Reference Manual

PlantPAx
Distributed Control System

Rockwell Automation Library of Process Objects: Deadband Controller (P_DBC)

Version 3.5

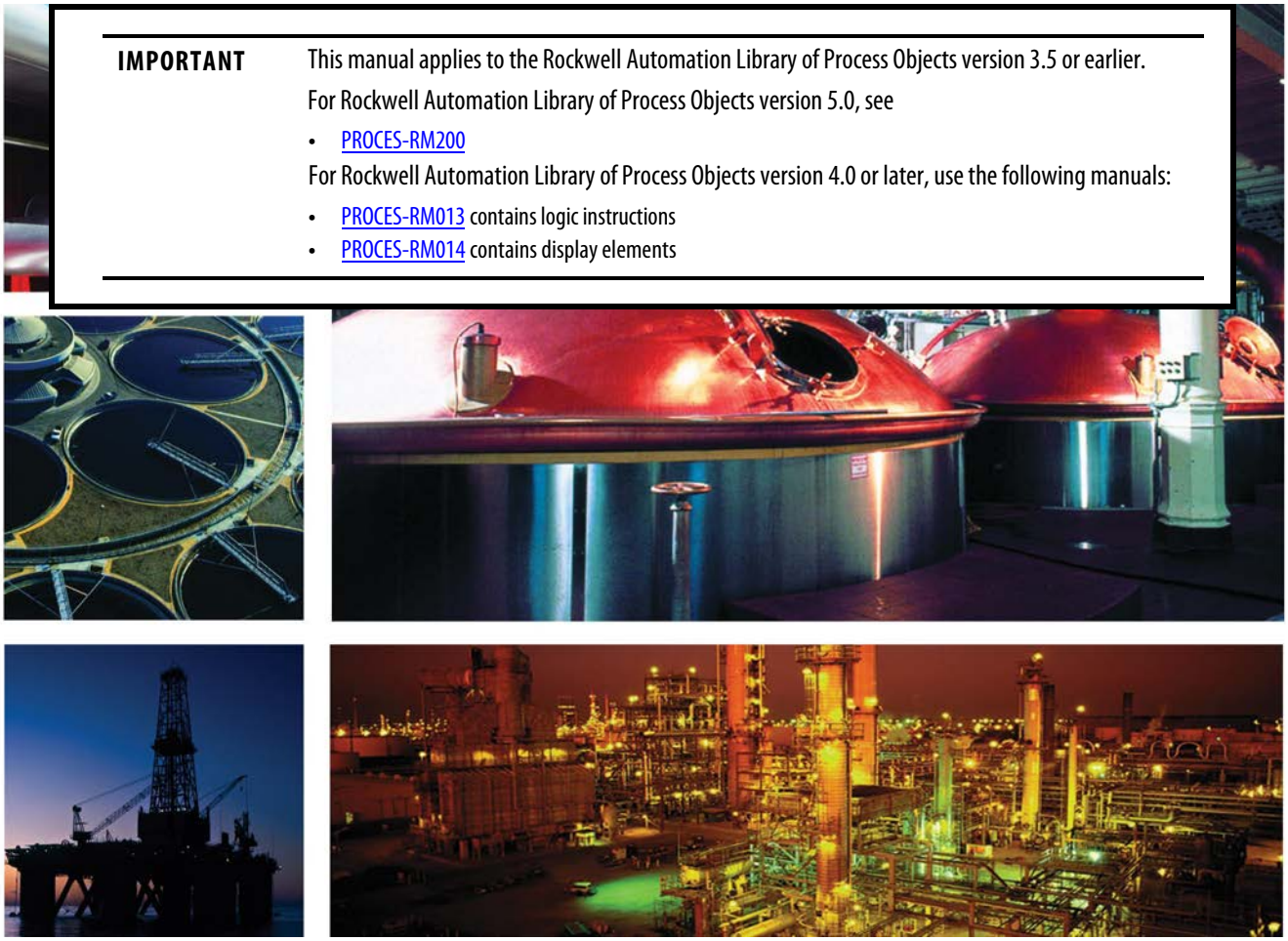
IMPORTANT This manual applies to the Rockwell Automation Library of Process Objects version 3.5 or earlier.

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).

Table of Contents

Notes:

Software Compatibility and Content Revisions

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

Table 1 - Summary of Changes

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

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 Reference Manual, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk® View Machine Edition User's Guide, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk® View Site Edition User's Guide, publication VIEWSE-UM006	Provides details on how to use this software package to develop and run 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 choose the Mode (owner) of an instruction or control strategy. The Mode instruction is 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 of the P_Gate instruction for processing status and alarm conditions, including gate delay, on-delay, and off-delay timing.

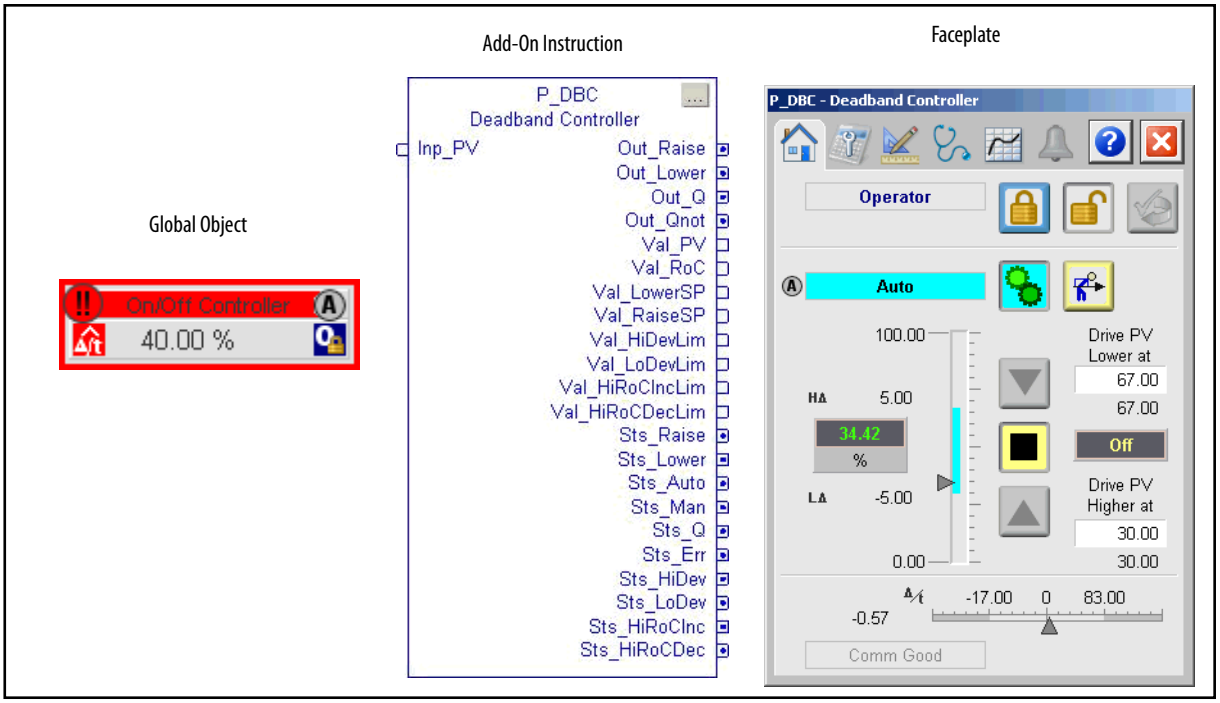
You can view or download publications at http://literature.rockwellautomation.com/idc/groups/public/documents/

webassets/browse_category.hcst. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Deadband Controller (P_DBC)

The P_DBC (Deadband Controller) Add-On Instruction provides control of a process variable within limits by using one or two discrete outputs. A deadband controller is also known as a 'bang-bang' or 'on-off' controller.

The global object and faceplate that are shown are examples of the graphical interface tools for this Add-On Instruction.



Guidelines

Use this instruction to control an analog process variable (PV), such as temperature, level or pressure, between upper and lower control limits by triggering one or two discrete outputs. The outputs typically energize and de-energize equipment that increases or decreases the process variable.

Do **not** use this instruction if you want to control an analog process variable by using an analog final control element, such as a modulating control valve or a variable speed motor drive. Use the P_PIDE Add-On Instruction, the PIDE function block, or PID ladder instruction for proportional + integral + derivative control, or use the IMC, CC, or MMC function block for model-based control of the PV.

Functional Description

The P_DBC instruction provides the following capabilities:

- A Raise output, which is activated when the PV is less than the entered Raise threshold, and a Lower output, which is activated when the PV is greater than the entered Lower threshold.
- Q and Q-Not outputs. Q is set when the PV falls below the Raise threshold and cleared when the PV rises above the Lower threshold; Q-Not is the inverse of Q.
- High and Low Deviation alarms with configurable thresholds and deadbands. These alarms can provide notification that the PV is approaching an out-of-control condition.
- Alarms for High PV Rate of Change Increasing and High PV Rate of Change Decreasing. These alarms can provide notification that the PV is changing faster than expected.
- Operation in Manual and Automatic Loop Modes. In Automatic Loop Mode, the outputs are triggered by the control algorithm to keep the PV within limits. In Manual Loop Mode, the operator directly manipulates the Raise and Lower outputs from the HMI.
- Operation in Operator, Program, Override, and Maintenance ownership modes.

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. The objects let 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_LLS_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.

Table 3 - Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
(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 Analog Objects	(RA-BAS-ME) Process Faceplate Analog Objects	Analog 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.

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_DBC-Faceplate	(RA-BAS-ME) P_DBC-Faceplate	The faceplate that is used for the object
(RA-BAS) P_DBC-Quick	(RA-BAS-ME) P_DBC-Quick	The Quick display that is used for the object
(RA-BAS) P_Gate-Faceplate	(RA-BAS-ME) P_Gate-Faceplate	The faceplate that is used for the P_Gate object
(RA-BAS) Process AnalogIn Family-Help	(RA-BAS-ME) Process AnalogIn Family-Help	The Help display for Analog input objects

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.

In a FactoryTalk View SE application, a macro is a series of commands stored in a text file. In FactoryTalk View ME application, a macro is a list of tag assignments stored in a text file. The following table lists the Macros (.mcr file type) used by the Process Library.

Table 6 - Visualization Files: Macros (.mcr file)

FactoryTalk View SE Software	FactoryTalk View ME Software	Description
NavToObject	N/A	This macro must be imported into the FactoryTalk View SE project to support faceplate-to-faceplate navigation by name.

Controller Code

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

Deadband Controller 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.
- 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_DBC Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the Logic routine for the instruction executes. If the rung-in condition is false, the EnableInFalse routine for the instruction executes. **Function Block Diagram:** If true, or not connected, the Logic routine for the instruction executes. If the parameter is exposed as a pin and wired, and the pin is false, the EnableInFalse routine for the instruction executes. **Structured Text:** No effect. The Logic routine for the instruction executes.
Inp_PV	REAL		0.0	Process Variable being controlled (engineering units)
Inp_PVSrcQ	SINT		0	Input Source and Quality (from Channel object, if available) (enumerated)
Inp_OvrdCmd	SINT		0	Override Mode command: 0 = No command 1 = Energize Raise Output (in Manual) 2 = Energize Lower Output (in Manual) 3 = None 4 = Manual Loop mode 5 = Auto Loop mode
Inp_OvrdRaiseSP	REAL		0.0	Override Mode Raise Setpoint (engineering units)
Inp_OvrdLowerSP	REAL		0.0	Override Mode Lower Setpoint (engineering units)
Inp_PVBad	BOOL		0	1 = PV or I/O Communication status bad 0 = OK
Inp_Ovrd	BOOL	Mode.Inp_Ovrd	0	1 = Acquire Override (higher priority program logic) Mode 0 = Release Override Mode
Inp_HiDevGate	BOOL	HiDevGate.Inp_Gate	1	High Deviation Status Gate: 1 = enabled
Inp_LoDevGate	BOOL	LoDevGate.Inp_Gate	1	Low Deviation Status Gate: 1 = enabled
Inp_HiRoCIncGate	BOOL	HiRoCIncGate.Inp_Gate	1	High Rate of Change (Increasing) Status Gate 1 = enabled

Table 7 - P_DBC Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Inp_HiRoCDecGate	BOOL	HiRoCDecGate.Inp_Gate	1	High Rate of Change (Decreasing) Status Gate 1 = enabled
Inp_Reset	BOOL		0	1 = Reset all Alarms requiring reset
Cfg_SetTrack	BOOL		0	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.
Cfg_HasPVNav	BOOL		0	1 = Tells HMI to enable navigation to a connected PV object
Cfg_HasOutNav	BOOL		0	1 = Tells HMI to enable navigation to a connected output object
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_HasHiDevAlm	BOOL	HiDev.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_HasLoDevAlm		LoDev.Cfg_Exists		
Cfg_HasHiRoCIncAlm		HiRoCInc.Cfg_Exists		
Cfg_HasHiRoCDecAlm		HiRoCDec.Cfg_Exists		
Cfg_HiDevResetReqd	BOOL	HiDev.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 HiDev.OCmd_Reset are required to clear Alm_HiDev 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_LoDevResetReqd		LoDev.Cfg_ResetReqd		
Cfg_HiRoCIncResetReqd		HiRoCInc.Cfg_ResetReqd		
Cfg_HiRoCDecResetReqd		HiRoCDec.Cfg_ResetReqd		
Cfg_HiDevAckReqd	BOOL	HiDev.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_HiDevAck or HiDev.OCmd_Ack) are 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_LoDevAckReqd		LoDev.Cfg_AckReqd		
Cfg_HiRoCIncAckReqd		HiRoCInc.Cfg_AckReqd		
Cfg_HiRoCDecAckReqd		HiRoCDec.Cfg_AckReqd		
Cfg_HiDevSeverity	INT	HiDev.Cfg_Severity	500	These parameters determine the severity of each alarm that gauges 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 priorities drive only the indication on the global object and faceplate. The Alarm and Events definition severity drives the color and symbol that is used on the alarm banner and alarm summary as well as the value returned by the FactoryTalk Alarm and Events software display commands.
Cfg_LoDevSeverity		LoDev.Cfg_Severity		
Cfg_HiRoCIncSeverity		HiRoCInc.Cfg_Severity		
Cfg_HiRoCDecSeverity		HiRoCDec.Cfg_Severity		
Cfg_PVEUMin	REAL		0.0	PV (Input) Range Minimum (engineering units)

Table 7 - P_DBC Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_PVEUMax	REAL		100.0	PV (Input) Range Maximum (engineering units)
Cfg_SPHiLim	REAL		100.0	Setpoint High Limit (clamp) (engineering units)
Cfg_SPLoLim	REAL		0.0	Setpoint Low Limit (clamp) (engineering units)
Cfg_RaiseDB	REAL		1.0	Deadband for the Raise output (above Raise limit)
Cfg_LowerDB	REAL		1.0	Deadband for the Lower output (below Lower limit)
Cfg_RateTime	REAL		1.0	PV Rate of Change time base (1 = /second) 60 = /minute, 3600 = /hour
Cfg_HiDevDB	REAL		1.0	High Deviation Status Deadband (engineering units)
Cfg_HiDevOnDly	DINT	HiDevGate.Cfg_OnDly	0	Minimum time above High Deviation Limit to raise Status (second)
Cfg_HiDevOffDly	DINT	HiDevGate.Cfg_OffDly	0	Minimum time below High Deviation Limit (minus deadband) to clear Status (seconds)
Cfg_HiDevGateDly	DINT	HiDevGate.Cfg_GateDly	0	High Deviation Status Gate Delay (seconds)
Cfg_LoDevDB	REAL		1.0	Low Deviation Status Deadband (engineering units)
Cfg_LoDevOnDly	DINT	LoDevGate.Cfg_OnDly	0	Minimum time below Low Deviation Limit to raise Status (seconds)
Cfg_LoDevOffDly	DINT	LoDevGate.Cfg_OffDly	0	Minimum time above Low Deviation Limit (plus deadband) to clear Status (seconds)
Cfg_LoDevGateDly	DINT	LoDevGate.Cfg_GateDly	0	Low Deviation Status Gate Delay (seconds)
Cfg_HiRoCIncDB	REAL		1.0	High Rate of Change (Increasing) Status Deadband (engineering units/RateTime)
Cfg_HiRoCIncOnDly	DINT	HiRoCIncGate.Cfg_OnDly	0	Minimum time above High Rate of Change (Increasing) Limit to raise Status (seconds)
Cfg_HiRoCIncOffDly	DINT	HiRoCIncGate.Cfg_OffDly	0	Minimum time below High Rate of Change (Increasing) Limit (minus deadband) to clear Status (seconds)
Cfg_HiRoCIncGateDly	DINT	HiRoCIncGate.Cfg_GateDly	0	High Rate of Change (Increasing) Status Gate Delay (seconds)
Cfg_HiRoCDecDB	REAL		1.0	High Rate of Change (Decreasing) Status Deadband (engineering units/RateTime)
Cfg_HiRoCDecOnDly	DINT	HiRoCDecGate.Cfg_OnDly	0	Minimum time above High Rate of Change (Decreasing) Limit to raise Status (seconds)
Cfg_HiRoCDecOffDly	DINT	HiRoCDecGate.Cfg_OffDly	0	Minimum time below High Rate of Change (Decreasing) Limit (minus deadband) to clear Status (seconds)
Cfg_HiRoCDecGateDly	DINT	HiRoCDecGate.Cfg_GateDly	0	High Rate of Change (Decreasing) Status Gate Delay (seconds)
PSet_LowerSP	REAL		30.0	Program Setting for Lower Setpoint (engineering units)
PSet_RaiseSP	REAL		20.0	Program Setting for Raise Setpoint (engineering units)
PSet_Owner	DINT		0	Program Owner Request ID (nonzero) or Release (zero)
PSet_HiDevLim	REAL		100.0	Program-Entered High Deviation Status Threshold (engineering units)
PSet_LoDevLim	REAL		-100.0	Program-Entered Low Deviation Status Threshold (engineering units)
PSet_HiRoCIncLim	REAL		100.0	Program-Entered High Rate of Change (Increasing) Status Threshold (engineering units/RateTime)
PSet_HiRoCDecLim	REAL		100.0	Program-Entered High Rate of Change (Decreasing) Status Threshold (engineering units/RateTime)
OSet_LowerSP	REAL		30.0	Operator Setting for Lower Setpoint (engineering units)
OSet_RaiseSP	REAL		20.0	Operator Setting for Raise Setpoint (engineering units)
OSet_HiDevLim	REAL		100.0	Operator-Entered High Deviation Status Threshold (engineering units)
OSet_LoDevLim	REAL		-100.0	Operator-Entered Low Deviation Status Threshold (engineering units)
OSet_HiRoCIncLim	REAL		100.0	Operator-Entered High Rate of Change (Increasing) Status Threshold (engineering units/RateTime)

Table 7 - P_DBC Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
OSet_HiRoCDecLim	REAL		100.0	Operator-Entered High Rate of Change (Decreasing) Status Threshold (engineering units/RateTime)
PCmd_Raise	BOOL		0	Program command to set output to Raise (in Manual)
PCmd_Lower	BOOL		0	Program command to set output to Lower (in Manual)
PCmd_None	BOOL		0	Program command to clear Raise, Lower outputs (in Manual)
PCmd_Auto	BOOL		0	Program command to select Automatic Loop Mode
PCmd_Man	BOOL		0	Program command to select Manual Loop Mode
PCmd_Reset	BOOL		0	• Set PCmd_Reset to 1 to reset all alarms requiring reset • This parameter is always reset automatically
PCmd_HiDevAck	BOOL	HiDev.PCmd_Ack	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • The parameter is reset automatically
PCmd_LoDevAck		LoDev.PCmd_Ack		
PCmd_HiRoCIncAck		HiRoCInc.PCmd_Ack		
PCmd_HiRoCDecAck		HiRoCDec.PCmd_Ack		
PCmd_HiDevSuppress	BOOL	HiDev.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_LoDevSuppress		LoDev.PCmd_Suppress		
PCmd_HiRoCIncSuppress		HiRoCInc.PCmd_Suppress		
PCmd_HiRoCDecSuppress		HiRoCDec.PCmd_Suppress		
PCmd_HiDevUnsuppress	BOOL	HiDev.PCmd_Unsuppress	0	
PCmd_LoDevUnsuppress		LoDev.PCmd_Unsuppress		
PCmd_HiRoCIncUnsuppress		HiRoCInc.PCmd_Unsuppress		
PCmd_HiRoCDecUnsuppress		HiRoCDec.PCmd_Unsuppress		
PCmd_HiDevUnshelve	BOOL	HiDev.PCmd_Unshelve	0	• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • The parameter is reset automatically
PCmd_LoDevUnshelve		LoDev.PCmd_Unshelve		
PCmd_HiRoCIncUnshelve		HiRoCInc.PCmd_Unshelve		
PCmd_HiRoCDecUnshelve		HiRoCDec.PCmd_Unshelve		
OCmd_Raise	BOOL		0	Operator command to set output to Raise (in Manual)
OCmd_Lower	BOOL		0	Operator command to set output to Lower (in Manual)
OCmd_None	BOOL		0	Operator command to clear Raise, Lower outputs (in Manual)
OCmd_Auto	BOOL		0	Operator command to select Automatic Loop Mode
OCmd_Man	BOOL		0	Operator command to select Manual Loop Mode
MCmd_Disable	BOOL		0	Maintenance command to Disable Deadband Controller
MCmd_Enable	BOOL		0	Maintenance command to Enable Deadband Controller
MCmd_Acq	BOOL	Mode.MCmd_Acq	0	Maintenance command to Acquire Ownership (Oper/Prog/Ovrd to Maint)
MCmd_Rel	BOOL	Mode.MCmd_Rel	0	Maintenance command to Release Ownership (Maint to Oper/Prog/Ovrd)
OCmd_AcqLock	BOOL	Mode.OCmd_AcqLock	0	Operator command to Acquire (Prog to Oper) / Lock Ownership
OCmd_Unlock	BOOL	Mode.OCmd_UnlockRel	0	Operator command to Unlock / Release (Oper to Prog) 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

Deadband Controller 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 indicator. These bits can also be used by other application logic.
- 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_DBC Output Parameters

Output Parameter	Data Type	Alias	Description
EnableOut	BOOL		Enable Output - System Defined Parameter
Out_Raise	BOOL		Output to equipment to increase PV
Out_Lower	BOOL		Output to equipment to decrease PV
Out_Q	BOOL		Output turns ON at Raise SP, OFF at Lower Setpoint
Out_Qnot	BOOL		Output turns ON at Lower SP, OFF at Raise Setpoint
Val_PV	REAL		Process Variable (engineering units)
Val_RoC	REAL		Process Variable Rate of Change (engineering units/RateTime)
Val_LowerSP	REAL		Accepted value for Lower Setpoint (engineering units)
Val_RaiseSP	REAL		Accepted value for Raise Setpoint (engineering units)
Val_PVEUMin	REAL		Minimum of scaled range = min (Cfg_PVEUMin, Cfg_PVEUMax)
Val_PVEUMax	REAL		Maximum of scaled range = max (Cfg_PVEUMin, Cfg_PVEUMax)

Table 8 - P_DBC Output Parameters

Output Parameter	Data Type	Alias	Description
SrcQ_IO	SINT		I/O signal source and quality.
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)
Val_Sts	SINT		Loop Confirmed Status: 0 = In deadband, Q is off, in Auto Loop mode 1 = In deadband, Q is on, in Auto Loop mode 2 = Above the Lower setpoint, in Auto Loop mode 3 = Below the Raise setpoint, in Auto Loop mode 4-7 = same as 0-3, but in Manual Loop mode 33 = Disabled (set in the EnableFalse routine)
Val_Fault	SINT		Loop Fault Status 0 = none 22 = Lo Deviation 23 = Hi Deviation 24 = Hi Rate of Change (decreasing) 25 = Hi Rate of Change (increasing) 34 = Configuration error
Val_Mode	SINT	Mode.Val	Mode enumeration: 0 = No mode 2 = Maintenance 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)
Val_Notify	SINT		Current Alarm Level and Acknowledgement (enumeration): 0 = Not in alarm (acknowledged) 1 = Not in alarm (unacknowledged or reset required) 2 = Low severity alarm (acknowledged) 3 = Low severity alarm (unacknowledged) 4 = Medium severity alarm (acknowledged) 5 = Medium severity alarm (unacknowledged) 6 = High severity alarm (acknowledged) 7 = High severity alarm (unacknowledged) 8 = Urgent severity alarm (acknowledged) 9 = Urgent severity alarm (unacknowledged)
Val_HiDevLim	REAL		Accepted value for High Deviation Status Threshold (engineering units)

Table 8 - P_DBC Output Parameters

Output Parameter	Data Type	Alias	Description
Val_LoDevLim	REAL		Accepted value for Low Deviation Status Threshold (engineering units)
Val_HiRoCIncLim	REAL		Accepted value for High Rate of Change (Increasing) Status Threshold (engineering units/RateTime)
Val_HiRoCDecLim	REAL		Accepted value for High Rate of Change (Decreasing) Status Threshold (engineering units/RateTime)
Sts_Raise	BOOL		1 = PV below Raise SP, Out_Raise is on
Sts_Lower	BOOL		1 = PV above Lower SP, Out_Lower is on
Sts_Auto	BOOL		1 = Current Loop Mode is Automatic
Sts_Man	BOOL		1 = Current Loop Mode is Manual
Sts_Q	BOOL		1 = Out_Q is ON (Out_Qnot is OFF)
Sts_Available	BOOL		1 = Loop available for manipulation in Program mode
Sts_Disabled	BOOL		1 = Loop is Disabled (held with outputs off)
Sts_NotRdy	BOOL		1 = Device Not Ready, see detail bits for reason
Nrdy_Disabled	BOOL		1 = Device Not Ready: • Loop Disabled by Maintenance • Configuration Error • Loop Logic Disabled/NO Mode
Nrdy_CfgErr			
Nrdy_NoMode			
Sts_AlmInh	BOOL		1 = An Alarm is Inhibited, Disabled or Suppressed, display icon
Sts_Err	BOOL		1 = Error in Config: see detail bits for reason
Err_EU	BOOL		1 = Error in Config: • Scaled engineering units Minimum = Maximum • Invalid Rate Time (use 1.0, 60.0, 3600.0, 86,400.0...) • On Delay, Off Delay, Gate Delay Time Invalid (use 0…2,147,483 seconds) • Alarm Minimum On Time or Severity
Err_Rate			
Err_Timer			
Err_Alarm			
Sts_Maint	BOOL	Mode.Sts_Maint	1 = Mode is Maintenance (supersedes Program and Operator)
Sts_Ovrd	BOOL	Mode.Sts_Ovrd	1 = Mode is Override
Sts_Prog	BOOL	Mode.Sts_Prog	1 = Mode is Program
Sts_Oper	BOOL	Mode.Sts_Oper	1 = Mode is Operator
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	BOOL	Mode.Sts_MAcqRcvd	1 = Maintenance Acquire command received this scan
Sts_HiDevCmp	BOOL	HiDevGate.Inp	PV High Deviation comparison result 1 = High Deviation
Sts_LoDevCmp		LoDevGate.Inp	PV Low Deviation comparison result 1 = Low Deviation
Sts_HiRoCIncCmp		HiRoCIncGate.Inp	PV High Rate of Change (Increasing) comparison result 1 = High Rate of Change
Sts_HiRoCDecCmp		HiRoCDecGate.Inp	PV High Rate of Change (Decreasing) comparison result 1 = High
Sts_HiDevGate	BOOL	HiDevGate.Sts_Gate	PV High Deviation Gate Delay Status, 1 = done
Sts_LoDevGate		LoDevGate.Sts_Gate	PV Low Deviation Gate Delay Status, 1 = done
Sts_HiRoCIncGate		HiRoCIncGate.Sts_Gate	PV High Rate of Change (Increasing) Gate Delay Status, 1 = done
Sts_HiRoCDecGate		HiRoCDecGate.Sts_Gate	PV High Rate of Change (Decreasing) Gate Delay Status, 1 = done

Table 8 - P_DBC Output Parameters

Output Parameter	Data Type	Alias	Description
Sts_HiDev	BOOL	HiDev.Inp	1 = Analog Input Deviation is above High limit
Sts_LoDev		LoDev.Inp	1 = Analog Input Deviation is below Low limit
Sts_HiRoCInc		HiRoCInc.Inp	1 = PV Rate of Change (Increasing) is above High limit
Sts_HiRoCDec		HiRoCDec.Inp	1 = PV Rate of Change (Decreasing) is above High limit
Alm_HiDev	BOOL	HiDev.Alm	1 = Alarm is active: • High Deviation Alarm • Low Deviation Alarm • PV Rate of Change (Increasing) Alarm • PV Rate of Change (Decreasing) Alarm
Alm_LoDev		LoDev.Alm	
Alm_HiRoCInc		HiRoCInc.Alm	
Alm_HiRoCDec		HiRoCDec.Alm	
Ack_HiDev	BOOL	HiDev.Ack	1 = Alarm has been acknowledged: • High Deviation Alarm • Low Deviation Alarm • PV Rate of Change (Increasing) Alarm • PV Rate of Change (Decreasing) Alarm
Ack_LoDev		LoDev.Ack	
Ack_HiRoCInc		HiRoCInc.Ack	
Ack_HiRoCDec		HiRoCDec.Ack	
Sts_HiDevDisabled	BOOL	HiDev.Disabled	1 = Alarm has been disabled by Maintenance: • High Deviation Alarm • Low Deviation Alarm • PV Rate of Change (Increasing) Alarm • PV Rate of Change (Decreasing) Alarm
Sts_LoDevDisabled		LoDev.Disabled	
Sts_HiRoCIncDisabled		HiRoCInc.Disabled	
Sts_HiRoCDecDisabled		HiRoCDec.Disabled	
Sts_HiDevShelved	BOOL	HiDev.Shelved	1 = Alarm has been shelved by Operator: • High Deviation Alarm • Low Deviation Alarm • PV Rate of Change (Increasing) Alarm • PV Rate of Change (Decreasing) Alarm
Sts_LoDevShelved		LoDev.Shelved	
Sts_HiRoCIncShelved		HiRoCInc.Shelved	
Sts_HiRoCDecShelved		HiRoCDec.Shelved	
Sts_HiDevSuppressed	BOOL	HiDev.Suppressed	1 = Alarm has been suppressed by program: • High Deviation Alarm • Low Deviation Alarm is Suppressed • PV Rate of Change (Increasing) Alarm • PV Rate of Change (Decreasing) Alarm
Sts_LoDevSuppressed		LoDev.Suppressed	
Sts_HiRoCIncSuppressed		HiRoCInc.Suppressed	
Sts_HiRoCDecSuppressed		HiRoCDec.Suppressed	
Rdy_Raise	BOOL		1 = Ready to receive command: • OCmd_Raise • OCmd_Lower • OCmd_None • OCmd_Auto • OCmd_Man • MCmd_Disable • MCmd_Enable
Rdy_Lower			
Rdy_None			
Rdy_Auto			
Rdy_Man			
Rdy_Disable			
Rdy_Enable			
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_DBC	BOOL		Unique Parameter Name for auto - discovery

Deadband Controller 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 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 the Logix Designer application export/import functionality.

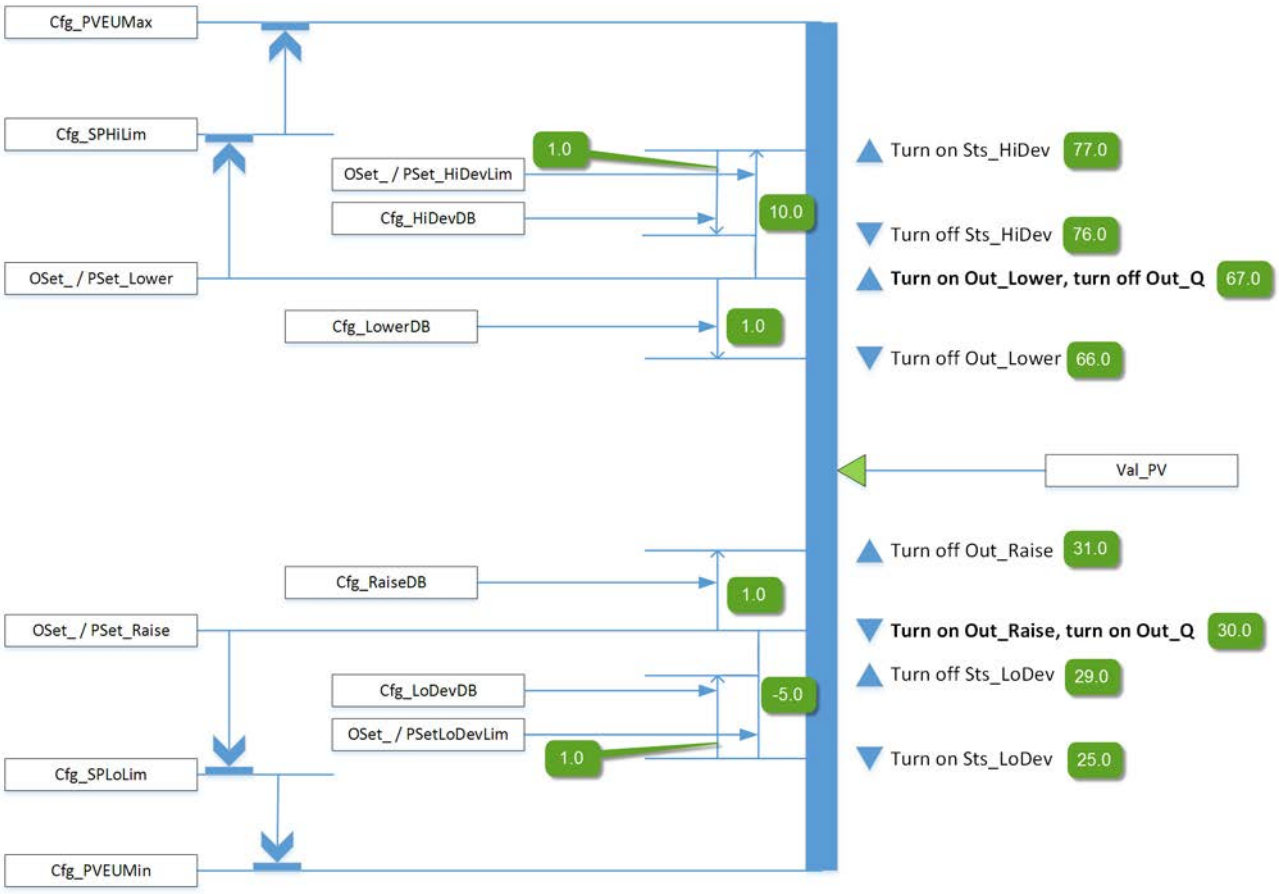
Table 9 - P_DBC Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_Desc	STRING_40	'Deadband Controller'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_Label	STRING_20	'On/Off Controller'	Label for graphic symbol that is displayed on HMI. This string appears on the display element.
Cfg_OutNavTag	STRING_NavTag	' '	Tagname for destination of Output Navigation button. **IMPORTANT:** This tag does not work in FactoryTalk ME Software.
Cfg_PVEU	STRING_8	'%'	Engineering units for display on HMI.
Cfg_PVNavTag	STRING_NavTag	' '	Tagname for destination of PV Navigation button. **IMPORTANT:** This tag does not work in FactoryTalk ME Software.
Cfg_Tag	STRING_20	'P_DBC'	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.

The following image shows the reactions of the instruction to the value of PV as it increases or decreases. The image also shows the values of PV that correspond to examples that are shown later in this document (See Maintenance Tab Page 1 on page 36).



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.
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.

Hand mode is not used in this Add-On Instruction.

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

Loop Modes

The P_DBC instruction uses the following Loop modes.

Mode	Operator Command	Program Command	Override Command Input	Purpose	Outputs
Automatic (Auto)	The instruction sets and clears the Raise, Lower, Q, and Qnot outputs of the instruction to manipulate the process based on the PV reaching the Raise and Lower setpoints to control the PV within limits.				
Manual (Man)	OCmd_Raise	PCmd_Raise	In_OvrdCmd = 1	Trigger equipment to increase the PV	Sets Out_Raise to 1 Clears Out_Lower to 0 Sets Out_Q to 1 Clears Out_Qnot to 0
	OCmd_Lower	PCmd_Lower	Inp_OvrdCmd = 2	Trigger equipment to decrease the PV	Clears Out_Raise to 0 Sets Out_Lower to 1 Clears Out_Q to 0 Sets Out_Qnot to 1
	OCmd_None	PCmd_None	Imp_OvrdCmd = 3	Stop increase or decrease	Clears Out_Raise to 0 Clears Out_Lower to 0 Out_Q and Out_Qnot remain in their current state

Operator Commands are accepted when the instruction is in Operator Mode or Maintenance Mode.

Program Commands are accepted when the instruction is in Program Mode.

The Override Command Input is accepted when the instruction is in Override Mode. In addition, in Override Mode:

- Inp_OvrdCmd = 4 sets the Loop Mode to Manual
- Inp_OvrdCmd = 5 sets the Loop Mode to Auto

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
High Deviation	HiDev	HiDevGate	Raised when the amount by which the PV exceeds the setpoint or reference is above the High Deviation threshold. The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.
High Rate of Change (Decreasing)	HiRoCDec	HiRoCDecGate	The PV is decreasing faster than the High Rate of Change Decreasing Limit. Limit set by Operator or Program. Deadband and severity are set in configuration.
High Rate of Change (Increasing)	HiRoCInc	HiRoCIncGate	The PV is increasing faster than the High Rate of Change Increasing Limit. Limit set by Operator or Program. Deadband and severity are set in configuration.
Low Deviation	LoDev	LoDevGate	Raised when the amount by which the PV exceeds the setpoint or reference is below the Low Deviation threshold. (Since the threshold is a negative number, this is the amount the PV falls below the setpoint or reference.) The threshold is set by the operator or by program logic. Deadband, gating, and timing are set in configuration.

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

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

This object does not have Simulation capability.

Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
EnableIn False (false rung)	Handled the same as if the loop was disabled by command. The loop outputs are de-energized and the loop is shown as disabled on the HMI. The mode is shown as No mode. All alarms are cleared.
Powerup (prescan, first scan)	Any commands that are received before first scan are discarded. The loop outputs are de-energized. Embedded P_Mode and P_Alarm instructions are handled in accordance with their standard powerup procedures. See the Reference Manuals for the P_Mode and P_Alarm instructions for details.
Postscan (SFC transition)	No SFC postscan logic is provided.

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

Display Elements

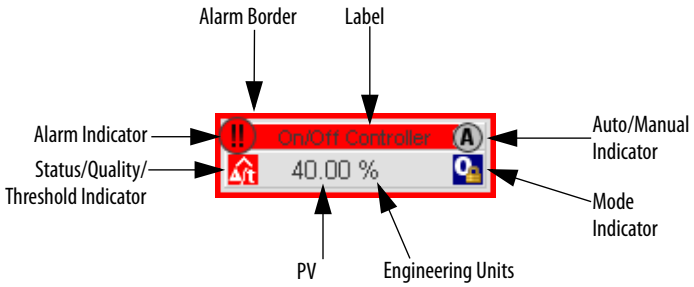
A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures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

Table 11 - P_DBC Global Object Loop Symbol

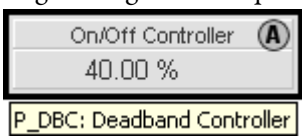
Global Object Name	Global Object	Description
GO_P_DBC		Standard Deadband controller global object.

Common attributes of the P_DBC global object include the following:

- Graphical representation of the loop
- Auto/Manual indicator
- Status/quality/threshold indicators
- Mode indicator
- Label
- Alarm indicator that changes color for the severity of the alarm
- Color-changing alarm border that blinks on unacknowledged alarm
- PV indicator (with engineering units)



Each graphic symbol includes a touch field over it that opens the faceplate for the object. In addition, in FactoryTalk View SE, there is a tooltip on the graphic symbol that displays the configured tag and description of the object.



Loop Mode Indicators

These indicators show the Loop mode.

Graphic Symbol	Description
	The loop is in Auto mode.
	The loop is in Manual mode.

Status/Quality Indicators

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

Table 12 -

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

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 on the appropriate tab at the top of the faceplate to guide you in finding the configuration error. Navigate to the tab and the condition with an invalid configuration appears in a magenta box.

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

- The scaled PV Range maximum and minimum are set to the same value (invalid range).
- Time used in Rate of Change calculations is less than or equal to zero.
- On Delay, Off Delay, or Gate Delay time is set to a value less than zero or greater than 2,147,483 seconds.
- An Alarm Minimum On Time 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 Device 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 Device Not Ready indicator appears on the appropriate tab at the top of the faceplate to guide you in finding the condition. Navigate to the tab and the condition preventing operation has the indicator next to it.

For this instruction, the Device Not Ready indicator appears under the following conditions:

- Loop has been disabled by Maintenance.
- There is an invalid configuration.
- Loop logic is disabled or there is no mode.

Threshold Indicators

These indicators show that the PV has exceeded a threshold.

Table 13 -

Graphic Symbol	Description
	High deviation threshold exceeded.
	Low deviation threshold exceeded.
	High rate of increase.
	High rate of decrease.

Mode Indicators

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

Table 14 -

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.
	Override mode
	Maintenance 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 15 -

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.

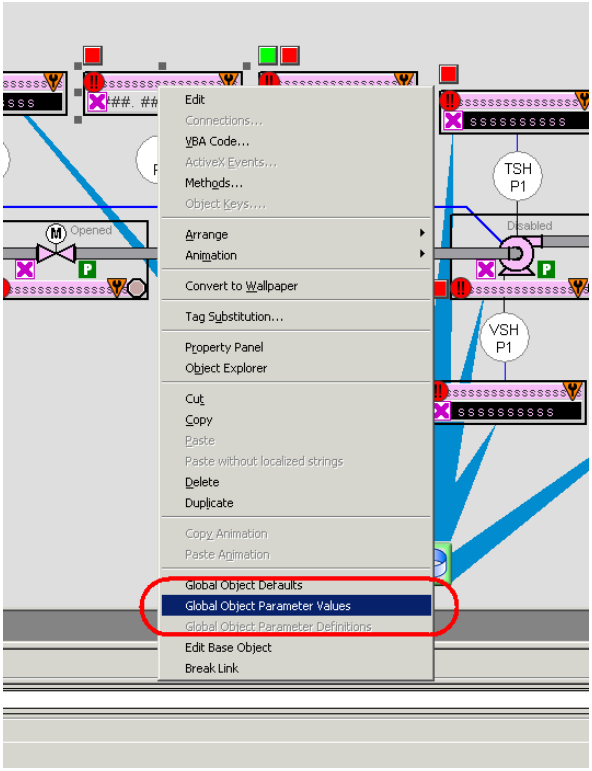
Maintenance Bypass Indicator

There are no conditions available to bypass in maintenance mode for the P_DBC Add-On Instruction. Therefore, the Maintenance Bypass Indicator is not used.

Using Global Elements

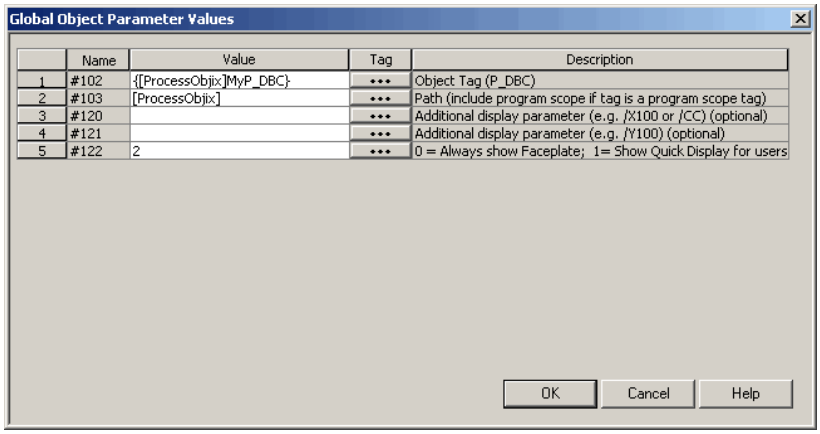
The global objects for P_DBC can be found in the global object file (RA-BAS-ME) P_DBC Graphics Library.ggfx for FactoryTalk View ME or (RA-BAS) P_DBC Graphics Library.ggfx for FactoryTalk View SE. Follow these steps to use a global object.

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



2. In the display, 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. 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 the 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.

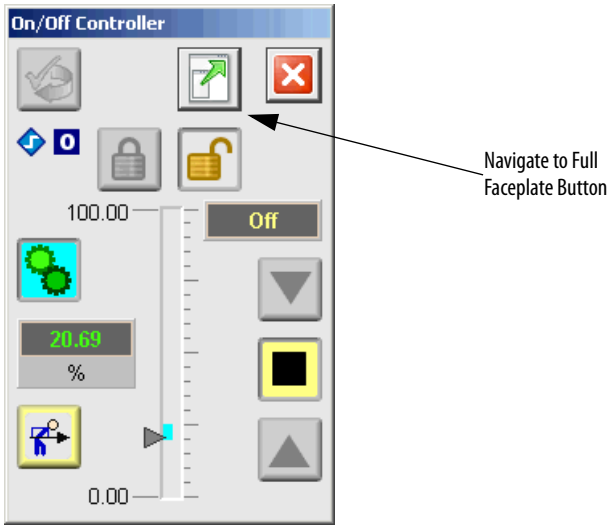
   TIP Click the ellipsis (. . .) to browse and select a tag.

   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_DBC instruction instance. From the Quick Display, you can navigate to the faceplate for full access for operation, maintenance, and configuration.

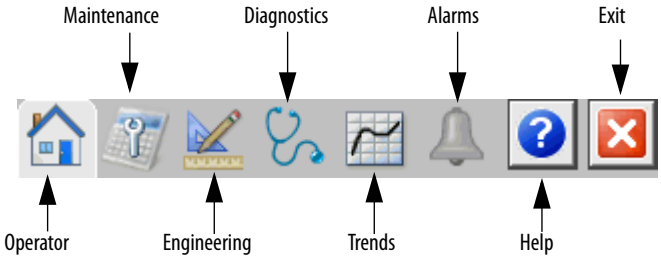


Faceplate

The P_DBC faceplate consists of six 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. Click the appropriate icon at the top of the faceplate to access a specific tab.



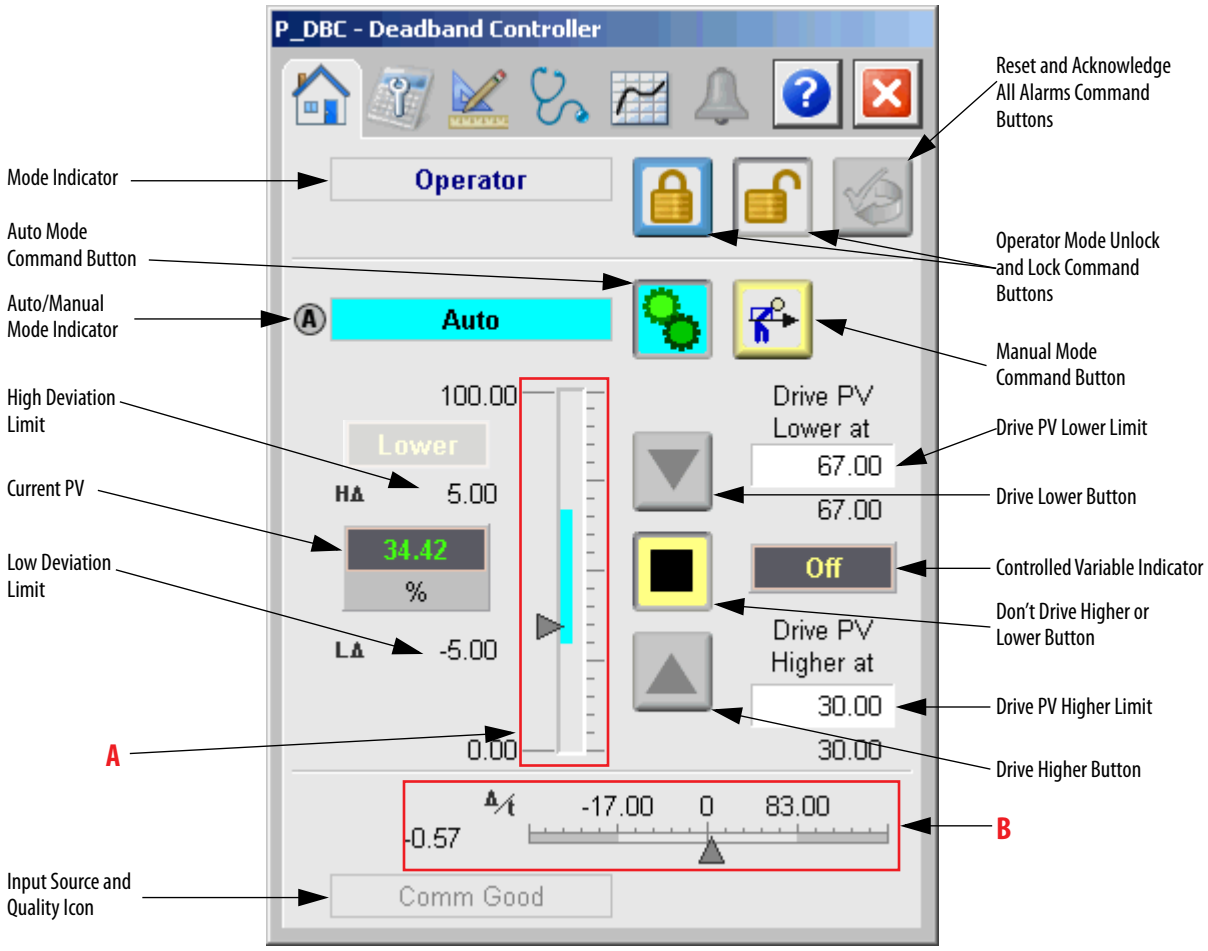
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the P_DBC instruction instance, including viewing its status and values and manipulating it through its commands and settings. When a given input is restricted via FactoryTalk View security, the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

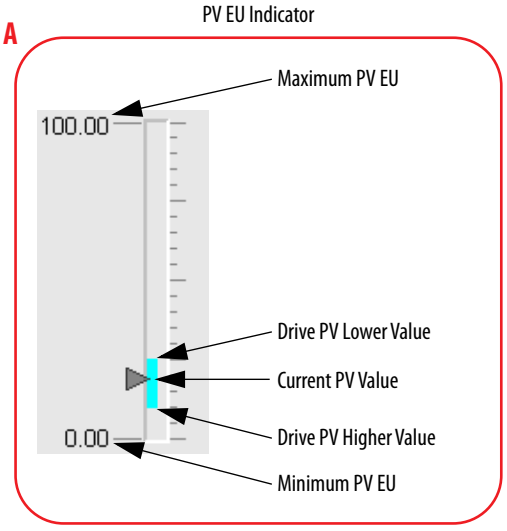
Operator Tab

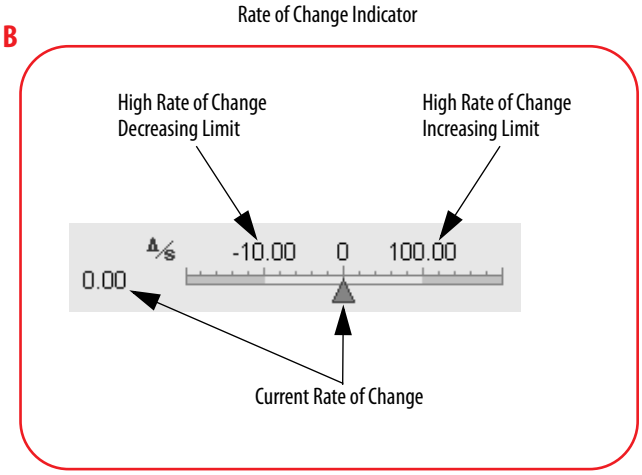
The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the loop status and manually operate the loop when it is in Operator mode.

The Operator tab shows the following:

- Current mode (Program, Operator, or Maintenance)
- Auto/Manual mode indicator
- PV controls and values
- Current Controlled Variable (CV)
- PV (engineering units)
- Rate of Change values and limits
- Input Source and Quality indicator (See 'SrcQ' in the Output parameters table on page 16 for details)


P_DBC - Deadband Controller
Reset and Acknowledge All Alarms Command Buttons
Mode Indicator
Operator
Auto Mode Command Button
Operator Mode Unlock and Lock Command Buttons
Auto/Manual Mode Indicator
Auto
Manual Mode Command Button
High Deviation Limit
100.00
Lower
HΔ
5.00
Drive PV Lower at
Drive PV Lower Limit
67.00
67.00
Drive Lower Button
Current PV
34.42
%
Low Deviation Limit
Off
Controlled Variable Indicator
Don't Drive Higher or Lower Button
LΔ
-5.00
Drive PV Higher at
30.00
Drive PV Higher Limit
A
0.00
30.00
Drive Higher Button
Δ/t
-17.00
0
83.00
-0.57
B
Input Source and Quality Icon
Comm Good


A
PV EU Indicator
Maximum PV EU
100.00
Drive PV Lower Value
Current PV Value
Drive PV Higher Value
0.00
Minimum PV EU

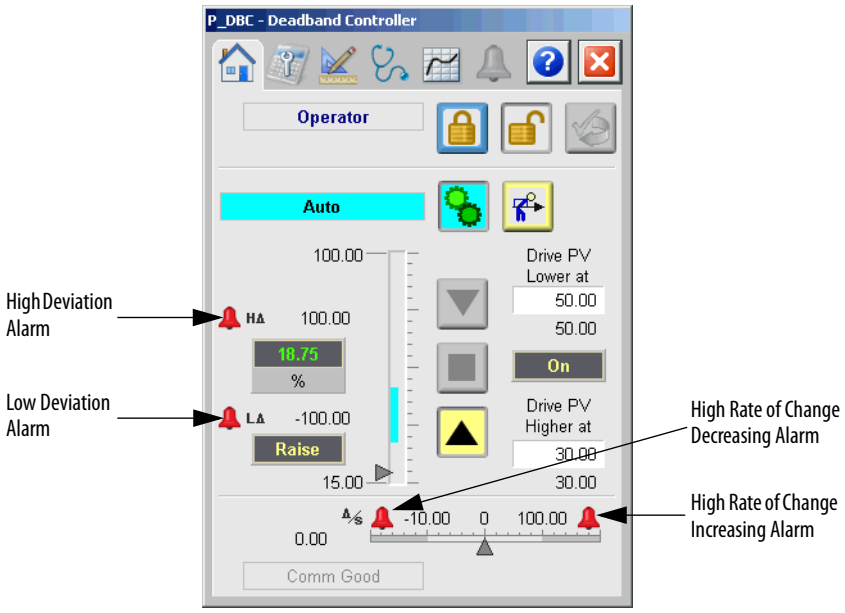

B
Rate of Change Indicator
High Rate of Change Decreasing Limit
High Rate of Change Increasing Limit
Δ/s
-10.00
0
100.00
0.00
Current Rate of Change

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

Table 16 - Operator Tab Descriptions

Function	Action	Security
	Click to lock in Operator mode. Function locks the mode in Operator mode, preventing the program from taking control.	Manual Loop Operation (Code B)
	Click to unlock Operator mode. Function unlocks Operator mode, letting the program take control.	
	Click to request Program mode.	
	Click to request Operator mode.	
	Click to request Auto Loop mode.	Normal Operation of Loops (Code A)
	Click to request Manual Loop mode.	
	Click to drive the PV lower. **IMPORTANT:** This button is only available in Manual mode.	
	Click to not drive PV higher or lower. **IMPORTANT:** This button is only available in Manual mode.	
	Click to drive the PV higher. **IMPORTANT:** This button is only available in Manual mode.	
loop PV Lower at	Type in the upper limit for PV.	
loop PV Higher at	Type in the lower limit for PV.	
Current PV Value	Display current PV value. (SE only) Click this value to open the PV Object faceplate. **IMPORTANT:** Allow Navigation for the PV Object on Engineering Page 2 must be checked to make this value clickable. See Engineering Tab Page 2 on page 42.	None
Controlled Variable Indicator	Displays current Controlled Variable value. (SE only) Click this value to open the Output Value faceplate. **IMPORTANT:** Allow Navigation for the Output Object on Engineering Page 2 must be checked to make this indicator clickable. See Engineering Tab Page 2 on page 42.	
	Click to reset and acknowledge all alarms.	Acknowledge Alarms (Code F)

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



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

Table 17 - 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) (Alarm is logged but not displayed)
	Alarm Disabled (by Maintenance)
	Alarm Shelved (by Operator)

Maintenance Tab

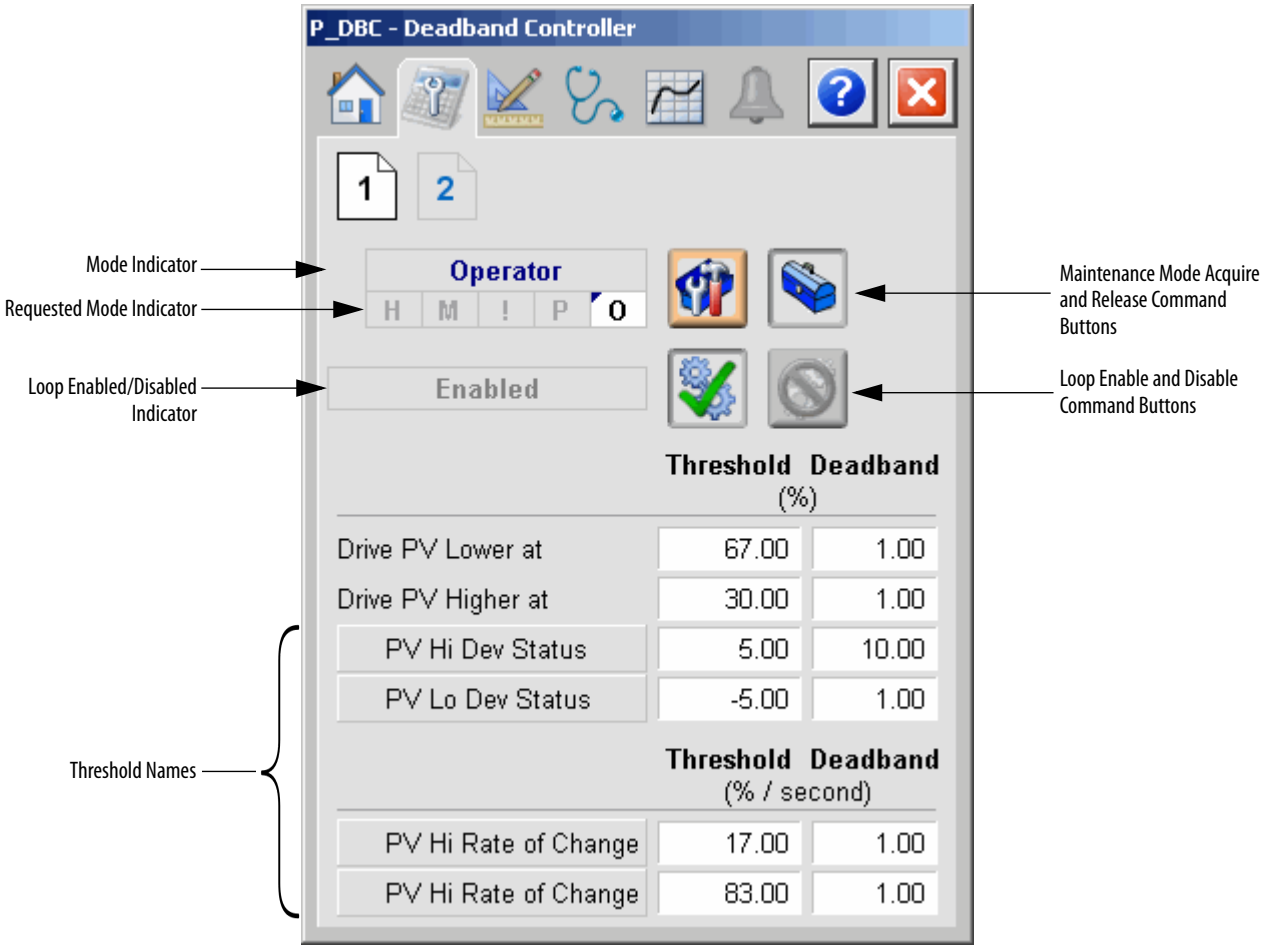
Maintenance personnel use the information and controls on the Maintenance tab to adjust loop parameters, troubleshoot and temporarily work around loop problems, and disable the loop for routine maintenance.

The Maintenance tab is divided into two pages.

Maintenance Tab Page 1

Page 1 of the Maintenance tab shows the following:

- Current mode (Program, Operator, or Maintenance).
- Requested modes indicator highlights all modes that have been requested. The leftmost highlighted mode is the active mode.
- Whether the loop is enabled or disabled.



IMPORTANT Click a threshold name to open the P_Gate faceplate. From the P_Gate faceplate, you can configure and perform additional operations for each status, including Gate Delay, Status On-delay, and Status Off-delay.

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

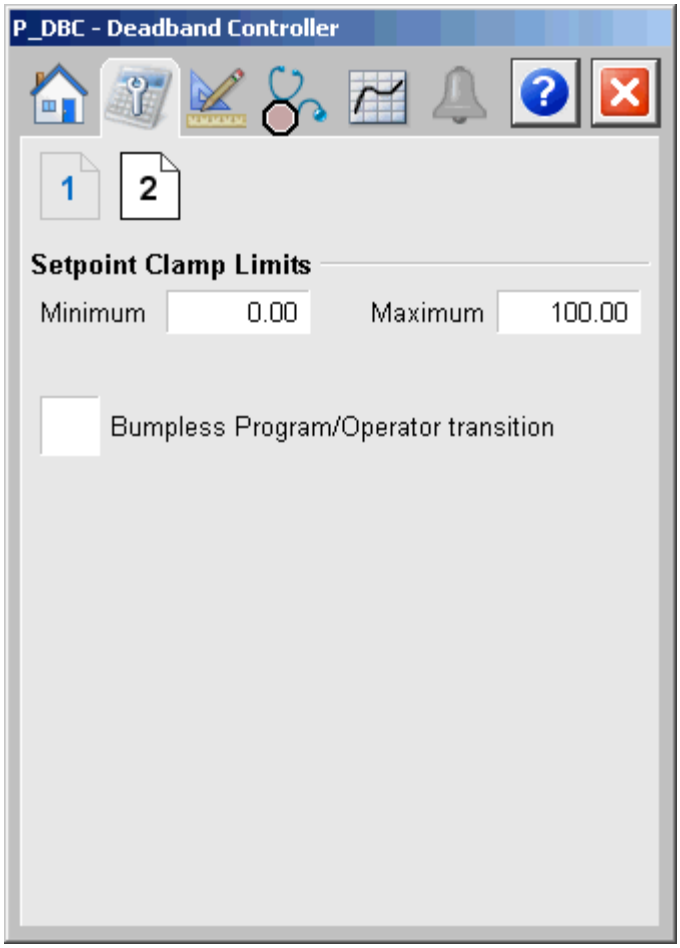
Table 18 - Maintenance Tab Page 1 Descriptions

Function	Action	Security	Configuration Parameters
	Click for Maintenance mode.	Equipment Maintenance (Code C)	None
	Click to release Maintenance mode.		
	Click to enable loop.		
	Click to disable loop.		
Threshold Names	Click a threshold name to open the associated P_Gate faceplate.	Engineering Configuration (Code E)	
Threshold: • Drive PV Lower at • Drive PV Higher at	Enter the value of the PV at which the output turns off and PV starts to decrease. Enter the value of the PV at which the output turns on and PV starts to increase.	Disable Alarms Bypass Permissives and Interlocks (Code H)	Cfg_SPHiLim Cfg_SPLoLim
Deadband: • Drive PV Lower at • Drive PV Higher at	Type a number that is the size of the deadband for the Lower output (below Lower limit) Type a number that is the size of the deadband for the Raise output (above Raise limit)		Cfg_LowerDB Cfg_RaiseDB
PV Hi Dev Status: Threshold	Type the number that is used to establish the high deviation limit. When the PV reaches this limit, a High Deviation alarm is generated. **EXAMPLE:** In the examples, the Lower setpoint is 67 and the PV Hi Dev Status is 5. We add 67 and 5 to get the high deviation limit of 72.		None
PV Hi Dev Status: Deadband	Type the number that PV must decrease to reset a High Deviation alarm. **EXAMPLE:** The high deviation limit is 72 and the deadband is 1. The PV must decrease 1 unit to 71 to reset the High Deviation alarm. **IMPORTANT:** The Deadband can be set so that the PV must decrease below the Lower setpoint before the High Deviation alarm is reset. For example, the Deadband can be set to 10 so that the PV must decrease to 62 to reset the alarm.		Cfg_HiDevDB

Table 18 - Maintenance Tab Page 1 Descriptions

Function	Action	Security	Configuration Parameters
PV Lo Dev Status: Threshold	Type the number that is used to establish the low deviation limit. When the PV reaches this limit, a Low Deviation alarm is generated. **EXAMPLE:** In the examples, the Raise setpoint is 30 and the PV Lo Dev Status is -5. We add 30 and -5 to get the low deviation limit of 25.	Disable Alarms Bypass Permissives and Interlocks (Code H)	None
PV Lo Dev Status: Deadband	Type the number that PV must increase to reset a Low Deviation alarm. **EXAMPLE:** The low deviation limit is 30 and the Deadband is 1. The PV must increase 1 unit to 26 to reset the Low Deviation alarm. **IMPORTANT:** The Deadband can be set so that the PV must increase above the Raise setpoint before the Low Deviation alarm is reset. For example, the Deadband can be set to 10 so that the PV must decrease to 35 to reset the alarm.		Cfg_LoDevDB
PV Hi Rate of Change (Increase): Threshold	Type the number to set the high Rate of Change (increase) limit (17 in the example). When the Rate of Change reaches this level, a Hi Rate of Increase alarm is generated.		None
PV Hi Rate of Change (Increase): Deadband	Type the number that the Rate of Change must increase to reset a Hi Rate of Increase alarm.		Cfg_HiRoCIncDB
PV Hi Rate of Change (Decrease): Threshold	Type the number to set the high Rate of Change (decrease) limit (83 in the example). When the Rate of Change reaches this level, a Hi Rate of Decrease alarm is generated.		None
PV Hi Rate of Change (Decrease): Deadband	Type the number that the Rate of Change must decrease to reset a Hi Rate of Decrease alarm.		Cfg_HiRoCDecDB

Maintenance Tab Page 2



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

Table 19 - Maintenance Tab Page 2 Descriptions

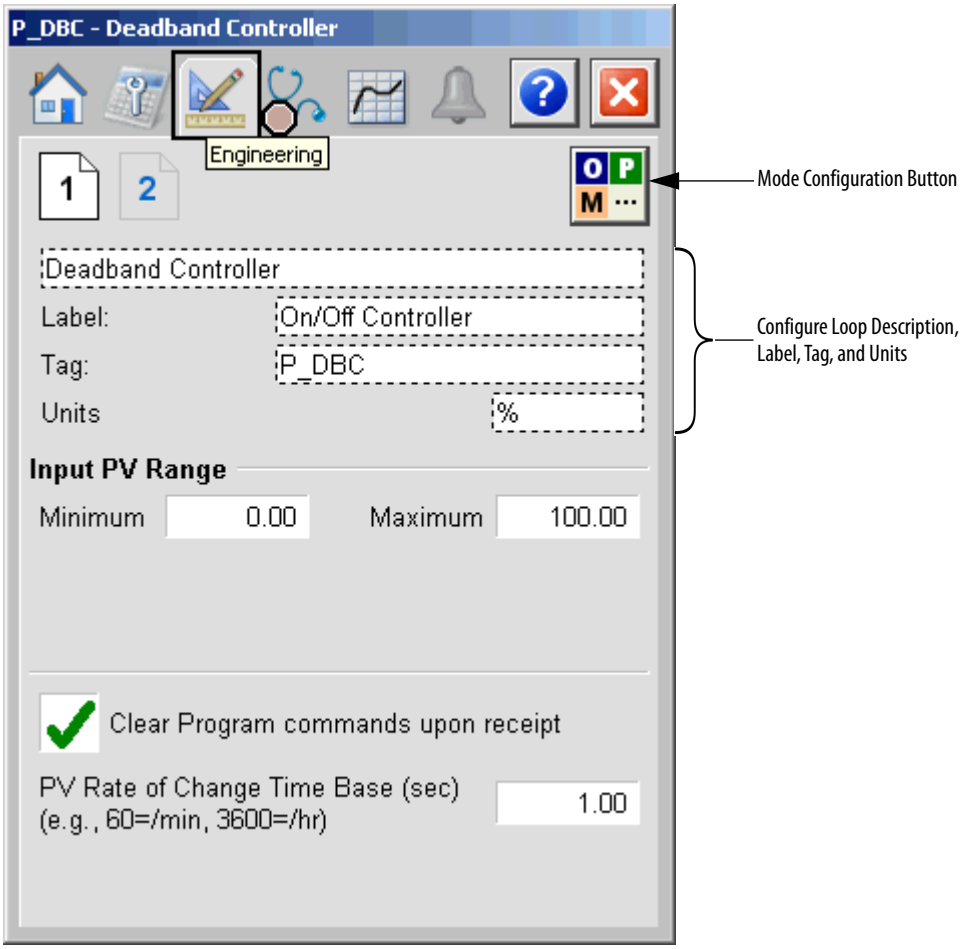
Function	Action	Security	Configuration Parameters
Setpoint Clamp Limits: Minimum Maximum	Type the upper limit for the loop PV Lower point. Type the lower limit for the Loop PV Higher point.	Engineering Configuration (Code E)	• Cfg_SPHiLim • Cfg_SPLoLim
Bumpless Program/ Operator Transition	Check so that when this parameter is the following: • 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

Engineering Tab

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

The Engineering tab is divided into two pages.

Engineering Tab Page 1

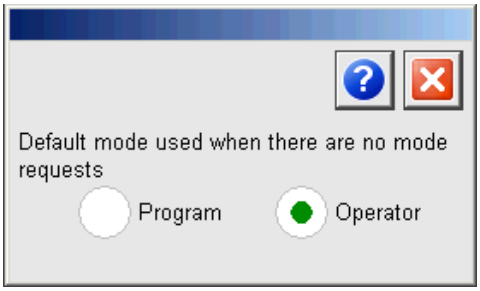


The following table lists the functions on page 1 of the Engineering tab.

Table 20 - Engineering Tab Page 1 Descriptions

Function	Action	Security	Configuration Parameters
	Click to open the Mode Configuration display.	Engineering Configuration (Code E)	See Mode Configuration display on page 41
Description	Type the loop description to be used on the faceplate title bar.		Cfg_Desc
Label	Type the loop label to be used on the graphic symbol.		Cfg_Label
Tag	Type the tagname to be used on the Operator tab of the faceplate.		Cfg_Tag
Units	Type the text of the engineering units for the PV.		Cfg_PVEU
Input PV Range: • Minimum • Maximum	Minimum and maximum values for PV input. These values are reflected on the PV bar graph on the Operator tab and the graph on the Trends tab.		• Cfg_PVEUMin • Cfg_PVEUMax
Clear Program Commands on Receipt	Check to clear Program commands on receipt.		Cfg_PCmdClear
PV Rate of Change Time Base (Seconds)	Type the time base in seconds. (60 = /minute, 3600 = /hour)		Cfg_RateTime

Mode Configuration Display



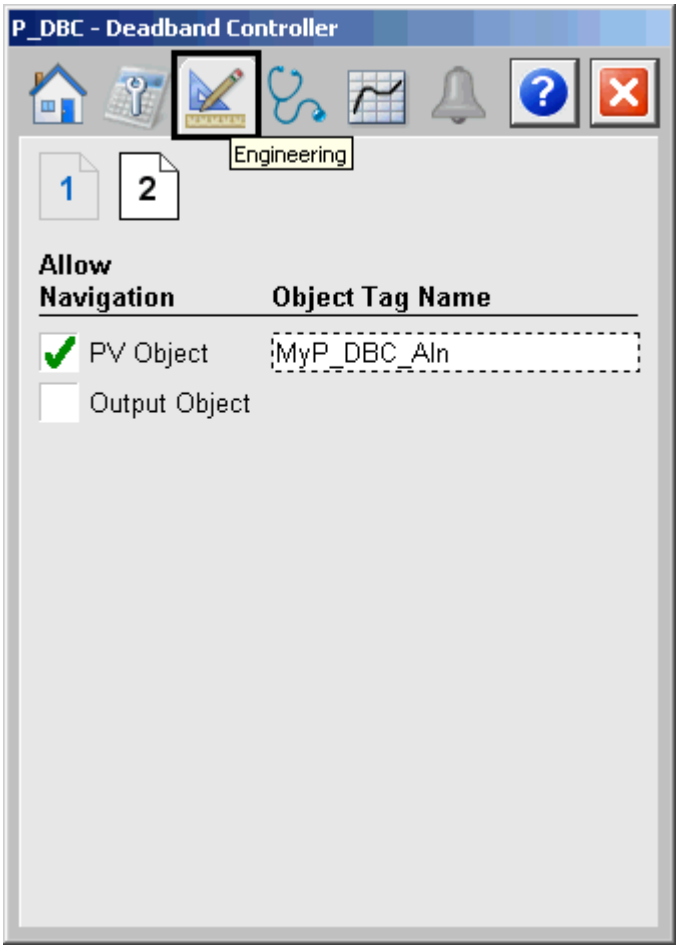
This display lets you select the default mode for the object by selecting the appropriate mode.

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

On page 2 of the Engineering tab, you enable navigation to and name the destination object for PV and Output.



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

Table 21 - Engineering Tab Page 2 Descriptions

Function	Action	Security	Configuration Parameters
Enable navigation to PV object	Check to enable navigation to the PV object.	Engineering Configuration (Code E)	Cfg_HasPVNav
Enable navigation to Output object	Check to enable navigation to the Output object.		Cfg_HasOutNav
Object Tag Name	Type the name of the PV object or Output object to navigate to.		• Cfg_PVNavTag • Cfg_OutNavTag

Diagnostics Tab

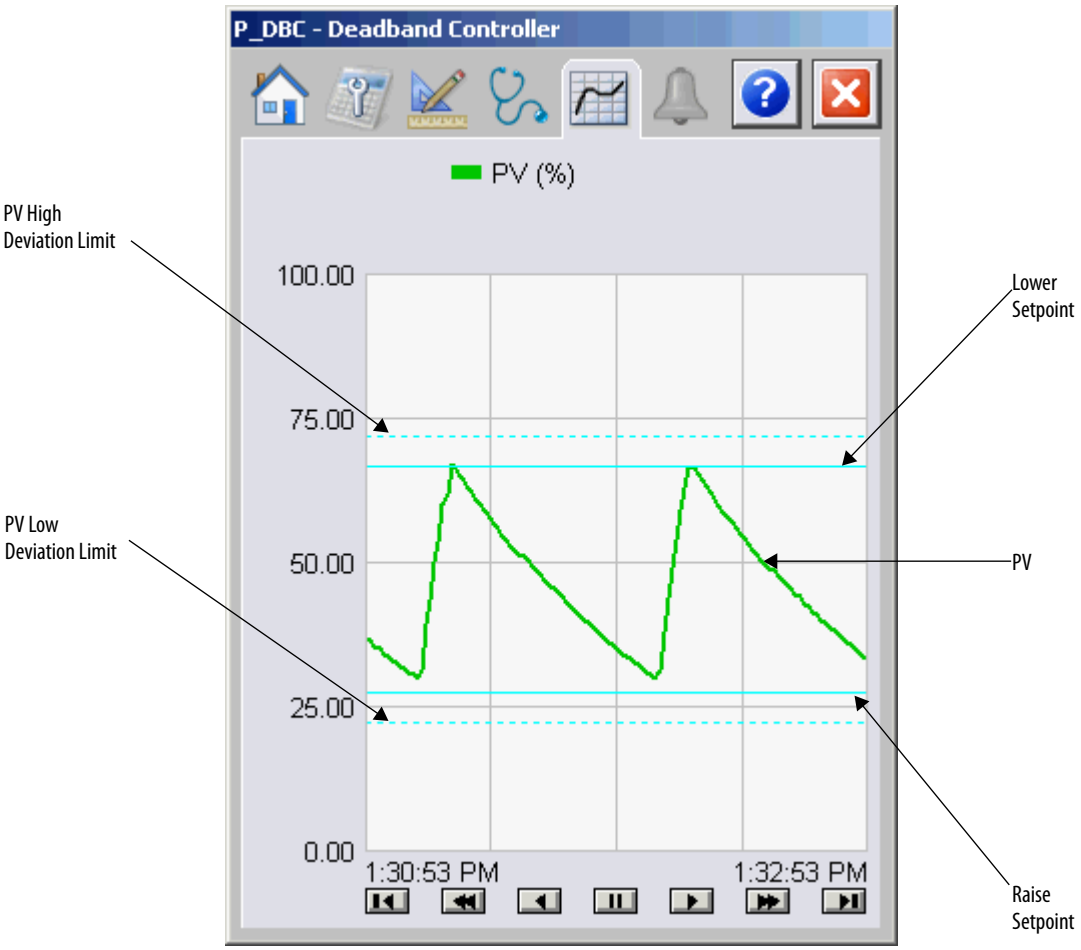
The Diagnostic tab provides indications that are helpful in diagnosing or preventing device problems, which can include specific reasons the loop is 'Not Ready', loop warnings and faults, warning and fault history, and predictive/preventive maintenance data.

The Diagnostics tab displays possible reasons for the loop not being ready.

The previous image indicates that the loop is not ready due to a configuration error.

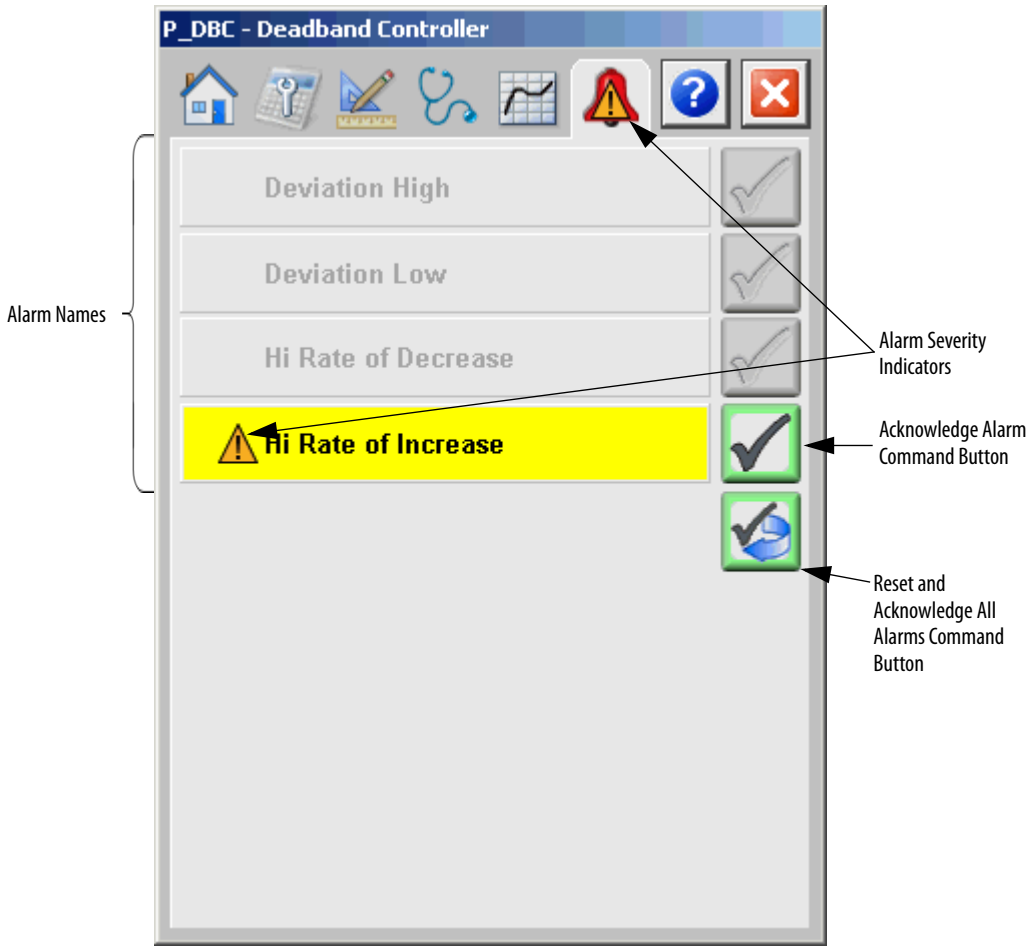
Trends Tab

On the Trends tab, you can view the PV (green line) in relation to the Lower Setpoint (67) and Raise Setpoint (30) (light blue lines) and the High Deviation limit (67 + 5) and Low Deviation limit (30 - 5) (dashed blue line).



Alarms Tab

The Alarms Tab shows all available alarms for the loop and their current status. From here, alarms can be acknowledged and reset. Click an alarm name to open the alarm detail faceplate for that alarm, where the alarm can be shelved by the operator, disabled by maintenance personnel, or configured by engineering.



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 22 - 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 23 - 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.

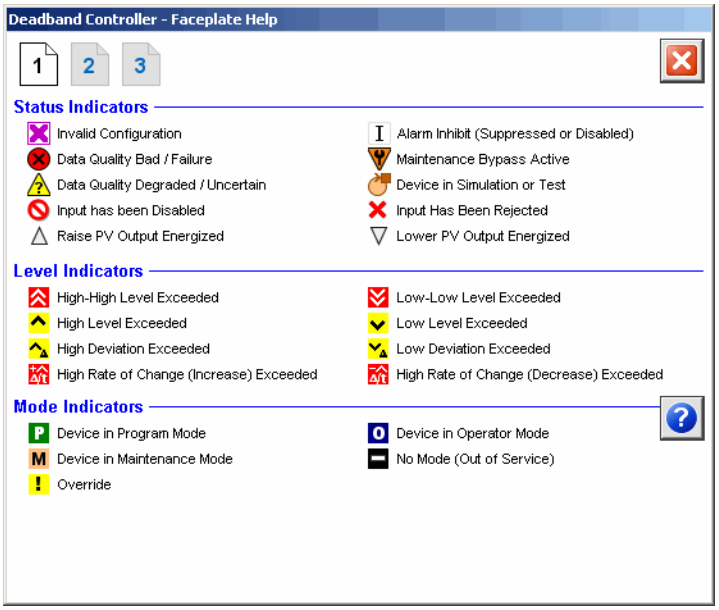
See Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Deadband Controller Faceplate Help

The Faceplate Help is divided into three pages.

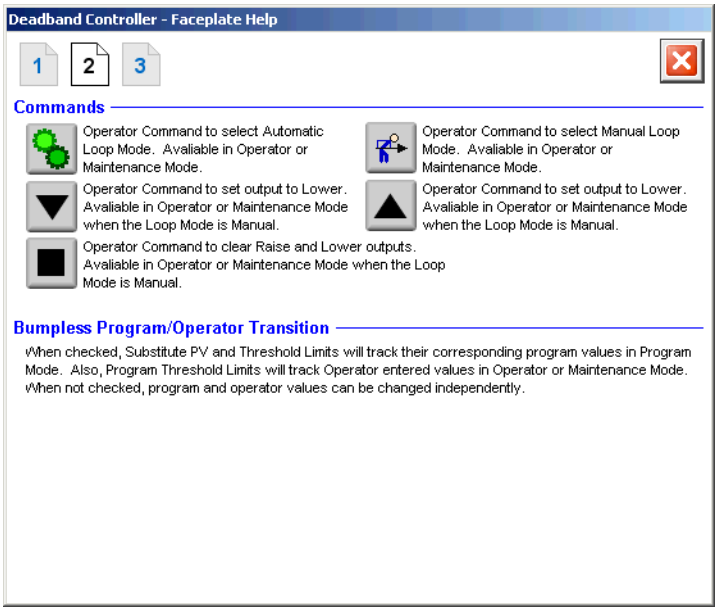
Faceplate Help Page 1

Faceplate Help page 1 defines the indicator symbols that are used.



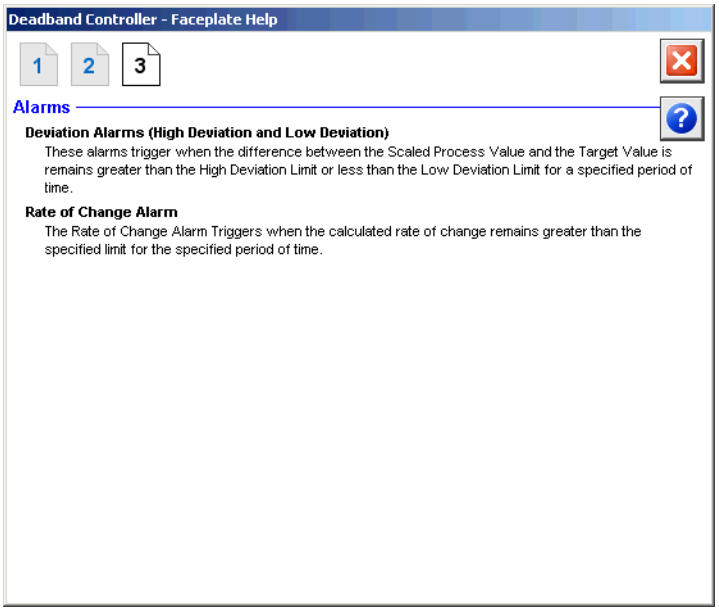
Faceplate Help Page 2

Faceplate Help page 2 shows commands and describes Bumpless Program/Operator Transition.



Faceplate Help Page 3

Faceplate Help page 3 shows the alarm conditions for P_DBC.



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