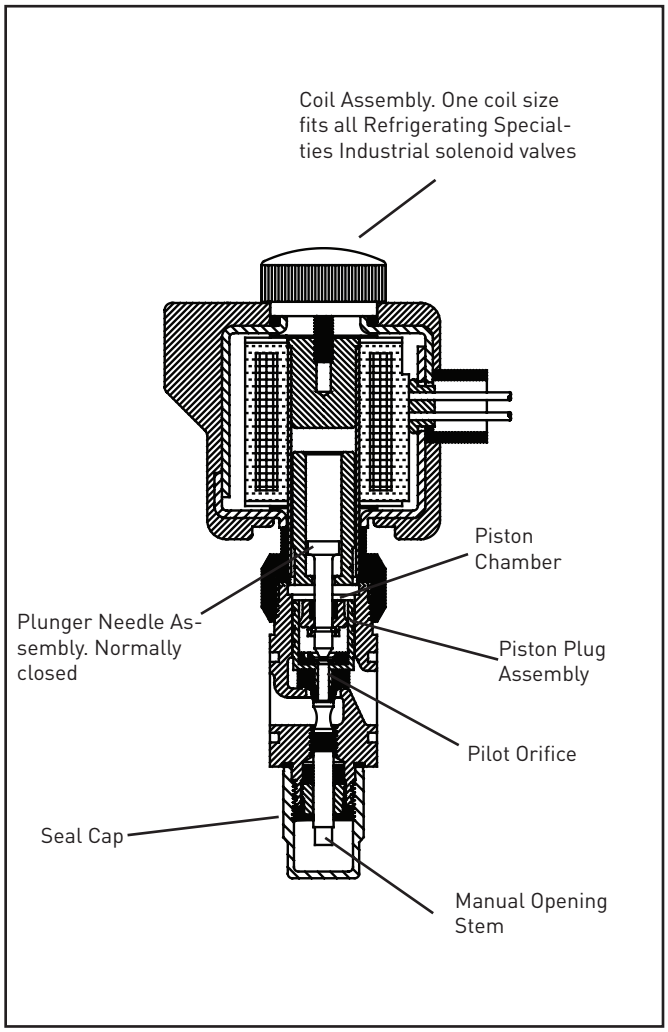
SOLENOID VALVE
Type S8F

Port Size 13mm (1/2")
FOR AMMONIA, R12, R22, R502
AND OTHER COMMON REFRIGERANTS

FEATURES

- Standard Coil Housing Meets NEMA 3R and NEMA 4 - Rain Tight
- Coil Housing Surpasses NEMA Salt Spray Test
- Plunger-Needle Assembly Same for S4A, S5A, S6N, S6A
- Replaceable Piston Plug Assembly
- Molded Class "B" Coil Construction
- Same Coil Fits All Refrigerating Specialties Solenoid Valves
- Pilot Light Available
- Stainless Steel Needle, PTFE Seats
- Manual Opening Stem
  MOPD 20.7 bar (300 PSIG)
- MRP 28 bar (400 PSIG)



BULLETIN 30-91 J

August 2016
Installation, Service and Parts Information

Description
This compact, heavy duty, pilot-operated, plated ductile iron bodied solenoid valve is suitable for Ammonia, R-12, R-22, R-502 and other common refrigerants for liquid, suction and hot gas lines, and refrigerant oil lines. The plunger-needle assembly is also used with most other Refrigerating Specialties Industrial Solenoid Valves. This valve is usually ordered with a close-coupled stainless steel screen strainer. (See current Bulletin 00-10 for strainer information.)

Purpose
A solenoid valve is an electrically operated device used to control the flow of liquids or gases in a fully open or fully closed configuration. The S8F is a normally closed solenoid valve to control the flow of refrigerant. Like all Refrigerating Specialties Solenoid Valves, this valve does not modulate. When electrically energized a slight fluid pressure difference across the Valve causes it to promptly open wide; when de-energized, the Main Valve promptly closes to stop all flow in the normal direction.

Principles of Operation
This is a pilot operated Solenoid Valve. A small Pilot Port is opened by a magnetically lifted Plunger-Needle Assembly; the consequent relief of pressure from the top of a Main Valve and Piston Assembly allows the Assembly to be lifted by the pressure difference between valve inlet and valve outlet. A minimum pressure difference of approximately 1 psi is required for operation.

Operation is as follows, starting with a closed valve: When energized, #6 Solenoid Coil forms a magnetic field which pulls #9 Solenoid Plunger upward, striking Valve Needle and pulling it up from its Pilot Seat to permit fluid travel from Chamber A (in and above #10 Piston Plug Assembly) through Orifice B in #10 Piston Plug Assembly to the downstream side of the Valve. When the pressure in Chamber A has dropped almost to the downstream pressure, the higher upstream pressure, acting on the annular portion of #10 Piston Plug Assembly outside of the Seat Bead, will lift the Main Valve to open position.

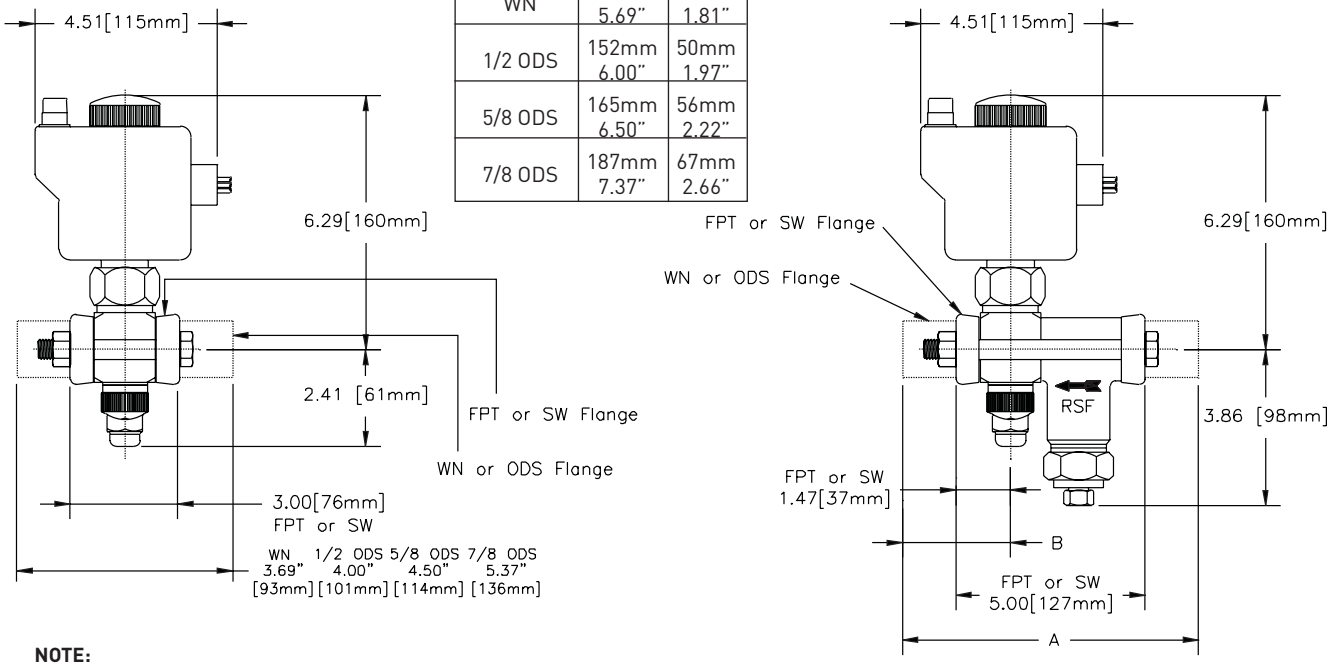
When the electrical circuit to the S8F Valve is broken, #6

Repair Kits For Type S8F Solenoid Valve			
Item	**Description**	**Qty.**	**Kit Number**
1	Knob	1	Only Available With Kit
2	Gasket	1	Only Available With Kit
1, 2	Knob Kit	1	205237
3	Encapsulated Coil	1	See Part No. Page 4
4	Lens	1	Only Available With Kit
5	Bulb	1	Only Available With Kit
6	Gasket	1	Only Available With Kit
7	Tube Assembly	1	Only Available With Kit
8	Gasket	1	Only Available With Kit
7-8	Tube Kit	1	201036
9	Plunger Needle Assembly**	1	Only Available With Kit
10	Piston Plug Assembly	1	Only Available With Kit
8-10	Plunger Piston Kit**	1	202072
11	Body, S8F	1	Not Available Separately
12	Stem, Manual Opening	1	Only Available With Kit
13	Washer	1	Only Available With Kit
14	Packing, Stem	1	Only Available With Kit
15	Nut, Packing	1	Only Available With Kit
12-15	Stem Kit, Opening	1	202238
16	O-Ring	1	Only Available With Kit
17	Seal Cap	1	Only Available With Kit
16-17	Cap Kit	1	202713
18	Flange Kit (Specify Flange Style & Connection Size) Includes 2 Flanges Only. Sold Separately	1	FK-13. Also Specify Size and Style of Connection.
19	Bolt	2	Only Available With Kit
20	Nut	2	Only Available With Kit
21	Gasket (H2 if Without Strainer, 3 if With Strainer)	H	Only Available With Kit
19-21	Bolt Kit (S8F Without Strainer)	–	201290
19-21	Bolt Kit (S8F With Strainer)	–	201287
8,16,21	Gasket Kit (Includes 2 Flange Gaskets)	–	201632
7-17,21	Complete Valve Body Assembly	1	100997

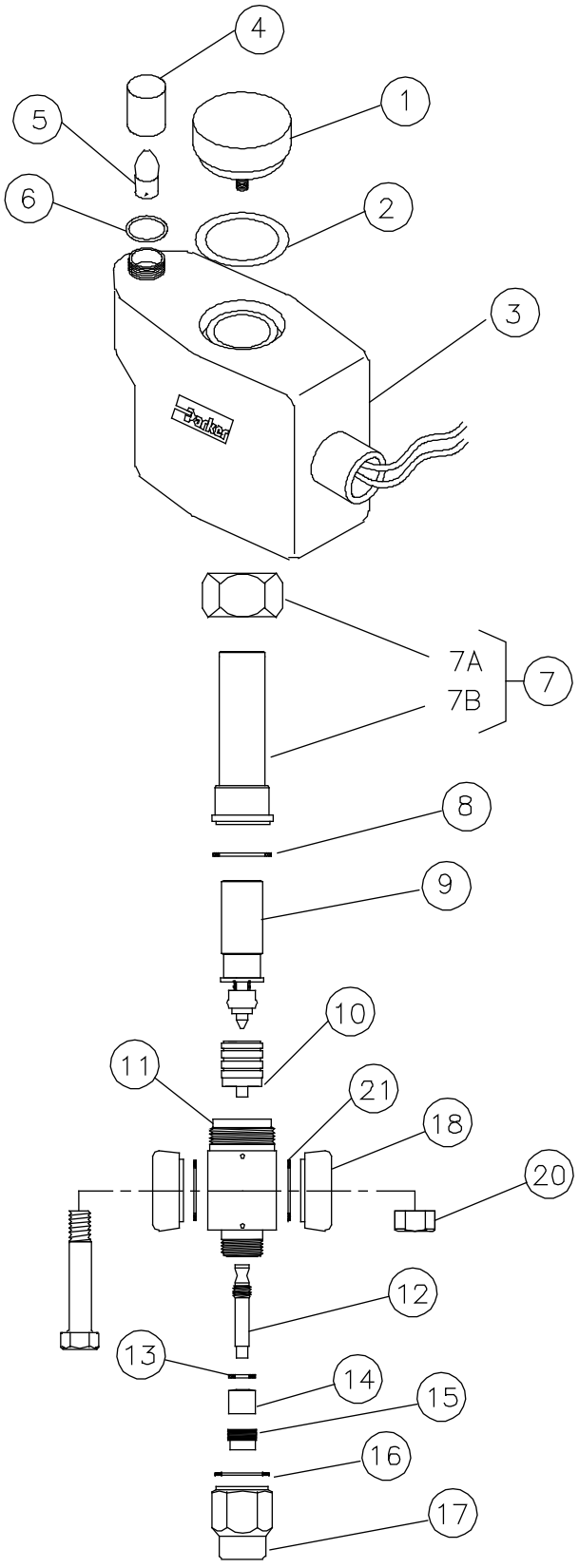
** Not for D.C. Consult factory for correct parts.

Dimensions

Flange	A	B
WN	144mm 5.69"	46mm 1.81"
1/2 ODS	152mm 6.00"	50mm 1.97"
5/8 ODS	165mm 6.50"	56mm 2.22"
7/8 ODS	187mm 7.37"	67mm 2.66"



NOTE:
Allow 100mm (4.0") above valve for removal of coil housing and coil.
Allow 25mm (1.0") below valve to operate manual opening stem.



S8F

Solenoid Coil is de-energized, allowing #9 Solenoid Plunger to drop and Valve Needle to close the Pilot Port in #10 Piston Plug. Liquid and/or gas leakage through the clearance area around #10 Piston Plug causes a rapid pressure build up in Chamber A which combines with the downward force of the Spring which is part of #9 Solenoid Plunger and the weight of #10 Piston Plug Assembly to force the Main Valve Disc tight against the Seat Bead to stop all flow.

Manual Opening

To manually open the S8F Solenoid Valve, cautiously remove #17 Seal Cap and turn #12 Manual Opening Stem in (clockwise viewed from beneath). The rising Stem will lift #10 Piston Plug Assembly from its seat and permit flow. To resume automatic operation, turn #12 Manual Opening Stem out (counterclockwise viewed from beneath) until it stops and replace #17 Seal Cap.

Installation

Protect inside of valve from dirt, chips and moisture during installation. Mount only in horizontal pipe line with solenoid coil at the top; this valve will work properly only in this position. In a liquid line the Solenoid Valve should be near the expansion valve inlet. It is advisable to install the S8F's close coupled companion strainer ahead of the valve for protection against dirt and chips.

The S8F 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 S8F 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 by more than 0.07 bar (11 psi) the piston will be blown upward from its seat and reverse flow will occur. If a system has this type of pressure reversal (as encountered during hot gas defrost with liquid recirculation systems), a check valve such as Refrigerating Specialties Division Type CK4A in series with the solenoid valve will prevent flow reversal. (CK4A must be installed downstream to avoid trapping liquid.)

Electrical

The Refrigerating Specialties Division molded water resistant Class "B" 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. The coil housing far exceeds the requirements of NEMA Standard ICS, 1 - 110. 57 salt spray test for rust resistance.

By definition, Class "B" coil construction will permit coil temperatures, as measured by resistance method, as high as 130°C (266°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

The molded Class "B" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for 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 (see current copy of Bulletin 60-10, "Pilot Light Assembly and Solenoid Transformer Coil").

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 burnout. Also, operating with line voltage below the limit will definitely result in lowering the valve opening pressure differential. Power consumption during normal operation will be 33 watts or less.

Inrush and running current is listed below:

Standard Coil Volts/Hertz	Part Number	Inrush Current (Amps)	Running Current (Amps)	Fuse Size (Amps)
120/60 (Blue leads)	205184	1.60	0.52	1
208/60 (Blue & Red leads)	205189	0.88	0.28	1
240/60 (Red leads)	205188	0.86	0.26	1
440/60 (Yellow & Red leads)		0.39	0.13	1
115/50 (Yellow & Blue leads)	205184	1.50	0.46	1
230/50 (Yellow leads)	205185	0.92	0.26	1
Other			(Contact Factory)	

On transformer coil the 6 volt leads are always black.

Service Pointers

The S8F Solenoid Valve and Strainer are easily removable for cleaning or repairing. To remove valve and strainer, merely unscrew the flange bolts and spread the flanges slightly apart.

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 S8F will open against a maximum pressure difference across the valve of 21 bar (300 psig). (e) Solenoid Coil is burned out. See "Electrical," and replace with proper coil. (f) #10 Piston Plug Assembly is sticking. To disassemble the S8F for inspection of internal parts (after pumping out the system as required): disconnect power source to #6 Solenoid Coil, remove #7 Tube Assembly, lift out #9 Plunger Needle Assembly, then remove #10 Plug Assembly. Remove every trace of dirt from the piston and cylinder using fine emery cloth to remove burrs if necessary. Thoroughly clean all parts and reassemble using a light film of refrigeration oil on the Piston.

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 Main Valve Disc (both in #10 Piston Plug Assembly), preventing proper seating. Disassemble and clean Valve as outlined in (1f) above. (c) Main Valve Disc, Pilot Seat, or Valve Needle may be worn or damaged and therefore leaking. Disassemble and clean Valve as outlined in (1f) above. If any of these parts need replacing, it is advisable to replace using #8-10 Plunger Piston Kit. (d) #10 Piston Plug is sticking. See (1f) above. (e) #12 Manual Opening Stem is turned all or partly in, holding #10 Piston Plug Assembly open and permitting flow through the valve. (f) #1 Coil Housing Screw (made of non-magnetic stainless steel) has been replaced with a screw made of magnetic material and residual magnetism is holding #9 Plunger Needle Assembly in the open position. Consequently, the Main Valve is not closing. Replace with screw of correct material.

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

4. Overheating: The Solenoid Coil is designed to operate hot and is constructed of high temperature materials accordingly. Unless troubled with actual Coil burnouts, high coil temperature should be ignored. Persistent burnouts indicate improper line or coil voltage. See (1e) above.

Warranty

All Refrigerating Specialties Products are warranted against defect 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 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 also 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 shutoff, 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.

SOLENOID VALVE

Type S7A, S7AL

Port Size 20-25mm (3/4”-1”)
FOR AMMONIA, R134a, R22, R507
AND OTHER COMMON REFRIGERANTS

FEATURES

- Standard Coil Housing MeetsNEMA 3R and NEMA 4-Rain Tight
- Coil Housing Surpasses NEMA Salt Spray Test
- Molded Class “B” Coil Construction
- Pilot Light Available
- Stainless Steel Needle
- Manual Opening Stem
- Design Pressure (MRP): 27.6 bar (400 PSIG)
- Positive Lift, Held Open Electrically

BULLETIN 30-92D
Type S7A

May 2002
Installation, Service and Parts Information

Description

This heavy duty solenoid valve is suitable for Ammonia, R-134a, R-22, and R-507, other refrigerants, certain oils and other fluids approved for use in refrigeration. The S7 is a pilot operated, positive lift, cast iron bodied valve. The valve may be opened by means of the manual opening stem for servicing or in case of electrical power failure.

The Type S7 Solenoid Valve is furnished with FPT Internal NPT (U.S. Standard Taper Pipe Thread), Socket Weld, Weld Neck or ODS (solders over copper tubing of given diameter) connections. The valve may be easily removed from between the flanges for servicing.

It is advisable to install a strainer upstream of each valve to prevent entrance of foreign material into the valves and the rest of the system. Refrigerating Specialties strainers are available to close-couple to valve inlets.

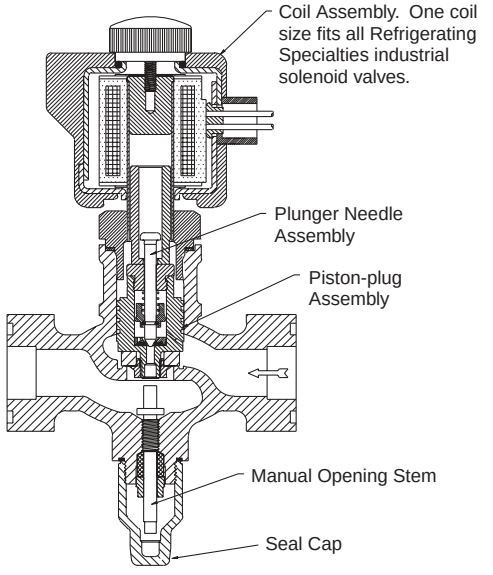


Fig. 1

Purpose

Type S7A is a very versatile valve that may be used in most liquid, or hot gas lines. The S7A should not be used on equalizer lines or where the inlet pressure is less than 30 psi. The S7AL is designed for low pressure drop applications, liquid transfer from intermediate to low pressure vessels and on equalizer lines. The maximum operating pressure differential (MOPD) for the S7AL is 90 psi.

Principles of Operation

The Type S7A is a pilot operated, positive lift, solenoid valve. Operation is as follows: The valve, in its closed position, with the solenoid coil de-energized and the plunger needle in its seated position, is shown in Figure 1. Electrical energization of the solenoid coil forms a magnetic field pulling up the plunger which strikes the needle, lifting it off its seat. This permits flow of the trapped refrigerant from the top of the piston which reduces pressure above the piston. The piston is then forced upward by the upstream pressure acting on the piston-main valve. This opens the valve port to allow flow through the valve. The piston-main valve is then held up magnetically by the plunger-needle assembly and no pressure drop is required to keep the valve open. If no pressure difference across the valve is present when the solenoid coil is energized, the piston-main valve is lifted off the seat by the plunger-needle assembly, opening the valve.

De-energization of the solenoid coil permits the spring-assisted needle to drop back into its seat, stopping the flow through the pilot port. The pressure above and below the piston-main valve is equalized through the bleed hole in the piston. The weights of the plunger-needle and the piston-main valve assembly cause the piston-main valve to drop to its seat and stop the flow. The pressure difference across the valve, acting upon the area of the valve seat, holds the piston-main valve in a tightly closed position.

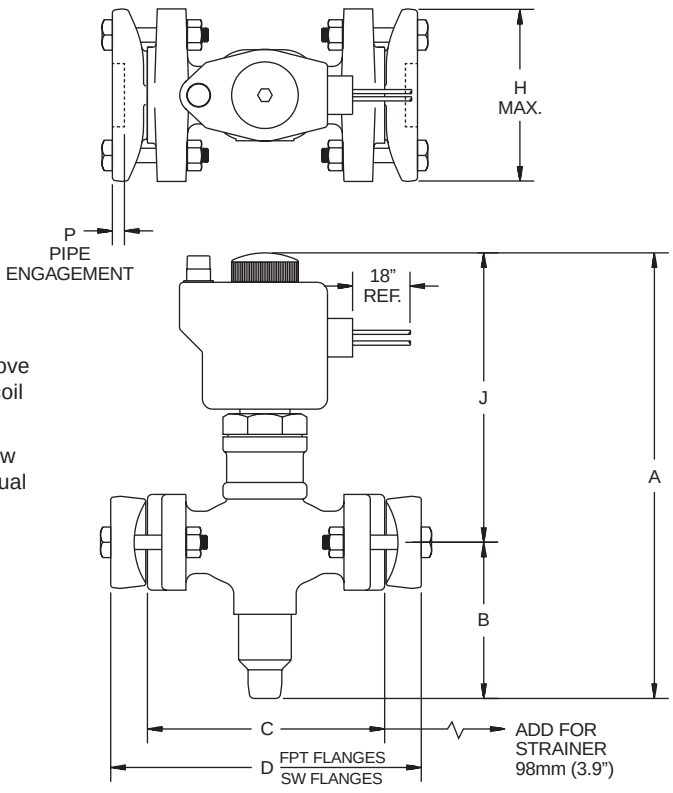
Manual Opening Stem

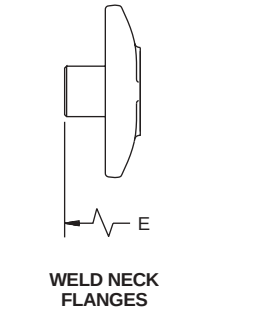
The manual opening stem on the Type S7A is for the purpose of opening the valve without energizing the solenoid coil. Refer to the exploded view and parts list for location of the stem and other related parts. For access to the stem the seal cap on the bottom of the valve must be removed. This must be done with caution as refrigerant may have been trapped inside the seal cap. Manual opening is accomplished by turning the stem clockwise until only the flats on the end of the stem protrude from the packing nut. To reset for automatic operation turn the stem counterclockwise as far as it goes.

REPAIR KITS FOR TYPE S7A SOLENOID VALVE

Item No.	Description	Qty.	20mm (3/4")	25mm (1")
1	Knob	1		
3	O-Ring	1		
1, 3	Knob Kit	1	205237	
6	Coil	1		
33	Tub Asm.	1		
34	Gasket	1		
35	Plunger Asm.	1		
36	Plug Asm.	1		
33,34	Tube Kit		201042	
34,35,36	Plug/Plunger Kit S7A		201014	201012
34,35,36	Plug/Plunger Kit S7AL		206563	206562
37	Man. Open Stem	1		
22	Flat Washer	1		
23	Packing, Stem	1		
22,23,34,37	Opening Stem Kit		201142	
24	Nut, Packing	1		
22,23,24	Stem Pkg. Kit		202100	
25	Gasket	1		
27	Seal Cap	1		
25,27	Seal Cap Kit		202110	
28	Flange Gasket Pkg.	12	202079	
25,28,34	S7A Gasket Kit		202286	
34	Gasket Pkg, Sol Tube	5	202405	

DIMENSIONS





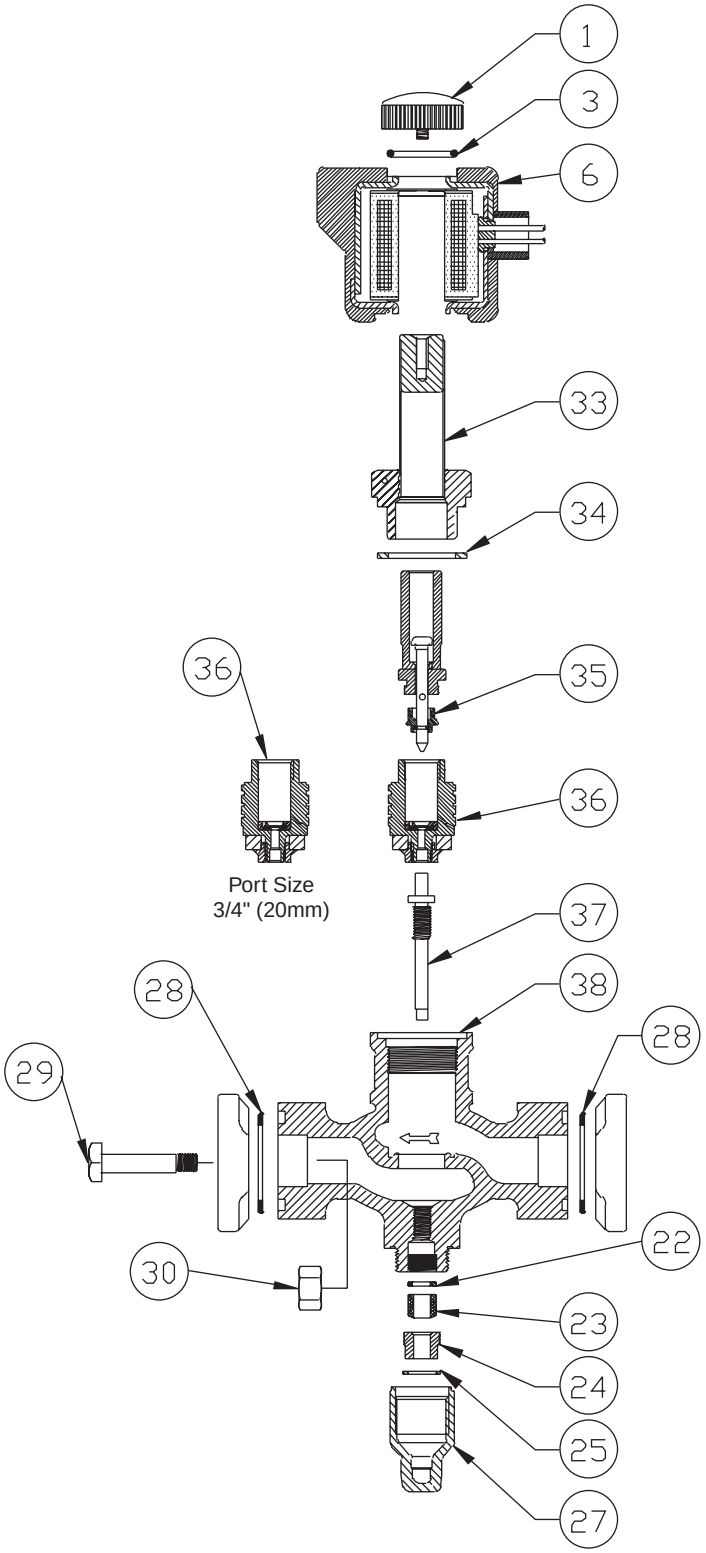
WELD NECK FLANGES

O.D.S. SOLDER FLANGES

Allow 100mm (4") above valve for removal of coil housing assembly.

Allow 25mm (1") below valve to operate manual opening stem.

A		B		C		D (FPT, SW)		E (WN)		F (ODS)		H		J		N (ODS)		P (SW)	
MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH
282	11.1	102	4.0	157	6.2	216	8.5	261	10.3	239	9.4	117	4.6	180	7.1	25	1.0	13	0.5



S7A
20-25mm (3/4” - 1”)

Installation

Protect inside of valve from dirt, chips and moisture during installation. Mount only in horizontal pipe line with solenoid coil at the top; this valve will work properly only in this position. In a liquid line the Solenoid Valve should be near the expansion valve inlet. It is advisable to install the S7A's close coupled companion strainer ahead of the valve for protection against dirt and chips.

The S7A 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 S7A 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 piston will be blown away from its seat and reverse flow will occur. If a system has this type of pressure reversal (as encountered during hot gas defrost with liquid recirculation systems), a check valve such as Refrigerating Specialties Division Type CK4A in series with the solenoid valve will prevent flow reversal. (CK4A must be installed downstream to avoid trapping liquid.)

Electrical

The Refrigerating Specialties Division molded water resistant Class "B" 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. The coil housing far exceeds the requirements of NEMA Standard ICS, 1-110.57 salt spray test for rust resistance.

By definition, Class "B" coil construction will permit coil temperatures, as measured by resistance method, as high as 130°C (266°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

The molded Class "B" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies. Coils are also available as transformer type with a 6 volt secondary winding for use with the Refrigerating Specialties Division Pilot Light Assembly (see current copy of Bulletin 60-10, "Pilot Light Assembly and Solenoid Transformer Coil").

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 burnout. Also, operating with line voltage below the limit will definitely result in lowering the valve opening pressure differential. Power consumption during normal operation will be 33 watts or less.

Inrush and running current is listed below:

Standard Coil Volts/Hertz	Inrush Current (Amps)	Running Size (Amps)	Fuse (Amps)
120/60 (Blue leads)	1.18	0.46	1
208/60 (Blue & Red leads)	0.63	0.26	1
240/60 (Red leads)	0.60	0.23	1
440/60 (Yellow & Red leads)	0.39	0.13	1
115/50 (Yellow & Blue leads)	1.22	0.21	1
230/50 (Yellow leads)	0.65	0.26	1
Other	(Contact Factory)		

On transformer coil the 6 volt leads are always black.

Service Pointers

The S7A Solenoid Valve and Strainer are easily removable for cleaning or repairing. To remove valve and strainer, first manually open the valve and pump out the refrigerant in the section of the line sealed off. Then unscrew the flange bolts and spread the flanges slightly apart.

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 S7A will open against a maximum pressure difference across the valve of 21 bar (300 psig). (e) Solenoid Coil is burned out. See "Electrical," and replace with proper coil. (f) Plug Plunger Assembly is sticking. To disassemble the S7A for inspection of internal parts (after pumping out the system as required); disconnect power source to Solenoid Coil, remove Tube Assembly, lift out Plug Plunger Assembly. Remove every trace of dirt from the piston and cylinder using fine emery cloth to remove burrs if necessary., Thoroughly clean all parts and reassemble using a light film of refrigeration oil on the Piston.

2. Failure to Close: (a) Electrical control circuit is not opening properly. Check wiring and controls. (b) There are chips or dirt on the Plug Plunger Seat, preventing proper seating. Disassemble and clean Valve as outlined in (1f) above. (c) Main Valve Disc, Pilot Seat, or Valve Needle may be worn or damaged and therefore leaking. Disassemble and clean Valve as outlined in (1f) above. If any of these parts need replacing, it is advisable to replace Plug Plunger Kit. (d) Piston Plug is sticking. See (1f) above. (e) Manual Opening Stem is turned all or partly in, holding Piston Plug Assembly open and permitting flow through the valve. (f) #5 Coil Housing Screw (made of nonmagnetic stainless steel) has been replaced with a screw made of magnetic material and residual magnetism is holding Plunger Needle Assembly in the open position. Consequently, the Main Valve is not closing. Replace with screw of correct materials.

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

4. Overheating: The Solenoid Coil is designed to operate hot and is constructed of high temperature materials accordingly. Unless troubled with actual coil burnouts, high coil temperature should be ignored. Persistent burnouts indicate improper line or coil voltage. See (1e) above.

Warranty

All Refrigerating Specialties Products are warranted against defect 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 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 also 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.

Type S4A

August 2001
Installation Information

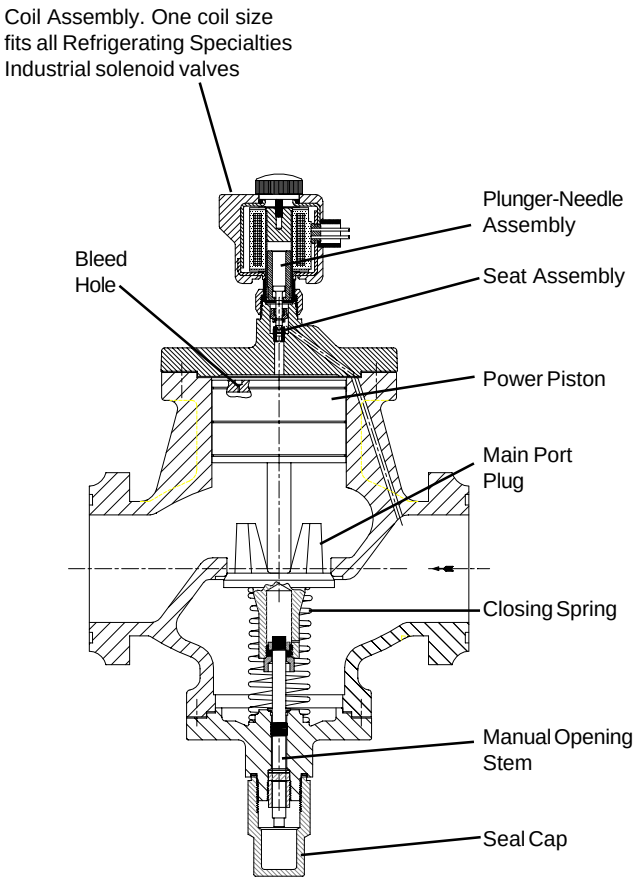


Fig. 1

Solenoid Valve

TYPE S4A
Port Size 3/4"-4" (20-100mm)

Compact, low capacity, wafer mount solenoid valve for service with most refrigerants and their corresponding lubricants. Requires R/S industrial coils offered as open frame, optional remote pilot lights or encapsulated, optional integral pilot light. Both coil styles available with 18 in. leads or DIN connector.

Purpose

A solenoid valve is an electrically operated device used to control the flow of liquids or gases in a fully open or fully closed configuration. Solenoid valves do not modulate; they either permit or prevent fluid flow in the normal direction.

Principles of Operation

The **S4A, S4W, S5A, S7A, S7F and S8F** are normally closed pilot operated solenoid valves that employ the Refrigerating Specialties Industrial operator and the corresponding selection of R/S industrial coils. Starting from the closed position, the plunger needle is seated in the pilot port preventing pilot stream flow. Energization of the solenoid coil forms a magnetic field, drawing the plunger upward. The plunger strikes the needle lifting it out of its seated position. This permits pilot stream flow through the seat. De-energization of the solenoid coil breaks the magnetic field and permits the spring-assisted needle to return to seat, interrupting the pilot stream flow.

S4A

When energized, fluid flow through the pilot port 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. When de-energized, fluid flow through the pilot port is stopped. Bleed-off 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 close 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.

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Installation

Refer also to Safety Installation Bulletin RSBCV. Do not remove the protective covers from the inlet and outlet of the valve until ready to install. They protect the interior from dirt and other foreign matter.

Select a location for installation where the valve will be easily accessible for adjustment and maintenance. Avoid locations where personnel, traffic, material handling or other equipment may damage the valve. If the valve surfaces will be cold, avoid areas where ice may accumulate in the body.

Before installing the valve, check to see that all chips, scale, dirt and other foreign material are removed from the pipes; also be sure the arrow on the valve body is pointing in the flow direction. Remove the protective covers from the valve.

Mount valves with R/S Industrial operators **(S4A, S4W, S5A, S7A, S7F and S8F)** only in horizontal pipeline with solenoid at the top; they will work properly only in this position.

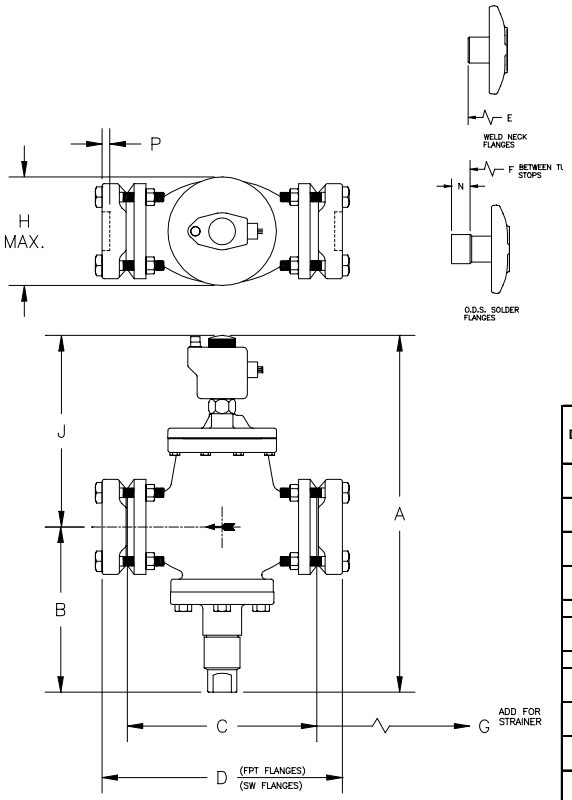
In a liquid line the Solenoid Valve should be near the expansion valve inlet. It is advisable to install the RSF close coupled companion strainer ahead of the valve for protection against dirt and chips.

Install with the arrow on the valve body in the direction of flow. If the valve is backwards, the flow will not be stopped when the valve is electrically de-energized. Solenoid Valves 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 main valve plug will be blown away from its seat and reverse flow will occur. If a system has this type of pressure reversal (as encountered during hot gas defrost with liquid recirculation systems), a check valve such as Refrigerating Specialties Division Type CK4A will need to be added. Check valves must be installed downstream to avoid trapping liquid.

If the valve is to be insulated be sure to allow access to the manual opening stem and strainer cover.

Do not insulate the coil or coil housing.

Connect the solenoid lead wires only to an electrical supply source as indicated on the solenoid coil. The power source must be capable of supplying full, constant voltage. The wires to which the solenoid leads are connected must be of suitable gauge, and must be insulated and enclosed appropriate to the voltage and the environmental or conformity requirements.



For parts selection see Bulletin 30-94, latest edition.
For solenoid coil availability see RSBCV latest edition.

Dimension		PORT SIZE										
		20-25mm (3/4 - 1")	32mm (1-1/4")		50mm (2")			65mm (2-1/2")		75mm (3")		100mm (4")
A	mm	376	394		442			467		579		645
	inch	14.8	15.5		17.4			18.4		22.8		25.4
B	mm	148	162		177			181		273		292
	inch	5.8	6.3		6.9			7.1		10.7		11.5
C	mm	164	203		251			251		311		339
	inch	6.2	8		9.9			9.9		12.2		14.1
D	mm	216	256		307			331		389		450
	inch	8.5	10.1		12.1			13		15.3		17.7
Conn Size			1-1/4"	1-1/2"	1-1/2"		2"	2-1/2		3		4
E	mm	261	300	304	364		371	401		478		571
	inch	10.3	11.8	12	14.3		14.6	15.8		18.8		22.5
Conn Size			1-3/8"	1-5/8"	2-1/8"	1-5/8"	2-1/8"	2-5/8"	2-5/8"	3-1/8"	3-1/8"	3-5/8"	4-1/8"
F	mm	239	269	279	304	358	338	358	348	389	414	432	303
	inch	9.4	10.6	11	12	14.1	13.3	14.1	13.7	15.3	16.3	17	19.8
G	mm	98	178		251			314		314		363
	inch	3.9	7		9.9			12.4		12.4		14.3
H	mm	117	117		140			159		176		222
	inch	4.6	4.6		5.5			6.2		7		8.8
J	mm	224	231		284			300		312		353
	inch	8.8	9.1		11.2			11.8		12.3		13.9
Conn Size			1-3/8"	1-5/8"	2-1/8"	1-5/8"	2-1/8"	2-5/8"	2-5/8"	3-1/8"	3-1/8"	3-5/8"	4-1/8"
N	mm	20	25	28	34	28	33	38	38	43	43	48	55
	inch	0.75	1	1.1	1.3	1.1	1.3	1.5	1.5	1.7	1.5	1.9	2.15
P	mm	13	15		15			25		29			32
	inch	0.5	0.6		0.6			1		1.1			1.3

Refrigerating Specialties Division

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SOLENOID VALVE

Type S4A-DN

Port Size 20-100mm (3/4”-4”)
FOR AMMONIA, R12, R22, R502
AND OTHER COMMON REFRIGERANTS

FEATURES

- Standard Coil Housing Meets NEMA 3R and NEMA 4-Rain Tight
- Coil Housing Surpasses NEMA Salt Spray Test
- Plunger-Needle Assembly Same for S4A,S5A,S6N,S6A,S8F
- Molded Class “B” Coil Construction
- Same Coil Fits Most Refrigerating Specialties Solenoid Valves
- Pilot Light Available
- Stainless Steel Needle
- Manual Opening Stem
- Design Pressure (PS): 28 bar (406 PSIG)
- Complies with Pressure Equipment Directive 97/23/EC

Description

This heavy duty solenoid valve is suitable for Ammonia, R-12, R-22, and R-502, other refrigerants, certain oils and other fluids approved for use in refrigeration. The S4A is a pilot operated, semi-steel bodied valve. The valve may be opened by means of the manual opening stem for servicing or in case of electrical power failure.

The Type S4A Solenoid Valve is furnished with FPT Internal NPT (U.S. Standard Taper Pipe Thread), Socket Weld, Weld Neck or ODS (solders over copper tubing of given diameter) connections. The valve may be easily removed from between the flanges for servicing.

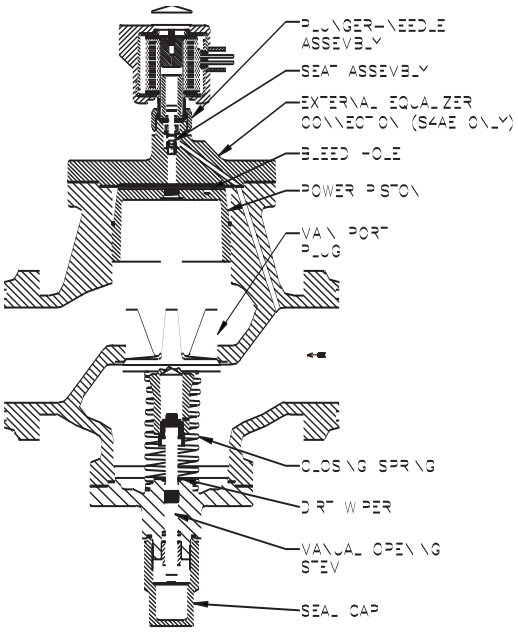


Fig. 1

BULLETIN DN30-94B
Type S4A-DN

January 2007
Installation and Service Information

It is advisable to install a strainer upstream of each valve to prevent entrance of foreign material into the valve and the rest of the system. Refrigerating Specialties strainers are available to close-couple to valve inlets.

Purpose

Type S4A is a spring closing valve, suitable for use in refrigerant liquid, hot gas or suction lines in a temperature range of -50° to 105°C (-60° to 220°F).

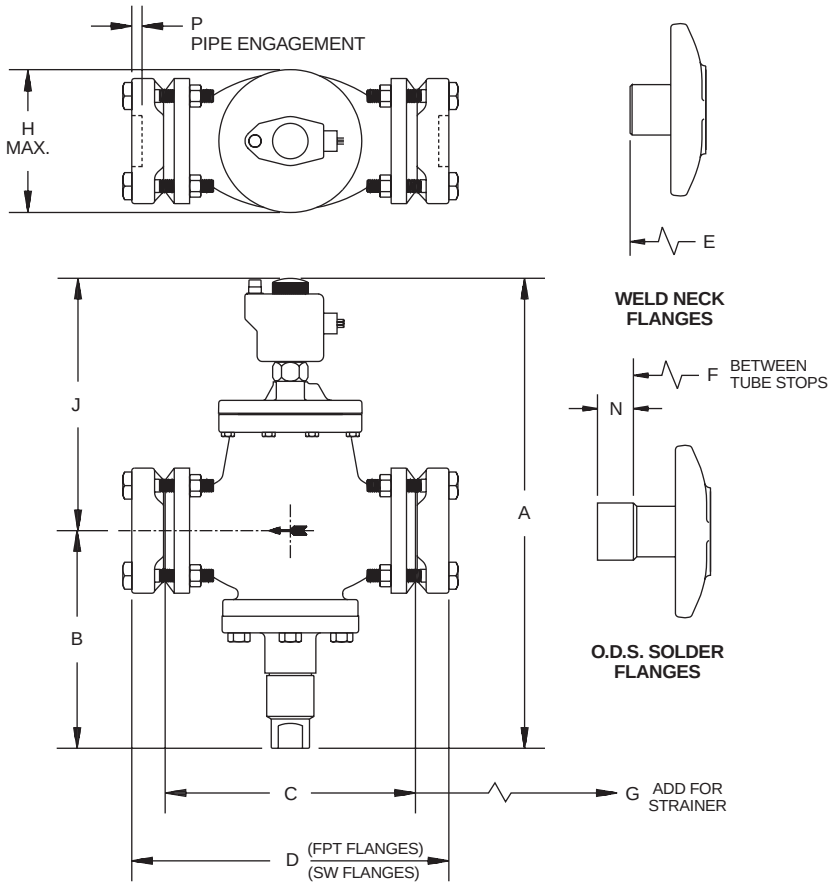
Principles of Operation

The **Type S4A** is a pilot operated solenoid. The valve in its closed position, with the solenoid coil de-energized and the plunger needle and main port plug in the seated position, is shown in Figure 1. Electrical energization of the solenoid coil forms a magnetic field, pulling up the plunger which strikes the needle, lifting it off its seat. Upward motion of the needle permits entrance of the fluid from the valve inlet M through Port N and down through the pilot port to the top of the power 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 needle to drop back into its seat, stopping the flow through the pilot port. Bleed-off, 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 S4A is for the purpose of opening the valve without energizing the solenoid coil. Refer to the applicable exploded view and parts list for location of the stem and other related parts. For access to stem the seal cap on the bottom of the valve must be removed. This must be done with caution as refrigerant may have been trapped inside the seal cap. To open the valve manually, turn the stem counterclockwise as far as it goes. To reset for automatic operation turn the stem clockwise until only the flats on the end of the stem protrude from the packing nut.



Allow 100mm (4”) above valve for removal of coil housing and coil.
Allow 25m (1.0”) below valve to operate manual opening stem.

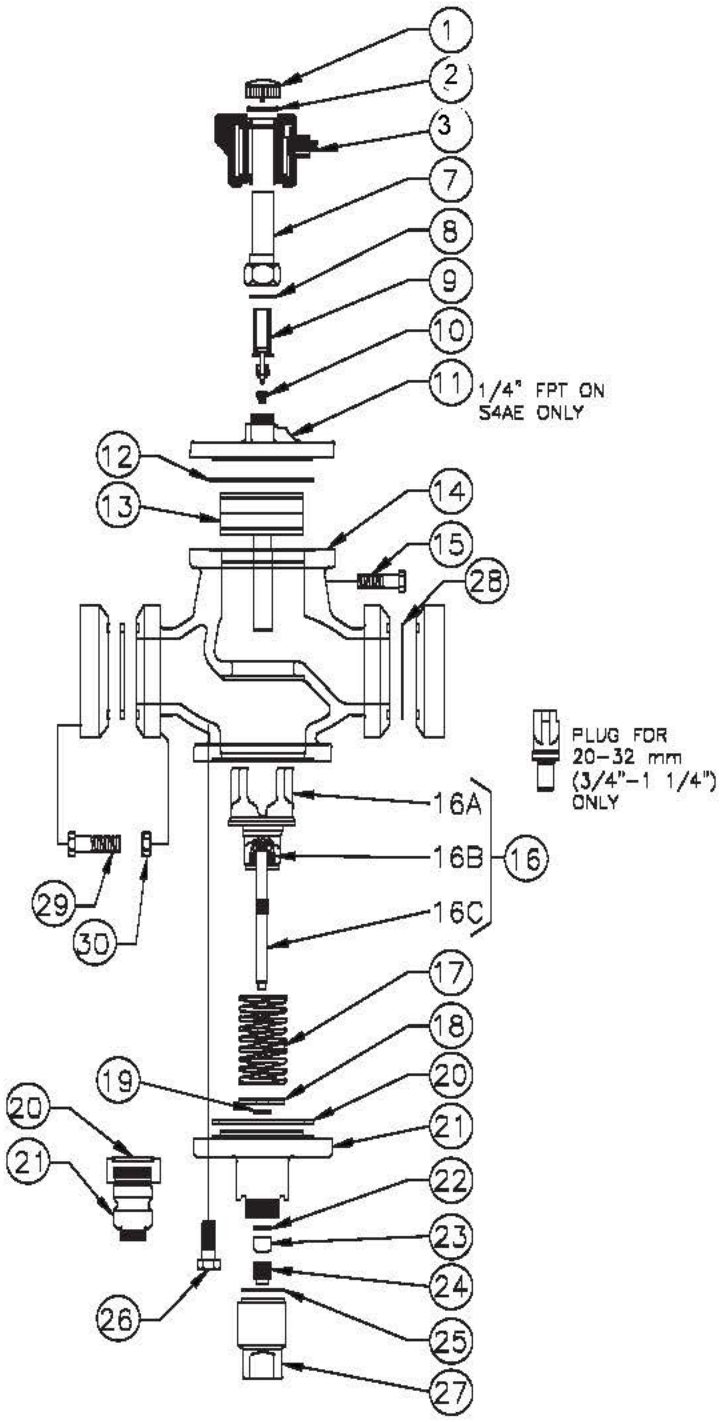
DIMENSIONAL TABLE

Dimension		PORT SIZE																					
		20mm (3/4”) & 25mm (1”)	32mm (1-1/4”)			40 & 50mm (15/8 & 2”)			65mm (2-1/2”)		75mm (3”)		100mm (4”)
A	mm	376	394			442			467		579		645
	inch	14.8	15.5			17.4			18.4		22.8		25.4
B	mm	148	162			177			181		273		292
	inch	5.8	6.3			6.9			7.1		10.7		11.5
C	mm	164	203			251			251		311		339
	inch	6.2	8.0			9.9			9.9		12.2		14.1
D (FPT,SW)	mm	216	256			307			331		389		450
	inch	8.5	10.1			12.1			13.0		15.3		17.7
			1¼		1½	1½		2					
E (WN)	mm	261	300		304	364		371	401		478		571
	inch	10.3	11.8		12.0	14.3		14.6	15.8		18.8		22.5
			1⅜	1⅝	2⅛	1⅝	2⅛	2⅝	2⅝	3⅛	3⅛	3⅝	
F (ODS)	mm	239	269	279	304	358	338	358	348	389	414	432	303
	inch	9.4	10.6	11.0	12.0	14.1	13.3	14.1	13.7	15.3	16.3	17.0	19.8
G	mm	98	178			251			314		314		363
	inch	3.9	7.0			9.9			12.4		12.4		14.3
H	mm	117	117			140			159		176		222
	inch	4.6	4.6			5.5			6.2		7.0		8.8
J	mm	224	231			284			300		312		353
	inch	8.8	9.1			11.2			11.8		12.3		13.9
			1⅜	1⅝	2⅛	1⅝	2⅛	2⅝	2⅝	3⅛	3⅛	3⅝	4⅛
N (ODS)	mm	25	25	28	33	28	33	38	38	43	43	48	55
	inch	1.0	1.0	1.1	1.3	1.1	1.3	1.5	1.5	1.7	1.7	1.9	2.2
			1-1/4		1-1/2	1-1/2		2					
P (SW)	mm	13	15		15	15		15	25		29		32
	inch	0.5	0.6		0.6	0.6		0.6	1.0		1.1		1.3

S4A-DN	3/4" TO 4"
PRESSURE BEARING COMPONENTS	
COMPONENT DESCRIPTION	**MATERIAL**
BODY, 1-1/4 TO 4"	DUCTILE IRON GGG 40.3
BODY, 3/4 & 1" S4A DN	DUCTILE IRON GGG 40.3
COVER,BOTM A4A/S4A 3/4 TO 1-1/4	1-7/8 RD 1215 STEEL
COVER,BOTM A4A/S4A 1-5/8 TO 4"	DUCTILE IRON GGG 40.3
ADAPTER ASM,S4A DN 1-1/4	DUCTILE IRON GGG 40.3
SLEEVE, SOLENOID TUBE	AISI 1117 CRS BARSTOCK

For replacement parts and prices, consult
PARTS KITS LIST PRICE SCHEDULE INDUSTRIAL AND FLO-CON (PK)

Item	Description
1	Knob
2	O-Ring
3	Coil Asm
7	Tube Assembly
8	Gasket
9	Plunge Needle Assembly
10	Seat Assembly
11	Adapter Assembly
12	Gasket
13	Piston
14	Body
15	Bolt
16	Plug Stem Asm
17	Spring, Comp
18	Washer
19	Wiper, Dirt
20	O-Ring
21	Cover, Bottom
22	Washer, Flat
23	Packing,Stem
24	Nut,Packing
25	Gasket
26	Bolt
27	Seal Cap



Installation

Protect inside of valve from dirt, chips and moisture during installation. Mount only in horizontal pipe line with solenoid coil at the top; this valve will work properly only in this position. In a liquid line the Solenoid Valve should be near the expansion valve inlet. It is advisable to install the S4A close coupled companion strainer ahead of the valve for protection against dirt and chips.

The S4A 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 S4A 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 piston will be blown away from its seat and reverse flow will occur. If a system has this type of pressure reversal (as encountered during hot gas defrost with liquid recirculation systems), a check valve such as Refrigerating Specialties Division Type CK4A in series with the solenoid valve will prevent flow reversal. (CK4A must be installed downstream to avoid trapping liquid.)

Electrical

The Refrigerating Specialties Division molded water resistant Class "B" 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. The coil housing far exceeds the requirements of NEMA Standard ICS, 1-110.57 salt spray test for rust resistance.

By definition, Class "B" coil construction will permit coil temperatures, as measured by resistance method, as high as 130°C (266°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

The molded Class "B" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for 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 (see current copy of Bulletin 60-10, "Pilot Light Assembly and Solenoid Transformer Coil").

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 burnout. Also, operating with line voltage below the limit will definitely result in lowering the valve opening pressure differential. Power consumption during normal operation will be 33 watts or less.

Inrush and running current is listed below:

Standard Volts/Hertz	Inrush Current (Amps)	Running Current (Amps)	Fuse Size (Amps)
120/60 (Blue leads)	1.18	0.46	1
208/60 (Blue & Red leads)	0.63	0.25	1
240/60 (Red leads)	0.60	0.23	1
440/60 (Yellow & Red leads)	0.39	0.13	1
115/50 (Yellow & Blue leads)	1.22	0.21	1
230/50 (Yellow leads)	0.65	0.261	
Other	(Contact Factory)		

On transformer coil the 6 volt leads are always black.

Service Pointers

The S4A Solenoid Valve and Strainer are easily removable for cleaning or repairing. To remove valve and strainer, first manually open the valve and pump out the refrigerant in the section of the line sealed off. Then unscrew the flange bolts and spread the flanges slightly apart.

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 S4A will open against a maximum pressure difference across the valve of 21 bar (300 psig). (e) Solenoid Coil is burned out. See "Electrical," and replace with proper coil. (f) Plunger/Needle Assembly is sticking. To disassemble the S4A for inspection of internal parts (after pumping out the system as required): disconnect power source to #4 Solenoid Coil, remove #7 Tube Assembly, lift out #9 Plunger Assembly, then remove #11 Adapter Assembly. Remove every trace of dirt from the piston and cylinder using fine emery cloth to remove burrs if necessary. Thoroughly clean all parts and reassemble using a light film of refrigeration oil on the Piston.

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 Main Valve Seat, preventing proper seating. Disassemble and clean Valve as outlined in (1f) above. (c) Main Valve Seat, Pilot Seat, or Valve Needle may be worn or damaged and therefore leaking. Disassemble and clean Valve as outlined in (1f) above. If any of these parts need replacing, it is advisable to replace using the proper replacement kit. (d) #13 Piston is sticking. See (1f) above. (e) #16C Manual Opening Stem is turned all or partly out holding #16A Modulating Plug Assembly open and permitting flow through the valve. (f) #5 Coil Housing Screw (made of non-magnetic stainless steel) has been replaced with a screw made of magnetic material and residual magnetism is holding #9 Plunger Needle Assembly in the open position. Consequently, the Main Valve is not closing. Replace with screw of correct material.

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

4. Overheating: The Solenoid Coil is designed to operate hot and is constructed of high temperature materials accordingly. Unless troubled with actual Coil burnouts, high coil temperature should be ignored. Persistent burnouts indicate improper line or coil voltage. See (1e) above.

Warranty

All Refrigerating Specialties Products are warranted against defect 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 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 also Bulletin RSB)

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 RSBCV 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.

SOLENOID VALVE
Type SV2, SV2A

Port Size 1/2" to 1-1/4" (13-32 mm) Suitable For: Ammonia, R-12, R-22, R-502 and Other Common Refrigerants

FEATURES
- Ductile Iron Body Strong, Compact
- Pilot Operated
- Manual Opening Stem
- All Service From The Top
- Maximum Opening Pressure Difference 20.7 bar (300 psig)
- Design Pressure (MRP):31.0 bar (450 psig)
- Pilot Light Available
- Molded Class "H" Coil Construction
- Teflon Seat

DESCRIPTION
This compact, heavy duty, pilot operated, ductile iron bodied solenoid valve is suitable for Ammonia, R 12, R 22, R 502, and other refrigerants, certain oils 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 an electrical power failure. The valve can be ordered with a close couple stainless steel screen strainer.

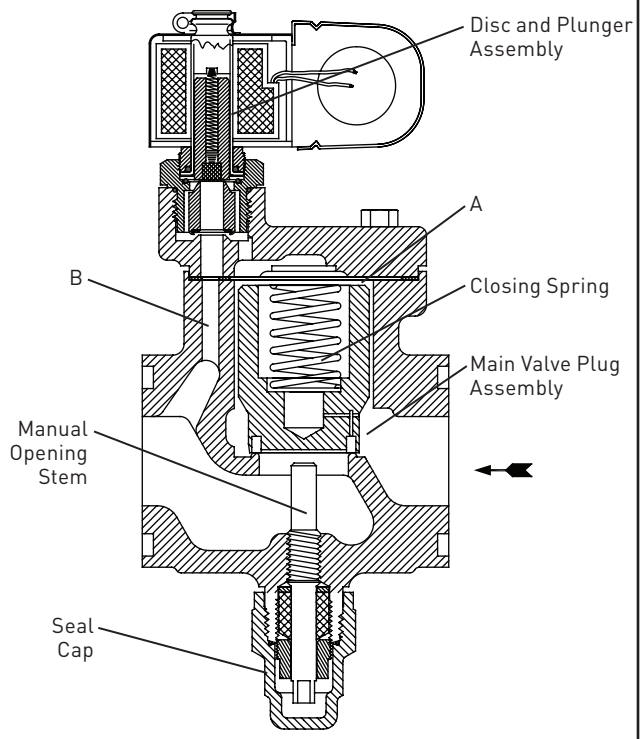


FIG. 1: SV2 Cross-Section

Bulletin 30-06 D

December 2007
Installation, Service, and Parts Information

The Type SV2 valve is available with an optional extension tube to raise the solenoid operator and coil housing assembly 50mm (2.0") above the valve body to accommodate pipe Insulation. When this option Is desired, the Type SV2A solenoid valve should be specified.

The Type SV2 and SV2A solenoid valves can be furnished with FPT: Internal NPT (U.S. Standard Taper Pipe Thread), Socket Weld, Weld Neck, or ODS (solders over copper tubing of given diameter) connections. The valves may be easily removed from between the flanges for servicing.

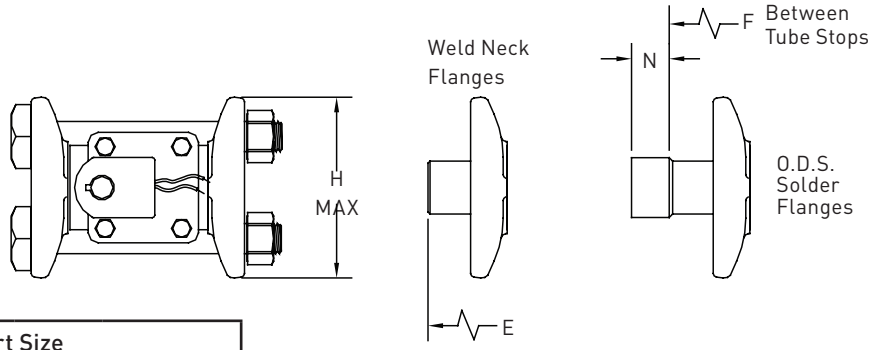
PURPOSE
The SV2 is a spring closing, normally closed solenoid valve. The SV2 is suitable for use in refrigerant liquid, hot gas or suction lines in a fluid temperature range of -45° to 121°C (50° to 250°F). Minimum pressure drop to hold valve open is .24 bar (3.5 psi).

PRINCIPLES OF OPERATION
The Type SV2 is a pilot operated solenoid valve. The valve, In its closed position, with the solenoid coil de-energized and the disc and plunger assembly in its seated position, is shown In Figure 1. Electrical energization of the solenoid coil forms a magnetic field, pulling up the plunger and allowing the piston plug to lift off its seat. This permits flow of the trapped refrigerant from the top of the main valve plug. (Chamber A) which reduces pressure above the plug assembly. The main valve plug is then forced upward by the upstream pressure acting on it. This opens the valve port to allow flow through the valve.

De-energization of the solenoid coil permits the spring assisted disc and plunger assembly to drop back to its seat, stopping the flow through the pilot port (port 13). The

REPAIR KITS FOR SV2 & SV2A SOLENOID VALVES

Item #	Description	Qty	1/2"(13mm	3/4"(20mm)	1"(25mm)	1-1/4"(32mm)
1 - 5	Coil & Housing Kit	1	Specify Coil Voltage and Valve Type			
6 - 8	Solenoid Operator Assembly	1	202700	202700	202700	202700
9 & 10	Seal Cap Kit(Discard Gasket)	1	202713	202713	202713	202713
11,12,&13	Stem Packing Kit	1	202100	202100	202100	202100
11 to 14	Manual Opening Stem Kit	1	202745	202746	202746	202747
17	Bolt Package	4	202761	202762	202762	202763
15,16	Main Valve Plug Kit	1	202748	202749	202750	202751
16,18	Closing Spring Kit	1	202752	202753	202753	202754
16,19,20	Top Cover Kit	1	202755	202756	202756	202757
20,21,22,23	Piston Plug Kit for SV2	1	-----	202764	202764	202764
20,21,22,23	Piston Plug Kit for SV2A	1	202765	202766	202766	202766
24	Flange Gasket	12	202078	202079	202079	202080
7,10,16,20,23,24	SV2,SV2A Solenoid Gasket Kit	1	202758	202759	202759	202760
	Sv2 Repair kit	1	202767	202769	202769	202770
	SV2A Repair Kit	1	202771	202773	202773	202774



DIMENSIONAL DATA- PORT SIZE

Dimension	Solenoid Valve Port Size								
	1/2" (13mm)			3/4" - 1" (20 - 25mm)			1-1/4" (32mm)		
	Flange	inch	mm	Flange	inch	mm	Flange	inch	mm
A	---	6.56	166	---	8.00	203	---	8.62	219
B	---	2.31	59	---	3.12	79	---	3.50	89
C	---	2.25	57	---	3.43	87	---	5.87	149
D(FPT,SW)	---	3.75	95	---	5.76	146	---	7.97	203
E(WN)	---	4.44	113	---	7.53	192	1-1/4"	9.67	246
							1-1/2"	9.87	251
F(ODS)	1/2"	4.75	121	---	6.63	168	1-3/8"	8.47	215
	5/8"	5.25	134				1-5/8"	8.87	225
	7/8"	6.12	156				2-1/8"	9.87	251
G	---	2.00	50	---	3.9	99	---	7.00	178
H	---	3.00	76	---	4.60	117	---	3.75	95
		3.87	98		4.87	124		5.12	130
J N(ODS)	1/2"	0.37	10	7/8"	0.75	20	1-3/8"	1.00	25
	5/8"	0.50	13	1-1/8"	0.93	24	1-5/8"	1.09	28
	7/8"	0.75	20	1-3/8"	1.00	25	2-1/8"	1.34	34
P(SW)		0.50	13	---	0.50	13	---	0.50	13

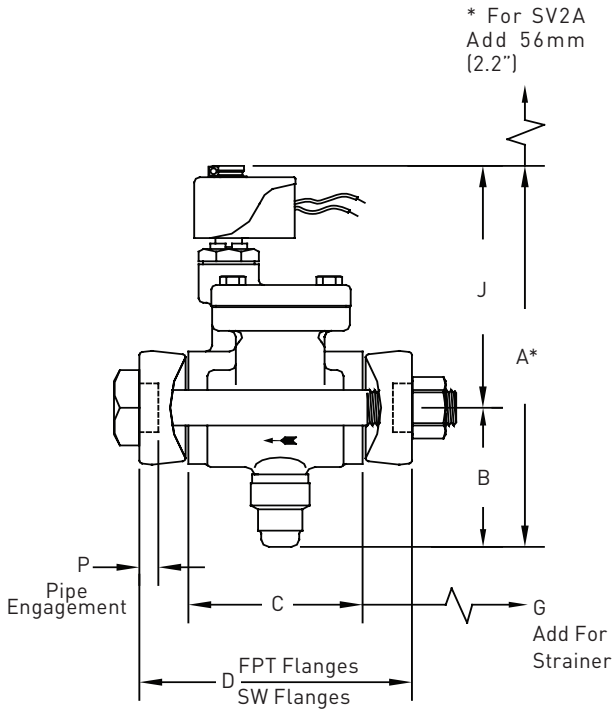


FIG. 2: SV2 Dimensions

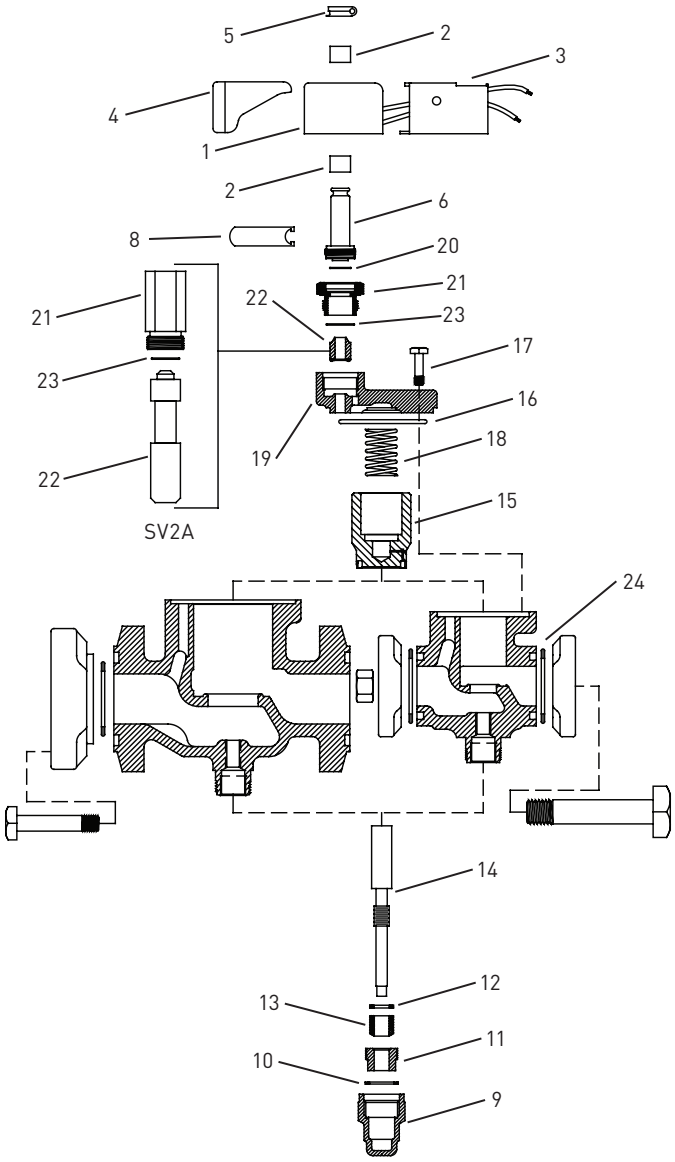


FIG 3. : SV2 Solenoid Valve

pressure above and below the main valve plug assembly Is equalized, utilizing the closing spring, which forces the main valve plug assembly onto its seat , thus stopping flow through the valve.

MANUAL OPENING STEM

The manual opening stem on the Type SV2 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 on the bottom of the valve 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 clockwise until only the flats on the end of the stem protrude from the packing nut. To reset for automatic operation, turn the stem counter clockwise as far as it will go. Loosen packing nut before turning stem and re-tighten after turning stem.

INSTALLATION

Protect inside of valve from dirt, chips and moisture during Installation. Mount only In horizontal pipe line with solenoid coil at the top; this valve will work properly only in this position. In a liquid line, the Solenoid Valve should be near the expansion valve inlet. It is advisable to Install the RSF close coupled companion strainer ahead of the valve for protection against dirt and chips.

The SV2 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 SV2 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 piston will be blown away from its seat and reverse flow will occur. If a system has this type of pressure reversal (as encountered during hot gas defrost with liquid recirculation systems) , a check valve such as Refrigerating Specialties Division Type CK4A in series with the solenoid valve will prevent flow reversal. (CK4A must be installed downstream 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 Class "H" coil construction will permit coil temperatures, as measured by resistance method, as high as 180°C (365°F). Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures so the maximum coil temperature is not exceeded. Conversely, low fluid temperatures permit higher ambient temperatures. 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 for 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 (see current copy of Bulletin 60 10, "Pilot Light Assembly and Solenoid Transformer Coil"). It is not recommended to mount the pilot light directly onto the coil housing.

The solenoid coil must be connected to electrical lines with Volts and Hertz the same as specified on the coil assembly. 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 at 15% under voltage. Operating with line voltage

Coil Type	Watt Rating and Volt Amperage		
	Watts	VA Holding	VA InRush
Standard AC Coil Coil Class 'H'	10.5	23	37
Standard AC Coil with 6v secondary pilot light	11	26	38

below the limit will result in lowering the valve opening pressure differential.

SERVICE POINTERS
The SV2 Solenoid Valve and Strainer are easily removable for cleaning or repairing. To remove valve and strainer, first manually open then pump out valve, unscrew the flange bolts and spread the flanges slightly apart.

1. **Failure To Open:** (a) Coil Is of incorrect voltage. See "Electrical." Check voltage specified on the coil assembly. (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 SV2 will open against a maximum pressure difference across the valve of 20.7 bar (300 psig). (e) Solenoid coil is burned out. See "Electrical," and replace with proper coil. (f) Disc and Plunger Assembly Is sticking. To disassemble the valve for Inspection of internal parts (after pumping out the system as required), disconnect the power source to the solenoid coil, remove the Tube Assembly, lift out the Disc and Plunger Assembly, then remove the Piston Plug Retainer and Piston Plug Assembly. Remove the Top Cover and the Main Valve Plug Assembly. In any traces of dirt from these parts and using fine emery cloth remove any burrs if necessary. Thoroughly clean all parts and re-assemble applying a light film of refrigeration oil on the parts.

2. **Failure To Close:** (a) Electrical control circuit is not opening properly. Check wiring and controls. (b) There are chips or dirt on the seat(s) preventing proper seating. Disassemble and clean valve as outlined In 1(f) above. If any of these parts need replacIng, It is advisable to replace them using a proper new replacement kit. (d) Piston is sticking. See 1(f) above. (e) Manual Opening Stem is turned all of the way or partly in holding Main Valve Plug Assembly open and permitting flow through valve.

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

4. **Overheating:** The Solenoid Coil Is designed to operate hot and is constructed of high temperature materials accordingly. Unless troubled with actual coil burn outs, high coil temperature should be Ignored. Persistent burn outs Indicate improper line or coil voltage. See 1(e) above .

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 that could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid that 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 valve upstream of solenoid valves or downstream of check valves be close 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 that 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 warranted against defects in workmanship and materials for a period of one (1) year from date of shipment from originating 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 Refrigerating Specialties Division. Defective products or parts of 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 that have been altered or repaired in the field, damaged in transit as a result of accidents, misuse, or abuse. Products disabled by dirt or other foreign substances will not be considered defective.

THE EXPRESS WARRANTY ABOVE CONSTITUTES THE ONLY WARRANTY OF REFRIGERATING SPECIALTIES PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF 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 neither to give any warranties on behalf of Refrigerating Specialties nor to assume for Refrigerating Specialties any other liability in connection with any of it products.