09/81

Type 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 serviceman to service the unit. Only a qualified person must install or service the regulator.



Figure 1. Typical S200 Series Gas Regulator

Introduction

Scope of Manual

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

Description

Type S201 and S202 Series regulators are typically installed on industrial and commercial applications. The Type 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 (1 to 10 psig).

Specifications

Table 1 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.





Type S201 and S202

Specifications

Body Sizes and End Connection Styles

1-1/2 or 2-inch NPT inlet and outlet and 2-inch ANSI Class 125 FF flanged

Maximum Allowable Inlet Pressures See table 2

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, 1, and 1-3/16 inches

Temperature Capabilities

-20° to 150°F (-29° to 66°C)

Pressure Registration

Internal

Approximate Weight

22 pounds (10 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, 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 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 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 male threads of the pipeline and install the

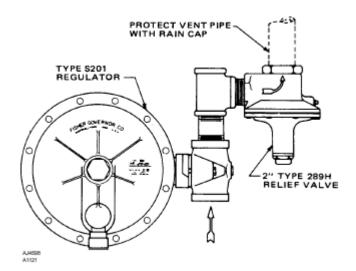


Figure 2. Type S201 Regulator Installed with the Vent Pointed Downward and with a Type H289 Relief Valve for High Capacity Relief

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 down spout.

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

The Type 289H should be set 10 inches w.c. higher than the outlet pressure setting of the regulator, up to 30 inches w.c. reduced pressure. For pressure greater than this, set the 289H 3/4 psi higher than the outlet pressure setting of the regulator.

Table 2. Inlet Pressure

Seat Ring Size		Inlet Pressure Setting				
Inches	mm	Opti	mum	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	12.7	60	4.1	100	6.9	
3/4	19.0	25	1.7	60	4.1	
1	25.4	13	.9	25	1.7	
1-3/16	30.2	5	.3	13	.9	

Table 3. Maximum Outlet Pressure Setting

Type Number	Diaphragm Head	Maximum Outlet*	
S201, S202	Light	30" W.C. (74.7 millibar)	
S201H, S202H	Heavy	5 psig (0.34 bar)	
S201K	Heavy	10 psig (0.69 bar)	

^{*} Maximum emergency outlet (casing) pressure for Series S200 is 15 psig.

Table 4. Spring Chart

Type	Spring I	Range	Part Number	Color Code	
Number	Inches W.C.	Millibar	Part Number		
S201, S202	50-90		1D8925 27022 1D8926 27022 1D8927 27012 1D8932 27032 1D8933 27032	Brown Red Black Gray Dark Green	
S201H, S202H	1.0- 2.0 psig 1.5- 3.25 psig 2.0- 5.0 psig	.0714 bar .1022 bar .1434 bar	1H9758 27032 1H9759 27032 1P6154 27142	Dark Blue Orange Yellow	
S201K		.1438 bar .2869 bar	OY0664 27022 1H8024 27032	Green Stripe Cadmium	

The Type 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 (S202 & 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 3. Outlet pressure more than 2 psi (light diaphragm head) or 3 psi (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.

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 applicances 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 4). 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.

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

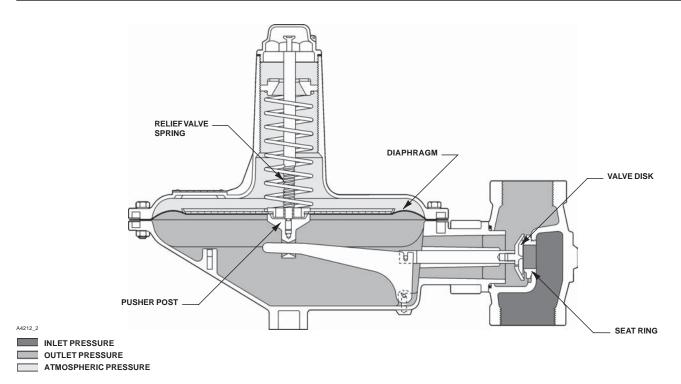


Figure 3. Type S202 Regulator Operational Schematic

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 Type 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 (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

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 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 requirements 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) counter-clockwise to ease spring compression.
- 2. On S201, S201H, S202, and S202H units, remove the adjusting screw and spring (key 2).

From Type S201K remove the adjusting screw, hex locknut, the 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 screw or stem (key 24) which fastens the lower spring seat (key 6) to the pusher post and 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 Type 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

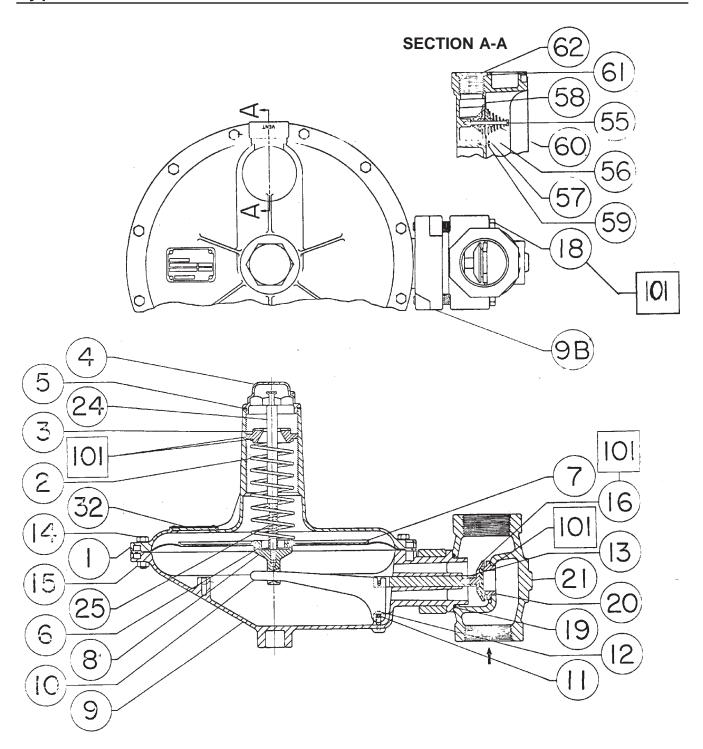
Before tightening cap screws (key 14), replace the spring and adjusting screw. Turn the adjusting screw to about mid position. This will stretch the oversized diaphragm to ensure slack in the assembled diaphragm. The slack created by this method is necessary for good regulation. Be sure the diaphragm 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 from the valve stem 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.

Ordering Parts

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. If construction changes are made in the field, be sure that the nameplate is also changed to reflect the most recent construction.



PARTS NOT SHOWN: 46,9C

 \square APPLY LUBRICATION COMPOUND

Figure 4. Type S202 Regulator

Parts List			Key	Description	Part Number	
Key	Description	Part N	umbor	21	Body	
Key	Description	rait iv	ullibei		Cast Iron 1-1/2-inch NPT	1J1903 19012
1	Spring Case				2-inch NPT	1H974919012
	Aluminum	4L1423	08032		2-inch 125 lb. Flanged	2K1842 19012
	Pinned for heavy spring	1J7186	99002		2-inch 250 lb. Flanged	2K1845 19012
2	Spring, steel, see table 4				With 1/8-inch NPT Test Gauge Connection	21(1010 10012
3	Adjusting Screw				1-1/2-inch NPT	1P7992 19012
	Aluminum (S201, S201H, S202, S202H)	1L9286	08012		2-inch NPT	1P7993 19012
	Steel (S201K)	1P8085	T0012		2-inch 125 lb. Flanged	2P8061 19012
4	Closing Cap				2-inch 250 lb. Flanged	2P8062 19012
	Aluminum (S201, S201H, S202, S202H)	1L9283	08012		Steel	2. 0002 .00.2
	Brass (S201K)	1H7987	14012		1-1/2-inch NPT	1K7879 22012
5*	Closing Cap Gasket, Neoprene	1N4462	06992		2-inch NPT	1K7921 22012
6	Upper/Lower Spring Seat				With 1/8-inch NPT Test Gauge Connection	
	Aluminum (S201, S201H, S202, S202H)	1L9287	08012		1-1/2-inch NPT	1P7991 22012
	Brass S201K (2 required)	1H7974	14012		2-inch NPT	1P7994 22012
7A*	Diaphragm, nitrile			24	Cap Screw, plated steel	
	S201, S202 - Use with 1D8933 & lighter				S201	1H9754 24272
	springs	1H9781			S201H	1A6678 24052
	S201H, S202H	1L1543			S201K	1K4278 28982
	\$201K	1K6496	02052		Stem, plated steel	
7B*	Diaphragm Head, steel				S202, S202H	1H9692 24272
	S201, S202 - Use with 1D8933 & lighter			25	Relief Valve Spring, plated steel (S202, S202h	H)
	springs	1H9779			Standard	1H9760 27012
	S201H, S202H	1H9780			For U.L. listed units with 1D8933 or	
0	S201K	1A3478	25022		lighter springs	1R1004 27012
8	Pusher Post, aluminum	0110000	00040	32	Nameplate, aluminum	
	S201, S201H, S201K	2H9806		46	Pipe Plug, 1/8-inch NPT, brass	1A6219 14012
0	S202, S202H	2H9752		53	Hex Nut, plated steel, S201K only	1A3524 24112
9 0B	Lower Casing Assembly, aluminum	1H9751		55	Flapper Stem, 302 stainless steel	1H9763 35022
9B 10	Union Ring, aluminum (2 required)	2H9734		56	Lower Flapper, nylon	1H9764 06992
11	Lever, steel Pin, 303 SST	1H9740 1H9729		57	Upper Flapper, nylon	1H9765 06992
12	Machine Screw, steel (2 required)	1B4204		58	Seat Ring, 302 stainless steel	1H9766 36012
13	Valve Stem Assembly 1H9748 000A2	104204	20902	59	Self-tapping Screw, steel (3 required)	1H9767 28982
14	Cap Screw, steel (12 required)	1B1363	24052	60	Spring, 302 stainless steel (2 required)	1H9768 37022
15	Hex Nut, plated steel (12 required)	1A3093		61	Screen, Monel†	1E5648 43122
16*	Disk Holder Assembly	1710000	27122	62	Snap Ring, 302 stainless steel	1E5649 37022
10	For Natural Gas Service	1P7349	00042			
	For Manufactured Gas (3/4" larger seat rings)					
17	Diaphragm Plate, steel (S201K only)	1A3478				
18	Cap Screw, plated steel (2 required)	1H9747				
19*	O-Ring, nitrile	T12587				
20	Seat Ring, aluminum	001				
	1/4-inch Port Diameter	1H9792	09022			
	3/8-inch Port Diameter	1H9793				
	1/2-inch Port Diameter	1H9794				
	3/4-inch Port Diameter	1H9795				
	1-inch Port Diameter	1H9796				
	1-3/16-inch Port Diameter	1H9797	09022			

^{*}Recommended spare part. †Trademark of International Nickel Company

Type S201 and S202

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