

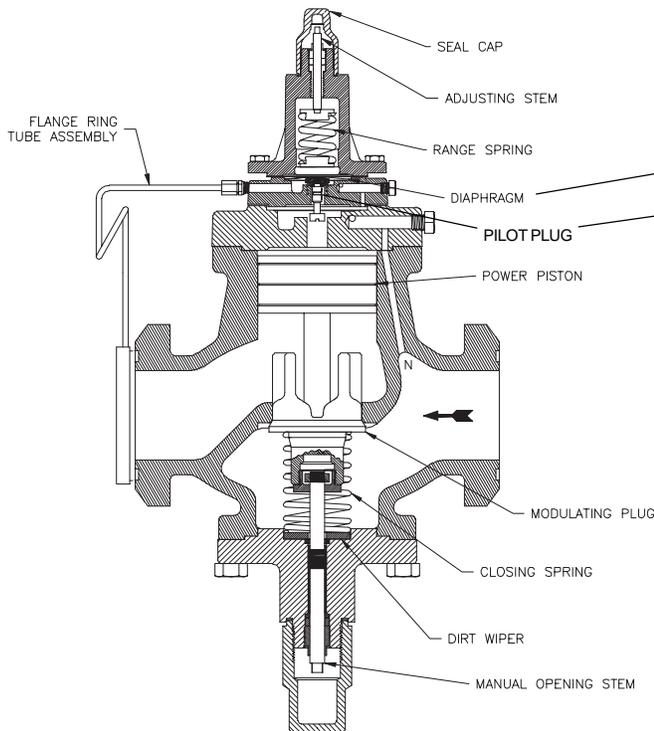
# ADAPTOMODE® OUTLET PRESSURE REGULATORS

Types: A4AO-DN, A4AOE-DN, A4AOS-DN and A4AOES-DN

Port Size 20 - 100 mm (3/4" - 4")  
FOR AMMONIA, R-12, R-22, R-502  
OTHER REFRIGERANTS AND OIL

## FEATURES

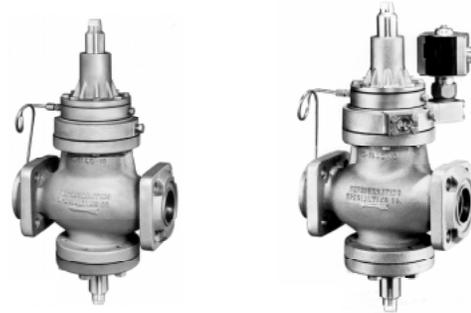
- Pilot operated characterized Modulating Plug precise control
- Suitable for all common refrigerants and oil
- 28 bar (406 psig) design pressure (PS)
- Flanges for threaded or welded steel pipe and copper tube (copper not for ammonia)
- Interchangeable parts
- Easy to service
- Close coupled strainers, optional
- Stainless Steel Diaphragm
- Stainless Steel Pilot Seat
- Manual Opening Stem
- Complies with Pressure Equipment Directive 97/23/EC



## Description

These compact, heavy duty, pilot operated, Outlet Pressure regulators are suitable for Ammonia, R-12, R-22, R-502 and other common refrigerants and fluids approved for use in refrigerant valves.

## BULLETIN DN23-07B Type A4AO-DN, A4AOE-DN, A4AOS-DN, A4AOES-DN



A4AO-DN

A4AOS-DN

January 2007  
Installation and Service Information

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 strainer to prevent entrance of foreign material into the valve and the rest of the system. (See current Bulletin DN00-10 for strainer information.)

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

## Purpose

Modulates flow of refrigerant gas or liquid to maintain a constant downstream pressure as set-for, despite fluctuations in load. The regulator will gradually close when downstream pressure begins to rise above the setting and will gradually open when pressure begins to fall below the setting. The regulator cannot maintain set-for pressure if uncontrolled branch pipe lines feed into the main pipeline downstream of the A4AO Regulator. Typical uses are as follows:

**Protect Compressor Motor from Overload (Hold-back):** See capacity ratings in Condensed Catalog CC-11. Select at design parameters i.e., tons, evaporator temp./press and pressure drop.

**Hot Gas Bypass Capacity Control:** See Bulletin BYG-4, Condensed Catalog CC-11.

**Limit Refrigerant Pressure in a Liquid Line:** Contact factory for selection assistance.

**Prevent Deep Vacuum in Booster Suction:** See capacity ratings Condensed Catalog CC-11 "Compressor Suction Loading". For selections other than those shown, contact factory.

**Prevent Pressure Rise in Suction Main:** Select valve based on mass flow requirements. Valve Cv and pressure drop across regulator. Contact factory for proper selection assistance, if required.

**Hot Gas Defrost Control:** Refer to Condensed Catalog CC-11 and Bulletin 90-10 for ratings and application information.

## Principles of Operation (See Fig. 1 & 1A)

The outlet pressure is sensed under the diaphragm through the sensing tube, which is part of the Flange Ring-tube assembly. When the force created by the outlet pressure acting under the diaphragm is less than the force of the range spring, the pilot is open, allowing pressure to enter on top of the piston. This causes the power piston to force the modulating plug to open to maintain constant outlet pressure. Decrease in the outlet pressure allows the range spring to open the pilot further, allowing more pressure on top of the piston and opening the modulating plug further. An increase in the outlet pressure will lift the diaphragm against the force of the range spring, allowing the pilot plug to start closing. The pressure on top of the power piston is decreased and the closing spring acts to reduce the opening of the modulating plug and the flow of fluid through the regulator. The pressure on top of the power piston is controlled by the flow through the pilot seat and the bleed through a 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 regulator is required to open it fully.

The A4AO Outlet Pressure Regulator therefore opens on a drop in the outlet pressure below its set point and closes on a rise in outlet pressure above its set point. The outlet pressure set point is not appreciably affected by variations in the inlet 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 counterclockwise) 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.

## Adjustment

Install a pressure gauge at the regulator gauge port in the A4AO Adapter next to the sensing tube. Back the adjusting stem all the way out to stop (counterclockwise). This will reduce the set-point to its lowest level and cause the valve to close. Operate the system until the outlet pressure is lower-than desired. Slowly turn in the adjusting stem (clockwise) until the desired outlet pressure is reached.

## A4AO Outlet Pressure Setting Ranges

Set Point Ranges	Approx. Pressure Change per Turn of Adjusting Screw	Factory Set Point (unless otherwise specified)
V:500mm hg to 8.3 bar (20in hg to 120 psig)	1.7 bar (25 psi)	2.8 bar (40 psig)
D:5.2 to 19.3 bar (75 to 280 psig)	3.7 bar (53 psi)	9.7 bar (140 psig)

## TYPE A4AOE (See Fig. 2)

### Description

#### A4AOE Outlet Pressure Regulator, Remote Sensing Connection

This regulator allows control of downstream pressure at a point remote from the outlet of the regulator. The pressure from the desired sensing point is connected directly to the A4AOE adapter at Fitting 7A in place of the Flange Ring-tube Assembly 20 shown for the A4AO. Thus the regulator will control the pressure at the sensing point. The regulator operation and adjustment is the same as for A4AO.

## Type A4AOS (See Figs. 2, 3, and 4)

### Description

#### A4AOS Outlet Pressure Regulator With Electric Shut-Off

The A4AOS Pressure Regulator controls outlet pressure when the modular solenoid is energized, and closes when the solenoid pilot is de-energized regardless of the pressure setting or pressure in the regulator. The Modudapter (Fig. 2, item 28A) is used only with the A4AOS. The Pilot Solenoid is mounted on Pad #1 of the Modudapter along with Moduplate, item #52, mounted on Pad #2 with "S" showing to the outside of the regulator.

Adjustment: With the solenoid energized, proceed as with the A4AO.

## 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, page 12). Avoid using the regulator flange bolts to stretch or align pipe. Even the heavy duty semi-steel 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 cannot 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. Do not insulate the solenoid coil and coil housing. 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 Figs. 2, 3 and 4 in this section.

Before disassembling any A4A type regulator, read the information in this bulletin and Bulletin RSBCV, 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 (counterclockwise) 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 types are included in other appropriate sections.

## Disassembly and Assembly

**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 and that the Bonnet 8 and Diaphragm Follower 15 are properly aligned, otherwise damage to the diaphragm and pilot seat may occur. Place Gasket 19 in the adapter and align Gasket 16 and Diaphragm 17 to the center of the bonnet. The raised center of the diaphragm must be towards the bonnet. 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.

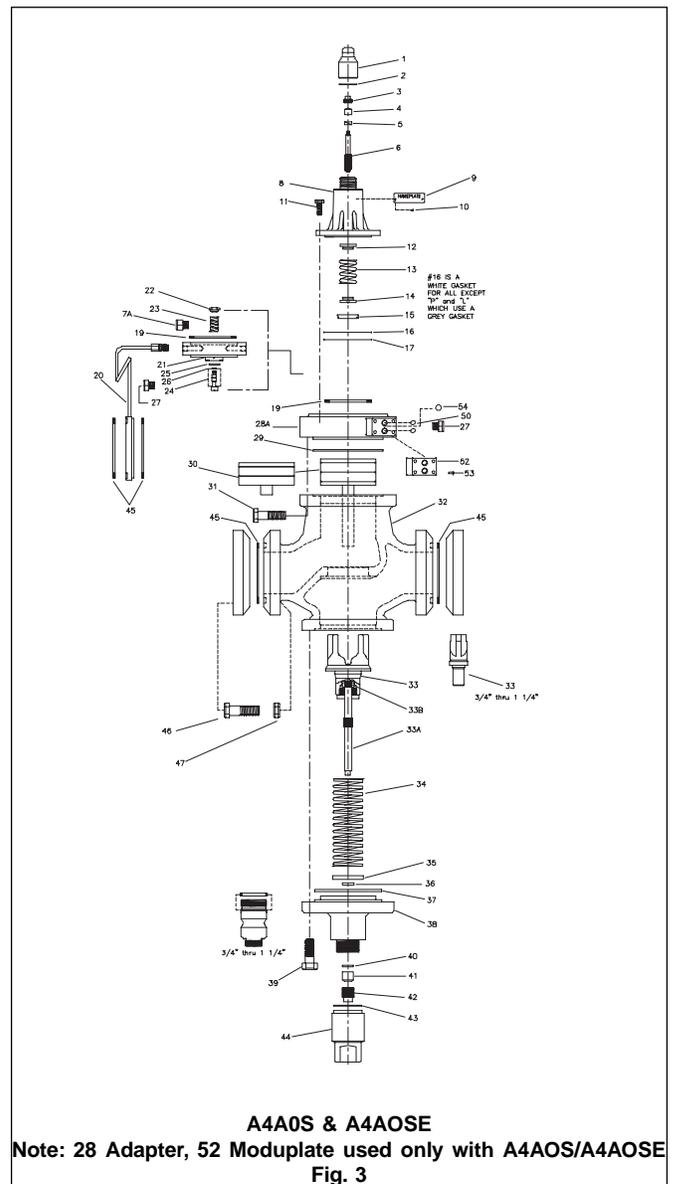
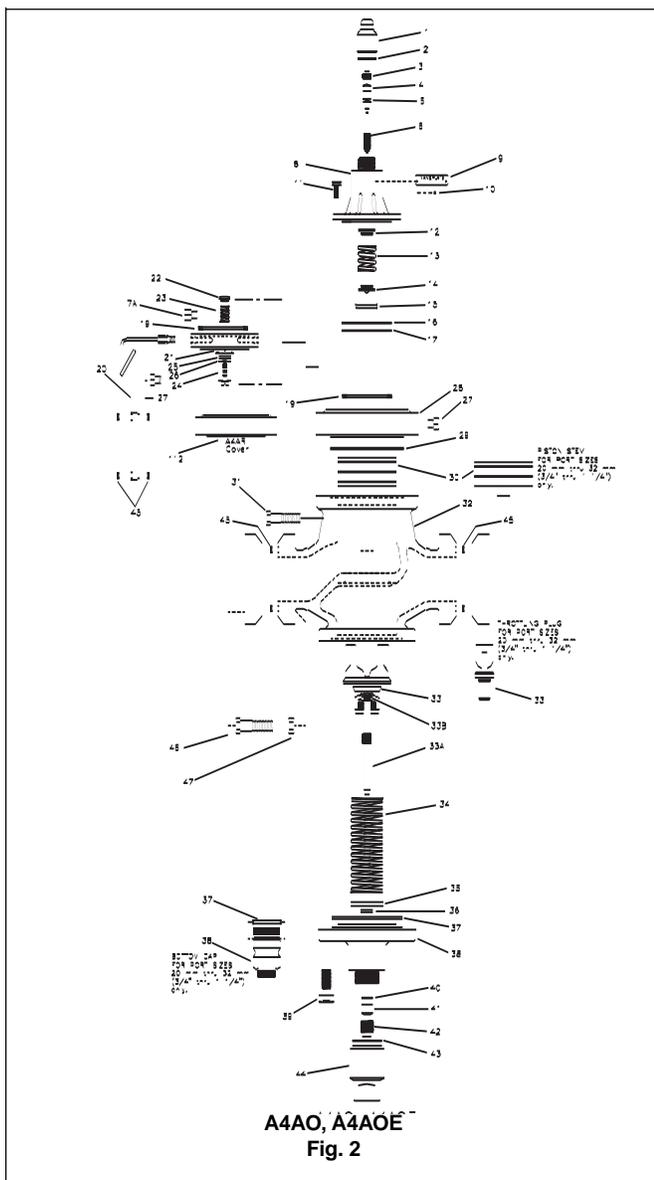
If close coupled strainer is used, it may be cleaned before putting the valve back in operation. The regulator must be tested for leaks with refrigerant gas or other appropriate gas before the system is put into operation.

## Basic Modules (Used on A4AOS/A4AOSE)

### Disassembly and Assembly

Refer to exploded views (Figs. 3 and 4), illustrating the Modular Solenoid Pilot and Moduplate. These modules are used only with the A4AOS/A4AOSE Outlet Pressure Regulator with Electric Shut Off. The Moduadapter, Item #28 (Fig. 2) accommodates these modules. The Pilot Solenoid is mounted on Pad #1 of the Moduadapter along with the Moduplate, item #52, mounted on Pad #2 with the "S" showing to the outside of the regulator.

Before disassembling and assembling any modules, refer to page 2 of this bulletin and to Bulletin RSB, Safety Procedure for Refrigerating Specialties Division Refrigeration Control Valves.



## Disassembly and Assembly (continued)

### Modudapter (See Figs. 1, 2 and 3)

The Modudapter 28 will accommodate the Modular Pilot Solenoid and Moduplate. When assembling make sure the Modudapter gauge port is directly lined up with the inlet of the regulator. Passage N must communicate upstream pressure through the hole in the Adapter Gasket 29 as well as into Modudapter 28 and thence to the pilot modules. It is imperative that proper alignment of these items be made to assure regulator function.

Before disassembly, make sure all refrigerant has been removed from the regulator and strainer, if used.

Protect the surfaces of Pads 1 and 2 of the Modudapter at all times since these surfaces determine the sealing tightness of the "O" Rings.

### S6A Modular Solenoid Pilot (Fig. 4)

This solenoid pilot is mounted on Pad 1. Before working on any solenoid pilot, make sure the coil is de-energized and will remain so during the servicing period. Refer to page 10 for Repair Parts Kit details of S6A Solenoid Pilot.

**Disassembly (Fig. 4)** - Remove Coil Housing Screw 55 and pull entire Coil and Housing Assembly, 56 through 60, upward and off of Bonnet Tube Assembly 61. Carefully remove Bonnet-Tube Assembly. Lift out Plunger-Needle Assembly 63, avoid damaging the needle. Remove Seat Assembly 64 by using a 7/16" (11 mm) socket wrench. Inspect all parts, clean or replace as needed.

**Assembly (Fig. 4)** - Reinstall the Seat Assembly and tighten (no gasket needed). Carefully insert the Plunger Needle Assembly. Replace the Gasket 62 and re-install Bonnet-Tube Assembly. Replace entire Coil and Housing Assembly and tighten Coil Housing Screw.

Make sure the solenoid coil is of the proper voltage and frequency.

When mounting the solenoid pilot, place the "O" Rings 50 into the proper grooves and tighten the Cap Screws 66, evenly. The ideal tightening torque is 1.1 kg-m (8 ft. lbs.).

### Moduplate (Fig. 2)

The Moduplate Item #52 is used to stop the flow through the flow path of the Modudapter. Protect the "O" Ring surfaces at all times. When mounting the Moduplate, place "O" Rings 50 into the grooves (lubricate with silicone grease) and tighten the Cap Screws 53 evenly to avoid distortion and assure proper sealing. The ideal tightening torque is 1.1 Kg-m (8 ft. lbs.).

## Maintenance and Service

### General Procedure:

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 RSBCV.

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 DN00-10. 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.

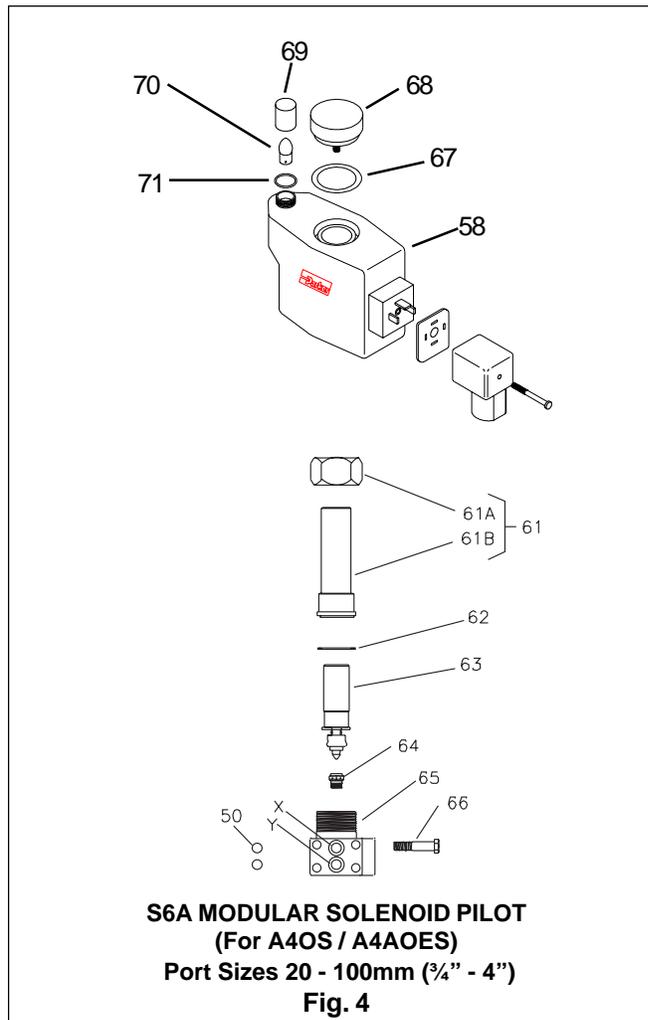
Before deciding to disassemble a regulator for servicing, the following investigations should be made:

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. Make sure that the regulator receives the proper electrical signal where modular pilot solenoids are used. Make sure they are same as the power supply.

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.



## Maintenance and Service (continued)

### Electrical

The Refrigerating Specialties Division molded water resistance 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 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:

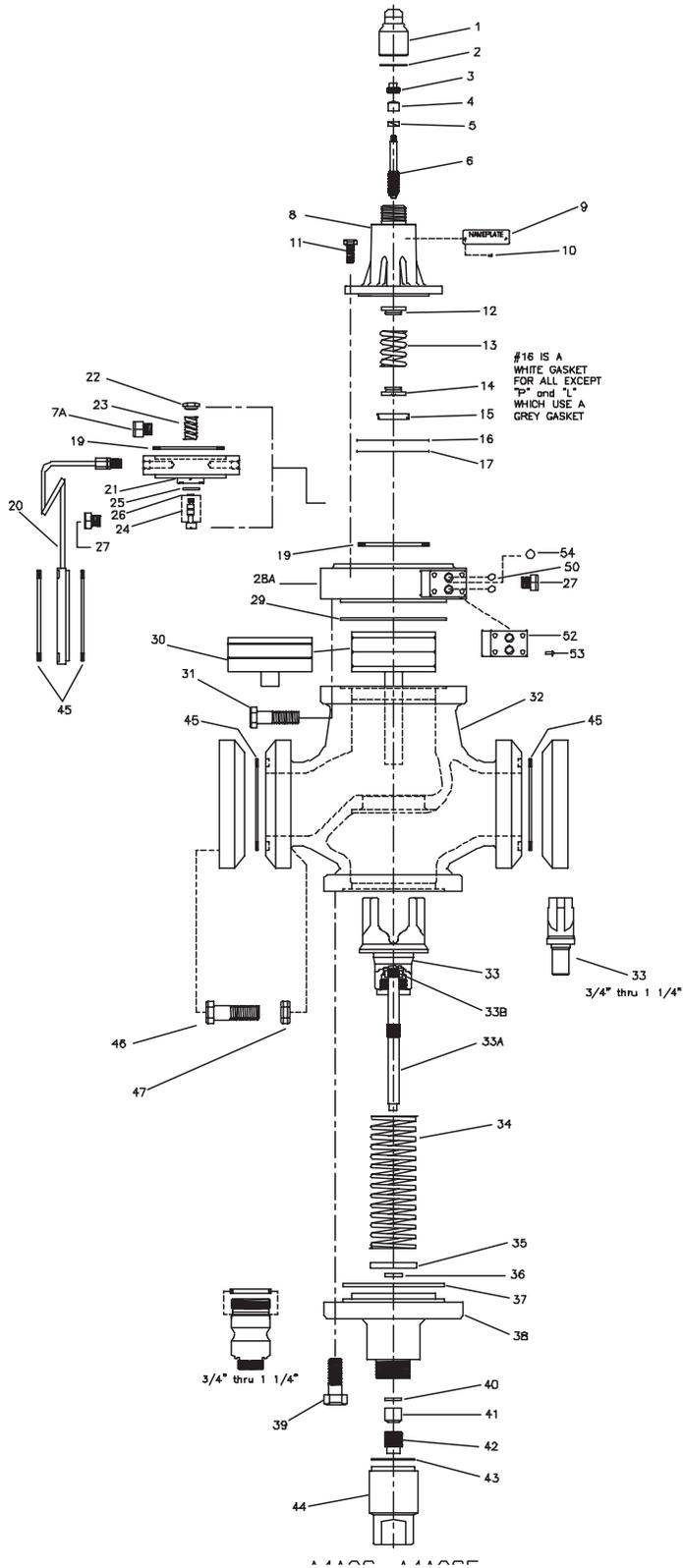
Standard Coil Volts/Hertz	Inrush Current (Amps)	Running Current (Amps)	Fuse Size (Amps)
120/60 (Blue leads)	1.18	0.46	1
208/60 (Blue & Red leads)	0.63	0.26	1
240/60 (Red leads)	0.60	0.23	1
440/60 (Yellow & Red leads)	0.39	0.13	1
115/50 (Yellow & Blue leads)	1.22	0.21	1
230/50 (Yellow leads)	0.65	0.26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

On transformer coil the 6 volt leads are always black.

## 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.
	Modulating 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 subcooling or by reducing pressure drop across valve by providing restriction at valve outlet.
	Diaphragm ruptured or badly deformed.	Replace. If Range "D" make sure has 2 diaphragms.
	A4AOS/A4AOSE Modular Solenoid Pilot Seat leaking.	Check seat and needle. Replace as needed.
	Diaphragm and seat eroded due to flash gas.	Replace. Reduce flash gas by subcooling or by reducing pressure drop across regulator by providing restriction at valve outlet.
	Modular Solenoid Pilot not closing.	Check power at leads, make sure coil is de-energized.
Regulator does not open.	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.
	A4AOS/A4AOSE Modular Solenoid Pilot not opening.	Pressure drop across valve too high; over 21 bar (300 psig). Lower pressure drop. Improper power supply. Correct. Replace solenoid coil.
	Piston worn, too much clearance.	Replace piston. Check for reason. If used on liquid, check for flash gas.
	Piston jammed with excess dirt.	Remove and polish piston and bore with crocus cloth. Clean valve and strainer.
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.
Pressure drop across regulator too high.	Inlet or outlet restricted.	Check for restriction. Clean strainer.
	Regulator too small.	Open manually to be sure valve is full open. Replace with proper size regulator.
	Large amount of flash gas in liquid line.	Reduce flash gas by subcooling. Reduce line restriction by increasing line size, particularly at the regulator outlet. Replace with larger regulator.
	High pressure drop causes high rate of expansion 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.

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

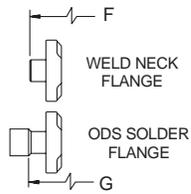


A4AOS & A4AOSE

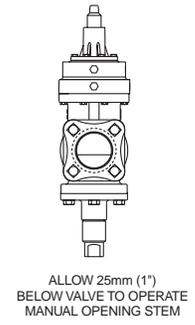
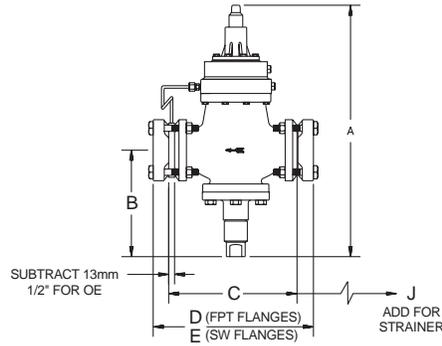
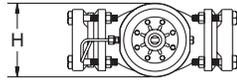
Note: 28 Adapter, 52 Moduplate used only with A4AOS/A4AOSE  
Fig. 3

Item	Description
1	Seal Cap
2	Gasket, Seal Cap
3	Nut, Stuffing Box
4	Packing Ring
5	Packing Washer
6	Adjusting Stem
7	Fitting, Bonnet
8	Bonnet
9	Nameplate
10	Screw, Name Plate
11	Screw, Bonnet
12	Spring Rest, Upper
13	Spring, Range
14	Spring Rest, Lower
15	Diaphragm Follower
16	Gasket, Bonnet
17	Diaphragm
18	Seat, Pilot
19	Gasket, Adapter
20	Flg Ring-tube Asm
21	Adapter, A4AO
22	Spring Nut
23	Spring, Pilot Plug
24	Pilot Plug
25	O-Ring Seal
26	O-Ring, Pilot Plug
27	Gauge Port Pipe Plug
28	Adapter, Body
29	Gasket, Body
30	Piston-Stem
31	Screw, Body
32	Body
33	Throttling Plug Asm
34	Spring, Closing
35	Dirt Wiper Retainer
36	Dirt Wiper
37	Seal, Bottom Cap
38	Bottom Cap
39	Screw, Bottom Cap
40	Packing Washer
41	Packing Ring
42	Stuffing Box Nut
43	Gasket, Seal Cap
44	Seal Cap
45	Gasket, Flange
46	Bolt, Flange
47	Nut, Flange
48	Pilot Body
49	Screw, Pilot Body
50	O-Ring
51	Moduadapter
52	Moduplate
53	Screw, Moduplate
54	O-Ring (Large)
58	Coil Assembly
61	Bonnet-Tube Asm
62	Tube Gasket
63	Plunger-Needle Asm
64	Seat Asm
65	Solenoid Pilot Body
66	Screw, Solenoid Pilot
67	O-Ring
68	Knob
69	Lens
70	Bulb
71	O-Ring

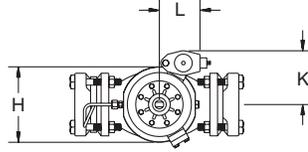
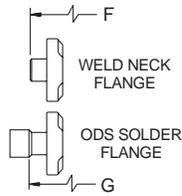
## A4AO, A4AOE



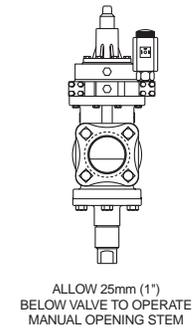
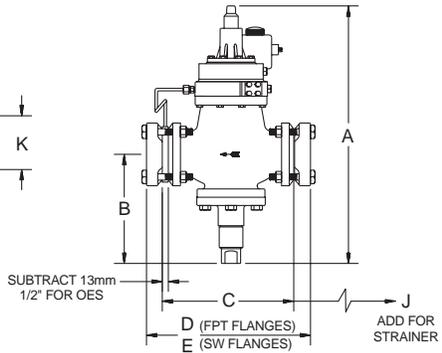
ALLOW 75mm (3") ABOVE VALVE TO OPERATE ADJUSTING STEM



## A4AOS, A4AOSE



ALLOW 75mm (3") ABOVE VALVE TO OPERATE ADJUSTING STEM



**TABLE OF DIMENSIONS FOR INLET PRESSURE Types A4AO, A4AOE, A4AOS, A4AOSE**

TYPE	20mm & 25mm (3/4 & 1")		32mm (1-1/4")		40mm & 50mm (1-5/8 & 2")		65mm (2-1/2")		75mm (3")		100mm (4")							
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches						
<b>A</b>	454	17.9	472	18.6	525	20.7	538	21.2	657	25.9	710	28.4						
<b>B</b>	148	5.8	162	6.3	177	6.9	181	7.1	273	10.7	292	11.5						
<b>C</b>	177	6.7	216	8.5	264	10.4	264	10.4	324	12.7	352	14.6						
<b>D</b> (FPT) FOR PIPE SIZES SHOWN	1/2"	229	9.0	1-1/4"	269	10.6	1-1/2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	3/4"	229	9.0		269	10.6		344	13.5		402	15.8						
	1"	229	9.0	1-1/2"	269	10.6	2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	1-1/4"	229	9.0	1-1/2"	269	10.6	2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
<b>E</b> (S.W.)FOR PIPE SIZES SHOWN	1/2"	229	9.0	1-1/4"	269	10.6	1-1/2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	3/4"	229	9.0		269	10.6		344	13.5		402	15.8						
	1"	229	9.0	1-1/2"	269	10.6	2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
	1-1/4"	229	9.0	1-1/2"	269	10.6	2"	320	12.6	2-1/2"	344	13.5	3"	402	15.8	4"	463	18.2
<b>F</b> (W.N.) FOR PIPE SIZES SHOWN	3/4"	267	10.5	1-1/4"	313	12.3	1-1/2"	377	14.8	2-1/2"	414	16.1	3"	491	19.3	4"	584	23.0
	1"	274	10.8	1-1/2"	317	12.5	2"	384	15.1		414	16.1		491	19.3			
	1-1/4"	274	10.0	1-1/2"	317	12.5	2"	384	15.1		414	16.1		491	19.3			
<b>G</b> (O.D.S.) FOR TUBE SIZES SHOWN	7/8"	252	9.9	1-3/8"	282	11.1	1-5/8"	371	14.6	2-5/8"	361	14.2	3-1/8"	427	16.8	4-1/8"	516	20.3
	1-1/8"	252	9.9		1-3/8"	282	11.1	1-5/8"	371		14.6	2-5/8"	361	14.2	3-1/8"			
	1-3/8"	244	9.6	1-5/8"	292	11.5	2-1/8"	351	13.8	3-1/8"	402	15.8	3-5/8"	445	17.5			
	1-5/8"	252	9.9	2-1/8"	318	12.5	2-5/8"	371	14.6		402	15.8	445	17.5				
<b>H</b>	117	4.6	117	4.6	140	5.5	159	6.2	178	7.0	222	8.8						
<b>J</b>	98	3.9	178	7.0	251	9.9	314	12.4	314	12.4	363	14.3						
<b>K</b>	112	4.4	112	4.4	117	4.6	124	4.9	142	5.6	157	6.2						
<b>L</b>	122	4.8	122	4.8	135	5.3	133	5.2	122	4.8	152	6.0						

**Flange Bolt Torque Requirements**

Bolt Diameter	Valve Port Size	Torque
11mm (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)

PRESSURE CONTAINING COMPONENTS A4A DN LINE: 3/4" & 1"				
	COMPONENT DESCRIPTION	MATERIAL	Kv	VOLUME
3/4 & 1 IN	BODY, A4A DN	ASTM A-126 CLASS B	6.2	
	ADAPTER, A4A DN	ASTM A-126 CLASS B	&	
20 & 25 MM	COVER BOTTOM, A4A/S4A	BARSTOCK ASTM 1213 CR	8.6	
	BONNET A4W	ASTM A-126 CLASS B		
	BODY, S6A (REGULAR MATL)	DUCTILE IRON ASTM A536		
	TUBE SOLENOID, S6	SS TUBING 304		
	SLEEVE, SOLENOID TUBE	AISI 1117 CRS BARSTOCK		
	BODY, A2D DN	ASTM A-126 CLASS B		
PRESSURE CONTAINING COMPONENTS A4A DN LINE: 1-1/4 TO 4				
	COMPONENT DESCRIPTION	MATERIAL	Kv	VOLUME
1-1/4 IN	BODY, A4A DN	DUCTILE IRON GGG 40.3	15	0.57 L
	ADAPTER, A4A DN	DUCTILE IRON GGG 40.3		
32 MM	COVER BOTTOM, A4A/S4A	BARSTOCK ASTM 1213 CRS		
	BONNET A4W	DUCTILE IRON GGG 40.6		
1-5/8 IN	BODY, 2 A4A DN	DUCTILE IRON GGG 40.3	28.6	1.61 L
	ADAPTER, 2 A4A DN	DUCTILE IRON GGG 40.3		
40 MM	COVER BOTTOM, A4A/S4A 1-5/8 to 2-1/2	DUCTILE IRON GGG 40.3		
	BONNET A4W	DUCTILE IRON GGG 40.3		
2 IN	BODY, 2 A4A DN	DUCTILE IRON GGG 40.3	42.4	1.61 L
	ADAPTER, 2 A4A DN	DUCTILE IRON GGG 40.3		
50 MM	COVER BOTTOM, A4A/S4A 1-5/8 to 2-1/2	DUCTILE IRON GGG 40.3		
	BONNET A4W	DUCTILE IRON GGG 40.3		
2-1/2 IN	BODY, 2-1/2 A4A DN	DUCTILE IRON GGG 40.3	60	3.19 L
	ADAPTER, 3 A4A DN	DUCTILE IRON GGG 40.3		
65 MM	COVER BOTTOM, 3 A4A/S4A	DUCTILE IRON GGG 40.3		
	BONNET A4W	DUCTILE IRON GGG 40.3		
3 IN	BODY, 3 A4A DN	DUCTILE IRON GGG 40.3	86	3.91 L
	ADAPTER, 3 A4A DN	DUCTILE IRON GGG 40.3		
75 MM	COVER BOTTOM, 3 A4A/S4A	DUCTILE IRON GGG 40.4		
	BONNET A4W	DUCTILE IRON GGG 40.3		
4 IN	BODY, 4 A4A DN	DUCTILE IRON GGG 40.3	116	6.5 L
	ADAPTER, 4 A4A DN	DUCTILE IRON GGG 40.3		
100 MM	COVER BOTTOM, 4 A4A/S4A	DUCTILE IRON GGG 40.4		
	BONNET A4W	DUCTILE IRON GGG 40.3		

A4A BOLT-ON ADAPTER 1-1/4" TO 4"		
Size	COMPONENT DESCRIPTION	MATERIAL
1-1/4" - 4"	BOLT, ON ADAPTER 1-1/4 DN - 4 DN	DUCTILE IRON GGG 40.3
32 mm - 100mm	MODUPLATE	AISI 1117 CRS
S6A SOLENOID		
	COMPONENT DESCRIPTION	MATERIAL
	BODY, S6A DN	AISI SS 304 BARSTOCK
	SLEEVE, SOLENOID TUBE	AISI 1117 CRS BARSTOCK
	TUBE SOLENOID, S6	SS TUBING 304
A2D PILOT REGULATOR		
	COMPONENT DESCRIPTION	MATERIAL
	BODY, A2D DN	DUCTILE IRON GGG 40.3
	BONNET, A4W	DUCTILE IRON GGG 40.3

## 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.

## 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, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OR 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.