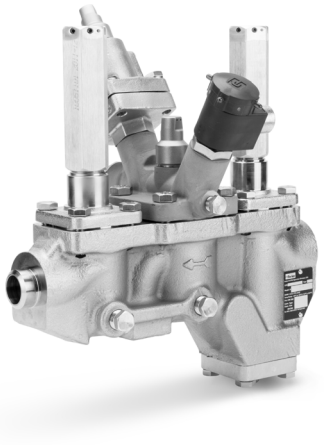
Parker Valve Station

Product Bulletin 10-00 E

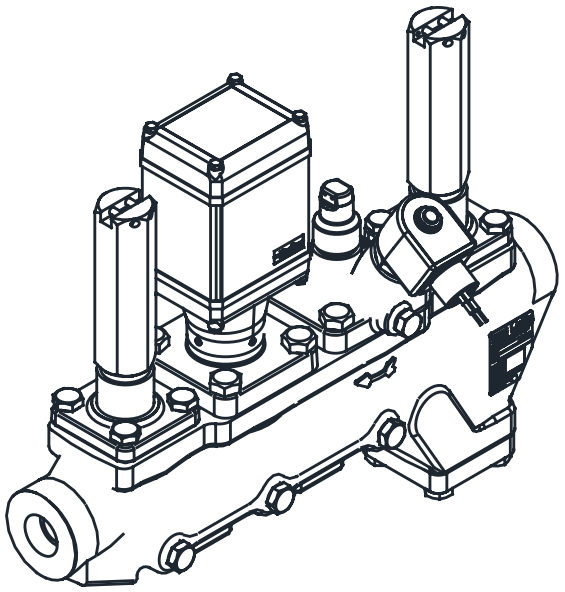
Type: PVS



Purpose:

The PVS weld-in valve stations are designed to simplify valve installation by minimizing the amount of welds required for each valve group. The valve station is also designed to overcome corrosion issues encountered in harsh environments by utilizing plated and stainless steel components. Being weld-in, the valves reduce potential for connection leaks. Since all the shut-off and control valves are top-mounted the PVS can be easily serviced with standard tools.

P ARKER V ALVE S TATION



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Product Features:

- Suitable for ammonia, CO_2 and other common refrigerants
- Combines multiple functions in a single housing
- Plated steel housing increases product life cycle
- Overall weight reduction up to 50% compared to traditional flanged products
- Interchangeable with other P-Series offerings
- Coil options to meet various applications
- Serviceable from the top using standard tools
- Top-mounted shut-off valves eliminate service issues
- Lock-out seal caps
- Complies with ASME B31.5 and PED 2014/68/EU

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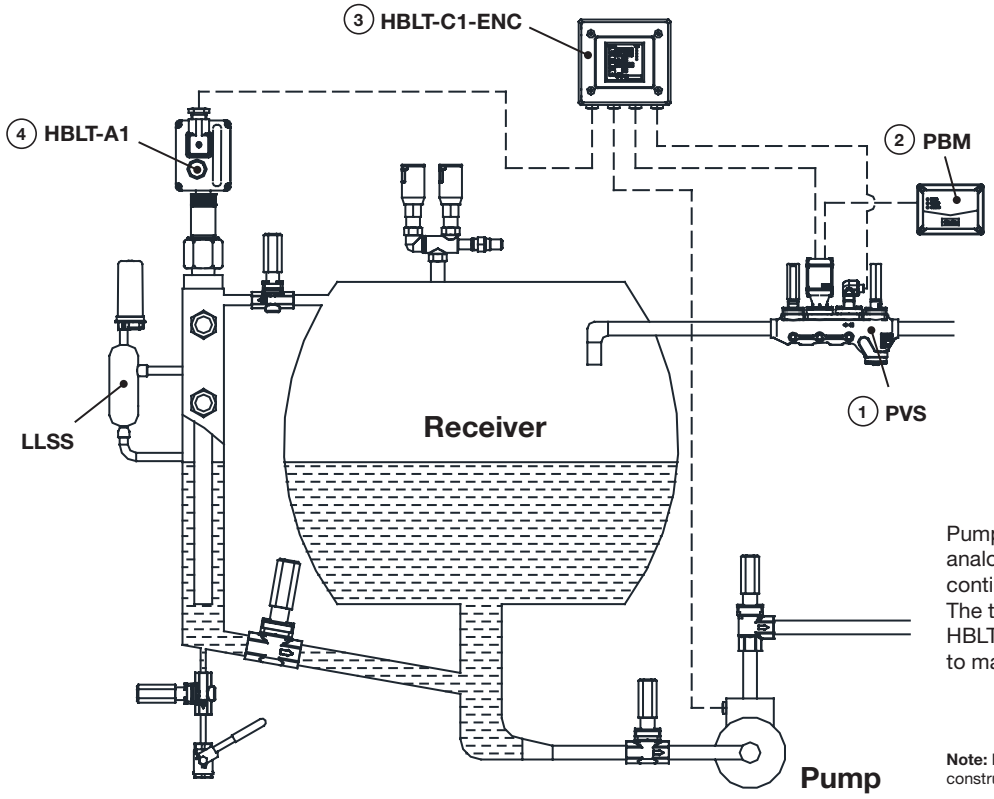
Application Example

Low Pressure (LP) Liquid Level Control



1 **PVS Valve**
2 **Backup Module for the PEV Actuator**
3 **Liquid Level Controller**
4 **Liquid Level Transmitter**

Pump separator installed with an HBLT-A1 analog liquid level transmitter probe for continuous level control of the vessel. The transmitter probe is connected to the HBLT-C1 controller which modulates the PEV to maintain a constant level in the receiver.

Note: Not all Valves are shown. Not to be used for construction purposes.

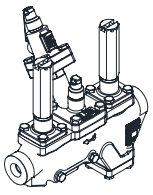
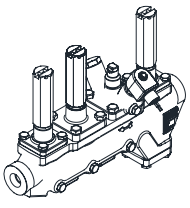
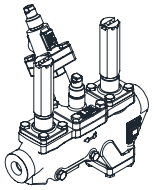
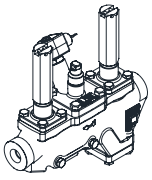
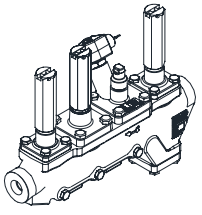
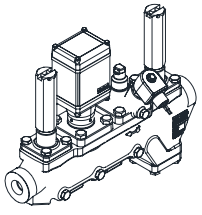
Relief Regulator	Pumped Liquid Feed	Suction Regulator	Hot Gas Defrost	High Pressure Liquid	Liquid Feed
					
Shut-Off	Shut-Off	Shut-Off	Shut-Off	Shut-Off	Shut-Off
Strainer	Strainer	Strainer	Strainer	Strainer	Strainer
Regulator (K)	Solenoid	Regulator	Solenoid	Solenoid	Solenoid
—	HEV	—	—	HEV	PEV
Shut-Off/Check	Shut-Off/Check	Shut-Off	Shut-Off	Shut-Off	Shut-Off

Table 1: PVS Common Valve Configurations

Technical Data

Liquid Temperature Range ..... -60°C to 120°C (-76°F to 248°F)

Maximum Rated Pressure (MRP)..... 52 bar (754 psig)

PEV Option

Ambient Temperature Range ... -40°C to 50°C (-40°F to 122°F)

Maximum Operating Pressure Differential (MOPD) ..... 52 bard (754 psid)

Electrical Specification .....24 VDC @ 1.3 Amp

Enclosure Specification ..... IP67 / NEMA 6

Rated Seat Leakage ..... ANSI/FCI 70-2 2006 Class II

Input Signal ..... 4 - 20 mA

Regulator / Solenoid Option

Ambient Temperature Range ... -60°C to 60°C (-76°F to 140°F)

Maximum Operating Pressure Differential (MOPD)
- AC Coils .....20.7 bard (300 psid)
- DC Coils .....10.0 bard (145 psid)

Minimum Pressure Drop Required to Open Valve
- Standard Solenoids ..... 2 psid (min)
- Two Stage Solenoid ..... 10 psid min (1st stage)
  4 psid min (2nd stage)
- Regulators ..... 3 psid (min)

Port Size		Application	Capacity Plugs	Flow Coefficient [1]		Connections		Weight [2]	
mm	inch			Kv	Cv	SW, BW ANSI	BW Metric (DIN)	kg	lbs
20	¾	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 65% 30%	9.1 6.0 3.0	10.5 7.0 3.5	¾", 1", 1¼"	20, 25, 32	18.6	41.0
		Pumped Liquid Feed						23.4	53.7
		High Pressure Liquid Feed [3]	Full 70%	6.0 4.3	7.0 5.0			26.1	57.6
25	1	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full	12.1	14.0	¾", 1", 1¼"	20, 25, 32	18.6	41.0
		Pumped Liquid Feed						23.4	53.7
		High Pressure Liquid Feed [3]	Full 40%	11.2 4.3	13 5.0			26.1	57.6
32	1¼	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 50%	15.7 8.1	18.2 9.4	1¼", 1½"	32, 40	28.5	62.8
		Pumped Liquid Feed						36.9	81.4
		High Pressure Liquid Feed [3]	Full	16.4	19.0			38.7	85.3
40	1½	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 30%	28.0 8.1	32.4 9.4	1½", 2"	40, 50	28.5	62.8
		Pumped Liquid Feed						36.9	81.4
		High Pressure Liquid Feed [3]	Full	29.4	34.0			38.7	85.3
50	2	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 35%	47.6 16.4	55 19	2", 2½"	50, 65	38.5- 40.8	85-90
		Pumped Liquid Feed							
		Suction Stop Valve							
65	2½	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 45%	65.0 30.3	75.0 35.0	2½" SW 2½", 3" BW	65, 80	54 - 60	120 - 132
		Pumped Liquid Feed							
		Suction Stop Valve							
80	3	Relief Regulator Suction Regulator Hot Gas Defrost High Pressure Liquid	Full 35%	86.5 30.3	100.0 35.0	2½" SW 2½", 3" BW	65, 80	54 - 60	120 - 132
		Pumped Liquid Feed							
		Suction Stop Valve							

1. The flow coefficient shown is for the control module in position three shown in Figure 1.
2. The weight will vary based on the application.
3. Parker Electronic Valve (PEV) applications.

Pressure Regulator Range	Set Point Range	Pressure Change per Turn of the Adjustment Screw	Factory Set Point [1]
V *	250mm Hg - 8.3 bar (10in Hg - 120 psig)	*Approximate* 1.5 bar (22 psig)	2.8 bar (40 psig)
A	0.35 - 10.3 bar (5 - 150 psig)	*Approximate* 1.2 bar (17 psig)	2.8 bar (40 psig)
D	5.2 - 19.3 bar (75 - 280 psig)	*Approximate* 2.9 bar (42 psig)	9.7 bar (140 psig)
E	6.9 - 51.7 bar (100 - 750 psig)	*Approximate* 3.8 bar (55 psig)	20.7 bar (300 psig)

1. The factory set point changes basd on regulator type. Example "K" feature for range A is 4.8 bar (70 psig).
* Range V: Only applicable for outlet regulator

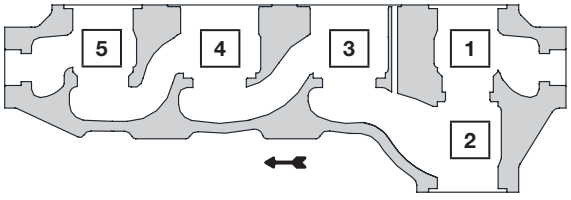
Function and Design

The PVS is an innovative design which combines several different functions into one compact valve station. This multi-module platform is available in four or five position housings, as shown in Figure 1, with the capability of interchangeable modules:

- Isolation valve (hand shut-off)
- Strainer (100 mesh)
- Solenoid
- Regulator
- Electronic valve
- Electronic expansion
- Hand expansion
- Stop/check

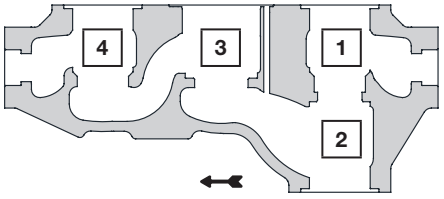
The PVS can be configured for many different applications including relief regulation, suction regulation, pumped liquid feed, hot gas defrost, and high pressure liquid solenoid applications as shown in Table 1 on page 2.

Five Position Valve Station (Not available with 2" ports)



1. Shut-Off Module
2. Strainer Module
3. Control Module (Solenoid/Regulator Option)
4. Parker Electronic Valve (PEV) or Hand Expansion Valve Module
5. Shut-Off or Stop/Check Module

Four Position Valve Station



1. Shut-Off Module
2. Strainer Module (Optional with 2" ports)
3. Control Module (PEV/Solenoid/Regulator Option)
4. Shut-Off or Stop/Check Module

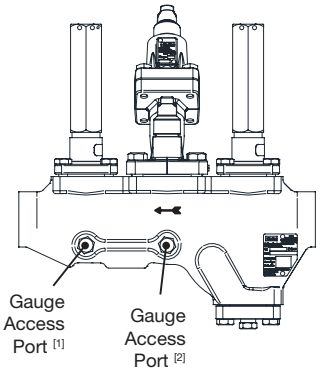
Figure 1: PVS Housings

The multi-module design reduces the overall length, weight and installation time. The PVS's regulator, solenoid and electronic modules, including the cartridge assembly for the solenoid and regulator control module, are interchangeable with the P-series valve group.

For additional information on the solenoid, regulator, and electronic P-series valve group, reference the bulletins listed below:

- 24-00 Parker Electronic Valve (PEV)
- 24-05 Pressure Regulators (PA4) & Solenoid (PS4)

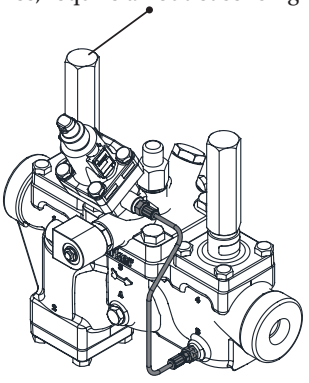
Pressure access ports, ⅜" or ¼" NPT, are available at multiple locations on both sides of the valve station, as shown in Figure 2.



1. The 20mm (¾") and 25mm (1") port valves have a ⅜" NPT access port, where the 32mm (1¼") and larger port valve have a ¼" NPT access port.
2. ⅜" NPT access port for all port sizes.

Figure 2: PVS Pressure Access Port Locations (4 Position Valve Shown)

Some regulator variation, such as the differential ('A4L') or outlet ('A4O') features, require an outlet sensing line as shown in Figure 3.

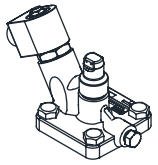
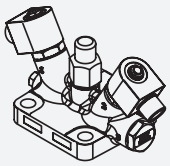
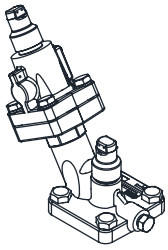
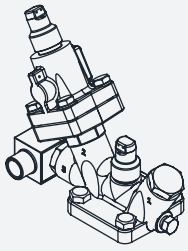
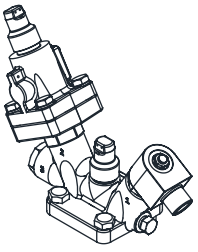
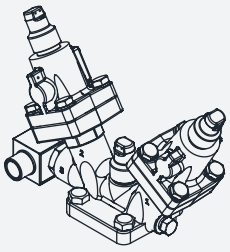


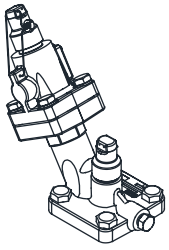
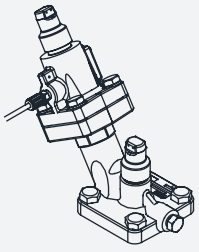
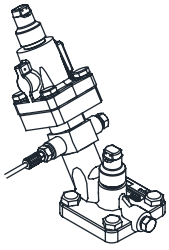
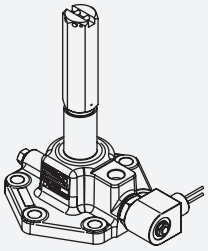
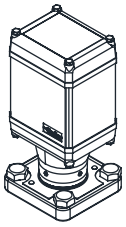
Sensing Line

Figure 3: Outlet (Down Stream) Sensing Line

Control Module Variations

There are many possible combinations for the control module position (3) . The solenoid ('S4'), electric shut-off ('A4S'), electric wide-opening ('A4B') and dual pressure ('A4D') variations are often combined with each other. Or they may be used in combination with inlet pressure ('A4'), outlet pressure ('A4O') or differential pressure ('A4L') regulators.

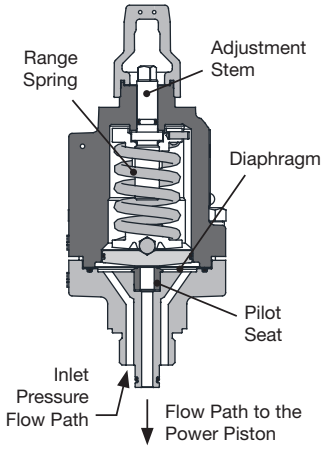
Variation	Control Module Suffix	Port Plate Setup	Function	Operation	Typical Applications
Solenoid	S4		Shut-off	Open when electrically energized; closed when not energized.	1. Pump liquid feed 2. High pressure liquid 3. Hot gas defrost
Two-Stage Solenoid	S4D		Combined soft gas/hot gas	Open 10% when #2 coil is electrically energized, open 100% when both coils energized; closed when not energized. (PAD2 then PAD1)	1. Combined soft gas/hot gas feed for hot gas defrost applications Patent Pending
Inlet Regulator	A4		Controls inlet pressure	Operates at present inlet pressure. Can be field adjusted. Opens on rising inlet pressure.	1. Evaporator pressure control 2. Condenser pressure control 3. Any inlet pressure control
Regulator with Electric Shut-Off	A4S		Controls inlet pressure or shut-off regulator	Regulates when electrically energized; closed when not energized.	1. Open for temperature control 2. Closed for defrosting
Regulator with Electric Wide Opening	A4B		Controls inlet pressure or wide open/bypass regulator	Regulates when not electrically energized; wide open when energized.	1. Wide open for maximum cooling 2. Regulating for defrost 3. Regulating for temperature control
Dual Regulator	A4D		Dual pressure control Position 1: high pressure pilot Position 2: low pressure pilot	Regulates at lower pressure when electrically energized; at higher pressure when not energized.	1. Higher pressure for defrost 2. Higher pressure for temperature control 3. Internal pressure relief.

Variation	Control Module Suffix	Port Plate Setup	Function	Operation	Typical Applications
Re-Seating Relief Regulator	A4K		Re-seating relief regulator	Open wide above set point. Repeatedly re-seats after operation.	1. Defrost relief 2. Non-atmospheric relief 3. High to low relief
Differential Regulator	A4L		Controls differential pressure across control module	Regulates pressure difference at or below a pre-set amount.	1. Liquid pump relief regulator 2. Reduce liquid or vapor line pressure
Outlet Regulator	A4O		Controls outlet pressure	Regulates at preset outlet pressure. Can be field adjusted. Opens on a drop in outlet pressure.	1. Crankcase pressure regulation 2. Hot gas bypass; booster loading 3. Receiver pressure control
Suction Stop	GSS		Gas powered suction stop	Normally open; gas powered valve that is closed when coil is electrically energized; enters bleed mode (10 - 30%) with high ΔP.	1. Gas powered suction stop Patent Pending
Electronic Actuator	PEV		Electronic flow control	4 - 20 mA	1. Liquid Feed

Regulator Pilot Assemblies

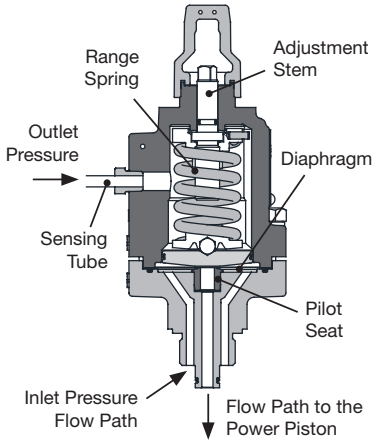
Pressure Pilot Regulator Assemblies

A4_ (B, S, D), A4K



The inlet pressure enters the space under the diaphragm through the inlet flow path. When the force created by the pressure exceeds the force of the range spring, the diaphragm is lifted off the pilot seat allowing pressure to enter on top of the power piston. This causes the power piston to move downward forcing the modulating plug to open and modulate to maintain constant inlet pressure. An increase in inlet pressure lifts the diaphragm further, allowing more pressure on top of the power piston and opening the valve wider. A decrease in inlet pressure causes the diaphragm to move closer to the pilot seat reducing the pressure on the top of the power piston and causing the closing spring to reduce the valve opening. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed off through the bleed hole in the power piston and through the clearance between the piston and cylinder.

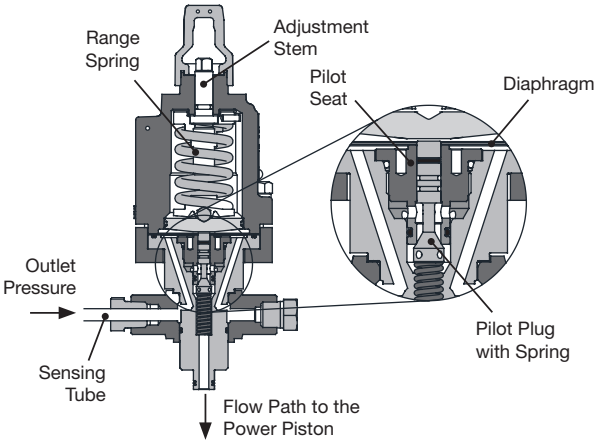
A4L



This is a pilot operated regulator whose main valve is opened by a power piston in response to the inlet pressure received from below the regulator diaphragm. The outlet pressure is introduced through a sensing tube from the outlet of the valve into the bonnet and to the top of the diaphragm, thus allowing the regulator to maintain a differential pressure between the inlet and outlet equivalent to the spring pressure.

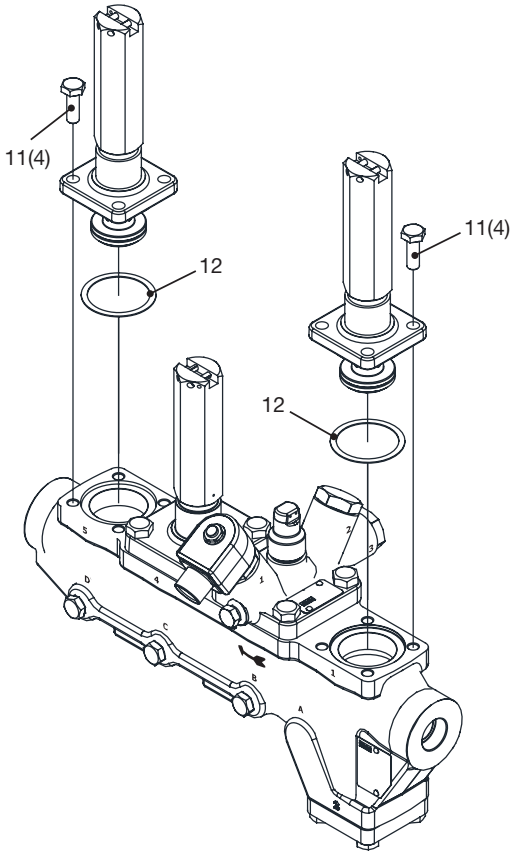
After the regulator is set for the desired pressure differential, the pressure at the inlet of the regulator will rise and fall, pound for pound, with the rise and fall of pressure at the regulator outlet, always maintaining the set-for differential pressure across the regulator. If the difference between inlet pressure and outlet pressure of the regulator is less than the set-for pressure, the regulator will remain tightly closed.

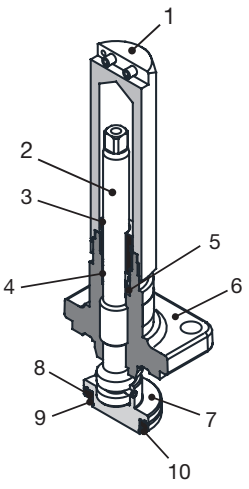
A4O



The outlet pressure is sensed under the diaphragm through the sensing tube. When the force created by the outlet pressure acting under the diaphragm is less than the force of the range spring, the pilot is open, allowing pressure to enter on top of the power piston. This causes the power piston to force the modulating plug to open to maintain to constant outlet pressure. An increase in the outlet pressure will lift the diaphragm against the force of the range spring, allowing the pilot plug to start closing. The pressure on top of the power piston is decreased and the closing spring acts to reduce the opening of the modulating plug and the flow of fluid through the regulator. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed through a bleed hole in the power piston and through the clearance between the piston and cylinder.

Material List: Shut-Off Module

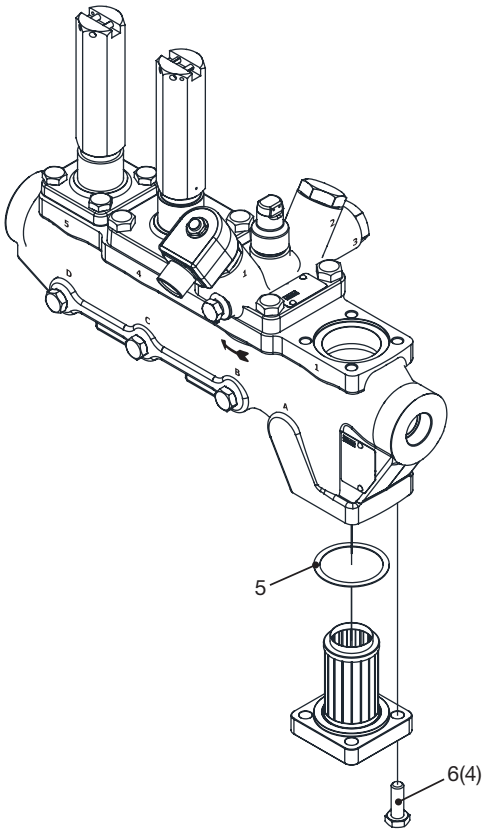


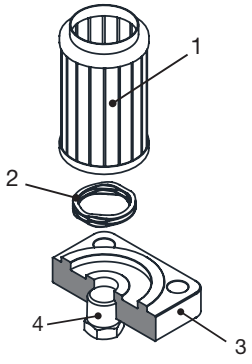


Item	Description	Material
1	Seal Cap	Aluminum, 2011-T3 per ASTM B211
2	Stem, Hand Valve	303 Stainless Steel
3	Nut, Packing	303 Stainless Steel
4	Packing Gland	PTFE, Carbon Filled
5	Packing	Style 235A Crane Foil
6	Bonnet, Hand Valve	Steel, Zinc Plated - A350-LF2 Class 1
7	Disc Carrier, Hand Valve	1117 Stainless Steel
8	Seat Disc, Hand Valve	PTFE, Carbon Filled
9	Washer, Retaining Ring	Low Carbon Steel, Zinc with Clear Chromate Plated
10	Retaining Ring	Carbon Spring, Temper Steel
11	Bolts, Hand Valve Bonnet	Stainless Steel, DIN ISO 3506-1 Grade A2
12	Gasket, Hand Valve Bonnet	Gylon 3500
—	O-Rings	Neoprene

*Body: Cast Steel - LCC ASTM A352

Material List: Strainer Module

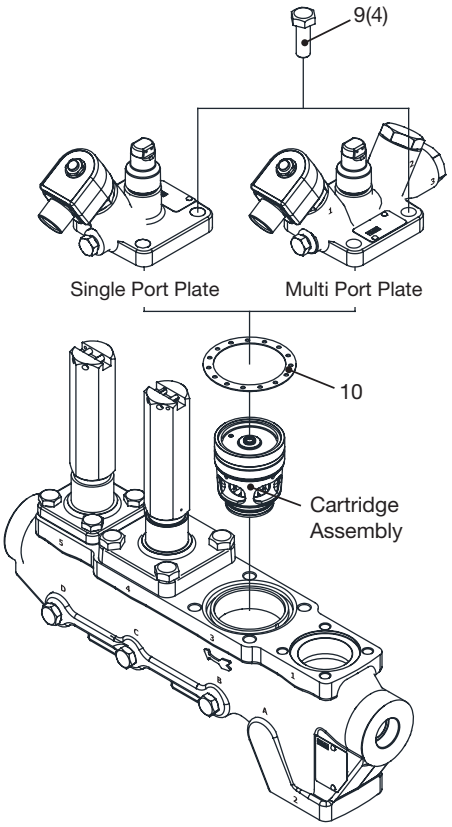


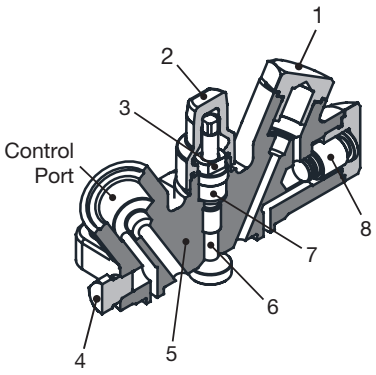


Item	Description	Material
1	Strainer Basket	100 Mesh, 304 Stainless Steel
2	Wave Spring	Carbon Spring, Temper Steel
3	Cover Plate, Strainer	ASTM A350, LF2 Class 1 Zinc with Clear Chromate Plated
4	Pipe Plug	Zinc Plated Steel
5	Gasket, Hand Valve Bonnet	Gylon 3500
6	Bolts, Hand Valve Bonnet	Stainless Steel, DIN ISO 3506-1 Grade A2

*Body: Cast Steel - LCL ASTM A352

Material List: Control Module (Solenoid/Regulator Options)



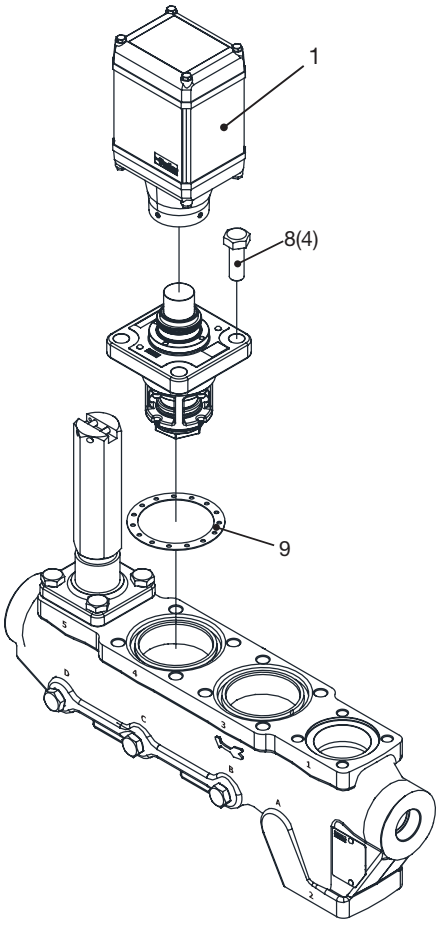


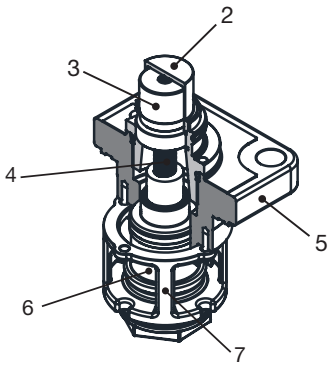
Item	Description	Material
1	Cap, Port Plate	303 Stainless Steel
2	Seal Cap	304 Stainless Steel
3	Packing Nut	303 Stainless Steel
4	Plug, Gauge Port	304 Stainless Steel
5	Port Plate	Cast Steel - LCC ASTM A352
6	Stem, Manual Opening	303 Stainless Steel
7	Packing	Graphitic - ASTM F2168
8	Plug, Pilot	303 Stainless Steel
9	Bolts, Port Plate	Stainless Steel, DIN ISO 3506-1 Grade A2
10	Gasket, Port Plate	Gylon 3500
—	Washer, Packing	Steel
—	Gasket, Seal Cap	Wolverine MS-18020
—	Gasket, Port Plate Cap	Wolverine MS-18020
—	Gasket, Control Port	Wolverine MS-18020

Note: The description and material information for the cartridge assembly and control port options can be found on page 11.

*Body: Cast Steel - LCC ASTM A352

Material List: Parker Electronic Valve (PEV) Module

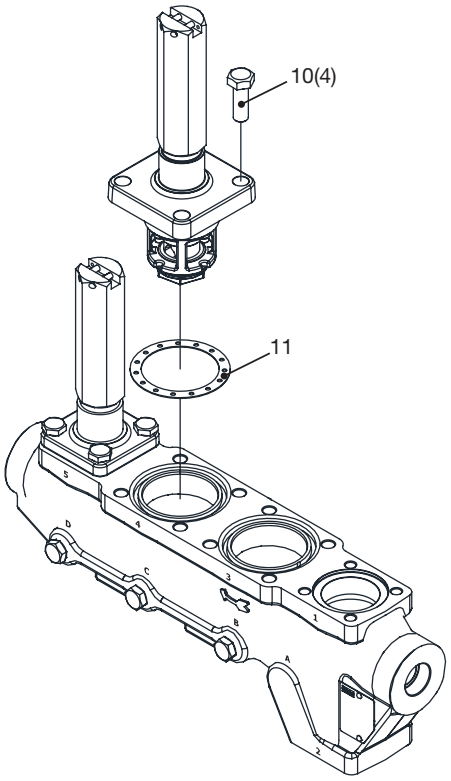


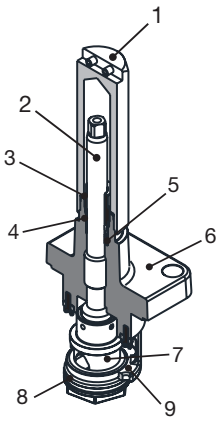


Item	Description	Material
1	Actuator, PEV	Aluminum, Resin, Silicone
2	Cap, Plug	303 Stainless Steel
3	Magnet	Stainless Steel
4	Screw, Plug	303 Stainless Steel
5	Port Plate, PEV	Stainless Steel - CF3 (ASTM A351)
6	Plug	303 Stainless Steel
7	Housing, Plug	CF3 (ASTM A351)
8	Bolts, Port Plate	Stainless Steel, DIN ISO 3506-1 Grade A2
9	Gasket, Port Plate	Gylon 3500
—	Seat, Plug	PTFE
—	O-Rings	Neoprene
—	Hex Screws, Plug Housing	Stainless Steel, Grade 18-8

*Body: Cast Steel - LCC ASTM A352

Material List: Expansion Module

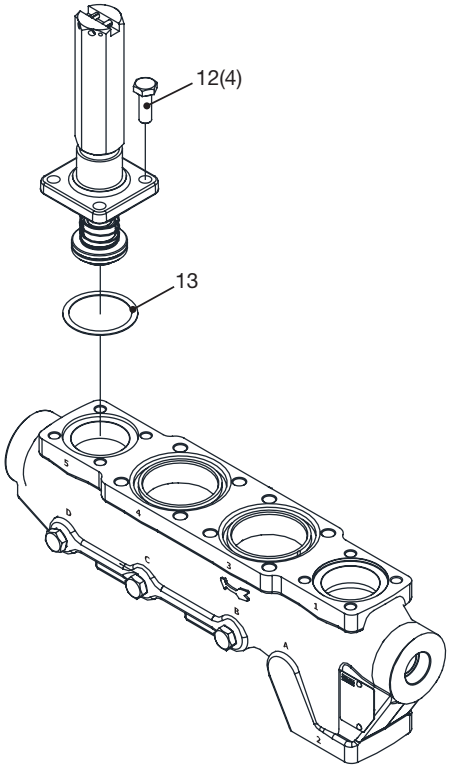


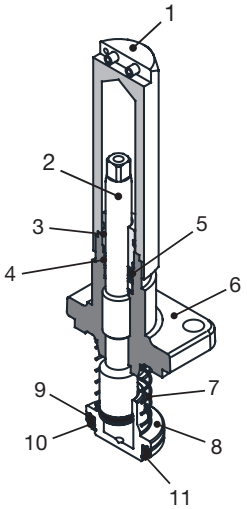


Item	Description	Material
1	Seal Cap, Yellow	Aluminum, 2011-T3 Per ASTM B211
2	Stem, Hand Valve	303 Stainless Steel
3	Nut, Packing	303 Stainless Steel
4	Packing Gland	PTFE, Carbon Filled
5	Packing	Style 235A Crane Foil
6	Bonnet, Hand Valve	Steel, Zinc Plated - (A350-LF2 Class 1)
7	Plug, Expansion	303 Stainless Steel
8	Disc Holder	303 Stainless Steel
9	Seat	Stainless Steel
10	Bolts, Hand Valve Bonnet	Stainless Steel, DIN ISO 3506-1 Grade A2
11	Gasket, Hand Valve Bonnet	Gylon 3500
—	O-Rings	Neoprene

*Body: Cast Steel - LCC ASTM A352

Material List: Stop/Check Module

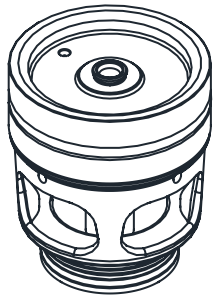


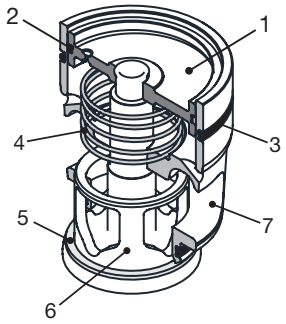


Item	Description	Material
1	Seal Cap, Green	Aluminum, 2011-T3 per ASTM B211
2	Stem, Hand Valve	303 Stainless Steel
3	Nut, Packing	303 Stainless Steel
4	Packing Gland	PTFE, Carbon Filled
5	Packing	Style 235A Crane Foil
6	Bonnet, Hand Valve	Steel, Zinc Plated - (A350-LF2 Class 1)
7	Spring	Music Wire, ASTM A-228
8	Disc Carrier, Stop/ Check Valve	1117 Stainless Steel
9	Seat Disc, Hand Valve	PTFE, Carbon Filled
10	Washer, Retaining Ring	Low Carbon Steel, Zinc with Clear Chromate Plated
11	Retaining Ring	Carbon Spring, Temper Steel
12	Bolts, Hand Valve Bonnet	Stainless Steel, DIN ISO 3506-1 Grade A2
13	Gasket, Hand Valve Bonnet	Gylon 3500
—	O-Rings	Neoprene

*Body: Cast Steel - LCC ASTM A352

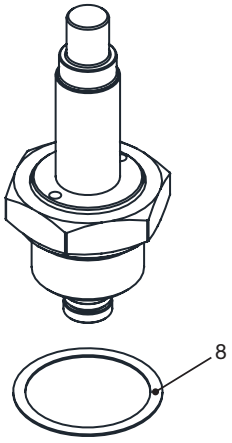
Material List: Control Module - Cartridge Assembly

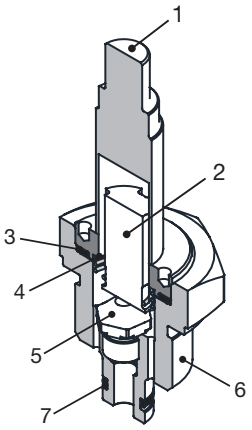




Item	Description	Material
1	Piston	303 Stainless Steel
2	Ring, Piston	Ductile Iron
3	O-Ring	Neoprene
4	Spring	Music Wire, ASTM A-228
5	Seat	PTFE
6	Plug/Stem	CF3 (ASTM A351)
7	Cartridge, Housing	CF3 (ASTM A351)

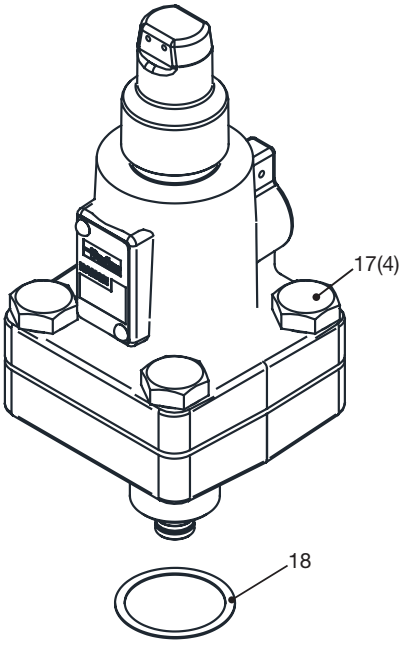
Material List: Control Module - Solenoid Pilot Assembly

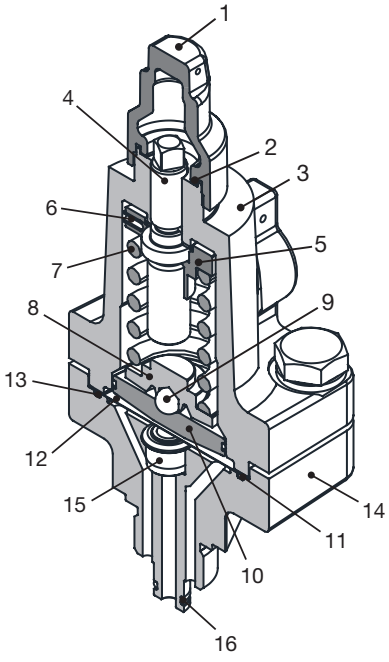




Item	Description	Material
1	Sleeve	304 Stainless Steel
2	Plunger	430FR Stainless Steel
3	O-Ring	Neoprene
4	Spring, Plunger	18-8 Stainless Steel
5	Seat, Solenoid	PTFE
6	Adaptor	303 Stainless Steel
7	O-Ring, Adaptor	Neoprene
8	Gasket, Adaptor Assembly	Wolverine MS-18020

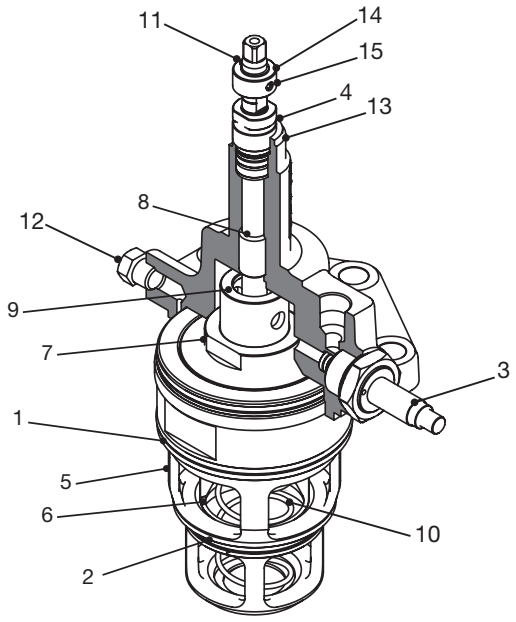
Material List: Control Module - Regulator Pilot Assembly





Item	Description	Material
1	Seal Cap	304 Stainless Steel
2	Gasket, Seal Cap	Wolverine MS-18020
3	Bonnet	CF3 (ASTM A351)
4	Adjustment Stem	303 Stainless Steel
5	Spring Plate, Top	Steel, AISI 1215 CD
6	Pin	420 Stainless Steel
7	Spring	Music Wire, ASTM A-228
8	Spring Plate, Bottom	Steel, AISI 1215 CD
9	Ball	440C Stainless Steel
10	Follower, Diaphragm	Steel, AISI 1215 CD
11	Gasket, Bonnet	Kingersil, C-4401
12	Diaphragm	301/302 Stainless Steel
13	O-Ring, Diaphragm	Neoprene
14	Plate, Bonnet	CF3 (ASTM A351)
15	Seat, Pilot	416 Stainless Steel
16	O-Ring, Bonnet Assembly	Neoprene
17	Bolt, Bonnet	Stainless Steel, DIN ISO 3506-1 Grade A2
18	Gasket, Bonnet Assembly	Wolverine MS-18020
—	Washer, Adjustment Stem	18-8 Stainless Steel
—	O-Ring, Adjustment Stem	Neoprene

Material List: Suction Stop Module



Patent Pending

Item	Description	Material
1	O-Ring	Neoprene
2	O-Ring	Neoprene
3	Solenoid, Operator Assy	303 Stainless Steel
4	Packing Nut	Graphitic - ASTM F2168
5	Cartridge, Body	Steel - AISI 1215
6	Piston, Inner	Steel - AISI 1215
7	Piston, Outer	Steel - AISI 1215
8	Stem, Manual Opening	303 Stainless Steel
9	Tube, Stem Lift	303 Stainless Steel
10	Spring	Music Wire - ASTM A-228
11	Retaining Ring	15-7 PH Stainless Steel
12	Plug	304 Stainless Steel
13	Bonnet	ASTM A350 LF 3CL2
14	Nut	303 Stainless Steel
15	Screw	303 Stainless Steel

Installation Instructions

All personnel working on valves must be qualified to work on refrigeration systems. If there are any questions contact Refrigerating Specialties before proceeding with the installation.

All valves are packed for maximum protection. Unpack carefully, checking to make sure all items are unpacked. If purchased PVS has the electronic option, the acutator comes with its own check list. Save the enclosed instruction for the installer and eventual user.

⚠ Do not remove the protective coverings from the inlet and outlet of the valve until the valve is ready to be installed.

The valve should be installed in a location where it is easily accessible for adjustment and maintenance. The location should be such that the valve can not be easily damaged by material handling equipment. When it is necessary to insulate the valve the insulation should be installed to provide access for adjustment and maintenance. Do not insulate solenoid coils, this also applies to pressure regulators with pilot solenoid options. Pressure gauges should be installed to be easily visible to the operating engineer for system checks and adjustment purposes.

The PVS series valves must be mounted in the upright horizontal position with the manual opening stems on the top. The valve must be installed with the arrow pointing in the direction of flow for the valve to function properly.

It is not necessary to disassemble the PVS before welding. The hand shut-off and hand expansion modules should be positioned in the mid position, off the seat. To gain access to the adjustments stems for the hand shut-off and expansion modules remove the seal caps, as shown in Figure 4, prior to welding.

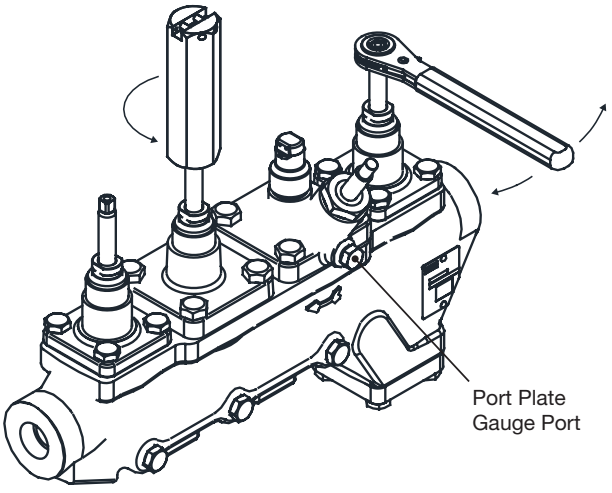


Figure 4: Hand Valve Module Disc Position

Note: The stop/check module can not be back seated, so a wet rag around the valve near the weld location is recommended, shown in Figure 5.

Contractors need to follow a WPS (Welding Procedure Specification) for all welding. The procedure must be qualified and the welder doing the weld must be qualified to perform that procedure.

The codes applicable to the welding of socket weld valves require that the pipe be inserted into the socket until bottomed against the stop. The pipe is then to be backed out approximately 1/16 of an inch before welding. Use of welding rings is optional, but recommended for butt weld valves. They help align, control the width of the gap for full penetration welding and reduce welding debris entry.

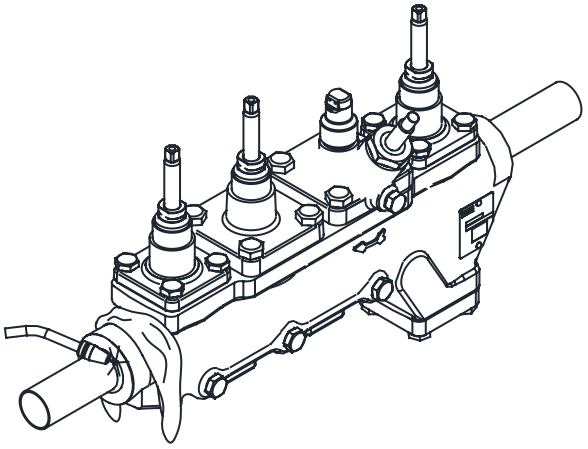


Figure 5: Welding with a Wet Rag

After welding the valve in place back seat the hand shut-off modules and put the seal caps back to the correct location. The expansion and electronic models can be adjusted at a later time. Seal caps are color coded: red for the stop/check module, yellow for the hand expansion module and non-painted for the hand shut-off module. Reference the module identifying sections in this literature for correct seal cap locations.

If you choose to disassemble the valve station prior to welding protect the inside of the valve station body, bonnet assemblies, cartridge port plate and strainer from welding debris and dirt. Place the components in a plastic bag, plastic container or use a rust protection agent, such as refrigerant oil, and store them in an area where they will not be damaged.

Remove welding debris and any dirt from the valve body before reassembling the valve. Check all contact surfaces, teflon seats, and cartridge o-rings for damage. Apply some silicon grease on the o-rings for protection and for ease installation.

Note: Refrigerating Specialties provides new bonnet gaskets for each module to be used as a replacement if valve is disassembled for welding, see Figure 6 for gasket location.

Insert the control module cartridge into station 3, for both the 5 and 4 position valves, prior to inserting all other modules. Next place the larger diameter gaskets with multiple holes in stations 3 and 4 in the 5 position valve and station 3 in the 4 position valve. Smaller diameter gaskets, with no holes, are used in stations 1, 2 and 5 for the 5 position valve and stations 1, 2 and 4 for the 4 position valve. See Figure 1 for valve module positions.

When installing the control module port plate assembly, the gauge port should always be on the side of the valve as shown in Figure 2. Tighten the port plate bolts with a torque wrench, evenly in a X configuration, to provide proper seating. Refer to Table 2 for the port plate bolt torque specifications.

Before putting valves into service, all pipe connections, valve seats, bonnet seals, and stem seals should be tested for leaks at pressure levels called for in appropriate codes.

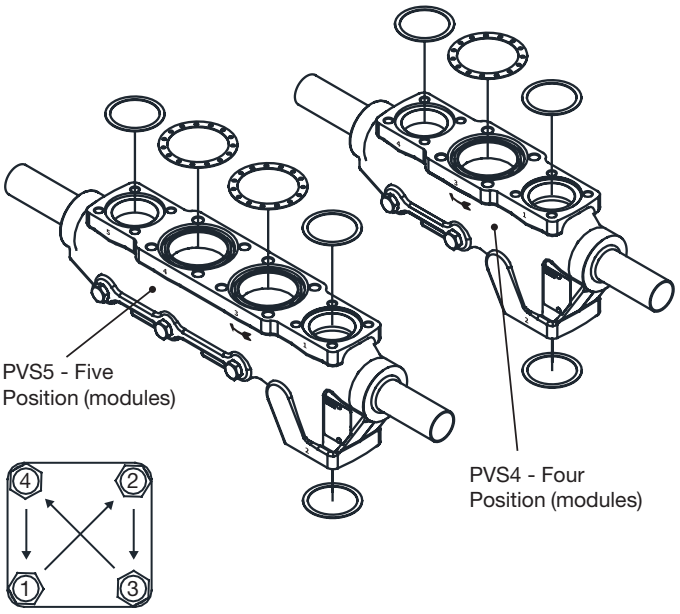


Figure 6: Gasket Location and Port Plate Torque Pattern

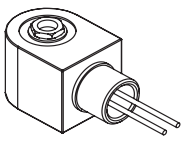
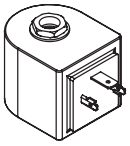
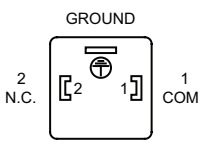
Valve Body	Port Size		Bolt Size	Module Position	Torque	
	mm	inch			Nm	ft. lb.
PVS3	50	2	M12 x 1.75	1, 3	90	66
			M14 x 2	2	104	77
	65	2½	M12 x 1.75	1, 3	90	66
			M16 x 2	2	149	110
	80	3	M12 x 1.75	1, 3	90	66
			M16 x 2	2	149	110
PVS4	20, 25	¾,1	M10 x 1.5	1, 2 & 4	41	30
			M12 x 1.75	3	61	45
	32, 40	1¼,1½	M12 x 1.75	1, 2 & 4	61	45
			M16 x 2	3	149	110
	50	2	M12 x 1.75	1, 2 & 4	90	66
			M14 x 2	3	104	77
	65	2½	M12 x 1.75	1, 2, & 4	90	66
			M16 x 2	3	149	110
	80	3	M12 x 1.75	1, 2, & 4	90	66
			M16 x 2	3	149	110
PVS5	20, 25	¾,1	M10 x 1.5	1, 2 & 5	41	30
			M12 x 1.75	3 & 4	61	45
	32, 40	1¼,1½	M12 x 1.75	1, 2 & 5	61	45
			M16 x 2	3 & 4	149	110

Table 2: Port Plate Bolt Torque Recommendations

Electrical

The Refrigerating Specialties Division molded water resistant solenoid coil is designed for long life and powerful opening force. The standard coil housing meets NEMA 4 requirements. This sealed construction can withstand direct contact with moisture and ice. Coil construction will permit coil temperatures as high as 180°C (356°F). A solenoid coil should never be energized except when mounted on its corresponding solenoid tube.

The solenoid coil must be connected to electrical lines with voltage and frequency, same as marked on coil. The supply circuits must be properly sized to give adequate voltage at the coil leads even when other electrical equipment is operating. The coil is designed to operate with line voltage from 85% to 110% of rated coil voltage. Operating with a line voltage above or below these limits may result in coil burn-out. Also, operating with line voltage below the limit will definitely result in lowering the valve's maximum opening pressure differential. Power consumption during normal operation will be 22 watts or less.

Type	Image	Terminal Diagram	Classification	Voltages/Frequencies	Wattage	Temp.	Cert.
Leaded		 Start Winding: White Wire End Winding: Black Wire	18" Leaded Wires NEMA 1, 2, 3, 4, 4x IP67	110-120 VAC/60 Hz 110-120 VAC/50 Hz 220-230 VAC/50 Hz 240 VAC/60 Hz 24 VAC/60 Hz 24 VDC [1] *(consult factory for other voltages/frequencies)*	22 W	180°C (356°F)	CE
DIN QD			NEMA 1, 2, 3, 4, 4x IP65				

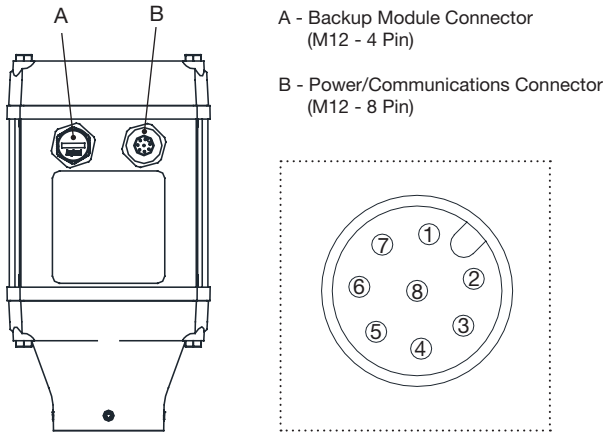
1. DC coils are limited to an ambient temperature of -25°C to 60°C (-13°F to 140°F) and an MOPD of 10.0 bard (145 psid). Only available in QD connection.

Table 3: General Coil Information

PEV Actuator

The PEV actuator requires 24 VDC power and a 4-20 mA input signal. The acceptable voltage range is 24 ± 2 for the power supply. The power supply should be sized to provide a minimum of 1.3 Amps of current to the PEV actuator. The PEV can be connected to a capacitive Parker Backup Module (PBM) via the four pin quick disconnect cable. The PBM is designed to position the PEV to a pre-determined user-identified position in the event of a power loss. The PEV can also be connected to a user-supplied Uninterruptible Power Supply (UPS) via pin 2 on the eight pin communication cable. The UPS should be sized to supply the necessary voltage and current to the PEV. For system wiring, the PEV comes with a 3 meter (9 foot) power cable.

At a minimum, the PEV actuator needs to be connected to a 24 VDC power supply (pins 1 & 8) and be provided with a 4-20 mA control signal (pins 5 & 6).



Manual Opening Operation

Solenoid/Regulator Control Module
The solenoid and regulator control modules, position three of both the four and five valve stations are equipped with a manual driven opening stem located in the center on the top side of the port plate. To manually bypass or open the pressure regulator turn the stem in (clockwise) until it stops. To put the pressure regulator back in automatic operation, turn the stem out (counter-clockwise) until it back seats.

Electronic Control Module
The PEV manual opening tool is for the purpose of opening or closing the valve without the use of the actuator. Prior to using the opening tool, turn off the main power to the PEV and disconnect all cords from the actuator. Loosen the four M4 set screws around the base of the actuator and lift the actuator off the valve body.

Once the actuator has been removed, the manual opening tool can be placed on the magnet assembly and manually rotated to open or close the valve, as shown in Figure 7. Clockwise motion will result in the valve opening and counter-clockwise motion will result in the valve closing. The manual opening tool is designed so that no external tools, wrenches, or levers are required to manually operate the valve.

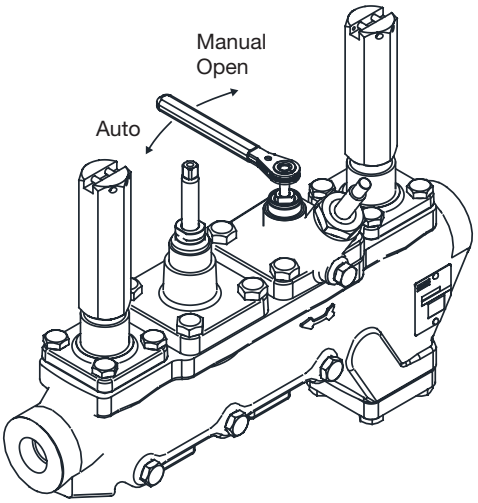


Figure 8: Solenoid/Regulator Control Module Manual Opening Stem

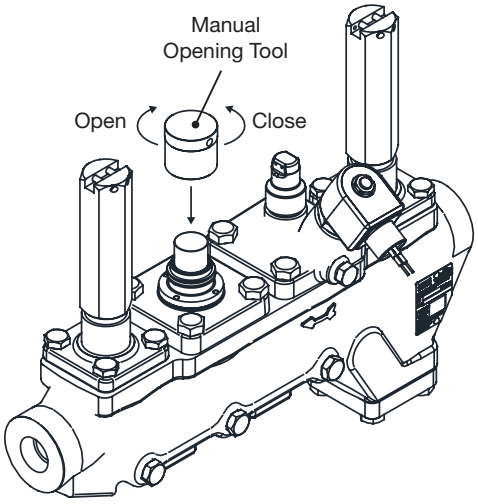


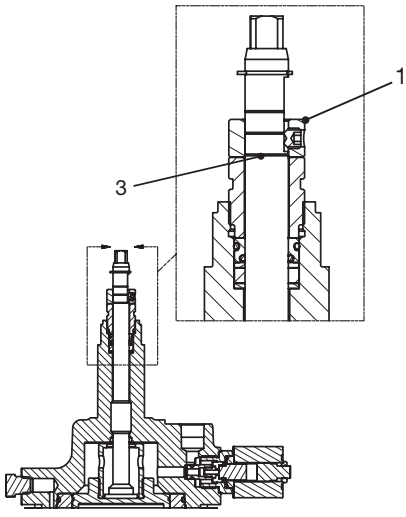
Figure 7: Electronic Module Manual Opening Tool

Note: Manual opening tool is ordered separately.

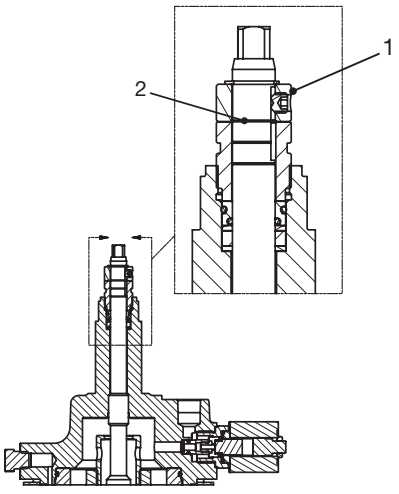
Apply o-ring grease to the actuator o-ring before reattaching the PEV actuator to the valve. Before attaching the actuator to the valve body check to see that the set screws are not going to cause any interference. If the set screws are protruding into the bore, use the hex wrench (Allen key) to back out the set screws. Now slide the actuator onto the valve and press down until the flat surface the actuator touches the valve. Once the actuator is in position, use the hex wrench to tighten the set screws.

Suction Stop Bleed Rate Adjustment

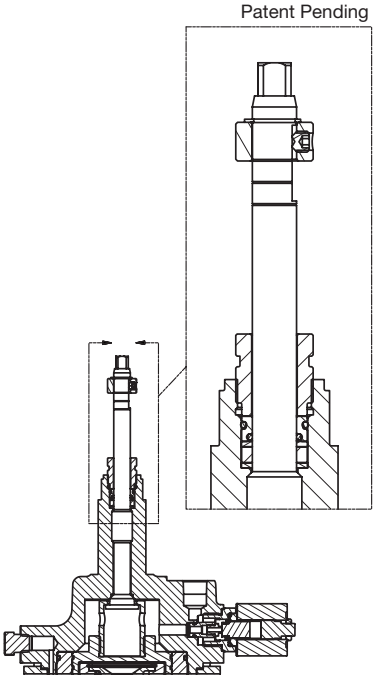
Patent Pending



Maximum Bleed



Minimum Bleed

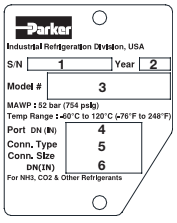
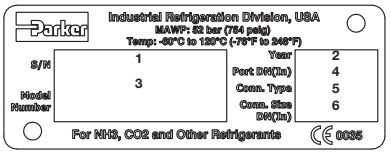


Manual Open

Variable Bleed: To adjust the bleed rate, first loosen the setpoint collar (1). Using a 1/4" wrench, turn the adjustment stem between the maximum (2) and minimum (3) bleed rate lines. Slide the setpoint collar down and lock it in place using a 1/8" Allen wrench.

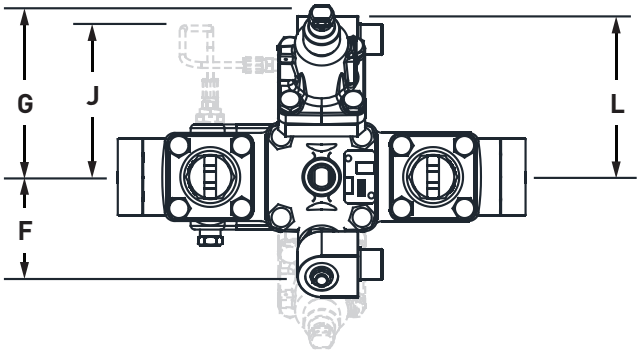
Manual Open: To put the normally open valve into manual open mode, turn the adjustment stem counter-clockwise until it is in the full out position. To put the valve back into automatic mode, turn the stem in until it reaches the set point previously established with the setpoint collar.

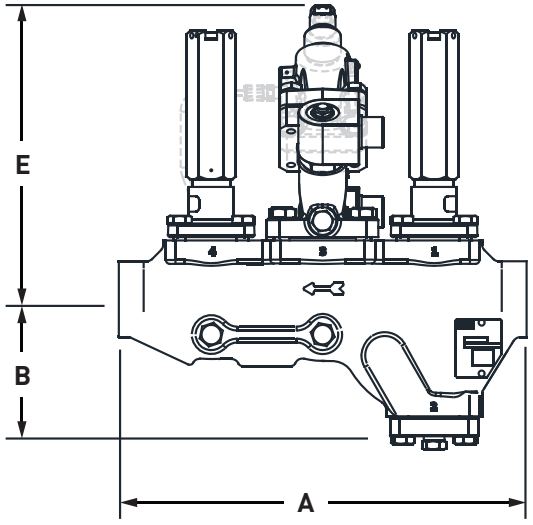
Nameplate Information

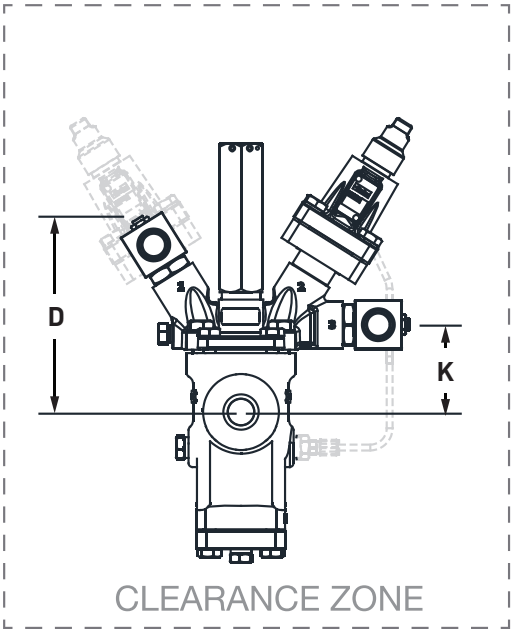
Port Size	Name Plate Image	Name Plate
20 mm, 25 mm (¾", 1)		1. Serial Number (S/N) 2. Year Manufactured 3. Valve Model Number (Smart Part Number) 4. Port Size 5. Connection Type 6. Connection Size
32 mm, 40 mm, 50 mm, 65 mm, 80 mm (1¼", 1½", 2", 2½", 3")		

Dimensional Information

Four Position Valve







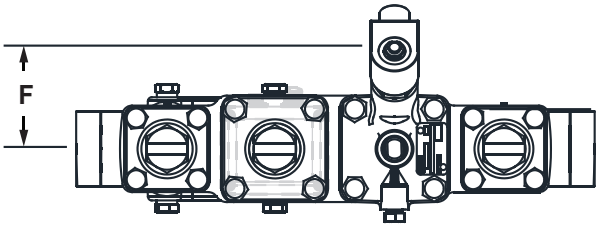
Port Size		A		B		D		F		L		K		J	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
20, 25	¾, 1	335	13.2	112	4.4	157	6.2	85	3.4	138	5.4	71	2.8	124	4.9
32, 40	1¼, 1½	404	15.9	161	6.3	175	6.9	83	3.3	138	5.4	81	3.2	165	6.5
50	2	476	18.8	164	6.4	182	7.2	89	3.5	148	5.8	94	3.7	137	5.4
65, 80	2½, 3	572	20.1	202	8.0	183	7.2	99	3.9	152	6.0	92	3.6	132	5.2

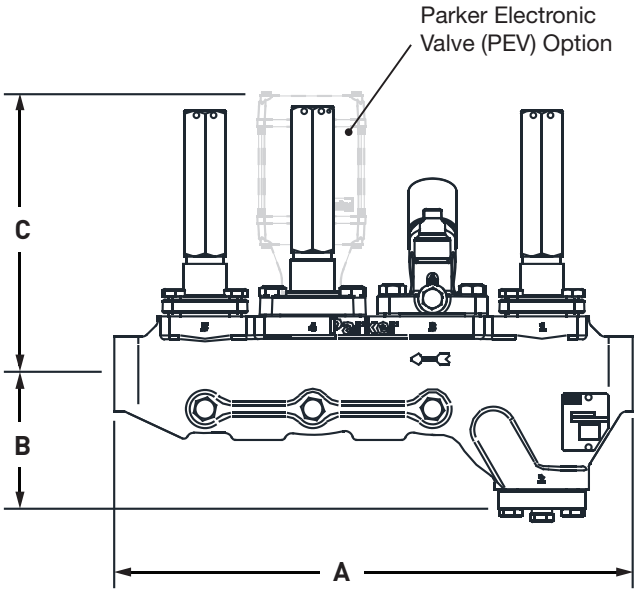
Port Size		E						G					
		Inlet Regulators				Outlet Regulators		Inlet Regulators				Outlet Regulators	
		Range A, D		Range E		Range V, D		Range A, D		Range E		Range V, D	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
20, 25	¾, 1	242	9.5	273	10.8	264	10.4	142	5.6	6.1	160	160	6.3
32, 40	1¼, 1½	245	9.7	277	10.9	267	10.5	137	5.4	162	6.4	156	6.1
50	2	267	10.5	299	11.8	290	11.4	143	5.6	162	6.4	157	6.2
65, 80	2½, 3	268	10.5	300	11.8	292	11.5	151	6.0	171	6.7	166	6.6

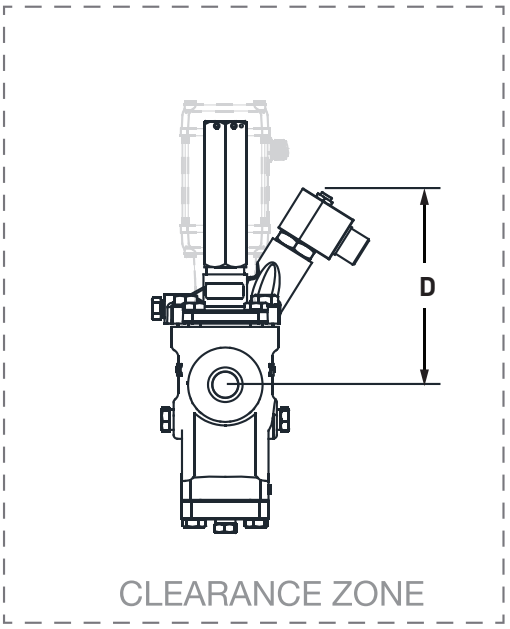
Clearance Zone:

1. The top of the PVS requires a clearance of 152 mm (6") for the removal the PEV actuator and hand valve seal caps.
2. The bottom of the PVS requires a clearance of 102 mm (4") for the removal of the strainer basket.
3. Both the left and right side of the PVS, widest valve setup as shown above, requires a minimum of 76 mm (3") on each side.

Five Position Valve





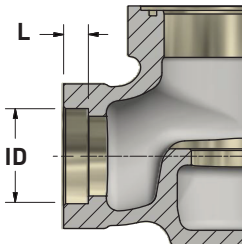


Port Size		A		B		C (PEV)		D		F	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
20, 25	¾, 1	434	17.1	112	4.4	234	9.2	157	6.2	85	3.4
32, 40	1¼, 1½	535	21.1	161	6.3	252	9.9	175	6.9	83	3.3

Clearance Zone:

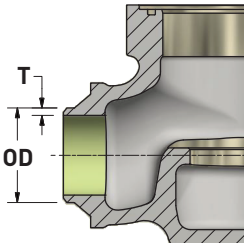
1. The top of the PVS requires a clearance of 152 mm (6") for the removal the PEV actuator and hand valve seal caps.
2. The bottom of the PVS requires a clearance of 102 mm (4") for the removal of the strainer basket.
3. Both the left and right side of the PVS, widest valve setup as shown above, requires a minimum of 76 mm (3") on each side.

Socket Weld (SW) ANSI



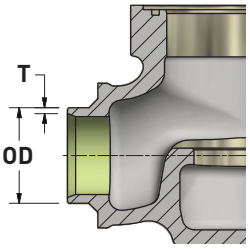
Port Size		Connection	L		ID	
mm	inch		mm	inch	mm	inch
20, 25	¾, 1	¾"	13	0.50	28	1.09
		1"			34	1.35
		1¼"			43	1.70
32, 40	1¼, 1½	1¼"	13	0.50	43	1.70
		1½"			49	1.94
		2"	16	0.63	61	2.43
50	2	2"	15.9	0.63	61	2.42
		2½"			74	2.92
65	2½	2½"	15.9	0.63	74	2.92
80	3	2½"	15.9	0.63	74	2.92

Butt-Weld (BW) ANSI



Port Size		Connection	T		OD	
mm	inch		mm	inch	mm	inch
20, 25	¾, 1	¾"	4.0	0.16	27	1.06
		1"	4.7	0.18	34	1.33
		1¼"	5.0	0.20	42	1.67
32, 40	1¼, 1½	1¼"	5.0	0.20	42	1.67
		1½"	5.2	0.21	49	1.91
		2"	4.0	0.16	61	2.39
50	2	2"	4.1	0.16	61	2.39
		2½"	5.3	0.21	73	2.89
65	2½	2½"	5.3	0.21	73	2.89
		3"	5.6	0.22	89	3.15
80	3	2½"	5.3	0.21	73	2.89
		3"	5.6	0.22	89	3.15

Butt-Weld (BW DN) Metric



Port Size		Connection	T		OD	
mm	inch		mm	inch	mm	inch
20, 25	¾, 1	20 mm	2.3	0.09	27	1.06
		25 mm	2.6	0.10	34	1.33
		32 mm	2.6	0.10	42	1.67
32, 40	1¼, 1½	32 mm	2.6	0.10	42	1.67
		40 mm	2.6	0.10	48	1.90
		50 mm	2.9	0.11	60	2.37
50	2	50 mm	2.9	0.11	60	2.37
		65 mm	3.5	0.14	77	3.03
65	2½	65 mm	3.5	0.14	77	3.03
		80 mm	4.0	0.16	90	3.54
80	3	65 mm	3.5	0.14	77	3.03
		80 mm	4.0	0.16	90	3.54

PVS Parts Kits

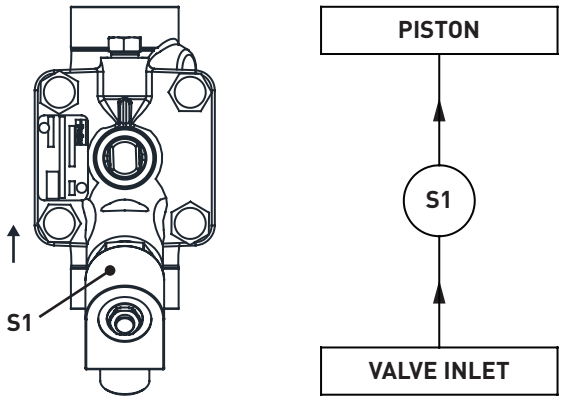
PVS Kit	Port Size	P/N	Description
Shutoff Module	¾" and 1"	210172	BN KT, HV PVS
	1¼" and 1½"	210422	BN KT, HV PVS 1½
	2½"	251246	BN KT, PGHV HV 2½" (DN65, SO)
Stop/Check Module	¾" and 1"	210173	BN KT, SCK PVS
	1¼" and 1½"	210423	BN KT, SCK PVS 1½
	2½"	251247	BN KT, PGHV SCK PVS 1½
Port Plate	¾" and 1"	251411	PVSW 3 PORT
	1"	251518	PVSW 1, SINGLE PRT
	1¼" and 1½"	251415	PVSW 3 PORT
	1½"	251522	PVSW 1½, SINGLE
	2"	251479	PVSW 3 PORT
	2"	251526	PVSW 2, SINGLE PORT
	3"	251528	PVSW 3, SINGLE PORT
	3"	251530	PVSW 3, 3 PORT
Strainer Basket	¾" and 1"	210178	STR KT, PVS
	¾" and 1"	210417	STR KT, PVS (6 PORT ¾ TO 1)
	1¼" and 1½"	210425	STR KT, PVS 1½
	2½"	251250	STR KT, PGHV STR 100MESH (DN65, ST.147)
Expansion Module	¾" and 1"	251056	BN KT, PVS4 HEV ¾ TO 1
	¾" and 1"	210174	BN KT, HEV PLUG PVS
	¾" and 1"	210175	BN KT, HEV PLUG PVS 50%
	1¼" and 1½"	251057	BN KT, PVS4 HEV 1¼ TO 1½
	1¼" and 1½"	210420	BN KT, HEV PLUG PVS 1½
	1¼" and 1½"	210421	BN KT, HEV PLUG PVS 1½ 50%
	2½"	251248	BN KT, PGHV HEV EXP PLUG PVS 2½" (DN65, RV, SO)
Cartridge Kits	1"	210547	CRT KT, 1 PVSW CK
	2½"	251533	CRT KT, 2½ PVS 75% CAP
	3"	251534	CRT KT, 3 PVS RED CAP 35%
Solenoid Tube Nut Wrench	ALL	210026	Tool Kit, Solenoid Tube
RG/TB Kit	¾" and 1"	251050	PVS4 A4AO
	1¼" and 1½"	251051	PVS4 A4AO
	¾" and 1"	251052	PVS4-A4L
	1¼" and 1½"	251053	PVS4-A4L
	2"	251538	PVS-A40
	2"	251539	PVS-A4L
	2½" and 3"	251540	PVS-A40
	2½" and 3"	251541	PVS-A4L
Gasket Kit	¾" and 1"	210176	GASKET KIT, PVS 1"
	1¼" and 1½"	210390	GASKET KIT, PVS 1½"
	2"	251213	GASKET KIT, PVS 2"
	3"	251499	GASKET KIT, PVS 3"
Seal Cap - Stop	ALL	209838	CAP KT, HV ¾ to 1½ PVS
Seal Cap - Expansion	ALL	209918	CAP KT, HV ¾ to 1½ PVS EXP
Seal Cap - Stop/Check	ALL	210077	CAP KT, SEAL SCK VLV 1¼ PVS
Pipe Plug Kit	¾" and 1"	210177	PLG KT, PVS
	1¼" and 1½"	210424	PLG KT, PVS 1½
	2"	251251	PLG KT, PIPE, PVS 2"
Plug/Cap Kit	ALL	251428	Plug Cap Kit, Port Plate, PVS/ PA4
Bottom Cover Kit	¾" and 1"	210179	CVR KT, PVS
	1¼" and 1½"	210426	CVR KT, PVS 1½
Seal Cap Kit	ALL	251400	PORT PLATE, MAN OPEN PVS, PA4
Bolt Kit	¾" and 1"	251542	BLT KT, PVS ¾" TO 1" PORT PLATE
	¾" and 1"	251543	BLT KT, PVS ¾" TO 1" BONNET
	1¼" and 1½"	251544	BLT KT, PVS 1¼" TO 1½" BONNET
	2"	251545	BLT KT, PVS 2" PORT PLATE
	2"-3"	251546	BLT KT, PVS 2" TO 3" BONNET
	2"-3"	251547	BLT KT, PVS 2" TO 3" STRAINER COVER
	3"	251548	BLT KT, PVS 3" PORT PLATE

APPENDIX A

Schematic Flow Diagrams

Schematic Flow Diagrams

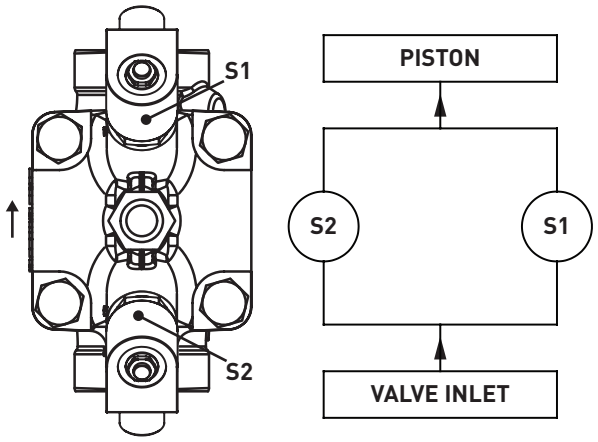
PS4_
Solenoid



Control Function	Operation
	S1
Open	Energized
Shut-Off	De-Energized

Patent Pending

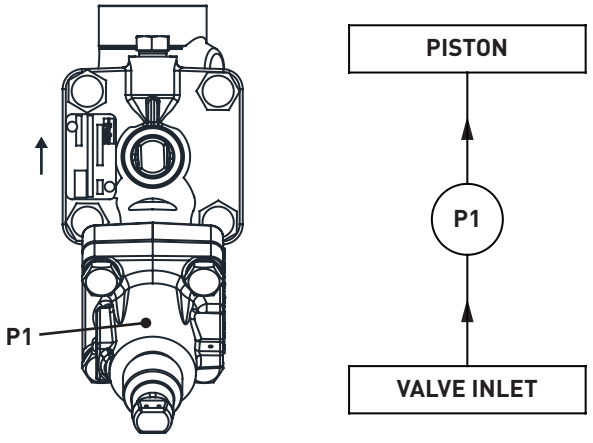
PS4D
Two-Stage Solenoid



Control Function	Operation	
	S1	S2
10% Open	De-Energized	Energized
100% Open	Energized	Energized
Shut-off	De-Energized	De-Energized

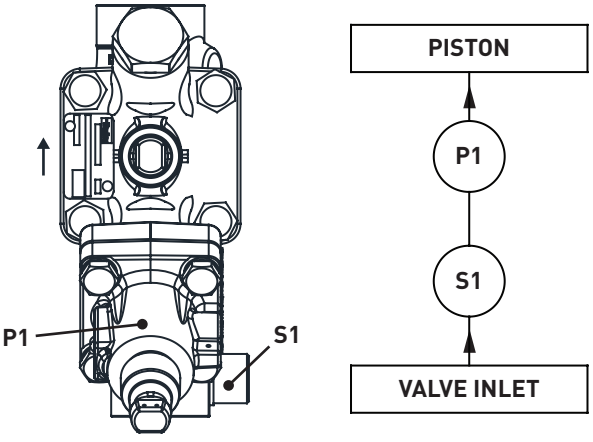
Proper sequencing (energizing and de-energizing) of the solenoid coils is essential for proper operation of the PS4D valve.

PA4_ / PA4_K
Inlet Pressure Regulator



Control Function	Operation
	P1
Pressure Pilot (P1)	Modulating

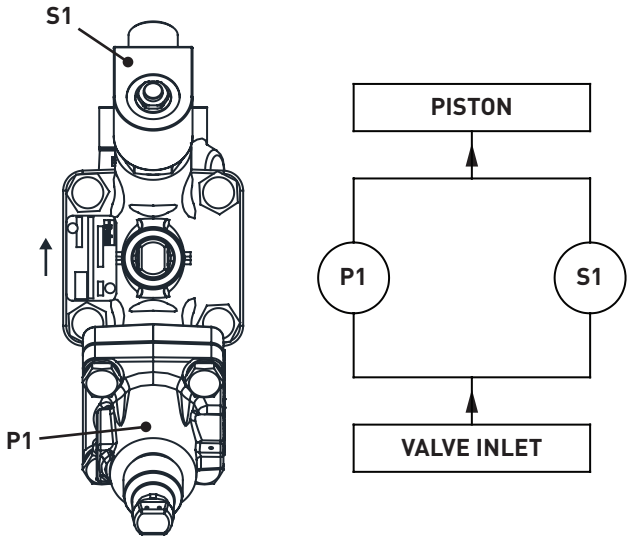
PA4_S
Inlet Pressure Regulator w/ Electric Shut-Off



Control Function	Operation
	S1
Pressure Pilot (P1)	Energized
Shut-Off	De-Energized

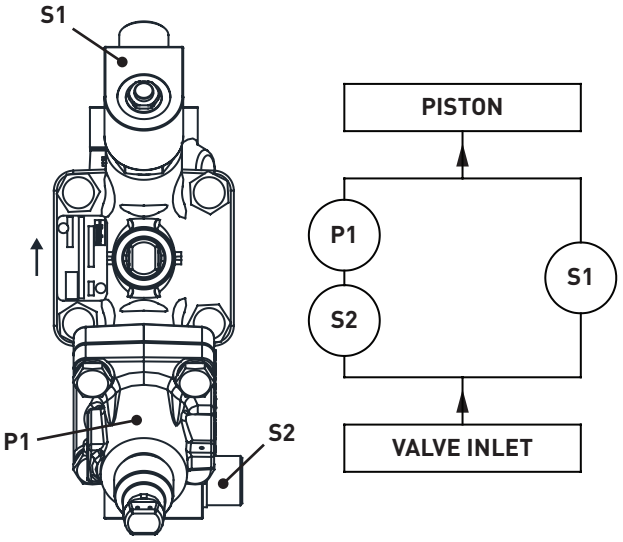
Schematic Flow Diagrams

PA4_B
Inlet Pressure Regulator w/ Electric Wide Open



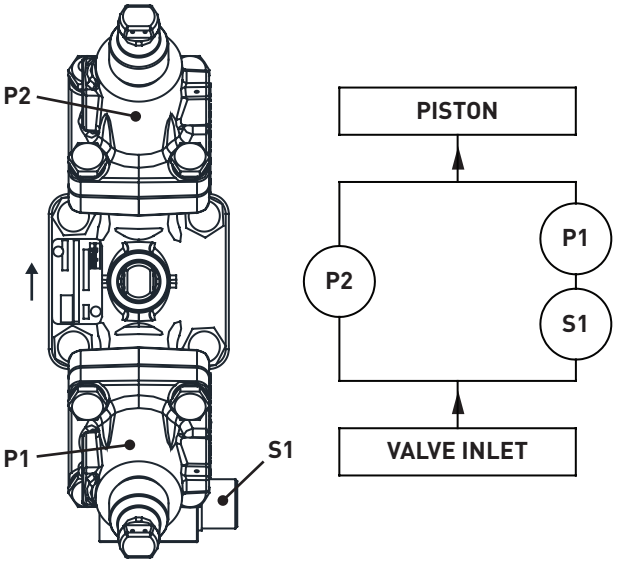
Control Function	Operation
	S1
Pressure Pilot (P1)	De-Energized
Wide Open	Energized

PA4_BS
Inlet Pressure Regulator w/ Electric Shut-Off and Electric Wide Open



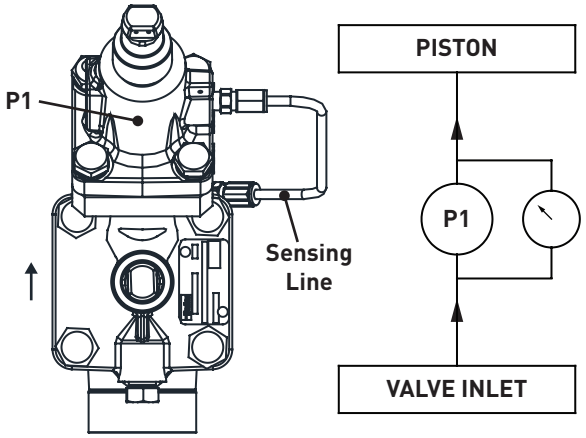
Control Function	Operation	
	S1	S2
Pressure Pilot (P1)	Energized	De-Energized
Shut-Off	De-Energized	De-Energized
Wide Open	Energized or De-Energized	Energized

PS4_D
Dual Inlet Pressure Regulator



Control Function	Operation
	S1
Low Pressure Pilot (P1)	Energized
High Pressure Pilot (P2)	De-Energized

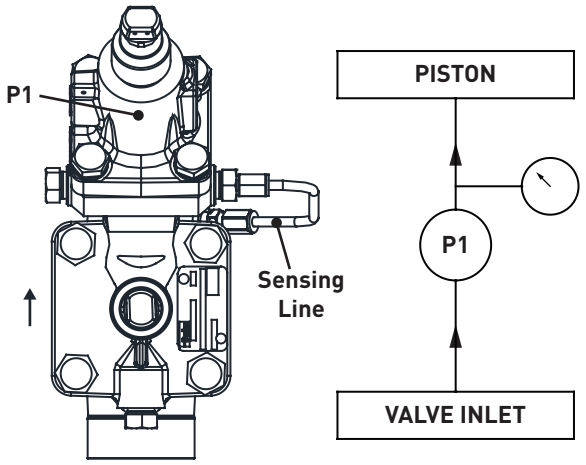
PA4_ L
Differential Pressure Regulator



Control Function	Operation
	P1
Pressure Pilot (P1)	Differential

Schematic Flow Diagrams

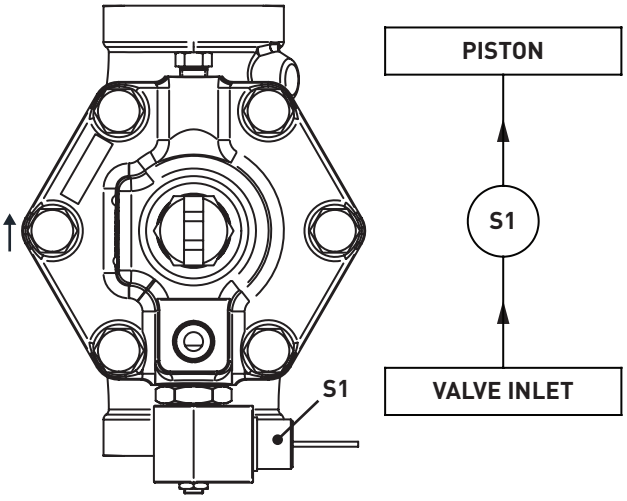
PA4_ 0
Outlet Pressure Regulator



Control Function	Operation
	P1
Pressure Pilot (P1)	Modulating

Patent Pending

PA4_GSS
Suction Stop



Control Function	Operation
	S1
100% Open	De-Energized
Bleed Mode	(10 - 30%) De-Energized w/ high ΔP
Shut-off	Energized

Safe Operation (See Bulletin RSBCV)
People doing any work on a refrigeration system must be qualified and completely familiar with the system and the Refrigerating Specialties Division valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent Refrigerating Specialties Division Product Bulletins and Safety Bulletin RSB prior to installation or servicing work.

Where cold refrigerant liquid lines are used, it is necessary that certain precautions be taken to avoid damage which could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid which can possibly rupture a gasket, pipe or valve. All hand valves isolating such sections should be marked, warning against accidental closing, and must not be closed until the liquid is removed. Check valves must never be installed upstream of solenoid valves, or regulators with electric shut-off, nor should hand valves upstream of solenoid valves or downstream of check valves be closed until the liquid has been removed.

It is advisable to properly install relief devices in any section where liquid expansion could take place. Avoid all piping or control arrangements which might produce thermal or pressure shock.

For the protection of people and products, all refrigerant must be removed from the section to be worked on before a valve, strainer, or other device is opened or removed. Flanges with ODS connections are not suitable for ammonia service.

Warranty
All Refrigerating Specialties products are under warranty against defects in workmanship and materials for a period of one year from date of shipment from factory. This warranty is in force only when products are properly installed, field assembled, maintained, and operated in use and service as specifically stated in Refrigerating Specialties Catalogs or Bulletins for normal refrigeration applications, unless otherwise approved in writing by the Refrigerating Specialties Division. Defective products, or parts thereof returned to the factory with transportation charges prepaid and found to be defective by factory inspection, will be replaced or repaired at Refrigerating Specialties option, free of charge, F.O.B. factory. Warranty does not cover products which have been altered, or repaired in the field, damaged in transit, or have suffered accidents, misuse, or abuse. Products disabled by dirt or other foreign substances will not be considered defective.

The express warranty set forth above constitutes the only warranty applicable to Refrigerating Specialties products, and is in lieu of all other warranties, expressed or implied, written including any warranty of merchantability, or fitness for a particular purpose. In no event is Refrigerating Specialties responsible for any consequential damages of any nature whatsoever. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Refrigerating Specialties, nor to assume, for Refrigerating Specialties, any other liability in connection with any of its products.

314069RSD ECO: #0326273 03/2020

Parker

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