

INLET PRESSURE REGULATORS

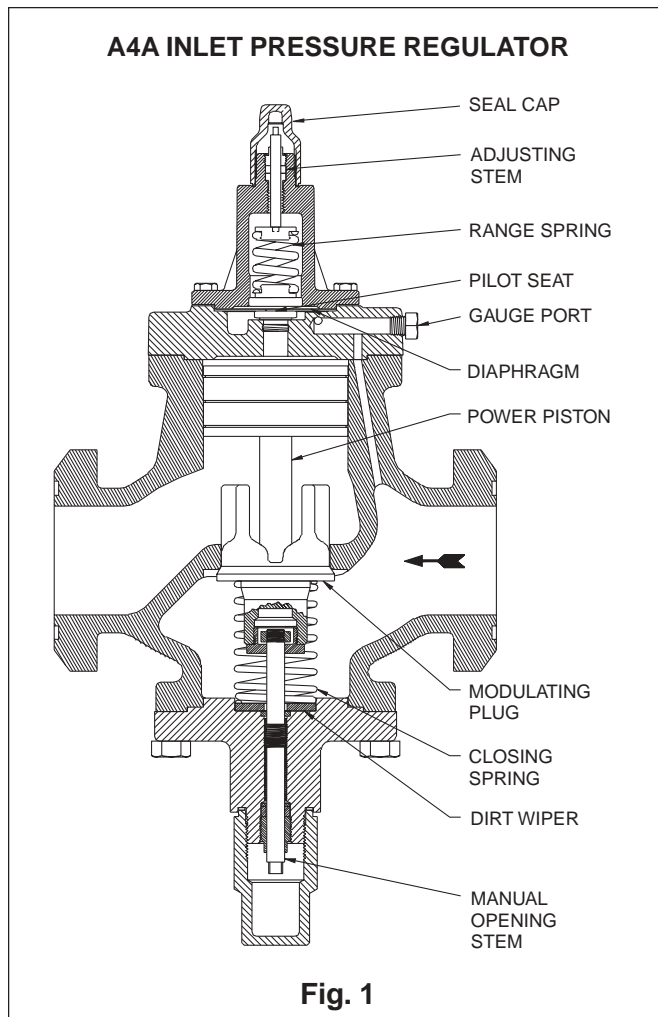
Type A4A, A4AK, A4AE, A4AR

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

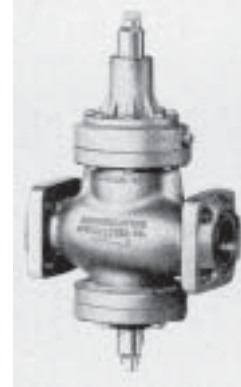
FOR AMMONIA, R-12, R-22, R-502
OTHER REFRIGERANTS AND OIL

FEATURES

- Pilot operated characterized Modulating Plug for precise control
- Suitable for all common refrigerants and oil
- 27.6 bar (400 psig) design pressure (MRP)
- Flanges for threaded or welded steel pipe and copper tube (copper not for ammonia)
- Interchangeable parts
- Easy to service
- Close coupled strainers, optional
- Many control variations are possible with the use of a few Modules and kits. (See Adaptomode Pressure Regulator Bul. 23-06)
- Stainless Steel Diaphragm
- Chrome Plated Pilot Seat
- Manual Opening Stem



BULLETIN 23-05B Type A4A, A4AK, A4AE, A4AR



A4A, A4AE



A4AK



A4AR

**January 2003
Installation, Service and Parts Information**

Description

These compact, heavy duty, pilot operated, iron alloy (ASTM A126 Class B) Inlet Pressure Regulators are suitable for Ammonia, R-12, R-22, R-502 and other common refrigerants and fluids approved for use in refrigeration systems.

All A4 Regulators are pilot operated using upstream pressure for the opening force and requires a minimum 0.14 bar (2 psig) pressure drop to fully open.

These valves are generally ordered with close coupled upstream strainer to prevent entrance of foreign material into the valve and the rest of the system. (See current Bul 00-10 for strainer information.)

Purpose

Modulates flow of refrigerant gas or liquid to maintain constant upstream (or inlet) pressure as set-for, despite load fluctuations. The A4AR is a main valve only and will control pressures as determined by the remote pilot(s) piped to it.

The fluid temperature range for the A4 Series of Regulators is -45°C to 105°C (-50°F to 220°F).

Principles of Operation (See Fig. 1)

The inlet pressure enters the space under the diaphragm through passage N. When the force created by the pressure exceeds the force of the range spring, the diaphragm is lifted off the pilot seat allowing pressure to enter on top of the power piston. This causes the power piston to move downward forcing the modulating plug to open and modulate to maintain constant inlet pressure. An increase in inlet pressure lifts the diaphragm further, allowing more pressure on top of the power piston and opening the valve wider. A decrease in inlet pressure causes the diaphragm to move closer to the pilot seat reducing the pressure on the top of the power piston and causing the closing spring to reduce the valve opening. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed off through the bleed hole in the power piston and through the clearance between the piston and cylinder. A minimum of 0.14 bar (2 psig) pressure drop across the valve is required to open it fully.

The A4A Inlet Pressure Regulator therefore opens on a rise in the inlet pressure above its set point and closes on a drop in inlet pressure below its set point. The inlet pressure set point is not appreciably affected by variations in the outlet pressure.

Manual Opening Stem

All Type A4A Regulators are provided with a manual opening stem. To open the regulator manually, back the stem out (turn counter-clockwise) until it stops. To put the regulator into automatic operation, turn the stem in (clockwise) until only the flats on the stem protrude from the packing nut. Always retighten packing nut after changing position of the manual opening stem.

Installation

All regulators are packed for maximum protection. Unpack carefully. Check the carton to make sure all flanges and other items are unpacked. Save the enclosed instructions for the installer and eventual user.

Do not remove the protective coverings from the inlet and outlet of the regulator until the regulator is ready to be installed. Protect the inside of the regulator from moisture, dirt and chips before and during installation. When welded or brazed flange connections are used, all slag, scale and loose particles should be removed from the flange interior before the regulator is installed between the flanges. It is advisable to install a close-coupled companion strainer (RSF) at the inlet of the regulator to help protect it from any foreign material in the system.

The A4A Series of Regulators will give optimum performance if mounted in a horizontal line in a vertical position with the manual opening stem on bottom. Where other positions are desired, the factory should be consulted; please give application and piping details. The regulator must be installed with the arrow on the valve body pointing in the direction of the fluid flow for the regulator to function properly. Backward flow through the regulator is uncontrolled and will vary with the valve model and the reverse pressure drop encountered. The regulator is not a check valve.

Tighten the flange bolts and nuts evenly to provide proper seating of the flange gasket and to avoid damage to gaskets or flanges. (See Flange Bolt Torque Table, p. 12) Avoid using the regulator flange bolts to stretch or align pipe. Even the heavy-duty iron alloy body of an A4A can be distorted, causing the precision parts to bind.

The regulator should be installed in a location where it is easily accessible for adjustment and maintenance. The location should be such that the regulator can not be easily damaged by material handling equipment. When it is necessary to insulate the regulator (and companion strainer), the insulation should be installed to provide access to the regulator (and companion strainer) for adjustment and maintenance. Proper indicating gauges should be installed to be easily visible to the operating engineer for system checking and adjusting purposes.

Disassembly and Assembly

Refer to the exploded view (Fig. 2) for parts discussed in this section.

Before disassembling any A4A type regulator, read the information in this bulletin and Bulletin RSB, Safety Procedures for Refrigerating Specialties Division Refrigeration Control Valves.

Before a regulator is removed from the line or disassembled in the line, make sure that all refrigerant has been removed from the regulator, including the bonnet, where applicable, and the close coupled strainer. The regulator must be isolated from the rest of the system in a safe manner. When pumping down to remove the refrigerant, the manual opening stem 33A must be turned out (counter clockwise) to make sure the valve is open.

All A4A Regulators

General Procedure

The construction of the regulator and the method of disassembly are relatively simple, but some procedures must be followed to avoid damage. The following describes the procedure for the basic A4A; special instructions for other styles will be included in other appropriate sections.

Disassembly - Take care when removing Seal Caps 1 and 44 in case some refrigerant may be trapped inside. Back the Adjusting Stem 6 all the way out to remove any pressure from Range Spring 13 otherwise damage to Diaphragm 17 or Pilot Seat 18 may occur. Remove Bonnet 8 by carefully removing Cap Screws 11. Take care not to damage Diaphragm Follower 15. Remove Adapter 28 by removing Cap Screws 31. Turn the Manual Opening Stem 33A all the way in until the flats on the stem barely protrude from the stuffing box nut. Push Piston 30 down against the spring force. The piston should move freely down and be returned by the spring force. If the piston is jammed or sticky, remove Bottom Cap Assembly, which includes Items 33 through 42, by removing Cap Screws 39 or unscrewing Bottom Cap, 20mm through 32mm (3/4" through 1-1/4"). Using a hard wood dowel rod inserted through the bottom of the valve, tap the piston upward and out. Thoroughly clean all parts. If jamming has taken place and the piston and bore are scored, remove all burrs by polishing the piston, bore and modulating plug with fine crocus cloth. Inspect the seating area of the Modulating Plug 33 for damage or erosion. If damaged it should be replaced. It would be advisable to replace the entire bottom cap assembly. Inspect all gaskets and "O" rings for damage and replace where necessary.

Assembly - When reassembling the valve, all internal parts should be clean, dry and lightly oiled with refrigerant oil, except "O" rings. Apply silicone grease to the "O" rings. Care must be taken especially when the parts are cold since moisture can condense on parts and cause rapid rusting. When replacing gaskets, they should be oiled very lightly with refrigerant oil before assembly. Install bottom cap assembly first and tighten in place. Carefully replace the piston; never try to force it in place. Align the Adapter Gasket 29 carefully with the proper holes in the adapter and valve body and fasten adapter in place. Before assembling the bonnet be sure the Adjusting Stem 6 is turned all the way out. Place Gasket 19, Diaphragm 17 and Gasket 16 in Adapter 28. The raised center of the diaphragm must be towards the bonnet. Stack Diaphragm Follower 15, Lower Spring Rest 14, Spring 13 and Upper Spring Rest 12 on top of diaphragm and carefully lower bonnet in place and tighten Screws 11 in place. For range "D" use two diaphragms. Tighten Cap Screws 11 evenly. The ideal tightening torque is 1.5 Kg-m (11 ft. lbs.). Valve is now ready to be adjusted for normal operation.

If close coupled strainer is used, it may be cleaned before putting the valve back in operation. The regulator must be tested for leaks with refrigerant gas or other appropriate gas before the system is put into operation.

A4A

After the General Procedure for disassembly, inspect the Pilot Seat 18 top seating surface for dirt, wear or damage.

Remove seat from valve body and clean, lap on a flat plate or replace as necessary. Examine the diaphragm region which contacts the seat surface, look for dirt, heavy scratches or corrosion. If the diaphragm cannot be easily wiped clean, it should be replaced. Reassemble the regulator following the General Procedure.

A4AK

For disassembly and assembly follow the General Procedure and the procedure for A4A. This regulator has a sealed wire connection to keep the seal cap from being removed. This wire must be removed before the regulator can be disassembled. Please Note: Removal of the seal voids any Refrigerating Specialties Division factory responsibility for the regulator pressure set-point.

Adjustment

Install an accurate pressure gauge in the gauge port. Back the adjusting stem all the way out to stop. This will reduce the set point to its lowest level and cause the valve to open wide. Start the system, and when suction pressure is about the desired pressure, turn the adjusting stem in until the pressure gauge shows a slight rise in the inlet pressure. At this point the adjusting stem may be turned in (clockwise) to raise the pressure further, or backed out (counterclockwise) to lower it; but the final adjustment should be made after the system has been operating for a period of time.

INLET PRESSURE SETTING RANGES

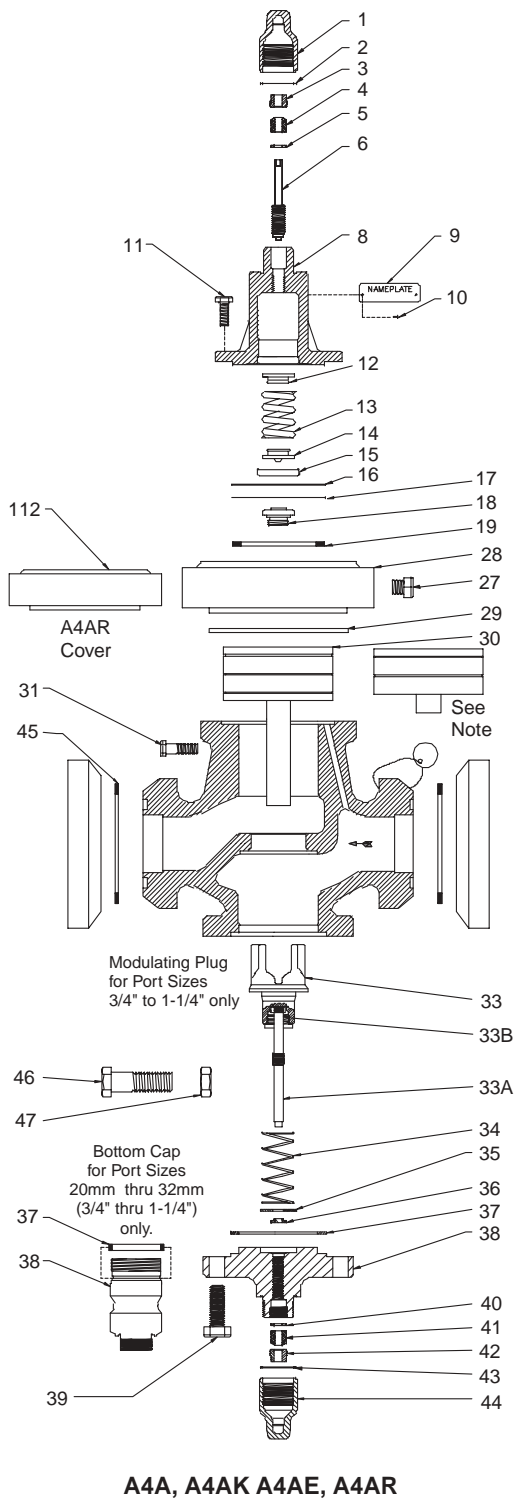
Set Point Ranges	Approx. Pressure Change per Turn of Adjusting Screw	Factory Set Point (unless otherwise specified)
A: 0 to 10.3 bar (0 to 150 psig)	1 .7 bar (25 psi)	2.8 bar (40 psig)
V: 500mm hg to 8.3 bar (20in hg to 120 psig)	1 .7 bar (25 psi)	1 .0 bar (15 psig)
D: 5.2 to 19.3 bar (75 to 280 psig)	3.7 bar (53 psi)	9.7 bar (140 psig)

A4AE Inlet Pressure Regulator, Remote Sensing Connection

This regulator allows control of upstream pressure at a point remote from the regulator inlet. Gasket 19 has no hole, thus blocking flow of upstream pressure to under the diaphragm. The sensing pressure from the desired control point, upstream of the regulator, is connected to the gauge port leading to under the diaphragm. Thus the regulator will control the pressure at this point. The regulator operation and adjustment is the same as for A4A.

(continued on page 8)

Repair Kits for A4A, A4AE, A4AK and A4AR



A4A, A4AK A4AE, A4AR

Fig. 2

Note: Piston for port sizes 3/4" thru 1-1/4" only.

Item No.	Description	20mm (3/4")		25mm (1")	
		Kit No.	Qty	Kit No.	Qty
1	Seal Cap	Only Avail. with Kit	1	Only Avail. with Kit	1
2	Seal Cap Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	Cap Kit, Seal	202110	1	202110	1
3	Nut, Packing	Only Avail. with Kit	1	Only Avail. with Kit	1
4	Packing, Stem	Only Avail. with Kit	1	Only Avail. with Kit	1
5	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5	Packing Kit, Stem	202100	1	202100	1
6	Stem, Adjusting	Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	Stem Kit, Adjusting	202120	1	202120	1
12	Plate, Spring, Upper	Only Avail. with Kit	1	Only Avail. with Kit	1
13	Spring, Comp.	Only Avail. with Kit	1	Only Avail. with Kit	1
14	Plate, Spring, Lower	Only Avail. with Kit	1	Only Avail. with Kit	1
15	Follower, Diaphragm	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5, 6, 12-15	Spring/ Stem Kit	Range AV 202006 Range D 202007	1 1	202006 202007	1 1
8	Bonnet	Only Avail. with Kit	1	Only Avail. with Kit	1
11	Screw, Hx. Hd.	Only Avail. with Kit	8	Only Avail. with Kit	8
16	Bonnet Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1
1-6, 8, 11-16	Spring Kit with Bonnet	Range AV Range D	1 1	202008 202009	1 1
12-14, 16	Spring Kit, Less Bonnet	Range AV Range D	1 1	202481 202482	1 1
17	Diaphragm	Only Avail. with Kit	1	Only Avail. with Kit	1
19	Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1
16, 17, 19	Diaphragm Kit	Range AV	1	200770	1
17	Diaphragms	Range D	2	Only Avail. with Kit	2
16, 17, 19	Diaphragm Kit	Range D	1	200771	1
16-19	VC Vacuum Cartridge		1	202004	1
16-19	Pilot Seat/ Diaphragm Kit (Not A4AO)	Range A	1	202000	1
		Range V	1	202004	1
		Range D	1	202002	1
27	Plug Pkg, 1/4" NPT		5	202552	5
28	Adapter	Only Avail. with Kit	1	Only Avail. with Kit	1
29	Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1
19, 28, 29	Adapter Kit		1	200703	1
30	Piston/Stem Assembly	Only Avail. with Kit	1	Only Avail. with Kit	1
29, 30	Piston Kit	200760	1	200760	1
32	Valve Body	Not Available		Not Available	
34	Spring, Comp.	Only Avail. with Kit	1	Only Avail. with Kit	1
35	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1
36	Wiper, Dirt	Only Avail. with Kit	1	Only Avail. with Kit	1
37	"O" Ring	Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	Spring Kit, Closing	(A4A)	1	202300	1
		(A4AK)	1	202298	1
33	Plug/Stem Assembly	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Packing, Stem	Only Avail. with Kit	1	Only Avail. with Kit	1
42	Nut, Packing	Only Avail. with Kit	1	Only Avail. with Kit	1
33, 34-37, 40-42	Full Cap. Plug Kit, Modul.	(A4A) (A4AK)	1 1	202021 202037	1 1
33, 34-37, 40-42	50% Cap. Plug Kit, Modul.	(A4A) (A4AK)	1 1	202029 202036	(*) (*)
33, 34-37, 40-42	35% Cap. Plug Kit, Modul.	(A4A) (A4AK)	Not Available Not Available	Not Available Not Available	Not Available Not Available
33, 34-37, 40-42	17% Cap. Plug Kit, Modul.	(A4A) (A4AK)	202030 1	202030 (*)	(*) (*)

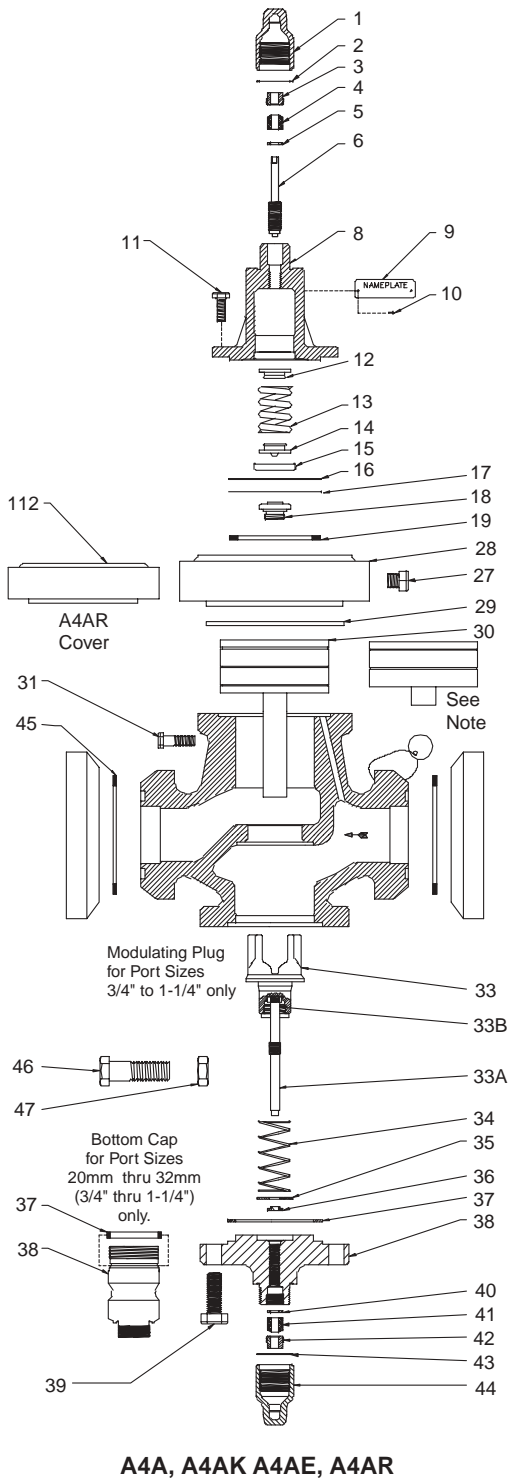
(*) All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4A, A4AE, A4AK and A4AR

Item No.	32mm (1-1/4")		40mm (1-5/8")		50mm (2")		65mm (2-1/2")		75mm (3")		100mm (4")	
	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty	Kit No.	Qty
1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
2	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-2	202110	1	202110	1	202110	1	202110	1	202110	1	202110	1
3	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
4	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
5	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5	202100	1	202100	1	202100	1	202100	1	202100	1	202100	1
6	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
4-6	202120	1	202120	1	202120	1	202120	1	202120	1	202120	1
12	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
13	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
14	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
15	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
3-5, 6, 12-15	202006	1	202006	1	202006	1	202006	1	202006	1	202006	1
	202007	1	202007	1	202007	1	202007	1	202007	1	202007	1
8	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
11	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8	Only Avail. with Kit	8
16	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
1-6, 8, 11-16	202008	1	202008	1	202008	1	202008	1	202008	1	202008	1
	202009	1	202009	1	202009	1	202009	1	202009	1	202009	1
12-14, 16	202481	1	202481	1	202481	1	202481	1	202481	1	202481	1
	202482	1	202482	1	202482	1	202482	1	202482	1	202482	1
17	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
16,17,19	200770	1	200770	1	200770	1	200770	1	200770	1	200770	1
17	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2	Only Avail. with Kit	2
16,17,19	200771	1	200771	1	200771	1	200771	1	200771	1	200771	1
16-19	202004	1	202004	1	202004	1	202004	1	202004	1	202004	1
	202000	1	202000	1	202000	1	202001	1	202001	1	202001	1
16-19	202004	1	202004	1	202004	1	202004	1	2020 4	1	202004	1
	202002	1	202002	1	202002	1	202003	1	202003	1	202003	1
27	202552	5	202552	5	202552	5	202552	5	202552	5	202552	5
28	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
19,28,29	200700	1	200725	1	200725	1	200685	1	200713	1	200716	1
30	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
29,30	200767	1	200389	1	200389	1	200391	1	200393	1	200227	1
32	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
34	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
35	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
36	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
37	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
34-37	202301	1	202302	1	202302	1	202303	1	202304	1	202305	1
	202299	1	202302	1	202302	1	202303	1	202304	1	202305	1
33	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
40	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
41	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
42	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1	Only Avail. with Kit	1
33,34-37, 40-42	202023	1	202024	1	202025	1	202026	1	202027	1	202028	1
40-42	202039	1	202024	1	202025	1	202026	1	202027	1	202028	1
33,34-37, 40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
33,34-37, 40-42	202031	1	202032	1	(**)		202033	1	202034	1	202035	1
40-42	202031	1	202032	1	(**)		202033	1	202014	1	202035	1
33,34-37, 40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	
40-42	Not Available		Not Available		Not Available		Not Available		Not Available		Not Available	

(**) All Plug Kits and Bottom Assembly Kits for 1-5/8" Port Size Valves can be used in the 2" Port Size Valves for reducing capacity.

Repair Kits for A4A, A4AE, A4AK and A4AR



A4A, A4AK A4AE, A4AR

Fig. 2

Note: Piston for port sizes 3/4" thru 1-1/4" only.

Item No.	Description	20mm (3/4")		25mm (1")		
		Kit No.	Qty	Kit No.	Qty	
37	O-Ring/Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1	
38	Cover, Bottom	Only Avail. with Kit	1	Only Avail with Kit	1	
40	Washer, Flat	Only Avail. with Kit	1	Only Avail. with Kit	1	
41	Packing, Stem	Only Avail. with Kit	1	Only Avail. with Kit	1	
37,38,40,41	Cover Kit	200761	1	200761	1	
42	Nut, Packing	Only Avail. with Kit	1	Only Avail. with Kit	1	
40-42	Packing Kit, Stem	202100	1	202100	1	
43	Gasket	Only Avail. with Kit	1	Only Avail. with Kit	1	
44	Seal Cap	Only Avail. with Kit	1	Only Avail. with Kit	1	
43, 44	Seal Cap Kit	202110	1	202110	1	
33-38,	Full Cap. Bottom	A4A	202010	1	202011	1
40-44	Assembly Kit	A4AK	202018	1	202019	1
33-38,	50% Cap. Bottom	A4A	202347	1	(*)	1
40-44	Assembly Kit	A4AK	Not Available		Not Available	
33-38,	17% Cap. Bottom	A4A	202346	1	(*)	1
40-44	Assembly Kit	A4AK	Not Available		Not Available	
3-6, 12-19,	Full Cap. Repair Kit, Reg. (All except A4AK)	Rge. A	202041	1	202044	1
29, 30, 33-37,		Rge. V	202040	1	202043	1
40-42		Rge. D	202042	1	202045	1
3-6, 12-19,	50% Cap. Repair Kit, Reg. (All except A4AK)	Rge. A	202352	1	(*)	1
29-30, 33-37,		Rge. V	202354	1	(*)	1
40-42		Rge. D	202353	1	(*)	1
3-6, 12-19,	17% Cap. Repair Kit, Reg. (All Except A4AK)	Rge. A	202349	1	(*)	1
29-30, 33-37,		Rge. V	202351	1	(*)	1
40-42		Rge. D	202350	1	(*)	1
112	Cover, Top	Only Avail. with Kit	1	Only Avail. with Kit	1	
29,112	A4AR Cover Kit	200680	1	200680	1	
2, 16(2), 19(2), 25, 26, 29, 37, 43, 45(3)	Gasket Kits (includes complete set of gaskets plus "O" Rings if applicable)					
	Gasket Kit A4/S4	202112	1	202112	1	
Indv'l Gaskets, "O" Rings & Valve Pk'g sold & pkg'd in qty's only as indicated.						
29	Gasket Pkg, Adapter	202406	5	202406	5	
37	"O" Ring/Gasket Pkg, Bottom Cap	202384	3	202384	3	
43	Gasket Pkg, Seal Cap (Bottom)	202408	12	202408	12	
2	Gasket Pkg, Seal Cap (Top)	202408	12	202408	12	
45	Gasket Pkg, Flange	202079	12	202079	12	
4	Packing Pkg, Stem (Top)	202478	25	202478	25	
41	Packing Pkg, Stem (Bottom)	202478	25	202478	25	
Bolt Package Kits						
11	Bolt Package, A4A Bonnet	202246	8	202246	8	
31	Bolt Package, Adapter	202248	8	202249	8	
39	Bolt Package, Bottom Cap	Not Required		Not Required		
Flange Bolt Package includes bolts and nuts; no gaskets						
46	Nut	5/8"-11	2	5/8"-11	2	
47	Bolt	5/8"-11x 3"	2	5/8" -11x3"	2	
46, 47	Bolt Kit, Flange	201585	1	201585	1	
Flange Kit		FK-25		FK-25		
Specify Flange, Style, Connection, Size		FPT, SW, WN		FPT, SW, WN		
Kit includes 2 Flanges only Connections Available		Std	Also Avail.	Std	Also Avail.	
Sizes in Inches		3/4	1, 1-1/4	7/8	1-1/8, 1-3/8	
		1	3/4	1-1/8	1-3/8	

(*) All Plug Kits and Bottom Assembly Kits for 3/4" Port Size Valves can be used in the 1" Port Size Valves for reducing capacity.

Repair Kits for A4A, A4AE, A4AK and A4AR

Item No.	32mm (1-1/4")			40mm (1-5/8")			50mm (2")			65mm (2-1/2")			75mm (31)			100mm (4")								
	Kit No.	Qty		Kit No.	Qty		Kit No.	Qty		Kit No.	Qty		Kit No.	Qty		Kit No.	Qty							
37	Only Avail. with Kit	1																						
38	Only Avail. with Kit	1																						
40	Only Avail. with Kit	1																						
41	Only Avail. with Kit	1																						
37,38,40,41	200761	1		Not Available			Not Available			Not Available			Not Available			Not Available								
42	Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit					
40-42	202100	1		202100	1		202100	1		202100	1		202101	1		202101	1		202101					
43	Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit					
44	Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit					
43,44	202110	1		202110	1		202110	1		202110	1		202111	1		202111	1		202111					
33-38	202012	1		202013	1		202014	1		202015	1		202016	1		202017	1		202017					
40-44	202020	1			1		202014	1		202015	1		202016	1		202017	1		202017					
33-38, 40-44	Not Available			Not Available			Not Available			Not Available			Not Available			Not Available			Not Available					
33-38, 40-44	Not Available			Not Available			Not Available			Not Available			Not Available			Not Available			Not Available					
3-6, 12-19,	202047	1		202050	1		202053	1		202056	1		202059	1		202062	1		202062					
29, 30, 33-37	202046	1		202049	1		202052	1		202055	1		202058	1		202061	1		202061					
40-42	202048	1		202051	1		202754	1		202057	1		202060	1		202063	1		202063					
3-6, 12-19, 29-30, 33-37, 40-42	<p>NOTE: 50% Capacity Repair Kit is not available for port sizes 1-1/4" to 4". Capacity reduction can be obtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere this section.</p>																							
3-6, 12-19, 29-30, 33-37, 40-42	<p>NOTE: 17% Capacity Repair Kit is not available for port sizes 1-1/4" to 4". Capacity reduction can be obtained through use of field installing "Reduced Capacity Plug Kits". See description and contents of these kits elsewhere this section.</p>																							
112	Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit	1		Only Avail. with Kit					
29,112	200669	1		200673	1		200673	1		200690	1		200676	1		200677	1		200677					
2, 16(2), 19(2), 25, 26, 29, 37 43, 45(3)	Gasket Kits (includes complete set of gaskets plus "O" Rings if applicable)																							
	202113			202114			202114			202115			202116			202117			202117					
	Individual Gaskets, "O" Rings and Valve Packing sold and packaged in quantities only as indicated.																							
29	202407	5		202397	3		202397	3		202396	3		202399	3		202400	3		202400					
37	202384	3		202374	6		202374	6		202374	6		202382	3		202383	3		202383					
43	202408	12		202408	12		202408	12		202408	12		202404	5		202404	5		202404					
2	202408	12		202408	12		202408	12		202408	12		202408	12		202408	12		202408					
45	202080	12		202081	12		202081	12		202082	12		202083	12		202084	12		202084					
4	202478	25		202478	25		202478	25		202478	25		202478	25		202478	25		202478					
41	202478	25		202478	25		202478	25		202478	25		202479	5		202479	5		202479					
	Bolt Package Kits																							
11	202246	8		202246	8		202246	8		202246	8		202246	8		202246	8		202246					
31	202248	8		202249	8		202249	8		202249	8		202250	6		202250	6		202250					
39	Not Required			202251	6		202251	6		202251	6		202252	6		202252	6		202252					
	Flange Bolt Package includes bolts and nuts; no gaskets																							
46	5/8"-11	4		5/8"-11	4		5/8"-11	4		3/4"-10	4		3/4"-10	4		7/8"-9	4		7/8"-9					
47	5/8"-11x2-3/4"	4		5/8"-11x3-1/4"	4		5/8"-11x3-1/4"	4		3/4"-10x3-3/4"	4		3/4"-10x3-3/4"	4		7/8"-9x4-1/2"	4		7/8"-9x4-1/2"					
46,47	201595	1		201604	1		201604	1		201611	1		201611	1		201620	1		201620					
	FK-32																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	
	FK-40																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	
	FK-50																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	
	FK-65																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	
	FK-75																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	
	FK-100																							
	FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS			FPT, SW WN			ODS		
	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.	Std.	Also Avail.		
	1-1/4	1-1/2	1-3/8	1-5/8, 2-1/8	1-1/2	2	1-5/8	2-1/8, 2-5/8	2	1-1/2	2-1/8	2-5/8	2-1/2		2-5/8	3-1/8	3		3-1/8	3-5/8	4		4-1/8	

A4AK Reseating Relief Regulator

This regulator is adjusted at the factory for a given inlet pressure. The seal cap is wired to a bonnet cap screw and the wires are sealed with a lead seal. The relief pressure setting is stamped on the seal. Breaking or removal of the seal voids the factory responsibility for the relief setting of the regulator. Normal set-point is 4.8 bar (70 psig)

The operation and other construction features are similar to A4A, except that sizes 20mm (3/4") through 32mm (1-1/4") use a PTFE seat in the modulating plug.

Because of slight leakage tolerance, this regulator is not intended for use as a safety relief valve to the atmosphere, but rather to a lower pressure section of that system. Because of large diaphragm to seat area ratio, setting is affected only slightly by outlet pressure.

The A4AK Regulator is often used as a defrost pressure relief regulator.

For atmospheric relief, use Type H high capacity safety relief valve. (See Bul. 70-01 for information and selection).

A4AR Main Regulator for Remote Pilot

The A4AR is the main regulator only, without the pressure pilot being an integral part thereof. Instead, the main valve has a valve cover tapped 3/8" NPT. With this arrangement, external pressure pilot and solenoid, if positive electric shut-off is required, may be connected to control the main valve. These items can be remotely located from the main valve where they may be more convenient to adjust, service or perhaps be in a non-corrosive or non-explosive area.

Remote pilot piping should not exceed 6m (20 ft.) in total length and should be 3/8" pipe or equivalent tube size. The remote piping must originate in the upstream pipe, not at the A4AR valve itself.

See current issue of Bul. 21-02 for details of A2B Inlet Pressure Pilot. Use A2B2 with 20-50mm (3/4" - 2") A4AR. Use A2B Inlet Pressure Pilot with 65-100mm (2-1/2" - 4") A4AR.

If main valve is to perform as an Outlet Pressure Regulator, use Outlet Pressure Pilots A2BO2E for 20-50mm (3/4" - 2") A4AR, or A2BO4E for 65-100mm (2-1/2" - 4") A4AR.

For positive electric shut-off, for all sizes A4AR Main Valve, use direct operated pilot solenoid Type S6N. See Bul. 30-90C for details.

Maintenance and Service

GENERAL PROCEDURE:

Dirt in the system is the greatest single cause of regulator malfunction. All screens or filters must be cleaned or replaced when they become dirty. At start up it is especially important that these items are cleaned or changed frequently. When the RSF close-coupled companion

strainers are used, maintain according to instructions in Bulletin 00-10. Moisture in halocarbon systems in particular can cause corrosion or form ice, causing the piston to freeze in position. Filter-driers should be used and maintained for halocarbon systems.

Before deciding to disassemble a regulator for servicing, the following investigations should be made:

- Check the manual opening stem; it should be turned in for automatic operation.
- Check the regulator setting to make sure it is properly adjusted. Turn adjusting screw slowly to see if regulator responds. Check regulator pressure range; if wrong, range spring must be replaced.
- Check other system components for proper operation.
- Check hand valves in the system to make sure they are open or closed as required and the system is receiving liquid or gas as the case may be.

Before disassembly of regulator, make certain that all refrigerant has been removed (pumped out) from the regulator and its companion strainer where one is used. Read Safety Bulletin RSB.

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.

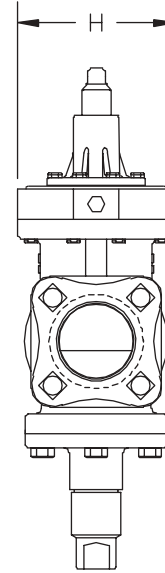
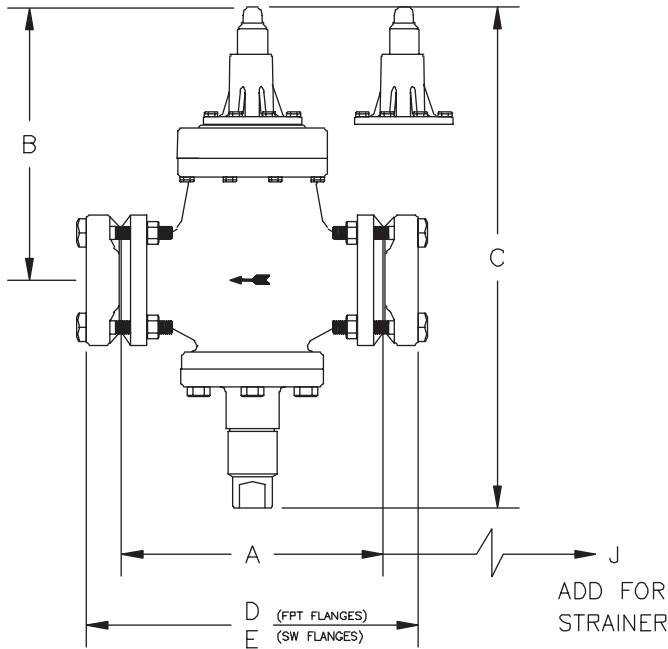
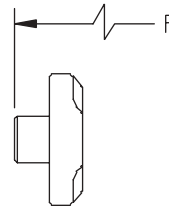
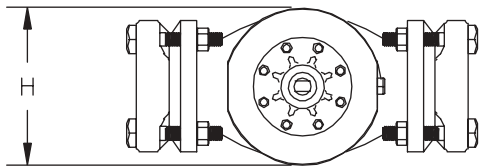
Avoid all piping or control arrangements which might produce thermal or pressure shock.

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.

SERVICE POINTERS (Check General Procedure)

SYMPTOM	PROBABLE REASON	CORRECTION
Regulator does not shut off flow.	Diaphragm or seat dirty, damaged or frozen.	Clean or replace. Clean strainer.
	Diaphragm follower stuck or damaged.	Clean or replace. Install follower carefully.
	Piston jammed with excess dirt.	Remove and polish piston and bore with crocus cloth. Clean valve and strainer.
	Throttling plug leaking due to excess dirt or damage.	Clean or replace. If used on liquid, check for erosion due to excessive flash gas. Reduce flash gas by sub-cooling or by reducing pressure drop across valve by providing restriction at valve outlet.
	Diaphragm and seat eroded due to flash gas.	Replace. Reduce flash gas by sub-cooling or by reducing pressure drop across regulator by providing restriction at valve outlet.
Regulator does not open.	A4A (inlet) Pressure Regulator Diaphragm ruptured or badly deformed.	Replace. If Range D make sure has 2 diaphragms.
	Diaphragm follower stuck, damaged or frozen.	Clean or replace. Install follower carefully.
	Piston worn, too much clearance.	Replace piston. Check for reason. If used on liquid, check for flash gas.
Regulator Operation erratic.	Diaphragm or seat dirty or damaged.	Clean or replace. Clean strainer.
	Diaphragm follower has dirt on the outside diameter or outside diameter is damaged.	Clean or replace.
	Other system components, line controllers, thermostats, etc. , erratic.	Adjust, repair or replace.
	Regulator too far oversized.	Check load. Replace with smaller regulator or investigate use of Reduced Capacity Plug Kit.
Pressure drop across regulator too high.	Inlet or outlet restricted.	Check for restriction. Clean strainer.
	Regulator too small.	Replace with proper size regulator.
	Large amount of flash gas in liquid line.	Reduce flash gas by sub-cooling. Reduce line restriction by increasing line size, particularly at the regulator outlet. Replace with larger regulator.
	High pressure drop causes high rate of expansion of gas at regulator outlet.	Increase pipe size at the outlet of the regulator.
	Regulator does not open all the way.	Check piston for wear. Replace, if needed.

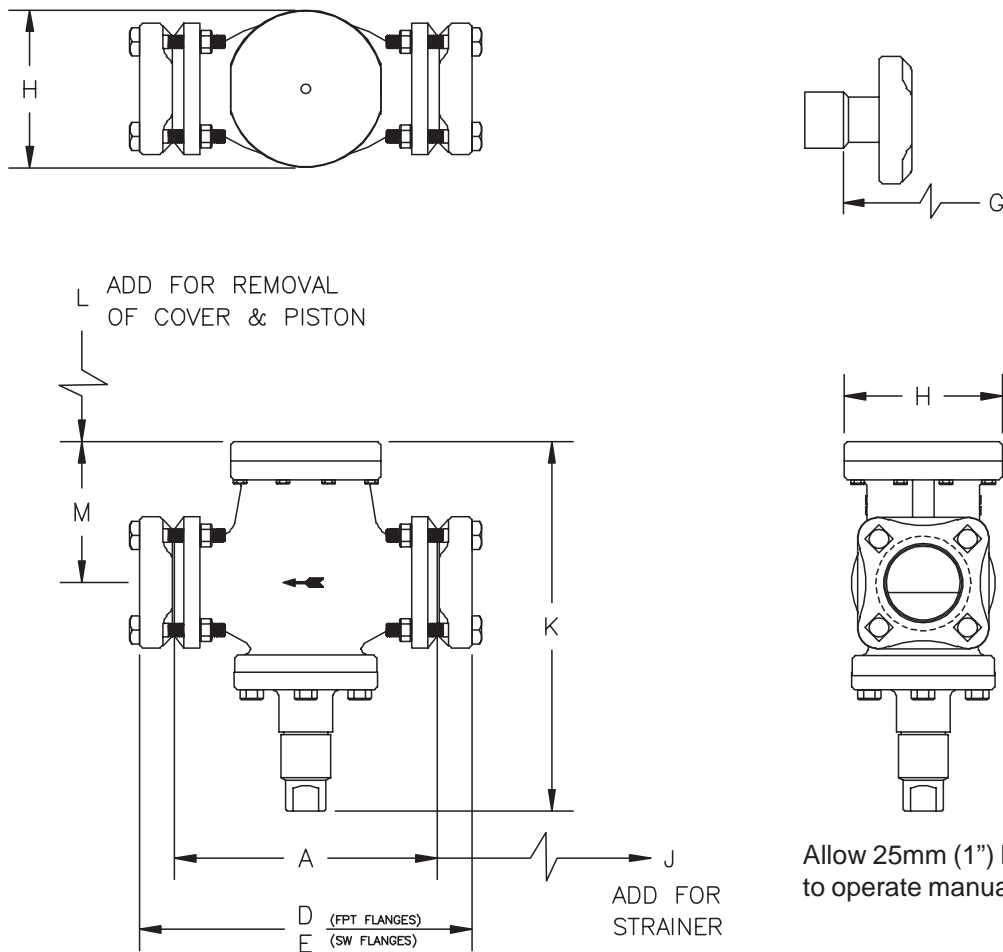


Allow 25mm (1") below valve to operate manual opening stem.

A4A, A4AE
Fig. 3

PIPING AND LAYOUT FOR STANDARD A4A BACK PRESSURE REGULATOR

PORT SIZE	A		B		C		PIPE SIZE	F.P.T. (D)		SOCKET (E) WELD		WELD (F) NECK	
	mm	INCHES	mm	INCHES	mm	INCHES		mm	INCHES	mm	INCHES	mm	INCHES
3/4" & 1"	164	6 2"	244	9.6"	392	15.4"	3/4"	216	8.5"	216	8.5"	254	10.0"
							1"	216	8.5"	216	8.5"	261	10.3"
							1-1 / 4"	216	8.5"	216	8.5"	261	10.3"
1-1/4"	203	8 0"	248	9.8"	410	16.1"	1-1 / 4"	256	10.1"	256	10.1"	300	11.8"
							1-1/2"	256	10.1"	256	10.1"	304	12.0"
1-5/8" & 2"	251	9.9"	287	11.3"	464	18.2"	1-1/2"	307	12.1"	307	12.1"	364	14 .3"
							2"	307	12.1"	307	12.1"	371	14.6"
2-1/2"	252	9.9"	302	11.9"	483	19.0"	2-1/2"	331	13.0"	331	13.0"	401	15.8"
3"	311	12.2"	324	12.8"	597	23.5"	3"	389	15.3"	389	15.3"	478	18.8"
4"	359	14.1"	361	14.2"	653	25.7"	4"	450	17.7"	450	17.7"	571	22.5"



A4AR
Fig. 4

PIPING AND LAYOUT FOR STANDARD A4A BACK PRESSURE REGULATOR

PORT SIZE	SOLDER O.D. TUBE		SOLDER (G) O.D.S.		H		J		K		L		M	
	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES
¾" & 1"	28.57	1-1/8"	286	11.3"	117	4.6"	98	5.9"	241	9.5"	71	2.8"	97	3.8"
	34.92	1-3/8"	285	11.2"										
	41.27	1-5/8"	299	11.8"										
1-1/4"	34.92	1-3/8"	324	12.8"	117	4.6"	178	7.0"	254	10.0"	76	3.0"	102	4.0"
	41.27	1-5/8"	339	13.3"										
	53.97	2-1/8"	370	14.6"										
1-5/8" & 2"	41.27	1-5/8"	414	16.3"	140	5.5"	251	9.9"	307	12.1"	114	4.5"	140	5.5"
	53.97	2-1/8"	404	15.9"										
	66.67	2-5/8"	429	16.9"										
2-1/2"	66.67	2-5/8"	432	17.0"	159	6.2"	314	12.4"	325	12.8"	130	5.1"	155	6.1"
	79.37	3-1/8"	468	18.4"										
	79.37	3-1/8"	496	19.5"										
3"	92.07	3-5/8"	542	21.3"	176	7.0"	314	12.4"	432	17.0"	152	6.0"	178	7.0"
	104.78	4-1/8"	613	24.1"										
4"	104.78	4-1/8"	613	24.1"	222	8.9"	363	14.3"	478	18.8"	157	6.2"	183	7.2"

FLANGES

VALVE SIZE		FPT FLANGES		WELDING FLANGES								FLANGES				Flge Pkg. No. (2/Pkg)
		Nom. Pipe Size	Flange Pkg. No. (2/Pkg)	Nominal Pipe Size		Sock Weld Sock t I.D.		Weld Neck Neck O.D.		Flange Package Number(2/Pkg)		Tubing O.D.		Fitting I.D.		
				Inches	AW	Inches	mm	Inches	mm	Socket Weld	Weld Neck	Inches	AW	Inches	mm	
mm	Inches	Inches	(2/Pkg)	Inches	NW No.	Inches	mm	Inches	mm	Socket Weld	Weld Neck	Inches	AW	Inches	mm	
20	3/4	3/4	200016	3/4	20	1.070	27.81	1.050	26.67	200020	200023	1-1/8	28.57	1.130	28.70	200027
and	and	1	200017	1	25	1.365	34.67	1.315	33.40	200021	200024	1-3/8	34.92	1.380	33.05	200028
25	1	1-1/4	200018	1-1/4	32	1.705	43.31	1.660	42.16	200022	200025	1-5/8	41.27	1.631	41.43	200029
32	1-1/4	1-1/4	200030	1-1/4	32	1.705	43.31	1.660	42.16	200032	200034	1-3/8	34.92	1.380	35.05	200036
		1-1/2	200031	1-1/2	40	1.930	49.02	1.900	48.26	200033	200035	1-5/8	41.27	1.631	41.43	200037
40	1-5/8	1-1/2	200039	1-1/2	40	1.930	49.02	1.900	48.26	200041	200043	1-5/8	41.27	1.631	41.43	200045
		2	200040	2	50	2.445	62.10	2.375	60.33	200042	200044	2-1/8	53.97	2.131	54.13	200046
50	2											2-5/8	66.67	2.631	66.83	200047
65	2-1/2	2-1/2	200048	2-1/2	65	2.945	—	2.875	73.03	200049	200050	2-5/8	66.67	2.631	66.83	200051
												3-1/8	79.37	3.131	79.53	200052
75	3	3	200053	3	80	3.575	90.81	3.500	88.90	200054	200055	3-1/8	79.37	3.131	79.53	200056
													3-5/8	92.07	3.631	92.23
100	4	4	200062	4	100	4.575	116.20	4.500	114.30	200063	200064	4-1/8	104.77	4.132	104.95	200065

AW FPT: Internal NPT (USA Standard Taper Pipe Thread).

AW NW: Metric equivalent nominal size for steel tubing.

AW Metric copper tubing used for refrigeration.

AW ODS connections to fit copper tubing of given outside diameter. (Not for use with ammonia)

Definitions:

ODS - Outside Diameter Sweat

I.D. - Inside Diameter

O.D. - Outside Diameter

N.A. - Not Available

Flange Bolt Torque Requirements

Bolt Diameter	Valve Port Size	Torque
11 mm (7/16")	13mm (1/2 ")	3.9 mkg (28 ft lb)
16mm (5/8")	20-50mm (3/4 "- 2")	11.8 mkg (85 ft lb)
19mm (3/4")	65-75mm (2-1/2 "- 3")	14.5 mkg (105 ft lb)
22mm (7/8")	100mm (4")	22.1 mkg (150 ft lb)

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 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 and in no event is Refrigerating Specialties responsible for any consequential damages of any nature whatsoever. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Refrigerating Specialties, nor to assume, for Refrigerating Specialties, any other liability in connection with any of its products.

Factory Repair and Rebuilding

For the convenience of our customers, we have a standard factory repair and rebuilding service. Repairable returned Regulators are disassembled, cleaned, sandblasted, worn parts replaced, reassembled and re-painted. For quickest service, it is advisable that this be done during the off peak season.