UTILITY SOLUTIONS GROUP

Model 461-S Regulator

Installation & Maintenance Manual

Contents

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Introduction

461-S Regulator

The Model 461-S, 461-8S and 461-12S are balanced valve, spring type regulators designed for distribution and industrial applications where a single seat regulator is too small and the usual 2" balanced valve regulators are too large. They are made in 2" pipe sizes only and are used for inlet pressures up to 175 psi, and outlet pressure ranges of 0-10 psi.

Contoured body passages for reducing turbulence and large exit areas give them a broad capacity capability. This makes them applicable to a wide variety of load handling requirements.

Models 461-S and 461-12S are unusually dependable regulators. Their design is simple, the construction is sturdy. Servicing and adjustment are easy, offering a fast response. The overall operation is stable, sensitive, and provides exceptionally precise regulation.

Models 461-S, 461-8S and 461-12S are excellent regulators for general usage. These regulators also make an excellent choice for special applications such as snap action (on-off) loads and monitoring service.

Installation and Start-Up

1. Thoroughly purge inlet piping to remove dirt and debris which could damage the regulator or impair its operation.

NOTE: If this cannot be done, a filter or strainer should be installed ahead of the regulator. Ensure that regulator is free of any dirt or foreign matter that might have collected.

2. Place regulator in the line with high-pressure connected to the inlet side.

NOTE: Ensure that shipping screens or covers, if used, are removed from the inlet and outlet.

On flanges, tighten bolts evenly. On threaded connections, apply pipe dope to male threads only.

Where required, the regulator may be inverted. It may also be installed in a vertical line. However, if installed in a vertical line, this could cause excessive wear to anti-friction bushing.

3. Install vent onto regulator.

CAUTION

The diaphragm case 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 prevent vent blockage and minimize chances for foreign material collecting in the vent side of the regulator diaphragm.

Regulators installed indoors or in a non-vented area must be vented to the outside.

For outdoor installations, it is recommended the regulator be installed so the regulator vent faces downward to avoid becoming obstructed.

CAUTION

It is the user's responsibility to ensure 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 ensure that each regulator is individually vented and that common vent lines ARE NOT used.

4. Install the control line. Pitch it to drain away from the regulator, free of moisture pockets.

CAUTION

Interior of both the control line and its connections should be clean and smooth to minimize turbulence. Remove any rough edges, welding debris, etc. Where outlet piping increases in size near the regulator, it is recommended to locate the control connection in the larger size. Keep pipe dope and all other foreign substances out of the control line.

The ½" control line union contains a small orifice, approximately 1/16" diameter. This orifice should not be removed. Ensure this orifice is open and free of foreign material.

NOTE: Control piping should be no less than ¼" steel tubing or pipe for the 461-12S and 461-8S models and ½" steel pipe for the 461-S models. It should be sturdy with adequate protection against breakage. Regulators will go wide open if the control line is broken.

The regulator will work to deliver the adjusted pressure at the point in the outlet piping where the control connection is located. Control connection should be at least eight pipe diameters downstream from the regulator and should be in as straight a run of pipe as possible.

5. Check all connections for leaks.

6. Put the regulator into operation as follows:
(see Typical Installation illustration on Page 10)
   a. Slowly open the downstream control line valve A.
   b. Slowly open the downstream block valve B.
   c. Very slowly open the upstream block valve C.

CAUTION

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

   d. Remove seal cap (**1**), (**1a**), or (**1b**) and loosen lock-nut (**4**). Set the adjusting screw for the required outlet pressure (set-point). Turn it clockwise to increase the pressure and counterclockwise to decrease it. Only make this adjustment when gas is actually flowing through the regulator.
   e. After adjustment is complete, tighten lock-nut (**4**) firmly and replace seal cap (**1**), (**1a**), or (**1b**).

7. To shut down, carefully close valves C, B, and A in that order.

Servicing and Adjustment

(See Illustrations on Page 6 for emboldened numbers.)

General Notes

1. Ensure the regulator is entirely depressurized before servicing.
2. A 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.
3. The valve and body parts are interchangeable with other Model 461 Regulators.
4. Carefully note location and position of disassembled parts to be certain reassembly is correct. Inspect each part and replace those that are worn, damaged, or otherwise unsatisfactory.
5. 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. Only use moly or silicone type lubricants. Avoid the use of petroleum base types. Lubricate the stem and O-rings with dry silicone lubricant. This helps to ensure free movement and a tight seal. An application of lubricant to other O-rings and tetraseals in the regulator will also help ensure they seal tightly.

CAUTION

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

Servicing Diaphragm

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.

   Model 461-S: Release adjustment (**3a**), remove cover (**8**), button (**7b**), and spring (**9**).

   Model 461-8S: Release adjustment (**3a**), remove cover (**5**), button (**7a**), and spring (**9**).

   Model 461-12S: Remove adjustment (**3**) and spring (**9**).
2. Remove bolts (**22**) and carefully remove upper diaphragm case (**21**).
3. Turn diaphragm assembly counterclockwise until (**11h**) unscrews from (**12b**). Remove assembly and inspect diaphragm.
4. If a new diaphragm (**20**) is required, remove nut (**11a**).

NOTE: When reassembling, ensure abrasive side of emery cloth washers faces against diaphragm.

5. Screw diaphragm assembly back into place, (**11h**) screws into (**12b**) until it bottoms and then back it off one-half to one-full turn.

NOTE: Single-seat balanced valve does not require any lock-up adjustment.

6. Carefully reinstall upper diaphragm case (**21**).

NOTE: Diaphragm must not be pinched between upper case (**21**) and lower cases (**24**). Tighten bolts (**23**) and (**22**) evenly. Ensure travel indicator (**45**) is working.

7. Insert spring (**9**), ensuring it nests correctly into part (**11b**). Replace remaining parts removed under step 1 of this section and return adjustment to original setting.

Servicing 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 setting during reassembly.

   Model 461-S: Release adjustment (**3a**), remove cover (**8**), button (**7b**), and spring (**9**).

   Model 461-8S: Release adjustment (**3a**), remove cover (**5**), button (**7a**), and spring (**9**).

   Model 461-12S: Remove adjustment (**3**) 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 ½" hex deep socket.) Reassemble in reverse order.

NOTE: If it is necessary to remove stem (**12b**) or valve guide (**30**), first remove lower diaphragm case (**24**), (see steps 2 through 7 under "Service Diaphragm"). Use socket wrench for (**30**) (1 ½" hex deep socket).

CAUTION

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 the 1" size of the other.

NOTE: Single-seat balanced valve does not require any lock-up adjustment.

4. Replace bottom inspection plate (**14**).
5. Replace parts removed under step 1 of this section and return adjustment to original setting.

Servicing 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.

   Model 461-12S: Remove adjustment (**3**) and spring (**9**).

   Model 461-8S: Release adjustment (**3a**), remove cover (**5**), button (**7a**), and spring (**9**).

   Model 461-S: Release adjustment (**3a**), 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 ½" 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**). The top end of (**12b**) screws onto (**11h**) until it bottoms, then be backed off one-half turn to one- full turn.
5. If new parts are needed, disassemble valve assembly by loosening set screw (**12g**). Then unscrew (**12h**) from (**12b**), 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. Screw upper half valve assembly (**12b**) onto (**11h**) until it bottoms then back off one-half to one full turn.
   b. Screw Orifice (**18**) firmly into place.
   c. Screw lower half valve assembly onto upper half by three to four 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**). Firmly tighten set screw (**12g**).
   a. 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.
   b. Tighten set screw(**12g**) with screwdriver or allen wrench through body side opening. If necessary, carefully turn the entire valve assembly to face (**12g**) toward side opening, (do not disturb adjustment).

NOTE: Set screw (**12g**) must tightened against flat area at top of (**12h**) to correctly lock the adjustment.

9. Rotate to screw entire valve assembly back on. The top end of (**12b**) screws onto lower end of diaphragm stem (**11h**) until it bottoms, then back it off one-half to one full turn .
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. Reassembly parts listed in step 1 of this section, then return adjustment to original setting.

Changing Spring

(See "Spring Ranges" tables below)

1. Remove seal cap (**1**), (**1a**), or (**1b**).
   Model 461-S: Release adjustment (**3a**), remove cover (**8**), button (**7b**), and spring (**9**).
   Model 461-8S: Release adjustment (**3a**), remove cover (**5**), button (**7a**), and spring (**9**).
   Model 461-12S: Remove adjustment (**3**) and spring (**9**).
2. Insert the new spring, ensuring it nests correctly onto part (**11b**).
3. Replace remaining parts removed under step 1 of this section.

Spring Ranges

Model 461-12S

Outlet Pressure Range	Spring Color	Part Number
3 ½" to 6 ½" w.c.	Red	143-16-021-03
5" to 8 ½" w.c.	Blue	143-16-021-04
6" to 14" w.c.	Green	143-16-021-05
12" to 28" w.c.	Orange	143-16-021-06
1 to 2 psi	Black	143-16-021-07
1.5 to 3 psi	Cadmium	143-16-021-08

Model 461-8S

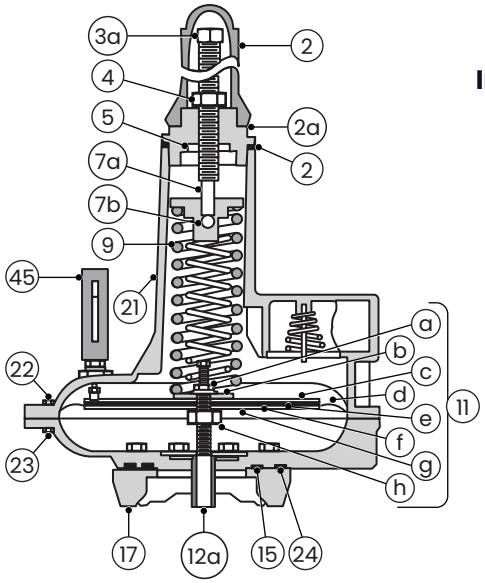
Outlet Pressure Range	Spring Color	Part Number
1 to 2 psi	Orange	143-16-021-06
2 to 4.25 psi	Black	143-16-021-07
3 to 6.5 psi	Cadmium	143-16-021-08
6 to 10 psi	Cadmium (Outer)	143-16-021-08
	White (Inner)	143-16-021-13

Model 461-S

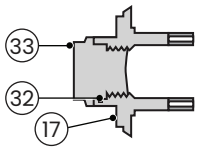
Diaphragm Size	Outlet Pressure Range	Spring Color	Part Number
8 ½"	3 to 6 psi	Blue	090-70-021-04
	5 to 10 psi	Red	090-70-021-05
12"	2" to 10" w.c.	Aluminum	090-70-021-00
	4" to 16" w.c.	Green	090-70-021-01
	7" to 29" w.c.	Yellow	090-70-021-02
	1.5 to 1.75 psi	Gray	090-70-021-03
	1 to 3.5 psi	Blue	090-70-021-04

Model 461-S Illustrations

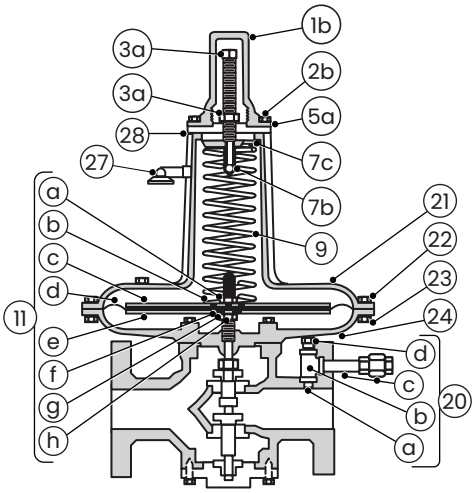
Model 461-8S Aluminum Diaphragm Case



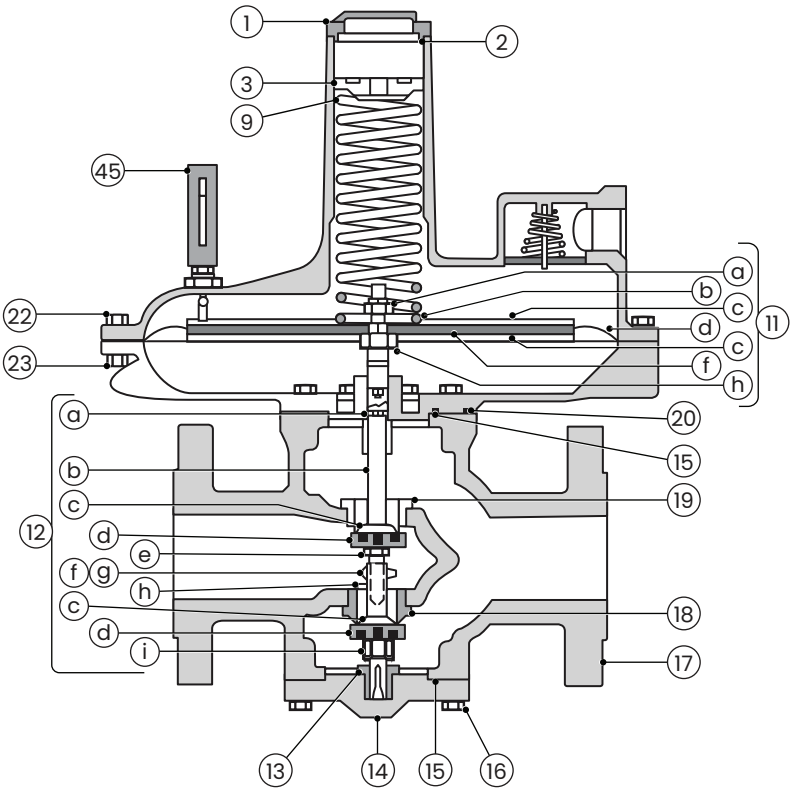
Threaded Side Inspection Plate



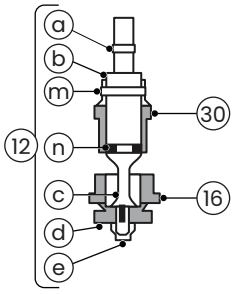
461-S Cast Iron Diaphragm Case



Model 461-12S Aluminum Diaphragm Case



Single-Seat Balanced Valve Assembly



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 ½" × 1 ⅝"	906534
2b	Tetraseal (or O-ring) 1 ¾" × 2"	904092
3*	Adjustment Spring Button	143-16-009-00
3a	Spring Adjusting Screw	090-16-007-00
4	Hex Nut, ½" – 13	906537
4a	Hex Steel Nut, ⅝" – 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, ⅜" dia.	930510
7c	Top Spring Button	091-16-009-00
8	Cap Screws, Hex Hd., 5⁄16" – 18 × ⅞" lg.	9210029
9	Spring, (See Spring Ranges Table Page 5)	-
12b	1" Double-Seat Valve Assembly, Stainless Steel Trim, Buna-N	091-16-515-03
	1" Double-Seat Valve Assembly, Stainless Steel Trim, Red Poly-U	091-16-515-13
	11⁄16" Double-Seat Valve Assembly, Stainless Steel Trim, Buna-N	091-16-515-02
	11⁄16" Double-Seat Valve Assembly, Stainless Steel Trim, Red Poly-U	091-16-515-12
	1" Single-Seat Valve Assembly, Stainless Steel Trim, Red Poly-U	091-16-515-51
	11⁄16" Single-Seat Valve Assembly, Stainless Steel Trim, Red Poly-U	091-16-515-50
12a	O-ring, ⅜" × ½"	934007
12b	Male Valve Stem, 5 1⁄16" lg., Stainless, for 1" and 11⁄16" Double-Seat Assembly	091-16-116-00
	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, 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

* Minimum recommended spare parts

Illustration Number	Description	Part Number
12d	Molded Valve, Buna-N (Black, 45-55 Duro), for 1" Double-Seat Assembly	091-16-315-01
	Molded Valve, Buna-N (Black, 45-55 Duro), for 11⁄16" Double-Seat Assembly	091-16-315-00
	Molded Valve, Poly-U (Red, 65-75 Duro), for 1" Double-Seat Assembly	091-16-315-11
	Molded Valve, Poly-U (Red, 65-75 Duro), for 11⁄16" Double-Seat Assembly	091-16-315-10
	Molded Valve, Viton (65-75 Duro, Stamped-V), for 1" Double-Seat Assembly	091-16-315-13
	Molded Valve, Viton (65-75 Duro, Stamped-V), for 11⁄16" Double-Seat Assembly	091-16-315-12
	Molded Valve, Poly-U (Red, 65-75 Duro), for 1" Single-Seat Assembly	091-16-315-51
	Molded Valve, Poly-U (Red, 65-75 Duro), for 11⁄16" Single-Seat Assembly	091-16-351-50
	Molded Valve, Viton (65-75 Duro, Stamped-V), for 1" Single-Seat Assembly	091-16-315-58
	Molded Valve, Viton (65-75 Duro, Stamped-V), for 11⁄16" Single-Seat Assembly	091-16-315-57
12e	Valve Locknut, Stainless, for Double-Seat Assembly	920303
	Valve Locknut, ⅜" – 24 Crown Nylok, for Single-Seat Assembly	903936
12f	Valve Stem Locking Ring, Stainless, for Double-Seat Assembly	091-16-043-01
12g	Set Screw, Slotted Headless Cup Pt. #12 - 24 × ¼" lg.	907694
12h	Female Valve Stem, Stainless, for Double-Seat Assembly	091-16-016-03
12j	Valve Guide, Stainless, for Double-Seat Assembly	091-16-012-02
12m	Roll Pin, ¼" × 1 ½" lg., for Single-Seat Assembly	910707
12n*	O-ring, ¾" × 1" Single-Seat Assembly	934015
	O-ring, 9⁄16" × ¾" Single-Seat Assembly	934011
13	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 ¾" x 3"	904079
16	Cap Screws, Hex Hd., 5⁄16" - 18 × 1" lg.	910030
17	Body, Threaded, 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

* Minimum recommended spare parts

Condensed Parts List (Continued)

All Models

Illustration Number	Description	Part Number
18	Outlet Orifice 1" Stainless	091-16-029-05
	Outlet Orifice, 11⁄16" Stainless	091-16-029-04
19	Inlet Orifice, 1" Stainless	091-16-028-05
	Inlet Orifice, 11⁄16" Stainless	091-16-028-04
20	Control Line Piping Assembly	091-16-361-50
20a	¼" Sq. Hd. Steel Piping Plug	906055
20b	¼" Malleable Iron Tee	946150
20c	Nipple and Plug Assembly	091-00-361-50
22	Hex Hd. Steel Bolt, 5⁄16" - 18 × 1" lg. (461-12S, 461-8S, 461-S 12")	910030
	Hex Hd. Steel Bolt, 5⁄16" - 18 × 1 ¼" lg. (461-S 8 ½")	910031
23	Hex Steel Nut, 5⁄16" - 18	903859
26*	Tetraseal (or O-ring), 4 3⁄8" × 4 5⁄8"	904085
27	Vent Cap, ¼"	137-02-505-02
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 ½" × 1 ¾"	904086
33	Ductile Iron Side Inspection Plate	091-16-072-04
	Steel Side Inspection Plate	091-16-072-01
45	Travel Indicator Assembly	091-00-365-61

* Minimum recommended spare parts

Model 461-S

Illustration Number	Description	Part Number
11	Diaphragm Assembly, 12"	091-16-550-01
	Diaphragm Assembly, 8 ½"	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 ½"	091-86-010-00
11d*	Diaphragm, 12"	091-16-150-00
	Diaphragm, 8 ½"	091-86-150-00
11e	Lower Diaphragm Plate, 12"	091-16-060-01
	Lower Diaphragm Plate, 8 ½"	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

Model 461-8S

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 461-12S

Illustration Number	Description	Part Number
11	Diaphragm Assembly, 3 ½" 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

Before using any of the below data, ensure this entire section is clearly understood.

The following are the maximum inlet pressures which the regulator body may be subjected to under abnormal conditions without causing internal damage are:

461-S (8.5" Cast Iron Diaphragm Case)..... 200 psi
461-8S ..... 200 psi
461-S (12" Cast Iron Diaphragm Case)..... 115 psi
461-12S..... 115 psi

The maximum outlet pressure which the diaphragm may be subjected to under abnormal conditions without causing internal damage is:

461-S (8.5" Cast Iron Diaphragm Case).....setpoint + 10 psi
461-8S ..... setpoint + 10 psi
461-S (12" Cast Iron Diaphragm Case)..... setpoint + 5 psi
461-12S..... setpoint + 5 psi

NOTE: The "set-point" is the outlet pressure the regulator is adjusted to deliver.

The maximum pressure that can be safely contained by the diaphragm case is:

461-S (8.5" Cast Iron Diaphragm Case)..... 25 psi
461-8S ..... 25 psi
461-S (12" Cast Iron Diaphragm Case)..... 15 psi
461-12S..... 15 psi

NOTE: Safely contained means no leakage and no bursting.

Overpressurization Protection

Methods of overpressuirzation protection include relief valves, monitor regulators, shutoff devices, or similar mechanisms. These protect the downstream piping system and the regulator's low-pressure chambers against overpressurization due to possible regulator malfunction or failure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, and other applicable standards.

Monitoring

The 461-S, 461-8S, or 461-12S make an excellent monitors; 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 response rate enables it to take over quickly when necessary, and 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, or Model 1100) 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.

Other Gases

The Model 461-S regulator is mainly used with natural gas. However, they perform equally as well with liquid propane gas (LPG), nitrogen, dry carbon dioxide (CO_2), air and others. When using with 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 Mix (Specific Gravity 1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63

For other non-corrosive gases, use the following formula:

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

For use with gases not listed above, please contact your Utility Solutions Group representative or Authorized Distributor.

Capacities at Other Pressures

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

$Q = K\sqrt{P_o(P_i - P_o)}$ ..... (for P_i/P_o less than 1.894)

$Q = \frac{K P_i}{2}$ ..... (for P_i/P_o less than 1.894)

Q = Maximum capacity of regulator, in SCFH of 0.6 specific gravity natural gas

K = the "K" factor, the regulator constant (see table below)

P_i = absolute inlet pressure (psi)

P_o = absolute outlet pressure (psi)

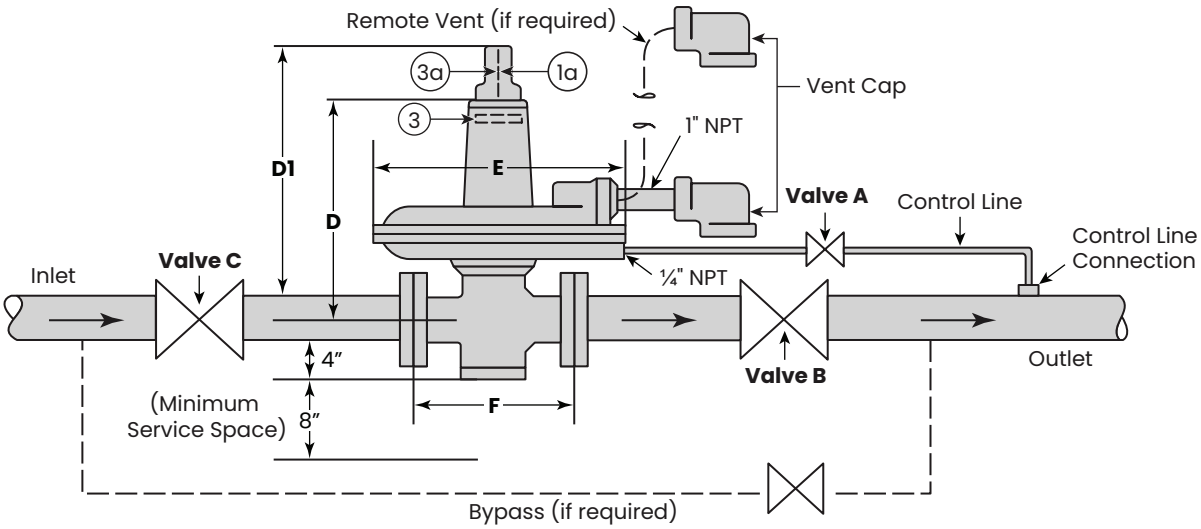
Temperature Limits

The Model 461-S Regulator can be used for flowing temperatures from -20°F to 150°F.

Buried Service

The Model 461-S Regulator is not recommended for buried service.

Typical Arrangement and Dimensions



Model	D	D1	E
461-12S	13 ¼"	-	14"
461-8S	-	18 ⅜"	10 ³⁄₁₆"
461-S (12")	-	19 ½"	14 ¼"
461-S (8 ½")"	-	19 ½"	11"

Regulator Body Type	F (Face to Face)
Threaded	6 ½"
Flanged ANSI 125 FF	10"
Flanged ANSI 250 RF	10 ½"

Body Pressure Ratings

Regulator Body Type	Diaphragm Case Material	Maximum Inlet Pressure
2" Threaded Only	Cast Iron	250 psi
Flanged ANSI 125 FF	Cast Iron	175 psi*
Flanged ANSI 250 RF	Ductile Iron	575 psi*
Flanged ANSI 300 RF	Cast Steel	720 psi*

* Carefully note the following exceptions to the above, based on diaphragm size, (see "Diaphragm Size" table below).

Maximum Inlet Pressures by Diaphragm Size

Diaphragm Size (I.D.)	Diaphragm Case Material	Maximum Inlet Pressure
12"	Cast Iron	100 psi
8 ½"	Cast Iron	175 psi
12"	Aluminum	100 psi
8"	Aluminum	175 psi

Maximum Differential and Inlet Pressure for Various Soft-Seated Valve Materials

The differential and inlet pressures given below are only to be used as general guidelines. In all cases, pressures must always remain within the ranges specified in Utility Solutions Group literature. For any given regulator, do not exceed the specified maximum pressures.

Valve Material	Maximum Pressure Differential	Maximum Inlet Pressure
Buna-N (Black, 50 to 55 duro)	250 psi	575 psi
Polyurethane (Red, 65 to 75 duro)	400 psi	720 psi

NOTE: The maximum temperature for the above materials are 150°F. Viton, if used, has a maximum temperature rating of 300°F and a maximum pressure differential of 250 psi.

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