

# GAS POWERED SUCTION STOP VALVE

## Type S9A

Port Size: 50-100mm (2" - 4")  
FOR AMMONIA, R12, R22, R502  
AND OTHER COMMON REFRIGERANTS

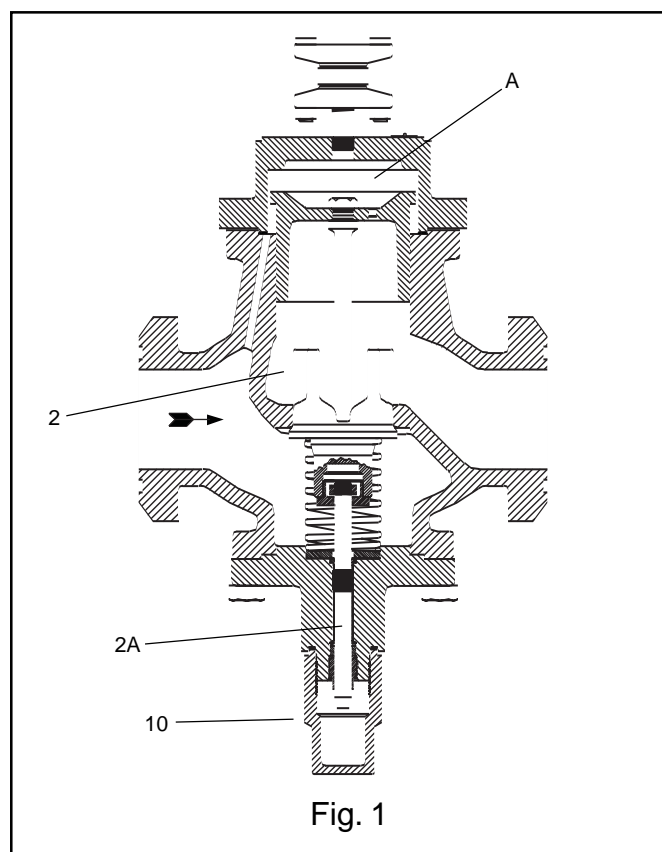
### FEATURES

- Low Pressure Drop for Low Temperature Operation
- Suitable to -50°C (-60°F)
- Can Be Installed in Vertical or Horizontal Position
- Manual Opening Feature
- 27.6 bar (400 PSIG) Maximum Rated Pressure (MRP)

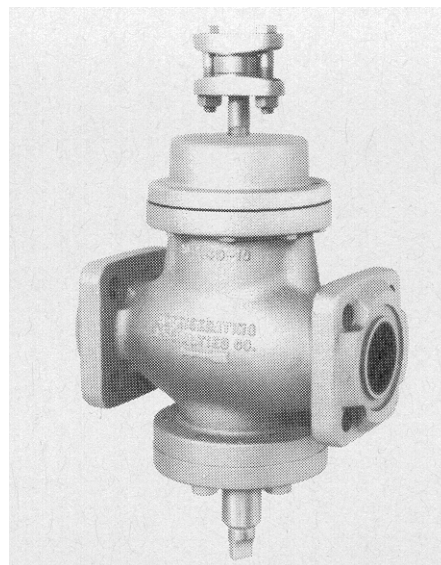
### Description

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

The Type S9A is a pilot operated valve but uses an external source of higher pressure gas to operate the valve, and, therefore requires no minimum pressure drop to open. The external gas pressure for the Type S9A must be at least 0.69 bar (10 psi) above valve internal upstream pressure for positive opening. This valve is normally closed.



## BULLETIN 31-90B Type S9A



March 2002

### Installation, Service and Parts Information

### Purpose

The S9A valve is designed to promptly and fully open or close under conditions which make conventional solenoid valves unreliable or unsuitable, such as viscous oil conditions, location in a vertical pipeline, or where very low valve pressure drop is required.

The S9A valve is a two-position valve using condenser gas pressure acting upon a piston for opening, and a strong spring for closing. A lapped seat at the top of the piston prevents the condenser gas from leaking around the piston to the compressor suction side of the valve. A twin Pilot Solenoid Valve assembly serves to admit condenser gas pressure to the piston for opening and to bleed this gas pressure to the suction line for valve closing. A single-pole, double throw thermostat or relay may be used to control these two Pilot Solenoid Valves.

The S9A is not a check valve and will permit reverse flow if the downstream pressure is higher than the upstream pressure.

### Principles of Operation

For opening of the S9A main valve, the Pressure Pilot Solenoid Valve is electrically energized to open (admitting high pressure gas to chamber A (Fig. 1) at the top of the power piston); simultaneously, the Bleed Pilot Solenoid Valve is electrically de-energized (preventing escape of the high pressure gas entering chamber A); thereby the pressure acting on the piston forces the main valve wide open.

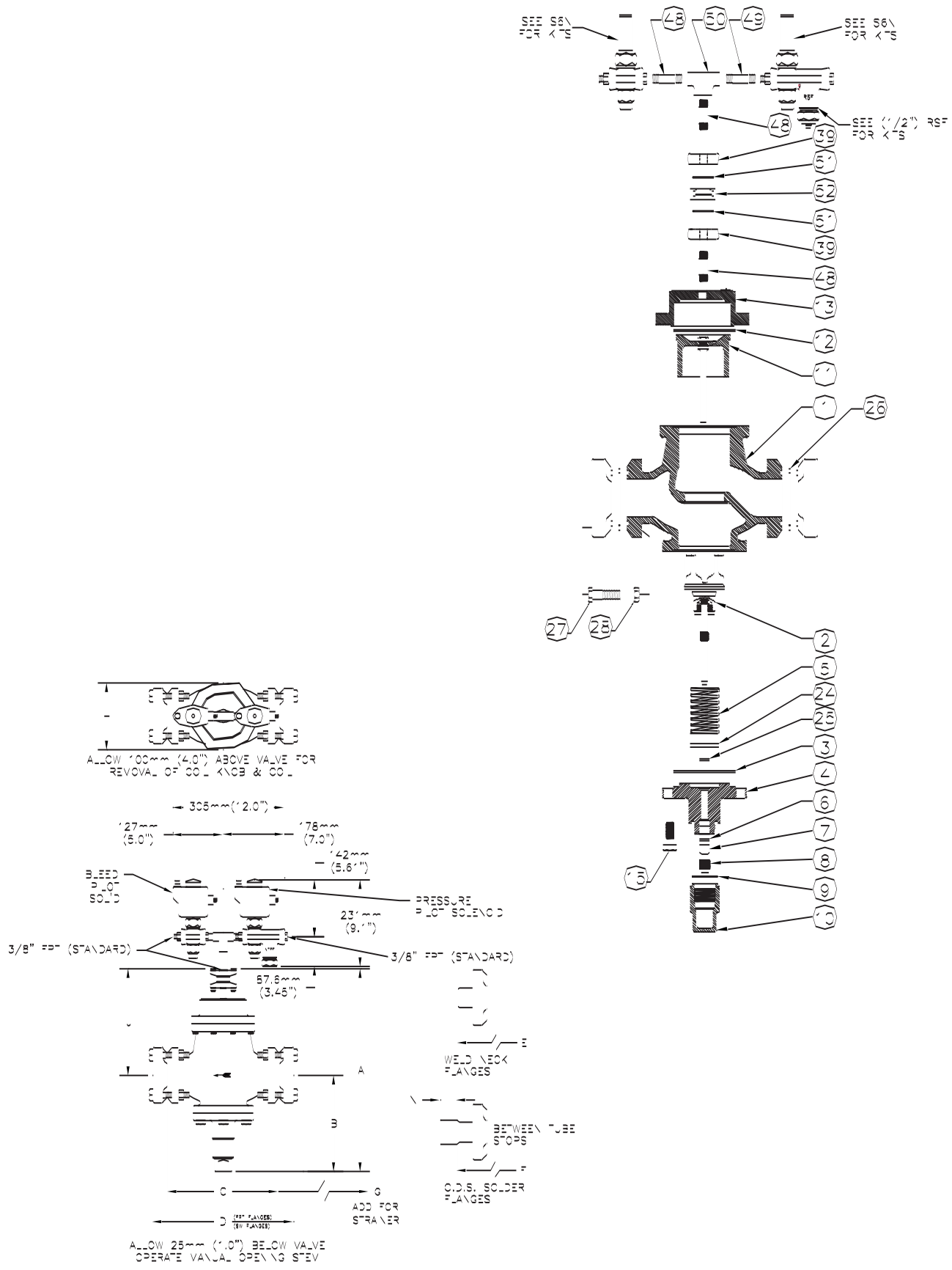
For closing of the S9A main valve, the reverse actions take place. The Pressure Solenoid is electrically de-energized to close (preventing further high pressure gas from reaching chamber A at the top of the piston); simultaneously, the Bleed Solenoid is electrically energized to open (bleeding off pressure from chamber A); thereby the main valve is caused to close by the force of the valve closing spring.

### Manual Opening Stem

To manually open the #2 Main Valve of the S9A Solenoid Valve, cautiously remove #10 Seal Cap and turn #2A Seat Lift Stem out until it stops. Valve cannot close now until the #2A Seat Lift Stem is once again turned in. See Fig. 1.

REPAIR KITS FOR TYPE S9A						
Item No.	Description & Contents	Oty.	50mm (2")	65mm(21/2")	75mm (3")	100mm(4")
2	Plug/Stem Asm.	1				
*	Spring Kit, Closing	1				
8	Nut, Packing					
7	Packing, Stem	1				
6	Washer, Flat	1				
2,6-8	Plug Kit, Main Valve		202209	202210	202211	202212
5	Spring, Comp	1				
25	Wiper, Dirt	1				
3	Gasket	1				
24	Washer, Flat	1				
3,5,24,25	Spring Kit, Closing		202306	202307	202308	202309
6	Washer, Flat	1				
8	Nut, Packing	1				
7	Packing Stem	1				
6-8	Packing Kit, Stem		202100	202100	202101	202101
7	Stem Packing Pkg. (0.28" I.D.) Packing	25	202478	202478	202479	202479
10	Seal Cap	1				
9	Gasket	1				
9-10	Cap Kit, Seal		202110	202110	202111	202111
13	Cover, Top	1				
12	Gasket	1				
12-13	Cover Kit		201150	201163	201144	201135
11	Piston/Stem Asm.	1				
12	Gasket	1				
11-12	Piston Kit		201072	201074	201076	200276
11	Piston/Stem Asm.	1				
12	Gasket	1				
11-12	Piston Kit 9A		202126	202127	202128	202129
	Plug Kit, Main Valve	1				
4	Cover, Bottom	1				
9	Gasket	1				
15	Bolt, Hex Head	6				
10	Seal Cap	1				
4,9,10,15	Bottom Asm. Kit		202358	202360	202361	202362
52	Strainer, Disc	1				
51	Gasket	2				
51,52	Strainer Kit, Disc		200912	200912	200912	200912
5	Spring Comp (Only)	1	301557	301558	301559	301500
48	Pipe Nipple 3/8" x 2"	1	302014	302014	302014	302014
52	Strainer, Disc	1				
51	Gasket	2				
39	Flange 3/8" FPT	2				
53	Bolt	2				
54	Nut	2				
39,51,52	Strainer, Disc with 3/8"					
53,54	FPT Flgs.		201665	201665	201665	201665
3	Gasket, Bottom Cap, Pkg.	6	202374	202374	202382	202383
26	Gasket, Flange, Pkg.	12	202081	202082	202083	202084
3,9,12,26	Gasket Kit		202287	202288	202289	202290
49	Orifice Asm.	1	200998	200999	200999	200999
50	3/8" Pipe Tee	1	302073	302073	302073	302073
14	Cover Bolt Pkg.	8	202541	202541		
		6			202546	202547
15	Bottom Cap Bolt Pkg.	6	202251	202251	202252	202252

DIMENSIONAL DATA (See Fig. 2)									
PORT SIZE		50mm (2")			65mm (2-1/2")		75mm (3")		100mm (4")
DIMENSION									
A	MM	429			455		570		615
	INCH	16.9			17.9		22.4		24.2
B	MM	175			180		269		292
	INCH	6.9			7.1		10.6		11.5
C	MM	251			251		311		366
	INCH	9.9			9.9		12.2		14.4
D (FPT,SW)	MM	307			331		389		450
	INCH	12.1			13.0		15.3		17.7
E (WN)	CONN.	1-1/2	2		2-1/2		3		4
	MM	364	371		401		478		571
	INCH	14.3	14.6		15.8		18.8		22.5
F (ODS)	CONN.	1-5/8	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	3-5/8	4-1/8
	MM	358	338	358	348	389	414	432	503
	INCH	14.1	13.3	14.1	13.7	15.3	16.3	17	19.8
G	MM	251			314		314		363
	INCH	9.9			12.4		12.4		14.3
H	MM	140			159		176		222
	INCH	5.5			6.2		7.0		8.8
J	MM	254			274		300		323
	INCH	10.0			10.8		11.8		12.7
N (ODS)	CONN.	1-5/8	2-1/8	2-5/8	2-5/8	3-1/8	3-1/8	3-5/8	4-1/8
	MM	28	33	38	38	43	43	48	55
	INCH	1.1	1.3	1.5	1.5	1.7	1.7	1.9	2.2
P (SW)	MM	15			25		29		32
	INCH	0.60			1.0		1.10		1.3



## Installation

It is necessary that all installation personnel read and become familiar with the Refrigerating Specialties Division Refrigeration Safety Bulletin (RSB) before installing any valves.

All valves are packed for maximum protection during storage and shipment. Read the enclosed literature and save it for reference after installing the valve.

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 the valve may be damaged by personnel, traffic, material handling or other equipment.

Before installing the valve, check to see that all chips, scale, dirt and other foreign material are removed from the pipes. Remove the protective covers from the valve.

Type S9A valve can be mounted in any position except upside down. The remote pilot solenoids, however, must be mounted in a vertical position with the solenoid at the top as shown on page 3.

There are some applications in which an S9A in a horizontal line will function better if installed lying on its side. For example, in a liquid overfeed suction line: The internal partitions of the valve body that separate the inlet side from the outlet side create a higher wall (or dam) which will tend to block flow of liquid refrigerant and/or oil if the valve is in an upright position instead of on its side. Especially in low temperature suction lines, where the velocities tend to be slower, an S9A lying on its side will offer less resistance to flow than one in an upright position, because the valve inlet throat will not be choked with as much liquid.

The Type S9A Main Valve Body should normally be installed with the arrow on the body pointing in the direction of normal fluid flow through the valve. However, when installed in gravity liquid or gas legs between a flooded evaporator and its surge drum, as part of a defrost control system, the arrow should always point from the evaporator to the surge drum.

The Pilot Solenoid Valve assembly may be located anywhere within approximately 8 meters (25 feet) of the Main Valve Body, provided pipe connections are extended to the Main Valve Body as well as to condenser gas and compressor suction lines. The standard Pilot Solenoid Valve assembly is built for installation on top of the Main Valve Body; therefore, remote or altered location of the Pilot Solenoid Valve assembly requires slight revisions in the field to the 3/8" pilot valve assembly piping.

After installation, check the valve and the welded joints for external leaks with refrigerant or other appropriate gas before putting the system into operation.

If the valve is to be insulated, be sure to allow access to the manual opening stem and strainer. Do not insulate the coil and coil housing.

Connect the solenoid lead wires to an electrical supply source as indicated on the valve coil. The power source must be capable of supplying full, constant voltage. The wires, to which the solenoid leads are connected, must be of the proper gauge.

## 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	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	0.26	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
230/150 (Yellow leads)	0.65	0.26	1
Other	Consult Factory		

On transformer coil the 6 volt leads are always black.

**Caution:** Do not connect the solenoid lead wires to the loadside circuit of a motor or other high current device. Doing this may cause the solenoid and motor or other device to become energized simultaneously and produce a voltage drop, resulting in the valve's failure to open. A more desirable condition would be to connect the solenoid on a separate circuit or to install a time delay on the solenoid valve circuit. This would prevent energization of the solenoid until the circuit's full power is restored.

## 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.