

Introduction

This installation guide provides instructions for installation, startup, and adjustment. To receive a copy of the instruction manual, contact your local Fisher Sales Office or Sales Representative or view a copy at www.FISHERregulators.com. For further information refer to:

- Type S201 and S202 Instruction Manual, form 5171, D400007X012
- Type S201P, S201PK, and S202P Instruction Manual, form 5172, D400009X012
- Type S203, S203H, and S203P1-P3 Instruction Manual, form 2216, D400010X1012
- Types S204 and S206 Instruction Manual, form 1749, D400011X012
- Types S208 and S209 Instruction Manual, form 5412, D102247X012

P.E.D. Categories

This product may be used as a safety accessory with pressure equipment in the following Pressure Equipment Directive 97/23/EC categories. It may also be used outside of the Pressure Equipment Directive using sound engineering practice (SEP) per table below.

PRODUCT SIZE	CATEGORIES	FLUID TYPE
DN 32, 40, 40 x 50, 50 (1-1/4, 1-1/2, 1-1/2 x 2, 2)	I	1

Specifications

Available Constructions (See table 1)

- S201:** Basic construction without internal relief for 5 to 75 mbar (2 to 30-inches w.c.) outlet pressures
S201H: S201 with a heavy diaphragm plate for 0,069 to 0,34 bar (1 to 5 psig) outlet pressures
S201K: S201 with a heavy diaphragm plate for 0,14 to 0,69 bar (2 to 10 psig) outlet pressures
S201P: S201 with downstream control line connection and O-ring stem seal for external pressure registration
S201PK: Combination of S201K and S201P
S202, S202H, S202P: S201, S201H, and S201P constructions with internal relief
S203, S203H, S203P: S201, S201H, and S201P constructions with "True" monitor regulator to provide overpressure protection. Available in Cast iron body only.
S204, S204H: S201 and S201H constructions with a low outlet pressure shutoff. Available in Cast iron body only.
S206, S206H: S202 and S202H constructions with a low outlet pressure shutoff with internal relief.

Available in Cast iron body only.

S208, S208H, S208P, S208K, S208PK: S201, S201H, S201P, S201K, and S201PK constructions with a Type VSX-2 slam-shut device to provide overpressure (OPSO) or over and underpressure (UPSO) protection. Available in Ductile iron body only.

S209, S209H, S209P: S202, S202H, and S202P constructions with a Type VSX-2 slam-shut device to provide overpressure (OPSO) or over and underpressure (UPSO) protection. Available in Ductile iron body only.

Body Sizes and End Connection Styles⁽¹⁾

See table 2

Minimum and Maximum Inlet Pressures⁽¹⁾

Maximum Emergency (Body Rating) Inlet Pressure: 12 bar (175 psig)

Maximum Operating Inlet Pressure: See table 4

Types S204 and S206 Minimum Inlet Pressure Required to Prevent Shutoff: See figure 1

Maximum Outlet Pressure (Casing)⁽¹⁾

1,0 bar (15 psig)

Maximum Operating Outlet Pressure to Avoid Internal Part Damage⁽¹⁾

Light Diaphragm Plate: 0,14 bar (2 psi) above outlet pressure setting

Heavy Diaphragm Plate: 0,21 bar (3 psi) above outlet pressure setting

Outlet Pressure Ranges⁽¹⁾

See table 3

Integral Monitor Performance⁽¹⁾

See table 5

Internal Relief Performance⁽¹⁾

Internal relief valve opens at 20 to 69 mbar (7 to 28-inches w.c.) above outlet setting, depending on control spring

Type VSX-2 Trip Pressure Ranges⁽¹⁾

See table 6

Proof Test Pressure

All Pressure Retaining Components have been proof tested per Directive 97/23/EC - Annex 1, Section 7.4

Maximum Temperature Capabilities⁽¹⁾

Nitrile (NBR): -29° to 66°C (-20° to 150°F)

Fluoroelastomer (FKM): -18° to 93°C (0° to 200°F)
(Upper temperature limitation due to nylon flappers)

Type VSX-2: -29° to 60°C (-20° to 140°F)

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

Table 1. Available Constructions

BODY MATERIALS	TYPE NUMBER																							
	S201	S201H	S201K	S201P	S201PK	S202	S202H	S202P	S203	S203H	S203P	S204	S204H	S206	S206H	S208	S208H	S208K	S208P	S208PK	S209	S209H	S209P	
Cast Iron	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
Ductile Iron	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X
Steel	X	X	X	X	X	X	X	X																



S200 Series

Table 2. Body Sizes and End Connection Styles

BODY SIZE, DN (INCHES)	END CONNECTION STYLE		
	Cast Iron	Ductile Iron	Steel
32 (1-1/4) 40 (1-1/2) 40 x 50 (1-1/2 x 2)	NPT, BSP NPT, BSP ---	--- NPT, BSP NPT, BSP	--- NPT, BSP ---
50 (2)	NPT; BSP; or ANSI Class 125FF ⁽¹⁾ , 250RF flanged	NPT; BSP; ANSI Class 125FF or 250RF flanged; or PN 10-16 flanged	NPT; BSP; ANSI Class 150RF or 300RF flanged; or PN 10-16 flanged

1. This flange is available with a face-to-face of 191 mm (7.5-inches) or 254 mm (10-inches).

Table 3. Outlet Pressure Ranges

TYPE NUMBER	SPRING NUMBER	OUTLET PRESSURE RANGE	CONTROL SPRING COLOR CODE
S201, S202, S203 ⁽¹⁾ , S208, S209 S201P, S202P, S203P, S208P, S209P	---	5 to 11 mbar ^(2,3) (2 to 4-1/2-inches w.c.) ^(2,3)	Brown
	1	9 to 16 mbar (3.5 to 6.5-inches w.c.)	Red
	2	12 to 22 mbar (5 to 9-inches w.c.)	Black
	3	21 to 45 mbar (8.5 to 18-inches w.c.)	Gray
S204, S206	---	35 to 75 mbar (14 to 30-inches w.c.)	Dark green
	---	9 to 12 mbar ⁽²⁾ (3.5 to 5-inches w.c.) ⁽²⁾	Brown
	---	12 to 17 mbar (5 to 7-inches w.c.)	Red
	---	16 to 23 mbar (6.5 to 9.5-inches w.c.)	Black
S201H, S202H, S203H ⁽¹⁾ , S208H, S209H, S201P ⁽⁴⁾ , S202P ⁽⁴⁾ , S203P ⁽⁴⁾ , S204H, S206H, S208P ⁽⁴⁾ , S209P ⁽⁴⁾	---	21 to 45 mbar (8.5 to 18-inches w.c.)	Gray
	---	35 to 75 mbar (14 to 30-inches w.c.)	Dark green
	5	0,069 to 0,14 bar (1 to 2 psig)	Dark blue
S201K, S201PK, S208K, S208PK	6	0,10 to 0,22 bar (1.5 to 3.25 psig)	Orange
	7	0,14 to 0,34 bar ⁽⁵⁾ (2 to 5 psig) ⁽⁵⁾	Yellow
S204H, S206H	8	0,14 to 0,38 bar (2 to 5.5 psig)	Green stripe
	9	0,28 to 0,69 bar (4 to 10 psig)	Unpainted
S204H, S206H	---	0,069 to 0,14 bar (1 to 2 psig)	Dark blue
	---	0,10 to 0,22 bar (1.5 to 3.25 psig)	Orange

1. Types S203 and S203H outlet pressure ranges are a function of the monitor construction (monitor spring and the number of spring seats used). See Table 5 for more information.
2. With regulator installed so control spring is on top of diaphragm. If installed so control spring is on bottom, lower end of outlet pressure range can be reduced by 2,5 mbar (1-inch w.c.) for regulator with light diaphragm plate or 5,0 mbar (2-inches w.c.) for regulator with heavy diaphragm plate.
3. Not available with Types S208 and S209.
4. Types S201P, S202P, S203P, S208P, and S209P require heavy diaphragm plate for outlet pressures over 0,069 bar (1 psig).
5. Not available for Types S203P, S204H, and S206H.

Table 4. Additional Specifications

TYPE NUMBER	OUTLET PRESSURE SETTING	ORIFICE SIZE, mm (INCH)	MAXIMUM OPERATING INLET PRESSURE TO OBTAIN OPTIMUM PERFORMANCE, bar (PSIG)
S201, S201P, S202, S202P, S203, S203P, S208, S208P, S209, S209P	5 to 75 mbar (2 to 30-inches w.c.)	6,4 (1/4)	8,6 (125)
		9,5 (3/8)	8,6 (125)
		12,7 (1/2)	6,9 (100)
		19,1 (3/4)	4,1 (60)
		25,4 (1)	1,7 (25)
		30,2 (1-3/16)	0,90 (13)
S201H, S201P, S202H, S202P, S203H, S203P, S208H, S208P, S209H, S209P	0,069 to 0,22 bar (1 to 3.25 psig)	6,4 (1/4)	8,6 (125)
		9,5 (3/8)	8,6 (125)
		12,7 (1/2)	6,9 (100)
		19,1 (3/4)	4,1 (60)
		25,4 (1)	2,1 (30)
		30,2 (1-3/16)	1,0 (14)
S201K, S201PK S208K, S208PK	All outlet pressure settings	6,4 (1/4)	8,6 (125)
		9,5 (3/8)	8,6 (125)
		12,7 (1/2)	6,9 (100)
		19,1 (3/4)	4,1 (60)
		25,4 (1)	2,1 (30)
		30,2 (1-3/16)	1,4 (20)
S201K, S201PK S208K, S208PK	0,14 to 0,38 bar (2 to 5.5 psig)	30,2 (1-3/16)	1,7 (25)
		0,28 to 0,69 bar (4 to 10 psig)	30,2 (1-3/16)
S204, S206	9 to 75 mbar (3.5 to 30-inches w.c.)	9,5 (3/8)	6,9 (100)
		12,7 (1/2)	6,9 (100)
		19,1 (3/4)	5,2 (75)
		25,4 (1)	2,1 (30)
		30,2 (1-3/16)	1,0 (15)
		S204H, S206H	0,069 to 0,22 bar (1 to 3.25 psig)
12,7 (1/2)	6,9 (100)		
19,1 (3/4)	5,2 (75)		
25,4 (1)	2,1 (30)		
30,2 (1-3/16)	1,0 (15)		
30,2 (1-3/16)	1,0 (15)		

Table 5. Integral Monitor Data

TYPE NUMBER	CONTROL SPRING COLOR (SEE TABLE 3 FOR RANGE)	OUTLET PRESSURE RANGE	MAXIMUM DOWNSTREAM PRESSURE WITH INTEGRAL MONITOR IN OPERATION, bar (PSIG)	RELIEF MONITOR SPRING COLOR	NUMBER OF SPRING SEATS REQUIRED
S203, S203P	Brown	0 to 12 mbar (0 to 5-inches w.c.)	55 (0.8 psig)	Green	0
	Red / Black	10 to 24 mbar (4 to 9.5-inches w.c.)		Green	1
	Gray	20 to 35 mbar (8 to 14-inches w.c.)	-- --	Green	2
		20 to 30 mbar (8 to 12-inches w.c.)	96 (1.4)	Red	0
		25 to 50 mbar (10 to 20-inches w.c.)	124 (1.8)	Red	1
		27 to 52 mbar (11 to 21-inches w.c.)	152 (2.2)	Blue	0
Dark green	35 to 70 mbar (14 to 28-inches w.c.)	193 (2.8)	Red	2	
	45 to 82 mbar (18 to 33-inches w.c.)	207 (3.0)	Blue	1	
	35 to 70 mbar (0.5 to 1.0 psig)	207 (3.0)	Silver	0	
S203H, S203P	Dark blue	70 to 110 mbar (1.0 to 1.6 psig)	262 (3.8)	Blue	2
		52 to 110 mbar (0.75 to 1.6 psig)	276 (4.0)	Silver	1
	Orange	86 to 155 mbar (1.25 to 2.25 psig)	345 (5.0)	Silver	2
		86 to 224 mbar (1.25 to 3.25 psig)	413 (6.0)	Silver	3

Table 6. Type VSX-2 High and Low Trip Pressure Ranges

SETPOINT RANGES	SLAM-SHUT TYPE	USE WITH MAIN VALVE SPRING NUMBER ⁽¹⁾	MINIMUM TO MAXIMUM TRIP PRESSURE
Overpressure Shutoff (OPSO)	LP	1, 2	30 to 63 mbar (12 to 25-inches w.c.)
		1, 2, 3, 4	50 to 130 mbar (20 to 52-inches w.c.)
		3, 4, 5, 6	95 to 270 mbar (1.4 to 3.9 psig)
		5, 6, 7, 8, 9	260 to 600 mbar (3.8 to 8.7 psig)
		9	400 to 1100 mbar (5.8 to 16 psig)
Underpressure Shutoff (UPSO)	LP	2, 3	6 to 30 mbar (2 to 12-inches w.c.)
		3, 4, 5, 6	10 to 75 mbar (4 to 30-inches w.c.)
		5, 6, 7, 8	25 to 160 mbar (0.36 to 2.3 psig)
		7, 8, 9	100 to 750 mbar (1.5 to 10.8 psig)

1. See table 3 for main valve spring number.

Installation



WARNING

Only qualified personnel should install or service a regulator. Regulators should be installed, operated, and maintained in accordance with international and applicable codes and regulations, and Fisher instructions.

If the regulator vents fluid or a leak develops in the system, it indicates that service is required. Failure to take the regulator out of service immediately may create a hazardous condition.

Personal injury, equipment damage, or leakage due to escaping fluid or bursting of pressure-containing parts may result if this regulator is overpressured 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 limits.

Additionally, physical damage to the regulator could result in personal injury and property damage due to escaping fluid. To avoid such injury and damage, install the regulator in a safe location.

Clean out all pipelines before installation of the regulator and check to be sure the regulator has not been damaged or has collected foreign material during shipping. For NPT bodies, apply pipe compound to the male pipe threads. For flanged bodies, use suitable line gaskets and approved piping and bolting practices. Install the regulator in any position desired, unless otherwise specified, but be sure flow through the body is in the direction indicated by the arrow on the body.

Note

It is important that the regulator be installed so that the vent hole in the spring case is unobstructed at all times. For outdoor installations, the regulator should be located away from vehicular traffic and positioned so that water, ice, and other foreign materials cannot enter the spring case through the vent. Avoid placing the regulator beneath eaves or downspouts, and be sure it is above the probable snow level.

Type VSX-2 Installation

The Type VSX-2 may be shipped separately from the regulator. To install the unit on a regulator, place the new O-rings (keys 2 and 3) on the Type VSX-2 and slide the module into the regulator body. Secure the Type VSX-2 to the regulator body with the four set screws (key 4). The unit may be oriented in any direction with respect to the sensor line connection.

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Overpressure Protection

The recommended pressure limitations are stamped on the regulator nameplate. Some type of overpressure protection is needed if the actual inlet pressure exceeds the maximum operating outlet pressure rating. Overpressure protection should also be provided if the regulator inlet pressure is greater than the safe working pressure of the downstream equipment.

Regulator operation below the maximum pressure limitations does not preclude the possibility of damage from external sources or debris in the line. The regulator should be inspected for damage after any overpressure condition.

Startup

The regulator is factory set at approximately the midpoint of the spring range or the pressure requested, so an initial adjustment may be required to give the desired results. With proper installation completed and relief valves properly adjusted, slowly open the upstream and downstream shutoff valves.

Type VSX-2 Startup

The Type VSX-2 is shipped in the tripped position and will need to be reset. If the Type VSX-2 is a high trip only, it can be reset before starting the regulator. If the Type VSX-2 is a high and low trip, the regulator will have to be started and the downstream system pressurized before the Type VSX-2 can be reset.

Adjustment

To change the outlet pressure, remove the closing cap or loosen the locknut and turn the adjusting screw clockwise to increase outlet pressure or counterclockwise to decrease pressure. Monitor the outlet pressure with a test gauge during the adjustment. Replace the closing cap or tighten the locknut to maintain the desired setting.

Type VSX-2 Trip Adjustment

Note

An adjustment tool is included with the Type VSX-2. Use only this tool to make adjustments to the unit. To make adjustments, the overpressure trip spring is found under the outer adjusting screw and the underpressure trip spring is found under the inner adjusting screw.

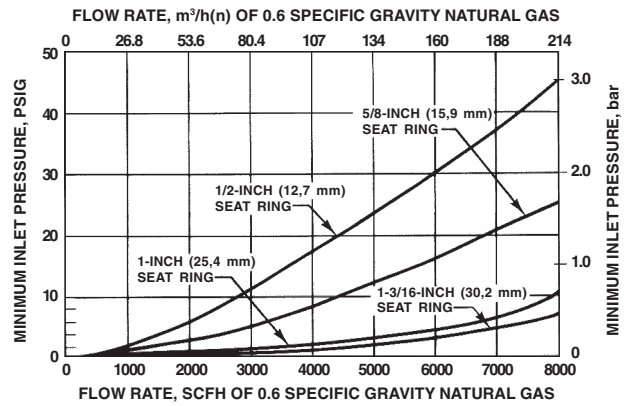


Figure 1. Minimum Inlet Pressure Required to Prevent Shutoff on all Sizes of S204, S204H, S206, and S206H Regulators at Indicated Flow

To adjust the Overpressure Trip Spring:

1. Adjust the overpressure trip setting to its maximum compression.
2. If present, adjust the underpressure spring to its minimum compression.
3. Backpressure the unit with the desired trip pressure.
4. Reduce the overpressure trip spring compression until the Type VSX-2 trips.

To adjust the Underpressure Trip Spring:

1. Adjust the underpressure trip spring back to its minimum compression.
2. Backpressure the unit with the desired trip pressure.
3. Increase the underpressure trip spring compression until the Type VSX-2 trips.

Taking Out of Service (Shutdown)



WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the regulator from all pressure before attempting disassembly.

Type S201 and S202 Parts List

Key Description

- 1 Spring Case
- 2 Spring
- 3 Adjusting Screw
- 4 Closing Cap
- 5 Closing Cap Gasket
- 6 Upper/Lower Spring Seat
- 7A Diaphragm
- 7B Diaphragm Head
- 8 Pusher Post
- 9 Lower Casing Assembly
- 10 Lever
- 11 Pin
- 12 Machine Screw
- 13 Valve Stem Assembly
- 14 Cap Screw
- 15 Hex Nut
- 16 Disk Holder Assembly
- 17 Diaphragm Plate
- 18 Cap Screw
- 19 O-Ring
- 20 Seat Ring
- 21 Body
- 24 Cap Screw
- 25 Relief Valve Spring
- 32 Nameplate
- 46 Pipe Plug
- 53 Hex Nut
- 55 Flapper Stem
- 56 Lower Flapper
- 57 Upper Flapper
- 58 Seat Ring
- 59 Self-Tapping Screw
- 60 Spring
- 61 Screen
- 62 Snap Ring

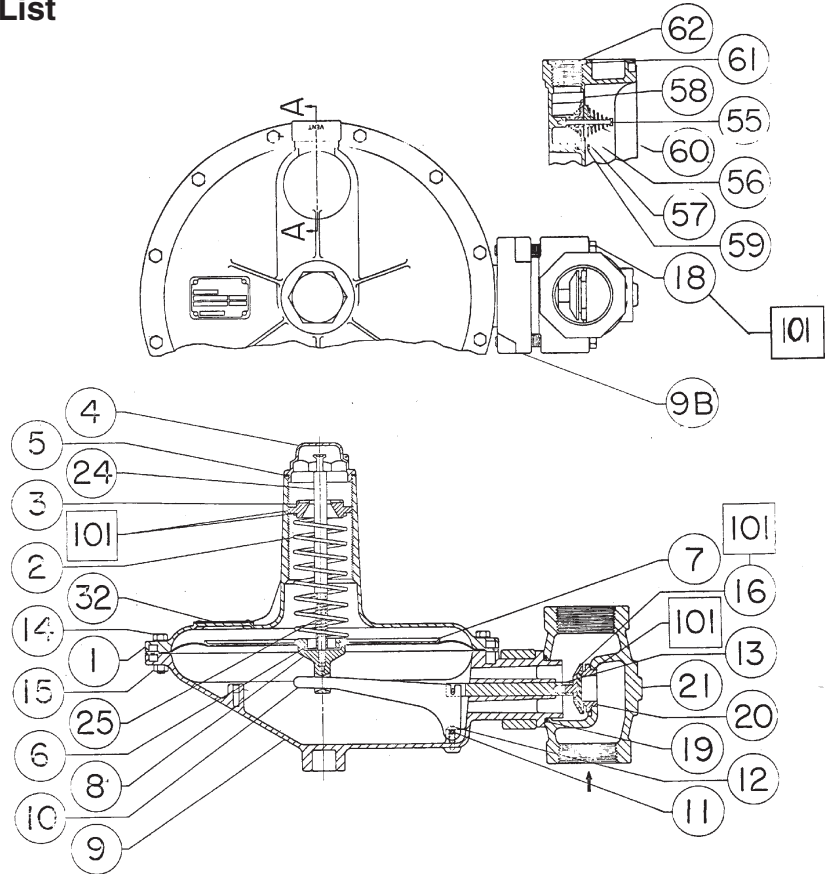


Figure 2. Type S202 Assembly

Type S204 and S206 Parts List

Key Description

- 1 Spring Case
- 2 Spring
- 3 Adjusting Screw
- 4 Closing Cap
- 5 Closing Cap Gasket
- 6 Lower Spring Seat
- 7 Diaphragm & Head Assembly
- 7A Diaphragm
- 8 Pusher Post (S204)
- 8 Ball Stem Assembly (S206)
- 9 Lower Casing Assembly
- 10 Lever
- 11 Pin
- 12 Machine Screw
- 13 Valve Stem Assembly
- 14 Cap Screw
- 15 Hex Nut
- 16 Disk Holder Assembly
- 18 Cap Screw
- 19 O-Ring
- 20 Seat Ring
- 21 Body
- 24 Reset Stem
- 25 Relief Valve Spring (S206)
- 26 Back Disk Spring
- 27 Back Disk Holder
- 28 Disk Spacer
- 32 Nameplate
- 33 Valve Stem
- 34 Gasket
- 55 Flapper Stem
- 56 Lower Flapper
- 57 Upper Flapper
- 58 Seat Ring
- 59 Self-Tapping Screw
- 60 Spring
- 61 Screen
- 62 Snap Ring

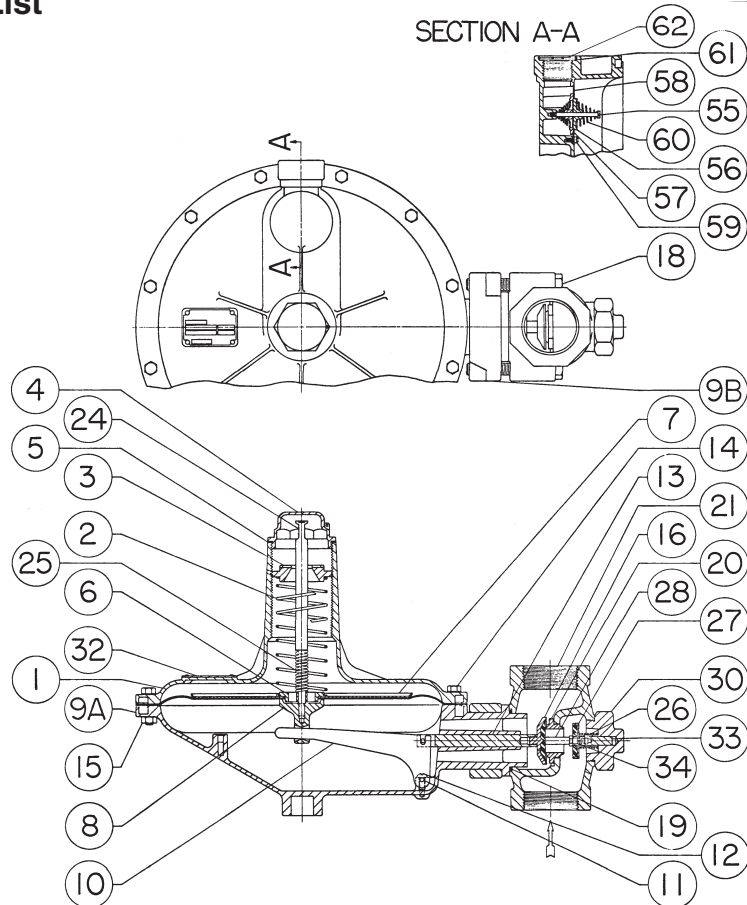


Figure 3. Type S206 Assembly

S200 Series

Type S208 and S209 Parts List

Key Description

- 1 Spring Case
- 2 Spring
- 3 Adjusting Screw
- 4 Closing Cap
- 5 Closing Cap Gasket
- 6 Lower Spring Seat
- 7 Diaphragm and Diaphragm Head
- 8 Pusher Post
- 9 Lower Casing Assembly
- 10 Lever
- 11 Pin
- 12 Machine Screw
- 13 Valve Stem Assembly
- 14 Cap Screw
- 15 Hex Nut
- 16 Disk Holder
- 17 Diaphragm Head
- 19 O-Ring
- 20 Orifice
- 21 Body
- 24 Stem
- 25 Relief Valve Spring
- 32 Nameplate
- 55 Flapper Stem
- 56 Lower Flapper
- 57 Upper Flapper
- 58 Orifice
- 59 Self-Tapping Screw
- 60 Spring
- 61 Screen
- 62 Snap Ring
- 63 Retaining Ring
- 64 O-Ring
- 65 O-Ring
- 67 Stem Adaptor
- 94 Relief Restriction
- 121 Insert
- 122 O-Ring
- 123 Pipe Plug

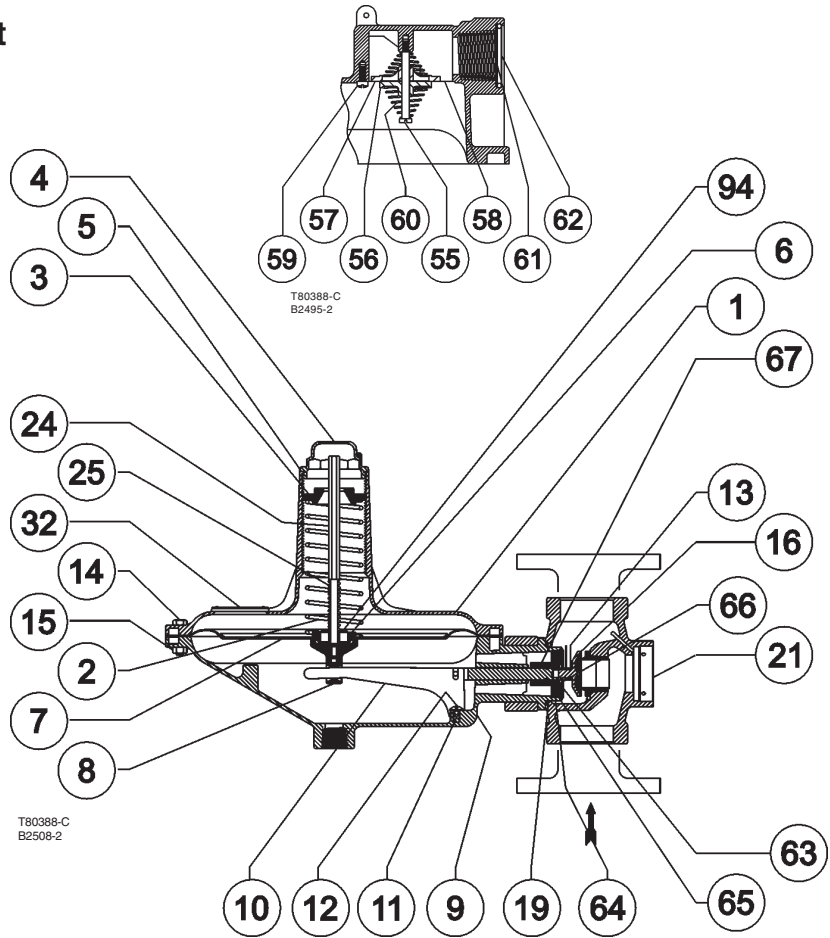


Figure 4. Type S209 Assembly

Type VSX-2 Parts List

Key Description

- 1 VSX-2 Module
- 2 Upper O-Ring
- 3 Lower O-Ring
- 4 Set Screw
- 6 Vent Assembly
- 7 High-Pressure Control Spring
- 8 Low-Pressure Control Spring
- 10 Machine Screw
- 11 Gasket
- 13 Pipe Plug

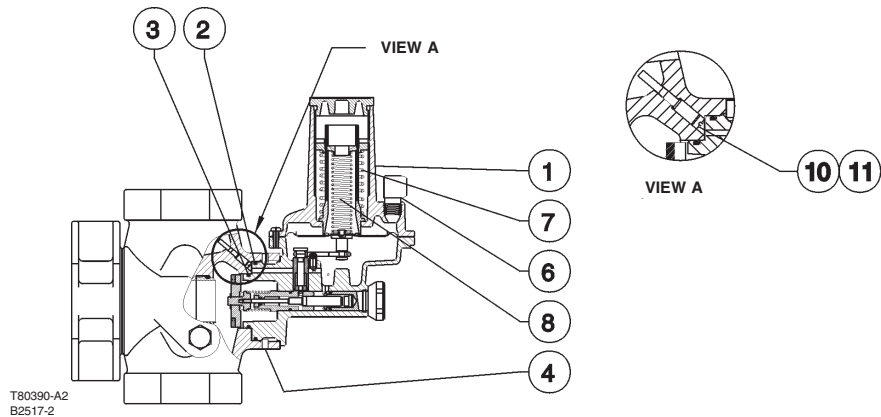


Figure 5. Type VSX-2 Assembly

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