

November 2007

Types S201 and S202 Gas Regulators

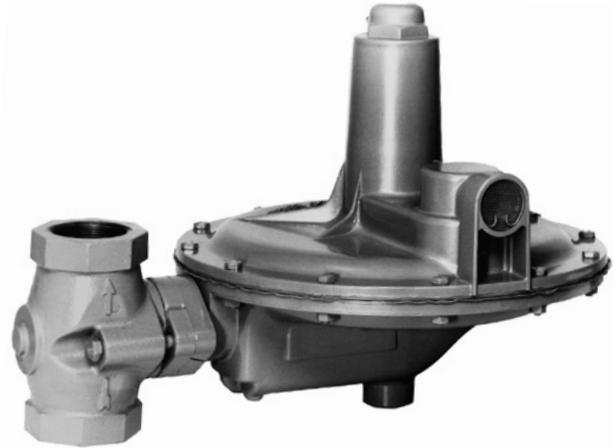


WARNING

Fisher regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Fisher instructions. For LP-gas service, an approved regulator (such as one listed by U.L.) should be used. The installation, in most states, must comply with NFPA standards.

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.



W1919

Figure 1. Typical S200 Series Gas Regulator

Introduction

Scope of the Manual

This instruction manual provides instructions and a parts list for Types S201, S201H, S201K, S202, and S202H gas service regulators.

Description

Types S201 and S202 regulators are typically installed on industrial and commercial applications. The Types S202 and S202H regulators contain an internal relief valve. Units with an "H" or "K" suffix are similar to the basic regulators but deliver a higher outlet pressure of 1 to 10 psig (0,07 to 0,69 bar).

Specifications

The Specifications table lists the specifications for the regulators. The following information is stamped on the regulator at the factory: type number, date of manufacture, spring range, port size, maximum inlet pressure, maximum operating outlet pressure, and outlet pressure which may damage regulator parts.

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 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 (see Figure 2). This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.



Types S201 and S202

Specifications

Body Size and End Connection Styles

1-1/2 or 2-inch inlet and outlet and
2-inch (DN 50) CL125 FF flanged

Maximum Allowable Inlet Pressures

See Table 1

Maximum Emergency Outlet Pressure

15 psig (1,03 bar)

Outlet Pressure Range

2.0-inches w.c. to 10 psig (4,9 mbar to 0,69 bar)

Seat Ring Diameter

1/4, 3/8, 1/2, and 1-3/16-inches
(6,35; 9,53; 12,7; and 30,2 mm)

Temperature Capabilities

-20° to 150°F (-29 to 66°C)

Pressure Registration

Internal

Approximate Weight

22 pounds (10,0 kg)

Under enclosed conditions or indoors, escaping gas may accumulate and be an explosion hazard. In these cases, the vent should be piped away from the regulator to the outdoors.



CAUTION

Like most regulators, Types S201 and S202 regulators have an outlet pressure rating lower than their inlet pressure rating. If actual inlet pressure can exceed the outlet pressure rating, outlet overpressure protection is necessary. However, overpressuring any portion of the regulators beyond the limits in Table 1 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 the possibility of damage from external sources or from debris in the pipeline.

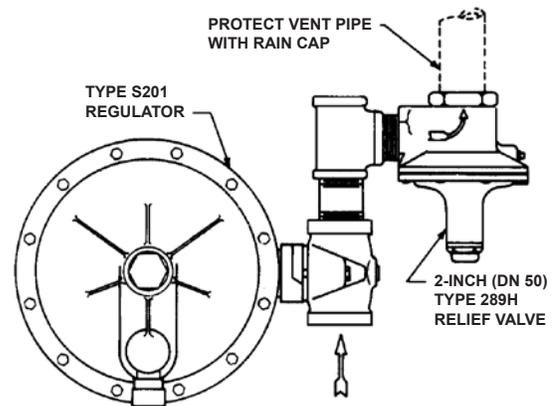


Figure 2. Type S201 Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief

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 male 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 4) 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.

If the regulator is used in conjunction with a Type 289H relief valve, it should be installed as shown in Figure 2. The outside end of the vent line should be protected with a rainproof assembly.

Types S201 and S202

Table 1. Inlet Pressure

SEAT RING SIZE		INLET PRESSURE SETTING			
Inches	mm	Optimum		Maximum	
		Psig	bar	Psig	bar
1/4	6,35	125	8,62	125	8,62
3/8	9,53	100	6,90	125	8,62
1/2	12,7	60	4,14	100	6,90
3/4	19,1	25	1,72	60	4,14
1	25,4	13	0,90	25	1,72
1-3/16	30,2	5	0,34	13	0,90

Table 2. Maximum Outlet Pressure Setting

TYPE NUMBER	DIAPHRAGM HEAD	MAXIMUM OUTLET*
S201, S202	Light	30-inches w.c. (74,7 mbar)
S201H, S202H	Heavy	5 psig (0,34 bar)
S201K	Heavy	10 psig (0,69 bar)

* Maximum emergency outlet (casing) pressure for S200 Series is 15 psig (1,03 bar).

Table 3. Spring Chart

TYPE NUMBER	SPRING RANGE		PART NUMBER	COLOR CODE
	Inches w.c.	mbar		
S201, S202	2.0 to 4.5	4,9 to 11,2	1D892527022	Brown Red Black Gray Dark Green
	3.5 to 6.5	8,7 to 16,2	1D892627022	
	5.0 to 9.0	12,4 to 22,4	1D892727012	
	8.5 to 18.0	21,2 to 44,8	1D893227032	
	14.0 to 30.0	34,9 to 74,7	1D893327032	
S201H, S202H	1.0 to 2.0 psig	0,07 to 0,14 bar	1H975827032	Dark Blue Orange Yellow
	1.5 to 3.25 psig	0,10 to 0,22 bar	1H975927032	
	2.0 to 5.0 psig	0,14 to 0,34 bar	1P615427142	
S201K	2.0 to 5.5 psig	0,14 to 0,38 bar	0Y066427022	Green Stripe Cadmium
	4.0 to 10.0 psig	0,28 to 0,69 bar	1H802427032	

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. (74,7 mbar) reduced 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 Types S201 and S202 regulators have 1-inch NPT screened 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 (Types S202 and S202H) 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 more 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 (1,03 bar).**

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 system is not pressurized by another regulator or manual bypass valve, use the following procedure to start-up the regulator.

1. Check to see that all appliances are turned off.
2. Slowly open the upstream plug cock.
3. Check all connections for leaks.
4. 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, change the nameplate to indicate the new pressure range.

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

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

Types S201 and S202

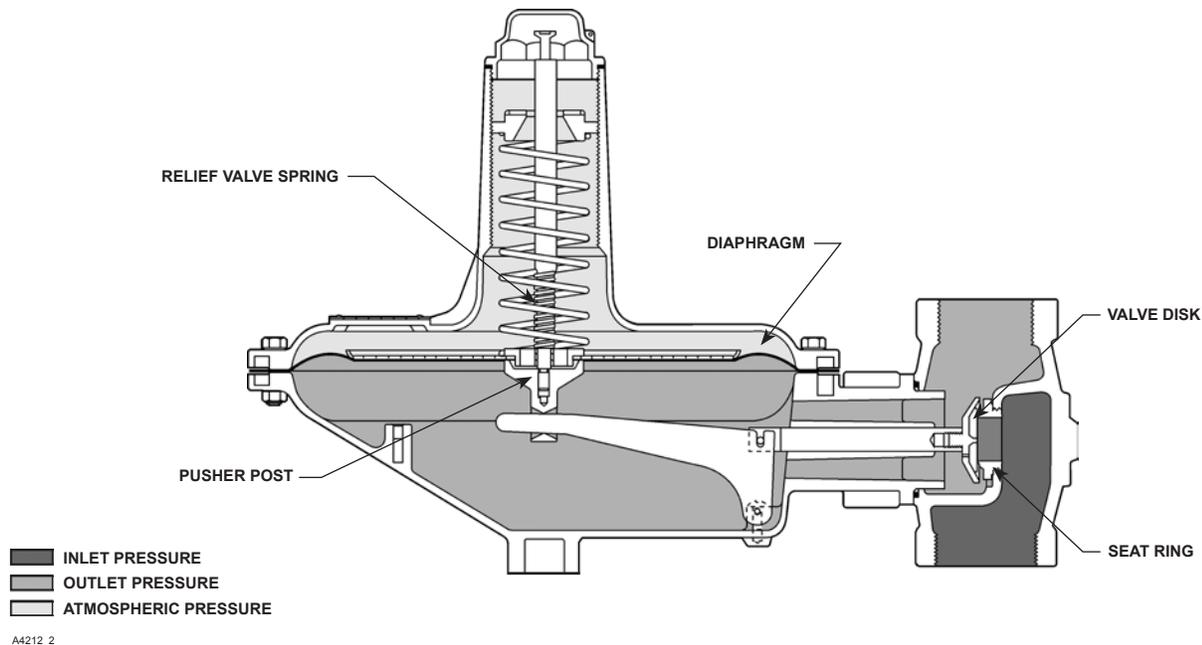


Figure 3. Type S202 Regulator Operational Schematic

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

Principle of Operation

Refer to Figure 3. 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, the valve disk moves closer to the seat ring and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward, the valve disk moves away from the seat ring, and the gas flow increases.

The Types S202 and S202H regulators include an internal relief valve for over pressure protection. If the downstream pressure exceeds the regulator setting by 7-inches w.c. to 2 psig (17 mbar to 0,14 bar) (depending on the main spring used), the relief valve opens and excess gas is vented through the stabilizer vent in the upper spring case.

Maintenance



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 returned to service. Only parts manufactured by Fisher 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 depends upon the severity of service conditions or the requirement of local, state, and federal rules and regulations.

Disassembly to Replace Diaphragm

1. Remove the closing cap (key 4, Figure 4) or loosen hex locknut. Turn the adjusting screw or nut (key 3) counterclockwise to ease spring compression.
2. On Types S201, S201H, S202, and S202H units, remove the adjusting screw and spring (key 2).
From Type S201K remove the adjusting screw, hex locknut, and closing cap (key 4), the upper spring seat (key 6), and 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).

Note

If disassembling a Type S202 or S202H regulator, lift the upper spring case straight up in order to avoid hitting the stem (key 24).

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 head assembly.
5. Unscrew the cap or stem (key 24) which fastens the lower spring seat (key 6) to the pusher post to separate the lower spring seat, diaphragm and diaphragm head assembly, and pusher post. (The relief valve spring (key 25) will also have to be removed from Types S202 and S202H regulators).
6. Reassemble the spring case unit in the reverse order of the above steps. 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 the screw or stem.



CAUTION

Before tightening cap screws (key 14), replace the spring and adjusting screw. Turn the adjusting screw to about mid position. This will stretch the oversized diaphragm to ensure slack in the assembled diaphragm. The slack created by this method is necessary for good regulation. Be sure the diaphragm does not fold over at the flange when reassembling.

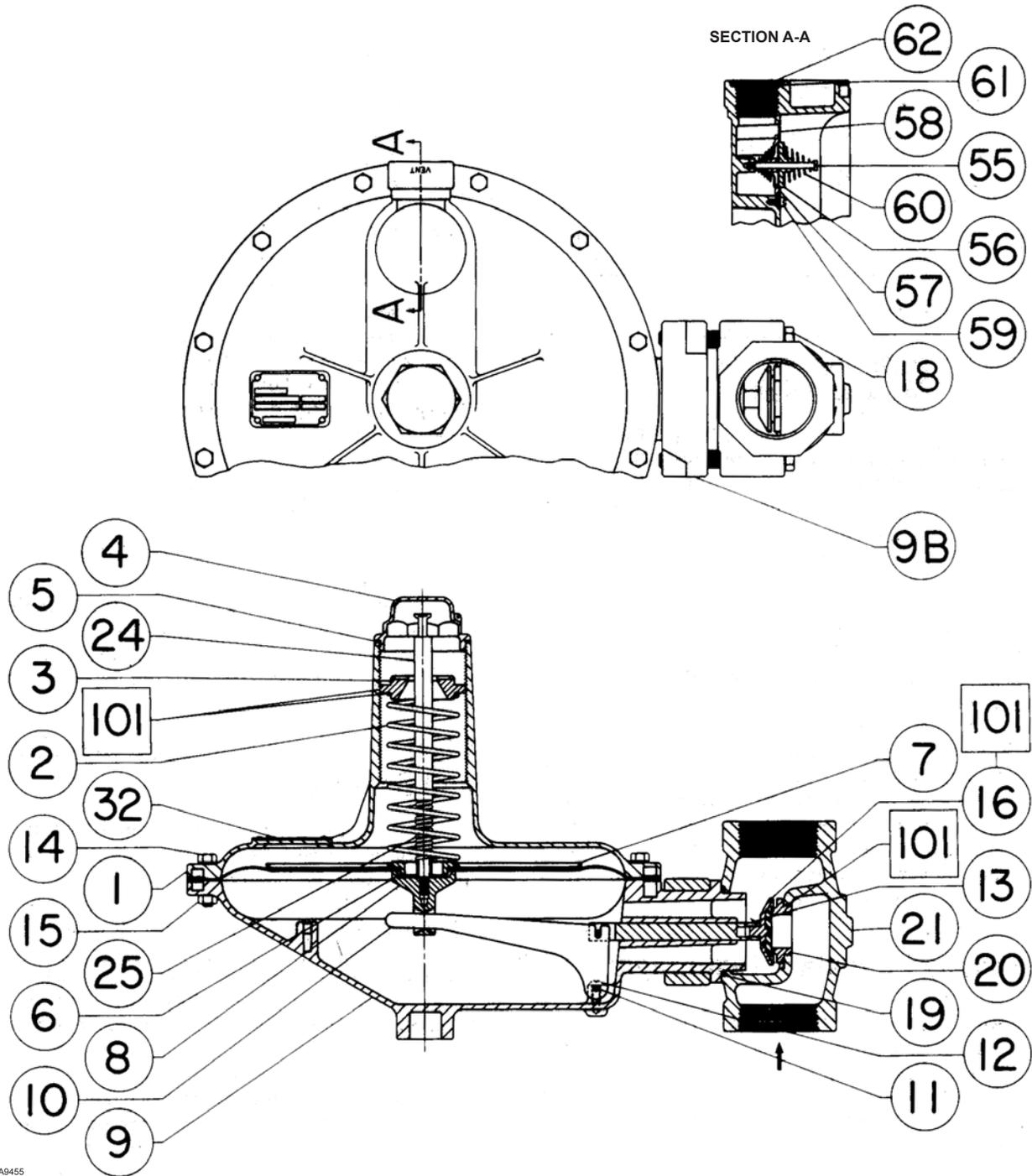
Disassembly to Replace Valve Disk and Seat Ring

1. Remove the bolts (key 18, Figure 4) 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 (key 13) and replace it with a new part if necessary.
4. If the seating edge of the seat ring (key 20) is nicked or rough, remove the seat ring from the body. Change to a new part when reassembling the regulator. (If the seat ring is being replaced with a different sized port, change the nameplate to state the new size and maximum inlet pressure).
5. Reassemble the regulator in reverse order of the above steps.

Parts Ordering

The type number, seat ring size, spring range, and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your Fisher Sales Representative or Sales Office regarding replacement parts or technical assistance.

Types S201 and S202



50A9455

PARTS NOT SHOWN: 46, 9C

□ APPLY LUBRICATION COMPUND

Figure 4. Type S202 Regulator

Types S201 and S202

Parts List

Key	Description	Part Number	Key	Description	Part Number
1	Spring Case Aluminum Pinned for heavy spring	4L142308032 1J718699002	21	Body Cast Iron	
2	Spring, Steel	see Table 3		1-1/2-inch NPT	1J190319012
3	Adjusting Screw Aluminum (Types S201, S201H, S202, S202H) Steel (Type S201K)	1L928608012 1P8085T0012		2-inch NPT	1H974919012
4	Closing Cap Aluminum (Types S201, S201H, S202, S202H) Brass (Type S201K)	1L928308012 1H798714012		2-inch (DN 50) 125 pounds (56,7 kg) Flanged	2K184219012
5*	Closing Cap Gasket, Neoprene	1N446206992		2-inch (DN 50) 250 pounds (113 kg) Flanged	2K184519012
6	Upper/Lower Spring Seat Aluminum (Types S201, S201H, S202, S202H) Brass, Type S201K (2 required)	1L928708012 1H797414012		With 1/8-inch NPT Test Gauge Connection	
7A*	Diaphragm, Nitrile Types S201, S202 - Use with 1D8933 and lighter springs	1H978102072		1-1/2-inch NPT	1P799219012
	Types S201H, S202H	1L154302052		2-inch NPT	1P799319012
	Type S201K	1K649602052		2-inch (DN 50) 125 pounds (56,7 kg) Flanged	2P806119012
7B*	Diaphragm Head, Steel Types S201, S202 - Use with 1D8933 and lighter springs	1H977928992		2-inch (DN 50) 250 pounds (113 kg) Flanged	2P806219012
	Types S201H, S202H	1H978025032		Steel	
	Type S201K	1A347825022		1-1/2-inch NPT	1K787922012
8	Pusher Post, Aluminum Types S201, S201H, S201K Types S202, S202H	2H980608012 2H975208012		2-inch NPT	1K792122012
9	Lower Casing Assembly, Aluminum	1H9751X0012		With 1/8-inch NPT Test Gauge Connection	
9B	Union Ring, Aluminum (2 required)	2H973408022		1-1/2-inch NPT	1P799122012
10	Lever, Steel	1H974028992		2-inch NPT	1P799422012
11	Pin, 303 SST	1H972935032	24	Cap Screw, Plated steel Type S201	1H975424272
12	Machine Screw, Steel (2 required)	1B420428982		Type S201H	1A667824052
13	Valve Stem Assembly	1H9748000A2		Type S201K	1K427828982
14	Cap Screw, Steel (12 required)	1B136324052		Stem, Plated steel	
15	Hex Nut, Plated steel (12 required)	1A309324122		Types S202, S202H	1H969224272
16*	Disk Holder Assembly For Natural Gas Service For Manufactured Gas (3/4-inch (19,1 mm) larger seat rings)	1P7349000A2 1J1680X0012	25	Relief Valve Spring, Plated steel (Types S202, S202H) Standard For U.L. listed units with 1D8933 or lighter springs	1H976027012 1R100427012
17	Diaphragm Plate, Steel (Type S201K)	1A347825022	32	Nameplate, Aluminum	-----
18	Cap Screw, Plated steel (2 required)	1H974724052	46	Pipe Plug, 1/8-inch NPT, Brass	1A621914012
19*	O-ring, Nitrile	T12587T0012	53	Hex Nut, Plated steel, Type S201K only	1A352424112
20	Seat Ring, Aluminum 1/4-inch (6,35 mm) Port Diameter 3/8-inch (9,53 mm) Port Diameter 1/2-inch (12,7 mm) Port Diameter 3/4-inch (19,1 mm) Port Diameter 1-inch (25,4 mm) Port Diameter 1-3/16-inch (30,2 mm) Port Diameter	1H979209022 1H979309022 1H979409022 1H979509022 1H979609022 1H979709022	55	Flapper Stem, 302 Stainless steel	1H976335022
			56	Lower Flapper, Nylon	1H976406992
			57	Upper Flapper, Nylon	1H976506992
			58	Seat Ring, 302 Stainless steel	1H976636012
			59	Self-tapping Screw, Steel (3 required)	1H976728982
			60	Spring, 302 Stainless steel (2 required)	1H976837022
			61	Screen, Monel†	1E564843122
			62	Snap Ring, 302 Stainless steel	1E564937022

* Recommended spare part.

† Trademark of International Nickel Company

Types S201 and S202

**Industrial Regulators
Regulator Division
Emerson Process Management**

USA - Headquarters
McKinney, Texas 75070 USA
Tel: 1-800-558-5853
Outside U.S. 1-972-548-3574

Asia-Pacific
Shanghai, China 201206
Tel: +86 21 2892 9000

Europe
Bologna, Italy 40013
Tel: +39 051 4190611

**Natural Gas Technologies
Regulator Division
Emerson Process Management**

USA - Headquarters
McKinney, Texas 75070
Tel: 1-800-558-5853
Outside U.S. 1-972-548-3574

Asia-Pacific
Singapore, Singapore 128461
Tel: +65 6777 8211

Europe
Bologna, Italy 40013
Tel: +39 051 4190611
Gallardon, France 28320
Tel: +33 (0)2 37 33 47 00

**TESCOM
Regulator Division
Emerson Process Management**

USA - Headquarters
Elk River, Minnesota 55330 USA
Tel: 1-763-241-3238

Europe
Selmsdorf, Germany 23923
Tel: +49 (0) 38823 31 0

For further information visit www.emersonprocess.com/regulators

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their prospective owners. Fisher is a mark owned by Fisher Controls, Inc., a business of Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Emerson Process Management does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Emerson Process Management product remains solely with the purchaser.