Reference Manual

PlantPAx
Distributed Control System

Rockwell Automation Library of Process Objects: Multiple Analog Input (P_AInMulti)

Version 3.5

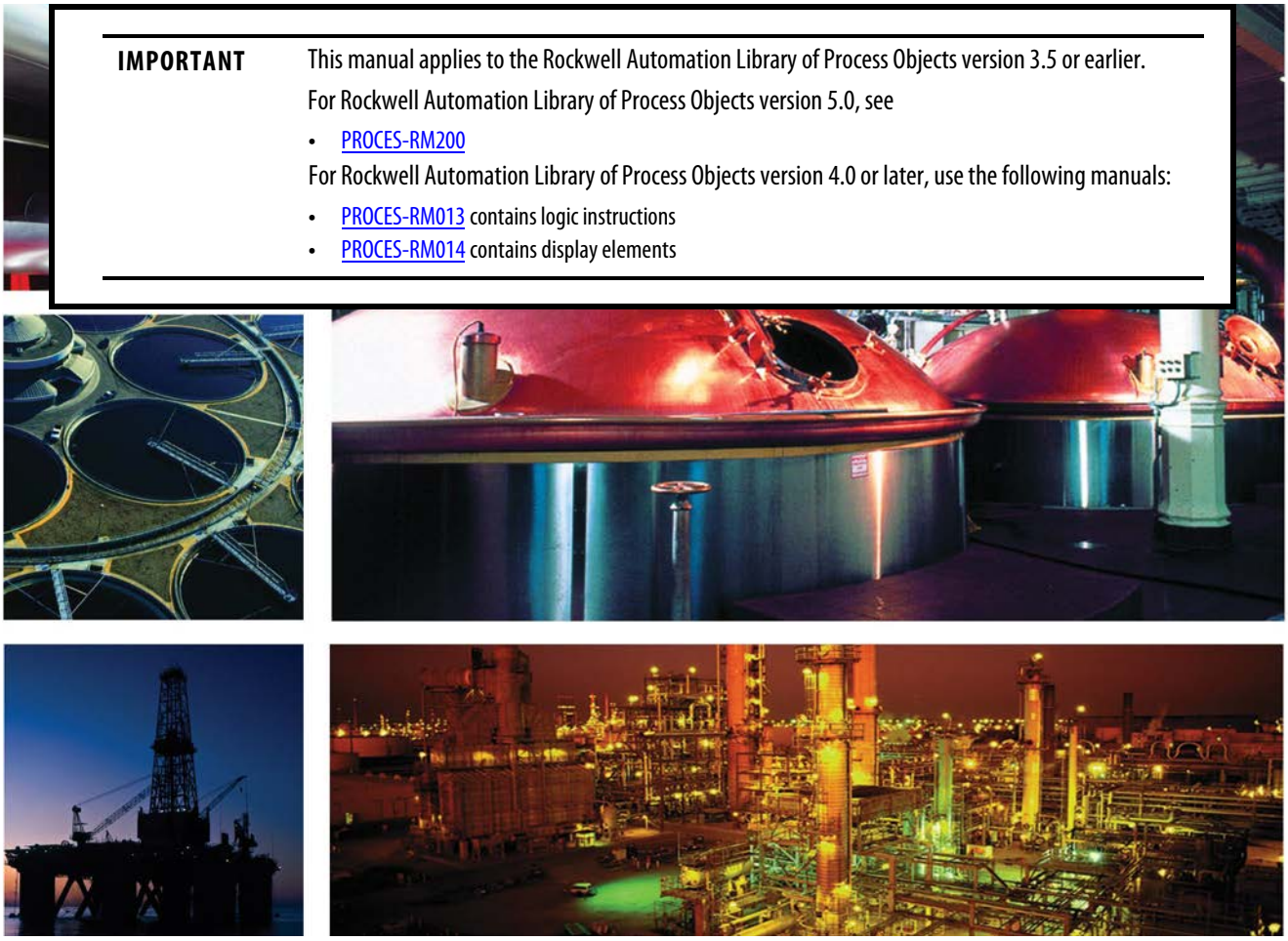
IMPORTANT This manual applies to the Rockwell Automation Library of Process Objects version 3.5 or earlier.

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).

Notes:

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

Software Compatibility and Content Revision

Table 1 - Summary of Changes

Topic	Page
Changed software version from 3_1 to 3_5	9
Visualization Files - Split visualization files table by type and reordered to align with installation requirements	9
Updated Alarm descriptions	25
Updated Status/Quality Indicator descriptions	33

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 additional information concerning related products from Rockwell Automation.

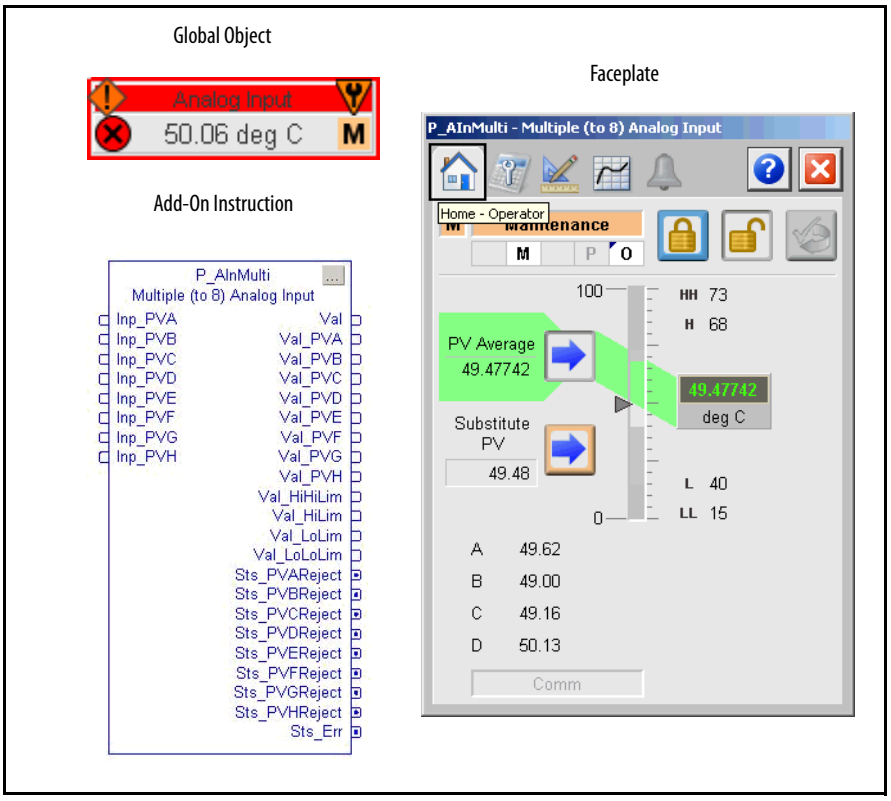
Resource	Description
PlantPAx® Distributed Control System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx system.
PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001	Provides characterized recommendations 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.

Resource	Description
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 choose 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: Condition Gate Delay (P_Gate) Reference Manual, publication SYSLIB-RM041	Provides details for using the P_Gate instruction for processing status and alarm conditions, including gate delay, on-delay, and off-delay timing. Generally the P_Gate faceplate is accessible from the Maintenance tab.

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.

Multiple Analog Input (P_AInMulti)

The P_AInMulti (Multiple Analog Input) Add-On Instruction monitors one analog process variable (PV) by using up to eight analog input signals (sensors, transmitters, input channels). The global object and faceplate shown below are examples of the graphical interface tools for this Add-On Instruction.



Guidelines

Use this instruction in these situations:

- You want to display a temperature, pressure, level, or other PV on your HMI or use the PV in your control logic, and the following apply:
  - You have three or more sensors for that PV (for example, six thermocouples and six thermocouple input channels on an I/O card).
  - You want the PV to be the mean or median of the sensors' input values.

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

- You have only two sensors for the PV. Use the P_AInDual (Dual Analog Input) instruction instead; it lets you select Sensor A, Sensor B, the greater (high select), the lesser (low select), or the average of the two sensors, and provides automatic failover to the good sensor when one sensor fails.
- You have multiple PVs, such as six temperatures, when each has its own significance. Use multiple instances of the P_AIn (Analog Input) instruction instead.

Functional Description

The Multiple Analog Input Instruction provides the following capabilities:

- Configuration to use 2...8 input signals.
- Linear scaling of each input signal from raw (input card) units to engineering (display) units.
- Input Source and Quality monitoring of inputs, plus monitoring of each signal for out-of-range condition. Rejection from the PV calculation of inputs that are out of range, flagged as bad, infinite, or not a number (floating-point exception values).
- First-order filtering of the calculated PV to reduce process or electrical signal noise.
- Calculation of the average (mean) or median of the inputs in use as the PV value.
- Selectable rejection from the PV calculation of inputs that are outside of two standard deviations from the mean (minimum four inputs required), or inputs that are outside of a user-defined deviation from the mean.
- Configuration of the minimum number of good (unrejected) input signals required to have a good PV value, and an alarm if the required number of good inputs is not met.
- Configuration of which PV to use if there are only two unrejected signals remaining: the lesser, the greater, or the average of the two.
- Maintenance capability to enter a substitute PV.
- High-High, High, Low, and Low-Low PV threshold alarms for the overall calculated PV, with operator-entered or program-entered limits and configurable deadband, on-delay, and off-delay per alarm.
- An alarm if any inputs configured to be used are rejected.
- An alarm if the number of unrejected inputs is equal to the minimum number required to be good (meaning the next input failure results in a PV failure).
- Display elements, plus a faceplate with bar graph PV indication, mode selection, alarm limit entry and alarm display, configuration, acknowledgement, trending, and maintenance and engineering configuration and setup.

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This 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_AInMulti_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

http://www.rockwellautomation.com/global/support/pcdc.pageThis 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) P_AIn Graphics Library	(RA-BAS-ME) P_AIn Graphics Library	Analog Input global object device symbols used to build process graphics.
(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Global objects used for managing alarms on process object faceplates.
(RA-BAS) Process Faceplate Analog Objects	(RA-BAS-ME) Process Faceplate Analog Objects	Analog global objects used on process object faceplates.
(RA-BAS) Process Help Objects	(RA-BAS-ME) Process Help Objects	Global objects used for all process objects help displays.
(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_AInMulti-Faceplate	(RA-BAS-ME) P_AInMulti-Faceplate	The faceplate that is used for the object
(RA-BAS) P_AInMulti-Quick	(RA-BAS-ME) P_AInMulti-Quick	The Quick display that is used for the object
(RA-BAS) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The faceplate that is used 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_Gate-Faceplate	(RA-BAS-ME) P_Gate-Faceplate	The gate faceplate display used for the object.
(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) Process AnalogIn Family-Help	(RA-BAS-ME) Process AnalogIn Family-Help	The Help display for AnalogIn objects
(RA-BAS) P_AIChan-Faceplate	(RA-BAS-ME) P_AIChan-Faceplate	**Optional** The Channel faceplate used for the object. Use this file if your Analog Input has an associated P_AIChan object and you enable navigation to its faceplate from the Analog Input faceplate.
(RA-BAS) P_AIChan-Help	(RA-BAS-ME) P_AIChan-Help	**Optional** Channel Help information that is accessed from the P_AIChan Help faceplate. Use this file if you use the Analog Input Channel 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.

Input Structure for Multiple Analog Input

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.
- Commands (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.
- Settings (PSet_, OSet_, MSet_) are used by program logic, operators, and maintenance personnel to establish runtime setpoints, thresholds, and so forth. A Setting without a leading P, O, or M establishes runtime settings regardless of role or mode.

Table 7 - P_AInMulti 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_PVA	REAL		0.0	Raw PV signals from the sensors/inputs. These values are typically read from an analog input module. Use the HasPV bits (for example, Cfg_HasPVA) to enable/disable these inputs.
Inp_PVB	REAL		0.0	
Inp_PVC	REAL		0.0	
Inp_PVD	REAL		0.0	
Inp_PVE	REAL		0.0	
Inp_PVF	REAL		0.0	
Inp_PVG	REAL		0.0	
Inp_PVH	REAL		0.0	
Inp_PVABad	BOOL		0	Bad Signal Quality/Communication Status for Inputs (1 = Bad, 0 = OK). If PV is read from an analog input, then this is normally read from the analog input channel fault status. **EXAMPLE:** Inp_PVABad is connected to the channel fault status for the input connected to Inp_PVA.
Inp_PVBBad	BOOL		0	
Inp_PVCBad	BOOL		0	
Inp_PVDBad	BOOL		0	
Inp_PVEBad	BOOL		0	
Inp_PVFBad	BOOL		0	
Inp_PVGBad	BOOL		0	
Inp_PVHBad	BOOL		0	

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Inp_PVAUncertain	BOOL		0	Uncertain Quality for Inputs (1 = Uncertain, 0 = OK). This is optional status for the input that can be used to drive the status of the output (Sts_PVUncertain). If Cfg_RejectUncertain is set to true, input signals with an uncertain status are treated as bad and are rejected from the PV calculation.
Inp_PVBUncertain				
Inp_PVCUncertain				
Inp_PVDUncertain				
Inp_PVEUncertain				
Inp_PVFUncertain				
Inp_PVGUncertain				
Inp_PVHUncertain				
Inp_PVASrcq	SINT		0	Input Source and Quality A through H (from Channel object, if available) (enumeration).
Inp_PVBSrcq				
Inp_PVCSrcq				
Inp_PVDSrcq				
Inp_PVESrcq				
Inp_PVFSrcq				
Inp_PVGSrcq				
Inp_PVHSrcq				
Inp_Sim	BOOL		0	Simulation input. When set to 1, the instruction uses simulation parameters (for example, Set_SimPVA) to calculate output. When set to 0, the instruction uses input parameters (for example, Inp_PVA) to calculate output.
Inp_HiHiGate	BOOL	HiHiGate.Inp_Gate	1	These parameters are the gate inputs used for status detection. When set to 1, the corresponding analog input threshold monitoring is enabled. When enabled, the threshold detection on-delay and off-delay timers are applied after the gate delay timer. When set to 0, detection is disabled and the corresponding status output is forced off. If the status is used as an alarm, this input acts as a suppression-by-design condition.
Inp_HiGate		HiGate.Inp_Gate		
Inp_LoGate		LoGate.Inp_Gate		
Inp_LoLoGate		LoLoGate.Inp_Gate		
Inp_FailGate		FailGate.Inp_Gate		
Inp_Reset	BOOL		0	Input parameter used to programatically reset alarms. When set to 1, all alarms requiring reset are reset.
Cfg_HasPVA	BOOL		1	Set these parameters to 1 if the corresponding PV input is wired and is to be used in the calculations. Set these parameters to 0 if the corresponding PV input is not connected or is not to be used in the calculations. This configuration indicates the engineering intent to use each PV input in calculating the output (Val). Use the UsePV bits (for example, Cfg_UsePVA) to exclude the input temporarily for maintenance purposes.
Cfg_HasPVB			1	
Cfg_HasPVC			1	
Cfg_HasPVD			0	
Cfg_HasPVE			0	
Cfg_HasPVF			0	
Cfg_HasPVG			0	
Cfg_HasPVH			0	

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_UsePVA	BOOL		1	Set these parameters to 1 to include the corresponding PV input in the calculation. Set these parameters to 0 to exclude the corresponding PV input from the calculation. This configuration is typically used for taking a measurement out of service temporarily for maintenance.
Cfg_UsePVB			1	
Cfg_UsePVC			1	
Cfg_UsePVD			0	
Cfg_UsePVE			0	
Cfg_UsePVF			0	
Cfg_UsePVG			0	
Cfg_UsePVH			0	
Cfg_RejectUncertain	BOOL		0	This parameter is used to determine behavior when an input status is set uncertain. When this parameter is 1, an input that is flagged as uncertain is rejected and not used in calculating the final PV. When this parameter is 0, an input that is flagged as uncertain is not rejected and still is used in calculating the final PV, but it causes the final PV status to be set as uncertain.
Cfg_UseStdDev	BOOL		0	This parameter determines how to validate input values. When this parameter is 1, an input is rejected if it is more than two standard deviations from the mean. When this parameter is 0, an input is rejected if it deviates from the mean by more than the value defined by Cfg_AbsDevLim. **IMPORTANT:** At least four inputs must be used for the setting of 1 to be meaningful.
Cfg_CalcAvg	BOOL		0	This parameter determines how the output (Val) is calculated. When this parameter is 1, the calculated final PV is the average (arithmetic mean) of all the good (non-rejected) PV inputs. When this parameter is 0, the calculated final PV is the median (central value) of all the good (non-rejected) PV inputs. If there are an even number of inputs, the median is calculated as the average of the two central values. If there are only two unrejected inputs, the output calculation is determined by parameter Cfg_CalcWhen2.
Cfg_NoSubstPV	BOOL		0	This parameter provides the ability to disable the maintenance substitution feature. When this parameter is 0, the Substitute PV Maintenance is allowed. When this parameter is 1, the Substitute PV Maintenance function is disallowed. When Cfg_NoSubstPV is 0, the commands MCmd_InpPV and MCmd_SubstPV are used to select the input (live) PV or the substitute PV. Sts_SubstPV is 1 when the substitute PV is selected.
Cfg_SetTrack	BOOL		1	This parameter is used to set up bumpless behavior of setting parameters when switching modes. When this parameter is 1, in Program mode the operator settings track the program settings; in Operator mode the program settings track the operator settings; and the simulation inputs match the output values (transitions are bumpless). When this parameter is 0, the operator settings and program settings are not modified by this instruction. In this case, when the mode is changed, the effective value of the setting can change depending on the program-set and operator-set values. For P_AInMulti, the value of this parameter impacts only the alarm threshold settings (for example, PSet_HiHiLim, OSet_HiHiLim, and Val_HiHiLim) and simulation values (for example, Set_SimPVA).

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_HasChanObjA	BOOL		0	1=Tells HMI a Channel object (AIChan, etc.) is used for Inp_PVA…Inp_PVH. **IMPORTANT:** The name of the Channel object in the controller must be this object's name with the suffix '_Chan' plus the input letter (A…H). This applies to each of the eight channels (A…H). For example, if your P_AInMulti object has the name 'AInMulti123', then its Channel A object must be named 'AInMulti123_ChanA'
Cfg_HasChanObjB				
Cfg_HasChanObjC				
Cfg_HasChanObjD				
Cfg_HasChanObjE				
Cfg_HasChanObjF				
Cfg_HasChanObjG				
Cfg_HasChanObjH				
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_HasHiHiAlm	BOOL	HiHi.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_HasHiAlm		Hi.Cfg_Exists		
Cfg_HasLoAlm		Lo.Cfg_Exists		
Cfg_HasLoLoAlm		LoLo.Cfg_Exists		
Cfg_HasAnyRejectAlm		AnyReject.Cfg_Exists		
Cfg_HasMinGoodAlm		MinGood.Cfg_Exists		
Cfg_HasFailAlm		Fail.Cfg_Exists		
Cfg_HiHiResetReqd	BOOL	HiHi.Cfg_ResetReqd	0	These parameters determine whether a reset is required to clear the alarm status. When these parameters are 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 Hi.OCmd_Reset is required to clear Alm_Hi 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_HiResetReqd		Hi.Cfg_ResetReqd		
Cfg_LoResetReqd		Lo.Cfg_ResetReqd		
Cfg_LoLoResetReqd		LoLo.Cfg_ResetReqd		
Cfg_AnyRejectResetReqd		AnyReject.Cfg_ResetReqd		
Cfg_MinGoodResetReqd		MinGood.Cfg_ResetReqd		
Cfg_FailResetReqd		Fail.Cfg_ResetReqd		
Cfg_HiHiAckReqd	BOOL	HiHi.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_FailAck or Fail.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_HiAckReqd		Hi.Cfg_AckReqd		
Cfg_LoAckReqd		Lo.Cfg_AckReqd		
Cfg_LoLoAckReqd		LoLo.Cfg_AckReqd		
Cfg_AnyRejectAckReqd		AnyReject.Cfg_AckReqd		
Cfg_MinGoodAckReqd		MinGood.Cfg_AckReqd		
Cfg_FailAckReqd		Fail.Cfg_AckReqd		
Cfg_MinGood	DINT		2	This parameter defines the minimum number of unrejected inputs required to have the final output (Val) show good quality (Val_Sts = 0). The status, Sts_MinGood is set when the number of unrejected inputs is equal to Cfg_MinGood, indicating the next input rejected results in a PV failure.

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_CalcWhen2	SINT		0	This parameter determines the output calculation when there are only two unrejected inputs: 0=Average, 1=Minimum, 2=Maximum. When there are more than two unrejected inputs, the calculation is determined by Cfg_CalcAvg.
Cfg_HiHiSeverity	INT	HiHi.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_HiSeverity		Hi.Cfg_Severity	750	
Cfg_LoSeverity		Lo.Cfg_Severity	750	
Cfg_LoLoSeverity		LoLo.Cfg_Severity	1000	
Cfg_AnyRejectSeverity		AnyReject.Cfg_Severity	500	
Cfg_MinGoodSeverity		MinGood.Cfg_Severity	500	
Cfg_FailSeverity		Fail.Cfg_Severity	1000	
Cfg_InpRawMin	REAL		0.0	These parameters must be set to the range of the signal connected to the Inp_PV inputs (for example, Inp_PVA). The inputs are then scaled to the values set by Cfg_PVEUMin and Cfg_PVEUMax.
Cfg_InpRawMax			100.0	
Cfg_PVEUMin	REAL		0.0	These parameters must be set to match the PV range of the input signals (for example, Inp_PVA) in engineering units. **EXAMPLE:** If your input card provides signals in the range of 4…20, and these values represent 0…250 °C , P_AInMulti can scale the inputs for you by setting Cfg_InpRawMin to 4, Cfg_InpRawMax to 20, Cfg_PVEUMin to 0, and Cfg_PVEUMax to 250. **TIP:** The P_AinMulti instruction supports reverse scaling; either the raw (input) or engineering (scaled) range can be reversed (maximum less than minimum).
Cfg_PVEUMax			100.0	
Cfg_AbsDevLim	REAL		10.0	Absolute Deviation Threshold in engineering units (engineering units). When Cfg_UseStdDev is configured to 0, an input is rejected if it deviates from the mean by this threshold.
Cfg_FiltTC	REAL		0.0	This parameter sets the filter time constant (in seconds) for a first-order (lag) filter applied to the output (Val). The filter is applied after scaling and before alarm checking. A value of 0.0 means the PV is unfiltered.
Cfg_HiHiDB	REAL		1.0	These parameters set the deadband (hysterisis) that is applied to each alarm limit, used to prevent a noisy signal from generating spurious alarms. **EXAMPLE:** If the High alarm is enabled (Cfg_HasHiAlm = 1), the High Alarm Limit (Val_HiLim) is 90 and the High Alarm Deadband (Cfg_HiDB) is 5, the high alarm is generated when the output (Val) rises above 90 and is cleared once the output (Val) falls below 85 (90 minus 5).
Cfg_HiDB			1.0	
Cfg_LoDB			1.0	
Cfg_LoLoDB			1.0	
Cfg_FailDB			0.41666666	
Cfg_HiHiGateDly	DINT	HiHiGate.Cfg_GateDly	0	These parameters determine the amount of time (in seconds) the gate input must be turned on for threshold detection to be enabled. On delays and off delays are applied after the gate delay is complete.
Cfg_HiGateDly		HiGate.Cfg_GateDly		
Cfg_LoGateDly		LoGate.Cfg_GateDly		
Cfg_LoLoGateDly		LoLoGate.Cfg_GateDly		
Cfg_FailGateDly		FailGate.Cfg_GateDly		
Cfg_HiHiOnDly	DINT	HiHiGate.Cfg_OnDly	0	These parameters determine the minimum time (in seconds) the PV must remain beyond the status threshold for the status to be set. On-delay times are used to avoid unnecessary alarms when an output (Val) only briefly overshoots its threshold (for example, Val_HiHiLim).
Cfg_HiOnDly		HiGate.Cfg_OnDly		
Cfg_LoOnDly		LoGate.Cfg_OnDly		
Cfg_LoLoOnDly		LoLoGate.Cfg_OnDly		
Cfg_FailOnDly		FailGate.Cfg_OnDly		

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_HiHiOffDly	DINT	HiHiGate.Cfg_OffDly	0	These parameters determine the amount of time (in seconds) the output must stay within each status threshold to clear the status. Off-delay times are used to reduce chattering alarms. **EXAMPLE:** If Cfg_HiOffDly is 5 seconds, the output (Val) must be below the status limit (Val_HiHiLim) minus deadband (Cfg_HiHiDB) for 5 seconds before the status is returned to normal.
Cfg_HiOffDly		HiGate.Cfg_OffDly		
Cfg_LoOffDly		LoGate.Cfg_OffDly		
Cfg_LoLoOffDly		LoLoGate.Cfg_OffDly		
Cfg_FailOffDly		FailGate.Cfg_OffDly		
Cfg_FailHiLim	REAL		103.958336	These limits determine what range of input values (in scaled engineering units) generate a Fail alarm indicating a signal failure. When the scaled input (for example, Val_PVA) is above the Fail Hi Limit (Cfg_FailHiLim) or below the Fail Lo Limit (Cfg_FailLoLim) and the Fail alarm is enabled (Cfg_FailAlm = 1), the sensor is regarded as failed, is rejected from the calculation, and generates an alarm. If used, set failure limits outside the configured expected engineering unit range (Cfg_PVEUMin and Cfg_PVEUMax).
Cfg_FailLoLim			-2.0833333	
PSet_Owner	DINT		0	Program Owner Request ID (non-zero) or Release (zero).
PSet_HiHiLim	REAL		1.5E+38	Program-entered Status Threhold in engineering units.
PSet_HiLim			1.5E+38	
PSet_LoLim			-1.5E+38	
PSet_LoLoLim			-1.5E+38	
MSet_SubstPV	REAL		0.0	Maintenance-entered Substitute PV in engineering units.
OSet_HiHiLim	REAL		1.5E+38	Operator-entered Status Threshold in engineering units.
OSet_HiLim			1.5E+38	
OSet_LoLim			-1.5E+38	
OSet_LoLoLim			-1.5E+38	
Set_SimPVA	REAL		0.0	PVs when in Simulation (Inp_Sim=1) in engineering units. **EXAMPLE:** Val is set based on Set_SimPVA when Inp_Sim is set, otherwise it is set based on Inp_PVA.
Set_SimPVB				
Set_SimPVC				
Set_SimPVD				
Set_SimPVE				
Set_SimPVF				
Set_SimPVG				
Set_SimPVH				
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		

Table 7 - P_AInMulti Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
PCmd_ClearCapt	BOOL		0	•Set PCmd_ClearCapt to 1 to clear the captured minimum/maximum PV excursion values •The parameter is reset Automatically
PCmd_Reset	BOOL		0	•Set PCmd_Reset to 1 to reset all alarms requiring reset •This parameter is always reset automatically
PCmd_HiHiAck	BOOL	HiHi.PCmd_Ack	0	•Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm •The parameter is reset automatically
PCmd_HiAck		Hi.PCmd_Ack		
PCmd_LoAck		Lo.PCmd_Ack		
PCmd_LoLoAck		LoLo.PCmd_Ack		
PCmd_AnyRejectAck		AnyReject.PCmd_Ack		
PCmd_MinGoodAck		MinGood.PCmd_Ack		
PCmd_FailAck		Fail.PCmd_Ack		
PCmd_HiHiSuppress	BOOL	HiHi.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 automaticallyS
PCmd_HiSuppress		Hi.PCmd_Suppress		
PCmd_LoSuppress		Lo.PCmd_Suppress		
PCmd_LoLoSuppress		LoLo.PCmd_Suppress		
PCmd_AnyRejectSuppress		AnyReject.PCmd_Suppress		
PCmd_MinGoodSuppress		MinGood.PCmd_Suppress		
PCmd_FailSuppress		Fail.PCmd_Suppress		
PCmd_HiHiUnsuppress		HiHi.PCmd_Unsuppress		
PCmd_HiUnsuppress		Hi.PCmd_Unsuppress		
PCmd_LoUnsuppress		Lo.PCmd_Unsuppress		
PCmd_LoLoUnsuppress		LoLo.PCmd_Unsuppress		
PCmd_AnyRejectUnsuppress		AnyReject.PCmd_Unsuppress		
PCmd_MinGoodUnsuppress		MinGood.PCmd_Unsuppress		
PCmd_FailUnsuppress		Fail.PCmd_Unsuppress		
PCmd_HiHiUnshelve	BOOL	HiHi.PCmd_Unshelve	0	•Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm •The parameter is reset automatically
PCmd_HiUnshelve		Hi.PCmd_Unshelve		
PCmd_LoUnshelve		Lo.PCmd_Unshelve		
PCmd_LoLoUnshelve		LoLo.PCmd_Unshelve		
PCmd_AnyRejectUnshelve		AnyReject.PCmd_Unshelve		
PCmd_MinGoodUnshelve		MinGood.PCmd_Unshelve		
PCmd_FailUnshelve		Fail.PCmd_Unshelve		
MCmd_SubstPV	BOOL		0	Maintenance command to use Substitute PV (override input).
MCmd_InpPV	BOOL		0	Maintenance command to use Input PV (normal).
OCmd_ClearCapt	BOOL		0	Operator command to clear the captured minimum/maximum PV excursion values.
MCmd_Acq	BOOL	Mode.MCmd_Acq	0	Maintenance command to acquire ownership (Operator/Program/Override to Maintenance).
MCmd_Rel	BOOL	Mode.MCmd_Rel	0	Maintenance command to release ownership (Maintenance to Operator/Program/Override).

Table 7 - P_AInMulti Input Parameters

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

Output Structure for Multiple Analog Input

Output parameters include the following:

- Value data elements (Val_) are the outputs of the instruction for HMI display or use by other application logic.
- 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_) contain quality, alarm, or instruction status information for HMI display or use 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.
- 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 set data entry fields.

Table 8 - P_AInMulti 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.
Val	REAL		Selected Analog PV (including substitute PV, if used) (engineering units).
Val_CalcPV	REAL		Calculated PV, before selection of substitute PV or filtering (engineering units).
Val_PVA	REAL		Analog Value (actual) from Inputs expressed in engineering units.
Val_PVB	REAL		
Val_PVC	REAL		
Val_PVD	REAL		
Val_PVE	REAL		
Val_PVF	REAL		
Val_PVG	REAL		
Val_PVH	REAL		
Val_PVMinCapt	REAL		Captured PV Minimum (excursion) since last cleared.
Val_PVMaxCapt	REAL		Captured PV Maximum (excursion) since last cleared.

Table 8 - P_AInMulti Output Parameters

Output Parameter	Data Type	Alias For	Description
Val_PVEUMin	REAL		Minimum of scaled range = MIN (Cfg_PVEUMin, Cfg_PVEUMax).
Val_PVEUMax	REAL		Maximum of scaled range = MAX (Cfg_PVEUMin, Cfg_PVEUMax).
SrcQ_IO	SINT		I/O signal source and quality for primary I/O.
SrcQ			Final PV 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)
SrcQ_IOA…SrcQ_IOH	SINT		Source and Quality of inputs A through H (enumeration).
Val_Sts	SINT		Device confirmed status: 0 = PV Good 5 = PV Uncertain 6 = PV Bad 7 = Substitute PV 33 = Disabled
Val_Fault	SINT		Device fault status: 0 = None 17 = AnyReject 18 = MinGood 20 = Lo 21 = Hi 24 = LoLo 25 = HiHi 32 = Fail 34 = Configuration error
Val_Mode	SINT	Mode.Val	The current mode is shown with status bits and also as an enumeration 'Val_Mode' as follows: 0 = No mode 1 = Not used 2 = Maintenance 3 = Not used 4 = Program (locked) 5 = Operator (locked) 6 = Program (unlocked, Operator is default) 7 = Operator (unlocked, Program is default) 8 = Program (unlocked, Program is default) 9 = Operator (unlocked, Operator is default)
Val_Owner	DINT		Current Object Owner ID (0 = not owned).

Table 8 - P_AInMulti Output Parameters

Output Parameter	Data Type	Alias For	Description
Val_Notify	SINT		Current Alarm Level and Acknowledgement (enumeration) rolled up from individual alarm status: 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)
Val_HiHiLim	REAL		Current Status Threshold.
Val_HiLim			
Val_LoLim			
Val_LoLoLim			
Sts_PVAReject	BOOL		When set to 1, indicates associated input is rejected and not used to calculate PV.
Sts_PVBReject	BOOL		
Sts_PVCReject	BOOL		
Sts_PVDReject	BOOL		
Sts_PVEReject	BOOL		
Sts_PVFReject	BOOL		
Sts_PVGReject	BOOL		
Sts_PVHReject	BOOL		
Sts_SubstPV	BOOL		1 = Using Substitute PV (input being overridden).
Sts_InpPV	BOOL		1 = Using Input PV (normal).
Sts_PVBad	BOOL		1 = PV Bad quality or Out of Range.
Sts_PVUncertain	BOOL		1 = PV Value is Uncertain (quality).
Sts_MaintByp	BOOL		1 = A 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_Raw	BOOL		1 = Error in configuration: Raw Input Scaling Minimum = Maximum.
Err_EU	BOOL		1 = Error in configuration: Scaled Engineering Units Minimum = Maximum.
Err_Timer	BOOL		1 = Error in configuration: Minimum Duration Time invalid (use 0…2,147,483 seconds).
Err_Filt	BOOL		1 = Error in configuration: PV Filter time constant.
Err_DB	BOOL		1 = Error in configuration: a Status Deadband is < 0.0.
Err_Has	BOOL		1 = Error in configuration: at Least One Cfg_HasPVx must be 1.
Err_Use	BOOL		1 = Error in configuration: at Least One Cfg_UsePVx must be 1.
Err_MinGood	BOOL		1 = Error in configuration: Cfg_MinGood must be in the range (1…8).
Err_Alarm	BOOL		1 = Error in configuration: alarm minimum on time or severity.
Sts_Maint	BOOL	Mode.Sts_Maint	1 = Mode is Maintenance (supersedes Operator and Program).
Sts_Prog	BOOL	Mode.Sts_Prog	1 = Mode is Program.
Sts_Oper	BOOL	Mode.Sts_Oper	1 = Mode is Operator.

Table 8 - P_AInMulti 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 = No mode (instruction is disabled because EnableIn is False).
Sts_MAcqRcvd	BOOL	Mode.Sts_MAcqRcvd	1 = Maintenance Acquire command received this scan.
Sts_HiHiCmp	BOOL	HiHiGate.Inp	PV High-High comparison result, 1 = High-High.
Sts_HiCmp		HiGate.Inp	PV High comparison result, 1 = High.
Sts_LoCmp		LoGate.Inp	PV Low comparison result, 1 = Low.
Sts_LoLoCmp		LoLoGate.Inp	PV Low-Low comparison result, 1 = Low-Low.
Sts_FailCmp		FailGate.Inp	PV Fail comparison result, 1 = Fail.
Sts_HiHiGate	BOOL	HiHiGate.Sts_Gate	1 = Corresponding gate delay is complete.
Sts_HiGate		HiGate.Sts_Gate	
Sts_LoGate		LoGate.Sts_Gate	
Sts_LoLoGate		LoLoGate.Sts_Gate	
Sts_FailGate		FailGate.Sts_Gate	
Sts_HiHi	BOOL	HiHi.Inp	1 = Analog Input is above High-High threshold.
Sts_Hi		Hi.Inp	1 = Analog Input is above High threshold.
Sts_Lo		Lo.Inp	1 = Analog Input is below Low threshold.
Sts_LoLo		LoLo.Inp	1 = Analog Input is below Low-Low threshold.
Sts_AnyReject		AnyReject.Inp	1 = At least one input has been rejected.
Sts_MinGood		MinGood.Inp	1 = At minimum required number of good inputs, next reject/fail results in Bad PV.
Sts_Fail		Fail.Inp	1 = PV failure (not enough good PV inputs).
Alm_HiHi	BOOL	HiHi.Alm	1 = Analog Input is in High-High alarm.
Alm_Hi		Hi.Alm	1 = Analog Input is in High alarm.
Alm_Lo		Lo.Alm	1 = Analog Input is in Low alarm.
Alm_LoLo		LoLo.Alm	1 = Analog Input is in Low-Low alarm.
Alm_AnyReject		AnyReject.Alm	1 = Alarm: at least one input has been rejected.
Alm_MinGood		MinGood.Alm	1 = Minimum Good PV inputs alarm.
Alm_Fail		Fail.Alm	1 = PV failure alarm.
Ack_HiHi	BOOL	HiHi.Ack	1 = Corresponding alarm has been acknowledged.
Ack_Hi		Hi.Ack	
Ack_Lo		Lo.Ack	
Ack_LoLo		LoLo.Ack	
Ack_AnyReject		AnyReject.Ack	
Ack_MinGood		MinGood.Ack	
Ack_Fail		Fail.Ack	

Table 8 - P_AInMulti Output Parameters

Output Parameter	Data Type	Alias For	Description
Sts_HiHiDisabled	BOOL	HiHi.Disabled	1 = Corresponding alarm is disabled (by maintenance).
Sts_HiDisabled		Hi.Disabled	
Sts_LoDisabled		Lo.Disabled	
Sts_LoLoDisabled		LoLo.Disabled	
Sts_AnyRejectDisabled		AnyReject.Disabled	
Sts_MinGoodDisabled		MinGood.Disabled	
Sts_FailDisabled		Fail.Disabled	
Sts_HiHiShelved	BOOL	HiHi.Shelved	1 = Corresponding alarm is shelved (by operator).
Sts_HiShelved		Hi.Shelved	
Sts_LoShelved		Lo.Shelved	
Sts_LoLoShelved		LoLo.Shelved	
Sts_AnyRejectShelved		AnyReject.Shelved	
Sts_MinGoodShelved		MinGood.Shelved	
Sts_FailShelved		Fail.Shelved	
Sts_HiHiSuppressed	BOOL	HiHi.Suppressed	1 = Corresponding alarm is suppressed (by program).
Sts_HiSuppressed		Hi.Suppressed	
Sts_LoSuppressed		Lo.Suppressed	
Sts_LoLoSuppressed		LoLo.Suppressed	
Sts_AnyRejectSuppressed		AnyReject.Suppressed	
Sts_MinGoodSuppressed		MinGood.Suppressed	
Sts_FailSuppressed		Fail.Suppressed	
Rdy_SubstPV	BOOL		1 = Ready for MCmd_SubstPV.
Rdy_InpPV	BOOL		1 = Ready for MCmd_InpPV.
Rdy_Reset	BOOL		1 = At least one alarm requires reset.
Rdy_ResetAckAll	BOOL		1 = At least one alarm requires reset or acknowledgement.
Rdy_OSet	BOOL		1 = Ready to receive OSets (enables data entry fields)
P_AInMulti	BOOL		Unique parameter name for auto-discovery.

Local Configuration Tags for Multiple Analog Input

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 by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. 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	'Multiple (to 8) Analog Input'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_EU	STRING_8	'%'	Engineering Units for display on HMI.
Cfg_Label	STRING_20	'Analog Input'	Label for graphic symbol displayed on HMI. This string appears on the graphic symbol.
Cfg_PVATag	STRING_20	'Sensor/Input A'	Tagname for Sensor/Inputs for display on HMI.
Cfg_PVBTag		'Sensor/Input B'	
Cfg_PVCTag		'Sensor/Input C'	
Cfg_PVDTag		'Sensor/Input D'	
Cfg_PVETag		'Sensor/Input E'	
Cfg_PVFTag		'Sensor/Input F'	
Cfg_PVGTag		'Sensor/Input G'	
Cfg_PVHTag		'Sensor/Input H'	
Cfg_Tag	STRING_20	'P_AInMulti'	Tag name for display on the 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.

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.
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.
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.

The following standard modes are not used:

- Hand mode
- Override (Ovrd) mode

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.

Alarm Name	P_Alarm Name	P_Gate Name	Description
Any Reject	AnyReject	None	Raised when 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).
Fail	Fail	FailGate	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 to not 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
High PV	Hi	HiGate	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.
High-High PV	HiHi	HiHiGate	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.
Low PV	Lo	LoGate	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.
Low-Low PV	LoLo	LoLoGate	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.
Minimum Good	MinGood	None	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 will result in a Bad PV quality.

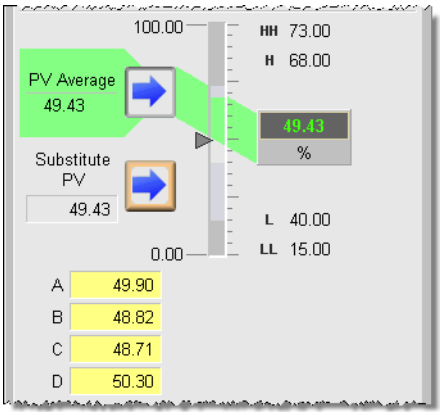
Parameters of the P_Alarm object can be accessed by using the following convention: [P_Alarm Name].[P_Alarm Parameter].

For more information, see the following Rockwell Automation Library of Process Objects publications:

- Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002
- Condition Gate Delay (P_Gate) Reference Manual, publication SYSLIB-RM041

Simulation

Simulation in P_AInMulti disables the normal inputs (Inp_PVA through Inp_PVH) and provides up to eight inputs on the Operator faceplate for you to enter your own input values. (four (A...D) are shown on the image,)



You must set the Inp_Sim parameter in the controller to '1' to enable simulation.

The Simulation icon is displayed at the bottom left of the Operator faceplate indicating the device is in simulation.

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.

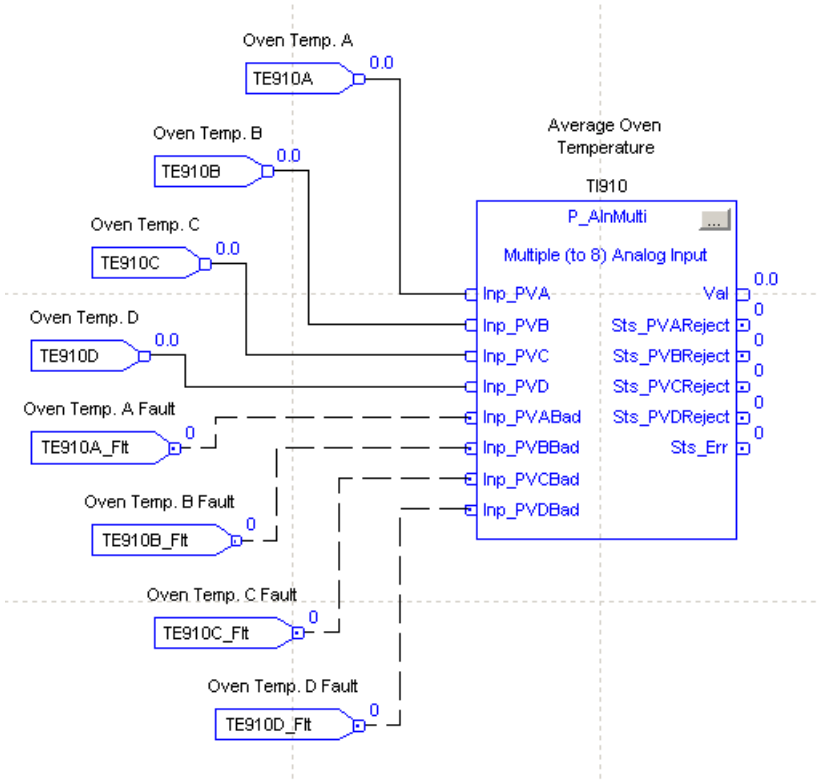
Condition	Description
EnableIn False (false rung)	The P_AInMulti instruction shows a status of Bad Quality (Sts_PVBad) on the HMI. All alarms are cleared. The mode is reported as No Mode. However, calculation of the scaled input PV value is executed to indicate to the operator the actual input value, even though the primary PV (value) is not updated (holds last value).
Powerup (prescan, first scan)	Any commands received before first scan are discarded. Embedded P_Mode and P_Alarm instructions are handled in accordance with their standard power-up procedure. Refer to the reference manuals for the P_Mode and P_Alarm instructions for more information.
Postscan	No SFC postscan logic is provided.

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

Programming Example

This example uses the P_AInMulti instruction to average multiple sensors for a single PV.

In this example, there is an oven with four temperature sensors (A, B, C, D). The average of these temperature sensors is used elsewhere in logic to control the heating element of the chamber.



The Inp_PVA, Inp_PVB, Inp_PVC, and Inp_PVD parameters (in the Function Block example above) are connected to the values that is coming from the four temperature transmitters. The fault status of each of these sensors is tied to the bad status input of P_AInMulti (for example, Inp_PVABad).

The output parameters Val and Sts_PVBad could then be connected to the PV and PVFault parameters of a PIDE instruction for control.

To implement this example, the following configuration input parameters need to be set. Those not listed could be left at their default. There is no alarming set in this example.

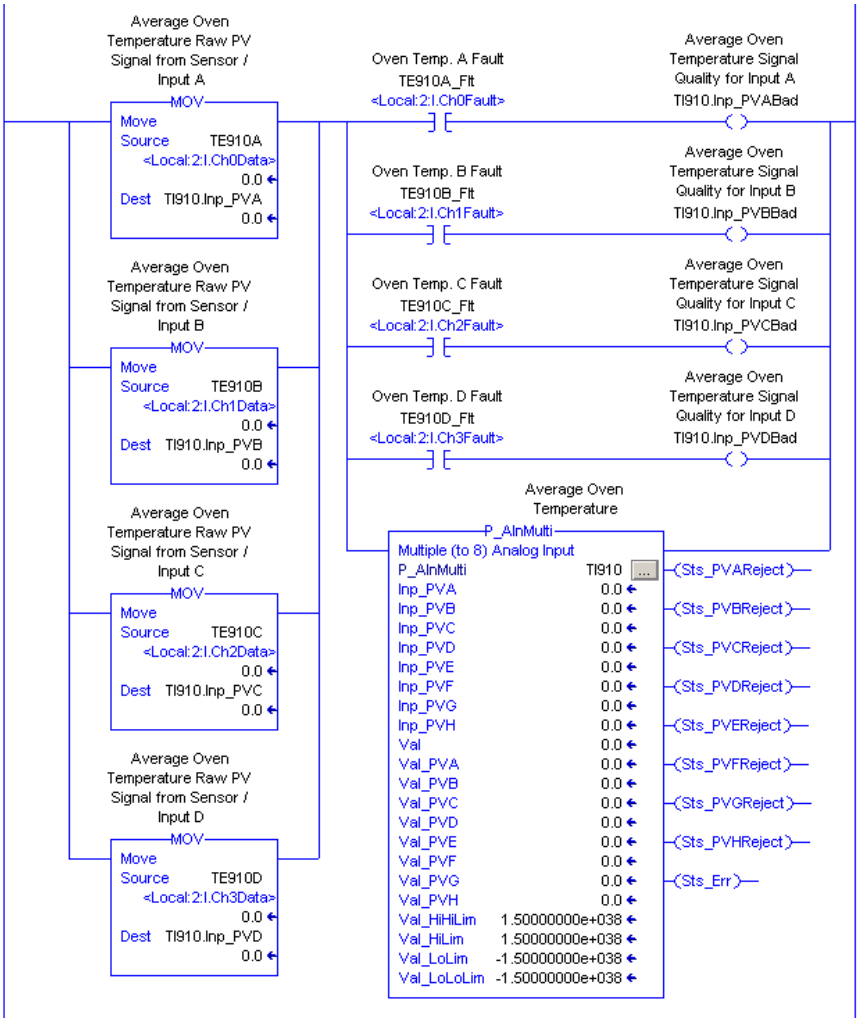
Cfg_HasPVA, Cfg_HasPVB, Cfg_HasPVC, Cfg_HasPVD: 1
Cfg_HasPVE, Cfg_HasPVF, Cfg_HasPVG, Cfg_HasPVH: 0
Cfg_UsePVA, Cfg_UsePVB, Cfg_UsePVC, Cfg_UsePVD: 1
Cfg_UsePVE, Cfg_UsePVF, Cfg_UsePVG, Cfg_UsePVH: 0
Cfg_InpRawMin, Cfg_EUMin: 0 (engineering low range of temperature)
Cfg_InpRawMax, Cfg_EUMax: 300 (engineering high range of temperature)
Cfg_CalcAvg: 1

If we set the range to 0...300, then Cfg_FailHiLim needs to approximately 310. In addition, the following strings are configured to drive the operation faceplate:

Cfg_Desc:	Average Oven Temperature
Cfg_EU:	Deg C
Cfg_Label:	Avg Oven Temp
Cfg_PVATag:	TE910A
Cfg_PVBTag:	TE910B
Cfg_PVCTag:	TE910C
Cfg_PVDTag:	TE910D
Cfg_Tag:	TI910

The above strings are local tags that can be configured through the HMI faceplates or in Logix Designer application by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag.

This Ladder Logic diagram shows the P_AInMulti instruction in the same example with multiple temperature sensors (inputs A, B, C, D).



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 10 - P_AInMulti Display Elements Description

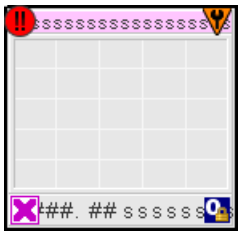
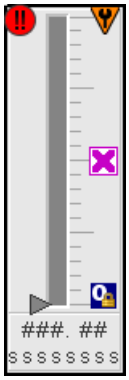
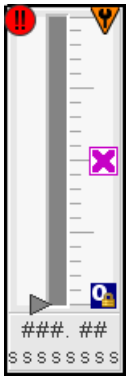
Display Element Name	Display Element	Description
GO_P_AIn		Standard analog input global object.
GO_P_AIn_Trend		Analog input with a trend of the Primary Value and limits (high-high, high, low, and low-low).
GO_P_AIn_Indicator		Primary Value indicated by a moving triangle. The graphic display includes limits displayed with filled bars.
GO_P_AIn_IndicatorWCapture		This object is the same as the GO_P_Ain_Indicator plus a light gray min/max capture area.

Table 10 - P_AInMulti Display Elements Description

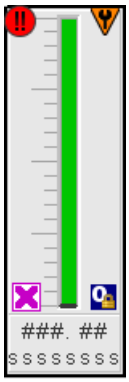
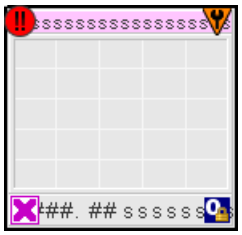
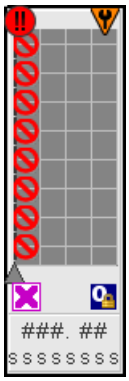
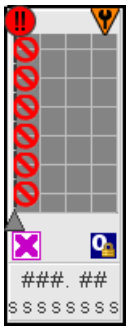
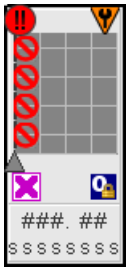
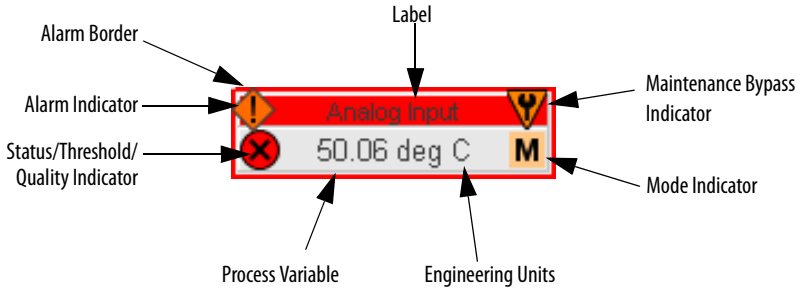
Display Element Name	Display Element	Description
GO_P_AInX		Primary Value displayed as a bar graph. The graphic display includes limits displayed as lines on the graph.
GO_P_AIn_TrendWCapture		The object is the same as GO_P_AIn_Trend except it displays a capture of the Primary Value.
GO_P_AInMulti_8V		The object displays 8 inputs (A-H), with each input a moving line on a horizontal axis. The graphic display includes indicators for disabled and rejected inputs.
GO_P_AInMulti_6V		The object displays 6 inputs (A-F), with each input a moving line on a horizontal axis. The graphic display includes indicators for disabled and rejected inputs.
GO_P_AInMulti_4V		The object displays 4 inputs (A-D), with each input a moving line on a horizontal axis. The graphic display includes indicators for disabled and rejected inputs.

Table 10 - P_AInMulti Display Elements Description

Display Element Name	Display Element	Description
GO_P_AInMulti_8H		The object displays 8 inputs (A-H), with each input a moving line on a vertical axis. The graphic display includes indicators for disabled and rejected inputs.

Common attributes of the P_AInMulti global objects include the following:

- Current value of the PV with engineering units
- Status/threshold/quality indicator
- Maintenance Bypass indicator
- Label
- Mode indicator
- Color changing alarm border that blinks on unacknowledged alarm
- Alarm indicator that changes color and symbol with the severity of an alarm



Status/Quality Indicators

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

Graphic Symbol	Description
	Invalid configuration.
	Data quality bad/failure.
	Data Quality degraded: uncertain, test, simulation, substitution, or out of specification.
	Input rejected.
	The input or device has been disabled.
No symbol displayed	I/O communication and quality good, configuration valid.

TIP When the Invalid Configuration indicator appears, you can find which 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 guide you in finding the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appears in a magenta box.

For the P_AInMulti instruction, the Invalid Configuration indicator appears under the following conditions:

- Input Raw Minimum and Raw Maximum scaling parameters are set to the same value.
- The scaled Engineering Units minimum and Engineering Units maximum scaling parameters are set to the same value.
- First-order filter time constant is set to a negative value.
- No inputs are configured to exist (by Engineering), or no inputs are configured to be used (by maintenance).
- The required minimum number of good inputs is set to a value less than one or greater than eight.
- Threshold Deadband is set to a negative value.
- Alarm minimum on time is set to a value less than zero or greater than 2,147,483 seconds.
- A status gate's Gate Delay, On-Delay, or Off-Delay 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.

Threshold Indicators

These indicators show that the PV has exceeded a threshold.

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

Mode Indicators

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

Graphic Symbol	Description
Transparent	Operator mode (if the default mode is Operator and the current mode is Operator, the mode indicator is transparent).
	Operator mode (if the default mode is Program).
	Operator mode locked.
Transparent	Program mode (if the default mode is Program and the current mode is Program, the mode indicator is transparent).
	Program mode (if the default mode is Operator).
	Program mode locked.
	Maintenance mode.
	No mode.

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 of the label to indicate the described alarm condition. 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.

Symbol	Border and Label Background	Description
	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.

Graphic Symbol	Description
	A maintenance bypass is active.
No symbol displayed	No maintenance bypass is active.

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 guide you in finding the bypass. Once you navigate to the tab, the bypassed item is flagged with this indicator.

For the Multiple Analog Input Instruction, the Maintenance Bypass indicator appears under the following conditions:

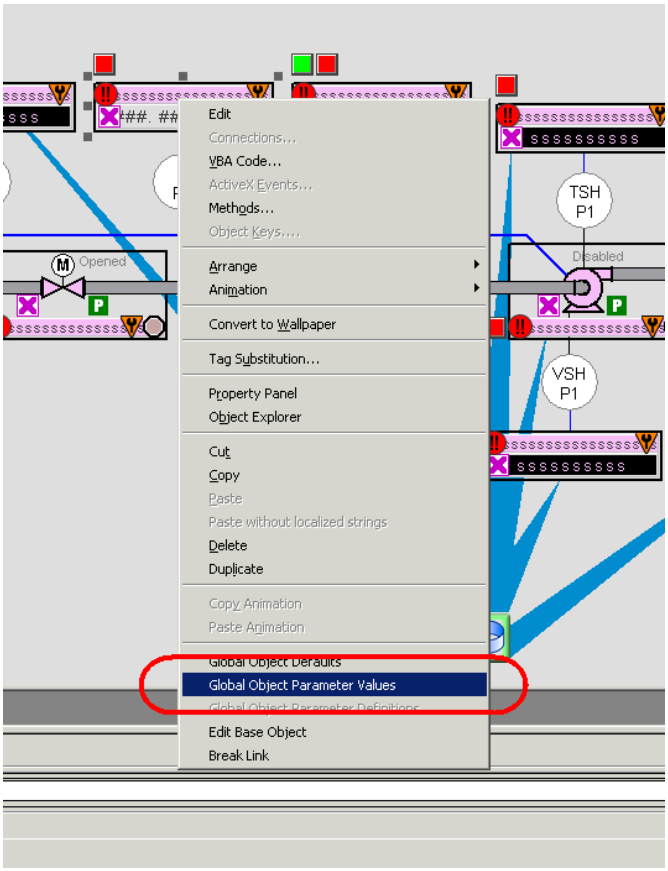
- The Substitute PV function has been enabled. The 'live' Process Variable is being superseded by a Maintenance-entered value.

- An input configured to exist (by Engineering) is set to not be used (by Maintenance).

Using Display Elements

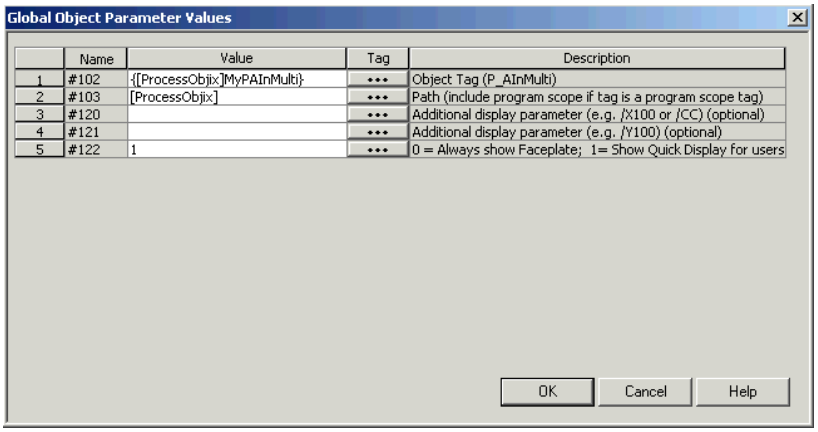
The global objects for P_AInMulti can be found in the global object file (RA-BAS) P_AIn Graphics Library.ggfx. Follow these steps to use a global object.

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



2. In the display file, right-click the global object file 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 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. if defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This lets these same parameters to be used in subsequent display commands originating from the faceplate.
#122	Y	These are the options for global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2 = Always show Quick Display

3. In the Value column, type the tag or value as specified in the Description column.

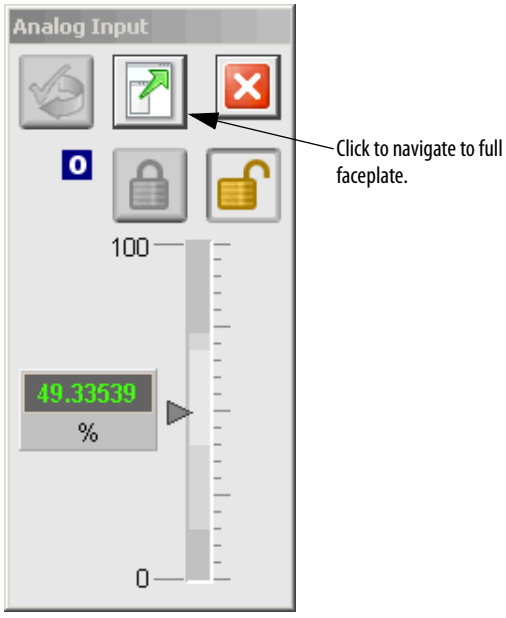
   TIP Click the ellipsis (…) to browse and select a tag.
   Values for items marked '(optional)' can be left blank.

4. Click OK.

Quick Display

The Quick Display screen provides means for operators to perform simple interactions with the P_AInMulti instruction instance. From the Quick Display,

you can navigate to the faceplate for full access for operation, maintenance, and configuration.

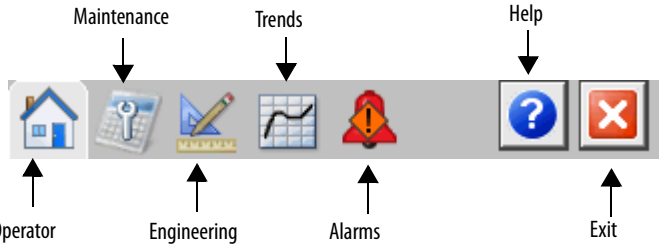


Faceplate

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

Each faceplate contains the value of local configuration tags Cfg_Tag and Cfg_Desc in the title bar.

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



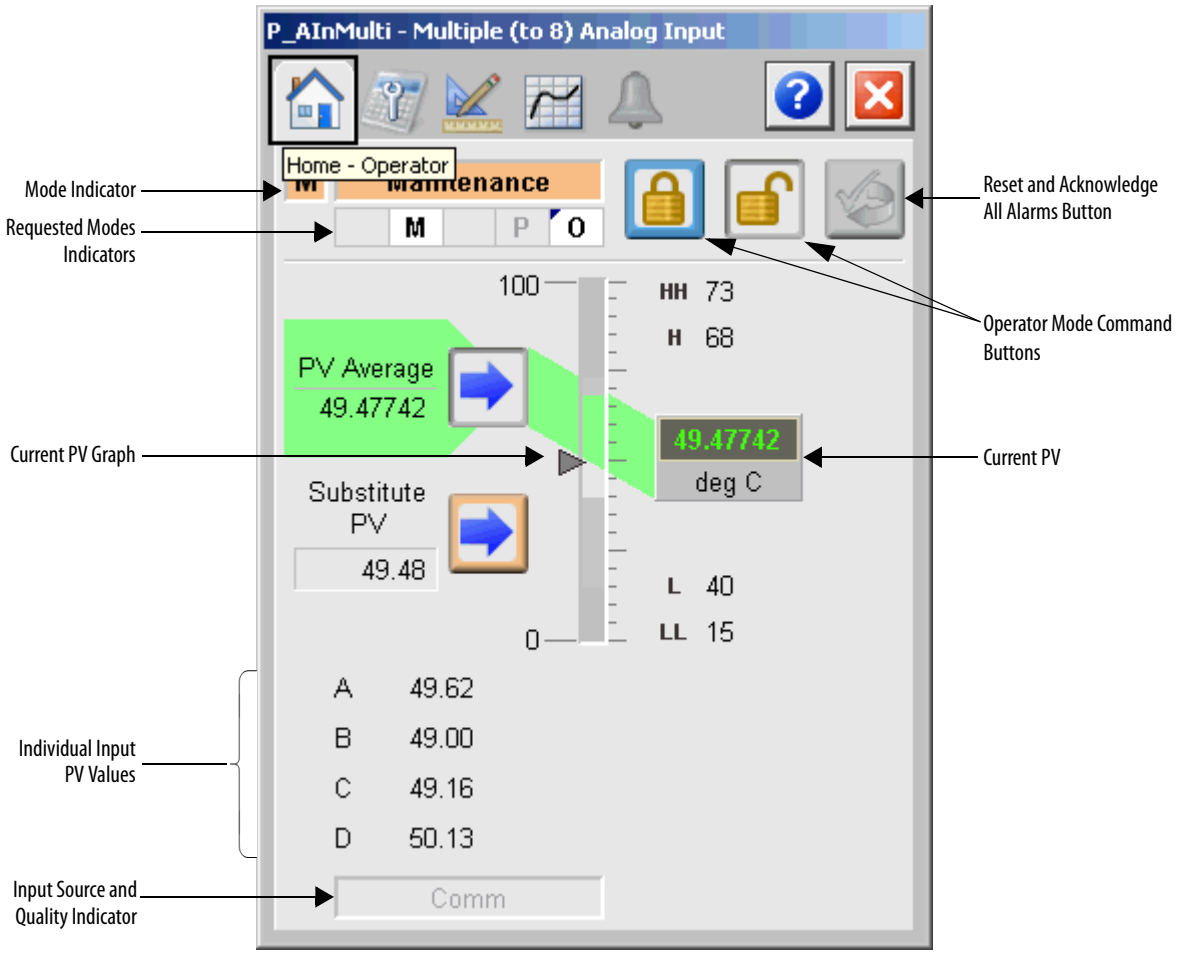
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the P_AInMulti Instruction instance, including viewing its status and values and manipulating it through its commands and settings. When a given input is restricted via FactoryTalk View security, the required user security code letter is shown in the tables that follow.

Operator Tab

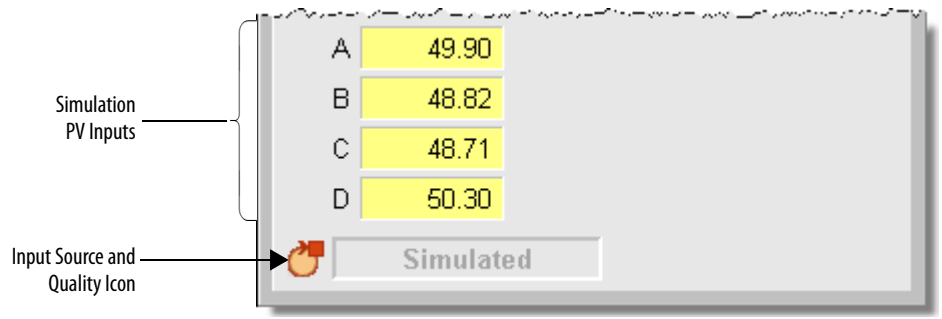
The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

The Operator tab shows the following information:

- Current Mode (Program, Operator, or Maintenance).
- Requested Modes indicator (appears only if the Operator or Program mode has been superseded by another mode.)
- Current PV and the values of all configured input PVs.
- Bar graph for the current PV. High-high and Low-low ranges are shown in dark gray and these ranges turn red if the threshold is exceeded. High and low ranges are shown in medium gray and these ranges turn yellow if the threshold is exceeded.
- Scaled high and low range values (top and bottom labels on the bar graph). If high-range or low-range values are exceeded, then the appropriate icon appears next to the values to the left of the bar graph.
- High-high (HH) and Low-low (LL) thresholds are displayed with a label background that turns red when exceeded.
- High (H) and Low (L) thresholds are displayed with a label background that turns yellow when exceeded.
- Input Source and Quality indicator (See 'SrcQ' in the Output parameters table on page 19 for details).


P_AInMulti - Multiple (to 8) Analog Input
Home - Operator
Mode Indicator
Requested Modes Indicators
Reset and Acknowledge All Alarms Button
Operator Mode Command Buttons
Current PV Graph
Current PV
Individual Input PV Values
Input Source and Quality Indicator
M
P
O
100
0
HH 73
H 68
L 40
LL 15
PV Average
49.47742
Substitute PV
49.48
49.47742
deg C
A 49.62
B 49.00
C 49.16
D 50.13
Comm

Simulation


Simulation PV Inputs
Input Source and Quality Icon
A 49.90
B 48.82
C 48.71
D 50.30
Simulated

The following table shows the functions included on the Operator tab.

Table 11 - Operator Tab Description

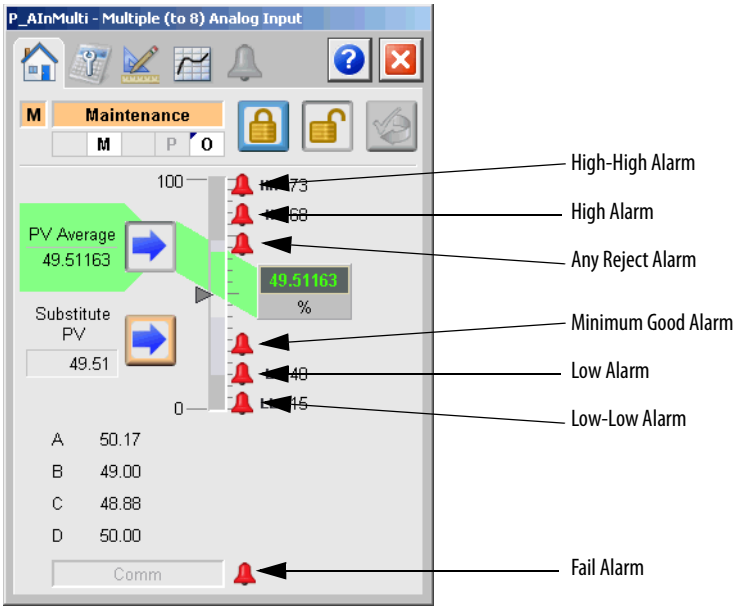
Function	Action	Security
	Click to lock in Operator mode. Function locks the mode in Operator mode, preventing the program from taking control.	Manual Device Operation (Code B)
	Click to unlock Operator mode. Function unlocks Operator mode, letting the program to take control.	
	Click to request Program mode.	
	Click to request Operator mode.	
	Click to reset and acknowledge all alarms.	Acknowledge Alarms (Code F)
	Click to select normal input for the PV. This button is visible only in Maintenance mode, and only if Engineering has enabled the Substitute PV function.	Equipment Maintenance (Code C)
	Click to select substitute PV instead of normal input. This button is visible only in Maintenance mode, and only if Engineering has enabled the Substitute PV function.	
Substitute PV data entry	Type the substitute PV value. This entry is available only when the substitute PV function is enabled.	
Simulation PV Inputs	Type the Simulation PV value. This entry is available only when simulation is enabled. (See Simulation on page 26 for more information.)	Normal Operation of Devices (Code A)

The following table shows the alarm status symbols used on the Operator tab.

Table 12 - Operator Tab Alarm Status

Graphic Symbol	Alarm Status
	In Alarm (Active Alarm)
	In Alarm and Acknowledged
	Out of Alarm but not Acknowledged
	Alarm Suppressed (by Program Logic)
	Alarm Disabled (by Maintenance)
	Alarm Shelved (by Operator)

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



Maintenance Tab

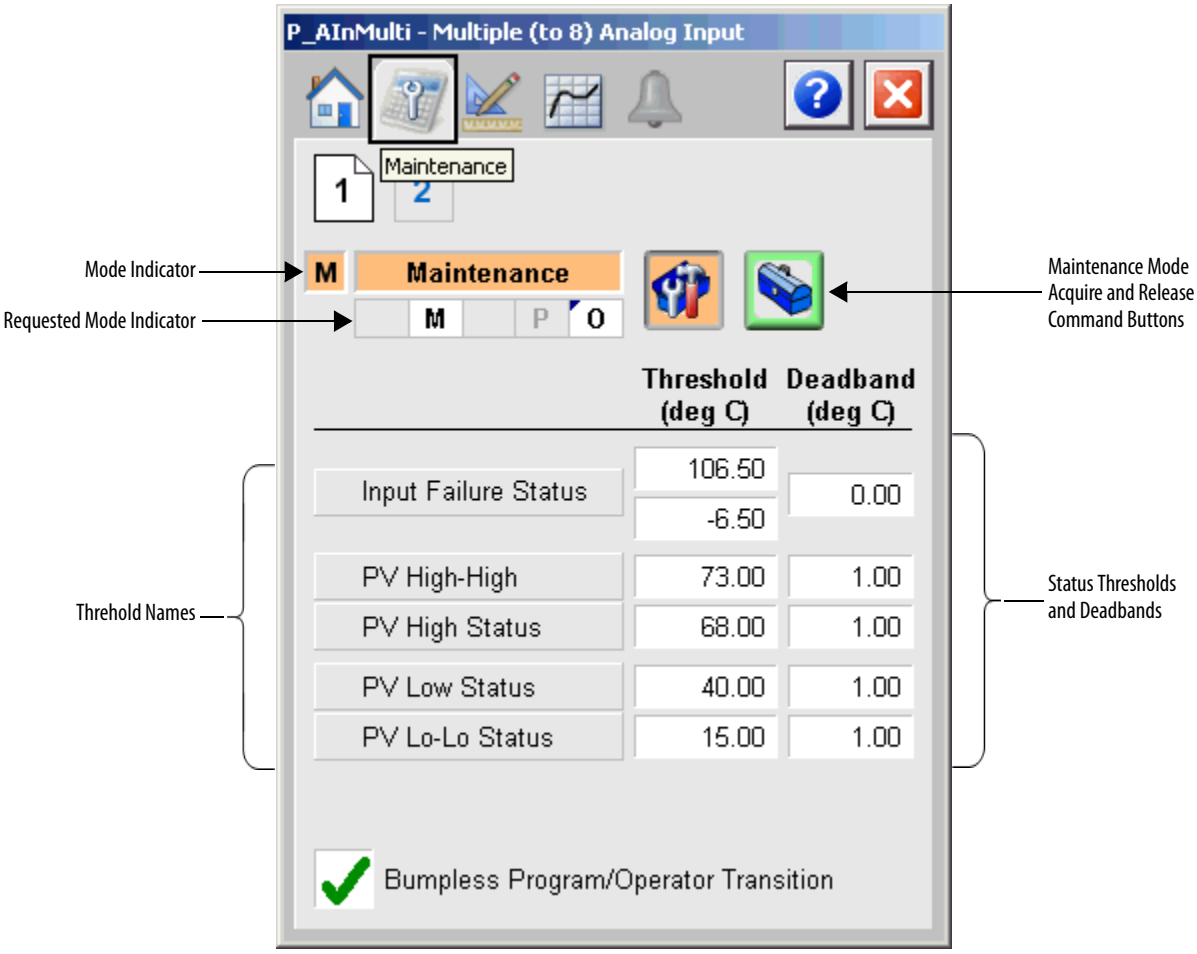
Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters, troubleshoot and temporarily work around device problems.

This tab is divided into two pages.

Maintenance Tab Page 1

Page 1 of the Maintenance tab shows the following information:

- Current mode (Operator, Program, or Maintenance).
- Requested Modes indicator highlights all of the modes that have been requested. The leftmost highlighted mode is the active mode. The mode indicator with the triangle in the corner is the default mode.



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

Table 13 - Maintenance Tab Page 1 Description

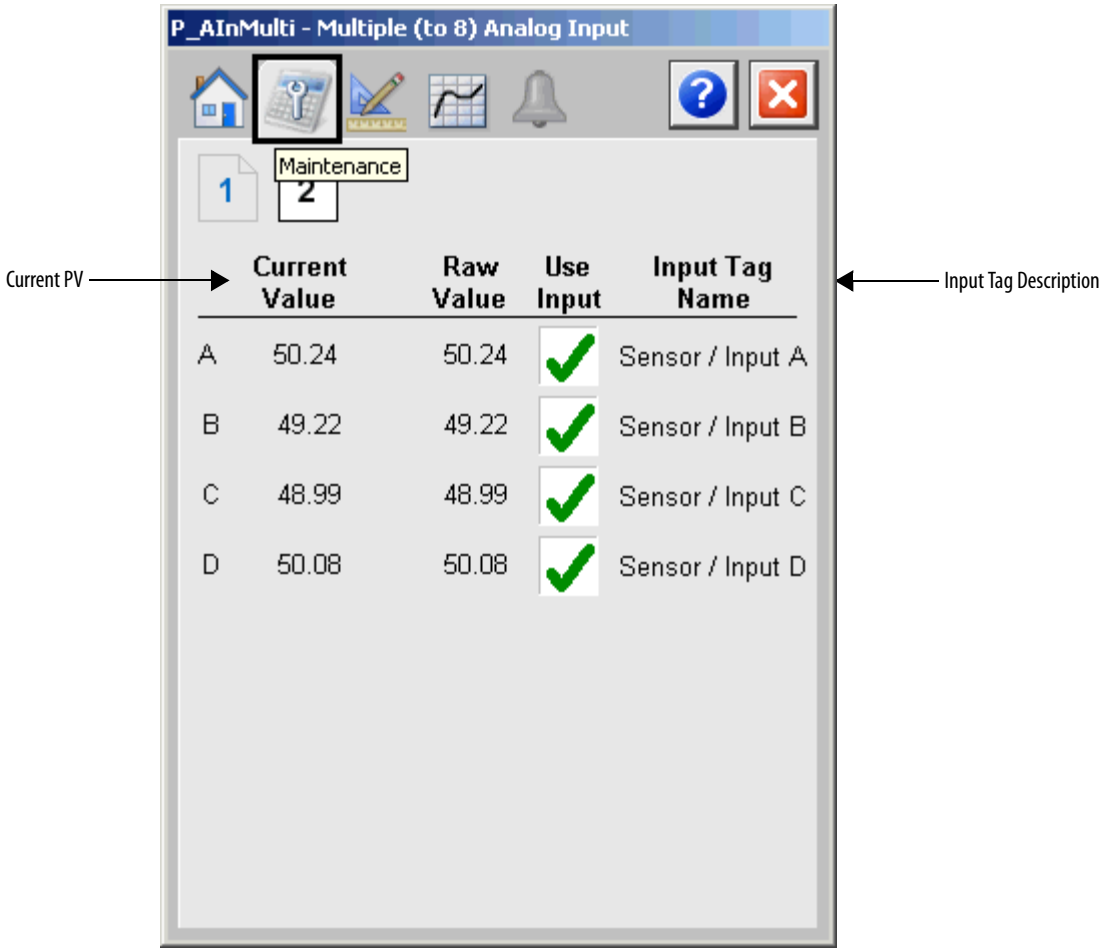
Function	Action	Security	Configuration Parameters
	Click for Maintenance mode.	Equipment Maintenance (Code C)	None
	Click to release Maintenance mode.		
Threshold	Type the threshold (trip point) for analog input alarms.	Disable Alarms Bypass Permissives and Interlocks (Code H)	• Cfg_FailHiLim • Cfg_FailLoLim
Deadband	Type the deadband (hysteresis) that is applied to each alarm limit. This is used to prevent a noisy signal from generating numerous spurious alarms. **EXAMPLE:** If the High Alarm Limit is 90.0 and the High Alarm Deadband is 5, once the signal rises above 90.0 and generates a High Alarm, the signal must fall below 85.0 (90.0-5.0) for the alarm to clear.		• Cfg_HiHiDB • Cfg_HiDB • Cfg_LoDB • Cfg_LoLoDB • Cfg_FailDB
Threshold Name	Click a threshold name to open the associated P_Gate faceplate.	Normal Operation of Devices (Code A)	Cfg_InpCond of P_Gate
Bumpless Program/Operator Transition	Check so that when this parameter is: • ON, the operator settings track the program settings when mode is Program, and program settings track the operator settings when the mode is Operator. Transition between modes is bumpless. • OFF, the operator settings and program settings are not modified by this instruction and retain their values regardless of mode. When the mode is changed, the value of a limit can change, such as from the Program-set value to the Operator-set value.	Equipment Maintenance (Code C)	Cfg_SetTrack

Refer to the Rockwell Automation Library of Process Objects: Condition Gate Delay (P_Gate) Reference Manual, publication SYSLIB-RM041, for more information.

Maintenance Tab Page 2

Page 2 of the Maintenance tab shows the following information:

- Current Value that is being used
- Input tag description



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

Table 14 - Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Use Input	Check: • ON if the corresponding input is to be used in calculating the final PV (average or median). • OFF to exclude the corresponding input from the PV calculation. This configuration is typically used to exclude a particular input when it is taken out of service for maintenance. If the P_AInMulti instruction **has** a PV but is **not using** it, the Maintenance Bypass Indicator is displayed.	Equipment Maintenance (Code C)	• Cfg_UsePVA • Cfg_UsePVB • Cfg_UsePVC • Cfg_UsePVD • Cfg_UsePVE • Cfg_UsePVF • Cfg_UsePVG • Cfg_UsePVH

Table 14 - Maintenance Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Raw Value	Click the Raw Value to open a corresponding channel object faceplate (for example, P_AIChan). The corresponding 'Has Channel' must be checked. (See Engineering Tab Page 2 on page 50.)	None	None

Refer to the Rockwell Automation Library of Process Objects: Analog Input Channel (P_AIChan) Reference Manual, publication SYSLIB-RM042, for more information.

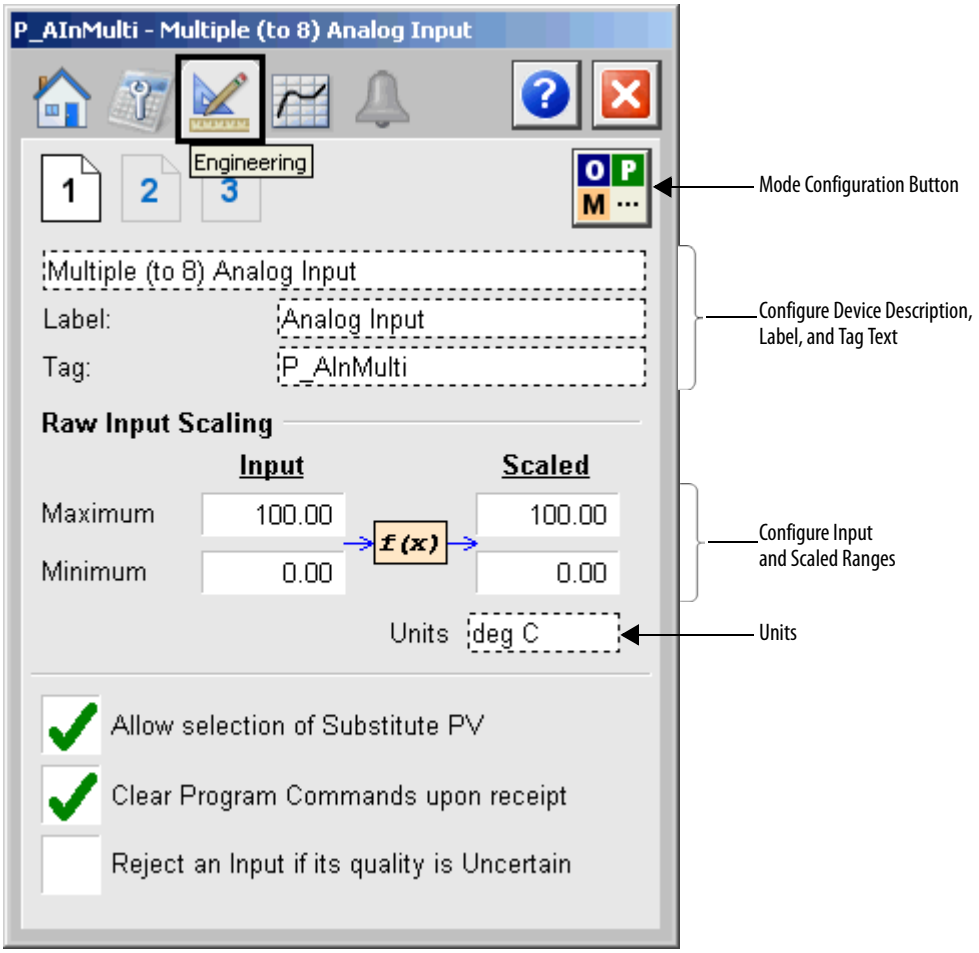
Engineering Tab

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.

This tab is divided into three pages.

Engineering Tab Page 1

On Page 1 of the Engineering tab, you can configure the description, label, tag, and PV units for the device.



The following table lists the functions on page 1 of the Engineering tab.

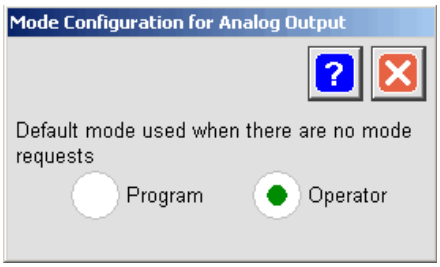
Table 15 - Engineering Tab Page 1 Description

Function	Action	Security	Configuration Parameters
	Click to open the Mode Configuration display.	None	See Mode Configuration display on page 49
Description	Type the device description to show on the Faceplate title bar.	Engineering Configuration (Code E)	Cfg_Desc
Label	Type the label to show on the graphic symbol.		Cfg_Label
Tag	Type the tag name to show on the Faceplate and Tooltip. **IMPORTANT:** Pausing the mouse over this field displays a tool tip with the configured Logix tag/path.		Cfg_Tag
Raw Input Scaling: Maximum Input Raw Input Scaling: Minimum Input	Enter these parameters within the range of the signal connected to the Inp_PV Input. The Raw Min default is 0.0 and the Raw Max default is 100.0. **EXAMPLE:** If your input card provides a signal from 4.0...20.0mA, set Cfg_InpRawMin to 4.0 and Cfg_InpRawMax to 20.0. The Raw minimum/maximum and engineering units minimum/maximum are used for scaling to engineering units.		• Cfg_InpRawMax • Cfg_InpRawMin
Raw Input Scaling: Maximum Scaled Raw Input Scaling: Minimum Scaled	Enter these parameters within the PV range represented by the input signal connected to Inp_PVA and Inp_PVB. The PV engineering units minimum default is 0.0 and the PV engineering units maximum is 100.0. **EXAMPLE:** If your input card provides a signal from 4...20 mA that represents -50...250 °C, set Cfg_PVEUMIN to -50.0 and Cfg_PVEUMax to 250.0. The Raw Min/Max and PV engineering units Min/Max are used for scaling to Engineering Units.		• Cfg_PVEUMax • Cfg_PVEUMin
Units	Enter the engineering units for display on the HMI. Percent (%) is the default.		Cfg_EU

Table 15 - Engineering Tab Page 1 Description

Function	Action	Security	Configuration Parameters
Allow selection of Substitute PV	Check to set this parameter to one of the following: • OFF to allow the Substitute PV Maintenance function (default). • ON to disallow the Substitute PV Maintenance function.	Engineering Configuration (Code E)	Cfg_NoSubstPV
Clear Program Commands on Receipt	Check to set this parameter to one of the following: • ON to use Edge-triggered Program Commands (default). • OFF to use Level-triggered Program Commands.		Cfg_PCmdClear
Reject an Input if its Quality is Uncertain	Check to set this parameter to one of the following: • ON, an input that is flagged as uncertain is rejected and not used in calculating the final PV. • OFF, an input that is flagged as uncertain is not rejected and is still used in calculating the final PV, but it causes the final PV to be flagged as uncertain (default).		Cfg_RejectUncertain

Mode Configuration Display

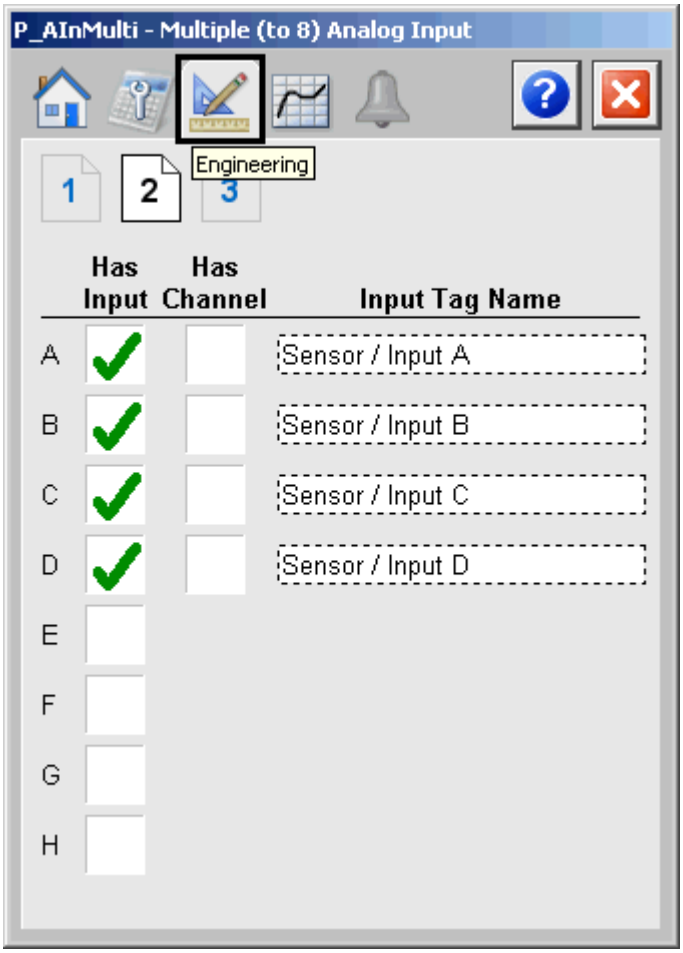


This display lets you select the default mode for the object by clicking the appropriate mode.

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 shows the functions on page 2 of the Engineering tab.

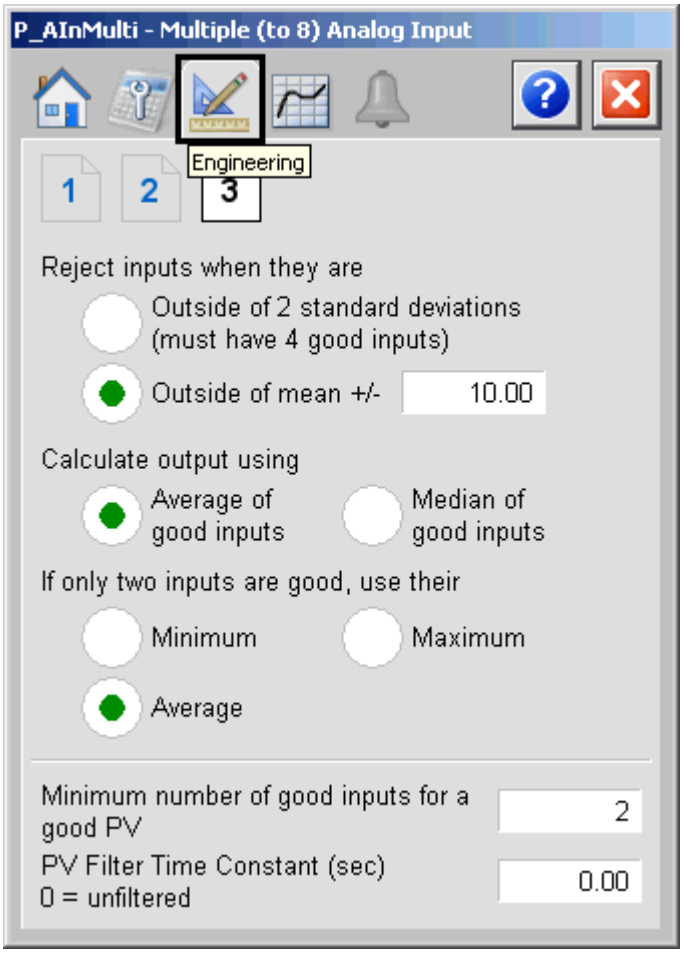
Table 16 - Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Has Input	Check to set this parameter: • ON, if the corresponding PV Input is to be used in calculating the final PV (average or median) • OFF, to exclude the corresponding PV Input from the PV calculation The default is the following: • ON - Cfg_HasPVA, Cfg_HasPVB, Cfg_HasPVC • OFF - Cfg_HasPVD, Cfg_HasPVE, Cfg_HasPVF, Cfg_HasPVG, Cfg_HasPVH **TIP:** This configuration determines whether a particular input is intended to be wired and used. See the Maintenance tab for functions to temporarily take an input out of service for maintenance.	Engineering Configuration (Code E)	• Cfg_HasPVA • Cfg_HasPVB • Cfg_HasPVC • Cfg_HasPVD • Cfg_HasPVE • Cfg_HasPVF • Cfg_HasPVG • Cfg_HasPVH

Table 16 - Engineering Tab Page 2 Description

Function	Action	Security	Configuration Parameters
Has Channel	Check to enable navigation to an upstream channel object (for example, P_AIChan). **IMPORTANT:** The name of the Channel object in the controller must be this object's name with the suffix '_Chan' plus the input letter (A…H). This applies to each of the eight channels (A…H). For example, if your P_AInMulti object has the name'AInMulti123', then its Channel A object must be named 'AInMulti123_ChanA'.	Engineering Configuration (Code E)	• Cfg_HasChanObjA • Cfg_HasChanObjB • Cfg_HasChanObjC • Cfg_HasChanObjD • Cfg_HasChanObjE • Cfg_HasChanObjF • Cfg_HasChanObjG • Cfg_HasChanObjH
Input Tag Name	Type the tagname of the corresponding input. This tagname is used for display only.		• Cfg_PVATag • Cfg_PVBTag • Cfg_PVCTag • Cfg_PVDTag • Cfg_PVETag • Cfg_PVFTag • Cfg_PVGTag • Cfg_PVHTag

Engineering Tab Page 3



The following table shows the functions on page 3 of the Engineering tab.

Table 17 - Engineering Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Reject inputs when they are: • Outside of 2 Standard Deviations (must have 4 good inputs) • Outside of mean +/-	Click: • 'Outside of 2 standard deviations' to reject an input that is more than 2 standard deviations from the mean. • 'Outside of mean +/-' to reject an input that deviates from the mean by more than Cfg_AbsDevLim (default). Type in a value for Cfg_AbsDevLim. **IMPORTANT:** At least four inputs must be used for the 'Outside of 2 standard deviations' selection to be meaningful.	Engineering Configuration (Code E)	Cfg_UseStdDev

Table 17 - Engineering Tab Page 3 Description

Function	Action	Security	Configuration Parameters
Calculate output using: • Average of Good Inputs • Median of Good Inputs	Click: • 'Average of good inputs' - the calculated final PV is the average (arithmetic mean) of all the good (non-rejected) PV inputs. • 'Median of good inputs' - the calculated final PV is the median (central value) of all the good (non-rejected) PV inputs (default). The average is the sum of values divided by the number of values. The median is the value of the item in the middle. If there are an even number of items, the median is the average of the two central values.	Engineering Configuration (Code E)	Cfg_CalcAvg
If only two inputs are good, use: • Minimum of two inputs • Average of two inputs • Maximum of two inputs	Click one of the options to determine the output calculation when there are only two unrejected inputs. When there are more than two unrejected inputs, the calculation is determined by Cfg_CalcAvg.		Cfg_CalcWhen2
Minimum number of good inputs for a good PV	Type the number of unrejected PV inputs required to have the final PV value show good quality. If any PV inputs are rejected, and the number of unrejected PV inputs is equal to this number, the status Sts_MinGood is set. If the number of unrejected PV inputs is less than this number, the status bits Sts_Fail and Sts_PVBad are set. Sts_MinGood is the input to the MinGood Alarm, and Sts_Fail is the input to the Fail Alarm.		Cfg_MinGood
PV Filter Time Constant (seconds) 0 = unfiltered	This parameter sets the filter time constant for the first-order (lag) filter applied to the PV. The filter is applied after scaling and before alarm checking and PV display as Val.		Cfg_FiltTC

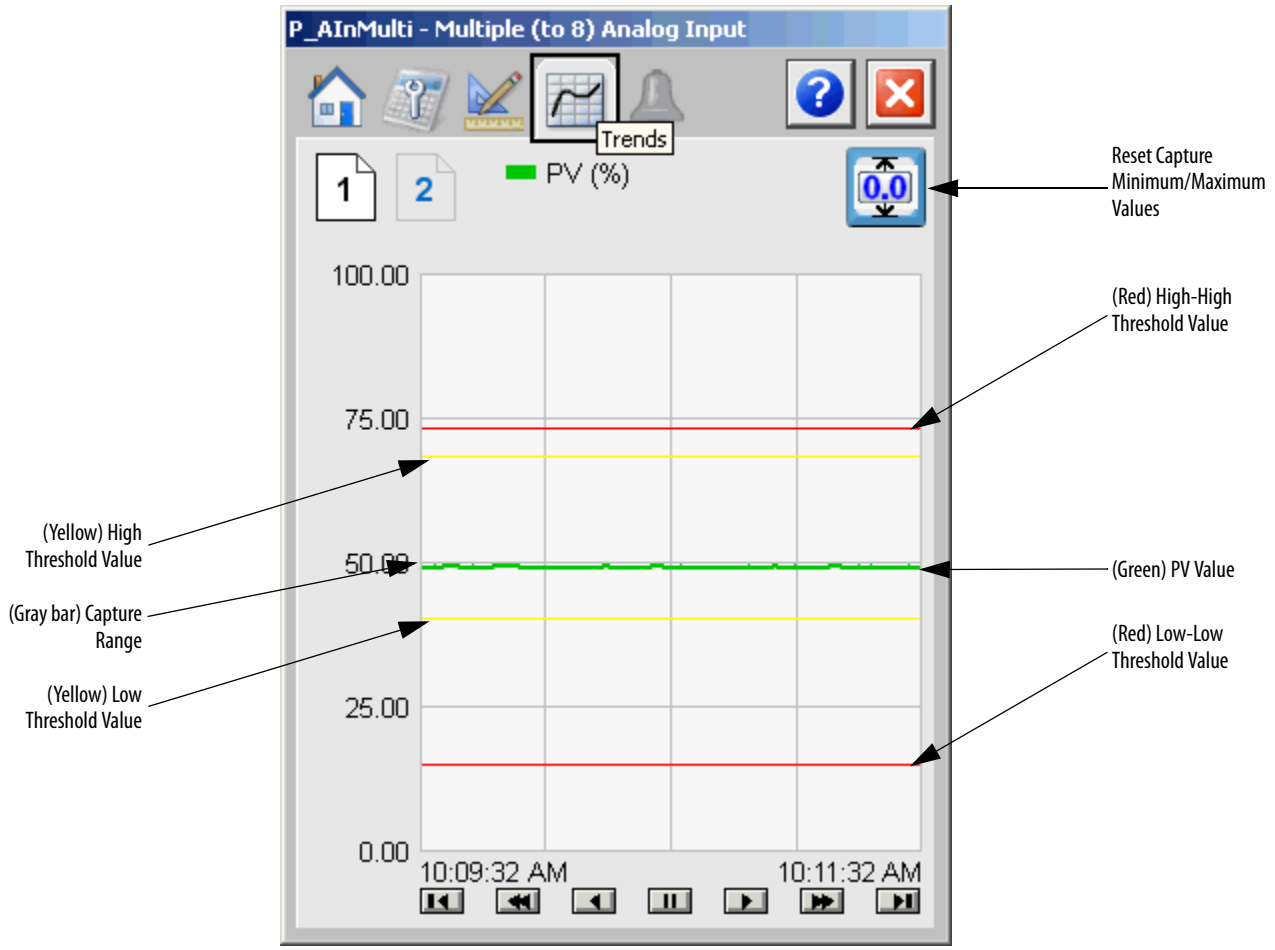
Trends Tab

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 Trends tab shows the PV and resets the capture range's minimum/maximum values. The green line represents the PV and the light gray area shows the capture range.



The following table lists the functions on the Trends tab page 1.

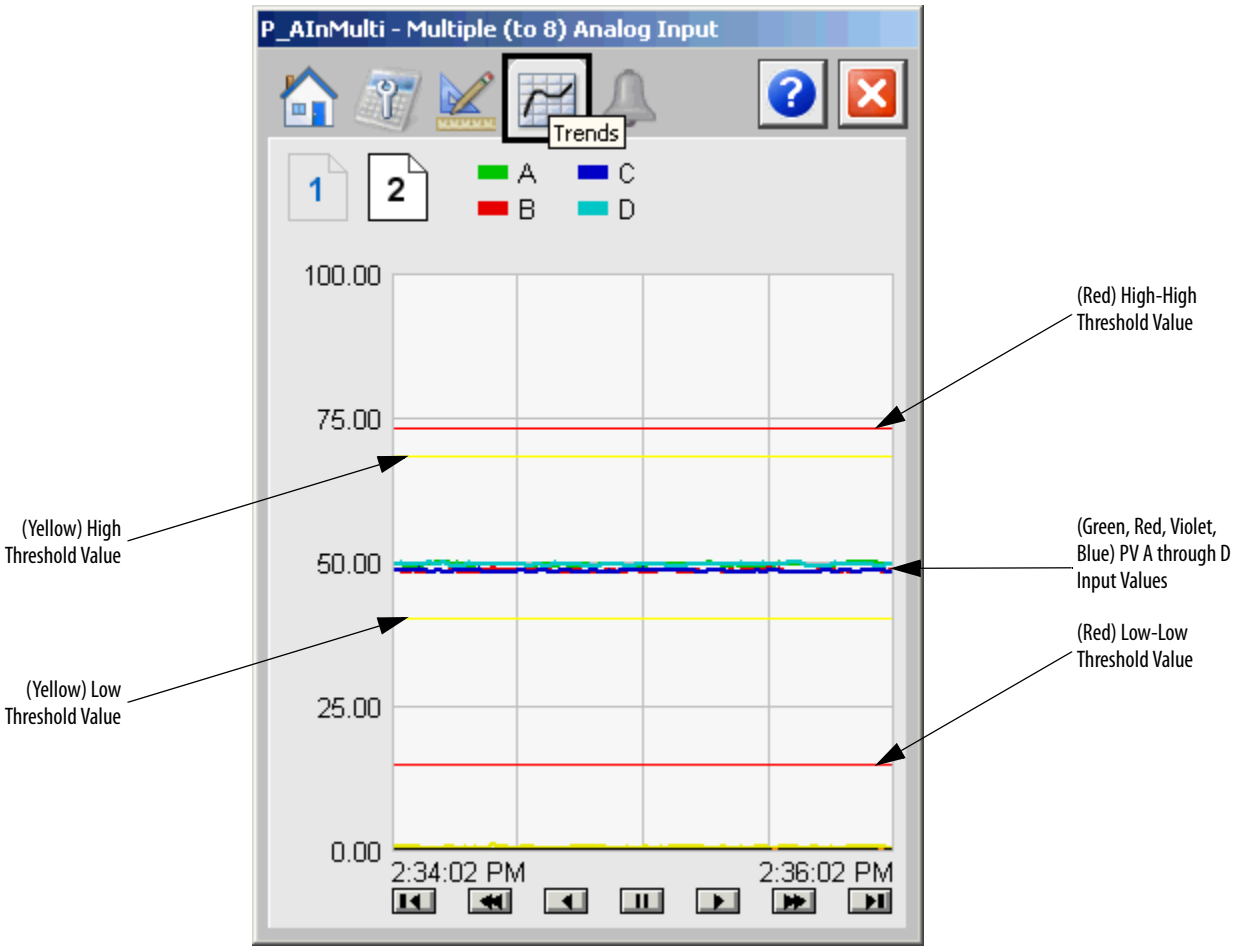
Table 18 - Trends Tab Page 1 Description

Function	Action	Security
	Reset capture minimum/maximum values.	Normal Operation of Devices (Code A)

Trends Tab Page 2

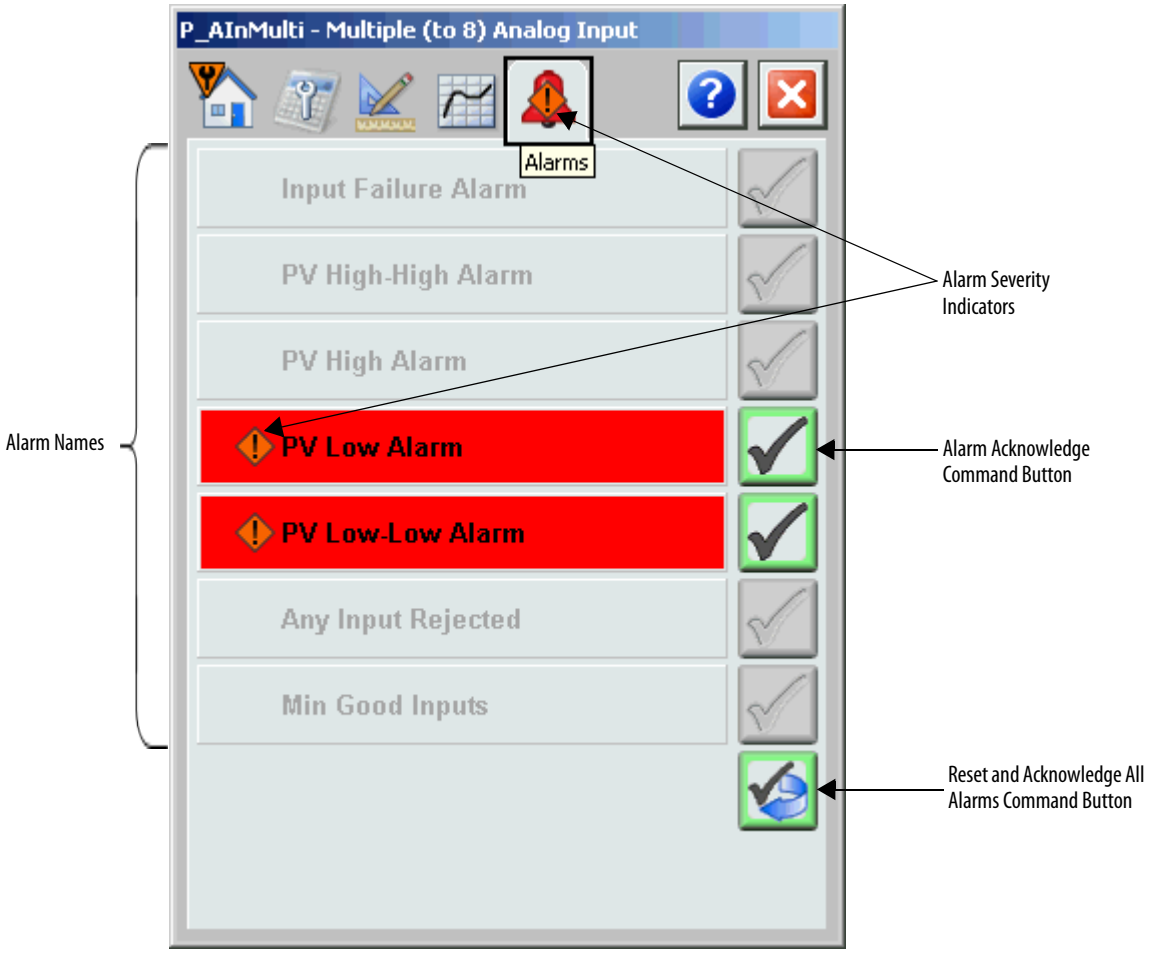
IMPORTANT Any unused inputs must be set to zero or extraneous trend lines could appear.

Page 2 of the Trends tab displays the individual input signals (A through H).



Alarms Tab

The Alarms tab displays each configured alarm for the P_AInMulti 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.



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 19 - 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 20 - 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.	

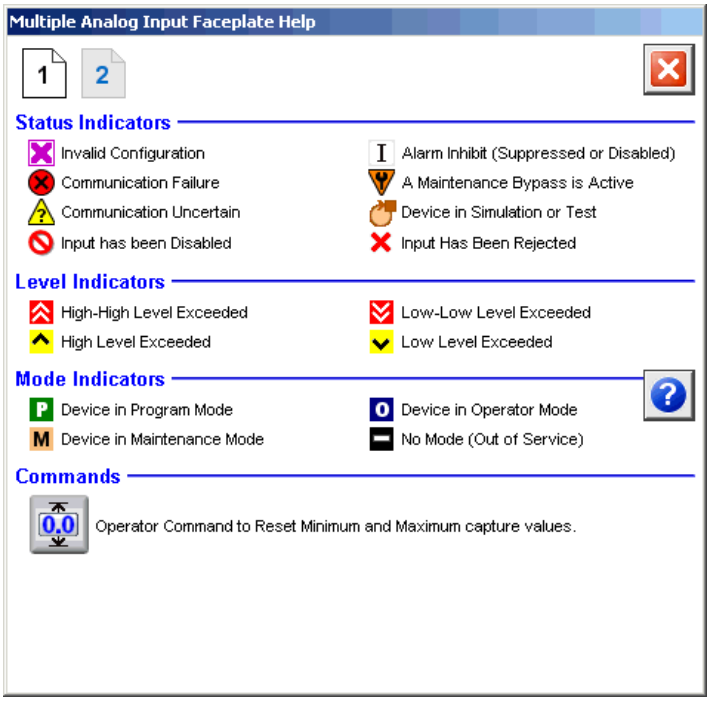
When the Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, indicating the alarm requires acknowledgement or reset. The Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the check mark to acknowledge the alarm.

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

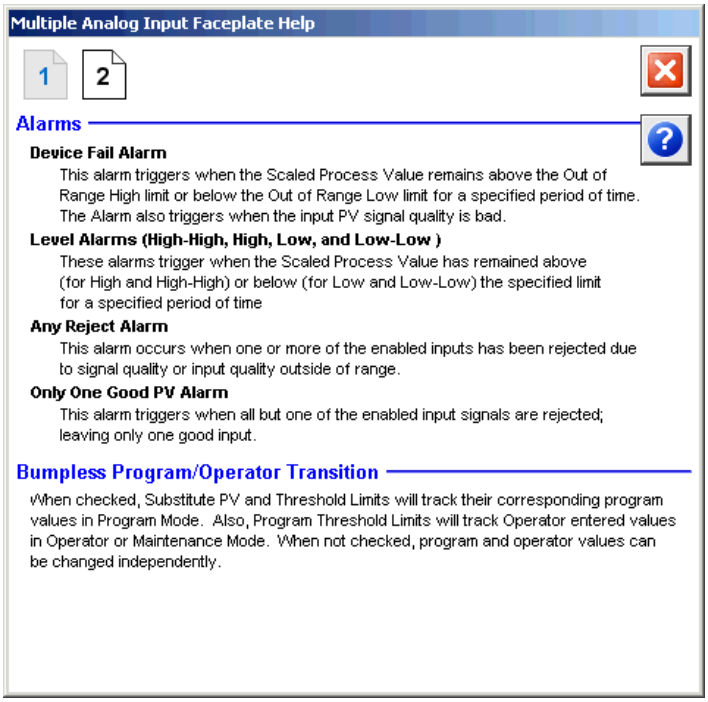
Multiple Analog Input Faceplate Help

The faceplate Help is divided into two pages.

Faceplate Help Page 1



Faceplate Help Page 2



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