

# SOLENOID VALVE

## Type S81, S82

Port 9mm (3/8") to 66mm (2-5/8")

### FEATURES

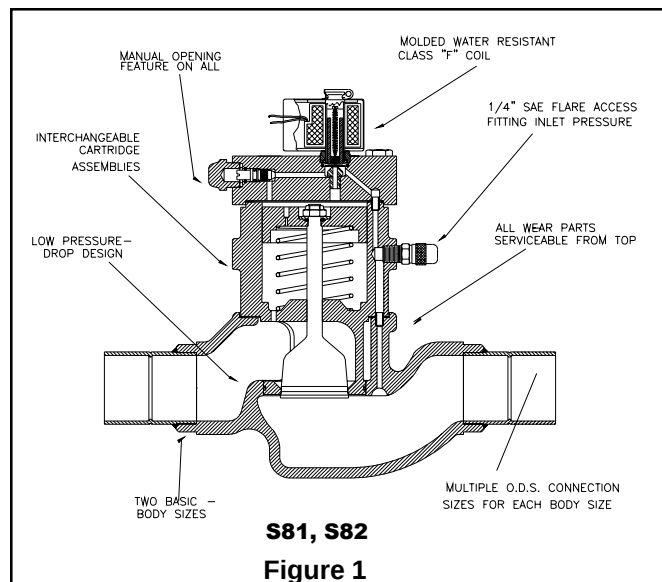
- Pilot Operated
- Interchangeable Capacity Cartridges
- Low Pressure Drop
- Manual Opening Stem
- All Service From The Top
- Sweat-in-place Without Disassembly
- Maximum Opening Pressure Difference (MOPD): 20.7 bar (300 psig)
- Design Pressure (MRP): 31.0 bar (450 psig)
- Molded Class "H" Coil Construction
- Pilot Light Available
- QD Coil Assemblies Available

### DESCRIPTION

The new S8 series of commercial solenoids was developed by the Refrigerating Specialties Division of Parker Hannifin as a versatile all purpose valve in a wide range of port and connection sizes. With cartridge (port) sizes available up to 66mm (2-5/8"), S8 solenoids are capable of handling greater flow rates than competitive valves with similar non-flanged body styles. In addition, this unique design incorporates the same concept of cartridge interchangeability as found in the A8 series of regulators.

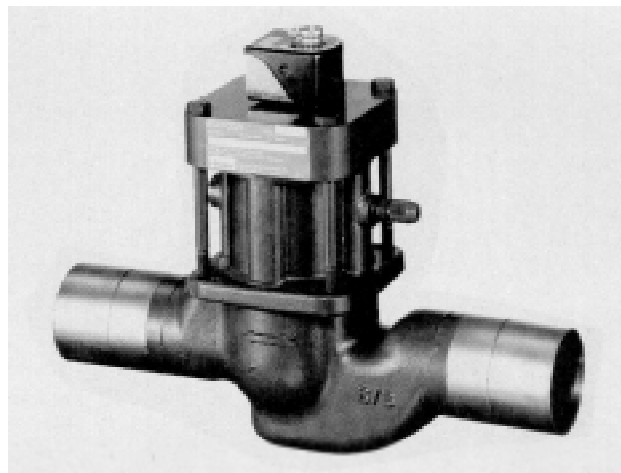
This innovative design actually utilizes the same capacity cartridges (and valve bodies) as those used in the A8 regulator series, as well as the same solenoid actuator, coil, and coil housing. Capacity cartridges can be changed by simply unscrewing the valves four adapter bolts to facilitate the removal of the adapter and cartridge assemblies. With this flexible line of commercial solenoids now supplementing the existing line of A8 regulators, a wide variety of control valves designed for commercial applications is now available from a single reliable source.

This ductile iron-bodied solenoid valve with brazed copper couplings is suitable for most common refrigerants, certain oils



### BULLETIN 32-00

#### Type S81, S82



March 2002

### Installation, Service and Parts Information

and other fluids approved for use in refrigeration. This valve may be opened by means of a manual opening stem for servicing or in case of electrical power failure.

### ORDERING GUIDE

Like the R/S line of A8 pressure regulators, the new S8 solenoids are available in a number of port and connection size combinations. When ordering, please indicate both the port and connection size required along with the coil voltage.

### PRINCIPLES OF OPERATION

The Type S81 is a pilot operated solenoid. The valve in its closed position, with the solenoid coil de-energized and the plunger and piston plug in the seated position, is shown in Figure 1. Electrical energization of the solenoid coil forms a magnetic field, pulling up the plunger, lifting it off its seat. Upward motion of the plunger permits entrance of the fluid from the valve inlet through the adapter and down through the pilot port to the top of the piston. This forces the piston downward and pushes the main port plug open, thereby permitting flow of the refrigerant through the valve. The closing spring meanwhile is held in a compressed position.

De-energization of the solenoid coil permits the spring-assisted plunger to reseat, stopping the flow through the pilot port. Bleedoff, through the bleed hole in the piston, decreases the pressure above the piston and allows the closing spring to force the main port plug upward into a closed position to stop the flow. The pressure difference across the valve, acting upon the area of the valve seat, plus the force of the closing spring, holds the main port plug in a tightly closed position.

### MANUAL OPENING STEM

The manual opening stem on the Type S81 is for the purpose of opening the valve without energizing the solenoid coil. Refer to the exploded view and the parts list for location of the stem and other related parts. For access to the stem, the seal cap must be removed. This must be done with caution as refrigerant may be trapped inside the seal cap. Manual opening is accomplished by turning the stem counter clockwise until stopped. To reset for automatic operation turn stem clockwise until seated.

## INSTALLATION

The solenoid valve can be mounted in a horizontal or vertical line with the flow in the direction of the arrow on the valve body. Protect the inside of the solenoid valve from moisture, dirt and chips during installation. These valves may be soldered into the line without disassembly. A wet cloth should be wrapped around the valve and the soldering flame should be directed away from the valve body.

The S81 solenoid valve must be installed with the arrow on the valve body in the direction of flow through the valve. If the valve is backwards, the flow will not be stopped when the valve is electrically de-energized. Like all Solenoid Valves, the S81 can stop flow only in the direction from normal inlet to normal outlet (as shown by the arrow on the body). If reversal of pressure occurs in the system so the outlet pressure exceeds the inlet pressure the plug will be blown away from its seat and reverse flow will occur. If a system has this type of pressure reversal, a check valve such as Refrigerating Specialties Division Type CK4A in series with the solenoid valve will prevent flow reversal. (The CK4A must be installed downstream of the solenoid to avoid trapping liquid.)

## ELECTRICAL

The Refrigerating Specialties Division molded water resistant Class "H" solenoid coil is designed for long life and powerful opening force. The standard coil housing meets NEMA 3R and 4 requirements. This sealed construction can withstand direct contact with moisture and ice. By definition, Class "H" coil construction will permit coil temperatures, as measured by resistance method, as high as 185°C (366°F). Final coil temperatures are a function of both liquid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit high ambient temperatures.

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

The molded Class "H" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as direct current. Coils are also available as transformer type with a 6 volt secondary winding for use with the Refrigerating Specialties Division Pilot Light Assembly PLT2. See Bulletin No. 60-20.

The solenoid coil must be connected to electrical line with volts and Hertz same as stamped on coil. The supply circuits must be properly sized to give adequate voltage at the coil leads 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 coil voltage above or below these limits may result in coil burnout. Also, operating with a coil voltage below the limit will definitely result in lowering the valve's maximum opening pressure differential. Power consumption during normal operation will be 10.2 watts or less.

## SERVICE POINTERS

**1. Failure to Open:** (a) Coil is of incorrectly high voltage. See "Electrical". Check voltage printed on the coil. (b) Line voltage is abnormally low. See "Electrical". Check line voltage at coil leads with a voltmeter. (c) Failure to electrically energize. Check control circuit. (d) Pressure difference across valve is too high. The S81 and S82 will open against a maximum pressure difference across the valve of 21 bar (300 psig). (e) Solenoid

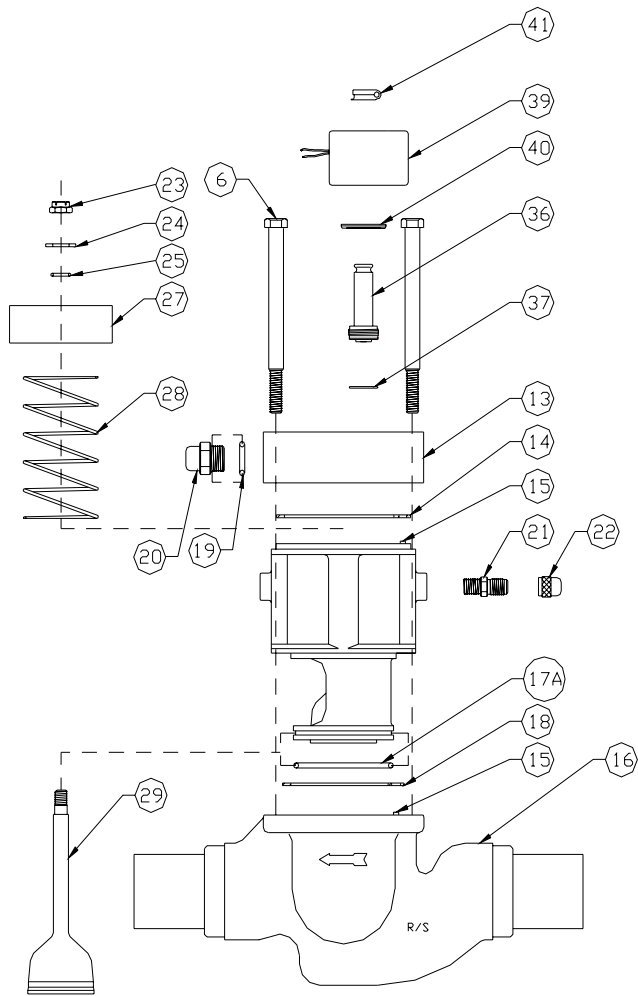
| REPAIR KITS FOR S81 AND S82 SOLENOID VALVES |                                        |      |                          |                            |
|---------------------------------------------|----------------------------------------|------|--------------------------|----------------------------|
| ITEM NO.                                    | DESCRIPTION                            | QTY. | S81<br>3/8 thru<br>1-3/8 | S82<br>1-5/8 thru<br>2-5/8 |
| 6                                           | Bolt Package                           | 4    | 204677                   | 204676                     |
| 13,14,19,20,<br>36,37                       | Adapter Assembly                       | 1    | 204671                   | 204670                     |
| 15                                          | Pin, Locating                          | 1    | N/A Separately           |                            |
| 16                                          | Body Assembly                          | 1    | N/A Separately           |                            |
| 14,17,17A, 18                               | Cartridge Kit (3/8")                   | 1    | 202712                   | —                          |
| 14,17,17A, 18                               | Cartridge Kit (5/8")                   | 1    | 202711                   | —                          |
| 14,17,17A, 18                               | Cartridge Kit (7/8")                   | 1    | 202710                   | —                          |
| 14,17,17A, 18                               | Cartridge Kit (1 -1/8")                | 1    | 202709                   | —                          |
| 14,17,17A, 18                               | Cartridge Kit (1 -3/8")                | 1    | 202708                   | —                          |
| 14,17,17A, 18,<br>26,30                     | Cartridge Kit (1 -5/8")                | 1    | —                        | 203811                     |
| 14,17,17A, 18,<br>26,30                     | Cartridge Kit (2-1/8")                 | 1    | —                        | 203812                     |
| 14,17,17A, 18,<br>26,30                     | Cartridge Kit (2-5/8")                 | 1    | —                        | 203813                     |
| 14,17A, 18, 26                              | Service Kit, Piston/Plug               | 1 ea | —                        | 203823                     |
| 14,17A, 18, 26,<br>27, 28                   | Piston Kit                             | 1 ea | —                        | 203824                     |
| 39, 40, 41                                  | Coil and Housing Kit 120/60,<br>110/50 | 1    | 202940                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 240/60<br>220/50  | 1    | 202941                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 480/60<br>440/50  | 1    | 202943                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 24/60             | 1    | 202944                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 240/50            | 1    | 202945                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 208/60            | 1    | 202942                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 120/6/60          | 1    | 202946                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 208/6/60          | 1    | 202947                   |                            |
| 39, 40, 41                                  | Coil and Housing Kit 240/6/60          | 1    | 202948                   |                            |
| 39, 40, 41                                  | Coil Assembly Q/D 240/60<br>220/50     | 1    | 203730                   |                            |
| 39, 40, 41                                  | Coil Assembly Q/D 240/50               | 1    | 203734                   |                            |
| 36                                          | Solenoid Operator Assembly             |      | Only with kit            |                            |
| 36, 37, 38                                  | Solenoid Operator Kit                  | 1    | 202700                   |                            |

Coil is burned out. See "Electrical", and replace with proper coil. (f) Plunger Assembly is sticking. To disassemble the S81 for inspection of internal parts (after pumping out the system as required); disconnect power source to Solenoid Coil, remove (number 36) Solenoid Operator Assembly, then Adapter. Remove every trace of dirt from Adapter and Cartridge Assembly. Thoroughly clean all parts and reassemble using a light film of refrigerant oil.

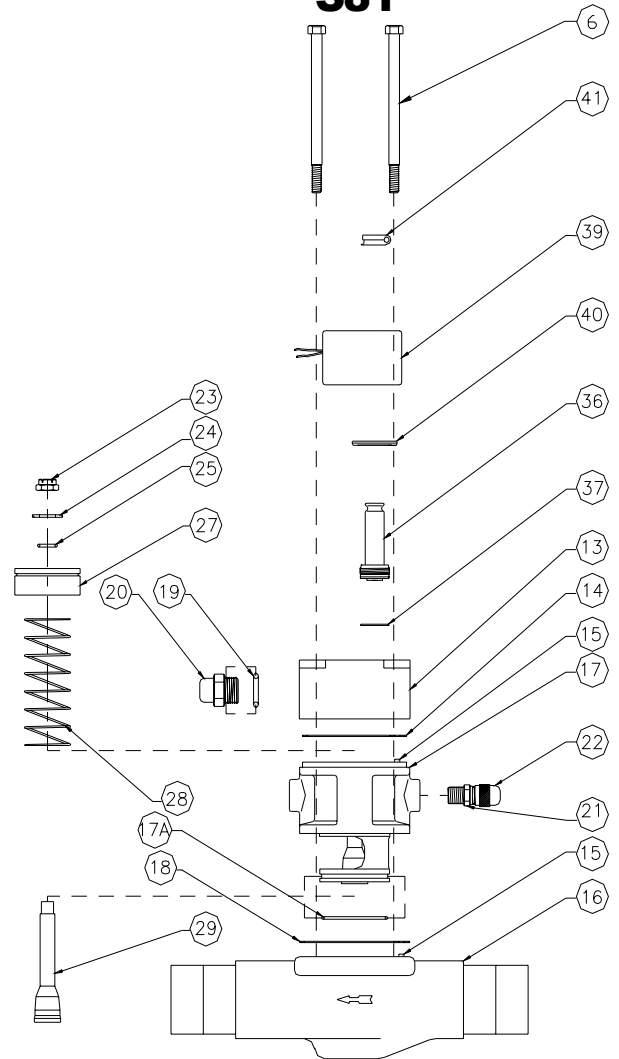
**2. Failure to Close:** (a) Electrical control circuit is not opening properly. Check wiring and controls. (b) There are chips or dirt on the Pilot Seat or the Piston Plug Seat, preventing proper seating. Disassemble and clean Valve as outlined in 1 (f) above. (c) Piston Plug Seat or Pilot Seat may be worn or damaged and therefore leaking. Disassemble and clean Valve as outlined in 1 (f) above. If any of these parts need replacing, it is advisable to replace using the proper replacement kit. (d) Manual Opening Stem is turned all or partly out and permitting flow through the valve.

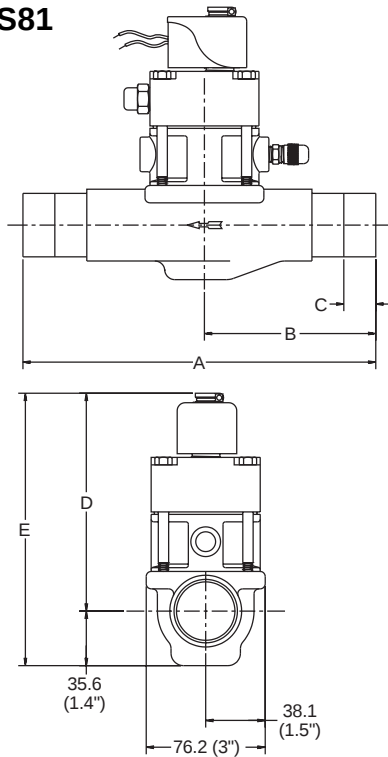
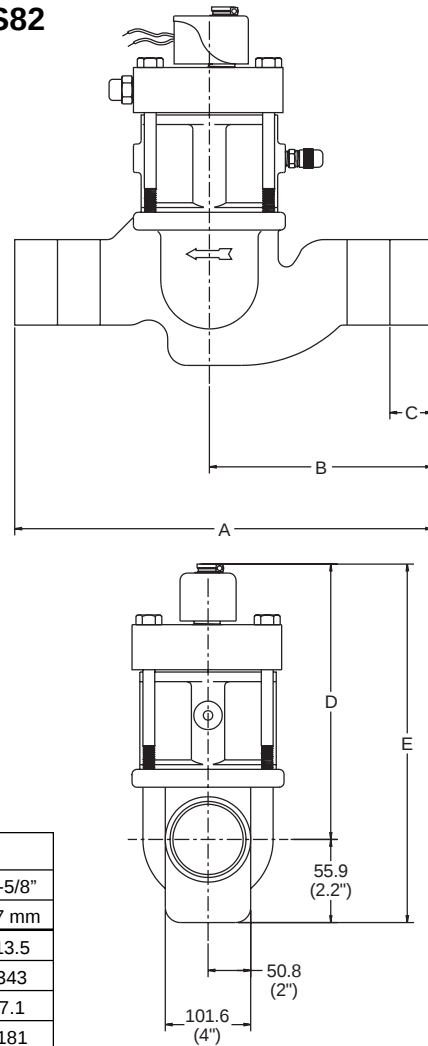
**3. Leakage Through Valve:** See (2) above.

## S82



## S81



**S81****S82**

| Type       |      | S81   |        |        |        |        | S82    |        |        |
|------------|------|-------|--------|--------|--------|--------|--------|--------|--------|
| Connection |      | 7/8"  | 1-1/8" | 1-3/8" | 1-5/8" | 2-1/8" | 1-5/8" | 2-1/8" | 2-5/8" |
| Size       |      | 22 mm | 28mm   | 35 mm  | 42 mm  | 54 mm  | 42 mm  | 54 mm  | 67 mm  |
| A          | Inch | 9.6   | 9.6    | 9.4    | 9.9    | 11.1   | 11     | 12     | 13.5   |
|            | mm   | 244   | 244    | 239    | 251    | 282    | 279    | 305    | 343    |
| B          | Inch | 4.8   | 4.8    | 4.7    | 5      | 5.6    | 5.9    | 6.4    | 7.1    |
|            | mm   | 122   | 122    | 119    | 127    | 142    | 149    | 162    | 181    |
| C          | Inch | 0.8   | 0.9    | 1      | 1.1    | 1.2    | 1.1    | 1.4    | 1.7    |
|            | mm   | 20    | 23     | 25     | 28     | 30     | 28     | 36     | 44     |
| D          | Inch | 5.5   | 5.5    | 5.5    | 5.5    | 5.5    | 7.2    | 7.2    | 7.2    |
|            | mm   | 140   | 140    | 140    | 140    | 140    | 183    | 183    | 183    |
| E          | Inch | 6.9   | 6.9    | 6.9    | 6.9    | 6.9    | 9.4    | 9.4    | 9.4    |
|            | mm   | 175   | 175    | 175    | 175    | 175    | 239    | 239    | 239    |

| Bolt Diameter     | Valve Size       | Torque             |
|-------------------|------------------|--------------------|
| 1/4" (6mm)        | 3/8" to 2-5/8"   | 8 ft lb (1.1 mkg)  |
| 5/16" (8mm)       | 1-5/8" to 2-5/8" | 12 ft lb (1.7 mkg) |
| Jam Nut           | 1-5/8" to 2-5/8" | 8 ft lb (1.1 mkg)  |
| Solenoid Operator | All              | 6 ft lb (0.0mkg)   |

**WARRANTY**

All Refrigerating Specialties Products are warranted against defect in workmanship and materials for a period of one year from date of shipment from the factory. This warranty is in force only when products are properly installed, 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 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, EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. 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.

**SAFE OPERATION (See Bulletin RSBCV)**

People doing any work on a refrigeration system must be qualified and completely familiar with the system and the valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent product bulletins and the current Bulletin RSB prior to installation or servicing work.