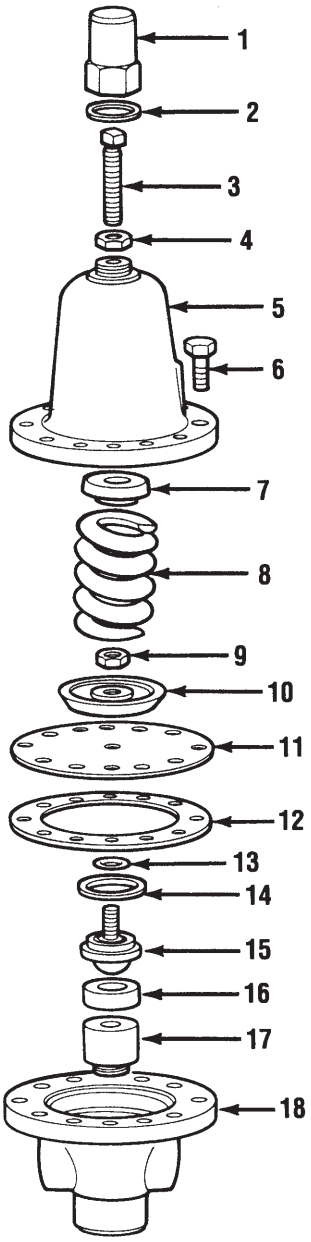
Tyco Valves & Controls

TECHSPEC



1. Closing Cap
2. Closing Cap Gasket
3. Adjusting Screw
4. Lock Nut
5. Spring Chamber
6. Assembly Bolt
7. Spring Seat
8. Pressure Spring
9. Pressure Plate Nut
10. Pressure Plate
11. Diaphragm
12. Diaphragm Gasket
13. O-Ring
14. Back-Up Ring
15. Seat Disc
16. Seat Ring
17. Body Seat
18. Body

DESCRIPTION

The Types FR and FR-6 are designed to function as Back Pressure or Economizer valves 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. FR Series valves are not emergency relief devices, but are designed for continuous pressure regulation.

SPECIFICATION DATA

Service: Cryogenic liquids and gases. Well suited for systems where high flows are required. For use in the economizer circuit.

Sizes: 1/2", 3/4", 1", 1-1/4", 1-1/2", and 2"

Connections: Threaded female side inlets (2), and bottom outlet.

Body: Bronze

Temperature Rating: +150°F (339°K) to -320°F (78°K)

Maximum Pressure: FR: 400 psi; FR-6: 600 psi

Maximum Set Pressure: Refer to Bulletin CRY

Capacity: For specific capacity information, consult the factory.

CONSTRUCTION

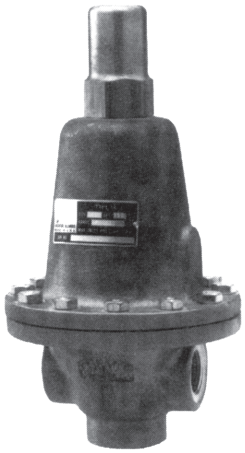
Bronze body, with a Bronze Spring Chamber; Stainless Steel Seat Disc, Pressure Spring, and Back-up Ring; Phosphor Bronze Diaphragm and Teflon O-ring Diaphragm Seals.

All parts commercially cleaned for cryogenic service.

GENERAL INSTALLATION INSTRUCTIONS

When installing the valve, connect the supply line to either the right or left hand body connection. The other right or left hand connection should be connected to the service line or plugged depending on the type of installation. The bottom connection, which is indicated by an arrow on the body, should be connected to the bypass or final vaporizer line.

For ease of operation and maintenance, it is suggested that manual shut-off valves be installed upstream and downstream from the valve. Before installing the valve, the piping and valve should be thoroughly flushed out to remove any foreign material. Use a compatible sealant on the male pipe threads and do not over tighten the valve connections.



Type FR
FR-6
CRYOGENIC
BACK PRESSURE OR ECONOMIZER VALVES

This Bulletin No.	**TS-FRCRY**
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Dated	**APRIL 1999**

OPERATING INSTRUCTIONS

Adjusting the Back Pressure

The regulator's back pressure setting is adjusted by turning the adjusting screw (3) at the top of the spring chamber after removing the closing cap (1) and loosening the adjusting screw lock nut (4). 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.

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MAINTENANCE INSTRUCTIONS

The following procedures are provided for servicing the Types FR and FR-6 back pressure relief valves. 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 valve 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 Type FR exploded view for parts identification.

Servicing the Pressure Spring (8), Diaphragm(s) (11), O-Ring (13), Seat Disc (15) and Seat Ring (16)

1. Remove the closing cap (1). Inspect and if necessary replace the cap gasket (2).
2. Loosen the lock nut (4) 1/4 turn and turn the adjusting screw (3) counter-clockwise until the pressure spring (8) 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.
3. Remove the assembly bolts (6) securing the spring chamber (5) to the valve body (18). During reassembly, tighten the screws evenly.
4. Lift the spring chamber (5) from the valve body. Then remove the spring seat (7), pressure spring (8), and diaphragm ring (FR-6 only).
5. The Diaphragm assembly, consisting of the pressure plate nut (9), pressure plate (10), diaphragm(s) (11), O-ring (13) or back-up ring (14) and seat disc (15) can now be lifted off the body (18). Disassemble the parts by unscrewing the pressure plate nut (9) from the seat disc. Inspect all parts and replace if necessary. The diaphragm gasket (12), below the diaphragm should be replaced when new diaphragm(s) (11) are installed.

   IMPORTANT: Exercise care to ensure that the surface of the seat disc (15) is not scratched, marred or damaged during disassembly and reassembly.
6. Once the diaphragm assembly has been removed, the seat ring (16) which is sitting loosely on top of the body seat (17) can be lifted from the valve body.

   IMPORTANT: Handle the seat ring carefully to avoid damage to the seat ring surface which contacts the seat disc (15).
7. 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 Operating Instructions.

Servicing the Body Seat (17)

1. Remove the spring chamber and related parts as described under Servicing the Pressure Spring (8), Diaphragm(s) (11), O-rings (13), Seat Disc (15) and Seat Ring (16) above.

   IMPORTANT: Before removing the body seat (17), be sure the top surface of the seat is protected from damage as this surface makes contact with the seat ring (16).
2. Remove the body seat by inserting a piece of hexagon bar stock (see table) into the top of the body seat, or alternatively, up through the bottom outlet connection into the bottom of the body seat. If removing the seat from the top, turn the hex bar to the left (counter-clockwise). If removing the seat from the bottom, turn the hex bar to the right (clockwise).

Required Hex Bar Sizes			
Valve Size	**Hex Bar**	**Valve Size**	**Hex Bar**
1/2"	7/16"	1-1/4"	1-5/16"
3/4"	9/16"	1-1/2"	1-1/16"
1"	11/16"	2"	1-1/8"

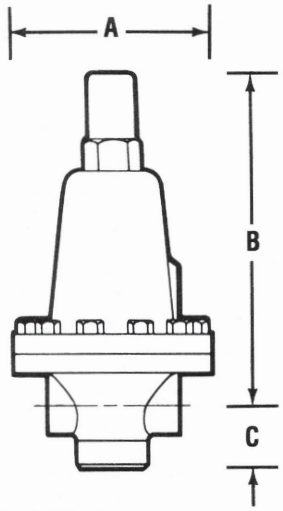
3. Examine the body seat (17) for wear or damage to the seating surface. Replace if necessary.
4. Place a small amount of compatible sealant on the threads of the body seat and install the seat in the valve body using care not to damage the surface which makes contact with the seat ring (16). After placing the valve in service, adjust the set pressure as outlined under Operating Instructions.

REPAIR PARTS INFORMATION

Refer to the Type FR valve exploded view for parts identification.

SPECIFICATIONS

Each Type FR and FR-6 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 for each valve size. Each valve has the "set" pressure and range of adjustment stamped on the identification tag fastened to the valve. The ranges shown are recommended for best performance.



SPRING RANGES

VALVE SIZE	SPRING NUMBER AND ADJUSTMENT RANGE						
1/2"	#8483 0-20	#8484 10-50	#8485 40-90	#8486 75-200	#8487 100-400	#8487* 300-600	-
3/4"	#8488 0-10	#8489** 0-15	#8489 10-70	#8490 50-175	#7806 100-265	#7806* 200-400	-
1"	#8493 0-15	#8493** 10-35	#8494 20-75	#6964 40-200	#8495 50-250	#8495* 200-400	-
1-1/4"	#8493 0-15	#8493** 10-30	#8494 20-85	#6964 40-125	#8495 50-250	#8495* 200-400	-
1-1/2"	#8493 0-15	#8493** 5-20	#8494 10-55	#6964 30-100	#8495 40-160	#14300 100-250	#14300* 200-400
2"	#8493 0-15	#8493** 5-20	#8494 10-55	#6964 30-100	#8495 40-160	#14300 100-250	#14300* 200-400

***NOTE: Requires special diaphragm ring and pressure plate.**
****NOTE: Requires different adjusting screw.**

DIMENSIONS

SIZE	DIMENSIONS			SHIPPING WEIGHT (lbs)
	A	B	C	
1/2"	4-3/4"	6-3/4"	1-5/8"	9-1/2
3/4"	5-5/8"	8"	2"	14-3/4
1"	6-1/2"	10-5/16"	2-1/4"	23-1/2
1-1/4"	6-1/2"	10-7/8"	2-3/8"	24-1/2
1-1/2"	7-1/2"	10-3/4"	2-5/8"	33
2"	7-1/2"	11"	2-5/8"	35-1/2

HOW TO ORDER

To order repair parts, refer to the exploded view of the Type FR 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 FR (or FR-6) 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
9. Valve assembly or serial number stated on the metal identification tag under the adjusting screw lock nut.