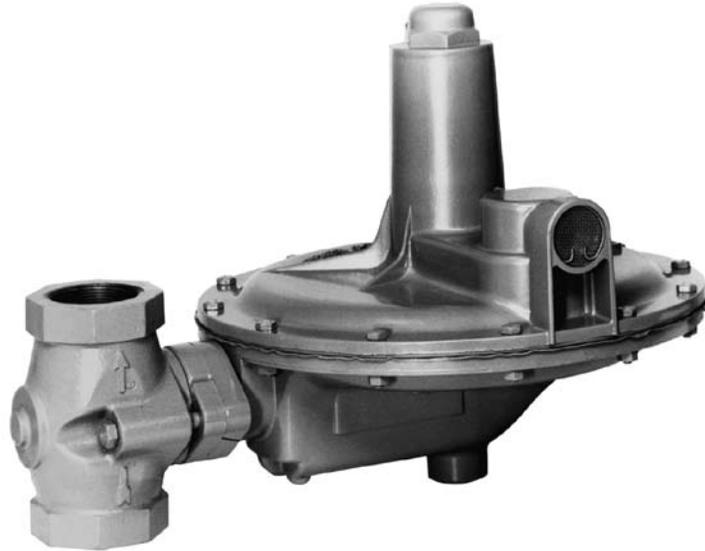


## S201P and S202P Series Gas Regulators



W1919

Figure 1. Typical S201P Gas Regulator



### WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc., instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Call a gas service person to service the unit. Only a qualified person must install or service the regulator.

### Introduction

#### Scope of the Manual

This instruction manual provides instructions for installation, adjustment, maintenance, and parts ordering information for S201P and S202P Series (spring loaded constructions only) and Type S201PK gas service regulators.

#### Description

The S201P and S202P Series can be used for monitoring service, as well as industrial and commercial applications. All "P" suffix regulators have a 3/4 NPT downstream control line and a blocked throat. S202P Series units have an internal relief valve that gives partial downstream protection.

#### Specifications

The Specifications section lists the specifications for S201P and S202P Series constructions. The following information is stamped on the regulator at the factory: type number, date of manufacture, spring range, orifice size, maximum inlet pressure, maximum operating outlet pressure, and outlet pressure which may damage regulator parts.



# S201P and S202P Series

## Specifications

### Available Configurations

**Type S201P:** Regulator with external pressure registration, spring loaded with O-ring stem seal, and stem wiper

**Type S202P:** Type S201P with internal relief

**Type S201PK:** Regulator with external adjustment, external pressure registration, and stem wiper

### Body Sizes and End Connection Style

1-1/2 or 2 NPT,  
NPS 2 (DN 50), CL125 FF flanged

### Maximum Allowable Inlet Pressures<sup>(1)</sup>

See Table 1

### Maximum Emergency Outlet Pressure<sup>(1)</sup>

15 psig (1,0 bar)

### Outlet Pressure Range

2.0-inches w.c. to 10 psig (5 mbar to 0,69 bar)

### Orifice Sizes

1/4, 3/8, 1/2, 3/4, 1, and 1-3/16-inches  
(6,4; 9,5; 13; 19; 25; and 30 mm)

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

-20° to 150°F (-29° to 66°C)

### Pressure Registration

External (Downstream control line)

### Control Line Connection

3/4 NPT

### Approximate Weight

22 pounds (10 kg)

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation for valve should not be exceeded.

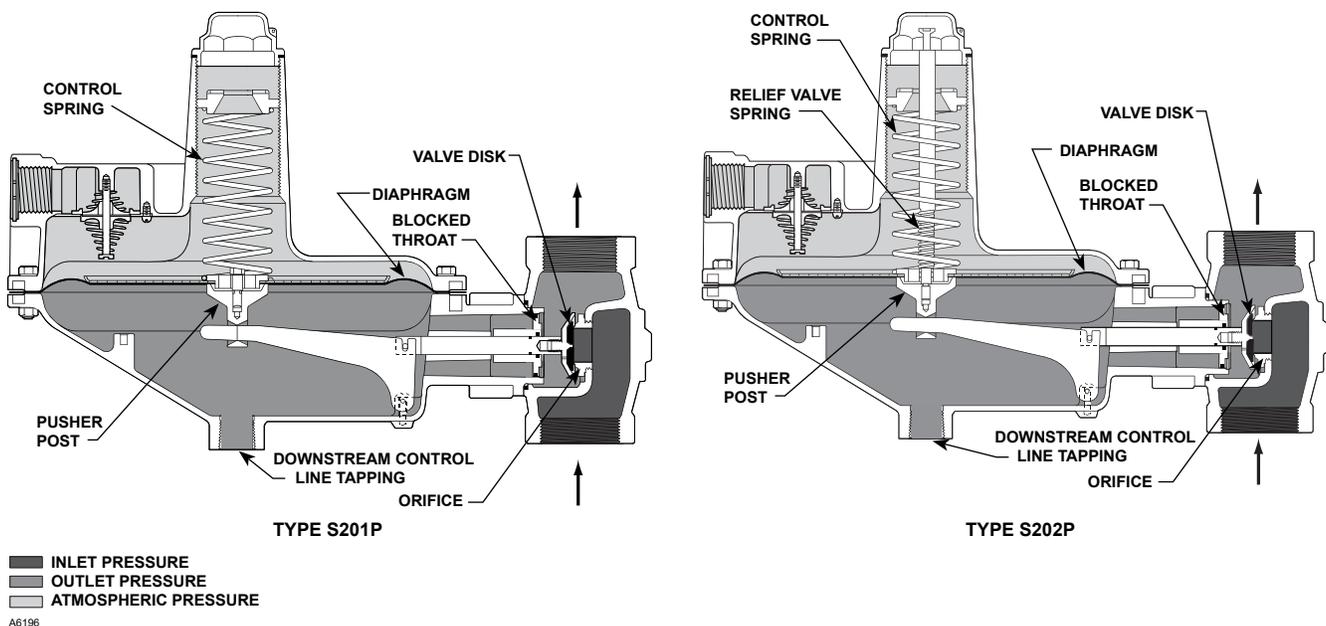


Figure 2. Operational Schematics

## Principle of Operation

See Figure 2. S201P and S202P Series use a downstream control line connected to the lower diaphragm case. They have a blocked throat and the downstream pressure reaches the diaphragm through the control line.

When downstream demand decreases, the pressure under the diaphragm increases. This pressure overcomes the regulator setting (which is set by a

spring). Through the action of the pusher post assembly, lever, and valve stem, the valve disk moves closer to the orifice and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward, and the valve disk moves away from the orifice, and the gas flow increases.

The S202P Series regulators include an internal relief valve for overpressure protection. If the downstream pressure exceeds the regulator setting by 7-inches w.c.

# S201P and S202P Series

**Table 1. Maximum Inlet Pressures**

ORIFICE SIZE		INLET PRESSURE SETTING			
Inches	mm	Optimum		Maximum	
		Psig	bar	Psig	bar
1/4	6,4	125	8,6	125	8,6
3/8	9,5	100	6,9	125	8,6
1/2	12,7	60	4,1	100	6,9
3/4	19,1	25	1,7	60	4,1
1	25,4	13	0,90	25	1,7
1-3/16	30,2	5	0,34	13	0,90

**Table 2. Maximum Outlet Pressure Setting**

TYPE NUMBER	DIAPHRAGM HEAD	MAXIMUM OUTLET*
S201P and S202P	Light	30-inches w.c. (75 mbar)
	Heavy	5 psig (0,34 bar)
S201PK	Heavy	10 psig (0,69 bar)

\* Maximum emergency outlet (casing) pressure for S200P Series is 15 psig (1,0 bar).

**Table 3. Outlet Pressure Ranges**

TYPE NUMBER	SPRING RANGE		PART NUMBER	SPRING FREE LENGTH, INCHES (mm)	SPRING WIRE DIAMETER, INCHES (mm)	SPRING COLOR CODE
	Inches w.c.	mbar				
S201P and S202P	2.0 to 4.5	5 to 11	1D892527022	6.12 (155)	0.109 (2,77)	Brown
	3.5 to 6.5	9 to 16	1D892627022	7.53 (191)	0.112 (2,84)	Red
	5.0 to 9.0	12 to 22	1D892727012	7.88 (200)	0.130 (3,30)	Black
	8.5 to 18.0	21 to 45	1D893227032	7.50 (191)	0.156 (3,96)	Gray
	14.0 to 30.0	35 to 75	1D893327032	7.25 (184)	0.182 (4,62)	Dark Green
	1.0 to 2.0 psig	0,07 to 0,14 bar	1H975827032	7.09 (180)	0.225 (5,72)	Dark Blue
S201PK	1.5 to 3.25 psig	0,10 to 0,22 bar	1H975927032	6.91 (176)	0.250 (6,35)	Orange
	2.0 to 5.0 psig	0,14 to 0,34 bar	1P615427142	6.50 (165)	0.295 (7,49)	Yellow
	4.0 to 10.0 psig	0,28 to 0,69 bar	0Y066427022 1H802427032	6.00 (152) 6.00 (152)	0.363 (9,22) 0.406 (10,3)	Green Stripe Cadmium

to 2 psig (17 mbar to 0,14 bar) (depending on the main spring used), the relief valve automatically opens and excess gas is vented through the stabilizer vent in the upper spring case.

**explosion hazard. In these cases, the vent should be piped away from the regulator to the outdoors.**

## Installation



### WARNING

Personal injury or system damage may result if this regulator is installed, without appropriate overpressure protection, where service conditions could exceed the limits given on the regulator nameplate. Regulator installations should be adequately protected from physical damage.

All vents should be kept open to permit free flow of gas to the atmosphere. Protect openings against the entrance of rain, snow, insects, or any other foreign material that may plug the vent or vent line. On outdoor installations, point the spring case vent downward to allow condensate to drain. This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.

Under enclosed conditions or indoors, escaping gas may accumulate and be an



### CAUTION

S201P and S202P Series regulators have an outlet pressure rating lower than their inlet pressure rating. If actual inlet pressure can exceed the outlet pressure rating, outlet overprotection is necessary. However, overpressuring any portion of the regulators beyond the limits in Specifications section and Tables 1 and 2 may cause leakage, damage to regulator parts, or personal injury due to bursting of pressure-containing parts.

Some type of external overpressure protection should be provided if inlet pressure will be high enough to damage downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shutoff devices, and series regulation.

If the regulator is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Regulator operation below these limits does not preclude

# S201P and S202P Series

## the possibility of damage from external sources or from debris in the pipeline.

Before installing the regulator, check for damage which might have occurred in shipment. Also check for dirt or foreign matter which may have accumulated in the regulator body or in the pipeline. Apply pipe compound to the external threads of the pipeline and install the regulator so that flow is in the direction of the arrow cast on the body. The diaphragm casing assembly can be rotated to any position relative to the body. Loosen the two cap screws (key 18, Figure 3) in order to rotate the diaphragm casing assembly.

Do not install the regulator in a location where there can be excessive water accumulation, such as directly beneath a downspout, gutter, or roof line of building. Even a protective hood may not provide adequate protection in these instances.

If the regulator is used in conjunction with a Type 289H relief valve, the Type 289H should be set 10-inches w.c. (25 mbar) higher than the outlet pressure setting of the regulator, up to 30-inches w.c. (75 mbar) outlet pressure. For pressure greater than this, set the Type 289H 0.75 psi (0,05 bar) higher than the outlet pressure setting of the regulator.

The S201P and S202P Series regulators have 1 NPT vent openings in the spring case. If necessary to vent escaping gas away from the regulator, install a remote vent line in the spring case tapping. Vent piping should be as short and direct as possible with a minimum number of bends and elbows. The remote vent line should have the largest practical diameter. Vent piping on regulators with internal relief (S202P Series) must be large enough to vent all relief valve discharge to atmosphere without excessive backpressure and resulting excessive pressure in the regulator.

Periodically check all vent openings to be sure that they are not plugged.

Maximum outlet pressure settings are shown in Table 2. Outlet pressure greater than 2 psi (0,14 bar) (light diaphragm head) or 3 psi (0,21 bar) (heavy diaphragm head) above the set point may damage internal parts such as the diaphragm head and valve disk. **The maximum emergency (casing) outlet pressure is 15 psig (1,0 bar).**

## Downstream Control Line



**CAUTION**

**All S201P and S202P Series units must be installed with an external downstream**

**control line attached to the tapped connection in the lower spring case. If the control line is not connected to the lower casing, or if it should fail, the regulator will remain wide-open and there will be no pressure control.**

Install the control line before putting the regulator into operation. The downstream control line pipe should be at least 1/2-inch (13 mm) in diameter, connected to a straight section of outlet piping 5 to 10 pipe diameters downstream of the regulator, and adequately protected against damage. To dampen pulsations which may cause instability or cycling of the regulator, a hand valve should be installed in the downstream control line. The hand valve can be throttled down to dampen pulsations, but must never be completely closed during operation.

## Startup



**CAUTION**

**Pressure gauges should always be used to monitor downstream pressure during startup. Procedures used in putting this regulator into operation must be planned accordingly if the downstream system is pressurized by another regulator or by a manual bypass.**

If the downstream is not pressurized by another regulator or manual bypass valve, use the following procedure to startup the regulator.

1. Open the hand valve in the control line.
2. Slowly open the upstream block valve.
3. Slowly open the downstream block valve.
4. If the regulator tends to pulsate, throttle down the hand valve in the control line. Never allow the hand valve to be completely closed while the regulator is in operation.
5. Check all connections for leaks.
6. Light the appliance pilots.

## Adjustment

The range of allowable pressure settings is stamped on the nameplate. If the required setting is not within this range, substitute the correct spring (as shown in Table 3). If the spring is changed, be sure to change the nameplate to indicate the new pressure range.

# S201P and S202P Series

A pressure gauge should always be used to monitor downstream pressure while adjustments are being made.

1. Remove the closing cap (key 4, Figure 3).
2. To increase the outlet setting, turn the adjusting screw (key 3) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Replace the closing cap.

## Shutdown

Installation arrangements may vary, but in any installation it is important that the valves be opened or closed slowly and that the outlet pressure be vented before venting inlet pressure to prevent damage caused by reverse pressurization of the regulator. The steps below apply to the typical installation as indicated.

1. Open vent valves downstream of the regulator.
2. Slowly close the upstream block valve.
3. Inlet pressure will automatically be released downstream as the regulator opens in response to the lowered pressure on the diaphragm.

## Maintenance



### WARNING

**To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure as described in “Shutdown”.**

**Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson Process management Regulator Technologies, Inc. should be used for repairing Fisher® regulators. Relight pilot lights according to normal startup procedures.**

**Due to normal wear or damage that may occur from external sources, this regulator should be inspected and**

**maintained periodically. The frequency of inspection and replacement of parts depend upon the severity of service conditions or the requirements of local, state, and federal rules and regulations.**

## Disassembly to Replace Diaphragm

1. Remove the closing cap (key 4, Figure 3), and turn the adjusting screw (key 3) counterclockwise to ease spring compression.
2. Remove the adjusting screw (key 3) and the spring (key 2).
3. Remove hex nuts (key 15) and cap screws (key 14). Separate the upper spring case (key 1) from the lower casing assembly (key 9).
4. Slide the diaphragm and diaphragm head assembly (key 7) away from the body (key 21) to unhook the pusher post (key 8) from the lever (key 10). Lift off the diaphragm and diaphragm head assembly.
5. Unscrew the reset stem (key 24) from the pusher post (The relief valve spring (key 25) will also have to be removed from S202P Series regulators).
6. The diaphragm head can now be lifted off the diaphragm assembly.

### Note

**Take care not to pinch or tear the diaphragm when reassembling.**

7. Reassemble the spring case unit in the reverse order of the above steps. Note the following:
  - a. Before tightening the cap screw or stem into the pusher post, place the loosely-assembled diaphragm assembly into position in the lower casing, being sure that the pusher post is hooked on the lever. Rotate the diaphragm so that the diaphragm and lower casing holes are aligned. Tighten cap screw or stem.
  - b. Tighten the spring case cap screws finger-tight only. After replacing the spring and adjusting screw, turn the adjusting screw in about halfway. This procedure will ensure proper slack in the diaphragm. Finish tightening the cap screws.

# S201P and S202P Series

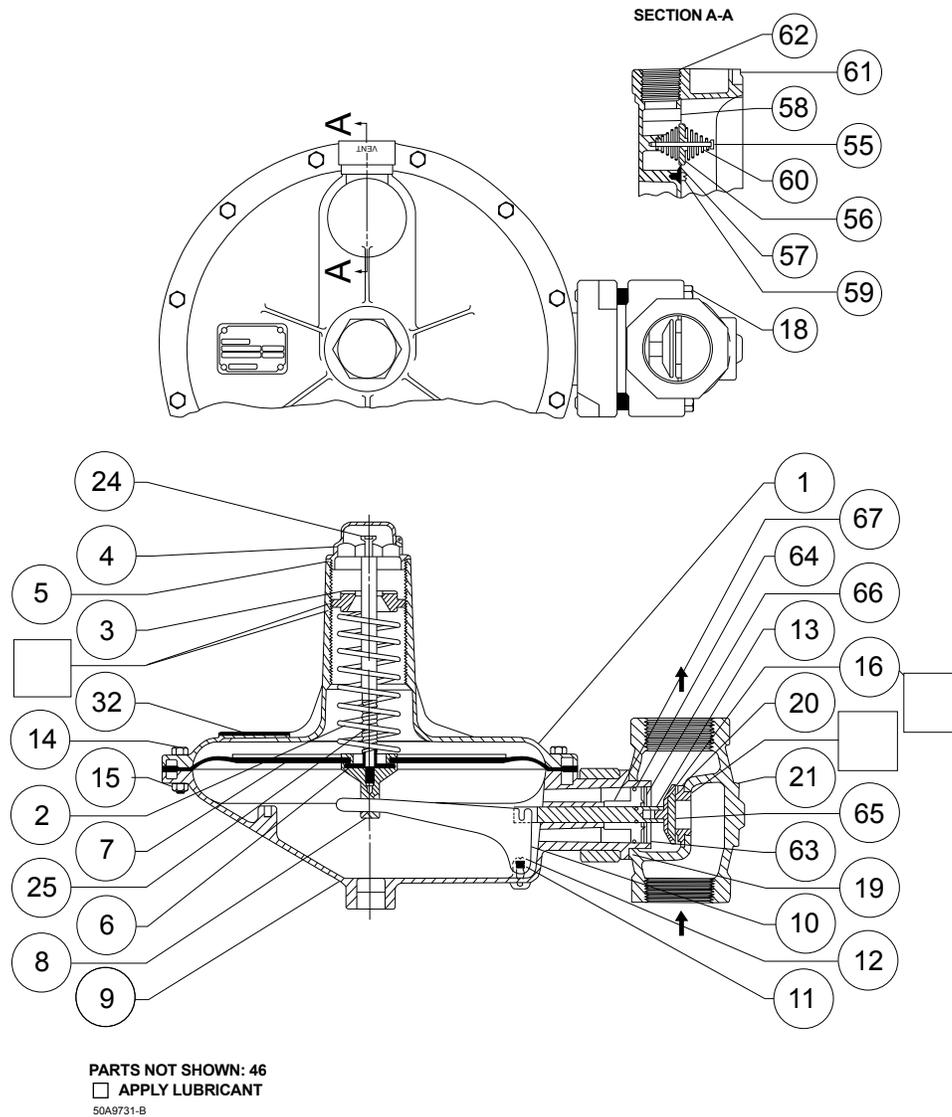


Figure 3. Type S202P Regulator Assembly

## Disassembly to Replace Valve Disk, Orifice, and O-Rings

1. Remove the cap screws (key 18, Figure 3) which hold the lower spring casing (key 9) to the body (key 21). Separate the lower spring casing from the body.
2. Check the body O-ring (key 19) for wear.
3. Examine the valve disk (key 16) for nicks, cuts, and other damage. Unscrew the disk holder assembly from the valve stem assembly (key 13) and replace it with a new part if necessary.
4. If the seating edge of the orifice (key 20) is nicked or rough, remove the orifice from the body. Change to a new part when reassembling the regulator. (If the orifice is replaced with a different size, change the nameplate to state the new size and maximum inlet pressure).
5. To inspect or replace the stem adaptor O-ring (key 64), remove the retaining ring (key 63) and slide the stem adaptor (key 67) off the stem.
6. The O-ring stem seal (key 65, Types S201P, S202P, and some S201PK units) should be examined and replaced if necessary.

# S201P and S202P Series

7. Also examine and replace if necessary the stem wiper ring (key 66, Types S201P, S202P, and some S201PK units). The wiper ring has a special electro-film treatment, and only Fisher® parts should be used for the wiper ring.

## Parts Ordering

The type number, orifice size, and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance. If construction changes are made in the field, make sure that the nameplates are also changed to reflect the most recent construction.

When ordering replacement parts, reference the key number of each needed part as found in the following parts list. Separate kits containing all recommended spare parts are available.

## Parts List

Key	Description	Part Number
	Parts Kit (Included are keys 5, 7, 16, and 19) S201P/S202P Series Type S201PK	RS201X00012 RS201KX0012
1	Spring Case Aluminum Pinned for heavy spring	4L142308032 1J718699022
2	Spring, Steel	See Table 3
3	Adjusting Screw Aluminum Steel (Type S201PK only)	1L928608012 1R8085T0012
4	Closing Cap Aluminum Brass (Type S201PK only)	1L928308012 1H798714012
5*	Closing Cap Gasket, Neoprene (CR)	1N446206992
6	Upper/Lower Spring Seat Aluminum Brass (Type S201PK only) (2 required)	1L928708012 1H797414012
7*	Diaphragm and Diaphragm Head, Nitrile(NBR)/Steel S201P and S202P Series Use with 1D8933 and lighter springs Use with 1H9758 and heavier springs Type S201PK Diaphragm only	1L1544X0012 1L1545X0012 1K649602052
8	Pusher Post, Aluminum S201P Series and Type S201PK S202P Series	2H980608012 2H975208012
9	Lower Casing Assembly Aluminum/Stainless Steel	1H9751X0022
10	Lever, Steel	1H974028992
11	Pin, 303 Stainless steel	1H972935032
12	Machine Screw, Steel (2 required)	1B420428982
13*	Valve Stem Assembly	1L1426000A2
14	Cap Screw, Steel (12 required)	1B136324052
15	Hex Nut, Steel, Cadmium plate (12 required)	1A309324122

Key	Description	Part Number
16*	Disk Holder Assembly For Natural Gas Service For Manufactured Gas (3/4-inch (19 mm) and larger orifices)	1P7349000A2 1J1680X0012
17	Diaphragm Head, Steel Type S201PK Only	1A347825022
18	Cap Screw, Carbon steel (2 required)	1H974724052
19*	O-Ring, Nitrile (NBR)	T12587T0012
20*	Orifice, Aluminum 1/4 (6,4 mm) 3/8-inch (9,5 mm) 1/2-inch (13 mm) 3/4-inch (19 mm) 1-inch (25 mm) 1-3/16-inch (30 mm)	T13833T0012 1H979309022 1H979409022 1H979509022 1H979609022 1H979709022
21	Body Cast Iron 1-1/2 NPT 2 NPT NPS 2 (DN 50), CL125 FF Flanged With 1/8 NPT Test Gauge Connection 1-1/2 NPT 2 NPT NPS 2 (DN 50), CL125 FF Flanged Steel 1-1/2 NPT 2 NPT	1J190319012 1H974919012 2K184219012 1P799219012 1P799319012 2P806119012 1K787922012 1K792122012
24	Cap Screw, Steel, Zinc-plated S201P Series Type S201PK Stem (S202P Series only)	1H975424272 1K427828982 1H969224272
25	Relief Valve Spring, Steel Cadmium plate (S202P Series only) Standard For U.L. Approved units and with 1D8933 or lighter springs	1H976027012 1R100427012
32	Nameplate, Aluminum	-----
46	Pipe Plug, 1/8 NPT Brass 304 SST	1A621914012 1E823135042
53	Hex Nut, Steel, Cadmium plate (Type S201PK only)	1A3524X0082
55	Flapper Stem 302 Stainless steel	1H976335022
56	Lower Flapper, Nylon (PA)	1H976406992
57	Upper Flapper, Nylon (PA)	1H976506992
58*	Flapper Orifice, 302 Stainless steel	T13609T0012
59	Self-tapping Screw, Steel (3 required)	1H976728982
60	Spring, 302 Stainless steel (2 required)	1H976837022
61	Screen, Stainless steel	1E564843122
62	Snap Ring, 302 Stainless steel	1E564937022
63	Retaining Ring, Stainless steel	1L142838992
64*	O-Ring, Nitrile (NBR)	1L142906992
65*	O-Ring, Nitrile (NBR) S201P and S202P Series	1E216306992
66*	Wiper Ring, Nitrile (NBR) Types S201P and S202P	1L143006992
67	Stem Adaptor, Aluminum S201P and S202P Series	1L143109012

\*Recommended Spare Parts

# S201P and S202P Series

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