

S201 and S202 Series Gas Regulators

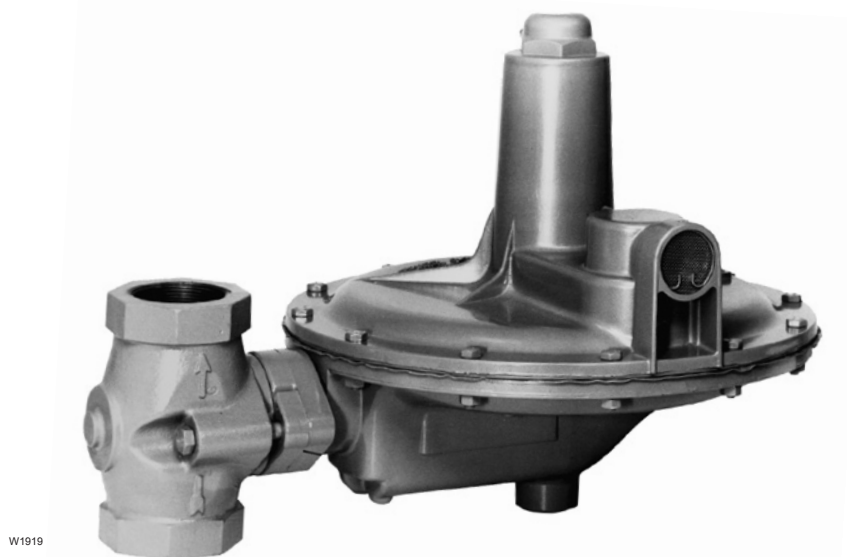


Figure 1. Typical S200 Gas Regulator



WARNING

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.

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.

Introduction

Scope of the Manual

This instruction manual provides instructions for installation, adjustment, maintenance, and parts ordering information for Types S201, S201H, S201K, S202, and S202H gas service regulators.

Description

S201 and S202 Series 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 5 psig (69 mbar to 0,35 bar) and 2 to 10 psig (0,14 to 0,69 bar), respectively.

Specifications

The Specifications section lists the specifications for the regulators. 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.



S201 and S202 Series

Specifications

Available Configurations

See Figure 3

Body Size and End Connection Styles

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

Maximum Allowable Inlet Pressures⁽¹⁾

See Table 1

Maximum Emergency Outlet Pressure⁽¹⁾

15 psig (1,0 bar)

Outlet Pressure Range

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

Orifice Size

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

-20° to 150°F (-29° to 66°C)

Pressure Registration

Internal

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.

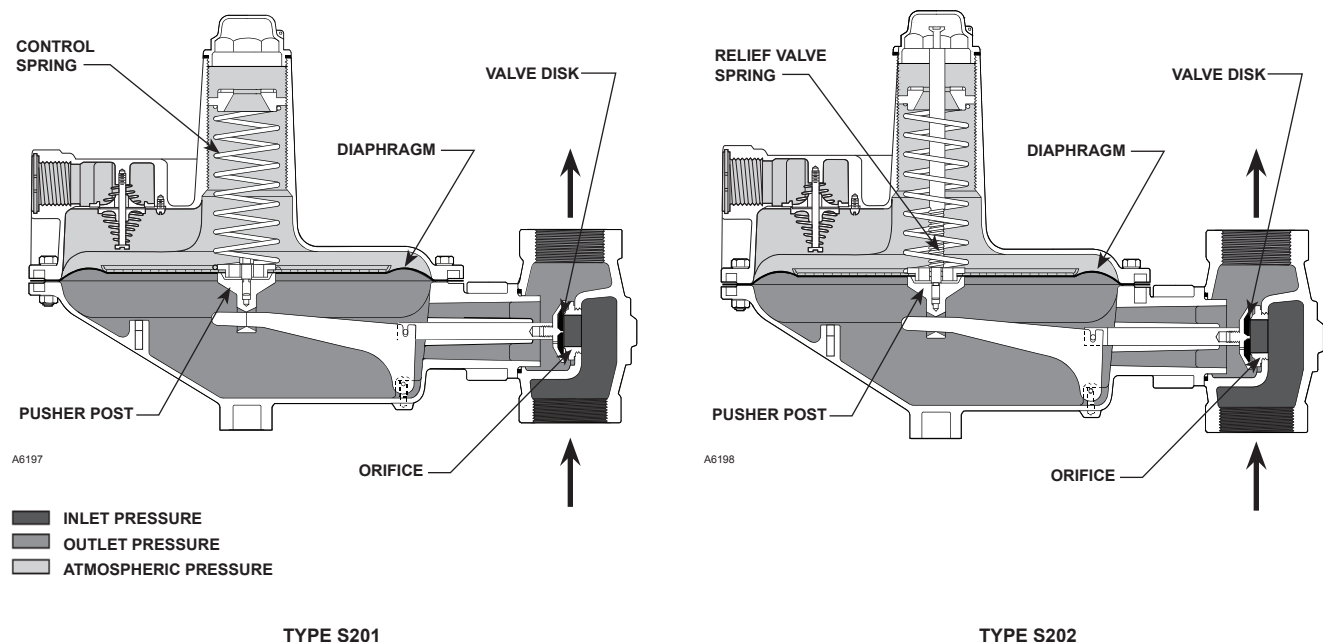


Figure 2. Operational Schematics

Principle of Operation

Refer to Figure 2. When downstream demand decreases, the pressure under the diaphragm increases. This pressure overcomes the regulator setting (which is set by the control 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 Types S202 and S202H regulators include an internal relief valve. Internal relief is used to help minimize overpressure. Any outlet pressure above the start-to-discharge point of the non-adjustable relief spring moves the diaphragm off of the relief seat, allowing excess pressure to discharge through the vent. Typical start-to-discharge values are 7-inches w.c. to 2 psi (17 to 138 mbar) above the outlet pressure setting, depending on control spring used.

S201 and S202 Series

TYPE NUMBER				OPTIONS
S	2	0		
				REGULATOR TYPE
		1		Regulator, 2 to 30-inches w.c. (5 to 75 mbar) outlet range
		2		Regulator, 2 to 30-inches w.c. (5 to 75 mbar) outlet range with Internal Relief
				PRESSURE OUTLET RANGE
			H	High-Pressure Regulator, 1 to 5 psi (0,07 to 0,34 bar) outlet range with heavy diaphragm plate
			K	High-Pressure Regulator with external adjusting screw, 2 to 10 psi (0,14 to 0,69 bar) outlet range (Not an option for S202)

Figure 3. Available Configurations

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 Specifications section and 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 4). This minimizes the possibility of freezing and of water or other foreign materials from entering the vent and interfering with proper operation.

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

S201 and S202 Series 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

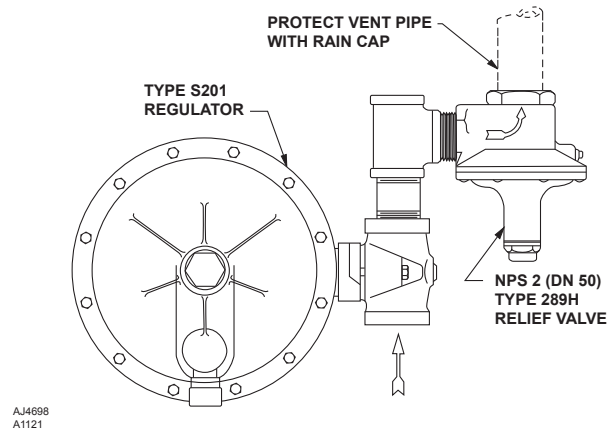


Figure 4. Type S201 Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief

any portion of the regulators beyond the limits in the Specifications section and 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 specified in the Specifications section and Table 1 does not preclude the possibility of damage from external sources or from debris in the pipeline.

S201 and S202 Series

Table 1. Maximum Allowable Inlet Pressures

ORIFICE SIZE		INLET PRESSURE SETTING			
Inches	mm	Optimum		Maximum	
		Psig	bar	Psig	bar
1/4	6,3	125	8,6	125	8,6
3/8	9,5	100	6,9	125	8,6
1/2	13	60	4,1	100	6,9
3/4	19	25	1,7	60	4,1
1	25	13	0,90	25	1,7
1-3/16	30	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. (75 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 (1,0 bar).

Table 3. Outlet Pressure Ranges

TYPE NUMBER	SPRING RANGE		PART NUMBER	SPRING FREE LENGTH, INCHES (mm)	SPRING WIRE DIAMETER, INCHES (mm)	COLOR CODE
	Inches w.c.	mbar				
S201 and S202	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
S201H and S202H	1.0 to 2.0 psig	0,07 to 0,14 bar	1H975827032	7.09 (180)	0.225 (5,72)	Dark Blue
	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
S201K	2.0 to 5.5 psig	0,14 to 0,38 bar	0Y066427022	6.00 (152)	0.363 (9,22)	Green Stripe
	4.0 to 10.0 psig	0,28 to 0,69 bar	1H802427032	6.00 (152)	0.406 (10,3)	Cadmium

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 5) 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 4. The outside end of the vent line should be protected with a rainproof assembly.

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 S201 and S202 Series regulators have 1 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 setpoint may damage internal parts such as the diaphragm head and valve disk. **The maximum emergency (casing) outlet pressure is 15 psig (1,0 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 startup the regulator.

1. Check to see that all appliances are turned off.
2. Slowly open the upstream block valve.
3. Check inlet and outlet pressure for correct values.
4. Check all connections for leaks.
5. 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 5) or loosen the hex locknut.
2. To increase the outlet setting, turn the adjusting screw (key 3, Figure 5) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Replace the closing cap or tighten the hex locknut.

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 the 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 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 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 5) or loosen hex locknut. Turn the adjusting screw or nut (key 3) counterclockwise to ease spring compression.
2. For Types S201, S201H, S202, and S202H units,

For 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 and diaphragm head assembly.
5. Unscrew the cap or reset 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).

S201 and S202 Series

Note

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

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 and diaphragm head 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, Orifice, and O-Rings

1. Remove the cap screws (key 18, Figure 5) 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 16) 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. Reassemble the regulator in reverse order of the above steps.

Parts Ordering

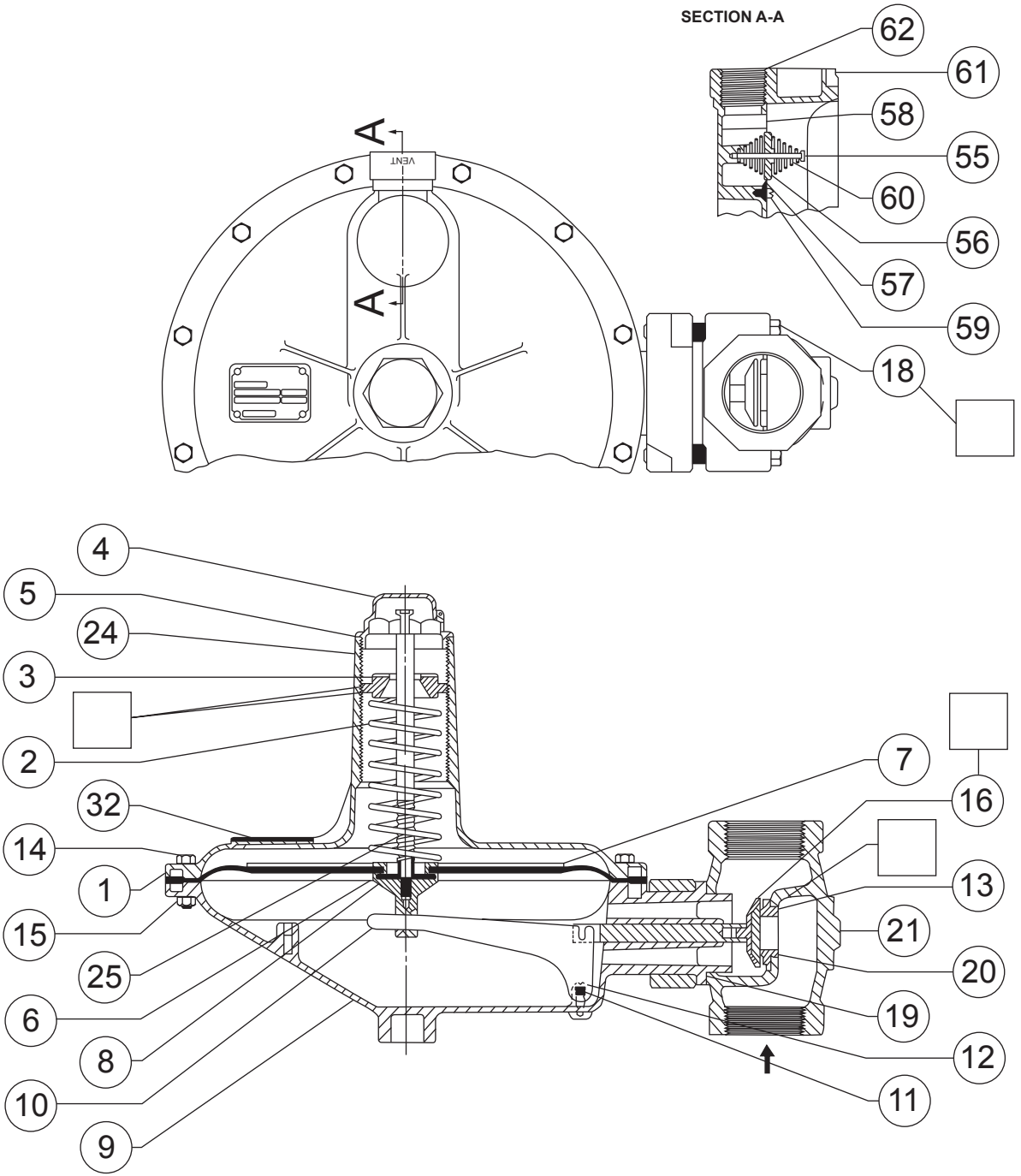
The type number, orifice size, spring range, and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance.

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

Parts List

Key	Description	Part Number
	Spare Parts (Repair Parts Kit includes keys 5, 7, 16, and 19)	
	Types S201, S202	RS201X00012
	Types S201H, S202H	RS201HX0012
	Type S201K	RS201KX0012
1	Spring Case	
	Aluminum	4L142308032
	Pinned for heavy spring	1J718699022
2	Spring, Steel	See Table 3
3	Adjusting Screw	
	Aluminum (Types S201, S201H, S202, S202H)	1L928608012
	Steel (Type S201K)	1R8085T0012
4	Closing Cap	
	Aluminum (Types S201, S201H, S202, S202H)	1L928308012
	Brass (Type S201K)	1H798714012
5*	Closing Cap Gasket, Neoprene (CR)	1N446206992
6	Upper/Lower Spring Seat	
	Aluminum (Types S201, S201H, S202, S202H)	1L928708012
	Brass, Type S201K (2 required)	1H797414012
7*	Diaphragm and Diaphragm Head	
	Types S201, S202 - Use with 1D8933 and lighter springs	1L1544X0012
	Types S201H and S202H - Use with 1H9758 and heavier springs	1L1545X0012
	Type S201K (Diaphragm only)	1K649602052
8	Pusher Post, Aluminum	
	Types S201, S201H, S201K	2H980608012
	Types S202, S202H	2H975208012
9	Lower Casing Assembly, Aluminum/Stainless steel	1H9751X0012
10	Lever, Steel	1H974028992
11	Pin, 303 Stainless steel	1H972935032
12	Machine Screw, Steel (2 required)	1B420428982
13	Valve Stem Assembly	1H9748000A2
14	Cap Screw, Steel (12 required)	1B136324052
15	Hex Nut, Plated steel (12 required)	1A309324122
16*	Disk Holder Assembly	
	For Natural Gas Service	1P7349000A2
	For Manufactured Gas	
	(3/4-inch (19 mm) larger orifices)	1J1680X0012
17	Diaphragm Plate, Steel (Type S201K)	1A347825022
18	Cap Screw, Plated steel (2 required)	1H974724052
19*	O-ring, Nitrile (NBR)	T12587T0012
20	Orifice, Aluminum	
	1/4-inch (6,3 mm)	T13833T0012
	3/8-inch (9,5 mm)	1H979309022
	1/2-inch (13 mm)	1H979409022
	3/4-inch (19 mm)	1H979509022
	1-inch (25 mm)	1H979609022
	1-3/16-inch (30 mm)	1H979709022

*Recommended spare part.



50A9455

PARTS NOT SHOWN: 46

□ APPLY LUB/SEA/ADH

Figure 5. Type S202 Regulator Assembly

S201 and S202 Series

Key	Description	Part Number	Key	Description	Part Number
21	Body		25	Relief Valve Spring, Plated steel	
	Cast Iron			(Types S202, S202H) Standard	1H976027012
	1-1/2 NPT	1J190319012		For U.L. listed units with 1D8933 or	
	2 NPT	1H974919012		lighter springs	1R100427012
	NPS 2 (DN 50), CL125 Flanged	2K184219012	46	Pipe Plug, 1/8 NPT, Brass	1A621914012
	With 1/8 NPT Test Gauge Connection		53	Hex Nut, Plated steel, Type S201K only	1A3524X0082
	1-1/2 NPT	1P799219012	55	Flapper Stem, 302 Stainless steel	1H976335022
	2 NPT	1P799319012	56	Lower Flapper, Nylon (PA)	1H976406992
	NPS 2 (DN 50), CL125 Flanged	2P806119012	57	Upper Flapper, Nylon (PA)	1H976506992
	Steel		58	Flapper Orifice, 302 Stainless steel	T13609T0012
	1-1/2 NPT	1K787922012	59	Self-tapping Screw, Steel (3 required)	1H976728982
	2 NPT	1K792122012	60	Spring, 302 Stainless steel (2 required)	1H976837022
24	Cap Screw, Plated steel		61	Screen, Stainless steel	1E564843122
	Type S201	1H975424272	62	Snap Ring, 302 Stainless steel	1E564937022
	Type S201H	1A667824052			
	Type S201K	1K427828982			
	Stem, Plated steel				
	Types S202, S202H	1H969224272			

Industrial Regulators

Emerson Process Management Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872 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

Middle East and Africa
Dubai, United Arab Emirates
Tel: +971 4811 8100

Natural Gas Technologies

Emerson Process Management Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872 USA
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

Emerson Process Management Tescom Corporation

USA - Headquarters
Elk River, Minnesota 55330-2445 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.