UTILITY SOLUTIONS GROUP

Model 046 Regulator

Installation and Maintenance Manual

Contents

Copyright

This document, in whole or in part, ("Document") includes confidential and proprietary information belonging to Utility Solutions Group and/or one of its subsidiaries or affiliates. Unauthorized use, reproduction, disclosure, distribution, or dissemination of this Document is strictly prohibited. No party may use, reproduce, disclose, distribute, or disseminate this Document for any purpose without express written authorization from Utility Solutions Group. Any use, reproduction, disclosure, distribution, or dissemination of this Document does not transfer title to, license, or grant any patent, copyright, trademark, or other intellectual property rights. This Document, and any copies or derivatives thereof, must be returned immediately on demand. This Document is subject to any applicable non-disclosure agreement(s). Information in this Document is subject to change without notice and does not represent a commitment on the part of Utility Solutions Group.

© 2025, Utility Solutions Group All Rights Reserved.

1050 Dearborn Dr.
Suite 200
Columbus, OH 43085
www.my-usg.com

Introduction

Simple design, rugged construction, and top performance make these regulators a dependable, economical answer for the wide variety of pounds-to-pounds applications. They are also available with an internal relief valve (IRV) and with a stem seal and control line tap for use as the upstream regulator in a monitor set.

The 046 Regulators typically are used for farm taps, field regulator applications, propane tanks, and high pressure industrial air or gas uses.

Maximum Inlet Pressure - 046 and 046-M

Orifice	Springs		
	Yellow	Aluminum, White, Dark Green, Tan	Grey
⅛"	500 psi	1,000 psi	1,000 psi
5⁄16"	500 psi	1,000 psi	1,000 psi
¼"	500 psi	500 psi	500 psi
5⁄16"	300 psi	400 psi	400 psi
⅜"	300 psi	500 psi	400 psi
½"	100 psi	100 psi	100 psi

Inlet Pressures ..... to 1000 psi
Outlet Pressures ..... 3 to 200 psi
Pipe Sizes ..... ¾", 1", and 1 ¼"

Maximum Inlet Pressure - 046-2 and 046-2M

Orifice	Springs	
	Yellow	Aluminum, White, Dark Green, Tan
⅛"	500 psi	925 psi
5⁄16"	500 psi	925 psi
¼"	500 psi	500 psi
5⁄16"	300 psi	400 psi
⅜"	300 psi	500 psi
½"	100 psi	100 psi

Inlet Pressures ..... to 925 psi
Outlet Pressures ..... 3 to 125 psi
Pipe Sizes ..... ¾", 1", and 1 ¼"

Maximum Inlet Pressure - By Valve Material

Valve Material	Max Inlet Pressure	Max Diff. Pressure
Poly-U Tan (90 Duro)	1,000 psig	800 psi
Buna-N (80 Duro)	500 psig	400 psi
Viton (70 Duro)	300 psig	250 psi

Installation and Start-up

1. Remove the shipping plugs from both the regulator inlet and outlet connections.
2. Make certain that the inside of the piping and the regulator inlet and outlet connections are clean. Connections must be free of dirt, pipe dope, and other debris.
3. Use pipe joint material only on the male threads of the pipe being connected to the regulator. Do not use pipe joint material on the female threads of the regulator.
4. Install the regulator in the piping. Make certain that the gas flow through the regulator is in the direction as indicated by the arrow on the regulator body.

The regulator may be installed in any position: right side up, upside down, vertical piping, diagonal piping, etc. If required, the diaphragm case can be rotated 360° in any number of increments. To rotate the diaphragm case assembly to another position in relation to the body, loosen coupling nut (**33**). Ensure it is retightened to 35 to 50 ft-lbs to hold the diaphragm case assembly in the new position and reseal.

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

CAUTION

Turn gas on 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. REFER TO RM-1328 FOR MORE DETAILED START-UP PROCEDURES.

5. Turn gas on very slowly.
6. Make certain that all connections are tight. Ensure proper seal and verify there aren't any leaks by using a soap and water solution, or other utility-approved method.

Model	Body Material	Diaphragm Case Material	Internal Relief Valve	Maximum Inlet Pressure	Outlet Pressure Range
046	Ductile Iron	Aluminum	No	See Tables Above	3 to 200 psi
046-2			Yes		3 to 125 psi
046-M[1]			No		3 to 200 psi
046-2M[1]*			Yes		3 to 125 psi

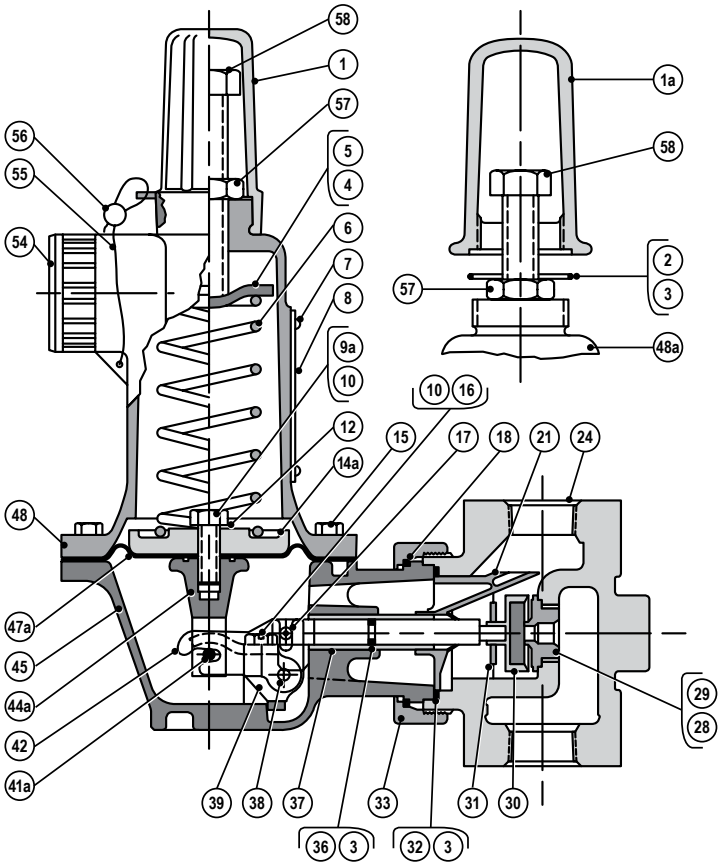
[1] Regulator requires a control line.

[2] Maximum inlet pressure is limited by orifice, spring ranges, and valve material (see capacity tables on page 3).

*046-2M is limited to 925 psig maximum inlet pressure.

NOTE: For specific maximum allowable inlet pressures, see tables on pages 1-2 and capacity tables on page 3.

Model 046 Section View



7. Adjust set-point (outlet pressure) by turning adjustment screw (**58**). Turn clockwise to increase and counter-clockwise to decrease. After making the necessary adjustments, tighten nut (**57**). Do not adjust when regulator is closed (no flow). Only adjust when gas is flowing through regulator (approximately 250 SCFH).

Except for lock-up (regulator closed), the outlet pressure during normal operation must not go higher than the maximum limit of the spring range. Whenever it goes higher, the spring could be overstressed. Also, higher pressure springs could compress solid, which can keep the regulator from closing.

Whenever the set-point is within the upper third of the spring range, set-point adjustment should be made at low flow (approximately 250 SCFH). If set-point adjustment must be made when flow is greater, use the next higher range spring.

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.

8. The vent assembly (**54**) 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-ventilated area must be vented to the outside. Simply run vent piping from the regulator vent connection to a nonhazardous location on the outside away from ANY potential sources of ignition. The vent piping must be a minimum ¼" NPT connection size or larger and piped to a safe area. The vent discharge must be protected against the potentials outlined in instructions 4, 8, 9, and 10.

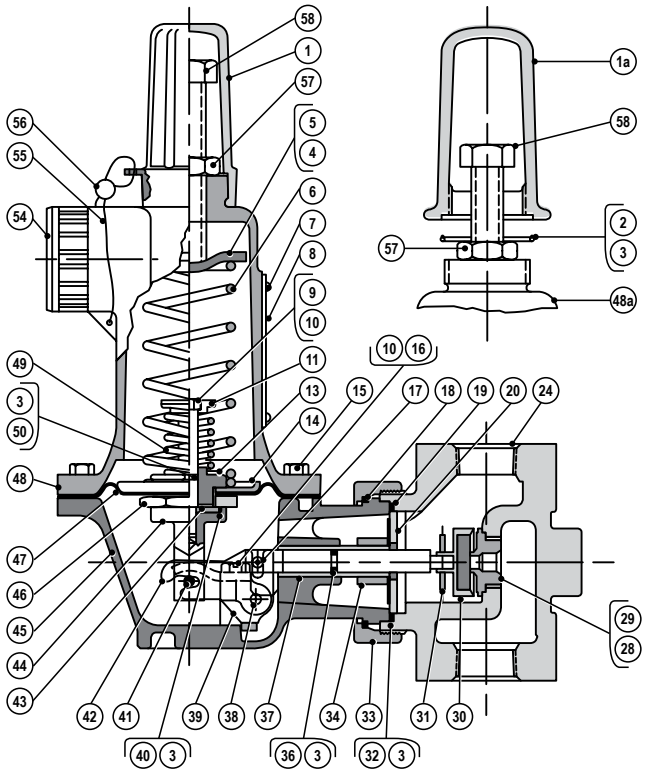
The outlet of the vent piping must allow for the free and unobstructed passage of air and gas and must be protected against the potentials listed in instructions 4, 8, 9, and 10.

9. For outdoor installations, it is recommended that the regulator be installed so that the regulator vent faces down to avoid the potential for water or other foreign matter entering the regulator and interfering with the proper operation of the regulator.
10. For application on combustible gas with a specific gravity greater than 1.0 (such as propane), it is recommended that the gas be vented outdoors where the gas will not collect in low areas and away from all open flames, arcing devices, etc.

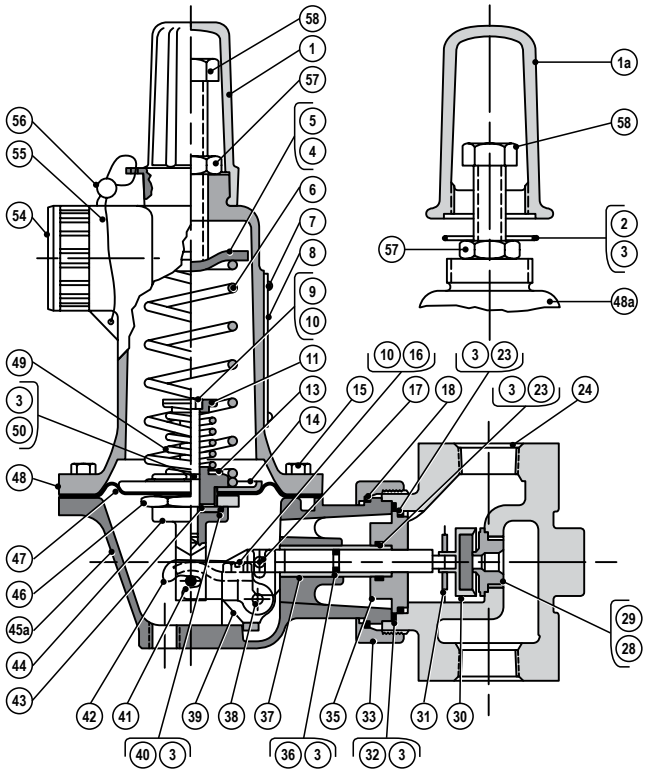
CAUTION

Regulators are pressure control devices with numerous moving parts subject to wear that is independent of particular operating conditions. To ensure 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.

Model 046-2 Section View



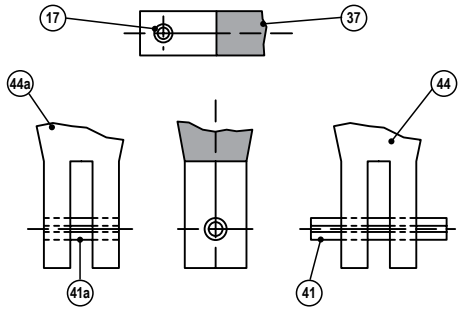
Model 046-2M Section View



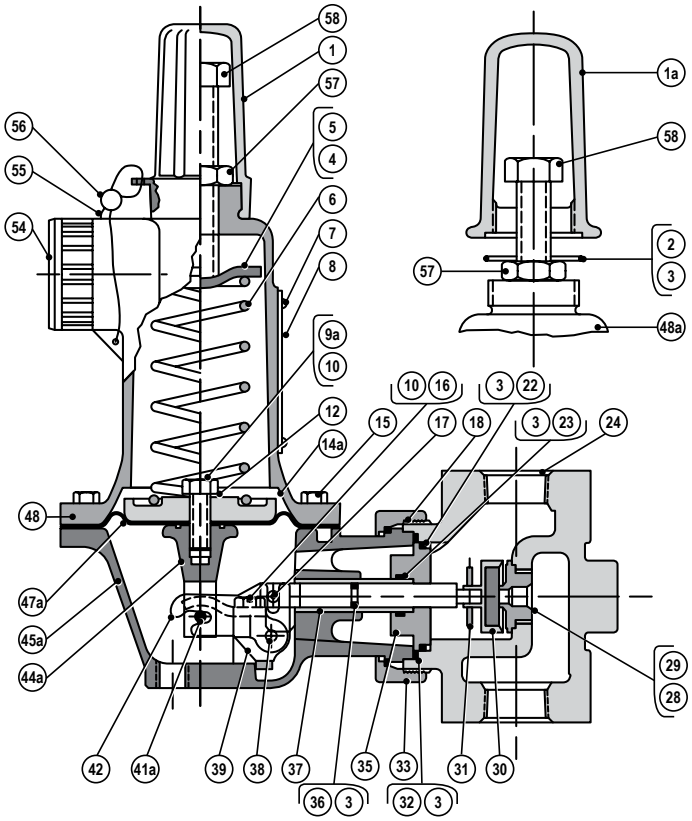
Model 046 Regulator Service

(Reference diagrams above and on page 6.)

1. Make sure the regulator is entirely depressurized before disassembling.
2. In general, it is not necessary to disconnect the body (**24**) or (**24A**) from the piping. Leave in place in the line when servicing the regulator.
3. Carefully note the location and position of each part during disassembly to make certain reassembly is correct. Replace all worn, damaged, or otherwise unsatisfactory parts.
4. To service the valve or orifice, first loosen coupling nut (**33**) and separate the diaphragm case assembly from the body. Remove and inspect the body to lower case seal (**32**). Replace if damaged. To remove the valve assembly (**30**), first remove hairpin (**31**). Orifice (**29**) unscrews from body using 1" hex socket wrench "thin wall" type. Use a moderate amount of pipe dope on the sealing surface (male threads) when replacing the orifice.
5. During reassembly, make sure tetraseal (**32**) is correctly positioned. Tighten coupling nut (**33**) to the torque range of 35 to 50 ft-lbs.
6. To change spring (**6**), remove cover cap (**1**) or (**1a**), and turn adjusting screw (**58**) counter-clockwise to remove spring load. Remove screws (**15**) or (**15a**), remove upper diaphragm case (**48**), (**48a**), or (**48b**) and spring ferrule (**5**). Make sure the new spring is correctly nested on diaphragm pan (**14**) or (**14a**) and install spring ferrule (**5**). Also, make sure diaphragm (**47**) or (**47a**) is not pinched.
7. To replace the diaphragm, follow step 6 during disassembly and reassembly. Remove screw (**9a**) to disassemble the diaphragm assembly and remove diaphragm (**47**) or (**47a**). On regulators with internal relief valves (all -2 models), remove IRV bolt (**9**) and IRV spring (**49**) slowly, as force is required to keep the spring from expanding rapidly. Remove clamping nut (**46**) and replace diaphragm (**47**). Assemble diaphragm (**47**) in reverse order. Inspect IRV O-rings (**50**) and (**40**) and replace if necessary. Align roll pin (**41**) parallel and square to the diaphragm centerline. Make sure roll pin (**41**) or (**41a**) is correctly positioned as shown below. On reassembly, tighten screws (**15**) or (**15a**) evenly to a torque of 125 in.-lbs. The screws must be tight enough to prevent leakage, but not so tight as to crush or damage the diaphragm. The diaphragm coupling roll pin (**41**) or (**41a**) must be assembled parallel and square to the diaphragm centerline to prevent binding of coupling (**44**) or (**44a**) and lever (**42**). Also, diaphragm (**47**) or (**47a**) must not be twisted or pinched.
8. Upon completing servicing, make sure the regulator is free of leaks.



Model 046-M Section View



Model 046 Parts List

The following are the parts for Model 046 regulators. Those parts generally required in maintenance and servicing are in bold type.

Illustration Number	Description	Part Number
1	Plastic Cap Cover	046-000-005-00
2	**Tetraseal, Buna-N Tetraseal, O-ring, Viton**	**950805 950806**
3	O-ring Lube	1191074
4	Aero-Lubriplate	1191073
5	Spring Ferrule	141-62-009-00
6	Spring	See chart
7	#0 × ½" Drive Screw	914760
8	Nameplate Nameplate (Taipei City)	046-00-086-00 046-00-086-01
9	**IRV Guide Bolt**	**046-00-153-00**
9a	**5/16"-18 × 8" Hex Head Screw**	**910029**
10	Loctite 242	906114
11	**Spring Holder**	**046-00-009-00**
12	**Stat-O-Seal (High Temp Only)**	**904983**
13	**Guide Bushing**	**046-00-074-00**

Illustration Number	Description	Part Number
14	**Diaphragm Pan (IRV)**	**046-00-022-01**
14a	**Diaphragm Pan**	**046-00-022-00**
15	**5/16"-18 × ¾" Hex Head Cap Screw**	**951136**
15a	**¼"-20 × 5/8" Hex Head Cap Screw**	**907558**
16	**¼"-20 x ¾" Hex Head Screw (self-tapping)**	**903164**
16a	**#10-24 × ½" Bind Head Machine Screw**	**903314**
17	**Spirol Pin 5/32" × 5/16" lg.**	**950381**
18	**Retaining Ring**	**141-62-130-00**
19	**Stabilizer Disc**	**141-62-035-00**
20	**Stabilizer**	**141-62-034-00**
21	**Boost Tube**	**141-62-045-00**
22	**O-ring, Buna-N O-ring, Viton**	**934010 902987**
23	**O-ring, Buna-N O-ring, Viton**	**908771 950746**

Model 046 Parts List

(Continued)

The following are the parts for Model 046 regulators. Those parts generally required in maintenance and servicing are in bold type.

Illustration Number	Description	Part Number
24	Body, ¾" Conn. Body, 1" Conn. Body, 1 ¼" Conn.	046-00-001-06 046-00-001-04 046-00-001-05
25	**Elbow ⅜" × ¼" NPT**	**903989**
26	**Conn. ⅜" Tube × ¼" NPT**	**903973**
27	**Tube ⅜" O.D. × 0.035 Wall**	**51125**
28	Loctite 222 Mild	905115
29	**⅛" Stainless Steel Valve Orifice** **3⁄16" Stainless Steel Valve Orifice** **¼" Stainless Steel Valve Orifice** **5⁄16" Stainless Steel Valve Orifice** **⅜" Stainless Steel Valve Orifice** **½" Stainless Steel Valve Orifice** **⅛" Brass Valve Orifice** **3⁄16" Brass Valve Orifice** **¼" Brass Valve Orifice** **5⁄16" Brass Valve Orifice** **⅜" Brass Valve Orifice** **½" Brass Valve Orifice**	**046-00-023-02** **046-00-023-03** **046-00-023-04** **046-00-023-05** **046-00-023-06** **046-00-023-07** **046-00-023-22** **046-00-023-23** **046-00-023-24** **046-00-023-25** **046-00-023-26** **046-00-023-27**
30	**Valve Assembly, Buna-N** **Valve Assembly, Poly-U Tan** **Valve Assembly, Viton**	**141-62-511-03** **141-62-511-01** **141-62-511-04**
31	**Hair Pin Cotter**	
32	**Tetraseal, Buna-N Tetraseal, O-ring, Viton**	**902497** **907718**
33	**Coupling Nut**	**43-62-102-00**
34	**Stabilizer Hub**	**141-62-036-00**
35	**Monitor Throat Block**	**046-00-038-00**
36	**O-ring, Buna-N** **O-ring, Viton**	**934005** **904839**
37	**Valve Stem, Brass Valve Stem, Stainless Steel (s.s.)**	**046-00-016-00** **046-00-016-01**
38	**Fulcrum Dowel Pin 3⁄16" × ¾" (Stainless Steel)**	**950728**
38a	**Fulcrum Pin**	**141-62-033-00**
39	**Pivot Bracket**	**046-00-029-00**
40	**O-ring, Buna-N**	**904824**

Illustration Number	Description	Part Number
41	**Roll Pin, 3⁄16" × 1 ¼" lg.**	**901695**
41a	**Roll Pin, 3⁄16" × ⅝" lg.**	**901697**
42	**Lever**	**046-00-030-00**
43	**IRV Coupling Disc**	**046-00-154-00**
44	**Diaphragm Coupling (IRV)**	**046-00-028-01**
44a	**Diaphragm Coupling**	**046-00-028-00**
45	Lower Case (Stainless Steel Bushing Assembly) Lower Case (Brass Bushing Assembly)	046-00-602-09 046-00-602-08
45a	Monitor Lower Case (Stainless Steel Bushing Assembly) Monitor Lower Case (Bushing Assembly)	046-00-602-11 046-00-602-10
46	**Clamping Nut**	**046-00-155-00**
47	**IRV Diaphragm, Buna-N**	**046-00-150-01**
47a	**Diaphragm, Buna-N Diaphragm, Viton**	**046-00-150-00** **046-00-150-02**
48	Upper Case Cover (Aluminum)	046-00-003-03
48a	Upper Case Cover (Aluminum With Threads)	046-00-003-04
48b	Upper Case Cover (Cast Iron With Threads)	046-00-003-01
49	**Spring Dark Blue (IRV)**	**080-02-021-01**
50	**O-ring, Buna-N**	**934003**
54	**Vent Assembly 1" NPT**	**046-00-527-00**
54a	**Vent Cap Assembly**	**137-02-505-03**
55	Seal Wire 12"	001-63-057-50
56	Seal	001-60-157-00
57	9⁄16"-12 UNC Hex Steel Jam Nut	921006
58	9⁄16"-12 UNC × 3" Hex head Stainless Cap screw	950655
Not Shown	Customer Badge	141-62-086-04

NOTE: For discontinued models, please contact the manufacturer directly to obtain replacement parts.

Over-Pressurization Protection

Protection must be provided for the downstream piping system and the regulator's low-pressure chambers to guard against the potential overpressurization due to a regulator malfunction or a failure of the regulator to lock up. The allowable overpressurization is the lowest of the maximum pressures permitted by federal and state codes, Utility Solutions Group document USG-IG-038, or other applicable standards. The method of providing overpressure protection could be a relief valve, a monitor regulator, a shutoff device, or any similar device.

Internal Relief Valve (IRV Capacity)

Internal Relief Valves, like all relief valves, must be carefully checked for adequate capacity. IRVs only have full-capacity relief capability when the inlet pressure to the regulator is low enough and the regulator orifice is small enough. If either one, or both, are too large, the IRV will not be capable of full-capacity relief and will not be able to prevent the outlet pressure from exceeding the maximum allowable limit.

Full open IRV capacity can be calculated from the formula:

$Q = \frac{K P_0}{2}$ for 0.6 specific gravity gas, where

K = 600 (the IRV constant) and

P_0 = absolute outlet pressure (psia).

Field regulators with internal relief valves can be obtained by specifying Models 046-2 or 046-2M. Model 046-2M is a limited-capacity IRV unit due to flow through the control line.

Spring Ranges

Spring Color	Outlet Pressure Range	Part Number
Yellow	3 to 10 psi	04600-21-00
Aluminum	8 to 20 psi	04600-021-01
White	15 to 52 psi	04600-021-02
Dark Green	10 to 95 psi	04600-021-05
Tan	50 to 125 psi	04600-021-03
Gray (046-2 only)	100 to 200 psi	04600-021-04

Full Open Capacity

Use the following formulas for calculating the full open capacity of 046 regulators. Do not use full open capacity when sizing one of these regulators for an application. Instead, use the capacity tables:

$Q = K\sqrt{P_0 (P_1 - P_0)}$ ..... (for P_1/P_0 less than 1.894)

$Q = \frac{K P_1}{2}$ ..... (for P_1/P_0 less than 1.894)

Q = Full open capacity in SCFH of 0.6 specific gravity natural gas.

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

P_1 = absolute inlet pressure (psia).

P_0 = absolute outlet pressure (psia).

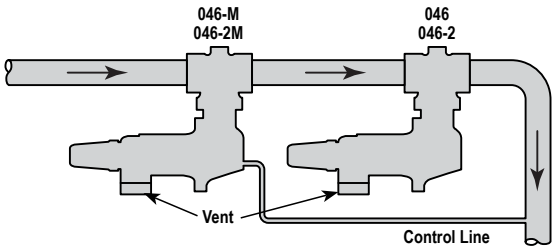
	Orifice Size					
Decimal	.12"	.18"	.25"	.31"	.37"	.50"
Fraction	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"
K	33	74	132	206	292	520

NOTE: When sizing relief valves for use with 046 regulators, use full open capacity as calculated with the above formulas. Do not use values from the capacity tables.

Monitoring

The 046 regulator makes an excellent monitor, which is a standby regulator installed in a series that assumes control if a failure in the operating regulator permits the outlet pressure to exceed the set-point. It can be in either the upstream or the downstream position.

When an 046 is used to monitor a regulator with an identical inner valve (another 046), the total maximum capacity through both regulators can be figured at 70% of the capacity of one of them alone. This applies with the monitor located either up or downstream.



Maximum Emergency Pressure

Maximum Inlet Pressure

The maximum pressure the inlet of the regulator may be subjected to, under abnormal conditions, without causing damage to the regulator is:

046, 046-2, 046-M, 046-2M ..... + 100 psi

Maximum Outlet Pressure

The maximum outlet pressure the diaphragm can be subjected to, without causing internal damage is:

For set-points of 3 to 200 psi ..... + 100 psi

The maximum outlet pressure the diaphragm can be subjected to, without leakage or rupture is:

046, 046-2, 046-M, 046-2M ..... 400 psi

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

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.

Other Gases

Model 046 Regulators are mainly designed for service in natural gas applications. However, these regulators will perform equally well when regulating the pressure of nitrogen, dry CO_2, air, as well as other industrial gases.

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:

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

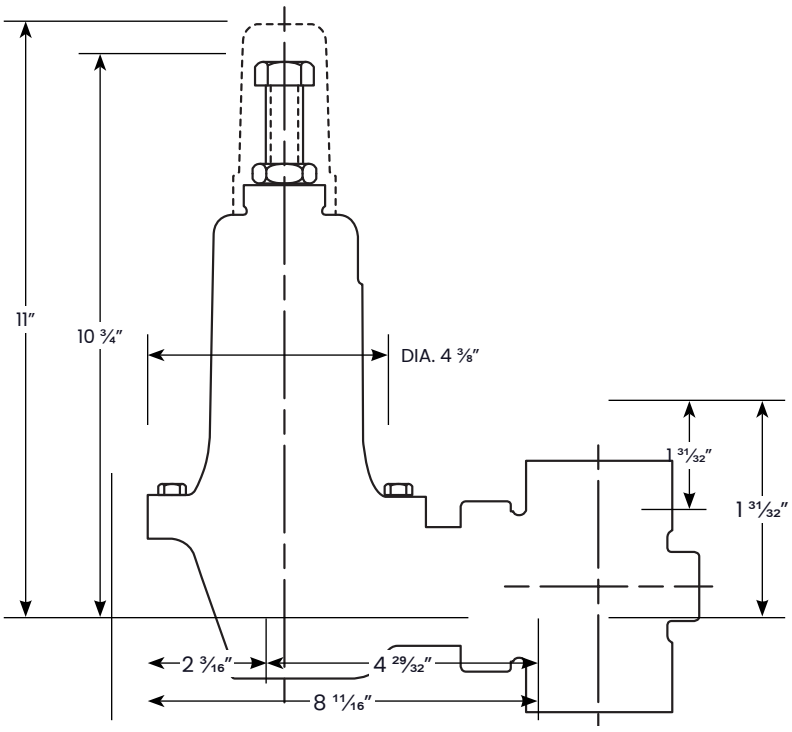
When used with gases not listed above, please contact your Utility Solutions Group representative or Industrial Distributor for recommendations.

NOTE: Model 046 Field Regulators are not suitable for use with sour gases, high purity gases or liquid, service.

Buried Service

Model 046 Field Regulators are not suitable for buried (underground) service.

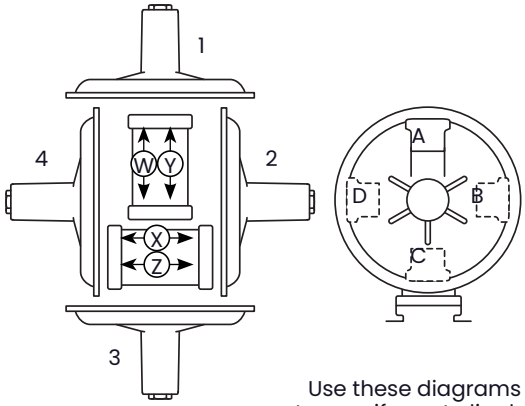
Dimensions

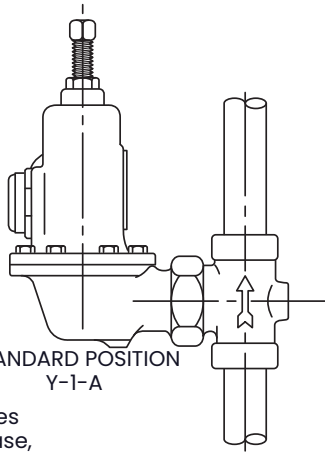


How to Order

When ordering, please specify the following:

1. Model Number
2. Pipe Size
3. Orifice Size
4. Inlet Pressure (max. and min., if available)
5. Outlet Pressure Setting
6. Spring Part Number
7. Capacity Required (SCFH)
8. Type or Specific Gravity of Gas
9. Mounting Position





STANDARD POSITION
Y-1-A

Use these diagrams as guides to specify vent, diaphragm case, and body arrangement. When mounting position is not specified, position Y-1-A will be supplied.

UTILITY SOLUTIONS GROUP

https://my-usg.com/

USG Headquarters
1050 Dearborn Dr.
Suite 200
Columbus, OH 43085

support@my-usg.com
614-704-5650
888-456-6060 (International)