



## CASH VALVE TYPE FRM-2 CRYOGENIC BACK PRESSURE OR ECONOMIZER VALVE INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be carefully read and understood.



### SPECIFICATION DATA

Service:	Cryogenic liquids and gases. Well suited for use in the Economizer circuit as a heat leak economizer valve in systems having medium flows.
Sizes:	¼" (6.4 mm), ⅜" (9.5 mm) and ½" (13 mm)
Connections:	NPTF
Body:	Brass
Material:	Brass
Maximum Temperature:	-320 to 150°F (-195 to 65°C)
Maximum Set Pressure:	FRM-2: 600 psig (41.4 barg)

### INSTALLATION INSTRUCTIONS

When installing the valve, connect the supply line to the inlet connection. The outlet connection should be connected to the bypass or final vaporizer line. Valves with 2 opposite side inlets and a bottom outlet may be installed as an angle valve with one inlet plugged, or alternatively used as an in-line valve with regulated pressure on both the inlet and process sides of the valve.

It is recommended that Type FRM-2 valve be installed in the horizontal position with the spring chamber upright. For ease of operation and maintenance, it is suggested that manual shut-off valves be installed upstream and downstream from the valve. Use a compatible sealant on the male pipe threads and do not overtighten the valve connections.

### DESCRIPTION

The Type FRM-2 is designed to function as a Back Pressure or Economizer valve in Cryogenic Circuits. The Back Pressure function is to open at a preset pressure and relieve inlet pressure to the discharge side into a lower pressure. The Economizer function is to open at a preset pressure, above the Pressure Build set pressure, and continue to open as gas head pressure from heat leak builds during non-use periods of the system. The Economizer by-passes gas head pressure directly to the Final Line circuit, when system draw resumes, to draw down the excess pressure rapidly and recloses before the Pressure Build regulator opens. These valves are small and compact, yet highly efficient, making it suitable for numerous applications that call for a small, accurate back pressure regulator. Type FRM-2 incorporates a "floating ring" design that provides for smooth even pressure control.

### CONSTRUCTION

Threaded ends; 2-way, side inlet-side outlet; 2-way, side inlet-bottom outlet; 3-way, 2 side inlets-bottom outlet; brass body; brass spring chamber; stainless steel seat disk, seat ring and pressure spring; bronze diaphragms; Polytetrafluoroethylene (PTFE) diaphragm gasket. Also available with stainless steel body, spring chamber and diaphragms.

All parts commercially cleaned for cryogenic service.

Other considerations in making a good installation are:

1. The valve should be sized properly for the service conditions.
2. Type FRM-2 valve is a diaphragm operated valve designed for the continuous operating pressure control of a system. All series FRM-2 valves are fitted with a diaphragm stop to prevent the diaphragms from extending beyond their limit; however, should a diaphragm fail, the valve will fail in the closed position. As a safeguard, it may be desirable to protect the system against damaging high pressures by a safety relief valve or some other type of safety device.

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## INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

### OPERATION INSTRUCTIONS

#### Adjusting the Back Pressure

The regulator's back pressure setting is adjusted by turning the adjusting screw (1) at the top of the spring chamber after loosening the adjusting screw lock nut (2). To obtain a higher pressure setting, turn the adjusting screw clockwise (into the spring chamber). To lower the pressure setting, turn the adjusting screw counter-clockwise (out of the spring chamber). Tighten the adjusting screw lock nut after the adjustment has been made and install the closing cap.

### MAINTENANCE INSTRUCTIONS

The following procedures are provided for servicing the Type FRM-2 back pressure relief valve. Repair parts can easily be installed without removing the valve from the line.

#### CAUTION

Before attempting to replace any spare parts, be sure to shut off all pressure connections to the valve. With the valves closed, however, system pressure could still be locked between the shut off valve and the inlet and/or outlet sides of the relief valve. Before proceeding with any valve service, be certain to relieve the pressure from BOTH sides of the valve.

Refer to the valve exploded view for parts identification.

#### Servicing the Pressure Spring (5), Diaphragms (10), Seat Disk (13), and Seat Ring (14)

1. Loosen the lock nut (2) ¼ turn and turn the adjusting screw (1) counter-clockwise until the pressure spring (5) is no longer under tension.

#### NOTE

When installing the adjusting screw during reassembly, turn the screw clockwise until the lock nut just touches the spring chamber. When the valve is placed in service, the pressure setting should be very close to the original setting.

2. Unscrew the spring chamber (3) from the valve body (15). During reassembly, tighten the spring chamber securely.
3. Remove the diaphragm seat (4), pressure spring (5), and the diaphragm stop (6) from the valve body.

4. The Diaphragm assembly, consisting of the pressure plate nut (7), lock washer (8), diaphragm pressure plate (9), diaphragms (10), seat disk gasket (12) and seat disk (13), can now be lifted off the body (15). Disassemble the parts by unscrewing the pressure plate nut (7) from the seat disk (13). Inspect all parts and replace if necessary. The diaphragm gasket (11), below the diaphragm, should be replaced when new diaphragms (10) are installed.

#### IMPORTANT

Exercise care to ensure that the surface of the seat disk (13) is not scratched, marred or damaged during disassembly and reassembly.

5. Once the diaphragm assembly has been removed, the seat ring (14), which is sitting loosely in a recess of the valve body, can be removed.

#### IMPORTANT

Handle the seat ring carefully to avoid damage to the seat ring surface which contacts the seat disk (13).

#### NOTE

Be sure to install the seat disk, with the machined groove around the outer edge of the flat face, so that this face is up (away from the body).

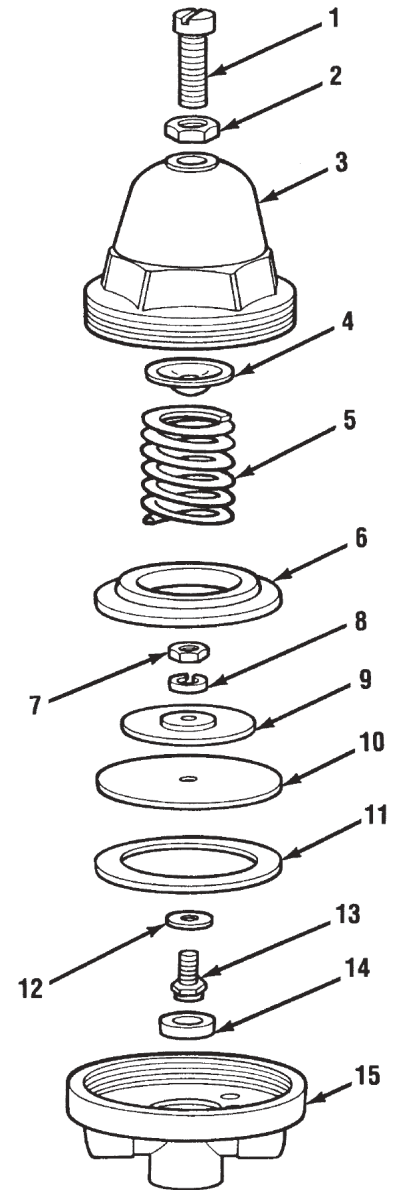
6. Inspect all parts and replace if necessary. Reassemble in reverse order. After placing the valve back in service, adjust the delivery pressure setting as detailed under Operation Instructions.

### REPAIR PARTS INFORMATION

Refer to the Type FRM-2 exploded view for parts identification.

### SPECIFICATIONS

Each Type FRM-2 back pressure valve is supplied with a pressure spring selected to provide the desired pressure setting. The range of adjustment or satisfactory "working range" of individual springs is shown below for each valve size. Each valve has the "set" pressure and range of adjustment stamped on a tag fastened to the valve.

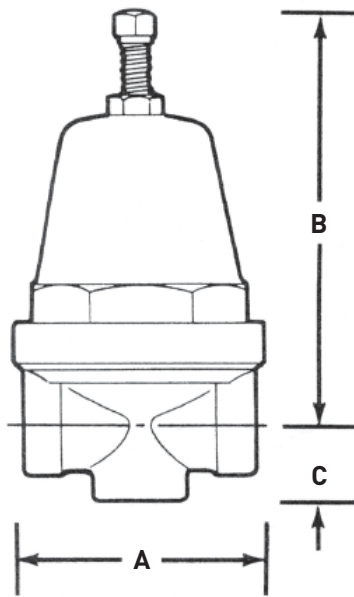


### LIST OF MATERIALS

Item No.	Description
1	Adjusting Screw
2	Lock Nut
3	Spring Chamber
4	Spring Seat
5	Pressure Spring
6	Diaphragm Stop
7	Pressure Plate Nut
8	Lock Washer
9	Pressure Plate
10	Diaphragm
11	Diaphragm Gasket
12	Seat Disk Gasket
13	Seat Disk
14	Seat Ring
15	Body

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### SPRING RANGES

Size	Maximum Working Ranges, psi (bar)
<b>FRM-2</b>	
All Sizes	0 to 30 (0 to 2.1)
	20 to 50 (1.4 to 3.4)
	40 to 80 (2.8 to 5.5)
	75 to 150 (5.2 to 10.3)
	100 to 275 (6.9 to 19.0)
	200 to 400 (13.8 to 27.6)
300 to 600 (20.7 to 41.4)	

### DIMENSIONS

Size, in. (mm)	Dimensions, in. (mm)			Ship. WT. lbs (kg)
	A	B	C	
<b>FRM-2</b>				
¼ (6)	2 <sup>11</sup> / <sub>16</sub> (68)	4½ (114)	¾ (19)	2½ (1.1)
⅜ (10)	2 <sup>11</sup> / <sub>16</sub> (68)	4½ (114)	¾ (19)	2½ (1.1)
½ (13)	2 <sup>7</sup> / <sub>8</sub> (73)	4½ (114)	1 <sup>1</sup> / <sub>8</sub> (29)	3½ (1.6)

### HOW TO ORDER

To order repair parts, refer to the exploded view of the Type FRM-2 to identify the part required. When ordering, please use the part names listed and provide the valve serial number stated on the identification tag. Also state the following:

#### “Repair Parts for Type FRM-2 Cryogenic Service” and provide:

1. Valve Size
2. Service
3. Inlet Pressure Range and Set Point
4. Outlet Pressure (if any)
5. Temperature Range
6. Pressure Range
7. Part Description
8. Quantity of each part
7. Valve assembly or serial number stated on the metal identification tag attached under the adjusted screw lock nut.

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