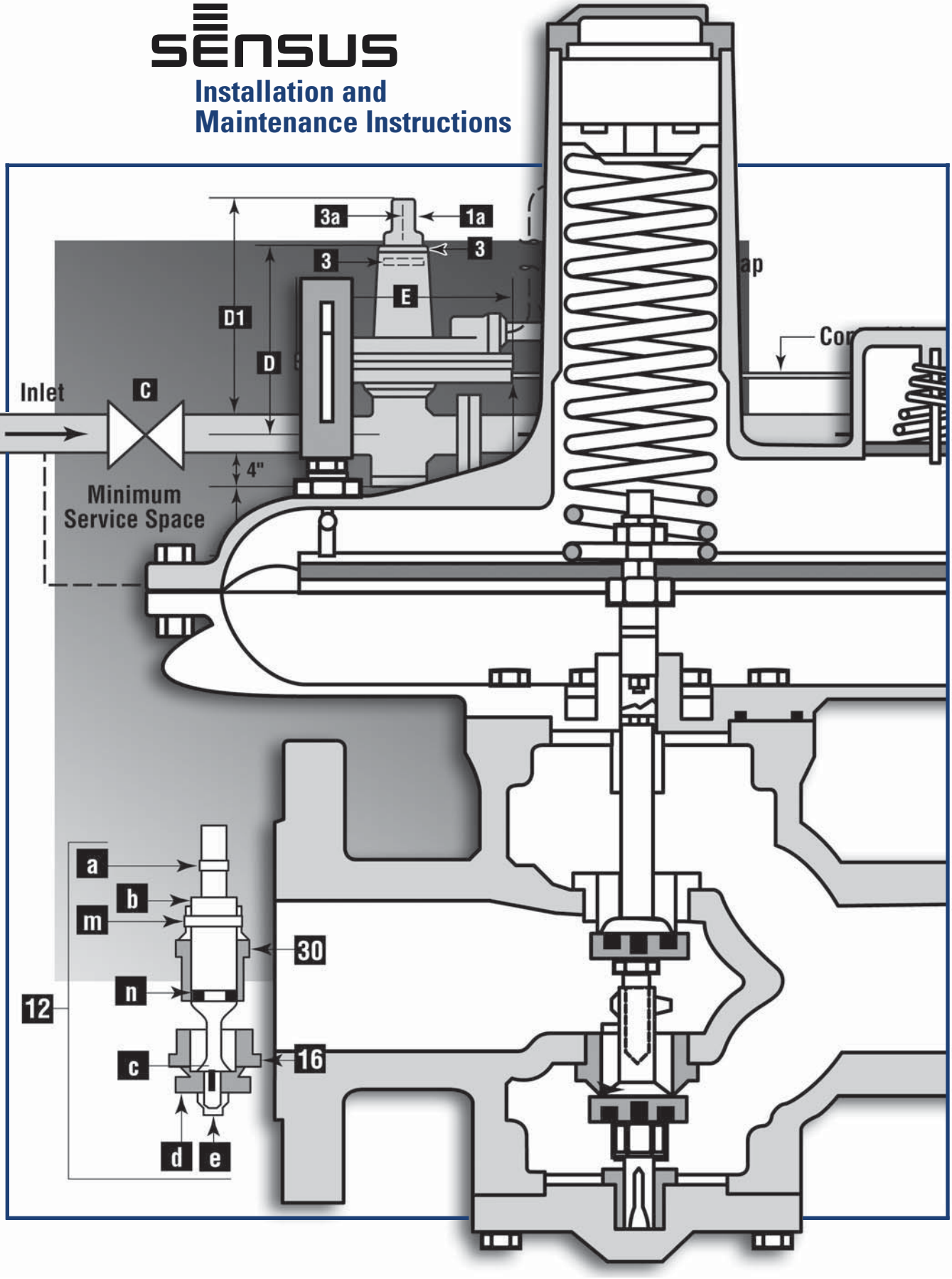
Models 461-S, 461-8S and 461-12S Regulators

Regulators

SENSUS

Installation and Maintenance Instructions



Installation and Maintenance Instructions
Model 461-S, 461-8S, and 461-12S Regulator

Regulator Models 461-S, 461-8S, and 461-12S are excellent general purpose gas pressure regulators for intermediate and larger loads. Use them for natural gas, air, dry CO_2, propane, butane and other gases.

Maximum Inlet Pressures

Regulator Body Type	Body Materials	Maximum Working Pressure of Body
2" Screwed only	Cast Iron	250 psi
Flanged ANSI 125	Cast Iron	175 psi*
Flanged ANSI 250	Ductile Iron	575 psi*
Flanged ANSI 300	Cast Steel	720 psi*

*Carefully note the following exceptions to the above, based on diaphragm size:

Diaphragm Size ID	Diaphragm Case Material	Maximum Inlet Pressure
12″	Cast Iron	100 psi
8-1/2″	Cast Iron	175 psi
12″	Aluminum	100 psi
8″	Aluminum	175 psi

Valve material selection is limited by inlet pressure and differential:

Valve Material	Maximum Inlet Pressure Rating	Maximum Pressure Differential Rating
Buna-N	575 psi	250 psi
Poly-U Red	720 psi	400 psi
Poly-U Tan	1200 psi	600 psi

Installation and Start-Up

1 Thoroughly purge inlet piping to remove dirt and debris that could damage the regulator or impair its operation. If this cannot be done, a filter or strainer should be installed ahead of the regulator. (see bulletin RDS-1498, Regulator Pressure Ratings).

Make certain that inside of the regulator and piping are free of dirt, foreign matter, and other debris.

2 Install the regulator. Make certain flow through the regulator is in the correct direction. High pressure connects to the inlet side. Be sure that shipping screens or covers, if used, are removed.

On flanges, tighten bolts evenly. On screwed connections, apply pipe dope to male threads only. Where required, the regulator may be inverted.

CAUTION

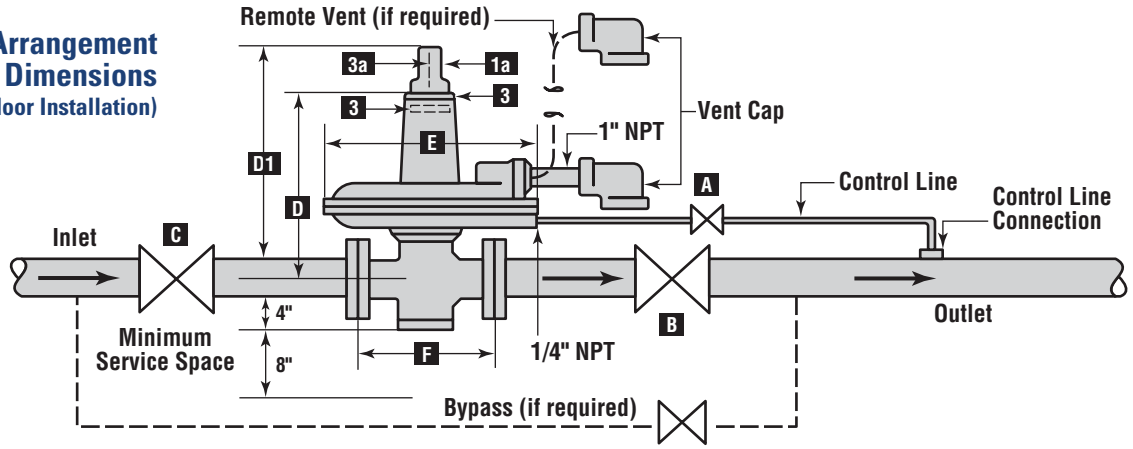
It is the user's responsibility to assure that all regulator vents and/or vent lines exhaust to a non-hazardous location away from any potential sources of ignition. Where vent lines are used, it is the user's responsibility to assure that each regulator is individually vented and that common vent lines are not used.

3 The vent connection is an escape path for flammable gas and it must be located and/or piped so that potential discharge occurs in a safe area away from buildings, open flames, collection areas, arcing devices, etc.

Regulators that are installed indoors, or in a non-vented area must be vented to the outside. Simply run vent piping from the regulator vent connection to a non-hazardous location on the outside away from any potential sources of ignition. The vent piping must be connection size or larger and piped to a safe area.

The outlet of the vent piping must allow for the free and unobstructed passage of air and gas, and must be protected against the potentials listed in instructions.

Typical Arrangement and Dimensions
(Indoor or Outdoor Installation)



Model	D	D1	E
461-12S	13-1/4"	–	14"
461-8S	–	18-3/8"	10-3/16"
461-S (12")	–	19-1/2"	14-1/4"
461-S (8-1/2")	–	19-1/2"	11"

Regulator Body Type	F (Face to Face)
Screwed	6-1/2"
Flanged ANSI 125 FF	10"
Flanged ANSI 250 FF	10-1/2"

4 For outdoor installation, it is recommended that the regulator be installed so that the regulator vent faces downward to avoid the potential of water or other foreign matter entering the vent and interfering with the proper operation of the regulator.

5 Install the control line. It should be sturdy with adequate protection against breakage (regulators go wide open if control line is broken). Pitch it to drain away from the regulator, free of moisture pockets. The control line should be no less than 1/4" steel tubing or pipe for the 461-12S and 461-8S models and 1/2" steel pipe for the 461-S models.

The regulator will work to deliver the pressure(for which it is adjusted) at that point in the piping where the control connection is located.

In general, the control connection should be at least eight pipe diameters downstream from the regulator and should be in as straight a run as possible where turbulence is a minimum. Keep clear of elbows, valves, and other causes of excessive turbulence.

The control connection should be clean and smooth inside the pipe to minimize turbulence. It should be located on the top or side of the pipe, not on the bottom.Where outlet piping increases in size near the regulator, it is generally preferable to locate the connection in the larger size.
The unions for the control lines of the 461-S models contain a small orifice (approximately 1/16" diameter). This orifice should not be removed. Also, make certain it is open and free of foreign material.

6 Check all connections for leaks.

CAUTION

Turn gas on very slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload.

7 Put the regulator into operation as follows:

- **a.** Slowly open downstream control line valve **(A)**.
- **b.** Slowly open downstream block valve **(B)**.
- **c.** Very slowly open upstream block valve **(C)**.
- **d.** When start-up and adjustment are completed, make sure valves **(A)**, **(B)**, and **(C)** are fully opened.

See diagram page 2

8 Set adjusting screw for the required outlet pressure. Turn it clock wise to increase the pressure and counterclockwise to decrease it. Only make the adjustment when gas is actually flowing through the regulator.

Remove the seal cap and, if applicable, loosen locknut to make adjustment.

After adjustment is complete, locknut (if applicable) should be tightened firmly and seal cap replaced. The absence of this seal cap can result in unstable operation.

9 To shut down, carefully close valves (C), (B), and (A) in that order.

CAUTION

1 Keep pipe dope and all other foreign substances out of the control line.

2 Never install any type of automatic shut-off device, which closes completely, between the regulator outlet and the downstream control line connection.

3 The vent must be positioned to protect against flooding, drain water, ice formation, traffic, tampering etc. The vent must be protected against nest-building animals, bees, insects, etc. to protect from vent blockage and minimize the chances of foreign material collecting in the vent side of the regulator diaphragm.

Servicing and Adjustment

General Notes

1 Make sure the regulator is entirely depressured before servicing.

2 A quick visual inspection of the valve can be made by removing inspection plates (33) from the sides of the body. These also provide greatly improved access to the valve when servicing or adjusting. Valve and body parts are interchangeable with other model 461 regulators.

3 Carefully note location and position of disassembled parts to be certain reassembly is correct. Inspect each one carefully and replace those that are worn or damaged or otherwise unsatisfactory.

4 Use lubricants sparingly and with care to avoid exposing tacky surfaces to the gas stream. Such surfaces could cause dirt accumulation on close-clearance parts.

Use moly or silicone type lubricants.
Avoid the use of petroleum base types.
It is best to avoid lubricating the stem or the guide. However, a small amount of silicone spray release agent to lubricate stem O-ring will help assure free movement and a tight seal. An application of silicone base lubricant to the other O-rings and the tetraseals in the regulator will also help assure their tightness.

CAUTION

Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operating conditions. To assure continuous satisfactory operation, a periodic inspection schedule must be adhered to with the frequency of inspection determined by the severity of service and applicable laws and regulations.

To Service Double Seat Balanced Valve Assembly

1 Remove seal cap **1**, **1a**, or **1b**. Mark or measure position of adjustment **3** or **3a**. Use this to return adjustment to setting during reassembly.
   On 461-12S remove adjustment **3** and spring **9**.
   On 461-8S release adjustment **3a** and remove cover **5**, button **7a**, and spring **9**.
   On 461-S release adjustment **3a** and remove cover **8**, button **7b**, and spring **9**.

2 Remove bottom inspection plate **14**, and unscrew valve assembly intact from diaphragm assembly (**12b** unscrews from **11h**).

3 Unscrew orifice **18** with socket wrench (1-1/2" hex deep socket). Remove orifice **18** and valve assembly intact through bottom opening.

4 If valve assembly does not require changes, replace without disturbing set screw **12g** (top end of **12b** screws onto **11h**) until it bottoms and should then be **backed off 1/2 turn to 1 full turn**).

5 If new parts are needed, disassemble valve assembly by loosening set screw **12g** and unscrewing **12h** from **12b**, and then unscrewing nut **12e** and part **12j**.

6 Replace parts as required, then reassemble upper half valve assembly (parts **12a**, **12b**, **12c**, **12d**, **12e**) and lower half (parts **12f**, **12g**, **12h**, **12c**, **12d**, **12j**).

7 Insert through bottom opening:
   a. upper half valve assembly – screw **12b** onto **11h** until it bottoms, then back off 1/2 to 1 full turn.
   b. orifice **18** – screw firmly into place.
   c. lower half valve assembly – screw onto upper half by 3 or 4 turns (**12h** screws onto **12b**).

8 Make the valve lock-up adjustment. Seat the upper valve against orifice **19** while screwing up the lower half valve assembly (**12h** screws onto **12b**) until the lower valve is seated against **18**. Then, firmly tighten set screw **12g**.

   To seat the upper valve against orifice **19** either reach it through the body side opening or remove diaphragm assembly and pull top end of stem **12b** upwards.

   Tighten **12g** with screwdriver or Allen wrench through body side opening. If necessary, turn the entire valve assembly (carefully – do not disturb adjustment) to face **12g** toward side opening. **12g** must tighten against flat area at top of **12h** to correctly lock the adjustment.

9 Screw entire valve assembly up (top of **12b** screws onto lower end of **11h**) until it bottoms.
Then back off 1/2 to 1 full turn – this is important.

10 Replace bottom inspection plate **14**. Engage pin in **13** with slot in lower end of **12j**, then rotate **14** until holes line up and install cap screws **16**.

11 Replace parts removed under Step 1 above and return adjustment to original setting.

To Service Single Seat Balanced Valve Assembly

1 Remove seal cap **1**, **1a** or **1b**. Mark or measure position of adjustment **3** or **3a**. Use this to return adjustment to this setting during reassembly.
   On 461-12S remove adjustment **3** and spring **9**.
   On 461-8S release adjustment **3a** and remove cover **5**, button **7a**, and spring **9**.
   On 461-S release adjustment **3a** and remove cover **8**, button **7b**, and spring **9**.

2 Remove bottom inspection plate **14**.

3 Remove locknut **12e**, then slip off valve **12d** and retainer **12c**. Orifice **18** can be removed with socket wrench (1-1/2" hex deep socket.) Reassemble in reverse order.

4 If it should be necessary to remove stem **12b** or valve guide **30**, do so by first removing lower diaphragm case **24** (steps 2 through 7 under "To Service Diaphragm" below). Use socket wrench for **30** (1-1/2" hex deep socket).

5 **Note – single seat balanced valve does not require any lock-up adjustment.**

6 **Note :** orifice **18** must be same size as stem guide **30** (1" **18** with 1" **30** and 11/16" **18** with 11/16" **30**). Do not use 11/16" size of one with 1" size of the other.

7 Replace bottom inspection plate **14**.

8 Replace parts removed under Step 1 above and return adjustment to original setting.

To Change Spring

1 Remove seal cap **1**, **1a** or **1b**.
   On 461-12S remove adjustment **3** and spring **9**.
   On 461-8S release adjustment **3a** and remove cover **5**, button **7a**, and spring **9**.
   On 461-S release adjustment **3a** and remove cover **8** button **7b**, and spring **9**.

2 Insert the new spring. Be sure it nests correctly onto part **11b**.

3 Replace remaining parts removed under Step 1.

To Service Diaphragm

1 Remove seal cap **1**, **1a** or **1b**. Mark or measure position of adjustment **3** or **3a**. Use this to return adjustment to this setting during assembly.
   On 461-12S remove adjustment **3** and spring **9**.
   On 461-8S release adjustment **3a** and remove cover **5**, button **7a**, and spring **9**.
   On 461-S release adjustment **3a** and remove cover **8**, button **7b**, and spring **9**.

2 Remove bolts **22** and then carefully remove upper diaphragm case **21**.

3 Turn diaphragm assembly counterclockwise (this unscrews **11h** from **12b**) and remove.

4 To disassemble diaphragm assembly, remove nut **11a**. When reassembling, note that abrasive side of emery cloth washers face against diaphragm.

5 Screw diaphragm assembly back into place. **11h** screws into **12b** until it bottoms, then **back off 1/2 to 1 full turn – this is important**.

6 **Note: single seat balanced valve does not require any lock-up adjustment**.

7 Carefully reinstall upper diaphragm case **21**. Diaphragm must not be pinched between upper and lower cases **21** and **24**. Make sure travel indicator **45** is working. Tighten bolts **23-22** evenly.

8 Insert spring **9**. Be sure it nests correctly into part **11b**. Replace remaining parts removed under Step 1 above and return adjustment to original setting.

Over-Pressurization Protection

Protection must be provided for the downstream piping system and the regulator's low pressure chambers to assure against the potential of over-pressurization due to a regulator malfunction or a failure of the regulator to lock up. The allowable over-pressurization is the lowest of the maximum pressures permitted by federal codes, state codes, Sensus bulletin RDS-1498, or other applicable standards. The method of providing over-pressure protection could be a relief valve, a monitor regulator, a shut off device or any similar device.

Temperature Limits

The regulator models 461-S, 461-12S, and 461-8S can be used for flowing temperatures from -20°F to 150°F.

Buried Service

The regulator models 461-S, 461-12S, and 461-8S **are not** recommended for buried service.

Condensed Parts List

All Models

Illustration Number	Description	Part Number
1	Seal Cap	143-16-005-00
1a	Seal Cap	121-10-005-52
1b	Seal Cap	090-00-005-02
2*	O-Ring	951357
2a	Tetraseal (or O-Ring) 1-1/2" x 1-5/8"	906534
2b	Tetraseal (or O-Ring) 1-3/4" x 2"	904092
3*	Adjustment Spring Button	143-16-009-00
3a	Spring Adjusting Screw	090-16-007-00
4	Hex Nut, 1/2" – 13	906537
4a	Hex Steel Nut, 5/8" – 11	921407
5	Housing Cover	121-10-005-51
5a	Housing Cover	091-16-080-53
7a	Top Spring Button	121-10-009-51
7b	Thrust Bearing, stainless steel ball, 3/8" dia.	930510
7c	Top Spring Button	091-16-009-00
8	Cap Screws, Hex Hd., 5/16" – 18 x 7/8" lg.	9210029
9	Spring – See Table	

*Minimum Recommended Spare Parts

All Models

Illustration Number	Description	Part Number
12	1" Double Seat Valve Assembly, brass trim, Buna-N	091-16-515-01
	1" Double Seat Valve Assembly, stainless steel trim, Buna-N	091-16-515-03
	1" Double Seat Valve Assembly, brass trim, Red Polyurethane	091-16-515-11
	1" Double Seat Valve Assembly, stainless steel trim, Red Polyurethane	091-16-515-13
	11/16" Double Seat Valve Assembly, brass trim, Buna-N	091-16-515-00
	11/16" Double Seat Valve Assembly, stainless steel trim, Buna-N	091-16-515-02
	11/16" Double Seat Valve Assembly, brass trim, Red Polyurethane	091-16-515-10
	11/16" Double Seat Valve Assembly, stainless steel trim, Red Polyurethane	091-16-515-12
	1" Single Seat Valve Assembly, stainless steel trim, Red Polyurethane	091-16-515-51
	11/16" Single Seat Valve Assembly, stainless steel trim, Red Polyurethane	091-16-515-50
12a*	O-Ring, 3/8" x 1/2"	934007
12b	Male Valve Stem, 5-1/16" lg., brass, for 1" & 11/16" double seat assembly	091-16-116-02
	Male Valve Stem, 5-1/16" lg., stainless, for 1" & 11/16" double seat assembly	091-16-116-00

*Minimum Recommended Spare Parts

Condensed Parts List

All Models

Illustration Number	Description	Part Number
12b	Valve Stem, stainless, for 1" single seat assembly	091-00-016-07
	Valve Stem, stainless, for 11/16" single seat assembly	091-00-016-06
12c	Valve Retainer, brass, for 1" double seat assembly (2 used)	091-16-018-03
	Vale Retainer, brass, V Port for 1" double seat (2 used)	091-16-012-04
	Valve Retainer, brass, for 11/16" double seat (2 used)	091-16-018-02
	Valve Retainer, stainless, for 1" single or double seat (1 or 2 used)	091-16-018-01
	Valve Retainer, stainless for 11/16" single or double seat (1 or 2 used)	091-16-018-00
12d*	Molded Valve, Buna-N (Black, 45-55 Duro) for 1" double seat all trim	091-16-315-01
	Molded Valve, Buna-N (Black, 45-55 Duro) for 11/16" double seat all trim	091-16-315-00
	Molded Valve, Polyurethane (Red, 65-75 Duro) for 1" double seat all trim	091-16-315-11
	Molded Valve, Polyurethane (Red, 65-75 Duro) for 11/16" double seat all trim	091-16-315-10
	Molded Valve, Viton (65-75 Duro, stamped V) for 1" double seat all trim	091-16-315-13
	Molded Valve, Viton (65-75 Duro, stamped V) for 11/16" double seat all trim	091-16-315-12
	Molded Valve, Polyurethane (Red 65-75 Duro) for 1" single seat	091-16-315-51
	Molded Valve, Polyurethane (Red 65-75 Duro) for 11/16" single seat	091-16-351-50
	Molded Valve, Viton (65-75 Duro, stamped V) for 1" single seat	091-16-315-58
	Molded Valve, Viton (65-75 Duro, stamped V) for 11/16" single seat	091-16-315-57
12e	Valve Locknut, brass, for double seat assembly	903920
	Valve Locknut, stainless, for double seat assembly	920303
	Valve Locknut, 3/8" – 24 Crown Nylok, for single seat assembly	903936
12f	Valve Stem Locking Ring, stainless, for double seat assembly	091-16-043-01

*Minimum Recommended Spare Parts

Condensed Parts List

All Models

Illustration Number	Description	Part Number
12g	Set Screw, slotted headless cup pt. #12-24 x 1/4" lg.	907694
12h	Female Valve Stem, brass, for double seat assembly	091-16-016-00
	Female Valve Stem, stainless for double seat assembly	091-16-016-03
12j	Valve Guide, brass for double seat assembly	091-16-012-00
	Valve Guide, stainless for double seat assembly	091-16-012-02
12m	Roll Pin, 1/4" x 1-1/2" lg., for single seat assembly	910707
12n*	O-Ring 3/4" x 1" single seat assembly	934015
	O-Ring 9/16" x 3/4", for 11/16" single seat assembly	934011
13	Guide Bushing, brass, with pin	091-16-385-02
	Guide Bushing, stainless,with pin	091-16-385-03
14	Bottom Inspection Plate,Iron	091-16-004-01
	Bottom Inspection Plate, Steel	091-16-004-02
15*	Tetraseal (or O-Ring), 2-3/4" x 3"	904079
16	Cap Screws, Hex Hd., 5/16" - 18 x 1" lg.	910030
17	Body, Screwed, 250 psi, Cast Iron	091-16-001-15
	Body Flanged, ANSI 125, FF, Cast Iron	091-16-001-17
	Body Flanged, ANSI 250, RF, Ductile Iron	091-16-001-18
	Body Flanged, ANSI 300, RF, Cast Steel	091-16-001-06
18	Outlet Orifice, 1" brass	091-16-029-01
	Outlet Orifice 1" stainless	091-16-029-05
	Outlet Orifice, 11/16" brass	091-16-029-00
	Outlet Orifice, 11/16" stainless	091-16-029-04
19	Inlet Orifice, 1" brass	091-16-028-01
	Inlet Orifice, 1" stainless	091-16-028-05
	Inlet Orifice, 11/16" brass	091-16-028-0
	Inlet Orifice, 11/16" stainless	091-16-028-04
20	Control Line Piping Assembly	091-16-361-50
20a	1/4" Sq. Hd. Steel Piping Plug	906055
20b	1/4" Malleable Iron Tee	946150
20c	Nipple and Plug Assembly	091-00-361-50
22	Hex Hd. Steel Bolt, 5/16" - 18 x 1" lg. (461-12S, 461-8S, 461-S 12")	910030
	Hex Hd. Steel Bolt, 5/16" - 18 x 1-1/4" lg. (461-S 8-1/2")	910031
23	Hex Steel Nut, 5/16" - 18	903859
26*	Tetraseal (or O-Ring), 4-3/8" x 4-5/8"	904085
27	Vent Cap, 1/4"	137-02-505-02

*Minimum Recommended Spare Parts

Condensed Parts List

All Models

Illustration Number	Description	Part Number
28	Seal Cap Gasket	091-16-066-00
30	Valve Stem Guide, stainless, 11/16" single seat assembly	091-16-012-52
	Valve Stem Guide, stainless, 1" single seat assembly	091-16-012-53
32	Tetraseal (or O-Ring), 1-1/2" x 1-3/4"	904086
33	Ductile Iron Inspection Plate,Side	091-16-072-04
	Steel Inspection Plate, Side	091-16-072-01
45	Travel Indicator Assembly	091-00-365-61

Model 461-12S

All Models

Illustration Number	Description	Part Number
11	Diaphragm Assembly, 3-1/2" w.c. to 2 psi outlet pressure complete	121-16-550-51
11a	Elastic Stop Nut 29-NE-066	903955
11b	Bottom Spring Button	121-10-022-53
11c	Diaphragm Pan	121-16-017-50
11d*	Molded Diaphragm, Buna-N	121-16-150-53-001
11f	Emery Cloth Washer	121-10-178-50
11h	Diaphragm Stud, stainless steel	121-16-058-52

*Minimum Recommended Spare Parts

Maximum Emergency Pressures

For complete Maximum Emergency Pressure information for Model 461 Regulators, refer to bulletin RDS-1498, Regulator Pressure Ratings. If the maximum outlet pressure is exceeded, the regulator must be removed from service and carefully inspected. Damaged or otherwise unsatisfactory parts must be replaced before returning the regulator to service.

Monitoring

The 461-S, 461-8S, or 461-12S make an excellent monitor; a standby regulator installed in series which assumes control if a failure in the operating regulator permits the outlet pressure to exceed the set-point.

The fast rate of response enables it to take over quickly where necessary, and its outstanding performance means that it will provide excellent standby regulation.

It can be located in either the upstream or the downstream position.

When a 461 is used to monitor a regulator with an identical inner valve (another 461, a Model 1100 etc.) the **total maximum capacity** through both can be figured at 70% of the capacity of one of them alone. This applies with the monitor located either upstream or downstream.

Model 461-8S

All Models

Illustration Number	Description	Part Number
11	Diaphragm assembly, 2 psi to 10 psi outlet pressure complete	121-10-550-55
11a	Elastic Stop Nut 29-NE-066	903955
11b	Bottom Spring Button	121-10-022-50
11c	Diaphragm Pan	121-10-017-50
11d*	Diaphragm, Buna-N	121-10-150-50
11e	Upper Plate	121-10-022-52
11f	Emery Cloth Washer	121-10-178-50
11g	Lower Plate	121-10-079-52
11h	Diaphragm Stud, stainless steel	091-16-058-02

Model 461-S

All Models

Illustration Number	Description	Part Number
11	Diaphragm Assembly, 12"	091-16-550-01
	Diaphragm Assembly, 8-1/2"	091-86-550-02
11a	Hex Flexloc Nut 3/8" – 16"	900123
11b	Bottom Spring Button	091-16-009-50
11c	Upper Diaphragm Plate, 12"	091-16-060-00
	Upper Diaphragm Plate, 8-1/2"	091-86-010-00
11d*	Diaphragm,12"	091-16-150-00
	Diaphragm, 8-1/2"	091-86-150-00
11e	Lower Diaphragm Plate, 12"	091-16-060-01
	Lower Diaphragm Plate, 8-1/2"	091-86-010-00
11f	Seal Washer	014-76-179-03
11g	Stat-O-Seal, 3/8"	904985
11h	Diaphragm Stud, stainless steel	091-16-058-02

*Minimum Recommended Spare Parts

Other Gases

The regulator models 461-S, 461-12S, and 461-8S are mainly used on natural gas services; however, these regulators will perform equally well on other gases. When using the regulators on other gases, the regulator capacities must be adjusted using the following correction factors.

Type of Gas	Correction Factor
Air (specific gravity 1.0)	0.77
Propane (specific gravity 1.53)	0.63
1350 BTU Propane-Air mixture (specific gravity 1.20)	0.71
Nitrogen (specific gravity 0.97)	0.79
Dry CO_2 (specific gravity 1.52)	0.63

$$\text{Correction Factor} = \frac{0.60}{\text{Specific gravity of the gas}}$$

For use with gases not listed above, please contact your Sensus representative or Sensus Distributor for recommendations.

Models 461-S, 461-8S and 461-12S Regulators

Installation and Maintenance Instructions

SENSUS

Authorized Distributor:

805 Liberty Boulevard
DuBois, PA 15801
800-375-8875
Fax: (814) 375-8460
www.sensus.com/gas

Model 461-12S

Outlet Pressure Range	Spring Color	Spring Part No.
3-1/2" to 6-1/2" w.c.	Red	143-16-021-03
5" to 8-1/2" wc.	Blue	143-16-021-04
6" to 14" wc.	Green	143-16-021-05
12" to 28" wc.	Orange	143-16-021-06
1 psi to 2 psi	Black	143-16-021-07
1-1/2 psi to 3 psi	Cadmium	143-16-021-08

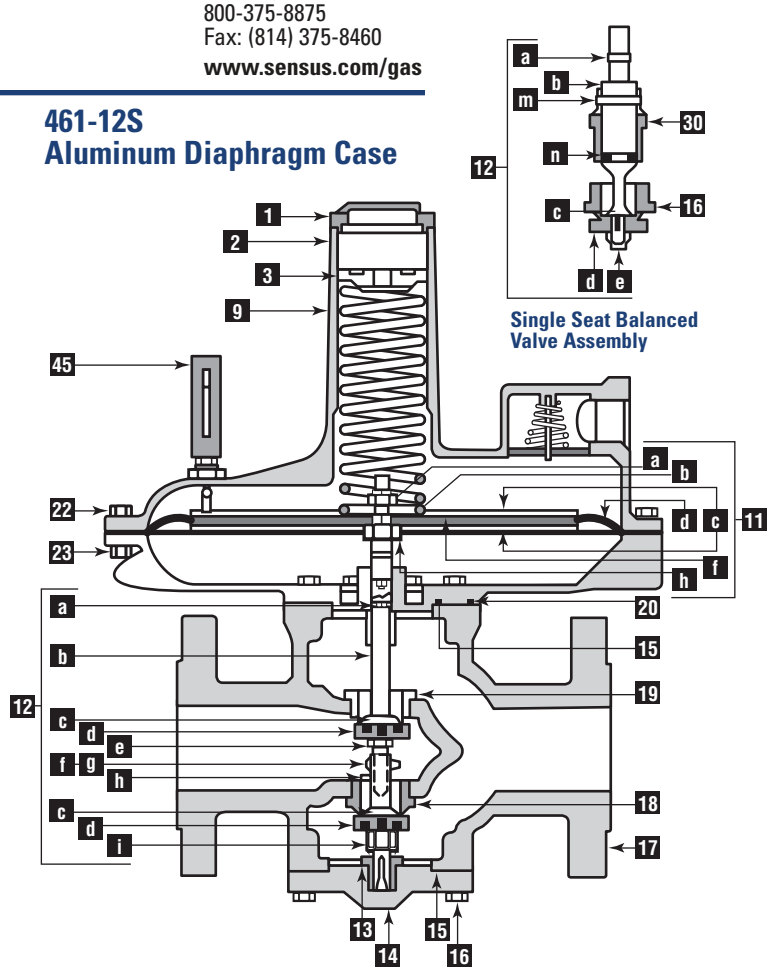
Model 461-S

Diaphragm Size	Outlet Pressure Ratings	Spring Color	Spring Part No.
8-1/2"	3 to 6 psi	Blue	090-70-021-04
	5 to 10 psi	Red	090-70-021-05
12"	2 to 10" w.c.	Aluminum	090-70-021-00
	4 to 16" w.c.	Green	090-70-021-01
	7 to 29" w.c.	Yellow	090-70-021-02
	1.5 to 1.75 psi.	Gray	090-70-021-03
	1 to 3.5 psi.	Blue	090-70-021-04

Model 461-8S

Outlet Pressure Range	Spring Color	Spring Part No.
1 psi to 2 psi	Orange	143-16-021-06
2 psi to 4-1/4 psi	Black	143-16-021-07
3 psi to 6-1/2 psi	Cadmium	143-16-021-08
6 psi to 10 psi	Cadmium (outer) White (inner)	143-16-021-08 143-16-021-13

461-12S Aluminum Diaphragm Case



Capacities at Other Pressures

Capacity for pressure reductions not listed in the table can be calculated with the following formula:

1 $Q = K\sqrt{P_0 (P - P_0)}$

2 $Q = \frac{KP_1}{2}$

Q = maximum capacity of the regulator (in SCFH of 0.6 specific gravity natural gas)

K = the **"K" factor;** the regulator constant (from Sensus bulletin R-1330, page 6)

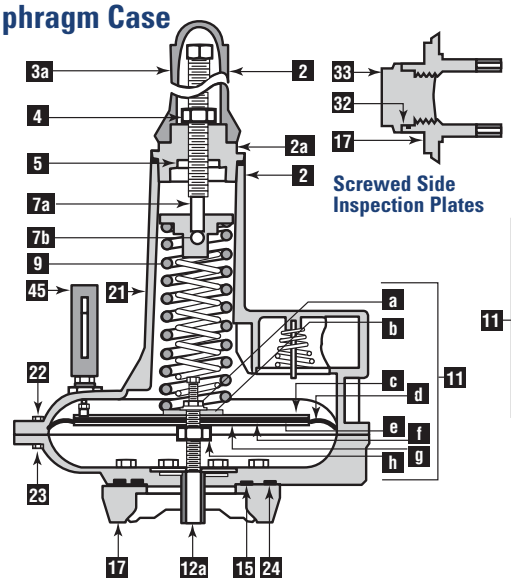
P_1 = **absolute** inlet pressure (psia)

P_2 = **absolute** outlet pressure (psia)

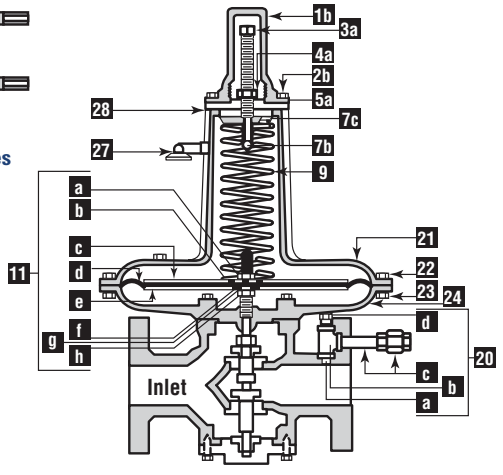
Use formula 1 when $\frac{P_1}{P_0}$ is less than 1.894

Use formula 2 when $\frac{P_1}{P_0}$ is greater than 1.894

461-8S Aluminum Diaphragm Case



461-S Cast Iron Diaphragm Case



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