

May 2008

Y690VB Series Vacuum Breakers

Introduction

Scope of Manual

This manual describes and provides instructions and parts lists for Types Y690VB and Y690VBM vacuum breakers. Instructions and parts lists for other equipment used with these breakers are found in separate manuals.

Product Description

The Y690VB Series vacuum breakers are used for precise control of small capacity, low-pressure service applications where an increase in vacuum must be limited. These direct-operated vacuum breakers come in 3/4 and 1-inch (DN 20 and 25) body sizes and have a 1/4 or 1/2-inch (6,35 or 12,7 mm) orifice. The individual products are described as follows:

Type Y690VB

The Type Y690VB is a vacuum breaker with internal pressure registration requiring no downstream control line.

Type Y690VBM

The Type Y690VBM is a vacuum breaker with a control line connection and a throat seal for external pressure registration.

Specifications

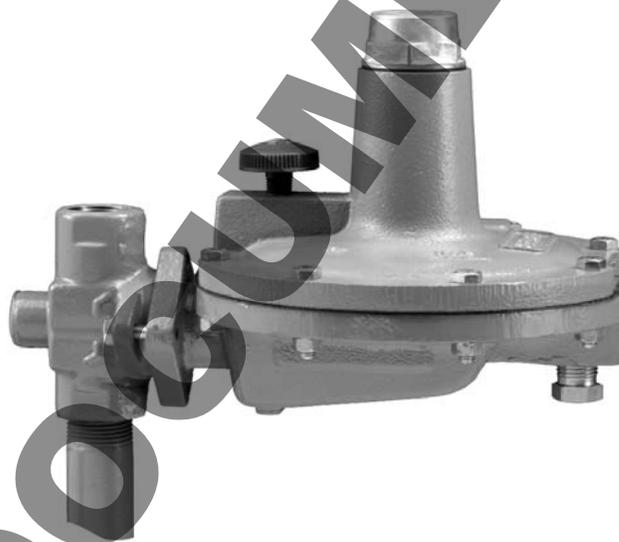
Specifications section gives some general ratings and specifications for the Y690VB Series vacuum breakers. Individual breakers come from the factory with the specific data stamped on the nameplate.

Installation



WARNING

Personal injury, property damage, equipment damage, or leakage due to escaping gas or bursting of



W7292

Figure 1. Type Y690VB Vacuum Breaker

pressure-containing parts may result if this equipment is overpressured or is installed where service conditions could exceed the limits given in Specifications section, or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding those limits. Additionally, physical damage to this equipment could cause personal injury or property damage due to escaping gas. To avoid such injury or damage, install the equipment in a safe and well ventilated location.

Equipment operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. This equipment should be inspected for damage periodically and after any overpressure condition.



Y690VB Series

Specifications

Body Sizes

3/4 or 1-inch (DN 20 or 25)

End Connection Styles⁽¹⁾

See Table 2

Maximum Allowable Inlet (Positive) Pressure⁽²⁾

150 psig (10,3 bar)

Vacuum Control Pressure Ranges⁽²⁾

See Table 1

Maximum Outlet (Casing) Pressure⁽²⁾

Full Vacuum

Maximum Emergency Outlet Pressure to Avoid Internal Parts Damage⁽²⁾

150 psig (10,3 bar)

Spring Case Connection

1/4-inch NPT

Orifice Size

1/4 or 1/2-inch (6,35 or 12,7 mm)

Change in Vacuum Control Pressure to Wide-Open⁽²⁾

See Table 1

Pressure Registration

Type Y690VB: Internal

Type Y690VBM: External

Material Temperature Capabilities⁽²⁾

Nitrile (NBR):

-20° to 180°F (-29° to 82°C)

Fluorocarbon (FKM):

40° to 300°F (4° to 149°C)

Ethylenepropylene (EPDM):

-20° to 275°F (-29° to 135°C)

Perfluoroelastomer (FFKM):

-20° to 300°F (-29° to 149°C)

Approximate Weight

19 pounds (8,62 kg)

1. End connections for other than U.S. standards can usually be provided; consult the Fisher Sales Office or Sales Representative.
2. The pressure/temperature limits in this instruction manual and any applicable standard or code limitation should not be exceeded.

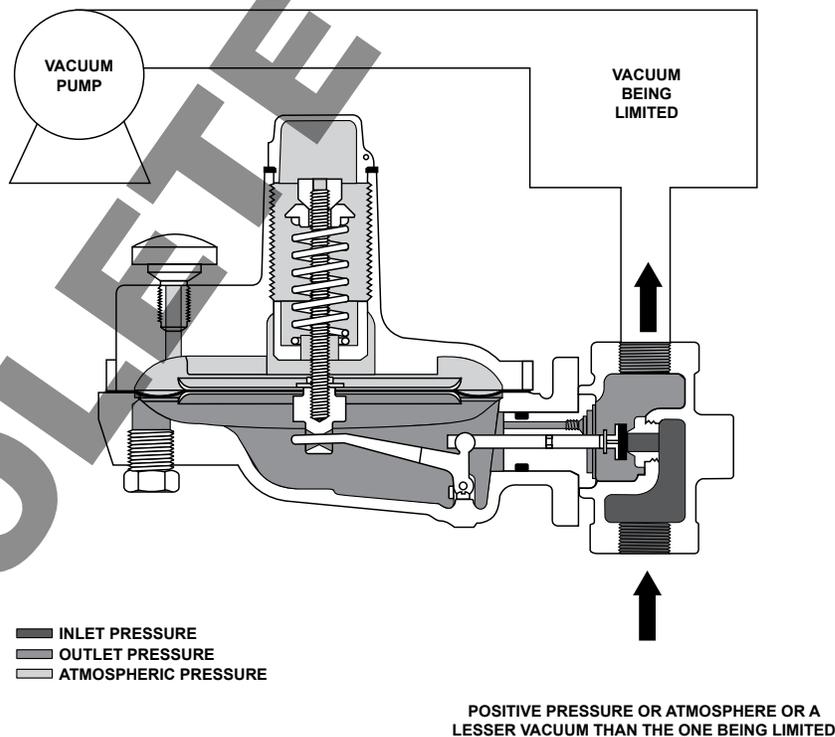


Figure 2. Type Y690VB Operational Schematic

Table 1. Vacuum Pressure Information

| VACUUM CONTROL PRESSURE RANGE ⁽¹⁾⁽²⁾ | CHANGE IN VACUUM TO WIDE-OPEN | | SPRING PART NUMBER | SPRING COLOR | SPRING WIRE DIAMETER |
|---|-------------------------------|----------------------------|--------------------|--------------|------------------------|
| | 1/4-inch (6,35 mm) Orifice | 1/2-inch (12,7 mm) Orifice | | | |
| 0 to 4-inches w.c. (0 to 10 mbar) | 0.6-inches w.c. (1,5 mbar) | 1.3-inches w.c. (3 mbar) | 0N039427222 | Unpainted | 0.062-inches (1,58 mm) |
| 0 to 1.0 psig (0 to 0,069 bar) | 10-inches w.c. (25 mbar) | 0.7 psig (0,048 bar) | 0N086127022 | Unpainted | 0.125-inches (3,18 mm) |
| 0 to 2.1 psig (0 to 0,145 bar) | 1.2 psig (0,08 bar) | 2.4 psig (0,17 bar) | 0N004327022 | Yellow | 0.172-inches (4,37 mm) |
| 0 to 5 psig (0 to 0,34 bar) | 3.2 psig (0,22 bar) | 6.3 psig (0,43 bar) | 1D141827012 | Dark blue | 0.207-inches (5,26 mm) |

1. Spring ranges based on atmospheric inlet pressure.
2. To convert to inches Hg, multiply psig value by 2.04.

Note

If this equipment is shipped mounted on another unit, install that unit according to the appropriate instruction manual.

1. Only personnel qualified through training and experience should install, operate, and maintain this equipment. For Y690VB Series equipment that is shipped separately, make sure that there is no damage to or foreign material in it. Also ensure that all tubing and piping have been blown free.
2. This equipment may be installed in any position as long as the flow through the body is in the direction indicated by the arrow attached to the body. If continuous operation is required during inspection or maintenance, install a three-way bypass valve around the equipment.



WARNING

This equipment may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death, or property damage due to fire or explosion. Vent equipment in hazardous gas service to a remote, safe location away from air intakes or any hazardous area. The vent line or stack opening must be protected against condensation or clogging.

Principle of Operation

The Y690VB Series vacuum breakers (Figure 2) are used in applications where an increase in vacuum must be limited. An increase in vacuum (decrease in absolute pressure) is transmitted to the lower side of the diaphragm, opening the disk assembly. This permits positive pressure, atmosphere, or an upstream vacuum that has higher absolute pressure than the

downstream vacuum, to enter the system and restore the controlled vacuum to its original pressure setting. A Type Y690VB (Figure 3) direct-operated vacuum breaker is self-contained and requires no control line. A Type Y690VBM (Figure 4) vacuum breaker requires a control line from the 1/2-inch NPT tapping in the diaphragm case assembly to the point where the vacuum needs to be controlled.

Startup and Adjustment

All Y690VB Series equipment can be placed in operation by slowly introducing inlet vacuum or pressure. This equipment takes control when vacuum is established. This equipment is suitable for the pressure range stamped on the nameplate (key 46), and listed in Table 1. To adjust the pressure setting, remove the closing cap (key 22) and turn the adjusting nut (key 20) clockwise to increase the pressure setting or counterclockwise to decrease the setting. Replace the cap after making this adjustment. If desired, the closing cap may be wired to the hole provided in the spring case (key 3) to discourage tampering.

Shutdown

First close the nearest upstream shutoff valve and then close the nearest downstream shutoff valve to vent the equipment properly. Next, open the vent valve between the equipment and the downstream shutoff valve nearest to it. All pressure between these shutoff valves is released through the open vent valve.

Maintenance

Equipment parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends on the severity of service conditions and upon applicable codes and government regulations.



WARNING

To avoid personal injury, property damage, or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure from the equipment.

Body Area

These procedures are for gaining access to the disk assembly, orifice, and body O-ring. All pressure must be released from the diaphragm case before the following steps can be performed.

Key numbers are referenced in Figures 3 and 4.

1. To inspect and replace the disk assembly (key 13) or orifice (key 5), remove the cap screws (key 2), and separate the diaphragm casing (key 4) from the body (key 1).
2. Remove and inspect the body seal O-ring (key 11) and the backup ring (key 50).
3. Inspect and replace the orifice (key 5) if necessary. Lubricate the threads of the replacement orifice with a good grade of light grease and tighten using 29 to 37 foot-pounds (39 to 50 N•m) of torque.
4. Remove the cotter pin (key 15) if it is necessary to replace the disk holder assembly (key 13). For a Type Y690VBM, also inspect the throat seal O-ring (key 31) by removing the machine screw (key 33). Replace if necessary. To install a throat seal, place the O-ring on the machine screw and thread into guide insert (key 18) to seal.

Note

The disk holder assembly (key 13) is comprised of the disk and disk holder.

5. Install the disk holder assembly (key 13) and secure it to the valve stem (key 14) with the cotter pin (key 15).
6. Install the backup ring (key 48) and body seal O-ring (key 11) into the body (key 1).
7. Replace the diaphragm casing (key 4) on the body (key 1) and secure with the cap screws (key 2).

Diaphragm and Spring Case Area

These procedures are for gaining access to the control spring, diaphragm assembly, valve stem, and stem O-ring. All pressure must be released from the diaphragm case before these steps can be performed.

Type Y690VB

Key numbers are referenced in Figure 3.

1. Remove the closing cap (key 22) and turn the adjusting nut (key 20) counterclockwise until all compression is removed from the control spring (key 6). If the only further maintenance is to change the control spring (key 6), skip to step 11.
 2. Remove the spring case cap screws (key 24) and hex nuts (key 23, not shown) and lift off the spring case assembly (key 3).
 3. Remove the diaphragm (key 10) and attached parts by tilting it so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm from the attached parts, unscrew the diaphragm hex nut (key 21). If the only further maintenance is to replace the diaphragm parts, skip to step 8.
 4. To replace the lever assembly (key 16), remove the machine screws (key 17) .
 5. To replace the valve stem (key 14) also perform body area maintenance procedure steps 1 through 4 and pull the valve stem (key 14) out of the guide insert (key 18).
 6. Install the valve stem (key 14) into the guide insert (key 18) and perform body area maintenance procedure steps 5 through 7.
 7. Install the lever assembly (key 16) into the valve stem (key 14) and secure the lever assembly (key 16) with the machine screws (key 17).
 8. Reassemble the diaphragm assembly in the following order:
 - Pusher post (key 8)
 - Diaphragm head gasket (key 45)
 - Diaphragm head (key 7)
 - Diaphragm (key 10)
 - Diaphragm head (key 7)
 - Washer (key 36)
 - Diaphragm nut (key 38)
- Secure with 5 to 6 foot-pounds (7 to 8 N•m) of torque.
9. Install the pusher post (key 8) plus attached diaphragm parts onto the lever assembly (key 16).

10. Install the spring case assembly (key 3) and control spring (key 6) on the diaphragm casing (key 4) so that the vent assembly is correctly oriented, and secure them with the spring case cap screws (key 24) and hex nuts (key 23, not shown) to finger tightness only.
11. Install the upper spring seat (key 19) and the adjusting nut (key 20) turning clockwise until there is enough control spring (key 6) force to provide proper slack to the diaphragm (key 10) and attached parts. Using a crisscross pattern, finish tightening the spring case cap screws (key 24) and hex nuts (key 23) to 160 to 190 inch-pounds (18 to 21 N•m) of torque. Then finish turning the adjusting nut to the desired outlet pressure setting.
12. Install a replacement closing cap gasket (key 25) if necessary, and then install the closing cap (key 22).

Type Y690VBM

Key numbers are referenced in Figure 4.

1. Remove the closing cap (key 22) and turn the adjusting nut (key 20) counterclockwise until all compression is removed from the control spring (key 6). If the only further maintenance is to change the control spring, skip to step 11.
2. Remove the spring case cap screws (key 24) and hex nuts (key 23, not shown) and lift off the spring case assembly (key 3).
3. Remove the diaphragm (key 10) and attached parts by tilting it so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm (key 10) from the attached parts, unscrew the diaphragm hex nut (key 21). If the only further maintenance is to replace the diaphragm parts, skip to step 8.
4. To replace the lever assembly (key 16), remove the machine screws (key 17).
5. To replace the valve stem (key 14) or stem seal O-ring (key 30) perform body area maintenance procedure steps 1 through 4 and pull the valve stem out of the guide insert (key 18).
6. Lightly grease the replacement stem seal O-ring (key 30) and install on the valve stem (key 14). Install the valve stem by pushing it into the guide insert (key 18) and perform body area maintenance procedure steps 5 through 7.
7. Install the lever assembly (key 16) into the valve stem (key 14) and secure the lever assembly (key 16) with the machine screws (key 17).
8. Reassemble the diaphragm assembly in the following order:
 - Pusher post (key 8)
 - Diaphragm head gasket (key 45)
 - Diaphragm head (key 7)
 - Diaphragm (key 10)
 - Diaphragm head (key 7)
 - Washer (key 36)
 - Diaphragm nut (key 38)Secure with 5 to 6 foot-pounds (7 to 8 N•m) of torque.
9. Install the pusher post (key 8) plus attached diaphragm parts onto the lever assembly (key 16).
10. Install the spring case assembly (key 3) and control spring (key 6) on the diaphragm casing (key 4) so that the vent assembly (key 26) is correctly oriented, and secure them with the spring case cap screws (key 24) and hex nuts (key 23, not shown) to finger tightness only.
11. Install the upper spring seat (key 19) and adjusting nut (key 20). Turn adjusting nut clockwise until there is enough control spring (key 6) force to provide proper slack to the diaphragm (key 10) and attached parts. Using a crisscross pattern, finish tightening the spring case cap screws (key 24) and hex nuts (key 23, not shown) to 160 to 190 inch-pounds (18 to 21 N•m) of torque. Then finish turning the adjusting nut to the desired outlet pressure setting.
12. Install a replacement closing cap gasket (key 25) if necessary, and then install the closing cap (key 22).

To Convert Constructions

Type Y690VB to Type Y690VBM:

New parts required: keys 30, 31, and 33

1. Remove pipe plug (key 27) from the diaphragm casing (key 4).
2. Refer to steps 1 and 3 in the Body area maintenance section.
3. Insert the throat seal O-ring (key 31, Figure 4) and one machine screw (key 33).

Y690VB Series

Table 2. Body Materials and Part Numbers (Key 1)

| BODY MATERIAL | END CONNECTION STYLE | PART NUMBER | |
|---|----------------------|-----------------------|---------------------|
| | | 3/4-Inch (DN 20) Body | 1-Inch (DN 25) Body |
| Ductile iron | NPT | 17B5351X012 | 17B5351X022 |
| Stainless steel | NPT | 17B5351X032 | 17B5351X042 |
| | CL 150 RF | 17B9733X072 | 17B9733X082 |
| Stainless steel with Carbon steel flanges | CL 150 RF | 17B9733X012 | 17B9733X022 |

4. Insert the stem seal O-ring (key 30) by following steps 1 through 7 and 9 through 12 in the Diaphragm and Spring Case Area Maintenance section

Type Y690VBM to Type Y690VB:

New parts required: key 27

1. Insert pipe plug (key 27) in the diaphragm casing (key 4).
2. Follow steps 1 through 7 and 9 through 12 in the Diaphragm and Spring Case Area Maintenance section to remove the stem seal O-ring (key 30, Figure 4). Follow steps 1 through 7 of Body Area Maintenance to remove the throat seal (key 31) and machine screw (key 33).

Parts Ordering

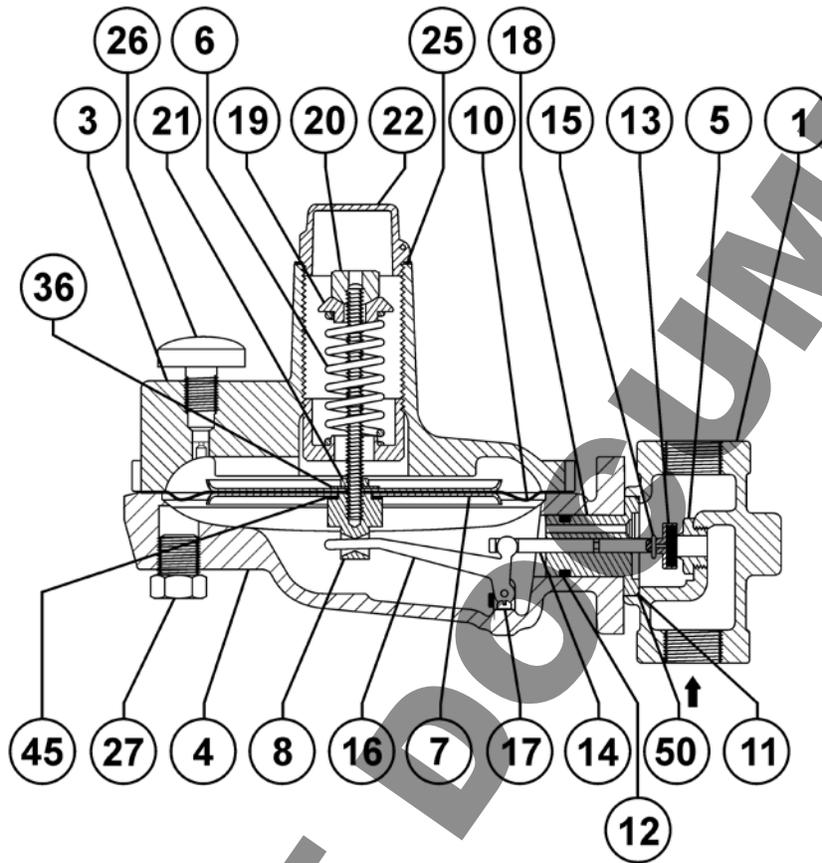
When corresponding with the local Sales Office about this regulator, include the type number and all other pertinent information stamped on the nameplate (key 46). Specify the eleven-character part number when ordering new parts from the following parts list.

Parts List

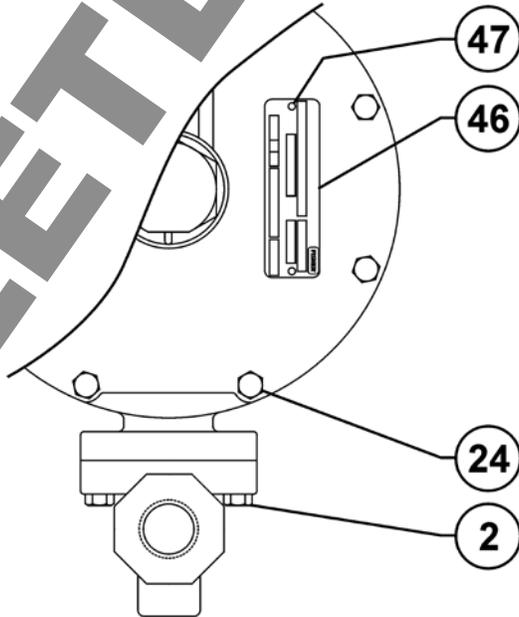
| Key | Description | Part Number |
|-----|--|----------------------------|
| | Spare Parts Kit (Stainless steel/Nitrile Construction) Included are keys 10, 11, 12, 13, 15, 25, 30, 31, 33, and 45 | RY690AX0012 |
| 1 | Body | See Table 2 |
| 2 | Cap Screw Ductile iron Stainless steel | 1C856228992 18B3456X012 |
| 3 | Spring Case Assembly Ductile iron Stainless steel | 17B8946X012 17B8946X022 |
| 4 | Diaphragm Casing Ductile iron Stainless steel | 47B3063X012 47B3064X012 |
| 5 | Orifice S30300 Stainless steel 1/4-inch (6,35 mm) 1/2-inch (12,7 mm) | 1B815135032 1A928835032 |
| 6 | Spring | See Table 1 |

*Recommended spare part

| Key | Description | Part Number |
|-----|---|----------------------------|
| 7 | Diaphragm Head (2 required) Stainless steel | 17B9723X032 |
| 8 | Pusher Post Assembly Stainless steel | 17B9742X012 |
| 10* | Diaphragm Nitrile Fluorocarbon (FKM) | 37B9720X012 23B0101X052 |
| 11* | Body Seal O-Ring Nitrile (NBR) Fluorocarbon (FKM) | 1H993806992 1H9938X0012 |
| 12* | Insert Seal Nitrile (NBR) Fluorocarbon (FKM) | 1B885506992 1B8855X0012 |
| 13* | Disk Assembly S30300 Stainless steel with Nitrile (NBR) Fluorocarbon (FKM) | 1C4248X0202 1C4248X0052 |
| 14 | Stem | 17B3423X012 |
| 15* | Cotter Pin Stainless steel | 1A866537022 |
| 16 | Lever Assembly Stainless steel | 1B5375000B2 |
| 17 | Machine Screw (2 required) Stainless steel | 19A7151X022 |
| 18 | Guide Insert Stainless steel | 27B4028X022 |
| 19 | Upper Spring Seat | 1A201824092 |
| 20 | Adjusting Nut | 17B9740X012 |
| 21 | Hex Nut | 1A345724122 |
| 22 | Closing Cap Standard Steel | 1B541644012 1E422724092 |
| 23 | Hex Nut, not shown (8 required) Ductile iron Stainless steel | 1A352724122 1E9440X0302 |
| 24 | Diaphragm Case Cap Screw (8 required) Ductile iron Stainless steel | 1A352524052 18B3455X012 |
| 25* | Closing Cap Gasket | 1P753306992 |
| 26 | Vent Assembly Spring Case Up (standard) Spring Case Down | 17A6570X012 17A6571X012 |
| 27 | Pipe Plug Ductile iron Stainless steel | 1A369224492 1A369235072 |
| 28 | Lubricant | |
| 30* | Stem Seal (Type Y690VBM only) Nitrile Fluorocarbon (FKM) | 1H2926G0012 1H2926X0022 |
| 31* | Throat Seal (Type Y690VBM only) Nitrile Fluorocarbon (FKM) | 1D682506992 1D6825X0012 |
| 33 | Machine Screw (Type Y690VBM only) | 18A0703X022 |
| 36 | Washer | 18B3440X012 |
| 45* | Lower Head Gasket | 18B3450X012 |
| 46 | Nameplate | ----- |
| 47 | Drive Screw (2 required) | 1A368228982 |
| 50 | Backup Ring | 18B3446X012 |



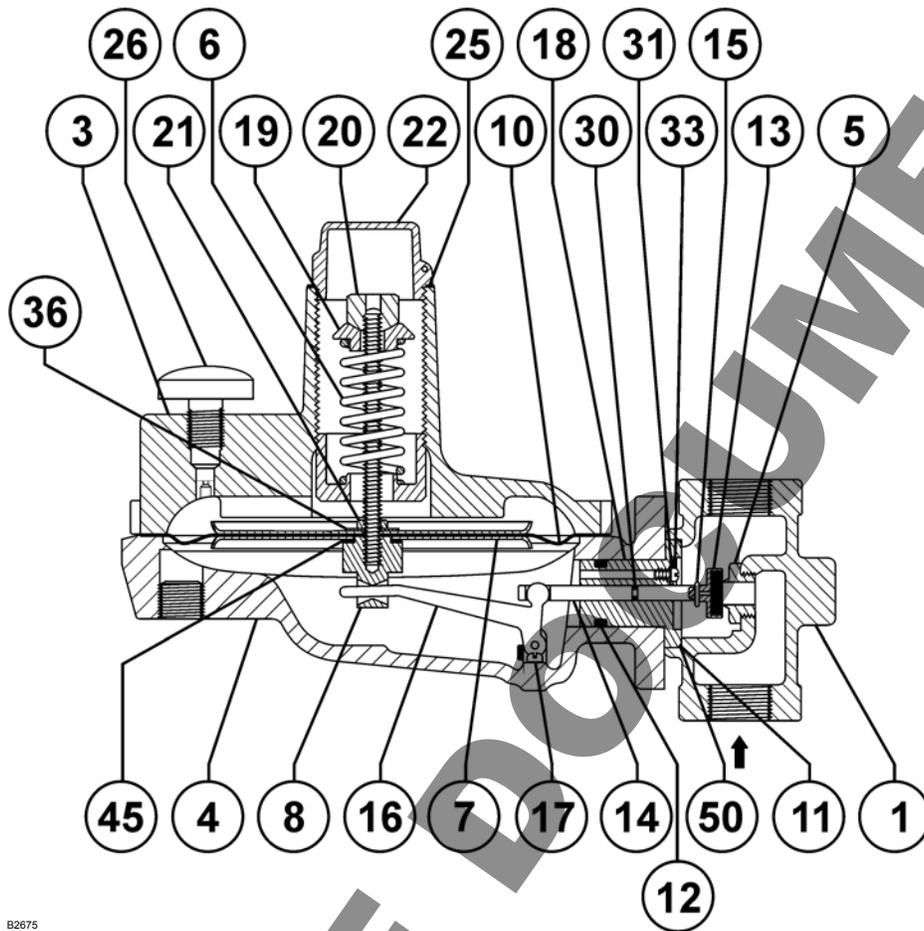
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Figure 3. Type Y690VB Assembly

Y690VB Series



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Figure 4. Type Y690VBM Assembly

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