Pressure Reducing Valve
Model No.: LF-PRC

Installation, Operation & Maintenance

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GENERAL DESCRIPTION

Features

The LF-PRC Pressure Reducing Valve is designed to perform the following function:
Reducing a higher upstream pressure into a lower, constant downstream pressure.

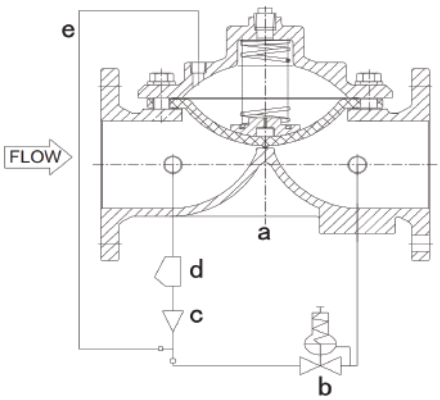
The LF-PRC consists of the following components (as arranged on the principle schematic):

Basic Control Valve
A hydraulically-operated, diaphragm-actuated globe valve which closes with an elastomer-on-metal seal.

Model PRP Pressure-Reducing Pilot
A two-way, normally-open pilot valve which senses downstream pressure under its diaphragm and balances it against an adjustable spring load. An increase in downstream pressure tends to make the pilot close.

Restriction
A simple ferrule fitting connection with a fixed orifice in its upstream port.

Y-Strainer
The Strainer protects the pilot system from solid contaminants in the line fluid.



No.	Component	Material
a	Main Valve	
b	Pressure Reducing Pilot	Bronze
c	Restriction Orifice	Stainless Steel 304
d	Y-Strainer	Stainless Steel 304
e	Pipeline	Stainless Steel 304

Theory of Operation (Refer to schematic diagram)

As downstream pressure tends to increase above the set point of the pressure-reducing pilot, the pilot moves further closed. This results in an increase in the diaphragm chamber of the basic control valve. The basic control valve the closes slightly to restore the downstream pressure to the set point. Conversely, as downstream pressure tends to decrease below the set point, the pilot moves further open. This results in a decrease in pressure in the diaphragm chamber of the basic control valve. The basic control valve then opens wider to bring the downstream pressure back up to the set point. The net result of all this is a constant modulating action by the pilot and the basic control valve and a downstream pressure which
remains constant despite fluctuations in demand or inlet pressure.

INSTALLATION

The 1320 is furnished fully factory-assembled and ready for installation at the appropriate point in the system. In order to ensure safe, accurate and efficient operation of the LF-PRC, these guidelines should be followed.

- Make sure you have a properly sized valve.
- Make a careful inspection of the valve to insure that there has been no damage to the external piping, fittings and controls. Check that all fittings are tight.
- It is recommended that either gate or block valves be installed on the inlet and discharge sides of the valve for preventive or corrective maintenance.
- Prior to mounting the valve, all interconnecting piping should be thoroughly flushed of chips, scale, and foreign matter.
- Install the valve in the line according to the flow arrow on the valve body. The arrow should point downstream.
- Allow sufficient room around the valve for ease of adjustment and maintenance service.
- For system protection, a pressure relief valve, at least 1/2" in size, must be installed downstream of the pressure control valve. Be sure to provide adequate drainage for the relief valve.

Startup and Adjustment

The following procedures should be followed in the order presented in order to effect an initial startup of the LF-PRC:

- Install a pressure gauge of the proper range upstream and downstream of the LF-PRC.The unused side ports on the basic control valve body may be used for this purpose if there is no convenient location in the piping.
- Remove the plastic cap from the pressure-reducing pilot and loosen the adjusting screw jam nut. Turn the adjusting screw counterclockwise until it is loose enough to be turned by hand.
- Start the pump, or otherwise start the system flowing. The basic control valve will at this time be either fully closed or open only a very small amount.
- Carefully loosen the pipe plug in the basic control valve bonnet until fluid appears around the threads. When only clear fluid (no air) is discharging, re-tighten the plug.
- Check downstream pressure. It should be lower than desired at this point. If it is already too high, there is too much restriction downstream. Open further valves or otherwise increase demand until the pressure falls below the desired set point.
- Slowly turn the adjusting screw of the pressure reducing pilot clockwise until downstream pressure rises to the desired set point. Tighten the adjusting screw jam nut, and replace the plastic cap.
- Slowly close downstream valves to reduce flow to zero, while observing the pressure gauge. The pressure will rise above the set point a few psi. This is normal. However, the magnitude of this pressure rise should not exceed 14.5 psig.
- If pressure readjustment should ever be required, the pressure-reducing pilot is adjusted clockwise to increase pressure; counterclockwise to decrease pressure.

MAINTENANCE

Due to the simplicity of design of the LF-PRC, required maintenance is minimal. However, the following checks, periodically performed, will do much to keep the valve operating properly and efficiently.

- Check for chipped or peeling paint.
- Check for leaks at fittings and around flange and connections. Tighten as required.
- Check the screen of the Y-strainer for buildup of solid material. Clean as required. This point is most important, as a clogged strainer can keep the valve from operating properly. On new installation, it is recommended that the strainer be checked every day or two until experience dictates a greater or lesser interval.

Troubleshooting

In the event of malfunction of the LF-PRC, the following guide should enable the technician to isolate the specific cause of the problem.

Basic Control Valve Fails To Open

- Valve closed downstream of the LF-PRC. Open as required.
- Pressure-reducing pilot adjusted too far counterclockwise. See adjustment instructions.
- Stem of pressure-reducing pilot binding. See Model PRP section of this manual.

Basic Control Valve Fails To Close

- Strainer clogged. Clean as required.
- Pressure-reducing pilot adjusted too far clockwise. See adjustment instructions.
- Diaphragm of pressure-reducing pilot ruptured. This will be evidenced by a discharge of fluid from the vent port in the pilot bonnet. Disassemble pilot and replace diaphragm.
- Pressure-reducing pilot stem binding or seat badly deteriorated. Disassemble pilot and determine cause. See the PRP section of this manual.
- The basic control valve diaphragm ruptured. Replace diaphragm. See Basic control valve section of this manual.
- Object in Basic control valve. Disassemble valve and determine cause. See Basic Control Valve section of this manual.

Basic Control Valve Open and Close, But Does Not Control Pressure

- If pressure remains too high despite adjustment of the pressure-reducing pilot, refer to BASIC CONTROL VALVE FAILS TO CLOSE, above.
- If pressure remains too low despite adjustment of the pressure-reducing pilot, refer to BASIC CONTROL VALVE FAILS TO OPEN, above.
- If pressure oscillate, you may likely be in a period of very low demand. Frequently this problem will disappear as demand increase. In an extreme case, try adjusting the pressure slightly higher.

Downstream Pressure Builds Too High When Demand Is Zero

- Pressure Reducing Pilot leaking. Disassemble pilot and determine cause. See the PRP Pressure-Reducing Pilot section of this manual.
- Basic control Valve leaking. Disassemble basic control valve and determine cause. See the Basic Control Valve section of this manual.

SECTION 2 BASIC CONTROL VALVE

General Description

The basic control valve is a hydraulically-operated, diaphragm-actuated valve. The diaphragm is nylon-fabric bonded with synthetic rubber and forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. An elastomeric seat disc forms a tight seal with the valve seat when pressure is applied above the diaphragm.

Functional Description

The valve functions on a simple principle of pressure differential. The line pressure at the inlet of the valve is bypassed through the pilot control piping to the diaphragm chamber of the valve. This pressure, together with the valve spring, works against the pressure upstream the valve seat. Because the effective area of the pressure of the diaphragm chamber is greater than that of the pressure upstream, the valve is held tightly closed. As the controlling pilot(s) allow the pressure to bleed off the diaphragm chamber, the two opposing pressures begin to balance and the valve will begin to open. The valve can be used to perform a simple onoff function, or with the proper pilot system, a modulating, or regulating function.

In cases where the line fluid is unusually dirty, or is otherwise unsuitable for operating the valve, an independent operating pressure source may be employed. The pressure available from such a source must be equal to, or greater than, line pressure.

MAINTENANCE

The basic control valve requires no lubrication and a minimum of maintenance. However, a periodic inspection should be established to determine how the fluid being handled is affecting the efficiency of the valve. In a water system, for example, the fluid velocity as well as the substances occurring in natural waters, such as dissolved minerals and suspended particles, vary in every installation. The effect of these actions or substances must be determined by inspection. It is recommended that an annual inspection, which includes examination of the valve interior, be conducted. Particular attention should be paid to the elastomeric parts, i.e., the diaphragm. Any obviously worn parts should be replaced.

Repair procedure

In the event of malfunction of the Weflo control valve, troubleshooting should be conducted according to the procedures outlined for the specific model of valve. Then, if those steps indicate a problem with the main valve, this section will outline the procedures necessary to correct the problem. Problems with the basic control valve can be classed in three basic categories:

Valve Falls to Close

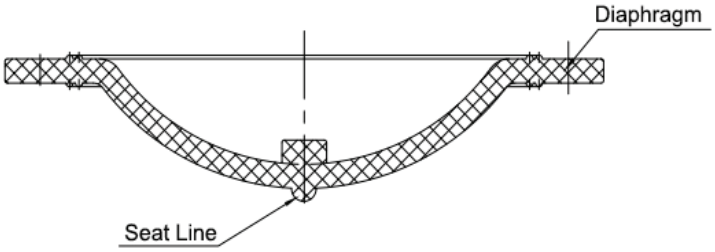
- Diaphragm damaged-See Procedure A
  A diaphragm failure can prevent the valve from closing. Most water service valves flow ”under the seat”, in which case a diaphragm failure will keep the valve from closing.
- Object lodged in valve-See Procedure A
  Valve Opens and Closes but Leaks When Closed
- Seat line of the diaphragm damaged-See Procedure A
- Seat surface of the body deteriorated-See Procedure A

Procedure A:

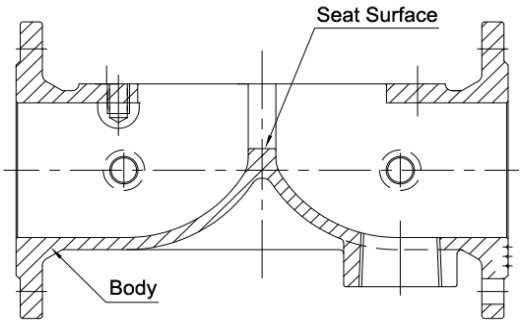
- Isolate the valve from the system by closing upstream and downstream block valves.
- Loosen one of the tubing connections on the bonnet. Allow any residual pressure to bleed off.
- Remove all tubing connected at the bonnet.
- Remove the bonnet bolts.
- Remove the bonnet. If the bonnet sticks in place, it may be loosened by rapping sharply around its edge with a rubber-headed mallet.

NOTE: 8” and larger valves are equipped with eye nuts through which a chain can be fastened to aid in lifting the bonnet.

- Remove the spring and the spring retainer. Set them aside in a safe place.
- Remove the diaphragm on which seat line lies. See the following figure.

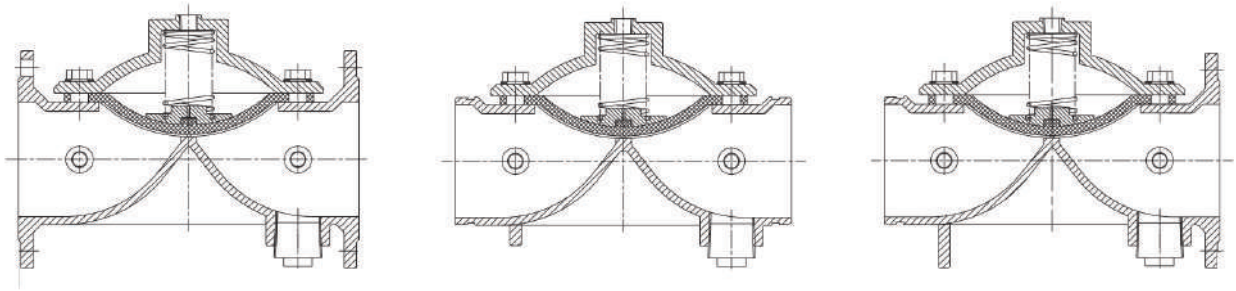


- Carefully examine the diaphragm. If the diaphragm is ruptured, or the seat line is deteriorated, replace the diaphragm.
- Carefully examine the seat surface of the body (see the following figure) for object, debris or other things. Clean them up.

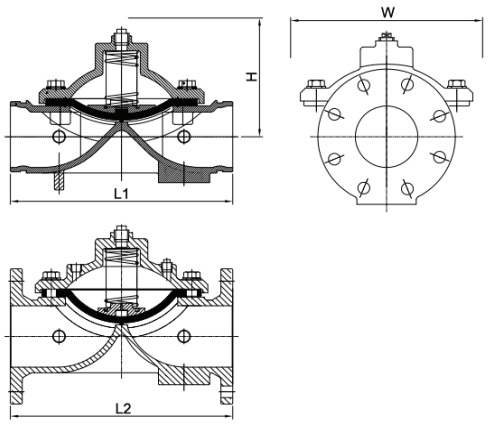


- Reinstall the diaphragm.
- Replace the spring retainer and the spring.
- Replace the bonnet and reinstall the bonnet bolts.
- Tighten the bonnet bolts snugly.
- Reinstall the control tubing.
- Reopen the upstream and downstream block valves.
- Before placing the valve back in service, perform the air bleed procedure described in the first section of this manual.

Basic Control Valve Section View



Installation and Maintenance Space Dimensions (mm)



Part	Material	ASTM Specification
Body	Ductile Iron	A536 Grade 65-45-12
Bonnet	Ductile Iron	A536 Grade 65-45-12
Diaphragm	Nylon Reinforced Natural Rubber/EPDM/NBR	
Spring Retainer	Ductile Iron	A536 Grade 65-45-12
Spring	Stainless Steel	A276 Type 304
Galvanized Bolt	Carbon Steel	A307 Grade B
Galvanized Washer	Carbon Steel	A307 Grade B

Size	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250	DN300
	2	2-1/2	3	4	5	6	8	10	12
L1	260	310	310	356	370	436	530	636	835
L2	233	290	310	356	370	436	530	636	835
W	450	485	500	520	550	590	640	700	950
H	210	220	259	270	280	290	360	380	430

SECTION 3, PRESSURE-REDUCING PILOT (MODEL PRP)

General Description

The Model PRP Pressure-reducing Pilot is a normally-open, direct-acting, spring-loaded, diaphragm-type control pilot. It is designed to maintain a constant preset discharge pressure from the main valve.

It is a constant throttling device, maintaining precise, positive control of the main valve. The Pressure-reducing Pilot may also be used by itself as a downstream pressure regulator.

The Pressure-reducing Pilot is available in bronze or stainless steel construction and with 3/8 NPT or 1/2NPT end connections.

Spring Range: 65psi-165psi

Functional Description

The downstream pressure is sensed under the diaphragm of the pilot and is balanced against an adjustable spring load. As the downstream pressure decrease below the set point, the pilot opens wider, decreasing the pressure in the diaphragm chamber of the basic control valve, opening the valve a proportionate amount. Conversely, as downstream pressure increases above the set point, the pilot closes further, increasing the pressure in the diaphragm chamber of the basic control valve, closing the valve a proportionate amount. The net result is a constant modulating action of the pilot and the basic control valve, keeping the downstream pressure at the set point within very close limits.

Installation and Adjustment

The Pressure-reducing Pilot is normally installed in the main valve control piping between the restriction and the downstream body tap. Flow must be in the direction indicated. In most cases, a sense line is factory installed between the diaphragm sense port and the downstream pilot body side port, as shown in the drawing. The pilot can also be remote sensed by running a line from the 1/8 NPT connection under the pilot diaphragm to the desired downstream point where the pressure control is desired.

Pressure adjustment is made by means of the single adjusting screw:
- Clockwise adjustment increases downstream pressure.
- Counterclockwise adjustment decreases downstream pressure.

Maintenance

Required maintenance of the Pressure-reducing Pilot is minimal. Fittings and bolts should be periodically checked, and the body should be inspected for damage or excessive buildup of foreign material.

Troubleshooting

Other than improper adjustment, there are basically only three malfunctions which can occur with the Pressure-reducing Pilot. These, and the symptoms they can cause, are as follows:
- Pilot Diaphragm Ruptured
  Results in failure of the main valve to close and/or downstream pressure that is too high. A ruptured pilot diaphragm will be evidenced by leakage through the vent hole in the pilot bonnet.
- Pilot Seat Disc Deteriorated
  Results in a downstream pressure that drifts too high under dead-end (zero flow) conditions.
- Pilot Stem Binding
  Typically results in poor pressure control, though in extreme cases, it can result in failure of the main valve to open or close.

Repair Procedures

Refer to the "Pressure-Reducing Pilot Assembly Drawing" for parts identification.

Diaphragm Replacement

- Prior to disassembling the pilot, turn the adjusting bolt (15) fully counterclockwise until it is loose enough to be turned with the fingers.
- Remove the six bonnet screws (20).
- Remove the bonnet (12). Set the adjusting spring (13) and spring retainer (14) aside in a safe place.
- Remove the plug (1) from the bottom of the pilot. Set bottom spring (3) aside in a safe place.
- Using an appropriate wrench, as a backup on the second nut from the top of stem (7), remove disc (4). Pull the diaphragm out of the body.
- Disassemble the diaphragm plate (19), remove the diaphragm plate (19) and old diaphragm (11).
- Inspect diaphragm plate o-ring (21). Replace if necessary.
- Place new diaphragm.
- Replace upper diaphragm plate (19), o-ring (21), and hex nuts (18). Tighten securely.
- Insert the diaphragm assembly into the body.
- Screw the disc (4) onto the bottom of stem (7). Tighten disc (4) securely, using an appropriate wrench, as a backup on the first nut from the top of stem (7).
- Reinstall plug (1).
- Hold adjusting spring (13) and spring retainer (14) together in the proper orientation, and place them onto diaphragm plate (19).
- Replace the bonnet (12) over the adapter (22), and insert the bonnet screws (20). Tighten securely.
  NOTE: The shorter screws should be screwed into the blind hole, and meanwhile the longer screws should be screwed into the through-hole.
- Place valve back in service, following the startup and adjustment procedures given in the main portion of this manual.

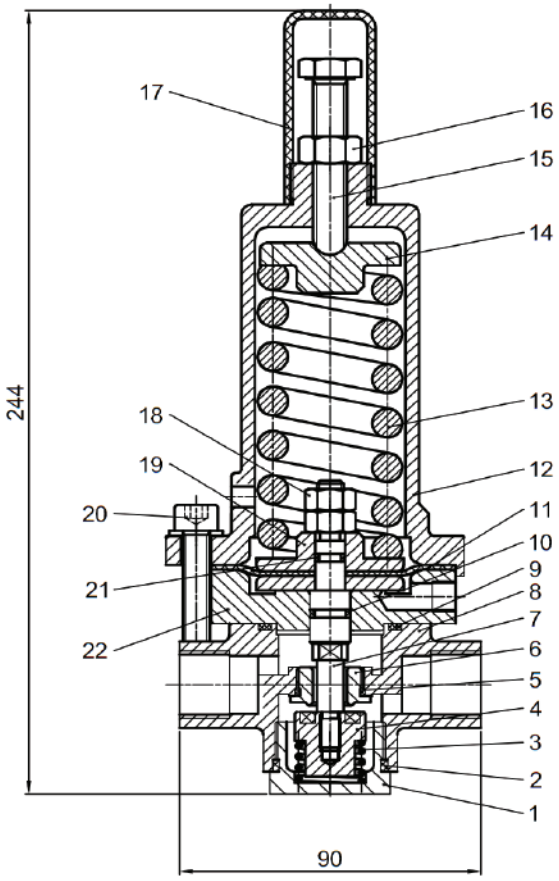
Seat Disc Replacement

- Follow Step 1 through 4 under "DIAPHRAGM REPLACEMENT", above.
- Using an appropriate wrench, as a backup on the second nut from the top of stem (7), remove disc (4).
- Place new seat disc Tighten Securely.
  Note: Tighten both the two nuts at the top the stem to prevent loosening.
- Reassemble pilot following Steps 12 through 15 under "DIAPHRAGM REPLACEMENT", above.

Stem Repair

- Follow Steps 1 through 5 under DIAPHRAGM REPLACEMENT, above.
- Inspect stem and o-ring (10) carefully.
- Remove any foreign material or light scratches from the stem with a fine grade of emery cloth. A badly scored stem should be replaced.
- Replace o-ring (10).
- Lubricate the o-ring and stem liberally with Vaseline or similar lubricant.
- Reassemble pilot following Steps 11 through 15 under "DIAPHRAGM REPLACEMENT", above.

Pressure-Reducing Pilot Assembly Drawing



Item	Description	Material
1	Plug	Brass
2	O-ring	NBR/EPDM
3	Bottom Spring	SS304
4	Disc	SS304+Rubber
5	O-ring	NBR/EPDM
6	Seat	SS304
7	Stem	SS304
8	Body	Bronze/Brass/SS304
9	O-ring	NBR/EPDM
10	O-ring	NBR/EPDM
11	Diaphragm	Nylon Reinforced Natural Rubber
12	Bonnet	Bronze/Brass/SS304
13	Adjusting Spring	SS304
14	Spring Retainer	SS304
15	Adjusting Bolt	SS304
16	Jam Nut	SS304
17	Cap	PVC
18	Nut	SS304
19	Diaphragm Plate	SS304
20	Screw	SS304
21	O-ring	NBR/EPDM
22	Adaptor	Bronze/Brass/SS304

Adjusting Spring Range: 65 to 165 psi.

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