Reference Manual

Rockwell Automation Library of Process Objects: Motor Operated Valve (P_ValveMO)

Version 3.5

IMPORTANT	This manual applies to the Rockwell Automation Library of Process Objects version 3.5 or earlier.
	For Rockwell Automation Library of Process Objects version 5.0, see
	• PROCES-RM200
	For Rockwell Automation Library of Process Objects version 4.0 or later, use the following manuals:
	• PROCES-RM013 contains logic instructions
	• PROCES-RM014 contains display elements

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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).

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Software Compatibility and Content Revision

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

For general library considerations, see Rockwell Automation Library of Process Objects, publication PROCES-RM002.

Additional Resources

These documents contain more information about related products from Rockwell Automation.

Resource	Description
PlantPAx® Distributed Control System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx® system.
PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
Rockwell Automation Library of Process Objects, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk® View Machine Edition User Manual, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk View Site Edition User Manual, publication VIEWSE-UM006	Provides details on how to use this software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for designing, configuring, and programming Add-On Instructions.
Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002	Details how to monitor an input condition to raise an alarm. Information includes acknowledging, resetting, inhibiting, and disabling an alarm. Generally the P_Alarm faceplate is accessible from the Alarms tab.
Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005	Explains how to select the Mode (owner) of an instruction or control strategy. The Mode instruction is usually embedded within other instructions to extend their functionality. It is possible to use a standalone Mode instruction to enhance a program where modes are wanted
Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007	Details how to collect permissive conditions to start a piece of equipment.
Rockwell Automation Library of Process Objects: 2-state Valve Statistics (P_ValveStats) Reference Manual, publication SYSLIB-RM036	Explains how to monitor stroke times and stroke counts for a 2-state (open and close) valve.

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.

Motor-operated Valve (P_ValveMO)

The P_ValveMO (Motor-operated Valve) Add-On Instruction is used to operate (open and close) a motor-operated valve in various modes, monitoring for fault conditions.
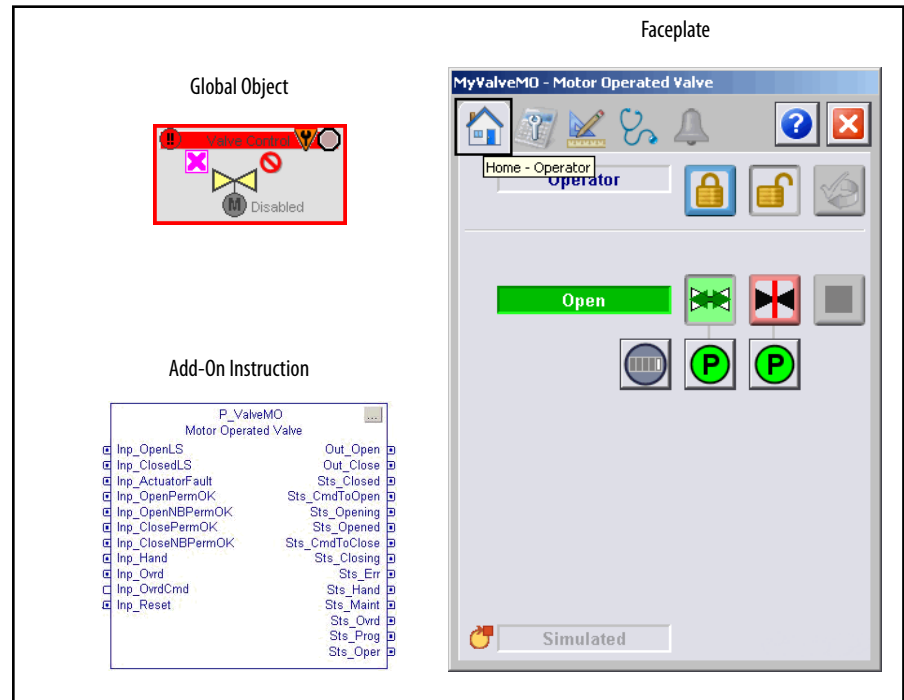
Guidelines

Use this instruction when operating a motor-operated valve or other valve that requires separate open and close outputs. The valve can have, but does not require, a limit switch feedback for the ends of travel. The valve cannot require an output to trigger a 'valve stop' function. For example: breaking a seal-in circuit on the valve operator to stop travel or switch the direction of travel.

Do **not** use this instruction in these situations:

- You need to operate a single-solenoid spring-return valve (fail closed or fail open). Use the Solenoid-operated Valve (P_ValveSO) Add-On Instruction instead.
- You need to operate a multi-solenoid valve such as a Mix-Proof Valve that has positions (such as CIP) other than 'opened' and 'closed'. Use the Mix-Proof Valve (P_ValveMP) Add-On Instruction instead.
- You need to monitor a valve that is primarily operated by hand. The valve could support a 'trip' output to drive it to a 'safe' position. Use the Hand-operated Valve (P_ValveHO) Add-On Instruction instead.
- You have a throttling (continuously variable) valve. Use the P_AOut Analog Output Instruction, the P_ValveC Control Valve instruction, or operate the valve directly from a PIDE or PID built-in instruction.

- For some valves, you could also find the P_DOut (Discrete Output), P_D4SD (Discrete Four-State Device), or P_nPos (n-Position Device) Instruction suitable.

Functional Description

The P_ValveMO instruction provides the following capabilities:

- Ownership of the Motor-operated Valve through the standard P_Mode Add-On Instruction and modes. Modes of operation are described in <u>Modes on page 21</u>.

- The ability to open or close a Motor-operated Valve, and if the valve is so equipped, monitor open/close limit switch feedback to verify the Motor-operated Valve is opened or closed. Whether the Motor-operated Valve has each of the feedback limit switches can be configured at the Engineer level. Whether to use each of the feedback limit switches can be configured at the Maintenance level.

- An optional ability to stop the motion of the Motor-operated Valve. Also, a Stop Output, which is typically used to break the valve motor 'seal-in' circuit and stop the actuating motor. If the option to allow stopping the valve is enabled, the instruction lets the operator reverse travel. For example, select 'Open' while closing, which stops the valve, then moves it in the opposite direction.

- An alarm for Full Stall if the valve feedback indicates that it did not move off the original position within a configured amount of time when commanded to the other position. Also, an alarm for Transit Stall if the valve feedback indicates that the valve moved from the original position but did not reach the target position within a configured amount of time. The Transit Stall or Full Stall condition can optionally de-energize the outputs to the valve, requiring a reset.

- A limit switch failure indication if the limit switches indicate that the valve is not closed, not opened, and not moving (invalid state). The fail state, whether both switches are ON or both switches are OFF to indicate limit switch failure, is configurable.

- Open Permissives (those that can be bypassed and those that cannot be bypassed), which are conditions that allow the Motor-operated Valve to open. Also, close Permissives (those that can be bypassed and those that cannot be bypassed), which are conditions that allow the Motor-operated Valve to close. Maintenance personnel can bypass those permissives that can be bypassed.

- Provide maintenance personnel the capability to disable (keep de-energized) the motor-operated valve.

- Monitor an I/O Fault input and alarm on an I/O Fault. The I/O Fault condition can optionally de-energize the outputs to the valve, requiring a reset.

- In Override mode, provide override inputs that determine whether the override is to open, close, or stop the motor-operated valve. See <u>Modes on page 21</u> for more information on override.

- A simulation capability, in which the outputs to the motor-operated valve are kept de-energized, but the object can be manipulated as if a working motor-operated valve were present. The delay between a command to open or close and the simulated opened or closed response is configurable. (This same delay is used if the motor-operated valve is configured with no open/close feedback.) This capability is often used for activities such as system testing and operator training.

- An Actuator Fault input. This input is provided for use by valves that generate a fault contact, such as actuator motor overload trip. The Actuator Fault condition can optionally de-energize the outputs to the valve, requiring a reset.

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This code lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The P_ValveMO_3_5-**00**_AOI.L5X Add-On Instruction must be imported into the controller project to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

Visualization Files

This Add-On Instruction has associated visualization files 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 2 - 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 3 - 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.
(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Global objects used for managing alarms on process object faceplates.
(RA-BAS) Process Diagnostic Objects	(RA-BAS-ME) Process Diagnostic Objects	Diagnostic global objects used on process object faceplates.
(RA-BAS) Process Faceplate Valve Objects	(RA-BAS-ME) Process Faceplate Valve Objects	Valve global objects used on process object faceplates
(RA-BAS) Process Graphics Library	(RA-BAS-ME) Process Graphics Library	Process global object device symbols used to build process graphics
(RA-BAS) Process Help Objects	(RA-BAS-ME) Process Help Objects	Global objects used for all process objects help displays.
(RA-BAS) Process Interlock Objects	(RA-BAS-ME) Process Interlock Objects	Global objects used for managing interlocks and permissives on process object faceplates.
(RA-BAS) Process Mode Objects	(RA-BAS-ME) Process Mode Objects	Global objects used for managing modes on process object faceplates.

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

Table 4 - Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(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) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The faceplate that is used for managing alarms for the object.
(RA-BAS) P_Alarm-Help	(RA-BAS-ME) P_Alarm-Help	Alarm Help information that is accessed from the P_Alarm faceplate.
(RA-BAS) P_Mode-Config	(RA-BAS-ME) P_Mode-Config	The Configuration Display used to configure the P_Mode object.
(RA-BAS) P_Mode-Help	(RA-BAS-ME) P_Mode-Help	Mode Help information that is accessed from the Help faceplate.
(RA-BAS) P_ValveMO-Faceplate	(RA-BAS-ME) P_ValveMO-Faceplate	The faceplate that is used for the object
(RA-BAS) P_ValveMO-Quick	(RA-BAS-ME) P_ValveMO-Quick	The Quick display that is used for the object
(RA-BAS) Process Valve Family-Help	(RA-BAS-ME) Process Valve Family-Help	The Help display for Valve objects
(RA-BAS) P_Perm-Faceplate	(RA-BAS-ME) P_Perm-Faceplate	**Optional** Permissive faceplate that is used for the object Use this file if your object has an associated P_Perm object and you enable navigation to the P_Perm faceplate from the object faceplate.

Table 4 - Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(RA-BAS) P_ValveStats-Faceplate	(RA-BAS-ME) P_ValveStats-Faceplate	**Optional** Valve statistics faceplate display that is used for the object Use this file if your object has an associated P_ValveStats object and you enable navigation to the P_ValveStats faceplate from the object faceplate.
(RA-BAS) Process Interlock Family-Help	(RA-BAS-ME) Process Interlock Family-Help	**Optional** Interlock/permissives help display that is used for the object Use this file if you use the P_Intlk or P_Perm faceplate.

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

Table 5 - 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.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Motor-operated Valve Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Settings (PSet_) are used by program logic, operators, and maintenance personnel to establish runtime setpoints, thresholds, and so forth. A Setting (without a leading P) establishes runtime settings regardless of role or mode.
- Command data elements (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.

Table 7 - P_ValveMO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp_OpenLS Inp_ClosedLS	BOOL		0	Valve Open and Closed Limit switch: 1 = Confirmed open or closed
Inp_ActuatorFault	BOOL		0	Valve Actuator fault (overload, and so forth): 0 = OK 1 = Fault
Inp_OpenPermOK	BOOL		1	1 = Bypassable and Non-bypassable permissives OK, valve can motor open.
Inp_OpenNBPermOK	BOOL		1	1 = Non-bypassable permissives OK, valve can motor open if Bypassable permissives are bypassed.
Inp_ClosePermOK	BOOL		1	1 = Bypassable and Non-bypassable permissives OK, valve can motor closed.
Inp_CloseNBPermOK	BOOL		1	1 = Non-bypassable permissives OK, valve can motor closed if Bypassable permissives are bypassed.
Inp_IOFault	BOOL		0	Input communication status: 0 = OK 1 = Fail
Inp_Sim	BOOL		0	Simulation input. When set to 1, the instruction keeps the outputs de-energized and simulates a working valve. When set to 0, the instruction operates the valve normally.
Inp_Hand	BOOL	Mode.Inp_Hand	0	1 = Select Hand (hardwired) mode.
Inp_Ovrd	BOOL	Mode.Inp_Ovrd	0	1 = Select Override mode.
Inp_OvrdCmd	DINT		0	Override mode command: 0 = None 1 = Close 2 = Open 3 = Stop
Inp_Reset	BOOL		0	Input parameter used to programatically reset alarms and shed conditions. When set to 1, all alarms and shed conditions requiring reset are reset.
Cfg_HasOpenLS	BOOL		0	1 = Valve provides an Open Limit switch signal.
Cfg_HasClosedLS	BOOL		0	1 = Valve provides a Closed Limit switch signal.
Cfg_UseOpenLS Cfg_UseClosedLS	BOOL		0	1 = Valve Open or Closed LS is used for failure checking.
Cfg_LSFail	BOOL		1	1 = Both switches on = Fail. 0 = Both switches off = Fail.
Cfg_HasStop	BOOL		0	1 = Stop output can be used to break local seal-in and stop valve motion.

Table 7 - P_ValveMO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_HasOpenPermObj	BOOL		0	1 = Tells HMI a P_Perm is connected to Inp_OpenPermOK. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_OpenPerm'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Permissive object must be named 'ValveMO123_OpenPerm'.
Cfg_HasClosePermObj	BOOL		0	1 = Tells HMI a P_Perm is connected to Inp_ClosePermOK. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_ClosePerm'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Permissive object must be named 'ValveMO123_ClosePerm'.
Cfg_HasStatsObj	BOOL		0	1 = Tells HMI a Valve Stats is monitoring this valve. **IMPORTANT:** The name of the ValveStats object in the controller must be this object's name with the suffix '_ValveStats'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Valve Stats object must be named 'ValveMO123_ValveStats'.
Cfg_PCmdClear	BOOL	Mode.Cfg_PCmdClear	1	When this parameter is 1, program commands are cleared once they are acted upon. When set to 0, program commands remain set until cleared by the application program logic. **IMPORTANT:** Clearing this parameter online can cause unintended program command execution.
Cfg_ProgDefault	BOOL	Mode.Cfg_ProgDefault	0	This parameter defines the default mode. When this parameter is 1, the mode defaults to Program if no mode is being requested. When this parameter is 0, the mode defaults to Operator if no mode is being requested. **IMPORTANT:** Changing this parameter online can cause unintended mode changes.
Cfg_OCmdResets	BOOL		0	1 = New Operator Valve command resets fault. 0 = Reset required to clear fault.
Cfg_ShedOnFullStall	BOOL		0	1 = Stop Valve and Alarm on Full Stall, Transit Stall, Actuator Fault, or I/O Fault. 0 = Alarm only on Full Stall, Transit Stall, Actuator Fault, or I/O Fault.
Cfg_ShedOnTransitStall			0	
Cfg_ShedOnActuatorFault			1	
Cfg_ShedOnIOFault			1	
Cfg_OvrdPerm	BOOL		0	1 = Override ignores Bypassable Permissives. 0 = Override uses all Permissives.
Cfg_HasFullStallAlm	BOOL	FullStall.Cfg_Exists	0	These parameters determine whether the corresponding alarm exists and is checked or if the alarm does not exist and is not used. When these parameters are 1, the corresponding alarm exists.
Cfg_HasTransitStallAlm		TransitStall.Cfg_Exists		
Cfg_HasActuatorFaultAlm		ActuatorFault.Cfg_Exists		
Cfg_HasIOFaultAlm		IOFault.Cfg_Exists		
Cfg_FullStallResetReqd	BOOL	FullStall.Cfg_ResetReqd	0	These parameters determine whether a reset is required to clear the alarm status. When this parameter is 1, the alarm is latched ON when the alarm occurs. After the alarm condition returns to normal, a reset is required to clear the alarm status (for example, OCmd_Reset, Inp_Reset, or FullStall.OCmd_Reset are required to clear Alm_FullStall alarm after the alarm is set and the value returns to normal). When these parameters are 0, no reset is required and the alarm status is cleared when the alarm condition returns to normal. **IMPORTANT:** If the reset clears the alarm, it also acknowledges the alarm.
Cfg_TransitStallResetReqd		TransitStall.Cfg_ResetReqd		
Cfg_ActuatorFaultResetReqd		ActuatorFault.Cfg_ResetReqd		
Cfg_IOFaultResetReqd		IOFault.Cfg_ResetReqd		

Table 7 - P_ValveMO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_FullStallAckReqd	BOOL	FullStall.Cfg_AckReqd	1	These parameters determine whether an acknowledgement is required for an alarm. When these parameters are 1, the acknowledge (ack) bit is cleared when the alarm occurs. An acknowledge command (for example, PCmd_IOFaultAck or IOFault.OCmd_Ack) is required to acknowledge the alarm. When set to 0, the Acknowledge bit is set when an alarm occurs, indicating an acknowledged alarm and no acknowledge command is required.
Cfg_TransitStallAckReqd		TransitStall.Cfg_AckReqd		
Cfg_ActuatorFaultAckReqd		ActuatorFault.Cfg_AckReqd		
Cfg_IOFaultAckReqd		IOFault.Cfg_AckReqd		
Cfg_FullStallSeverity	INT	FullStall.Cfg_Severity	1000	These parameters determine the severity of each alarm. This drives the color and symbol that are used to indicate alarm status on the faceplate and global object. The following are valid values: 1…250 = Low 251…500 = Medium 501…750 = High 751…1000 = Urgent **IMPORTANT:** For FactoryTalk View software version 7.0, these severity parameters drive only the indication on the global object and faceplate. The Alarms and Events definition of severity drives the color and symbol that is used on the alarm banner and alarm summary as well as the value returned by FactoryTalk Alarms and Events display commands.
Cfg_TransitStallSeverity		TransitStall.Cfg_Severity		
Cfg_ActuatorFaultSeverity		ActuatorFault.Cfg_Severity	500	
Cfg_IOFaultSeverity		IOFault.Cfg_Severity	1000	
Cfg_OutPulseT	DINT		5	When this parameter is set to zero, the output for the last command is maintained ON, even after the valve/device reaches position. This configuration is for devices that require a maintained output. When this parameter is greater than zero, the output is held on until the pulse time expires, a full stall or transit stall shed occurs, or the device reaches the commanded position, whichever occurs first. For devices that require a fixed pulse time, set this parameter to the required time. For devices that require the output to be kept energized until the device reaches the commanded position, set this parameter to a 'large' value, at least as large as the transit stall time.
Cfg_SimFdbkT	DINT		20	Delay to echo back of Open/Closed status when in simulation (seconds).
Cfg_FullStallT	DINT		15	After command, time with no motion before fault (seconds).
Cfg_TransitStallT	DINT		60	After command, time to reach position before fault (seconds).
PSet_Owner	DINT		0	Program owner Request ID (non-zero) or release (zero).
PCmd_Open PCmd_Close	BOOL		0	When Cfg_PCmdClear is 1: • Set PCmd_Open to 1 to open the valve • Set PCmd_Close to 1 to close the valve • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Open to 1 to open the valve • Set PCmd_Open to 0 to close the valve • **NOTE:** PCmd_Close is not used to control the valve • These parameters do not reset automatically
PCmd_Stop	BOOL		0	When Cfg_PCmdClear is 1: • Set PCmd_Stop to 1 to stop the Valve • This parameter resets automatically When Cfg_PCmdClear is 0: • Set PCmd_Stop to 1 to stop the motion of the vale • If PCmd_Open is 1 and PCmd_Close is 1, the valve is stopped • These parameters do not rest automatically

Table 7 - P_ValveMO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
PCmd_Acq	BOOL	Mode.PCmd_Acq	0	When Cfg_PCmdClear is 1: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Rel to 1 to Release • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Acq to 0 to Release • PCmd_Rel is not used • These parameters do not reset automatically
PCmd_Rel		Mode.PCmd_Rel		
PCmd_Lock	BOOL	Mode.PCmd_Lock	0	When Cfg_PCmdClear is 1: • Set PCmd_Lock to 1 to Lock • Set PCmd_Unlock to 1 to Unlock • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Lock to 1 to Lock • Set PCmd_Lock to 0 to Unlock • PCmd_Unlock is not used • These parameters do not reset automatically
PCmd_Unlock		Mode.PCmd_Unlock		
PCmd_Reset	BOOL		0	• Set PCmd_Reset to 1 to reset all alarms requiring reset • This parameter is always reset automatically
PCmd_FullStallAck	BOOL	FullStall.PCmd_Ack	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • The parameter is reset automatically
PCmd_TransitStallAck		TransitStall.PCmd_Ack		
PCmd_ActuatorFaultAck		ActuatorFault.PCmd_Ack		
PCmd_IOFaultAck		IOFault.PCmd_Ack		
PCmd_FullStallSuppress	BOOL	FullStall.PCmd_Suppress	0	When Cfg_PCmdClear is 1: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Unsuppress to 1 to unsuppress alarm • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Suppress to 0 to unsuppress alarm • PCmd_<Alarm>Unsuppress is not used • These Parameters do not reset automatically
PCmd_TransitStallSuppress		TransitStall.PCmd_Suppress		
PCmd_ActuatorFaultSuppress		ActuatorFault.PCmd_Suppress		
PCmd_IOFaultSuppress		IOFault.PCmd_Suppress		
PCmd_FullStallUnsuppress		FullStall.PCmd_Unsuppress		
PCmd_TransitStallUnsuppress		TransitStall.PCmd_Unsuppress		
PCmd_ActuatorFaultUnsuppress		ActuatorFault.PCmd_Unsuppress		
PCmd_IOFaultUnsuppress		IOFault.PCmd_Unsuppress		
PCmd_FullStallUnshelve	BOOL	FullStall.PCmd_Unshelve	0	• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • The parameter is reset automatically
PCmd_TransitStallUnshelve		TransitStall.PCmd_Unshelve		
PCmd_ActuatorFaultUnshelve		ActuatorFault.PCmd_Unshelve		
PCmd_IOFaultUnshelve		IOFault.PCmd_Unshelve		
OCmd_Open	BOOL		0	Operator command to open valve.
OCmd_Close	BOOL		0	Operator command to close valve.
OCmd_Stop	BOOL		0	Operator command to stop valve motion.
OCmd_Bypass	BOOL		0	Operator command to bypass all bypassable interlocks and permissives.
OCmd_Check	BOOL		0	Operator command to check (not bypass) all interlocks and permissives.
MCmd_Disable	BOOL		0	Maintenance command to disable valve.
MCmd_Enable	BOOL		0	Maintenance command to enable (allow to energize) valve.
MCmd_Acq	BOOL	Mode.MCmd_Acq	0	Maintenance command to acquire ownership (Operator/Program/Overload to Maintenance).
MCmd_Rel	BOOL	Mode.MCmd_Rel	0	Maintenance command to release ownership (Maintenance to Operator/Program/Overload).

Table 7 - P_ValveMO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
OCmd_AcqLock	BOOL	Mode.OCmd_AcqLock	0	Operator command to acquire (Program to Operator)/lock ownership.
OCmd_Unlock	BOOL	Mode.OCmd_UnlockRel	0	Operator command to unlock/release Operator to Program ownership.
OCmd_Reset	BOOL		0	Operator command to reset all Alarms and shed conditions requiring reset.
OCmd_ResetAckAll	BOOL		0	Operator command to acknowledge and reset all alarms and latched shed conditions.

Motor-operated Valve Output Structure

Output parameters include the following:

- Output data elements (Out_) are the primary outputs of the instruction, typically used by hardware output modules; however, they can be used by other application logic.
- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Values can also be used by other application logic or software packages.
- Source and Quality data elements (SrcQ_) are outputs of the instruction used by the HMI to indicate PV source and quality.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits can also be used by other application logic.
- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.
- Not Ready data elements (Nrdy_) are bit outputs of the instruction for use by the HMI for displaying the Device Not Ready indicators.
- Alarm data elements (Alm_) are outputs of the instruction that indicate a particular alarm has occurred.
- Acknowledge data elements (Ack_) are outputs of the instruction that indicate the corresponding alarm has been acknowledged.
- Ready data elements (Rdy_) are bit outputs of the instruction used by the HMI to enable or disable Command buttons and Setting entry fields.

Table 8 - P_ValveMO Output Parameters

Output Parameter	Data Type	Alias For	Description
EnableOut	BOOL		Enable Output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn input state.
Out_Open	BOOL		1 = Run actuator motor to open or close valve.
Out_Close			
Out_Stop	BOOL		1 = Break seal-in circuit in actuator to stop valve motion.

Table 8 - P_ValveMO Output Parameters

Output Parameter	Data Type	Alias For	Description
SrcQ_IO	SINT		I/O signal source and quality.

SrcQ			Final valve status source and quality:
			GOOD 0 = I/O live and confirmed good quality
			            1 = I/O live and assumed good quality
			            2 = No feedback configured, assumed good quality
			TEST 8 = Device simulated
			            9 = Device loopback simulation
			            10 = Manually entered value
			UNCERTAIN 16 = Live input, off-specification
			            17 = Value substituted at device/bus
			            18 = Value substituted by maintenance (Has and not Use)
			            19 = Shed, using last good value
			            20 = Shed, using replacement value
			BAD 32 = Signal failure (out-of-range, NaN, invalid combination)
			            33 = I/O channel fault
			            34 = I/O module fault
			            35 = Bad I/O configuration (for example, scaling parameters)

Val_Cmd	SINT		This shows the command being processed, returns to zero once the command succeeds or fails. The command could be made not visible if zero. These values are also used for Inp_OvrdCmd: 0 = None 1 = Close 2 = Open 3 = Stop
Val_Fdbk	SINT		This shows the (usually raw, interpreted) input from the device: 0 = Moving 1 = Closed 2 = Opened 3 = Limit switch failure
Val_Sts	SINT		This is the primary status, used to show the operator the 'confirmed' device status: 0 = Unknown 1 = Closed 2 = Opened 3 = Commanded to close 4 = Commanded to open 5 = Closing 6 = Opening 7 = Stopped 33 = Disabled
Val_Fault	SINT		This is the device fault status, used to show the operator the most sever device fault: 0 = None 16 = Transit Stall 17 = Full Stall 19 = Actuator Fault 32 = I/O Fault 34 = Configuration Error
Val_Mode	SINT	Mode.Val	This exists if P_Mode is used within the object and shows all modes used by (implemented in) the object: 0 = No mode 1 = Hand 2 = Maintenance 3 = Overload 4 = Program Lock 5 = Operator Lock 6 = Program (Operator default) 7 = Operator (Program default) 8 = Program (Program default) 9 = Operator (Operator default)
Val_Owner	DINT		Current Object Owner ID (0 = not owned).

Table 8 - P_ValveMO Output Parameters

Output Parameter	Data Type	Alias For	Description
Val_Notify	SINT		Current alarm level and acknowledgement (enumeration): 0 = No alarm 1 = Alarm cleared: a reset or acknowledge is required 2 = Low (acknowledged) 3 = Low (unacknowledged) 4 = Medium (acknowledged) 5 = Medium (unacknowledged) 6 = High (acknowledged) 7 = High (unacknowledged) 8 = Urgent (acknowledged) 9 = Urgent (unacknowledged)
Sts_Closed	BOOL		1 = Valve requested to close and is confirmed closed.
Sts_CmdToOpen	BOOL		1 = Valve commanded to open, has not yet moved off Closed.
Sts_Opening	BOOL		1 = Valve requested to open and awaiting open feedback.
Sts_Opened	BOOL		1 = Valve requested to open and is confirmed opened.
Sts_CmdToClose	BOOL		1 = Valve commanded to close, has not yet moved off Open.
Sts_Closing	BOOL		1 = Valve requested to close and awaiting closed feedback.
Sts_Stopped	BOOL		1 = Valve requested to stop and is not at either end of travel.
Sts_Available	BOOL		1 = Valve available for control by automation (Program).
Sts_Bypass	BOOL		1 = Bypassable Interlocks and Permissives are bypassed.
Sts_BypActive	BOOL		1 = Bypassing Active (bypassed or maintenance).
Sts_Disabled	BOOL		1 = Valve is disabled.
Sts_LSFail	BOOL		1 = Limit Switch overlap failure.
Sts_NotRdy	BOOL		1 = Valve is Not Ready to Energize (independent of mode).
Nrdy_Disabled	BOOL		1=Device Not Ready: • Device disabled by Maintenance • Configuration error • Permissive Not OK • External equipment fault (fault or shed requires reset) • Device failure (shed requires reset) • I/O fault (shed requires reset) • Logic disabled/No mode
Nrdy_CfgErr			
Nrdy_Perm			
Nrdy_EqpFault			
Nrdy_Fail			
Nrdy_IOFault			
Nrdy_NoMode			
Sts_MaintByp	BOOL		1 = Maintenance bypass is active, display icon.
Sts_AlmInh	BOOL		1 = An alarm is shelved, disabled or suppressed, display icon.
Sts_Err	BOOL		1 = Error in configuration: See detail bits for reason.
Err_Timer	BOOL		1 = Error in configuration: invalid check or pulse time (use 0 … 2,147,483).
Err_Sim	BOOL		1 = Error in configuration: simulation timer preset (use 0 … 2,147,483).
Err_Alarm	BOOL		1 = Error in configuration: invalid alarm delay or severity.
Sts_Hand	BOOL	Mode.Sts_Hand	1 = Mode is Hand (supersedes Maintenance, Override, Program, Operator).
Sts_Maint	BOOL	Mode.Sts_Maint	1 = Mode is Maintenance (supersedes Override, Program, Operator).
Sts_Ovrd	BOOL	Mode.Sts_Ovrd	1 = Mode is Override (supersedes Program, Operator).
Sts_Prog	BOOL	Mode.Sts_Prog	1 = Mode is Program (auto).
Sts_Oper	BOOL	Mode.Sts_Oper	1 = Mode is Operator (manual).

Table 8 - P_ValveMO Output Parameters

Output Parameter	Data Type	Alias For	Description
Sts_ProgOperLock	BOOL	Mode.Sts_ProgOperLock	1 = Program or Operator has requested mode Lock.
Sts_NoMode	BOOL	Mode.Sts_NoMode	1 = Nomode (disabled because EnableIn is **false**).
Sts_MAcqRcvd	BOOK	Mode.Sts_MAcqRcvd	1 = Maintenance Acquire command received this scan.
Sts_FullStall	BOOL	FullStall.Inp	1 = Valve Full Stall (failed to move at all) (one-shot).
Sts_TransitStall		TransitStall.Inp	1 = Valve Transit Stall (did not reach target position) (one-shot).
Sts_ActuatorFault		ActuatorFault.Inp	1 = Actuator Fault detected (input).
Sts_IOFault		IOFault.Inp	I/O Communication Fault status: 0 = OK 1 = Bad
Alm_FullStall	BOOL	FullStall.Alm	1 = Valve (Full Stall, Transit Stall, Actuator Fault, or I/O Fault) alarm.
Alm_TransitStall		TransitStall.Alm	
Alm_ActuatorFault		ActuatorFault.Alm	
Alm_IOFault		IOFault.Alm	
Ack_FullStall	B0	FullStall.Ack	1 = Alarm (Full Stall, Transit Stall, Actuator Fault, or I/O Fault) has been acknowledged.
Ack_TransitStall		TransitStall.Ack	
Ack_ActuatorFault		ActuatorFault.Ack	
Ack_IOFault		IOFault.Ack	
Sts_FullStallDisabled	BOOL	FullStall.Disabled	1 = Alarm (Full Stall, Transit Stall, Actuator Fault, or I/O Fault) has been disabled by Maintenance.
Sts_TransitStallDisabled		TransitStall.Disabled	
Sts_ActuatorFaultDisabled		ActuatorFault.Disabled	
Sts_IOFaultDisabled		IOFault.Disabled	
Sts_FullStallShelved	BOOL	FullStall.Shelved	1 = Alarm (Full Stall, Transit Stall, Actuator Fault, or I/O Fault) has been shelved by Operator.
Sts_TransitStallShelved		TransitStall.Shelved	
Sts_ActuatorFaultShelved		ActuatorFault.Shelved	
Sts_IOFaultShelved		IOFault.Shelved	
Sts_FullStallSuppressed	BOOL	FullStall.Suppressed	1 = Alarm (Full Stall, Transit Stall, Actuator Fault, or I/O Fault) has been suppressed by Program.
Sts_TransitStallSuppressed		TransitStall.Suppressed	
Sts_ActuatorFaultSuppressed		ActuatorFault.Suppressed	
Sts_IOFaultSuppressed		IOFault.Suppressed	
Rdy_Open	BOOL		1 = Ready to receive Operator command (Open, Close, Stop, Bypass, or Check) (enables HMI button).
Rdy_Close			
Rdy_Stop			
Rdy_Bypass			
Rdy_Check			
Rdy_Disable	BOOL		1 = Ready to receive Maintenance command (Disable or Enable) (enables HMI button).
Rdy_Enable			
Rdy_Reset	BOOL		1 = Ready for Operator command (Reset or ResetAckAll) (enables HMI button).
Rdy_ResetAckAll			
P_ValveMO	BOOL		Unique parameter name for auto-discovery.

Motor-operated Valve Local Configuration Tags

Configuration parameters that are array, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in Studio 5000 Logix Designer® application. Open the instruction logic of the Add-On Instruction instance and then open the Data Monitor on a local tag to accomplish this configuration. These parameters cannot be modified by using controller logic or Logix Designer application export/import functionality.

Table 9 - Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_Desc	STRING_40	'Motor-operated Valve'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_Label	STRING_20	'Valve Control'	Label for graphic symbol that is displayed on HMI. This string appears on the graphic symbol.
Cfg_Tag	STRING_20	'P_ValveMO'	Tagname for display on HMI. This string is shown in the title bar of the faceplate.

Operations

This section describes the primary operations for Add-On Instructions.

Modes

This instruction uses the following standard modes, which are implemented by using an embedded P_Mode Add-On Instruction.

Table 10 - Modes

Mode	Description
Operator	The Operator owns control of the device. Operator commands (OCmd_) and Operator settings (OSet_) from the HMI are accepted.
Program	Program logic owns control of the device. Program commands (PCmd_) and Program settings (PSet_) are accepted.
Override	Priority logic owns control of the device and 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	Maintenance owns control of the device and supersedes Operator, Program, and Override control. Operator commands and settings from the HMI are accepted. Bypassable interlocks and permissives are bypassed, and device timeout checks are not processed.
Hand	Hardwired logic or other logic outside the instruction owns control of the device. 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 section for more information on EnableInFalse processing.

See Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarms

This instruction uses the following alarms, which are implemented by using embedded P_Alarm and P_Gate Add-On Instructions.

Table 11 -

Alarm Name	P_Alarm Name	P_Gate Name	Description
Actuator Fault	ActuatorFault	None	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.
Full Stall	FullStall	None	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.
I/O Fault	IOFault	None	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.
Transit Stall	TransitStall	None	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.

Parameters of the P_Alarm object can be accessed by using the following convention: [P_Alarm Name].[P_Alarm Parameter].

The Full Stall and Transit Stall Alarms have a configurable delay to allow the open and/or closed feedback time to align with the commanded output. This delay also provides time for the Motor-operated Valve to actually open or close.

See Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Simulation

Simulation in P_ValveMO disables the outputs of the valve and simulates the feedback of a working valve.

Set the Inp_Sim parameter in the controller to '1' to enable simulation.

The Simulation or Loopback Test icon is displayed at the bottom left of the Operator faceplate and indicates the device is in simulation.

While in simulation, you can set the number of seconds to wait (Cfg_SimFdbkT) before echoing back the Open/Closed status.

When you have finished in simulation, set the Inp_Sim parameter in the controller to '0' to return to normal operation.

Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
EnableIn False (false rung)	Processing for EnableIn False (False Rung) is handled the same as if the Motor-operated Valve were Disabled by Command. The Valve outputs are de-energized and the Motor-operated Valve is shown as disabled on the HMI.
Powerup (prescan, first scan)	Processing of Modes and Alarms on prescan and powerup is handled by the embedded P_Mode and P_Alarm Add-On Instructions - refer to their specifications for details. On Powerup, the Motor-operated Valve is treated as if it had been commanded to stop motion.
Postscan (SFC transition)	No SFC postscan logic is provided.

See the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

Programming Example

The following is a simple example of P_ValveMO.

Boolean parameters MyP_ValveMO_ZSO and MyP_ValveMO_ZSC are used as limit switch feedback inputs. Two outputs, MyP_ValveMO_Open and MyP_ValveMO_Close, are wired to outputs that drive the valve open and closed.

```
                            My Motor-Operated
                                 Valve

                              MyP_ValveMO
                             P_ValveMO          ...
                          Motor Operated Valve
                                               0
MyP_ValveMO_ZSO  1  — — —  Inp_OpenLS      Out_Open   0  — — —  MyP_ValveMO_Open
MyP_ValveMO_ZSC  0  — — —  Inp_ClosedLS    Out_Close  0  — — —  MyP_ValveMO_Close
                           Inp_ActuatorFault  Sts_Closed  0
                           Inp_OpenPermOK   Sts_CmdToOpen  0
                           Inp_OpenNBPermOK   Sts_Opening  0
                           Inp_ClosePermOK    Sts_Opened  0
                           Inp_CloseNBPermOK  Sts_CmdToClose  0
                           Inp_Hand           Sts_Closing  0
                           Inp_Ovrd             Sts_Err  0
                           Inp_OvrdCmd         Sts_Hand  0
                           Inp_Reset          Sts_Maint  0
                                               Sts_Ovrd  0
                                               Sts_Prog  0
                                               Sts_Oper  1
```

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, in conjunction with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 12 - P_ValveMO Display Elements Description

Display Element Name	Display Element	Description
GO_P_ValveMO GO_P_ValveMO2 GO_P_ValveMO1 GO_P_ValveMO3		Standard motor-operated valve global objects.

Common attributes of the Motor-operated Valve graphic symbols include the following:

- Graphical representation of the valve
- Current state of the valve in text
- Status/quality indicators
- Mode indicator
- Label
- Alarm indicator that changes color for the severity of the alarm
- Alarm border that changes color and blinks on unacknowledged alarm
- Maintenance bypass indicator
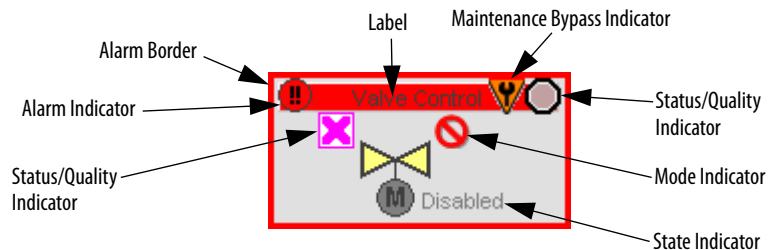
Each graphic symbol includes a touch field over it that opens the object's faceplate. In addition, there is a tooltip on the graphic symbol that displays the object's configured tag and description.
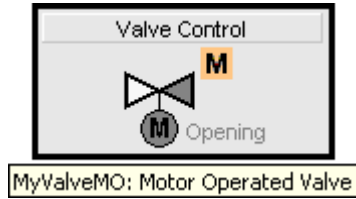
State Indicators
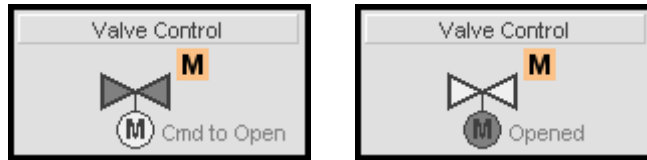
The state indicator text changes and the color of the graphic symbol changes depending on the state of the valve.

Table 13 - Valve State Colors

Color	State Text
Half Dark Gray and Half White	Transition: Commanded to Open, Opening, Commanded to Close or Closing
Light Yellow	Stopped
Dark Gray	Closed
White	Opened

Status/Quality Indicators

One of these symbols appears on the graphic symbol when the described condition is true.

Table 14 -

Graphic Symbol	Description
	Invalid configuration.
	Data quality bad/failure.
	Data Quality degraded: uncertain, test, simulation, substitution, or out of specification.
	The input or device has been disabled.
	Device not ready to operate.

> **TIP** When the Invalid Configuration Indicator appears, you can find what configuration setting is invalid by following the indicators. Click the graphic symbol to open the Faceplate. The Invalid Configuration indicator appears next to the appropriate tab at the top of the faceplate to help you find the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appear in a magenta box.

For the Motor-operated Valve instruction, the Invalid Configuration indicator appears under the following conditions:

- The Full Stall check time (time with no motion) or Transit Stall check time (time to reach final position) is set to a value less than zero or greater than 2,147,483 seconds.
- The feedback Simulation timer is set to a value less than zero or greater than 2,147,483 seconds.
- Alarm Severity is set to a value less than 1 or greater than 1000.

> **TIP** When the Not Ready indicator appears, you can find what condition is preventing operation by following the indicators. Click the graphic symbol to open the faceplate. The Not Ready indicator appears next to the appropriate tab at the top of the faceplate to help you find the condition. When you navigate to the tab, the condition preventing operation is flagged.

For the Motor-operated Valve instruction, the Device Not Ready indicator appears under the following conditions:

- Device has been disabled by Maintenance.
- There is a configuration error.
- Permissive is not OK.
- External equipment fault, fault or shed requires reset.
- Device failure, shed requires reset.
- I/O fault. shed requires reset.

Device logic is disabled or there is no mode.

Mode Indicators

One of these symbols appears on the right side of the graphic symbol to indicate the mode of the object instruction.

Table 16 -

Graphic Symbol	Description
Transparent	Operator mode (if the default mode is Operator and the current mode is Operator, the mode indicator is transparent).
O	Operator mode (if the default mode is Program).
O	Operator mode locked.
Transparent	Program mode (if the default mode is Program and the current mode is Program, the mode indicator is transparent).
P	Program mode (if the default mode is Operator).
P	Program mode locked.
!	Override mode
M	Maintenance mode.
H	Hand mode
▬	No mode.

> **TIP** The images provided for the Operator and Program default modes are transparent; therefore, no mode indicators are visible if the device is in its default mode. This behavior can be changed by replacing the image files for these mode indicators with images that are not transparent.

See Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarm Indicators

One of these symbols appears on the left side of the label to indicate the described alarm condition and the alarm border and label background change color. The

alarm border and label background blink if acknowledgement of an alarm condition is required. Once the alarm is acknowledged, the alarm border and label background remain the color that corresponds to the severity of the alarm.

Table 17 -

Symbol	Border and Label Background	Description
I	No change in color	Alarm Inhibit: an alarm is suppressed by the Program, disabled by Maintenance, or shelved by the Operator.
🔔	White	Return to normal (no alarm condition), but a previous alarm has not been acknowledged.
!	Blue	Low severity alarm.
⚠	Yellow	Medium severity alarm.
❗	Red	High severity alarm.
‼	Magenta	Urgent severity alarm.
No symbol	No change in color	No alarm or alarm inhibit condition, and all alarms are acknowledged.

See Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Maintenance Bypass Indicator

This symbol appears to the right of the label to indicate that a maintenance bypass has been activated.

TIP	When the Maintenance Bypass indicator appears, you can find what condition was bypassed by following the indicators. Click the graphic symbol to open the faceplate. The Maintenance Bypass indicator appears next to the appropriate tab at the top of the faceplate to help you find the bypass. Once you navigate to the tab, the bypassed item is flagged with this indicator.

For the Motor-operated Valve instruction, the Maintenance Bypass indicator appears under the following conditions:

- Interlocks and Permissives that can be bypassed have been bypassed.
- The valve is configured to have an Open Limit switch (on the Engineering tab of the faceplate), but the Open Limit switch is not being used (selection on the Maintenance tab of the faceplate).
- The valve is configured to have a Close Limit switch, but the Closed Limit switch is not being used.

Using Display Elements

The graphic symbol for P_ValveMO can be found in the global object file (RA-BAS) Process Graphics Library.ggfx.

1. Copy the global object from the global object file and paste it in the display file.

2. In the display, right-click the global object and choose Global Object Parameter Values.
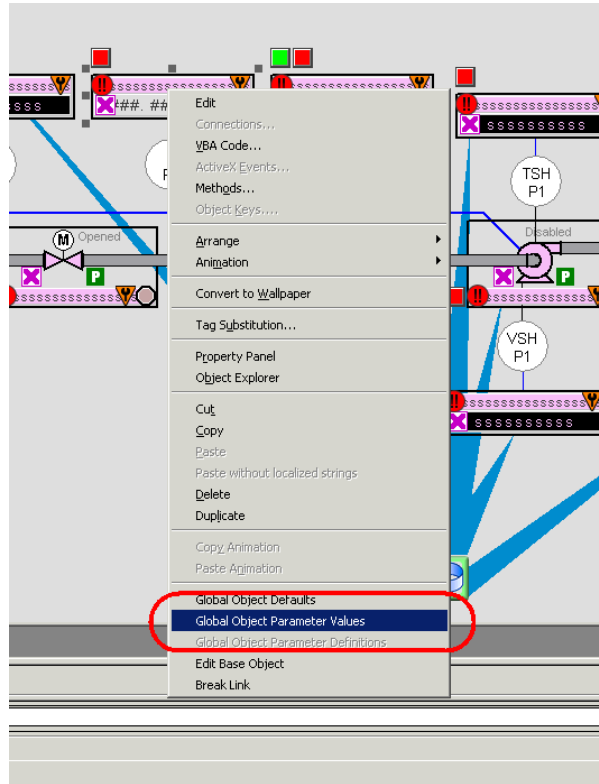
The Global Object Parameter Values dialog box appears.
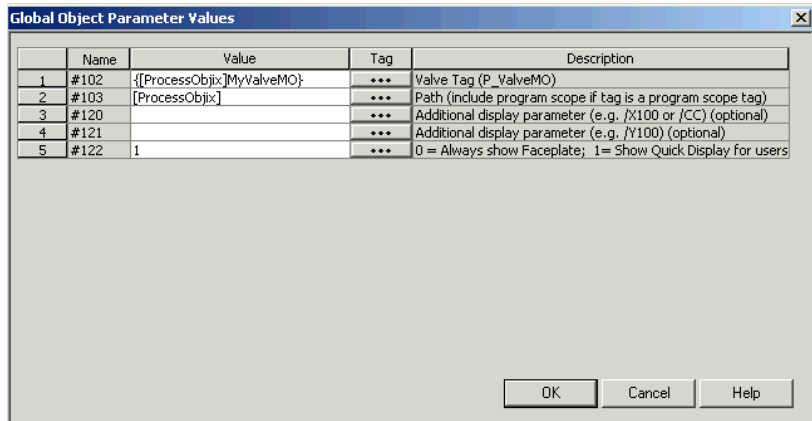
The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Add-On Instruction in the controller.
#103	Y	Path that is 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.
#121	N	Additional parameter to pass to the display command to open the faceplate. When you define the X and Y coordinate, separate parameters so that #120 defines X and #121 defines Y. This definition lets the same parameters be used in subsequent display commands that originate from the faceplate.
#122	Y	The options for the global object display are as follows: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2= Always show Quick Display

3. Type the tag or value in the Value column as specified in the Description column.

TIP	Click the ellipsis (…) to browse and choose a tag.
	Values for items marked '(optional)' can be left blank.

4. Click OK.

Quick Display

The Quick Display screen provides the means for operators to perform simple interactions with the P_ValveMO instruction instance. From the Quick Display, you can navigate to the faceplate for full access for operation, maintenance, and configuration.

Navigate to Full Faceplate Button
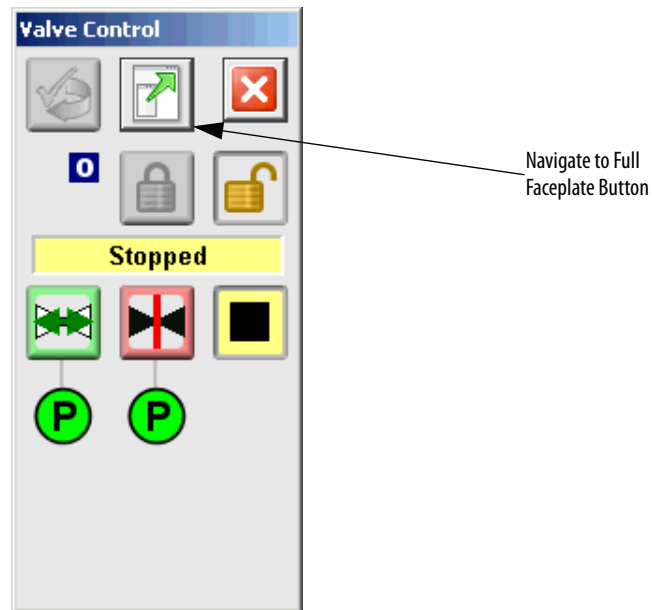
Faceplate

The P_ValveMO faceplate consists of five tabs and each tab consists of one or more pages.

The title bar of each faceplate contains the value of local configuration tags Cfg_Tag and Cfg_Desc.

The Operator tab is displayed when the faceplate is initially opened. Choose the appropriate icon at the top of the faceplate to access a specific tab.

Maintenance   Diagnostics   Exit

Operator   Engineering   Alarms   Help
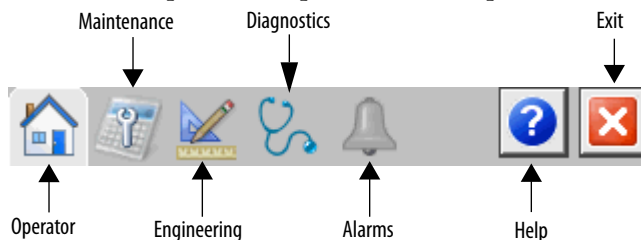
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the P_ValveMO instruction instance. You can also view its status and values and manipulate it through its commands and settings. When a given input is restricted via FactoryTalk View security, the required user Security Code letter is shown in the tables that follow.

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 mode (Program, Operator, Override, Maintenance, or Hand)
- Requested modes Indicator (appears only if the Operator or Program mode has been superseded by another mode)
- Motor-operated Valve state (Commanded to Close, Closing, Closed, Commanded to Open, Opening, Opened, Disabled, or I/O Fault)
- Limit Switch fault (appears under the Valve state when the fault is active)
- Open and Close Permissive states
- Input Source and Quality indicator (See 'SrcQ' in the Output parameters table on page 18 for details)
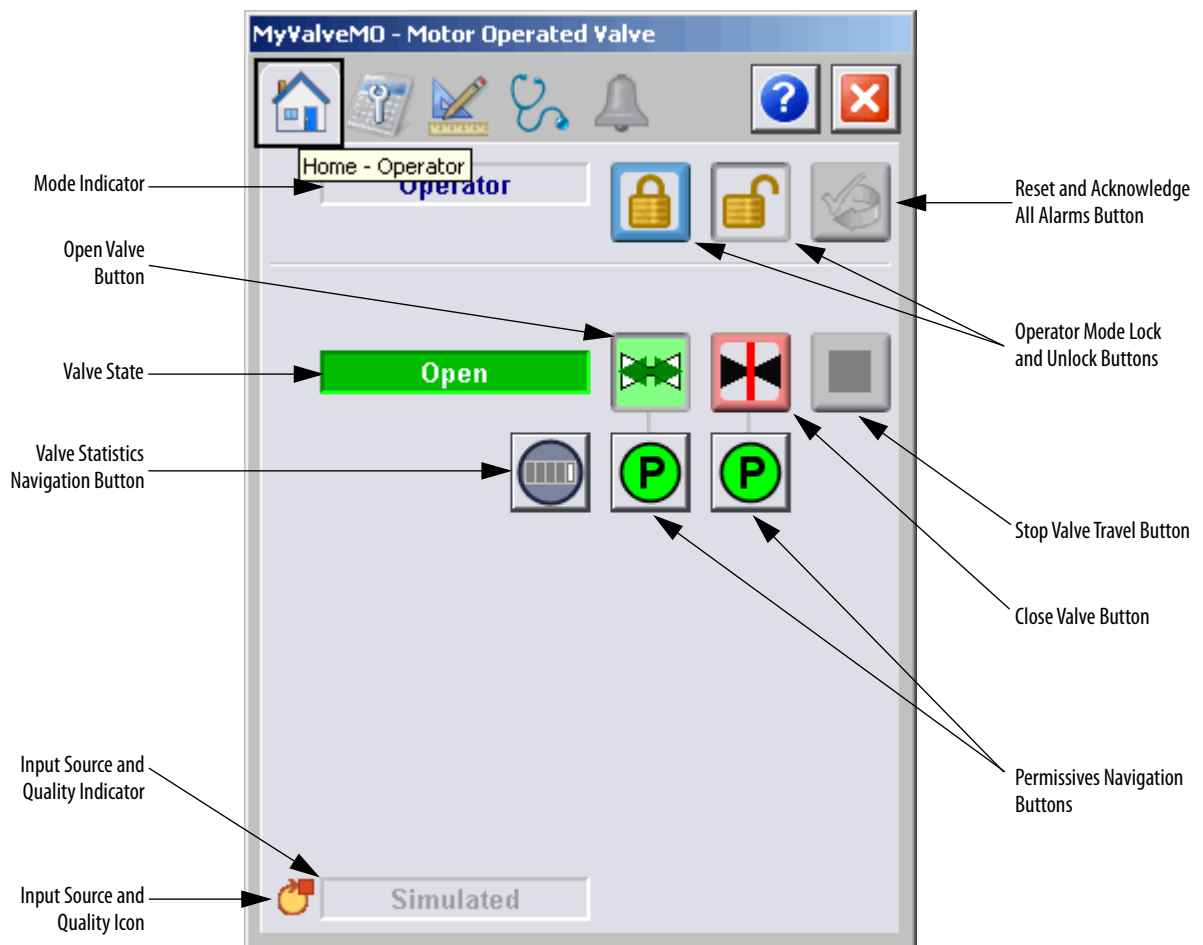
The following table lists the functions on the Operator tab.

Table 18 - Operator Tab Description

Button	Action	Security
	Click to release Operator Mode Lock.	Manual Device Operation (Code B)
	Click to acquire from Program and lock in Operator mode.	
	Click to request Program mode.	
	Click to request Operator mode.	
	Click to reset and acknowledge all alarms.	Acknowledge Alarms (Code F)
	Click to open motor operated valve.	Normal Operation of Devices (Code A) Available in Operator or Maintenance mode.
	Click to close motor operated valve.	
	Click to stop valve travel.	Normal Operation of Devices (Code A) Available in Operator or Maintenance mode. This button is visible only if the Valve Stop capability has been enabled.
	Click the button below the Open Valve command button to view the Open Permissives faceplate. Click the button below the Close Valve command button to view the Close Permissives faceplate.	None.
	Click to open the Valve Statistics faceplate.	

If the object is configured to have a permissive object (for example, Cfg_HasOpenPermObj or Cfg_HasClosePermObj is true), the permissive indication becomes a button. This button opens the faceplate of the source object used as a permissive (often this is a P_Perm permissive object). If the object is not configured in this way, the permissive is indicator only.

The Operator tab also has a button to open the Valve Statistics faceplate if the valve is configured to use the P_ValveStats object (Cfg_HasValveStats = 1). When the object is not configured to have an P_ValveStats instruction, the Valve Statistics button is not displayed.

See these publications for more information:

- Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007
- Rockwell Automation Library of Process Objects: 2-state Valve Statistics (P_ValveStats) Reference Manual, publication SYSLIB-RM036

In the Operator faceplate example that follows, the P_ValveMO instruction does not have associated Open P_Perm, Close P_Perm, or P_ValveStats objects.
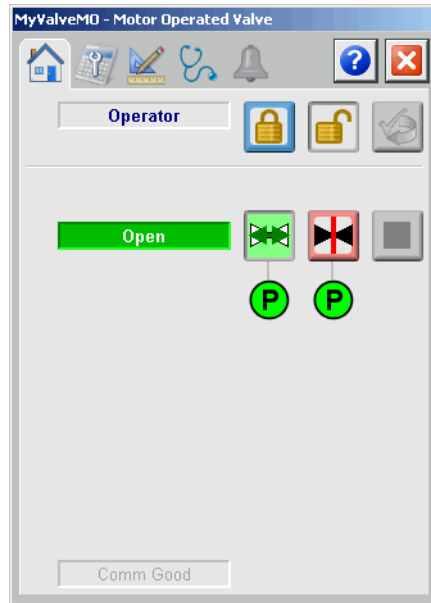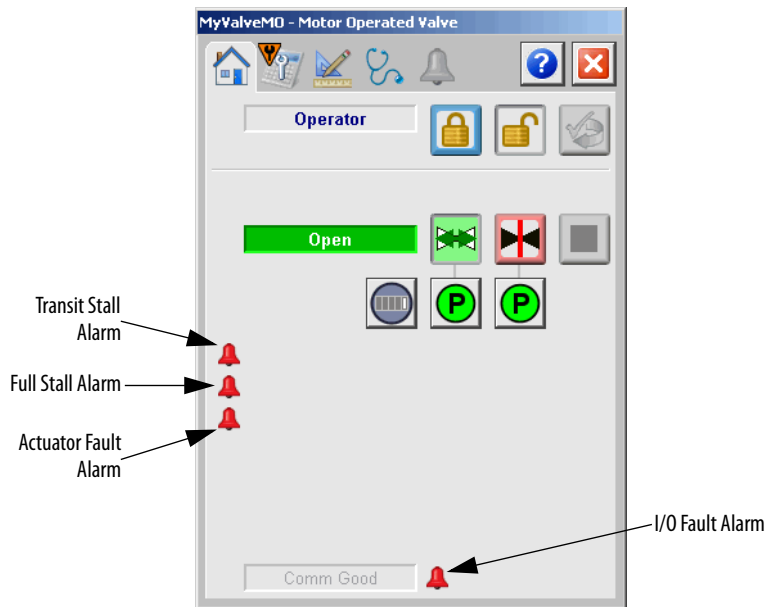

One of these symbols appears to indicate the described permissives condition.

Table 19 - Permissive Status Indicators

Graphic Symbol	Description
	One or more conditions not OK
	Non-bypassed conditions OK
	All conditions OK, bypass active
	All conditions OK

Alarm indicators appear on the Operator tab when a corresponding alarm occurs.

One of these symbols appears to indicate the described alarm condition. The alarm bell symbol blinks if acknowledgement of an alarm condition is required.

Graphic Symbol	Alarm Status
	In alarm (active alarm)
	In alarm and acknowledged
	Out of alarm but not acknowledged
	Alarm suppressed (by operator) (alarm is logged but not displayed)
	Alarm disabled (by maintenance)
	Alarm shelved (by program logic)

Maintenance Tab

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

The Maintenance tab is divided into two pages.

Maintenance Tab Page 1

The following information is shown on page 1 of the Maintenance tab:

- Current mode (Operator, Program, Override, Maintenance, or Hand).
- Requested modes indicator - This display highlights all modes that have been requested. The leftmost highlighted mode is the active mode.
- Whether motor-operated valve is enabled or disabled.
- Permissive Bypassed/Enabled indicator.
- Whether Override mode bypasses the permissives that can be bypassed.
- Whether the valve's Limit Switch Feedback is checked when opening or closing the valve.

Requested Mode Indicators

Valve Enabled/ Disabled Indicator

Check Bypass/ Permissives Indicator

Maintenance Mode Request and Release Command Buttons

Valve Enable and Disable Command Buttons

Bypass/Check Permissives Command Buttons
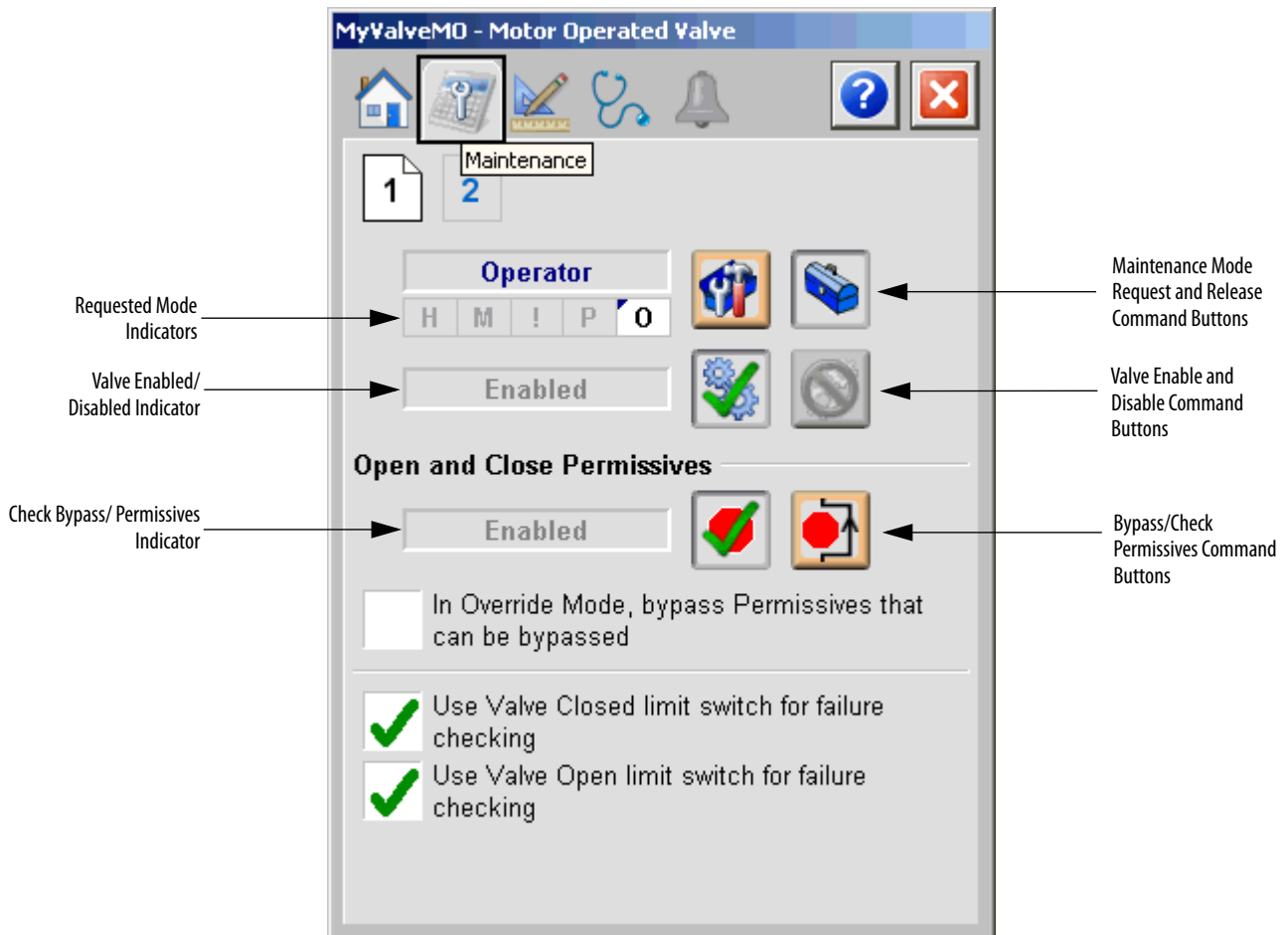
The following table lists the functions on page 1 of the Maintenance tab.

Table 20 - Maintenance Tab Page 1 Description

Function	Action	Security	Configuration Parameters
	Click to place valve in Maintenance mode	Equipment Maintenance (Code C)	None
	Click to release valve from Maintenance mode		
	Click to enable valve		
	Click to disable valve		
	Click to enable checking of all permissives	Disable Alarms Bypass Permissives and Interlocks (Code H)	
	Click to bypass checking of permissives that can be bypassed		
In Override mode, bypass Permissives that can be bypassed	Check to bypass permissives that can be bypassed in Override mode		Cfg_OvrdPerm
Use Valve Closed limit switch for failure checking	Check to have the valve configured to use the closed limit switch. Clear the checkbox to temporarily bypass the closed limit switch. **IMPORTANT:** This option is available only if 'Valve has Closed Limit Switch' on page 1 of the Engineering tab is checked. (See Engineering Tab Page 1 on page 41.)	Equipment maintenance (Code C)	Cfg_UseClosedLS
Use Valve Open limit switch for failure checking	Check to have the valve configured to use the open limit switch. Clear the checkbox to temporarily bypass the open limit switch. **IMPORTANT:** This option is available only if 'Valve has Open Limit Switch' on page 1 of the Engineering tab is checked. (See Engineering Tab Page 1 on page 41.)		Cfg_UseOpenLS

Maintenance Tab Page 2
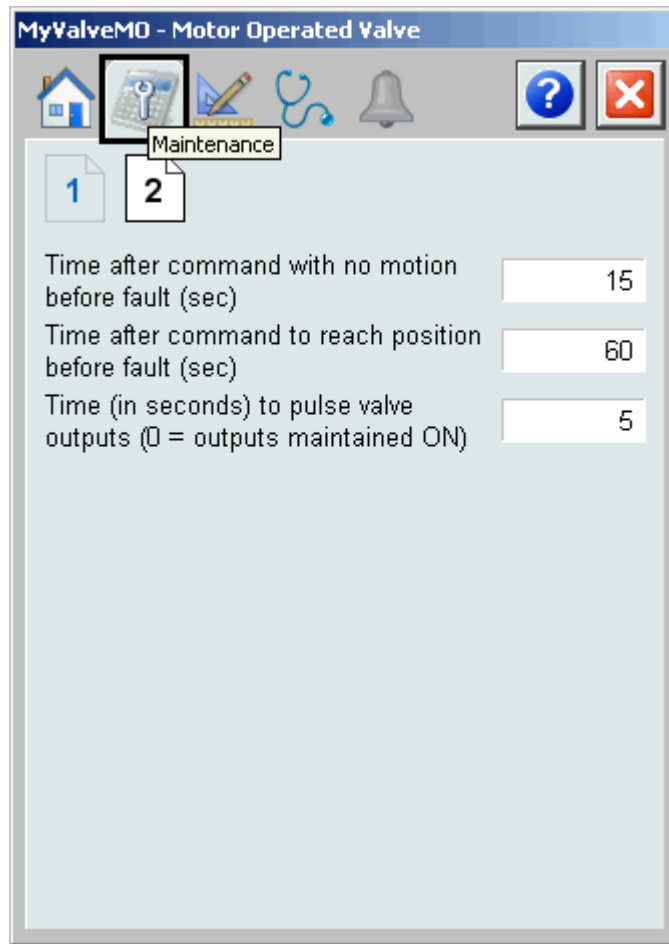
The following table lists the functions on page 2 of the Maintenance tab.

Table 21 - Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Time after command with no motion before fault (seconds)	Type the amount of time (in seconds) with no motion after a command for an alarm to occur.	Configuration and Tuning Maintenance (Code D)	Cfg_FullStallT
Time after command to reach position before fault (seconds)	Type the amount of time (in seconds) to reach position after a command before an alarm occurs.		Cfg_TransitStallT
Time (in seconds) to pulse valve outputs (0 = outputs maintained ON)	Type the amount of time (in seconds) to pulse the valve outputs. 0 means the outputs are always on.		Cfg_OutPulseT

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 three pages.

Engineering Tab Page 1

Configure Device Description, Label, and Tag Text
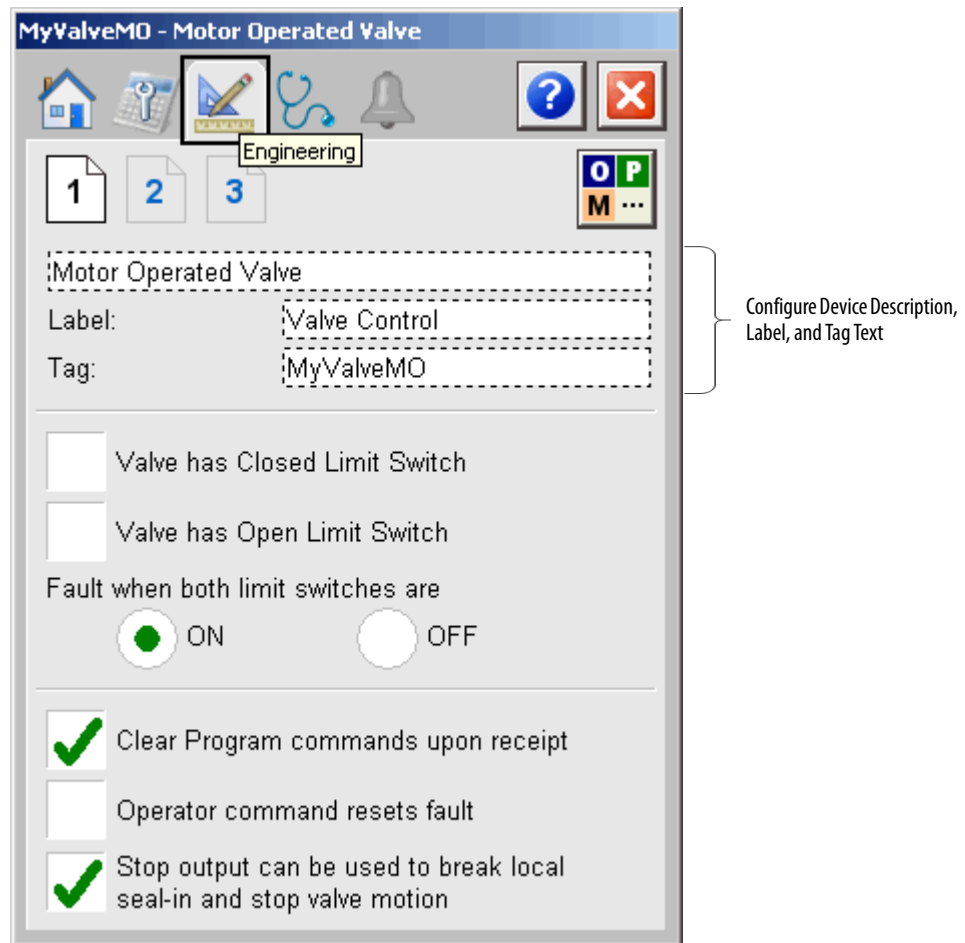
The following table lists the functions on page 1 of the Engineering tab.

Table 22 - Engineering Tab Page 1 Description

Function	Action	Security	Configuration parameters
	Click to navigate to the Mode Configuration display.	Engineering configuration (code E)	None
Description	Type the device description that appears on the faceplate title bar.		Cfg_Desc
Label	Type the label text that appears on the graphic symbol.		Cfg_Label
Tag	Type the text that appears on the title bar of each faceplate and in the tooltip.		Cfg_Tag
Valve Has Closed Limit Switch	Check if the valve has a closed limit switch and the switch is wired to Inp_ClosedLS for position monitoring.		Cfg_HasClosedLS
Valve Has Open Limit Switch	Check if the valve has an open limit switch and the switch is wired to Inp_OpenLS for position monitoring. **IMPORTANT:** If neither checkbox is checked, the valve does not have position feedback and the Full Stall alarm and the Transit Stall alarm never occur and do not exist. **IMPORTANT:** Check either of the checkboxes to place the device in Maintenance Bypass unless the corresponding 'Use for failure checking' on page 1 of the Maintenance tab is checked. (See Maintenance Tab Page 1 on page 38.)		Cfg_HasOpenLS
Fault when both limit switches are ON/OFF	Click 'ON' if both limit switches are off when the valve is moving in normal operation. Click 'OFF' if both limit switches are on when the valve is moving in normal operation. This selection determines which limit switch combination indicates abnormal operation		Cfg_LSFail
Clear program commands on receipt	Check to clear program commands on receipt.		Cfg_PCmdClear
Operator command resets fault	Check to allow operator commands to reset any previous faults (I/O fault, transit stall, full stall, interlock trip), then move the valve. Clear this checkbox to reset faults by using only the reset command.		Cfg_OCmdResets
Stop output can be used to break local seal-in and stop valve motion	Check if a signal used to stop valve motion is connected to the instruction's Out_Stop output. This action makes the Stop command button visible on the Operator tab.		Cfg_HasStop

Mode Configuration Display
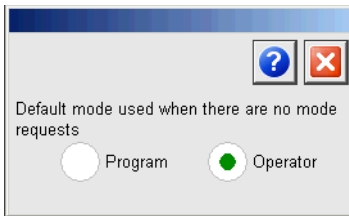
This display lets you select the default mode for the object by selecting the appropriate mode.

IMPORTANT	If no mode is being requested, changing the default mode changes the mode of the instruction.

You must have FactoryTalk View security code E to select the default mode on this display.

Engineering Tab Page 2
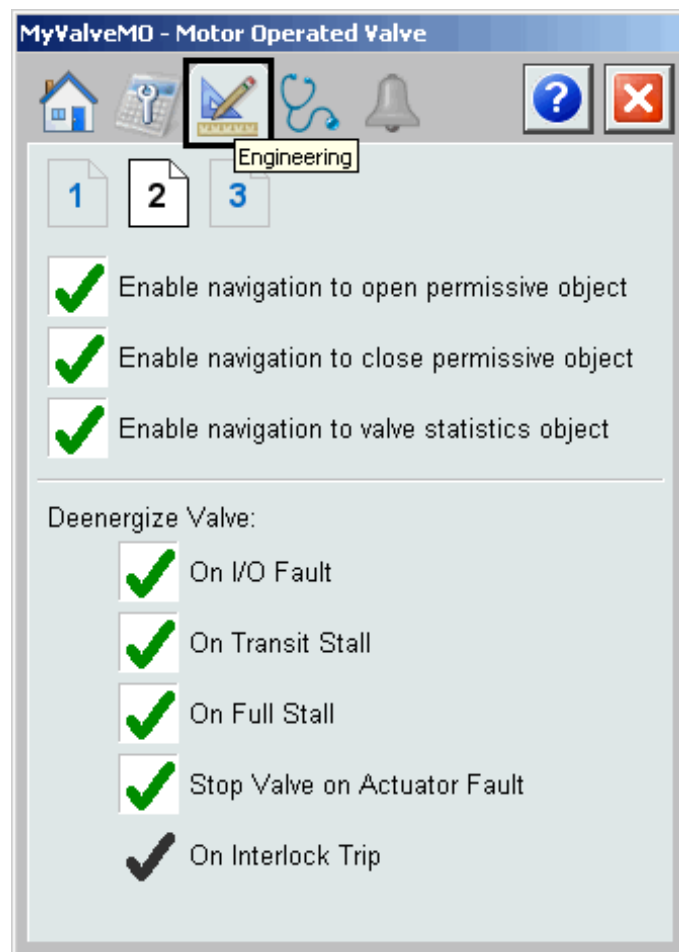
The following table lists the functions on page 2 of the Engineering tab.

Table 23 - Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Enable navigation to open permissive object	Check if you have a P_Perm instruction used with this valve for Open Permissives. This action changes the Permissive indicator to a clickable button to open the Permissive faceplate. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_OpenPerm'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Permissive object must be named 'ValveMO123_OpenPerm'.	Engineering Configuration (Code E)	Cfg_HasOpenPermObj
Enable navigation to close permissive object	Check if you have a P_Perm instruction used with this valve for Close Permissives. This action changes the Permissive indicator to a clickable button to open the Permissive faceplate. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_ClosePerm'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Permissive object must be named 'ValveMO123_ClosePerm'.		Cfg_HasClosedPermObj
Enable navigation to a valve statistics object	Check if a Valve Stats object is used with this valve. This action makes the Valve Statistics button visible; click this button to open the Valve Statistics faceplate for this valve. **IMPORTANT:** The name of the ValveStats object in the controller must be this object's name with the suffix '_ValveStats'. For example, if your P_ValveMO object has the name 'ValveMO123', then its Valve Stats object must be named 'ValveMO123_ValveStats'.		Cfg_HasStatsObj
De-energize Valve: on I/O Fault	Check to send a stop output to the valve and clear the Open and Close outputs when an I/O Fault condition occurs. Clear this checkbox to keep the outputs to the valve in their current state on an I/O Fault condition. **IMPORTANT**: When this checkbox is checked and an I/O Fault condition occurs, a reset is required before the valve can be energized.		Cfg_ShedOnIOFault
De-energize Valve: on Transit Stall	Check to send a stop output to the valve and clear the Open and Close outputs when a Transit Stall condition occurs. Clear this checkbox to keep the outputs to the valve in their current state (keep trying) on a Transit Stall condition. (A Transit Stall means the valve, when commanded to move, moved off its original position, but did not reach its commanded position before the Transit Stall time expired.) **IMPORTANT**: When this checkbox is checked and a Transit Stall condition occurs, a reset is required before the valve can be energized.		Cfg_ShedOnTransitStall

Table 23 - Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
De-energize Valve: on Full Stall	Check to send a stop output to the valve and clear the Open and Close outputs when a Full Stall condition occurs. Clear this checkbox to keep the outputs to the valve in their current state (keep trying) on a Full Stall condition. (A Full Stall means the valve, when commanded to move, did not move off its original position before the Full Stall time expired.) **IMPORTANT**: When this checkbox is checked and a Full Stall condition occurs, a reset is required before the valve can be energized.	Engineering Configuration (Code E)	Cfg_ShedOnFullStall
De-energize Valve: Stop Valve on Actuator Fault	Check to send a stop output to the valve and clear the Open and Close outputs when an Actuator Fault condition occurs. Clear this checkbox to keep the outputs to the valve in their current state on an Actuator Fault condition. **IMPORTANT**: When this checkbox is checked and an Actuator Fault condition occurs, a reset is required before the valve can be energized.		Cfg_ShedOnActuatorFault
De-energize Valve: on Interlock Trip	The valve outputs are always de-energized on an Interlock Trip. This item cannot be cleared. It is displayed as a reminder that the Interlock Trip function always de-energizes the valve.		None

Engineering Tab Page 3
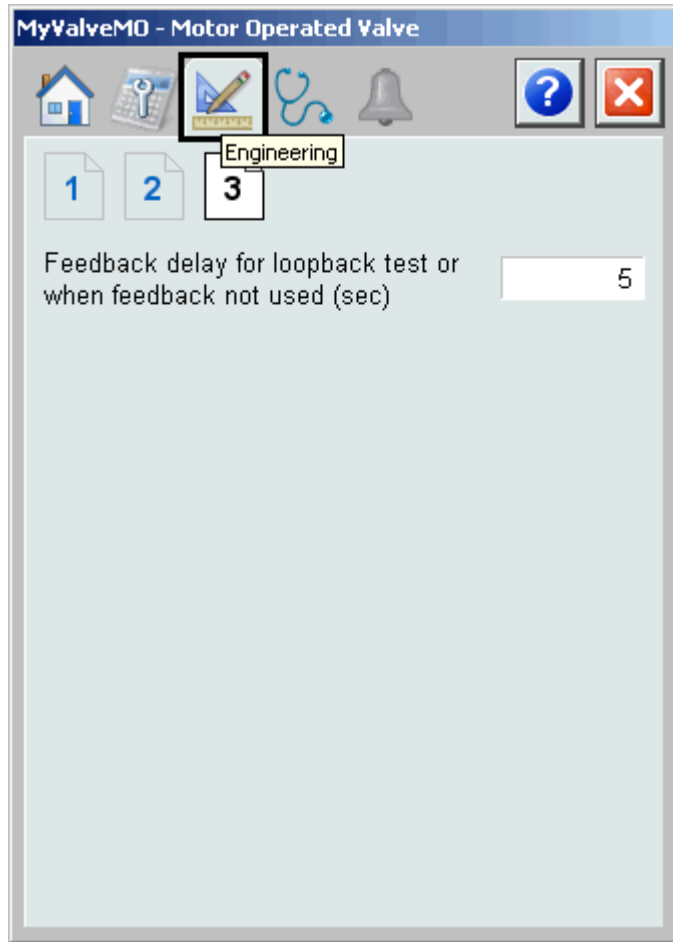
The following table lists the functions on page 3 of the Engineering tab.

Table 24 - Engineering Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Feedback delay for loopback test or when feedback not used (seconds)	Type the time delay (in seconds) for the opened or closed status to be echoed back when Simulation is enabled or when limit switch feedback is not used.	Engineering Configuration (Code E)	Cfg_SimFdbkT

Diagnostics Tab

The Diagnostic tab provides indications that are helpful in diagnosing or preventing device problems. These diagnostic indications 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 possible reasons the device is not ready.
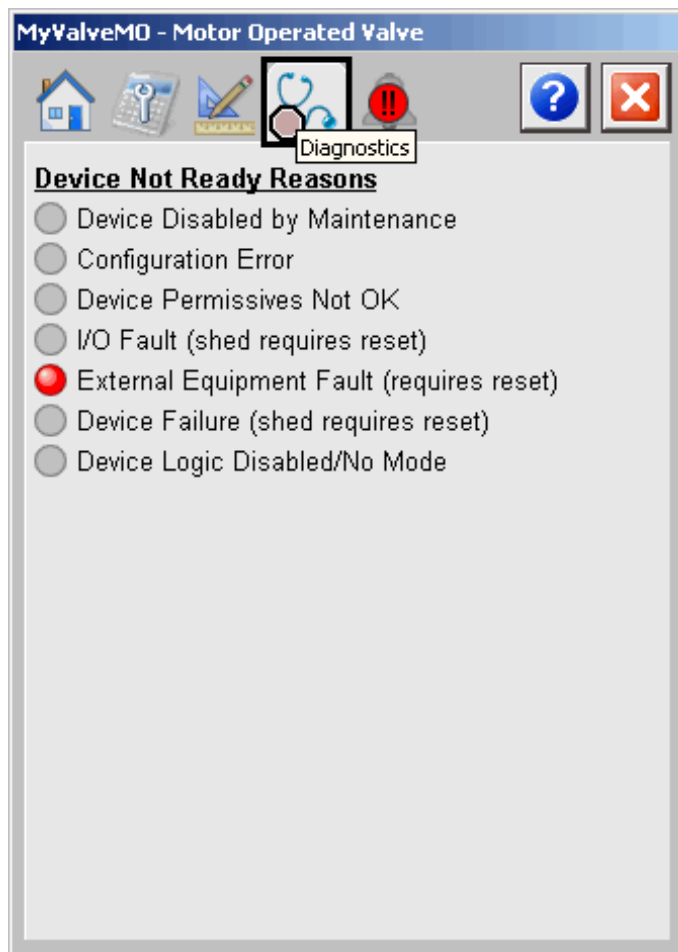
Alarms Tab

The Alarms tab displays each configured alarm for the P_ValveMO instruction. The icon on the tab for the alarms page changes color based on the current active alarms. A blinking alarm icon indicates that one or more alarms must be acknowledged or the device must be reset.

MyValveMO - Motor Operated Valve

Alarm Severity Indicator

I/O Fault

(!!) Actuator Fault

Alarm Acknowledge Command Button

Alarm Names

Full Stall

Transit Stall

Reset and Acknowledge All Alarms Command Button
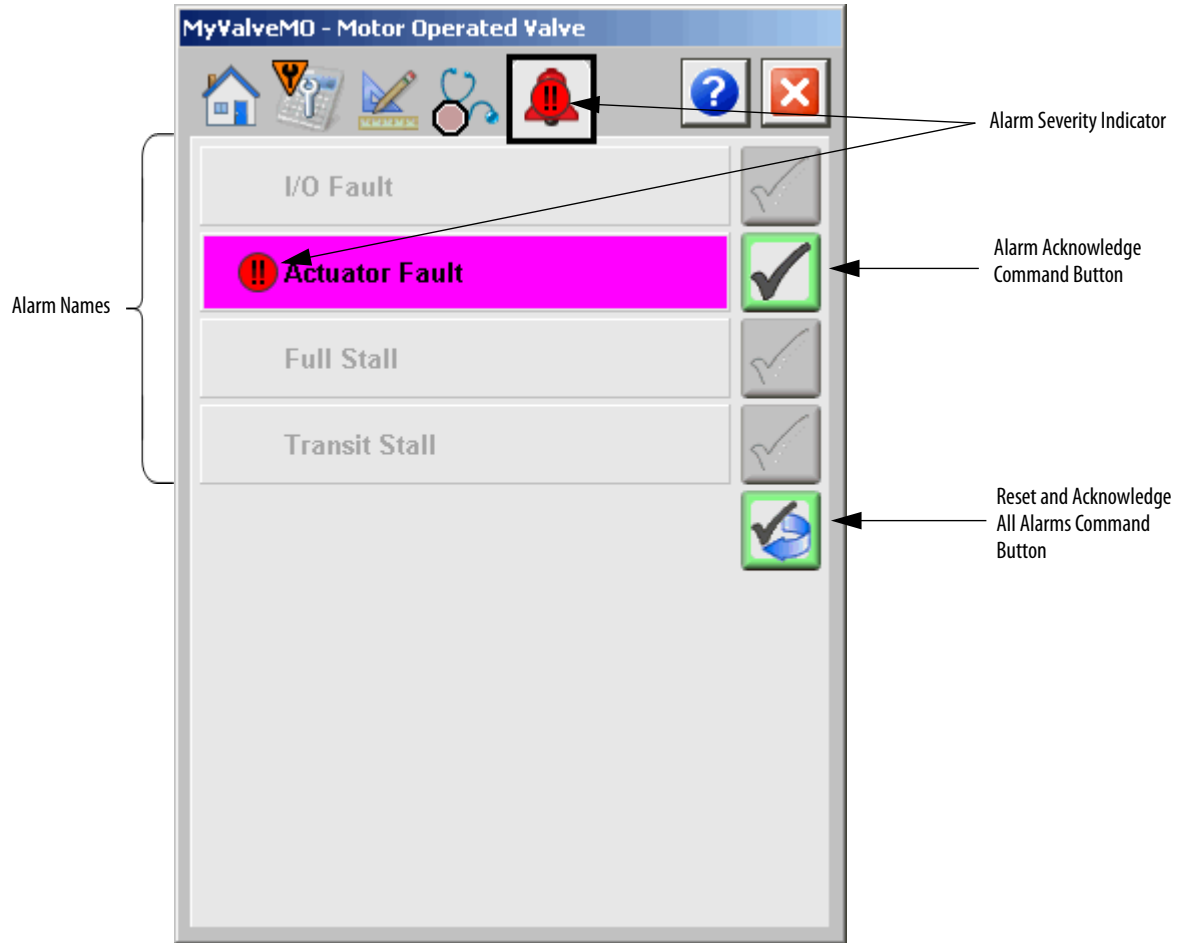
Click an alarm name to open the P_Alarm faceplate for that alarm. From the P_Alarm faceplate, you can configure and perform additional operations on the alarm.

If an alarm is active, the panel behind the alarm changes color to match the severity of the alarm. The color of the bell icon at the top of the faceplate shows the severity of the highest active alarm, and the icon blinks if any alarm is unacknowledged or requires reset.

Table 25 - Alarm Severity Colors

Color	Definition
Magenta	Urgent
Red	High
Yellow	Medium
Blue	Low
White (bell icon)	Alarm has cleared but is unacknowledged
Background (Light Gray)	No alarm

The following table shows the functions on the Alarms tab.

Table 26 - Alarms Tab Description

Function	Action	Security
Alarm Name	Click an alarm name to open the associated P_Alarm faceplate.	None
	Click to acknowledge the alarm.	Acknowledge Alarms (Code F)
	Click to reset and acknowledge all alarms.	

When the Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, indicating the alarm requires acknowledgement or reset. The Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the check mark to acknowledge the alarm.

See Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Motor-operated Valve Faceplate Help

The Faceplate Help is divided into two pages.

Faceplate Help Page 1

Faceplate Help Page 2

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If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
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