

December 2008

Y600A Series Pressure Reducing Regulators

Introduction

Scope of Manual

This manual describes and provides instructions, installation, maintenance, and parts lists for Types Y600A, Y600AM, and Y600AR pressure regulators. Instructions and parts lists for other equipment used with these regulators are found in separate manuals.

Product Description

The Y600A Series pressure reducing regulators may be applied as switching valves, relay or pressure loading regulators, or monitoring regulator pilots, and are described as follows:

Type Y600A—Direct-operated regulator with internal registration requiring no downstream control line.

Type Y600AM—Direct-operated regulator with blocked throat, O-ring stem seal to prevent leakage around the stem, and diaphragm casing tapped 1/2-inch NPT for control line connection.

Type Y600AR—Type Y600A with internal relief valve.

Specifications

Ratings and specifications for the Y600A Series regulators are given in the Specifications section on page 2. Individual regulator data is stamped on the closing cap as it comes from the factory.

Installation



WARNING

Personal injury, property damage, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts may result if this



Figure 1. Type Y600A Pressure Regulator

regulator is over pressured or is installed where service conditions could exceed the limits given in the 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 the regulator could cause personal injury or property damage due to escaping gas. To avoid such injury or damage, install the regulator in a safe and well ventilated location.

Regulator operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. A regulator should be inspected for damage periodically and after any overpressure condition. Key numbers referenced in this section are shown in Figures 3 through 6.



Y600A Series

Specifications

<p>Body Sizes (Inlet x Outlet) and End Connection Style⁽¹⁾ 3/4 x 3/4 or 1 x 1-inch NPT</p> <p>Maximum Inlet Pressure (Body Rating)⁽²⁾ 150 psig (10,3 bar)</p> <p>Maximum Outlet Pressure (Casing)⁽²⁾ 20 psig (1,38 bar)</p> <p>Maximum Operating Inlet Pressure See Table 2</p> <p>Maximum Operating Outlet Pressure to Avoid Internal Parts Damage⁽²⁾ 2 psig (0,14 bar) above outlet pressure setting</p>	<p>Outlet Pressure Ranges⁽²⁾ See Table 1</p> <p>Flow Coefficients See Table 2</p> <p>Temperature Capabilities⁽²⁾ -20° to 180°F (-29° to 82°C)</p> <p>Spring Case Vent Connection 1/4-inch NPT</p> <p>Diaphragm Case Connection 1/2-inch NPT</p> <p>Approximate Weight 13 pounds (5,9 kg)</p>
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1. End connections for other than U.S. standards can usually be provided; consult your local Sales Office.
2. The pressure/temperature limits in this instruction manual and any applicable standard or code limitation should not be exceeded.

Table 1. Outlet (Control) Pressure Ranges

TYPE NUMBER	SPRING COLOR	SPRING PART NUMBER	OUTLET PRESSURE RANGE WITH SPRING CASE ABOVE DIAPHRAGM ⁽¹⁾	APPROXIMATE POINT ABOVE PRESSURE SETTING AT WHICH THE TYPE Y600AR INTERNAL RELIEF STARTS TO DISCHARGE
Y600A, Y600AM, Y600AR	Red	1B653827052	4 to 8-inches w.c. (10 to 20 mbar)	10 to 24-inches w.c. (25 to 60 mbar)
	Olive drab	1B653927022	7 to 16-inches w.c. (17 to 40 mbar)	10 to 26-inches w.c. (25 to 65 mbar)
	Yellow	1B537027052	15-inches w.c. to 1.2 psig (37 to 83 mbar)	
	Light green	1B537127022	1.2 to 2.5 psig (0,08 to 0,17 bar)	0.5 to 2 psig (0,03 to 0,14 bar)
	Light blue	1B537227022	2.5 to 4.5 psig (0,17 to 0,31 bar)	0.5 to 3 psig (0,03 to 0,21 bar)
	Black	1B537327052	4.5 to 7 psig (0,31 to 0,48 bar)	1 to 4 psig (0,07 to 0,28 bar)

1. Minimum outlet pressure setting may be approximately 1-inch w.c. (2 mbar) lower if spring case is below diaphragm.

Table 2. Maximum Operating Inlet Pressures

ORIFICE SIZE, INCHES (mm)	MAXIMUM OPERATING INLET PRESSURE, PSIG (bar)				WIDE-OPEN FLOW COEFFICIENTS FOR EXTERNAL RELIEF SIZING		
	With 1.2 PSIG (0,08 bar) or Less Outlet Pressure Setting	With 1.2 to 2.5 PSIG (0,08 to 0,17 bar) Outlet Pressure Setting	With 2.5 to 4.5 PSIG (0,17 to 0,31 bar) Outlet Pressure Setting	With 4.5 to 7 PSIG (0,31 to 0,48 bar) Outlet Pressure Setting	C _g	C _v	C _i
1/8 (3,17)	150 (10,3)	150 (10,3)	150 (10,3)	150 (10,3)	12.3	0.35	35
3/16 (4,76)	150 (10,3)	150 (10,3)	150 (10,3)	150 (10,3)	27.6	0.79	35
1/4 (6,35)	75 (5,17)	150 (10,3)	150 (10,3)	150 (10,3)	50	1.43	35
3/8 (9,53)	35 (2,41)	60 (4,14)	60 (4,14)	60 (4,14)	110	3.14	35
1/2 (12,7)	8 (0,55)	10 (0,69)	12 (0,83)	12 (0,83)	200	5.71	35
9/16 (14,3)	5 (0,34)	6 (0,41)	8 (0,55)	8 (0,55)	250	7.14	35

Note

If the regulator 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 a regulator. For a regulator that is shipped separately, make sure that there is no damage to, or foreign material in the regulator. Also ensure that all tubing and piping are free of debris.

2. The regulator may be installed in any position as long as the flow through the body is in the direction indicated by the arrow cast on the body. If continuous operation is required during inspection or maintenance, install a three-valve bypass around the regulator.



WARNING

A regulator 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 a regulator 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.

3. Be certain that the vent (key 26) is not positioned so that it can collect moisture which may drain into the spring case. The diaphragm casing (key 4) may be rotated to any of four positions with respect to the body in order to obtain desired positioning. Perform Body Area Maintenance procedure steps 1 and 4 through 8 to rotate the diaphragm casing.
4. The Type Y600AM regulator requires a downstream control line. Be sure to install this control line before putting the regulator into operation. The downstream control line pipe should be at least 1/2-inch (12,7mm) in diameter and connected to a straight section of outlet piping at least 5 to 10 pipe diameters downstream of the regulator. If instability due to turbulence exists, a hand valve can be installed in a straight section of the control line. This hand valve can be throttled down to dampen out pulsations.

Startup and Adjustment

A Y600A Series regulator can be placed in operation by slowly introducing inlet pressure. The regulator takes control when downstream pressure is established.

The regulator has been adjusted at the factory to provide approximately the reduced pressure requested on the order. With a spring-loaded regulator, the pressure setting may be adjusted within the spring range shown in Table 1. To adjust the pressure setting, perform the following steps (key numbers are referenced in Figures 3 through 6):

1. Remove the closing cap (key 22).

2. Use a 1-inch (25,4 mm) hex rod or screwdriver to turn the adjusting screw (key 35) either clockwise to increase outlet pressure or counterclockwise to decrease outlet pressure.



WARNING

To avoid personal injury, property damage, or equipment damage caused by bursting of pressure containing parts or explosion of accumulated gas, never adjust the control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range for that particular spring. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range according to the Diaphragm and Spring Case Area section of the Maintenance procedure.

3. After making the adjustment and replacing the closing cap (key 22), the closing cap can be wired to 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 regulator properly. Next, open the vent valve between the regulator and the downstream shutoff valve closest to it. All pressure between these shutoff valves is released through the open vent valve, since a Y600A Series regulator remains open in response to the decreasing downstream pressure.

Maintenance

Regulator 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. Key numbers are referenced in Figures 3 through 5 unless otherwise noted.



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 regulator.

Y600A Series

Body Area

This procedure is for gaining access to the disk assembly, orifice, body O-ring, and pitot tube if used. All pressure must be released from the diaphragm casing, and the disk assembly must be open, before these steps can be performed.

1. 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 48). See Figure 2.
3. Inspect and replace the orifice (key 5) if necessary. Protect the orifice seating surface during disassembly and assembly. Lubricate the threads of the replacement orifice with a good grade of light grease and install with 29 to 37 foot-pounds (39 to 50 N•m) of torque.
4. To replace the disk assembly (key 13), remove the cotter pin (key 15). If not necessary, skip to step 7.
5. To replace the pitot tube (key 32, Figures 3 and 6) on the Types Y600A and Y600AR, remove the machine screws (key 33), install the new pitot tube, and secure with the machine screws. Position the pitot tube so that it points into the outlet of the body (key 1) by rotating the guide insert (key 18).
6. Install the disk assembly (key 13) and secure it with the cotter pin (key 15).
7. Place backup ring (key 48) into the body (key 1). Then place the body seal O-ring (key 11) into the body. See Figure 2.
8. Place the diaphragm casing (key 4) on the body (key 1). Secure the the diaphragm casing to the body with the cap screws (key 2) using 7 to 9 foot-pounds (9 to 12 N•m).

Diaphragm and Spring Case Area

This procedure is for gaining access to the spring, diaphragm, lever assembly stem, and Type Y600AM stem O-ring. All pressure must be released from the diaphragm casing before performing these steps.

Note

Any Type 662 remote control drive unit used with a Y600A Series regulator must be removed from the spring case (key 3) before these steps can be performed.

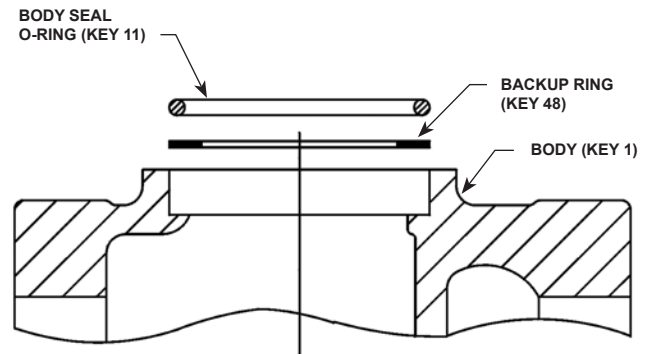


Figure 2. Expanded View of the Body Area Showing the Body Seal O-ring and Backup Ring Placement

1. Remove the closing cap (key 22), and turn the adjusting screw (key 35) counterclockwise to remove the compression from the spring (key 6).
2. If the only maintenance is to change the control spring, take out the control spring and replace with the desired spring. Turn the adjusting screw (key 35) clockwise to compress the spring to the desired outlet pressure setting. Skip to step 11.
3. If further maintenance to the internal diaphragm casing parts is required, remove the hex nuts (key 23, not shown) and cap screws (key 24). Remove the diaphragm (key 10) plus attached parts by tilting them so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm from the attached parts, unscrew the cap screw (key 38, Figures 3 and 4) from the pusher post (key 8) for a Type Y600A or Y600AM, or unscrew the relief valve spring holder (key 37, Figure 6) from the pusher post (key 8) for a Type Y600AR. 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). To replace the stem (key 14) or the Type Y600AM stem O-ring (key 30, Figure 4), also perform Body Area Maintenance procedure steps 1 and 4, and pull the stem (key 14) out of the diaphragm casing (key 4). With a Type Y600AM, grease the replacement stem O-ring (key 30, Figure 4) with a good grade of lubricant and install it on the stem (key 14).
5. Install the stem (key 14) into the diaphragm casing (key 4) and perform Body Area Maintenance procedure steps 6 through 8 as necessary.

6. Install the lever assembly (key 16) into the stem (key 14) and secure the lever assembly with the machine screws (key 17).
7. For a Type Y600A or Y600AM (Figures 3 and 4), hold the pusher post (key 8) and place diaphragm assembly parts on the pusher post in the following order: diaphragm (key 10), diaphragm head (key 7), lower spring seat (key 50), and washer (key 36), and secure with diaphragm cap screw (key 38) using 7 to 9 foot-pounds (9 to 12 N•m) of torque or for a Type Y600AR (Figure 6), secure the pusher post (key 8) to the relief valve spring holder with 1 to 3 foot-pounds (1,4 to 4,1 N•m) of torque.
8. Install the pusher post (key 8) and attached parts onto the lever (key 16).
9. Install the control spring (key 6) and spring case (key 3) on the diaphragm casing (key 4) so that the vent assembly (key 26) is correctly oriented, and secure them with the cap screws (key 24) and hex nuts (key 23) to finger tightness only.
10. Turn the adjusting screw (key 35) clockwise until there is enough control spring (key 6) force to provide proper slack to the diaphragm (key 10). Using a crisscross pattern, finish tightening the cap screws (key 24) and hex nuts to 5 to 6 foot-pounds (6,8 to 8,1 N•m) of torque. Finish turning the adjusting screw to the desired outlet pressure setting.
11. Install the closing cap (key 22) or the Type 662 remote control drive unit, if used.

To Convert Constructions

The Type Y600A to the Type Y600AM:

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 5 in the Body Area Maintenance section to remove the four machine screws (key 33) and pitot tube (key 32, Figure 3).
3. Insert the throat O-ring (key 31, Figure 4) and one machine screw (key 33, Figure 4).
4. Insert the stem O-ring (key 30, Figure 4) by following steps 1 through 6 in the Diaphragm and Spring Case Area Maintenance section.

The Type Y600AM to the Type Y600A:

New parts required: keys 27, 32, and 33

1. Insert pipe plug (key 27, Figure 4) in the diaphragm casing (key 4).
2. Follow steps 1 through 4 in the Diaphragm and Spring Case Area Maintenance section to remove one machine screw (key 33, Figure 3), the stem seal O-ring (key 30, Figure 4), and the throat seal (key 31, Figure 4) blocking the registration port.
3. Insert pitot tube (key 32) and four machine screws (key 33) as outlined in step 5 of the Body Area Maintenance section.

Parts Ordering

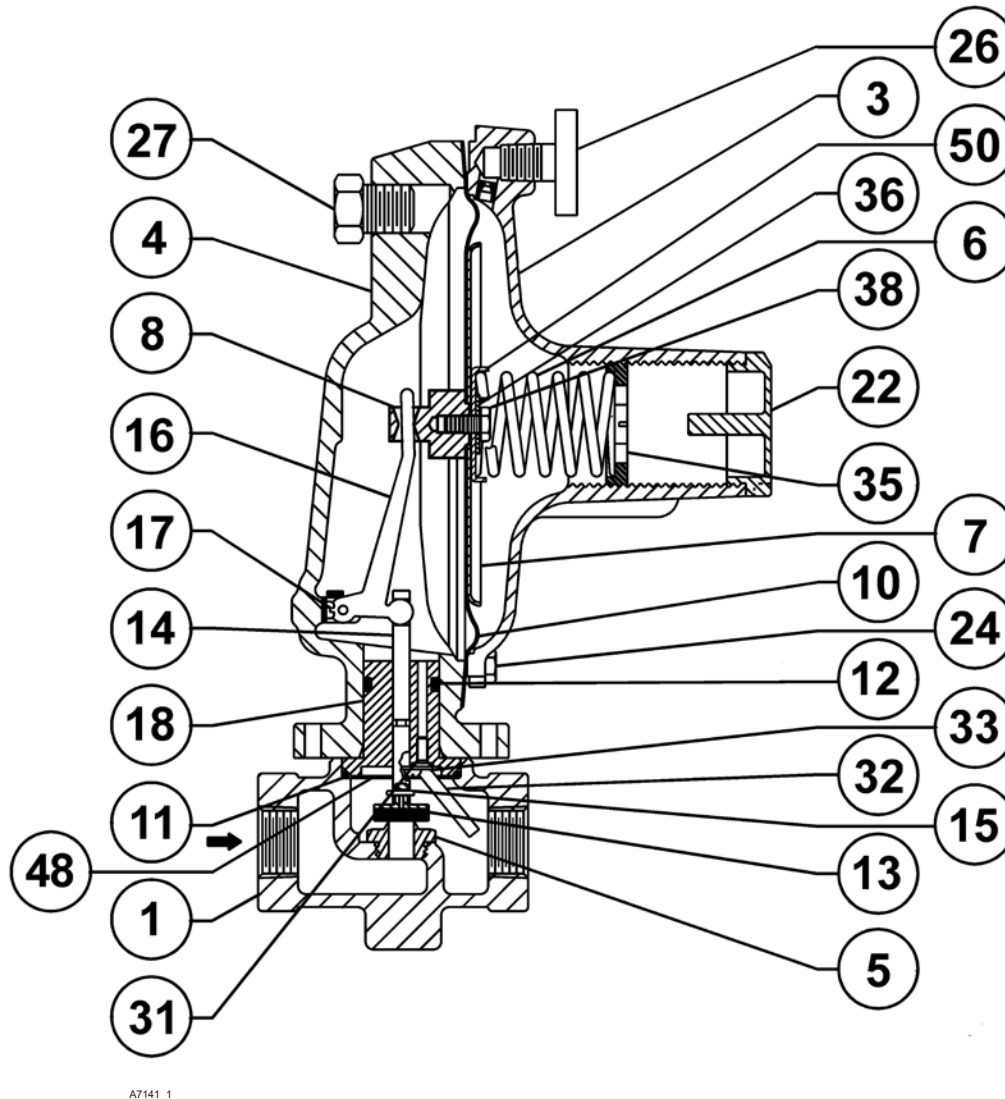
When corresponding with your local Sales Office about this regulator, include the type number and all other pertinent information stamped on the closing cap. Specify the eleven-character part number when ordering new parts from the following parts list.

Parts List (Figures 3 through 6)

Key	Description	Part Number
	Parts Kit (keys 10, 11, 12, 13, 15, 30, and 31)	
	Types Y600A and Y600AM	RY600AX0012
	Type Y600AR	RY600ARX012
1	Body, Cast iron 3/4 x 3/4-inch 1 x 1-inch	1E987119012 1E987319012
2	Cap Screw (2 required), Plated steel	1C856228992
3	Spring Case Assembly, Cast iron	1B6365X0342
4	Diaphragm Casing, Cast iron	47B2271X012
5	Orifice, Aluminum 1/8-inch (3,18 mm) 3/16-inch (4,76 mm) 1/4-inch (6,35 mm) 3/8-inch (9,53 mm) 1/2-inch (12,7 mm) 9/16-inch (14,3 mm)	1A936709012 00991209012 0B042009012 0B042209012 1A928809012 1C4252X0012
6	Spring, Plated steel 4 to 8-inches w.c. (10 to 20 mbar) 7 to 16-inches w.c. (17 to 40 mbar) 15-inches w.c. to 1.2 psig (37 to 83 mbar) 1.2 to 2.5 psig (0,08 to 0,17 bar) 2.5 to 4.5 psig (0,17 to 0,31 bar) 4.5 to 7 psig (0,31 to 0,48 bar)	1B653827052 1B653927022 1B537027052 1B537127022 1B537227022 1B537327052
7	Diaphragm Head Types Y600A and Y600AM, 304 Stainless steel Type Y600AR, Plated steel	17B9723X032 1B541425072
8	Pusher Post Types Y600A and Y600AM, Aluminum Type Y600AR, Zinc	17B9734X032 2B541944012
10*	Diaphragm, Nitrile (NBR) Types Y600A and Y600AM Type Y600AR	17B9726X012 1C942902072
11*	Body Seal O-ring, Nitrile (NBR)	1H993806992
12*	Insert Seal O-ring, Nitrile (NBR)	1B885506992
13*	Disk Assembly, Aluminum Disk Holder with Nitrile (NBR) disk	1C4248X0212
14	Stem, Stainless Steel	17B3423X012
15*	Cotter Pin, Stainless steel	1A866537022

* Recommended spare part.

Y600A Series

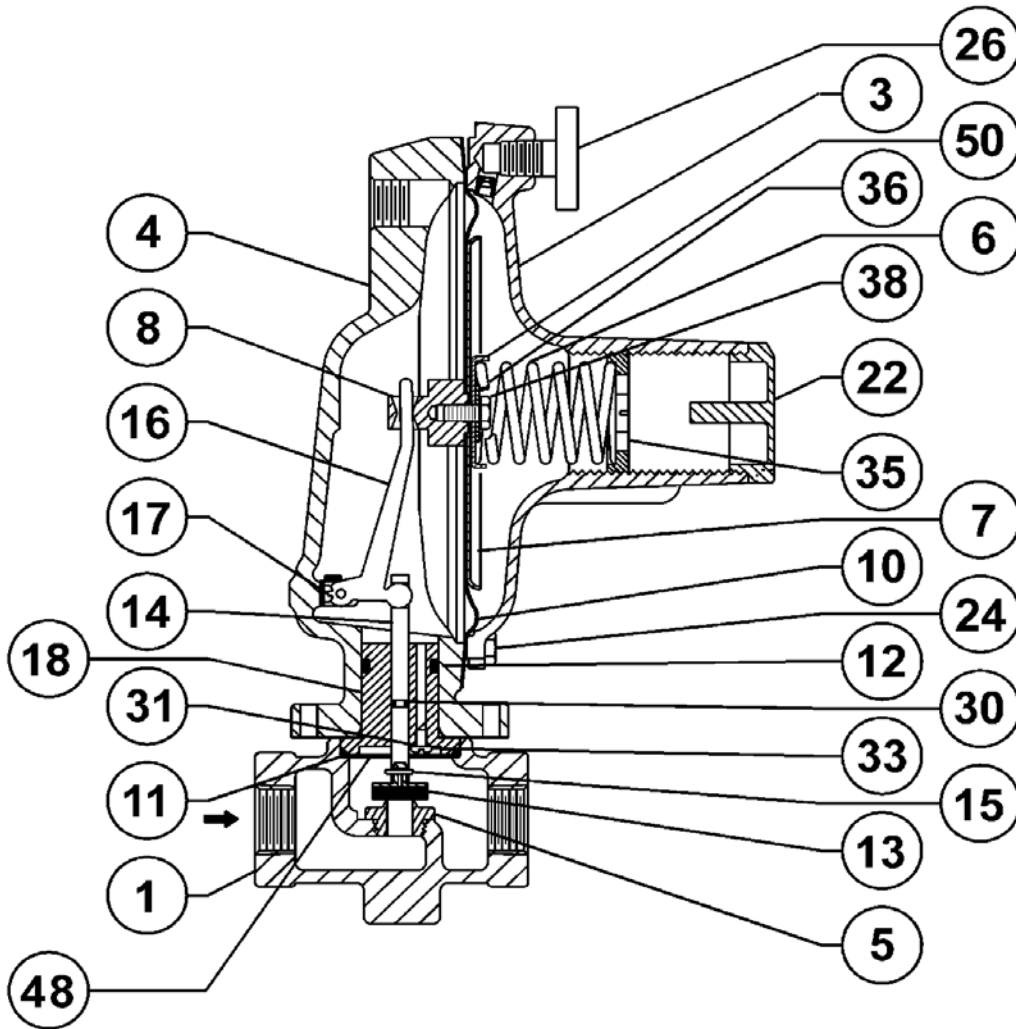


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Figure 3. Type Y600A Regulator Assembly

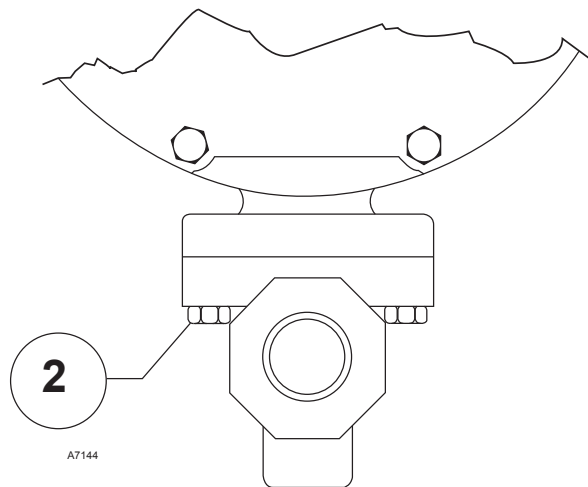
Key	Description	Part Number	Key	Description	Part Number
16	Lever Assembly, Plated steel	1B5375X0082	32	Pitot Tube (Types Y600A and Y600AR only), 304 Stainless steel	17B4479X012
17	Machine Screw (2 required), Stainless steel	19A7151X022	33	Machine Screw, Stainless steel	18A0703X022
18	Guide Insert, Delrin	27B4028X012		Type Y600AM (1 required)	19A7151X022
22	Closing Cap, Thermoplastic	T13524T0062	35	Adjusting Screw, Zinc	1B537944012
23	Hex Nut, not shown (8 required), Plated steel	1E985324142	36	Washer	18B3440X012
24	Cap Screw (8 required), Plated steel	T1070824912	37	Spring Holder (Type Y600AR only), Plated steel	1C323114012
26	Type Y602 Vent Assembly		38	Diaphragm Cap Screw (Types Y600A and Y600AM only), Plated steel	1B290524052
	Spring case up (standard)	17A5515X012	39	Relief Valve Spring (Type Y600AR only), Plated steel	1B541327022
	Spring case down	17A6570X012	48	Back Up Ring, Stainless Steel	18B3446X012
27	Pipe Plug, Plated steel	1A369224492	50	Lower Spring Seat (Types Y600A and Y600AM only), Plated steel	1B636325062
30*	Stem O-Ring (Type Y600AM only), Nitrile (NBR)	1H292606992			
31*	Throat Seal O-Ring (Type Y600AM only), Nitrile (NBR)	1D682506992			

* Recommended spare part.



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Figure 4. Type Y600AM Regulator Assembly



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Figure 5. Diaphragm Casing Cap Screw Location

Y600A Series

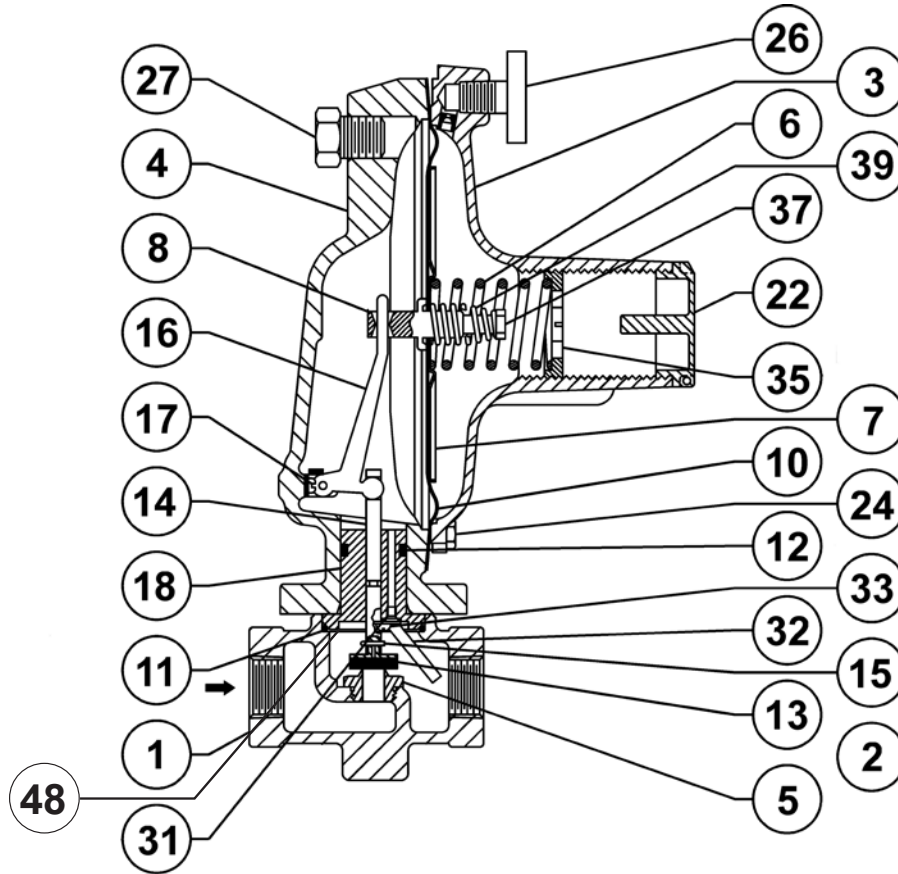


Figure 6. Type Y600AR Regulator Assembly

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Industrial Regulators

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