

Parker Compact Solenoid

Product Bulletin 30-80 A

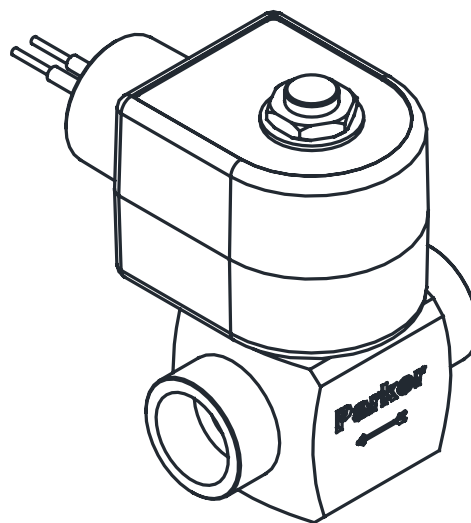
Type: PCS



Purpose:

The PCS direct acting solenoid valves are designed to work in a variety of applications around the world. The PCS is constructed from globally accepted materials and is available in carbon or stainless steel versions. This valve is also offered with either a threaded or welded end connection to allow for use in a variety of applications. The standard coil offering allows the PCS to be used anywhere in the world simply by specifying the needed voltage and frequency.

P	C	S
A	O	O
R	M	L
K	P	E
E	A	N
R	C	O
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Contact Information: Product Features:

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- Suitable for ammonia, CO₂, R-22, R-134a, R-404a, R-410a, R-507 and other common refrigerants
- Available as a plated steel or stainless steel housing to increase product lifecycles
- Replaceable seat ensures easy service and long life
- Coil interchangeable with other P-Series offerings
- Coil options to meet various applications
- Available with Neoprene or HNBR O-rings



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Technical Data

Liquid Temp. Range Neoprene	-60°C to 120°C (-76°F to 248°F)	Maximum Rated Pressure (MRP)	28 bar (400 psig)
Liquid Temp. Range HNBR	-46°C to 120°C (-51°F to 248°F)	Burst Pressure	> 5 x MRP
Ambient Temperature Range	-60°C to 70°C (-76°F to 158°F)	Coil Classification.....	IP65(DIN) / IP67 (Leaded); NEMA 4; CE

Port Size		Connection			Flow Coefficient		MOPD	
mm	inch	SW	BW (ANSI / DIN)	Threaded (NPT or BSPT)	K _v	C _v	bar	psi
3	1/8"	3/8"	3/8" / DN10	1/4", 3/8"	0.29	0.33	20.7	300
4	5/32"				0.43	0.50	11	160

Function and Design

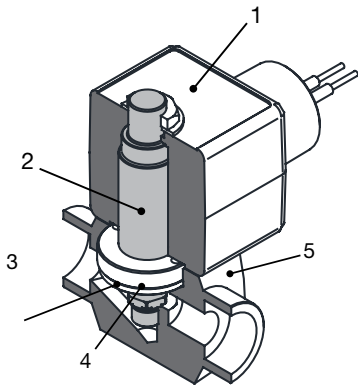
The PCS is a direct acting normally closed solenoid valve making it ideal for oil or liquid feed applications as well as for controlling the pilot section of larger valves. This valve requires no pressure drop to operate.

The method of operation starts with a closed valve. When power is applied to the coil an electrical field is created around the operator.

This electrical field causes a plunger assembly contained in the operator to lift off of the seat allowing refrigerant to flow through the valve. (When the coil is energized the valve will open and when the coil is de-energized the valve will close.)

This valve is available with several different connections, two port sizes and the option for a neoprene or HNBR o-ring.

Material List



Item	Description	Material
1	Coil	—
2	Pilot Solenoid Assembly	Stainless Steel
3	O-Ring	Neoprene / HNBR
4	Seat, Solenoid	Stainless Steel
5	Body, Valve	Stainless Steel (316) / Steel (A350 LF2)

Installation

All valves are packed for a maximum protection. Unpack carefully. Check the carton to make sure all items are unpacked. 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. Protect the inside of the valve from dirt and chips before and during installation.

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 applies to regulators with pilot solenoid options. Proper indicating gauges should be installed to be easily visible to the operating engineer for system checks and adjustment purposes.

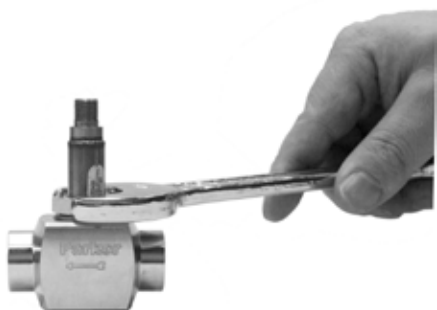
Warning

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

The PCS valve should be disassembled prior to welding to protect the internal components from excessive heat generation. Only the operator and o-ring need to be removed. To remove the solenoid tube assembly from the valve assembly slide the tool over the tube.



Align the pins on the tool with the holes located at the base of the solenoid tube assembly. Using a $\frac{15}{16}$ " wrench or extended socket remove the solenoid tube assemble from the body by turning counter clockwise.



Remove the solenoid tube and operator. Care should be taken as the operator is spring loaded into the solenoid tube and the two components will come apart.



After the tube and operator are removed the o-ring seal should be removed carefully to prevent any damage to the o-ring itself or the sealing surfaces.



Care should be taken to keep the components clean and protected during installation. If possible the parts should be placed in a sealed bag or container to prevent contamination or damage.

Process Connections:

The preferred mounting method for the PCS series valves is in the upright horizontal position. The valve must be installed with the arrow pointing in the direction of flow for the valve to function properly. Prior to welding protect the inside of the valve body from welding debris and dirt.

In the event the valve is left disassembled for any length of time, protecting the components is essential. Place the components in a polyethylene bag or apply a rust protection agent, such as refrigerant oil.

Welded Connection:

Contractors need to follow a WPS (Welding Procedure Specification) for all welding. The procedure must be qualified and welder doing the weld 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 $\frac{1}{16}$ of an inch before welding. Use of welding rings is optional, but recommended for butt weld valves. They help alignment, control gap for full penetration welding, and reduce welding debris entry.

Note: When welding carbon steel and stainless steel the welded joint should be painted to prevent galvanic corrosion.

Socket welding, where allowed, is the preferred connection. This connection helps to reduce the amount of welding debris in the piping system.

Remove welding debris and any dirt from the pipes and valve body before reassembling the valve.

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

Threaded Connection:

In order to achieve a secure and leak tight connection care should be taken in the selection and preparation of the mating piping. The pipe should be properly cut and threaded according to the NPT or BSPT standards. Sealant on the male side (pipe side) is recommended for a tight connection. Sealant should be applied evenly to act as a lubricant between the male and female threads which will prevent galling. The PCS valve and piping should be adequately tightened by using two wrenches positioned as close together as possible while avoiding any contact with the threads. Before putting valves into service, all pipe connections, valve seats, and seals should be tested for leaks at pressure levels called for in appropriate codes.

Maintenance and Service

Depending on operating conditions periodic cleaning and/or replacement of components may be necessary. Prior to any service work the system should be put into a safe condition by qualified personnel. Failure to do so may result in injury or loss of life. The system should be pumped down according to standard operating procedures and in accordance with all local rules and regulations. The coil and electrical connections should be disconnected and put into a known safe condition. Only after the system is put into a safe condition should maintenance work be performed.

The first step in valve disassembly is to remove the coil. Depending on the type of coil used the method to disconnect the coil from the electrical system may vary. Once the coil is disconnected the coil nut and washer can be removed. Care

should be taken not to apply any forces or torques to the operator during this step. Once the coil is removed the operator can be disassembled from the body. A wrench nut or spanner wrench should be used to apply the torque necessary to remove the operator. No tools should be used to apply force or torque to the operator sleeve itself as this can cause an unsafe condition. Once the operator is removed the o-ring can be removed from the valve body. The final step in disassembly is to remove the valve seat from the housing. The valve seat features an $\frac{3}{8}$ " hex design to allow for disassembly using standard tools.

Prior to reassembly all o-rings and sealing surfaces should be inspected for any damage. If damage is found the parts should be replaced.

Service Pointers

Symptom	Probable Reason	Correction
Fails to Open or close	Coil is improperly applied	Check supply voltage and frequency compared to coils rated voltage and frequency. Ensure that the control circuitry is applying power when needed. Ensure that coil is not burnt out.
	Pressure exceeds MOPD	Check the system pressure compared to the valves rating. The valve will not be able to open when the system pressure exceeds its MOPD.
	Control seat is dirty or eroded	This can be remedied by replacing the valve seat or by cleaning the seat.
	Valve installed backwards	This can be remedied by removing the valve from the system and reinstalling in the correct orientation.

Electrical

The Parker Refrigerating Specialties Division molded water resistant solenoid coil is designed for long life and powerful opening force. The leaded coil is rated at IP67 and the DIN QD version is rated at IP65. This sealed construction can withstand direct contact with moisture and ice. Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures for the maximum coil temperature not to be exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

A solenoid coil should never be energized except when mounted on its corresponding solenoid tube.

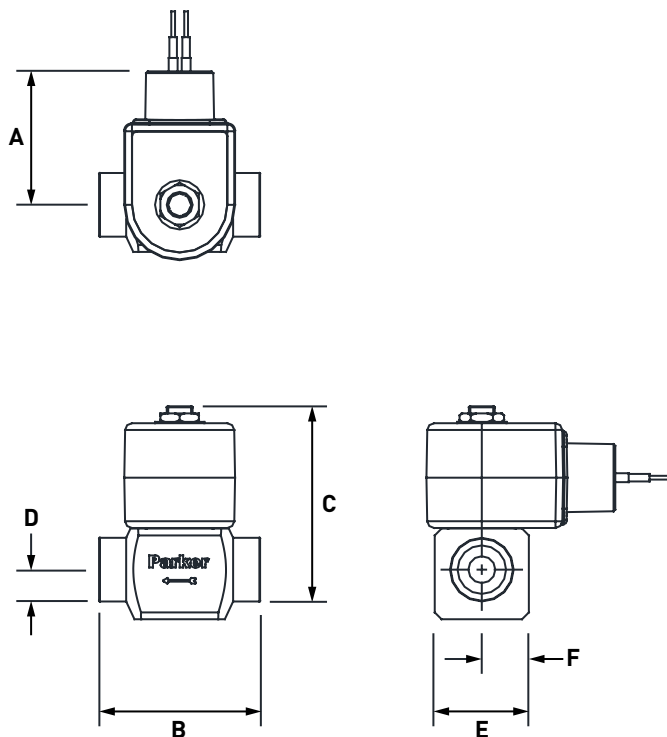
The coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for direct current are also available.

The solenoid coil must be connected to electrical lines with Volts and Hertz same as stamped 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.

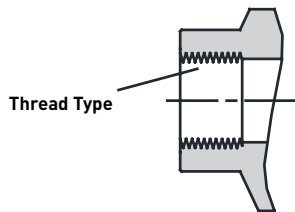
Coil Information				
Type	Classification	Voltages/Frequencies	Wattage	Temp.
Leaded	18" Leaded Wires Nema 1, 2, 3, 4, 4x / IP67	110-120 VAC/50Hz, 110-120 VAC/60Hz 220-230 VAC/50 Hz, 220-230 VAC/60Hz 240 VAC/60Hz	22	180°C (356°F)
DIN QD	Nema 1, 2, 3, 4, 4x / IP65	100 VAC/50Hz, 200 VAC/50Hz (consult factory for other volages/frequencies)		

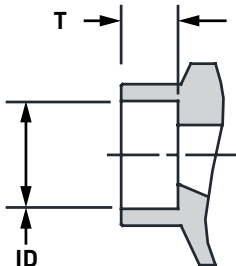
Table 1: General Coil Information

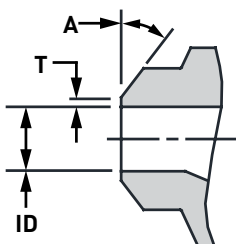
Dimensional Information

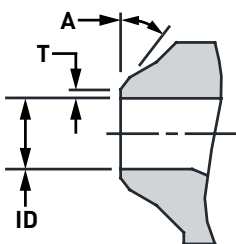


Port Size		A		B		C		D		E		F	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
3	1/8"	50.0	1.97	59.7	2.35	71.6	2.82	11.8	0.47	30.0	1.18	15.0	0.59
4	5/32"												

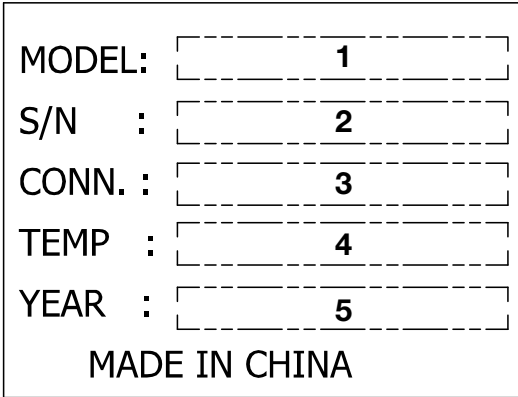
Threaded					
		Port Size	Connection	Thread Type	
		1/8"	1/4 NPT	1/4" National Pipe Thread Female	
			3/8 NPT	3/8" National Pipe Thread Female	
			1/4 BSPT	1/4" British Standard Pipe Taper Female	
5/32"	3/8 BSPT	3/8" British Standard Pipe Taper Female			
	3/8 NPT	3/8" National Pipe Thread Female			
5/32"	3/8 BSPT	3/8" British Standard Pipe Taper Female			

Socket Weld (SW) ANSI					
		Port Size	Connection	ID (inch)	T (inch)
		1/8"	3/8 SW	0.715	0.380
5/32"					

Butt-Weld (BW) ANSI						
		Port Size	Connection	ID (inch)	T (inch)	A (°)
		1/8"	3/8 ANSI BW	0.423	0.062	37.5
5/32"						

Butt-Weld (BW DN) Metric						
		Port Size	Connection	ID (mm)	T (mm)	A (°)
		1/8"	DN10 DIN BW	10.75	2.00	37.5
5/32"						

Nameplate Information

Port Size	Name Plate Image	Name Plate
3 mm, 4 mm (1/8", 5/32")		1. Valve Model Number (Smart Part Number) 2. Serial Number (S/N) 3. Connection Type and Size 4. Temperature Range 5. Year of Manufacture

Parts Kit Reference

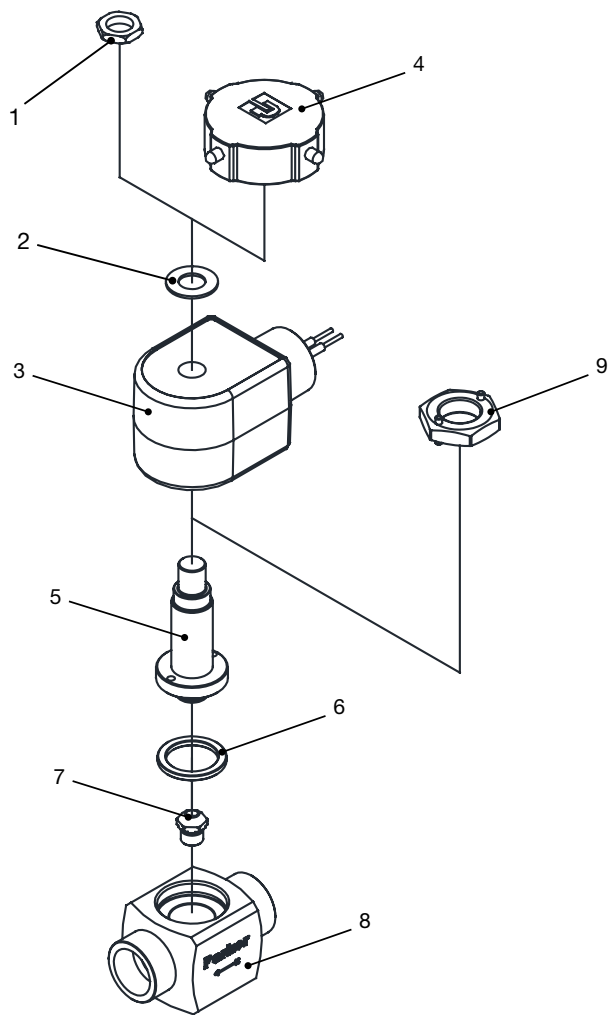


Figure 3: PCS Exploded View

PCS Service Parts List			
Item	Description	Kit Description	Kit
1	Nut, Coil	Coil ⁽¹⁾	Consult Factory
2	Spring Washer, Coil		
3	Coil		
4	LED Knob, Coil	Knob Kit Red Green	209694 209695
5	Tube Assembly, Solenoid	Tube Kit (Neoprene) ⁵ / ₃₂ " Orifice ¹ / ₈ " Orifice	210023 210218
6	O-Ring, Tube (Neoprene)		
7	Seat, Solenoid Pilot		
9	Tool, Tube Assembly	Tube Kit (HNBR) ⁵ / ₃₂ " Orifice ¹ / ₈ " Orifice	210182 210217
5	Tube Assembly, Solenoid		
6	O-Ring, Tube (HNBR)		
7	Seat, Solenoid Pilot	Tool Kit	210026
9	Tool, Tube Assembly		

1 Encapsulated coils are available in a variety of styles and voltages. Contact factory for coil options and part number.

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.

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