Accord Designer

User Guide

Controller / Process Model

Document: Accord Designer User Guide - V4 – Process Model

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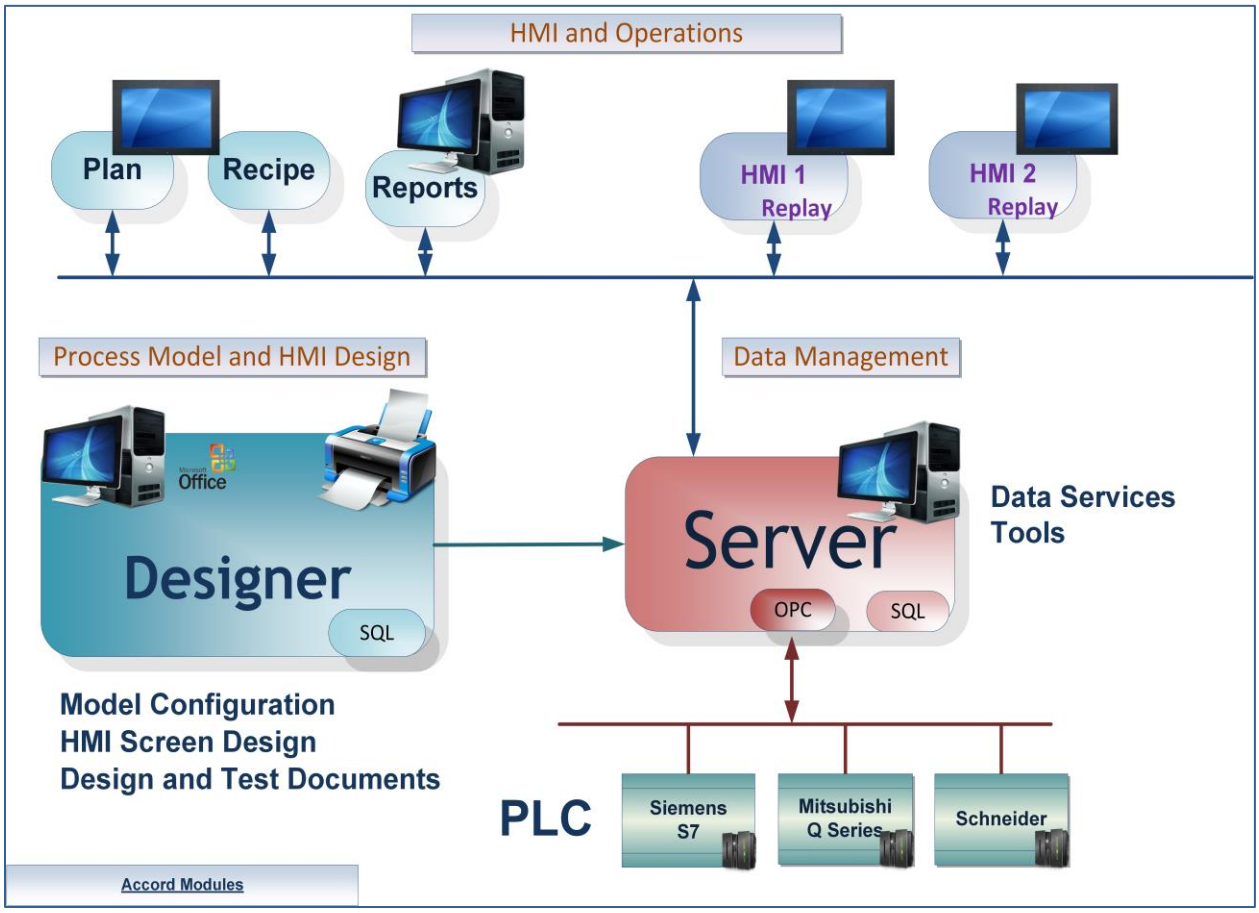
1 Introduction

Accord Designer provides a graphical environment for engineering personnel to develop process models and associated HMI screens for control systems.

Process Model development is carried out by configuring equipment and programs and HMI screens are developed by placing devices and programs onto the screens. All relevant linking and control is implemented automatically by the Accord Server service. Items are available in HMI, Recipe or other modules when initially configured in Designer.



Accord Platform Modules

The Accord Modules may be hosted on single PC or distributed across many PC's.

1.1 List of Accord Platform Modules

Designer	Application for configuring Process Model and HMI screens
PLC Library	PLC Runtime Library to implement control of the process in standard PLC.
Server	For management of PLC communications including download to PLC, Data for HMI's and modules, Logging, Redundancy, Security, Recipes and MES functions.
HMI	A runtime application showing the plant and providing device and program control. The screens are set-up and configured in Designer.
Recipe Manager	For generation and management of recipes of Setpoints, Selection Decisions and Step Times.
Plan / MES	This provides scheduling of program starts or other required actions in sequence and at selectable times.
Process Audit	For query of the Server Database to generate time or event based reports, with export to various formats.
Security Audit	For query of all interaction with the control system.
Relay	This provides transfer of Data to and from networked PLC's.
Emulation	This module provides PLC Emulation for multiple PLC's
Simulation	This module provides simulation of Inputs to PLC for Emulated PLC's

1.2 General Definitions

Plant	The process plant or machine to be modelled and controlled.
Database	The information for configuration and documentation of the control system project is contained in a SQL Server Database.
Controller	A container for the setup information for the Controller – either an Emulator or PLC - and the process model information. When a Process Model is deployed to PLC the PLC then controls the Plant using Process Model data and PLC Library. The library is downloaded to the PLC using the standard PLC editor.
Process Model	The configuration of data representing the Equipment and the Programs contained in the Controller container.

1.3 PLC Control and Accord Process Model Terms

These explanations are meant to reflect common industry understanding. These signals may be either electrical or on a bus system.

PLC Control

Digital Output	A Signal, having two states (On/Off, 1/0, True/False) sent from PLC to control a device.
Digital Input	A Signal, having two states (On/Off, 1/0, True/False) received from digital device or instrument.
Analog Output	A Signal from PLC to a modulating item, usually to control the item.
Analog Input	A Signal received from analog instrument.

Process Model Equipment

Valve	Allows material to flow from one part of plant to another. Always has a PLC Digital Output and may have one or more Feedbacks.
Motor (Pump)	Causes material to be transported. Always has a PLC Digital Output and may have one or more Feedbacks.
Digital Output	An Output from the PLC without Feedback, for a Lamp or Signal.
Analog Device - Control Valve	A Valve whose opening is dependent on an PLC analog output.
Analog Device - Variable Speed Drive	A Motor whose rotation speed depends on PLC Analog Output.
Digital Input – Switch	An indication that a physical state has been achieved.
Analog Input – Transmitter	An indication of the value of a physical state. This is a PLC Analog Input.
PID Controller	PID (Proportional, Integral, Derivative) This is a controller for an analog device, which uses common PID characteristics and terminology. Example - Flow Control loop using Variable Speed pump
Unit	This is a group of devices and instruments which form a logical section of plant. Examples; Water Supply Tank, Reactor, Conveyor, CIP Supply Line

Process Model Program

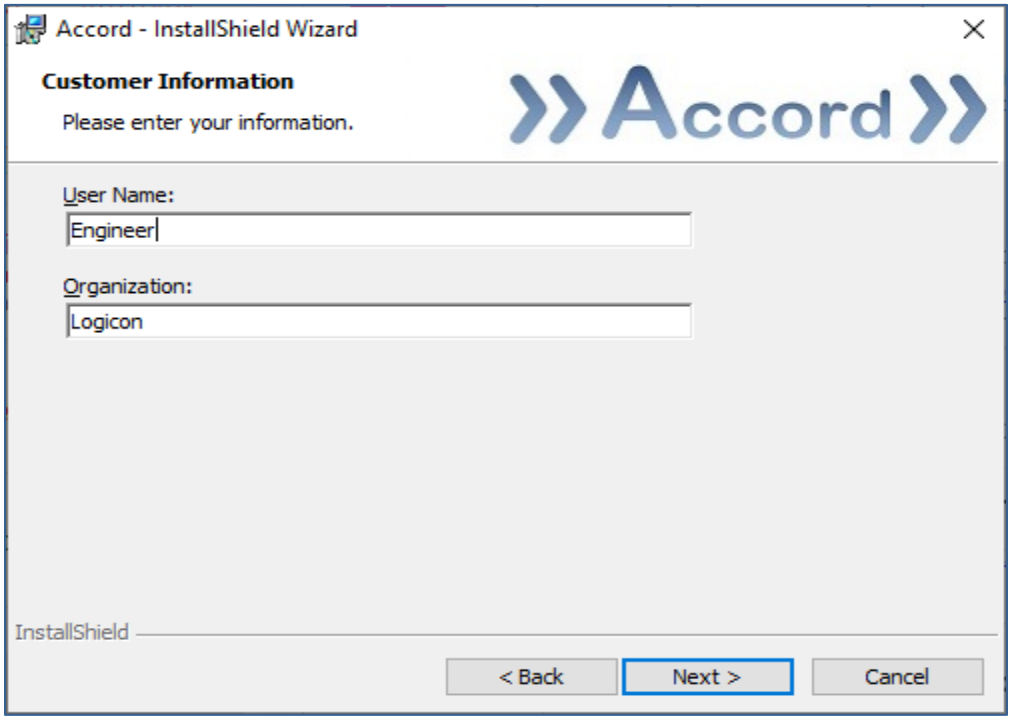
Program	This is a set of items forming a distinct part of the process. It is also known as a program or sequence, as it may consist of a sequence of steps. Example - A Sequential Program to clean a part of plant
Step	This is an individual program stage performing a specific section of the program. This consists of step components. Example - An Initial Rinse step at start of Cleaning Program
Setpoint	This is a value written in Recipe or HMI or which is examined to determine if a condition is met. It is part of the default Recipe for the Program. Example – Rinse Temperature Setpoint
Activation	This is a signal activate a digital device or digital output.
Operation	This is a function for changing a value or a program status or step. Example – Supply Control Valve to Feed Setpoint.
Comparison	This is a test for status of a single item at a particular point. Example –Water Supply Tank below Empty Level.
Delay	A Wait time for an Event, which goes True when the Event is True for a configured time.
Combination	This allows combined Boolean logic to be applied to items. Example - High Pressure Level Switch AND Pressure High-High Alarm
Alarm	This is a fault in a program due to an operational failure. It may be configured to cause the program to go into Alarm and Hold. Example – Water Supply at Low Level.
Recipe	• Step Times : Time for steps in the Program. • Setpoints : List of setpoints for the program. • Decisions: List of On/Off Selections for the program.
Variable	This value is written by the PLC, usually as mathematical Operation result. Example – Water Volume used in Rinse.
Constant	This value is written only at configuration in Designer, may not be changed from HMI or Server or in PLC.

2 Installation

Accord Designer requires a good standard PC. Accord Server may require a high performance PC, depending on applications sizes and system requirements.

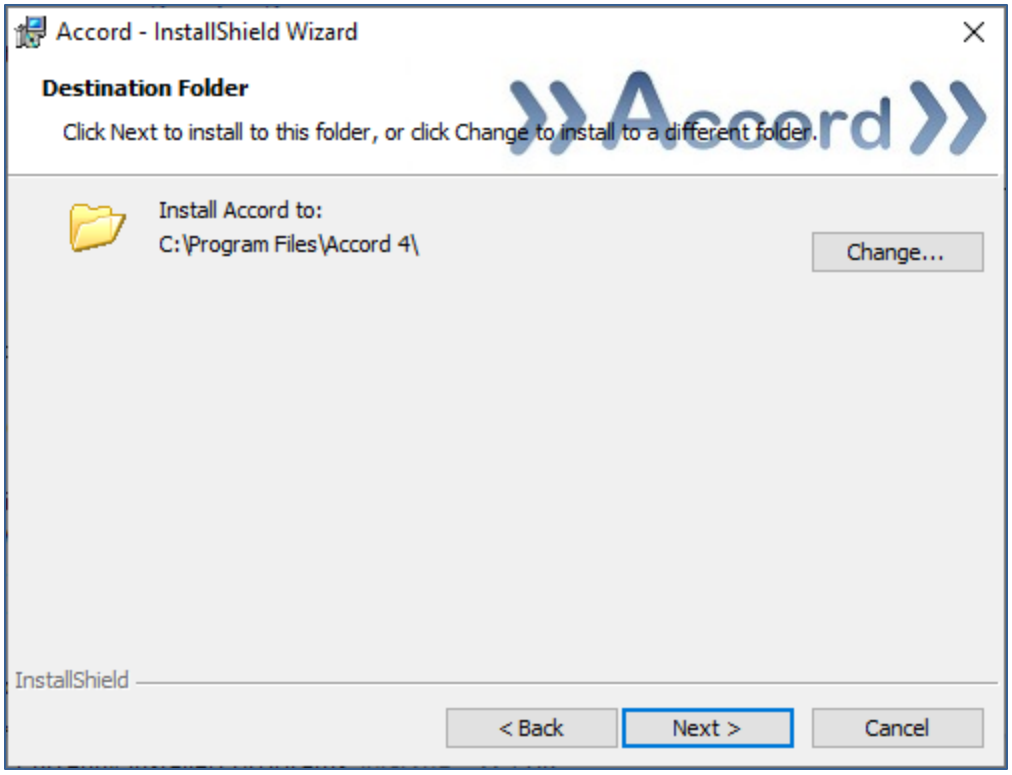
Designer is installed from Accord Setup Installer.

Accord Setup is started and Designer and any other required modules are selected. Server should be installed, either on this or a networked PC, to provide Database management.

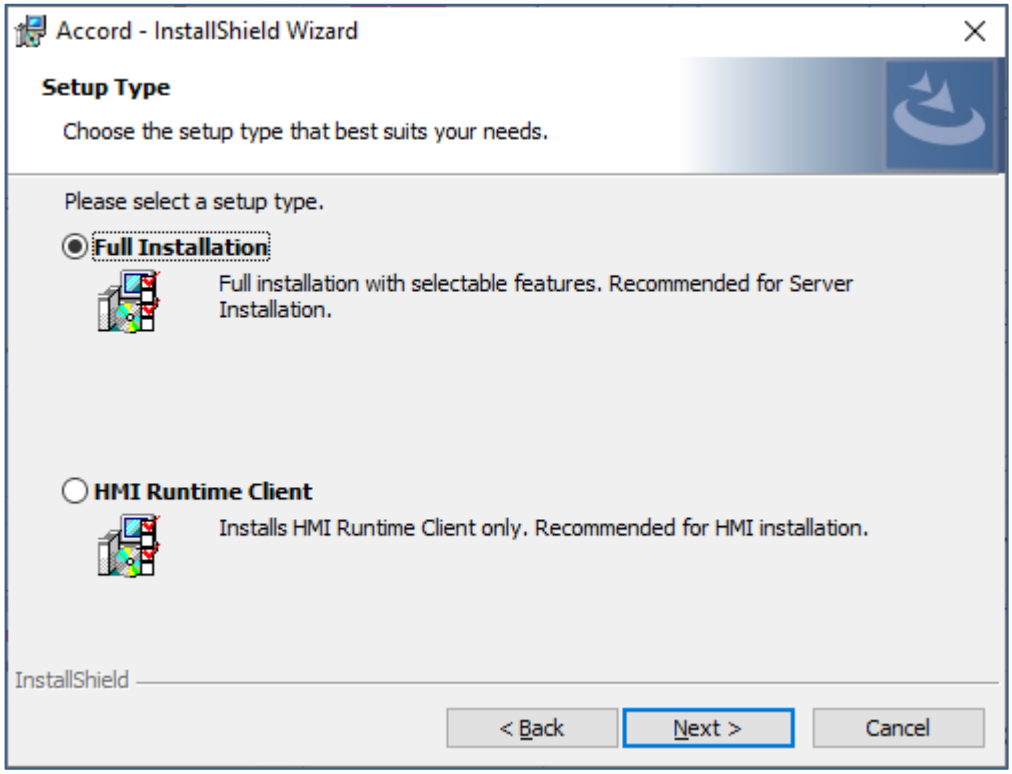


Accord Setup.exe

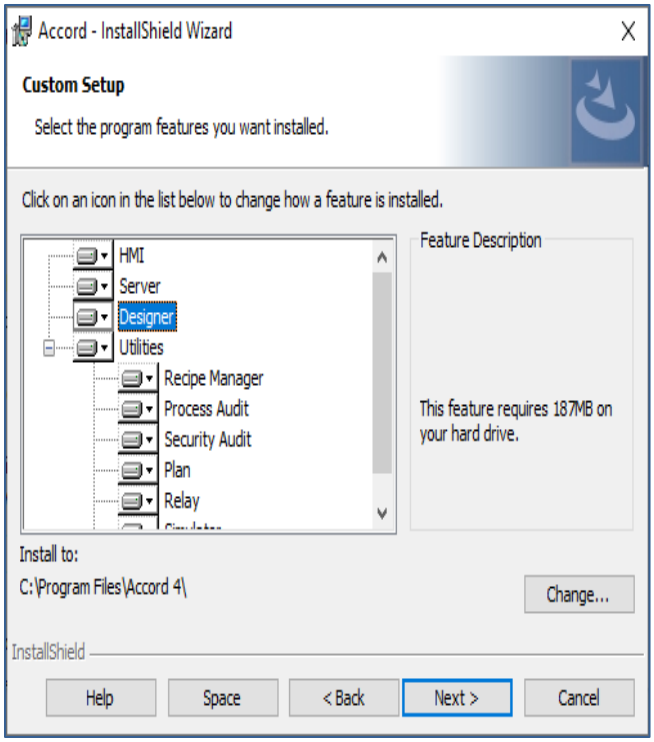
1. Entry of User Name and Organisation

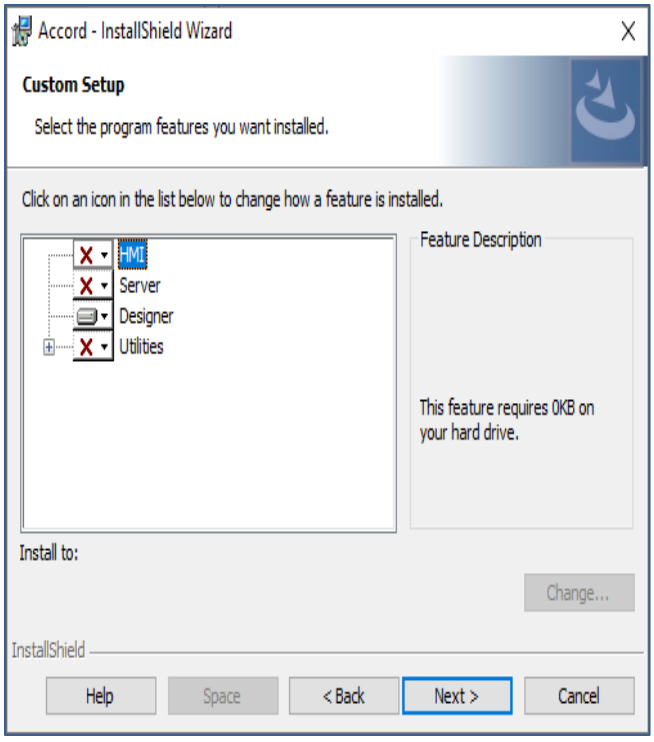


2. Installation Folder selection



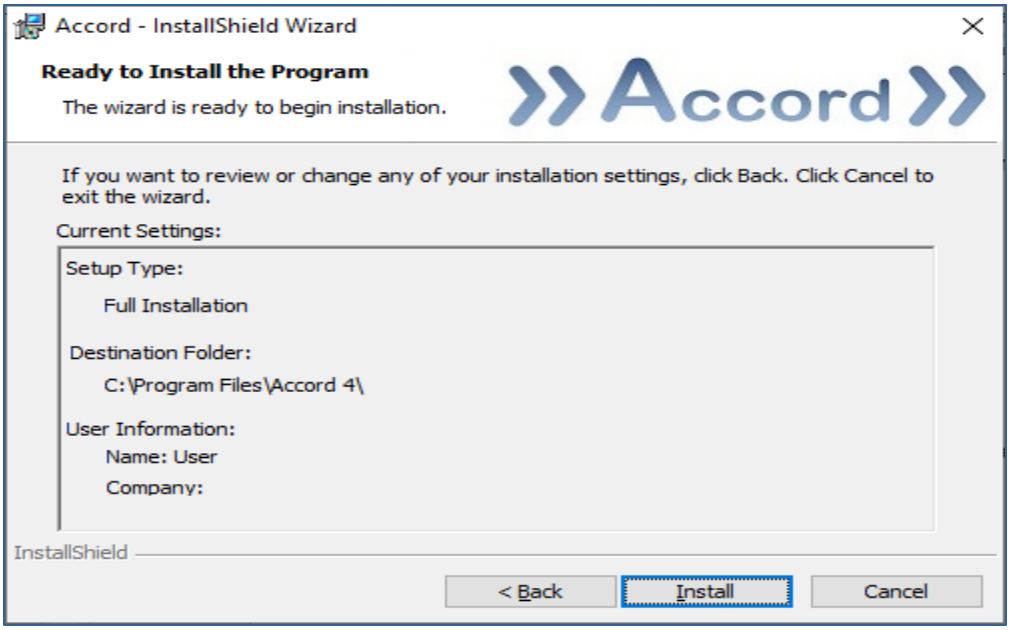
3. Installation selection





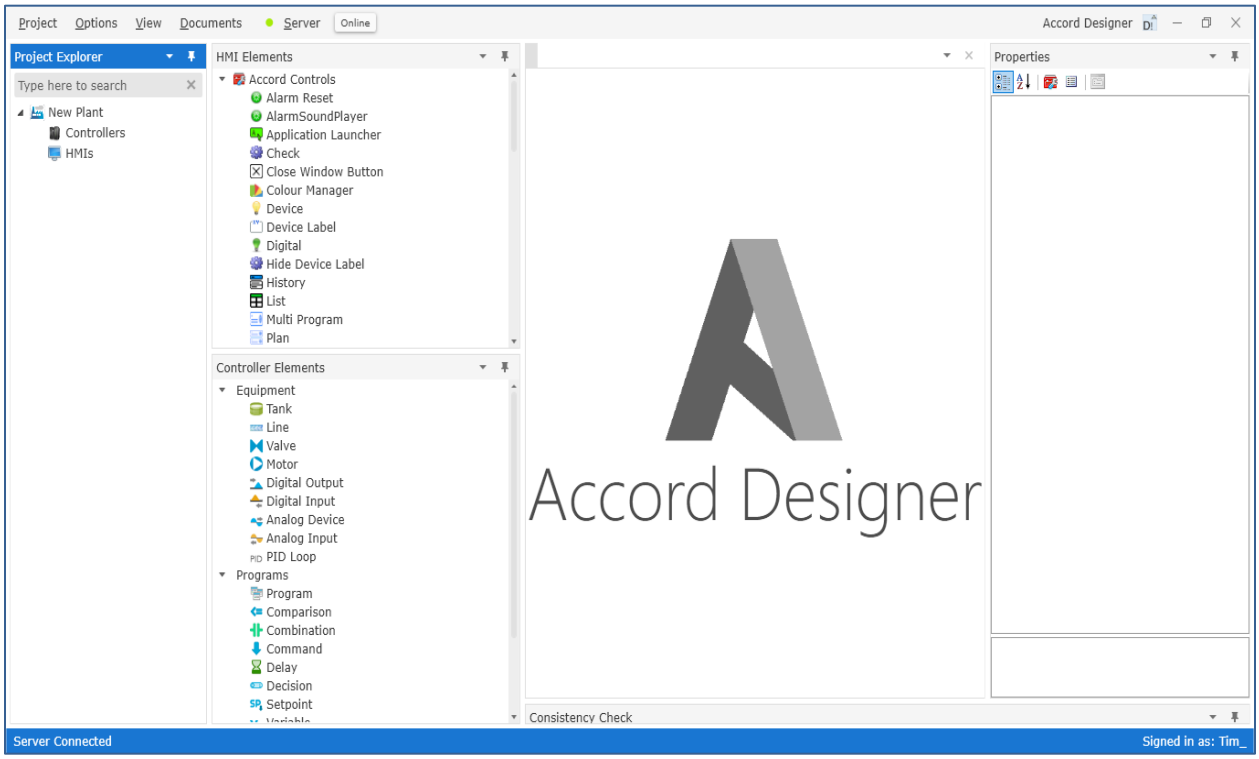
4. Selection of Designer and any other required modules. The installation is to a ProgramFiles folder but may be changed. Server must be installed on this PC or on a networked PC.

Note: Modules are selected to be installed by default. Right-click to deselect installation of a module.



5. Installation is completed on pressing Install.

3 Designer Layout



Initial Designer Screen, showing containers for Plant and Controllers and HMIs

The Designer window is comprised of the following:

- Top Level with Plant or overall system name
- Containers for controllers (PLC's or Emulators) and HMI's
- Elements toolbox for HMI and Controller elements
- Centre Panel for HMI Screens
- Properties configuration section
- Consistency Check Section
- Details section under the Plant icon
- A search window accessed by the search icon in lower right side

There is also information along the bottom border of Builder

- Status of Server connection
- Name of the signed in user

Panels may be detached and moved to different areas to suit the users workflow.

3.1 Designer Menus

Project Menu – this allows a project to be Created (using New) or Opened, and also the Exit from the application.

Options Menu – this contains Appearance Customization, for selection of Theme and Font and Colour.

Documents Menu – to access the I/O List, Equipment SDS, Process Description, Process FDS and SDS documents.

Server – to access Initialisation of Server, Server Settings, Utilities and Configuration Report.

There is an indication for being Online to Server; for Online monitoring.

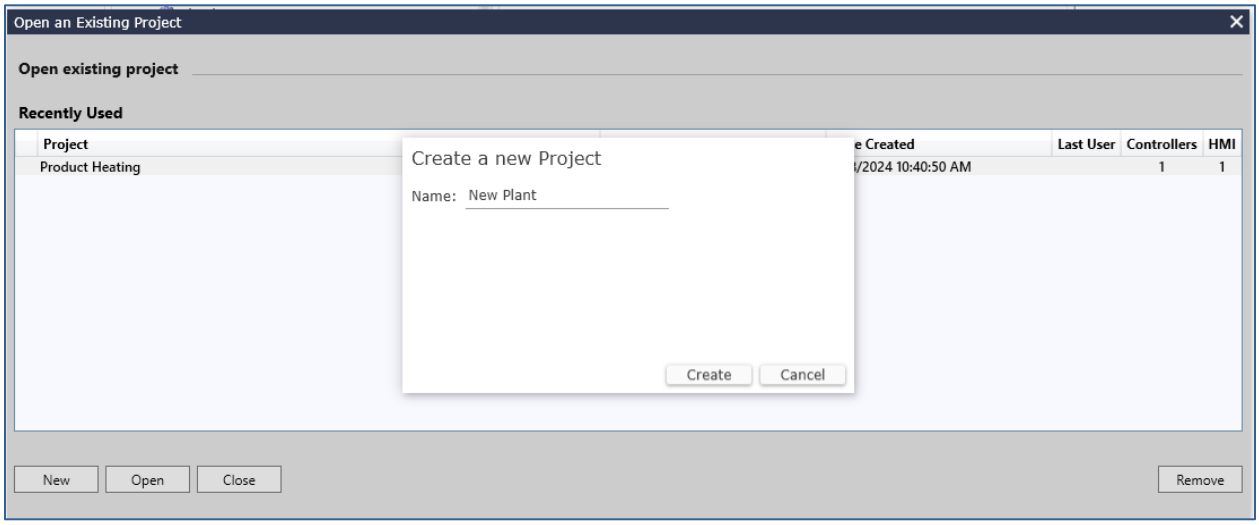
4 Model Configuration

Designer includes full functionality for model generation or modification; for adding, removing or changing an item. Design and Test documents, which completely match the process model, may be automatically generated.

Designer provides the addition and configuration of equipment and programs using drag-and-drop or right-click-and-add, and using copy-paste, rename and remove and providing properties panels for each item and tables in which items can be added, removed, or have their properties changed using drop down or editing. The application should make configuration of a process model easy and understandable.

4.1 Creation of a New Project.

This is prompted if there are no existing projects, or it may be accessed under Project/New.

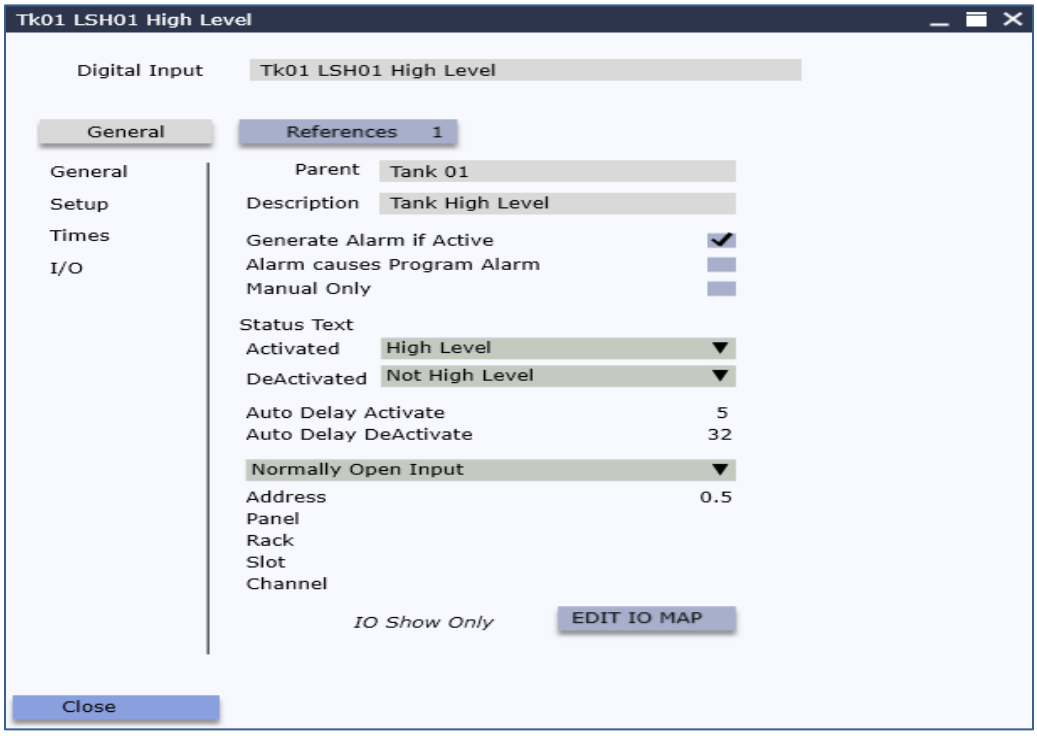


Project List with panel for New Project

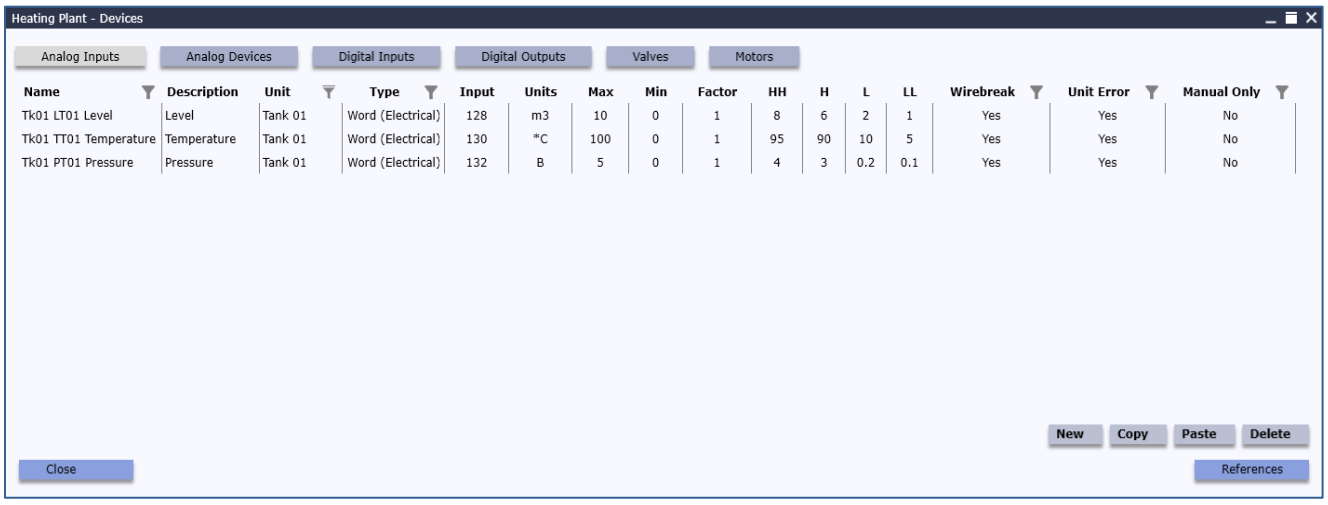
The Project is listed in the project list. The assigned name is used for Project access for configuration, and the Project may be renamed at any time.

4.2 Process Model Note

Designer provides a method for configuring Process Models by defining Equipment Objects (such as Valves) and Programs and Program objects (such as Alarms) and linking these items by listing them in tables or tables to provide required functionality. The application should make devices and aspects of items accessible for editing as much as possible.



Sample of Properties of a Device



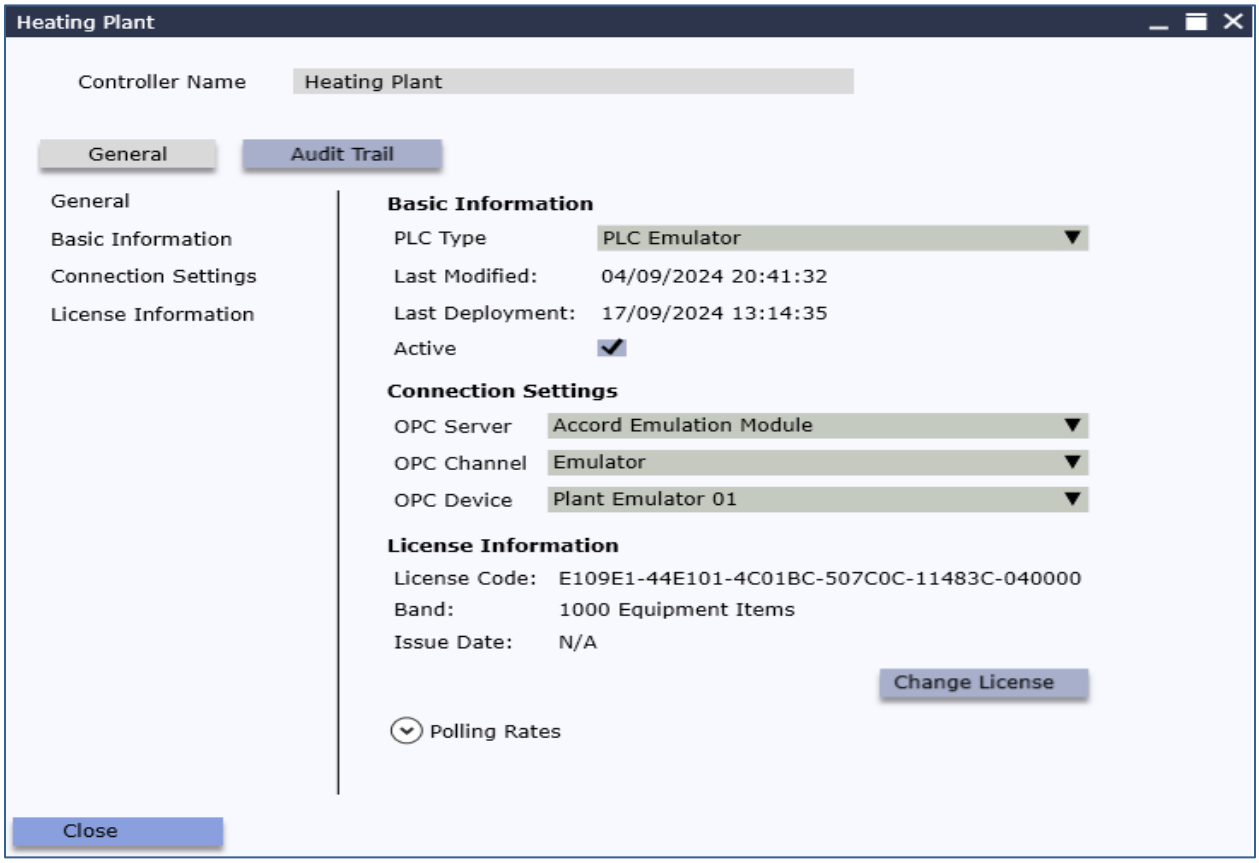
Sample of Table of Devices in a Unit

4.3 Setting up a Controller

A Controller holds a Process Model as the developed model will be transferred to a single PLC or Emulator instance. A controller can be added by right-click in the Controllers and selecting New

4.4 Controller Summary

This is accessed by right-click properties for the Controller.



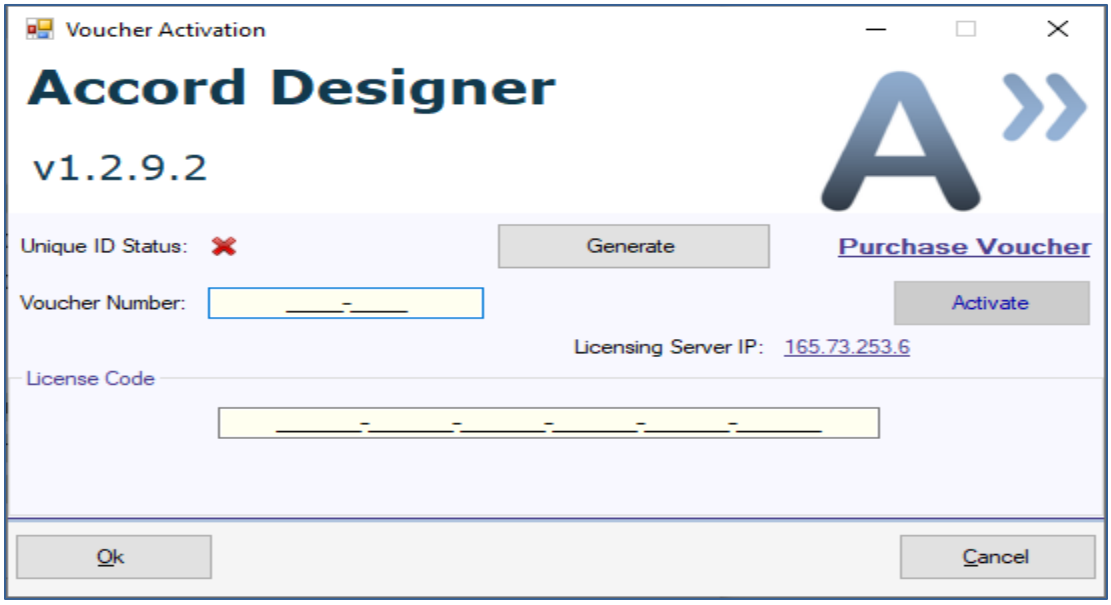
Controller Properties

The Details section allows the user to configure the following:

- PLC Type - Selection of the Controller Brand, or Emulator.
- Active – Selection of the controller being Active in Accord Server
- OPC Communications settings for the PLC or Emulator, including Polling Rates
- License Information.
- Area or section of the company or plant

The setup can generally be completed by Dropdown menu and selection.

4.4.1 Licencing of the Controller

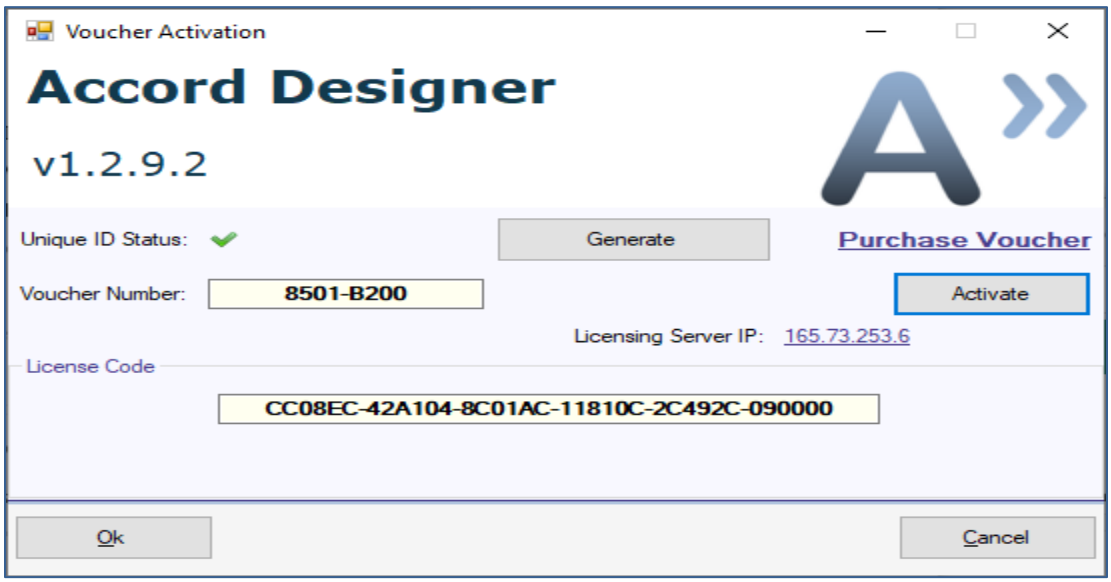


Project before Licencing

The screen will initially show no information.

A Unique ID, activated by clicking on the Generate button, is used to match with the PLC.

Note: If a PLC is already in use and matched to another PC, then resetting the Unique ID will reset the communications with the already matched PC.



Licenced Project

The PLC is licenced for the PC by entering a Voucher Number and pressing Activate. The License code is generated by the Licensing Service.

5 Configuration of Equipment Units

Equipment is contained in Units, to reflect process drawing, which are comprised of:

- Analog Devices (with PID Loops)
- Analog Inputs
- Digital Outputs
- Digital Devices
- Digital Inputs

Items associated with a Tank or section of line are placed in a Unit. There are two types of units: Tank Units and Line Units.

In configuring a process plant a Tank Unit contains equipment which is connected to the Tank and a Line Unit is usually section of line between block valves or a block valve and an end-of-line drain valve. A Line Unit is a usually a section of plant which is used for transfer.

Units are grouped for presentation purposes and both Tank and Line Units may contain equipment Devices and Instruments. Examine the plant drawing and process description to decide on the setup of Units.

A continuous operation system, in which there is one main program, may be configured using 1 Unit. A sequential system, in which there is more than one program, and the different programs will use different parts of the equipment would be configured using Units.

5.1 Unit Common Functionality

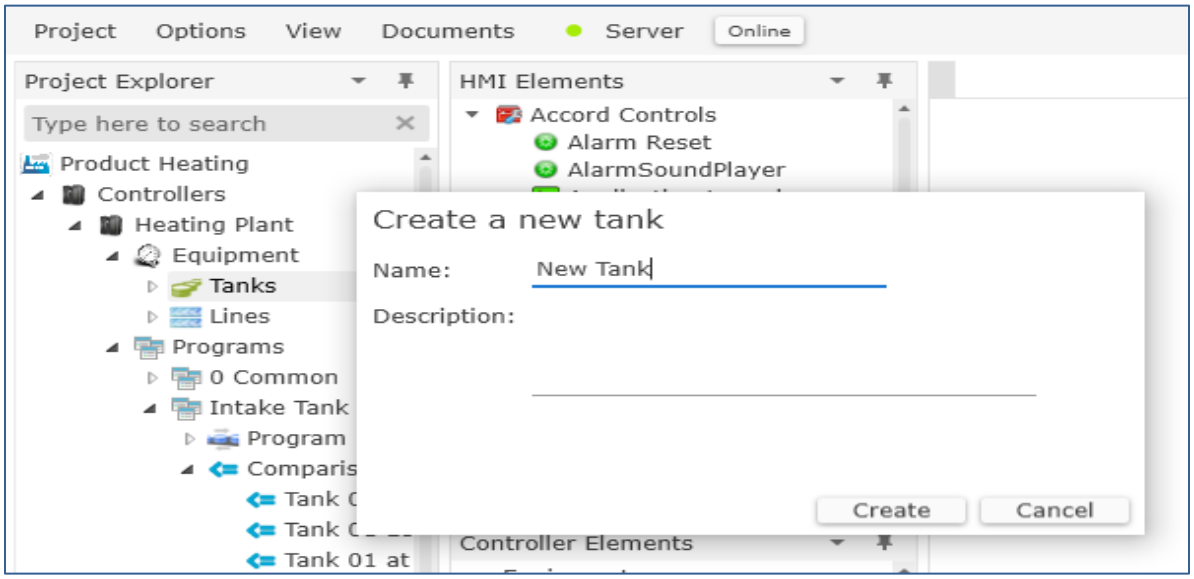
A Unit is a logical section of plant, and use of equipment units allows safe operation:

1. If a device (analog or digital) in a unit is in Maintenance then devices in that unit will be Affected by Maintenance and may not be activated
2. If a device (analog or digital) in a unit is in Error and the device is enabled to cause a Program Alarm then the program which is using or attempting to use the unit is placed in Alarm.
3. If a Unit is Reserved by a program and another program attempts to select the Unit then that new Program may be placed in Alarm if Unit Selected Alarm is configured.

When a unit is configured it may be placed in a program in the Unit Routes component holder in the program. The program will then be able to use, or access, devices and instruments in the unit.

5.2 Insertion of Units – Tanks or Lines

Units are inserted into the Model by dragging from the toolbox into Tanks or Lines groups or right-click on group and adding the unit type.

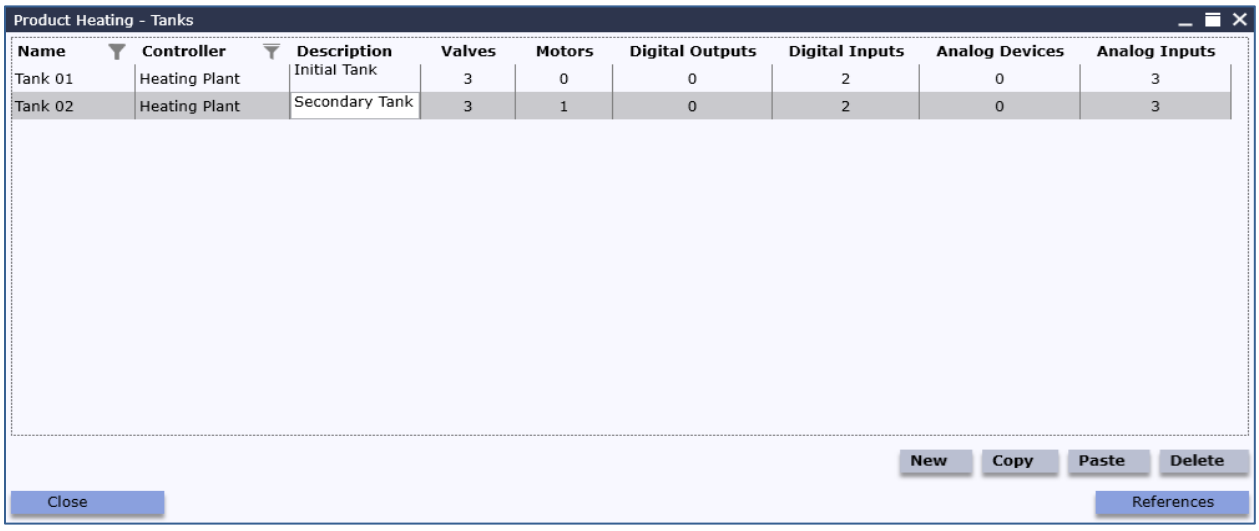


2.

Creating an Equipment Unit

There is a prompt for the unit name to be entered. This may be based on the Unit identification in plant drawings (P&ID's). In this example the name New Tank is given to the Unit.

Double-clicking on Tanks shows a table of properties of the Tanks and a description for the Tank can be entered here.

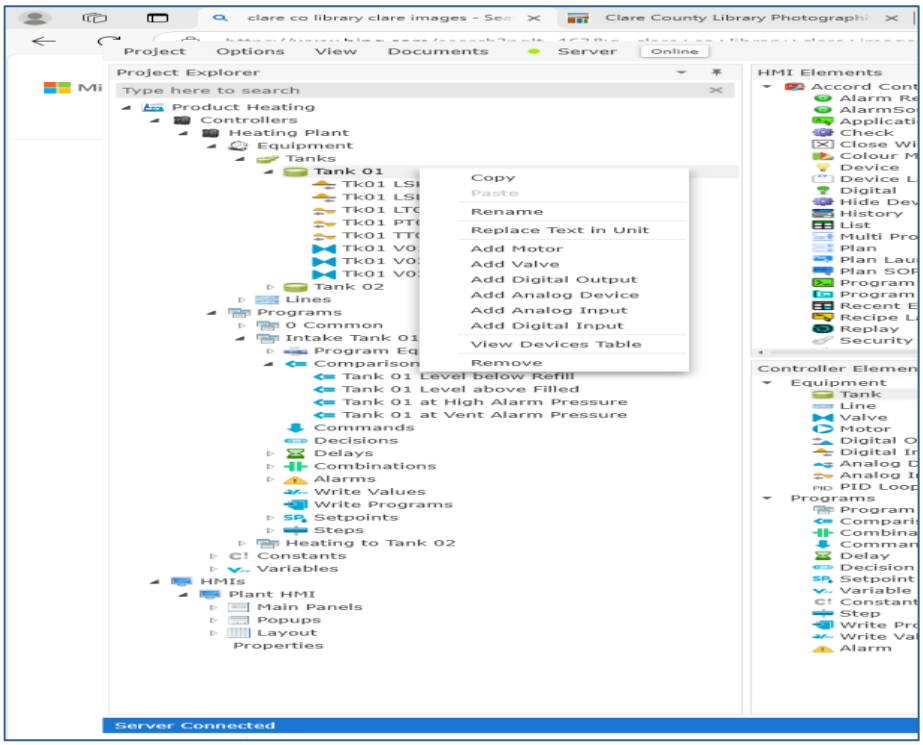


List of Units

5.3 Adding Devices Items to Units

Equipment items may be added into Units by

1. Dragging in the appropriate icon from the equipment toolbox
2. Right-clicking on the Unit to add required item type
3. Copy and Paste of a similar item, by right-click or in Table.
4. Adding into a Table



Addition to a Unit which contains Valve, Analog Input and Digital Inputs

A guidance prompt may appear during some Addition methods.

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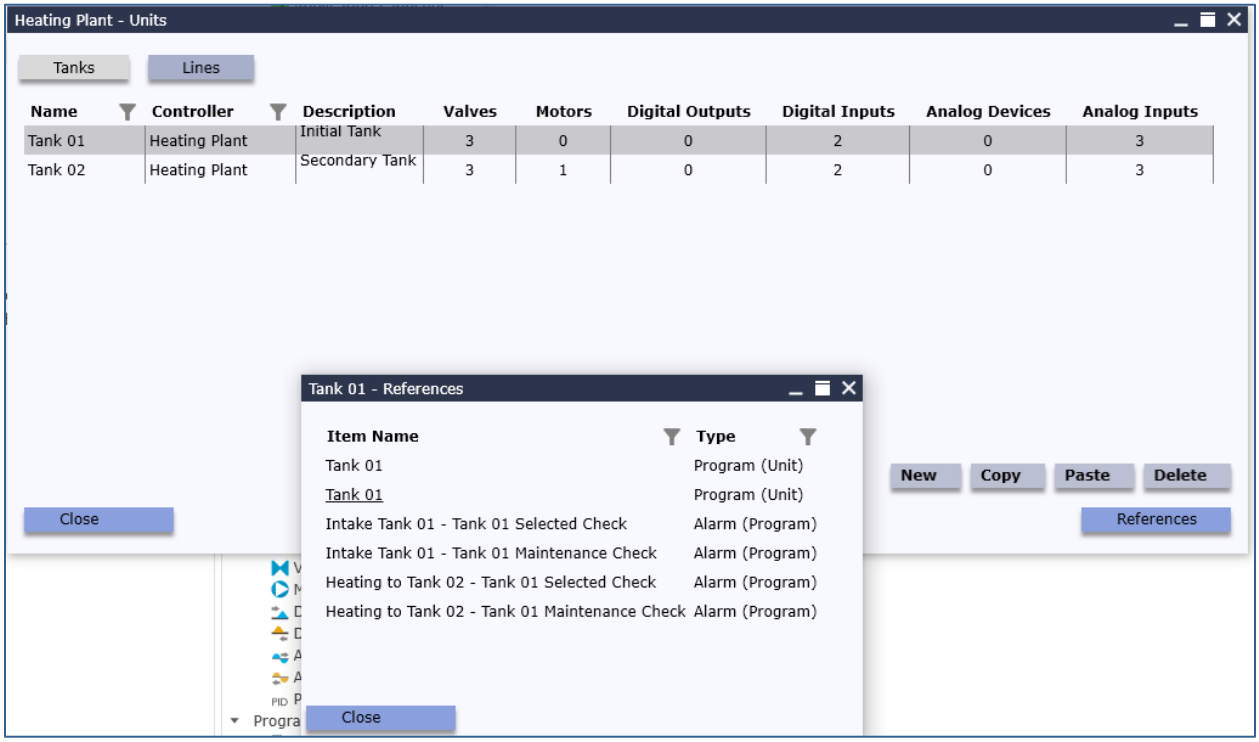
5.3.1 Copy and Paste of Units

In addition to insertion of devices, right-clicking on the Unit gives the options to Rename, Delete, or Copy the Unit.

A Tank or Line unit may be copied and pasted within the object unit Tank group or line group. Copying a Unit creates an exact copy of all the information for the Unit. The copied unit and all the components must be renamed, and re-configured, including changing I/O addresses with correct settings.

5.4 Cross References for Units

Cross References may be accessed by right-click on Equipment and View Units Table and selecting a Unit in the List and clicking References in the bottom of panel.

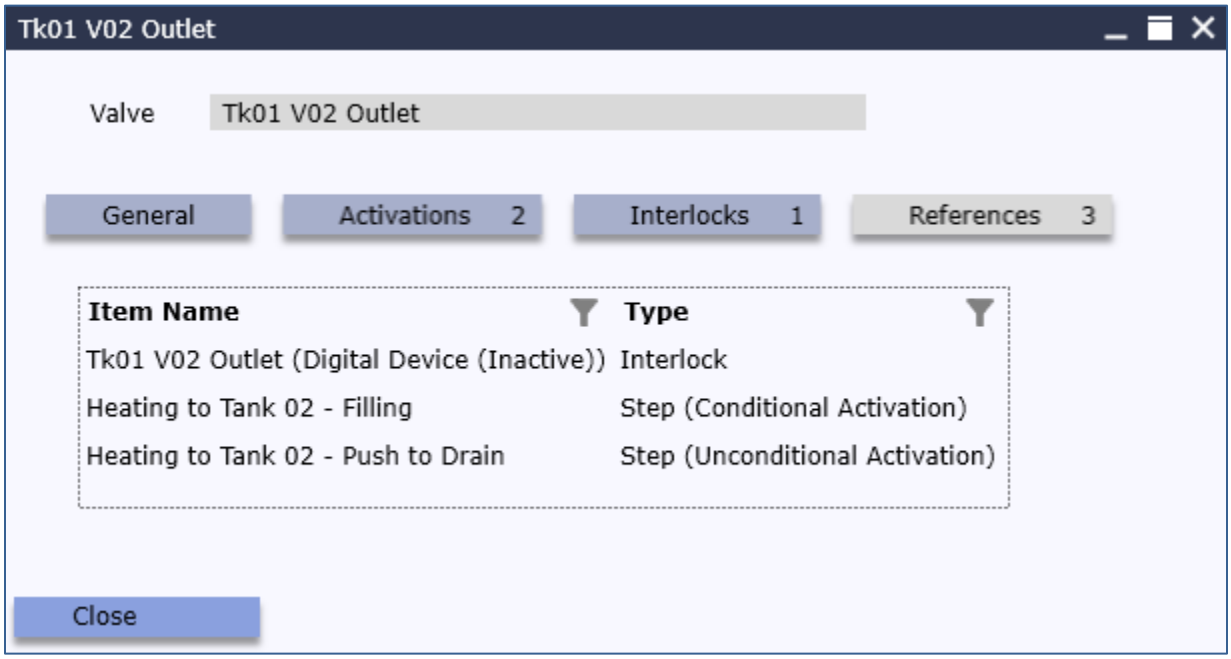


Cross reference screen for Unit

Clicking on a Link under an item will bring up the properties for that item.

5.5 Cross References for Devices

Cross References may be accessed by selecting References in the top of the device property panel.



Cross reference for Unit

The unit shows the unit that the item belongs to.

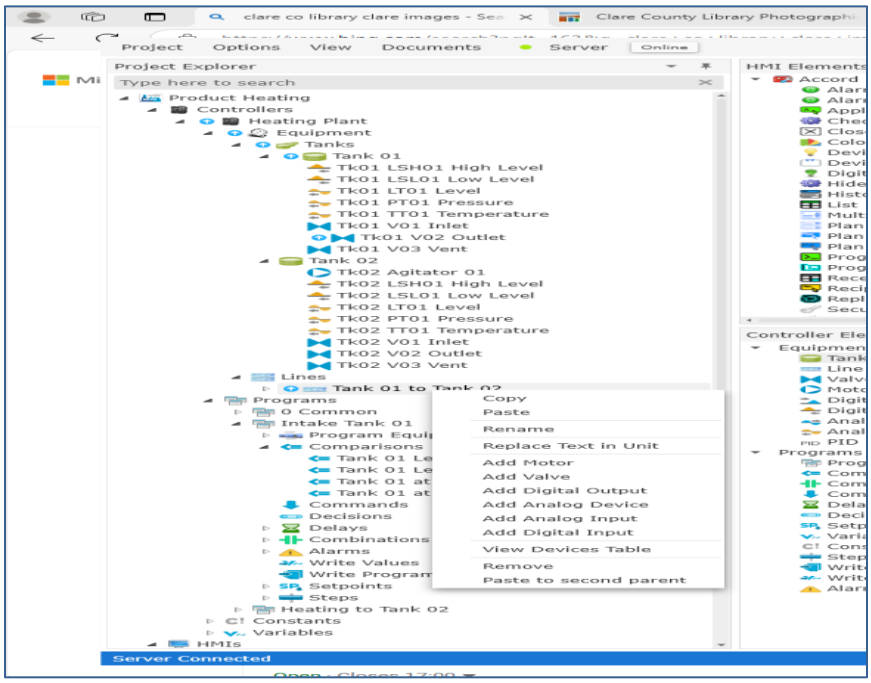
The sections buttons show all the areas where the items could be cross referenced. The number in the sections refers the number of occurrences in areas where this item is used.

Clicking on the link will access the referenced item.

5.6 Linking of Units

Tank or line units are linked when a digital device is part of both units. This is achieved by selecting the valve in one unit and right-clicking to copy the valve and then selecting the required second unit and right-clicking to use the function “Paste to Second Parent”.

This function is only for Digital Devices Valve.



Selection of Valve in Tank and Insertion by “Paste to second parent” in Line Unit

It is possible to link any two units in this manner. Such linking needs to be carried out carefully to reflect the actual plant or process. A valve that is a component of two units is accessed and treated in the same manner as a valve that is a component of only one unit.

It is important to link units using this function in order to ensure that attributes of both units that are dependent on devices are treated exactly the same.

Such attributes are:

1. Unit, and any Program using the Unit, may be put in Alarm if the valve is in error.
2. Other Devices in the Unit are placed in Affected by Maintenance if the valve is in maintenance.

6 Configuration of Equipment Devices

Following insertion in a unit, a device is configured with settings that will determine its operation and its description in documentation. During insertion, the device is given a name and short description. The name may be changed at any time.

There are sections for General for Name and Unit, and for Setup, Times and I/O Address in the properties. There is also a button for references. The I/O Map Table can be accessed.

6.1.1 PLC I/O Description – Card Setup

A PLC is composed of a CPU and I/O cards on racks, and in some cases communications processors, special function modules and bus based I/O.

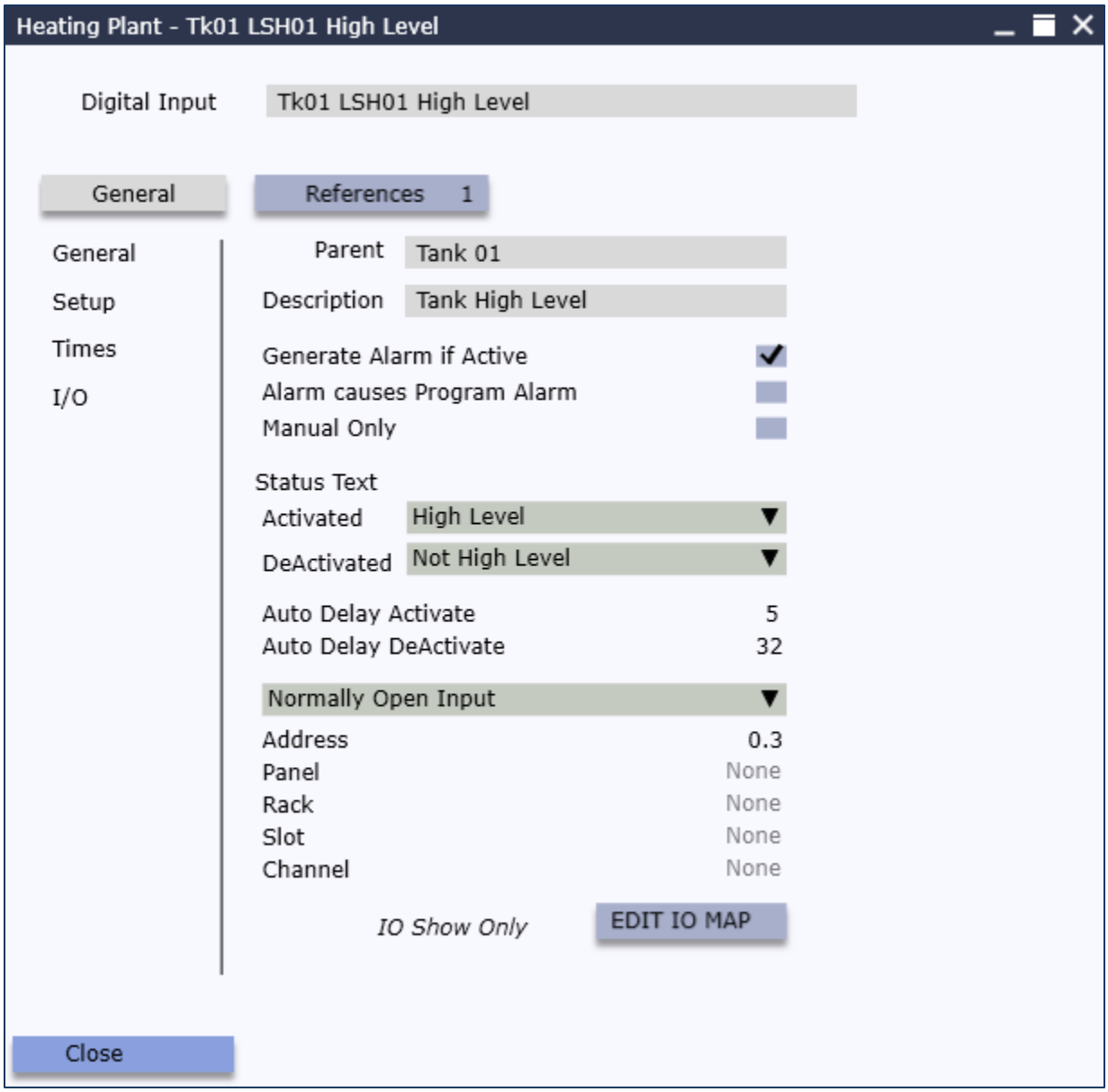
The PLC I/O description for a Device is available in the I/O setup area.

The fields for Panel, Central Rack, Slot and Channel are all text input fields. Once a text is entered for a device or instrument it then becomes available for other objects in the project. No validation is performed on this data. The same combination of information could be entered for more than one device. This could give rise to erroneous documentation as each device must be unique, so care must be exercised in entering this information.

The fields are free text fields and data may be used more than once (i.e. the Slot Nr.) It is the overall combination of data input that should be unique.

6.2 Configuration of Digital Inputs

Digital Inputs are items such as Level Switches, Proximity Switches, signals from other PLC's, buttons and other inputs that do not have a corresponding digital output.



Digital Input Setup

6.2.1 Digital Input Setup

The following aspects of the device may be filled in for Setup.

Setup:	Explanation
Parent	This is the Unit that the Input switch is in. The field is Read-Only.
Description	A description of the device, for documents and maintenance.
Generate Alarm	This causes an On/Active state to cause an HMI Alarm, with the Description appearing in the Alarm.
Alarm causes Program Alarm	This causes an On/Active state to cause a Unit Alarm and then a Program Alarm if a program is working on the Unit.
Manual Only	This is used if the Input is not referenced in a program, only used for display.
Status Text Activated / Deactivated	This text is used to describe the On and Off states of the item in the HMI controls. This is a free text field.
Times:	**Explanation**
Auto Delay Active	This is the 'de-bounce' time, in seconds, for which the Digital Input must be present before it is recorded as being On/Active.
Auto Delay DeActive	This is the time, in seconds, for which the Digital Input must be not present before it is recorded as being Off/Inactive.
I/O:	**Explanation**
Normally Open / Normally Closed	A Digital Input is normally recognized as being ON when the electrical signal to the PLC input point is present. By selecting the Normally Closed Input, the user can declare that the input will be ON when the electrical signal is not present. A common example of this is a Tank Low Level Signal where (for failsafe reasons) the true low level (tank empty) is recognized when the signal is present.
Address	This is the PLC input address for the device. This must correspond to the point address of the item according to PLC format.
Panel, Rack, Slot, Channel	These fields can be used to describe the location of the signal, for maintenance and documentation.

6.3 Configuration of Digital Device Objects

Digital Devices are items such as Valves, Motors, and Digital Outputs (signals, such as to other PLC's), that have a PLC Digital Output and may have Digital Inputs as Feedbacks.

Each Digital Device is assigned 1 Output and a number of Feedbacks may be configured. The type required is selectable in the setup area.

There are following types of Digital Valve Feedbacks:

- No Feedback
- 1 Feedback (Feedback True when Activated)
- 1 Feedback (Feedback True when Deactivated)
- 2 Feedbacks (Feedback True when Activated & Feedback True when Deactivated)

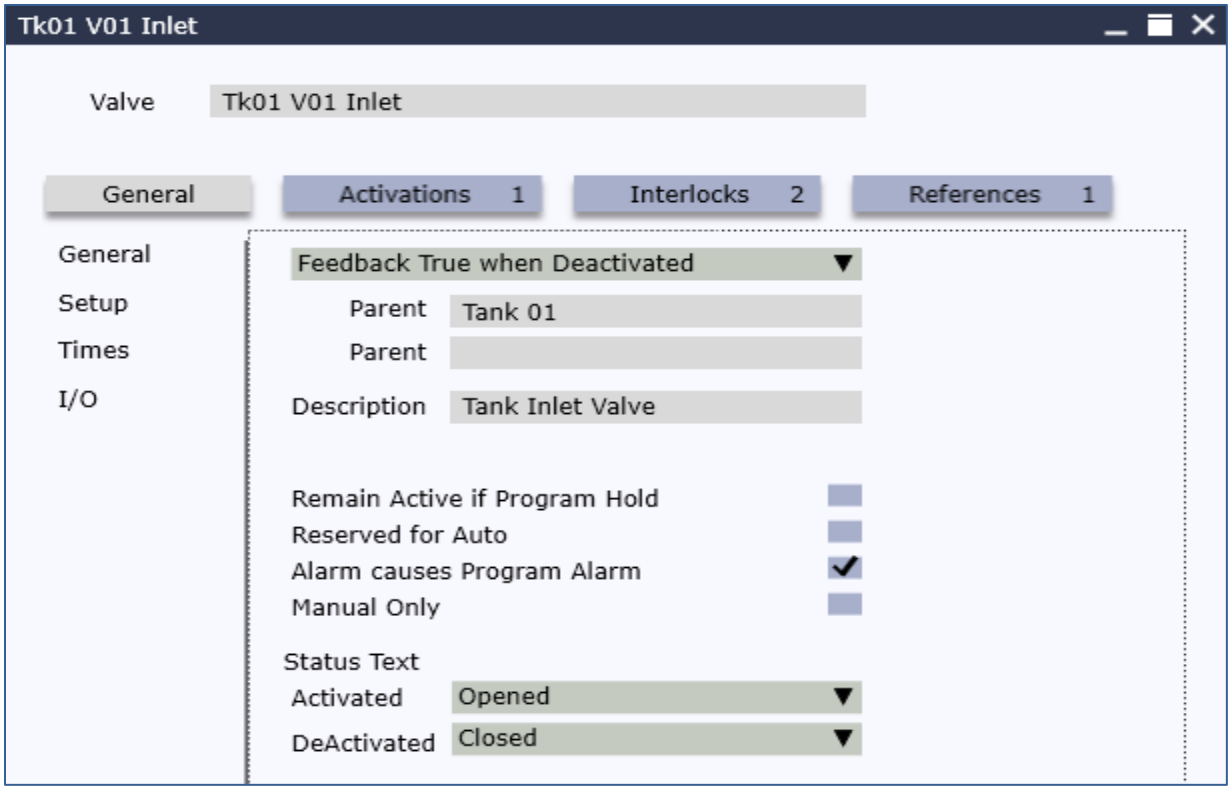
Feedback True when Activated may be thought of as a Normally Open feedback
Feedback True when Deactivated may be thought of as a Normally Closed feedback

There are following types of Digital Motor Feedbacks:

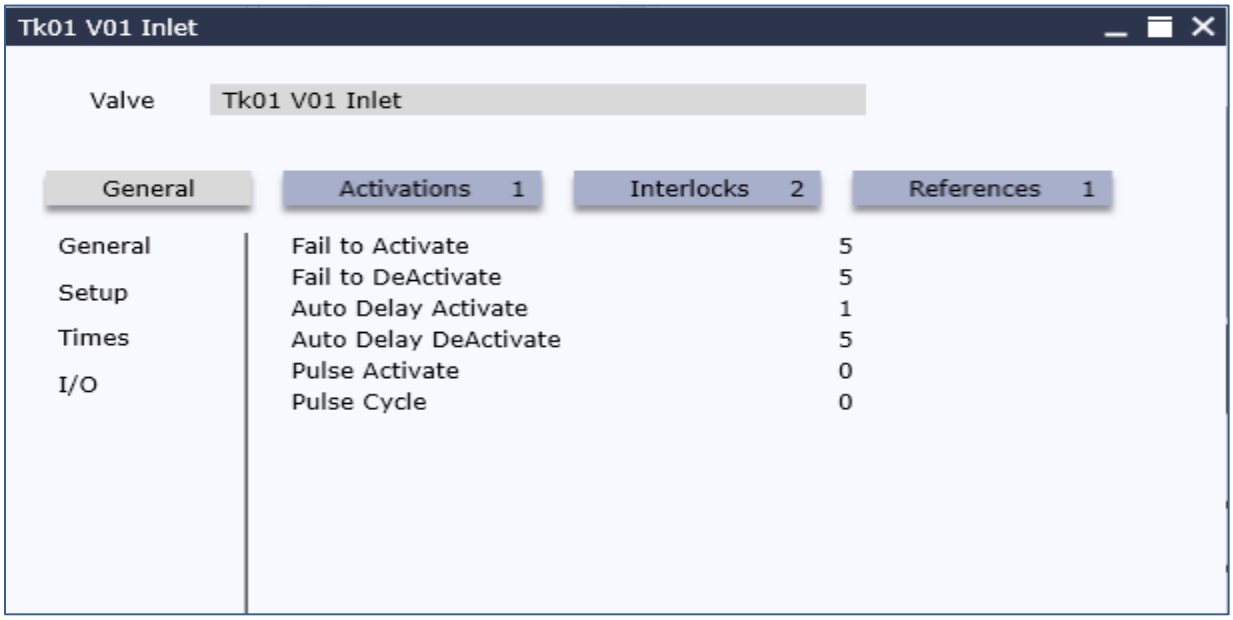
- No Feedback
- Run Feedback (Normally Open)
- Run Feedback (Normally Open) with Isolator (Normally Closed)
- Run Feedback (Normally Open) with Trip (Normally Closed)
- Run Feedback (Normally Open) with Isolator (Normal Closed) and Trip (Normally Closed)

A Run feedback indicates that the motor contactor is engaged.

6.3.1 Setup



Setup showing types for Valve Feedbacks



Times allows Editing of Fail, Delay and Pulse times

Setup showing assigned Valve I/O

6.3.2 Setup Fields

The following aspects of the device must be filled as required:

Setup:	Explanation
Type	This sets the type and number of feedbacks for the device.
Parent	The Parent Unit for the Device, and a second Parent in case of Valve that is part of 2 Units
Description	A description of the device, for documents and maintenance.
Remain Active during Program Hold	This enables the item to stay On or Activated if the Program (sequence) that has activated the item goes into Hold or Error state
Reserved for Automatic	This is to have the item reserved for automatic only. When this is selected then Manual mode can only be selected with a specific additional override.
Alarm causes Program Alarm	This causes an Error state to cause a Unit Alarm and then a Program Alarm if a program is working on the Unit.
Manual Only	This is used if the Input is not referenced in a program, only used for display.
Status Text Activated / Deactivated	This text is used to describe the On and Off states of the item in the HMI controls. This is a free text field.

Times:	Explanation
Fail to Activate	This is the time, in seconds, that the valve or motor is allowed to travel without correct feedback status. If this time elapses then the valve or motor is placed in error.
Fail to Deactivate	This is the time, in seconds, that the valve or motor is allowed to have an Activated feedback while deactivated and at rest. This indicates a feedback signal when not expected e.g. a valve lifting against pressure.
Auto Delay Activate	This is the time, in seconds, that the valve or motor activation will be delayed by the device routine. This is used to avoid pressure issues.
Auto Delay Deactivate	This is the time, in seconds, that the valve or motor deactivation will be delayed by the device routine. This is used to allow closing of the valve or motor in a controlled manner to avoid line hammer and other pressure issues.

Pulse Activate	This is the time, in seconds, that the valve or motor will be pulsed for during the pulse cycle. Example Cycle time = 60, Pulse Time SP = 15 Valve will be activated for 15 seconds, deactivated for 45 seconds, activated for 15 seconds in a cycle while requested by program step.
Pulse Cycle	This is the overall time of the valve or motor pulsing cycle in seconds.

I/O	Explanation
Output	This is the PLC Digital Output address for the device. This may be Electrical or Bus address.
Feedbacks Valve- Deactivated Valve- Activated Motor-Isolator Motor-Run Motor – Trip	PLC Input address for Feedbacks. These are shown and available depending on the selected device and feedback types.
Panel, Rack, Slot, Channel	These fields can be used to describe the location of the signal, for maintenance and documentation.

The I/O for the item must be filled in. It will be checked for duplication in consistency check.

6.3.2.1 Feedbacks Types for Valves

1. 1 Feedback when Deactivated (Normally Closed) - Valve with feedback signal that is On (True) when the valve is deactivated
2. 1 Feedback when Activated (Normally Open) - Valve with feedback signal that is On (True) when the valve is activated
3. 2 Feedbacks - Valve with Activated and Deactivated feedback signals
4. No Feedback - Valve with only an Output and no associated Inputs.

Note: Valves are understood to be “Air/Motor to open & Spring to close”. In the case of a valve which is “Air/Motor to open & Air/Motor to close”, this may be catered for as two valves.

6.3.2.2 Feedbacks Types for Motors

1. Run Feedback (Normally Open) - Motor with a Running feedback signal that is On (True) when the motor is activated.
2. Run (Normally Open) and Isolator (Normally Closed) - Motor with a Running feedback signal that is On (True) when the motor is Activated and an Isolator signal that is true at all times to indicate that the motor is not electrically isolated
3. Run (Normally Open) and Trip (Normally Closed) - Motor with a Running feedback signal that is On (True) when the motor is Activated and a Trip signal that is true at all times to indicate that the motor is not tripped.
4. Run (Normally Open) and Isolator (Normally Closed) and Trip (Normally Closed) - Motor with a Running feedback signal that is On (True) when the motor is Activated and an Isolator signal that is true at all times to indicate that the motor is not electrically isolated and a Trip signal that is true at all times to indicate that the motor is not tripped.
5. No Feedbacks - Refers to a motor which only has an activation

Note; For Output and Feedback addresses; PLC addresses are represented per PLC editor.

Example used Siemens notation and numbers 4 & 7 correspond to Q 4.7 in Siemens PLC notation which is Output byte 4, bit 7.

Note: Accord configured I/O is usually processed cyclically in the PLC.

6.3.3 Interlocks Section

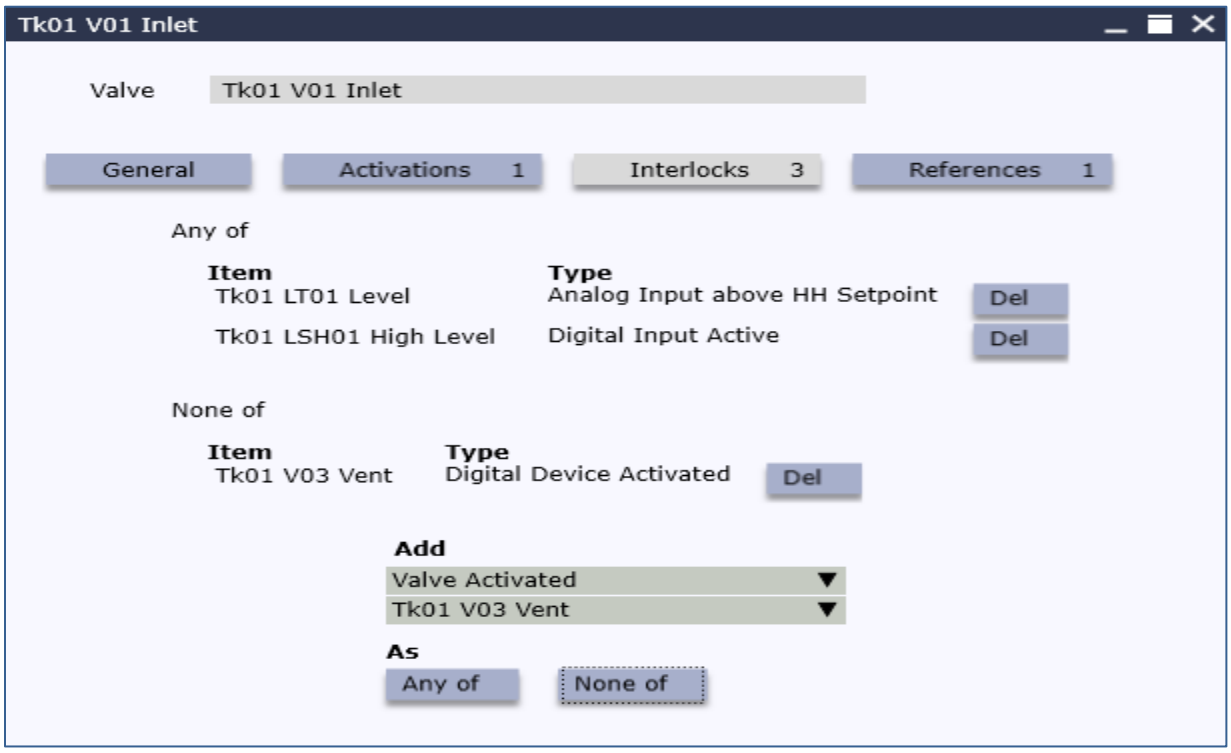
Interlocks are conditions of devices and instruments that prevent a device from activating. This is to prevent damage to equipment or to material. For example, a pump may not run if a low level in a pipe exists to prevent the pump running dry, or two particular valves may not open together to prevent product mixing.

Interlocks are applicable to HMI manual activation as well as automatic activations.

Clicking on the Edit Interlocks button brings up the Interlocks Section.

There are two types of interlocks allowed.

Section Any - Device is Interlocked if Any item is True.
Section None - Device is Interlocked if No item is True (unless One item is True).
Both sections are considered always, - the Device will be interlocked on either section.



Interlocks Setup for a Device.

In the example the Valve Tk01 V01 Inlet is interlocked if:

1. Tk01 LT 01 Level is above HH Setpoint or Tk01 LSH01 High Level is True
   OR
2. Tk01 V03 is not activated

Interlocks are added using the Dropdown for Device Type and Item and selection of Type 'Any Of' or 'None Of'. All of the appropriate items are made available by means of drop down menus.

6.3.3.1 Types of Interlocking Items:

- A Digital Input is Active
- An Analog Input is above High-High Alarm setpoint
- An Analog Input is above High Alarm setpoint
- An Analog Input is below Low Alarm setpoint
- An Analog Input is below Low-Low Alarm setpoint
- A Digital Input is Inactive
- A Valve is activated – open
- A Motor is activated – running
- A Digital Output is activated
- An Analog Input is below High-High Alarm setpoint
- An Analog Input is below High Alarm setpoint
- An Analog Input is above Low Alarm setpoint
- An Analog Input is above Low-Low Alarm setpoint
- A Valve is deactivated – closed
- A Motor is deactivated – stopped
- A Digital Output is Deactivated
- A Valve is in Alarm -error
- A Motor is in Alarm -error

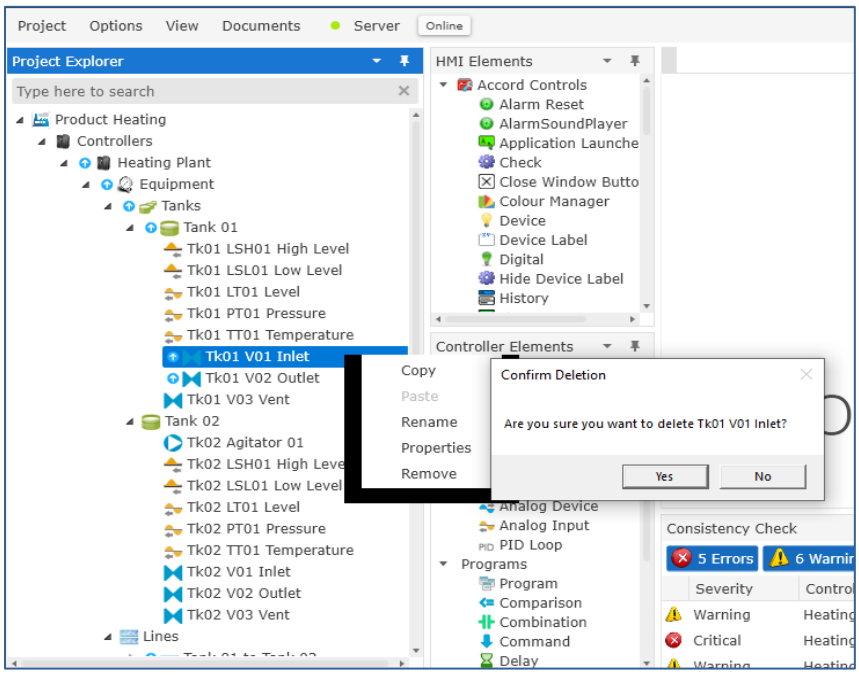
Once the type of condition is chosen the relevant items which are already configured in the same unit(s) become available for the choice of interlocking item in the drop-down menu.

The particular interlocking item is chosen from the drop down menu and the Interlock added by clicking “Add Interlock”.

Interlocks may be removed at any time by clicking “Del”.

6.3.4 Deletion or Removal of Digital Devices

To delete a digital device, right-click the desired device and select Remove.



Deletion of a Digital Device

Remove only takes place if there are no references for the item. A message is displayed allowing the device to be removed from any reference items before the item is also removed.

6.3.4.1 Deletion of Valves which have two parent Units

There is a choice for removing a valve which is used in two units.

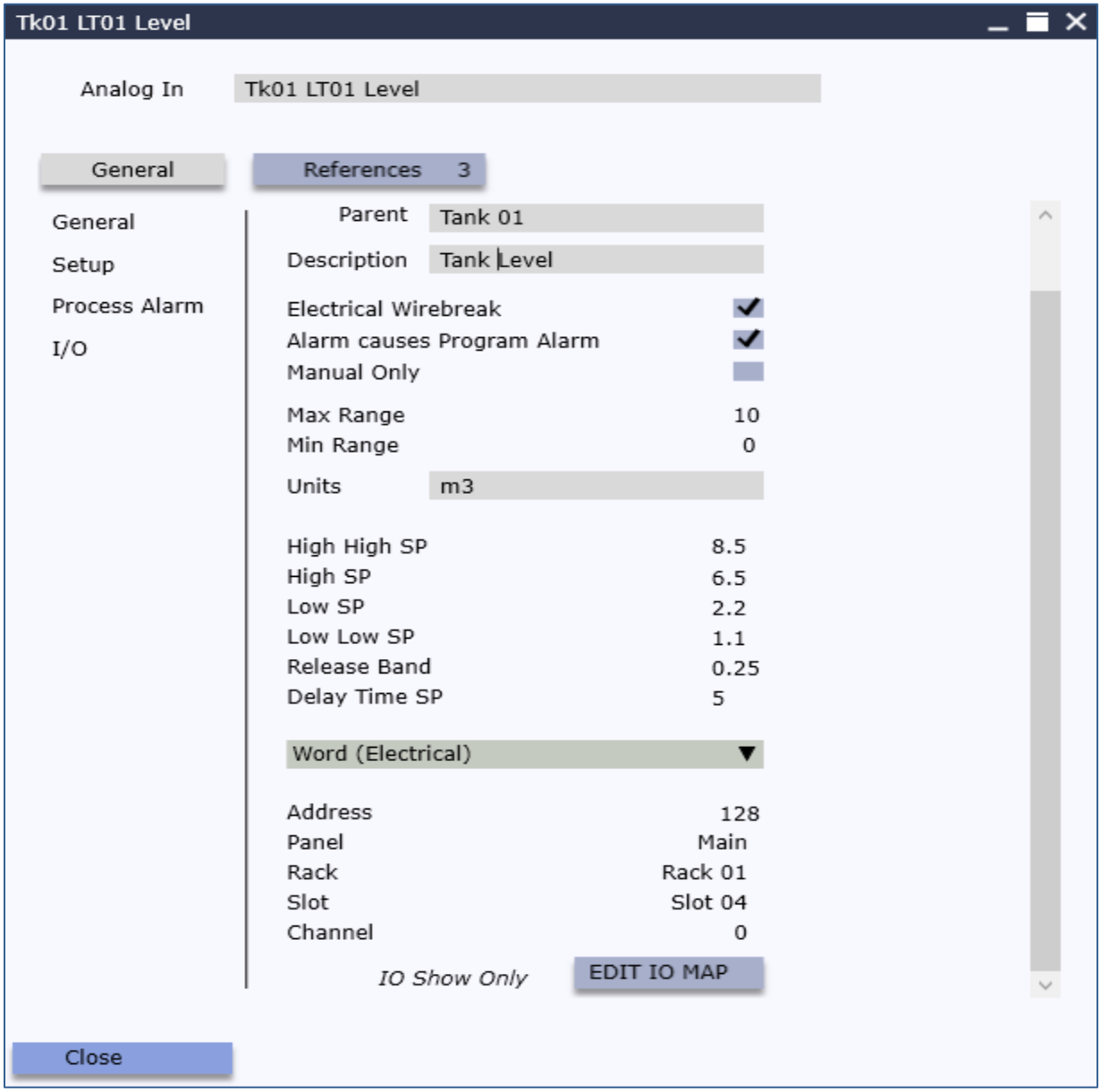
A prompt will request the user to choose between

- Delete Link – Deletes only the link between this valve and the parent unit.
- Delete Valve – Deletes the valve and links to any other parent units.
- Cancel Delete - cancels the Valve removal

6.4 Configuration of Analog Input Objects

6.4.1 Setup

There are settings in the Analog Input properties configuration section.



Analog Input Setup

6.4.2 Setup Fields

The following aspects of the instrument must be configured:

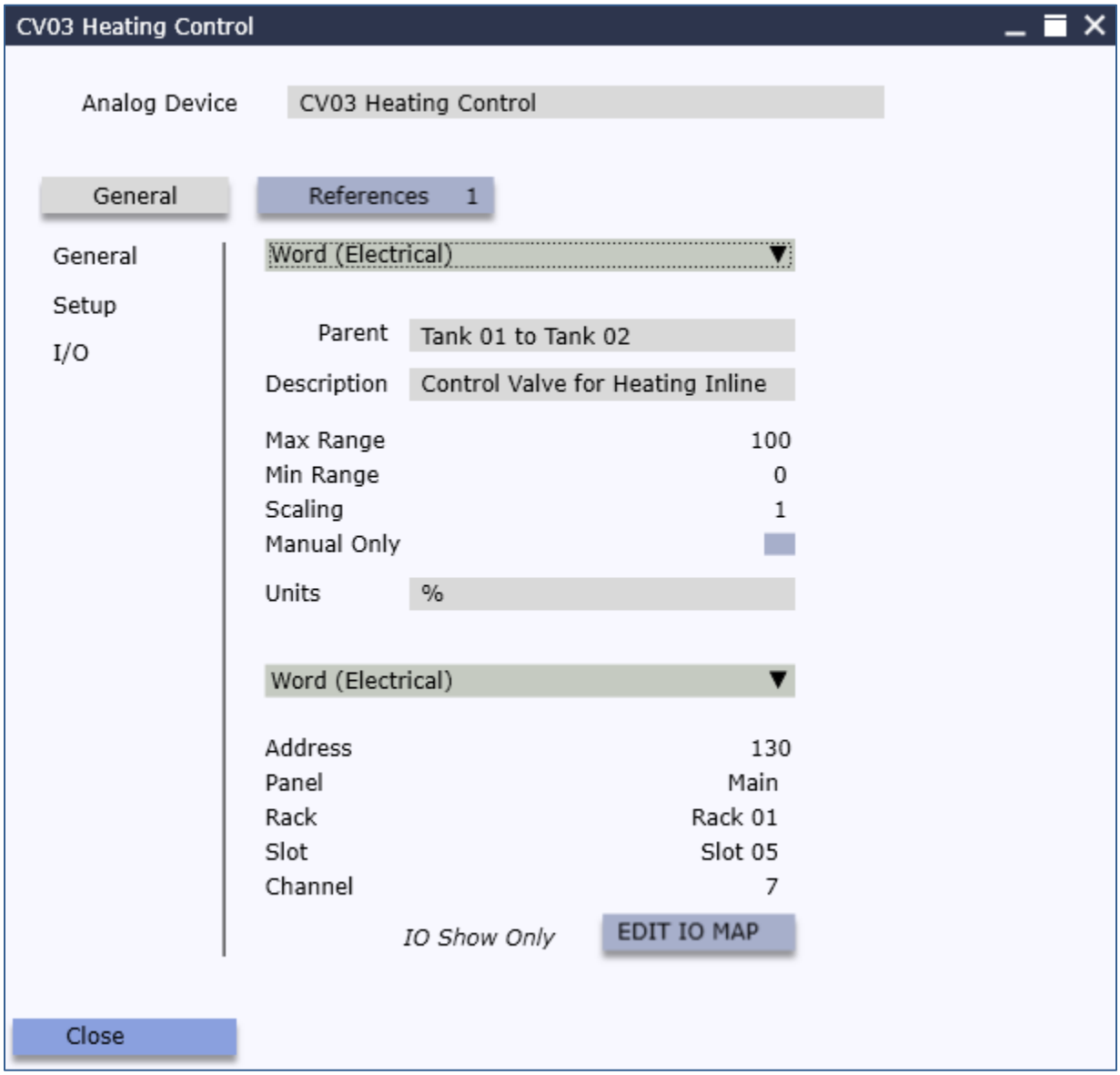
Setup:	Explanation
Parent	The Parent Unit for the Device,
Description	A description of the device, for documents and maintenance.
Electrical Wirebreak	To check for Wirebreak Alarm
Alarm causes Program Alarm	This causes an Error state to cause a Unit Alarm and then a Program Alarm if a program is working on the Unit.
Manual Only	This is used if the Input is not referenced in a program, only used for display.
Min Range	The lower value of the range in engineering units that the Electrical Input is to be scaled between.
Max Range	The upper value of the range in engineering units that the Electrical Input is to be scaled between.
Scaling	Scaling Factor applied to Bus based signals
Engineering Units	The name of the process units that is to be used in documentation and HMI Controls.

Process Alarm:	Explanation
High- High SP	This is the setpoint at which the High-High Alarm occurs.
High SP	This is the setpoint at which the High Alarm occurs.
Low SP	This is the setpoint at which the Low Alarm occurs.
Low-Low SP	This is the setpoint at which the Low-Low Alarm occurs.
Release Band	This is the value that the scaled value must recover by in order to release the alarm point. Example - If the high alarm is set to 90 and the alarm timer is 5 seconds and the hysteresis is set for 2 then the high alarm will be set if the Analog Input scaled value exceeds 90 for 5 seconds continuously. The high alarm will only be released as soon as the value falls below 88.
Delay Time SP	The number of seconds before an Alarm is triggered when the value is greater than or less than the respective Alarm SP

I/O	Explanation
I/O Address	This is the channel of the instrument, represented in word format. Example - 128, corresponds to I/O channel 128.
Input Type	This refers to the type of connection to the PLC, which will affect the scaling routine. The following types are configurable: 1. Word Electrical (Integer) e.g. 0-5 V, or 4-20 mA 2. Real Bus - The signal is read from Bus channel with applied Scaling Factor. 3. Word Bus (Integer) - The signal is read from Bus channel with applied Scaling Factor.
Panel, Rack, Slot, Channel	These fields can be used to describe the location of the signal, for maintenance and documentation.

6.5 Configuration of Analog Device Objects

There are settings in the Analog Device properties configuration section.



Analog Device Setup

6.5.1 Setup Fields

The following aspects of the device must be filled as required:

Setup:	Explanation
Parent	The Parent Unit for the Device,
Description	A description of the device, for documents and maintenance.
Min Range	The lower value of the range in engineering units that the Electrical Input is to be scaled between.
Max Range	The upper value of the range in engineering units that the Electrical Input is to be scaled between.
Scaling	Scaling Factor applied to Bus based signals
Manual Only	This is used if the Input is not referenced in a program, only used for display.
Engineering Units	The process units to be used in documentation and HMI Controls.

I/O:	Explanation
I/O Address	This is the channel of the instrument, represented in word format. Example - 128, corresponds to I/O channel 128
Output Type	This refers to the type of connection to the PLC, which will affect the scaling routine. The following types are configurable: 1. Word Electrical (Integer) e.g. 0-5 V, or 4-20 mA 2. Real Bus - The signal is written to the Bus channel with applied Scaling Factor. 3. Word Bus (Integer) - The signal is written to Bus channel with applied Scaling Factor.
Panel, Rack, Slot, Channel	These fields can be used to describe the location of the signal, for maintenance and documentation.

6.6 PID Loop Controller

6.6.1 PID Loop Note

A PID Loop Controller is used to control an Analog Device, based on a desired setpoint and feedback (in a loop fashion) from an Analog Instrument, also called the process variable.

An example is where Heat is transferred by allowing a quantity of steam to pass through a control valve. Initially the Temperature in the system (process variable) read by the Analog Input Temperature Transmitter will be low. As the system heats up the Control Valve will begin to close. The ideal is to maintain the Control Valve Analog Device at an output which maintains the temperature Process Variable at the desired Setpoint.

The difference between the Setpoint and the Process Variable is called the Error. The Loop controller allows the system to provide a low steady-state Error for different Setpoints.

PID stands for Proportional, Integral and Derivative control. The three terms refer to portions of the controller loop which provide the output value from the controller which is sent to the Analog device being controlled.

Proportional Control, also called gain, is a straight multiplier factor on the Error

Integral Control, is based on the average Error over recent time period.

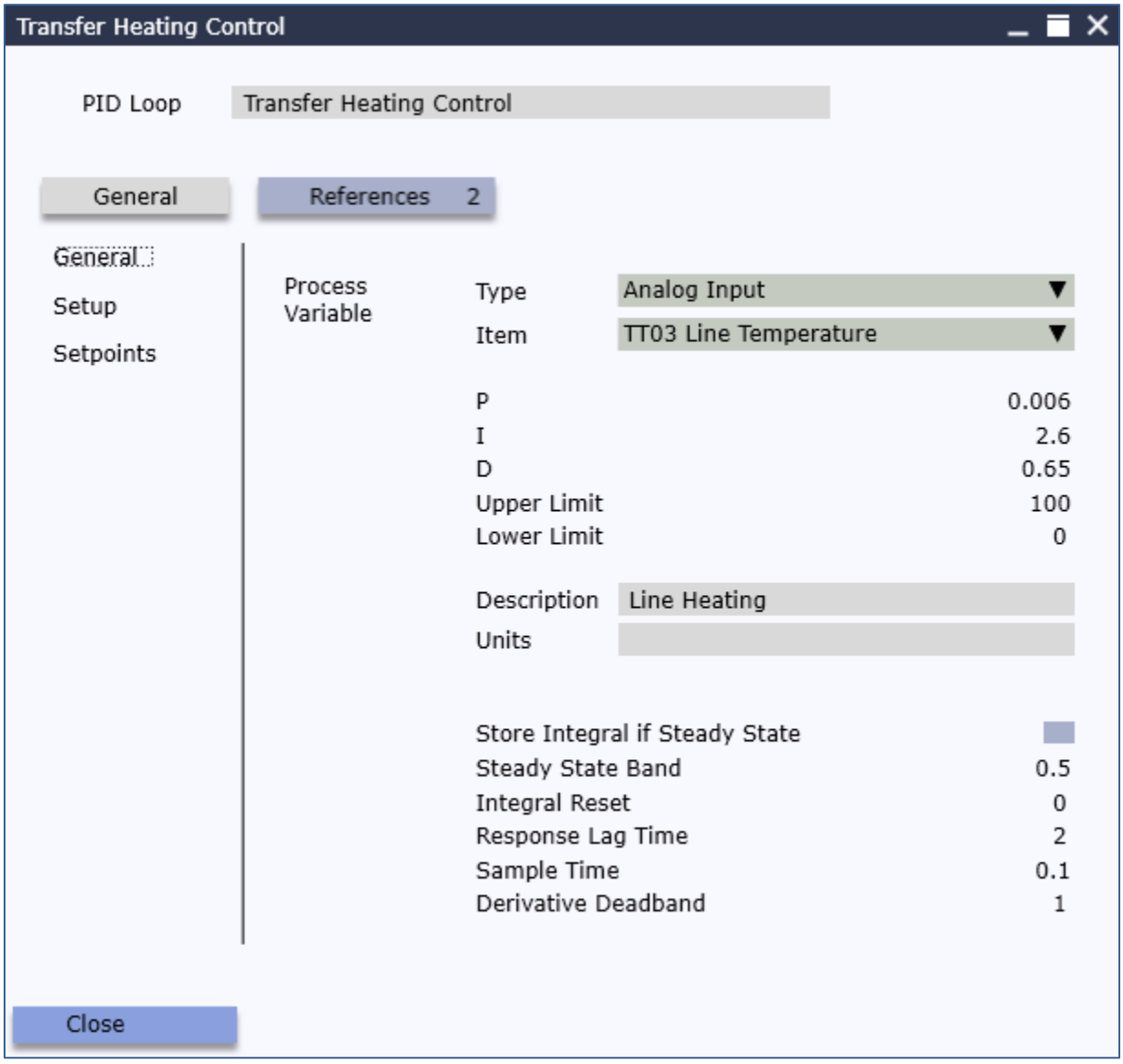
Derivative Control is based on the rate of change of the Output and (Error)

A controller only using Proportional control (P) would always generate an output which would cause the Process Variable to oscillate. Use of the I and D terms allows the user to generate controller action which will provide the required system response in terms of the output not oscillating at steady state. The process of modifying P, I and D terms to achieve smooth non-oscillating response is known as “tuning the loop”. Many systems just use P and I control and leave the derivative D term at 0.

6.6.2 Configuration of PID Loop Controller

Following insertion in a unit object each PID Loop must be configured with settings that will determine its operation and its description in documentation. During insertion the PID Loop is given a name and short description. These may be changed at any time.

There are two sections in the PID Loop properties configuration section. The name and analog device of the PID Loop are given in the Current Item. The PID loop is always associated with an Analog Device.



PID Controller Setup

6.6.3 Setup Fields

The following aspects of a PID Loop may be configured:

Settings	Explanations
AI Source	This is the Analog Input or Variable that is used as the Process Variable. It must be already configured.
P	Proportional, or Gain, Factor.
I	Integral Factor.
D	Derivative Factor.
Upper Limit Output	Maximum Range value for the Loop.
Lower Limit Output	Minimum Range value for the Loop. Often same as the Analog Device.
Description	A description of the device, for documents and maintenance.
Engineering Units	The process units to be used in documentation and HMI Controls.

Setpoints	Explanations
Store Integral when in Steady State	This allows the integral component to be stored, which will give a faster response in case of a PID restart.
Steady State Deadband	Deadband around the Setpoint within which the Loop is deemed to be in steady state. If the loop achieves this state for 100 seconds (given sampling time of 100ms) then the Integral component is stored when the "Store Integral when in Steady State" is enabled. Example- If the Steady State Hysteresis is 2.0 for a Loop with setpoint of 80.0 and then the Steady State is achieved when the Process Variable is between 78.0 and 82.0 for 100 seconds.
Integral Reset	Integral component value used when loop is starting up. Not used if there is a stored Integral Value from "Store Integral when in Steady State".
Response Time Lag	A factor for how quickly the loop is to react. It is used to set the rate of decay of Derivative term effect. The larger the value the slower the loop will act.
Sample Time	This is the interval between successive processing of the PID loop. This is set up in the PLC hardware to be 100 milliseconds. All PID loops are processed from OB35 in Simatic S7 PLC. The Hardware configuration will have OB35 interrupt time set to 100 milliseconds.
Derivative Deadband	The Derivative Deadband is the minimum amount of an error change that will cause a change to the derivative component of the PID calculation. It is a Deadband on the error with respect to the Derivative Component of the PID loop.

These settings are also available in Accord HMI PID Controls for tuning.

6.6.4 Steps in setting up a PID controller

These steps are generally carried out at HMI or Scada commissioning.

1. The PID Loop sample time will be 100 Ms- this means that the PID Loop and error is evaluated and output is manipulated every 100 milliseconds.
2. The response lag time depending on how quickly the physical loop is to react;
   - Initial guides for this are;
     - Flow controller - in the range 2-5 seconds
     - Temperature controller – in the range 30-40 seconds

     Test the accuracy of these times by manually activating (opening) the PID Loop output item – (analog device - control valve) and measure the time before a response is noted, being a change in the process variable (e.g. Temperature Transmitter).
3. To Tune the PID Loop
   - Initially set Integral and derivative (I & D) terms to 0 (zero)
   - Give an expected setpoint (or 50-70% of the maximum expected output).
   - Adjust the P term until the PID Loop oscillates around the setpoint without closing or reaching upper or lower limits.
   - Measure the time between peaks (i.e. the time for 1 complete cycle between maximum output and minimum output)

Apply P, I and D terms as follows

Proportional and integral control - Using PI control - Use the formula (flow control)

- P=Initial gain/2.2 I=Periodic time/1.2

Proportional and integral and derivative control - Using PID Loop control - Use the formula (Temperature Control)

- P=Initial gain/1.7 I=Periodic time/2 D=I/4

4. PID Loop Restart
   - If the PID Loop is required to Start from value other than Min Range then for check (tick) the box for “Store Integral When in SS”.

     This will cause the integral component of the PID Loop output to be stored when the PID Loop is in steady state, and Loop will load this value on new starts.

Note: Ensure disturbance variable is not set too high as this disables a derivative change effect if the error change between PLC cycles is too small. i.e. If the PID Loop reacts very slowly ensure the derivative term is not redundant.

7 Configuration of Programs

7.1 Program General

Programs contain Steps, which in turn contain Alarms and Activations. The Step sequence and the Alarms and Activations may be dependent on values which are checked in Comparisons, or some logic evaluated in a Combination, and the values may be Analog devices, or Setpoints, or Variables. The values in variables can be changed using Write Variables operations.
These are the components that Designer provides for implementation of a step sequenced program.

The full list of components required is, (as well as reference to equipment devices)

Common Items	
Program	Collection of program items and a sequence of Steps.
Program Order	Order in which programs are to be processed.
Variable	Register whose Value (Floating Pt) is written by the PLC.
Constant	Register which has a constant (Floating Pt) value in the PLC.

Program Items	
Comparison	A test of two signal or values, e.g. Greater than... .
Combination	A logic function. e.g. Tank LSL and Outlet Valve Open.
Command	A single command from HMI to the PLC
Delay	An OnTimer type delay for debounce items
Decision	A point selection at the HMI, may be part of a recipe
Setpoint	A value selection at the HMI, may be part of a recipe
Write Value	To perform a mathematical operation
Write Program	To change the step or state of another program
Alarm	A Critical fault or an Event in process operation.
Step	Stage of the program.

Program Recipe Items	
Step Times	Times used when the Step On is to Normal Step-On on Time.
Setpoints	A value type selection at the HMI
Decisions	An On/Off type point selection at the HMI

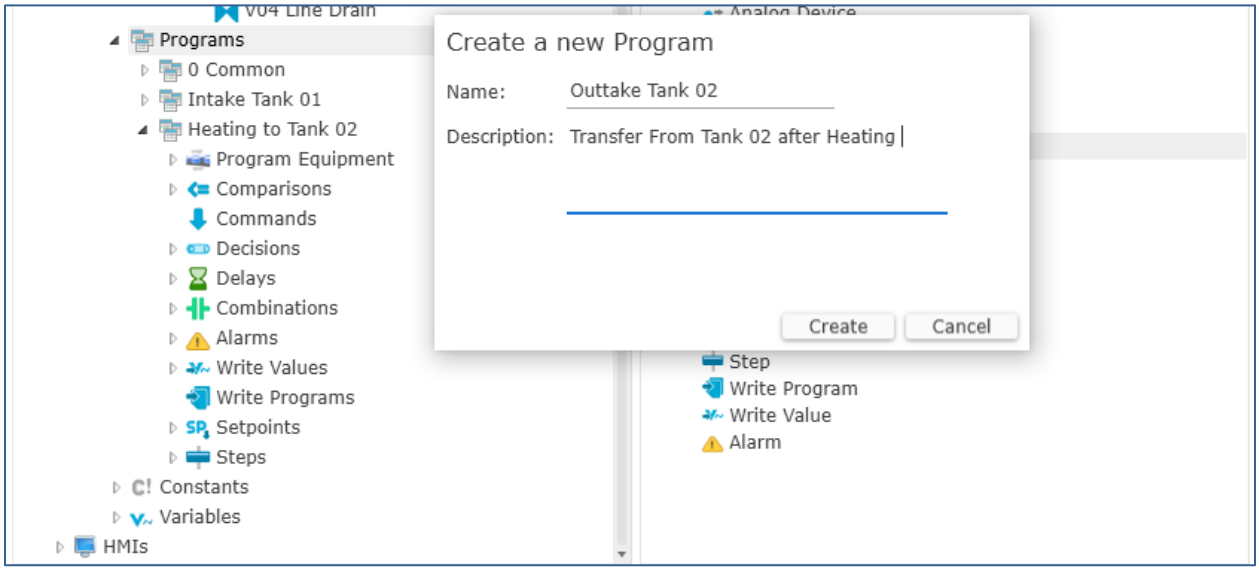
A Program is configured or built by configuring program and by listing them (for enabling) in Steps. Items are configured by dragging the appropriate icon from the Program toolbox or by right-click in the component holder and “adding component ” such as “Add Operation”. Equipment Units must be dragged to Equipment container in order to Activate devices or use items in Conditions etc.

A Program has the following states

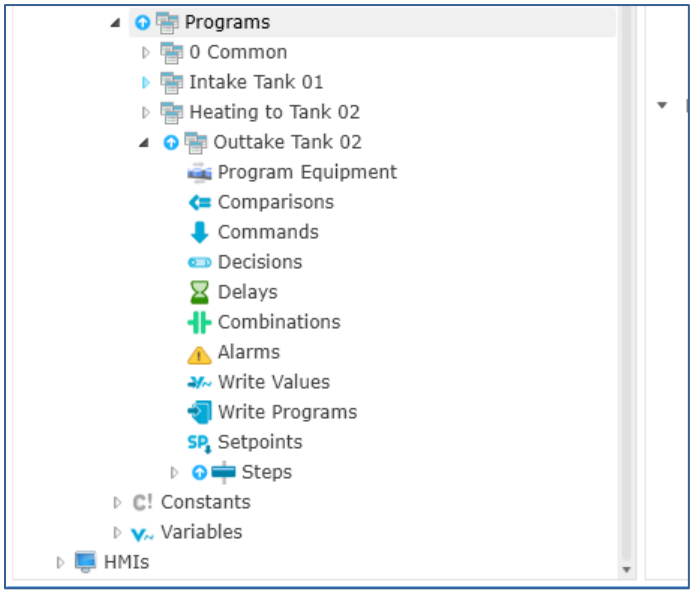
Program States	
Active	Program has been Started
Hold	Disallow Step On, Alarms and activations that are not ‘Enabled in Hold’
Alarm	A program Alarm or an Alarm in an associated equipment device has occurred.
TimeHold	The Step Time is paused.
Running	Program is Active, and not in Alarm or Hold.
Normal Step On	Program goes to the next step in the Step Order
Alternative Step On	Program goes to another step
Step	The number of the step the program is in. Startup Step is 0.
Startup Step	Initial step which checks on any Alarms or Units being reserved by other program being active.

7.2 Insertion of a Program

A program is inserted into the configuration by dragging a program icon from the toolbox to the Program Configuration area, or by right-clicking and Add Program. The inserted program must be named. In example the program is named “CIP Program”. The program sub-component holders are automatically generated.



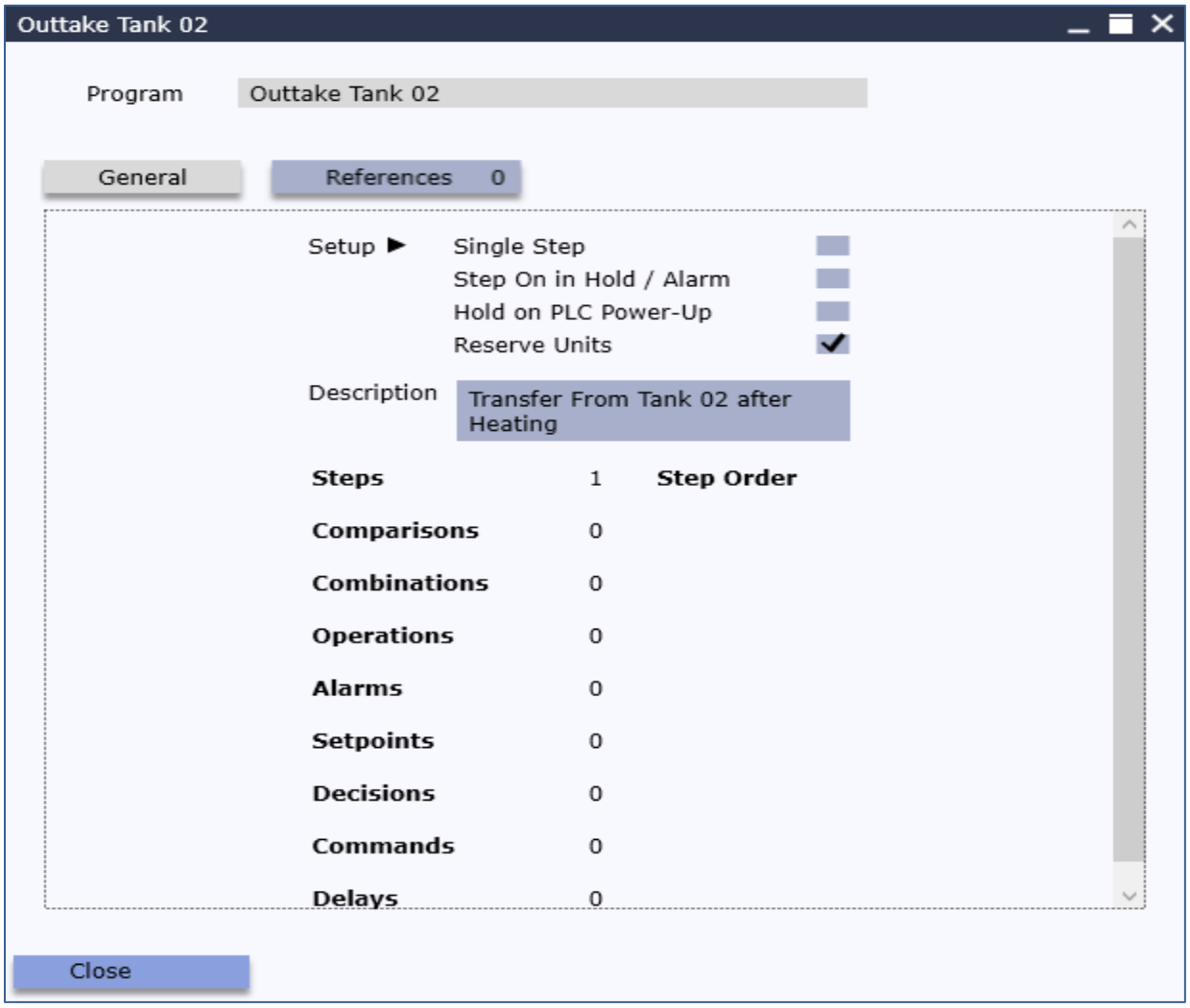
Initial Program creation



Initial Program Containers

7.3 Program Properties

Following Insertion the program initial properties may be configured.



Program Properties

Program Properties:
Single Step – this is for a 'Background Program' which is to run continuously. These programs run Common or Safety functions.

Step On in Hold - The default setting is that a program will not step on automatically if it is in hold or Alarm. This means the Operator must acknowledge the Alarm or restart the program manually. The Enable setting will allow the program to step on Automatically if a Critical Alarm has occurred or while the program is in Hold State.

Hold on PLC Power-Up - If the PLC fails all the information for the system is retained until the PLC is powered up again. The program may be configured to resume if it was running at time of power loss, or be configured to go into Hold, which will require Operator to restart the program.

Reserve Units - Normally a program will 'Reserve' or Select units when it is Active. This means that another program attempting to start using those units will go into Alarm, assuming the Unit Selected Alarms are still in the First Step. However, some programs for background or common functions may not be required to 'Reserve' or select units.
PreStart Operator Actions notes – this information will be used in project documentation.

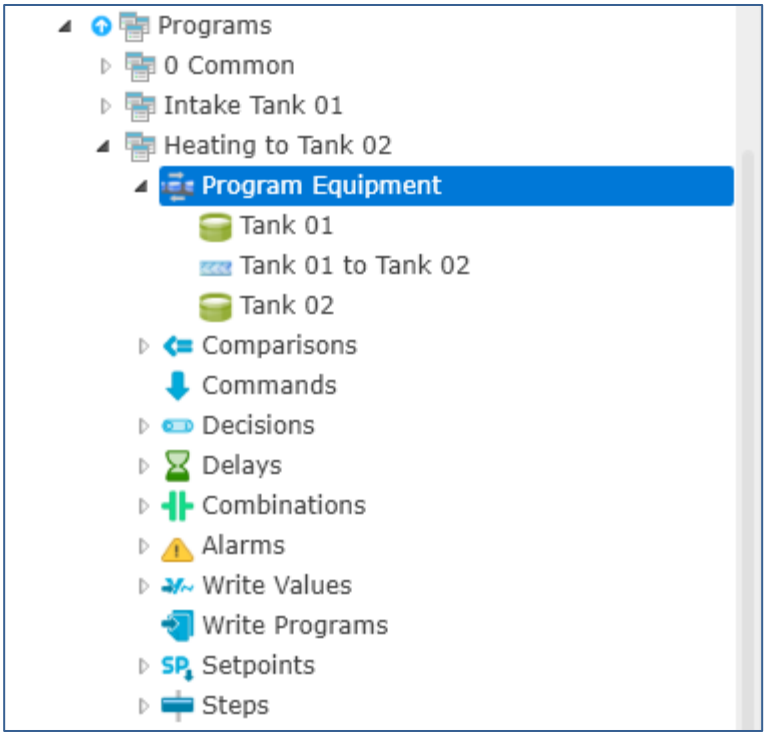
7.4 Equipment Units in Program

Control System Programs work on Devices, which are arranged in Equipment Units.

If an Equipment Item is in Alarm, and a program is Active in a Step which activates devices in the same Unit, then program will go into Alarm.

This is achieved simply by placing the required Equipment into the program Equipment holder. The Tank and line equipment units for the program are dragged from the Tank and line groups into the Equipment holder. Only devices in Units in the program Equipment holder are available for activation in the program.

The Units placed in the container for the program are the Units which may be reserved, and associated Units reserved alarms may stop multiple programs from working on the same equipment.



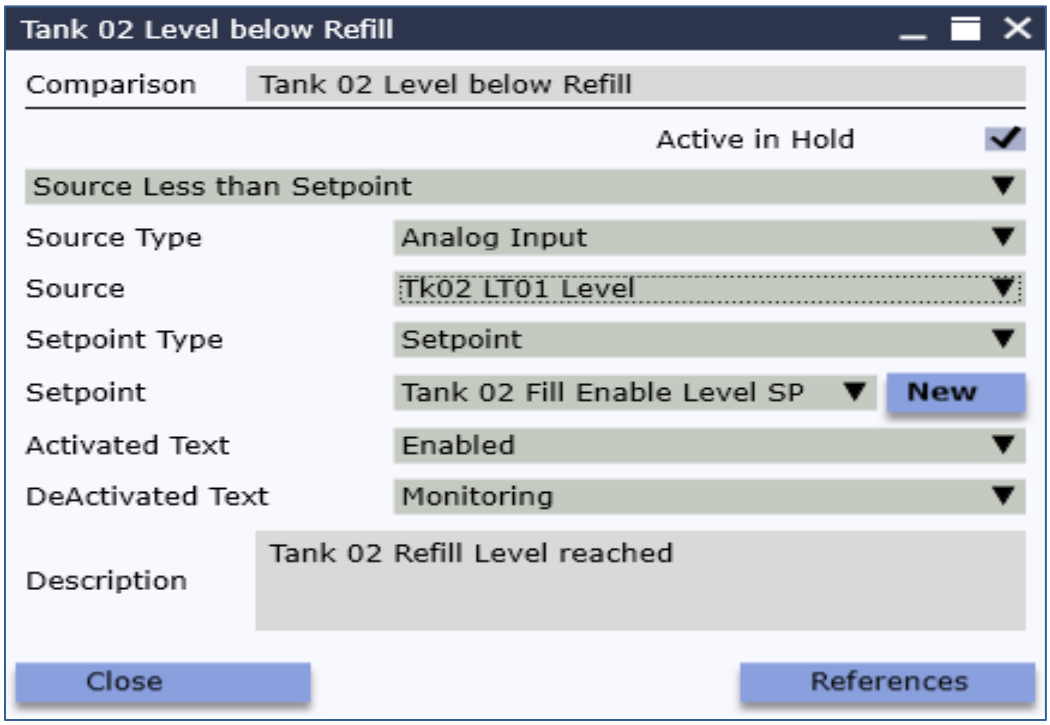
Program Unit Details

A Unit should only be in use by one program at a time in the running plant. When each unit is placed in a program, two alarms are automatically associated with it - Unit Selected Check and Unit Maintenance Check. These alarms are automatically inserted into Step 0. They may be removed if not required. These error checks are important for program interlock, product security and personnel safety. The user may also insert a 'Unit in Manual' Alarm here to cause an Alarm if the program is Active while a device in one of the program equipment units is in Manual.

7.5 Configuration of Comparisons

A comparison is added to the program by dragging the comparison icon from the toolbox to the program comparison component holder, or by right-clicking on the holder and selecting New or by duplicating an existing item.

The inserted comparison must be given a unique name.



Setup of a Comparison

7.5.1 Setup

The following are filled in for the comparison

1. Comparison Type must be selected.

   The types are

   - Source Less than Setpoint,
   - Source Less than or Equal to Setpoint
   - Source Greater than Setpoint
   - Source Greater than or Equal to Setpoint
   - Source Equal to Setpoint
   - Source not Equal to Setpoint
   - Source within Deadband of Setpoint
   - Program in Step

2. Source and Setpoint declaration

The Value type registers are possible types for Comparison Source and Setpoints

The types are:

- Analog Inputs
- Analog Devices
- Setpoints
- Variables

3. Active in Hold Selection

This is selected to allow the Result to be True if the Program is in Hold or Alarm.

4. Texts and Description.

The desired Texts for Active and Inactive Status may be filled in, along with a description for documents.

In the example the Comparison is True if Tk02 LT01 Level is less than a Setpoint Tank 02 Fill Enable Level SP.

There is no Delay time available here. A delay may be applied aa a Delay if required.

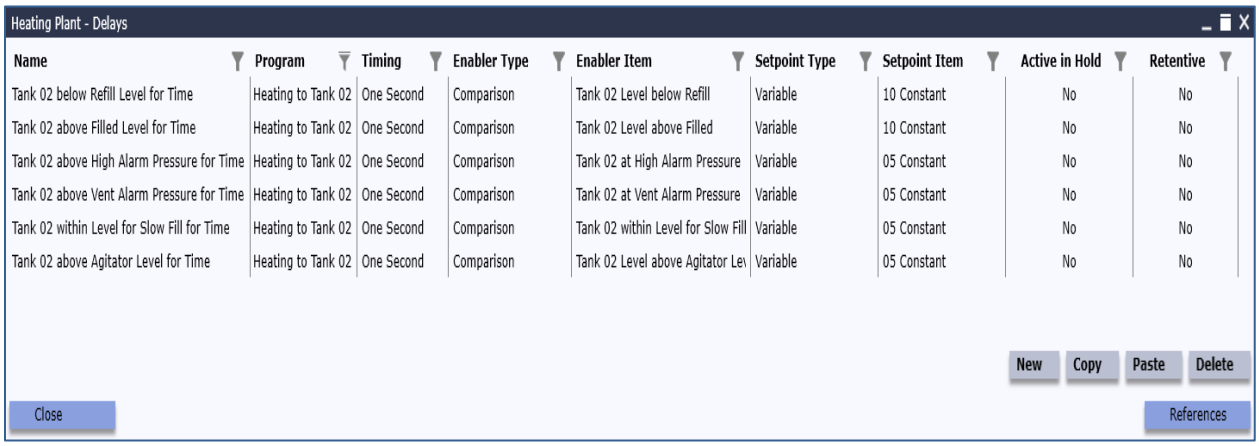
Note: Setpoints and Variables may be generated by clicking on the NEW button.

For Setpoints a default value is used in Designer but may be changed in HMI or Recipe.

The maximum and minimum values will be bounds that apply in HMI and Recipe. There is an Option to allow each Setpoint to be changed or not allow it to be changed, when program is Active.

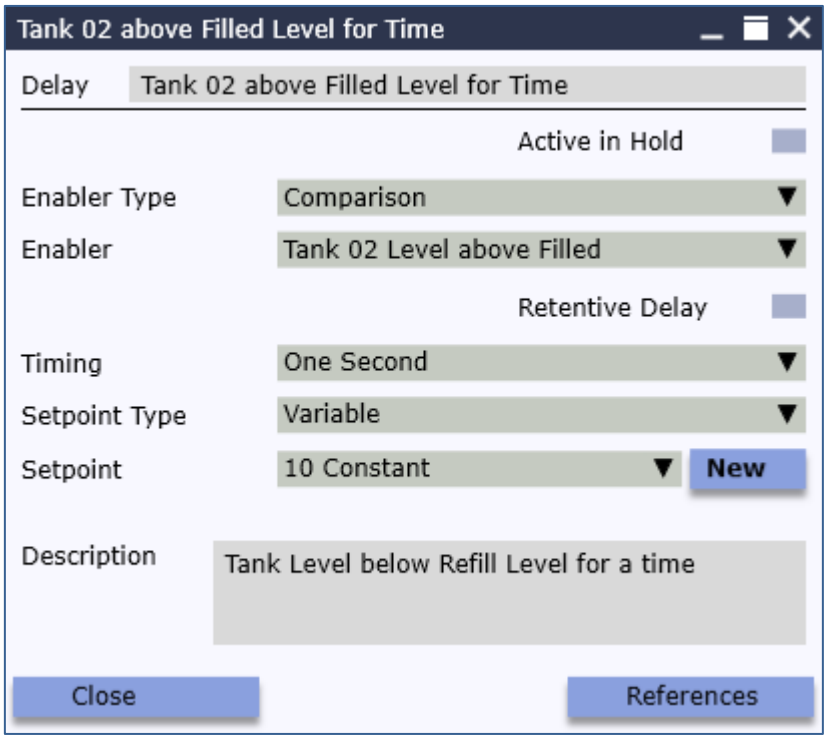
7.6 Configuration of Delays

A delay is added to the program by dragging the delay icon from the toolbox to the program delay component holder, or by right-clicking on the holder and selecting New or by duplicating an existing item.



List of Delays in a Program

The inserted delay must be given a unique name.



Delay Setup

7.6.1 Setup

The following are filled in for the comparison

1. The Enabler Type must be selected.

Where the Types are

- Comparisons
- Combinations
- Commands
- Digital Inputs
- Analog Input Value Alarms
- Digital Device Alarms
- Program is Active, or Running, or in Hold, or in Alarm, or in TimeHold.
- Step Time; Check performed on Step Time elapsing. Also known as Watchdog Time
- Program in a new Step
- Unit in Maintenance, Manual, or Selected

And Enablers may be configured on items being true or false where appropriate.

2. The Time Base is selected,
   The time bases are
   - 100 Ms
   - One Second
   - One Minute
   - One Hour
3. The Setpoint Type and Setpoint are Selected.
4. Source and Setpoint declaration

The Value type registers are possible types for Comparison Source and Setpoints
The types are:

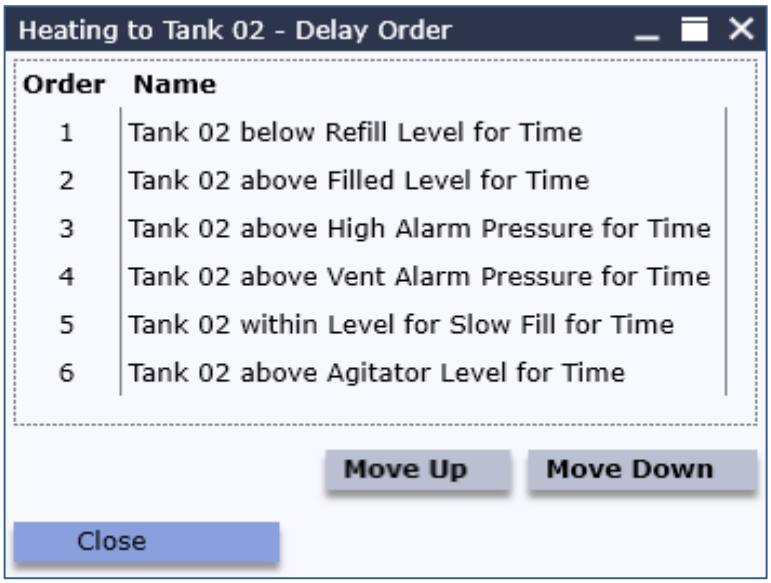
- Analog Inputs
- Analog Devices
- Setpoints
- Variables

In the example the Delay is True if Comparison Tank 02 Level above Filled is true for 10 Seconds.

The Delay is usually an OnDelay, where the Enabler has to be present continuously for the nominated time.

Selecting retentive delay will cause the time to be retained if the Enabler is not present, and to continue counting when the Enabler returns. Care should be taken with this as the Delay can appear to become True in a shorter time, if the Enabler has become present again.

7.6.1.1 Delay Order

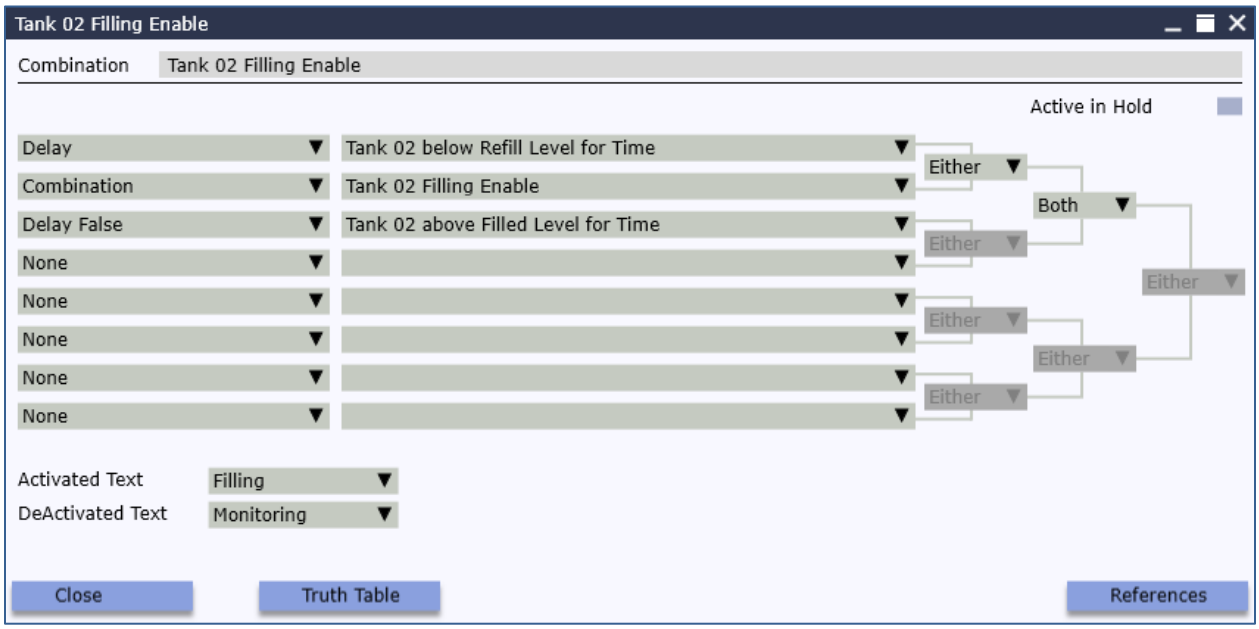


Ordering of Processing of Delays in PLC

This allows the Delays to be sequenced if necessary, for example if Delay Enablers are also Delays.

7.7 Configuration of Combinations

A combination is added to the program by dragging the combination icon from the toolbox to the Combination holder, or by right-clicking on the holder and selecting New or by duplicating an existing item.



Setup for a Combination

The example shows a Combination which is a latch: it becomes true on the Comparison Tank 02 below Refill Level for Time and stays true while Comparison Tank 02 above Refill Level for Time is false.

7.7.1 Boolean Gate Descriptions

The combination is made up of a series of Gates. Each gate can be used to evaluate a Boolean logic condition. A spreadsheet utility is provided in the help area to allow users to test the logic prior to confirming and downloading.

GATE	Description
BOTH	True if both inputs to gate are true.
EITHER	True if either input to gate is true.
NOT BOTH	True if both inputs to gate are false.
NEITHER	True if either input to gate is false
ONLY 1	True if both inputs to gate have different states.
SAME	True if both inputs to the gate have the same state.
A NOT B	True if input to first gate is true and the input to second gate is false.

7.7.2 Boolean Gate Operations

BOTH Gate - Both inputs to gate are true.

If state=1 of input X AND state=1 of input Y then Result=1.

Input X	Input Y	Result
0	0	0
0	1	0
1	0	0
1	1	1

EITHER Gate - Either input to gate is true.

If state=1 of input X OR state=1 of input Y then Result=1.

Input X	Input Y	Result
0	0	0
0	1	1
1	0	1
1	1	1

NOT BOTH Gate - Both inputs to gate are false.

If NOT state=1 of input X AND NOT state=1 of input Y then Result=1.

Input X	Input Y	Result
0	0	1
0	1	0
1	0	0
1	1	0

NEITHER Gate - Either input to gate is false

If NOT state=1 of input X OR NOT state=1 of Input Y then Result=1.

Input X	Input Y	Result
0	0	1
0	1	1
1	0	1
1	1	0

ONLY 1 Gate - Both inputs to gate have different states

If state=1 of input X AND NOT state=1 of input Y

OR if NOT state=1 of input X AND state=1 of input Y then Result=1.

Input X	Input Y	Result
0	0	0
0	1	1
1	0	1
1	1	0

SAME Gate - Both inputs to the gate have the same state

If NOT state=1 of input X AND NOT state=1 of input Y

OR if state=1 of input X AND state=1 of input Y then result is 1.

Input X	Input Y	Result
0	0	1
0	1	0
1	0	0
1	1	1

A NOT B Gate - Input to first gate is true and the input to second gate is false

If state=1 of input X AND NOT state=1 of input Y then Result=1.

Input X	Input Y	Result
0	0	0
0	1	0
1	0	1
1	1	0

7.7.3 Setup

The following are filled in for each required row of the combination

The Gate Type – per table above.

The type of item to be checked, and the name of the item to be checked.

1. Active in Hold Selection

This is selected to allow the Result to be True if the Program is in Hold or Alarm.

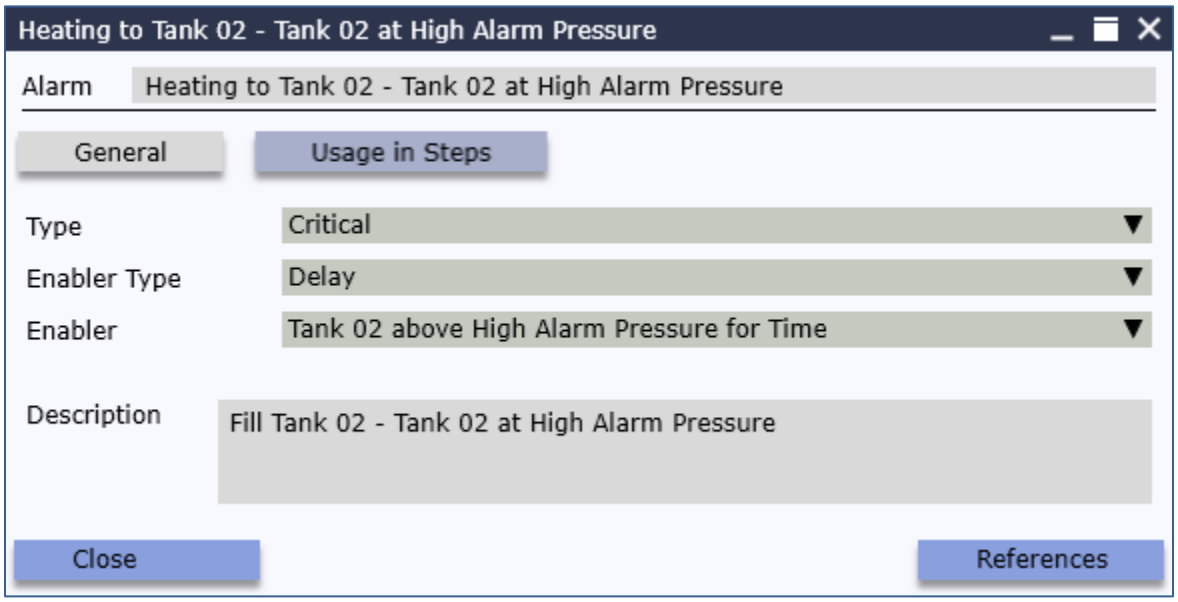
2. Texts and Description.

The desired Texts for Active and Inactive Status and a description for documents.

7.8 Configuration of Alarms

Alarms are used to give warnings or to stop the program from performing unsafe or undesired operations.

An alarm is assigned to a program by dragging the alarm icon to the component holder or by right-clicking on the holder and selecting New or by duplicating an existing item.



Critical Alarm Configuration

7.8.1 Setup

1. The type of the Alarm is selected. The types are
   - Critical alarm.
   - Non Critical alarm.
   - Event.

A Critical Alarm will cause the Program to go into Alarm and Hold. This must be Reset before the Program can Restart.

A Non Critical Alarm is a Warning, it will not cause the Program to go into Hold. It will be registered at HMI/Scada and must be acknowledged there.

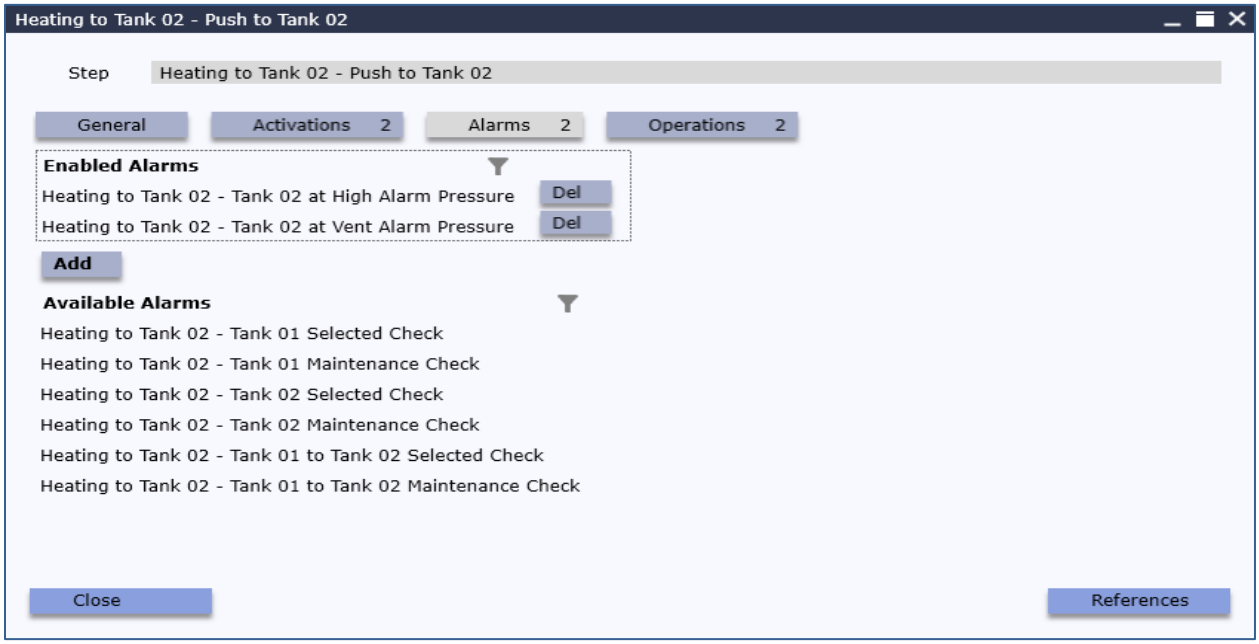
An Event may be generated just for logging, for Audit or Reports.

2. The type of the Alarm enabler is selected. The possible Alarm Enabler item types are
   - Comparisons
   - Combinations
   - Commands
   - Digital Inputs
   - Analog Input Value Alarms
   - Digital Device Alarms
   - Program is Active, or Running, or in Hold, or in Alarm, or in TimeHold.
   - Step Time; Check performed on Step Time elapsing. Also known as Watchdog Time
   - Program in a new Step
   - Unit in Maintenance, Manual, or Selected

Alarm may be configured on items being true or false where appropriate.

3. The “Description” section is used to enter a description for documentation purposes.

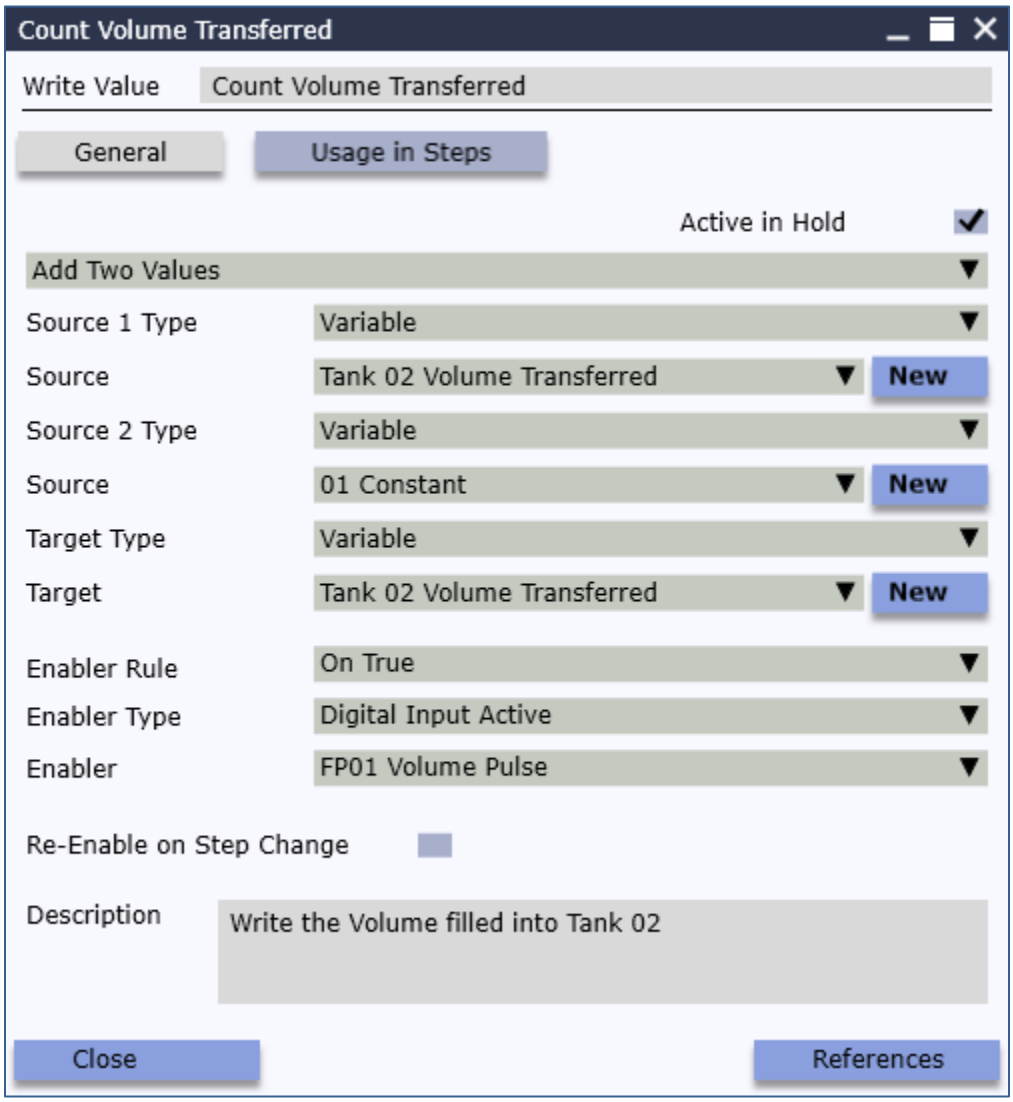
An Alarm may be Added to or Removed from Steps in the Usage in Steps section



Alarm Usage in Steps

7.9 Configuration of Write Value

Write Values are used to perform mathematical functions in the program. A Write Value operation is added to the program by dragging the icon from the toolbox to the program and configuring or by right-click and New on the container, or by duplication of an existing.



Setup for a Write Value type

This write causes the value 'Tank 02 Volume Transferred' to be incremented each time the Pulse on the Flowmeter 'FP01 Volume Pulse' is present.

7.9.1 Setup

1. The type of the Write is chosen. The possible types are

Arithmetic

- Add Two Values
- Subtract From Value
- Multiply By Value
- Divide By Value
- Transfer Value
- Absolute Value
- Average Value
- Periodic Value Change

Boolean

- Set Item
- Reset Item

Trigonometric

- Square
- Square Root
- Exponential
- Log Natural
- Sine
- Cosine
- Tan
- ArcSine
- ArcCosine
- ArcTan

2. The Operand Types and Operand Items for Source 1, Source 2 and Target are filled in.

The Source can be an Analog Input, an Analog Device, a Variable or a Setpoint.

The Target can be an Analog Device, a Variable, an Analog Input Alarm SP, or a PID Loop, or a PID Loop Gain (P) setting, or a PID Loop Integral (I) Setting.

3. The Enabler is configured.

The Enabler type and item are chosen from the list and the Enabler Rule is one of
For Steps;

- Always During Step
- Step Start
- Step End

For other items:

- On True - when the enabling object becomes true
- On False - when the enabling object becomes false
- While True - while the enabling object is true
- While False - while the enabling object is false

Where the Items are

- Comparisons
- Combinations
- Commands
- Digital Inputs
- Analog Input Value Alarms
- Digital Device Alarms
- Program is Active, or Running, or in Hold, or in Alarm, or in TimeHold.
- Step Time; Check performed on Step Time elapsing. Also known as Watchdog Time
- Program in a new Step
- Unit in Maintenance, Manual, or Selected

And Enablers may be configured on items being true or false where appropriate.

The Description section is used to enter a long description of the alarm for documentation purposes. The Write Value is enabled in steps by using the “Usage in steps” Section. Here steps are Added/Removed to the “Steps Using this Write” window.

7.9.2 Note on Write Value to generate Average

A Write Value for Average is composed of Source and Target Item, where the Source is the item to be sampled, and the Target is the result of the Averaging of Samples.
The Source can be an Analog Input, an Analog Device, or a Variable, and the Target can be a Variable.

There are settings for the Sampling Period type (Seconds or Minutes) and the Repeat Interval (as the Number of Seconds or Minutes) and the Number of Samples to be counted for the Average.

The Average and Sampling is unconditional, it always occurs during a Step.

7.9.3 Note on Write Value to Periodic Value Change

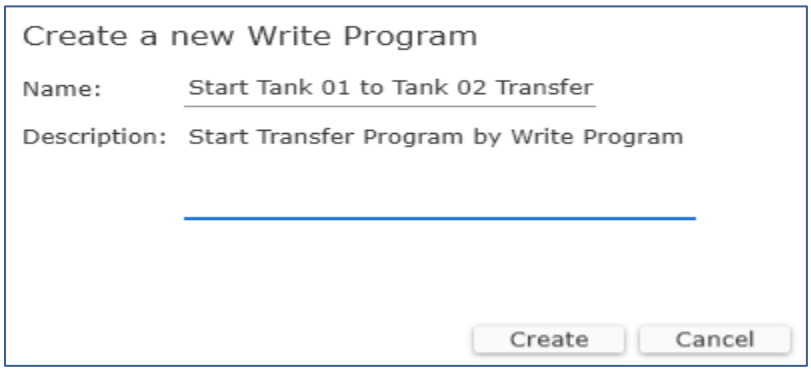
In a Periodic Value Change Write the Source 1 item is incremented by the Source 2 item each time period.

There are settings for the Time Period type (Seconds or Minutes) and the Repeat Interval (as the Number of Seconds or Minutes) .

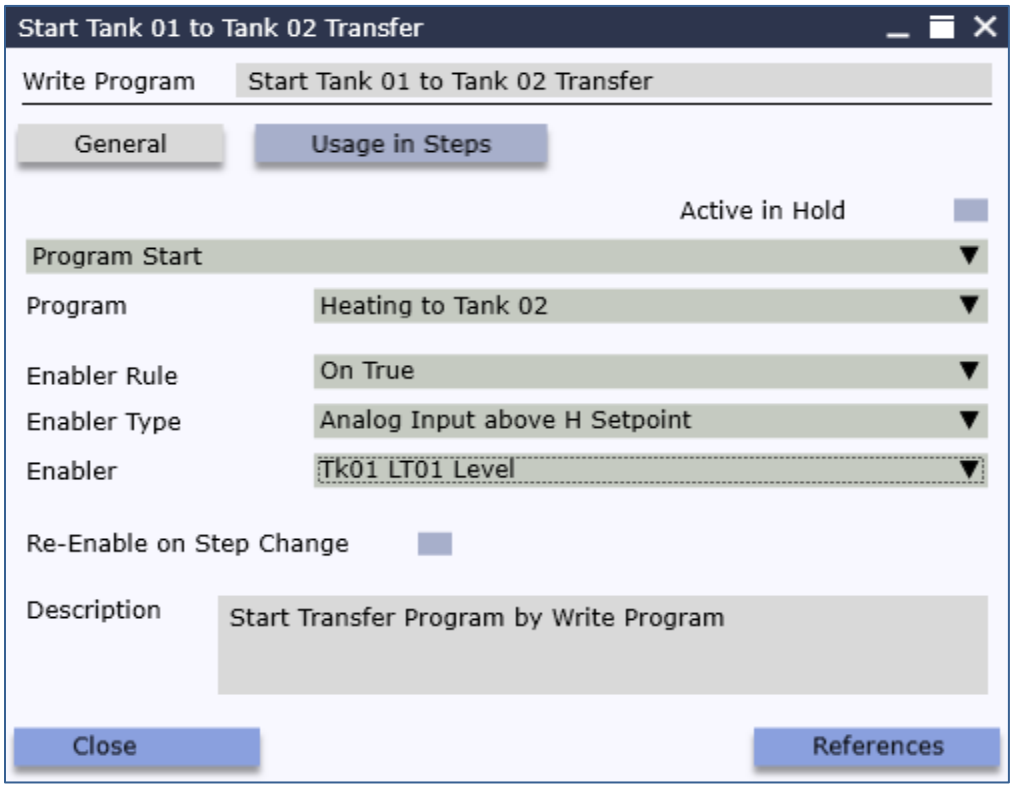
7.10 Configuration of Write Program

Write Program are used to change the Status or the Step of a Program.

perform mathematical functions in the program. A Write Value operation is added to the program by dragging the icon from the toolbox to the program and configuring or by right-click and New on the container, or by duplication of an existing.



New Write to Program



Configured Write to Program

The Program Heating to Tank 02 is started if the Tk01 LT01 goes above its High Alarm SP.

7.10.1 Setup

1. The type of the Write is chosen. The possible types are

Arithmetic

- Program Start – new Start or Resume
- Program Stop - End
- Program Step On – to Selected Step
- Program Hold

2. The Operand Types and Operand Items for Source 1, Source 2 and Target are filled in.

The Source can be an Analog Input, an Analog Device, a Variable or a Setpoint.

The Target can be an Analog Device, a Variable, an Analog Input Alarm SP, or a PID Loop, or a PID Loop Gain (P) setting, or a PID Loop Integral (I) Setting.

3. The Enabler is configured.

The Enabler type and item are chosen from the list and the Enabler Rule is one of
For Steps;

- Always During Step
- Step Start
- Step End

For other items:

- On True - when the enabling object becomes true
- On False - when the enabling object becomes false
- While True - while the enabling object is true
- While False - while the enabling object is false

Where the Items are

- Comparisons
- Combinations
- Commands
- Digital Inputs
- Analog Input Value Alarms
- Digital Device Alarms
- Program is Active, or Running, or in Hold, or in Alarm, or in TimeHold.

- Step Time; Check performed on Step Time elapsing. Also known as Watchdog Time
- Program in a new Step
- Unit in Maintenance, Manual, or Selected

And Enablers may be configured on items being true or false where appropriate.

The Description section is used to enter a long description of the alarm for documentation purposes. The Write Value is enabled in steps by using the “Usage in Steps” section. Here steps are Added/Removed to the “Steps Using this Write” window.

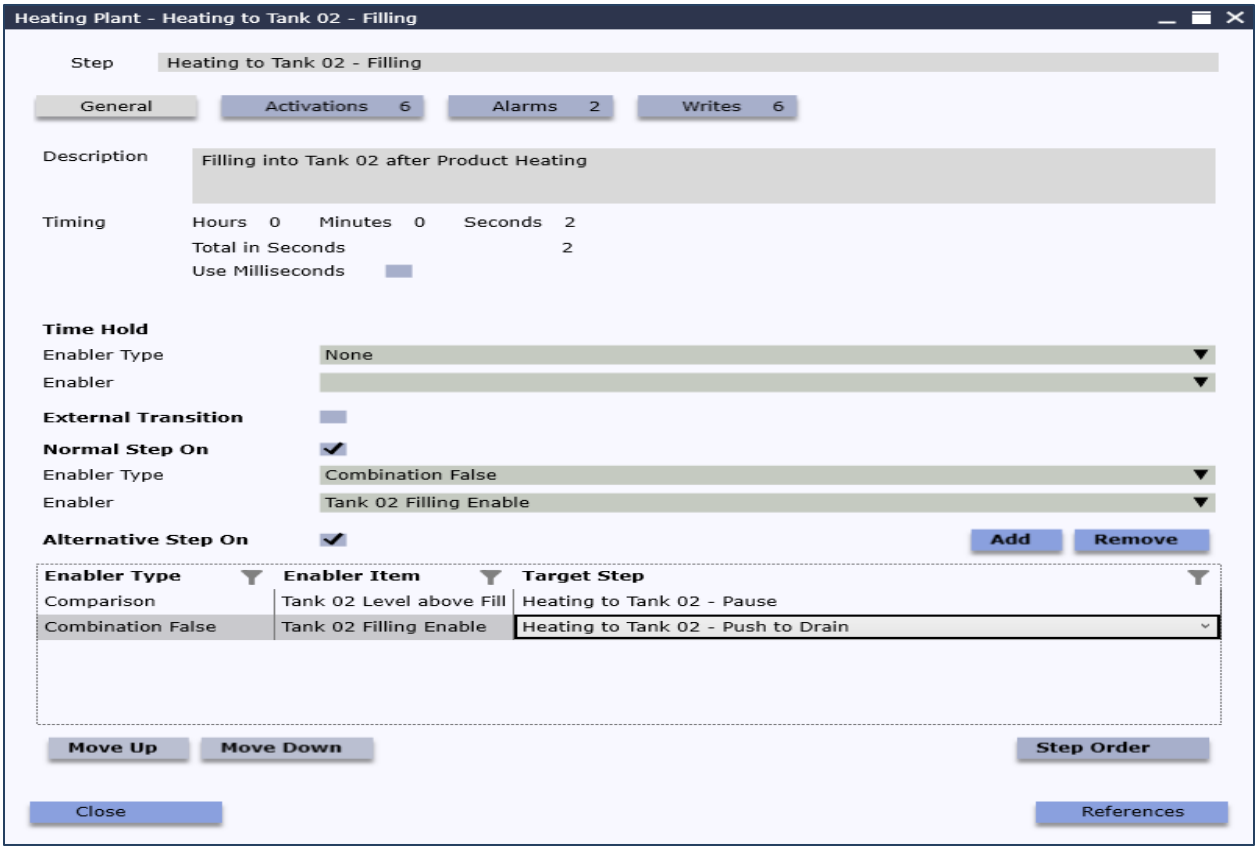
Care must be taken to ensure correct operation when writing to other programs.

7.11 Configuration of Steps

Alarms and Operations are enabled in required steps. Step Transitions are configured also.

7.11.1 Properties

Properties include a default Step time and Descriptions fields



Step Properties showing Selection of Alternative Step On

The above Properties Section contains the following:

Field	Description
Description	This is a basic description which will appear in the documentation.
Timing	Each step has an allocated time. Generally, this time is used as a step duration, in which case the program will move to the next step (see step order) when the duration time has elapsed. Step Time may be used as a watch-dog timer in an Alarm. Step time counts down when Program is not in Hold or TimeHold.
Time Hold	An Enabler can be selected here. If the Enabler is true while the step is running, then the Step Time counting will be paused.
External Transition	This may be selected if there is no configured Step On transition.
Normal Step On	Selection that the program will step to next step in the Step Order list.
Alternative Step On	Selection that program will go to another step.

7.11.2 Configuring Step On-Transitions

The following types of Step-On transitions may be configured:

1. Normal Step On transition
   This causes the program to Step-on to next step in the Step Order.
2. Alternate Step On transition
   Causes the program to go to another step other than the next in Step Order.
   This may be useful for situations such as a recirculation requirement on a heat exchanger.
   The order of Alternate Step On checks may be altered, to give priority in case two happen in the same PLC scan.
3. External Step On
   This means the program will not step on automatically, it must be stepped on by an operation or by Operator at HMI.

When a program leaves a step - Activations, Operations and Alarm monitoring on items configured for the step are finished. The program may return to the step again per Recipe or an Operation or Alternate Step On.

Normal and Alternate Step On transitions may be enabled by the following:

- Comparisons
- Combinations
- Step Time
- Digital inputs
- Analog High-High Alarms
- Analog High Alarms
- Analog Low Alarms
- Analog Low-Low Alarms
- Valve Activated / Deactivated
- Motor Activated / Deactivated
- Valve Error
- Motor Error
- Digital Output Activated / Deactivated
- Analog Input WireBreak

These items may be tested for True or False state.
Steps in Step holder are listed in default Step Order.

7.11.3 Enabling Comparisons and Combinations and Delays

These items are automatically enabled in all steps while the Program is Active.

7.11.4 Enabling Device Activations

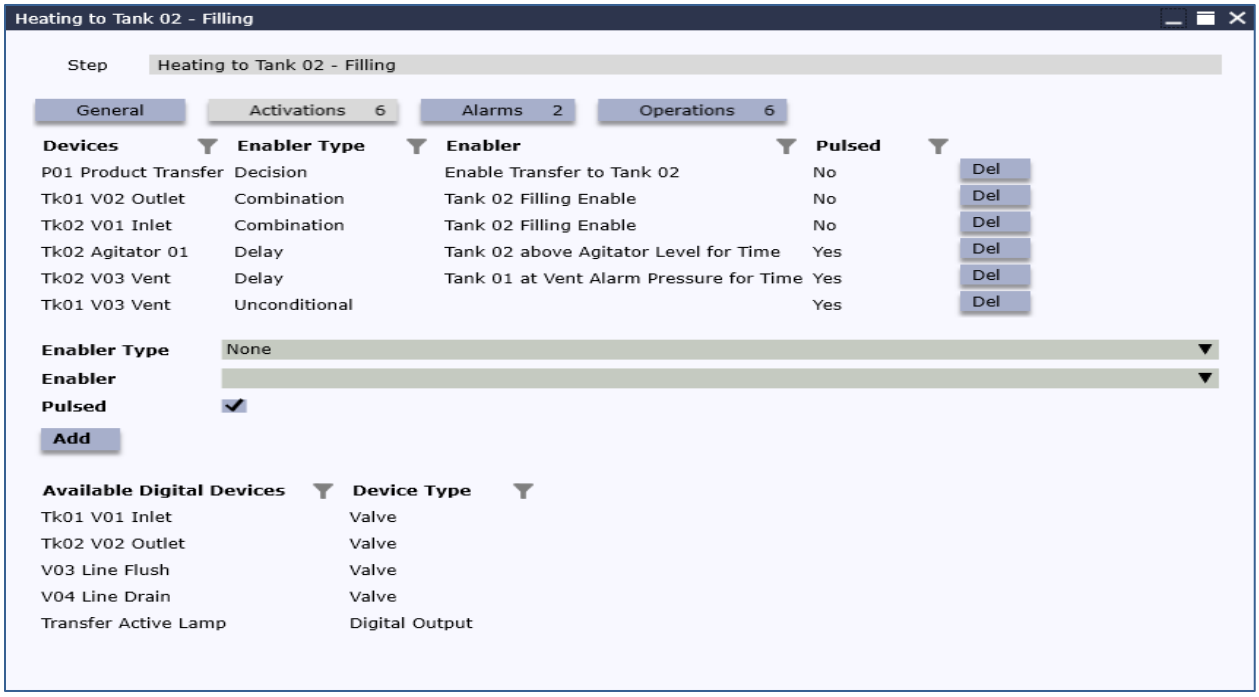
Required Digital Devices (valves, motors, digital outputs) may be activated in a step. Only Devices in Units that have been added to the Program Equipment are available for Automatic Activation. The PLC program will automatically monitor for all device errors in Equipment Units of devices being activated.

The devices may be activated during the step in one of the following ways:

1. Always or Unconditional
2. Pulsed, according to the device pulse time and pulse cycle time.
3. Activated conditionally on one of the following enablers;
    - Comparison
    - Combination
    - Alarm
    - Digital input
    - Analog High-High Alarm
    - Analog High Alarm
    - Analog Low Alarm
    - Analog Low-Low Alarm
    - Step time
    - Valves Activated / Deactivated
    - Motors Activated / Deactivated
    - Digital Output Activated / Deactivated
    - Valve Alarm
    - Motor Alarm
    - Analog Input WireBreak

    The above items can be used for a true or false state where appropriate.

4. Conditionally Pulsed, according to the device pulse time and pulse cycle time using the above enablers.

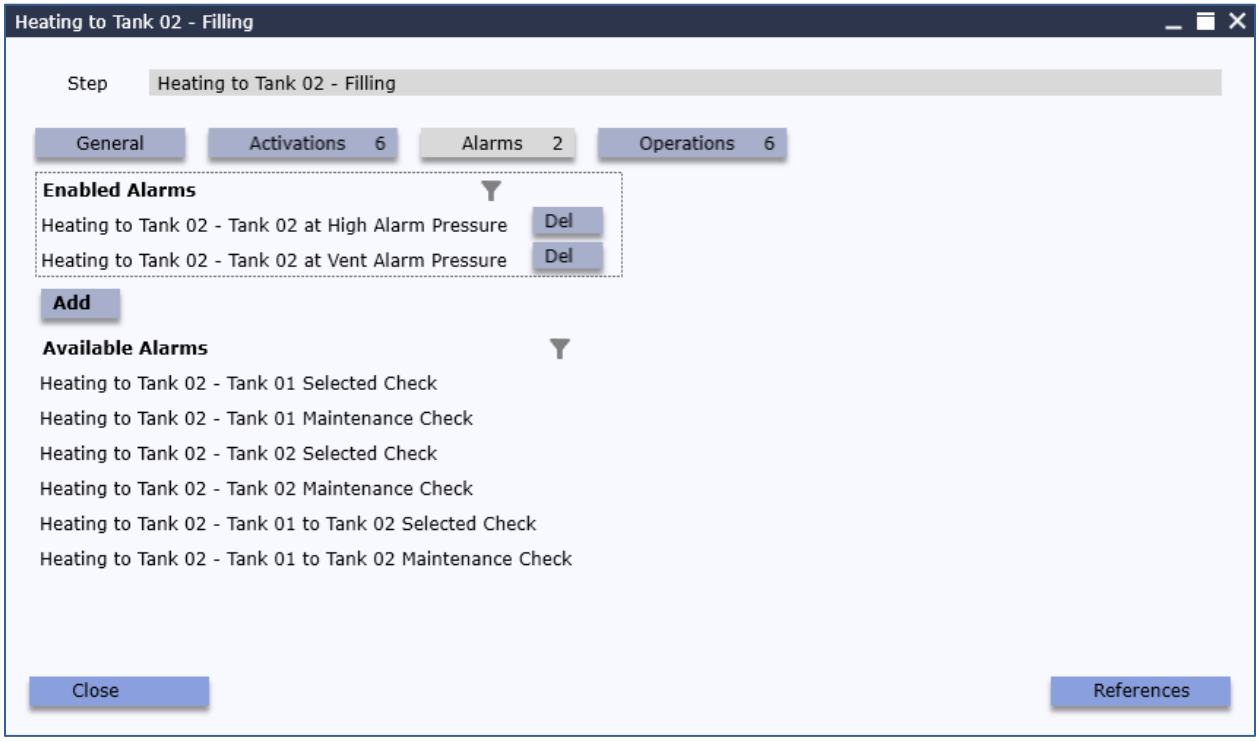


Activations List in a Step

The activations section shows activations for the Step, which may be accessed using the Activations button. List of Activations for a device are also available in the panel for Valve Motor or Digital Output.

7.11.5 Enabling of Alarms

This section allows Alarms to be enabled in a step. An Alarm may be configured at any time and subsequently added to a step.



Alarms List in a Step

An Alarm is enabled in a step by selecting it and adding it to the “Enabled Alarms”.

An Alarm may be removed from a step also by clicking on the Del button.

The system automatically assigns unit based alarms (Unit Selected and Unit Maintenance) to each program for each unit that is added to the Equipment Unit component holder. These alarms are automatically assigned to Step 0. These alarms may be added to other steps also and may be removed from any step.

7.11.6 Enabling of Writes - Operations

Configured Writes may be enabled for required Steps; the Write will be enabled for implementation while the program is in the Step.

Writes List in a Step

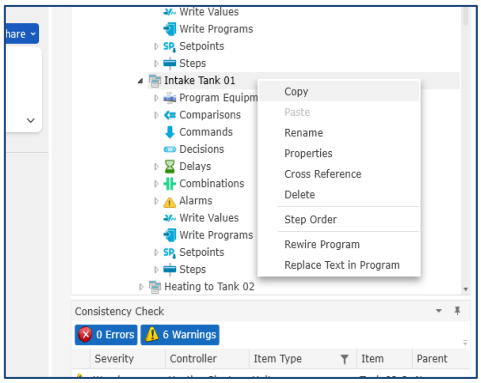
Available Writes are already configured in the program. The Write is enabled for use in the step by selecting it and clicking the Add button, adding it to the “Enabled Writes” section.

A Write may be removed by clicking on the Del button beside the Write.

The Order of Writes may be changed using the Move Up and Move Down buttons. The Order can be used when it is important that one write is processed before another, in the case of an equation, for example.

7.12 Programs Functions

These functions may be accessed on right-click on the program name.



7.12.1 Copy

A Program may be copied and pasted. This is very useful for module type programs where a single program controls a single unit. The program may be pasted within the same controller or in another controller, or in another controller in another project. If a component name is going to be duplicated, then it will be renamed by appending "– Copy" to the name.

7.12.2 Rename

A program may be renamed here.

7.12.3 Properties

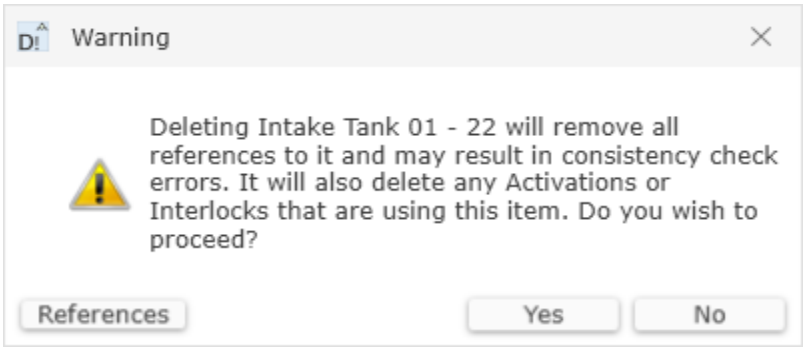
The program properties may be shown by selecting Properties.

7.12.4 Cross Reference

Any reference to the program may be found here. The references are in Write Programs or Program status check.

7.12.5 Delete

The program may be deleted here. References to the program will be automatically deleted. This may mean that objects which did reference the deleted program may have to be manually changed or deleted.

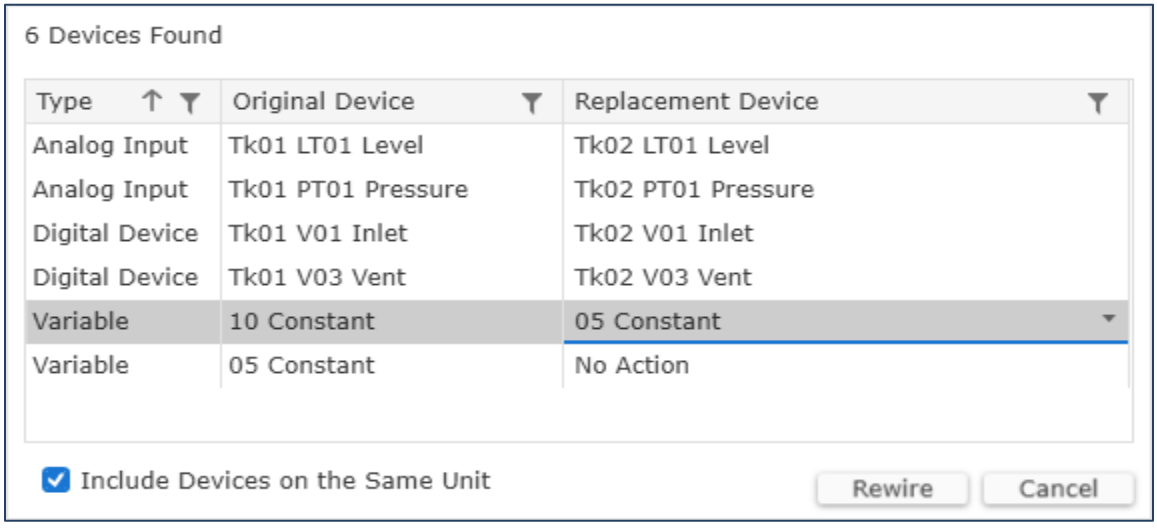


7.12.6 Step Order

The Step Order may be accessed here. The step order is described in Program Selections.

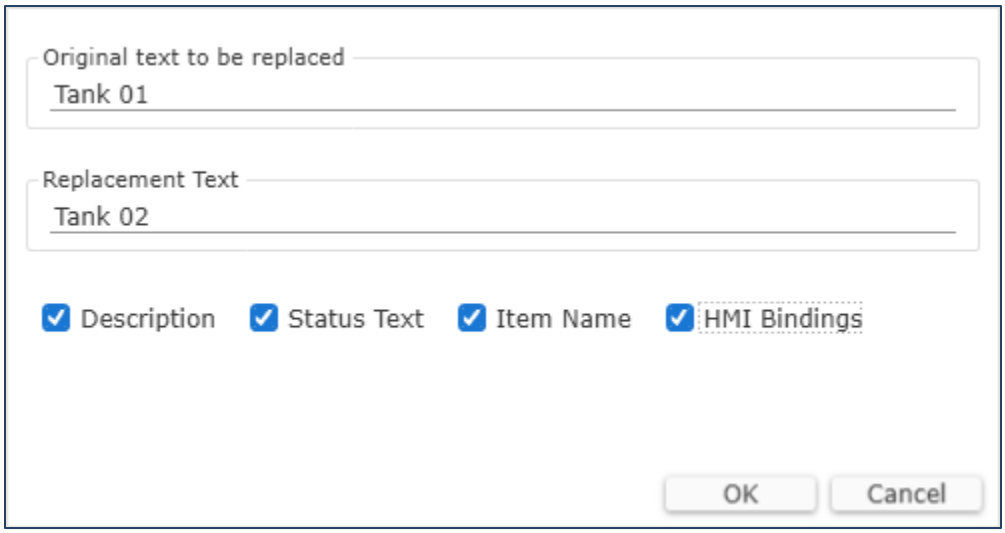
7.12.7 Rewire

The Rewire Function allows items to be changed in a group, within a program. This is used, for example, when a program is copied and is to be changed to work with different equipment.



Replacement devices are selected using dropdown lists. When all required replacement devices are selected then the Rewire may be carried out using the Rewire button.

7.12.8 Replace Text in Program



This function allows text to be changed for the following aspects

Item Name - the text will be replaced within the names of objects in the program,

Description - the text will be replaced in descriptions

Status Text - the text will be replaced in Status for display at HMI

HMI Bindings - HMI Bindings using the object will change to use renamed bindings. These should be checked after the replace function is carried out.

8 Program Selections

8.1 Setpoints

Setpoints are used in settings in Comparisons, Delays and Write Values. Setpoints are in a container in the Program, and can also be seen in a Table. Setpoints may be changed in Recipes.

Container of Setpoints in a Step

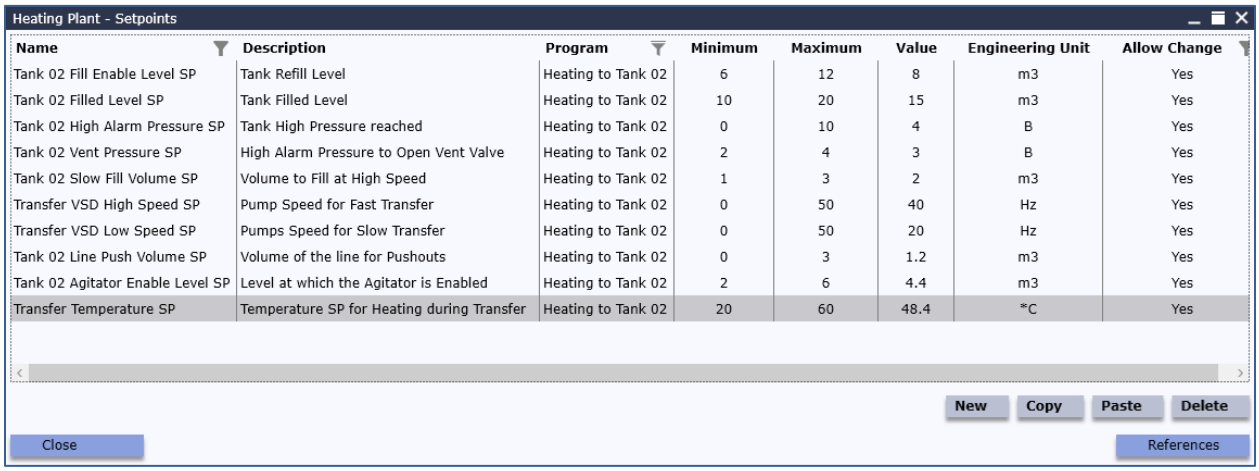


Table of Setpoints

The minimum, maximum and default values for each Setpoint may be modified. These values will be applied as limits for operator setpoint entry in HMI controls.

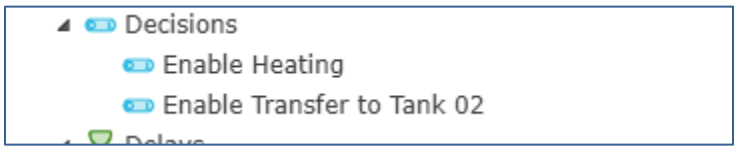
Setpoints may be deleted by selecting clicking on Delete in the table, or by right-clicking and selecting remove in the container. If a Setpoint is in use it cannot be deleted.

Setpoints may be renamed by selecting and right-click and Rename in the container.

Allow Change enables that Setpoints may be changed, or not, when a program is Active, and this may be changed in the table.

8.2 Decisions

These are digital On / Off type selections that can be accessed in HMI. The initial state of the Decisions may be changed in a Recipe.



Container of Decisions in a Step

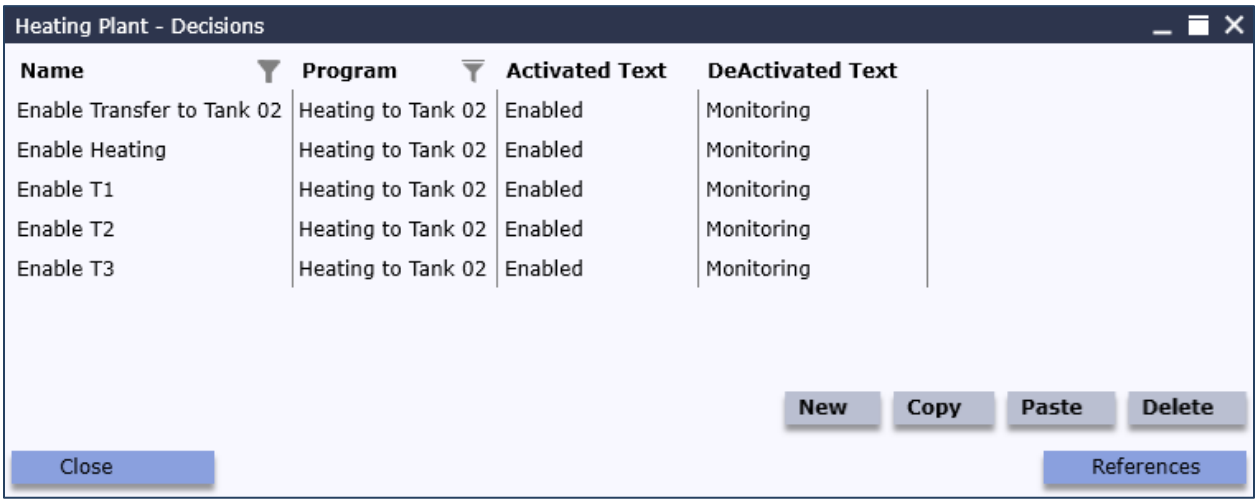


Table of Decisions

Decisions may be accessed by clicking on Decisions container.

Decisions may be deleted by selecting clicking on Delete in the table, or by right-clicking and selecting remove in the container. If a Decision is in use it cannot be deleted.
Decisions may be renamed by selecting and right-click and Rename in the container.
Allow Change enables that Decisions may be changed, or not, when a program is Active, and this may be changed in the table.

8.3 Step Order

The Step Order refers to the order in which a Program normally will proceed through the Steps when the Normal Step Ons are used.
The Step Order for a program may be accessed by right-click on Steps container or by clicking on Step Order in the Step Properties.

Accessing the Step Order from Program properties

Step Order Panel

The step order determines the order of processing of steps to carry out the default sequence using Normal Step on transitions.
A step may be inserted in more than one location in the step sequence. Each step must be used at least once in the program. The step order can be modified by selecting the step to be moved in the sequence and clicking on “Move Up” or “Move Down”.
Clicking on a Step will cause the Cross references for the Step to update at the bottom of the screen. The Section field will show the relevant Cross reference / Usage information for the Step.

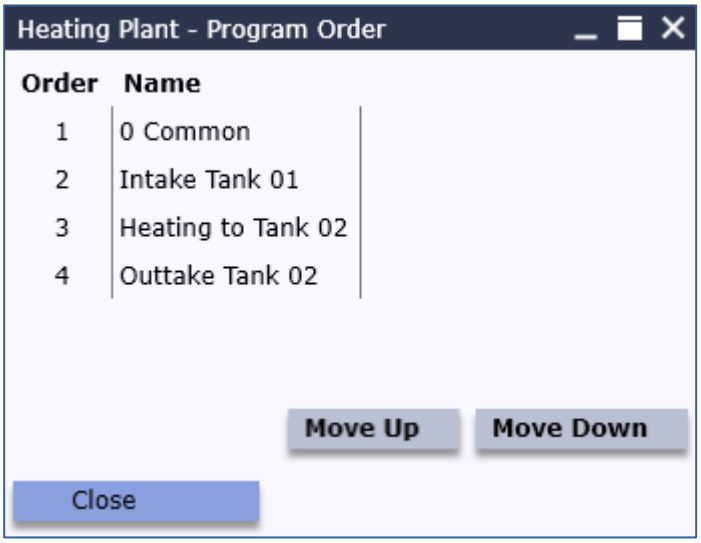
9 General Model Items

9.1 Consistency Check

The consistency check examines the project to confirm that devices are used and that addresses are unique and conform to PLC rules. The check must be performed before a download to a PLC. Consistency check for documents is optional.
Items listed in the Consistency Check may be accessed by clicking the row in the Check.

A PLC cannot be downloaded if there are Errors, but may be downloaded if there are warnings, and users should take care with any downloads to avoid Errors or any unwanted actions.

9.2 Program Order



Program Order panel

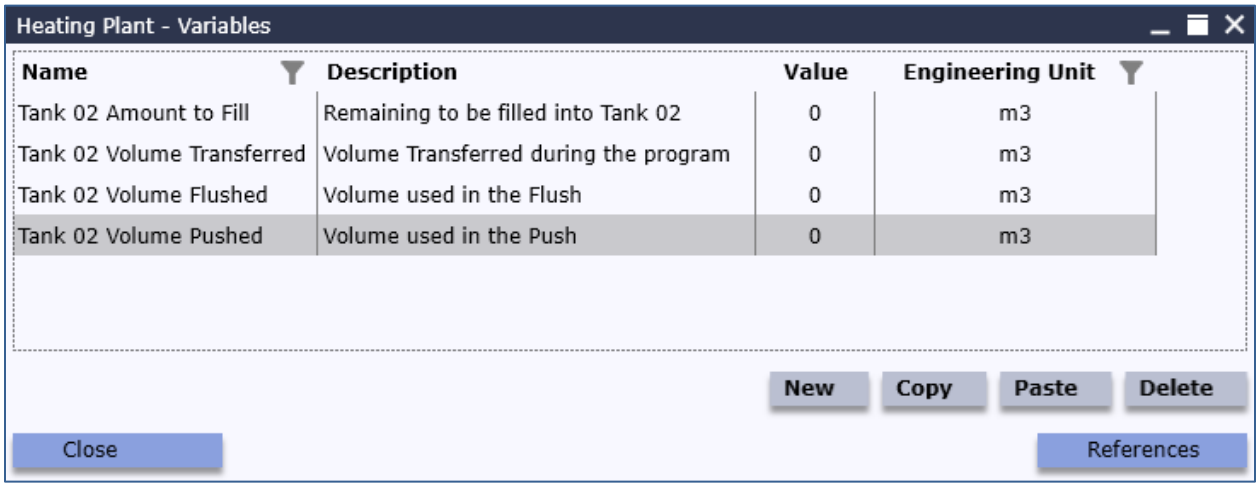
The configured programs are placed in order for processing by the PLC.

All configured programs must appear in the list.

9.3 Variables

Variables are common across all programs and may be read or written by all programs.

Variables may be modified by clicking on or right-clicking on the variable row.



Variables List

Accord systems may be configured to interact with other PLC code using Variables. This may also apply to Inter PLC communications.

PLC Addresses for Variables are obtained from Accord (Device Report or Excel Tag List) following Full Download to a PLC. The user may write to, or read from, an address by writing PLC code.

Accord PLC Libraries system only uses the Data Areas it has configured and will not interfere with any other PLC code or data. The user should only interface using the Variables.

10 Documents Generation

Accord Designer provides the printing of documentation which matches the Model. This documentation is printed to MS Word and is valid for use in Design and Testing stages of projects. The Documents Menu presents all the auto-generated Documents. It also provides viewing the Audit Trail for loaded Model.

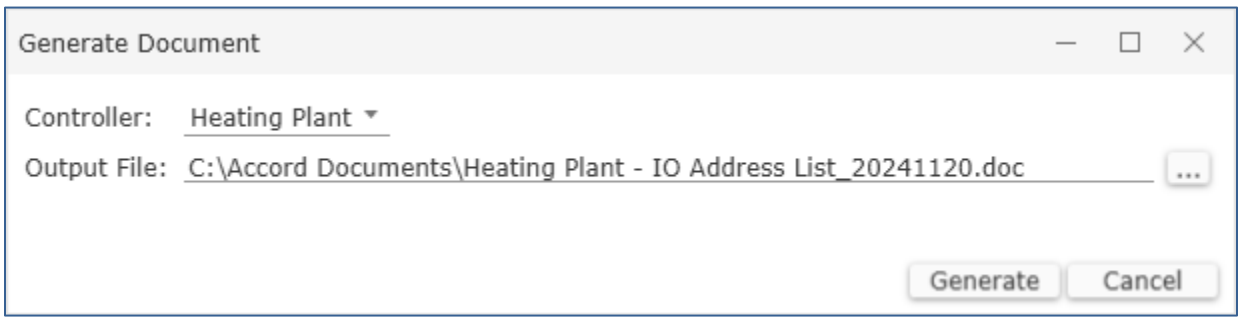
Designer provides automatic generation of the following Documents per menu list

1. I/O Address List
2. Equipment Software Design Specification
3. Process Description
4. Functional Design Specification
5. Program Software Design Specification

Documents are generated by Builder to MS Word .doc format, to templates and are accurate to the model. They should be formatted for presentation after generation.

10.1 Generating Process Model Documents

To generate a document, click the Documents menu in the top menu bar and select the required document. The document will begin to generate to MS Word. Note use of copy-paste in other applications while document is generating may affect the document.

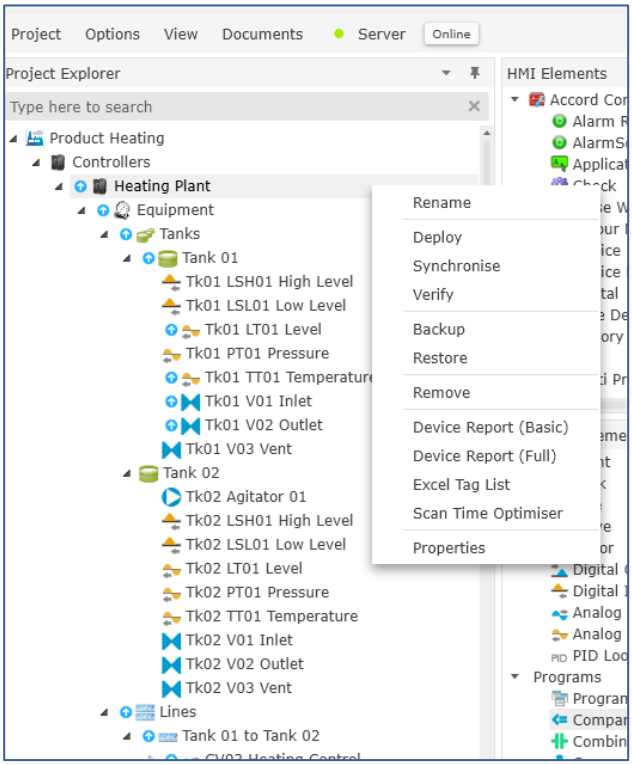


Document Print Setup

11 Project and Edit Menus

11.1 Model Menu

The Model menu is accessed by right-click.



Model Menu

11.1.1 Rename

This allows the controller / process Model to be renamed.

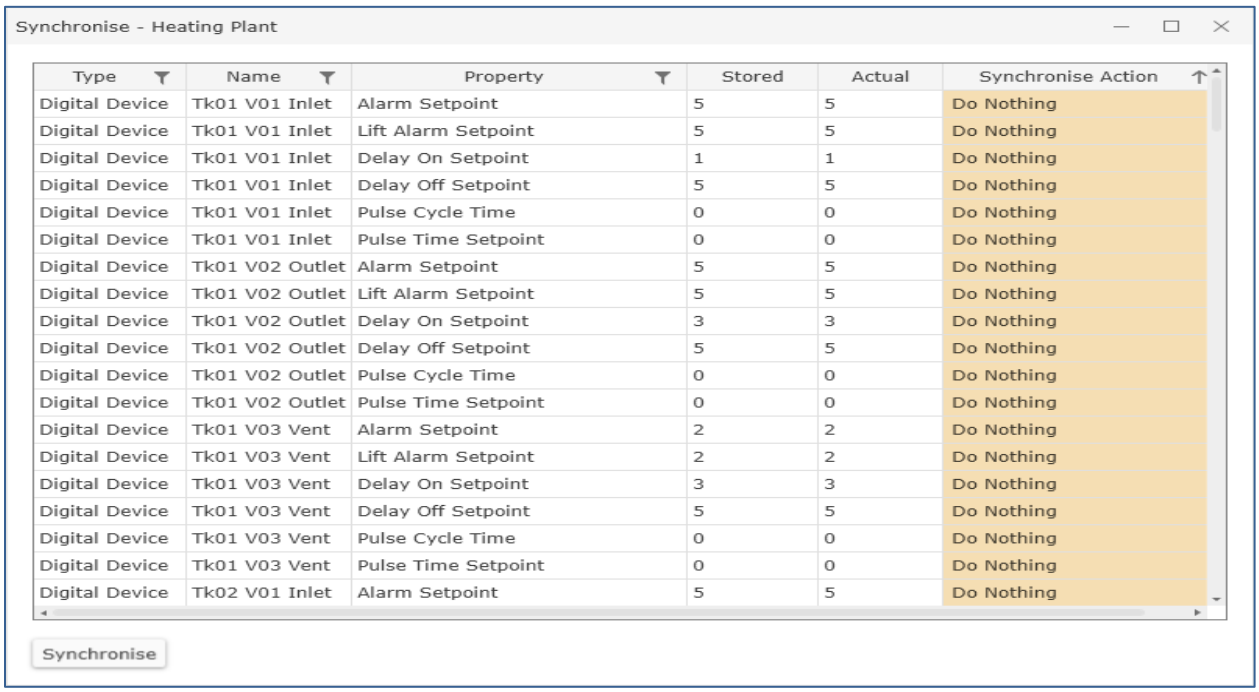
11.1.2 Deploy

This allows the Process Model to be downloaded to the Controller; PLC or emulator, which is configured in Properties.

The stages of the download are shown in a progress status panel

11.1.3 Synchronise

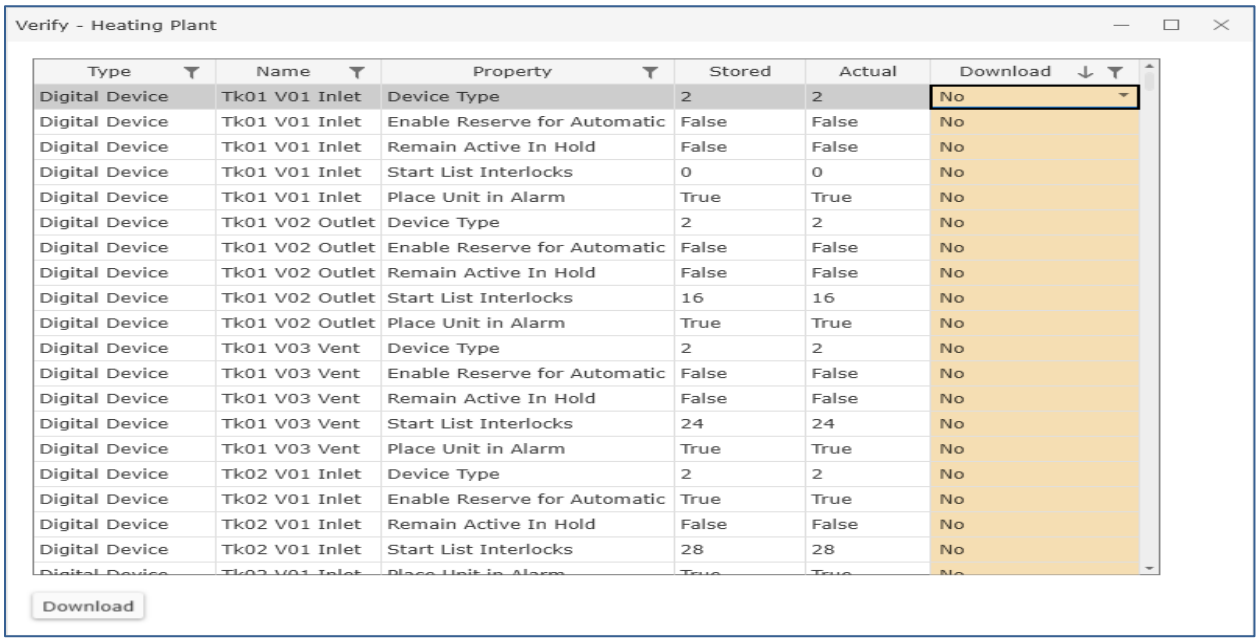
This allows for recovery of all current values from the PLC to the Model.



Synchronise Panel

11.1.4 Verify

This verifies that all settings values, which should only be written by Accord, not have changed in PLC. Any discrepancies should be investigated.



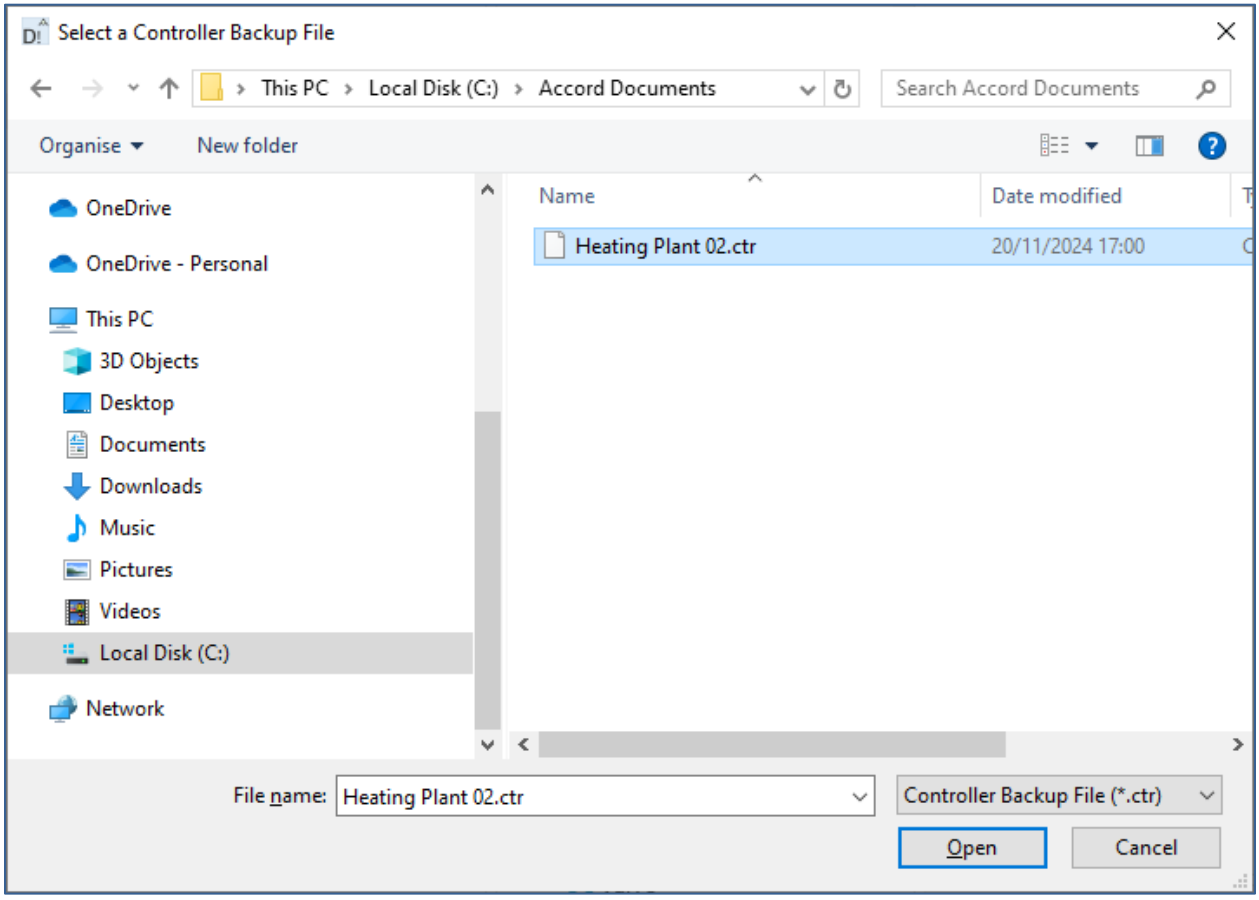
Verify Panel

11.1.5 Backup

This allows the Model to be stored as a .ctr file on nominated folder.

11.1.6 Restore

This allows a stored .ctr file to be restored as a full model in the project.



Storage of Controller Backup file

11.1.7 Copying a Controller

A Controller may be duplicated by being backed up to a .ctr file and restored to a new controller.

Right-click on the Controller and back up to .ctr file, e.g., Heating Plant 240802.ctr

Make new Controller in the project.

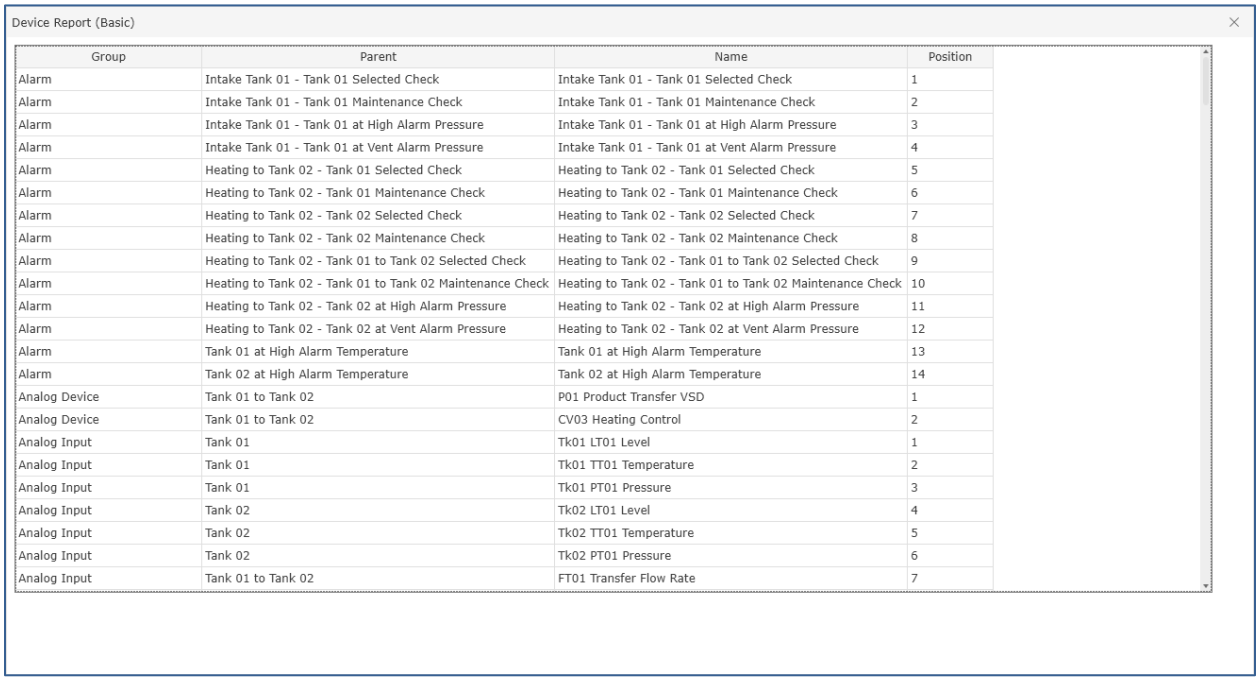
Right-click on new Controller and Restore from .ctr file. The system will prompt for confirmation and on confirm will generate the new Controller.

11.1.8 Deleting Controller - Delete

To delete a Model - click on the Model menu and click on Delete.

11.1.9 Device Report – Basic

The Device Report (Basic) produces an exportable report containing a list of all devices and their location on the PLC.


Device Report (Basic)

Group	Parent	Name	Position
Alarm	Intake Tank 01 - Tank 01 Selected Check	Intake Tank 01 - Tank 01 Selected Check	1
Alarm	Intake Tank 01 - Tank 01 Maintenance Check	Intake Tank 01 - Tank 01 Maintenance Check	2
Alarm	Intake Tank 01 - Tank 01 at High Alarm Pressure	Intake Tank 01 - Tank 01 at High Alarm Pressure	3
Alarm	Intake Tank 01 - Tank 01 at Vent Alarm Pressure	Intake Tank 01 - Tank 01 at Vent Alarm Pressure	4
Alarm	Heating to Tank 02 - Tank 01 Selected Check	Heating to Tank 02 - Tank 01 Selected Check	5
Alarm	Heating to Tank 02 - Tank 01 Maintenance Check	Heating to Tank 02 - Tank 01 Maintenance Check	6
Alarm	Heating to Tank 02 - Tank 02 Selected Check	Heating to Tank 02 - Tank 02 Selected Check	7
Alarm	Heating to Tank 02 - Tank 02 Maintenance Check	Heating to Tank 02 - Tank 02 Maintenance Check	8
Alarm	Heating to Tank 02 - Tank 01 to Tank 02 Selected Check	Heating to Tank 02 - Tank 01 to Tank 02 Selected Check	9
Alarm	Heating to Tank 02 - Tank 01 to Tank 02 Maintenance Check	Heating to Tank 02 - Tank 01 to Tank 02 Maintenance Check	10
Alarm	Heating to Tank 02 - Tank 02 at High Alarm Pressure	Heating to Tank 02 - Tank 02 at High Alarm Pressure	11
Alarm	Heating to Tank 02 - Tank 02 at Vent Alarm Pressure	Heating to Tank 02 - Tank 02 at Vent Alarm Pressure	12
Alarm	Tank 01 at High Alarm Temperature	Tank 01 at High Alarm Temperature	13
Alarm	Tank 02 at High Alarm Temperature	Tank 02 at High Alarm Temperature	14
Analog Device	Tank 01 to Tank 02	P01 Product Transfer VSD	1
Analog Device	Tank 01 to Tank 02	CV03 Heating Control	2
Analog Input	Tank 01	Tk01 LT01 Level	1
Analog Input	Tank 01	Tk01 TT01 Temperature	2
Analog Input	Tank 01	Tk01 PT01 Pressure	3
Analog Input	Tank 02	Tk02 LT01 Level	4
Analog Input	Tank 02	Tk02 TT01 Temperature	5
Analog Input	Tank 02	Tk02 PT01 Pressure	6
Analog Input	Tank 01 to Tank 02	FT01 Transfer Flow Rate	7

Device Report – Basic

11.1.10 Device Report – Full

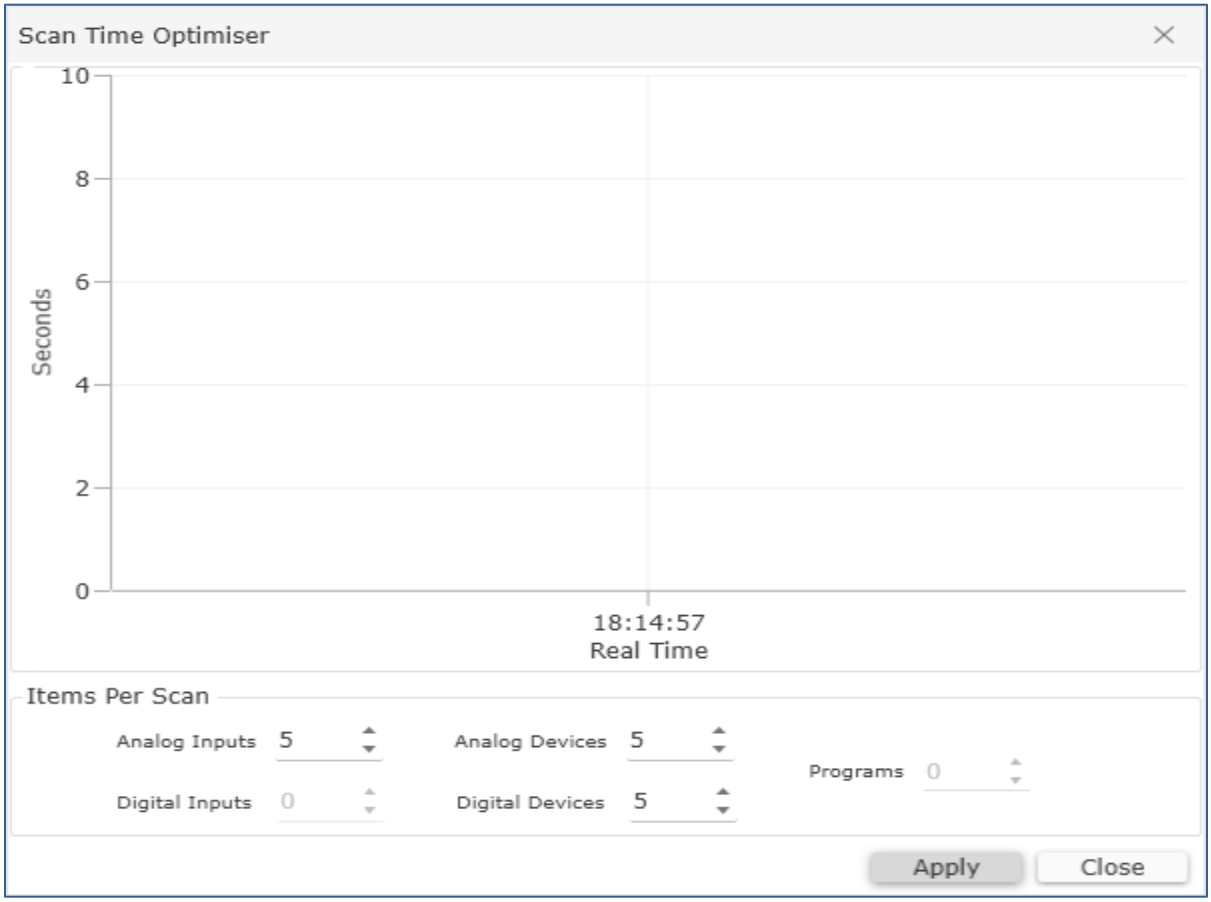
The Device Report (Basic) produces an exportable report containing a list of all devices and addresses of their aspects on PLC.

11.1.11 Excel Tag List

This provides tag bases for Intouch and WinCC formats for all devices and program information.

11.1.12 Scan Time Optimiser

This allows Devices per PLC Scan to be changed for Digital Devices, and Analog Inputs and Devices. This may be used to reduce a PLC Scan Time.



Scan Time Optimiser

11.2 Search Bar

There is a Search bar at the top of the Project Explorer. This will return full or partial matches for names of items.

12 Server Menu

Server Status is shown as Active when there is a Green dot next to the word Server, and as Inactive when there is a Red dot next to the word Server.

12.1 Online Mode

This shows the actual status of items in the controller by colour in the standard method

- Grey – Off or Manual Off or Inactive
- Green – On or Manual On or Active
- Red – Alarm or Error
- The Online mode is toggled on and off using the Online button.

12.2 ReStart

This allows the Server to be Restarted. This action has no effect on a controller but may show items re-initialising on the HMI Screens.

The service must be restarted after changes to the following:

- Device Logging – any device being newly logged or not logged or change to a deadband
- Archiving – any change to Archiving thresholds or enablers.
- Communications Settings – changes to Port Numbers, for Advanced, Redundancy or ActiveX
- External Tags – any changes to External PLC Tags in the system
- Status text settings
- Engineering unit settings

12.3 Utilities – Data Archiving Monitor

This provides a view of statics relating to the Data Archiving module. These statistics are only available while the Data Archiving module is running. The Data Archiving Monitor tool automatically updates without the need to manually refresh.

12.4 Utilities – Manual Archiving

Under normal circumstances, Accord Server will only archive the current database when it reaches the threshold as defined by the user. This approach helps ensure Accord Server historical queries perform optimally. The disadvantage of this approach is that on a particularly busy system, Accord Server may be forced to initiate the archiving at an undesirable time. To overcome this potential issue Accord Server allows users to manually trigger the archiving procedure. To manually trigger the archiving procedure, simply select Manual Archiving here.

12.5 Utilities – Accord Server Configuration Report

This allows export of a Document (docx) containing the current configuration of Accord Server as a snapshot. Microsoft Word does not need to be installed to use this feature. The document may be useful as after commissioning snapshot.
The following information is stored in the document:

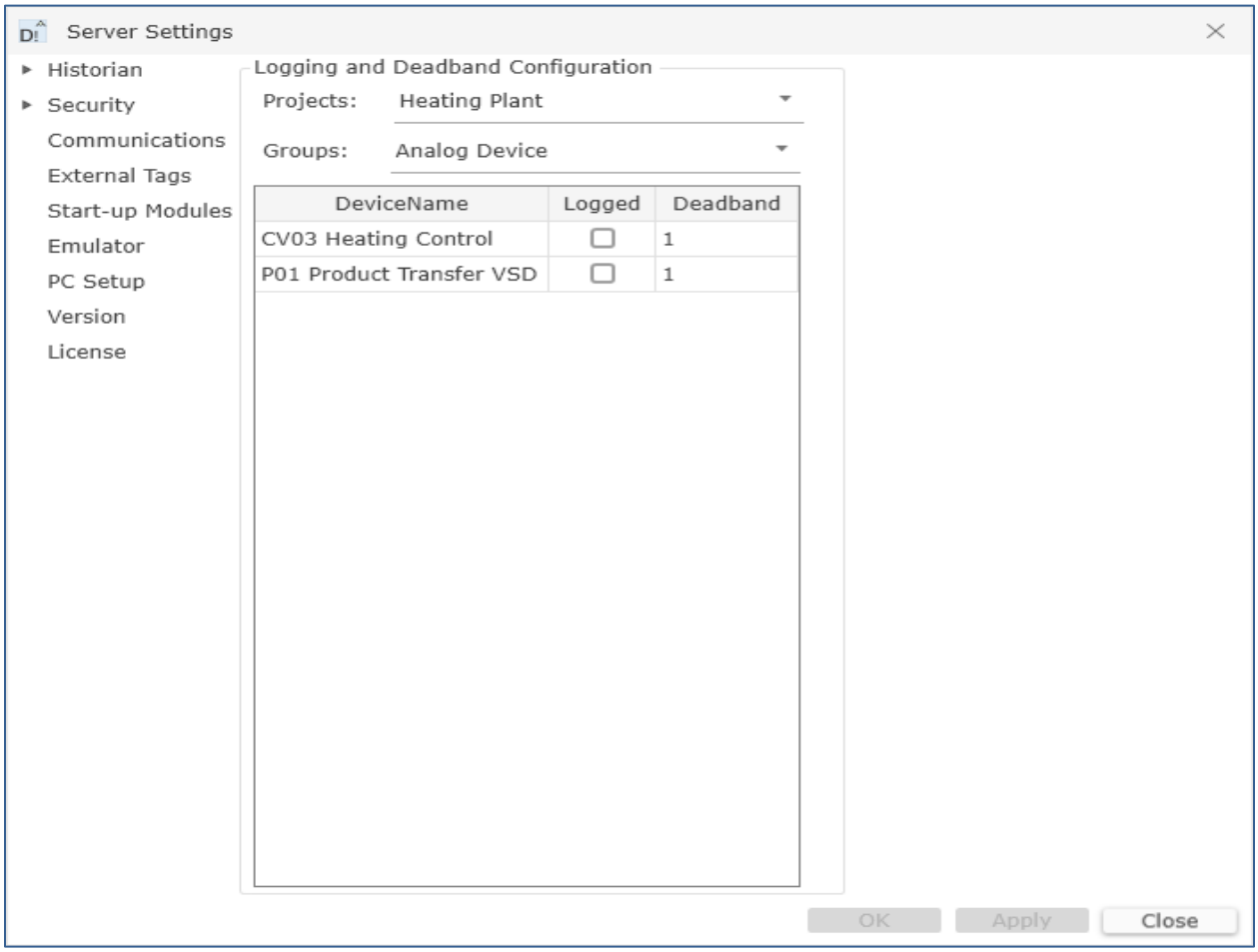
Item	Description
Modules	The list of modules currently available in Accord Server along with an indicator stating if the module has been selected for use.
System Configuration	Various settings and useful pieces of information relating to the computer Accord Server is currently installed on. The following is the list of items displayed here: o Archiving Limit o Computer Name o SQL DB Version o SQL Server o Domain o Install Date o Install Location o Logging o Operating System o Performance o Accord Version o Processor Count o Memory o SMTP Server o Windows User
OPC Configuration	Contains a listing of all OPC Profiles along with all settings relating to an OPC Profile, such as update rates, OPC Server and Channel/Device setups.
Project Configuration	Contains a listing of all Projects including detailed list of all entities in each project (Alarms, Programs, Devices, etc.), deadband & logging setup, security settings and project related schedule information.

12.6 Settings

Settings provides an area where Server settings may be modified.

12.7 Settings – Historian - Devices

Devices allows users to configure the Logging and Deadband settings for specific devices on a given Project. By default, all Alarms and Program are automatically logged. Although it is not possible to deselect logging for Alarms, it is possible to deselect logging for Programs. Logging on Programs should only be deselected if information relating to them is no longer required for reporting purposes. Additionally, some groups, such as Analog Device, contain configurable Deadbands. Deadbands are used as a logging threshold for a given device and can help avoid large quantities of unnecessary data being logged in the database.



Logging individual devices in Historian

12.7.1.1 Activating/Deactivating Logging

To Activate/Deactivate Logging on a particular device:

Select '**Devices**' under the '**Historian**' in Server Settings and select the desired project from the '**Project**' list and the group from the '**Group**' list. Then Tick or Untick the '**Logged**' box for the appropriate device and enter a value for the Deadband.

Note 1: It is not possible to configure logging for Alarms. By default, all alarms are logged.

Note 2: Deactivating Logging for a device will not delete any history previously recorded for that device.

There are Functions for Set All, Reset All, and Export to csv, these are under Right-Click.

12.7.1.2 Understanding Deadbands

Accord Server allows define deadbands on a number of properties for various devices for efficiency for storage space. When a deadband is defined, Accord Server will only log data for a device under the following circumstances:

1. If the change was greater than or equal to the amount defined deadband.
2. If any other property changes regardless of the deadband amount.

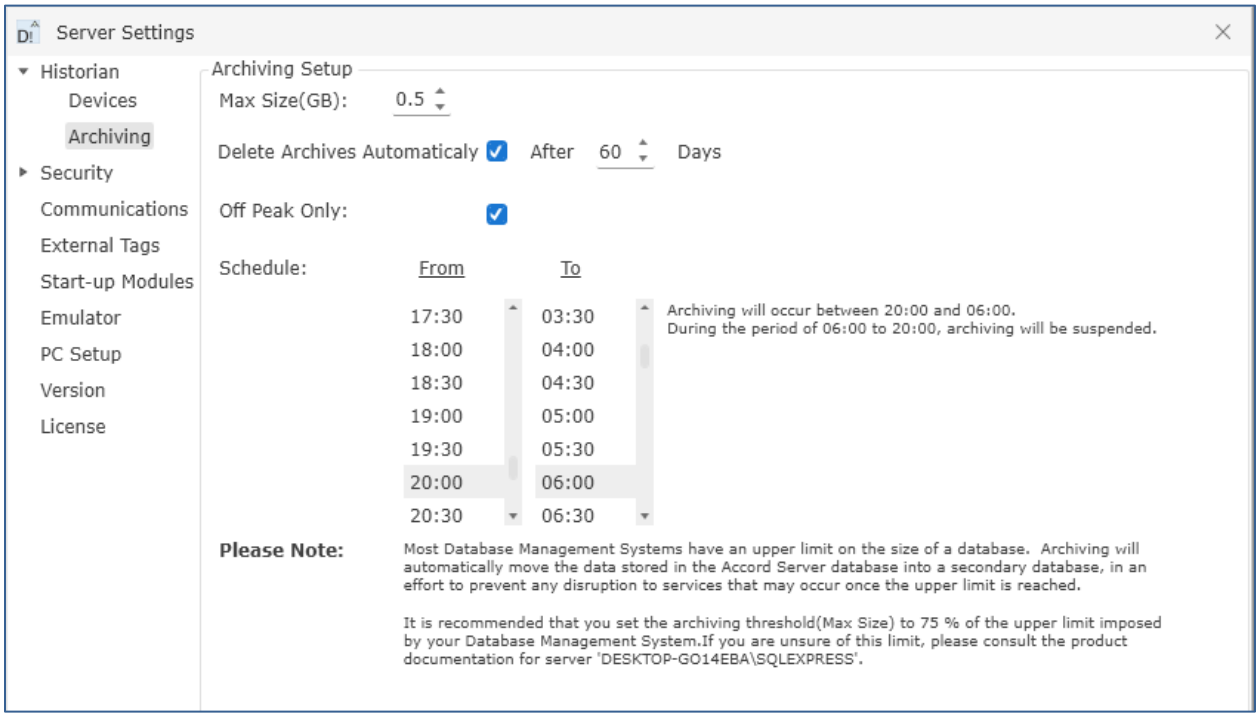
It is important to understand the second condition, as it may result in confusion when viewing historical data. For example, an Analog Input has a Value property and an Alarm LL property. If Value has a deadband of 1.0 applied and the last logged Value was 3.0, then based on rule 1, the next time a log entry should be created is when the value rises or falls by 1.0 or more. If however, the Alarm LL trigger is the value of 3.5, and Value changes to 3.5, triggering the Alarm LL flag, then a new entry will be created, saving both the Alarm LL flag and the Value regardless of the deadband. The reason for this is because Accord Server ensures all data saved in the historical log is consistent, and since the Alarm LL was triggered by a Value of 3.5 and not 3.0, it is necessary for this to be reflected in the historical data.

Note: Not all groups have configurable deadbands. Configurable deadbands always appear adjacent to the Logged column.

12.8 Settings – Historian – Archiving

Archiving allows users to define the maximum allowable database size before data is automatically transferred to a new archived database. An archived database contains all information contained in the current database, including data and configuration settings, up to the moment the archiving procedure was triggered. Once archiving has completed, all historical data and security audit logs present in the archived database are deleted and the database compressed to free up space for additional logs.

Archiving allows for the configuration of automated deletion of archive databases beyond a specified age to manage disk space. Archiving allows configuration of an off-peak schedule for scheduling archiving to only occur between required times to manage PC performance.



Historian Archiving Setup

Enter required value for the Maximum Size of archives.
Enable Auto Deletion of archives by ticking the selection and select the age in '**Days**'. Archives older than this 'Days' value will be auto deleted.
Select '**Archiving**' under the '**Historian**' node from the settings tree to access editing of the off-peak schedule.
Tick '**Off Peak Only**' to enable the feature and select the appropriate times using the from the '**To**' and '**From**' fields to define the time frame for the Off Peak Schedule.

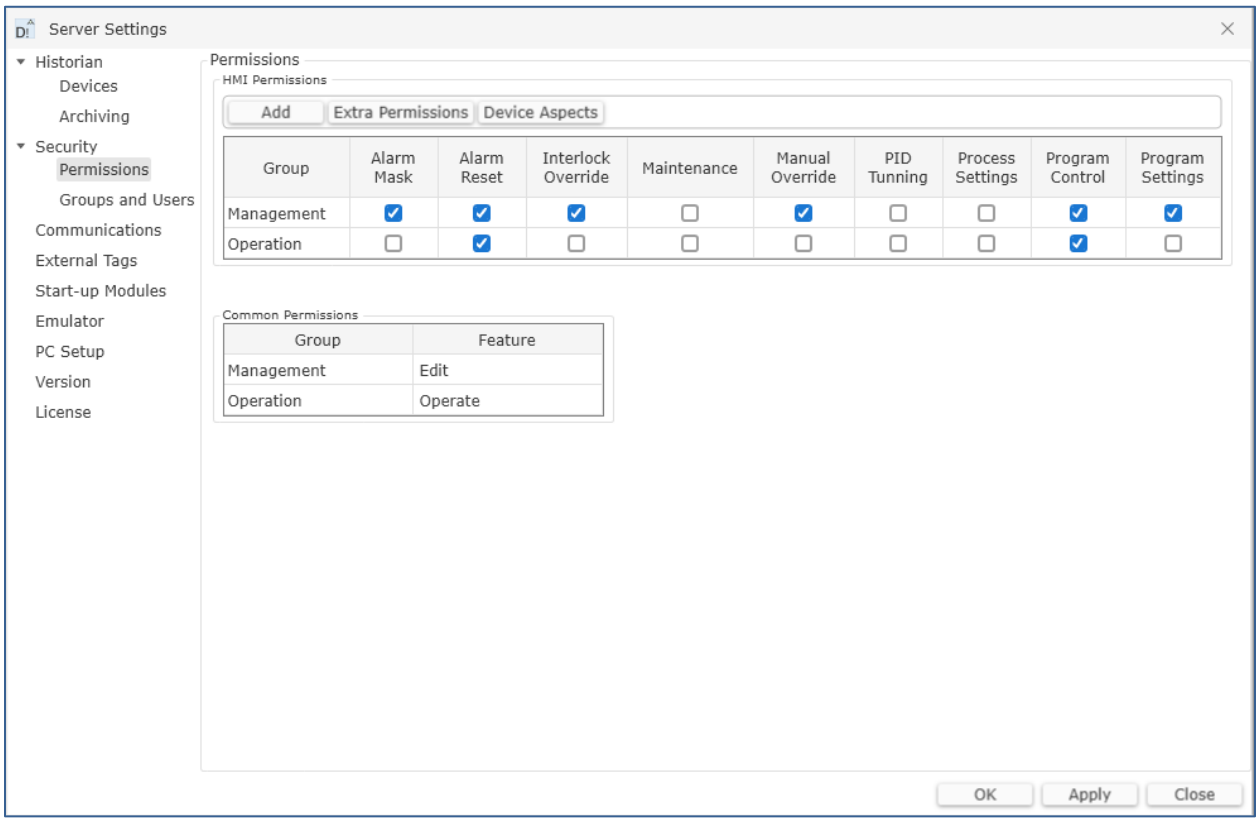
12.9 Settings - Security - Permissions

Permissions allows the user to apply permissions for functions on HMI. A logged in user is permitted access to functionality if the user has been assigned to the permitted User Group, or the function is enabled for all users.

HMI Permissions allow Operation on HMI screens for the function,

Common Controls are for other modules – Reports and Plans etc, and this has two levels: Operate and Edit. Operate allows the user to run Reports, and Start and stop Plans, and Edit permission allows the user to create or edit Reports or Plans. Edit is an Engineering or Management level permission.

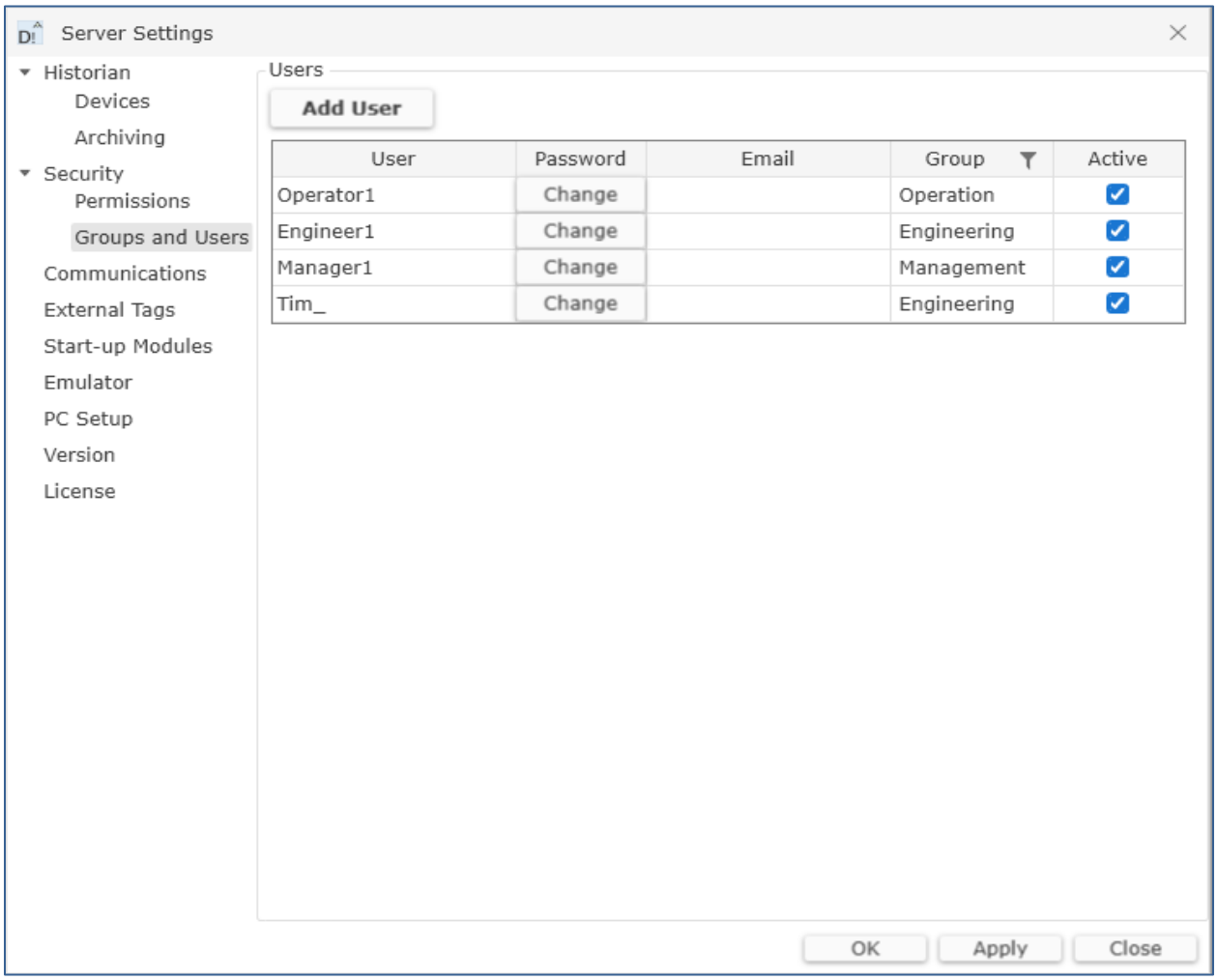
Permissions must be assigned, if they are blank then there is no access for the group.



Permissions for User Groups

12.10 Groups and Users

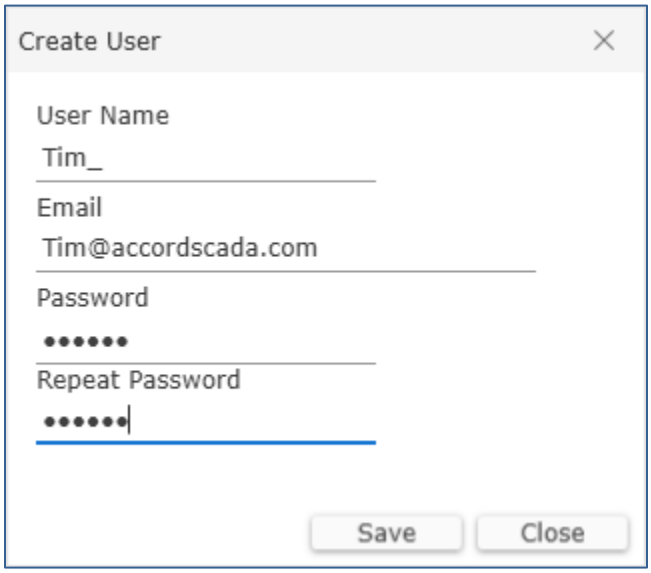
Users allows for the configuration of users that may be assigned to any of the created user groups. Users are assigned an access level, a password, and an optional email address. It is not possible to change these settings while the service is active.



Users in Groups

12.10.1.1 Adding a User

A User is added in the Users list by Clicking the '**Add**' button. A unique name must be provided for the user. A password must be provided, and an email address may be entered if the user is to receive e-mail reports.



User Setup

12.10.1.2 Disabling a User

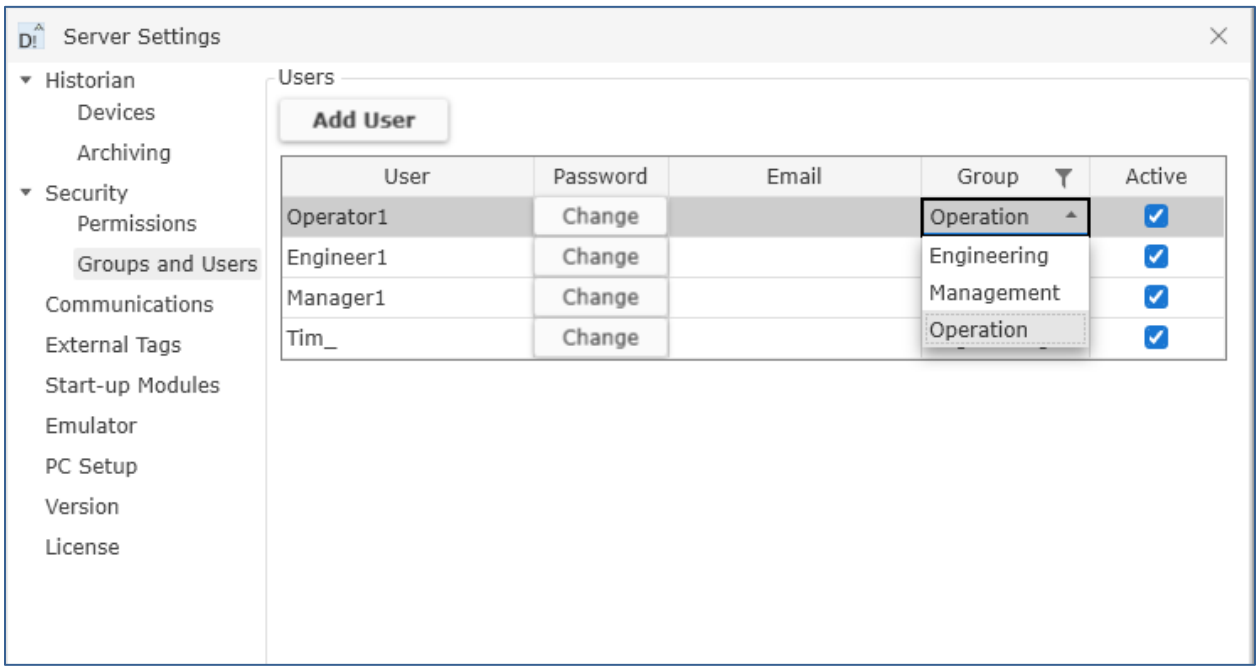
A user is disabled by selecting in the '**Users**' list and unticking the "Active" box.

12.10.1.3 Managing a User

A particular user's password is changed by clicking the '**Change**' hyperlink for the user to display the password panel and then typing in old and new passwords and Confirming.
Once applied, the passwords for the selected server will be updated and the Password Manager will update to reflect this change.
A particular user's email is changed by entering the new email address into '**Email**' field. The address is removed by clearing the **'**Email**'** field.

12.10.1.4 Assigning a User Group to a User

A User is assigned to a group by selecting 'Group' in the '**Groups and Users**' section.



Assigning a User to a Group

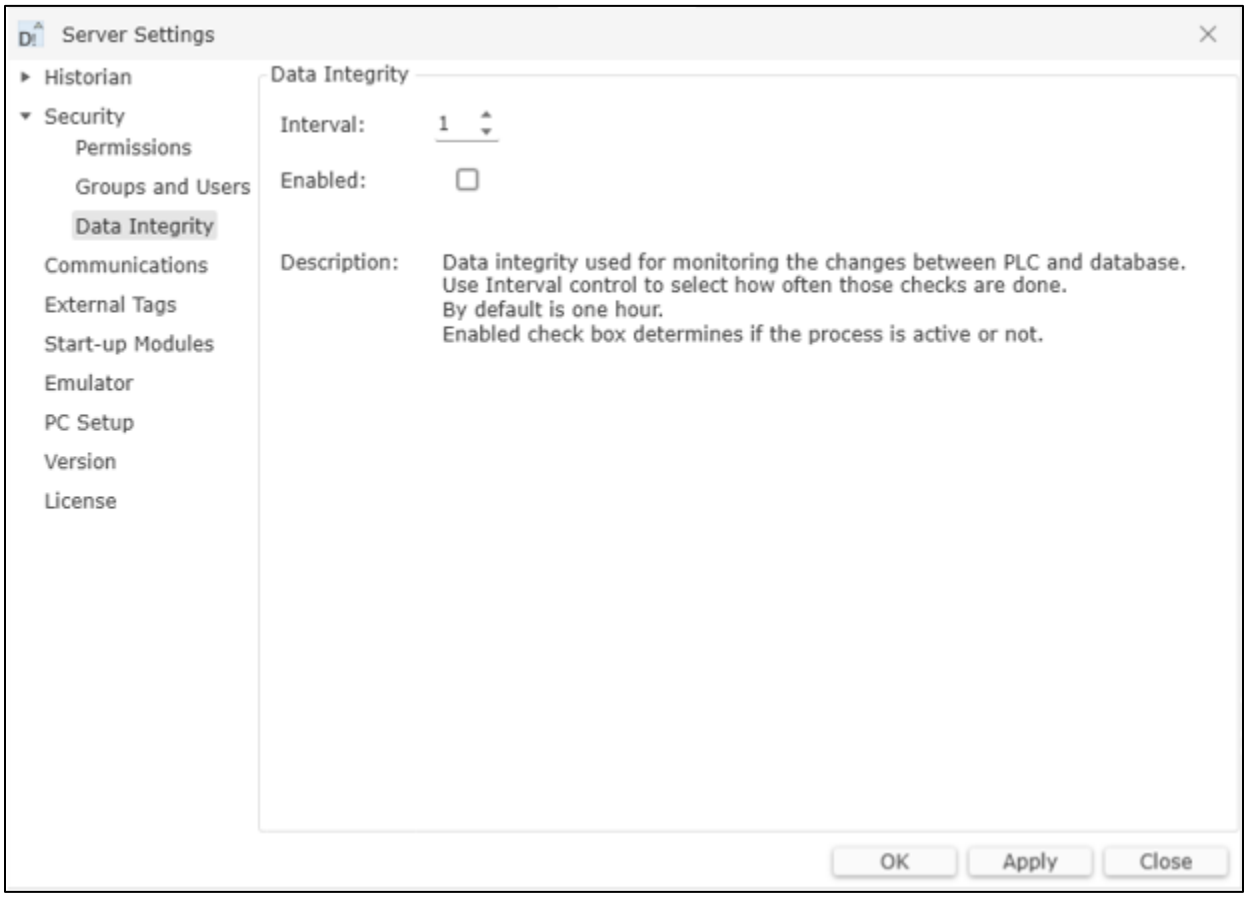
12.11 Data Integrity

Data Integrity provides access to continuous project Verification. During which data in the PLC is compared to the data in SQL database. Any differences are emailed to the selected personnel. Verification can detect unauthorised data changes in the PLC and inform authorised personnel about those changes.

Interval determines how often Verification check will run, the minimum and default value is 1 hour.

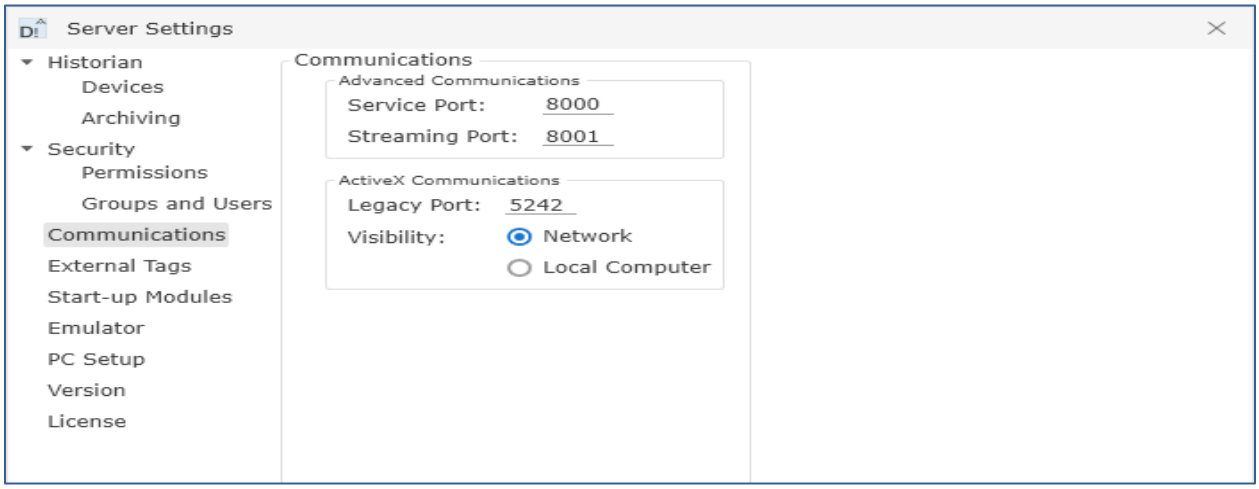
When Enabled checked, then Verification process in enabled, if not checked, then disabled.

See Defined Reports user manual on how to setup users to receive Verification results by email.



12.12 Settings – Communications

This provides access to the port numbers in Ethernet that the Service will use, for Advanced / WCF communications and ActiveX communications.



Communications Settings for Accord Server

12.12.1 Note on Legacy Communications for ActiveX

ActiveX Communications allows for the configuration of TCP related settings for ActiveX Communications.

The Legacy Port refers to the TCP Port number the ActiveX Communications module binds to when the service starts. It is important that this number is unique and does not conflict with any other services running on the host computer.

The Port number may be changed by entering new number into '**Legacy Port**' field.

In some situations, it may be desirable to only allow ActiveX connections on the local computer and this is managed using the visibility option.

Selecting '**Network**' allows connections from any computer on the network.

Selecting '**Local**' restricts connections to the local computer only.

12.12.2 Advanced Communications for Accord Modules

The Advanced Communications module uses TCP in order to communicate with client controls. By default, the Advanced Communications module will provide services using the first available network connection. The following should be checked when setting up for Network comms:

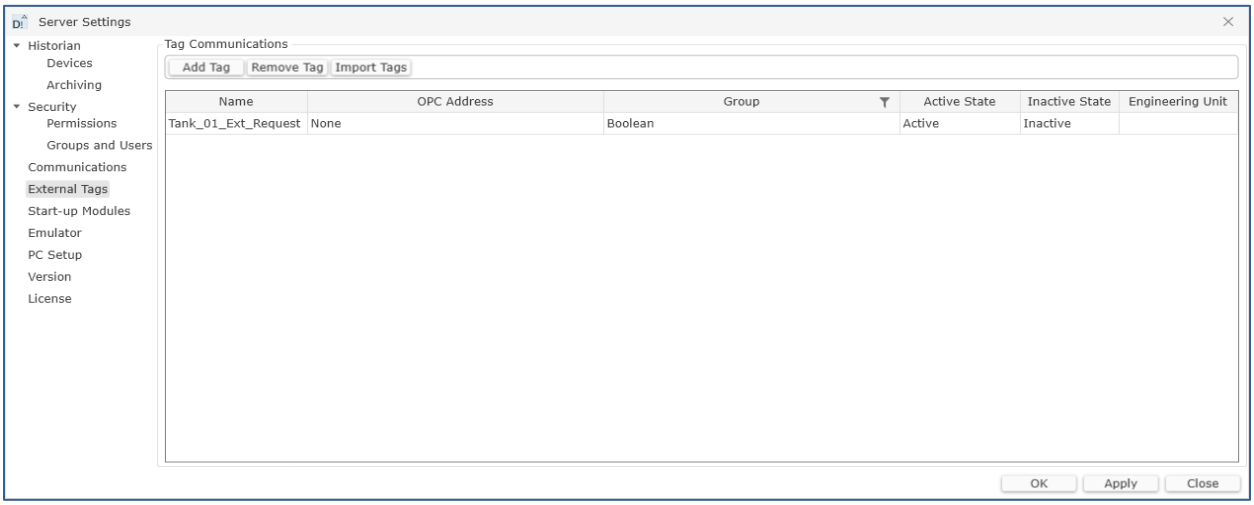
1. IP version 4 is enabled.
2. A static IP address has been configured.

The DNS (if any) is configured correctly.

12.13 Settings – External Tags

External Tags allow for the configuration of custom devices that relate to data external to the selected Accord Server project. External Tags are treated much in the same way as standard devices within a project are and thus, are available to the Accord Controls and the Accord Server SDK. There are three supported data types for External Tags, these are as follows:

1. Boolean Supporting values that are either True or False.
2. Integer Support values ranging from -2147483648 to 2147483647.
3. Real Supporting values ranging from -3.40282e+038 to 3.40282e+038.



External Tags setup

External Tags use the same OPC Server that the project uses however, it is not required that they use the same Channel/Device configuration as used by the various groups within the project. This means it is possible to configure an External Tag to read data from an entirely different PLC than that used by the project. When configuring an External Tag, it is important to remember that the absolute tag address must be used. This means that if the tag requires a specific OPC Channel and Device, those must be included in the address.

For example, to read value the Life Byte value for a Siemens S7 project, located in data block 3 at offset 4, using an OPC Channel called 'S7' and an OPC Device called 'Device', it is necessary to use the following address:

```
S7.Device.DB3,BYTE4
```

In this example, since the data is a whole number, the correct type to configure the External Tag as is Integer. Information on address formats is in OPC Server documentation.

A new External Tag is Added by selecting the group from the '**Group**' list and clicking the '**+**' button and entering a unique name for the new tag.
An External Tag is deleted by selecting the group from the '**Group**' list and selecting the desired tag from the '**Tags**' list and clicking the '**X**' button.
The 'OPC Tag' and 'Engineering Units' fields may be entered and edited later if required. Active and Inactive states for Boolean tags may be entered and edited later if required.

12.13.1.1 Exporting External Tags to CSV File

Data for external tags (of the same Group) can be exported to a CSV file for reference or to be imported at a later time. The Data comprises of the Name, the OPC address and the appropriate Engineering Unit or Active/Inactive state text. The Export is carried out by right-clicking in the '**Tags**' list and selecting the '**Export As**' option, folder, and file name.

12.13.1.2 Importing External Tags from CSV File

Multiple external tags (of the same Group) can be imported from a CSV file. This file can be created from a previous export, can be manually created or a combination of both. An export using this method will import the name, the OPC address and the appropriate Engineering Unit or Active / Inactive state texts. Existing tags with the same name will be replaced with the new address.

The absolute tag address must be used when entering the address for an External Tag in the CSV file. This means that if the tag requires a specific OPC Channel and Device, those must be included in the address.

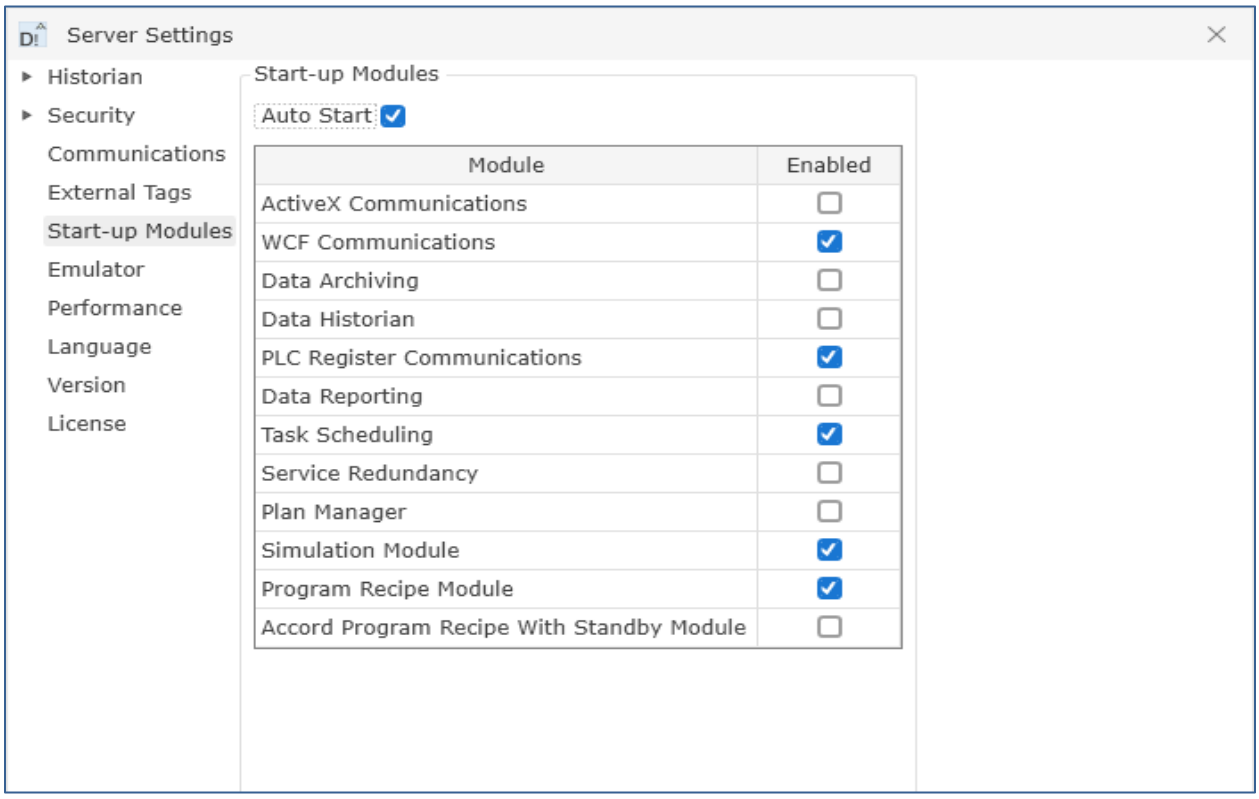
For example, the address DB3.DBW4 in a Siemens S7 project, location Data Block 3 Byte 4, in OPC Device called 'Device' in OPC Channel 'S7' is given as :

```
S7.Device.DB3,BYTE4
```

Importing a file is carried out by clicking on the arrowed '**Import**' button and Browsing to folder and selecting the file to be imported.

12.14 Settings – Start-Up Modules

Start-up Modules allows the user to enable/disable optional Service modules. This is useful when dealing with limited system resources. For example, if the system does not have Recipes or Plans then those modules would not be selected.



Accord Server Start-up Modules

Auto Start is Enabled by selecting '**Start-up Modules**' from the settings tree and ticking or unticking the '**Auto Start'** box.

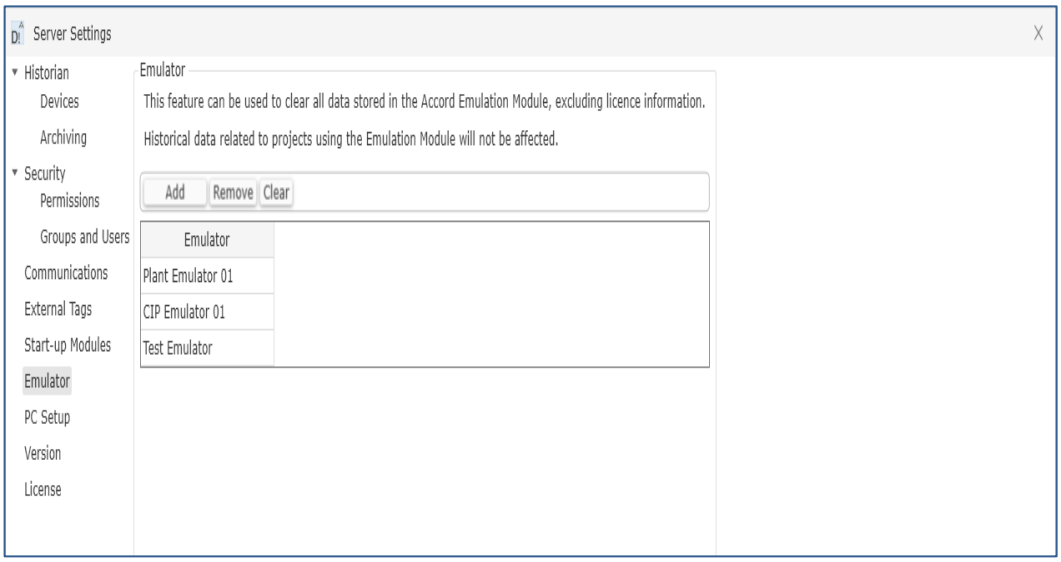
Note: Deactivating Auto Start means that Accord Server will no longer automatically run when Windows starts.

A module is Activated or Deactivated by selecting '**Start-up Modules**' from the settings tree and ticking or unticking the '**Enabled**' box for the module.

Note: Permanently deactivating a module means that all functionality that module provides to other dependent modules is no longer available. It is strongly recommended to verify the service operates as intended following the deactivation of a module.

12.15 Emulator

Multiple PLC Emulations may be configured. Each Emulator represents a PLC and will perform in the same manner as Accord PLC library performs in a PLC. The Emulator instance is created here and associated with a project in the same manner as an OPC profile.



PLC Emulator Setup

Existing Emulator instances are listed, and a new instance may be created by pressing the 'Add' button or removed by pressing the 'Remove' button.

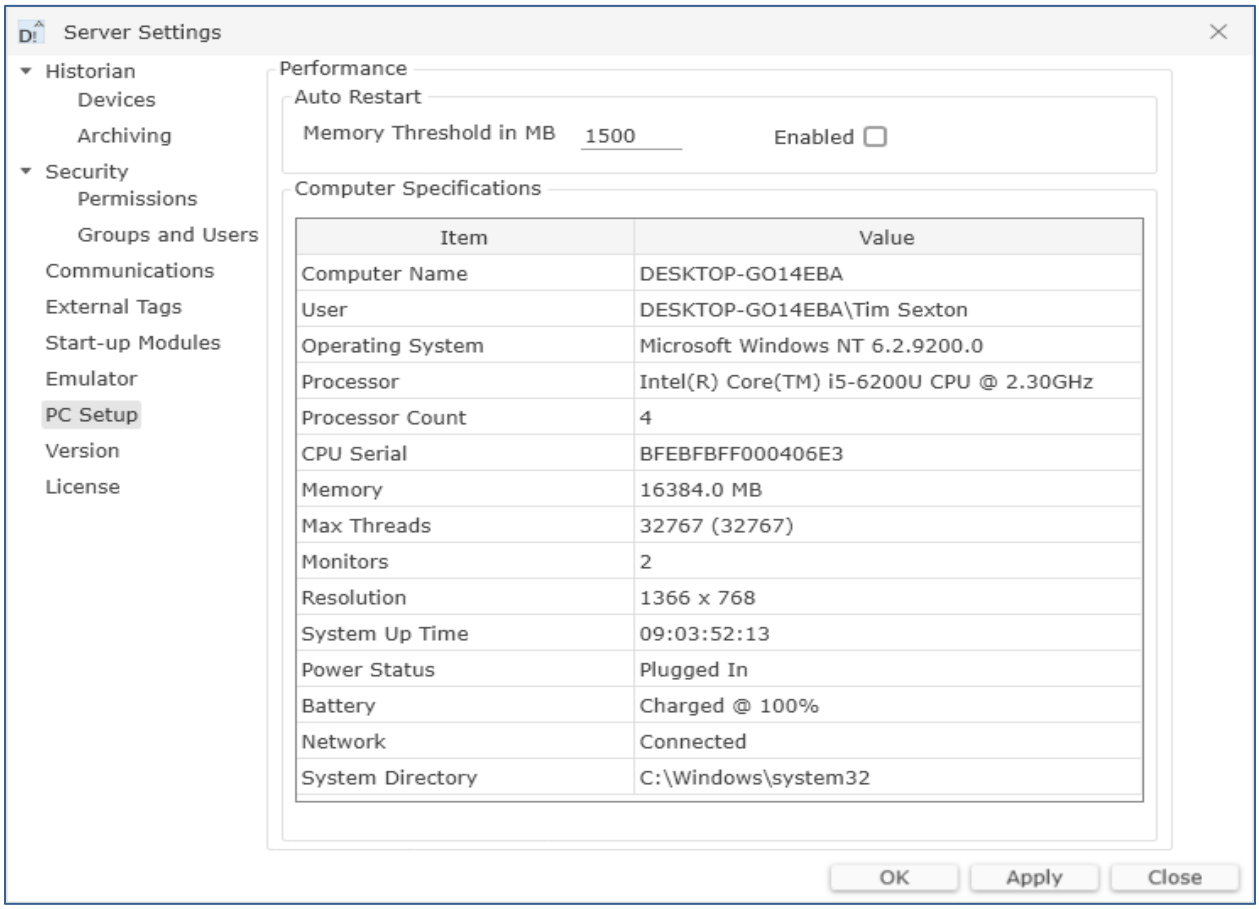
12.16 Settings – Version

The Version section provides a summary of all Accord assemblies with their version numbers.

12.17 Settings – Licence

The License section provides a summary of all features currently licensed to Accord Server.

12.18 Server PC Setup



Server PC Setup

12.18.1 Setting the Memory Threshold

The Memory Threshold is a limit for the amount of Memory that Accord server can use. If the limit is exceeded (due to PC being used for another process or communication overload) then the Server module will restart. This is to avoid prolonged outages, if possible.

To change the desired Threshold setting:

Select '**Server PC Setup**' from the settings tree and Enable the **Memory Threshold** by clicking on the tickbox and adjusting the threshold figure as required. Accord should normally use less than 500mB of memory, so 1500 Mb is a large threshold.