

October 2009

# Type 1805P Pilot-Operated Relief Valve



## WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required.

Failure to correct trouble could result in a hazardous condition. Call a gas service person to service the unit. Only a qualified person must install or service the regulator.



W6913

Figure 1. Type 1805P Pilot-Operated Relief Valve

## Introduction

### Scope of the Manual

This manual describes and provides instructions for the installation, adjustment, maintenance, and parts ordering information for the Type 1805P pilot-operated relief valve. Instructions and parts lists for any other Fisher equipment mentioned in this instruction manual are found in separate manuals.

### Description

The Type 1805P pilot-operated relief valve is used to provide protection from overpressuring a downstream system. This relief valve is suitable for service on natural gas, air, propane, or any other operating

medium not corrosive to the internal parts. Very little build-up over the set pressure is required for the main valve to go wide-open for maximum relief capacity. Smooth opening action minimizes system pressure surges during emergency action.

### Specifications

Some of the specifications for a given relief valve as it comes from the factory appear on the nameplate attached to the Type 1805 main valve spring case. Other specifications appear on the Type 6358B pilot spring case.



# Type 1805P

## Specifications

<p><b>Body Size and End Connection Style</b> 2 NPT</p> <p><b>Maximum Relief (Inlet) Pressure<sup>(1, 2)</sup></b> 50 psi (3,4 bar) over relief pressure setting or 150 psig (10,3 bar), whichever is lower</p> <p><b>Relief Set Pressure Ranges<sup>(2)</sup></b> See Table 1</p> <p><b>Pressure Registration</b> External</p> <p><b>Wide-Open Flow Coefficients</b> <math>C_g</math>: 900 (without outlet piping); <math>C_v</math>: 23.7; <math>C_1</math>: 38</p>	<p><b>IEC Sizing Coefficients</b> <math>X_T</math>: 0.91 <math>F_D</math>: 0.44 <math>F_L</math>: 0.89</p> <p><b>Pilot Control Line and Vent Connections</b> 1/4 NPT</p> <p><b>Temperature Capabilities<sup>(2)</sup></b> <b>Nitrile (NBR):</b> -20° to 180°F (-29° to 82°C) <b>Fluorocarbon (FKM):</b> 0° to 300°F (-18° to 149°C)</p> <p><b>Approximate Weight</b> 13 pounds (6 kg)</p>
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1. Relief pressure plus maximum allowable build-up over setting.
2. The pressure/temperature limits in this instruction manual and any applicable standard or code limitation for this relief valve should not be exceeded.

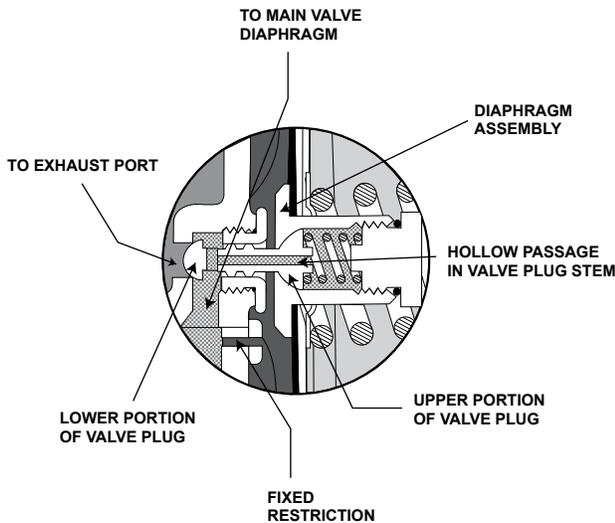
**Table 1. Type 6358B Relief Set Pressure Ranges**

RELIEF SET PRESSURE	COLOR	SPRING WIRE DIAMETER	SPRING FREE LENGTH	PART NUMBER
10 to 18 psig (0,69 to 1,2 bar)	Green	0.120-inch (3,0 mm)	2.12-inch (53 mm)	1B986027212
18 to 30 psig (1,2 to 2,1 bar)	Unpainted	0.142-inch (3,6 mm)	2.12-inch (53 mm)	1B788327022
30 to 100 psig (2,1 to 6,9 bar)	Red	0.192-inch (4,9 mm)	2.19-inch (55 mm)	1K748527202

**Table 2. Pilot Information**

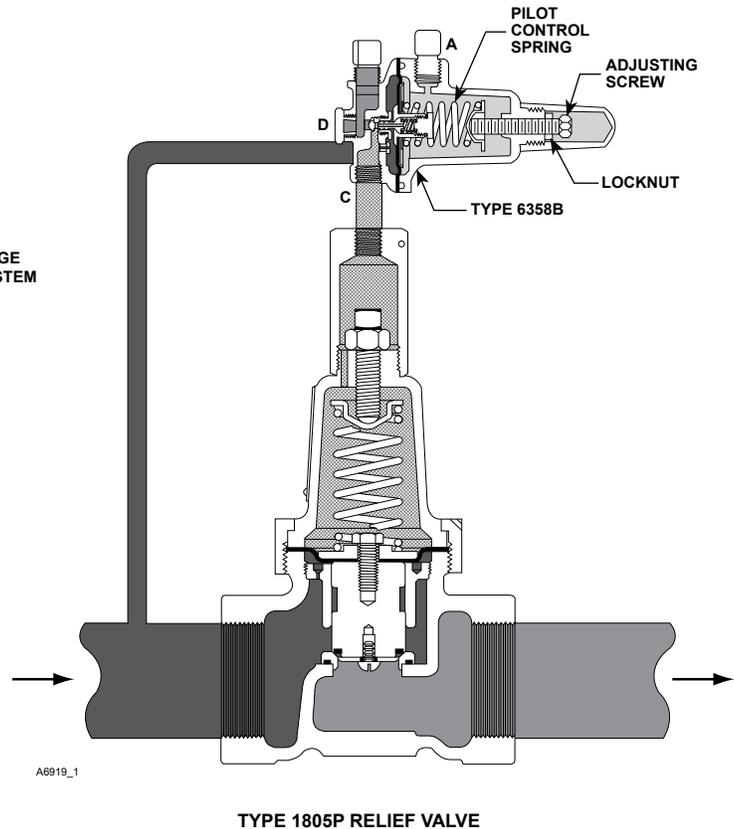
MAIN VALVE SPRING, PART NUMBER, AND COLOR, PSIG (bar)	SET PRESSURE RANGE, PSIG (bar)	SET PRESSURE <sup>(1)</sup> , PSIG (bar)	BUILD-UP OVER SET PRESSURE TO BEGIN OPENING MAIN VALVE <sup>(2)</sup> , PSIG (bar)	BUILD-UP OVER SET PRESSURE TO FULLY OPEN MAIN VALVE <sup>(3)</sup> , PSIG (bar)	PRESSURE DROP BELOW SET PRESSURE TO RESEAT PILOT, PSIG (bar)
For set pressures up to 30 (2,1) 1F826927052 Pink	10 to 18 (0,69 to 1,2)	10 (0,69)	0.8 (0,05)	1.1 (0,08)	1.0 (0,07)
		15 (1,0)	0.8 (0,05)	1.1 (0,08)	1.0 (0,07)
		18 (1,2)	0.8 (0,05)	1.1 (0,08)	1.0 (0,07)
	18 to 30 (1,2 to 2,1)	18 (1,2)	0.9 (0,06)	1.3 (0,09)	1.0 (0,07)
		25 (1,7)	0.9 (0,06)	1.3 (0,09)	1.0 (0,07)
		30 (2,1)	0.9 (0,06)	1.3 (0,09)	1.0 (0,07)
For set pressures over 30 (2,1) 1D751527022 Unpainted	30 to 100 (2,1 to 6,9)	30 (2,1)	1.5 (0,10)	2.2 (0,15)	1.0 (0,07)
		40 (2,8)	1.5 (0,10)	2.2 (0,15)	1.0 (0,07)
		50 (3,4)	1.5 (0,10)	2.2 (0,15)	1.0 (0,07)
	70 (4,8)	60 (4,1)	1.5 (0,10)	2.2 (0,15)	1.0 (0,07)
		80 (5,5)	1.7 (0,12)	2.5 (0,17)	1.0 (0,07)
		90 (6,2)	1.7 (0,12)	2.5 (0,17)	1.0 (0,07)
100 (6,9)	2.0 (0,14)	2.5 (0,17)	1.0 (0,07)		

1. Set pressure is defined as the pressure at which the pilot exhaust starts to bubble (discharge).
2. Crack pressure is the inlet pressure at which the main valve starts audible flow.
3. Inlet pressure buildup over the set pressure to achieve wide-open capacity.



EXPANDED VIEW OF THE TYPE 6358B RELIEF PILOT DIAPHRAGM ASSEMBLY AND VALVE PLUG

- INLET PRESSURE
- OUTLET PRESSURE
- ATMOSPHERIC PRESSURE
- LOADING PRESSURE



TYPE 1805P RELIEF VALVE

Figure 2. Typical 1805P-6358B Relief Valve Installation Operational Schematic

## Principle of Operation

Inlet pressure registers on the underside of the main valve diaphragm and also on the underside of the pilot diaphragm. As long as the inlet pressure is below the set pressure, the pilot control spring keeps the pilot valve plug closed. Inlet pressure passes through the pilot restriction and registers as loading pressure on top of the main valve diaphragm, keeping it closed.

When inlet pressure rises above the set pressure, the pressure on the pilot diaphragm overcomes the pilot control spring and opens the pilot valve plug. The pilot exhausts the loading pressure from the top of the main valve diaphragm and plug assembly. While inlet pressure is above the set pressure, the pilot continuously exhausts gas. Inlet pressure unbalance overcomes the main spring force and opens the main valve, reducing the inlet pressure to set pressure.

As the inlet pressure drops below the set pressure, the pilot control spring closes the pilot valve plug and the exhaust stops. This causes the inlet pressure to build in the main valve diaphragm casing, allowing the main valve spring to close the main valve.

## Installation



### WARNING

Personal injury or system damage may result if this relief valve is installed where service conditions could exceed the limits given on the Specifications section or regulator nameplate. Installations should be adequately protected from physical damage.

Overpressuring any portion of this equipment may cause equipment damage, leaks in the relief valve, or personal injury due to bursting of pressure-containing parts. System operation within the limits shown in the Specifications section (page 2) does not eliminate the possibility of damage from external sources or debris in the pipeline. The relief valve should be inspected for damage regularly and after any overpressure condition.

# Type 1805P

Before installing, inspect the main valve and pilot for any shipment damage and any foreign material. Make sure that the valve is oriented so that pipeline flow is in the same direction as indicated by the arrow cast on the body. Use a good grade of pipe compound on the pipe threads, but not on the body threads.

A typical pilot mounting position is shown in Figure 1. To achieve other desired control and exhaust connections, the pilot may be rotated on the pipe nipple (port C, Figure 2).

The Type 1805P requires a control line attached to the 1/4 NPT control connection (port D, Figure 2). The control line should be 1/4-inch (6,4 mm) outer diameter pipe or tubing or larger and connected to a straight run of inlet piping. If the pipeline contains dirt, install a filter in the control line and/or upstream piping.



## WARNING

**If venting gas will accumulate and be an explosion hazard under enclosed conditions, such as in pit or underground installations, make sure the installation is remotely vented to a safe location.**

**To avoid possible injury or equipment damage, never adjust the pilot control spring to produce a set pressure higher than the upper limit of the set pressure range for that particular spring.**

If it is necessary to vent the unit, install an exhaust line into the 1/4 NPT pilot exhaust (port A, Figure 2). This exhaust line may be vented directly into the main valve outlet or separately to atmosphere. In either case, the vent line or stack diameter should be as large as practical with a minimum number of bends or other restrictions.

A vent line or stack must be located to avoid venting gas near buildings, air intakes, or any hazardous location. The line or stack opening must be protected against debris, weather, condensation, insects, or anything else that might clog it.

The set pressure of the unit is adjusted by changing the pilot spring compression. The pressure setting of each unit is factory set. If adjustment is necessary, refer to the Adjustment section for the procedures.

## Overpressure Protection

Relief ranges are from 10 to 150 psig (0,69 to 10,3 bar). The maximum inlet pressure including build-up, is

150 psi (10,3 bar). The individual spring range of your relief valve is stamped on the nameplate. System operation within these limitations does not eliminate the possibility of damage from external sources or debris in the gas line. The valve should be inspected for damage after any overpressure condition.

## Vents



## WARNING

**Venting gas may accumulate and be an explosion hazard under enclosed conditions such as in pit or underground installations. Install remote vent lines to carry gas to a safe area.**

If remote venting is necessary, install remote vent lines in both the outlet of the pilot and the outlet of the main valve. Remove the screen, if one is present in the outlet, and install remote vent lines in the outlet openings. The vent lines must have the largest practical diameter and be as short as possible with a minimum number of bends or elbows.

## Startup

With proper installation completed and system equipment properly adjusted, close any vent valves, and slowly open the upstream shutoff valve while using pressure gauges to monitor pressure.

## Adjustment

### Note

**Do not adjust the main valve spring (key 11, Figure 3).**

Each unit is factory set for the pressure specified on your order. The allowable spring range is stamped on the nameplate. If a pressure setting beyond the indicated range is required, substitute the appropriate spring. Be sure to label the valve to indicate the new pressure range.

## Pilot Adjustment

If set pressure adjustment is necessary, monitor the inlet pressure with a gauge during the adjustment procedure.

1. Loosen the locknut (key 11, Figure 4).
2. Turn the adjusting screw (key 10) clockwise to increase or counterclockwise to decrease the relief pressure setting.
3. Tighten locknut (key 15)

## Shutdown

Slowly close the upstream shutoff valve and release all pressure from the main valve and pilot by opening a vent valve.

## Maintenance

Relief valve parts are subject to normal wear and must be inspected and maintained as necessary, depending upon the service conditions.



### WARNING

**Avoid personal injury or damage to property from sudden release of pressure or uncontrolled gas or other process fluid. Before starting to disassemble, carefully release all pressures according to the shutdown procedure. Use gauges to monitor inlet, loading, and outlet pressures while releasing these pressures.**

## Type 1805P Main Valve

This procedure is to be performed if main valve parts would require inspecting, cleaning, or replacing. Key numbers are referenced in Figure 3.

### Note

**The main valve body (key 1) may remain in the line during maintenance. Lightly lubricate O-rings before assembly.**

1. Disconnect pilot (ports A and D, Figure 2). The pilot may remain attached to the main valve closing cap (key 17) unless replacing the cap.
2. Remove the closing cap (key 17) from the spring case (key 13), loosen the locknut (key 15), and turn the set screw (key 14) to remove spring compression.
3. Unscrew the union nut (key 16) and remove it with the spring case (key 13), spring (key 11), and spring seat (key 12).
4. Pull the O-ring holder (key 4) out of the valve guide orifice (key 2).
5. Remove the diaphragm cap screw (key 10) and the diaphragm plate (key 9). Then inspect the diaphragm (key 8).
6. Take the machine screw (key 7) out of the opposite end of the O-ring holder, remove the O-ring washer (key 6) and inspect the O-ring (key 5).
7. Remove the valve guide orifice (key 2) from the body and check the O-ring (key 3).
8. Replace parts as necessary and reassemble the main valve in reverse order of steps 2 through 7. To ensure proper slack in the diaphragm, tighten the union nut finger-tight only. To provide the proper amount of main valve spring loading, turn both the locknut and set screw all the way in until the locknut bottoms against the spring case and the set screw head bottoms against the locknut. Complete the tightening of the union nut and connect the pilot lines.

## Type 6358B Pilot

Key numbers are referenced in Figure 4. Unless replacing or removing the pilot body (key 1), the pilot may remain on the main valve during maintenance.

### Disassembly

1. Remove the closing cap (key 12), loosen the locknut (key 11), and back out the adjusting screw (key 10) until compression is removed from the control spring (key 7).
2. Remove the machine screws (key 17) and separate the spring case (key 2) from the pilot body. Remove the control spring seat (key 8) and the control spring (key 7).
3. Lift out the diaphragm assembly (key 5) and valve plug (key 4). Check the stem guide (key 9) and restriction (key 20) for damage or plugging.
4. If necessary to replace the diaphragm assembly (key 5), the valve plug (key 4), the valve spring (key 14), or the stem O-ring (key 37), remove the connector cap (key 6) and O-ring or gasket (key 36) from the top of the diaphragm assembly.

# Type 1805P

## Assembly

1. If removed, install the body plug O-ring (key 13) over the body plug (key 3), and install the body plug into the body (key 1).
2. Install the stem guide (key 9), if removed, and make sure to install the O-ring or gasket (key 36) between the body (key 1) and the stem guide.

### Note

**In step 3, if installing a different size restriction, be sure to remove the code letter (H - High, M - Medium, L - Low) on the bottom of the pilot and indicate the new letter.**

3. If the restriction (key 20) was removed, coat the threads with lubricant and install it.
4. If replacing the stem O-ring (key 37), sparingly apply lubricant and install the O-ring over the valve plug (key 4).
5. If removed, install the valve plug (key 4) and valve spring (key 14) into the diaphragm assembly (key 5). Install a replacement O-ring or gasket (key 36) on the diaphragm assembly, and secure with the connector cap (key 6).
6. Install the diaphragm assembly (key 5) and push down on it to see if the valve plug (key 4) moves smoothly. The diaphragm assembly should stroke approximately 1/16-inch (1,6 mm) after the valve plug contacts the port.

### Note

**In step 7, if installing a control spring of a different set pressure range, be sure to remove the set pressure range on the spring case and indicate the new range.**

7. Place the control spring (key 7) and the control spring seat (key 8) on the diaphragm assembly (key 5).

8. Install the spring case (key 2) on the body (key 1) with the vent assembly (key 16) oriented to prevent clogging or entrance of moisture. Install the machine screws (key 17) and tighten in a crisscross pattern, using 5 to 7 foot-pounds (6,8 to 9,5 N•m) of torque.
9. Replace the closing cap gasket (key 19) if necessary, and install the closing cap (key 12).

## Parts Ordering

When corresponding with your local Sales Office about this equipment, always reference the equipment serial number or FS number that can be found on the nameplate.

When ordering replacement parts, reference the key number of each needed part as found in the following parts list.

## Parts List

### Type 1805P Main Valve (Figure 3)

Key	Description	Part Number
1	Valve Body, Cast iron	1E824319012
2	Valve Guide Orifice, Anodized aluminum	1N939909012
3*	O-ring, Nitrile (NBR)	1N940306562
4	O-ring Holder, Aluminum	1E824609092
5*	O-ring, Nitrile (NBR)	1C5622X0022
6	O-ring Washer, Stainless steel	1E824235072
7	Machine Screw, Steel	1B420428982
8*	Diaphragm, Nitrile (NBR)	1E824102052
9	Diaphragm Plate, Brass	1E824714012
10	Cap Screw, Zinc-plated steel	1E760324052
11	Spring, Zinc-plated steel 10 to 30 psig (0,69 to 2,1 bar), Pink 30 to 100 psig (2,1 to 6,9 bar), Unpainted	1F826927052 1D751527022
12	Spring Seat, Steel	1D667125072
13	Spring Case, Cast iron	2E824919042
14	Set Screw, Zinc-plated steel	1D995448702
15	Locknut, Zinc-plated steel	1H483324122
16	Union Nut, Ductile iron	1E766619062
17	Closing Cap, Brass	1E823914012
18	Nameplate, Aluminum	-----
19	Drive Screw, Steel (4 required)	1E501728982

\*Recommended spare part

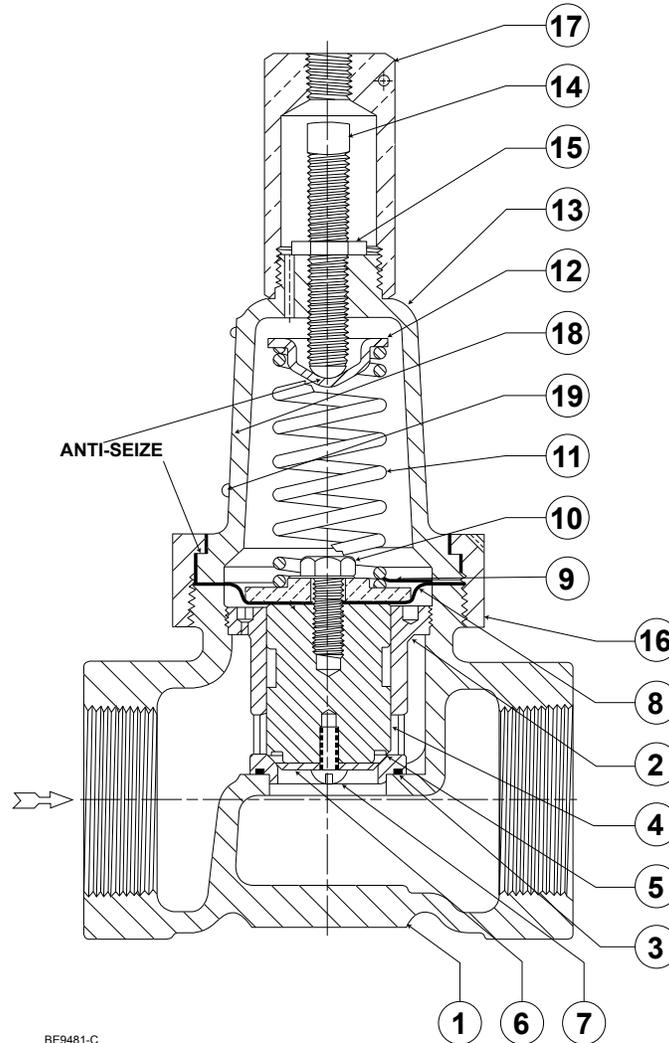


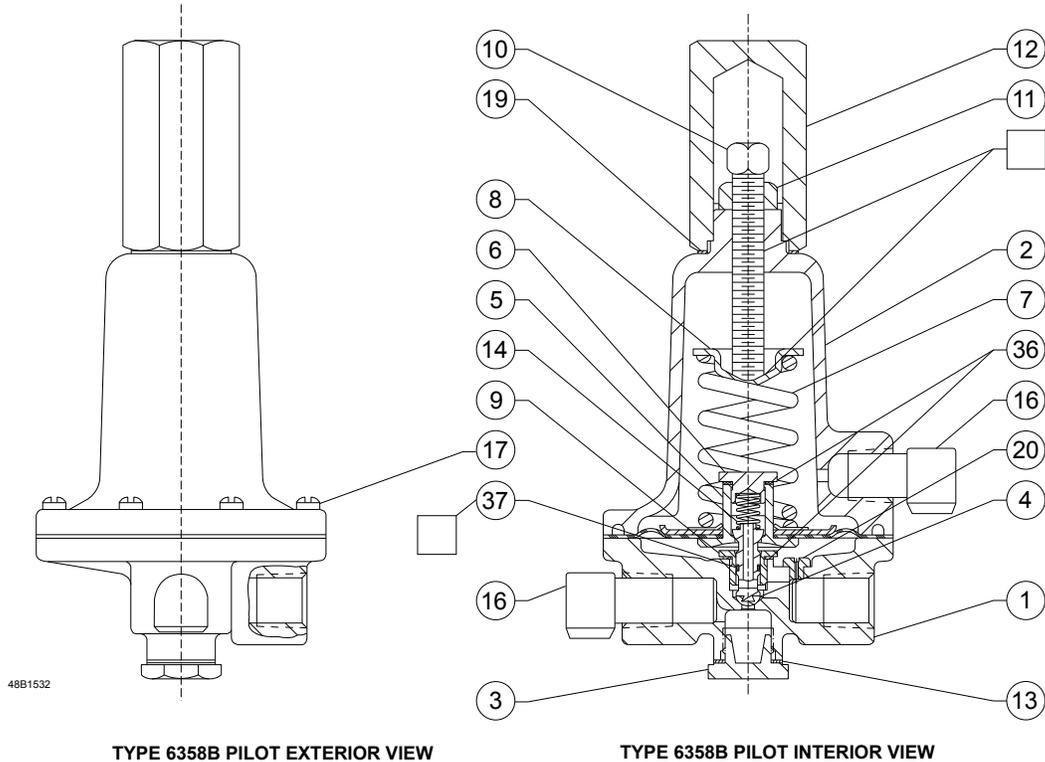
Figure 3. Type 1805P Main Valve Assembly

## Type 6358B Pilot (Figure 4)

Key	Description	Part Number	Key	Description	Part Number
1	Pilot Body, Aluminum	39A0138X012	11	Locknut	1A946324122
2	Spring Case, Aluminum	25A6220X012	12	Closing Cap	23B9152X012
3	Body Plug, Aluminum	1B797509032	13*	Body Plug Gasket or O-ring Nitrile (NBR)	1C495704022
4*	Valve Plug and Stem Assembly Nitrile (NBR) plug with stainless steel stem Fluorocarbon (FKM) plug with stainless steel stem	14B6372X012		Fluorocarbon (FKM)	1N463906382
		16A2924X012	14	Valve Spring	17A2328X012
5*	Diaphragm Assembly Nitrile (NBR)	15A6216X072	16	Vent Assembly, Type Y602X1-A12 (2 required)	27A5515X012
	Fluorocarbon (FKM)	15A6216X172	17	Machine Screw (6 required)	10B6189X022
6	Connector Cap, Stainless steel	16A2921X012	19*	Closing Cap Gasket	15A6218X012
7	Spring 10 to 18 psig (0,69 to 1,24 bar), Green 18 to 30 psig (1,24 to 2,07 bar), Unpainted 30 to 100 psig (2,07 to 6,90 bar), Red	1B986027212 1B788327022 1K748527202	20*	Restriction High gain Medium gain Low gain	17A7279X012 17A2029X012 17A7277X012
8	Spring Seat, Zinc-plated steel	1B798525062	36*	Stem Guide Gasket, Fluorocarbon (FKM) (2 required)	1U1716X0012
9	Stem Guide, Stainless steel	16A2923X012	37*	Stem O-ring Nitrile (NBR)	16A2920X012
10	Adjusting Screw	10B7192X012		Fluorocarbon (FKM)	16A2920X022

\*Recommended spare part

# Type 1805P



□ APPLY SEAL/ADH/LUB

**Figure 4. Type 6358B Pilot Assemblies**

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