

December 2008

# Y695VR Series Vacuum Regulators

## Introduction

### Scope of Manual

This manual describes and provides instructions and parts lists for the Types Y695VR and Y695VRM vacuum regulators. Instructions and parts lists for other equipment used with these regulators are found in separate manuals.

### Product Description

The Y695VR Series vacuum regulators are used for precise control of small capacity, low-pressure service applications where an increase in vacuum must be limited. These direct-operated vacuum regulators come in 3/4 and 1-inch (DN 20 and 25) body sizes and have a 7/16-inch (11,1 mm) orifice and a 1/4-inch spring case vent connection with optional umbrella vent assembly. The individual products are described as follows:

#### *Type Y695VR*

The Type Y695VR is a vacuum regulator with internal pressure registration requiring no downstream control line.

#### *Type Y695VRM*

The Type Y695VRM is a vacuum regulator with external registration. The throat is blocked with an O-ring stem seal.

### Specifications

Specifications for the Y695VR Series vacuum regulators are listed on page 2. Specifications for a given regulator as it originally comes from the factory are stamped on the nameplate.

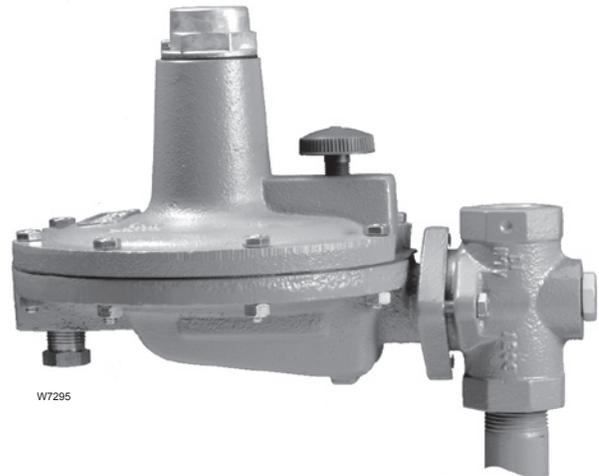


Figure 1. Type Y695VR Vacuum Regulator

## 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 the Specifications, 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.



# Y695VR Series

## Specifications

### Body Sizes

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

### End Connection Styles

See Table 2

### Maximum (Casing) Pressure<sup>(1)</sup>

Full Vacuum

### Maximum Downstream Pressure<sup>(1)</sup>

Full Vacuum

### Vacuum Control Pressure Ranges<sup>(1)</sup>

See Table 1

### Pressure Registration

**Type Y695VR:** Internal

**Type Y695VRM:** External

### Orifice Size

7/16-inch (11,1 mm)

### Control Line Connection

1/2-inch NPT

### Material Temperature Capabilities<sup>(1)</sup>

**Nitrile (NBR):** -20° to 180°F (-29° to 82°C)

**Fluorocarbon (FKM):**  
40° to 300°F (4° to 149°C)

**Perfluoroelastomer (FFKM):**  
-20° to 300°F (-29° to 149°C)

### Spring Case Connection

1/4-inch NPT

### Approximate Weight

19 pounds (8,62 kg)

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

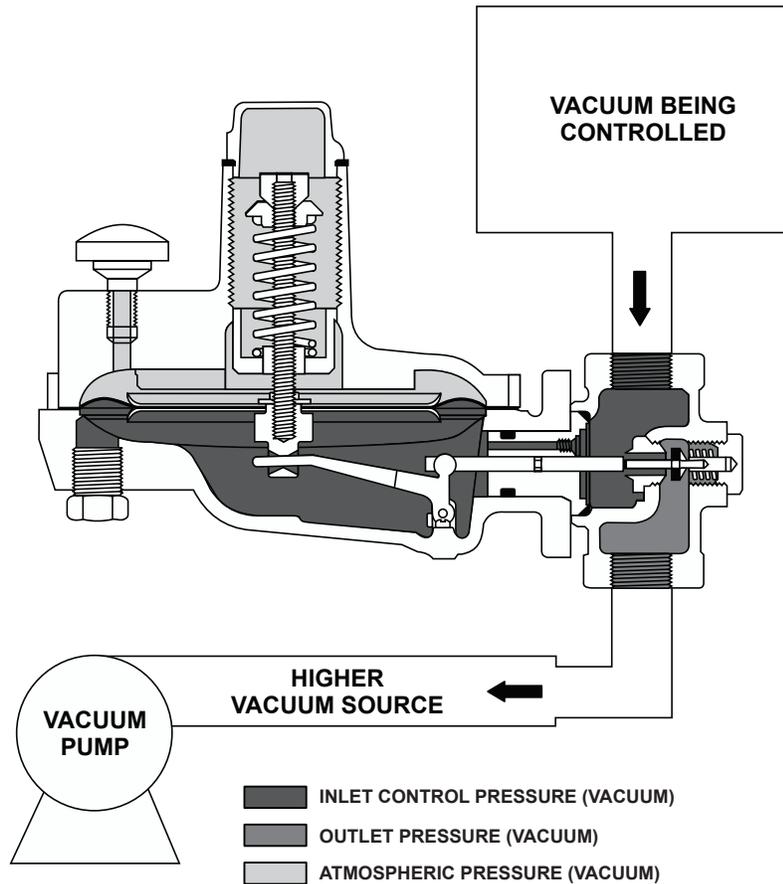


Figure 2. Type Y695VR Operational Schematic

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.

## 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 Y695VR 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 threeway 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 Y695VR Series vacuum regulators (Figure 2) are used to maintain a constant vacuum at the regulator inlet. A decrease in this vacuum (increase in absolute pressure) beyond this value registers on the diaphragm and opens the disk. This permits a downstream vacuum of lower absolute pressure than the upstream vacuum to restore the upstream vacuum to its original pressure setting. On the Type Y695VR, pressure registers underneath the diaphragm. The Type Y695VRM has a control line connecting the diaphragm casing to the vacuum line and an O-ring stem seal blocking the throat.

## Startup and Adjustment

All Y695VR Series equipment can be placed in operation by slowly introducing inlet vacuum or pressure. This equipment takes control when control vacuum is established. This equipment is suitable for the pressure range stamped on the nameplate (key 46).

## 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, and body gasket. 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 holder assembly (key 13), remove the body cap assembly (key 43).
2. If it is necessary to replace the disk holder assembly (key 13), remove it from the disk spacer (key 44).
3. To inspect and replace the orifice (key 5) or throat seal (key 31) and machine screw (key 33), remove the cap screws (key 2), and separate the diaphragm casing (key 4) from the body (key 1).

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4. Remove and inspect the body seal O-ring (key 11). 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.
5. 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.
6. If necessary, install the replacement backup ring (key 49) and body seal O-ring (key 11) into the body (key 1).
7. Replace the body (key 1) on the diaphragm casing (key 4) and secure with the cap screws (key 2).
8. The disk holder assembly (key 13) consists of the disk and disk holder. Install the disk holder assembly (key 13) and secure it to the disk spacer (key 44).
9. Use a good quality thread sealer when replacing the back disk spring (key 41), body cap assembly (key 43), and body seal O-ring (key 11).
5. To replace the valve stem (key 14), perform steps 1 and 2 of Body Area Maintenance then pull valve stem out of the diaphragm casing (key 4) and install a new valve stem by pushing it into the diaphragm casing.
6. Install the lever assembly (key 16) into the valve (key 8) includes the pusher post and adjusting stem. Assembly is fixed together at the factory.
7. 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.
8. Install the pusher post (key 8) plus attached diaphragm parts onto the lever assembly (key 16).
9. 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) to fingertightness only.

## 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. Key numbers are referenced in Figures 3 and 4.

### *Type Y695VR Vacuum Regulator*

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 10.
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 nut (key 21). If the only further maintenance is to replace the diaphragm parts, skip to step 7.
4. To replace the lever assembly (key 16), remove the machine screws (key 17).
10. 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, not shown) to 160 to 190 inch-pounds (18 to 21 N•m) of torque. When finished, turn the adjusting nut (key 20) to the desired outlet pressure setting.
11. Install a replacement closing cap gasket (key 25) and then install the closing cap (key 22).

### *Type Y695VRM Vacuum Regulator*

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 10.
2. Remove the spring case cap screws (key 24) and hex nuts (key 23) 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)

**Table 1.** Vacuum Control Pressure Ranges and Spring Part Numbers (Spring, Key 6)

VACUUM CONTROL PRESSURE RANGE	SPRING PART NUMBER	SPRING COLOR	BACK DISK SPRING PART NUMBER	CHANGE IN CONTROL PRESSURE TO WIDE-OPEN	SPRING WIRE DIAMETER
0 to 4-inches w.c. (0 to 10 mbar) <sup>(1)</sup>	0N039427222	Unpainted	1E984637022	1-inch w.c. (2 mbar)	0.062-inch (1,57 mm)
0.5 to 0.75 psig (0,034 to 0,052 bar)	0N086027022	Unpainted	18B0911X012	5.5-inches w.c. (14 mbar)	0.105-inch (2,67 mm)
0.15 to 1.75 psig (0,01 to 0,12 bar)	0N086127022	Unpainted		0.44 psig (0,03 bar)	0.125-inch (3,17 mm)
0.25 to 2.75 psig (0,017 to 0,19 bar)	0N022027022	Dark green		0.63 psig (0,043 bar)	0.135-inch (3,43 mm)
1.5 to 4.75 psig (0,10 to 0,33 bar)	0N004327022	Yellow		1.44 psig (0,10 bar)	0.172-inch (4,37 mm)
3 to 12.8 psig (0,21 to 0,88 bar)	1D141827012	Blue		3.88 psig (0,27 bar)	0.207-inch (5,26 mm)

1. Do not use fluorocarbon (FKM) diaphragm with this spring at diaphragm temperatures lower than 60°F (16°C).

- slips off the lever assembly (key 16). To separate the diaphragm (key 10) from the attached parts, unscrew the diaphragm nut (key 21). If the only further maintenance is to replace the diaphragm parts or change the control spring (key 6), skip to step 8.
- To replace the lever assembly (key 16), remove the machine screws (key 17).
  - To replace the valve stem (key 14) and stem seal O-ring (key 30), perform steps 1 and 2 of Body Area Maintenance and then pull the valve stem out of the diaphragm casing.
  - 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).
  - 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).

**Note**

**Pusher post assembly (key 8) includes the pusher post and adjusting stem. Assembly is fixed together at the factory.**

- 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.

- Install the pusher post assembly (key 8) plus attached diaphragm parts onto the lever assembly (key 16).
- 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 fingertightness only. Install upper spring seat (key 19) and adjusting nut (key 20).
- Turn the adjusting nut (key 20) 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 (key 20) to the desired outlet pressure setting.
- Install a replacement closing cap gasket (key 25) if necessary, and then install the closing cap (key 22).

## To Convert Constructions

### *The Type Y695VR to the Type Y695VRM:*

New parts required: keys 30, 31, and 33

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

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

BODY MATERIAL	END CONNECTION STYLE <sup>(1)</sup>	PART NUMBER	
		3/4-Inch (DN 20) Body	1-Inch (DN 25) Body
Ductile iron	NPT	17B9020X012	17B9020X022
Stainless steel	NPT	17B9020X032	17B9020X042
Stainless steel with Stainless steel flanges	ANSI Class 150 RF	17B5280X012	17B5280X022
Stainless steel with Carbon steel flanges	ANSI Class 150 RF	17B5280X072	17B5280X082

1. All flanges are welded on. All flange dimensions are 14-inches (356 mm) face-to-face.

## The Type Y695VRM to the Type Y695VR:

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 or Sales Representative about this regulator, include the type number and all other pertinent information stamped on the closing cap (key 22) or 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, Stainless steel/Nitrile Construction Keys 10, 11, 12, 25, 30, 33, 42, and 45 Kit (Does not include key 13) Disk (key 13)	RY690AX0012 1E9848X0042
1 Body	See Table 2
2 Cap Screw (2 required) 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, Stainless steel 7/16-inch (11,1 mm)	0L0832X0012
6 Control Spring	See Table 1
7 Diaphragm Head (2 required)	17B9723X032
8 Pusher Post	17B9742X022
10* Diaphragm Nitrile (NBR) Fluorocarbon (FKM)	37B9720X012 23B0101X052

Key Description	Part Number
11* Body Seal O-Ring Nitrile Fluorocarbon (FKM)	1H993806992 1H9938X0012
12* Insert Seal O-Ring Nitrile (NBR) Fluorocarbon (FKM)	1B885506992 1B8855X0012
13* Disk Assembly Stainless steel with Nitrile (NBR) Fluorocarbon (FKM)	1E9848X0042 1E9848X0032 17B5278X012
14 Stem	17B5278X012
16 Lever Assembly	1B5375000B2
17 Machine Screw (2 required)	19A7151X022
18 Guide Insert	27B4028X022
19 Upper Spring Seat	1A201824092
20 Adjusting Nut	17B9740X012
21 Diaphragm Nut	1A345724122
22 Closing Cap Zinc ( <b>standard</b> ) Steel	1B541644012 1E422724092
23 Hex Nut (8 required) Ductile iron Stainless steel	1A352724122 1E9440X0352
24 Diaphragm Case Cap Screw (8 required) Ductile iron Stainless steel	1A352524052 18B3455X012
25* Closing Cap Gasket	1P753306992
26 Vent Assembly Spring Case Down Spring Case Up ( <b>standard</b> )	17A6571X012 17A5515X012
27 Pipe Plug Stainless steel casing Ductile iron casing	1A369235072 1A369224492 T13081T0012
28 Magna-Lube	
30* Stem Seal (Type Y695VRM only) Nitrile (NBR) Fluorocarbon (FKM)	1H2926G0012 1H2926X0022
31* Throat Seal (Type Y695VRM only) Nitrile (NBR) Fluorocarbon (FKM)	1D682506992 1D6825X0012
33 Machine Screw Type Y695VRM only	18A0703X022
36 Washer	18B3440X012
41 Back Disk Spring	See Table 1
42* Back Body Seal Nitrile (NBR) Fluorocarbon (FKM)	13A1584X012 13A1584X022
43 Back Body Cap Stainless steel	1F2737X0012
44 Disk Spacer Stainless steel	1E9861X0012
45* Lower Head Gasket	18B3450X012
46 Nameplate	
47 Drive Screw (2 required)	1A368228982
49 Backup Ring	18B3446X012

\*Recommended spare part

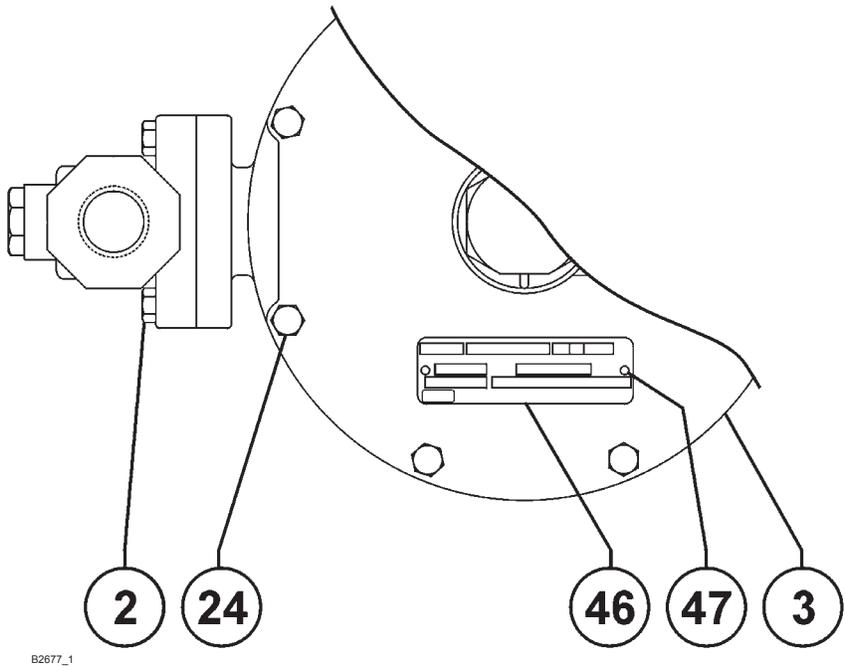
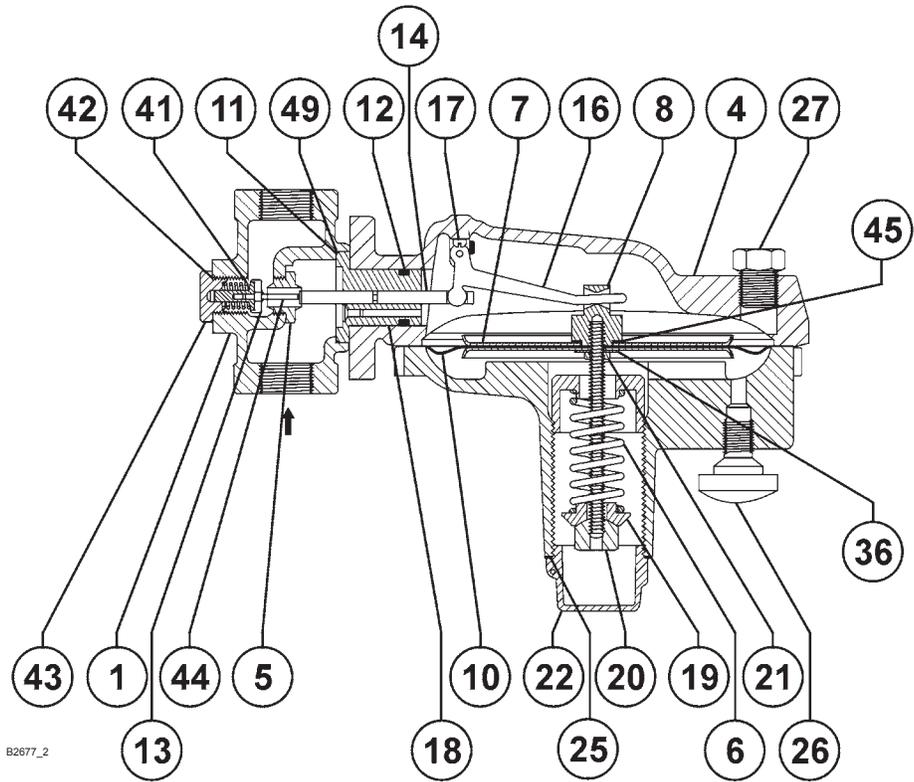
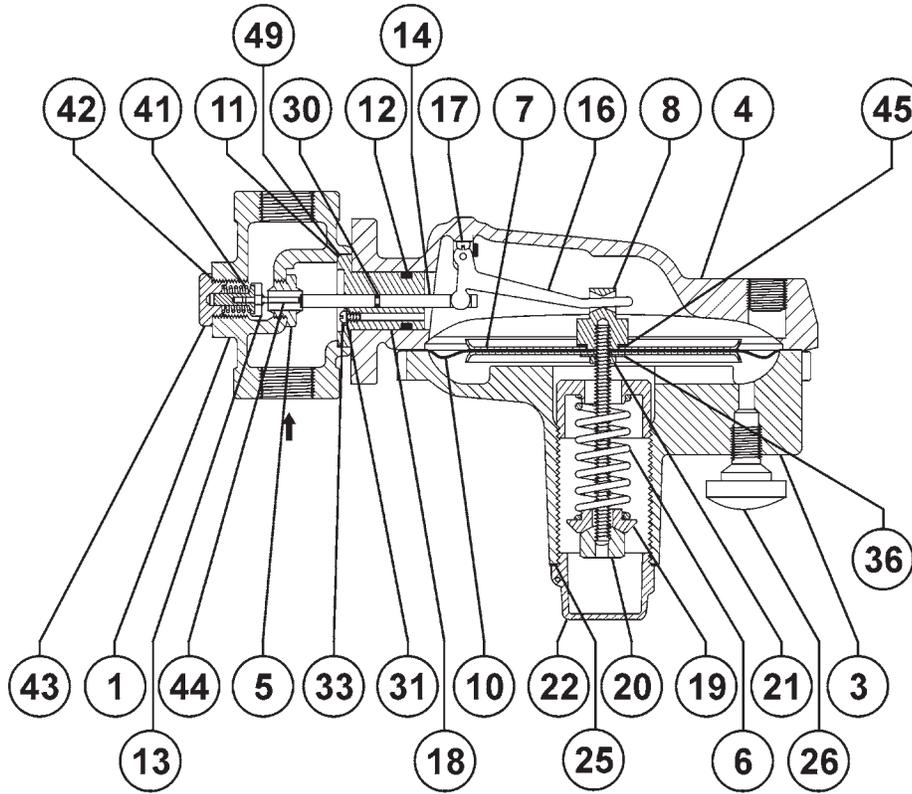


Figure 3. Type Y695VR Assembly

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Figure 4. Type Y695VRM Assembly

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