs created in the application dealing with each procedure in turn.

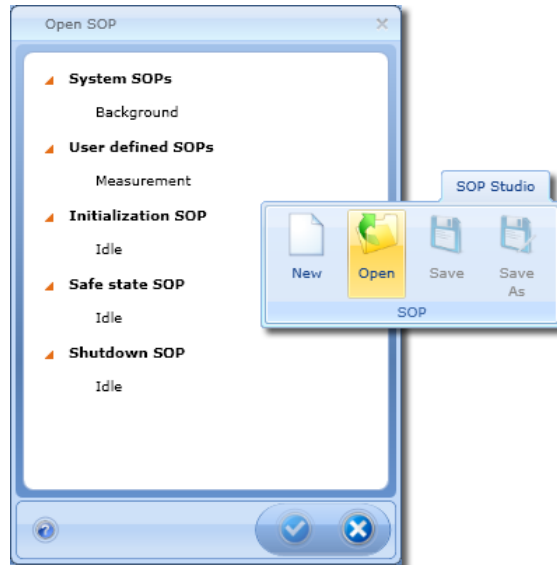


Note

SOP creation and editing is a privilege based feature. The logged on user must have a privilege to Create/Edit/Delete User Defined SOP or Create/Edit/Delete System SOP.

Opening an SOP

On the **SOP Studio** command ribbon, select **Open** from the **SOP** group. A dialog window containing a list of existing SOPs is displayed.




1. The SOPs are categorized into categories: **System**, **User Defined**, **Initialization**, **Safe State** and **Shutdown SOP**.
2. Select the required SOP name and click **OK**. The Selected SOP will be displayed in the **SOP Studio** window.

Deleting an SOP



Note

This feature is not available in Malvern Link II Ultra version.

On the **SOP Studio** command ribbon, select **Delete** from the **SOP** group. A dialog window containing a list of existing SOPs is displayed. Select the required SOP name and click **Delete** . The Selected SOP is deleted.



Note

Marked or scheduled SOPs cannot be deleted.

Mark SOPs

This section explains the details of marking SOPs as an Initialization, Safe State or Shutdown SOP.

Only **System SOPs** can be Marked.



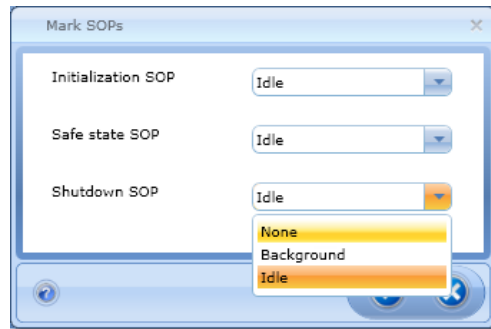
- **Initialization** SOPs are executed at Malvern Link II Application start-up.
- **Shutdown** SOPs are executed when Malvern Link II Application exits.
- The **Safe State SOP** can be executed in case of alarm to bring the System automation devices and analyzers to a safe state.



Note

This is a privilege based feature. The logged on user must have a privilege to Mark SOPs.

1. On the SOP Studio command ribbon, select Mark SOPs from the Configuration group. A dialog window containing the Initialization, Safe State and Shutdown SOP options is displayed.



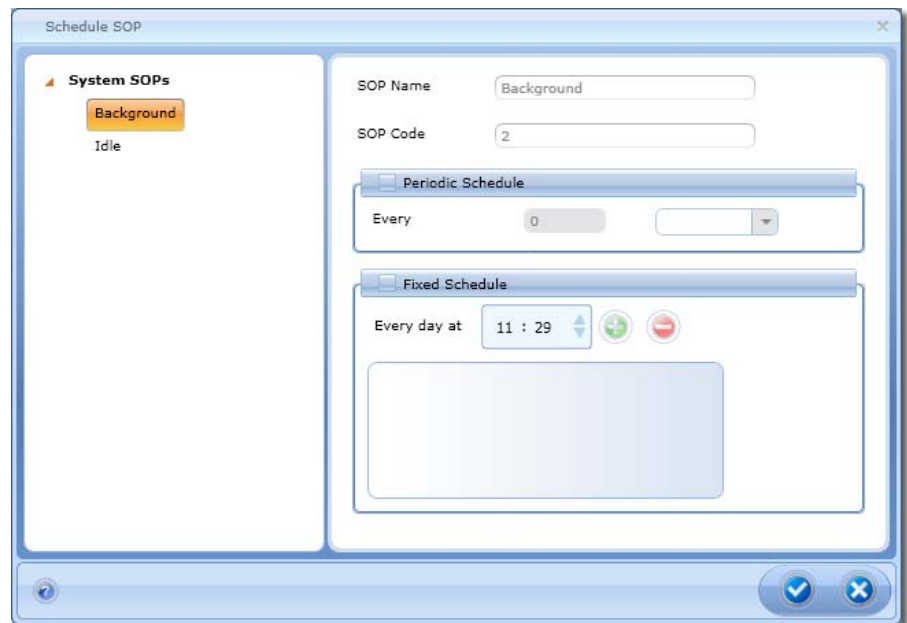
2. For each **Mark SOP** option, select the system SOP from drop down list and click **OK**. The selected SOP will be marked.
Note that the **same** SOP can be marked as Initialization, Safe State and Shutdown SOP.

Schedule SOP

This section explains the procedure to schedule SOPs at a fixed time or periodically. Note that only System SOPs can be scheduled.



1. On the **SOP Studio** command ribbon, select **Schedule SOP** from the **Configuration** group. A **Schedule SOP** dialog window containing list of system SOPs is displayed.



2. Select the required SOP from the list. Details of the SOP will then be displayed in right pane of the dialog window.
 - Select the **Periodic Schedule** checkbox to schedule the SOP to execute periodically
Input and select the required periodic scheduling.
 - Select the **Fixed Schedule** checkbox to schedule the SOP to execute at fixed times. Input or select the time required and click **Add** to add to the scheduling list.
3. Repeat the above steps to schedule all required SOPs and click **OK**. The SOP scheduling details are saved.

Change Priority

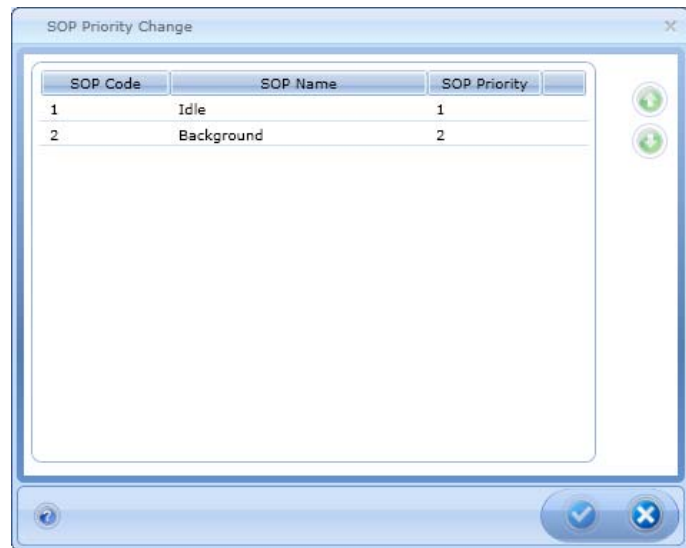
This section explains the procedure to change the SOP priorities. The lower the number in the list, the higher the priority is.



Note

Only System SOP priorities can be changed. User defined SOPs have least priority.

On the **SOP Studio** command ribbon, select **Change Priority** from the **Configuration** group. The **SOP Priority Change** dialog window is displayed with a list of system SOPs and their respective priorities. The lower the number is in the list, the higher the priority of the SOP.



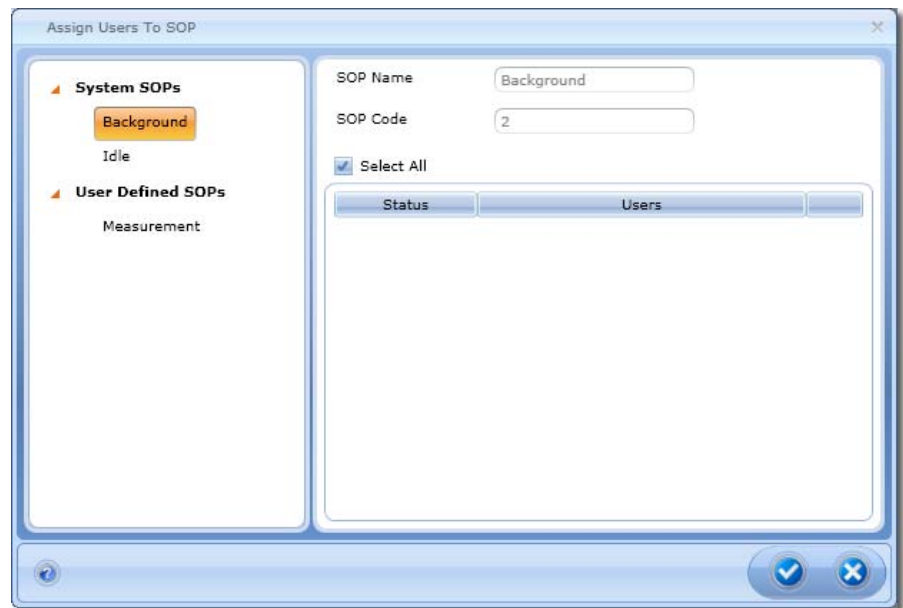
- To increase an SOP priority of, select the SOP and click **Up** till the required priority is set.
- To decrease an SOP priority, select the SOP and click **Down** till the required priority is set.
- Repeat the above steps to change priority of other SOPs and click **OK**. The system SOP priorities are updated.

Assign Users to SOP

This section explains the procedure to assign users to SOPs. Only assigned users can execute SOPs in Malvern Link II Application.



1. On the **SOP Studio** command ribbon, select **Assign Users** from the **Configuration** group. The **Assign Users To SOP** dialog window is displayed with a list of available SOPs.



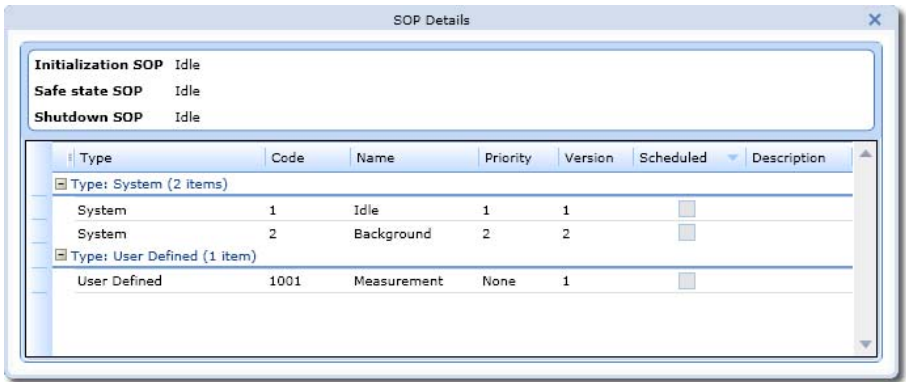
2. Select the required SOP from the list. Details of the SOP will then be displayed in right pane of the dialog window.
3. To assign users to an SOP, select the checkbox next to the user. To assign all users select the **Select All** checkbox on top of the user list.
4. Repeat the above steps to assign users to other SOPs and click **OK**.

Viewing SOP Details

The SOP details command shows the main setup details for all configured SOPs



On the **SOP Studio** command ribbon, select **SOP Details** from the **View** group. The **SOP Details** window is displayed, with the fields reflecting how the SOP how the SOP has been configured. This is with respect to priority, scheduling, SOP marking, etc.



Parameter	Description
Header window	Shows which SOPs have been marked as Initialization, Safe State or Shutdown SOP
Type	SOP Type (User Defined/System)
Code	Unique SOP Code
Name	Name of SOP
Priority	Priority of System SOP
Scheduled	Selected if SOP is scheduled Note: This field is not applicable for User Defined SOPs
Description	Description of SOP

Tools

This section explains the options available for configuration under the **Tools** command ribbon. The Tools ribbon enables the following to be configured:



- Custom Data Items
- Data Converters
- OPC Server List (to be used in Malvern Link II)
- RTSizer (This menu option is available only if an Insitex is added in process definition)

Configure Custom Data Item

Custom data items can be created to give global variables of different data types that are used in standard operating procedures.




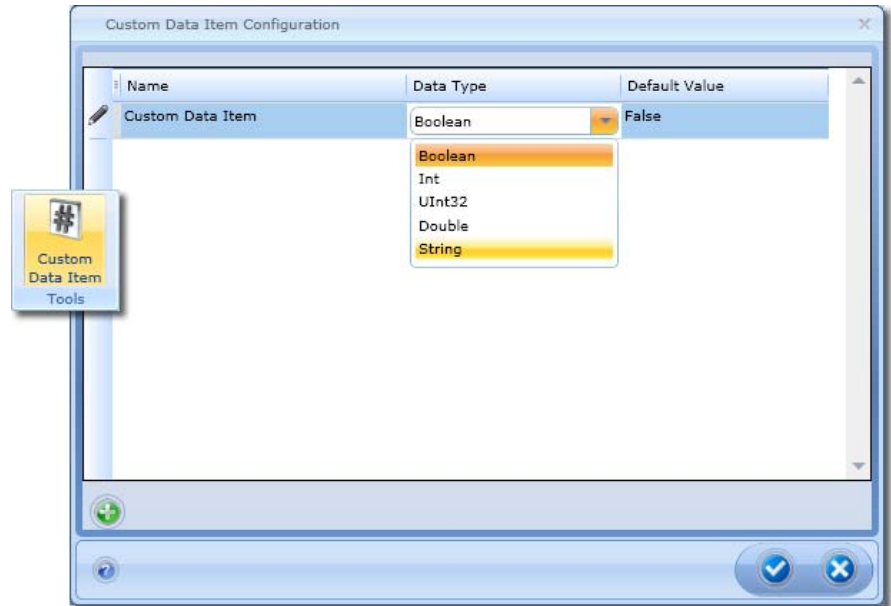
Note

This is a privilege based feature. The logged on user must have the privilege **Create/Edit/Delete Custom Data Items**.

Custom data items are also used for remote reporting and control. This feature is only available in Malvern Link II PRO and ULTRA versions.

To add Custom Data Item:

1. From **Tools** Command ribbon, select **Custom Data Items** from the **Tools** group. The **Custom Data Item Configuration** window is displayed.
2. Click **Add** . A new custom data item row is added with default data type as **Boolean** and default value as **False**.
3. Click on **Custom data item** name and type a description of the custom item. Ensure that **all** custom data item names are unique.
4. Click the default **data type**. Select the required data type from the dropdown list and enter also provide a **default value**.



5. Repeat the above steps for all custom data items to be added and click **OK**.

To remove Custom Data Item

Select the custom data item row and click **Remove**. The selected custom data item is deleted.



Note

It is not possible to delete the Custom data item called **Heartbeat**. This item is a counter (1 to 32767 and then restart at 1). It allows external software to establish a watchdog with Malvern Link. When Malvern Link is not running the counter stops counting.



Note

If Malvern Link II Ultra version is installed you cannot delete custom data items.

Supported Data Types

Following data types are supported by Malvern Link II for creation of custom data items.

- Boolean
- Int32

- UInt32
- Double
- String

Create Data Converters

The purpose of a Data convertor is to perform conversion from a raw value to an engineering value, and vice-versa.



Note

This is a privilege based feature. The logged on user must have the privilege **Create/Edit/Delete Custom Data Items**.

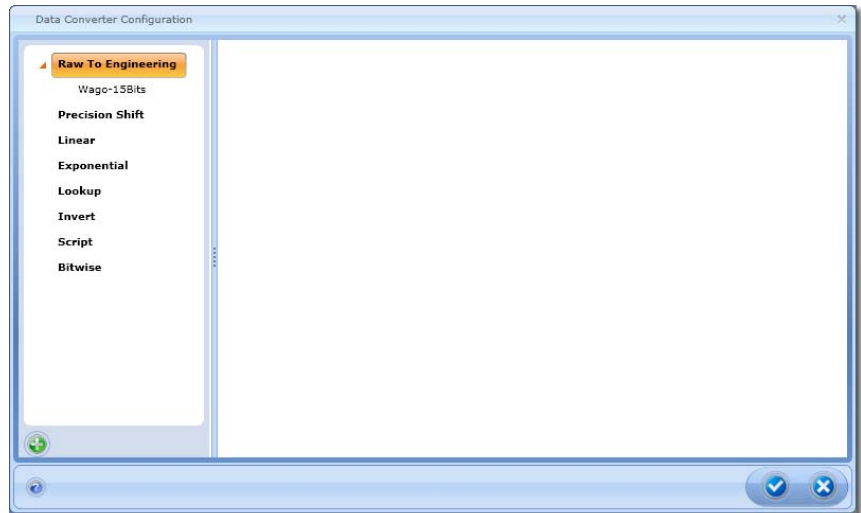
The Data convertors available are:


- Raw to Engineering
- Precision shift
- Linear
- Exponential
- Lookup
- Invert
- Script
- Bitwise

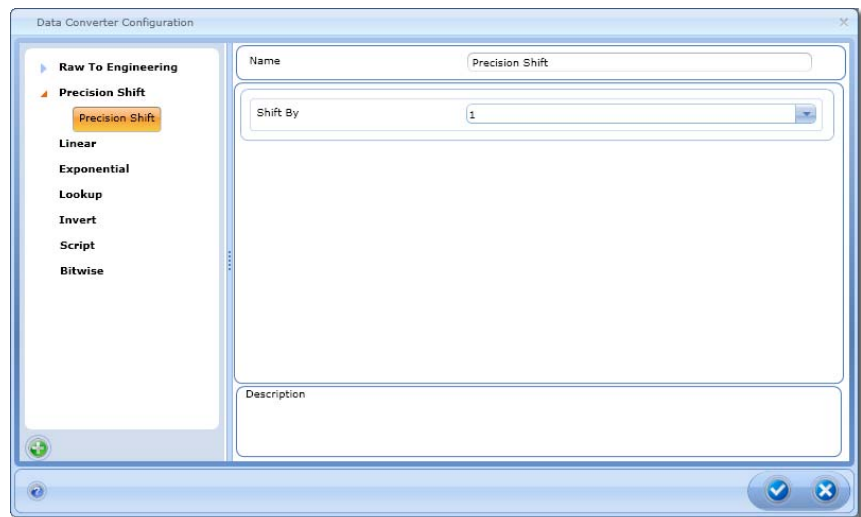
For a field description of each Data Converters and data conversion formulae used, refer to the **Data Converter Details** section later in this chapter.

To create Data Converter:

1. On the **Tools** Command ribbon, select **Data Converter** from the **Tools** group. The **Data Converter Configuration** window is displayed.



2. Select the relevant data converter type and click **Add** . A Data converter configuration parameters pane will be displayed with default values.



3. Type the **Name** and configuration parameter values for the data converter.
4. Repeat the above steps for all data convertors required and click **OK**.

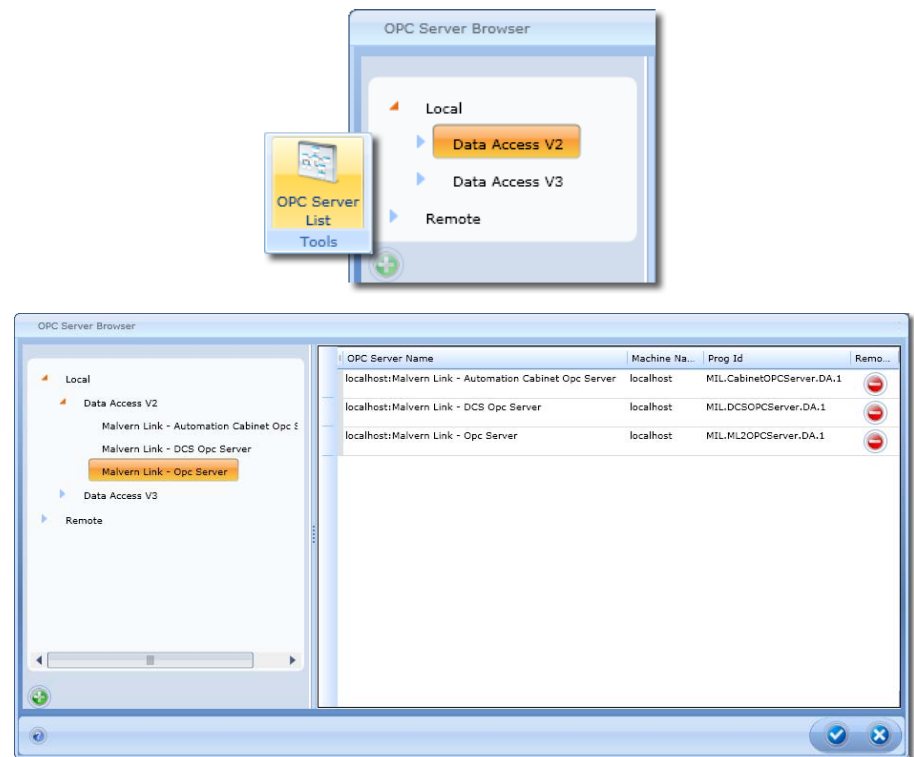
For more information on Data Converters (such as field description, formulae), refer to the **Data Converter Details** section later in this chapter.


OPC Server List

This section explains the procedure to add OLE for process control (OPC) server and create a list of OPC servers referred by Malvern Link II configuration and execution.

To Add OPC Server:

1. On the **Tools** Command ribbon, select **OPC Server List** from the **Tools** group. A window will be displayed showing **Local** and **Remote** options.



2. Expand the folders as required. Select the relevant OPC server name and click **Add** . A row is added for the selected OPC server in the right pane.
3. Repeat the above steps to add other required OPC servers. Click **OK** to create the list for a process definition and exit.

To Remove OPC Server:

Select the OPC server row to be removed and click Remove . The selected OPC server is removed from the list. Click OK to exit.

**Note**

You cannot remove an OPC server if it is used in configuration for the opened process definition.

Launch RTSizer Software

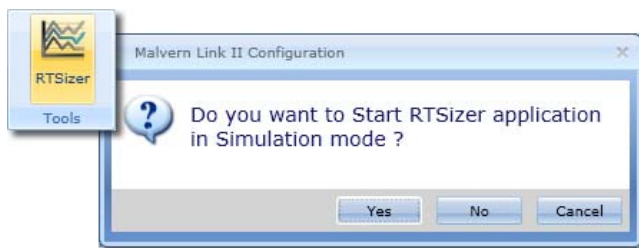
The RTSizer software application used for conducting the measurement of the sample can be launched from the Malvern Link II application. The RTSizer application can be opened either in Simulation mode or as an actual connection to the Insitex analyzing instrument.

**Note**

This option is available only if Insitex device is selected in process definition wizard.

To launch RTSizer software application:

1. On the **Tools** Command ribbon, select **RTSizer** from the **Tools** group. A message box as shown in the following figure is displayed.



2. Select **Yes** to start the RTSizer application in simulation mode
3. Select **No** to connect to the Insitex analyzing instrument using the RTSizer application.

Configuration

This section explains the options available for configuration under the **Configuration** command ribbon. The Configuration ribbon enables the following to be configured:



- Devices (automation devices, analyzers (Insitex) and additional Malvern instruments)
- Alarms and associated actions
- Remote control operations
- Remote reporting functionality
- Viewing of the OLE for Process Control (OPC) Server item mapping.

Configuring Devices

This section explains the procedures necessary for the configuration of any automation devices, analyzers and other Malvern instrumentation used in the Process arrangement.

- The **Automation device configuration** sets values of device configuration parameters and maps the input/output of automation devices to OPC server items.
- The analyzer configuration sets values of analyzer parameters, for example, the **Insitex analyzer device**.
- **Malvern instrumentation device:** The Malvern Link II product enables automation of Malvern instruments range of particle size measurement and analysis instruments such as the Mastersizer 2000, Mastersizer 3000 and Zetasizer series.

Details on configuring the parameters of each of the specified devices is described in the following respective sections.



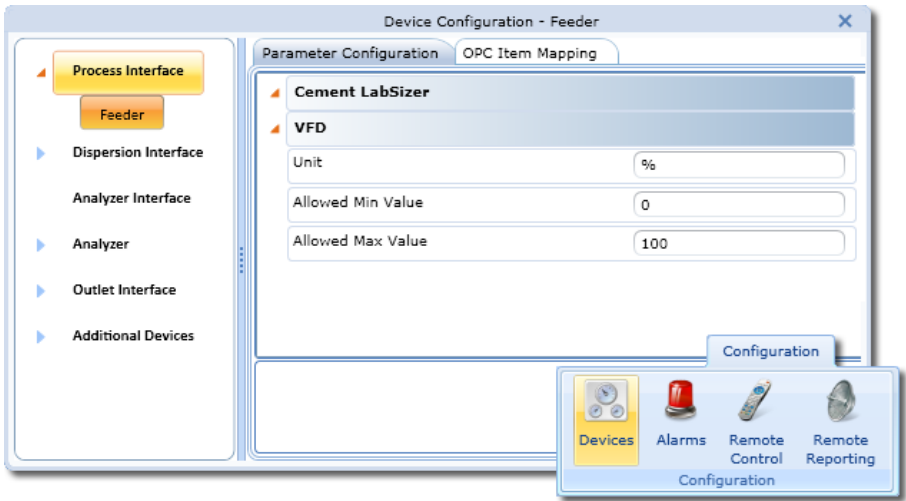
Note

The devices shown in the **Devices** listing will match those assigned in the Process definition.

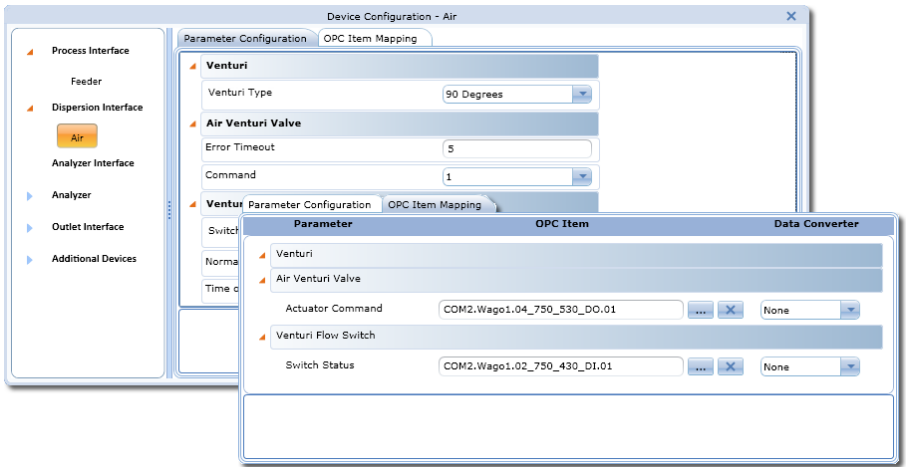
Configuring an Automation Device


This section describes the configuration of all assigned automation devices.

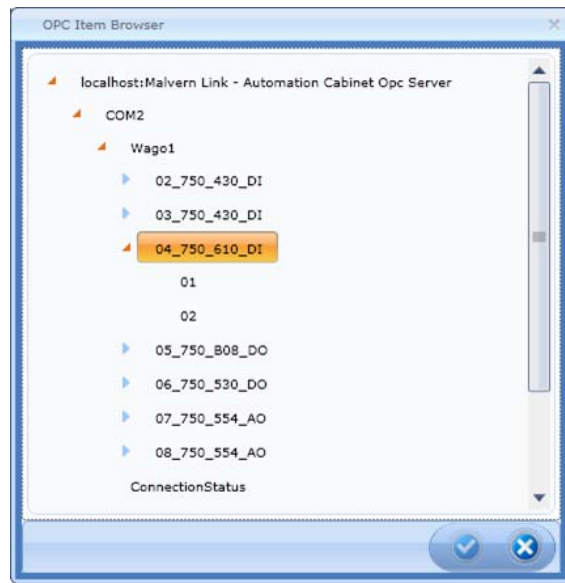
- 1. On the **Configuration** command ribbon, select **Devices** from **Configuration** group.
All Devices, categorized by interface type, that are within the Process definition are listed in left pane of the **Device configuration** window.



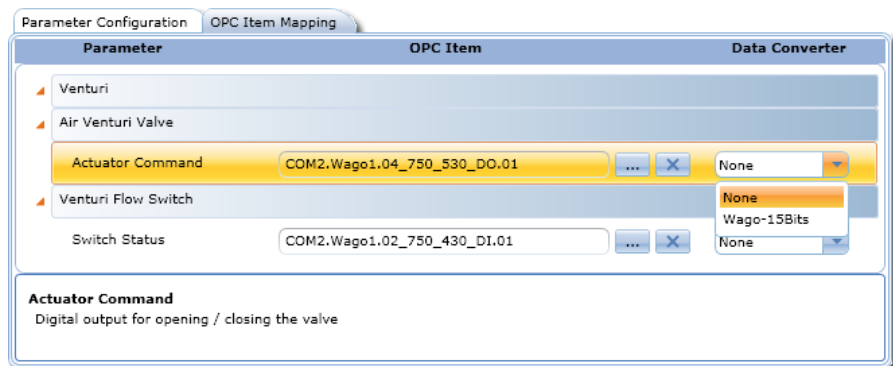
- 2. Open each category and select the required automation device.
A configuration window for the selected device will be displayed. The device parameters with default values are displayed in the **Parameter Configuration** tab page, with the input/outputs listed in the **OPC Item Mapping** tab page. An example is shown below:



3. Alter the **Parameter configuration** values as required – refer to **Appendix A: Devices** for details of each parameter.
4. To map an **OPC server** item to an input/output, select **Browse**  in the **OPC Item Mapping** tab page.
A dialog box as shown in the following figure containing the available OPC servers.



5. Select the required OPC item and click **OK**. The selected OPC server item is mapped with the input output.
6. To associate a **Data Converter**, select the relevant data converter name from **Data Converter** drop down list.

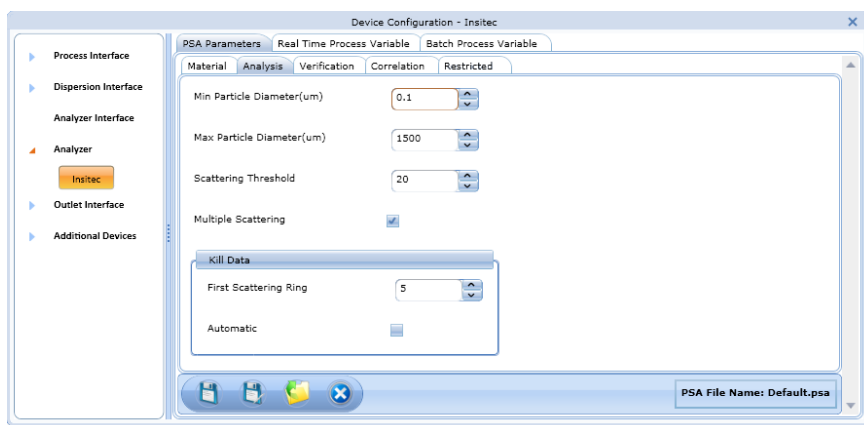


7. Repeat all steps to configure all assigned automation devices.

Configuring the Insitec Device

This section explains the procedure to configure the Insitec device.

1. On the **Security** command ribbon, select **Devices** from **Configuration** group.
All Devices, categorized by interface type, that are within the Process definition are listed in left pane of the **Device configuration** window.
2. Open the **Analyzer** category and select the **Insitec** to display the **Insitec Device configuration**.
3. The **Insitec Device configuration** includes the tab pages: **PSA Parameters**, **Real Time Process Variable**, **Batch Process Variable** and **Process Variable Definition file**.



PSA Parameter Configuration

This section explains the details of the PSA Parameters for **Insitec** device.

The **PSA Parameters** tab contains five additional tabs pages: **Material**, **Analysis**, **Verification**, **Correlation** and **Restricted** tab pages. Select each tab to view additional details, The **Material** tab is selected by default with the **Default.psa** file loaded.

- **Material:** The parameters in this tab allow you to set up particle density, and refractive indices for particles and media.
- **Analysis:** The parameters in this tab allows you to set up a working range in terms of particle diameter, reduce the amount of data using a scattering threshold, and enable the multiple scattering algorithm.
- **Verification:** The parameters in this tab allow you to set up alarms to inform you when the particle size, light background or dark background is out of range.

- **Correlation:** The parameters in this tab allow you to correlate Malvern results with those from other particle size measurement methods such as sieving.
- **Restricted:** This tab enables the restricted parameters to be configured directly from the Malvern Link application.

Open and Save PSA parameter files (.psa) using the buttons at the bottom left of the window.



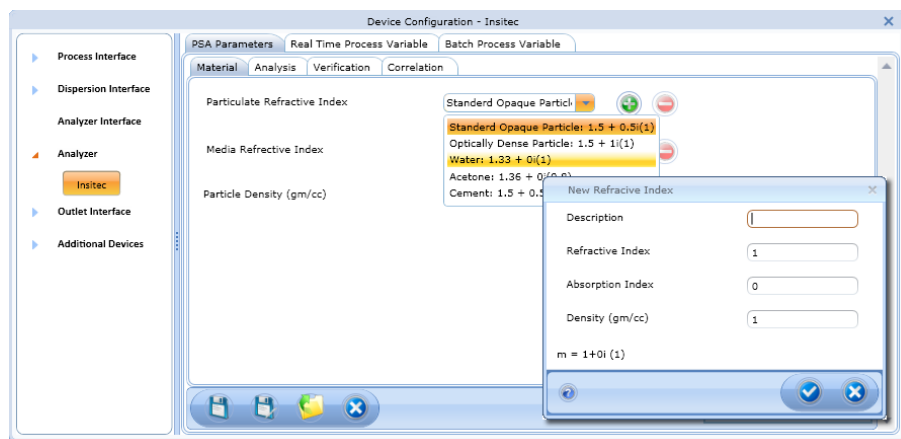
(Save, Save As, Open, Cancel)


Material Tab

The Materials Tab enables the setting up of the particle density and refractive indices for particles and media.


Parameter	Description
Particulate Refractive Index	Select from the drop down list, or enter a new particulate refractive index by clicking Add . Refer to procedure below.
Media Refractive Index	Select from the drop down list, or enter a new media refractive index by clicking Add . Refer to procedure below.
Particle Density (gm/cc)	To report the SSA (specific surface area) a particle density must be entered.

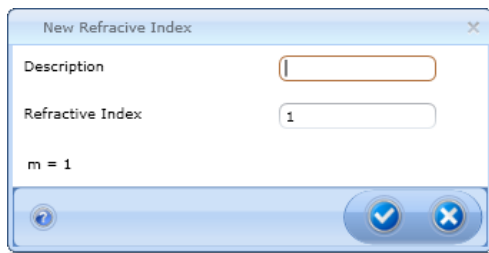
1. Select an appropriate **Particulate Refractive Index** from the drop-down list.



2. If the required RI is not in the list, alongside **Particulate Refractive Index** select **Add**  to display the **New refractive Index** dialog window. Use this window to define the refractive indices of particles and media. This information is vital for particle size calculations.

3. Type the **Description**, **Refractive Index**, **Absorption Index** and **Density** for the new sample, then select **OK** to create the new refractive index.
4. Select an appropriate **Media Refractive Index** from the drop-down list.

Again if the required RI is not in the list, select **Add**  to display the **New refractive Index** dialog window, and enter the new details as required.



Parameter	Description
Description	Type in a text to identify the refractive index.
$m=a+bi$	<p>m is the refractive index</p> <p>a is the real refractive index, which describes the amount of scattering that takes place as a result of light interacting with the particle.</p> <p>b is the imaginary or complex refractive index, which describes the amount of absorption that takes place as the light enters the particle.</p>
Density (gm/cc)	The particle density is used in the calculation of specific surface area (SSA). To report the SSA (specific surface area) a particle density must be entered.

5. Enter the Particle density.

Analysis Tab

The Analysis Tab allows a working analysis range (particle diameter) to be specified, a scattering threshold to be set so the amount of data used in the analysis is reduced, and enable the multiple scattering algorithm.

Parameter	Description
Minimum and Maximum Particle Diameter (microns)	Adjust the limits to control the size range of the particles that contribute to the results. Particles that are smaller than the minimum diameter or larger than the maximum diameter are excluded from the particle size calculations.

Scattering threshold	Specify a threshold below which the scattering signal is not used. Results are taken only from those detectors that detect a signal greater than the threshold.
Multiple scattering	In cases where the particle loading is high, the measurement process is complicated by scattered light being re-scattered by other particles before it reaches the detector. With this option selected a patented 'multiple scattering' algorithm is applied to correct for this.
Kill Data	<p>The user can ignore (kill) the data obtained from the first detector rings and not use it whenever an analysis is performed. This is useful if the alignment is poor and unwanted data is present on the first few rings that could affect the final result.</p> <p>The software allows either the detectors killed to be chosen automatically (select the Automatic checkbox), or by manual selection. The data on all rings prior to the first scattering ring indicated will be ignored.</p>

Verification Tab

The Verification tab enables alarms to be set up to inform when the particle size, light background or dark background is out of range.

Parameter	Description
Particle Size Distribution	
Min Transmission (%)	Alarm is triggered when the transmission falls below the values entered.
Min Signal	Alarm is triggered when the signal falls below the values entered.
Light Background	
Min Transmission	Measurements that fall below the specified minimum transmission may indicate that the windows are too dirty to make accurate measurements, or that the detector is poorly aligned.
Max Signal / Peak Signal	During a light background measurement, no sample will be present within the beam; therefore any light diffraction is most likely to be due to optical contamination. The Max signal and Peak signal alarms are measures of the light that is hitting the detectors, which should be minimal if the windows are clean and there is no sample in the measurement area.

If measurements are higher than the values entered in these fields, the alarm will be activated and the windows should be cleaned.

The **Max Signal** is a measure of the average light intensity across all the detectors.

The **Peak Signal** is a measure of the light intensity from the detector that is receiving the most light.

Dark Background

Max Signal / Peak Signal

The Dark background is a measure of electrical noise. The laser beam is turned off during this measurement, so there is no laser transmission reading. There should also be minimal light diffraction as the unit is sealed and no light should be able to enter. The alarm parameters allow this to be verified prior to any measurement.

The **Max** and **Peak Signal** are both measures of the light that is hitting the detectors and are used in the same way as the Max and Peak Signal light background alarm fields.

Correlation Tab

The Correlation tab enables the Malvern results to be correlated with those from other particle size measurement methods such as sieving.

Parameter	Description
Curve Fit	Use to apply a Rosin-Rammler or LogNormal curve fit to the particle size distribution graph. with a Rosin-Rammler curve fit, a particle size distribution graph can be setup (in the Time History Display Settings window) to display the Drr and Nrr values.
Mesh Factor	Using mesh sizes on the x-axis (use the Display Settings to change the x-axis units), a value between + / – 99 can be entered to shift the particle size distribution left or right along the x-axis.
Correlation Shift	If not using mesh factors, a value between + / – 99 can be entered to move the particle size distribution graph to the right or left along the x-axis
D:Correlation	Use this table to enter specific correlation values. Double-click on a line in the table to open a Correlation dialog window where a Particle diameter and a Correlation factor can be entered. More than one line in the table must be completed

RTSizer uses the curve fit to interpolate the particle diameter vs. correlation factor plot (Note this action cannot be viewed). The resulting interpolated correlation factors are then applied to the particle size distribution.

Restricted Tab

The Restricted tab enables the restricted parameters to be configured directly from the Malvern Link application.

The screenshot shows the 'Restricted' tab in the Malvern Link application. The window is divided into several sections for configuring parameters:

- Storage:** Minimum Diameter (0.1), Maximum Diameter (2000).
- Smoothing:** Last Scattering Ring (32), Last Smoothing Ring (32), Graduated Smoothing (checkbox).
- Iteration:** Regularization (Size Classes) (1), Prediction Smoothing (Size Classes) (5), Alternate Psf (0).
- Data:** Clip Large Size Range (checkbox), Narrow Mono-Dispersions (checkbox), 1/R Weighting (checkbox), Constrained Analysis (checkbox), Smoothing Constraint Factor (0.1).
- Analysis:** PSD Solution Residual (%x1000) (250), Multiple Scattering Residual(%x1000) (10), Maximum PSD Solution Iterations (2500), Maximum Multiple Scattering Iterations (100), Maximum Local Error Increase(%) (2), Peak Noise @ 1x Gain (0).
- Version 5.x Compatibility:** Initial Uncertainty (checkbox), Background Subtraction (checkbox), Chi Calculation (checkbox), No Matrix Angle Correction (checkbox), No Mie Calculation Fix (checkbox).

Buttons for 'Version 5.x Settings' and 'Reset' are located at the bottom right of the window.

Parameter	Description
Storage	
Minimum and maximum storage sizes	Controls the size-bands used for size parameter calculation. Changing these may change values such as the Dv(50). To limit the size range of the analysis use the Min. and Max. Particle Diameter controls on the Analysis tab page.
Smoothing	
Last Scattering Ring	Change from 32 if outer detector rings are affected by stray light or cut-off by a special cell (one that does not have an imaging correction)
Last Smoothing Ring	Inner detector rings are smoothed to reduce the effects of mis-alignment. This changes the last ring for which this smoothing is used. Changing this can affect the sub-micron extension. Use of graduated smoothing is preferred.
Graduates Smoothing	Smoothing gradually reduced with ring number. Using this can improve latex and other narrow size distributions.
Iteration	
Regularization / Prediction Smoothing	Controls changes made at each iteration of the analysis. It is recommended not to change these values.
Alternate Psf	0 = use a value calculated based on the size distribution. Psf is the ratio of scattered light that is detected to total scattered light, and is used to modify the multiple scatter correction. Values should typically be in the range 0.5 to 1.0.
Data	
Clip Large Size Range	Tries to tighten the coarse end of the largest-size mode in the size distribution. Note: In v7.20 the mode selection function has been changed back to how it worked in RTSizer 5.x. With Constrained Analysis enabled in v7.20 this option controls a similar function based on the one in the Mastersizer S analysis.
Narrow Mono-Dispersions	Tries to narrow the modes of the size distribution. With Constrained Analysis enabled in v7.20 this option controls a similar function based on the one in the Mastersizer 2000 analysis.

1/R Weighting	This option weights the scattering data and matrix by the inverse of the detector radius, in a similar way to how Mastersizer data is weighted. This makes the result less sensitive to small changes in the outer detectors and tends to flatten the sensitivity across the size range.
Constrained analysis / Constraint factor	Use to improve comparability with Mastersizer and if the standard analysis gives irregular size distributions in the 1 – 10µm range, particularly if the particle optical model has zero absorption (e.g. polystyrene latex, glass beads). The constraint factor should be set to the smallest value that gives a smooth distribution without ripples or extra modes.

Analysis

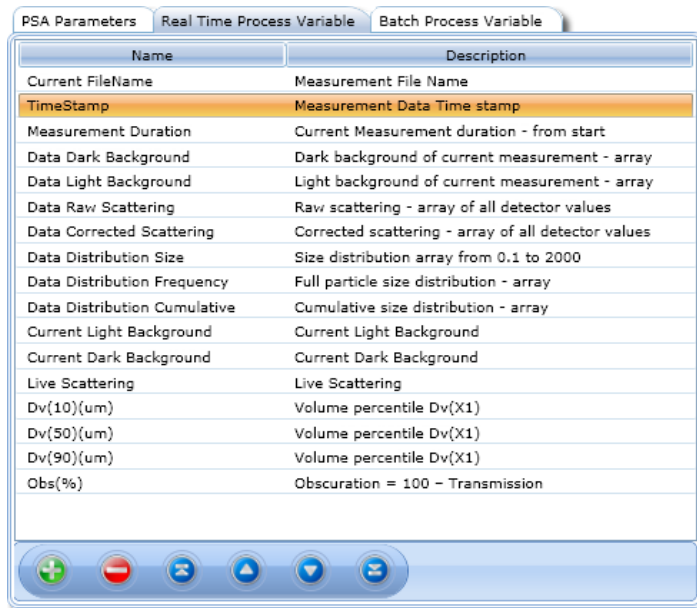
PSD / Multiple scattering residuals and iterations / local error	The controls in this group set the limits for the iterations in the standard analysis. It is recommended that these values are not changed. They have no effect on the constrained analysis.
Peak Noise	Initial value for the analysis uncertainty. It is recommended that this value is not changed.

Reset	Select Reset to change controls to the pre-set values
--------------	--


Version 5.x Settings	Options to make the analysis behave more like that of RTSizer 5.x
Initial uncertainty	If checked sets the initial uncertainty to 4.0. RTSizer normally uses a value of 0.0. Refer to Peak Noise setting above
Background subtraction	Currently has no functionality in RTSizer 7.xx
Chi Calculation	Chi is the difference between the measured scattering data and the values predicted from the size distribution. The function that calculates chi also calculates the correction factors used at each iteration in the analysis. If this option is checked the original correction algorithm is used.
No matrix angle correction	If checked the scattering matrix is calculated without correcting the scattering angles for the medium. This gives a major error in the size distributions for wet measurements. Matrix file names have an 'A' suffix.
No Mie calculation fix	If checked the scattering matrix is calculated with an error in the Mie generation algorithm (the calculation of number of terms in the series). Matrix file names have an 'M' suffix.

Real Time Process Variables

This section explains the details of the **Real Time Process Variables** tab page for the **Insitec** device.



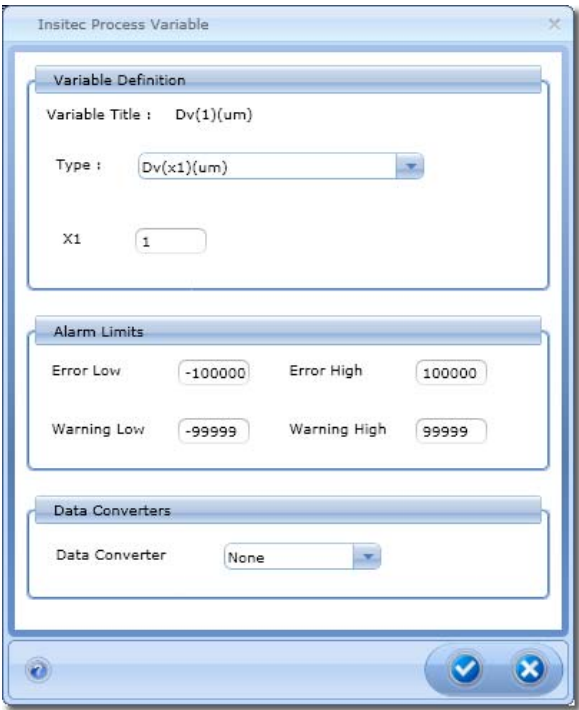
Process Variables can be added, repositioned or removed from the list using the buttons at the bottom of the editor.

1. Select the **Real Time Process Variables** tab page and click **Add** . A dialog box as shown in the following figure is displayed.
2. Select the variable **Type** to be displayed, enter the **Alarm limits** and select the relevant **Data Converter**
3. Click **OK**. The variable is added to list of real time process variables along with the description.
4. Repeat the above steps until all required Process variables have been added.



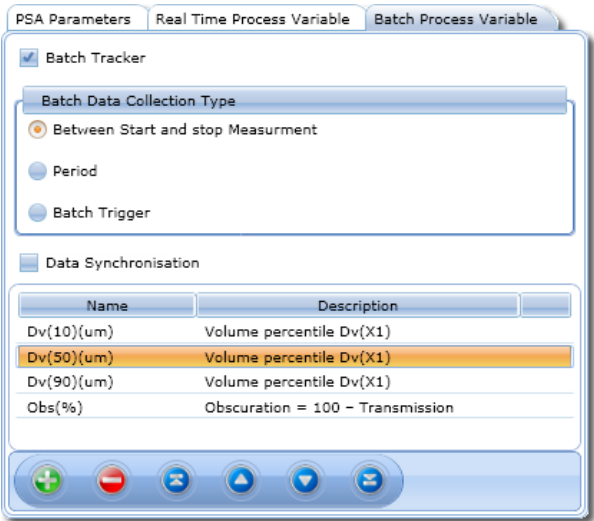
Note

Double clicking on a process variable will display that variables details.



Batch Process Variables

This section explains the details of the **Batch Process Variables** tab page for the **Insittec** device.



- **Batch Tracker**

Select this option to configure batch parameters and batch data collection type.

- **Batch Data Collection Type.**

Select the required option: Either all data obtained between the **Start and stopping** of a measurement, or for a set **Period**. Select the option and alter the time duration as required.


In Malvern Link II PRO and ULTRA version, **Batch Trigger** and **Data Synchronisation** options are available

- **Batch Trigger** - Select to configure an OLE process control (OPC) Server item, which can trigger the batch Data Collection.

- **Data Synchronisation** - Select to achieve data synchronisation between OPC server and Malvern Link II. Selecting the data synchronisation checkbox provides two additional variables, **Data Ready** and **Data Acknowledge**. These need to be configured and mapped as OPC server items to **Data Ready** from **Remote reporting** configuration window, and **Data Acknowledge** from the **Remote Control** window.

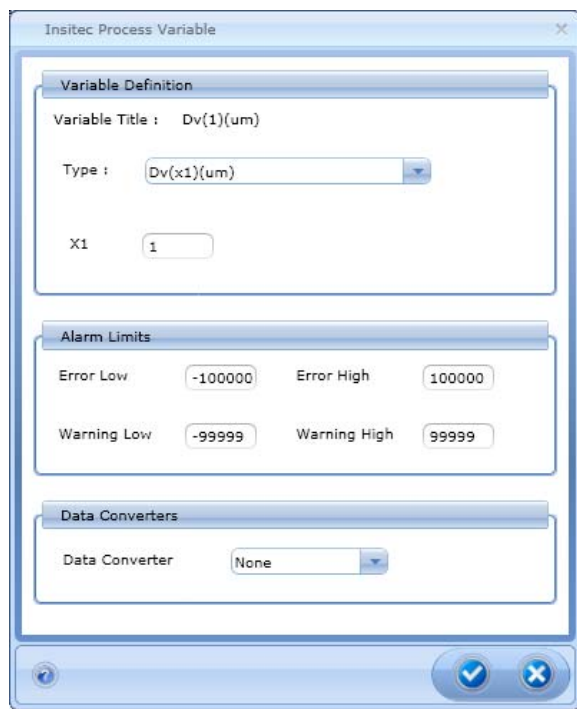
When Malvern Link II collects batch data, it will report on OPC Server items and set the **Data Ready** item to **True**. This indicates to the application to begin collecting data and set the **Data Acknowledge** item to **True**. On receiving the Data Acknowledgement, **Data Ready** is set to **False**

Batch process variable can be added, repositioned or removed from the list using the buttons at the bottom of the editor.

1. Select **Add** , the **Insittec Process variable** dialog window is displayed as shown in the following figure.
2. Select the variable **Type** to be displayed, enter the **Alarm limits** and select the relevant **Data Converter**
3. Click **OK**. The variable is added to list of real time process variables along with the description.
4. Repeat the above steps until all required Process variables have been added.

**Note**

Double clicking on a process variable will display that variables details.



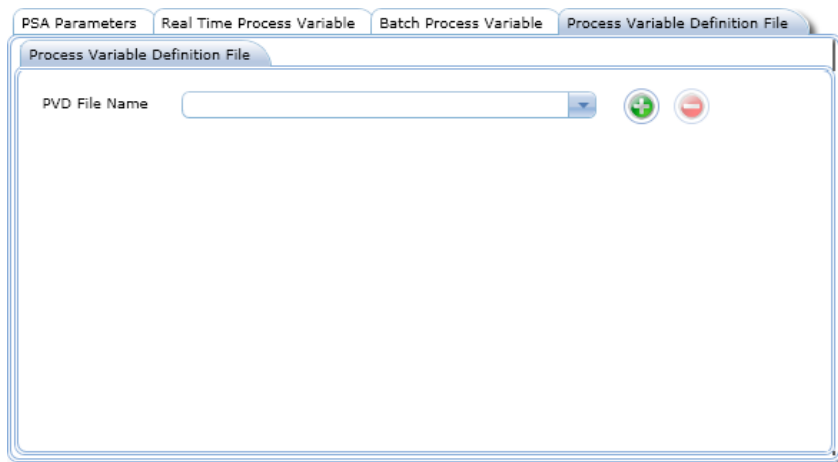
The image shows a software dialog box titled "Insitex Process Variable". It contains three main sections: "Variable Definition", "Alarm Limits", and "Data Converters".

- Variable Definition:** Includes a "Variable Title" field with the value "Dv(1){um}", a "Type" dropdown menu showing "Dv(x1){um}", and an "X1" input field with the value "1".
- Alarm Limits:** Contains four input fields for limits: "Error Low" (-100000), "Error High" (100000), "Warning Low" (-99999), and "Warning High" (99999).
- Data Converters:** Includes a "Data Converter" dropdown menu set to "None".

At the bottom of the dialog are three buttons: a question mark icon, a checkmark icon, and a close (X) icon.

Process Variable Definition File

An **RTSizer Process Variable Definition file** is a file containing the Process variables as defined when right-clicking on the trend chart in RTSizer. Refer to the RTSizer user manuals for more information.



The image shows a software dialog box titled "Process Variable Definition File". It has four tabs at the top: "PSA Parameters", "Real Time Process Variable", "Batch Process Variable", and "Process Variable Definition File". The "Process Variable Definition File" tab is selected.

Inside the dialog, there is a "PVD File Name" label followed by a text input field. To the right of the input field are two circular buttons: a green one with a plus sign and a red one with a minus sign.

The **Process Variable definition** tab page allows the creation of a list of PVD (Process variable definition) files that are available in the current process definition. These files are loaded from the process SOP.

Configuring a Malvern Instrumentation device

This section explains the procedure to configure the Malvern instruments range of particle size measurement and analysis instruments such as the Mastersizer 2000, Mastersizer 3000 and Zetasizer series.

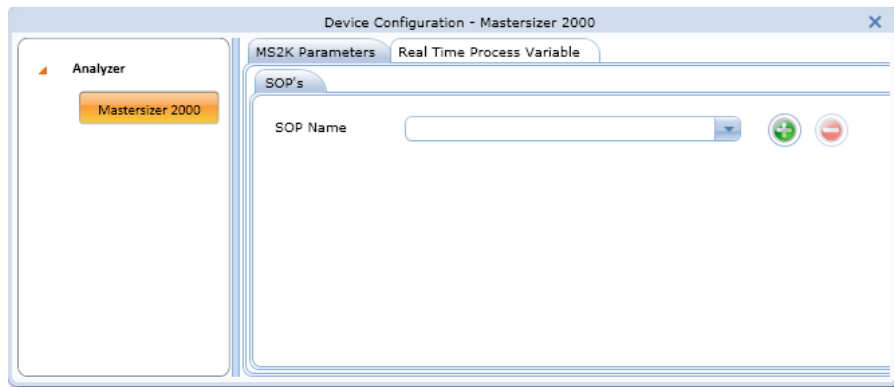


Note

This feature is not compatible with 21CFR part11 compliance (Malvern Link II Ultra version)

Configuration of Mastersizer 2000 devices

The Mastersizer 2000 parameters page allows attaching pre-configured Mastersizer 2000 SOP to the current Malvern Link II configuration.



The **Real time process variable** tab page allows the creation of a list of process variables; refer to the **Real time process variable** tab page description in the **Configuring the Insittec device** section.



Note

Only one Mastersizer 2000 can be run per session on the control computer.

Configuration of Mastersizer 3000 devices

The Mastersizer 3000 parameters page allows attaching pre-configured Mastersizer 3000 SOP to the current Malvern Link II configuration.



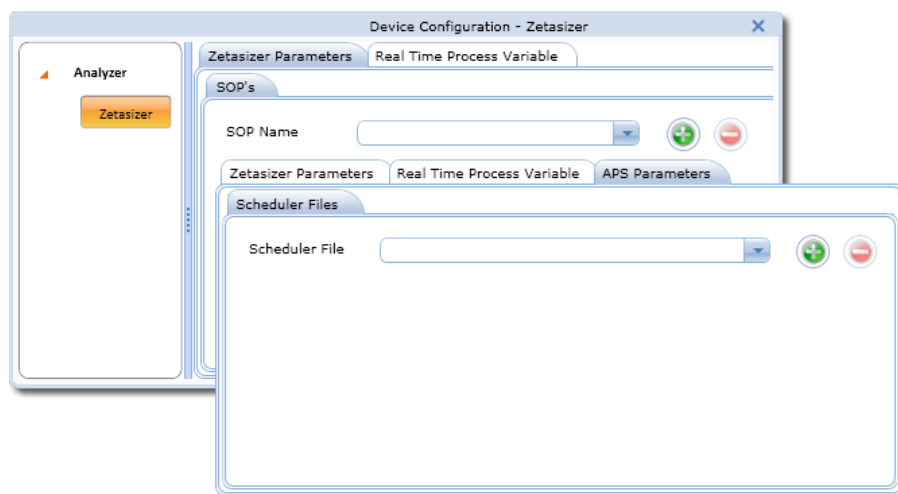
The **Real time process variable** tab page allows the creation of a list of process variables; refer to the **Real time process variable** tab page description in the **Configuring the Insitex device** section.

**Note**


Only one Mastersizer 3000 instrument can be run per session on the control computer.

Configuration of Zetasizer series devices

The Zetasizer parameters page allows attaching pre-configured Zetasizer and APS SOP files to the current Malvern Link II configuration.




The **Real time process variable** tab page allows the creation of a list of process variables; refer to the **Real time process variable** tab page description in the **Configuring the Insitex device** section.

 **Note**
Only one Zetasizer instrument can be run per session on the control computer.

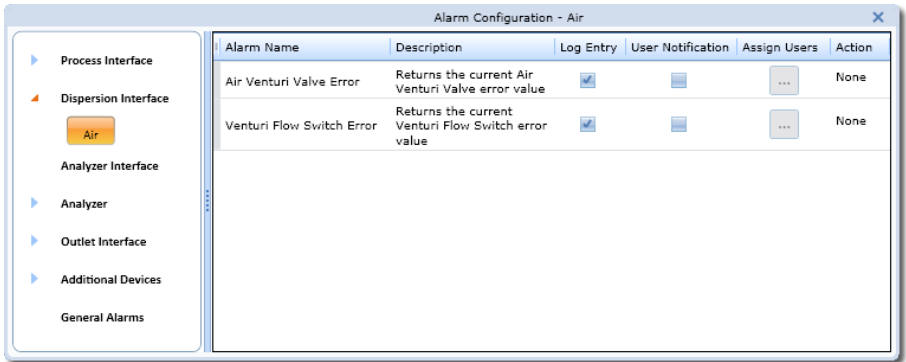
Configure Alarms

This section explains the details of **Alarm Configuration** function. Malvern Link II Application will handle the alarms and takes action as per the configuration settings.

 **Note**
This is a privilege based feature. The logged on user must have the privilege to **Configure Alarms**.



1. On the **Configuration** command ribbon, select **Alarms** from the **Configuration** group. Device names categorized by interface type are listed in left pane of the window. For system alarms a **General Alarms** category is also displayed.




2. Open each category and select the required automation device.
An Alarm configuration window for the selected device will be displayed showing with their default configuration
3. With respect to the table, select the required values of configuration parameters.
4. Repeat the above steps for all required alarms. The alarm configuration values will be saved on exiting the window.

Parameter	Description
Alarm Name	Name of the alarm to be configured
Description	Alarm description
Log entry	Indicates whether an entry should be made in Alarm Log on occurrence of alarm
User Notification	Indicates whether associated users should be notified on occurrence of the alarm
Assign User	Associated users who are notified about an occurrence of the alarm. This field becomes active when if user notification is selected
Action	Action to be taken on occurrence of the alarm. A drop-down list indicates the available actions. Example actions are: None Stop current running SOP Abort current running SOP Abort and Safe state current running SOP Run System SOPs

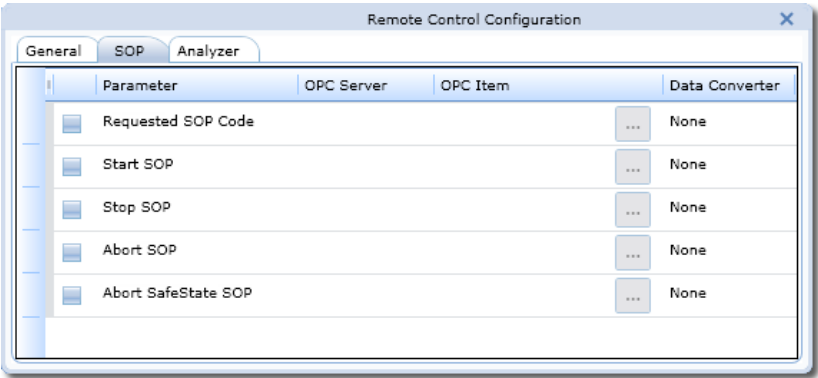
Configure Remote Control Items

This section explains the details of Remote Control Configuration. Malvern Link II Application handles the request from configured OLE for Process Control (OPC) items and takes the action associated with it.

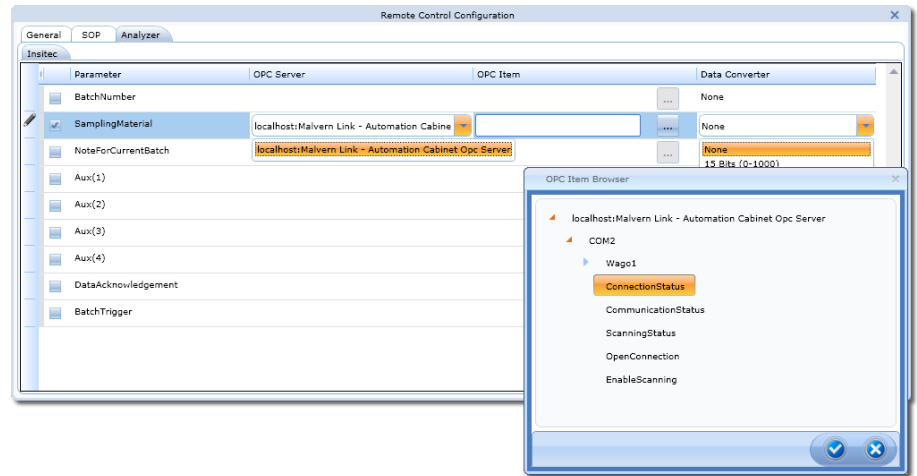
 **Note**
Remote Control Items can be configured only if OPC Servers are added in process definition. This feature is available in Malvern Link II PRO and Malvern Link II ULTRA edition only.



1. On the **Configuration** command ribbon, select **Remote Control** from the **Configuration** group. The remote control items categorized under four tab pages: General, SOP, Analyzer and, if configured, Custom Data Item categories. Note that the **Analyzer** tab page is displayed only when process definition contains an Analyzer device.



2. To configure a remote control item, select the check box next to it.
3. Double click in the **OPC server** area on the item row and select a relevant OPC Server from the drop-down list.
4. Browse and select the required **OPC server** item and click **Ok**.
5. Double click in the data converter area on the item row and select the relevant data converter from the drop-down list.



6. Repeat the above steps to configure all remote control items.

**Note**

In case of Malvern Link II OPC Server, the OPC server item name is auto generated. Users cannot browse the OPC server.

**Note**

Custom Data Items are by default controlled from Malvern Link II OPC server. This mapping is not displayed.

Configure Remote Reporting Items

This section explains the details of Remote Reporting Configuration. Malvern Link II Application reports values of configured reporting items to OLE for Process Control (OPC) server.

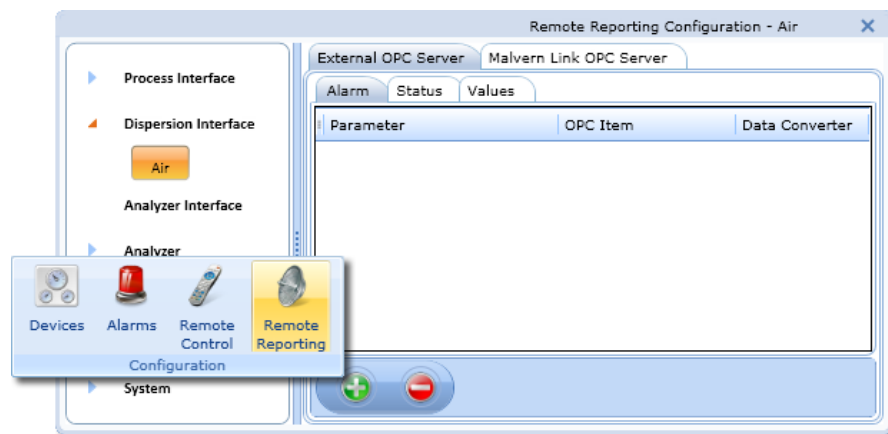
**Note**


Remote Reporting Items can be configured only if OPC Servers are added in process definition.

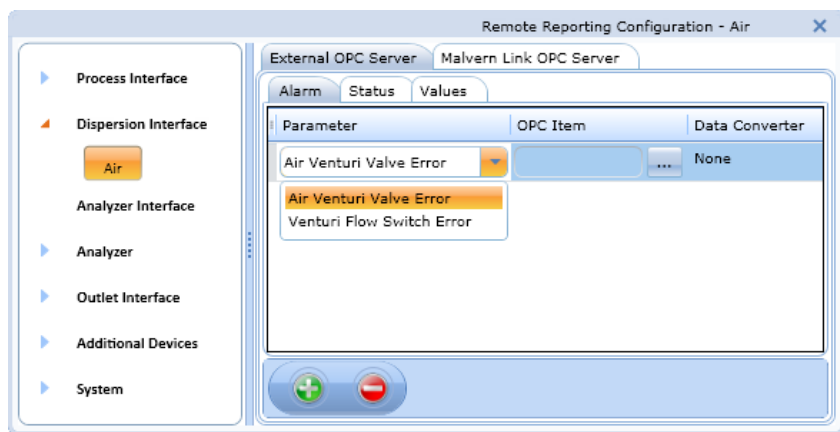
**Note**

This feature is available Malvern Link II PRO and Malvern Link II ULTRA version only.

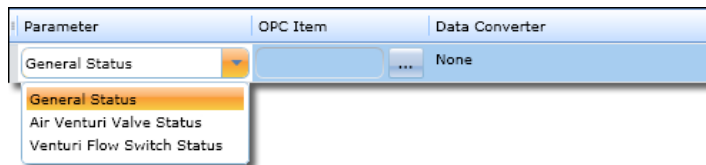
1. On the **Configuration** command ribbon, select **Remote Reporting** from the **Configuration** group. The remote reporting items are categorized under two tab pages: **External OPC Server** and **Malvern Link II OPC Server**. Note that the **Analyzer** tab page is displayed only when process definition contains an Analyzer device.



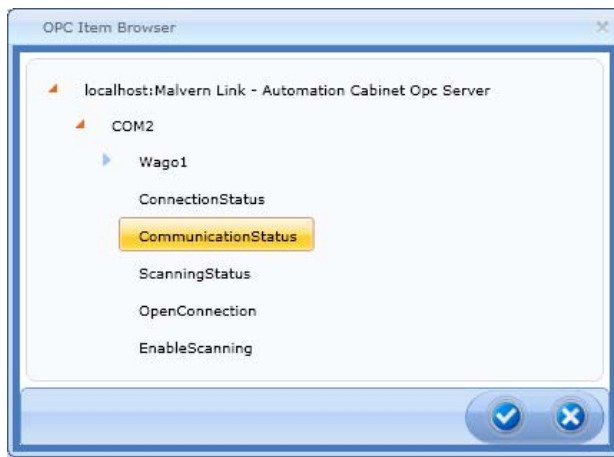
2. Reports for each device, can be added or removed using the buttons at the bottom of the **External OPC Server** tab page.
3. To report a status, an alarm or a value on external OPC server, select the **device**, then select the **Status**, **Alarm** or **Value** tab and select **Add** . An empty entry is created and displayed in selected tab.



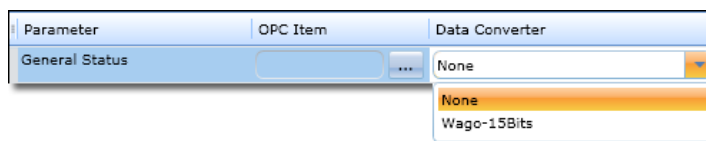
4. Select the **Parameter** to report to external OPC Server from the parameter drop down list.



5. Click **Browse** and select relevant OLE for Process Control (OPC) server item. The selected item is associated with parameter.



6. Select relevant data converter from **Data Converter** drop down list. The selected data converter is associated with the reporting item.



7. Repeat the above steps, to configure the remote reporting for all other required devices.

Reporting On Malvern Link II OPC Server

To report a status, an alarm or a value on Malvern Link II OPC server, select the **Malvern Link II OPC Server** tab and select the required parameters.



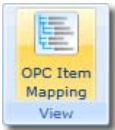
Note

The Custom Data Items are by default reported to Malvern Link II OPC server and this mapping cannot be cleared.

View OPC Item Mapping

This section explains the details of OLE for Process Control (OPC) Server item mapping.



On the **Configuration** command ribbon, select **OPC Item Mapping Reporting** from the **View** group.



The details of all OPC Item mapping in the current process definition is displayed.

Source	Parameter	OPC Server	OPC Item
Source: Device Input Output Item Mapping (21 items)			
Device Input Output Item Mapping	Cascade Diluter.Waste Valve Closed Status	localhost:Malvern Link - Automation Cabinet Opc Server	COM2.Wago1.02_750_430_
Device Input Output Item Mapping	Wet Flow Cell.Wiper Command	localhost:Malvern Link - Automation Cabinet Opc Server	COM2.Wago1.07_750_513_
Device Input Output Item Mapping	Cascade Diluter.Waste Valve Open Status	localhost:Malvern Link - Automation Cabinet Opc Server	COM2.Wago1.02_750_430_
Device Input Output Item Mapping	Cascade Diluter.Dispersant Valve Closed Status	localhost:Malvern Link - Automation Cabinet Opc Server	COM2.Wago1.05_750_513_
Device Input Output Item Mapping	Cascade Diluter.Waste Valve Command	localhost:Malvern Link - Automation Cabinet Opc Server	COM2.Wago1.06_750_513_
Device Input Output Item Mapping	Air Pressure.Switch Status	localhost:Malvern Link -	COM2.Wago1.04_750_610_

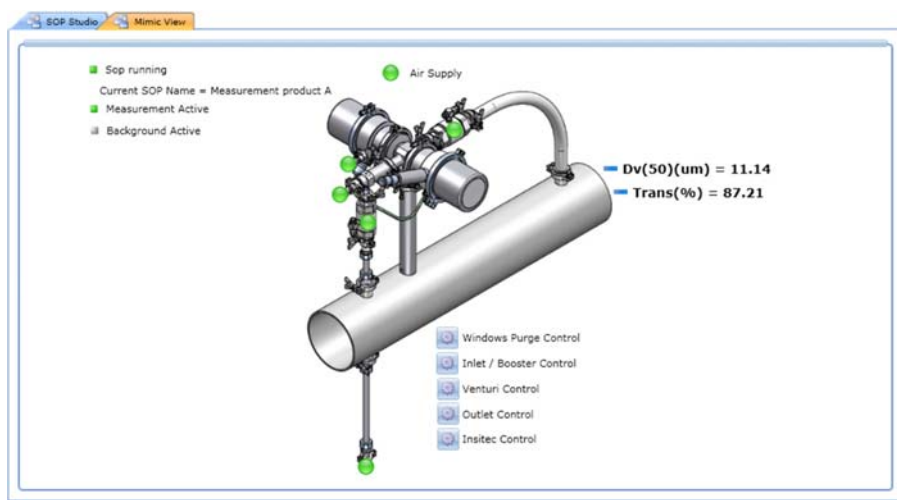
Parameter	Description
Source	Source of OPC Server Item mapping. The values are Automation Device Input Output Mapping Remote Control Mapping Remote Reporting Mapping Custom Data Items
Parameter	Parameter mapped to OPC server item. This item can be a device parameter, custom data item or system status/alarm. It also includes controlling parameters for SOP control/ analyzer control
OPC Server	OPC Server to which parameter is mapped.
OPC Item	The OPC Item to which parameter is mapped
Data Converter	Associated Data Converter

- To **export** the details, click **Export** .
- To **print** the details, click **Print** .

Mimic configuration

The **Mimic view** tab page shows an animated representation of the process installation configuration. The mimic simulates the current operation of the real process installation - the animation devices will activate and indicate depending upon the operation currently being performed within the real installation.

Within **Malvern Link II application**; on the **Home** command ribbon, select **Mimic** from the **View** group. This will display the **Mimic view** tab page. The text or device indicators shown may change according to the device used in the configuration.

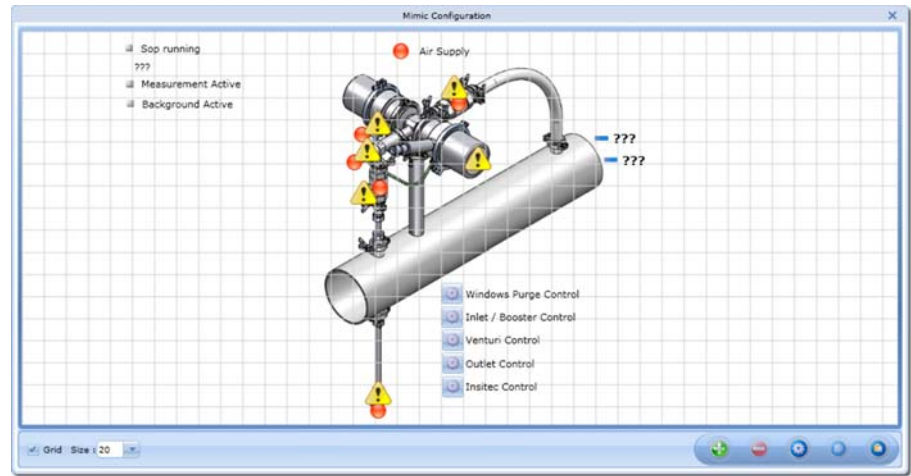


Mimic configuration manager

The Mimic view that is seen in the application is configured by selecting the **Mimic** from the **Configuration** group.



The **Mimic configuration Manager** view will be displayed. This will initially be a **blank** page; see below section for adding a background image.



Controls the grid size displayed



Animation controls:



Add animation



Remove animation



Configure animation



Copy animation

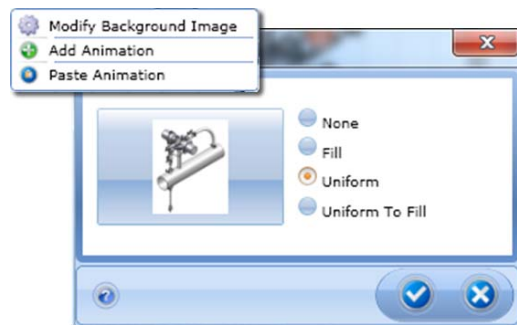


Paste animation

Adding a Background image

A background image first needs to be loaded into the Mimic configuration manager; the animation items will then be added to this.

Right-click the mouse anywhere on the screen - an **action selection box** will appear - select **Modify background image** to display the **background image** selection dialogue.



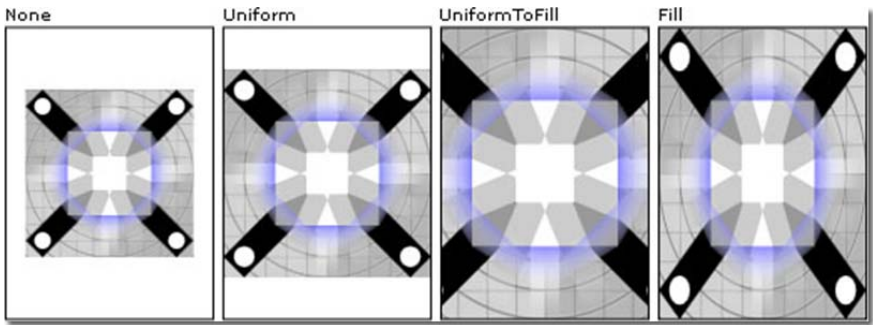
To add a background image, select the image select button and then select how the image will be displayed.




Image select button


Press this button to select an image to be used. Then select a display option (below) for how the image should be presented.

None	The content preserves its original size.
Fill	The content is resized to fill the destination dimensions. The aspect ratio is not preserved.
Uniform	The content is resized to fit in the destination dimensions while it preserves its native aspect ratio.
Uniform To Fill	The content is resized to fill the destination dimensions while it preserves its native aspect ratio. If the aspect ratio of the destination rectangle differs from the source, the source content is clipped to fit in the destination dimensions.

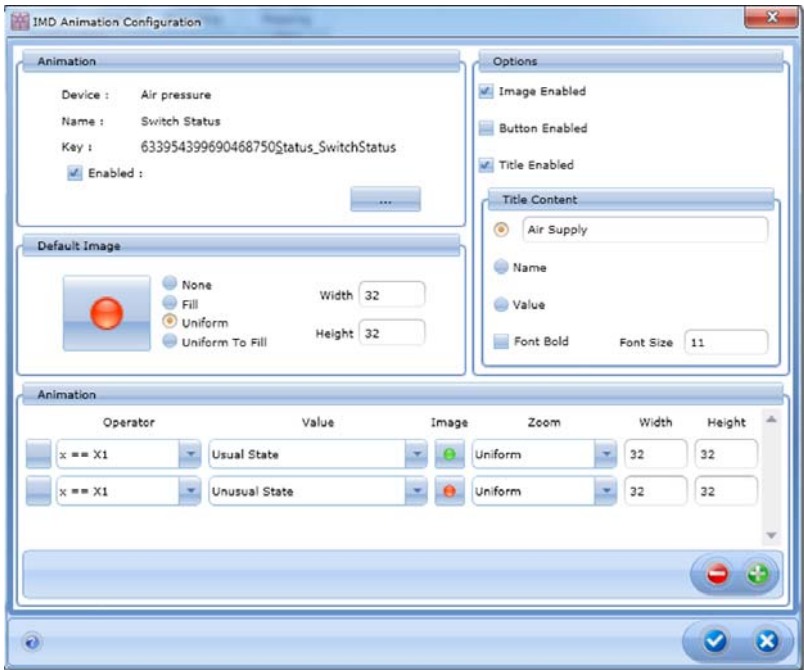


Select the  button once the image selection and display preference is complete.


Configuring the Animation items

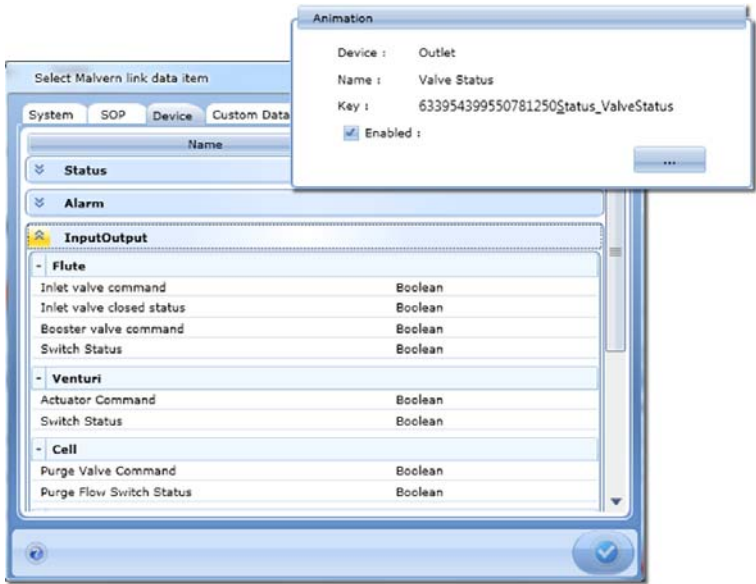
With a background image loaded into the Mimic configuration manager; the animation items can then be added; Select the **Add animation**  button to open the **IMD Animation Configuration dialogue**. Using this, individual animation items can be added that:

- Are linked to a IMD item (Internal Memory Data). This item could be a valve status, an alarm, a PCV, etc.
- A image can be assigned to specific value of the IMD
- A control button added allowing changing the current value of the item.



Animation source

Press the  button to select the animation source. A dialogue window will appear where the item can be selected



Default image

Select **Default image** to display the **animation image** selection dialogue.



To add an animation image, select the **image select button** and then select how the image will be displayed.



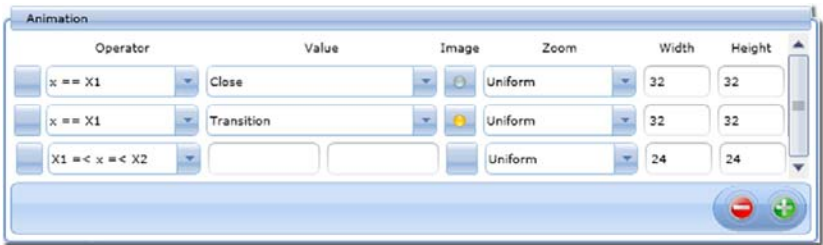
Image select button



Press this button to select an image to be used. Then select a display option (below) for how the image should be presented. (The image shown left is loaded by default)

Width / Height	Alter the image size as required.
None	The content preserves its original size.
Fill	The content is resized to fill the destination dimensions. The aspect ratio is not preserved.
Uniform	The content is resized to fit in the destination dimensions while it preserves its native aspect ratio.
Uniform To Fill	The content is resized to fill the destination dimensions while it preserves its native aspect ratio. If the aspect ratio of the destination rectangle differs from the source, the source content is clipped to fit in the destination dimensions.

Animation parameters

Use this section to define the operational values and settings that the item will conform to.



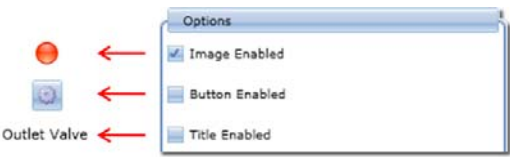
Operator	The current item value (x)
Value	The values that the operator value (x) is compared too (X1 & X2). Example: X1=<x<=X2
Image	Select an image to be used, depending on the operational status. Example: (using lines in screen graphic above)  : Use this image if the current value is equal to Close (line 1)  : Use this image if the current value is equal to Transition (line 2)
Zoom	Select a display (zoom) option for how the image should be presented. The content is resized to fill the destination dimensions. Refer to previous sections.
Width / Height	The size of the image; alter the image size as required.









Animation options

During a Measurement sequence (in run-time), the **Mimic view** can be viewed to show a animated representation of the process installation configuration. It is possible to configure the animation items in the mimic to activate when that item on the mimic is selected. For example a component in the process arrangement can be enabled/disabled by pressing a button image that has been assigned to the animation item for that components.

The options are:

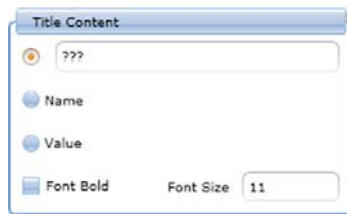
- Button (for manually changing the value of the item)
- Image
- Title



Example of a run-time user interface view	All	  Outlet Valve
Button only		Title + Image Outlet Valve 
Image only		Title + Button Outlet Valve 
Title only	Outlet Valve	Image + Button  

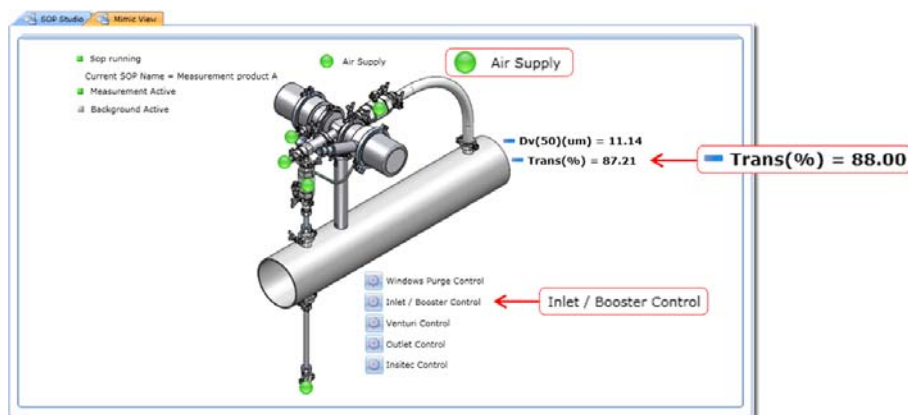
Animation title options

For each Animation item that has been optioned (above), the title can also be changed or refreshed if required.



The title options are:

- A **specific text** entered manually: Inlet / Booster Control
- The explicit **name** of the source: Air Supply
- The current **value** of the source: Trans(%) = 88.00



General Actions Available in SOP Sequence

Overview

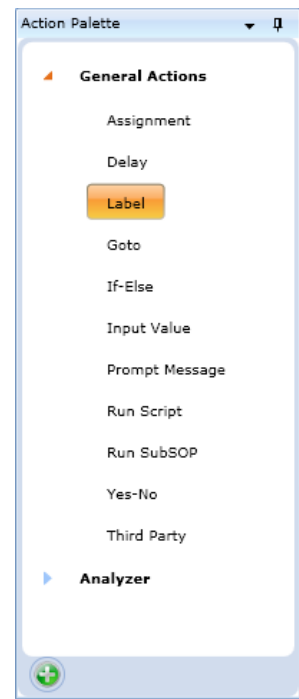
A sequence consists of number of tasks. A task could be an action on an automation device, an action on an analyzer instrument or a user defined script or another SOP. A task could be flow **control actions** such as **Goto** or **If-Else**.

This section explains the **general actions** available in SOP sequences. The general actions are used for flow control, user input and notifications.

The available general actions are:

- Assignment
- Delay
- Label
- GoTo
- If-Else
- Input Value
- Prompt Message
- Run Script
- Run Sub SOP
- Yes-No
- Third Party

The field description for each general action follows:



Actions - Field description

Assignment

Assignment actions set the value of **Custom Data Item**

Parameter	Description
Assign To	Custom data item to which value should be assigned
Value	Value to be assigned to selected Custom Data Item This can be a constant value or you can browse and select required Malvern Link II Data Item value

Delay

Parameter	Description
Delay period	Time for which sequence should wait before executing next step (in seconds) Note: The default value is 1 second and the maximum is 18000 seconds

Label

Parameter	Description
Name	Name of label . This name will be called from a GOTO action. Calling a lable instead of a step number allows modifying the sequence without breaking the references.

GoTo

Parameter	Description
GoTo	Jump to step within a sequence

If Else

Parameter	Description
X Value	The Malvern Link II Data Item whose value is compared with the Y Value

Operator	<p>Comparison Operator</p> <p>Note: The comparison operator depends on the data type of the X Value. For String, Boolean, Enum data types the comparison operators are 'Equals' and 'Not Equals'</p> <p>For UInt32, Int32 and Double data types the comparison operators are 'Equals', 'Not Equals', 'Less Than', 'Less Than Equal To', 'Greater Than', 'Greater Than Equal To'</p>
Y Value	<p>Value that is compared with X Value.</p> <p>This can be a constant value or a value of the Malvern Link II Data Item</p>
Condition Holding Time	<p>Time (in seconds) for which the comparison should evaluate to true.</p> <p>Note:</p> <p>If the comparison evaluates to true for specified time, step mentioned in 'Then' part is executed, otherwise the step in 'Else' part gets executed</p>
GoTo in Then part	Step No which is executed when the comparison evaluates to true
GoTo in Else part	Step No which is executed when comparison evaluates to false

Input Value

The table below explains the **Input Value** action. The User will provide the value of the specified Malvern Link II Data Item during the SOP execution.

Parameter	Description
Assign To	Malvern Link II Data Item whose value is provided by the user
Label	Title of the Input value message box

Prompt Message

The table below explains the Prompt Message action. The Main SOP waits till the user responds to the displayed message.

Parameter	Description
Message	Message
Title	Title of the message box

Run Script

The Run Script action executes a Win Wrap script. The executing SOP will wait for the completion of a script before executing the next step.

Parameter	Description
Script Name	Win wrap macro module name
Script Parameters	String parameter which will be passed to the 'ExecuteScript' method in Macro module

Run Sub SOP

The Run Sub SOP action executes specified system SOPs. The Main SOP will wait for completion of any sub SOP before continuing.



Note

This action can not be added in a system SOP.

Parameter	Description
SOP Name	Name of the System SOP appears.

Yes/No

Parameter	Description
Question	Yes No question
Title	Title of the message box
Goto in Yes part	Jumps to step when user input is 'Yes'
Goto in No part	Jumps to step when user input is 'No'

Third Party

The table below explains the **Third party** action. The Third party action allows the calling any third party application (example notepad, excel,) to be performed.

Parameter	Description
Application Path	Full path of the application (example: C:\Windows\system32\notepad.exe)

Parameter	Optional command line (example : name of the text file to open). The parameters list depends of the application itself.
Starting mode	Windows start up option (maximize, minimize, normal, hidden)

Data Converter Details

The purpose of a Data convertor is to perform conversion from a raw value to an engineering value, and vice-versa. This section details the field descriptions for each data converter.

Raw To Engineering Data Converter

The Raw To Engineering data converter performs the conversions.

- Raw to engineering value
- Engineering to raw value

Parameter	Description
Name	Specify the name of data converter
Raw Min Value	Minimum raw value
Raw Max Value	Maximum raw value
Engg Min Value	Minimum Engineering value
Engg Max value	Maximum Engineering value

Data Conversion Formula:

- $\text{Engg Value} = ((\text{EnggMax} - \text{EnggMin} / \text{RawMax} - \text{RawMin}) \times (\text{RawInput} - \text{RawMin})) + \text{EnggMin}$
- $\text{Raw Value} = ((\text{RawMax} - \text{RawMin} / \text{EnggMax} - \text{EnggMin}) \times (\text{InputEngg} - \text{EnggMin})) + \text{RawMin}$

Precision Shift Data Converter

The Precision Shift data converter shifts the precision of decimal values by the specified **Shift By** value.

Parameter	Description
Name	Specify the name of data converter
Shift By	specify the number of digits to shift by (1-5)

Data Conversion Formula:

- Precision Shift = ROUND (Input Value x (POWER (10, ShiftBy)), 0)
- Precision Shift = ROUND (Input Value/(POWER (10, ShiftBy)), 0) (used when convert back is applied)

Linear Correlation Data Converter

The Linear Correlation data converter accepts different set of values for **A** and **B** where as the **X** is the raw value and **Y** is the converted value.

Parameter	Description
Name	Specify the name of data converter
Value A	specify the value of A
Value B	Specify the value of B

Data Conversion Formula:

- $Y = A * X + B$
- $X = (Y - B) / A$

Exponential Correlation Data Converter

The exponential correlation data converter accepts different set of values for **A** and **B** where as the **X** is the raw value and **Y** is the converted value.

Parameter	Description
Name	Specify the name of data converter
Value A	specify the value of A
Value B	Specify the value of B

Data Conversion Formula

- $Y = A ^ X + B$
- $X = (LOG (Y - B)) / (LOG A)$

Lookup Data Converter

The Lookup data converter specifies different set of values for **X** and **Y** where as the **X** is the raw value and **Y** is the converted value.

Following table explains an example of lookup table

Lower Bound (X)	Upper Bound(X)	(Output) Y
10	20	5
50	100	60
40	80	50

Data Conversion Formula

- $\text{Output} = \text{Lower Bound}(x) < \text{Input} < \text{Upper Bound}(x)$
- $\text{Input} = (\text{Lower Bound}(x) + \text{Upper Bound}(x))/2$


Invert Data Converter

The Invert data converter inverts the input value. It is generally used to convert **Boolean** values or **digital** values which have two states only.

Script Data Converter

Script data converters allow a user to do custom conversion using win wrap basic scripts. This script editor provides a programming environment. You can select the Malvern Link data Items in script data converters to set and get values.

The script data converter template contains the following two functions with signatures:



Note

Do not change the signatures of both the functions. Malvern Link II application calls the function **Convert** and **ConvertBack**.

```
Public Function Convert(ProcessDeinitionName As Object, x as Object) As Object
{
    // Add code here for custom conversion
}

Public Function ConvertBack(ProcessDeinitionName As Object, x as Object) As Object
{
    // Add code here for custom conversion
}
```

Bitwise Data Converter

The Bitwise data converter allows a specific bit in an integer to be changed.

For example:

- Bit 0 : measurement running
- Bit 1 : Background Error
- Bit 2 : Remote Mode

Parameter	Description
Name	Specify the name of data converter
Bit Number	Specify the bit to be changed in the integer
Data Item	Create an internal variable for saving the integer value
Data type	Byte (8 bits) - Integer (16 bits) - Long (32 bits)

Devices

Introduction

For each process installation an arrangement of the Insittec measuring system will have been configured consisting of a combination of automated measuring devices and modules. This chapter describes the details of each automated measurement device that can be used in an installation. Details of the status, alarms, input/output and process variable values for all the devices used in the dashboard will be given. The table below shows the devices available for use in a process installation.

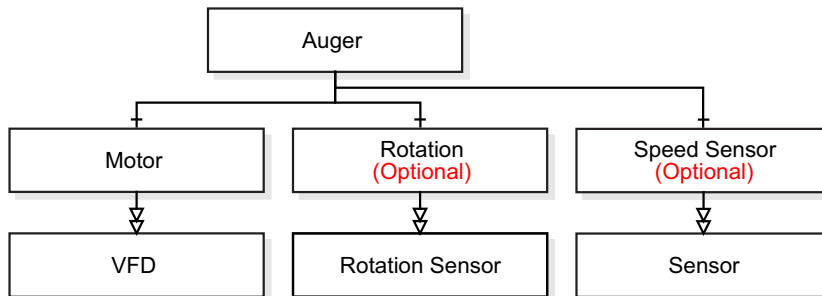
Process Interface	Dispersion Interface	Analyzer Interface
Auger	Venturi	Wet Flow Cell
Valve	Pre-Diluter Tank	Dry Flow Cell
At-Line Feeder	Cascade Diluter	
Rotary Air Lock	Ultrasonic Probe	
Liquid Sampler	Pump	
Piston Sampler		
Screw Sampler		
Flute		
Cement LabSizer		

Analyzer	Outlet Interface	Additional Devices
Insittec	Auger	Valve
Mastersizer 2000	Valve	Switch
Mastersizer 3000	Rotary Air Lock	Sensor
Zetasizer series		Output Controller
		Variable Frequency Driver
		Rotation Sensor

Auger

An **Auger** is a primary sampling device for providing a representative sample flow that is recommended by analyser instrument. A correct flow of sample is important, for if the sample flow is too high or unrepresentative, it may not be possible to measure the sample correctly when utilising a secondary device such as a **Flute**.

Augers can utilise three additional devices: **Variable Frequency Drive (VFD)**, **Rotation Sensor** and **Speed Sensor**. Note that the Variable Frequency Drive (VFD) is a mandatory device. These devices are described later in this section.



i11 8545

Input/Output

Name	Is Mandatory	Type	Description
Auger Mode Manual	No	Digital Input	When the Auger is in manual control, the Auger is controlled from a local panel on the automation cabinet.
Auger Ready	No	Digital Input	It could be a local break Switch for shutting down the high voltage

Configuration Parameters

Augers can utilise three additional devices: **Variable Frequency Drive (VFD)**, **Rotation Sensor** and **Speed Sensor**. These devices are described later in this section.

Status

Name	Description	Value
Is Auger Ready	Indicates that Auger is ready to perform actions.	True
		False
Is Manual Mode	Indicates that Auger is in manual mode.	True
		False
Is Rotation On	Indicates that Auger is rotating. This is True if Rotation Sensor detects rotation	True
		False
Auger Status	Indicates current Auger status.	Started
		Stopped
Auger Mode	Indicates current mode of Auger.	Normal
		Reverse
General Status	<p>General status is a 32 bit size array indicating overall status of a device.</p> <p>Note: This status is available for reporting to OLE for Process Control (OPC) Server only</p>	

Alarms


Name	Description	Value
Auger Error	Returns the current Variable Frequency Drive (VFD) error status	OK
		Error
Rotation Error	Return the current Rotation Sensor error. This value is conditional and linked to VFD Status	OK
		Error
Speed Sensor Error	Current Speed sensor error. This is conditional and linked with VFD Status	OK
		Warning Low
		Warning High
		Error Low
		Error High

Process Control Variable

Name	Description
Setting value	Display the setting value before converting it to raw value
Reading value	Current value read directly from the analogue input and converted to the engineering value

Actions

Name	Parameter	Parameter Description	Action Description
Start	None	None	Starts Auger
Stop	None	None	Stops Auger
Set Mode	Mode	Auger mode values are Normal Reverse	Sets Auger Mode. Auger is stopped before changing the mode
Set Speed	Speed	Speed with which Auger rotates. This is the engineering value before conversion	Sets the Auger Speed. The speed is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

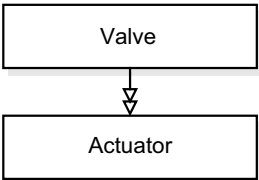


Note

Auger can be operated if Auger is ready and not in manual mode.

Valve

Any **Valve** device will be considered as an Actuator. Each valve device will be characterised as **normally closed** (NC) if the idle state is closed, or **normally open** (NO) if the idle state is open.



ill 8556

Input/Output

Name	Is Mandatory	Type	Description
Actuator Command	Yes	Digital Output	Digital output for opening/closing the valve
Actuator Status Open	No	Digital Input	Digital input to determine state of valve
Actuator Status Closed	No	Digital Input	Digital input to determine state of valve



Configuration Parameters

Name	Description
Error Timeout	Maximum transition time (in seconds) before generating Valve error
Command Value	Actuator Command value when valve is Open
Open Sensor	Actuator Status Open value when valve is Open
Closed Sensor	Actuator Status Closed value when valve is Open

Status

Name	Description	Value
Valve Status	Indicates status of the valve	Open
		Close
		Transition

Alarms

Name	Description	Value	Dash-board Colour Code	Reporting Value
Valve Error	Indicates current valve error value	OK		0
		Error		2

Actions

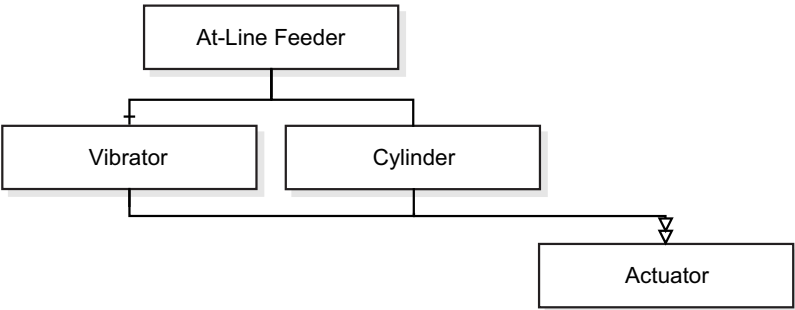
Name	Parameter	Parameter Description	Action Description
Open	Start Cycle	Indicates whether Valve should be opened and closed periodically	Opens valve. When valve is started in cyclic mode, it is kept Open for Time On period and kept Closed for Time Off period
	Time On	Time (in seconds) for which Valve should be kept Open	
	Time Off	Time (in seconds) for which Valve should be kept Closed	
Close	Stop Cycle	Indicates whether the cyclic behaviour should be stopped	Closes valve. When Stop Cycle is selected, stops the valve cycle
Toggle	None	Not applicable	Toggles current state of the valve.

Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are	
		Equal To	
		Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

At Line Feeder

An **At-Line Feeder** allows at-line or off-line measurement. It is used for providing the sample to the instrument. In an installation it will normally consist of a pneumatic system incorporating two additional devices; a cylinder for opening or closing the flow of the sample, and a vibrator for dispatching the sample to the instrument.

These two additional devices, **Vibrator** and **Cylinder**; are classified as **Valves**. Note it is mandatory these devices are used with each At-Line Feeder device utilised in the installation. These additional devices are described elsewhere in this section.



ill 8544

Input/Output

Refer to the Valves description for input and output details of the Vibrator and Cylinder devices. The At Line Feeder itself contains no extra input or outputs.

Configuration Parameters

Refer to the Valves description for Configuration Parameters of the Vibrator and Cylinder devices.

Status

Name	Description	Value
Funnel Status	Indicates current status of Cylinder	Open
		Close
		Transition
Vibration Status	Indicates current status of Vibrator	On
		Off
		Transition

General Status	General status is a 32 bit size array indicating overall status of a device.
	Note: This status is available for reporting to OLE for Process Control (OPC) Server only

Alarms

Name	Description	Value
Funnel Error	Indicates current Cylinder error value	OK
		Error
Vibration Error	Indicates current Vibrator error value	OK
		Error

Actions

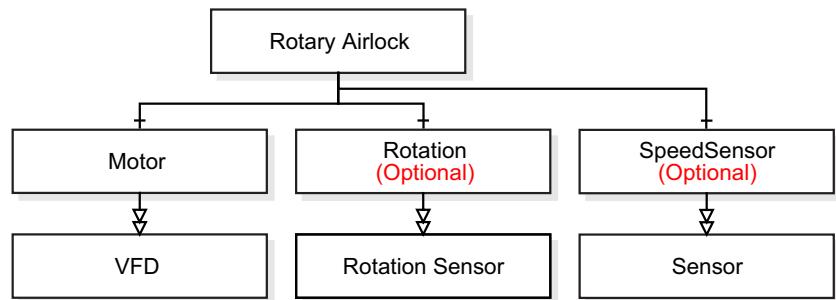
Name	Parameter	Parameter Description	Action Description
Open Funnel	None	Not applicable	Opens Cylinder valve
Close Funnel	None	Not applicable	Closes Cylinder valve
Start Vibration	None	Not applicable	Starts vibration
Stop Vibration	None	Not applicable	Stops vibration
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are	
		Equal To	
		Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Rotary Airlock

The **Rotary Airlock** feeder device is used as an airlock transition point; this seals pressurised systems against any loss of air or gas while still maintaining a flow of material between components with different pressure levels. It is suitable for air lock applications ranging from gravity discharge of filters, rotary Valves, cyclone dust collectors and Rotary Airlock storage devices.

Additionally Rotary airlock devices can be used with precision feeders for dilute phase, and continuous dense phase pneumatic convey systems.

The Rotary Airlock device can utilise three additional devices: **Variable Frequency Drive (VFD)**, **Rotation Sensor** and **Speed Sensor**. Note that the Variable Frequency Drive (VFD) is a mandatory device. These devices are described elsewhere in this section.



ill 8553

Input/Output

Name	Is Mandatory	Type	Description
Rotary Airlock Mode Manual	No	Digital Input	When the RAL is in manual control, the Rotary Airlock is controlled from a local panel on the automation cabinet.
Rotary Airlock Ready	No	Digital Input	It could be a local break Switch for shutting down the high voltage

Configuration Parameters

Refer to the additional devices: **Variable Frequency Drive (VFD)**, **Rotation Sensor** and **Speed Sensor** later in this section for details of configuration parameters.

Status

Name	Description	Value
Is Rotary Airlock Ready	Indicates that Rotary Airlock is ready to perform actions.	True
		False
Is Manual Mode	Indicates that Rotary Airlock is in manual mode.	True
		False
Is Rotation On	Indicates that Rotary Airlock is rotating. This is True if Rotation Sensor detects rotation	True
		False
Rotary Airlock Status	Indicates current Rotary Airlock status.	Started
		Stopped
Rotary Airlock Mode	Indicates current mode of Rotary Airlock.	Normal
		Reverse
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	

Alarms

Name	Description	Value
Rotary Airlock Error	Returns the current VFD error status. Note: In case of Error, Rotary Airlock stops rotating	OK
		Error
Rotation Error	Return the current Rotation Sensor error. This value is conditional and linked to VFD Status	OK
		Error
Speed Sensor Error	Current Speed sensor error. This is conditional and linked with VFD Status	OK
		Warning Low
		Warning High
		Error Low
		Error High

Process Control Variable

Name	Description
Setting value	Display the setting value before converting it to raw value
Reading value	Current value read directly from the analogue input and converted to the engineering value

Actions

Name	Parameter	Parameter Description	Action Description
Start	None	None	Starts Rotary Airlock
Stop	None	None	Stops Rotary Airlock
Set Mode	Mode	Rotary Airlock mode values are Normal Reverse	Sets Rotary Airlock Mode. Rotary Airlock is stopped before changing the mode
Set Speed	Speed	Speed with which Rotary Airlock rotates. This is the engineering value before conversion	Sets the Rotary Airlock speed. The speed is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

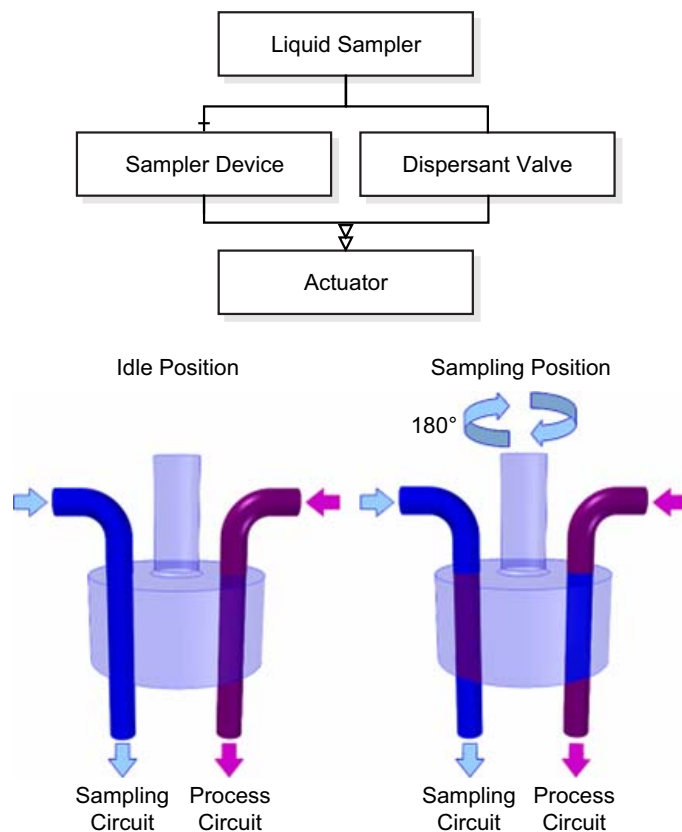
**Note**

Rotary Airlock can be operated if it is ready and not in manual mode.

Liquid Sampler

A **Liquid Sampler** is a device that enables sampling to be conducted in liquid process line is without stopping the sample flow.

These two additional devices, **Sampler valve** and **Dispersant valve** are used with the Liquid sampler. Note it is mandatory these devices are used with each Liquid sampler device utilised in the installation. These additional devices are described elsewhere in this section.



ill 8550 / 8559

Input/Output

Refer to the valves description for input and output details of the Sampler and Dispersant devices. The Liquid Sampler itself contains no extra input or outputs.

Configuration Parameters

Refer to the Valves description for Configuration Parameters of the Sampler valve and Dispersant valve devices.

Status

Name	Description	Value
Sampler Status	Indicates current status of Sampler device	Position 1
		Position 2
		Transition
Dispersant Valve Status	Indicates current status of Dispersant Valve	Open
		Closed
		Transition
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	

Alarms

Name	Description	Value
Sampler Error	Indicates current Sampler error value	OK
		Error
Dispersant Valve Error	Indicates current Dispersant Valve error value	OK
		Error

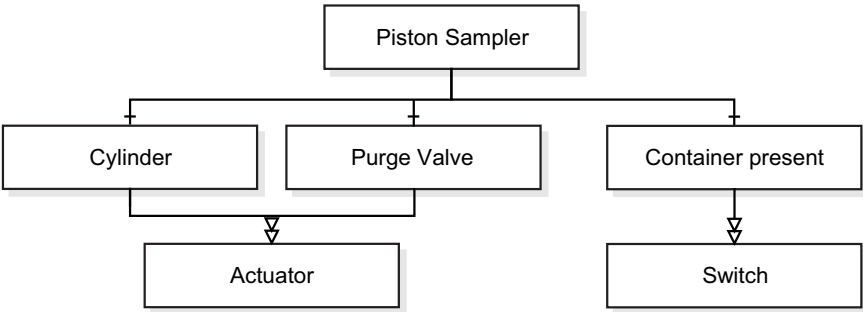
Actions

Name	Parameter	Parameter Description	Action Description
Toggle Sampler	None	Not applicable	Toggles sampler device
Open Dispersant Valve	None	Not applicable	Opens Dispersant valve
Close Dispersant Valve	None	Not applicable	Closes Dispersant valve
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Piston Sampler

The **Piston Sampler** is intended to automatically collect samples from the process line for laboratory analysis. The sampler will collect samples at a rate defined by the user until the collection vessel is full. When the container is full the collection of samples will stop until the container is emptied; the cycle will then repeat until the system is manually stopped. The sampler is an independent device and does not synchronise with the operation of the On Line sampling system.

The Piston Sampler utilises three additional devices, **Cylinder Valve**, **Purge Valve** and **Container Present Switch**. Note it is mandatory these devices are used with each Piston Sampler device utilised in the installation. These additional devices are described elsewhere in this section.



iii 8551

Input/Output

Refer to the valves description for input and output details of the Cylinder and Purge devices. Refer to the switches description for input and output details of the container pressure device. The Piston Sampler itself contains no extra input or outputs.

Configuration Parameters

Name	Description
Sampling Time	Time (in seconds) required to collect a sample
Emptying Time	Time required to empty the sampler
Container Full	Number of samples that can be held in a container
Sequence Duration	Time (in minutes) required to complete one collection sequence
Container Count	Number of containers to be counted when running Batch collection mode

Cleaning Time	Time (in seconds) for which Air Purge Valve should be kept Open
Auto Restart	Determines if the collection should restart automatically after an incident
Push Air	Determines if the cleaning valve should be opened during emptying position

Status

Name	Description	Value
Is Cycle Running	Indicates whether Sample collection sequence is executing	True
		False
Current Collection Mode	Indicates current sample collection mode	None
		Continuous
		Batch
		One Shot
Sampler Position	Indicates current position of Sampler.	Sampling Position
		Emptying Position
		Transition
Air Purge Status	Indicates current state of Air Purge Valve	Open
		Close
		Transition
Is Container Present	Indicates whether the sample collection container is in place	True
		False
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	

Alarms

Name	Description	Value
Sampler Error	Indicates current Sampler error value	OK
		Error
Air Purge Error	Indicates current Air Purge Valve error value	OK
		Error

Container Present	Indicates Container Present switch	OK
Error	error value	Error

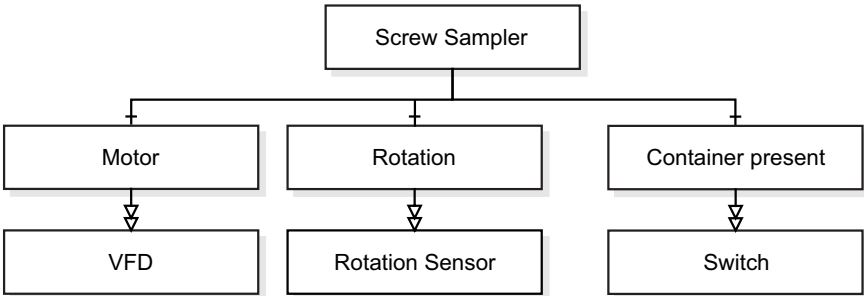
Actions

Name	Parameter	Parameter Description	Action Description
Start Cycle	Collection Mode	Indicates the sample collection mode type. The values are Continuous Batch One Shot	Starts sample collection cycle
Stop Cycle	None	Not applicable	Stops sample collection cycle
Open Purge	None	Not applicable	Opens Air Purge valve
Close Purge	None	Not applicable	Closes Air Purge valve
Sampling Position	None	Not applicable	Sets cylinder in Sampling position
Cleaning Position	None	Not applicable	Sets cylinder in Cleaning position
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Screw Sampler

The **Screw Sampler** is intended to automatically collect samples from the process line for laboratory analysis. The sampler will collect samples at a rate defined by the end user until the collection vessel is full. When the container is full the collection of samples will stop until the container is emptied; the cycle will then repeat until the system is manually stopped. The sampler is an independent device and does not synchronise with the operation of the On Line sampling system.

The **Screw Sampler** utilises three additional devices, **Screw** (a VFD device), **Rotation Sensor** and **Container Present Switch**. Note it is mandatory that a Screw and Container Present Switch device are used with each Screw Sampler device utilised in the installation. These additional devices are described elsewhere in this section.



ill 8554

Input/Output

Refer to the Variable Frequency Drive (VFD) description for input and output details of the Screw device. Refer to the Sensor description for input and output details of the Rotation Sensor. Refer to the Switches description for input and output details of the Container pressure device. The Screw Sampler itself contains no extra input or outputs.

Configuration Parameters

Name	Description
Sampling Time	Time (in seconds) required to collect a sample
Emptying Time	Time required to empty Screw
Container Full	Number of samples that can be held in a container
Sequence Duration	Time (in minutes) required to complete one collection sequence

Container Count	Number of containers to be counted when running Batch collection mode
Auto Restart	Determines if the collection should restart automatically after an incident

Status

Name	Description	Value
Is Cycle Running	Indicates whether Sample collection sequence is executing	True
		False
Current Collection Mode	Indicates current sample collection mode	None
		Continuous
		Batch
		One Shot
Screw Status	Indicates current status of Screw.	Off
		On
Is Screw Rotating	Indicates whether Screw is rotating	True
		False
Is Container Present	Indicates whether the sample collection container is in place	True
		False
General Status	General status is a 32 bit size array indicating overall status of a device.	

Alarms

Name	Description	Value
Screw Error	Indicates current Screw error value	OK
		Error
Container Present Error	Indicates Container Present switch error value	OK
		Error

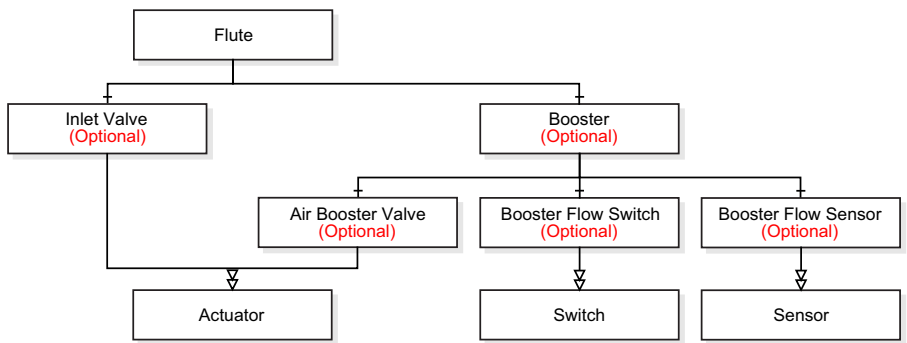
Actions

Name	Parameter	Parameter Description	Action Description
Start Cycle	Collection Mode	Indicates the sample collection mode type. The values are Continuous Batch One Shot	Starts sample collection cycle
Stop Cycle	None	Not applicable	Stops sample collection cycle
Start Screw	None	Not applicable	Starts screw
Stop Screw	None	Not applicable	Stops screw
Set Speed	Speed	Speed with which Screw should rotate.	Sets Screw speed. The speed is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Flute

A **Flute** device enables sample to be removed from a process line. It is normally a ½ inch pipe with one or more holes present along one side. A flute device in an installation may incorporate additional devices; Valves for isolating the analyser from the process line, and booster devices for diluting and optimizing the sampling.

Flutes can utilise four additional devices: **Inlet Valve**, **Air Booster Valve**, **Booster Flow Switch** and **Booster Flow Sensor**. These additional devices are optional and are described elsewhere in this section.



iii 8549

Input/Output

Refer to the valves description for input and output details of the Inlet and Air booster valve devices. Refer to the Sensor description for input and output details of the Booster flow Sensor. Refer to the Switches description for input and output details of the Booster Flow switch. Flute devices contain no extra input or outputs.

Configuration Parameters

Name	Description
Flute Type	Type of the Flute. The values are
	J Probe
	Open
Hole Size	Hole size (in millimetre)
Hole Count	Number of holes

Status

Name	Description	Value
Inlet Valve Status	Indicates current status of Screw.	Open
		Close
		Transition
Air Booster Valve Status	Indicates current state of Air Booster valve	Open
		Close
		Transition
Booster Flow Switch Status	Indicates current status of Booster Flow Switch	Usual State
		Unusual State
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control	

Alarms

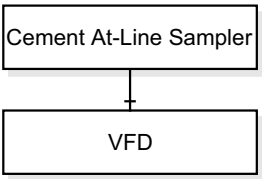
Name	Description	Value
Inlet Valve Error	Indicates current Inlet Valve error value	OK
		Error
Air Booster Valve Error	Indicates current Air Booster Valve error value	OK
		Error
Booster Flow Switch Error	Indicates current Booster Flow Switch error value	OK
		Error
Booster Flow Sensor Error	Indicates current Booster Flow Sensor error value	OK
		Warning Low
		Warning High
		Error Low
		Error High

Actions

Name	Parameter	Parameter Description	Action Description
Open Inlet Valve	None	Not applicable	Opens Inlet Valve
Close Inlet Valve	None	Not applicable	Closes Inlet Valve
Toggle Inlet Valve	None	Not applicable	Toggles Inlet Valve
Open Air Booster Valve	None	Not applicable	Opens Air Booster Valve
Close Air Booster Valve	None	Not applicable	Closes Air Booster Valve
Toggle Air Booster Valve	None	Not applicable	Toggles Air Booster Valve
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Cement LabSizer

The **Cement LabSizer** device is used for the sampling of cement from a process line. It is a device designed and optimised for the measurement of cement. The Cement LabSizer utilises a **Variable Frequency Drive (VFD)** as an additional device and it is mandatory that this VFD device is used with each Cement LabSizer device utilised in the installation. This device is described later in this section.



iii 8547

Input/Output

Refer to the Variable Frequency Drive (VFD) description for input and output details. The Cement LabSizer itself contains no extra input or outputs.

Configuration Parameters

Refer to the Variable Frequency Drive (VFD) description for details of configuration parameters.

Status

Name	Description	Value
Cement LabSizer Status	Indicates status of Cement LabSizer.	Started
		Stopped
Cement LabSizer Mode	Indicates current Cement LabSizer mode	Reverse
		Normal
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Alarms

Name	Description	Value
Cement LabSizer Error	Indicates current Cement LabSizer error value	OK Error

Actions

Name	Parameter	Parameter Description	Action Description
Start	None	Not applicable	Starts Cement LabSizer
Stop	None	Not applicable	Stops Cement LabSizer
Set Mode	Mode	Cement LabSizer mode values are Normal Reverse	Sets Cement LabSizer Mode. Cement LabSizer is stopped off before changing the mode
Set Speed	Speed	Speed with which Cement LabSizer operate. This is the engineering value before conversion	Sets the Cement LabSizer Speed. The speed is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

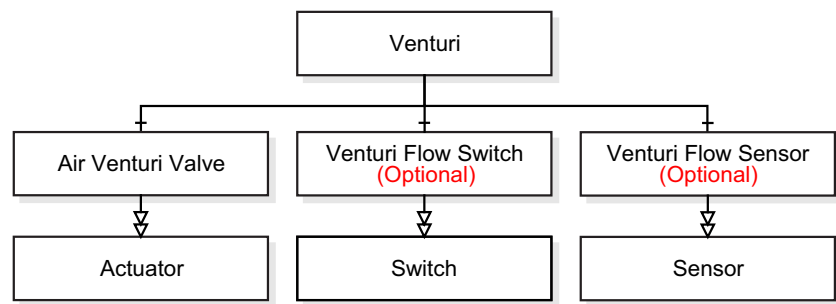
Process Control Variable

Name	Description
Setting Value	Display the setting value before converting to raw value

Venturi

A **Venturi** or educator is a device used for the transporting and dispersing of the sample.

A Venturi can utilise three additional devices, **Air Venturi Valve**, **Venturi Flow Switch** and **Venturi Flow Sensor**. Note it is mandatory that an Air Venturi Valve device is used with each Venturi device utilised in the installation.



iii 8557

Input/Output

Refer to the Valves description for input and output details of the Air Venturi Valve device. Refer to the Switches description for input and output details of the Venturi Flow Switch. Refer to the Sensors description for input and output details of the Venturi Flow Sensor device. The Venturi itself contains no extra input or outputs.

Configuration Parameters

Name	Description
Venturi Type	Type of the Venturi. The values are 90 Degrees Coaxial Fox

Status

Name	Description	Value
Air Venturi Valve Status	Indicates current state of Air Venturi valve	Open
		Closed
		Transition
Venturi Flow Switch Status	Indicates current status of Venturi Flow Switch	Unusual State
		Usual State
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Actions

Name	Parameter	Parameter Description	Action Description
Open Air Venturi Valve	None	Not applicable	Opens Air Venturi Valve
Close Air Venturi Valve	None	Not applicable	Closes Air Venturi Valve
Toggle Air Venturi Valve	None	Not applicable	Toggles Air Venturi Valve
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are	
		Equal To	
		Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

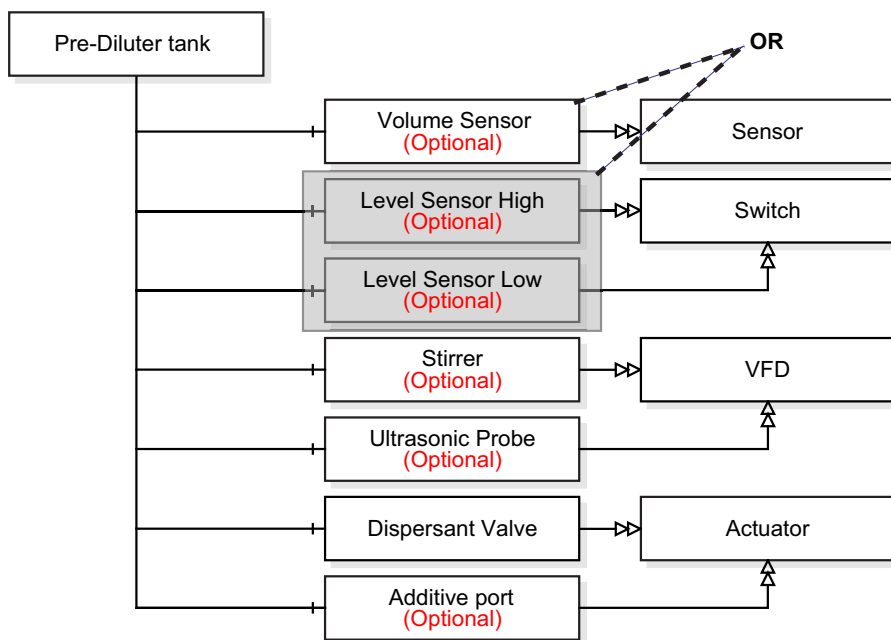
Alarms

Name	Description	Value
Air Venturi Valve Error	Indicates current Air Venturi Valve error value	OK
		Error
Venturi Flow Switch Error	Indicates current Venturi Flow Switch error value	OK
		Error
Venturi Flow Sensor Error	Indicates current Venturi Flow Sensor error value	OK
		Warning Low
		Warning High
		Error Low
		Error High

Pre Diluter Tank

After sampling small volume of slurry, a **Pre Diluter tank** will be used to pre-dilute the sample.

A **Pre Diluter tank** can utilise upto seven additional devices: **Ultrasonic Probe**, **Stirrer** (a VFD device), **Additive Port** and **Dispersant Valves**, and **Volume**, **Low Level** and **High Level Sensors**. These additional devices are all optional and are described elsewhere in this section.



ill 8560

Input/Output

Refer to the Variable Frequency Drive (VFD) description for input and output details of the Stirrer device. Refer to the valves description for input and output details of the Additive Port and Dispersant Valves devices. Refer to the Sensor description for input and output details of the Volume, Low Level and High Level Sensors. The Pre Diluter Tank device itself contains no extra input or outputs.

Configuration Parameters

Refer to the additional devices indicated above for details of configuration parameters.

Status

Name	Description	Value
Level Status	Indicates material level in the tank	None
		Low Level
		High Level
		Transition
Stirrer Status	Indicates current status of Stirrer	Off
		On
Stirrer Mode	Indicates current mode of Stirrer	Reverse
		Normal
Ultrasonic Status	Indicates current status of Ultrasonic Probe	Off
		On
Dispersant Valve Status	Indicates current status of dispersant valve	Open
		Closed
		Transition
Additive Port Status	Indicates current status of additive port	Open
		Closed
		Transition
General Status	<p>General status is a 32 bit size array indicating overall status of a device.</p> <p>Note: This status is available for reporting to OLE for Process Control (OPC) Server only</p>	Not applicable

Process Control Variable

Name	Description
Volume	The material volume in the tank. This is the engineering value after conversion
Stirrer Speed	Setting speed of stirrer. This is the engineering values before conversion
Ultrasonic Power	Setting power of Ultrasonic Probe. This is the engineering value before conversion

Alarms

Name	Description	Value
Stirrer Error	Indicates current Stirrer error value	OK
		Error
Ultrasonic Probe Error	Indicates Ultrasonic Probe error value	OK
		Error
Dispersant Valve Error	Indicates current Dispersant Valve error value	OK
		Error
Additive Port Error	Indicates current Additive Port error value	OK
		Error
		Error
Volume Sensor Error	Indicates current Volume Sensor error value	OK
		Warning Low
		Warning High
		Error Low
		Error High

Actions

Name	Parameter	Parameter Description	Action Description
Start Stirrer	None	Not applicable	Starts Stirrer
Stop Stirrer	None	Not applicable	Stops Stirrer
Set Stirrer Mode	Mode	Stirrer Mode. The values are Normal Reverse	Sets Stirrer mode. Stirrer is stopped before changing the mode
Set Stirrer Speed	Speed	Speed with which stirrer operate.	Sets Stirrer speed. The speed is set according to the configured limits
Start Ultrasonic Probe	None	Not applicable	Starts Ultrasonic Probe
Stop Ultrasonic Probe	None	Not applicable	Stops Ultrasonic Probe

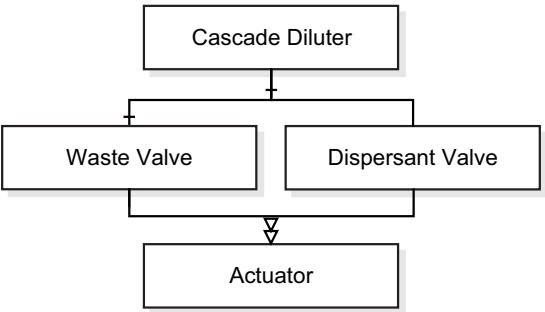
Set Ultrasonic Power	Power	Ultrasonic probe power	Sets Ultrasonic probe power. The power is set according to the configured limits
Open Dispersant Valve	None	Not applicable	Opens Dispersant Valve
Close Dispersant Valve	None	Not applicable	Closes Dispersant Valve
Open Additive Port	None	Not applicable	Opens Additive Port
Close Additive Port	None	Not applicable	Closes Additive Port
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Cascade Diluter

The **Cascade Diluter** performs two functions:

- Dilute the sample
- Transport the sample to the analyser device

The Cascade Diluter can utilise two additional devices; a **Waste Valve** and **Dispersant Valve**. Note it is mandatory that a Dispersant Valve device is used with each Cascade Diluter device utilised in the installation. These additional devices are described elsewhere in this section.



ill 8546

Input/Output

Refer to the valves description for of input and output details of the Waste and Dispersant valve devices. The Cascade Diluter itself contains no extra input or outputs.

Configuration Parameters

Refer to the additional devices indicated above for details of configuration parameters.

Status

Name	Description	Value
Waste Valve Status	Indicates current status of Waste Valve	Open
		Closed
		Transition
Dispersant Valve Status	Indicates current status of Dispersant Valve	Open
		Closed
		Transition

General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable
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Alarms

Name	Description	Value
Waste Valve Error	Indicates current Waste Valve error value	OK Error
Dispersant Valve Error	Indicates current Dispersant Valve error value	OK Error

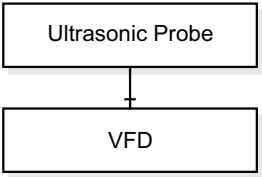
Actions

Name	Parameter	Parameter Description	Action Description
Open Waste Valve	None	Not applicable	Opens Waste valve
Close Waste Valve	None	Not applicable	Closes Waste valve
Open Dispersant Valve	None	Not applicable	Opens Dispersant valve
Close Dispersant Valve	None	Not applicable	Closes Dispersant valve
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Ultrasonic Probe

The **Ultrasonic Probe** is used for dispersing sample.

The Ultrasonic Probe can utilise a **Variable Frequency Drive (VFD)** as an additional device. Note that the Variable Frequency Drive (VFD) is a mandatory device and must be used with each Ultrasonic Probe device utilised in the installation. This device is described elsewhere in this section.



iii 8555

Input/Output

Refer to the Variable Frequency Drive (VFD) description for input and output details. The Ultrasonic Probe itself contains no extra input or outputs.

Configuration Parameters

Refer to the Variable Frequency Drive (VFD) description for details of configuration parameters.

Status

Name	Description	Value
Ultrasonic Probe Status	Indicates Ultrasonic Probe status	Started
		Stopped
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Alarms

Name	Description	Value
Ultrasonic Probe Error	Indicates current Ultrasonic Probe error value	OK
		Error

Process Control Variable

Name	Description
Setting Power	Display the setting power. This is the engineering value before conversion to raw value.

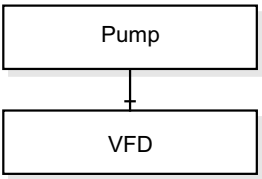
Actions

Name	Parameter	Parameter Description	Action Description
Start Ultrasonic	None	Not applicable	Starts Ultrasonic Probe
Stop Ultrasonic	None	Not applicable	Stops Ultrasonic Probe
Set Power	Power	Ultrasonic probe power value. This is the engineering value before conversion	Sets Ultrasonic Probe power. The power is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Pump

The **Pump** can be used for transporting the sample.

The Pump can utilise a **Variable Frequency Drive (VFD)** as an additional device. Note that the Variable Frequency Drive (VFD) is a mandatory device and must be used with each Pump device utilised in the installation. This device is described elsewhere in this section.



iii 8552

Input/Output

Refer to the Variable Frequency Drive (VFD) description for input and output details. The Pump itself contains no extra input or outputs.

Configuration Parameters

Refer to the Variable Frequency Drive (VFD) description for details of configuration parameters.

Status

Name	Description	Value
Pump Status	Indicates pump status	Started
		Stopped
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Alarms

Name	Description	Value
Pump Error	Indicates the current pump error value	OK Error

Process Control Variable

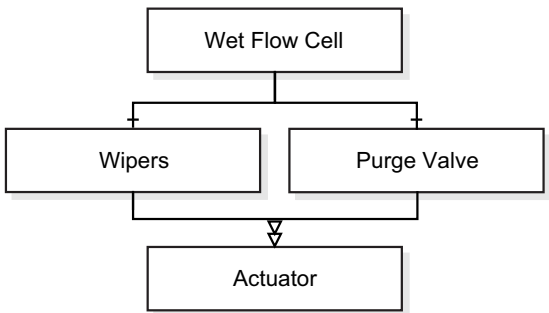
Name	Description
Setting Value	Setting Value. This is the engineering value before conversion.

Actions

Name	Parameter	Parameter Description	Action Description
Start	None	Not applicable	Starts Pump
Stop	None	Not applicable	Stops Pump
Set Value	Value	Value with which Pump operates	Sets Pump value. The Value is set according to the configured allowed limits
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Wet Flow Cell

The **Wet Flow Cell** is the measurement area for the process installation. Within this area the sample is exposed to the laser. For reliable measurement results it is essential that the windows within the flow cell are kept clean. A Wet Flow Cell can utilise two additional devices: **Wiper** and **Purge Valves**. These additional devices are optional and are described elsewhere in this section.



iii 8558

Input/Output

Refer to the valves description for input and output details of the Wiper and Purge valve devices. The Wet Flow Cell device contains no extra input or outputs.

Configuration Parameters

Refer to the additional devices indicated above for details of configuration parameters.

Status

Name	Description	Value
Wiper Status	Indicates current status of Wiper	Idle Position
		Cleaning Position
		Transition
Purge Valve Status	Indicates current status of Purge Valve	Open
		Closed
		Transition
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Alarms

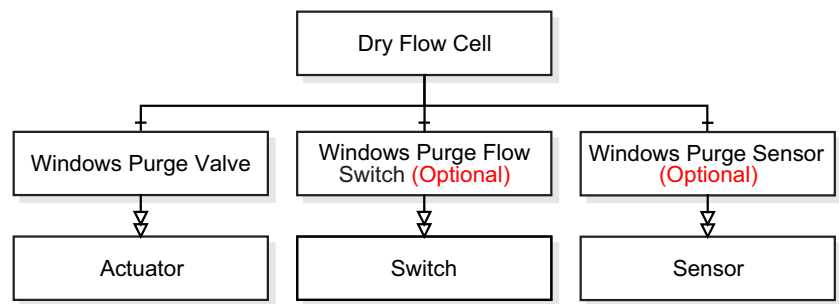
Name	Description	Value
Wiper Error	Indicates current Wiper error value	OK
		Error
Purge Valve Error	Indicates current Purge Valve error value	OK
		Error

Actions

Name	Parameter	Parameter Description	Action Description
Wipe	Wipe Time	Time for which Wiper should be in cleaning position	Wipes the cell windows
Open Purge Valve	None	Not applicable	Opens Purge valve
Close Purge Valve	None	Not applicable	Closes Purge valve
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Dry Flow Cell

The **Dry Flow Cell** is the measurement area for the process installation. Within this area the sample is exposed to the laser. For reliable measurement results it is essential that the windows within the flow cell are kept clean. A Dry Flow Cell can utilise three additional devices: **Windows Purge Valve**, **Windows Purge Flow Switch** and **Windows Purge Sensor**. Note it is mandatory that a Windows Purge Valve is used with each Dry Flow cell utilised in the installation. These additional devices are described elsewhere in this section.



ill 8548

Input/Output

Refer to the Valves description for input and output details of the Windows Purge valve. Refer to the Switches description for input and output details of the Windows Purge Flow switch. Refer to the Sensor description for input and output details of the Windows Purge Sensor. The Dry Flow Cell device contains no extra input or outputs.

Configuration Parameters

Name	Description
Flow Cell Type	Type of the Dry Flow Cell. The values are
	Insittec 2000
	Insittec 2004
	Insittec 2008

Status

Name	Description	Value
Windows Purge Valve Status	Indicates current state of Windows Purge valve	Open
		Closed
		Transition
Windows Purge Flow Switch Status	Indicates current status of Windows Purge Flow Switch	Unusual State
		Usual State
General Status	<p>General status is a 32 bit size array indicating overall status of a device.</p> <p>Note: This status is available for reporting to OLE for Process Control (OPC) Server only</p>	Not applicable

Alarms

Name	Description	Value
Windows Purge Valve Error	Indicates current Air Windows Purge Valve error value	OK
		Error
Windows Purge Flow Switch Error	Indicates current Windows Purge Flow Switch error value	OK
		Error
Windows Purge Sensor Error	Indicates current Windows Purge Sensor error value	OK
		Warning Low
		Warning High
		Error Low
		Error High

Actions

Name	Parameter	Parameter Description	Action Description
Open Windows Purge Valve	None	Not applicable	Opens Windows Purge Valve
Close Windows Purge Valve	None	Not applicable	Closes Windows Purge Valve
Toggle Windows Purge Valve	None	Not applicable	Toggles Windows Purge Valve

Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Insitec

The **Insitec** has been designed to measure particle size or more specifically, the distribution of different sizes within a sample. It is typically installed as an integral part of a process control plant, where it is used to monitor and optimise the process.

Particle size measurement is continuous, automatic, and is done locally, without the need to remove samples to a laboratory for analysis.

Status

Instrument Status:

Name	Description
Detector Connected	Connection status of detector module
Detector Serial Number	Serial number of detector
Detector Type String	Detector Type
Instrument Connected	Connection status of Instrument
Instrument Manual	Status of Instrument manual override
Instrument Type String	Description of the instrument
Laser Connected	Connection status of Laser module
Laser Interlock	Instrument interlock status
Lens Type String	Range lens in use
System Serial Number	Serial number of the instrument
Beam Diameter String	Laser beam diameter
Gain String	System gain
Instrument Type	Type of the instrument
Laser Status	Status of the laser
Wavelength String	System laser wavelength

Real Time Measurement Status:

Name	Description
Measurement Active	Measurement status
Measurement Error Message	Explicit measurement error message
Measurement Error Code	Measurement error code
Measurement Valid	Validity of measurement
Measurement Warning	Warning status of measurement
Measurement Error	Error status of measurement

Background Status:

Name	Description
Background Active	Status of background measurement
Background Valid	Validity status of background measurement
Background Warning	Warning status of background measurement
Background Error	Error status of background measurement

Live Scattering Status:

Name	Description
Live Scattering Active	Status of light scattering measurement

Alarms

Name and description
No PSD Data Available
Low Scattering Signal
Low Transmission
Signal outlier found

Iteration count exceeded in PSD analysis
Iteration count exceeded in multiple scattering analysis
Scattering matrix not found
Low laser power monitor
Multiple scattering module not available
Signal saturation
Imaging matrix not found or imaging error
No valid background available
Spray settings not found
Not enough scattering detectors above threshold for analysis
Not enough size range for analysis
Error in PSD correlation function
Missing light background
High light background signal (average)
Low background light transmission
Light background signal outlier
Light background signal saturation
Missing dark background
High dark background signal (average)
Dark background signal outlier
Dark background signal saturation
Communications port error
Electronics not connected or not responding
Detector not connected
Laser manual override on
Instrument open
Laser not connected
Zero scans in PSD record

Values

Process Control Variables:

Name	Description
Dv (X1) (µm)	Volume percentile Dv(X1)
% < x1 (µm)	% Volume < X1

% < x1 (mesh)	% Volume < X1
% > x1 (μm)	% Volume > X1
% > x1 (mesh)	% Volume > X1
X1 < % < X2	X1 < %Volume < X2
[Dv(X1) – Dv(X2)]/ Dv(50)	Span - [Dv(X1) – Dv(X2)]/Dv(50)
SSA (m2/cc)	Specific surface area (SSA)
Trans (%)	Transmission
Obs (%)	Obscuration = 100 – Transmission
Cv (PPM)	Volume concentration - Cv
Dv(X1)/Dv(X2)	Ratio - Dv(X1)/Dv(X2)
Blaine (m2/kg)	Blaine Number
Blaine (cm2/g)	Blaine Number (cgs units)
Sr[x1]	Raw scattering signal on detector X1
Sc[x1]	Corrected scattering signal on detector X1
D[x1][x2] (μm)	Derived diameter - D[X1][X2]
GSD (μm)	Geometric Standard Deviation
Aux x1	Auxiliary value on channel X1 (1 to 4)
ASD (μm)	Arithmetic standard deviation
Drr (μm)	Rosin-Rammler parameter X
Nrr	Rosin-Rammler parameter N
BI (x1)	Light background on detector X1
RTSizer PCV Current (x1)	RTSizer PCV

Measurement Variables:

Name	Description
Current File Name	Measurement file name
Current Material Name	Current product name
Current Lot Name	Current lot ID
Current Notes Name	Current notes
Time Stamp	Time stamp of current measurement
Measurement Duration	Duration of measurement

Data Dark Background	Array containing dark background of current measurement
Data Light Background	Array containing light background of current measurement
Data Raw Scattering	Array containing raw scattering of current measurement
Data Corrected Scattering	Array containing corrected scattering of current measurement
Data Distribution Frequency	Array containing full particle size distribution
Data Distribution Size	Array containing size of current particle size distribution
Data Distribution Cumulative	Array containing cumulative size of current particle size distribution

Actions

Name	Parameter	Parameter Description	Action Description
Start Measurement	File Name	Measurement filename with complete file path for saving the data (*.PSH file)	Starts the measurement
	Update Period	Update period measurement: 250 ms 500 ms 1 to 60 Sec	
	Saving Mode	The file name can be changed No Change Daily Weekly Monthly	
	PSA File	Measurement file parameters	
	Stop Measurement	None	
		Not applicable	Stops measurement

Perform Background	Duration	Duration of the background measurement in seconds in the range 5 to 30 seconds. If 0 then the current background duration is used	Performs background
Start Scattering	Update Period	Scattering refresh period : 250 ms 500 ms 1 to 5 seconds	Switch on the laser and proceed to a scattering measurement only. RTSizer will not perform any particle size distribution calculation
Stop Scattering	None	Not applicable	Stops the scattering acquisition. If a measurement is running or the system is performing a background, it doesn't stop the acquisition
Change Annotation	Material	Material or product currently measured	Changes the current measurement annotation
	Batch	Batch number or Batch ID	
	Notes	Comment for the measurement	
Update Period	Period	Update period measurement 250 ms 500 ms 1 to 60 Sec	Updates measurement period
Density	Density	The density is used for blaine calculation	Sets density

Measurement Parameter File	PSA File	Measurement file parameters	Apply a new measurement parameters configuration file
Set Auxiliary Channel	Channel ID	Channel 1 to 4	Assign a value to one of the four auxiliary channels
	Value	This value will be displayed in the current RTSizer trend chart	
Set Limits	PCV Name	Process control variable name	Sets the PCV alarm limits based on the product measured by Insitec
	Error Low	Lower limit for error	
	Warning Low	Lower limit for generating warning	
	Warning High	Higher limit for generating warning	
	Error High	Higher limit for generating Error	
Enable Batch Collection	Batch Collection	Indicates whether batch data should be collected	Enables/disables batch data collection
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	
Rolling Average Period	Rolling average period	RTSizer Rolling average period in seconds	Refer to the RTSizer Manual for details

Load Process variable Definition File	PVD File	Name of the PVD file to be loaded	Allows loading a PVD file. The list of PVD files is created in the Insittec Configuration page.
Set Correlation	PCV Name	Name of the process variable to be modified	Modify the correlation of a specified Process Control variable
	Data converter	Name of the data converter related to the correlation function.	

Mastersizer 2000 device

The **Mastersizer 2000** is a modular instrument designed for the measurement of the particle size distribution of wet and dry samples. It has a wide range of sample dispersion units including an Autosampler. Fully automated, it delivers results based on standardized procedures designed to eliminate user-to-user variability.

Contact **Malvern Instruments** for more information.

Status

Instrument status

Name	Description
Mastersizer Ready	Returns true if the Mastersizer2000 is ready Note: Raise an alarm if status is not
Remote Mode On	Verify the Mastersizer is in Remote mode

Name	Description
Last Error	Returns the last Mastersizer software error: (refer to below table)

Value	Description
0	The command succeeded
2	The Mastersizer software is being used in local mode
3	The Request failed because the response timeout expires
4	The Request failed because the file could not be found
9	The Request failed because the server application is not running.
10	The Request failed, because there is no where to save the measurement(s) produced by the SOP.
255	Any other error.

Name	Description
Wet Instrument Status	Returns the status of the instrument for a wet measurement: (refer to below table)

Name	#	Description
WET_INITIAL_STATE	0	SOP Initialization, load the SOP parameters
WET_FILL_TANK_AUTO_STATE	1	The system is filling the tank (Automatic sampler)
WET_FILL_TANK_MANUAL_TATE	2	The system is filling the tank (Manual sampler)
WET_EMPTYING_TANK_STATE	3	The system is emptying the tank
WET_CLEAN_AUTO_PRE_DOSE_STATE	4	
WET_CLEAN_MANUAL_PRE_DOSE_STATE	5	
WET_WAIT_FOR_TEMPERATURE_STATE	6	The system is waiting for temperature state
WET_MEASURE_ELEC_BACKGROUN D_STATE	7	The system is performing an electrical background
WET_DISPERSANT_STABILISING_STATE	8	Wait for stabilising state
WET_VARIFLOW_DISPERSANT_EQUI LIBRATING_STATE	9	
WET_VARIFLOW_OPTICS_EQUILIBRA TING_STATE	10	
WET_ALIGN_STATE	11	The system is aligning
WET_MEASURE_OPTICAL_BACKGRO UND_STATE	12	The system is performing a light background
WET_INSTRUCT_OPERATOR_STATE	13	Displays a window instructing the operator
WET_ADD_SAMPLE_STATE	14	The system prompt the user to add sample
WET_AUTO_DILUTION_STATE	15	The system is performing an auto-dilution
WET_PRE_MEASURE_ULTRASOUND _STATE	16	The system is applying ultrasound before measuring
WET_PRE_MEASURE_DELAY_STATE	17	The system is waiting for a delay before measuring
WET_VARIFLOW_PRE_MEASURE_DE LAY_STATE	18	
WET_MEASURE_SAMPLE_STATE	19	The system is measuring the sample

WET_CALCULATE_RESULT_STATE	20	The software is calculating the particle size distribution
WET_FLUSH_FILL_ALTERNATIVE_DISP_STATE	21	The system is flushing the wet accessory using an alternative dispersant
WET_DELAY_BETWEEN_MEASUREMENTS_STATE	22	The system is waiting for a delay before next measurement
WET_VARIFLOW_REDISPERSION_DELAY_STATE	23	
WET_CLEAN_AUTO_POST_DOSE_STATE	24	
WET_CLEAN_MANUAL_POST_DOSE_STATE	25	
WET_POST_MEASURE_INSTRUCT_OPERATOR_STATE	26	Display a window instructing the operator after measurement
WET_PROMPT_FOR_REPEAT_STATE	27	Prompt the user for repeating the SOP
WET_CLOSE_DOWN_STATE	28	Closes the live display window
WET_FINAL_STATE	29	End of the SOP sequence

Name	Description	
Dry Instrument Status	Returns the status of the instrument for a dry measurement: (refer to below table)	
Name	#	Description
DRY_INITIAL_STATE	0	SOP Initialization, load the SOP parameters
DRY_INSTRUCT_OPERATOR_STATE	1	Displays a window instructing the operator
DRY_WAIT_FOR_AIRFLOW_STATE		The system is waiting for the air flow
DRY_MEASURE_ELEC_BACKGROUND_STATE	3	The system is performing an electrical background
DRY_ALIGN_STATE	4	The system is performing an alignment
DRY_MEASURE_OPTICAL_BACKGROUND_STATE	5	The system is performing an optical background
DRY_MEASURE_SAMPLE_STATE	6	The system is measuring

DRY_CALCULATE_RESULT_STATE	7	The system is calculating the particle size distribution
DRY_DELAY_BETWEEN_MEASUREMENTS_STATE	8	The system is waiting for a delay before performing the next measurement
DRY_DISPLAY_CLEAN_INSTRUCTIONS_STATE	9	Displays a message instructing the operator how to clean the system
DRY_PROMPT_FOR_REPEAT_STATE	10	Prompt the user for repeating the SOP
DRY_CLOSE_DOWN_STATE	11	Closes the live display window
DRY_FINAL_STATE	12	End of the SOP sequence
DRY_CLEAN_STATE	13	The system is performing a dry powder feeder cleaning

Name	Description
SOP Status	Returns the SOP Status: (refer to below table)

Value	Description
0	The system is not running an SOP
1	The system is running an SOP and is preparing for measurement
2	The system is running an SOP and is currently waiting for sample to be added
3	The system is running an SOP and is currently measuring the sample
4	The system is running the SOP, and the data is ready.
255	The system is in an error condition which requires physical intervention

Wet accessory Status

Name	Description
Cleaning	Returns true the cleaning cycle is active
Degassing	Returns true if the tank is degassing
Filling	Returns true if it is filling
Emptying	Returns true if it is emptying
Drain Valve Moving	Returns true if the valve is moving
Dispersant Valve Moving	Returns true if the dispersant is moving
Level Sensor Active	Returns true if the level sensor is active

Dry accessory status

Name	Description
Dry Accessory Mode	Returns the current mode of the instruments: (refer to below table)

Name	#	Description
e_Dry_Standby	0	Dry accessory in stand by mode
e_Dry_WaitingVacuum	1	Dry accessory is waiting for the vacuum
e_Dry_WaitingPressure	2	Dry accessory is waiting for the pressure
e_Dry_Airflow	3	Air pressure active
e_Dry_Feed	4	Vibration active

Alarms

Name	Description
Instrument general Error	Any Mastersizer Error
Remote Mode Error	Mastersizer in remote Mode
Wet DrainValveError	Drain valve error
Wet PumpError	Pump Error
Wet StirrerError	Stirrer Error
Wet UltrasonicsError	Ultrasonic Error
Wet TankError	Tank Error
Wet TempSensorError	Temperature sensor error
Wet UnknownError	Error not recognized
Dry VacuumError	Vacuum Error
Dry PressureError	Air pressure error
Dry VibratorError	Vibrator error
Dry OverCurrentError	Over current on vibrator
Dry NoTrayDetectedError	No tray detected
Dry ThermalError	Thermal error on the vibrator
Dry VacuumTimeoutError	Unable to get the vacuum requested
Dry PressureTimeoutError	Unable to get the pressure requested

Process variable

Definition	X1	X2	Units
Volume percentile Dv(X1)	% V value	-	μm
% Volume < X1	size (μm)	-	% Volume
% Volume > X1	size (μm)	-	% Volume
X1 < %Volume < X2	size (μm)	size (μm)	% Volume
Span - [Dv(X1) – Dv(X2)]/Dv(50)	% V value	% V value	-
Specific surface area	-	-	m ² /cc
Obscuration	-	-	%
Volume concentration - Cv	-	-	PPM
Raw scattering signal on detector X1	Detector	-	-
Corrected scattering signal on detector X1	Detector	-	-

Derived diameter - D[X1][X2]	Number	Number	µm
Light background on detector X1	Detector	-	-
Mode Count	-	-	-
Mode	-	-	-
Obscuration Blue	-	-	-
Residual	-	-	-
Residual Weighted	-	-	-
Uniformity	-	-	-
PumpSpeed	-	-	-
StirrerSpeed	-	-	-
UltrasonicValue	-	-	-
AirPressure	-	-	-
Vibration	-	-	-
HopperVibration	-	-	-
CurrentFileName	-	-	-
CurrentSopName	-	-	-
CurrentSampleName	-	-	-
CurrentSourceType	-	-	-
CurrentSourceValue	-	-	-
CurrentBulkLotType	-	-	-
CurrentBulkLot	-	-	-
TimeStamp	-	-	-
Record Number	-	-	-
DataBackground	-	-	-
DataRawScattering	-	-	-
DataCorrectedScattering	-	-	-
DataDistributionFrequency	-	-	-
DataDistributionSize	-	-	-
DataDistributionCumulative	-	-	-

Actions

Instrument actions

Action	Action Description	Parameter Name	Parameter Description
Open Measurement File	Open a measurement file	Filename	Measurement filename with complete file path (*.mea file)
Close Measurement File	Close a measurement file	Filename	Measurement filename with complete file path (*.mea file)
Close All	Close all the measurement files currently opened	Filename	Measurement filename with complete file path (*.mea file)
Reset All	Reset any MS2000 alarms	-	--
Start SOP	Start the Mastersizer SOP using different information regarding the sample to measure	Sop Name	Name of the SOP
		Sample Name	Sample identification for the next measurement
		Sample Source Type	Sample Source Type for the next measurement
		Sample Source	Sample Source value for the next measurement
		Sample Bulk Lot Type	Sample Bulk Lot type for the next measurement
		SampleBulk Lot	Sample Bulk Lot value for the next measurement

Stop SOP	Stop the current Mastersizer 2000 SOP	-	It is not an instantaneous command. The Sop is never stopped in a middle of a step but it always terminated the current action before stopping.
Trigger Measurement	Send a signal to the Mastersizer in order to start the acquisition when the system is waiting for sample	-	
WaitForStatus	Select status variable to wait on	Status name	Select the status or device alarm to wait for.
	Select the operator - Equal To - Not Equal To	Operator	Select the comparison operator
	Set value with waitforstatus action will compare with.	Value	Select the value to compare with.
	Set the timeout value till which <i>waitforstatus</i> will wait for the value	Timeout	Set the timeout for the wait. The default timeout is 10 seconds

Set Limits	Select the PCV for which alarm limits are to be set	PCV Name	Select the MS2000 Process Control variables for which alarm limits are to be set. The purpose is to set these limits according to the product under measurement.
		Error Low	Lower limit for generating error low
	Set the PCV alarm limits based on the product measured by Mastersizer 2000	Warning Low	Lower limit for generating warning low
		Warning High	Higher limit for generating warning high
		Error High	Higher limit for generating error high
Set Correlation	Change the data converter of PCV in order to modify the correlation	PCV Name	Name of the Process variable
		Data Converter	Data converter assigned to the correlation function.

Wet accessory actions

Action	Action Description	Parameter Name	Parameter Description
Abort Long Command	Abort any running command on the wet accessory	-	

		Cycle Count	Number of cleaning cycle
		Fast Wash	Performs a fast cleaning cycle
Clean Tank	Perform a tank cleaning	Degass	Indicates if the accessory has to perform a degassing after cleaning
Close Dispersant Valve	Close a dispersant valve	-	Close the dispersant valve
Close Drain Valve	Close the drain valve	-	
Degass	Perform a tank degassing using ultrasound	Timer	Degassing duration in seconds
Fill Tank	Fill the tank automatically	-	
Empty Tank	Empty the tank automatically	-	
Open Dispersant Valve	Open a dispersant valve	-	Close the dispersant valve
Set Level Sensor Threshold	Set the level sensor sensitivity	Sensitivity	(0 to 100%)
Open Drain Valve	Open the drain valve	-	
Set Pump Speed	Set the current pump speed	Speed	(0 to 3500 rpm)
Set Ultrasonic Value	Set the ultrasonic power	Power	(0 to 100 %)
Set Stirrer Speed	Set the current stirrer speed	Speed	(0 to 3500 rpm)
Disable Ultrasonic Threshold	Disable the level detection for starting the Ultrasonic	Enable	True or false

Dry accessory actions

Action	Action Description	Parameter Name	Parameter Description
Set Air Pressure	Set the dry accessory air pressure	Pressure	Measurement pressure (0 to 6 bars)
Set Feed Rate	Set the dry accessory feed rate	Feed Rate	Measurement feed rate (0 to 100 %)
Set Hopper Feed Rate	Set the dry accessory hooper feed rate	Hooper Feed Rate	Hooper feed rate (0 to 100%)
Set Mode	Set the current accessory mode	Mode	Refer to Set mode table below

Set mode table

Name	#	Description
e_Dry_Standby	0	Dry accessory in stand by mode
e_Dry_WaitingVacuum	1	Dry accessory is waiting for the vacuum
e_Dry_WaitingPressure	2	Dry accessory is waiting for the pressure
e_Dry_Airflow	3	Air pressure active
e_Dry_Feed	4	Vibration active

Mastersizer 3000 device

The **Mastersizer 3000** is a modular instrument designed for the measurement of the particle size distribution of wet and dry samples. Fully automated, it delivers results based on standardized procedures designed to eliminate user-to-user variability.

Contact **Malvern Instruments** for more information.

Status

Name	Description
Instrument ready	The instrument is ready for starting a measurement
Instrument busy	The instrument is busy
Ready for sample	The instrument is ready for adding sample
Sop Details	Details of the current SOP status

Alarms

Name	Description
Instrument Error	General Error Returned by the instrument

Process variable

Definition	X1	X2	Units
Volume percentile Dv(X1)	% V value	-	µm
% Volume < X1	size (µm)	-	% Volume
% Volume > X1	size (µm)	-	% Volume
X1 < %Volume < X2	size (µm)	size (µm)	% Volume
Span - [Dv(X1) – Dv(X2)]/Dv(50)	% V value	% V value	-
Specific surface area	-	-	m ² /cc
Obscuration	-	-	%
Volume concentration - Cv	-	-	PPM
Raw scattering signal on detector X1	Detector	-	-
Corrected scattering signal on detector X1	Detector	-	-

Derived diameter - D[X1][X2]	Number	Number	μm
Light background on detector X1	Detector	-	-
Mode Count	-	-	-
Mode	-	-	-
Obscuration Blue	-	-	-
Residual	-	-	-
Residual Weighted	-	-	-
Uniformity	-	-	-
PumpSpeed	-	-	-
StirrerSpeed	-	-	-
UltrasonicValue	-	-	-
AirPressure	-	-	-
Vibration	-	-	-
HopperVibration	-	-	-
CurrentFileName	-	-	-
CurrentSopName	-	-	-
CurrentSampleName	-	-	-
CurrentSourceType	-	-	-
CurrentSourceValue	-	-	-
CurrentBulkLotType	-	-	-
CurrentBulkLot	-	-	-
TimeStamp	-	-	-
Record Number	-	-	-
DataBackground	-	-	-
DataRawScattering	-	-	-
DataCorrectedScattering	-	-	-
DataDistributionFrequency	-	-	-
DataDistributionSize	-	-	-
DataDistributionCumulative	-	-	-

Actions

Action	Action Description	Parameter Name	Parameter Description
Open Measurement File	Open a measurement file	Filename	Measurement filename
Close Measurement File	Close a measurement file	Filename	Measurement filename
Reset MS3000	Reset any MS3000 error	-	-
Start Measurement	Start the Mastersizer SOP using different information regarding the sample to measure	Sop Name	Name of the SOP
		Sample Name	Sample identification for the next measurement
Stop Measurement	Stop the current Mastersizer SOP	-	
Continue Measurement	Send a signal to the Mastersizer in order to start the acquisition when the system is waiting for sample	-	
Clean	Execute the cleaning sequence of an existing SOP	SOP Name	Name of the SOP containing the cleaning sequence

WaitForStatus	Select status variable to wait on	Status name	Select the status or device alarm to wait for.
	Select the operator - Equal To - Not Equal To	Operator	Select the comparison operator
	Set value with waitforstatus action will compare with.	Value	Select the value to compare with.
	Set the timeout value till which <i>waitforstatus</i> will wait for the value	Timeout	Set the timeout for the wait. The default timeout is 10 seconds
Set Limits	Select the PCV for which alarm limits are to be set	PCV Name	Select the MS3000 Process Control variables for which alarm limits are to be set. The purpose is to set these limits according to the product under measurement.
	Set the PCV alarm limits based on the product measured by Mastersizer 3000	Error Low	Lower limit for generating error low
		Warning Low	Lower limit for generating warning low
		Warning High	Higher limit for generating warning high
		Error High	Higher limit for generating error high

Set Correlation	Change the data converter of PCV in order to modify the correlation	PCV Name	Name of the Process variable
		Data Converter	Data converter assigned to the correlation function.

Zetasizer series device

The Malvern **Zetasizer** series measures particle and molecule size from below a nanometer to several microns using dynamic light scattering, zeta potential and electrophoretic mobility using electrophoretic light scattering, and molecular weight using static light scattering.

The Zetasizer series is available in a range of variants dependent upon the application required. Contact **Malvern Instruments** for more information.

Status

Name	Description
Zetasizer Ready	Return true if the instrument is ready for measurement
SOP Status	Return the current SOP Status
APS Scheduler Status	Return the current APS scheduler status
Is Plate Ejected	Return true if the APS plate is ejected
X Position	X position of the active APS cell
Y Position	Y position of the active APS cell

Alarms

Name	Description
Instrument Not Ready	The instrument is not ready
SOP Error	Sop error
APS Scheduler error	APS scheduler error

Process variable

Definition	X1	X2	Units
FileName	-	-	-
SopName	-	-	-
SampleName	-	-	-
TimeStamp	-	-	-
Record Number	-	-	-
ZetaPotential			mV

ZetaDeviation			mV
Mobility			umcm/Vs
MobilityDeviation			umcm/Vs
Conductivity			mS/cm
PeakMean(x)	(1-4)		mV
PeakArea(x)	(1-4)		%
PeakCount			-
Temperature			°C
CountRate			Kcps
ZetaRuns			-
Attenuator			-
MeasurementPosition			mm
Merit			%
QualityFactor			%
IsDataQualityOk			-
Spectrum:DistributionIntensity			-
Spectrum:DistributionZeta			mV
Spectrum:DistributionMobility			umcm/Vs
Spectrum:DistributionPhase			rad
Spectrum:DistributionTime			sec
ZAverageMean			nm
Polydispersity			nm
PDIWidth			nm
IntensityMean			nm
VolumeMean			nm
NumberMean			nm
Merit			%
Intercept			nm
Duration			s
Temperature			°C
CountRate			Kcps
Attenuator			-
MeasurementPosition			mm
Spectrum:Peaks(x)	PeakData	PeakType	nm
Spectrum:Sizes			nm

Spectrum: Intensities	%
Spectrum: Volumes	%
Spectrum: Numbers	%
Spectrum: Undersize Intensities	%
Spectrum: Undersize Volumes	%
Spectrum: Undersize Numbers	%
Spectrum: Relaxation Times	sec
Spectrum: Relaxations	-
Spectrum: Weight Times	sec
Spectrum: Weights	-
Spectrum: Diffusion Times	sec
Spectrum: Diffusions	-
Spectrum: Fit	-
Spectrum: Fit Times	sec
Spectrum: Fit Data	-
Spectrum: Cumulants Fit	-
Spectrum: Cumulants Fit Times	sec
Spectrum: Cumulants Fit Data	-
Spectrum: ACFTimes	sec
Spectrum: ACFTData	-

Actions

Action	Action Description	Parameter Name	Parameter Description
Open Measurement File	Open a measurement file	Filename	Measurement filename with complete file path (*.mea file)
Close Measurement File	Close a measurement file	Filename	Measurement filename with complete file path (*.mea file)
Close All	Close all the measurement files currently opened	Filename	Measurement filename with complete file path (*.mea file)

		Sop Name	Name of the SOP
Start SOP	Start the Zetasizer SOP	Sample Name	Sample identification for the next measurement
		Notes	Additional text for commenting the measurement
Stop SOP	Stop the current Zetasizer SOP	-	It is not an instantaneous command. The Sop is never stopped in a middle of a step but it always terminated the current action before stopping.
Open Plate	Opens the APS plate	-	-
Close Plate	Closes the APS plate	-	-
Start Plate Scheduler	Start the APS plate measurement	File Name	Name of the scheduler file
Stop Plate Scheduler	Stop the APS scheduler file	-	-
WaitForStatus	Select status variable to wait on	Status name	Select the status or device alarm to wait for.
	Select the operator - Equal To - Not Equal To	Operator	Select the comparison operator
	Set value with <i>waitforstatus</i> action will compare with.	Value	Select the value to compare with.
	Set the timeout value till which <i>waitforstatus</i> will wait for the value	Timeout	Set the timeout for the wait. The default timeout is 10 seconds

Set Limits	Select the PCV for which alarm limits are to be set	PCV Name	Select the Zetasizer Process Control variables for which alarm limits are to be set. The purpose is to set these limits according to the product under measurement.
		Error Low	Lower limit for generating error low
	Set the PCV alarm limits based on the product measured by the Zetasizer	Warning Low	Lower limit for generating warning low
		Warning High	Higher limit for generating warning high
		Error High	Higher limit for generating error high
Set Correlation	Change the data converter of PCV in order to modify the correlation	PCV Name	Name of the Process variable
		Data Converter	Data converter assigned to the correlation function.

Switch

A **Switch** is a digital device with that can indicate two states, ON or OFF, when detecting a condition or status. Switches can be used in process automation to detect various conditions, such as:

- **Pressure switch** - for detecting a level of pressure
- **Flow switch** - for detecting a level flow
- **Humidity sensor** - for detecting a level of humidity
- **Level sensor** - for detecting a level in a tank

A Switch may be used to generate an error if required. For example, if a pressure level is being measured, and an incorrect level of pressure is detected, an error should be generated.

The error status can be ON or OFF depending of the function of the Switch. For example a pressure Switch will fire an error if the pressure is low (error state: OFF). But a humidity sensor may generate the error if the humidity is detected (error state: ON).

A Switch can be configured in two ways:

- **Alarm** – where it returns an error
- **Indicator** – where it does not return an error

Input/Output

Name	Is Mandatory	Type	Description
Switch Status	Yes	Digital Input	Digital input indicating Switch status value

Configuration Parameters

Name	Description
Switch Type	Switch has two types.
	Indicator (Example : Level Sensor)
	Alarm (Example : Humidity Sensor)
Normal State	Specify the normal value of the digital input. If the switch is not an indicator and the value is different of the Normal State, the switch should fire an error after the Error Timeout
Error Timeout	Maximum transition time before generating alarm

Status

Name	Description	Value
Switch Status	Indicates current status of Switch	Usual State
		Unusual State

Alarms

Name	Description	Value
Switch Error	Returns the current Switch error status	OK
	Note: Switch contains this alarm only when Switch Type is Alarm	Error

Actions

Name	Parameter	Parameter Description	Action Description
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Sensor

A **Sensor** is an analogue device returning a value. Sensors can be used in process automation to measure various conditions, such as:

- Pressure sensor - for measuring the pressure
- Flow sensor - for measuring a flow
- Volume sensor - for measuring the volume of a tank

Input/Output

Name	Is Mandatory	Type	Description
Sensor Value	Yes	Analogue Input	Analogue Input returning a value

Configuration Parameters

Name	Description
Unit	Engineering unit for the Sensor value
Error Low	Minimum value for generating an error
Warning Low	Minimum value for generating warning
Warning High	Maximum value for generating warning
Error High	Maximum value for generating an error
Error Timeout	Maximum transition time (in seconds) before generating alarm

Process Control Variable

Name	Description
Value	Current value read from Analogue Input. This is the engineering value after conversion

Alarms

Name	Description	Value
Sensor Error	Indicates current Sensor error value	OK (Value is between Warning Low and Warning High)
		Warning Low (Value is between Error Low and Warning Low)
		Warning High (Value is between Warning High and Error High)
		Error Low (Value is below Error Low)
		Error High (Value is greater than Error High)

Actions

Name	Parameter	Parameter Description	Action Description
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are	
		Equal To	
		Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Output Controller

An **Output Controller** enables the monitoring and regulation of a sampling parameter with respect to an original setup value. Output Controllers can be used in process automation to monitor and regulate various parameters, such as:

- **Pressure controller** - for setting a specific pressure
- **Flow controller** - for setting a specific flow.

Input/Output

Name	Is Mandatory	Type	Description
Setting Value	Yes	Analogue Output	Analogue Output for setting required value
Reading Value	No	Analogue Input	Analogue Input returning the value read by the device. Normally the value should be identical

Configuration Parameters

Name	Description
Unit	Engineering unit for the Output Controller
Allowed Minimum Value	Minimum value
Allowed Maximum Value	Maximum value
Error Low	Minimum value for generating an error
Warning Low	Minimum value for generating warning
Warning High	Maximum value for generating warning
Error High	Maximum value for generating an error
Error Timeout	Maximum transition time (in seconds) before generating alarm

Alarms

Name	Description	Value
Controller Error	Indicates current Sensor error value	OK (Value is between Warning Low and Warning High)
		Warning Low (Value is between Error Low and Warning Low)
		Warning High (Value is between Warning High and Error High)
		Error Low (Value is below Error Low)
		Error High (Value is greater than Error High)

Process Control Variable

Name	Description
Reading Value	Current value read from Analogue Input. This is the engineering value after conversion
Setting Value	Setting value. This is the engineering value before conversion

Actions

Name	Parameter	Parameter Description	Action Description
Set Value	Value	Output controller value	Sets the Output Controller value. The value is set according to the configured allowed limits

Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are	
		Equal To	
		Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Variable Frequency Drive

A **Variable Frequency Drive** (VFD) is a device used to control VAC motors by adjusting the frequency. Examples of devices that would use a VFD are Stirrers and Shafts.

Input/Output

Name	Is Mandatory	Type	Description
VFD Command	Yes	Digital Output	Digital output for starting the motor
VFD Reverse	No	Digital Output	Digital output for reversing the motor
VFD Frequency Setting	No	Analogue Output	Analogue output allowing setting up the frequency
VFD Error	No	Digital Input	Digital input returning error. (It is generally linked to a thermal Switch)

Configuration Parameters

Name	Description
Unit	Engineering unit for the VFD speed (% , RPM)
Allowed Minimum Value	Minimum speed value
Allowed Maximum Value	Maximum speed value
Inverting Time Delay	Delay in seconds before inverting the VFD

Status

Name	Description	Value
VFD Status	Indicates current VFD status.	On
		Off
VFD Mode	Indicates current mode of VFD.	Normal
		Reverse
General Status	General status is a 32 bit size array indicating overall status of a device. Note: This status is available for reporting to OLE for Process Control (OPC) Server only	Not applicable

Alarms

Name	Description	Value
VFD Error	Returns the current VFD error status	OK
		Error

Process Control Variable

Name	Description
Value	Display the setting value(directly read from the analogue output and converted to the engineering value)

Actions

Name	Parameter	Parameter Description	Action Description
------	-----------	-----------------------	--------------------

Start	Start Cycle	Indicates whether VFD should be started and stopped periodically	Starts VFD. When VFD is started in cyclic mode, VFD is kept On for Time On period and kept Off for Time Off period
	Time On	Time (in seconds) for which VFD should be kept On	
	Time Off	Time (in seconds) for which VFD should be kept Off	
Stop	Stop Cycle	Indicates whether the cyclic behaviour should be stopped	Stops VFD. When Stop Cycle is selected, stops the VFD cycle
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	
Set Mode	Mode	VFD mode values are Normal Reverse	Sets VFD Mode. VFD is put off before changing the mode
Set Speed	Speed	Speed with which VFD operate. This is the engineering value before conversion	Sets the VFD Speed. The speed is set according to the configured allowed limits

Rotation Sensor

A **Rotation Sensor** is a device returning a rotation status. It returns 1 when the transmitter and receiver are aligned.

Input/Output

Name	Is Mandatory	Type	Description
Signal	Yes	Digital Input	Digital input returning 1 when the transmitter and receiver are aligned

Configuration Parameters

Name	Description
Max Rotation Period	Maximum rotation period time (in seconds). If the Rotation Sensor digital input doesn't change, it means the Rotation is stopped

Status

Name	Description	Value
Status	Indicates current rotation status	Rotation Idle

Actions

Name	Parameter	Parameter Description	Action Description
Wait For Status	Status name	Status or device alarm to wait for	Wait for given status/alarm. This action can be used as a step in Standard Operating Procedure (SOP) sequence only.
	Operator	Comparison operator values are Equal To Not Equal To	
	Value	Value to compare with.	
	Timeout	Maximum time to wait when comparison evaluates to false	

Privileges

Privileges

The table below describes the privileges that can be assigned to the configured user groups in the Malvern Link II application.

Privilege	Description	Administrators	Supervisor	Operator
Create / Edit / Delete process definition	Permission to create a new process definition and edit the existing definition. It includes running Process Wizard and Device configuration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create / Edit/ Delete custom data items	Permission to create new custom data item and edit or delete the exiting custom data items	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create / Edit/ Delete Data Converters	Permission to create new Data Converters and edit or delete existing converters	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create / Edit/ Delete User Defined SOP	Permission to create new user defined SOP and edit or delete existing user defined SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create / Edit/ Delete System SOP	Permission to create new system SOP and edit or delete existing system SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Configure Alarms	Permission to configure the alarms and modify the existing alarm configuration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Configure Remote Reporting /Control	Permission to configure / edit the remote reporting /control parameters	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Assign users to SOP	Permission to assign new users to SOP and edit the existing assignment to users to SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Change system SOP priority	Permission to change the priority of system SOPs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Schedule system SOP	Permission to schedule system SOP and edit schedule of existing system SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Group Management	Permission to Add/Remove user or privileges from the existing groups and update groups description except the group name	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
User Management	Permission to Add/Remove group membership of the existing users and update user details except the user name	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create/Delete Groups	Permission to create new groups and delete existing groups	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create/Delete Users	Permission to create new users and delete existing users	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Security Settings	Permission to configure the security settings.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Start / stop / abort / abort and safe state user defined SOP	Permission to perform start / stop / abort / abort and safe state operation on a user defined SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Mark SOPs	Permission to mark SOPs as Initialization/Shutdown/SafeState	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Dashboard operations for automation devices	Permission to perform dashboard operations for automation devices	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Dashboard operations for analyzer	Permission to perform dashboard operations for analyzer instrument	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Clear/Acknowledge Alarms	Permission to clear / acknowledge an alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Exit Malvern Link II Application	Permission to exit run mode session of Malvern Link II	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create/Edit/Delete win wrap scripts	Permission to create/edit/delete win wrap scripts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Create/Edit/Delete Automation cabinet OPC server configuration	Permission to create/edit/delete automation cabinet OPC server configuration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Create/Edit/Delete Automation cabinet Modbus OPC server configuration	Permission to create/edit/delete modbus OPC server configuration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Windows system Keys	Permission to use the windows keys like Alt/Shift/Ctrl/Tab/Esc and its combination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Windows Desktop	Permission to use windows desktop	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enable cycle behavior for automation devices in dashboard	Permission to perform the cycle behaviour on automation devices	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Connect/Disconnect communication channel	Permission to perform diagnostic functionalities on OP servers (Malvern Link -Automation cabinet/ Malvern Link - DCS OPC Server)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Switch local/remote mode	Permission to switch between local and remote mode	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Start / stop / abort / abort and safe state system SOP	Permission to perform start / stop / abort / abort and safe state operation on a system SOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Show Analyzer Software	Permission to launch RTSizer application.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Security

Introduction

The Malvern Link II software will be used by users of different skills levels. Within the software It is possible to restrict the access of particular software features to precisely defined groups of users. This will mean that only certain available features used in the configuration and execution of the software are restricted to authorised users only.



Note

When Malvern Link II ULTRA version is installed, the 21 CFR part 11 feature will be enabled enabling access to several other additional security level features.

When the Malvern Link II application is initially started, one user named **Administrator** is created, This allows configuring of the system to be performed. **This user is not editable.** The administrator controls access to different features and privileges of the Malvern Link II software by creating **Groups**. A group will contains one or more users that all have the same access rights.

The Administrator adds the users and defines the password policy which will be applicable to all the users within the security system.

Malvern Link II software will create three default groups during the installation.

- **Administrators:**

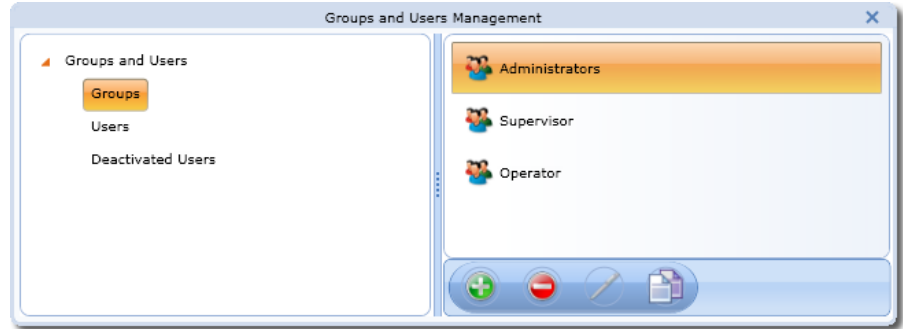
This group has the maximum privileges. These privileges **cannot** be changed. The default user **Administrator** is by default a member of this group.

- **Supervisor:**

The **Supervisor** group has fewer privileges as compared to the administrators group. A majority of privileges are assigned to this group by default. Privileges can be added or removed for this group.

■ Operator:

The **Operator** group has the least privileges as compared to the Administrators and Supervisors group. Only minimal privileges are assigned to this group by default. Privileges can be added or removed for this group.



Managing Groups

This section explains the how to create, edit or delete a security group.



Note

This is privileged based feature. Only the administrator can creates/edits/deletes groups, or any user that has the **create/delete groups and Group Management** privilege assigned to them.

Create Group

A group is created to contain one or more users that all have the same access rights. Once a group is created an administrator can assign privileges to the group.

On the **Security** command ribbon, select **User Management** from the **Configuration** group.

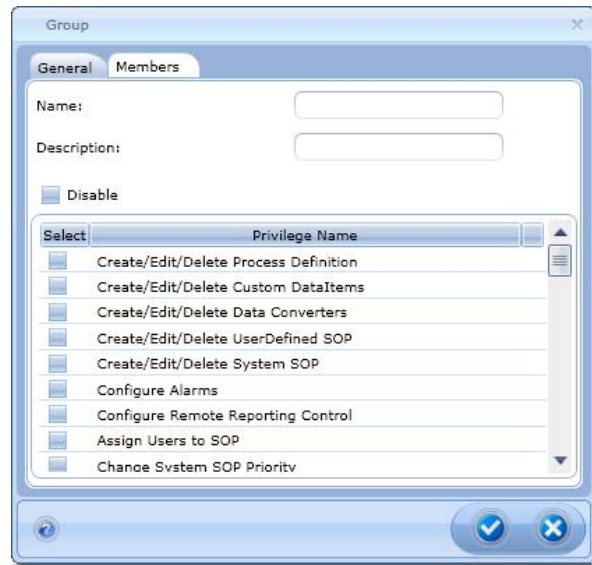


The Groups and users list is displayed in the left pane of the screen.

Click on **Groups** to display all existing groups.

Right-click on **Groups** and select **New**, or select to display a group dialog.

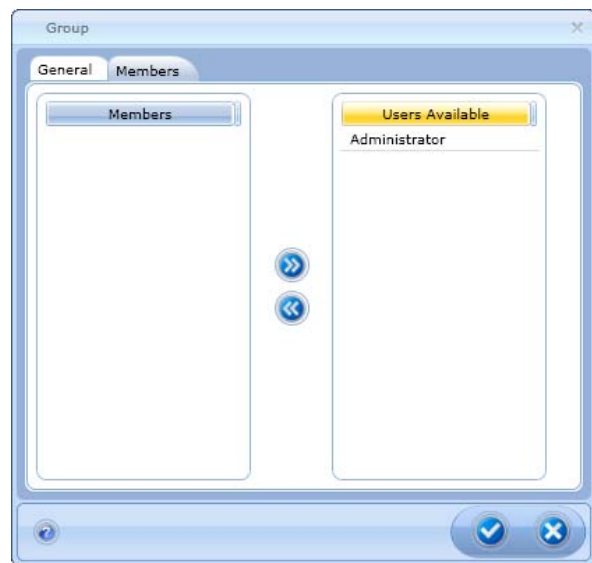
The dialog box will show two tabs: **General** and **Members**





From the **General** tab page, input the group **Name** and **Description** and assign (**select**) the required group privileges from the Privileges list.

The privileges available are described in **Appendix A: Privileges**.


Select the **Members** tab page. This tab page displays the members of group and all the available users that can be added to the group.




Select any users from the **Users available** list that are to be added to the group, and click the **Add** arrow button . The selected users will be added to list of group **Members**.

Select **OK** . The user group is added and listed in the right pane of the screen.


Edit Group

To edit a **Group**, double-click on the required group, or select **Edit**  from the bottom menu bar. Alter the privileges and users as required.

Disable Group

To disable a **Group**, double-click on the required group, or select **Edit**  from the bottom menu bar. On the **General** tab page, select the **Disable** option on the to disable the group.

Delete Group


To delete a **Group**, right click on the required group and select **Delete**, or select ,

Copy Group

Copy group allows a duplicate of an existing group to be created, with an option to include all the same users and available privileges. A name for the duplicate group will be required.


On the **Security** command ribbon, select **User Management** from the **Configuration** group. The Group and management window will be displayed, with the Groups and users list shown in the left pane.

Click on **Groups** to display all existing groups.

Right-click on a group, and select **Copy**, or select a group and click **copy**  from the bottom menu bar. A dialog box is displayed.



Type the **Name** and **Description** for the **new** group. Select the required options to include the users and privileges of the existing group in the new copy.

Click **OK**  and the group will be copied.

Managing Users

This section explains the how to create, edit or delete a user of the Malvern link II software. After a user is created the administrator assigns the user to a group.




Note

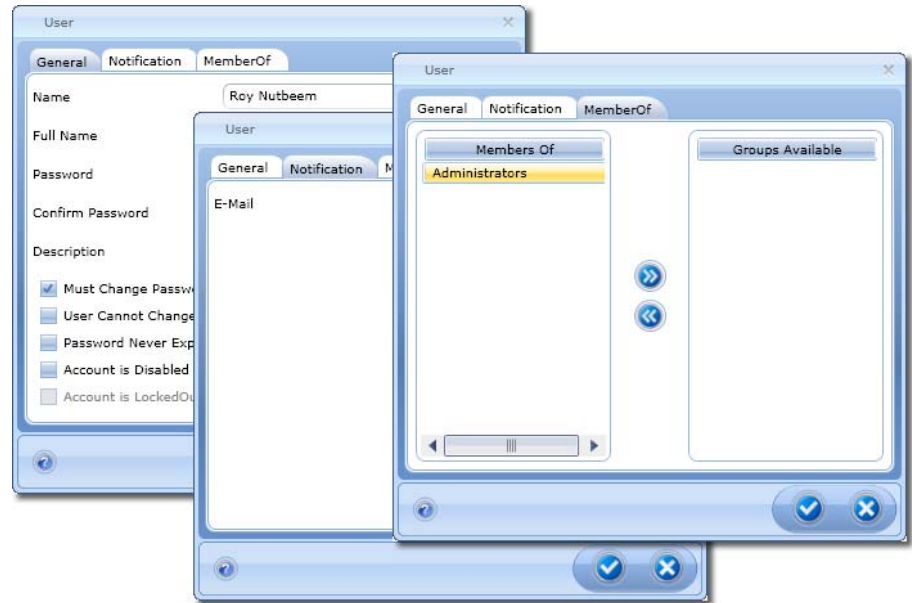
This is privileged based feature. Only the administrator can creates/edits/deletes users, or any user that has the **create/delete groups and User Management** privilege assigned to them.

Creating a User:

On the **Security** command ribbon, select **User Management** from the **Configuration** group. The Groups and users list is displayed in the left pane of the screen.

Select **Users** to display all existing users.

Right click on **Users** and select **New**, or select  to display a User dialog window. The dialog box will show three tabs: **General**, **Notification** and **Member Of**.



General tab

In the **General** tab page, Enter the user Name, Full Name, password, Confirm Password and Description.

Select the option for password as required.



Note


Options **Account is Disabled** and **Account is Locked Out** are available only in Malvern Link II ULTRA version is installed.


Notification tab

In the **Notification** tab page enter the user email.


MemberOf tab

Click the **MemberOf** tab page. The available groups are listed. Select the required available groups and add them to **MemberOf** list.


Select the required groups from the **Groups available** list that the user is to be a member of, and click the **Add** arrow button . The selected groups will be added to the **Members of** list.

Click **OK** . The new user will be added to the Groups and Users window, in the right pane of the screen.

Edit Users

To edit a **User**, select the user and double-click, or click **Edit** . Alter the user details as required, and click **OK**.

Delete Users

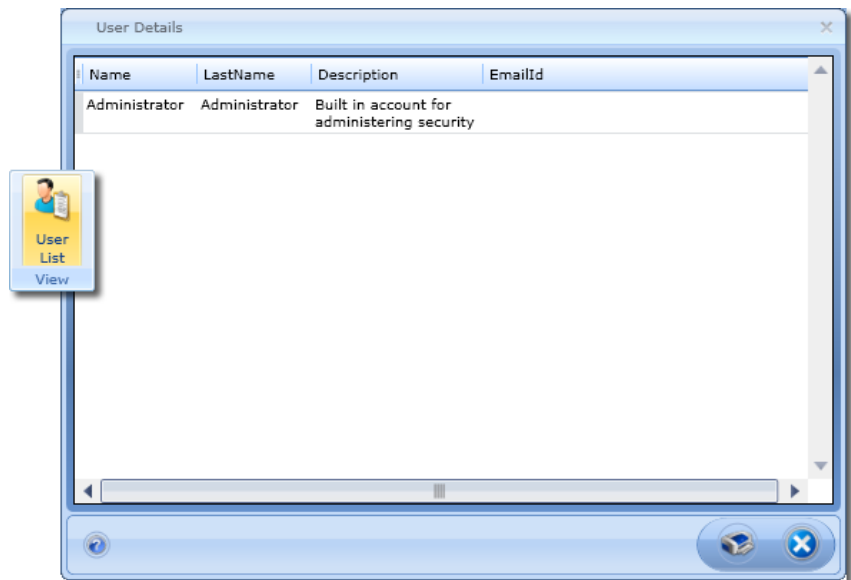
To delete a **User**, right click on the required user and select **Delete**, or select .

View User List

All users configured for using the software can be shown by inspecting the User List.

On the **Security** command ribbon, select **User List** from the **View** group.

A dialog box is displayed showing the details of all users of the application, each row containing information for one individual user.



The following information for each user is displayed

- Use Name
- Full Name
- Description
- Email Id

Change Password

This section explains the procedure to change password of the logged on user.

**Note**

The logged on user can change password only if the administrator has **not** selected the option “**User Cannot Change password**” when the user was created.

On the **Security** command ribbon, select **Change Password** from the **Configuration** group. The **User** dialog window is displayed with available fields to change the password.

Type the **Old Password**, **New Password** and **Confirm Password**.

The **Password policy** is displayed in the dialog window to remind users of the password criteria.

**Note**

Password policy is displayed only if Malvern Link II ULTRA version is installed.

Refer to the following section: **Security settings** for more information on security features that are available in Malvern Link II Ultra version,

Security settings

There are two security settings available with Malvern Link II. These are:

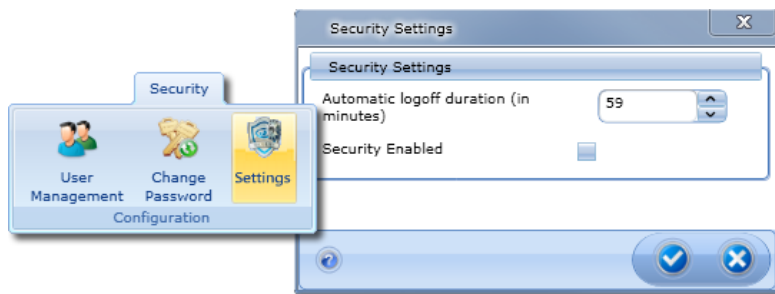
- **Standard security settings**
- **Advanced security settings**

These are explained in the following sections.

Standard security settings

This section explains the **standard** security features that are available if the Malvern Link II **Essential** and **Pro** versions have been installed.

On the **Security** command ribbon, select **Settings** from the **Configuration** group.



Automatic Logoff Settings

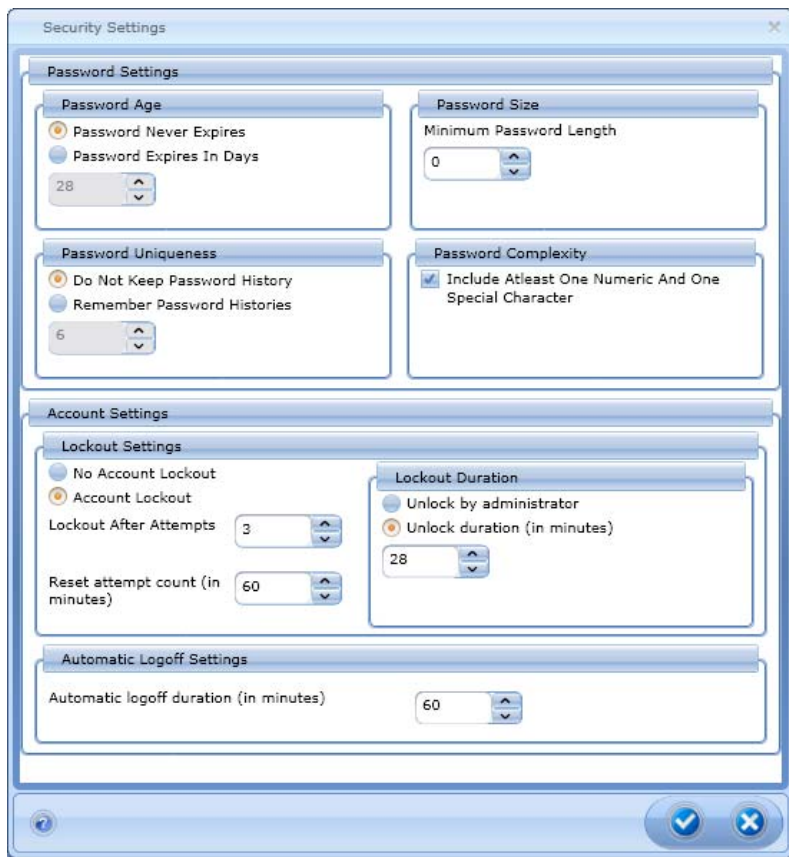
There is an option to be configured for automatic logoff settings.

Automatic Logoff Duration	The period (in minutes) of inactivity after which the application is locked.
Security enabled	On/Off (Not available if the Malvern link II Ultra version is enabled)

Advanced security settings

This section explains the **advanced** security features that are available if the Malvern Link II **Ultra** version has been installed, with the 21 CFR part 11 features enabled.

On the **Security** command ribbon, select **Settings** from the **Configuration** group.



Password Settings

There are four options to be configured for password settings.

Password Age

Use to configure the security settings to force users to change their passwords at specified intervals. This is known as password ageing and is required by 21 CRF Part 11. If the user does not change their password within this configured interval, the system will prompt the user to change the password before logging in.

Password Size

Use to define the minimum length of passwords. The recommended minimum length is 6 characters.

Password Uniqueness	Use to maintain a password history to prevent users using the same password. If a user sets a new password, it must differ from those in the password history. You can configure the number of history password that is remembered.
Password Complexity	Use to set the password complexity by forcing the user to use at least one numeric, or one special character in the password.

Account Settings

There are two options to be configured for account lockout settings.

Account Lockout	<p>Use to specify that an account is locked after a number of unsuccessful login attempts. This is a mechanism that prevents the security system being breached by randomly entering passwords. The recommended number of incorrect login attempts is 3.</p> <p>The period after which the invalid attempt counter is reset is configurable.</p>
Lockout Duration	<p>If an account is locked out, it is possible for the system to automatically re-enable the account after an elapsed period of time, or to require an administrator to re-enable the account.</p> <p>For 21 CFR Part 11 compliance, it is required that an administrator is informed if an attempt has been made to access a user's account illegally. This requirement is met if an administrator is required to unlock the account.</p> <p>To unlock an account, uncheck the Account locked out check box in the Users dialog.</p>

Automatic Logoff Settings

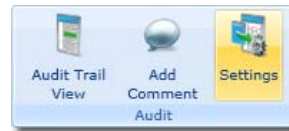
There is an option to be configured for automatic logoff settings.

Automatic Logoff Duration	The period (in minutes) of inactivity after which the application is locked.
----------------------------------	--

Audit features

Audit Trail Settings

The Audit trail feature attaches a time stamp to certain actions that are recorded by the RTSizer application.



Malvern Link II provides the auditing capability for the actions performed in conjunction with each process definition.

Audit trail file output directory.

Select **Settings** from the **Audit** group on the **Security** command ribbon. A dialog box is displayed with the option to browse the audit trail output directory.

The audit trail file output directory is where the audit trail files created. Pressing the **browse** button allows the user to explore the system for a suitable directory.

Begin new Audit trail file.

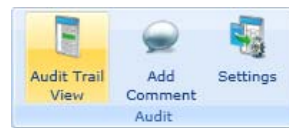
In order to manage the size of the audit trail files, and allow the old audit trails to be archived, a new audit trail file is created at regular intervals. The interval period can be set to begin a new file either at the beginning of each day, week, month, 3 months, 6 months or at 1 year periods.

The audit trail files are stored in the audit trail file output directory, and are named:

RTSAUDIT-dd-mm-yyyy.adt where dd-mm-yyyy is when the date the file was created.

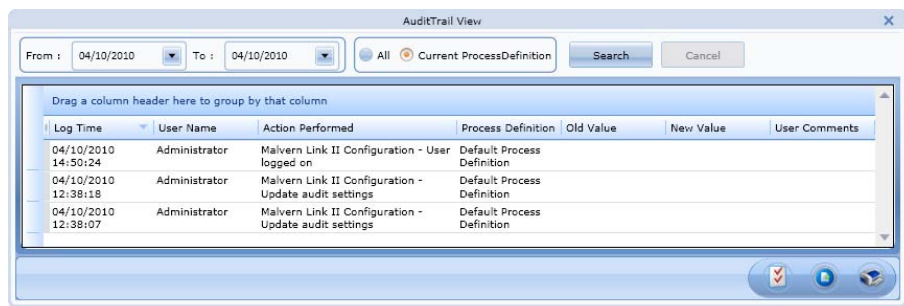
Audit Trail View

This section explains the details of audit trail records and the procedure to view the records.



Procedure

On the **Security** command ribbon, select **Audit Trail View** from the **Audit** group. The audit trail records will be displayed for the all configured process definitions.



An audit record contains the following fields:

Field Name	Description
Log Time	Time stamp at which the action was performed
User Name	Logged on user name who performed the action
Action performed	Details of action performed
Process definition	Name of the process definition for which the action was performed
Old value	This value holds the previous value before modification. It is used to store the SOP filename
New value	This is the new value which has replaced the old value. It is used to store the new SOP filename
User comments	User comments providing the reason for modification.

Audit Trail Filter

An Audit trail records can be filtered using two options:

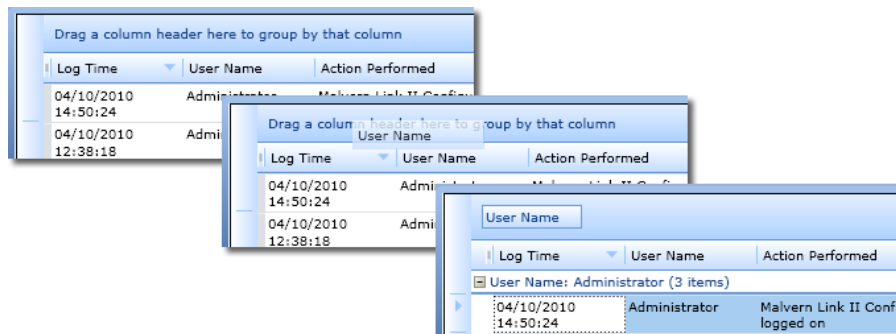
- Select a **From** date and **To** date
- Search by **all** process definitions or for **Current process definition**

After selecting the filter click **Search**. The records are displayed. A message will appear if records do not exist for the specified filter.

Grouping Audit Trail Records

Audit trail records can be grouped on any of the fields from an audit records.

Drag a column towards the top left area above the first row. The records will then be grouped on the dragged column field.




To remove the grouping, drag the grouped column back to the header row. The records will no longer be grouped.

Comparing Records

This option is used to compare the different versions of SOP files and PSA files modified in a process definition.

21 CFR part 11 is enabled in Malvern Link II Ultra version, SOP and PSA modifications are stored in separate files to be compared at later point.

In the audit trail view, select the audit records which have files in **old value** and

new value columns and click **compare**  at the bottom right of the screen. A separate window is displayed showing the difference between the old value and new value files.


Export Audit records

This option is used to export audit trail records to a text file or excel file.

To export audit records select the **Export** button  at the bottom right of the screen.

A save file dialog is displayed. Type the filename and click save. The records are successfully exported to the file.

Print Audit records

This option is used to print the audit trail records. Click **Print** , the audit records are printed.

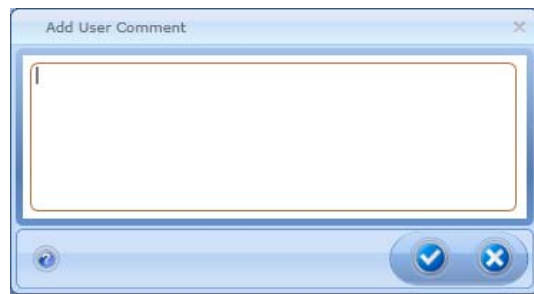
Add Comment

This section explains the purpose of **Add Comments** feature. It is possible make a manual entry into the Audit trail records. This allows a user to make a check on any actions or events performed. Any comments will be shown in the Audit trail view.



Procedure

On the **Security** command ribbon, select **Add Comment** from the **Audit** group. A dialog window is displayed as shown in the figure below with the option to add comments.



Input any comments and click **OK**. The added comments will be displayed in the Audit trail view.

