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Type EZL Pressure Reducing Regulator for Low Pressure Applications

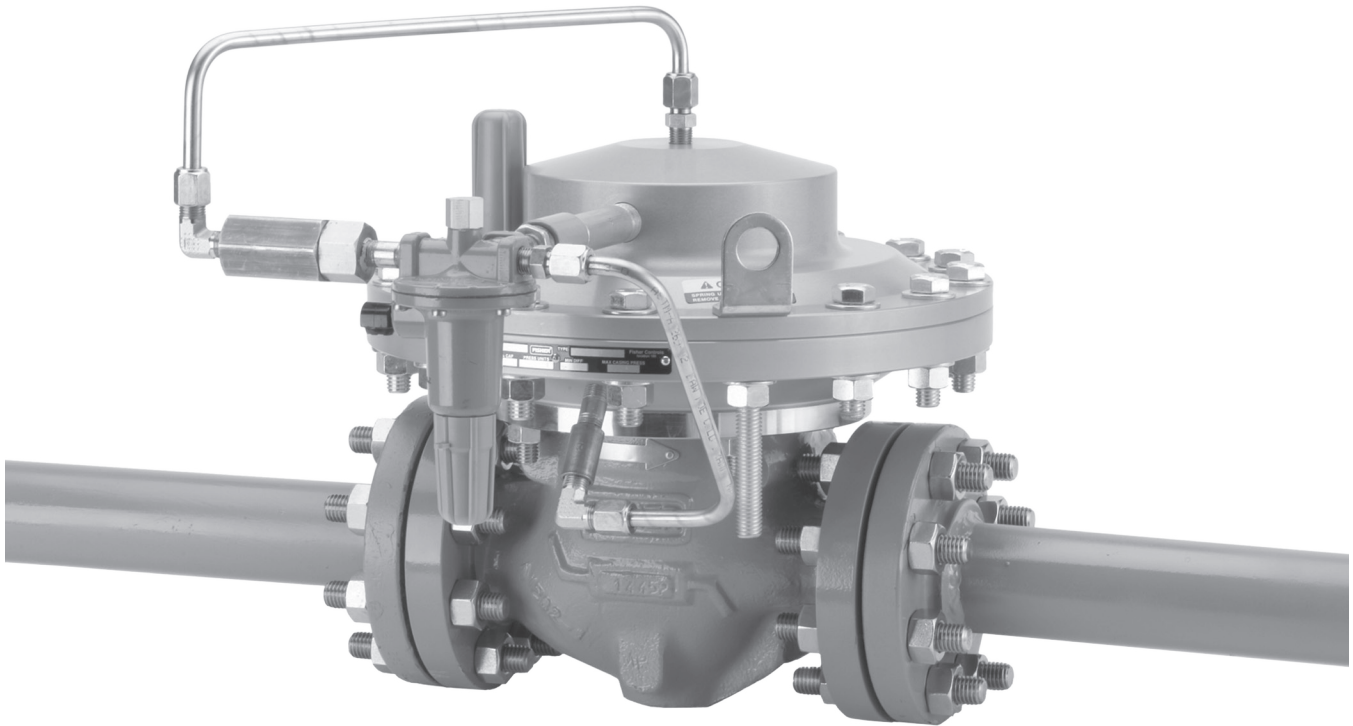


Figure 1. Type EZL Pressure Reducing Regulator

Introduction

Scope of the Manual

This manual provides installation, startup, maintenance and parts ordering information for the Type EZL pressure reducing regulator. Information on other equipment used with this regulator is found in separate manuals.

Product Description

Type EZL regulators are accurate pilot-operated, pressure balanced and soft seated regulators. They are designed for use in natural gas distribution applications such as district regulating stations and commercial/industrial meter sets. They provide low differential, smooth, reliable operation, tight shutoff and long life.

Type EZL

Specifications

The Specifications section lists the specifications for Type EZL pressure reducing regulator. Factory specifications for specific regulator constructions are stamped on the nameplate fastened to either the main actuator or the pilot spring case.

Available Configuration

Type EZL: Pilot-operated pressure reducing regulator for low to high outlet pressure

Body Sizes, End Connection Styles and Pressure Ratings⁽¹⁾

See Table 1

Maximum Pressures⁽¹⁾

Inlet and Outlet (Design): 290 psig / 20 barg
Emergency (Design Casing): 290 psig / 20 barg
Operating Differential: 290 psid / 20 bar d

Outlet Pressure Ranges

See Table 2

Minimum Differential Pressure⁽¹⁾

TRIM, PERCENT OF CAPACITY	MINIMUM DIFFERENTIAL FOR FULL STROKE	
	2 in. / DN 50	3 and 4 in. / DN 80 and 100
100	2.9 psid / 0.204 bar d	2.9 psid / 0.204 bar d
80	2.9 psid / 0.204 bar d	3.1 psid / 0.214 bar d
50	3.0 psid / 0.207 bar d	3.2 psid / 0.221 bar d
30	3.4 psid / 0.234 bar d	3.5 psid / 0.241 bar d

Process Temperature Capabilities⁽¹⁾

Nitrile (NBR) Version:

-20 to 180°F / -29 to 82°C

Fluorocarbon (FKM) Version:

0 to 180°F / -18 to 82°C

Options

- Travel Indicator
- Integral Type OS2 Slam-shut Device

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

Table 1. Main Valve Body Sizes, End Connection Styles and Body Ratings

MAIN VALVE BODY SIZE	MAIN VALVE BODY MATERIAL	END CONNECTION STYLE	STRUCTURAL DESIGN RATING ⁽¹⁾
2, 3 and 4 in. / DN 50, 80 and 100	WCC Steel	NPT ⁽²⁾ or SWE ⁽²⁾	1500 psig / 103 barg
		CL150 RF	290 psig / 20.0 barg
		CL300 RF	750 psig / 51.7 barg
		CL600 RF or BWE	1500 psig / 103 barg
	Cast iron	NPT ⁽²⁾	400 psig / 27.6 barg
		CL125 FF	200 psig / 13.8 barg

1. Structural design rating is the rating for the main valve body. The Type EZL complete assembly is limited to 290 psig / 20 barg.

2. Available only on 2 in. / DN 50 body.

Table 2. Outlet Pressure Ranges

PILOT TYPE	OUTLET CONTROL PRESSURE RANGE		SPRING COLOR	SPRING PART NUMBER
	psig	barg		
6352	2 to 10	0.14 to 0.69	Black	14A9673X012
6353	3 to 40	0.21 to 2.8	Yellow	1E392527022
	35 to 125	2.4 to 8.6	Red	1K748527202
6354L ⁽¹⁾	85 to 200	5.9 to 13.8	Blue	1L346127412
6354M ⁽²⁾	175 to 220	12.1 to 15.2	Blue	1L346127412
6354H	200 to 285	13.8 to 19.7	Green	15A9258X012
61L	0.25 to 2	0.02 to 0.14	Red	1B886327022
	1 to 5	0.07 to 0.34	Yellow	1J857827022
	2 to 10	0.14 to 0.69	Blue	1B886427022
	5 to 15	0.34 to 1.0	Brown	1J857927142
	10 to 20	0.69 to 1.4	Green	1B886527022
61HP	15 to 45	1.0 to 3.1	Yellow	1E392527022
	35 to 100	2.4 to 6.9	Blue	1D387227022
	100 to 285	6.9 to 19.7	Red	1D465127142
161EBM	5 to 15	0.34 to 1.0	White	17B1260X012
	10 to 40	0.69 to 2.8	Yellow	17B1262X012
	30 to 75	2.1 to 5.2	Black	17B1259X012
	70 to 140	4.8 to 9.6	Green	17B1261X012
	130 to 200	9.0 to 13.8	Blue	17B1263X012
	200 to 350	13.8 to 24.1	Red	17B1264X012

1. Without diaphragm limiter.

2. With diaphragm limiter.

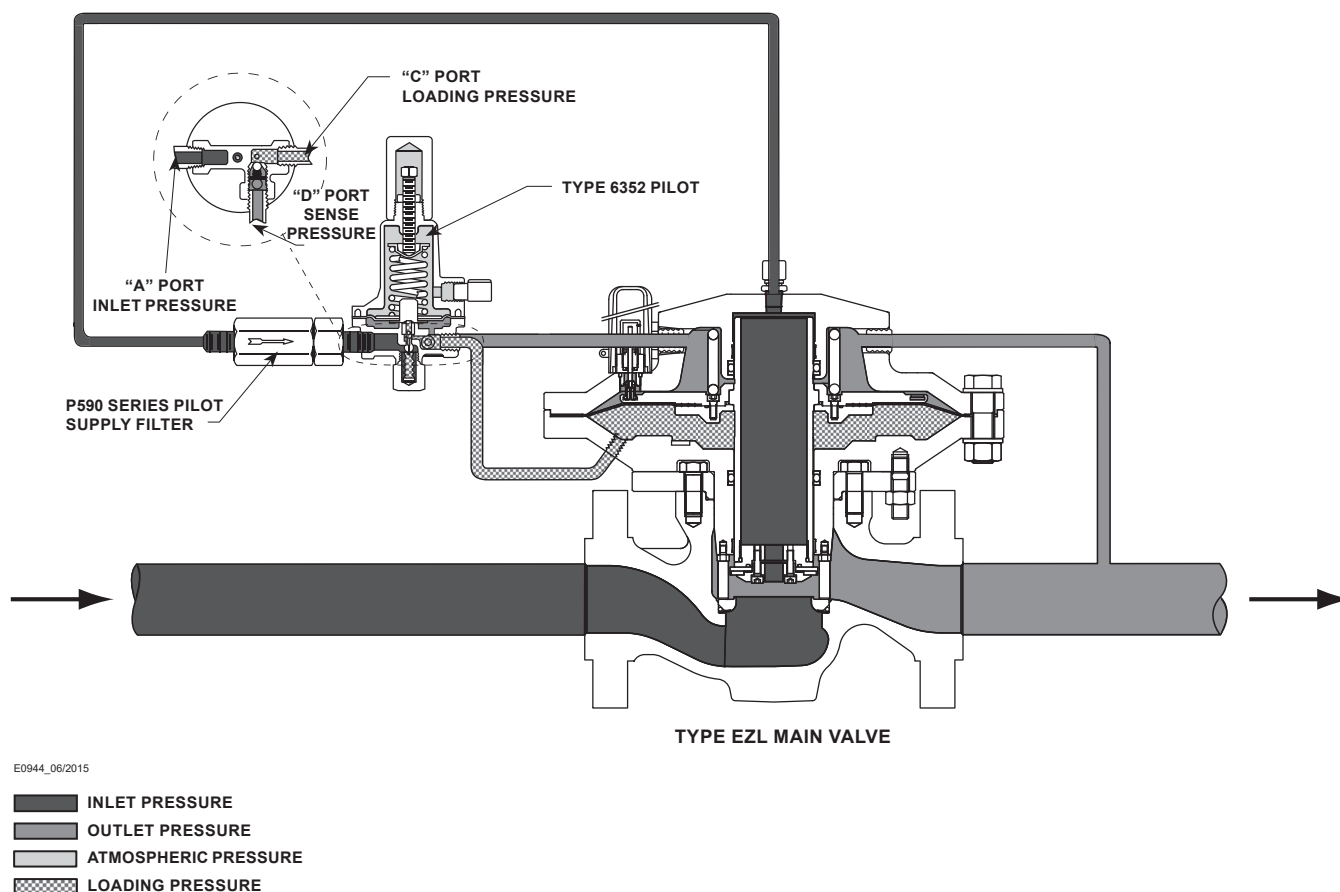


Figure 2. Type EZL with Type 6352 Pilot

Principle of Operation

Single-Pilot Regulator

The pilot-operated Type EZL (Figure 2 or 3) uses inlet pressure as the operating medium, which is reduced through pilot operation to load the actuator diaphragm. Outlet pressure opposes loading pressure in the actuator and also opposes the pilot control spring.

When outlet pressure drops below the setting of the pilot control spring, pilot control spring force on the pilot diaphragm thus opens the pilot valve plug, providing additional loading pressure to the actuator diaphragm. This diaphragm loading pressure opens the main valve plug, supplying the required flow to the downstream system. Any excess loading pressure on the actuator diaphragm escapes downstream through the bleed restriction in the pilot.

When the gas demand in the downstream system has been satisfied, the outlet pressure increases. The increased pressure is transmitted through the downstream control line and acts on the pilot

diaphragm. This pressure exceeds the pilot spring setting and moves the diaphragm, closing the orifice. The loading pressure acting on the main diaphragm bleeds to the downstream system through a bleed restriction in the pilot.

Monitoring Systems

Monitoring regulation is overpressure protection by containment, therefore, there is no relief valve to vent to the atmosphere. When the working regulator fails to control the pressure, a monitor regulator installed in series, sensing the downstream pressure, goes into operation to maintain the downstream pressure at a slightly higher than normal pressure. During an overpressure situation, monitoring keeps the customer on line. Also, testing is relatively easy and safe. To perform a periodic test on a monitoring regulator, increase the outlet set pressure of the working regulator and watch the outlet pressure to determine if the monitoring regulator takes over at the appropriate outlet pressure.

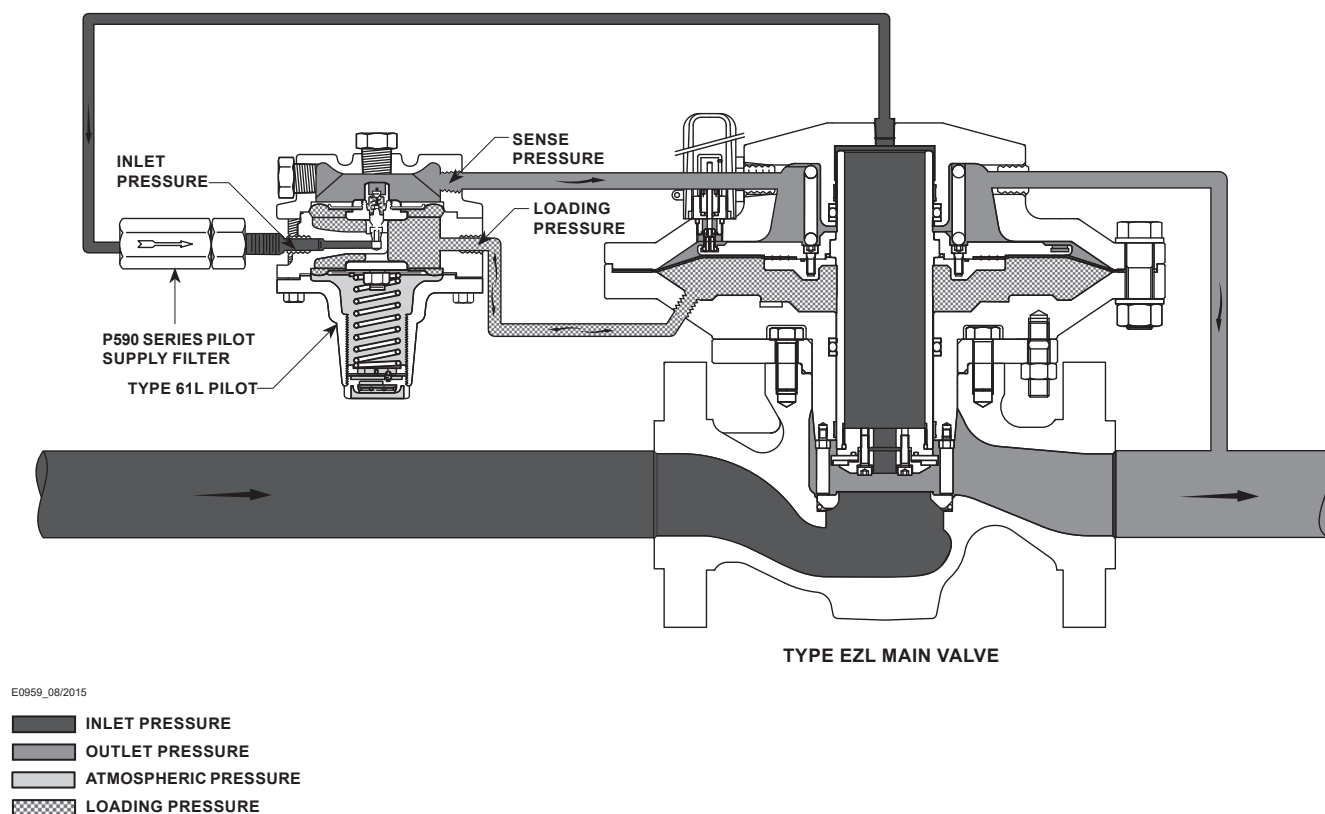


Figure 3. Type EZL with Type 61L Pilot

Wide-Open Monitoring Systems (Figure 4)

There are two types of wide-open monitoring systems: upstream and downstream. The difference between upstream and downstream monitoring is that the functions of the regulators are reversed. Systems can be changed from upstream to downstream monitoring and vice-versa, by simply reversing the setpoints of the two regulators. The decision to use either an upstream or downstream monitoring system is largely a matter of personal preference or company policy.

In normal operation of a wide-open configuration, the working regulator controls the system's outlet pressure. With a higher outlet pressure setting, the monitor regulator senses a pressure lower than its setpoint and tries to increase outlet pressure by going wide-open. If the working regulator fails, the monitoring regulator assumes control and holds the outlet pressure at its outlet pressure setting.

When using a 6350 Series Pilot on the monitoring regulator, it should be equipped with a pilot supply regulator set to 5 psig / 0.34 barg plus the monitor minimum differential pressure above the working

regulator pressure setting. Since the pilot on the monitoring regulator is wide-open during normal operation, the pilot supply regulator prevents differential check valve chatter on the monitoring regulator pilot.

Working Monitoring Regulators (Figure 5)

In a working monitoring system, the upstream regulator requires two pilots and it is always the monitoring regulator. The additional pilot permits the monitoring regulator to act as a series regulator to control an intermediate pressure during normal operation. In this way, both units are always operating and can be easily checked for proper operation.

In normal operation, the working regulator controls the outlet pressure of the system. The monitoring regulator's working pilot controls the intermediate pressure and the monitoring pilot senses the system's outlet pressure. If the working regulator fails, the monitoring pilot will sense the increase in outlet pressure and take control.

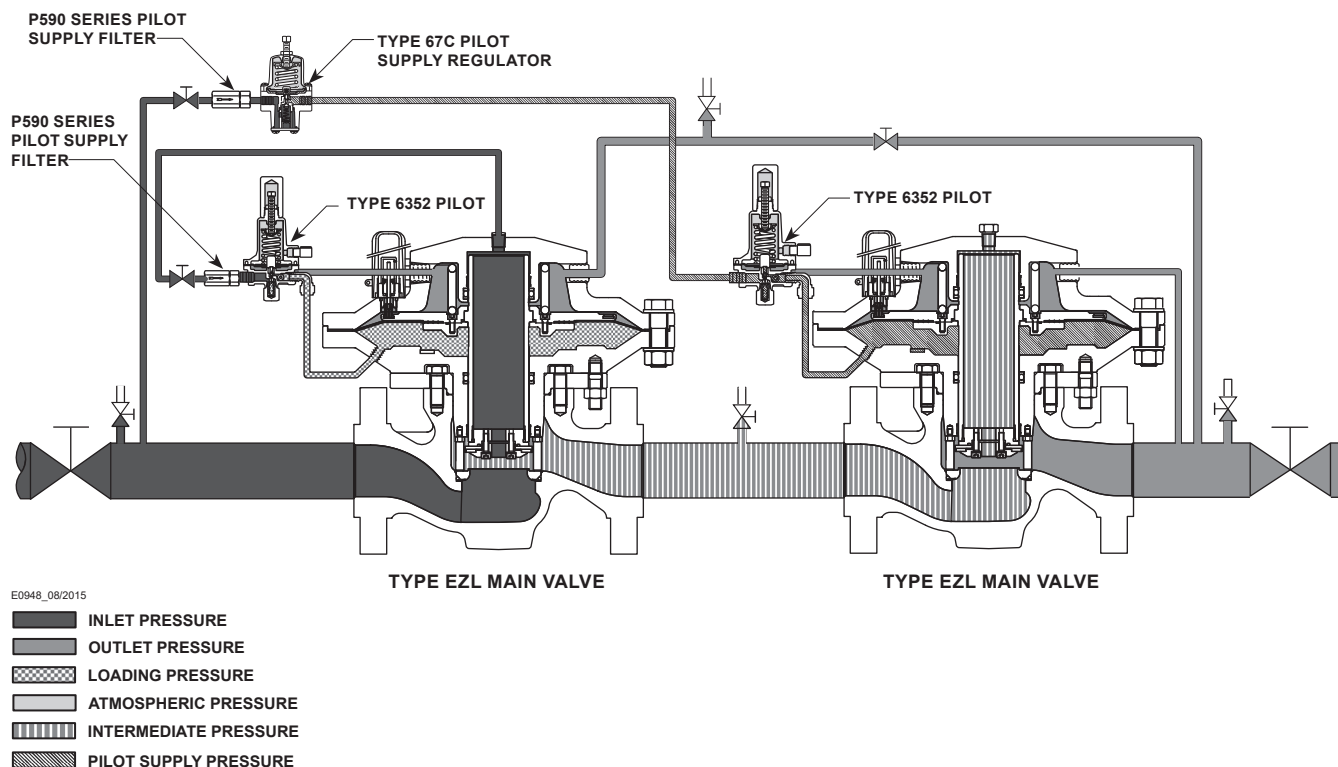


Figure 4. Downstream Wide-Open Monitor System

Note

The working regulator must be rated for the maximum allowable operating pressure of the system because this will be its inlet pressure if the monitoring regulator fails. Also, the outlet pressure rating of the monitoring pilot and any other components that are exposed to the intermediate pressure must be rated for full inlet pressure.

Working monitor installations require a Type EZL main valve with a working pilot and a monitoring pilot for the upstream regulator and a Type EZL with the appropriate pilot for the downstream regulator.

Installation



WARNING

Personal injury or equipment damage, due to bursting of pressure-containing parts may result if this regulator is overpressured or is installed where

service conditions could exceed the limits given in the Specification section and on the appropriate nameplate or where conditions exceed any rating of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices to prevent service conditions from exceeding those limits. Also, be sure the installation is in compliance with all applicable codes and regulations.

Additionally, physical damage to the regulator could break the pilot off the main valve, causing personal injury and property damage due to bursting of pressure-containing parts. To avoid such injury and damage, install the regulator in a safe location.

All Installations

A Type EZL regulator bleeds no gas to atmosphere during normal operation, making it suitable for installation in pits and other enclosed locations without

Type EZL

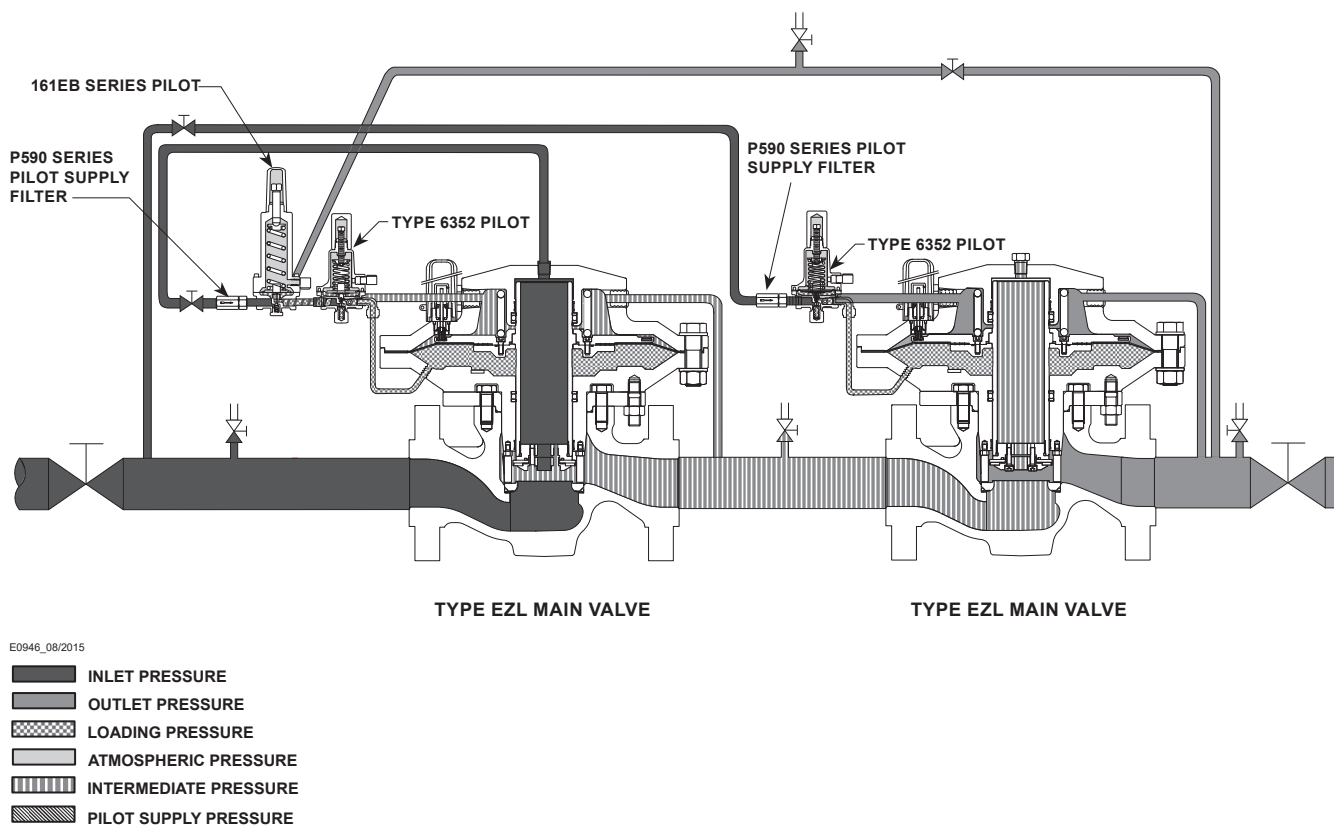


Figure 5. Working Monitoring System Operational Schematic

elaborate venting systems. This regulator also can be installed in pits subject to flooding by venting the pilot spring case above the expected flood level so that the pilot diaphragm is exposed to atmospheric pressure.

1. Only personnel qualified through training and experience should install, operate and maintain a regulator. Before installation, make sure that there is no damage to or debris in the regulator. Also, make sure that all tubing and piping are clean and unobstructed.
2. Install the regulator so that the flow arrow on the main valve matches the flow direction of process fluid through the regulator. The EZL Series may be installed in any position, but it is normally installed in a horizontal pipeline with the pilot or pilots above the body.
3. Apply pipe compound to the external pipeline threads before installing a regulator with threaded end connections. Use gaskets between pipeline and regulator flanges when installing a regulator

with flanged end connections. When installing buttweld end connections, remove trim before welding and make sure to use approved welding practices. Use approved piping procedures when installing the regulator.



WARNING

A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate, causing personal injury, death or property damage due to bursting of pressure-retaining parts. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous location. The vent line or stack opening must be protected against condensation or clogging.

- Pilots have a 1/4 NPT vent connection in the spring case. To remotely vent gas from the spring case, remove the screened vent and connect 1/4 in. / 6.4 mm piping or tubing to the spring case connection. The piping or tubing should vent to a safe location, have as few elbows as possible and have a screened vent on its exhaust. Install the regulator and any remote vent piping or tubing so that the vent is protected from condensation, freezing or substances that may clog it.



CAUTION

To avoid freeze up because of pressure drop and moisture in the gas, use anti-freeze practices, such as heating the supply gas or adding a de-icing agent to the supply gas.

- Run a 3/8 in. / 9.5 mm outer diameter or larger pilot supply line from the upstream pipeline to the filter inlet as shown in Figure 3, bushing the line down to fit the 1/4 NPT filter connection. Do not make the upstream pipeline connection in a turbulent area, such as near a nipple, swage or elbow. If the maximum pilot inlet pressure could exceed the pilot rating, install a separate reducing regulator in the pilot supply line. Install a hand valve in the pilot supply line and provide vent valves to properly isolate and relieve the pressure from the regulator.
- Attach a 1/2 in. / 13 mm piping or tubing downstream control line to the 1/2 NPT control line connection on the actuator casings. Connect the other end of the control line to the pipeline downstream of the regulator. Do not attach the control line near any elbow, swage, block valve or any other location that might cause turbulence. Install a full port ball valve in the control line to shutoff the control pressure when using the bypass.
- If a quick acting solenoid is to be installed downstream of a regulator, the regulator and solenoid should be located as far apart as practical. This will maximize the gas piping volume between the regulator and solenoid and improve the regulator response to quick changing flow rates.
- Consult the appropriate instruction manual for installation of an optional pneumatic or electric remote control drive unit. For optional remote

pneumatic loading of a 6350 or 61 Series pilot, make the loading piping connections to the 1/4 NPT vent connection.

Wide-Open Monitor Regulator (Figure 4)

- Follow the procedures in the All Installations section and then continue with step 2 of this section.
- Connect the control line of the wide-open monitoring regulator to the downstream piping near the working regulator control line connection. During normal operation, the wide-open regulator stands wide-open with the pressure reduction being taken across the working regulator. Only in case of working regulator failure does the wide-open monitoring regulator take control at its slightly higher setting.

Regardless of which regulator is used as the monitor, it should be equipped with a pilot supply regulator set to limit the pilot supply pressure to 10 to 15 psig / 0.69 to 1.0 barg above control pressure. Since the pilot on the monitoring regulator is wide-open during normal operation, the pilot supply regulator is used to prevent differential pressure relief valve chatter on the monitoring regulator pilot.

Working Monitor Regulator (Figure 5)

- Follow the procedure in the All Installations section and then continue with step 2 of this section.
- Attach 3/8 in. / 9.5 mm tubing (for Type 161EBM) downstream control line to the control line (sense) connection on the pilot. Connect the other end of the control line to the pipeline downstream of the downstream working regulator. Do not attach the control line near any elbow, swage, block valve or any other location that might cause turbulence.
- Apply pilot sense pressure by connecting the outlet of the monitor pilot to the inlet of the working monitor pilot.

Startup and Adjustment

Pre-startup Considerations

Each regulator is factory-set for the outlet pressure specified on the order. If no setting was specified, outlet pressure was factory-set at the mid-range of the pilot control spring. Before beginning the startup procedure in this section, make sure the following conditions are in effect:

Type EZL

- Block valves isolate the regulator
- Vent valves are closed
- A bypass, if any, is in operation

In all cases, check the control spring setting to make sure it is correct for the application.



CAUTION

Be sure to slowly introduce pressure into the system to prevent downstream overpressure due to potential rapid pressure increase. Pressure gauges should always be used to monitor downstream pressure during startup. Procedures used in putting this regulator into operation must be planned accordingly if the downstream system is pressurized by another regulator or by a manual bypass.

Startup

1. Make sure all block valves, vent valves and control line valve(s) are closed.
2. Back out the pilot adjusting screw(s).
3. **Slowly open** the valves in the following order:
 - a. Pilot supply and control line valve(s), if used.
 - b. Inlet block valves.
4. Crack open the outlet block valve or bypass valve to allow minimum flow.
5. **For a single regulator**, set the pilot to the desired outlet (control) pressure according to the Pilot Adjustment procedure.

For a wide-open downstream monitor installation, adjust the upstream working pilot until intermediate pressure is higher than the desired setpoint of the monitor pilot. Adjust the downstream monitoring pilot to the desired monitoring takeover pressure. Reduce the upstream pilot to the normal outlet pressure setting.

For a wide-open upstream monitor installation, adjust the downstream working pilot to a setpoint higher than the setpoint of the monitor pilot. Adjust the upstream monitoring pilot to the desired monitoring takeover pressure. Reduce the downstream pilot to the normal outlet pressure setting.

For a working monitor installation, back out the adjusting screw of the downstream pilot. Adjust the upstream working pilot to the desired intermediate pressure setting. Back out the adjusting screw of the upstream monitor pilot (Type PRX/125). Drive in the adjusting screw of the downstream pilot. Adjust

the upstream monitor pilot to the desired setpoint. Establish final desired downstream pressure by adjusting the downstream pilot.

6. After adjusting the pilot(s) to the desired pressure setting(s), slowly open the downstream block valve wide-open.
7. Close the bypass valve, if used.

Pilot Adjustment

The adjustment of the regulators is performed by means of the pilot adjustment screw, which varies the compression of the control spring. Adjustment is performed while the regulator is in operation with the aid of a pressure gauge to monitor downstream pressure. The shutoff valve downstream of the regulator must not be completely closed, as it is necessary that a small quantity of gas flows downstream to allow the outlet side to vent, when it is necessary to lower the pressure.

Remove closing cap, if necessary. Loosen the locknut. Turn the adjusting screw into the spring case (clockwise) to increase the downstream pressure. Turn the adjusting screw out of the spring case (counterclockwise) to decrease the downstream pressure. When the desired setpoint adjustment is completed and verified, tighten the locknut to lock the adjusting screw in position. Replace the pilot closing cap, if necessary.

Adjusting the monitor regulator (Figure 4) is the same as adjusting the main regulator. Monitor setpoints are set slightly higher than the main regulator. The monitor pressure setting should be adjusted so it is at minimum two times the pilot accuracy band pressure above the working regulator pressure setting.

Shutdown



CAUTION

If the pilot bleed control line pressure is shutdown first, the downstream system may be subjected to full inlet pressure.

1. If the pilot setting must be disturbed, be sure to keep some tension on the spring. This will prevent trapping inlet pressure during blow down.
2. Slowly close the valves in the following order:
 - a. Inlet block valve
 - b. Outlet block valve
 - c. Control line valve(s), if used.
3. Open the vent valves to depressurize the system.

Maintenance

The regulator parts are subject to normal wear and must be inspected periodically and replaced as necessary. The frequency of inspection and replacement depends on the severity of service conditions and on applicable federal, state and local codes and regulations.



WARNING

To avoid personal injury or property damage from sudden release of pressure, isolate the regulator from the pressure system and release all pressure from the pilot and main valve before performing maintenance operations.



CAUTION

When disassembling the upper and lower actuator, always remove the long cap screws (key 39) last to allow spring tension force to be released in a slow and controlled manner.

Use proper lifting techniques, when lifting the upper and lower actuator casings (keys 11 and 5) off the Type EZL body (key 1). The 2 in. / DN 50 actuator assembly weighs more than 40 lbs / 18 kg.

Type EZL (Figure 7)

Seat Maintenance

1. Make a mark on the lower actuator casing (key 5), intermediate flange (key 25) and body (key 1) to indicate proper alignment.
2. Remove stud nuts (key 26).



CAUTION

Use proper care in moving actuator to ensure no damage occurs to the pins or actuator casings.

3. Carefully lift the actuator assembly (keys 11 and 5) off the body (key 1).
4. Remove O-ring (key 34) from lower actuator casing (key 5). Inspect the O-ring for damage or wear and replace if necessary. Lightly lubricate O-ring before placing on lower actuator casing (key 5).

5. Remove the hex socket cap screws (key 33) and spring lock washers (key 32). Lift off the disk holder assembly (key 30) and disk retainer (key 31).
6. Remove the O-ring (key 29). Inspect for damage or wear and replace if necessary. Lightly lubricate O-ring before placing in the sleeve adaptor (key 27).
- 7a. On the 2 and 3 in. / DN 50 and 80 sizes remove the seat ring (key 2), spring washer (key 72) and O-ring (key 34) (see Figure 7, Detail A.2). Inspect the O-ring for damage or wear, replace if necessary.
- 7b. On the 4 in. / DN 100 size, the seat ring (key 2) can be moved out of the way and the O-ring (key 75) can be removed without removing the intermediate flange (key 25). For easy access to the O-ring (key 75), the intermediate flange (key 25) can be removed by following steps 4 through 6 in the Intermediate Flange O-ring Maintenance section. Inspect the O-ring (key 75) for damage or wear, replace if necessary.
- 8a. For the 2 and 3 in. / DN 50 and 80 sizes reinstall the spring washer (key 72) with the inside edge pointing up. Lightly lubricate O-ring (key 34) before placing on top of the spring washer (key 72) in the body (key 1).
- 8b. For the 4 in. / DN 100 size lightly lubricate the O-ring (key 75) and place it in the body (key 1).
9. Set the seat ring (key 2) back in the body (key 1) with the curved side down and the seat edge up.
10. Place the disk holder assembly (key 30) and disk retainer (key 31) on the sleeve adaptor (key 27).
11. Insert the spring lock washers (key 32) and hex socket cap screws (key 33) and tighten. See Table 3 for proper torque.
12. Lubricate surface between lower casing and intermediate flange. Carefully lift the upper actuator casing and lower actuator casing assembly (keys 11 and 5) and place on the body (key 1). Secure with stud nuts (key 26). See Table 3 for proper torque.

Intermediate Flange O-ring Maintenance

1. Make a mark on the lower actuator casing (key 5), intermediate flange (key 25) and body (key 1) to indicate proper alignment.
2. Remove stud nuts (key 26).
3. Carefully lift the upper actuator casing and lower actuator casing assembly (keys 11 and 5) off the body (key 1).
4. Remove cap screws (key 6).

Table 3. Torque Specifications

TORQUE SPECIFICATIONS, FT-LBS / N·m						
Body Size	Indicator Fitting (key 56) or Plug (key 38)	Stud Nuts (key 26)	Socket Head Cap Screws (key 16) ⁽¹⁾⁽²⁾	Cap Screws (keys 21 and 39)	Cap Screws (key 6)	Socket Head Cap Screws (key 33) ⁽¹⁾
2 in. / DN 50	10 to 15 / 15 to 20	45 to 50 / 60 to 70	55 to 60 / 6.21 to 6.78	40 to 50 / 54 to 68	50 to 60 / 70 to 80	60 to 70 / 6.78 to 7.91
3 and 4 in. / DN 80 and 100	10 to 15 / 15 to 20	80 to 95 / 110 to 130	90 to 100 / 10.2 to 11.3	40 to 50 / 54 to 68	70 to 95 / 90 to 110	80 to 90 / 9.04 to 10.2

1. Socket head cap screw (keys 16 and 33) torque specifications are given in in-lbs.
2. Apply torque to each screw in star pattern, 5 complete rounds.

- Lift off intermediate flange (key 25).
- Remove O-ring (key 7). Inspect the O-ring for damage or wear and replace if necessary. Lightly lubricate O-ring before placing in the body (key 1).
- Replace the intermediate flange (key 25), make sure to position the stud bolt (key 24) holes on the outsides of the body (key 1). Secure with cap screws (key 6). See Table 3 for proper torque.
- Lubricate the surface between the lower casing and the intermediate flange. Reinstall actuator assembly to body.

Actuator Assembly Maintenance

- Make a mark on the upper actuator casing (key 11), lower actuator casing (key 5), intermediate flange (key 25) and body (key 1) to indicate proper alignment.
- Remove travel indicator assembly, if present, by loosening the travel indicator fitting (key 56) and lifting out the indicator assembly. Refer to Travel Indicator Maintenance section for maintenance procedure.
- Remove cap screws (key 21), washers (key 22) and hex nuts (key 23). Remove all the short cap screws first, then evenly remove the two long cap screws (key 39) and brackets (key 35). Take care to balance the upper actuator casing while removing the spring tension. Carefully lift the upper actuator casing (key 11) off the lower actuator casing (key 5). Remove spring (key 13).
- Remove the hex socket cap screws (key 16). Lift off the diaphragm (key 20) and the inlet plate (key 18). Remove O-rings (keys 15 and 17). Inspect the diaphragm and O-rings for damage or wear and replace if necessary.
- Inspect the upper actuator casing (key 11), O-ring (key 9), anti-friction split rings (key 8) and anti-friction ring (key 4) for damage or wear. If damaged, remove the O-ring and split rings and

replace with new parts. Lightly lubricate the O-ring and split rings. Place the split rings in the body first, then slide the O-ring between the split rings.

- Remove hex nuts (key 26) from the stud bolts (key 24). Lift off the lower actuator casing (key 5). Remove the hex socket cap screws (key 33) and spring lock washers (key 32). Lift off the disk holder assembly (key 30) and disk retainer (key 31).
- Slide the sleeve (key 14) out of the lower actuator casing (key 5) and slide the outlet plate (key 19) off of the sleeve. Check the sleeve for scratches, burrs or other damage and replace if necessary.
- Inspect the lower actuator casing (key 5), O-ring (key 9), anti-friction split rings (key 8) and anti-friction ring (key 4) for damage or wear. If damaged, remove the O-ring and split rings and replace with new parts. Lightly lubricate the O-ring and split rings. Place the split rings in the body first, then slide the O-ring between the split rings.
- Slide the outlet plate (key 19) onto the sleeve (key 14) and slide the sleeve into the lower actuator casing (key 5). Place the disk holder (key 30) and disk retainer (key 31) on the sleeve adaptor (key 27). Insert the spring lock washers (key 32) and hex socket cap screws (key 33) and tighten. See Table 3 for proper torque. If seat was removed, make sure to reinstall.
- Lightly lubricate the O-rings (keys 15 and 17) and the inner and outer diaphragm (key 20) edges. Make sure O-rings (keys 15 and 17) are correctly positioned. Place the inlet plate (key 18) and the diaphragm (key 20) on the sleeve (key 14). Insert and tighten the hex socket cap screws (key 16). See Table 3 for proper torque.
- Lubricate surface between lower casing and intermediate flange. Carefully lift the lower actuator casing assembly (key 5) and place on the body (key 1). Take care to match up the alignment marks. Secure with stud bolts and nuts (keys 24 and 26). See Table 3 for proper torque.

12. Lightly lubricate the spring (key 13) and place on the inlet plate (key 18).
13. Carefully place the upper actuator casing (key 11) on the lower actuator casing (key 5). Take care to match up the alignment marks. Insert the two long cap screws (key 39) and brackets (key 35) 180° apart and away from flanges. Place the washers (key 22) and hex nuts (key 23) on the long cap screws and evenly tighten. Using proper bolting techniques, install remaining small cap screws (key 21), washers and hex nuts. See Table 3 for proper torque.
14. Place travel indicator assembly in the upper actuator casing (key 11), if present and tighten the travel indicator fitting (key 56).

Type EZL Travel Indicator Maintenance

A new and improved version of the travel indicator has been phased in during 2013. The new version improves the O-ring seal to minimize leakage and extend service life. The components of the legacy and new versions are not interchangeable. If maintenance is performed on the travel indicator, it is recommended to replace the entire travel indicator assembly with the new version. Part numbers for the assemblies are shown in the parts list. Figure 6 shows the difference between the designs. The spare parts kits will support either design. Take care to use the correct O-ring (key 12A or 12B) when performing maintenance, see parts list for the appropriate part number.

1. Remove plastic travel indicator cover (key 53).
2. Loosen travel indicator bushing (key 55) and remove it by sliding it over the travel indicator stem (key 54).
3. Remove indicator fitting (key 56) and inspect O-ring (key 70). Remove O-ring (key 12B) and back-up rings (key 76). Replace and lubricate O-ring if damaged. Pull up on the travel indicator stem (key 54) to force the spring collet (key 57) out of the diaphragm head groove. Examine these parts and the stem for wear and replace if necessary.
4. Insert the travel indicator stem (key 54) and spring collet (key 57) back into the diaphragm head groove. Replace the indicator fitting (key 56) and O-ring (key 70) and tighten with a referenced torque of 20 ft-lbs / 27.1 N•m.

5. Lubricate the O-ring (key 12B) and backup rings (key 76, 2 required). Place one back-up ring on the stem (key 54) followed by the O-ring and then the other back-up ring. Push into groove of the indicator fitting (key 56).

Slide the travel indicator bushing (key 55) over the travel indicator stem (key 54) and tighten firmly in place with a torque of 3.7 ft-lbs / 5.0 N•m.

6. Replace the travel indicator cover (key 53) and tighten firmly in place.

Pilot Maintenance

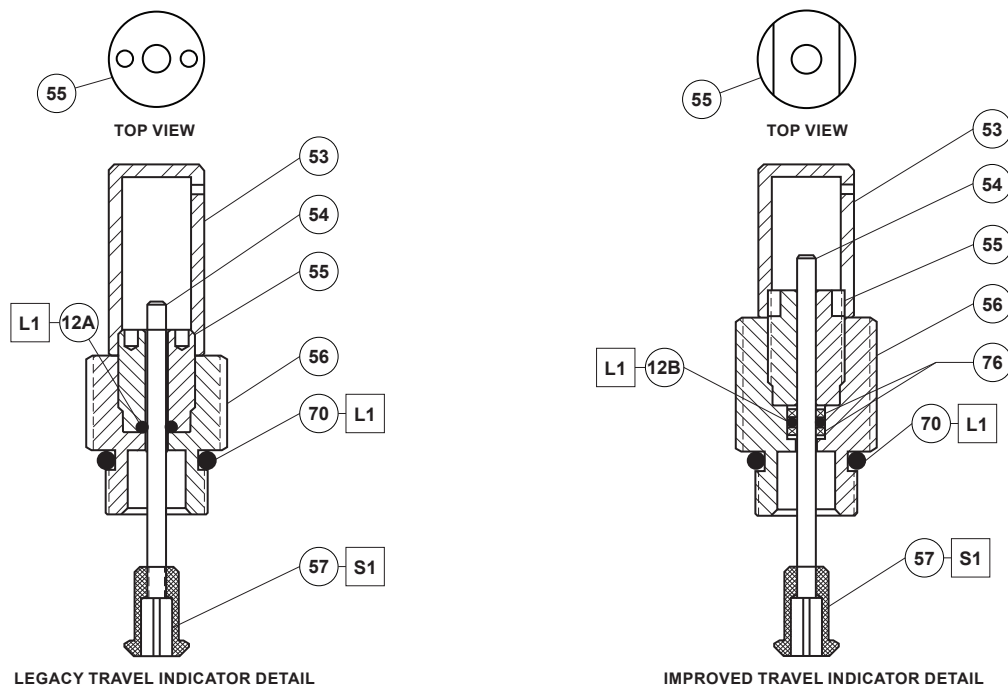
Types 6352 through 6354M Pilots

Perform this procedure if changing the control spring for one of a different range or if inspecting, cleaning or replacing any other pilot parts. Pilot part key numbers are referenced in Figure 8.

Note

The body (key 1) may remain on the pipe nipple (key 21, Figure 8 or key 24, Figure 9) unless the entire pilot is replaced.

1. To gain access to the diaphragm assembly (key 5), diaphragm limiter (key 23) if used, control spring (key 6), restriction (key 22), stem guide (key 8) or spring seat (key 7), remove the closing cap (key 11), loosen the locknut (key 10) and turn the adjusting screw (key 9) counter clockwise until compression is removed from the spring. Remove the machine screws (key 14) and separate the body from the spring case (key 2).
2. Inspect the removed parts and replace as necessary. Make sure the restriction and the registration hole in the body are free from debris. After assembly, make sure of the proper control spring setting according to the Startup section and re-mark the spring case if necessary.
3. To replace the valve plug (key 4) or bellows O-ring (key 17), remove the body plug (key 3) and body plug gasket (key 12). Be careful to keep the bellows assembly (key 16) from falling out and possibly getting lost while removing the valve plug. Inspect the removed parts and replace as necessary. Make sure the valve plug seating surfaces are free from debris.



P1765

□ APPLY LUBRICANT (L) OR SEALANT (S)⁽¹⁾
 L1 = LITHIUM HYDROXYSTEGRATE NLGI 2 GRADE GREASE
 S1 = ANAEROBIC METHACRYLATE SEALANT FOR NUTS AND BOLTS

1. Lubricant and sealant must be selected such that they meet the temperature requirements.

Figure 6. Travel Indicator Assembly Drawings

61 Series Pilot

Perform this procedure if changing the control spring for one of a different range or if inspecting, cleaning or replacing relief valve or any other pilot parts. Pilot part key numbers are referenced in Figure 9.

1. Remove the pilot from the pipe nipple (key 24) unless just the control spring is to be changed.
2. To gain access to the control spring or other internal parts, remove the closing cap assembly (key 5) and relieve control spring (key 7) compression by turning the adjusting screw (key 6) counter clockwise. Change the control spring and install the adjusting screw and closing cap assembly if no other maintenance will be performed. Make sure of the proper control spring setting according to the Installation and Startup section and restamp the nameplate if necessary.
3. For any other internal maintenance, relieve control spring compression according to step 2. Then remove the cap screws (key 20) and separate the pilot into three sections; spring case (key 1), body (key 2) and bottom cover (key 3).
4. To inspect the two diaphragms (keys 14 and 15) thoroughly, remove the diaphragm nut (key 11), hex nut (key 19) and the upper and lower relay heads (keys 16 and 17). The projecting prong in the body may be used as the restraining member to keep the yoke from turning while removing the nuts. Also inspect the O-ring (key 12) and replace any parts as necessary.
5. Take the yoke (key 4) and attached parts out of the body to examine the disk holder assembly (key 9). Remove the relay orifice (key 8) to check for clogging and replace if necessary.
6. To replace the disk holder assembly, first unscrew the bleed orifice (key 10). Remove it and the associated parts. Then unscrew the disk holder assembly from the bleed valve (key 26) to gain access to the relay spring (key 13). Clean or replace any parts as necessary before reassembling.
7. Upon reassembly, pay particular attention to the following assembly suggestions.
 - a. Before replacing the diaphragm case or spring case, be sure the yoke assembly is positioned so that it will not bind or rub on the prong in the relay body.

- b. Avoid wrinkling the diaphragms when replacing the diaphragm case and spring case.
 - c. Replace the diaphragm case, carefully working the upper relay diaphragm (key 14) into the recess in the diaphragm case. If the diaphragm case rocks with respect to the pilot body, diaphragm is probably wrinkled.
 - d. Replace the spring case, using care to smooth the lower relay diaphragm (key 15) evenly into the recess in the pilot body.
 - e. Install the eight cap screws, tightening them down evenly in a crisscross pattern to avoid crushing the diaphragm. Recommended final torque on these cap screws is 10 to 12 ft-lbs / 14 to 16 N•m.
8. After assembly, make sure of the proper control spring setting according to the Installation and Startup section and restamp the nameplate (key 27) if needed.

Type 161EBM Pilot

Key numbers are referenced in Figure 10 unless otherwise noted.

Trim Parts

1. As shown in Figure 10, remove the body plug (key 3). Use needle nose pliers to remove the plug spring (key 6) and plug/stem assembly (key 4).
2. Inspect the removed parts and body plug O-ring (key 15), replace as necessary and make sure the plug seating surfaces are free from debris.
3. Sparingly apply lubricant to the body plug O-ring (key 15) and the threads of the body plug (key 3). Install the body plug O-ring over the body plug.
4. As shown in Figure 10, stack the plug spring (key 6) and plug/stem assembly (key 4) on the body plug (key 3). Install the body plug with stacked parts into the body (key 1).

Diaphragm Parts

1. Remove the closing cap (key 16), loosen the locknut (key 12) and back out the adjusting screw (key 11) until compression is removed from the control spring (key 9).
2. Remove the machine screws (key 13) and separate the spring case (key 2) from the body assembly (key 1). Remove the control spring seat (key 8), the control spring (key 9) and, if used, the diaphragm limiter (key 10).

3. Remove the diaphragm assembly (key 7) and inspect the diaphragm.
4. To gain access to the stem guide seal O-ring, remove and inspect the stem guide seal assembly (key 19) and if damaged replace the complete assembly. Inspect the outer O-ring (key 22), replace if necessary.
5. Install the diaphragm assembly (key 7) and push down on it to see if the plug/stem assembly (key 4) strokes smoothly and approximately 1/16 in. / 1.6 mm.

Note

In step 6, if installing a control spring with a different range, be sure to replace the spring range indicated on the spring case with the new spring range. A diaphragm limiter (key 10) and other listed parts are required with the highest spring range.

6. As shown in Figure 10, stack the control spring (key 9), the control spring seat (key 8) and, if used, the diaphragm limiter (key 10) onto the diaphragm assembly (key 7). Make sure that, if used, the diaphragm limiter is installed bevelled side up. Sparingly apply lubricant to the control spring seat.
7. Install the spring case (key 2) on the body (key 1) with the vent (key 18) oriented to allow for wrenches, needed for connecting outlet piping and to prevent clogging or entrance of moisture. Install the machine screws (key 13) and, using a crisscross pattern, torque them to 5 to 7 ft-lbs / 6.8 to 9.5 N•m for Stainless steel constructions and 2 to 3 ft-lbs / 2.7 to 4.1 N•m for aluminum constructions.

Note

Spring case vent may be mounted in any orientation convenient to your application, but plastic vent (key 18) should be oriented downward.

8. When all maintenance is complete, refer to the Startup and Adjustment section to put the regulator back into operation and adjust the pressure setting. Tighten the locknut (key 12), replace the closing cap gasket (key 17) if necessary and install the closing cap (key 16).

Type EZL

Parts Ordering

Each Type EZL regulator is assigned a serial number, which can be found on the nameplate. Refer to the number when contacting your local Sales Office for technical information or ordering parts. Also be sure to include the complete 11-character part number from the following Parts List.

Parts List

Type EZL Main Valve (Figure 7)

Key	Description	Part Number
	Disk Parts Kits	
	2 and 3 in. / DN 50 and 80 (includes key numbers: 29, 30 and 34)	
	4 in. / DN 100 (includes key numbers: 7, 29, 30, 34 and 75)	
	2 in. / DN 50, Nitrile (NBR) and Fluorocarbon (FKM)	REZL2X00N12
	2 in. / DN 50, FKM	REZL2X00F12
	3 in. / DN 80, Nitrile (NBR) and FKM	REZL3X00N12
	3 in. / DN 80, FKM	REZL3X00F12
	4 in. / DN 100, Nitrile (NBR) and FKM	REZL4X00N12
	4 in. / DN 100, FKM	REZL4X00F12
	Full Repair Kits	
	2 and 3 in. / DN 50 and 80 (includes key numbers: 4, 7, 8, 9, 12B, 15, 17, 20, 28, 29, 30, 34, 70 and 76)	
	4 in. / DN 100 (includes key numbers: 4, 7, 8, 9, 12B, 15, 17, 20, 28, 29, 30, 34, 70, 75 and 76)	
	2 in. / DN 50, Nitrile (NBR) and FKM	REZL2X00N22
	2 in. / DN 50, FKM	REZL2X00F22
	3 in. / DN 80, Nitrile (NBR) and FKM	REZL3X00N22
	3 in. / DN 80, FKM	REZL3X00F22
	4 in. / DN 100, Nitrile (NBR) and FKM	REZL4X00N22
	4 in. / DN 100, FKM	REZL4X00F22
	Travel Indicator Parts Kits	
	2 in. / DN 50 (includes key numbers: 12B, 53, 54, 55, 56, 57, 58, 70 and 76)	ERSA01550A0
	3 and 4 in. / DN 80 and 100 (includes key numbers: 12B, 53, 54, 55, 56, 57, 58, 70 and 76)	ERSA01555A0
1	Body	
	2 in. / DN 50	
	Cast Iron	
	NPT	GE10583X012
	CL125 FF	GE10585X012
	Steel	
	NPT	GE10588X012
	CL150 RF	
	Standard	GE10676X012
	Tapped inlet and outlet	14B5834X032
	CL300 RF	
	Standard	GE10678X012
	Tapped inlet and outlet	14B5834X042
	CL600 RF	
	Standard	GE10679X012
	Tapped inlet and outlet	14B5834X052
	BWE, Schedule 40	GE10680X012
	SWE	GE10682X012

Key	Description	Part Number
1	Body (continued)	
	3 in. / DN 80	
	Cast Iron	
	CL125 FF	GE10689X012
	Steel	
	CL150 RF	
	Standard	GE10699X012
	Tapped inlet and outlet	14B5835X032
	CL300 RF	
	Standard	GE10700X012
	Tapped inlet and outlet	14B5835X042
	CL600 RF	
	Standard	GE10701X012
	Tapped inlet and outlet	14B5835X052
	BWE, Schedule 40	GE10702X012
	4 in. / DN 100	
	Cast iron	
	CL125 FF	GE10707X012
	Steel	
	CL150 RF	
	Standard	GE10835X012
	Tapped inlet and outlet	14B5836X032
	CL300 RF	
	Standard	GE10839X012
	Tapped inlet and outlet	14B5836X042
	CL600 RF	
	Standard	GE10842X012
	Tapped inlet and outlet	14B5836X052
	BWE, Schedule 40	GE10843X012
2	Seat Ring	
	2 in. / DN 50	GE10271X012
	3 in. / DN 80	GE11213X012
	4 in. / DN 100	GE17779X012
3*	Pin	
	2 in. / DN 50 (6 required)	M0295820X12
	3 and 4 in. / DN 80 and 100 (8 required)	M0297310X12
4*	Anti-Friction Ring (2 required)	
	2 in. / DN 50	M0272760X12
	3 and 4 in. / DN 80 and 100	M0272810X12
5	Actuator Lower Casing	
	2 in. / DN 50	GE05003X012
	3 and 4 in. / DN 80 and 100	GE07988X012
6	Cap Screws (8 required)	
	2 in. / DN 50	1A340924052
	3 in. / DN 80	M4696002X12
	4 in. / DN 100	1N462324052
7*	O-ring	
	2 in. / DN 50	
	Nitrile (NBR)	12A1297X022
	FKM	12A1297X012
	3 in. / DN 80	
	Nitrile (NBR)	18B8514X012
	FKM	18B8514X022
	4 in. / DN 100	
	Nitrile (NBR)	18B2140X012
	FKM	18B2140X022
8*	Anti-Friction Rings (4 required)	
	2 in. / DN 50	M0194690X12
	3 and 4 in. / DN 80 and 100	M0192170X12
9*	O-ring (2 required)	
	2 in. / DN 50	
	Nitrile (NBR), -20 to 180°F / -29 to 82°C	1C3342X0042
	FKM	M6020036X12
	3 and 4 in. / DN 80 and 100	
	Nitrile (NBR), -20 to 180°F / -29 to 82°C	1D2658X0012
	FKM	1D2658X0022

- continued -

*Recommended spare part

Type EZL Main Valve (Figure 7) (continued)

Key	Description	Part Number	Key	Description	Part Number
10	Pipe Plug (up to 3 required), All sizes	1A767524662	30*	Disk Holder Assembly 2 in. / DN 50 Nitrile (NBR) FKM	M0279110X12 M0281870X12
11	Actuator Upper Casing 2 in. / DN 50 3 and 4 in. / DN 80 and 100	GE04968X012 GE07514X012		3 and 4 in. / DN 80 and 100 Nitrile (NBR) FKM	M0276830X12 M0282120X12
12A*	O-ring Nitrile (NBR) FKM	M6010001X12 M6020066X12	31	Disk Retainer 2 in. / DN 50 100% Capacity 80% Capacity 50% Capacity 30% Capacity	M0272750X12 M0297340X12 M0297430X12 M0297440X12
12B*	O-ring Nitrile (NBR) FKM	1H2926X0032 1H2926X0022		3 and 4 in. / DN 80 and 100 100% Capacity 80% Capacity 50% Capacity 30% Capacity	M0276250X12 M0297630X12 M0297640X12 M0297650X12
13	Spring 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0195000X12 M0196880X12	32	Lock Washer (2 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M5077004X12 M5077001X12
14	Sleeve 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0272600X12 M0276310X12	33	Socket Head Cap Screw (2 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M5011006X12 M5011017X12
15*	O-ring 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M6020095X12 M6020073X12	34*	O-ring (2 required) 2 in. / DN 50 Nitrile (NBR) FKM	10B4428X012 10B4428X022
16	Socket Head Cap Screw (6 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M5011119X12 FA402512X12		3 and 4 in. / DN 80 and 100 Nitrile (NBR) FKM	10B4366X012 10B4366X022
17*	O-ring 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M6020096X12 M6020127X12	35	Bracket (2 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0278570X12 M0220960X12
18	Inlet Plate 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0300260X12 M0196800X12	36	Nameplate	-----
19	Outlet Plate 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0279180X12 M0276570X12	37	Drive Screw (5 required), All sizes	1A368228982
20*	Diaphragm 2 in. / DN 50 3 and 4 in. / DN 80 and 100	GE07400X012 GE09204X012	38	Travel Indicator Plug, All sizes	M0297680X12
21	Cap Screw 2 in. / DN 50 (14 required) 3 and 4 in. / DN 80 and 100 (22 required)	18B3065X012 1A514724052	39	Bolt (2 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	GE07223X012 GE07221X012
22	Plain Washer 2 in. / DN 50 (32 required) 3 and 4 in. / DN 80 and 100 (48 required)	1A5196X0012 1A518925072	43	Caution Label (2 required)	GE00835X012
23	Hex Nut 2 in. / DN 50 (16 required) 3 and 4 in. / DN 80 and 100 (24 required)	1E944624112 1A3412A0022	44	Adjusting Screw Cap, All sizes	24B1301X012
24	Continuous Thread Stud Bolt (4 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	GE00808X012 M4693003X12	53	Indicator Cover 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0196770X12 M0192220X12
25	Intermediate Flange 2 in. / DN 50 3 in. / DN 80 4 in. / DN 100	GE10308X032 GE11210X042 GE17777X032	54	Travel Indicator Stem 2 in. / DN 50 3 and 4 in. / DN 80 and 100	ERSA01799A0 ERSA01806A0 ERSA02798A0
26	Hex Nut (4 required) 2 in. / DN 50 3 and 4 in. / DN 80 and 100	1A341224122 1A368124122	55	Indicator Bushing, All sizes	ERSA02569A0
27	Sleeve Adaptor 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M0272570X12 GD27634X012	56	Travel Indicator Fitting, All sizes	M0192180X12
28*	O-ring 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M6020079X12 M6020151X12	57	Spring Collet, All sizes	M0201990X12
29*	O-ring 2 in. / DN 50 3 and 4 in. / DN 80 and 100	M6020112X12 M6020147X12	58	Travel Indicator Scale, All sizes	-----
			59	Flow Arrow, All sizes	-----
			60	Protective Cap 2 in. / DN 50 3 in. / DN 80	T13659T0112 T13659T0092
			70*	O-ring	M6020005X12
			72	Belleville Washer 2 in. / DN 50 3 in. / DN 80	GE10273X012 GE11214X012
			75*	O-ring 4 in. / DN 100 Nitrile (NBR) FKM	10B4373X012 10B4373X022
			76*	Back Up Ring (2 required)	1N659106242

*Recommended spare part

Type EZL

Mounting Parts

Standard Single Pilot Configuration for Mounting Type 6352, 6353 or 6354

Key	Description	Part Number
47	Pipe Nipple	1C782526012
48	Tube Elbow	
	Steel	-----
	Stainless steel	-----
49	External Tube Connector	
	Steel	-----
	Stainless steel	-----
52	Tubing	-----
63	1/4 in. / 6.35 mm, Pipe Nipple	1C488226232
64	1/4 in. / 6.35 mm, Coupling	1C911728992

Standard Working Monitor Pilot Types 161AYW and 61 Series

Key	Description	Part Number
65	Mounting Bracket	GE07740X012
66	Bushing (2 required)	1A3424X00A2
67	Washer (2 required)	1D716228982
68	Nut (2 required)	1E944024112
69	U-bolt	11B3469X012

Types 6352, 6353, 6354L, 6354M and 6354H Pilots (Figure 8)

Key	Description	Part Number
	Parts kit (included are: valve plug, key 4; diaphragm assembly, key 5; body plug gasket, key 12; bellows O-ring, key 17; closing cap gasket, key 20 and for the P590 Series filter, filter element, key 2 and gasket, key 7)	
	Type 6352	R6352X00012
	Type 6353	R6353X00012
	Type 6354	R6354X00012
1	Pilot Body	
	Aluminum	35A6228X012
	Aluminum with 50 psig / 3.4 barg	
	Type 1806H relief	17A8075X012
	Stainless steel	39A5971X012
	Stainless steel with 50 psig / 3.4 barg	
	Type 1806H relief	17A8075X022
2	Spring Case	
	Aluminum	25A6220X012
	Stainless steel	28A9277X012
2	Regulator Bonnet (for Type 6353)	24B6641X022
3	Body Plug	
	Aluminum	15A6221X012
	316 Stainless steel	15A6221X042
4	Valve Plug and Stem Assembly	
	Nitrile (NBR) disk with Stainless steel stem (standard)	15A6207X012
	Nitrile (NBR) disk with 316 Stainless steel stem (NACE)	15A6207X052
	FKM with Stainless steel stem	15A6207X042

Types 6352, 6353, 6354L, 6354M and 6354H Pilots (Figure 8) (continued)

Key	Description	Part Number
5	Diaphragm Assembly	
	Type 6352, Nitrile (NBR)	15A6216X012
	Type 6353, Nitrile (NBR)	15A6216X022
	Type 6353, FKM	15A6216X092
	Type 6353, FKM	15A6216X162
	Type 6354, Neoprene (CR)	15A6216X032
	Type 6354, FKM	15A6216X152
6	Control Spring	
	Type 6352	
	2 in. w.c. to 2 psig / 5 to 140 mbar	14A9672X012
	2 to 10 psig / 0.14 to 0.69 bar, Black	14A9673X012
	DVGW 4 to 10 psig / 0.30 to 0.69 bar	14A9673X012
	Type 6353	
	3 to 40 psig / 0.21 to 2.8 bar	1E392527022
	35 to 125 psig / 2.4 to 8.6 bar	1K748527202
	DVGW 10 to 40 psig / 0.69 to 2.8 bar	1E392527022
	DVGW 40 to 58 psig / 2.8 to 4.0 bar	1K748527022
	Type 6354L	
	85 to 200 psig / 5.9 to 13.8 bar	1L346127142
	Type 6354M	
	175 to 220 psig / 12.1 to 15.2 bar	1L346127142
	Type 6354H	
	200 to 300 psig 13.8 to 20.7 bar	15A9258X012
7	Spring Seat	
	Type 6352 or 6353	1B798525062
	Type 6354L, 6354M or 6354H	1K155828982
8	Stem Guide	
	416 Stainless steel (standard)	15A6222X012
	410 Stainless steel (NACE)	15A6222X022
9	Adjusting Screw	
	Type 6352 or 6353	10B7192X012
	Type 6354	10B6190X012
10	Locknut	
	Type 6352	1C724018992
	Type 6353 or 6354	1A946324122
11	Closing Cap	
	Aluminum	23B9152X012
	Stainless steel	1H2369X0032
12	Body Plug Gasket/O-ring	
	For aluminum body, Composition	1C495704022
	For Stainless steel body, Nitrile (NBR)	1F113906992
	For Stainless steel body, FKM	1N463906382
13	Vent Assembly	Type Y602X1-A12
14	Machine Screw (6 required)	
	Aluminum and brass	10B6189X022
	Stainless steel	1V4360X0022
15	Relief Valve Assembly	
	25 psig / 1.7 bar	16A5929X052
	25 psig / 1.7 bar (NACE)	16A5929X042
	25 psig / 1.7 bar (for oxygen service)	16A5929X032
	25 psig / 1.7 bar (Stainless steel)	16A5929X072
16	Bellows Assembly	15A6202X032
17	O-ring	1D682506992
19	Filter	
	P590 Series (standard)	Type P590X1-A2
	P590 Series for corrosive service	Type P590X1-A1
	P590 Series for NACE service	Type P590X1-A6
20	Closing Cap Gasket	15A6218X012

- continued -

Types 6352, 6353, 6354L, 6354M and 6354H Pilots (Figure 8) (continued)

Key	Description	Part Number
21	Pipe Nipple For standard and corrosive service For NACE service For corrosive NACE service	1C488226232 1C4882X0032 1C488238982
22	Restriction Standard High	17A2030X012 17A2029X012
23	Diaphragm Limiter Aluminum Brass Stainless steel	15A9259X012 19A8674X012 10B4407X012
26	NACE Tag	-----
27	Tag Wire	-----
28	Packing Bonnet	1L449635072
29	Packing Nut	0P077624102
30	Handwheel	1L217544992
31	Washer	1A329128982
32	Screw	1E985428982
33	Packing Spring	1F125437012
34	Packing Box Gasket	1B487099202
35	Packing Follower	1K885035072
36	External Adaptor	1F124801012
37	Internal Adaptor	1F124401012
38	Packing Washer	1F125236042
39	Packing Ring (3 required)	1C752601012
40	Adjusting Screw	21B5621X012

61 Series Pilots (Figure 9)

Key	Description	Part Number
1	Relay Spring Case Types 61L, 61LD and 61LE Type 61H Standard adjusting screw Capped adjusting screw Type 61HP Standard adjusting screw Capped adjusting screw	1B983919012 1B984119012 1H232619012 2P969419012 20A4735X012
2	Relay Valve Body Types 61L, 61LD, 61LE and 61H Type 61HP	2J581919012 33A9845X012
3	Bottom Cover Type 61L Type 61HP	2C518619012 13A9843X012
4	Relay Yoke Type 61L Type 61HP (2 required)	1D662544012 13A9838X012
5	Closing Cap Assembly Type 61L For all except pilots with handwheel adjusting screw and pressure loaded pilots Pressure loaded corrosive trim Standard trim with handwheel adjusting screw Type 61HP Pressure loaded/capped adjusting screw	T11069X0012 1E422724092 1R759314012 1E599914012
6	Adjusting Screw Type 61L For all except handwheel adjusting screw For use with handwheel adjusting screw Type 61HP Standard Pressure loaded/capped adjusting screw	1B537944012 1R759414012 1C216032992 1F6635X0012

61 Series Pilots (Figure 9) (continued)

Key	Description	Part Number
7	Control Spring Type 61L 0.25 to 2 psig / 0.02 to 0.14 bar 1 to 5 psig / 0.07 to 0.34 bar 2 to 10 psig / 0.14 to 0.69 bar 5 to 15 psig / 0.34 to 1.0 bar 10 to 20 psig / 0.69 to 1.4 bar Type 61HP 15 to 45 psig / 1.0 to 3.1 bar 35 to 100 psig / 2.4 to 6.9 bar 100 to 300 psig / 6.9 to 20.7 bar	1B886327022 1J857827022 1B886427022 1J857927142 1B886527022 1E392527022 1D387227022 1D465127142
8	Relay Orifice Standard applications Fast close and open or open only	1C520135032 1D373735032
9	Disk Holder Assembly Standard trim Corrosive trim	1B8868000A2 1B8868000B2
10	Bleed Orifice Type 61L Standard bleed Capped bleed Type 61HP	1B887335032 1D777135032 1D318135032
11	Diaphragm Nut Standard trim Corrosive trim	1B989514012 1B989535072
12	O-ring Seal Standard and corrosive trim Pressure loaded corrosive trim	1B885506992 1B8855X0012
13	Relay Spring Type 61L Type 61HP	1C911537022 18797937022
14	Upper Relay Diaphragm Type 61L Standard and corrosive trim Pressure loaded corrosive trim Type 61HP	1B885202052 1N162802332 13A9841X022
15	Lower Relay Diaphragm Type 61L Standard and corrosive trim Pressure loaded corrosive trim Type 61HP	1B886002052 1N536102332 13A9840X012
16	Upper Relay Head Type 61L Type 61HP (4 required)	1B919325072 13A9839X012
17	Lower Relay Head (Type 61L only)	1B91942S072
18	Spring Seat (Type 61L only)	1B886225072
19	Hex Nut Type 61L Type 61HP (2 required)	1A340324122 1A346524122
20	Cap Screw (8 required)	1B989624052
23	Pipe Plug (for Type 61L)	1A649528992
24	Pipe Nipple	1C488226232
25	Filter Assembly Standard trim Corrosive trim	Type P590X1-A2 Type P590X1-A1
26	Bleed Valve Type 61L Type 61HP	1D986735132 1D5604000B2
27	Nameplate	-----
28	Gasket (Type 61L only)	1P753306992
30	Pipe Plug	1A369224492
33	Handwheel	1J496144012
34	Hex Nut	1A351124122

- continued -

Table 4. 161EBM Series Monitor Pilot Part Numbers (keys 7, 8, 9, 10 and 11, Figure 10)

KEY	PART NAME	CONTROL SPRING RANGE IN psig / barg AND SPRING COLOR CODE					
		5 to 15 / 0.34 to 1.0, White	10 to 40 / 0.69 to 2.8, Yellow	30 to 75 / 2.1 to 5.2, Black	70 to 140 / 4.8 to 9.7, Green	130 to 200 / 9.0 to 13.8, Blue	200 to 350 / 13.8 to 24.1, Red
7	Diaphragm Assembly	17B9055X022 ⁽¹⁾	17B9055X022 ⁽¹⁾	17B9055X022 ⁽¹⁾	17B9055X022 ⁽¹⁾	17B9055X022 ⁽¹⁾	17B9055X032 ⁽²⁾
8	Spring Seat	17B0515X012	17B0515X012	17B0515X012	17B0515X012	17B0515X012	17B0515X012
9	Spring	17B1260X012	17B1262X012	17B1259X012	17B1261X012	17B1263X012	17B1264X012
10	Diaphragm Limiter	-----	-----	-----	-----	-----	10B4407X012
11	Adjusting Screw	10B3081X012	10B3081X012	10B3081X012	10B3081X012	10B3081X012	10B3080X012

1. Standard assembly for Stainless steel construction; 1/32 in. / 0.80 mm thick diaphragm and 1-3/4 in. / 45 mm diaphragm plate diameter.
2. Standard assembly for Stainless steel construction; 1/32 in. / 0.80 mm thick diaphragm and 1-1/2 in. / 38 mm diaphragm plate diameter.

61 Series Pilots (Figure 9) (continued)

Key	Description	Part Number
35	Spring Seat Type 61L Type 61HP	1J618124092 10A3963X012
40	O-ring	1D541506992
41	Adaptor	1J881624092
42	Yoke Cap	13A9836X012
43	Lockwasher	1A352332992
44	Machine Screw	16A5763X012
45	Valve Spring Seat	1L251135072
46	Cap Screw (6 required)	15A0690X012
47	Machine Screw (4 required)	1A866935032
48	Cap Screw (6 required)	1P327028982
50	Drive Screw (2 required)	1A368228982
51	Diaphragm Insert (2 required)	13A9842X012
52	Lower Yoke Cap	13A9837X012
53	Bleed Plug	1V211514012
54	Vent Assembly	Type Y602X1-A12

P590 Series Filter (Figure 11)

Key	Description	Part Number
1	Filter Body Type P594-1, Brass Type P593-1, Aluminum	1E312414012 1E312409012
2*	Filter Element, Cellulose	1E312606992
3	Filter Head Type P594-1, Brass Type P593-1, Aluminum	1E312514012 1E312509012
4	Machine Screw Type P594-1, Brass Type P593-1, Aluminum	1J500218992 1J500209012
5	Washer (2 required) Type P594-1, Brass Type P593-1, Aluminum	1J500018992 1J500010062
6	Spring Washer, Plated carbon steel	1H885128982
7*	Gasket, Composition	1F826804022

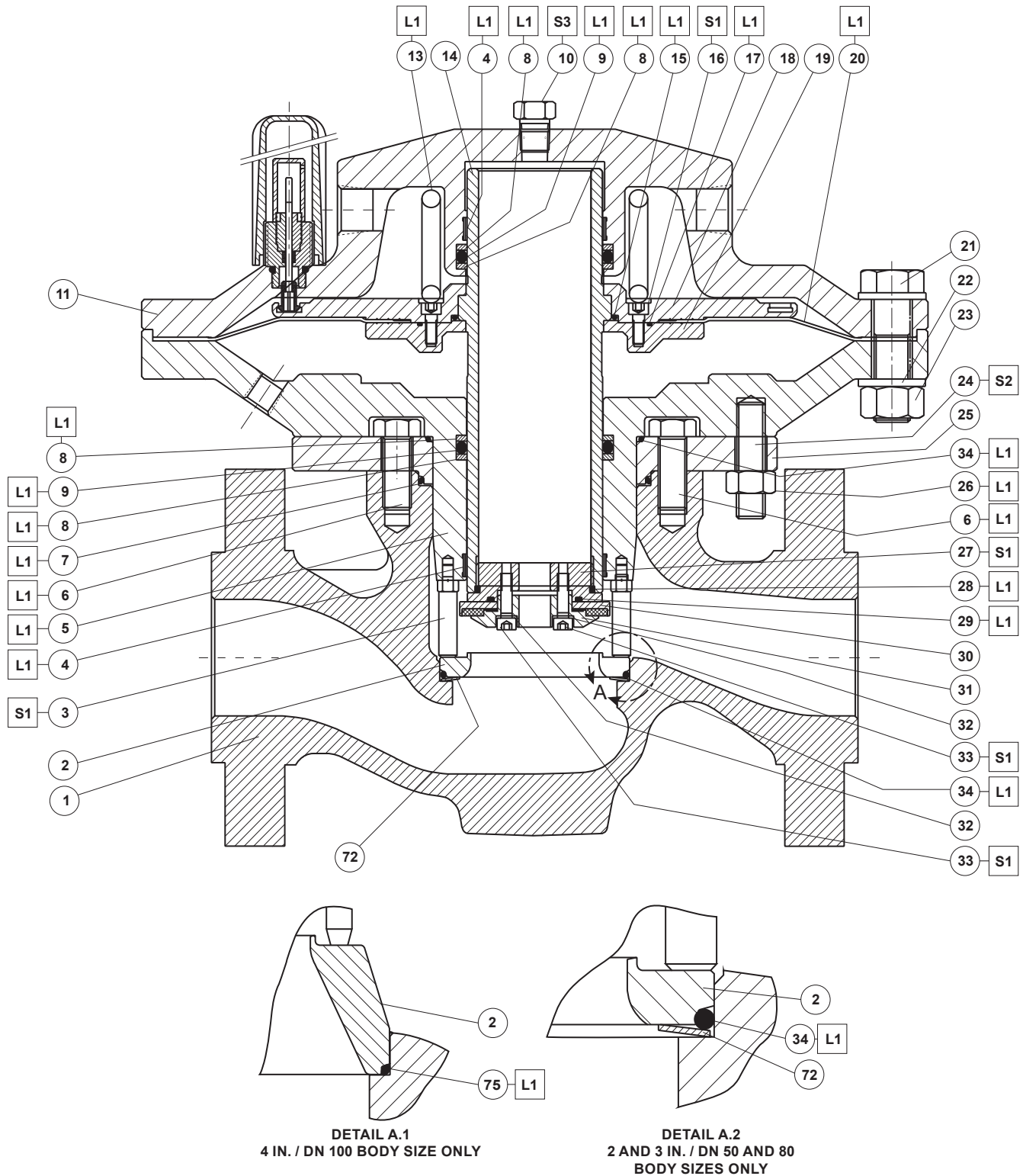
Type 161EBM Pilot (Figure 10)

Key	Description	Part Number
	Type 161EBM Pilot Parts Kit (included are keys 4, 6, 7, 15, 17, 19 and 22) For 5 to 200 psig / 0.34 to 13.8 bar For 200 to 350 psig / 13.8 to 24.1 bar	R161MX00012 R161MX00022
1	Body Assembly, Stainless steel	30B8715X012
2	Spring Case	27B9722X012
3	Body Plug, Stainless steel	1B7975X0052
4*	Plug/Stem Assembly, Nitrile (NBR) with Stainless steel stem FKM with Stainless steel stem	20B9389X052 20B9389X062
6	Plug Spring, 302 Stainless steel	1E701337022
7*	Diaphragm Assembly, Nitrile (NBR) diaphragm with 304 Stainless steel diaphragm plate	See Table 4
8	Control Spring Seat, Plated steel	See Table 4
9	Control Spring, Plated steel spring wire	See Table 4
10	Diaphragm Limiter, 303 Stainless steel	See Table 4
11	Adjusting Screw, Plated steel	See Table 4
12	Locknut, Plated steel	1D667728982
13	Machine Screw, Plated steel (6 required)	1V4360T0012
15*	Body Plug O-ring, Nitrile (NBR) rubber	1F113906992
16	Closing Cap Type 161EBM Metal, for pressure loading, Type 161EBM	24B1301X012 17B1406X012
17*	Closing Cap Gasket, Pressure loading for metal closing cap only, Type 161EBM	1C659804022
18	Type Y602-12 Vent Assembly, Plastic	27A5516X012
19*	Stem Guide Seal Assembly, Stainless steel seal and seal retainer with Nitrile (NBR) rubber O-ring	10B8711X012
22*	O-ring	10A0904X012

Type 252 Pilot Supply Filter (Figure 12)

Key	Description	Part Number
1	Filter Head Assembly Aluminum (A92011 T3) 316 Stainless steel	17B7978X012 17B7978X022
2	Filter Body Aluminum (A92011 T3) Standard Extended 316 Stainless steel Standard Extended	27B6811X022 27B7488X022 27B6811X012 27B7488X012
3	Lower Seat, Delrin®	17B6816X012
4	Filter Cartridge, Polyethylene	17B6813X012
5	O-ring, Nitrile (NBR)	1F269206992
6	Pipe Plug, 316 Stainless steel	1A767535072
7	Drain Valve (Optional), 316 Stainless steel	16A8280X362
8	Upper Seat, Delrin®	17B6814X012

*Recommended spare part
Delrin® is a mark owned by E.I. du Pont De Nemours and Co.



GE10987

- **APPLY LUBRICANT (L) OR SEALANT (S)⁽¹⁾**
 L1 = LITHIUM HYDROXYSTEGRATE NLGI 2 GRADE GREASE
 S1 = ANAEROBIC METHACRYLATE SEALANT FOR NUTS AND BOLTS
 S2 = ANAEROBIC METHACRYLATE SEALANT FOR THREADS
 S3 = MULTI-PURPOSE POLYTETRAFLUOROETHYLENE (PTFE) THREAD SEALANT

1. Lubricant and sealants must be selected such that they meet the temperature requirements.

Figure 7. Type EZL Main Valve Assembly

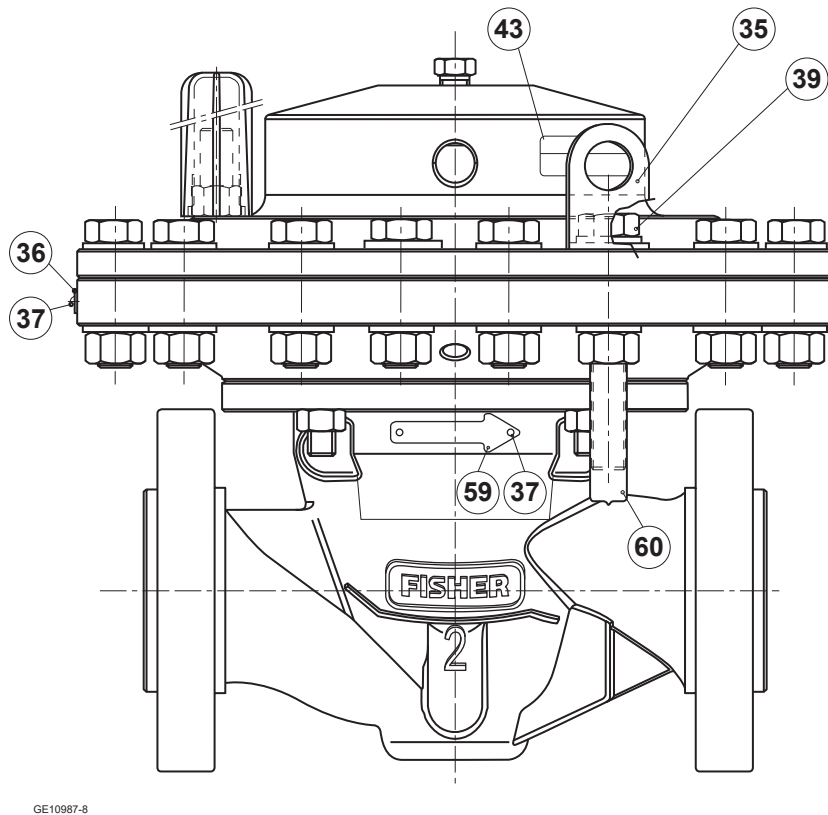


Figure 7. Type EZL Main Valve Assembly (continued)

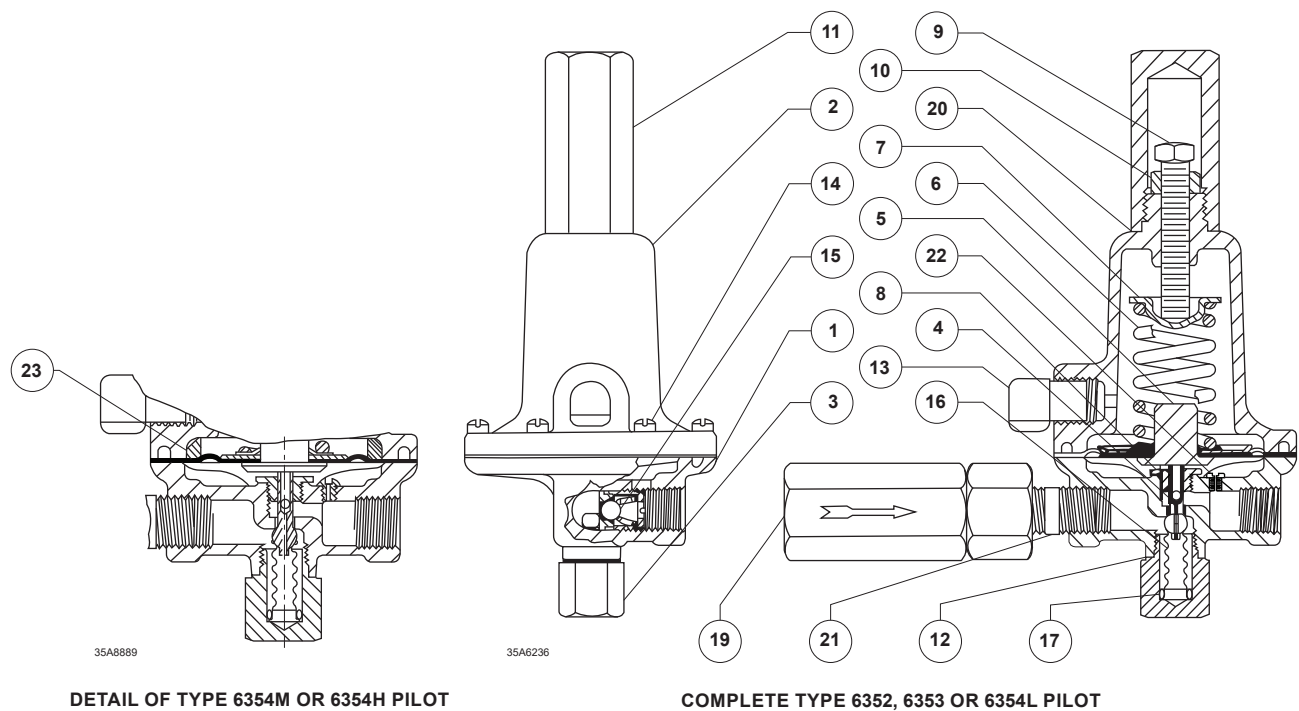
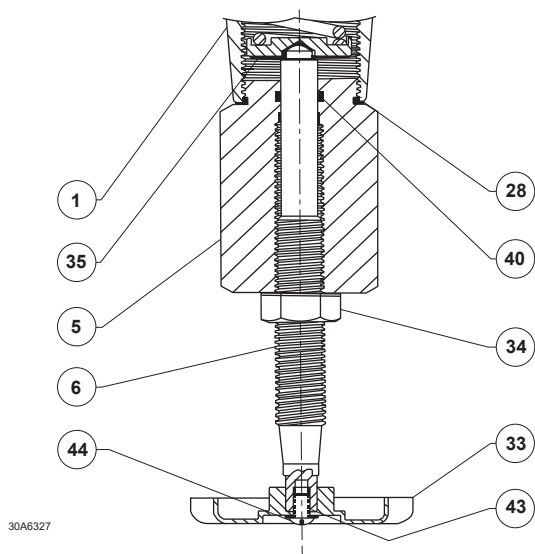
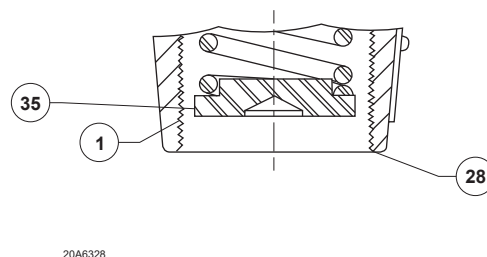


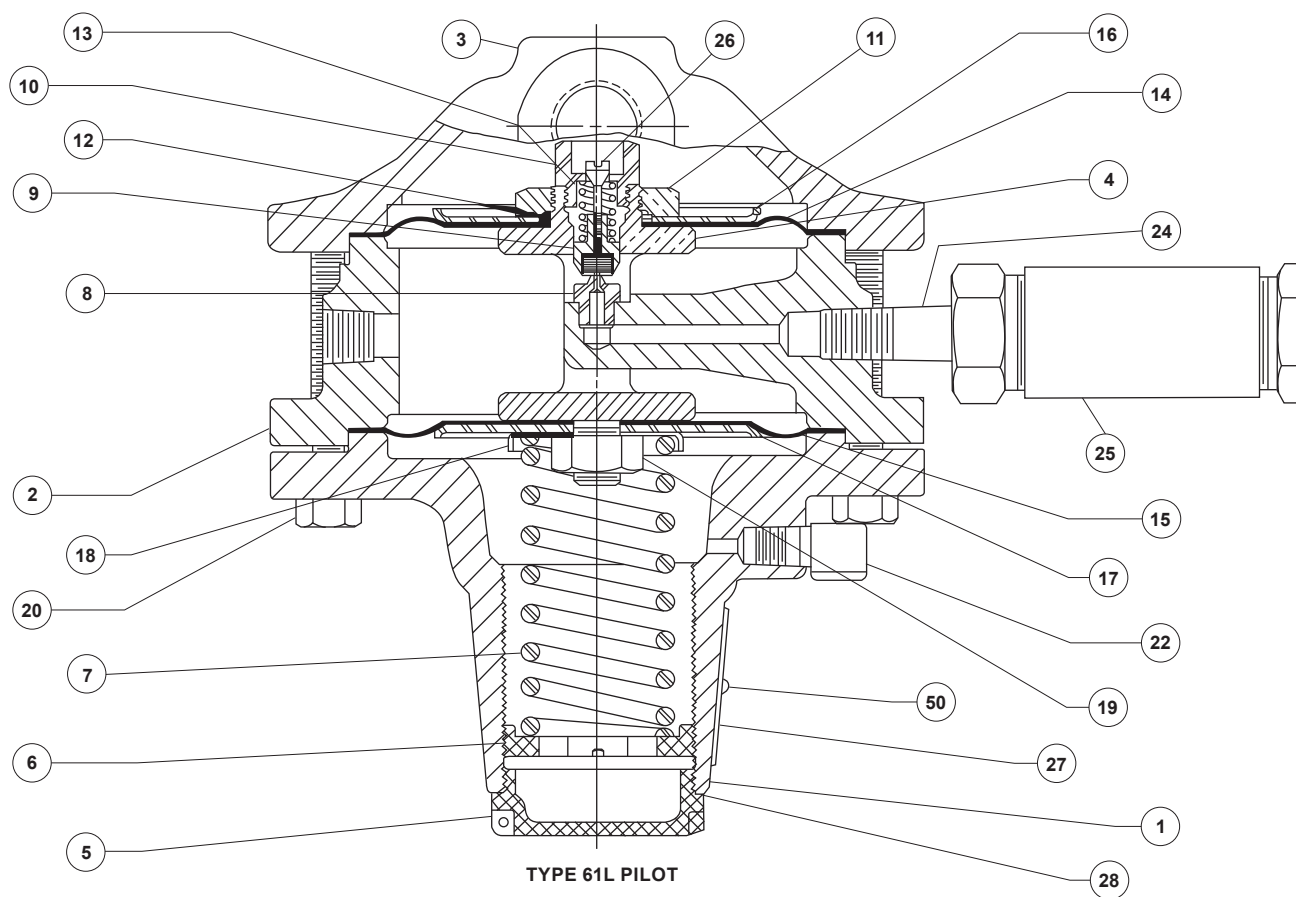
Figure 8. Types 6352 through 6354H Pilot Assemblies



DETAIL OF HANDWHEEL OPTION

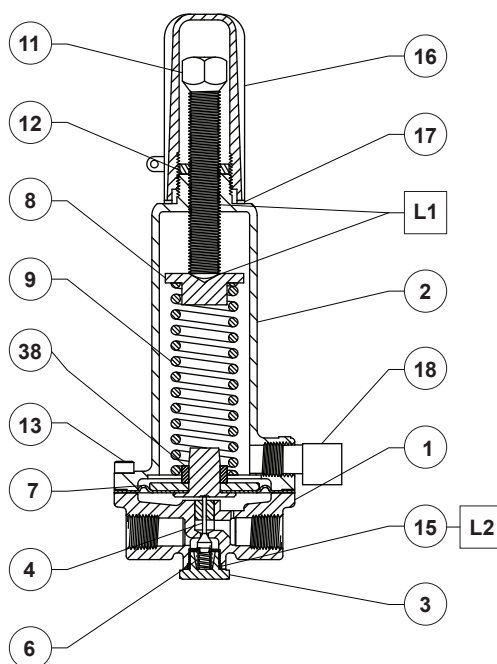
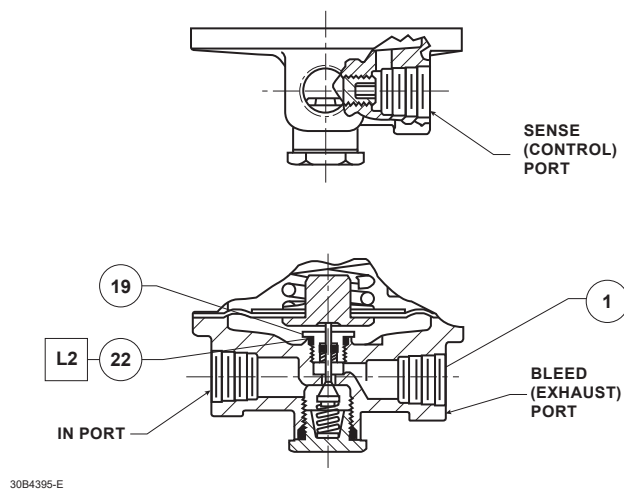


DETAIL OF CAPPED
ADJUSTING SCREW OPTION



TYPE 61L PILOT

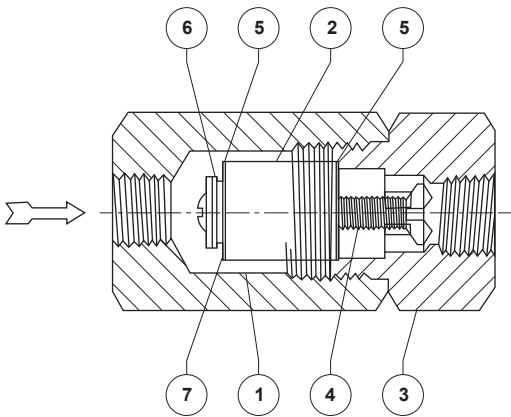
Figure 9. Type 61L Pilot Assembly



□ APPLY LUBRICANT (L)⁽¹⁾
 L1 = ANTI-SEIZE LUBRICANT
 L2 = EXTREME LOW TEMPERATURE BEARING GREASE

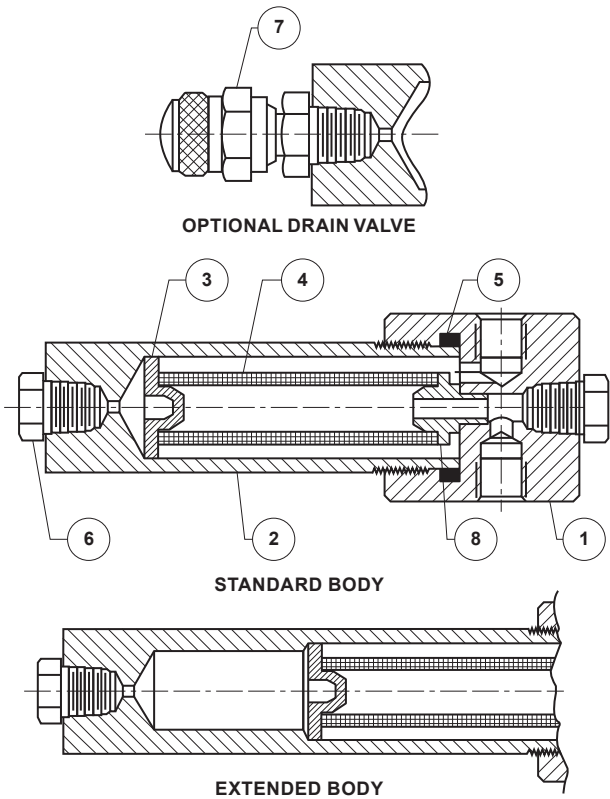
1. Lubricants must be selected such that they meet the temperature requirements.

Figure 10. Type 161EBM Pilot Assembly



A7008

Figure 11. P590 Series Filter



A7013

Figure 12. Type 252 Filter

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