UTILITY SOLUTIONS GROUP

Model 441-X57 Regulator

Installation & Maintenance Manual

Contents

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Introduction

441-X57 Regulator

The Model 441-X57 is a unique high-pressure, large-capacity, spring-operated regulator. This high-pressure regulator incorporates the same roll-out diaphragm principal that is widely used in the 461-57S and 441-57S models.

This regulator offers pilot-type performance with spring-operated regulator simplicity. The action of the roll-out diaphragm makes the regulators exceptional performance possible by reducing droop, the falloff in outlet pressure as a spring regulator opens to increase flow, to a minimum.

The 441-X57 features a fast response and ease of installation. It is also simple to adjust and service. The 441-X57 is perfect for most high-pressure, large-capacity applications. This includes high-pressure regulator sets, gas distribution systems, town border stations, transmission systems and most industrial applications.

The 441-X57 regulator can also be used as a monitor to quickly assume control if a failure in the operating regulator allows the outlet pressure to exceed its set-point. No modifications are required for use as a monitor, even if used as a monitor for other types of regulators.

Roll-Out Diaphragm

The heart of the Model 441-X57 is the "Roll-Out" diaphragm. The 441-X57 is a spring regulator with performance which approximates that of a pilot operated regulator. The "Roll-out" Diaphragm makes this exceptional performance possible because its action reduces "droop" to a minimum, ("droop" being fall off in outlet pressure as a spring regulator opens to increase flow.)

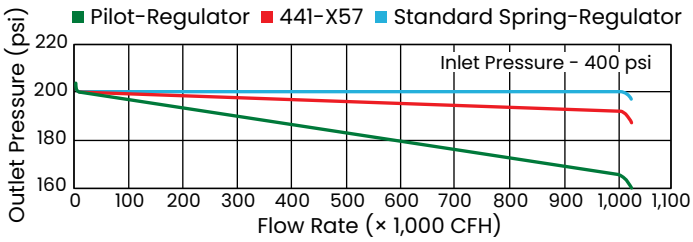
The action of the "Roll-Out" diaphragm differs from that of the conventional diaphragm in the manner which the change in effective area occurs. Where the effective area of a conventional diaphragm would increase as the regulator opens, the "Roll-Out" area decreases. Conversely, where the area of the conventional diaphragm decreases during closing, the "Roll-Out" area increases. The following explanation and the graph below show how this affects performance.

Spring-type regulators are operated by the inter-action between spring and diaphragm. The compressive force of the spring works to open the regulator and is balanced by the opposing force of outlet pressure on the diaphragm which provides the closing force.

As the regulator opens, the compressive force of the spring decreases. However, as this spring force decreases, there must be a corresponding decrease in the opposing force from the diaphragm. For this opposing diaphragm force to decrease, either the effective area or the outlet pressure must decrease. Herein is the essential difference; with a conventional diaphragm the outlet pressure must decrease, where as with the "Roll-Out" diaphragm it is the effective area that decreases, permitting the outlet pressure to remain constant.

The operation actually is quite simple, yet the action of the "Roll-Out" diaphragm is so effective that "droop" is practically eliminated.

The Model 441-X57 provides constant pressure regulation. It approaches pilot performance, and additionally offers further advantages of simplicity, dependability, freedom from freeze-up, and exceptionally fast response.



Installation and Start-Up

NOTE: Do not install sideways. The diaphragm should be horizontal.

1. Ensure the inlet and outlet connections are correct. High-pressure connects to the regulator inlet. The flow arrow on the body must point downstream.
2. Tighten flanged joints evenly.

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.

3. Before beginning start-up, ensure the regulator is correctly connected, adequately supported, and pipe joints are tight.
4. Document the factory adjusted set-point. The regulator is factory adjusted to the set-point specified on the order.

NOTE: "Set-point" is the outlet pressure the regulator is adjusted to deliver). Only adjust set-point when gas is flowing through the regulator. Flow should be small (10% of maximum regulator capacity or less). Do not adjust if regulator is locked-up (tight shutoff).

CAUTION

During start-up a pressure gauge must be used on the piping at the regulator outlet and closely monitored. While inlet pressure enters the regulator, outlet pressure must not exceed set-point by more than the small amount needed for lock-up (tight shutoff). If outlet pressure continues to increase above this, close the inlet shutoff valve. The regulator is not closing properly. Make necessary corrections before resuming start-up. Regulator must be fully capable of tight lock-up.

5. After completing start-up, make sure there are no leaks.

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.

6. From the ¼" union (**60**), extend pipe or tubing to the control connection into the outlet piping.

NOTE: Control piping should not be less than ¼" in size and should be adequately protected against breakage. Regulators will go wide open if the control line is broken.

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. It should be located on the top or side of the pipe, and the line pitched to drain away from the regulator into the outlet pipe.

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 ¼" union (60) 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: 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 from the regulator and should be in as straight a run of pipe as possible.

7. Check all connections for leaks.
8. Put the regulator into operation as follows: (see "Typical Installation and Dimensions" on Page 11)
   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. Set the adjusting screw (**10**) for the required outlet pressure. 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, the lock-nut (**11**) should be tightened firmly and the seal cap (**1**) replaced.
9. To shut down, carefully close valves C, B, and A in that order.

Servicing and Adjustment

(See "Model 441-X57 Illustration" on Page 7 for emboldened numbers.)

General Notes

1. Ensure the regulator is entirely depressurized before servicing. Pressure must be fully released from the inlet, the outlet and the control line connection. Failure to adequately depressurize the regulator could result in serious personal injury.

WARNING

Even at only 10 psi outlet pressure, the force exerted on the adjustment screw by spring compression can be great. As a result, failure from worn threads could result in serious personal injury. Therefore, adjustment screw lubrication and thread condition must be given careful attention.

2. Carefully note the location and position of all disassembled parts to be certain reassembly is correct. Inspect each part carefully and replace any that are worn, damaged, or otherwise unsatisfactory. Where there is evidence of thread wear, such as a loose fit or excessive side play, the worn parts must be replaced.
3. Adjustment screw lubrication should be checked whenever the regulator is serviced. Ensure the threads are fully coated with lubricant.
4. Ensure that the regulator installation is entirely free of leaks after completion of service.
5. A quick visual inspection of the valve can be made by removing inspection plates (**38**) from the sides of the body. They also provide greatly improved access to the valve when servicing or adjusting.
6. The diaphragm (**20**), springs (**14**), all other parts from the lower diaphragm plate (**22**), and parts listed above are interchangeable with the 461-X57.
7. Valve and body parts are interchangeable with other 441 Regulators (441-S, 441-87S, 441-VPC, etc.)

8. Use lubricants sparingly and with care to avoid exposing tacky surfaces to the gas stream. Such surfaces could cause accumulation of dirt on close clearance parts. Only moly or silicone-type lubricants. Avoid the use of petroleum base type.

   It is best to avoid lubricating stem (**24**) or guide (**50h**). However, as mall amount of lubricant on stem O-ring (**23**) and O-ring (**21**) will help ensure free movement and a tight seal. An application of lubricant to the other O-rings and the tetraseals in the regulator will help ensure their tightness.

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.

Remove Valves

1. Remove seal cap (**1**), back off adjusting screw (**10**), remove housing cover (**5**), and remove spring (**14**).
2. Remove bottom inspection plate (**33**), and side plate (**38**).
3. Insert an Allen wrench through side inspection opening and loosen Allen screw (**50g**).
4. Unscrew lower valve assembly and remove through bottom opening, (**50h**) unscrews from (**50e**).
5. Unscrew upper valve assembly and remove through side opening, (**50e**) unscrews from (**24**).

NOTE: If upper valve assembly is too large to remove through side opening, remove it through bottom opening by also removing outlet orifice (**29**), (remove cap screws (**26**) to remove orifice. If it is too tight, jack out using cap screws in jacking holes.

The entire valve assembly may be removed intact through bottom opening by also removing orifice (**29**). This method leaves the lock-up adjustment undisturbed.

Use care when handling orifice gasket (**27**).

6. To disassemble upper and/or lower valve assembly, remove nuts (**50a**).

Replace and Adjust Valves

1. Assemble upper valve assembly parts (**50a**), (**50b**), (**50c**), (**50d**), (**50e**), and (**50g**). Assemble lower valve assembly parts (**50a**), (**50b**), (**50c**), (**50d**), and (**50h**). Then firmly tighten nuts (**50a**).
2. Insert upper valve assembly and screw into place, (**50e**) should be screwed into (**24**) until it bottoms and then backed off one-half to one-full turn.
3. If orifice (**29**) was removed, reinstall it.
4. Inset lower valve assembly and screw into place by a few turns, (**50h**) screws into (**50e**).
5. Turn upper valve assembly so Allen screw (**50g**) is accessible through side inspection opening.
6. Make the valve lock-up adjustment as follows:
   a. Hold upper valve against its seat. This can be done by hand by reaching through side inspection opening.
   b. While holding the upper valve against its seat, screw lower valve assembly upwards until the lower valve also touches its seat. When both upper and lower valves are touching their seats they are correctly adjusted for tight lock-up.
   c. Firmly tighten Allen screw (**50g**). This locks the adjustment by evenly and tightly locking (**50h**) and (**50e**) together.

NOTE: If the entire valve assembly was removed intact and Allen screw (**50g**) has not been loosened, valve assembly may be reinstalled without making the lock-up adjustment.

7. Rotate entire valve assembly to thread it upward until it bottoms, (**50e**) screws into (**24**). Then back off one-half to one-full turn.
8. Replace the side plates (**38**).
9. Replace bottom plate (**33**). Match bottom end of (**50h**) into (**32**) and then turn bottom plate either direction to the first matching bolt hole position. Pin in (**32**) must be intact.

Remove Orifices

1. Remove outlet orifice (**29**), (see steps 1 through 5 under section "Remove Valves").
2. Remove inlet orifice (**28**) as follows:
   a. Remove seal cap (**1**), back off adjusting screw (**10**), remove housing cover (**5**), and remove spring (**14**).
   b. Remove bottom inspection plate (**33**). Unscrew upper valve assembly (**50h**), (**50e**) unscrews from (**24**).
   c. Remove diaphragm case assembly by first opening union (**60**) and removing cap screws (**34**).
   d. Remove cap screws (**26**) and inlet orifice (**28**). If orifice is tight, jack out cap screws in jacking holes. Use care with gasket (**27**).
   e. When replacing diaphragm assembly, the threaded connection between (**24**) and (**50e**) should be screwed together until it bottoms, then backed it off one-half to one-full turn

Changing Spring

(See "Spring Ranges" table below for spring identification and selection.)

1. Remove seal cap (**1**), back off adjusting screw (**10**), remove housing cover (**5**), and remove spring (**14**).
2. Insert the new spring, ensuring it nests correctly onto part (**15**) and travel indicator bracket (**45k**) is in place.

NOTE: Visually inspect diaphragm (**20**) before inserting the spring to ensure the roll-out is uniform and in place. Use a flashlight, if necessary.

3. To complete reassembly, (see steps 7 through 9 of section "Assemble 441-X57").

Spring Ranges

Outlet Pressure Min. to Max.	Spring Color	Nominal Diaphragm Size (I.D.)
75 to 100 psi	Red	2 ½" Diaphragm All Ranges
100 to 175 psi	Brown	
150 to 250 psi	Black	

Servicing Diaphragm

1. Remove seal cap (**1**), back off adjusting screw (**10**), remove housing cover (**5**), and remove spring (**14**).
2. Remove bolts (**42**) and carefully remove upper diaphragm case (**8**).
3. Turn diaphragm assembly counterclockwise until diaphragm connecting stem (**24**) unscrews from (**50e**). Remove assembly and inspect diaphragm.
4. If a new diaphragm (**20**) is required, remove nut (**16**) and disassemble.

NOTE: During reassembly, ensure fabric side of diaphragm (**20**) faces toward the vent side of the regulator and the rubber side of the diaphragm faces toward the pressure side. The gasket is always placed on the spring side of the diaphragm.

5. Screw diaphragm assembly back into place, (**24**) screws into (**50e**) until it bottoms and then back it off one-half to one-full turn
6. Fold roll into roll-out diaphragm and then carefully reinstall upper diaphragm case (**8**). Tighten bolts (**42**) evenly.

NOTE: Roll-out loop must be uniformly full and even. It should be in place as shown on the cross-section drawing, (see "Model 441-X57 Illustration" on Page 6).

Diaphragm must not be pinched between upper and lower case (**8**) and lower case (**40**).

7. Reinstall spring assembly, (see steps 6 through 9 under "Assemble 441-X57").

Assembling 441-X57

1. Install orifice (**28**) through top opening.
2. Install valve assembly and orifice (**29**), (see steps 1 through 6 under section "Replace and Adjust Valves" on Page 5).

NOTE: Do not screw (**50e**) into (**24**) yet.

3. Install lower diaphragm case (**40**).
4. Install diaphragm assembly and upper case (**8**), (see steps 5 through 7 under "Service Diaphragm" on Page 4).
5. Replace bottom plate (**33**). Line up bottom end of (**50h**) into (**32**), then rotate bottom plate either direction to first matching bolt hole position.

NOTE: Pin in (**32**) intact.

6. Insert the new spring, ensuring it nests correctly onto part (**15**) and travel indicator bracket (**45k**) is in place.

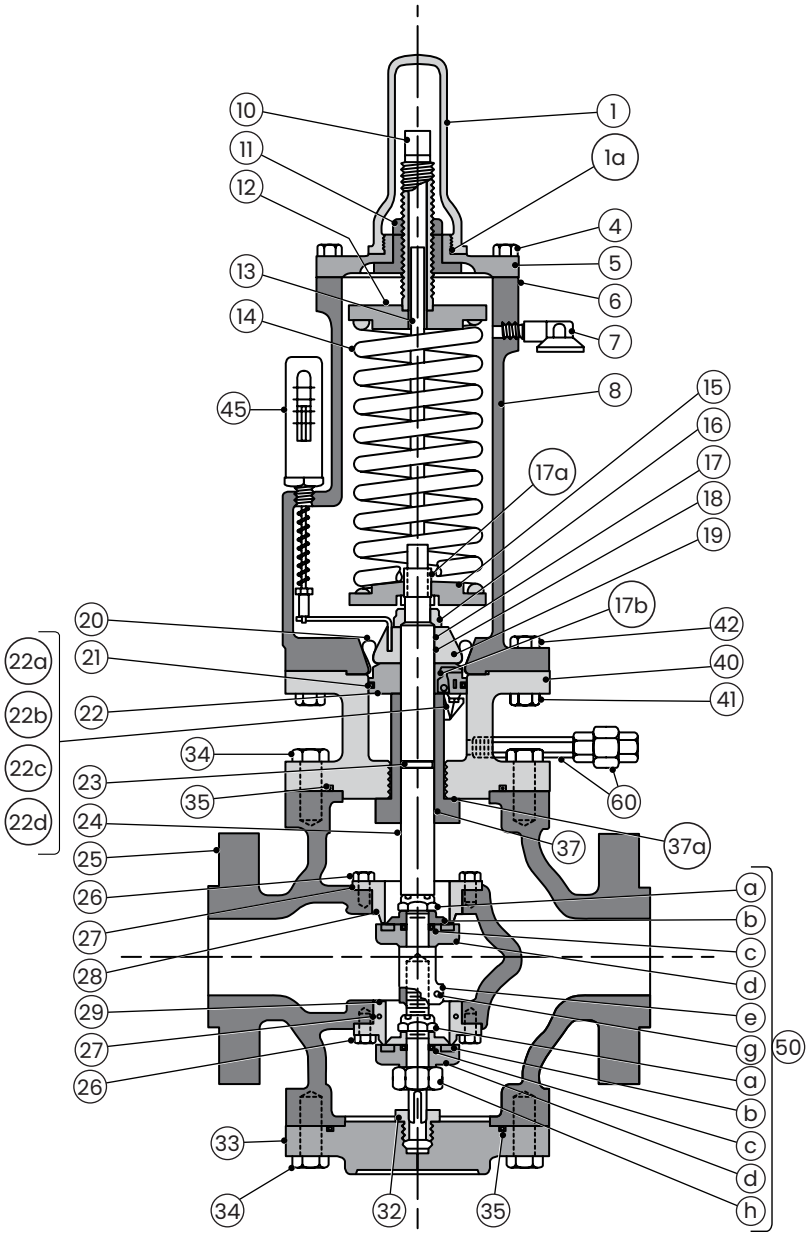
NOTE: Visually inspect diaphragm (**20**) before inserting the spring to ensure the roll-out is uniform and in place. Use a flashlight, if necessary.

7. Insert top spring button (**12**), ensuring it is nested correctly on the spring.
8. Install housing cover (**5**). Ensure the lower end of adjusting screw (**10**) fits into the recess of button (**12**).
9. Set adjusting screw (**10**) for desired set-point, firmly tighten nut (**11**), and replace seal cap (**1**).

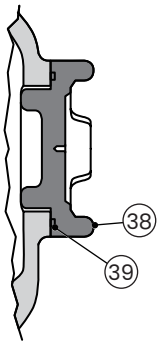
NOTE: Only adjust set-point when gas is flowing through the regulator.

Model 441-X57 Illustration

2" and 3" Model441-X57



Side Inspection Plate



Model 441-X57 Condensed Parts List

2" and 3" Models

Illustration Number	Description	Part Number
1	Seal Cap	090-00-005-02
1a	Tetraseal (or O-ring) 1 ¾" × 2"	904902
4	Hex Cap Screw 5/16" – 18 × 1" 120,000 tensile, (8 used)	910030
5	Top Cap Assembly	091-16-380-01
6	Housing Cover Gasket	091-00-066-30
7	Vent Cap, ¼" NPT	137-02-505-02
10	Spring Adjusting Screw	091-00-007-50
11	Hex Steel Jam Nut, ⅜" – 14	903873
12	Top Spring Button	091-00-009-50
13	Spring Thrust Rod (Upper)	091-00-062-50
14	Spring, Red (75 to 100 psi)	091-00-021-02
	Spring, Brown (100 to 175 psi)	091-00-021-01
	Spring, Black (150 to 250 psi)	091-00-021-00
15	Lower Spring Button	091-00-009-51
16	Elastic Stop Nut ¾" – 16	903596
17	Diaphragm Stub (Lower)	091-00-158-50
17a	Type 2 Groove Pin ⅛" × 3/16" Lg.	904118
17b	Thrust Bearing, Stainless Steel, ⅜" Dia.	930510
18	Diaphragm Stub	090-00-058-50
19	Diaphragm Plate, Upper	091-00-010-50
20	Diaphragm, 2 ½" Roll-Out	091-00-350-50
21	O-ring, 2 ⅛" × 2 ½"	934033
22	Diaphragm Plate, Lower	091-00-022-50
22a	Stainless Steel Ball, ¼" Dia.	930506
22b	Soc. Hd. Cap Screw #10 – 24 × ⅜" Lg.	939900
22c	#10 Steel Lock washer	904012
22d	Ball Valve Retaining Ring Washer	090-16-178-01
23	O-ring, 11/16" × ⅞"	934013
24	Diaphragm Connecting Stem, Stainless Steel	090-00-058-51
26	Hex Cap Screw, ¼" – 20 × ½" Lg. 120,000 tensile	910001
32	Guide Bushing with Pin, Brass	090-16-385-01
	Guide Bushing with Pin, Stainless Steel	090-16-385-03
34	Hex Cap Screw, ½" – 13 × 1 ¼"	910106
35	Tetraseal (or O-Ring), 4 ⅜" × 4 5/8"	904085
37	Centerpiece Stem Bushing	090-16-373-01
37a	Aluminum Seal Ring	090-26-178-00
39	Tetraseal (or O-ring), 3 ¼" × 3 ½"	904078
40	Lower Diaphragm Case, for 250 lb. Ductile Iron Bodies	090-00-002-51
	Lower Diaphragm Case, for Cast Steel bodies	090-00-002-53

Illustration Number	Description	Part Number
41	Hex Steel Nut, ⅜" × 16"	920053
42	Hex Steel Bolt, ⅜" × 16" × 1 ¾" Lg. 120,000 tensile	910058
45	Travel Indicator Assembly	091-00-365-83
50	Valve Assembly, 1 ¾", brass trim, Polyurethane (red, 65-75 Duro)	090-16-515-32
	Valve Assembly, 1 ½", brass trim, Polyurethane (red, 65-75 Duro)	090-16-515-33
	Valve Assembly, 1 ¾", Stainless trim, Polyurethane (red, 65-75 Duro)	090-16-515-52
	Valve Assembly, 1 ½", Stainless trim, Polyurethane (red, 65-75 Duro)	090-16-515-53
50a	Valve Lock Nut, ⅝" – 18	905564
50b	Valve Retainer, Standard, steel, 1 ¾"	090-16-018-00
	Valve Retainer, Standard, steel, 1 ½"	090-16-018-01
	Valve Retainer, Standard, Stainless Steel, 1 ¾"	090-16-018-30
	Valve Retainer, Standard, Stainless Steel, 1 ½"	090-16-018-31
	Valve Retainer, V-Port Wings, Steel, 1 ¾"	090-16-012-50
	Valve Retainer, V-Port Wings, Steel, 1 ½"	090-16-012-52
	Valve Retainer, V-Port Wings, Stainless Steel, 1 ¾"	090-16-012-53
	Valve Retainer, V-Port Wings, Stainless Steel, 1 ½"	090-16-012-55
50c	O-ring, ⅝" × 13/16"	934012
50d	Molded Valve, 1 ¾", Polyurethane (Red, 65-75 Duro)	090-16-315-02
	Molded Valve, 1 ½", Polyurethane (Red, 65-75 Duro)	090-16-315-03
	Molded Valve, 1 ¾", Polyurethane (Tan, 85-95 Duro)	090-16-315-05
	Molded Valve, 1 ½", Polyurethane (Tan, 85-95 Duro)	090-16-315-04
50e	Female Valve Stem, Brass	090-16-116-00
	Female Valve Stem, Stainless Steel	090-16-116-01
50g	Adjustment Clamp Screw, Soc. Hd. Screw, #10 – 24 × ½" Lg.	903486
	Adjustment Clamp Screw, for 1 ½" valve only	090-16-046-01
50h	Male Valve Stem, Brass	090-16-016-01
	Male Valve Stem, Stainless Steel	090-16-016-02
60	Nipple, Orifice Plug and Union Assembly	091-00-361-03

Condensed Parts List (Continued)

3" Models

Illustration Number	Description	Part Number
27	O-ring, for Orifices	950818
28	2 ⅛" Inlet Orifice, CRS Steel	090-20-028-00
	1 ¾" Inlet Orifice, CRS Steel	090-20-028-02
	1 ½" Inlet Orifice, CRS Steel	090-20-028-03
	2 ⅛" Inlet Orifice, Stainless Steel	090-20-028-50
	1 ¾" Inlet Orifice, Stainless Steel	090-20-028-52
	1 ½" Inlet Orifice, Stainless Steel	090-20-028-53
29	2 ⅛" Outlet Orifice, CRS Steel	090-20-029-00
	1 ¾" Outlet Orifice, CRS Steel	090-20-029-02
	1 ½" Outlet Orifice, CRS Steel	090-20-029-03
	2 ⅛" Outlet Orifice, Stainless Steel	090-20-029-50
	1 ¾" Outlet Orifice, Stainless Steel	090-20-029-52
	1 ½" Outlet Orifice, Stainless Steel	090-20-029-53
50	Valve Assembly, 2 ⅛", Brass trim, Polyurethane (Red 65-75 Duro)	090-20-515-40
	Valve Assembly, 2 ⅛", Iron trim, Polyurethane (Red 65-75 Duro)	090-20-515-10
50b	Valve Retainer, Standard, CRS Steel, 2 ⅛"	090-20-018-00
	Valve Retainer, Standard, Stainless Steel, 2 ⅛"	090-20-018-30
	Valve Retainer, V-Port Wings, CRS Steel, 2 ⅛"	090-20-012-50
	Valve Retainer, V-Port Wings, Stainless Steel, 2 ⅛"	090-20-012-51
50d	Molded Valve, 2 ⅛", Polyurethane (Red, 65-75 Duro)	090-20-315-02
	Molded Valve, 2 ⅛", Polyurethane (Tan, 85-95 Duro)	090-20-315-03

2" Models

Illustration Number	Description	Part Number
27	O-ring, for Orifices	904832
28	1 ¾" Inlet Orifice, Plated Steel	090-16-028-00
	1 ½" Inlet Orifice, Plated Steel	090-16-028-01
	1 ¾" Inlet Orifice, Stainless Steel	090-16-028-50
	1 ½" Inlet Orifice, Stainless Steel	090-16-028-51
29	1 ¾" Outlet Orifice, Plated Steel	090-16-029-00
	1 ½" Outlet Orifice, Plated Steel	090-16-029-01
	1 ¾" Outlet Orifice, Stainless Steel	090-16-029-50
	1 ½" Outlet Orifice, Stainless Steel	090-16-029-51

Maximum Emergency Pressures

NOTE: Ensure this entire section is clearly understood before using any of the following data.

The maximum inlet pressures the Model 441-X57 Regulator may be subjected to under abnormal conditions without causing damage to the regulator are:

Ductile Iron Body ..... Maximum Inlet Pressure + 60 psi
Cast Steel Body ..... Maximum Inlet Pressure + 100 psi

The maximum outlet pressures the Model 441-X57 Regulator may be subjected to under abnormal conditions without causing damage to the regulator is:

Maximum Outlet Pressure ..... Set-point + 50 psi

NOTE: Set-point is defined as the outlet pressure a regulator is adjusted to deliver.

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

Maximum Pressure ..... 350 psi

NOTE: Safely contained means no leakage as well as no bursting.

If any of the above pressure limits are exceeded, the regulator must be taken out of service and inspected. Damaged or otherwise unsatisfactory parts must be repaired or replaced.

Maximum Inlet Pressures

Regulator Body Type	441-S Body Material	Maximum Working Body Pressure	Maximum Inlet Pressure
Flanged ANSI 250 lb. RF	Cast Iron	575 psi	575
Flanged ANSI 300 lb. RF	Cast Steel	720 psi	
Flanged ANSI 600 lb. RF	Cast Steel	1,200 psi	

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.

Other Gases

The Model 441-X57 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.

Monitoring

The Model 441-S Regulator makes an excellent monitor. It can act as 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. It can be located in either the upstream or the downstream position.

When a Model 441-X57 Regulator is used to monitor a regulator with an identical inner valve (another 441 Regulator), the total maximum capacity through both regulators can be figured at 70% of the capacity of one regulator alone. This applies with the monitor located either upstream or downstream.

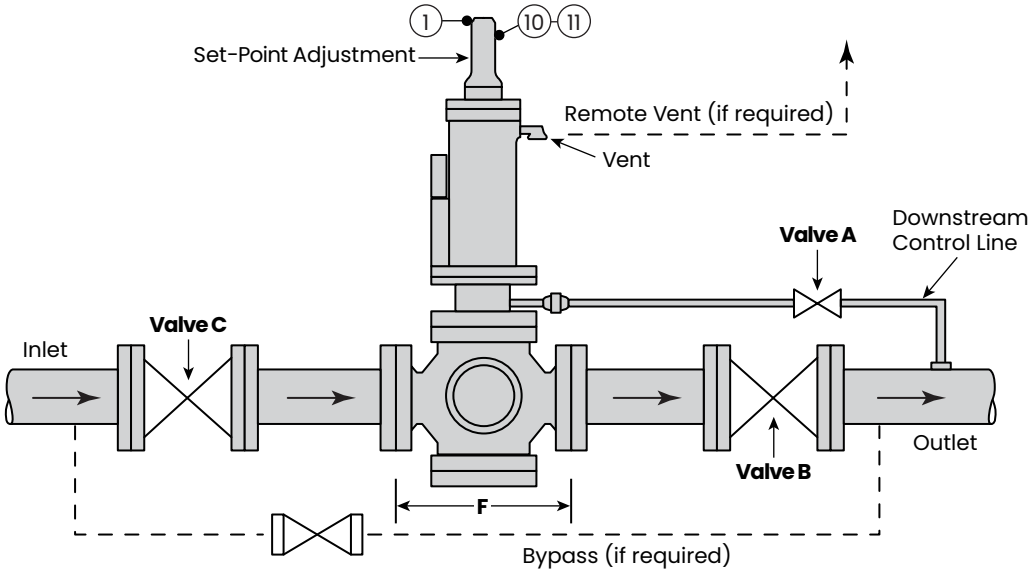
Temperature Limits

The Model 441-X57 Regulator can be used for flowing temperatures from -20°F to 150°F.

Buried Service

The Model 441-X57 Regulator is not recommended for buried service.

Typical Installation and Dimensions



Regulator Body Type	F (Face to Face)	
	2" Pipe	3" Pipe
Flanged ANSI 250 lb.	10 ½"	12 ½"
Flanged ANSI 300 lb.	10 ½"	12 ½"
Flanged ANSI 600 lb.	11 ¼"	13 ¼"

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