Y690VB Series Vacuum Breakers

Introduction

Scope of the 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 NPS 3/4 and 1 (DN 20 and 25) body sizes and have an 1/4 or 1/2-inch (6,4 or 13 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.

Figure 1. *Type Y690VB Vacuum Breaker*

Installation

WARNING

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

D102594X012

Specifications

Body Sizes
NPS 3/4 or 1 (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 NPT

Orifice Size
1/4 or 1/2-inch (6,4 or 13 mm)

Change in Vacuum Control Pressure to Wide-Open[2]
See Table 1

Pressure Registration
Type Y690VB: Internal
Type Y690VBM: External

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 (9 kg)

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

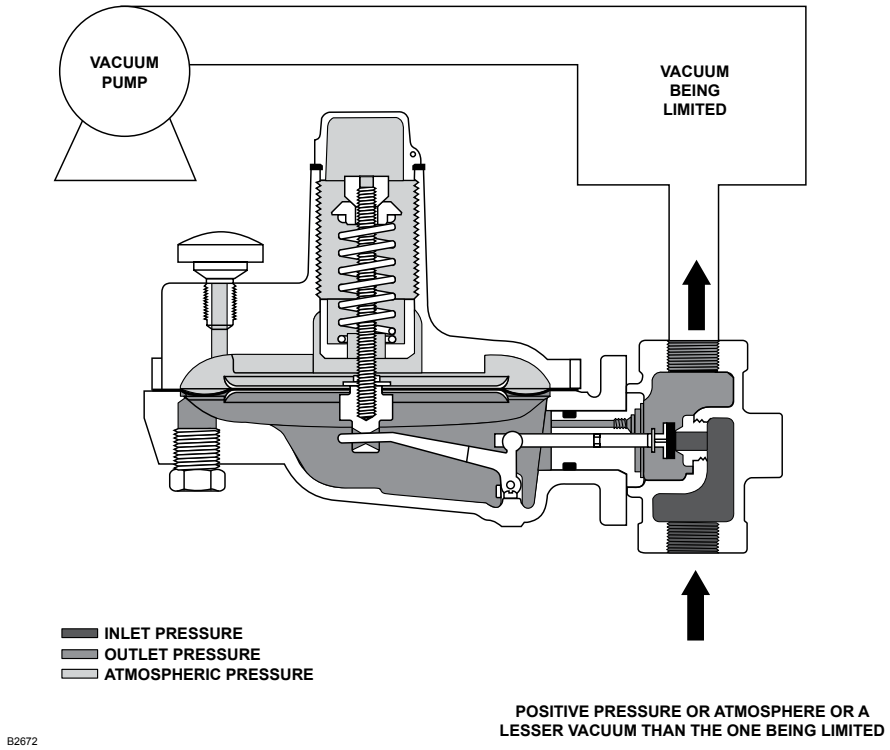


Figure 2. *Type Y690VB Operational Schematic*

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 (6,4 mm) Orifice	1/2-inch (13 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 (1,6 mm)
0 to 1.0 psig (0 to 0,07 bar)	10-inches w.c. (25 mbar)	0.7 psig (0,05 bar)	0N086127022	Unpainted	0.125-inches (3,2 mm)
0 to 2.1 psig (0 to 0,14 bar)	1.2 psig (0,08 bar)	2.4 psig (0,17 bar)	0N004327022	Yellow	0.172-inches (4,4 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 (5,3 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 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).

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

BODY MATERIAL	END CONNECTION STYLE	PART NUMBER	
		NPS 3/4 (DN 20) Body	NPS 1 (DN 25) Body
Ductile iron	NPT	17B5351X012	17B5351X022
Stainless steel	NPT	17B5351X032	17B5351X042
	CL150 RF	17B9733X072	17B9733X082
Stainless steel with Carbon steel flanges	CL150 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).

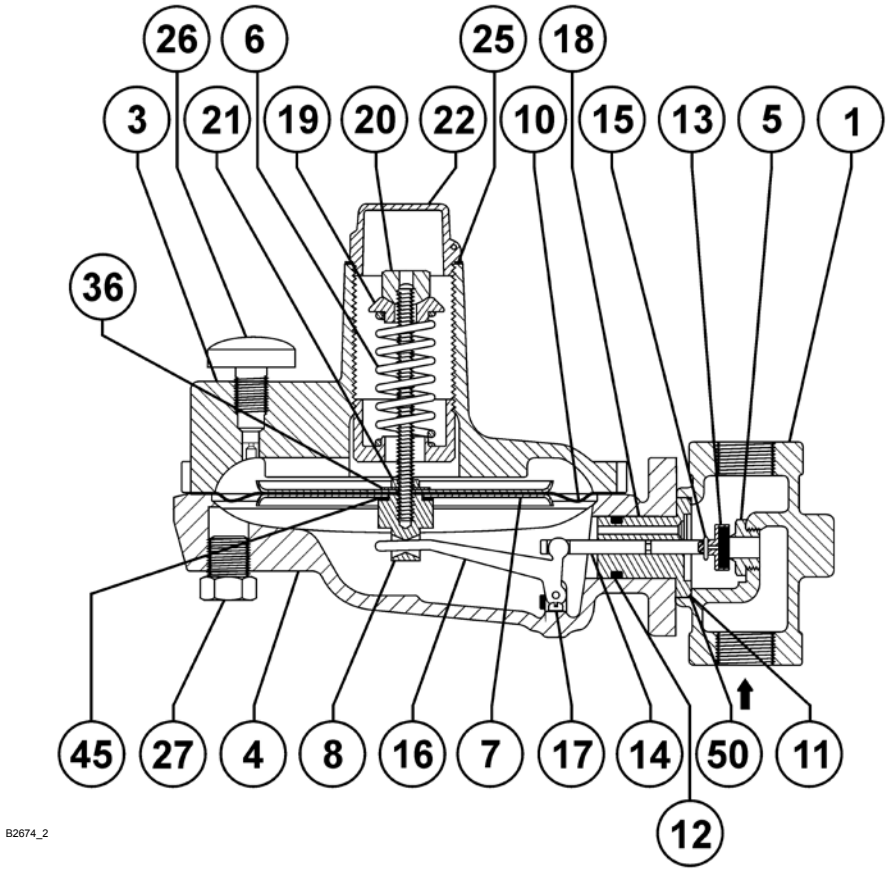
Parts Ordering

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	1C856228992
	Stainless steel	18B3456X012
3	Spring Case Assembly	
	Ductile iron	17B8946X012
	Stainless steel	17B8946X022
4	Diaphragm Casing	
	Ductile iron	47B3063X012
	Stainless steel	47B3064X012
5	Orifice	
	303 Stainless steel	
	1/4-inch (6,4 mm)	1B815135032
	1/2-inch (13 mm)	1A928835032
6	Spring	See Table 1
7	Diaphragm Head (2 required)	
	Stainless steel	17B9723X032
8	Pusher Post Assembly	
	Stainless steel	17B9742X012
10*	Diaphragm	
	Nitrile (NBR)	37B9720X012
	Fluorocarbon (FKM)	23B0101X052
11*	Body Seal O-Ring	
	Nitrile (NBR)	1H993806992
	Fluorocarbon (FKM)	1H9938X0012
12*	Insert Seal	
	Nitrile (NBR)	1B885506992
	Fluorocarbon (FKM)	1B8855X0012
13*	Disk Assembly	
	303 Stainless steel with	
	Nitrile (NBR)	1C4248X0202
	Fluorocarbon (FKM)	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	1B541644012
	Steel	1E422724092
23	Hex Nut, not shown (8 required)	
	Ductile iron	1A352724122
	Stainless steel	1E9440X0302
24	Diaphragm Case Cap Screw (8 required)	
	Ductile iron	1A352524052
	Stainless steel	18B3455X012
25*	Closing Cap Gasket	1P753306992
26	Vent Assembly	
	Spring Case Up **(standard)**	17A6570X012
	Spring Case Down	17A6571X012
27	Pipe Plug	
	Ductile iron	1A369224492
	Stainless steel	1A369235072
30*	Stem Seal (Type Y690VBM only)	
	Nitrile (NBR)	1H2926G0012
	Fluorocarbon (FKM)	1H2926X0022
31*	Throat Seal (Type Y690VBM only)	
	Nitrile (NBR)	1D682506992
	Fluorocarbon (FKM)	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

*Recommended spare part



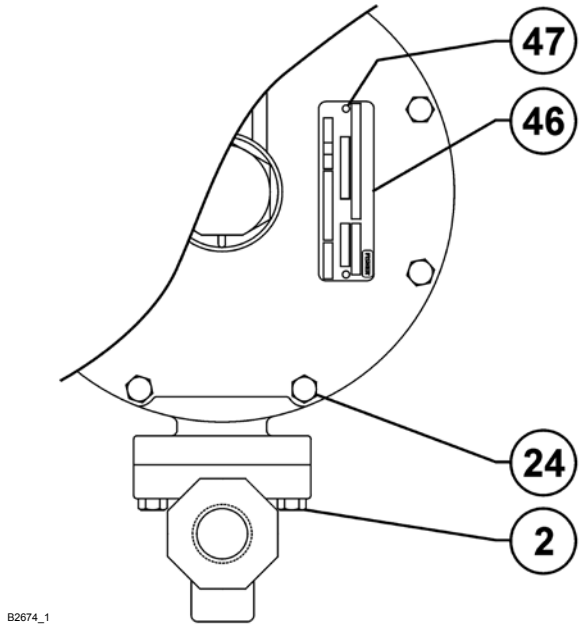


Figure 3. *Type Y690VB Assembly*

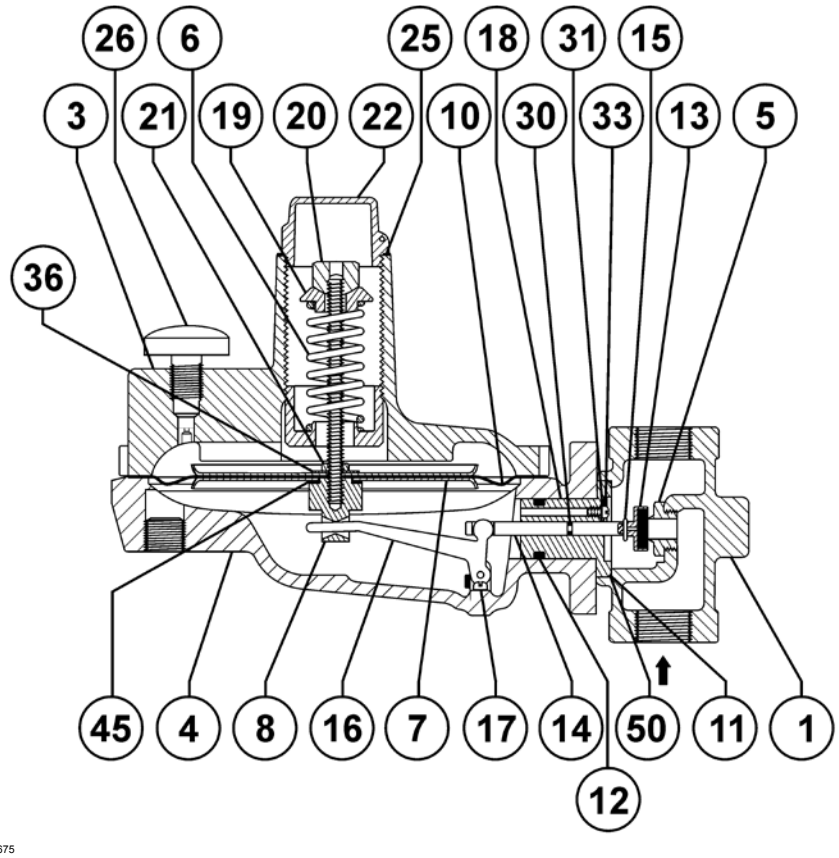


Figure 4. *Type Y690VBM Assembly*

Industrial Regulators

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