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7409 – DeltaV Implementation I using DeltaV Live

DeltaV v14.3 – Revision 2

Prepared by Educational Services
Austin, TX USA

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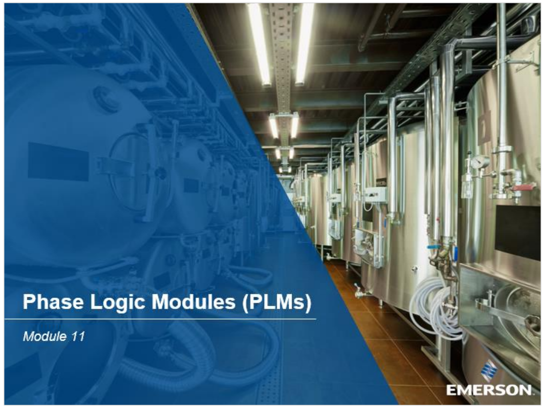

Workshops

1. DeltaV Overview

- Identify the DeltaV Applications
- Commission the Controllers

2. The Simulated Process

- Defining Plant Areas
- Configuring Traditional DSTs
- Configuring CHARM DSTs
- Download Control Network

3. DeltaV Control Modules

- Creating Module XV-101
- Creating a New Folder and Display
- Adding Data Links
- Adding and Customizing Text
- Adding and Configuring a GEM
- Publishing and Operating XV-101

4. Configuring DeltaV Alarms

- Creating LEVEL-101
- Creating LI-101
- Add LI-101 & LEVEL-101 to Tank101
- Add Alarm Data links
- ALARMS[1] Parameter
- Creating and Viewing Alarm Help
- Optional Workshop – Unsafe Practice Alarm

5. Cold Restart

- Controller Cold Restart

Workshops

6. DeltaV Motor Control

- Creating MTR-102
- Adding MTR-102 to Tank101
- Optional Workshop – XV-OPTION

7. DeltaV Regulatory Control

- Creating FIC-102
- Adding FIC-102 to Tank101
- Optional Workshop
  - Tune FIC-102
  - DeltaV Live Functions
  - Mode not Normal

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- Creating SFC-T101
- Optional Workshop
  - Update Message
  - Check Tank Level
  - Add Shutdown Option
  - Add Alarm

9. DeltaV Cascade Control

- Creating MTR-203
- Creating FIC-20X
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- Creating LEV2-SIM
- Creating LIC-20X
- Add LIC-20X to Tank201 Display
- Continuous Historian

Workshops

- Optional Workshop
  - Add Embedded Trend
  - Change Themes
  - Modify FIC-20X Scaling
  - Add Buttons
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10. Conditional Alarms

- Configuring a Conditional Alarm

11. Phase Logic Modules (PLMs)

- PLM Plant Shutdown
- Export
- Optional Workshop
  - Add logic for Stop and Abort

DeltaV Overview

Module 1

EMERSON

Module Objectives

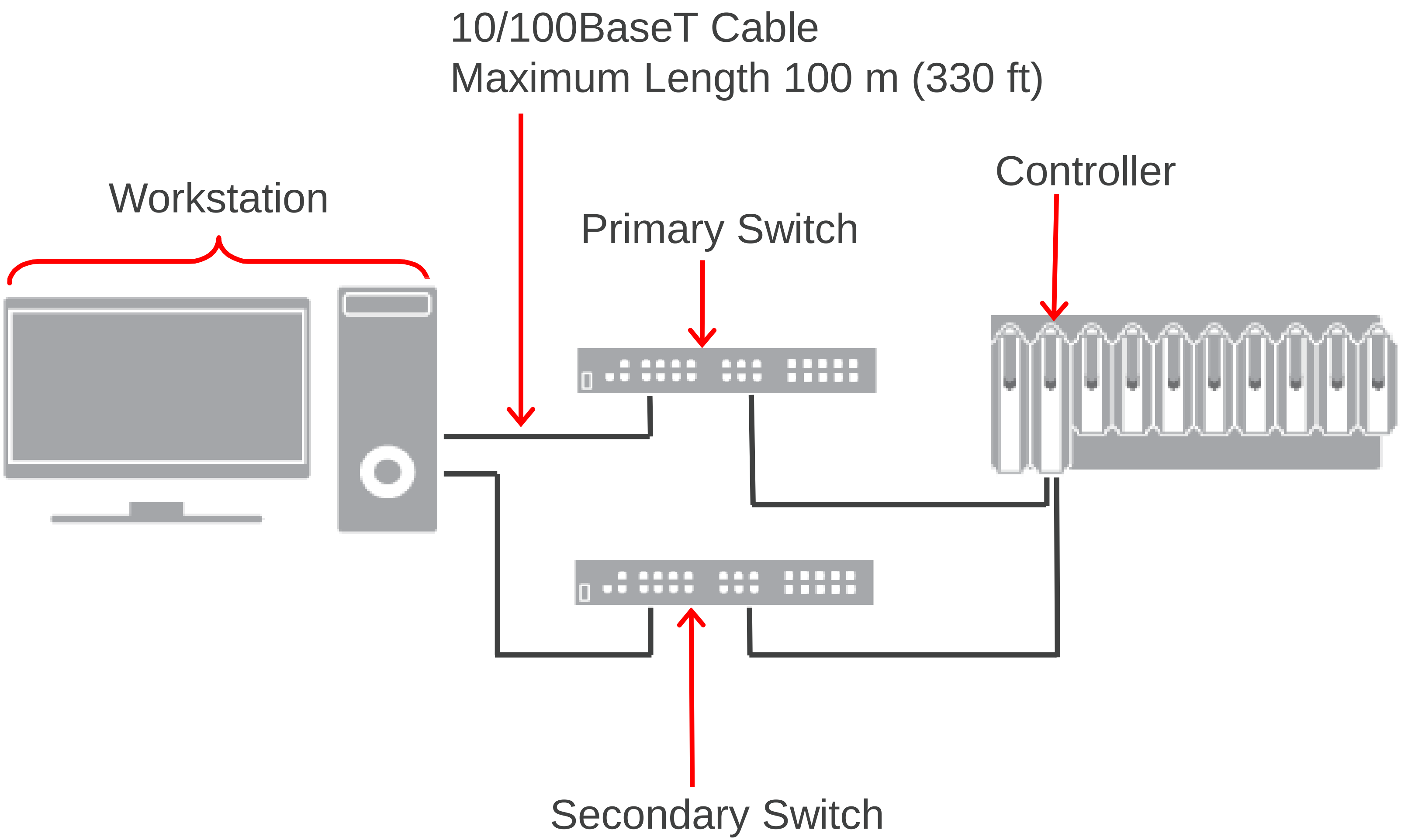
- Define Plantweb/DeltaV System Architecture
- Define DeltaV Software Components
- Define DeltaV System Capacities
- Identify and launch DeltaV applications
- Identify, decommission, and commission a controller

Module Workshops

- Identify the DeltaV Applications
- Commission the Controllers

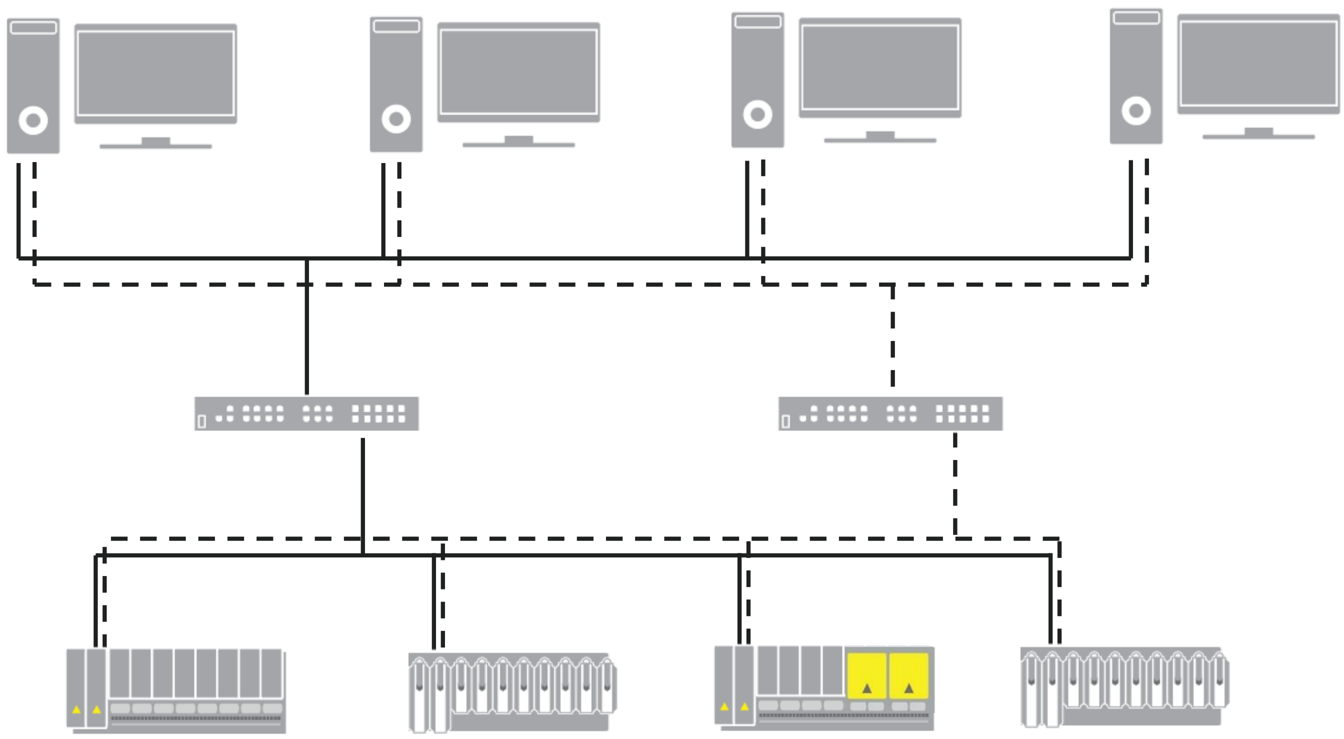
DeltaV System Architecture

A Basic DeltaV Control Network



DeltaV System Architecture

Multiple Nodes



Legend:
Primary Control Network
Secondary Control Network

DeltaV System Architecture – System Capacities

Capacity limits for system topology and controllers:

- 120 – Nodes
- 100 – Controllers / Simplex or Redundant Pairs
- 65 – Workstations
- 30,000 Device Signal Tags (DSTs) Lic License
- 25,000 SCADA tags – No License

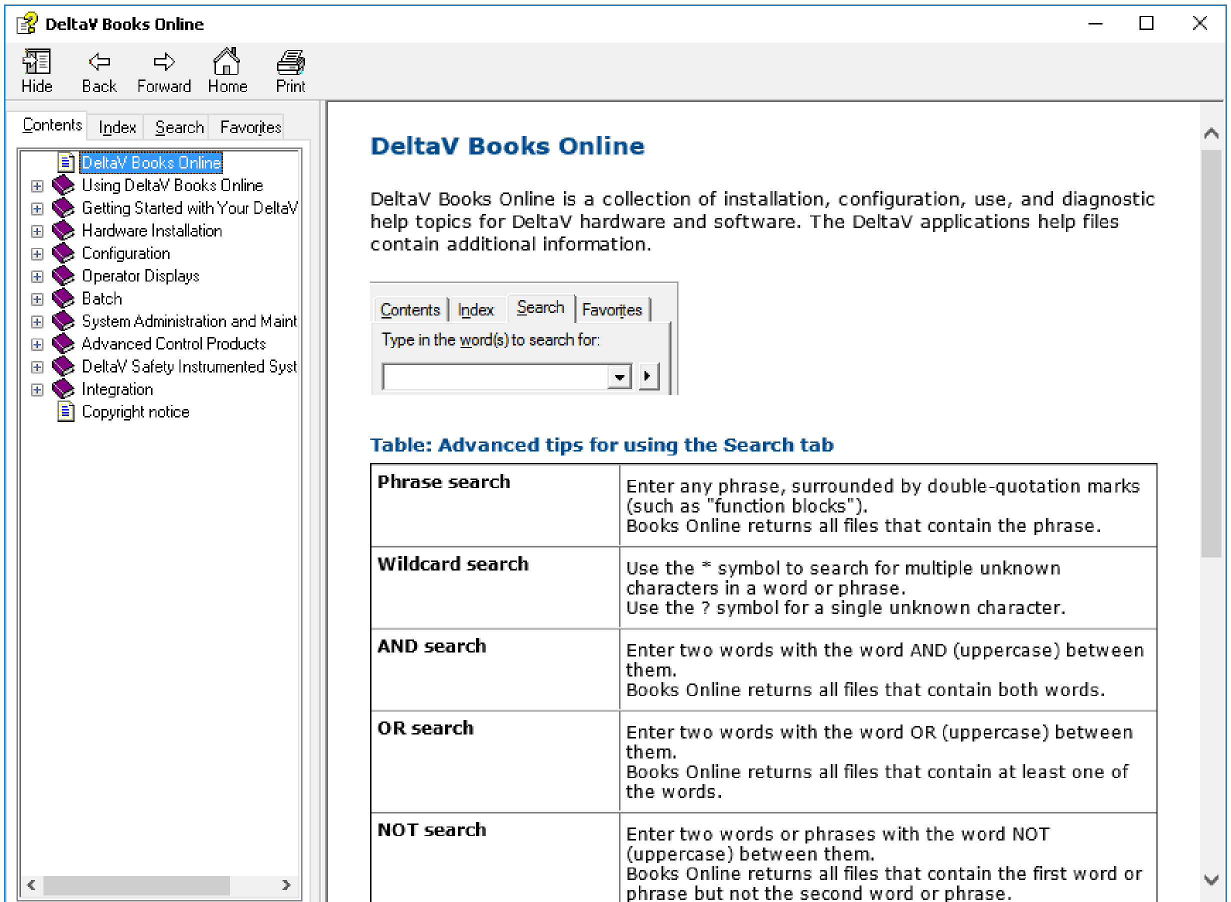
Supervisory Control
Data Acquisition

- 750 max. DSTs per MD Plus/SD Plus/MQ/SQ Controller
- 1500 max. DSTs per MX/SX Controller
- 1536 max. DSTs per SZ Controller
- 100/300/750/1500 DSTs for PK controller

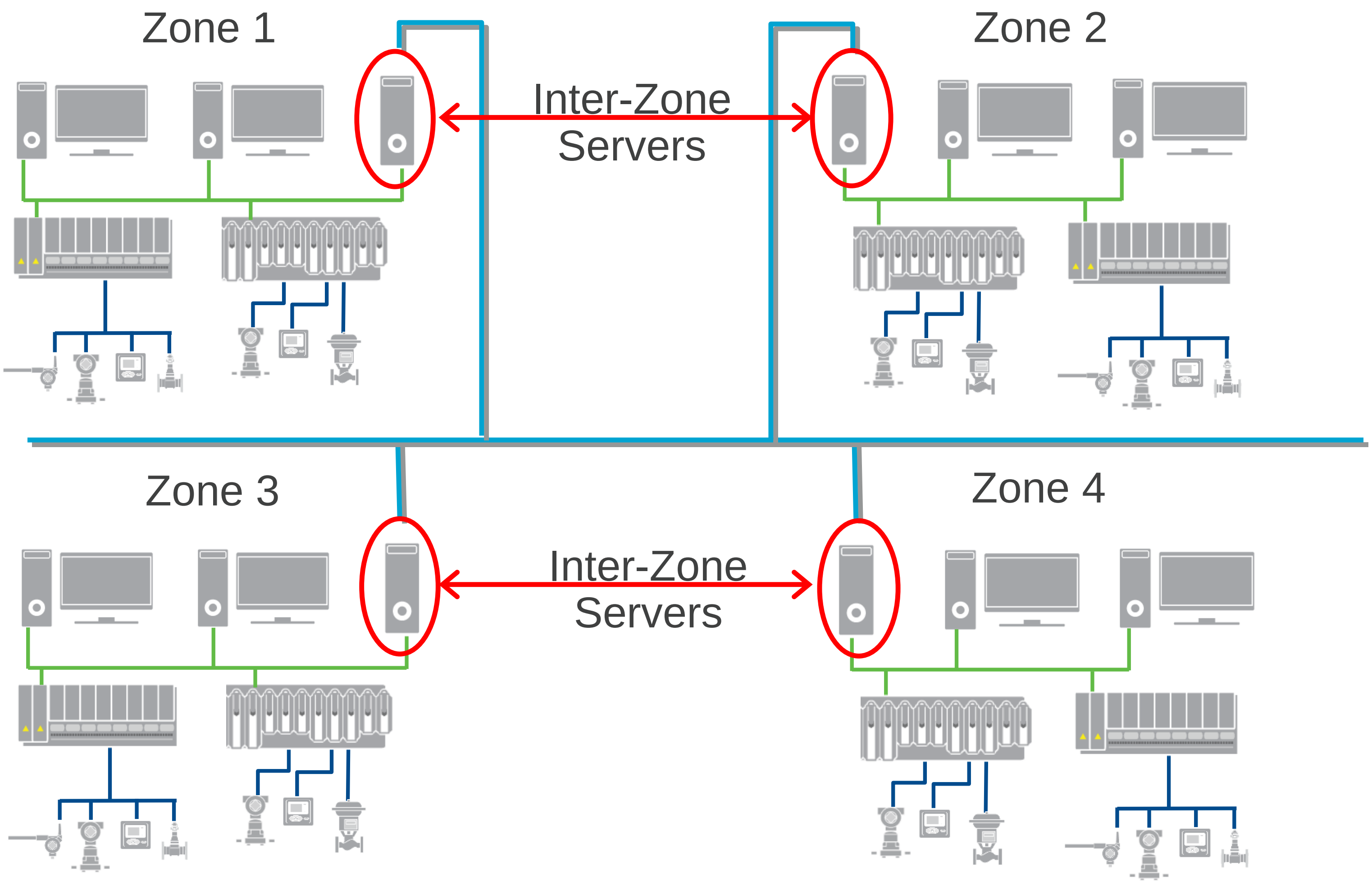
Refer to DeltaV Books Online for additional information about the DeltaV system's capacities.

DeltaV System Architecture

Refer to the *Guardian Support* website or *DeltaV Books Online* for additional information about the DeltaV system architecture.



DeltaV Zone Architecture



DeltaV Zone Architecture

DeltaV Zones allow multiple DeltaV Systems to communicate operating data and alarms between one another via Inter-Zone Servers (IZS).

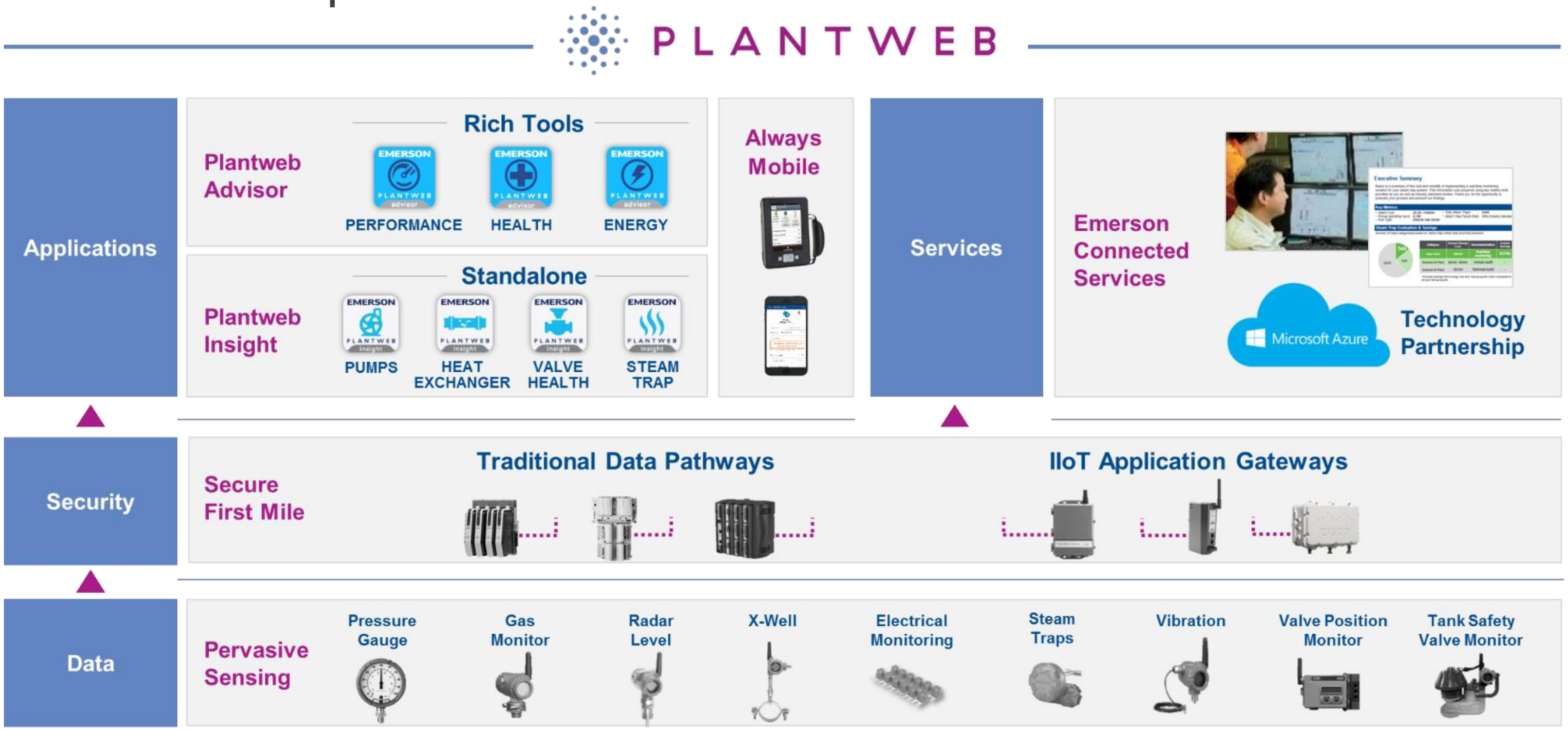
Each zone is a standalone DeltaV system comprised of the ProfessionalPLUS node, an Inter-Zone Server node, and other nodes as desired.

Zone considerations:

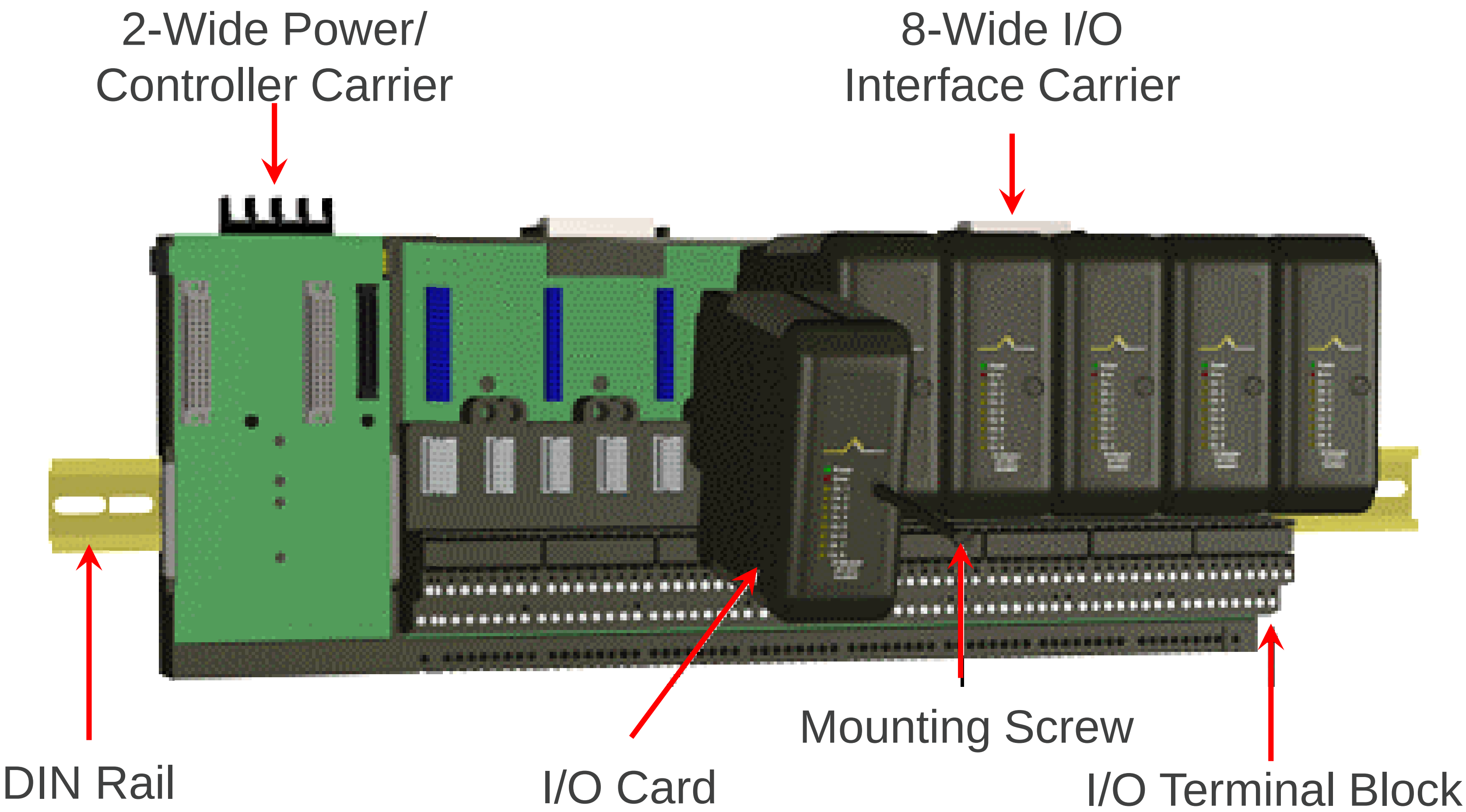
- The ability to upgrade systems independently while maintaining communications
- Large systems greater than 30,000 DSTs and/or 120 Nodes
- A maximum of 15 Zones
- Optional redundant IZS
- Each Zone requires a license

Plantweb Digital Ecosystem

Industrial IoT – a scalable portfolio of standards-based hardware, software, intelligent devices and services for securely implementing the *Industrial Internet of Things (IoT)* with measurable business performance improvement.



DeltaV M-Series I/O Interface



Redundancy is determined by carrier type

DeltaV M-Series Traditional I/O Card Types

Analog Inputs	**Discrete Inputs**
AI 4-20 mA HART, 8 channels *	DI 24 VDC Isolated, 8 channels
AI 4-20 mA HART, 16 channels	DI 24 VDC Dry Contact, 8 channels *
AI 4-20 mA HART Plus, 16 channels*	DI 24 VDC Dry Contact, 32 channels
AI Isolated (TC/mV/Ohm/V/RTD), 4 channels	DI 24 VDC Dry Contact Plus, 32 channels*
RTD, 8 channels	Multi-Function (Isolated DI), 4 channels
Thermocouple, 8 channels	SOE (DI 24 VDC), 16 channels
Millivolt, 8 channels	DI 120 VAC Low Side Detection, 8 channels
I.S. AI 4-20 mA HART, 8 channels	DI 120 VAC Isolated, 8 channels
	I.S. DI 12 VDC I.S. Power, 16 channels
Analog Outputs	**Discrete Outputs**
AO 4-20 mA HART, 8 channels *	DO 24 VDC Isolated, 8 channels
AO 4-20 mA HART Plus,16 channels*	DO 24 VDC High Side, 8 channels *
I.S. AO 4-20 mA HART, 8 channels	DO HD 24 VDC High Side, 32 channels
	DO 24 VDC High Side Plus, 32 channels*
	DO 120/230 VAC Isolated, 8 channels
	DO 120/230 VAC High Side, 8 channels

* Indicates which cards can be used for redundant I/O applications.

DeltaV M-Series Communication Interfaces

FOUNDATION™ fieldbus Interface *
- 2 Ports, maximum of 16 Devices/Port, 1900 meters
- 4 Ports H1 Series 2 Plus, maximum of 16 Devices/Port, 1900 meters

DeviceNet
- 1 Port, maximum of 61 Devices, 500 meters @ 125K baud

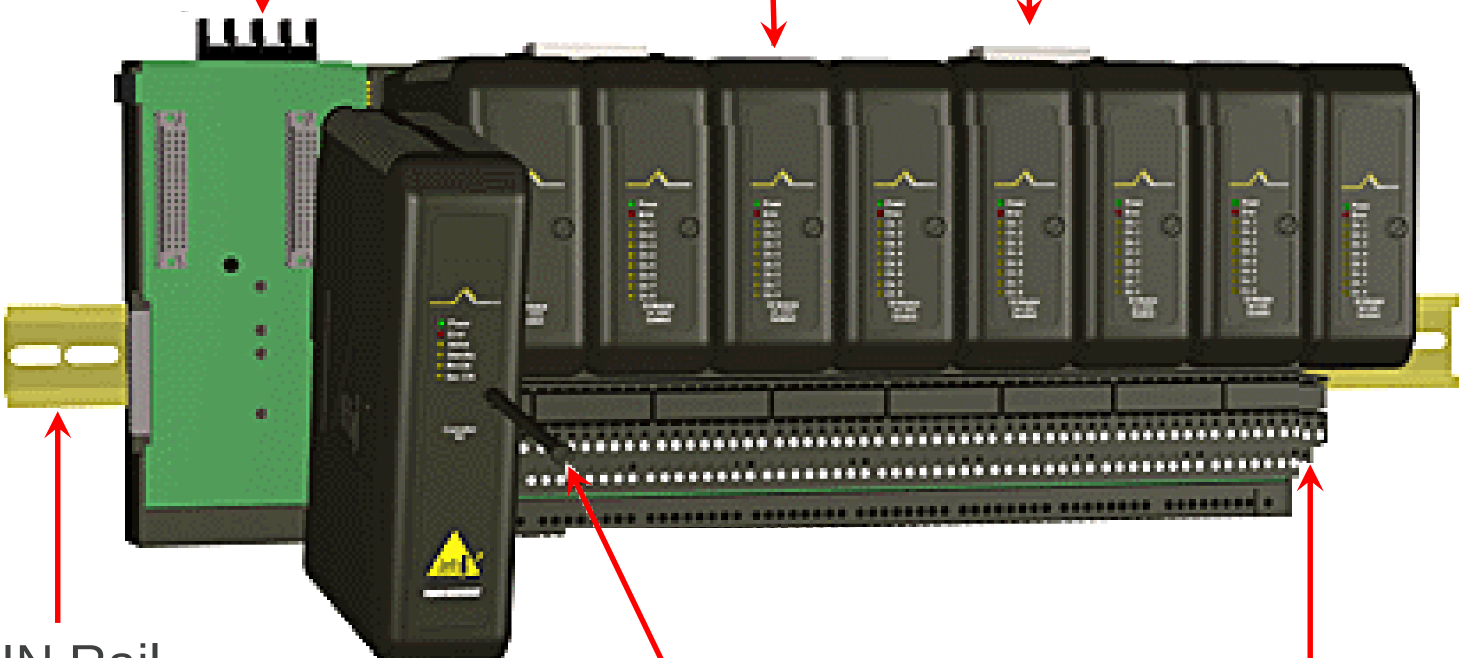
Profibus DP *
- 1 Port, maximum of 64 Devices, 2000 meters @ 1.5M baud

Actuator Sensor Interface (AS-i)
- 2 Ports, maximum of 31 Devices/Port, 300 meters

Serial Interface *
- 2 Port Modbus Protocol, RS232/RS485 or 2 Port Programmable

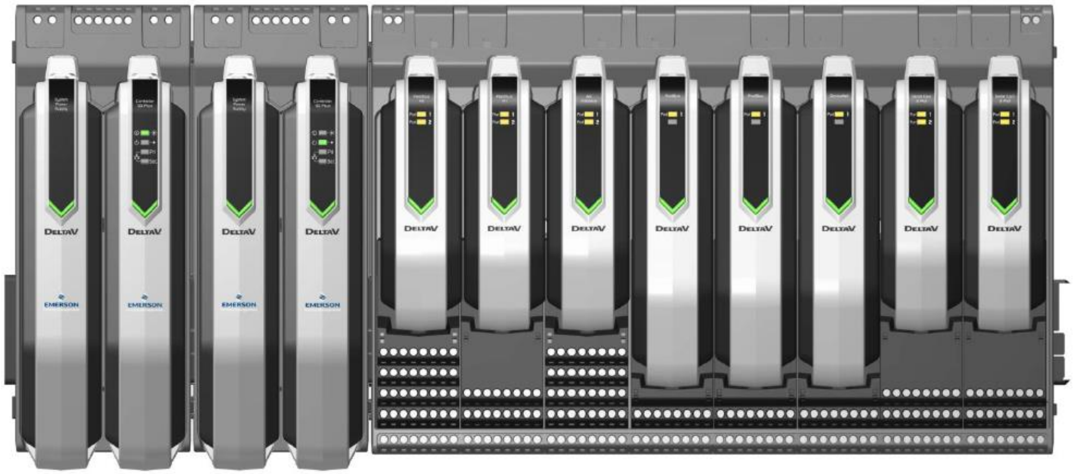
* Indicates which cards can be used for redundant I/O applications.

DeltaV M-Series Controller



DeltaV S-series Hardware

The S-series is recognizable by its silver color. Installation is simplified with snap-in cards that are released by a push button on top. Protected venting allows for cooling and prevents debris from falling in the top of the cards.



The S-series provides the same I/O card types as the traditional M-series.

Starting with v14.3, MQ, MD Plus, MX, PK, SD Plus, SX, and SQ controllers all support integration with Wireless I/O Cards and Electronic Marshalling.

DeltaV S-series I/O Card Types

Analog Inputs	Discrete Inputs
AI 4-20 mA HART 8 channels *	DI 24 VDC Isolated 8 channels
AI 4-20 mA HART 16 channels	DI NAMUR 8 channels *
AI 4-20 mA HART Plus 16 channels *	DI 120 VAC Isolated 8 channels
AI Isolated (TC/RTD/MV/Ohms/Voltage) 4 channels	DI 120 VAC Dry Contact 8 channels
RTD / Resistance Input 8 channels	DI HD 24 VDC Dry Contact 32 channels
Thermocouple, mV 8 channels	DI HD 24 VDC Dry Contact Plus 32 channels *
	PCI (High Frequency) 4 channels
	SOE, (DI 24 VDC) 16 channels
Analog Outputs	**Discrete Outputs**
AO 4-20 mA HART 8 channels *	DO 24 VDC Isolated 8 channels
AO 4-20 mA HART Plus 16 channels *	DO 24 VDC High Side 8 channels *
	DO 120/230 VAC Isolated 8 channels
	DO 120/230 VAC High Side 8 channels
	DO HD 24 VDC High Side 32 channels
	DO HD 24 VDC High Side Plus 32 channels *

* Indicates which cards can be used for redundant I/O applications.

DeltaV S-series Communication Interfaces

FOUNDATION™ fieldbus Interface *

- 2 Ports, maximum of 16 Devices/Port, 1900 meters
- 2 Ports H1 with Integrated Power, maximum of 16 Devices/Port, 1900 meters
- 4 Ports H1 Plus, maximum of 16 Devices/Port, 1900 meters

DeviceNet

- 1 Port, maximum of 61 Devices, 500 meters @ 125K baud

Profibus DP *

- 1 Port, maximum of 64 Devices, 2000 meters @ 1.5M baud

Actuator Sensor Interface (AS-i)

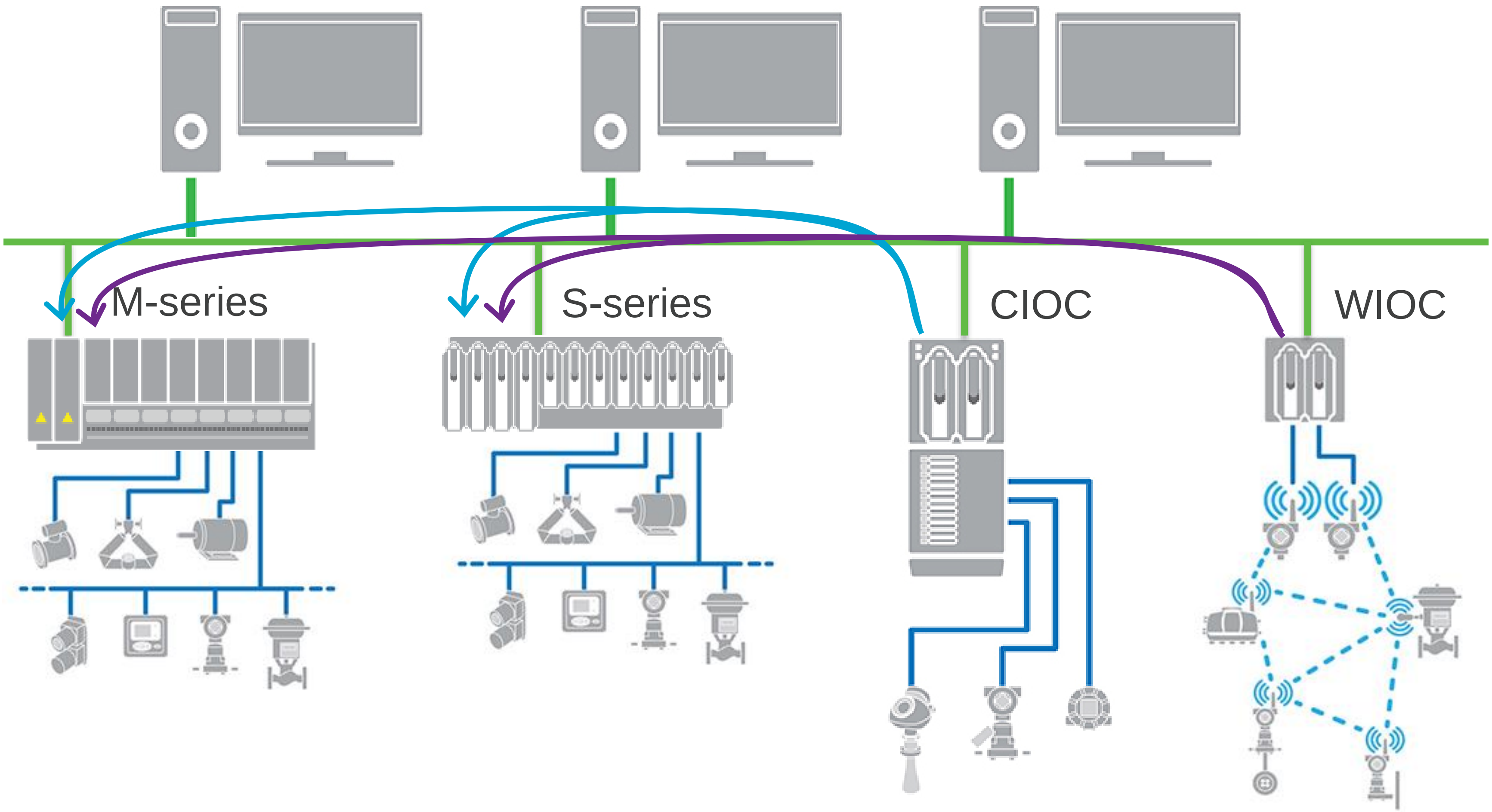
- 2 Ports, maximum of 31 Devices/Port, 300 meters

Serial Interface *

- 2 Port Modbus Protocol, RS232/RS485 or 2 Port Programmable

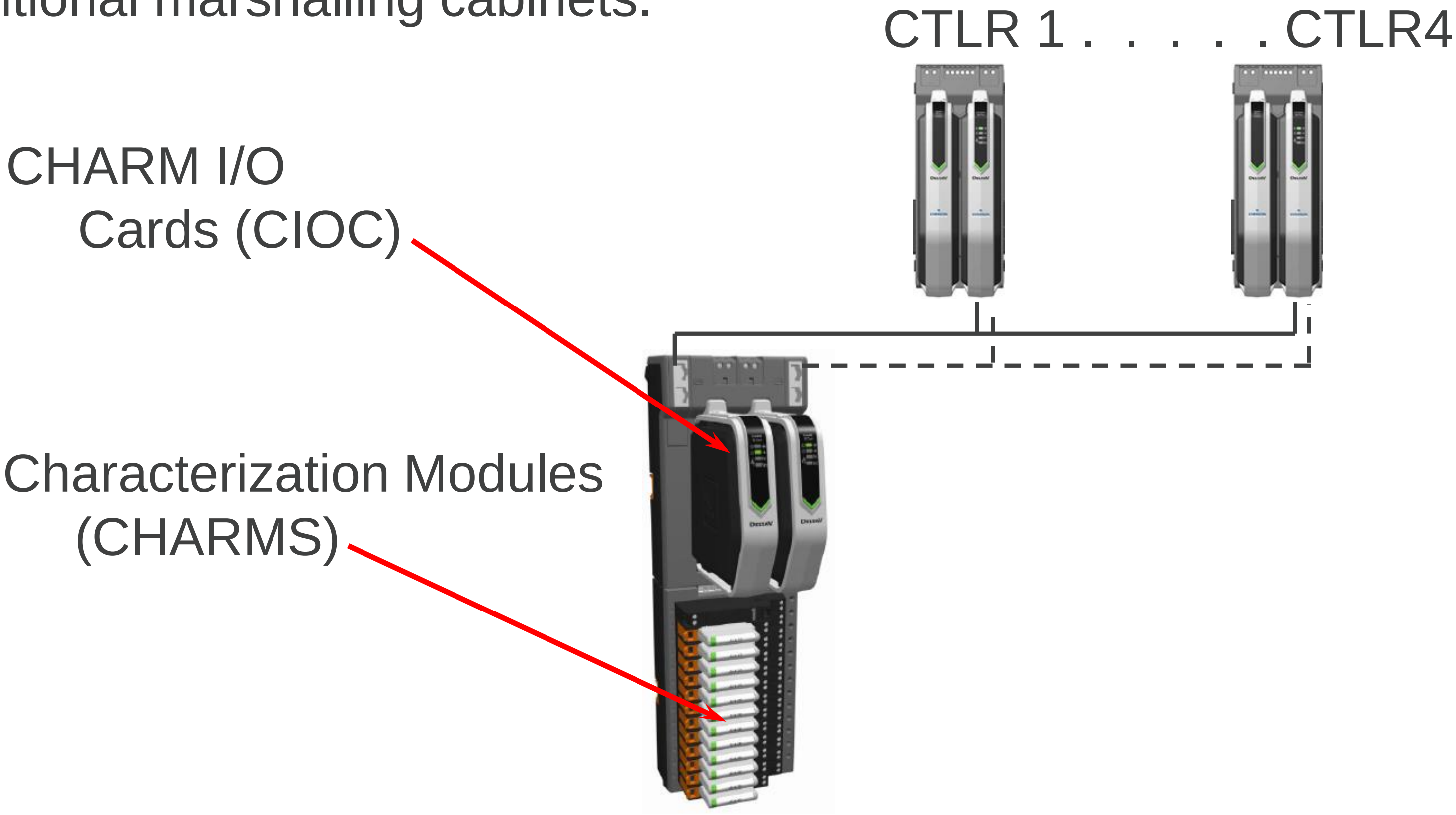
* Indicates which cards can be used for redundant I/O applications.

Electronic Marshalling & Wireless Integration



DeltaV Electronic Marshalling

S-series Electronic Marshalling provides circuit protection, isolation, and single-channel granularity with full redundancy. The CIOCs and CHARMs can be installed in field junction boxes and can eliminate traditional marshalling cabinets.



DeltaV CHARM Classes and Types

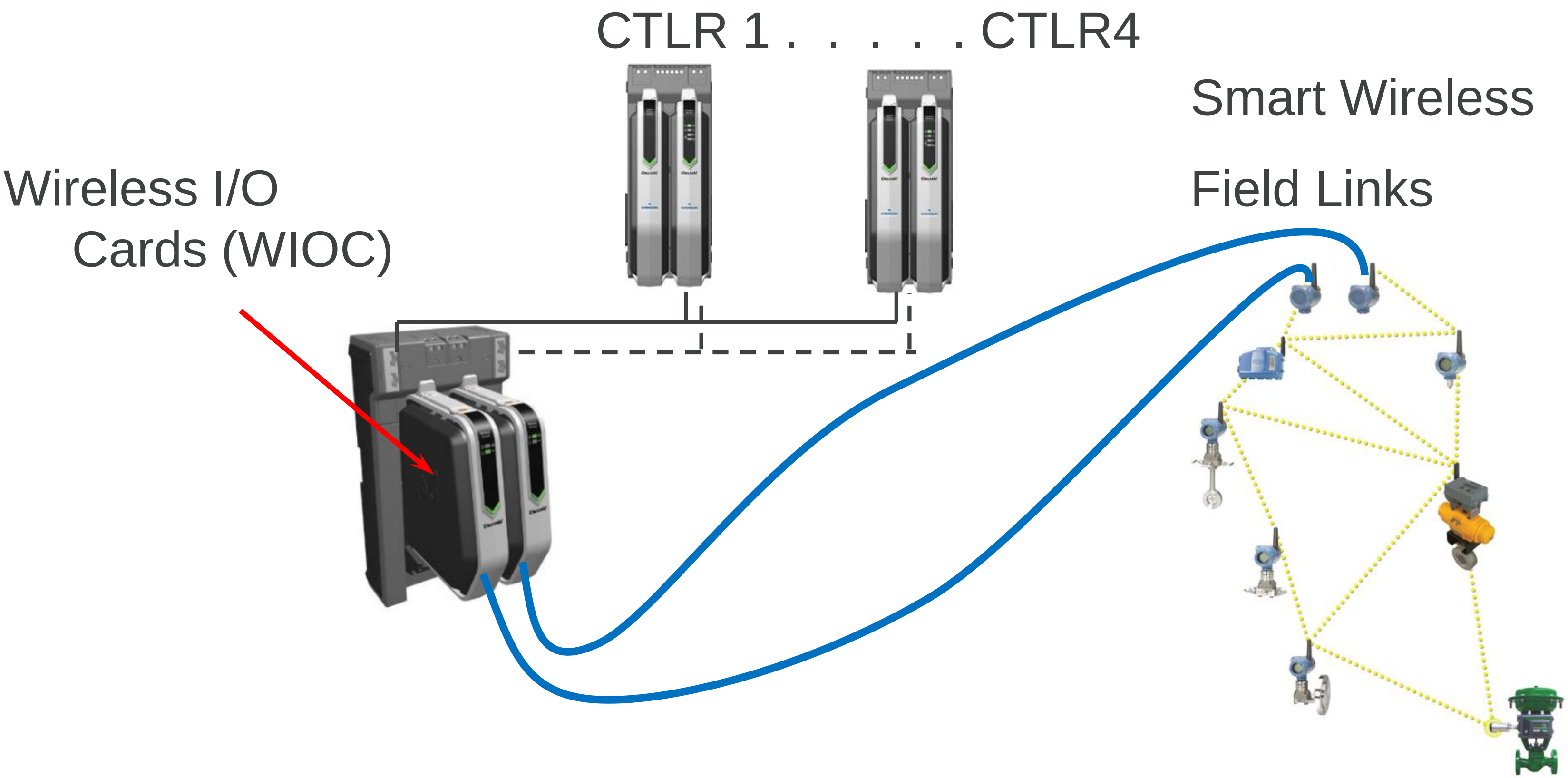
CHARM Class	CHARM Type
Analog Input (AI)	AI 4-20 mA HART
Analog Output (AO)	AO 4-20 mA HART
Discrete Input (DI)	DI 24 VDC Isolated DI 120 VAC Isolated DI 120 VAC Isolated Plus DI 230 VAC Isolated DI 24 VDC Low side sense (dry contact) DI NAMUR
Discrete Output (DO)	DO 24 VDC High side DO 24 VDC Isolated DO 100ma Energy Limited DO VAC Isolated 24 VDC Power CHARM

DeltaV CHARM Classes and Types

CHARM Class	CHARM Type
Thermocouple Input	Thermocouple/mV
RTD Input	RTD / Resistance input
Voltage	AI 0-10 VDC Isolated
Intrinsically Safe (IS)	I.S. AI 4-20 mA HART I.S. AO 4-20 mA HART I.S. DI NAMUR I.S. DO 45 mA I.S. RTD / Resistance input I.S. Thermocouple/mV

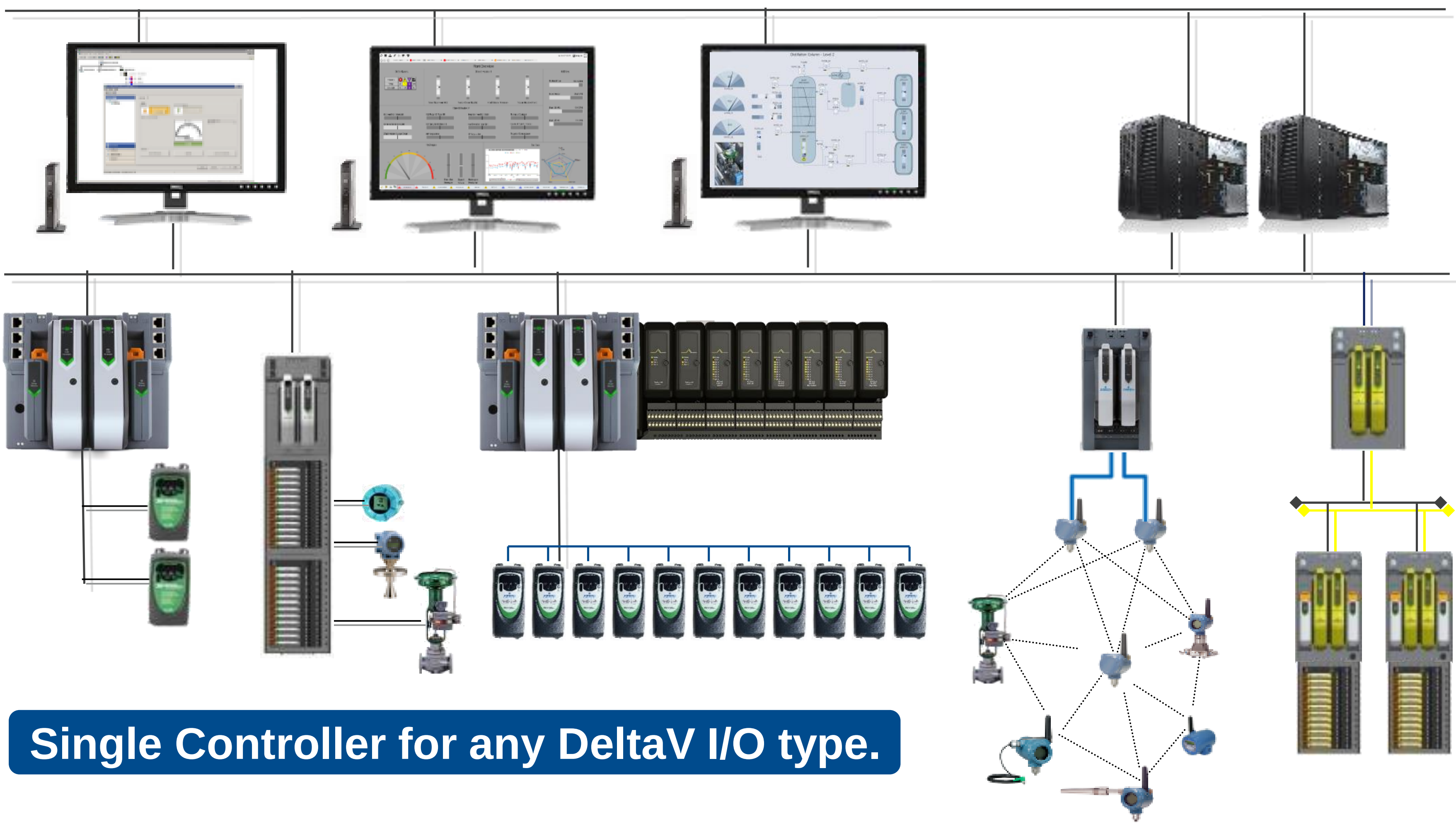
DeltaV Wireless I/O Card

The Wireless I/O Card provides redundant communications between controllers and Smart Wireless Field Links, which communicate to wireless field devices using the self-organizing network.



Note: 100 Devices per WIOC.

DeltaV PK controller (integrated)



Single Controller for any DeltaV I/O type.

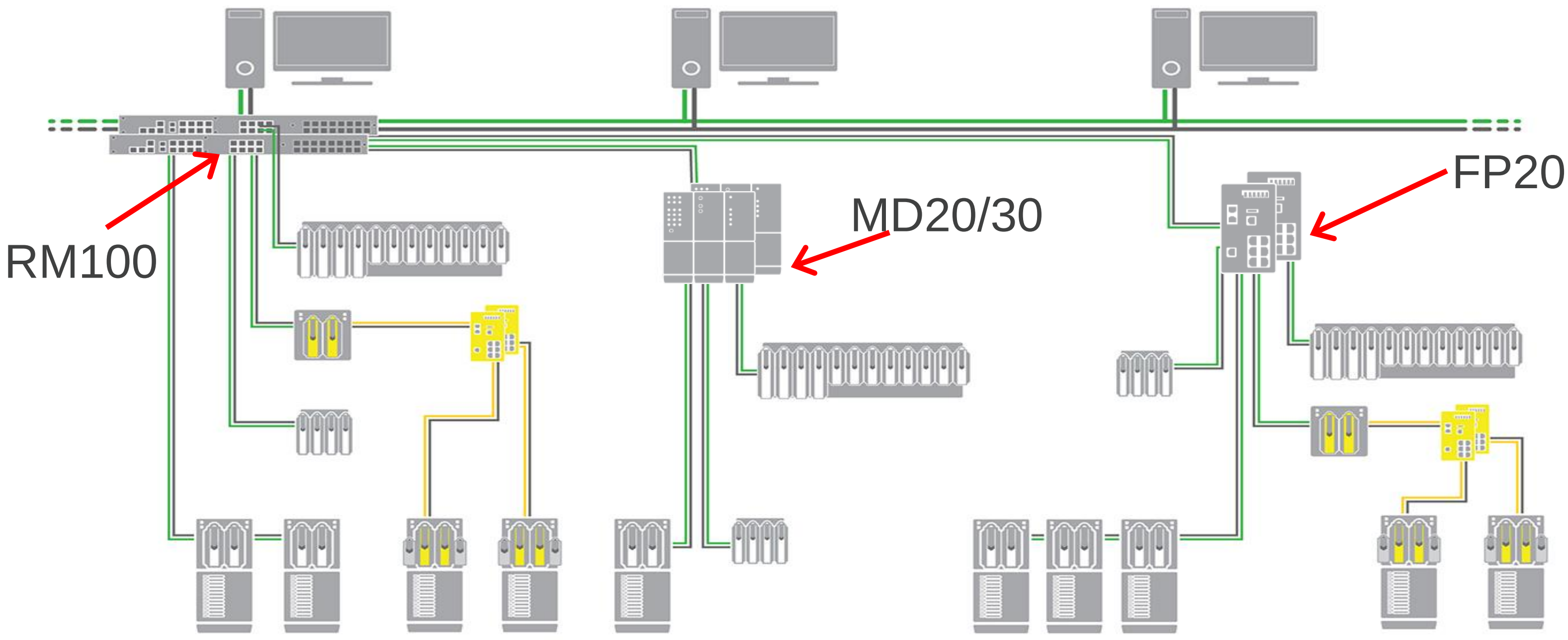
DeltaV Control Network Hardware

- *Unmanaged switches* – provide a means to connect multiple nodes in smaller DeltaV systems containing less than 15 network devices. This type of switch serves as a connection point and rejuvenates the electrical signal as messages are forwarded on the control network.
- *DeltaV Smart Switches* – the preferred switch to be used within the DeltaV network as they provide network management and automatic lockdown capability. The switches are plug-and-play and pre-configured for a DeltaV Network.

Note: To ensure that you have proper switch configuration and the correct switch software for your DeltaV system, you should purchase switches through normal Emerson channels.

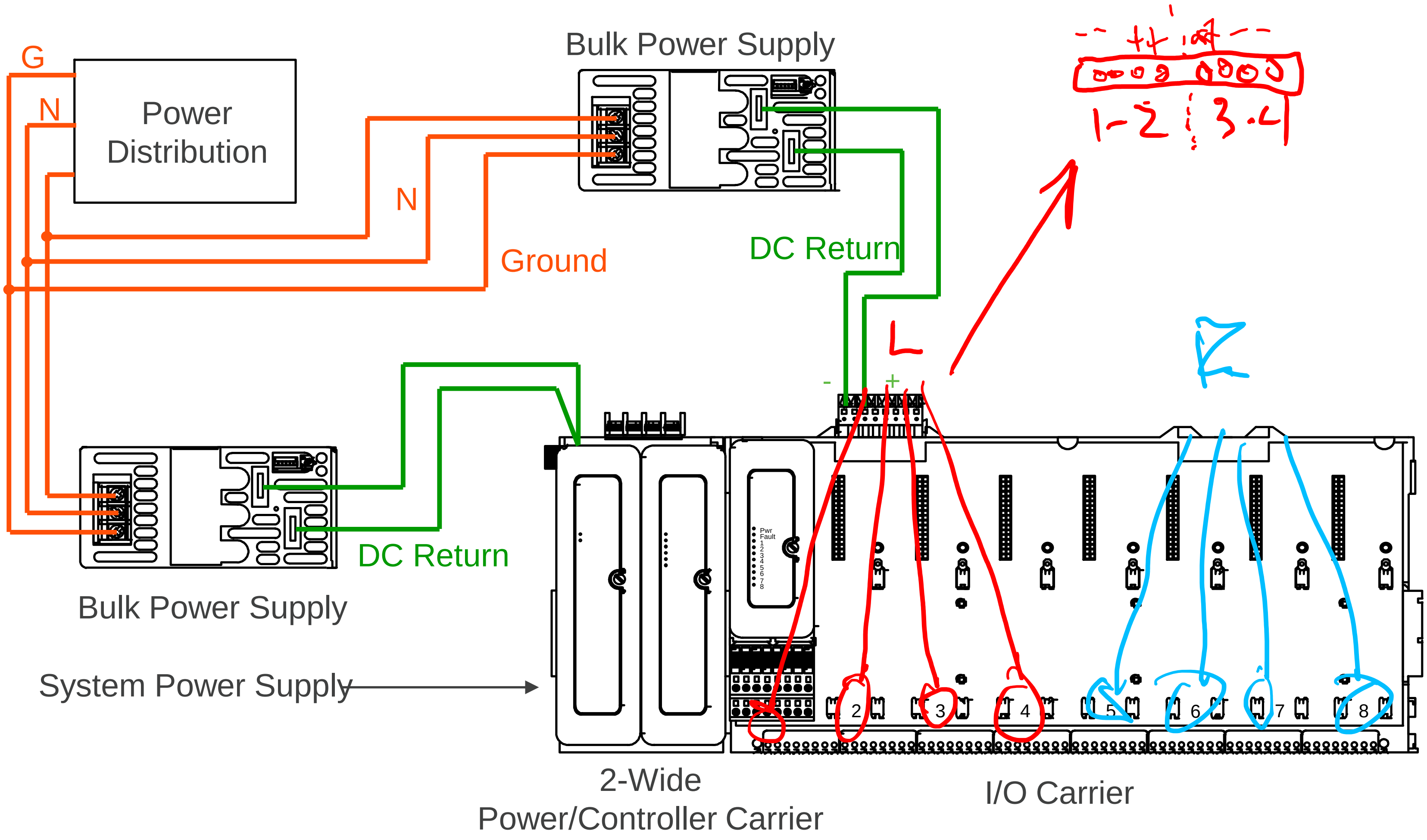
DeltaV Control Network – DeltaV Smart Switches

DeltaV Smart Switches offer a variety of environmental, mounting, and sizing options.



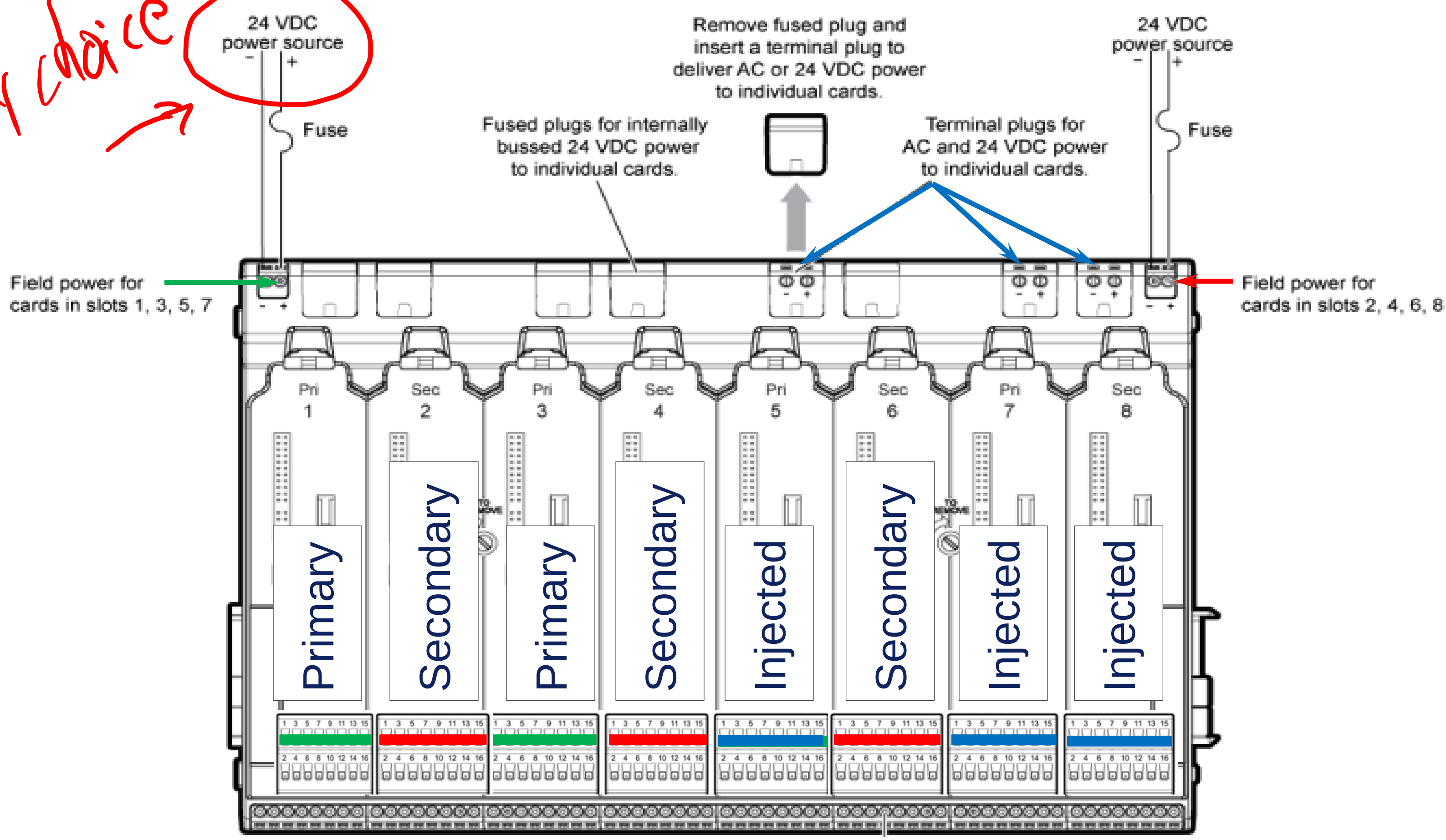
Gigabit connections are supported only between switches. Connections between controllers and workstations are 10/100MB.

M-series Power Distribution



S-series Field Power

Only choice



Internally Bussed Field Power: 12 A (3 A per card maximum)

DeltaV Power Supplies

The DeltaV System Power Supply consists of the following options:

- System Power Supply (AC/DC) – Input 100 to 264 VAC (M-series)
- System Power Supply (Dual DC/DC) – Input 24 VDC or 12 VDC (M-series)
- System Power Supply (DC/DC) – Input 24 VDC (S-series)

The DeltaV Bulk Power Supply consists of the following options:

- Bulk AC to 24 VDC Power Supply
- Bulk AC to 12 VDC Power Supply

An Intrinsically Safe Power Supply is available for the Intrinsically Safe I/O:

- Intrinsically safe (DC/DC) – Input 24 VDC

☆ Learn this

DeltaV Workstation Types

Workstations are licensed, based on the functionality required, as follows:

- *ProfessionalPLUS Station* – Configuration, Operation, and Configuration Database node (offline database)
- *Professional Station* – Configuration and Operation
- *Operator Station* – Operation
- *Maintenance Station* – Diagnostics and AMS Intelligent Device Manager
- *Base Station* – Select necessary functionality
- *Application Station* – Run-time database plus user-selected applications. User applications include DeltaV Batch software or other third-party OPC applications for interfacing to the plant business systems.

DeltaV Workstations Capacity Limits

Up to 65 max local Workstations

- 1 ProfessionalPLUS Station
- 10 max Professional Stations
- 59 max combined Operator, Maintenance, and Base Stations
- 20 max Application Stations

Remote workstations:

- 72 max Remote Workstations
  - 8 max Remote Data Servers (ProfessionalPLUS and 7 Application Stations)
- 15 max Remote Clients Sessions per Remote Desktop Session Host (Professional PLUS, Operator, or Base stations)

For additional information on “Capacity Limits for Workstations” refer to DeltaV Books Online.

DeltaV Workstation Hardware

Workstation – Dell

- DVD-ROM/CD-RW
- Network Interface cards
- Serial and USB ports
- 19-24 inch flat panel (4:3) or widescreen (16:10 or 16:9)
- Dual/Quad Monitor Optional

DeltaV Workstation Hardware

Server – Dell Single or Dual CPU

- DVD-ROM/CD-RW
- Network Interface cards
- Dell Open Manage
- RAID 10 (Redundant Array of Independent Drives)

Refer to the Product Data Sheet "DeltaV Workstation Hardware" for an updated listing and specifications of tested and supported Dell hardware.
http://www.emerson.com/catalog/en-us/deltav-workstation-hardware

DeltaV Common Software Components

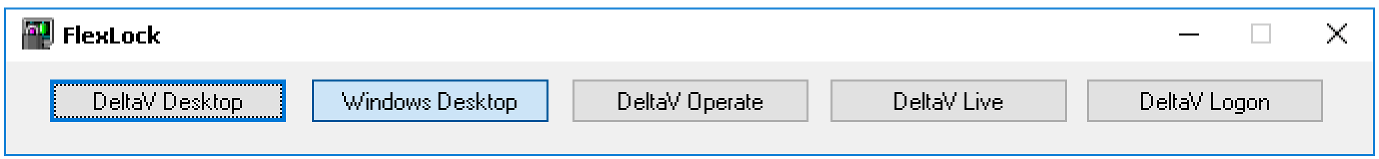
The DeltaV Workstations usually contains the following:

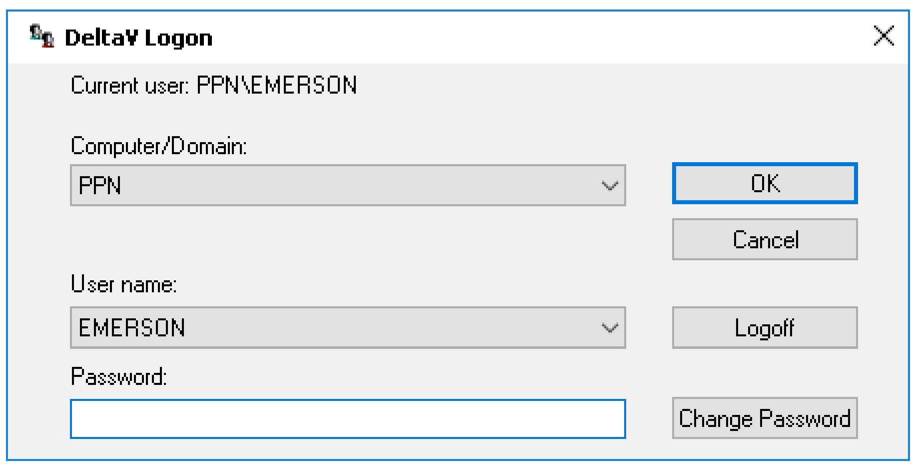
- DeltaV FlexLock
- Operator Graphics: DeltaV Live
- Configuration Software Suite
- Diagnostics

DeltaV Flexlock

The DeltaV FlexLock application creates dual desktops on a single workstation to provide both a secure operating environment and a wide open engineering environment.

Access to a desktop is determined by the current user's privileges.





DeltaV Live

DeltaV Live is used by the operator to view and control the process.

Access DeltaV Live (online) by selecting ...

Start → All apps → DeltaV Operator → DeltaV Live

← Menu Bar

← Display

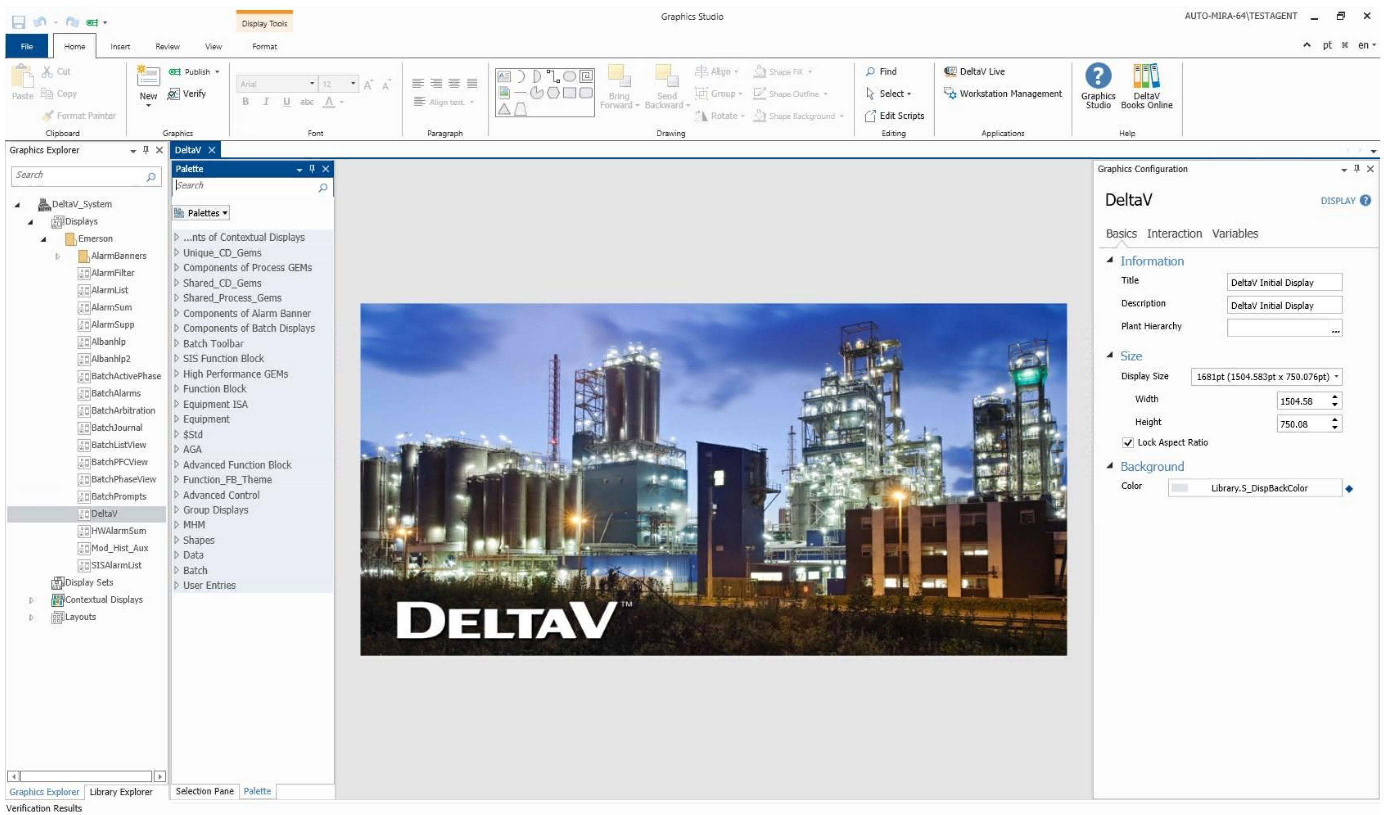
← Alarm Banner

Graphics Studio

Graphics Studio is used to create, edit, preview, test, and publish DeltaV Live displays.

Access Graphics Studio by selecting ...

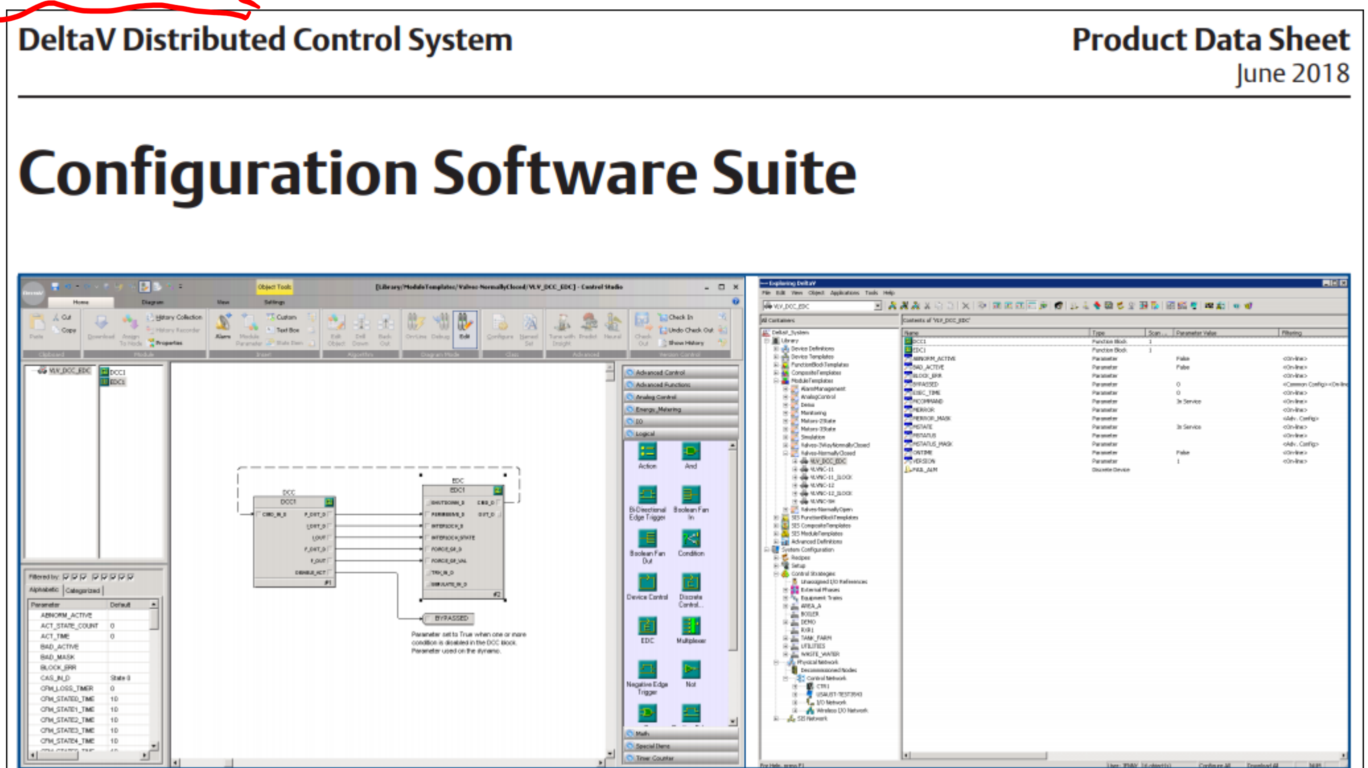
Start → All apps → DeltaV Engineering → Graphics Studio



DeltaV Configuration Software Suite

The DeltaV software applications included in our scope of training are the following:

- DeltaV Explorer
- Control Studio


DeltaV Distributed Control System

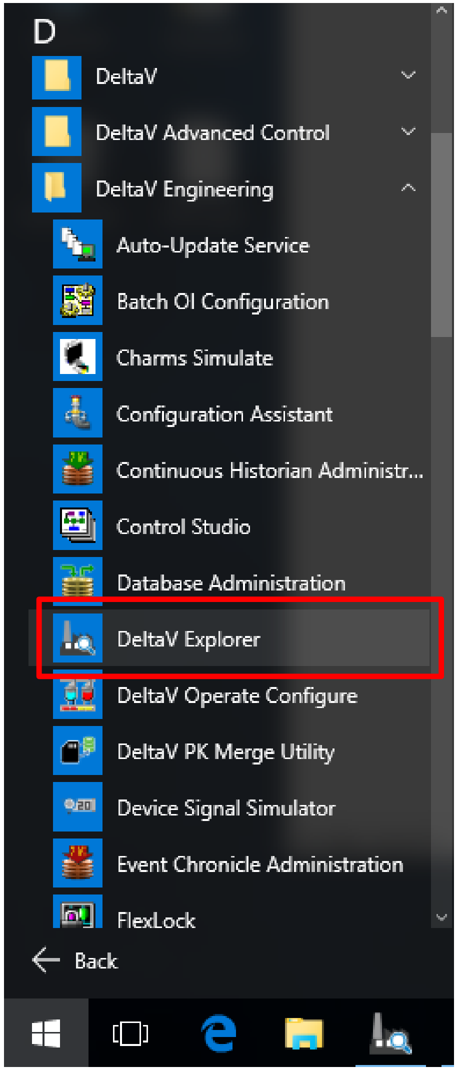
Product Data Sheet
June 2018

Configuration Software Suite

DeltaV Explorer

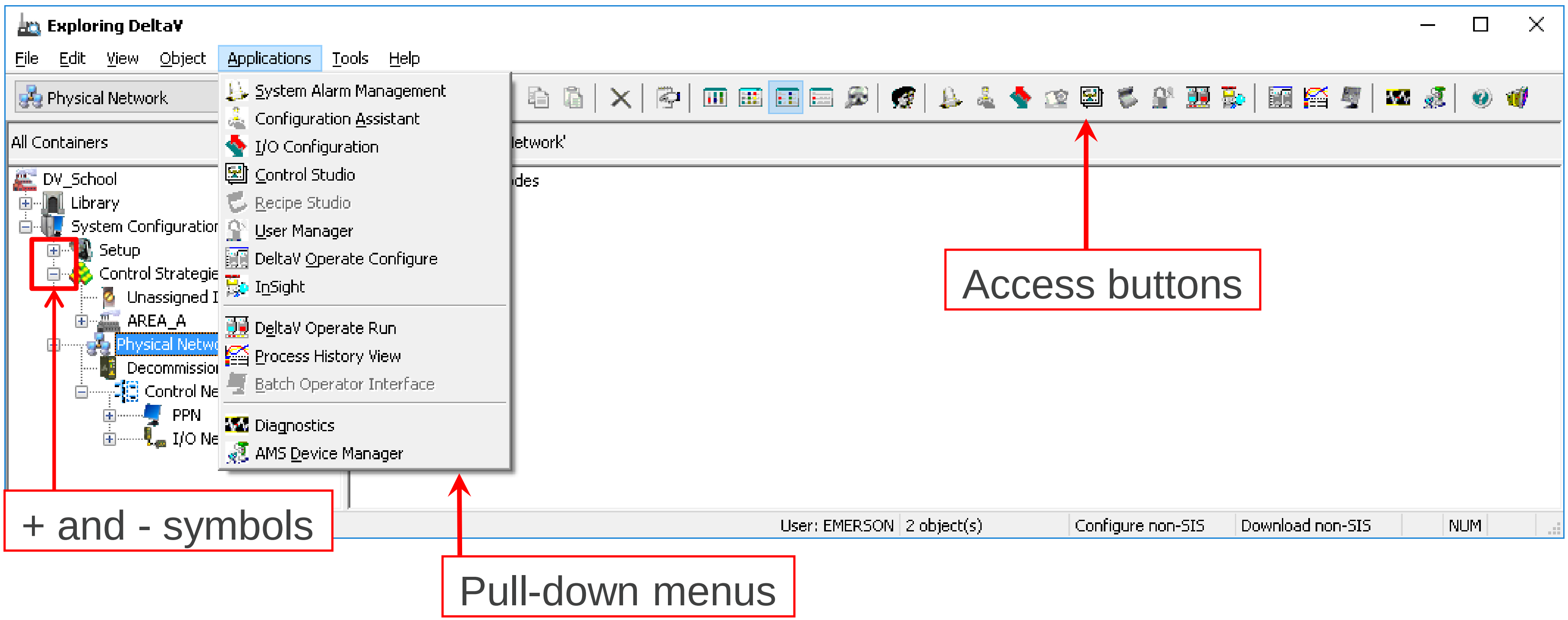
Access DeltaV Explorer by selecting . . .

Start → All apps →
DeltaV Engineering → DeltaV Explorer



DeltaV Explorer

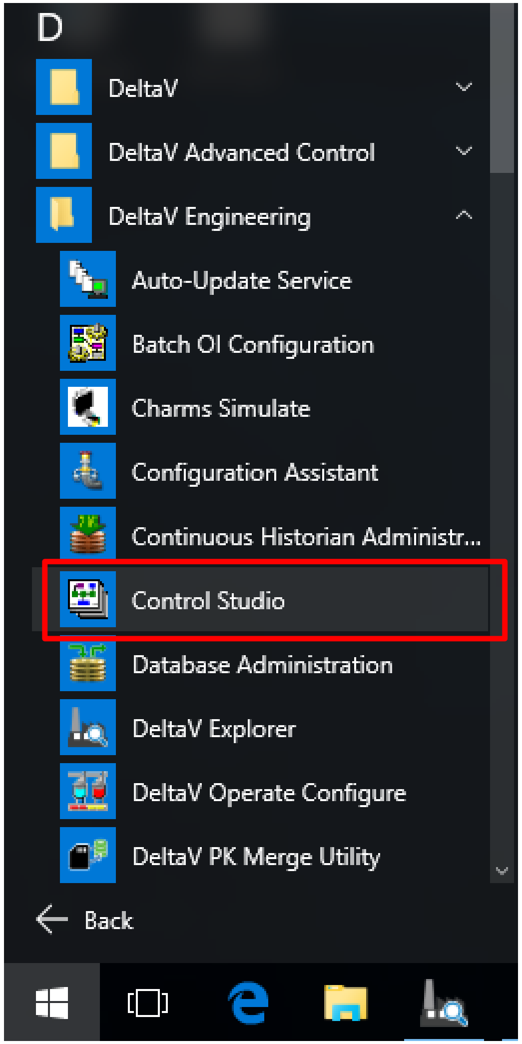
The DeltaV Explorer is used to view and edit the system’s configuration. Use the Explorer’s pull-down menus to perform various DeltaV-related functions or use the buttons at the top of the DeltaV Explorer window to access other DeltaV programs. Also, use the plus (+) and minus (–) symbols to expand and collapse the selected item.



DeltaV Control Studio

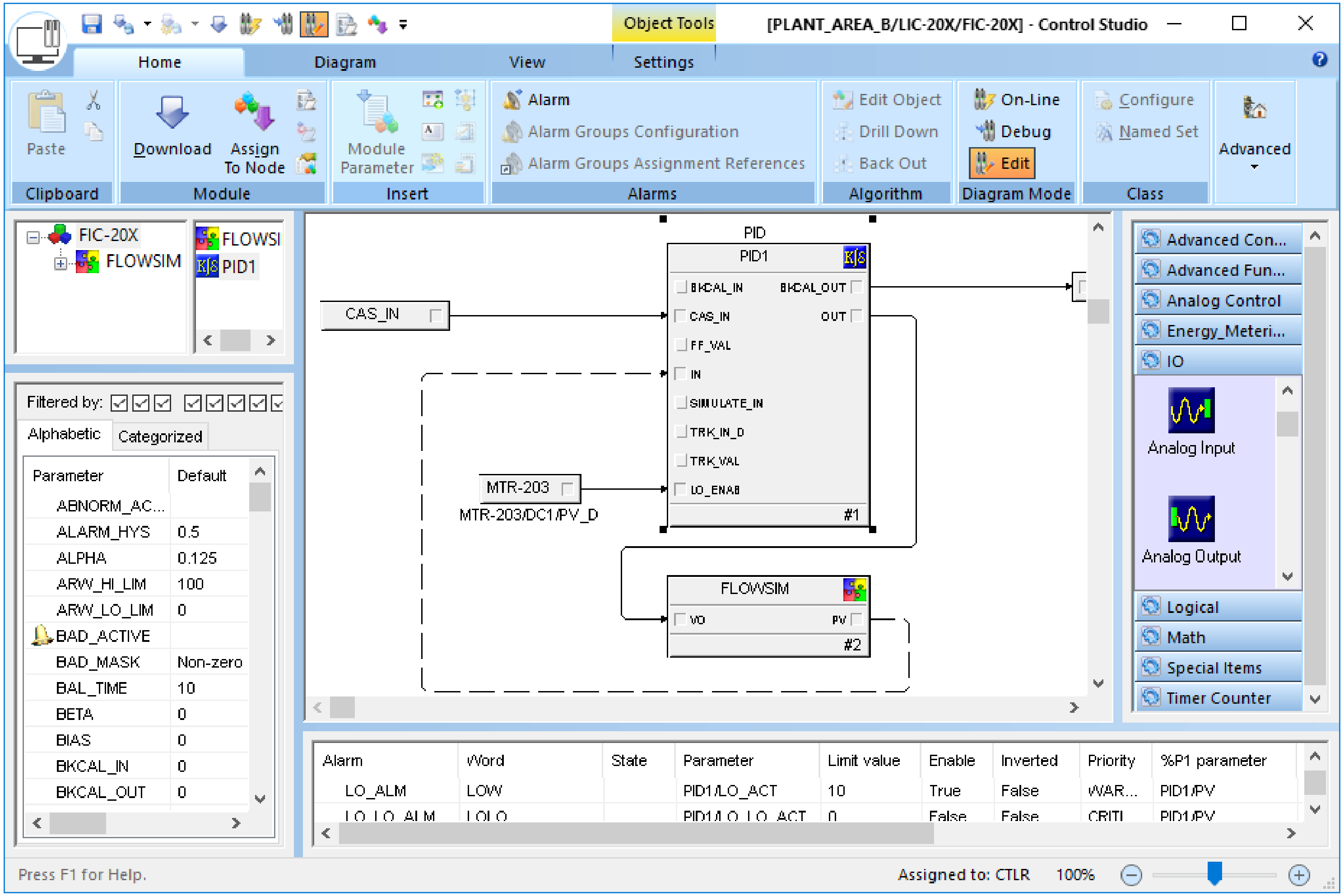
Access DeltaV Control Studio by selecting . . .

Start → All apps →
DeltaV Engineering → Control Studio



DeltaV Control Studio

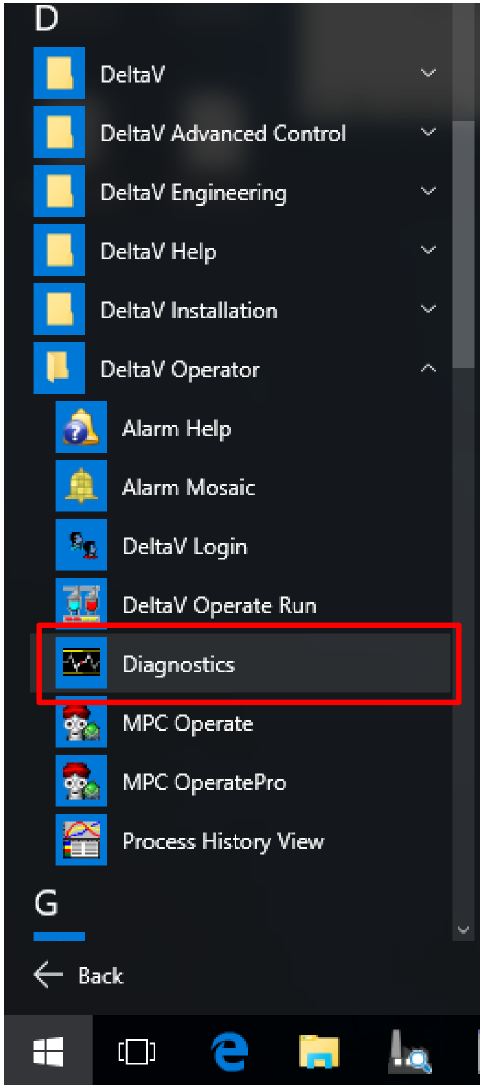
A typical DeltaV Control Studio display is shown below.



DeltaV Diagnostics

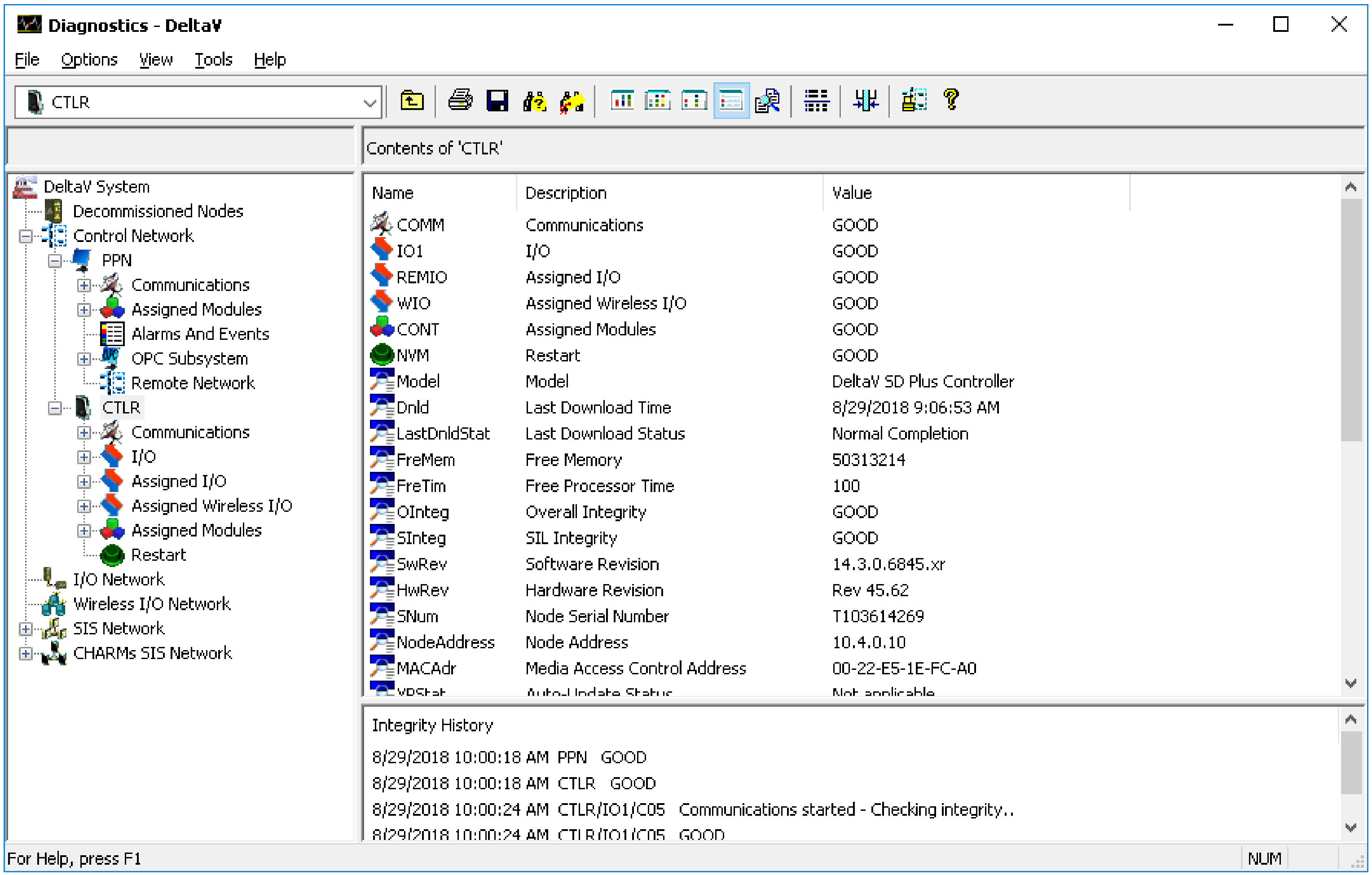
Access DeltaV Diagnostics by selecting . . .

Start → All apps →
DeltaV Operator → Diagnostics



DeltaV Diagnostics

A typical DeltaV Diagnostics display is shown below.



Workshop – Identify the DeltaV Applications

- Use the FlexLock Application
- Identify and launch DeltaV Explorer
- Identify and launch Control Studio
- Identify and launch DeltaV Live
- Identify and launch Graphics Studio
- Identify and launch DeltaV Diagnostics

Workshop – Identify the DeltaV Applications

Step 1. Power up the DeltaV Monitor and Workstation.

Step 2. Logon to Windows using the credentials below:

Username: **emerson**
Password: **DeltaVE1**

Step 3. Click *OK* or press the *ENTER* key to continue.

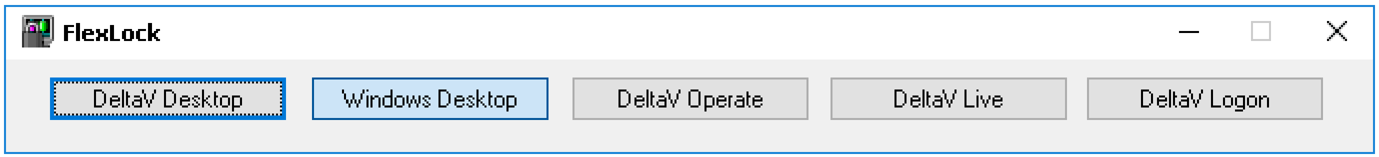
Two windows appear: Flexlock and DeltaV Logon.

Note: Bring the DeltaV Logon window to the front, if it's not already there. Do not select Windows Desktop *until completing the* DeltaV log-on*.*

Step 4. Enter the same *User name* and *Password* specified above in the DeltaV Logon window, then click *OK* or press the *ENTER* key.

Workshop – Identify the DeltaV Applications

Step 5. Left click on the upper left corner of the FlexLock application. Can you identify the different Flexlock options?



Step 6. Click *Windows Desktop* in the FlexLock window.

Step 7. Launch the following DeltaV applications:

- DeltaV Explorer
- Control Studio
- DeltaV Live
- Graphics Studio
- DeltaV Diagnostics

How many nodes are shown in DeltaV Explorer and in DeltaV Diagnostics?

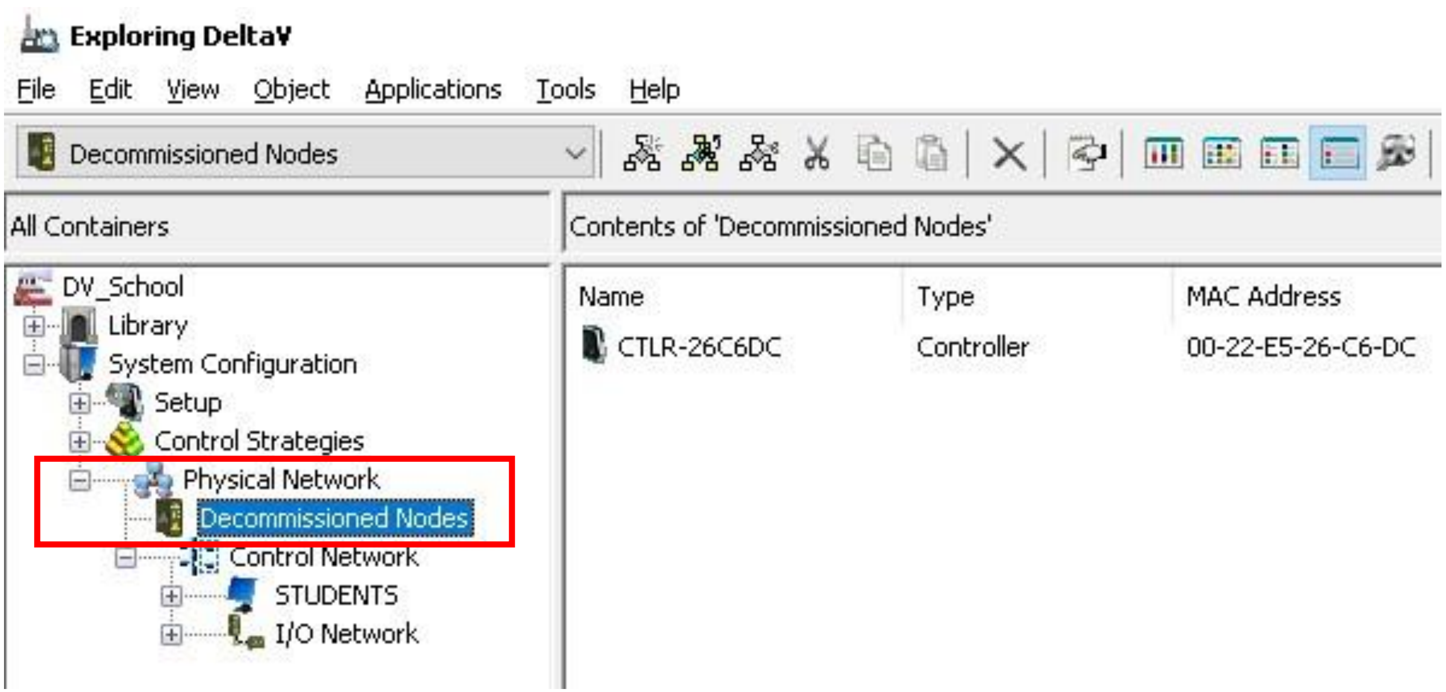
What is the default picture of DeltaV Live (online)?

Workshop Complete

Decommissioned Controllers

Decommissioned controllers are listed in the Contents window of DeltaV Explorer by selecting . . .

Physical Network → Decommissioned Nodes



Decommissioned Controllers

Decommissioned State – Controller(s) are non-active members of a Control Network. For example, when:

- A new controller is added to the Control Network
- A replacement is installed for an existing controller (any new controller starts in the decommissioned state)
- A controller is deliberately decommissioned for an extended scheduled shutdown

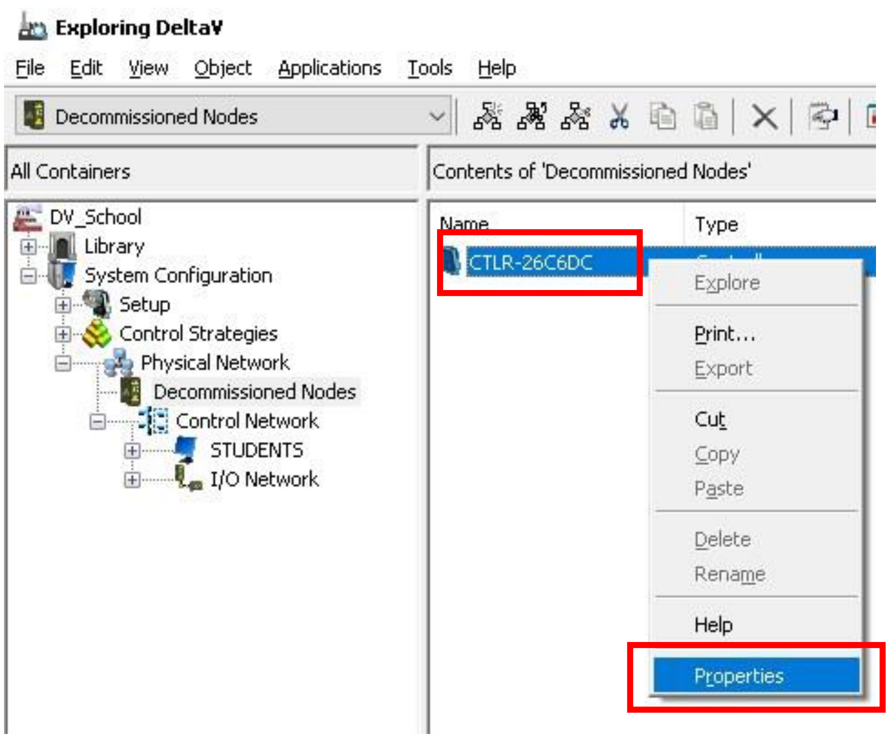
Decommissioned State Visual Indicators –

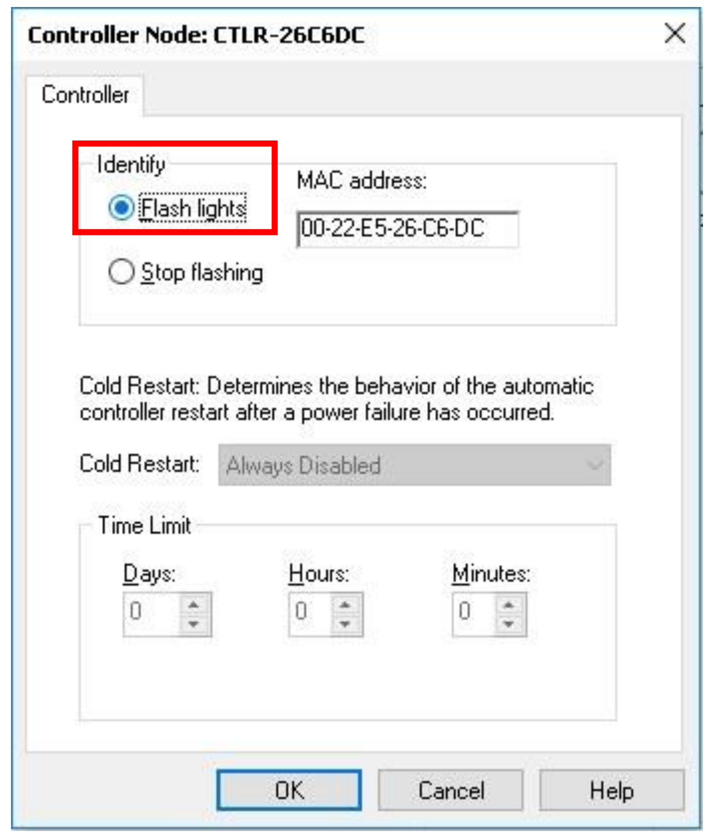
Power LED (Green)	ON
Error LED (Red)	FLASH at one-second interval
Active/Standby LED (Green)	OFF
Pri/Sec LEDs (Yellow)	FLASH at random

Identify a Controller

Identify the controller from DeltaV Explorer by selecting . . .

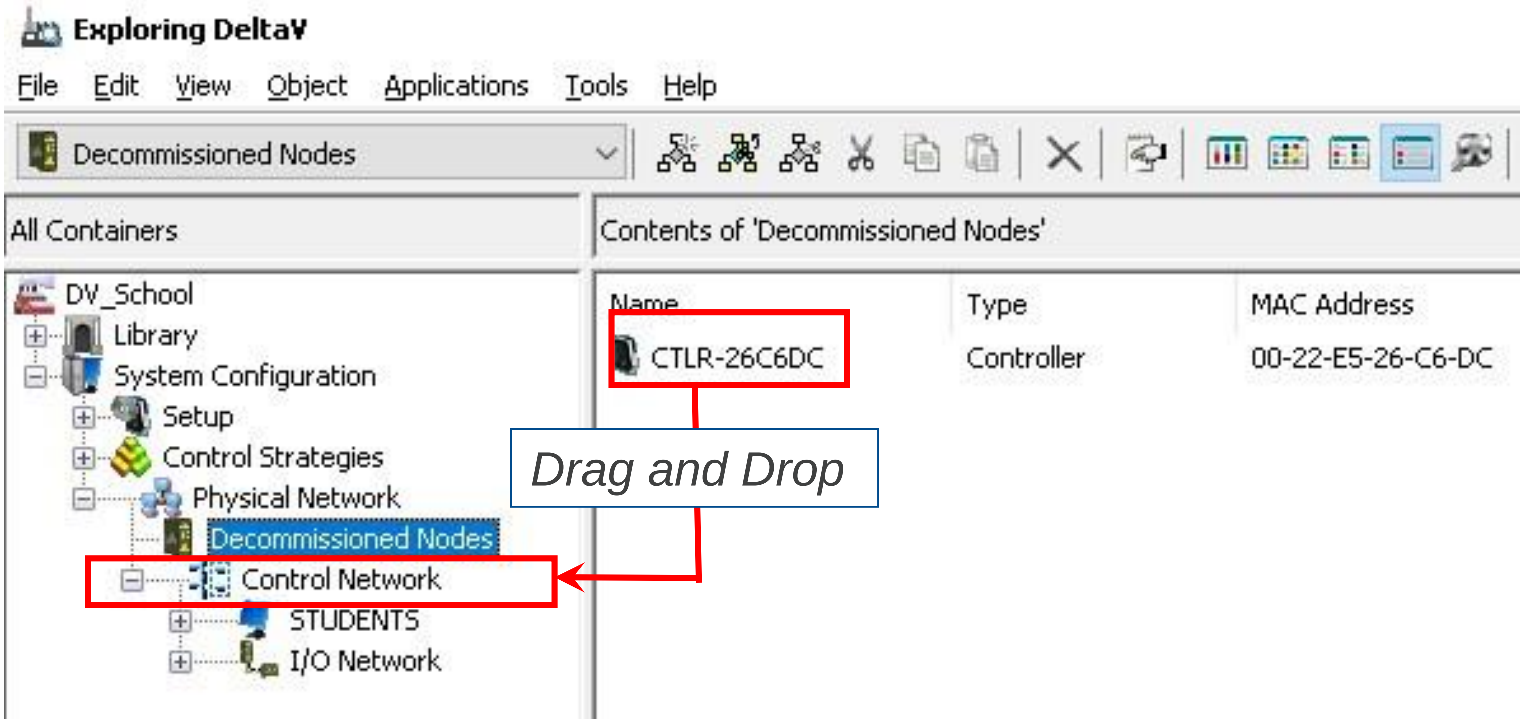
(right-click) Decommissioned Controller →
(left -click) Properties → Flash lights





Commissioning a Controller

Commission – The act of making a controller an active member of a DeltaV Control Network.

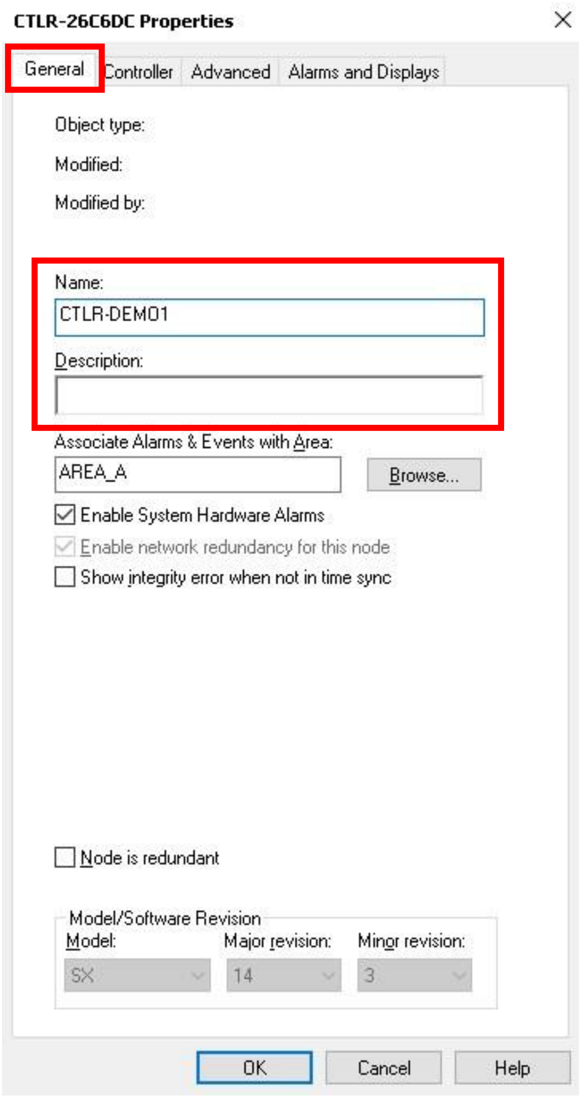


Commissioning a Controller

The fields in the controller Properties box are:

Name – A user-defined name with a maximum of 16 characters containing at least one alpha character. It may also contain $, -, or _.

Description – An optional user description of no more than 255 characters appearing in the DeltaV Explorer. It is for information only and not used by the controller.



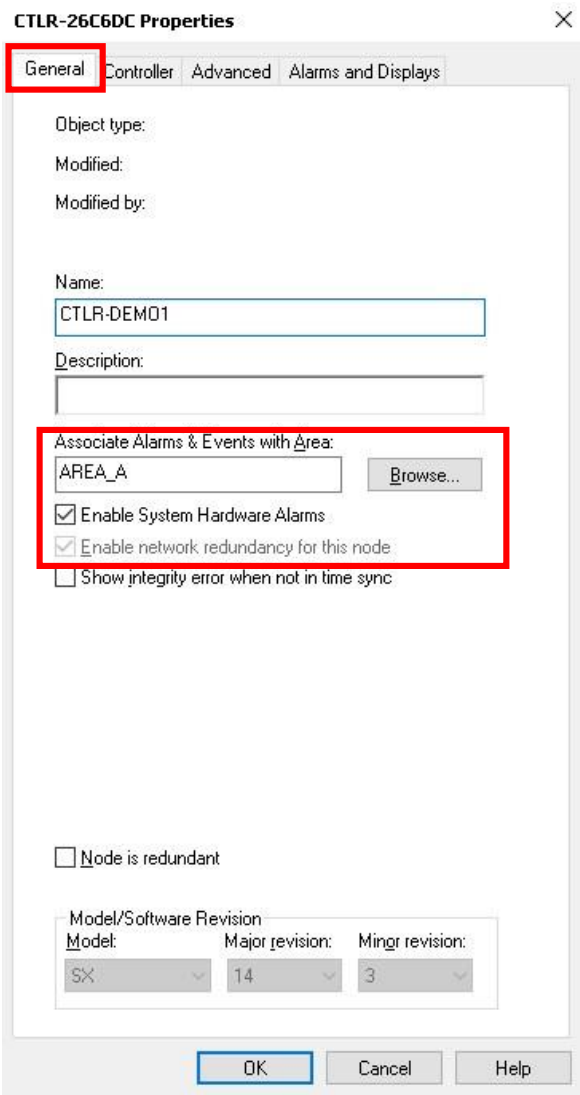
Commissioning a Controller

The fields in the controller Properties box are:

Associate Alarms and Events with Area – Define the plant area that will be associated with the controller node and subordinate field device alarms.

Enable System Hardware Alarms – Checking the box ☑ enables the controller hardware errors to appear as alarms.

Enable network redundancy for this node – Checking the box ☑ enables the secondary control network for the node.

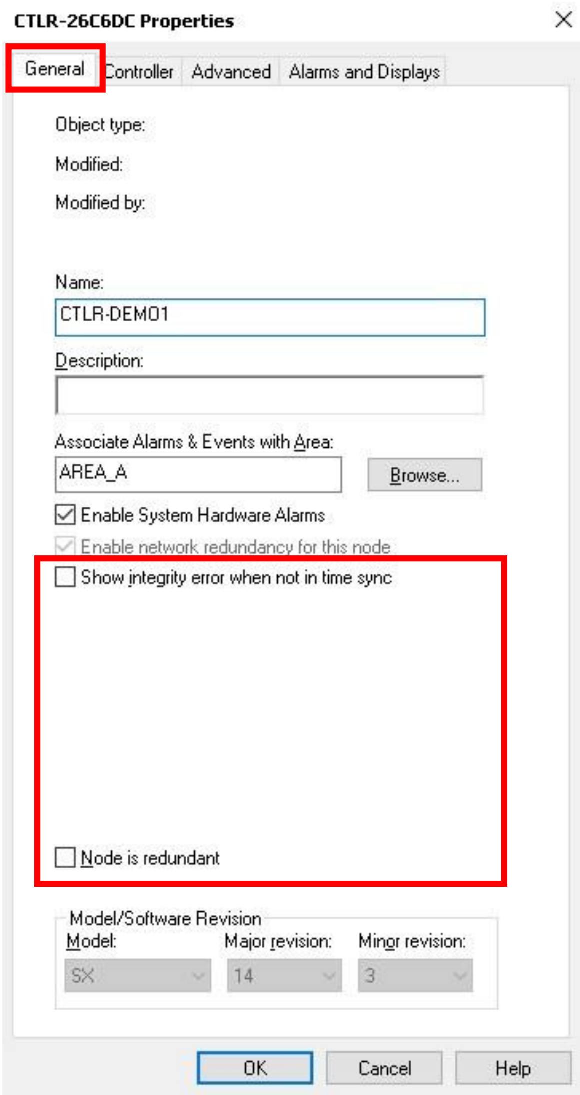


Commissioning a Controller

The fields in the controller Properties box are:

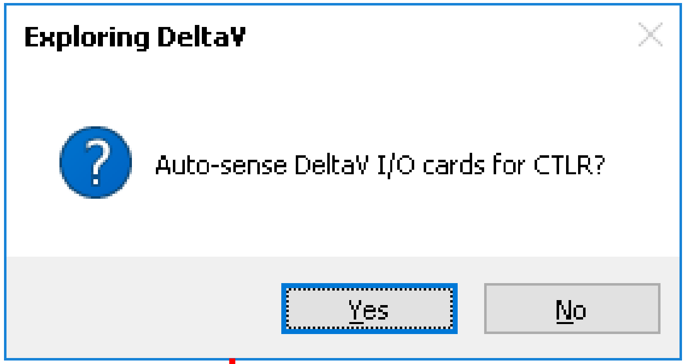
Show integrity error when not in time sync - Checking the box ☑ enables an integrity error on this controller when the time is not synchronized with the master time server.

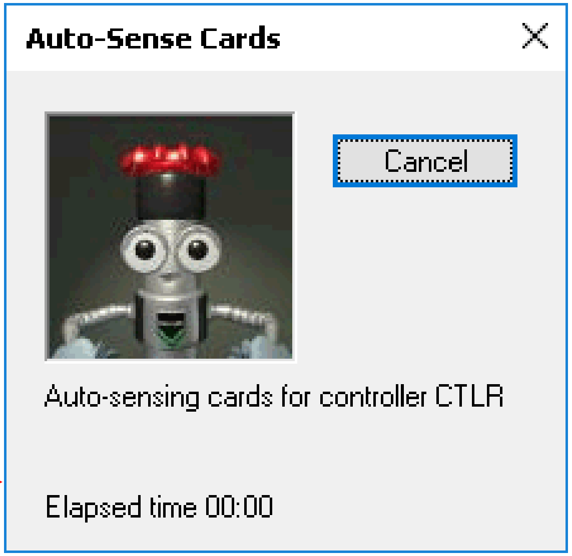
Node is redundant – A simplex controller will be grayed out. A checked box ☑ indicates that the controller is redundant.



Auto-Sensing I/O Cards

The last step in commissioning the controller permits you to Auto-sense the I/O cards for the controller.

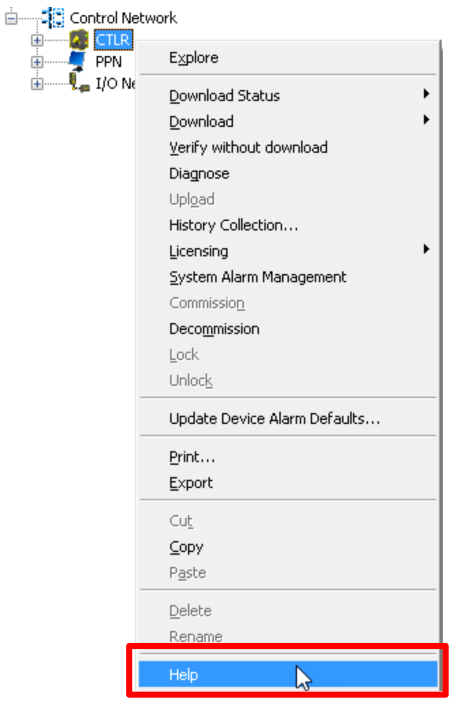


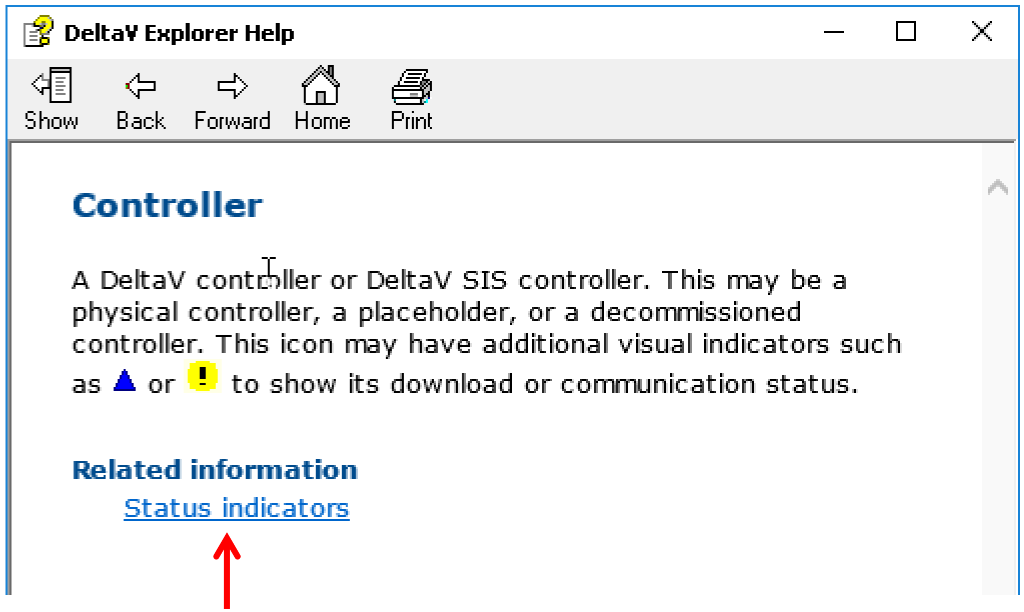


Clicking YES causes the controller to scan its I/O sub-system and identify the card types and carrier slots where the I/O cards are installed.

Status Indicators

DeltaV Explorer provides visual indicators on the status of nodes and modules.





Select and right-click the object with the visual indicator, then select *Help* from the menu, then click the status indicators link.

Status Indicators

DeltaV Explorer Help

Show Back Forward Home Print

Status indicators

Objects may have a visual status indicator on or over the normal object icon:

Node status indicators

Incomplete information

For nodes, this indicates that the downloading node (the workstation) does not have all the information on the node with this indicator. To clear this indicator, right-click the node with the indicator, and then click **Download Setup Data**. This transfers setup data from the database to the physical node. It also updates the downloading workstation node so that the workstation has all the information it needs to manage the new node. This indicator can appear on controllers and workstations that are physically connected to the network or on controller or workstation placeholders. Note that you cannot download the system data for a placeholder because the physical node must be connected first.

For devices, this indicates that the device is not commissioned. To commission the device, select it from the **Decommissioned Fieldbus Devices** list and drag it to either a port or device placeholder.

Integrity

Indicates that the node is communicating but has an integrity problem.

Controllers can have this indicator for several reasons. For example:

- There is a mismatch between the I/O configuration and the physical I/O. Compare the controller's I/O configuration in the Explorer with the actual I/O cards connected to the controller.
- The controller is configured for network redundancy but does not have the necessary connections to support it. Check to see if the node is configured to support network redundancy. If it is, make sure the controller has a network connection.
- Some modules may not be executing at their configured scan rate (slippage is occurring). This is indicated in Diagnostics by an MpctOnTime value of less than 100.

Workstations can have this indicator for several reasons. For example:

- The workstation is configured for network redundancy but does not have the necessary connections to support it. Check to see if the workstation is configured to support network redundancy. If it is, make sure the workstation has a network connection.
- The workstation cannot communicate with at least one controller that it needs to communicate with.
- The Event Chronicle database has detected an error (such as an invalid directory).

Locked

Indicates that the node is locked (the node's LOCKED parameter = TRUE). A locked node cannot be downloaded (full or partial); cannot be decommissioned; cannot be upgraded; cannot have its maintenance port's privileged menus accessed.

SIL Integrity

Indicates a problem with the overall integrity of one or more of the logic solvers or SISNet repeaters connected to this controller (the SInteg parameter is not GOOD). This indicator has a higher priority than the Integrity indicator, but not as high as the Not communicating indicator.

No configuration

Indicates that the node does not have a configuration. This can occur if the node has never been downloaded. For controllers, this can occur if there is a power failure and cold restart was not enabled for the node.

Not communicating

Indicates that the node is not communicating. This indicator occurs when there is a bad connection, if the controller is not powered up, or if the controller is decommissioned. To clear this indicator, go to the node and make sure it is connected, that the wiring is correct and sound, and that the node is powered up.

The Explorer enables you to launch the Diagnostics application and view diagnostics data for any selected Explorer object. This can provide useful diagnostic information for nodes that have the ? indicator. To investigate integrity problems for a node, right-click its icon, and then select **Diagnose**.

Status Indicators

DeltaV Explorer Help

Show Back Forward Home Print

Download status indicators

Note

The system does not continuously update the download status indicators. Update the download status manually to determine if a download is required.

Needs downloading

Indicates that some of the parameters in the database for this object do not match the parameters in the node itself. The **Needs Downloading** column in the right-pane detailed view displays a value of **Yes**. To open the **Pending Download Changes** dialog, containing a list of all modified download scripts contributing to the pending download of a selected item, right-click the node, and then select **Download Status → Show Details**.

Unknown

indicates that some of the parameters in the database for this object *might not* match the parameters in the node itself. The **Needs Downloading** column in the right-pane detailed view displays a value of **Unknown**. To determine if a download is required, right-click the node, and then select one of the following menu options:

- **Download Status → Update**

  If a blue triangle ( ) status indicator appears for this node, a download is required.
- **Download Status → Show Details**

  After updating the download status for the node, the **Pending Download Changes** dialog opens. If a blue triangle ( ) status indicator appears for this node, a download is required.

Module indicators

Library module

Represents a library module. You can drag library modules into an area, modify them, and use them in your configuration strategy.

Area module

Represents a module in an area. A module in an area is the database copy of the module. Area modules can be edited and assigned by reference to a specific controller.

Module assigned to a controller

Represents a module assigned to a controller. The control associated with this module will be placed in the controller when the controller is downloaded.

Module assigned to a controller and downloaded

Represents a module that has been assigned to a controller and downloaded.

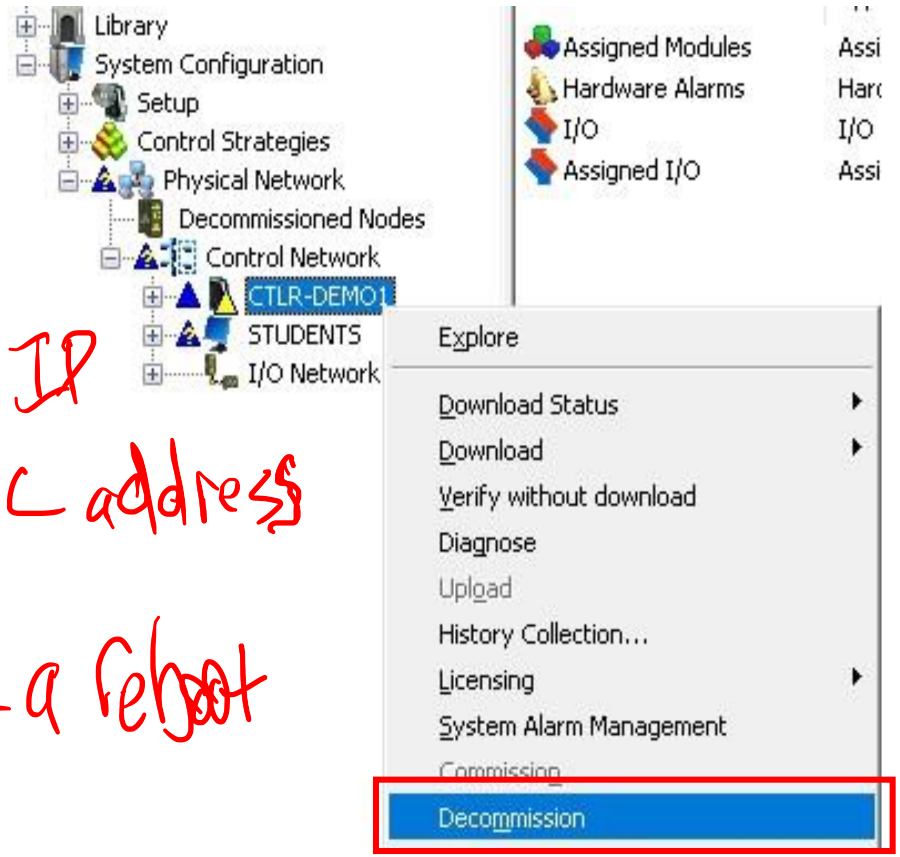
Module downloaded in a controller (assignment deleted)

Represents a downloaded module for which the assignment has been removed.

Controller Placeholder

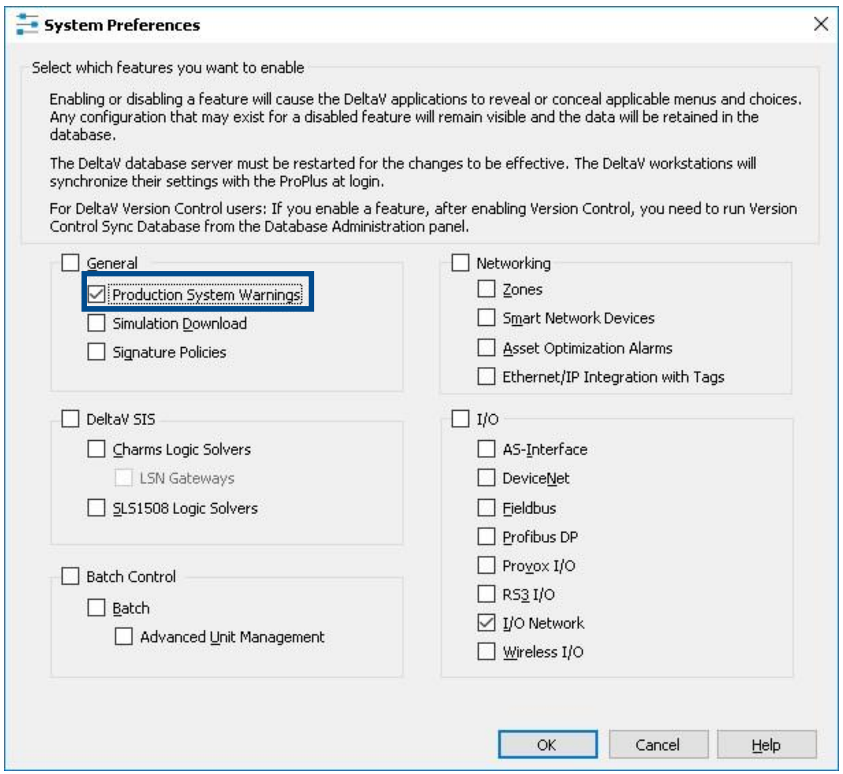
In DeltaV Explorer, right-click on a commissioned controller and select ***Decommission.***

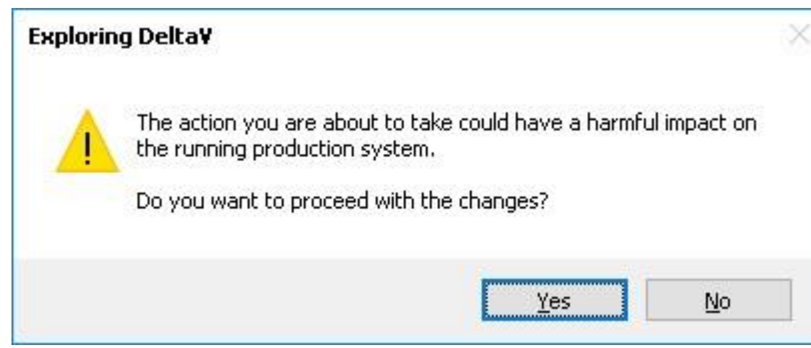
unbinds the IP
from the MAC address
Kind of like a reboot



Controller Placeholder

A Warning message may pop-up during decommissioning if *Production System Warnings* is enabled in System Preferences.

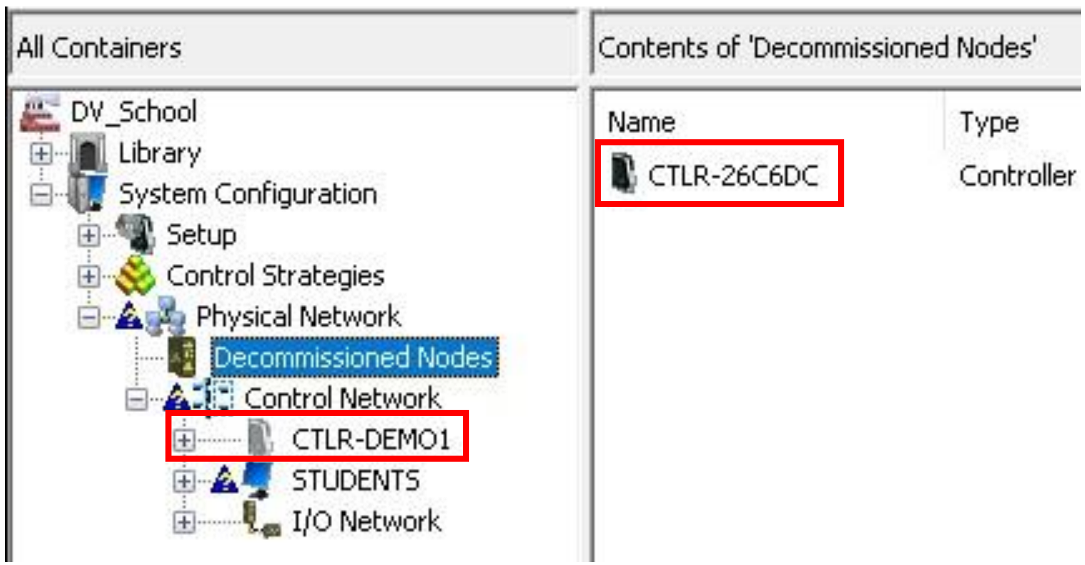




Controller Placeholder

After being decommissioned, a controller **placeholder** remains in the Control Network.

The decommissioned controller will be displayed again under decommissioned nodes with the default naming convention.



Workshop – Commission the Controller

- Use the Identify Controller Property
- Commission and decommission the Controller
- Access the Status indicator information

Workshop – Commission the Controller

Commission the decommissioned controller CTLR-XXXXXX from

DeltaV Explorer by performing the following tasks:

Step 1. Identify the M- or S-series controller using the Identify State.

Step 2. Commission the M- or S-series controller, name it, give it a description, verify network redundancy if enabled, and Auto-sense I/O***.***

Step 3. Access the *Status indicators* by right-clicking *Help* on the controller.

Step 4. Identify the controller using the Identify State after being commissioned.

How many nodes are shown in DeltaV Explorer and in DeltaV Diagnostics?

Workshop – Commission the Controller

Step 5. Decommission the controller.
Can you find where the decommissioned controller goes to?

Step 6. Commission the controller again.

Workshop Complete

Summary

- Define Plantweb/DeltaV System Architecture
- Define DeltaV Software Components
- Define DeltaV System Capacities
- Identify and launch DeltaV applications
- Identify, decommission, and commission a controller

The Simulated Process

Module 2

EMERSON

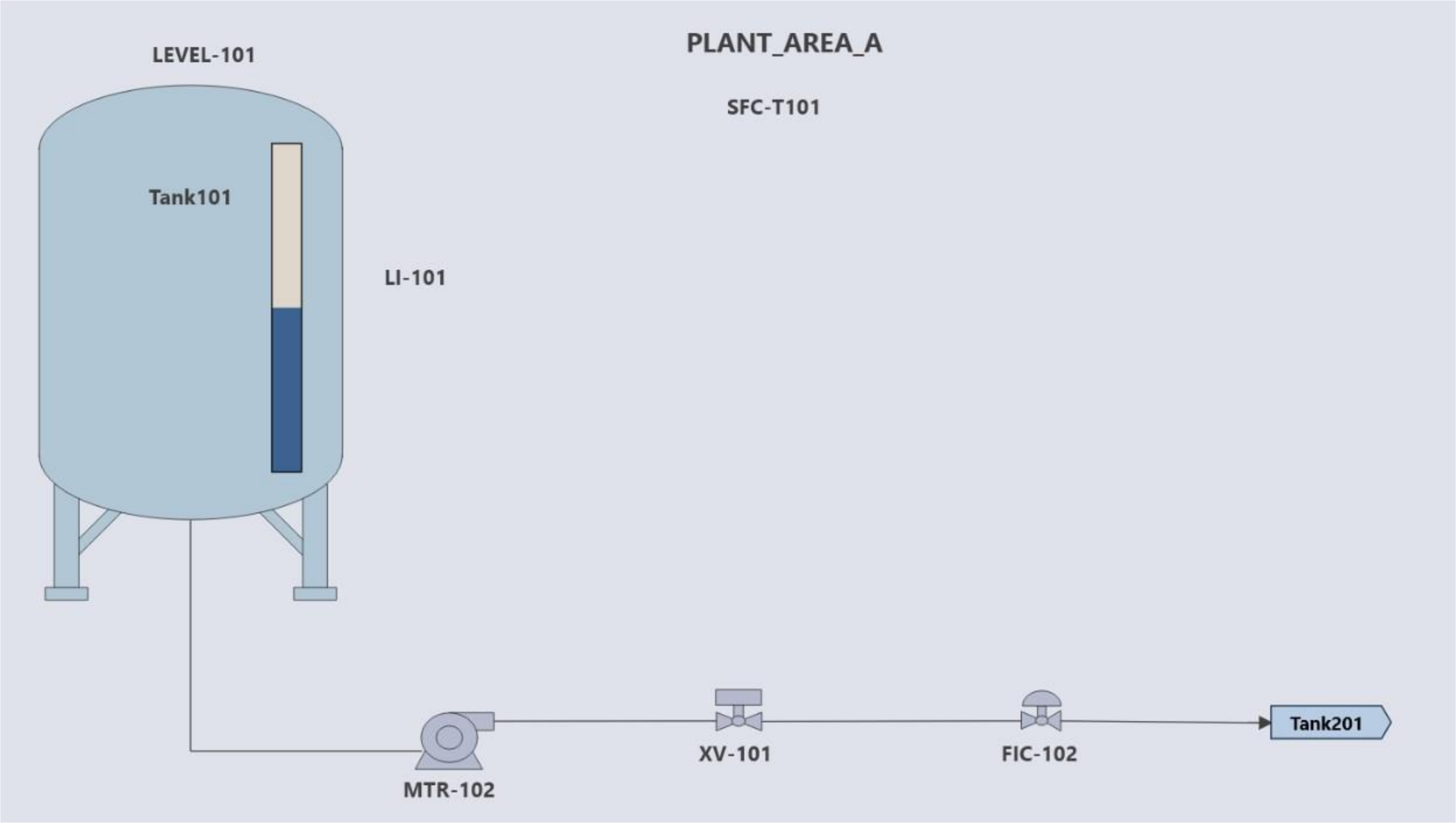
Module Objectives

- Define the process to be controlled
- Define the characteristics of the various plant areas
- Define the characteristics of the Device Signal Tags (DSTs)
- Perform a total download
- View diagnostics

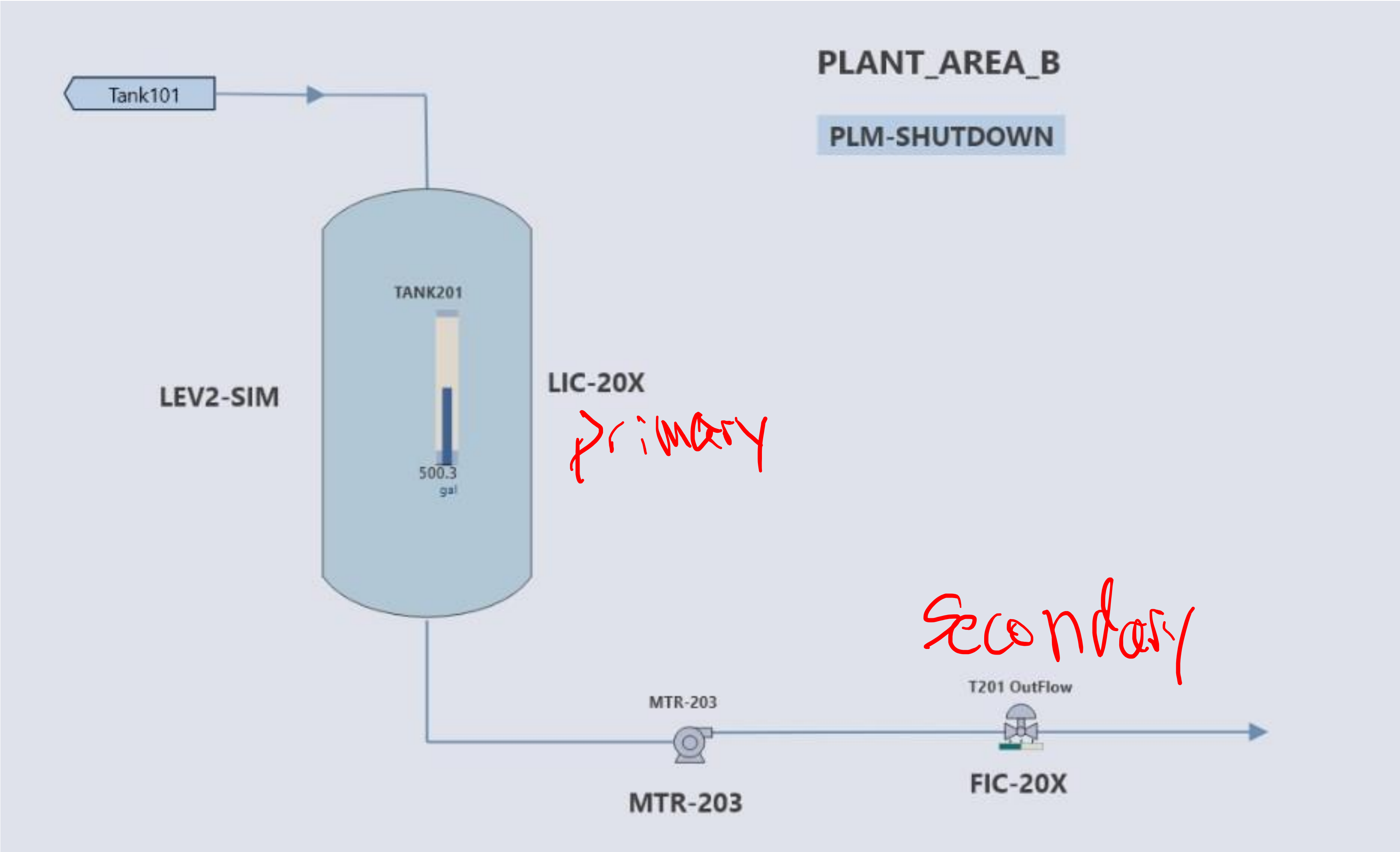
Module Workshops

- Defining Plant Areas
- Configuring Traditional DSTs
- Configuring CHARM DSTs
- Download Control Network

The Simulated Process – PLANT_AREA_A



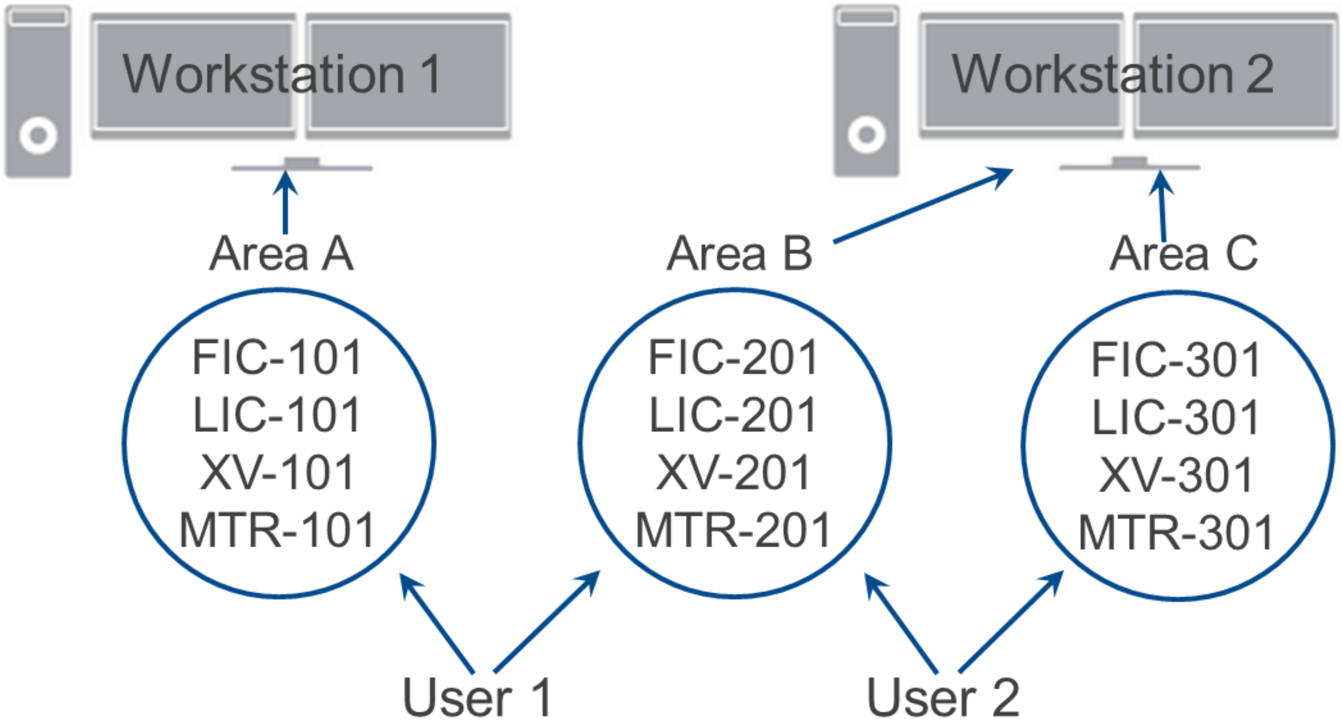
The Simulated Process



Plant Areas

Characteristics of a Plant Area:

- Contain control modules
- Define user privilege boundaries
- Define workstation alarms boundaries



Workshop – Defining Plant Areas

Locate Control Strategies in DeltaV Explorer

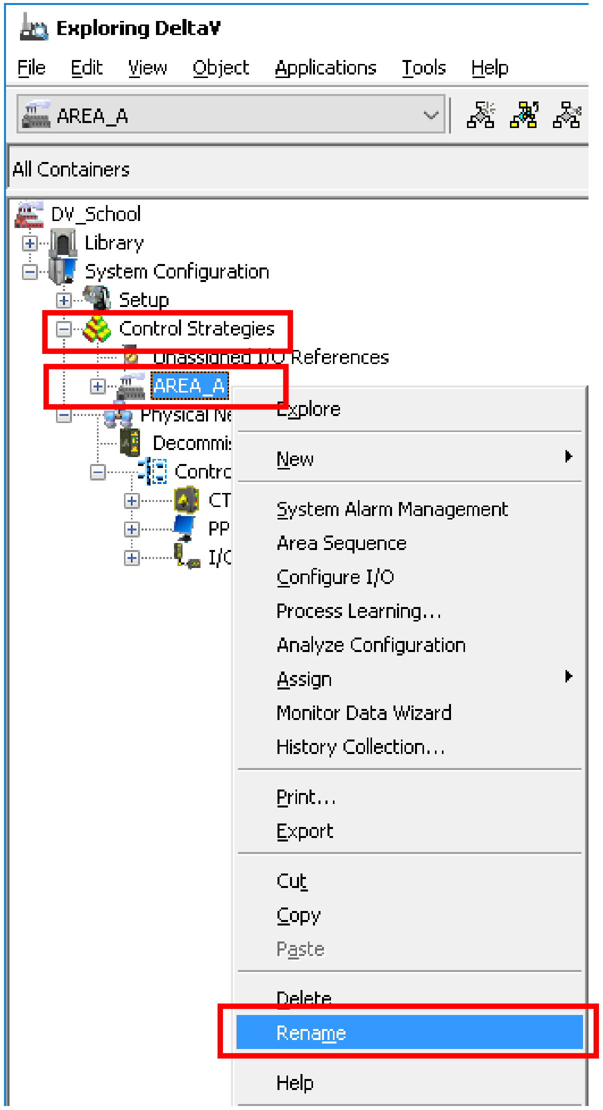
Rename the default plant area

Create a new plant area

Workshop – Defining Plant Areas

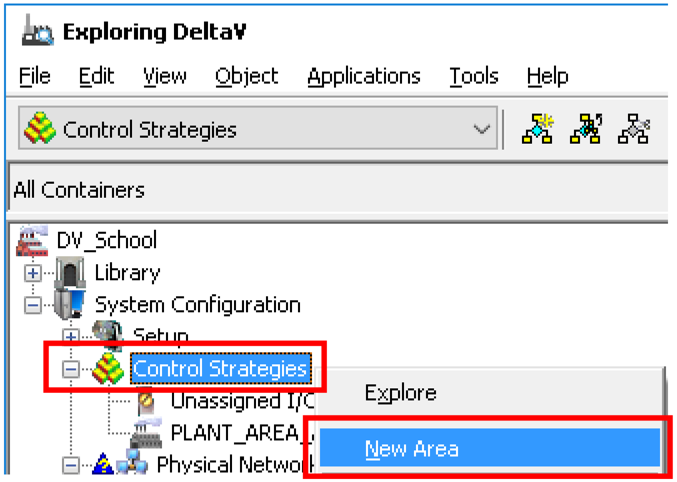
Step 1. From the DeltaV Explorer, select… *Control Strategies → AREA_A → (right-click) Rename*

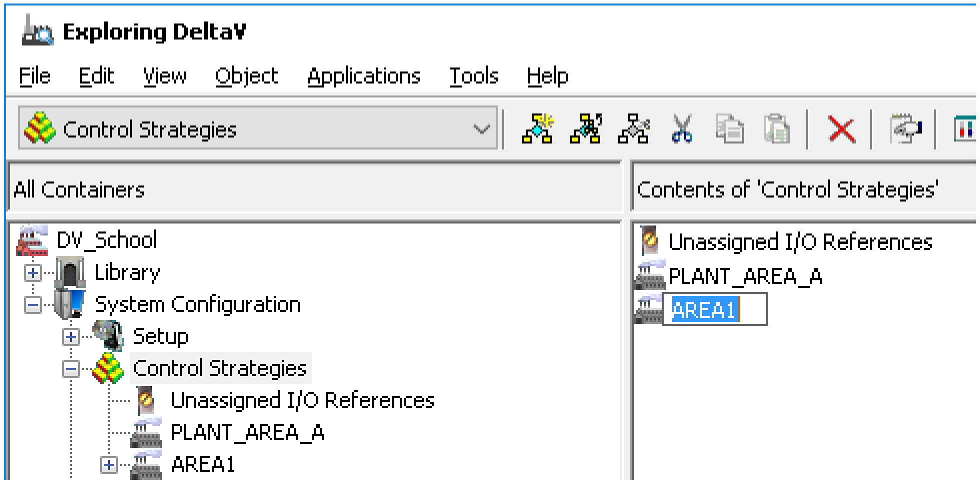
Step 2. Rename AREA_A to PLANT_AREA_A. Type the new name PLANT_AREA_A, then press the ENTER key.



Workshop – Defining Plant Areas

Step 3. Add *PLANT_AREA_B*. From the DeltaV Explorer, select . . .
(right-click) Control Strategies → New Area





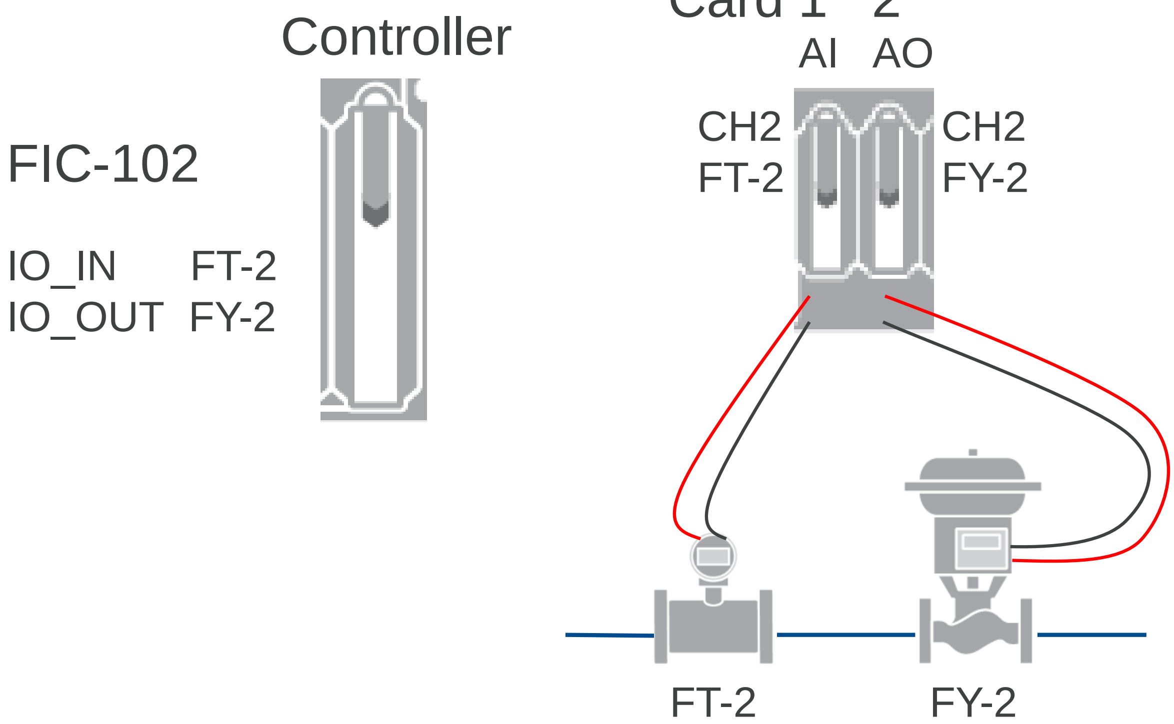
Step 4. AREA1 appears as a highlighted selection in the Contents window. Type the new name PLANT_AREA_B, then press the ENTER key.

Workshop Complete

Device Signal Tag (DST) Licensing

DST licensing is based on the number of inputs and outputs as follows:

- Analog Output
- Analog Input
- Discrete Output
- Discrete Input



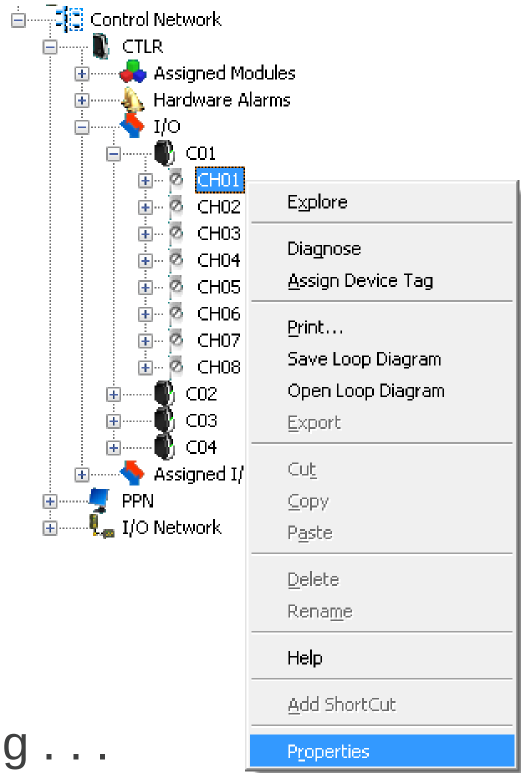
Each instrument, wired into a set of screw terminals, requires one DST.

Start with the P&ID and count the number and type of instruments when identifying the required DST licensing.

Device Signal Tags (DSTs)

DeltaV Device Signal Tags are:

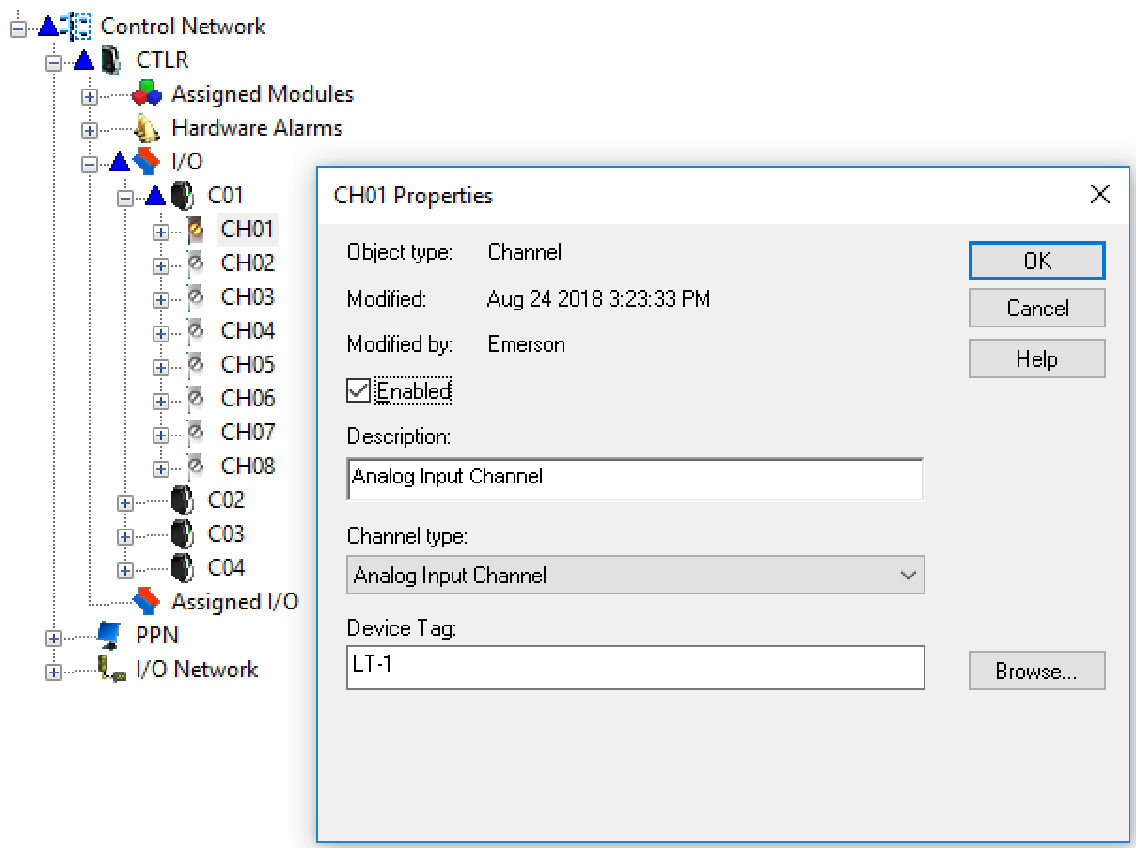
- Named items which attach an I/O channel to a control module
- Typically named to match an instrument name
- Used to define I/O properties such as
  – Analog In vs. HART
  – DO Latching, Momentary or Continuous Pulse



Configure channels from the DeltaV Explorer by selecting . . .
CTLR → I/O → Card # (CO1) → Channel #(CH01) → Properties

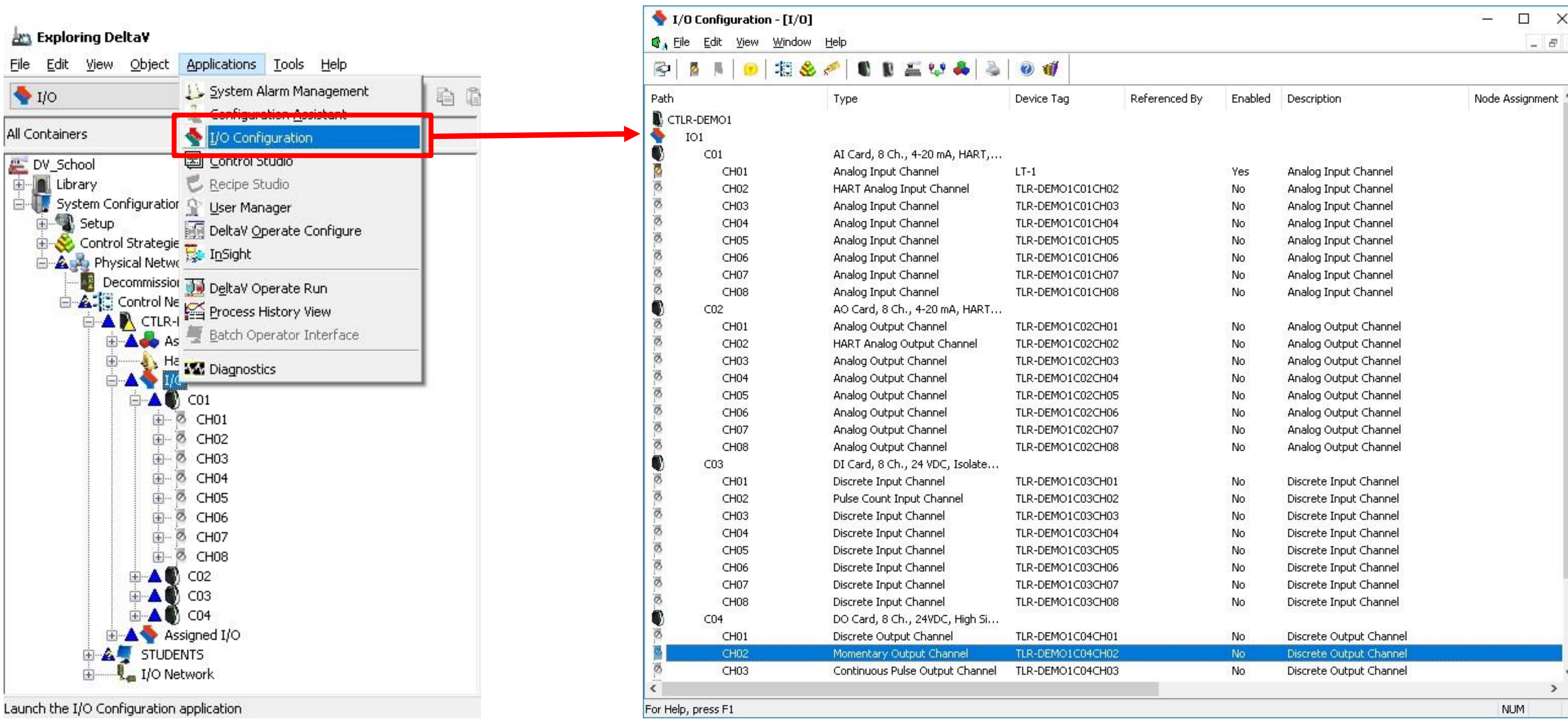
Configuring Traditional (DSTs)

The Properties dialog box for the selected channel will appear. The box contains fields for the Description, Channel type, and Device Tag.



Configuring Traditional DSTs

Channels can also be configured using the I/O Configuration application on the DeltaV Explorer.



Workshop – Configuring Traditional DSTs

- Locate the controller cards in DeltaV Explorer
- Enable the channels
- Change the Device Tags

Students using Traditional I/O will perform the instructions on next slides.

Students using CHARMs , proceed to slides for the workshop for CHARMS.

Note: If configuring Traditional I/O and CHARMs, DST names cannot be the same.

Workshop – Configuring Traditional DSTs

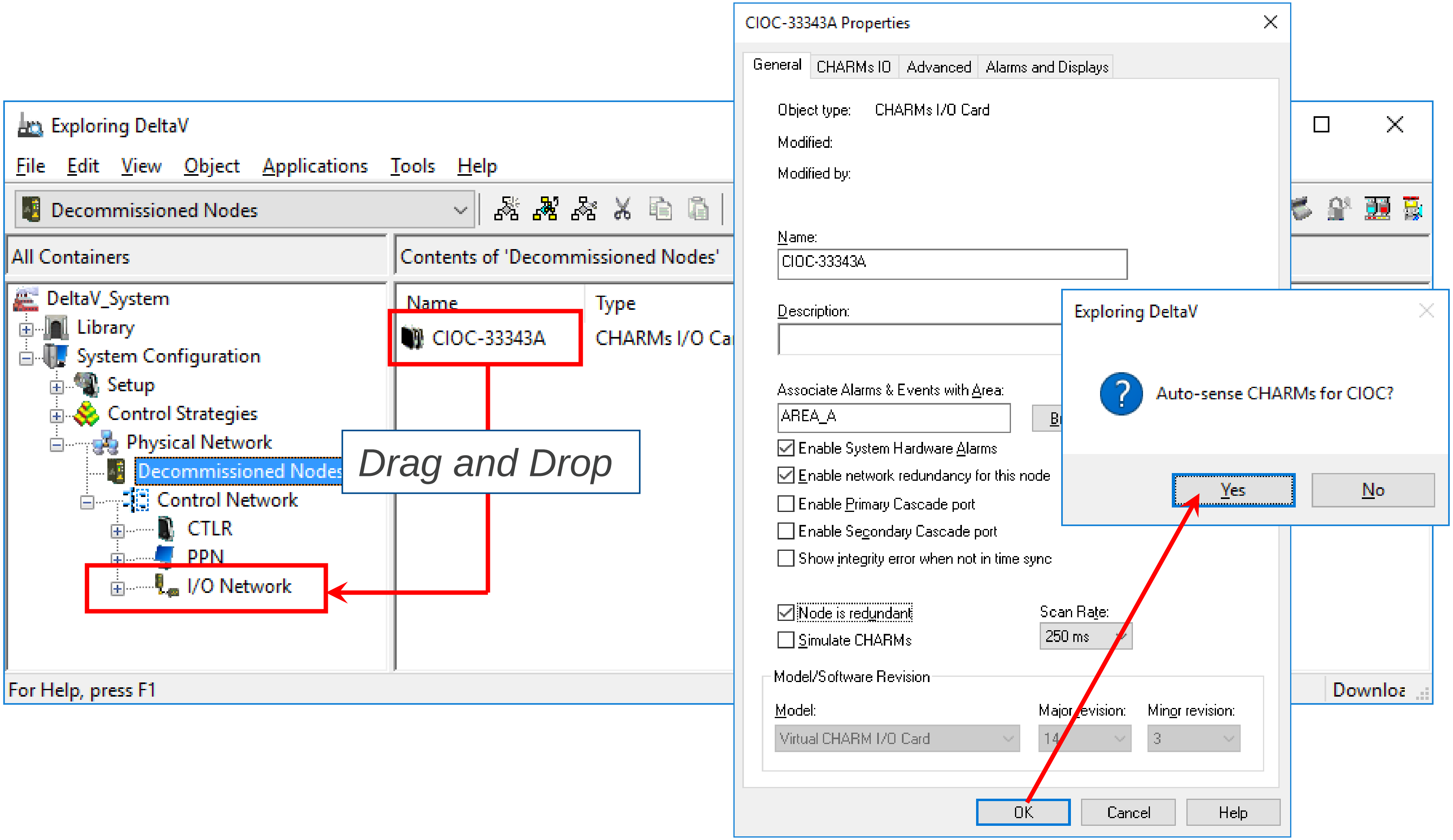
Step 1. Configure the Channels 1 and 2, on Cards 1 through 4 as follows:

Card	Channel	Device Tag	Channel Type	Enabled
C01	CH01	LT-1	Analog Input Channel	Checked
C01	CH02	FT-2	Analog Input Channel	Checked
C02	CH01	LY-1	Analog Output Channel	Checked
C02	CH02	FY-2	Analog Output Channel	Checked
C03	CH01	LSO-1	Discrete Input Channel	Checked
C03	CH02	XI-2	Discrete Input Channel	Checked
C04	CH01	XV-1	Discrete Output Channel	Checked
C04	CH02	ZX-2	Discrete Output Channel	Checked

Workshop Complete

Configuring Electronic Marshalling

Commission the CIOC and Auto-sense the CHARMs as shown below.

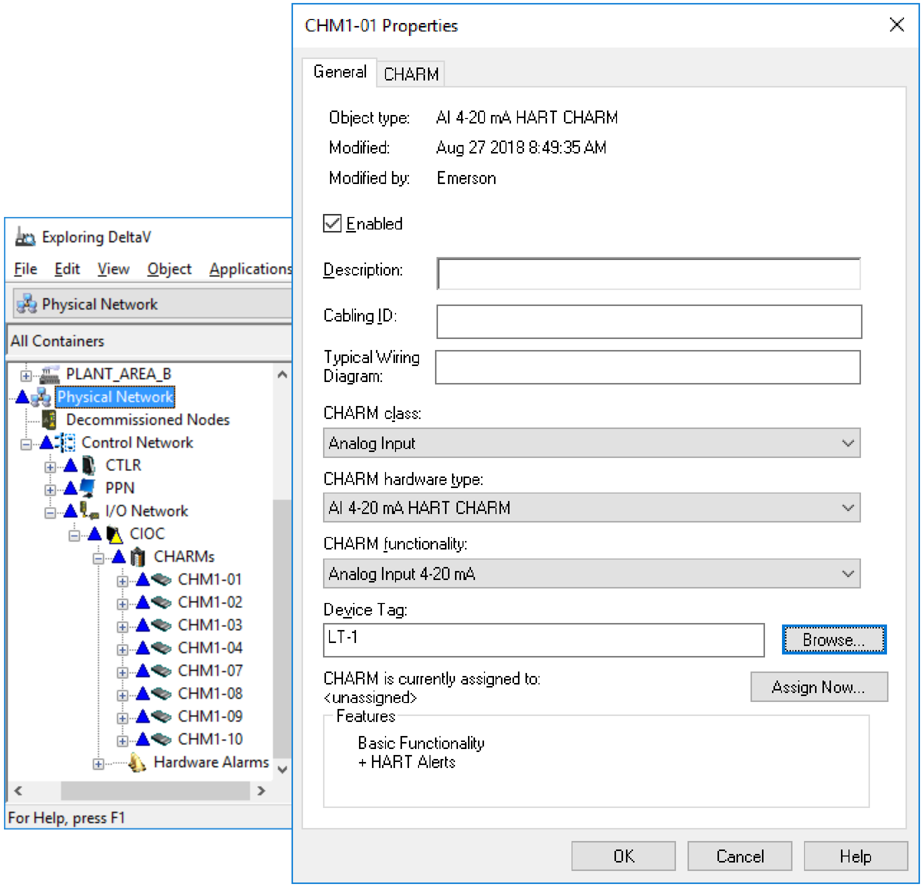


Configuring CHARM DSTs

Configure CHARM DSTs from the DeltaV Explorer by selecting . . .

CIOC → CHARMs → CHARM # (CHM1-01) → Properties

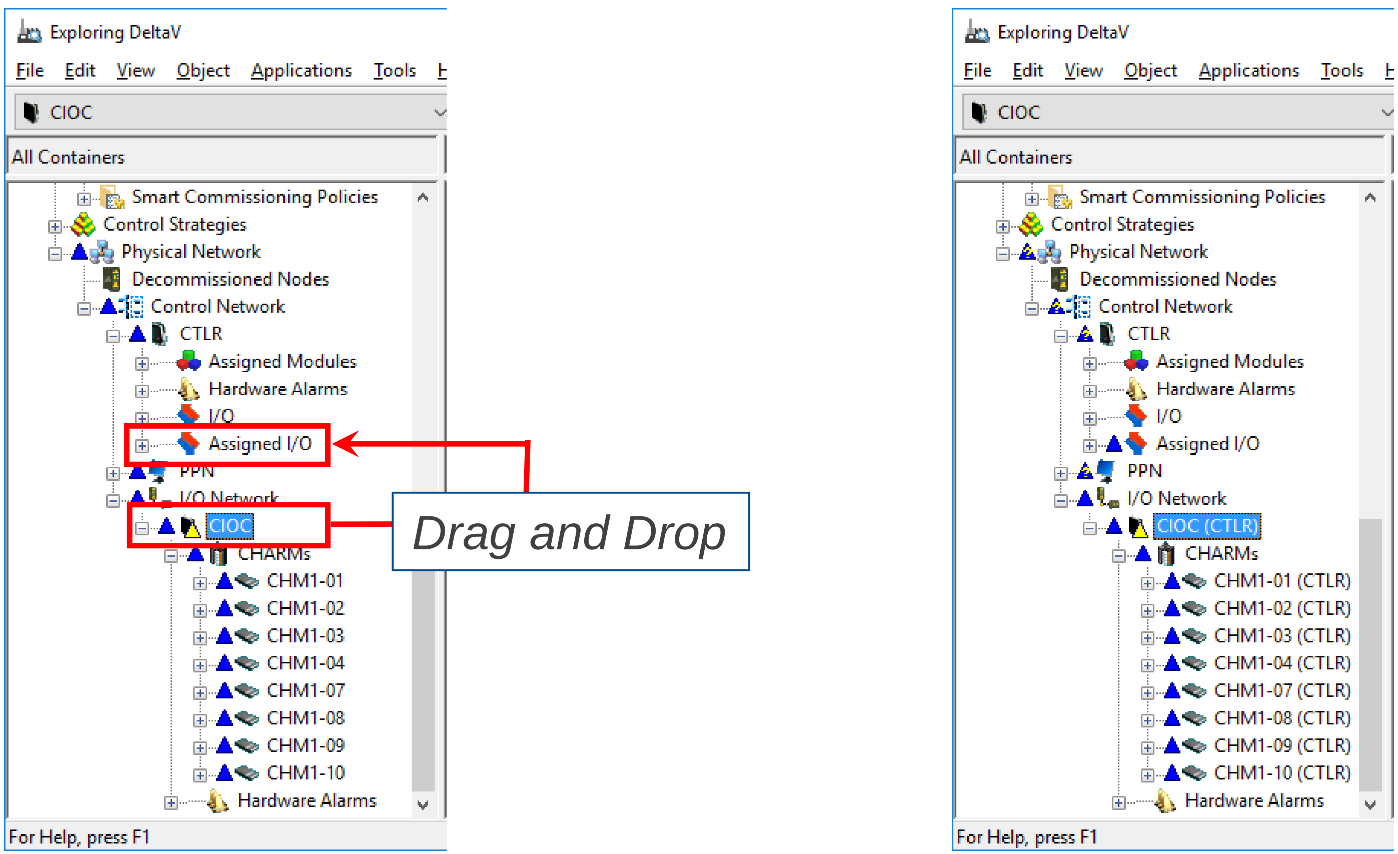
The box contains fields for the Description, Cabling ID, CHARM class, CHARM hardware type, CHARM functionality, and Device Tag.



You may also assign the individual CHARM to a specific controller by selecting the *Assign Now* button or assign all CHARMS under a CIOC to a controller from the CIOC.

Assigning CHARMS

Assign CHARMs to a controller by dragging and dropping the *CIOC* to *Assigned I/O* under the controller. The illustration on the right shows the CHARMS assigned to CTLR.



Workshop – Configuring CHARM DSTs

- Commission the CIOC in DeltaV Explorer
- Enable/Disable the CHARMS
- Change the Device Tags of the CHARMS
- Assign the CIOC to your controller

Students using CHARMs perform the following workshop on next slide.
Students using Traditional I/O perform the workshop for Traditional I/O

Note: If configuring Traditional I/O and CHARMs, DST names cannot be the same.

Workshop – Configuring CHARM DSTs

Step 1. Commission your CIOC.

Step 2. Configure CHARM DSTs as follows:

CHARM	CHARM functionality	Device Tag	Enabled
CHM1-01	Analog Input 4-20mA	LT-1	Checked
CHM1-02	Analog Output 4-20mA	LY-1	Checked
CHM1-03	Analog Input 4-20mA	FT-2	Checked
CHM1-04	Analog Output 4-20mA	FY-2	Checked
CHM1-05	Not Used	Default Name	Unchecked
CHM1-06	Not Used	Default Name	Unchecked
CHM1-07	Discrete Input	LSO-1	Checked
CHM1-08	Discrete Output	XV-1	Checked
CHM1-09	Discrete Input	XI-2	Checked
CHM1-10	Discrete Output	ZX-2	Checked

Step 3. Assign all CHARMs to your M-series or S-series controller.

Workshop Complete

Downloading Data

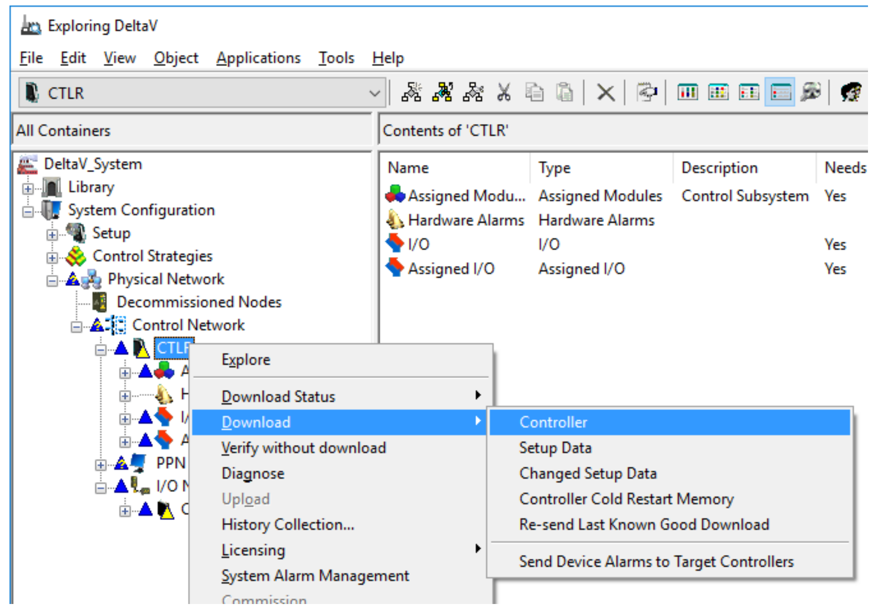
A download transfers configuration, setup data and cold restart memory from the configuration database in the ProfessionalPLUS to the controller(s) and/or workstation(s) run-time database. Downloads are performed from DeltaV Explorer or Control Studio.

Downloading DeltaV Configuration

The illustration below shows how to perform a total controller download.

Two Main Types of Downloads

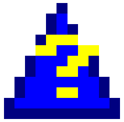
- *Total/Full Download* – Downloads the entire configuration for the selected node (controller or workstation).
- *Partial Download* – Downloads only specific parts of the configuration; i.e., a single control module or I/O card.



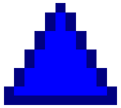
Important: It may not be desirable to perform a Total/Full Download on a running process.

Please refer to KBA's or Books Online "Downloading Data" for detailed information.

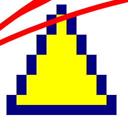
Downloading DeltaV Configuration



A triangle with a question mark indicates that some of the node's configuration database parameters may not match the parameters in the node itself. By selecting *Download Status* → *Update* the system will determine if differences exist, resulting in a blue triangle; if the parameters match, the triangle disappears.



A blue triangle indicates that some of the node's configuration database parameters do not match the parameters in the node itself.



A yellow triangle indicates no configuration is present in the node. A total download is required.

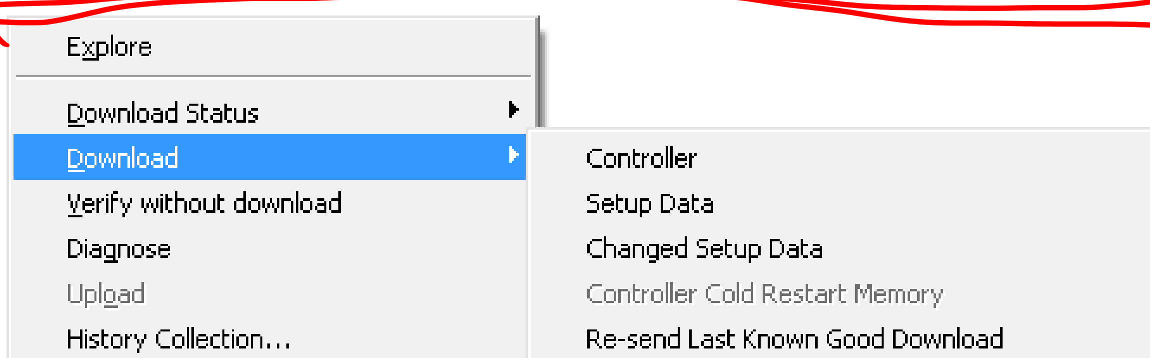
The only time you do a total download

Download Options in DeltaV Explorer

Download Subsets – Configuration data that is not directly related to a control module or card:

- *Setup Data* – includes named sets, parameter security, cold restart information, redundancy information, alarm preferences and event chronicle definitions. Setup data can be downloaded to Controllers and Workstations.
- *Changed Setup Data* – Sends only changed setup data items.
- *Controller Cold Restart Memory* – Updates the controller's non-volatile memory so that the Cold Restart download script is valid.
- *Re-send Last Known Good Download* – Sends the last successful total download to a node without going to the database.

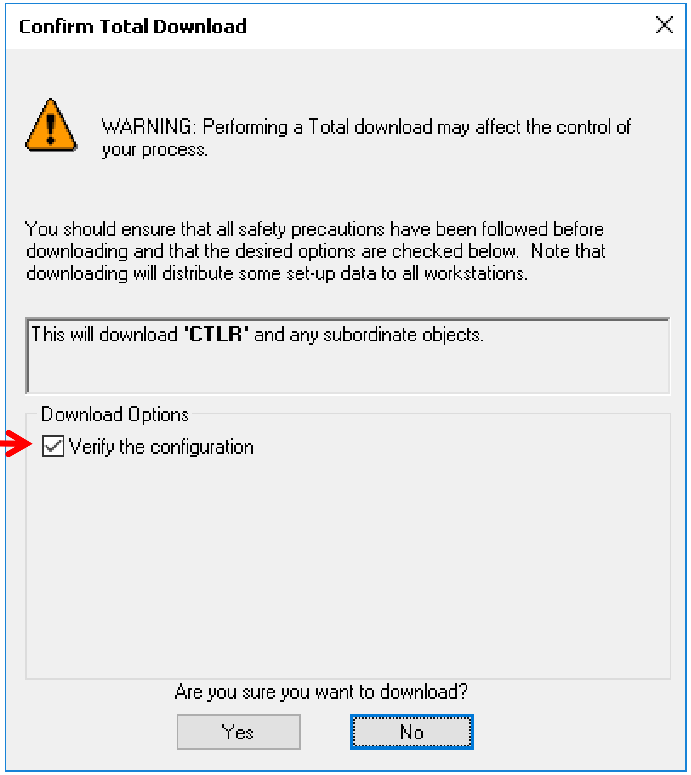
Not recommended



Confirm Total Download Window

Confirmation window shows after download is selected.

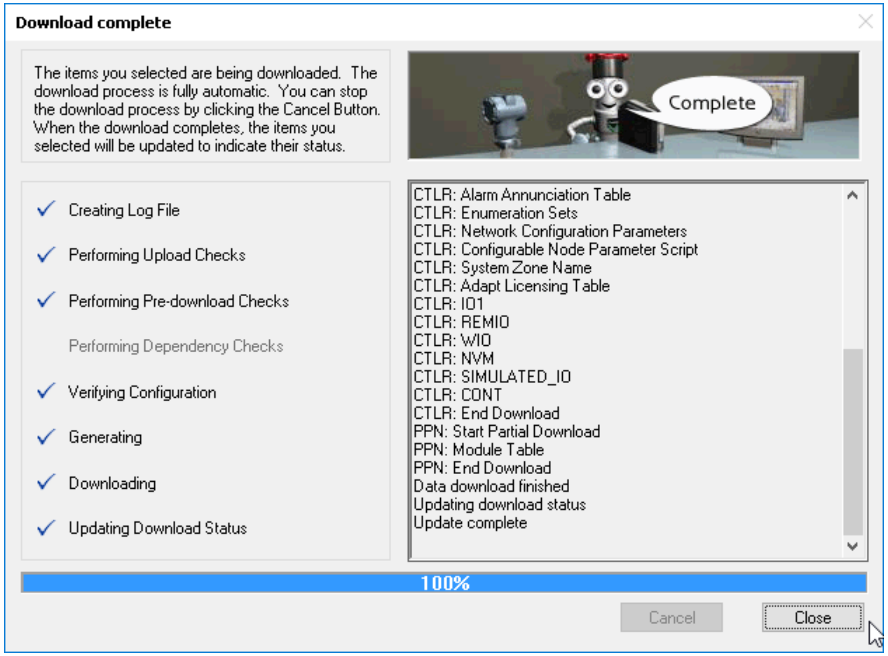
Verify the configuration option is selected by default



The cautionary note gives you the opportunity to abort the Control Network's pending download. You can click Yes to continue or No to abort the download.

Downloading Dialog Box

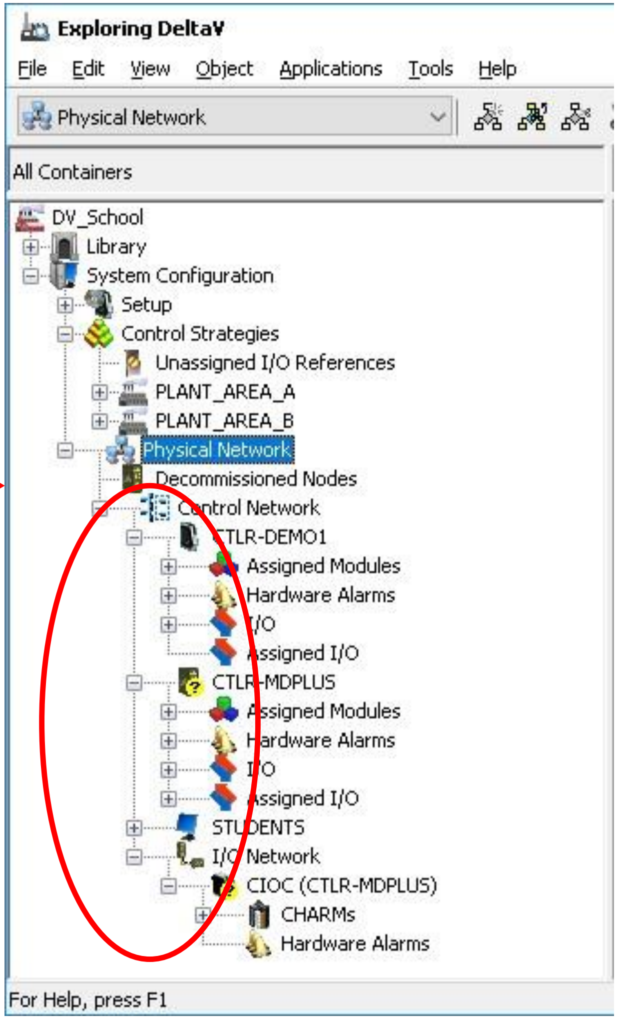
The *Downloading Selected Objects* dialog box displays the download's progress.



The checkmark beside each item indicates that the function is complete. As a specific event is processing, it is displayed in bold type. Stippled items are events that do not need to be performed during the current download.

Download Complete – Status Indicators

The blue triangles are removed after the download is complete.

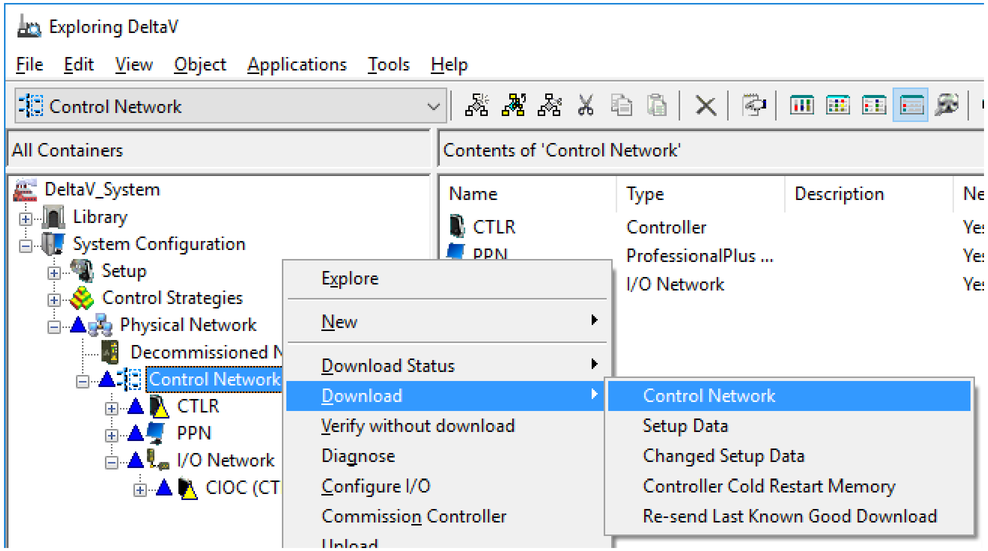


Workshop – Download Control Network

- Download the Control Network
- Verify the configuration
- Check Download Status indicators
- Launch DeltaV Diagnostics

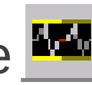
Workshop – Download Control Network

Step 1. Download the Control Network from the DeltaV Explorer by… *(right-click) Control network → Download→ Control Network*
You must respond to several options while stepping through the download process.

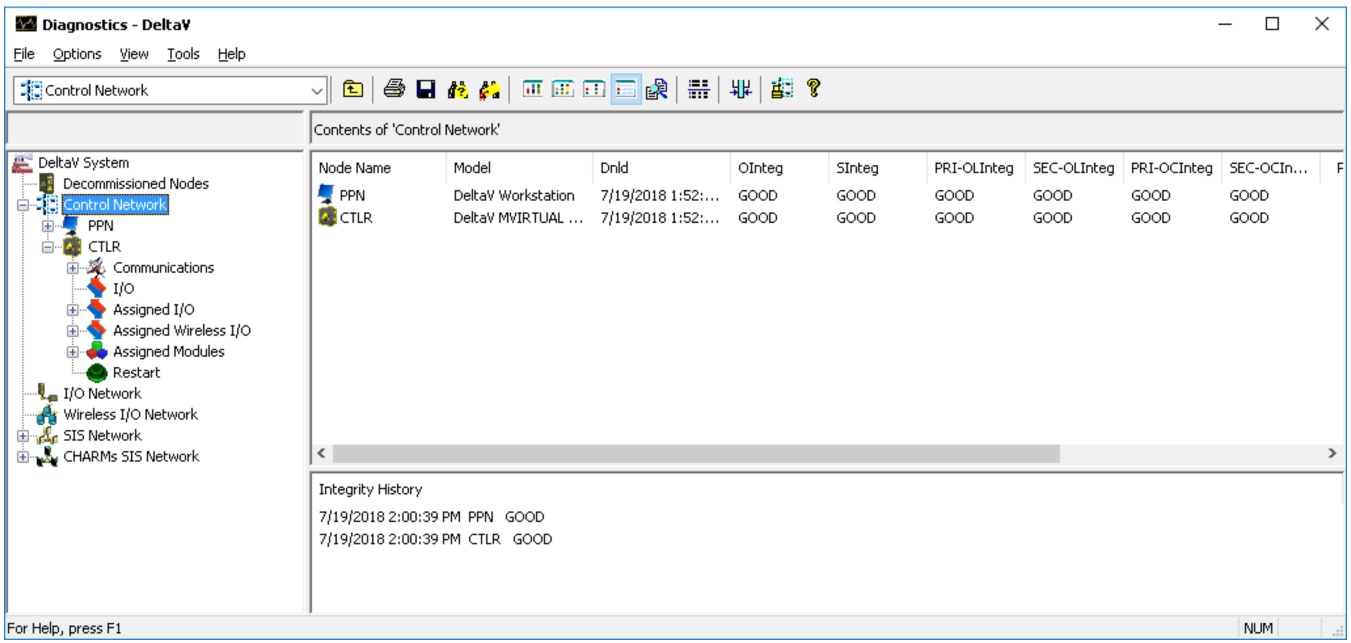


Step 2. On the Confirm to download window make sure that *Verify the configuration* is checked and then clicked *Yes* to continue with the download.

Workshop – Download Control Network

Step 3. Launch Diagnostics from the DeltaV Explorer by clicking the  Diagnostic button on the toolbar or by selecting. . .
Start → DeltaV Operator → Diagnostics

Step 4. Once Diagnostics has been successfully launched, check out your system.



Workshop Complete

Summary

- Define the process to be controlled
- Define the characteristics of the various plant areas
- Define the characteristics of the Device Signal Tags (DSTs)
- Perform a total download
- View diagnostics

EMERSON

DeltaV Control Modules

Module 3

EMERSON

Module Objectives

- Define DeltaV Control Module Characteristics
- Create a Discrete Input control module from a template
- Add a Discrete Output function block
- Create a Display from a template
- Add Data links to a Display
- Add Static Objects/Text
- Add a GEM
- Publish a Display

Module Workshops

- Creating Module XV-101
- Creating a New Folder and Display
- Adding Data Links
- Adding and Customizing Text
- Adding and Configuring a GEM
- Publishing and Operating XV-101

Common Parameters

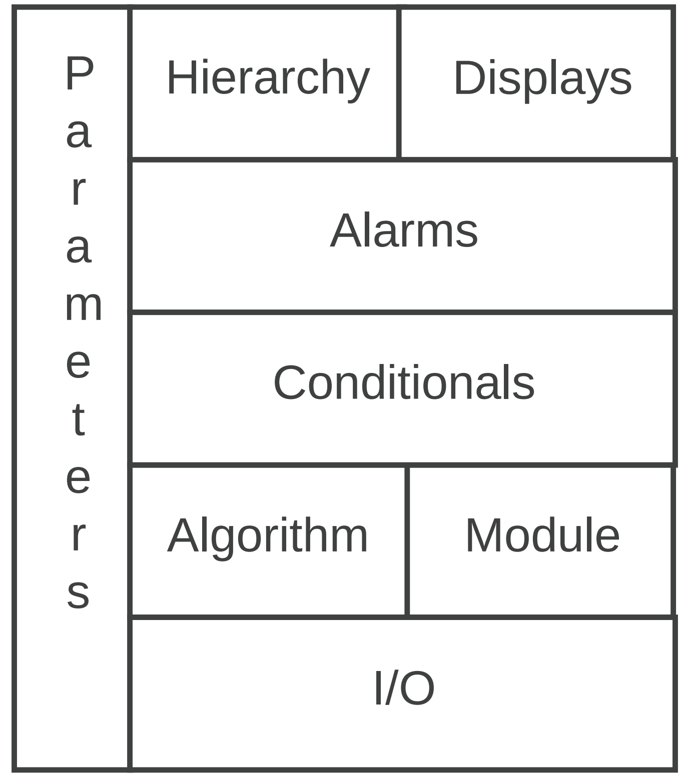
IO_IN
IO_out
SP - set point

PV - process variable
OUT - contrl. of signal
MODE - who has control of the device

DeltaV Control Modules

Control Module Characteristics:

- Unique name – 16 characters maximum alphanumeric, with at least one alpha
- Executes control algorithms
- Flexible size
- May be independently taken out of service
- Independent scan rate per module
- References a primary, detail and faceplate display
- Independent function block scan rate, execute block every (1-255) module scan(s)
- Set function block execution order



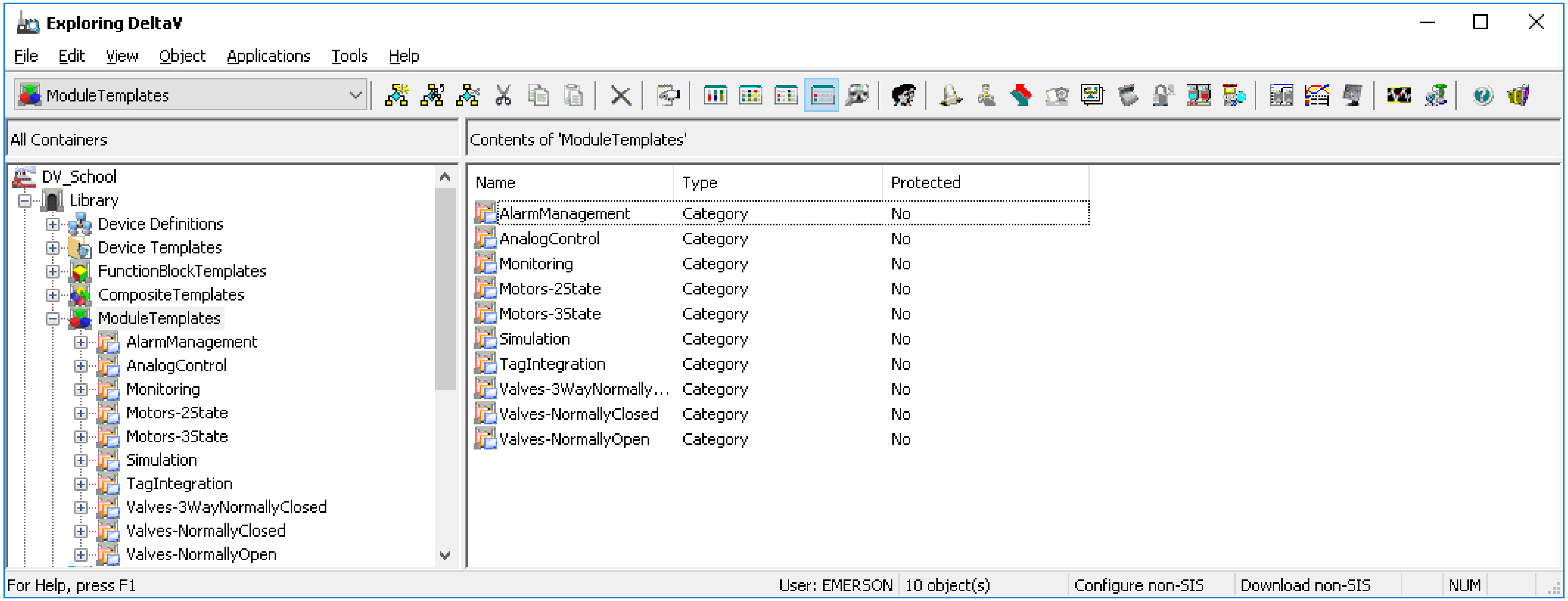
XV-101 Block valve

Module Templates

Module Templates may be used as a starting point for creating modules.

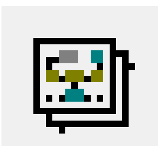
Access DeltaV Module Templates by clicking. . .

Start → DeltaV Engineering → DeltaV Explorer → Library → Module Templates



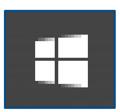
DeltaV Control Studio

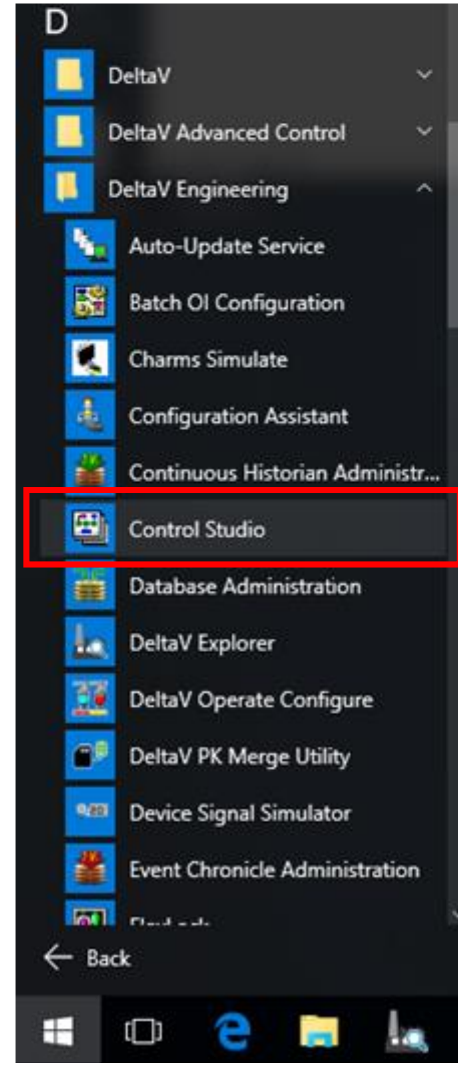
Control Studio is used to define and modify control modules.



Launch Control Studio from DeltaV Explorer by clicking the Control Studio button.

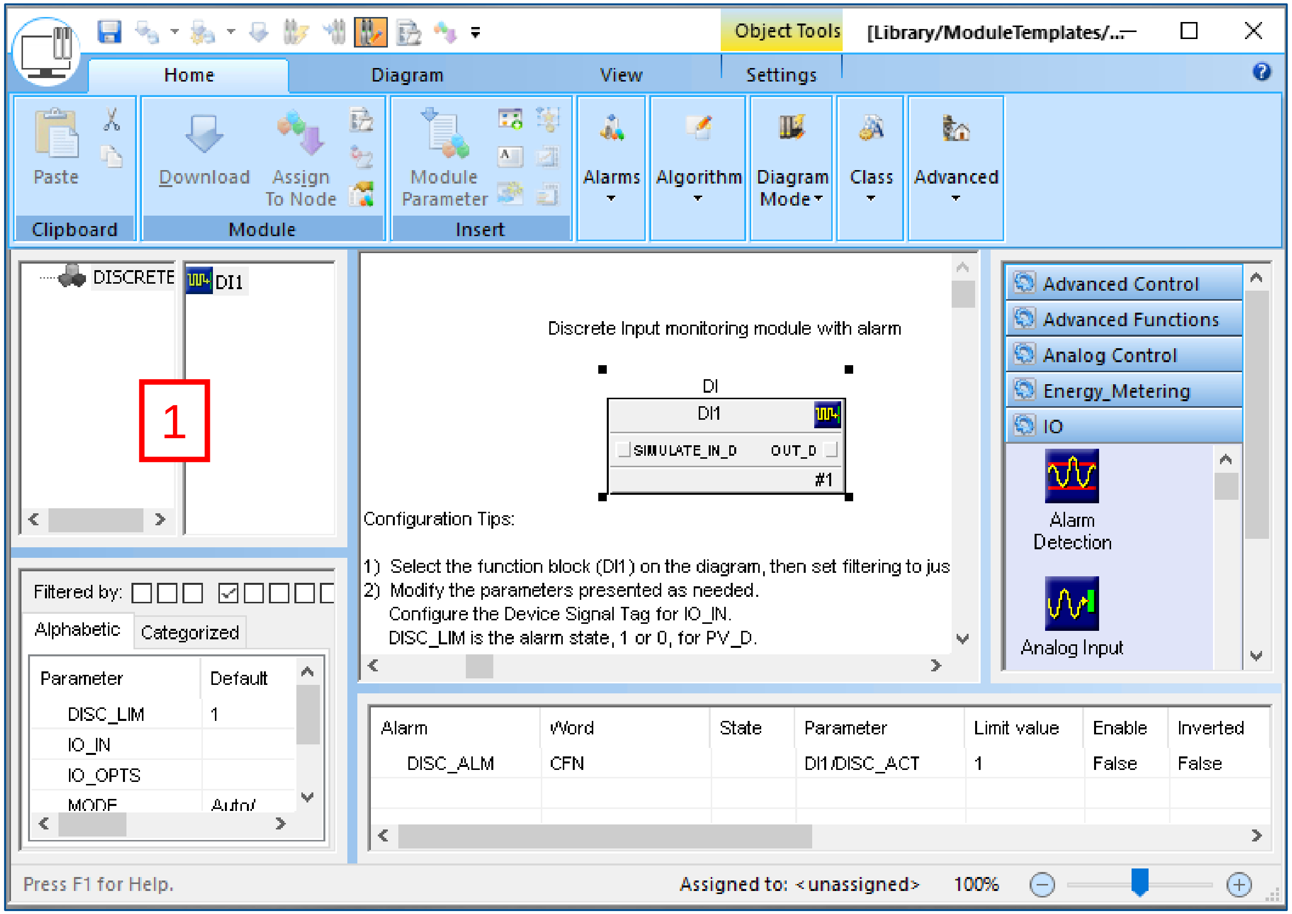
You can also access DeltaV Control Studio by clicking. . .

 → *All apps* → *DeltaV Engineering* → *Control Studio*



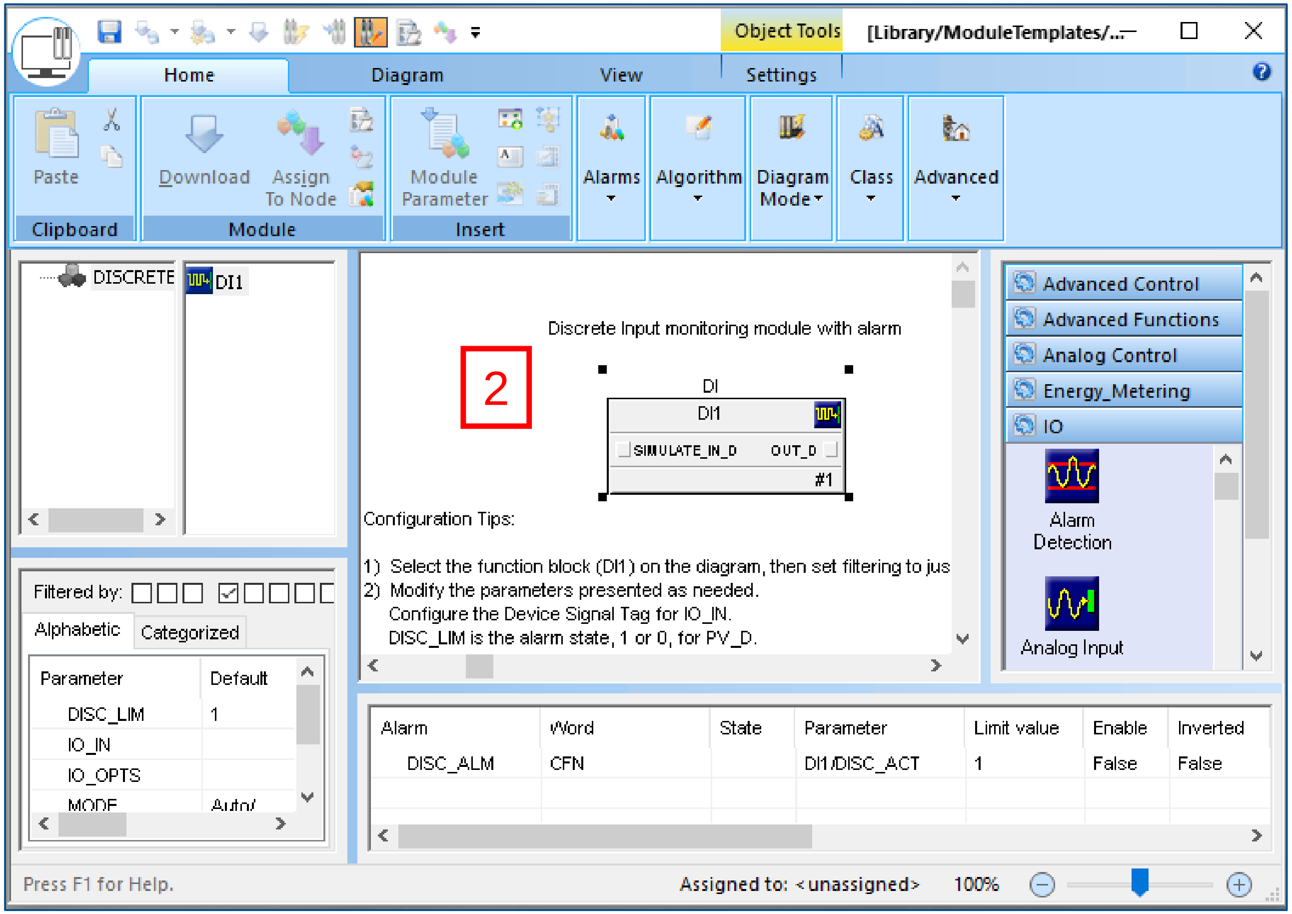
DeltaV Control Studio

1. *Hierarchy View* – Displays the contents of the Function Block diagram or Sequential Function Chart.



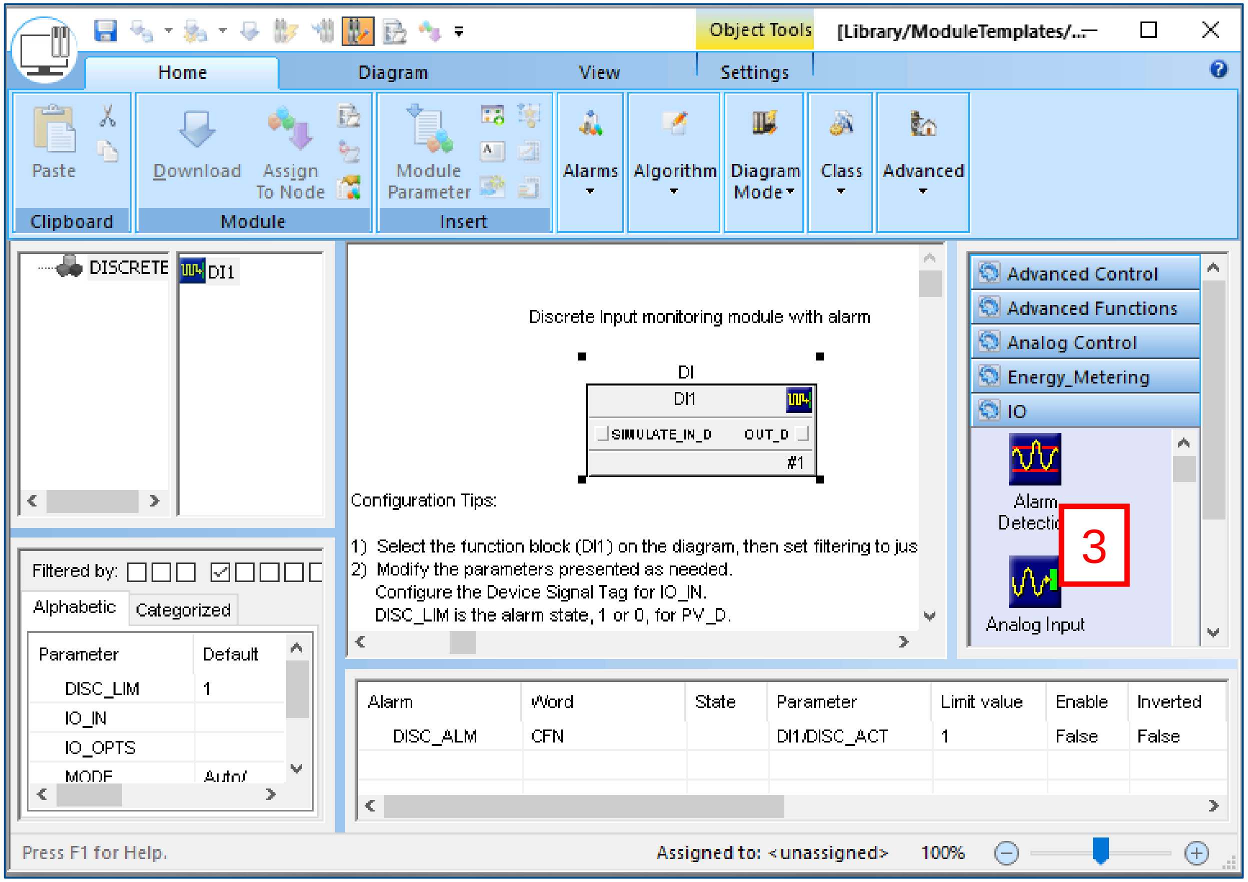
DeltaV Control Studio

2. *Diagram View* – The working area where you build control strategies for the control module.



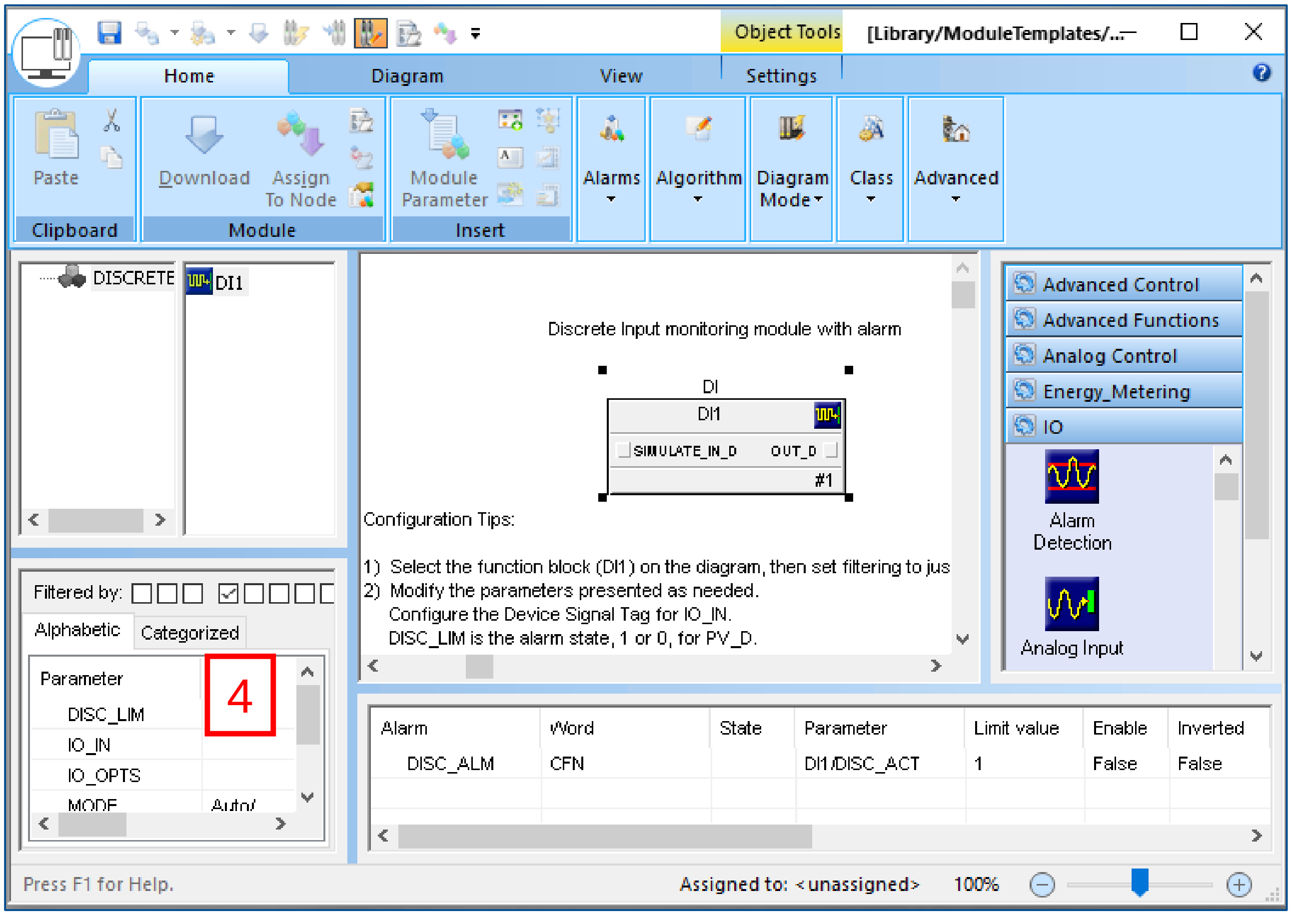
DeltaV Control Studio

3. *Palette View* – The selectable window containing different function blocks, parameters, and custom blocks used to build control strategies for the control module.



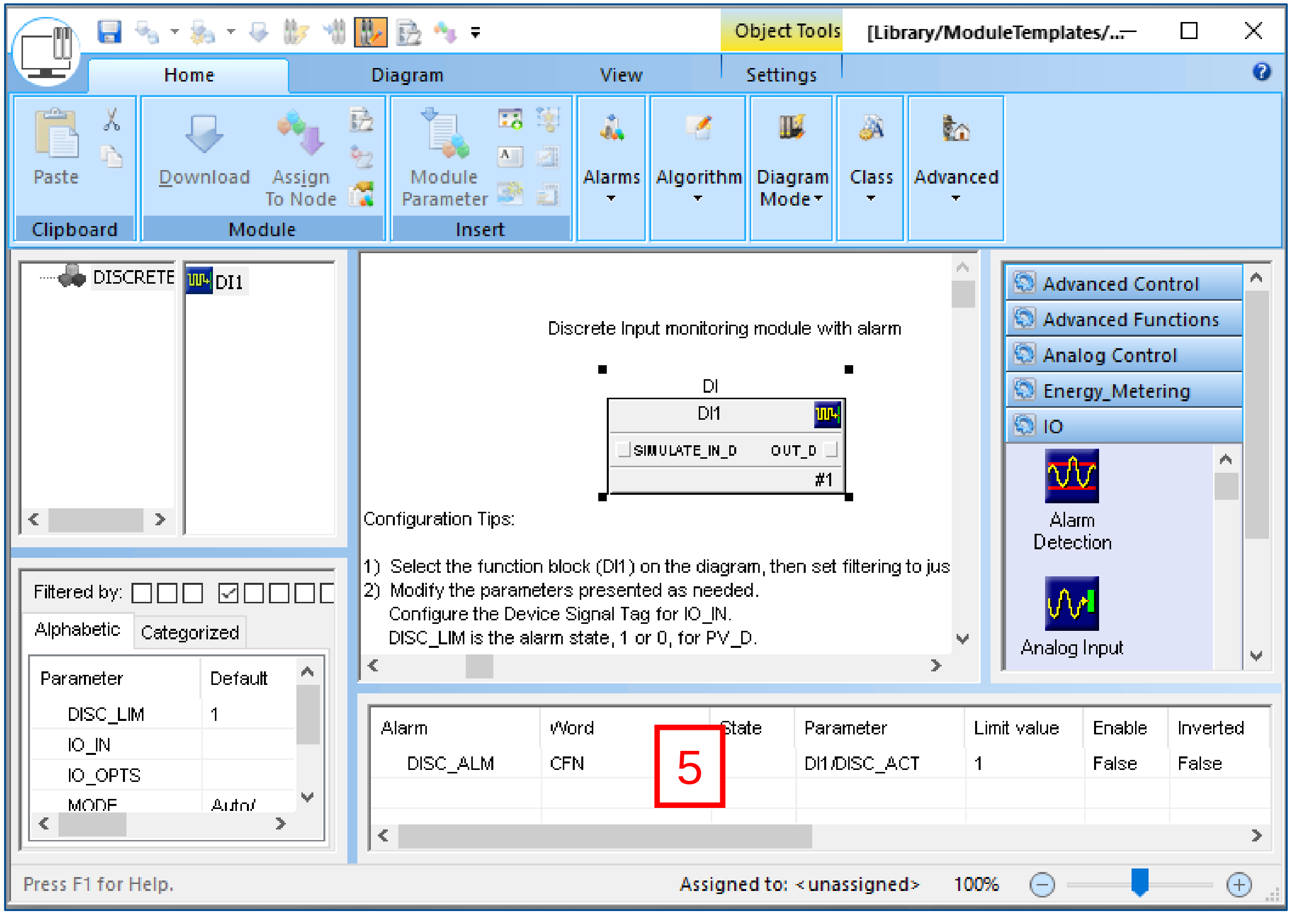
DeltaV Control Studio

4. Parameter View – Displays module-level parameters or function block parameters when a function block is selected.



DeltaV Control Studio

5. *Alarm View* – The area in which pre-defined alarms or user-created alarms are created and displayed.

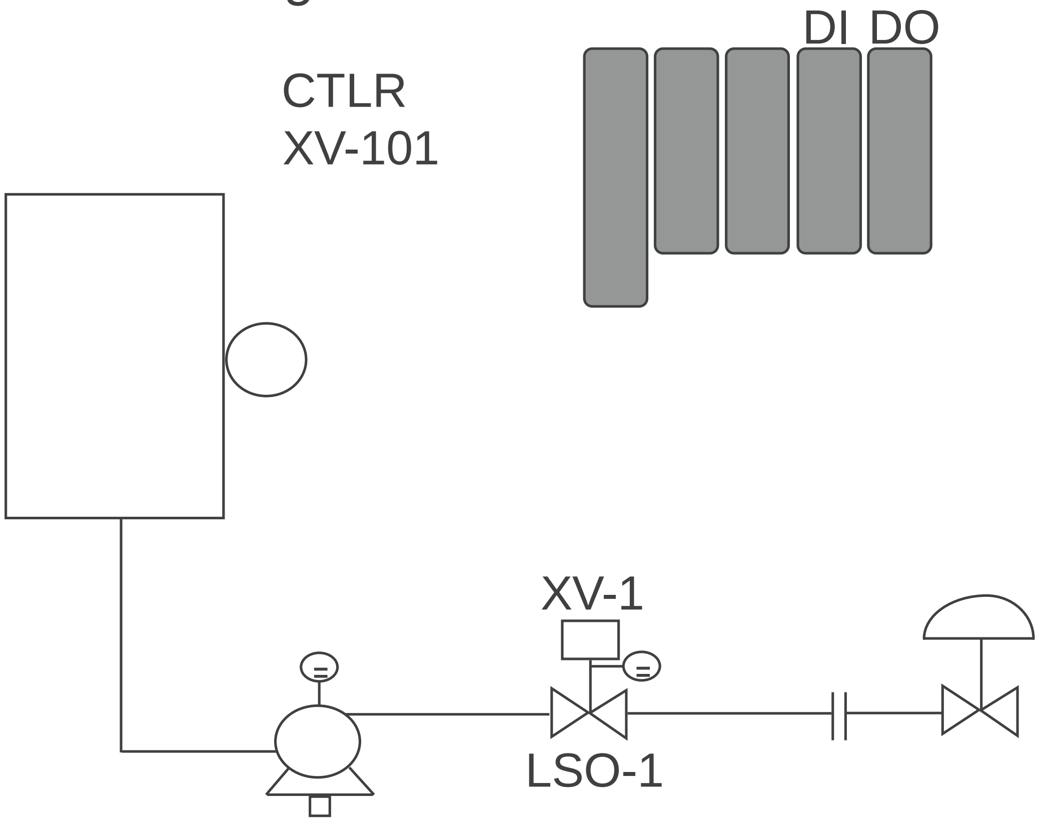


Workshop – Creating Module XV-101

- Copy a module template from the library
- Define a Discrete Input control module
- Add a Discrete Output function block
- Define a Discrete Output function block

Workshop – Creating Module XV-101

XV-101 is the control module that will manipulate the solenoid valve along Tank101's discharge line.



Continue to the next slide to start creating the XV-101 module.

Workshop – Creating Module XV-101

Create the new module XV-101 in the following manner:

Step 1. From the DeltaV Explorer, select . . .
Library → Module Templates → Monitoring

Step 2. Drag and drop the DISCRETE Module Template from the Library to PLANT_AREA_A.

Step 3. Rename the module *XV-101.*

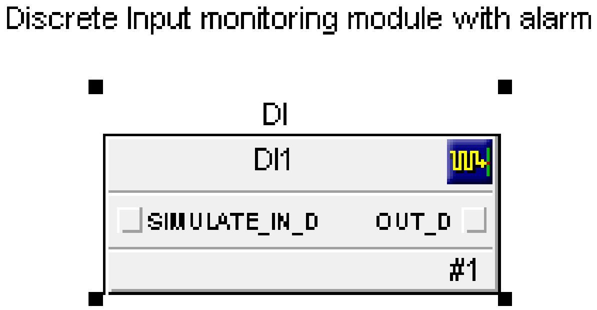
Step 4. Launch Control Studio by selecting . . .
(right-click) XV-101 → Open → Open with Control Studio

Step 5. Double-click *Filtered by* in the parameter window.

Step 6. Check *Quick Configuration* and *Common Configuration.*

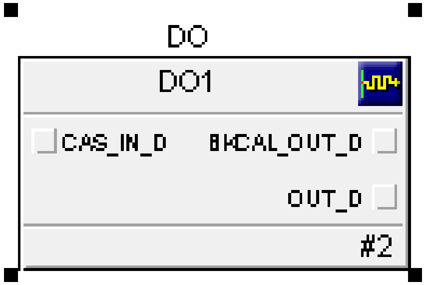
Workshop – Creating Module XV-101

Step 7. Modify the Discrete input function block as follows:
a. Modify IO_IN to use DST LSO-1.



Step 8. Enable the discrete Alarm (DISC_ALM) and modify to alarm on a value of 0.

Step 9. Drag and drop a Discrete Output function block from the IO palette.



Workshop – Creating Module XV-101

Step 10. Double-click the IO_OUT parameter and browse for the DST XV-1.

Step 11. Modify the *Mode* parameter: change the *Target* from *Cascade* to *Auto*.

Step 12. Click the *Assign to Node* button  to assign the control module to your controller.

Step 13. Click the *Properties* button  and select the Displays tab. Type *Tank101* in the Primary Control field.

Step 14. Click the *Save* button  to save the module.

Step 15. Click the *Download* button  to download the module from Control Studio.

Workshop – Creating Module XV-101

Step 16. Click the *On-Line* button 

to open the module in the on-line view.

Step 17. Select the DO1 function block. Change the *SP_D* parameter to *1*.

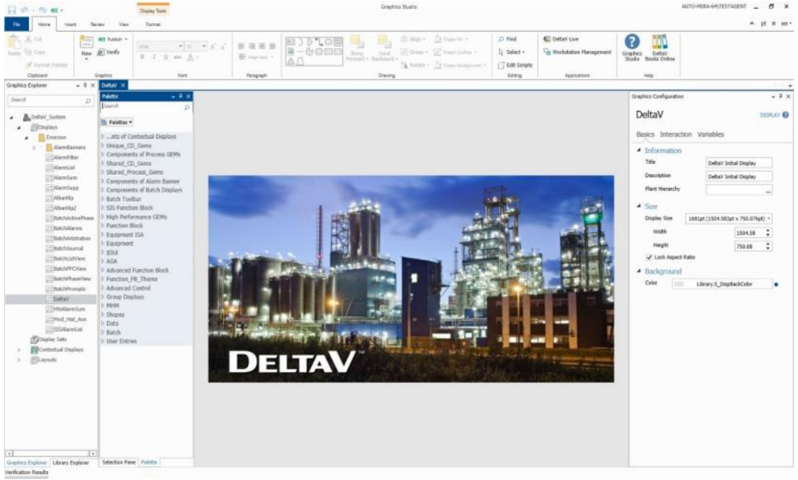
Step 18. Verify that DI1/PV_D changes value to 1.

Workshop Complete

DeltaV Live

DeltaV Live is the first distributed control system operator interface to natively support HTML5 graphics. Two main applications that can run concurrently are available with DeltaV Live:

Graphics Studio



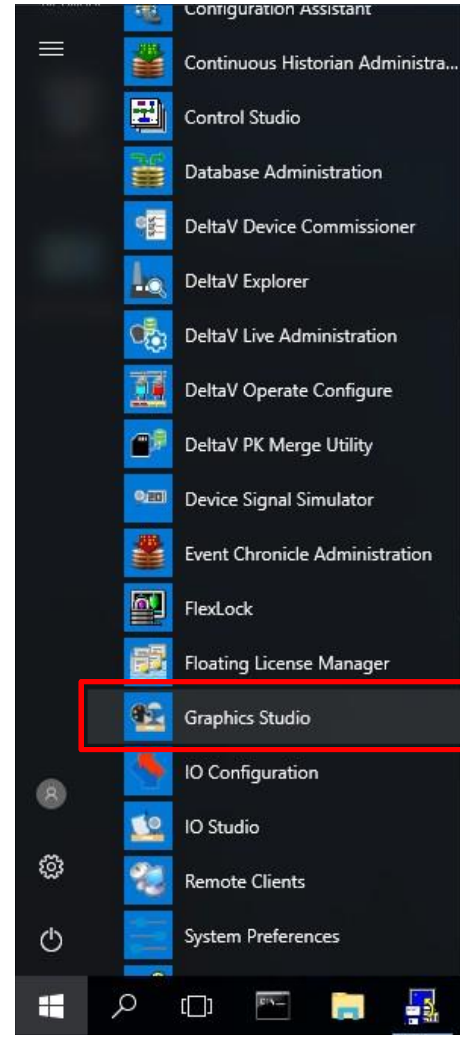
DeltaV Live

Graphics Studio

Graphics Studio, , is used to create, edit, preview, test, and publish DeltaV Live displays.

Access Graphics Studio by selecting ...

Start → All apps →
DeltaV Engineering → Graphics Studio



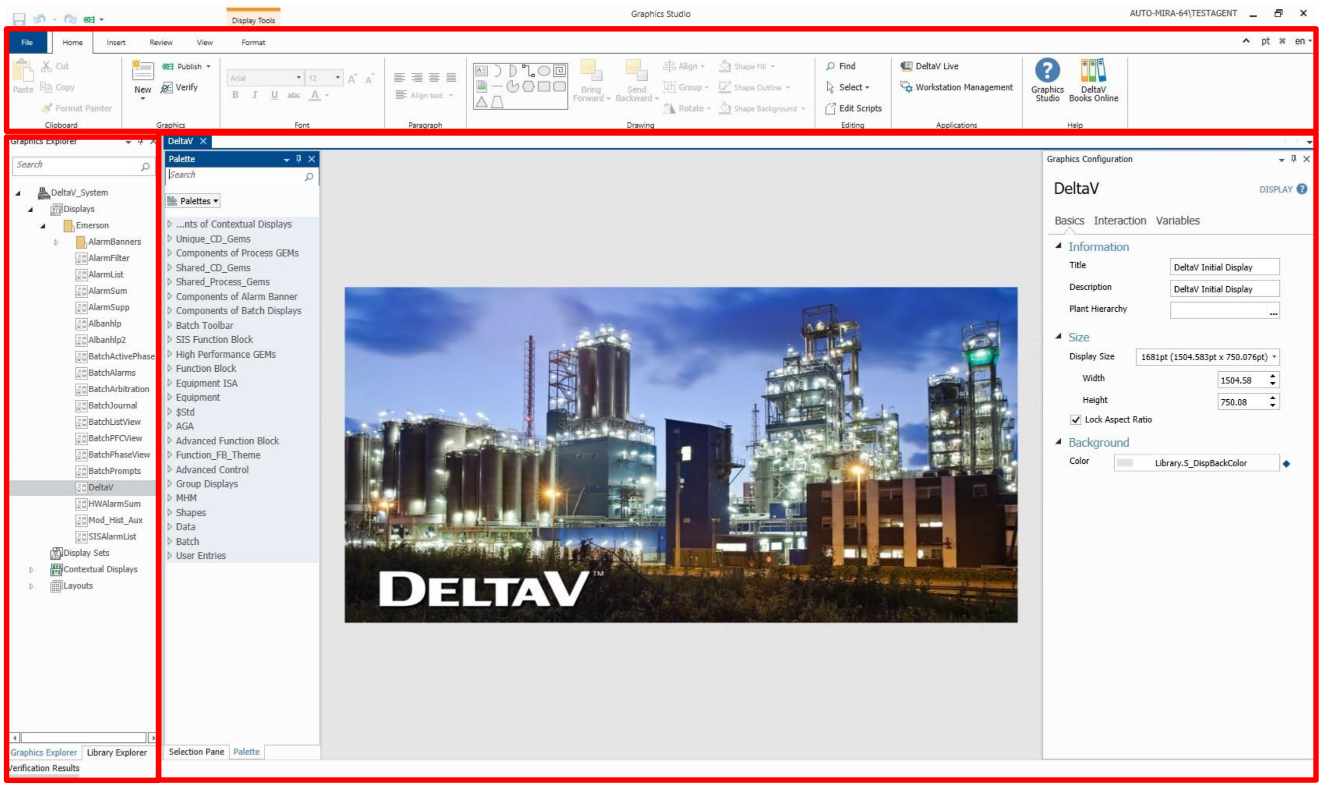
Graphics Studio

The Graphics Studio user interface contains three main areas:

① Ribbon

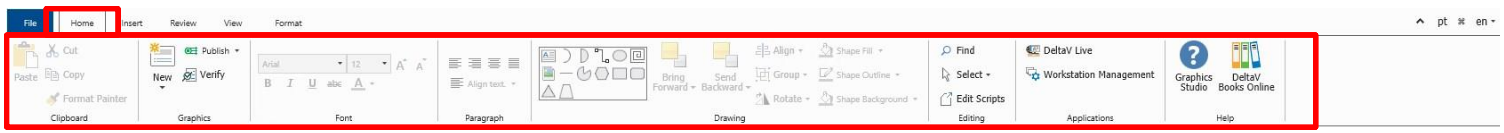
② Explorer View

③ Content Tabs View



Graphics Studio

1. *Ribbon* – Contains a menu bar that provides quick access to commonly used commands and tasks. The tab selected in the ribbon determines the available menu bar options.

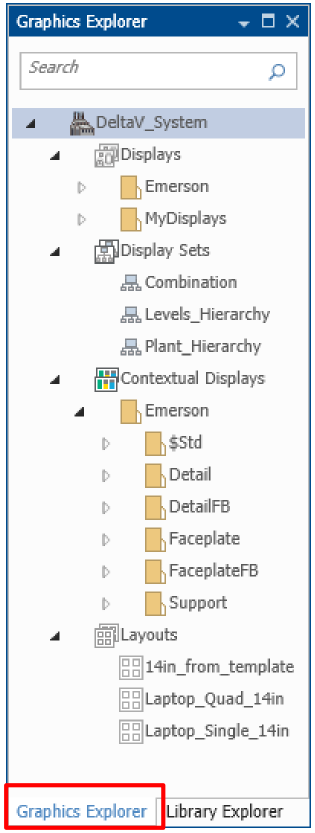


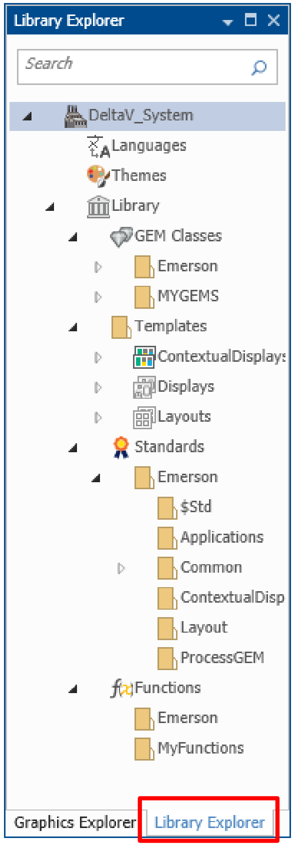
You can publish displays, insert shapes, launch other DeltaV Live applications and help from the **Home** tab.

You can select which panes are active, show or hide the grid lines and configure the space between grid lines from the **View** tab.

Graphics Studio

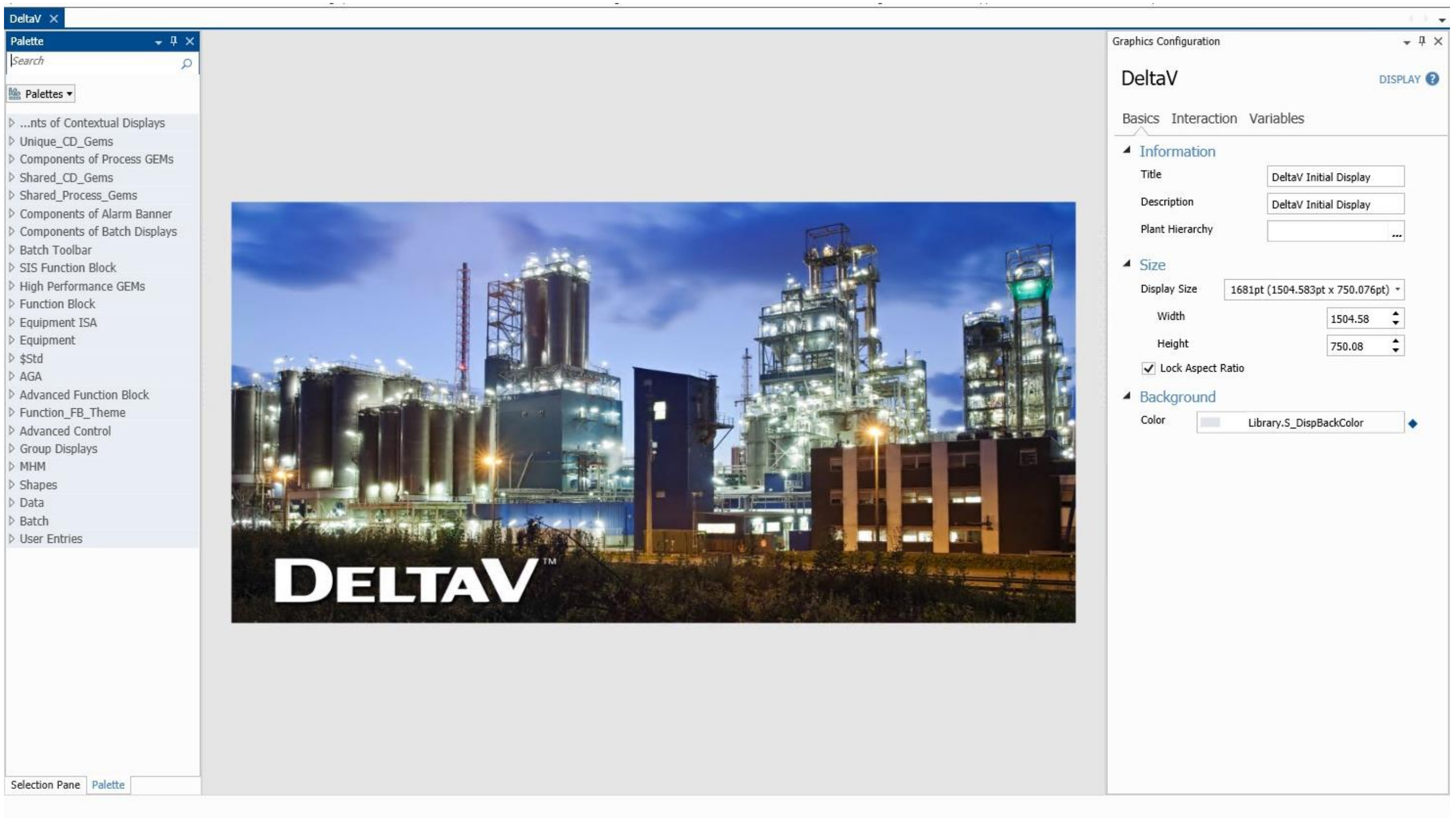
2. *Explorer View* – This is used to manage your DeltaV Live configuration database. This view contains two panes, the Graphics Explorer pane and the Library Explorer pane.





Graphics Studio

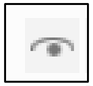
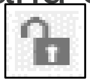
3. *Content Tabs View* – This is the working area to view and edit displays. This view contains the Palette pane, Selection pane, Content pane, Content Tabs, and Graphics Configuration pane.

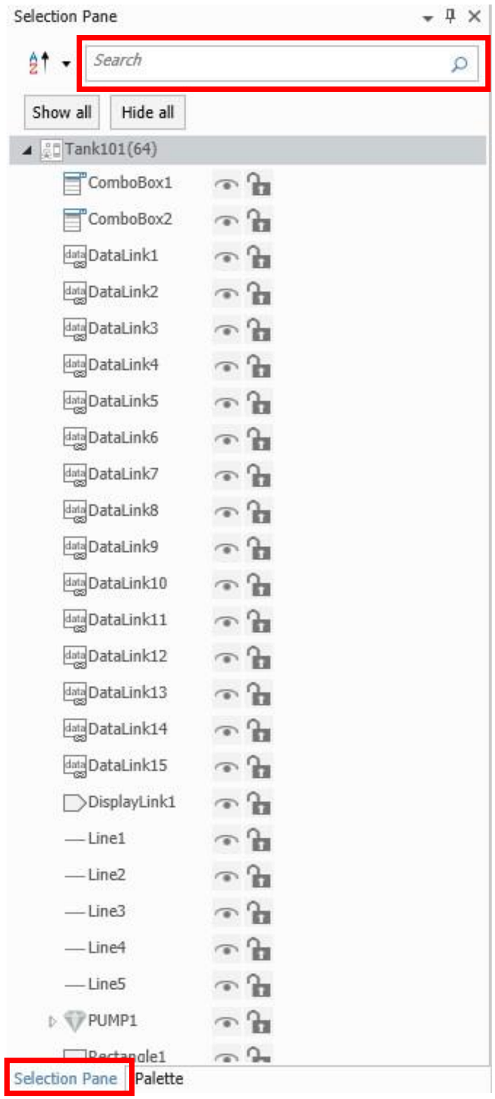


Content Tabs View – Palette

- The Palette pane contains the graphic elements available for adding to displays.
- This pane is divided into groups of similar elements.
- Drag and drop an element from the Palette pane onto the editing canvas to create an instance of the element.
- The search bar on top can be used to find objects faster.

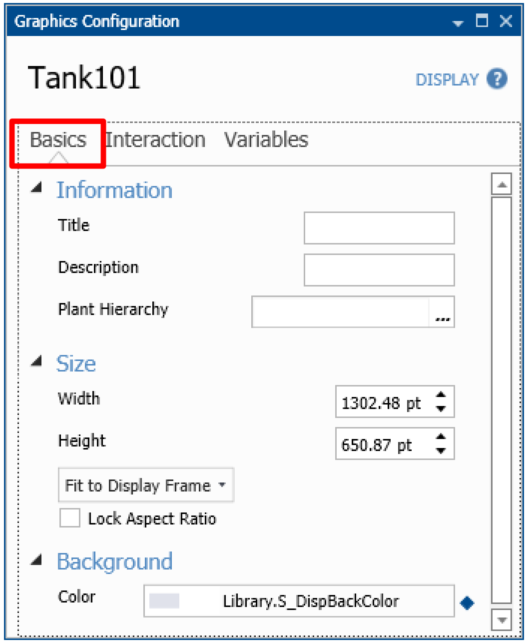
Content Tabs View – Selection

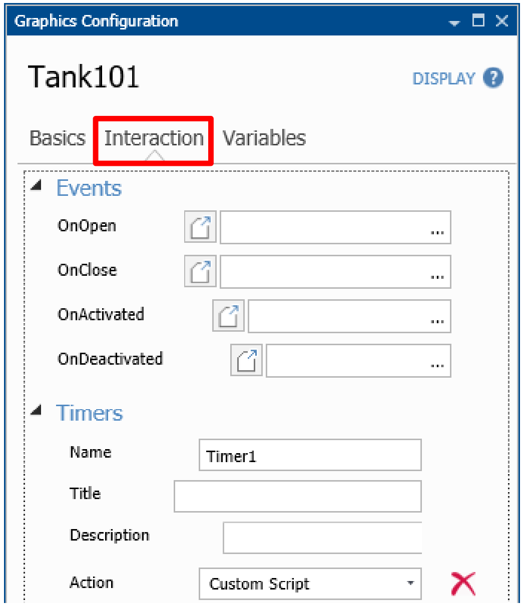
- The Selection pane provides another means for viewing, selecting, and commanding the elements that are currently on the editing canvas.
- The icons beside the objects when clicked, allow the user to:
  - Make an object invisible 
  - Lock or anchor and element in its current position 
- The search bar on top can be used to find objects faster.

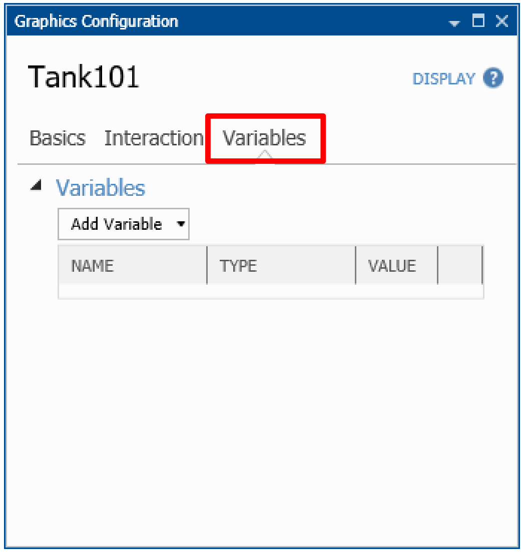


Content Tabs View – Graphics Configuration

The Graphics Configuration pane can be used to rename displays or a selected object and to configure its properties. The properties are organized into tabs, such as Basics, Interaction, and Variables. Each tab then divides the properties into groups, such as Information, Size, Background.

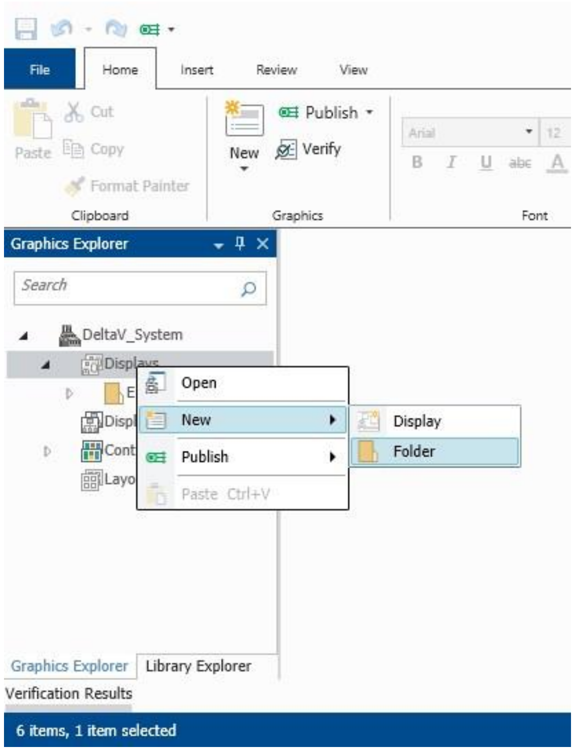






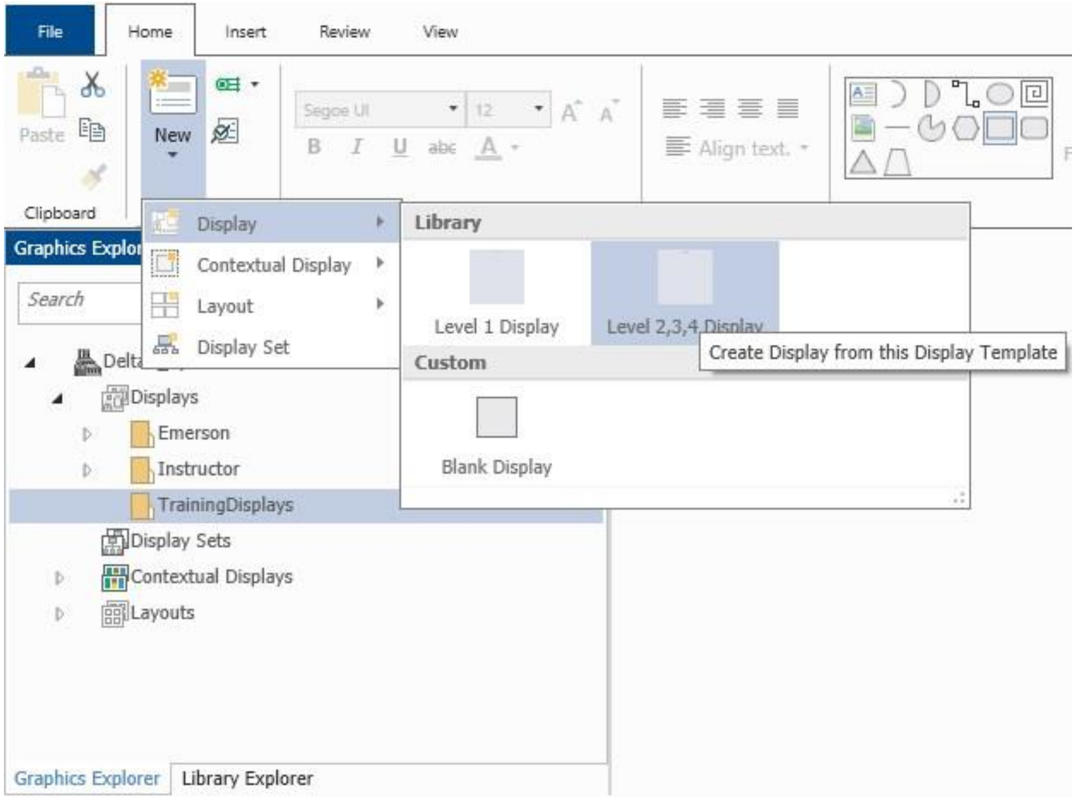
Creating a New Folder

Folders can be created in the Displays section of the Graphics Explorer pane to organize and save displays.



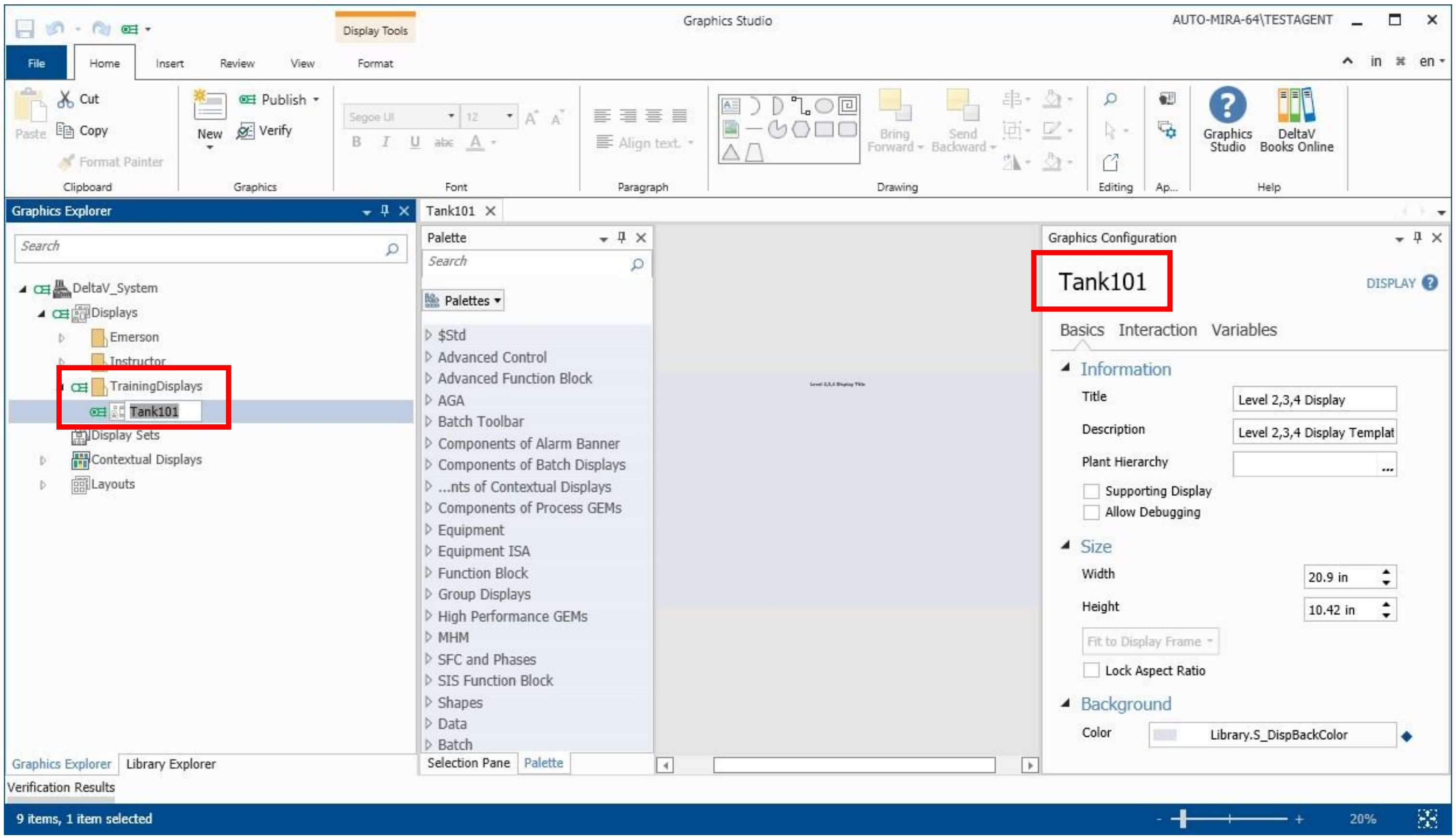
Creating a New Display from a Template

To create a display using a template, go to the *Home* tab, click on the *New* button, highlight *Display,* and select either a *Level 1 Display* or *Level 2, 3, 4 Display*.



Creating a New Display

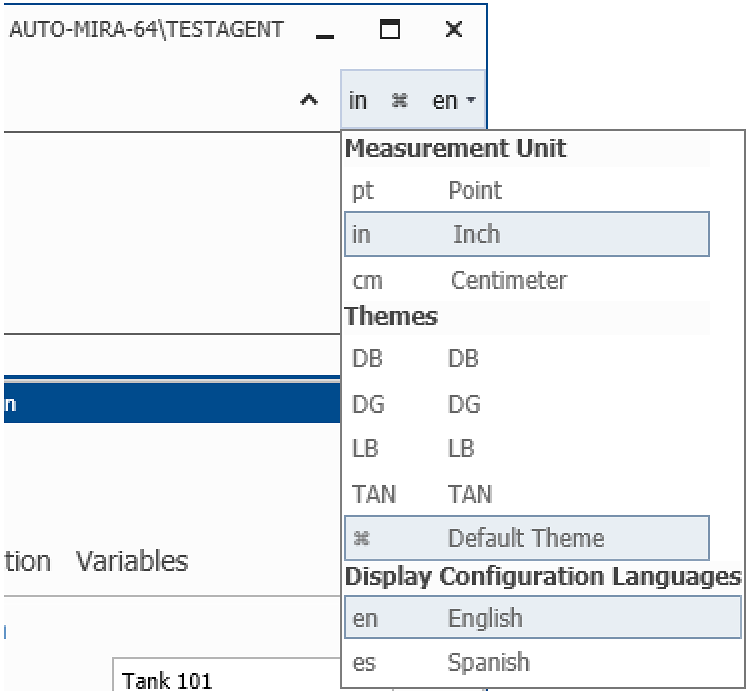
Rename the Display from the Graphics Explorer pane in the Explorer View or from the Graphics Configuration pane in the Content Tabs View.



Changing Themes in Graphics Studio

The Application preferences menu allows you to change *Themes* in the configuration environment. DeltaV Themes include:

- DB – Dark Blue
- DG – Dark Grey
- LB – Light Blue
- TAN
- Default Theme - Silver



Workshop – Creating a New Folder and Display

Create a New Displays Folder

Create a New Display from a Template

Workshop - Creating a New Folder and Display

Step 1. In Graphics Studio, select the *Graphics Explorer* pane and find the *Displays* section.

Step 2. Right-click on the *Displays* section and select *New* → *Folder*

Step 3. Rename the folder *Folder1* to *TrainingDisplays.*

Step 4. From the Home Ribbon, select…
New → *Display* → *Library* → *Level 2,3,4 Display*

Step 5. Rename the new display to Tank101.

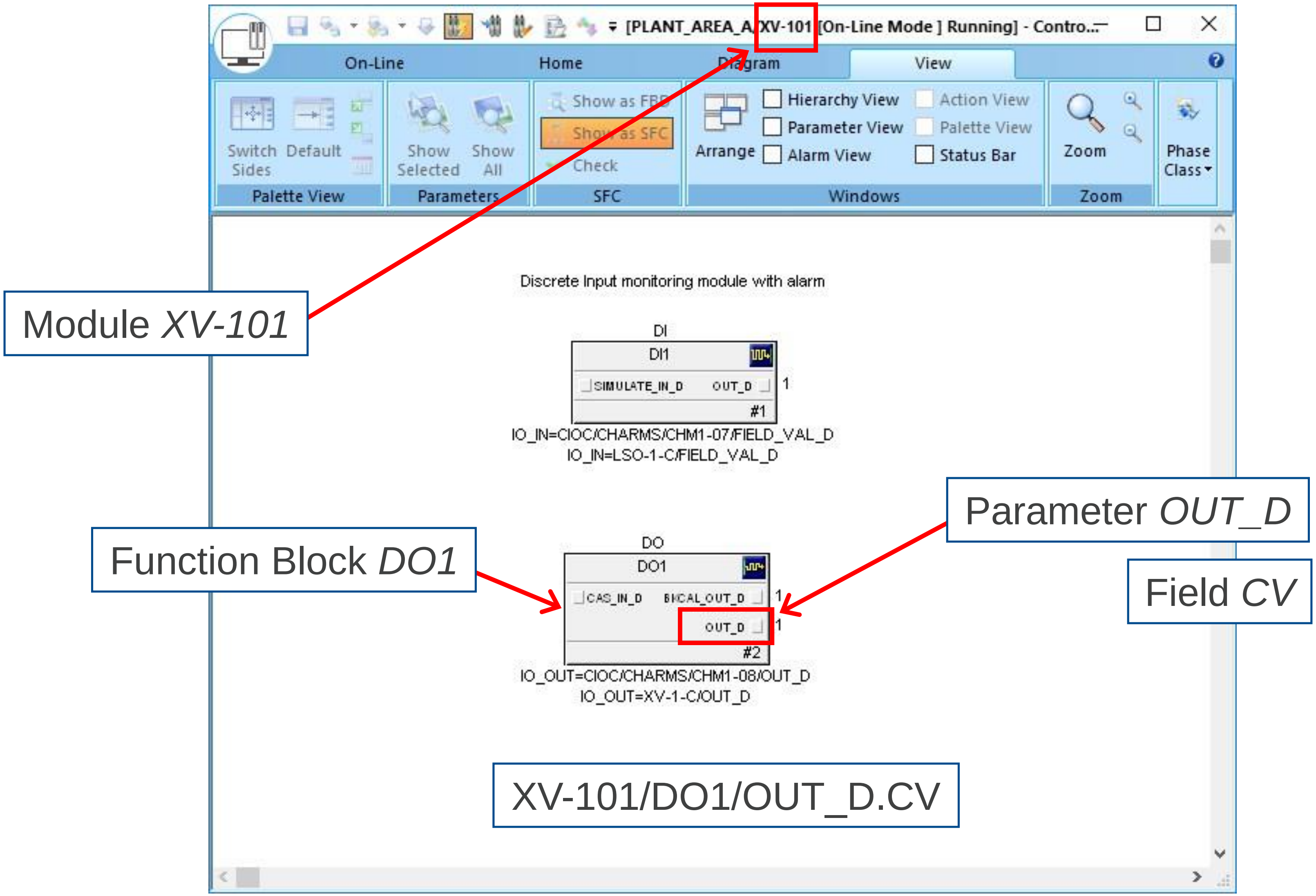
Step 6. In the Graphics Configuration pane, click on the Basics tab and enter the following information:

Title: My Tank 101
Description: Tank101 process display

Step 7. Save the Display.

Workshop Complete

Parameter Path



DeltaV Live Parameter Path Syntax

The parameter path is DataServer[“Module/Block/Parameter.Field”]

For example:

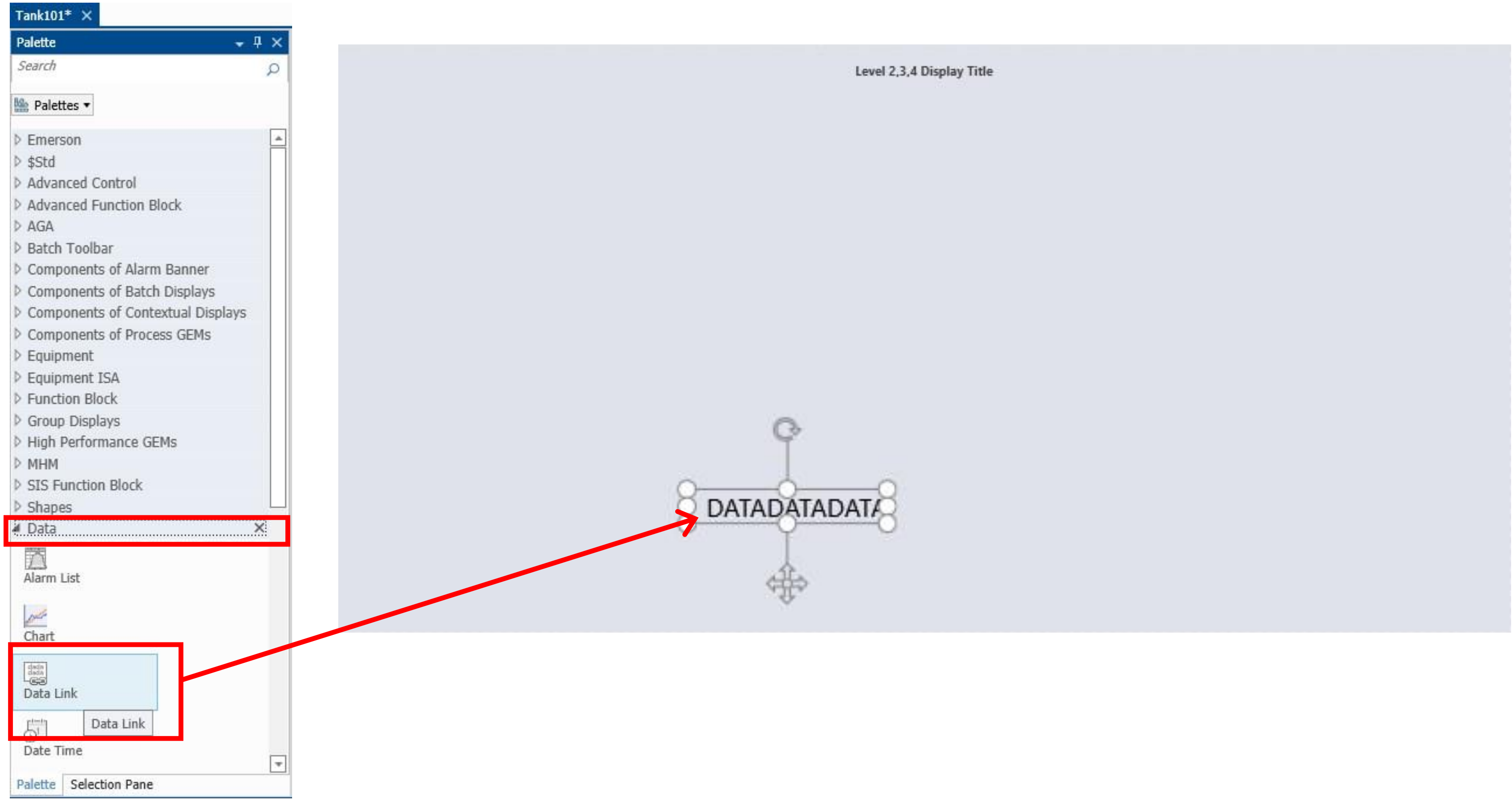
DLSYS[“XV-101/DO1/OUT_D.CV”]

where:

- DLSYS is a mandatory and case-sensitive prefix for DeltaV Live
- DeltaV parameter path string is a fully resolved path to a DeltaV parameter.

Adding a Data Link

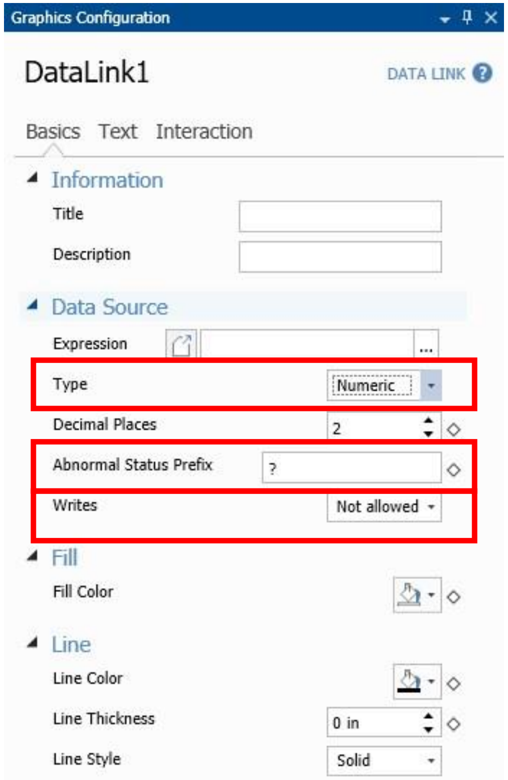
Drag and drop a data link element under *Data* from the Palette pane into the Content pane to create an instance of the element.



Configuring a Data Link

In the Graphics Configuration pane, select the Basics tab.

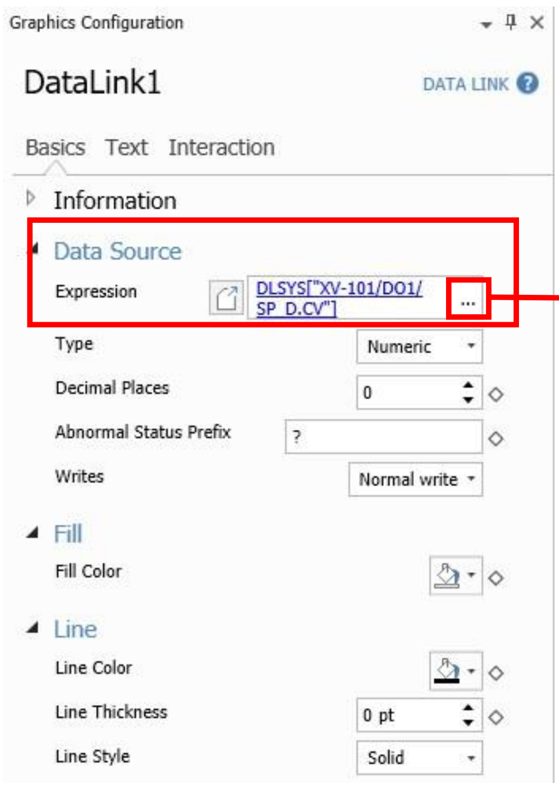
Select the data link type (the type of data the Expression references). Each data link type includes a different set of configurable properties.

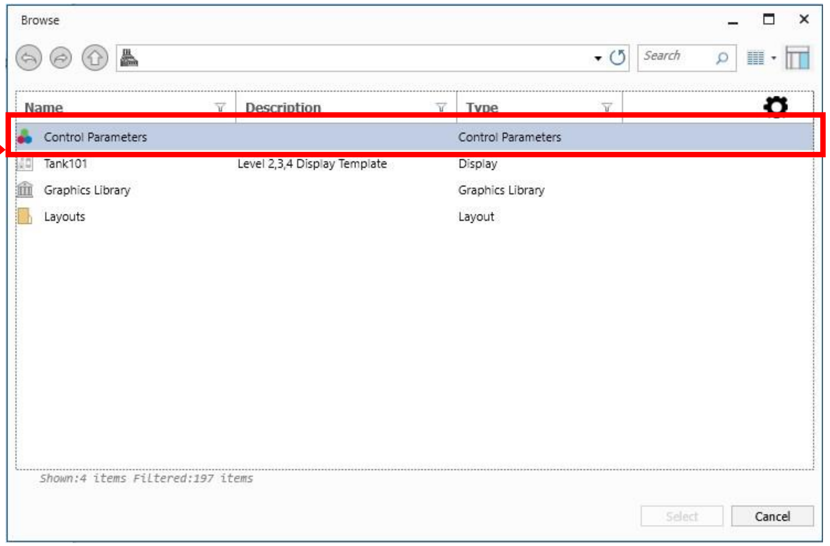


- *Type*
  - Options – String, Numeric, Scaled Named Set, Mode, Scaling
- *Abnormal Status Prefix*
  - String value to be displayed when the data status is abnormal
- *Writes*
  - Not allowed
  - Normal write
  - Normal write with confirmation
  - SIS write

Configuring a Data Link

Click the … (ellipsis) symbol inside the Expression box under the Data Source to browse for the parameter to be used.





Workshop – Adding Data Links

Add Data Links to the Display

Browse for parameters

Workshop – Adding Data Links

Step 1. Click on the *Palette* pane and expand the *Data* section.

Note: You can also use search on top of the Palette and type “Data Link”.

Step 2. Drag and drop a Data Link element 

to Tank101.

Step 3. From the Graphics Configuration Pane, under *Basics* → *Data Source* → *Type,* set to Numeric.

Step 4. Click on the ellipsis symbol on the *Expression* box to browse for the DeltaV parameter path string.

Step 5. Double-click on *Control Parameters* → *Module Parameters* to browse for XV-101/DO1/SP_D.CV.

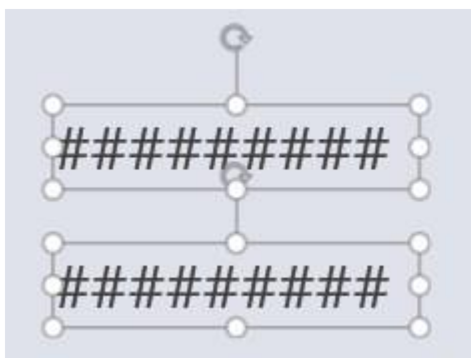
Step 6. Change the following Data Source fields as follows:
Decimal Places – 0
Writes – Normal write

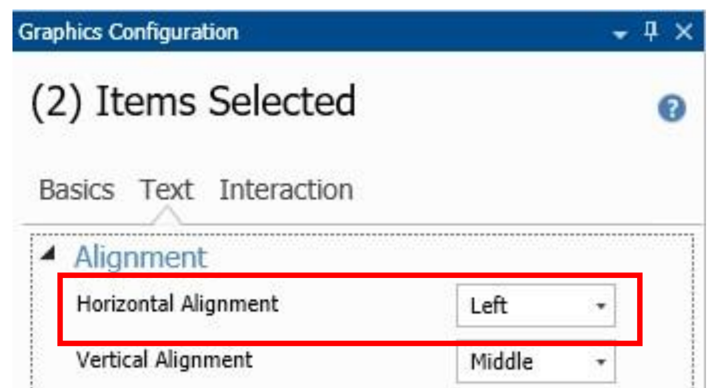
Workshop – Adding Data Links

Step 7. Drag and drop another data link element for XV-101/DI1/PV_D.CV.

Step 8. Click or highlight both data links and select the Text tab on the Graphics Configuration pane.

Step 9. Change the Horizontal Alignment to “Left”.





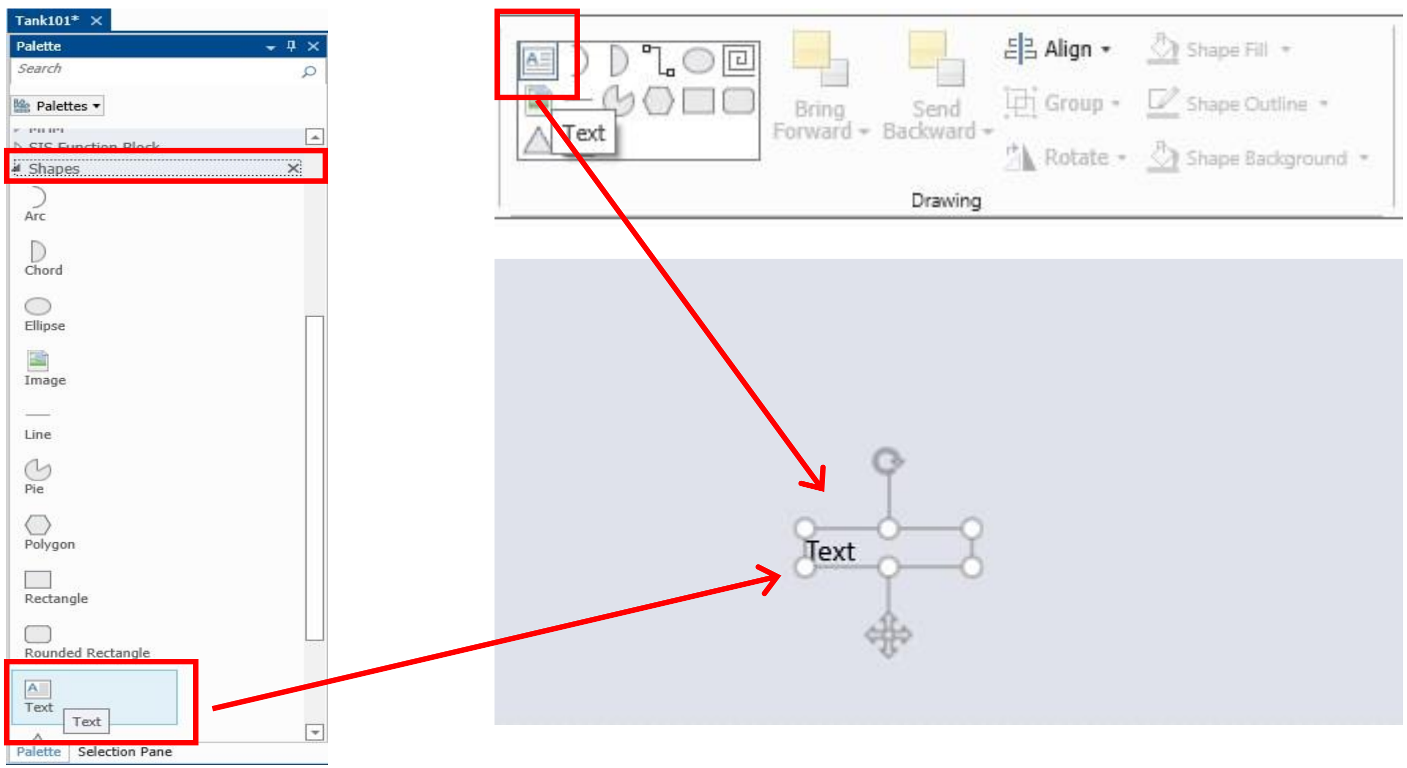
Step 10. Save the display.

Workshop Complete

Adding Text

Drag and drop a Text element under *Shapes* from the Palette pane into the Content pane to create an instance of the element. Or,

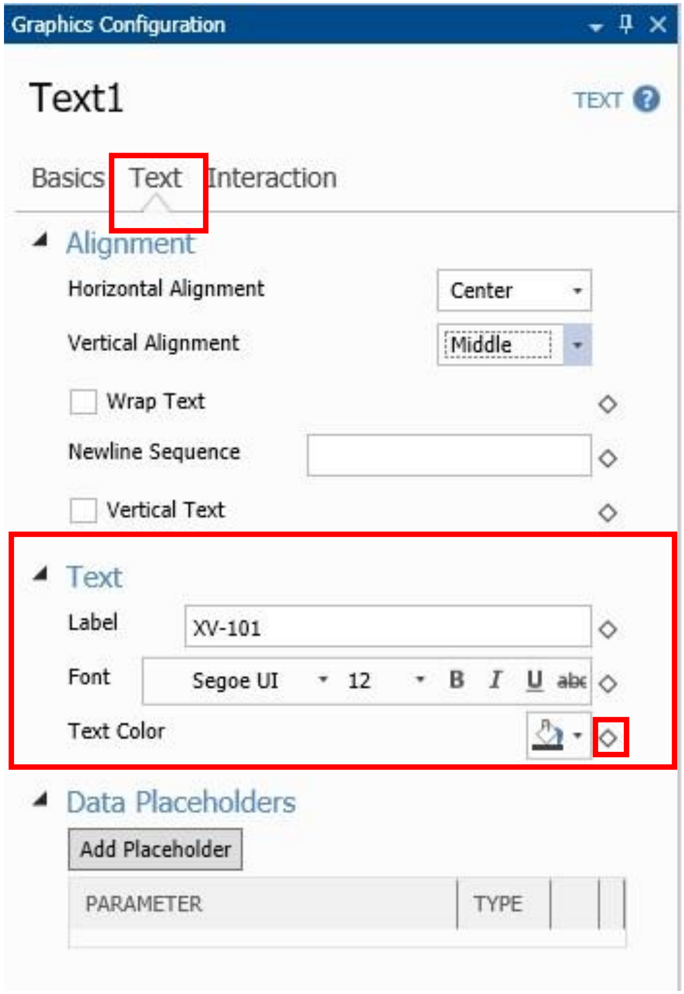
Click on the Text icon from the *Home Ribbon* → *Drawing,* then click on the editing canvas on the Content pane.



Configuring Text

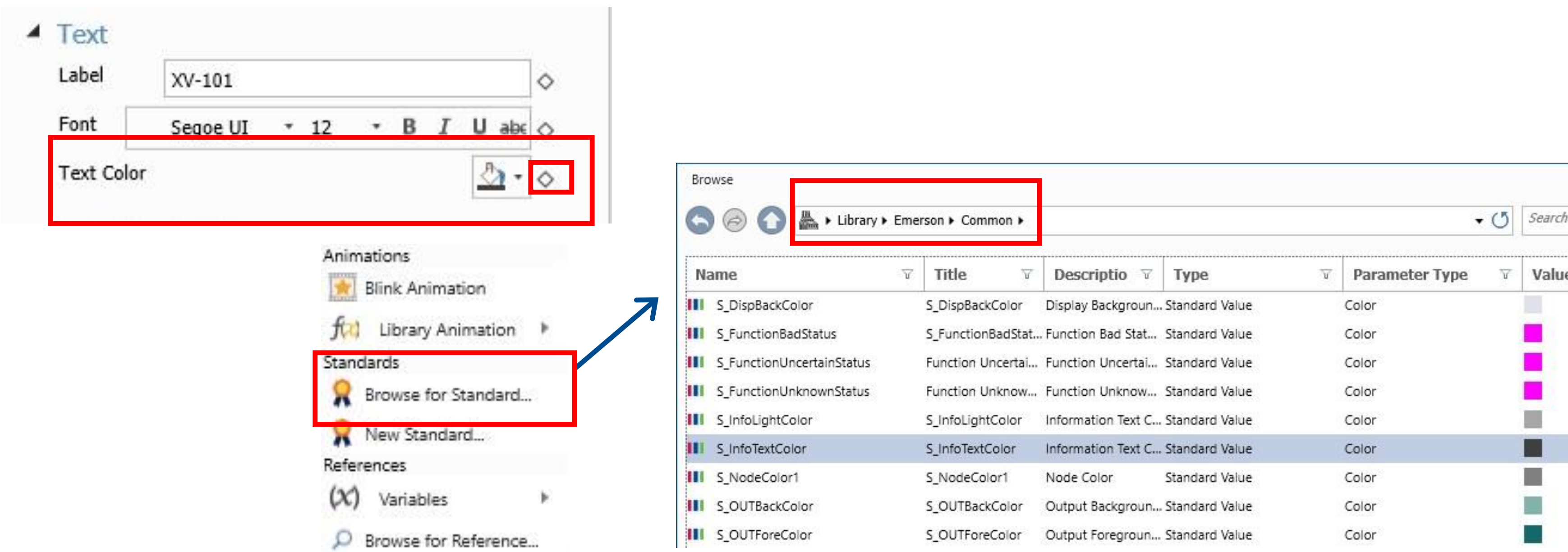
To configure the caption, select the Text tab:

- *Label* – Enter the text to display
- *Font* – Select the font type, size, and style for the label
- *Text Color* – Select the color for the label's text.
- *Diamond icon* – allows additional menu options such as:
  - Animations
  - Standards
  - References



Changing Text Color

The text color for Data Link and Text elements may be manually specified as a static color using the drop down option. Or, use a preconfigured color defined under standards for commonly used and similar objects by clicking on the diamond icon, ◇.

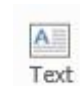


Workshop - Adding and Customizing Text

- Add text to the Display
- Customize the text on the Display
- Change colors of text and data links on the Display
- Change Themes using the Application Preferences Menu

Workshop - Adding and Customizing Text

Step 1. Click on the *Palette* pane and expand the *Shapes* section.

Step 2. Drag and drop a Text element 

to Tank101.

Step 3. With the text selected, click the Text tab from the Graphics Configuration Pane.

Step 4. Change the Label to SP.

Step 5. Change the Text Color by clicking on the diamond icon,

Step 6. Click *Browse for Standard…*

Step 7. Browse to *Emerson* → *Common* → *S_InfoTextColor.*

Step 8. Add a text for labelling the data link for XV-101/DI1/PV_D.CV and change the color following steps 1-8.

Workshop - Adding and Customizing Text

Step 9. Click or highlight both text boxes and select the Text tab on the Graphics Configuration pane.

Step 10. Change the Horizontal Alignment to “Right”.

Step 11. Use the Alignment tools on the Home tab from the ribbon to align the text with the data links.

Step 12. Click or highlight both data links and select the Text tab on the Graphics Configuration pane.

Step 13. Change the Text Color for the two data links for XV-101 to *S_InfoTextColor* (step 5-7).

Step 14. From the Application preferences menu, change the Theme to Dark Grey and observe what happens.

Step 15. Save the display.

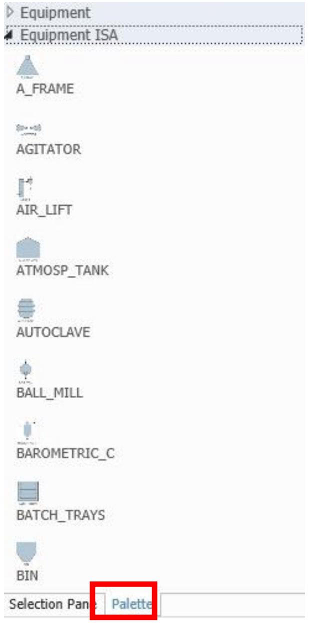
Workshop Complete

GEMs

GEMs are complex graphic elements used to represent process control equipment or other objects on a display.

DeltaV Live comes with several out-of-the-box GEM sets that can help with faster creation of displays. Some of these GEM sets are:

- Advanced Control
- Advanced Function Block
- Equipment
- Equipment ISA
- High Performance GEMs
- Batch

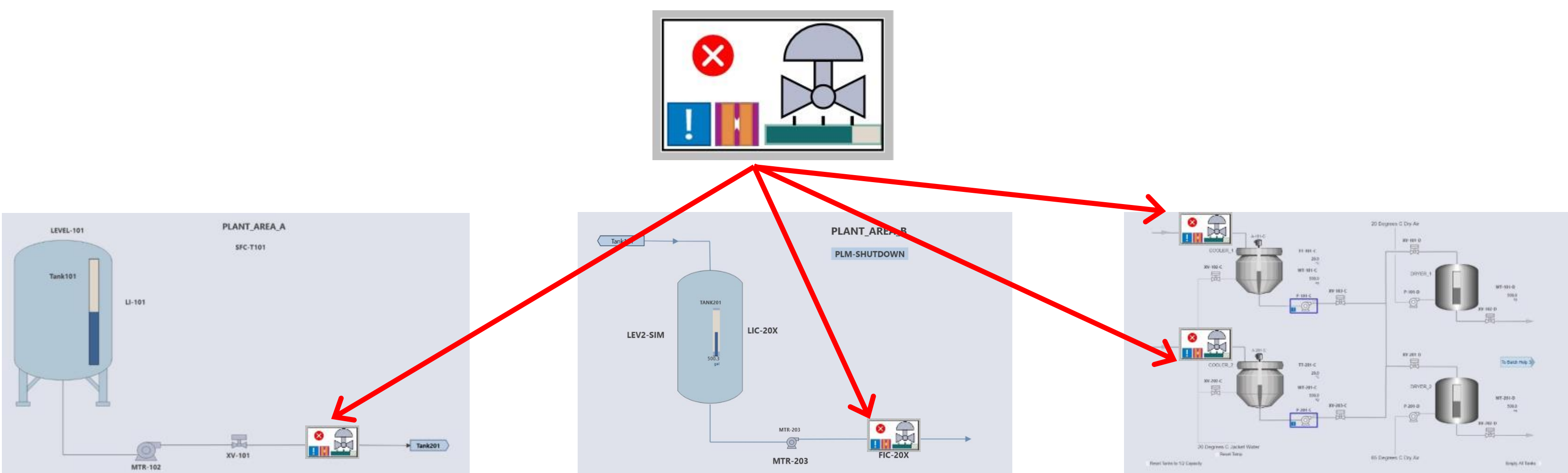


GEM Classes

DeltaV Live supports GEM Classes providing a means to define common appearance and behaviors for the linked GEMs from a GEM Class.

When a GEM class is modified and saved, all GEMs linked to it are immediately updated with the changes.

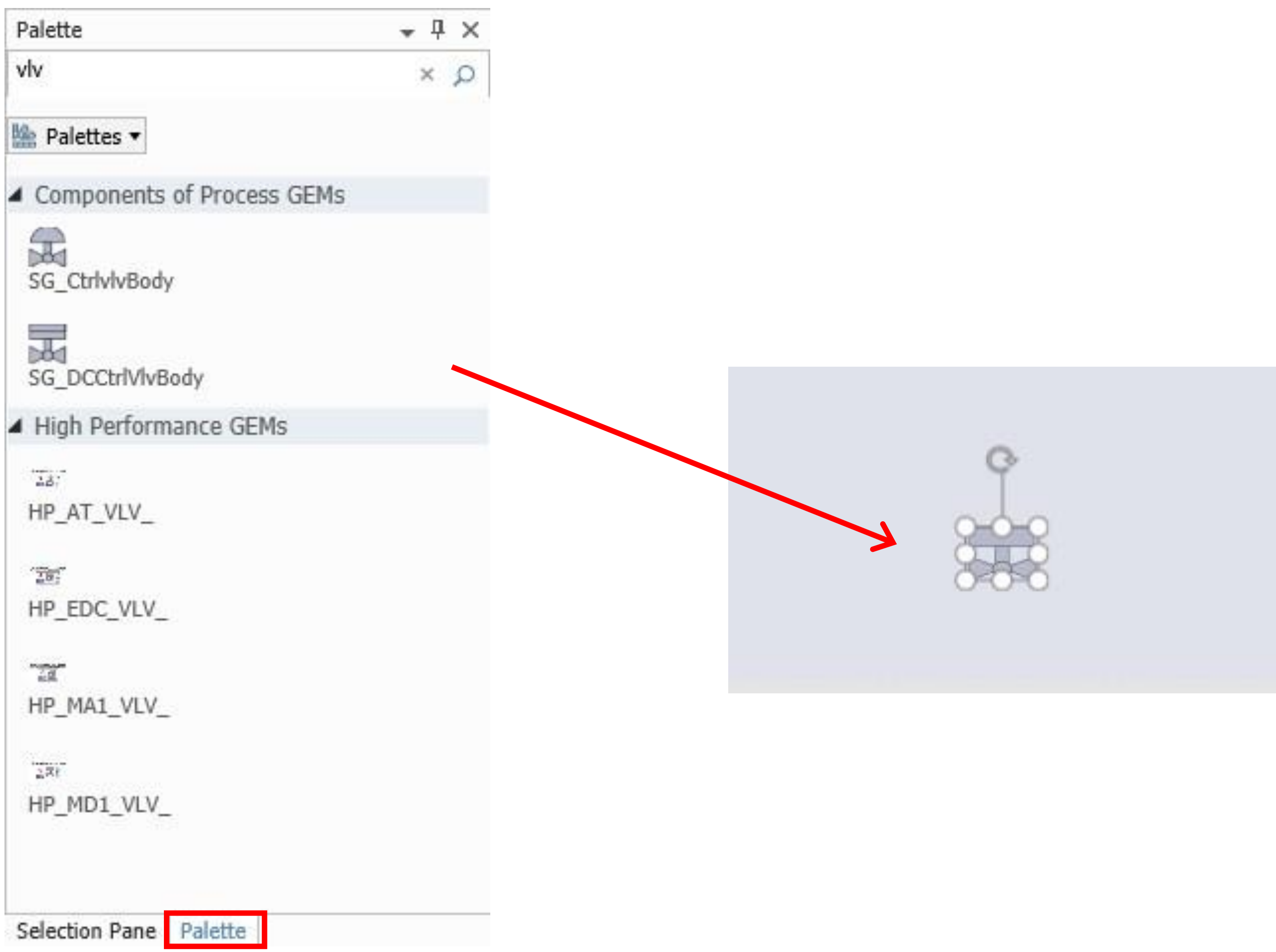
GEM Class



Display 1 Display 2 Display 3

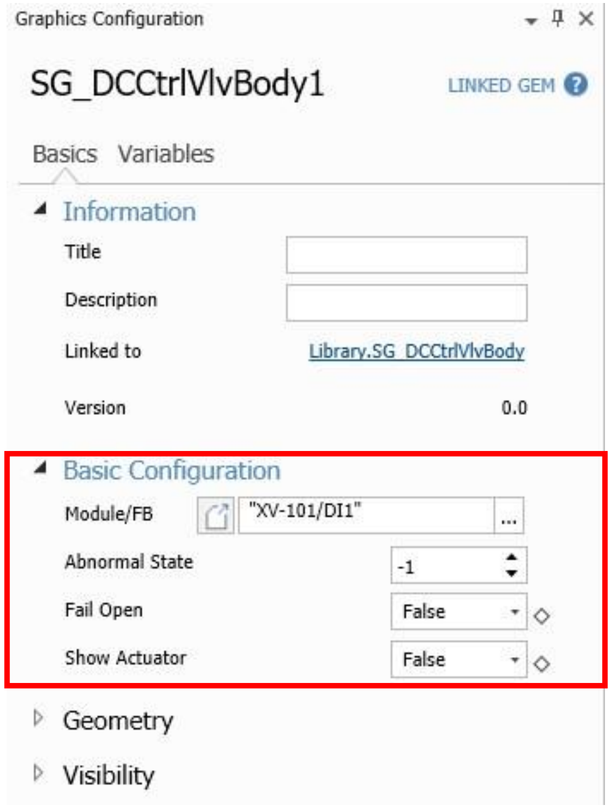
Adding and Configuring a GEM

Add a GEM to a display by dragging and dropping from the Palette.



Adding and Configuring a GEM

Configure the properties of the GEM on the Graphics Configuration Pane under the *Basics* tab → *Basic Configuration*.



Workshop - Adding and Configuring a GEM

- Add a valve GEM to the Tank101 Display
- Configure the GEM to reference XV-101

Workshop - Adding and Configuring a GEM

Step 1. Click on the *Palette* pane and expand the *Components of Process GEMs* section.

Step 2. Drag and drop a valve GEM, SG_DCCtrlVlvBody 

, to Tank101.

Step 3. With the GEM selected, change the *Basic Configuration* property of Show Actuator to False.

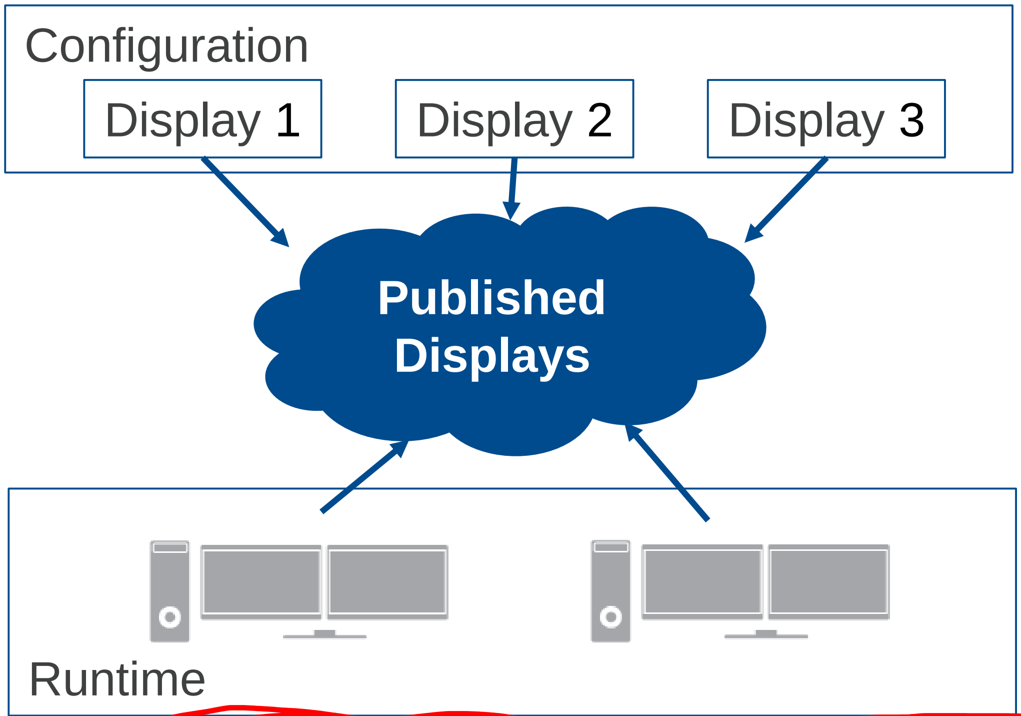
Step 4. Change the Module/FB to “XV-101/DI1”.

Step 5. Save the Display.

Workshop Complete

Publishing Graphic Configurations

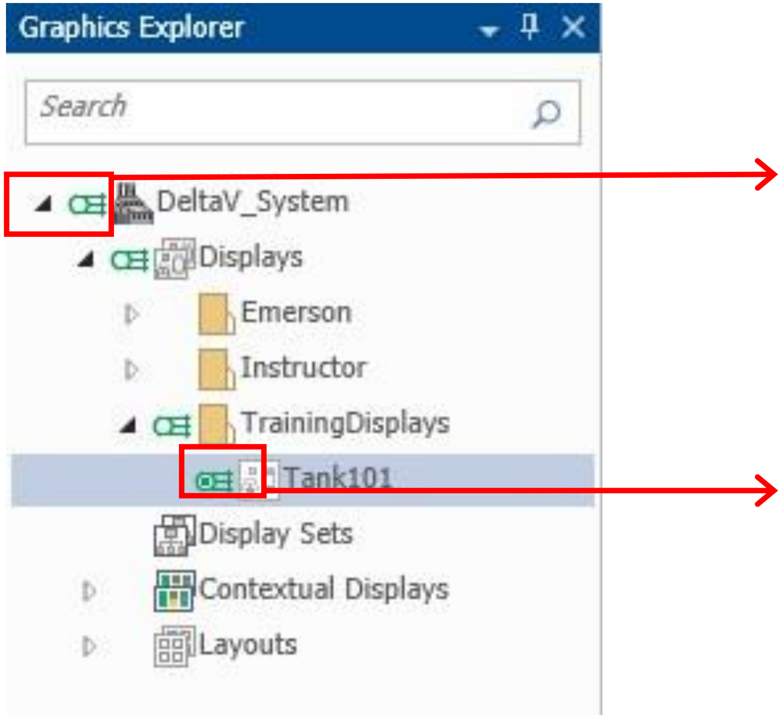
Publishing – a command initiated by users, authorizes graphics configurations and DeltaV Live workstations to be deployed for use online and on all DeltaV Live workstations that should have it locally.



Updates are not available in DeltaV Live prior to publishing.

Publishing Graphic Configurations

Every time a change is saved on a display, Graphics Studio will identify the objects that are pending deployment/publishing.

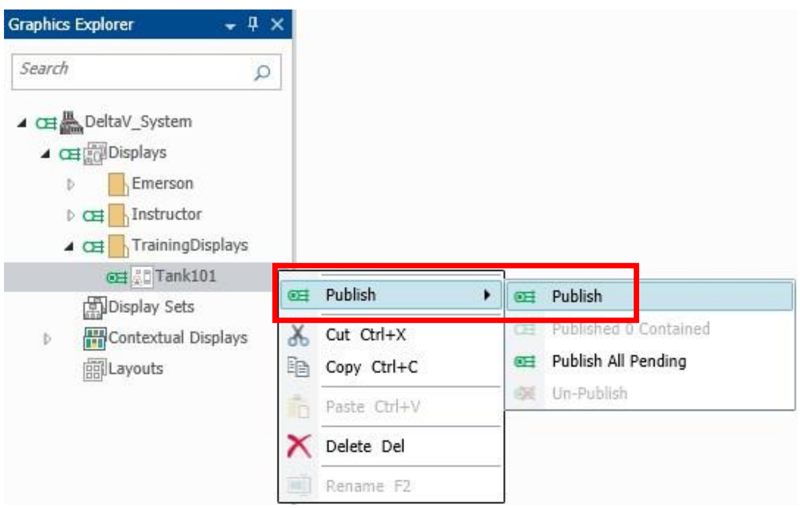


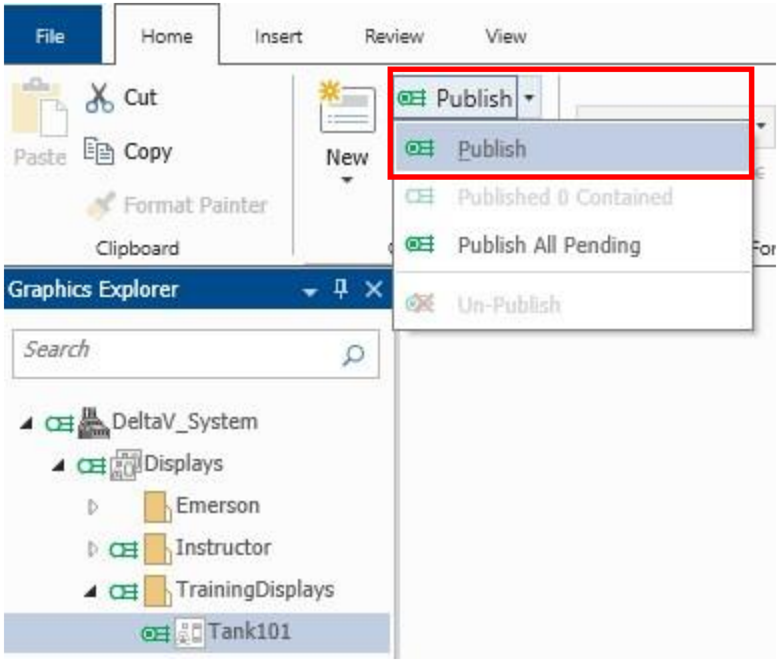
- This icon indicates that a container or folder has at least one item/configuration with changes that are pending to be published.
- The publish pending icon indicates a configuration has been added or modified but is not yet available in DeltaV Live.

Publishing Graphic Configurations

To *Publish* the display or the changes made to a display, right-click on the display and select *Publish.* Or,

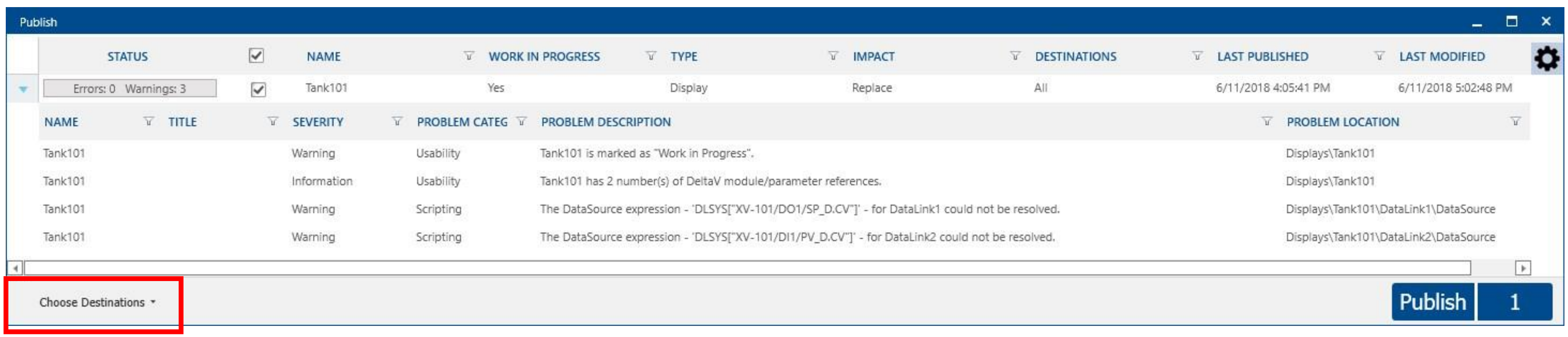
Select the display and click on the *Publish* button on the *Home* ribbon.





Publishing Graphic Configurations

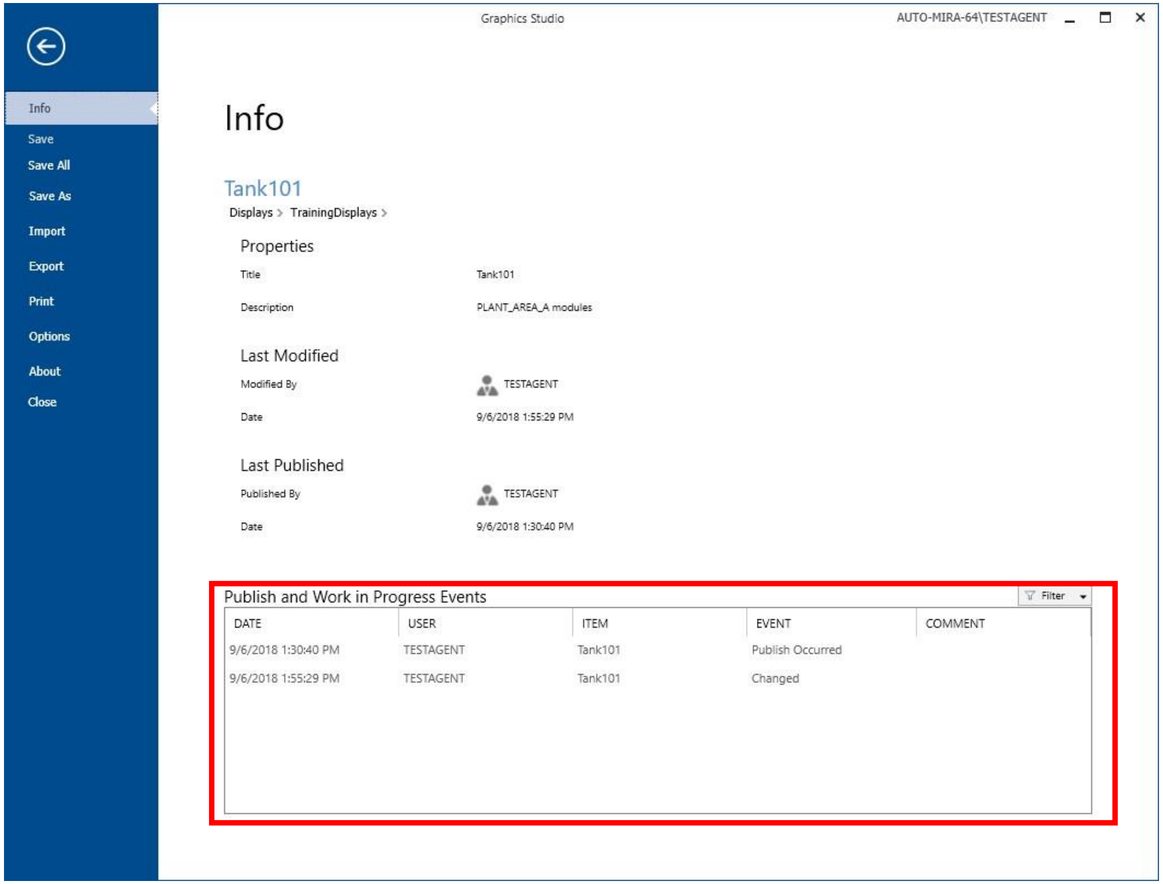
When you select a Publish command, the Publish dialog opens with the eligible displays to publish. You can also select the workstations that will receive a copy of the display by clicking on the *Choose Destination* button.



Select the *Publish* button to make the display available in DeltaV Live. After the display has been published, the *Publish* indicator should go away.

Publishing Graphic Configurations

A record of Publish and Work in Progress Events can be accessed from the backstage under Info by clicking on File from the Home Ribbon.



DeltaV Live

DeltaV Live (online) is the environment from which plant operators monitor and control their plant processes.

Access DeltaV Live (online) by selecting ...
Start → *All apps* → *DeltaV Operator* → *DeltaV Live*

Or from
Graphics Studio → *Home Ribbon*→ *Applications*

DeltaV Live

Menu Bar

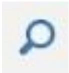
Navigation Bar

Main Display

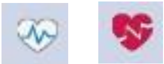
Alarm Banner

DeltaV Live – Menu bar

The *Menu Bar* gives access to several tools and applications to the operator in DeltaV Live.



- *Search* – search for a display. List will be populated with thumbnails of the objects that match the search criteria.



- *Snapshot Errors* – A red color indicates that an error is detected on the operator display. Capture the snapshot in a log file by clicking the icon.

- *Tools* – provides additional options: Print, Reset Layout, Layout Scale, Display Sets, Themes, Languages.

- *Refresh Configuration* – updates the DeltaV Live displays with the latest published version. A yellow asterisk indicates that a new published version is available.

DeltaV Live – Menu bar

The *Menu Bar* gives access to several tools and applications to the operator in DeltaV Live.

- *Switch to Window mode*

- *Switch to Full Desktop mode*

- *Restart or Exit DeltaV Live* – available only in Full Desktop mode

Workshop – Publishing and Operating XV-101

- Publish Tank101 Display
- View Tank101 from DeltaV Live (online)
- Open and close XV-101 from DeltaV Live (online)

Workshop - Publishing and Operating XV-101

Step 1. From Graphics Explorer, right-click on Tank101.

Step 2. Select Publish and click on Publish on the dialog that appears.

Step 3. Launch DeltaV Live from Windows or from the Ribbon's *Home* tab in Graphics Studio.

Step 4. Open Tank101 Display by selecting the drop down list from the Navigation bar. Scroll down and select My Tank 101.

Step 5. Verify that the control module XV-101 is operating properly by manipulating the SP_D datalink and checking that the PV matches.

Step 6. Verify that the color of the valve GEM changes when the PV changes.

Step 7. Verify the alarm on XV-101.

Workshop Complete

Summary

- Define DeltaV Control Module Characteristics
- Create a Discrete Input control module from a template
- Add a Discrete Output function block
- Create a Display from a Template
- Add Data links to a Display

EMERSON

Summary

- Add Static Objects/Text
- Add a GEM
- Publish a Display

Configuring DeltaV Alarms

Module 4

Module Objectives

- Define basic alarm characteristics
- Create a control module using Analog Output
- Define partial download behavior of parameters and critical block values
- Create a control module using Analog Input
- Use Animation for Fill, Blink and Visibility properties of display elements
- Define detailed alarm characteristics
- Define Event Chronicle
- Define Alarm Help

Module Workshops

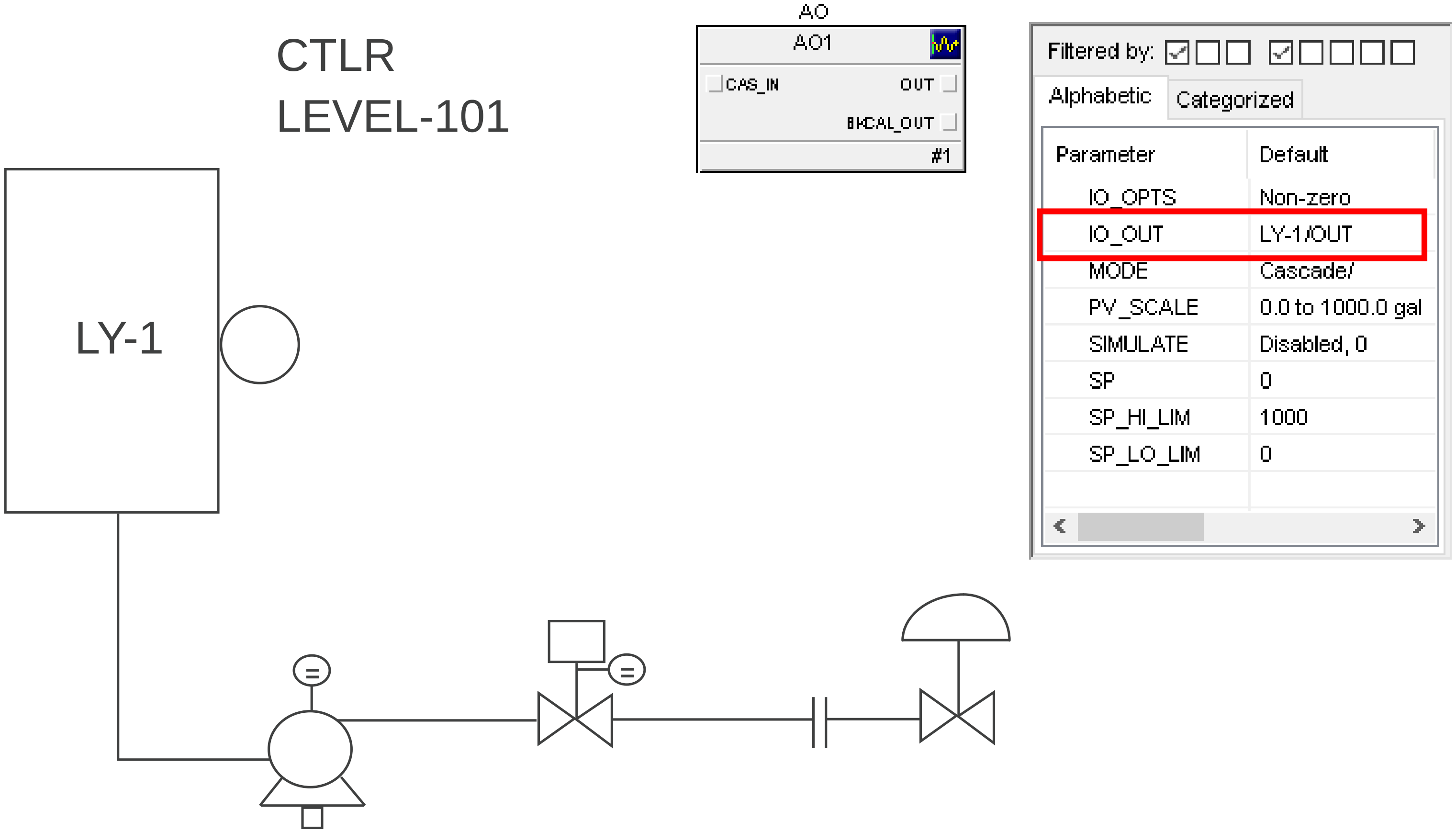
- Creating LEVEL-101
- Creating LI-101
- Add LI-101 & LEVEL-101 to Tank101
- Add Alarm Data links
- ALARMS[1] Parameter
- Creating and Viewing Alarm Help
- Optional – Unsafe Practice Alarm

Workshop – Creating LEVEL-101

- Create a control module and add an Analog Output Function Block
- Define Analog Output Function Block
- Add an Input Parameter

Workshop – Creating LEVEL-101

LEVEL-101 is used solely for simulating level in Tank101.



Continue to the next slide to start creating the LEVEL-101 module.

DV Explorer → new module – open in control studio

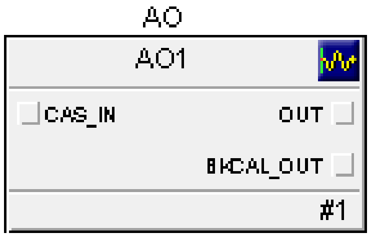
Workshop – Creating LEVEL-101

Use Control Studio to create a new Analog Output module LEVEL-101 in the following manner:

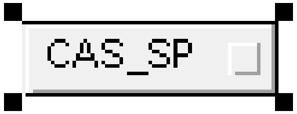
Step 1. Drag and drop an Analog Output function block from the IO palette.

Step 2. Modify the following parameters:

IO_OUT	to	DST *LY-1*
PV_SCALE	to	*0-1000 gal*
SP_HI_LIM	to	*1000*
SP_LO_LIM	to	*0*

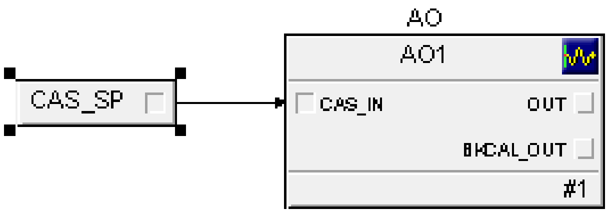


Step 3. Drag and drop an Input Parameter from the Special Items palette and name the parameter *CAS_SP*. The parameter type is Floating Point.



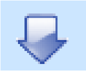
Workshop – Creating LEVEL-101

Step 4. Connect the CAS_SP parameter to CAS_IN on the AO function block.



Step 5. Click the  button to assign the module to your controller.

Step 6. Click the  button to modify properties and the  button to save.

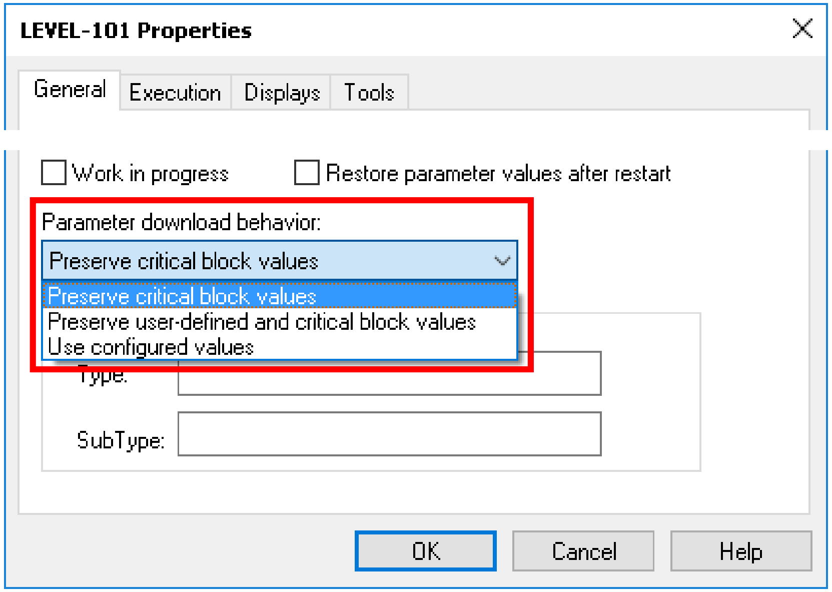
Step 7. Click the  button to download the module to the controller.

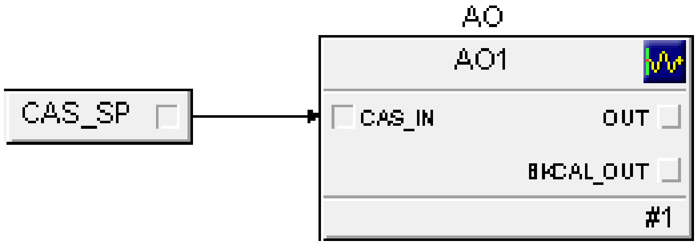
Workshop Complete

Parameter Download Behavior

Module Properties also allow you to define the partial download behavior of a module. This applies to two types of parameters:

- user-defined (ex. CAS_SP)
- critical block parameters (MODE.TARGET, PV, SP,SP_WRK, OUT



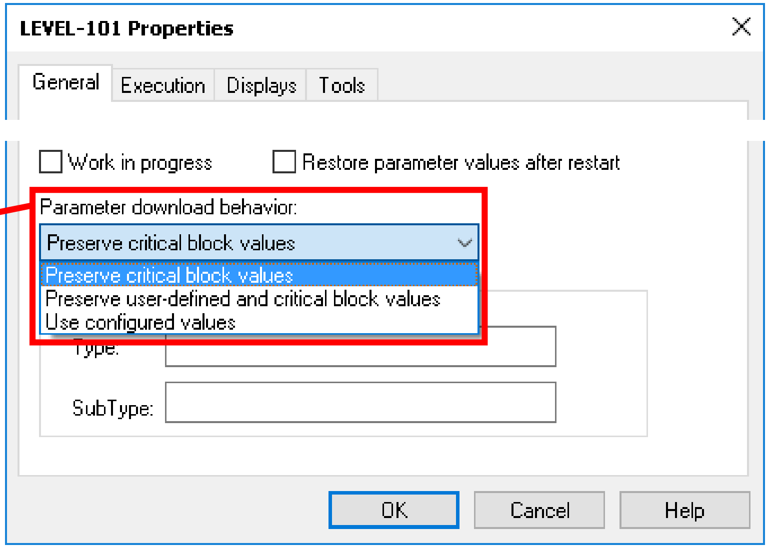


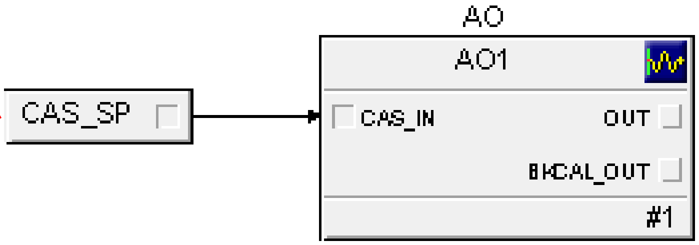
A complete table of critical block parameters can be found in BOL by searching the phrase *downloading data*.

Parameter Download Behavior

The table below shows the different value of CAS_SP and MODE parameters after doing a Partial Download.

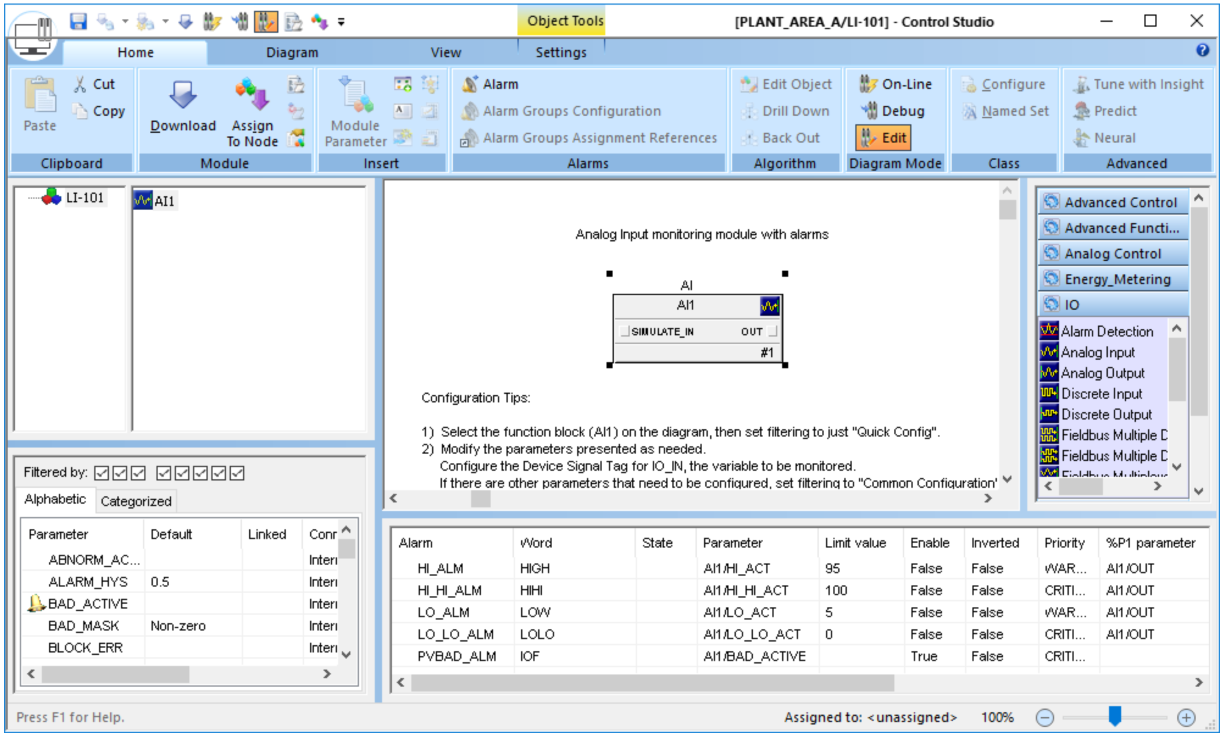
Partial Download behavior	Mode (critical block value)	CAS_SP (user-defined)
Configuration database	CAS	500
On-line Value	AUTO	555
Preserve critical block values	AUTO	500
Preserve user-defined and critical block values	AUTO	555
Use configured values	CAS	500





DeltaV Alarms

A module created from a Module Template may include pre-assigned alarm(s).

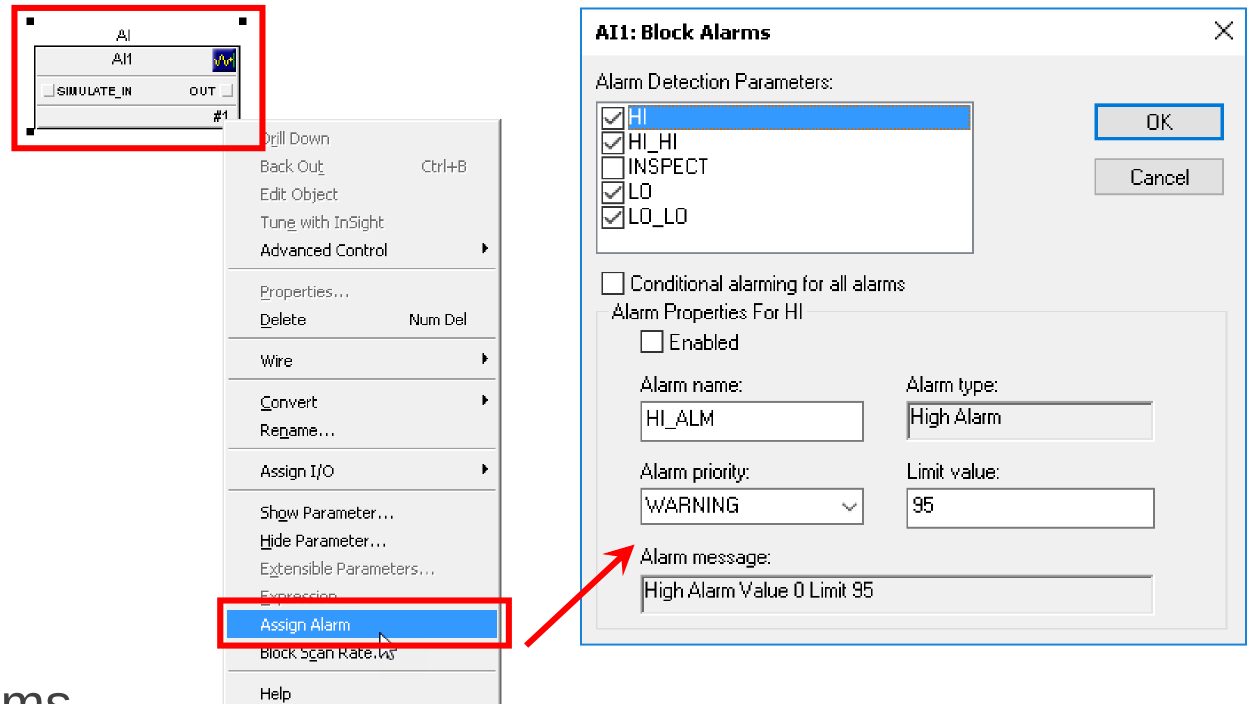


Access DeltaV Alarms from the DeltaV Control Studio by selecting . . .

File → Open → LI-101 (module name)

DeltaV Alarms

Right-click a selected function block to assign an alarm.



DeltaV Alarms

- Represent a Boolean evaluation of a pre-defined process state. For example, *LI-101/AI1/PV > 950*
- Are specific to a module. For example, *LI-101/HI_ALM.A_CV*

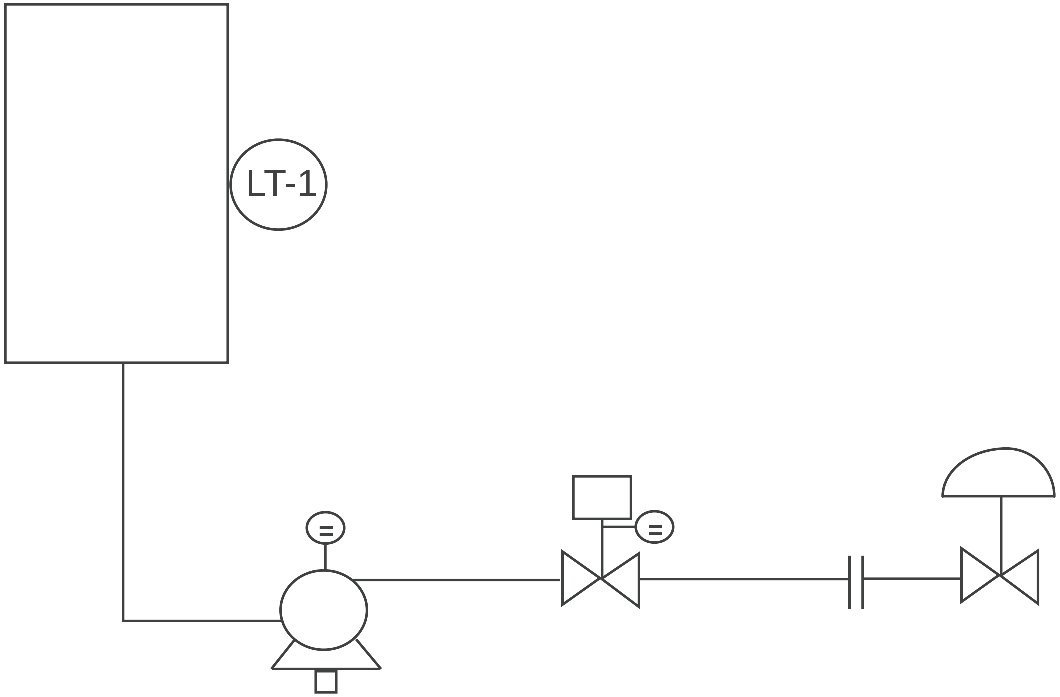
Workshop – Creating LI-101

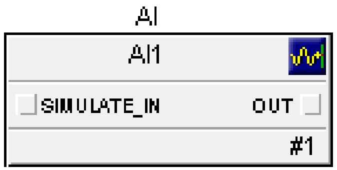
Create a control module using an Analog Template

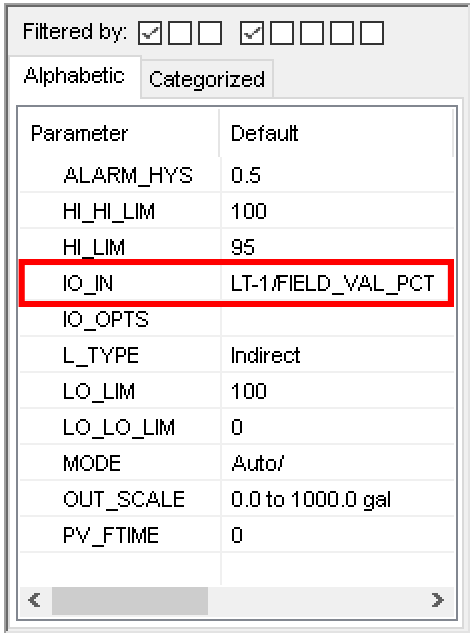
Define Analog Alarms

Workshop – Creating LI-101

LI-101 will provide the level indication of Tank101.







Parameter	Default
ALARM_HYS	0.5
HI_HI_LIM	100
HI_LIM	95
IO_IN	LT-1/FIELD_VAL_PCT
IO_OPTS	
L_TYPE	Indirect
LO_LIM	100
LO_LO_LIM	0
MODE	Auto/
OUT_SCALE	0.0 to 1000.0 gal
PV_FTIME	0

Continue to the next slide to start creating the LI-101 module.

Workshop – Creating LI-101

Use Analog Module templates to monitor the Analog Input in the following manner:

Step 1. Using the DeltaV Explorer, drag and drop the Monitoring - ANALOG Module Template from the Library to PLANT_AREA_A.

Step 2. Rename the module *LI-101*.

Step 3. Launch Control Studio and modify the module as follows:

a. Modify IO_IN to use DST *LT-1*.
b. Modify OUT_SCALE to *0-1000 gal*.
c. Modify HI_ALM limit to *950*.
d. Modify LO_ALM limit to *100*. ✓ to enable
e. Assign to the controller and modify the primary display to *TANK101*.
f. Save the module.
g. Download the module to the controller.

Workshop – Add LI-101 & LEVEL-101 to Tank101

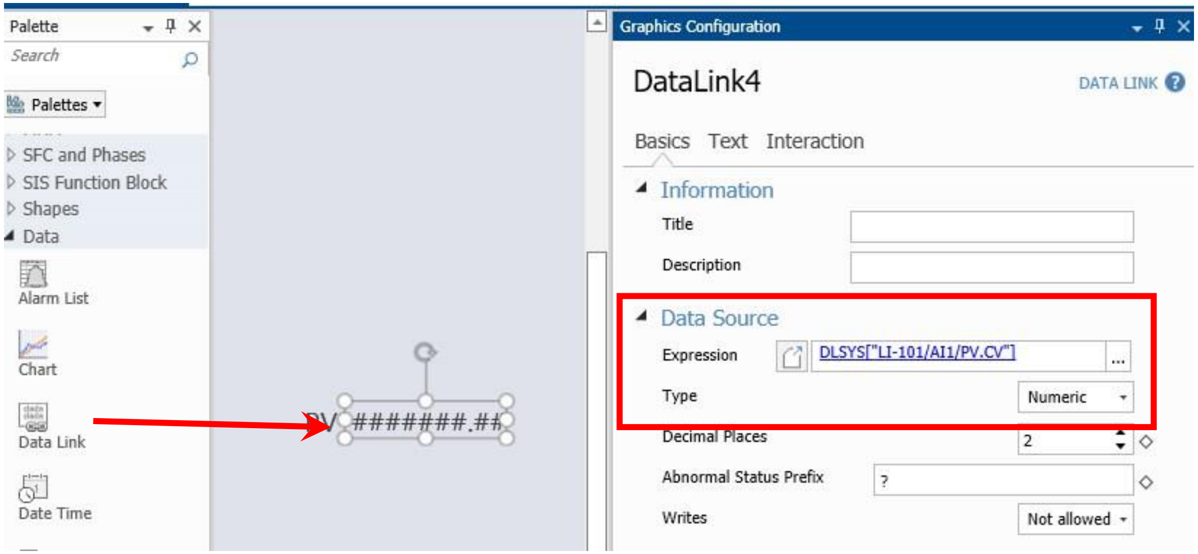
- Add LI-101 and LEVEL-101 data links to the display
- Add a tank Gem to the Display
- Configure the Fill Animation on the Tank
- Verify the Operation of the Analog Modules

Workshop – Add LI-101 & LEVEL-101 to Tank101

Add LI-101 and LEVEL-101 to the Tank101 display in the following manner:

Step 1. In Graphics Studio, open the Tank101 display.

Step 2. Add a data link element and set the Type to *Numeric* before browsing for the Expression *DLSYS["LI-101/AI1/PV.CV"]* , in the Graphics Configuration pane.



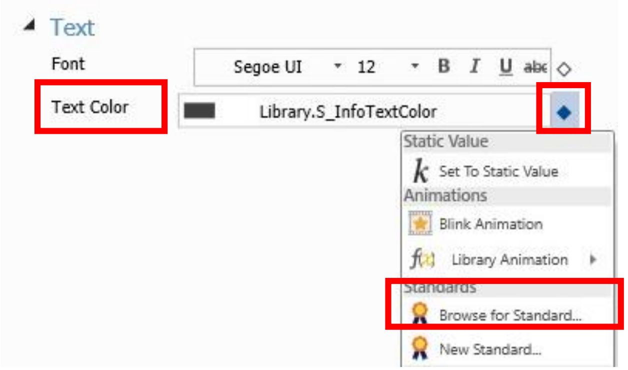
Workshop – Add LI-101 & LEVEL-101 to Tank101

Step 3. Add another data link element from the palette for *DLSYS[“LEVEL-101/CAS_SP.CV”]*.

Note: Make sure to specify the Data Type as Numeric before browsing for the Expression.

Step 4. Select *Normal writes* in the drop down menu for Writes to allow the operator to change the tank level via the CAS_SP parameter.

Step 5. Modify the color of the data link elements as necessary, using the Library Standard, *Emerson→ Common→ S_InfoTextColor*.



Workshop – Add LI-101 & LEVEL-101 to Tank101

Step 6. Add a Tank Gem to the display, ex. TANK_VESSEL2, from the Equipment section in the Palette.

Step 7. Drag and Drop a Rectangle Shape from the *Palette* → *Shapes.*

Step 8. Choose a *Fill Color* and *Background* color from the Graphics Configuration Pane for the rectangle, ex. S_PVForeColor and S_PVBackColor.

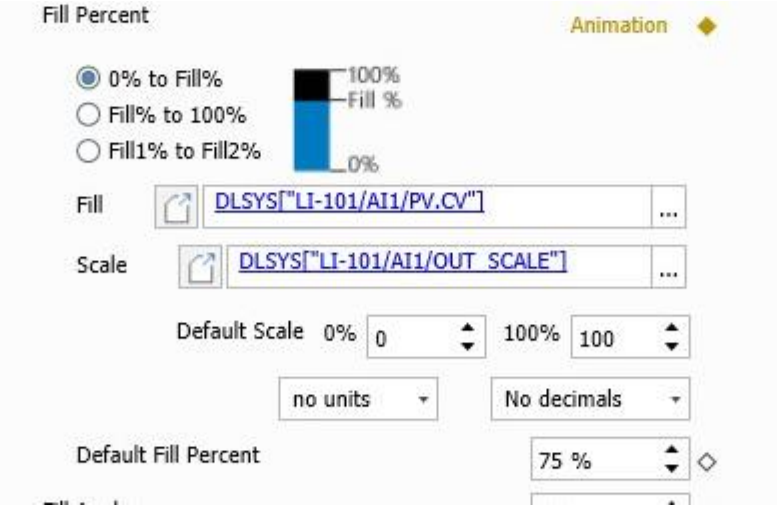
Step 9. Click on the diamond icon for Fill Percent, to launch the diamond context menu, and choose Animation.

Workshop – Add LI-101 & LEVEL-101 to Tank101

Step 10. Choose 0% to Fill% for the Animation.

Step 11. Modify the *Fill* to point to the module *LI-101* and parameter *PV*.

Step 12. Set the Scale to reference *DLSYS[“LI-101/AI1/OUT_SCALE”].*



Step 13. Save then publish the display.

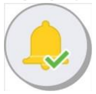
Workshop – Add LI-101 & LEVEL-101 to Tank101

Operate *LEVEL-101* and monitor *LI-101* in the following manner:

Step 14. Switch to the DeltaV Live application.

Step 15. Click Refresh Configuration button  from the menu bar to update the display with the new published version.

Step 16. Verify *LEVEL-101* output manipulates *LI-101* input.

Note: Alarms occurring on LI-101 can be acknowledged by clicking the Acknowledge  *button on LI-101's faceplate.*

Workshop Complete

DeltaV Alarm Priorities

DeltaV Alarm Priorities . . .

- Indicate the importance of an alarm.
- Affect the order alarms appear in the Alarm Banner and the Alarm List Displays in DeltaV Live.
- Maximum of 12 alarm priority levels, numeric values ranging from 4 (lowest) to 15 (highest), and a log-only priority level of 3.

DeltaV Default Alarm Priorities

CRITICAL (15) WARNING (11) ADVISORY (7)

- Time stamped in the controller
- Included in the list of highest ranked alarms
- One to six alarms appear on the Alarm Banner
- May cause audible alarm at the Workstation
- Generate alarm records in the Event Chronicle
- Capture a maximum of two parameters

LOG (3)

- Generate event records in the Event Chronicle
- Capture up to two parameters

DeltaV Alarm Ranking

DeltaV Alarms are ranked in the following manner:

- *Unacknowledged alarms* are more important than acknowledged alarms.
- *Alarms with equal acknowledgment status* – Active alarms are more important than inactive alarms.
- *Alarms with equal acknowledgement status and active status* – alarms with higher priority (numeric) values have greater importance.
- *Alarms with equal acknowledgement status, active status and priority value* – NEWER alarms (i.e., alarms with more recent time stamps) are more important than OLDER alarms.

DeltaV Alarm Summary

DeltaV Live provides an *Alarm List Display* that can be customized from the Graphics Configuration pane in Graphics Studio. The Alarm List Display is accessed by clicking the  icon.

DeltaV Alarm Summary

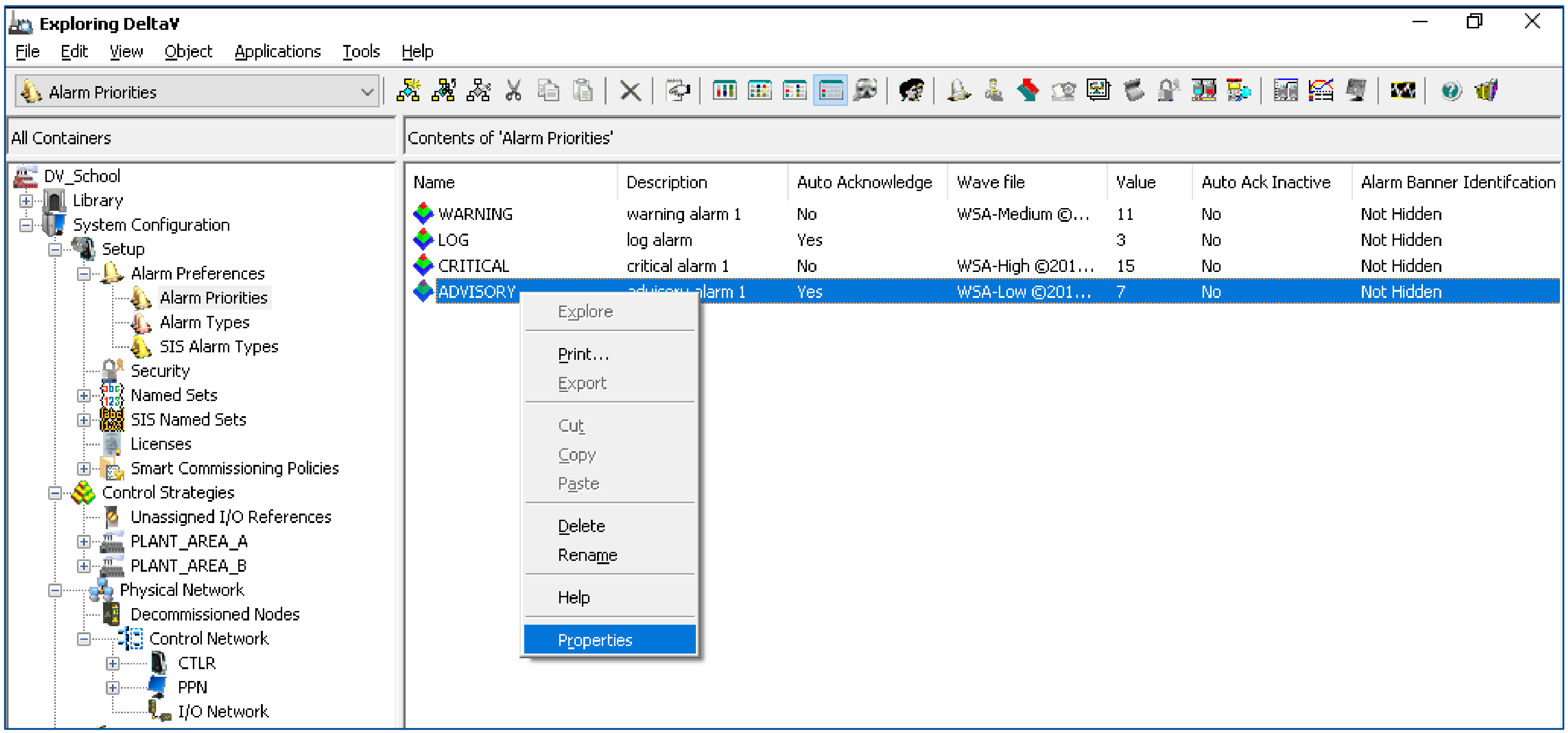
The following are valid Alarm Summary Columns which may appear in the DeltaV Alarm List:

- Ack
- Time In
- Unit
- Module/Param
- Description
- Alarm
- Help
- Message
- Priority
- Area
- Category
- Classification
- Module
- Node
- Param
- Part of
- Time Last
- Zone

DeltaV Alarm Priorities

Access the DeltaV Alarm Priorities definition from the DeltaV Explorer by selecting …

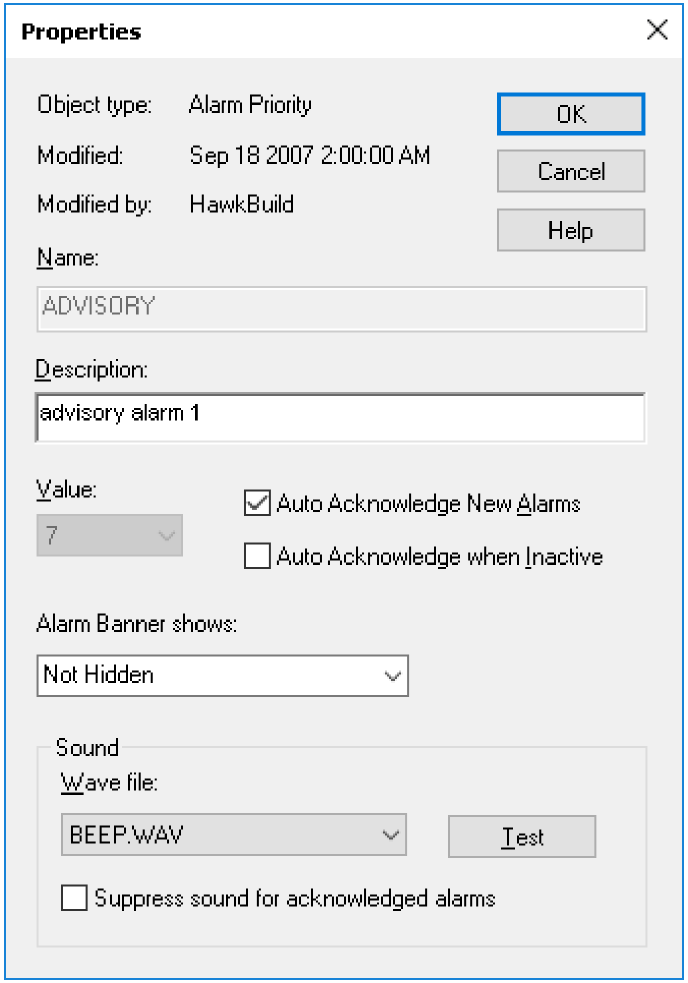
System Configuration → Setup → Alarm Preferences → Alarm Priorities → Right click (i.e., Advisory) → Properties



DeltaV Alarm Priorities

The Alarm Priorities Properties dialog box defines the Alarm Priority:

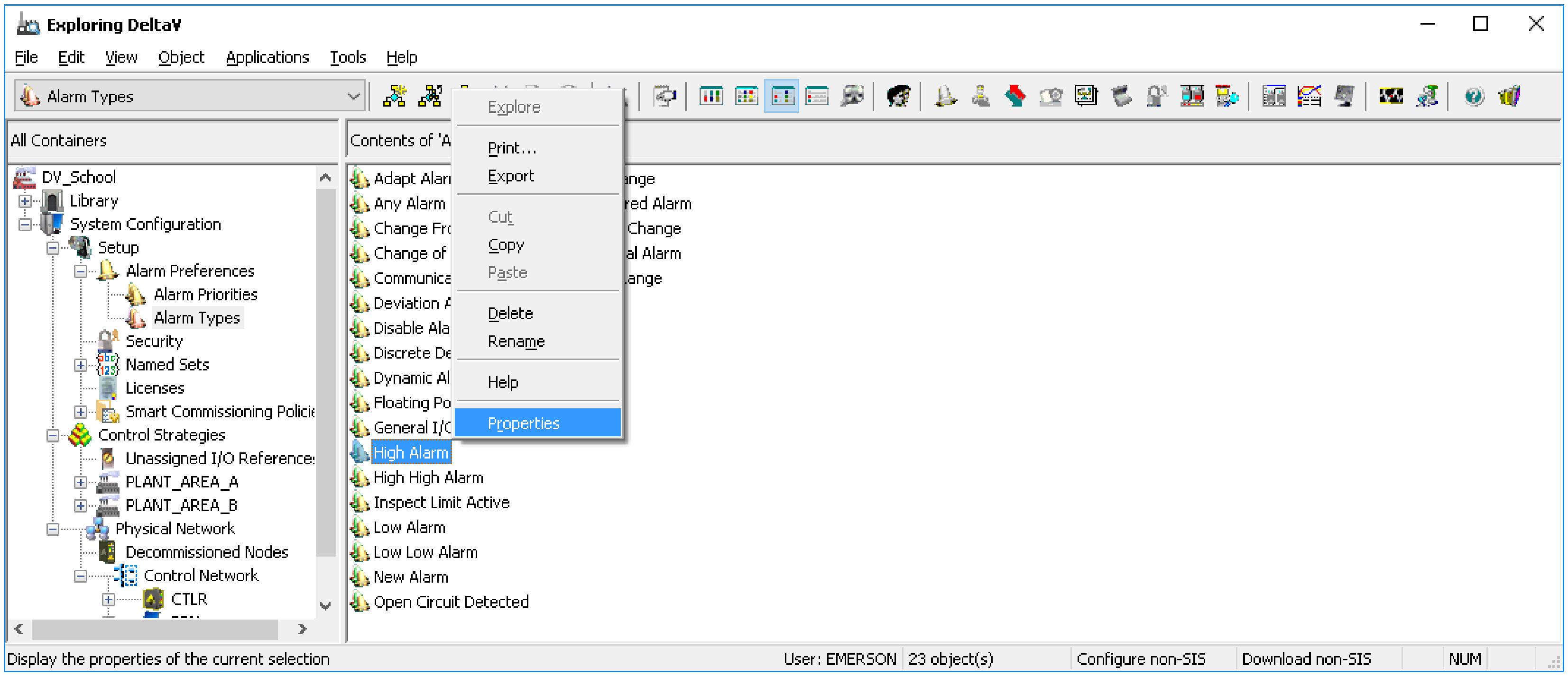
- *Description*
- *Value*
- *Auto Acknowledge New Alarms*
- *Auto Acknowledge When Inactive*
- *Alarm Banner Shows:*
  - Not Hidden
  - Module
  - Unit/Equipment Module
- *Wave File*
- *Suppressed sound for acknowledged alarms*



DeltaV Alarm Types

Access the DeltaV Alarm Types definition from the DeltaV Explorer by selecting …

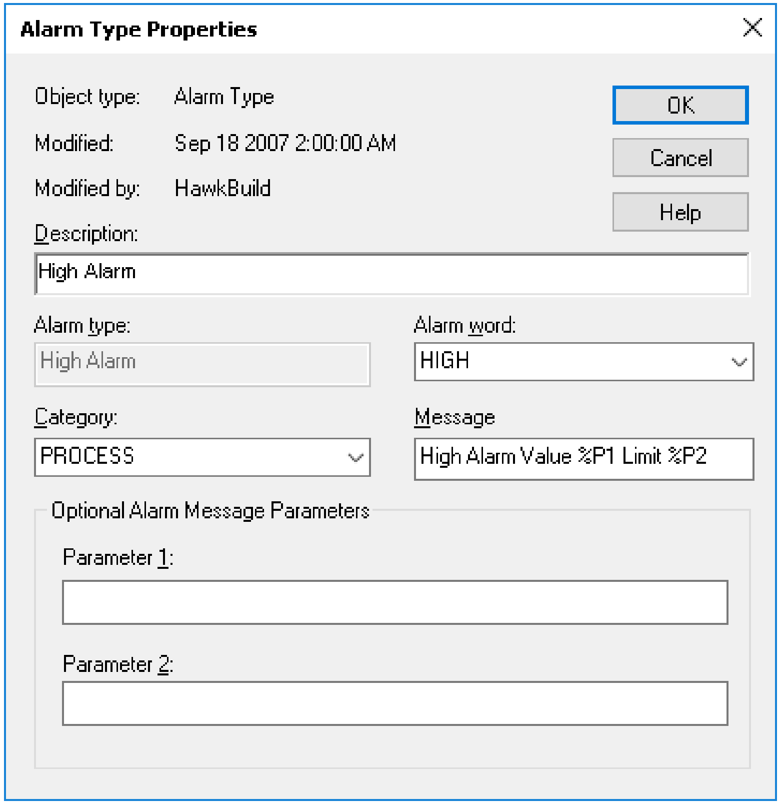
System Configuration → Setup → Alarm Preferences → Alarm Types → Alarm Type (i.e.,High Alarm) → Properties



DeltaV Alarm Type

The Alarm Types Properties dialog box defines alarm characteristics by alarm type:

- Description
- Alarm Type
- *Alarm Word*
- *Category*
- *Message*
- *Optional Alarm Message Parameters*
  - *Parameter 1*
  - *Parameter 2*

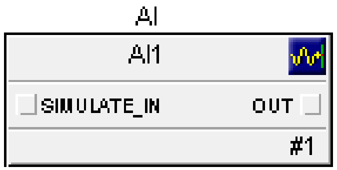


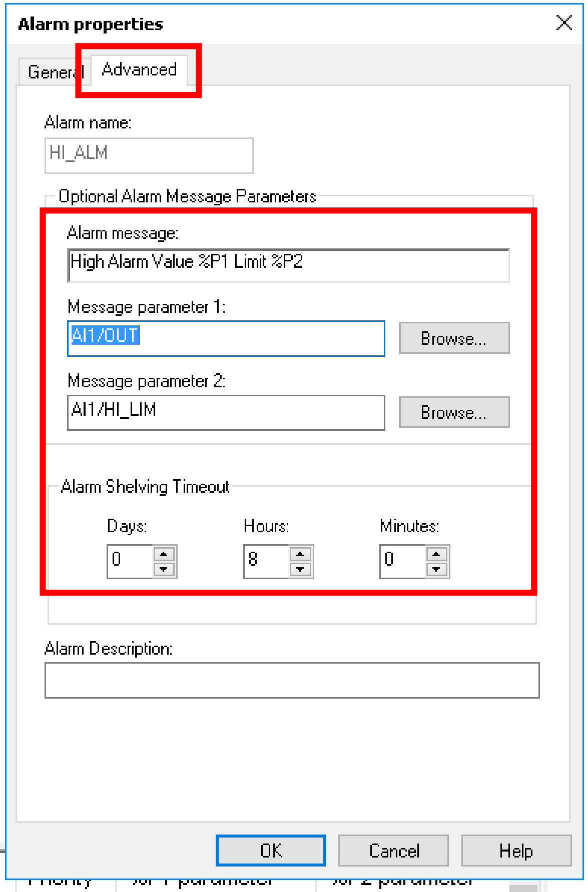
A maximum of 255 alarm types may be added and defined.

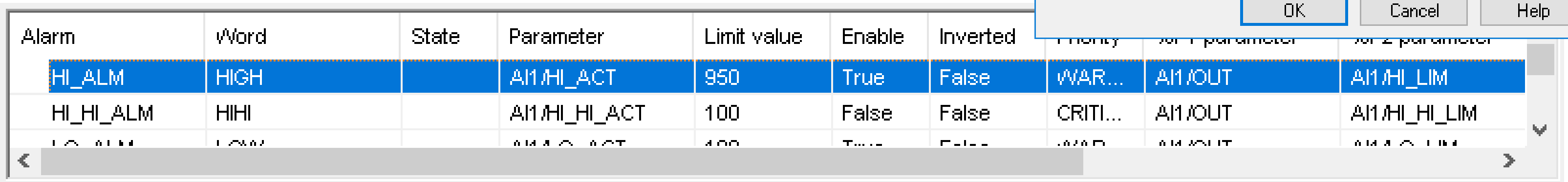
DeltaV Alarm Types

Advanced Alarm Properties:

- Alarm Message - *Parameter 1 (%P1) and Parameter 2 (%P2) are established when an Alarm is associated with an alarm on a function block.*
- Alarm shelving Timeout – a value greater than 0 will allow temporary operator suppression with reason entry and recording

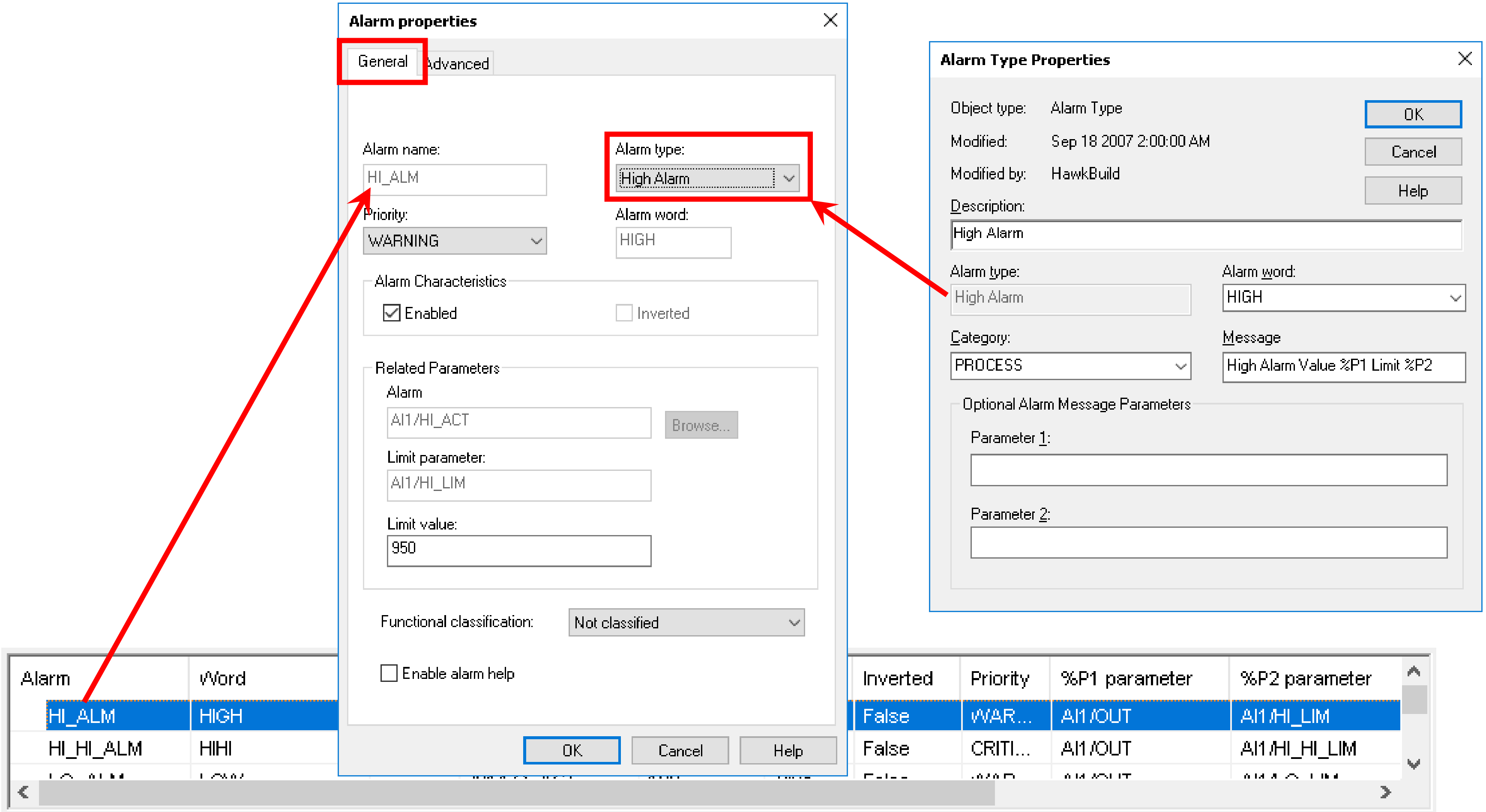






DeltaV Alarm Types

Alarm Type Properties define each alarm's individual characteristics.



DeltaV Alarm Types

DeltaV Alarm Types	Numeric	DeltaV Alarm Types	Numeric
Discrete Device	1	Change From Normal	11
Communication Error	2	Change of State	12
Open Circuit Detected	3	High High Alarm	13
General I/O Failure	4	Low Low Alarm	14
Floating Point Error	5	Rate of Change	15
Over Range	6	High Alarm	16
Under Range	7	Low Alarm	17
Statistical Error	8	Deviation Alarm	18
New Alarm	9	Adapt Alarm Active	254
Any Alarm	10	Inspect Limit Active	255

DeltaV Alarm Parameter Fields

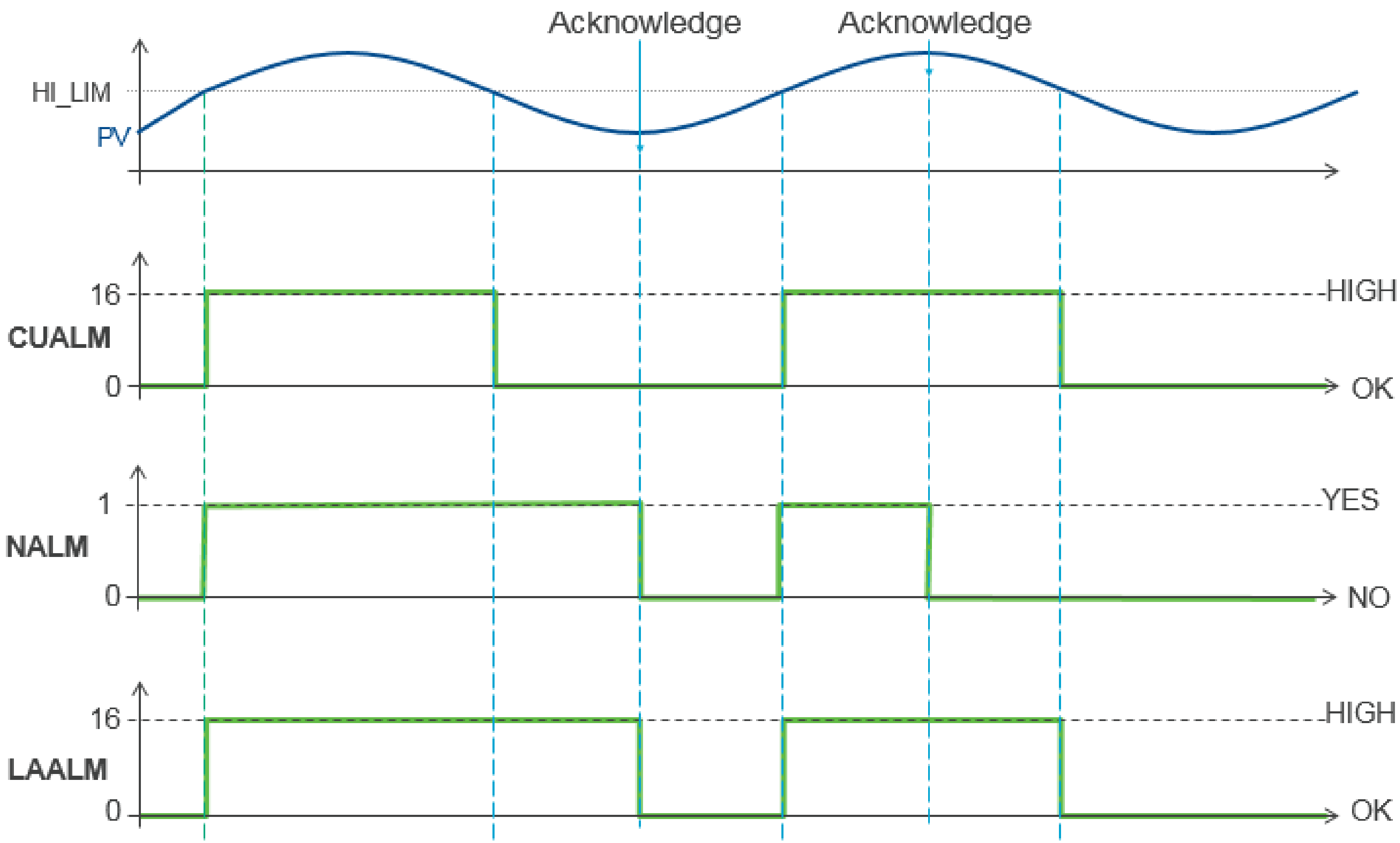
Display example: Module/Alarm.Field<.STR> (ex. LI-101/HI_ALM.CV)

Field	**R/W**	Module/Alarm.Field.STR	Module/Alarm.Field
CUALM *Current Alarm*	R	OK/HIGH	0/16
LAALM *Latched Alarm*	R	OK/HIGH	0/16
CV *Same as LAALM*	R	OK/HIGH	0/16
NALM *New Unacknowledged*	R/W	NO/YES	0/1
PRI *Priority*	R/W	CRITICAL . . . LOG	15 . . . 3
ENAB *Enabled*	R/W	NO/YES	0/1
INV *Invert Input*	R/W	NO/YES	0/1
OPSUP *Alarm Suppression*	R/W	NO/YES	0/1
SUPTMO *Suppression Timeout*	R/W	Time (minutes)	Time (minutes)
SUPTMR *Suppression Timer*	R/W	Time (minutes)	Time (minutes)
OOS *Alarm is Out of Service*	R/W	NO	0/1
SUPRSN Suppression Reason	R/W	NO	1-254
FUNC Functional Classification	R		0-10

DeltaV Alarm Parameter Fields

ALARM_HYS = 0

Sample graph of different Alarm Fields



Data Type and Data Link Expression

When adding a data link to a display, you must select a data link type: String, Numeric, Scaled Numeric, Mode, Named Set, or Scaling. The data link type you choose determines the value type to be returned and the parameters that can be included in the data source expression.

DLSYS[“Module/Parameter.Field<.STR>”]

For alarms

Data Link Type	Sample Path	Return Value
String	DLSYS[“LI-101/HI_ALM.CV.STR”]	OK/HIGH
Numeric	DLSYS[“LI-101/HI_ALM.CV”]	0/16
Scaled Numeric	DLSYS[“LI-101/AI1/PV.CV”]	Numerical value
Mode	DLSYS[“LEVEL-101/AO1/MODE”]	Target mode
Named Set	DLSYS[“MTR-102/DC1/SP_D”]	START/STOP
Scaling	DLSYS[“LI-101/AI1/OUT_SCALE”]	Numerical value

Refer to DeltaV BOL: Managing the DeltaV Live environment → Graphic elements overview → Data elements reference

Workshop – Add Alarm Data links

- Add Alarm Data links to Tank101 display
- Use the Blink Animation on the Alarm Data links
- Verify Alarm functionality in DeltaV Live

Workshop – Add Alarm Datalinks

Step 1. Launch Graphics Studio and open the Tank101 display.

Step 2. Add the following datalinks, with Data type set to String:
DLSYS[“*LI-101/HI_ALM.CV.STR”]*
DLSYS[“*LI-101/LO_ALM.CV.STR”]*

Step 3. For the **HI_ALM** data link, animate the text color by adding a Blink Animation. From the Text tab, click on the Diamond Context Menu for the Text Color.

Workshop – Add Alarm Datalinks

Step 4. Click on Blink Animation.

Step 5. Configure the following properties:
Alternating Color Condition: DLSYS[“LI-101/HI_ALM.NALM”]
On Color: Red
Off Color: Black
Blink Style: Standard blink rate
Default Text Color: default

Workshop – Add Alarm Datalinks

Step 6. Add a Blink Animation on the Text Color of the LO_ALM data link and configure the following properties:

Property	**Value**
Alternating Color Condition	DLSYS[“LI-101/LO_ALM.NALM”]
On Color	Red
Off Color	Black
Blink Style	Standard blink rate
Default Text Color	Default

Step 7. Save then publish the display.

Workshop – Add Alarm Datalinks

Operate LEVEL-101 and monitor LI-101 in the following manner:

Step 8. Launch the DeltaV Live application.

Step 9. Click Refresh Configuration button  from the menu bar to update the display with the new published version.

Step 10. Verify that LI-101's HIGH and LOW alarms function properly.

Note: The alarms can now be acknowledged by selecting the Acknowledge button on the alarm banner after adding the alarm data link with the .NALM field.

Workshop Complete

ALARMS[1]-[5] Parameter

The *ALARMS[1]* parameter will display the highest priority alarm that is active for a given module.

For example:
LI-101/ALARMS[1].LAALM

NON-Browseable

Field	Module/Alarm.Field.STR	Module/Alarm.Field
LAALM	OK	0
	LOW	17
	HIGH	16
CUALM	OK	0
	LOW	17
	HIGH	16
NALM	NO	0
	YES	1
PRI	CRITICAL	15
	WARNING	11
	ADVISORY	7
ATTR	ALARM NAME	N/A
TIN	Tue Oct 27, 2015 14:22:05:.22	N/A

ALARMS[1]-[5] Parameter

Alarm	Word	State	Parameter	Limit value	Enable	Inverted	Priority	%P1 parameter
HI_ALM	HIGH		AI1/HI_ACT	950	True	False	WARNING	AI1/OUT
HI_HI_ALM	HIHI		AI1/HI_HI_ACT	975	True	False	CRITICAL	AI1/OUT
LO_ALM	LOW		AI1/LO_ACT	100	True	False	WARNING	AI1/OUT
LO_LO_ALM	LOLO		AI1/LO_LO_ACT	50	True	False	CRITICAL	AI1/OUT
PVBAD_ALM	IOF		AI1/BAD_ACTIVE		True	False	CRITICAL	

Picture Configuration	**Data Displayed**
LI-101/ALARMS[1].LAALM.STR	HIHI
“ NALM.STR	NO
“ PRI.STR	CRITICAL
“ ATTR.STR	HI_HI_ALM
“ TIN.STR	Tue Oct 27, 2015 21:05:03.57
LI-101/ALARMS[2].LAALM.STR	HIGH
“ NALM.STR	NO
“ PRI.STR	WARNING
“ ATTR.STR	HI_ALM
“ TIN.STR	Tue Oct 27, 2015 21:05:03.45

ALARMS Parameter

ALARMS.MACK – Module Ack

- Setting to a 1 or YES causes all Alarms in the module to be acknowledged
- Immediately returns to 0

ALARMS.ENAB – Module Alarm Enable

- Setting to a 0 or NO causes all Alarms to be disabled

ALARMS.PRIAD – Module Priority Adjustment

- Adjusts the effective priority of all alarms in the module (0 . . . 12)
- Setting to a 0 causes alarms to be treated as pre-configured priority

Refer to Help on Display Parameters when adding data links for a more complete list of parameters.

Workstation Alarm Consolidation Example

Workstations maintain a list of the most important alarms for display in the Alarm Banner for THISUSER.

Alarms qualify for the Workstation Alarm Banner by being in an eligible Plant Area which includes:

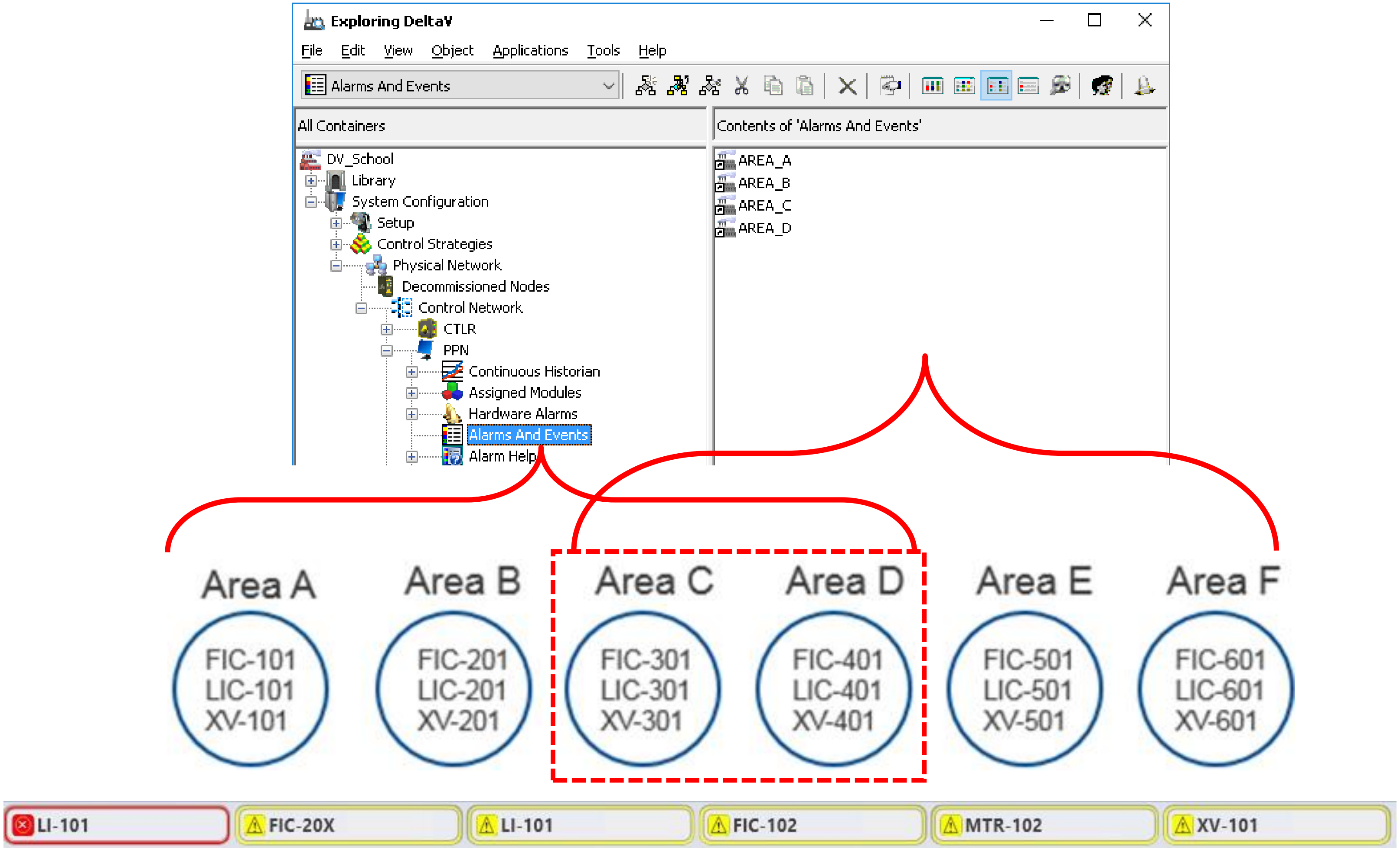
- Plant Area configured as part of this workstation’s Alarms and Events Subsystem
- Plant Area where current user is granted any attribute security write keys

For example:

- Areas in this node’s Alarms and Events subsystem A B C D
- Areas in which user has write privileges C D E F
- Areas in which alarms are consolidated C D

Workstation Alarm Consolidation Example

Which module alarms will show up for said user if he logs on to PPN?



Alarms by Plant Area

Alarms, grouped by plant area, exhibit the following:

- Every Alarm parameter is part of a module
- Every Module is assigned to a Plant Area
- Each Workstation informs each controller of the list of Plant Areas in which it is listening for alarms
- Every state change detected in an alarm parameter generates an *event occurrence record* which is sent to Workstations which are listening for alarms in that specific plant area
- Workstations maintain a list of active alarms, ordered by importance, from the event occurrence records they receive

DeltaV Event Chronicle

The Event Chronicle is a journal of system, process, and user events associated with a workstation and its associated areas.

Access the DeltaV Event Chronicle by selecting the Process History View button in DeltaV Live or by selecting . . .
Start → All apps → DeltaV Operator → Process History View → Event

Process History View - [Event1]

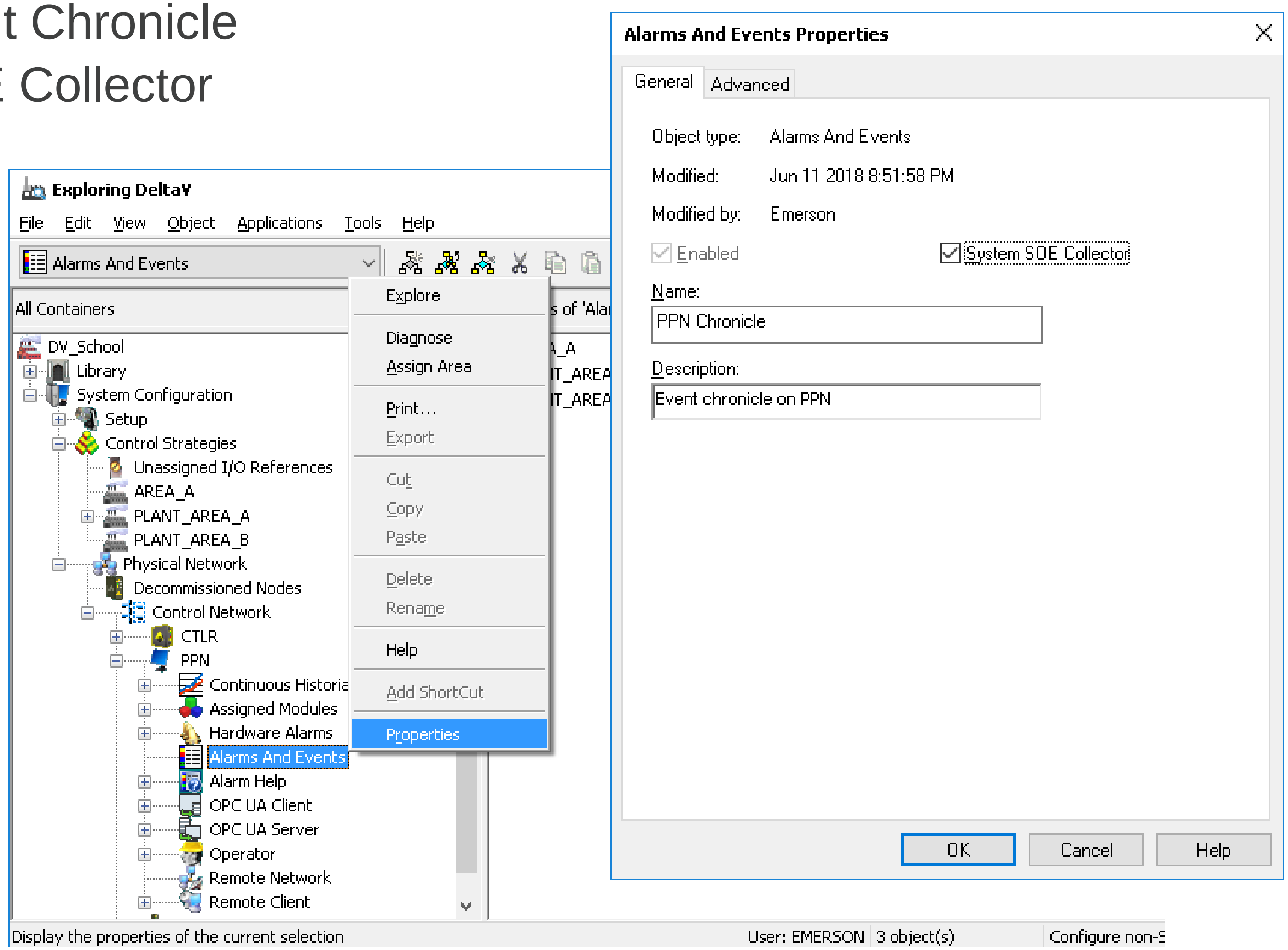
File Edit View Events Window Help

		Date/Time*	Event Type	Category*	Area	Node	Unit	Module	Module Description	Parameter	State	Level	Desc1	Desc2
1		8/6/2018 1:40:50.1	CHANGE	USER	PLANT	PPN					REMOTE		EMERS	
2		8/6/2018 1:04:01.0	CHANGE	USER	PLANT	PPN					REMOTE		EMERS	
3		8/6/2018 12:53:23.	ALARM	HARDWAR	PLANT	PPN		PPN		MAINT_ALM	INACT/A	11-WA	OK	<None>
4		8/6/2018 12:53:23.	CHANGE	USER	PLANT	PPN		PPN		MAINT_ALM			EMERS	NEW VALUE = 0, OLD VALUE
5		8/6/2018 12:51:31.	EVENT	SYSTEM	PLANT	CTL				ACN COMM	ACTIVE	4-INFO		Switched to Primary ACN - P
6		8/6/2018 12:51:30.	EVENT	SYSTEM	PLANT	CTL				ACN COMM	ACTIVE	4-INFO		Switched to Secondary ACN -
7		8/6/2018 12:42:24.	CHANGE	USER	PLANT	PPN					REMOTE		EMERS	
8		8/6/2018 12:42:12.	ALARM	INSTRUME	PLANT	CTL		LI-101	Control Module	PVBAD_AL	INACT/A	15-CRI	IOF	General I/O Failure

Time stamped in the controller

DeltaV Event Chronicle

- Enable Event Chronicle
- System SOE Collector
- Name
- Description



Workshop – ALARMS[1] Parameter

- Replace the Alarms data links with ALARMS[1] parameter
- Use the blink and visibility animation on the ALARMS[1] Datalink
- Verify the operations of the Alarms

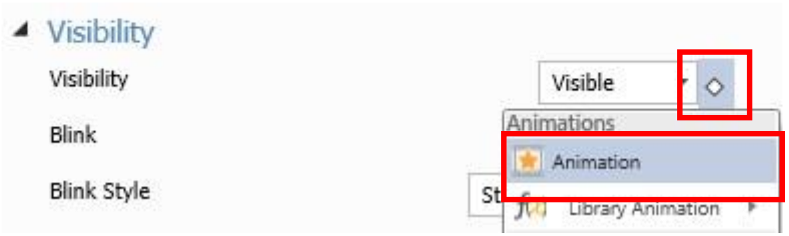
Workshop – ALARMS[1] Parameter

Step 1. Launch the Graphics Studio and open the Tank101 display.

Step 2. Delete the HI_ALM and LO_ALM data links on the display.

Step 3. Add the Data Link *. . .* *LI-101/ALARMS[1].LAALM.STR*

Step 4. Still in the Graphics Configuration pane for the ALARMS[1] datalink, change the Visibility setting from the default of *Visible* to Animation.



Step 5. Set the Value to condition expression so that the datalink is visible only when an alarm is active.

Workshop – ALARMS[1] Parameter

Step 6. Add a Blink Animation on the Text Color of the ALARMS[1] data link and configure the following properties:

Property	**Value**
Alternating Color Condition	DLSYS[“LI-101/ALARMS[1].NALM”]
On Color	Red
Off Color	Black
Blink Style	Standard blink rate
Default Text Color	Red

Step 7. Save and Publish the Tank101 display.

Workshop – ALARMS[1] Parameter

Operate LEVEL-101 and monitor LI-101 in the following manner:

Step 8. Launch the DeltaV Live application.

Step 9. Click Refresh Configuration button  from the menu bar to update the display with the new published version.

Step 10. Verify that LI-101/ALARMS[1].LAALM functions properly.

Step 11. Verify that the Event Chronicle is logging alarms and events.

Workshop Complete

Alarm Help

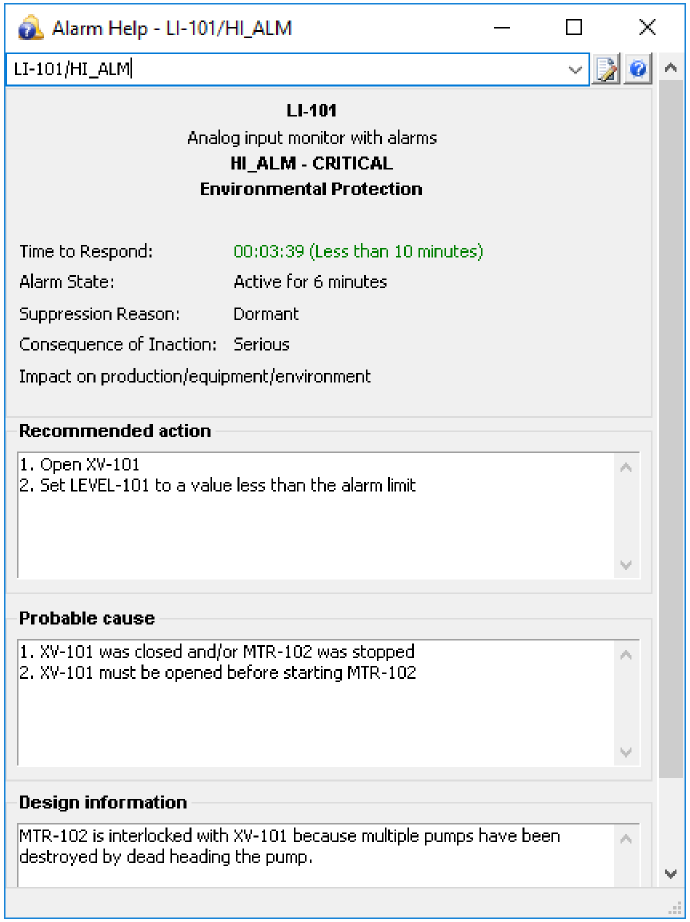
Alarm help provides in-context operator alarm help to assist the operator in responding to alarms more effectively.

Common objectives for using alarm help are:

- Operator response tool
- Operator knowledge capture system

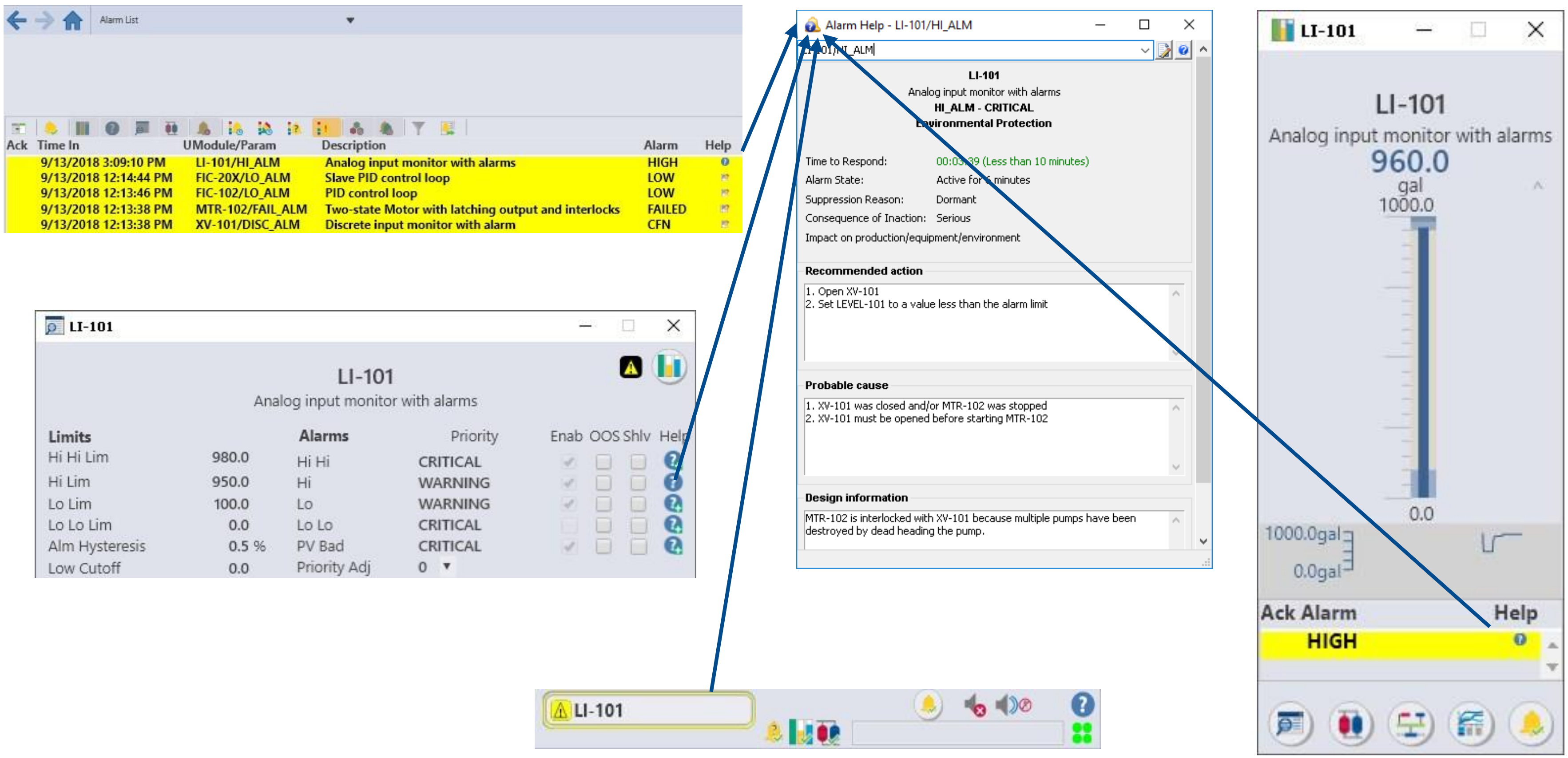
ISA 18.2 requirements include:

- Master alarm database
- Local alarm response policy



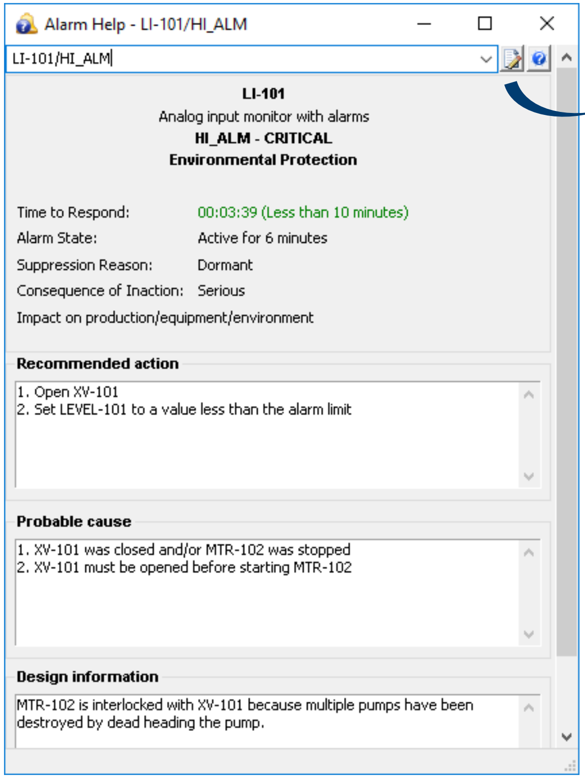
Alarm Help Access

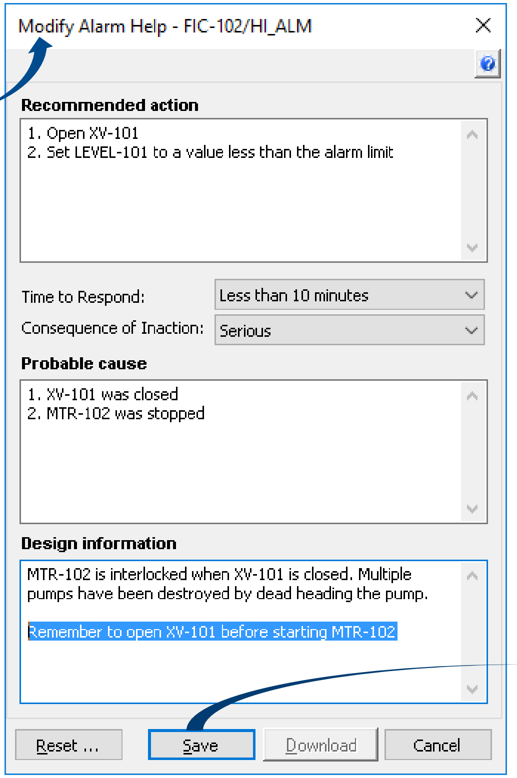
Alarm help can be accessed multiple ways as shown. Right-clicking on the alarm from the banner also opens alarm help if Alarm Help Direct Access is enabled.

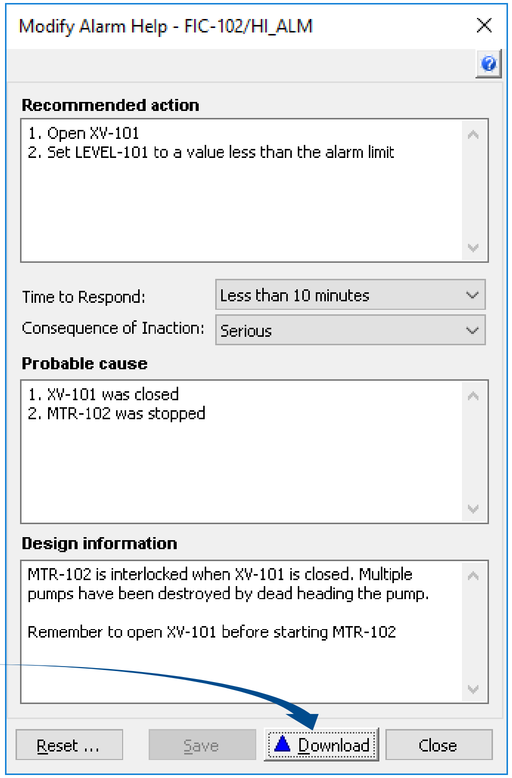


Modify Alarm Help

Alarm help can be modified if the user has the Edit and Download function privilege. The modifications saved to alarm help in the operator interface are written to the configuration database and require a subsequent download.

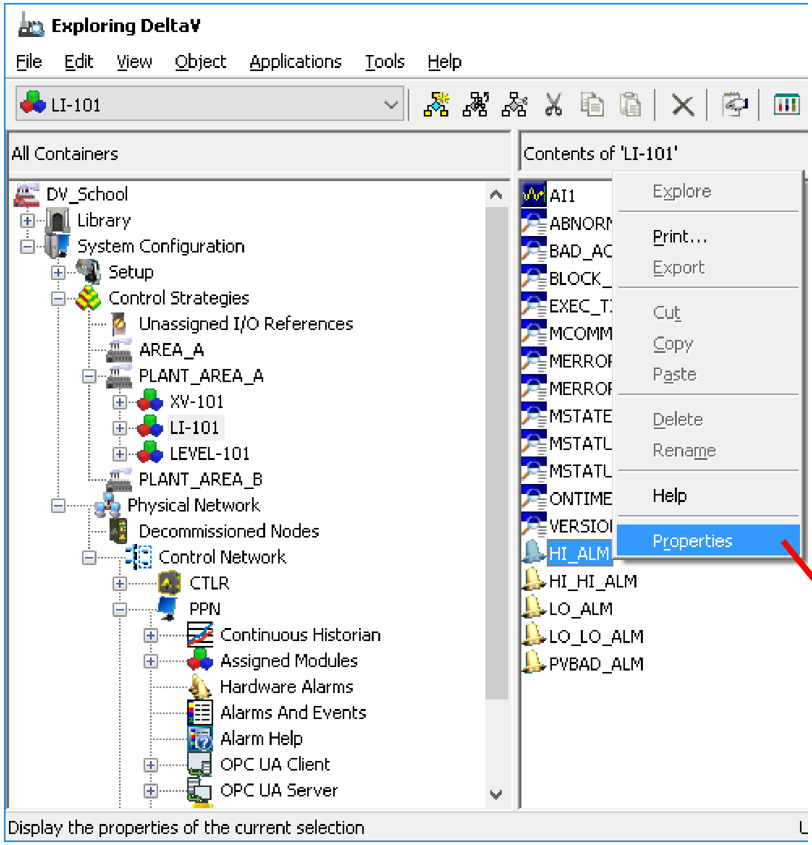


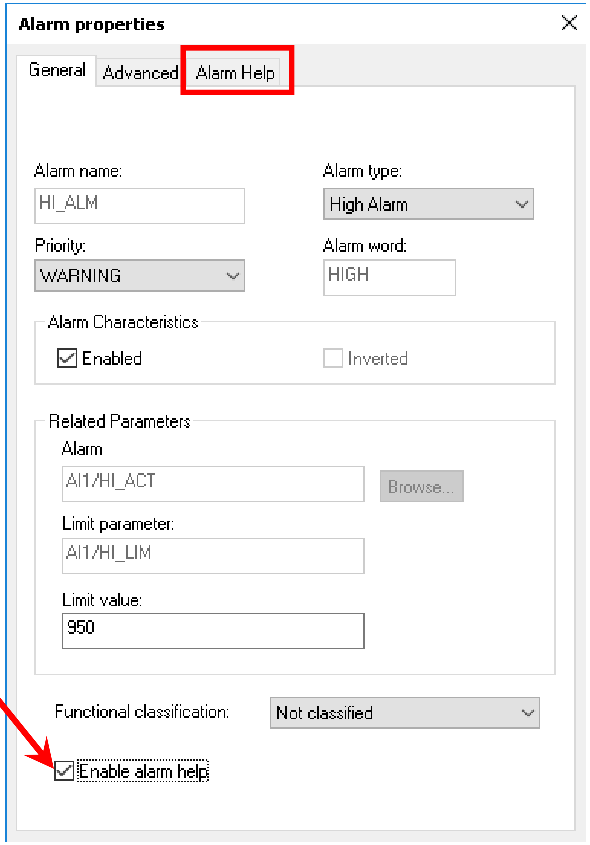




Configure Alarm Help

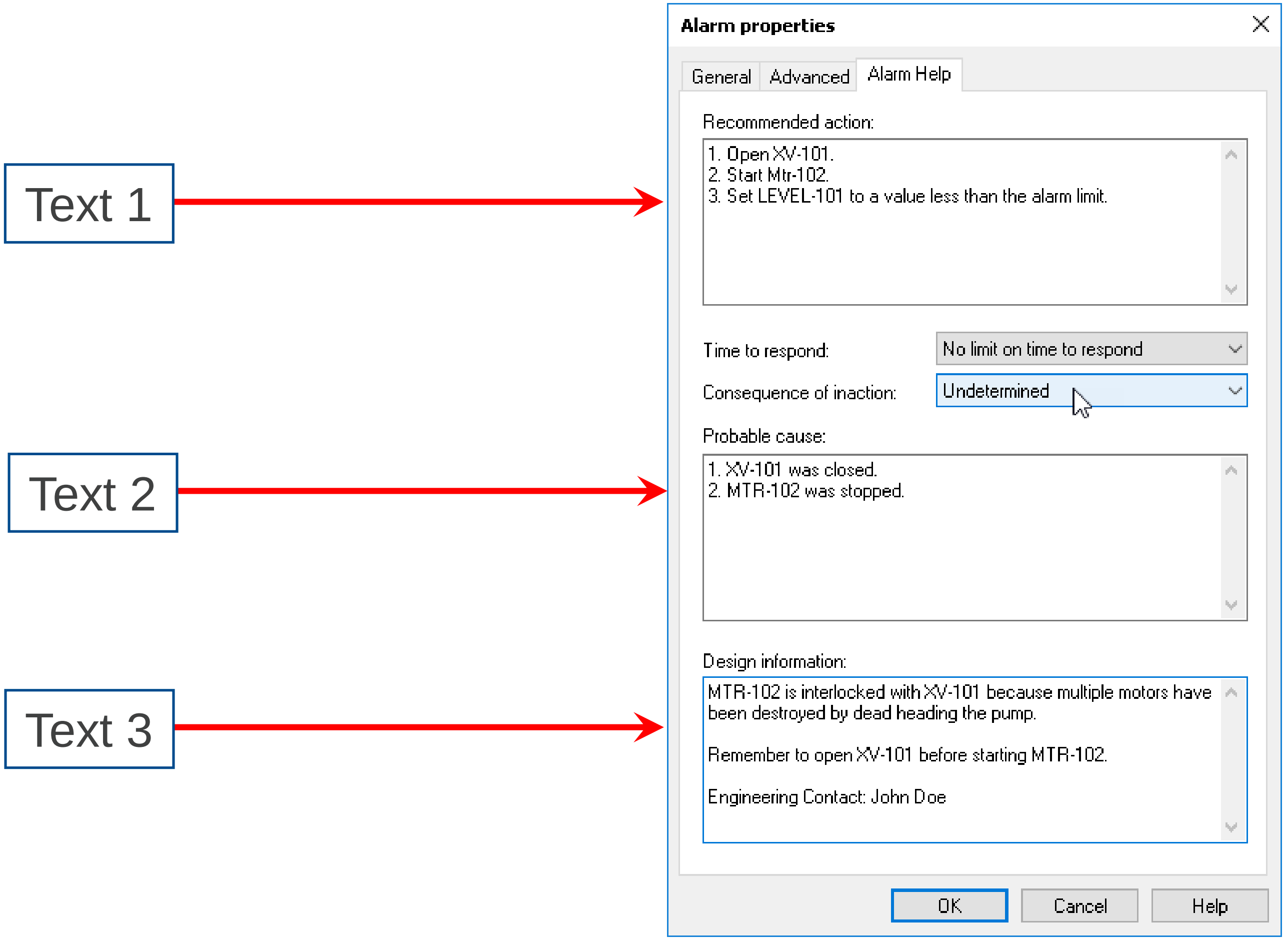
Alarm help can be configured from the DeltaV Explorer or Control Studio. Checking the *Enable alarm help* box enables alarm help and displays the Alarm Help tab.





Alarm Help – Text fields

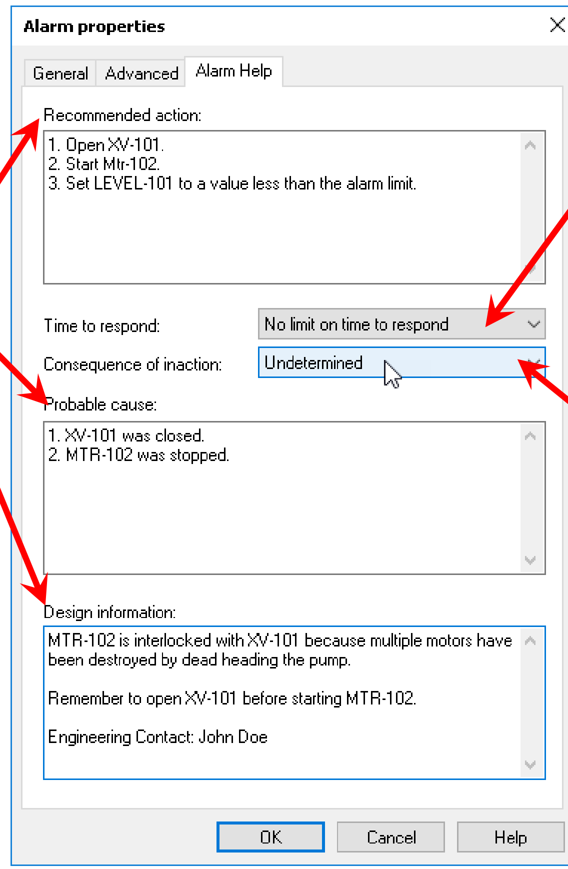
Three text fields allow you to enter up to 500 characters each.



Alarm Help – Named Sets

Default named sets allow you to modify the dialog descriptions. You can add up to 255 names to a named set.

dv_alm_help_text
1 Recommended action
2 Probable cause
3 Design information



dv_alm_ttr
10 Less than 10 minutes
30 Less than 30 minutes
255 No limit on time to respond

dv_alm_coi
0 Undetermined
1 Minor
2 Serious
3 Severe

Workshop – Creating and Viewing Alarm Help

- Modify process alarm properties
- Modify, enable, and download Alarm Help using DeltaV Explorer
- Modify, enable, and download Alarm Help using DeltaV Live

Workshop – Creating and Viewing Alarm Help

Step 1. Expand PLANT_AREA_A and select LI-101 in the DeltaV Explorer.

Step 2. Right-click *HI_ALM* and select *Properties*.

Step 3. Modify *HI_ALM* as indicated below:

General Tab

Functional Classification	Environmental Protection
☑	Enable alarm help

Alarm Help Tab

Recommended Action	Set LEVEL-101/SP < HI_ALM limit
Time to respond	Less than 10 minutes
Consequence	Serious

Step 4. Click *OK*.

Workshop – Creating and Viewing Alarm Help

Step 5. Download LI-101.

Step 6. Download Alarm Help under your Workstation.

View Alarm Help in the following manner:

Step 7. Run the DeltaV Live application.

Step 8. Adjust LI-101/SP greater than the HI_ALM limit.

Step 9. Click LI-101 in the alarm banner.

Step 10. Click *Alarm Help* on the faceplate of *LI-101*.

Workshop – Creating and Viewing Alarm Help

Modify Alarm Help in DeltaV Live in the following manner:

Step 11. Click the modify *Alarm Help* button  on the Alarm Help faceplate.

Step 12. Add your own text to *Probable Cause* and *Design Information*.

Step 13. Click the *Save* button.

Step 14. Click the *Download* button.

Step 15. Verify your new text has been added to the *Alarm Help* faceplate.

Workshop Complete

Optional Workshop – Unsafe Practice Alarm

Create new Alarm Type

Create Custom Alarm

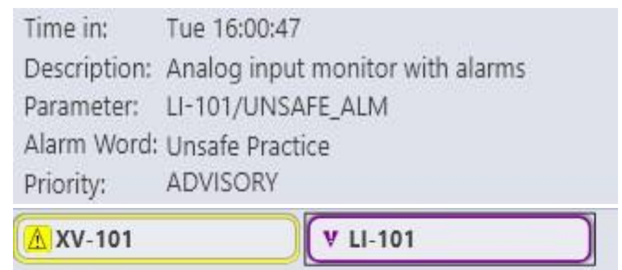
Optional Workshop – Unsafe Practice Alarm

Create a custom alarm with an advisory priority and an alarm word of *Unsafe Practice*. The alarm will advise the operator of impending danger if LI-101 is greater than 900 gallons and XV-101 is closed for more than 20 seconds.

Hints:

1. Create a new alarm type
2. Use a condition block
3. Right-click the alarm area in LI-101 to create a custom alarm

DeltaV Live View



Process History View

	Date/Time	Event Type	Category	Area	Node	Module	Module Description	Parameter	State	Level	Desc1	Desc2
	9/13/2018 3:31:58.432 PM	ALARM	PROCESS	PLANT_A	AUTO-MI	LI-101	Analog input monitor wit	UNSAFE_ALM	ACT/ACK	07-ADVISORY	Unsafe Practice	Level 909.995 is nearing hi lim - valve closed

Summary

- Define basic alarm characteristics
- Create a control module using Analog Output
- Define partial download behavior of parameters and critical block values
- Create a control module using Analog Input
- Use Animation for Fill, Blink and Visibility properties of display elements

EMERSON.

Summary

- Define detailed alarm characteristics
- Define Event Chronicle
- Define Alarm Help

Cold Restart

Module 5

EMERSON

Module Objectives

- Define Cold Restart
- Define Restore Parameter Value after Restart option

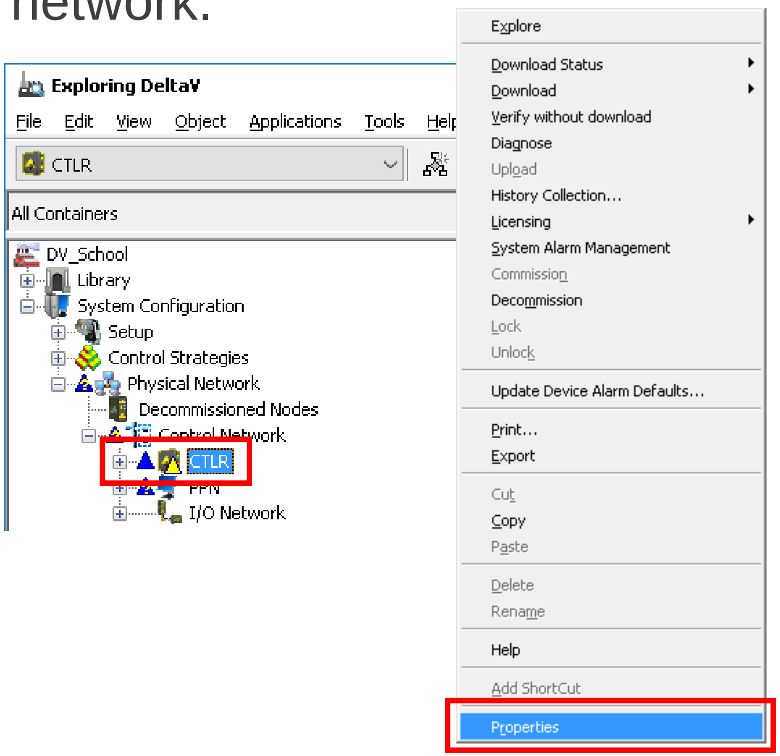
Module Workshop

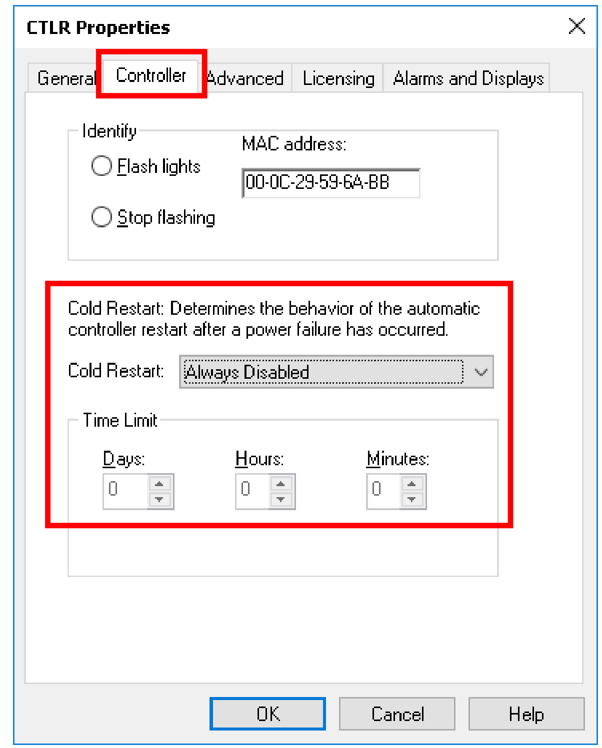
- Controller Cold Restart

Cold Restart

NVM only saves prox info.

Cold restart ensures that in case of power failure, the controller will restart without manual intervention and without any other device present on the network.





Enable cold restart in a controller by selecting . . .

CTLR → Properties → Controller tab

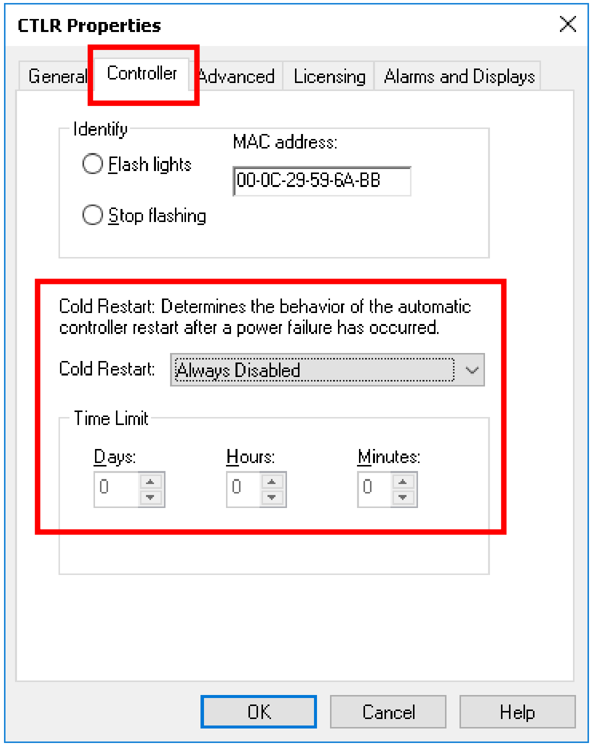
Cold Restart

Download changed Setup data

In the event of a power failure, the controller can download itself using the configuration data in its non-volatile memory

The options are:

- *Always Disabled*
- *Always Enabled (maximum time)*
- *Enabled Within A Time Limit*
  - *Days* (0 to 30)
  - *Hours* (0 to 23)
  - *Minutes* (0 to 59)



Commissioning and downloading procedures are automatically executed if power returns to the controller in less than or equal to the cold restart time.

Cold Restart

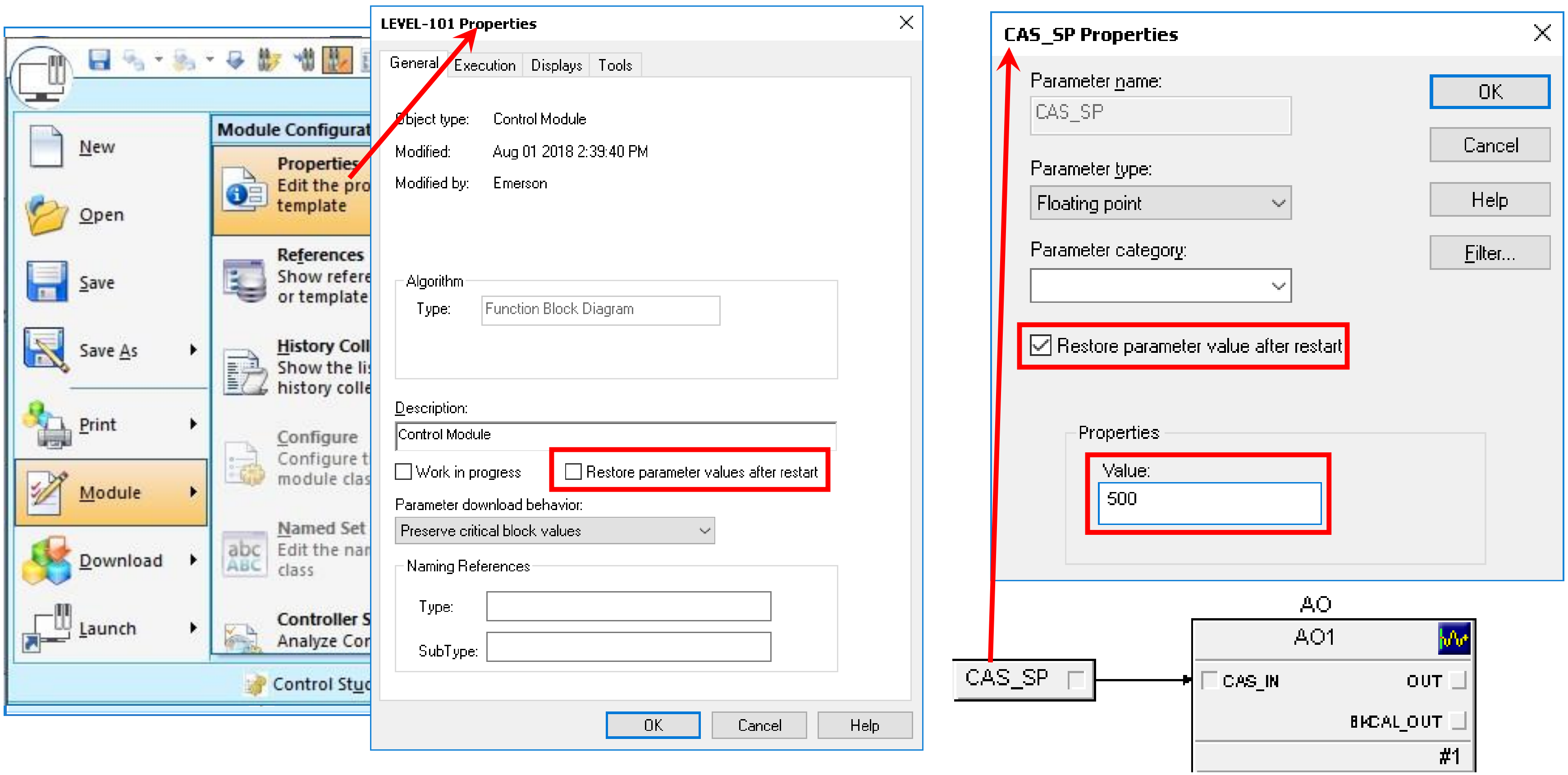
It is further recommended that a UPS be installed between the AC distribution (source) and the System Power Supply for the controller(s) to ensure controller operations during short interruptions of plant power.

Refer to Books Online for additional information about Cold Restart.

Search for *Preserving Configuration During Power Loss.*

Restore Parameter Value After Restart

Enabling the parameter's *Restore parameter value after restart* and the module-level *Restore parameter values after restart* will restore the current operating value (stored in NVM) after a Cold Restart.



Workshop - Controller Cold Restart

- Enable Cold Restart to a controller
- Identify the different options related to Cold Restart
- Remove and reconnect power to a controller

Workshop - Controller Cold Restart

Step 1. Set Cold Restart to *5 minutes* for your selected controller(s).

Step 2. Download the Changed Setup Data for the controller(s).

Note: If your DeltaV system has redundant controllers, remove power from the Active and Standby controllers for this Workshop.

Step 3. Remove power from the controller. Reconnect it after 45 seconds.

Question: What visual indications do you see in DeltaV Explorer/Diagnostics?

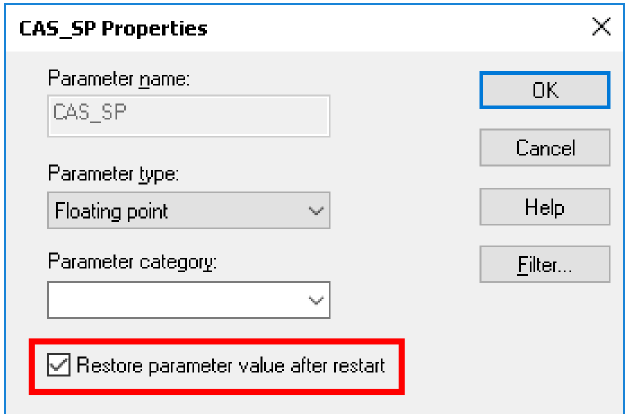
Question: Will the controller come back up commissioned? Why or why not?

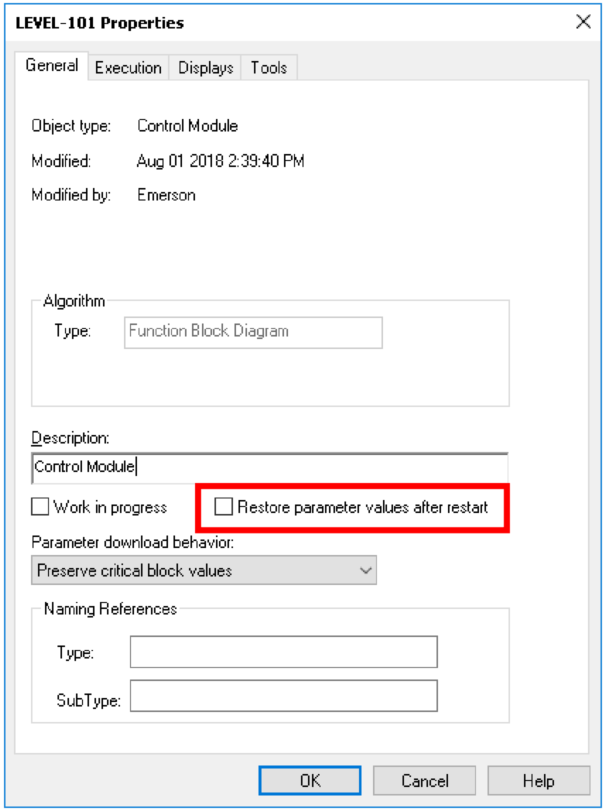
Question: Will it come back configured? What is the online value of CAS_SP?

Workshop - Controller Cold Restart

Step 4. Enable the *Restore parameter values after restart* in the Level-101 module properties.

Step 5. Enable the *Restore parameter value after restart* for CAS_SP parameter in the LEVEL-101 module.





Workshop - Controller Cold Restart

Step 6. Download the module without uploading any parameters.

Step 7. Change the on-line value of CAS_SP to 550.

Step 8. Remove the power from the controller and reconnect after 30 seconds.

Question: What happened to the real time value of CAS_SP? → Ø

Question: What would happen if power does not get restored to your controller after the configured time limit?

comes back with no configuration (asterisks)

Workshop Complete

Summary

- Define Cold Restart
- Define Restore Parameter Value after Restart option

DeltaV Motor Control

Module 6

EMERSON

Module Objectives

- Identify the appropriate module template for motor control
- Define state masks
- Define named sets
- Define device options
- Define condition expressions
- Configure an Interaction for a Group

Module Workshops

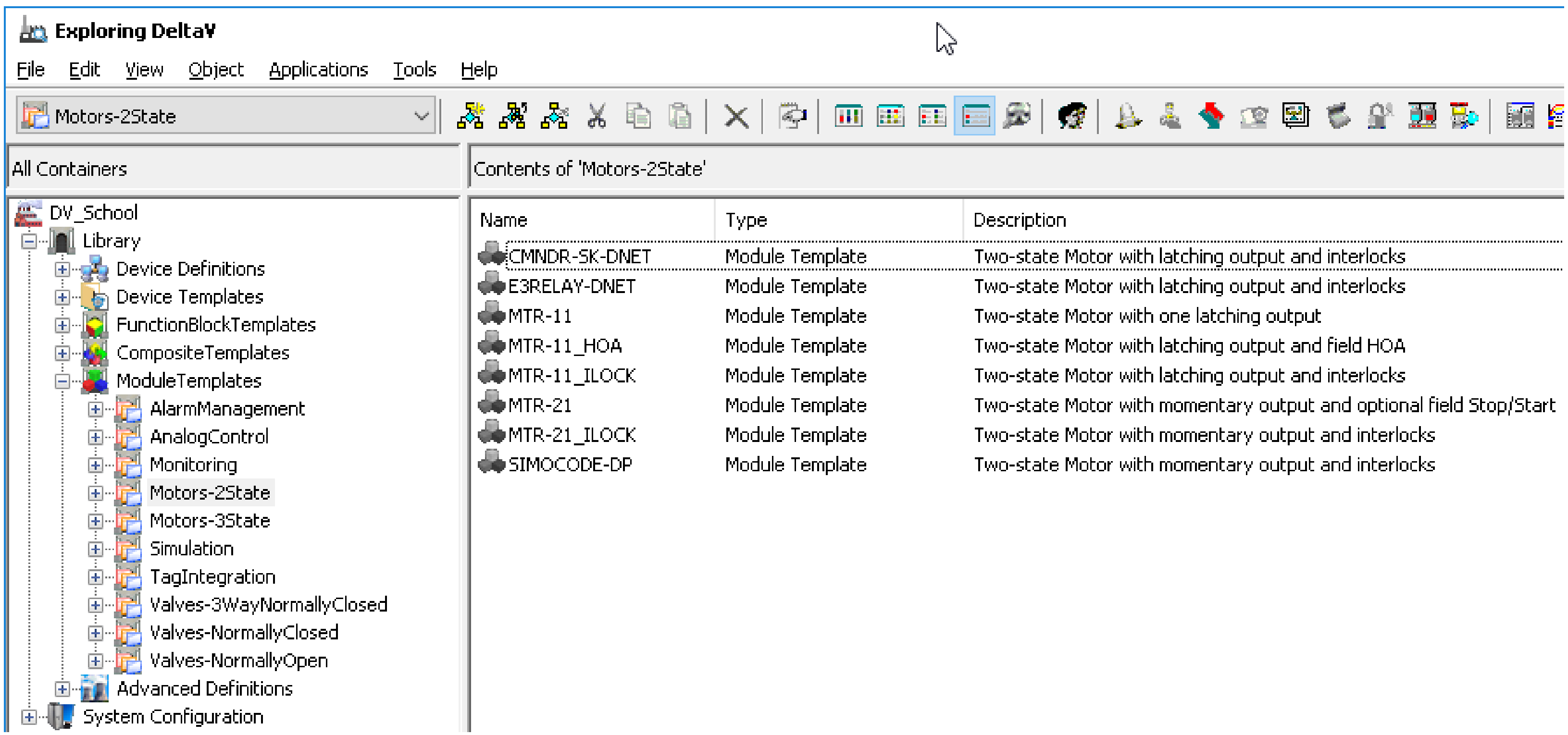
- Creating MTR-102
- Adding MTR-102 to Tank101
- Optional Workshop – XV-OPTION

Motor Control Module Templates

Motor control is commonly used in the field, that is why library templates have been pre-configured already in DeltaV as shown here.

Access the two-state motor templates in DeltaV Explorer by selecting . . .

Library → Module Templates → Motors-2State

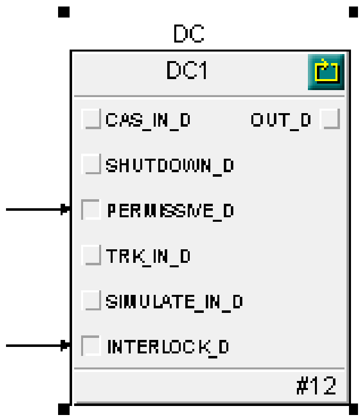


combines 4 DOs and 4 DIs

Device Control Function Block

in one block

The driving force behind motor control is the Device Control block (DC).



The parameter window for the DC block, shown on the right, displays the common configuration parameters.

Filtered by:

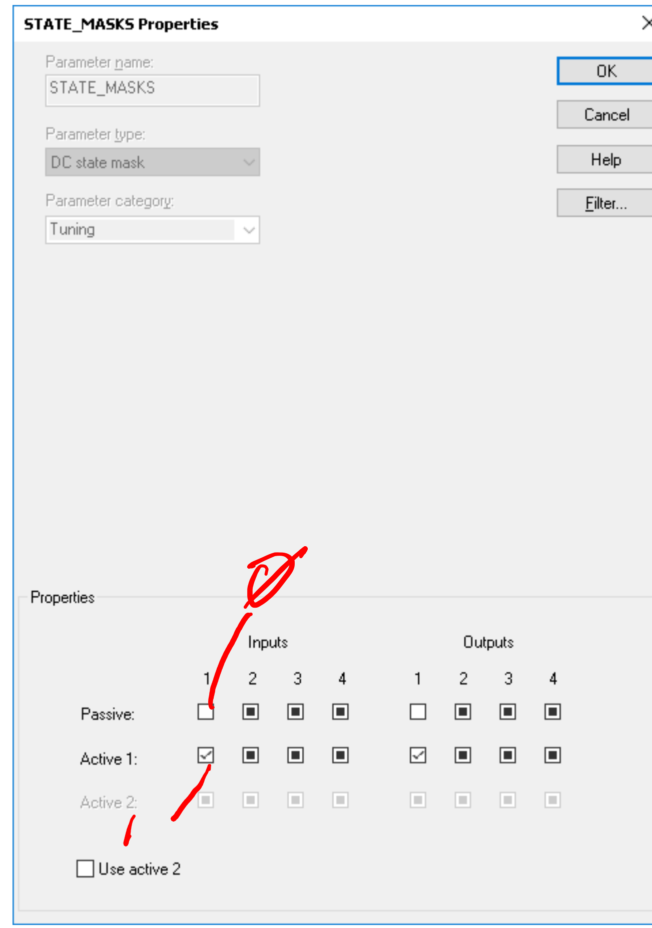
Alphabetic | Categorized

Parameter	Default	Linked	Connection type	Parameter type
Tuning				
CFM_ACT1_TIME	5		Internal	Floating point
CFM_ACT2_TIME	10		Internal	Floating point
CFM_PASS_TIME	5		Internal	Floating point
DEVICE_OPTS	Non-zero		Internal	Option bitstring
STATE_MASKS			Internal	DC state mask
Operating				
FV_D	STOPPED		Internal	Named Set
MODE	Auto/		Internal	Mode
PV_D	STOPPED		Internal	Named Set
SP_D	STOP		Internal	Named Set
I/O				
IO_IN_1			Internal read only	I/O Reference
IO_IN_2			Internal read only	I/O Reference
IO_OUT_1			Internal write only	I/O Reference
IO_OUT_2			Internal write only	I/O Reference

STATE_MASKS is one of the DC block parameters that need to be configured to achieve desire device control action

Device Control Function Block

The STATE_MASKS Properties dialog box to meet specific operating requirements. The DC Block will write DO signals according to the STATE_MASKS configuration.

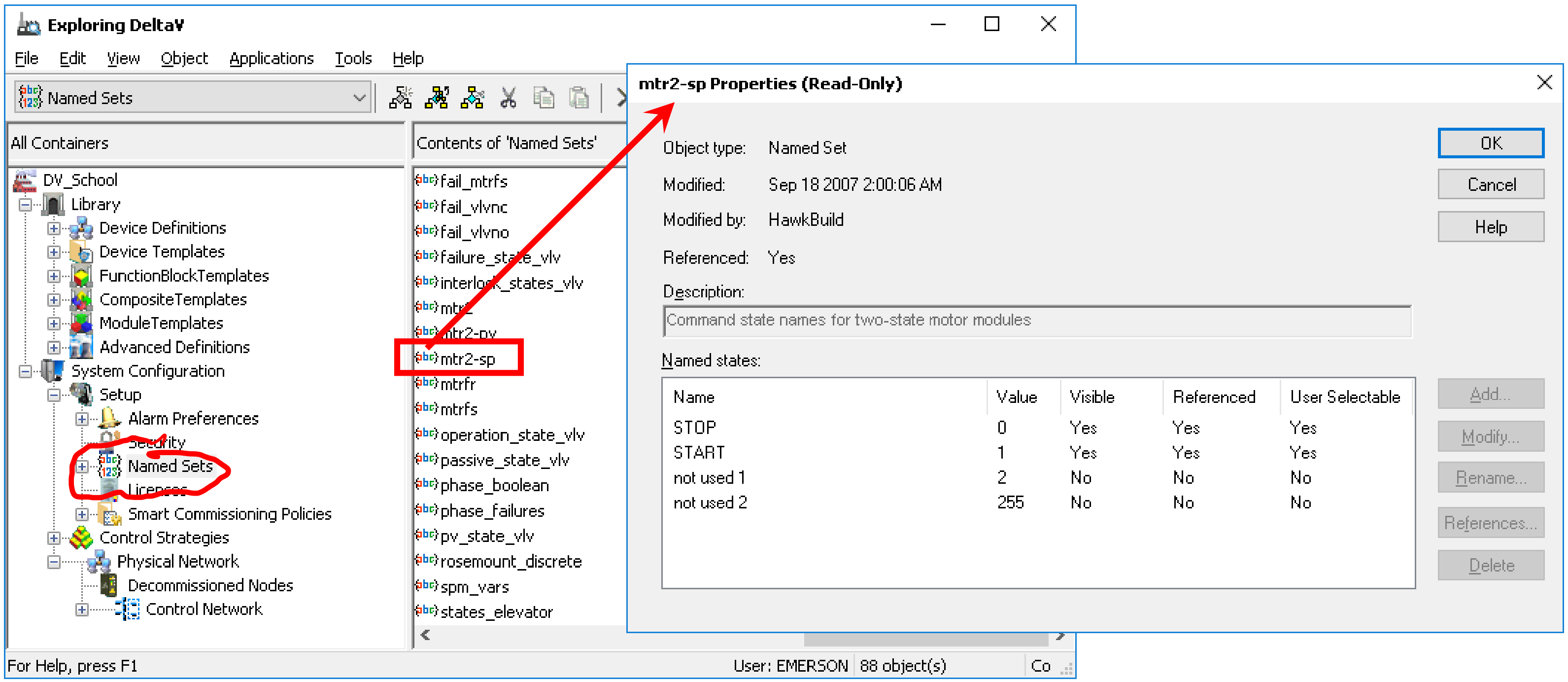


- Empty = 0 value on I/O channel
- Check mark = 1 value on I/O channel
- Stippled check mark light gray background = don't care
- Stippled check mark dark gray background = not available

  - Passive = 0 in named set
  - Active1 = 1 in named set

Named Sets

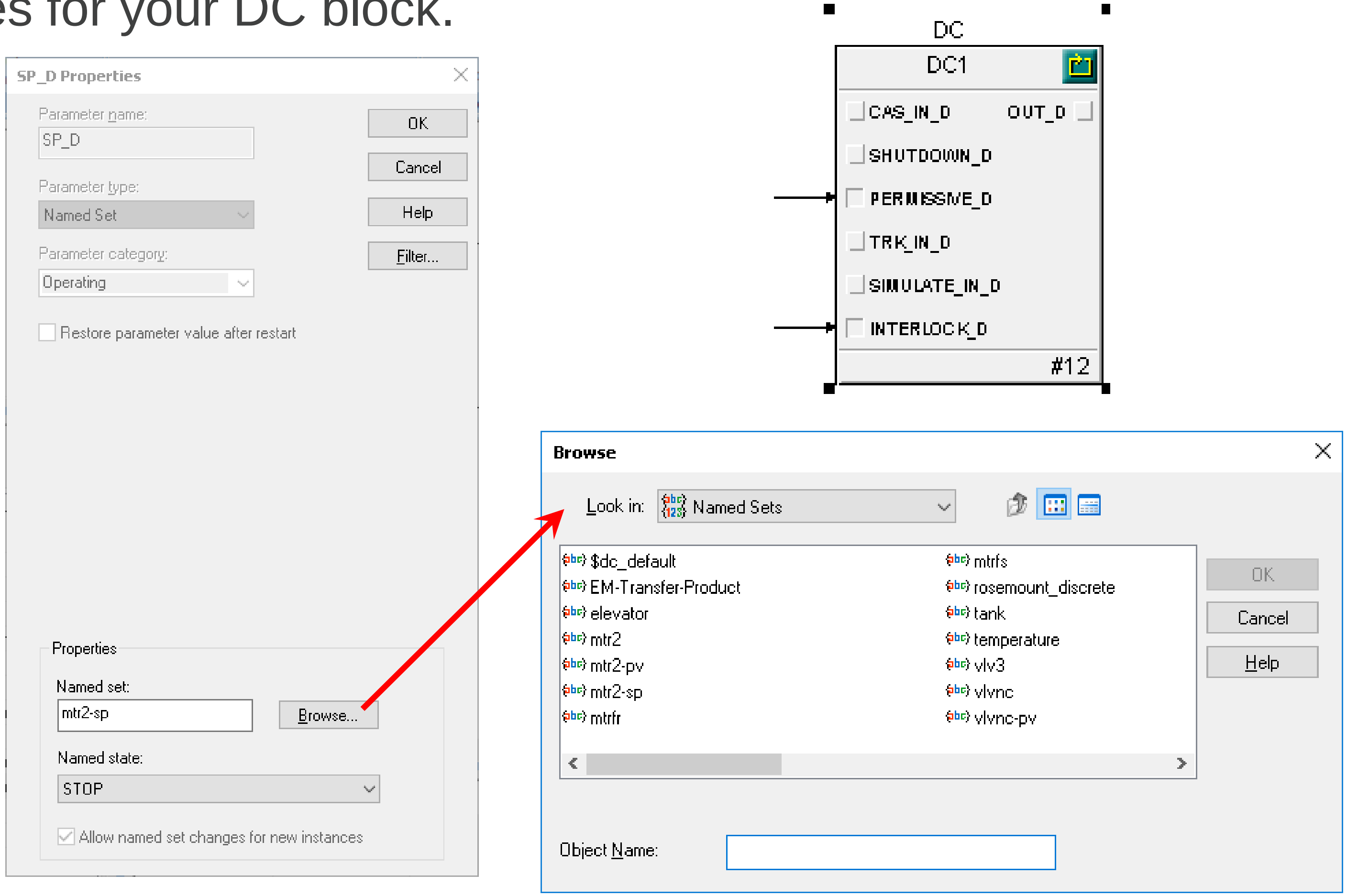
Named Sets are a collection of strings called Named States with equivalent floating point values.
mtr2-sp named set properties are shown here.



Access the Named Set Properties: mtr2-sp dialog box from DeltaV Explorer by selecting ... *Setup → Named Sets*

Named Sets

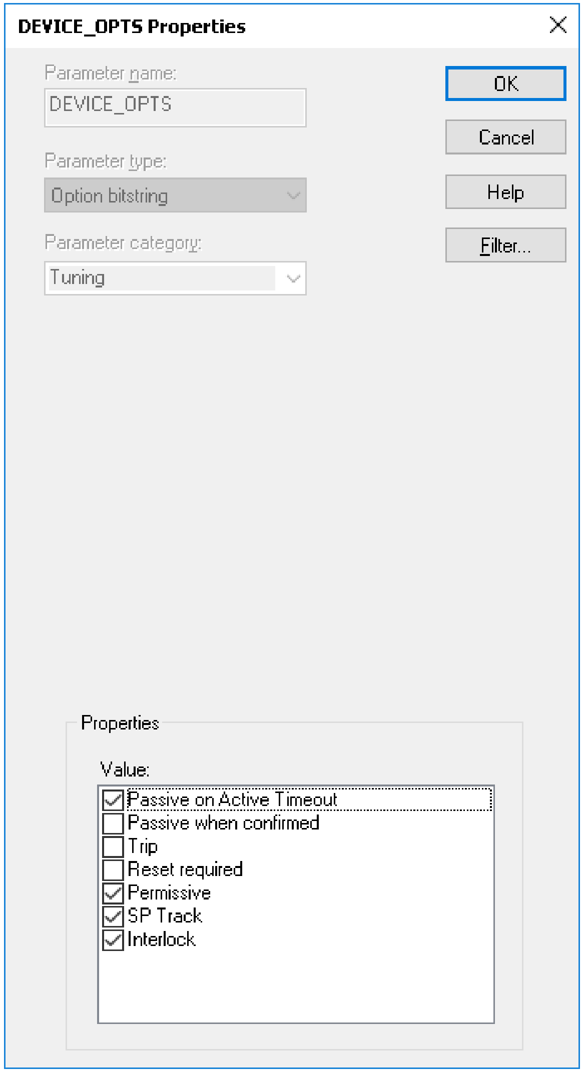
The SP_D Properties for the DC block allows you to browse for the available named sets. The names in the named set become the setpoint names for your DC block.



DC Block - Device Options

The DEVICE_OPTS Properties dialog box allows you to select device controller logic options to satisfy the process control strategy and the operation's safety requirements.

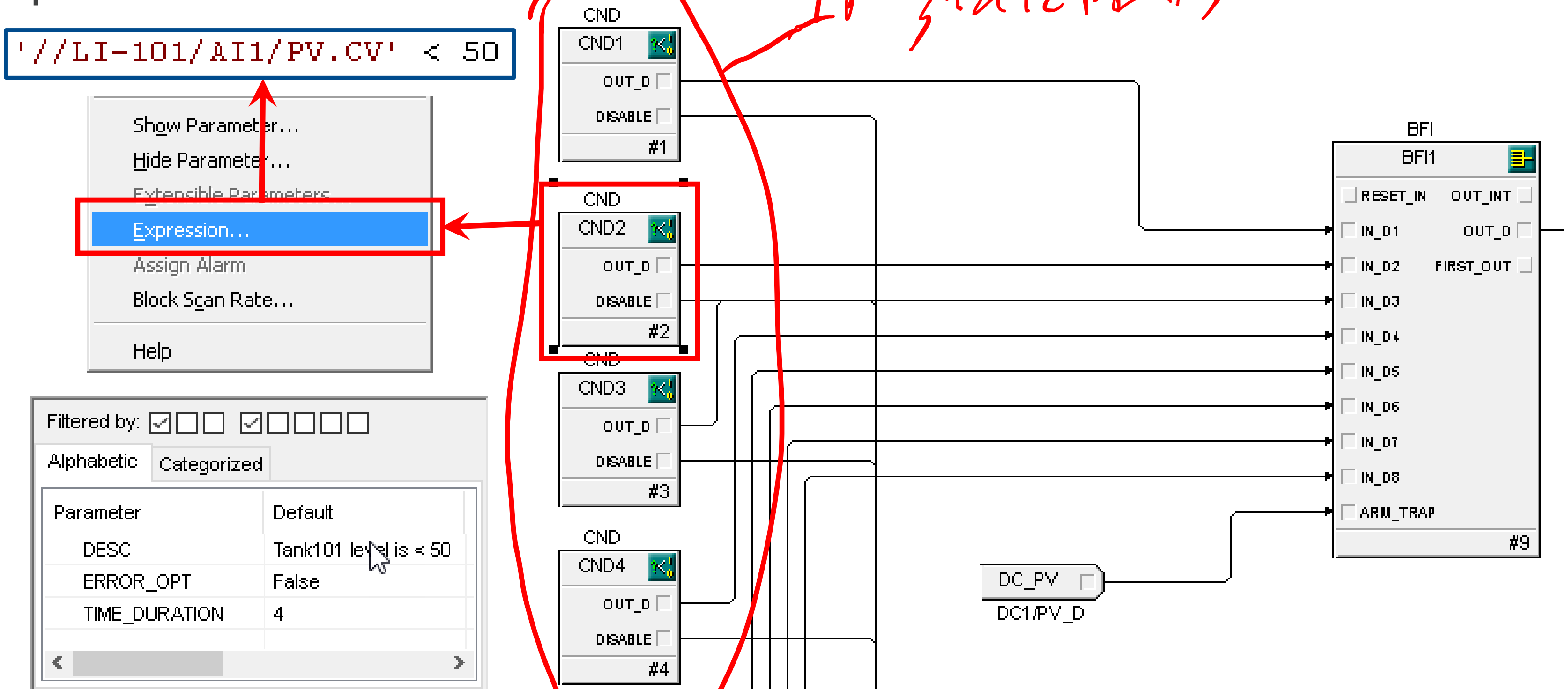
- Passive on Active Timeout
- Passive when Confirmed
- Trip
- Reset Required
- Permissive
- SP Track
- Interlock



DC Block - Interlocking

Interlocking is provided by the use of Condition blocks that evaluate an expression.

If statements



The Boolean Fan Input (BFI) block provides a first-out trap for operator indication and the *OR* block provides operator indication of bypassed conditions.

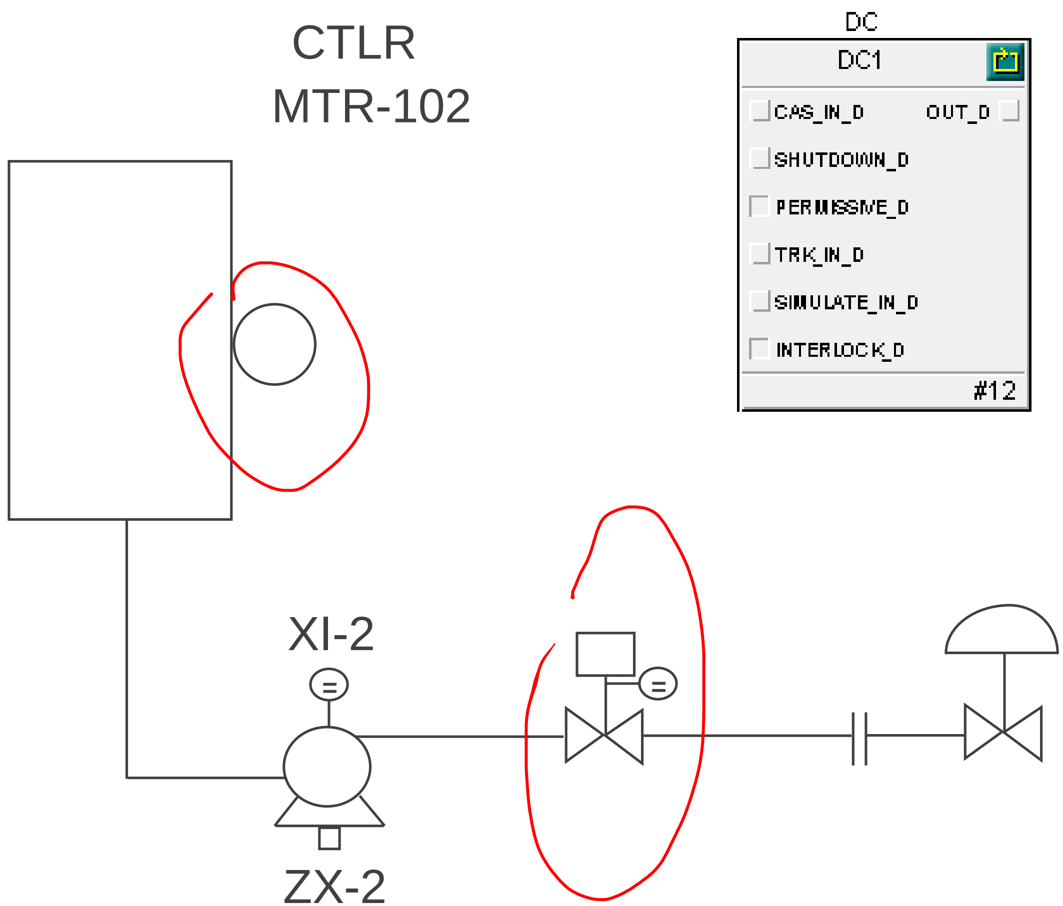
Workshop – Creating MTR-102

- Create the motor control module MTR-102 using module template
- Define interlocks

Workshop – Creating MTR-102

PV = Feedback

MTR-102 will be used to start or stop the discharge pump.



Filtered by:

Alphabetic | Categorized

Parameter	Default
CFM_ACT1_TIME	5
CFM_ACT2_TIME	10
CFM_PASS_TIME	5
DEVICE_OPTS	Non-zero
FV_D	STOPPED
IO_IN_1	XI-2/FIELD_VAL_D
IO_IN_2	
IO_OUT_1	ZX-2/OUT_D
IO_OUT_2	
MODE	Auto/
PV_D	STOPPED
SP_D	STOP
STATE_MASKS	

Continue to the next slide to start creating the MTR-102 module.

Workshop – Creating MTR-102

Create motor control module MTR-102 in the following manner:

Step 1. From the DeltaV Explorer, drag and drop the *MTR-11_ILOCK* template from the Library to PLANT_AREA_A.

Step 2. Rename the module *MTR-102*.

Workshop – Creating MTR-102

Step 3. Launch Control Studio and modify the DC block parameters as shown:

I/O	IO_IN_1	XI-2	(C03CH02 or CHM1-09)
	IO_OUT_1	ZX-2	(C04CH02 or CHM1-10)

Device_Opts
- ☐ Passive on Active Timeout
- ☐ Passive when confirmed
- ☐ Trip
- ☑ Reset required
- ☑ Permissive
- ☑ SP Track
- ☑ Interlock

Workshop – Creating MTR-102

Step 4. Provide Permissive and Interlock conditions.

Block	DESC	Time Duration	Expression
CND1	XV-101 is closed		‘//XV-101/DI1/PV_D.CV’=0
CND2	Tank101 level is <50	4 Secs	‘//LI-101/AI1/PV.CV’<50

Step 5. Assign the module to the controller. 

Step 6. Select the  button and modify module properties primary display to *Tank101*.

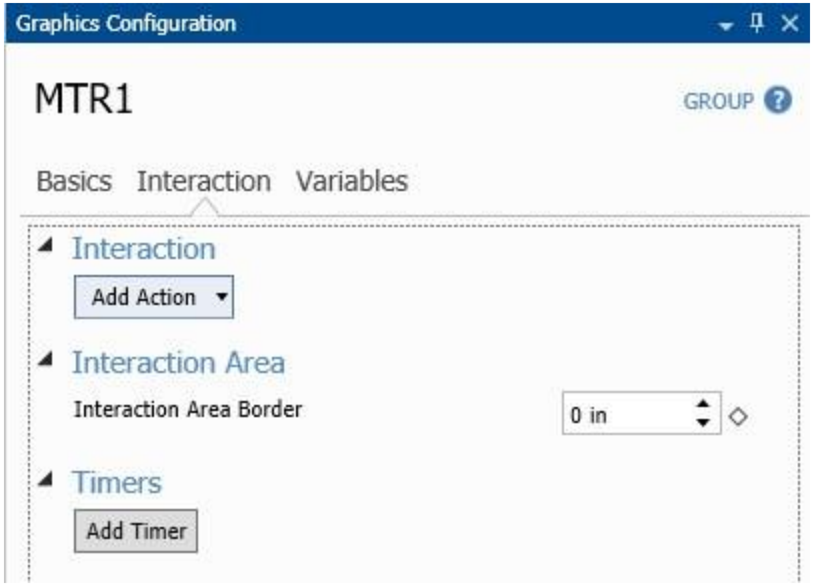
Step 7. Select the  button to save and the  button to download the module.

Note: Search Books Online for “Using Profibus DP, DeviceNET, and AS-Interface with DeltaV Functions Blocks” for special considerations with the DC block.

Workshop Complete.

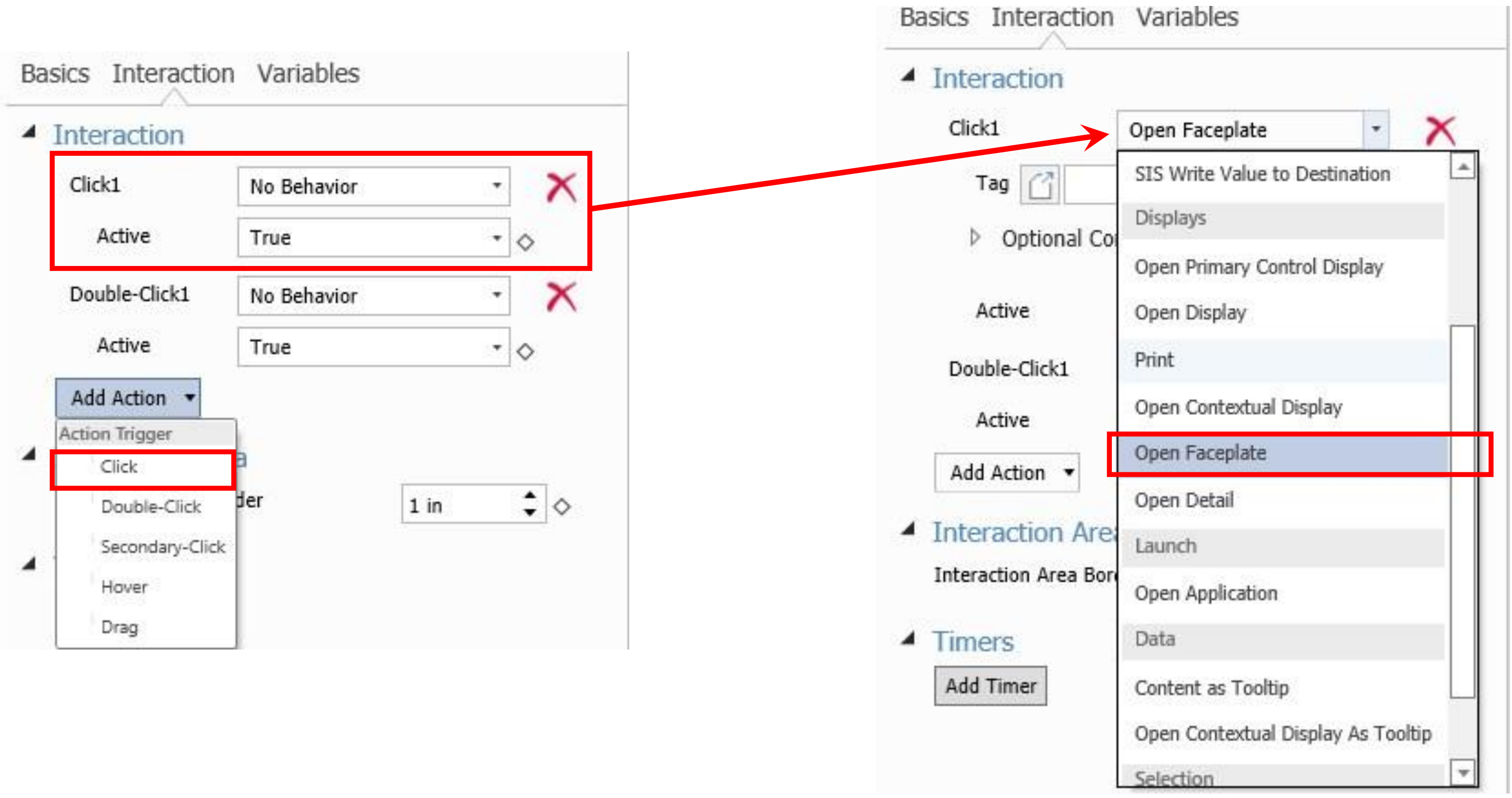
Configuring Interactions

Interactions are actions or events that define how DeltaV Live users can interact with graphics online. These can be customized through the Interactions tab in the Graphics Configuration pane.



Configuring Interactions

Select from the available mouse actions in the drop down window when you click on *Add Action* to trigger a behavior from the graphics element.



Workshop – Adding MTR-102 to Tank101

- Display a pump GEM
- Create data links
- Add an Open Faceplate Behavior as an Interaction for a Group

Workshop – Adding MTR-102 to Tank101

Modify the operator display by adding motor control module MTR-102 to the Tank101 display in the following manner:

Step 1. Launch the Graphics Studio application and open the Tank101 display.

Step 2. Add data links with the following characteristics:

Expression	Type	Writes
DLSYS[“MTR-102/DC1/SP_D”]*	Named Set*	Normal Write
DLSYS[“MTR-102/DC1/PV_D”]*	Named Set*	Not allowed
DLSYS[“MTR-102/ALARMS[1].LAALM.STR”]	String	Not allowed

Step 3. Animate the Alarm data link to make it visible only when an alarm is active and make it blink red when the alarm is new and unacknowledged.

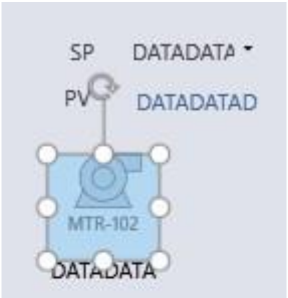
**Hint: Set the Type first and then browse for the parameter.*

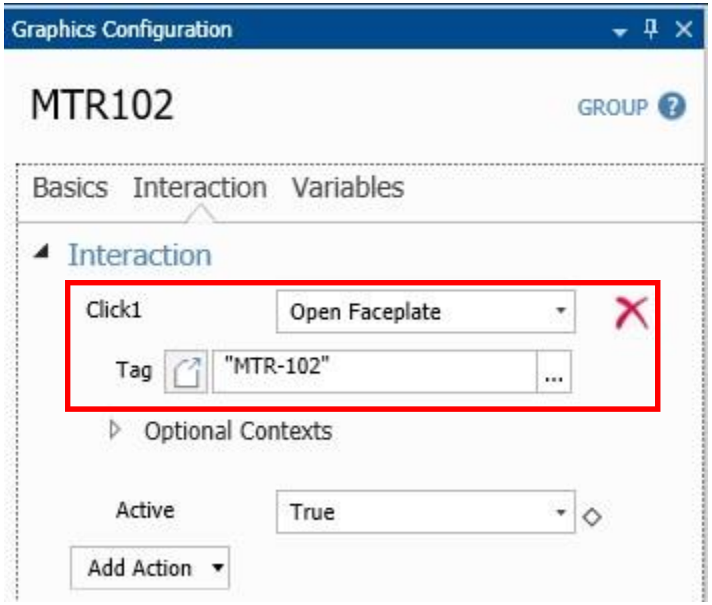
Workshop – Adding MTR-102 to Tank101

Step 4. Add an instance of PUMP4 GEM to the display from the Equipment section in the Palette. Set the Equipment Title to MTR-102 and Equipment Description to blank.

Step 5. Right-click on the GEM and click Group → Group.

Step 6. Go to the Interaction tab of the Group to add an Action that will open the faceplate for MTR-102.





Workshop – Adding MTR-102 to Tank101

Step 7. Save then Publish the Display.

Verify the operation of motor control module MTR-102 in the following manner:

Step 8. Run the DeltaV Live application and click on the *Refresh Configuration* button  .

Step 9. Energize (open) XV-101.

Step 10. Fill Tank101 to 500 gallons.

Step 11. Verify that motor control module MTR-102 is operating properly by manipulating the SP_D.

Step 12. De-energize (close) XV-101 and verify that the interlock occurs.

Workshop – Adding MTR-102 to Tank101

Step 13. Adjust Tank101’s level to 10 gallons and verify that the interlock occurs.

Step 14. Verify that the faceplate for MTR-102 opens when clicking on the pump.

Workshop Complete.

Optional Workshop – XV-OPTION

- Create a new module called XV-OPTION
- Use a module template with Device Control block
- Create new Named Sets

Optional Workshop – XV-OPTION

Create a new module named *XV-OPTION*. This valve will be controlled with a Device Control block. The process engineer has requested that the Setpoint names should be *Flush(1)* and *Hold(0).* The *Process Variable* names should be *Flushing(1)* and *Holding(0)*.

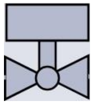
Hints:

1. Module Templates
2. New Named Sets (must have 4 names)
3. If using CHARMs, simulate the I/O

DeltaV Live View

XV-OPTION

Card 4 Channel 4



Card 3 Channel 4

Summary

- Identify the appropriate module template for motor control
- Define state masks
- Define named sets
- Define device options
- Define condition expressions
- Configure an Interaction for a Group

DeltaV Regulatory Control

Module 7

Module Objectives

- Determine DST license requirements
- Define Modes and Fields
- Define a Regulatory Control module using the PID_LOOP template
- Use a Library Function for Animation

Module Workshops

- Creating FIC-102
- Adding FIC-102 to Tank101

- Optional Workshops
  - Tune FIC-102
  - DeltaV Live Functions
  - Mode not Normal

DeltaV DST Licensing Requirements

DST licensing is based on the number of inputs and outputs:

- Analog Output
- Analog Input
- Discrete Output
- Discrete Input

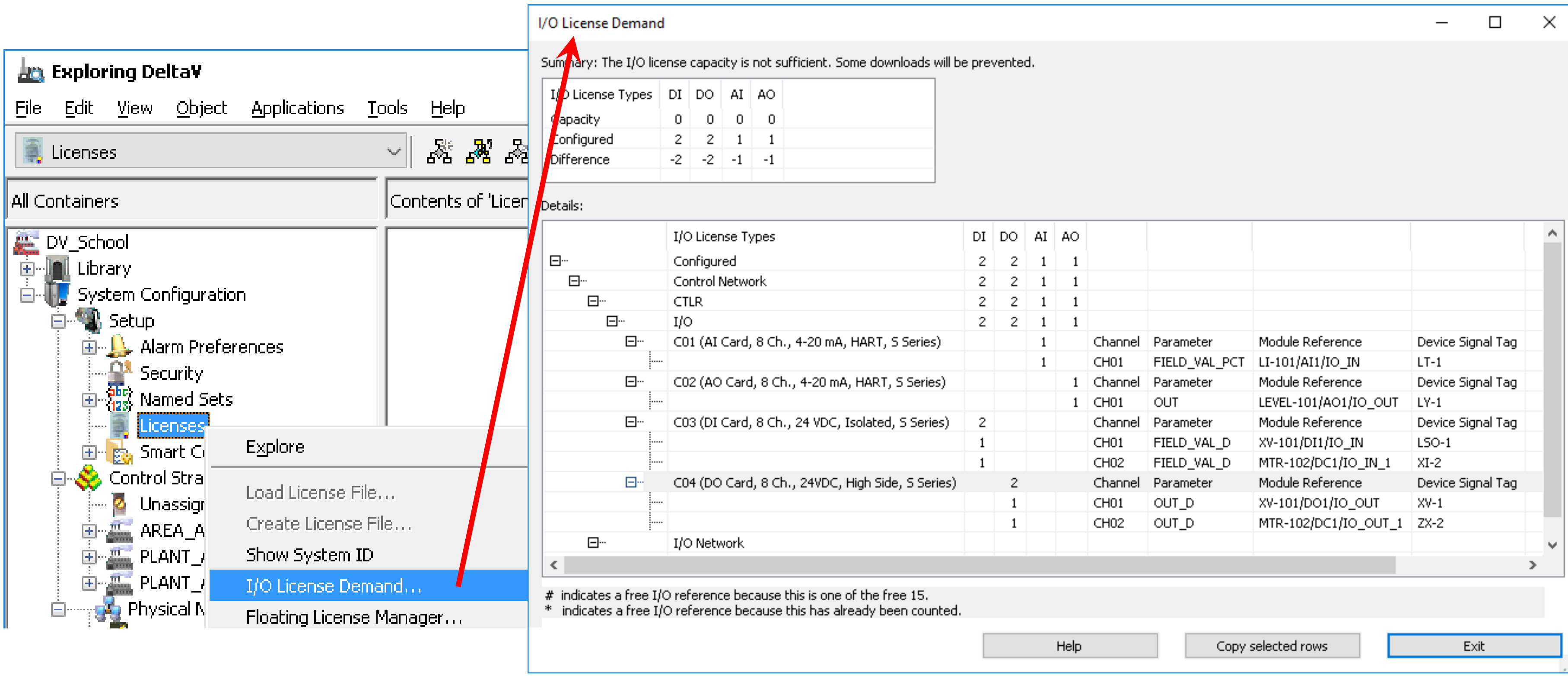
DeltaV keeps track of DSTs as you use them.

Note: DSTs can be substituted for less functional DSTs. For example, an Analog Output DST License could be used for an Analog Input DST.

Total System DSTs

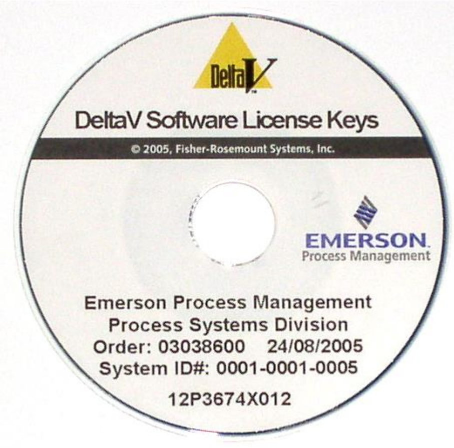
View a system summary of DST usage by selecting from the DeltaV Explorer . . .

Setup→ Licenses → I/O License Demand…



DeltaV Licenses

DeltaV licenses are provided in the form of a license file(s) provided on a mini CD and a unique System Identifier (ID) Key.

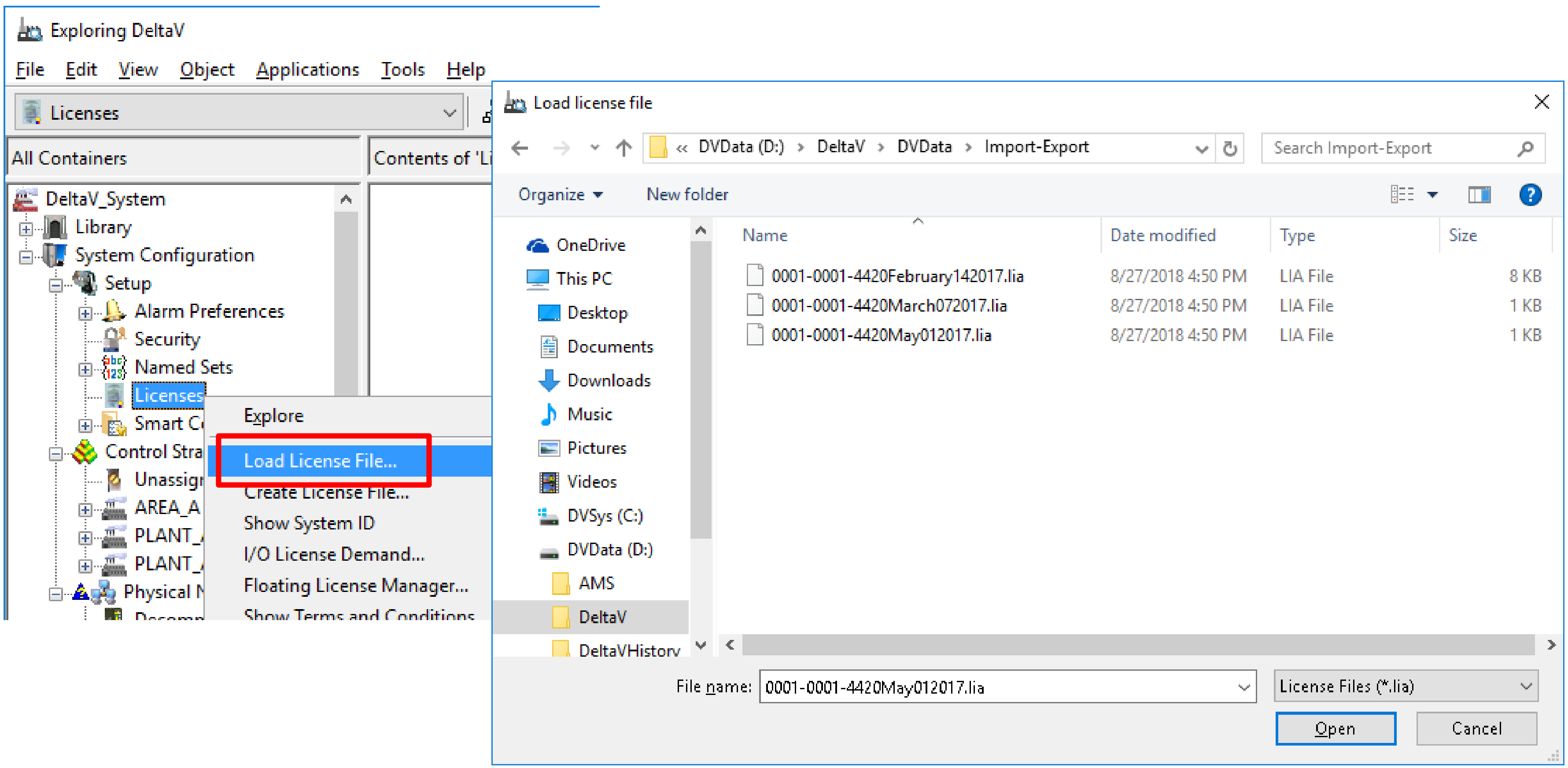


Mini License CD

USB System ID Key

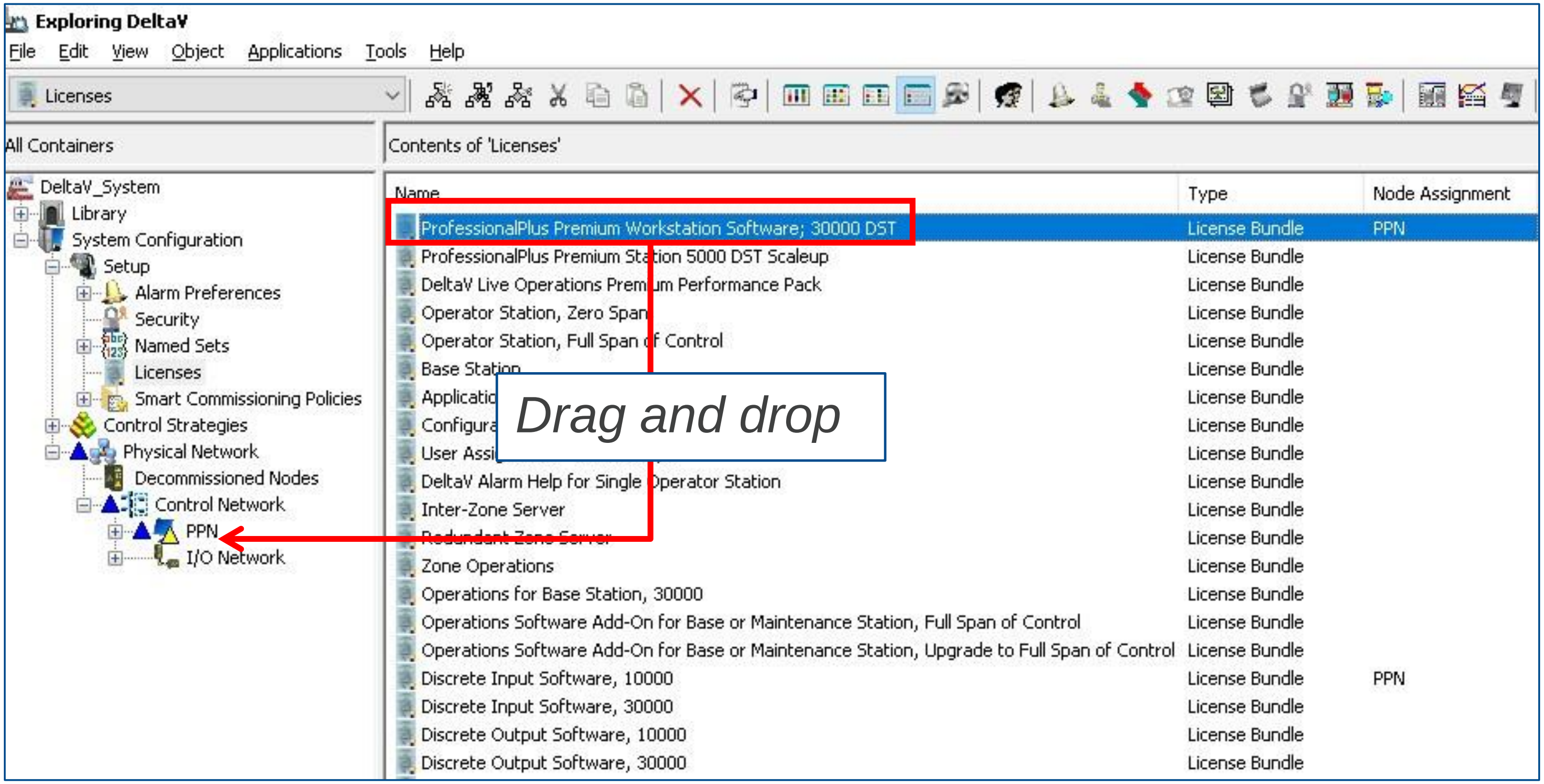
Loading Licenses

Licenses are loaded into your DeltaV database as shown below. The file number must match the number on your System ID Key.



Assigning Licenses to Nodes

Licenses can be assigned to the appropriate node using drag and drop.

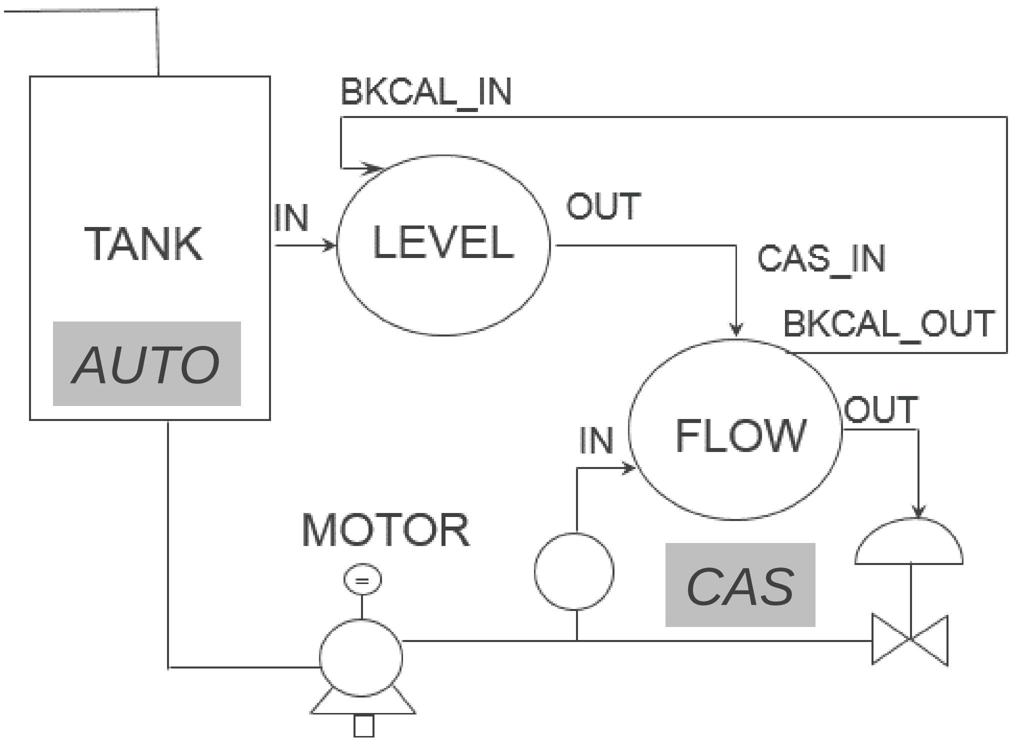


Modes

Mode determines where the PID block will get its SP and how it will determine its OUT value.

DeltaV Function Block Modes:

- *Automatic* (AUTO)
- *Cascade* (CAS)
- *Manual* (MAN)
- *Remote Cascade* (RCAS)
- *Remote Out* (ROUT)
- *Initialize Manual* (IMAN)
- *Out of Service* (OOS)
- *Local Override* (LO)



ex. Cascade Control Loop Modes

Modes – Numeric Values

IMAN	=	*2.0 (Target);*	*2.0 (Actual)*
MAN	=	*8.0 (Target);*	*8.0 (Actual)*
CAS	=	*48.0 (Target);*	*32.0 (Actual)*
AUTO	=	*16.0 (Target);*	*16.0 (Actual)*
OOS	=	*1.0 (Target);*	*1.0 (Actual)*
RCAS	=	*80.0 (Target);*	*64.0 (Actual)*
ROUT	=	*144.0 (Target);*	*128.0 (Actual)*
LO	=	*N/A (Target);*	*4.0 (Actual)*

Important: Always use numeric values, not the word*, when writing the mode to Fieldbus devices!*

Mode Fields

DeltaV Mode Fields include:

- *Target* – Mode is requested by the operator. Only modes from the permitted list may be requested.
- *Actual* – This is the block's current mode. This may differ from the target based on operating conditions.
- *Normal* – This is the mode the block should be set to during normal operating conditions. May be configured and read but is not used by the block algorithm.
- *Permitted* – List of valid mode choices.

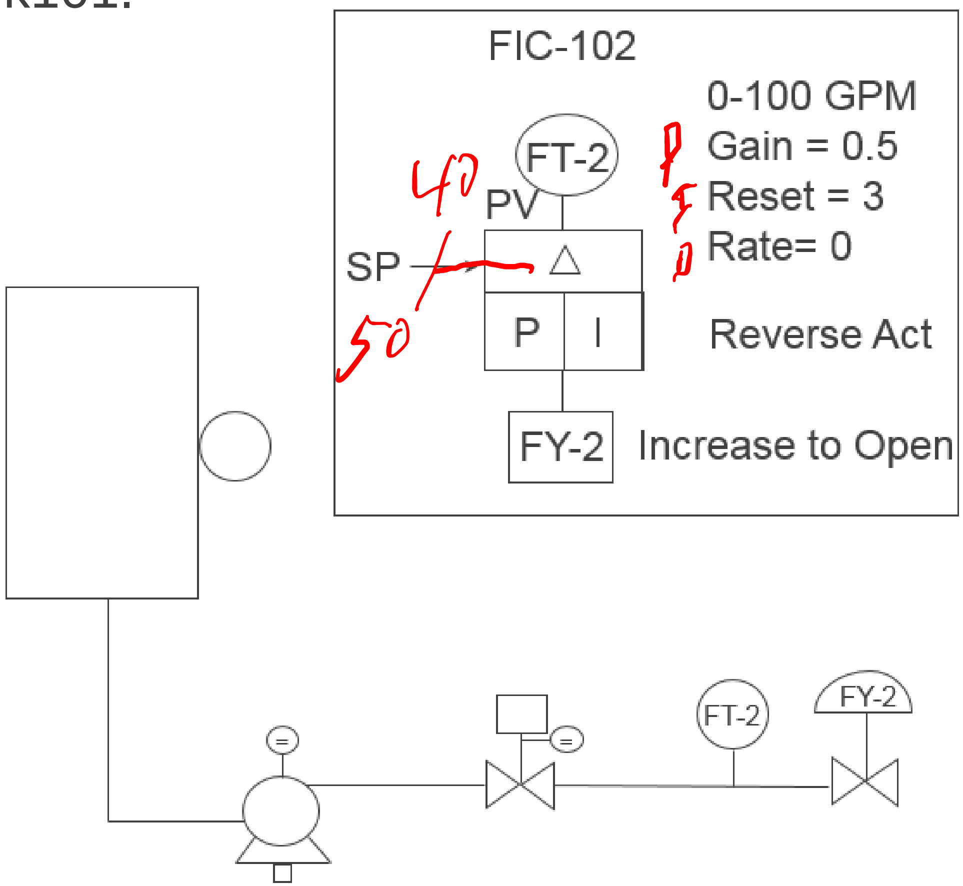
Workshop – Creating FIC-102

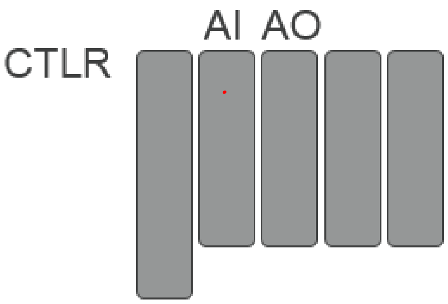
- Record DST usage prior to configuring FIC-102
- Configure the regulatory loop FIC-102 using PID_LOOP template
- Record DST usage after configuring FIC-102
- Display loop parameters using data links

Workshop – Creating FIC-102

Error = 10

FIC-102 will simulate a PID loop that will regulate the outlet flow from Tank101.





Continue to the next slide to start creating the FIC-102 module.

Workshop – Creating FIC-102

Record DST usage prior to configuring FIC-102 in the following manner:

Step 1. Launch the DeltaV Explorer.

Step 2. Right-click on Licenses under Setup and then select *I/O License Demand…*

Step 3. Record the number of DSTs configured for:

Discrete Inputs ___________

Discrete Outputs ___________

Analog Inputs ___________

Analog Outputs ___________

Workshop – Creating FIC-102

Create Regulatory Control module FIC-102 in the following manner:

Step 4. From the DeltaV Explorer, drag and drop the *PID_LOOP* template from the Library to *PLANT_AREA_A*.

analog category

Step 5. Rename the module *FIC-102*.

Step 6. Launch Control Studio and modify the PID block as indicated below:

IO_IN	FT-2	(C01CH02 or CHM1-03)
IO_OUT	FY-2	(C02CH02 or CHM1-04)
GAIN	0.5	
RESET	3 seconds/repeat	
PV_SCALE	0 - 100 GPM	
IO_OPTS	Increase to OPEN	Default
CONTROL_OPTS	Reverse Acting	
Alarms	LOW = 10 HIGH = 90	

Workshop – Creating FIC-102

Step 7. Click the button to assign the module to the controller.

Step 8. Click the button to modify Module Properties primary display Tank101.

Step 9. Click the button to save and the button to download the module.

Workshop – Creating FIC-102

Record DST usage after configuring FIC-102 in the following manner.

Step 10. Launch the DeltaV Explorer.

Step 11. Right-click on Licenses under Setup and then select *I/O License Demand…*

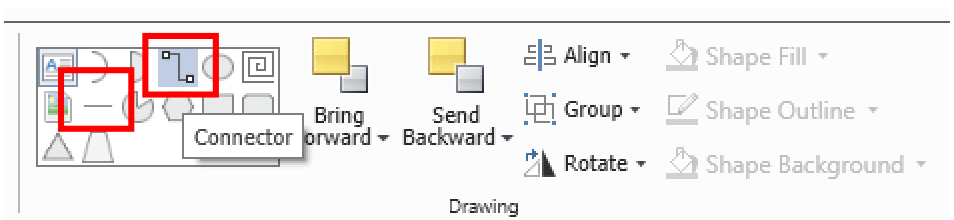
Step 12. Record the number of DSTs configured for:

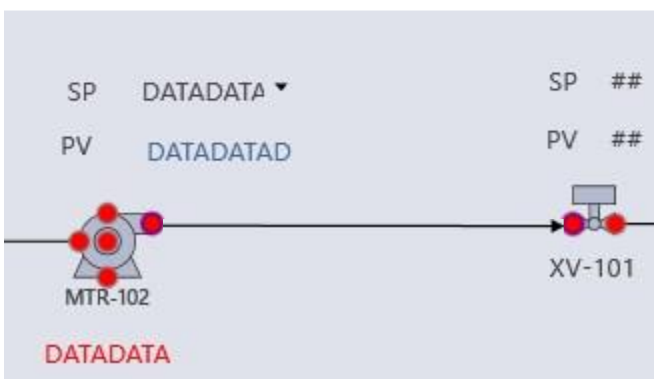
Discrete Inputs ___________
Discrete Outputs ___________
Analog Inputs ___________
Analog Outputs ___________

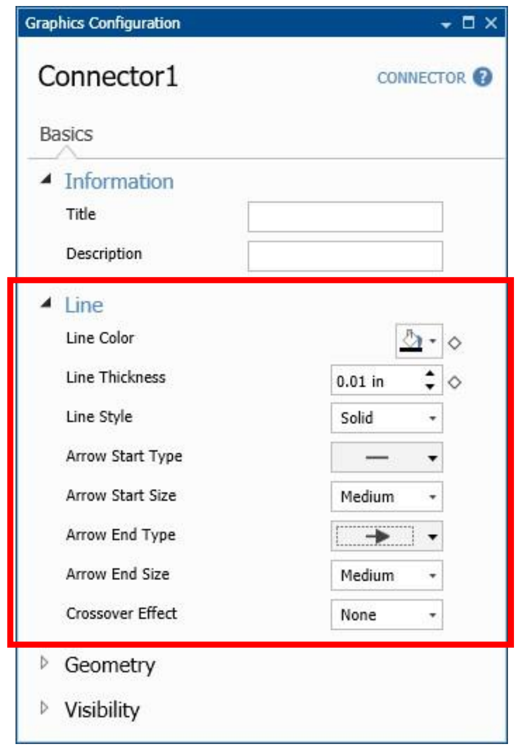
Workshop Complete.

DeltaV Live Lines and Connectors

Lines and Connectors allow a user to join equipment. It will latch itself to a connection point in objects, including GEMs or other lines/connectors. Options include animations, arrows and crossover effects. To use it, select it from the Drawing section in the Home tab of the Ribbon.

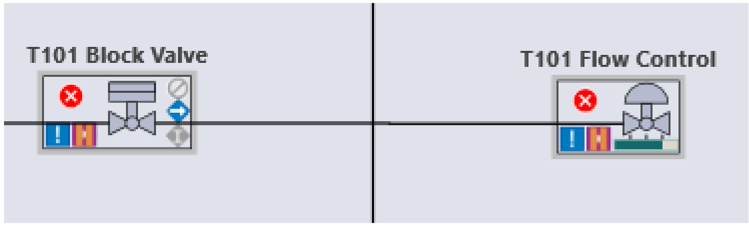


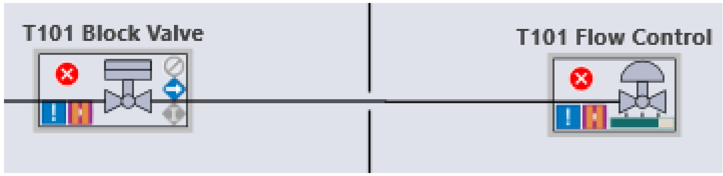


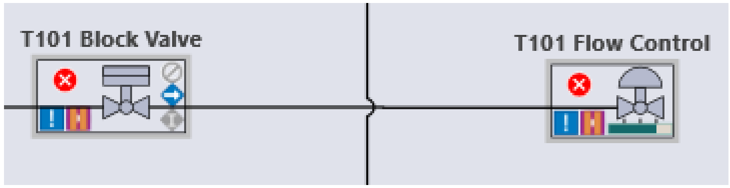


DeltaV Live Lines and Connectors

Three Crossover Effects are available as configurable properties in the Graphics Configuration pane:

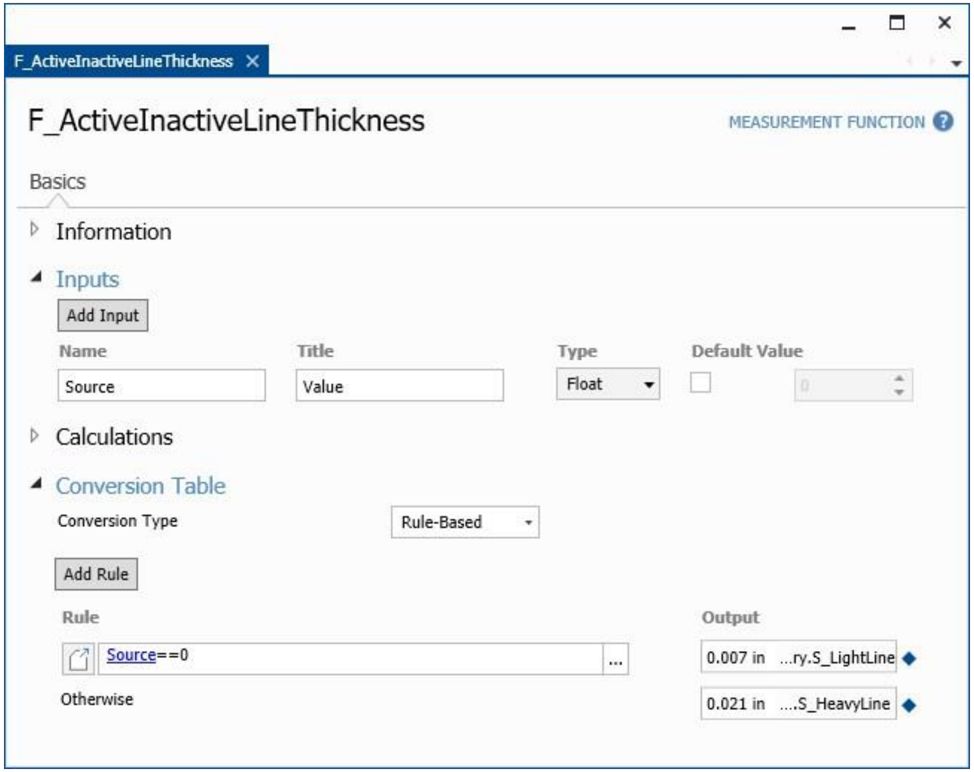






Library Animations and Functions

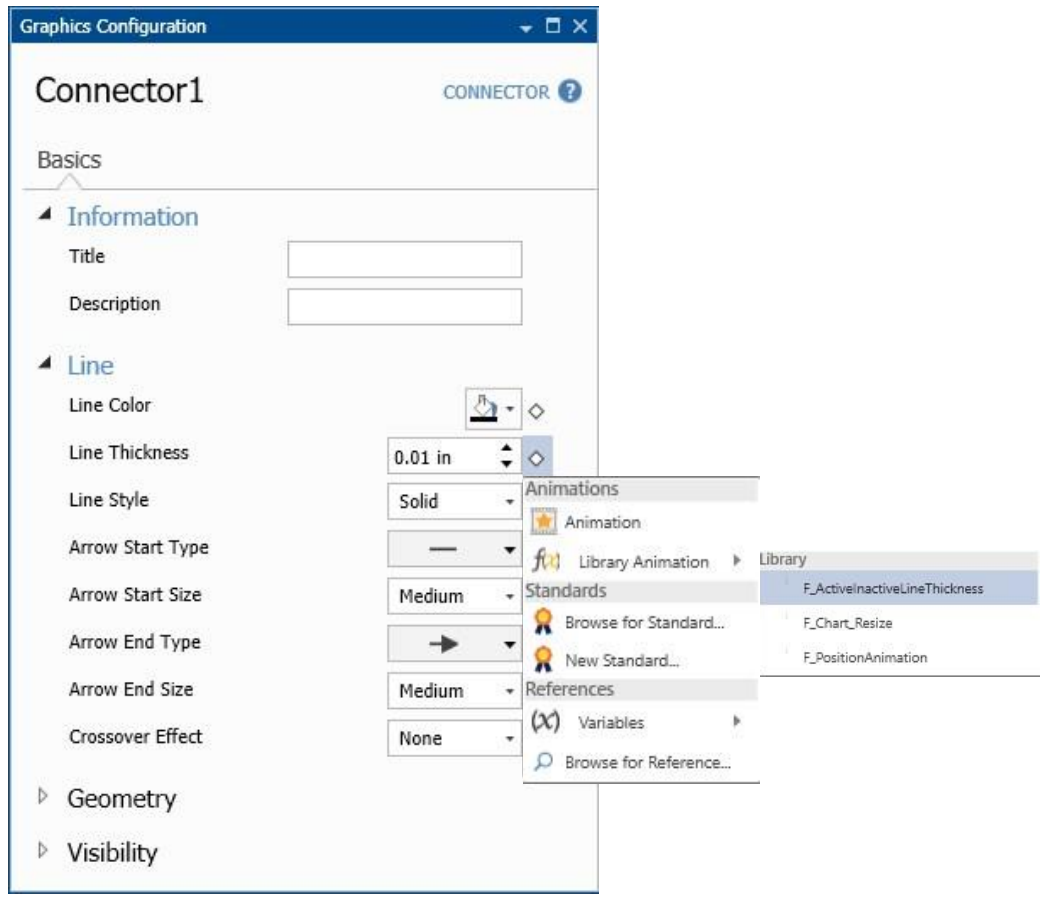
Library functions provides a means to create logic that converts values of one type into values of a different type, ex. Floating values to line thickness.



Library Animations and Functions

Library functions can be used and referenced by graphic elements for animation purposes.

To add an animation using a library function, use the diamond context menu to access the Library Animation for a property. A list of available and valid library functions for the property will be displayed.



Workshop – Adding FIC-102 to Tank101

Display loop parameters using data links

Use a Library Function for animation

Workshop – Adding FIC-102 to Tank101

Modify the operator display by adding Regulatory Control module FIC-102 to the Tank101 display in the following manner:

Step 1. Launch the Graphics Studio application and open Tank101.

Step 2. Add datalinks with the following characteristics:

Expression	Type	Writes
FIC-102/PID1/SP.CV	Numeric	Normal Write
FIC-102/PID1/PV.CV	Numeric	Not allowed
FIC-102/PID1/OUT.CV	Numeric	Normal Write
FIC-102/PID1/MODE*	Mode*	Normal Write
FIC-102/PID1/MODE.ACTUAL	String	Not allowed
FIC-102/ALARMS[1].LAALM	String	Not allowed

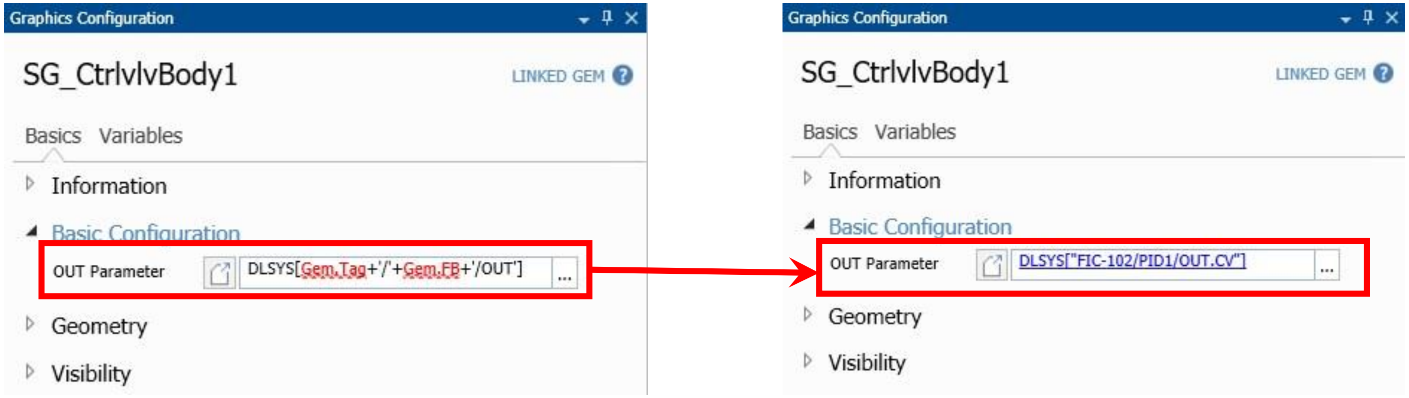
**Hint: Set the Type first and then browse for the parameter.*

Workshop – Adding FIC-102 to Tank101

Step 3. Animate the Alarm data link to make it visible only when an alarm is active and make it blink red when the alarm is new and unacknowledged.

Step 4. Add the GEM SG_CtrlvlvBody from the *Components of Process GEMs* set.

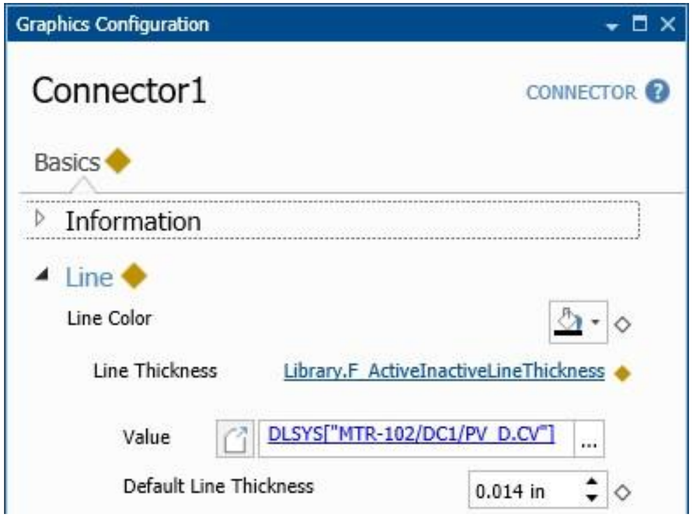
Step 5. Delete the contents of the *OUT Parameter* and replace with the OUT of FIC-102:



Workshop – Adding FIC-102 to Tank101

Step 6. Connect the tank, pump, and valves together using Lines and/or connectors.

Step 7. Animate the process lines using the library function F_ActiveInactiveLineThickness.



Step 8. Add the Open Faceplate Interaction to the valve GEM.

Workshop – Adding FIC-102 to Tank101

Step 9. Save then publish the display.

Verify the operation of Regulatory Control loop FIC-102 in the following manner:

Step 10. Launch the DeltaV Live application and *Refresh Configuration.*

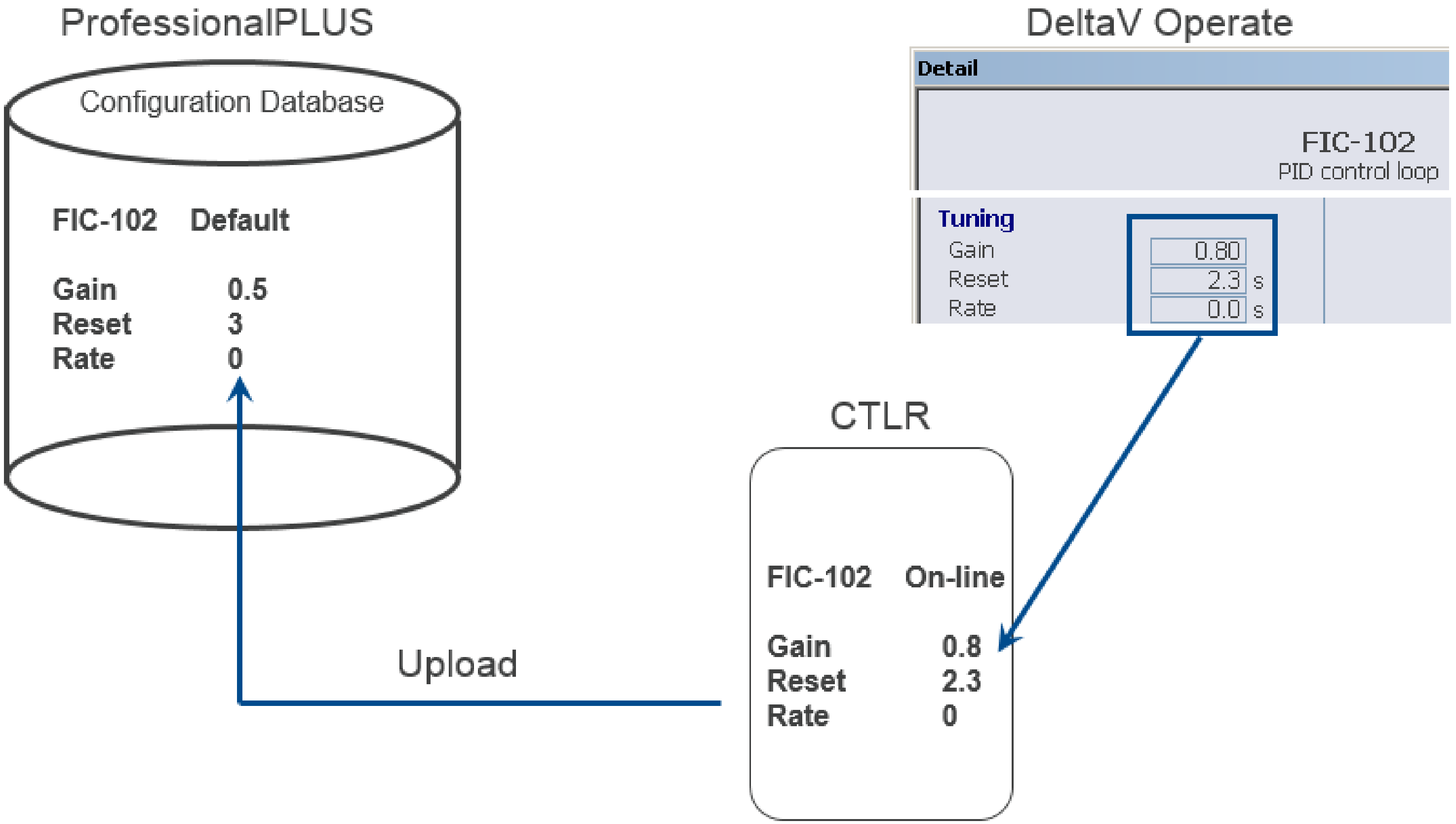
Step 11. Verify Regulatory Control loop FIC-102's functionality by manipulating the SP.

Step 12. Open the detail picture for FIC-102 and adjust the tuning parameters.

Workshop Complete.

Uploading Parameter Changes

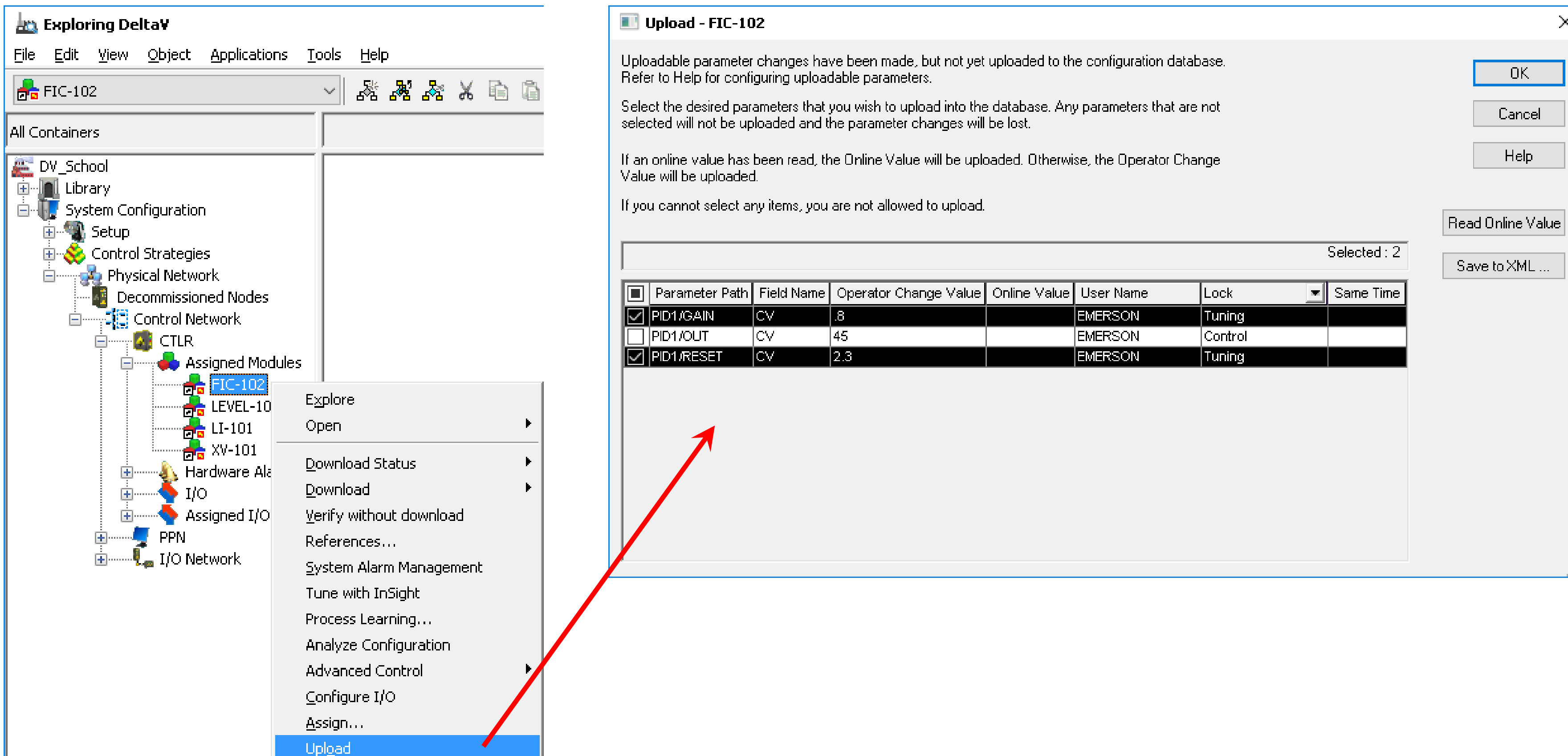
On-line values can be changed from Control Studio or DeltaV Operate. The Upload option allows you to write on-line values back to the configuration database.



Uploading Parameter Changes

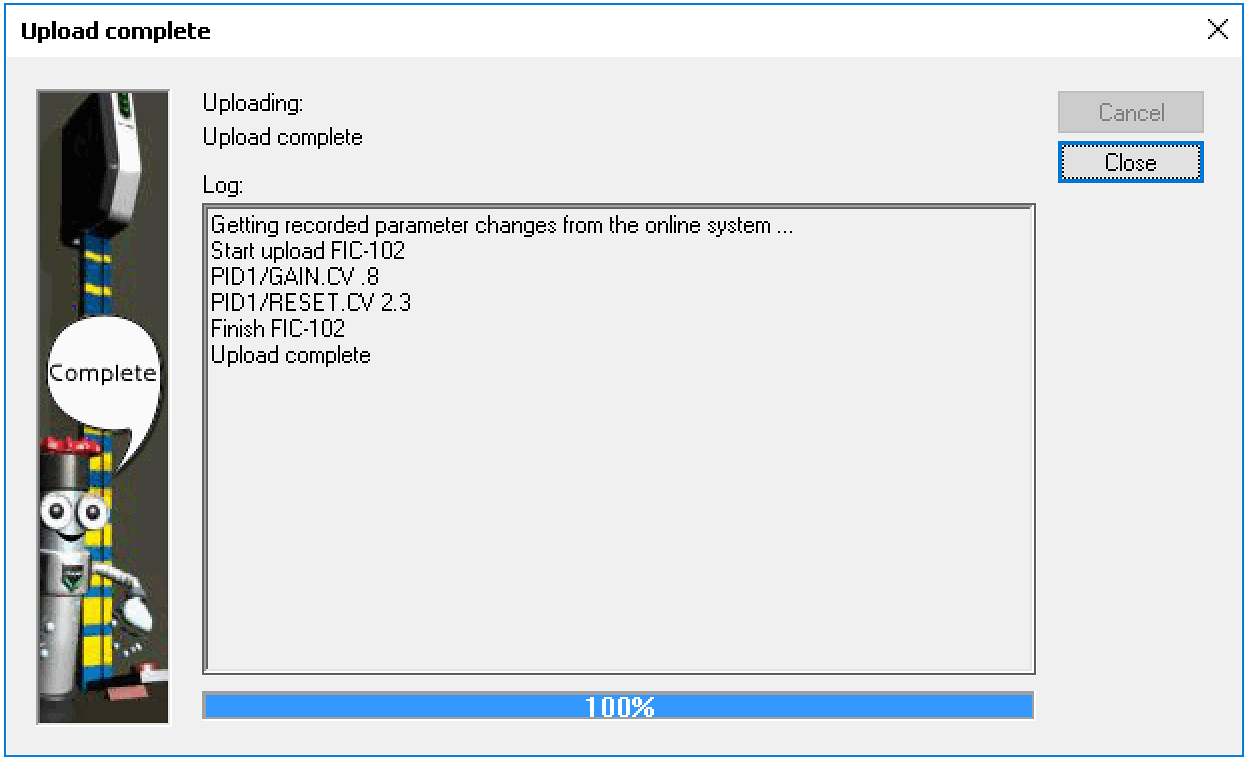
The Upload option is accessed by right-clicking the module of interest.

Select the parameters you want written back to the database and click OK to continue.



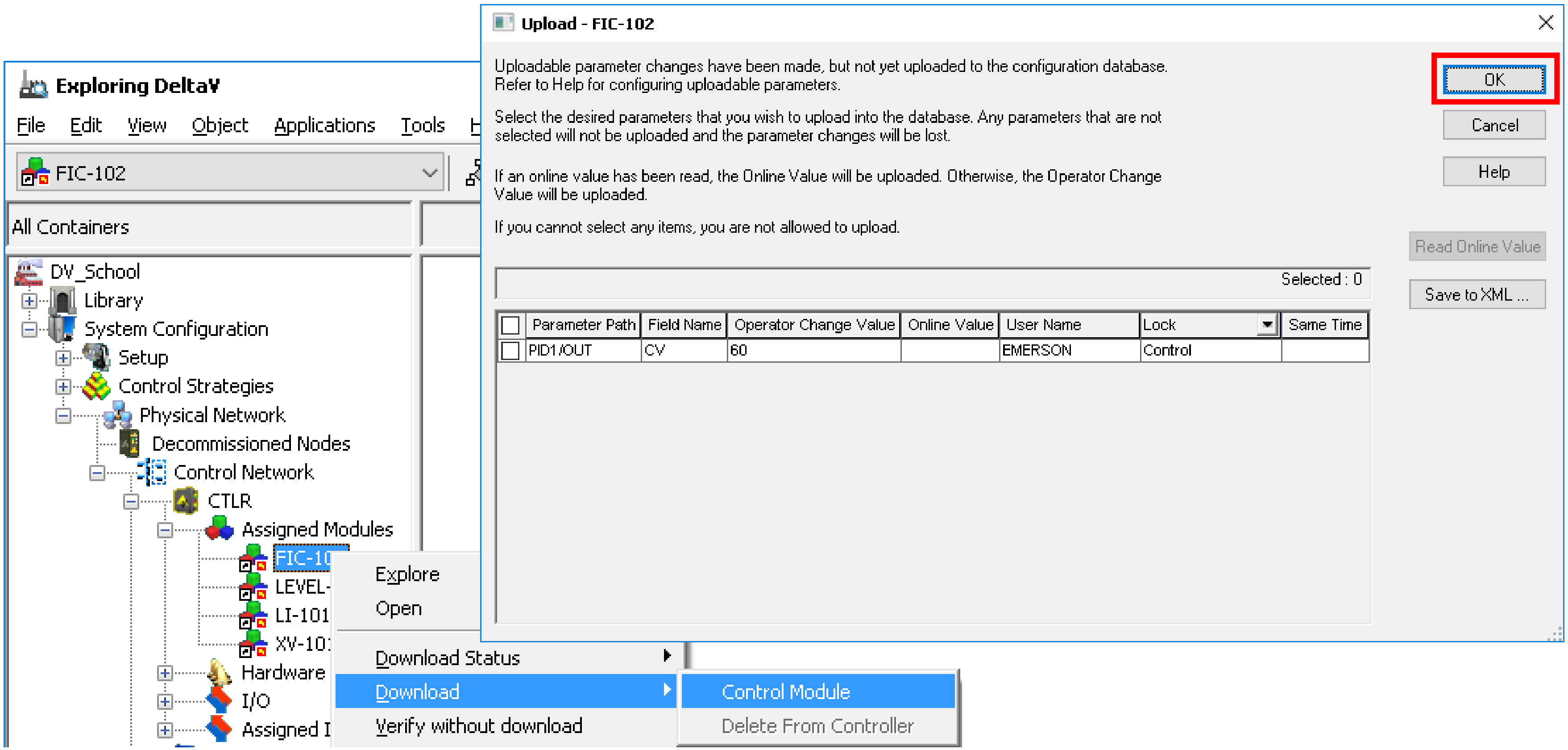
Upload Confirmation

The Upload complete confirmation box appears once the selected data has been successfully uploaded. Click Close to continue. You may want to Download Controller Cold Restart Memory if it is enabled.



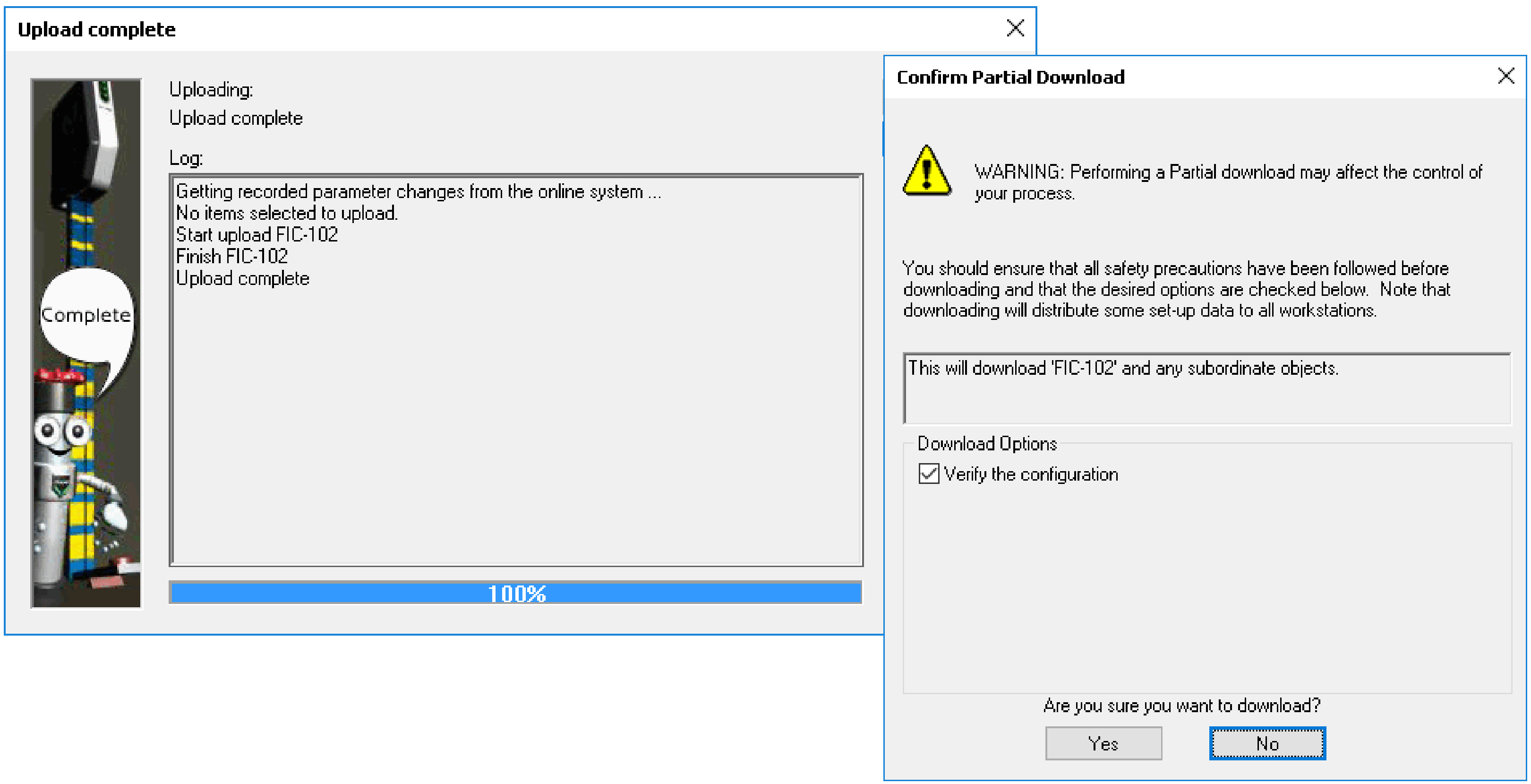
Downloading with an Upload

Selecting a download will prompt you with an Upload option if external changes have been made to the on-line data. If an Upload is not necessary, click OK because, by default, no parameters are selected.



Uploading Parameter Changes – Select None

When you click OK on the Upload dialog box above *no parameters are uploaded* even though the Upload appears to execute. This is necessary for internal housekeeping.



Optional Workshop 1 – Tune FIC-102

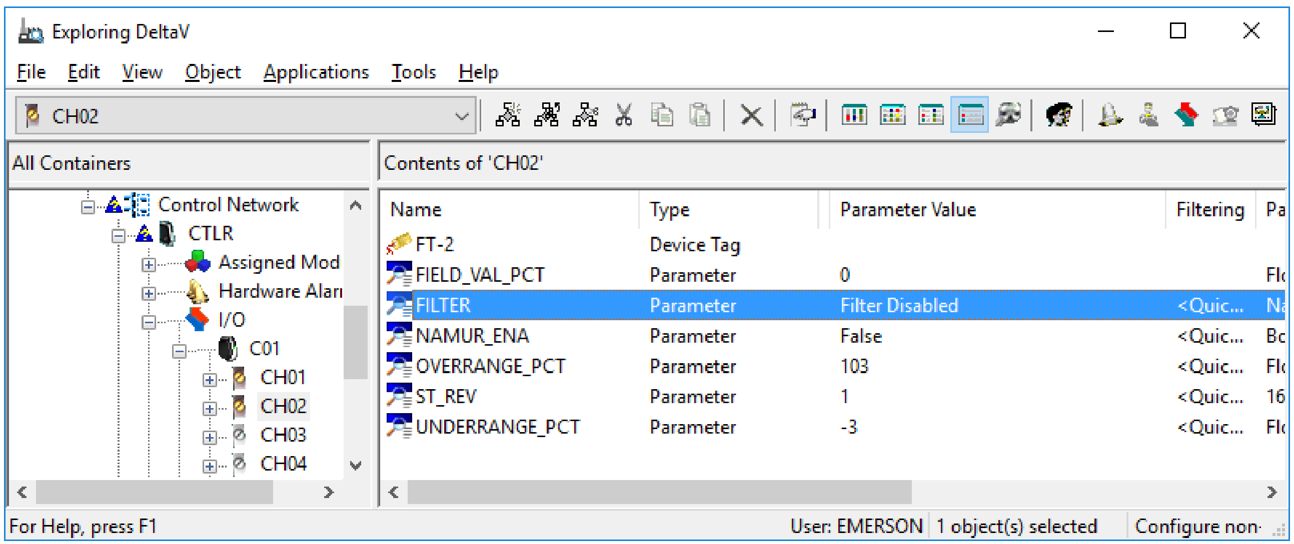
- Apply a Filter on FIC-102
- Tune FIC-102 with DeltaV Tune
- Upload new tuning parameters

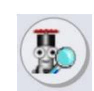
Optional Workshop 1 – Tune FIC-102

Tune FIC-102 using DeltaV Tune. To emulate a realistic process response, your first step is to apply a filter on FIC-102's input channel or CHARM.

Hints:

1. Apply a 2.6 second filter on FIC-102's input and download.



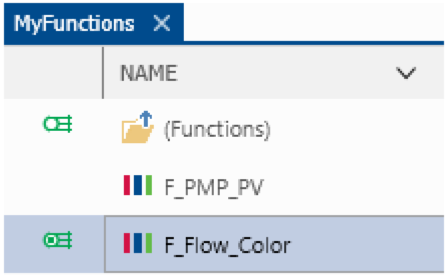
2. Launch DeltaV Tune from the FIC-102's detail picture 
3. First Test the process, then Update with new tuning parameters.

Optional Workshop 2 – DeltaV Live Functions

- Create a color Function in Graphics Studio
- Modify Piping animation to use the function
- Verify new color appears on all the objects

Optional Workshop 2 – DeltaV Live Functions

In Graphics Studio, create a color function named *F_Flow_Color*. The function should have two colors: one to indicate product flow and a second color for no flow. Then modify your pipes animation to use the color function.



Hints:

1. Create the function in Graphics Studio
2. Save and Publish the function
3. Verify the colors change on all objects
4. Select a new flow color in the function and verify the new color appears on all the objects

Optional Workshop 3 – Mode not Normal

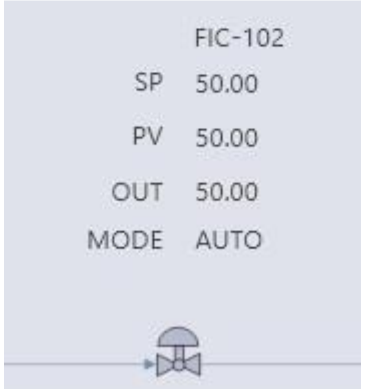
Make the datalink for Mode flash if mode is not normal

Make the datalink for Mode become invisible if mode is normal

Optional Workshop 3 – Mode not Normal

FIC-102 is designed to operate in the AUTO mode under normal conditions. The process engineer has requested that any time FIC-102's actual mode is not AUTO, make the datalink FIC-102/PID1/MODE.ACTUAL flash red, otherwise make it invisible.

Hint: Use the ISAN (Is Actual Normal) field for animation



Summary

- Determine DST license requirements
- Define Modes and Fields
- Define a Regulatory Control module using the PID_LOOP template
- Use a Library Function for Animation

EMERSON

Sequential Function Charts (SFCs)

Module 8

Module Objectives

- Define the application of a Sequential Function Chart
- Define the execution of a Sequential Function Chart
- Define the Steps in a Sequential Function Chart
- Define the Actions in a Step
- Define the Action Qualifiers in a Step
- Define Transitions
- Use Named Sets for a Sequential Function Chart

Module Workshops

- Creating SFC-T101

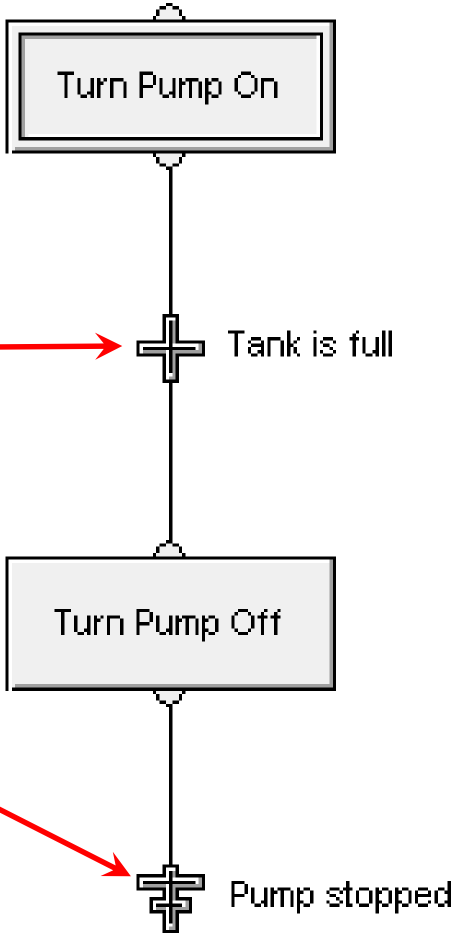
- Optional Workshops
  - Update Message
  - Check Tank Level
  - Add Shutdown Option
  - Add Alarm

Sequential Function Charts (SFCs)

SFCs are used to control time/event sequences.

SFCs are consist of:

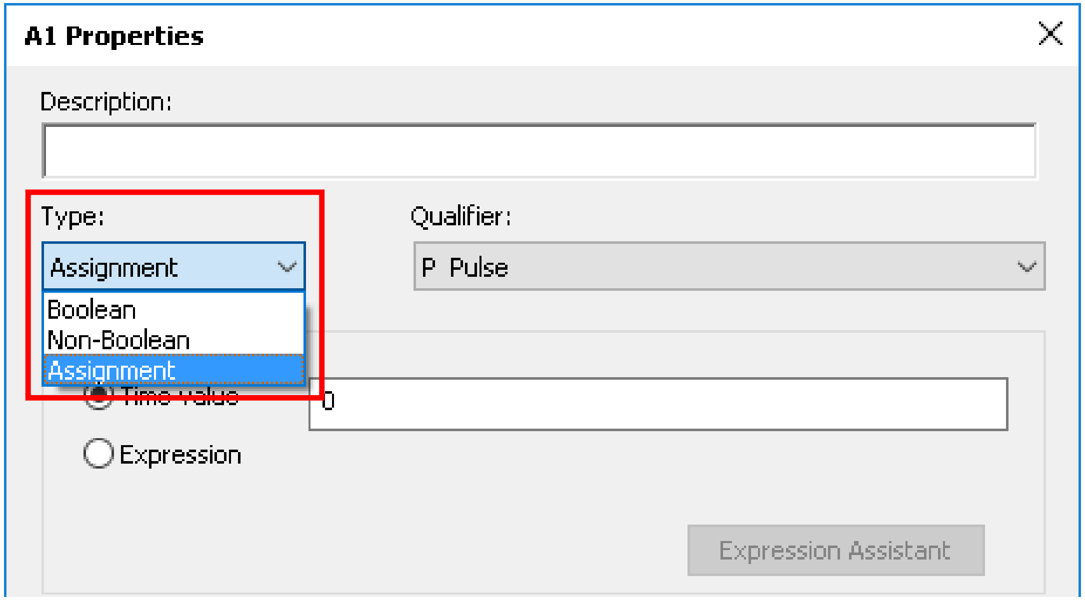
- *Steps* – Execute action(s).
- *Transitions* – Determines when to proceed to the next Step based on an expression being evaluated as TRUE.
- *Termination* – Special symbol that represents the end of a sequence. May also contain an expression.



Step Action Types

There are three types of Step Actions:

- *Assignment* – Assigns the result of an expression to a destination. Assignment type action is most commonly used.
- *Boolean* – References a module-level Boolean parameter. Boolean action can be used to set a Boolean parameter to TRUE if logic requires.
- *Non-Boolean* – Used to run a FB embedded inside the SFC logic.



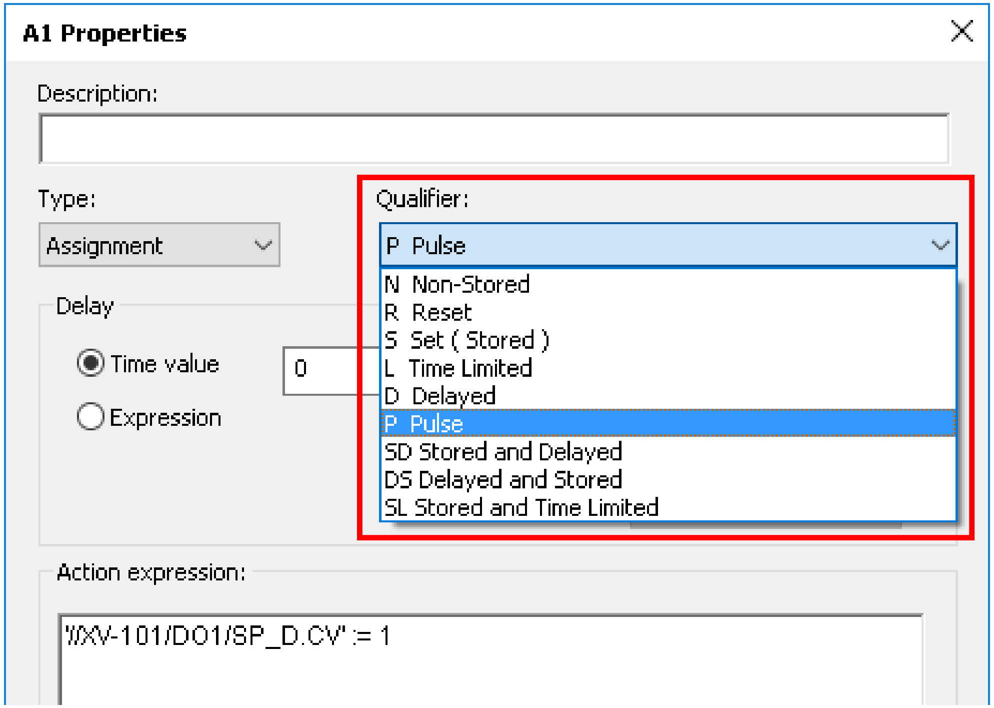
Step Action Qualifiers

How long should the action execute

Actions can be Stored or Non-Stored depending on the Qualifier used.

Non-Stored.
- *N (Non-Stored)*
- *R (Reset)*
- *L (Time Limited)*.
- *D (Delayed)*
- *P (Pulse*

Stored
- *S Set (Stored)*
- *SD (Stored and Delayed)*
- *DS (Delayed and Stored)*
- *SL (Stored and Time Limited)*

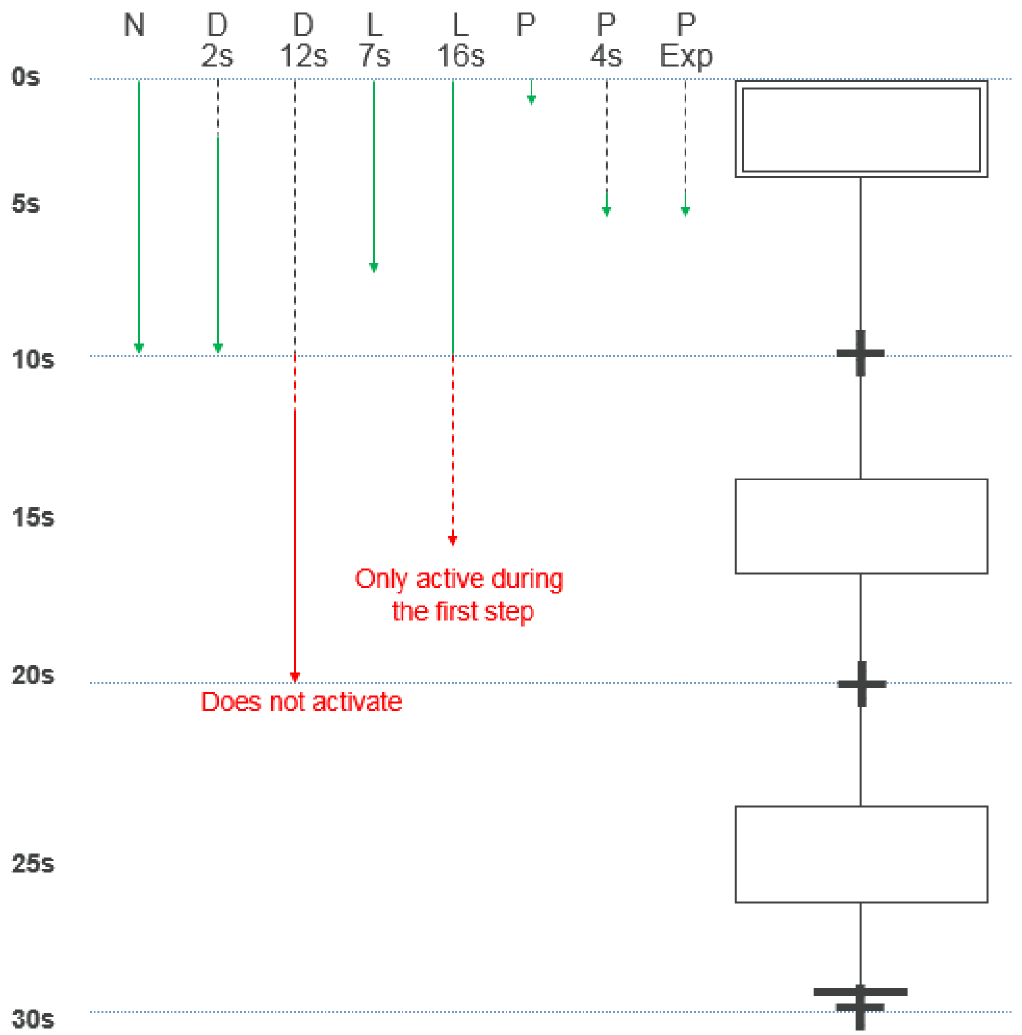


Step Action Qualifiers – Non-Stored

Non-Stored action qualifiers are only active while the associated step is active or a portion of the time the step is active.

Non-Stored:

- *N (Non-Stored)*
- *R (Reset)*
- *L (Time Limited)*
- *D (Delayed)*
- *P (Pulse)*

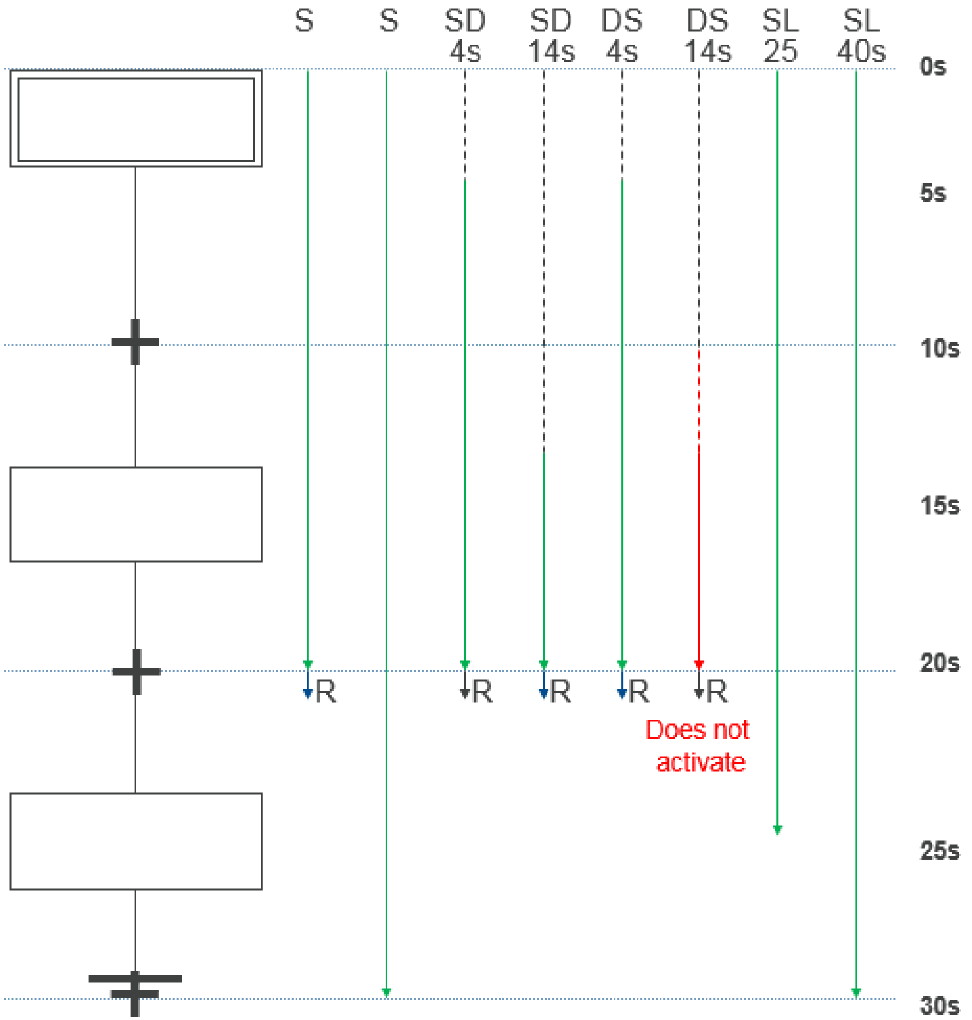


Step Action Qualifiers – Stored

Stored action qualifiers may be active for only a portion of the time that the associated step is active or they may remain active after the associated step has become inactive depending on the specific qualifier.

Stored

- *S Set (Stored)*
- *SD (Stored and Delayed)*
- *DS (Delayed and Stored)*
- *SL (Stored and Time Limited)*



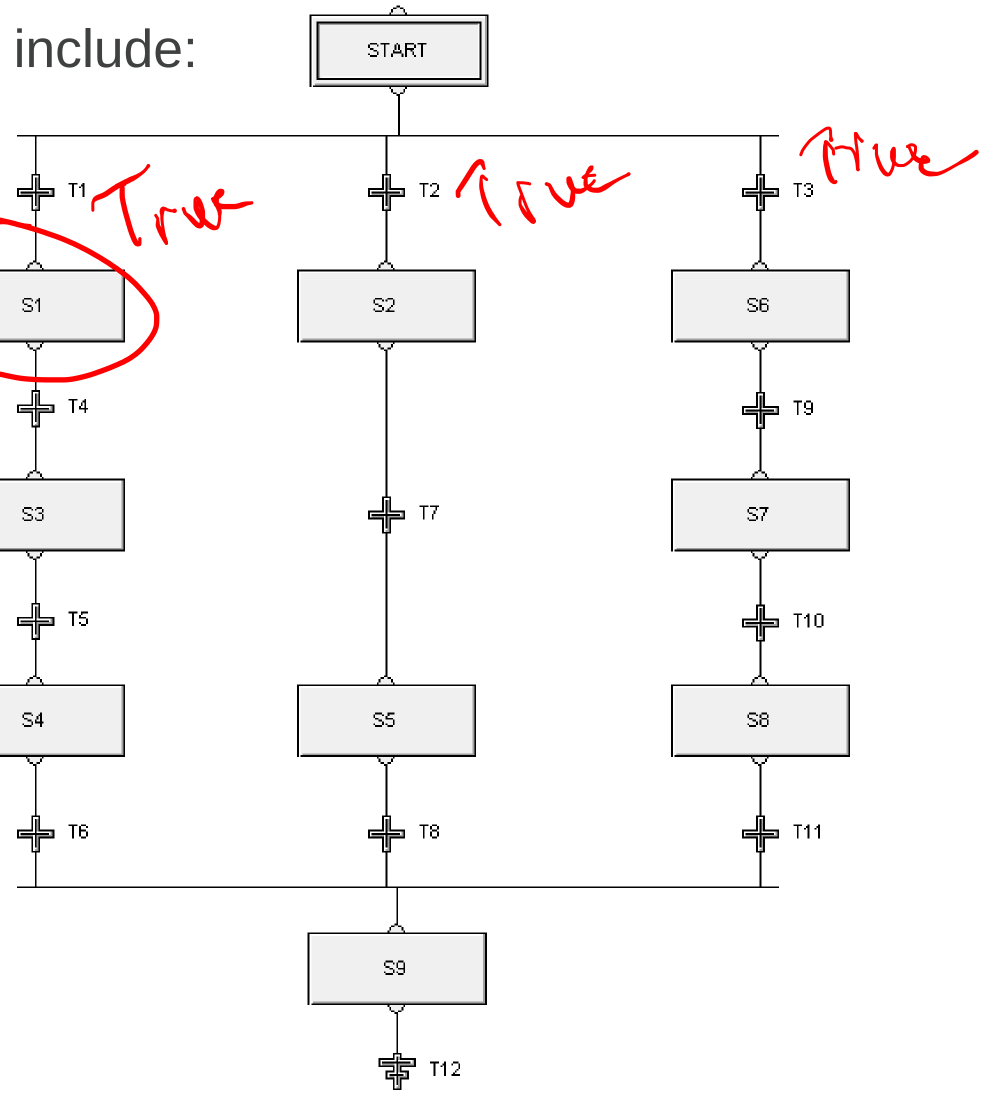
SFC Execution

Valid divergence and convergence include:

Divergent Paths

If all true, then the one on the left.

Sequence Select Convergence

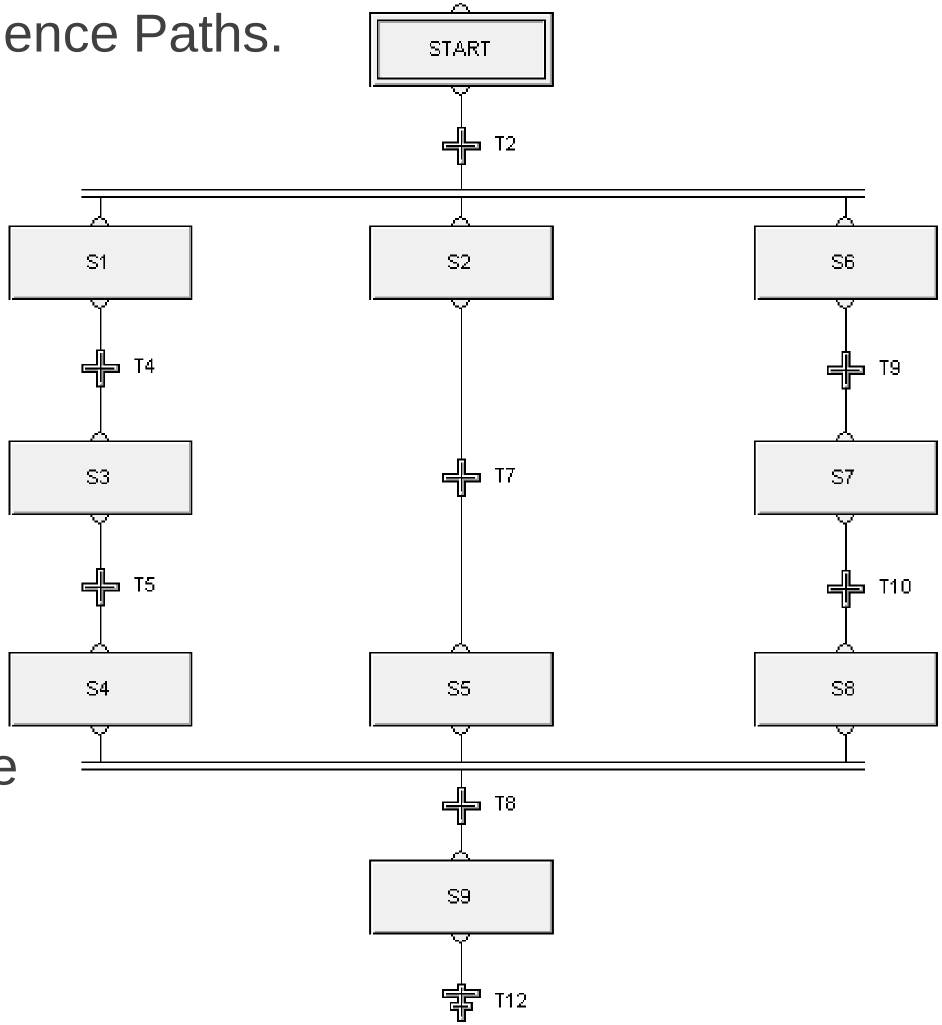


SFC Execution

Parallel Divergence and Convergence Paths.

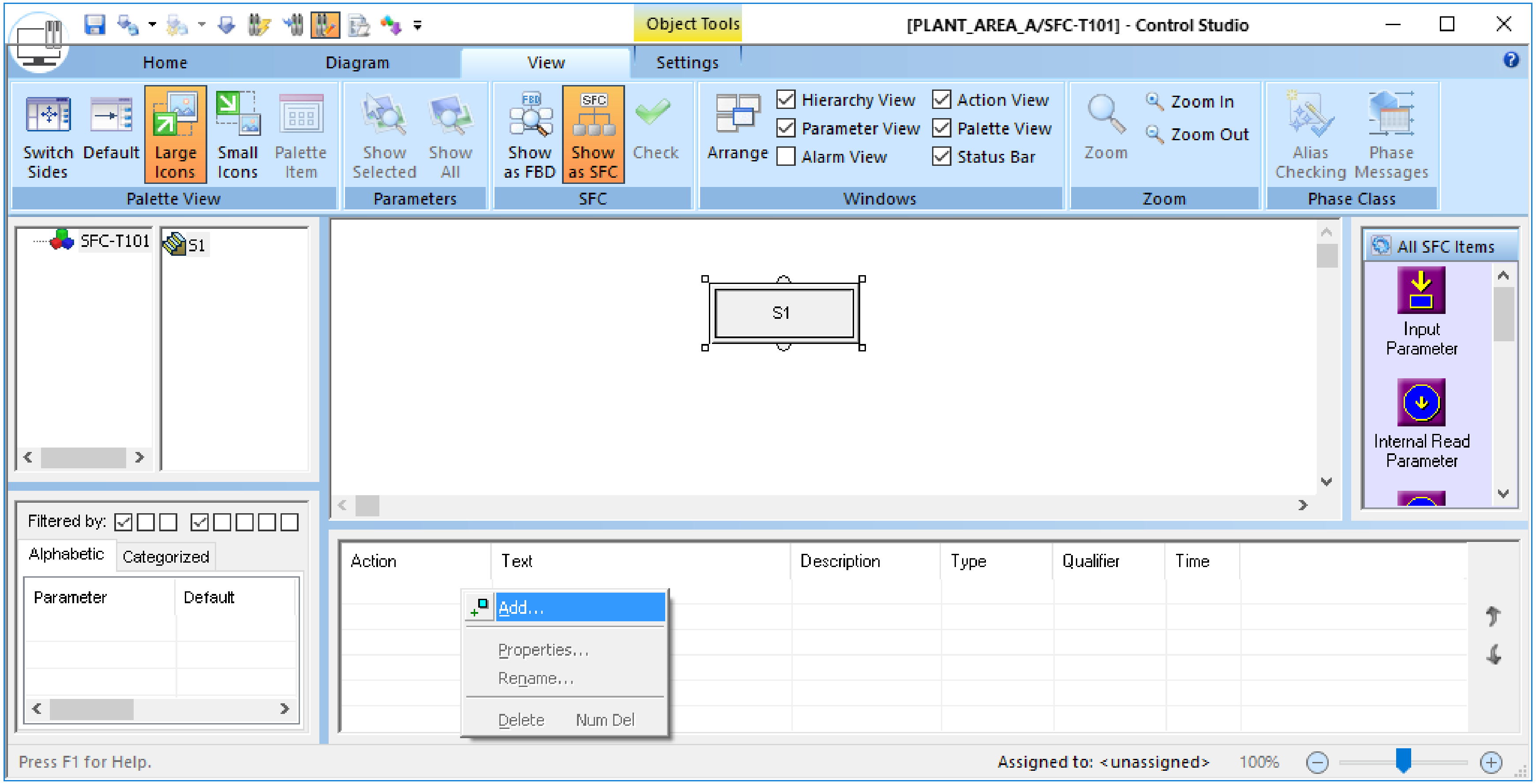
Parallel Divergence

Parallel Convergence



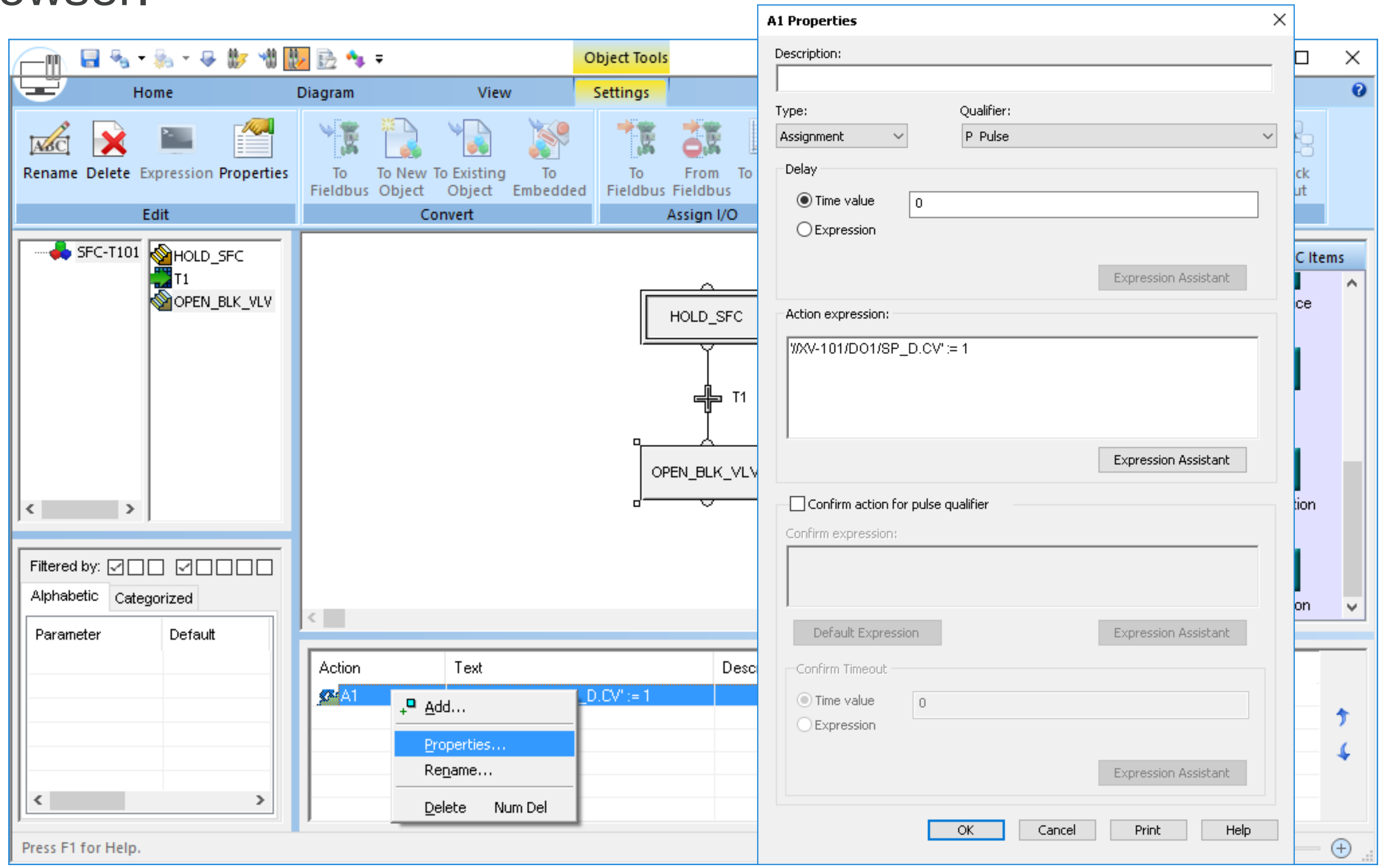
Adding an Action to a Step

Add Actions by selecting a Step, placing the cursor in the Action window, right-clicking and selecting the Add option from the pop-up menu.



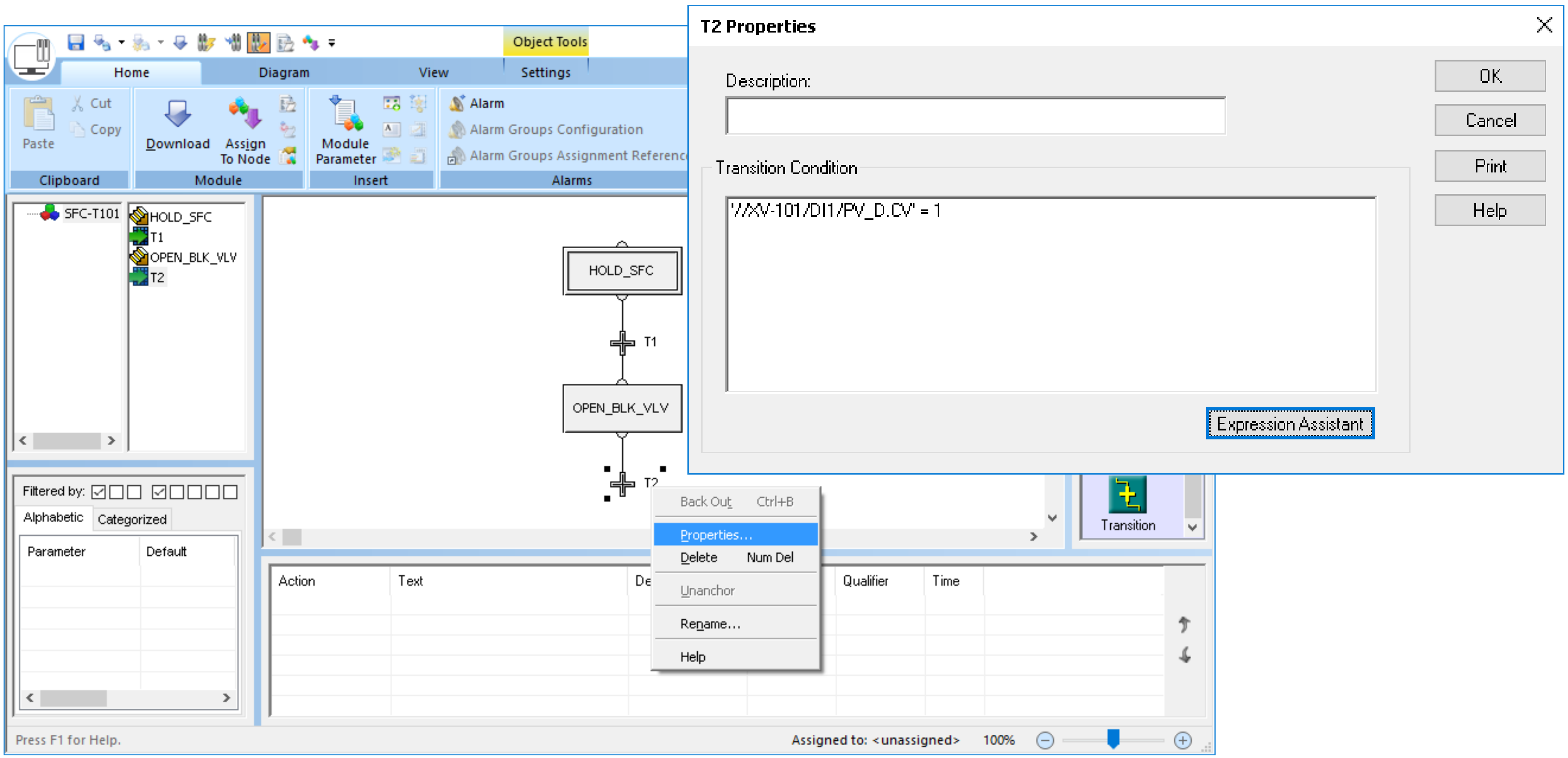
Defining Action Properties

Modify an action by selecting an Action, right-clicking and selecting Properties from the pop-up menu. Click Expression Assistant to launch the Browser.



Defining Transition Properties

Modify or define the transition condition by selecting a Transition, right-clicking and selecting *Properties…* from the pop-up menu. The T1 Properties dialog box appears.



Workshop – Creating SFC-T101

- Define parameter paths required to manipulate Tank101 equipment
- Create a Named Set which will be used for operator interface to SFC
- Create an SFC which will start up Tank101
- Display the Named Set to the operator
- Modify the SFC which will either start up or shutdown Tank101

Workshop – Creating SFC-T101

List the parameter paths required to:

Open or close the block valve '//XV-101/DO1/SP_D.CV' :=1

Determine if the block valve is open or closed '//XV-101/DI1/PV_D.CV'. =1

Start or stop the motor //XV-101/DC1/SP_D.CV' :=1

Determine if the motor is running or stopped '//XV-101/DC1/PV_D.CV'. =1

Set the mode of the flow loop '//FIC-102/PID1/MODE.TARGET' :=AUTO

Set the setpoint of the flow loop '//FIC-102/PID1/SP.CV' :=60

Manipulate the output of the flow loop '//FIC-102/PID1/OUT.CV' :=0

Determine the mode of the flow loop '//FIC-102/PID1/MODE.ACTUAL' :=AUTO

Determine the flow rate '//FIC-102/PID1/PV.CV' >59

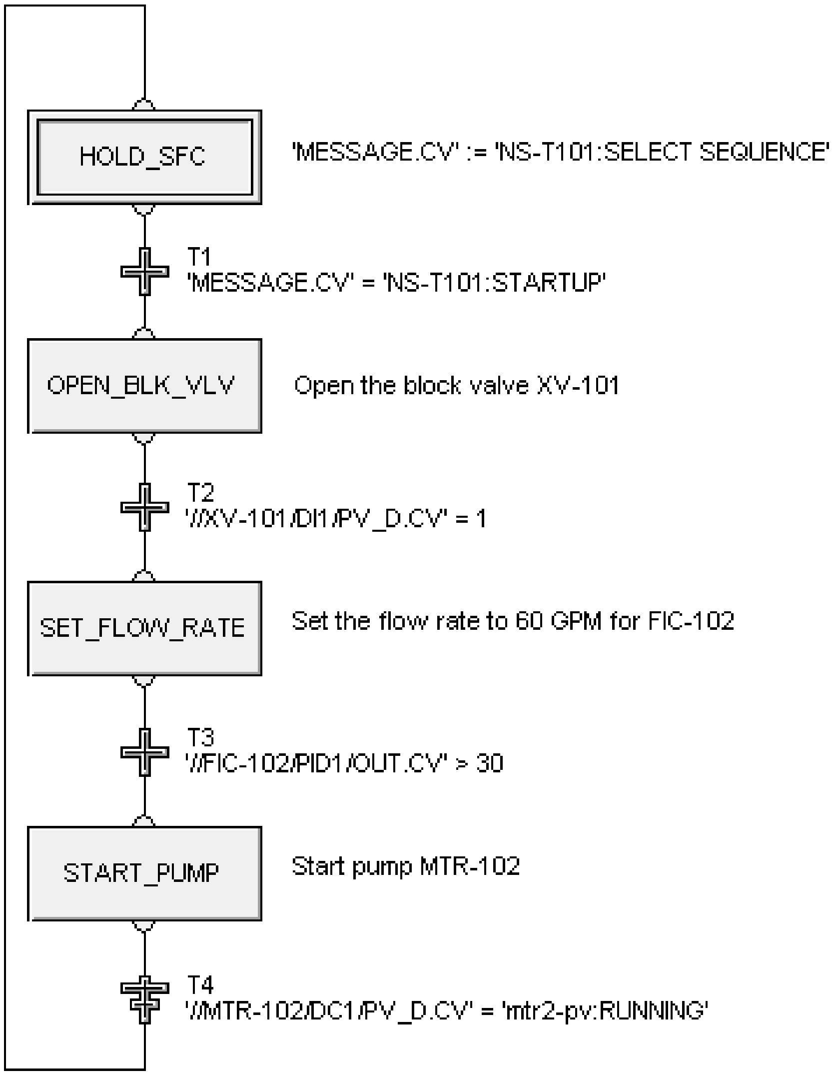
Workshop – Creating SFC-T101

Named Set NS-T101

1   = STARTUP

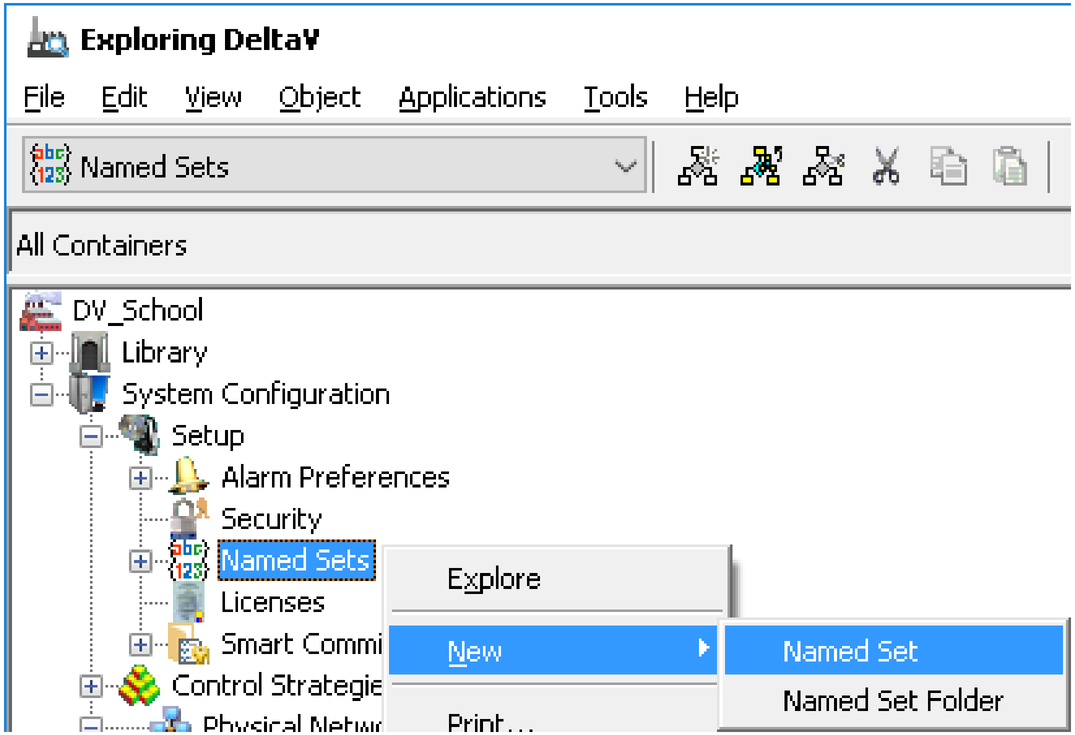
255 = SELECT SEQUENCE

parameter - MESSAGE
(Named Set, NS-T101)



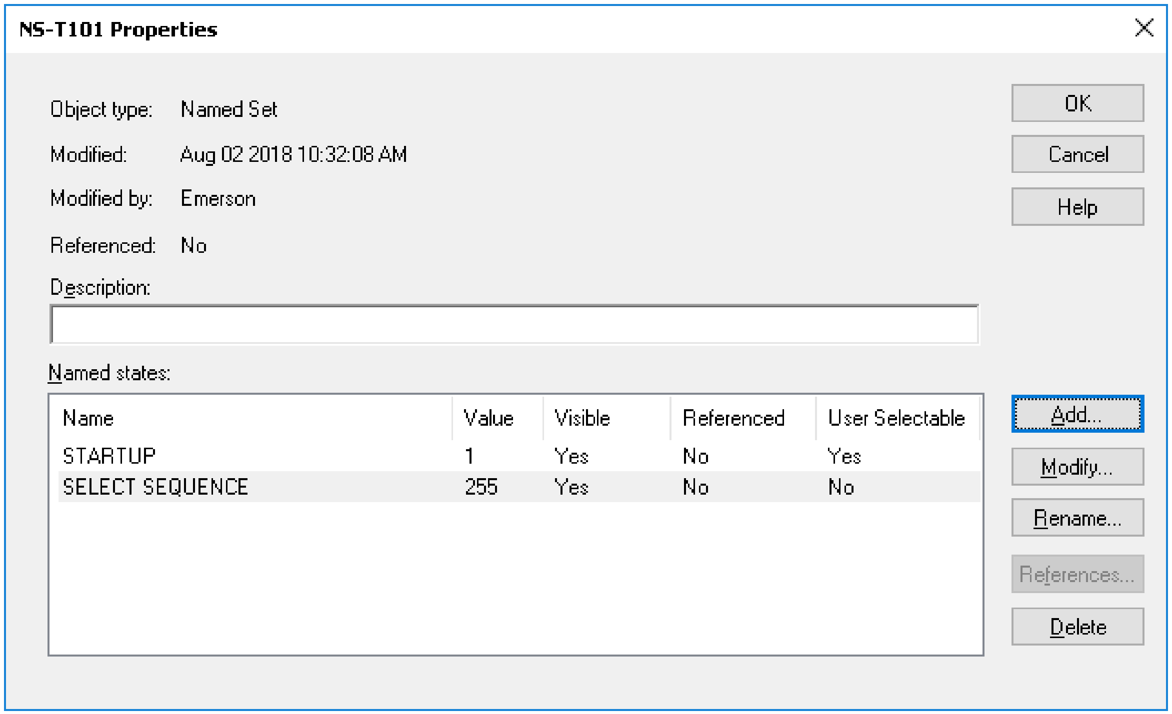
Workshop – Creating SFC-T101

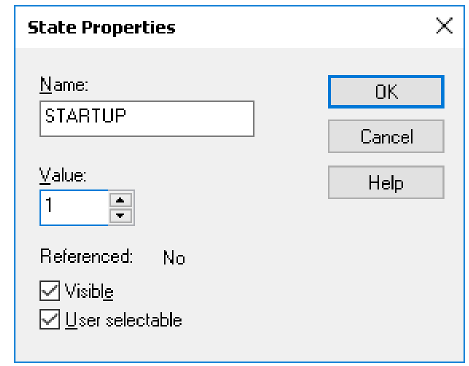
Step 1. Create Named Set NS-T101 using DeltaV Explorer.

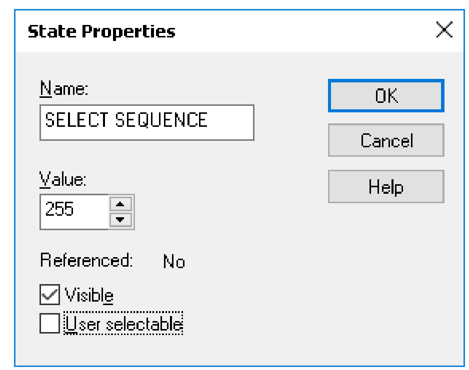


Workshop – Creating SFC-T101

Step 2. Modify Properties and add names and values as shown below.



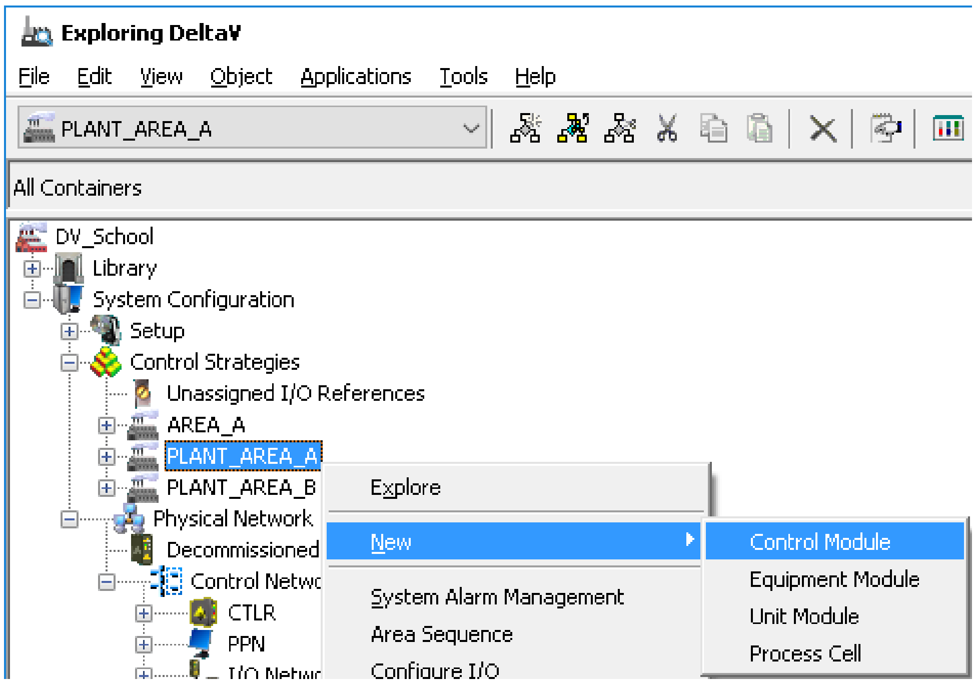


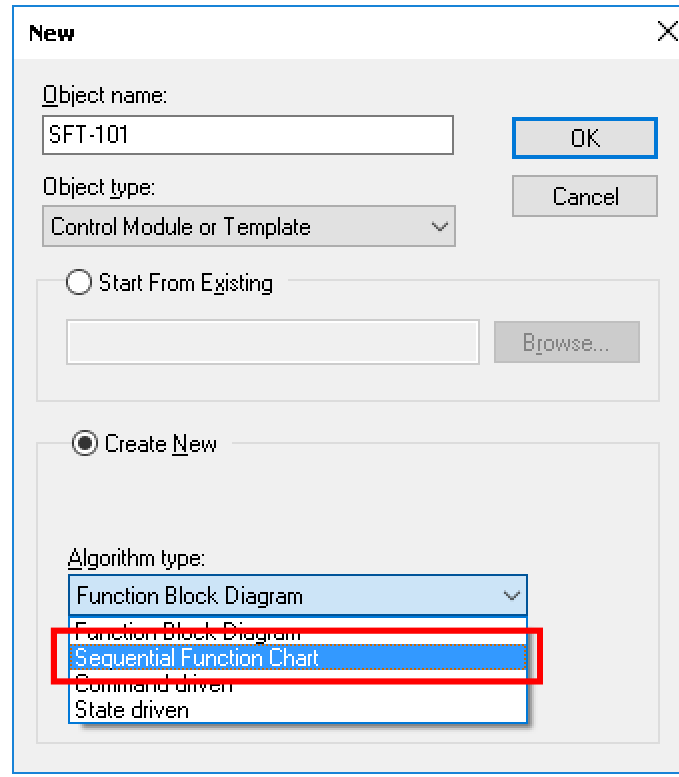


Named Set NS-T101 (*Name* – Case-sensitive)	Visible	User Selectable
1 = STARTUP	*Yes*	*Yes*
255 = SELECT SEQUENCE	*Yes*	*No*

Workshop – Creating SFC-T101

Step 3. Create an Sequential Function Chart named *SFC-T101 in PLANT_AREA_A.* Change the Algorithm Type to *Sequential Function Chart.*

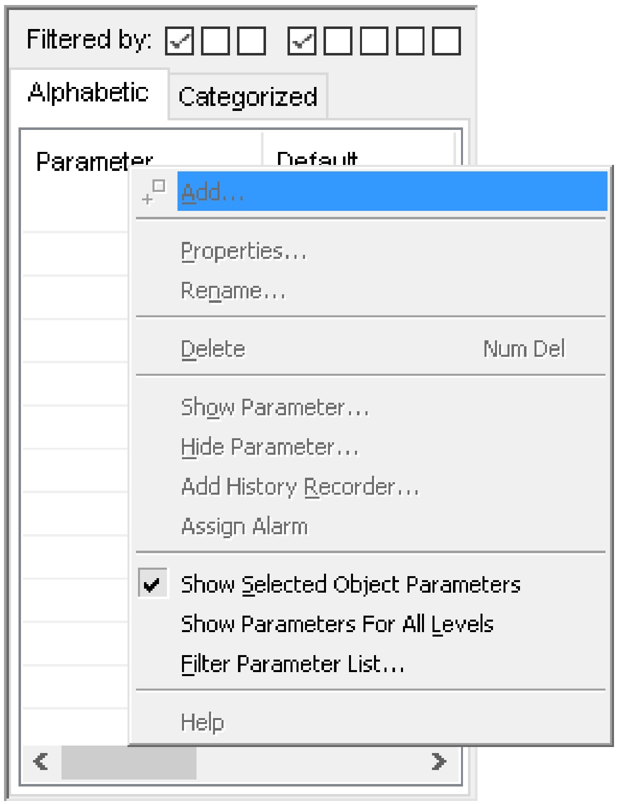


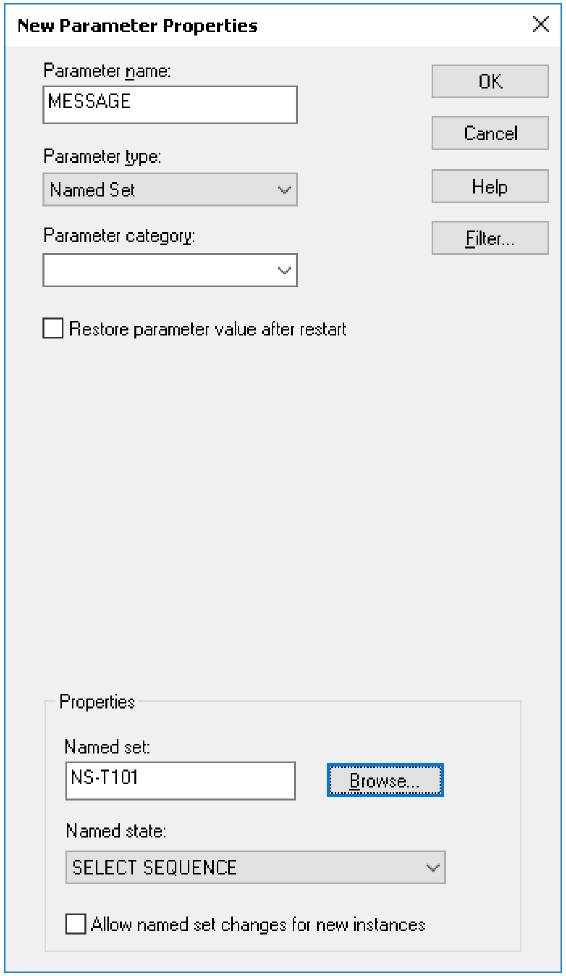


Step 4. Launch Control Studio.

Workshop – Creating SFC-T101

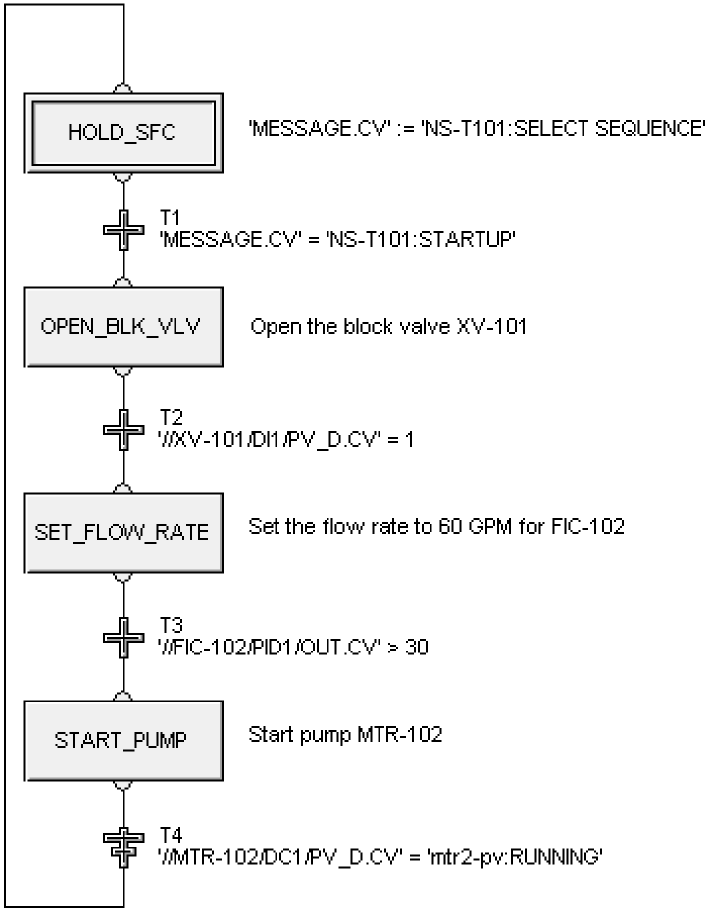
Step 5. Create parameter MESSAGE (Named Set, NS-T101).





Workshop – Creating SFC-T101

Step 6. Create Sequential Function Chart using Steps, Transitions, and Terminations from the All SFC Items palette.

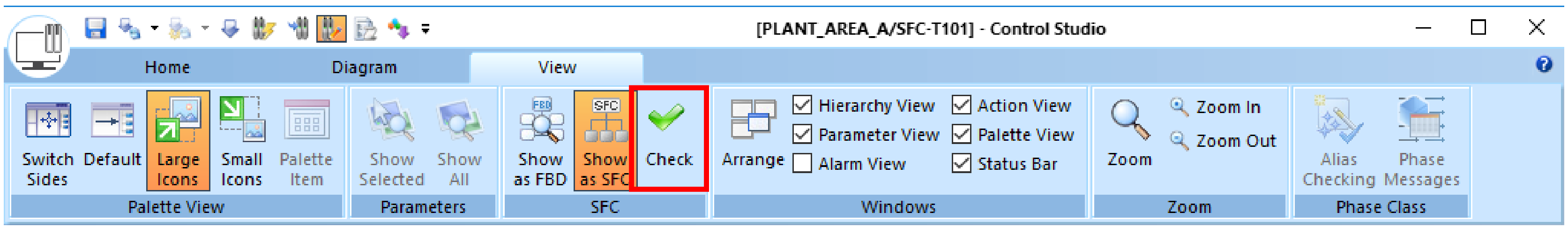


Step 7. Modify Module Properties and assign the SFC to your controller.

Workshop – Creating SFC-T101

Step 8. Save and download the SFC.

Step 9. If an algorithm error occurs, use the *Check* button to check the SFC.



Step 10. Add the MESSAGE parameter to operator display Tank101 with Normal Write capability.

Step 11. Shut down your process and then verify that the sequence executes properly.

Note: Remember to download Changed Setup Data.

Workshop Complete.

Optional Workshop 1 – Update Message

Update operator message in the Named Set NS-T101

Add actions to the steps to update the Message Parameter

Update the operator with a message pertaining to what the SFC is waiting for in each transition.

Hints:

1. Add values to the Named Set NS-T101
2. Add actions in the appropriate steps to update the MESSAGE parameter

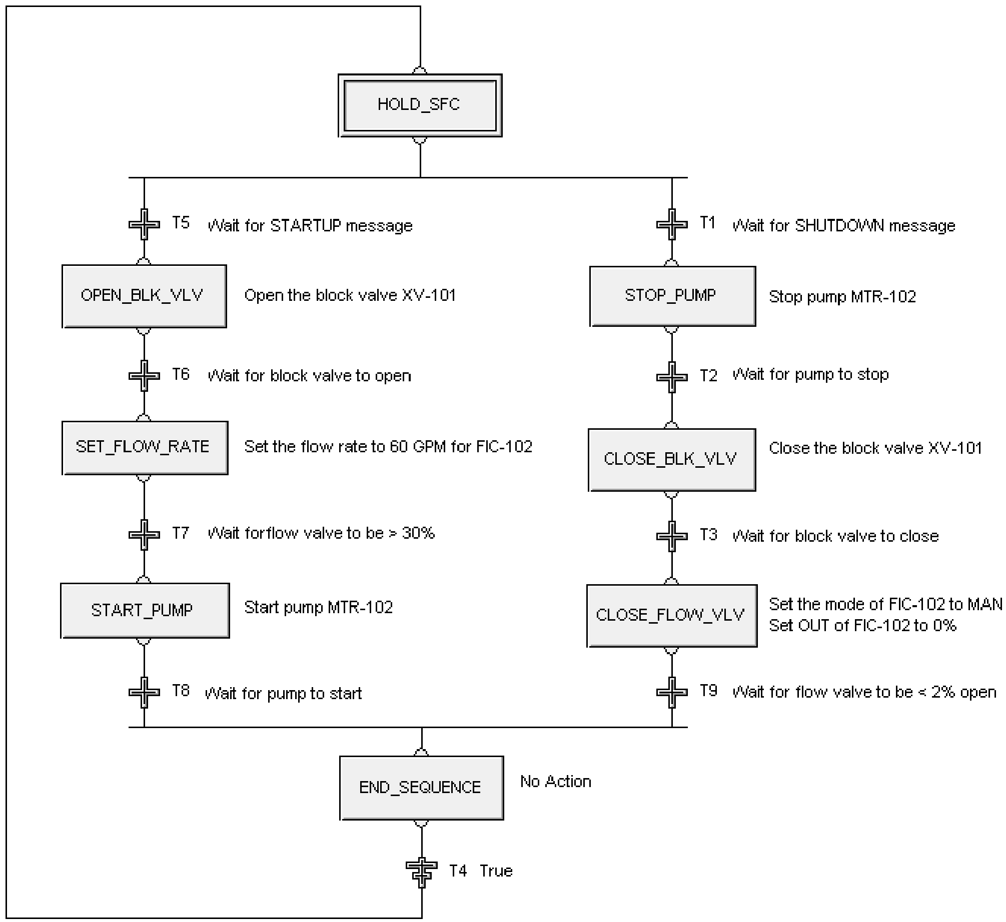
Optional Workshop 2 – Check Tank Level

Modify SFC to check Tank Level and reset MTR-102's lock

Modify the SFC so that Startup will make sure the level in Tank101 is high enough to allow MTR-102 to start and reset MTR-102's lock if necessary.

Optional Workshop 3 – Add Shutdown Option

Modify NS-T101 to include shutdown as an option



Optional Workshop 4 – Add Alarm

Add an Alarm when SFC exceeds specified execution time.

Cause an alarm to be displayed in DeltaV Operate (Run) when the SFC exceeds a specified time (for example, over 30 seconds) to execute.

Hints:

1. Add an Alarm Type
2. Add a function block to the SFC to trigger the alarm
3. Add an alarm to the SFC
4. Start the function block

Summary

- Define the application of a Sequential Function Chart
- Define the execution of a Sequential Function Chart
- Define the Steps in a Sequential Function Chart
- Define the Actions in a Step
- Define the Action Qualifiers in a Step
- Define Transitions
- Use Named Sets for a Sequential Function Chart

DeltaV Cascade Control

Module 9

Module Objectives

- Perform top-down configuration
- Implement cascade control using the CASCADE_MASTER template
- Define Module Block
- Implement flow simulation using the Calc and Filter function blocks
- Implement level simulation with the Integrator function block
- Use Control Studio On-line for testing modules
- Use High Performance GEMs
- Implement the Continuous Historian

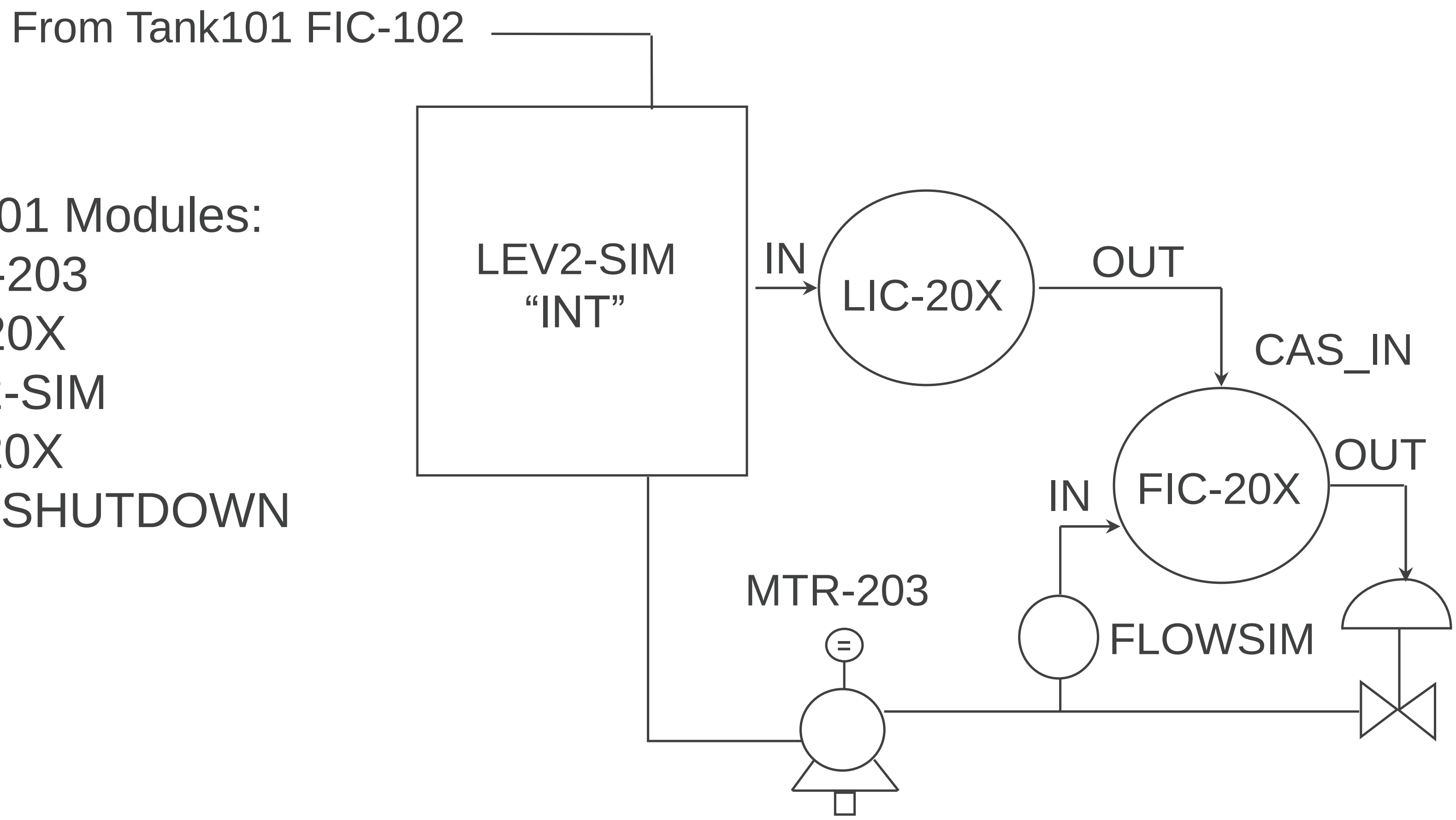
Module Workshops

- Creating MTR-203
- Creating FIC-20X
- Creating Tank201
- Creating LEV2-SIM
- Creating LIC-20X
- Add LIC-20X to Tank201 Display
- Continuous Historian

- Optional Workshops
  - Add Embedded Trend
  - Change Themes
  - Modify FIC-20X Scaling
  - Add Buttons
  - Reset Integrator

TANK201 Modules

Tank 201 implements Cascade Control strategy for LIC-20X (Master) and FIC-20X (Slave) using the Cascade_Master Template.



Tank 201 Modules:

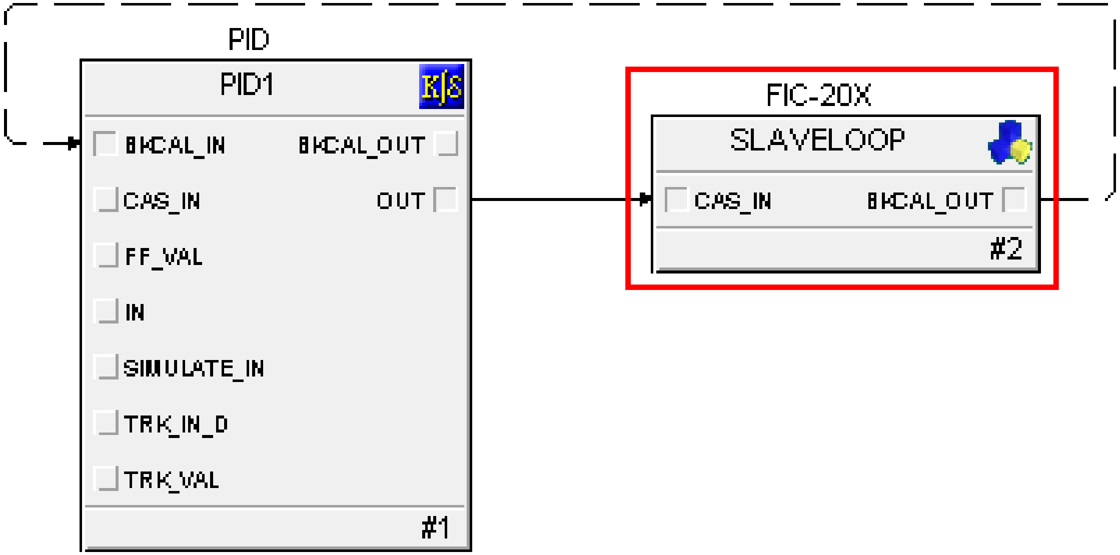
- MTR-203
- FIC-20X
- LEV2-SIM
- LIC-20X
- PLM-SHUTDOWN

Module Block

Module blocks allow one control module to be represented on the diagram of a different control module.

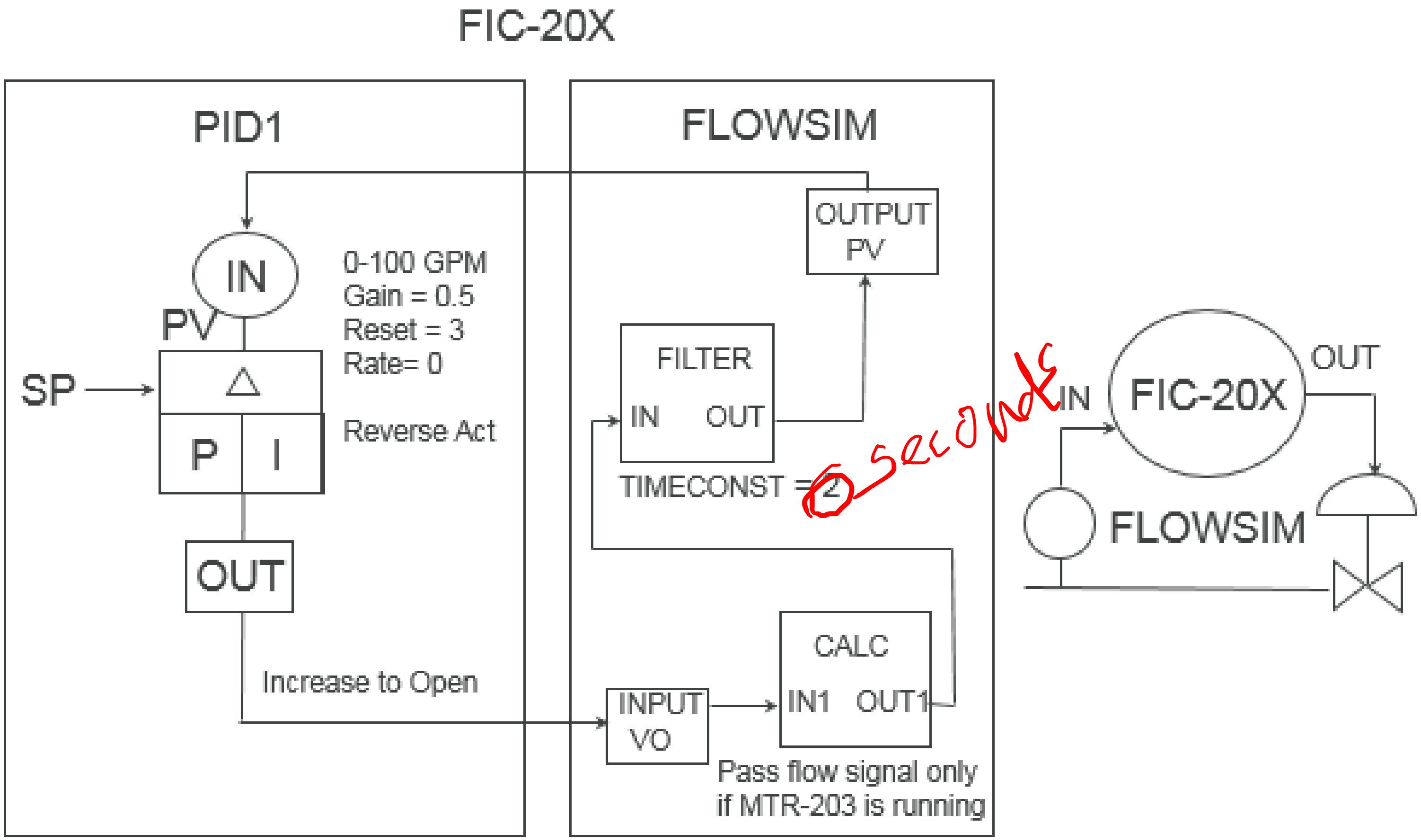
This allows the interactions between multiple control strategies to be visually created and maintained while ensuring the isolation and integrity of each independent module. The module block is graphically wired to other blocks on the strategy.

FIC-20X (Slave) represented by Module Block



Secondary Flow Control

FIC-20X is a Slave (Secondary) PID control loop. It will use an embedded composite of Function Blocks for flow simulation.



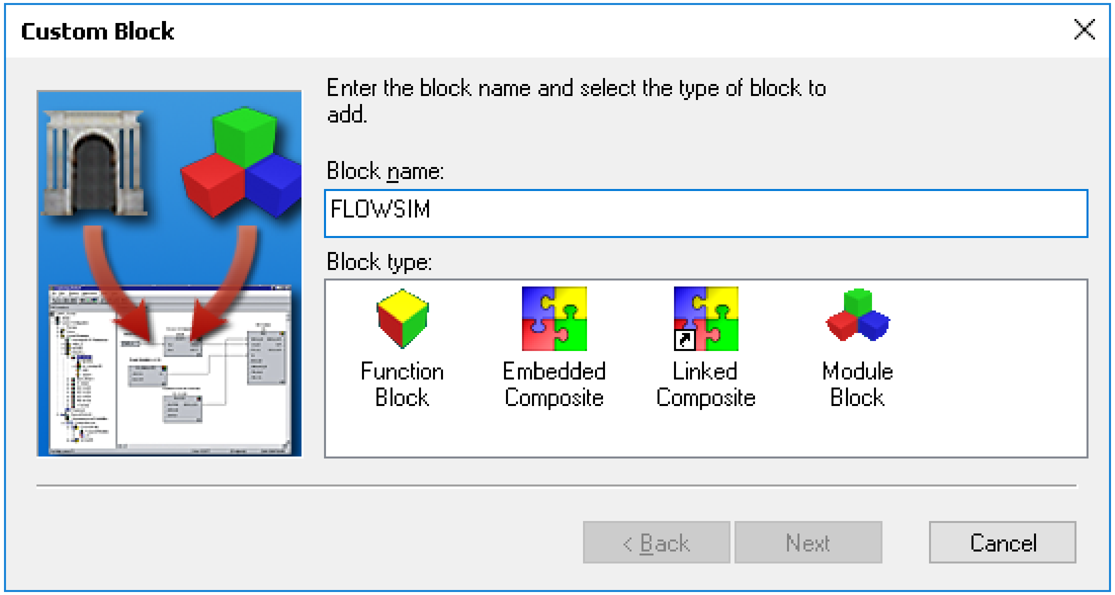
Embedded Composite

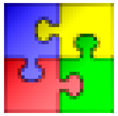
Composites are like Modules in the sense that they're made up of FB configuration except that they cannot be assigned and downloaded to controllers.

You can add an Embedded Composite by dragging and dropping a Custom Block found in the Special Items palette.

Custom Block types:

- *Function Block*
- *Extended Block*
- *Embedded Composite*
- *Linked Composite*.
- *Module Block*

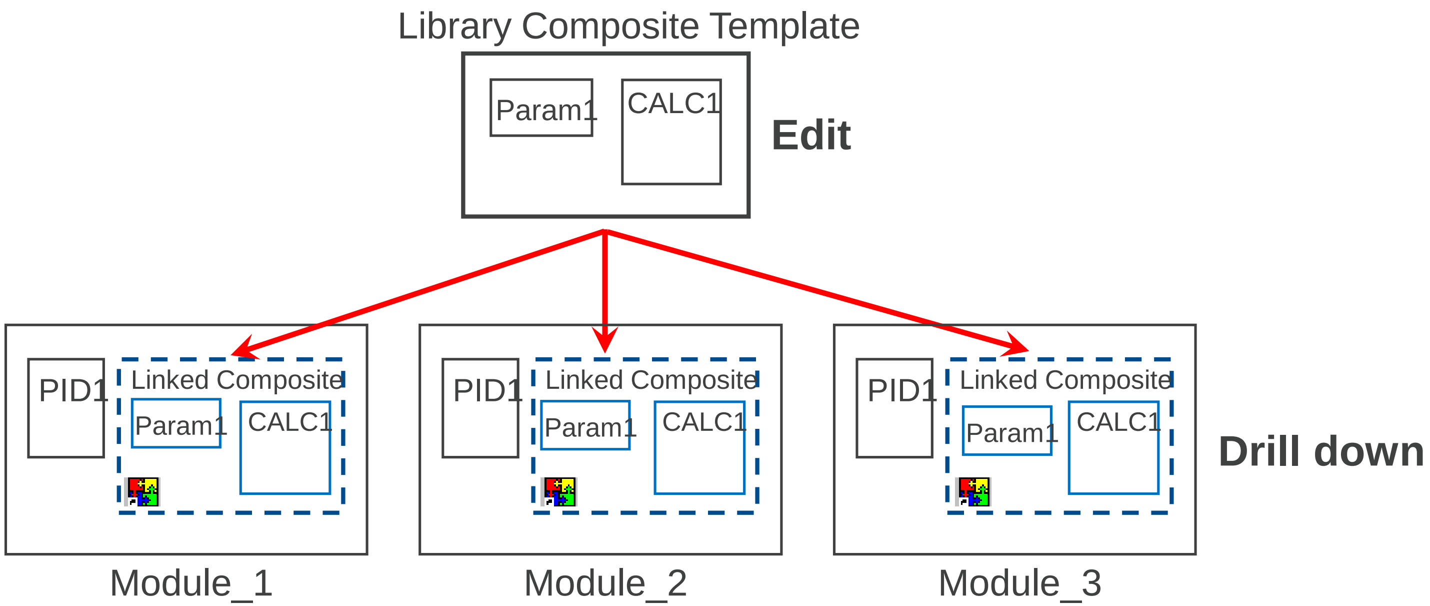


Embedded Composite 

Modification of Embedded Composite Blocks DOES NOT modify instances.

- You may drill down and modify an Embedded block from an instance usage.
- You may drill down and modify the parameters of an Embedded block.

Linked Composite Characteristics



Modifying Linked Composite Blocks modifies instances.

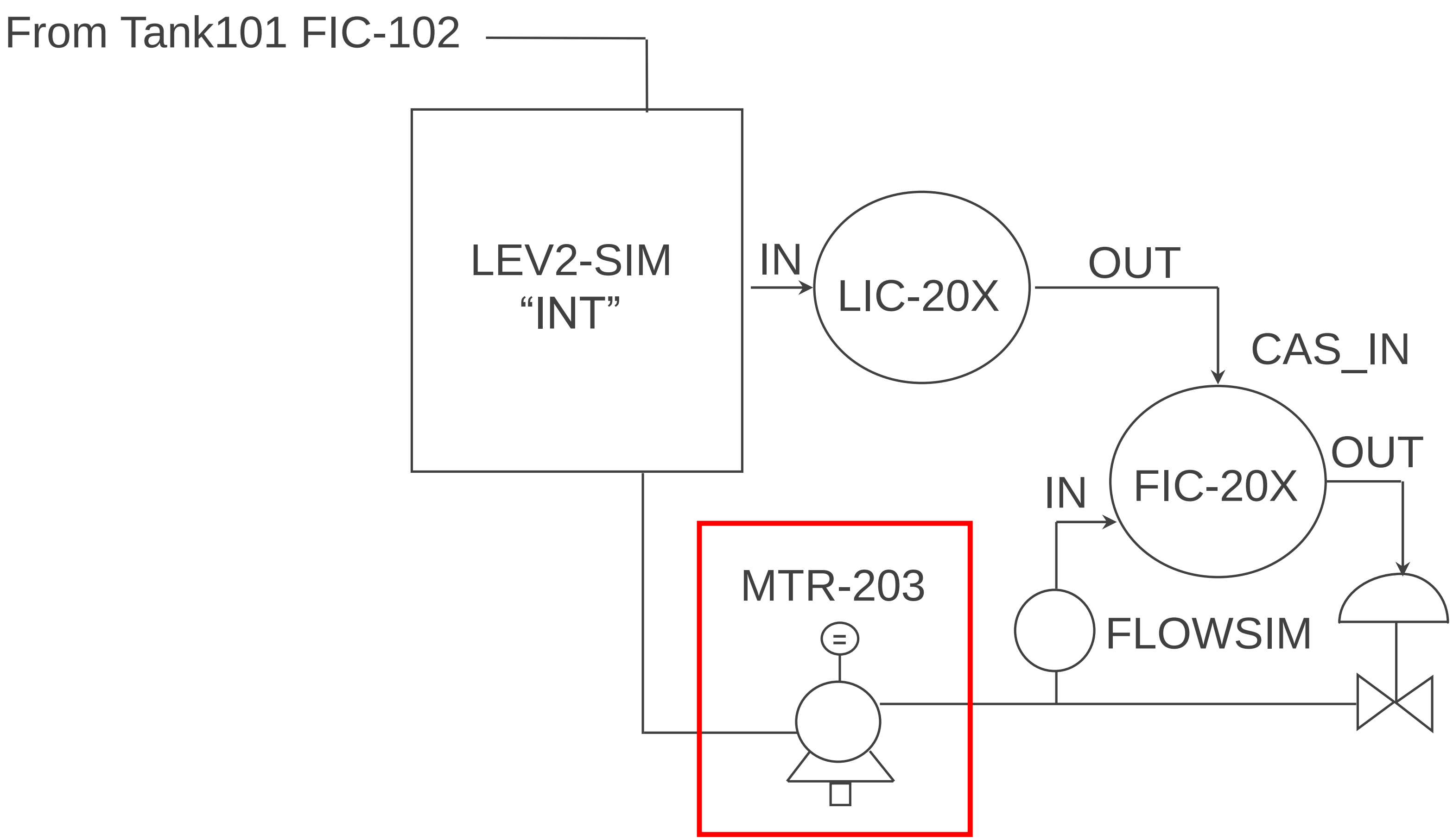
- You are not permitted to drill down and modify a Linked block from an instance; you must open another Control Studio application.
- You are permitted to drill down and modify a Linked block's parameters. The parameter modifications are only applicable to the module from which they are modified.

Workshop – Creating MTR-203

- Create MTR-203 using the MTR-11 module template
- Assign DSTs from the Unassigned I/O to the appropriate channels.
- Verify the Motor functionality in Control Studio Online

Workshop – Creating MTR-203

MTR-203 is for basic start/stop functionality with no interlocking.



Continue to the next slide to start creating the MTR-203 module.

Workshop – Creating MTR-203

Create motor *MTR-203* in the following manner:

Step 1. From the DeltaV Explorer, drag and drop the MTR-11 template from the Library to PLANT_AREA_B.

Step 2. Rename the module *MTR-203*.

Step 3. Launch Control Studio and modify the module as indicated below:

I/O	IO_IN_1	*XI-3*	(C03CH03 or CHARM1-11)
	IO_OUT_1	*ZX-3*	(C04CH03 or CHARM1-12)

Step 4. Modify module properties' primary control display to *Tank201.*

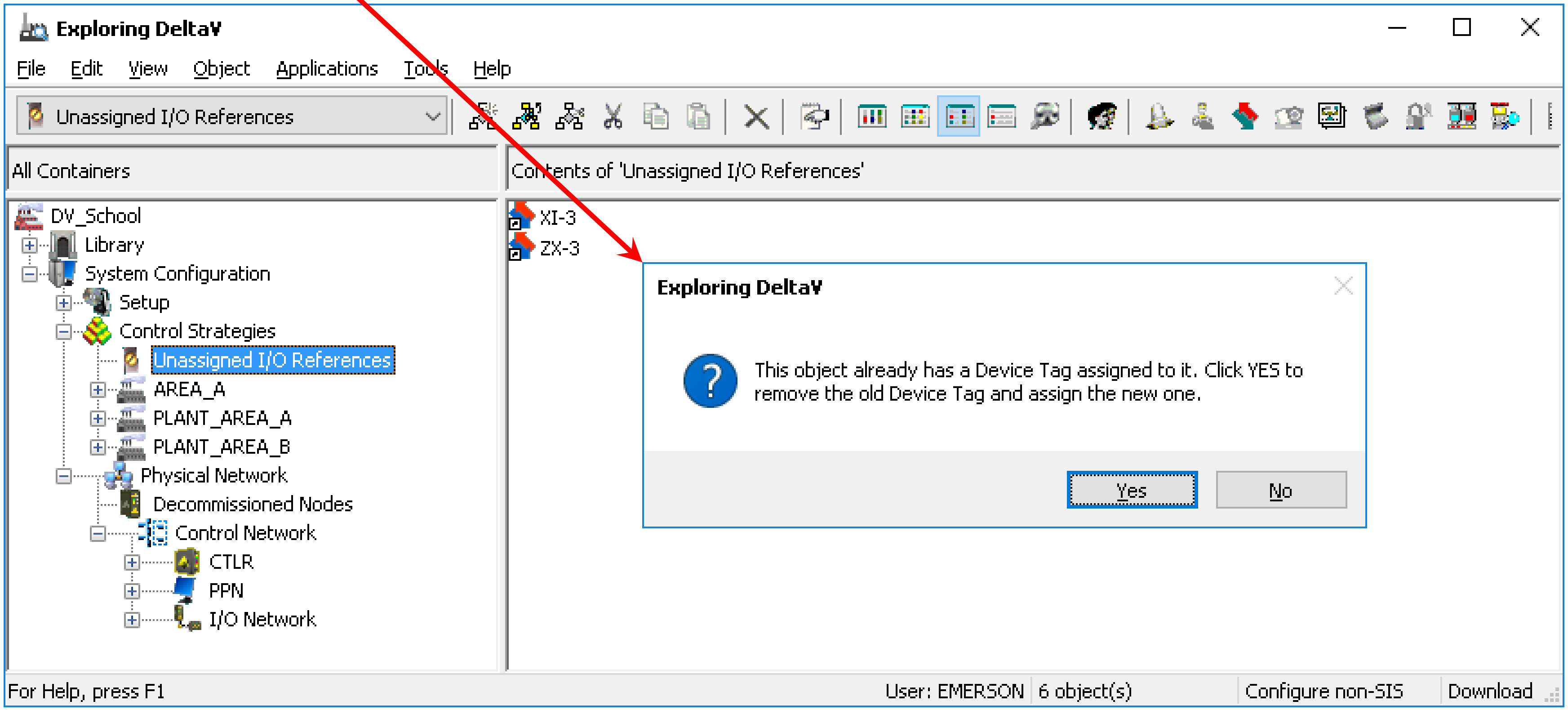
Step 5. Assign to the controller.

Step 6. Save the control module.

Workshop – Creating MTR-203

Step 7. Assign DSTs XI-3 and ZX-3 to the appropriate card and channel or CHARM.

Note: The warning is expected.

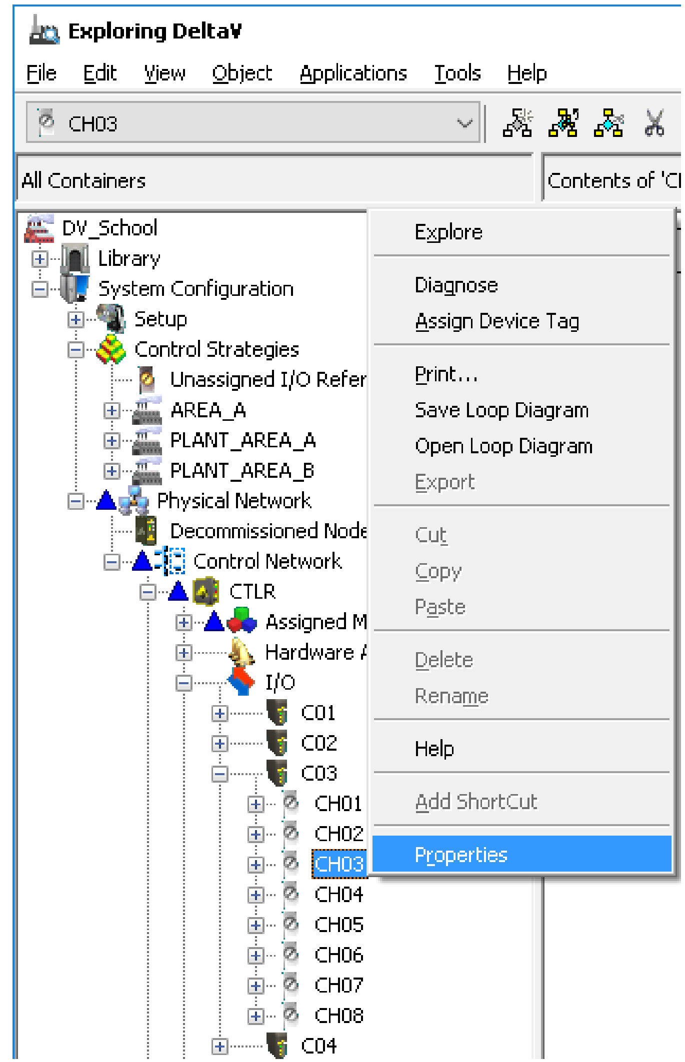


Workshop – Creating MTR-203

Step 8. Select the appropriate channel, go to Properties and enable both channels or CHARMs.

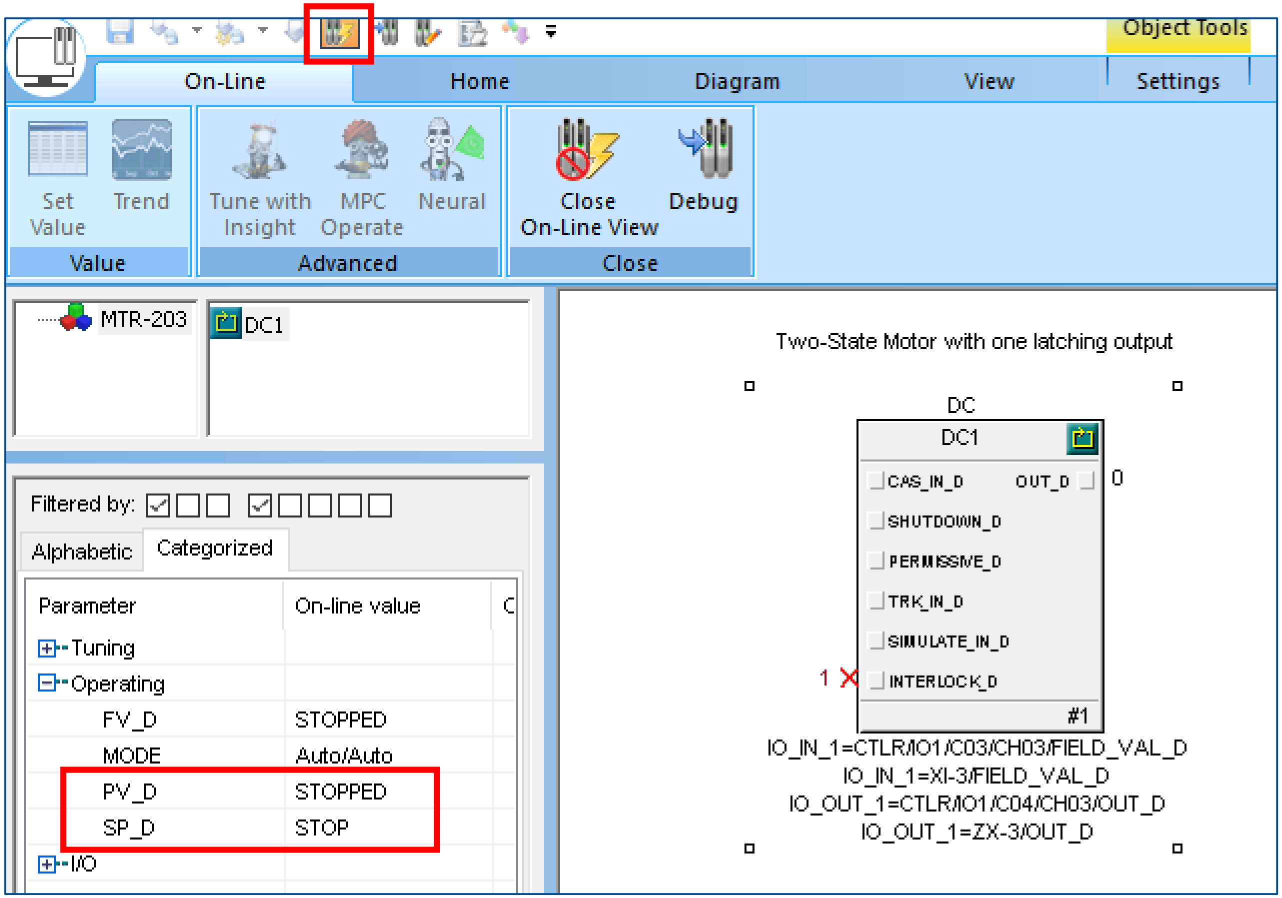
Step 9. Download I/O Cards 3 and 4 or CHARMs 1-11 and 1-12.

Step 10. Download control module MTR-203.



Workshop – Creating MTR-203

Step 11. Verify that the motor STARTS and STOPS using Control Studio's On-line button.



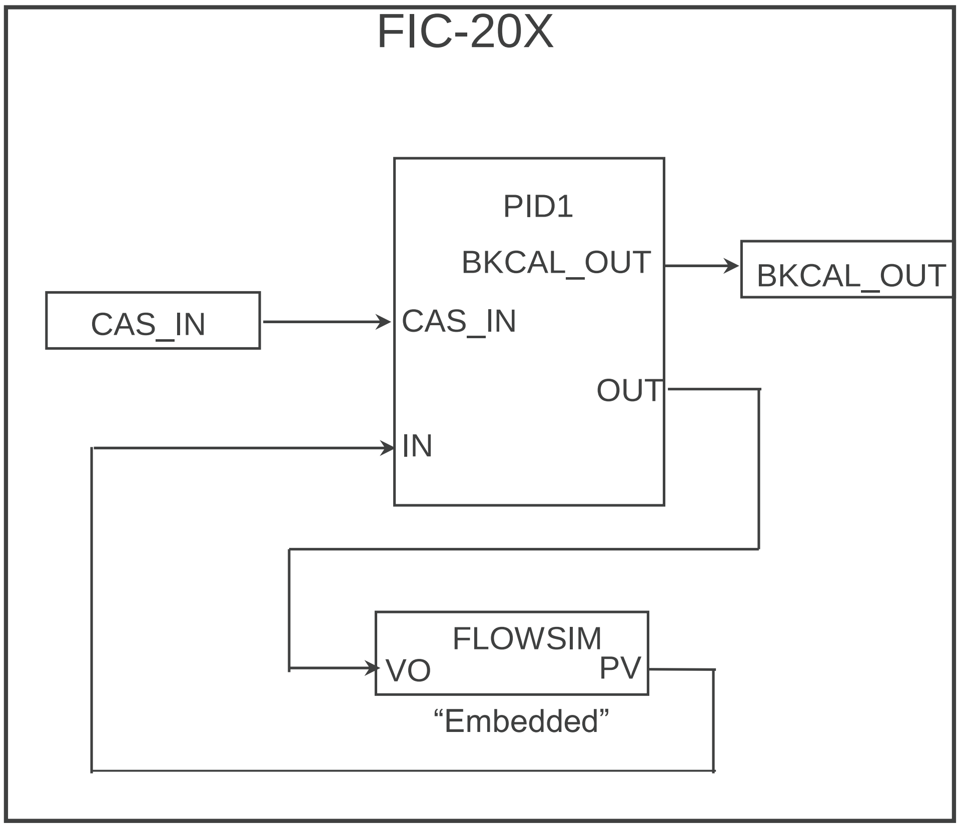
Workshop Complete.

Workshop – Creating FIC-20X

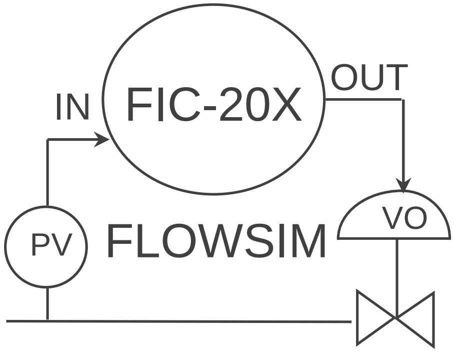
- Create FIC-20X using the Cascade_Master module template
- Add an Embedded Composite Block for Flow Simulation
- Create simulation logic using CALC and FILTER function blocks

Workshop – Creating FIC-20X

FIC-20X is the Slave (Secondary) PID loop in a cascade control strategy that will be implemented



PID1
0-100 GPM
Gain = 0.5
Reset = 3
Rate = 0
Reverse Act
Increase to Open



Continue to the next slide to start creating the FIC-20X module.

Workshop – Creating FIC-20X

Create FIC-20X in the following manner:

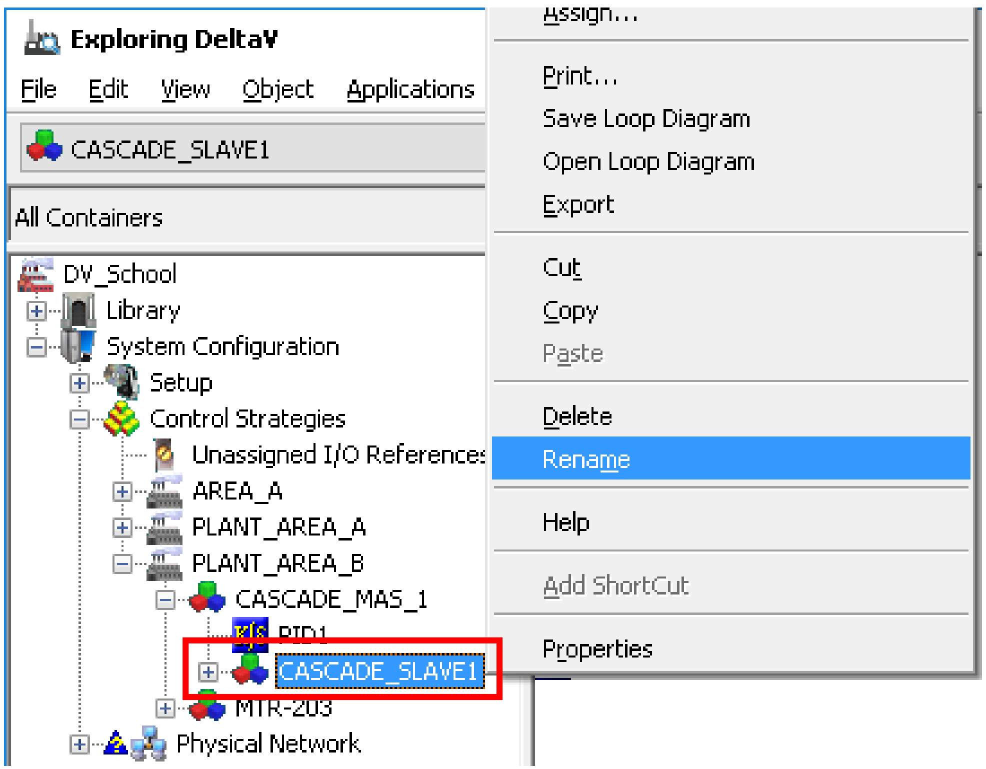
Step 1. Drag and drop, from the DeltaV Explorer, the *CASCADE_MASTER* template located in the Module Template Library's AnalogControl category to PLANT_AREA_B.

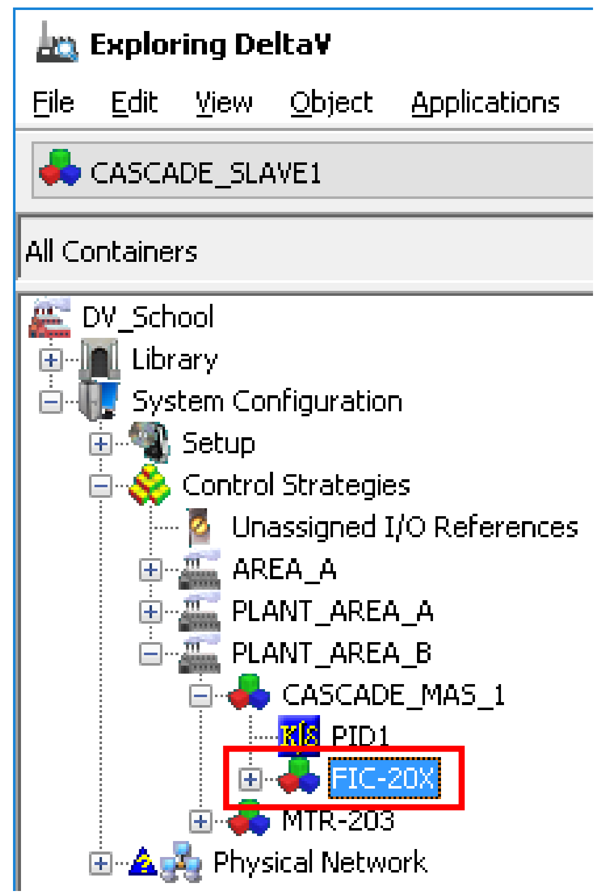
Configuration tips:

- The control blocks and parameters are shown above.
- The parameters for PID1 are shown above.
- DSTs are not used for IO_IN and IO_OUT. The IO_IN will be supplied from the FLOWSIM's PV and IO_OUT will be passed to FLOWSIM's VO.

Workshop – Creating FIC-20X

Step 2. Expand CASCADE_MAS_1, select CASCADE_SLAVE1 and rename the Module Block to *FIC-20X*.



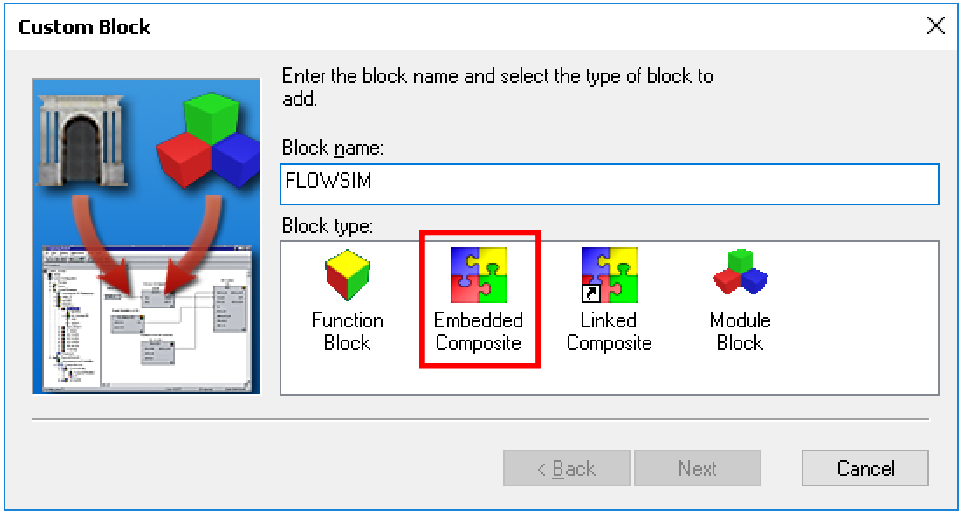


Workshop – Creating FIC-20X

Step 3. Open FIC-20X in Control Studio.

Step 4. Modify the PID1 parameters as indicated on page 352.

Step 5. Add the Embedded Composite block to FIC-20X by dragging and dropping a Custom Block found in the Special Items palette. Name it *FLOWSIM*.



Workshop – Creating FIC-20X

Step 6. Select the FLOWSIM block by clicking the right mouse button to *Drill Down* or *Edit Object* according to the following:

a. Drag and drop the CALC/LOGIC block from the Analog Control palette.

b. Right-click on the *CALC1* block and select Extensible Parameters... .

c. Set the Number of Parameters for IN and OUT to *1*

d. Select the *CALC1* block again and define the *Expression ...*as follows

```
IF  '//MTR-203/DC1/PV_D.CV' = 'mtr2-pv:RUNNING’
   THEN
      'OUT1.CV' := 'IN1.CV’;
   ELSE
      'OUT1.CV' := 0;
ENDIF;
```

Workshop – Creating FIC-20X

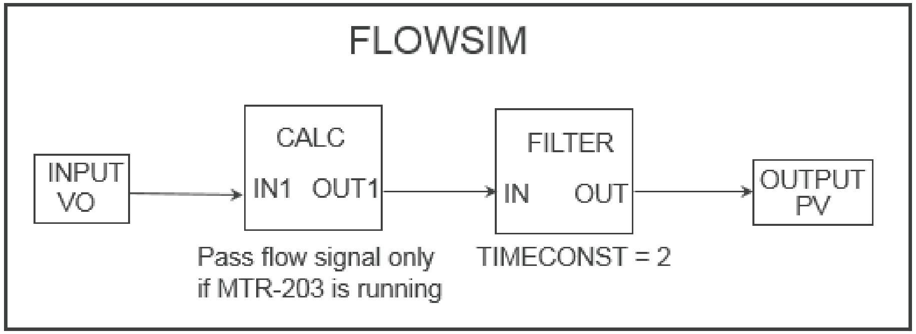
Step 7. Drag and drop the FILTER block from the Analog Control palette.

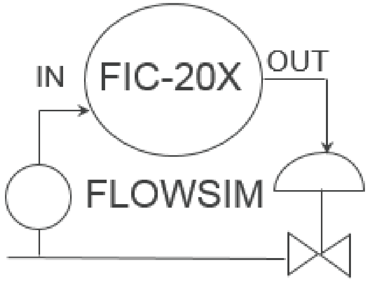
Step 8. Set the TIMECONST parameter on the Filter block to *2 seconds.*

Step 9. Re-name Input Parameter PARAM1 to *VO.*

Step 10. Re-name Output Parameter PARAM2 to *PV.*

Step 11. Connect the blocks and parameters according to the diagram.





Workshop – Creating FIC-20X

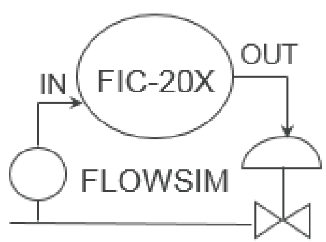
Step 12. Right-click and select *Back Out* in order to return to the top level of FIC-20X.

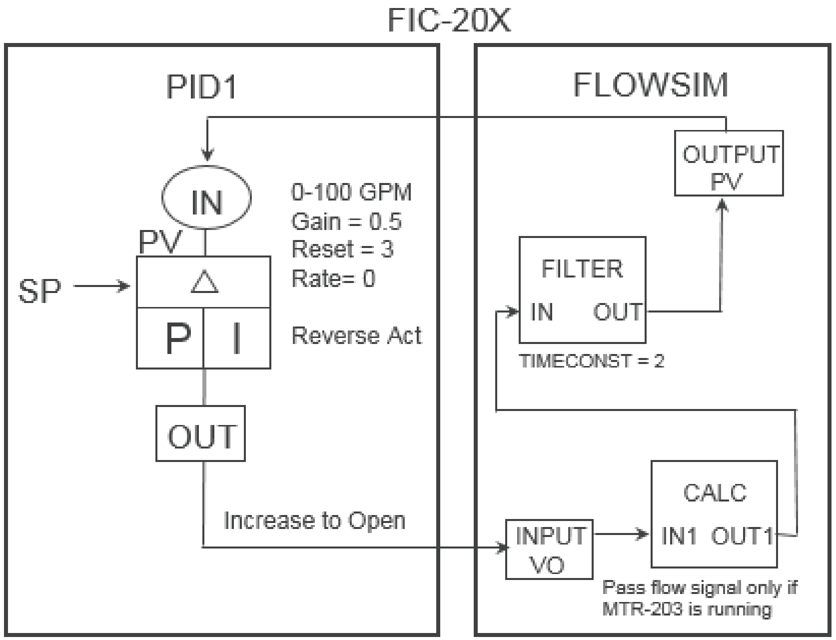
Step 13. Connect the PID1 and FLOWSIM blocks as illustrated below.

Step 14. Modify the module Properties.

Step 15. Assign to the controller.

Step 16. Save and download.

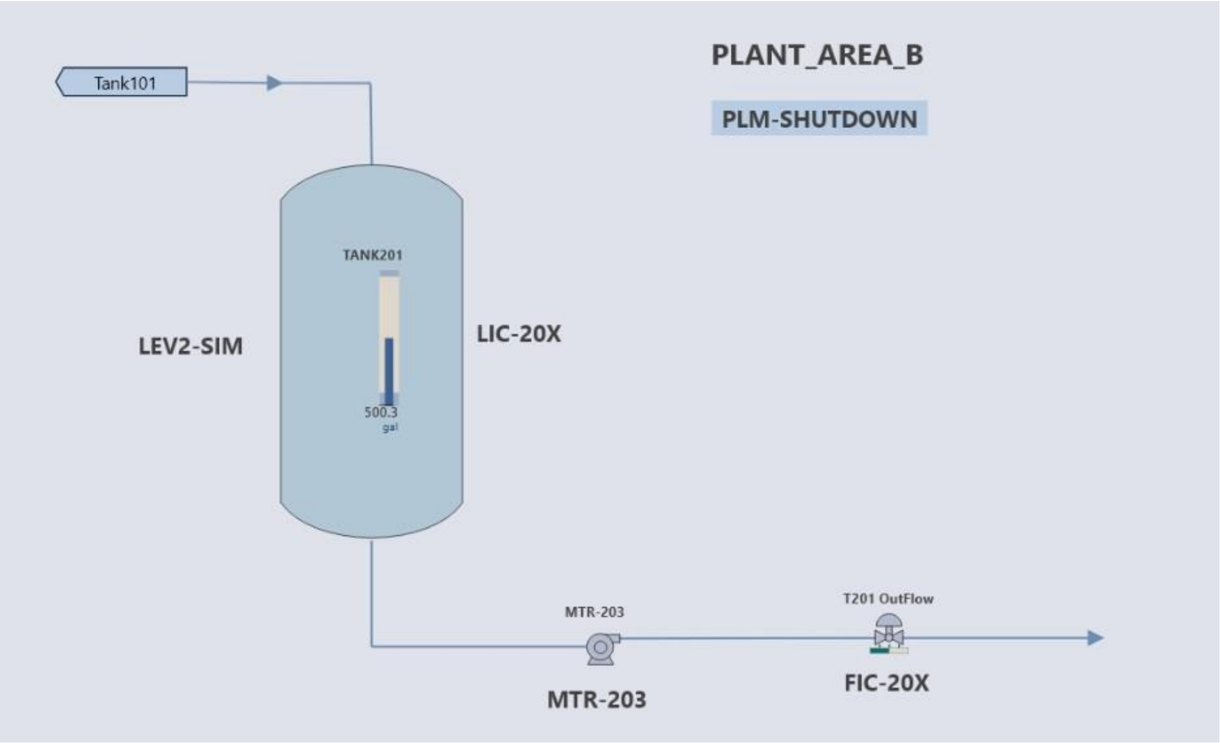




Workshop Complete

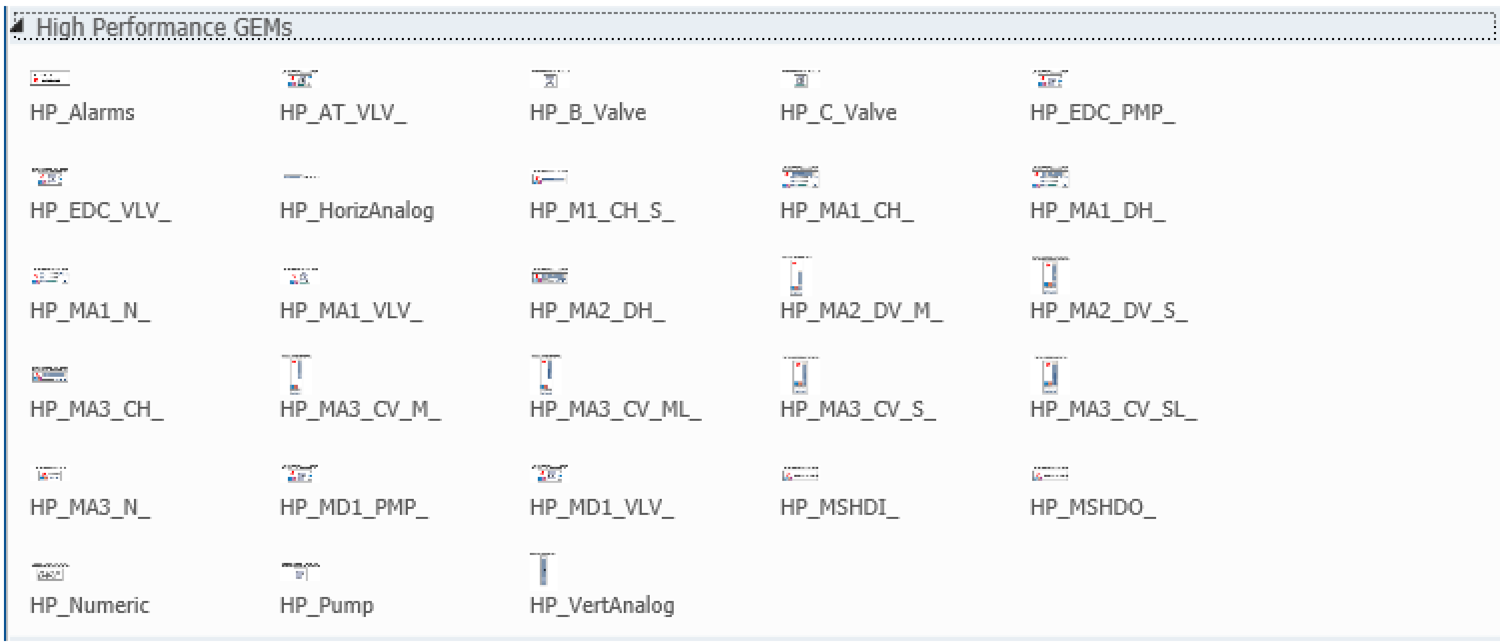
Human Centered Display Design – Theme Colors

Theme colors in DeltaV don't eliminate the use of colors in displays, they use colors from the same palette and keep the colors used to a reasonable number. This allows an operator to process the information faster and react effectively.



High Performance GEMs

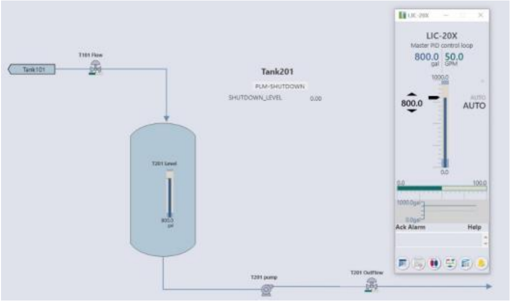
To support ISA's display optimization recommendations, the high performance GEM classes (High_Performance_Gems) are designed to improve operators' situational awareness on displays.



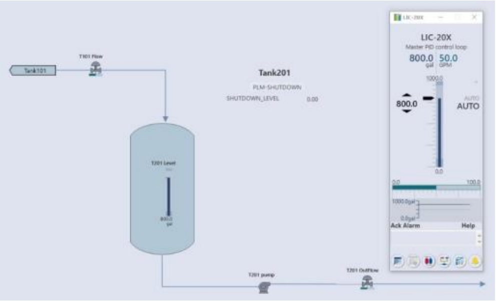
Alarm and status information is consistent throughout the GEMs in terms of location and presentation so that operators are able to process the information quickly and efficiently.

DeltaV Live Themes

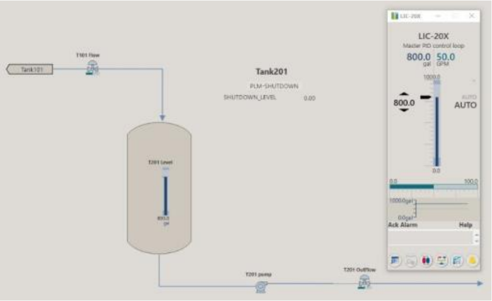
DeltaV Live Themes allow the same graphics configuration to appear differently on different workstations or at different times on the same workstation.



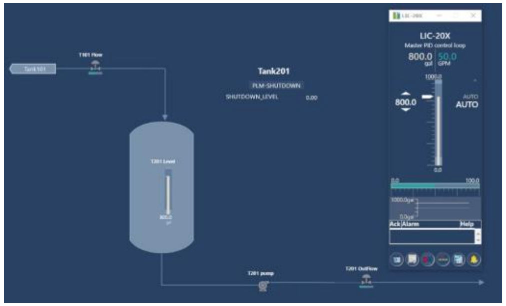
Silver Theme (Default)



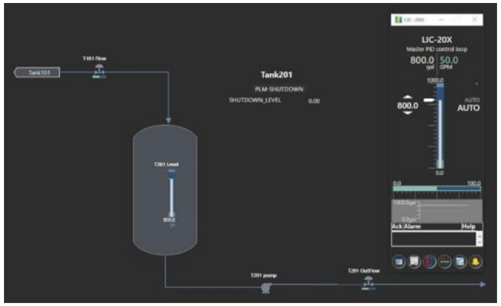
Light Blue Theme



Tan Theme



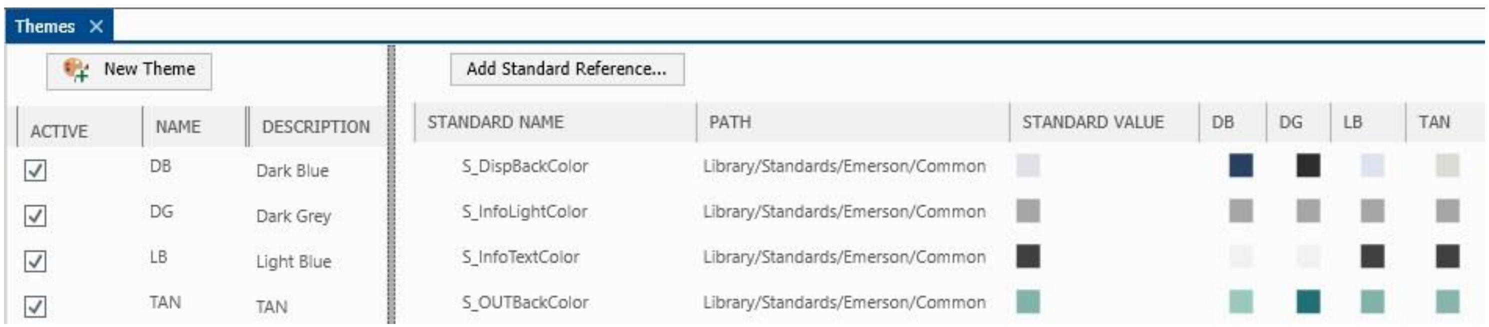
Dark Blue Theme



Dark Gray Theme

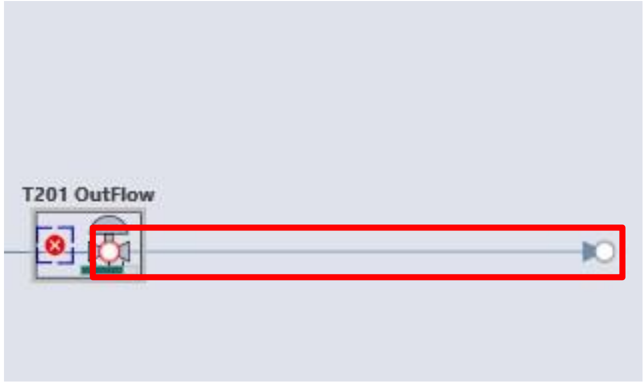
DeltaV Live Themes

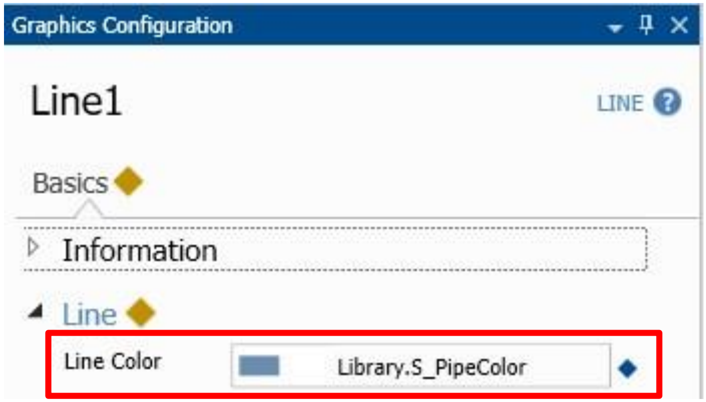
A theme consists of theme-specific values configured on a standard. A standard can have one theme-specific value (of the same type) for each theme existing in the database.



DeltaV Live Themes

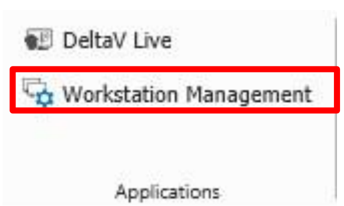
Using the Library Standards for the colors of the elements in the displays, make the displays support theme selection at runtime.

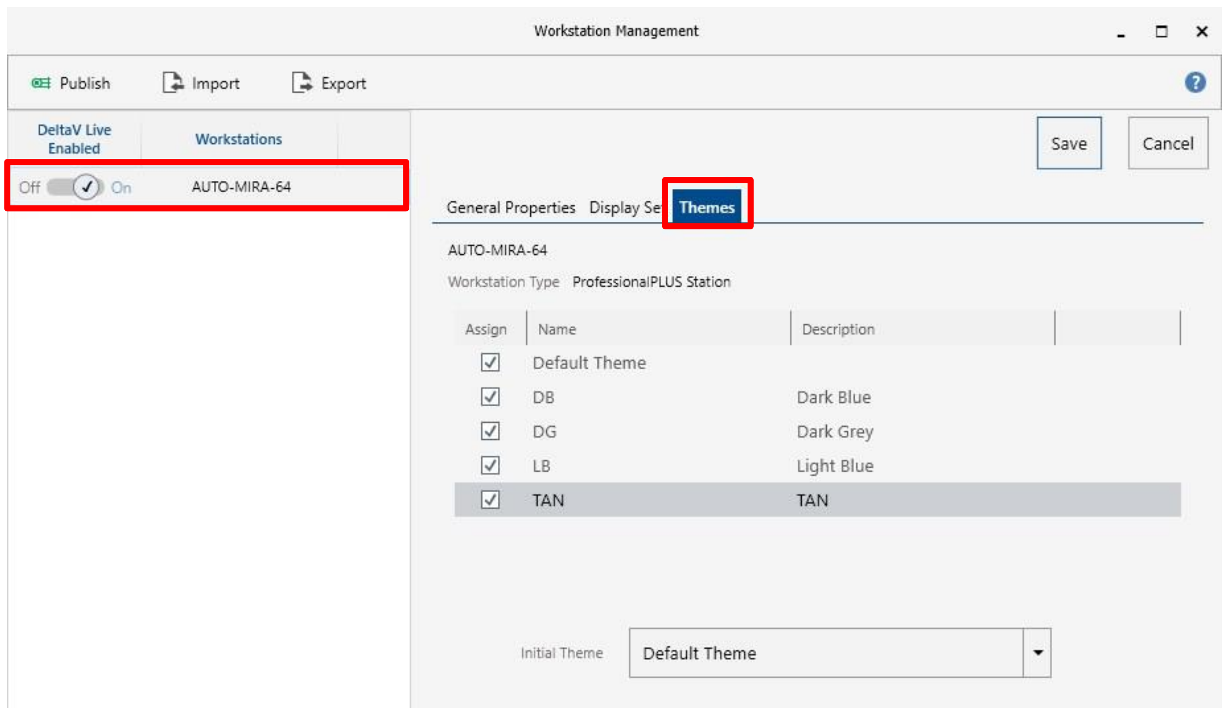




Themes selection

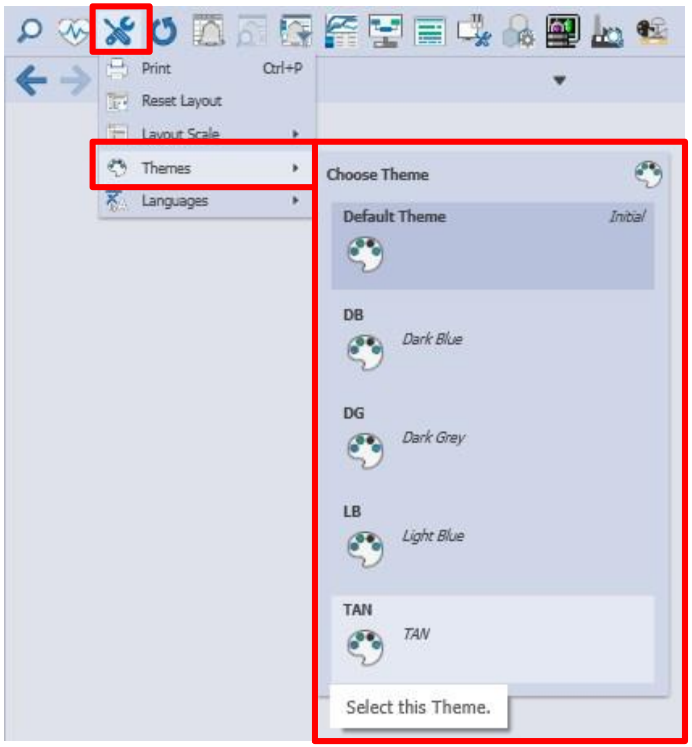
In order to allow an operator to change themes in DeltaV Live on a workstation, an active theme must be assigned to a workstation. This is done from *Graphics Studio* → *Ribbon (Home* tab) → *Applications* → *Workstation Management* tool → *Themes* tab.





Themes selection

A Themes selection option is available on a workstation's DeltaV Live Toolbar, under Tools. Users can select the theme that most appropriately meet their needs.



Workshop – Creating Tank201

Create Tank201 Display using High Performance GEMs

Verify the Operation of MTR-203 and FIC-20X

Workshop – Creating Tank201

Create a new display called Tank201 using theme colors and GEMs in the following manner:

Step 1. Create a new display called Tank201 using a template*.*

Step 2. Add the GEM *HP_C_Valve* from the *High Performance GEMs* set to manipulate *FIC-20X.*

Hint: Set the Module Name property to FIC-20X. You can type a Friendly Name as an option.

Step 3. Add the GEM *HP_MD1_PMP_* to manipulate MTR-203*.*

Hint: Set the Module Name property to MTR-203. You can type a Friendly Name as an option.

Workshop – Creating Tank201

Step 4. Add a Display Link from the palette to the top left corner of the display with the following parameters:

Link Target: Tank101
Label: Tank101
Shape: Left

Step 5. *Save* and publish the display.

Verify the operation of FIC-20X in the following manner:

Step 6. Run the DeltaV Live application and *Refresh Configuration*.

Step 7. Verify FIC-20X's functionality by manipulating the SP.

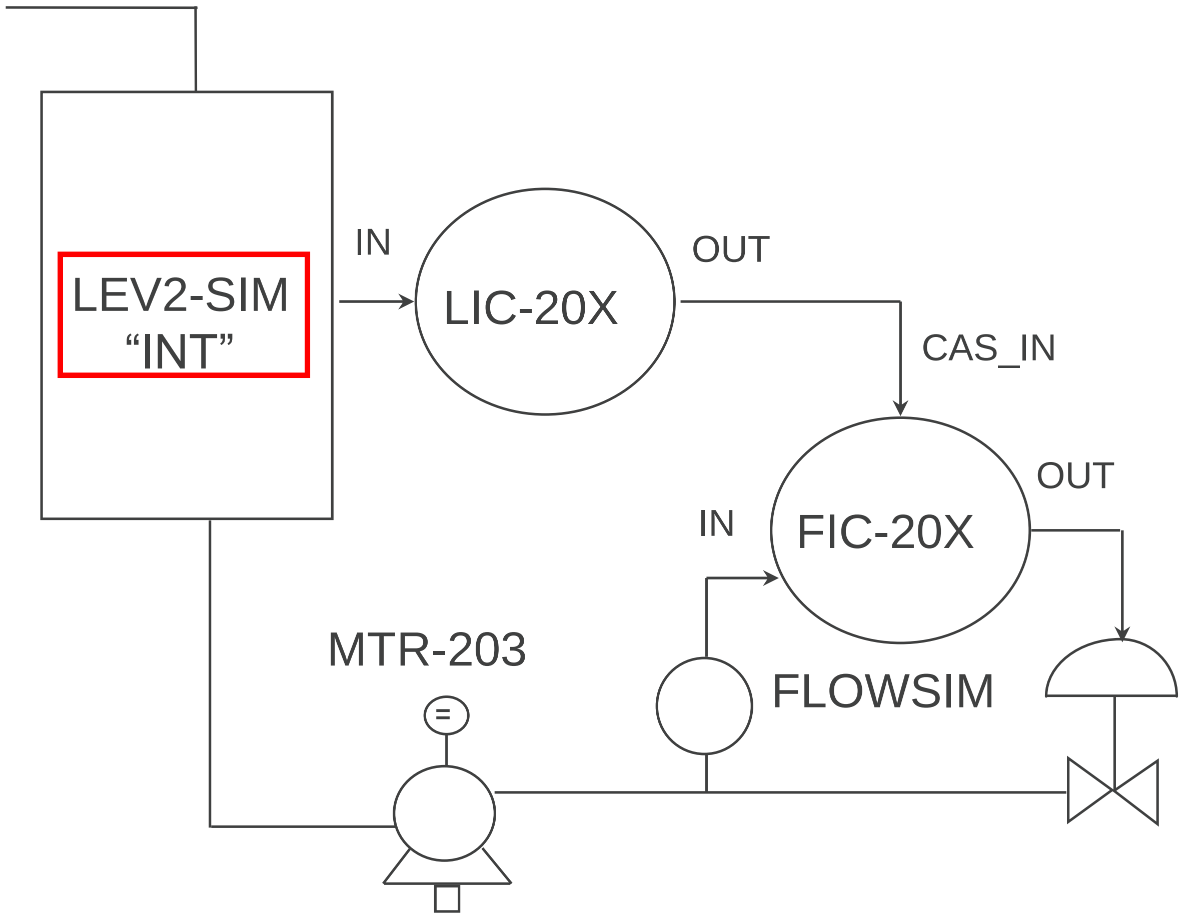
Step 8. Verify MTR-203's functionality by STARTING and STOPPING the motor.

Note: Tune if necessary.

Workshop Complete.

Workshop – Creating LEV2-SIM

LEV2-SIM is used to simulate level in Tank201.



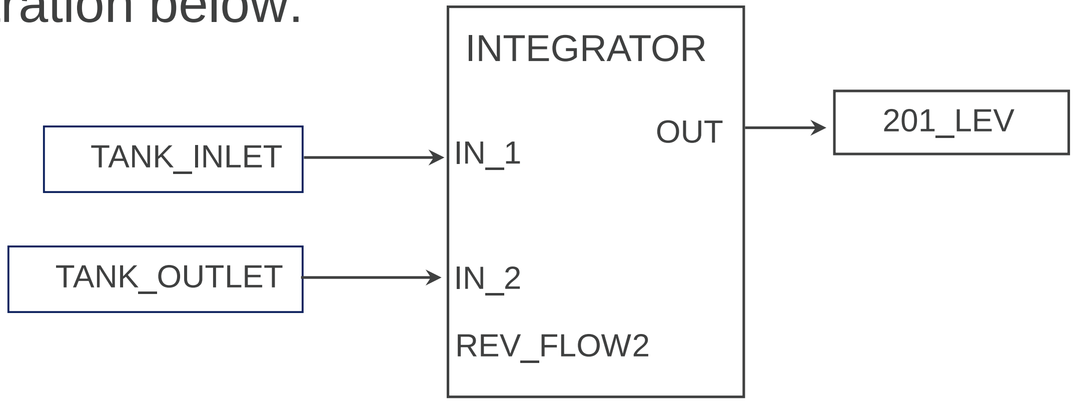
Continue to the next slide to start creating the LEV2-SIM module.

Workshop – Creating LEV2-SIM

- Create LEV2-SIM Simulation module using Integrator function block
- Verify level simulation is working

Workshop – Creating LEV2-SIM

Step 1. Create a new module named LEV2-SIM using Control Studio. Follow the remaining steps to build the module according to the illustration below:



Step 2. Drag and drop the Integrator function block from the Math palette onto the function block diagram.

Step 3. Double-click in the filter area of the Parameter window. Click *Select All* in the Parameter Filtering window.

Workshop – Creating LEV2-SIM

Step 4. Modify the following parameters:

ENABLE_IN_2	*1 (True)*
INTEG_TYPE	*0* to *?- demand reset*
REV_FLOW2	*1 (negative integration)*
TIME_UNIT1	*Minutes*
TIME_UNIT2	*Minutes*

Step 5. Drag and drop two Input parameters or Internal Read parameters onto the function block diagram from the Special Items palette.

PARAM1 Name:	*TANK_INLET*
Parameter type:	*External Reference*
Browse for external parameter path:	*FIC-102/PID1/PV*
PARAM2 Name:	*TANK_OUTLET*
Parameter type:	*External Reference*
Browse for external parameter path:	*FIC-20X/PID1/PV*

Workshop – Creating LEV2-SIM

Step 6. Drag and drop an *Output* parameter onto the function block diagram from the *Special Items* palette; promoting a parameter.

PARAM1 Name	*201_LEV*
Parameter type	*Floating point*

Step 7. Wire connections to all parameters as illustrated above.

Step 8. Modify module properties, assign to the controller, save as LEV2-SIM in PLANT_AREA_B and download.

Step 9. Verify the level is being integrated properly by using the on-line tool.

Hint: The Integrator may be reset or returned to zero by setting the OP_CMD_INT parameter to 1 in the ON-LINE mode.

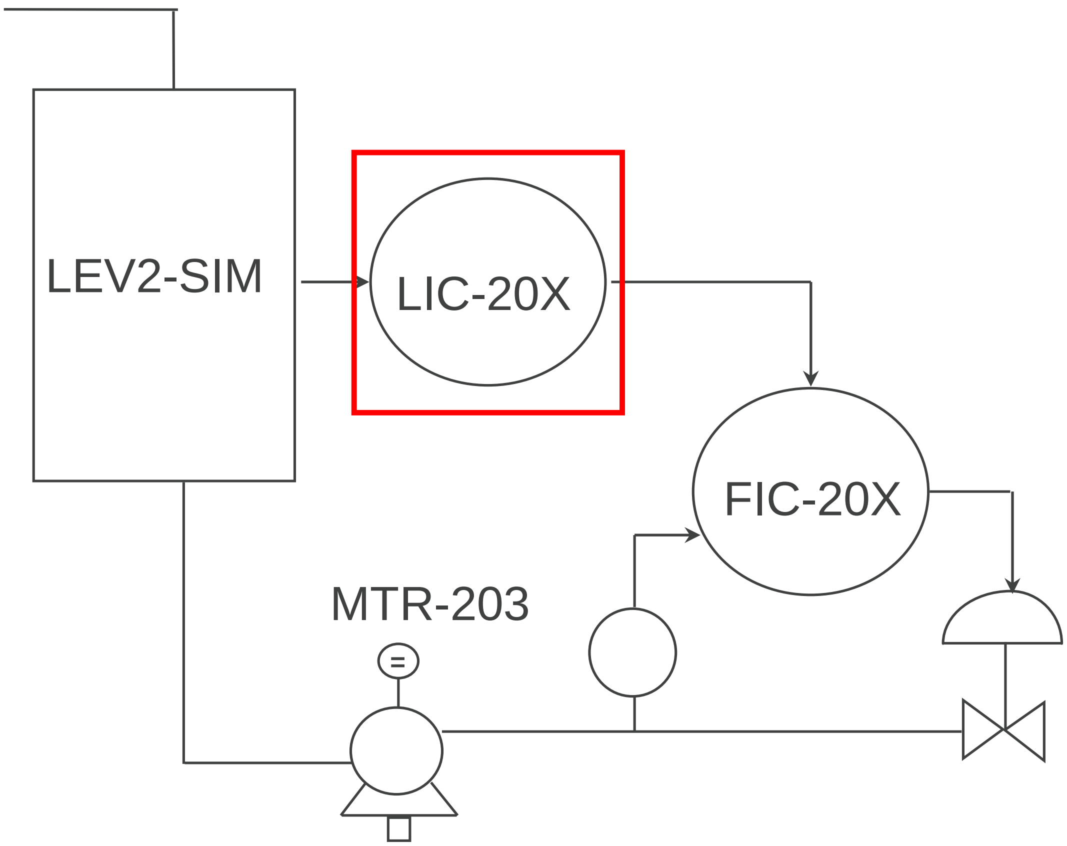
Workshop Complete.

Workshop – Creating LIC-20X

- Modify the CASCADE_MASTER module in Plant Area B
- Reference the LEV2-SIM module using Read Only external reference

Workshop – Creating LIC-20X

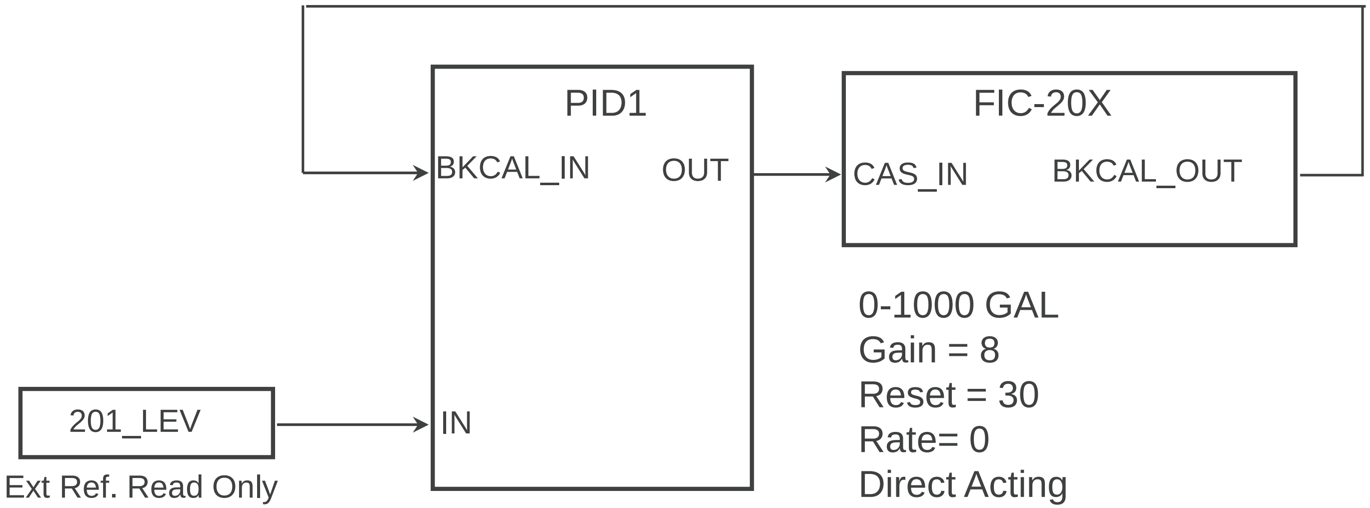
LIC-20X is the Master (Primary) PID in the cascade control strategy.



Continue to the next slide to start creating the LIC-20X module.

Workshop – Creating LIC-20X

Step 1. Rename CASCADE_MAS_1 to LIC-20X.



0-1000 GAL
Gain = 8
Reset = 30
Rate= 0
Direct Acting
Increase to Open
SP_HI_LIM 1000
SP_LO_LIM 0
HI_ALM 950
LO_ALM 100
OUT_SCALE 0-100 GPM

Step 2. Modify PID1's parameters as illustrated above.

Workshop – Creating LIC-20X

Step 3. Add an Input parameter from the Special Items palette and assign it the following characteristics:

Name:	*201_LEV*
Parameter type:	*External Reference*
Browse for path:	*LEV2-SIM/201_LEV*

As illustrated above, connect the External Reference parameter to the IN parameter on *PID1*.

Step 4. Modify the Module Properties.

Step 5. Assign to the controller.

Step 6. Save and download LIC-20X.

Step 7. Download FIC-20X.

Workshop Complete.

Workshop – Add LIC-20X to Tank201 Display

Add LIC-20X to the Tank201 display using High Performance GEMs

Verify LIC-20X High and Low Alarm Functionality

Workshop – Add LIC-20X to Tank201 Display

Add LIC-20X to the Tank201 theme display in the following manner:

Step 1. Add the GEM *HP_MA3_CV_* ML_ from the *High Performance GEMs* set to manipulate LIC-20X .

Hint: Set the Module Name property to LIC-20X. You can type a Friendly Name as an option.

Step 2. Finish the display by adding and connecting the process equipment.

Tip: Use lines and connectors with arrows.

Step 3. Save and publish the display.

Workshop – Add LIC-20X to Tank201 Display

Verify the operation of LIC-20X in the following manner:

Step 4. Run the DeltaV Live application and *Refresh Configuration*.

Step 5. Verify LIC-20X's functionality by manipulating the inlet feed FIC-102 to verify the level is maintained.

Note: Tune if necessary.

Step 6. Set FIC-20X to AUTO and verify LIC-20X's output tracks FIC-20X's SP.

Step 7. Verify that LIC-20X's HIGH and LOW alarms function properly.

Workshop Complete.

DeltaV Continuous Historian

Continuous Historian allows the collection of user-specified parameters for long-term storage, retrieval and presentation.

- *History Collection* – allows you to define module and node parameters to be monitored and stored in the Continuous Historian.
- *Continuous History Subsystems* – monitors modules for history collection data on a plant area basis because each workstation has a Continuous History Subsystem capable of detecting and storing historical data.
- *Process History View* – displays real-time and historical data from the Continuous History Subsystems as well as from the Event Chronicle.

Workshop – Continuous Historian

- Define parameter for History Collection
- Enable and Assign areas to Continuous Historian
- Configure a Chart
- Display Historical Data

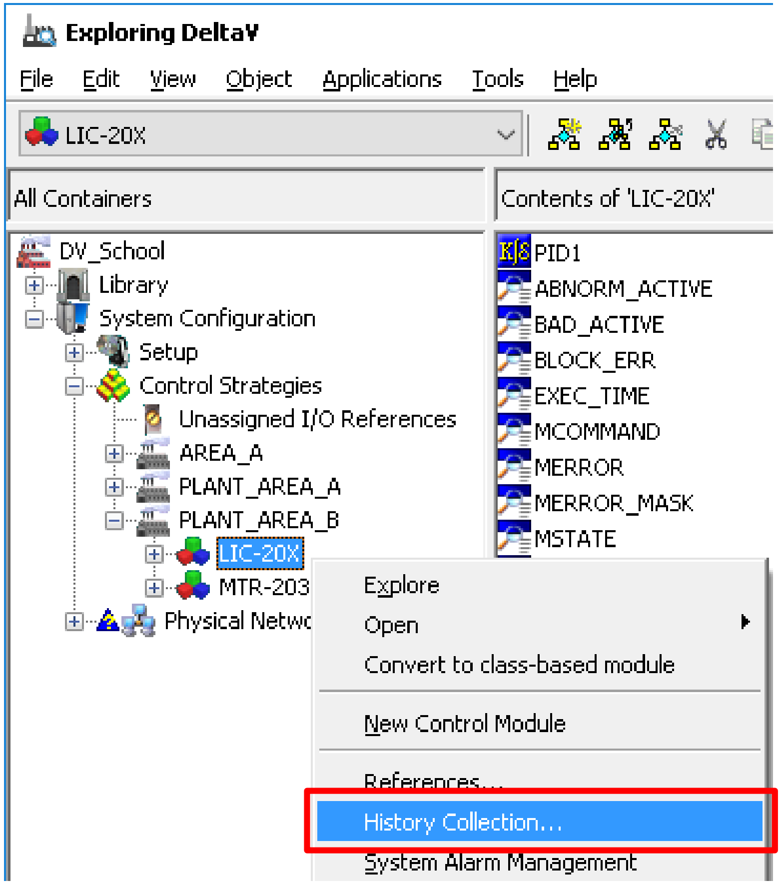
Workshop – Continuous Historian

This workshop requires you to define history collection for LIC-20X in the following manner:

Step 1. Expand PLANT_AREA_B.

Step 2. Select LIC-20X by clicking the right mouse button.

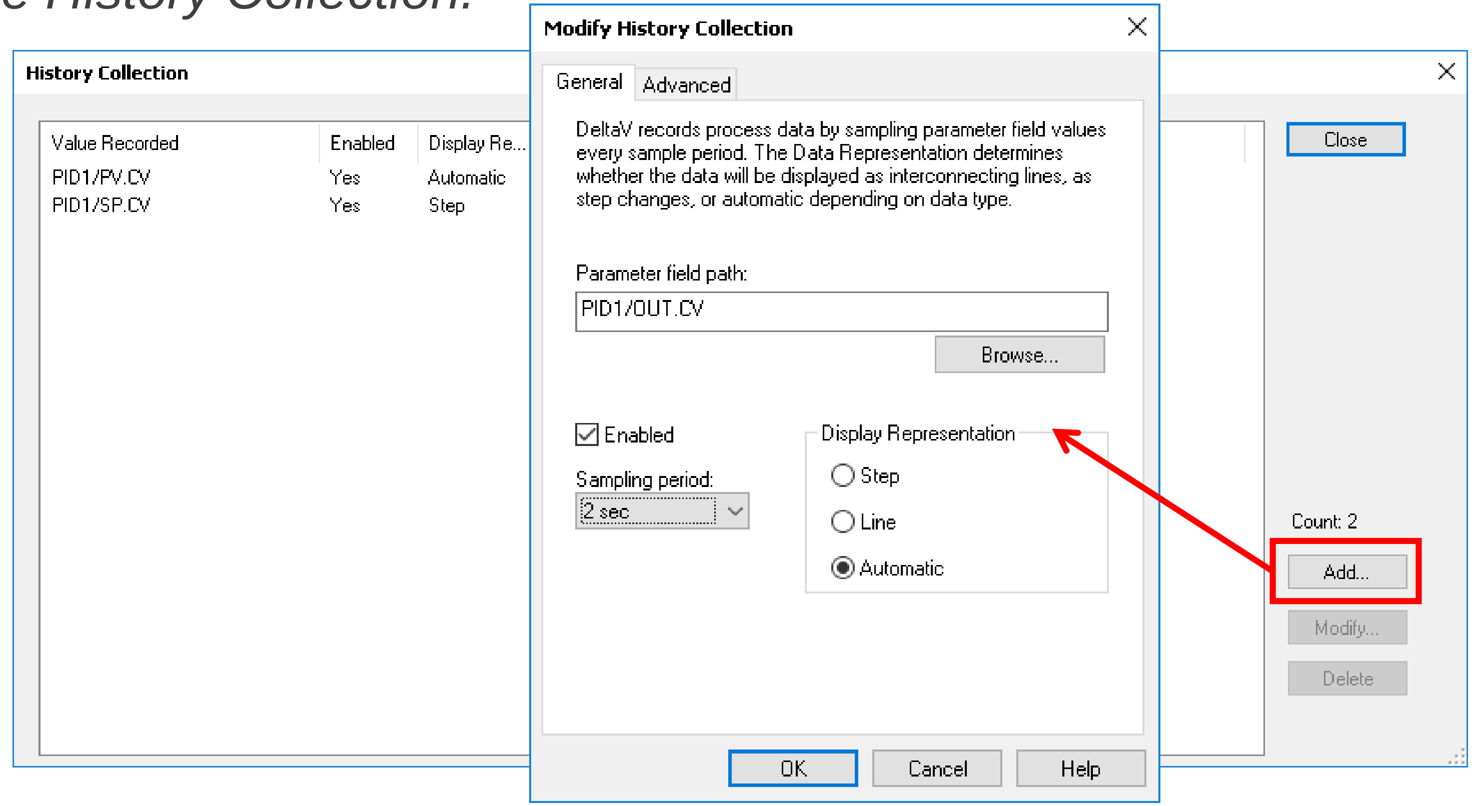
Step 3. Select History Collection.



Workshop – Continuous Historian

Step 4. Define a History Collection consisting of LIC-20X's PV, SP, and OUT.

Note: When using Library items, some parameters are predefined for the History Collection.



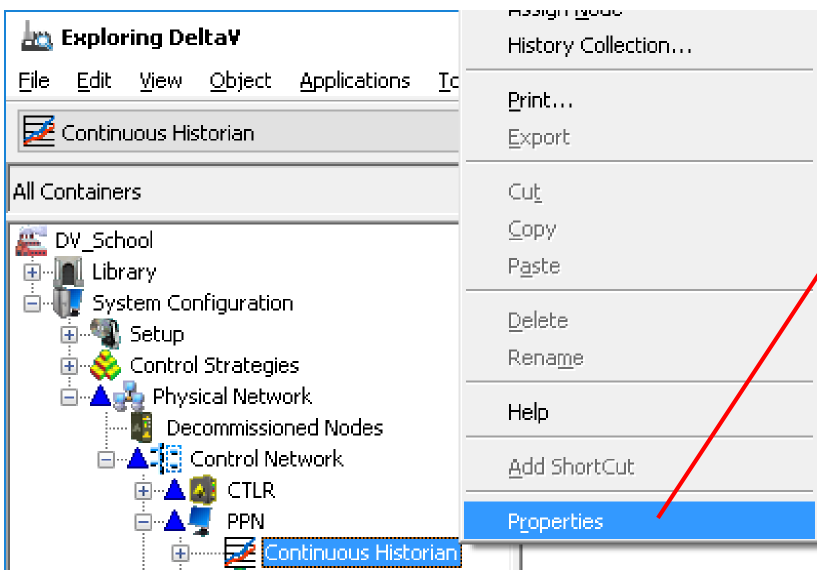
Workshop – Continuous Historian

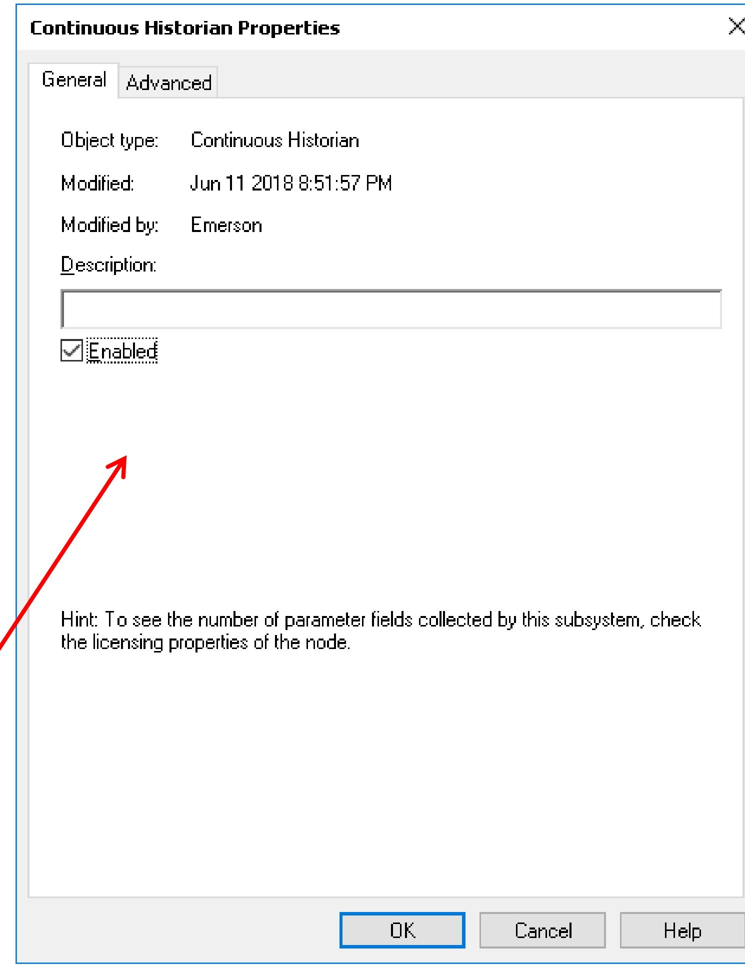
This workshop requires you to begin collecting data in the following manner:

Step 5. Expand your workstation.

Step 6. Select Continuous Historian by clicking the right mouse button.

Step 7. Select Properties ☑ Enabled





Workshop – Continuous Historian

Step 8. Drag and drop PLANT_AREA_B to Continuous Historian.

Step 9. Download the workstation.

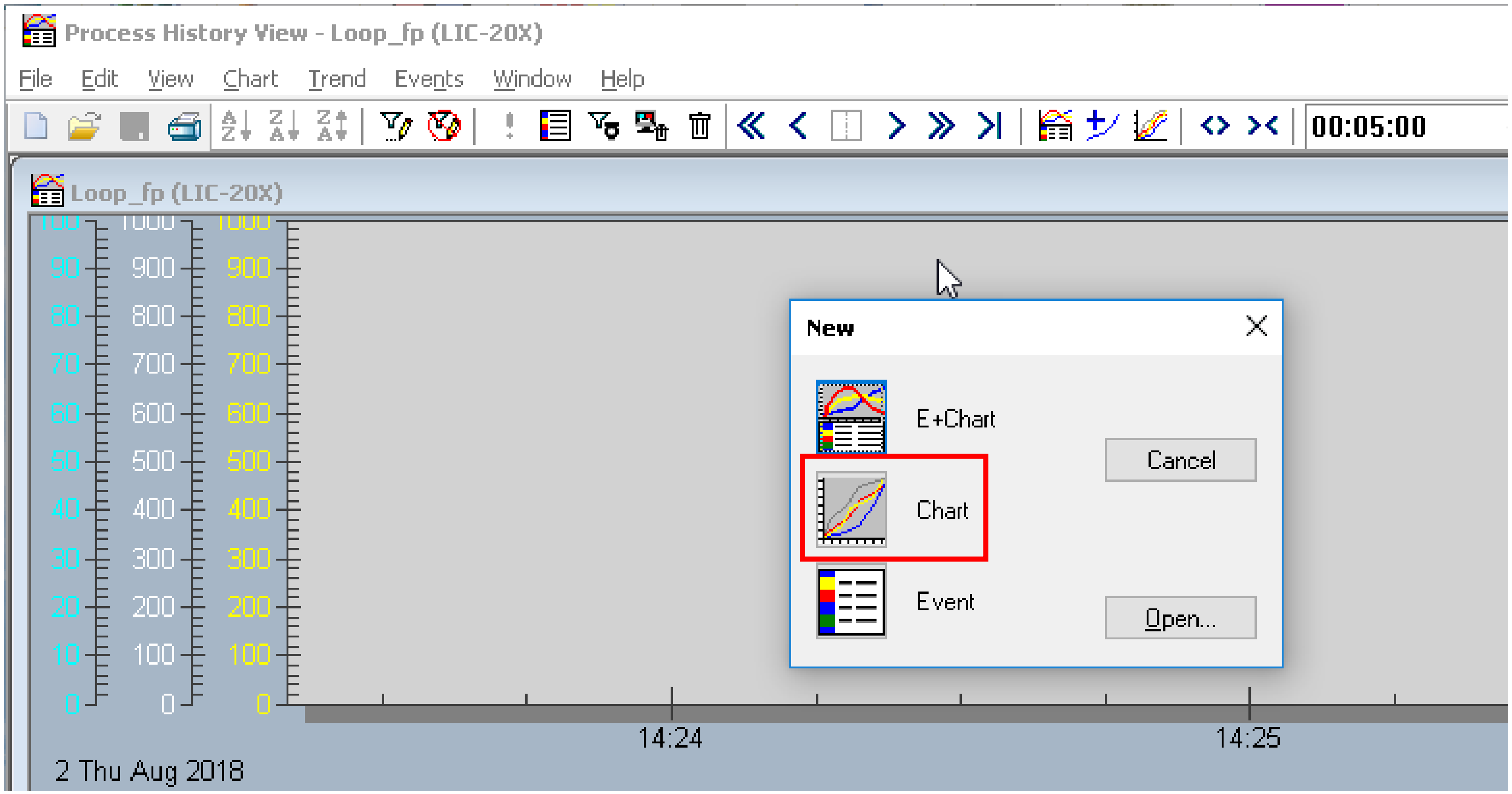
This workshop requires that you display historical data for LIC-20X in the following manner:

Step 10. Launch Process History View.

Note: Launching Process History View from DeltaV Live Menu bar prompts the user to decide what type of window to open. Launching Process History View from a faceplate opens a default chart for that module type. Launching Process History View from anything other than DeltaV Live displays the last chart that was viewed, if any.

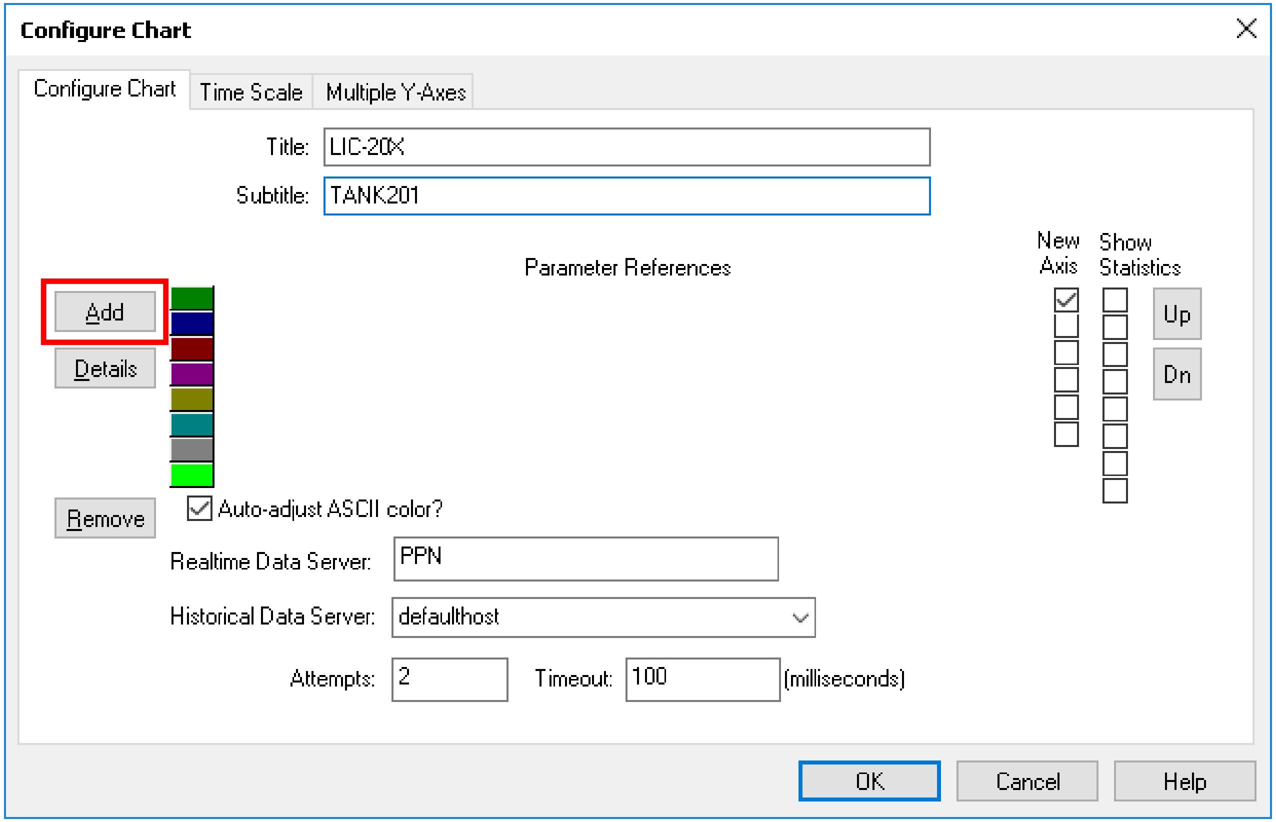
Workshop – Continuous Historian

Step 11. Select Chart.



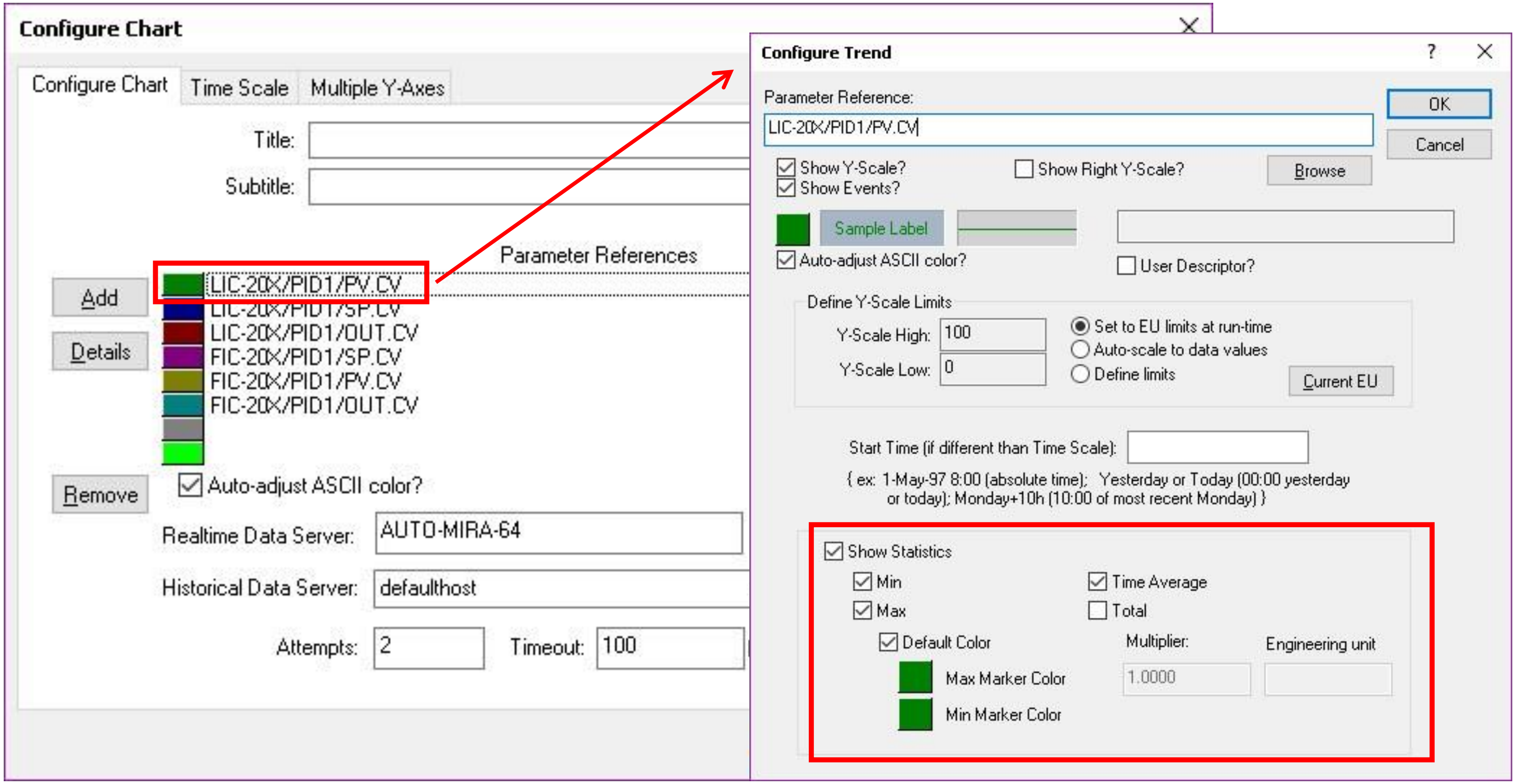
Workshop – Continuous Historian

Step 12. Configure the chart to include the PV, SP, and OUT of LIC-20X and FIC-20X using the *Add* button and browsing for the parameter path.



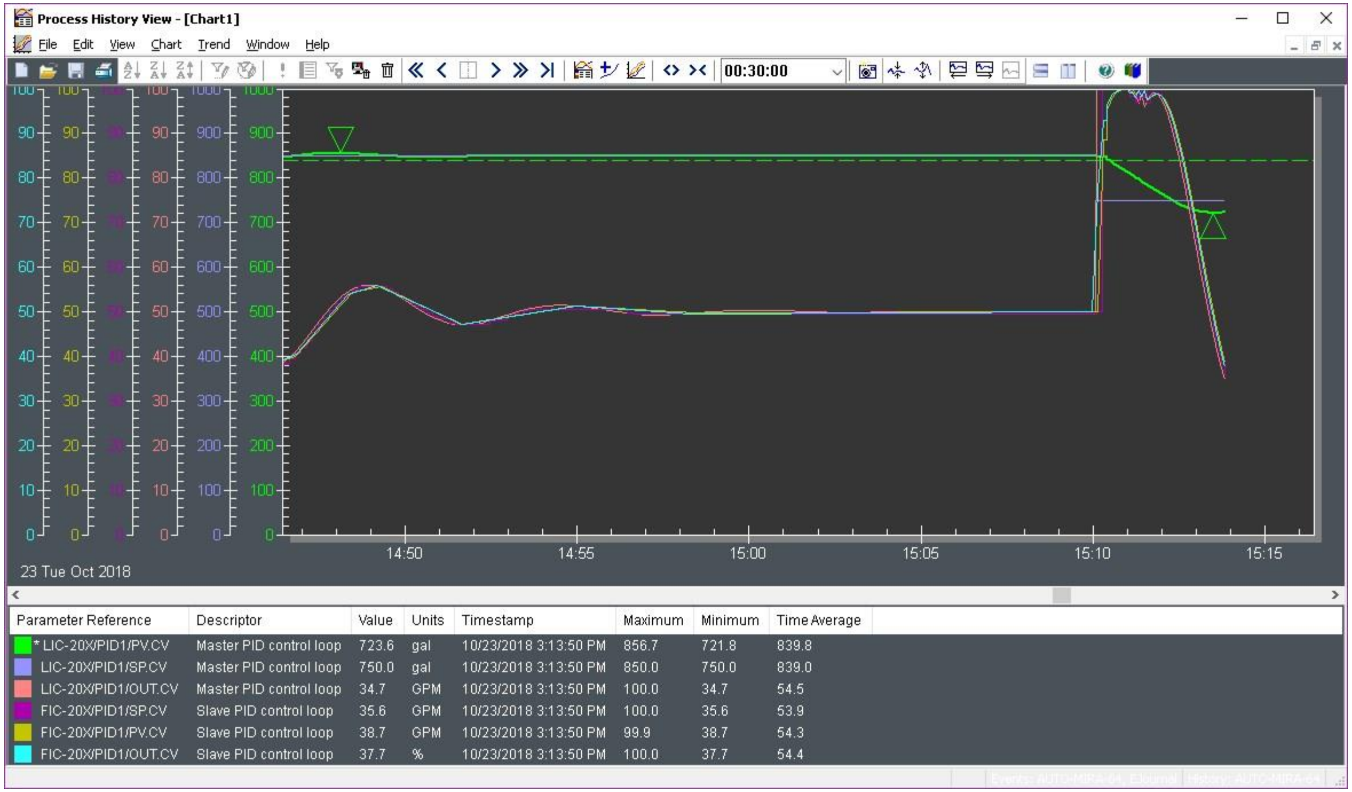
Workshop – Continuous Historian

Step 13. Double-click on LIC-20X/PID1/PV.CV to launch the Configure Trend window. Check the box for *Show Statistics* to display the Min, Max, and Time Average on the Chart.



Workshop – Continuous Historian

Step 14. View the data.



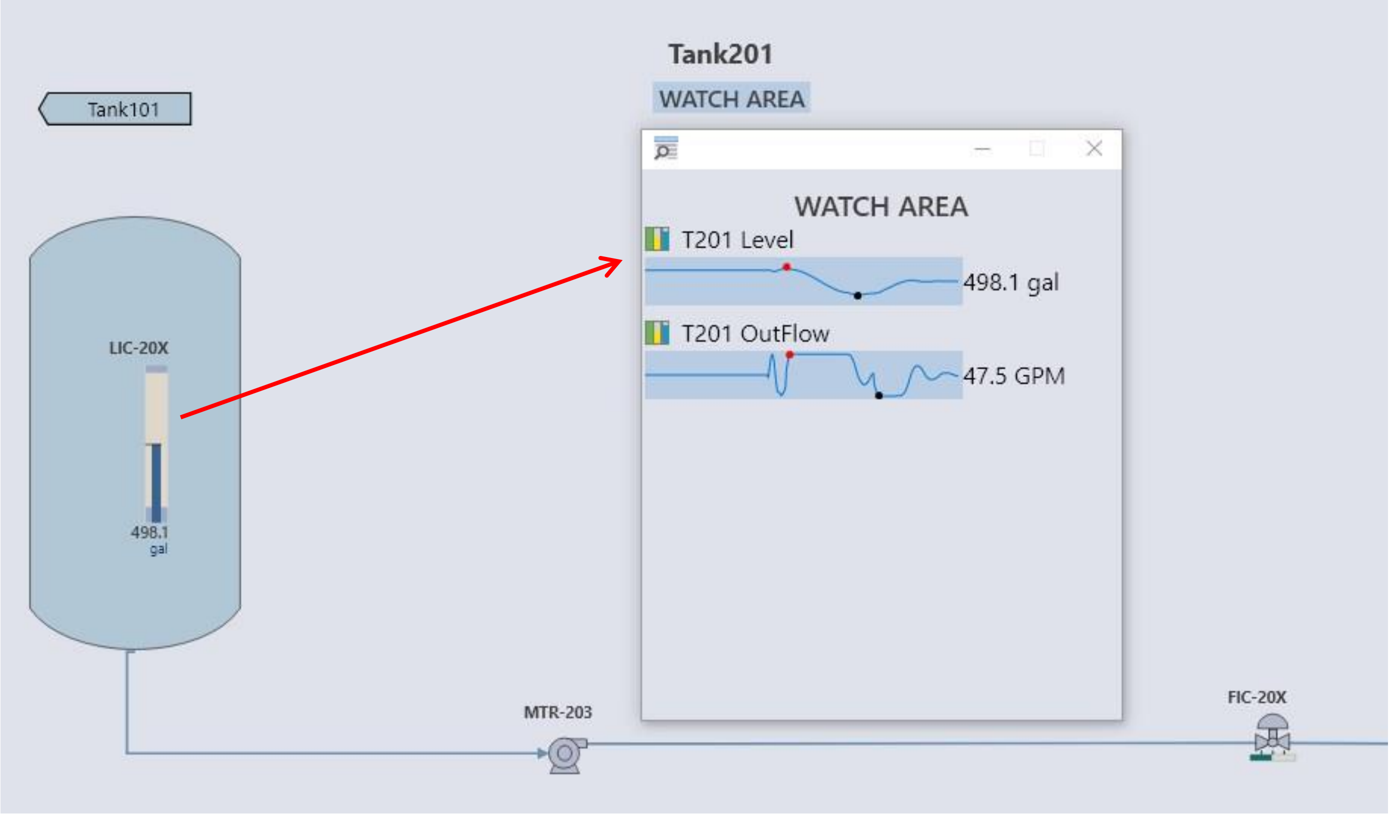
Workshop Complete.

Chart Builder

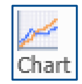
High Performance GEMs natively support adding three default parameters: PV, SP and OUT to the Chart Builder. The Chart Builder allows a user to dynamically build a chart with 8 trends.

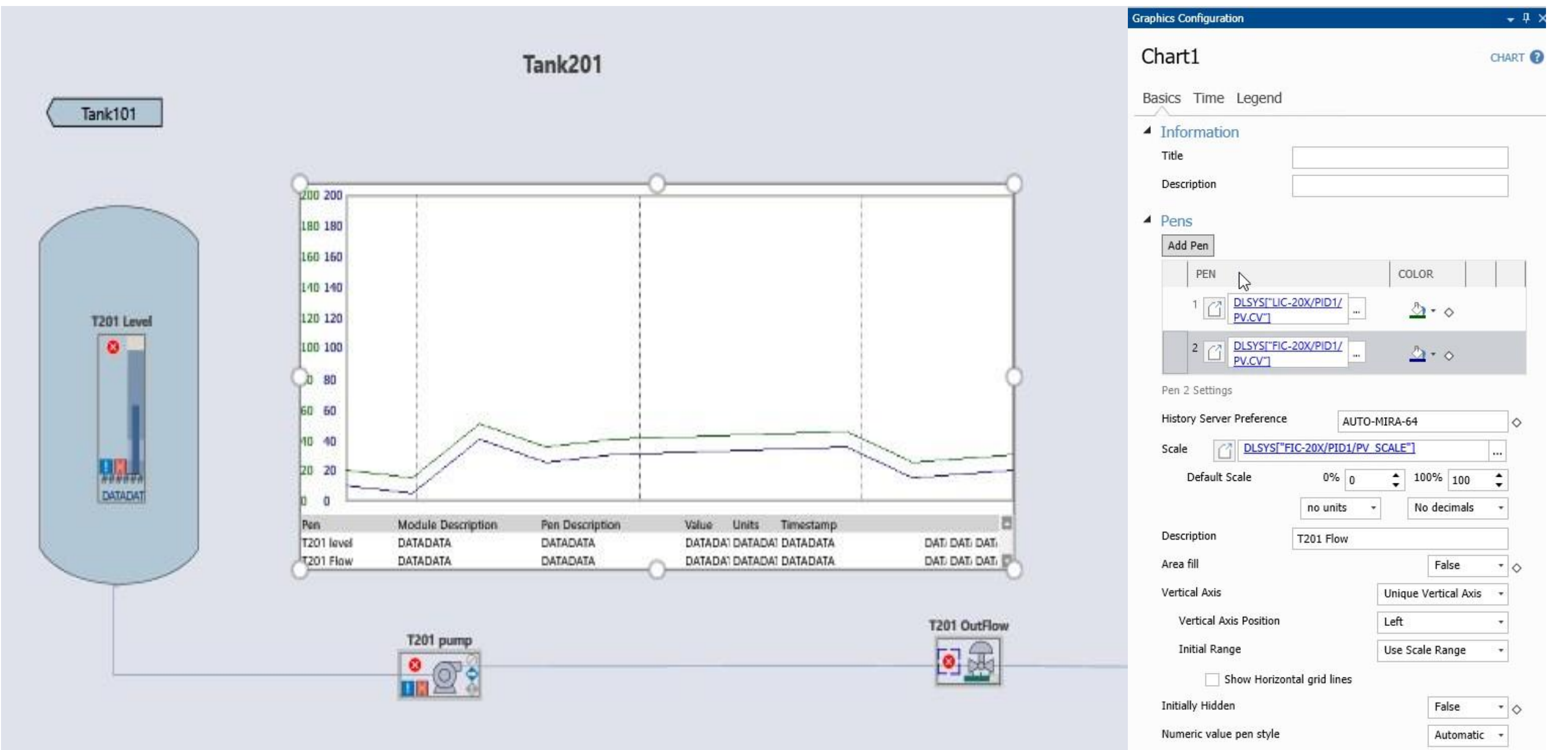
Watch Areas

A watch area provides a designated area from which operators can monitor parameters for an extended period of time. Drag and drop High Performance GEMs to the watch area to monitor values.



Embedded Trend Configuration

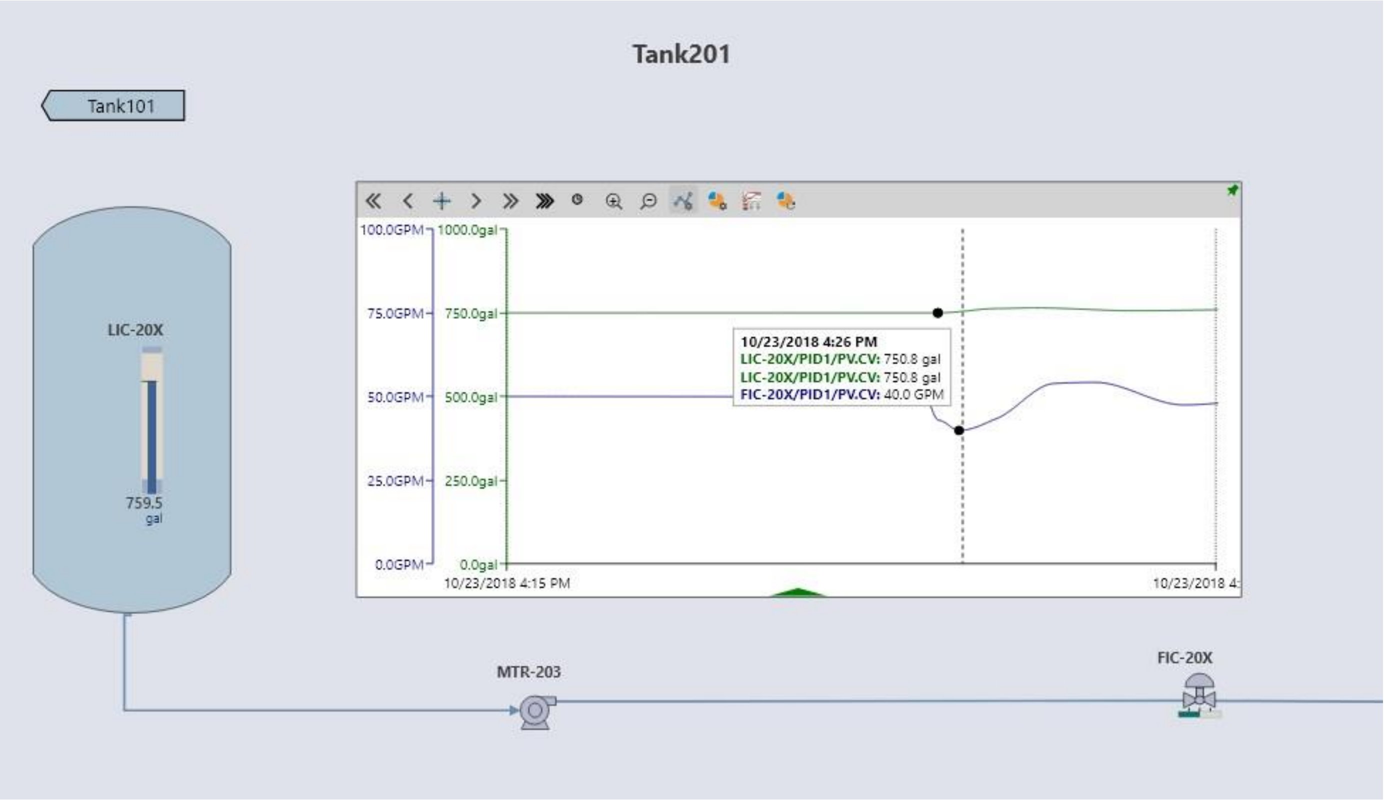
An embedded trend object can be placed in a graphic display by using the *Chart* GEM from the *Data* GEM set. 



Select the Chart object in Graphics Studio to configure the chart.

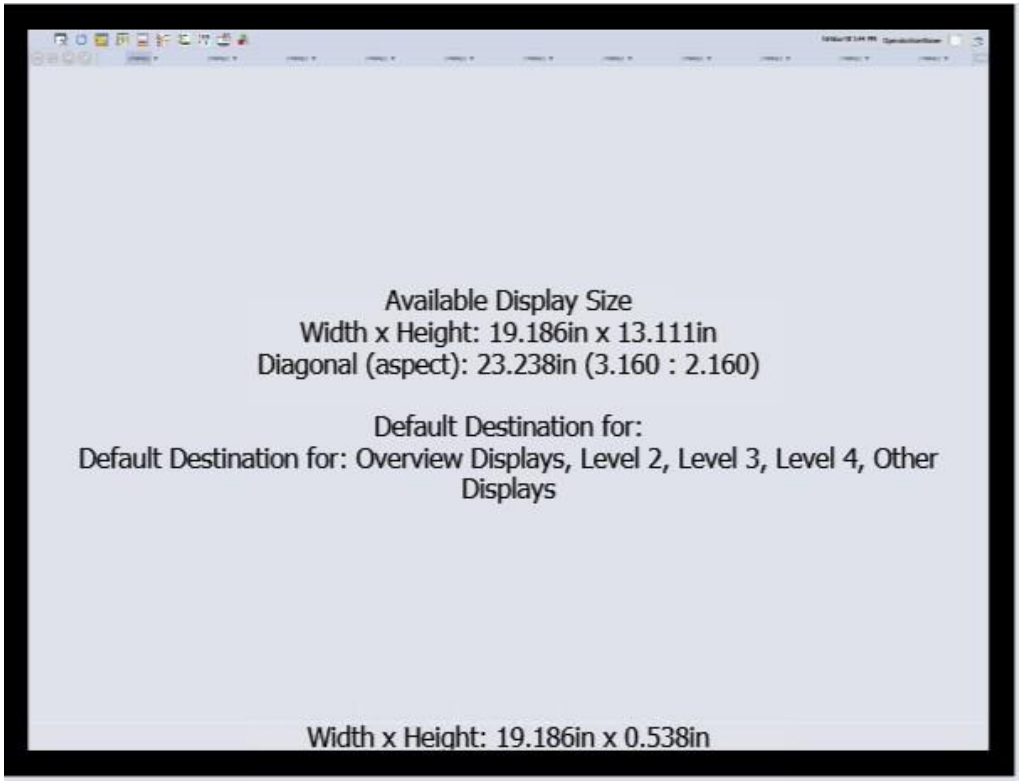
Embedded Trend Operation

The embedded trend object in DeltaV Live provides many of the same options as Process History View shown below.



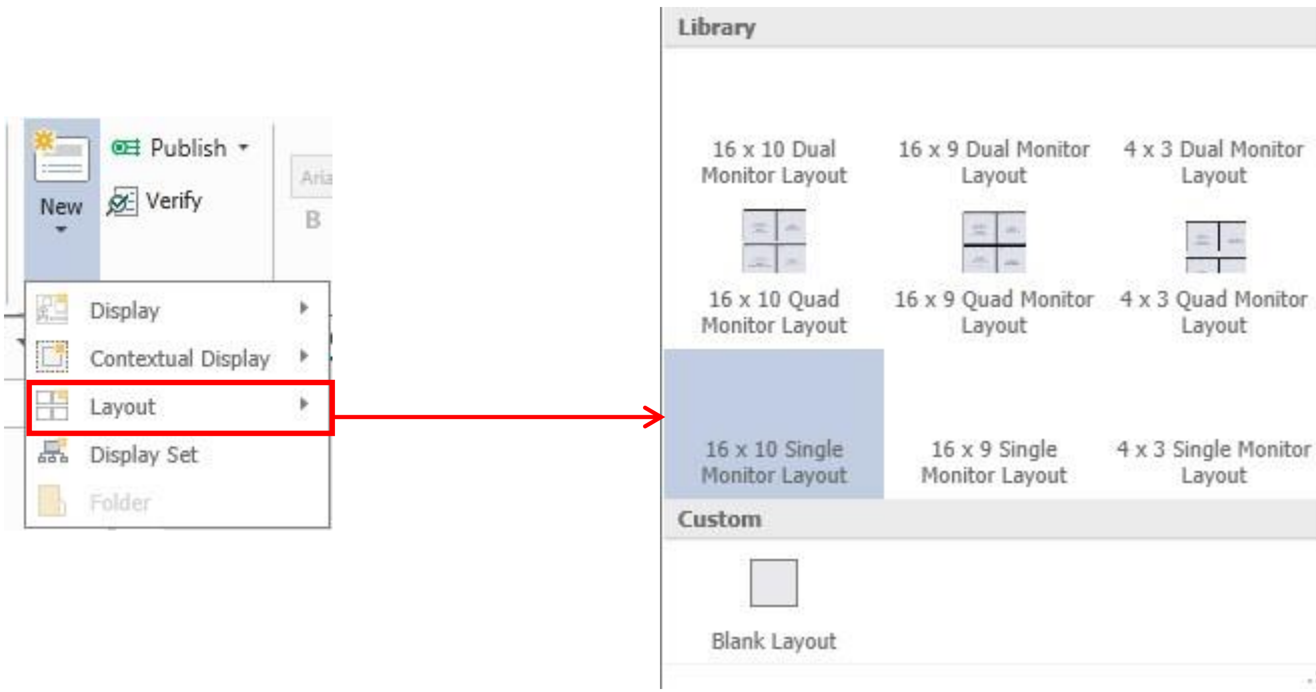
Optional – DeltaV Live Layouts

Layouts are created based on monitor size and automatically resize to fit varying monitor sizes, allowing you to create one-size-fits-all displays rather than an individual display for each monitor size.



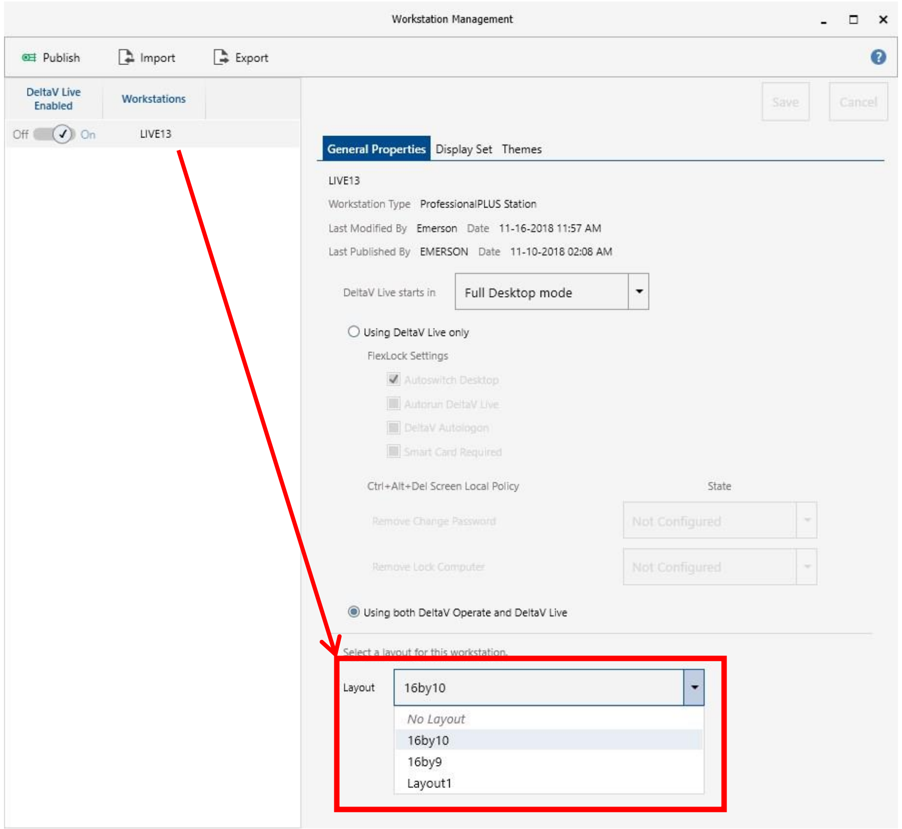
Optional – DeltaV Live Layouts

Layouts are created, configured, and managed in Graphics Studio. Layout templates are provided but can be modified as desired.



Optional – DeltaV Live Layouts

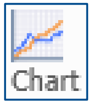
Layouts are then assigned and published for use on DeltaV Live-enabled Operator Stations using the Workstation Management Tool.



Optional Workshop 1 – Add Embedded Trend

Add an Embedded Trend Object to Tank201 Display

Add an embedded trend object to the Tank201 display for monitoring LIC-20X.

Hint: Don’t forget the embedded Chart GEM 

in the Data GEM set in Graphics Studio.

Optional Workshop 2 – Change Themes

Use Themes Selection to Change Themes

Allow operators to change Themes in DeltaV Live on the same workstation.

Hints:

1. *Use the Workstation Management Tool.*
2. *Modify the elements in Tank101 and Tank201 to use Library Standards.*

Optional Workshop 3 – Modify FIC-20X Scaling

Modify the PV_SCALE of FIC-20X to Drain Faster

Modify the PV_SCALE of FIC-20X so that the outlet flow for Tank201 does not equal the inlet flow. This will allow Tank201 to drain faster.

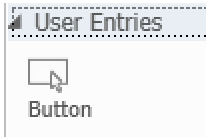
Hint: Don't forget to modify LIC-20X.

Optional Workshop 4 – Add Buttons

Add buttons with interactions

Add a button to Tank101 with an interaction that opens the Tank201 display.

Add a button to Tank201 with an interaction that launches the Contextual Display called WatchArea.



Optional Workshop 5 – Reset Integrator

Add an option to Reset the Integrator

Add a data link to the TANK201 display to reset the integrator.

OR

Replace the integrator block with a calc block that will perform the integration and limit the value between 0 and 1000.

Summary

- Perform top-down configuration
- Implement cascade control using the CASCADE_MASTER template
- Define Module Block
- Implement flow simulation using the Calc and Filter function blocks
- Implement level simulation with the Integrator function block

Summary

- Use Control Studio On-line for testing modules
- Use High Performance GEMs
- Implement the Continuous Historian

EMERSON

Conditional Alarms

Module 10

Module Objectives

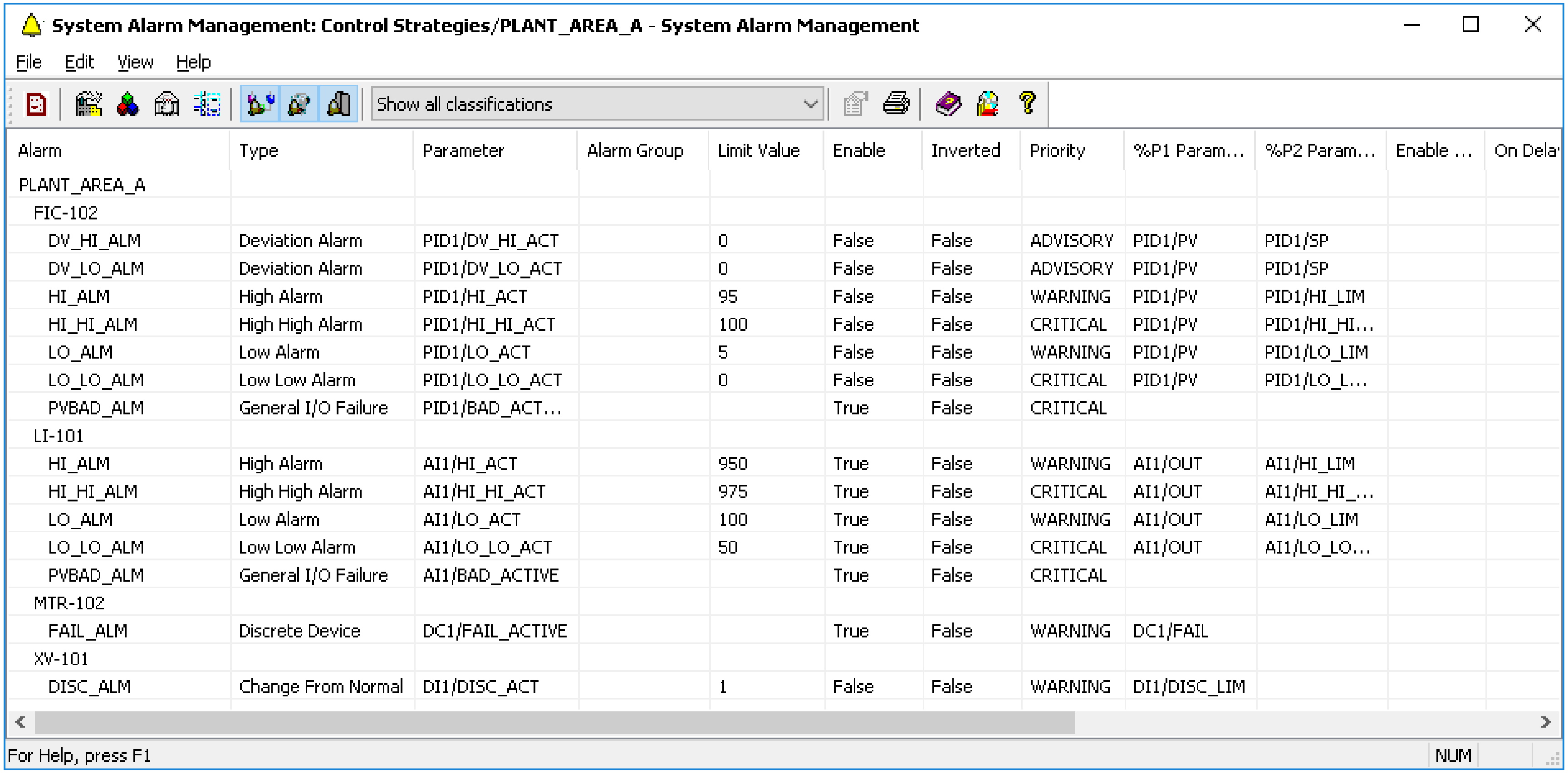
- Modify alarms using the System Alarm Management application
- Create a Conditional Alarm for a loop

Module Workshop

- Configuring a Conditional Alarm

System Alarm Management

The System Alarm Management application lets you view and edit all alarms within selected Areas, Modules, Units, Logic Solvers and Nodes.


System Alarm Management: Control Strategies/PLANT_AREA_A - System Alarm Management

File Edit View Help

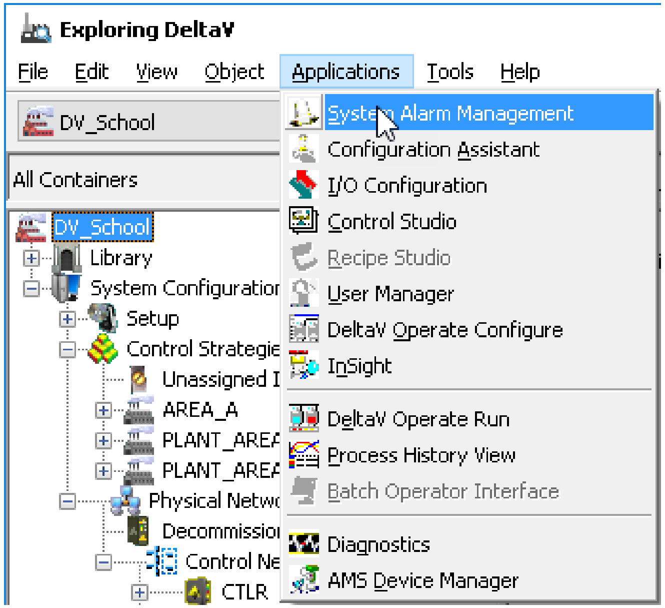
Show all classifications

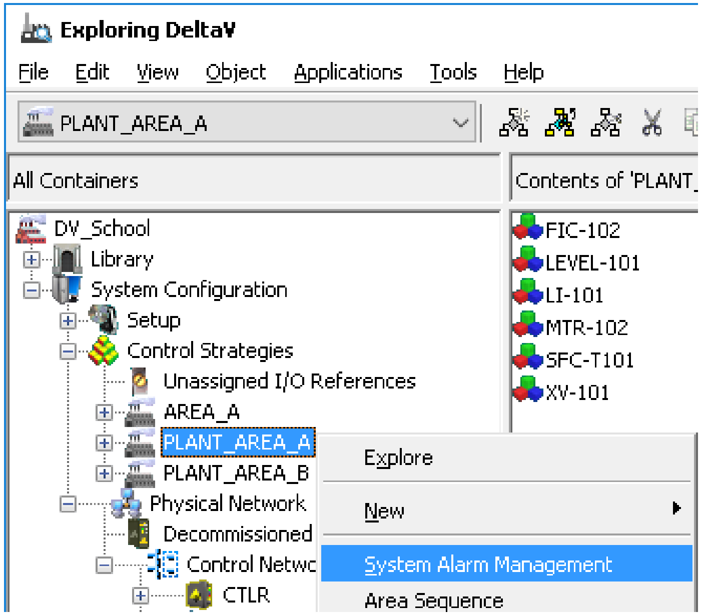
Alarm	Type	Parameter	Alarm Group	Limit Value	Enable	Inverted	Priority	%P1 Param...	%P2 Param...	Enable ...	On Dela
PLANT_AREA_A											
FIC-102											
DV_HI_ALM	Deviation Alarm	PID1/DV_HI_ACT		0	False	False	ADVISORY	PID1/PV	PID1/SP		
DV_LO_ALM	Deviation Alarm	PID1/DV_LO_ACT		0	False	False	ADVISORY	PID1/PV	PID1/SP		
HI_ALM	High Alarm	PID1/HI_ACT		95	False	False	WARNING	PID1/PV	PID1/HI_LIM		
HI_HI_ALM	High High Alarm	PID1/HI_HI_ACT		100	False	False	CRITICAL	PID1/PV	PID1/HI_HI...		
LO_ALM	Low Alarm	PID1/LO_ACT		5	False	False	WARNING	PID1/PV	PID1/LO_LIM		
LO_LO_ALM	Low Low Alarm	PID1/LO_LO_ACT		0	False	False	CRITICAL	PID1/PV	PID1/LO_L...		
PVBAD_ALM	General I/O Failure	PID1/BAD_ACT...			True	False	CRITICAL				
LI-101											
HI_ALM	High Alarm	AI1/HI_ACT		950	True	False	WARNING	AI1/OUT	AI1/HI_LIM		
HI_HI_ALM	High High Alarm	AI1/HI_HI_ACT		975	True	False	CRITICAL	AI1/OUT	AI1/HI_HI_...		
LO_ALM	Low Alarm	AI1/LO_ACT		100	True	False	WARNING	AI1/OUT	AI1/LO_LIM		
LO_LO_ALM	Low Low Alarm	AI1/LO_LO_ACT		50	True	False	CRITICAL	AI1/OUT	AI1/LO_LO...		
PVBAD_ALM	General I/O Failure	AI1/BAD_ACTIVE			True	False	CRITICAL				
MTR-102											
FAIL_ALM	Discrete Device	DC1/FAIL_ACTIVE			True	False	WARNING	DC1/FAIL			
XV-101											
DISC_ALM	Change From Normal	DI1/DISC_ACT		1	False	False	WARNING	DI1/DISC_LIM			

For Help, press F1 NUM

System Alarm Management

The System Alarm Management application can be accessed several ways. Two methods are shown below.





From the DeltaV Explorer toolbar under Applications

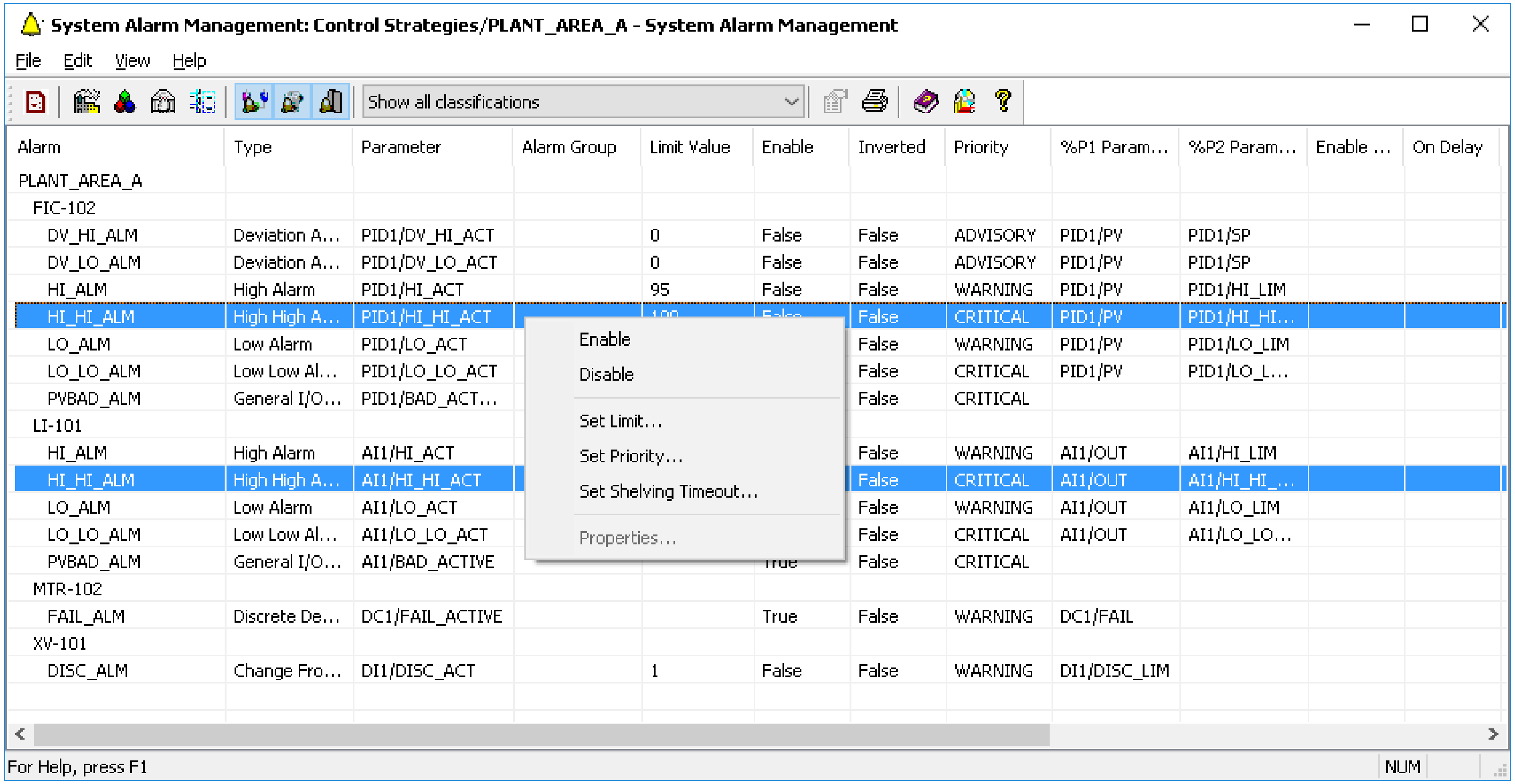
By right-clicking on the plant area to display all the alarms in the plant area

Note: By default, no alarms are listed when the application first opens using this method.

System Alarm Management

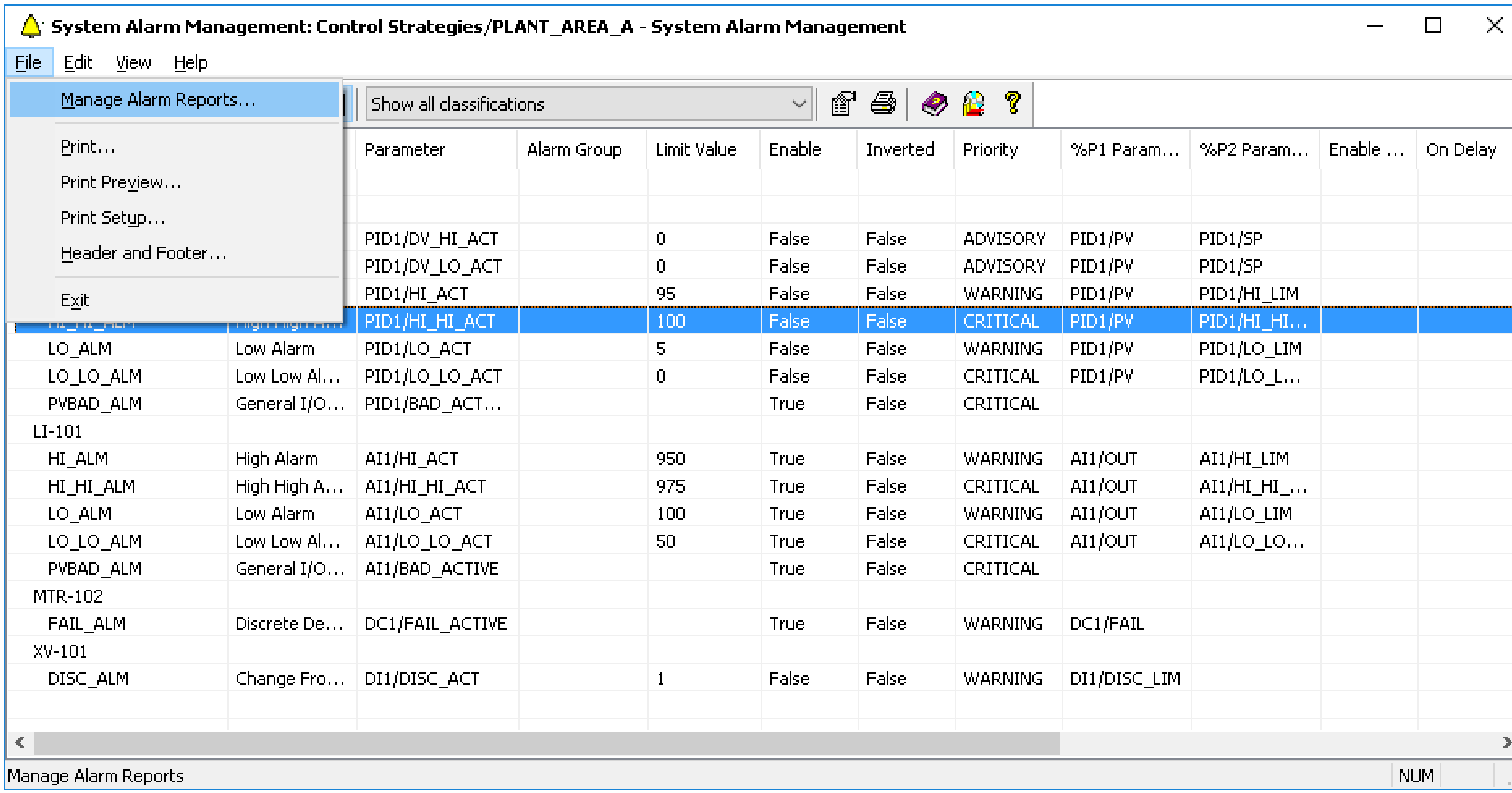
Alarm properties can be modified individually or in groups.

Note: Modifications to alarm properties will not take effect until they are downloaded.



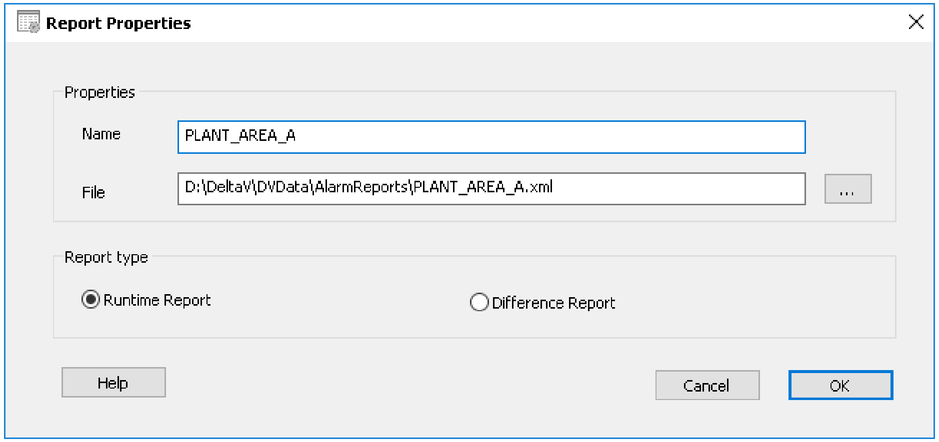
Manage Alarm Reports

The Manage Alarm Reports menu option is now available in the SAM application on the Professional Plus workstation.



Manage Alarm Reports

Report Properties:

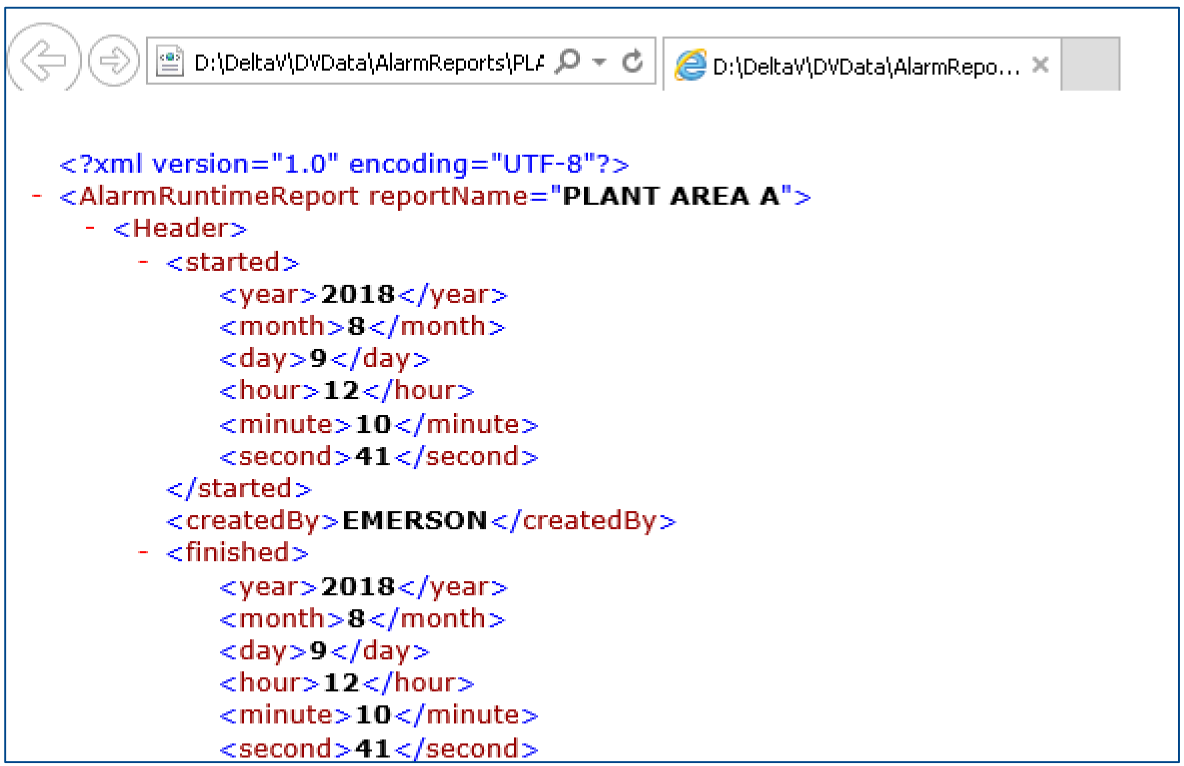


- The Report Properties allows you to enter a name for the report. The name allows a maximum of 50 printable characters and must be unique.
- You can click the Browse button and browse to the path where you want to store the report, or use the default path (DeltaV\DVData\Alarm Reports).
- The Report Type is also defined here.

Running Alarm Reports

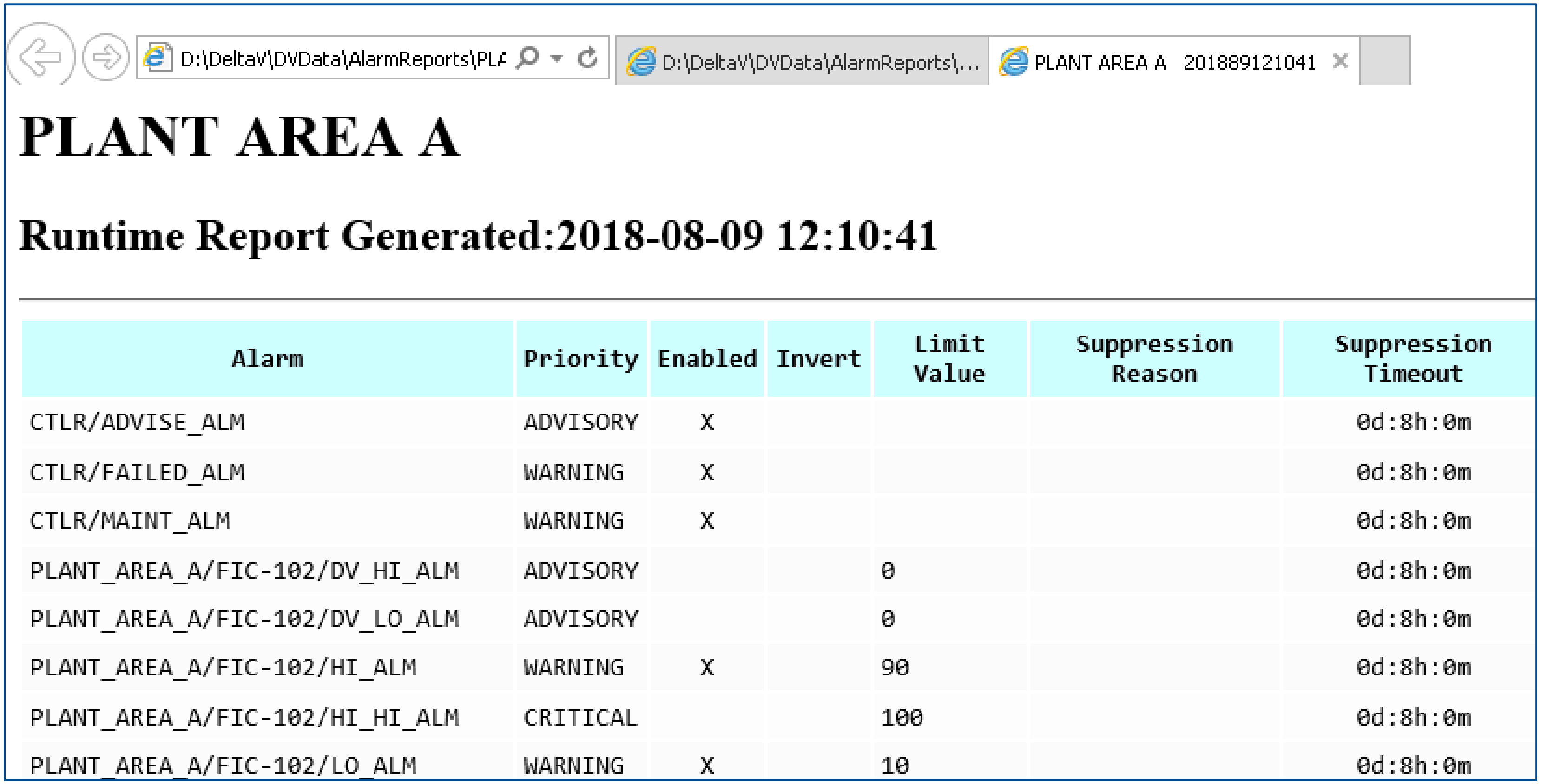
Run Report:

- An XML report is created in the file location specified when the report is created.
- The XML file is updated each time the report is run.



Runtime Report List

The Runtime Report lists basic run-time alarm parameters, regardless of their deviation from the configured values.



PLANT AREA A

Runtime Report Generated:2018-08-09 12:10:41

Alarm	Priority	Enabled	Invert	Limit Value	Suppression Reason	Suppression Timeout
CTLR/ADVISE_ALM	ADVISORY	X				0d:8h:0m
CTLR/FAILED_ALM	WARNING	X				0d:8h:0m
CTLR/MAINT_ALM	WARNING	X				0d:8h:0m
PLANT_AREA_A/FIC-102/DV_HI_ALM	ADVISORY			0		0d:8h:0m
PLANT_AREA_A/FIC-102/DV_LO_ALM	ADVISORY			0		0d:8h:0m
PLANT_AREA_A/FIC-102/HI_ALM	WARNING	X		90		0d:8h:0m
PLANT_AREA_A/FIC-102/HI_HI_ALM	CRITICAL			100		0d:8h:0m
PLANT_AREA_A/FIC-102/LO_ALM	WARNING	X		10		0d:8h:0m

Difference Report List

The Difference Report shows the differences between the run-time alarm parameters and their configured values.

D:\DeltaV\DVData\AlarmReports\ALL

ALL PLANT AREAS 2018891...

ALL PLANT AREAS

Difference Report Generated: 2018-08-09 12:18:21

Summary

Runtime alarms:

Total= 35

Different= 4

Shelved= 0

Out of Service= 0

Configuration only:

Total= 2

Alarm	Property	Configured	Runtime	Additional Data
PLANT_AREA_A/LI-101/HI_ALM	Limit Value	950	900	AI1/HI_ACT
PLANT_AREA_A/LI-101/LO_ALM	Limit Value	100	200	AI1/LO_ACT
PLANT_AREA_B/LIC-20X/HI_ALM	Limit Value	950	900	PID1/HI_ACT
PLANT_AREA_B/LIC-20X/LO_ALM	Limit Value	100	200	PID1/LO_ACT

Conditional Alarming

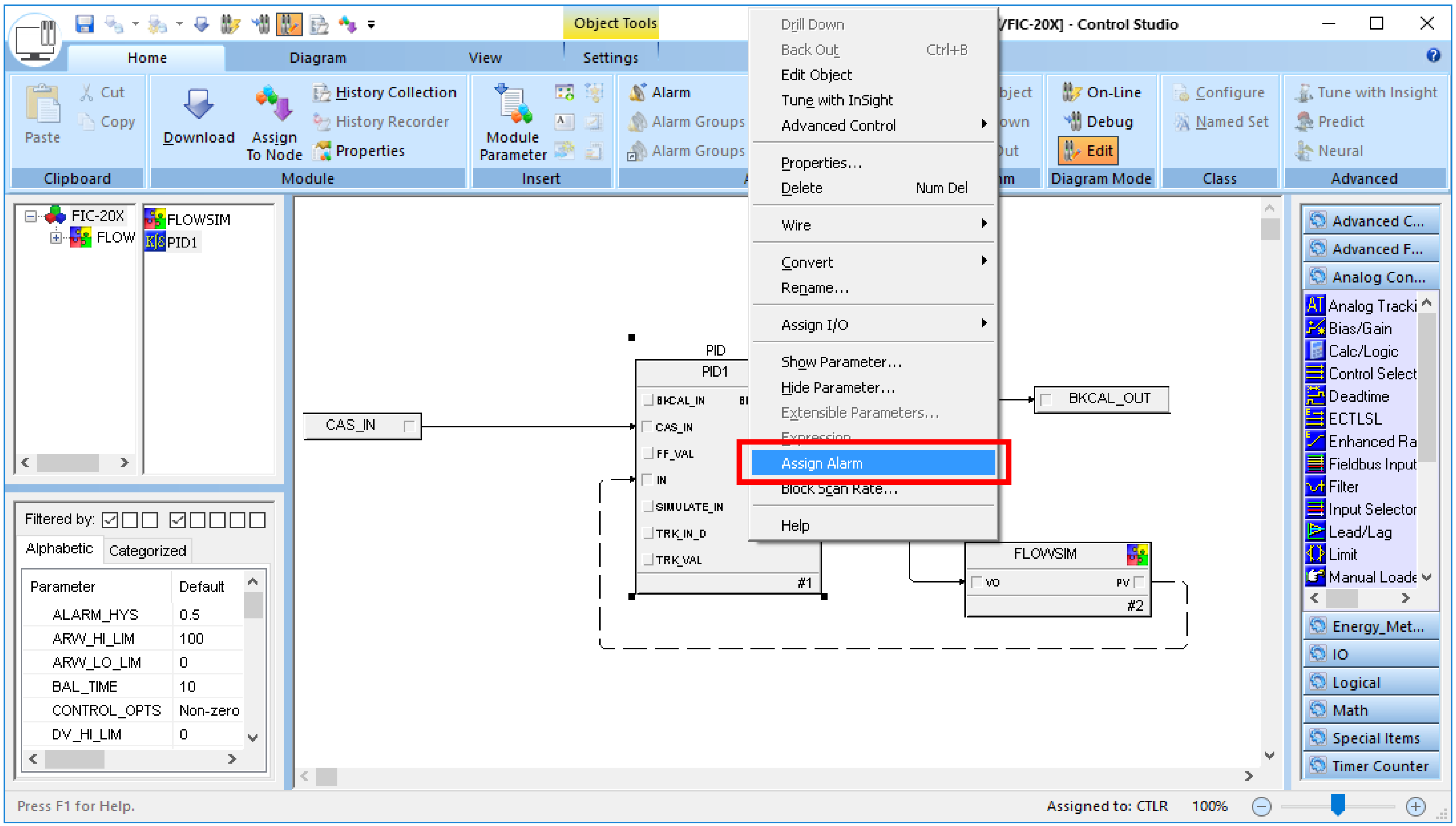
Conditional Alarming enables you to add time delays and enable/disable alarms to minimize nuisance alarms.

For example, a low flow alarm is needed for FIC-20X. However, we do not want a low flow alarm if the pump is not running. Conditional alarming allows us to disable the alarm if the pump is not running.

The *AI*, *Alarm*, *Manual Loader*, *PID*, *Fuzzy Logic Control* and *Ratio* function blocks support conditional alarming for the standard alarms: *HI*, *HI_HI*, *DV_HI, DV_LO, LO* and *LO_LO*. The *DI* function block supports conditional alarming for the *DISC* alarm.

Enabling Conditional Alarming

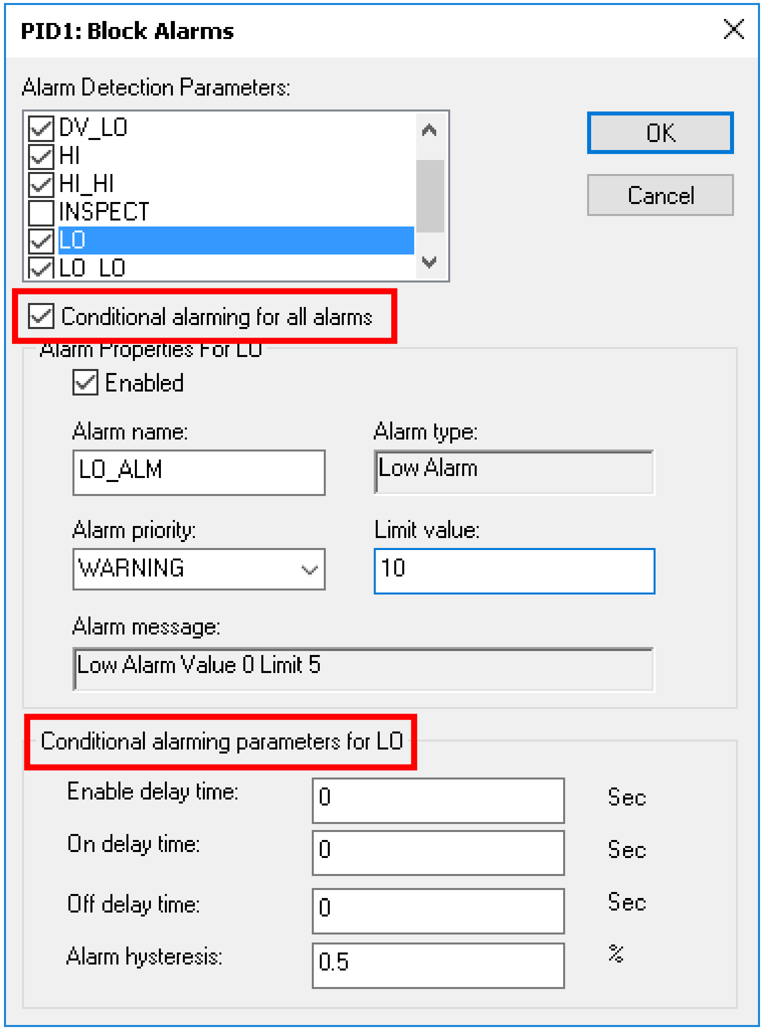
Conditional Alarming is enabled from the Assign Alarm dialog box.



Enabling Conditional Alarming

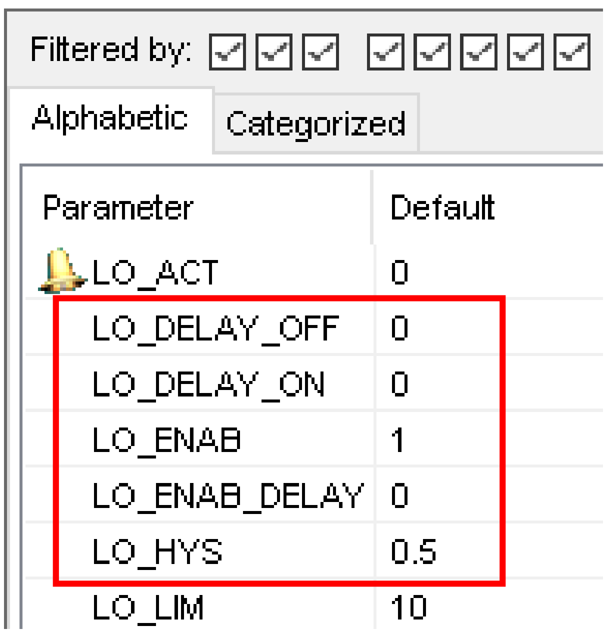
Check the Conditional alarming box on the Block Alarms dialog box. The dialog box indicates the Conditional Alarming features for each alarm as it is selected.

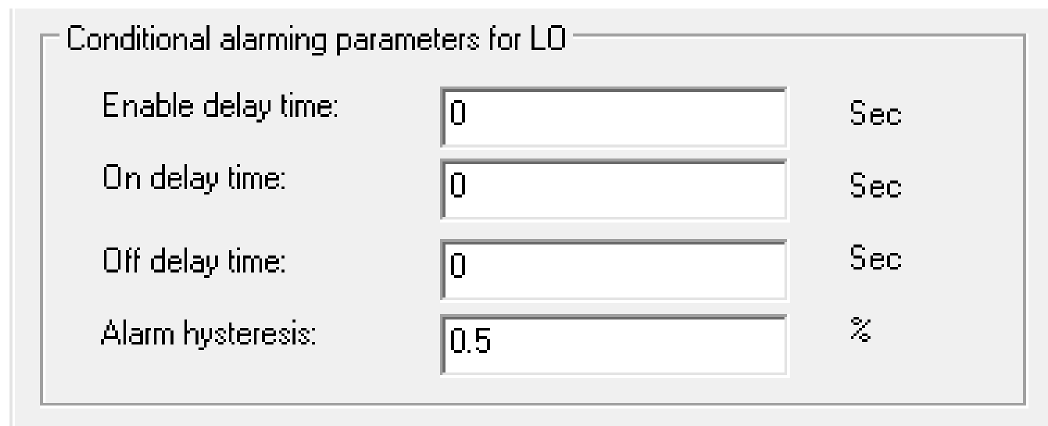
Use the Conditional Alarming feature to set any delay times needed for the alarms.



Conditional Alarming Parameters

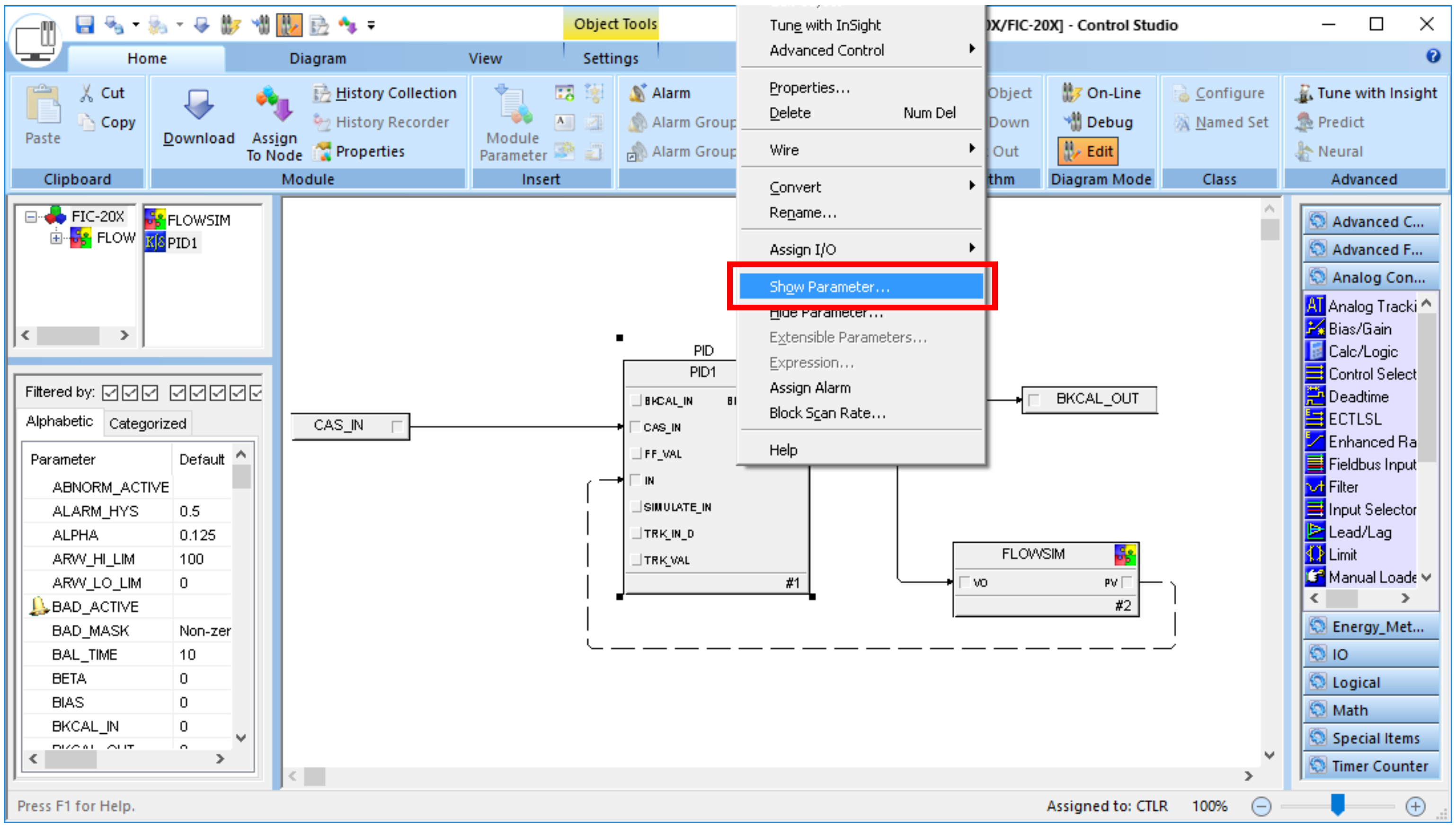
When conditional alarming is enabled, five new parameters are added to the function block for each alarm. These include *DV_HI*, *DV_LO*, *HI*, *HI_HI*, *LO*, *LO_LO* and *DISC*. The following descriptions refer to the condition that sets the <alarm>_ACT
to *TRUE*.





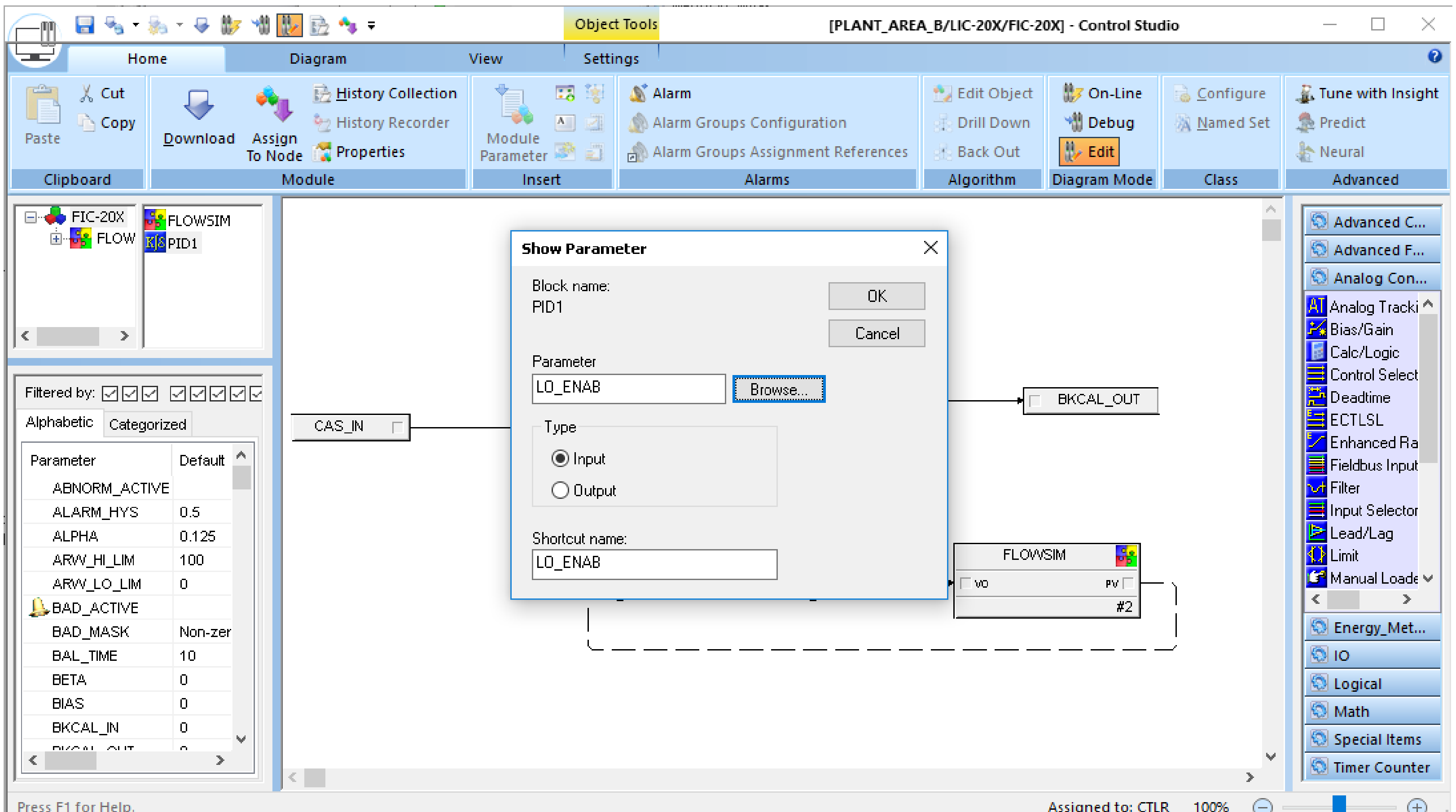
Conditional Alarming Parameters

Once conditional alarming is enabled, the condition on which to alarm may be defined. Right-click on the function block and select Show Parameter.



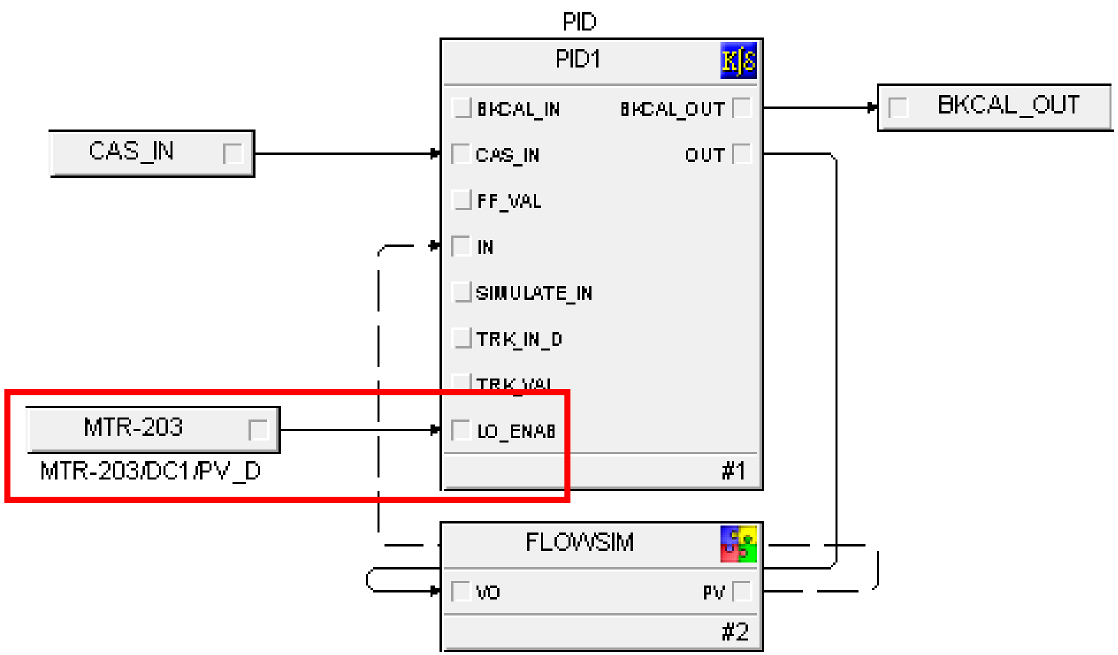
Conditional Alarming Parameters

Apply a condition to FIC-20X to enable the LO_ALM only when MTR-203 is running. Show the LO_ENAB input parameter.



Conditional Alarming Parameters

An external reference parameter is wired into the LO_ENAB input on the PID1 function block. When MTR-203's PV is Running or 1, the LO_ENAB will be set to 1.



Workshop – Configuring a Conditional Alarm

Configure a conditional alarm on the LO_ALM of FIC-20X to enable only when the motor is running

Note : While the level alarms are valid, FIC-20X's low alarm is a nuisance unless the pump, MTR-203, is running.

Workshop – Configuring a Conditional Alarm

Step 1. Open FIC-20X in Control Studio.

Step 2. Right-click the PID1 block and select *Assign Alarm…*

Step 3. Check the Conditional alarming option.

Step 4. Select the LO alarm and set the limit value to *10*. Enable LO_ALM. Click *OK* to continue.

Step 5. Right-click on the PID1 block and select *Show Parameter…*.

Step 6. Browse and select the LO_ENAB parameter, an input parameter, from the list.

Workshop – Configuring a Conditional Alarm

Step 7. Add an Input Parameter to your diagram. Name the parameter MTR-203 and set the type to External Reference. Assign the category to Alarm. Set the parameter path to *MTR-203/DC1/PV_D.*

Step 8. Connect the input parameter to LO_ENAB on the PID1 block. Only when the input is 1 (pump is running) will LO_ACT be enabled.

Step 9. Save and download FIC-20X.

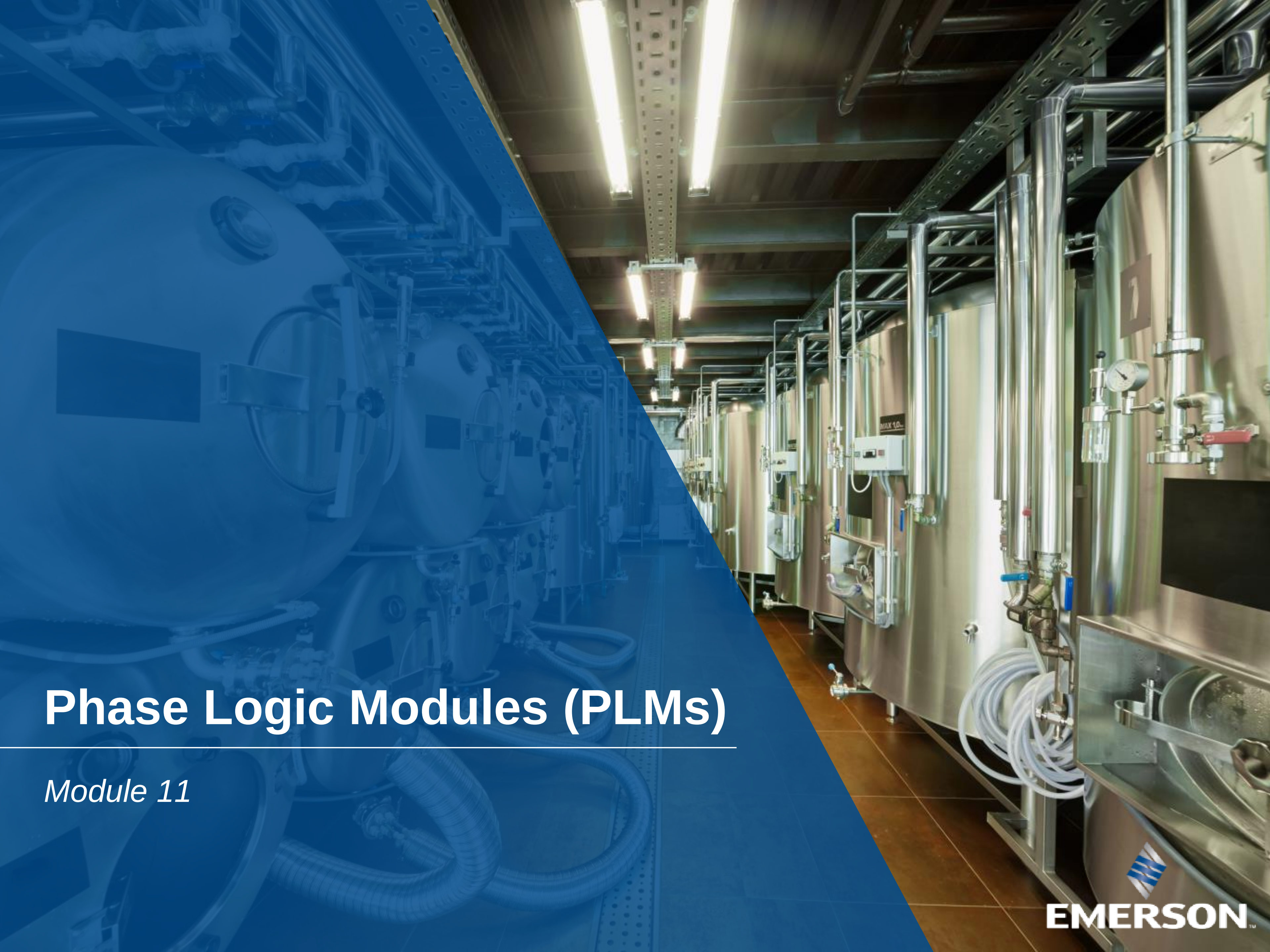
Step 10. Verify that the LO_ALM for FIC-20X is not triggered unless the pump is running.

Workshop Complete.

Summary

- Modify alarms using the System Alarm Management application
- Create a Conditional Alarm for a loop

EMERSON™



Phase Logic Modules (PLMs)

Module 11

Module Objectives

- Define the application of a Phase Logic Module
- Define States of a PLM
- Edit a Named Set for FAIL_MONITOR
- Export DeltaV Database Objects
- Export Displays

Module Workshops

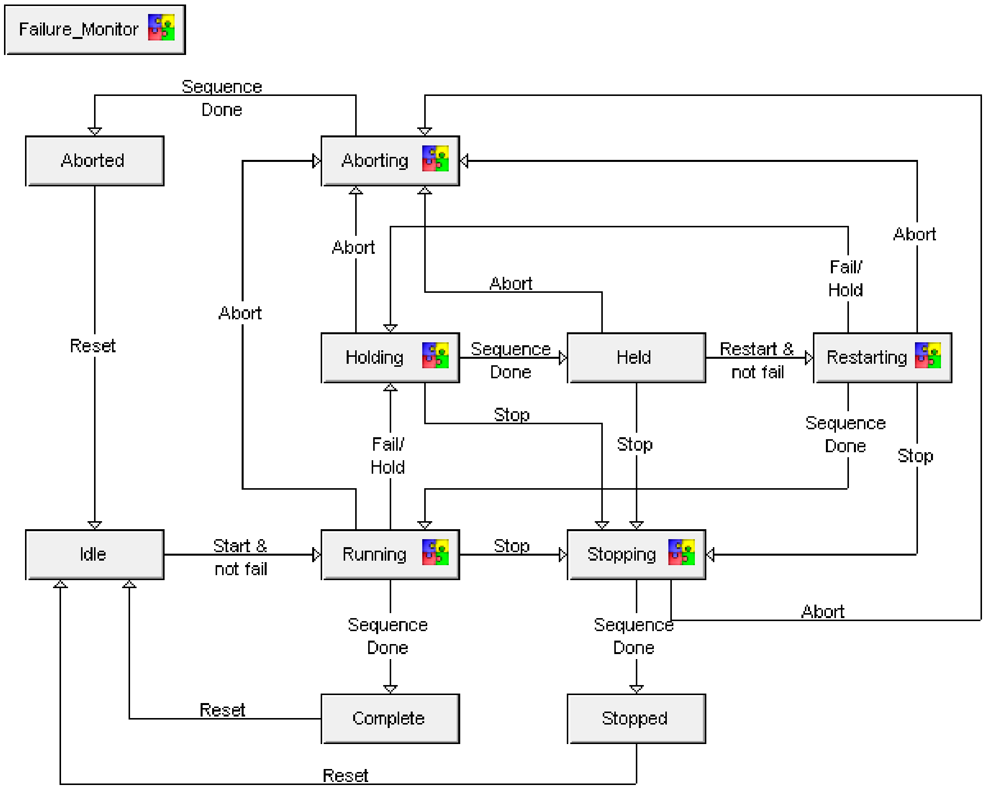
- PLM Plant Shutdown
- Export

- Optional Workshop
  - Add logic for Stop and Abort

Phase Logic Module

A Phase Logic Module (PLM) is similar to a Sequential Function Chart (SFC). PLMs and SFCs both execute time and event sequences.

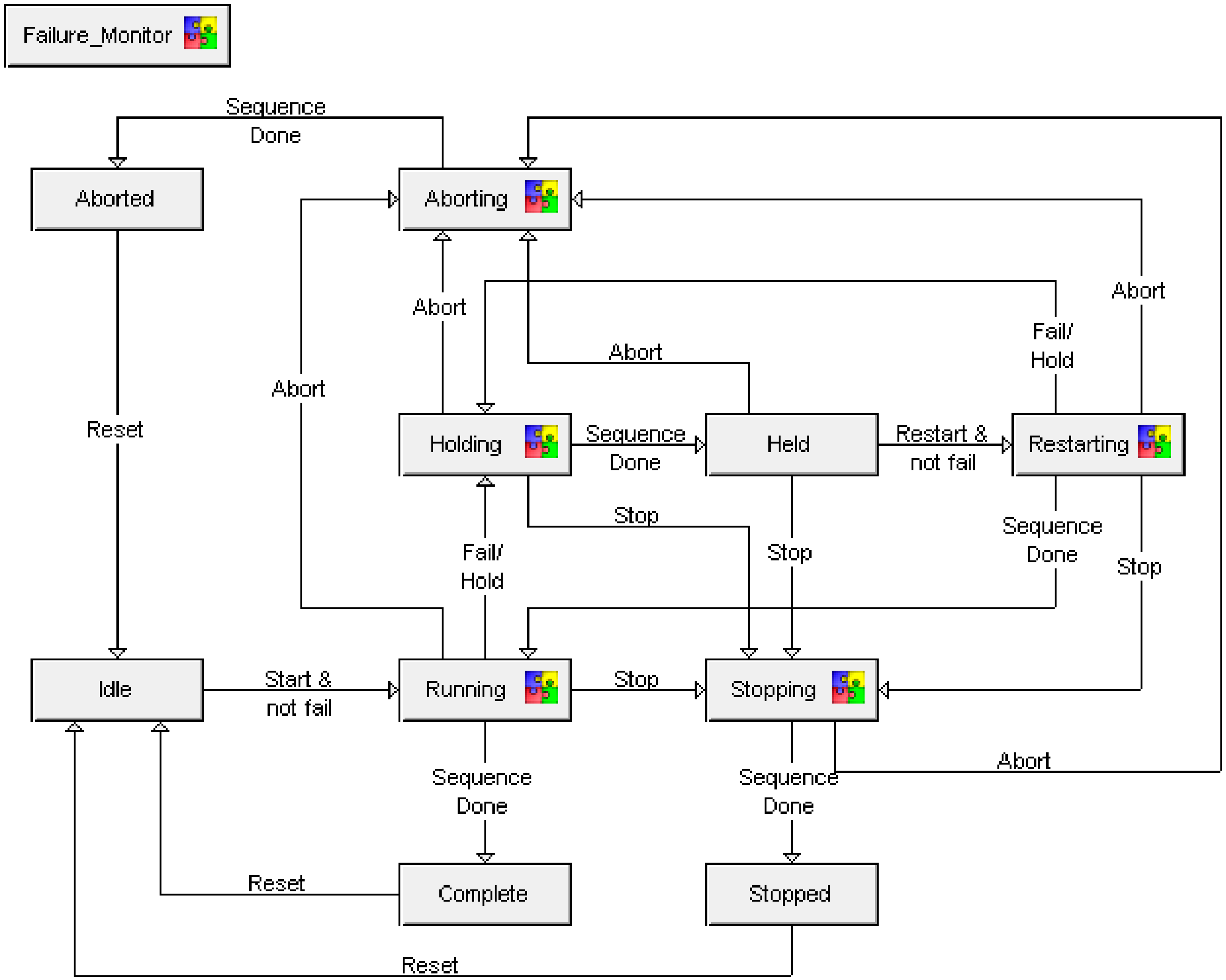
PLMs use a standard set of commands such as Start, Hold, Restart, Stop, and Abort based on the ISA S88 standard.



Phase Logic Module

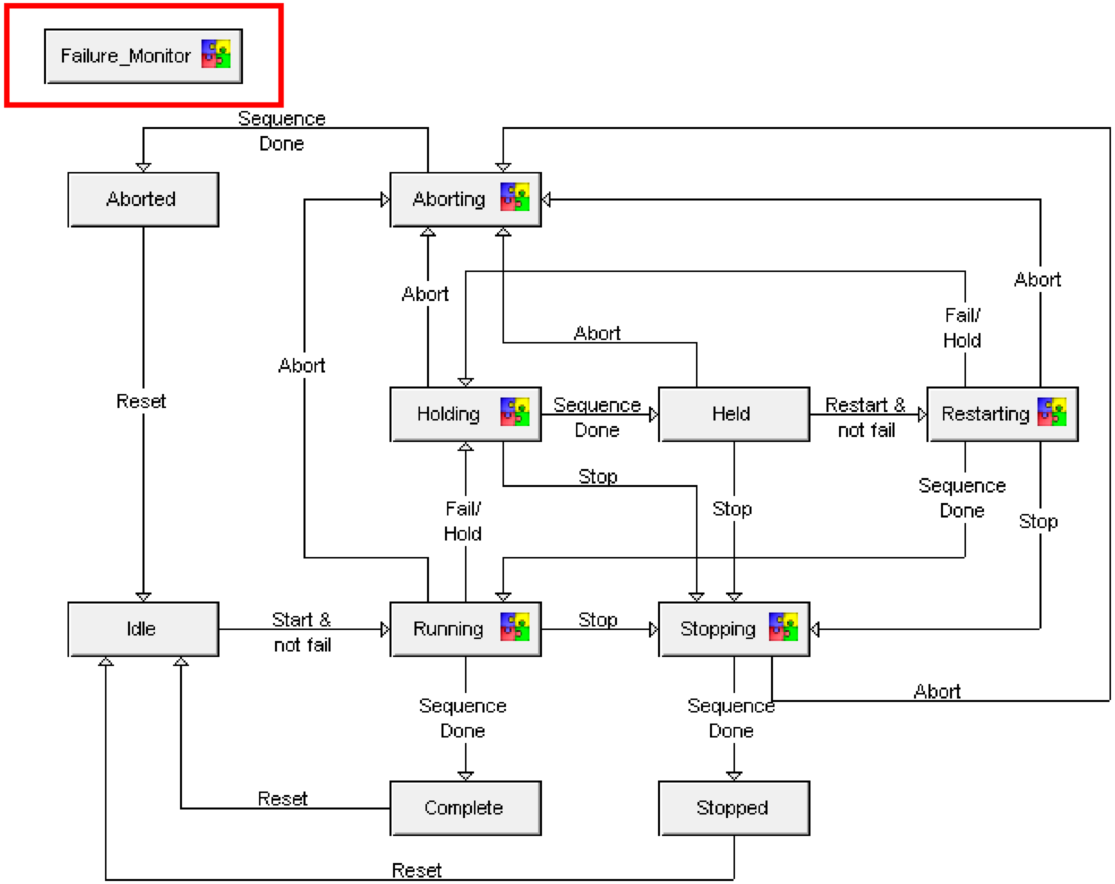
A PLM has the following states:

- *Idle*
- *Running*
- *Holding*
- *Held*
- *Restarting*
- *Aborting*
- *Aborted*
- *Stopping*
- *Stopped*
- *Complete*

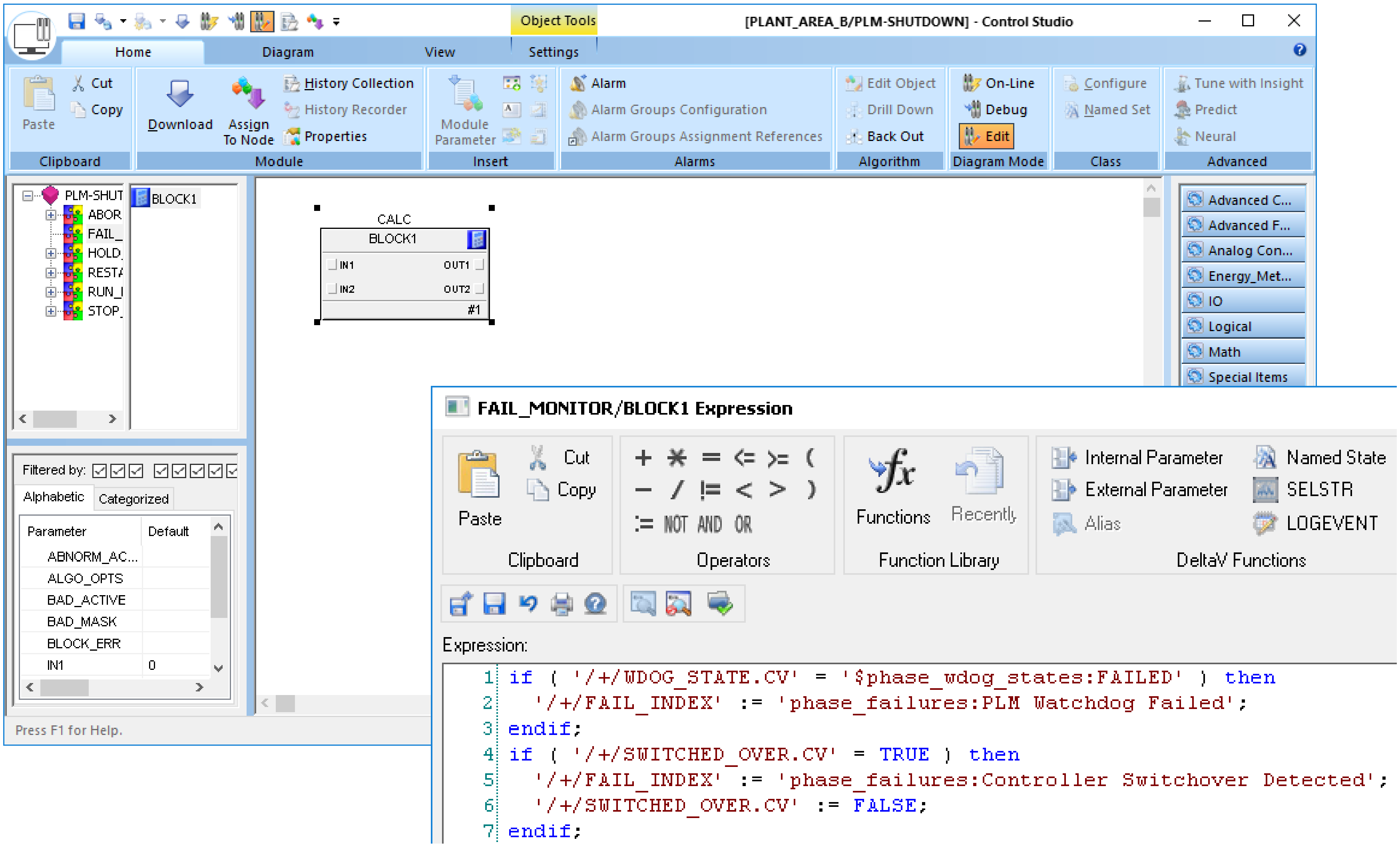


Failure_Monitor

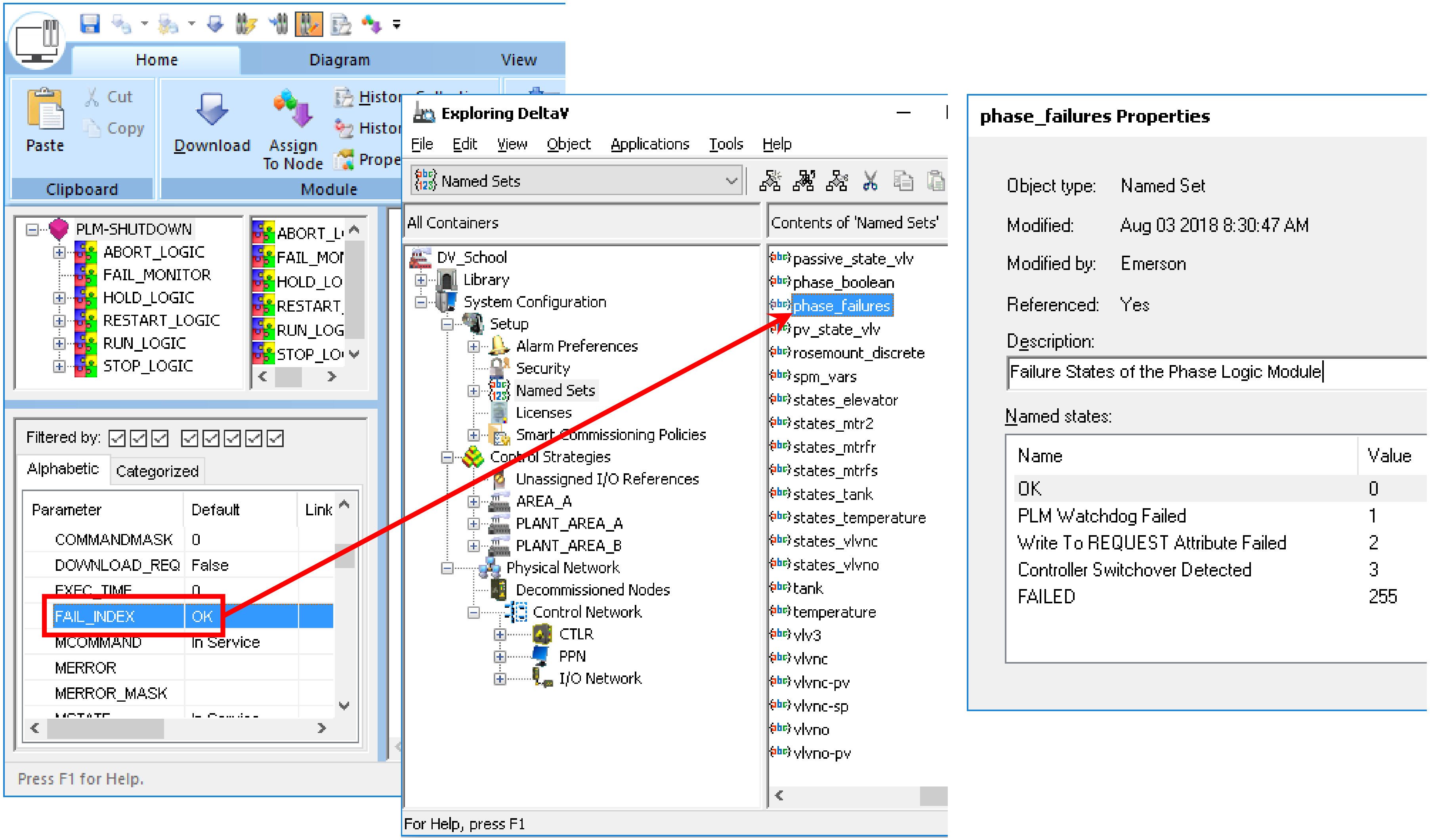
The Failure_Monitor continuously monitors failure conditions and sets the PLM parameter *FAIL_INDEX* equal to the fail number. When FAIL_INDEX is non-zero, the phase transitions to the Holding state.



Failure_Monitor Defaults



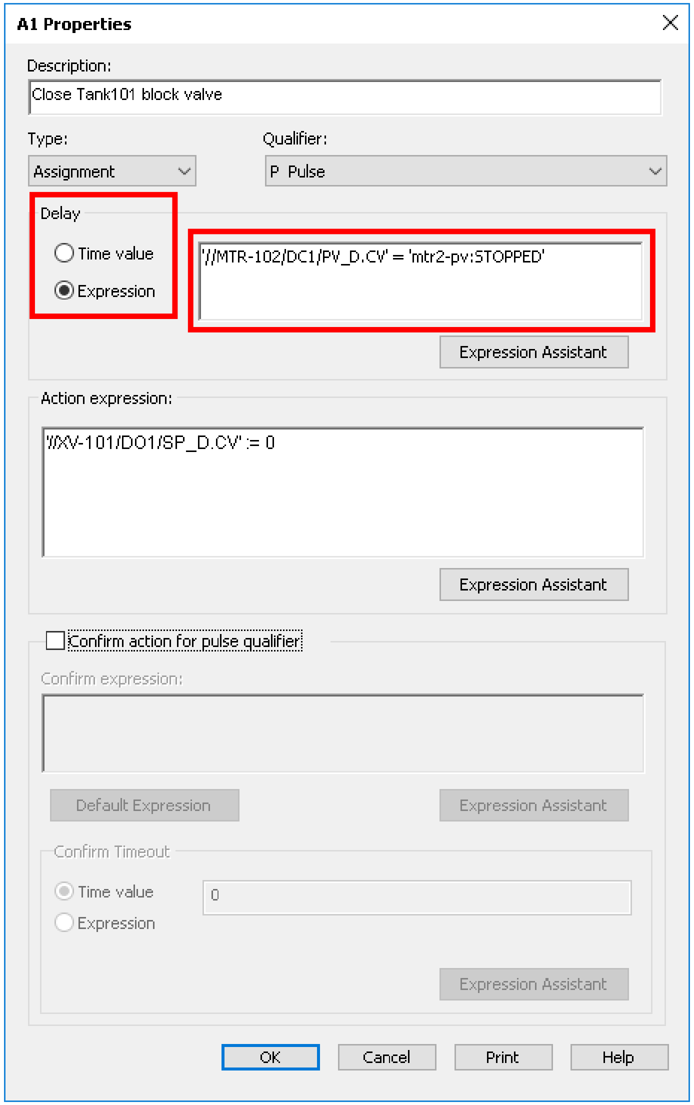
FAIL_INDEX Parameter



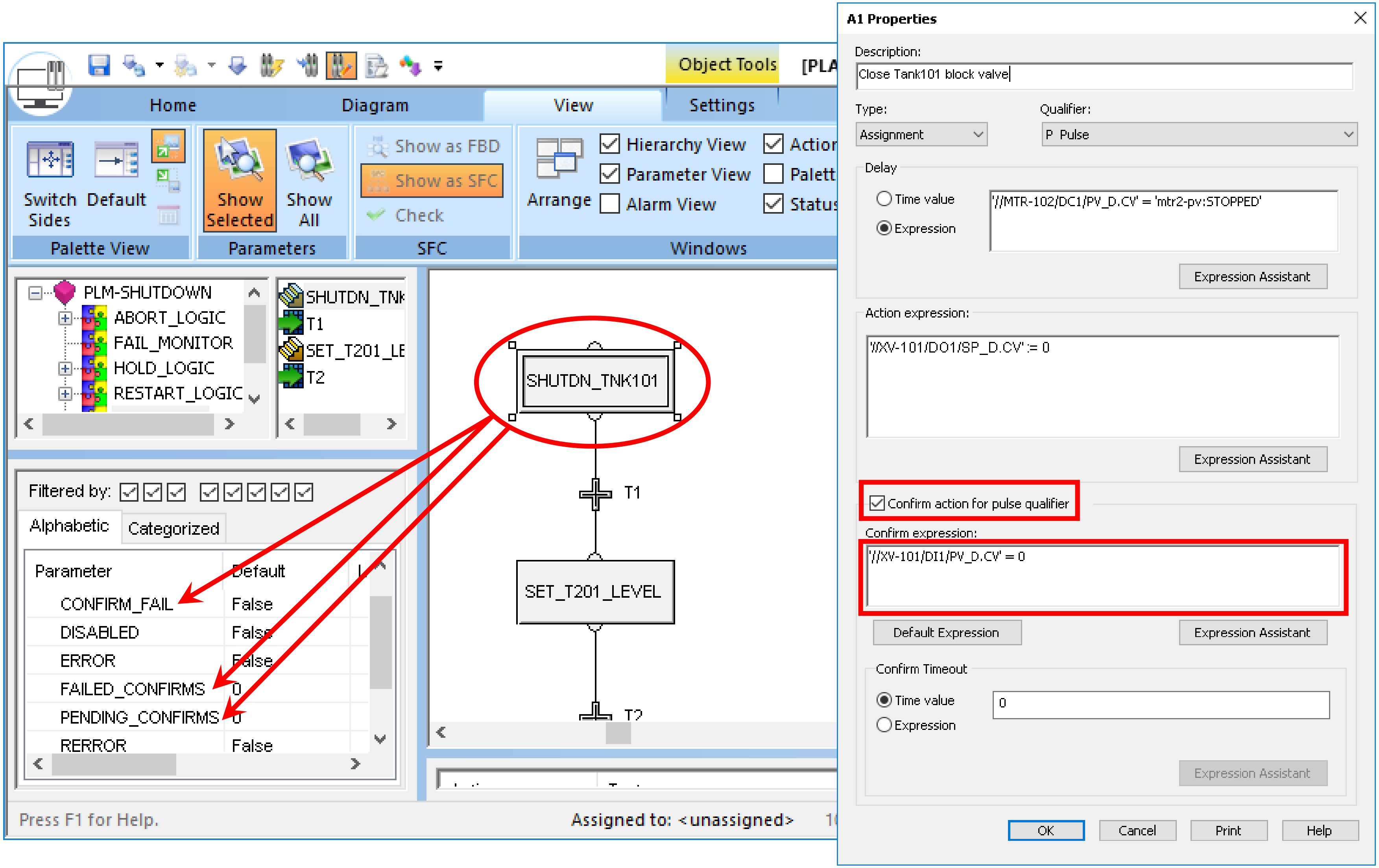
Action Properties – Delay

Delay allows you to define a time or an expression you want satisfied before the action is executed. When the time has lapsed or the expression has been evaluated TRUE, the action will be performed.

Note: The delay does not hold the step.



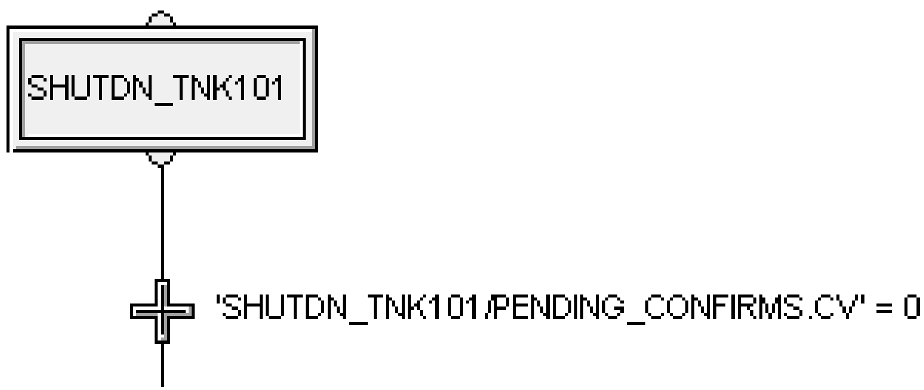
Action Properties – Confirm action for pulse qualifier



Confirm Expression Parameters

If you add a Confirm to an Action, you must configure the transition or termination that follows to an expression that allows for the confirmation to complete.

- *CONFIRM_FAIL* – set whenever an action has a confirmed timeout before the expression used in confirming becomes TRUE.
- *FAILED_CONFIRMS* – the number of actions on the step that have failed to confirm.
- *PENDING_CONFIRMS* – the number of actions on the step not yet confirmed or failed.



Workshop – PLM Plant Shutdown

- Modify the named set phase_failures
- Create a Phase Logic Module
- Configure RUN_LOGIC, HOLD_LOGIC and RESTART_LOGIC

Workshop – PLM Plant Shutdown

The PLM will shut down Tank101 and then set the final level you want in Tank201. Tank201 will shut down after final level has been satisfied.

You will create a parameter named SHUTDOWN_LEVEL to specify Tank201's final level.

While Tank201 is draining, the PLM will monitor XV-101 (Tank101's block valve) to ensure the valve remains closed.

Workshop – PLM Plant Shutdown

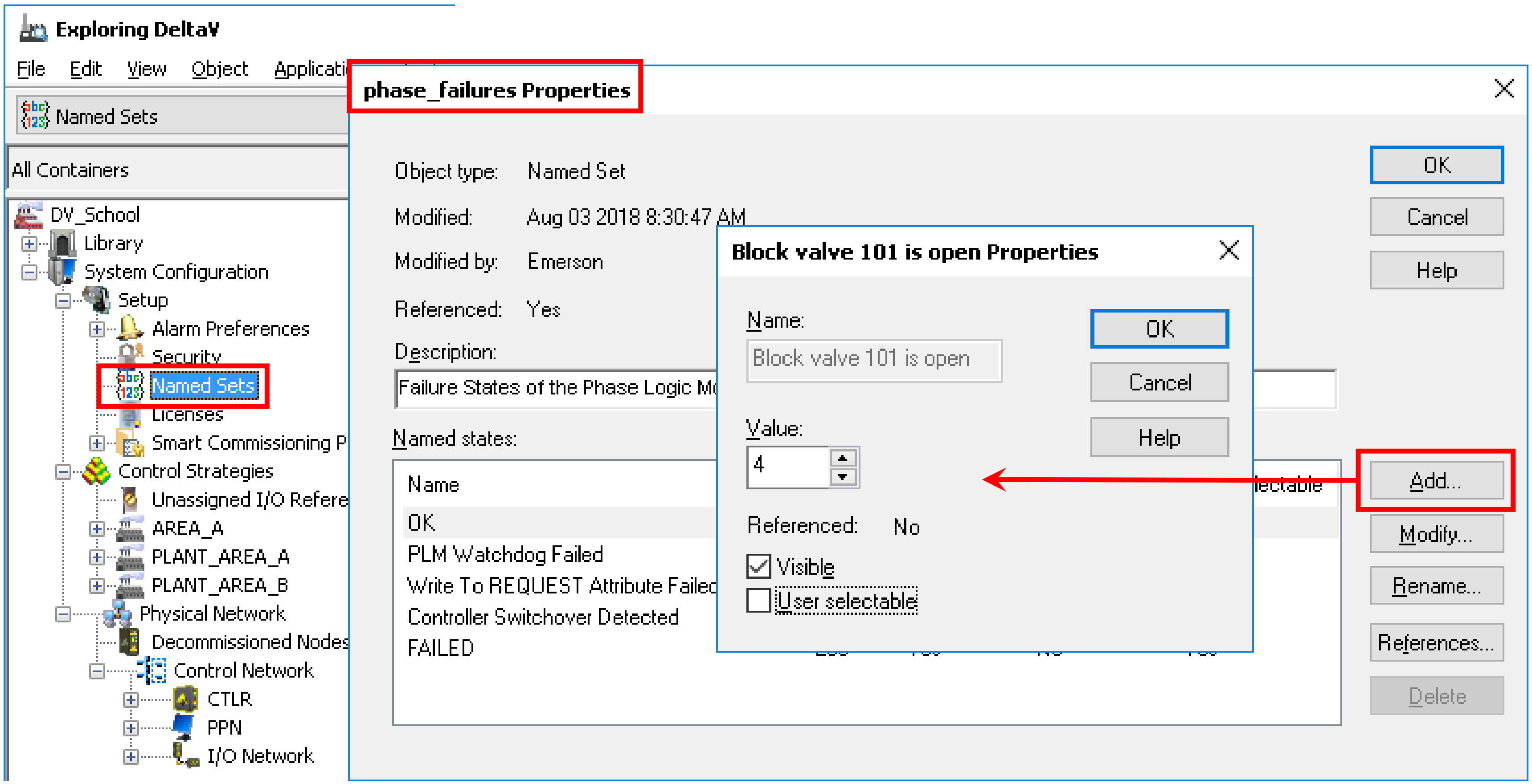
The PLM commands listed below will be used with the PLM-SHUTDOWN during this workshop.

- *Hold* – Initiates a safety shutdown sequence allowing you to Restart at a later time.
- *Reset* – Returns the PLM to Idle.
- *Restart* – Initiates a Restarting sequence allowing the draining of Tank201 to resume.
- *Start* – Transitions from Idle to the Running state.

Note: Abort and Stop used in Optional workshops.

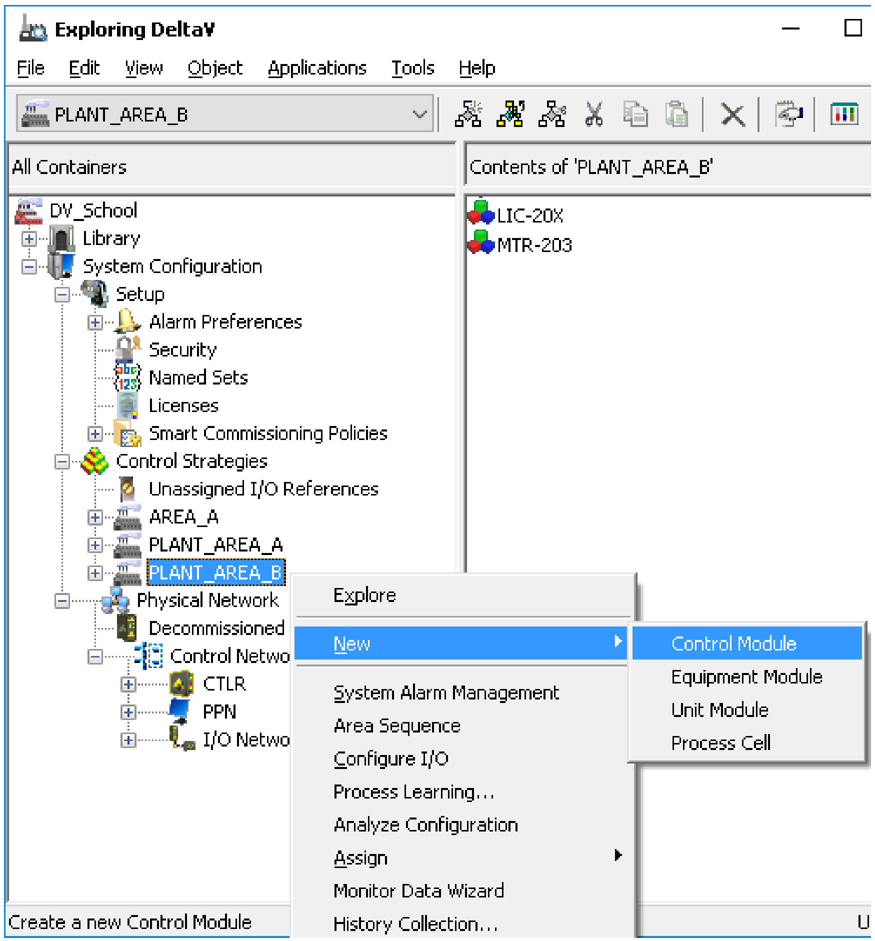
Workshop – PLM Plant Shutdown

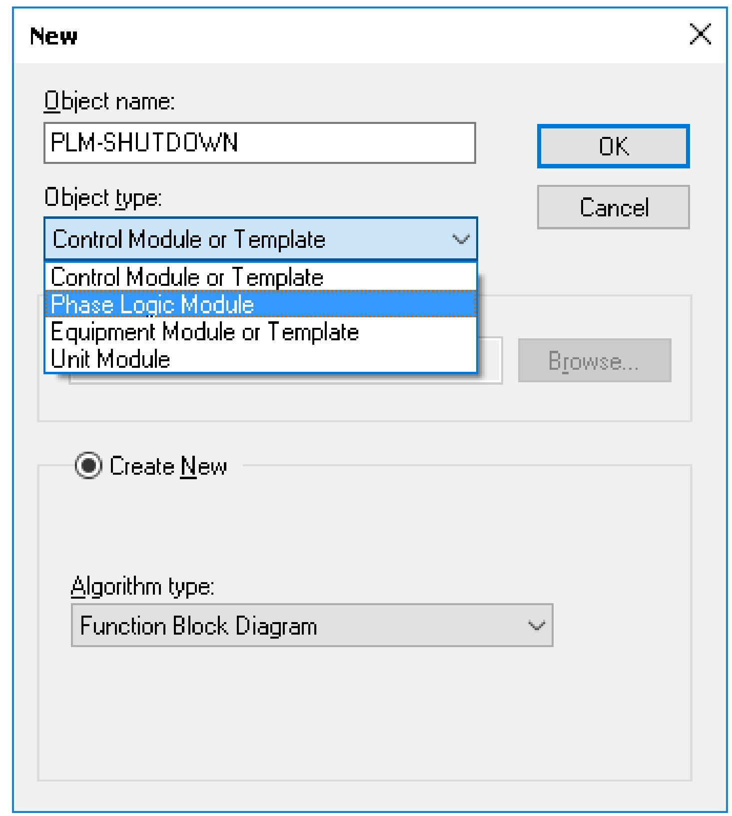
Step 1. Modify Named Set phase_failures. Add the name for the phase failure *Block valve 101 is open*.



Workshop – PLM Plant Shutdown

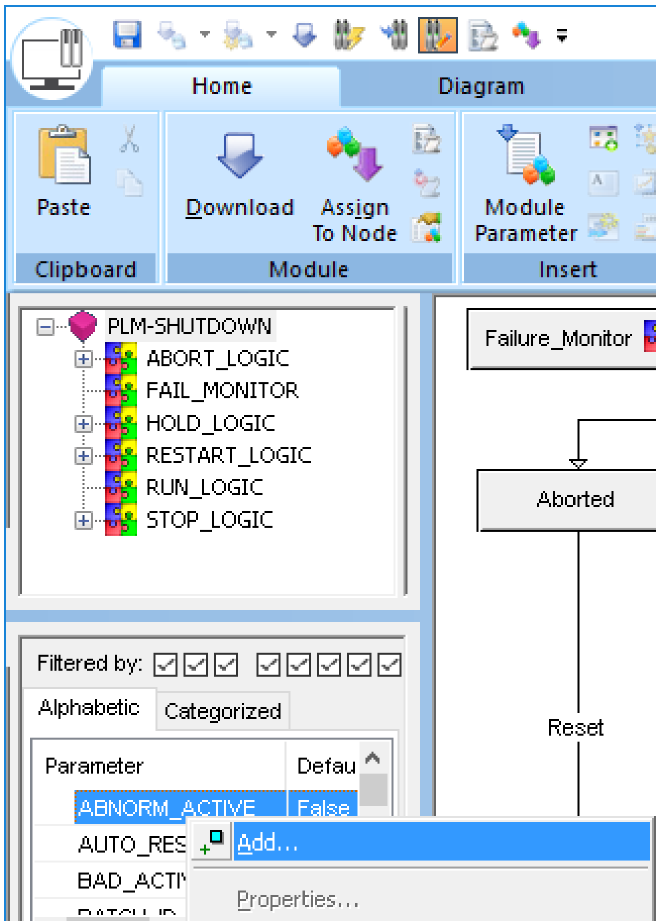
Step 2. From DeltaV Explorer create PLM-SHUTDOWN. Change the Object type to Phase Logic Module.

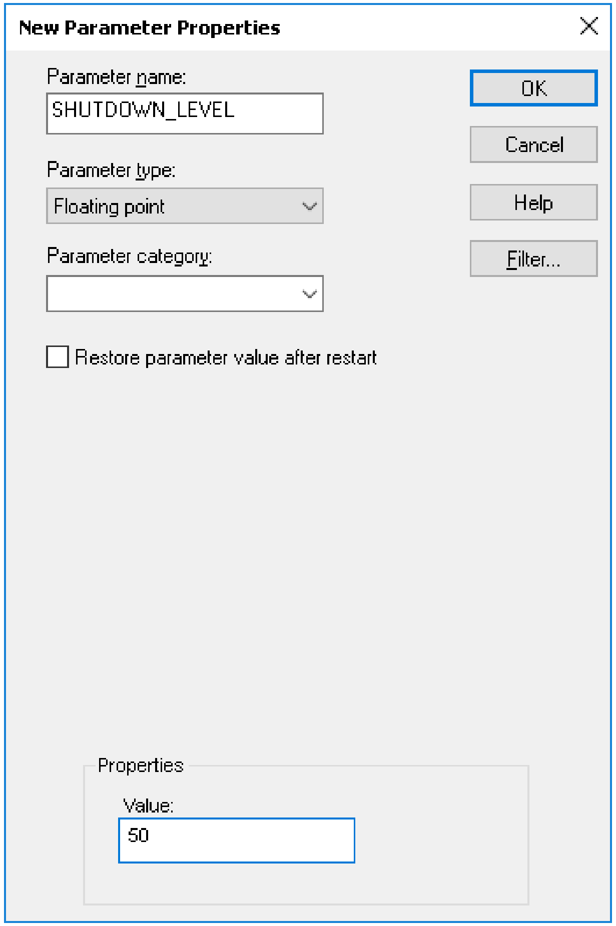




Workshop – PLM Plant Shutdown

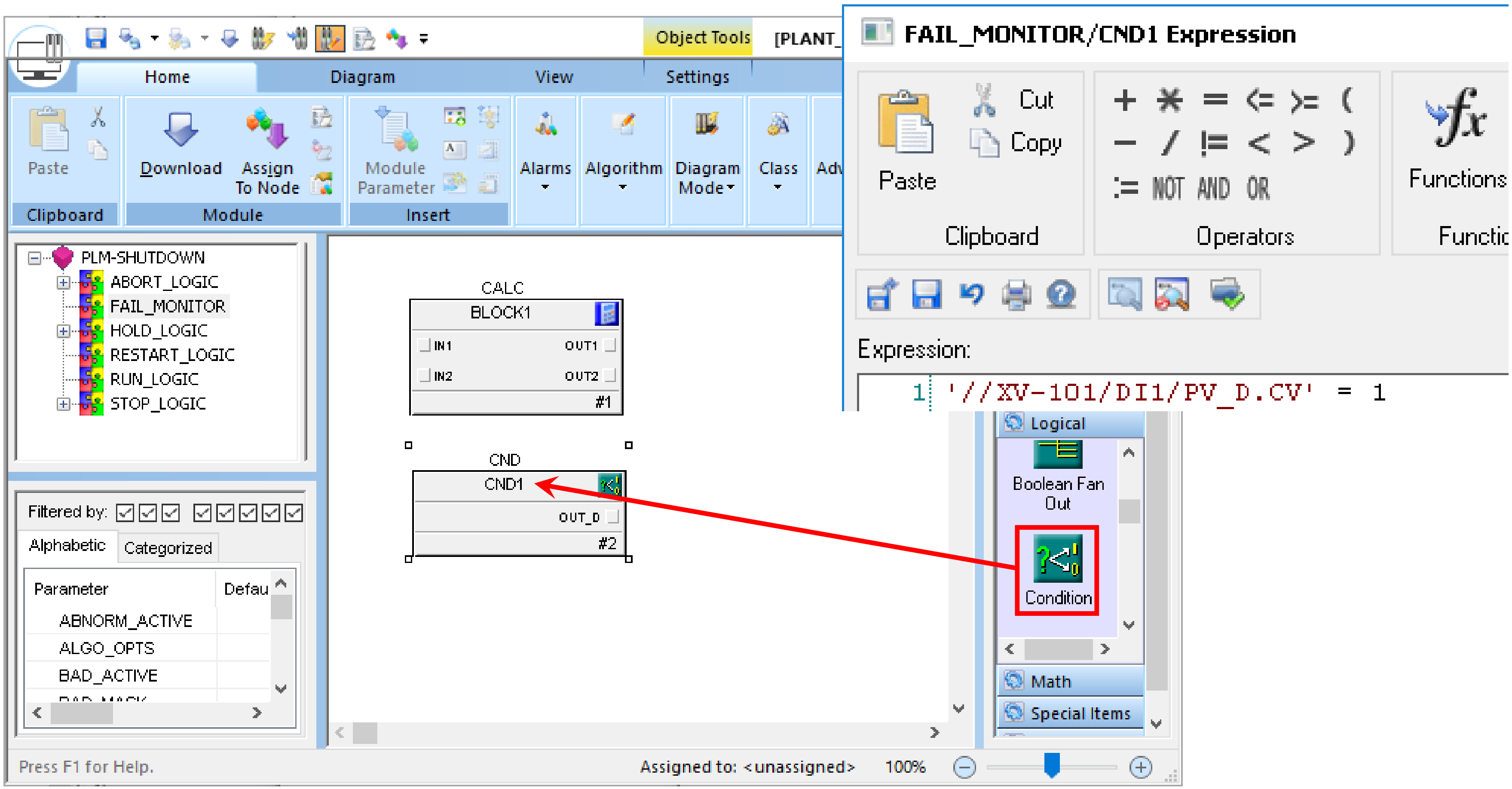
Step 3. Open PLM-Shutdown with Control Studio. Create a PLM parameter *SHUTDOWN_LEVEL* (floating point).





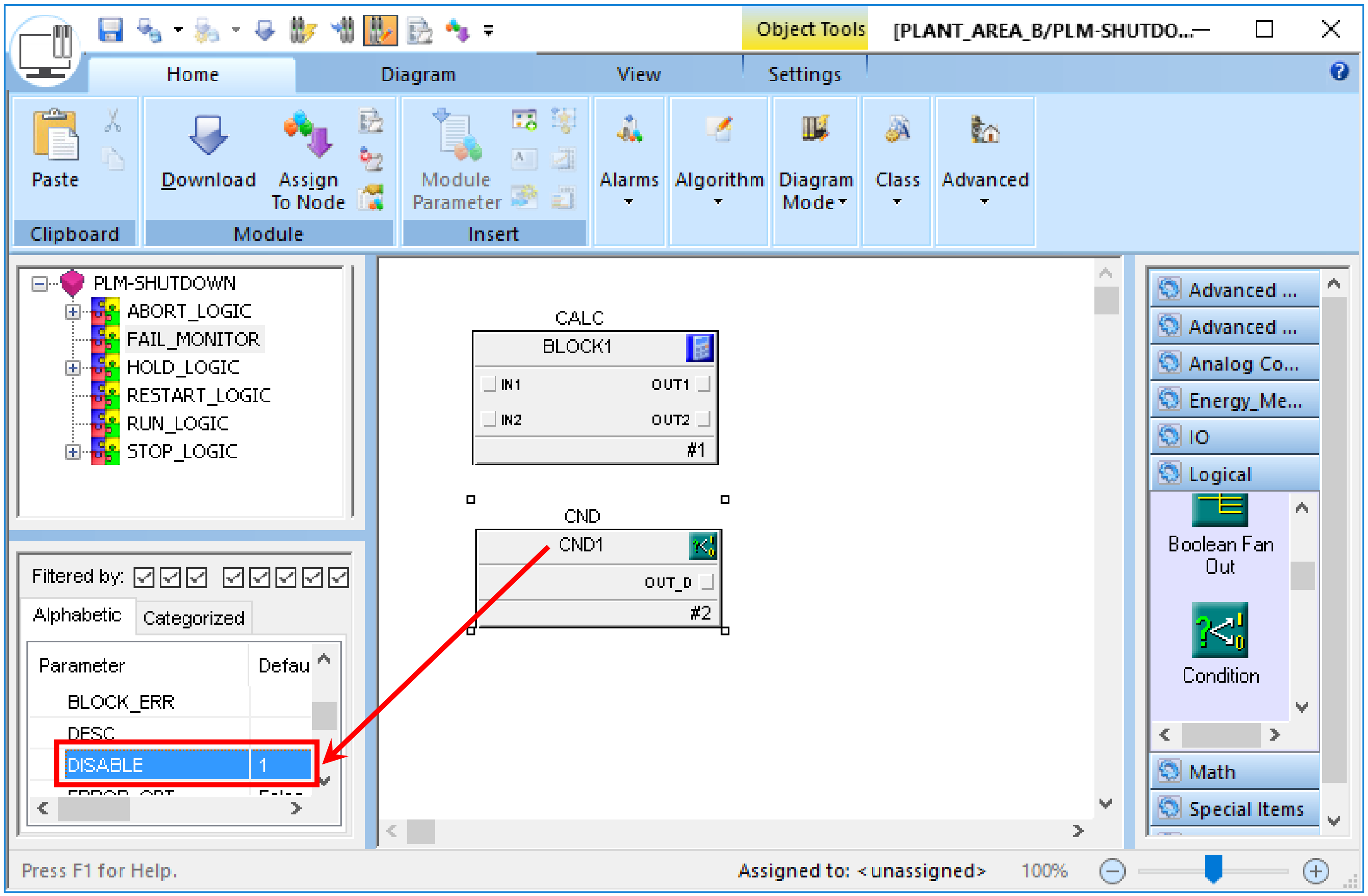
Workshop – PLM Plant Shutdown

Step 4. Add a Condition block to *FAIL_MONITOR* to determine whether Tank101's block valve is OPEN.



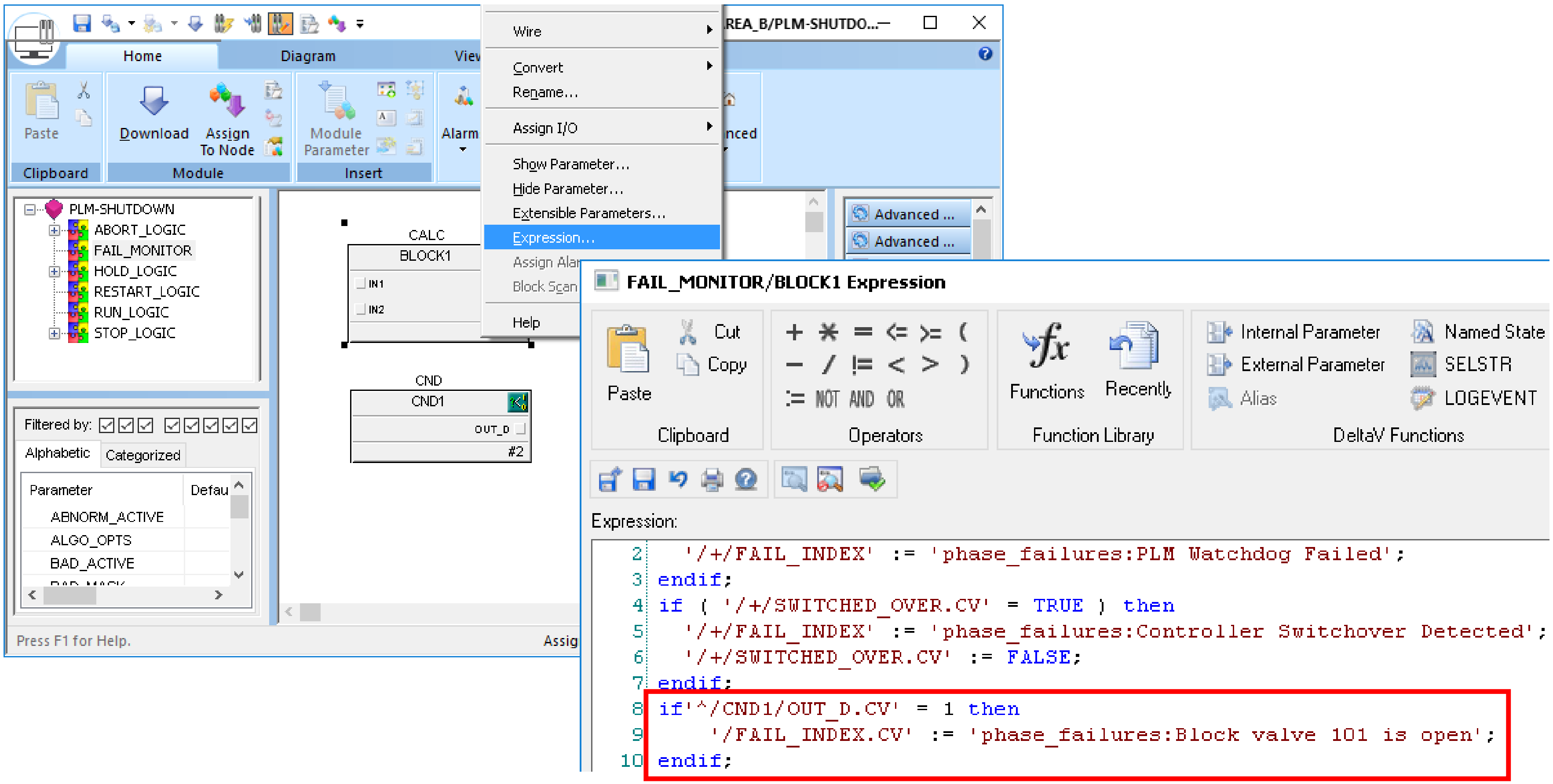
Workshop – PLM Plant Shutdown

Step 5. Set the Condition block's Disable parameter to 1.



Workshop – PLM Plant Shutdown

Step 6. Modify the expression of BLOCK1 to include an IF-THEN statement to check OUT_D of the Condition block and set FAIL_INDEX if the block valve is OPEN.



Workshop – PLM Plant Shutdown

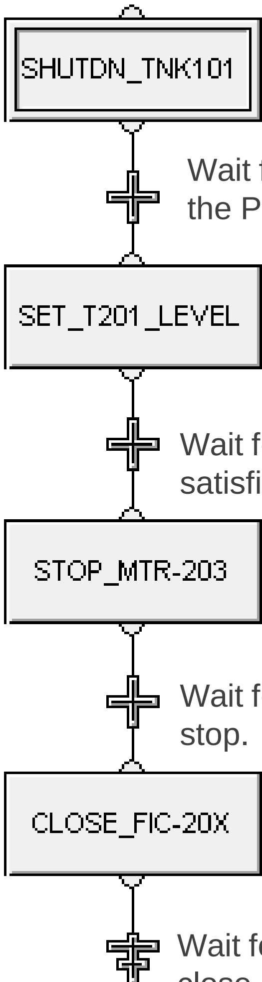
Step 7. Define RUN_LOGIC.

The RUN_LOGIC should shut down Tank101, enable our failure condition block and set LIC-20X's final level. Once LIC-20X has drained to the specified level, we will stop MTR-203, close Tank201's flow valve, and disable the failure condition block.

The step SHUTDN_TNK101 should include actions to stop MTR-102, close XV-101, set FIC-102 to manual and close the flow valve.

Note: Assumption for RUN_LOGIC to work, process is running with the Cascade Pair in the normal mode.

RUN_LOGIC



Perform actions necessary to shut down Tank101 utilizing confirms.

Wait for above devices to transition utilizing the PENDING_CONFIRMS parameter.

Enable monitoring of phase FAIL_MONITOR condition (set CND1's *Disable* parameter to 0).
Set LIC-20X SP to SHUTDOWN_LEVEL .

Wait for level to be satisfied.

Stop MTR-203.

Wait for motor to stop.

Close FIC-20X.
Disable monitoring of phase FAIL_MONITOR condition (set CND's *Disable* parameter to 1).

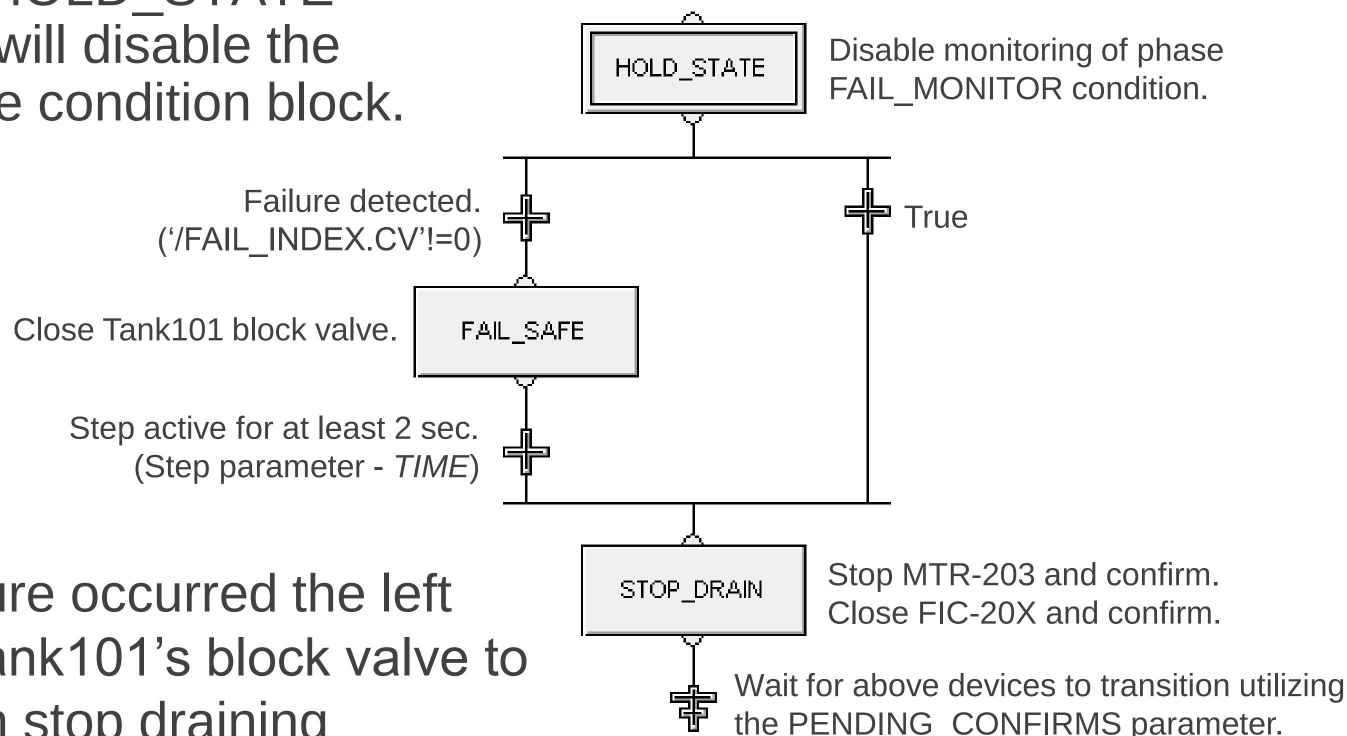
Wait for flow valve to close.

Workshop – PLM Plant Shutdown

Step 8. Define HOLD_LOGIC.

The HOLD_STATE step will disable the failure condition block.

HOLD_LOGIC



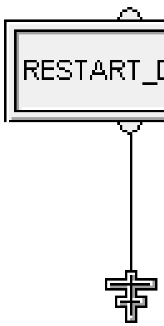
If a phase failure occurred the left path will tell Tank101's block valve to close and then stop draining Tank201.

If you issued a Hold command the right path will stop draining Tank201.

Workshop – PLM Plant Shutdown

Step 9. Define RESTART_LOGIC.

RESTART_LOGIC



Set FIC-20X mode to CAS.
Start MTR-203.
Enable monitoring of phase FAIL_MONITOR condition.
Set LIC-20X SP to SHUTDOWN_LEVEL, delay action until actual mode AUTO.

Wait for motor to start and Step *TIME* >3.

When RESTART_LOGIC is complete the PLM will return to the RUN_LOGIC. Since actions with pulse qualifier execute only once, the PLM needs to start draining Tank201 before returning to the RUN_LOGIC. This is so that LIC-20X can drain to the level defined by the phase parameter SHUTDOWN_LEVEL.

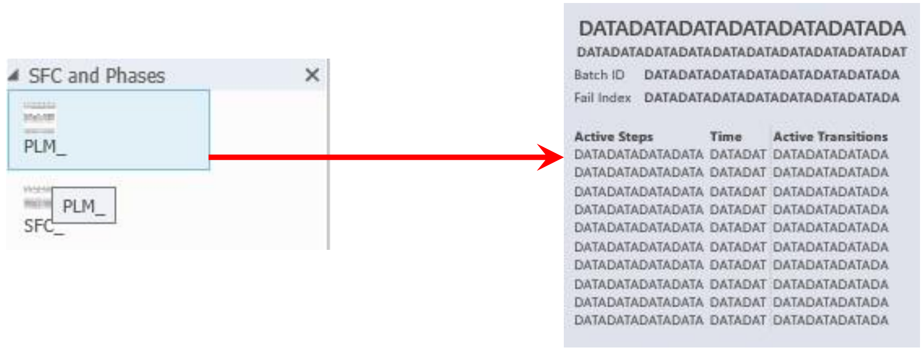
Workshop – PLM Plant Shutdown

Step 10. Assign the PLM to your controller.

Step 11. Save and download the PLM.

Step 12. If an algorithm error occurs, use the Check button to check the PLM.

Step 13. Drag and drop the *PLM_* GEM from the Palette → *SFC and Phases.*



Step 14. In the Graphics Configuration pane, set Module/FB to PLM-SHUTDOWN.

Workshop – PLM Plant Shutdown

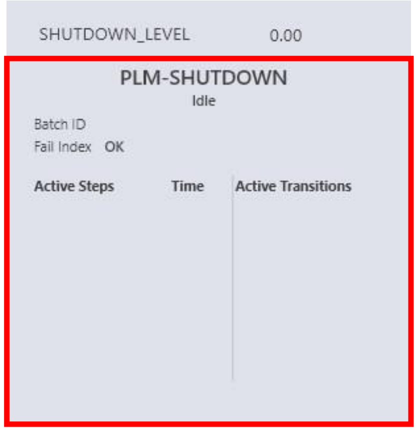
Step 15. Add the data link *PLM-SHUTDOWN/SHUTDOWN_LEVEL.CV* (Normal Write).

Step 16. Save then publish the display.

Step 17. Launch DeltaV Live and Refresh Configuration.

Step 18. Change the Shutdown level value to a desired value.

Step 19. Click on the PLM GEM to launch the faceplate for PLM-SHUTDOWN.

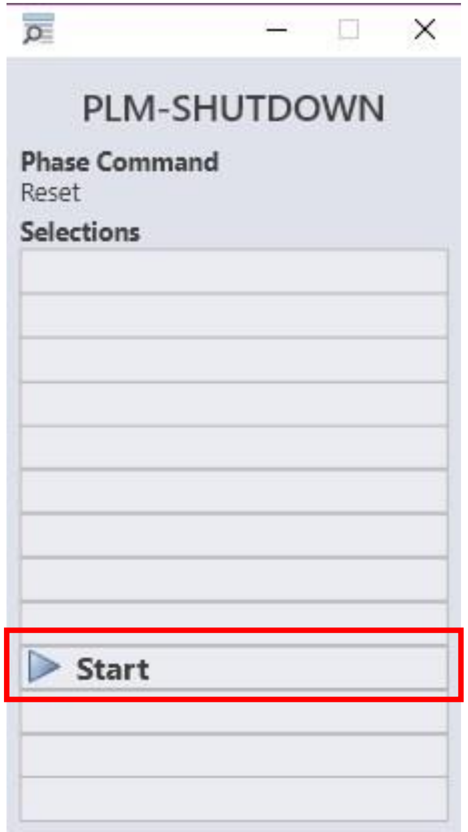


Workshop – PLM Plant Shutdown

Step 20. Change the Phase Owner to *External* by from DeltaV Batch by clicking on *External*.

Workshop – PLM Plant Shutdown

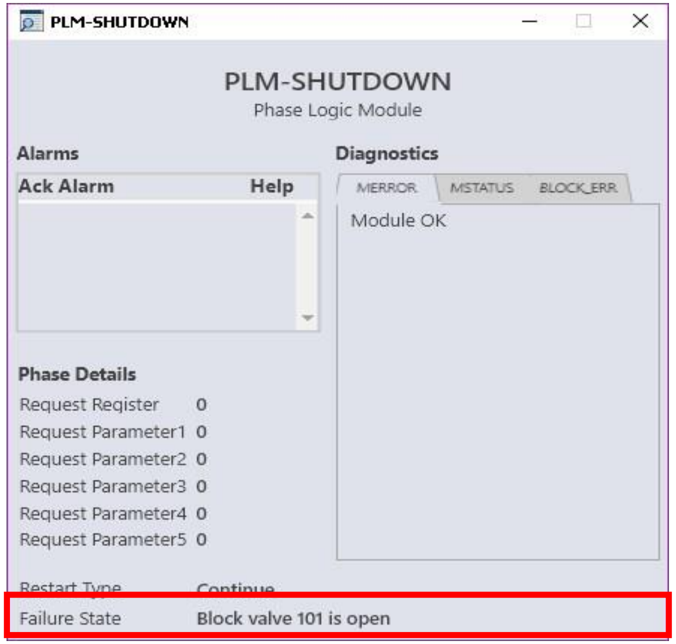
Step 21. Click the Phase *Command* ellipsis button to display a list of valid phase commands. Issue the *Start* command.

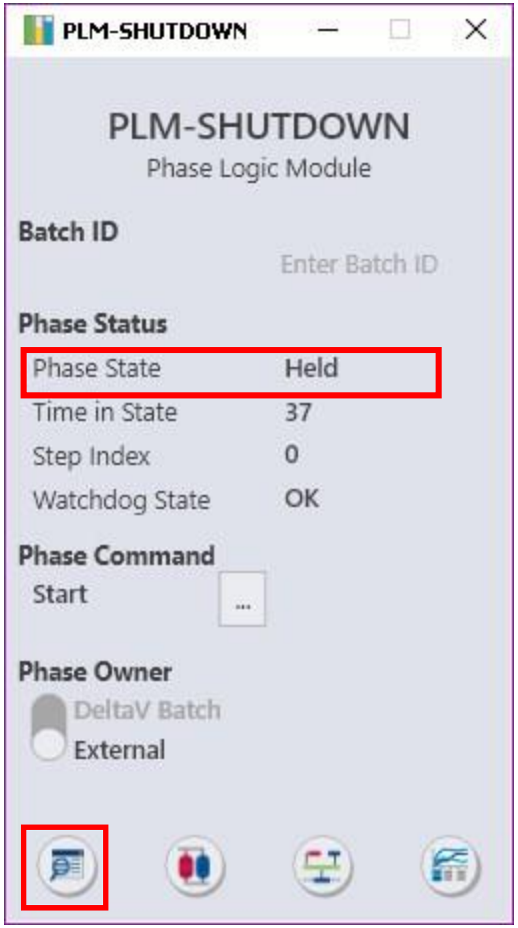


Workshop – PLM Plant Shutdown

Step 22. While the PLM is running, *Open* XV-101 to cause a failure. Verify PLM executes the HOLD logic.

Step 23. Verify the Failure State by opening the Detail.



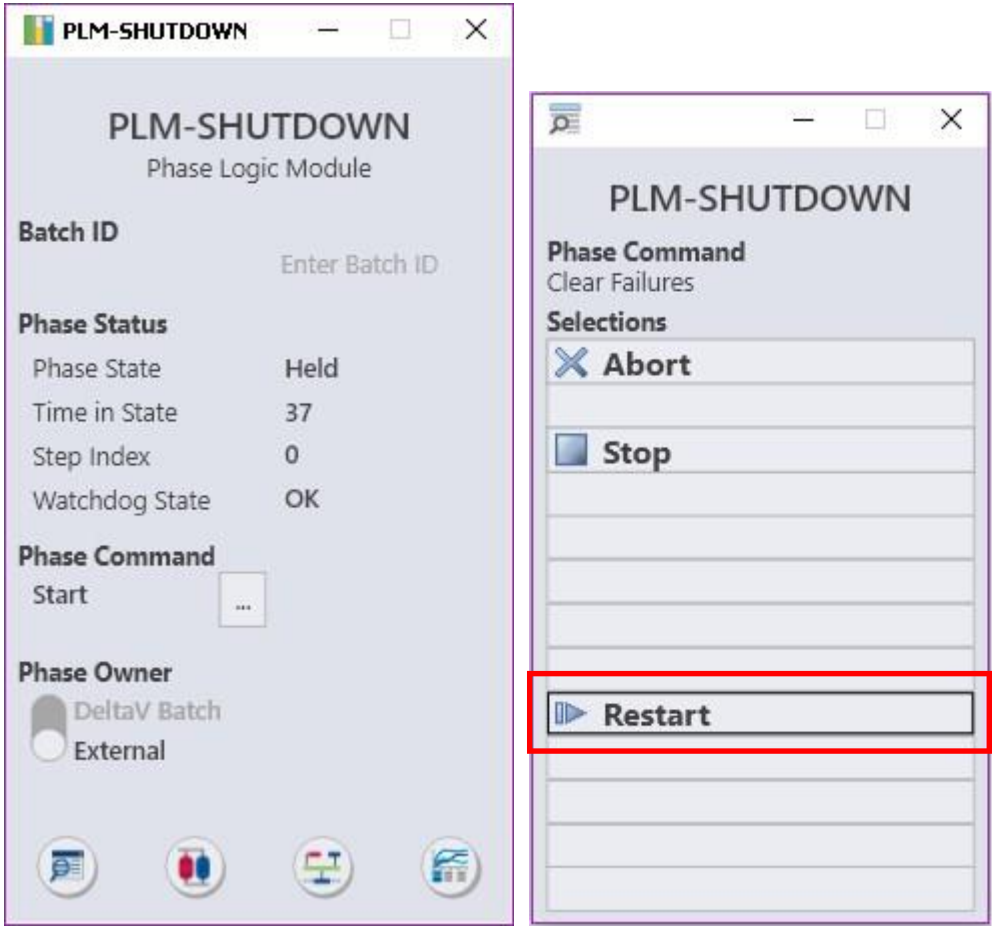


Workshop – PLM Plant Shutdown

Step 24. Clear Failure.

Workshop – PLM Plant Shutdown

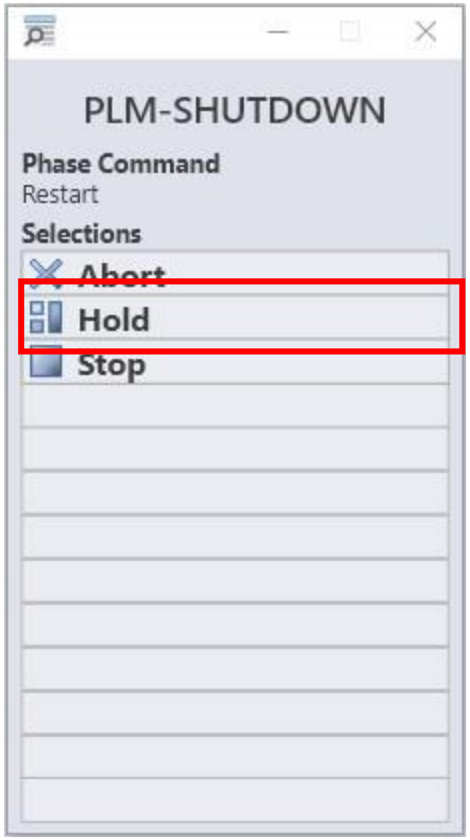
Step 25. Issue the Restart command.



Workshop – PLM Plant Shutdown

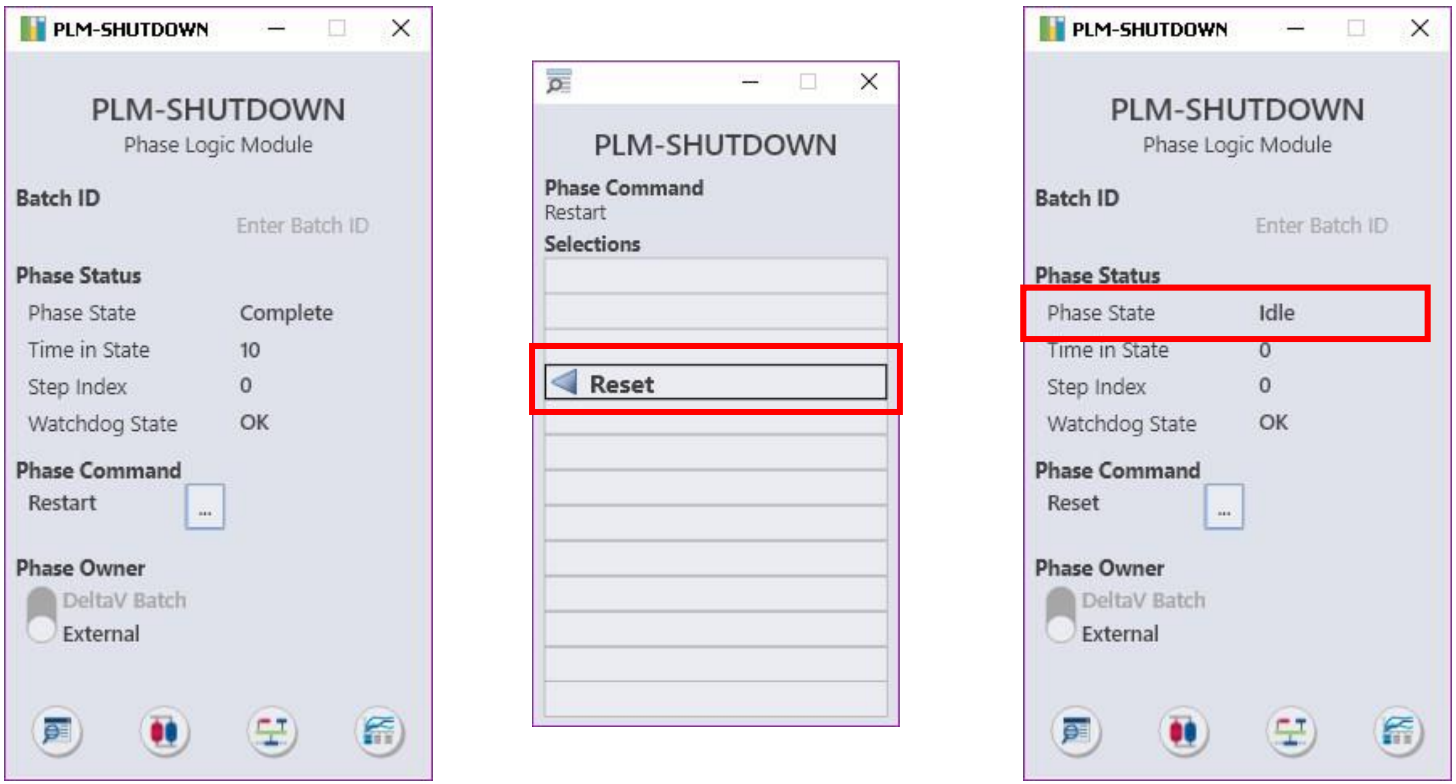
Step 26. Issue a Hold command while the PLM is running.

Step 27. Restart the PLM after Hold logic is complete.



Workshop – PLM Plant Shutdown

Step 28. Reset the PLM when it is complete. Also verify that PLM transitions to Idle.



Workshop Complete.

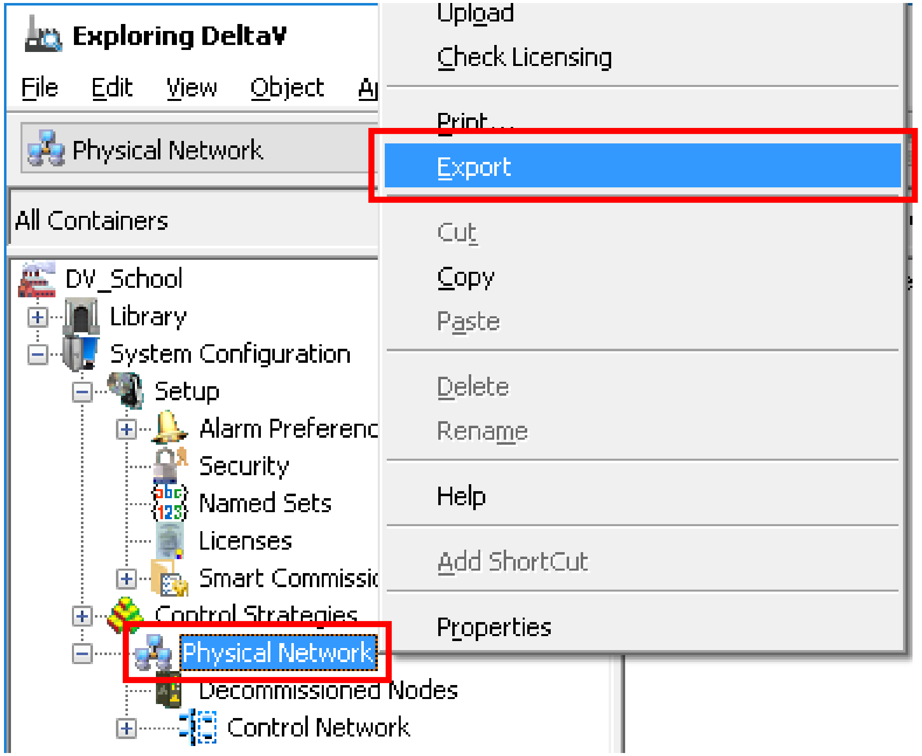
Workshop – Export

Export the configuration database using DeltaV Explorer

Export the operator displays to removable media

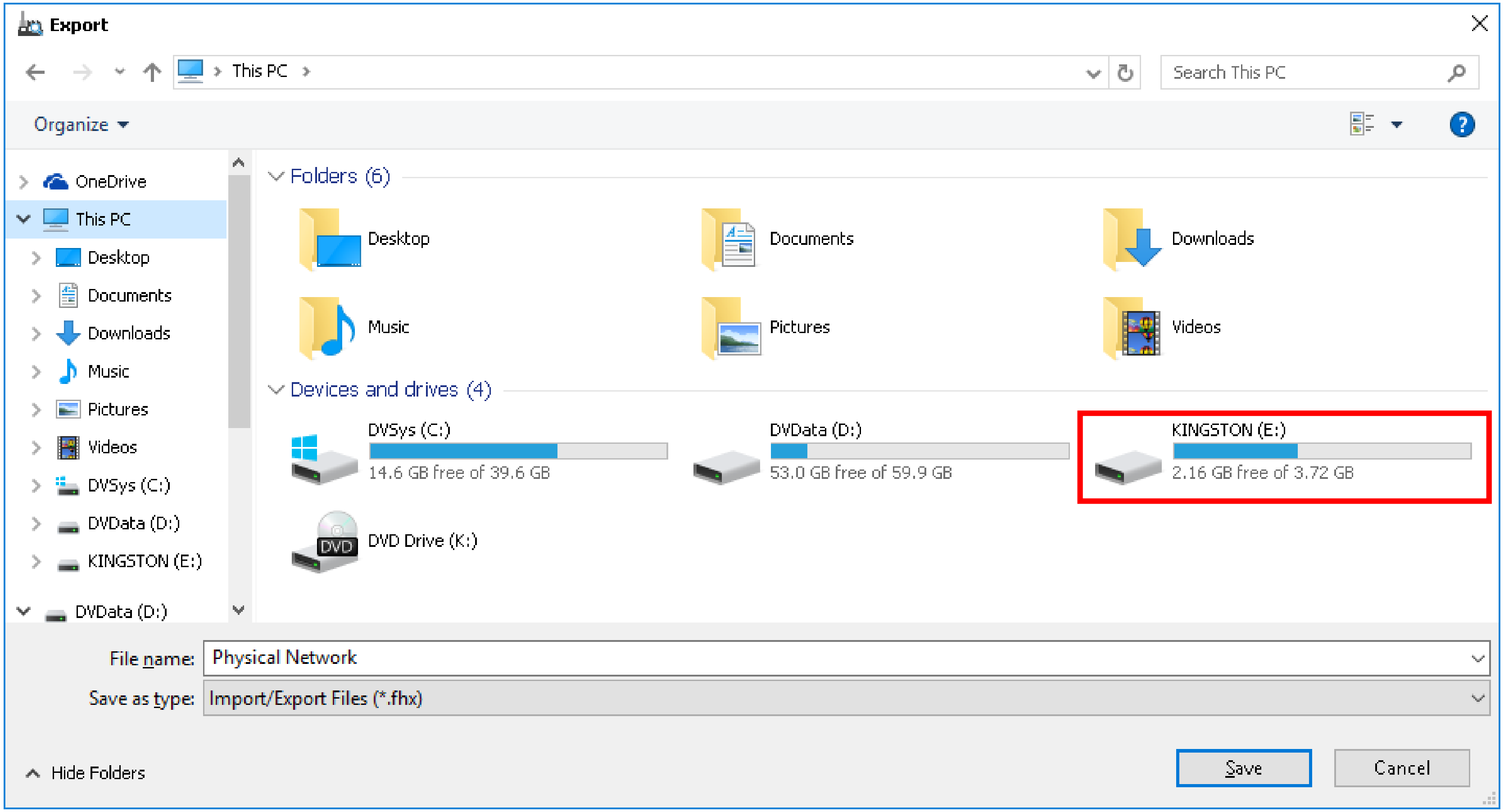
Workshop – Export

Step 1. From the DeltaV Explorer, right-click on Physical Network and select *Export.*



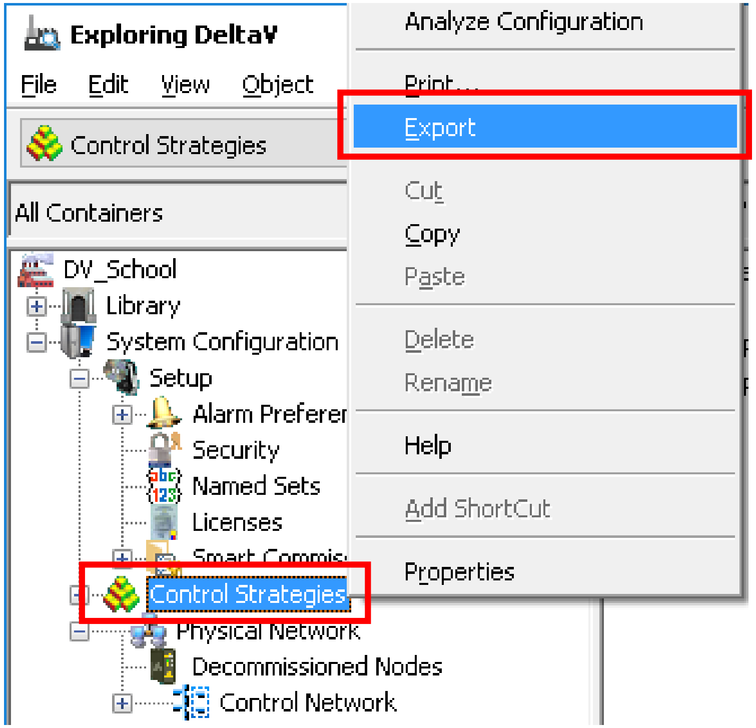
Workshop – Export

Step 2. Select a removable drive as the destination, thereby exporting the Physical Network. Click *Save*.



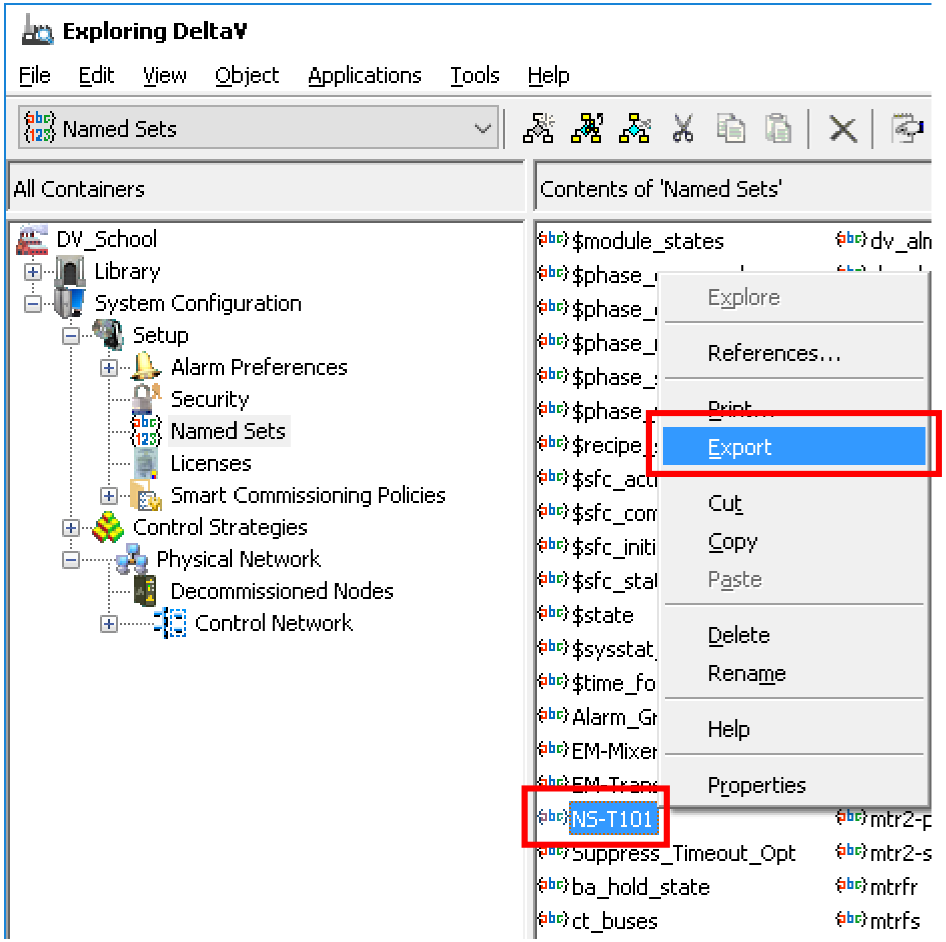
Workshop – Export

Step 3. Export Control Strategies by selecting a removable drive as the destination, thereby exporting the Control Strategies. Click Save.



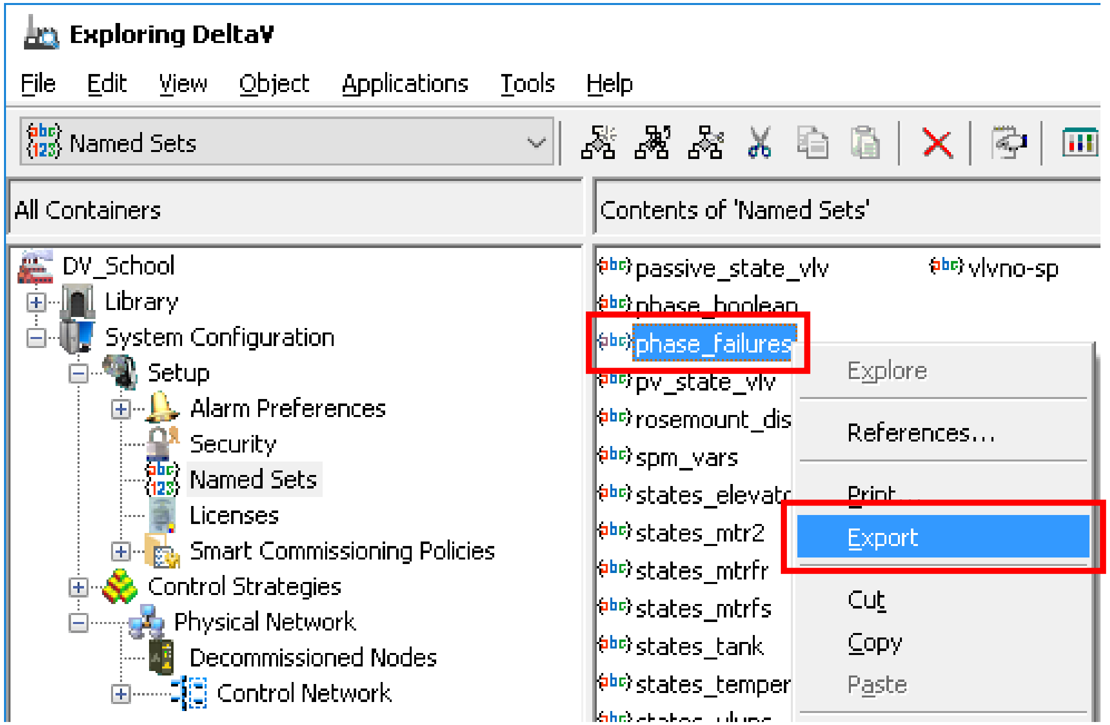
Workshop – Export

Step 4. Export Named Set NS-T101 by selecting a removable drive as the destination, thereby exporting NS-T101. Click *Save*.



Workshop – Export

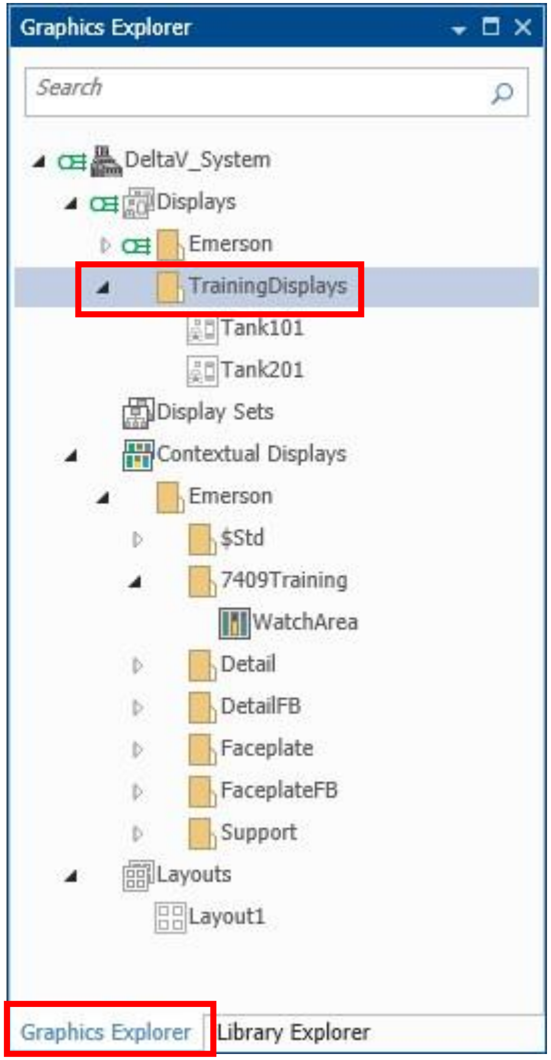
Step 5. Export Named Sets phase_failures by selecting a removable drive as the destination, thereby exporting phase_failures. Click *Save*.



Workshop – Export

Step 6. Launch Graphics Studio.

Step 7. Select the TrainingDisplays folder in the Graphics Explorer Pane.

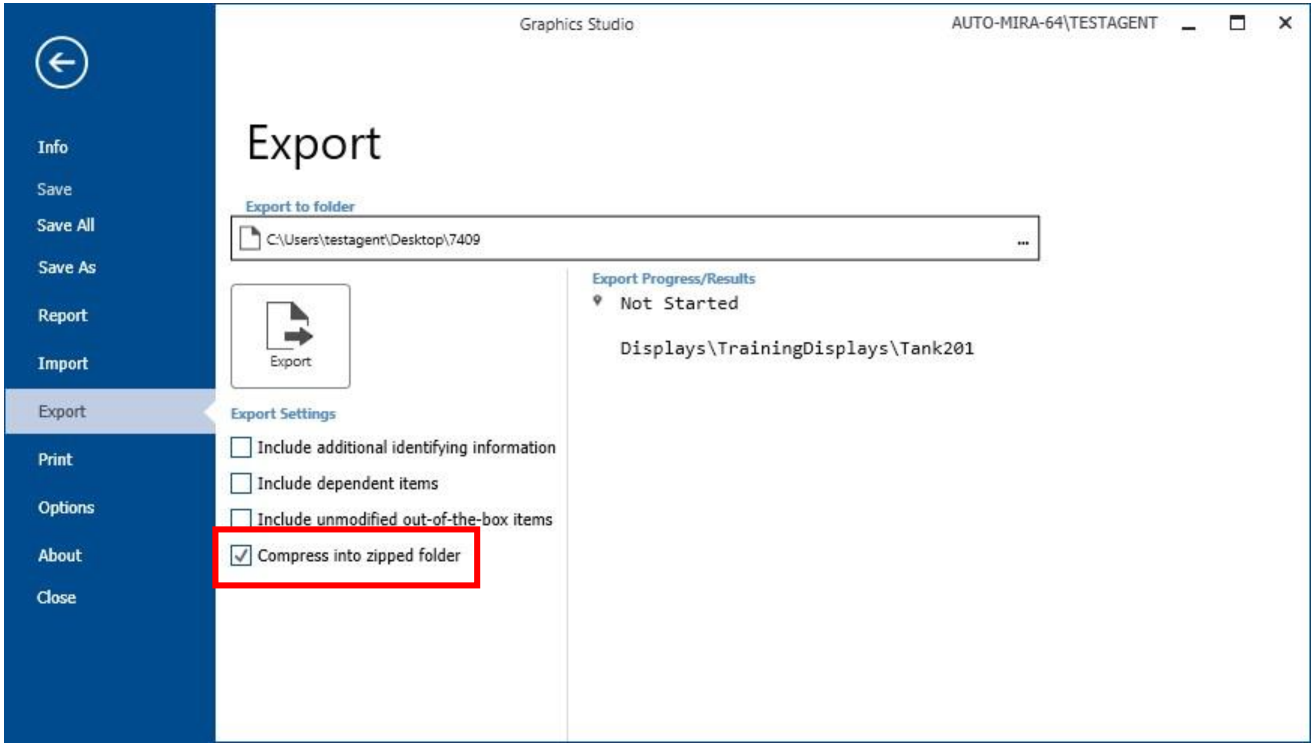


Workshop – Export

Step 8. On the Ribbon, click on File.

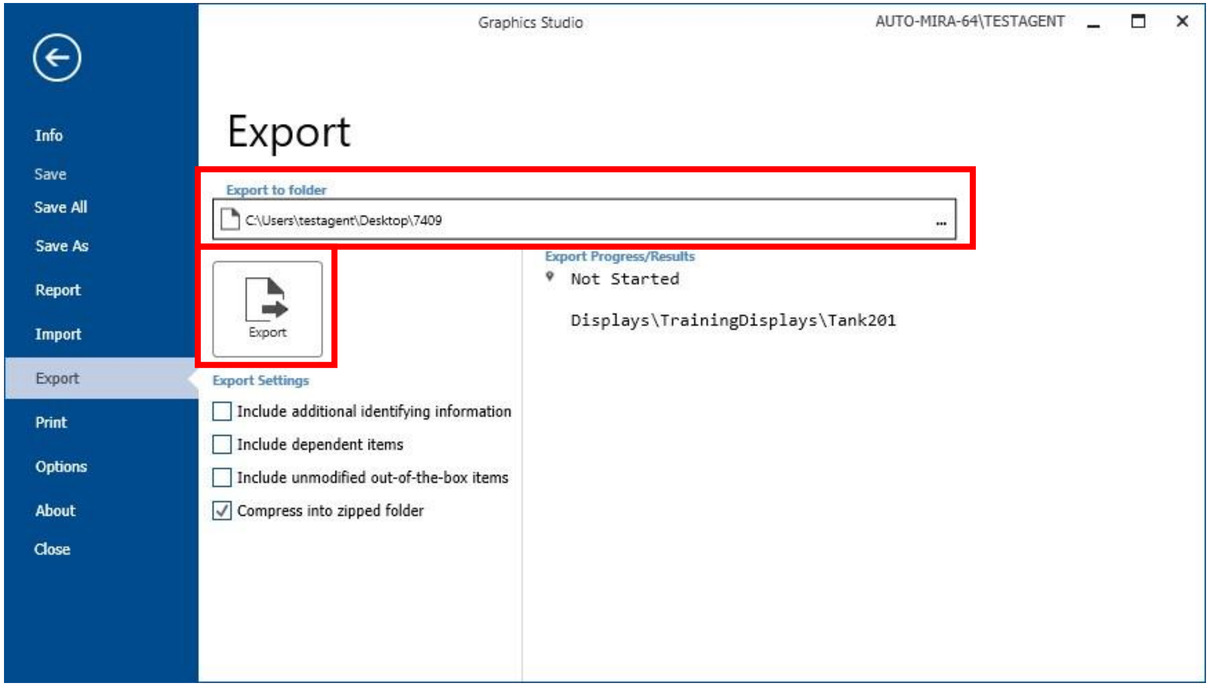
Step 9. Select Export to open the Export pane.

Step 10. Check the box to Compress into zipped folder.



Workshop – Export

Step 11. Browse to the folder of the removable media to save the zipped folder.



Step 13. Click Export.

Step 14. Remove the media and take it home with you.

Workshop Complete.

Optional Workshop – Add logic for Stop and Abort

Define logic for Stop and Abort

Create additional logic sequence for the STOP STATE and ABORT STATE

Summary

- Define the application of a Phase Logic Module
- Define States of a PLM
- Edit a Named Set for FAIL_MONITOR
- Export DeltaV Database Objects
- Export Displays

EMERSON

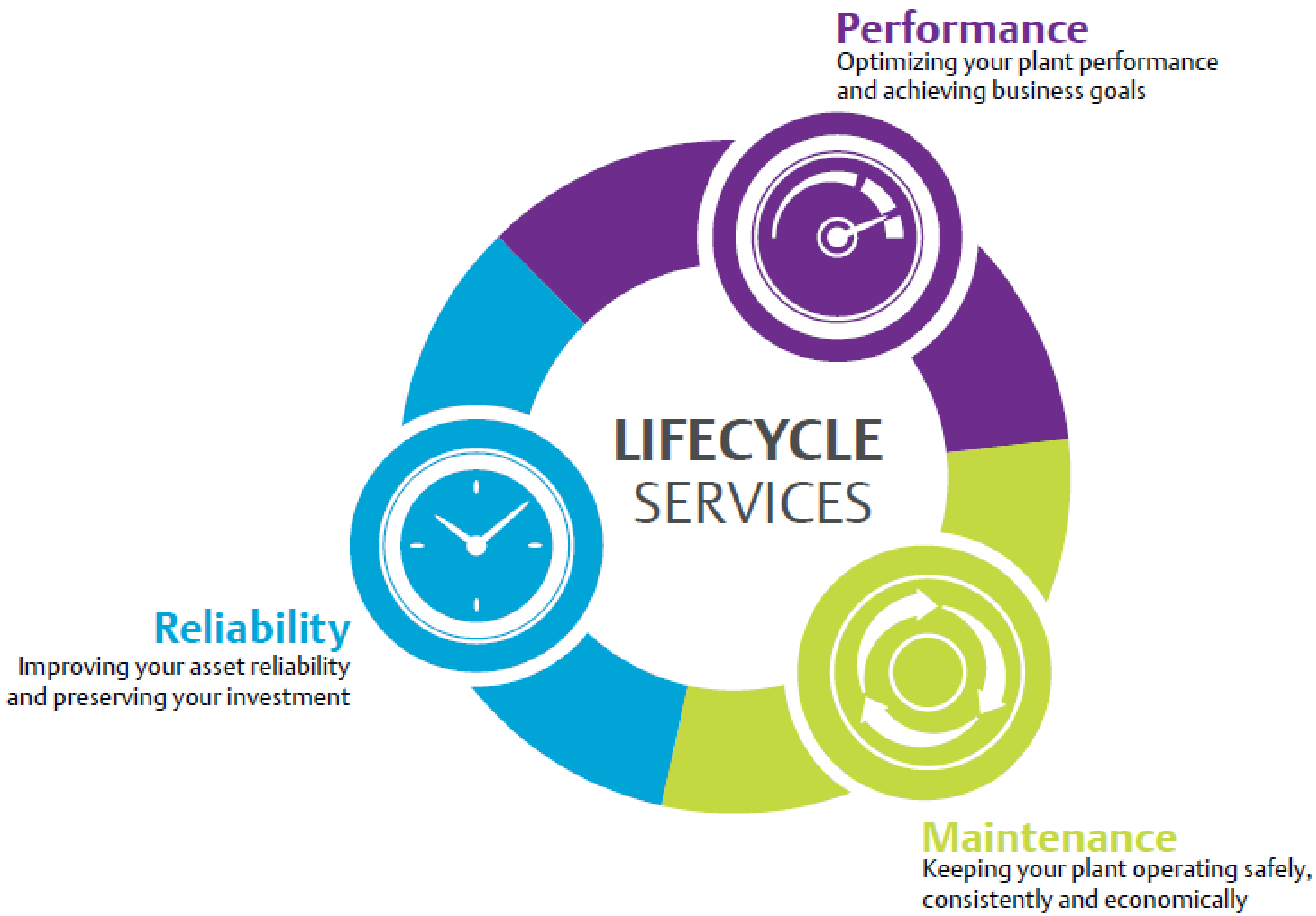
Lifecycle Services

Process Systems and Solutions

EMERSON
Process Management

What is Lifecycle Services?

Emerson Lifecycle Services provide customers with **expertise, technology** and **processes** that can help them operate safely, improve asset reliability and optimize process capabilities.



Guardian Support

Optimize the reliability and performance of your system

Risk Management

- Matched system specific information and proactively manage risk
- Microsoft updates are tested and bundled for easier installation
- Dashboard gauges overall system health

Lifecycle Management

- Lifecycle status to better plan for upgrades and replacements and access to all software updates
- Accurate inventory of all system components and licensing
- Expertise and advice for maintaining your system, with resources to help troubleshoot or extend knowledge through the Global Service Center

Incident Management

- Access to experts at all times to help you through critical issues
- Knowledge Base Articles to help fix issues quickly and correctly
- Historical record of issues makes it easy to collaborate or share information across your enterprise

SureService Program

SureService packaged services makes it easier to fill the gaps between where you are now, and where you want to be in the future.

Maintenance Services

Keep your system running smoothly

Scheduled System Maintenance protects your automation investment by scheduling planned maintenance visits.

Site Evaluation Service delivers an evaluation of your distributed control systems across multiple dimensions, compared against Emerson Best Practices.

SIS Functional Safety Maintenance & Proof Testing Services specialists identify failures, while helping you meet compliance and manage risks.

Protect your control system from critical issues and a security breach

Cybersecurity Solutions for DeltaV Systems is a comprehensive set of services and products, including assessment services, expert consultation, patch management services, endpoint solutions and more, to establish a proactive cybersecurity strategy.

Get faster resolution and secure expert support

Emergency On-Site Service offers a team of experts immediately available to reduce or eliminate any unplanned downtime.

Resident Engineer Program provides a specialized, factory-trained engineer for a variety of offsite and onsite activities.

Reliability Services

Get proactive and avoid system reliability surprises

DeltaV System Health Monitoring Service eliminates manual effort and increases system availability.

Backup and Recovery Services provide a centralized, scalable, single solution for data protection and disaster recovery.

Increase system availability while reducing risk

DeltaV Upgrade Service modernizes your system safely and efficiently, with minimal disruptions to current operations and production.

Power and Grounding Integrity Service allows specialists to investigate, analyze and report recommendations for integrity issues in your plant.

Secure critical parts promptly

Spare Parts Management with DeltaV Factory Module Replacement Service provides direct access to required spare parts and lowers total cost of ownership by creating budget certainty.

Sustain Program for PROVOX & RS3 gives you access to spare parts, repairs and support following product retirement.

Extended Computer Availability Service provides factory-certified remanufactured workstations and server computers.

Performance Services

Augment your team

System Consulting Services connect you with technical experts who support systems and applications worldwide.

Replenish lost expert knowledge internally

Educational Services offer training through traditional classroom, e-learning, virtual training, instructor-led classes, blended learning and operator training solutions.

Control Performance Improvement provides access to consulting, tools and training to optimize system performance.

DeltaV Logbooks Services help maximize functionality with worry-free installation, setup and configuration.

Achieve your business goals

Alarm Services help you improve alarm performance while increasing operator efficiency.

SIS Modification Services ensure straightforward, predictable and documented modifications.

High Performance Graphics Services include consultation and implementation services designed to increase process situational awareness, allowing you to run your plant safer and more efficiently.

Loop Service Express offers consultation, data collection, analysis and basic loop tuning.

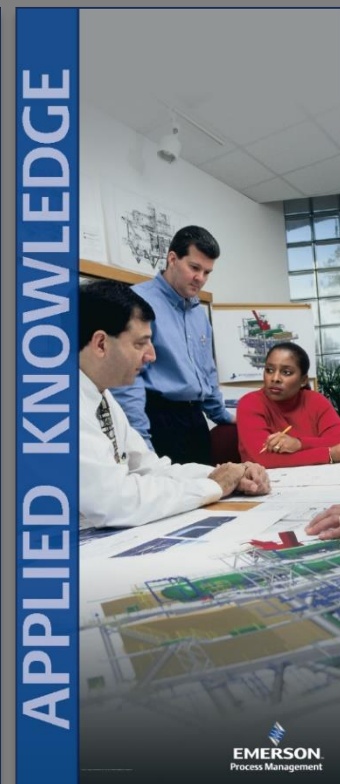
Lifecycle Services

People

Technology & Innovation

Global Coverage

Expertise & Processes



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