

Marshall Excelsior

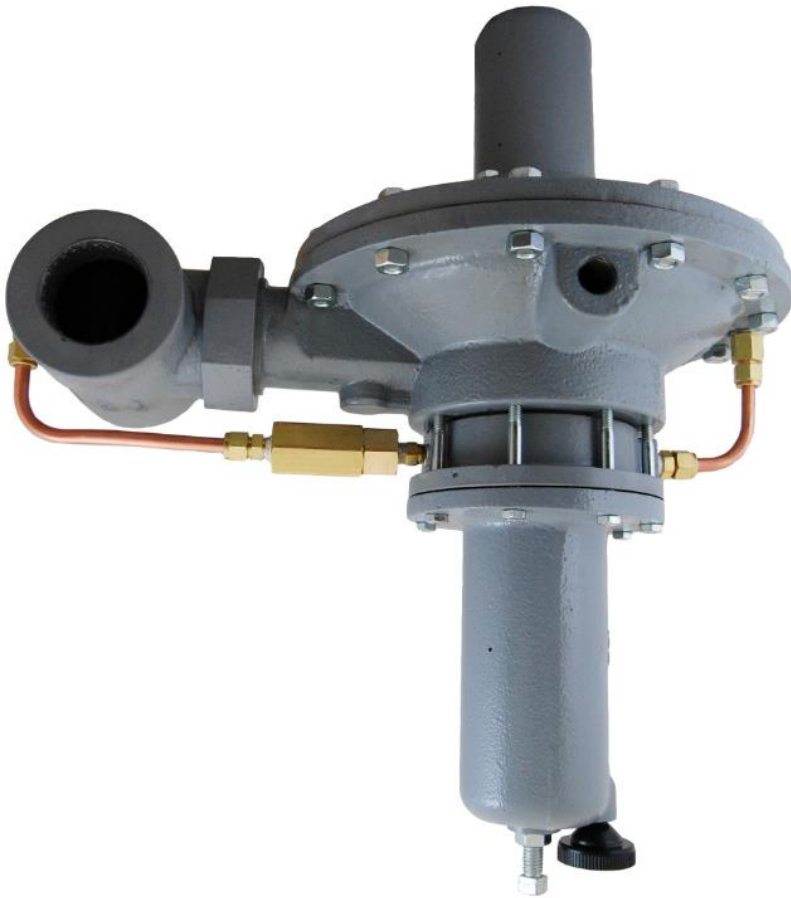


Gas Connections

MEGR-199 PILOT OPERATED PRESSURE REGULATOR

Instruction Manual- Look Inside For:

- Applications
- Specifications
- Installation
- Start-Up and Adjustment
- Maintenance
- Parts List



Marshall Excelsior Company
Marshall, MI 49068
269-789-6700
FAX 269-781-8340

www.marshallexcelsior.com

The contents of this publication are for informational purposes only. While every effort has been made to ensure accuracy, these contents are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or for their use or applicability. Marshall Excelsior Co. reserves the right to modify or improve the designs or specifications of such products at any time without notice. The MEC™ logo is the trademark of Marshall Excelsior Co.

Applications

The MEGR-199 gas regulators provide a broad range of controlled pressure ranges and capacities in a wide variety of distribution, industrial, and commercial applications.

Introduction

The MEGR-199 uses an integrated pilot design to allow for better control of downstream pressure. A variety of pilot regulators can be installed on the MEGR-199. The type of pilot mainly depends on the desired output range.

The inlet pressure pilot is factory-piped, so no supply line is required for standard installations. The MEGR-199 also allows for easy inspection of the main seat and orifice due to its union nut connections.

There is not atmospheric bleed associated with the MEGR-199, all excess pressure is vented downstream. It is recommended that an overpressure protection system be installed.

Materials of Construction

Body	Cast Ductile Iron, WCB Steel
Upper Casing	Cast Ductile Iron
Lower Casing	Cast Ductile Iron
Main Spring Case	Cast Ductile Iron
Diaphragm Plate	Zinc-plated Steel
Main Diaphragm	Nitrile
O-Rings	Nitrile
Springs	Zinc-plated Steel
External Fittings	Brass
Tubing	Copper
Pilot Body/Spring Case	Cast Ductile Iron
Pilot Trim	Brass / Nitrile
Pilot Internals	Zinc-plated Steel, Zinc, Stainless Steel,
Filter	Brass
Filter Element	Cellulose

How It Works

Pressure is introduced through the IN port of the unit. From there it splits into two paths, the pressure that acts against the main seat of the regulator and the inlet pressure for the pilot. The inlet pressure for the pilot flows through a filter to

remove any particulates that could clog or damage the pilot internals.





The pilot valve reduces the inlet pressure and controls the loading pressure on the top of the main diaphragm. The loading pressure overcomes the main spring force to actuate the diaphragm and opens the main valve through a lever connection. Outlet pressure registers under the main diaphragm through an external control line. The double diaphragm of the pilot senses the outlet pressure under the main diaphragm and controls the loading pressure. When the output pressure is lower than the set point, the force exerted by the pilot range spring acts against the output pressure and opens the pilot valve as necessary. When the demand is met, the outlet pressure overcomes the range spring, and closes the pilot orifice. The pilot then relieves the loading pressure through the bleed valve. This reduces the loading pressure until the unit reaches equilibrium.

Monitoring Systems

A monitor unit can serve as overpressure protection in the case of a wide-open failure of the main regulator. A MEGR-199M that is configured as a monitor regulator has a modified lower casing that includes an O-ring seal around the valve carrier (Figure 5).

The system should be set up in as seen in Figure 2, with the O-ring seal unit upstream. The control line of the upstream regulator must be installed downstream of the second regulator. During normal operation, the monitor regulator remains wide open. If the main regulator fails open, the monitor regulator will take over at a slightly higher pressure.

When adjusting the set point of a wide-open monitor, first increase the set point of both regulators to a point above the desired monitor setting by turning the adjustment screws clockwise. Lower the set point of the monitor regulator to the desired pressure, and then adjust the main regulator. Be sure that the difference between the monitor and the main regulator set points is at least equal to the minimum differential pressure for full stroke of the main spring.

-  - Inlet Pressure
-  - Loading Pressure
-  - Outlet Pressure
-  - Atmospheric Pressure

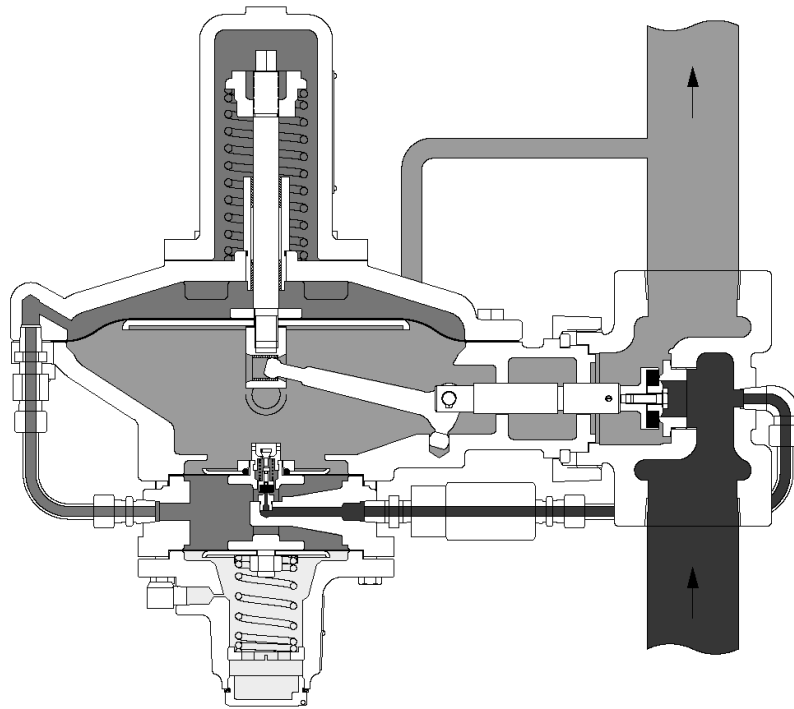


Figure 1. MEGR-199 Pressure Diagram

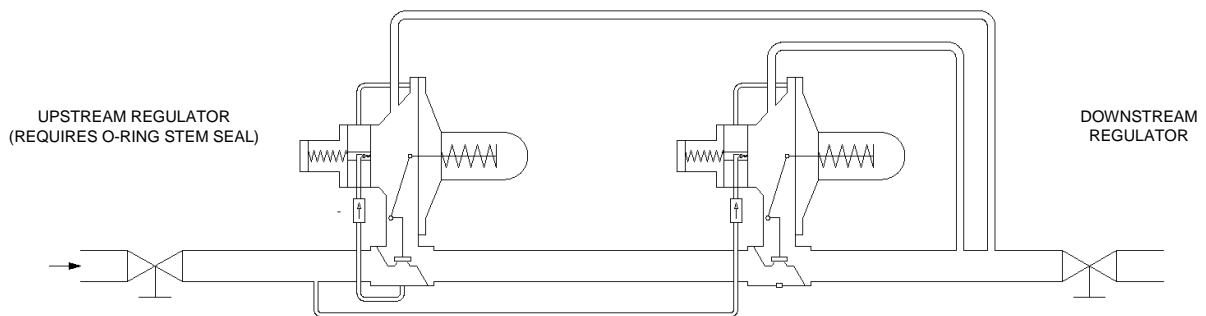


FIGURE 2A. MONITOR REGULATOR MUST BE PLACED UPSTREAM OR DOWNSTREAM. REQUIRES ADDITIONAL PIPING

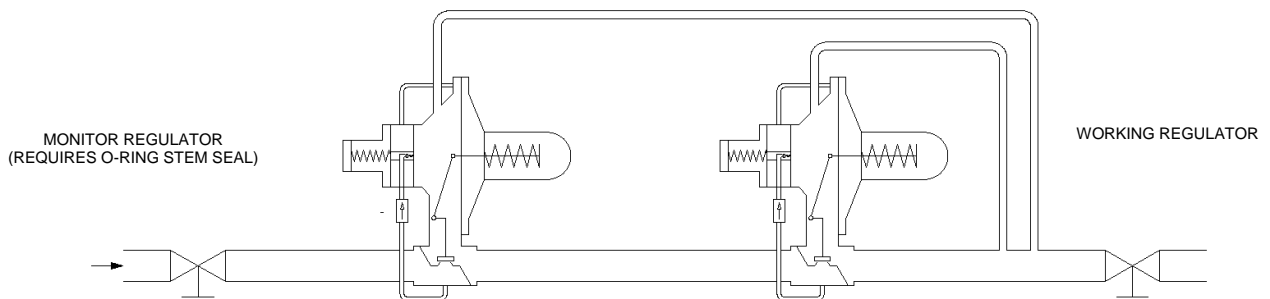


FIGURE 2B. MONITOR REGULATOR MUST BE PLACED UPSTREAM. NO ADDITIONAL PIPING REQUIRED.

Figure 2. MEGR-199M Wide-Open Monitor Installations

Installation

Qualified personnel should perform installation, operation, and maintenance. The regulator may be mounted in any position that the tubing allows, provided that the flow through the body is in the direction from inlet to outlet (as marked by the arrow on the body). It is important that the pilot bonnet vent remains unobstructed at all times. Be sure to position the regulator to prevent any contamination, rain, or debris from entering the bonnet vent. If it is necessary to vent the pilot bonnet remotely, remove the provided vent and replace the ¼" tubing or pipe. Prior to installation, inspect the regulator and the piping lines for any debris or contamination. Apply pipe compound to the male pipe threads prior to installation. After installation, periodically inspect the regulator for damage, especially after any overpressure condition.

The MEGR-199 requires a downstream control line to accurately control pressure. This is installed in one of the two ½" ports on the lower casing. The port closer to the upstream side of the regulator will come plugged from the factory. This control line should be installed approximately 2 to 3 feet (.61 to .91 meters) downstream from the regulator. If this distance is difficult to achieve, it is better to install the control line closer to the regulator, rather than farther away. Do not install the tap near any fittings that may cause turbulence in the control line (ex: elbows, valves, etc.).

It is not necessary to install an upstream pilot supply line because of the factory installed pilot supply tubing. If an upstream pilot supply line is desired, the ¼" NPT hole in the valve body must be plugged.

A venting valve should be installed between the MEGR-199 and the upstream shutoff valve to relieve pressure during shutdown and/or disassembly.

The MEGR-199 is a non-relieving unit, so it is strongly recommended that additional overpressure protection be installed. This can be done by either a relief valve, or by a monitoring system. The regulator should be inspected periodically and immediately after any over pressure condition.

Start-Up and Adjustment

When starting up the regulator, slowly open the upstream shutoff valve. If an upstream pilot supply line was installed, slowly open it. The output pressure should rise to the outlet pressure setting. Next, slowly open the downstream shutoff valve. Check all piping and connections for leaks before making any final pressure adjustments. The nameplate will provide the range of allowable pressure settings. For pressure ranges outside of the given range, either change the spring in the current pilot, or replace the entire pilot. Be sure to correct the nameplate accordingly. For information on changing the pilot see the Maintenance section.

When adjusting the set pressure of the MEGR-199, be sure to use an additional pressure-measuring device to monitor the downstream pressure. Remove the closing cap, if necessary, and turn the adjustment screw as needed. Clockwise rotation of the pilot adjustment screw will increase the set pressure, and counter-clockwise rotation will decrease it. After reaching the desired pressure, replace the closing cap, or tighten the jam nut to prevent unit tampering.

Maintenance

Severity of conditions and the requirement of both state and federal laws determine the frequency to which the regulators need to be inspected. Debris in the process line, exterior damage, and normal wear could require the replacement of the diaphragms or other various parts. The procedures below will provide assistance when attempting to replace these parts.

!WARNING!

When attempting any inspection or disassembly, relieve all pressure from the valve and its adjacent piping. Failure to do so may result in personal injury or equipment damage as a result of an explosion or sudden pressure release.

All items numbers called out in the instructions below can be found in Figures 2 through 7.

All actuator components can be accessed without removing the main body from the line. Disconnect the pilot loading tubing from the regulator, and loosen the union nut to remove the actuator from the body.

Main Valve (Figure 2)

These procedures are for inspecting/replacing the main diaphragm and main trim. The procedures for inspecting the pilot valve are listed on the next page.

1. Remove the four cap screws (12) and lift off the spring case (1).
2. Remove the main spring seat (2) and the main spring (3). Take care when removing the spring seat, as the main spring will still be compressed.
3. Remove the 12 cap screws (15) and hex nuts (16), and lift off the upper casing (13).
4. Remove the diaphragm assembly (4, 7, 8, 9, 10, & 11) by tilting it so that the pusher post (9) disengages the lever (14).
5. Separate the components of the diaphragm assembly by unscrewing the diaphragm rod (4) from the pusher post (9). Inspect the diaphragm (11) and the pusher post gasket (8). Replace if necessary.
6. If unit is a monitor unit with o-ring seal (Figure 7), the o-ring (65) can be inspected by removing the valve carrier (19). If the lower casing (30) has been disconnected from the body (27), the valve carrier can be inspected by removing the cotter pin (23) holding the main seat holder (24). The lever and valve carrier will then be able to be removed and inspected. If the unit is still connected to the body, one of the retaining rings (17) must be removed from the lever pin (18) to remove the lever and inspect the valve carrier.
7. If the lower casing (30) was removed, replace the body gasket (22). Reinstall the main seat, if it was removed, onto the valve carrier using a new cotter pin. With the lever (14) and valve carrier reinstalled in the lower casing (30), assemble the lower casing and union nut (21) onto the body (27) and secure it.
8. Loosely reassemble the diaphragm assembly, and catch the pusher post (9) onto the lever (14) as seen in Figure 2. Align the "U" of the diaphragm (11) with the "U" of the lower casing (30) and tighten the diaphragm rod (4).
9. Install the upper casing (13) and secure it to the lower casing (30) by tightening the cap screws (15) and hex nuts (16).
10. Place the main spring (3) onto the upper casing (13) and thread the main spring seat (2) onto the diaphragm rod (4) until it bottoms, then back out 1 revolution.

CAUTION! Be sure to use the main spring seat (2) only with spring (3).

11. Install a new spring case gasket (6) and the main spring case (1). Install the four cap screws. Mark the nameplate if any functional changes have been made to the regulator.

Note: When replacing o-rings, apply a good quality o-ring lubricant to them to ensure a good seal, and to prevent the valve carrier from jamming.

Pilot Valve (Figure 3 & 5)

1. If necessary, remove the closing cap (33). Back off the adjustment screw (35) to relieve spring pressure from the unit. Remove the range spring (36) and adjustment screw seat (45), if necessary.
2. Loosen compression fittings (61 and 55) to prepare to remove the pilot. Remove cap screws (44).
3. Remove the pilot assembly from the lower casing (30).
4. The internal pilot body arm can be used for leverage to remove the diaphragm nuts (16 and 49). Remove the diaphragm plates (37 and 41), and inspect the diaphragms (38 and 40) and the o-ring (50). Replace them if necessary.
5. Remove the bleed valve assembly by loosening the bleed orifice (48). The bleed valve assembly will also include the bleed valve (52), spring (53), and pilot valve seat (54). These parts can be unthreaded by hand, inspect them and replace as necessary.
6. The pilot orifice (51) should now be accessible. Inspect it for nicks, digs, or clogs, and replace if necessary.
7. Reassemble the pilot in the reverse of the steps listed above. After tightening the diaphragm nuts (16 and 49), make sure that the yoke assembly (39) is straight as shown in Figures 2 and 3. The yoke assembly could bind and cause the valve to fail if this is not checked. When placing the pilot assembly back onto the lower casing, make sure that the diaphragms are not flat.

MEGR-199 Main Seat (Figure 2 & 7)

1. Loosen compression fittings (57 and 55) and remove the pilot loading tubing (56). Loosen the union nut (21) and remove the lower casing (30) from the main body (27).
2. Inspect the orifice (26) and replace if there is any visible damage.

3. Inspect the disk/o-ring (25) by removing the cap screw (29) with the disk holder (24) still held in place by the cotter pin (23). The retainer (28) and disk/o-ring can now be removed. If the entire disk holder assembly is to be replaced, remove the cotter pin to release it. Replace with new cotter pin.
4. Reassemble the disk holder assembly. Install a new body gasket, and reassembly the lower casing onto the valve body. Tighten the union nut and reinstall the pilot loading tubing.

Filter Assembly (Figure 6)

1. Remove the filter cap (F1) from the filter body (F7).
2. Remove the assembly screw (F2) along with the rest of the filter internals. Remove any debris found inside of the filter parts.
3. Replace the filter element (F3) and the filter gasket (F5). Reinstall the assembly screw, making sure to stack the parts as shown in Figure 6.

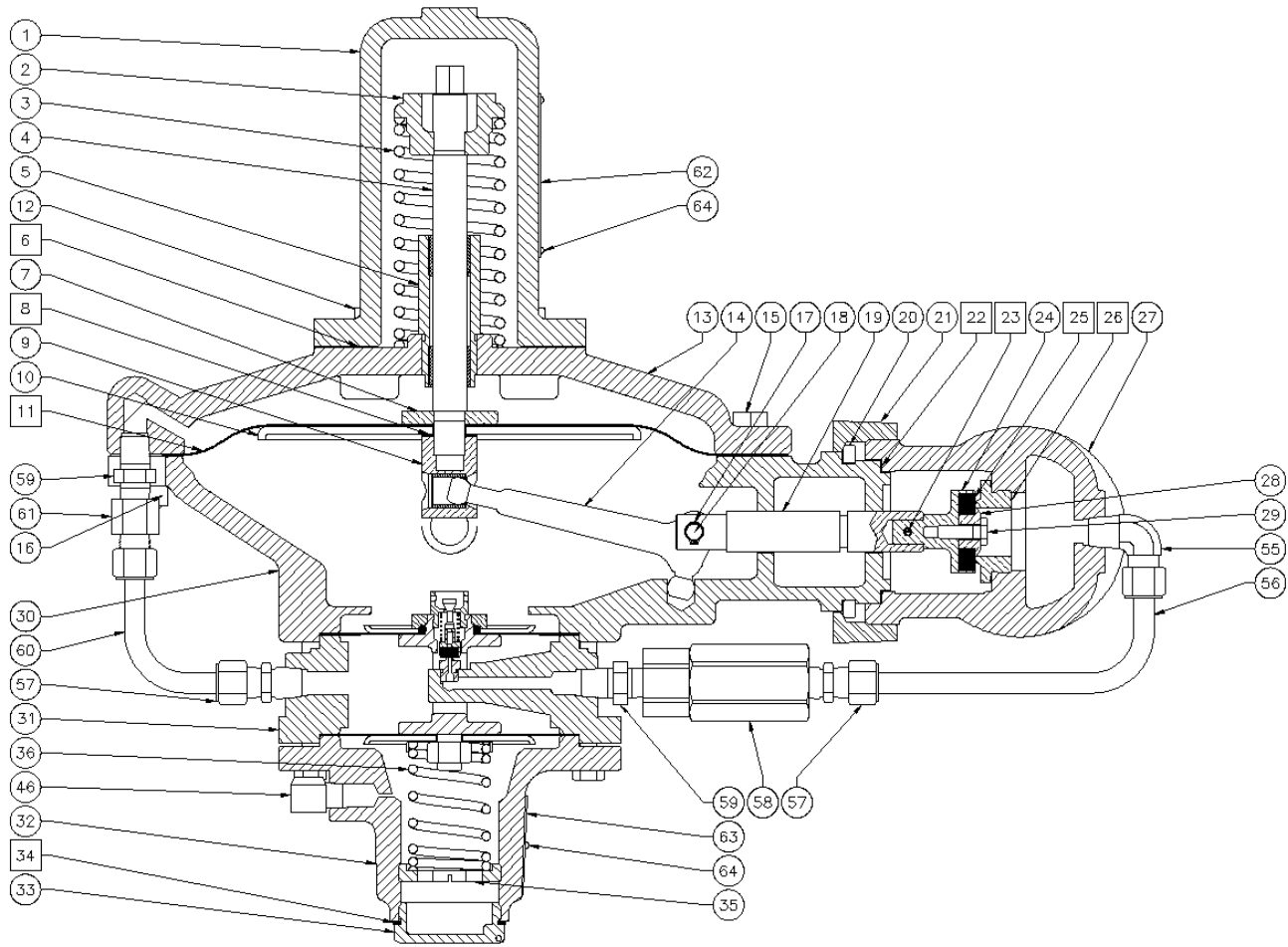


Figure 3. MEGR-199 Internals with pilot and Disk Seat

MEGR-199 Main Actuator Parts List (Fig. 3)

Item Description

- 1 Main Spring Case
- 2 Main Spring Seat,
Up to 250 PSI Max Differential
300 PSI Max Differential
- 3 Main Spring
25 PSI Max Differential
50 PSI Max Differential
250 PSI Max Differential
300 PSI Max Differential
- 4 Diaphragm Rod
- 5 Diaphragm Rod Guide Assembly
- 6 Spring Case Gasket
- 7 Collar
- 8 Pusher Post Gasket
- 9 Pusher Post Assembly
- 10 Diaphragm Plate
- 11 Diaphragm, Nitrile
- 12 Cap Screw, 4 required
- 13 Upper Casing
- 14 Lever
- 15 Cap Screw, 12 required
- 16 Hex Nut, 13 required
- 17 Retaining Ring, 2 required
- 18 Lever Pin
- 19 Valve Carrier

- 20 Body Snap Ring, 2 required
- 21 Union Nut
- 22 Body Gasket
- 23 Cotter Pin
- 24 Main Seat Holder
Disk Type
O-Ring Type, 7/8 Orifice
O-Ring Type, 1-1/8 Orifice
- 25 Main Seat
Disk Seat, Nitrile
7/8" O-Ring Seat, Nitrile
1-1/8" O-Ring Seat, Nitrile
- 26 Main Orifice
Disk Type Orifice
7/8", Brass
1-1/8", Brass
O-ring Type Orifice
7/8", Brass
1-1/8", Brass
- 27 Main Valve Body
2" NPT, Iron
2" NPT, Steel
- 28 Retainer
Disk Type Retainer
7/8", Brass
1-1/8", Brass
O-ring Type Retainer
7/8", Brass
1-1/8", Brass

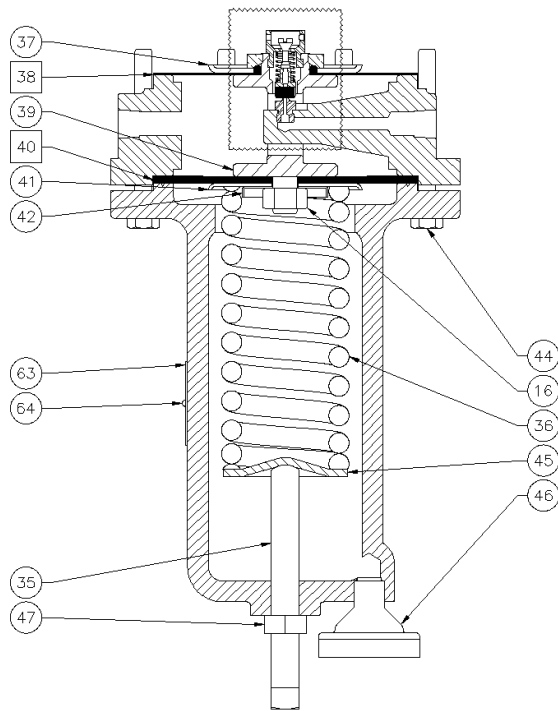


Figure 4. Pilot Assembly

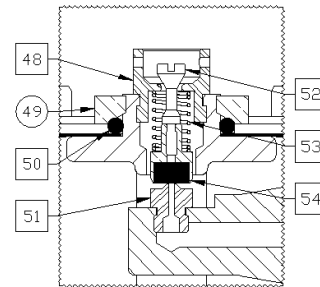


Figure 5. Pilot Seat & Relief Assembly

MEGR-199 Main Actuator Parts List (Fig. 3)

<u>Item</u>	<u>Description</u>
29	Cap Screw
30	Lower Casing Standard Monitor
43	Pipe Plug (Not Shown)
62	Main Nameplate
64	Drive Screw
65	Monitor O-ring

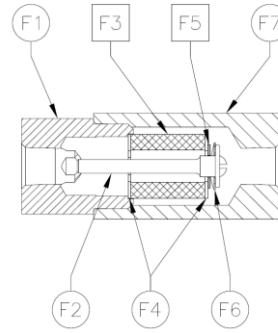
Pilot Parts List (Figs. 3, 4, & 5)

<u>Item</u>	<u>Description</u>
31	Pilot Body
32	Pilot Spring Case Spring Case
33	Closing Cap
34	Closing Cap Gasket
35	Adjusting Screw Adjusting Screw
36	Control Spring 3" – 12" W.C., Silver .25 – 2 PSI, Red 1 – 5 PSI, Yellow 2 – 10 PSI, Blue 5 – 15 PSI, Brown 10 – 20 PSI, Green 10 – 65 PSI, Green Stripe
37	Upper Pilot Diaphragm Plate Diaphragm Plate
38	Upper Pilot Diaphragm
39	Pilot Yoke Assembly

40	Lower Pilot Diaphragm Diaphragm
41	Upper Pilot Diaphragm Plate Diaphragm Plate
42	Spring Seat
44	Cap Screw, 8 required
45	Adjustment Screw Seat
46	Vent Assembly
47	Hex Nut
48	Bleed Orifice
49	Diaphragm Nut
50	Diaphragm O-ring
51	Pilot Orifice Standard 25 PSI Max Pressure
52	Bleed Valve
53	Bleed Valve Spring 250 Max Inlet Pressure, Plain +250 Inlet Pressure, Blue 25 Max Inlet, Red
54	Seat Assembly
63	Pilot Nameplate
64	Drive Screw, 2 required

Pilot Connecting Parts List (Fig. 3)

<u>Item</u>	<u>Description</u>
55	Compression Fitting
56	Pilot Supply Tubing, Horizontal
	Pilot Supply Tubing, Vertical
57	Compression Fitting
58	Filter Assembly
59	Pipe Nipple
60	Loading Tubing
61	Compression Fitting



Filter Parts List (Fig. 6)

<u>Item</u>	<u>Description</u>
F1	Filter Cap
F2	Assembly Screw
F3	Filter Element
F4	Filter Washer
F5	Gasket
F6	Spring Washer
F7	Filter Body

Figure 6. Brass Filter Assembly

Assembly Torque Values

<u>Item</u>	<u>Torque Value</u>
4	200 in-lbs
12	380 in-lbs
15	750 in-lbs
26	480 in-lbs
44	150 in-lbs
48	240 in-lbs
51	100 in-lbs

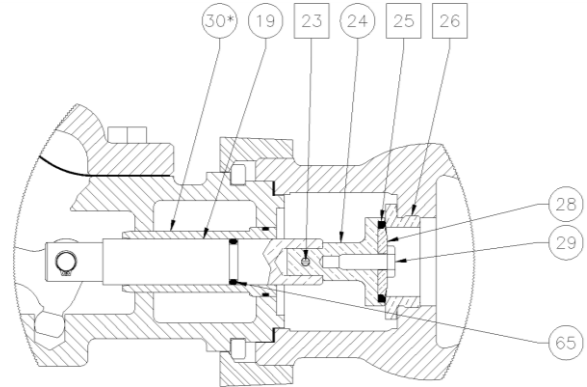


Figure 7. Monitor Housing and O-ring Seat