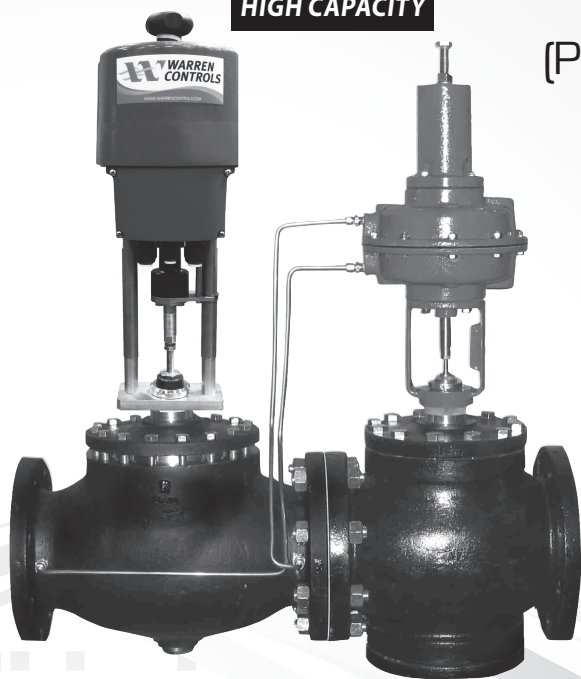


HIGH CAPACITY



SERIES PICV (Pressure Independent Control Valve)

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PICV_IOM_RevI_0721

OVERVIEW

This document covers the installation, operation and maintenance of Series PICV (Pressure Independent Control Valves). The Series PICV maximizes efficiency and energy savings by providing precise control of maximum differential temperatures across a coil or heat exchanger independent of variations in system pressure. The Series PICV consists of two functional controlling segments. The first segment is an electrically actuated control valve, capable of responding to a control signal from a controller that is not part of the PICV. The second segment is connected in series with the first, and serves to sense and regulate a preset flowing differential pressure across the control valve segment. Both segments include pressure balanced control elements of industrial quality manufactured in accordance with ISO 9001. The PICV has a rangeability of 50:1, meaning that

good control performance can be achieved when the minimum flow requirement is as low as 1/50 of the maximum flowing GPM (LPS). A wide range of sizes, materials of construction, pressure ratings and control characteristics provide flexible configuration to meet almost any specification or system requirement. The Series PICV is factory assembled, complete with sensing lines, check valve pressure taps, and actuators, and is ready for field installation as a complete unit. The Series PICV is pre-calibrated to a customer-specified set differential pressure from 2-8 PSIG (0.14-0.55 BARG), and includes a means for calibration adjustment. A separate, customer supplied, differential pressure gauge may be installed between the check valve pressure taps on the PICV to allow for monitoring of the set differential pressure.

OPERATION

One of the primary factors that influence the flow of fluid through a control valve is the amount of pressure, or differential pressure across it. At any point in valve plug travel, flow through a valve will typically increase if differential pressure is raised, and decrease if it is lowered. A change in pumping pressure can therefore produce a change in rate of flow that is not related to the system controller's output signal. With pressure independence, the amount of water flowing through a valve and the controlled load (i.e. heat exchanger coil) is more accurately controlled as a function of the control signal, and is less dependent upon varying pump pressure. Stability in the control system is enhanced when pressure independence is provided, and the control valve's installed flow characteristic more closely resembles its inherent, or constant-pressure characteristic.

The Series PICV (Pressure Independent Control Valve) consists of two functional controlling segments. The first segment is a pressure-

balanced control valve, actuated by either a high-thrust electric motor actuator or pneumatic diaphragm actuator. The electric actuator provides precise positioning of the valve closure mechanism, and responds quickly and precisely to the electronic control signals supplied to them. The second segment is a differential pressure control valve that operates independently of the control valve segment. This segment is self-powered (self-operating) and does not burden or interact with the building automation control system. By quickly raising or lowering its own resistance to flow, the differential pressure control segment of the PICV regulates and stabilizes the pressure drop across the control valve segment by absorbing unused head pressure. This compensates for changes in pumping pressure resulting from pump switching or from varying flow demands in it's own, or parallel flow paths and results in pressure independent operation.

NOTE: The maximum differential pressure across the entire PICV is approximately 2 x (Set Differential Pressure) at max flow

CONFIGURATIONS

Control Valve Size	Control Valve Flange	Control Valve Profile	Control Valve Trim Size	Control Valve Trim Mat'l	Control Valve Actuator	DPRV Size	DPRV Flange	DPRV Trim Material	DPRV Actuator
P2 2.5"	0 ANSI 125 Flanges	22 Type of Control Valve Body (Sizes P8 & P1)	F Control Valve Trim Size Full	S Stainless Steel	E029 Fail-in-Place, 24 Vac	P2 2.5"	0 ANSI 125 Flanges	DS DPRV w/ SS Trim	2L DPRV Actuator Cast Iron, w/ Low DP Spring
P3 3"	2 PN 16 Flanges			B Bronze	E031 Fail-Safe w/VMS Backup, 24 Vac	P3 3"	2 PN16 Flanges	DB DPRV w/ Brz Trim	
P4 4"			X Control Valve Trim Size Extended		E047 1010 Lbf., 5.5 Secs/In, Fail-in-Place, 115 Vac	P4 4"	Note: Must match control valve		
P5 5"					E048 1010 Lbf., 5.5 Secs/In, Fail-in-Place, 230 Vac	P5 5"			
P6 6"		23 Type of Control Valve Body (Sizes P2-P6)			E049 1010 Lbf., 5.5 Secs/In, Fail-in-Place, 24 Vac	P6 6"			2M DPRV Actuator Cast Iron, w/ Medium DP Spring
P8 8"			1 Control Valve Trim Size 1SR		E050 1010 Lbf., 5.5 Secs/In, Fail-in-Place, 24 Vac	P8 8"			
P1 10"			2 Control Valve Trim Size 2SR		E051 1010 Lbf., 5.5 Secs/In, Fail Safe, 115 Vac	P1 10"			
					E052 1010 Lbf., 5.5 Secs/In, Fail Safe, 230 Vac				
					E053 1010 Lbf., 5.5 Secs/In, Fail Safe, 24 Vac				
					E054 1010 Lbf., 5.5 Secs/In, Fail Safe, 24 Vdc				
					*E061 1798 Lbf., 35 Secs/In, 2.5" Travel, IP-67 End, Fail-In-Place, 230 Vac				
					*E062 1798 Lbf., 35 Secs/In, 2.5" Travel, IP-67 End, Fail-In-Place, 24 Vac				
					*E065 1798 Lbf., 35 Secs/In, 2.5" Travel, IP-67 End, Fail Safe, 230 Vac				
					*E066 1798 Lbf., 35 Secs/In, 2.5" Travel, IP-67 End, Fail Safe, 24 Vac				

*E061, E062, E065 used E066 exclusively on the 6" extended port PICV

VALVE BODIES

Body Material:	Cast Iron
End Connections:	ANSI 125LB FF Flanges, PN16 FF Flanges
Trim Designs:	Type 23 - Single Seat Cylinder Balanced, ANSI Class IV Leakage Type 22 and 72 - Double Seat Balanced, ANSI Class III Leakage
Trim Material:	Bronze or 300 Series Stainless Steel EPDM Seal (Type 23 w/Bronze Trim) Fluoraz Seal (Type 23 w/Stainless Steel Trim)
Fluid:	Chilled Water Typical, Water or Water/Glycol from 35 °F- 180°F (2°C - 82°C)
Trim Limits:	Stainless Steel: MAX Flowing Differential Pressure, 150 PSIG (10.3 BARG) Bronze: MAX Flowing Differential Pressure, 100 PSIG (6.9 BARG)
Packing:	Long-Life Multi-Stack EPDM Lip Packing - Water / Water-Glycol Service

Body Pressure Temperature Ratings			
Temperature		Iron Body 125 FLG & PN16	
°F	°C	PSIG	BARG
35 to 180	1.7 to 82.2	150	10.20

DPRV DOUBLE ACTING DIAPHRAGM ACTUATOR WITH SPRING ASSIST

Control Signal:	Differential Pressure from Control Valve, 2.0 to 8 PSIG (0.14 to 0.55 BARD) 150 PSIG (10.3 BARD) Max Static
Fluid:	Chilled Water Typical, Water or Water/Glycol from 35 °F- 180°F (2°C - 82°C)
Spring Pack:	Low DP Spring: Adjustable 2 to 6 PSIG (0.14-0.41 BARD) Medium DP Spring: Adjustable 5 to 8 PSIG (0.34-0.55 BARD)
Construction:	Cast Gray Iron Class G3000, epoxy coated, epoxy coated spring, SS components, Woven Buna-N, nylon reinforced.
Temperature Limits:	Ambient 32°F - 122°F (0°C - 50°C)
Mounting:	Factory Aligned, Vertical Above Centerline of Control Valve Consult factory for preconfigured alternate orientations

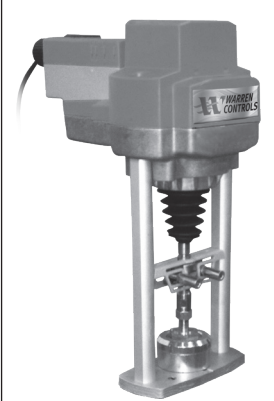
SPECIFICATIONS - ACTUATORS E029 / E031

E029 & E031: (Not Available for 58H40 and 58H43 Valve Series)



E029

Control Signal:	2-10 Vdc; (4-20 mA _{dc} with 500 ohm resistor Kit KR500-supplied with motor)
Control Action, Loss of Signal:	Increasing Signal Opens Valve, Loss of Signal Closes Valve (Default) Reversible with Switch. Can be specified when ordering.
Feedback Signal:	2-10 Vdc
Power Supply:	24 VAC/DC
Loss of Power:	E031 (E029 w/VMS-50 BCM, FAIL SAFE TO LOSS OF SIGNAL POSITION) 12W; E029 / E031 6W (w/VMS.50 BCM)
Running:	3W; E029 / E031 3.5W (w/VMS.50 BCM)
Holding:	See Configuration Tables
Timing:	Hex crank (supplied with actuator)
Construction:	Aluminum Die Cast and Plastic Housing
Locations:	NEMA Type 2 / IP54, UL enclosure type 2
Temperature Limits:	+32°F to 122°F Ambient
Mounting:	Vertical above centerline of valve
Safety Agency Listing:	CE, cUL



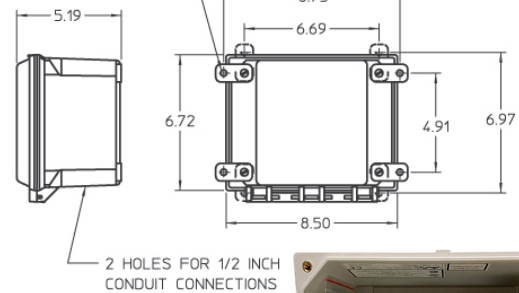
E031

(Includes: VMS-50 BCM)

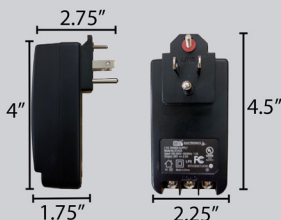
VMS-50 BCM specifications

Actuator Usage:	Models E024, E029 or E031 (<i>NOTE: E031 is an E029 Actuator with a VMS-50-BCM. This does not include the VMS-50-PS.</i>)
Power Requirement:	24 Vdc 2.0 A from Separate External; Switching Power Supply
Power Output:	24 Vdc 48W Total
Number Actuators:	One, Two or Three
Construction:	Battery w/Circuit Board and Charger
Circuit Board Protection:	Fuse Littelfuse T6.3AH250VP
Enclosure Type:	NEMA 4X, IP66, UL 4X, CSA 4X
Flame Retardant:	UL 50
Construction:	UV Stabilized Fiberglass Reinforced Polyester, Polycarbonate Hinge and Closed Cell Neoprene Gasket
Connections:	Two 1/2 IN conduit with one plug
Number Batteries:	One
Initial Charge:	2-4 hours
Output Cycle Time:	6.0 Minutes from loss of power until circuit board times out
Battery Life:	Up to 5 years ... Replacement battery model SP12-1.2 (12V1.4AH/T1)
Indication:	Red REPLACE BATTERY LED ON indicates Replace Battery (See REPLACE BATTERY LED Function)
Dimensions:	8.75" (W) x 6.97" (H) x 5.19" (D)
Mounting:	Feet for Wall Mount (4.91" x 8.75" centers)
Environmental:	Operating/ Storage: Ambient +32°F to +104°F (0 to +40°C) – due to battery
Weight:	4.15 lbs (1.9 kg)
Safety Agency Listing:	Not listed

VMS-50 BCM



VMS-50 PS SEPARATE EXTERNAL SWITCHING POWER SUPPLY



Usage:	VMS-50 BCM (VMS-50 BCM does not include VMS-50 PS)
Input:	115 VAC 50/60 Hz 1.5A
Indication:	Red LED ON indicates Input Line Voltage Present
Output:	24 Vdc 2.0 A
Input Connector:	Three Pin Input Plug
Construction:	Molded Plastic
Dimensions:	4.31" (L) x 2.16" (W) x 1.62" (H)
Environmental: Operating/ Storage:	Ambient +32°F to +113°F (0 to +45°C)/ -40°F to +185°F (-40 to +85°C)
Weight:	0.5 lbs (0.2 kg)
Safety Agency Listing:	UL listed
Safety Agency Listing:	Two 1/2 IN conduit with one plug

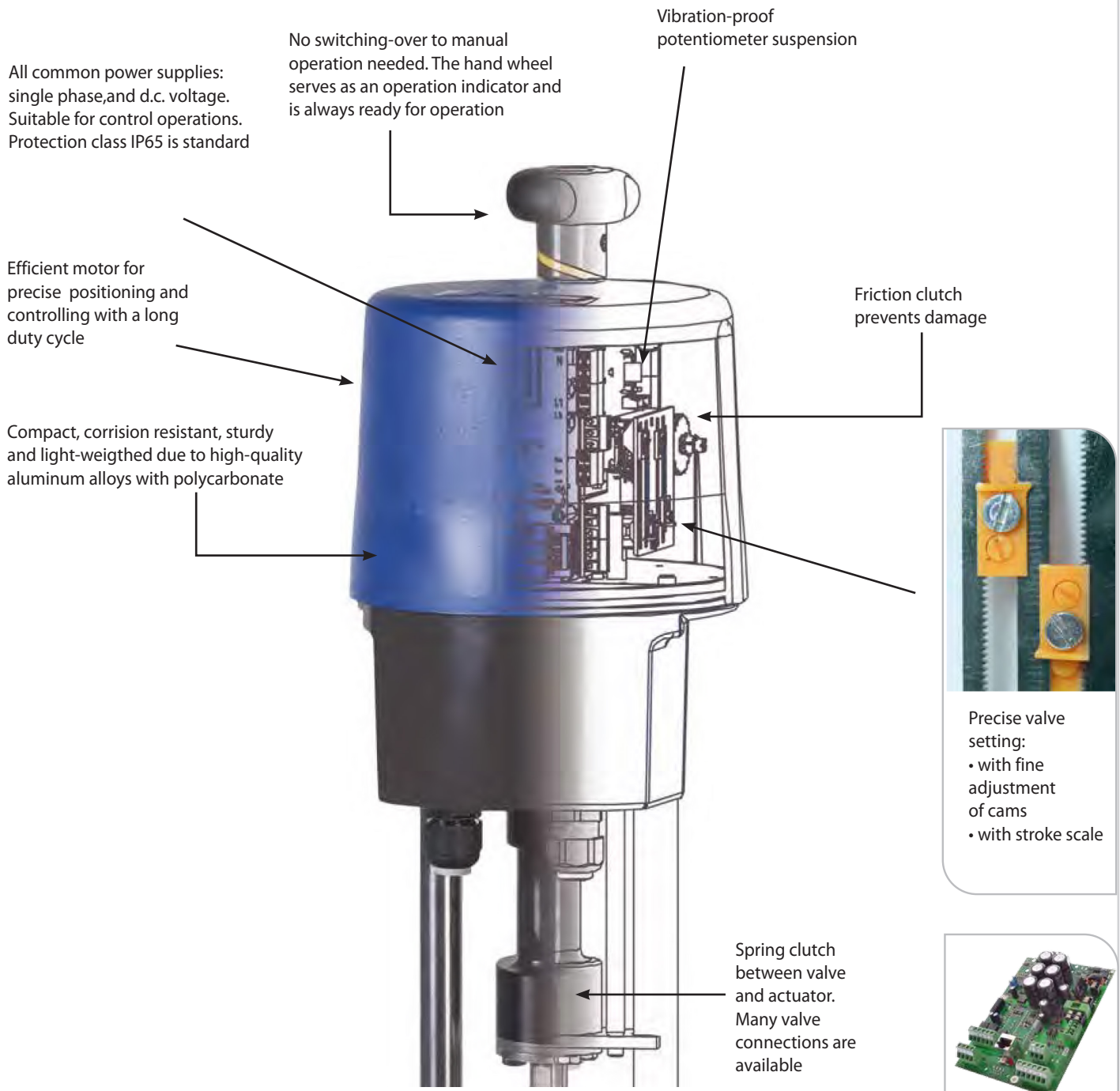


SPECIFICATIONS - ACTUATORS E047-E054/E061-E066

E047-E054/E061-E066

High Quality, Modulating, Linear, Industrial Electric Valve Actuator

Feature rich and proven design with robust construction provides reliable, trouble free service.



IP65 ENCLOSURE POLYCARBONATE COVER

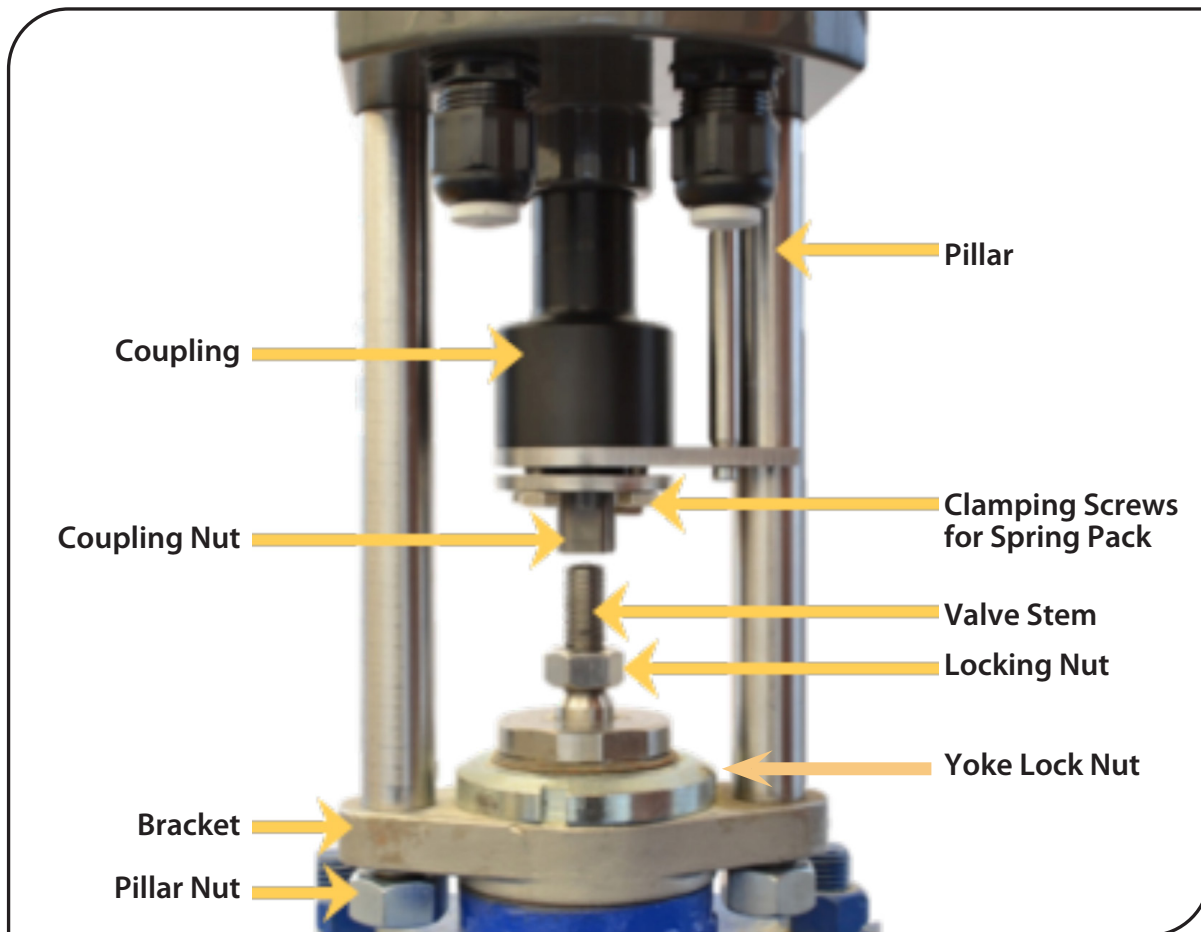
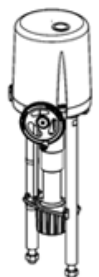
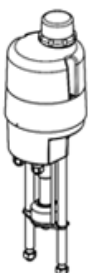
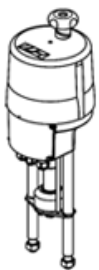
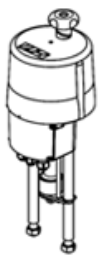
SPECIFICATIONS - ACTUATORS E047-E054/E061-E066

	MODELS	E049	E047	E048	E053	E051	E052	E062	E061	E066	E065
	UNITS										
Thrust/Force	(Lbf)	1010	1010	1010	1010	1010	1010	1798	1798	1798	1798
MAX Stroke	(inches)	1.675	1.675	1.675	1.675	1.675	1.675	2.188	2.188	2.188	2.188
Power Supply	(VAC)	24	115	230	24	115	230	24	230	24	230
Nominal Current	(Amps AC)	1.1	0.23	0.11	1.1	0.23	0.11	2.1	0.22	2.1	0.22
MAX Current	(Amps AC)	1.4	0.3	0.14	1.4	0.3	0.14	2.7	0.29	2.7	0.29
Power Consumption	(Watts)	18	19	19	18	19	19	35	38	35	38
Pillar Distance C to C (inches)	(inches)	4	4	4	4	4	4	4	4	4	4
Weight (Lbs)	(Lbs)	8	8	8	12.5	12.5	12.5	12	12	16.5	16.5
Stroke Speed	(Secs/inch)	11	11	11	11	11	11	36	36	36	36
Approximate Height	(inches)	18.9	18.9	18.9	18.9	18.9	18.9	23	23	23	23
Approximate clearance above to remove cover	(inches)	4	4	4	4	4	4	4.8	4.8	4.8	4.8
Fail-Mode, Loss of Power		Fail-In-Place	Fail-In-Place	Fail-In-Place	Fail-Safe	Fail-Safe	Fail-Safe	Fail-In-Place	Fail-In-Place	Fail-Safe	Fail-Safe
Enclosure Rating		IP-67	IP-67	IP-67	IP-67	IP-67	IP-67	IP-67	IP-67	IP-67	IP-67
Cover Material		Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

GLOBAL SPECIFICATIONS For Actuator Models: E047 - E054 / E061 - E066

Manual Override	Hand-knob (For use when unpowered)
Motor Protection	Electronic motor current monitoring with safety cutoff
Duty Cycle as per IEC 60034-1,8	S2 30min S4 50% ED @ 25 °C
Permitted Ambient Temperature	-20 °C to +60 °C
Binary Control	24 Vac to 230 Vac, for ON/OFF control (min. duration of pulse 1s)
Internal Fault Monitoring	Torque, set value, temperature, power supply, positioning deviation etc., adjustable
Overvoltage Category	II
Automatic Startup	Recognizing the end position(s) and autoscaling set and feedback values
Diagnostics Function	Stores cumulated operation data (motor and total running time, number of motor starts) and data sets of current values (set value, feedback value, torque, temperature and error messages)
Communication Interface	Connecting to a USB port and a software, allows data reading and parametrization
Control Signal & Feedback	Factory programmable, 0 (4) .. 20 mA or 0 (2) .. 10 Vdc, split range operation as well
Valve Positioner Function	Integrated positioner, deadband adjustable from 0.5 .. 5%, shut-off minimum
Mounting Position	Any position, except below horizontal
Conduit Entries	2 pcs. M20 x 1.5, 1 pc. M16 x 1.5
Fault Indication Relay	Potential-free opening contact provides a freely definable collective fault signal, programmable by a variety of combined faults and conditions
Additional Options	Local Controls Station, Heating Resistor, Limit Switches, Communications Options

E047-E066 ACTUATOR PART DESIGNATIONS



SYMBOLS AND SAFETY



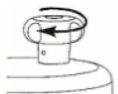
Please ensure that the detailed operating instructions and the chapter on "Safety" in particular have been read and understood by all personnel involved in the installation, start-up, operation, maintenance and repair of the actuators.



Beware of mechanical hazards due to electrically powered actuator components! With the actuator powered electrically, operating the unit holds the danger of crushing your finger!



Caution! During the installation of the actuator on the valve, the unit must not be powered electrically. Disconnect voltage from the actuator before maintenance and adjustment work.



During adjustment work, the actuator must be operated by means of the handwheel only. Do not operate electrically!
DO NOT FULLY EXTEND.

E047-E066 ACTUATOR MOUNTING

BEFORE START WORKING: SAFETY REGULATIONS:

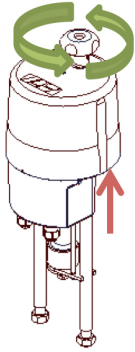


- Disconnect mains!
- Prevent reconnection!
- Test for absence of harmful voltages!
- Cover or close nearby live parts!

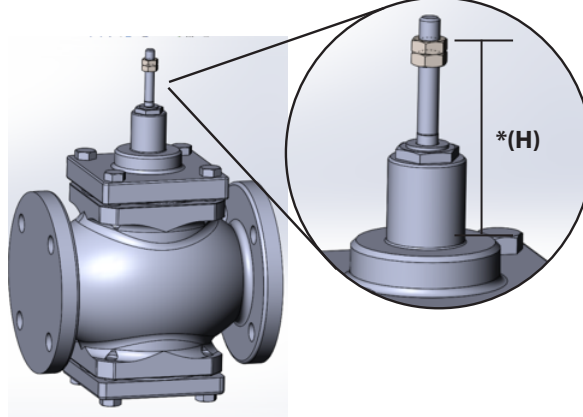
When mounting an actuator on a valve, always use the hand wheel! Motor operation during mounting may cause injuries and damage to actuator and valve!

FOR MOUNTING THE ACTUATOR, THE VALVE MUST BE IN FULLY CLOSED POSITION!

Mounting

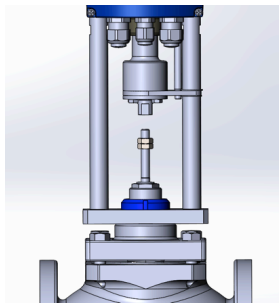


- 1:** Drive coupling upwards by hand

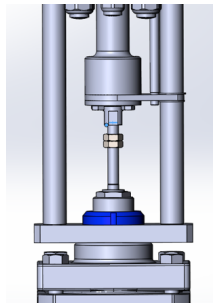


- 2:** Position Jam nuts as per reference drawing and lock nuts together.

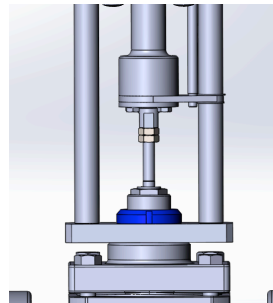
Valve	Height *(H)	Number of Jam Nuts
PICV	2.67	2



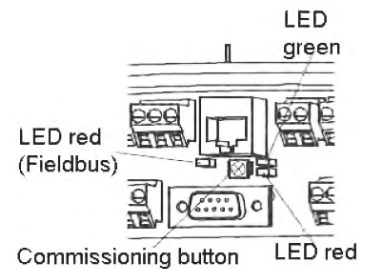
- 3:** Drop Actuator onto Valve assembly and tighten lock nut.



- 4:** Extend Actuator by hand and lift valve stem to meet Actuator coupling.



- 5:** Thread the valve stem into the coupling until the jam nuts meet the coupling. Lock the upper jam nut against the coupling. Lock the second jam nut against the upper nut.



- 6:** Proceed **ONLY AFTER** following set-up and wiring on Pages 4 & 5.

Use the commission function to complete the actuator mounting, **detailed on the bottom of Page 5.**

GENERAL SAFETY

ILEA actuators are built with state of the art technology and are safe to operate with commonly accepted electrical safety precautions. ILEA Actuators can also produce significant linear forces and should only be operated when connected to a control valve unless otherwise instructed. Fingers should not be anywhere near the moving parts of the valve and actuator assembly while power is connected.

Operators should be trained, read the user manual and have a good understand of the actuator's function and operating capabilities.

The wiring termination should be verified before commissioning commences.

If the actuator was purchased together with a control valve the actuator will be precalibrated to the valve's stroke and there will be no other requirement than applying the correct power supply and control signal.

The standard control signal is 4 – 20 mA where a 2-way valve is closed at 4mA and fully open at 20 mA. This standard configuration would be depicted on the product label for

E047-E066 SET UP & GENERAL SAFETY

'Signal' as 20-4 CL, to indicate it is a 4 – 20 mA signal and CLOSED at 4 ma. The actuator should be preprogrammed for control action and which signal is designated. Switching from a milliamp signal to a voltage signal is simply a matter of wiring termination. Switching whether the control signal is ZERO based or not, or the control action must be done in the software set up. This can be done on the job site as necessary with the programming umbilical cord option along with a laptop computer that has a USB connection. If this is required, contact the Warren Controls factory.

CONTROL SIGNAL AND POSITION FEEDBACK CHOICES AND LABEL DESIGNATIONS.

SIGNAL	2-WAY VALVE CLOSED	LABEL DESIGNATION	3-WAY VALVE LOWER PORT CLOSED	LABEL DESIGNATION
4 – 20 mA	@ 4 mA	20 – 4 mA CL	@ 4 mA	20 – 4 mA DN
4 – 20 mA	@ 20 mA	4 – 20 mA CL	@ 20 mA	4 – 20 mA DN
0 – 20 mA	@ 0 mA	20 – 0 mA CL	@ 0 mA	20 – 0 mA DN
0 – 20 mA	@ 20 mA	0 – 20 mA CL	@ 20 mA	0 – 20 mA DN
2 – 10 Vdc	@ 2 Vdc	10 – 2 Vdc CL	@ 2 Vdc	10 – 2 Vdc DN
2 – 10 Vdc	@ 10 Vdc	2 – 10 Vdc CL	@ 10 Vdc	2 – 10 Vdc DN
0 – 10 Vdc	@ 0 Vdc	10 – 0 Vdc CL	@ 0 Vdc	10 – 0 Vdc DN
0 – 10 Vdc	@ 10 Vdc	0 – 10 Vdc CL	@ 10 Vdc	0 – 10 Vdc DN

With power applied, preferably, use a signal calibrator to verify that the valve is fully stroking from one end to the other as depicted by the travel indicator on the side of the actuator mounting Pillar and with the proper control action. Alternately the process controller could be directly connected to test if it has a 'Manual-Mode' of operation where the controllers output can be manually adjusted from 0% - 100%.

IF THE ACTUATOR IS ONE WITH A DEFINED 'FAIL-SAFE' DIRECTION ,THAT CAN BE VERIFIED BY:

1. Using the signal calibrator to move the actuator position to mid-stroke.
2. Safely disconnecting power at the power breaker switch and observing the actuator going to its fail-safe position.

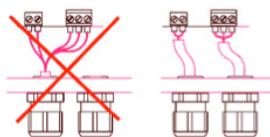
Once these steps are verified you may proceed to commissioning the control valve. If either of these tests did not perform as expected, then contact the Warren Controls factory for further troubleshooting steps.

BASIC SAFETY NOTES:

- Before opening the actuator cover, ensure that the electrical mains supply voltage is disconnected.
- If operating the actuator with the cover removed for troubleshooting reasons make sure the wiring terminations are clearly understood. Contract the Warren Controls factory for further troubleshooting steps as may be necessary.
- Do NOT attempt to auto-stroke the actuator when the actuator is not connected to a control valve as it will not function.
- Do NOT adjust the Manual Override completely downward when the actuator is not connected to a control valve as this could permanently damage the actuator.
- If the actuator is removed from the control valve, upon reinstallation the auto-calibration procedure must be performed.

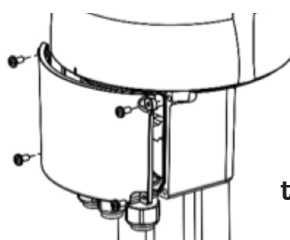


Electric installation as well as over-current and over-voltage protection devices must be conform to the standard DIN IEC 60364-4-41, protection class I resp. protection class III (24VAC/24VDC) and also to the standard DIN IEC 60364-4-44 according to the applied over-voltage category of the actuator.

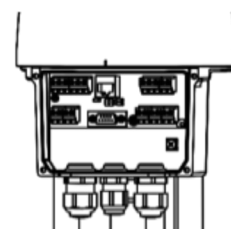


Please protect all of the power supply and control cables in front of the terminals mechanically by using suitable measures against unintentional loosening.

Never install the power supply and the control cables together in one conduit but instead please always use two different conduit.



Remove connection terminal cover



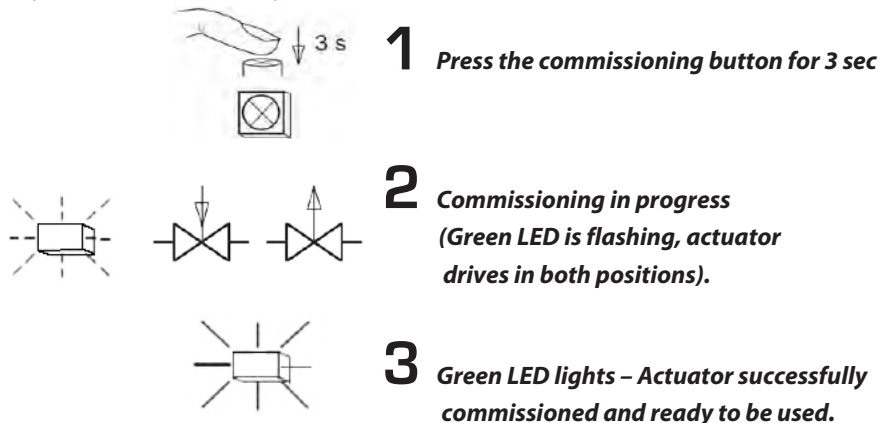
COMMISSIONING

The actuator can only be commissioned when correctly mounted to a valve and with at least one cut off set to "force/torque.



CAUTION! ELECTRICAL OPERATION OF THE ACTUATOR IS ALLOWED ONLY AFTER MOUNTING TO A VALVE!

(Only available if at least one of the cut-offs is set to be "by force/torque" or "by position automatically".)



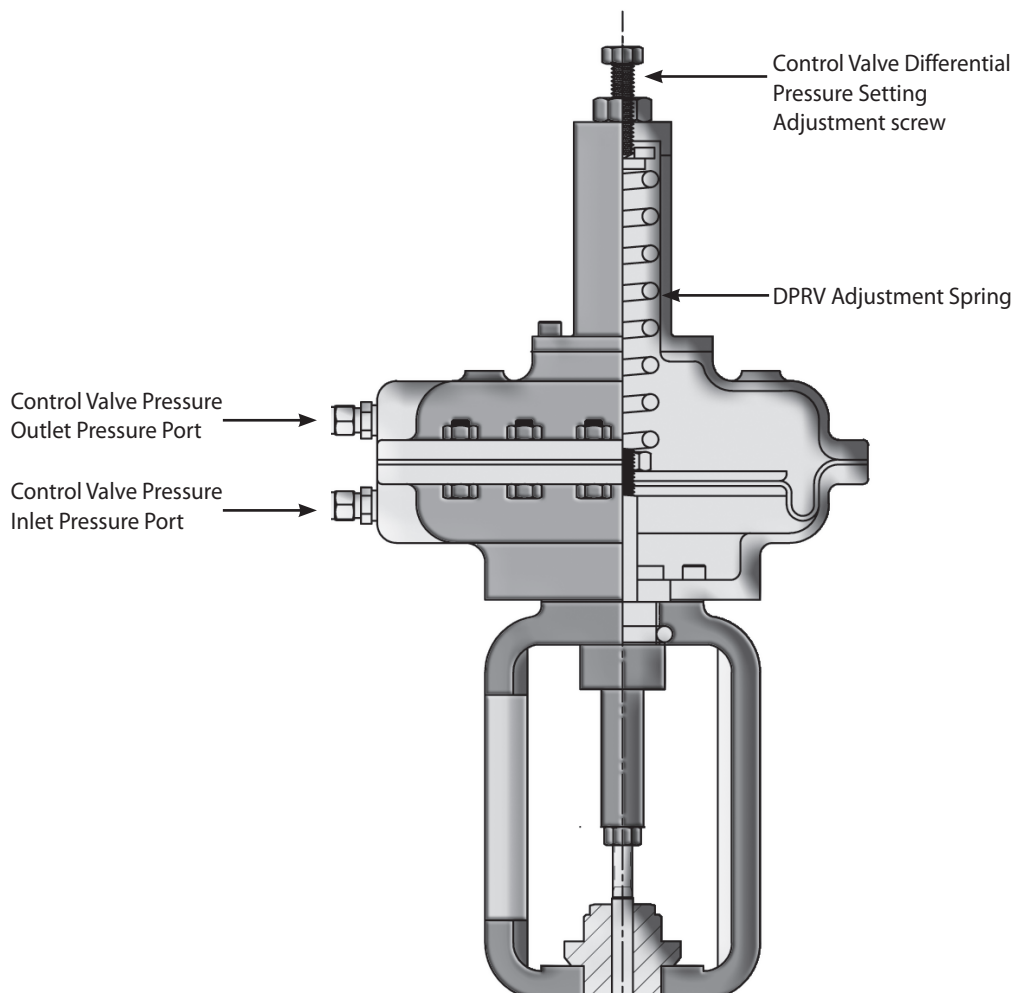
E047-E066 TRACING FAULTS CHARTS

Red LED				Green LED						
Glowing permanently	Flashing quickly	Flashing slowly	Off	Glowing permanently	Flashing quickly	Flashing slowly	Off			
								Status	Probable reasons	Possible remedy
			x				x	Actuator does not respond, both LEDs are off	1) No supply voltage applied 2) The applied voltage does not match the actuator voltage on the tag plate	1) Check mains supply 2) Apply correct supply voltage
			x	x				Actuator does not drive the full stroke	1) Actuator not correctly commissioned 2) Too small stroke programmed (in mode "one position-dependent cut-off")	1) Repeat commissioning 2) Check valve stroke parameters -> see instructions AMS-PSCS
			x	x				Actuator does not close the valve properly	1) Actuator not correctly commissioned 2) Actuator closing force/torque too low	1) Repeat commissioning 2) Check actuator selection
			x	x				Actuator is in normal operating condition, but does not respond to set-value changes	1) Fixed digital set-value is activated 2) Actuator is configured to work with process controller	1) Check set-value parameters -> see instructions AMS-PSCS 2) Connect process sensor controller
			x	x				Actuator position does not correspond to set-value input	A non-linear valve curve has been parameterised	Verify parameterised characteristic -> see instructions AMS-PSCS
								Operating conditions	Probable reasons	Possible remedy
			x	x				Normal operating condition		
			x		x			Actuator in commissioning mode		Commissioning mode will be left automatically after completion
			x			x		Actuator not commissioned		Depending on the type of cut-offs, the actuator has to be commissioned either automatically or manually
								Faults within the actuator's environment	Probable reasons	Possible remedy
		x		x				Too high torque has been encountered within the valve stroke	1) Actuator not correctly commissioned to the valve 2) Mechanical block within the stroke path 3) Improper selection of the actuator	1) Repeat commissioning 2) Check valve and actuator for unobstructed running 3) Check actuator selection
		x			x			1) No proper process feedback (only in combination with PSIC) 2+3) Maximum control range exceeds (only in combination with PSIC)	1) Process feedback wrongly or not at all connected 2) Process feedback outside od adjusted range 3) No process sensor signal available	1) Apply the correct process feedback signal and check polarity 2) Ensure the correct process feedback range 3) Check the process sensor and its supply voltage

SPECIFICATIONS - DPRV DOUBLE ACTING DIAPHRAGM ACTUATOR

DPRV Double Acting Diaphragm Actuator with Spring Assist (Series 2)

Control Signal:	Differential Pressure from Control Valve, 2 to 8 PSIG (0.14 to 0.55 BARD) 150 PSIG (10.3 BARD) Max Static
Fluid:	Chilled Water Typical, Water or Water/Glycol from 35 °F- 180°F (2°C - 82°C)
Spring Pack:	Low DP Spring: Adjustable 2 to 6 PSIG (0.14-0.41 BARD) Medium DP Spring: Adjustable 5 to 8 PSIG (0.34-0.55 BARD)
Construction:	Cast Gray Iron Class G3000, epoxy coated, epoxy coated spring, SS components, Buna-N nylon reinforced diaphragm.
Temperature Limits:	Ambient 32°F - 122°F (0°C - 50°C)
Mounting:	Factory Aligned, Vertical Above Centerline of Control Valve Consult factory for preconfigured alternate orientations



FLANGE	PRODUCT MODEL (where 'x' is a configurable option)	LOW DP SPRING PERFORMANCE	MEDIUM DP SPRING PERFORMANCE																																
ANSI125	P2023Fx-xxxx-P20Dx-2x 2 1/2" Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>2.0</td><td>3.1</td><td>4.2</td><td>5.3</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>92</td><td>114</td><td>133</td><td>150</td></tr> </table>	Set Differential Pressure (PSI)				2.0	3.1	4.2	5.3	Maximum flow (GPM)				92	114	133	150	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>5.7</td><td>6.5</td><td>7.2</td><td>8.0</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>155</td><td>166</td><td>174</td><td>184</td></tr> </table>	Set Differential Pressure (PSI)				5.7	6.5	7.2	8.0	Maximum flow (GPM)				155	166	174	184
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ANSI125	P10222S-xxxx-P10Dx-2x 10" 2 Sizes Reduced Port SS Trim Only	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>2.0</td><td>3.1</td><td>4.2</td><td>5.3</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>1039</td><td>1294</td><td>1506</td><td>1692</td></tr> </table>	Set Differential Pressure (PSI)				2.0	3.1	4.2	5.3	Maximum flow (GPM)				1039	1294	1506	1692	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>5.7</td><td>6.5</td><td>7.2</td><td>8.0</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>1755</td><td>1874</td><td>1972</td><td>2079</td></tr> </table>	Set Differential Pressure (PSI)				5.7	6.5	7.2	8.0	Maximum flow (GPM)				1755	1874	1972	2079
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1755	1874	1972	2079																																
ANSI125	P10221S-xxxx-P10Dx-2x 10" 1 Size Reduced Port SS Trim Only	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>2.0</td><td>3.1</td><td>4.2</td><td>5.3</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>1188</td><td>1479</td><td>1721</td><td>1934</td></tr> </table>	Set Differential Pressure (PSI)				2.0	3.1	4.2	5.3	Maximum flow (GPM)				1188	1479	1721	1934	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>5.7</td><td>6.5</td><td>7.2</td><td>8.0</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>2005</td><td>2142</td><td>2254</td><td>2376</td></tr> </table>	Set Differential Pressure (PSI)				5.7	6.5	7.2	8.0	Maximum flow (GPM)				2005	2142	2254	2376
Set Differential Pressure (PSI)																																			
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FLANGE	PRODUCT MODEL (where 'x' is a configurable option)	LOW DP SPRING PERFORMANCE	MEDIUM DP SPRING PERFORMANCE																																
ANSI125	P1022Fx-xxxx-P10Dx-2x 10" Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>2.0</td><td>3.1</td><td>4.2</td><td>5.3</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>1358</td><td>1690</td><td>1967</td><td>2210</td></tr> </table>	Set Differential Pressure (PSI)				2.0	3.1	4.2	5.3	Maximum flow (GPM)				1358	1690	1967	2210	<table> <tr><th colspan="4">Set Differential Pressure (PSI)</th></tr> <tr><td>5.7</td><td>6.5</td><td>7.2</td><td>8.0</td></tr> <tr><th colspan="4">Maximum flow (GPM)</th></tr> <tr><td>2292</td><td>2448</td><td>2576</td><td>2715</td></tr> </table>	Set Differential Pressure (PSI)				5.7	6.5	7.2	8.0	Maximum flow (GPM)				2292	2448	2576	2715
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FLANGE	PRODUCT MODEL (where 'x' is a configurable option)	LOW DP SPRING PERFORMANCE	MEDIUM DP SPRING PERFORMANCE																																
PN16	P2223Fx-xxxx-P22Dx-2x DN65 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>5.8</td><td>7.2</td><td>8.4</td><td>9.5</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				5.8	7.2	8.4	9.5	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>9.8</td><td>10.5</td><td>11.0</td><td>11.6</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				9.8	10.5	11.0	11.6
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PN16	P32231x-xxxx-P32Dx-2x DN80 1 Size Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>6.7</td><td>8.3</td><td>9.7</td><td>11.0</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				6.7	8.3	9.7	11.0	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>11.3</td><td>12.1</td><td>12.7</td><td>13.4</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				11.3	12.1	12.7	13.4
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PN16	P3223Fx-xxxx-P32Dx-2x DN80 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>8.1</td><td>9.9</td><td>11.6</td><td>13.2</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				8.1	9.9	11.6	13.2	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>13.5</td><td>14.5</td><td>15.3</td><td>16.0</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				13.5	14.5	15.3	16.0
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Maximum flow (LPS)																																			
13.5	14.5	15.3	16.0																																
PN16	P42232x-xxxx-P42Dx-2x DN100 2 Sizes Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>10.5</td><td>12.9</td><td>15.1</td><td>17.1</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				10.5	12.9	15.1	17.1	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>17.6</td><td>18.9</td><td>19.9</td><td>20.8</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				17.6	18.9	19.9	20.8
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PN16	P42231x-xxxx-P42Dx-2x DN100 1 Size Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>12.9</td><td>15.9</td><td>18.6</td><td>21.0</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				12.9	15.9	18.6	21.0	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>21.6</td><td>23.2</td><td>24.5</td><td>25.7</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				21.6	23.2	24.5	25.7
Set Differential Pressure (BAR)																																			
0.14	0.21	0.29	0.37																																
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0.39	0.45	0.5	0.55																																
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21.6	23.2	24.5	25.7																																
PN16	P4223Fx-xxxx-P42Dx-2x DN100 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>15.3</td><td>18.7</td><td>22.0</td><td>24.8</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				15.3	18.7	22.0	24.8	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>25.5</td><td>27.4</td><td>28.9</td><td>30.3</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				25.5	27.4	28.9	30.3
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0.39	0.45	0.5	0.55																																
Maximum flow (LPS)																																			
25.5	27.4	28.9	30.3																																
PN16	P52232x-xxxx-P52Dx-2x DN125 2 Sizes Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>18.2</td><td>22.4</td><td>26.3</td><td>29.7</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				18.2	22.4	26.3	29.7	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>30.5</td><td>32.7</td><td>34.5</td><td>36.2</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				30.5	32.7	34.5	36.2
Set Differential Pressure (BAR)																																			
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FLANGE	PRODUCT MODEL (where 'x' is a configurable option)	LOW DP SPRING PERFORMANCE	MEDIUM DP SPRING PERFORMANCE																																
PN16	P52231x-xxxx-P52Dx-2x DN125 1 Size Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>21.3</td><td>26.1</td><td>30.7</td><td>34.6</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				21.3	26.1	30.7	34.6	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>35.6</td><td>38.2</td><td>40.3</td><td>42.2</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				35.6	38.2	40.3	42.2
Set Differential Pressure (BAR)																																			
0.14	0.21	0.29	0.37																																
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21.3	26.1	30.7	34.6																																
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0.39	0.45	0.5	0.55																																
Maximum flow (LPS)																																			
35.6	38.2	40.3	42.2																																
PN16	P5223Fx-xxxx-P52Dx-2x DN125 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>24.3</td><td>29.7</td><td>34.9</td><td>39.5</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				24.3	29.7	34.9	39.5	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>40.5</td><td>43.5</td><td>45.9</td><td>48.1</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				40.5	43.5	45.9	48.1
Set Differential Pressure (BAR)																																			
0.14	0.21	0.29	0.37																																
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24.3	29.7	34.9	39.5																																
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0.39	0.45	0.5	0.55																																
Maximum flow (LPS)																																			
40.5	43.5	45.9	48.1																																
PN16	P62232x-xxxx-P62Dx-2x DN150 2 Sizes Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>24.7</td><td>30.3</td><td>35.6</td><td>40.2</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				24.7	30.3	35.6	40.2	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>41.3</td><td>44.3</td><td>46.7</td><td>49.0</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				41.3	44.3	46.7	49.0
Set Differential Pressure (BAR)																																			
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24.7	30.3	35.6	40.2																																
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41.3	44.3	46.7	49.0																																
PN16	P62231x-xxxx-P62Dx-2x DN150 1 Size Reduced Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>28.3</td><td>34.7</td><td>40.8</td><td>46.0</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				28.3	34.7	40.8	46.0	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>47.3</td><td>51</td><td>54</td><td>56</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				47.3	51	54	56
Set Differential Pressure (BAR)																																			
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PN16	P6223Fx-xxxx-P62Dx-2x DN150 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>32.4</td><td>39.6</td><td>46.6</td><td>53</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				32.4	39.6	46.6	53	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>54</td><td>58</td><td>61</td><td>64</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				54	58	61	64
Set Differential Pressure (BAR)																																			
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0.39	0.45	0.5	0.55																																
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PN16	P6223Xx-xxxx-P62Dx-2x DN150 Extended Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>37.8</td><td>46.2</td><td>54</td><td>61</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				37.8	46.2	54	61	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>63</td><td>68</td><td>71</td><td>75</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				63	68	71	75
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PN16	P82222S-xxxx-P82Dx-2x DN200 2 Sizes Reduced Port SS Trim Only	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>46.7</td><td>57</td><td>67</td><td>76</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				46.7	57	67	76	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>78</td><td>84</td><td>88</td><td>93</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				78	84	88	93
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PN16	P82221S-xxxx-P82Dx-2x DN200 1 Size Reduced Port SS Trim Only	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>53</td><td>66</td><td>77</td><td>87</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				53	66	77	87	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>89</td><td>96</td><td>101</td><td>106</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				89	96	101	106
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PN16	P8223Fx-E02x-P82Dx-2x DN200 Standard Port	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>61</td><td>75</td><td>88</td><td>99</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				61	75	88	99	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>102</td><td>110</td><td>116</td><td>121</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				102	110	116	121
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FLANGE	PRODUCT MODEL (where 'x' is a configurable option)	LOW DP SPRING PERFORMANCE	MEDIUM DP SPRING PERFORMANCE																																
PN16	P1222S-xxxx-P12Dx-2x DN250 2 Sizes Reduced Port SS Trim Only	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.14</td><td>0.21</td><td>0.29</td><td>0.37</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>66</td><td>81</td><td>95</td><td>107</td></tr> </table>	Set Differential Pressure (BAR)				0.14	0.21	0.29	0.37	Maximum flow (LPS)				66	81	95	107	<table> <tr><th colspan="4">Set Differential Pressure (BAR)</th></tr> <tr><td>0.39</td><td>0.45</td><td>0.5</td><td>0.55</td></tr> <tr><th colspan="4">Maximum flow (LPS)</th></tr> <tr><td>110</td><td>118</td><td>125</td><td>131</td></tr> </table>	Set Differential Pressure (BAR)				0.39	0.45	0.5	0.55	Maximum flow (LPS)				110	118	125	131
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INSTALLATION

Recommended Piping: ANSI 125 Flanges should mate with piping with 125 Lb or 150 Lb Flat Faced Flanges.

Per ISA Recommended Piping Practices. Control valves perform best with a reasonable amount of upstream and downstream straight pipe prior to elbows and strainers. The general specification for this is 16 pipe diameters upstream of straight pipe and 5 pipe diameters downstream of straight pipe as minimums. However, this is a broad specification covering all pipe diameters and velocities. Many applications do not have this kind of space. While more length of straight pipe is desirable, Warren Controls has produced a table of minimum pipe diameters for use on our PICV. Failure to follow these guidelines may lead to noticeable vibrations or noise for excessive turbulence in some applications with significant head pressure. In the unlikely event of excessive noise or vibration, other remedies like special low noise trim may be available but at the expense of the user or installer when not following installation guidelines.

**PICV Minimum Lengths of
Straight Pipe**

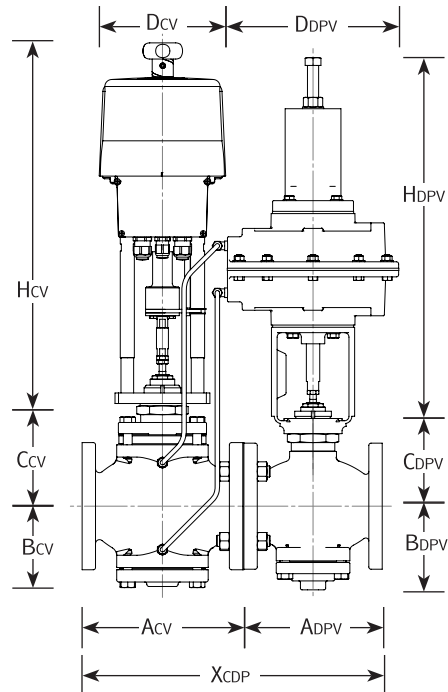
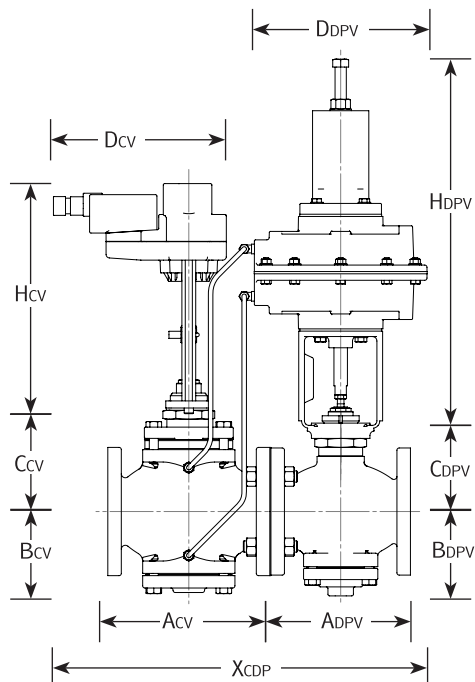
PICV Size	Upstream Straight Pipe	Downstream Straight Pip
2 ½" (DN65)	16" (40.64 cm)	12" (30.48 cm)
3" (DN80)	16" (40.64 cm)	12" (30.48 cm)
4" (DN100)	16" (40.64 cm)	12" (30.48 cm)
5" (DN125)	24" (60.96 cm)	12" (30.48 cm)
6" (DN150)	32" (81.28 cm)	12" (30.48 cm)
8" (DN200)	36" (91.44 cm)	14" (35.56 cm)
10" (DN250)	40" (101.6 cm)	16" (40.64 cm)

The above tables are recommended minimum lengths for good and stable performance. Wherever possible, longer runs of straight pipe should be used for optimal performance and stability.

- Be sure that the flow medium, ambient temperature and the selected location will not exceed the maximum temperature of the PICV, actuator, or accessories. Information can be found on the nameplate and product specifications regarding these limits.
- Check PICV for any damage due to improper storage or transportation. Immediately notify your sales organization of any damaged goods upon receipt. Do not attempt to move or disturb them further so photos may be taken. If the shipping container is noticeably damaged, refuse receipt as the shipping company should be held liable, until a shipping representative is available to take photos.
- Verify that the PICV is visually in good working order – not bent or cracked.
- Follow good piping practices. Install a bypass around the PICV. Install stop valves in inlet and outlet piping to provide means to isolate PICV.
- THE PICV SHOULD BE INSTALLED AS A UNIT. THE SEGMENTS SHOULD **NOT** BE SEPARATED FOR INSTALLATION.
- Carefully remove the PICV from shipping crate with a portable hoist or crane. The PICV is too heavy for one or even two people to lift and hand-install depending on size. The Crane or Hoist should use a strap or chain cradle around the central flanges of the two valve assemblies to raise and maneuver the PICV into position at the pipe flanges. Efforts should be made to avoid damaging the sensing lines and actuators during this installation procedure.

- Protect PICV and downstream equipment with an upstream self-cleaning strainer.
- For maximum efficiency and minimum wear install PICV **IN VERTICAL POSITION** with the stems **POINTING UPWARD.**
- Be sure to leave **6 INCHES (15.24 CM) OF CLEARANCE** above the actuators to allow for actuator removal.
- Before installing, be sure PICV and piping are **CLEAN INSIDE** and **FREE OF SCALE**, chips, welding spatter, and foreign material. Thoroughly blow out or flush pipe lines.
- The PICV must be installed with the fluid flow in the direction of the arrow on the flow arrow plate.
- Pipes must be aligned squarely with the PICV at each connection.
- Tighten flange bolts evenly to prevent excessive stress and the possibility of cracking. If mating flanges are raised faced they must be machined flat.
- The PICV and accessories (if so equipped) are assembled, tested, and calibrated at the factory as a unit. The nameplate specifies set-up parameters used.
- Supply air or power, instrument signal, and accessories should be connected to ports or terminals as indicated on the PICV.
- Verification and tuning of the set differential pressure may be required under actual operating conditions.

DIMENSIONS - PICV SIZES: 2 1/2-4 IN



Control Valve (Left)

MODEL LISTING	ACTUATOR	SIZE	Acv	Bcv	Ccv	Dcv	Hcv
P2023xx-E0xx-P20Dx-xx	E04x / E05x	2 1/2	9 in	4-3/4 in	5-3/4 in	7-1/8 in	20-1/4 in
P2023xx-E0xx-P20Dx-xx	E029 / E031	2 1/2	9 in	4-3/4 in	5-3/4 in	7-1/8 in	10-7/8 in
P3023xx-E0xx-P30Dx-xx	E04x / E05x	3	10 in	5-3/8 in	6-5/8 in	7-1/8 in	20-1/4 in
P3023xx-E0xx-P30Dx-xx	E029 / E031	3	10 in	5-3/8 in	6-5/8 in	7-1/8 in	10-7/8 in
P4023xx-E0xx-P40Dx-xx	E04x / E05x	4	13 in	6-3/8 in	7-3/4 in	7-1/8 in	20-1/4 in
P4023xx-E0xx-P40Dx-xx	E029 / E031	4	13 in	6-3/8 in	7-3/4 in	7-1/8 in	10-7/8 in

Acv +/- 1/16 in (0.16 cm) All other dimensions are maximum

Allow 6 in (15.24 cm) above actuator for removal service

CONVERSION
inches X 2.54= cm

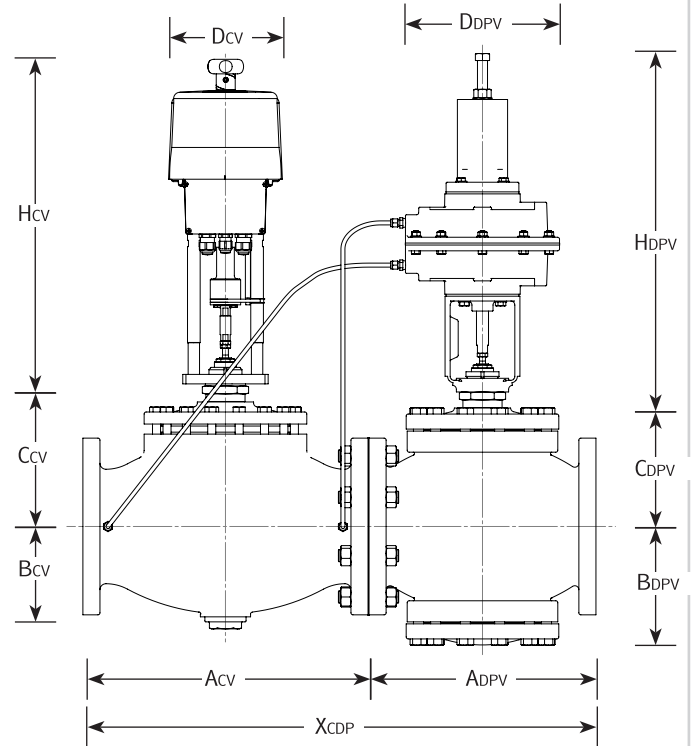
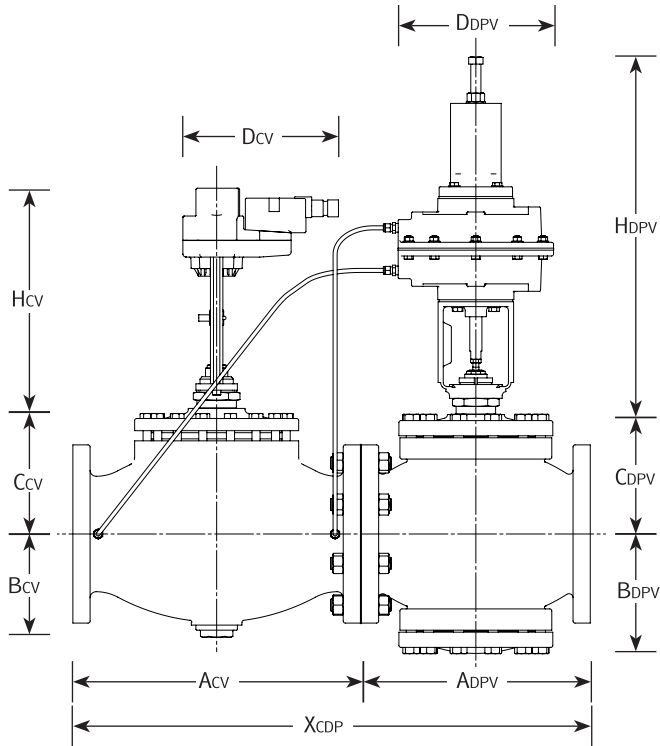
DIFFERENTIAL PRESSURE VALVE (RIGHT)

MODEL LISTING	ACTUATOR	SIZE	Adpv	Bdpv	Ccpv	Ddpv	Hdpv	Total combined*
P2023xx-E0xx-P20Dx-2L	E04x / E05x	2 1/2	7-3/4 in	4-7/8 in	4-1/8 in	9-3/4 in	22-1/8 in	16-13/16 in
P2023xx-E0xx-P20Dx-2M	E04x / E05x	2 1/2	7-3/4 in	4-7/8 in	4-1/8 in	9-3/4 in	26-3/4 in	16-13/16 in
P2023xx-E0xx-P20Dx-2L	E029 / E031	2 1/2	7-3/4 in	4-7/8 in	4-1/8 in	9-3/4 in	22-1/8 in	16-13/16 in
P2023xx-E0xx-P20Dx-2M	E029 / E031	2 1/2	7-3/4 in	4-7/8 in	4-1/8 in	9-3/4 in	26-3/4 in	16-13/16 in
P3023xx-E0xx-P30Dx-2L	E04x / E05x	3	9 in	5-1/8 in	4-3/8 in	9-3/4 in	22-1/8 in	19-1/16 in
P3023xx-E0xx-P30Dx-2M	E04x / E05x	3	9 in	5-1/8 in	4-3/8 in	9-3/4 in	26-3/4 in	19-1/16 in
P3023xx-E0xx-P30Dx-2L	E029 / E031	3	9 in	5-1/8 in	4-3/8 in	9-3/4 in	22-1/8 in	19-1/16 in
P3023xx-E0xx-P30Dx-2M	E029 / E031	3	9 in	5-1/8 in	4-3/8 in	9-3/4 in	26-3/4 in	19-1/16 in
P4023xx-E0xx-P40Dx-2L	E04x / E05x	4	11-3/8 in	6-3/8 in	5-1/4 in	9-3/4 in	22-1/8 in	24-7/16 in
P4023xx-E0xx-P40Dx-2M	E04x / E05x	4	11-3/8 in	6-3/8 in	5-1/4 in	9-3/4 in	26-3/4 in	24-7/16 in
P4023xx-E0xx-P40Dx-2L	E029 / E031	4	11-3/8 in	6-3/8 in	5-1/4 in	9-3/4 in	22-1/8 in	24-7/16 in
P4023xx-E0xx-P40Dx-2M	E029 / E031	4	11-3/8 in	6-3/8 in	5-1/4 in	9-3/4 in	26-3/4 in	24-7/16 in

* Includes gasket between Control Valve and Differential Pressure Valve
Adpv +/- 1/16 in (0.16 cm) Xcdp +/- 1/8 in (0.32 cm)
Allow 6 in (15.24 cm) above actuator for removal service

All other dimensions are maximum

DIMENSIONS - PICV SIZES: 5-6 IN



Control Valve (Left)

MODEL LISTING	ACTUATOR	SIZE	Acv	Bcv	Ccv	Dcv	Hcv
P5023xx-E0xx-P50Dx-xx	E04x / E05x	5	15-3/4in	5-3/4 in	8-1/4 in	7-1/8 in	20-1/4 in
P5023xx-E0xx-P50Dx-xx	E029 / E031	5	15-3/4in	5-3/4 in	8-1/4 in	7-1/8 in	10-7/8 in
P6023xx-E0xx-P60Dx-xx	E04x / E05x	6	15-3/4in	5-3/4 in	8-7/8 in	7-1/8 in	20-1/4 in
P6023xx-E0xx-P60Dx-xx	E029 / E031	6	15-3/4in	5-3/4 in	8-7/8 in	7-1/8 in	10-7/8 in
P6023Xx-E0xx-P60Dx-xx	E061 / E062	6 EXT.	15-3/4in	5-3/4 in	8-7/8 in	7-1/8 in	24-3/8 in

Acv +/- 1/16 in (0.16 cm) All other dimensions are maximum

Allow 6 in (15.24 cm) above actuator for removal service

CONVERSION
inches X 2.54= cm

DIFFERENTIAL PRESSURE VALVE (RIGHT)

								Total combined*
MODEL LISTING	ACTUATOR	SIZE	Adpv	Bdpv	Ccpv	Ddpv	Hdpv	Xcdp
P5023xx-E0xx-P50Dx-2L	E04x / E05x	5	12 in	6-1/2 in	7-5/8 in	9-3/4 in	22-1/8 in	27-13/16 in
P5023xx-E0xx-P50Dx-2M	E04x / E05x	5	12 in	6-1/2 in	7-5/8 in	9-3/4 in	26-3/4 in	27-13/16 in
P5023xx-E0xx-P50Dx-2L	E029 / E031	5	12 in	6-1/2 in	7-5/8 in	9-3/4 in	22-1/8 in	27-13/16 in
P5023xx-E0xx-P50Dx-2M	E029 / E031	5	12 in	6-1/2 in	7-5/8 in	9-3/4 in	26-3/4 in	27-13/16 in
P6023xx-E0xx-P60Dx-2L	E04x / E05x	6	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	22-1/8 in	31-15/16 in
P6023xx-E0xx-P60Dx-2M	E04x / E05x	6	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	26-3/4 in	31-15/16 in
P6023xx-E0xx-P60Dx-2L	E029 / E031	6	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	22-1/8 in	31-15/16 in
P6023xx-E0xx-P60Dx-2M	E029 / E031	6	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	26-3/4 in	31-15/16 in
P6023Xx-E0xx-P60Dx-2L	E061 - E066	6 EXT.	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	22-1/8 in	31-15/16 in
P6023Xx-E0xx-P60Dx-2M	E061 - E066	6 EXT.	14-1/8 in	6-1/2 in	8-1/2 in	9-3/4 in	26-3/4 in	31-15/16 in

* Includes gasket between Control Valve and Differential Pressure Valve

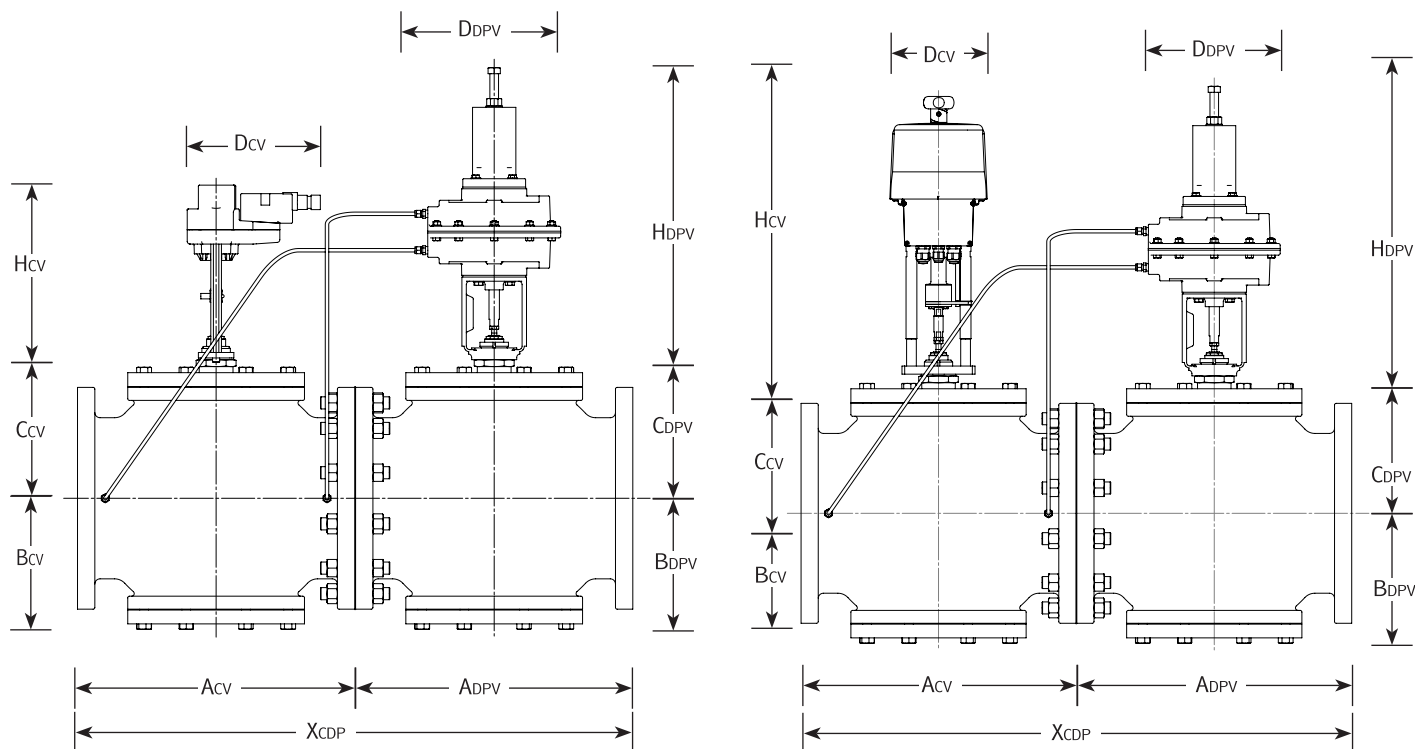
Adpv +/- 1/16 in (0.16 cm)

Xcdp +/- 1/8 in (0.32 cm)

All other dimensions are maximum

Allow 6 in (15.24 cm) above actuator for removal service

DIMENSIONS - PICV SIZES: 8-10 IN



Control Valve (Left)

MODEL LISTING	ACTUATOR	SIZE	Acv	Bcv	Ccv	Dcv	Hcv
P8022xx-E0xx-P80Dx-xxx	E04x / E05x	8	16-1/4in	8-7/8 in	9-5/8 in	7-1/8 in	20-1/4 in
P8022xx-E0xx-P80Dx-xxx	E029 / E031	8	16-1/4in	8-7/8 in	9-5/8 in	7-1/8 in	10-7/8 in
P1022xx-E0xx-P10Dx-xxx	E04x / E05x	10	20 in	9-5/8 in	10-1/8 in	7-1/8 in	20-1/4 in
P1022xx-E0xx-P10Dx-xxx	E029 / E031	10	20 in	9-5/8 in	10-1/8 in	7-1/8 in	10-7/8 in

Acv +/- 1/16 in (0.16 cm) All other dimensions are maximum

Allow 6 in (15.24 cm) above actuator for removal service

CONVERSION
inches X 2.54= cm

DIFFERENTIAL PRESSURE VALVE (RIGHT)

								Total combined*
MODEL LISTING	ACTUATOR	SIZE	Adpv	Bdpv	Ccpv	Ddpv	Hdpv	Xcdp
P8022xx-E0xx-P80Dx-2L	E04x / E05x	8	16-1/4in	8-7/8 in	9-5/8 in	9-3/4 in	22-1/8 in	32-9/16 in
P8022xx-E0xx-P80Dx-2M	E04x / E05x	8	16-1/4in	8-7/8 in	9-5/8 in	9-3/4 in	26-3/4 in	32-9/16 in
P8022xx-E0xx-P80Dx-2L	E029 / E031	8	16-1/4in	8-7/8 in	9-5/8 in	9-3/4 in	22-1/8 in	32-9/16 in
P8022xx-E0xx-P80Dx-2M	E029 / E031	8	16-1/4in	8-7/8 in	9-5/8 in	9-3/4 in	26-3/4 in	32-9/16 in
P1022xx-E0xx-P10Dx-2L	E04x / E05x	10	20 in	9-5/8 in	10-1/8 in	9-3/4 in	22-1/8 in	40-1/16 in
P1022xx-E0xx-P10Dx-2M	E04x / E05x	10	20 in	9-5/8 in	10-1/8 in	9-3/4 in	26-3/4 in	40-1/16 in
P1022xx-E0xx-P10Dx-2L	E029 / E031	10	20 in	9-5/8 in	10-1/8 in	9-3/4 in	22-1/8 in	40-1/16 in
P1022xx-E0xx-P10Dx-2M	E029 / E031	10	20 in	9-5/8 in	10-1/8 in	9-3/4 in	26-3/4 in	40-1/16 in

* Includes gasket between Control Valve and Differential Pressure Valve

Adpv +/- 1/16 in (0.16 cm)

Xcdp +/- 1/8 in (0.32 cm)

All other dimensions are maximum

Allow 6 in (15.24 cm) above actuator for removal service


CONTROL VALVES IN HVAC WATER SYSTEMS

Fluid Quality and Service Life Guide Lines: The purpose of these guidelines is to avoid valve and water systems problems caused by poor water quality in HVAC systems. While all cooling and heating systems are susceptible to problems, closed chilled water systems, including those containing brine or glycol, are especially prone to system and valve problems. To achieve the satisfactory operation and maximum life of your Warren Controls valve, it is important that the following recommendations are adhered to and that a water treatment, filtration and control specialists be consulted before the system start-up.

WATER QUALITY RECOMMENDED PARAMETERS

Chilled Water, Closed Loops, and Hot Water Systems up to 212°F (100° C).

	8.0	<	pH	<	10.3
			Conductivity	<	3000 MMHS
			Iron	<	0.5 ppm
			Copper	<	0.5 ppm
Chilled Systems	→ 100 ppm	<	Molybdenum	<	150 ppm
			<i>(Mild Steel Corrosion Inhibitor)</i>		
Hot Systems	→ 200 ppm	<	Molybdenum	<	250 ppm
			<i>(Mild Steel Corrosion Inhibitor)</i>		
	400 ppm	<	Nitrite	<	1000 ppm
			<i>(Mild Steel Corrosion Inhibitor)</i>		
			Azole	>	5 ppm free and available
			<i>(Yellow Metal Inhibitor)</i>		
			Bacteria	<	1000 cells/ml
					(when system is cool)



CAUTION

The use of hydrazine can result in the formation of ammonia and must be controlled to prevent stress corrosion and embrittlement, which can lead to fracture of some brass alloys.

Water hardness should be less than 100 ppm of hard water ions (Ca++, Mg++), where 17.1 ppm = 1 Grain Hardness. Additionally, levels of chloride and sulfate should remain less than 25 ppm. When water hardness is at unacceptable levels, a water softener expert should be consulted.

ANTIFREEZE SOLUTIONS-GLYCOLS

The commonly used heat transfer glycol fluids are, either ethylene glycol or propylene glycol. Glycol concentrations of <25% often do not provide sufficient corrosion inhibiting properties and at levels <20% can actually provide a food source for bacteria. As bacteria consume the food and die off, a highly acidic condition can result. The recommended concentration for popular glycol based solutions is 25% to 60%.

VALVE PACKING LEAKS

The service life of valve stems and packing is dependent on maintaining non-damaging fluid conditions. Inadequate treatment or filtration, not in accordance with the recommendations of this guide, or a qualified treatment specialist, can result in corrosion, scaling, or abrasive particle formation. Scale and particles migrating from pipe walls to control valves, will result in scratching the valve stem, which will prevent the packing from sealing. This problem can be avoided by the use of proper cleaning, treatment chemicals, and storage procedures. Water must be treated and soft. Trace leaks of hard water result in hard calcium carbonate particles on the outside of the valve, which will scratch the sealing members creating a packing leak. To avoid a damaging condition, the system should be cleaned prior to start-up. Filtration equipment and strainers should be employed as required and a regularly scheduled program of water condition monitoring and treatment should be followed. Side stream water filtration may be needed in closed systems, if there is no regular blow down of the system.

Control valve 'hunting' will cause excessive stroking of the valve stem and result in premature failure of the valve packing seal. The system must be stabilized to ensure reasonable packing life and optimal control performance.

Over sizing of a control valve will result in an un-stable condition, can result in, noise, vibration, premature trim and packing seal failure. The use of the Warren Controls ValveWorks sizing program Will facilitate the selection of the optimum valve.

COMMISSIONING

Thorough flushing of the system is necessary before start-up as new systems, or old systems that have been shut down for an extended period of time, will usually contain dirt, Weld slag, solder flux, and pipe scale.

STORAGE

Systems that are stored wet should be completely filled with properly treated water and isolated to avoid slow leaks, which can cause serious corrosion problems.

Drained system should be air dried, sealed, and treated with a desiccant to prevent "atmospheric corrosion" of pipes, which is a major source of pipe scale.

DPRV ACTUATOR INSTRUCTIONS

WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010			
2 1/2 - 10 INCH DIFFERENTIAL PRESSURE REGULATING VALVE ASSEMBLY			
SIZE C	FSCH NO 03847	DWG NO C3121902	REV A
SCALE 1/4	MT	SHEET	

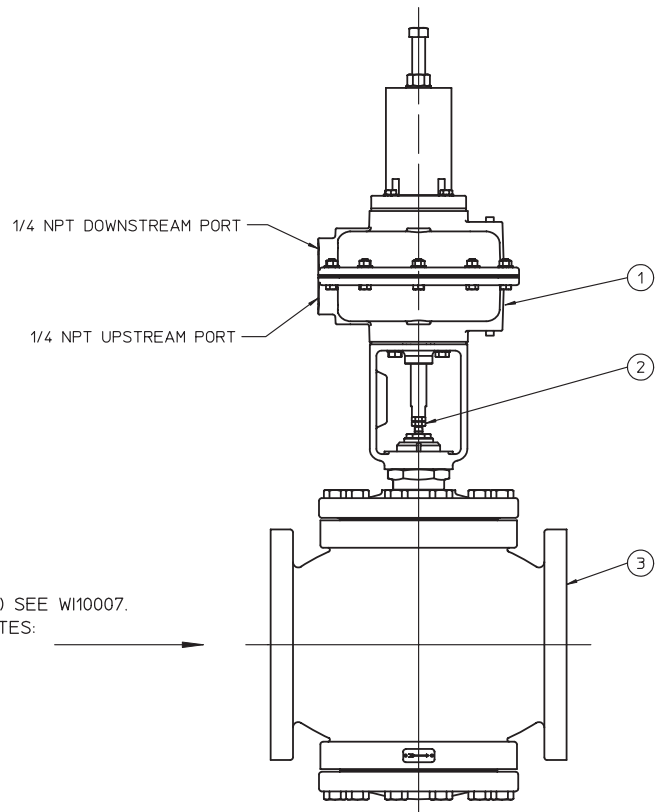
3	1	VALVE BODY ASSEMBLY
2	2	3/8-24 HEX JAMNUT
1	1	SPRING LOADED DOUBLE ACTING DIAPHRAGM ACTUATOR
ITEM	QTY	DESCRIPTION

PICV SET DIFFERENTIAL PRESSURE ADJUSTMENT

1. Remove line pressure and isolate PICV valve in piping.
2. Remove upstream port and downstream port pressure sensing lines from connections on diaphragm actuator (See drawing C3121902).
3. Connect flexible temporary air connection to upstream port pressure sensing connection on diaphragm actuator (See drawing C3121902 for location of upstream port pressure sensing connection).
4. Use marking pen to place mark on valve stem just above where it enters the valve.

WARNING: In Steps 5 thru 10, do not turn the adjusting screw so it extends more than 3-3/4 inches (9.53 cm) above the top of the actuator (more than 26 threads are visible on the adjusting screw). Doing so may cause the adjusting screw to separate from the actuator resulting in damage and personal injury from the uncontrolled release of pressure inside the actuator. Be careful not to damage the seal in the seal washer on the adjusting screw. The seal may be damaged by excessive turning of the adjusting screw or by pushing it over the screw's threads. If the seal in the seal washer is damaged the actuator will leak when line pressure is returned to the valve.

5. Loosen locknut on adjusting screw on top of actuator and separate from seal washer. Thread locknut only to top of adjusting screw.



6. Apply air pressure to upstream port pressure sensing connection equal to desired set differential pressure plus 1/2 psig (0.034 BAR). Example: For set differential pressure of 5 psig (0.345 BARG), apply 5-1/2 psig (0.379 BARG) to upstream port pressure sensing connection. If mark made on valve stem in Step 9 moves away from valve, turn adjusting screw clockwise, looking down on actuator, until mark returns to its closest point to the valve.
7. Turn adjusting screw slowly counter-clockwise, looking down on actuator, a 1/2 turn at a time until mark made on valve stem in Step 9 just begins to move away from the valve.
8. Reduce air pressure to upstream port pressure sensing connection to 0 psig (0 BARG) and allow all air to bleed from actuator.
9. Slowly increase air pressure to upstream port pressure sensing connection until equal to desired set differential pressure. Mark made on valve stem should just begin to move away from the valve when pressure reaches desired set differential pressure. If mark moves too soon, turn adjusting screw clockwise an additional 1/2 turn then repeat Steps 13 and 14. If mark does not move, turn adjusting screw counter-clockwise an additional 1/2 turn then repeat Steps 13 and 14. Satisfactory adjustment should be made within 2 additional full turns of the adjusting screw.
10. Thread locknut on adjusting screw down to top of actuator and tighten securely against seal washer to create seal against actuator. **If the locknut is not tightened securely the actuator will leak when line pressure is returned to the valve.**
11. Install upstream port and downstream port pressure sensing lines (See drawing D3121311 (Sizes 2-1/2 thru 4 inch, P2 thru P4) or C3121900 (Sizes 5 thru 10 inch, P5 thru P1) for orientation of upstream port and downstream port pressure sensing lines).
12. Return line pressure to valve.

PICV DIAPHRAGM ACTUATOR REMOVAL FROM VALVE

1. Remove line pressure and isolate PICV valve in piping.
2. Remove upstream port and downstream port pressure sensing lines from connections on diaphragm actuator (See drawing C3121902).
3. Connect flexible temporary air connection to upstream port pressure sensing connection on diaphragm actuator. Apply air pressure and increase until actuator stem begins to retract into actuator.
4. Loosen yoke locknut then unthread it from valve body assembly.
5. Reduce air pressure to upstream port pressure sensing connection to 0 psig (0 BARG). Remove temporary air connection.
6. Use wrench on flats of actuator stem to keep actuator stem from turning. Loosen two jamnuts on valve stem so they are not in contact with actuator stem. Tighten two jamnuts together on valve stem.
7. Looking down on top of actuator, rotate actuator counterclockwise to unthread actuator stem from valve stem. Use wrench on jamnuts on valve stem to keep valve stem from turning. Continue rotating actuator until actuator stem is completely unthreaded from valve stem.
Rotating the actuator stem relative to the actuator will damage the diaphragm and void the warranty. The diaphragm-actuated section of the PICV valve is reverse acting. The plug is on the seat when the valve stem is fully up (not down). Do not turn the valve stem if the plug is in contact with the seat. Rotating the valve stem with the plug on the seat will destroy the seating surfaces and void the warranty.
8. Remove actuator and yoke locknut from the valve.

PICV DIAPHRAGM ACTUATOR MOUNTING ON VALVE

1. Remove line pressure and isolate PICV valve in piping.
2. Push valve stem down until plug reaches travel stop in valve.
3. Thread two valve stem jamnuts onto valve stem. With valve stem down and plug at travel stop in valve, position jamnuts on valve stem so the distance from the actuator yoke mounting surface of the valve bonnet to the top of the jamnuts is 2.438 inch (6.193 cm). Tighten jamnuts together.
4. Place yoke locknut on actuator yoke tapered side up.
5. Place actuator with yoke locknut over valve stem.
6. Engage actuator stem with valve stem. Looking down on top of actuator, rotate actuator clockwise to thread actuator stem onto valve stem. Continue rotating actuator until actuator stem is in contact with jamnuts on valve stem. If necessary lift actuator slightly and use wrench on jam nuts on valve stem to thread valve stem into actuator stem. Use wrench on jamnuts on valve stem to tighten valve stem to actuator stem. Use wrench on flats on actuator stem to keep actuator stem from turning. **Rotating the actuator stem relative to the actuator will damage the diaphragm and void the warranty. The diaphragm-actuated section of the PICV valve is reverse acting. The plug is on the seat when the valve stem is fully up (not down). Do not turn the valve stem if the plug is in contact with the seat. Rotating the valve stem with the plug on the seat will destroy the seating surfaces and void the warranty.**
7. Connect flexible temporary air connection to upstream port pressure sensing connection on diaphragm actuator (See drawing C3121902 for location of upstream port pressure sensing connection). Apply air pressure and increase until actuator yoke firmly contacts mounting boss of valve. Orient actuator with pressure sensing line connections facing PICV electric motor actuator or so existing pressure sensing line connections can be reconnected. **Rotating the actuator stem relative to the actuator will damage the diaphragm and void the warranty. The diaphragm-actuated section of the PICV valve is reverse acting. The plug is on the seat when the valve stem is fully up (not down). Do not turn the valve stem if the plug is in contact with the seat. Rotating the valve stem with the plug on the seat will destroy the seating surfaces and void the warranty.**
8. Thread yoke locknut onto valve bonnet. Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening. Reduce air pressure to upstream port pressure sensing connection to 0 psig.
9. **If it is necessary to adjust the set differential pressure complete Steps 4 thru 10 of the PICV Set Differential Pressure Adjustment instructions.**
10. Install upstream port and downstream port pressure sensing lines (See drawing D3121311 (Sizes 2-1/2 thru 4 inch, P2 thru P4) or C3121900 (Sizes 5 thru 10 inch, P5 thru P1) for orientation of upstream port and downstream port pressure sensing lines).
11. Return line pressure to valve.

Read all instructions carefully before beginning.

TURNING THE ACTUATOR LEGS CAUSES DAMAGE TO THE ACTUATOR AND VOIDS THE WARRANTY.

REMOVAL OF ELECTRIC ACTUATOR FROM VALVE

- 1) Remove line pressure and isolate valve in piping.
- 2) Operate actuator so plug is off seat(s) and tabs of anti-rotation device (Item 2) can be unbent in Step 5.
- 3) Loosen jamnut (Item 3) and thread to bottom of threads on valve stem.
- 4) Loosen yoke locknut until it is free of bonnet.
- 5) Unbend tabs of anti-rotation device.
- 6) Remove anti-rotation device from stem connector so stem connector may be turned.
- 7) Hold jamnut on valve stem and turn the stem connector to disengage from valve stem. **The valve stem should never be turned while the plug is in contact with the seat otherwise the seating surfaces will be damaged.**
- 8) Remove actuator from valve.

PARTS/ OVERHAUL

Worn or damaged parts can decrease performance and shorten valve life. A worn or damaged valve stem can damage the packing, bearings, and other bonnet parts causing a packing leak, increased hysteresis, and poor operation. A worn or damaged plug, seat ring, or o-ring can cause excessive leakage, poor shut-off, poor control, and increased hysteresis. Worn or damaged gaskets and o-rings can cause excessive leakage and poor shut-off. Should parts become worn or damaged, parts kits are available. Separate kits are available for each PICV segment; Control Valve or Differential Pressure Reducing Valve (DPRV). Repack Kits are available to replace the packing. Repack/Inspection Kits are available to allow a segment to be opened for inspection of its internal parts. Rebuild/Repack Kits are available to completely rebuild/ overhaul a segment. Parts kits come with complete step-by-step instructions. Each kit has its own part number. Please provide the PICV serial number and segment, Control Valve or Differential Pressure Reducing Valve (DPRV), to ensure getting the correct kit part number and correct parts.

REPACK KIT

P/N KXXXXXXX007 REPACK KIT INCLUDES (see drawing C3769956)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	Packing Retainer		1	V-Ring Packing Extractor
3	1	Retainer Bearing		1	Packing Spring Removal Tool
5	1	Lip Packing		1	O-Ring Retainer & O-Ring Extractor
8	1	Tube Stem Lube		1	Stem Sleeve

REPACK/INSPECTION KITS

Control Valve Size 2-1/2", 3", 4" (DN65, DN80 & DN100) REPACK/ INSPECTION KIT INCLUDES					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
12	3	GASKET (See Dwg C3241354)		1	REPACK KIT

DPRV Size 2-1/2", 3", 4" (DN65, DN80 & DN100) REPACK/ INSPECTION KIT INCLUDES (See Drawing C3201355)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
9	1	GASKET (See Dwg C3201355)		1	REPACK KIT

Control Valve Size 5" & 6" (DN 125 & DN150) REPACK/ INSPECTION KIT INCLUDES (See Drawing C3241556 & C3769956)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
7	2	GASKET (See Dwg C3241556)	15	1	TUBE O-RING LUBE (See Dwg C3241556)
9	1	O-RING (See Dwg C3241556)		1	REPACK KIT

DPRV Size 5" & 6" (DN 125 & DN150) REPACK/ INSPECTION KIT INCLUDES (See Drawing D3201753)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
13	2	GASKET (See Dwg D3201753)		1	REPACK KIT

Control Valve Size 8" & 10" (DN200 & DN 250) REPACK/ INSPECTION KIT INCLUDES (See Drawing D3201950)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
14	2	GASKET (See Dwg D3201950)		1	REPACK KIT

DPRV Size 8" & 10" (DN200 & DN 250) REPACK/ INSPECTION KIT INCLUDES (See Drawing D3201951)					
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
4	2	GASKET (See Dwg D3201951)		1	REPACK KIT

Control Valve Size 2-1/2", 3", 4" (DN65, DN80 & DN100) REBUILD/ REPACK KIT INCLUDES

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg C3241354)	9	1	PLUG (See Dwg C3241354)
3	1	TRAVEL STOP (As required, See Dwg C3241354)	10	1	SEAT RING (See Dwg C3241354)
6	1	GROOVE PIN (See Dwg C3241354)	12	3	GASKET (See Dwg C3241354)
6	1	BONNET BEARING (See Dwg C3769956)	15	1	TUBE O-RING LUBE (See Dwg C3241354)
7	1	BONNET (See Dwg C3769956)	16	1	TUBE PERMATEX #2 (See Dwg C3241354)
8	1	O-RING (See Dwg C3241354)		1	REPACK KIT

**DPRV Size 2-1/2", 3", 4" (DN65, DN80 & DN100) REBUILD/ REPACK KIT INCLUDES
(See Drawing C3201355 & C3769956)**

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg C3201355)	7	1	TRAVEL STOP (As required, See Dwg (3201355)
4	1	GROOVE PIN (See Dwg C3201355)	9	2	GASKET (See Dwg C3201355)
6	1	BONNET BEARING (See Dwg C3769956)	12	1	TUBE PERMATEX #2 (See Dwg C3201355)
6	1	PLUG (See Dwg C3201355)		1	REPACK KIT
7	1	BONNET (See Dwg C3769956)			

**Control Valve Size 5" & 6" (DN 125 & DN150) REBUILD/ REPACK KIT INCLUDES
(See Drawing C3241556 & C3769956)**

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg C3241556)	9	1	O-RING (See Dwg C3241556)
3	1	TRAVEL STOP (As required, See Dwg C3241556)	10	1	PLUG (See Dwg C3241556)
4	1	GROOVE PIN (See Dwg C3241556)	11	1	SEAT RING (See Dwg C3241556)
6	1	BONNET BEARING (See Dwg C3769956)	15	1	TUBE O-RING LUBE (See Dwg C3241556)
7	2	GASKET (See Dwg C3241556)	16	1	TUBE PERMATEX #2 (See Dwg C3241556)
7	1	BONNET (See Dwg C3769956)		1	REPACK KIT

DPRV Size 5" & 6" (DN 125 & DN150) REBUILD/ REPACK KIT INCLUDES (See Drawing D3201753 & C3769956)

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg D3201753)	9	1	PLUG (See Dwg D3201753)
6	1	GROOVE PIN (See Dwg D3201753)	10	1	UPPER SEAT RING (See Dwg D3201753)
6	1	BONNET BEARING (See Dwg C3769956)	13	2	GASKET (See Dwg D3201753)
7	1	BONNET (See Dwg C3769956)	15	1	TUBE PERMATEX #2 (See Dwg D3201753)
8	1	LOWER SEAT RING (See Dwg D3201753)		1	REPACK KIT

**Control Valve Size 8" & 10" (DN200 & DN 250) REBUILD/ REPACK KIT INCLUDES
(See Drawing D3201950 & C3769956)**

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg D3201950)	10	1	PLUG (See Dwg D3201950)
6	1	BONNET BEARING (See Dwg C3769956)	11	1	LOWER SEAT RING (See Dwg D3201950)
7	1	BONNET (See Dwg C3769956)	14	2	GASKET (See Dwg D3201950)
8	1	GROOVE PIN (See Dwg D3201950)	16	1	TUBE PERMATEX #2 (See Dwg D3201950)
9	1	UPPER SEAT RING (See Dwg D3201950)		1	REPACK KIT

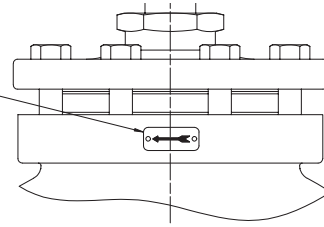
DPRV Size 8" & 10" (DN200 & DN 250) REBUILD/ REPACK KIT INCLUDES (See Drawing D3201951 & C3769956)

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	VALVE STEM (See Dwg D3201951)	8	1	LOWER SEAT RING (See Dwg D3201951)
4	2	GASKET (See Dwg D3201951)	9	1	PLUG (See Dwg D3201951)
6	1	BONNET BEARING (See Dwg C3769956)	10	1	UPPER SEAT RING (See Dwg D3201951)
7	1	BONNET (See Dwg C3769956)	16	1	TUBE PERMATEX #2 (See Dwg D3201951)
7	1	GROOVE PIN (See Dwg D3201951)		1	REPACK KIT

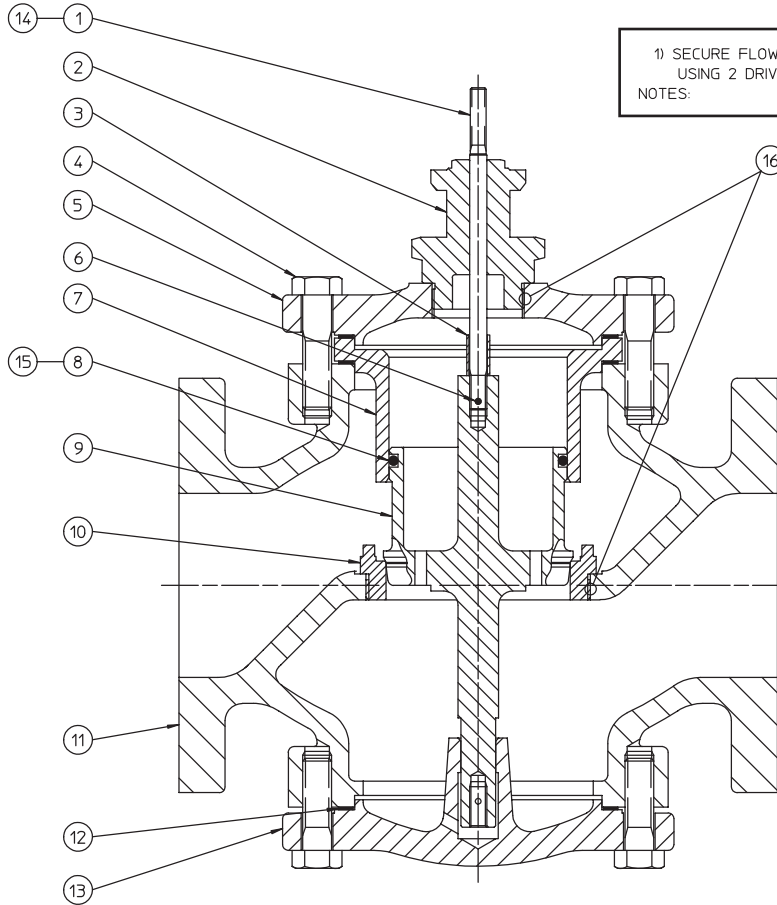
C3241354

WARREN CONTROLS INCORPORATED				
BETHLEHEM, PENNSYLVANIA 18020-8010				
2 1/2 - 4 INCH TYPE 23				
VALVE BODY ASSEMBLY				
SIZE	FSCH NO	DWG NO	C3241354	REV
C	03847			
SCALE	WT	SHEET		

17 18
NOTE 1

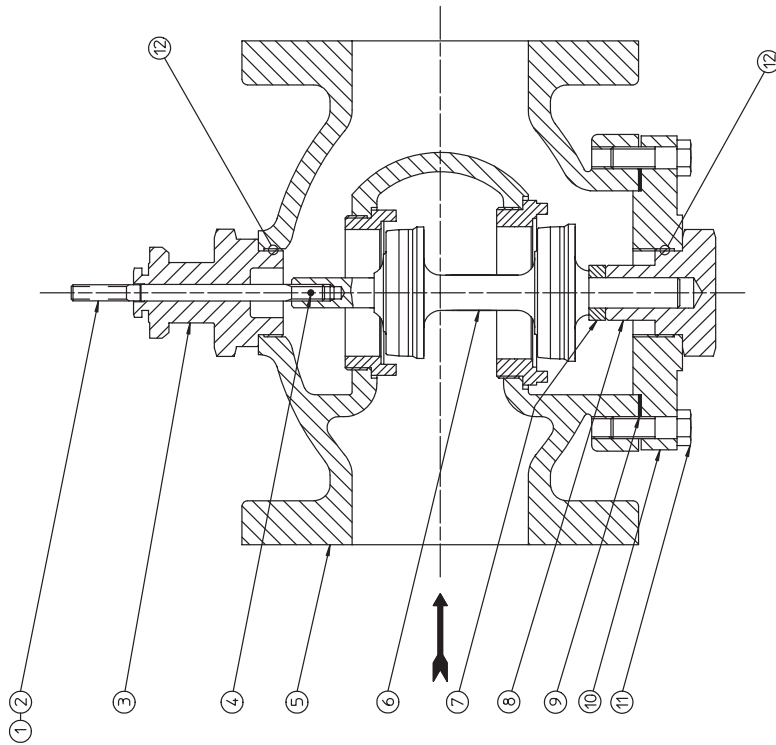


1) SECURE FLOW ARROW PLATE (17) TO VALVE BODY FLANGE
USING 2 DRIVE SCREWS (18).
NOTES:



18	2	DRIVE SCREW #4 x 1/4
17	1	FLOW ARROW PLATE
16	A/R	PERMATEX #2
15	A/R	O-RING LUBE
14	A/R	STEM LUBE
13	1	BOTTOM COVER
12	3	GASKET
11	1	VALVE BODY
10	1	SEAT RING
9	1	PLUG
8	1	O-RING
7	1	PISTON CHAMBER
6	1	GROOVE PIN
5	1	TOP COVER
4	A/R	HEX HD CAPSCREW
3	1	TRAVEL STOP
2	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
1	1	VALVE STEM
ITEM	QTY	DESCRIPTION

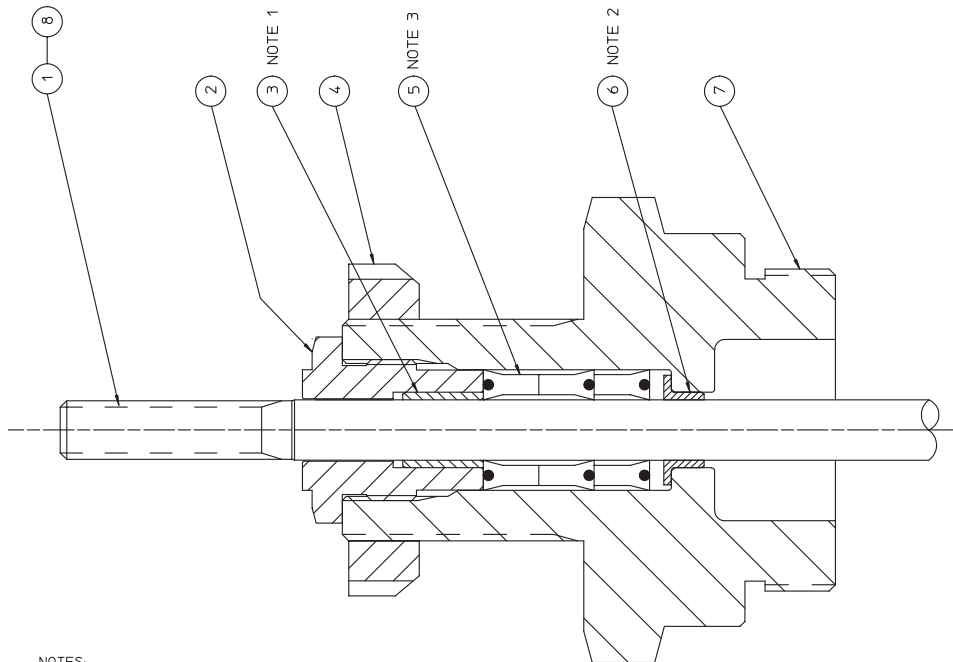
C3201355



WARREN CONTROLS CORPORATION			
BROADWAY, NEW JERSEY 08808			
1 1/2 THRU 4 INCH TYPE 72 VBA			
SIZE	FSCH NO	DWG NO	REV
C	03847	C3201355	
SCALE	WT	SHEET	

A/R	PERMATEX #2	QTY	DESCRIPTION
A/R	HEX HEAD CAPSCREW		
1	BOTTOM COVER		
1	GASKET		
1	BOTTOM GUIDE PLUG		
A/R	TRAVEL STOP		
1	PLUG		
1	VALVE BODY WITH SEAT RINGS		
1	GROOVE PIN		
1	BONNET SUBASSEMBLY		SEE SEPARATE DWG
A/R	STEM LUBE		
1	VALVE STEM		
1			

C3769956



WARREN CONTROLS CORPORATION			
BETHLEHEM, PENNSYLVANIA 18020-8010			
BONNET SUBASSEMBLY NLP PACKING			
400°F EPDM 1.376-18 2-18 W/ BEARINGS			
SIZE	FSCH NO	DWG NO	REV
C	03847	C3769956	A
SCALE	WT	SHEET	

ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
8	A/R	A0940021	DC111 LUBE	
7	1	C1180670-01	BONNET	BRASS ASTM B16 H02
6	1	B1060057	BONNET BEARING	FIBER REINFORCED POLYETHERETHERKETONE
5	3	4207-18700375-312	LIP PACKING	HIGH TEMP ETHYLENE PROPYLENE 90 DURO
4	1	B1640034-01	YOKE LOCKNUT	STL PLTD
3	1	B1060056	RETAINER BEARING	FIBER REINFORCED POLYETHERETHERKETONE
2	1	C1720061-03	PACKING RETAINER	BRASS ASTM B16
1	1	AS REQD	VALVE STEM	ST STL TYPE 316

NOTES:

1) RETAINER BEARING (3) IS NOT A SYMMETRICAL PART & SHOULD ONLY BE ASSEMBLED AS FOLLOWS. PRESS RETAINER BEARING (3) INTO PACKING RETAINER (2) UNTIL THE END WITH THE CHAMFER ON THE ID IS ABOVE OR FLUSH WITH THE BOTTOM OF THE PACKING RETAINER (2).

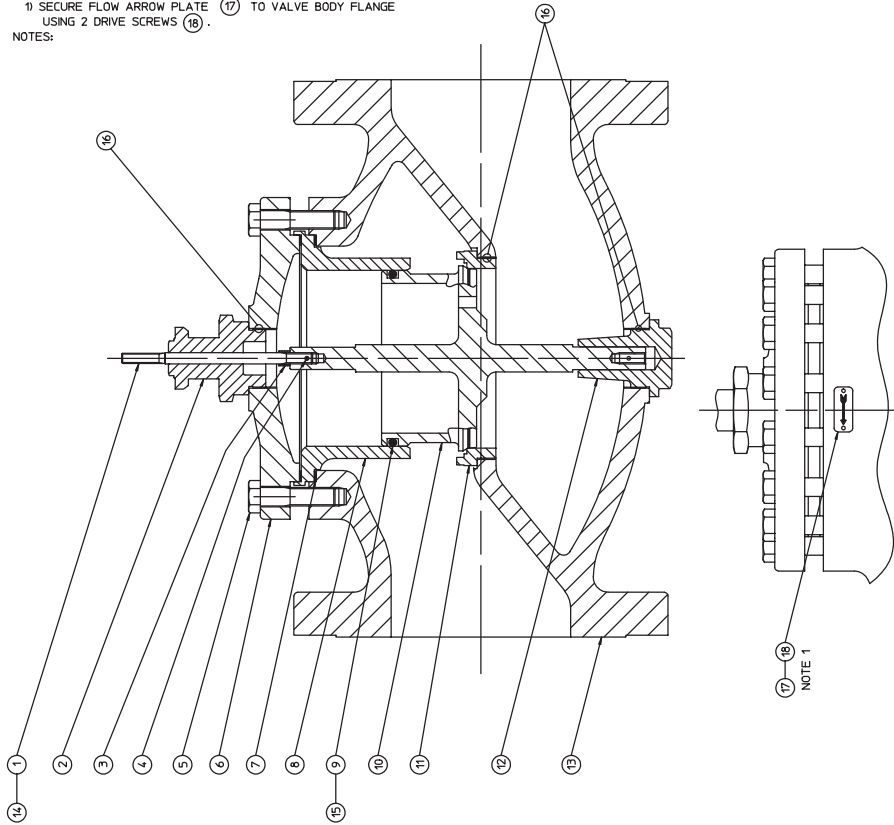
2) PRESS BONNET BEARING (6) INTO BONNET (7), ORIENTED AS SHOWN, UNTIL IT BOTTOMS OUT IN PACKING GLAND.

3) PROTECT ID & OD SEALING LIPS OF PACKING FROM CUTS, NICKS OR SCRAPES DURING INSTALLATION. DO NOT FORCE SEALING LIPS PAST BONNET THREADS OR STEM THREADS. USE OF INSTALLATION SLEEVE IS RECOMMENDED. LUBRICATE PACKING ID & OD AND STEM BEFORE INSTALLATION. PACKING MUST BE ORIENTED AS SHOWN.

D3241556

1) SECURE FLOW ARROW PLATE (17) TO VALVE BODY FLANGE
USING 2 DRIVE SCREWS (18).

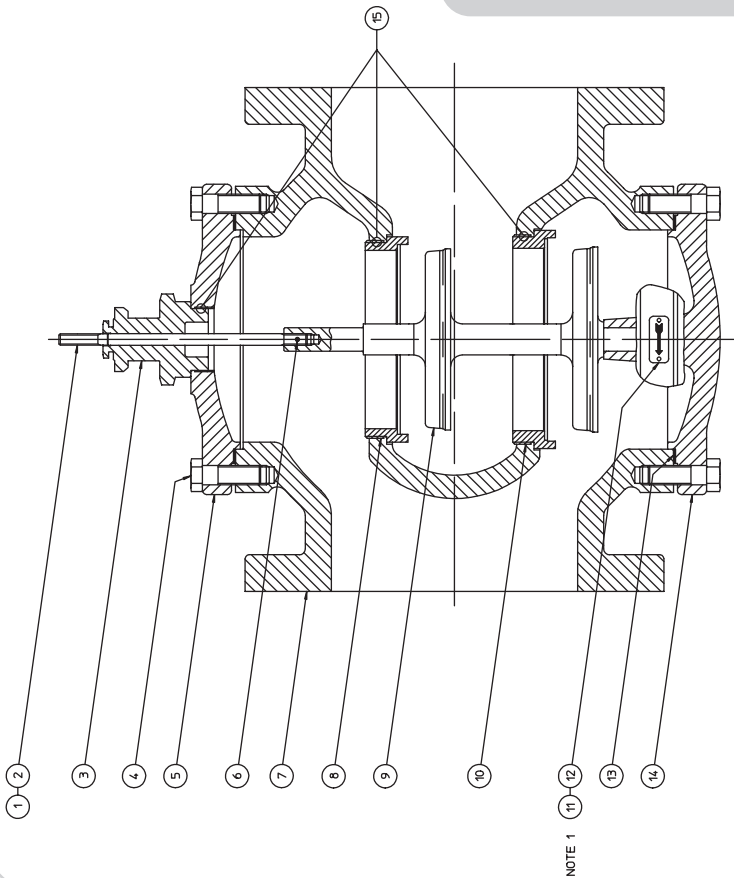
NOTES:



WARREN CONTROLS INCORPORATED				
BETHLEHEM, PENNSYLVANIA 18020-8010				
5 - 6 INCH TYPE 23				
VALVE BODY ASSEMBLY				
SIZE	FSCH NO	DWG NO	REV	
D	03847	D3241556		
SCALE	WT	SHEET		

ITEM	QTY	DESCRIPTION
18	2	DRIVE SCREW #4 x 1/4
17	1	FLOW ARROW PLATE
16	A/R	PERMATEX #2
15	A/R	O-RING LUBE
14	A/R	STEM LUBE
13	1	VALVE BODY
12	1	BOTTOM GUIDE PLUG
11	1	SEAT RING
10	1	PLUG
9	1	O-RING
8	1	PISTON CHAMBER
7	2	GASKET
6	1	TOP COVER
5	A/R	HEX HD CAPSCREW
4	1	GROOVE PIN
3	1	TRAVEL STOP
2	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
1	1	VALVE STEM

D3201753



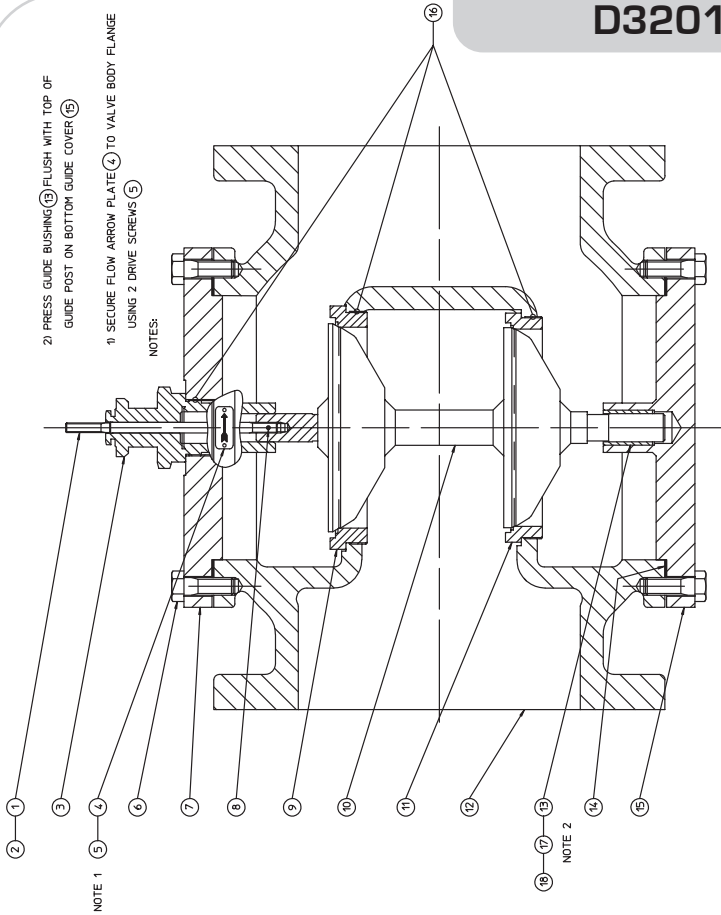
1) SECURE FLOW ARROW PLATE (17) TO VALVE BODY FLANGE
USING 2 DRIVE SCREWS (18).

WARREN CONTROLS CORPORATION				
BROADWAY, NEW JERSEY 08808				
5 & 6 INCH TYPE 72 VBA				
SIZE	FSCH NO	DWG NO	REV	
D	03847	D3201753	A	
SCALE	WT	SHEET		

ITEM	QTY	DESCRIPTION
15	A/R	PERMATEX #2
14	1	BOTTOM GUIDE COVER
13	2	GASKET
12	2	DRIVE SCREW NO 4 X 1/4
11	1	FLOW ARROW PLATE
10	1	UPPER SEAT RING
9	1	PLUG
8	1	LOWER SEAT RING
7	1	VALVE BODY
6	1	GROOVE PIN
5	1	TOP COVER
4	A/R	HEX HEAD CAPSCREW
3	1	BONNET SUBASSEMBLY SEE SEPARATE DWG
2	A/R	STEM LUBE
1	1	VALVE STEM

D3201950

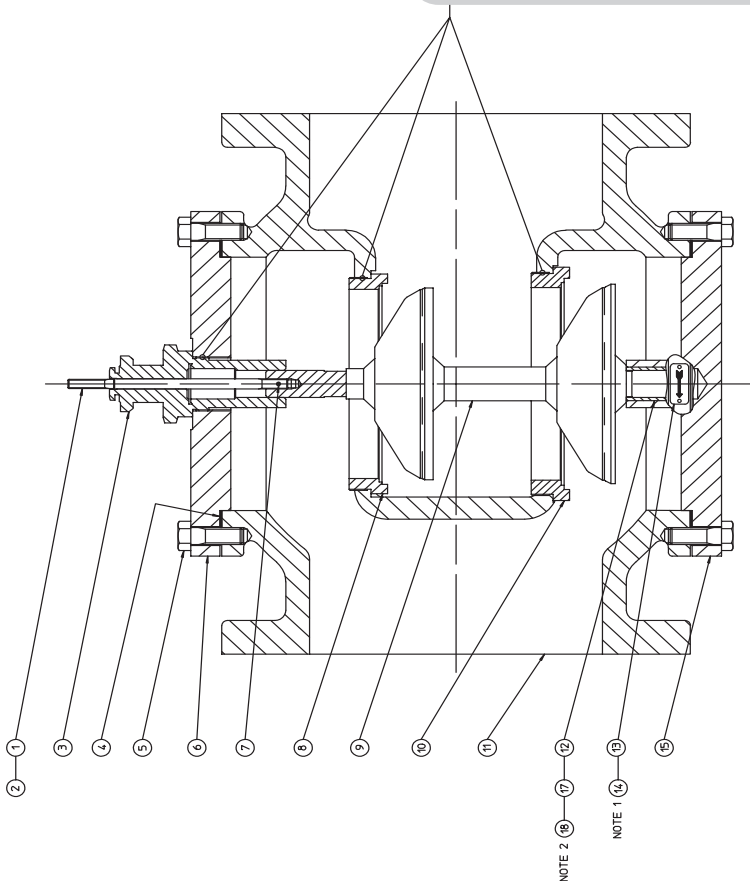
WARREN CONTROLS CORPORATION			
BROADWAY, NEW JERSEY 08808			
VALVE BODY ASSEMBLY			
8 & 10 INCH TYPE 22			
SIZE	PSCH NO	DWG NO	REV
D	03847	D3201950	
SCALE	WT	SHEET	



ITEM	QTY	DESCRIPTION
18	A/R	LOCTITE PRIMER T
17	A/R	LOCTITE 272
16	A/R	PERMATEX #2
15	1	BOTTOM GUIDE COVER
14	2	GASKET
13	1	GUIDE BUSHING
12	1	VALVE BODY
11	1	LOWER SEAT RING
10	1	PLUG
9	1	UPPER SEAT RING
8	1	GROOVE PIN
7	1	TOP COVER
6	A/R	HEX HEAD CAPSCREW
5	2	DRIVE SCREW NO 4 x 1/4
4	1	FLOW ARROW PLATE
3	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
2	A/R	STEM LUBE
1	1	VALVE STEM

D3201951

WARREN CONTROLS CORPORATION			
BROADWAY, NEW JERSEY 08808			
VALVE BODY ASSEMBLY			
8 & 10 INCH TYPE 72			
SIZE	PSCH NO	DWG NO	REV
D	03847	D3201951	
SCALE	WT	SHEET	



ITEM	QTY	DESCRIPTION
18	A/R	LOCTITE PRIMER T
17	A/R	LOCTITE 272
16	A/R	PERMATEX #2
15	1	BOTTOM GUIDE COVER
14	2	DRIVE SCREW NO 4 x 1/4
13	1	FLOW ARROW PLATE
12	1	GUIDE BUSHING
11	1	VALVE BODY
10	1	UPPER SEAT RING
9	1	PLUG
8	1	LOWER SEAT RING
7	1	GROOVE PIN
6	1	TOP COVER
5	A/R	HEX HEAD CAPSCREW
4	2	GASKET
3	1	BONNET SUBASSEMBLY SEE SEPARATE DRAWING
2	A/R	STEM LUBE
1	1	VALVE STEM

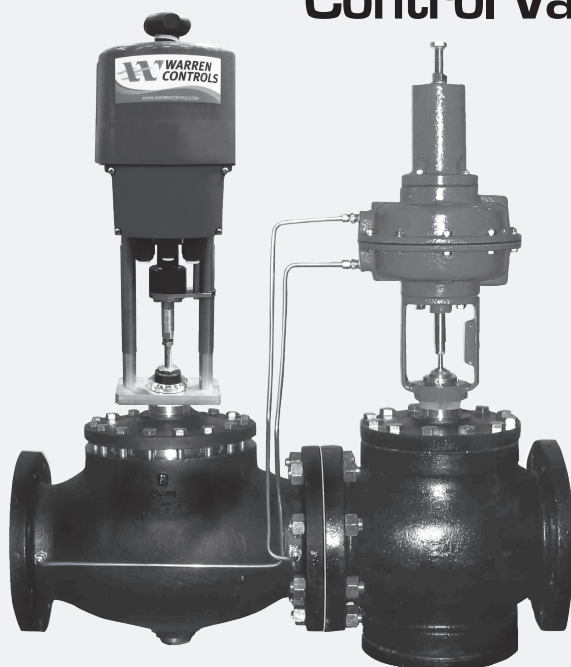
2) PRESS GUIDE BUSHING (12) FLUSH WITH TOP OF GUIDE POST ON BOTTOM GUIDE COVER (15)

1) SECURE FLOW ARROW PLATE (13) TO VALVE BODY FLANGE USING 2 DRIVE SCREWS (14)

NOTES:



Pressure Independent Control Valve



PICV_IOM_Rev1_0721

WARREN CONTROLS

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