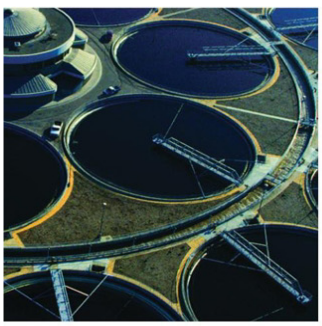
Reference Manual

Original Instructions

PlantPAx
Distributed Control System

Rockwell Automation Library of Process Objects

Version 3.5



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Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Preface

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Notes:

The purpose of this manual is to facilitate the use of the Rockwell Automation® Library of Process Objects and associated productivity tools. The library consists of predefined application code for Logix controllers and graphics for FactoryTalk® View software.

The combination of programming logic and human machine interface (HMI) visualization files helps accelerate control project development by starting from a proven, tested, and documented set of code. The instructions provide common process objects for the control and interaction with motors, valves, pumps, and numerous other devices.

See Table 2 on page 14 for links to the individual reference manuals for objects that comprise the Rockwell Automation Library of Process Objects.

New and Updated Information

This table contains the changes that are made to this revision.

Topic	Page
Included Add-On Instructions overviews for PowerFlex® 6000 and PowerFlex 7000 drives	28, 29
Added Important text on the new L_CPU_24_up Add-On Instruction	45
Added quick screens for PowerFlex 6000 and PowerFlex 7000 drives	66
Added process strategies for PowerFlex 6000 and PowerFlex 7000 drives	74
Added procedures for modifying navigation tags	137
Updated Alarm Builder procedures for FactoryTalk View ME alarms	174
Updated descriptions for the Synchronize Controller Clock (T-Sync) instruction	199

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Figure 1 - Additional Resources for Related Library Information

Resource	Description
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for how to define, configure, and program Add-On Instructions.
FactoryTalk View SE Edition User's Guide, publication VIEWSE-UM006	Provides details on how to use this software package to develop and run HMI applications that can involve multiple users and servers, which are distributed over a network.
FactoryTalk View Machine Edition User's Guide, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk Alarms and Events System Configuration Guide, publication FTAE-RM001	Provides details on how to install, configure, and use FactoryTalk Alarms and Events services as part of a FactoryTalk-enabled automation system.
PlantPAx® Distributed Control System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx system.

Figure 1 - Additional Resources for Related Library Information

Resource	Description
PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
PlantPAx Distributed Control System Infrastructure Configuration, publication PROCES-UM001	Provides screen facsimiles and step-by-step procedures to configure infrastructure components for your system requirements.
PlantPAx Distributed Control System Application Configuration, publication PROCES-UM003	Provides the steps necessary to start development of your PlantPAx Distributed Control System.

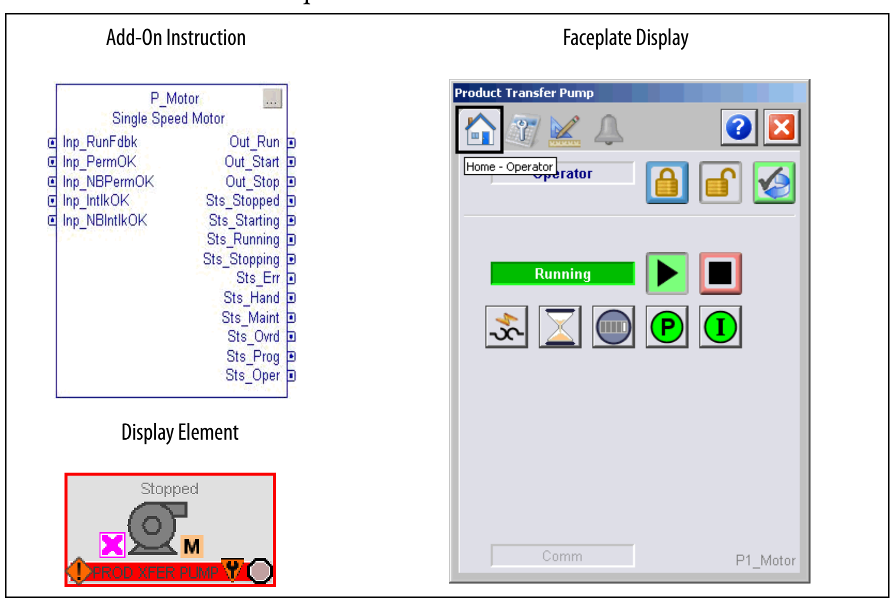
You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Overview

The Rockwell Automation® Library of Process Objects is a predefined collection of coded objects that offer proven strategies, functionality, and known performance for your process control system.

The library features various instructions for motors, valves, drives, interlocks, permissives, and additional objects that can be used with the PlantPAx® system. However, using the library objects is **not** equivalent to designing a PlantPAx system. To have a PlantPAx system, you must properly size the application and implement system guidelines. See the following resources: PlantPAx Selection Guide, publication PROCES-SG001, and the PlantPAx Reference Manual, publication PROCES-RM001.

Library elements include controller code (Add-On Instructions), display elements (global objects), and faceplates that provide controller-ready logic and visualization tools for the operator.



The following table describes the topics in this chapter.

Library Benefits

The Library of Process Objects offers these benefits:

- Provides reusable engineering designs with modular programming code
- Simplifies process development with controller-ready logic
- Provides visualization of device and diagnostic information

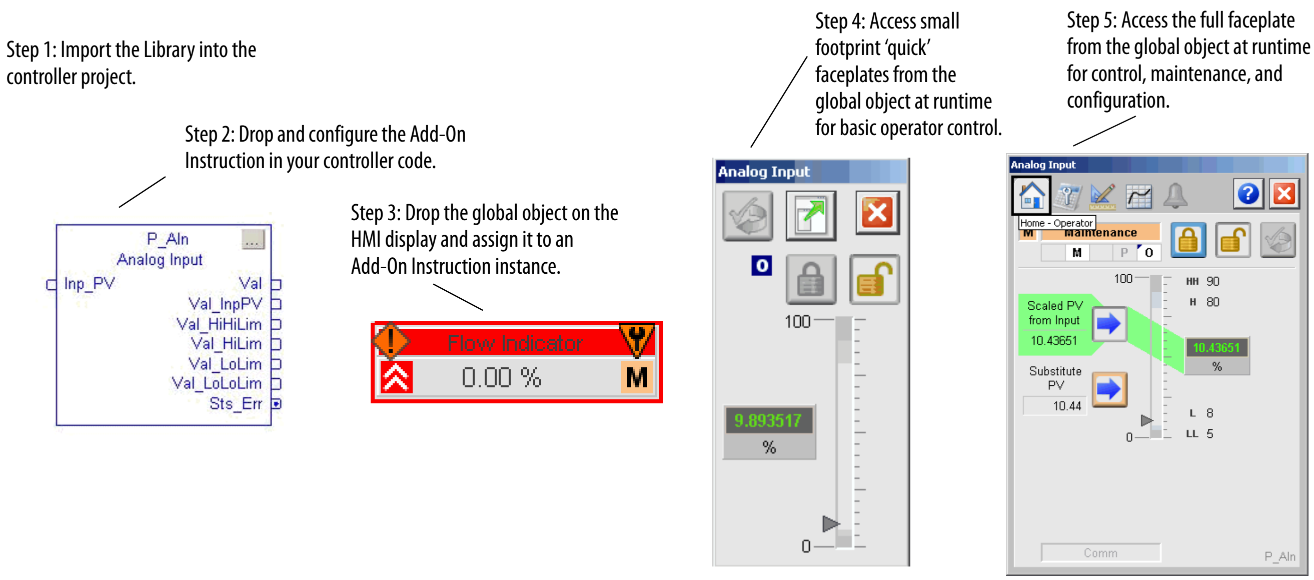
Reusable design — The instruction set lets you control, monitor, and troubleshoot the process with little added engineering effort. Add-On Instructions provide modules of code, with predefined functionality, to monitor and control devices. Developing a system becomes configuring the ready-made objects rather than having to design functionality for each particular tool.

Simplified development — Each instance of an instruction can be configured without changing the source definition. Each instruction has been designed to satisfy a broad range of users. Once the visualization elements are added to your project, you can configure devices from the associated faceplates rather than having to open controller tags.

Visualization of real-time data — Global objects provide access to faceplates that let you see how the device is operating in real-time conditions. Alarms and diagnostic information alert operators to monitor specific conditions for well-informed business decisions.

When the predefined logic is coupled with display elements and faceplates in FactoryTalk® View Studio software, objects are configured in a drag-and-drop environment as shown in Figure 2.

Figure 2 - Configuring Library Objects



By using a library of consistent elements, you improve the operability, maintainability, and efficiency of your PlantPAx system. All objects have a common set of security access levels, modes of operation, symbols, and indicators.

See Table 2 on page 14 for a complete listing of the library objects.

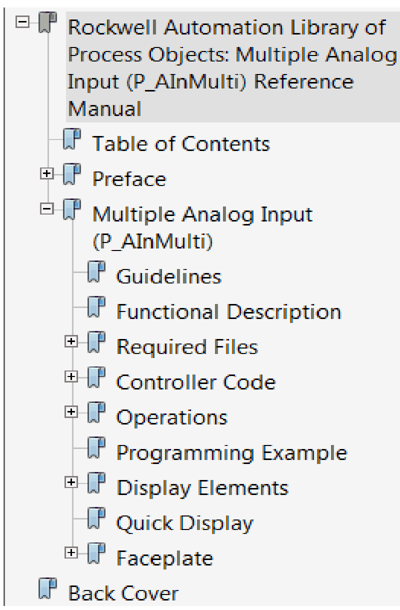
[Table 1](#) describes additional Rockwell Automation libraries that the PlantPAx system leverages for process-specific content.

Table 1 - Rockwell Automation Library of Process Objects Resources

Resource	Description
Rockwell Automation Library of Logic Diagnostic Objects, publication PROCES-RM003	Provides Add-On Instructions that monitor controllers to provide diagnostic information.
Rockwell Automation Library of Steam Table Instructions, publication PROCES-RM004	Provides Add-On Instructions for steam table calculations.
Rockwell Automation Sequencer Object, publication PROCES-RM006	Provides instructions for a controller-based step sequencing solution that reduces engineering time by automating common operator procedures.

Using Library Object Documentation

Figure 3 - Add-On Instruction Bookmarks



Each Library object has its own reference manual that defines the parameters and display elements that are specific to the object. The manuals are structured with the following subsections (bookmarks in the PDFs as shown in Figure 3):

- Guidelines – Explains when to use the instruction and alternative Add-On Instructions for situations that do not apply to this instruction.
- Functional Description – Provides details on how the instruction operates to acquaint you with the capabilities of the instruction.
- Required Files – Includes the controller and visualization files that you must import into your project to use the instruction.
- Controller Code –Describes the input and output parameters and local configuration tags for controller configuration and maintenance.
- Operations – Describes primary operations for the Add-On Instruction, including modes, alarms, and simulation.
- Programming Example (selected manuals) – Illustrates the use of the instruction for a better understanding of the instruction logic.
- Display Elements – Depicts the display elements to aid in choosing the ones that you need.
- Quick Display – A small display that lets operators perform simple interactions with the respective instruction. From the Quick Display, you can navigate to the faceplate.
- Faceplate – Explains how to understand and use the faceplate display for control, maintenance, and configuration of the object.

Table 2 lists objects per functional category.

Table 2 - Library Object Table of Contents

A brief description of each Library object is provided in the following pages to help you select functionality for your system. These overviews include sample displays and links to the respective Add-On Instruction reference manual.

I/O Processing

The Process Objects in this group provide analog and discrete input/output signal processing. Pressure/temperature compensated flow calculations and cylindrical tank level interpolations are also provided.

Table 3 - I/O Processing

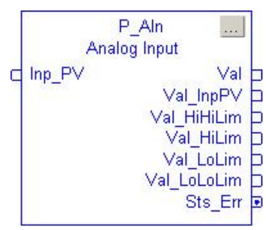
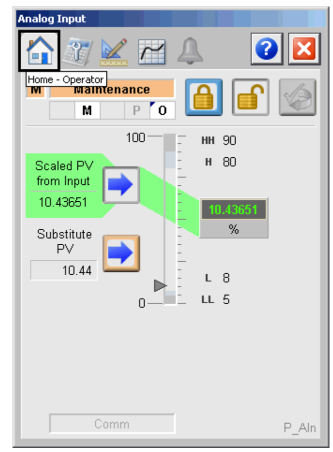
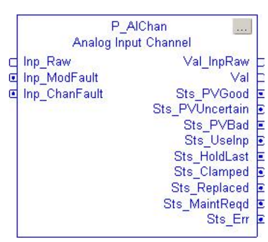
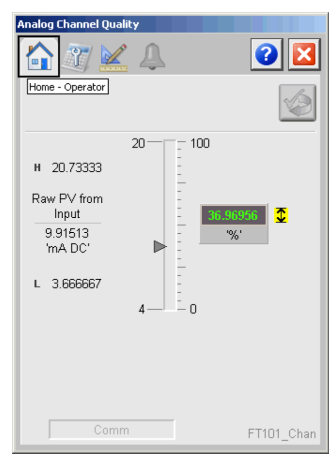
Process Object Description	Object Elements	
Basic Analog Input (P_AIn) The P_AIn instruction monitors one analog value, typically from a channel of an analog input module, and provides alarms when the analog value exceeds user-specified thresholds (high and low). This instruction also provides for linear scaling of an analog input value from raw (input) units to engineering (output) units, and entry of a substitute Process Variable. Click the link to access the Reference Manual: SYSLIB-RM001	Global Object  Add-On Instruction 	Faceplate 
Analog Input Channel (P_AIChan) The P_AIChan instruction monitors one analog input channel and provides a configurable failure alarm. This instruction is usually associated with other instructions. The P_AIChan faceplate is called from other faceplates, such as the associated analog input instruction faceplate, P_PIDE, and the Dosing faceplates. Click the link to access the Reference Manual: SYSLIB-RM042	Add-On Instruction  There are no dedicated display elements for this instruction.	Faceplate 

Table 3 - I/O Processing

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Advanced Analog Input (P_AInAdv)

The P_AInAdv instruction monitors one analog value, typically from an analog input I/O module.

This instruction has the following advanced features that are not included in the basic analog input:

- Square root scaling to provide positive or negative flow values
- Calculation of the PV rate of change and configurable high rate of change alarming
- Alarms for deviation from a reference value

Click the link to access the Reference Manual:

SYSLIB-RM018

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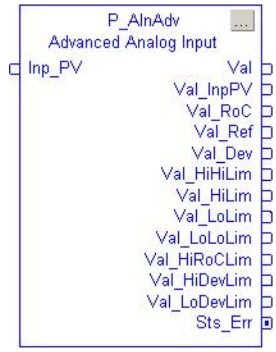
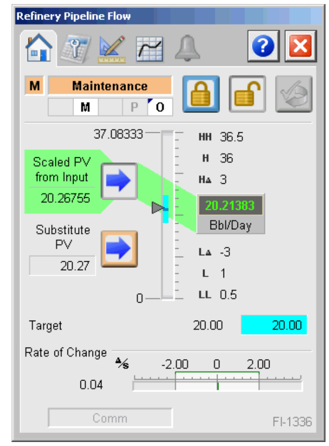
Global Object

Add-On Instruction



Faceplate



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<tr><td>

Dual Sensor Analog Input (P_AInDual)

The P_AInDual instruction monitors one analog process variable (PV) by using two analog input signals (dual sensors, dual transmitters, dual input channels).

This instruction has the following advanced features that are not included in the basic analog input:

- Dual inputs
- Alarm if difference between the two input PVs exceeds a configured limit

Click the link to access the Reference Manual:

SYSLIB-RM019

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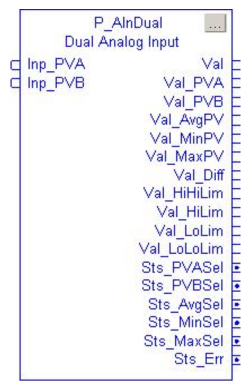
Global Object

Add-On Instruction



Faceplate

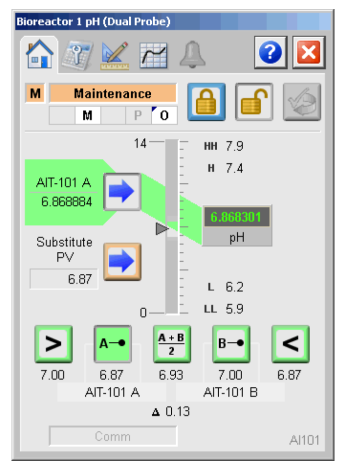


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Table 3 - I/O Processing

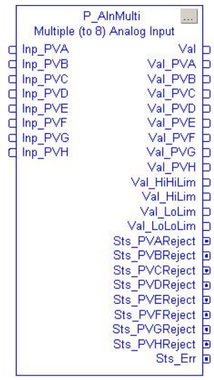
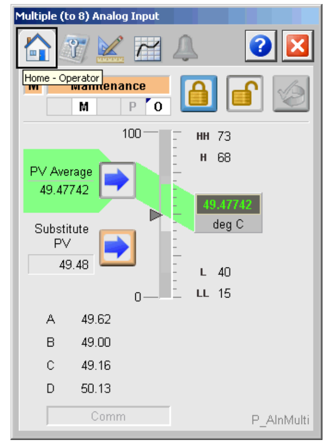
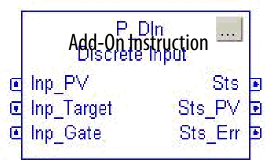
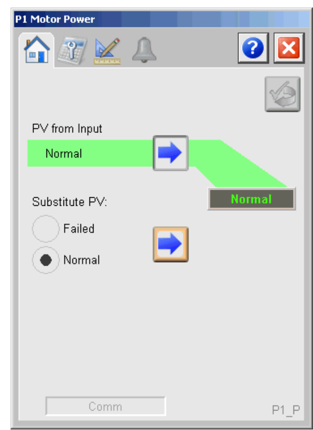
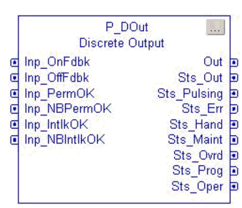
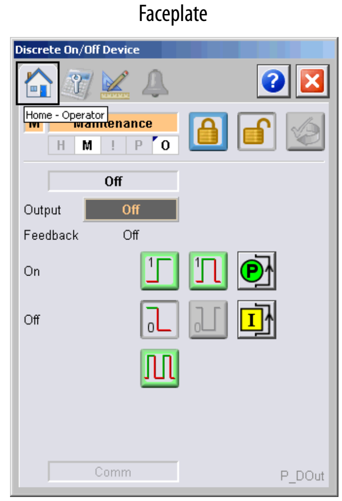
Process Object Description	Object Elements
Multiple Analog Input (P_AInMulti) The P_AInMulti instruction monitors one analog process variable (PV) by using up to eight analog input signals (sensors, transmitters, input channels). Use this instruction if you want to display a temperature or other process variable by averaging multiple measurements. Click the link to access the Reference Manual: SYSLIB-RM026	Global Object  Add-On Instruction  Faceplate 
Discrete Input Object (P_DIn) The P_DIn instruction is used to receive and process a single discrete condition, typically for a channel of a discrete input card. It can be used with any discrete (BOOL) signal. You can use this instruction to display the state of a process temperature, level, flow, proximity, pressure, or other switch. Click the link to access the Reference Manual: SYSLIB-RM003	Global Object  Add-On Instruction  Faceplate 
Discrete Output (P_DOut) The P_DOut instruction controls a device by using a single discrete output signal and monitors feedback from the device to check for device failures. This instruction operates in various modes, and can provide steady, single pulsed, or continually pulsed output. The P_DOut instruction can be a good choice for pilot lights or stack lights that require blinking. Click the link to access the Reference Manual: SYSLIB-RM029	Global Object  Add-On Instruction  Faceplate 

Table 3 - I/O Processing

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
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Analog Output (P_AOut)

The P_AOut instruction is used to manipulate an analog output to control a field device, such as a control valve or motorized gate positioner. The output responds to an Operator (manual) or Program setting of the Controlled Variable (CV) signal.

The P_AOut instruction controls the analog output in various modes, monitoring for fault conditions.

Click the link to access the Reference Manual:

SYSLIB-RM011

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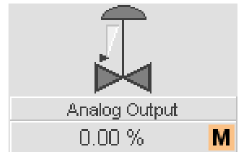
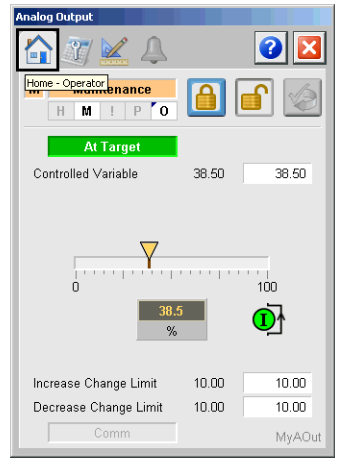
Global Object



Add-On Instruction

Faceplate



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Pressure/Temp. Compensated Flow (P_PTComp)

The P_PTComp instruction is used to calculate a flow at standard temperature and pressure, essentially a mass flow rate, given a volumetric flow rate, or differential pressure measurement. This instruction also requires measurements of the actual temperature and pressure of the flowing gas.

Click the link to access the Reference Manual:

SYSLIB-RM032

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The P_PTComp Instruction is intended only as a calculation function, between other blocks, and no HMI components are provided.

Add-On Instruction

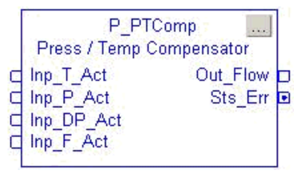

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Table 3 - I/O Processing

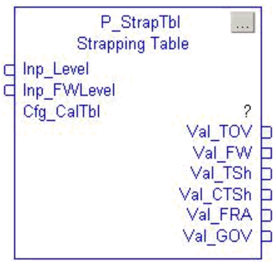
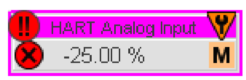
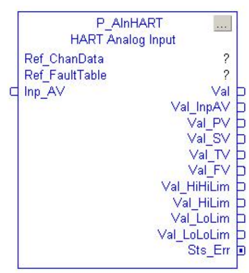
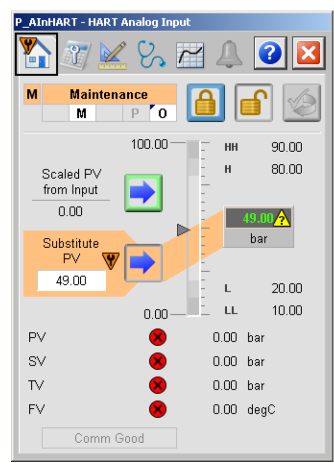
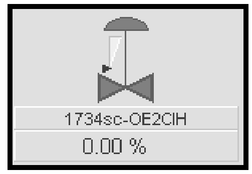
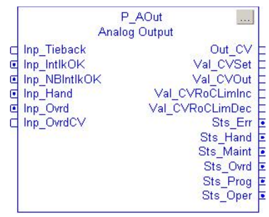
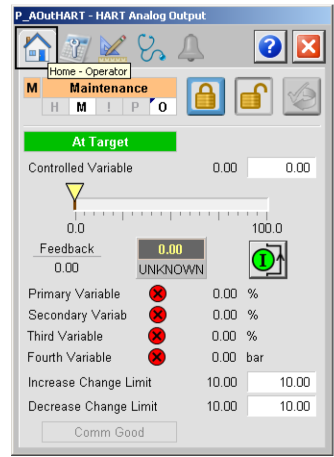
Process Object Description	Object Elements
Tank Strapping Table (P_StrapTbl) The P_StrapTbl instruction calculates the volume of product in an upright cylindrical tank, given the level of the product and the tank calibration table. This instruction can optionally compensate for free water at the bottom of the tank (given a product/water interface level) or for thermal expansion of the tank shell (given the coefficient of linear expansion of the shell material and product and ambient temperatures). Click the link to access the Reference Manual: SYSLIB-RM033	The P_StrapTbl Instruction is intended as a calculation function only, between other blocks, and no HMI components are provided. Add-On Instruction 
HART Analog Input (P_AInHART) The P_AInHART Add-On Instruction monitors one analog input from a flow, level, pressure, temperature, or other HART-connected analog sensor. Alarms are provided when the analog value exceeds user-specified thresholds (high and low). The instruction also provides the following: • Capabilities for linear scaling of an analog input value from raw (input) units to engineering (output) units • Entry of a substitute Process Variable (PV), providing handling of an out-of-range or faulted input. Click the link to access the Reference Manual: PROCES-RM010	Global Object  Add-On Instruction  Faceplate 

Table 3 - I/O Processing

Process Object Description	Object Elements
HART Analog Output (P_AOutHART) The P_AOutHART Add-On Instruction is used to manipulate an analog output to control a field device, such as a control valve or a motorized gate positioner. The output responds to an Operator (manual) or Program setting of the Controlled Variable (CV) signal. Click the link to access the Reference Manual: PROCES-RM010	Global Object  Add-On Instruction  Faceplate 

Regulatory Control

The Process Objects in this group provide regulatory control of a final process element.

Table 4 - Regulatory Control

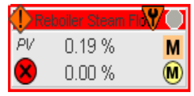
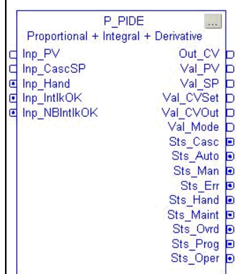
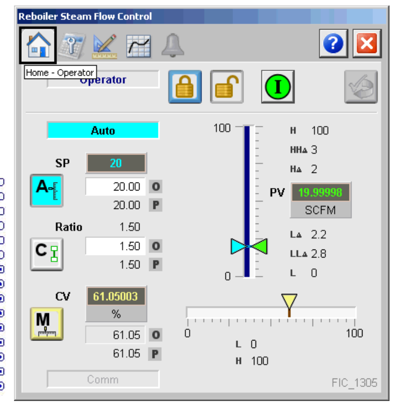
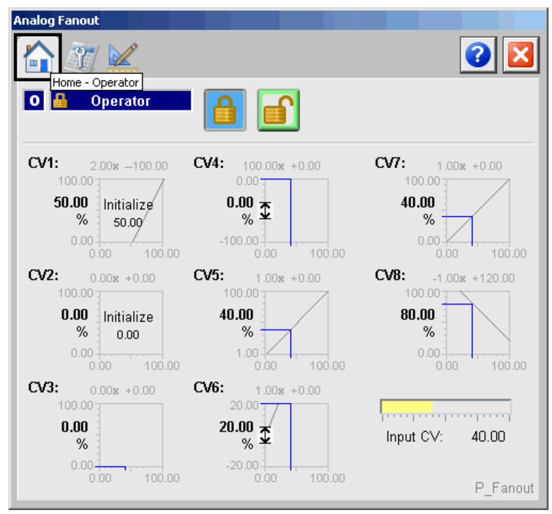
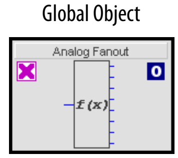
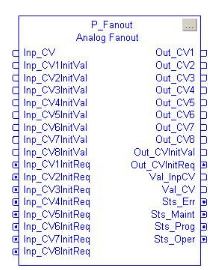
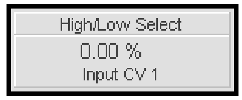
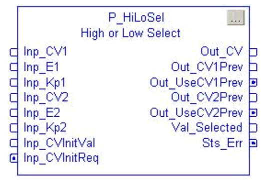
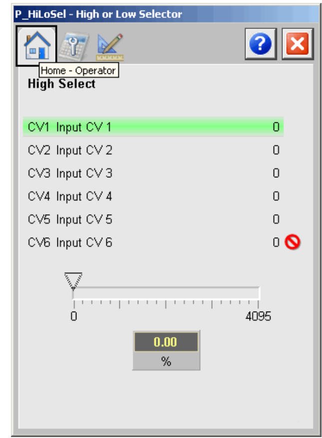
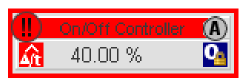
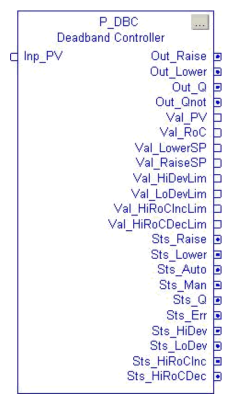
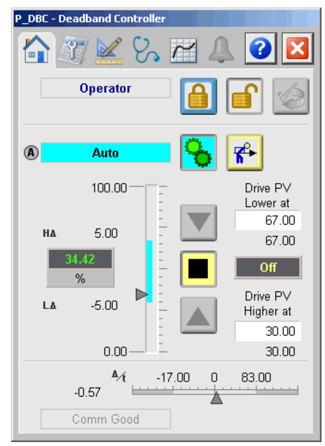
Process Object Description	Object Elements
Proportional + Integral + Derivative Enhanced (P_PIDE) The P_PIDE instruction provides the functionality of the PIDE built-in instruction for PID loop control and additional alarm status information, including limits and severities. Use this instruction when you plan to use the PIDE for loop control and provide visualization to the operator. Click the link to access the Reference Manual: SYSLIB-RM045	Global Object  Add-On Instruction  Faceplate 
Analog Fanout (P_Fanout) The P_Fanout instruction fans one 'primary' analog output signal out to multiple 'secondary' users or devices. Each secondary output has configurable gain and offset. The instruction applies minimum and maximum clamping limits to each output (secondary) CV. Click the link to access the Reference Manual: SYSLIB-RM030	Faceplate  Global Object  Add-On Instruction 

Table 4 - Regulatory Control

Process Object Description	Object Elements
High or Low Selector (P_HiLoSel) The P_HiLoSel instruction selects the lowest of the (up to 6) incoming CVs or the highest of the incoming CVs and outputs the value. The unselected CVs are flagged to track the selected CV. The tracking value can optionally be offset by an amount equal to the upstream PID/PIDE Gain times Error to avoid problems with ever-decreasing (if low-select) or ever-increasing (if high-select) output. Click the link to access the Reference Manual: SYSLIB-RM047	Global Object  Add-On Instruction  Faceplate 
Deadband Controller (P_DBC) The P_DBC (Deadband Controller) Add-On Instruction implements a Deadband (On/Off or Bang-Bang) Controller. The Deadband Controller uses Drive PV Lower and Drive PV Higher setpoints to maintain the input PV between these setpoints. When PV reaches the Drive PV Lower setpoint, the output to a downstream device is turned off. When PV reaches the Drive PV Higher setpoint, the output to a downstream device i turned on. It has both Auto and Manual Loop Modes. Click the link to access the Reference Manual: SYSLIB-RM055	Global Object  Add-On Instruction  Faceplate 

Procedural Control

The Process Objects in this group provide procedural control definition via a series of discrete sequential actions.

Table 5 - Procedural Control

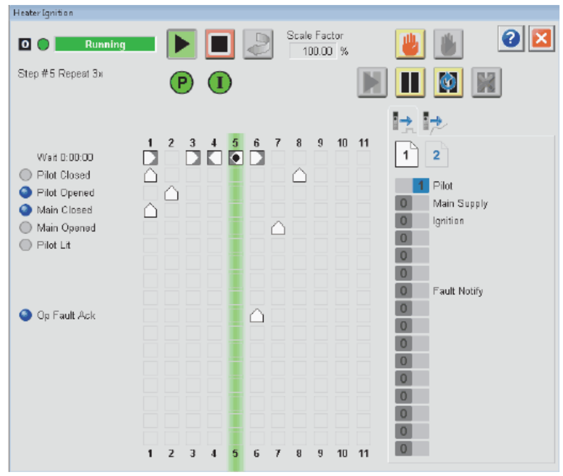
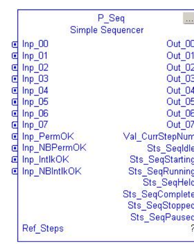
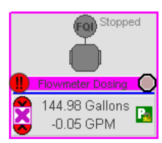
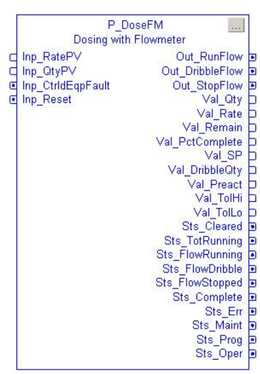
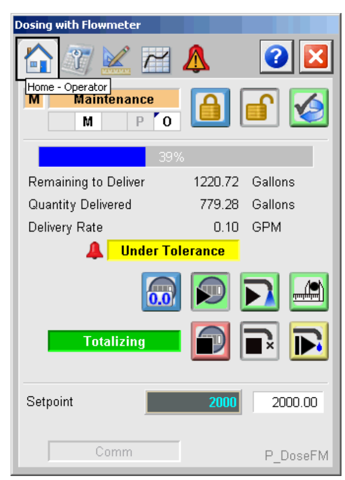
Process Object Description	Object Elements
Sequencer Object (P_Seq) The P_Seq instruction is a controller-based step sequencing solution that reduces engineering time by automating common operator procedures. The step-by-step configuration makes it easy to adjust procedures directly from the HMI displays. Click the link to access the Reference Manual: [PROCES-RM006]()	Faceplate  Global Object  Add-On Instruction 
Flowmeter Dosing (P_DoseFM) The P_DoseFM instruction controls an ingredient addition that uses a flowmeter to measure the amount of ingredient added. The flowmeter can be any of the following: • Analog flowmeter (signal proportional to flow) • Pulse generating flowmeter (pulse count proportional to quantity delivered) • Digital flowmeter providing flow rate or quantity (totalized flow) information. Click the link to access the Reference Manual: [SYSLIB-RM020]()	Global Object  Add-On Instruction  Faceplate 

Table 5 - Procedural Control

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Weigh Scale Dosing (P_DoseWS)

The P_DoseWS instruction controls an ingredient addition that uses a weigh scale to measure the amount of ingredient added.

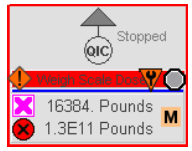
The weigh scale can be on the receiving vessel (gain in weight) or on the sourcing vessel (loss in weight). The weigh scale can be connected via an analog input, device network, or other connection.

Click the link to access the Reference Manual:

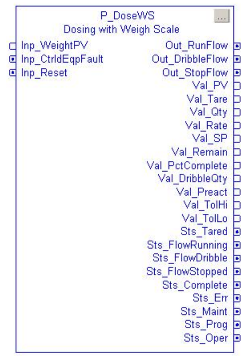
SYSLIB-RM021

</td><td>

Global Object



Add-On Instruction



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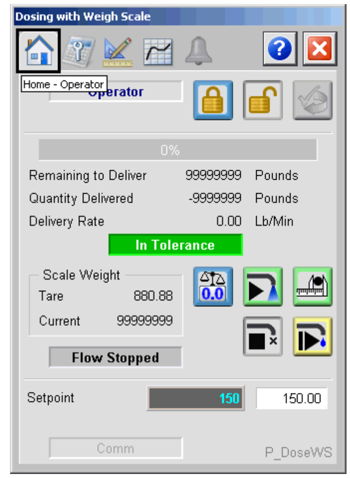

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<tr><td>

Lead/Lag/Standby Motor Group (P_LLS)

The P_LLS (Lead/Lag/Standby Motor Group) controls and monitors a group of 2 to 30 motors.

The number of motors in the group, the order in which the motors start, and the time between starts and stops can be set.

Alarms are generated if there are not enough motors to start or to stop.

Click the link to access the Reference Manual:

SYSLIB-RM054

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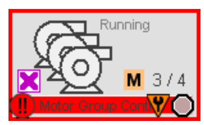
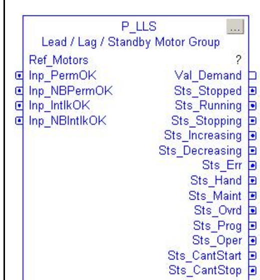
Global Object



Add-On Instruction



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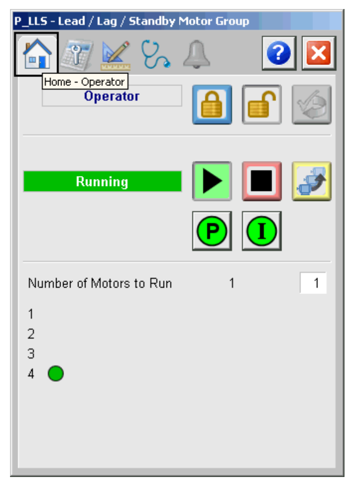

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Motors

The Process Objects in this group provide control and monitoring of drives, smart motor controllers, and overload relays.

Table 6 - Motors

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Single-speed Motor (P_Motor)

The P_Motor instruction controls a non-reversing, single-speed motor in various modes and monitors for fault conditions.

The motor can use a full voltage starter (FVNR), a soft starter, or other motor protective equipment.

The instruction also provides run feedback and a display of actual motor status.

Click the link to access the Reference Manual:

SYSLIB-RM006

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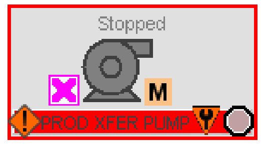
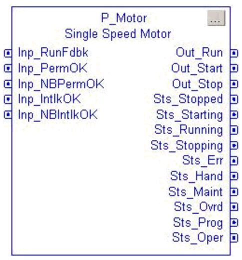
Global Object



Add-On Instruction



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<tr><td>

Two-speed Motor (P_Motor2Spd)

The P_Motor2Spd instruction controls a non-reversing, two-speed motor (fast/slow/stopped) in various modes and monitors for fault conditions.

The motor can optionally have run feedback that, if available, is used to confirm that the motor is running at the commanded speed, and alarm if not.

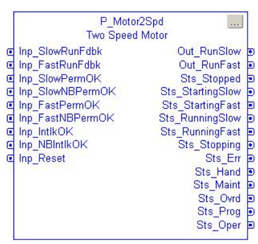
Click the link to access the Reference Manual:

SYSLIB-RM012

</td><td>

Global Object

Add-On Instruction



Faceplate

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<tr><td>

Reversing Motor (P_MotorRev)

The P_MotorRev instruction controls a reversing motor (FVR, forward/reverse/stopped motor) in various modes and monitors for fault conditions.

This instruction can optionally have run feedback that, if available, is used to confirm that the motor is running in the commanded direction, and alarm if not.

Click the link to access the Reference Manual:

SYSLIB-RM013

</td><td>

Global Object

Add-On Instruction

Faceplate

</td></tr>
</table>

Table 6 - Motors

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
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Hand-Operated Motor (P_MotorHO)

The P_MotorHO instruction monitors a locally controlled (hand-operated) motor.

The P_MotorHO instruction supports single-speed motors, two-speed motors, and reversing motors. The instruction also supports an optional trip function and output, used to stop the motor.

Click the link to access the Reference Manual: SYSLIB-RM022

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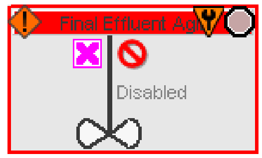
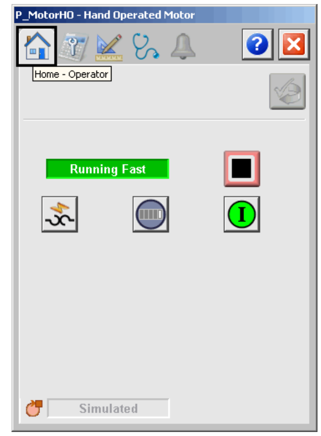


Faceplate



Add-On Instruction

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<tr><td>

Discrete 2-, 3-, or 4-state Device (P_D4SD)

The P_D4SD instruction controls and monitors feedback from a discrete 2-state, 3-state, or 4-state device, including a multiple-speed motor or a multiple-position valve.

The instruction controls up to four discrete outputs, with configurable states of each output in the various device states, and monitors up to four discrete feedback inputs.

Click the link to access the Reference Manual: SYSLIB-RM028

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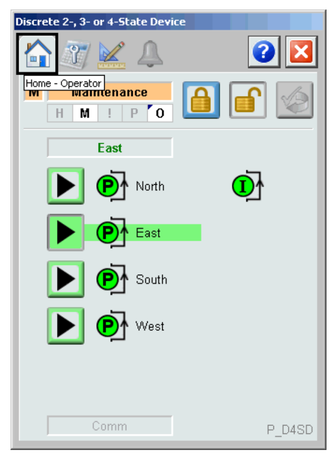
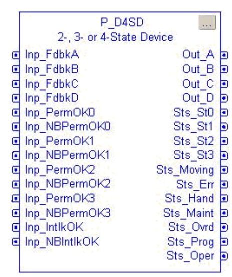
Global Object

Faceplate



Add-On Instruction



</td></tr>
</table>

Table 6 - Motors

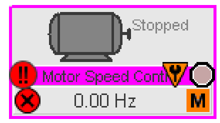
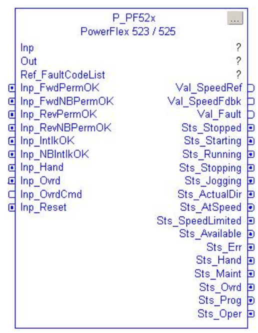
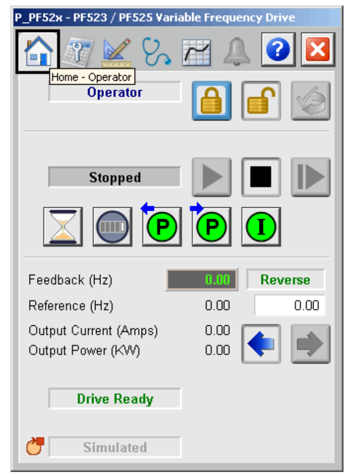
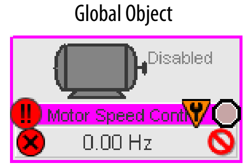
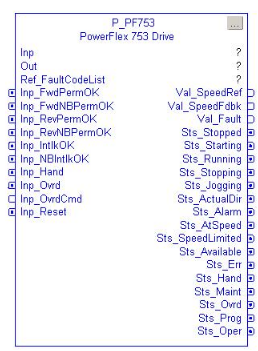
Process Object Description	Object Elements
PowerFlex 523/525 Drives (P_PF52x) The P_PF52x instruction is used to control and monitor a PowerFlex 523 or PowerFlex 525 variable-frequency drive. The instruction collects and displays diagnostic information from the drive by using configured data links on the EtherNet/IP interface. The instruction also provides the following capabilities: • Starting, stopping, jogging of drive, and setting speed reference and direction. • Monitoring of run feedback and display of actual drive status. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM048	Global Object  Add-On Instruction  Faceplate 
PowerFlex 753 Drive (P_PF753) The P_PF753 instruction operates one variable-speed motor by using a drive (AC variable frequency) in various modes, monitoring for fault conditions. This instruction is designed to work with the PowerFlex 753 drive and a 20-COMM-E Ethernet communication module. The instruction displays drive information, including faults, alarms, and general status. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM044	Global Object  Add-On Instruction  Faceplate 

Table 6 - Motors

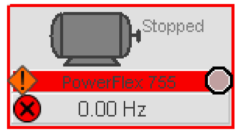
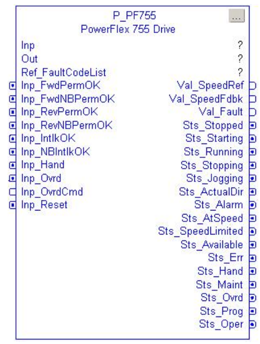
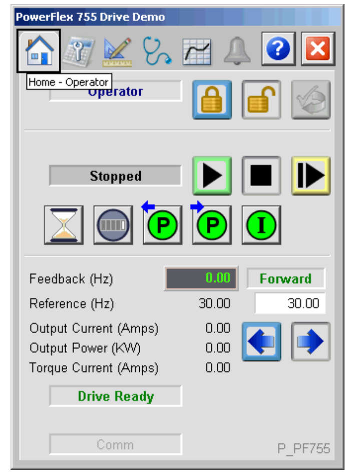
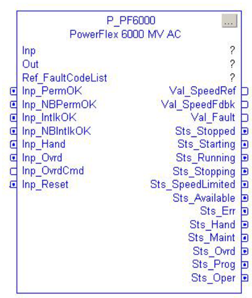
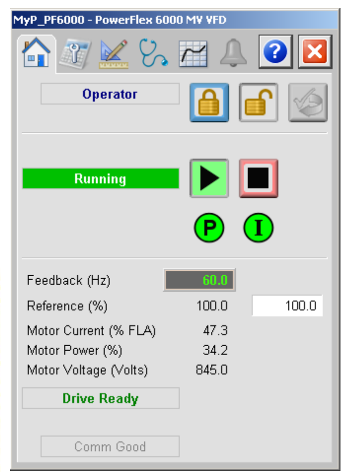
Process Object Description	Object Elements
PowerFlex 755 Drive (P_PF755) The P_PF755 instruction operates one variable-speed motor by using a drive (AC variable frequency or DC) in various modes, monitoring for fault conditions. This instruction is designed to work with a PowerFlex 755 variable frequency AC drive that is communicating with the controller over an EtherNet/IP network. The instruction also works with a PowerFlex 753 drive with an enhanced Ethernet card. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM040	Global Object  Add-On Instruction  Faceplate 
PowerFlex 6000 Drive (P_PF6000) The P_PF6000 instruction operates one variable-speed motor by using a PowerFlex 6000 medium voltage variable frequency AC drive. This instruction is designed to work with a PowerFlex 6000 variable frequency AC drive, which communicates with the controller over an EtherNet/IP network. Drive Parameter read/write capability is provided by a separate Add-On Instruction. See Knowledgebase Answer ID 1008677for details. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM057	Global Object  Add-On Instruction  Faceplate 

Table 6 - Motors

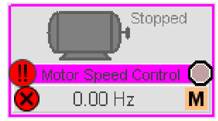
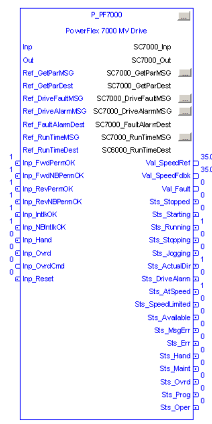
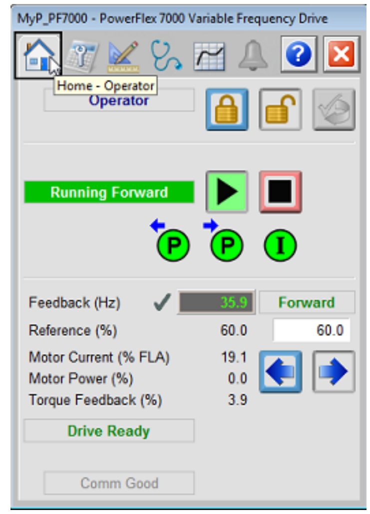
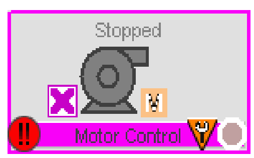
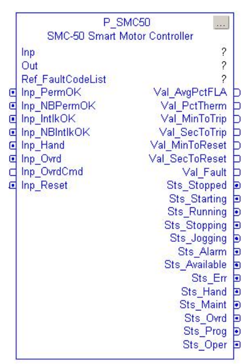
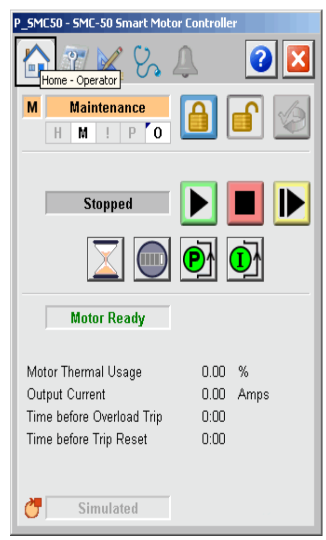
Process Object Description	Object Elements
PowerFlex 7000 Drive (P_PF7000) The P_PF7000 instruction operates one variable-speed motor by using a PowerFlex 7000 medium voltage variable frequency AC drive. The Add-On Instruction controls the drive in various modes and monitors fault conditions. This instruction requires a motor connected to a PowerFlex 7000 variable frequency AC drive that is communicating with the controller over an EtherNet/IP network. The instruction is designed for motors with continuously variable (analog) speed, not multiple discrete speed selections. You can use the P_D4SD or P_nPos instruction for motors with multiple discrete speeds. Click the link to access the Reference Manual: SYSLIB-RM056	Global Object  Add-On Instruction  Faceplate 
SMC™-50 Smart Motor Controller (P_SMC50) The P_SMC50 instruction controls and monitors a motor via an SMC-50 Smart Motor Controller (soft starter). The instruction communicates with the motor controller to start, stop, and jog the motor. The instruction also monitors the status of the motor, detects motor failure to start or stop, and displays motor runtime information. The runtime data includes power, power factor, motor thermal usage, and motor controller fault codes. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM052	Global Object  Add-On Instruction  Faceplate 

Table 6 - Motors

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

SMC™ Flex Smart Motor Controller

(P_SMCFlex)

The P_SMCFlex instruction controls a motor by using a SMCFlex series Smart Motor Controller (soft starter).

The instruction communicates with the motor controller to start and stop the motor. The instruction also monitors the status of the motor, detects motor failure to start or stop, and displays motor runtime information. The runtime data includes phase currents, motor power and power factor, and motor controller fault codes.

This instruction is provided as a rung import for installation.

Click the link to access the Reference Manual:

SYSLIB-RM053

</td><td>

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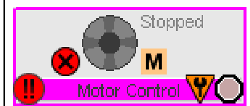

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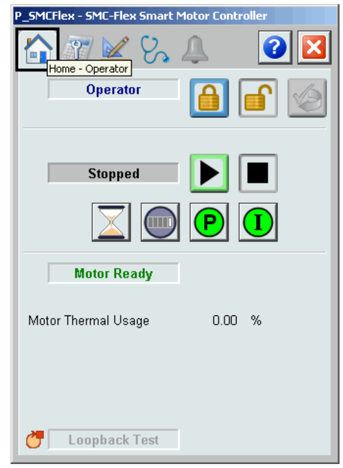
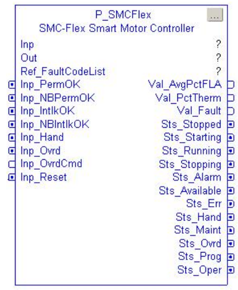


Add-On Instruction



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<tr><td>

Variable-speed Drive

(P_VSD)

The P_VSD instruction operates one variable speed motor by using a drive (AC variable frequency or DC).

This instruction is designed to work with all currently available and many legacy Allen-Bradley® drives, including:

- Bulletin 1336
- Bulletin 1395
- PowerFlex 4/40/70/700/7000
- PowerFlex DC Drives

This instruction is provided as a rung import for installation.

Click the link to access the Reference Manual:

SYSLIB-RM016

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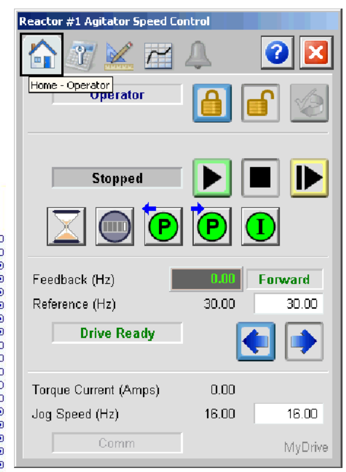
Global Object

Faceplate



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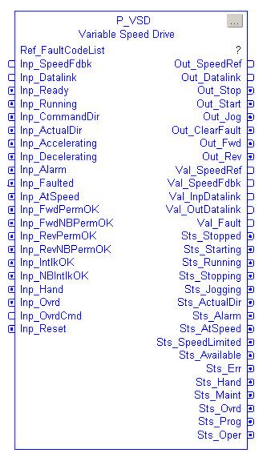

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Table 6 - Motors

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

E1 Plus™ Electronic Overload Relay
(P_E1PlusE)

The P_E1 Plus (EtherNet/IP) instruction controls and monitors an E1 Plus overload relay by using a 193-ETN EtherNet/IP interface.

The instruction monitors the overload relay for warning and trip conditions, displays motor current as a percentage of Full Load amps (% FLA), and percentage of motor thermal utilization (% MTU). A list includes the causes of the last five overload trips. The instruction also provides a limited capability for remote reset of overload trips.

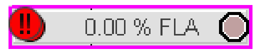
This instruction is provided as a rung import for installation.

Click the link to access the Reference Manual:

SYSLIB-RM049

</td><td>

Global Object



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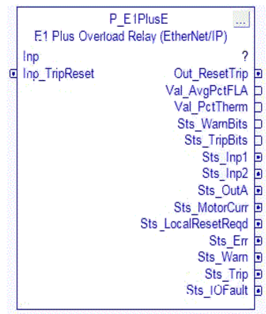

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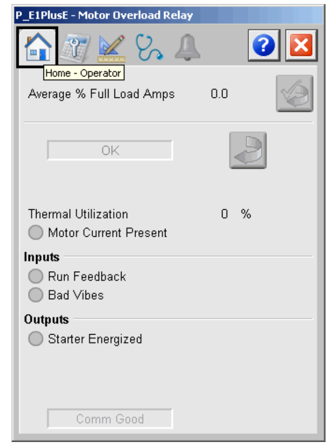

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<tr><td>

E3™/E3Plus™ Overload Relay
(P_E3Ovld)

The P_E3Ovld instruction controls and monitors the following overload relays:

- 193/592-EC1
- 193/592-EC2
- 193/592-EC3
- 193/592-EC5

The instruction monitors the relays by using a built-in DeviceNet interface or by using a 2100-ENET EtherNet/IP interface. The instruction reports warning and trip conditions, displays motor current as a percentage of Full Load amps (% FLA), and provides commands to initiate a remote trip and a remote trip reset.

This instruction is provided as a rung import for installation.

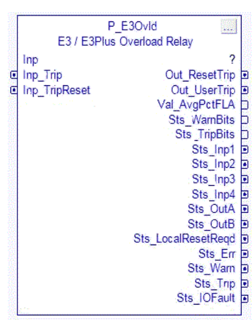
Click the link to access the Reference Manual:

SYSLIB-RM050

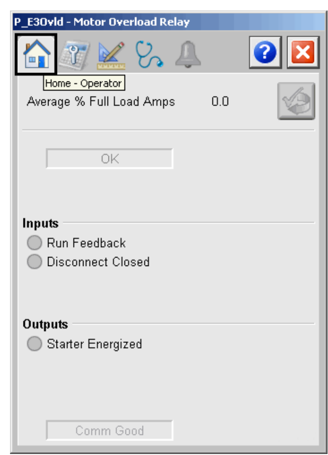
</td><td>

Global Object

Add-On Instruction



Faceplate



</td></tr>
</table>

Table 6 - Motors

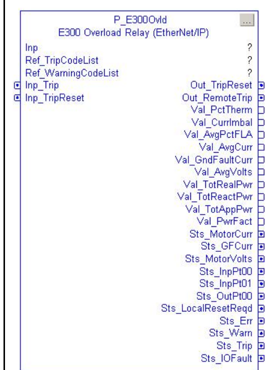
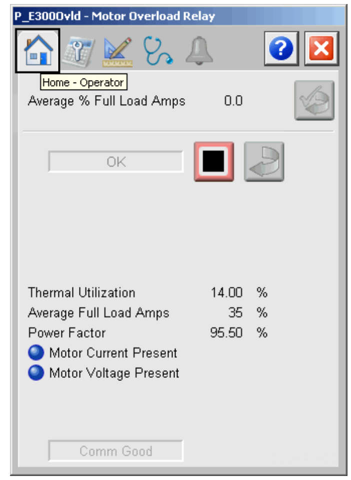
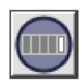
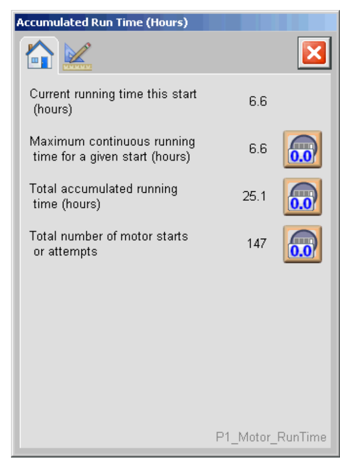
Process Object Description	Object Elements
E300™ Overload Relay (P_E300Ovld) The P_E300Ovld instruction controls and monitors a 193-ECM-ETR overload relay by using its built-in EtherNet/IP interface. The instruction reports warning and trip conditions, displays motor average current and phase currents, and provides commands to initiate a remote trip and a remote trip reset. The instruction also supports add-on options for the overload relay, including its operator interface, and optional discrete I/O and analog I/O modules. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: SYSLIB-RM051	Global Object  Add-On Instruction  Faceplate 
Run Time and Start Counter (P_RunTime) The P_RunTime instruction is used to accumulate the total run time and count of starts for a motor or other equipment. It is a software implementation of the mechanical hour meter that is often mounted in the door of a Motor Control Center (MCC) bucket to show total motor run time. The run time and number of starts are variables used for maintenance activities. Click the link to access the Reference Manual: SYSLIB-RM010	Global Object  Add-On Instruction  Faceplate 

Table 6 - Motors

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Restart Inhibit for Large Motor
(P_ResInh)

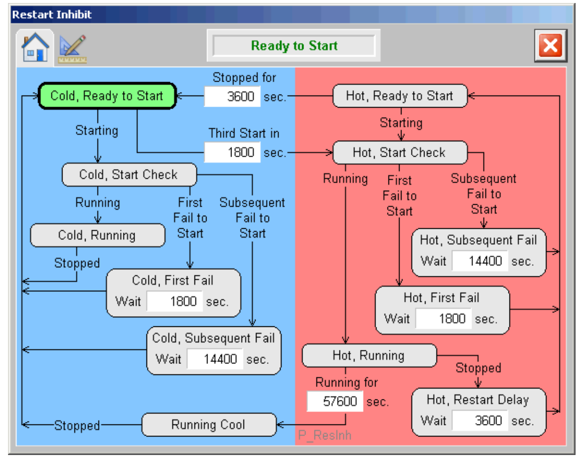
The P_ResInh instruction is used to help prevent damage to a large motor from repeated starts. The instruction provides a rule-based state model for restarts and is not intended to model or monitor the motor heating.

Click the link to access the Reference Manual:

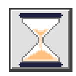
[SYSLIB-RM009]()

</td><td>

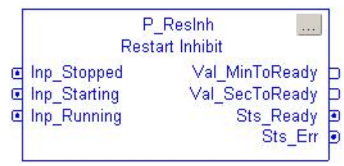
Faceplate



Global Object



Add-On Instruction



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</table>

Notes:

Valves

The Process Objects in this group provide an interface to a wide range of process valve types and valve statistical calculations.

Table 7 - Valves

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Analog/Pulsed Control Valve (P_ValveC)

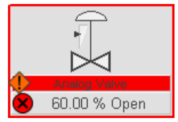
The P_ValveC instruction manipulates a control valve by using an analog signal or discrete signals.

The valve requires an analog output (or analog value over a network) for the target position. Or, the valve requires a pair of discrete outputs (or discrete signals over a network) to tell it when to move toward fully closed and when to move toward fully open.

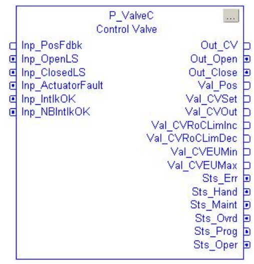
Click the link to access the Reference Manual: SYSLIB-RM034

</td><td>

Global Object



Add-On Instruction



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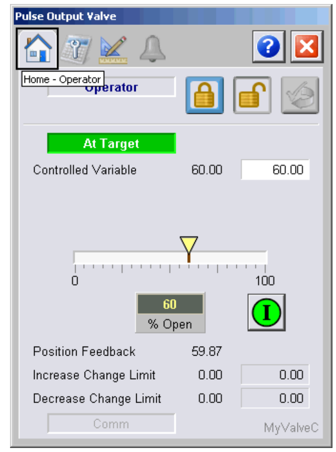


</td></tr>
<tr><td>

Hand-operated Valve (P_ValveHO)

The P_ValveHO instruction monitors a hand (locally) operated valve and displays its current state.

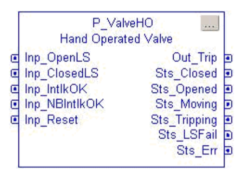
The valve can be solenoid operated, motor operated, or manually actuated. The P_ValveHO instruction cannot fully control the valve, but it can optionally provide an output to include in a trip circuit to trip the valve to a default (fail) state.

Click the link to access the Reference Manual: SYSLIB-RM025

</td><td>

Global Object

Add-On Instruction



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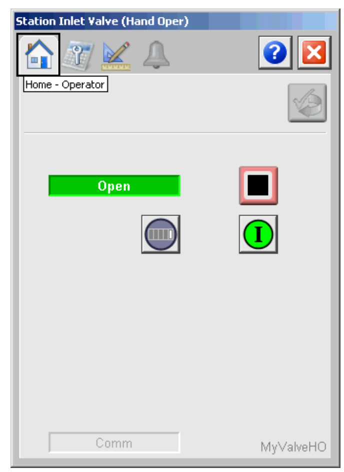


</td></tr>
</table>

Table 7 - Valves

Motor-operated Valve (P_ValveMO)

The P_ValveMO instruction is used to operate (open and close) a motor-operated valve in various modes, monitoring for fault conditions.

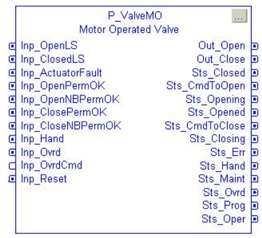
The valve can have, but does not require, limit switch feedback for the ends of travel. The valve can optionally use an output to trigger a 'valve stop' function, such as breaking a seal-in circuit on the valve operator to stop travel or switch the direction of travel.

Click the link to access the Reference Manual:

SYSLIB-RM014

Global Object

Add-On Instruction



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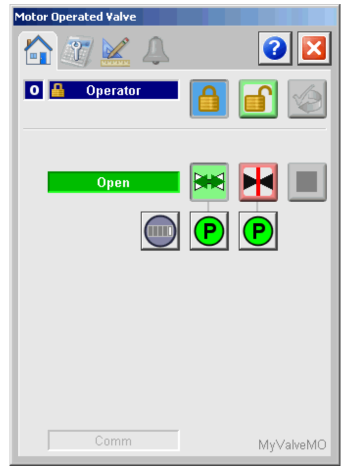


Mix-proof Valve (P_ValveMP)

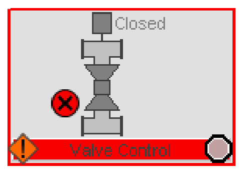
The P_ValveMP instruction controls one mix-proof valve in various modes and states, and can verify that the valve reached the commanded position. An alarm can be provided on failure to reach a target position.

This instruction supports mix-proof valves with or without additional connections for cleaning (CIP, clean in place) or steaming (SIP, sanitize in place).

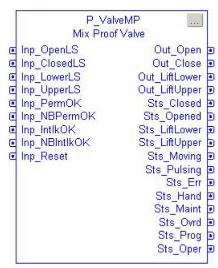
Click the link to access the Reference Manual:

SYSLIB-RM035

Global Object



Add-On Instruction



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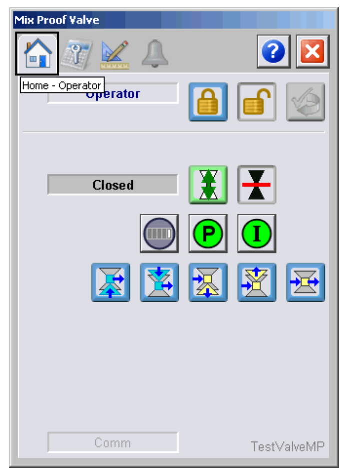


Solenoid-operated Valve (P_ValveSO)

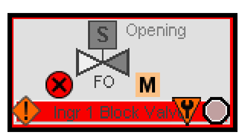
The P_ValveSO instruction is used to operate (open and close) a single solenoid operated valve in various modes, monitoring for fault conditions.

Use this instruction to operate a single-solenoid spring-return valve, either energize-to-open (fail closed) or energize-to-close (fail open). The valve can have, but does not require, limit switch feedback for either or both ends of travel.

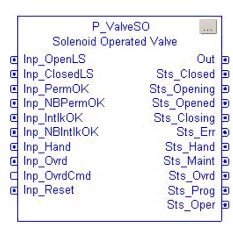
Click the link to access the Reference Manual:

SYSLIB-RM015

Global Object



Add-On Instruction



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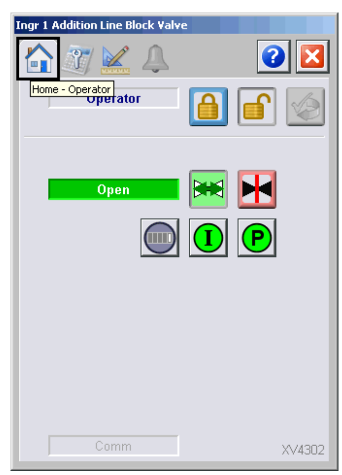

Table 7 - Valves

<table>
<tr>
<td>

2-state Valve Statistics (P_ValveStats)

The P_ValveStats instruction monitors a 2-state (open and close) valve and records various statistics that are related to stroke times and stroke counts.

The instruction is designed to work with the P_ValveSO, P_ValveMO, and P_ValveHO instructions. This instruction also can be used with the P_ValveMP instruction.

Click the link to access the Reference Manual:

SYSLIB-RM036

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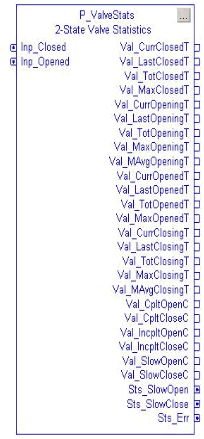
<td>

Add-On Instruction



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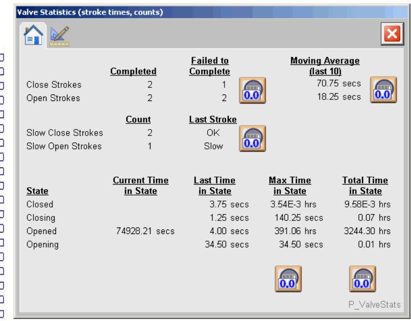

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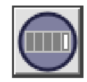

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<tr>
<td>

n-Position Device (P_nPos)

The P_nPos instruction controls a circular or linear discrete device with 2…8 positions.

The instruction provides outputs to select an individual position and outputs to move toward increasing positions (‘clockwise’ for a circular device) or decreasing positions (‘counterclockwise’ for a circular device).

Click the link to access the Reference Manual:

SYSLIB-RM031

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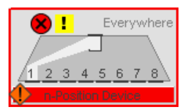
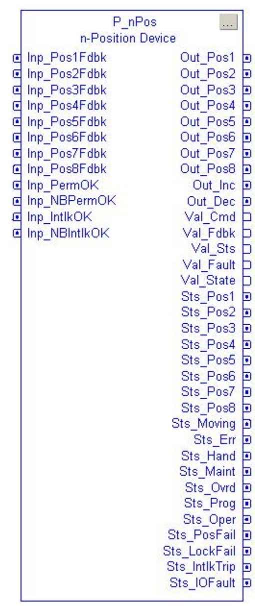
Global Object



Add-On Instruction



Faceplate

</td>
</tr>
</table>

Table 7 - Valves

<table>
<tr>
<td>

Discrete 2-, 3-, or 4-state Device
(P_D4SD)

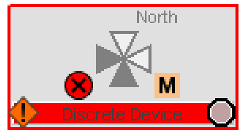
The P_D4SD instruction controls and monitors feedback from a discrete 2-state, 3-state, or 4-state device, including a multiple-speed motor or a multiple-position valve.

The instruction controls up to four discrete outputs, with configurable states of each output in the various device states, and monitors up to four discrete feedback inputs.

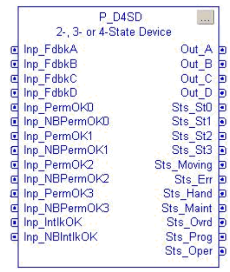
Click the link to access the Reference Manual:
SYSLIB-RM028

</td>
<td>

Global Object



Add-On Instruction



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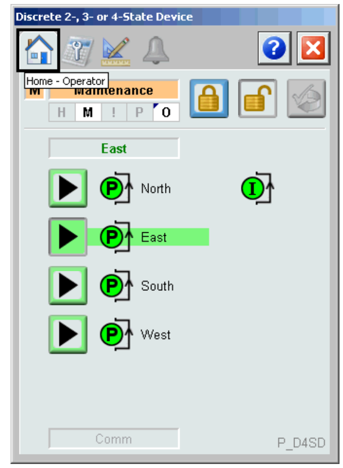
Faceplate



</td>
</tr>
</table>

Steam Tables

The Process Objects in this group provide steam table calculations.

Table 8 - Steam Tables

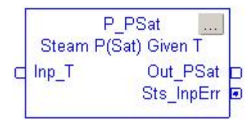
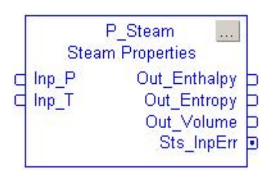
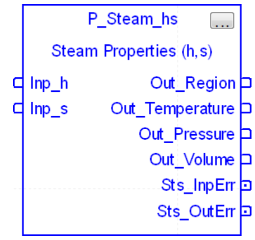
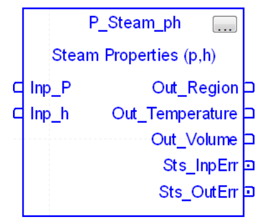
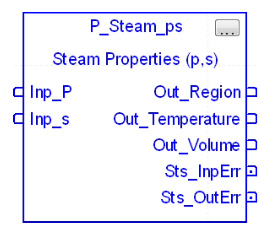
Steam Object Description	Object Elements
Saturated Steam Pressure (P_PSat) The P_PSat instruction calculates the absolute pressure (in MPa or psia) of saturated steam given the temperature (in degrees Celsius or Fahrenheit). It also provides the liquid and vapor enthalpy, entropy, and specific volume at the given temperature. Click the link to access the Reference Manual: PROCES-RM004	The P_PSat instruction is only a calculation function, and no HMI components are provided. Add-On Instruction 
Saturated Steam Temperature (P_TSat) The p_TSat instruction calculates the temperature (in degrees Celsius or Fahrenheit) of saturated steam given the absolute pressure (in MPa or psia). It also provides the liquid and vapor enthalpy, entropy, and specific volume at the given pressure. Click the link to access the Reference Manual: PROCES-RM004	The P_TSat instruction is only a calculation function, and no HMI components are provided. Add-On Instruction 
General Steam Table (P_Steam) The P_Steam instruction calculates the enthalpy, entropy, and specific volume for steam (or water) at the given pressure and temperature. Click the link to access the Reference Manual: PROCES-RM004	The P_Steam instruction is only a calculation function, and no HMI components are provided. Add-On Instruction 

Table 8 - Steam Tables

Steam Object Description	Object Elements	
Steam Properties Given Enthalpy and Entropy (P_Steam_hs) The P_Steam_hs (Steam Properties Given Enthalpy and Entropy) Add-On Instruction calculates the pressure, temperature, specific volume (Region 3), and vapor fraction (Region 4) at the given enthalpy and entropy. Click the link to access the Reference Manual: PROCES-RM004	The P_Steam_hs instruction is only a calculation function, and no HMI components are	Add-On Instruction 
Steam Properties Given Pressure and Enthalpy (P_Steam_ph) The P_Steam_ph (Steam Properties Given Pressure and Enthalpy) Add-On Instruction calculates the temperature and specific volume (Region 3) at the given pressure and enthalpy. Click the link to access the Reference Manual: PROCES-RM004	The P_Steam_ph instruction is a calculation function only, and no HMI components are provided.	Add-On Instruction 
Steam Properties Given Pressure and Entropy (P_Steam_ps) The P_Steam_ps (Steam Properties Given Pressure and Entropy) Add-On Instruction calculates the temperature and specific volume (Region 3) at the given pressure and entropy. Click the link to access the Reference Manual: PROCES-RM004	The P_Steam_ps instruction is only a calculation function, and no HMI components are	Add-On Instruction 

Cross Functional

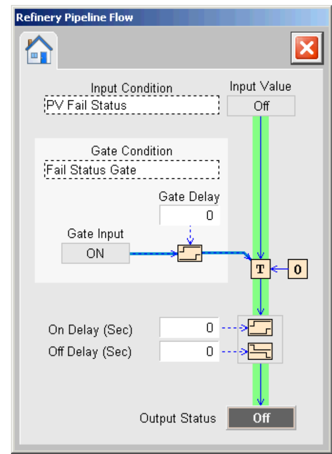
The Process Objects in this group are often used to extend the functionality of other objects. However, they can also be used as standalone objects when necessary to implement a desired control scheme.

Table 9 - Cross Functional

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>
Condition Gate Delay (P_Gate)

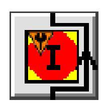
The P_Gate instruction provides a ‘gate’ for a discrete signal and provides on-delay and off-delay timing for the gated signal. This instruction is used within P_DIn, all analog inputs, and P_PIDE for threshold and target disagree status processing.
When the gate input is true, the input is passed through to the output by using on-delay and off-delay timing. When the gate input is false, the output is kept off.

Click the link to access the Reference Manual:
SYSLIB-RM041
</td><td>
Add-On Instruction


Faceplate


</td></tr>
<tr><td>
Interlocks with First Out and Bypass (P_Intlk)

The P_Intlk instruction is used to collect (‘sum up’) the interlock conditions that stop or de-energize a running or energized piece of equipment or prevent it from starting or being energized. Interlocks are always evaluated to de-energize equipment.
Use this instruction if you want configurable text descriptions of shutdown conditions or other features of the P_Intlk faceplate.

Click the link to access the Reference Manual:
SYSLIB-RM004
</td><td>
Global Object

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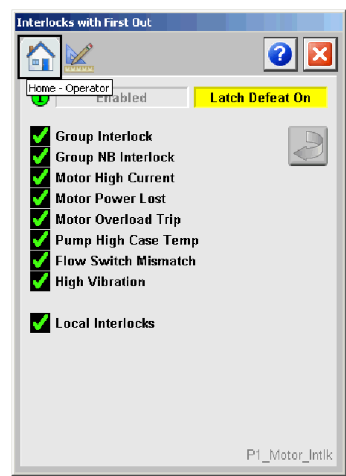
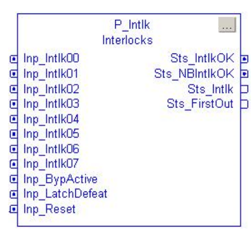


Add-On Instruction


</td></tr>
</table>

Table 9 - Cross Functional

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Permissives with Bypass (P_Perm)

The P_Perm instruction is used to collect ('sum up') the permissive conditions that allow a piece of equipment to start.

Permissive conditions generally must be true to start the equipment. Once the equipment is running, permissives are ignored.

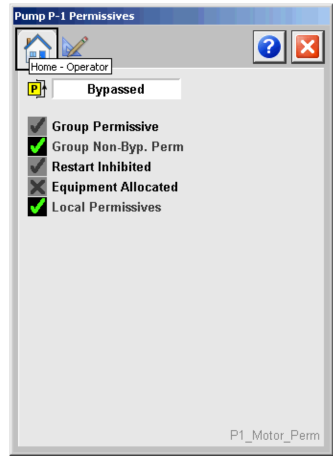
Click the link to access the Reference Manual:

SYSLIB-RM007

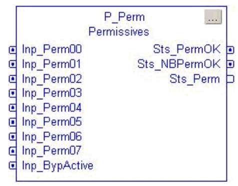
</td><td>

Global Object

Faceplate



Add-On Instruction



</td></tr>
<tr><td>

Central Reset (P_Reset)

The P_Reset instruction provides a central point that resets equipment faults and latched alarms for a control strategy.

Use this instruction if you want a common reset point (Master Reset) for alarms and fault conditions for a control strategy, process unit, process cell or equipment group, process area or plant section, or even a small site.

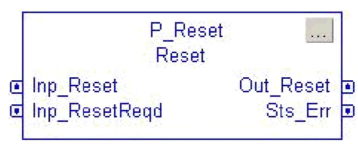
Click the link to access the Reference Manual:

SYSLIB-RM008

</td><td>

Reset Button

Add-On Instruction



</td></tr>
<tr><td>

Common Alarm Block (P_Alarm)

The P_Alarm instruction is used to monitor an input condition, and, when it is true, raise an alarm. An operator is notified of abnormal conditions or events.

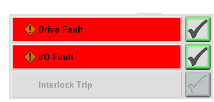
This instruction handles Alarm Acknowledgement, Alarm Reset, Alarm Shelving / Disabling, and Alarm Suppression (for FactoryTalk® Alarm and Events).

Click the link to access the Reference Manual:

SYSLIB-RM002

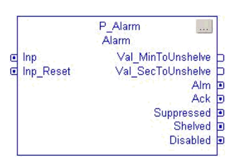
</td><td>

Alarm Display Bars



Faceplate

Add-On Instruction



</td></tr>
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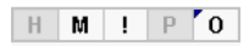
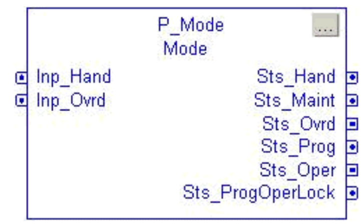
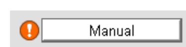
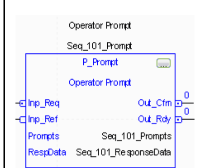
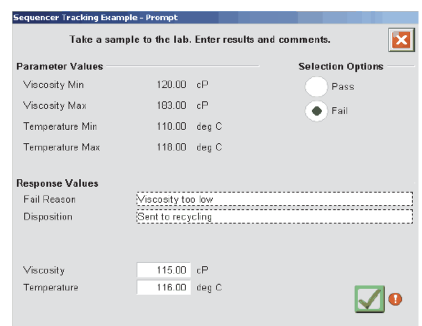
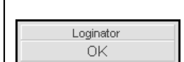
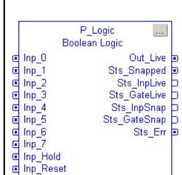
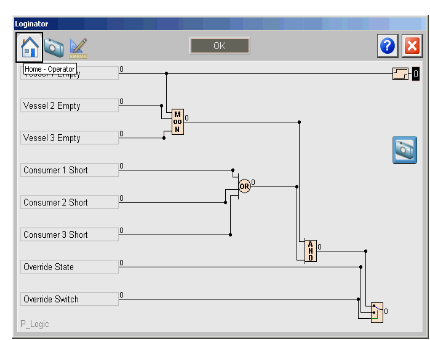
Table 9 - Cross Functional

Process Object Description	Object Elements
Common Mode Block **(P_Mode)** The P_Mode instruction is used to provide selection of the mode (owner) of an instruction or control strategy. Use this instruction if you are creating an Add-On Instruction for a device that requires separate acquisition by an operator and program logic, or that supports Override or Hand capabilities, or that needs a separate Maintenance mode. Click the link to access the Reference Manual: SYSLIB-RM005	Mode Totem Pole  Add-On Instruction 
Operator Prompt **(P_Prompt)** The P_Prompt instruction is a generic mechanism for operator interaction that can be used for any task. The instruction prompts an operator for some type of information (message or data) and accepts operator-input data and confirmation. Click the link to access the Reference Manual: SYSLIB-RM046	Global Object  Add-On Instruction  Faceplate 
Boolean Logic with Snapshot **(P_Logic)** The P_Logic instruction executes up to eight gates of configurable Boolean logic. Each gate provides up to four input conditions. Gate types available include AND, OR, XOR (Exclusive-OR), Set/Reset, Select, and Majority. Click the link to access the Reference Manual: SYSLIB-RM027	Global Object  Add-On Instruction  Faceplate 

Notes:

Diagnostic Objects

These objects provide diagnostic information and statistics for Logix controllers to maximize system performance.

Table 10 - Diagnostic Objects

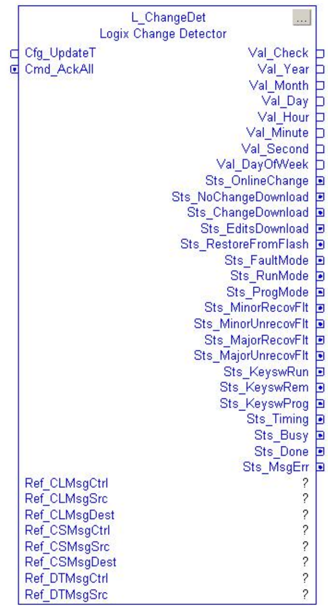
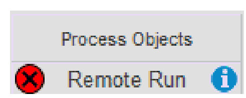
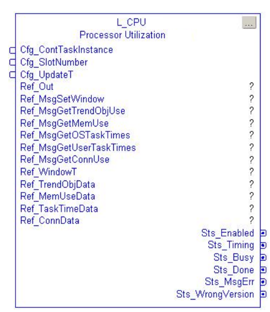
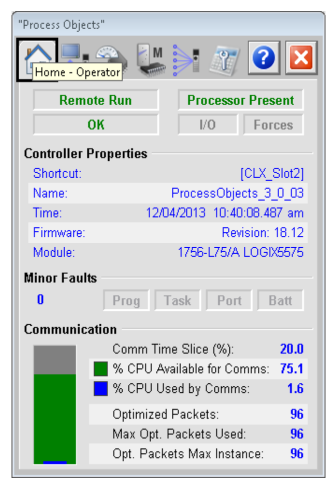
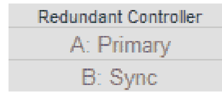
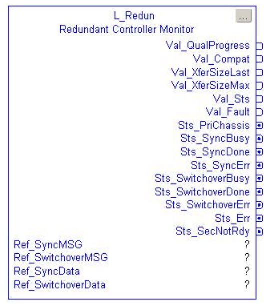
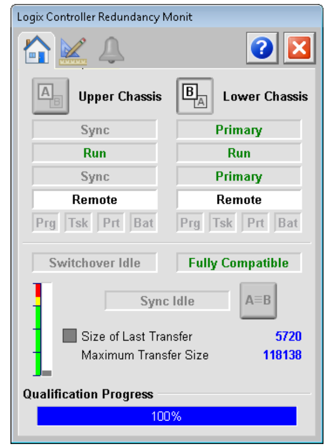
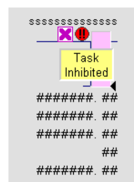
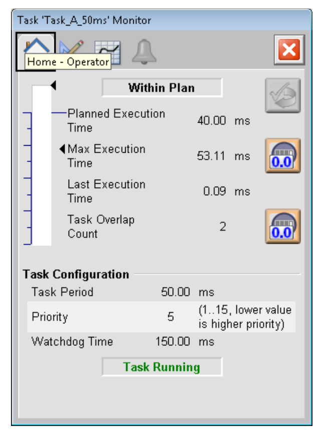
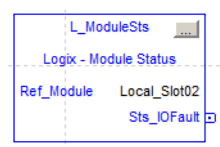
Process Object Description	Object Elements
Logix Change Detector (L_ChangeDet) The L_ChangeDet instruction monitors another Logix controller on the network and checks for changes that impact operation. Changes that can be monitored include downloads, online edits, I/O forcing, and controller mode changes. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: PROCES-RM003	Add-On Instruction No visualization elements are supplied with the L_ChangeDet instruction. 
Logix Controller CPU Utilization (L_CPU) The L_CPU instruction monitors a Logix controller, and provides information on controller CPU utilization, communication usage, memory usage, task scan times, and other information. Data provided by this instruction is useful in diagnosing communication or control responsiveness issues. This instruction is provided as a rung import for installation. **IMPORTANT:** The L_CPU_24 instruction is replaced with an Add-On Instruction for Version 24 and later: L_CPU_24_up. The instruction is used with Version 24 and later (24, 26, 27, 28, 29, 30) major firmware versions of specific CompactLogix™ 5370 and ControlLogix 5570 controllers. Click the link to access the Reference Manual: PROCES-RM003	Global Object  Add-On Instruction  Faceplate 

Table 10 - Diagnostic Objects

Process Object Description	Object Elements
Logix Redundant Controller Monitor **(L_Redun)** The L_Redun instruction monitors one redundant pair of Logix controllers, checking primary and secondary controller status that can impact the ability of the system to switch to the back-up controller on a failure of the primary. This instruction is provided as a rung import for installation. Click the link to access the Reference Manual: PROCES-RM003	Global Object  Add-On Instruction  Faceplate 
Logix Task Monitor **(L_TaskMon)** The L_TaskMon instruction monitors one task running in a Logix controller to provide task statistics, such as task scan time and overlap count. This instruction also provides task configuration settings, task 'plan' execution time, and alarm if the planned execution time is exceeded. Click the link to access the Reference Manual: PROCES-RM003	Global Object  Add-On Instruction  Faceplate 
Logix Module Status **(L_ModuleSts)** The L_ModuleSts (Logix Module Status) Add-On Instruction monitors the connection status of one module in the I/O configuration tree of the Logix controller. The instruction also provides an I/O fault if the connection is not 'running'. Click the link to access the Reference Manual: PROCES-RM003	No visualization elements are supplied with the L_ModuleSts instruction. Add-On Instruction 

Built-in Instructions

Faceplates shown in this section are designed so the built-in Logix5000™ controller instructions can interface with the Process Library Add-On Instructions.

Table 11 - Built-in Instructions

<table>
<tr><th>Process Object Description</th><th>Object Elements</th></tr>
<tr><td>

Built-in Autotuner

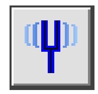
The Studio 5000 Logix Designer® application PIDE autotuner provides an open-loop autotuner that is built into the PIDE instruction. The autotune function is accessed from the PIDE faceplate.

You can autotune from PanelView™ terminals or any other operator interface devices as well as the Logix Designer application. The PIDE block has an Autotune Tag (type PIDE_AUTOTUNE) that you specify for those PIDE blocks that you want to autotune.

Click the links to access:
- faceplates in Appendix F
- Reference Manual, publication 1756-RM006

</td><td>

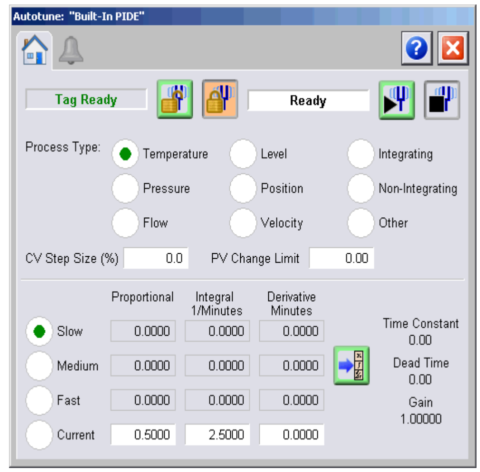
Global Object



— — —

The autotune is supported only in function block programming; it is not available in relay ladder or structured text programming.

Faceplate



</td></tr>
<tr><td>

Coordinated Control (CC)

The Coordinated Control (CC) function block controls a single process variable by manipulating as many as three different control variables. As an option, any of the three outputs can be used as an input to create feed forward action in the control variable.

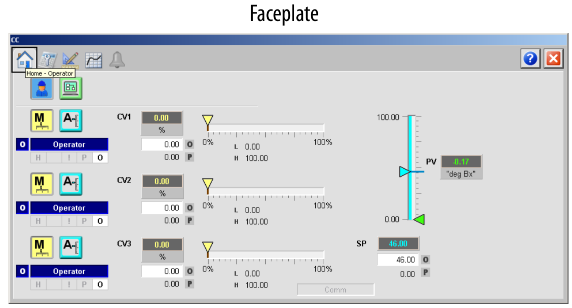
The CC function block calculates the control variables (CV1, CV2, and CV3) in the Auto mode based on the PV - SP deviation, internal models, and tuning.

The CC function block is a flexible model-based algorithm that can be used in various configurations.

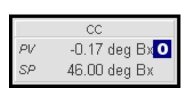
Click the links to access:
- faceplates in Appendix F
- Reference Manual, publication 1756-RM006

</td><td>

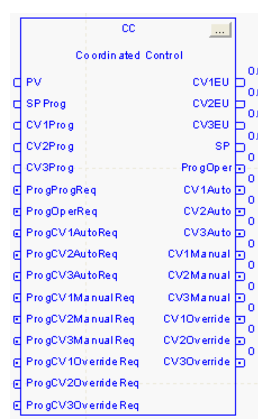
Faceplate



Global Object



Add-On Instruction



</td></tr>
</table>

Table 11 - Built-in Instructions

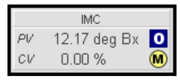
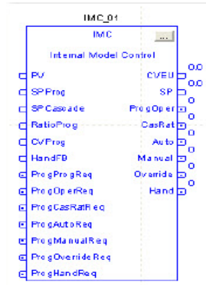
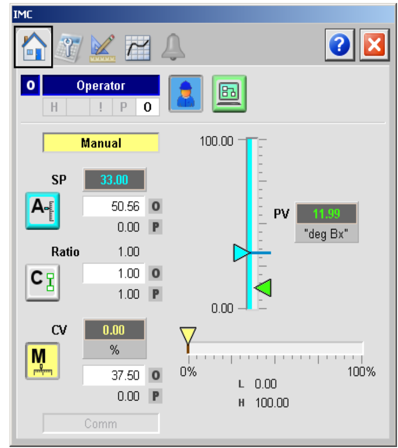
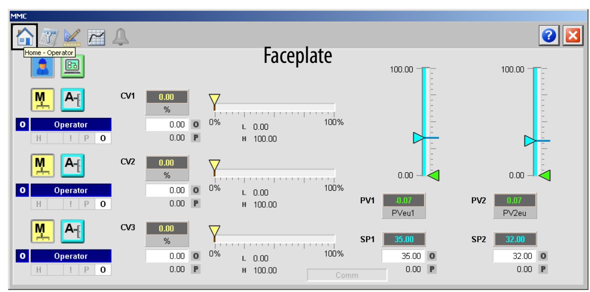
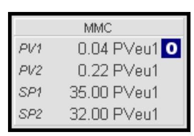
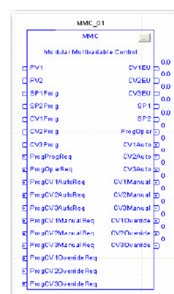
Process Object Description	Object Elements
Internal Model Control (IMC) The IMC function block controls a single process variable by manipulating a single control-variable output. This function block performs an algorithm where the actual error signal is compared against that of an internal first-order lag plus deadtime model of the process. The IMC function block calculates the control variable output (CV) in the Auto mode based on the PV - SP deviation, internal model, and tuning. Click the links to access: • faceplates in Appendix F • Reference Manual, publication 1756-RM006	Global Object  Add-On Instruction  Faceplate 
Modular Multivariable Control (MMC) The Modular Multivariable control (MMC) function block controls two process variables to their setpoints by manipulating up to three control variables. The MMC function block calculates the control variables (CV1, CV2, and CV3) in the Auto mode based on the PV1 - SP1, PV2 - SP2 deviation, internal model, and tuning. The MMC function block is a flexible model-based algorithm that can be used in two basic configuration modes: • Three control variables used to control two interacting process variables • Two control variables used to control two interacting process variables Click the links to access: • faceplates in Appendix F • Reference Manual, publication 1756-RM006	Faceplate  Global Object  Add-On Instruction 

Table 11 - Built-in Instructions

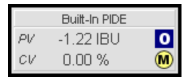
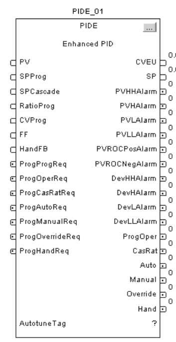
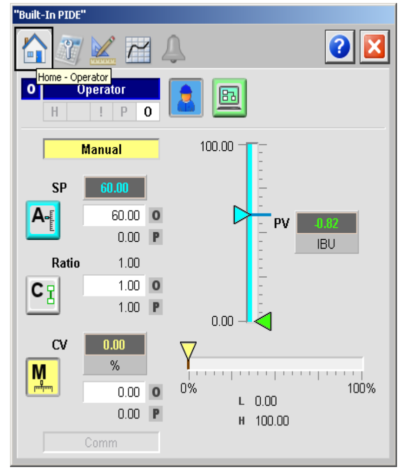
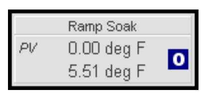
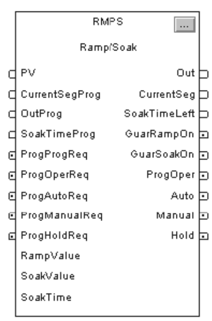
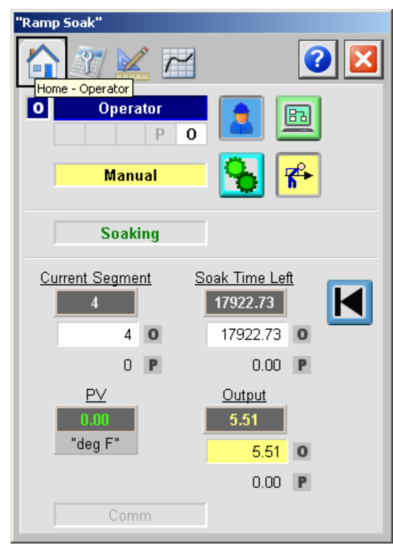
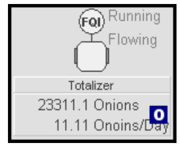
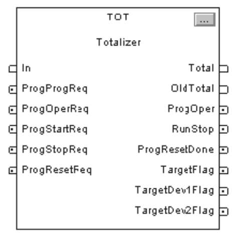
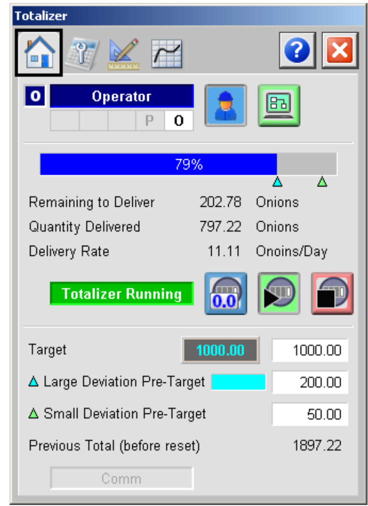
Process Object Description	Object Elements
Enhanced PID (PIDE) The PIDE instruction provides enhanced capabilities over the standard PID instruction. The instruction uses the velocity form of the PID algorithm. The gain terms are applied to the change in the value of error or PV, not the value of error or PV. The PIDE instruction uses a velocity form PID algorithm similar to those used in most DCS systems. An advantage to a velocity form algorithm includes a bumpless adaptive gain change – changing gains on the fly without initializing the algorithm. Click the links to access: • faceplates in Appendix F • Reference Manual, publication 1756-RM006	Global Object  Add-On Instruction  Faceplate 
Ramp/Soak (RMPS) The RMPS instruction provides for a number of segments of alternating ramp and soak periods. The RMPS instruction is typically used to provide a temperature profile in a batch heating process. The output of this instruction is typically the input to the setpoint of a PID loop. The RMPS instruction can be controlled by either Program mode or Operator mode. Control can be changed any time. Click the links to access: • faceplates in Appendix F • Reference Manual, publication 1756-RM006	Global Object  Add-On Instruction  Faceplate 

Table 11 - Built-in Instructions

Process Object Description	Object Elements
Totalizer (TOT) This instruction typically totals the amount of a material added over time, based on a flow signal. Support for the TOT instruction includes the following: • Time-base selectable as seconds, minutes, hours, or days. • Specify a target value and up to two pre-target values. Pre-target values are typically used to switch to a slower feed rate. Digital flags show the reaching of the target or pre-target values. • Low flow input cutoff that eliminates negative totalization due to slight flowmeter calibration inaccuracies when the flow is shut off. Click the links to access: • faceplates in Appendix F • Reference Manual, publication 1756-RM006	Global Object  Add-On Instruction  Faceplate 

PlantPAx MPC

The faceplates in this section are provided to facilitate interaction with the PlantPAx MPC module.

Table 12 - PlantPAx MPC

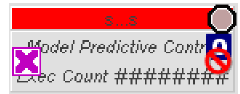
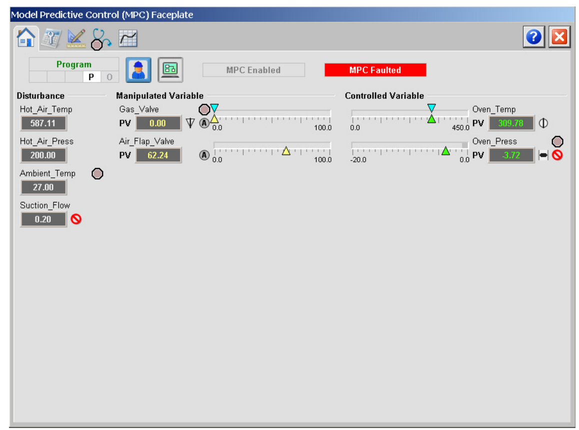
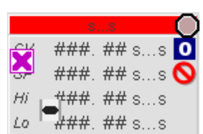
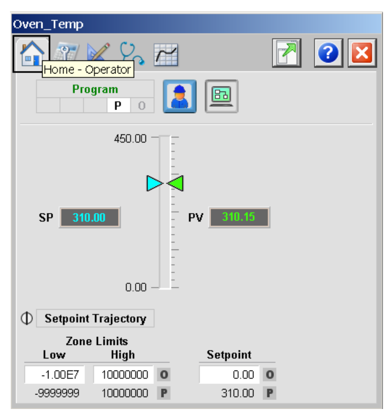
Process Object Description	Object Elements
MPC Overview This faceplate provides an overview of the MPC controller and modification of its general settings. The faceplate shows values for Disturbance, Manipulated, and Controlled Variables. The number of displayed variables depends on the configuration stored in the MPC controller tag. Five tabs provide additional information for operators, maintenance personnel, engineers, and others to interact with the MPC Client instruction instance. A 'faulted' message appears if a setpoint value has triggered attention. Click the link to access the faceplates: PlantPAx MPC Overview on page 289	Global Object  Faceplate 
Controlled Variable (CV) This faceplate provides the ability to monitor and interact with the PlantPAx MPC Controlled Variable (CV). The faceplate connects to the Controlled Variable data structure, which is stored in the MPC tag in array CV. The index is passed to the faceplate as a parameter. The Controlled Variable faceplate consists of five tabs and each tab consists of one or more pages. Click the link to access the faceplates: PlantPAx MPC Controlled Variable on page 304	Global Object Faceplate  

Table 12 - PlantPAx MPC

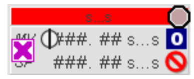
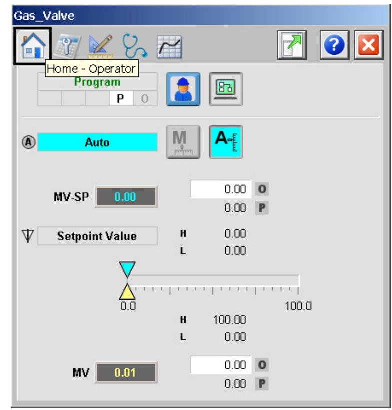
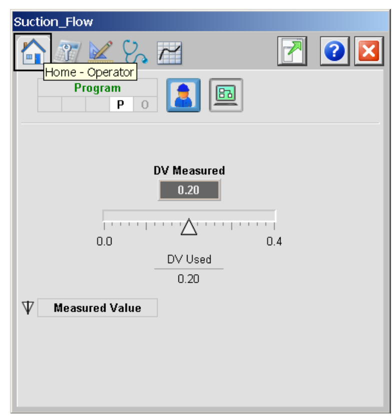
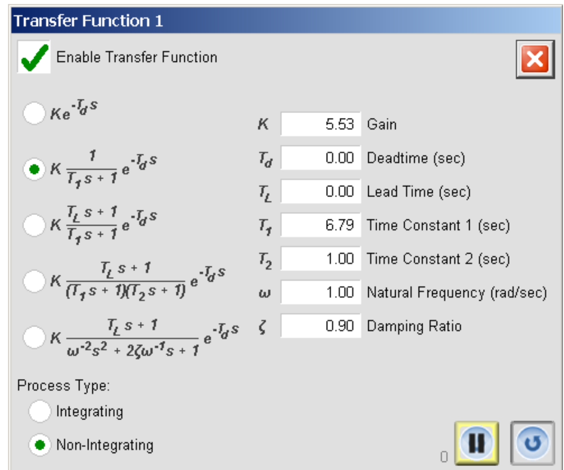
Process Object Description	Object Elements
Manipulated Variable (MV) This faceplate provides the ability to monitor and interact with the PlantPAx MPC Manipulated Variable (MV). The faceplate connects to the Manipulated Variable data structure, which is stored in the MPC tag in array MV. The index is passed to the faceplate as a parameter. The Manipulated Variable faceplate consists of five tabs and each tab consists of one or more pages. Click the link to access the faceplates: PlantPAx MPC Manipulated Variable on page 319	Global Object  Faceplate 
Disturbance Variable (DV) This faceplate provides the ability to monitor and interact with the PlantPAx MPC Disturbance Variable (DV). The faceplate connects to the Disturbance Variable data structure, which is stored in the MPC tag in array DV. The index is passed to the faceplate as a parameter. The Disturbance Variable faceplate consists of five tabs and each tab consists of one or more pages. Click the link to access the faceplates: PlantPAx MPC Disturbance Variable on page 332	Global Object  Faceplate 

Table 12 - PlantPAx MPC

Process Object Description	Object Elements
Transfer Function This faceplate provides the ability to monitor and interact with the PlantPAx MPC transfer function. The faceplate is used for editing of transfer functions between: • MVs and CVs • DVs and CVs **IMPORTANT:** The Transfer Function faceplate opens only from page 1 of the Engineering tab of the MV Faceplate or from page 1 of the Engineering tab of the DV Faceplate. Click the link to access the faceplates: PlantPAx MPC Transfer Function on page 341	Faceplate 

64-Bit Math

See Long Integer and Time Instructions on page 187 for 64-bit (LINT) math and time functions with library objects.

Time and Date Math

See the Time and Date Instructions on page 191 for date and time functions with library objects.

Standard Symbols and Indicators

The Library of Process Objects uses a standard set of symbols and indicators across its HMI objects. The following section illustrates these items.

Table 13 - Tab Navigation Icons

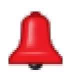
Graphic Symbol	Description
	Operator (Home) Page
	Maintenance Page
	Engineering Page
	Trends Page
	Diagnostics Page
	Alarms Page
	Alarms Page (with active alarm)
	Snapshot Page

Table 14 - Breadcrumbs

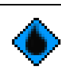
Graphic Symbol	Description
	Invalid Configuration
	Information Available
	A Maintenance Bypass is active
	Operator Attention: prompt posted and operator response required
	Maintenance Required

Table 15 - Mode Symbols and Indicators

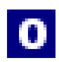
Graphic Symbol	Description
	No Mode (out of service)
	Hand (Local)
	Device in Maintenance mode
	Override
	Device locked in Program mode
	Device locked in Operator mode
	Device in Program mode
	Device in Operator mode

Table 16 - Status Symbols

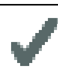
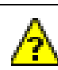
Graphic Symbol	Description
	Input or device has been disabled
	At target speed
	Communication failure
	Accelerating
	Decelerating
	Data quality degraded: uncertain, test, simulation, substitution, or out of specification
	The device is not ready to operate
	Value is being initialized
	Value has not changed (stuck)
	Input has been rejected

Table 16 - Status Symbols

Graphic Symbol	Description
	Value infinite or not a number
	Value clamped to minimum/maximum
	Output CV clamped to minimum/maximum (information)
	Value is being held at the last good value
	Value is being replaced
	Input matches target
	Input does not match target

Table 17 - Alarm Symbols

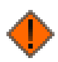
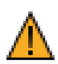
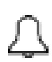
Graphic Symbol	Description
	Urgent
	High
	Medium
	Low
	Out of alarm - Acknowledge required
	Alarm inhibit (suppressed, shelved, or disabled)
	In alarm (alarm active)
	In alarm and acknowledged
	Out of alarm but not acknowledged

Table 17 - Alarm Symbols

Graphic Symbol	Description
	Alarm suppressed (by Program logic)
	Alarm disabled (by Maintenance)
	Alarm shelved (by Operator)

Table 18 - Interlock and Permissive Indicators

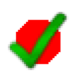
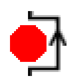
Graphic Symbol		Description
		One or more conditions not OK
		Non-bypassed conditions OK
		All conditions OK, bypass active
		All conditions OK
		Enable checking all interlock and permissive conditions
		Bypass interlocks and permissives that can be bypassed

Table 19 - Level and Deviation Threshold Indicators

Graphic Symbol	Description
	High-high threshold exceeded
	High threshold exceeded
	Low threshold exceeded
	Low-low threshold exceeded
	High rate of change threshold exceeded
	High-high deviation threshold exceeded

Table 19 - Level and Deviation Threshold Indicators

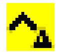
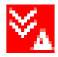
Graphic Symbol	Description
	High deviation threshold exceeded
	Low deviation threshold exceeded
	Low-low deviation threshold exceeded

Table 20 - PID Symbols

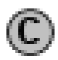
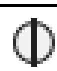
Graphic Symbol	Description
	Manual loop mode
	Auto loop mode
	Auto loop mode (cascade enabled)
	Cascade loop mode
	PV within SP deadband (no control action occurs)
	The CV has reached a high limit and cannot control the loop
	The CV has reached a low limit and cannot control the loop

Table 21 - MPC Symbols

Graphic Symbol	Description
	Setpoint or Manual Trajectory used
	Setpoint or Manual Value used
	Zone Control used
	Measured Value used

Standard Buttons

The Library of Process Objects uses a standard set of buttons across its HMI objects. The following section illustrates these items.

Table 22 - Enable and Disable Buttons

Button	Description	Button	Description
	Enable Device		Disable Device

Table 23 - Alarm Buttons

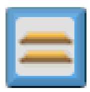
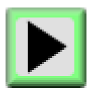
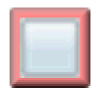
Button	Description	Button	Description
	Acknowledge Alarm		Acknowledge and Reset all alarms for an object
	Shelve Alarm		Unshelve Alarm
	Enable Alarm		Disable Alarm

Table 24 - Mode Buttons

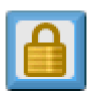
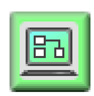
Button	Description	Button	Description
	Lock Operator Mode		Unlock Operator Mode
	Request Operator Mode		Request Program Mode
	Request Maintenance Mode		Release Maintenance Mode
	Navigate to Mode Configuration Display		

Table 25 - PID Buttons

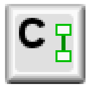
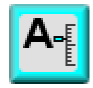
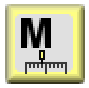
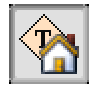
Button	Description	Button	Description
	Request Cascade Loop mode		Request Auto Loop mode
	Request Manual Loop mode		Request 'Normal' Loop mode

Table 26 - Miscellaneous Command Buttons

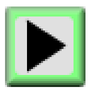
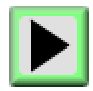
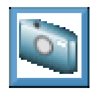
Button	Description	Button	Description
	Move to state		Move to position
	Clear Counter		Capture snapshot. Captures the current state of the object.

Table 27 - Mix-proof Valve Buttons

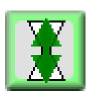
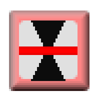
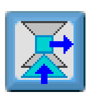
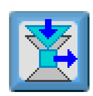
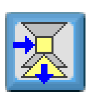
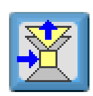
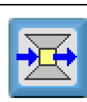
Button	Description	Button	Description
	Open Valve		Close Valve
	Lift Valve Lower Seat		Lift Valve Upper Seat
	SIP/CIP Valve Lower Seat		SIP/CIP Valve Upper Seat
	SIP/CIP Valve Cavity		

Table 28 - Motor and Drive Buttons

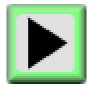
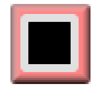
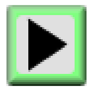
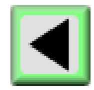
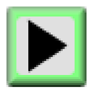
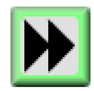
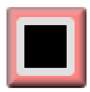
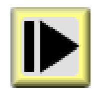
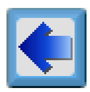
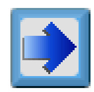
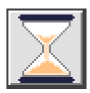
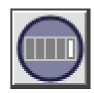
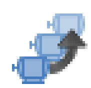
Button	Description	Button	Description
	Start		Stop
	Run Motor Forward		Run Motor Reverse
	Run Motor at Slow Speed		Run Motor at Fast Speed
	Operator Command to Trip Motor		Jog
	Request Reverse Motion		Request Forward Motion
	Restart Inhibit Navigation Button		Runtime Accumulator Navigation Button
	Overload Navigation Button		Rotate Motor Assignment Button

Table 29 - Valve Buttons

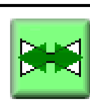
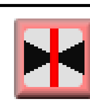
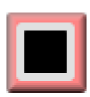
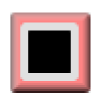
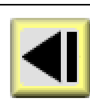
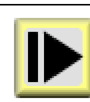
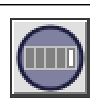
Button	Description	Button	Description
	Open Valve		Close Valve
	Stop Valve Motion		Operator Command to Trip Valve
	Bump Valve Close		Bump Valve Open
	Valve Stats Navigation Button		

Table 30 - Overload Buttons

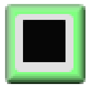
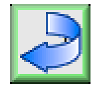
Button	Description	Button	Description
	Operator Command to Trip Overload		Operator Command to Reset the Overload Trip

Table 31 - Digital Output Buttons

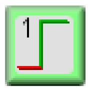
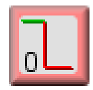
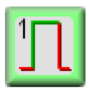
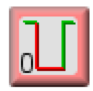
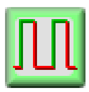
Button	Description	Button	Description
	Output ON		Output OFF
	Pulse Output ON (Once)		Pulse Output OFF (Once)
	Continuous Pulse Output		

Table 32 - Analog Input Buttons

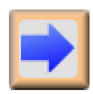
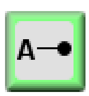
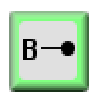
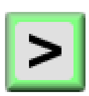
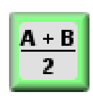
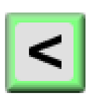
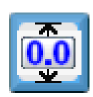
Button	Description	Button	Description
	Use Input PV		Use Substitute PV
	Select Sensor A Input PV		Select Sensor B Input PV
	Select the Maximum of Sensor A and Sensor B Input PV		Select the Average of Sensor A and Sensor B Input PV
	Select the Minimum of Sensor A and Sensor B Input PV		Operator Command to Reset Min and Max capture Values

Table 33 - Dosing Buttons

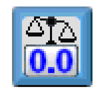
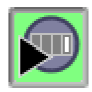
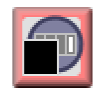
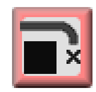
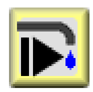
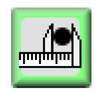
Button	Description	Button	Description
	Clear Totalizer		Tare Scale
	Start Totalizer		Stop Totalizer
	Start Flow		Stop Flow
	Bump Flow		Check Tolerances

Table 34 - Deadband Controller Buttons

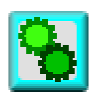
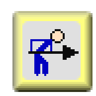
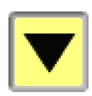
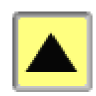
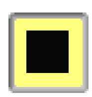
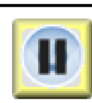
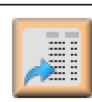
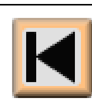
Button	Description	Button	Description
	Request Auto mode		Request Manual mode
	Drive PV lower		Drive PV higher
	Not drive PV higher or lower		

Table 35 - PlantPAx MPC Buttons

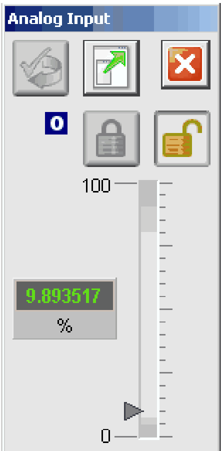
Button	Description	Button	Description
	Temporarily suspend Change Core update requests		Enable Change Core update requests. Requests can occur each time a core parameter is modified.
	Requested parameter update from MPC module to MPC client		Refresh communications between MPC client and MPC module
	Request initialization		

Notes:

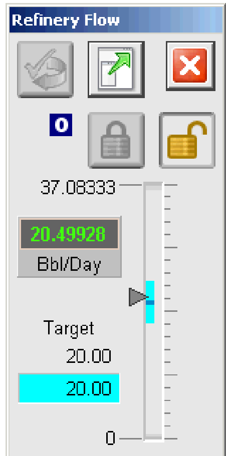
Quick Displays

Quick displays provide means for operators to perform simple interactions with Add-On Instruction instances. From the Quick Display, you can navigate to the faceplate for full access for operation, maintenance, and configuration.

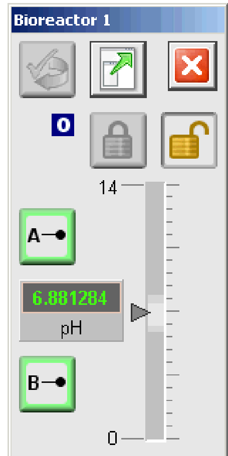
Basic Analog Input
(P_AIn)



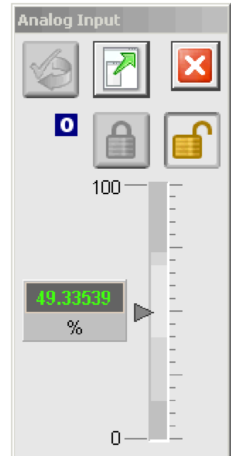
Advanced Analog Input
(P_AInAdv)



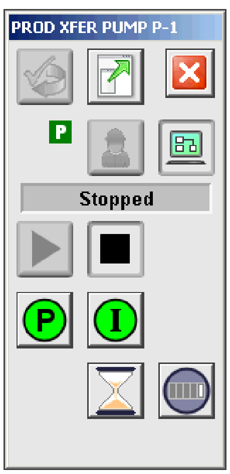
Dual Sensor Analog Input
(P_AInDual)



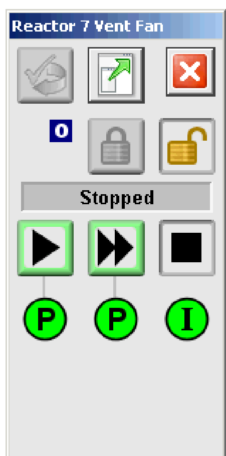
Multiple Analog Input
(P_AInMulti)



Single-speed Motor
(P_Motor)



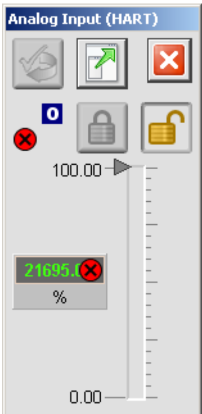
Two-speed Motor
(P_Motor2Spd)



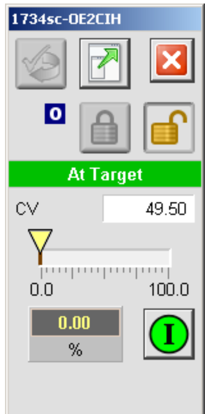
Hand-operated Motor
(P_MotorHO)

Reversing Motor
(P_MotorRev)

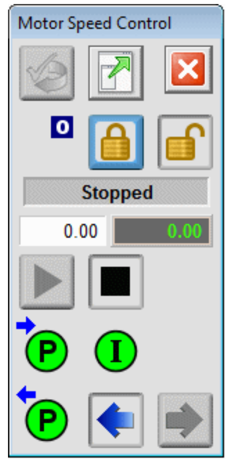
HART Analog Input
(P_AInHART)



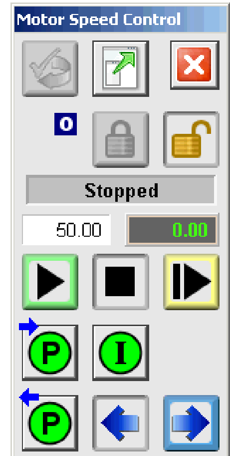
HART Analog Output
(P_AOutHART)



PowerFlex 523/525 Drive
(P_PF52x)



PowerFlex 753 Drive
(P_PF753)



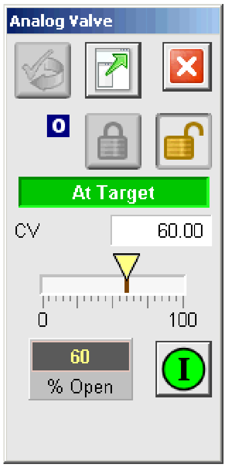
PowerFlex 755 Drive
(P_PF755)

PowerFlex 6000 Drive
(P_PF6000)

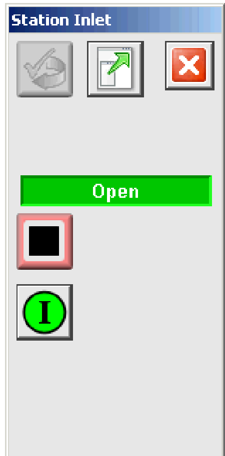
PowerFlex 7000 Drive
(P_PF7000)

Variable-speed Drive
(P_VSD)

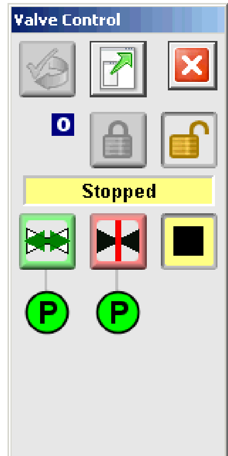
Analog/Pulsed Control Valve
(P_ValveC)



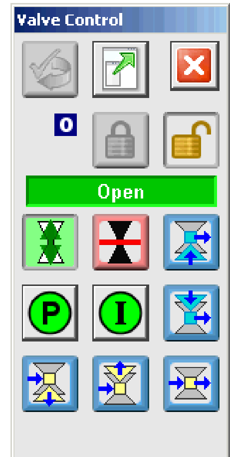
Hand-operated Valve
(P_ValveHO)



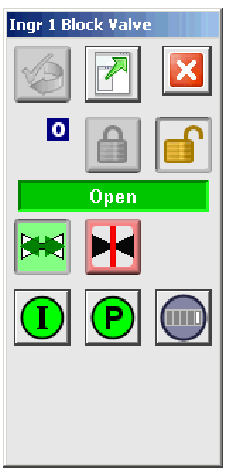
Motor-operated Valve
(P_ValveMO)



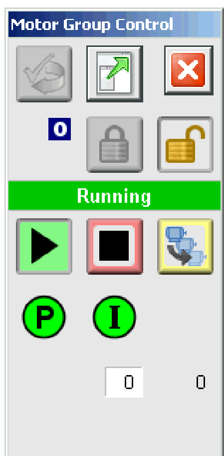
Mix-proof Valve
(P_Valve MP)



Solenoid-operated Valve
(P_ValveSO)

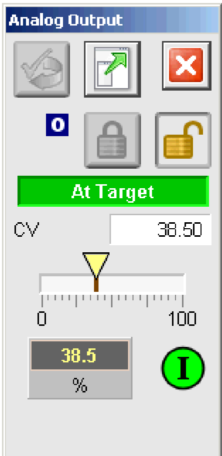


Lead, Lag, Standby Motor Group
(P_LLS)

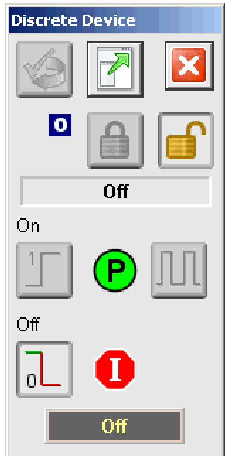


Deadband Controller
(P_DBC)

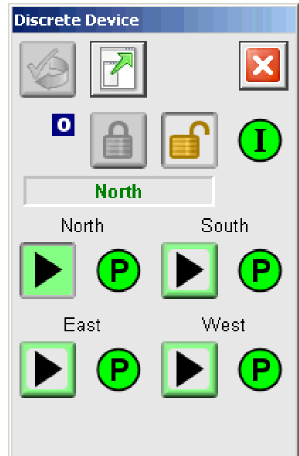
Analog Output
(P_AOut)



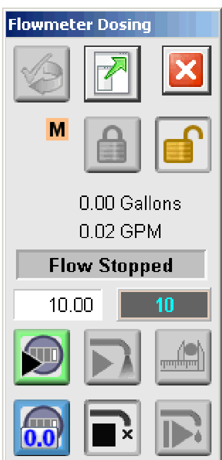
Discrete Output
(P_DOut)



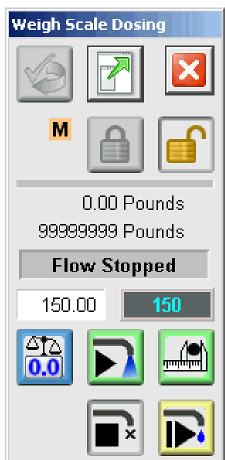
Discrete 2-, 3-, 4-state Device
(P_D4SD)



Flowmeter Dosing
(P_DoseFM)

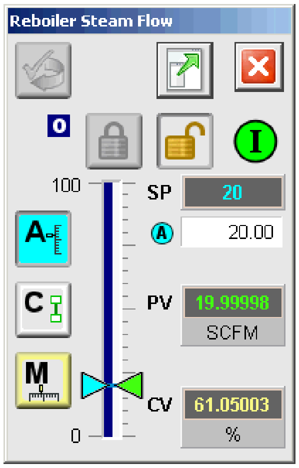


Weigh Scale Dosing
(P_DoseWS)



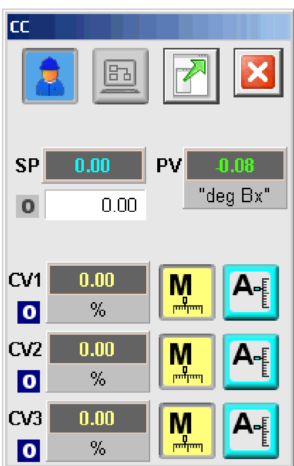
n-Position Device
(P_nPos)

Proportional + Integral + Derivative Enhanced (P_PIDE)

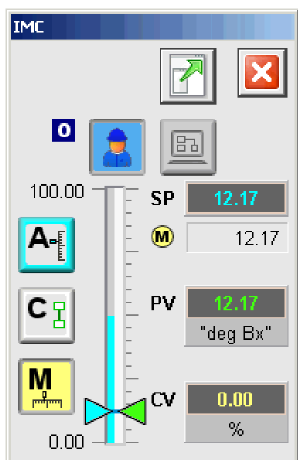


Sequencer Object (P_Seq)

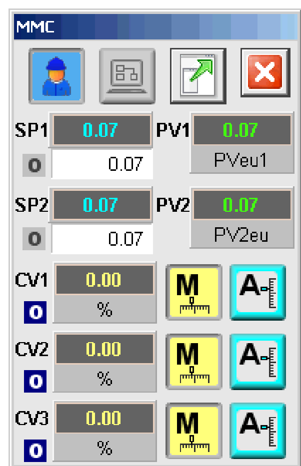
Coordinated Control (CC)



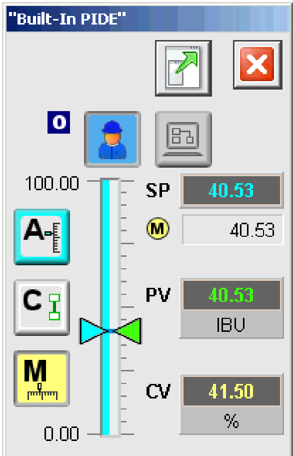
Internal Model Control (IMC)



Modular Multivariable Control (MMC)

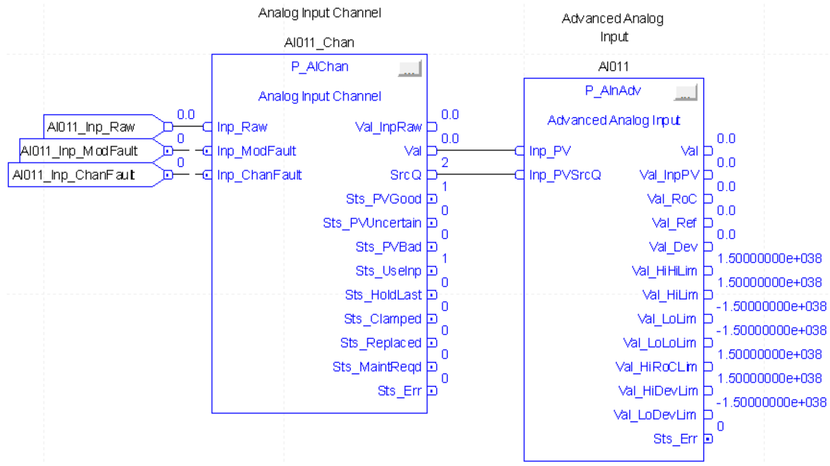


Proportional + Integral + Derivative (PIDE)



Process Strategies

Process strategies incorporate the Rockwell Automation Library of Process Objects. To meet control system needs, process strategies provide pre-connected functionality. These sets of connected Process Library objects help reduce implementation time and improve control objectives for process devices.



The strategies can be imported as Function Block routines and Ladder Logic rung imports. For more information, see the PlantPAx System Application Configuration User Manual, publication PROCES-UM003

The following table provides a summary of the available Process Strategies:

Table 36 - Process Strategies

Object Category	Description	Additional Process Library Objects Used	Process Strategy
I/O Processing	Discrete Input Object (P_DIn)		(RA-LIB)PS_DIn_3_5-01_ROUTINE.L5X
	Discrete Output (P_DOut)	• P_Intlk	(RA-LIB)PS_DOut_3_5-01_ROUTINE.L5X
	Discrete Output (P_DOut) no Intlk		(RA-LIB)PS_Dout_noIntlk_3_5-01_ROUTINE.L5X
	Basic Analog Input (P_AIn)		(RA-LIB)PS_AIn_3_5-01_ROUTINE.L5X
	Basic Analog Input (P_AIn) with AIChan	• P_AIChan	(RA-LIB)PS_AIn_Chan_3_5-01_ROUTINE.L5X
	Advanced Analog Input (P_AInAdv)		(RA-LIB)PS_AInAdv_3_5-01_ROUTINE.L5X
	Advanced Analog Input (P_AInAdv) with AIChan	• P_AIChan	(RA-LIB)PS_AInAdv_Chan_3_5-01_ROUTINE.L5X
	Dual Sensor Analog Input (P_AInDual)		(RA-LIB)PS_AInDual_3_5-01_ROUTINE.L5X
	Dual Sensor Analog Input (P_AInDual) with AIChan	• P_AIChan	(RA-LIB)PS_AInDual_Chan_3_5-01_ROUTINE.L5X
	Multiple Analog Input (P_AInMulti)		(RA-LIB)PS_AInMulti_3_5-01_ROUTINE.L5X
	Analog Output (P_AOut)	• P_Intlk	(RA-LIB)PS_AOut_3_5-01_ROUTINE.L5X
	Analog Output (P_AOut) no Intlk		(RA-LIB)PS_AOut_noIntlk_3_5-01_ROUTINE.L5X

Table 36 - Process Strategies

Object Category	Description	Additional Process Library Objects Used	Process Strategy
Regulatory Control	PID Enhanced (P_PIDE)	• P_Intlk	(RA-LIB)PS_PID_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) with AIn	• P_AIn • P_Intlk	(RA-LIB)PS_PID_AIn_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) with AIn Chan	• P_AIn • P_AIChan • P_Intlk	(RA-LIB)PS_PID_AIn_Chan_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) with AInAdv	• P_AInAdv • P_Intlk	(RA-LIB)PS_PID_AInAdv_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) with AInAdv Chan	• P_AInAdv • P_AIChan • P_Intlk	(RA-LIB)PS_PID_AInAdv_Chan_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) Cascade with AIn Chan	• P_AIn • P_AIChan • P_Intlk	(RA-LIB)PS_PID_Cas_AIn_Pri_3_5-01_ROUTINE.L5X
		• P_AIn • P_AIChan • P_Intlk	(RA-LIB)PS_PID_Cas_AIn_Sec_3_5-01_ROUTINE.L5X
	PID Enhanced (P_PIDE) Cascade with AInAdv Chan	• P_AInAdv • P_AIChan • P_Intlk	(RA-LIB)PS_PID_Cas_AInAdv_Pri_3_5-01_ROUTINE.L5X
		• P_AInAdv • P_AIChan • P_Intlk	(RA-LIB)PS_PID_Cas_AInAdv_Sec_3_5-01_ROUTINE.L5X
	Analog Fanout (P_Fanout)		(RA-LIB)PS_Fanout_3_5-01_ROUTINE.L5X
	High or Low Selector (P_HiLoSel)		(RA-LIB)PS_HiLoSel_3_5-01_ROUTINE.L5X
Procedural Control	Flowmeter Dosing (P_DoseFM)		(RA-LIB)PS_DoseFM_3_5-01_ROUTINE.L5X
	Weigh Scale Dosing (P_DoseWS)		(RA-LIB)PS_DoseWS_3_5-01_ROUTINE.L5X
	Sequencer Object (P_Seq)		(RA-LIB)PS_Seq_3_5-01_ROUTINE.L5X
	Sequencer Object (P_Seq) no Prompt		(RA-LIB)PS_Seq_noPrompt_3_5-01_ROUTINE.L5X
Motors	Single-speed Motor (P_Motor)	• P_Intlk • P_Perm • P_Runtime • P_ResInh	(RA-LIB)PS_Motor_3_5-01_ROUTINE.L5X
	Single-speed Motor (P_Motor) with E300	• P_E300 • P_Intlk • P_Perm • P_Runtime • P_ResInh	(RA-LIB)PS_Motor_E300Ovl_3_5-01_ROUTINE.L5X
	Single-speed Motor (P_Motor) with E3	• P_E3Plus • P_Intlk • P_Perm • P_Runtime • P_ResInh	(RA-LIB)PS_Motor_E3Ovl_3_5-01_ROUTINE.L5X
	Single-speed Motor (P_Motor) with E1Plus	• P_E1PlusE • P_Intlk • P_Perm • P_Runtime • P_ResInh	(RA-LIB)PS_Motor_E1PlusE_3_5-01_ROUTINE.L5X
	Reversing Motor (P_MotorRev)	• P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_MotorRev_3_5-01_ROUTINE.L5X

Table 36 - Process Strategies

Object Category	Description	Additional Process Library Objects Used	Process Strategy
Motors (continued)	Reversing Motor (P_MotorRev) with E300	• P_E300 • P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_MotorRev_E300Ovl_3_5-01_ROUTINE.L5X
	Reversing Motor (P_MotorRev) with E3	• P_E3Plus • P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_MotorRev_E3Ovl_3_5-01_ROUTINE.L5X
	Two-speed Motor (P_Motor2Spd)	• P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_Motor2Spd_3_5-01_ROUTINE.L5X
	Two-speed Motor (P_Motor2Spd) with E300	• P_E300 • P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_Motor2Spd_E300Ovl_3_5-01_ROUTINE.L5X
	Two-speed Motor (P_Motor2Spd) with E3	• P_E3Plus • P_Intlk • P_Perm (2) • P_Runtime • P_ResInh	(RA-LIB)PS_Motor2Spd_E3Ovl_3_5-01_ROUTINE.L5X
	Hand-operated Motor (P_MotorHO)	• P_Intlk • P_Runtime • P_ResInh	(RA-LIB)PS_MotorHO_3_5-01_ROUTINE.L5X
	Hand-operated Motor (P_MotorHO) with E300	• P_E300 • P_Intlk • P_Runtime • P_ResInh	(RA-LIB)PS_MotorHO_E300Ovl_3_5-01_ROUTINE.L5X
	Hand-operated Motor (P_MotorHO) with E3	• P_E3Plus • P_Intlk • P_Runtime • P_ResInh	(RA-LIB)PS_MotorHO_E3Ovl_3_5-01_ROUTINE.L5X
	Hand-operated Motor (P_MotorHO) with E1Plus	• P_E1PlusE • P_Intlk • P_Runtime • P_ResInh	(RA-LIB)PS_MotorHO_E1PlusE_3_5-01_ROUTINE.L5X
	SMC-50 Smart Motor Controller (P_SMC50)	• P_Intlk • P_Perm • P_Runtime	(RA-LIB)PS_SMC50_3_5-01_ROUTINE.L5X
	SMC Flex Smart Motor Controller (P_SMCFlex)	• P_Intlk • P_Perm • P_Runtime	(RA-LIB)PS_SMCFlex_3_5-01_ROUTINE.L5X
	Variable Speed Drive (P_VSD)	• P_Intlk • P_Perm (2) • P_Runtime	(RA-LIB)PS_VSD_3_5-01_ROUTINE.L5X
	PowerFlex 755 Drive (P_PF755)	• P_Intlk • P_Perm (2) • P_Runtime	(RA-LIB)PS_PF755_3_5-01_ROUTINE.L5X
	PowerFlex 753 Drive (P_PF753)	• P_Intlk • P_Perm (2) • P_Runtime	(RA-LIB)PS_PF753_3_5-01_ROUTINE.L5X
	PowerFlex 52x Drive(P_PF52x)	• P_Intlk • P_Perm (2) • P_Runtime	(RA-LIB)PS_PF52x_3_5-01_ROUTINE.L5X

Table 36 - Process Strategies

Object Category	Description	Additional Process Library Objects Used	Process Strategy
Motors (continued)	PowerFlex 6000 Drive(P_PF6000)	• P_Intlk • P_Perm • P_Runtime	(RA-LIB)PS_PF6000_3_5-01_RUNG.L5X
	PowerFlex 7000 Drive(P_PF7000)	• P_Intlk • P_Perm (2) • P_Runtime	(RA-LIB)PS_PF7000_3_5-01_RUNG.L5X
	Discrete 2-, 3-, or 4-state Device (P_D4SD)	• P_Intlk • P_Perm (4)	(RA-LIB)PS_D4SD_3_5-01_ROUTINE.L5X
Valves	Solenoid-operated Valve (P_ValveSO)	• P_Intlk • P_Perm • P_Runtime	(RA-LIB)PS_ValveSO_3_5-01_ROUTINE.L5X
	MotorHO Operated Valve (P_ValveMO)	• P_Perm (2) • P_Runtime	(RA-LIB)PS_ValveMO_3_5-01_ROUTINE.L5X
	Mix-proof Valve (P_ValveMP)	• P_Intlk • P_Perm (4) • P_Runtime	(RA-LIB)PS_ValveMP_3_5-01_ROUTINE.L5X
	Hand-operated Valve (P_ValveHO)	• P_Intlk • P_Runtime	(RA-LIB)PS_ValveHO_3_5-01_ROUTINE.L5X
	Hand-operated Valve (P_ValveHO) no Intlk	• P_Runtime	(RA-LIB)PS_ValveHO_noIntlk_3_5-01_ROUTINE.L5X
	Analog Pulsed Control Valve (P_ValveC)	• P_Intlk	(RA-LIB)PS_ValveC_3_5-01_ROUTINE.L5X
	n-Position Device (P_nPos)		(RA-LIB)PS_nPos_3_5-01_ROUTINE.L5X
Cross Functional	Boolean Logic with Snapshot (P_Logic)		(RA-LIB)PS_Logic_3_5-01_ROUTINE.L5X
Built-In	Internal Model Control (IMC)		(RA-LIB)PS_IMC_3_5-01_ROUTINE.L5X
	Coordinated Control (CC)		(RA-LIB)PS_CC_3_5-01_ROUTINE.L5X
	Modular Multivariable Control (MMC)		(RA-LIB)PS_MMC_3_5-01_ROUTINE.L5X
	Totalizer (TOT)		(RA-LIB)PS_Tot_3_5-01_ROUTINE.L5X
	Ramp Soak (RMPS)		(RA-LIB)PS_RMPS_3_5-01_ROUTINE.L5X
Diagnostics	Modules Diagnostic		(RA-LIB)PS_ModuleSts_3_5-01_RUNG

Chapter 2

How to Install the Library

This chapter describes procedures for installing the HMI and controller elements that comprise the Rockwell Automation® Library of Process Objects. There are two methods:

- Use predefined application templates
- Import individual library objects

The following table describes the topics in this chapter.

Download the Library

For the latest compatible software information and to download the Rockwell Automation Library, see the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

Using HMI and Controller Templates

Both controller and HMI templates are provided with the Rockwell Automation Library of Process Objects. These templates provide a starting point for building your PlantPAx® applications.

- The HMI templates are offered in various screen resolutions to align with the most commonly used monitors. The templates have a framework inclusive of a FactoryTalk® Alarm and Event alarm banner.
- The controller templates are provided in supported Logix firmware revisions. The templates provide a recommended task structure in preparation for importing Process Library Add-On Instructions and building control strategies.

For further information on how to configure your PlantPAx application, refer to PlantPAx Distributed Control System Application Configuration, publication PROCES-UM003.

Adding Controller Logic

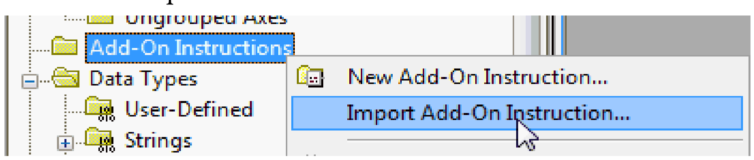
An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code. To use the Add-On Instructions, you import them into a controller project.

Do these steps for each Add-On Instruction.

1. In Studio 5000 Logix Designer® application, open a new or existing project.

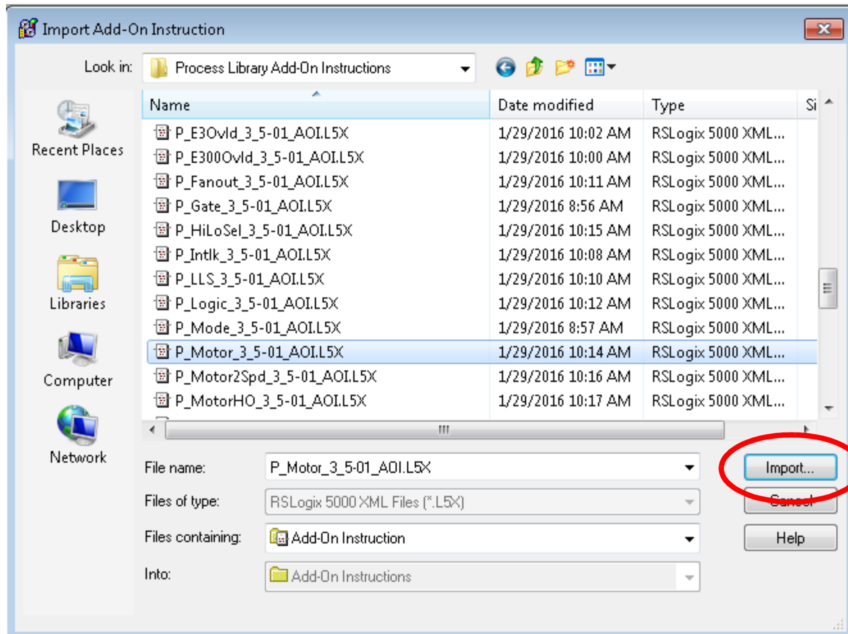
IMPORTANT	Add-On Instruction definitions can be imported, but not updated, online.

2. Right-click the Add-On Instructions folder in the Controller Organizer and choose Import Add-On Instruction.



The Import Add-On Instruction dialog box appears.

3. Select the Add-On Instruction and click Import.

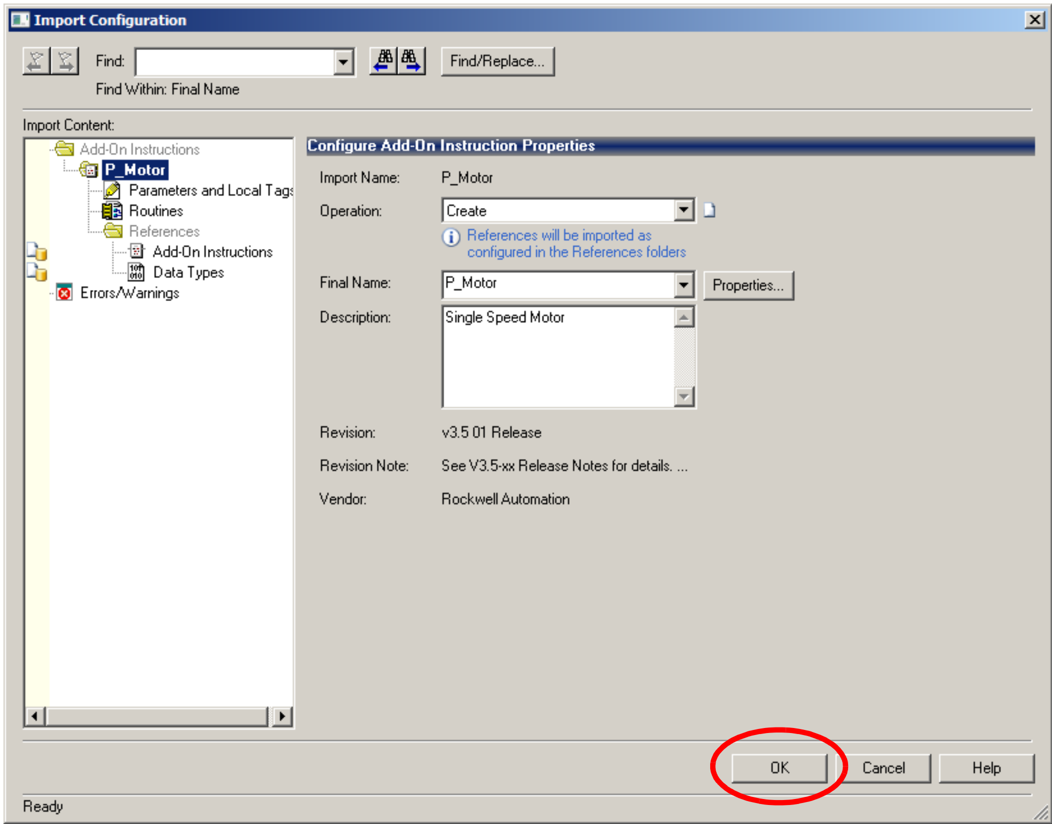


TIP The P_Mode, P_Alarm, and P_Gate Add-On Instructions are used within many of the other instructions. We recommend that you import these three instructions first.

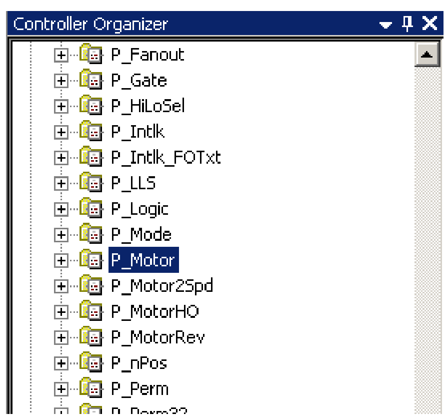
Some Add-On Instructions are provided in RUNG import files.

TIP If a RUNG import file is provided, import the rung into a Ladder Diagram routine to get all required additional tags, data types, and message configurations.

4. On the Import Configuration dialog box, click OK.



Once the import is complete, the Add-On Instructions are visible in the Controller Organizer.



Import Visualization Files

Each Add-On Instruction has associated visualization files that provide a common user interface. You must import these files in the following order:

- Images (.png files)
- Global objects (.ggfx file type)
- HMI faceplates (.gfx file type)
- Tags (FactoryTalk View ME only) (.csv file type)
- Macros (FactoryTalk View SE only) (.mcr file type)

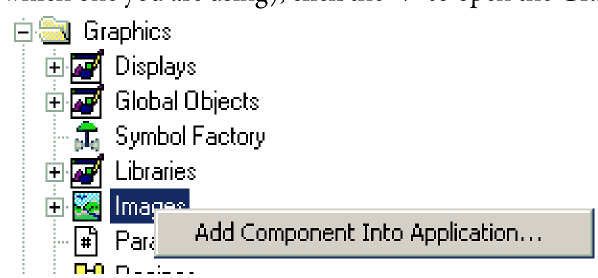
A global object is an HMI display element that is created once and referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix® system, aid in consistency and save engineering time.

The import procedures in this section are to be followed in the sequence as documented to add the visualization files to your project.

Import Images

Do these steps to use the common icons for the global objects and faceplates for all Process objects.

1. In your FactoryTalk View SE or ME software program (depending on which one you are using), click the '+' to open the Graphics folder.

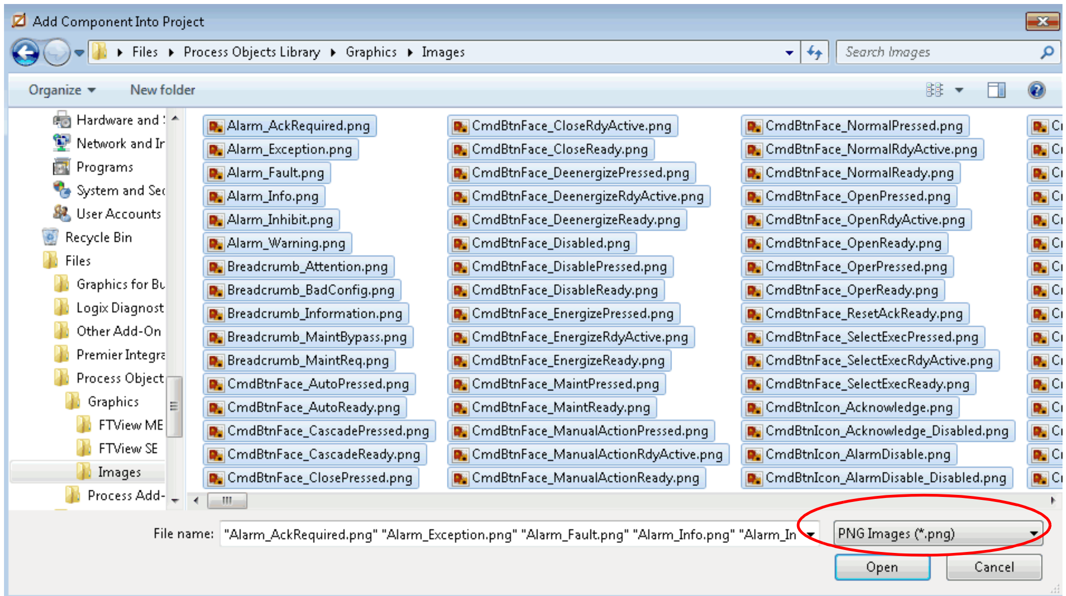


2. Right-click Images and choose Add Component Into Application.

   The Add Component Into Project dialog box appears.

3. Browse to your downloaded Rockwell Automation library files.
4. Click the graphics folder.

5. Click the Images folder.



IMPORTANT	You need to change the path to the image folder and the file type to PNG. PNG files provide more control with transparency.

6. Click the pull-down menu (as circled) and select a file type.

   For example, PNG Images (*.png)

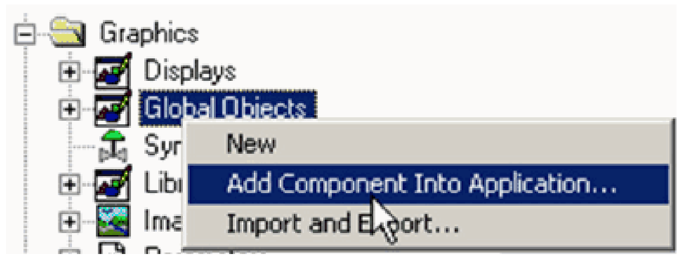
7. To highlight all .png files, press Ctrl-A.
8. Click Open to import the images.

Import Global Object Files

Global objects serve two purposes:

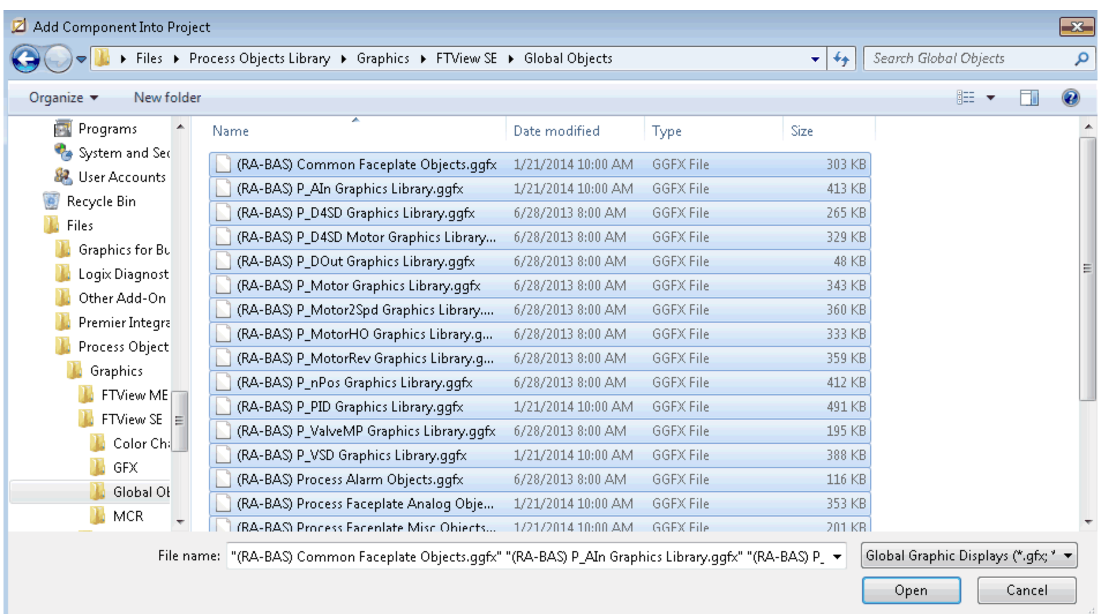
- Faceplate objects files contain common elements that are used to build faceplate displays.
- Graphics Library files contain device symbols that you can use to build your application displays. Click the symbol to open the corresponding faceplate display.

1. Right-click Global Objects and choose Add Component Into Application.



   The Add Component Into Project dialog box appears.

2. Browse to your downloaded Rockwell Automation Library files.
3. Click the Graphics folder.
4. Click the FactoryTalk View SE or FactoryTalk View ME folder depending on your application.
5. Click the Global Objects folder.

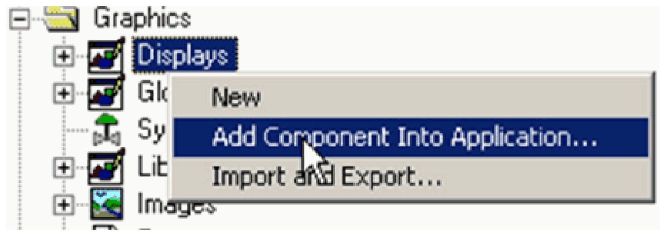


6. To highlight all global object (.ggfx) files, press Ctrl-A.
7. Click Open to import the objects.

Import HMI Faceplates

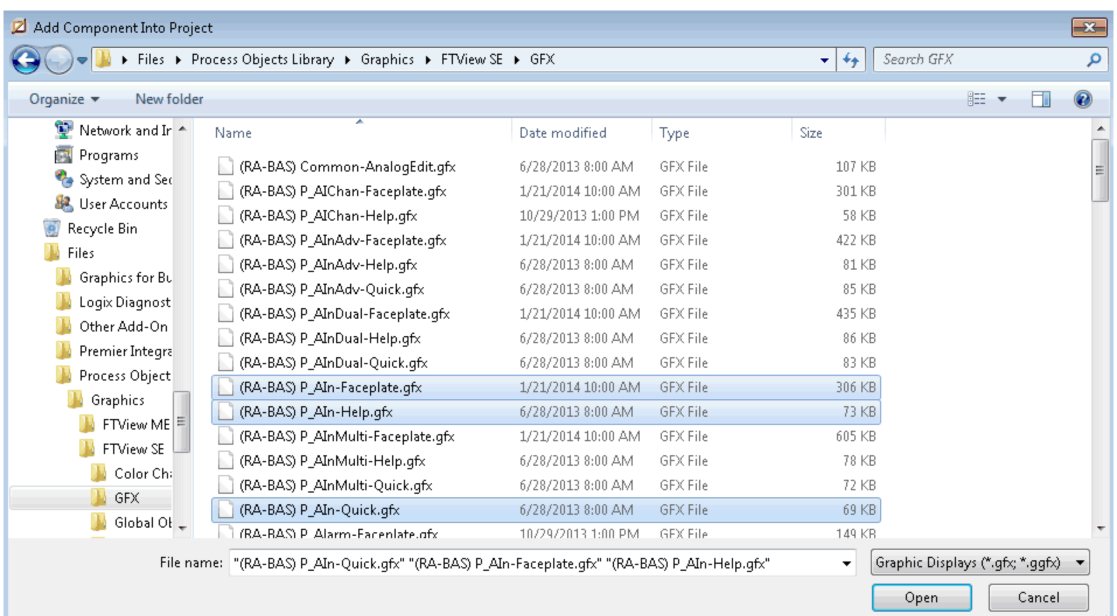
Faceplates provide operators, maintenance workers, engineers, and others with visual components to enable interaction with instrument data. Do these steps to import faceplates.

1. Right-click Displays and choose Add Component Into Application.



The Add Component Into Project dialog box appears.

2. Browse to your downloaded Rockwell Automation library files.
3. Click the graphics folder.
4. Click the FactoryTalk View SE or FactoryTalk View ME folders depending on your application.
5. Click the GFX folder.



6. Click only the displays that you need; do not import all of them.

IMPORTANT	To select multiple display files after the initial file selection, press and hold the Ctrl key while selecting additional files.

The highlighted example with P_AIn shows that each Add-On Instruction requires a Faceplate.gfx, Help.gfx, and Quick.gfx. Most motors, valves, and other devices need displays for Mode Configuration and Help and Alarm Configuration and Help.

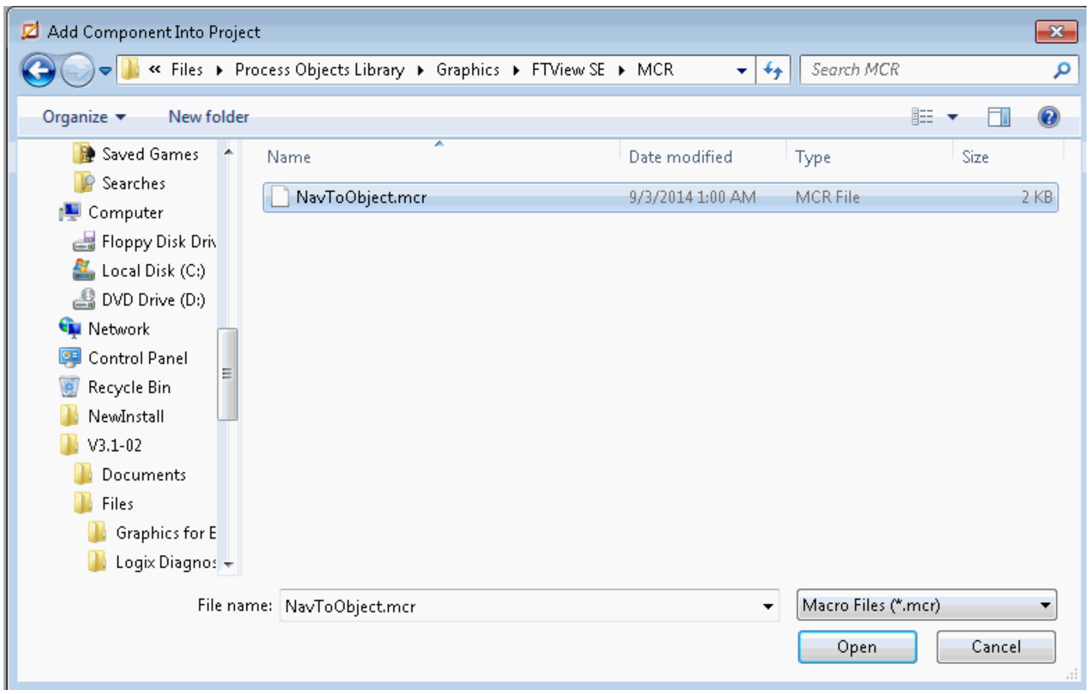
See the Reference Manual for the respective Add-On Instruction for a list of required .gfx files.

7. For FactoryTalk View SE applications, also import the Common Analog Edit display.

Import the Macro

These instructions are for FactoryTalk View SE projects only. A macro must be imported to support faceplate-to-faceplate navigation by tag name.

1. Right-click Macro and select Add Component Into Application.

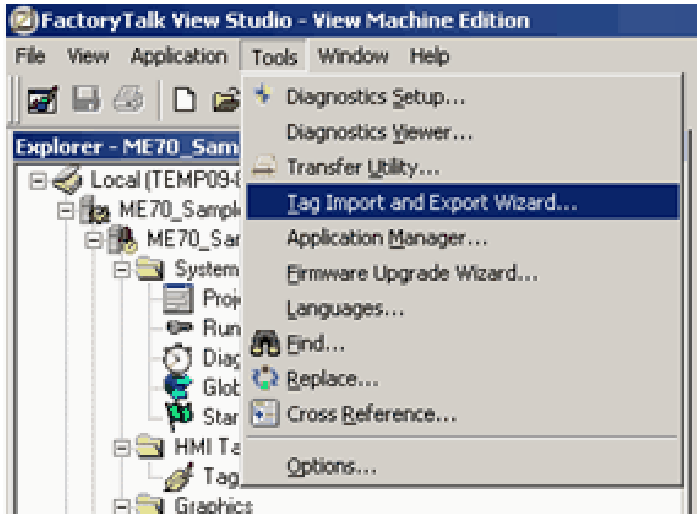


2. Select the NavToObject.mcr file and click Open.

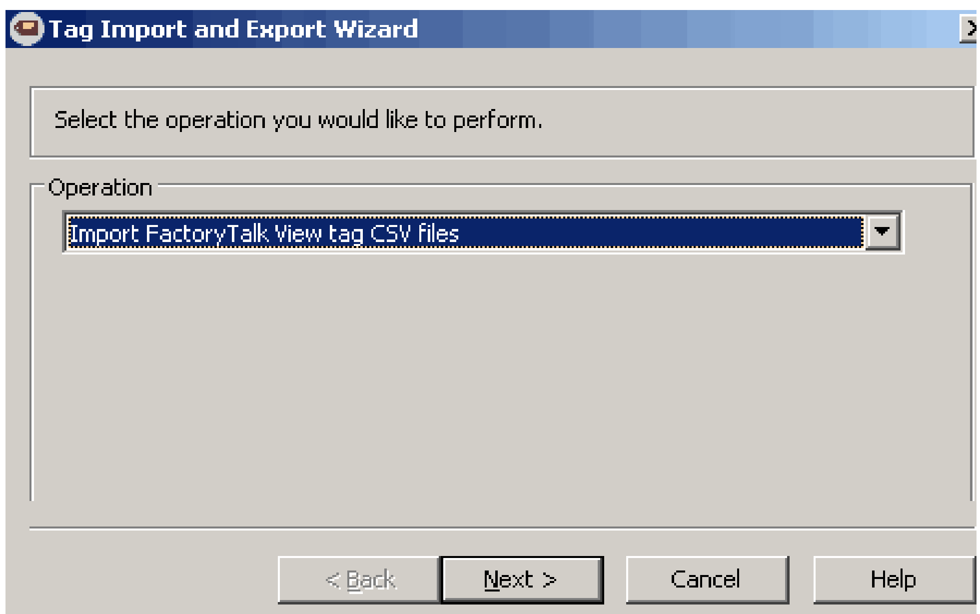
Import HMI Tags

These instructions are for FactoryTalk View ME projects **only**. Complete these steps to import HMI tags so you can switch between tabs on the faceplates.

1. From the Tools pull-down menu, choose Tag Import and Export Wizard.

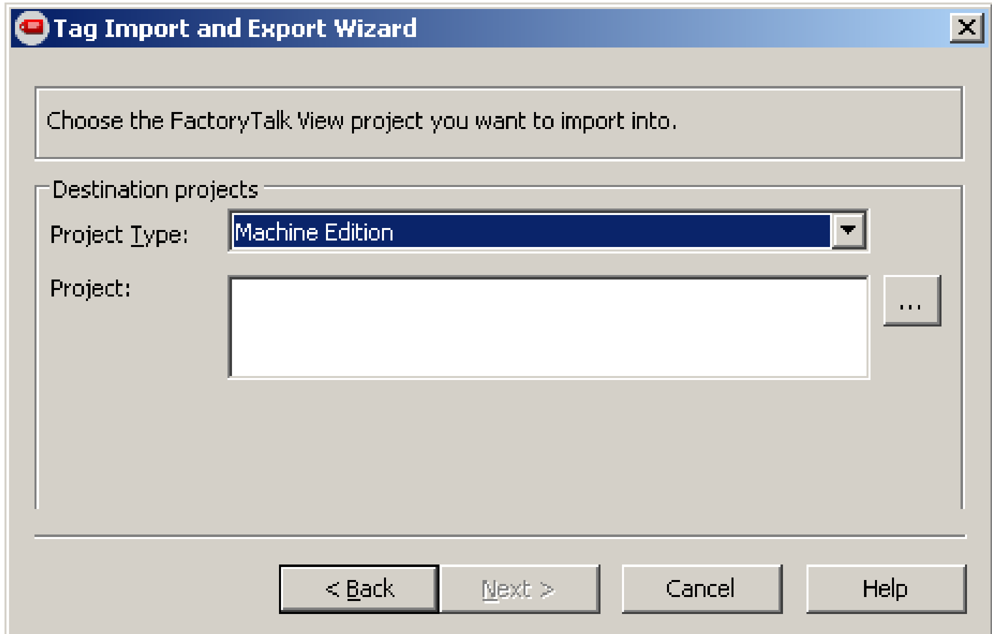


The Tag Import and Export Wizard dialog box appears.



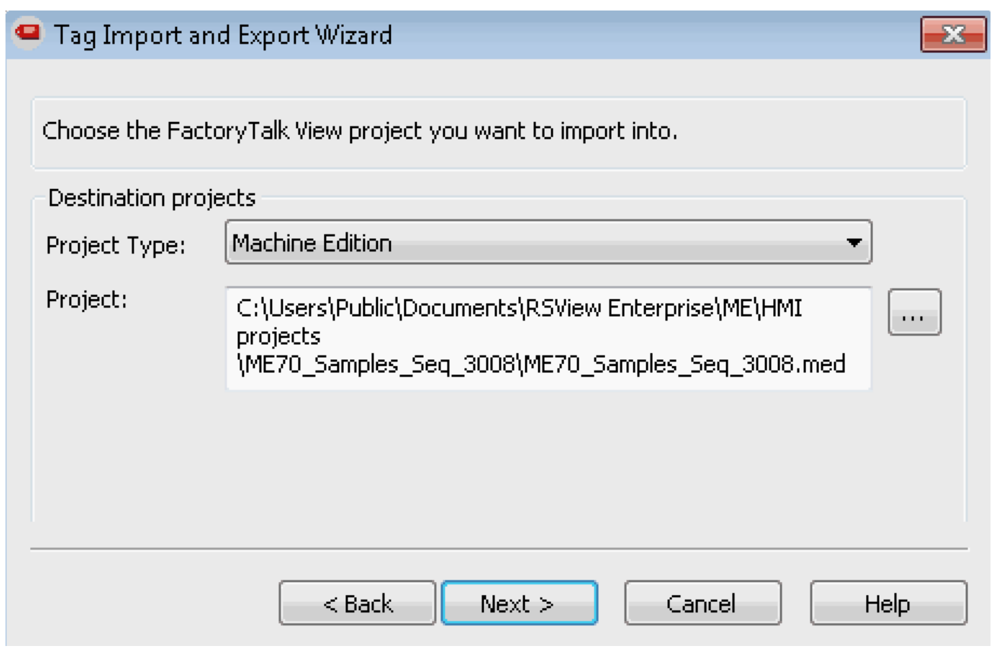
2. From the Operation pull-down menu, choose Import FactoryTalk View tag CSV files and click Next.

The Tag Import and Export Wizard dialog box reappears with a blank Project text box.



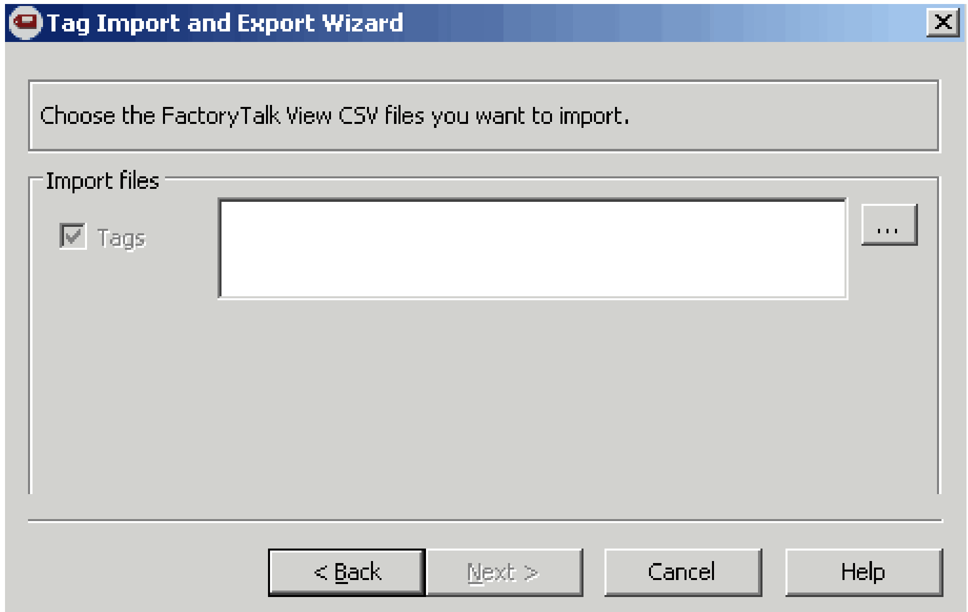
3. From the Project text box, click Browse (...) and select the .med project file that you want the HMI tags imported into and click Open.

   The Tag Import and Export Wizard dialog box reappears with the .med file in the Project text box.



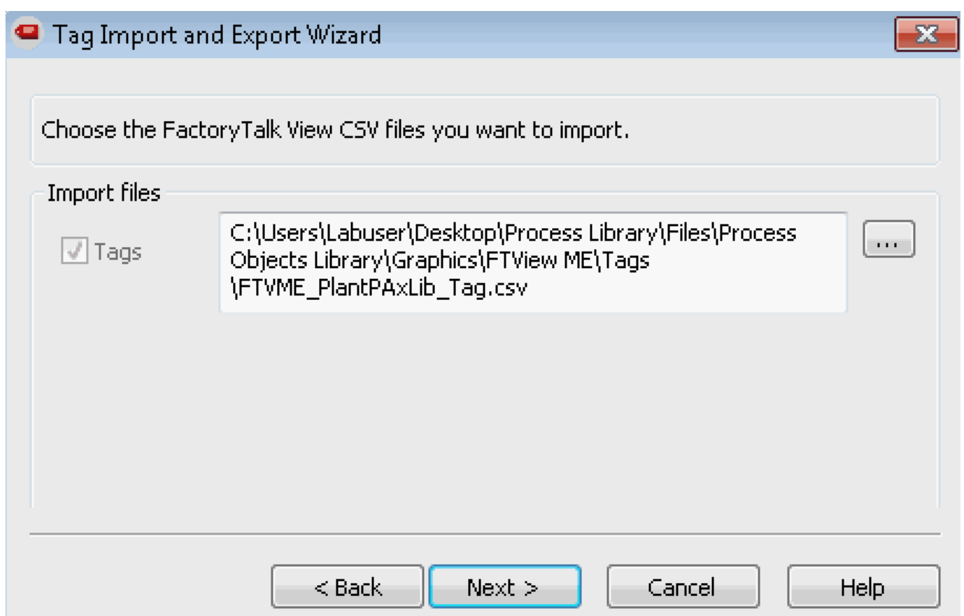
4. Click Next.

The Tag Import and Export Wizard dialog box reappears with a blank Import Files text box.



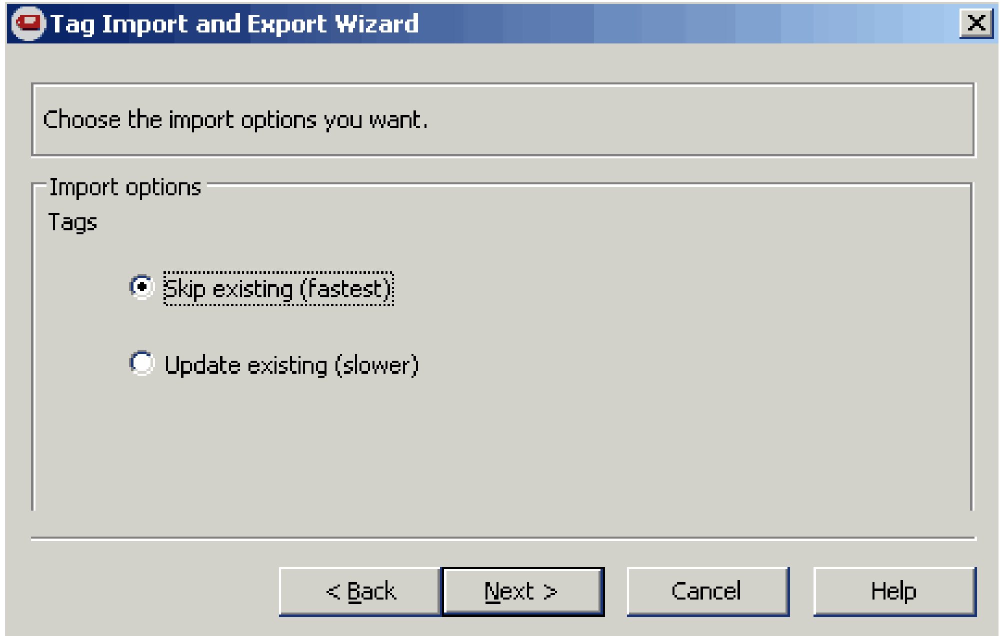
5. From the Import files text box, click Browse (...) and select the .csv file that is contained within the downloaded Library zipped file.
6. Click Open.

   The Tag Import and Export Wizard dialog box reappears with the selected .CSV file.



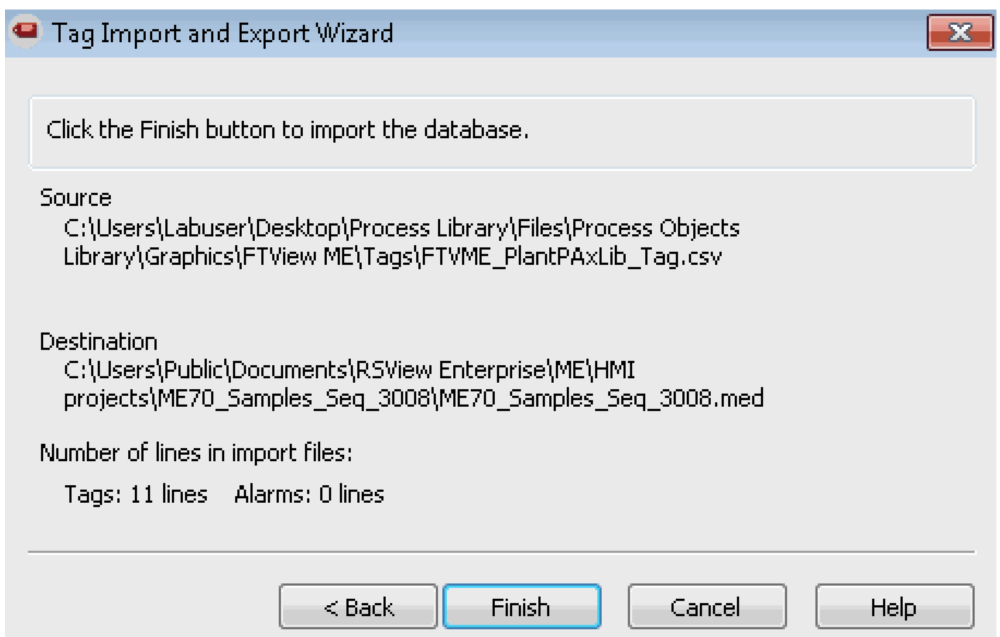
7. Click Next.

The Tag Import and Export Wizard dialog box reappears.



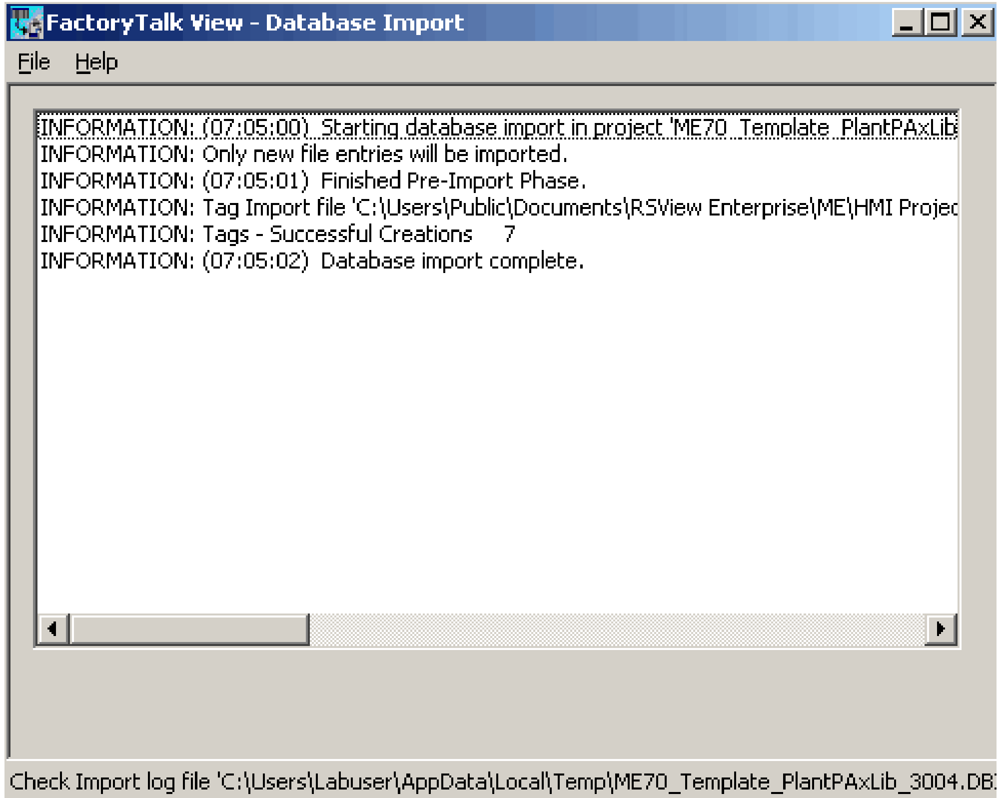
8. Use the Skip existing (fastest) option and click Next.

The Tag Import and Export Wizard dialog box reappears.



9. Click Finish to import the HMI files.

The FactoryTalk View - Database Import dialog box appears with the information that the import is complete.



10. Click the 'X' in the upper, right corner of the window to close the window and complete the import.

Configure Your HMI Application for Language Switching

Process Library Language Switching

FactoryTalk View language switching provides the ability to configure multiple languages for an application and switch them dynamically at runtime.

The static strings that are used in the Rockwell Automation Library of Process Objects (Process Library) graphic elements have been designed to use the native FactoryTalk View Language Switching feature. This feature gives operators the ability to switch between languages in one application at runtime. FactoryTalk View SE/ME Clients can run in any of the languages an application supports. In a network distributed application, multiple clients can run in different languages simultaneously.

Translated versions of the Process Library static strings (distributed with the Process Library in the /Files/Translations folder) can be imported via the FactoryTalk View Studio Language Configuration dialog box. See Set up Language Switching on page 89 for a summary of the steps necessary to incorporate language switching in your applications.

For more information and details about language switching, see the following FactoryTalk View publications:

- FactoryTalk View Site Edition User's Guide, publication VIEWSE-UM006
- FactoryTalk View Machine Edition User's Guide, publication VIEWME-UM004

Set up Language Switching

Perform the following steps to set up language switching for an application:

1. Install the Windows languages that the application is going to use.

IMPORTANT	Windows locale formatting determines how the application shows time, date, and floating point values at design time and runtime. When the application language is switched, the Windows locale settings for the new language are used even if that language has not been installed. You do not need to edit the default locale settings.

2. Create, open, or import the application in the language of your choice.
3. Add additional languages to your application.

IMPORTANT	Static strings with undefined translations are shown with question mark '?' characters at runtime. Set en-US as your default English application language and choose the option to 'display undefined strings in the default language.'

4. Import Process Library graphic elements.

5. Import Process Library translated text strings for each of the desired languages.
6. Use the Process Library **Language Switch** Global Objects in your application to provide operators with a mechanism to switch between the application languages at runtime.

   The **Language Switch** global objects are on the (RA-FRAME) Standard Objects.ggfx display for FactoryTalk View SE and (RA-FRAME-ME) Standard Objects.ggfx display for FactoryTalk View ME.

Set Up FactoryTalk View SE Clients

Perform the following steps to set up FactoryTalk View SE clients:

1. On client computers, install the Windows languages that the application supports.
2. In client setup files, specify an initial language for the client to run.

Set Up FactoryTalk View ME Runtime Device

Perform the following steps to set up FactoryTalk ME runtime device:

1. For applications that are going to run on a personal computer, install the Windows languages that the application is going to use.
2. For applications that are going to run on a PanelView™ Plus or PanelView Plus CE terminal, set up the fonts that the application is going to use.

Common Configuration Considerations

This chapter includes programming considerations that are common for all Process Objects.

The following table describes the topics in this chapter.

Library Programming Considerations

Multiple programming languages are available for your Library Add-On Instructions that are based on the type of application that you are creating. The Add-On Instruction logic can be used with Ladder Diagram, Function Block Diagram, and Structured Text languages.

Review the following programming language examples for the P_Motor instruction. Use whatever language is 'best' for your application.

Figure 4 - Ladder Diagram

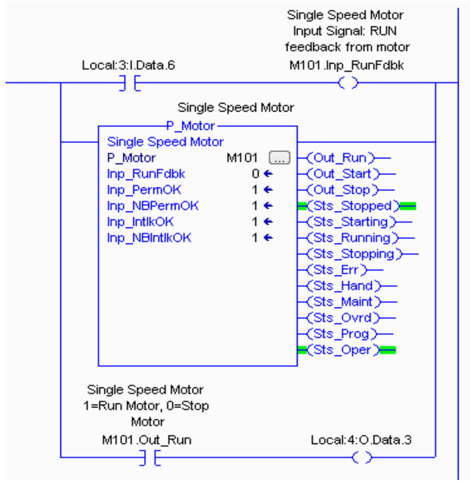


Figure 5 - Function Block Diagram

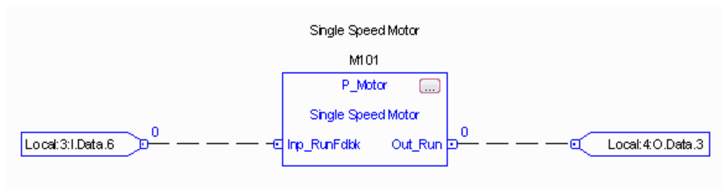


Figure 6 - Structured Text

```
M101.Inp_RunFdbk:= Local:3:I.Data.6;
P_Motor(M101);
Local:4:O.Data.3:= M101.Out_Run;
```

Once created, an Add-On Instruction can then be used in any of the Studio 5000 Logix Designer® application routines without any additional effort on your part. This configuration provides the flexibility of interfacing to the library through the programming method that you use to develop control strategies in the application code.

Ladder Diagram logic executes simple Boolean logic, timers, and counters the fastest. Function Block Diagrams and Structured Text can give you an advantage of the more advanced process and drives instructions available in those languages.

You cannot compare execution times for the same Add-On Instruction that are written in different programming languages. There are fundamental differences on how the different languages execute and are compiled.

Ladder Diagram Considerations

Although multiple programming languages are available to be used with the Library Add-On Instructions, Ladder Diagram has differences in behavior to consider. The controller evaluates Ladder Diagram instructions based on the rung condition that precedes the instruction (rung-in condition).

Based on the rung-in condition and the instruction, the controller sets the rung condition following the instruction (rung-out condition), which affects any subsequent instruction.

If the rung-in condition to an input instruction is true, the controller evaluates the instruction and sets the rung-out condition based on the results of the instruction. If the instruction evaluates to true, the rung-out condition is true; if the instruction evaluates to false, the rung-out condition is false.

IMPORTANT	The rung-in condition is reflected in the EnableIn parameter and determines how the system performs each Process Add-On Instruction. If the EnableIn signal is **true**, the system performs the main logic routine of the instruction. Conversely, if the EnableIn signal is **false**, the system performs the EnableInFalse routine of the instruction. The main logic routine for the instruction sets/clears the EnableOut parameter, which then determines the rung-out condition. The EnableInFalse routine cannot set the EnableOut parameter. If the rung-in condition is **false**, then the EnableOut parameter and the rung-out condition are also **false**.

Prescan

During the transition into Run mode, the controller performs a Prescan before the first logic scan. Prescan is a special scan of all routines in the controller. The controller scans all main routines and subroutines during Prescan, but ignores jumps that could skip the execution of instructions. The controller executes all FOR loops and subroutine calls. If a subroutine is called more than once, it is executed each time that it is called. The controller uses Prescan of built-in instructions to reset non-retentive data values.

During Prescan, input values are not current and outputs are not written. The following conditions generate Prescan:

- Toggle from Program to Run mode
- Automatically enter Run mode from a power-up condition

Prescan does not occur for a program when the following occurs:

- Program becomes scheduled while the controller is running
- Program is unscheduled when the controller enters Run mode

IMPORTANT	The Prescan performs the logic routine for the Process Add-On Instruction as all **false** and then performs its Prescan routine as **true**.

TIP When hard-coding configuration bits in Ladder Diagram instances of Add-On Instructions, we recommend using OTL (output latch) instructions. The OTL instruction writes configuration bits to 1 and the OTU (output unlatch) instruction writes configuration bits to 0. Avoid using OTE (output energize) instructions for writing to Add-On Instruction bits. Because OTE is a non-retentive instruction, when the controller logic prescan occurs (on Powerup or controller Program to Run transition), the bit referenced in the OTE is cleared to zero.

Example: You want the mode of a device to default to Program and you don't want anyone to be able to change the mode from the faceplate, so you write code to set the Cfg_ProgDefault bit. The prescan logic of the P_Mode Add-On Instruction examines this bit and sets the Program/Operator selection on Powerup. Suppose that you use an OTE instruction to hard-code this configuration to 1 (Program default). The prescan of the OTE sets Cfg_ProgDefault to 0 during prescan, and the instruction powers up in Operator mode, not the desired Program mode. By using an OTL instruction to hard-code this configuration, the result is the desired action: Powering up in Program mode.

Mode Configuration

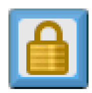
Mode indicators provide a visual reference to the current owner of the process device. The modes available are listed on the Operator tab, as shown in the example.

Standard modes are implemented in each object by using an embedded instance of the P_Mode Add-On Instruction. The available modes are Operator, Program, Override, Maintenance, and Hand. Not all modes are used in every object. The particular modes available for a given object are listed in the Reference Manual for that object.

The following table lists the standard modes and their description.

Mode	Description
Operator	Control of the device is owned by the Operator. Operator Commands (OCmd_) and Operator Settings (OSet_) from the HMI are accepted.
Program	Control of the device is owned by Program logic. Program Commands (PCmd_) and Program Settings (PSet_) are accepted.
Override	Control of the device is owned by priority logic that supersedes Operator and Program control. Override Inputs (Inp_OvrdCmd and other Inp_OvrdXxxx values) are accepted. If so configured, bypassable interlocks and permissives are bypassed.
Maintenance	Control of the device is owned by Maintenance. Operator Commands and Settings from the HMI are accepted. Bypassable interlocks and permissives are bypassed, and device timeout checks are not processed.
Hand	Control of the device is owned by hardwired logic or other logic outside the instruction. The instruction tracks the state of the device for bumpless transfer back to one of the other modes.
No Mode	The device is disabled and has no owner because the EnableIn input is false. The main instruction Logic routine is not being scanned. See Execution for more information on EnableInFalse processing.

The Mode buttons on the faceplate show the behavior to expect when clicked.

Function	Action	Function	Action
	Click the button to acquire Operator mode and take from Program.		Click the button to lock the Operator mode to help prevent Program from acquiring.
	Click the button to release Operator mode and return to Program.		Click the button to unlock the Operator mode and let Program acquire.

Alarm Considerations

Effective alarm management is an important function of a process control system. This section describes how to use FactoryTalk® View Alarm and Event software to create alarms for library objects to help safeguard personnel and plant assets.

IMPORTANT	Version 3.5 of the Rockwell Automation® Library of Process Objects requires FactoryTalk View software version 7.0 or later. FactoryTalk Alarm and Event software within View 7.0 supports new features for operator shelving of alarms and improves alignment with ANSI/ISA-18.2 (2009) alarm management standards. The software also gives operators new tools for dealing with alarm conditions to improve their response to abnormal process conditions.

The Library uses instances of a dedicated Add-On Instruction, P_Alarm, for alarm handling. For example, the P_Motor instruction uses four P_Alarm instances for the following four alarms:

- Fail to Start (used in the examples of this section)
- Fail to Stop
- Interlock Trip
- I/O Fault

The methods described in this section can be used to configure any alarm for objects in the Library of Process Objects. Recommended procedures for connecting the Add-On Instruction instance alarms are presented in the following subsections:

- Alarm with FactoryTalk Alarm and Event Server on page 104
- Alarm with FactoryTalk View ME Software on page 111

If you are using FactoryTalk View SE software, Version 3.1 of the Library of Process Objects uses a P_Alarm instance to communicate alarm conditions to the tag-based server. Digital alarm tags for P_Alarm instances can be configured manually from within FactoryTalk View Studio. We also provide the PlantPAx® Alarm Builder tool (see Appendix B) that helps to streamline the digital alarm tag definition process and facilitates bulk configuration.

Table 37 summarizes the P_Alarm alarm types that are used with the Library, and indicates which objects use the alarm.

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
ActuatorFault	Raised if the Inp_ActuatorFault input is true. This alarm is provided for use by valves that generate a fault contact, such as actuator motor overload trip. **P_ValveMO only:** If the actuator fault is configured as a shed fault, the Stop output to the valve is triggered and a reset is required to command the valve open or closed.	• P_ValveC • P_ValveMO
AnyReject	At least one input signal has been rejected because of any of the following: • It is outside the configured failure range. • It is a statistical outlier per the Modified Thompson Tau test. • It is outside of a user-defined deviation from the mean. • It has its Bad quality input bit set or its Source and Quality input indicates it has Bad quality. • It has a floating point value that is infinite or not a number (floating point exception).	• P_AInMulti
CantStart	There are not enough motors that can be started to satisfy Number of Motors to Run.	• P_LLS
CantStop	There are not enough motors that can be stopped.	• P_LLS
DeviceFault	Raised when the Inp_DeviceFault input is true. This alarm is provided for use by devices that generate their own fault signal. If the device fault is configured as a shed fault, the device is commanded to State 0 and a reset is required to command the device to any other state.	• P_D4SD
Diff	Raised when the difference between the two input signals exceeds the configured high difference threshold.	• P_AInDual
DriveFault	Raised when the drive detects a fault and sets its Faulted status bit. Check the Fault Code and description to determine the cause. Issuing a Reset of this object causes a Clear Fault command to be sent to the drive in an attempt to clear the fault.	• P_PF52x • P_PF753 • P_PF755 • P_VSD
EqpFault	Raised when the Inp_CtrldEqpFault input is true, or when equipment feedback signals fail to track the commanded state of the equipment within the configured time. If an equipment fault is configured as a shed fault, the flow is stopped and a reset is required to resume flow.	• P_DoseFM • P_DoseWS
Fail	Raised when any of the following is true: • The PV quality is bad • The Inp_PVBad input is true • The PV is outside the configured failure limits • The PV is infinite or not a number (floating point exception) • The raw or engineering unit range configuration is invalid	• P_AIn • P_AInAdv • P_AInHART
	Raised when the PV is flagged as Bad, or when the PV is flagged as Uncertain and Cfg_FailOnUncertain is 1. The PV can be configured to be flagged as Bad or Uncertain for the following reasons: • Its value has not changed for more than the configured Stuck PV time • It is outside the configured failure range thresholds for more than the Out of Range on-delay time • It is infinite or not a number (floating point exception) • Module Fault input is true • Channel Fault input is true • Out of Specification (measurement uncertain) input is true • Function Check (PV substituted at device) input is true • Maintenance Required input is true • There is a Configuration Error (see Sts_Err and the Err_ bits)	• P_AIChan
	Raised when any of the following is true: • Both PV input values are outside the configured failure range thresholds • Both PV input values have bad quality or are infinite or not a number • Selected PV is infinite or not a number (floating point exception) • Raw or engineering unit range configuration is invalid	• P_AInDual

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
Fail (continued)	Raised when any of the following is true: • Number of unrejected PVs is less than the configured required number of good PVs • Calculated PV is infinite or not a number (floating point exception) • Raw or engineering unit range configuration is invalid. A PV can be rejected if: • It is set not to be used (by Maintenance) • It is outside the configured failure range thresholds • It is infinite or not a number (floating point exception) • It has Bad quality • It has Uncertain quality and Cfg_RejectUncertain is true It is an outlier, either because its deviation is outside the configured threshold from the mean or its deviation from the mean exceeds the Modified Thompson Tau statistical test	• P_AInMulti
	Raised when the device is commanded to a new state and the device feedbacks fail to confirm that the device reached the new state within the configured time (Cfg_FailT). If the Failure is configured as a shed fault, the device is commanded to State 0 and cannot be commanded to another state until reset.	• P_D4SD
	Raised when the internal PIDE instruction reports an Instruction Fault. The PIDE instruction reports an Instruction Fault under any of the following conditions: • Process variable (PV) bad quality • Control variable (CV) bad quality • Hand feedback bad quality • Invalid span of PV. PVEUMax -PVEUMin • Setpoint below low setpoint limit or above high setpoint limit. The instruction uses the clamped value for SP • Limits invalid: SPLoLim < PVEUMin, SPHiLim > PVEUMax, or SPHiLim < SPLoLim. If SPHiLim < SPLoLim, the instruction limits the value using SPLLimit • Ratio below low ratio limit or above high ratio limit. The instruction uses the clamped value for Ratio • CV < 0 or CV > 100, CV below low CV limit, or CV above high CV limit when the Loop Mode is Manual and Manual Limiting is enabled. The instruction clamps the value for CV • Interlock CV is < 0 or > 100 and the Interlock CV is active. The instruction clamps the value for CV • Invalid CVEU span. The instruction uses a value of CVEUMax = CVEUMin. • CVLLimit < 0, CVHLimit > 100, or CVHLimit < CVLLimit. If CVHLimit < CVLLimit, the instruction limits CV using CVLLimit • CVRoCLimit < 0. The instruction disables rate of change limiting. • Feedforward < -100 or > 100. The instruction clamps the value for Feedforward • Hand Feedback < 0 or > 100. The instruction clamps the Hand Feedback value • Proportional gain < 0. The instruction uses a value of PGain = 0 • Integral gain < 0. The instruction uses a value of IGain = 0 • Derivative gain < 0. The instruction uses a value of DGain = 0 • Zero crossing deadband < 0. The instruction disables zero crossing deadband	• P_PIDE
	Raised when the valve is commanded to a new position and the device feedbacks fail to confirm the valve reached each required position (see state diagram) within the configured time (Cfg_FailT). If the Failure is configured as a shed fault, the valve is commanded closed and cannot be opened until reset.	• P_ValveMP

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
FailToStart	Raised when the motor has and is using run feedback, an attempt is made to start the motor, and the run feedback does not indicate that the motor is running within the configured time. If Fail to Start is configured as a shed fault, the motor is stopped and a reset is required to start the motor.	• P_Motor • P_Motor2Spd • P_MotorRev • P_SMC50 • P_SMCFlex
	Raised when the drive has and is using run feedback, an attempt is made to start the drive, and the run feedback does not indicate that the drive is running within the configured time. If Fail to Start is configured as a shed fault, the drive is stopped and a reset is required to start the drive.	• P_PF52x • P_PF753 • P_PF755 • P_VSD
FailToStop	Raised when the motor has and is using run feedback, an attempt is made to stop the motor, and the run feedback does not indicate that the motor stopped within the configured time.	• P_Motor • P_Motor2Spd • P_MotorRev • P_SMC50 • P_SMCFlex
	Raised when the drive has and is using run feedback, an attempt is made to stop the drive, and the run feedback does not indicate that the drive stopped within the configured time.	• P_PF52x • P_PF753 • P_PF755 • P_VSD
FullStall	Raised when the valve has and is using Open and/or Closed limit switches, an attempt is made to open or close the valve, and the limit switches indicate that the valve did not move from its original position at all within the configured time. **P_ValveSO only:** If Full Stall is configured as a shed fault, the valve is de-energized and a reset is required to command the valve to its energized position.	• P_ValveMO • P_ValveSO
Hi	Raised when the PV is above the High threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_AInHART
HiDev	Raised when the amount by which the PV exceeds the setpoint or reference is above the High Deviation threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AInAdv • P_DBC • P_PIDE
HiHi	Raised when the PV is above the High-High threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_AInHART
HIHIDev	Raised when the amount by which the PV exceeds the setpoint or reference is above the High-High Deviation threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_PIDE
HiRoC	Absolute value of PV rate of change above High Rate of Change limit. Limit set by Operator or Program. Deadband and severity in configuration.	• P_AInAdv
HiRoCDec	Absolute value of PV rate of change above High Rate of Change limit and decreasing. Limit set by Operator or Program. Deadband and severity are set in configuration.	• P_DBC
HiRoCInc	Absolute value of PV rate of change above High Rate of Change limit and increasing. Limit set by Operator or Program. Deadband and severity are set in configuration.	• P_DBC

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
IntlkTrip	Raised when an interlock 'not OK' condition causes the output CV to be changed to the configured Interlock CV value or held at its last value. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_AOut • P_PIDE • P_ValveC • P_AOutHART •
	Raised when an interlock 'not OK' condition causes the device to transition from the On state or a pulsing state to the Off state. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_DOut
	Raised when the motor is running and an interlock 'not OK' condition causes the motor to stop. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_LLS • P_Motor • P_Motor2Spd • P_MotorRev • P_SMC50 • P_SMCFlex
	Raised when the motor is running, the optional trip function is used, and an interlock 'not OK' condition triggers the trip function to stop the motor. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_MotorHO
	Raised when an interlock 'not OK' condition causes the device to transition from some other state to State 0. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_D4SD
	Raised when the drive is running and an interlock 'not OK' condition causes the drive to stop. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_PF52x • P_PF753 • P_PF755 • P_VSD
	Raised when the optional trip function is used and an interlock 'not OK' condition triggers the trip output to the valve. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_ValveHO
	Raised when an interlock 'not OK'condition causes the valve to transition from some other position to the closed position. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.+	• P_ValveMP
	Raised when the valve is energized and an interlock 'not OK' condition causes the valve to be de-energized. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_ValveSO
	Raised when an interlock 'not 0' condition occurs and the device is not in Position 1. The device can be configured to be commanded to Position 1 when an interlock trip occurs. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_nPos

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
IntlkTrip (Continued)	Raised when an interlock 'not OK' condition causes the sequence to perform its configured interlock action. The sequence can: • Command the sequence to Stop; • Hold at the current step; • Transfer control back to the last step configured as an Interlock Fallback Step. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_Seq
IOFault	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the device is commanded to State 0 and cannot be commanded to another state until reset.	• P_D4SD
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the device is commanded Off and cannot be commanded to another state until reset.	• P_DOut
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the device can transition to the Faulted state and remain de-energized until reset.	• P_nPos
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the valve is commanded to Stop motion and cannot be commanded to either position until reset.	• P_ValveMO
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the device can transition to the Faulted state and remain de-energized until reset.	• P_ValveSO
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the motor is stopped and not permitted to start until reset.	• P_Motor • P_Motor2Spd • P_MotorRev • P_SMC50 • P_SMCFlex
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the drive is stopped and not permitted to start until reset.	• P_PF52x • P_PF753 • P_PF755 • P_VSD
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault and the optional trip function is used, the trip output is triggered until reset.	• P_MotorHO • P_ValveHO •
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that communication with the overload relay has failed. The device faceplate can show the I/O Source and Quality as communication failure flag a "Not Ready" diagnostic.	• P_E1PlusE • P_E300Ovld • P_E3Ovld
	Raised when the Inp_IOFault input is true. This input is usually used to indicate to the instruction that a communication failure has occurred for its I/O. If the I/O Fault is configured as a shed fault, the output CV is set to the configured Interlock CV or held at its last value until reset.	• P_AOut • P_ValveC • P_AOutHART
	Raised when an interlock 'not OK' condition causes the valve to transition from some other position to the closed position. If interlocks are not bypassed, a bypassable interlock or a non-bypassable interlock 'not OK' condition initiates an interlock trip. If interlocks are bypassed, only a non-bypassable interlock 'not OK' condition initiates an interlock trip.	• P_ValveMP

Table 37 - P_Alarm Types by Library Objects

Alarm Type	Alarm Description	Library Objects
Lo	Raised when the PV is below the Low threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_AInHART
LockFail	Raised when a device with a locking or sealing feature is commanded to a new position, but the lock/seal feedback failed to confirm the device unlocking before moving or failed to confirm the device locking after moving, within the time allowed. If the Lock Failure is configured as a shed fault, the device can transition to the Faulted state and remain de-energized until reset.	• P_nPos
LoDev	Raised when the amount by which the PV exceeds the setpoint or reference is below the Low Deviation threshold. (Since the threshold is a negative number, this is the amount the PV falls below the setpoint or reference.) The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AInAdv • P_DBC • P_PIDE
LoLo	Raised when the PV is below the Low-Low threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_AInHART
LoLoDev	Raised when the amount by which the PV exceeds the setpoint or reference is below the Low-Low Deviation threshold. (Since the threshold is a negative number, this is the amount the PV falls below the setpoint or reference.) The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.	• P_PIDE
MinGood	Raised when at least one input signal has been rejected, and the remaining unrejected signals are the minimum number configured as required for a good PV. This status / alarm is to warn you that the next input failure can result in a Bad PV quality.	• P_AInMulti
MotorFault	Raised when the Smart Motor Controller detects a fault and sets its Faulted status bit. Check the Fault Code and description to determine the cause. Issuing a Reset of this object can cause a Clear Fault command to be sent to the Smart Motor Controller in an attempt to clear the fault.	• P_SMC50 • P_SMCFlex
NoneGood	Raised when neither PV input has good quality. This is an indication that both PV inputs have degraded or bad signal quality, and so the resulting PV does not have good quality.	• P_AInDual
OffFail	Raised when the device is commanded Off, but the device feedback does not confirm that the device is actually Off within the configured failure time (Cfg_OffFailT).	• P_DOut
OneGood	Raised when either of the two PV inputs has degraded or bad quality.	• P_AInDual
OnFail	Raised when the device is commanded On, but the device feedback does not confirm that the device is actually On within the configured failure time (Cfg_OnFailT). If the Failure is configured as a shed fault, the device is commanded Off and cannot be commanded On until reset.	• P_DOut
OverTol	Raised when the tolerance check is performed and the quantity delivered exceeds the setpoint by more than the High Tolerance threshold.	• P_DoseFM • P_DoseWS
PosFail	Raised when the device is commanded On, but the device feedback does not confirm that the device is actually On within the configured failure time (Cfg_OnFailT). If the Failure is configured as a shed fault, the device is commanded Off and cannot be commanded On until reset.	• P_nPos
SeqTO	Raised when the overall time in the sequence, since the sequence was started, exceeds the sequence timeout configuration (Cfg_SeqTO).	• P_Seq
StepTO	Raised when the amount of time in the current step of the sequence exceeds the step timeout configuration for that step (Ref_Steps[stepnumber].Cfg_FaultT).	• P_Seq

Table 37 - P_Alarm Types by Library Objects

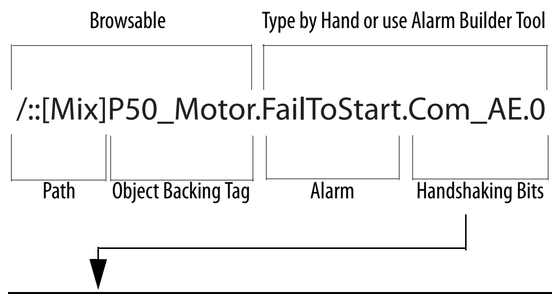
Alarm Type	Alarm Description	Library Objects
TareFault	Raised if the scale is tared, then the weight changes from the tare weight by more than the configured tare fault threshold (Cfg_TareFaultLim) before flow is commanded to start.	• P_DoseWS
TgtDisagree	Raised when the Input PV is not in the same state as the Target (Inp_Target). Gating, and timing are set in configuration.	• P_DIn
TransitStall	Raised when the valve is using both open and closed limit switches and neither position is confirmed (the valve position is in transit) for the configured transit stall time.	• P_ValveHO
	Raised when the valve has and is using both open and closed position feedback, an attempt is made to open or close the valve, and the position feedback indicates that the valve moved off the original position but did not reach the target position within the configured transit stall time.	• P_ValveMO • P_ValveSO
Trip	Raised when the overload relay has tripped, preventing the motor from running. The overload relay must be reset before the motor can be started.	• P_E1PlusE • P_E300Ovld • P_E3Ovld
TripFail	Raised is the motor has and is using the optional trip feature, an attempt is made to trip (stop) the motor, and the run feedbacks show that the motor did not stop within the configured fail to trip time.	• P_MotorHO
	Raised is the valve has and is using the optional trip feature, an attempt is made to trip the valve, and the limit switch feedbacks show that the valve did not reach the configured tripped position (opened or closed) within the configured fail to trip time.	• P_ValveHO
UnderTol	Raised when the tolerance check is performed and the quantity delivered falls short of the setpoint by more than the Low Tolerance threshold. **TIP:** In some instances, the Bump function can be used to make up the shortage.	• P_DoseFM • P_DoseWS
Warn	Raised when a motor overload condition is occurring and a trip of the overload relay is imminent. Immediate action must be taken to reduce the load on the motor.	• P_E1PlusE • P_E300Ovld • P_E3Ovld
ZeroFault	Raised if the totalizer fails to clear, or if the totalizer is cleared but then registers flow before flow is commanded to start.	• P_DoseFM

Alarm with FactoryTalk Alarm and Event Server

FactoryTalk View SE alarms use digital alarms; one digital alarm per P_Alarm instance. This section describes how to configure digital alarm parameters.

As shown in Figure 7, each object with alarms has a P_Alarm instance for each alarm, and each P_Alarm instance has a Local Tag (.Com_AE.*x*) specifically for communicating all alarm status and commands with the FactoryTalk Alarm and Event server.

Figure 7 - FactoryTalk View SE Alarm Path



Local INT Tag with Bit Number

Communication Bits	Alarm Description	AE Status	AE Control
Com_AE.0	Alarm to AE (alarm condition required for digital alarm)	No	No
Com_AE.1	Acknowledged from AE Status, Acknowledge to AE Control	Yes	Yes
Com_AE.2	Not used	N/A	N/A
Com_AE.3	Shelved from AE Status	Yes	No
Com_AE.4	Shelve to AE Control	No	Yes
Com_AE.5	Unshelve to AE Control	No	Yes
Com_AE.6	Suppressed from AE Status (see Important on page 105)	Yes	No
Com_AE.7	Suppress to AE Control	No	Yes
Com_AE.8	Unsuppress to AE Control	No	Yes
Com_AE.9	Disabled from AE Status (see Important on page 105)	Yes	No
Com_AE.10	Disable to AE Control	No	Yes
Com_AE.11	Enable to AE Control	No	Yes
Com_AE.12	Not used	N/A	N/A
Com_AE.13	Not used	N/A	N/A
Com_AE.14	Not used	N/A	N/A
Com_AE.15	Not used	N/A	N/A

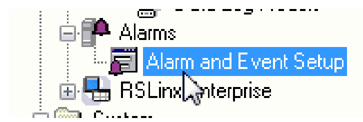
By using an INT (Com_AE) tag for the interface and bits for status and control, the number of tags and elements on scan in the FactoryTalk Alarm and Event server are kept to a minimum.

IMPORTANT	Status and control bits for Suppress and Disable have been separated beginning with Version 3.1-02 of the Process Library to improve FactoryTalk Alarm and Event import behavior. If you update the current P_Alarm Add-On Instruction, it is not necessary to modify an existing FactoryTalk Alarm and Event configuration. However, certain alarms can remain disabled following an alarm import. It's important to make sure that this situation does not occur. If you update to the new bit assignments shown in Figure 7, this situation does not occur but you must update the P_Alarm Add-On Instruction to the latest system version.

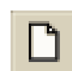
Adding a Digital Alarm

Complete these steps to add a digital alarm.

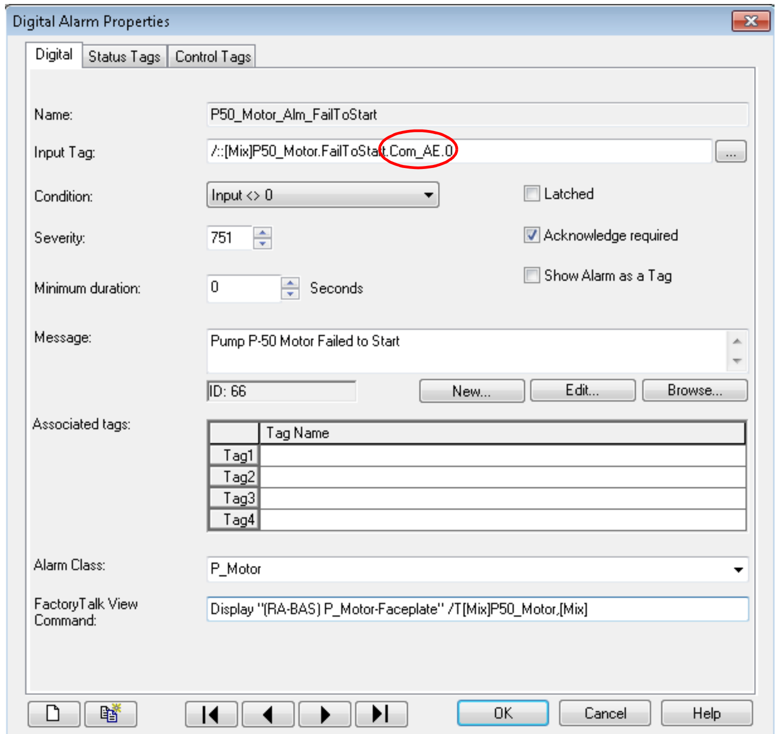
1. Open the FactoryTalk View Studio software.
2. In the Explorer window, click Alarms and double-click Alarm and Event Setup.

   The Alarm and Event Setup dialog box appears with the All Alarms tab.

3. Click the New Toolbar icon  and choose Digital.

The Digital Alarm Properties dialog box appears empty for a new alarm. The example shows data for instructional purposes.



IMPORTANT In the 'Com_AE' local tag, bit .0 (circled in the example on page 106) is the alarm condition required for the digital alarm in the FactoryTalk Alarm and Event setup.

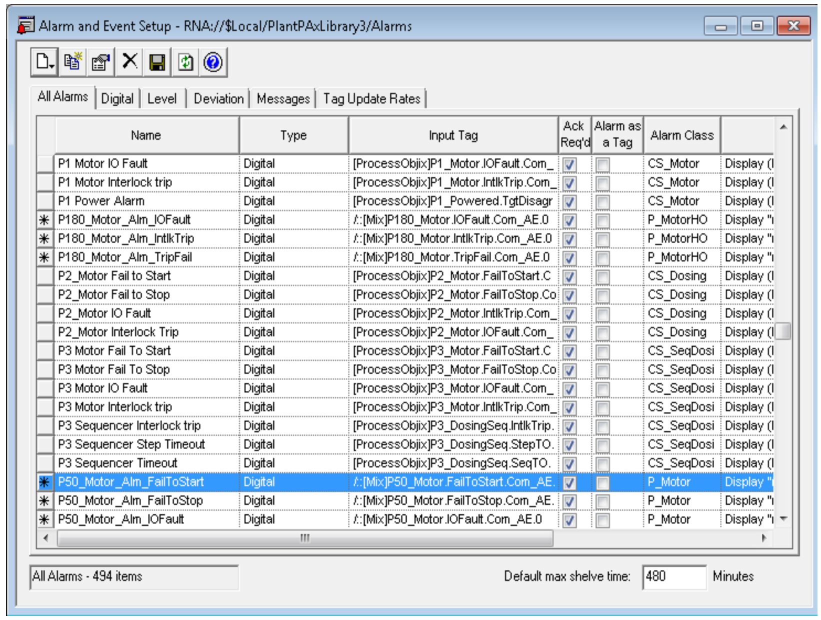
4. Complete the Digital Alarm Properties dialog box.

Topic	Description
Name	Type a unique designator for the object and a short description of the alarm. In the example, 'P50_Motor' identifies the P_Motor object and 'Alm_FailToStart' identifies the alarm.
Input Tag	Type bit .0 of the Com_AE local tag in the P_Alarm instance. You can click Browse (. . .) to select the path and object but not for local tags. Therefore, you must type the last part of the input tag (Com_AE.0). **IMPORTANT:** A simple method to generate the alarm name, especially in an editing tool like Microsoft Excel, is to remove the communication path (shortcut) and replace the dot ('.') separating the tag name and the alarm status parameter name with an underscore ('_'). For example, the input tag: /::[Mix]P50_Motor.Alm_FailToStart becomes alarm name: P50_Motor_Alm_FailToStart
Condition	From the Condition pull-down menu, choose Input <> 0.

Topic	Description
Severity	Choose an alarm severity that aligns with the severity in the controller and is shown on the HMI faceplate. Severity values include the following: **Severity on Faceplate** — **A & E Severity** 1…250 = Low — 1…250 251…500 = Medium — 251…500 501…750 = High — 501…750 751…1000 = Urgent — 751…1000 **IMPORTANT:** The Alarm Builder tool works with Library versions 2.0, 3.0, 3.1, and 3.5. The mapping shown above is for version 3.1 and later that has a range from 1…1000 (INT data type). For Add-On Instructions version 3.0 and earlier, the severity values are in the range of 1…4 (SINT data type). When an ACD file that contains version 3.0 Add-On Instructions is updated with version 3.1 or later Add-On Instructions, the Add-On Instruction tags retain their existing severity values (1…4).
Minimum duration	Set to zero. Alarm on-delay and off-delay timing are handled by the controller.
Latched	Leave blank. Alarm latching (reset required) is handled by the controller.
Acknowledge required	Make sure that there is a check in the checkbox. Alarm auto-acknowledgement for alarms configured as 'Ack Not Required' from the faceplate is handled by the controller.
Show Alarm as a Tag	Leave blank.
Message	To create an optional text message with embedded variables for each alarm, click the Browse button (ellipsis, …) beside the Message box. At runtime, these messages appear in Alarm and Event graphic objects, such as the Alarm and Event Summary. The maximum length of an alarm message is 255 characters. When importing alarm messages, Studio 5000 Logix Designer application verifies the message length and displays a warning if the alarm message exceeds the character limit.
Associated tags	Optionally define up to four Associated Tags. At runtime, the associated tag values are recorded in the alarm and event history log and can also be displayed in the Alarm and Event Summary or Alarm and Event Log Viewer. The values of associated tags can also be embedded in alarm messages. The contents of the Alarm and Event Summary or Alarm and Event Log Viewer can also be filtered based on the value of an associated tag.
Alarm Class	Optionally, type the name of a new Alarm Class or select one from the list of classes. Each time you create an alarm class, the name is added to the list of Alarm Classes. Alarm Classes are used to further group-related alarms, based on characteristics other than priority and severity.
FactoryTalk View Command	Type a FactoryTalk View command that accesses a faceplate when you double-click an alarm for a particular object on an A&E Alarm Summary dialog box. The command is configured as this example: 'Display {faceplate display name} /TPath object}' The name of the display must be inside double-quotes because it contains a space.

5. Click OK.

The digital alarm configuration information appears on the Alarm and Event Setup dialog box.

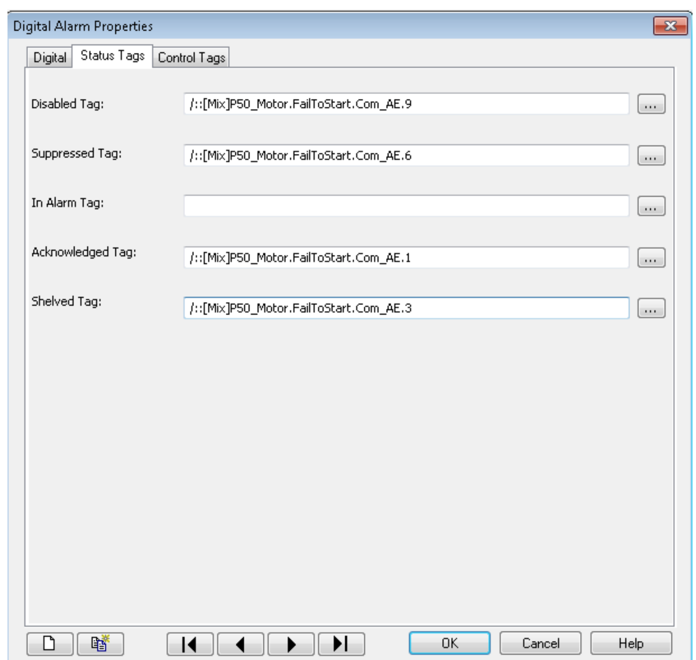


Add Digital Alarm Status Tags

The status tags configuration sends to the controller any shelved/unshelved, disabled/enabled, suppressed/unsuppressed, and acknowledged status updates from the FactoryTalk Alarms and Events Alarm Summary and Alarm Status Explorer dialog boxes.

1. From the Alarms Properties dialog box, click the Status Tags tab.

   The Status Tags dialog box appears.



2. Complete the status tag dialog boxes.

Table 38 - Status Tag Dialog Box

Field	Description
Disabled Tag	Type "'Path Object.Alarm.Com_AE.9" for the disabled tag. Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.9
Suppressed Tag	Type 'PathObject.Alarm.Com_AE.6 for the suppressed tag. Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.6
In Alarm Tag	Leave blank.
Acknowledged Tag	Type 'Path Object.Alarm.COM_AE.1' for the acknowledged tag. Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.1
Shelved Tag	Type 'Path Object.Alarm.COM_AE.3' for the shelved tag. Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.3

IMPORTANT Even though Com_AE is a Local Tag in the Add-On definition, it's configured to be writable (Read/Write, not Read Only) so the FactoryTalk Alarm and Event server status is sent to the bits identified for the tags shown previously.

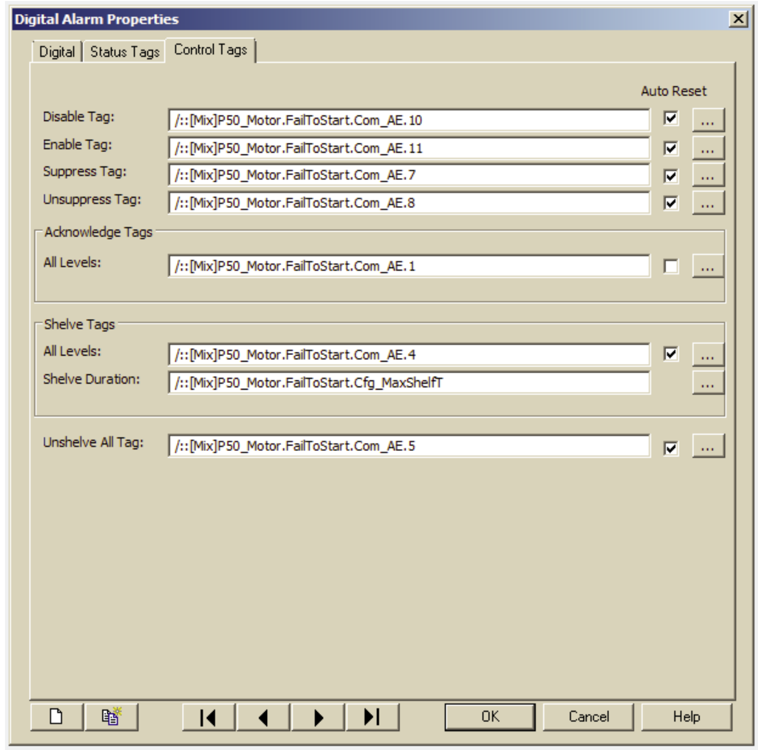
3. Click OK.

Add Digital Alarm Control Tags

Control Tags let the FactoryTalk Alarm and Event server to access alarm acknowledgment, disable, enable, shelve, and unshelve actions. These actions are performed via faceplates. Suppress and unsuppress actions are performed in controller logic.

1. From the Alarms Properties dialog box, click the Control Tags tab.

The Control Tags dialog box appears.



2. Complete the Control Tags dialog box.

Field	Description
Disable Tag Auto Reset checked	Type "Path Object.Alarm.Com_AE.10" for the disable tag. Check the Auto Reset checkbox (so the Disable control automatically resets). Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.10
Enable Tag Auto Reset checked	Type "Path Object.Alarm.Com_AE.11" for the enable tag. Check the Auto Reset checkbox (so the Enable control automatically resets.) Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.11
Suppress Tag Auto Reset checked	Type "Path Object.Alarm.Com_AE.7" for the suppress tag. Check the Auto Reset checkbox (so the Suppress control automatically resets). Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.7
Unsuppress Tag Auto Reset checked	Type "Path Object.Alarm.Com_AE.8" for the unsuppress tag. Check the Auto Reset checkbox (so the Unsuppress control automatically resets.) Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.8
Acknowledge Tags All Levels Auto Reset unchecked	Type "Path Object.Alarm.Com_AE.1" for the acknowledge tag. Leave the Auto Reset checkbox blank. Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.1
Shelve Tags All Levels Auto Reset checked	Type "Path Object.Alarm.Com_AE.4" for the shelve tag. Check the Auto Reset checkbox (so the Shelve control automatically resets.) Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.4
Shelve Duration	Type "Path Object.Alarm.Cfg_MaxShelfT" for the shelve duration tag. Our example is /::[Mix]P50_Motor.FailToStart.Cfg_MaxShelfT
Unshelve All Tags Auto Reset checked	Type "Path Object.Alarm.Com_AE.5" for the unshelve tag. Check the Auto Reset checkbox (so the Unshelve control automatically resets.) Our example is /::[Mix]P50_Motor.FailToStart.Com_AE.5

3. Click OK.

Alarm with FactoryTalk View ME Software

This section describes how to configure a library alarm in FactoryTalk View ME software for use with PanelView™ Plus and other FactoryTalk View ME terminals. Because FactoryTalk View ME software does not support features for suppression, shelving, and disabling, this procedure has not changed from the method used for the Library Version 2.0.

This method does support acknowledgement of alarms from the FactoryTalk View ME terminal. In addition, because the FactoryTalk View ME faceplates are the same as the FactoryTalk View SE faceplates, operator actions for shelve, unshelve, disable, enable, and acknowledgement are recognized by the P_Alarm Add-On Instruction, and by the FactoryTalk Alarm and Event server.

The missing capabilities in FactoryTalk View ME include the following:
- Ability to shelve/unshelve and disable/enable from the Alarm Status Explorer (there is none) or Alarm Summary
- Ability to provide lists of shelved, suppressed, or disabled alarms

An operator on a FactoryTalk View ME terminal can shelve alarms, or maintenance personnel can disable alarms (and the P_Alarm Add-On Instruction prevents new alarms from being generated when shelved). The shelved or disabled status is reflected on the FactoryTalk View SE Alarm Status Explorer.

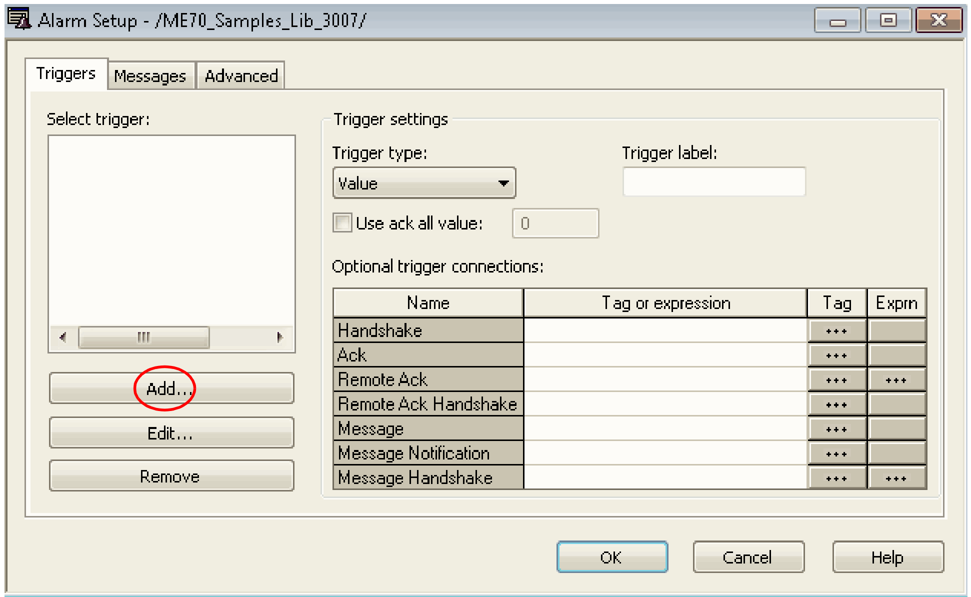
The examples use the following attributes:
- Path is /::[Mix]
- Object is P50_Motor
- Alarm is FailToStart

Create a New Alarm Trigger

Complete these steps.

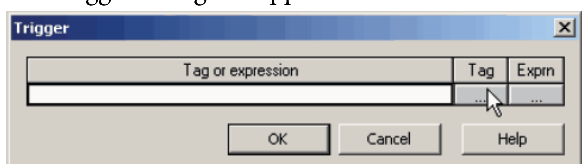
1. Open the FactoryTalk View Studio software.
2. In the Explorer window, click Alarms and double-click Alarm Setup.

The Alarm Setup dialog box appears with the Triggers tag open.



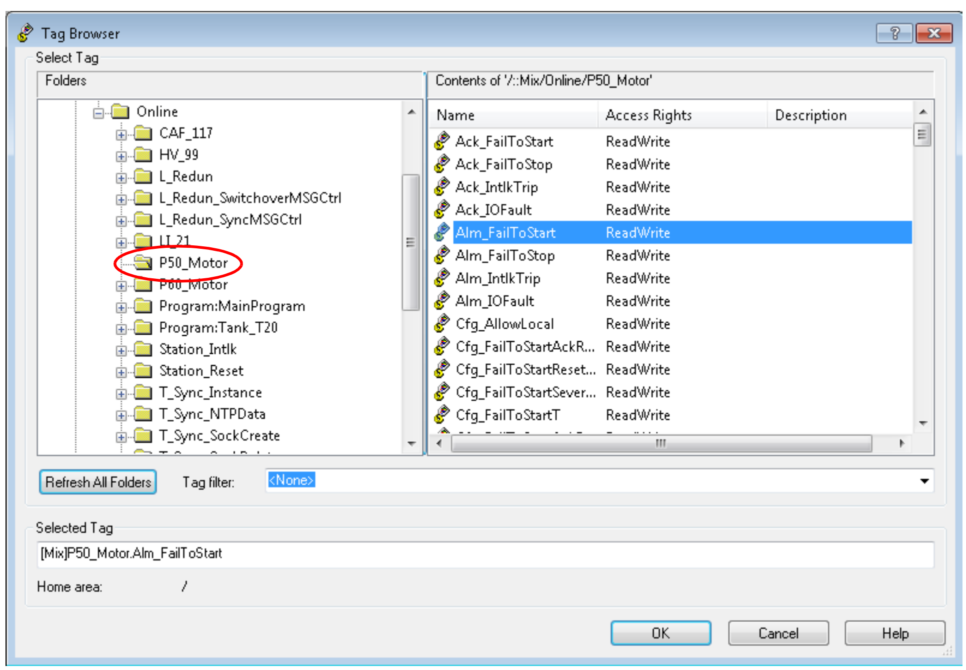
3. Click Add.

The Trigger dialog box appears.



4. Click Browse (...) under Tag.

The Tag Browser appears.



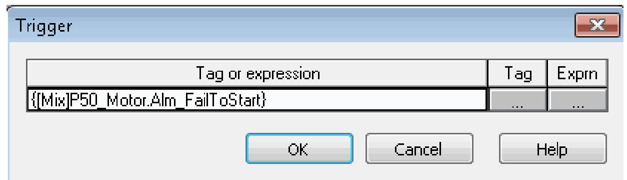
5. In the left pane of the Tag Browser, click the folder that represents the Add-On Instruction instance. Our example is P50_Motor.

You can use the folder for the offline controller. If you are connected to the actual hardware controller on a network and the controller application is loaded, you can use the online folder.

6. In the right pane of the Tag Browser, double-click the alarm status parameter for the alarm.

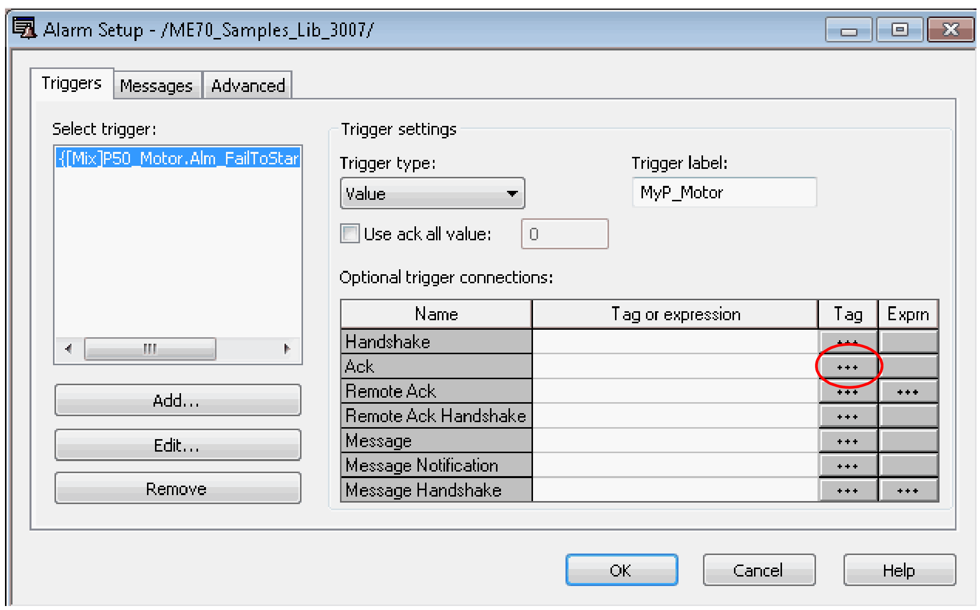
TIP The alarm status parameter name starts with 'Alm_'. For example, the parameter is 'Alm_FailToStart'.

The alarm status parameter appears in the Trigger popup window.



7. Click OK.

The alarm status parameter appears in the Select trigger box of the Alarm Setup dialog box.



8. Click Browse (...) in the Tag column for the Ack row.

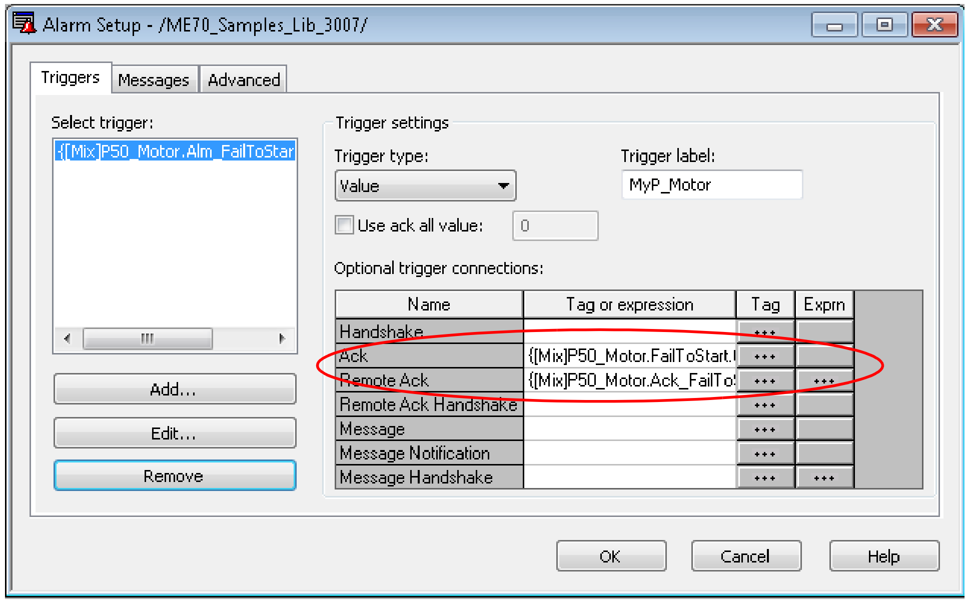
'Ack' is an abbreviation for acknowledge.

The Tag Browser appears when you click Browse.

9. Use the Tag Browser to choose the acknowledge status parameter.

10. Repeat step 8 and step 9 to choose the acknowledge status parameter for the Remote Ack row.

Your setup now looks like the example.



The 'Ack' parameter must be changed so it triggers the Operator Acknowledge Command, which is part of the alarm's Local Tag within the Add-On Instruction. Because this parameter is in a Local Tag, it cannot be browsed. But, the FactoryTalk View ME HMI server can still write to the tag.

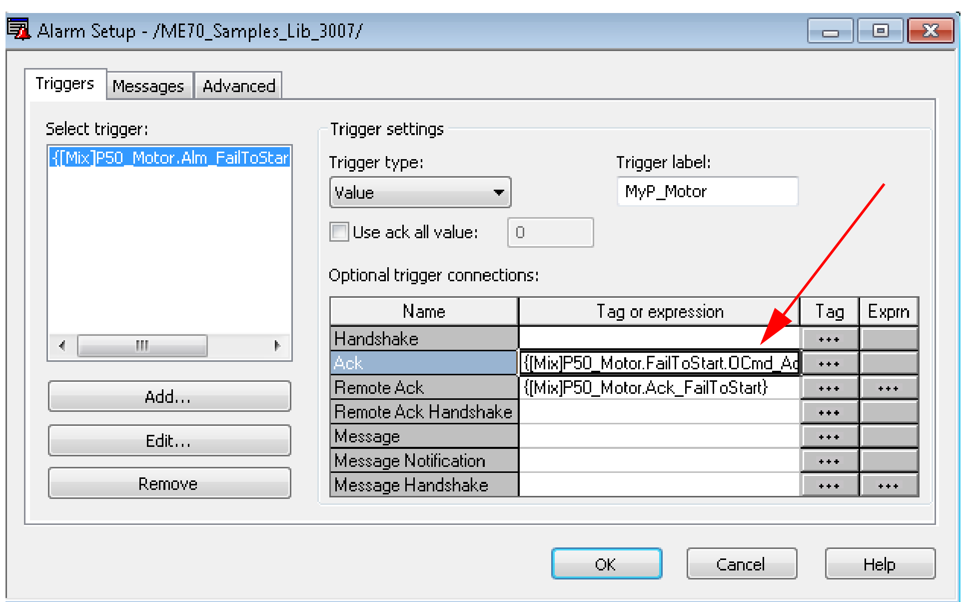
11. To change the 'Ack' parameter, click the tag in the Tag or expression box to access a text cursor and manually type the change.

The format of the expression changes from:

'Path Object.Ack_Alarm'

to:

'Path Object. Alarm.OCmd_Ack'

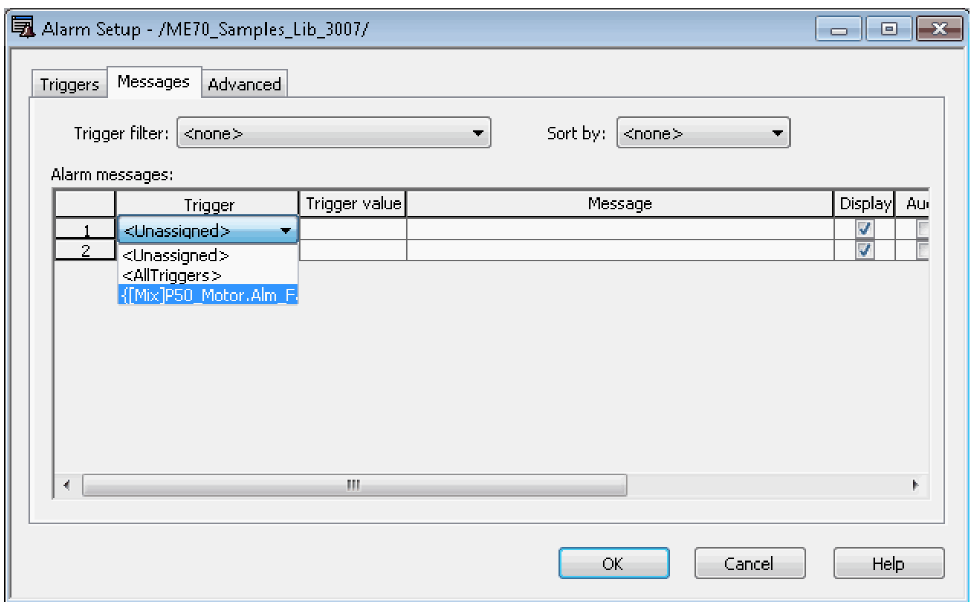


IMPORTANT	Each 'Ack' tag occurrence can be changed in the alarm database by exporting the alarms and making the changes with an editing tool, then importing the changes. Simply Find and Replace every 'Ack' tag of: .Ack_FailToStart to: .FailToStart.OCmd_Ack Perform a similar Find and Replace for each type of alarm: FailToStop, IOFault, and so forth. Be careful when performing the Find and Replace procedure that you do not change the RemoteAck entries.

Configure the Alarm Message

Follow these steps to define a message that appears when the alarm occurs.

1. On the FactoryTalk View ME Alarm Setup dialog box, click the Messages tab.

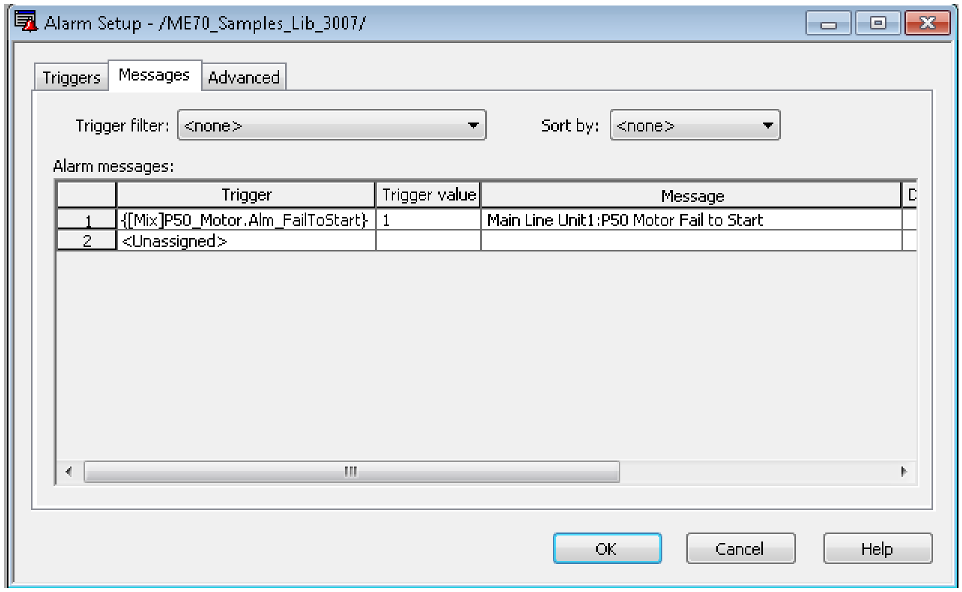


2. From the Trigger pull-down menu, choose the Trigger tag that you created.

   Our example is the {[Mix]P50_Motor.

3. In the Trigger Value column, type 1.

4. In the Message column, type the message to appear with the alarm.

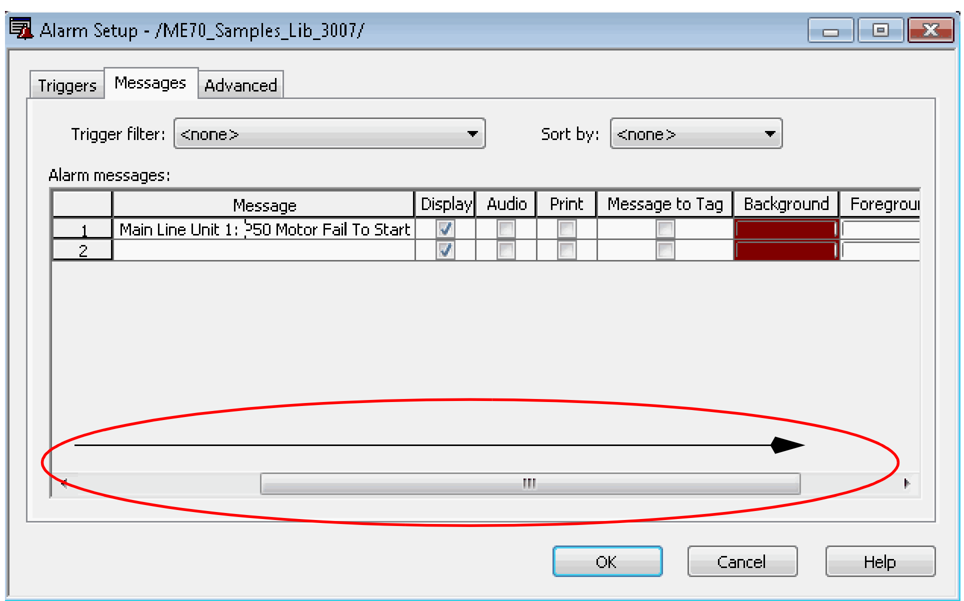


5. Click OK.

Configure Notification Options

Follow these steps for audio or visuals when an alarm occurs.

1. On the Message tab of the Alarm Setup dialog box, click and drag the bottom display bar to the right to show the rest of the columns for the alarm message.



2. Complete the notification options.

Field	Description
Display	Leave the check in the checkbox so you see the alarm display when there is an alarm occurrence.
Audio	Check the checkbox if you want a sound to play from the speakers for the HMI terminal when an alarm occurs.
Print	Check the checkbox if you have a printer attached to the HMI terminal (directly or via a network) and you want the alarm to print when the alarm occurs.
Message to Tag	We recommend that you leave the box blank.
Background and Foreground	Select the colors that are used to display the alarm on the alarm summary. Colors selected must match the alarm severity. **Severity** / **Foreground** / **Background** 1…250 (Low) / White / Blue 251…500 (Medium) / Black / Bright Yellow 501…750 (High) / Black / Bright Red 751…1000 (Urgent) / Black / Bright Magenta

3. Repeat these steps for additional messages.
4. Click OK.

Security Configuration

Runtime security must be set up to provide each account or user group with the correct FactoryTalk View security codes. The security codes verify that operators, maintenance personnel, and engineers have permission to run secured commands, open secured graphic displays, or write to secured HMI tags at runtime.

IMPORTANT	See Appendix E for a list of security codes and descriptions.

FactoryTalk Directory stores information about users that have access to the parts of a control system. During the logon, FactoryTalk Security uses this information to verify the identity of the user and then permissions that are assigned to the user. Authorized users can then access secured parts of the application.

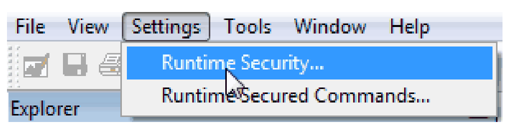
IMPORTANT	FactoryTalk Security settings are stored separately for a Local Directory and a Network Directory, even if both are in use on the same computer. You must set up security permissions twice—once for the Local Directory and once for the Network Directory—to give one user access to a local and a network distributed application on the same computer.

Add Users to Security Codes

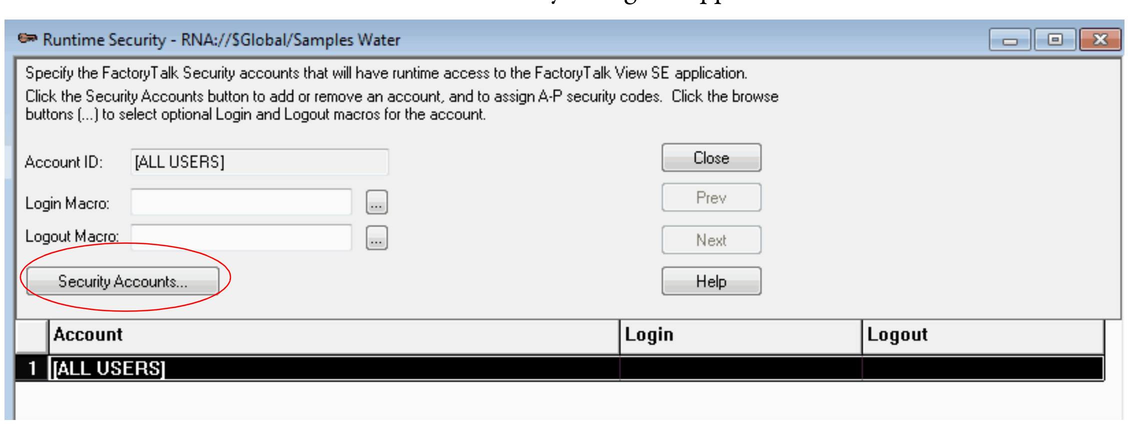
The following steps are for adding a user or group account to an **existing** FactoryTalk Security account.

If you are adding a user, you must create the FactoryTalk account first, and then add the account in the Runtime Security editor. For procedures, see the FactoryTalk View Site Edition User's Guide, publication VIEWSE-UM006.

1. From the Settings menu, click Runtime Security.

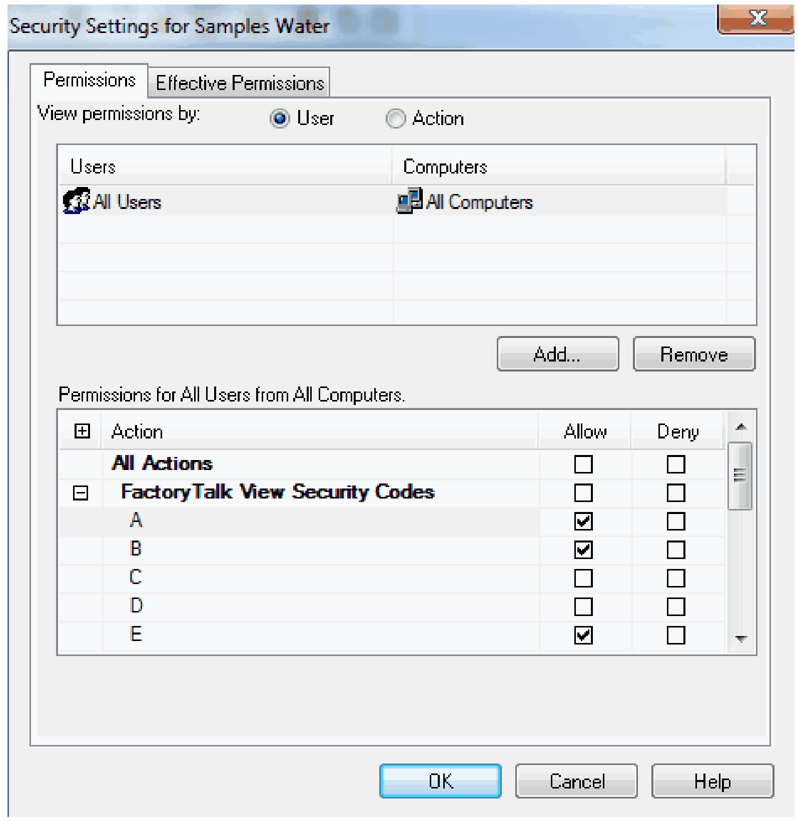


The Runtime Security dialog box appears.



2. Click Security Accounts.

   The Security Settings dialog box appears.



3. Click Add to select an existing user or user group from the Select User and Computer dialog box.

   The selection appears under the Users and Computers columns at the top of the Security Settings dialog box.

4. Click the Allow checkbox beside the FactoryTalk View Security Codes that you want to allow permission for the selected account.

   To select all codes A…P, click the Allow checkbox for All Actions or the checkbox next to FactoryTalk View Security Codes.

IMPORTANT	Recommended settings for the Library do not use Deny, which takes precedence over an explicit Allow.

5. Click OK.

6. Repeat step 3 through step 5 for each user or group account that you want to set up with Runtime Security.

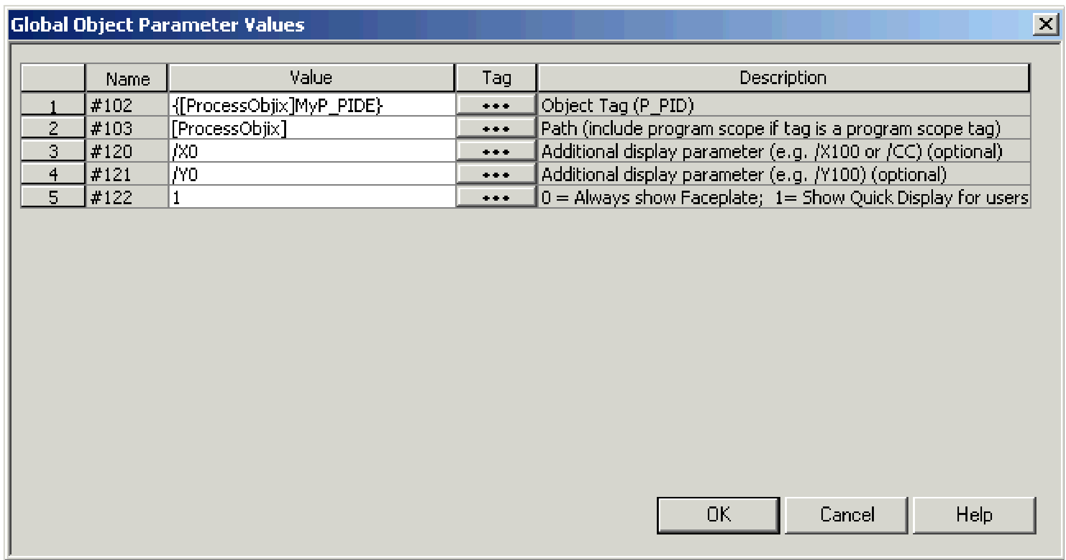
Global Object Configuration

Graphic displays, which consist of display elements (graphic objects), provide an operator with a visual, runtime outlook on a plant activity. The displays show system or process data, and provide operator's with a way to write values to external devices, such as a controller.

For details on using graphic objects, see page 127.

/X and /Y Positioning

The Global Object Parameter Values dialog box, which is used for specifying faceplate coordinates, has two optional parameters: #120 and #121.



Parameters #120 and #121 let you specify additional display command switches. These additional switches can be used to specify where the faceplate appears on your screen.

For example, '/x150' in parameter #120 and '/Y50' in parameter #121 specify that the faceplate appears 150 pixels from the left and 50 pixels from the top. These parameters are optional and do not need to be specified.

Table 39 and Table 40 describe the position parameters and how to use them with the #120 and #121 global object parameters, respectively.

Table 39 - Corner and Center Positioning

Global Object Parameter	Position Parameter	Description
#120	/Q1	Top, right corner
	/Q2	Top, left corner
	/Q3	Bottom, left corner
	/Q4	Bottom, right corner
	/CT	Centered on top edge
	/CB	Centered on bottom edge
	/CL	Centered on left edge
	/CR	Centered on right edge
	/CC	Center of screen
#121	Leave blank. See the tip.	

TIP The values of global object parameters #120 and #121 are passed directly to the Display command that opens the faceplate display (.gfx). Nothing prevents you from putting any valid Display command parameters in these values. For more information, see the FactoryTalk View Site Edition User's Guide, publication VIEWSE-UM006, or the online Help for the Display command parameters in the FactoryTalk View Studio software.

Table 40 - Absolute Positioning

Global Object Parameter	Position Parameter	Description
#120 (SE)	/Xnnn	Left edge of faceplate 'nnn' pixels from the left edge of the screen
#120 (ME)	Numeric value (for example, 100)	
#121 (SE)	/Ynnn	Top edge of the faceplate 'nnn' pixels down from the top edge of the screen
#121 (ME)	Numeric value (for example, 100)	

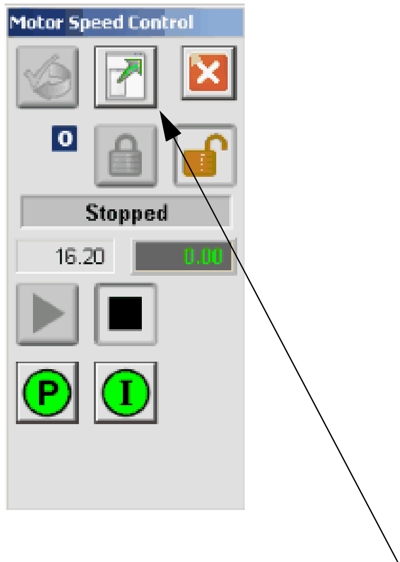
Parameter #122 controls the display that appears when you click the display element. You can expand the row height for parameter #122 by typing a value and clicking Enter.

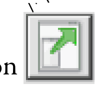
- '0' specifies the full faceplate always appears.
- '1' specifies the full faceplate appears if the user has security code 'C' (see page 118), and the 'Quick' display (see page 122) appears if you do not have security code 'C'.
- '2' specifies the 'Quick' display always appears.
- If parameter #122 is left blank, the full faceplate always appears.

See the 'Use Global Objects' section in each Add-On Instruction Reference Manual to configure these parameters, if applicable.

Quick Display

Most library objects that have faceplates have 'Quick' displays. The Quick display is much smaller than the PlantPAx faceplate, but still has all of the information and controls needed by the operator.



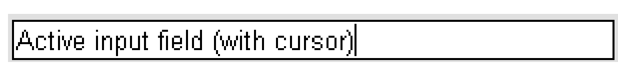
Clicking the View Faceplate icon  shows the full faceplate.

Saving Your Data in FactoryTalk View SE Software

When entering data into string Input fields in FactoryTalk View SE software, the data is not saved to the tag until you press Enter. When the Input field is active, its border changes based on the state of the input:

- When the Input field is active (the cursor is in the field), the Input field border is a solid line.

EXAMPLE

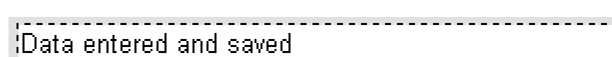


- If you modify the data in the Input field and move to another field without pressing Enter, the border remains a solid line. This indicates that the data has not been saved to the tag.

EXAMPLE

- If the data in the Input field has not changed or has been written to the controller tag, the border is a dashed line.

EXAMPLE



Help Graphics Files

To reduce the number of Help displays that count against your licenses, Rockwell Automation has consolidated some Help graphics into family groups. This consolidation has reduced the number of displays from 48 to 16.

Some individual Help graphics files were not consolidated because they are too specialized to fit into a group.

The following table lists the Help family groups and the Add-On Instructions that use them.

Table 41 - Help Graphics Files

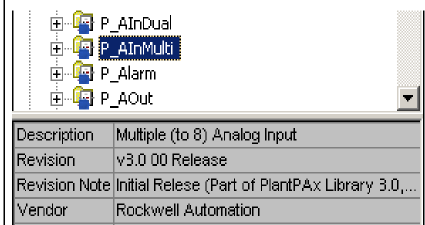
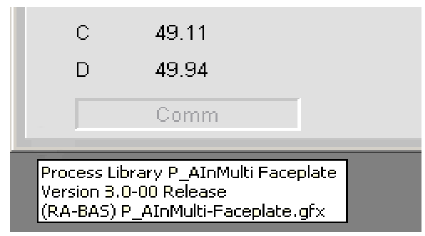
Help Family Files	Add-On Instructions
Logix Family-Help.gfx	• L_CPU • L_Redun • L_TaskMon
Logix-Help.gfx	• Logix
Built-In Family-Help.gfx	• Built-In CC • Built-In IMC • Built-In MMC • Built-In PIDE • Built-In RMPS • Built-In Totalizer
P_AIChan-Help.gfx	• P_AIChan
Process AnalogIn Family-Help.gfx	• P_AIn • P_AInHART • P_AInAdv • P_AInDual • P_AInMulti • P_DBC
Process Analog Family-Help.gfx	• P_AOut • P_AOutHART • P_ValveC • P_Fanout • P_HiLoSel
Process Discrete Family-Help.gfx	• P_D4SD • P_DOut • P_nPos • P_DIn
Process Dose Family-Help.gfx	• P_DoseFM • P_DoseWS
Process Ovld Family-Help.gfx	• P_E1PlusE • P_E300Ovld • P_E3Ovld
P_Logic-Help.gfx	• P_Logic
Process Motor Family-Help.gfx	• P_LLS • P_Motor2Spd • P_Motor • P_MotorRev • P_MotorHO • P_PF52x • P_PF753 • P_PF755 • P_SMC50 • P_SMCFlex • P_VSD
Process PID Family-Help.gfx	• P_PIDE

Table 41 - Help Graphics Files

Help Family Files	Add-On Instructions	
Process Valve Family-Help.gfx	• P_ValveMO • P_ValveMP • P_ValveSO • P_ValveHO	
Process Interlock Family-Help.gfx	• P_Intlk • P_Perm	
P_Mode-Help.gfx	• P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_AOut • P_D4SD • P_DoseFM • P_DoseWS • P_DOut • P_Fanout • P_Mode • P_Motor • P_Motor2Spd • P_MotorHO	• P_MotorRev • P_nPos • P_PF52x • P_PF753 • P_PF755 • P_PIDE • P_SMC50 • P_SMCFlex • P_ValveC • P_ValveMO • P_ValveMP • P_ValveSO • P_VSD •
P_Alarm-Help.gfx	• P_AIChan • P_AIn • P_AInAdv • P_AInDual • P_AInMulti • P_Alarm • P_AOut • P_D4SD • P_DBC • P_DoseFM • P_DoseWS • P_DOut • P_E1PlusE • P_E3Ovld • P_E300Ovld • P_Motor	• P_Motor2Spd • P_MotorHO • P_MotorRev • P_nPos • P_PF52x • P_PF753 • P_PF755 • P_PIDE • P_SMC50 • P_SMCFlex • P_ValveC • P_ValveHO • P_ValveMO • P_ValveMP • P_ValveSO • P_VSD

Maintain Library Releases

Each library object has a revision xx.yy-zz where: xx is the Major Revision number, yy is the Minor Revision number, and zz is the Service Release. Each release of the Process Library comes with release notes that describe the changes made since the last release.

Component	Example
The Add-On Instruction in Logix Designer application has revision information visible when the instruction is selected in the Controller Organizer.	
The faceplate in FactoryTalk View software has revision information visible when the pointer is paused just inside the lower left corner of the faceplate when accessed in a running HMI Client.	

The instruction and faceplate are compatible if they have the same Major and Minor Revision numbers. In general, service releases can be loaded into your application with little impact. We suggest that you review the release notes to make sure you understand the changes made in the release and assess the impact to your application.

Process Library patches are made available between Service Releases via Knowledgebase Article 654910–Rockwell Automation Library Patch TOC.

TIP You are required to log into the Knowledgebase.

The article provides a collection, or table of contents, that directs the user to all patches related to the Rockwell Automation Library of Process Objects. Patches are arranged chronologically by Major Revision. Each subsequent Service Release of the Process Library rolls up all patches associated with the prior Service Release. (In other words, Service Release 3.50-02 rolls up any patches released via KB 654910 for 3.50-01.) Therefore, users need only check for patches related to the version of the Process Library that they are using.

Using two different Major/Minor revisions of the Library in a single application is not supported. When updating major or minor releases, there are several considerations to take into account:

- The new revision can have differences in functionality that requires adjustment of your application code written around the library instruction instances.
- There can be differences in the look-and-feel that requires an update of operator training and manuals.
- If you have made any customizations, they likely need to be repeated on the new release of the library after it is loaded.

It is important that these considerations are weighed properly against the benefits you gained from the new Library release. The release of the Library typically includes documentation on how to upgrade from the previous Major/Minor release.

Customize the Library

The Rockwell Automation Library of Process Objects can be customized for project or customer-specific reasons. However, we recommend that you consider the following:

- Weigh the value of the customization against the value of using the library as issued. For example, you must document any customization so it can be reapplied, if necessary, on top of a subsequent maintenance release.
- Rockwell Automation provides a varied schedule of maintenance releases for the library. If the library object has not been altered, updating the latest maintenance release can be done more easily. If customized, the customization has to be reapplied manually on subsequent releases.

IMPORTANT	There are some library objects, such as Logix Diagnostic objects and Steam Table instructions, that are not to be customized. These objects typically are not operator-facing and have logic that must be fixed to provide the desired functionality.

- Customization could inhibit your ability to leverage the library documentation or standard training based on the library.
- The library is supported through Rockwell Automation Technical Support as long as the Add-On Instructions have not been modified from the original deployment. If customized, the library is supported similar to any other application code.

Use the Library

This chapter shows how to use Library Add-On Instructions, global objects, and faceplates to build your control application. FactoryTalk® View SE software provides visualization of instruments that are connected to the network interface.

Global objects (display elements) provide touch areas from which faceplates are launched, link tag names to the faceplates, and display the process variables and alarms.

The procedures in this section require that you have installed global objects (.ggfx file types). See Import Visualization Files on page 79 for installation details, if necessary.

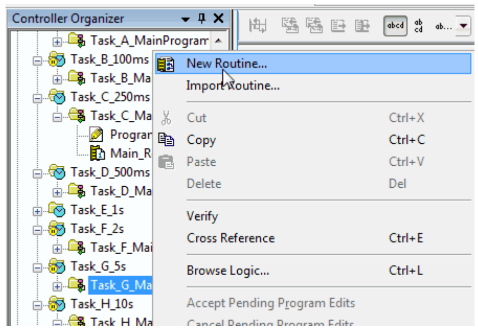
The following table describes the topics in this chapter.

Create a Logic Instance

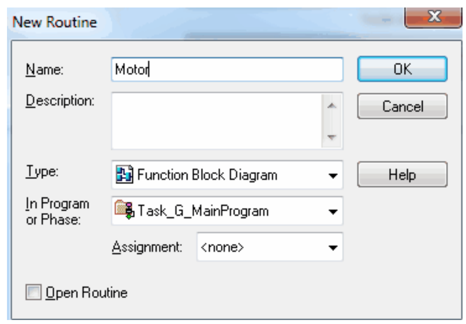
Do these steps to add an Add-On Instruction to a routine, create a backing tag, and connect I/O.

Add-On Instructions can be used in any of the Logix languages: Ladder Diagram, Function Block Diagram, or Structured Text. In this example, we show how to add an instruction instance to a Function Block Diagram routine.

1. In the Controller Organizer, right-click the Task and choose New Routine.



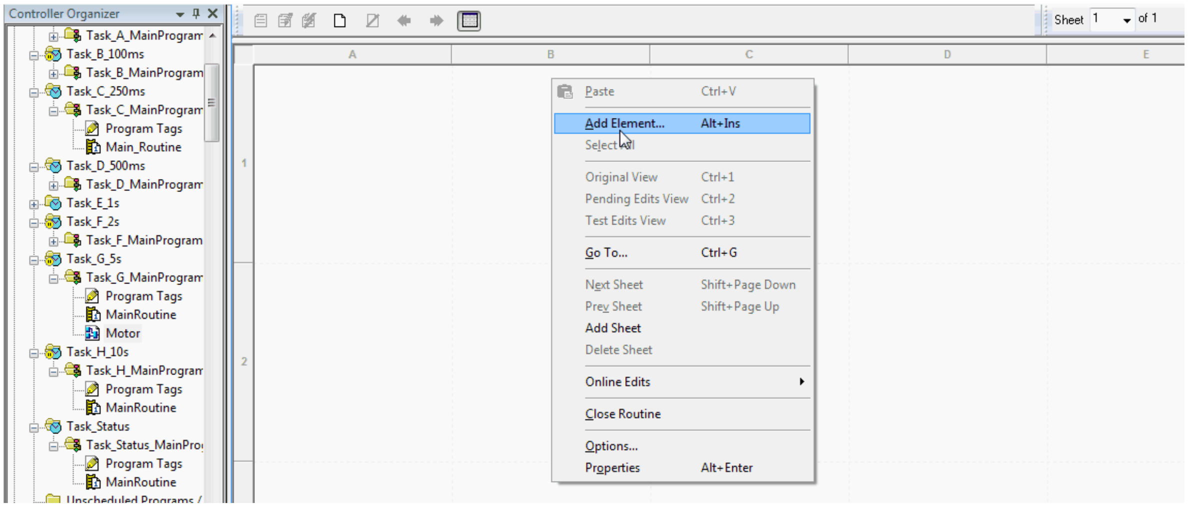
The New Routine dialog box appears.



2. Type a name for the routine.
3. Click the Type pull-down to select a Logic language, such as Function Block Diagram, and click OK.
4. Double-click the routine name in the Controller Organizer

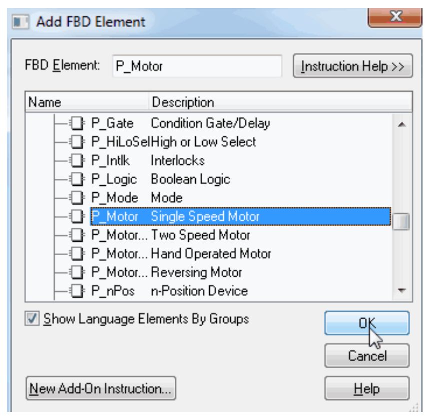
   A blank sheet appears in the right pane.

5. Right-click the blank sheet and choose Add Element.



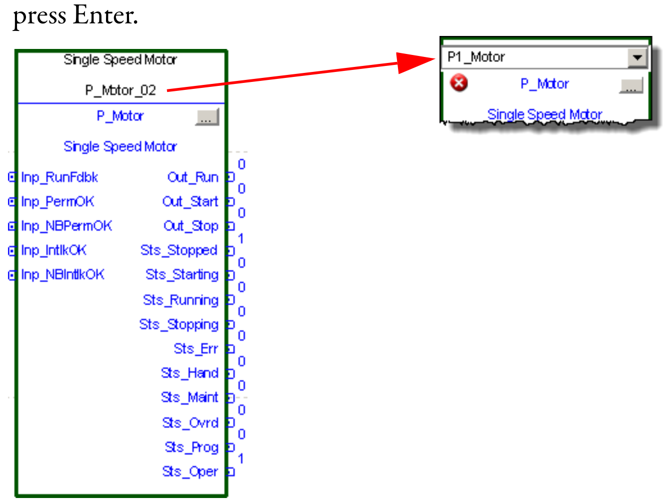
The Add FBD Element window appears.

6. Browse to the Add-On Instruction folder, select the Add-On Instruction, and click OK.



A function block (or the language type you selected) appears.

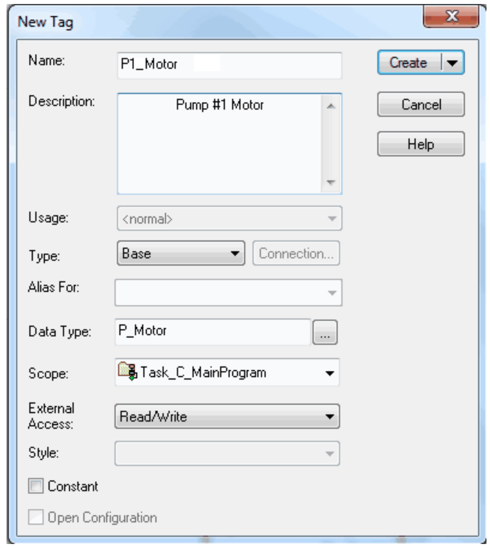
7. Double-click the name, type a new name (P1_Motor in our example), and press Enter.



8. Right-click the new name and choose New 'name'.

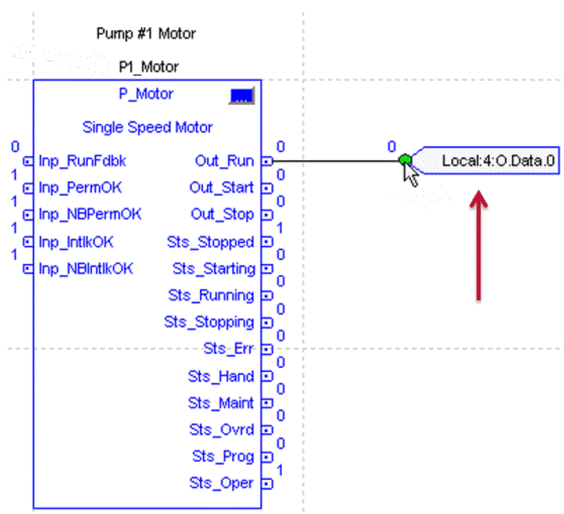
   The Properties dialog box appears.

9. Type a description for your new backing tag and click Create.



   The description and name of the tag appears at the top of the function block.

10. Connect the pins to add I/O.

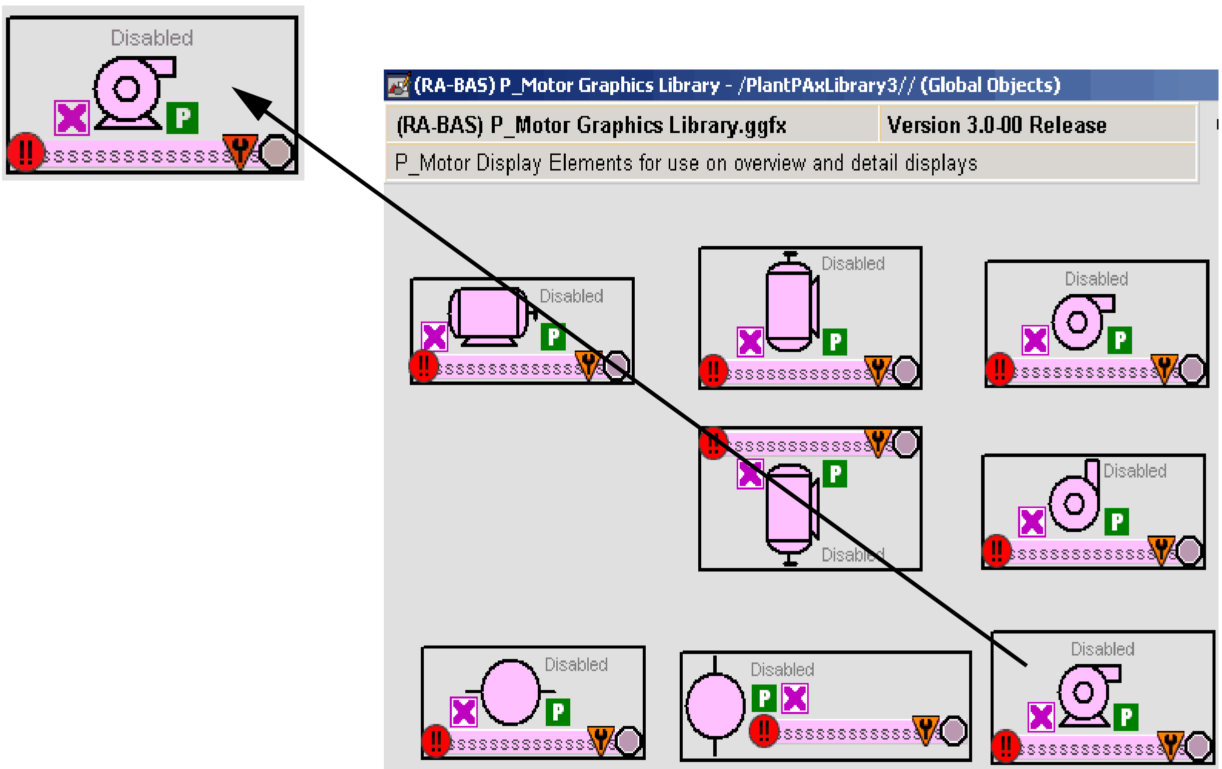


11. Repeat this process for each required Add-On Instruction.

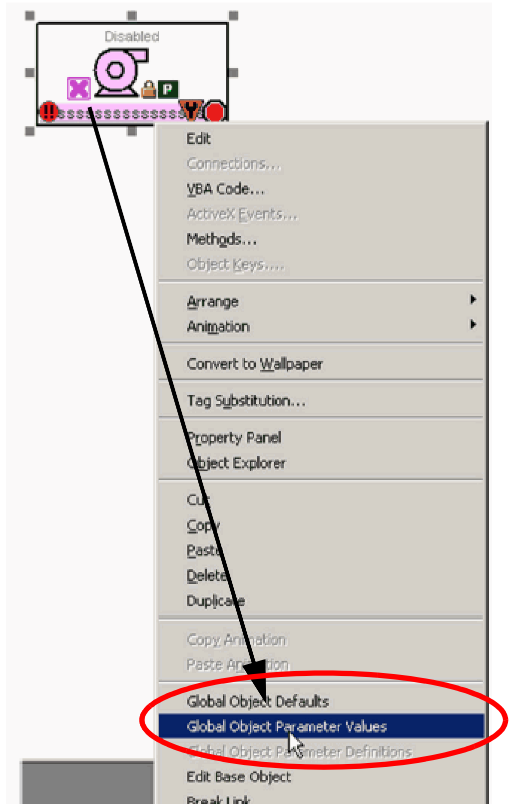
Create an HMI Instance

Follow these steps to configure the HMI instance.

1. In the FactoryTalk View Studio software program, open the global objects (.ggfx) file that contains the graphics library for the instruction.
2. Click and drag a global object onto the Studio software display file.



3. In the display file, right-click the global object file and choose Global Object Parameter Values.

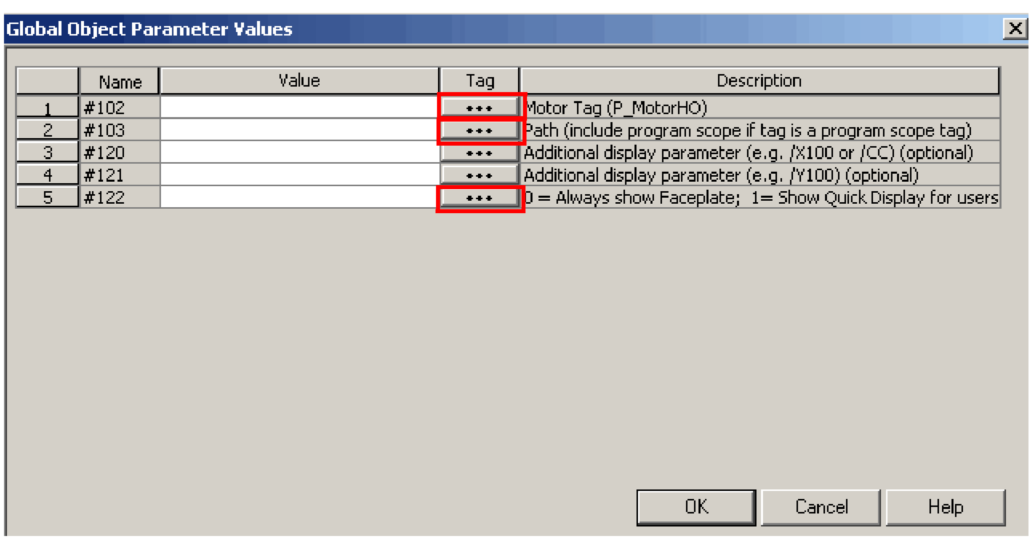


The Global Object Parameter Values dialog box appears.

Configure the first, second, and fifth parameters.

The third and fourth parameters are 'optional' and differ in syntax depending on whether the FactoryTalk View SE or the FactoryTalk View ME application is used.

See page 120 for details.



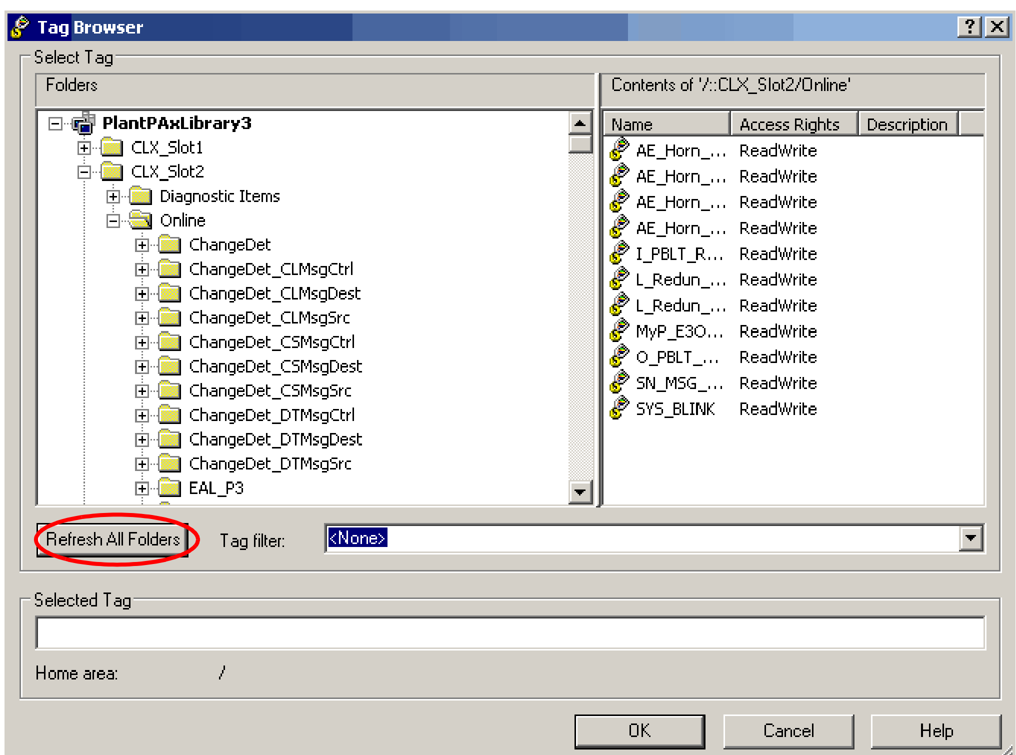
The global object parameters are as follows.

Parameter	Required	(SE) Description	(ME) Description
#102	Y	Object tag to point to the name of the associated object Add-On Instruction in the controller.	
#103	Y	Path used for display navigation features to other objects. Include program scope if tag is a program-scope tag.	
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.	Optional position parameter for Left offset. Type a number ("nnn") to set the number of pixels the left edge of the display is from the left edge of the screen
#121	N	Additional parameter to pass to the display command to open the faceplate. If defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This functionality lets the same parameters to be used in subsequent display commands that originate from the faceplate.	Optional position parameter for Top offset. Type a number ("nnn") to set the number of pixels the top edge of the display is from the top edge of the screen
#122	Y	These are the options for the global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2 = Always show Quick Display	

4. To enter the backing tag for the #102 parameter, you can type a tag into the Value column or click the Browse button .

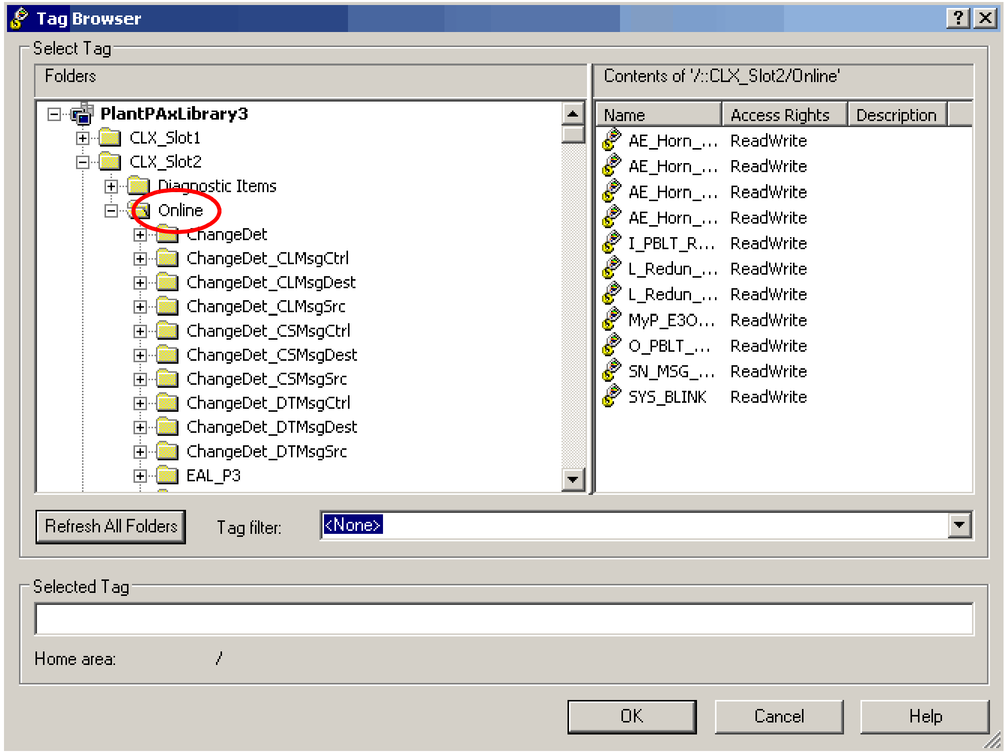
   For the following procedures, click Browse to enter the first parameter, the object tag.

   The Tag Browser dialog box appears.



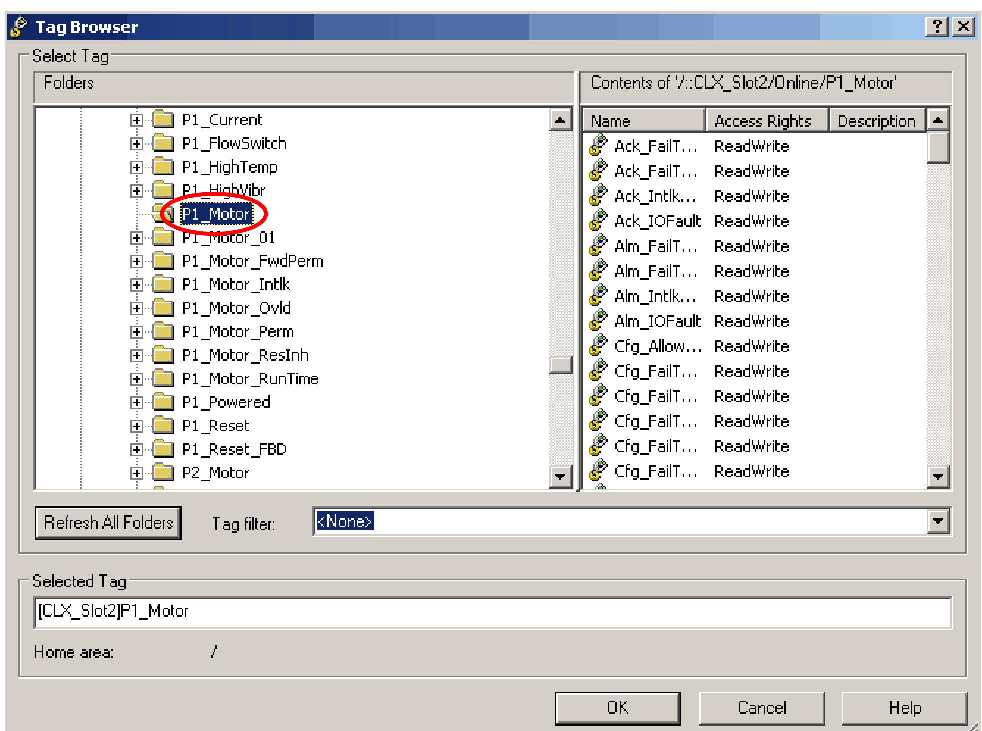
5. Click Refresh All Folders.

6. Expand the shortcut for the project controller and then click Online.



7. Expand and scroll down the Online menu to select the tag for the Add-On Instruction.

IMPORTANT	The backing tag for the Add-On Instruction is a folder.

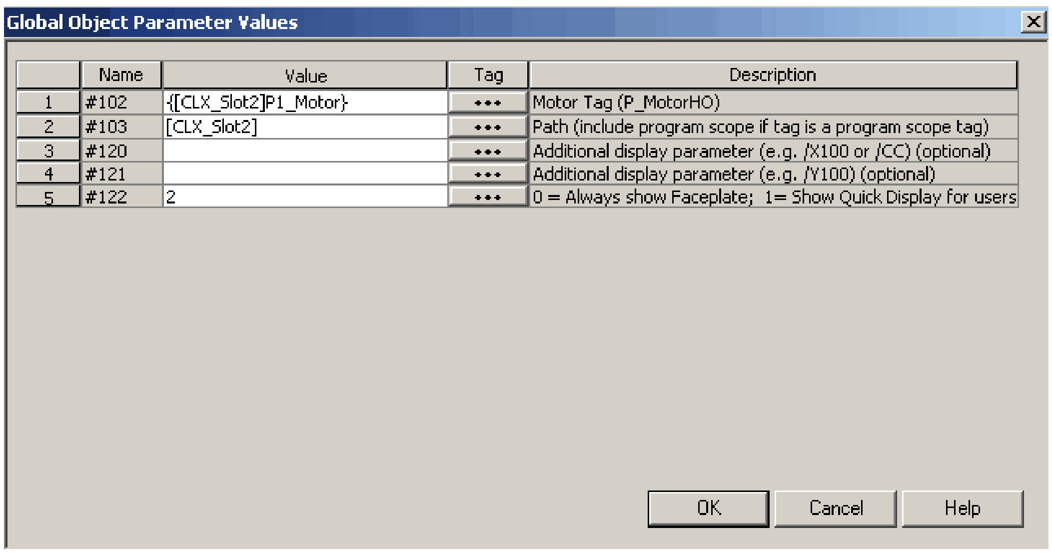


8. Click OK.
9. To configure the #103 parameter, copy the path part of #102 into the Value column:
   - No { } (curly braces)
   - No tag
   - Just /:[ ] (area and shortcut)

IMPORTANT	If the Tag is Program scoped, include the scope (including the period after the Program name) in the Path. For example, if the Tag is "{[CLX_Slot2]PROGRAM:Unit1.P1_Motor}", then the Path is "[CLX_Slot2]PROGRAM:Unit1."

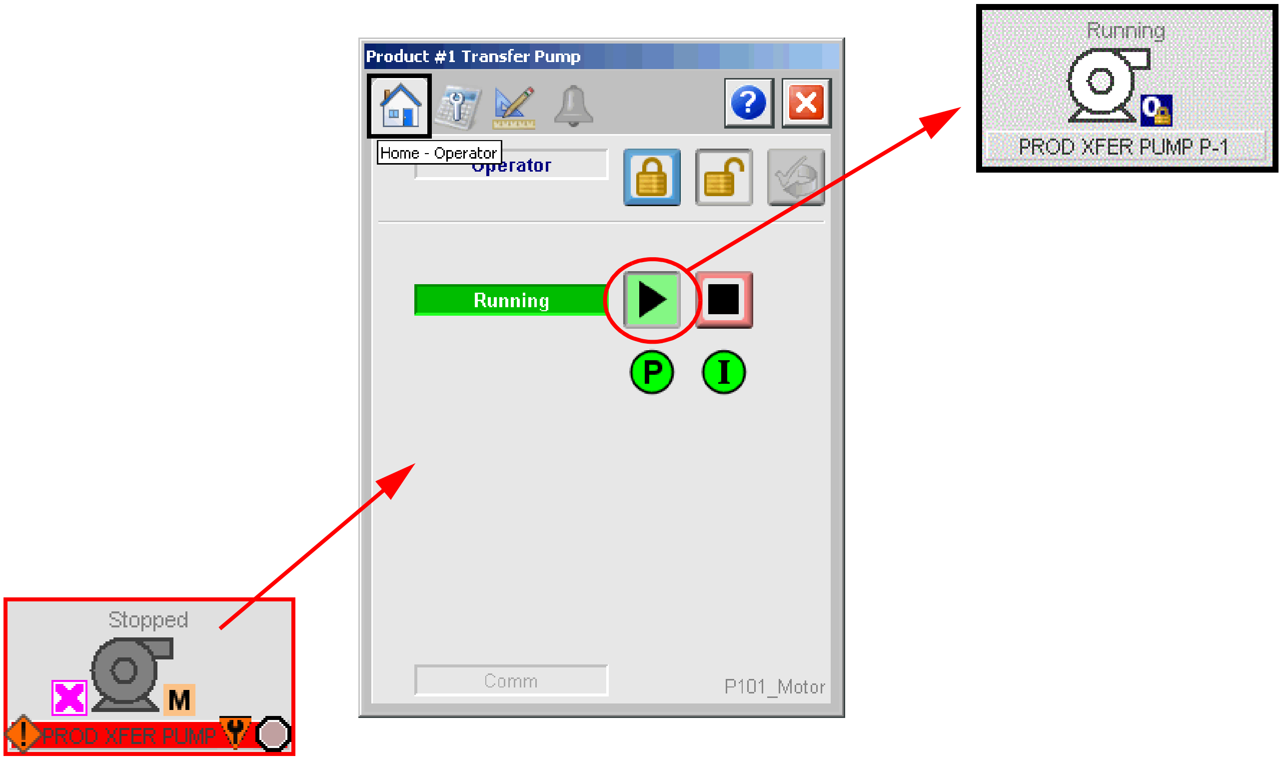
10. Click the Value column for the fifth parameter and enter a value (0, 1, 2) per the desired display.

    The following image is an example of parameter values.



11. Click OK.
12. Click Save.

13. On an HMI screen, access the display that contains the global object.
14. Click the global object to access a faceplate.



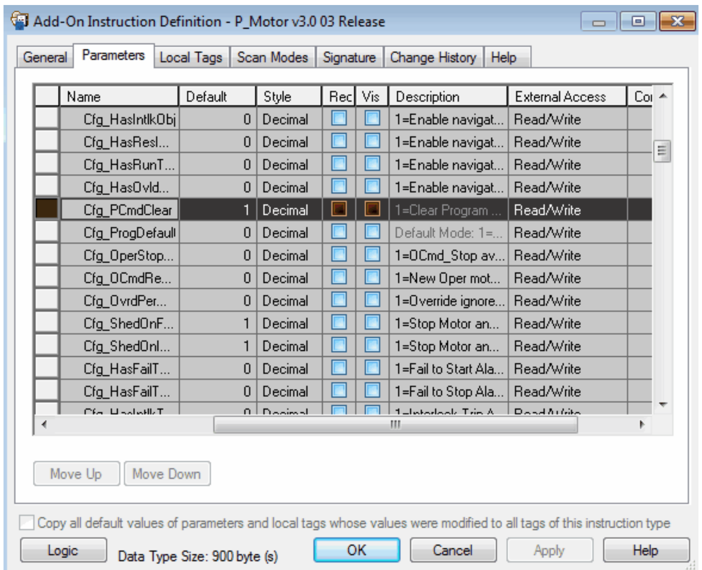
15. To operate the device, click the command buttons on the faceplate.

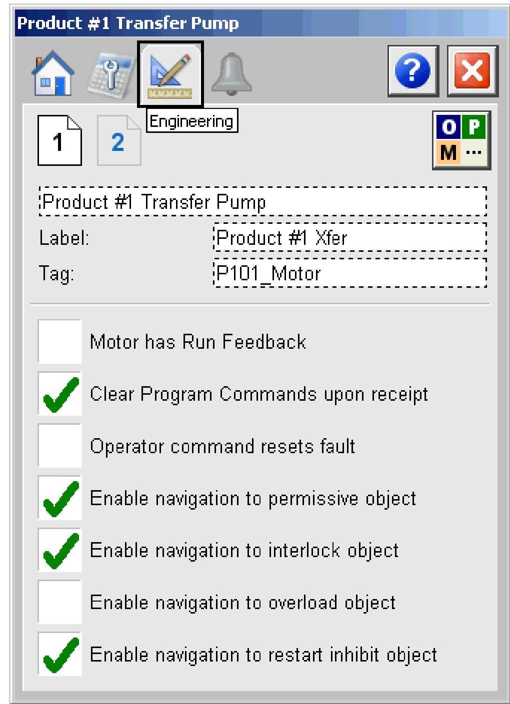
IMPORTANT	See Appendix C to change the color on a display element or faceplate.

Device Configuration

You can configure the device parameters by doing the following:

- Type values in the Parameters tab of the Studio 5000 Logix Designer® application
- Make selections and enter data for each option on the Engineering tab of the instruction HMI faceplate



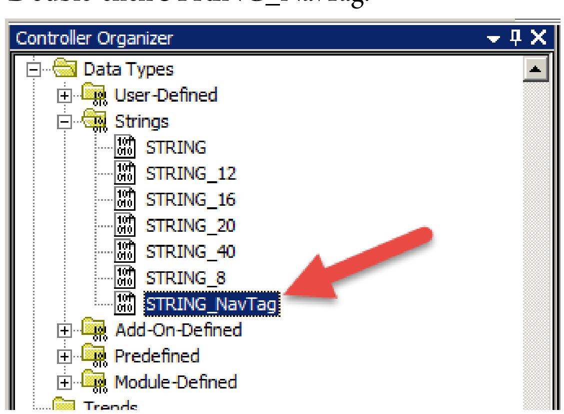


Modify Navigation Tags

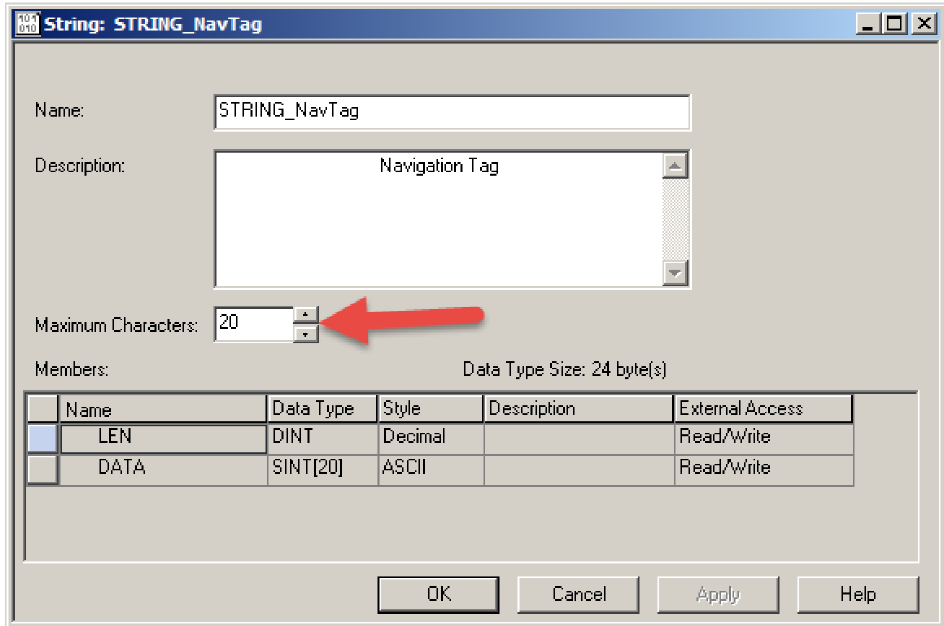
You can change the size of all navigation tags globally without having to change the definitions of each Add-On Instruction. By changing the definition of the STRING type, you can use longer names for backing tags.

Complete these steps.

1. In the Controller Organizer, click '+' to expand the Strings folder.
2. Double-click STRING_NavTag.



A dialog box appears that provides access to a text box for modifying the number of characters in the string.



3. Type a number into the Maximum Characters text box.

   You also can use the Up and Down counter arrows.

   Any length works, but lengths from 4…40 in multiples of 4 (4, 8, 12, …36, 40) work the best. Controller tag names have a 40-character limit.

   You also can shorten tag names to save some controller memory.

IMPORTANT	We suggest that your device tag names are no longer than 28 characters. This limit helps prevent corresponding tags ('_Intlk', '_Perm', '_ResInh', '_RunTime', and '_Valve Stats') from exceeding the 40-character tag name limit.

Increasing the length of tag names requires corresponding changes to faceplate global object files in FactoryTalk View. You are responsible for modifications to the Nav Tag string entry and string display fields in FactoryTalk View.

Online Configuration Tool

The Online Configuration Tool is a standalone, Microsoft Excel-based spreadsheet. The multi-tabbed spreadsheet lets you access configuration tags of Library objects (Add-On Instruction parameters and local tags) for multiple instances of a library instruction simultaneously by using OPC.

IMPORTANT	The Configuration Tool is supported **only** in 32-bit editions of Microsoft Excel software. The tool uses RSLinx® Classic OPC/DA for its online communication, and RSLinx Classic OPC Server is a 32-bit application. (The tool works fine on 64-bit Microsoft Windows operating systems; it requires a 32-bit installation of Microsoft Excel/Microsoft Office.)

This tool lets you make bulk changes more easily, especially for local configuration tags like strings, instead of modifying each tag separately for each Add-On Instruction instance.

WARNING: The spreadsheet is used to modify parameters by using a controller. However, the controller **must not** be in a production environment controlling machinery or processes. The spreadsheet works with the controller in Program mode, so we strongly suggest it be used that way to avoid unintended control changes to running equipment.

Before You Begin

The spreadsheet uses RSLinx Classic software DDE/OPC, so you need a suitably licensed copy (OEM, Gateway) of the software. You cannot use the Lite version of RSLinx Classic software.

We suggest that you make a back-up copy of your application before completing the following steps. When using the spreadsheet, all of your Add-On Instruction instances (backing tags) are to be created in your Studio 5000 Logix Designer® application project (.acd file) and the project downloaded to your controller.

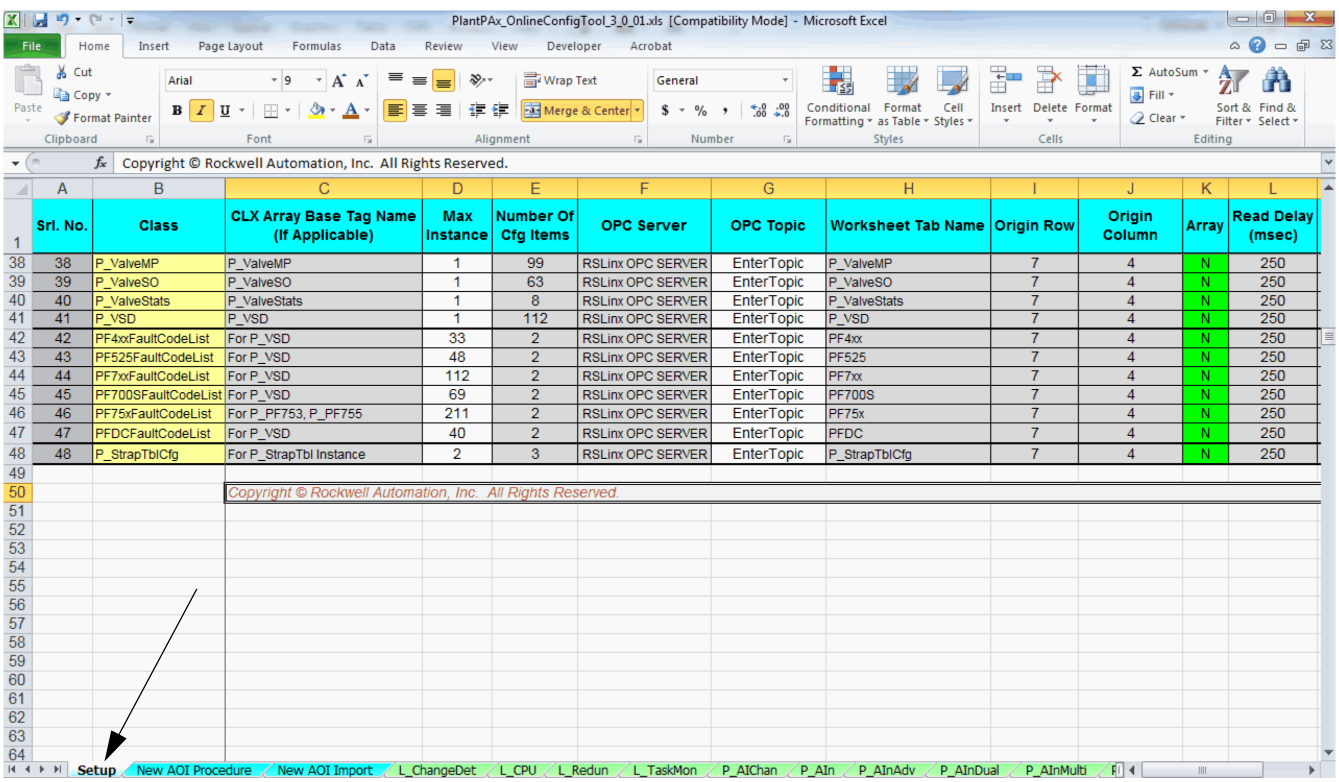
Configure Parameters By Using a Spreadsheet

Local tags can be configured through the HMI faceplates or in Logix Designer application. Open the instruction logic of the Add-On Instruction instance and then open the Data Monitor on a local tag.

The following procedure is for using a spreadsheet to upload (save) and download (restore) the configuration (.Cfg) parameters from library instances in an online controller. See the previous Warning that applies for the controller that is being used before starting these steps.

1. Download the Rockwell Automation® Library from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/downloads.page.
2. Open Tools & Utilities and double-click PlantPAx® Online Configuration Tool.
3. Open the Excel spreadsheet.

   The spreadsheet opens in the default Setup folder (at the bottom of the screen).



Srl. No.	Class	CLX Array Base Tag Name (If Applicable)	Max Instance	Number Of Cfg Items	OPC Server	OPC Topic	Worksheet Tab Name	Origin Row	Origin Column	Array	Read Delay (msec)
38	P_ValveMP	P_ValveMP	1	99	RSLinx OPC SERVER	EnterTopic	P_ValveMP	7	4	N	250
39	P_ValveSO	P_ValveSO	1	63	RSLinx OPC SERVER	EnterTopic	P_ValveSO	7	4	N	250
40	P_ValveStats	P_ValveStats	1	8	RSLinx OPC SERVER	EnterTopic	P_ValveStats	7	4	N	250
41	P_VSD	P_VSD	1	112	RSLinx OPC SERVER	EnterTopic	P_VSD	7	4	N	250
42	PF4xxFaultCodeList	For P_VSD	33	2	RSLinx OPC SERVER	EnterTopic	PF4xx	7	4	N	250
43	PF525FaultCodeList	For P_VSD	48	2	RSLinx OPC SERVER	EnterTopic	PF525	7	4	N	250
44	PF7xxFaultCodeList	For P_VSD	112	2	RSLinx OPC SERVER	EnterTopic	PF7xx	7	4	N	250
45	PF700SFaultCodeList	For P_VSD	69	2	RSLinx OPC SERVER	EnterTopic	PF700S	7	4	N	250
46	PF75xFaultCodeList	For P_PF753, P_PF755	211	2	RSLinx OPC SERVER	EnterTopic	PF75x	7	4	N	250
47	PFDCFaultCodeList	For P_VSD	40	2	RSLinx OPC SERVER	EnterTopic	PFDC	7	4	N	250
48	P_StrapTblCfg	For P_StrapTbl Instance	2	3	RSLinx OPC SERVER	EnterTopic	P_StrapTblCfg	7	4	N	250

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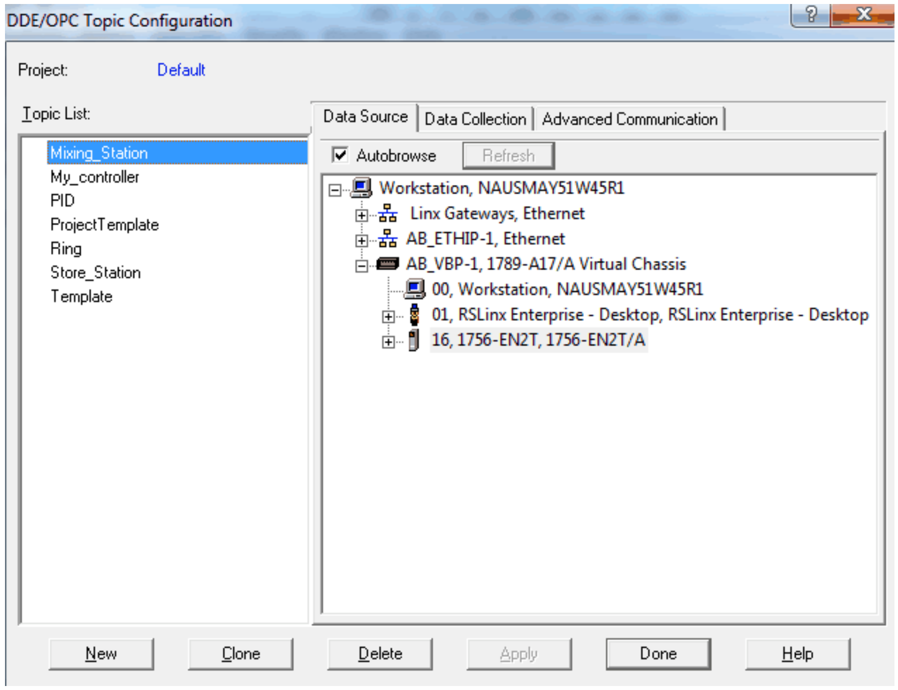
4. Using 'Save As', save the file with a filename that matches the name of the controller.
5. Open RSLinx Classic software.

6. From the DDE/OPC menu, choose Topic Configuration.

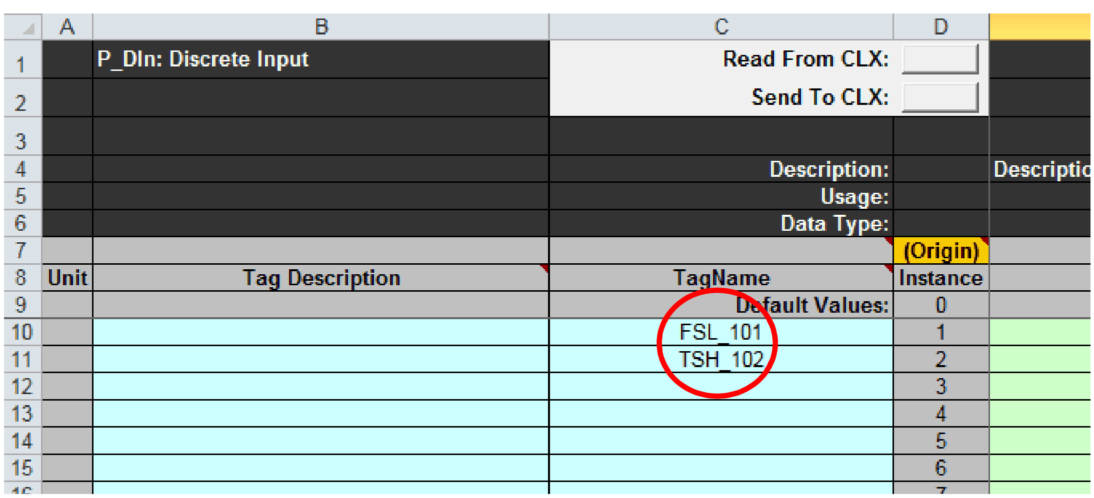
   The DDE/OPC Topic Configuration dialog box appears.



7. In the left pane, find the Topic that points to your controller or create one.
8. Open your new spreadsheet file.

   Use the active content if you get a warning message.
9. Type the Topic name in all rows of column G of the Setup sheet.

   Be sure that you are going to the correct controller.
10. Open an Add-On Instruction instance by clicking the respective tab name at the bottom of the screen.
11. In column C, start in row 10 and type the backing tag names for your Add-On Instruction instances.

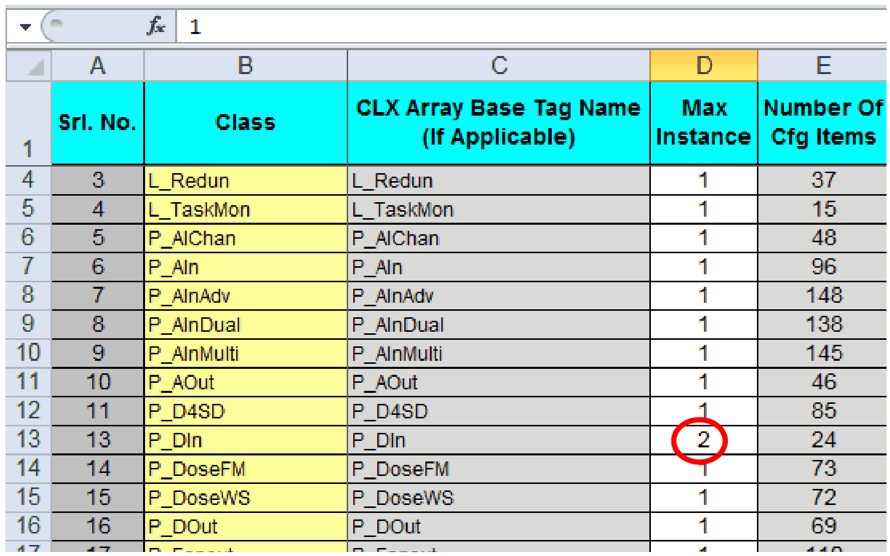


TIP	If your Add-On Instruction instances are in Program-scope tags, you can get to them as well. The TagName syntax is: Program:<program_name>.<tagname>

12. On the Setup sheet, type the number of instances of each Add-On Instruction in column D.

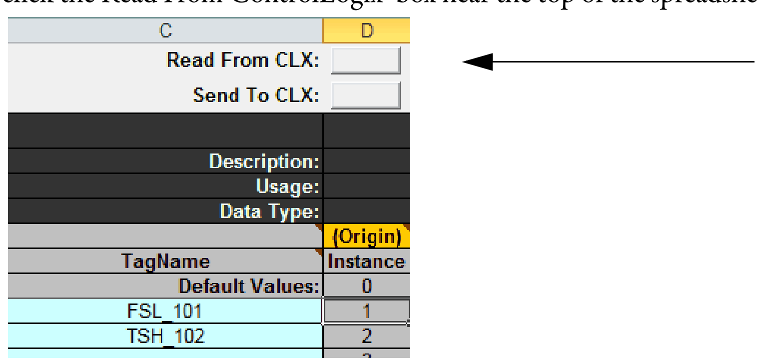
IMPORTANT	Make sure that you switched to the Setup sheet for step 12. Do **not** change the 'Number of Cfg Items' in Column E or any of the other data on the Setup sheet.

The following example shows two instances that are entered on the Setup sheet because we entered two instance tags in column C in the P_DIn sheet.



Srl. No.	Class	CLX Array Base Tag Name (If Applicable)	Max Instance	Number Of Cfg Items
3	L_Redun	L_Redun	1	37
4	L_TaskMon	L_TaskMon	1	15
5	P_AIChan	P_AIChan	1	48
6	P_AIn	P_AIn	1	96
7	P_AInAdv	P_AInAdv	1	148
8	P_AInDual	P_AInDual	1	138
9	P_AInMulti	P_AInMulti	1	145
10	P_AOut	P_AOut	1	46
11	P_D4SD	P_D4SD	1	85
13	P_DIn	P_DIn	2	24
14	P_DoseFM	P_DoseFM	1	73
15	P_DoseWS	P_DoseWS	1	72
16	P_DOut	P_DOut	1	69

13. Return to the Add-On Instruction sheet, in our example its P_DIn, and click the Read From ControlLogix® box near the top of the spreadsheet.



14. Click Yes to the overwrite message to populate the row for that instance.

15. Make your modifications, for example change the strings, and click the Send To ControlLogix to send the new configuration to the controller.

16. Check the data in the controller and save the project (to a new .acd file is best).

    Make sure that you upload tag values when you save the project.

Alarm Builder Tool

The PlantPAx® Alarm Builder tool expedites the process of creating the FactoryTalk® View SE/ME alarms that work with the Rockwell Automation® Library of Process Objects. With this tool you can:

- Define a project that contains multiple controller ACD files and associated FactoryTalk View HMI applications.
- Organize Logix code, Logix tags, and FTView SE HMI displays in a Process Tree organizer. The tree structure creates AE alarm groups, select tags to use in the AE and ME alarm builders, and SILAlarm import files.
- Tag Data Editing, Import, Export:
  - Edit Logix tag data in off-line controller ACD files.
  - Export and import Logix tag data to/from text files.
  - Create Microsoft Excel workbook for online OPC tag data read/writes.
- Create AE XML import files by using tag data from controller files.
- Create ME XML import files by using tag data from controller files.

Before You Begin

The PlantPAx Alarm Builder tool is included with the Rockwell Automation® Library of Process Objects available from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/downloads.page.

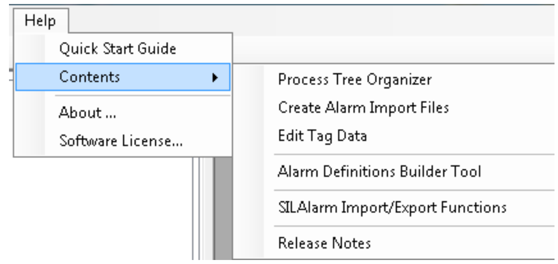
You must also have Studio 5000 Logix Designer® application or RSLogix 5000® software installed. Logix Designer services, which are part of the software installation package, convert a controller ACD file to an XML file. The XML conversion lets the Alarm Builder software to read the data and create alarm tags.

Additional documentation resources provide information on how to configure alarm tags, data types, and other functions that Alarm Builder can perform.

In the Help menu on the PlantPAx Alarm Builder and Tag Data Edit Tool window, click Quick Start Guide to access this document.

In the Help menu, click Contents to access these documents:

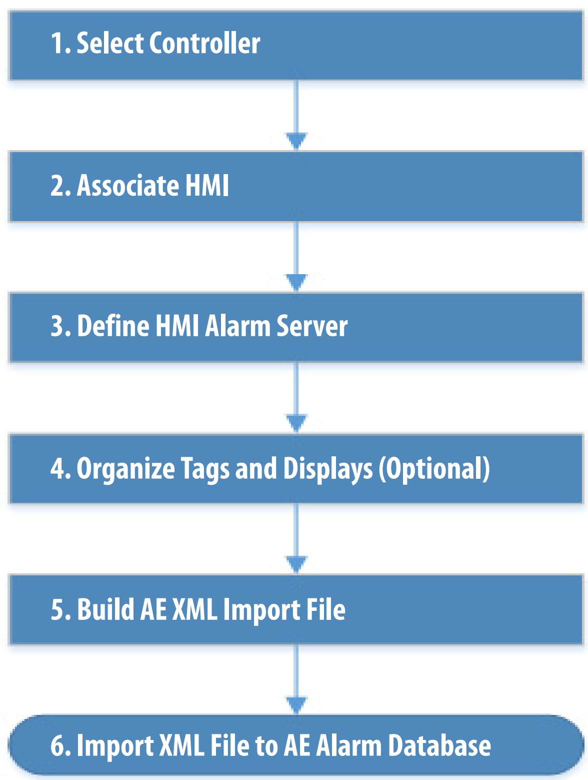
- Process Tree Organizer
- Create Alarm Import Files
- Edit Tag Data
- Alarm Definitions Builder Tool
- SILAlarm Import/Export Functions
- Release Notes



Build AE Alarms

The diagram outlines the procedures for creating FactoryTalk View SE software alarms. The procedures in this section are in the same order as the headings in the diagram.

Figure 8 - Alarm Builder AE Workflow



1. Select Controller

This section describes how to associate a Logix controller to FactoryTalk View HMI servers and data servers so the Alarm Builder tool can create HMI alarm tags. This tool obtains server information from specified FactoryTalk View directories, which use default FactoryTalk View installation settings. The HMI server and data server information can be entered manually, if necessary.

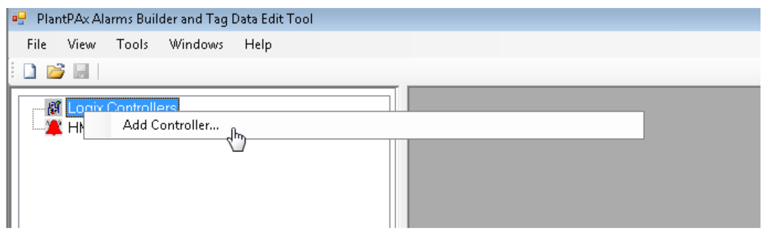
Follow these steps to add a controller to the Alarm Builder software tool.

1. From the Tools & Utilities folder in the downloaded library files, open the Alarm Builder tool.

   A Quick Start PDF file opens in a separate Adobe PDF Reader window. Review the Quick Start guide and close the Adobe window.

   The PlantPAx Alarm Builder and Tag Data Edit Tool window appears.

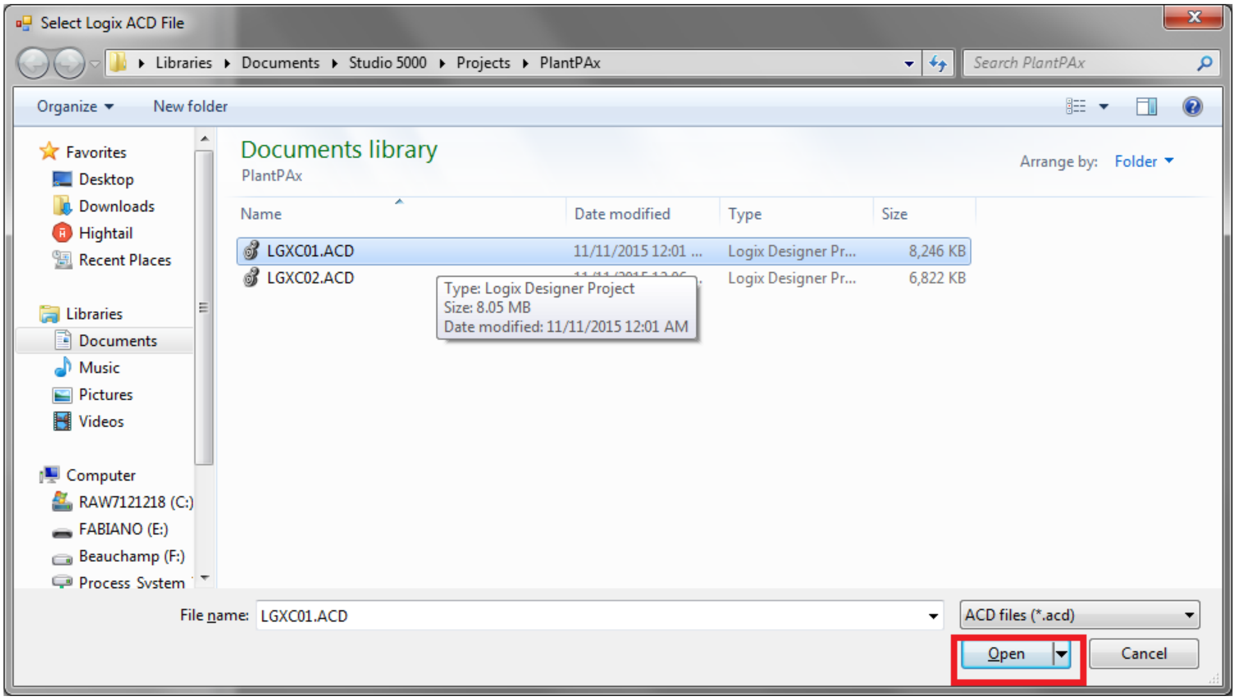
2. Right-click Logix Controllers and choose Add Controller.

   The Select Logix ACD File dialog box appears.

3. Navigate to the folder that stores the controller project file.

4. Select the ACD file and click Open.

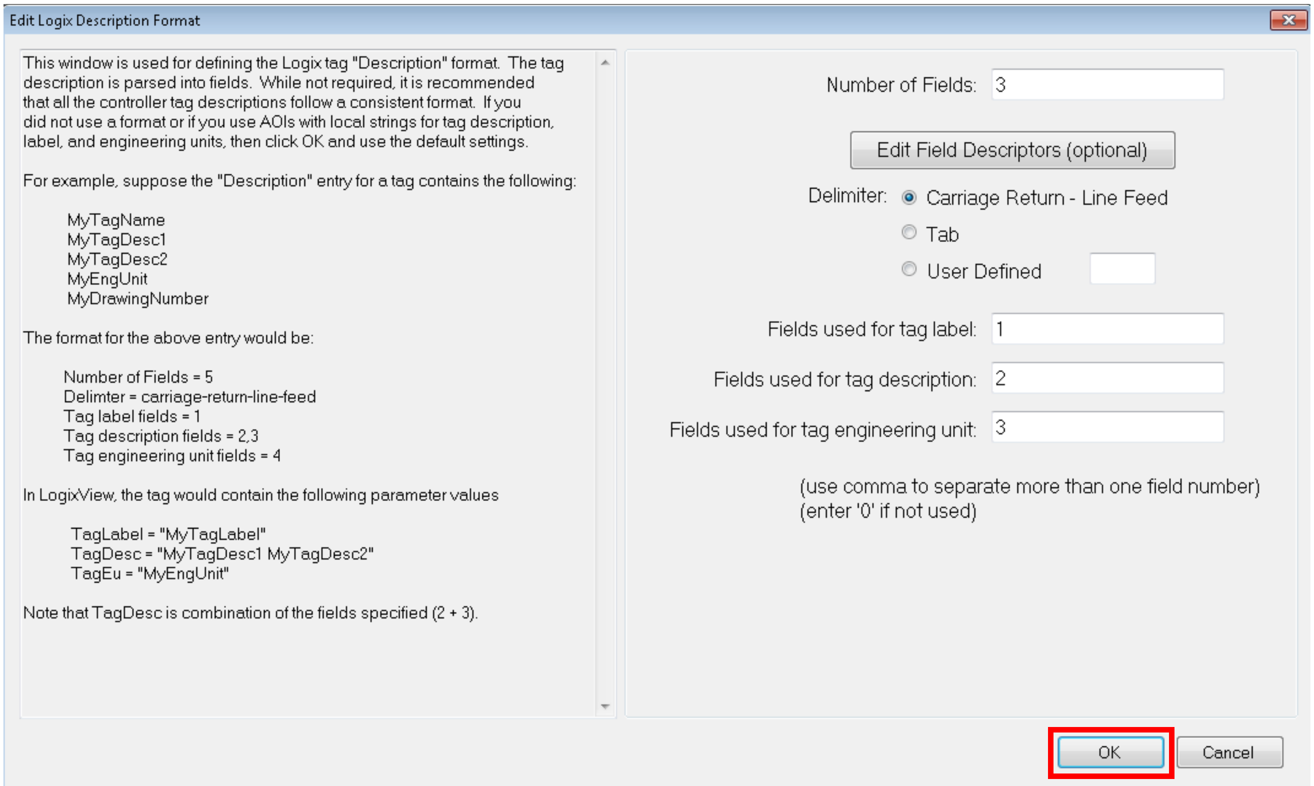


A message window displays if the tool cannot determine the Logix Designer version of the selected ACD file.

5. Type the Logix Designer application version and click OK if prompted. Otherwise, proceed to step 6.

6. On the Edit Logix Description Format dialog box, click OK to use the defaults if the following conditions apply:

- You do not use a format for describing controller tags
- You use Add-On Instructions with local strings that describe the tag label and engineering units



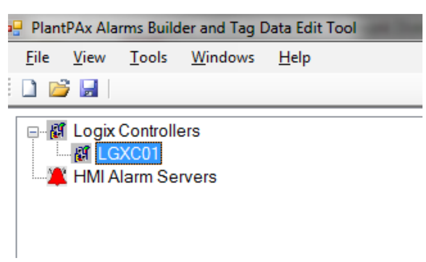
7. If the preceding conditions do **not** apply, type data into the text boxes to describe the tags and click OK.

   A dialog box appears to update severity values if you are replacing Version 3.0 Add-On Instructions with Version 3.1 or later instructions.

   See Replace Logix Tag Severity Values on page 148 for details.

   TIP The conversion of the controller project file to an XML format can take several minutes for each controller file.

   When the conversion is complete, the controller file is added to the configuration tree under Logix Controllers.



8. Repeat step 2 through step 6 to add multiple controllers to the project.

   Multiple controllers can be associated to different HMI alarm servers. For example, you can have an AE alarm server for several controllers in a SE project and a ME alarm server for skid-mounted controllers.

Replace Logix Tag Severity Values

Use the procedures in this section if you have upgraded an ACD file with Rockwell Automation Library Add-On Instructions, Version 3.0, to Version 3.1 or later and want to change the severity values. The severity values for the Version 3.1 or later instructions are now a range as shown in Table 42.

Table 42 - Logix Tag Severity Values

Version 3.0 and earlier		Version 3.1 or later		Definitions	Alarm Color
Logix Severity	**A&E Severity**	**Logix Severity**	**A&E Severity**		
1	1	1…250	1…250	Low	Blue
2	251	251…500	251…500	Medium	Yellow
3	501	501…750	501…750	High	Red
4	751	751…1000	751…1000	Urgent	Magenta

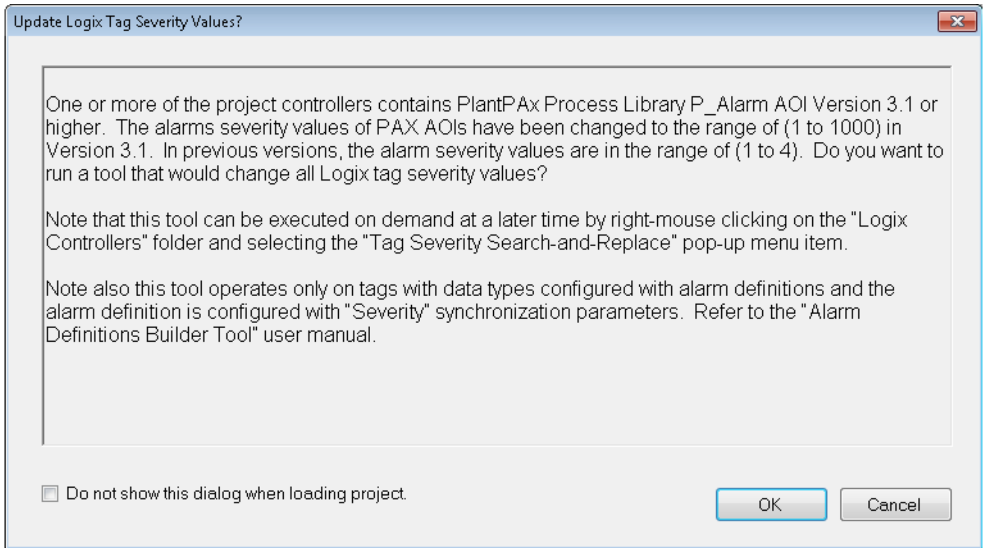
The Version 3.1 instruction range of 1…1000 (INT data type) is consistent with the default AE severity value range.

The Version 3.0 and earlier instructions have a severity range of 1…4 (SINT data type). When an ACD file that contains Version 3.0 instructions is updated with Version 3.1 instructions, the tags retain their existing severity values (1…4).

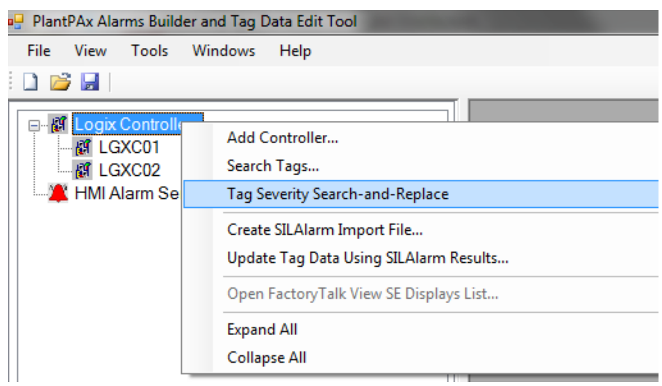
IMPORTANT	For FactoryTalk View software, version 8 and later, the AE severity can be configured by using a Logix tag address. The alarm server reads the severity from the Logix tag during runtime. This function lets the severity value to be changed from the HMI faceplate; no number mapping is required. For FactoryTalk View software, version 7 and earlier, the AE severity value is a fixed numeric value. It cannot be changed from the tag faceplate; it can be changed only from the AE tag database.

If you load a controller that has the P_Alarm Add-On Instruction with Version 3.1 or later, an Update or Logix Tag Severity Values dialog box appears. The dialog box has a tool to change severity tag values.

1. Do one of the following:
   a. Click Cancel to run the tool later.



IMPORTANT To reaccess the prompt, right-click Logix Controllers and choose Tag Severity Search-and-Replace from the pull-down menu.



   b. Click OK to replace the severity values.

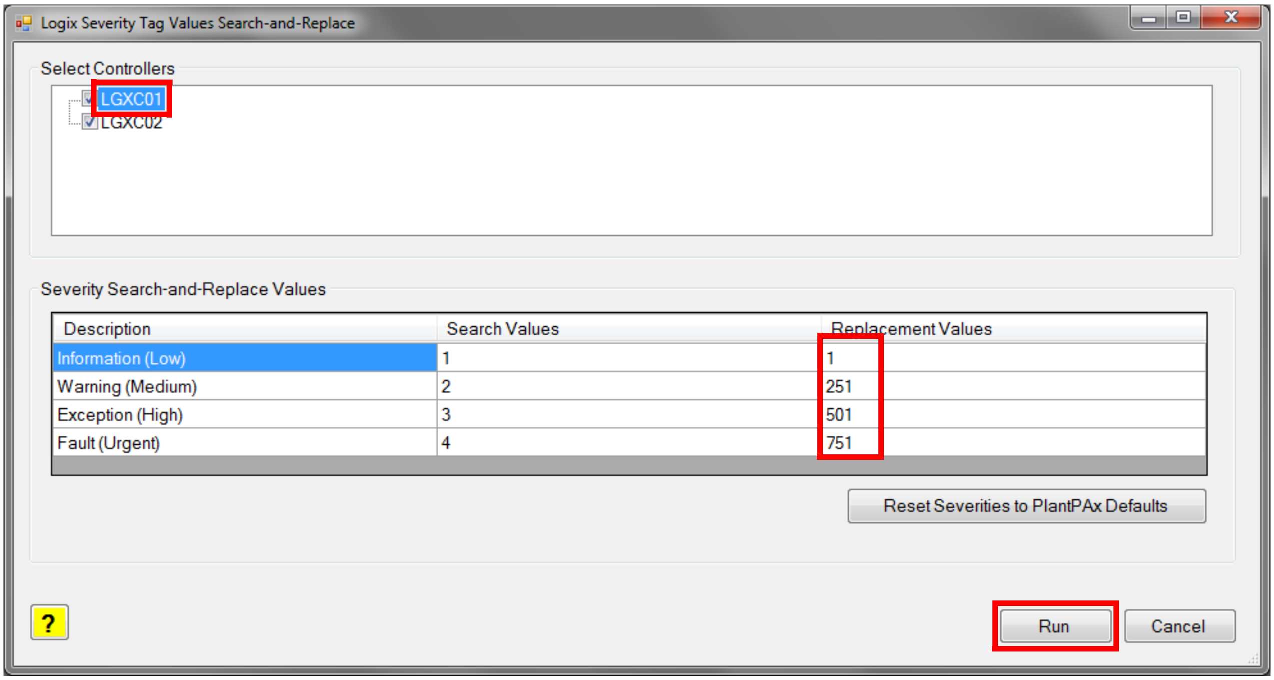
The Replacement Severity Tool dialog box appears.

2. In the top box, select a controller.

   Controllers that contain Version 3.1 or later of the P_Alarm Add-On Instruction are automatically selected.

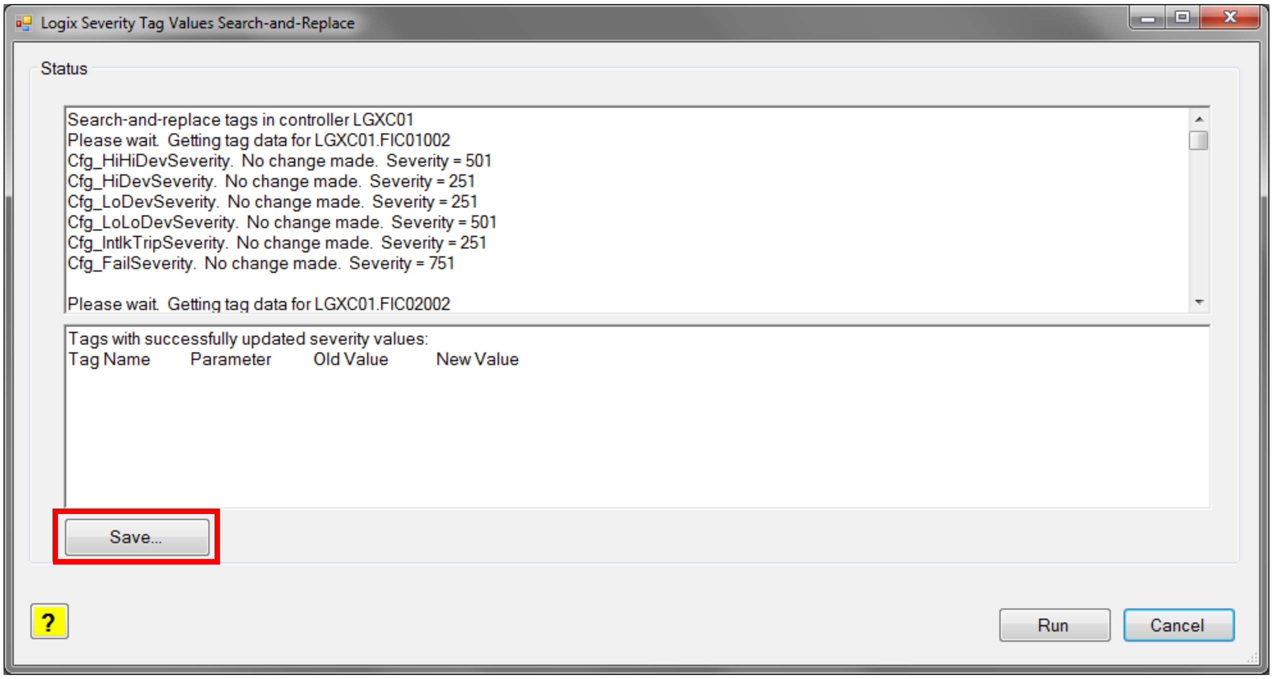
3. In the bottom box, change the values by typing in the respective cells.

4. Click Run.



Two status boxes appear in the Logic Severity Tag Values Search-and-Replace window during the replacement operation.

- The top table provides status and error messages.
- The bottom table provides a listing of tag values that are changed, if any.

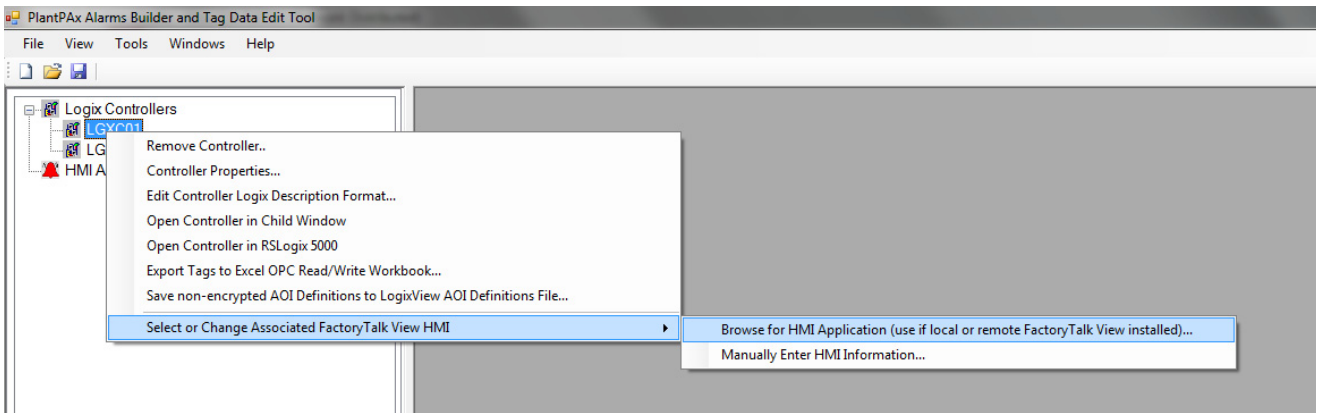


5. Click Save.

2. Associate HMI

The HMI association provides the information (data area name, device shortcut name) needed in the AE tag addresses.

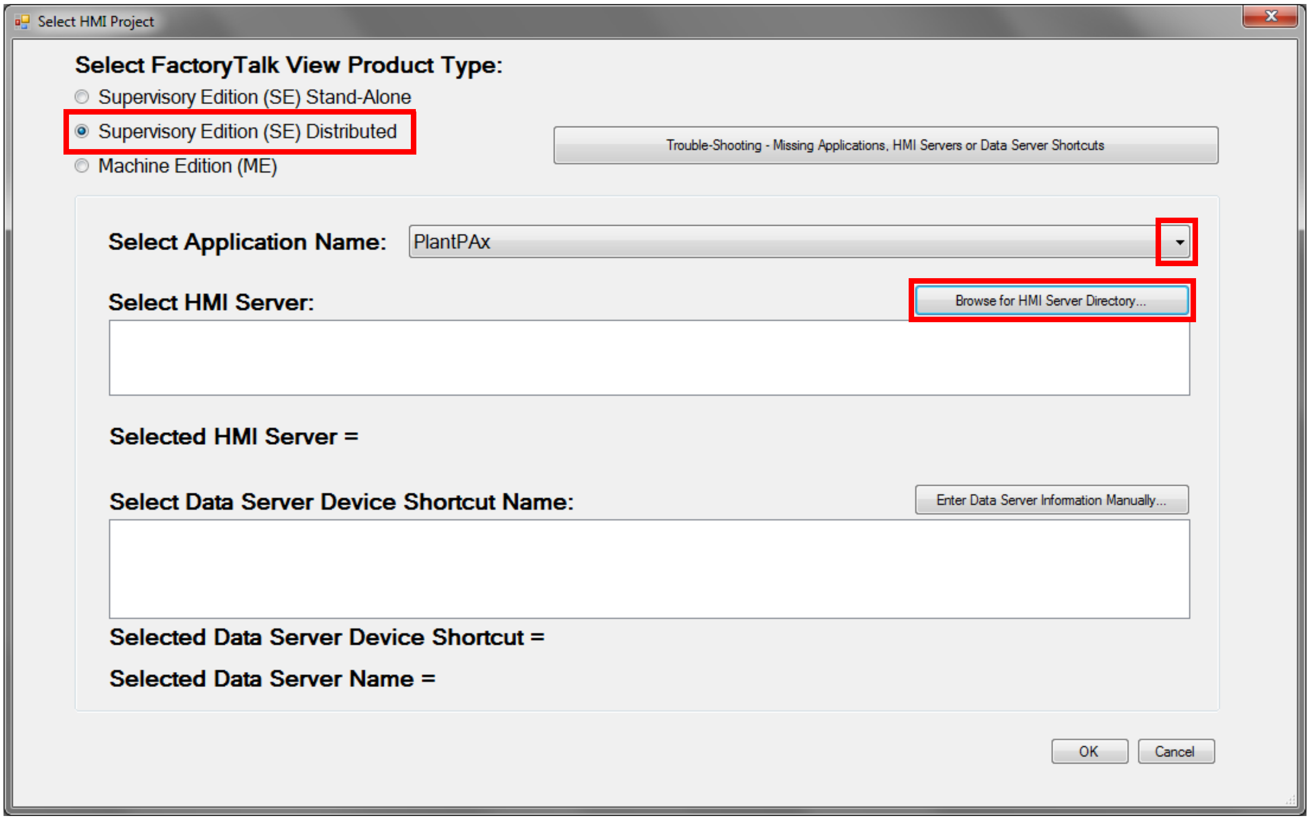
1. If you have multiple controllers, click the '+' to expand the Logic Controllers node.
2. Right-click a controller file, and from the pull-down menu choose Select or Change Associated FactoryTalk View HMI>Browse for HMI Application (use if local or remote FactoryTalk View installed).



The Select HMI Project dialog box appears.

3. Click the Supervisory Edition (SE) Distributed product type.
4. From the Select Application Name pull-down menu, choose the application name.

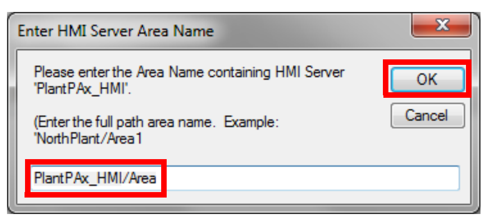
5. Click Browse for HMI Server Directory.



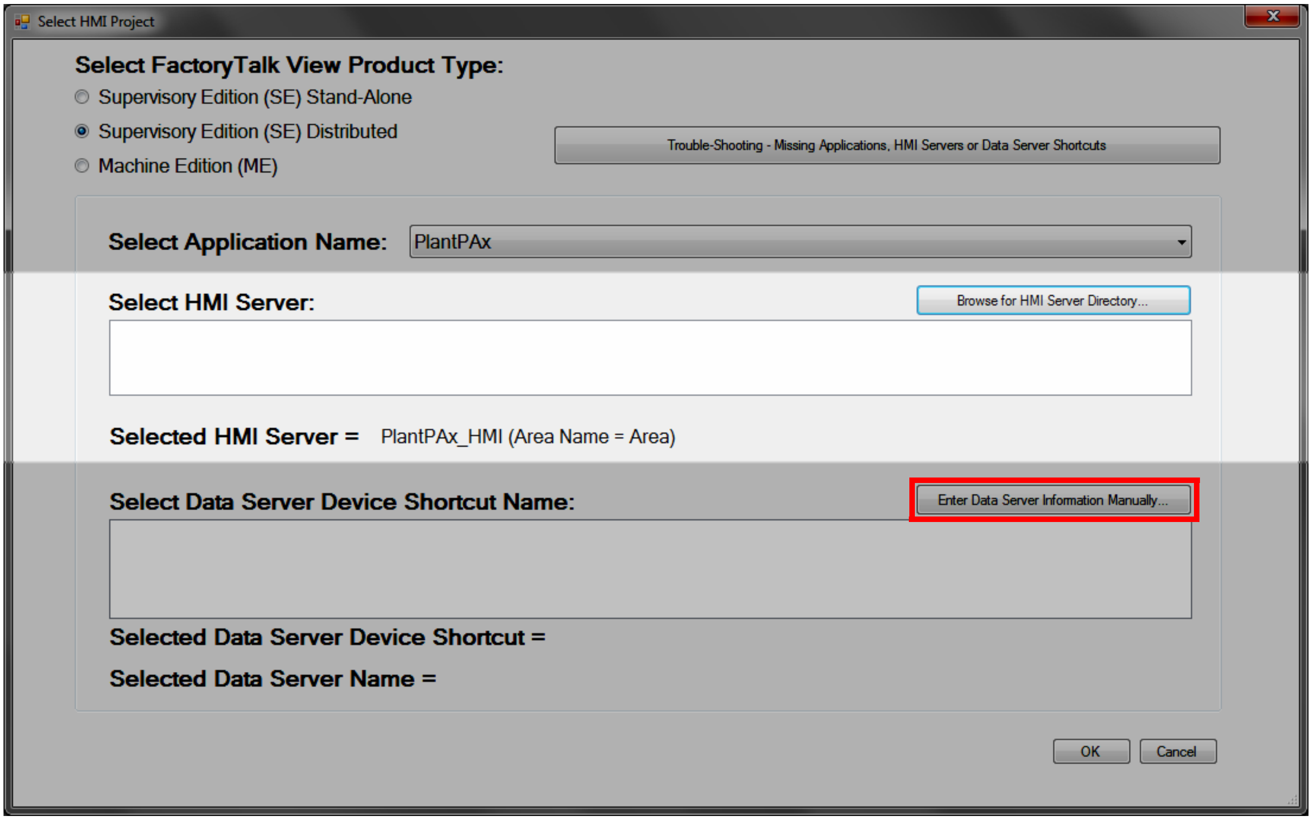
6. Navigate to and select the HMI Server and click OK.

The Area Name dialog box appears.

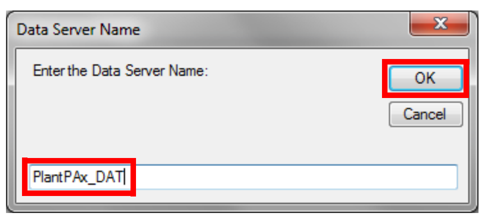
7. Type the path and the area name (for example: the HMI project name) and click OK.



The HMI Server name appears below the Select HMI Server box.

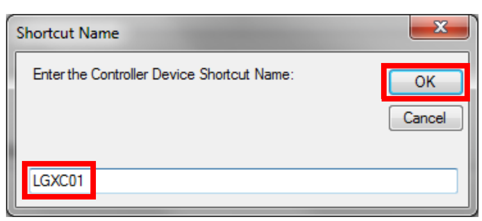


8. Click Enter Data Server Information Manually.
9. Type the Data Server name (for example: the Data area in the HMI project) and click OK.



The Shortcut Name dialog box appears.

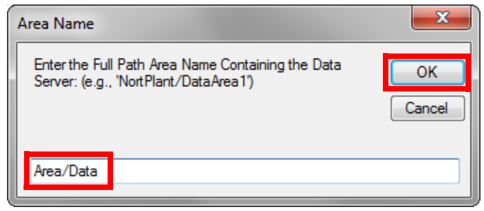
10. Type the shortcut name, which is typically the controller name, and click OK.



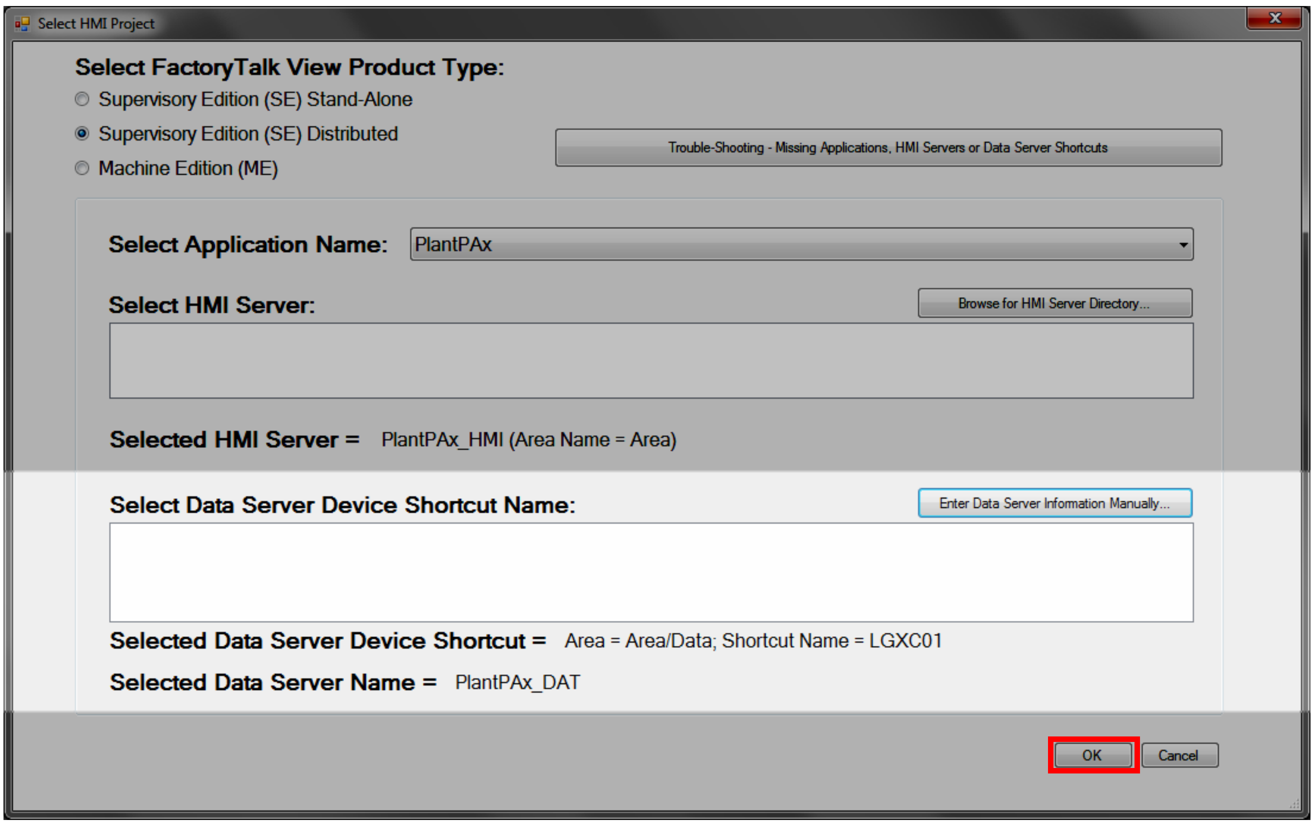
The area name dialog box appears.

11. Type the area name and click OK.

IMPORTANT	Do not add a leading slash (for example: '/Area/Data').

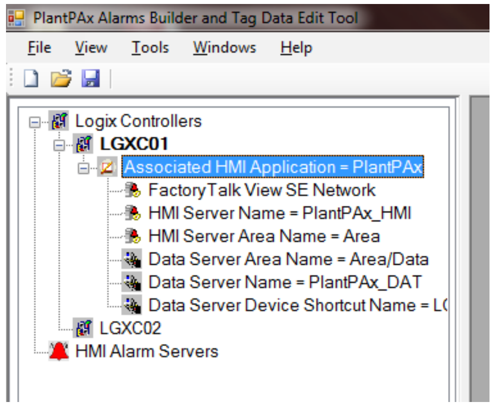


The Selected Data Server Device Shortcut and Selected Data Server Name appear on the Select HMI Project dialog box.



12. On the Select HMI Project dialog box, click OK.

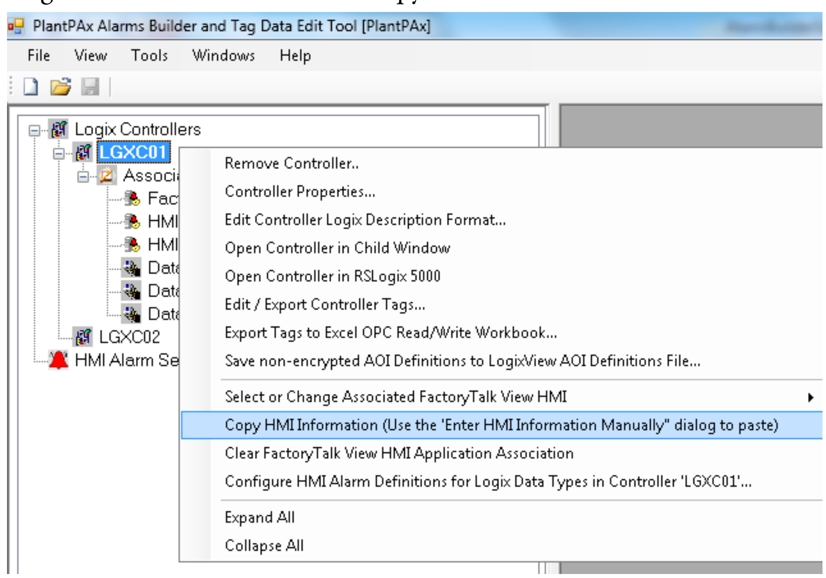
The associated HMI application with its valid information appears under the selected controller.



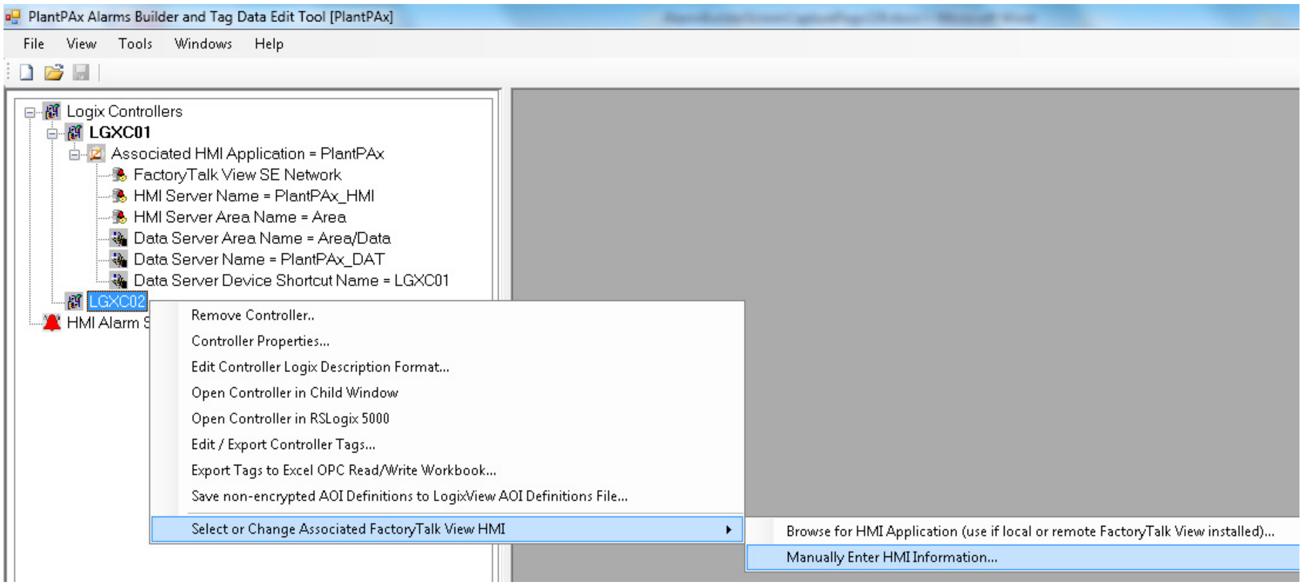
Set Up Other Controllers

In this section, you can configure other controllers with the same servers.

1. Right lick LGXC01 and select 'Copy HMI Information'.

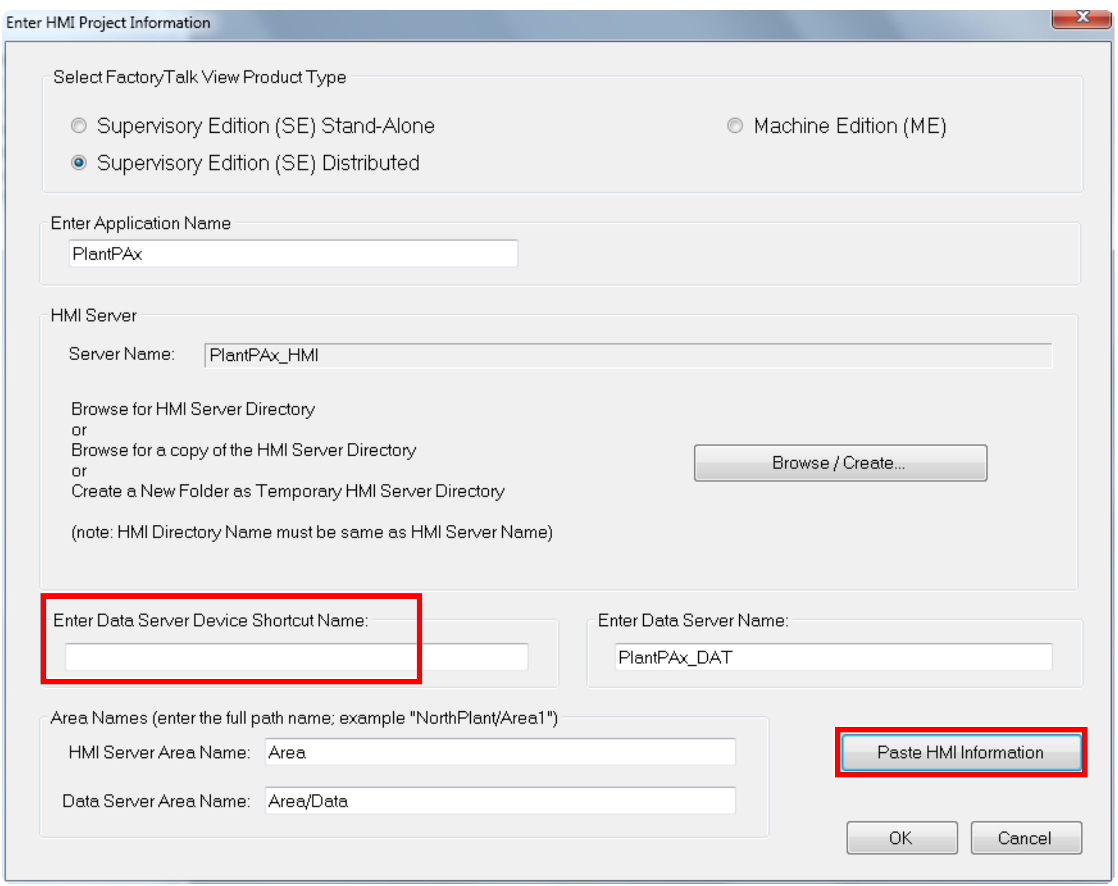


2. Right-click LGXC02 and select 'Select or Change Associated FactoryTalk View HMI'>'Manually Enter HMI Information' to open the HMI information configuration window.



The Enter HMI Project Information dialog box appears.

3. Click 'Paste HMI Information'.



The HMI Server Area Name and the Data Server Area Name appear.

4. Type the 'Data Server Device Shortcut Name' (LGXC02 in the example) as controller name.
5. Click OK

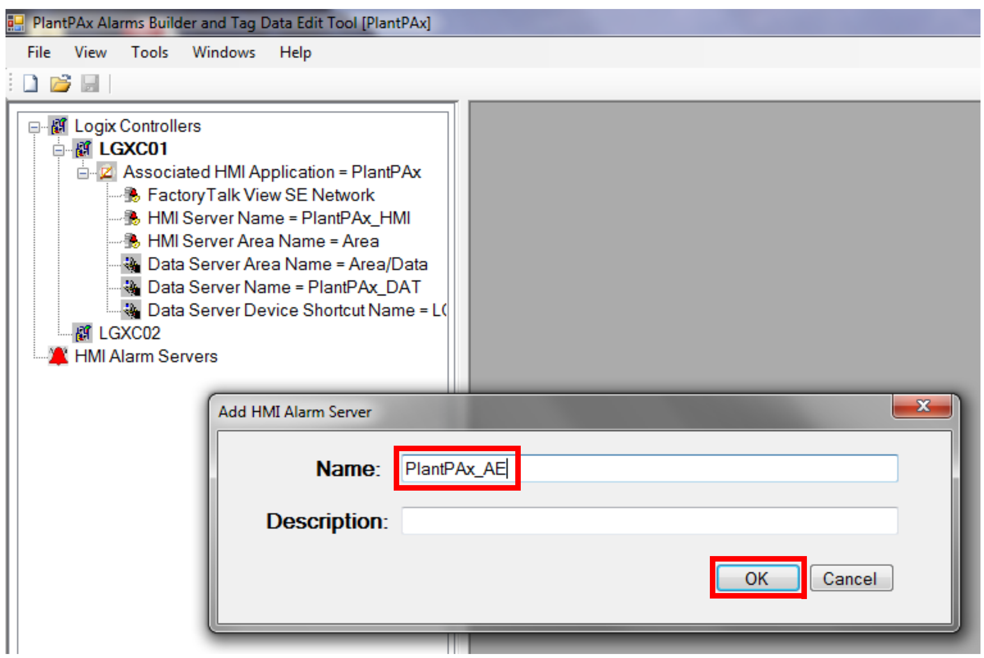
3. Define HMI Alarm Server

This section shows how to add an alarm server to organize the controllers that you want to create AE alarm polling tags. This alarm server has no association to the AE alarm server that you configure in FactoryTalk View Studio software.

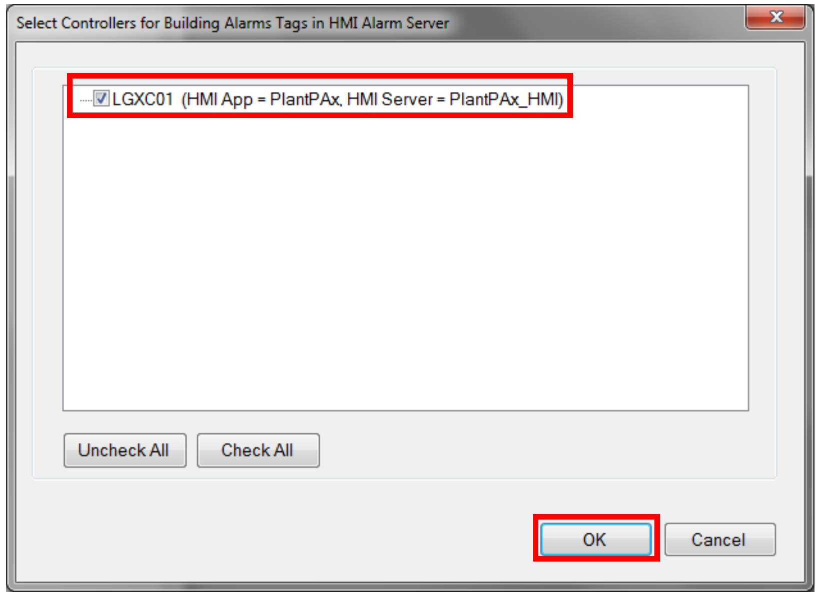
Follow these steps.

1. In the Alarm Builder configuration tree, right-click HMI Alarm Servers and choose Add Alarm Server.

   The Add HMI Alarm Server dialog box appears.
2. Type a name and a description (optional).
3. Click OK.



The Select Controllers for Building Alarms Tags in HMI Alarm Server window appears.



4. Check the checkbox to select the controller that you added, and click OK.

   The alarm server name appears under HMI Alarm Servers in the configuration tree.

4. Organize Tags and HMI Displays (Optional)

The Alarm Builder Process Tree Organizer can be used to organize Logix tags, Logix code, and SE HMI displays in user-defined folders. The Process Tree folder hierarchy is used for creating AE alarm groups when building the AE XML import file. AE alarm groups are available with FactoryTalk View Version 8.1 or later.

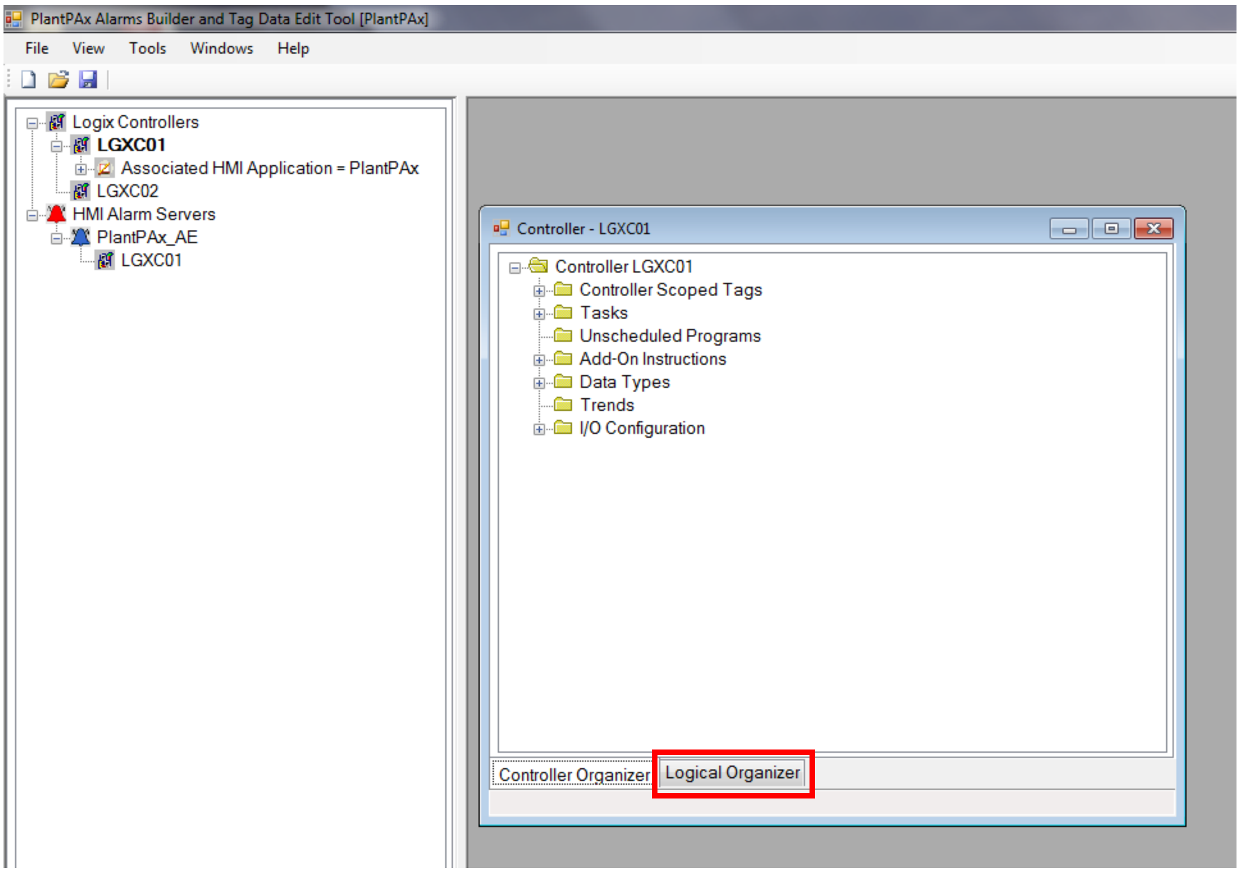
This section provides instructions on using the controller Logical Organizer to configure the Process Tree folders. Other methods of configuring the Process Tree folders are available – refer to the Alarm Builder 'Process Tree Organizer' user manual for details.

It is not required that the Process Tree be configured to build the AE XML import file. However, we recommend that the Process Tree be configured when controller Logical Organizers have already been previously configured. Use Logix Designer Version 24 or later to configure controller Logical Organizers.

This section also provides instructions on how to organize SE HMI displays in the Process Tree folders. The AE XML import file builder tool provides an option to automatically configure the AE alarm tag View command to open an associated HMI display from the runtime AE alarm summary

Create Process Tree Folders from Controller Logical Organizers

1. Click the 'Controllers & HMI' tab at the bottom of the window.
2. If you have multiple controllers, click the '+' to expand the Logic Controllers node.
3. Double-click a controller node to open the controller in a child window.

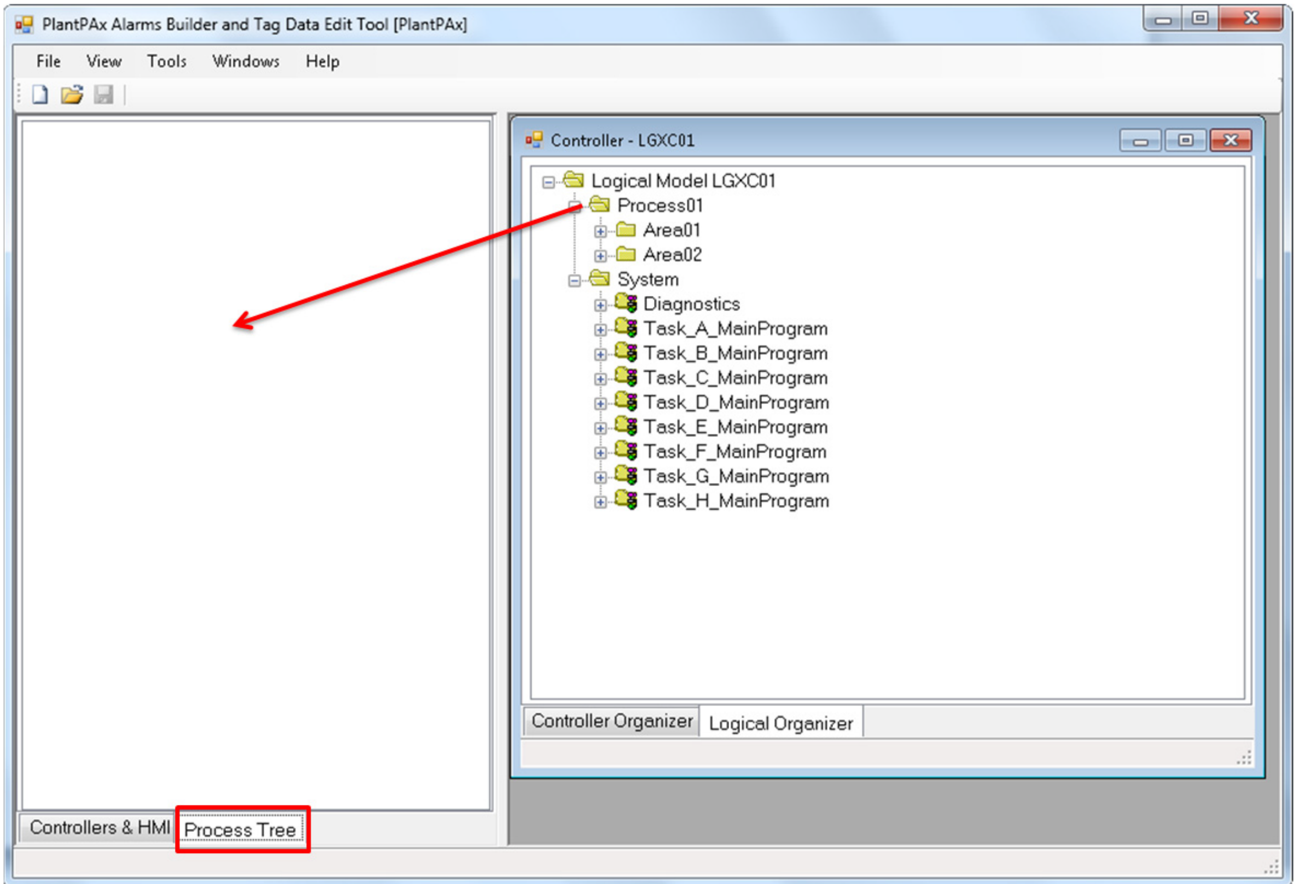


4. Click the 'Logical Organizer' tab in the controller child window. The

IMPORTANT	This tab is available only for controller files that are created with Logix Designer application Version 24 or later.

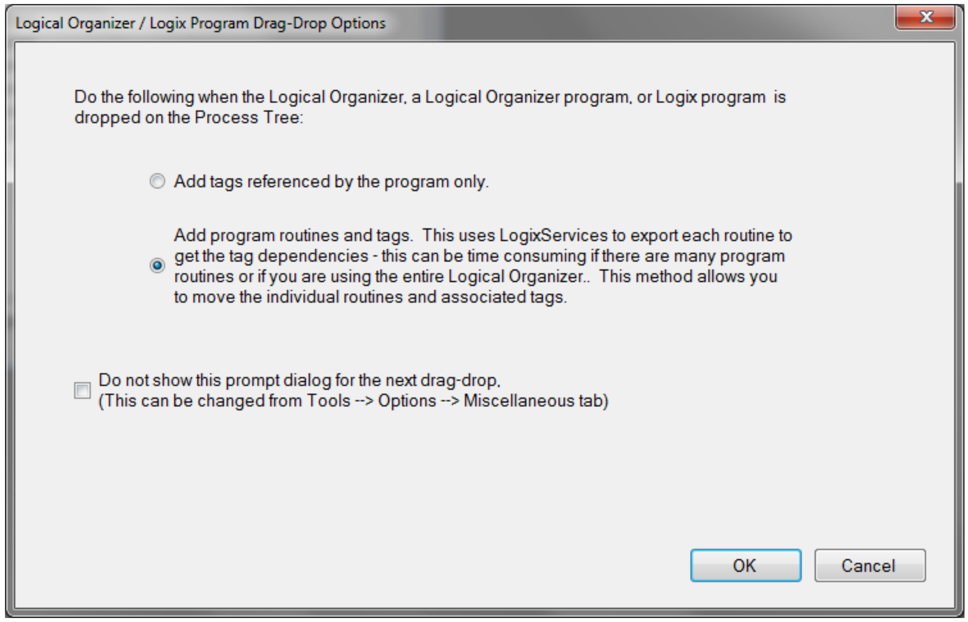
Logical Organizer contains all controller programs and program folders structure that is configured by using the Logix Designer application.

5. Click the Process Tree tab at the bottom the main Alarm Builder window.
6. Click the Process01 folder in the Logical Organizer tree and drag-and-drop the folder to the Process Tree tab area.



The Logical Organizer/Logix Program Drag-Drop Options dialog box appears.

7. Select the 'Add program routines and tags' option.



The Process01 folder and all its child folders are added to the Process Tree. Program folders contain 'Tags' subfolders. The 'Tag' subfolders contain tags that are referenced by the program. Process Tree folders can be reorganized by using drag-and-drop if desired.

TIP Using the 'Add program routines and tags' option can be very time consuming if the Process01 folder contains many routines. Use the 'Add tags reference by the program only' option instead for faster processing. The major difference between the two options is that the second option lets tags to be reorganized and moved to different process tree folders by moving routines. Whereas, tags have to be moved individually if the first option is used. Refer to the 'Process Tree Organizer' user manual for details. This user manual can be found in Help>Contents on the PlantPAx Alarm Builder and Tag Data Edit Tool window.

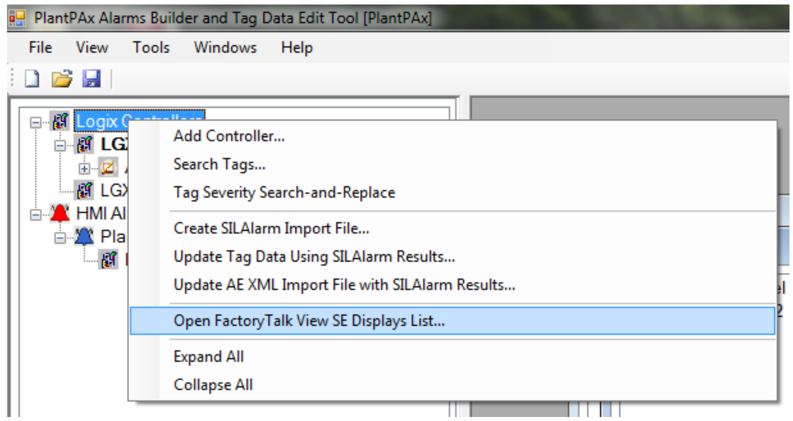
8. Click OK.

9. Repeat step 2 through step 7 for each controller in the project.

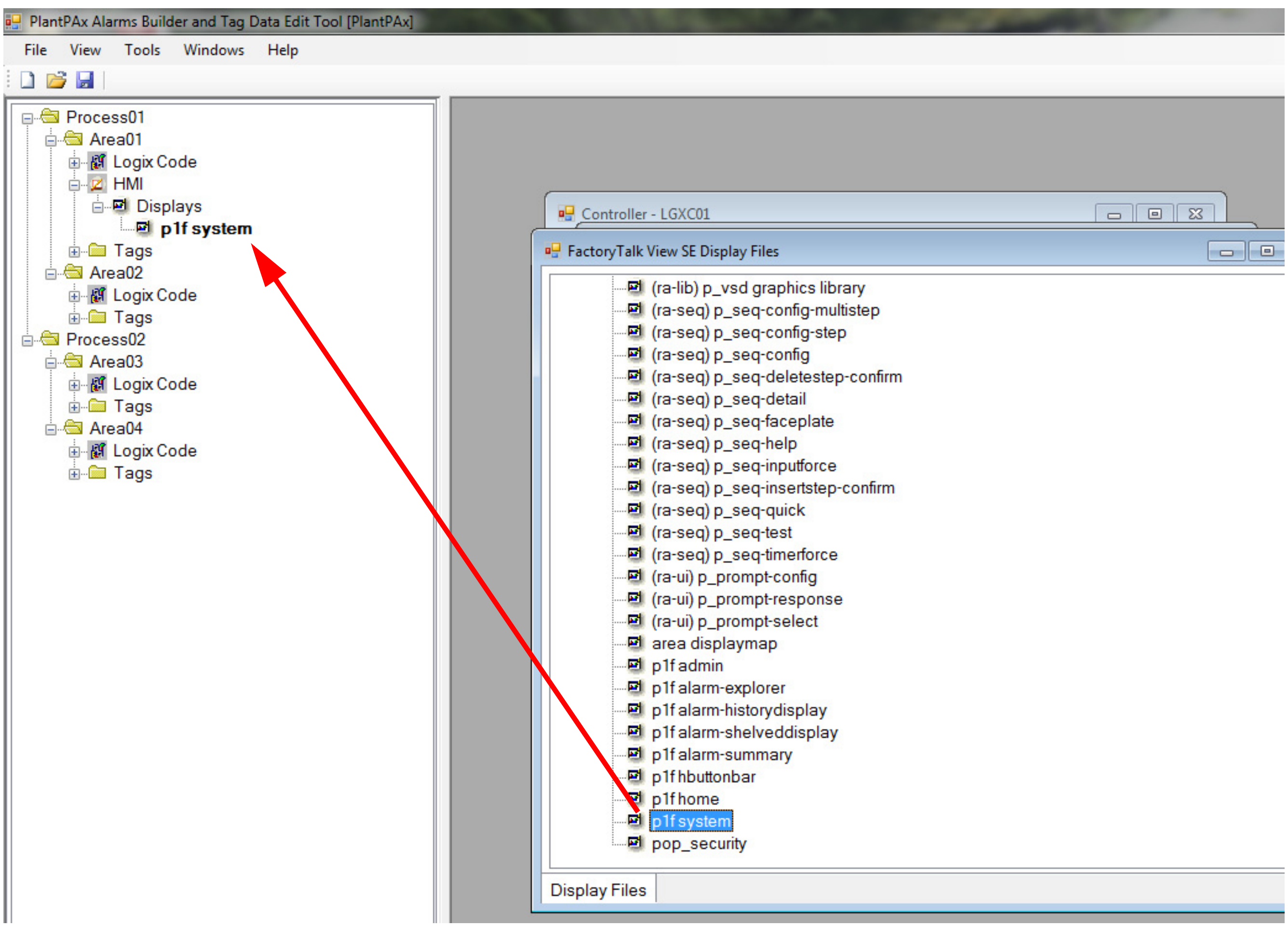
Organize SE HMI Displays in Process Tree Folders

1. Right-click the Logix Controllers tree node in the Controllers & HMI tab, and choose Open FactoryTalk View SE Displays List.

   A child window opens with a FactoryTalk View SE displays list that is organized by HMI servers.



2. Click the Process Tree.
3. Click an HMI display to organize in the SE Displays Files child window.



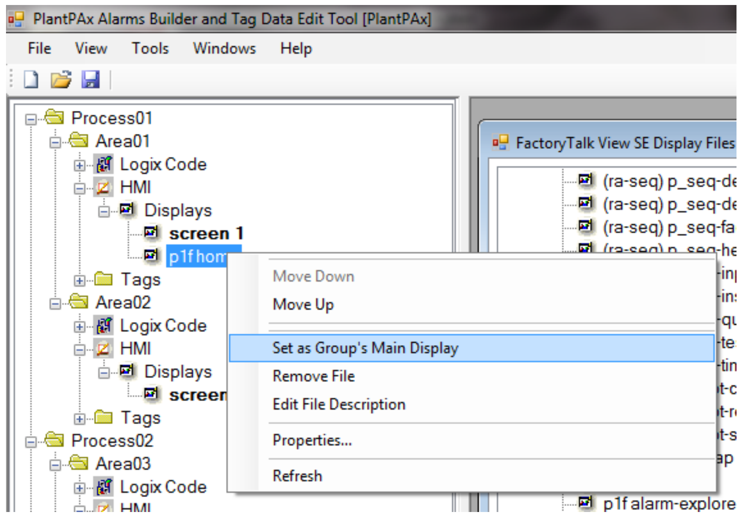
4. Drag and drop the file on the desired Process Tree folder.

   HMI/Displays subfolders are automatically added under the target process folder for organizing HMI displays.

   The process tree folder tags are associated with the HMI display.

   Display files can be moved by drag-and-drop.

   Right-click a display file to display a context-sensitive menu.



   Multiple displays can be added to the same process folder – this feature is for future use. If a process folder contains multiple displays, only the one set as the 'main display' for the group that is associated with the process folder tags. The main display has a bold font. Use the pop-up menu to change the main display.

5. Build AE XML Import File

IMPORTANT	Make sure to configure the Logix tags correctly before building the AE XML file. It is especially important to make sure the HasAlarm values are configured correctly. If the HasAlarm is configured as '0' and the default build options are used, then an AE tag is NOT added to the AE XML file. If you later change the Logix HasAlarm value to '1', there is NO alarm annunciation because the AE tag does not exist.

Logix tag values can be configured by using the following software and tools:

- Logix Designer application to make tag edit changes.
- Online Configuration Tool (see Appendix A).
- Alarm Builder tag data editing tools. See the Alarm Builder 'Edit Tag Data' user manual for details.

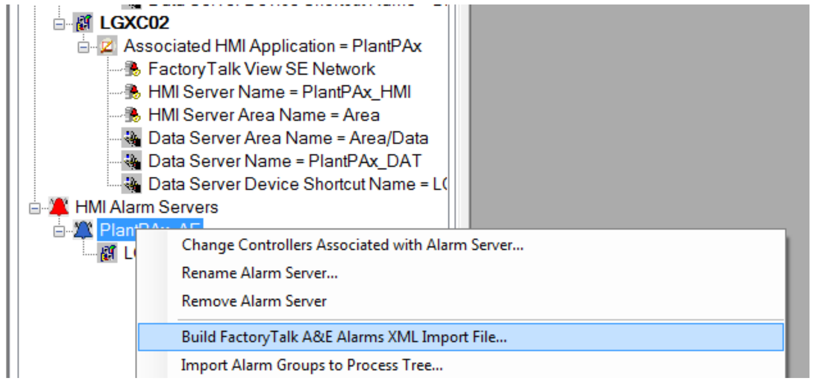
If tag changes are made by using the Logix Designer application or the Online Configuration Tool while a project is loaded in Alarm Builder, then do the following:

1. If online changes are made by using the Logix Designer application or the Online Configuration Tool, then use the Logix Designer application to upload and save the Controller changes to the Controller ACD file.
2. If offline changes are made by using the Logix Designer application, then save the changes and exit the Logix Designer application.
3. In Alarm Builder, click File and choose Open to reload the project (for example, select the same project currently loaded in the Open Project File browser).

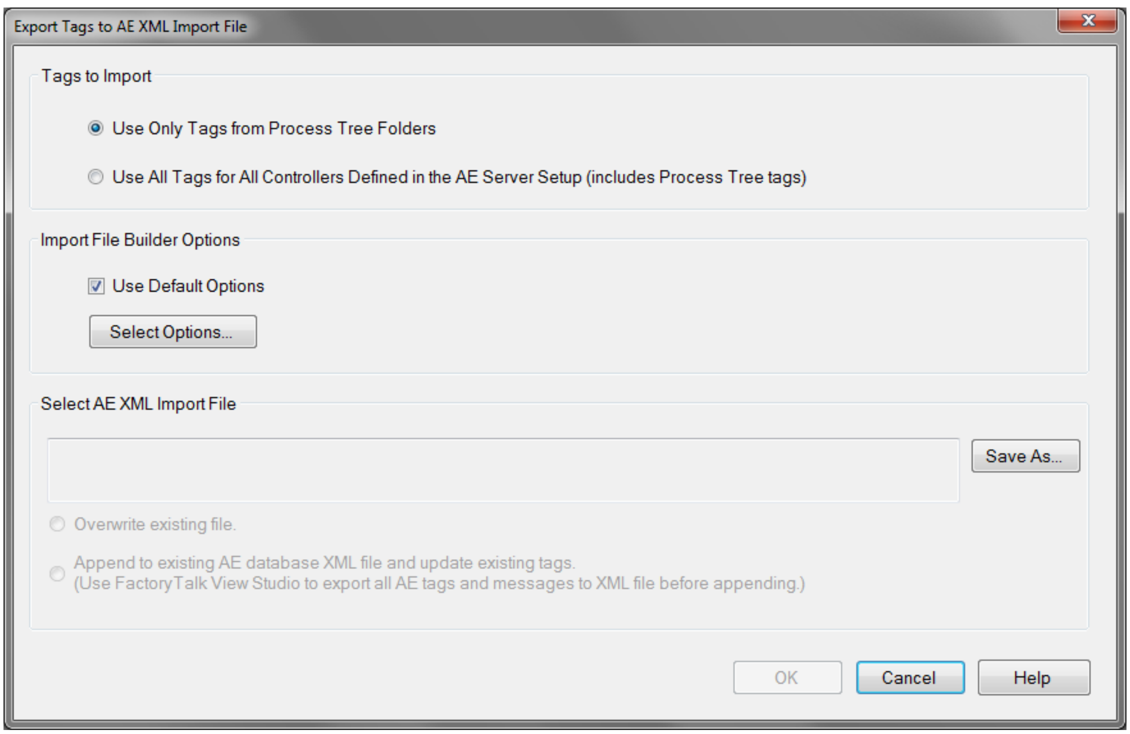
   Reloading the project rebuilds the controller XML files for any controller ACD files that have been changed. This rebuilding helps ensure that controller XML file contents match the controller ACD file. Alarm Builder uses the controller XML file, it is not able to read the controller ACD file directly.

After the project is loaded with properly configured Logix tag values, then do the following to build the AE XML import file:

1. Right-click the alarm server name and choose Build FactoryTalk A&E Alarms XML Import File.

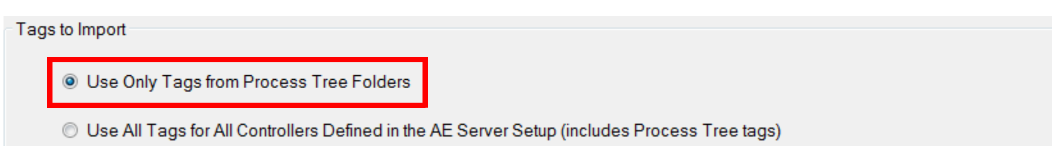


The Export Tags to AE XML Import File dialog box appears.

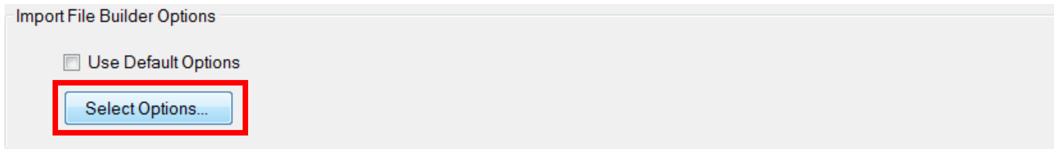


2. If you used the controller the Logical Organizer tree to configure the Alarm Builder process tree (see 4. Organize Tags and HMI Displays (Optional) on page 159), then select the 'Use Only Tags from Process Tree Folders' option under Tags to Import.

   Otherwise, accept the default.



3. We recommend that you uncheck Use Default Options under Import File Builder Options.



The following rules are used when Use Default Options is checked:

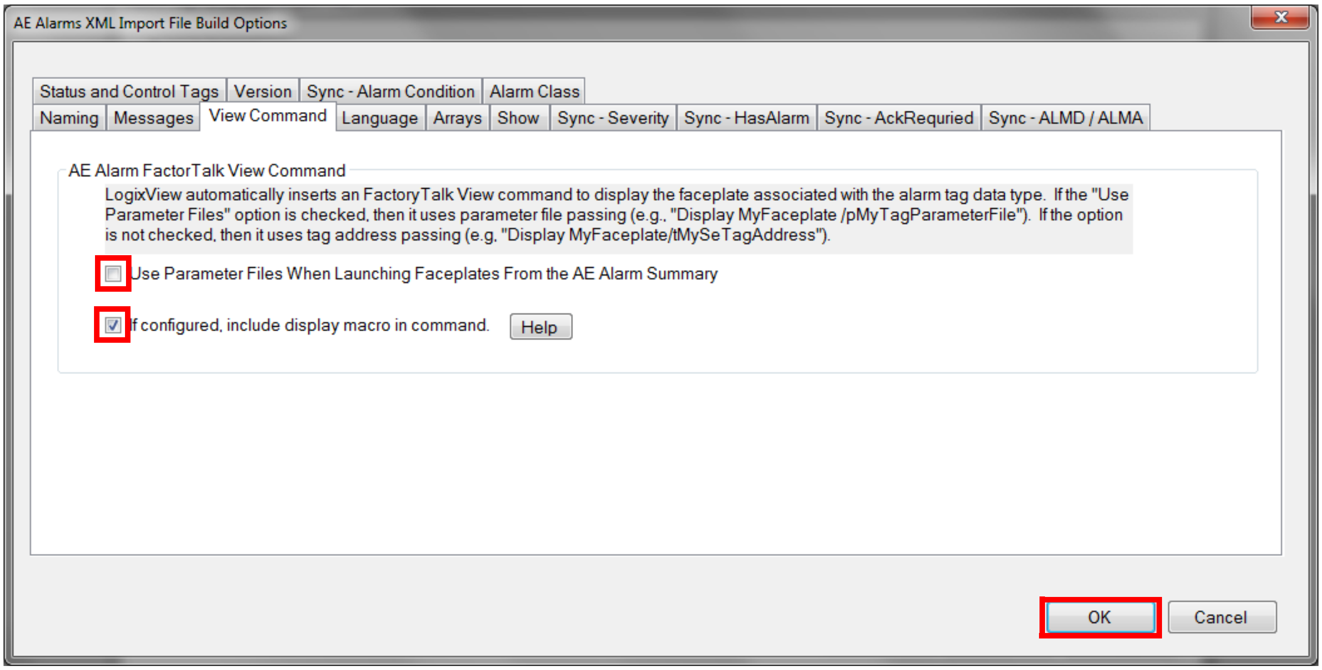
- AckRequired parameter for the AE tag is set to True
- Severity value for the AE tag is set from the alarm severity value of the Logix tag. For FactoryTalk View Version 8 or later, AE Severity is set to Logix tag severity address if configured in the Alarm Builder data type definition.
- AE tag is added to the XML file only if the HasAlarm value for the Logix tag is '1'.

IMPORTANT	Make sure to configure the Logix tags correctly before building the AE XML file. It is especially important to make sure the HasAlarm values are configured correctly. If the HasAlarm is configured as '0', then an AE tag is NOT created. If you later change the Logix HasAlarm value to '1' there is NO alarm annunciation because the AE tag does not exist.

- The local string tag (Cfg_Desc) value from the Logix tag is added to the alarm message for the AE tag
- AE tag name equals the Logix tag name and alarm element name. For example, if the Logix tag is 'TI123' and the alarm element is 'Alm_HiHi', then the AE alarm name is 'TI123_Alm_HiHi'
- View command from the AE tag is configured to display the corresponding Logix tag faceplate by using the parameter file passing. The parameter file containing the tag address is automatically added to the HMI project 'par' folder
- For FactoryTalk View Version 8.0 and older, the Alarm Class parameter in the AE tag is configured with the path of the Logix tag (for example, Controller\Task\Program) or the parent process tree full path name of the tag (for example, 'Area1\Unit1\Heater'). For FactoryTalk View 8.1 and newer, the Alarm Class is configured by using the alarm definitions. Alarm groups are automatically configured.
- AE status and control tags for data types are automatically configured by using the PlantPAx P_Alarm Add-On Instruction
- All other AE parameters are configured based on the Logix data type alarm definition
- The AE XML file format version uses the installed FactoryTalk View version. For example, if FactoryTalk View Version 7 is installed, then it uses the AE XML file format compatible with Version 7. If FactoryTalk View is not installed, then the user is prompted for the format version to use.

- Builder options that are not described in the preceding paragraphs use the configured options (click Select Options to view all available configuration options).

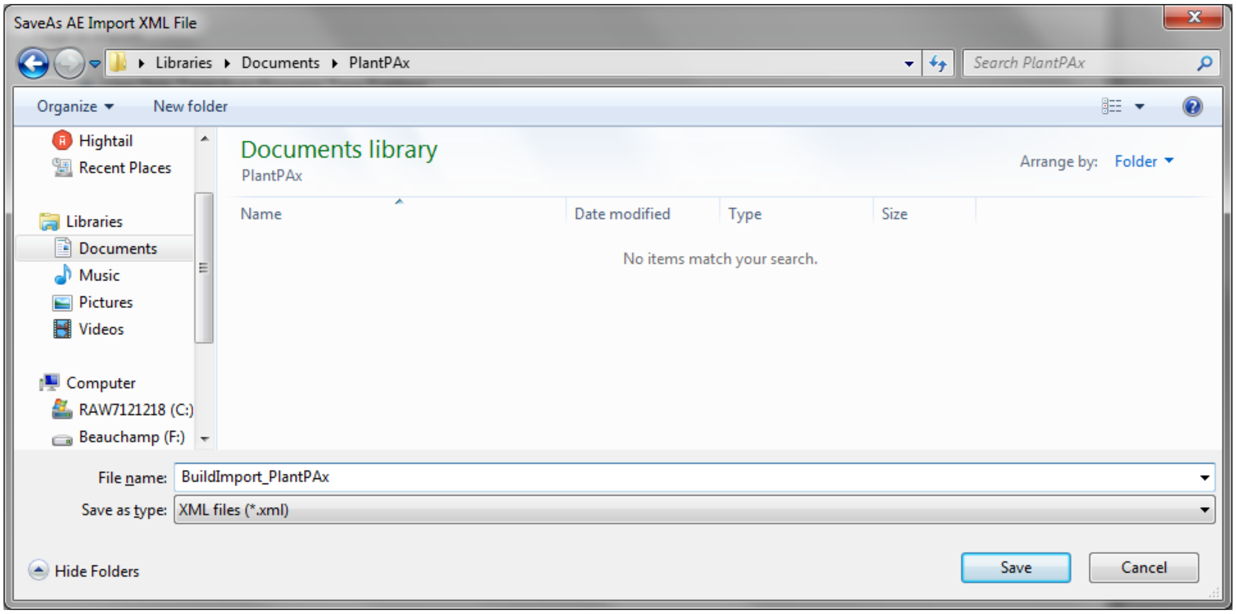
4. Click Select Options.
5. Click the View Command tab.
6. Uncheck 'Use Parameter Files when launching Faceplates ...'.
7. Check 'If configured, include display macro in command'.



With this option, the AE alarm tags' View command is automatically appended with 'mcrAE_Display DisplayName'. 'DisplayName' is the HMI display name associated to the AE tag. 'mcrAE_Display' is a user-defined macro. You can configure the macro to open the HMI display directly or to access a faceplate that has a button to open a display. Refer to the 'Create Alarm Import Files' user manual for details on the macro. This user manual can be found in Help>Contents on the PlantPAx Alarm Builder and Tag Data Edit Tool window.

8. Click OK.
9. In the Export Tags to AE XML Import File dialog box, click Save As.

10. Navigate to the folder where you want to save the XML file, specify the XML file name, and click Save.



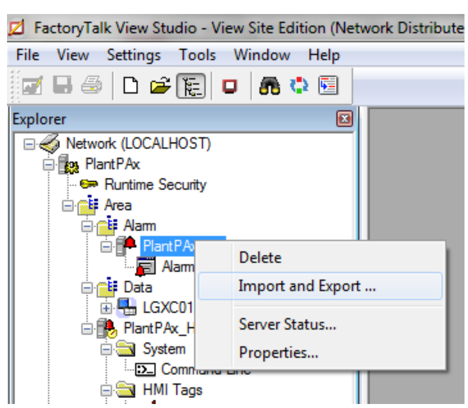
11. In the Export Tags to AE XML Import File dialog box, click OK to build the AE XML import file.

6. Import XML File to AE Alarm Database

This section describes how to use FactoryTalk View Studio software to implement the XML file to import alarms into the PlantPAx system.

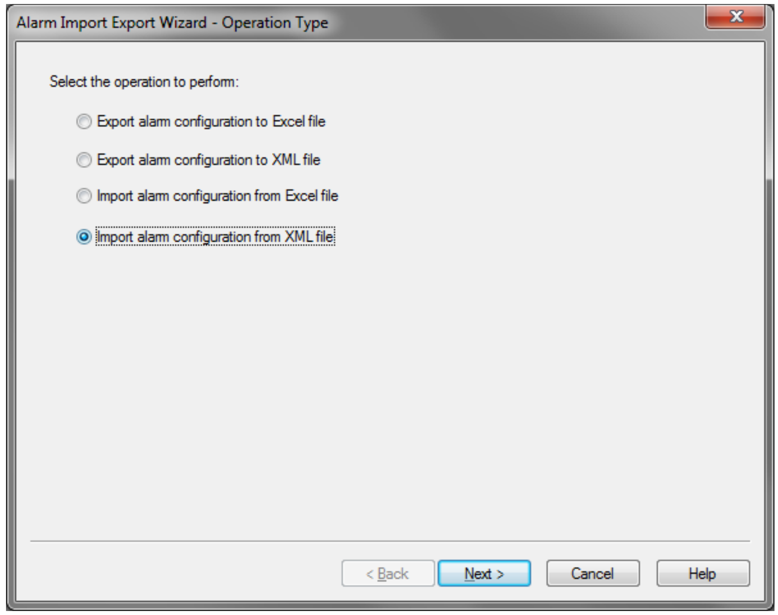
Follow these steps after opening the FactoryTalk View Studio software.

1. From the FactoryTalk View Studio Explorer tree configuration, right-click the AE alarm server and choose Import and Export.



The Alarm Import Export Wizard - Operation Type dialog box appears.

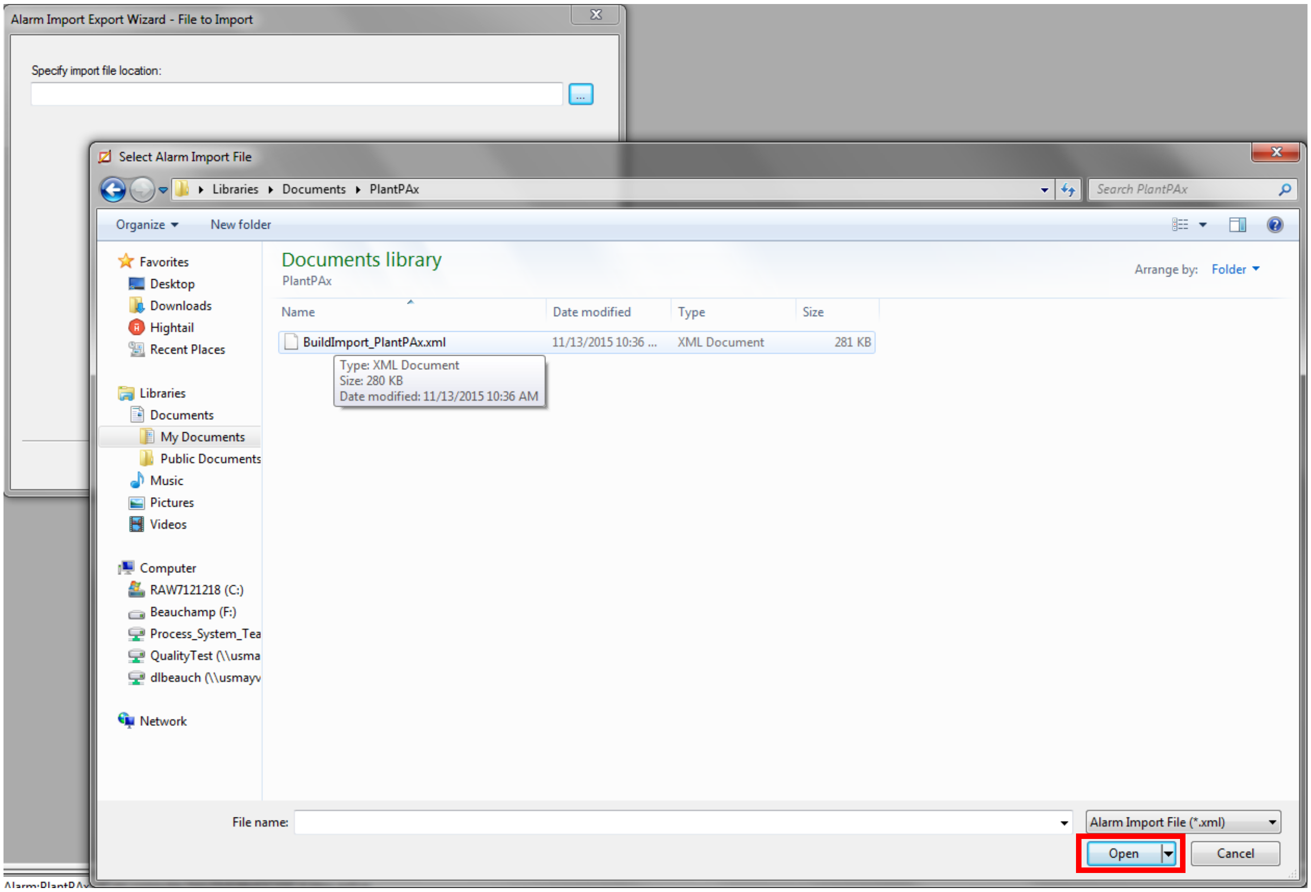
2. Select 'Import alarm configuration from XML file' and click Next.



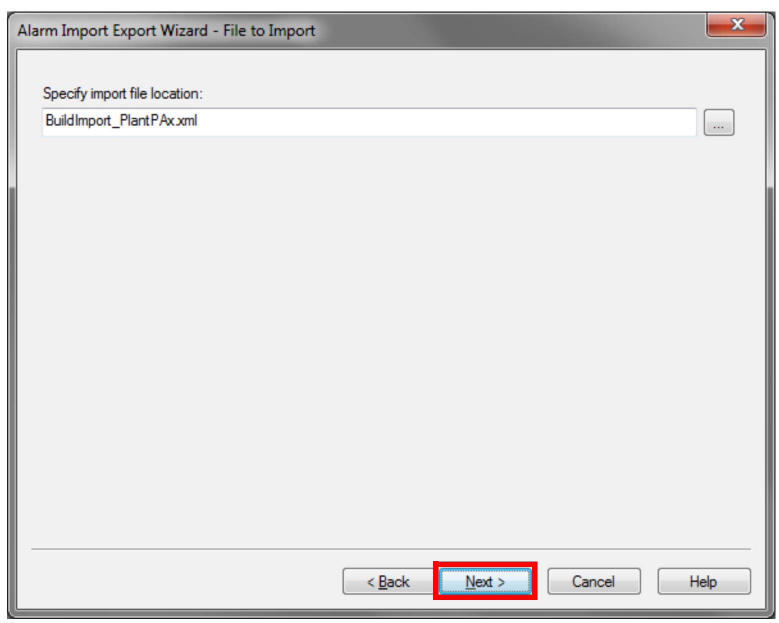
3. Click

and navigate to the XML file you created using the alarm builder tools.

4. Select the file and click Open to close the file dialog.



5. In the Alarm Import Export Wizard - File to Import dialog box, click Next.

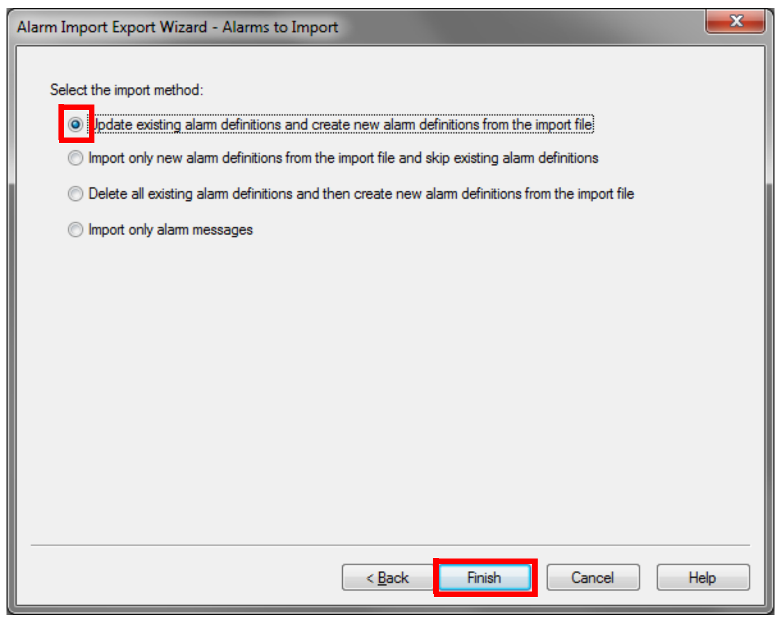


6. In the Alarm Import Export Wizard - Alarms to Import dialog box, select the import method.

   Select the first option ('Update existing alarm definitions and create alarm definitions from the import file') or the third option ('Delete all existing alarm definitions and then create alarm definitions from the import File').

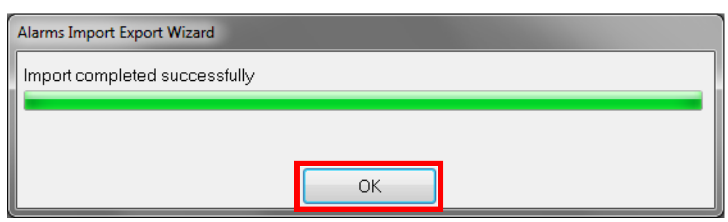
   The second option ("Import only new alarm definitions from the import file and skip existing alarm definitions.") is not recommended because PlantPAx HMI Alarm Builder Tool creates messages for each new alarm definition. If you import only new alarm definitions, the newly imported alarm definitions point to the wrong messages or to non-existing messages.

   Do not use the fourth option ("Import only alarm messages") with the XML file created by PlantPAx HMI Alarm Builder Tool. The purpose of PlantPAx HMI Alarm Builder Tool is to create alarm definitions with corresponding alarm messages. Importing only alarm messages is not useful.



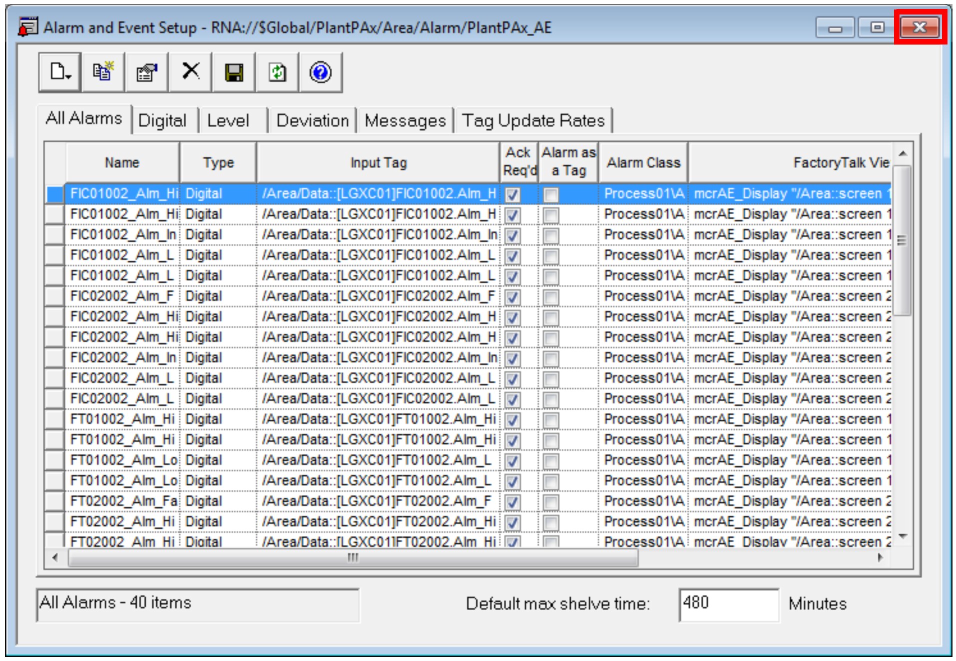
7. Click Finish.

   Depending on how many tags are being imported, the computer speed, and if you are updating existing tags, the import can take several minutes. A dialog box appears when the import is completed.



8. Click OK. The imported alarms are now in the alarm server database.

9. In the Explorer tree configuration, double-click Alarm and Event Setup. The Alarm and Event Setup tag database window appears to let you view the alarm definitions.

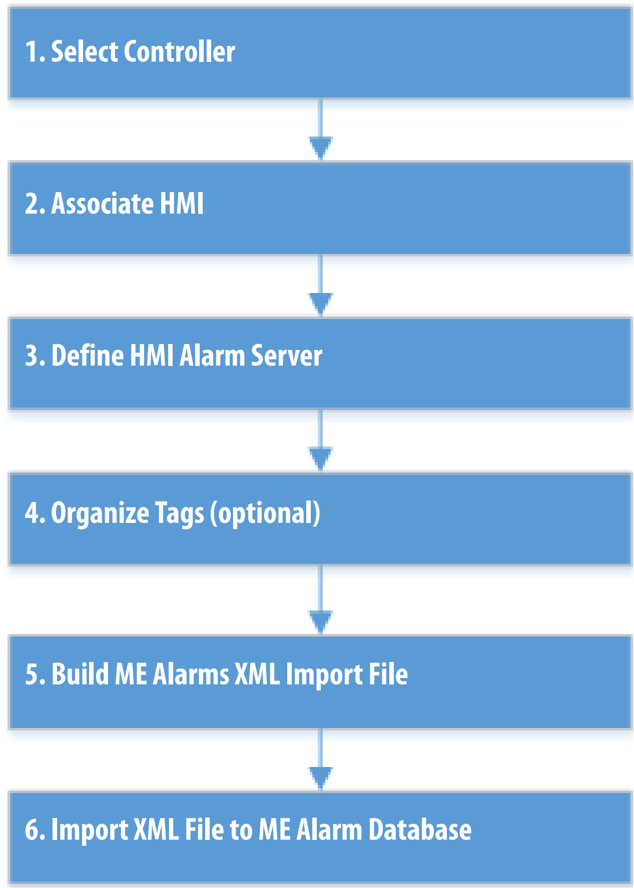


10. Click the 'X' in the upper, right corner to close the window.

Build ME Alarms

The diagram outlines the procedures for creating FactoryTalk View ME software alarms. The procedures in this section are in the same order as the headings in the diagram.

Figure 9 - Alarm Builder ME Workflow



1. Select Controller

Complete the steps, starting on page 145.

2. Associate HMI

Complete the steps, starting on page 152. However, select Machine Edition (ME) for the product type on the Select HMI Project dialog box.

IMPORTANT	If the controllers in the alarm server are associated with FactoryTalk View SE software projects, the ME XML import file building tools can be used as long as the data server device shortcut name for the controller is the same for SE and ME. If the device shortcut names are different, you must create separate Alarm Builder projects.

3. Define HMI Alarm Server

Complete the steps, starting on page 158.

4. Organize Tags (optional)

The ME alarm builder provides the following options:

- Adding all controller alarm tags to the ME alarms XML import file
- Adding tags only from the Alarm Builder Process Tree Organizer folders

To configure a Process Tree, complete step 1 through step 4 on pages 165-166.

5. Build ME Alarms XML Import File

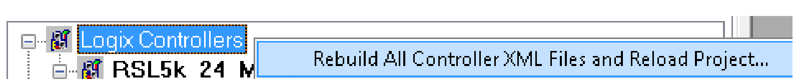
IMPORTANT	Make sure to configure the Logix tags correctly before building the ME alarms XML import file. It is especially important to make sure the HasAlarm values are configured correctly. If the HasAlarm is configured as '0' and the default build options are used, then an ME alarm trigger is **not** added to the ME XML files. If the Logix HasAlarm value is changed later to '1', there is **no** alarm annunciation because the ME alarm trigger does not exist.

Logix tag values can be configured by using the following software and tools:

- Studio 5000 Logix Designer application to make tag edit changes
- Online Configuration Tool (see Appendix A on page 139)
- Alarm Builder tag data editing tools

Complete these steps if tag changes are made by using the Logix Designer application or the Online Configuration Tool while a project is loaded in Alarm Builder.

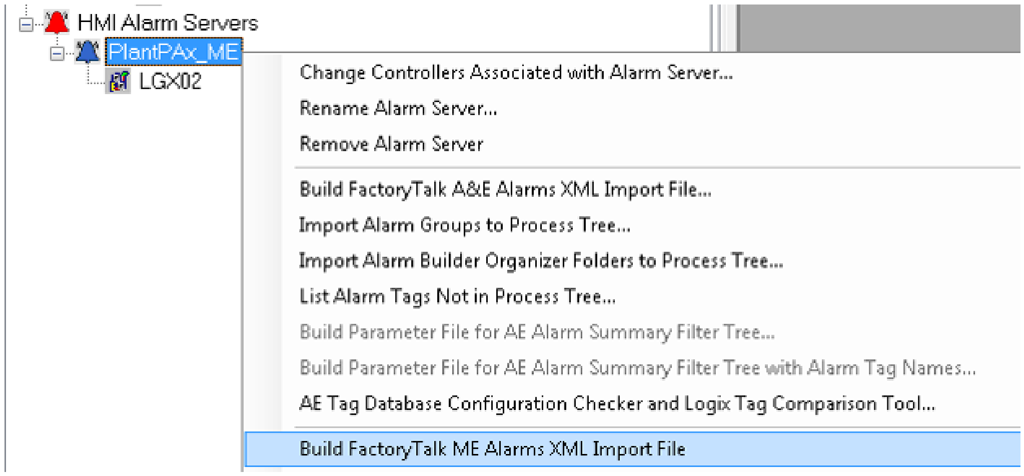
1. If online changes are made by using either tool, use the Logix Designer application to upload and save the controller changes to the controller ACD file.
2. If offline changes are made by using the Logix Designer application, save the changes and exit the Logix Designer application.
3. In the Alarm Builder tree, right-click Logix Controllers and choose Rebuild All Controller XML Files and Reload Project.



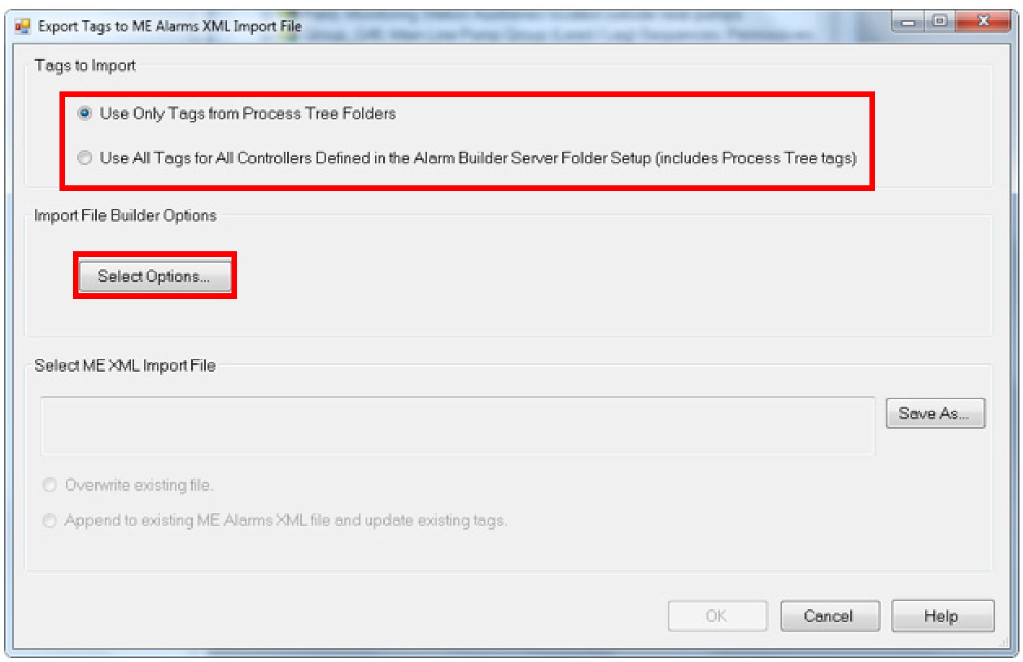
The rebuild helps to make sure the controller XML file contents match the controller ACD file. Alarm Builder uses the controller XML file, it is not able to read the controller ACD file directly.

To build the ME alarms XML import file after the project is loaded, complete these steps.

1. 1.Right-click the alarm server name and choose Build FactoryTalk ME Alarms XML Import File.

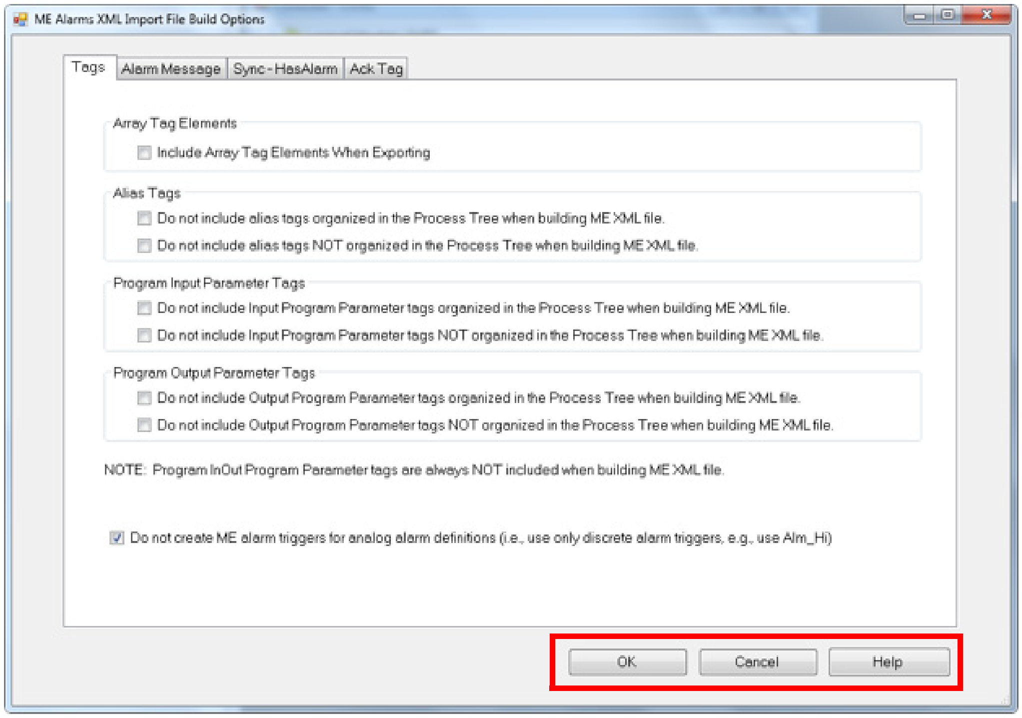


The Export Tags to ME Alarms XML Import File dialog box appears.

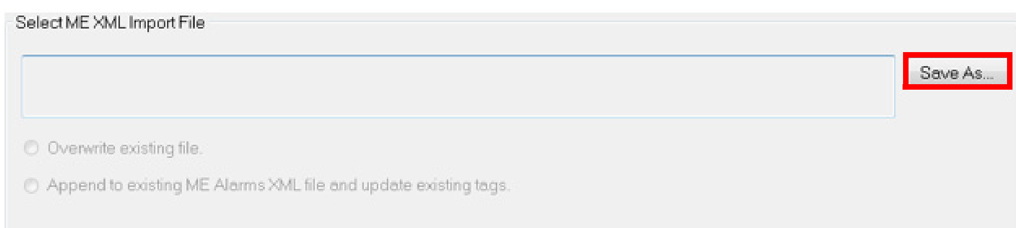


2. Select one of the following options under Tags to Import:
   a. Use Only Tags from Process Tree Folders if you used the controller in the Logical Organizer tree to configure the Alarm Builder process.
      See 4. Organize Tags and HMI Displays (Optional) on page 159.
   b. Otherwise, Use All Tags for All Controllers Defined in the Alarm Builder Server Folder Setup (includes Process Tree tags).
3. Click Select Options.

4. Review the build options and, if necessary, use these functions:
   – Click Help for option descriptions
   – Click OK to save option changes
   – Click Cancel



5. Click Save As.



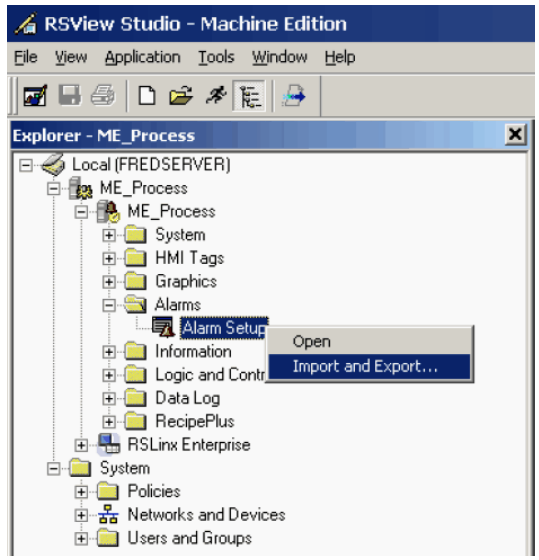
6. Navigate to the folder where you want to save the XML file and specify the XML file name.
7. Click Save.
8. In the Export Tags to ME Alarms XML Import File dialog box, click OK to build the ME Alarms XML import file.

6. Import XML File to ME Alarm Database

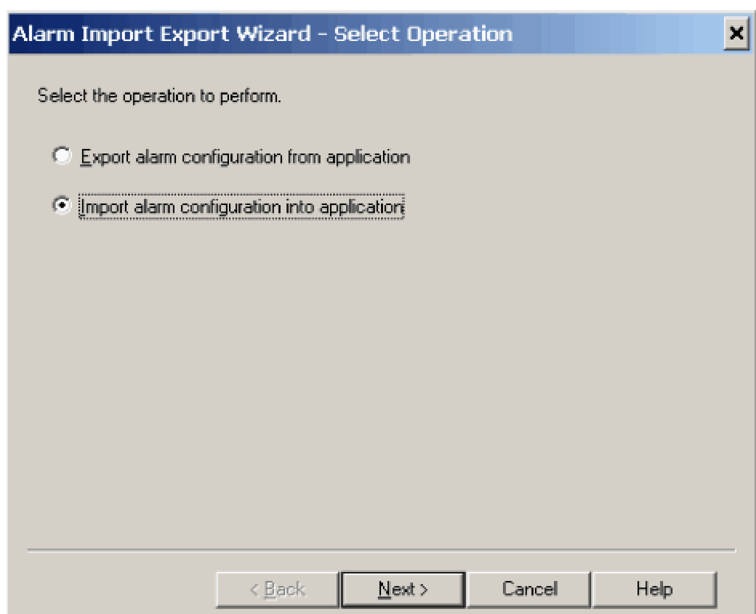
This section describes how to use FactoryTalk View Studio software to implement the XML file to import alarms into the PlantPAx system.

Follow these steps after opening the FactoryTalk View Studio software.

1. From the FactoryTalk View Studio Explorer tree configuration, right-click the alarm server and choose Import and Export.

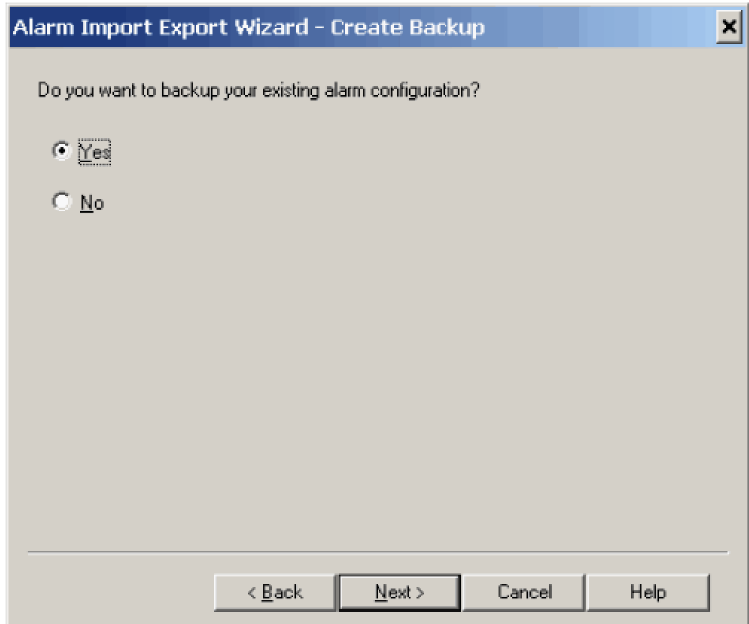


The Alarm Import Export Wizard - Select Operation dialog box appears.

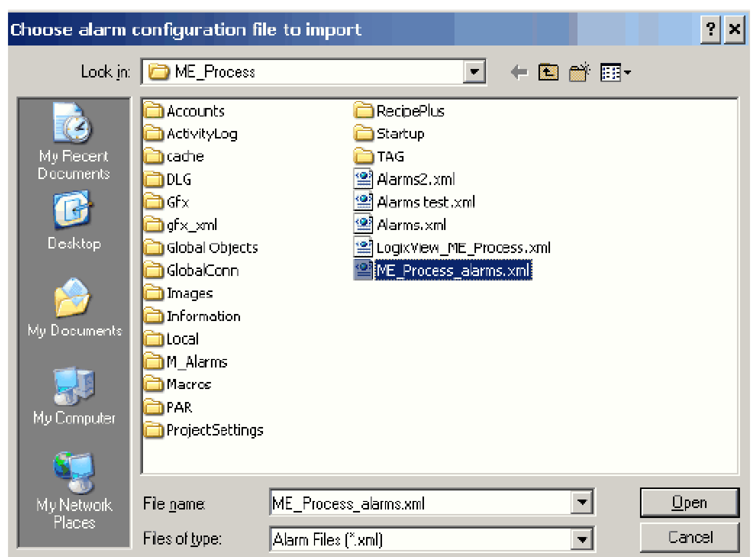


2. Click Import alarm configuration into application and click Next.

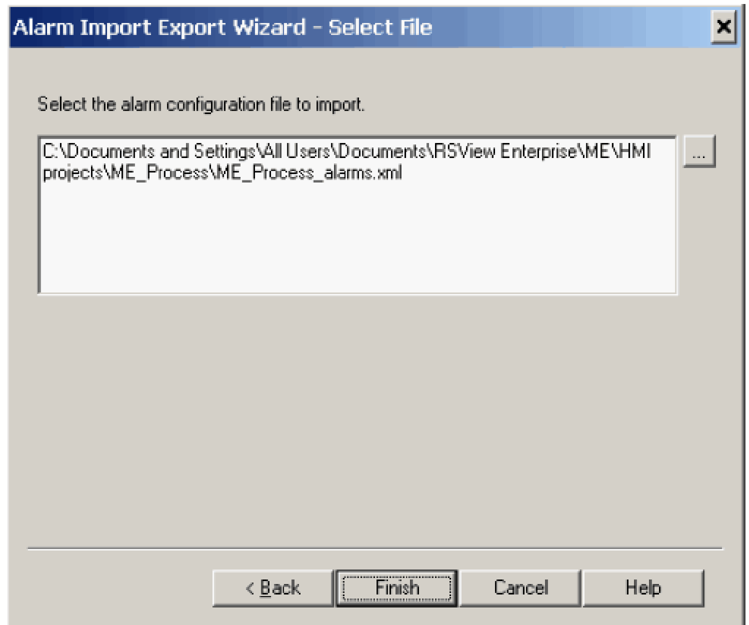
We recommend that you make a backup until you are familiar with the import process.



3. Type a name for the backup file and click Next.
4. Click Browse (ellipsis, ...) on the alarm wizard dialog box to find where you saved the file.
5. Select the alarm configuration file and click Open.



The Alarm Import Export Wizard - Select File dialog box appears.



6. Click Finish.

Color Change Utility

This customizing tool lets you create a color palette to change the colors for FactoryTalk® View software display elements (global objects) and faceplates.

The Color Change Utility uses three types of files:

- **FactoryTalk View Graphics .xml file:** This file is exported from the FactoryTalk View graphic (display or global object) in the View Studio software program. Once changes are made, it is imported into the View Studio software program to change the colors in the display or global object.
- **Color Association File:** This .xml file matches a color instance in the FactoryTalk View Graphics .xml file to the color palette entry. There is one Color Association File (CAXML) for each FactoryTalk View Graphics .xml file. The utility creates and maintains the CAXML file.
- **Color Palette:** This .xml file defines the colors for an application. The utility creates and maintains the .xml file. There is one color palette file for all FactoryTalk View Graphics .xml files that are being customized. If you want to change the color, it is done in the color palette.

TIP	We suggest that you make a copy of the color palette .xml file if you plan to use the color tool.

Install Tool File

The Color Change Utility can be downloaded with the Library of Process Objects from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/downloads.page. Choose Graphics>Color Change Utility>and double-click FTViewCustomizationSetup.msi.

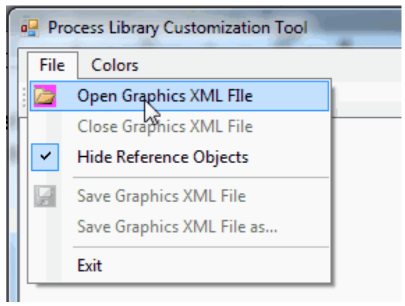
This file installs the program and adds a shortcut to the Start menu under 'PlantPAx®.'

Use the Utility with Library Objects

The download includes .xml exports for all global objects and display files in the library (for FactoryTalk View SE software). Make sure that you also download the CAXML and Process Library Standard Colors .xml files.

Follow these steps to change colors in the process library.

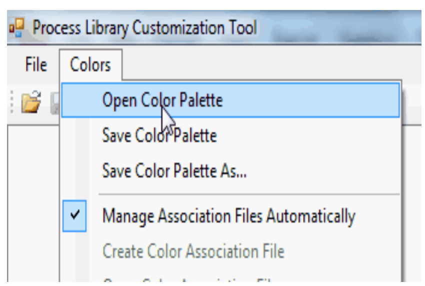
1. From the Process Library Customization Tool File menu, click Open Graphic XML File.



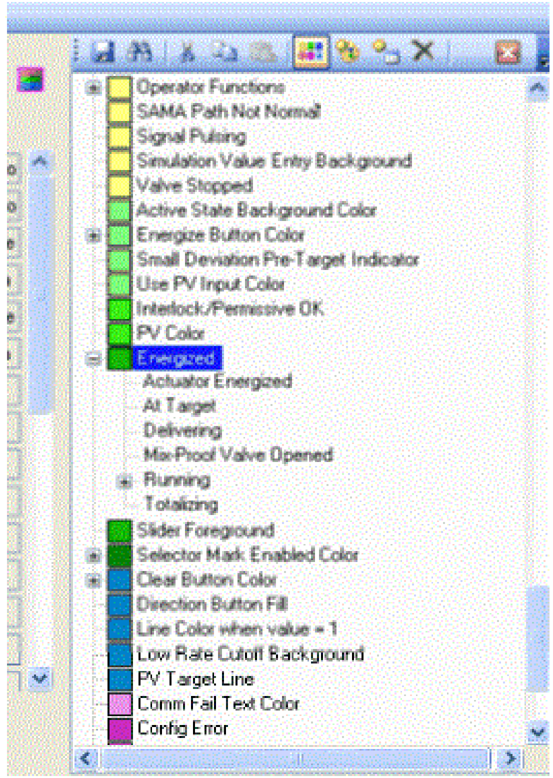
   The Open Graphics XML Files dialog box appears.

   Multiple global object and display files can be opened simultaneously from the file open dialog box.

2. Click the Colors tab and choose Open Color Palette.

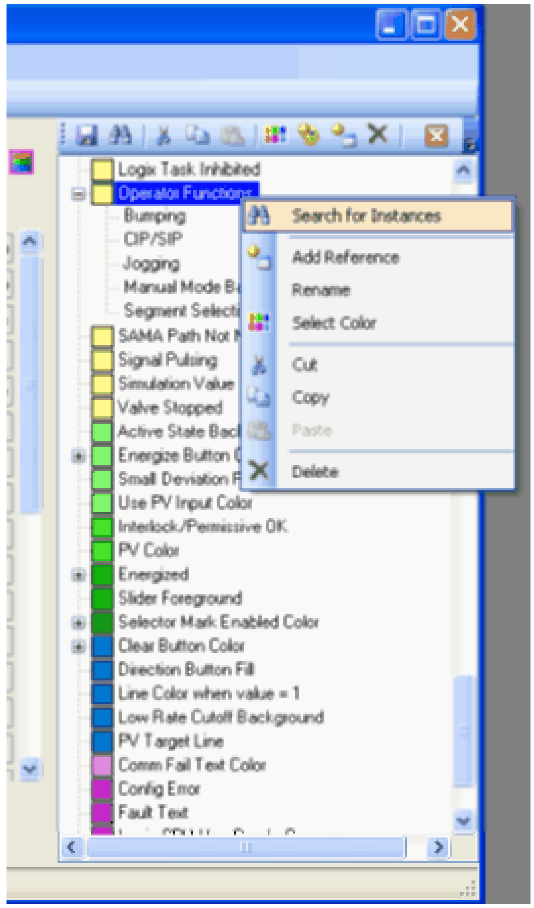


3. Select the colors that you want to change in the palette.

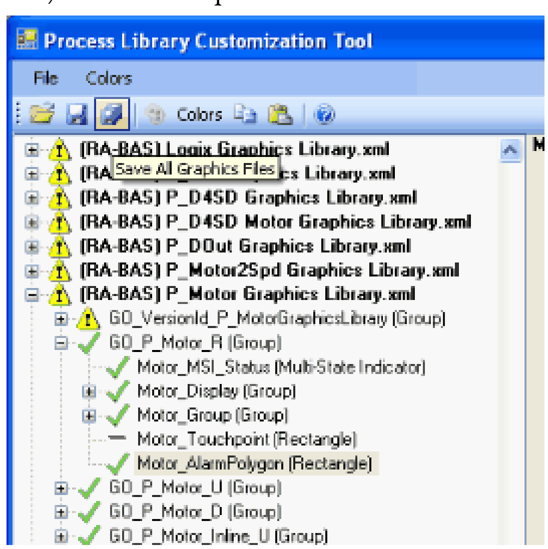


4. To select a new color, click the Choose Color icon.
5. Repeat step 4 to change each color.

6. To see where a color is used, right-click a color and choose Search for Instances.



7. Click Save All  to save all graphic files (along with their association files) and the color palette file.



8. Import the files into the FactoryTalk View software program.

There are bulk import files for the displays (BatchImport_Displays_PlantPAx)Library.xml) and global objects (BatchImport_Global_OlantPAx)Library.xml).

Modifying the Color Palette

The color palette appears in a tree format that shows a parent-child relationship between colors. 'Base Colors' are shown with a color box next to them. 'Reference Colors' reference either a Base Color or another Reference Color.

By changing a Base Color, all Reference Colors under it change. For example, you can create a generic Base Color, called 'Energized', and then reference it with the Reference Color, called 'Running'.

Do not delete Color palette entries unless they are known to be unused. To see if a color palette entry is being used, right-click the color and choose 'Find Color Instances'.

Any color palette entry (Reference or Base Color) can be moved to reference another color. This action is done by simply dragging the color to be moved and dropping it on the new color to reference. When a color that has references is moved, all of its references move as well.

A Reference Color can also be made a Base Color by right-clicking the Reference Color and selecting 'Make Base Color' from the context menu.

Color palette entries are stored with an integer code and that integer code is used in the association file. Renaming a color palette entry does not break any existing associations. Multiple color palette entries can have the same name, but this practice is not recommended.

Follow these color palette considerations:

- Once a color palette entry is deleted and the palette is saved, the only way to restore associations is to manually recreate them.
- Object names in FactoryTalk View software usually have a number on the end. Names are considered to be similar if they are the same after the ending number is removed.
- Button icons are not associated with the color palette for the following reasons:
  - Future versions of the library can change these icons to images
  - Button icons are global objects and do not have multiple definitions, the colors are changed only in one file
  - Additional color palette entries for individual button icons can increase palette maintenance

Use the Utility with Other FactoryTalk View Software Files

The color palette must be applied to FactoryTalk View software files that are not part of the Rockwell Automation Library. Graphic elements in the file must be associated to the color palette. You must create associations and save them in a color association file. When opening an .xml graphics file, if the file already has an association file (CAXML), it is automatically opened as well. If an association file does not exist, it is created.

Follow these steps to create associations.

1. From the Process Library Customization Tool File menu, click Open Graphic XML File.

   The Open Graphics XML Files dialog box appears.

2. Select an object from the tree on the left, and its colors appear in the center of the screen.

3. To associate a color from the palette, select the palette color and drag it to the text box next to the color display box.

   Once all colors for an object are associated with the color palette, a check appears next to the object in the tree.

   Colors that are used for the object only are displayed. For example, if an object is configured as 'Transparent', its background color does not show up in the utility. Also, instances of global objects from display files do not appear in the object tree. The tree can be configured to show instances of global objects. But these objects do not have any color instances because their colors are controlled by their parent global objects.

4. Copy and paste functions have been included to allow quick creation of color associations. To use these functions, right-click the graphic object in the tree on the left and a menu appears.

   - **Copy Color Associations:** Use this function to copy the color associations for the object. If the object is a group, the color configuration for all group members is copied.
   - **Paste Color Associations (this Object only):** Use this function to paste the previously copied color associations to the selected object. This option is not available if the selected object is a group that has members with color associations.
   - **Paste Color Associations (to all group members):** Use this function to paste the previously copied color associations to the new object and all of its members. This option is available only if the source and destination objects are groups with members that have similar names and object types.
   - **Copy and Paste Color Associations to Similar Objects with Names like 'Xxxx#'**: This option copies the selected object and searches objects with a similar name and object type. Color associations are copied to all objects with similar names and types in any of the currently open graphics files. If the objects are groups, then the group members must have similar names and object types. Be careful when you use this feature to prevent unwanted changes.

Additional Add-On Instructions

Long Integer and Time Instructions

The Rockwell Automation® Library of Process Objects provides additional sets of Add-On Instructions. The Logix firmware does not provide operations on Long Integers (LINT, 64-bit signed integers) used as time stamps. The instructions in Table 43 provide 64-bit integer math functionality for the Library objects.

The long integer instructions are **calculation functions only**, and no HMI components are provided.

Table 43 - Long Integer Instructions

Name	Short Description	Long Description	File Name
L_ABS	Absolute Value (64 bit)	This instruction returns the absolute value (positive magnitude) of an input 64-bit integer (LINT) value.	L_ABS_1_0-00_AOI.L5X
L_ADD	Add (64 bit)	Adds two LINT (signed 64 bit) values and returns a LINT (signed 64 bit) sum. Also provides math status bits for Carry, Negative, Overflow, and Zero result (equivalent to built-in S:C, S:N, S:V, S:Z).	L_ADD_1_0-00_AOI.L5X
L_AND	Bitwise AND (64 bit)	This instruction returns the bitwise Logical **and** (output bit true if both corresponding input bits true) of two input 64-bit integers (LINTs), into an output 64-bit integer.	L_AND_1_0-00_AOI.L5X
L_DEC	Decrement (64 bit)	This instruction decrements the input 64-bit integer, to return its value minus 1.	L_DEC_1_0-00_AOI.L5X
L_DIV	Divide (64 bit by 32 bit)	This instruction implements an elementary-school shift/subtract (looping) method of dividing a 64-bit integer (LINT) dividend by a 32-bit integer (DINT) divisor. The resulting quotient is a 64-bit integer (LINT), and the remainder (32-bit integer DINT) is also returned.	L_DIV_1_0-00_AOI.L5X
L_EQU	Equal (64 bit)	This instruction compares two LINT (64 bit signed integer) variables. If Inp_A is equal to Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_EQU_1_0-01_AOI.L5X
L_FtoH	Float to Half-Precision	This instruction converts a 32-bit single-precision floating point number (REAL) to the best equivalent 16 bit 'half-precision' floating point number (stored in an INT, because Logix does not have a SREAL type). It accounts for positive and negative zero, subnormal (small) numbers, Infinity (+/- 1.$), Indeterminate (-1.#IND) and Not a Number (+/- 1.#QNaN).	L_FtoH_1_0-00_AOI.L5X
L_GEQ	Greater Than or Equal (64 bit)	This instruction compares two LINT (64 -bit signed integer) variables. If Inp_A is greater than or equal to Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_GEQ_1_0-01_AOI.L5X
L_GRT	Greater Than (64 bit)	This instruction compares two LINT (64 -bit signed integer) variables. If Inp_A is greater than Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_GRT_1_0-01_AOI.L5X
L_HtoF	Half-Precision to Float	This instruction converts a 16 bit ('half-precision') floating point number (contained in an INT, as Logix doesn't have an SREAL type) to the equivalent 32-bit single-precision floating point number (REAL). It accounts for positive and negative zero, subnormal (small) numbers, Infinity (+/- 1.$), Indeterminate (-1.#IND) and Not a Number (+/- 1.#QNaN).	L_HtoF_1_0-00_AOI.L5X

Table 43 - Long Integer Instructions

Name	Short Description	Long Description	File Name
L_INC	Increment (64 bit)	This instruction increments the input 64-bit integer, to return its value plus 1.	L_INC_1_0-00_AOI.L5X
L_LEQ	Less Than or Equal (64 bit)	This instruction compares two LINT (64 bit signed integer) variables. If Inp_A is less than or equal to Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_LEQ_1_0-01_AOI.L5X
L_LES	Less Than (64 bit)	This instruction compares two LINT (64 bit signed integer) variables. If Inp_A is less than Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_LES_1_0-01_AOI.L5X
L_LIM	Limit Test (Circular) (64 bit)	This instruction compares a 64-bit Input with a 64-bit High Limit and a 64-bit Low Limit. There are two cases: a 'normal case' (Low Limit <= High Limit) and a 'circular case' (Low Limit > High Limit) In the normal case, EnableOut, and Out are set if: Low Limit <= Input <= High Limit In the circular case, EnableOut, and Out are set if: Input >= Low Limit OR Input <= HighLimit (remember, High Limit < Low Limit) This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the LIM instruction is used for 32-bit integers and floating point numbers. However, because it has InOut Parameters (references to tags of LINT type), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0.	L_LIM_1_0-01_AOI.L5X
L_MEQ	Masked Equal (64 bit)	Performs a 64-bit bitwise comparison of a Source Value against a Compare Value, and returns **true** if they are the same in all bit positions that have a '1' in the Mask Value. Therefore, output is **true** if (Source AND Mask) = (Compare AND Mask). On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0.	L_MEQ_1_0-01_AOI.L5X
L_MUL	Multiply (64-bit X 32-bit)	This instruction implements an elementary-school multiply-and-add-partial-products (place notation) method of multiplying a 64-bit integer (LINT) by a 32-bit integer (DINT). The resulting product is a 64-bit integer (LINT).	L_MUL_1_0-01_AOI.L5X
L_MVM	Move with Mask (64 bit)	Performs a 64 bit bitwise Move with Mask of a Source Value to an Output. If a bit in the Mask is **true**, the corresponding Source bit is copied to the Output. If a bit in the Mask is **false**, the corresponding Output bit is left unchanged. In other words, Output = (Output AND NOT Mask) OR (Source AND Mask).	L_MVM_1_0-00_AOI.L5X
L_NEG	Negate (64 bit)	This instruction returns the negative (2's complement) of an input 64-bit integer (LINT) value.	L_NEG_1_0-00_AOI.L5X
L_NEQ	Not Equal (64 bit)	This instruction compares two LINT (64 bit signed integer) variables. If Inp_A is not equal to Inp_B, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0).	L_NEQ_1_0-01_AOI.L5X
L_NOT	Bitwise NOT (64 bit)	This instruction returns the bitwise Logical NOT (inverse or 1's complement) of an input 64-bit integer (LINT) value. (It flips all bits.)	L_NOT_1_0-00_AOI.L5X
L_OR	Bitwise OR (64 bit)	This instruction returns the bitwise Logical OR (output bit true if either of the corresponding input bits are true) of two input 64-bit integers (LINTs), into an output 64-bit integer.	L_OR_1_0-00_AOI.L5X
L_OTE	Output Energize (64 bit)	This instruction energizes the given bit of the referenced LINT (64-bit integer) tag, that is, it sets the given bit (true, 1) if the EnableIn condition is **true**, or clears the given bit (false, 0) if the EnableIn condition is **false**. If the given bit number is outside the range 0…63, the controller **major faults** on an invalid array index (bad bit number). There is no validity checking of the given bit number.	L_OTE_1_0-00_AOI.L5X

Table 43 - Long Integer Instructions

Name	Short Description	Long Description	File Name
L_OTL	Output Latch (64 bit)	This instruction latches the given bit of the referenced LINT (64-bit integer) tag, that is, it sets the given bit (true, 1) if the EnableIn condition is **true**, or leaves the given bit (and the referenced LINT) unmodified if the EnableIn condition is **false**. If the given bit number is outside the range 0…63, the controller **major faults** on an invalid array index (bad bit number). There is no validity checking of the given bit number.	L_OTL_1_0-00_AOI.L5X
L_OTU	Output Unlatch (64 bit)	This instruction unlatches the given Bit of the referenced LINT (64-bit integer) tag, that is, it clears the given bit (false, 0) if the EnableIn condition is **true**, or leaves the given bit (and the referenced LINT) unmodified if the EnableIn condition is **false**. If the given Bit number is outside the range 0…63, the controller **major faults** on an invalid array index (bad bit number). There is no validity checking of the given bit number.	L_OTU_1_0-00_AOI.L5X
L_SEL	Select (64 bit)	This instruction returns Input A if the input selector bit is **false**, Input B if the selector bit is **true**. **IMPORTANT:** When EnableIn is **false**, the input selector bit sense is reversed. With the selector bit default value of 1, the rung state in an LD instance controls the selector in a straightforward manner. If the rung is **true**, select Inp_B; if the rung is **false**, select Inp_A.	L_SEL_1_0-00_AOI.L5X
L_SUB	Subtract (64 bit)	Subtracts two LINT (signed 64 bit) values and returns a LINT (signed 64 bit) difference. Also provides math status bits for Carry (borrow), Negative, Overflow, and Zero result (equivalent to built-in S:C, S:N, S:V, S:Z).	L_SUB_1_0-00_AOI.L5X
L_XIC	Examine On (64 bit)	This instruction examines the given Bit of the input LINT (64-bit integer) and outputs **true** (1) if the bit is 1, **false** (0) if the bit is 0. **IMPORTANT:** Use the output rung state or EnableOut to feed downstream logic. The output bit 'Out' reflects only the state of the given bit, for ladder animation, and **not** the rung state. If the given bit number is outside the range 0…63, the controller **major faults** on an invalid array index (bad bit number). There is no validity checking of the given bit number.	L_XIC_1_0-00_AOI.L5X
L_XIO	Examine Off (64 bit)	This instruction examines the given Bit of the input LINT (64-bit integer) and outputs **true** (1) if the bit is 0, **false** (0) if the bit is 1. **IMPORTANT:** Use the output rung state or EnableOut to feed downstream logic. The output bit 'Out' reflects only the state of the given bit, for ladder animation, and **not** the rung state. If the given bit number is outside the range 0…63, the controller **major faults** on an invalid array index (bad bit number). There is no validity checking of the given bit number.	L_XIO_1_0-00_AOI.L5X

Table 43 - Long Integer Instructions

Name	Short Description	Long Description	File Name
L_XOR	Bitwise XOR (64 bit)	This instruction returns the bitwise Logical XOR (exclusive OR, output bit **true** if either but NOT both of the corresponding input bits are **true**) of two input 64-bit integers (LINTs), into an output 64-bit integer.	L_XOR_1_0-00_AOI.L5X
T_LtoT	LTIME to DateTime	This instruction converts an LTIME (64-bit integer time stamp, for example, from an ALMD or ALMA instruction or the WALLCLOCKTIME object) to a DateTime (Year, Month, Day, Hour, Minute, Second, Microsecond as DINTs) in Coordinated Universal Time (UTC offset = 0). The input LTIME is the 64 bit (LINT) number of microseconds since DT#1970-01-01_00:00:00.000000 UTC.	T_LtoT_1_0-00_AOI.L5X
T_TtoL	DateTime to LTIME	This instruction converts a DateTime (Year, Month, Day, Hour, Minute, Second, Microsecond as DINTs) in Coordinated Universal Time (UTC offset = 0) to an LTIME (64-bit integer time stamp, for example, from an ALMD or ALMA instruction or the WALLCLOCKTIME object). The output LTIME is the 64 bit (LINT) number of microseconds since DT#1970-01-01_00:00:00.000000 UTC.	T_TtoL_1_0-00_AOI.L5X

Time and Date Instructions

The Rockwell Automation Library of Process Objects also includes instructions for performing date and time functions.

The time and date instructions are **calculation functions only**, and no HMI components are provided.

Table 44 - Time and Date Instructions

Name	Short Description	Long Description	File Name
T_ADD	DateTime:= DateTime + Time	T_Add; Add Date/Time plus time to get new Date/Time This instruction adds a given amount of Time to a Date/Time to arrive at a new Date/Time. The new Date/Time is 'normalized', that is, given as a valid (if possible) Gregorian Date and Time: • 0 <= Microseconds < 1,000,000 • 0 <= Seconds < 60 (This instruction cannot add leap seconds) • 0 <= Minutes < 60 • 0 <= Hours < 24 • 1 <= Day <= 31 **and** Date is a valid Gregorian date • 1 <= Month <= 12	T_ADD_1_0-01_AOI.L5X

T_Clock	Date/Time Clock	This object manages the controller 'Wall Clock', providing date and time services, including:
		
		• Accepts downloaded date and time from HMI or other sync source and sets the clock
		• Reads the clock and provides the local date and time to other logic
		  – **IMPORTANT:** Current date/time is provided as individual DINTs and as a Date Time type for use with Date/Time math instructions (T_ADD, T_SUB, T_GRT, and so forth)
		• Calculates and provides the day of the week for the current date
		  – **IMPORTANT:** Use T_DoW to calculate the day of the week for **any** given date
		• Optionally sets a flag once a day to request a clock sync update
		• Based on configured shift start times, determines the current production shift (for up to three shifts). The controller clock can be synchronized by writing a valid year, month, day, hour, minute, and second into the appropriate settings. When the clock has been set, the settings are returned to '-1' and the time is reflected in the corresponding values and status.
			T_Clock_1_0-01_AOI.L5X

T_DIFF	Time:= DateTime - DateTime	T_DIFF: Date/Time minus Date/Time gives time difference This instruction is given two Date/Time points and determines the amount of time between them. The result is given in days, hours, minutes, seconds, and microseconds. (Years and months are returned as zero, as the number of months is generally not used.) The Date/Time parameters must be valid Gregorian Dates and valid clock times: • 0 <= Microseconds < 1,000,000 • 0 <= Seconds < 60 (This instruction cannot add leap seconds) • 0 <= Minutes < 60 • 0 <= Hours < 24 • 1 <= Day <= 31 **and** Date is a Valid Gregorian Date • 1 <= Month <= 12	T_DIFF_1_0-00_AOI.L5X
T_DoW	Day of the Week	T_DoW: Day of the Week This instruction takes a given Date/Time, and, for the date part, returns the day of the week: (0 = Sun, 1 = Mon, 2 = Tue, 3 = Wed, 4 =T hu, 5 = Fri, 6 = Sat) If the given date is **invalid**, a flag is set (but the calculated day of the week is returned anyway.) **IMPORTANT:** The time part of input parameter DT (hours, minutes, seconds, microseconds) is ignored.	T_DoW_1_0-00_AOI.L5X

Table 44 - Time and Date Instructions

Name	Short Description	Long Description	File Name
T_DST	Daylight Savings Time	This instruction manages Daylight Saving Time. It uses a number of configuration values to allow handling a wide variety of national and regional rules for when to start and end Daylight Saving Time (or 'summer time'). For use with HMI, it also provides values for display of the Month/Day and Hour/Minute of the points in time when DST starts and ends. Plus, for logging logic, it provides bits to indicate when time stamps have an overlap (1:30 a.m. happens twice) or there is a gap (one-shot). Follow these steps for best results. 1. Clear Cfg_EnableDST to 0. 2. Open the Controller Properties, clear the DST checkbox, and set the clock to local STANDARD time 3. Configure the T_DST instruction per the following instructions. 4. Set the Cfg_EnableDST bit to 1. The clock is switched to DST based on the rules entered if DST is currently in effect for your location. Configuration: • Cfg_FwdMo -- Month specified in rule for date to spring forward (1…12) • Cfg_FwdOccur -- Occurrence of day of week to spring forward 1 = first, 2 = second…5 = last • Cfg_FwdDoW -- Day of the week to spring forward (0 = Sun…6 = Sat) • Cfg_FwdDoM -- Day of month for spring forward if on a fixed date (1…31) • Cfg_FwdDoWBefore -- Day of the week BEFORE the first…last day of week or date (0 = Sun…6 = Sat) • Cfg_FwdHr --Hour (LOCAL) to spring forward (0…23) • Cfg_FwdMin -- Minute (LOCAL) to spring forward (0…59) • Cfg_FwdFixedDate --1 = Spring forward on fixed date, 0 = on occurrence of day of week • Cfg_FwdUseBefore --1 = Spring forward on day of week **before** date or day of week • Cfg_BackMo -- Month specified in rule for date to fall back (1…12) • Cfg_BackOccur -- Occurrence of day of week to fall back 1 = first, 2 = second…5 = last • Cfg_BackDoW -- Day of the week to fall back (0 = Sun…6 = Sat) • Cfg_BackDoM -- Day of month for fall back if on a fixed date (1…31) • Cfg_BackDoWBefore -- Day of the week BEFORE the first…last day of week or date (0 =S un…6 = Sat) • Cfg_BackHr --Hour (LOCAL) to fall back (0…23) • Cfg_BackMin -- Minute (LOCAL) to fall back (0…59) • Cfg_BackFixedDate -- 1 = Fall back on fixed date, 0=on occurrence of day of week • Cfg_BackUseBefore: --1 = Fall back on day of week **before** date or day of week • Cfg_Offset --Number of minutes to spring forward or fall back (0…1439, default = 60) • Cfg_EnableDST --1 = Automatically adjust clock for DST, 0 = Always Standard Time, no DST	T_DST_1_0-01_AOI.L5X

Configuration Values for T_DST for Sample Rulesets
(T_DST was tested in each of these configurations)

Parameter	U.S./Can (default)	European Union	Russia	Morocco	Israel	New Zealand	Newfoundland(1988)
"Spring Forward" Rule	Second Sunday in March at 02:00 Local	Last Sunday in March at 01:00 UTC	Saturday before Last Sunday in March at 23:00 UTC	For 2014: March 30 at 02:00 Local	Last Friday before April 2 at 02:00 Local	Last Sunday in September at 02:00 Local	Second Sunday in March at 00:01 Local (advance 2 hours)
Cfg_FwdMo	3	3	3	3	4	9	3
Cfg_FwdOccur	2	5	5	---	---	5	2
Cfg_FwdDoW	0	0	0	---	---	0	0
Cfg_FwdDoM	-	-	-	**30**	**2**	-	-
Cfg_FwdDoWBefore	-	-	**6**	-	**5**	-	-
Cfg_FwdHr	2	varies by zone	varies by zone	2	2	2	0
Cfg_FwdMin	0	0	0	0	0	0	**1**
Cfg_FwdFixedDate	0 (false)	0 (false)	0 (false)	**1 (true)**	**1 (true)**	0 (false)	0 (false)
Cfg_FwdUseBefore	0 (false)	0 (false)	**1 (true)**	0 (false)	**1 (true)**	0 (false)	0 (false)
"Fall Back" Rule	First Sunday in November at 02:00 Local	Last Sunday in October at 01:00 UTC	Saturday before Last Sunday in October at 23:00 UTC	For 2014: June 28 at 02:00 Local	Sunday between Rosh Hashanah and Yom Kippur (varies)	First Sunday in April at 03:00 Local	First Sunday in November at 00:01 Local (fall back 2 hours)
Cfg_BackMo	11	10	10	6	varies	4	11
Cfg_BackOccur	1	5	5	---	varies	1	1
Cfg_BackDoW	0	0	0	---	0	0	0
Cfg_BackDoM	-	-	-	**28**	-	-	-
Cfg_BackDoWBefore	-	-	**6**	-	-	-	-
Cfg_BackHr	2	varies by zone	varies by zone	2	2	2	0
Cfg_BackMin	0	0	0	0	0	0	**1**
Cfg_BackFixedDate	0 (false)	0 (false)	0 (false)	**1 (true)**	0 (false)	0 (false)	0 (false)
Cfg_BackUseBefore	0 (false)	0 (false)	**1 (true)**	0 (false)	0 (false)	0 (false)	0 (false)
Cfg_Offset	60	60	60	60	60	60	**120**
Cfg_EnableDST	1	1	1	1	1	1	1

Name	Short Description	Long Description	File Name
T_EQU	DateTime = DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is equal to DT2, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the EQU instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined data type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_EQU_1_0-01_AOI.L5X

Name	Short Description	Long Description	File Name
T_GEQ	DateTime >= DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is greater than (after) or equal to DT2, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the GEQ instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_GEQ_1_0-01_AOI.L5X
T_GRT	DateTime > DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is greater than (after) DT2, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the GRT instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_GRT_1_0-01_AOI.L5X

Name	Short Description	Long Description	File Name
T_LEQ	DateTime <= DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is less than (before) or equal to DT2, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the LEQ instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_LEQ_1_0-01_AOI.L5X
T_LES	DateTime < DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is less than (before) DT2, EnableOut and Out are set to **true** (1). Otherwise EnableOut and Out are cleared to **false** (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the LES instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_LES_1_0-01_AOI.L5X

Name	Short Description	Long Description	File Name
T_LIM	DateTime Limit Test	This instruction compares a Date-and-Time-of-Day or amount of time with a High Limit (Date/Time or amount of time) and a Low Limit (Date/Time or amount of time). There are two cases: • 'normal case' (Low Limit <= High Limit) • 'circular case' (Low Limit > High Limit) In the normal case, EnableOut and Out are set if: Low Limit <= DateTime <= High Limit In the circular case, EnableOut and Out are set if: DateTime >= Low Limit OR DateTime <= High Limit (remember, High Limit < Low Limit) This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the LIM instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_LIM_1_0-00_AOI.L5X
T_LtoT	LTIME to DateTime	This instruction converts an LTIME (64-bit integer time stamp, for example, from an ALMD or ALMA instruction or the WALLCLOCKTIME object) to a DateTime (year, month, day, hour, minute, second, microsecond as DINTs) in Coordinated Universal Time (UTC offset = 0). The input LTIME is the 64 bit (LINT) number of microseconds since DT#1970-01-01_00:00:00.000000 UTC.	T_LtoT_1_0-01_AOI.L5X

Name	Short Description	Long Description	File Name
T_NEQ	DateTime <> DateTime?	This instruction compares two Date-and-Time-of-Day (DateTime) variables. If DT1 is not equal to DT2, EnableOut and Out are set to true (1). Otherwise EnableOut and Out are cleared to false (0). This instruction can be used in Ladder Diagram, Structured Text, or Function Block Routines just like the NEQ instruction is used for integers and floating point numbers. However, because it has InOut Parameters (tag references to user-defined types), it is **not** left justified on ladder rungs. On a **False** rung in LD, or in FBD with EnableIn cleared to 0, Out is cleared to 0. **IMPORTANT:** This instruction is dependent on the user-defined type 'DateTime' (external to this Add-On Instruction definition). 'DateTime' is defined as the following: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_NEQ_1_0-01_AOI.L5X
T_Now	Current DateTime	Returns the current local date and time from the controller clock as a DateTime In/Out Parameter. This instruction depends on the (external) DateTime data type: • Yr -- DINT (year) • Mo -- DINT (month) • Da -- DINT day) • Hr -- DINT (hour) • Min -- DINT (minute) • Sec -- DINT (second) • uSec -- DINT (microsecond)	T_Now_1_0-00_AOI.L5X
T_Scan	Time Since Previous Scan	Returns the time between the previous scan of the instance and the current scan of the same instance as a REAL number of Seconds.	T_Scan_1_0-01_AOI.L5X
T_SEL	DateTime Select	This instruction uses an Input bit signal to select one of two Date/Time values. **IMPORTANT:** The selected Date/Time is only 'moved through' as-is; it is **not** 'normalized' to a valid Gregorian Date and Time: Inp_Sel is defaulted to 1 so this instruction can be used on a Ladder Diagram Routine rung with the rung condition as the selector: Rung True selects DT1, Rung False selects DT0. The Inp_Sel is **inverted** when EnableIn is **False** (false rung). This inversion can be useful beyond this ladder diagram function.	T_SEL_1_0-00_AOI.L5X
T_SUB	DateTime:= DateTime - Time	T_Sub: Subtract Date/Time minus time to get new Date/Time. This instruction subtracts a given amount of time from a Date/Time to arrive at a new Date/Time. The new Date/Time is 'normalized', that is, given as a valid (if possible) Gregorian Date and Time: • 0 <= Microseconds < 1,000,000 • 0 <= Seconds < 60 (This instruction cannot add leap seconds) • 0 <= Minutes < 60 • 0 <= Hours < 24 • 1 <= Day <= 31 AND Date is a Valid Gregorian Date • 1 <= Month <= 12	T_SUB_1_0-01_AOI.L5X

Name	Short Description	Long Description	File Name
T_Sun	Sun Rise / Set / Az/El	This instruction takes a given Date/Time, and for the date part, plus the configured latitude, longitude, and UTC offset, returns the Date/Time of local sunrise and local sunset (to the nearest minute, to an accuracy of within about 2 minutes). Solar Azimuth (heading, clockwise in degrees from true north) and Elevation (degrees above horizon) are calculated and accurate to within about half a degree when the sun is above the horizon. Azimuth bearing is not necessarily accurate when elevation is more than a degree or two negative. The given date is assumed **valid**. If necessary, check by using T_Valid first. **IMPORTANT:** This instruction uses only the month and day to estimate the sunrise and sunset times to within a couple minutes. It does **not** deal with detailed astronomical calculations based on planetary models. It is based on the current Gregorian calendar and does **not** deal with Julian dates for dates before 1582. For algorithms, see: http://www.srrb.noaa.gov/highlights/sunrise/solareqns.PDF To get your latitude and longitude, see: http://www.batchgeocode.com/lookup/	T_Sun_1_0-00_AOI.L5X

Name	Short Description	Long Description	File Name
T_Sync	Synchronize Controller Clock	This object synchronizes the controller real-time clock with an NTP Time Server with excellent reliability (computer responsible for network time, or a standard time server, like time.windows.com) **IMPORTANT:** This is **not** a full NTP precision exchange. It is simply a quick 'get' of the NTP server time and applying it to the controller clock. It supports the following features: • Ability to sync controller clock to server on Maintenance command • Ability to sync on a periodic (default = daily) basis • Ability to retry on a periodic (default = hourly) basis on a failure to retrieve date/time from server • Ability to sync on controller powerup or PROGRAM to RUN transition. • Ability via configuration to allow or disallow each of the previous methods • Reads time from NTP server and displays time received as Values. • Updates the controller clock to time received (if allowed by configuration) • Calculates clock drift (difference between previous and new controller time) and displays as Values. Cfg_PollT: The Poll Time (default = 1440 min = 1 day) is the number of minutes between polls of the NTP server for excellent time reliability after a **successful** get of the time. Cfg_RetryT: The Retry Time (default = 60 min = 1 hour) is the number of minutes between polls of the NTP server for excellent time reliability after a **failure** to get the time. Cfg_ENSlotNumber: Enter the chassis slot number of the EtherNet/IP module (for example, 1756-EN2T) that can communicate with the time server. This module must support 'socket services'. For more information, see the EtherNet/IP Socket Interface Application Technique, publication ENET-AT002. **TIP:** For CompactLogix™ controllers with built-in Ethernet interface (for example, the 1769-L36ERM), use a value of 1. **IMPORTANT:** The Cfg_ENSlotNumber value is used to build the Path for the MSG instructions used in T_Sync. If you change Cfg_ENSlotNumber while the controller is running, you can cycle the controller to PROG and back to RUN for the Path change to take effect. Cfg_Host (a Local STRING tag): Name or IP address of the time server. **IMPORTANT:** If you use the name of the host, be sure the DNS (domain name service) server addresses are configured for your Ethernet module so the name can be resolved to an IP address. The default value of 'time.nist.gov' for users in the United States provides an automatic redirect to an available reliable time server. For a local domain, the domain controller often provides time service for members of the domain; if it has a fixed IP address, you can enter it in the common dotted-decimal format, for example '192.168.1.1'. Cfg_Port (a Local STRING tag): Number of the IP Port for the NTP time service. This string must be in the form: '?port=nnn' where nnn is the port number in decimal. The default NTP port number is 123, so the default value of '?port=123' works for most cases. Cfg_AllowClockUpdate: 1 = Allow Add-On Instruction to update controller clock. 0 = Just get the time (UTC) and display it. Cfg_AllowMCmdSync: 1 = Permit manual sync request via MCmd_Sync. 0 = No manual sync request allowed. Cfg_AllowPeriodicSync: 1 = Permit enabling periodic clock sync via MCmd_Enable. 0 = Periodic sync is kept disabled. Cfg_SyncOnPwrup: 1 = Request time sync on controller first scan. 0 = Do not initiate sync on controller first scan.	T_Sync_1_0-04_AOI.L5X T_Sync_1_0-04_RUNG.L5X

Name	Short Description	Long Description	File Name
T_TtoISO_WkDate	Date to ISO Week Date	This object converts a Date in common form (Year, Month, Day) to an ISO-8601 Week Date (like 2014-W04-2, meaning Tuesday in the fourth week of Week-Numbered Year 2014) for 2014-01-21. This object calculates the ISO Year, ISO Week, and ISO Day (day of the week). Note that the ISO Day is specified as 1=Monday …7=Sunday. This object also determines the number of weeks (52 or 53) in the calculated ISO Year. The Date to convert is given in the Year, Month, and Day of the Ref_DT reference tag, of type DateTime (Year, Month, Day, Hour, Minute, Second, Microsecond). The Week-Numbered Year does not necessarily start on January 1. It can start from December 29 through January 4. The first week of an ISO Week-Numbered Year is the week, beginning with Monday and ending on Sunday, that contains the first THURSDAY of the calendar year. See Wikipedia, 'ISO Week Date', for more information.	T_TtoISO_WkDate_1_0-00 _AOI.L5X
T_TtoL	DateTime to LTIME	This instruction converts a DateTime (year, month, day, hour, minute, second, microsecond as DINTs) in Coordinated Universal Time (UTC offset = 0) to an LTIME (64-bit integer time stamp, for example, from an ALMD or ALMA instruction or the WALLCLOCKTIME object). The output LTIME is the 64-bit (LINT) number of microseconds since DT#1970-01-01_00:00:00.0000 UTC.	T_TtoL_1_0-00_AOI.L5X
T_TtoS	Date/Time to String	This instruction takes the given date and formats it as a human-readable STRING. For example, for the Date/Time: 2008 12 31 23 59 59 999999 the return STRING is (based on configuration): Wednesday, December 31, 2008 11:59:59.999999 p.m. Options are provided for: • 24- or 12-hour time format (with a.m. or p.m. indicator on the 12-hour format) • Displaying or not displaying microseconds • Displaying or not displaying seconds • Displaying or not displaying the Day of the Week • Displaying day first (31 July) or month first (July 31) • Displaying date in an ISO-format (YYYY-MM-DD) This instruction checks for a valid (Gregorian) date and time and returns 'Invalid Date' and/or 'Invalid Time' as appropriate in the output STRING. The following are valid dates/times: • 0 <= Microseconds < 1,000,000 • 0 <= Seconds < 60 • 0 <= Minutes < 60 • 0 <= Hours < 24 • 1<= Days <= 31 and a valid Gregorian Date (Feb = 28 or 29 days) • 1 <= Month <= 12 • Year in the range +/- 5879600 The names of the days of the week and the months of the year, and the AM and PM indicator text can be changed by using the Local Tags Monitor for the instance.	T_TtoS_1_0-00_AOI.L5X

Name	Short Description	Long Description	File Name
T_Valid	Is DateTime Valid?	This instruction tests the given DateTime variable and verifies that it is a valid calendar date and clock time, as follows: • 0 <= Microseconds < 1,000,000 • 0 <= Seconds < 60 (This instruction cannot check leap seconds) • 0 <= Minutes < 60 • 0 <= Hours < 24 • 1 <= Day <= 31 **and** Day is Valid for Gregorian Date (28, 29, 30, or 31 days in month • 1 <= Month <= 12 • Year is within the range of dates that this instruction can calculate a Gregorian day number (about +/- 5.8 million years) **IMPORTANT:** This instruction does **not** switch to Julian dates for dates before 1582 (or 1753). This instruction assumes that the Gregorian Calendar extends 'indefinitely' (at least 5.8 million years) either side of 'zero'. It **does** handle the Gregorian 4-, 100-, 400-year rules, so Feb. 29, 2000 is a valid date, but Feb. 29, 2100 is not.	T_Valid_1_0-00_AOI.L5X

Notes:

HMI Security Codes Configuration

FactoryTalk View Software Code Description

FactoryTalk® View software security codes help protect information that is contained within HMI faceplates. Operators, maintenance personnel, and engineers must have security permission to modify their respective faceplate tabs.

Display elements (global objects) have an associated faceplate that appears when the display element is clicked. Variables, setpoints, alarms, and other device configuration data is entered and viewed on the HMI faceplates.

Table 12 - Maintenance Tab 2 Description

Function	Action	Security	Configuration Parameters
Controlled Variable	Type the CV in engineering units. This entry is available in Operator mode and Maintenance mode. It is available in other modes if Bumpless Program/Operator Transition is not selected on Maintenance Tab Page 1.	Normal Operation of Devices (Code A)	• Cfg-MinCV • Cfg_MaxCV
Minimum and Maximum CV	Type the clamping limits for the Controlled Variable in engineering units. Clamping limits are enforced in Operator and Program modes only.	Configuration & Tuning Maintenance (Code D)	• Cfg_MinCV • Cfg_MaxCV
Interlock CV	Type the interlock target CV in engineering units. This value is used for the CV when interlocked or on an I/O Fault, but only if the Hold Last Good Value checkbox is not selected.		Cfg_IntlkCV
Rate of Change Limit	Type the CV Rate of Change Limit in engineering units per second. This value determines the rate at which the CV output changes upon a change in CV target. A value of zero disables rate of change limiting. The	Normal Operation of Devices (Code A)	• OSet_CVRoCLimInc • OSet_CVRocLimDec

Data cannot be entered or changed without administrator permission with the corresponding security code on each faceplate tab.

See Table 45 on page 204 for a description of the FactoryTalk View HMI security codes.

Table 45 - FactoryTalk View Software Code Descriptions

FTView A-P Security Code Configuration	Normal Operation of Devices	Manual Device Operation (non coordinated)	Equipment Maintenance	Configuration & Tuning Maintenance	Engineering Configuration	Acknowledge and Shelve Alarms	Supervisory Operations	Disable Alarms Bypass Permissives and Interlocks	spare	Normal Production (Batches & Lots)	Setpoint and Parameter Override	Override/Force Sequences	Process Exception Handling, Advanced Production	Navigate Across Units/Applications	Shutdown Application, Operating System Access	Admin: Security, Users, Passwords
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
Command Equipment in Operator Mode	X															
Enter Setpoints, Control Variables	X															
Reset Latched Interlocks, Restart Equipment	X															
Add Batch to Batch List, Run Batches										X						
Hold, Restart Batches, clear failures, bind, bind ack										X						
Acquire/Lock and Release Equipment Operator Mode		X														
Change Loop Mode (Manual, Auto, Cascade)	X															
Acquire/Release Equipment Maintenance Mode			X													
Reset Run Time Accumulators			X													
Override Inputs			X													
Bypass Feedback			X													
Enable/Disable Device			X													
Configuration (Limits, Constants, Timers)				X												
Modify Alarm Delay Times				X												
Tuning				X												
Change Machine Configuration					X											
Setup Configuration (Advanced)					X											
Alarm Configuration					X											
Put Device in Simulation					X											
Edit HMI Application					X											
Acknowledge Alarms						X										
Reset Alarms						X										
Shelve Alarms						X										
Disable Alarms								X								
Modify Alarm Limits and Deadbands								X								
Bypass Permissives and Interlocks								X								
Respond to Prompt (level 1)										X						
Respond to Prompt (level 2)													X			
Exception Processing (Resume, Manual, Auto, Semi-Auto, Pause, Disconnect, Release)													X			
Exception Processing (Step Change, Parameter Change, Step, Acquire, Reorder, Reactivate Step)												X				
Override Downloaded Setpoints											X					
Override Downloaded Phase Parameters											X					
Manual Batch Processing (Stop, Abort, Reset Phases)													X			
Manual Supervisory EP/EM Control							X									
Force Steps/States												X				
Change Inflights and Preacts				X												
Force Queue Indexing													X			
Navigate to Other Units														X		
Shutdown HMI Application															X	
Access Windows Start Menu, Windows Apps															X	
Change Accounts/Passwords																X
Change Security Settings																X
Process																
HMI Operators	X					X				X			X			
HMI Operating Supervisor	X	X				X	X	X		X	X	X	X	X		
HMI Maintenance	X	X	X			X	X	X		X	X	X	X		X	
HMI Maintenance Supervisor	X	X	X	X		X	X	X		X	X	X	X	X	X	
HMI Manager	X	X	X	X		X	X	X		X	X	X	X	X	X	
HMI Engineering	X	X	X	X	X	X	X	X		X	X	X	X	X	X	
HMI Admin														X	X	X

Faceplates for Built-in Logix5000 Instructions

The faceplates that appear in this section are designed to let the function blocks and built-in firmware instructions for the Logix5000™ controllers interface with the Process Library Add-On Instructions.

For details on built-in instructions, see the Logix5000 Controllers Advanced Process Control and Drives Instructions Reference Manual, publication 1756-RM006.

Built-in Autotune

The Studio 5000 Logix Designer® application PIDE autotuner provides an open-loop autotuner that is built into the PIDE instruction. This function filters a signal to assist with the calculation of control variables. You can autotune from PanelView™ Plus terminals or any other operator interface devices and Logix Designer application.

The PIDE block has an Autotune Tag (type PIDE_AUTOTUNE) that you specify for those PIDE blocks that you want to autotune.

IMPORTANT	The PIDE autotuner is installed with the Logix Designer application, but you need an activation key to enable the autotuner. The autotuner is supported only in function block programming; it is not available in relay ladder or structured text programming.

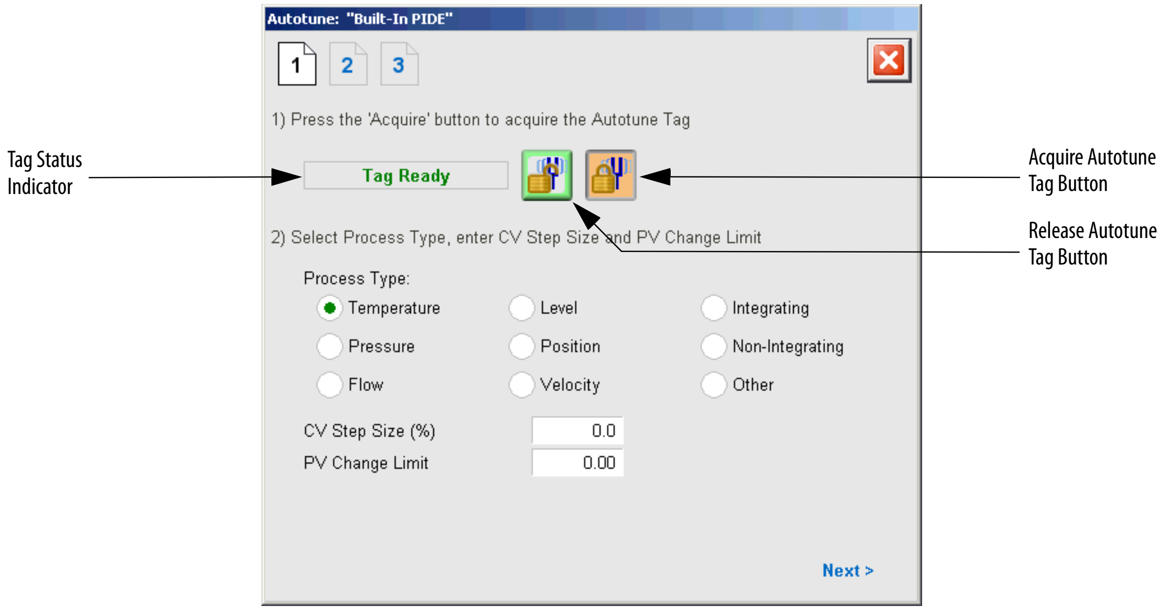
The Autotune function is accessed through page 2 of the Maintenance tab of the Built-in PIDE faceplate.

To perform the Autotune process, follow the steps on the Autotune pages in the order they are displayed.

Autotune Page 1

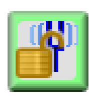
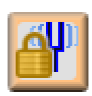
You can do the following on page 1 of the Autotune faceplate:

- Acquire the Autotune tag
- Select the Process Type
- Type a CV Step Size
- Type a PV Change Limit



The following table lists the functions on Autotune Page 1.

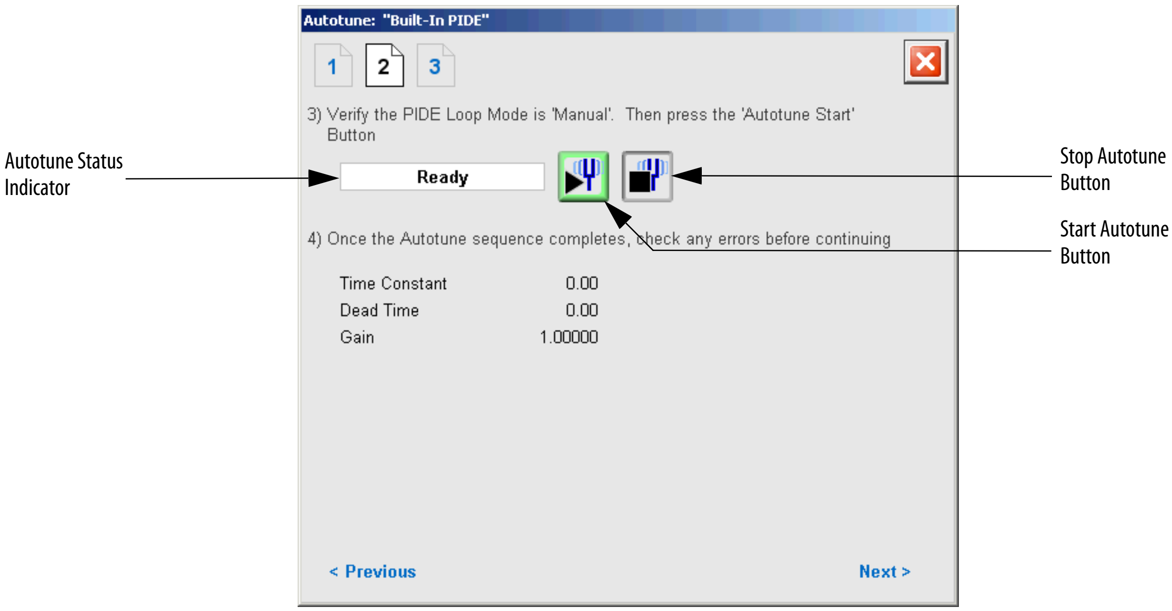
Table 46 - Autotune Operator Tab Description

Function	Action	Security
	Click to release the Autotune tag.	Configuration and Tuning Maintenance (Code D)
	Click to acquire the Autotune tag.	
Process Type	Click the item that best describes the process.	
CV Step Size (%)	Type a value for CV step size in percent for the tuning step test.	
PV Change Limit	Type a value for the PV Change Limit. The autotune is aborted if the PV changes by more than this amount.	

Autotune Page 2

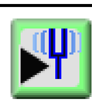
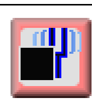
Page 2 of the Autotune faceplate shows the following information:

- Time Constant
- Dead Time
- Gain



The following table lists the functions on Autotune Page 2.

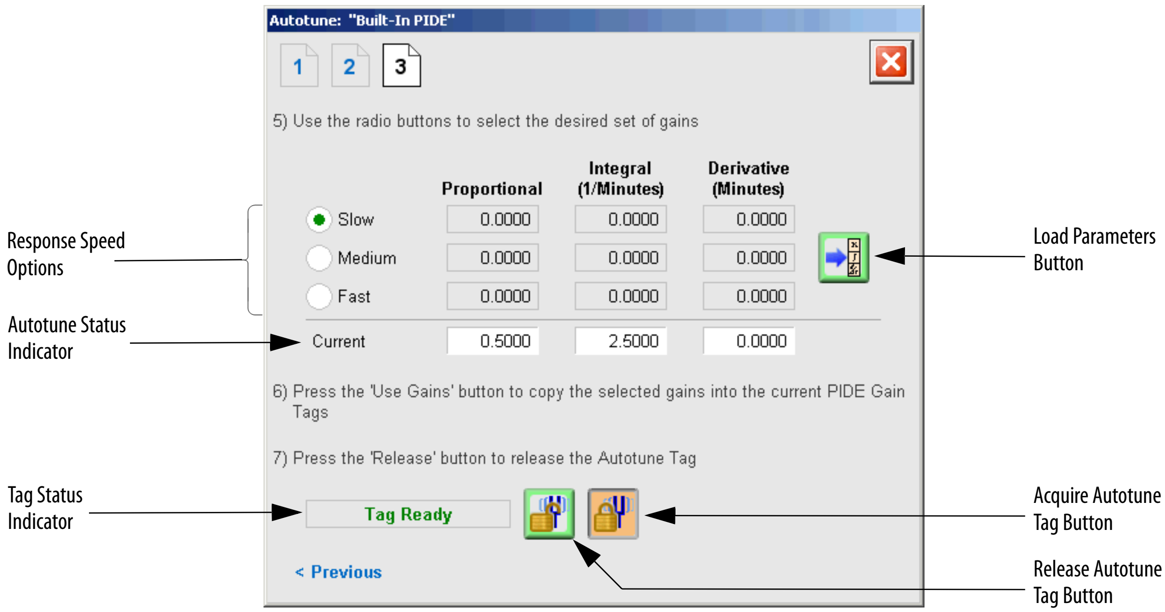
Table 47 - Autotune Operator Tab Description

Function	Action	Security
	Click to start the Autotune process for CV1, CV2, and CV3.	Configuration and Tuning Maintenance (Code D)
	Click to stop the Autotune process.	

Autotune Page 3

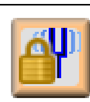
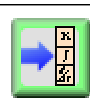
Page 3 of the Autotune faceplate shows the following information:

- Proportional gain tuned slow, medium, or fast
- Integral gain tuned slow, medium, or fast
- Derivative gain tuned slow, medium, or fast

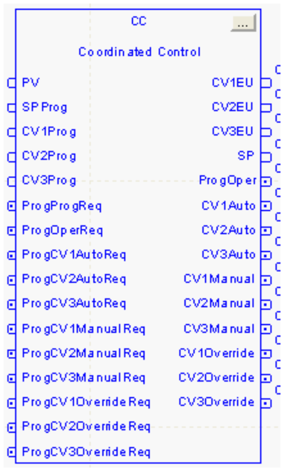


The following table lists the functions on Autotune Page 3.

Table 48 - Autotune Operator Tab Description

Function	Action	Security
	Click to release the Autotune tag.	Configuration and Tuning Maintenance (Code D)
	Click to acquire the Autotune tag.	
	Click to replace the current model parameters with the calculated Autotune model parameters.	
Response Speed Options: Slow Medium Fast	Click an option for Response Speed	
Gains: Proportional Integral Derivative	Type in a value for: Proportional gain Integral gain Derivative gain	

Coordinated Control (CC)



The Coordinated Control (CC) function block controls one process variable by manipulating as many as three different control variables. As an option, any of the three outputs can be used as an input to create feed forward action in the control variable. The CC function block calculates the control variables (CV1, CV2, and CV3) in the Auto mode based on the PV - SP deviation, internal models, and tuning.

Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:
- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk® View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 49 - CC Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 50 - CC Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build process graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 51 - CC Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In CC Autotune-Faceplate	(RA-BAS-ME) Built-In CC Autotune-Faceplate	The faceplate display used for the Autotune object.
(RA-BAS) Built-In CC Faceplate	(RA-BAS-ME) Built-In CC Faceplate	The faceplate display used for the CC object.
(RA-BAS) Built-In CC Quick	(RA-BAS-ME) Built-In CC Quick	The Quick display used for the CC object.
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates uses the native analog input data entry, so no file is required.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

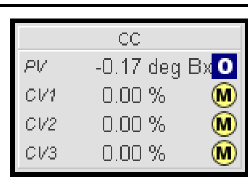
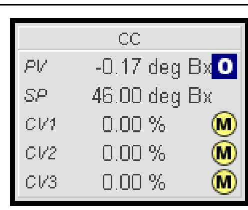
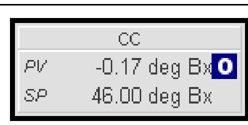
Table 52 - CC Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix® system, aid consistency and save engineering time.

Table 53 - Coordinated Control (CC) Display Elements Descriptions

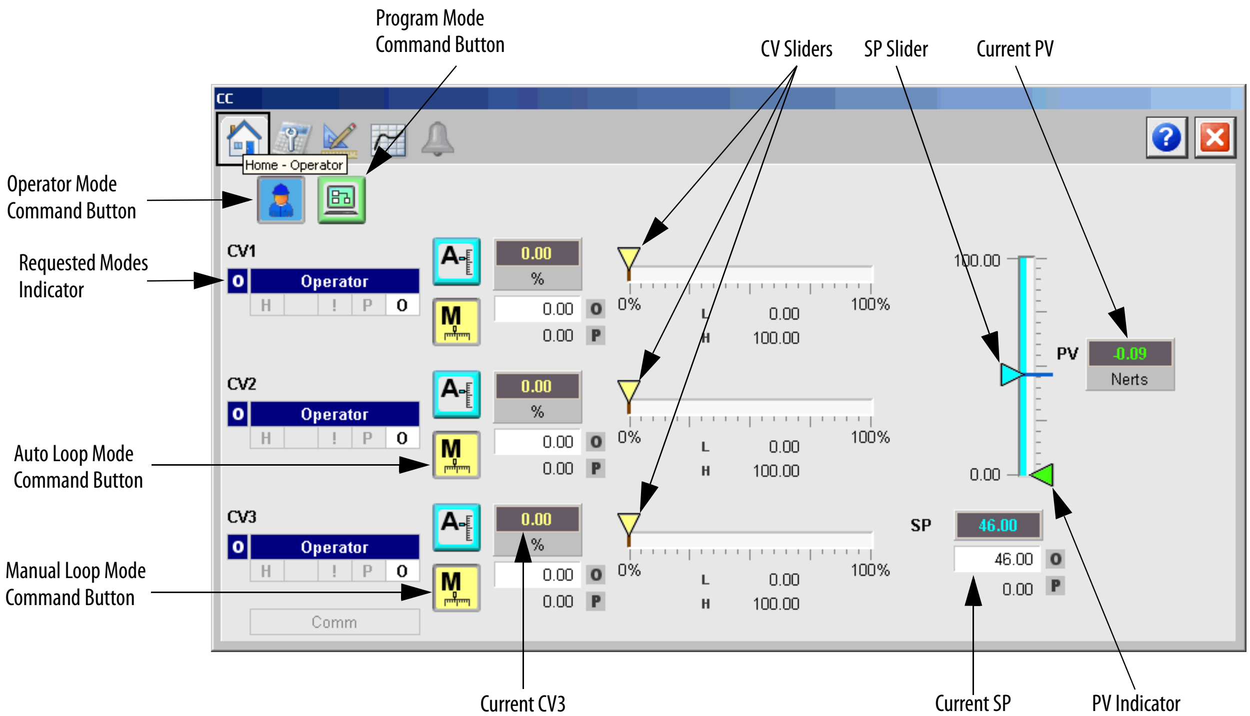
Display Element Name	Display Element	Description
GO_BuiltIn_CC		Coordinated Control object with a Process Variable and three Control Variables.
GO_BuiltIn_CC1		Coordinated Control object with a Process Variable, Setpoint, and three Control Variables.
GO_BuiltIn_CC2		Coordinated Control object with a Process Variable and a Setpoint.

Operator Tab

The faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

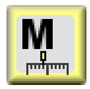
The Operator tab shows the following information:

- Requested modes indicator
- Current process variable and bar graph
- Current control variables and bar graph for each
- Current setpoint
- High (H) and Low (L) clamping limits for the CVs
- Input status (Communications OK, Communications Fail, Bad PV Quality, or Uncertain PV Quality)



The following table lists the functions on of the CC Operator tab.

Table 54 - CC Operator Tab Description

Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
	Click to request Manual Loop mode.	Normal Operation of Devices (Code A)
	Click to request Auto Loop mode.	
Operator CV value (CV1, CV2, and CV3)	Type a value for a CV output.	
CV Slider (CV1, CV2, and CV3)	Move this slider to adjust the loop CV output.	Equipment Maintenance (Code C)
SP Slider	Move this slider to adjust the loop setpoint.	
Operator Setpoint Value	Type a value for the loop Setpoint.	Normal Operation of Devices (Code A)

Maintenance Tab

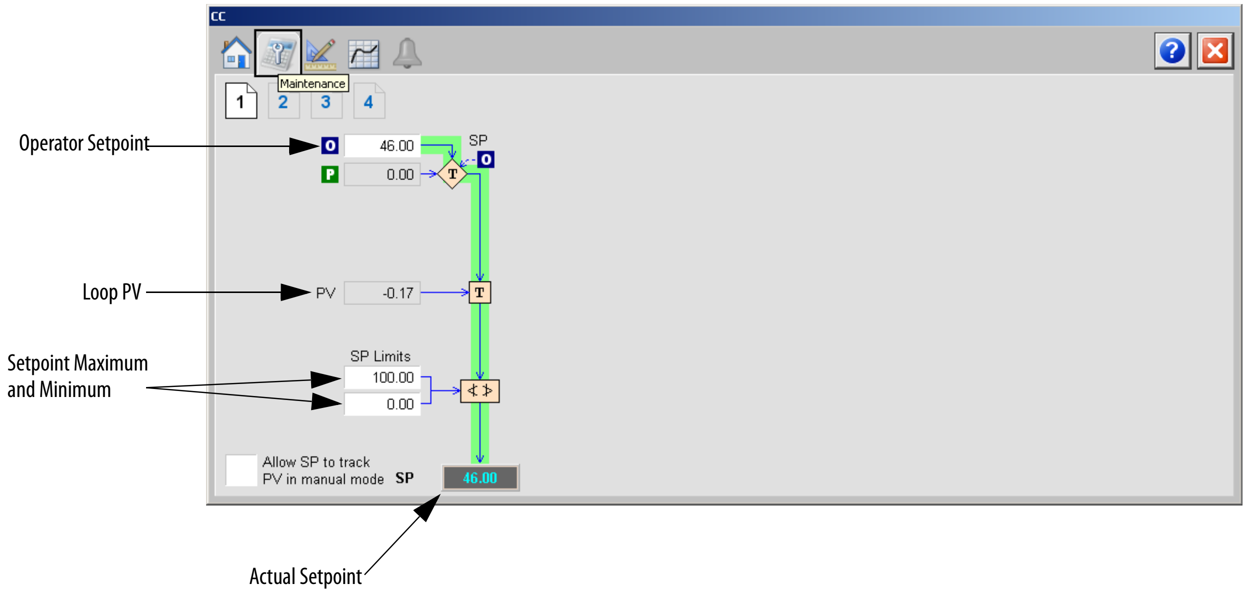
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments on device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab is divided into four tabs.

Maintenance Tab Page 1

Page 1 of the Maintenance tab shows the following information:

- Source of the setpoint, by animation of the data path and the transfer points
- Actual loop setpoint after selection and clamping
- Loop process variable (PV)



The following table shows the functions of page 1 of the Maintenance tab.

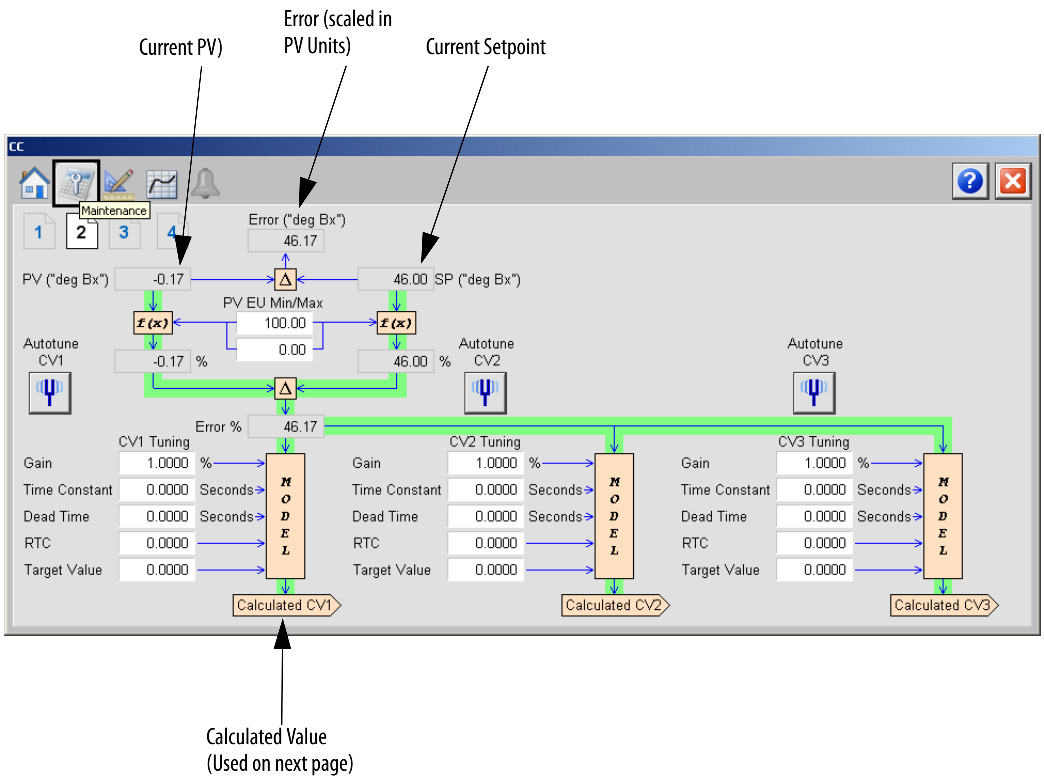
Table 55 - CC Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Operator Setpoint	Type the Operator setpoint.	Normal Operation of Devices (Code A)	.SPOper
Setpoint Limits	Type the maximum limit for the setpoint.	Configuration and Tuning Maintenance (Code D)	.SPHLimit
	Type the minimum limit for the setpoint.		.SPLLimit
Allow SP to track PV in manual mode	Click to Set **true** to enable CV Tracking when autotune is OFF. This parameter is ignored in Hand and Override mode.	Equipment Maintenance (Code C)	.PVTracking

Maintenance Tab Page 2

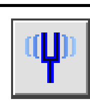
Page 2 of the CC Maintenance tab shows the following information:

- Error (scaled in PV units)
- Current process variable (PV)
- Current setpoint
- PV (percent of span)
- SP (percent of span)



The following table shows the functions of page 2 of the CC Maintenance tab.

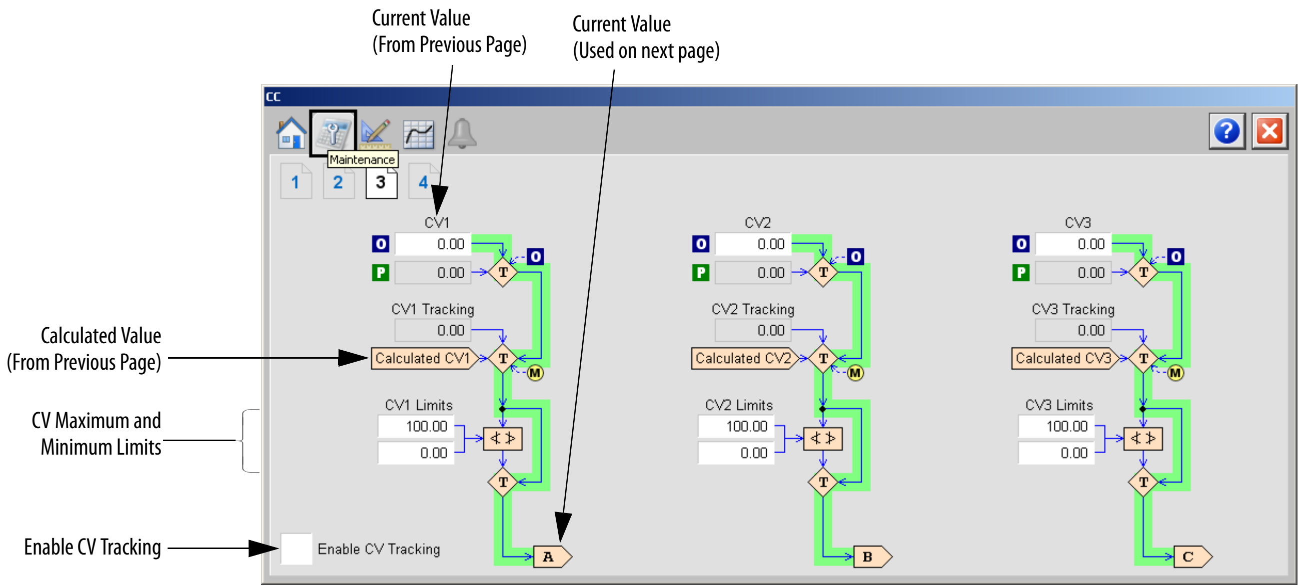
Table 56 - CC Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
	Click to open the CC Autotune (CV1, CV2, or CV3) faceplate. See CC Autotune Page 1 on page 222.	None	None
PV EU Min/Max	Type the maximum limit for the PV in engineering units.	Engineering Configuration (Code E)	• .PVEUMax
	Type the minimum limit for the PV in engineering units.		• .PVEUMin
Gain (CV1, CV2, and CV3)	Enter the CV1, CV2, or CV3 gain for the appropriate model.	Configuration and Tuning Maintenance (Code D)	• .CV1ModelGain • .CV2ModelGain • .CV3ModelGail
Time Constant (CV1, CV2, and CV3)	Enter the CV1, CV2, or CV3 time constant for the appropriate model.		• .CV1ModelTC • .CV2ModelTC • .CV3ModelTC
Dead Time (CV1, CV2, and CV3)	Enter the internal model deadtime for CV1, CV2, or CV3 for the appropriate model.		• .CV1ModelDT • .CV2ModelDT • .CV3ModelDT
RTC (CV1, CV2, and CV3)	Enter the CV1, CV2, or CV3 response time constant for the appropriate model. This value determines the speed of the CV action in seconds.	Configuration and Tuning Maintenance (Code D)	• .CV1RespTC • .CV2RespTC • .CV3RespTC
Target Value (CV1, CV2, and CV3)	Enter the target value for CV1, CV2, or CV3 for the appropriate model.		• .CV1Target • .CV2Target • .CV3Target

Maintenance Tab Page 3

Page 3 of the CC Maintenance tab shows the following information:

- Program value in percent
- CV Track value
- Calculated CV (from Maintenance page 2)



The following table shows the functions of page 3 of the CC Maintenance tab.

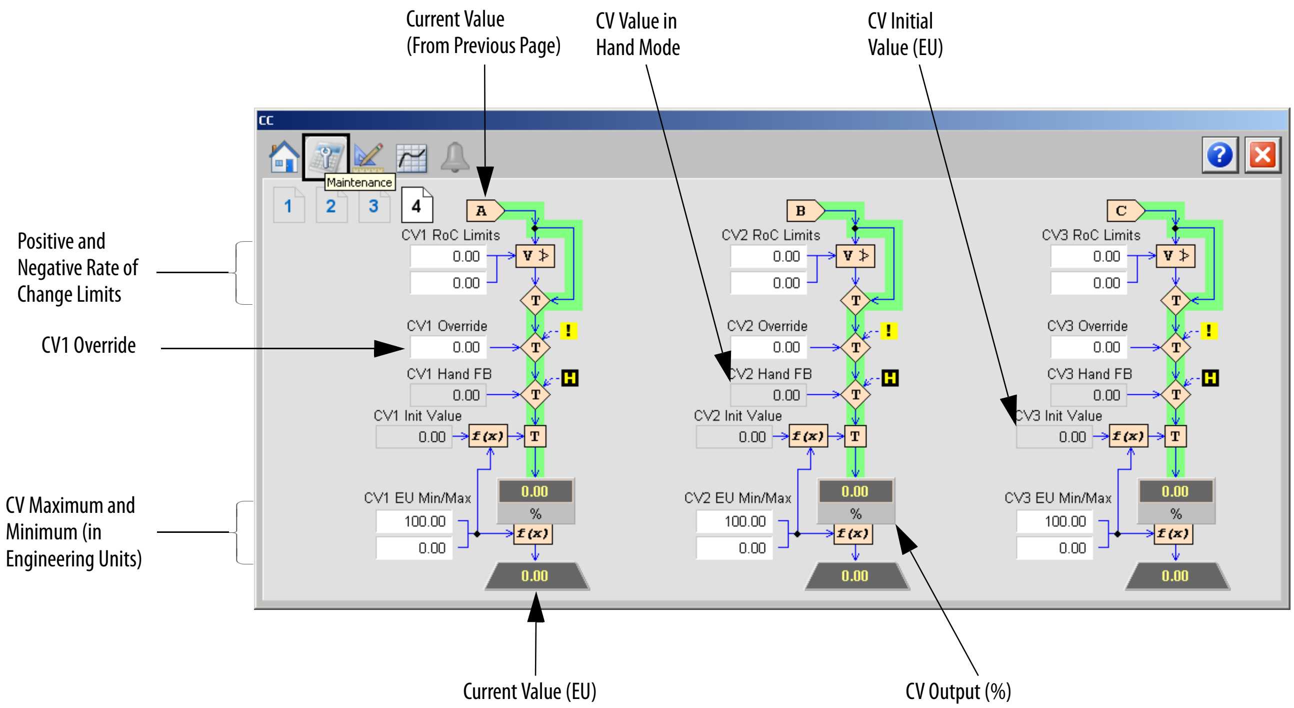
Table 57 - CC Maintenance Tab Page 3 Description

Function	Action	Security	Configuration Parameters
CV1 (CV1, CV2, or CV3)	Type the value (%) for CV.	Normal Operation of Devices (Code A)	• .CV1Oper • .CV2Oper • .CV3Oper
CV Maximum Limit (CV1, CV2, or CV3)	Type the maximum limit for CV1, CV2, or CV3.	Configuration and Tuning Maintenance (Code D)	• .CV1HLimit • .CV2HLimit • .CV3HLimit
CV Minimum Limit (CV1, CV2, or CV3)	Type the minimum limit for CV1, CV2, or CV3.		• .CV1LLimit • .CV2LLimit • .CV3LLimit
Enable CV Tracking	Check to enable CV tracking when autotune is OFF. This parameter is ignored in Hand and Override mode.	Equipment Maintenance (Code C)	• .CVTrackReq

Maintenance Tab Page 4

Page 4 of the CC Maintenance tab shows the following information:

- CV value in Hand mode
- Initial CV value (EU)
- CV output value (EU)
- Current value (from Maintenance page 3)



The following table shows the functions of page 4 of the CC Maintenance tab.

Table 58 - CC Maintenance Tab Page 4 Description

Function	Action	Security	Configuration Parameters
CV Rate of Change Positive Limit	Type the CV1, CV2, or CV3 positive or negative rate of change limit, in percent per second. Rate of change limiting is used only when in Auto mode or in Manual mode if CVManLimiting is **true**. A value of zero disables CV1 ROC limiting.	Configuration and Tuning Maintenance (Code D)	• .CV1ROCPosLimit • .CV2ROCPosLimit • .CV3ROCPosLimit
CV Rate of Change Negative Limit			• .CV1ROCNegLimit • .CV2ROCNegLimit • .CV3ROCNegLimit
CV Override	Type the CV1, CV2, or CV3 Override value. CV1, CV2, or CV3 is set to this value when in Override mode. This value is recommended to correspond to a safe state output of the loop.		• .CV1OverrideValue • .CV2OverrideValue • .CV3OverrideValue
CV EU Maximum	Type the maximum value for CV1EU, CV2EU, or CV3EU. The value of CV1EU, CV2EU, or CV3EU that corresponds to 100% CV1, CV2, or CV3.	Engineering Configuration (Code E)	• .CV1EUMax • .CV2EUMax • .CV3EUMax
CV EU Minimum	Type the minimum value for CV1EU, CV2EU, or CV3EU. The value of CV1EU, CV2EU, or CV3EU that corresponds to 0% CV1, CV2, or CV3.		• .CV1EUMin • .CV2EUMin • .CV3EUMin

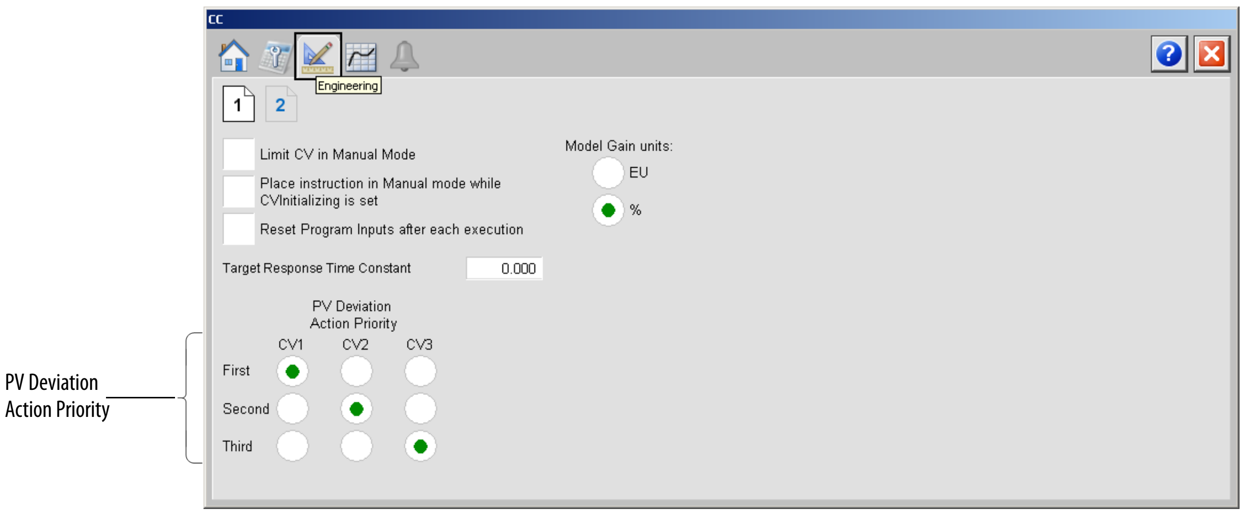
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages.

Engineering Tab Page 1

Page 1 of the CC Engineering tab has various Operator inputs and options for the CV, model gain, and PV deviation.



The following table shows the functions of page 1 of the CC Engineering tab.

Table 59 - CC Engineering Tab Page 1 Description

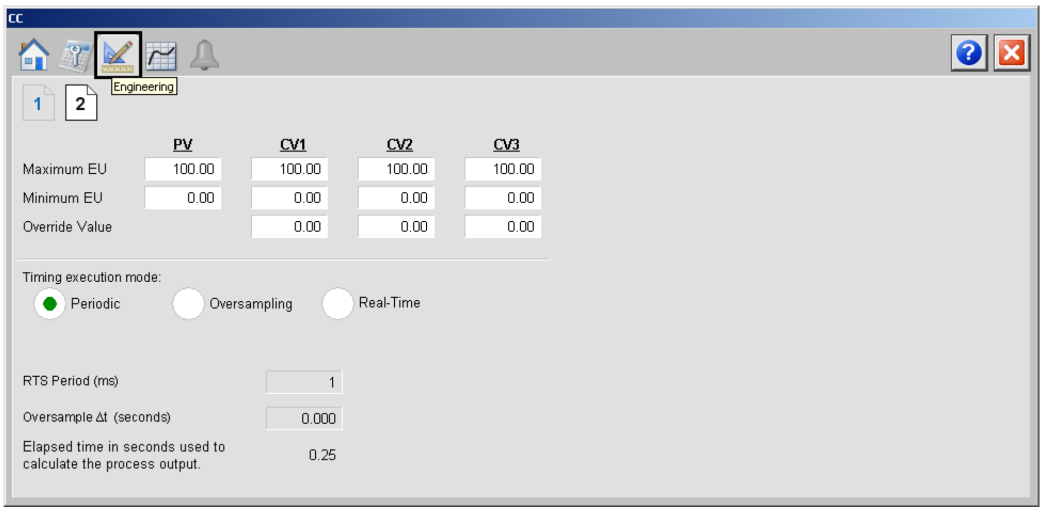
Function	Action	Security	Configuration Parameters
Limit CV in manual Mode	Check to limit the current value when in Manual mode.	Engineering Configuration (Code E)	• .CVManLimiting
Place instruction in Manual mode while CV Initializing is set	Check to set the Loop mode to manual when CV initialization is requested. Clear the checkbox to leave the Loop mode unchanged when initialization is requested. When the initialization request clears, the loop resumes control in its previous Loop mode.		• .ManualAfterInit
Reset Program Inputs after each execution	Check to reset Program inputs after each execution.		• .ProgValueReset
Model Gain units	Select either 'EU' or '%' for the Model Gain units.		• .GainEUSpan
Target Response Time Constant	Type a value for the Target Response Time Constant.		• .TargetRespTC

Table 59 - CC Engineering Tab Page 1 Description

Function	Action	Security	Configuration Parameters
PV Deviation Action Priority: First Second Third	Click to select CV1, CV2, or CV3 to be the first, second, or third to act to compensate for PV-SP deviation.	Engineering Configuration (Code E)	• .Act1stCV • .Act2ndCV • .Act3rdCV

Engineering Tab Page 2

Page 2 of the CC Engineering tab has various Operator inputs/options for the PV, CV, timing execution mode, RTS period, oversample, and time used to calculate output.



The following table shows the functions of page 2 of the CC Engineering tab.

Table 60 - CC Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Maximum/ Minimum EU: PV CV1 CV2 CV3	Type the maximum or minimum scaled value for PV. Type the maximum and minimum value of CV1EU, CV2EU, or CV3EU. These are the values of CV1EU, CV2EU, or CV3EU that correspond to 100% or 0% of CV1, CV2, or CV3.	Engineering Configuration (Code E)	• .PVEUMax • .CV2EUMax • .CV2EUMax • .CV2EUMax • .PVEUMin • .CV2EUMin • .CV2EUMin • .CV2EUMin
Override Value CV1 CV2 CV3	Type the CV1, CV2, or CV3 Override value. CV1, CV2, or CV3 is set to this value when in Override mode.		• .CV1OverrideValue • .CV2OverrideValue • .CV3OverrideValue
Timing execution mode	Click to select the time base execution mode.		• .TimingMode

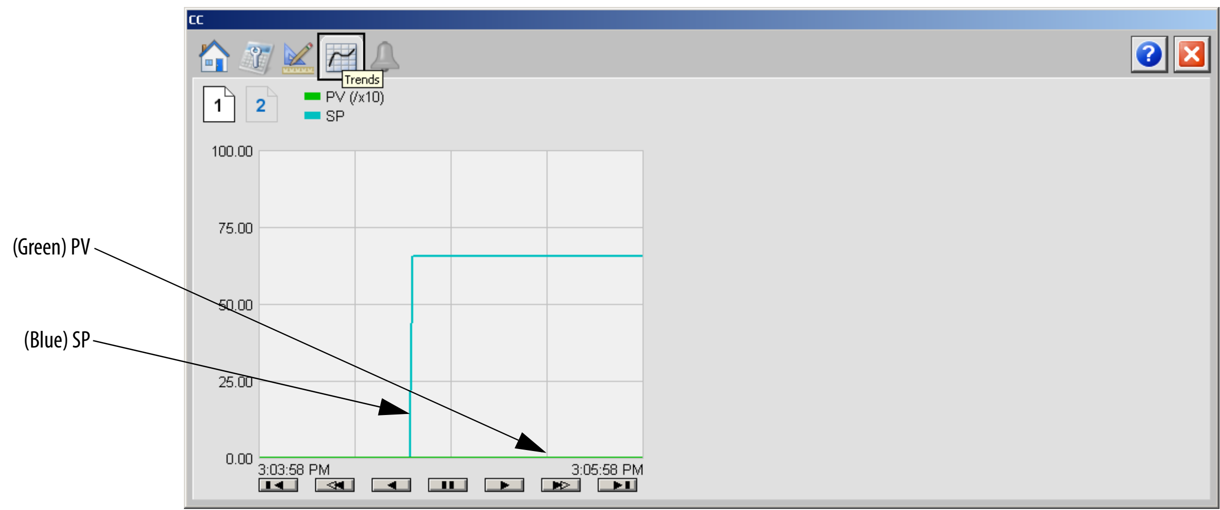
Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.

The Trends tab is divided into two pages.

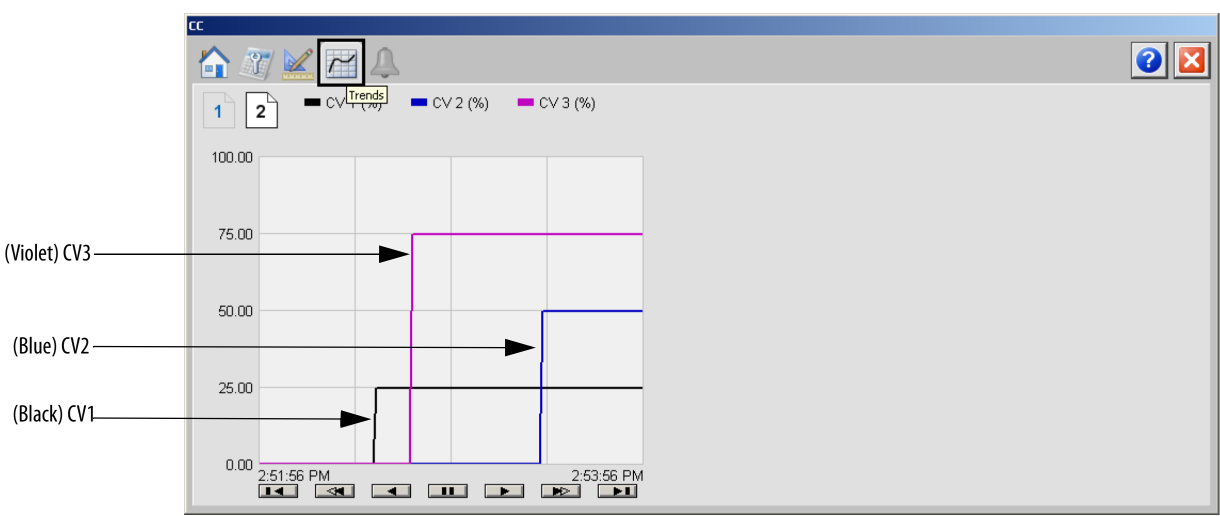
Trends Tab Page 1

Page 1 of the CC Trends tab trends values of PV and SP over time.



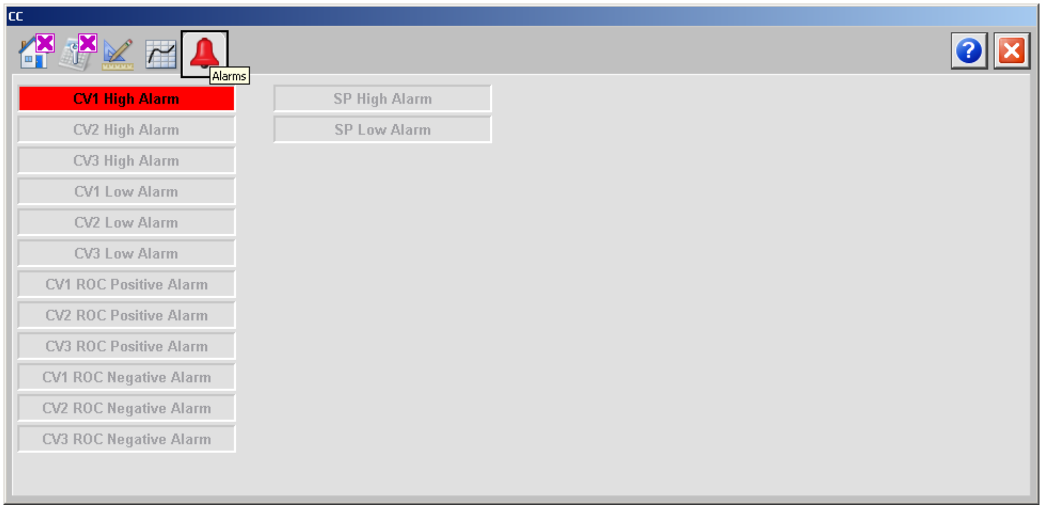
Trends Tab Page 2

Page 2 of the CC Trends tab trends values of CV1, CV2, and CV3 over time.



Alarms Tab

The CC Alarms tab shows all available alarms for the device and their current status.

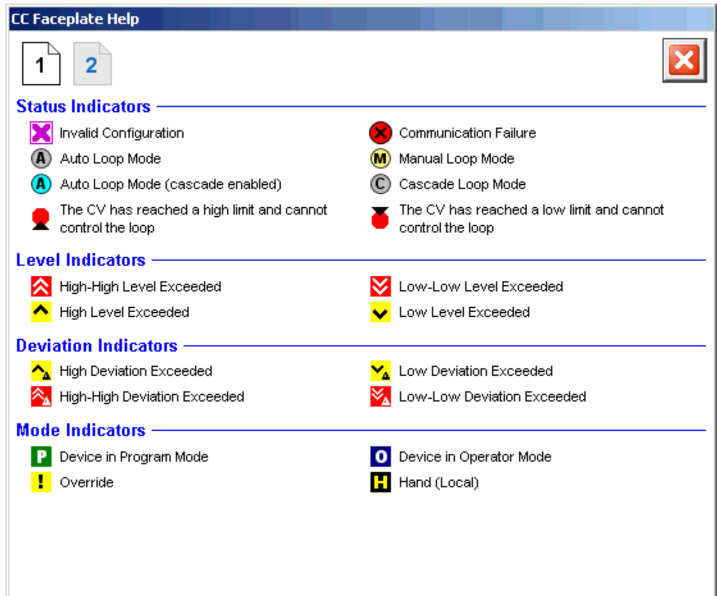


Faceplate Help

The faceplate Help is divided into two pages.

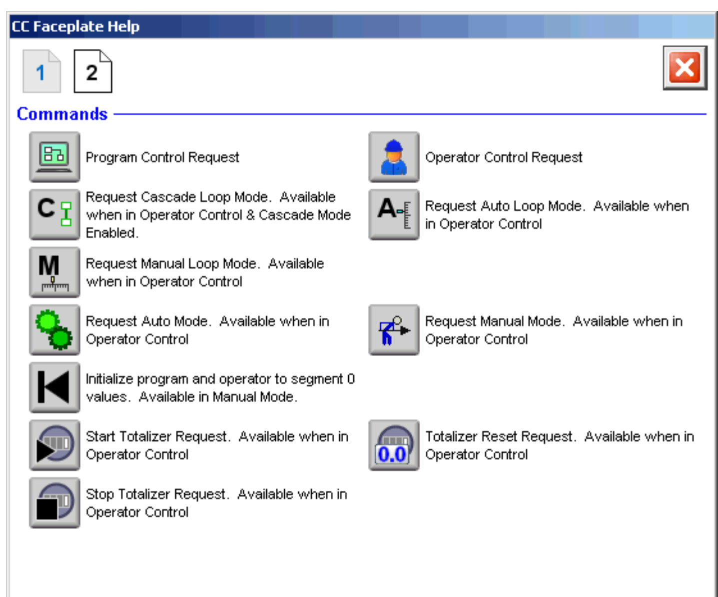
Coordinated Control Faceplate Help Page 1

The Faceplate Help page 1 shows the indicators that are used by the Coordinated Control (CC) faceplate.



Coordinated Control Faceplate Help Page 2

The Faceplate Help page 2 shows the command buttons that are used by the Coordinated Control faceplate.



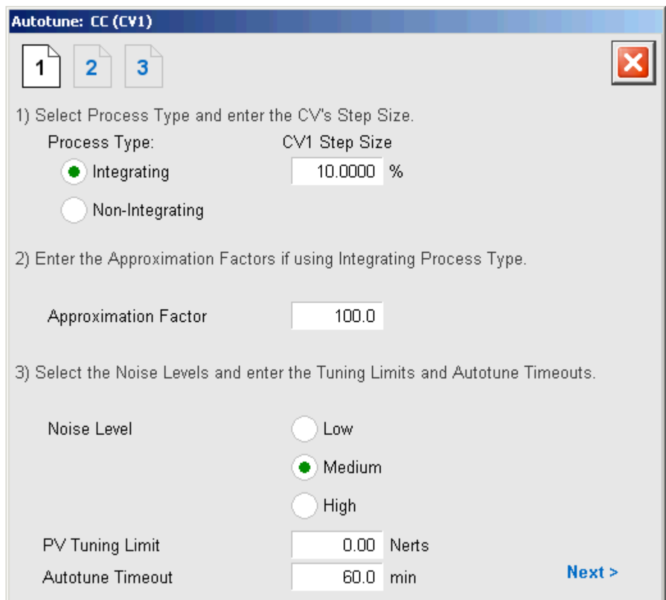
Coordinated Control (CC) Autotune

The faceplates in this section let you access all necessary parameters to autotune the CC function block and hand-tune the instruction.

CC Autotune Page 1

CC Autotune Page 1 shows the following information:

- Process Type
- CV1 Step Size
- Approximation factor
- Noise Level
- PV Tuning Limit
- Autotune Timeout



The following table lists the functions on of CC Autotune page 1.

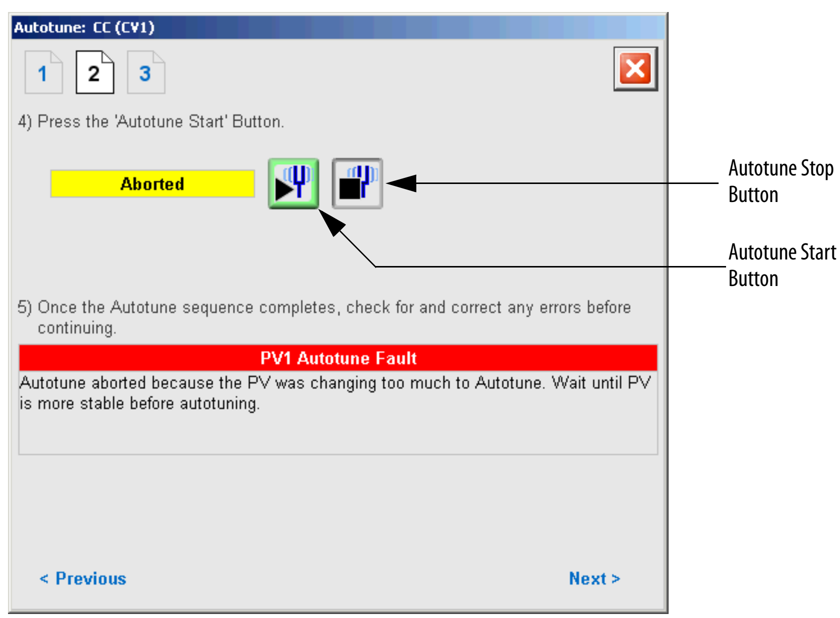
Table 61 - CC Autotune Page 1 Description

Function	Action	Security
Process Type	Click either Integrating or Non-integrating.	Configuration and Tuning Maintenance (Code D)
CV1 Step Size	Type a value for CV1, CV2, or CV3 step size in percent for the tuning step test.	
Approximation Factor	Type a value for the integrating model approximation factor. **IMPORTANT:** You can enter this value only when Integrating is selected as the Process Type.	
Noise Level	Click Low, Medium, or High to set the estimate of the noise level expected on the PV to compensate for it during tuning.	
PV Tuning Limit	Type a value for the PV tuning limit scaled in PV units. When Autotune is running and predicted PV exceeds this limit, the tuning is aborted.	Configuration and Tuning Maintenance (Code D)
Autotune Timeout	Type a value for the maximum time for autotune to complete following the CV step change. When autotune exceeds this time, tuning is aborted.	

CC Autotune Page 2

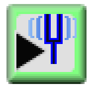
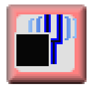
CC Autotune Page 2 shows the following information:

- Autotune Status
- Autotune Fault



The following table lists the functions on of CC Autotune page 2.

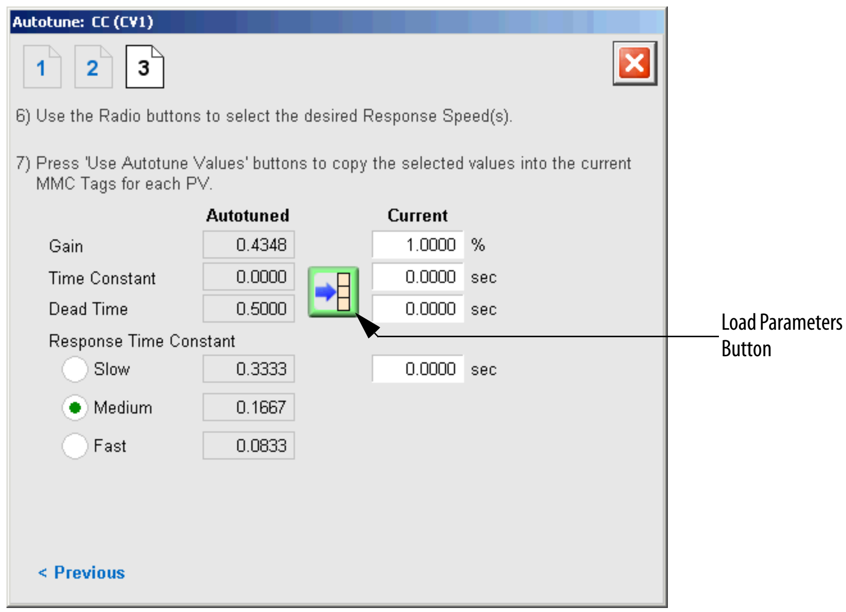
Table 62 - CC Autotune Page 2 Description

Function	Action	Security
	Click to start the autotune process.	Configuration and Tuning Maintenance (Code D)
	Click to abort the autotune process. This button also becomes active if the process is aborted due to an error.	

CC Autotune Page 3

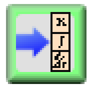
CC Autotune Page 3 shows the following information:

- Autotuned Gain, Time Constant, and Dead Time
- Response Time Constant

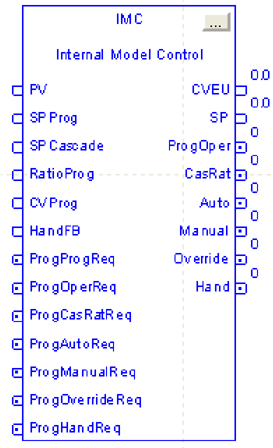


The following table lists the functions on of CC Autotune page 3.

Table 63 - CC Autotune Page 3 Description

Function	Action	Security
	Click to replace the current model parameters with the calculated Autotune model parameters.	Configuration and Tuning Maintenance (Code D)
Current Gain	Type a value for the internal model gain for CV1, CV2, or CV3. Enter a positive or negative gain depending on process direction.	
Current Time Constant	Type a value for CV1, CV2, or CV3 internal model time constant in seconds.	
Current Dead Time	Type a value for CV1, CV2, or CV3 internal model deadtime in seconds.	
Current Response Time Constant	Type a value for the tuning parameter that determines the speed of the control variable action for CV1, CV2, or CV3 in seconds	

Internal Model Control (IMC)



The Internal Model Control (IMC) function block controls one process variable by manipulating one control-variable output. This function block performs an algorithm where the actual error signal is compared against that of an internal first-order lag plus deadtime model of the process. The IMC function block calculates the control variable output (CV) in the Auto mode based on the PV - SP deviation, internal model, and tuning.

Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT	The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables: • Images • Global Objects • Standard Displays • HMI Tags • Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 64 - IMC Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 65 - IMC Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build process graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 66 - IMC Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Built-In IMC Autotune-Faceplate	(RA-BAS-ME) Built-In IMC Autotune-Faceplate	The faceplate display used for the Autotune object.
(RA-BAS) Built-In IMC Faceplate	(RA-BAS-ME) Built-In IMC Faceplate	The faceplate display used for the IMC object.
(RA-BAS) Built-In IMC Quick	(RA-BAS-ME) Built-In IMC Quick	The Quick display used for the IMC object.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

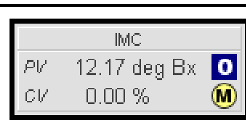
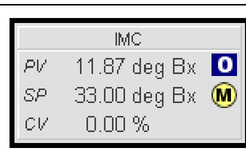
Table 67 - IMC Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix® system, aid consistency and save engineering time.

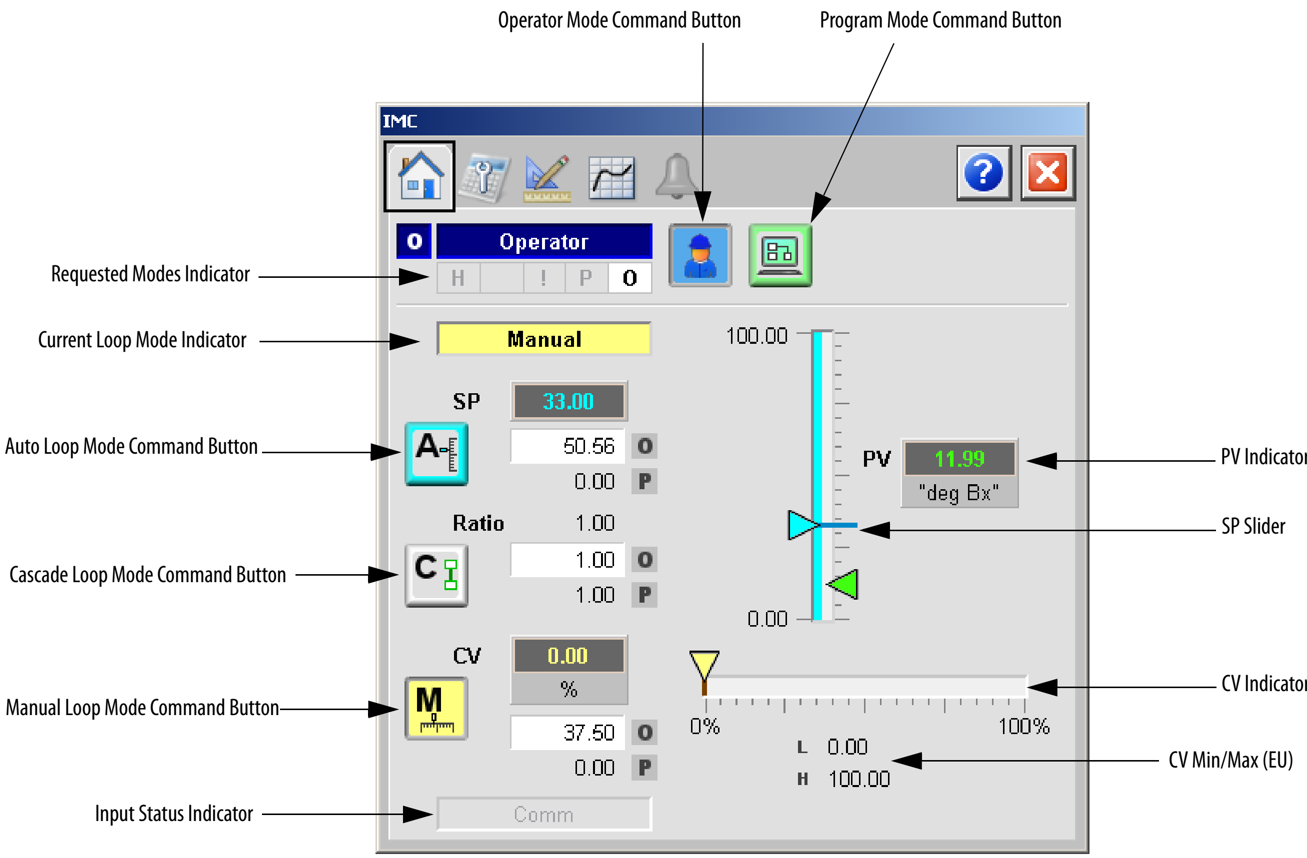
Table 68 - Internal Model Control (IMC) Display Elements Descriptions

Display Element Name	Display Element	Description
GO_BuiltIn_IMC		Internal Model Control object with a Process Variable and a Control Variable.
GO_BuiltIn_IMC2		Internal Model Control object with a Process Variable, Setpoint, and a Control Variable.

Operator Tab

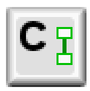
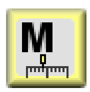
The IMC faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

The IMC Operator tab shows the following information:
- Requested modes indicator
- Current ratio multiplier
- Current Program multiplier
- Current Process Variable and bar graph
- Current Control Variable and bar graph
- Current Set Point
- High (H) and Low (L) clamping limits for the PV
- Input Status (Communications OK, Communications Fail, Bad PV Quality, or Uncertain PV Quality)



The following table lists the functions on of the Operator tab.

Table 69 - IMC Operator Tab Description

Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
	Click to request Auto Loop mode.	Normal Operation of Devices (Code A)
Operator Setpoint Value	Type the SP Operator value, scaled in PV units. SP is set to this value when in Operator control.	
	Click to request Cascade Loop mode. **IMPORTANT:** This button is available only if 'Allow Cascade/Ratio Mode' on page 1 of the Engineering tab is checked. (See Engineering Tab Page 1 on page 234.)	
Operator CV value (CV1, CV2, and CV3)	Type a value for CV Operator Manual value. CV is set to this value when in Operator control and Manual mode.	
	Click to request Manual Loop mode.	Normal Operation of Devices (Code A)
Operator Ratio Value	Type a value for the Ratio Operator multiplier. Ratio is set to this value when in Operator control.	
CV Slider (CV1, CV2, and CV3)	Move this slider to adjust the loop CV output.	Equipment Maintenance (Code C)
SP Slider	Move this slider to adjust the loop setpoint.	

Maintenance Tab

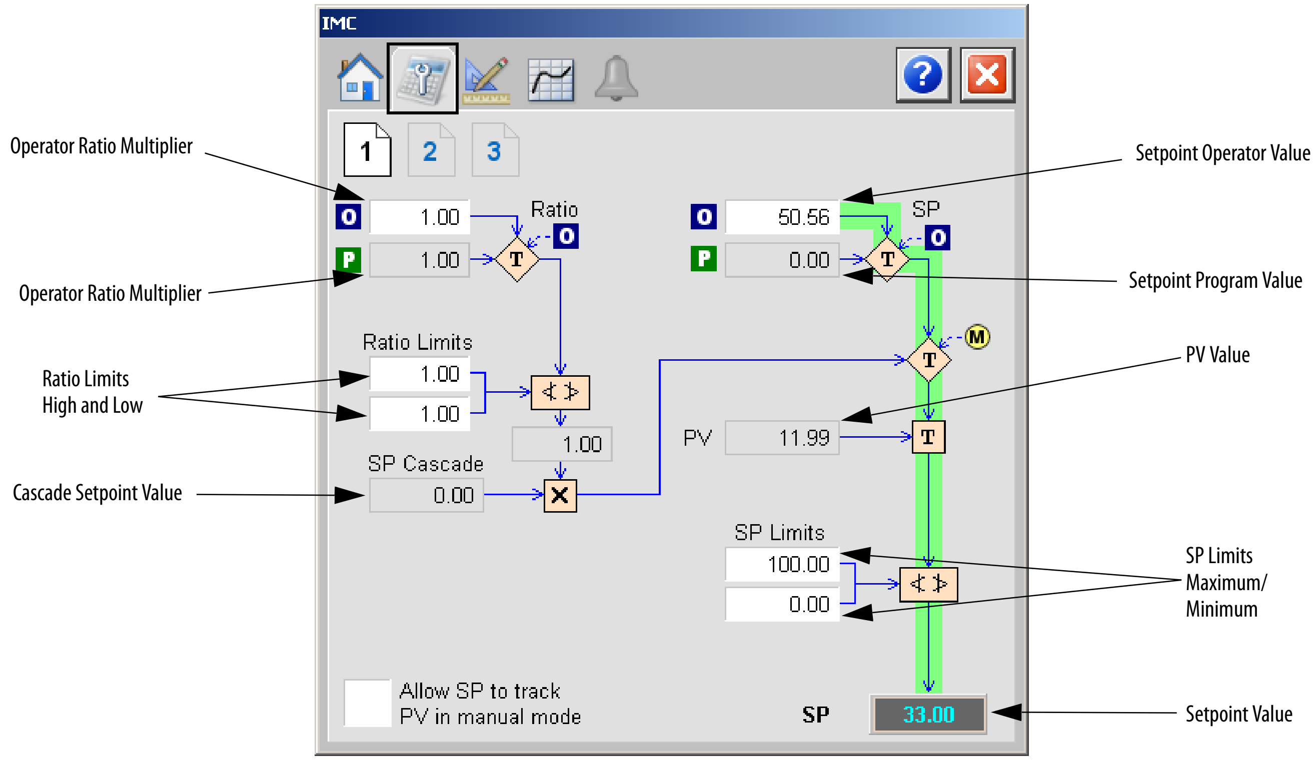
Maintenance personnel use the information and controls on the IMC Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The IMC Maintenance tab is divided into three tabs.

Maintenance Tab Page 1

Page 1 of the IMC Maintenance tab shows the following information:

- The ratio Program multiplier
- The Cascade setpoint value in PV units
- The setpoint Program value in PV units
- The PV value
- The setpoint value in PV units



The following table shows the functions of page 1 of the IMC Maintenance tab.

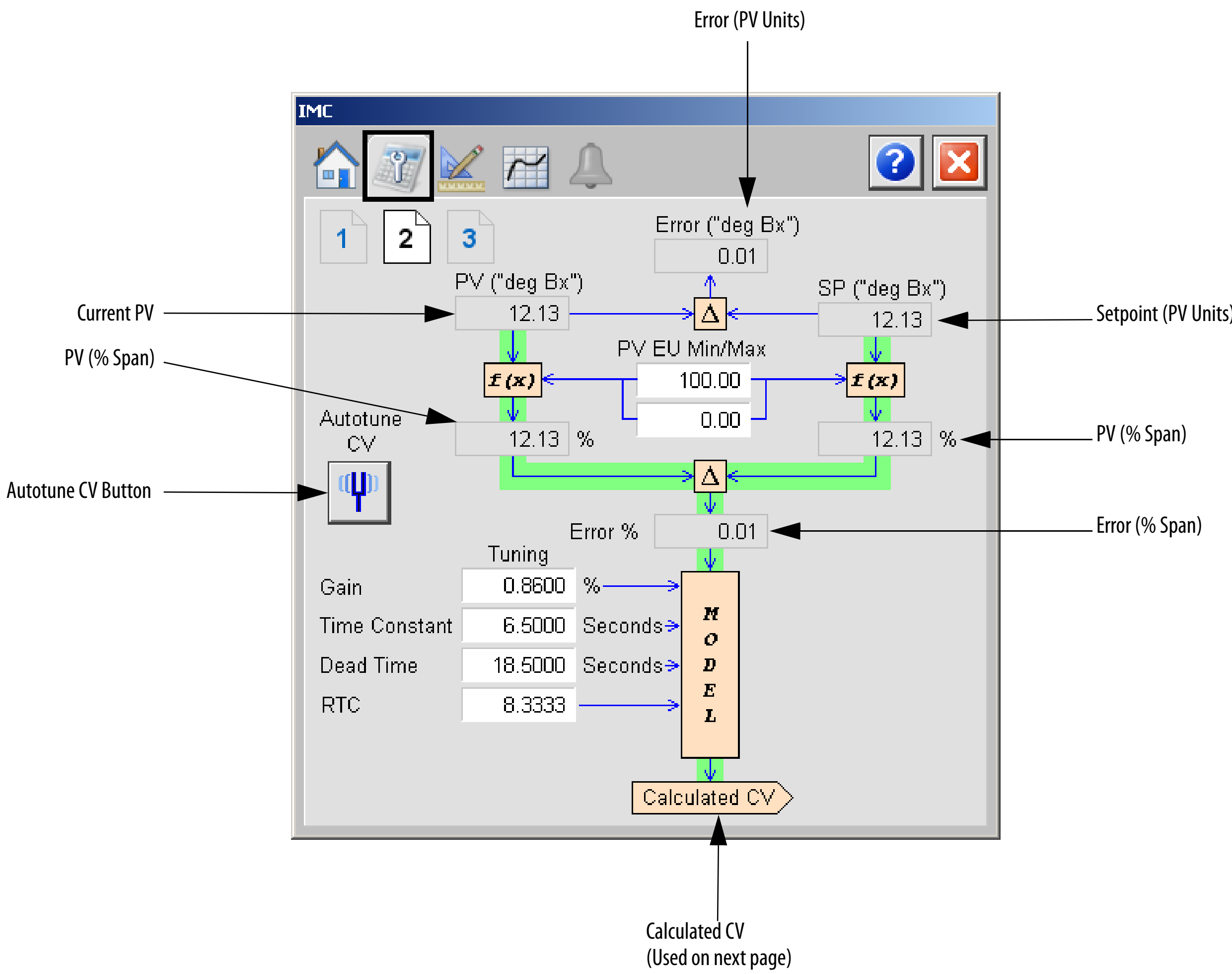
Table 70 - IMC Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Operator Ratio Multiplier	Type a value for the Ratio Operator multiplier. Ratio is set to this value when in Operator control.	Normal Operation of Devices (Code A)	• .RatioOper
Ratio Limits High and Low	Type a value for the Ratio high and low limits. These parameters limit the value of Ratio obtained from RatioProg or RatioOper.	Configuration and Tuning Maintenance (Code D)	• .RatioHLimit • .RatioLLimit
Operator Setpoint	Type a value for the SP Operator value, scaled in PV units. SP is set to this value when in Operator control.	Normal Operation of Devices (Code A)	• .SPOper
SP Limits	Type the SP maximum and minimum limits.	Configuration and Tuning Maintenance (Code D)	• .SPHLimit • .SPLLimit
Allow SP to track PV in manual mode	Click to enable CV Tracking when autotune is OFF. This parameter is ignored in Hand and Override mode.	Equipment Maintenance (Code C)	• .PVTracking

Maintenance Tab Page 2

Page 2 of the Maintenance tab shows the following information:

- Error value in PV units
- Current process variable (PV)
- Setpoint value in PV units
- PV (percent of span)
- PV(percent of span)
- Error (percent of span)

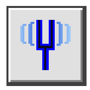


The following table shows the functions of page 2 of the IMC Maintenance tab.

Table 71 - IMC Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
PV EU Min/Max	Type the minimum or maximum limits for the PV in engineering units.	Engineering Configuration (Code E)	• .PVEUMax • .PVEUMin

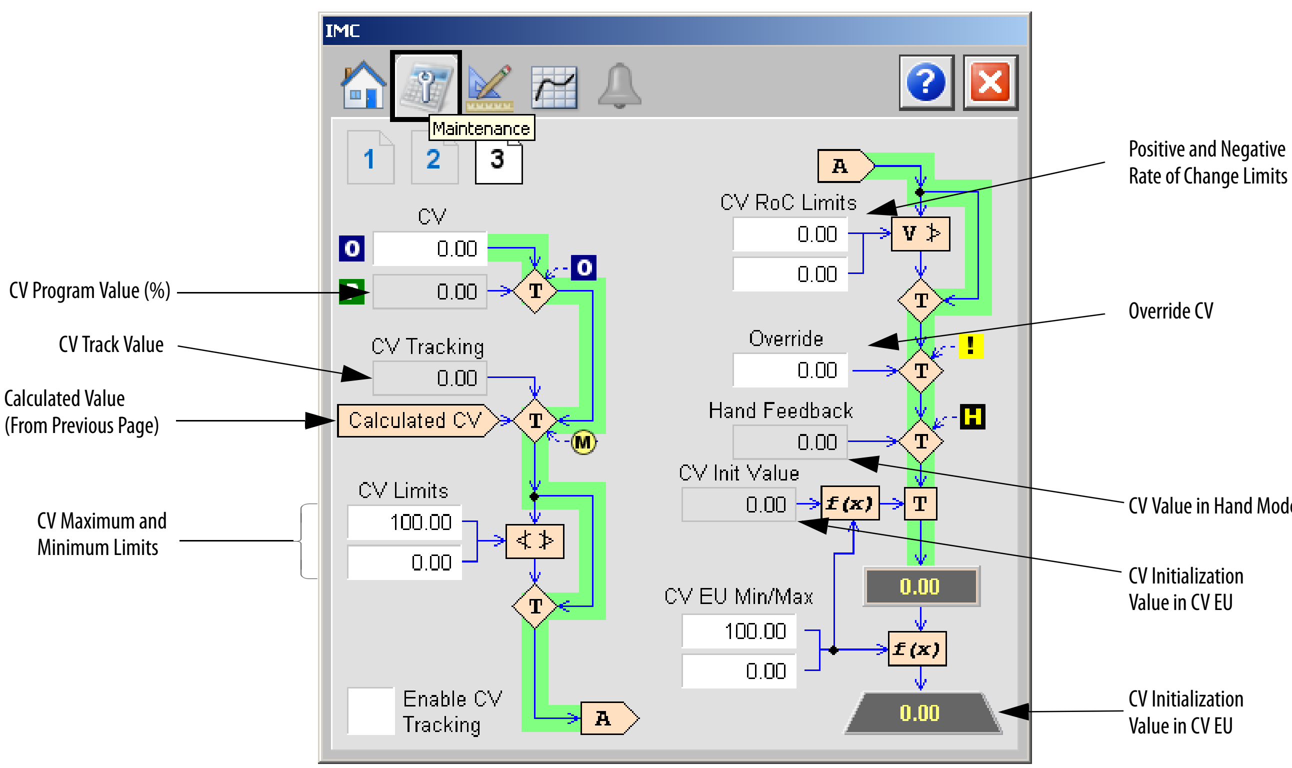
Table 71 - IMC Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Gain	Type a value for the internal model gain. Enter a positive or negative gain depending on process direction.	Configuration and Tuning Maintenance (Code D)	• .ModelGain
Time Constant	Type a value for the internal model Time Constant in seconds.		• .ModelTC
Dead Time	Type a value for the internal model Deadtime in seconds.		• .ModelDT
RTC	Type a value for the tuning parameter that determines the speed of the control variable action in seconds.		• .RespTC
	Click to open the CV Autotune faceplate.	None	None

Maintenance Tab Page 3

Page 3 of the IMC Maintenance tab shows the following information:

- Calculated CV (from Maintenance page 2)
- CV Program value in percent
- CV track value
- CV value in Hand mode
- CV initialization value in CV engineering units
- CV in engineering units



The following table shows the functions of page 3 of the IMC Maintenance tab.

Table 72 - IMC Maintenance Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Operator CV Value (%)	CV Operator-Manual value in percent. CV is set to this value when in Operator control and Manual mode.	Normal Operation of Devices (Code A)	• .CVOper
CV High Limit CV Low Limit	Type values for the CV high and low limits. It is also used for limiting CV when in Auto or CascadeRatio modes or Manual mode if CVManLimiting is **true**.	Configuration and Tuning Maintenance (Code D)	• .CVHLimit • .CVLLimit
CV Rate of Change Positive Limit CV Rate of Change Negative Limit	CV increasing or decreasing rate of change limit, in percent per second. The rate of change limiting is used only when in Auto or CascadeRatio modes or Manual mode if CVManLimiting is **true**. A value of zero disables CV ROC limiting.		• .CVROCPosLimit • .CVROCNegLimit
Override	Type the value for the CV Override value. CV is set to this value when in Override mode.		• .CVOverrideValue
CV EU Maximum CV EU Minimum	Type the maximum or minimum value for CVEU scaling. This the value of CVEU that corresponds to 100% or 0% CV respectively.	Engineering Configuration (Code E)	• .CVEUMax • .CVEUMin
Enable CV Tracking	Check to enable CV Tracking when autotune is OFF. This parameter is ignored in Hand and Override mode.	Equipment Maintenance (Code C)	• .CVTrackReq

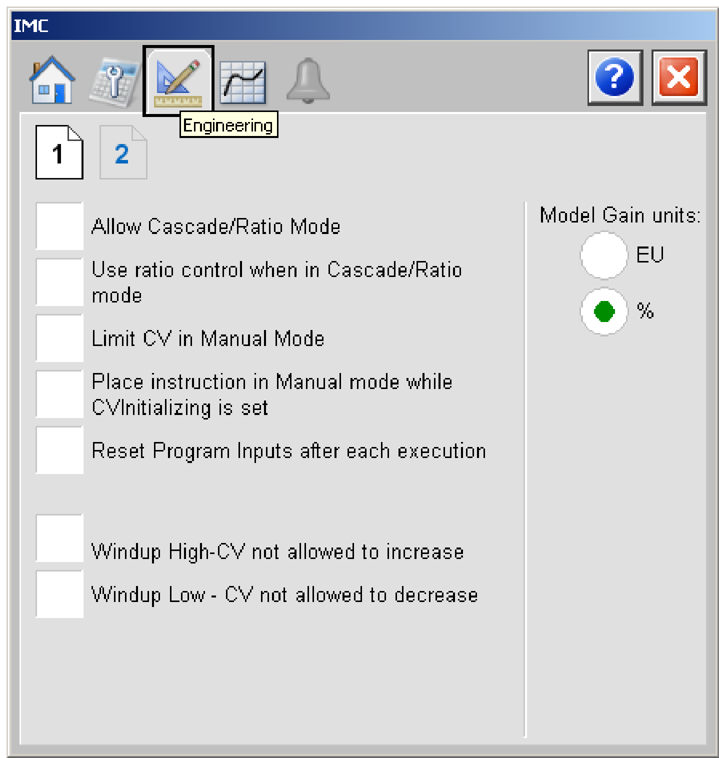
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages.

Engineering Tab Page 1

Page 1 of the Engineering tab has various Operator inputs/options for the CV, Cascade/Ratio mode, and Windup CV.



The following table shows the functions of page 1 of the IMC Engineering tab.

Table 73 - IMC Engineering Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Allow Cascade/ Ratio Mode	Check if Cascade/Ratio mode is to be used. **IMPORTANT:** Checking this option displays the Cascade button on the Operator tab. (See Operator Tab on page 228.)	Engineering Configuration (Code E)	• .AllowCasRat

Table 73 - IMC Engineering Tab Page 1 Description

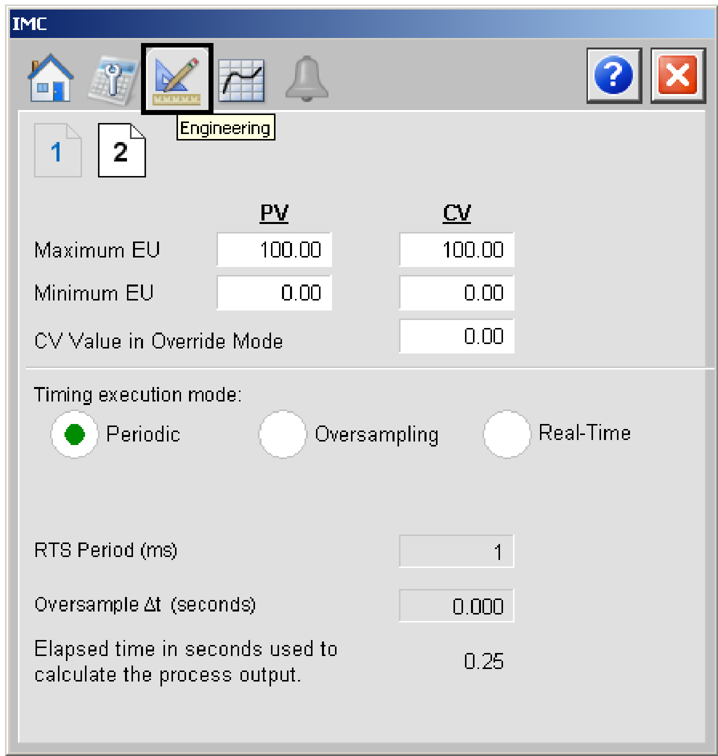
Function	Action	Security	Configuration Parameters
Use ratio control when in Cascade/ Ratio mode	Check to enable ratio control when in CascadeRatio mode. **IMPORTANT:** Checking this option displays the current ratio multiplier, Operator ratio multiplier, and Program ratio multiplier on the Operator tab. (See Operator Tab on page 228.) Checking this option also displays the Cascade/Ratio portion of the SAMA diagram on page 1of the Maintenance tab. (See Maintenance Tab Page 1 on page 229.)	Engineering Configuration (Code E)	• .UseRatio
Limit CV in manual Mode	Check to limit the CV while in Manual mode.		• .CVManLimiting
Place instruction in Manual mode while CV Initializing is set	Check to set the Loop mode to manual when CV initialization is requested. Clear the checkbox to leave the Loop mode unchanged when initialization is requested. When the initialization request clears, the loop resumes control in its previous Loop mode.		• .ManualAfterInit
Reset Program Inputs after each execution	Check to reset Program inputs after each execution.		• .ProgValueReset
Model Gain units	Select either 'EU' or '%' for the Model Gain units.		• .GainEUSpan
Windup High - CV not allowed to increase	Check so that CV cannot increase in value.		• .WindupHIn
Windup Low - CV not allowed to decrease	Check so that CV cannot decrease in value.		• .WindupLIn

Engineering Tab Page 2

Page 2 of the Engineering tab has various Operator inputs/options for the PV, CV, and Timing Execution mode.

The following values are displayed:

- RTS period
- Oversample delta-t
- Time used to calculate output.



The following table shows the functions of page 2 of the IMC Engineering tab.

Table 74 - IMC Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Maximum/ Minimum EU: PV CV	Type the maximum or minimum scaled value for PV. Type the maximum and minimum value of CV. This is the value of CVEU that corresponds to 100% or 0% of CV.	Engineering Configuration (Code E)	• .PVEUMax • .CVEUMax • .PVEUMin • .CVEUMin
CV Value in Override Mode	Type the CV Override value. CV is set to this value when in Override mode.		• .CVOverrideValue
Timing execution mode	Click to select the time base execution mode.		• .TimingMode

Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.

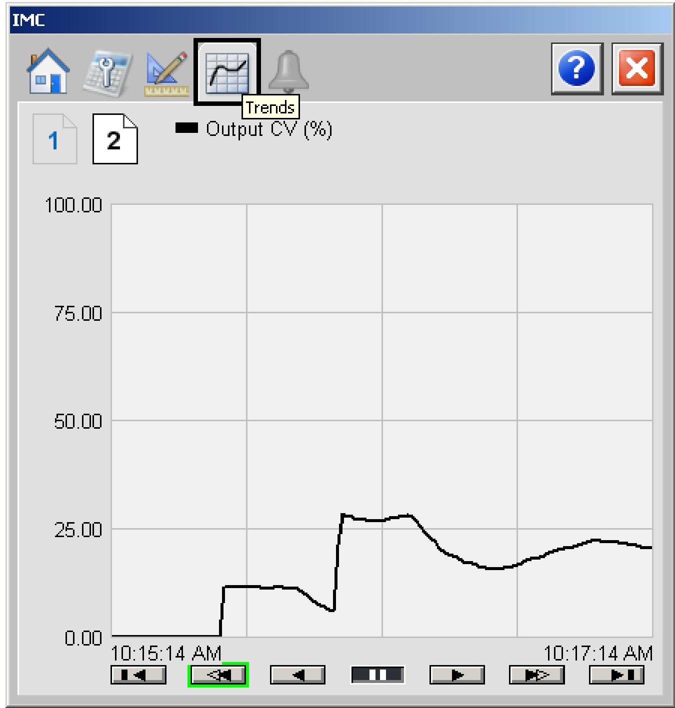
The Trends tab is divided into two pages.

Trends Tab Page 1

Page 1 of the IMC Trends tab shows the relationship between PV and SP for the same time frame of a process.

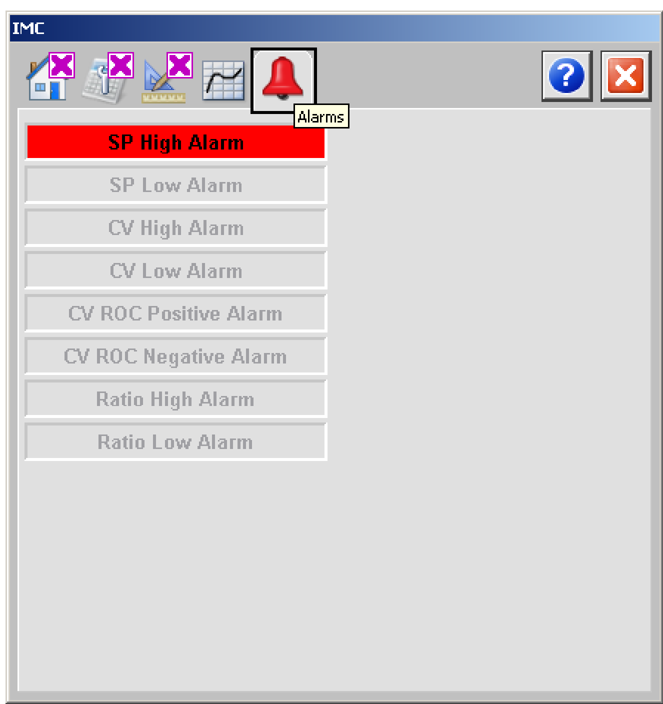
Trends Tab Page 2

Page 2 of the IMC Trends tab shows the output CV waveform.



Alarms Tab

The IMC Alarms tab shows all available alarms for the device.



Faceplate Help

The Faceplate Help for the Internal Model Control (IMC) faceplate is the same as for the Coordinated Control (CC) faceplate.

See Faceplate Help on page 221 for more information.

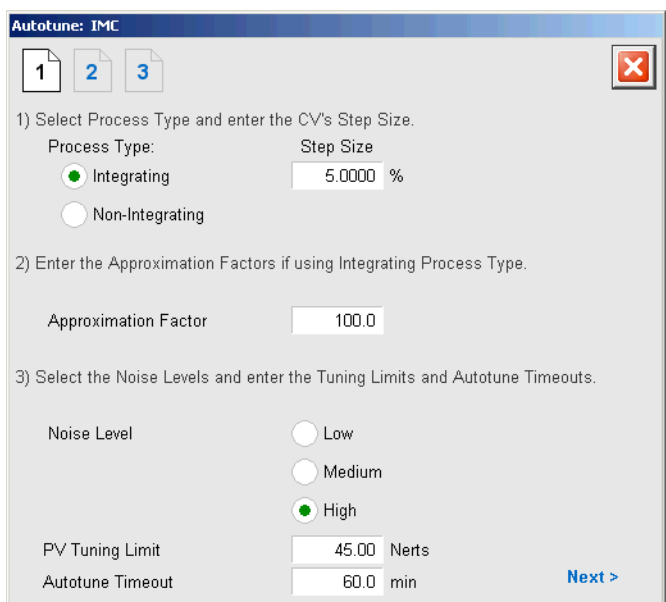
Internal Model Control (IMC) Autotune

The faceplates in this section let you access all necessary parameters to autotune the IMC function block and hand-tune the instruction.

IMC Autotune Page 1

IMC Autotune page 1 shows the following information:

- Process Type
- Step Size (%)
- Approximation Factor
- Noise Level (low, medium, and high)
- FV Tuning Limit
- Autotune Timeout



The following table lists the functions on of the IMC Autotune page 1.

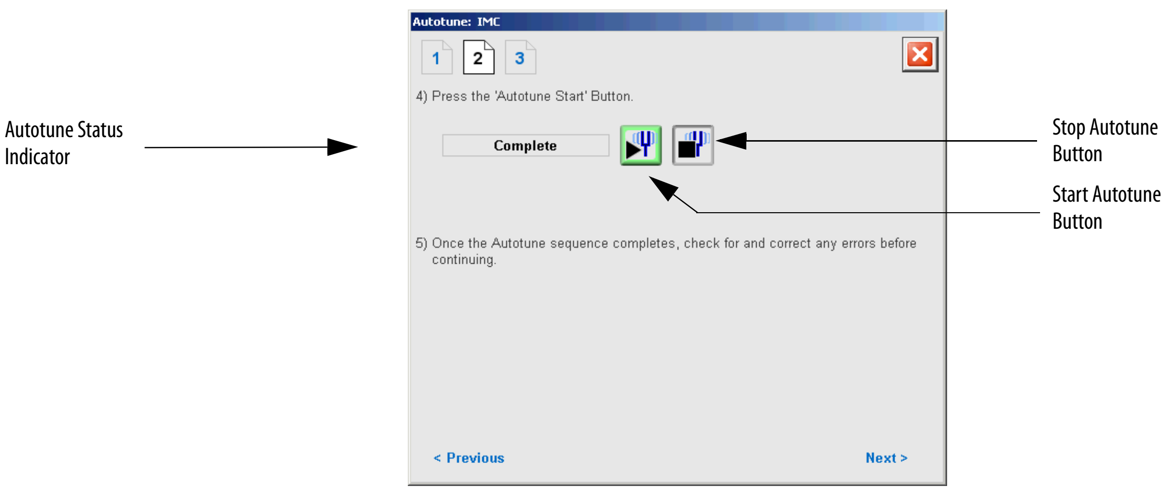
Table 75 - IMC Autotune Page 1 Description

Function	Action	Security
Process Type	Click either Integrating or Non-integrating.	Configuration and Tuning Maintenance (Code D)
Approximation Factor	Type a value for the non-integrating model approximation factor. **IMPORTANT:** You can enter this value only when Integrating is selected as the Process Type.	
CV Step Size (%)	Type a value for CV1, CV2, or CV3 step size in percent for the tuning step test.	
Noise Level	Click Low, Medium, or High to set the estimate of the noise level expected on the PV to compensate for it during tuning.	Configuration and Tuning Maintenance (Code D)
PV Tuning Limit	Type a value for the PV tuning limit scaled in PV units. When Autotune is running and predicted PV exceeds this limit, the tuning is aborted.	
Autotune Timeout	Type a value for the maximum time for autotune to complete following the CV step change. When autotune exceeds this time, tuning is aborted.	

IMC Autotune Page 2

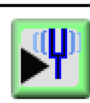
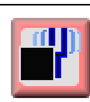
IMC Autotune page 2 shows the following information:

- Autotune Status
- Start and Stop Autotune buttons



The following table lists the functions on of IMC Autotune page 2.

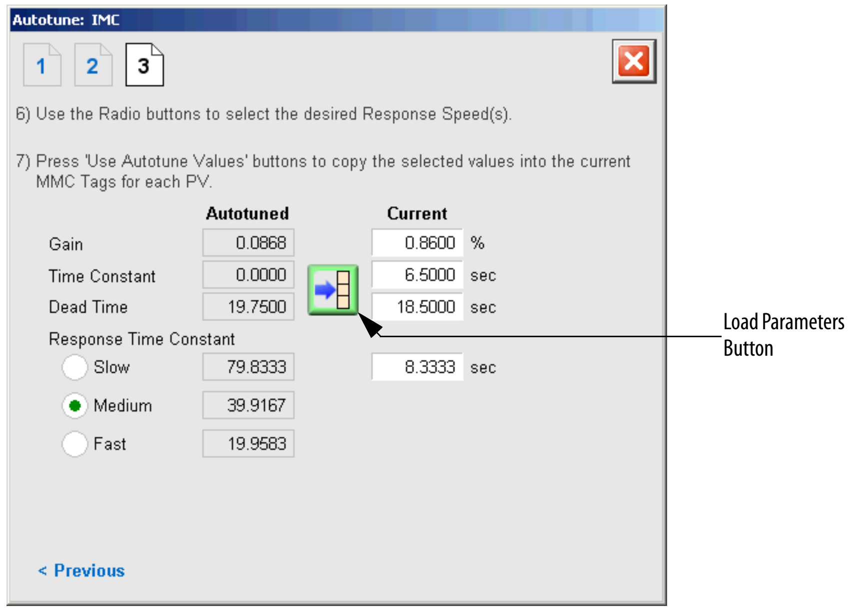
Table 76 - IMC Autotune Page 2 Description

Function	Action	Security
	Click to start the autotune process.	Configuration and Tuning Maintenance (Code D)
	Click to abort the autotune process. This button also becomes active if the process is aborted due to an error.	

IMC Autotune Page 3

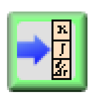
IMC Autotune page 3 shows the following information:

- Autotune Status
- Start and Stop Autotune buttons



The following table lists the functions on of IMC Autotune page 3.

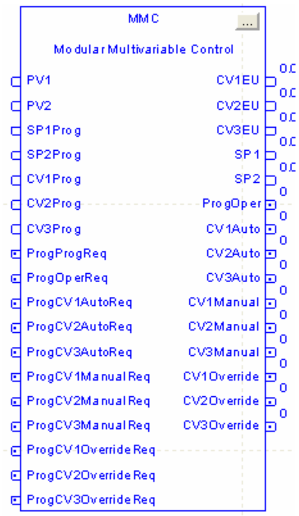
Table 77 - IMC Autotune Page 3 Description

Function	Action	Security
	Click to replace the current model parameters with the calculated Autotune model parameters.	Configuration and Tuning Maintenance (Code D)
Current Gain	Type a value for the internal model gain. Enter a positive or negative gain depending on process direction.	
Current Time Constant	Type a value for the internal model time constant in seconds.	
Current Dead Time	Type a value for the internal model deadtime in seconds.	
Current Response Time Constant	Type a value for the tuning parameter that determines the speed of the control variable action in seconds	

Modular Multivariable Control (MMC)

The Modular Multivariable Control (MMC) function block controls two process variables to their setpoints manipulating up to three control variables. The MMC function block calculates the control variables (CV1, CV2, and CV3) in the Auto mode based on the PV1 - SP1, PV2 - SP2 deviation, internal model, and tuning. The MMC function block is a flexible model-based algorithm that can be used in two basic configuration modes:

- Three control variables used to control two interacting process variables
- Two control variables used to control two interacting process variables



Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 78 - MMC Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 79 - MMC Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build process graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.

Table 79 - MMC Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 80 - MMC Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Built-In MMC Autotune-Faceplate	(RA-BAS-ME) Built-In MMC Autotune-Faceplate	The faceplate display used for the Autotune object.
(RA-BAS) Built-In MMC Faceplate	(RA-BAS-ME) Built-In MMC Faceplate	The faceplate display used for the MMC object.
(RA-BAS) Built-In MMC Quick	(RA-BAS-ME) Built-In MMC Quick	The Quick display used for the MMC object.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

Table 81 - MMC Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 82 - Modular Multivariable Control (MMC) Display Elements Descriptions

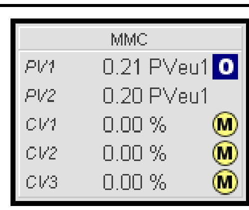
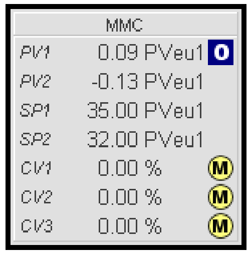
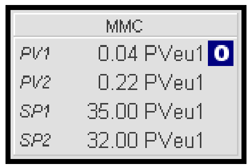
Display Element Name	Display Element	Description
GO_BuiltIn_MMC		Modular Multivariable Control object with two process variables and three control variables.

Table 82 - Modular Multivariable Control (MMC) Display Elements Descriptions

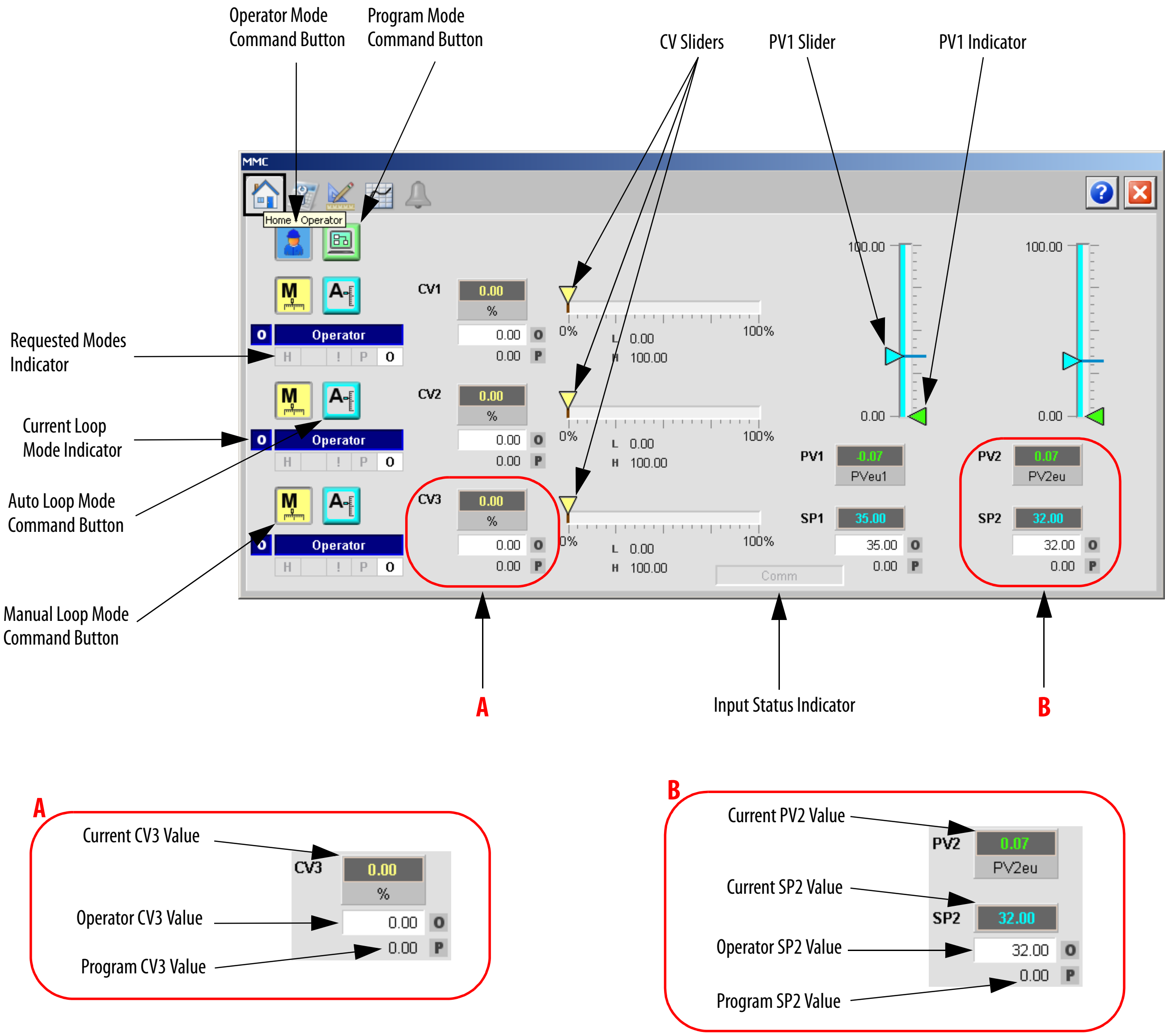
Display Element Name	Display Element	Description
GO_BuiltIn_MMC1		Modular Multivariable Control object with two process variables, two setpoints, and three control variables.
GO_BuiltIn_MMC2		Modular Multivariable Control object with two process variables and two setpoints.

Operator Tab

The faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

The MMC Operator tab shows the following information:

- Requested modes indicator for CV1, CV2, and CV3
- Current mode indicator for CV1, CV2, and CV3
- Current process variable (PV1 and PV2) and bar graph
- Current CV (CV1, CV2, and CV3)
- Program CV (CV1, CV2, and CV3) and bar graph for each
- Current setpoint for PV1 and PV2
- Program setpoint for PV1 and PV2



The following table lists the functions on of the MMC Operator tab.

Table 83 - MMC Operator Tab Description

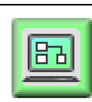
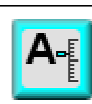
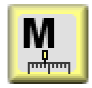
Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
	Click to request Auto Loop mode.	Normal Operation of Devices (Code A)

Table 83 - MMC Operator Tab Description

Function	Action	Security
	Click to request Manual Loop mode.	Normal Operation of Devices (Code A)
Operator CV Value (CV1, CV2, and CV3)	Type a value for CV1, CV2, or CV3.	
CV Slider (CV1, CV2, and CV3)	Move this slider to adjust the loop CV output.	Equipment Maintenance (Code C)
Operator Setpoint Value (SP1 and SP2	Type a value for the loop Setpoint.	Normal Operation of Devices (Code A)
PV Slider (PV1 and PV2)	Move this slider to adjust the loop PV value.	Equipment Maintenance (Code C)

Maintenance Tab

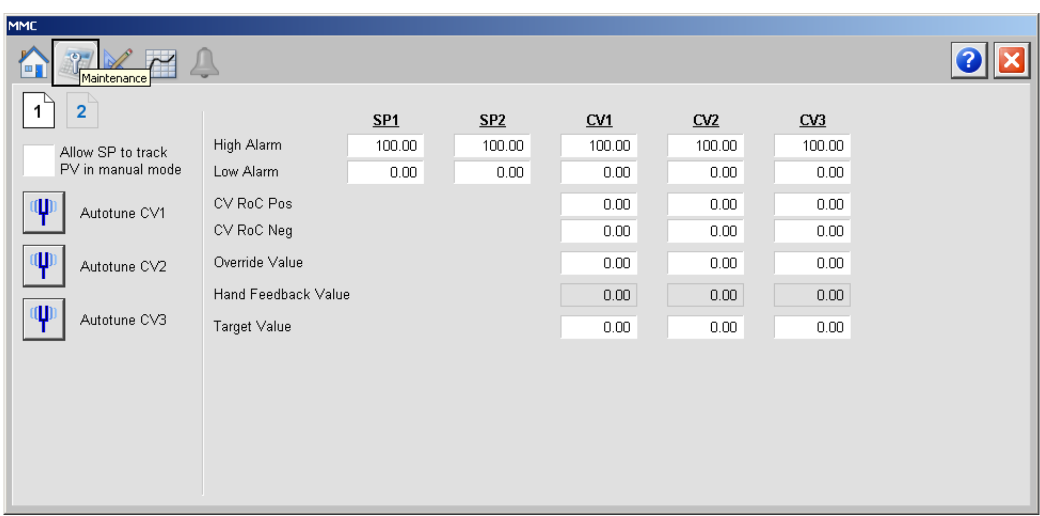
Maintenance personnel use the information and controls on the MMC Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The MMC Maintenance tab is divided into two tabs.

Maintenance Tab Page 1

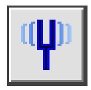
Page 1 of the MMC Maintenance tab shows the following information:

- The Hand feedback value
- Autotune buttons for CV1, CV2, and CV3
- High and low alarms
- Operator inputs for high and low alarms, positive and negative rate of change, override, and target value



The following table shows the functions of page 1 of the Maintenance tab.

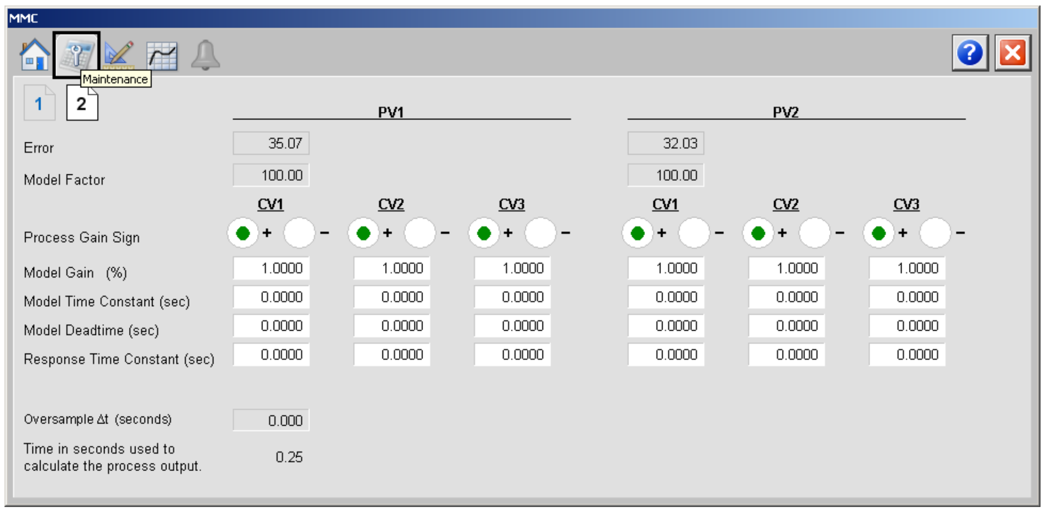
Table 84 - MMC Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Allow SP to track PV in manual mode	Check to enable SP to track PV. This is ignored when in Auto modes. SP tracks PV only when all three outputs are in manual. As soon as any output returns to Auto, PVTracking stops.	Equipment Maintenance (Code C)	• .PVTracking
	Click to show the Autotune (CV1, CV2, or CV3) Operator faceplate.	None	None
Operator High Alarm	Type the High alarm value for SP1, SP2, CV1, CV2, or CV3.	Configuration and Tuning Maintenance (Code D)	• .SP1HLimit • .SP2HLimit • .CV1HLimit • .CV2HLimit • .CV3HLimit
Operator Low Alarm	Type the Low alarm limit value for SP1, SP2, CV1, CV2, or CV3.		• .SP1LLimit • .SP2LLimit • .CV1LLimit • .CV2LLimit • .CV3LLimit
CV Rate of Change Positive	Type the positive Rate of Change limit value for CV1, CV2, or CV3. Rate of change limiting is used only when in Auto mode or in Manual mode if CVManLimiting is **true**. A value of zero disables CV1 ROC limiting.		• .CV1ROCPosLimit • .CV2ROCPosLimit • .CV3ROCPosLimit
CV Rate of Change Negative	Type the negative Rate of Change limit value for CV1, CV2, or CV3. Rate of change limiting is used only when in Auto mode or in Manual mode if CVManLimiting is **true**. A value of zero disables CV2 ROC limiting.		• .CV1ROCNegLimit • .CV2ROCNegLimit • .CV3ROCNegLimit
Override Value	Type the Override value for CV1, CV2, or CV3. CV1, CV2, or CV3 is set to this value when in the Override mode.		• .CV1OverrideValue • .CV2OverrideValue • .CV3OverrideValue
Target Value	Type the Target value for CV1, CV2, or CV3 output.		• .CV1Target • .CV2Target • .CV3Target

Maintenance Tab Page 2

Page 2 of the MMC Maintenance tab shows the following information:

- Error value for PV1 and PV2
- Model factor for PV1 and PV2
- Oversample Δt (seconds)
- Time in seconds used to calculate the process output
- Operator inputs for process gain time, model gain, model time constant, model dead time, and response time constant



The following table shows the functions of page 2 of the MMC Maintenance tab.

Table 85 - MMC Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Process Gain Sign	Click to select '+' or '-' as the Process Gain sign for PV1: CV1, CV2, or CV3, PV2: CV1, CV2, or CV3. This is used only for Autotune and is the sign of the process gain (ΔPV1/ΔCV1).	Engineering Configuration (Code E)	• .CV1PV1ProcessGainSign • .CV2PV1ProcessGainSign • .CV3PV1ProcessGainSign • .CV1PV2ProcessGainSign • .CV2PV2ProcessGainSign • .CV3PV2ProcessGainSign
Model Gain (%)	Type the Operator model gain for PV1: CV1, CV2, or CV3, PV2: CV1, CV2, or CV3. This is the internal model gain for CV# - PV#. enter a positive or negative gain depending on the process direction.	Configuration and Tuning Maintenance (Code D)	• .CV1PV1ModelGain • .CV2PV1ModelGain • .CV3PV1ModelGain • .CV1PV2ModelGain • .CV2PV2ModelGain • .CV3PV2ModelGain
Model Time Constant (seconds)	Type the internal model time constant for PV1: CV1, CV2, or CV3, PV2: CV1, CV2, or CV3 in seconds.		• .CV1PV1ModelTC • .CV2PV1ModelTC • .CV3PV1ModelTC • .CV1PV2ModelTC • .CV2PV2ModelTC • .CV3PV2ModelTC

Table 85 - MMC Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Model Deadtime	Type the internal model deadtime for PV1: CV1, CV2, or CV3, PV2: CV1, CV2, or CV3 in seconds.	Configuration and Tuning Maintenance (Code D)	• .CV1PV1ModelDT • .CV2PV1ModelDT • .CV3PV1ModelDT • .CV1PV2ModelDT • .CV2PV2ModelDT • .CV3PV2ModelDT
Response Time Constant (seconds)	Type the internal Response time constant for PV1: CV1, CV2, or CV3, PV2: CV1, CV2, or CV3. This is the tuning parameter that determines the speed of the control variable action for CV# - PV# in seconds.		• .CV1PV1RespTC • .CV2PV1RespTC • .CV3PV1RespTC • .CV1PV2RespTC • .CV2PV2RespTC • .CV3PV2RespTC

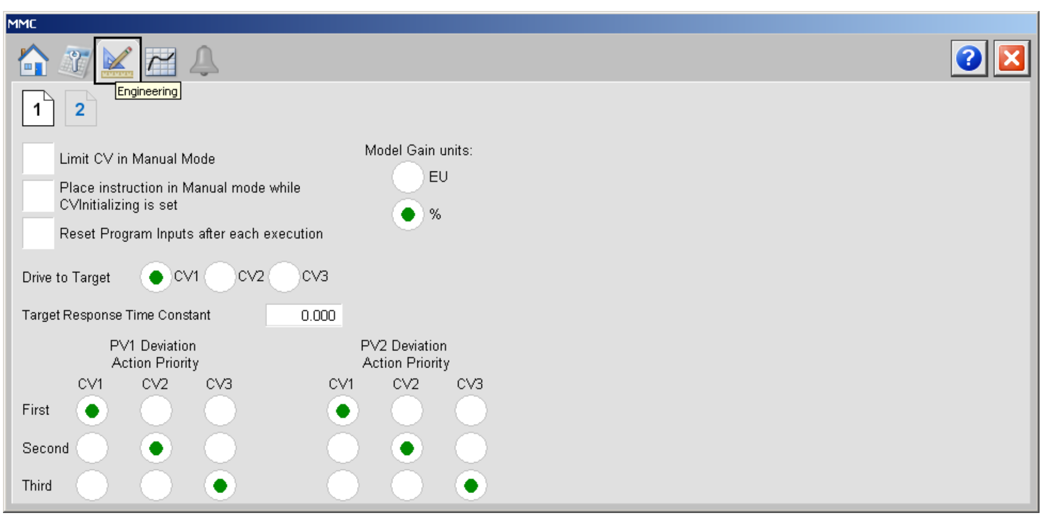
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages.

Engineering Tab Page 1

Page 1 of the MMC Engineering tab has various Operator inputs/options for the CV, Cascade/Ratio mode, and Windup CV.



The following table shows the functions of page 1 of the MMC Engineering tab.

Table 86 - MMC Engineering Tab Page 1 Description

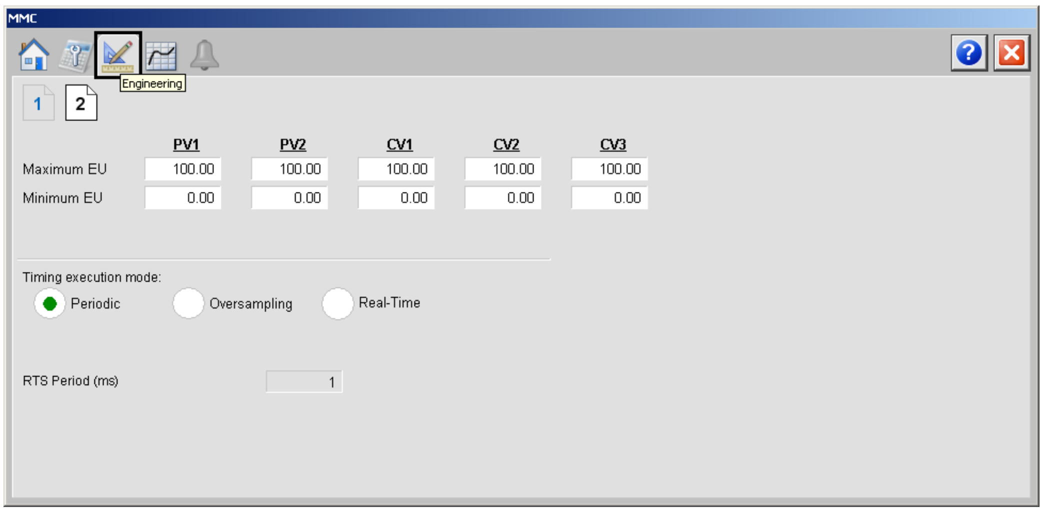
Function	Action	Security	Configuration Parameters
Limit CV in manual Mode	Limit CV1, CV2, or CV3 in Manual mode. If in Manual mode and CVManLimiting is **true**, CV1, CV2, and CV3 are limited by the CV1, CV2, and CV3 HLimit and CV1, CV2, and CV3 LLimit values.	Engineering Configuration (Code E)	• .CVManLimiting
Place instruction in Manual mode while CV Initializing is set	Check to set the Loop mode to manual when CV initialization is requested. Clear the checkbox to leave the Loop mode unchanged when initialization is requested. When the initialization request clears, the loop resumes control in its previous Loop mode.		• .ManualAfterInit
Reset Program Inputs after each execution	Check to reset Program control values after each execution.		• .ProgValueReset
Model Gain units	Select either 'EU' or '%' for the Model Gain units in EU or '% of span'.		• .GainEUSpan
Drive to Target: CV1 CV2 CV3	Click to select the CV to be driven to its target.		• .TargetCV
Target Response Time Constant	Type the value that determines the speed with which the control variables approach their target values.		• .TargetRespTC
PV1 Deviation Action Priority: First: CV1, CV2, or CV3 Second: CV1, CV2, or CV3 Third: CV1, CV2, or CV3	 Click to select the first CV to act to compensate for PV1-SP1 deviation. Click to select the second CV to act to compensate for PV1-SP1 deviation. Click to select the third CV to act to compensate for PV1-SP1 deviation.		• .PV1Act1stCV • .PV1Act2ndCV • .PV1Act3rdCV
PV2 Deviation Action Priority: First: CV1, CV2, or CV3 Second: CV1, CV2, or CV3 Third: CV1, CV2, or CV3	 Click to select the first CV to act to compensate for PV2-SP2 deviation. Click to select the second CV to act to compensate for PV2-SP2 deviation. Click to select the third CV to act to compensate for PV2-SP2 deviation.		• .PV2Act1stCV • .PV2Act2ndCV • .PV2Act3rdCV

Engineering Tab Page 2

Page 2 of the MMC Engineering tab has various Operator inputs/options for the PV, CV, and Timing Execution mode.

The following values are displayed:

- RTS period
- Operator inputs for Maximum and Minimum EU for PV1, PV2, CV1, CV2, and CV3.
- Operator options for Timing Execution mode.



The following table shows the functions of page 2 of the MMC Engineering tab.

Table 87 - MMC Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Maximum/ Minimum EU: PV1 PV2 CV1 CV2 CV3	Type the maximum /minimum PV and CV values in engineering units.	Engineering Configuration (Code E)	• .PVEUMax • .CVEUMax • .PVEUMin • .CVEUMin
CV Value in Override Mode	Type the CV value when in Override mode.		• .CVOverrideValue
Timing execution mode	Click to select Periodic, Oversampling, or Real-Time for the execution mode.		• .TimingMode

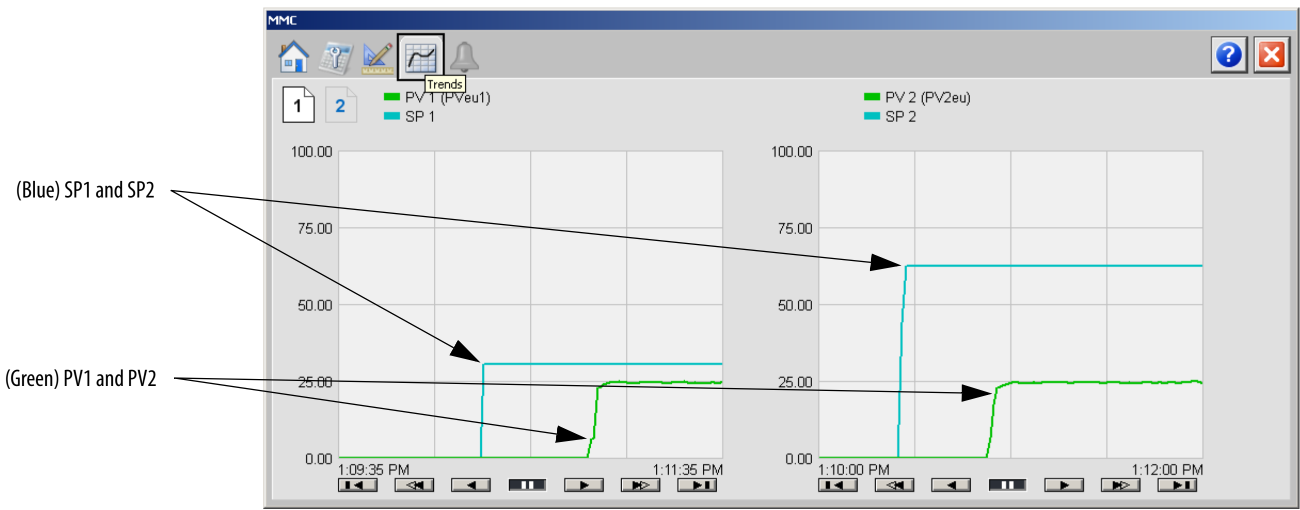
Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.

The Trends tab is divided into two pages.

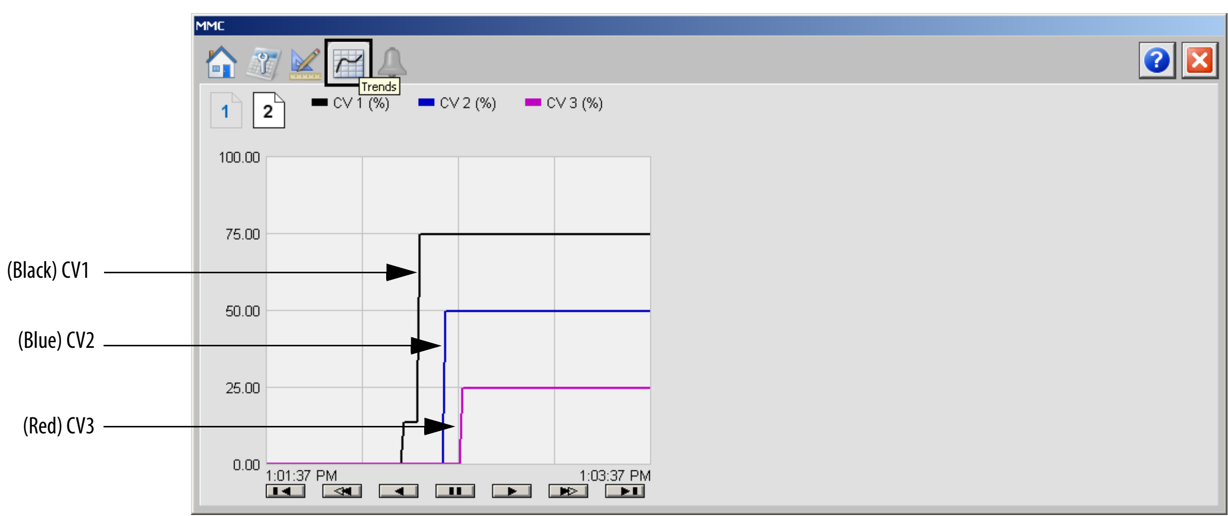
Trends Tab Page 1

Page 1 of the MMC Trends tab shows the relationship between PV1 (PVeu1) and SP1 for the same time period, and PV2 (PV2eu) and SP2 for the same time period.



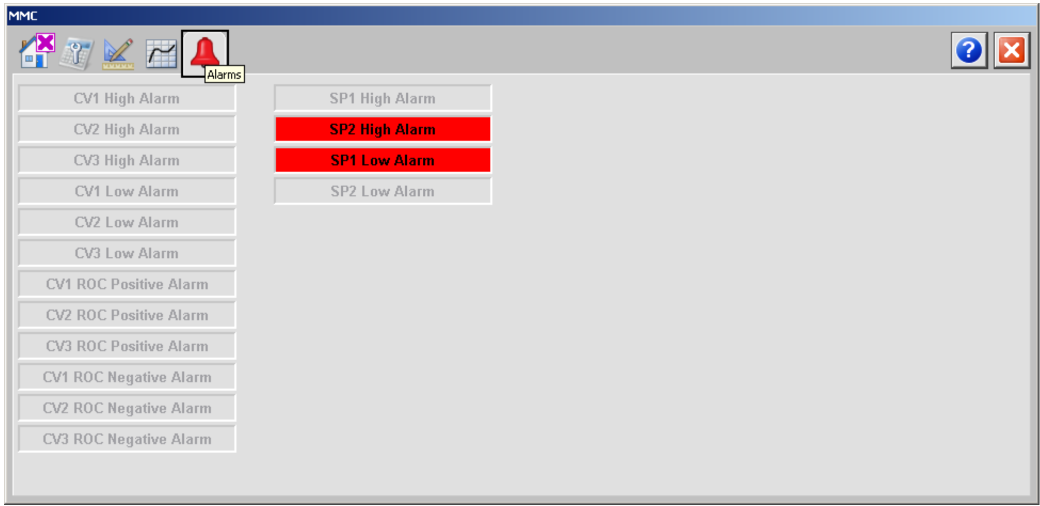
Trends Tab Page 2

Page 2 of the MMC Trends tab shows the waveforms for CV1, CV2, and CV3 for the same time period.



Alarms Tab

The MMC Alarms tab shows all available alarms for the device and their current status.



Faceplate Help

The Faceplate Help for the Modular Multivariable Control (MMC) faceplate is the same as for the Coordinated Control (CC) faceplate.

See Faceplate Help on page 221 for more information.

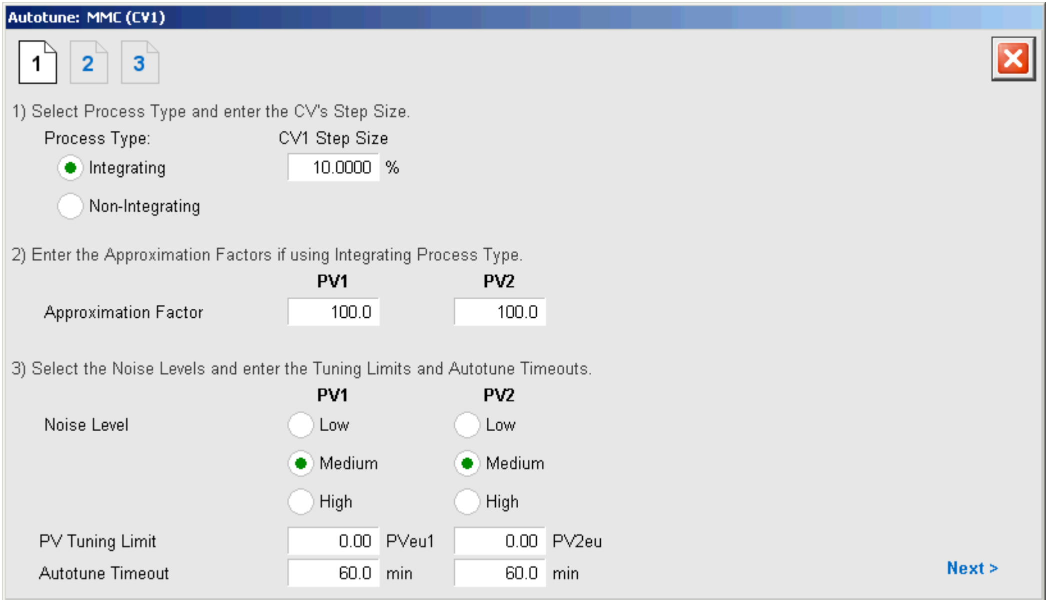
Modular Multivariable Control (MMC) Autotune

The faceplates in this section let you access all necessary parameters to autotune the MMC function block and hand-tune the instruction.

MMC Autotune Page 1

MMC Autotune page 1 shows the following information:

- Process Type
- Step Size (%)
- Approximation Factor
- Noise Level (low, medium, and high)
- FV Tuning Limit
- Autotune Timeout



The following table lists the functions on of the MMC Autotune page 1.

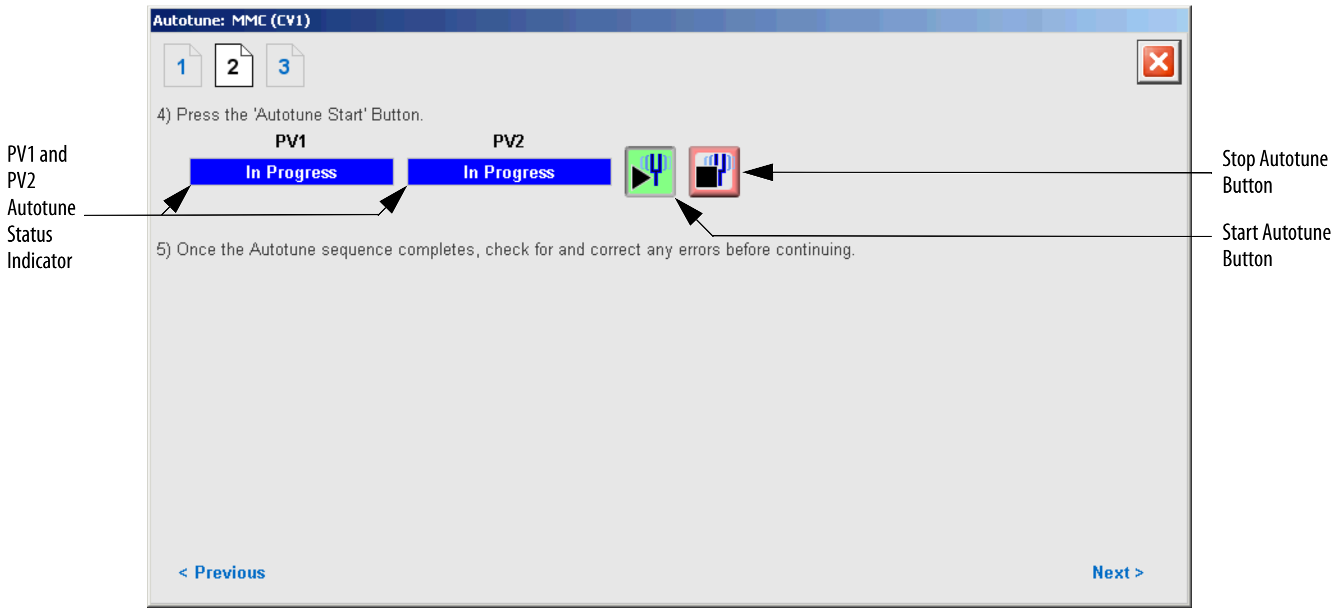
Table 88 - MMC Autotune Page 1 Description

Function	Action	Security
Process Type	Click either Integrating or Non-integrating.	Configuration and Tuning Maintenance (Code D)
Approximation Factor	Type a value for the PV1 and PV2 non-integrating model approximation factor. **IMPORTANT:** You can enter these values only when Non-Integrating is selected as the Process Type.	Configuration and Tuning Maintenance (Code D)
CV Step Size (%)	Type a value for CV1 step size in percent for the tuning step test.	
Noise Level	Click Low, Medium, or High to set the estimate of the noise level expected on PV1 and PV2 to compensate for it during tuning.	
PV Tuning Limit	Type a value for PV1 and PV2 tuning limit scaled in PV units. When Autotune is running and predicted PV exceeds this limit, the tuning is aborted.	
Autotune Timeout	Type a value for PV1 and PV2 maximum time (in minutes) for autotune to complete following the CV step change. When autotune exceeds this time, tuning is aborted.	

MMC Autotune Page 2

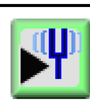
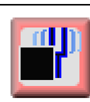
MMC Autotune page 2 shows the following information:

- PV1 and PV2 Autotune Status
- Start and Stop Autotune buttons



The following table lists the functions on of MMC Autotune page 2.

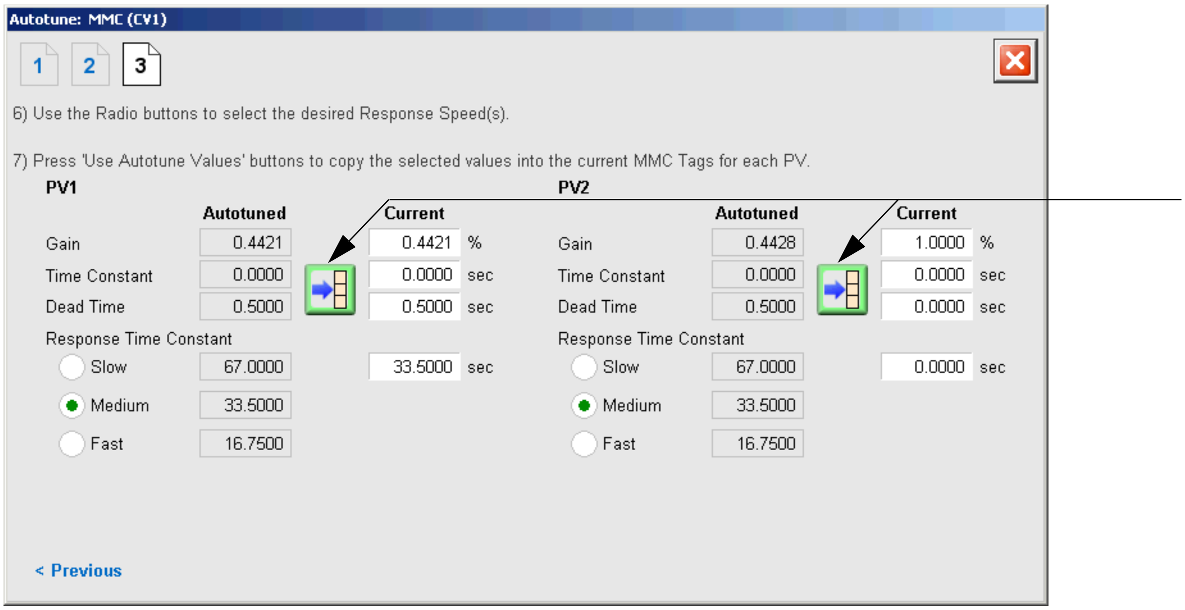
Table 89 - MMC Autotune Page 2 Description

Function	Action	Security
	Click to start the autotune process.	Configuration and Tuning Maintenance (Code D)
	Click to abort the autotune process. This button also becomes active if the process is aborted due to an error.	

MMC Autotune Page 3

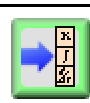
MMC Autotune page 3 shows the following information:

- Autotune Status
- Start and Stop Autotune buttons

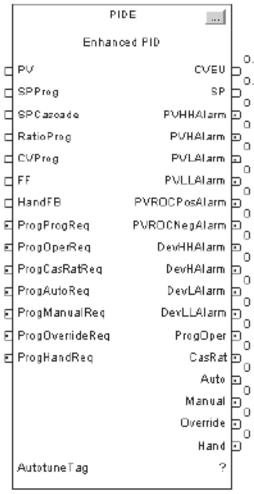


The following table lists the functions on of MMC Autotune page 3.

Table 90 - MMC Autotune Page 3 Description

Function	Action	Security
	Click to replace the current PV1 and PV2 model parameters with the calculated Autotune PV1 and PV2 model parameters.	Configuration and Tuning Maintenance (Code D)
Current Gain	Type a value for the modular multivariable PV1 and PV2 gain. Enter a positive or negative gain depending on process direction.	
Current Time Constant	Type a value for the modular multivariable PV1 and PV2 time constant in seconds.	
Current Dead Time	Type a value for the modular multivariable PV1 and PV2 deadtime in seconds.	
Current Response Time Constant	Type a value for thePV1 and PV2 tuning parameter that determines the speed of the control variable action in seconds	

Proportional + Integral + Derivative Enhanced (PIDE)



The Proportional + Integral + Derivative Enhanced (PIDE) instruction provides enhanced capabilities over the standard PID instruction. The instruction uses the velocity form of the PID algorithm. The gain terms are applied to the change in the value of error or PV, not the value of error or PV.

Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:
- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 91 - PIDE Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 92 - PIDE Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build process graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 93 - PIDE Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Built-In PIDE Faceplate	(RA-BAS-ME) Built-In PIDEFaceplate	The faceplate display used for the PIDE object.
(RA-BAS) Built-In PIDE Quick	(RA-BAS-ME) Built-In PIDE Quick	The Quick display used for the PIDE object.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
(RA-BAS) Built-In Autotune-Faceplate	(RA-BAS-ME) Built-In Autotune-Faceplate	**Optional** The Autotune faceplate display that is used for the object Use this file if the object has an associated Autotune object and you enable navigation to the Autotune faceplate from the object faceplate.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

Table 94 - PIDE Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 95 - PIDE Display Elements Descriptions

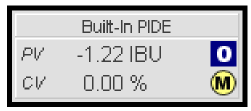
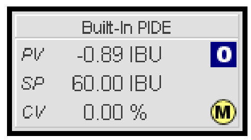
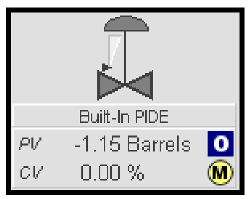
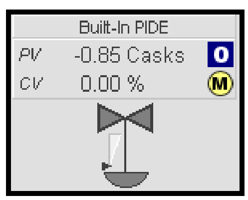
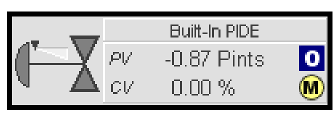
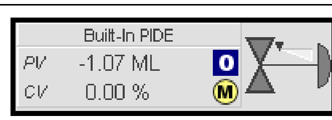
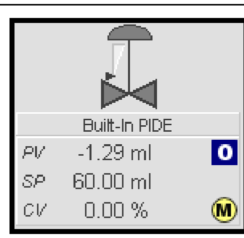
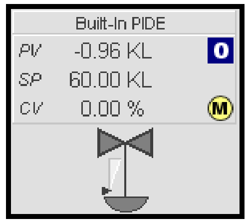
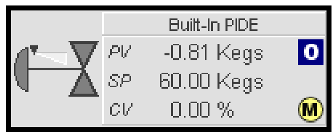
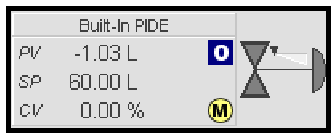
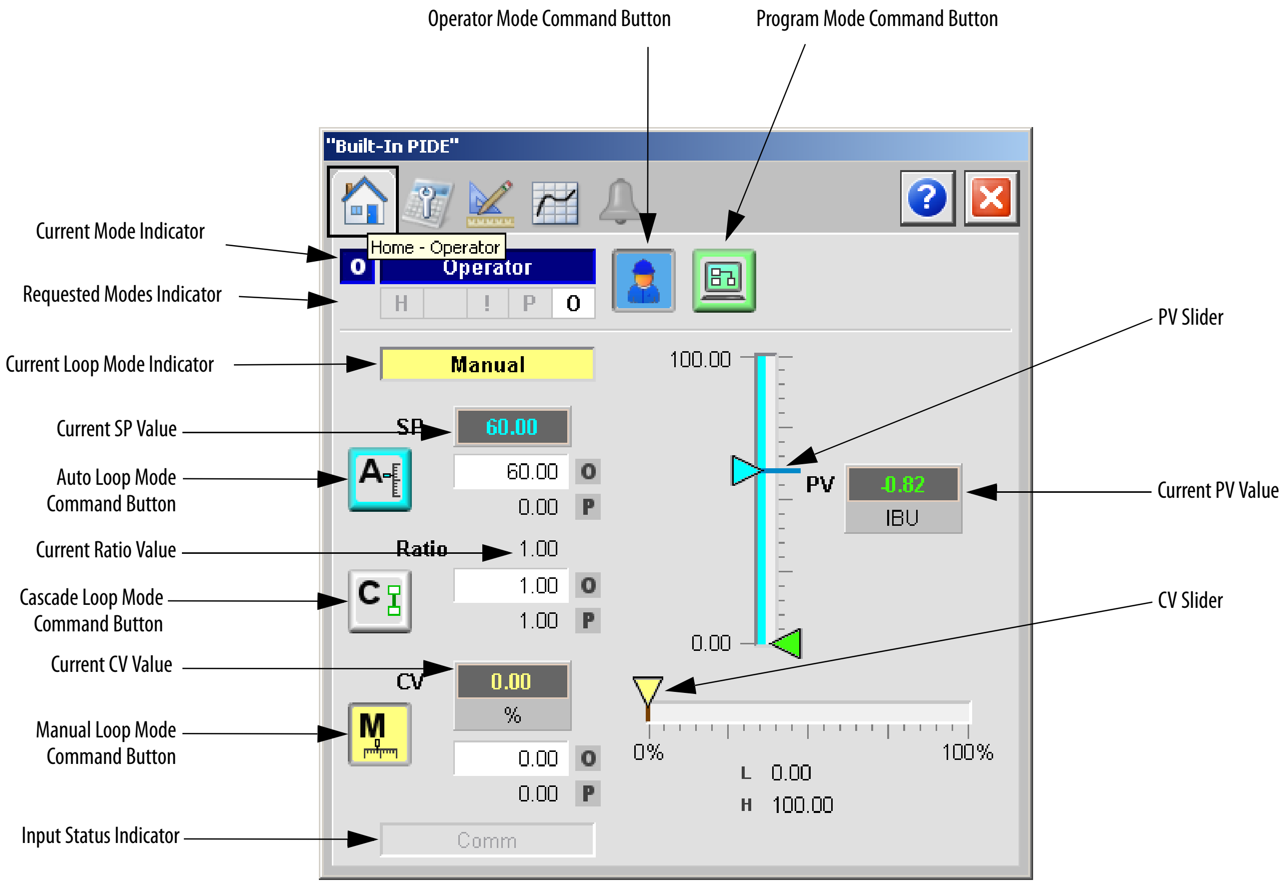
Display Element Name	Display Element	Description
GO_BuiltIn_PIDE		Proportional + Integral + Derivative Enhanced object with one Process Variables and one Control Variable.
GO_BuiltIn_PIDE1		Proportional + Integral + Derivative Enhanced object with one Process Variable, one Setpoint, and one Control Variable.
GO_BuiltIn_PIDE_CV		Proportional + Integral + Derivative Enhanced (normal Control Valve for horizontal pipe) object with one Process Variable and one Control Variable.
GO_BuiltIn_PIDE_CV1		Proportional + Integral + Derivative Enhanced (inverted Control Valve for horizontal pipe) object with one Process Variable and one Control Variable.
GO_BuiltIn_PIDE_CV2		Proportional + Integral + Derivative Enhanced (Control Valve for vertical pipe to the left) object with one Process Variable and one Control Variable.
GO_BuiltIn_PIDE_CV3		Proportional + Integral + Derivative Enhanced (Control Valve for vertical pipe to the right) object with one Process Variable and one Control Variable.
GO_BuiltIn_PIDE_CV4		Proportional + Integral + Derivative Enhanced (normal Control Valve for horizontal pipe) object with one Process Variable, one Setpoint, and one Control Variable.

Table 95 - PIDE Display Elements Descriptions

Display Element Name	Display Element	Description
GO_BuiltIn_PIDE_CV5		Proportional + Integral + Derivative Enhanced (inverted Control Valve for horizontal pipe) object with one Process Variable, one Setpoint, and one Control Variable.
GO_BuiltIn_PIDE_CV6		Proportional + Integral + Derivative Enhanced (Control Valve for vertical pipe to the left) object with one Process Variable, one Setpoint, and one Control Variable.
GO_BuiltIn_PIDE_CV7		Proportional + Integral + Derivative Enhanced (Control Valve for vertical pipe to the right) object with one Process Variable, one Setpoint, and one Control Variable.

Operator Tab

The faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.



The following table lists the functions on of the CC Operator tab.

Table 96 - PIDE Operator Tab Description

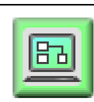
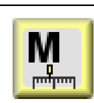
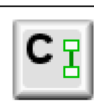
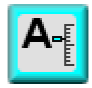
Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
	Click to go to Manual Loop mode.	Normal Operation of Devices (Code A)
	Click to go to Cascade Loop mode.	

Table 96 - PIDE Operator Tab Description

Function	Action	Security
	Click to go to Auto Loop mode.	Normal Operation of Devices (Code A)
Operator Setpoint Value	Type a value for the loop Setpoint.	
Operator Ratio Value	Type a value for the ratio operator multiplier.	
Operator CV Value	Type a value for CV.	
CV Slider	Move this slider to adjust the loop CV output.	None
PV Slider	Move this slider to adjust the loop PV value.	

Maintenance Tab

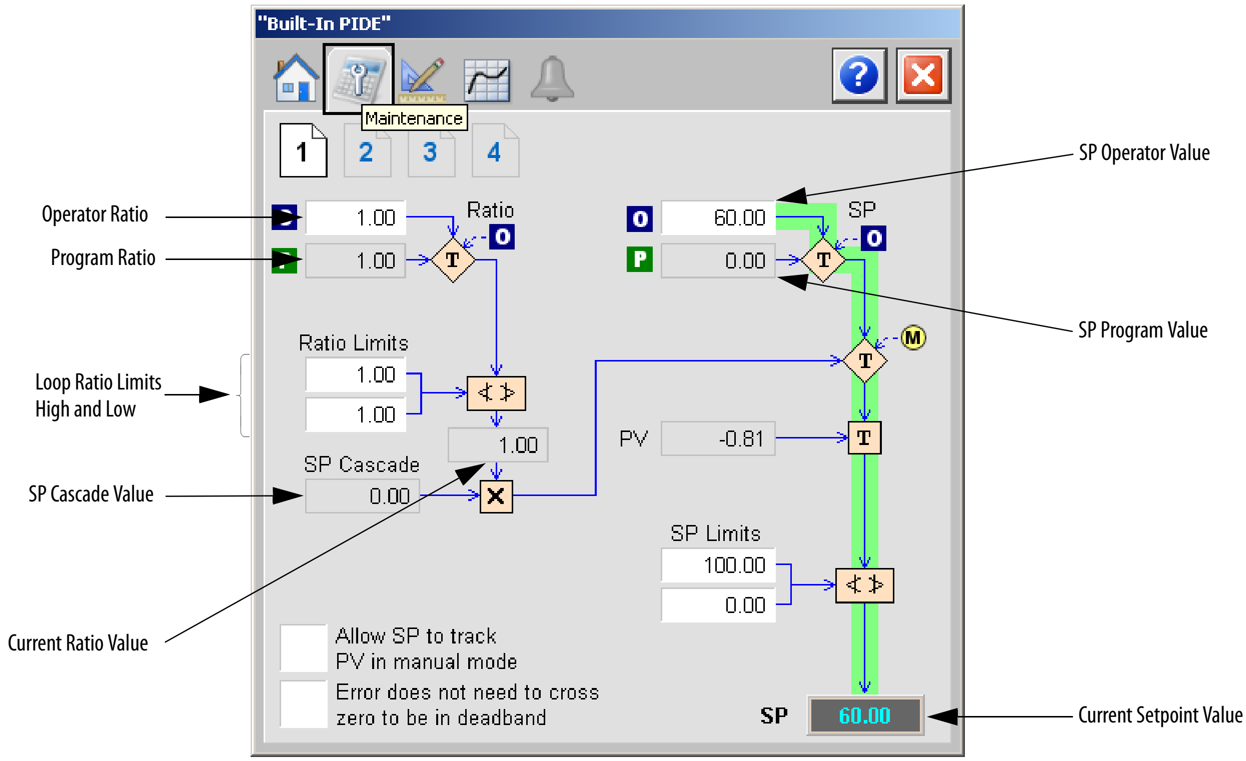
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab is divided into four tabs.

Maintenance Tab Page 1

Page 1 of the Maintenance tab shows the following information:

- Ratio program multiplier
- SP program value scaled in PV units
- Current ratio multiplier
- Current Setpoint value
- SP Cascade value scaled in PV units



The following table shows the functions of page 1 of the PIDE Maintenance tab.

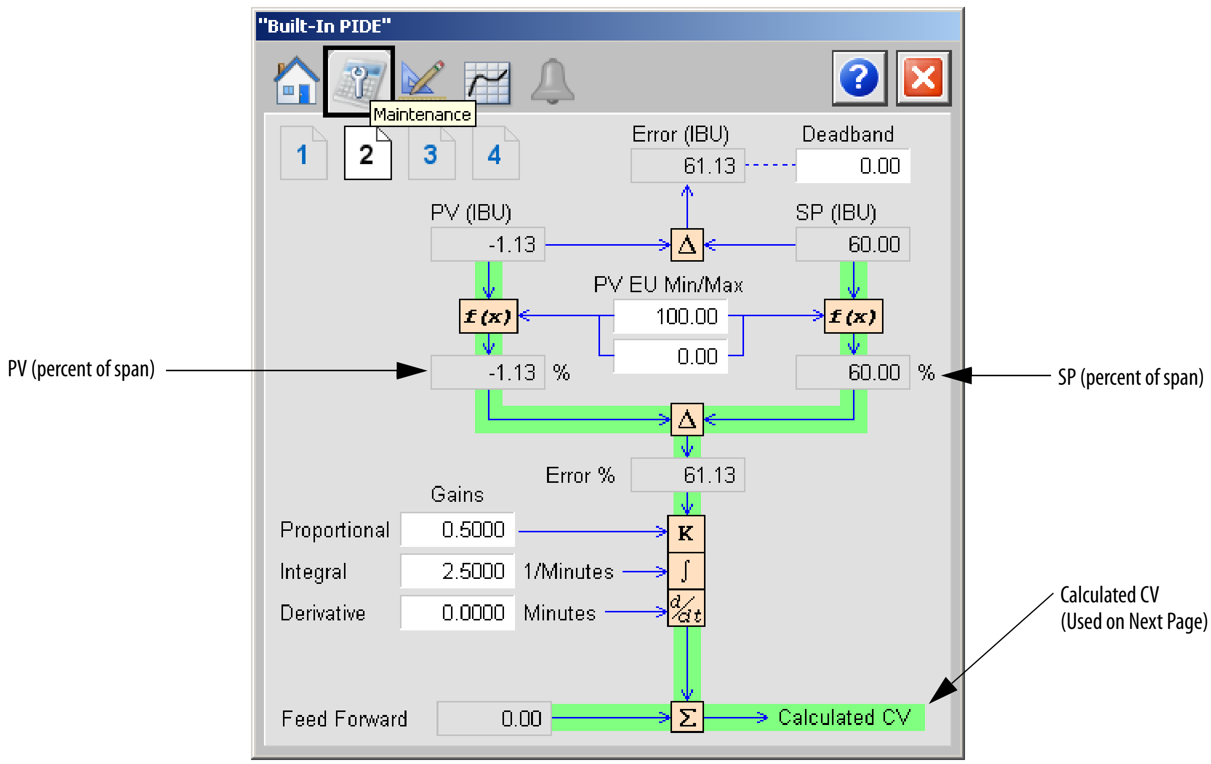
Table 97 - PIDE Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Operator Ratio	Type a ratio operator multiplier.	Normal Operation of Devices (Code A)	• .RatioOper
Loop Ratio High and Low	Type values for the high and low ratio limits. These values limit the value of Ratio obtained from Operator or Program Ratio.	Configuration and Tuning Maintenance (Code D)	• .RatioHLimit • .RatioLLimit
SP Limits High and Low	Type the high and low limits for the setpoint.		• .SPHLimit • .SPLLimit
Allow SP to track PV in Manual mode	Click to have SP track PV when in Manual mode. This setting is ignored when in Cascade or Auto mode.	Equipment Maintenance (Code C)	• .PVTracking
Error does not need to cross zero to be in deadband	Click to disable zero crossing for the deadband calculation.	Configuration and Tuning Maintenance (Code D)	• .ZCOff

Maintenance Tab Page 2

Page 2 of the PIDE Maintenance tab shows the following information:

- Process error
- PV (scaled input)
- PV (expressed as a percent of span)
- SP (expressed as a percent of span)
- Error (expressed as a percent of span)
- Feed forward value



The following table shows the functions of page 2 of the Maintenance tab.

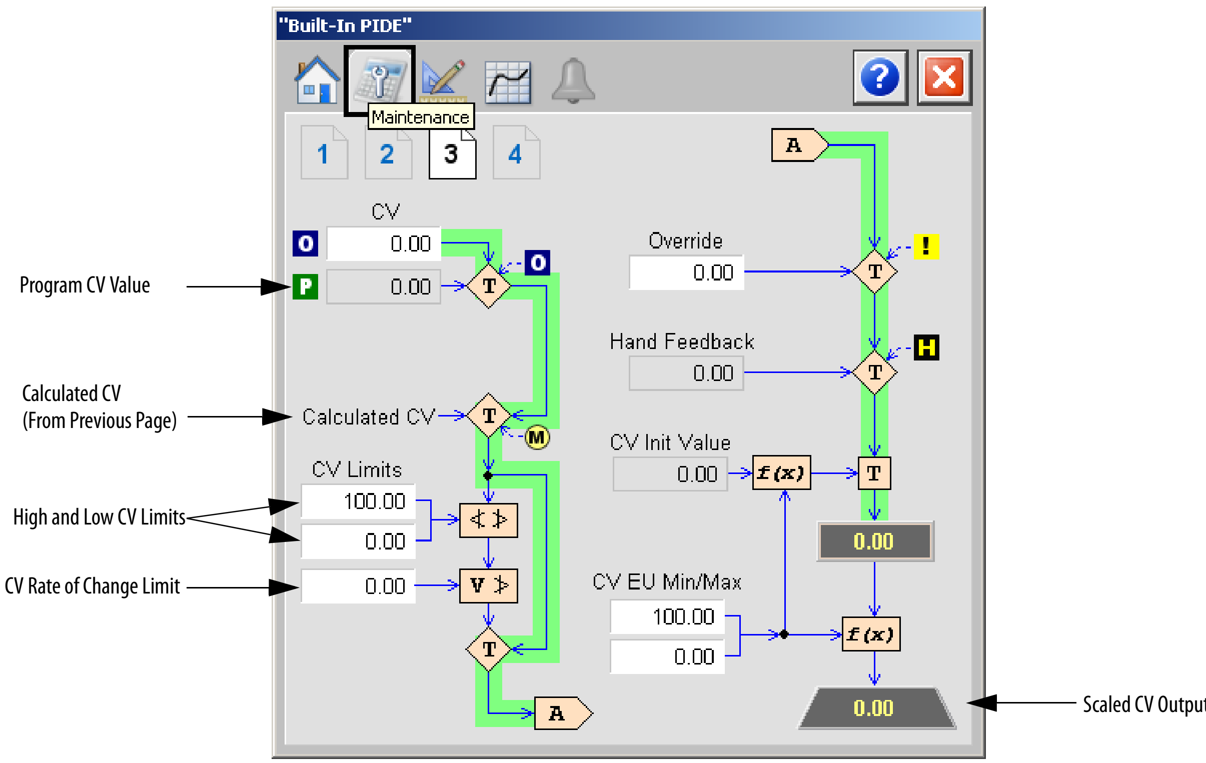
Table 98 - PIDE Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Deadband Value	Type a value for the zero crossing deadband range. Type zero to disable the zero crossing deadband checking.	Configuration and Tuning Maintenance (Code D)	• .ZCDeadband
PV/EU Maximum and Minimum	Type a value for the maximum and minimum scaled values for PV.	Engineering Configuration (Code E)	• .PVEUMax • .PVEUMin
Gains: Proportional Integral Derivative	Type in a value for: Proportional gain Integral gain Derivative gain	Configuration and Tuning Maintenance (Code D)	• .PGain • .IGain • .DGain

Maintenance Tab Page 3

Page 3 of the PIDE Maintenance tab shows the following information:

- CV (when in the Program Manual mode)
- CV Hand feedback value (when in Hand mode and HandFBFault is clear)
- CV initial value
- Scaled CV output



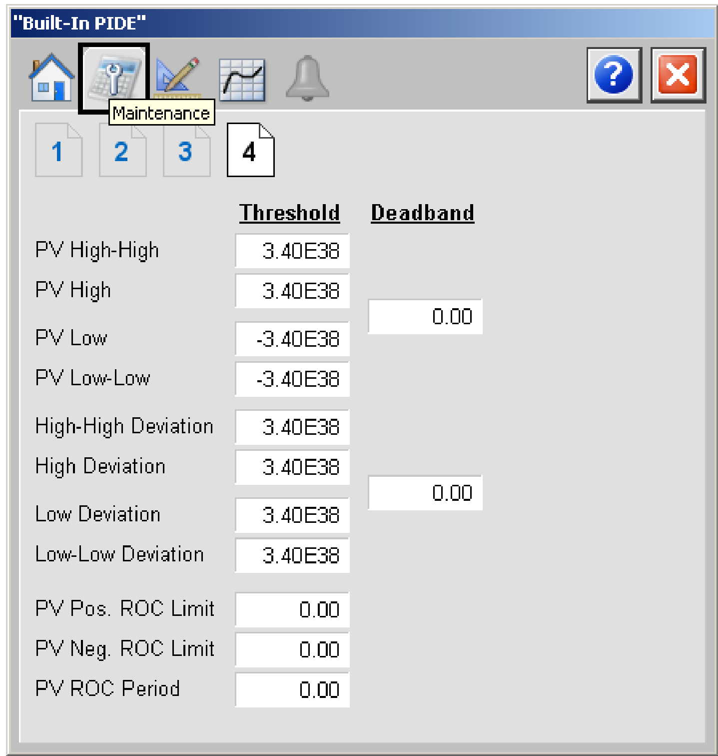
The following table shows the functions of page 3 of the Maintenance tab.

Table 99 - PIDE Maintenance Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Operator CV Value	Type a value for CV when in the Operator Manual mode.	Normal Operation of Devices (Code A)	• .CVOper
Override Value	Type a value for CV when in the Override mode.	Configuration and Tuning Maintenance (Code D)	• .CVOverride
CV High and Low Limits	Type values for the CV high and low limits.		• .CVHLimit • .CVLLimit
CV Rate of Change Limit	Type a value for CV in percent per second.		.CVROCLimit
CV EU Minimum and Maximum	Type values for the maximum and minimum values for CVEU.	Engineering Configuration (Code E)	• .CVEUMax • .CVEUMin

Maintenance Tab Page 4

Page 4 of the PIDE Maintenance tab has Operator inputs for PVs, deviations, and Range of Change limits and period.



The following table shows the functions of page 4 of the Maintenance tab.

Table 100 - PIDE Maintenance Tab Page 4 Description

Function	Action	Security	Configuration Parameters
PV High-High	Type values for the PV high-high, high, low, and low-low alarm limits (scaled in PV units).	Disable Alarms (Code H)	• .PVHHLimit • .PVHLimit • .PVLLimit • .PVLLLimit
PV High			
PV Low			
PV Low-Low			
PV Deadband	Type a value for the PV alarm limit deadband (scaled in PV units).		• .PVDeadband
High-High Deviation	Type values for the Deviation high-high, high, low, and low-low alarm limits (scaled in PV units).		• .DevHHLimit • .DevHLimit • .DevLLimit • .DevLLLimit
High Deviation			
Low Deviation			
Low-Low Deviation			
Deviation Deadband	Type a value for the Deviation alarm limit deadband (scaled in PV units).		• .DevDeadband
PV Positive ROC Limit	Enter values for the positive and negative rates of change alarm limits.		• .PVROCPosLimit • .PVROCNegLimit
PV Negative ROC Limit			

Table 100 - PIDE Maintenance Tab Page 4 Description

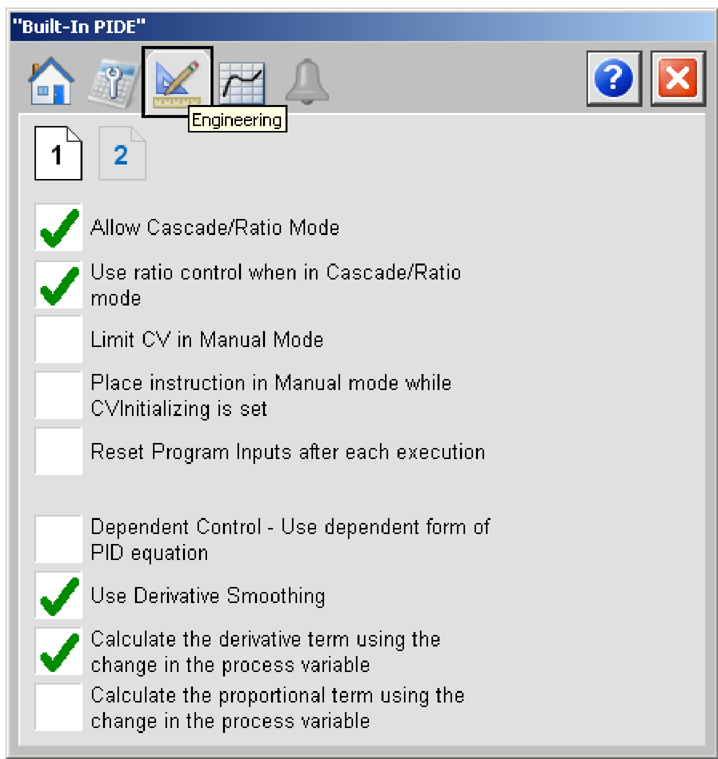
Function	Action	Security	Configuration Parameters
PV ROC Period	Type a value for the PV Rate of change sample period. This is the time period, in seconds, over which the rate of change for PV is evaluated. Type zero to disable the PV rate of change period checking.	Disable Alarms (Code H)	• .PVROCPeriod

Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two tabs.

Engineering Tab Page 1



The following table shows the functions of page 1 of the Engineering tab.

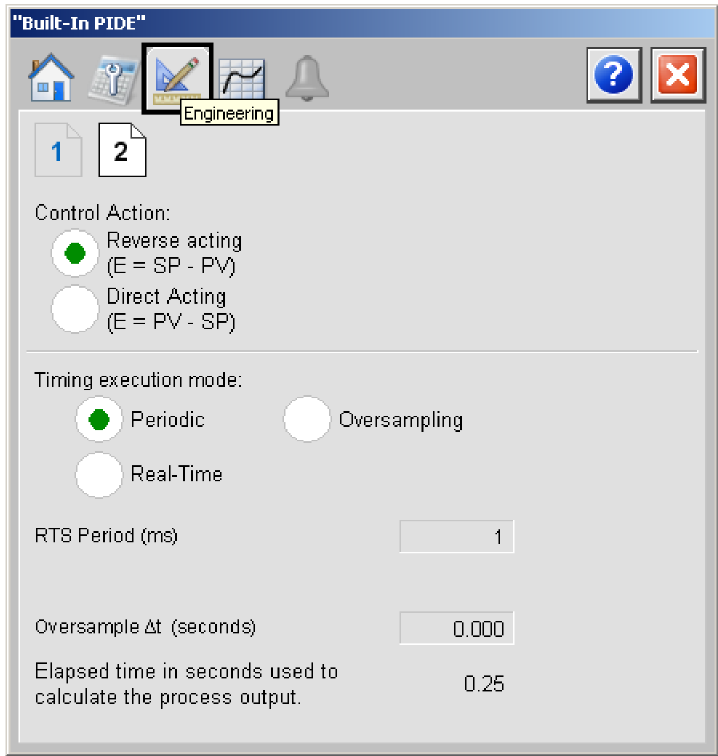
Table 101 - PIDE Engineering Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Allow Cascade/ Ratio Mode	Check to enable Cascade/Ratio mode.	Engineering Configuration (Code E)	• .AllowCasRat
Use ratio control when in Cascade/ Ratio mode	Check to enable ratio control when in Cascade/Ratio mode.		• .UseRatio
Limit CV in Manual Mode	Check to limit CV in the Manual mode.		• .CVManLimiting
Place instruction in Manual mode while CV Initializing is set	Check to set the Loop mode to manual when CV initialization is requested. Clear the checkbox to leave the Loop mode unchanged when initialization is requested. When the initialization request clears, the loop resumes control in its previous Loop mode.		• .ManAfterInit
Reset program inputs after each execution	Click to clear all program request inputs after each execution of the instruction.		• .ProgValueReset
Dependent Control - Use dependent form of PID equation	Click to use the dependent form of the PID equation. Clear this checkbox to use the independent form of the equations.		• .DependIndepend
Use Derivative Smoothing	Click to smooth changes in the derivative term.		• .DSmoothing
Calculate the derivative term using the change in the process variable	Click to calculate the derivative term (DeltaDTerm) by using the change in the process variable (PVPercent). Clear this checkbox to use the change in error (EPercent).		• .PVEDerivative
Calculate the proportional term using the change in the process variable	Click to calculate the derivative term (DeltaDTerm) by using the change in process variable (PVPercent). Clear this checkbox to use the change in error (EPercent).		• .PVEProportional

Engineering Tab Page 2

Page 2 of the PIDE Engineering tab shows the following information:

- RTS Period (milliseconds)
- Oversampling (seconds)
- Elapsed time in seconds used to calculate the process output
- Operator inputs for Control Action and Timing Execution mode



The following table shows the functions of page 2 of the Engineering tab.

Table 102 - PIDE Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Control Action: Reverse acting (E = SP - PV) Direct Acting (E = PV - SP)	Click to select the method of calculating error.	Engineering Configuration (Code E)	• .ControlAction
Timing execution mode: Periodic Oversampling Real-Time	Click to select the Timing execution mode.		• .TimingMode

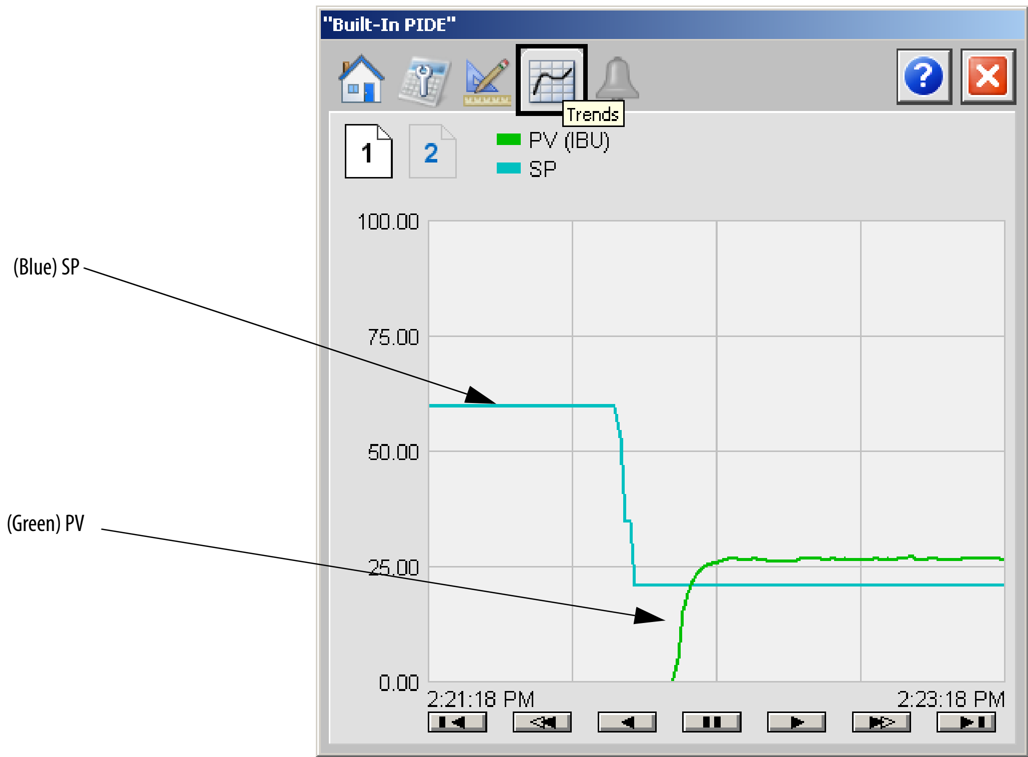
Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.

The Trends tab is divided into two pages.

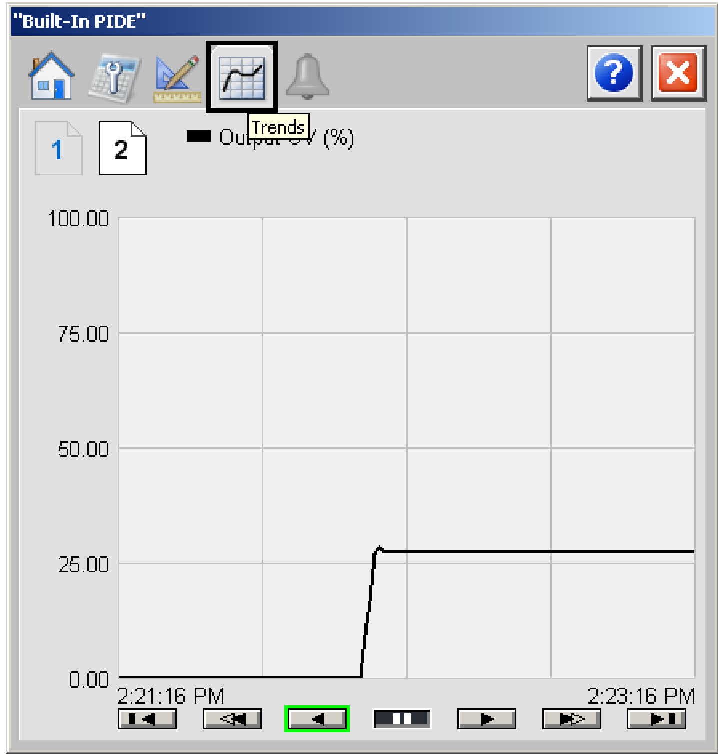
Trends Tab Page 1

Page 1 of the PIDE Trends tab shows the relationship between PV (IBU) and SP for the same time frame of a process.



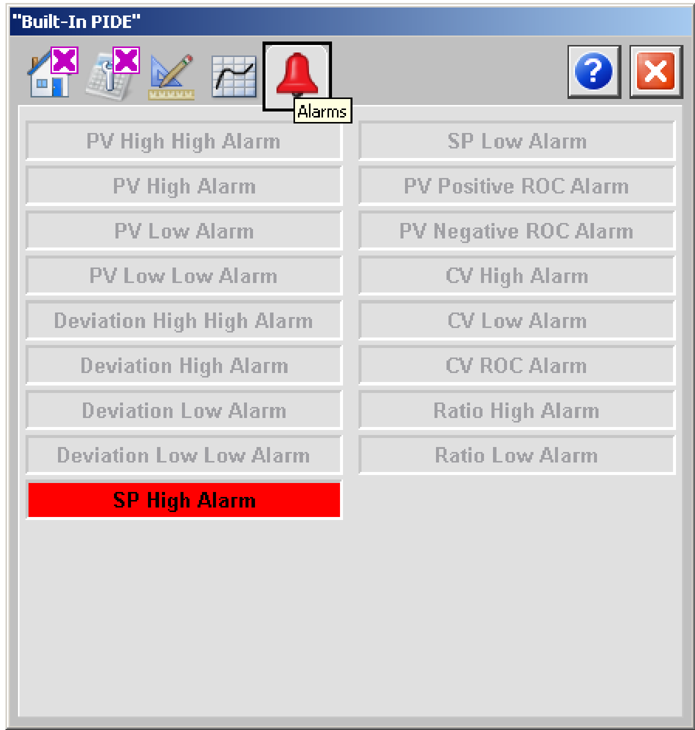
Trends Tab Page 2

Page 2 of the PIDE Trends tab shows the waveforms for the output CV.



Alarms Tab

The PIDE Alarms tab shows all available alarms for the device and their current status.

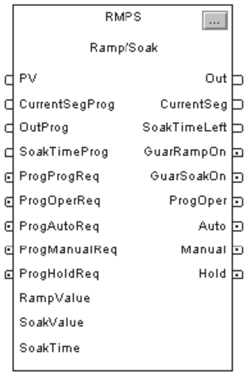


Faceplate Help

The Faceplate Help for the Proportional + Integral + Derivative Enhanced (PIDE) faceplate is the same as for the Coordinated Control (CC) faceplate.

See Faceplate Help on page 221 for more information.

Ramp/Soak (RMPS)



The Ramp/Soak (RMPS) instruction provides for a number of segments of alternating ramp and soak periods.

Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 103 - RMPS Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 104 - RMPS Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build process graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 105 - RMPS Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Built-In RMPS-Faceplate	(RA-BAS-ME) Built-In RMPS Faceplate	The faceplate display used for the RMPS object.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

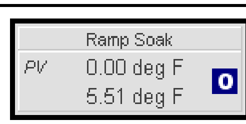
Table 106 - RMPS Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

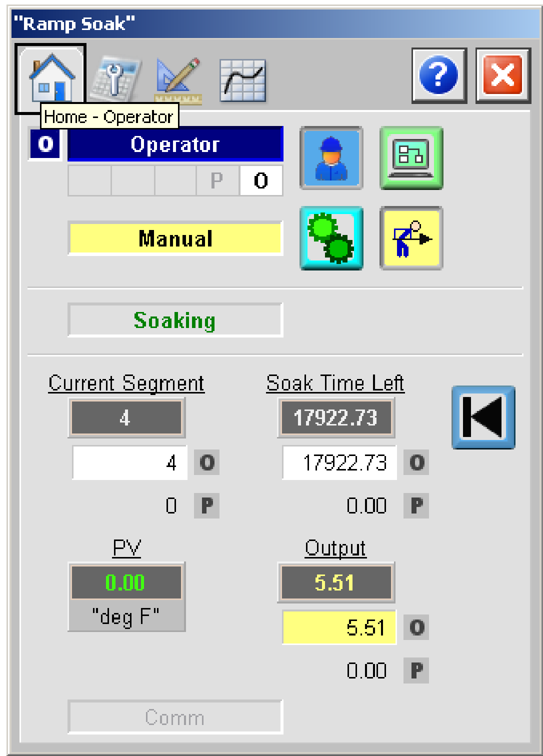
A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 107 - Ramp/Soak (RMPS) Display Element Descriptions

Display Element Name	Display Element	Description
GO_BuiltIn_RMPS		Ramp Soak global object.

Operator Tab

The faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.



The following table lists the functions on of the RMPS Operator tab.

Table 108 - RMPS Operator Tab Description

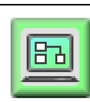
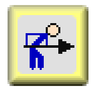
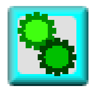
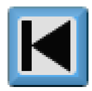
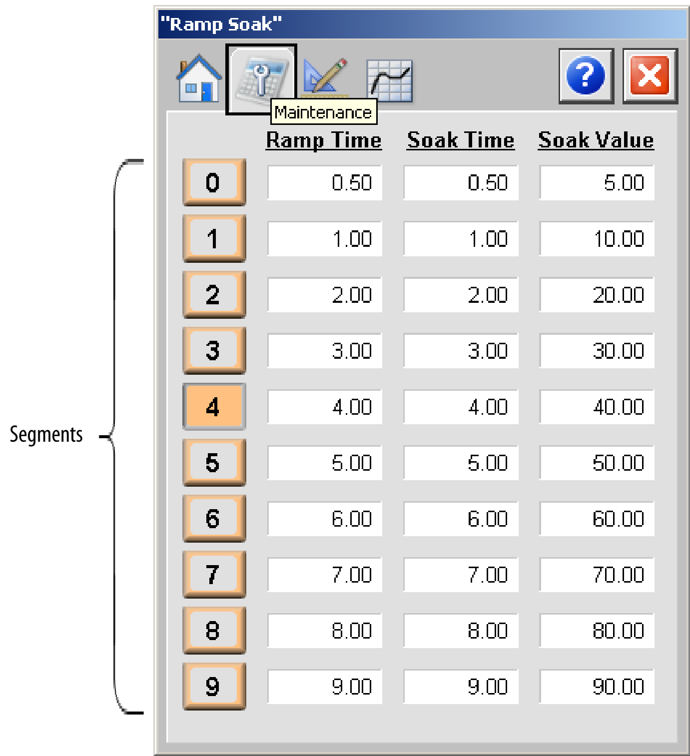
Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	

Table 108 - RMPS Operator Tab Description

Function	Action	Security
	Click to request Manual Loop mode.	Normal Operation of Devices (Code A)
	Click to request Auto Loop mode.	
	Click to initialize Current Segment and Soak Time Left.	
Operator Segment Value	Type a value for the Operator Segment. This value is used if Ramp/Soak is in the Manual mode.	
Operator Soak Time Left Value	Type a value for the Operator Soak Time Left. This value is used if Ramp/Soak is in the Manual mode.	
Operator Output Value	Type a value for the Operator output value. This value is used as the Output when Ramp/Soak is in the Manual mode.	

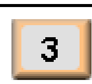
Maintenance Tab

The Maintenance tab has inputs for Ramp Time, Soak Time, and Soak Value for each segment.



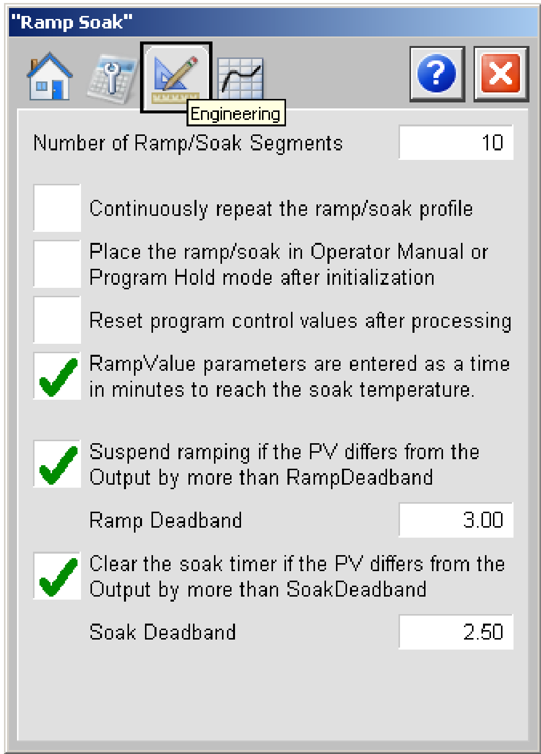
The following table shows the functions of the RMPS Maintenance tab.

Table 109 - RMPS Maintenance Tab Description

Function	Action	Security	Configuration Parameters
	Click to select the current segment.	Normal Operation of Devices (Code A)	• .CurrentSeg
Ramp Time	Type a value for Ramp time, in minutes or units/minute, for the desired segments.	Configuration and Tuning Maintenance (Code D)	• .RampValue
Soak Time	Type a value for Soak Time, in minutes, for the desired segments.		• .SoakTime
Soak Value	Type a value for Soak Value for the desired segments.		• .SoakValue

Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.



The following table shows the functions of the RMPS engineering tab.

Table 110 - RMPS Engineering Tab Description

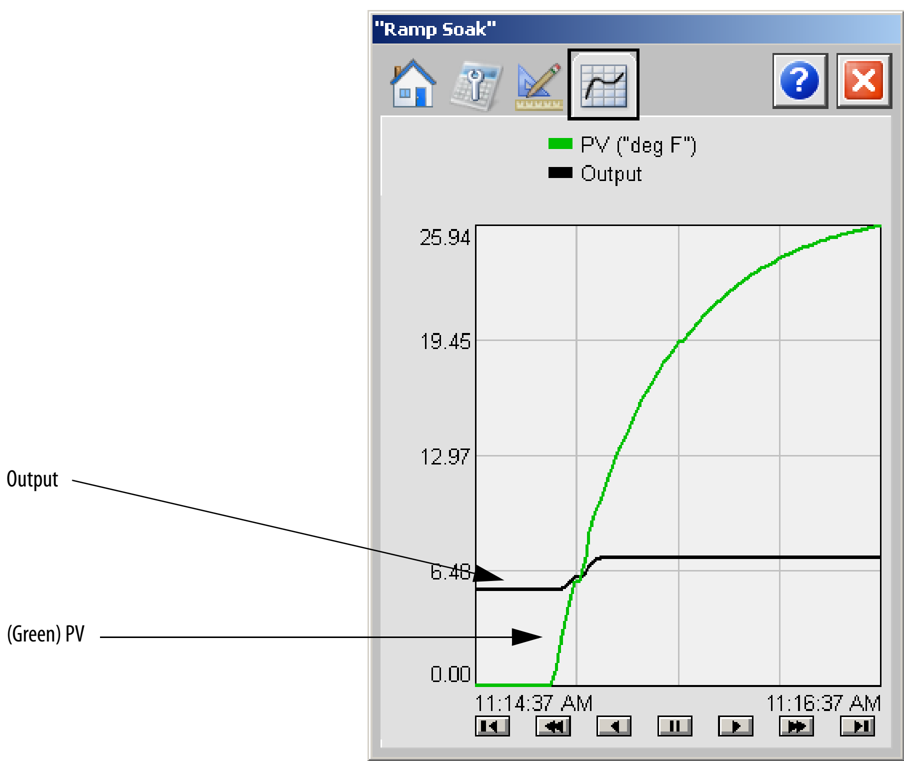
Function	Action	Security	Configuration Parameters
Number of Ramp/ Soak Segments		Engineering Configuration (Code E)	• .NumberOfSegs
Continuously repeat the ramp/soak profile	Check to set for cyclic action. Clear this checkbox to set for single action. Cyclic action continuously repeats the ramp/soak profile. Single action performs the ramp/ soak profile once and then stops.		• .CyclicSingle
Place the ramp/ soak in operator Manual or Program Hold mode after initialization	Click to set ramp/Soak in Manual or Program Hold mode after initialization. Clear this checkbox to have Ramp/Soak remain in its previous mode after initialization completes.		• .ManHoldAftInit
Reset program control values after processing	Click to set program control values.		• .ProgValueReset

Table 110 - RMPS Engineering Tab Description

Function	Action	Security	Configuration Parameters
RampValue parameters are entered as a time in minutes to reach the soak temperature	Click so that the RampValue parameter entered is in minutes. Clear this checkbox if the RampValue parameter is entered in units/minute.	Engineering Configuration (Code E)	• .TimeRate
Suspend ramping if the PV differs from the Output by more than RampDeadband	Click to set Guaranteed Ramp. If set and the instruction is in Auto, ramping is temporarily suspended if the PV differs from the Output by more than RampDeadband.		• .GuarRamp
Ramp Deadband	Type a value (Guaranteed Ramp Deadband) in engineering units that PV is allowed to differ from the output when GuarRamp is on.		• .RampDeadband
Clear the soak timer if the PV differs from the Output by more than SoakDeadband	Click to clear the soak timer.		• .GuarSoak
Soak Deadband	Type a value in engineering units that the PV is allowed to differ from the output when GuarSoak is on.		• .SoakDeadband

Trends Tab

Page 1 of the PIDE Trends tab shows the relationship between PV (°F) and the output for the same time period.



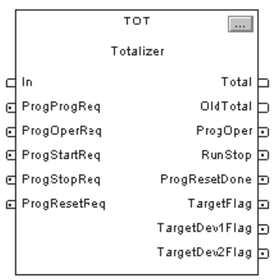
Faceplate Help

The Faceplate Help for the Ramp/Soak (RMPS) faceplate is the same as for the Coordinated Control (CC) faceplate.

See Faceplate Help on page 221 for more information.

Totalizer (TOT)

The TOT instruction provides a time-scaled accumulation of an analog input value.



Visualization Files

The Process Library contains visualization files for built-in firmware instructions that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 111 - TOT Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 112 - TOT Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Faceplate Objects	(RA-BAS-ME) BuiltIn Faceplate Objects	Global objects for built-in instruction faceplates.

Table 112 - TOT Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) BuiltIn Graphics Library	(RA-BAS-ME) BuiltIn Graphics Library	Global object device symbols used to build built-in instruction graphics.
(RA-BAS) BuiltIn Help Objects	(RA-BAS-ME) BuiltIn Help Objects	Global objects for built-in instruction Help displays.
(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Global objects used on process object faceplates.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 113 - TOT Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) Built-In Family-Help	(RA-BAS-ME) Built-In Family-Help	Built-in instruction help information that is accessed from the built-in faceplates.
(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
(RA-BAS) Built-In Totalizer-Faceplate	(RA-BAS-ME) Built-In Totalizer Faceplate	**Optional** The faceplate display used for the Totalizer object.
(RA-BAS) Built-In TotalizerTgt-Faceplate	(RA-BAS-ME) Built-In TotalizerTgt Faceplate	**Optional** The faceplate display used for the Totalizer Target object.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported via the comma-separated variable file (.csv file type) in the following table.

Table 114 - TOT Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 115 - Totalizer (TOT) Display Element Descriptions

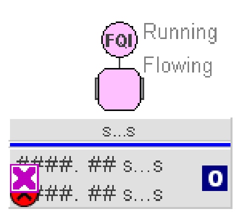
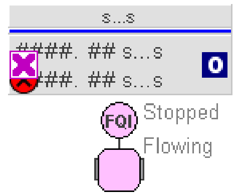
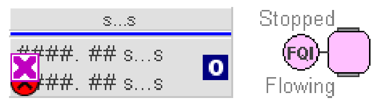
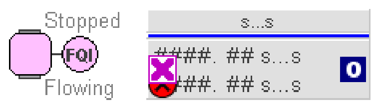
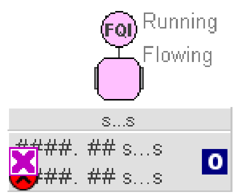
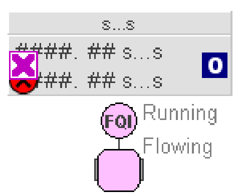
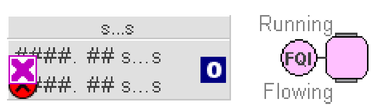
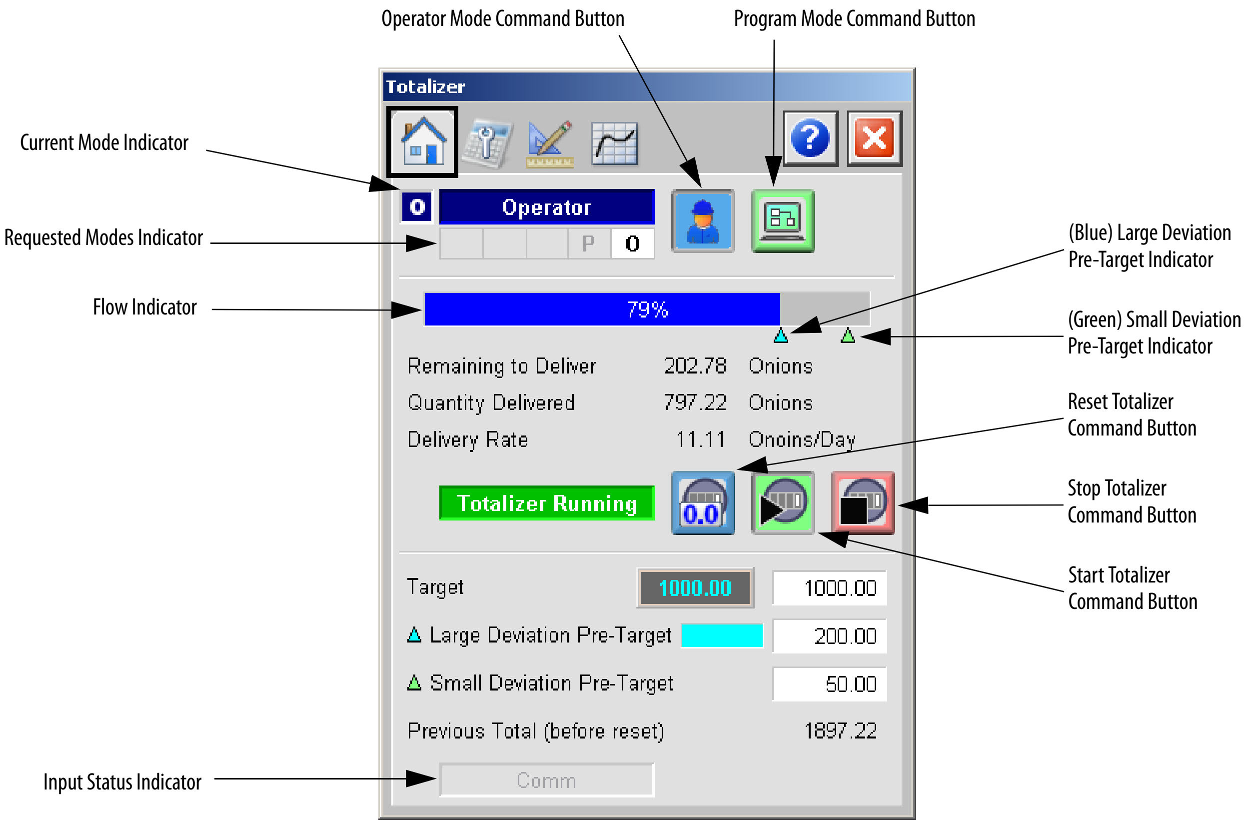
Display Element Name	Display Element	Description
GO_BuiltIn_TotalizerTgt		Totalizer with target, vertical orientation - top

Table 115 - Totalizer (TOT) Display Element Descriptions

Display Element Name	Display Element	Description
GO_BuiltIn_TotalizerTgt1		Totalizer with target, vertical orientation - bottom
GO_BuiltIn_TotalizerTgt2		Totalizer with target, vertical orientation - right
GO_BuiltIn_TotalizerTgt3		Totalizer with target, vertical orientation - left
GO_BuiltIn_Totalizer		Totalizer, vertical orientation - top
GO_BuiltIn_Totalizer1		Totalizer, vertical orientation - bottom
GO_BuiltIn_Totalizer2		Totalizer, vertical orientation - right
GO_BuiltIn_Totalizer3		Totalizer, vertical orientation - left

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.



The following table lists the functions on of the TOT Operator tab.

Table 116 - TOT Operator Tab Description

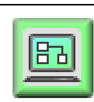
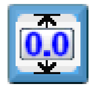
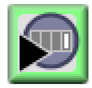
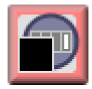
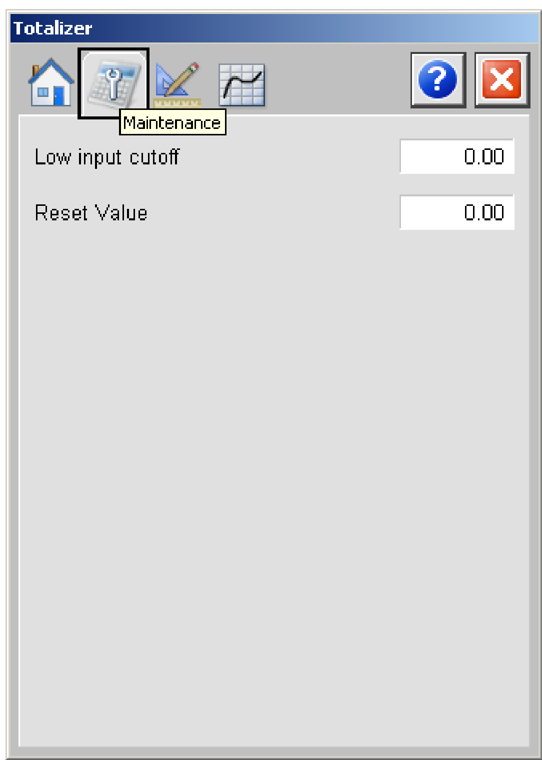
Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	

Table 116 - TOT Operator Tab Description

Function	Action	Security
	Click to reset Totalizer.	Normal Operation of Devices (Code A)
	Click to start Totalizer.	
	Click to stop Totalizer.	
Target	Type the target value for the totalizer input.	
Large Deviation Pre-Target	Type a value for the large deviation pre-target value of Total compared to Target. This value is expressed as a deviation from the Target.	
Small Deviation Pre-Target	Type a value for the small deviation pre-target value of Total compared to Target. This value is expressed as a deviation from the Target.	

Maintenance Tab



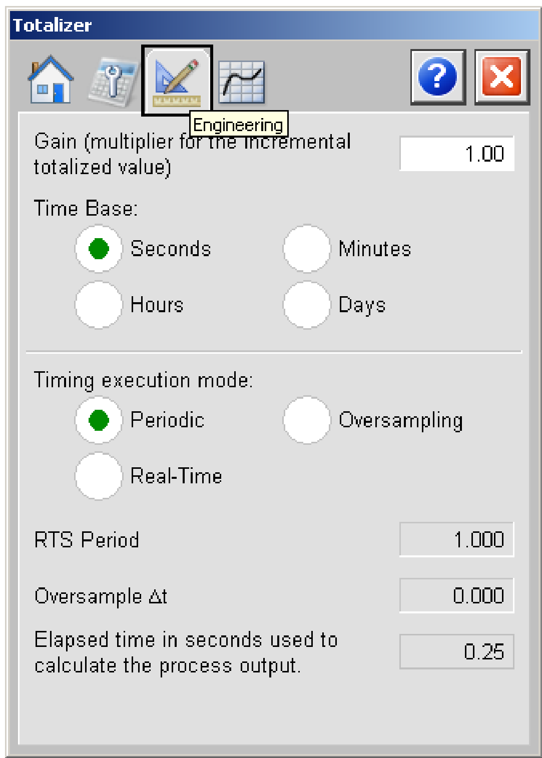
The following table shows the functions of the RMPS Maintenance tab.

Table 117 - TOT Maintenance Tab Description

Function	Action	Security	Configuration Parameters
Low input cutoff	Type a value for the low input cutoff. When the input is set at or below LowInCutoff, totalization stops.	Configuration and Tuning Maintenance (Code D)	• .LowInCutoff
Reset Value	Type a value for reset input.		• .ResetValue

Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.



The following table shows the functions of the TOT engineering tab.

Table 118 - TOT Engineering Tab Description

Function	Action	Security	Configuration Parameters
Gain (multiplier for the incremental totalized value)	Type a value for the multiplier of the incremental totalized value.	Engineering Configuration (Code E)	• .Gain
Time Base: Seconds Minutes Hours Days	Click to select the time base for the time base input.		• .TimeBase

Table 118 - TOT Engineering Tab Description

Function	Action	Security	Configuration Parameters
Timing execution mode: Periodic Oversampling Real-Time	Click to select the timing execution mode.		• .TimingMode

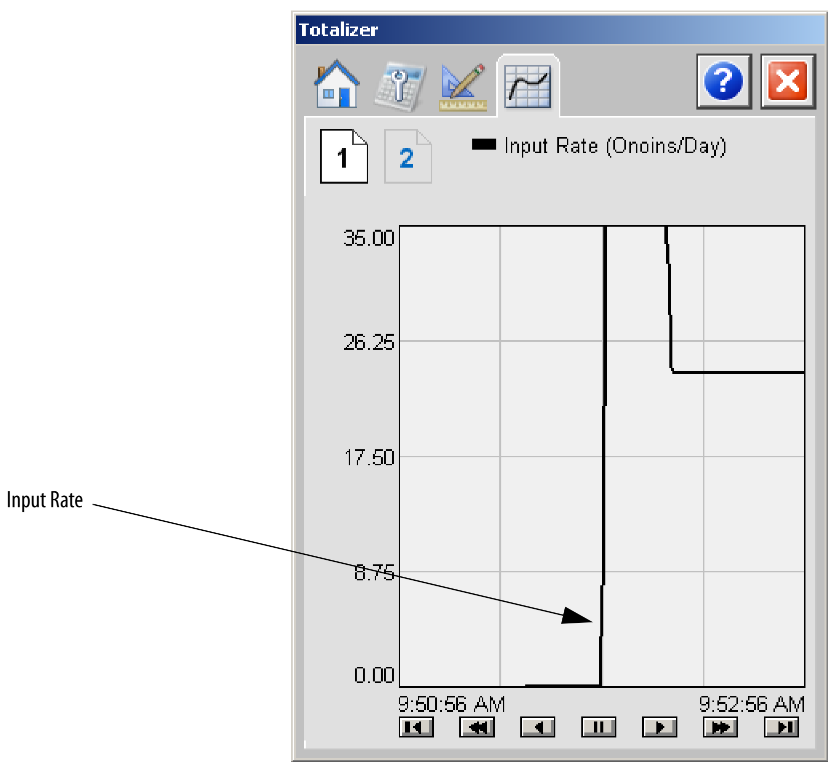
Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.

The Trends tab is divided into two pages.

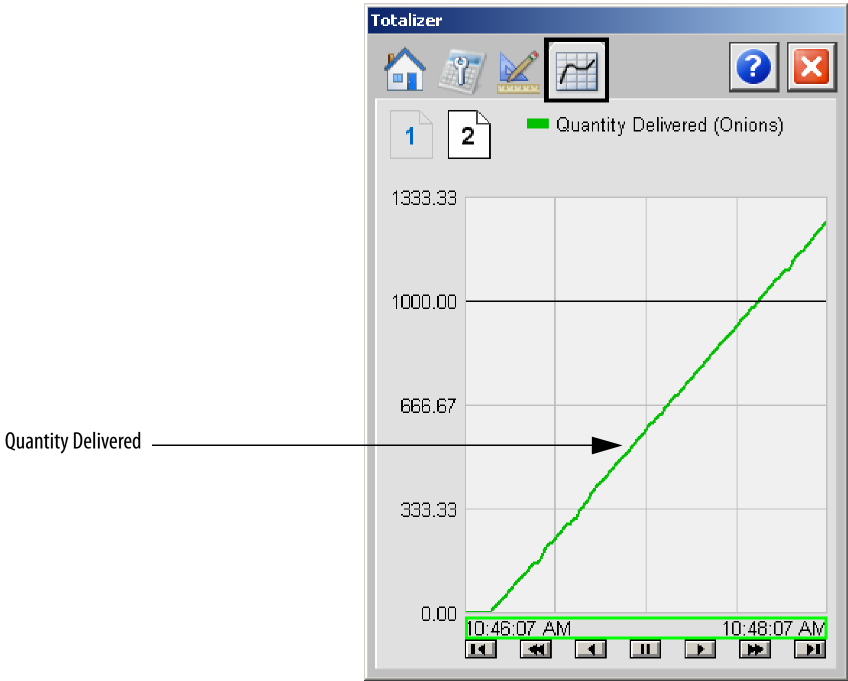
Trends Tab Page 1

Page 1 of the PIDE Trends tab shows the Input waveform.



Trends Tab Page 2

Page 2 of the Trends tab shows the quantity delivered.



Faceplate Help

The Faceplate Help for the totalizer (TOT) faceplate is the same as for the Coordinated Control (CC) faceplate.

See Faceplate Help on page 221 for more information.

Notes:

Faceplates for PlantPAx MPC

Model Predictive Control (MPC) is an advanced control methodology that uses dynamic models. Models are identified, generally from plant tests, to deliver improved control performance particularly with interacting control loops, processes with long time lags, or processes with measurable disturbances. This improved control lets operators to push closer to control limits (constraints) to maximize performance.

PlantPAx® MPC runs on a ControlLogix® platform and requires a 1756-MPC module that executes PlantPAx MPC functionality in the ControlLogix chassis. This PlantPAx MPC module is integrated with PlantPAx applications through generated Add-On instructions. A workstation-based option is available for advanced monitoring. The Rockwell Automation® Library of Process Objects provides FactoryTalk® View SE faceplates for HMI-based visualization and monitoring of the PlantPAx MPC model.

PlantPAx MPC Overview

Plant PAx MPC Overview faceplate provides an overview of the PlantPAx MPC controller and access to settings of the general parameters of both the Add-On Instruction and PlantPAx MPC Instruction.

Visualization Files

IMPORTANT	The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables: • Images • Global Objects • Standard Displays • HMI Tags • Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 119 - PlantPAx MPC Overview Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons that are used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

Table 120 - PlantPAx MPC Overview Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-MPC) MPC Faceplate Objects	N/A	Global objects that are used on PlantPAx MPC faceplates.
(RA-MPC) MPC Graphics Library	N/A	PlantPAx MPC display elements that are used to build process graphics.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 121 - PlantPAx MPC Overview Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-MPC) MPC Faceplate	N/A	The faceplate display that is used for the PlantPAx MPC object.
(RA-MPC) MPC Family-Help	N/A	Help information that is accessed from the PlantPAx MPC Help faceplate.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported through the comma-separated variable file (.csv file type) in the following table.

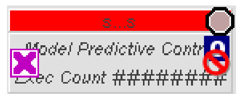
Table 122 - PlantPAx MPC Overview Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	N/A	N/A

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

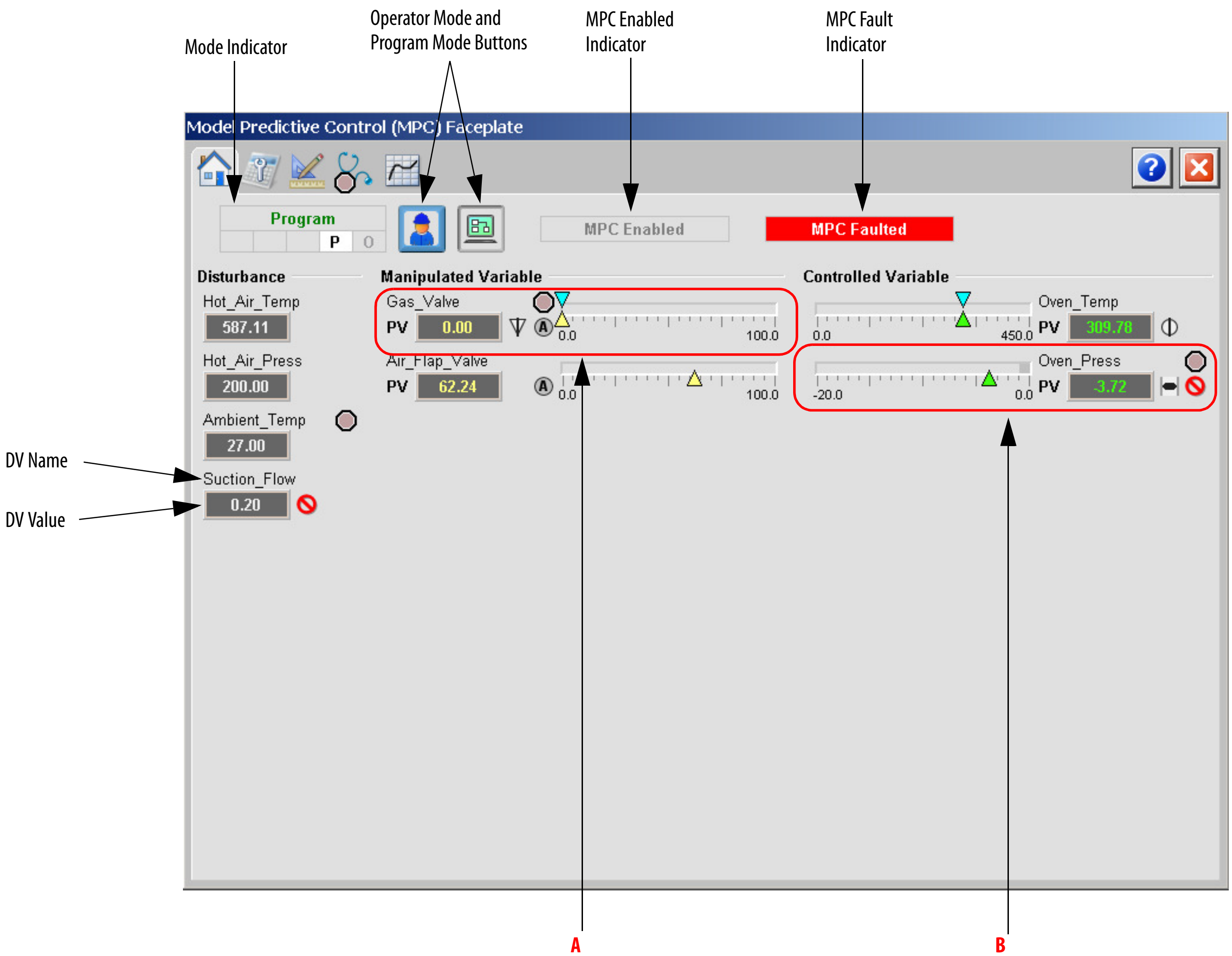
Table 123 - PlantPAx MPC Overview Display Elements Descriptions

Display Element Name	Display Element	Description
GO_MPC		PlantPAx MPC object with Execution Count numeric display.

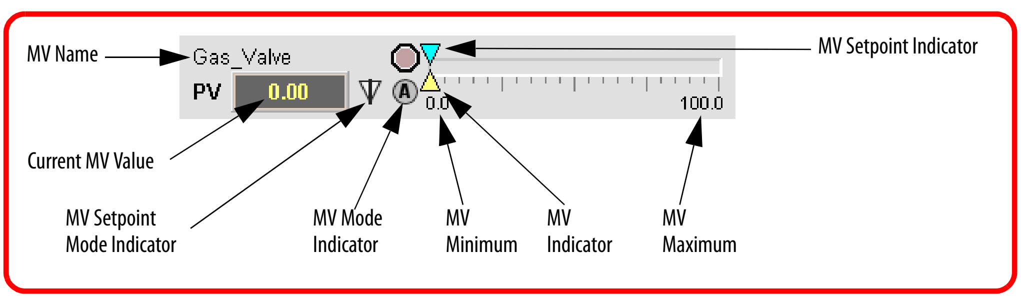
Operator Tab

The Faceplate initially opens to the Operator (‘Home’) tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

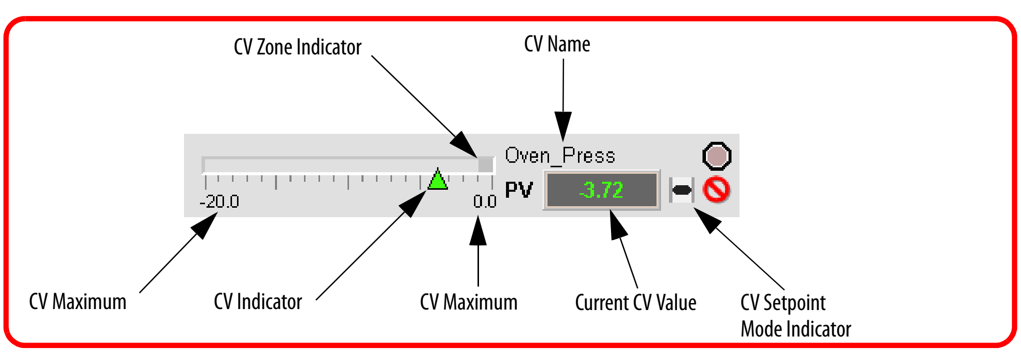
The Operator tab shows the following information:
- Current instruction mode (Program or Operator)
- Current PlantPAx MPC instruction execution enabled status and fault status
- Current Controlled Variables (CV) and bar graph for each
- Current Manipulated Variables (MV) and bar graph for each
- Current Disturbance Variables (DV)


Mode Indicator
Operator Mode and Program Mode Buttons
MPC Enabled Indicator
MPC Fault Indicator
Model Predictive Control (MPC) Faceplate
Program
P
O
MPC Enabled
MPC Faulted
Disturbance
Manipulated Variable
Controlled Variable
Hot_Air_Temp
587.11
Hot_Air_Press
200.00
Ambient_Temp
27.00
Suction_Flow
0.20
Gas_Valve
PV
0.00
0.0
100.0
Air_Flap_Valve
PV
62.24
0.0
100.0
Oven_Temp
PV
309.78
0.0
450.0
Oven_Press
PV
-3.72
-20.0
0.0
DV Name
DV Value
A
B

A


MV Name
Gas_Valve
PV
0.00
0.0
100.0
MV Setpoint Indicator
Current MV Value
MV Setpoint Mode Indicator
MV Mode Indicator
MV Minimum
MV Indicator
MV Maximum

B


CV Zone Indicator
CV Name
Oven_Press
PV
-3.72
-20.0
0.0
CV Maximum
CV Indicator
CV Maximum
Current CV Value
CV Setpoint Mode Indicator

The following table lists the functions on of the Operator tab.

Table 124 - Operator Tab Description

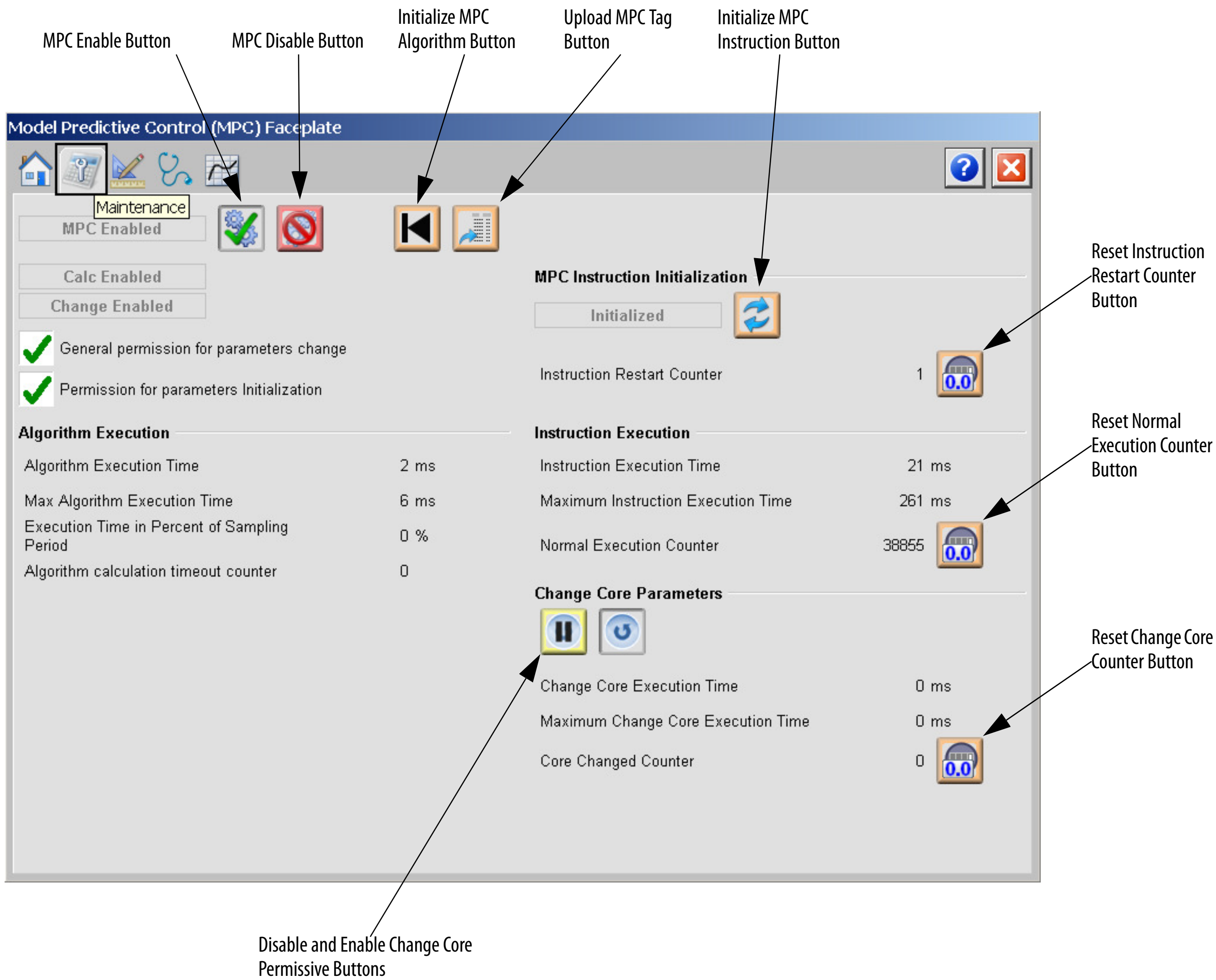
Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
Current CV Value and bar graph	Click to open CV faceplate.	None
Current MV Value and bar graph	Click to open MV faceplate.	
Current DV Value	Click to open DV faceplate.	

Maintenance Tab

Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems. The tab also provides the ability to disable the device for routine maintenance.

The Maintenance tab shows the following information:

- Current PlantPAx MPC instruction execution enabled status
- Current Normal PlantPAx MPC calculation enabled status
- Current Change of parameters permissive status
- Current PlantPAx MPC Module message error status
- Current PlantPAx MPC Algorithm Execution Timeout status, current Algorithm Execution Time, Maximum Algorithm Execution Time, current Algorithm Execution Time in Percent of Sampling Period, Algorithm execution timeout count
- Instruction Restart count
- Current Instruction Normal Execution Time, Maximum Instruction Execution Time, Normal Execution count
- Current Change Core Execution Time, Maximum Change Core Execution Time, Core Changed count.



The following table lists the functions on of the Maintenance tab.

Table 125 - Maintenance Tab Description

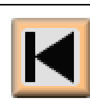
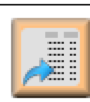
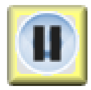
Function	Action	Security
	Click to enable PlantPAx MPC instruction	Equipment Maintenance (Code C)
	Click to disable PlantPAx MPC instruction.	
	Click to initialize PlantPAx MPC algorithm.	Configuration and Tuning Maintenance (Code D)
	Click to upload PlantPAx MPC tag from the PlantPAx MPC module.	Normal Operation of Devices (Code A)

Table 125 - Maintenance Tab Description

Function	Action	Security
	Click to initialize PlantPAx MPC instruction.	Configuration and Tuning Maintenance (Code D)
	Click to disable the Change Core permissive.	
	Click to enable the Change Core permissive.	
	Click to reset the Instruction Restart Counter.	Equipment Maintenance (Code C)
	Click to reset the Normal Execution Counter.	
	Click to reset the Core Change Counter.	
General permission for parameters change	Check to enable parameter changes.	Normal Operation of Devices (Code A)
Permission for parameters initialization	Check to enable initialization.	Configuration and Tuning Maintenance (Code D)

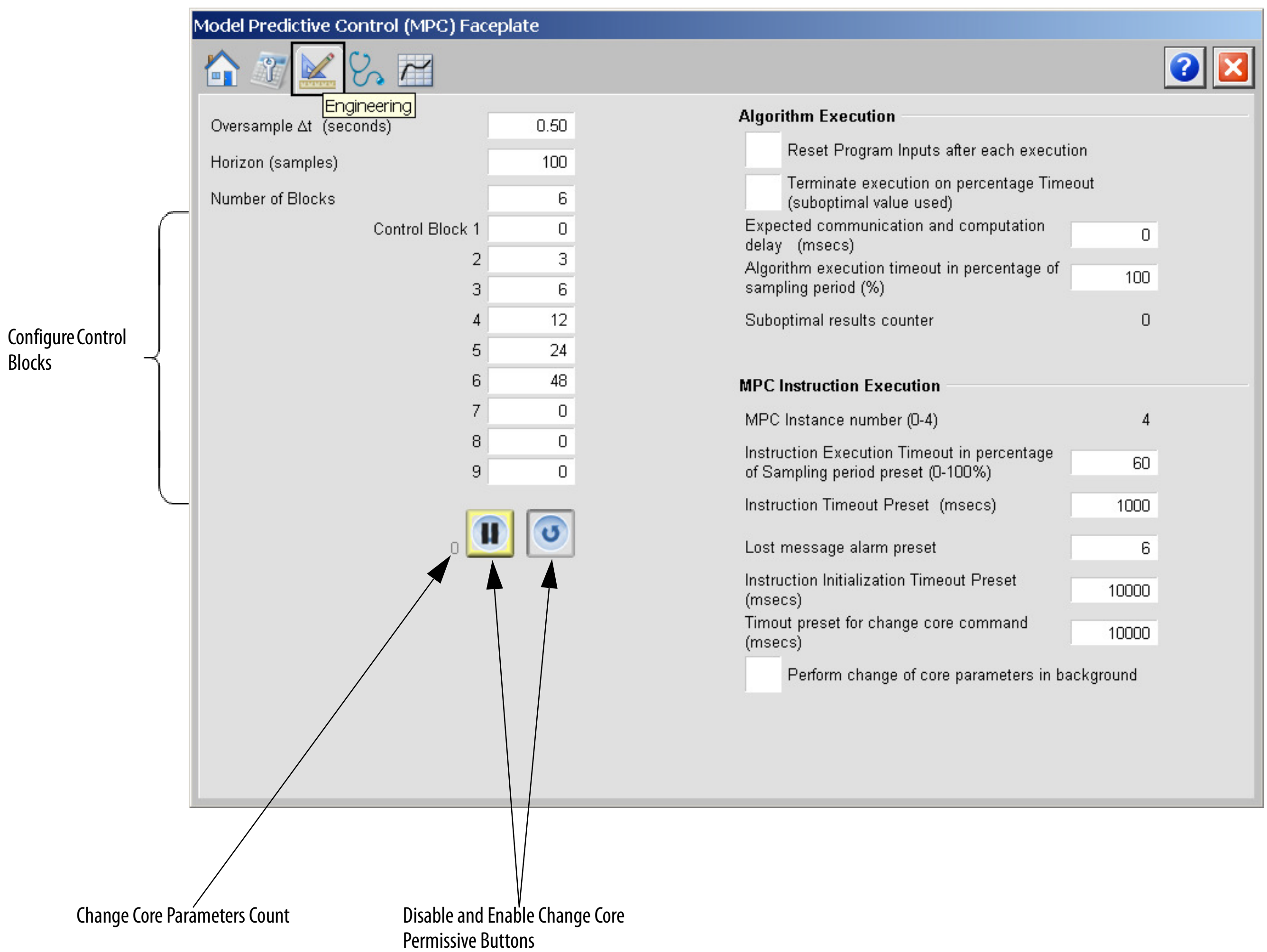
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

On the Engineering tab, you can configure prediction properties, PlantPAx MPC execution and communication parameters and timeouts and change core execution mode.

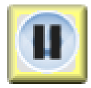
The Engineering tab shows the following information:

- Suboptimal algorithm results count
- PlantPAx MPC Instance number



The following table lists the functions on of the Engineering tab.

Table 126 - Engineering Tab Description

Function	Action	Security
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
Oversample Δt (Seconds)	Type a value for PlantPAx MPC Instruction sampling period.	Engineering Configuration (Code E)
Horizon (samples)	Type a value for length of the prediction horizon (in number of steps).	
Number of blocks.	Type a value for number of control blocks (possible moves) of manipulated variables.	
Control blocks (1…9)	Type values for indexes of prediction horizon where the change of MV is enabled.	
Reset Program inputs after each execution	Check to reset Program inputs after each execution.	
Terminate execution on percentage Timeout	Check to terminate instruction execution when timeout is reached and apply current suboptimal results of optimizer.	
Expected communication and computation delay	Type a value for Expected computation and communication delay of the instruction.	
Algorithm execution timeout in percentage of sampling period	Type a value for Execution timeout of the algorithm in percent of sampling period.	Configuration and Tuning Maintenance (Code D)
Instruction Execution Timeout in percentage of Sampling period preset	Type a value for Execution timeout of the instruction in percent of PlantPAx MPC Sampling period.	
Instruction Timeout Preset	Type a value for Normal execution operation timeout preset of the instruction.	
Lost message alarm preset	Type a value for Number of lost messages between client Add-On Instruction and PlantPAx MPC module to trigger Lost Message Timeout.	
Instruction Initialization Timeout Preset	Type a value for Initialization timeout preset.	
Timeout preset for change core command	Type a value for Change Core timeout preset.	
Perform change of core parameters in background	Check to execute change of parameters that are requested by ChangeCoreReq in parallel in the background, in a lower priority Task. Clear the checkbox to execute the change of core parameters in series with normal execution in the same Task.	

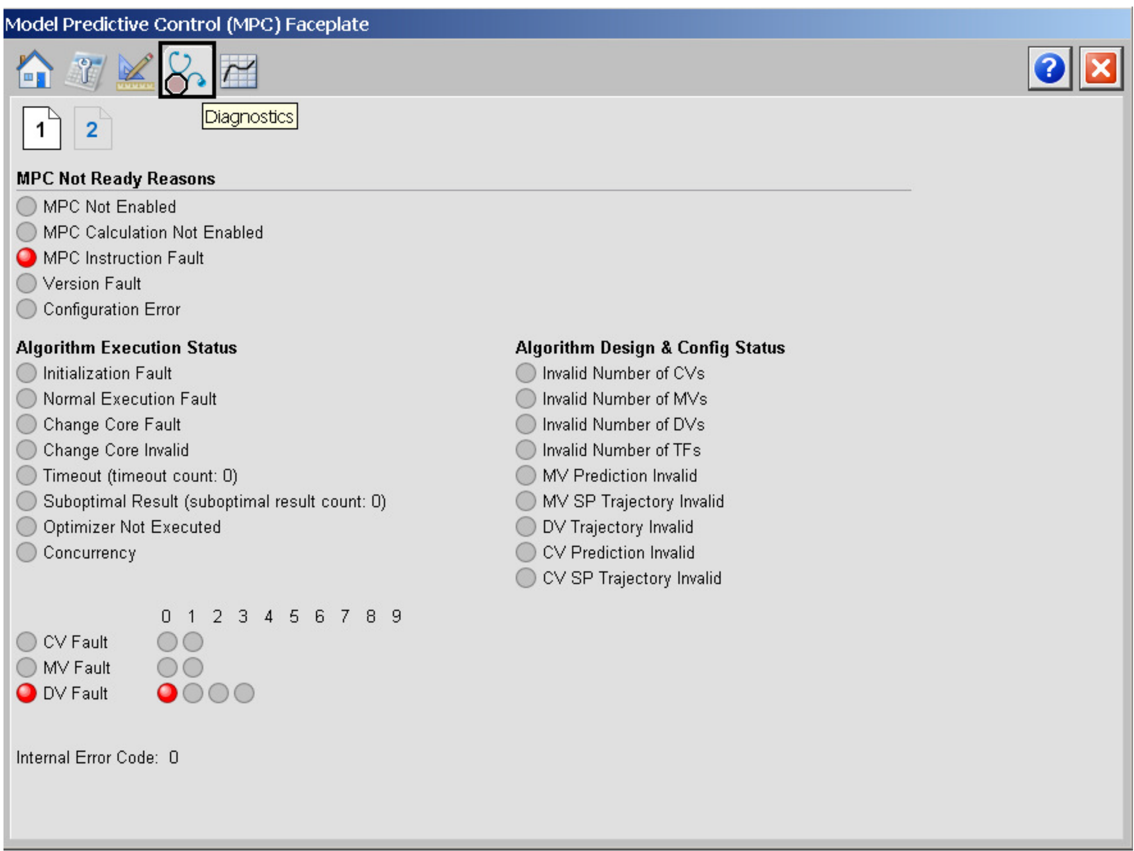
Diagnostics Tab

The Diagnostic tab provides indications that are helpful in diagnosing or preventing device problems, which can include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

The Diagnostics tab is divided into two pages.

Diagnostics Tab Page 1

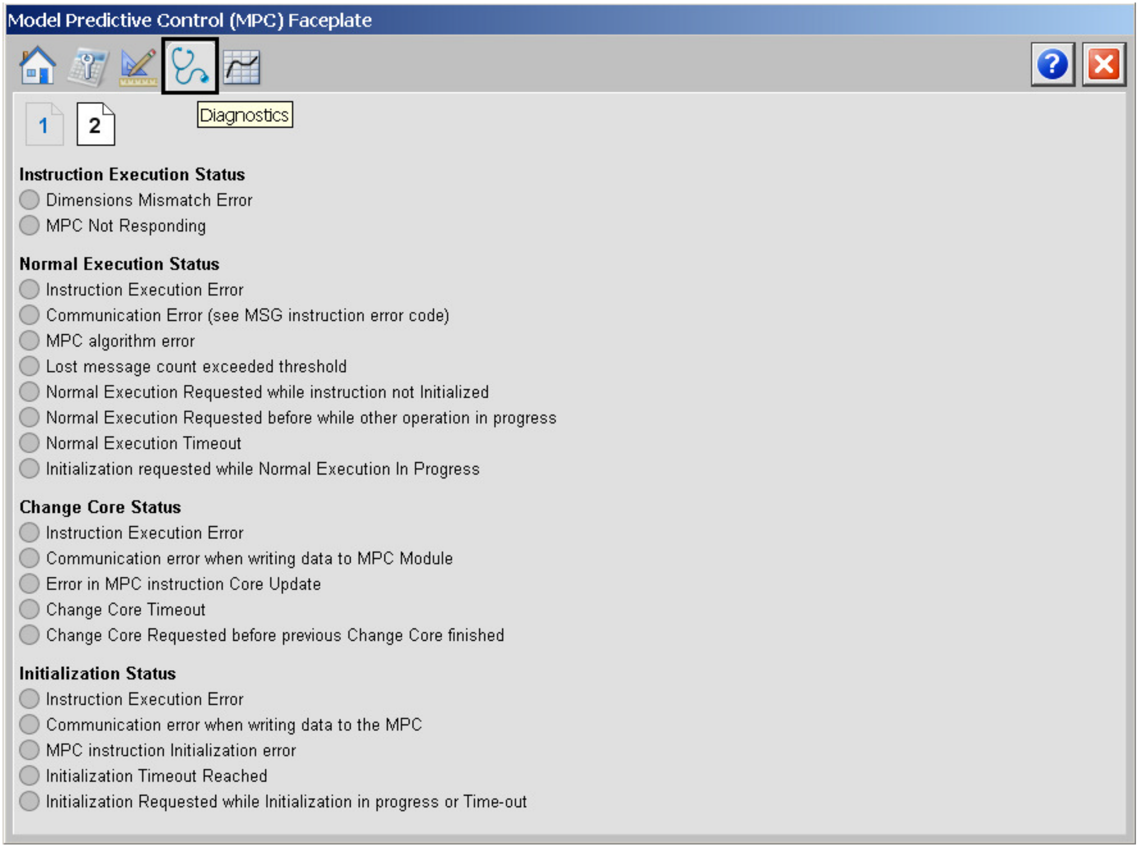
Page 1 of the Diagnostics tab displays PlantPAx MPC Not Ready reasons, algorithm execution and design faults, and variables (CV, MV, and DV) faults. Internal Error Code is also displayed here.



The previous image indicates that the device is not ready because of a DV0 fault.

Diagnostics Tab Page 2

Page 2 of the Diagnostics tab displays PlantPAx MPC Add-On Instruction execution status, communication errors, and timeouts that can occur during Normal Execution, Change Core, or Initialization.



The previous image indicates that there are no faults and PlantPAx MPC works correctly.

Trends Tab

The Trends tab is divided into up to five pages based on the number of variables.

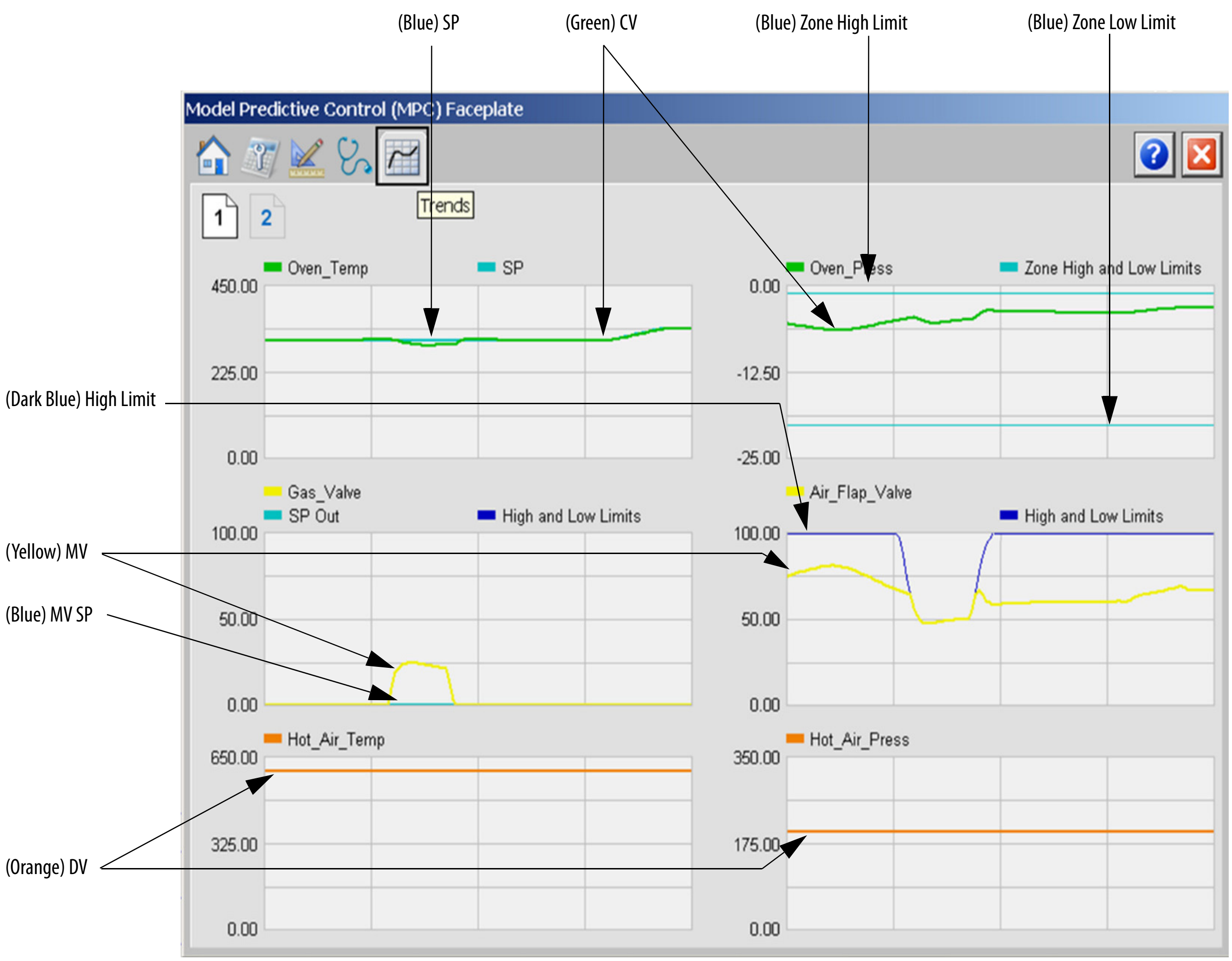
Each page contains two sets of trends for CV, MV and DV, which are organized in the following way.

On the upper part, you can view the constant or trajectory setpoint (blue line) and CV (green line). In case the zone control is used, the high and low limits are indicated by blue lines.

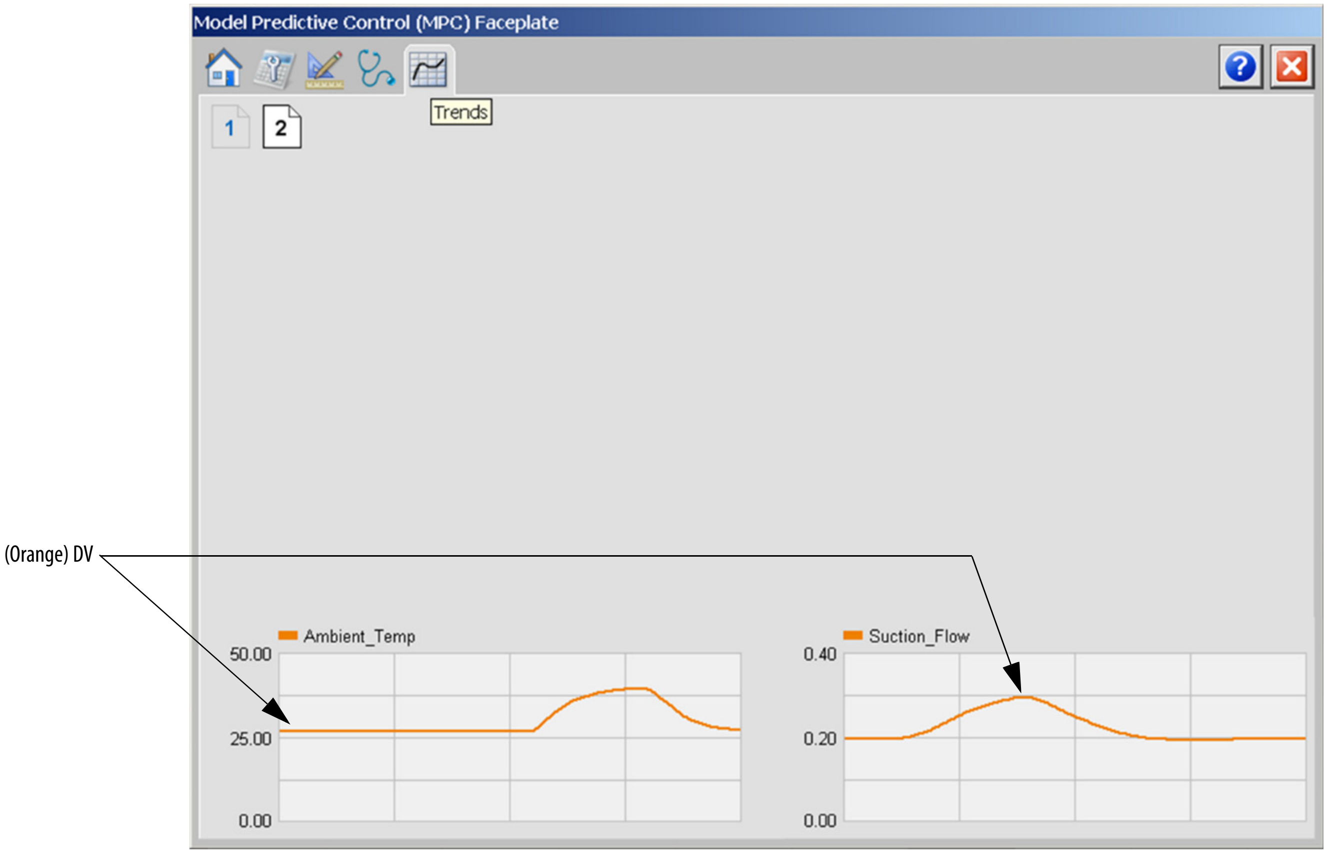
On the middle part, you can view, if used, the constant or trajectory setpoint (blue line) and MV (yellow line). The high and low limits are indicated by dark blue lines.

On the lower part, you can view DV (orange line).

Trends Tab Page 1



Trends Tab page 2

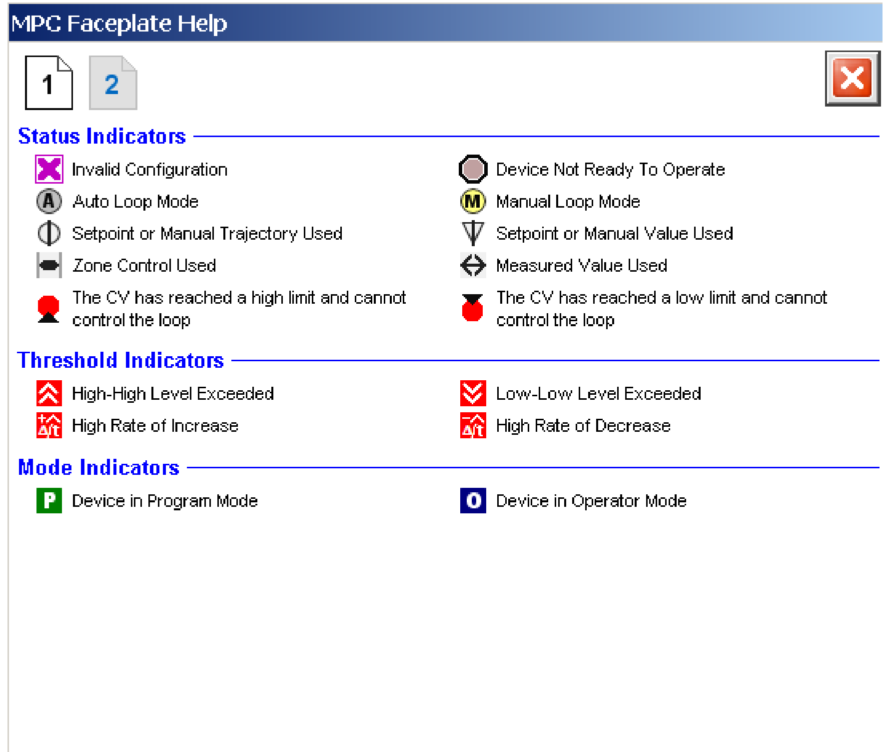


Faceplate Help

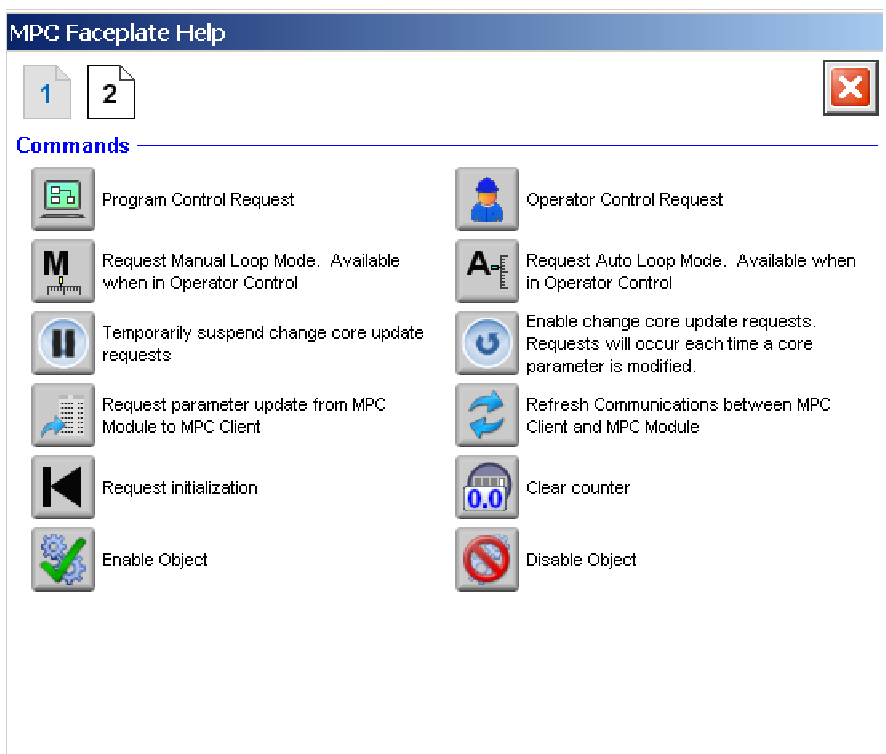
The Faceplate Help page shows the indicators and command buttons that are used by the PlantPAx MPC function block.

The Faceplate Help is divided into two pages.

Faceplate Help Page 1



Faceplate Help Page 2



PlantPAx MPC Controlled Variable

The PlantPAx MPC Controlled Variable faceplate provides monitoring of the Controlled Variable and modification of its settings.

TIP The Controlled Variable faceplate can be opened either using the corresponding Controlled Variable icon or a link from PlantPAx MPC Overview Faceplate.

Visualization Files

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 127 - PlantPAx MPC Controlled Variable Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons that are used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 129 - PlantPAx MPC Controlled Variable Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-MPC) CV-Faceplate	N/A	The faceplate display that is used for the Controlled Variable object.
(RA-MPC) MPC Family-Help	N/A	Help information that is accessed from the MPC Help faceplate.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported through the comma-separated variable file (.csv file type) in the following table.

Table 130 - PlantPAx MPC Controlled Variable Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	N/A	N/A

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 131 - PlantPAx MPC Overview Display Elements Descriptions

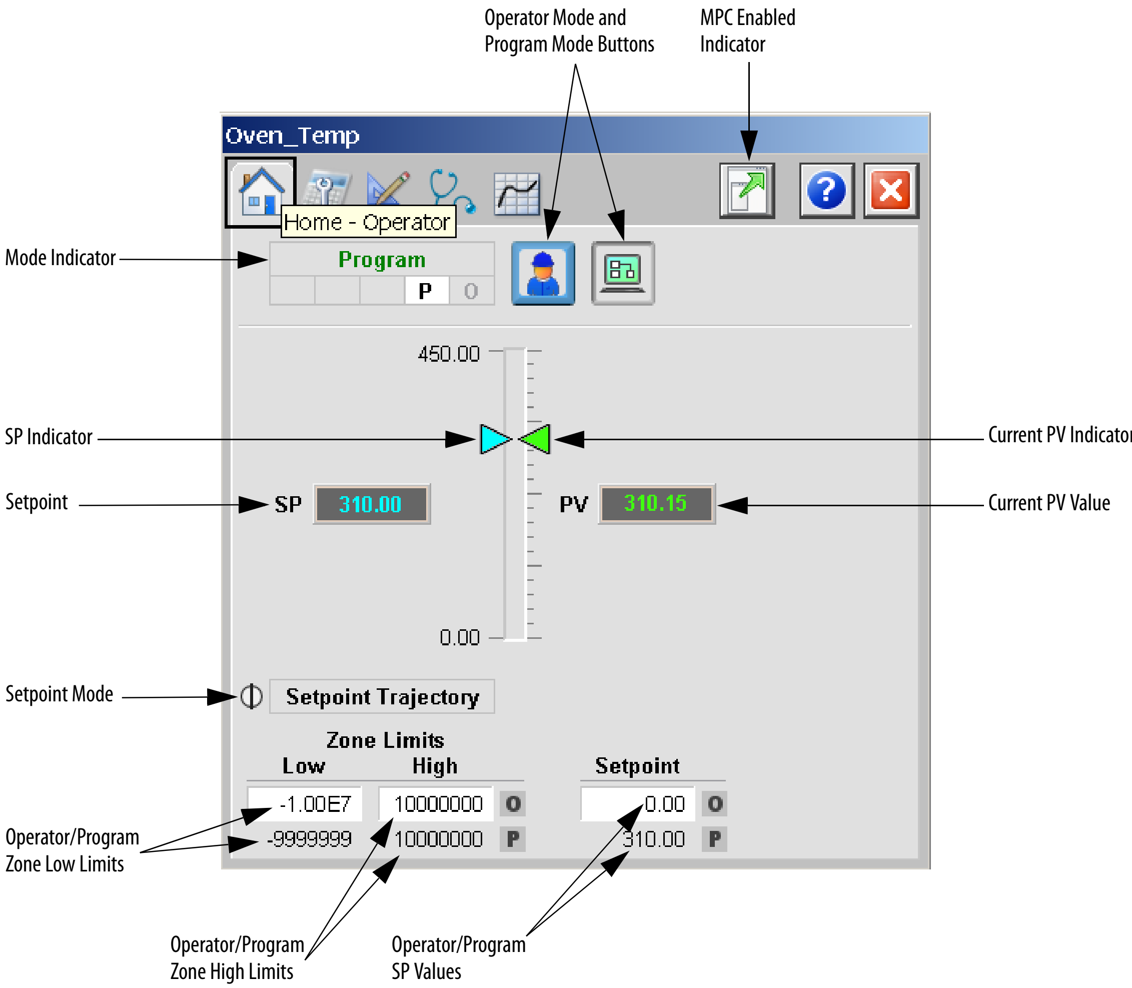
Display Element Name	Display Element	Description
GO_MPC_CV		PlantPAx MPC Controlled Variable object with CV, SP, and Zone high and low value numeric displays.

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the CV status and manually operate the CV when it is in Operator mode.

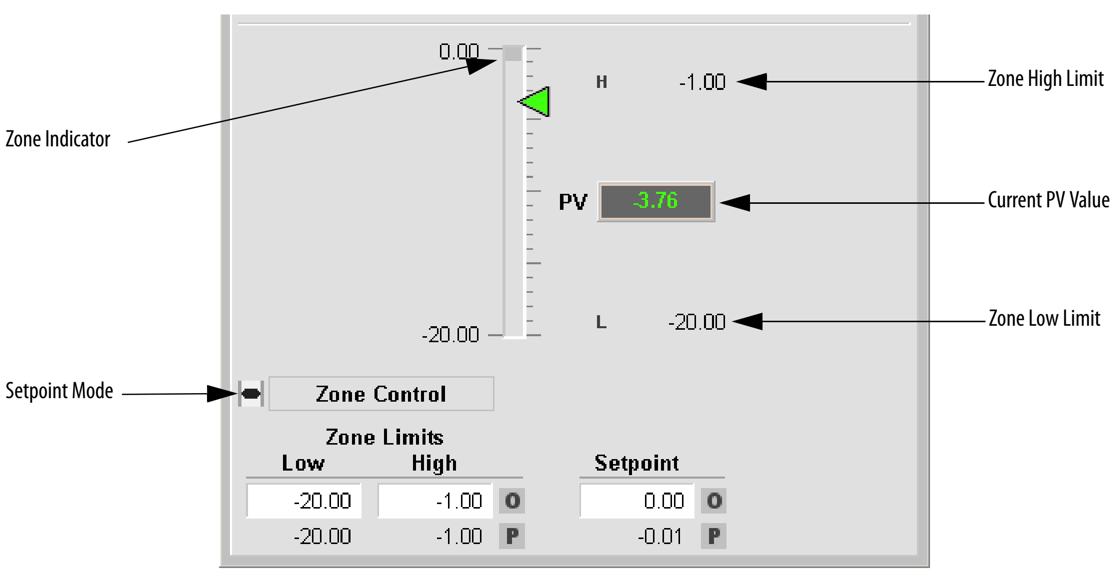
The Operator tab shows the following information:

- Current instruction mode (Program or Operator)
- Current CV enabled status and fault status
- Current Controlled Variable (CV)
- Bar graph for the current Controlled Variable
- Current Setpoint (SP)
- Current High and Low Zone Limits
- Current Setpoint Mode (not selected, Value, Trajectory, Zone)
- Program Low and High Zone Limits
- Program setpoint



Operator Mode and Program Mode Buttons
MPC Enabled Indicator
Oven_Temp
Home - Operator
Mode Indicator
Program
P
O
450.00
SP Indicator
Current PV Indicator
Setpoint
SP
310.00
PV
310.15
Current PV Value
0.00
Setpoint Mode
Setpoint Trajectory
Zone Limits
Low
High
Setpoint
-1.00E7
10000000
0.00
-9999999
10000000
310.00
Operator/Program Zone Low Limits
Operator/Program Zone High Limits
Operator/Program SP Values

Zone Mode



0.00
H
-1.00
Zone High Limit
Zone Indicator
PV
-3.76
Current PV Value
-20.00
L
-20.00
Zone Low Limit
Setpoint Mode
Zone Control
Zone Limits
Low
High
Setpoint
-20.00
-1.00
0.00
-20.00
-1.00
-0.01

The following table lists the functions on of the Operator tab.

Table 132 - Operator Tab Description

Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
Operator Low and High Limits	Type the low and high limits for Zone Control.	Normal Operation of Devices (Code A)
Operator Setpoint	Type a value for the Operator mode Operator Setpoint.	

Maintenance Tab

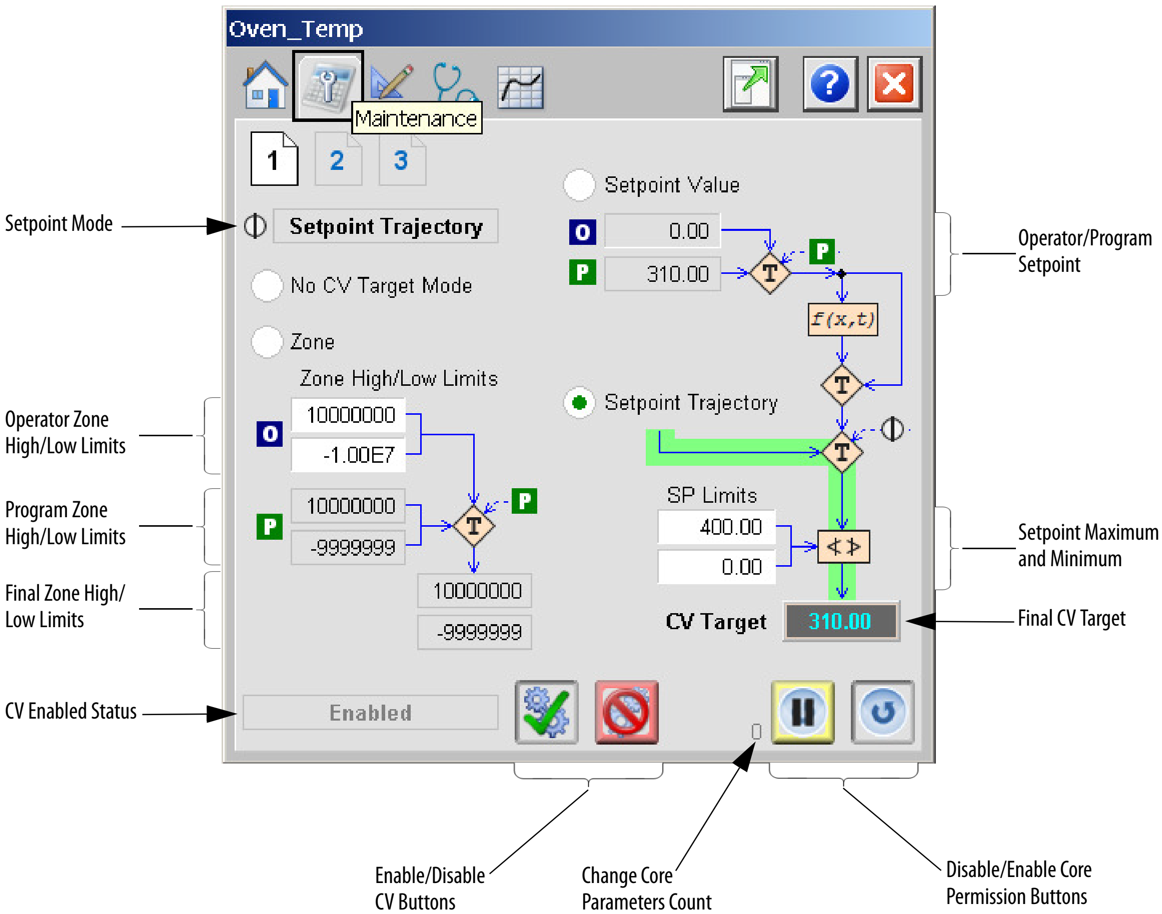
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab is divided into three pages.

Maintenance Tab Page 1

Page 1 of the Maintenance tab enables you to change the Setpoint mode of the CV and edit the limits for setpoint and for zone control mode.

Page 1 of the Maintenance tab shows the following information:
- Current Setpoint Mode (not selected, Value, Trajectory, Zone)
- Current CV enabled status
- Program Low and High Zone Limits
- The actual low and high zone limits after selection
- Program setpoint value
- The actual CV Target after selection and clamping
- The source of the setpoint, by animation of the data path and transfer points



The following table lists the functions on page 1 of the Maintenance tab.

Table 133 - Maintenance Tab Page 1 Description

Function	Action	Security
	Click to enable PlantPAx MPC instruction	Equipment Maintenance (Code C)
	Click to disable PlantPAx MPC instruction.	
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
No CV Target Mode	Click to select no setpoint mode and exclude the objective from criterion.	Equipment Maintenance (Code C)
Zone	Click to set the setpoint mode to Zone.	
Setpoint Value	Click to set the setpoint mode to Setpoint Value.	
Setpoint Trajectory	Click to set the setpoint mode to Setpoint Trajectory.	

Table 133 - Maintenance Tab Page 1 Description

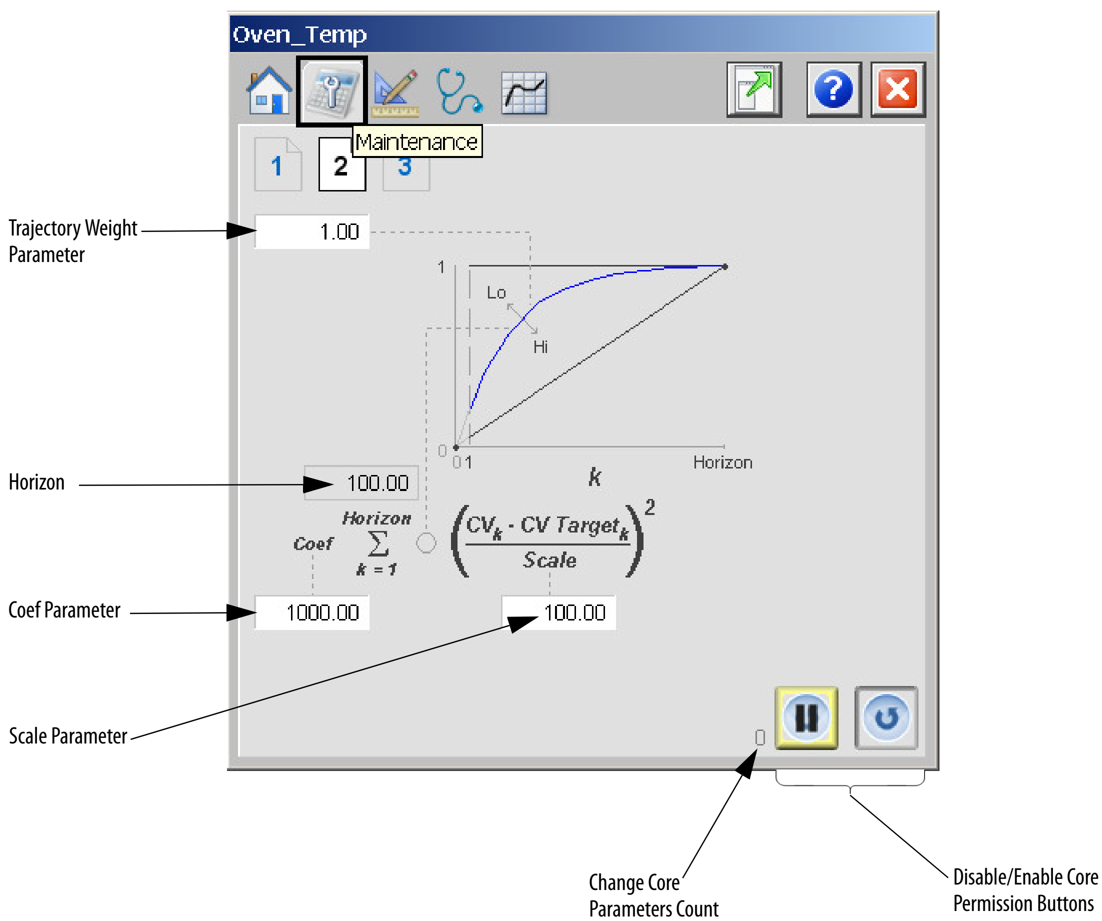
Function	Action	Security
Operator Zone - High/Low Limits	Type high and low limits for zone control.	Normal Operation of Devices (Code A)
Operator Setpoint Value	Type a value for the Operator Setpoint for the Operator mode.	
Setpoint high and low limits	Type the maximum and minimum limits for the setpoint.	Equipment Maintenance (Code C)

Maintenance Tab Page 2

Page 2 of the Maintenance tab displays the CV Objective function term and enables you to edit its parameters.

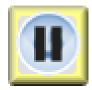
Page 2 of the Maintenance tab shows the following information:

- Current Prediction horizon
- Input fields for CV Coefficient, Scale, and Trajectory Weight



The following table lists the functions on page 2 of the Maintenance tab.

Table 134 - Maintenance Tab Page 2 Description

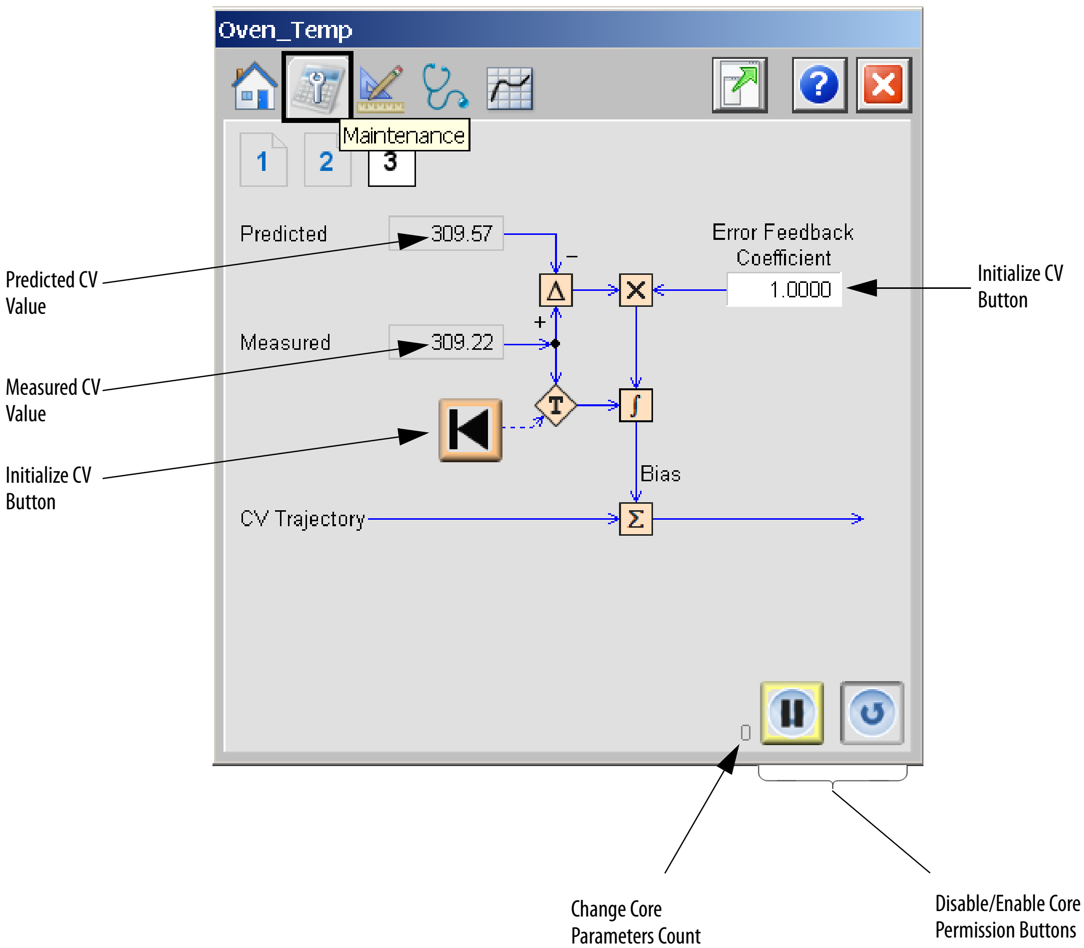
Function	Action	Security
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
Trajectory Weight	Type a value for the CV Trajectory Weight parameter.	
Coef	Type a value for the CV Coef parameter.	
Scale	Type a value for the CV Scale parameter.	

Maintenance Tab Page 3

Page 3 of the Maintenance tab displays the Model Error Compensation scheme and enables you to edit Error Feedback Coefficient parameter and also set the CV initialization request.

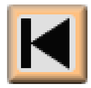
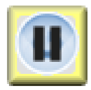
Page 3 of the Maintenance tab shows the following information:

- Predicted CV Value
- Measured CV Value
- Data path and transfer points for model error compensation



The following table lists the functions on Page 3 of the Maintenance tab.

Table 135 - Maintenance Tab Page 3 Description

Function	Action	Security
	Click to request initialization of CV.	Configuration and Tuning Maintenance (Code D)
	Click to disable the Change Core permissive.	
	Click to enable the Change Core permissive.	
Error Feedback Coefficient.	Type a value for the CV Error Feedback Coefficient	

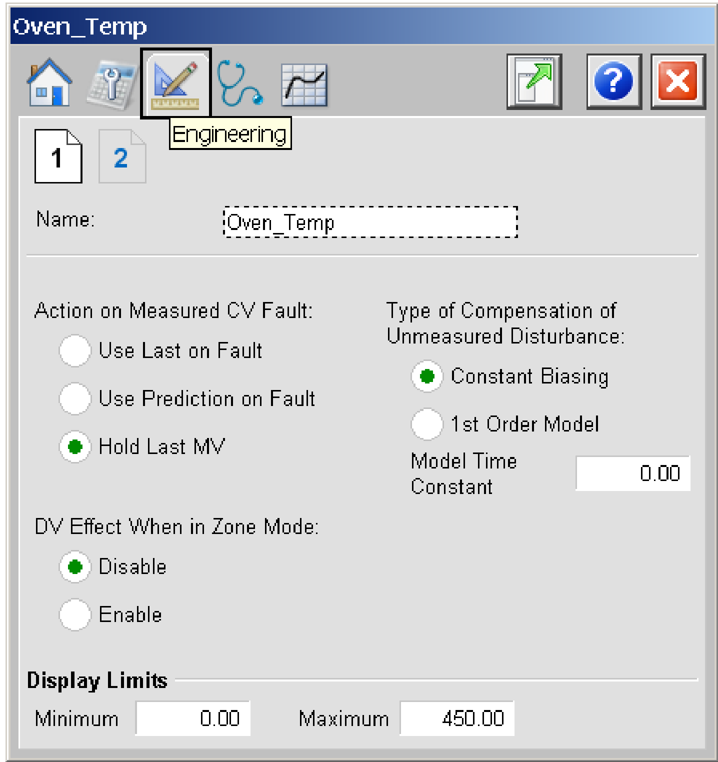
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages

Engineering Tab Page 1

On page 1 of the Engineering tab, you can configure the name of the CV, behavior when CV has faulty value, compensation of the unmeasured disturbance, reaction on DV changes when in zone mode, and display limits for the variable.



The following table lists the functions on page 1 of the Engineering tab.

Table 136 - Engineering Tab Page 1 Description

Function	Action	Security
Name	Type the variable name	Engineering Configuration (Code E)
Action on Measured CV Fault: Use Last on Fault	Click to use the last healthy measurement for the CV as the current measured value.	
Action on Measured CV Fault: Use Prediction on Fault	Click to use the predicted value for the CV as the current measured value.	
Action on Measured CV Fault: Hold Last MV	Click to hold previous output values for the MVs in Auto mode.	
DV Effect When in Zone Mode: Disable	Click to calculate the CV setpoint so that MV is not affected by moving disturbance as long as the CV stays within Zone limits.	
DV Effect When in Zone Mode: Enable	Click to stabilize the CV on constant setpoint inside the zone limits.	
Type of Compensation of Unmeasured Disturbance: Constant Biasing	Click to set Type of error feedback for compensation of unmeasured disturbance: Constant output unmeasured disturbance.	

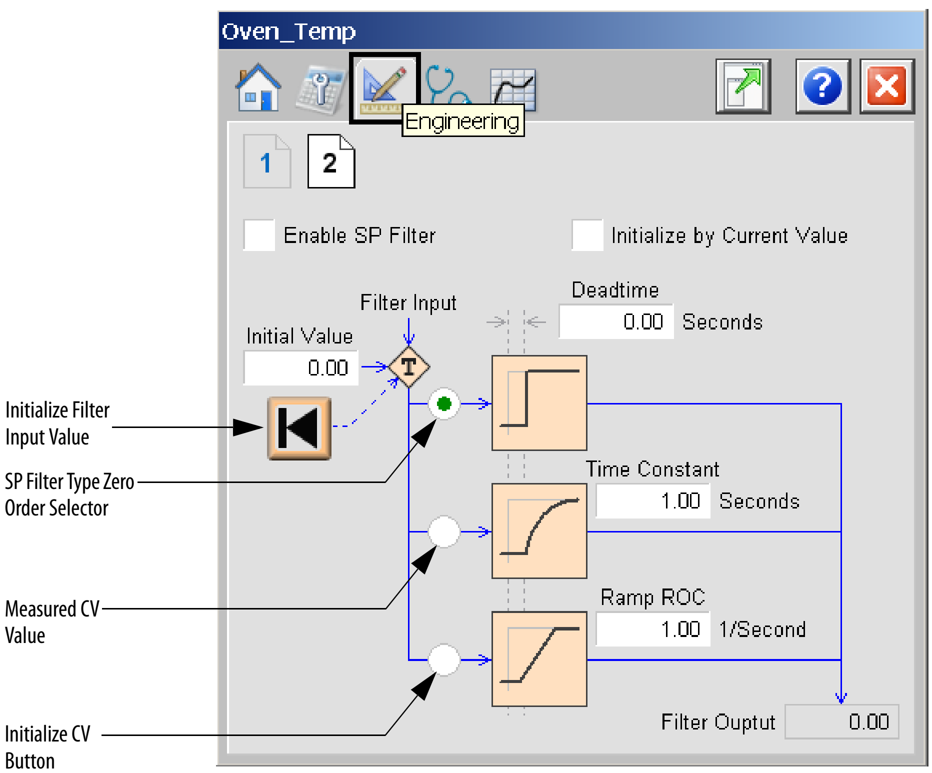
Table 136 - Engineering Tab Page 1 Description

Function	Action	Security
Type of Compensation of Unmeasured Disturbance: 1st Order Model	Click to set Type of error feedback for compensation of unmeasured disturbance: First order model of unmeasured disturbance.	Engineering Configuration (Code E)
Model Time Constant	Type a value for Time Constant of first order model of unmeasured disturbance.	
Display Limits Minimum and Maximum	Type minimum and maximum value of the variable to be used in HMI.	

Engineering Tab Page 2

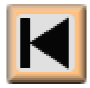
On page 2 of the Engineering tab, you can configure the Filter for the CV Setpoint. You can choose one of three filter types, set the required filter parameters and turn the filtering on and off.

Page 2 of the Engineering tab shows the Current SP Filter Output.



The following table lists the functions on page 2 of the Engineering tab.

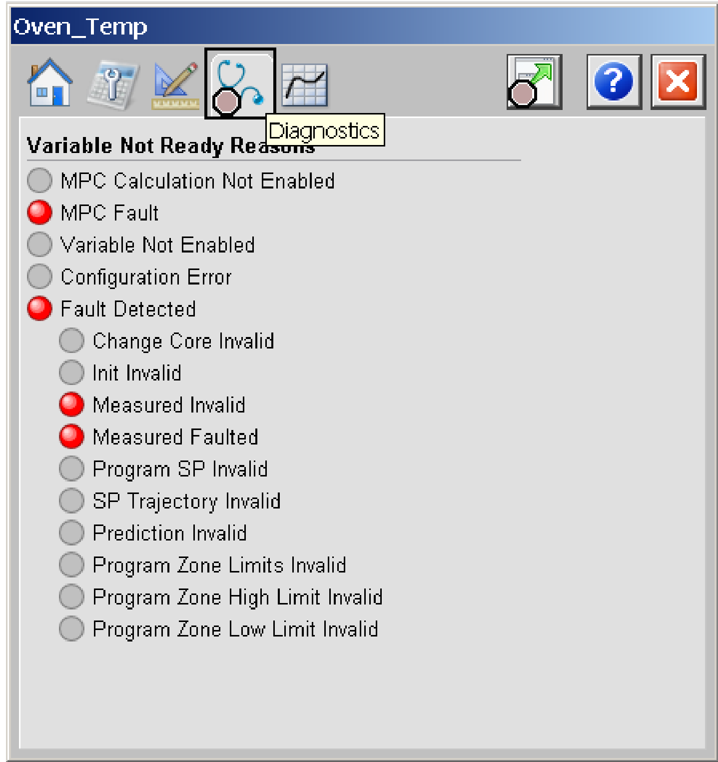
Table 137 - Engineering Tab Page 2 Description

Function	Action	Security
	Click to request to initialization of filter internal states and output of the filter based on InitValue input.	Engineering Configuration (Code E)
Enable SP Filter	Check to enable Setpoint Filter.	
Initialize by Current Value	Check to initialize filter by current value in every time step.	
Initial Value	Type a value for Setpoint Filter initial value.	
Deadtime	Type a value for model deadtime.	
Time Constant	Type a value for model time constant.	
Ramp ROC	Type a value for Ramp Rate of Change per second.	
SP Filter Type	Click to select the filter model type. 0 = Zero order, 1 = First order, 2 = Ramp.	

Diagnostics Tab

The Diagnostic tab provides indications that help to diagnose or prevent device problems. These problems can include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

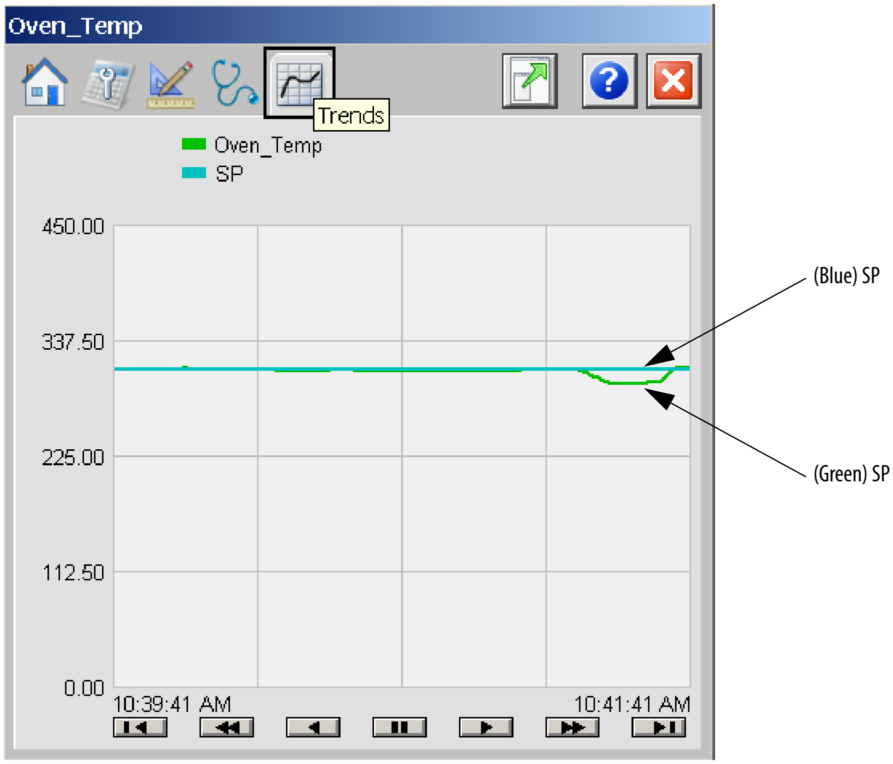
The Diagnostics Tab displays overall PlantPAx MPC errors, configuration errors for both Operator and Program mode, initialization and change core parameters errors and measurement errors.



The previous image indicates that the device is not ready because of a measured value fault.

Trends Tab

On the Trends Tab, you can view the constant or trajectory setpoint (blue line) and CV (green line). In case the zone control is used, the high and low limits are indicated by two blue lines.



Faceplate Help

See Faceplate Help on page 302 for information on Faceplate Help.

PlantPAx MPC Manipulated Variable

The PlantPAx MPC Manipulated Variable Faceplate provides monitoring of the Manipulated Variable and modification of its settings.

TIP The Manipulated Variable faceplate can be opened either using the corresponding Manipulated Variable icon or a link from PlantPAx MPC Overview faceplate.

Visualization Files

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 138 - PlantPAx MPC Manipulated Variable Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons that are used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 140 - PlantPAx MPC Manipulated Variable Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-MPC) MV-Faceplate	N/A	The faceplate display that is used for the Manipulated Variable object.
(RA-MPC) MPC Family-Help	N/A	Help information that is accessed from the MPC Help faceplate.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported through the comma-separated variable file (.csv file type) in the following table.

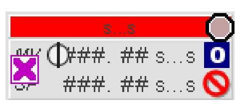
Table 141 - PlantPAx MPC Manipulated Variable Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	N/A	N/A

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 142 - PlantPAx MPC Overview Display Elements Descriptions

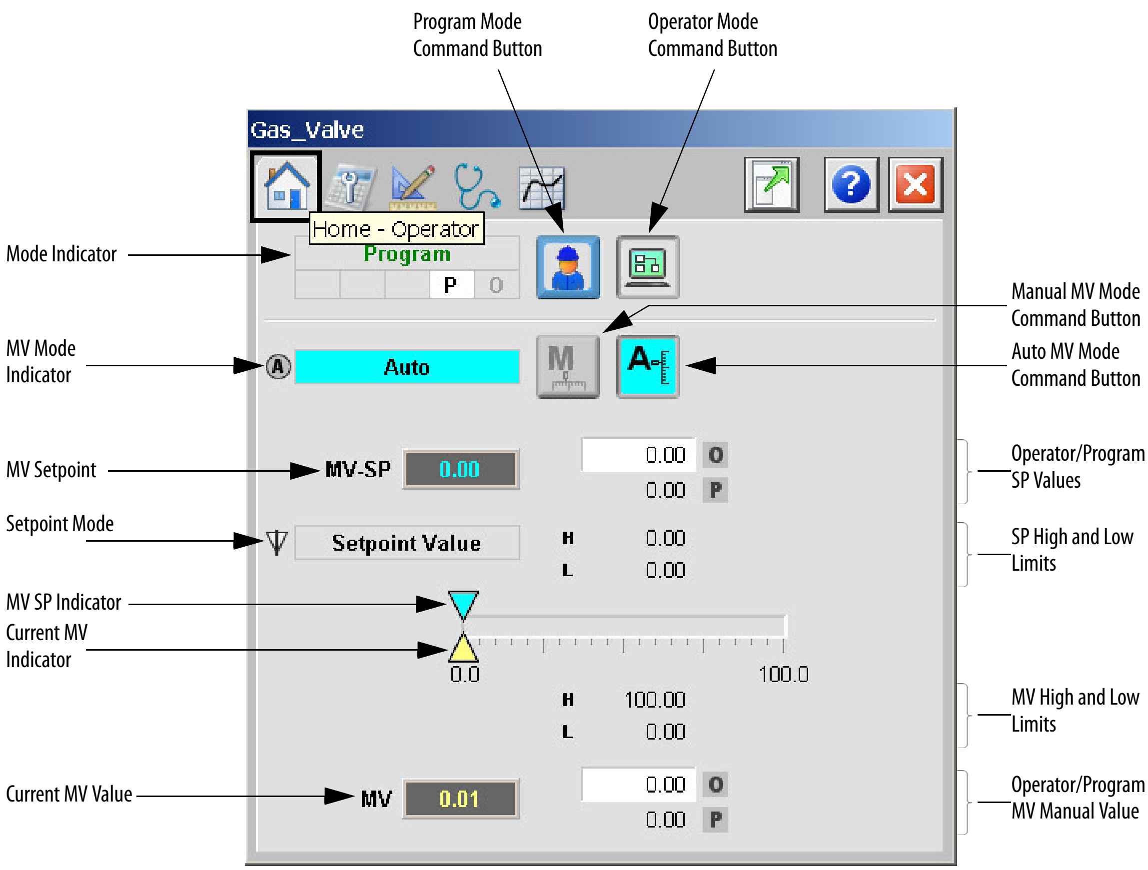
Display Element Name	Display Element	Description
GO_MPC_MV		PlantPAx MPC Manipulated Variable object with MV and SP numeric displays.

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the MV status and manually operate the MV when it is in Operator mode.

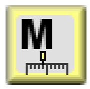
The Operator tab shows the following information:

- Current instruction mode (Program or Operator)
- Current MV mode, enabled status and fault status
- Current Setpoint (MV-SP)
- Program setpoint
- Current MV Setpoint Mode (not selected, Value, Trajectory)
- Current MV Setpoint Limits
- Bar graph for the current Manipulated Variable
- Current MV Manual Mode Value (not used, Manual Value, Manual Trajectory)
- Current MV High and Low Limits
- Current Manipulated Variable (MV)



The following table lists the functions on of the Operator tab.

Table 143 - Operator Tab Description

Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	
	Click to request Manual MV mode.	Normal Operation of Devices (Code A)
	Click to request Automatic MV mode.	
Operator MV Setpoint Value	Type a value for the MV Setpoint in the Operator mode.	
Operator Manual Value	Type s value for the MV value in the Operator mode.	

Maintenance Tab

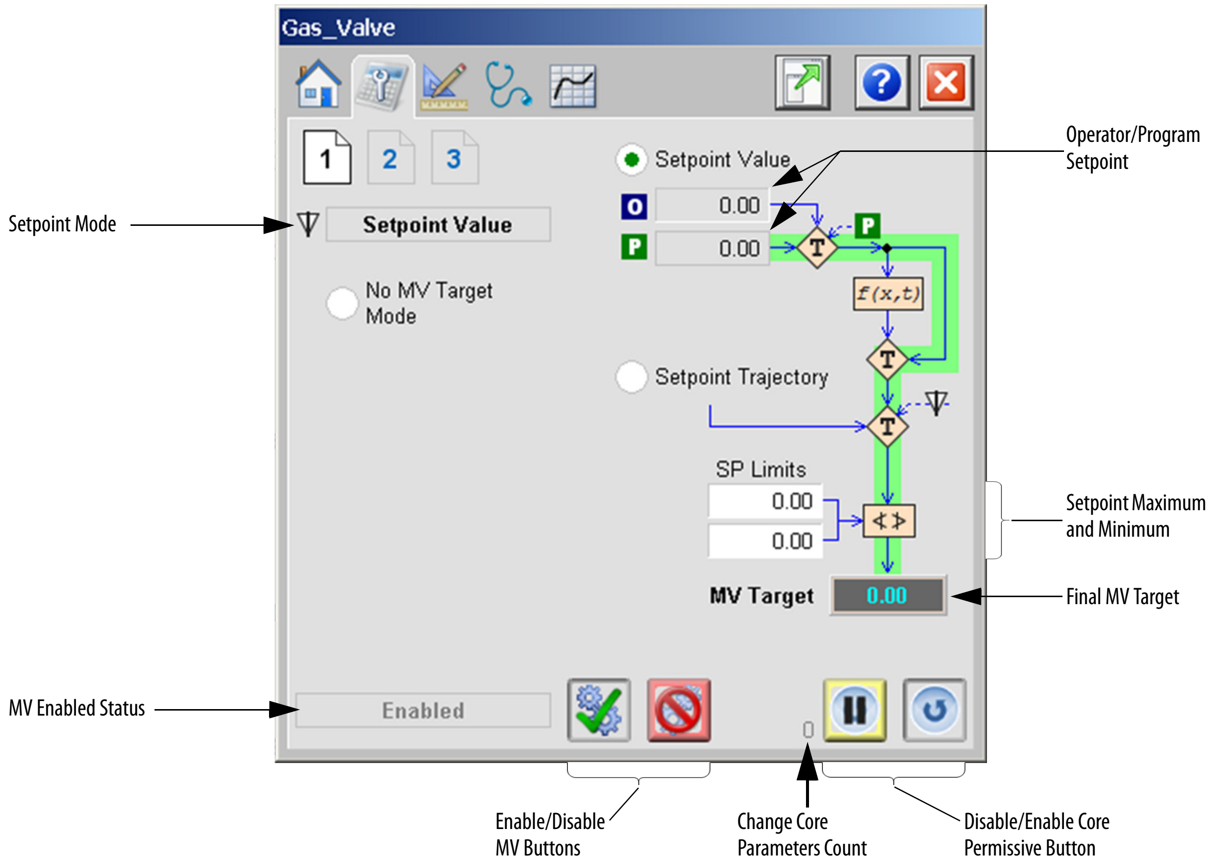
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab is divided into three pages

Maintenance Tab Page 1

Page 1 of the Maintenance tab enables you to change the Setpoint mode of the MV and edit the limits for the setpoint.

Page 1 of the Maintenance tab shows the following information:
- Current MV Setpoint Mode (not selected, Value, Trajectory)
- Current CV enabled status
- Program setpoint value
- The actual CV Target after selection and clamping
- The source of the setpoint, by animation of the data path and transfer points



The following table lists the functions on page 1 of the Maintenance tab.

Table 144 - Maintenance Tab Page 1 Description

Function	Action	Security
	Click to enable PlantPAx MPC instruction	Equipment Maintenance (Code C)
	Click to disable PlantPAx MPC instruction.	
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
No MV Target Mode	Click to select no setpoint mode and exclude the objective from criterion.	Equipment Maintenance (Code C)
Setpoint Value	Click to set the Setpoint mode to Setpoint Value.	
Setpoint Trajectory	Click to set the Setpoint mode to Setpoint Trajectory.	

Table 144 - Maintenance Tab Page 1 Description

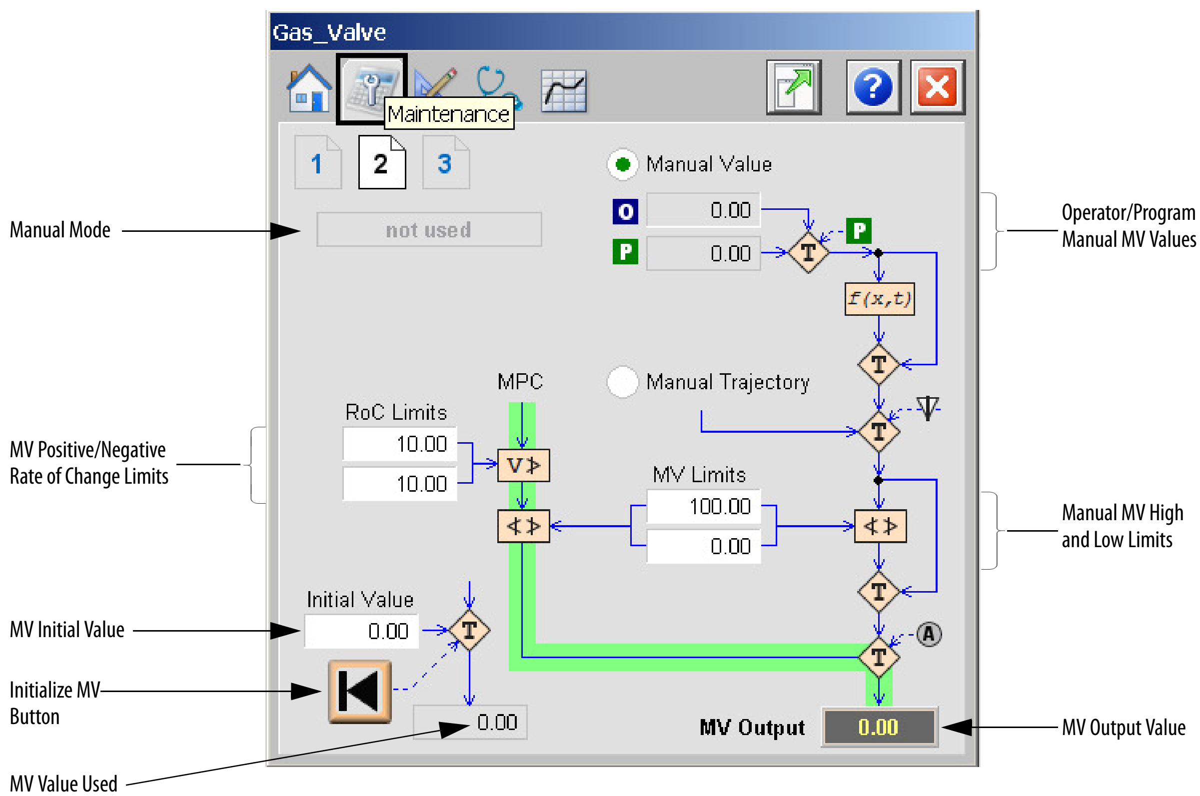
Function	Action	Security
Operator Setpoint Value	Type a value for the Operator Setpoint in Operator mode.	Normal Operation of Devices (Code A)
Setpoint High and Low Limits	Type the maximum and minimum limits for the Setpoint.	Equipment Maintenance (Code C)

Maintenance Tab Page 2

Page 2 of the Maintenance tab enables you to edit the MV Rate of Change Limits, MV High and Low Limits, change the MV Initial Value, and initialize the MV.

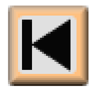
Page 2 of the Maintenance tab shows the following information:

- Current MV Manual mode (not used, Manual Value, Manual Trajectory)
- Current Value Used
- Program Manual Value
- MV Output
- The source of the MV Output, by animation of the data path and transfer points



The following table lists the functions on page 2 of the Maintenance tab.

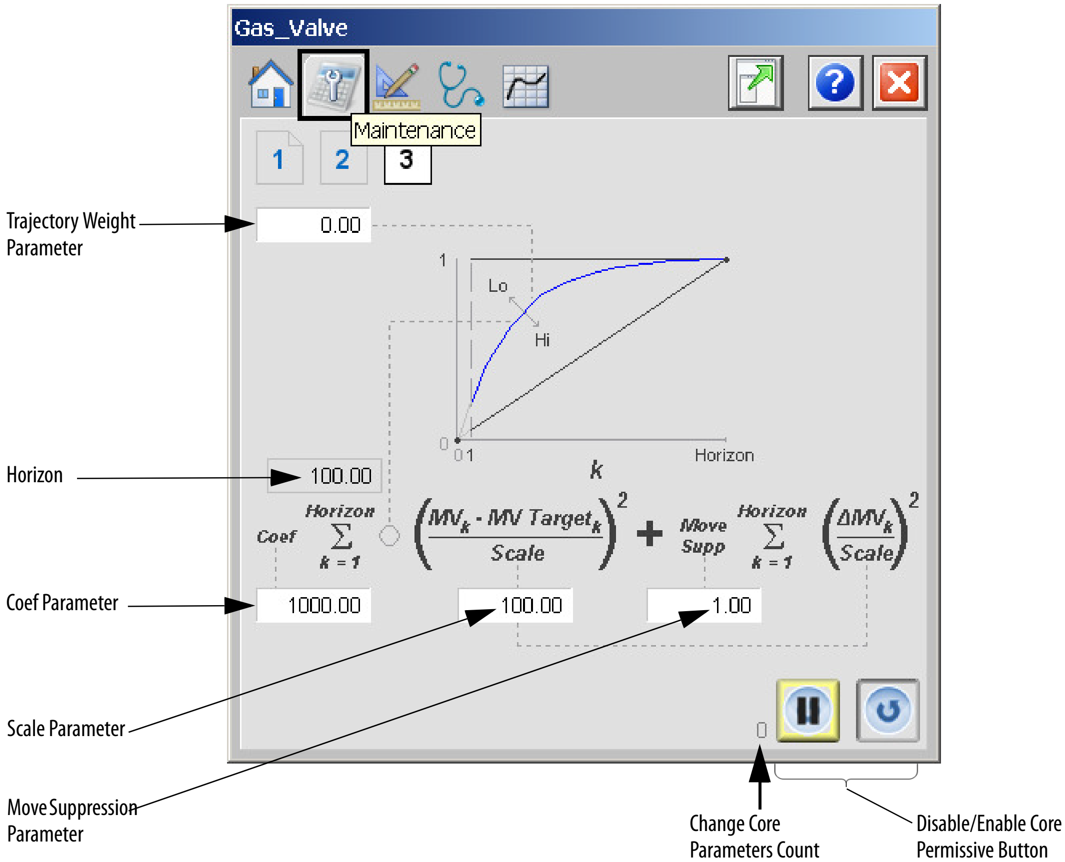
Table 145 - Maintenance Tab Page 2 Description

Function	Action	Security
	Click to request instruction of MV.	Configuration and Tuning Maintenance (Code D)
Initial Value	Type a value for the initial value of MV.	Equipment Maintenance (Code C)
Operator Manual Value	Type a value for MV in the Operator mode.	Normal Operation of Devices (Code A)
RoC Limits	Type a value for MV Rate of Change positive and negative limits.	Equipment Maintenance (Code C)
MV Limits	Type the maximum and minimum limits for MV.	
Manual Value	Click to set the MV Manual mode to Manual Value.	
Manual Trajectory	Click to set the MV Manual mode to Manual Trajectory.	

Maintenance Tab Page 3

Page 3 of the Maintenance tab displays the MV Objective function term and enables you to edit its parameters.

Page 3 of the Maintenance tab shows the following information:
- Current Prediction horizon
- Input fields for MV Coefficient, Scale, Trajectory Weight and Move Suppression



The following table lists the functions on page 3 of the Maintenance tab.

Table 146 - Maintenance Tab Page 3 Description

Function	Action	Security
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
Trajectory Weight Parameter	Type a value the MV Trajectory Weight parameter.	
Coef Parameter	Type a value for the MV Coef parameter	
Scale Parameter	Type a value for the MV Scale parameter.	
Move Suppression Parameter	Type a value for the MV Move Suppression parameter.	

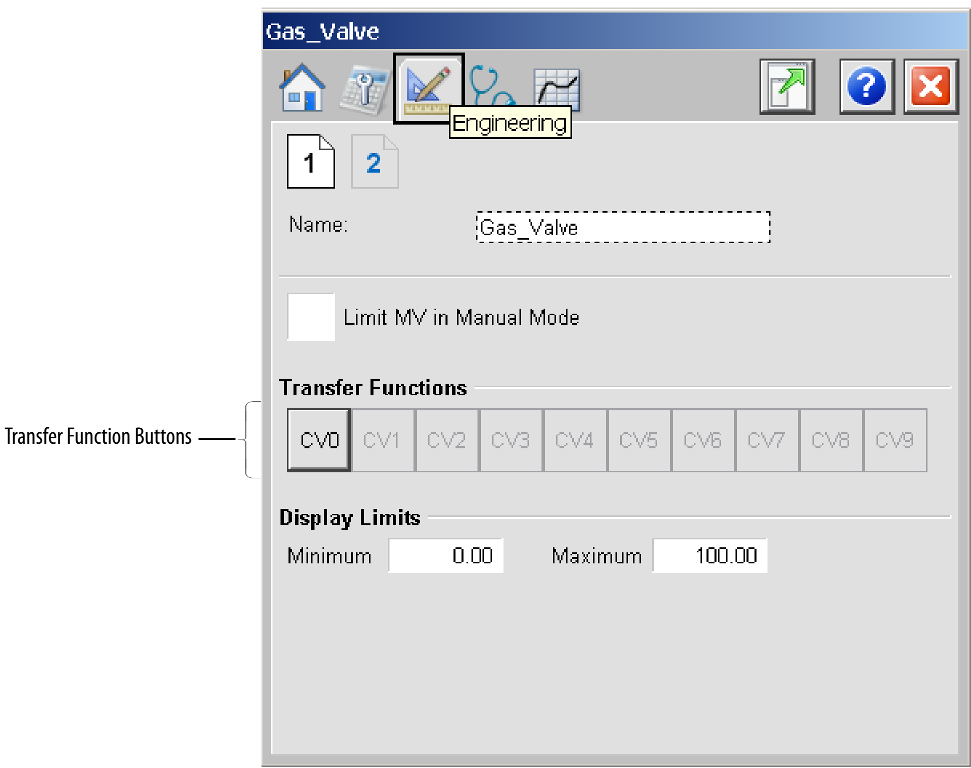
Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages

Engineering Tab Page 1

On page 1 of the Engineering tab, you can configure the name of the MV, limiting of the MV in Manual mode, display limits for the variable. There are also buttons opening the Transfer Function Faceplates for the transfer functions related to the MV. If there is a transfer function between the particular MV and CV, the button is enabled, otherwise is disabled.



The following table lists the functions on page 1 of the Engineering tab.

Table 147 - Engineering Tab Page 1 Description

Function	Action	Security
Name	Type the name of the variable.	Engineering Configuration (Code E)
Limit MV in Manual Mode	Check to limit the output in Manual mode.	
Transfer Functions (CV0…CV9)	Click to open the corresponding Transfer Function faceplate.	None

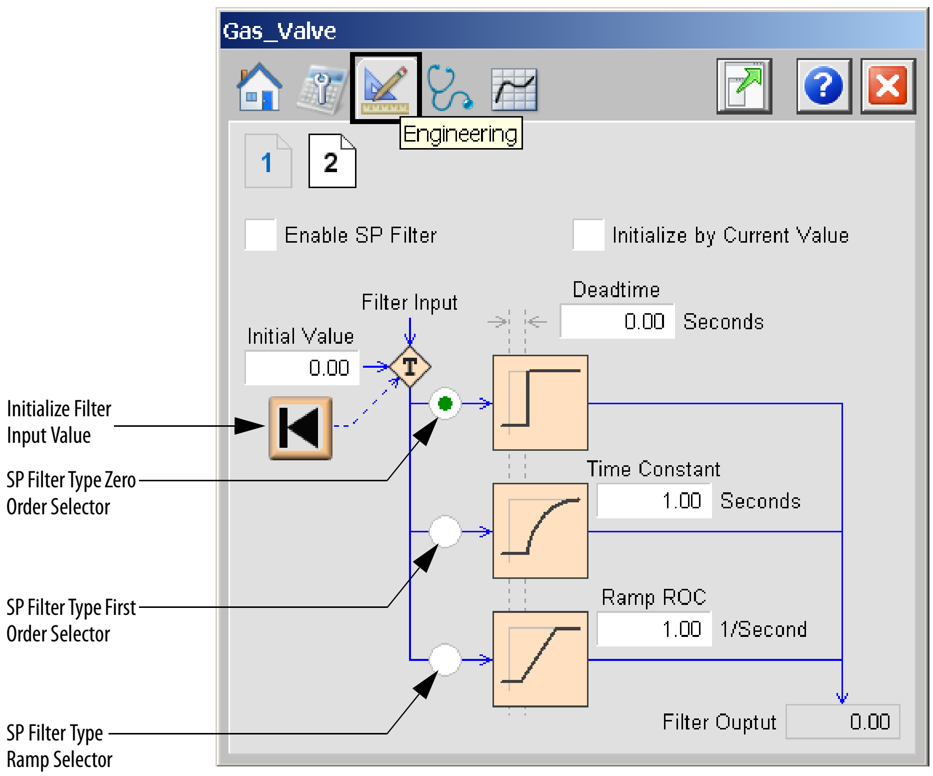
Table 147 - Engineering Tab Page 1 Description

Function	Action	Security
Display Limits Minimum and Maximum.	Type the minimum and maximum value of the variable to be used in the HMI.	Engineering Configuration (Code E)

Engineering Tab Page 2

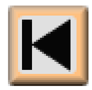
On page 2 of the Engineering tab, you can configure the Filter for the MV Setpoint or Manual Value (depends on the MV mode). You can choose one of three filter types, set the required filter parameters and turn the filtering on and off.

Page 2 of the Engineering tab shows the Current SP Filter Output.



The following table lists the functions on page 2 of the Engineering tab.

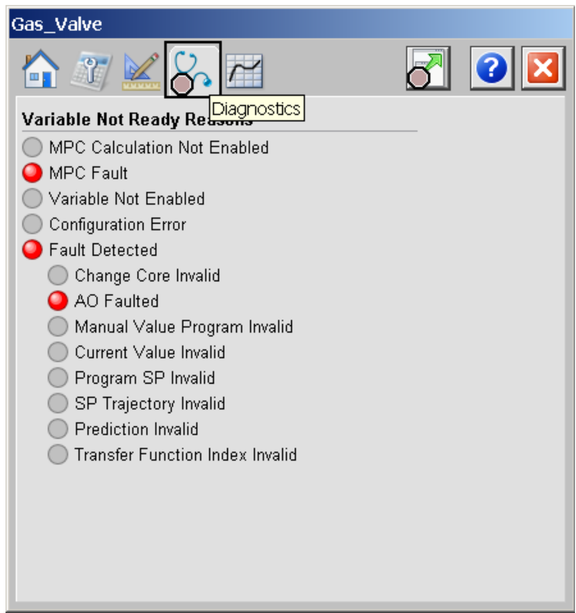
Table 148 - Engineering Tab Page 2 Description

Function	Action	Security
	Click to request to initialization of filter internal states and output of the filter based on InitValue input.	Engineering Configuration (Code E)
Enable SP (input) Filter	Check to enable Filter.	
Initialize by Current Value	Check to initialize filter by current value in every time step.	
Initial Value	Type a value for the Filter initial value.	
Deadtime	Type a value for model Deadtime.	
Time Constant	Type a value for model Time Constant.	
Ramp ROC	Type a value for Ramp Rate of Change per second.	
SP Filter Type	Click to select the filter model type. 0 = Zero order, 1 = First order, 2 = Ramp.	

Diagnostics Tab

The Diagnostic tab provides indications that help to diagnose or prevent device problems, which can include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

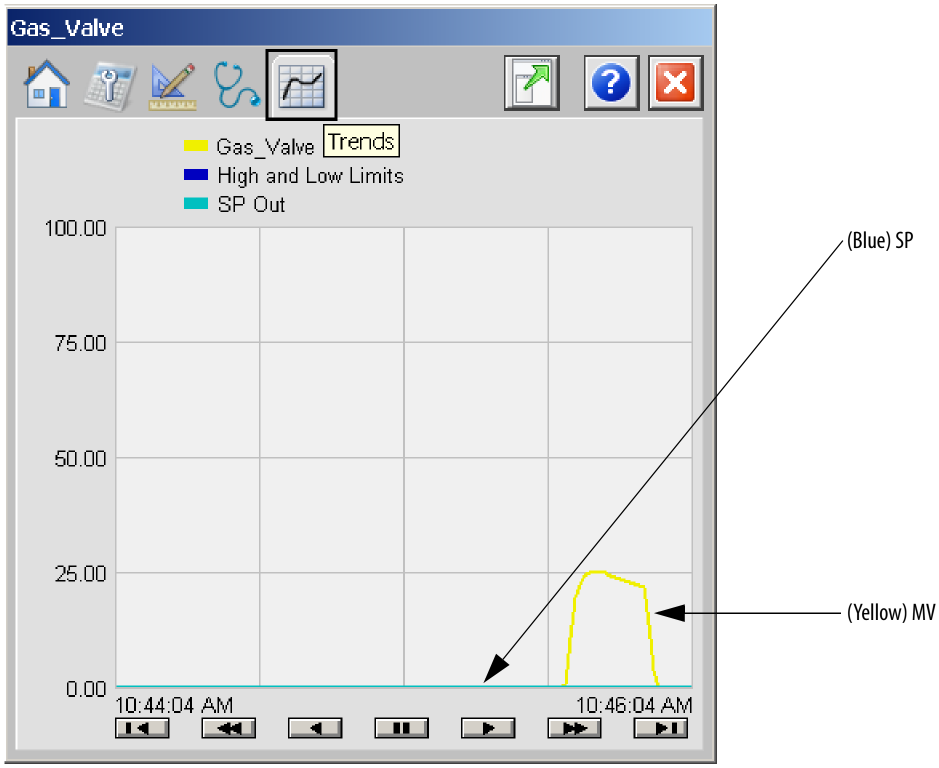
The Diagnostics tab displays overall PlantPAx MPC errors, configuration errors for both Operator and Program mode, change core parameters errors and measurement errors.



The previous image indicates that the device is not ready because of an actuator fault.

Trends Tab

On the Trends Tab, you can view, if used, the constant or trajectory setpoint (blue line) and MV (yellow line). The high and low limits are indicated by dark blue lines.



IMPORTANT	The previous image does not show the variable High and Low Limits because they are identical with the Display High and Low Limits that define the displayed range.

Faceplate Help

See Faceplate Help on page 302 for information on Faceplate Help.

PlantPAx MPC Disturbance Variable

The PlantPAx MPC Disturbance Variable faceplate provides monitoring of the Disturbance Variable and modification of its settings.

TIP The Disturbance Variable faceplate can be opened either using the corresponding Disturbance Variable icon or a link from PlantPAx MPC Overview Faceplate.

Visualization Files

IMPORTANT The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags
- Macros

Images are external graphic files that can be used in displays. They must be imported for FactoryTalk View to make use of them.

When PNG files are imported, they are renamed by FactoryTalk View with a .bmp file extension, but retain a .png format.

Table 149 - PlantPAx MPC Disturbance Variable Visualization Files: Images (.png)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and standard displays for all Process Objects.

The Global Object files (.ggfx file type) in the following table are Process Library display elements that are created once and referenced multiple times on multiple displays in an application. When changes are made to a Global Object, all instances in the application are automatically updated.

The Standard Displays files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

Table 151 - PlantPAx MPC Disturbance Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-MPC) DV- Faceplate	N/A	The faceplate display that is used for the Disturbance Variable object.
(RA-MPC) MPC Family-Help	N/A	Help information that is accessed from the MPC Help faceplate.

HMI Tags are created in a FactoryTalk View ME application to support tab switching on Process Library faceplates. The HMI tags can be imported through the comma-separated variable file (.csv file type) in the following table.

Table 152 - MPC Disturbance Visualization Files: HMI Tags (.csv)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
N/A	FTVME_PlantPAxLib_Tags_3_5_**xx**.csv where xx = the service release number.	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 153 - PlantPAx MPC Overview Display Elements Descriptions

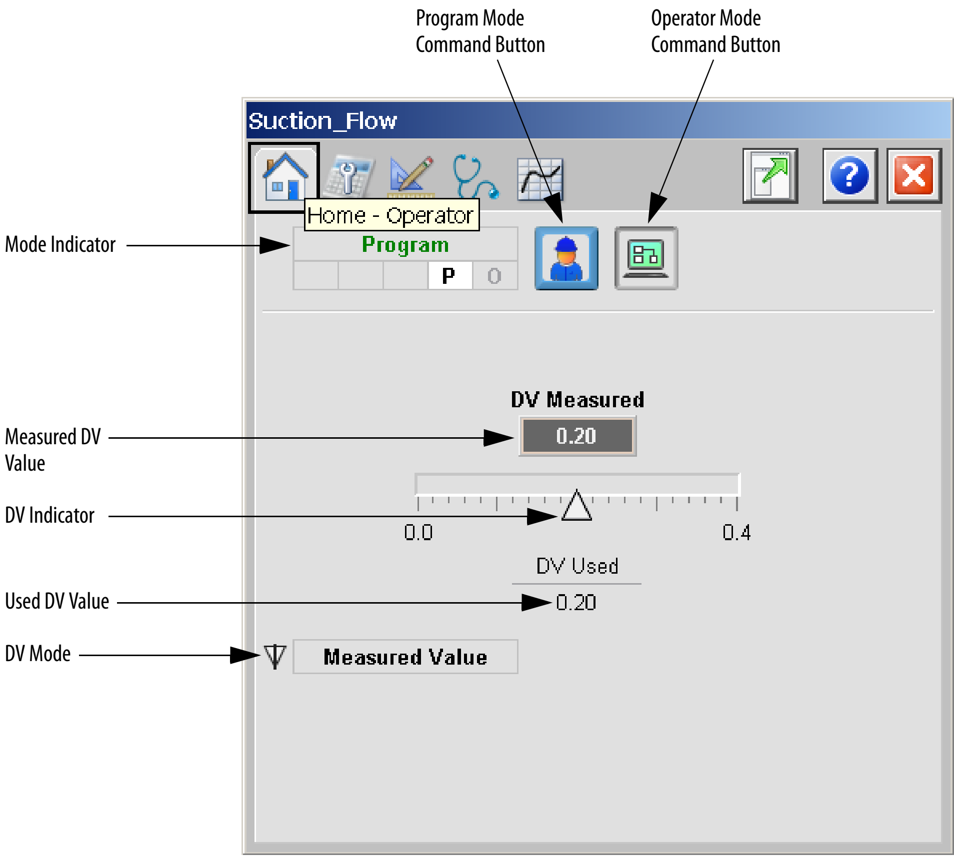
Display Element Name	Display Element	Description
GO_MPC_DV		PlantPAx MPC Disturbance Variable object with DV numeric display.

Operator Tab

The Faceplate initially opens to the Operator (‘Home’) tab. From here, an operator can monitor the DV status.

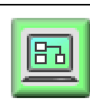
The Operator tab shows the following information:

- Current instruction mode (Program or Operator)
- Current DV enabled status and fault status
- Measured Disturbance Variable (DV)
- Bar graph for the current Disturbance Variable
- Currently Used Disturbance Variable
- Current Disturbance Variable Mode (not selected, Measured Value, DV Trajectory)



The following table lists the functions on of the Operator tab.

Table 154 - Operator Tab Description

Function	Action	Security
	Click to request Operator mode.	Manual Device Operation (Code B)
	Click to request Program mode.	

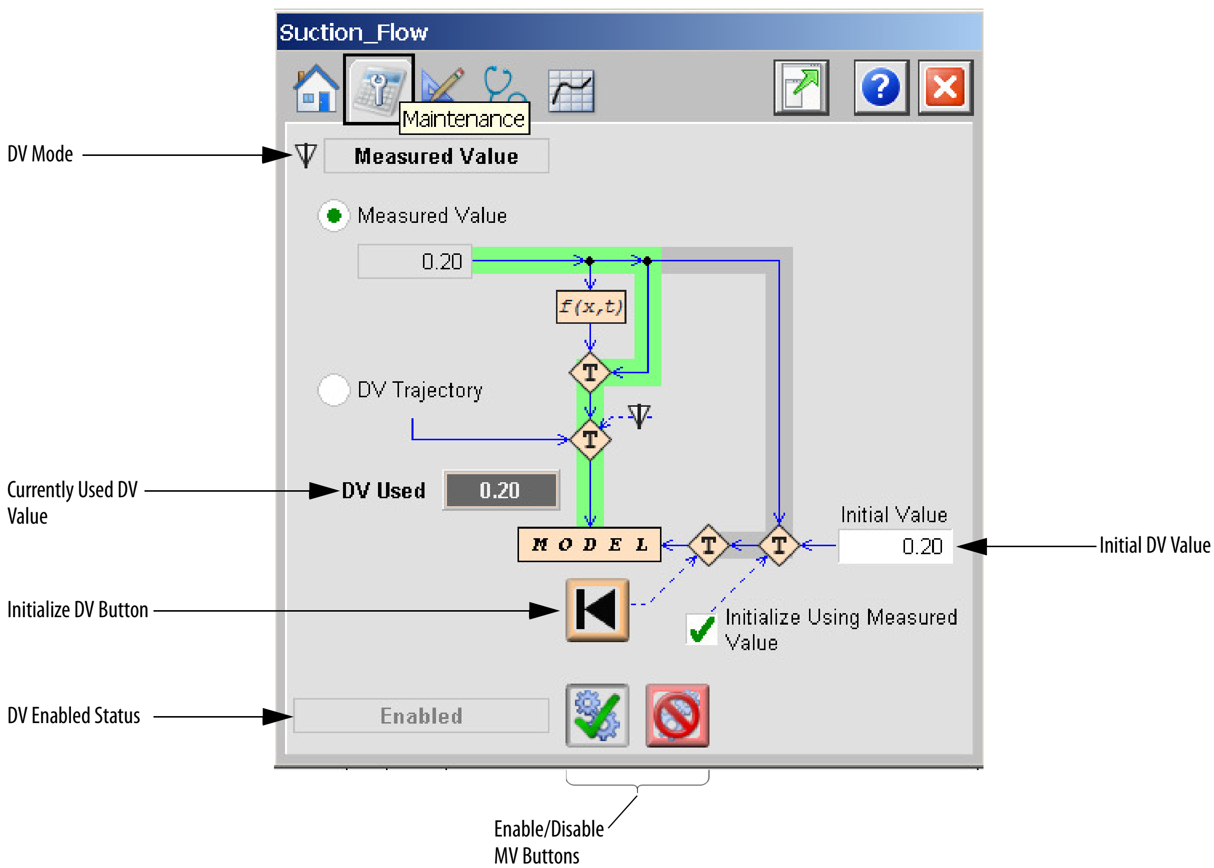
Maintenance Tab

Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

Maintenance tab enables you to change DV mode between Measured Value and Trajectory and set the DV Initial Value.

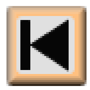
Maintenance tab shows the following information:

- Current Disturbance Variable Mode (not selected, Measured Value, DV Trajectory)
- Current Disturbance Variable
- Current DV enabled status
- The source of the DV, by animation of the data path and transfer points



The following table lists the functions on of the Maintenance tab.

Table 155 - Maintenance Tab Description

Function	Action	Security
	Click to enable PlantPAx MPC instruction	Equipment Maintenance (Code C)
	Click to disable PlantPAx MPC instruction.	
	Click to request initialization of MV.	Engineering Configuration (Code E)
Measured Value	Click to set the DV mode to Measured Value.	Configuration and Tuning Maintenance (Code D)
DV Trajectory	Click to set the DV mode to Trajectory.	
Initial Value	Type a value for the DV Initial value.	
Initialize Using Measured Value	Check to initialize the DV to Measured Value or Trajectory. Clear to initialize the DV to Initial Value.	Engineering Configuration (Code E)

Engineering Tab

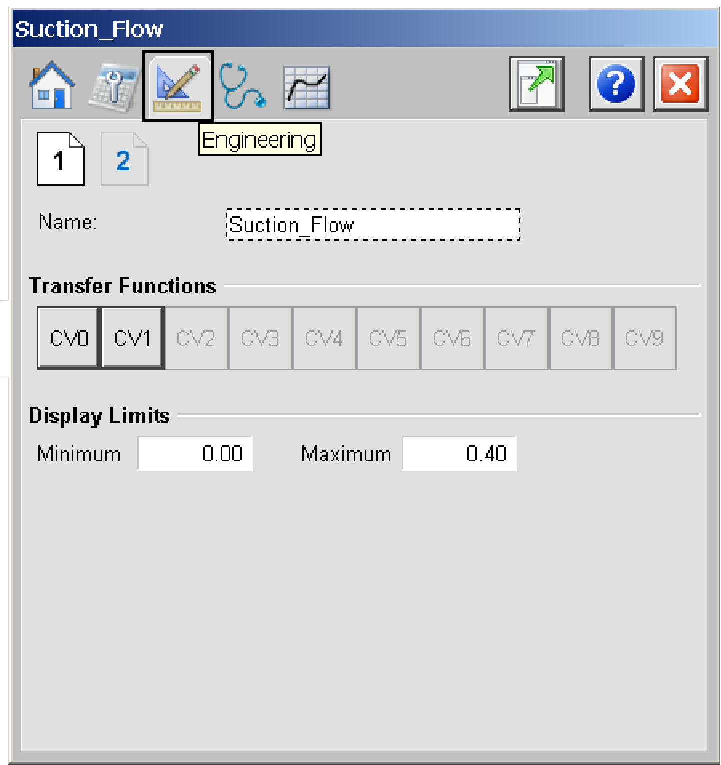
The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages

Engineering Tab Page 1

On page 1 of the Engineering tab, you can configure the name of the DV and display limits for the variable. There are also buttons opening the Transfer Function Faceplates for the transfer functions related to the DV. If there is a transfer function between the particular DV and CV, the button is enabled, otherwise is disabled.

Transfer Function Buttons



The following table lists the functions on page 1 of the Engineering tab.

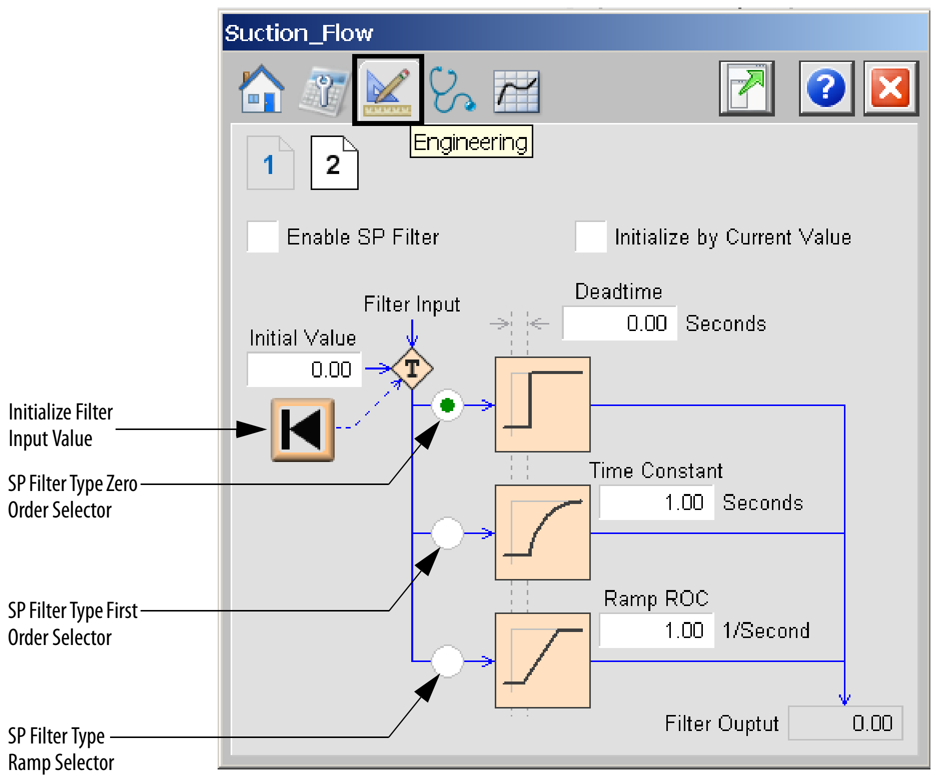
Table 156 - Engineering Tab Page 1 Description

Function	Action	Security
Name	Type the name of the variable.	Engineering Configuration (Code E)
Transfer Functions (CV0…CV9)	Click to open the corresponding Transfer Function faceplate.	None
Display Limits Minimum and Maximum.	Type the minimum and maximum value of the variable to be used in the HMI.	Engineering Configuration (Code E)

Engineering Tab Page 2

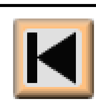
On page 2 of the Engineering tab, you can configure the Filter for the DV value. You can choose one of three filter types, set the required filter parameters and turn the filtering on and off.

Page 2 of the Engineering tab shows the Current Input Filter Output.



The following table lists the functions on page 2 of the Engineering tab.

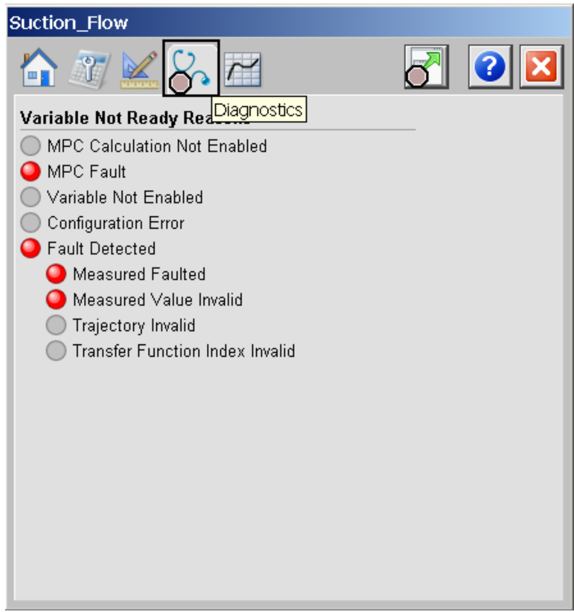
Table 157 - Engineering Tab Page 2 Description

Function	Action	Security
	Click to request to initialization of filter internal states and output of the filter based on InitValue input.	Engineering Configuration (Code E)
Enable SP (input) Filter	Check to enable Filter.	
Initialize by Current Value	Check to initialize filter by current value in every time step.	
Initial Value	Type a value for the Setpoint Filter initial value.	
Deadtime	Type a value for model Deadtime.	
Time Constant	Type a value for model Time Constant.	
Ramp ROC	Type a value for Ramp Rate of Change per second.	
SP Filter Type	Click to select the filter model type. 0 = Zero order, 1 = First order, 2 = Ramp.	

Diagnostics Tab

The Diagnostic tab provides indications that help to diagnose or prevent device problems, which can include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

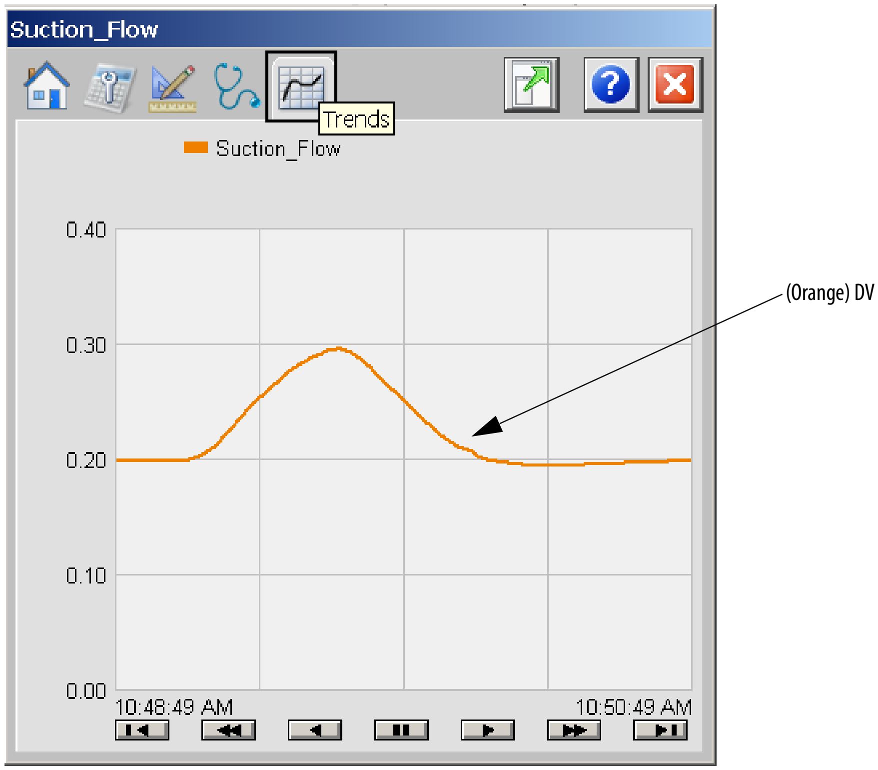
Diagnostics Tab displays overall PlantPAx MPC errors, configuration errors for both Operator and Program mode and measurement errors.



The previous image indicates that the device is not ready because of a measured value fault.

Trends Tab

On the Trends Tab, you can view DV (orange line).



Faceplate Help

See Faceplate Help on page 302 for information on faceplate Help.

PlantPAx MPC Transfer Function

The PlantPAx MPC Transfer Function Faceplate is used for editing of transfer functions between:

- MVs and CVs
- DVs and CVs

The faceplate is opened from page 1 of the Engineering tab of the MV Faceplate or from page 1 of the Engineering tab of the DV Faceplate.

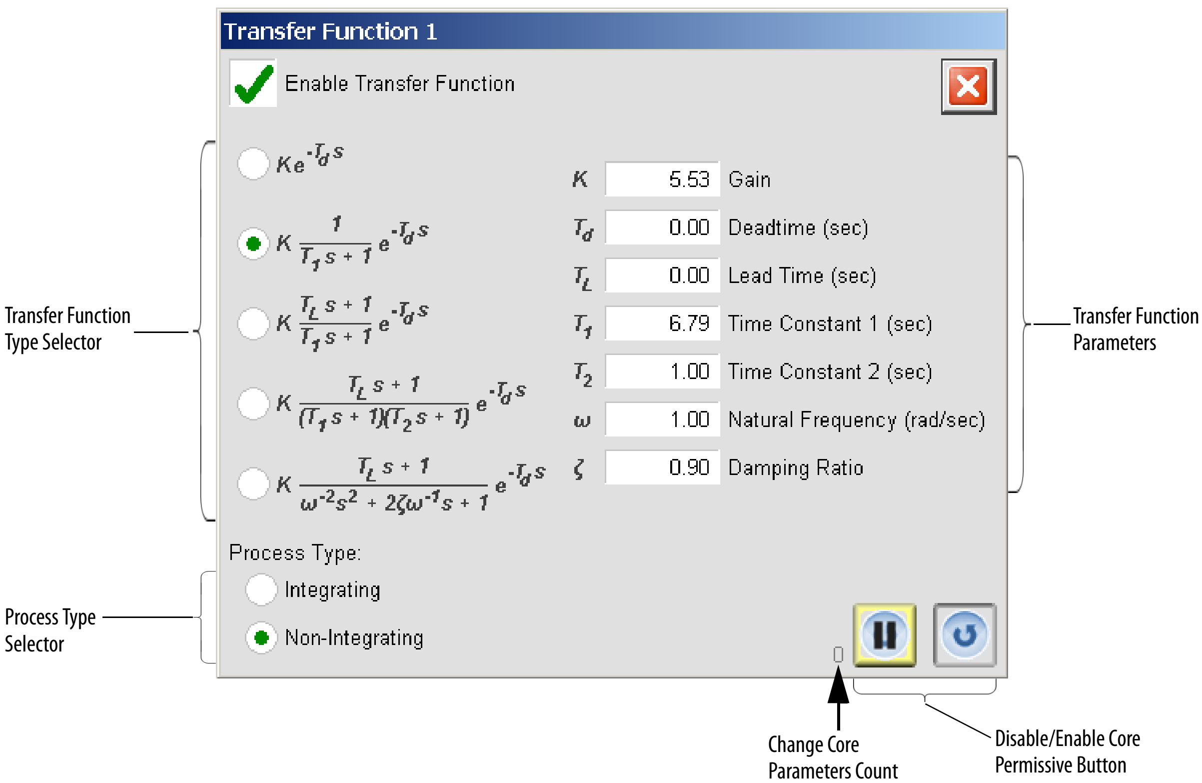


Table 158 - Engineering Tab Page 2 Description

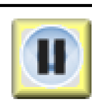
Function	Action	Security
	Click to disable the Change Core permissive.	Configuration and Tuning Maintenance (Code D)
	Click to enable the Change Core permissive.	
Enable Transfer Function	Check to enable the transfer function	

Table 158 - Engineering Tab Page 2 Description

Function	Action	Security
Zero Order	Click to set the transfer function model type to Zero Order	Engineering Configuration (Code E)
First Order	Click to set the transfer function model type to First Order	
First Order with Zero	Click to set the transfer function model type to First Order with Zero	
Second Order Overdamped	Click to set the transfer function model type to Second Order Overdamped	
Second Order Underdamped	Click to set the transfer function model type to Second Order Underdamped	
Process Type: Integrating	Click to set transfer function type to Integrating	
Process Type: Non-Integrating	Click to set transfer function type to Non-Integrating	

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Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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