

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

DESCRIPTION

The Types FR, FR-6 and FR-10 are fully automatic back pressure valves designed to dependably maintain a desired pressure in a vessel or system by maintaining a predetermined valve inlet pressure and relieving excess pressure into a lower pressure line. FR Series valves are not emergency relief devices, but are designed for continuous pressure regulation.

SPECIFICATION DATA

Service: Acceptable for use with most fluids and gases except steam. Well suited for all grades of oils, including Bunker "C" and may be used in centrifugal, regenerative turbine, reciprocating or rotary pump bypass valve application.

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

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

Body: FR: Iron, Bronze, 316 Stainless Steel; FR-6: Bronze, 316 Stainless Steel; FR-10: Iron

Maximum Temperature:
FR and FR-6: 600°F, FR-10: 450°F

Pressure Control Range: FR: 0-400 psi, FR-6: 200-600 psi, FR-10: 0-250 psi

Capacity: Refer to Bulletin BPV-FR (supersedes BPV-1) for capacity information.

GENERAL INSTALLATION INSTRUCTIONS

When installing the valve, connect the supply line (usually the pump discharge line) to either the right hand or left hand body connection. The other right hand 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 valve body should be connected to the return or by-pass line. Before installing the valve, the piping and valve should be thoroughly flushed out to remove any foreign material.

In the typical installations shown on the following page, Type FR, FR-6, and FR-10 valves are shown installed in the horizontal position with the spring chamber upright. This is the recommended way to install the valve. Although installing the valve in a vertical line (valve on its side) or inverted in a horizontal line is not entirely discouraged, there are certain cautions to be considered. The concerns are



Type FR FR-6, FR-10 BACK PRESSURE VALVES

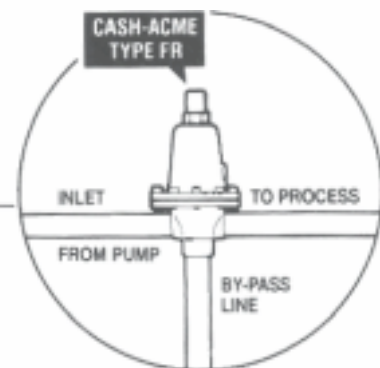
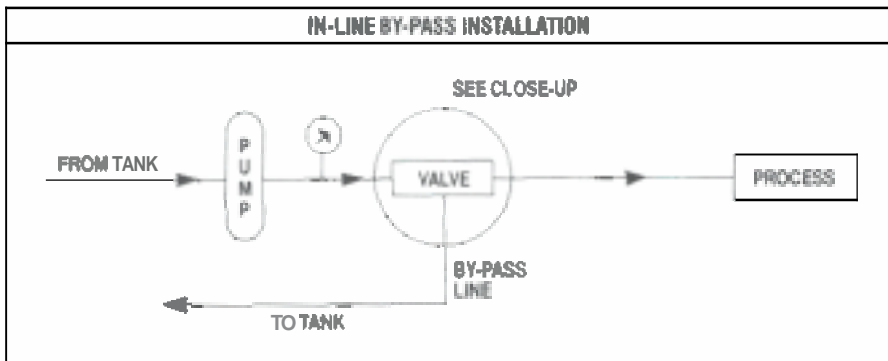
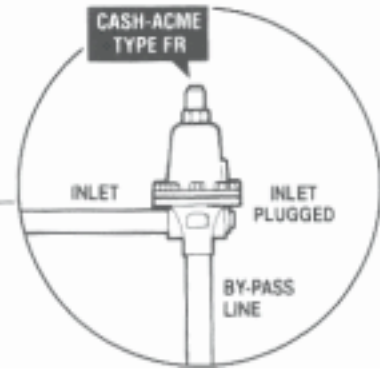
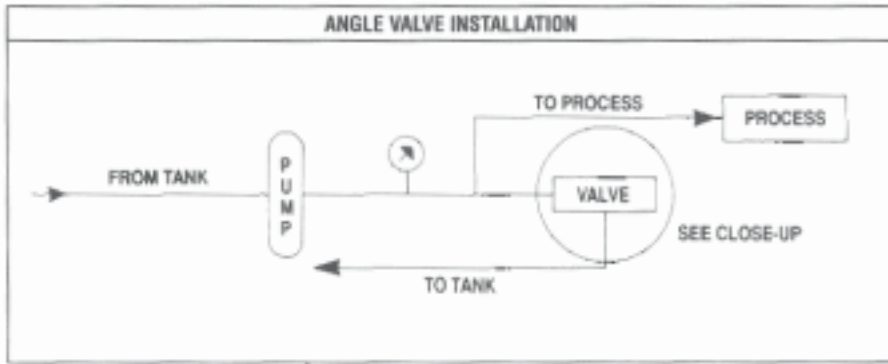
This Page No.	TS-FR
Date Of This Issue	MARCH 1999
Supersedes Page No.	TS-FR
Dated	MAY 1998

(1) low pressure settings and (2) a fluctuating pressure in the return line or relief line. In cases where either of these concerns are present and such types of installations are being considered, consult with the factory or its authorized representative before proceeding with the installation.

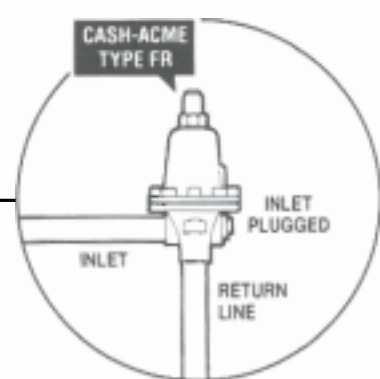
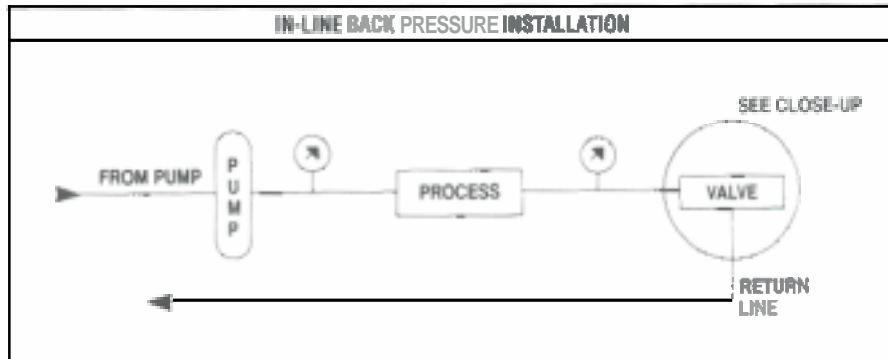
Other considerations in making a good installation are:

1. The valve should be sized properly for the service conditions.
2. Type FR Series valves are diaphragm operated valves designed for the continuous operating pressure control of a system. Should a diaphragm fail, the valve will fail in a 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.

TYPICAL RECOMMENDED INSTALLATIONS



REGULATED PUMP PRESSURE ON BOTH INLET AND PROCESS SIDES OF VALVE.

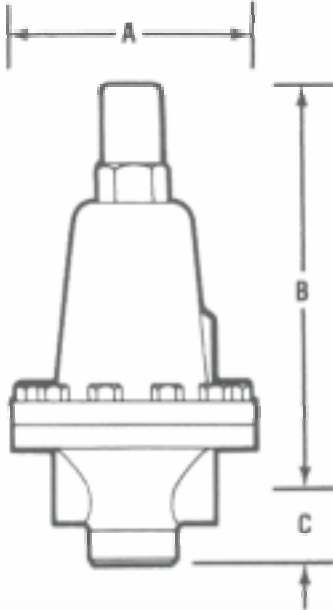


SPECIFICATIONS

Each Type FR, FR-6, and FR-10 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.

DIMENSIONS

SIZE	DIMENSIONS					SHIPPING WEIGHT (lbs.)		
	A		B		C	BRONZE	IRON	STAINLESS STEEL
	FR, FR-6	FR-10	FR, FR-6	FR-10	FR, FR-6			
1/2"	4-3/4"	6-3/4"	6-9/16"	1-5/8"	1-5/8"	8	9-1/2	7
3/4"	5-5/8"	8"	7-1/2"	2"	2"	13	14-3/4	11-1/2
1"	6-1/2"	10-5/16"	8-1/2"	2-1/4"	2-1/4"	20-1/4	23-1/2	18-1/4
1-1/4"	6-1/2"	10-7/16"	8-5/8"	2-3/8"	2-3/8"	21-1/2	24-1/2	19-1/2
1-1/2"	7-1/2"	10-3/4"	10"	2-5/8"	2-5/8"	29	33	27
2"	7-1/2"	11"	10-1/4"	2-5/8"	3"	31-1/2	35-1/2	29-1/2



SPRING RANGES

TYPE	SPRING NUMBERS & RANGES (in psi)				
	1/2"	3/4"	1"	1-1/4"	1-1/2", 2"
FR, FR-10	#5356 0-25	#5379 0-10	#5186 0-20	#5186 0-15	#5186 0-10
	#737 5-50	A380 10-50	A187 20-90	55187 20-85	A5187 10-55
	81163 30-100	#9222 20-110	#9577 40-175	#9577 40-125	#9577 30-100
	#1303 75-175	A381 30-225	#5188 50-230	#5188 50-230	#5188 40-200
	#2245 100-250	#5382 100-250			
FR	#2245 150-400	15383 150-400	A153 175-380	85153 175-380	85153 125-300
			A189 300-400	#5189 300-400	#5189 200-400
FR-6	#2245 200-600	#5383 200-600	#5189 200-600	#5189 200-600	#5189 200-600

REPAIR PARTS INFORMATION

Refer to the Type FR exploded view for parts identification.

TYPE	PART NO.	DESCRIPTION	MATERIAL	NO. REG.	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
					DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.
FR, FR-6	1	Adjusting Screw Cap (not required for T-handle or handwheel valves)	Brass	1	5248	5248	5150	5150	5150	5150
FR, FR-6	2	Adjusting Screw Cap Gasket (not required for T-handle or handwheel valves)	Fiber	1	5184	5184	2653	2653	2653	2653
FR, FR-6	3	Standard Adjusting Screw	St. Cd. Pl.	1	968	968	5149	5149	5149	5149
FR-10	3	Standard Adjusting Screw	St. Cd. Pl.	1	968	968	968	968	7634	7634
FR, FR-6	3	T-Handle Adjusting Screw Assembly: Adjusting Screw Hand Bar Lock Screw	Steel	1	6797	5797	7291	7291	7291	7291
Brass			1	6796	5796	6796	6796	6796	6796	
Steel			1	6795	5795	6795	6795	6795	6795	
FR, FR-6	4	Lock Nut (not required for T-handle or handwheel valves)	St. Cd. Pl.	1	5368	5368	5151	5151	5151	5151
FR, FR-10			or Brass	1	1567	1567	1567	1569	7635	7635
FR	5	Spring Housing (used w/o adj. screw cap)	Cast Iron	1	5265	5250	5225	5225	5154	5154
FR	5	Spring Housing (used w/o adj. screw cap)	Cast Iron	1	5301	5299	5297	5297	5295	5295
FR, FR-6	5	Spring Housing (used with adj. screw cap)	Bronze	1	5264	5249	5224	5224	5155	5155
FR	5	Spring Housing (used with adj. screw cap)	Bronze	1	5300	5298	5296	5296	5294	5294
FR	5	Spring Housing (used with adj. screw cap)	Carb. St.	1	6386	-	7468	7468	9159	9159
FR	5	Spring Housing (used with adj. screw cap)	316 S. St.	1	14056	-	6959	6959	-	-
FR	5	Spring Housing (for T-handle adj. screw)	Cast Iron	1	11866	7194	5297	5297	5295	-
			Bronze	1	-	6798	5296	5296	5294	-
FR	5	Spring Housing (for pressure loaded valves with adj. screw cap)	Cast Iron	1	9797	8744	11872	11872	11873	-
			Bronze	1	7796	7797	7798	7798	7799	-
FR-6	N.S.	Diaphragm Ring	Brass	1	13382	13383	13384	13384	13385	13385
FR, FR-6	6	Assembly Screws (for valve nos. over 13,000)	Steel	10	9061	9022	9022	9022	9331	9331
or 20				(10)	(10)	(12)	(12)	(12)	(12)	
FR	6a	Assembly Screws (for valve nos. over 13,000)	Steel	10 or 20	1551 (10)	894 (10)	894 (12)	894 (12)	339 (12)	339 (12)
FR	6b	Assembly Nuts (for valve nos. under 13,000)	Steel	10 or 20	1552 (10)	805 (10)	805 (12)	805 (12)	820 (12)	820 (12)
FR-10	6	Assembly Screws	Steel	8	9061	9022	9022	9022	9331	9331
FR, FR-6	7	Spring Seat	Brass	1	4843	5185	5152	5152	5152	5152
FR-10	7	Spring Seat	Brass	1	4843	5185	13101	13101	13101	13101
FR, FR-6	8	Pressure Spring	Carb. St.	1	(See Ranges Shown on page 5)					
FR, FR-6 FR-10	9	Pressure Plate Nut	St. Cd. Pl.	1	1552	805	820	820	5156	5156
FR	10	Pressure plate	Cast Iron	1	5267	5252	5227	5227	5280	5280
FR, FR-10	10	Pressure plate	Brass	1	5266	5251	5226	5226	5157	5157
FR	10a	Pressure plate (metal diaphragm, pressure loaded valves only)	Cast Iron	1	-	-	12419	12421	12418	12418
FR-6	10	Pressure plate	Brass	1	13386	13387	13388	13388	13389	13389
FR	10b	Pressure plate seal (metal diaphragm, pressure loaded valves only)	Teflon	1	-	-	12421	12421	12418	12418
FR	10c	Pressure plate (for pressure loaded valves)	Cast Iron	1	5561	5562	5563	5563	5564	5564
FR	10c	Pressure plate (for pressure loaded valves)	Brass	1	5535	5536	5537	5537	5538	5538
FR	10c	Pressure plate (for pressure loaded valves)	316 S. St.	1	6183	6184	6185	6185	6229	6229
FR, FR-6	11a*	Diaphragm(s) (valve nos. less than 13,000 require 6 metal diaphragms; valve nos. greater than 13,000 require 4 metal diaphragms)	Metal: Bronze	4.6	5268	5253	5228	5228	5159	5159
			Monel	4.6	5269	5254	5229	5229	5158	5158
			316 S. St.	4.6	7166	7285	6961	6961	7252	7252
			Comp.: Buna-N	1	5375	5376	5377	5377	5378	5378

*Recommended spare parts

OPERATING INSTRUCTIONS

Adjusting the Delivery Pressure

The regulator's delivery 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.

MAINTENANCE INSTRUCTIONS

The following procedures are provided for servicing the Types FR, FR-6, and FR-10 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. If fitted, **unscrew** the adjusting screw 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 (6) 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 screws (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 diaphragm plate nut (9), diaphragm plate (10), diaphragm(s) (11), O-ring (13) or seat disc ring (14) and seat disc (15) can now be **lifted off** the body (18). **Disassemble** the parts by **unscrewing** the diaphragm plate nut (9) from the seat disc. Inspect all parts and **replace if necessary**. If there is a diaphragm gasket (12), below the diaphragm it should be replaced when new diaphragm(s) 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. Also, any new O-ring (13 or 14) should be lubricated with Fiske Brothers Lubriplate No. 907 or equivalent prior to 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 **insetting** 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"	15/16"
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 pipe dope 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.

For other installation requirements consult the factory. For ease of operation and maintenance, it is suggested that manual shut-off valves be installed upstream and downstream from the valve. Use a good pipe joint compound on the male pipe threads and do not over tighten the valve connections.

REPAIR PARTS INFORMATION (continued)

Refer to the Type FR exploded view for parts identification.

TYPE	PART NO.	DESCRIPTION	MATERIAL	NO. REG.	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
					DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.	DWG. NO.
FR, FR-6	11b	Liner for corrosive service; used with metal or composition diaphragms	Teflon	1	14130	14131	14132	14132	14133	14133
FR-10	11	Diaphragm(s)	Metal: Monel	3,4	13113	13108	13103	13103	13946	13946
FR-10	11	Diaphragm	Comp: Buna-N	1	13883	13882	13856	13856	13947	13947
FR, FR-6	12*	Upper diaphragm gasket (for pressure loaded valves with metal diaphragms only)	Durabla	1	5270	5255	5230	5230	5160	5160
FR-10			Durabla	1	13097	13109	13104	13104	13948	13948
FR, FR-6	12*	Lower diaphragm gasket (for metal diaphragms only)	Teflon	1	6343	7265	6963	6963	7253	7253
FR, FR-6	12*	Upper diaphragm gasket (for pressure loaded valves with metal diaphragms only)	Teflon	1	6343	7265	6963	6963	7253	7253
FR, FR-6	12*	Lower diaphragm gasket (for metal diaphragms only)	Durabla	1	5270	5255	5230	5230	5160	5160
FR, FR-6	13a	O-Ring (for all metal diaphragm valves or for composition diaphragms with valve nos. under 13,000)	Buna-N	1	5271	5231	5231	5231	5161	5161
FR-10			Teflon	1	6344	6362	6962	5962	7254	7254
FR, FR-6	14b	Backup Ring (for Teflon O-ring only)	303 S. St.	1	10443	10444	10444	10444	10445	10445
FR, FR-6	14c	Seat Disc Ring (for composition diaphragms with valve nos. over 13,000)	Brass	1	13379	13380	13380	13380	13381	13381
FR-10			303 S. St.	1	5273	5257	5241	5233	5217	5166
FR, FR-6	15*	Seat Disc	316 S. St.	1	6236	6237	6238	6239	6240	6241
FR-10			303 S. St.	1	5275	5259	5243	5235	5219	5163
FR, FR-6	16*	Seat Ring	316 S. St.	1	6342	6243	6244	6245	6246	6247
FR-10			Brass	1	5276	5260	5244	5236	5220	5168
FR, FR-6	17	Body Seat	303 S. St.	1	5277	5261	5245	5237	5221	5169
FR-10			316 S. St.	1	6248	5249	6250	6251	6252	6253
FR	18	Body (for valve nos. under 13,000)	Cast Iron	1	5279	5263	5247	5239	5223	5172
			Bronze	1	5278	5262	5246	5238	5222	5171
			Carb. St.	1	6367	-	7466	-	9161	8064
			316 S. St.	1	6230	6231	6232	6233	6234	6235
FR, FR-6	18	Body (for valve nos. over 13,000)	Cast Iron	1	13660	13703	13728	13741	13760	13778
			Bronze	1	13390	13391	13392	13393	13394	13395
			Carb. St.	1	13683	-	13729	13839	13837	13780
			316 S. St.	1	13664	13704	13727	13742	13761	13779
FR-10	18	Body	Cast Iron	1	13112	13110	13106	13106	13944	13945

*Recommended spare parts

HOW TO ORDER

When ordering repair parts, refer to the cut away 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, FR-6, or FR-10" and provide:

1. Valve size
2. Service (water, air, oil, etc.)
3. Inlet pressure

4. Outlet or delivery pressure range and setting
5. Part description
6. Quantity of each part
7. Valve assembly or serial number stated on the metal identification tag attached to the valve.



IMI CASH VALVE INC.

2400 7TH AVENUE SW • CULLMAN, ALABAMA 35055
 1-800-879-2042 • FAX 1-800-879-2057
 256-775-8200 • FAX 256-775-8238
 www.cashacme.com • www.cashacme.thomasregister.com



© 1997 IMI CASH VALVE INC.