

Model 046 Field Regulators

Construction and Design Features

Model 046 Family of Field Regulators

Based on years of operating experience, the Model 046 family of field regulators combines simplicity of design, rugged construction, exceptional performance and operational safety to provide a dependable, flexible and economical answer to pounds-to-pounds pressure regulation applications. Model 046 regulators are available with standard construction, an internal relief valve (IRV), blocked throat and control line tap for remote or monitor applications. Model 046 regulators are available with aluminum or cast iron diaphragm cases.

Typical applications for the Model 046 Field Regulators are:

- Farm taps
- Field Regulator Applications
- High Pressure Industrial Air or Gases
- Gas Blanketing Systems

Basic Models

Standard Regulator 046 and 046C

This is a non relief type regulator which requires separate over-pressure protection to safeguard the downstream system. Standard regulators are available in the configurations and trims found below. The regulator body is configured to provide increased capacity by means of an integral boost tube.

Body	Ductile Iron
Valve trim	Poly-U Tan (standard), Buna-N or Vitron
Internal trim	Standard (brass) or stainless steel
External trim	Carbon Steel or stainless steel
Diaphragm case ...	Aluminum or cast iron
Cover cap	Plastic snap-on or cast iron with tetraseal (with or without seal wire and seal) provides sealed chamber for inside service.
Valve Material:	Poly-U Tan (90 duro), Buna-N (80 duro), Vitron (70 duro)

Spring Color	Outlet Pressure Range	Part Number
Yellow	3-10 psig	04600-21-00
Aluminum	8-20 psig	04600-021-01
White	15-52 psig	04600-021-02
Green	10-95 psig	04600-021-05
Tan	50-125 psig	04600-021-03
Gray	100-200 psig	04600-021-04

Monitor Regulator 046-M and 046-CM

These regulators are identical to the 046C regulators respectively, except for the fact that they have no integral boost tube and have remote pressure sensing, requiring separate over-pressure protection to prevent damage to the downstream system.

Internal Relief Valve Regulator 046-2

This regulator has relief protection to prevent damage to internal parts and the downstream system. The relief valve is activated by internal over-pressurization of the outlet chamber above the set outlet pressure of the regulator. Integral IRV stops reduce relief pressure build-up for added safety. No integral boost tube.

Body	Ductile Iron
Valve trim	Poly-U Tan (standard), Buna-N or Vitron
Internal trim	Standard (brass) or stainless steel
External trim	Carbon Steel or stainless steel
Diaphragm case ...	Aluminum only
Vent	1" NPT for piping remote
Cover cap:	Plastic snap-on or cast iron with tetraseal (with or without seal wire and seal) provides sealed chamber for inside service.
Valve Material:	Poly-U Tan (90 duro), Buna-N (80 duro), Vitron (70 duro)

Spring Color	Outlet Pressure Range	Part Number
Yellow	3-10 psig	04600-21-00
Aluminum	8-20 psig	04600-021-01
White	15-52 psig	04600-021-02
Green	10-95 psig	04600-021-05
Tan	50-125 psig	04600-021-03

Internal Relief Valve Monitor Regulator 046-2M

This regulator is identical to the 046-2 except it has remote pressure sensing and relief protection through the remote control line to prevent damage to internal regulator parts. For full open capacity relief, separate over-pressure protection is required to prevent damage to the downstream system.

Environmental Conditions

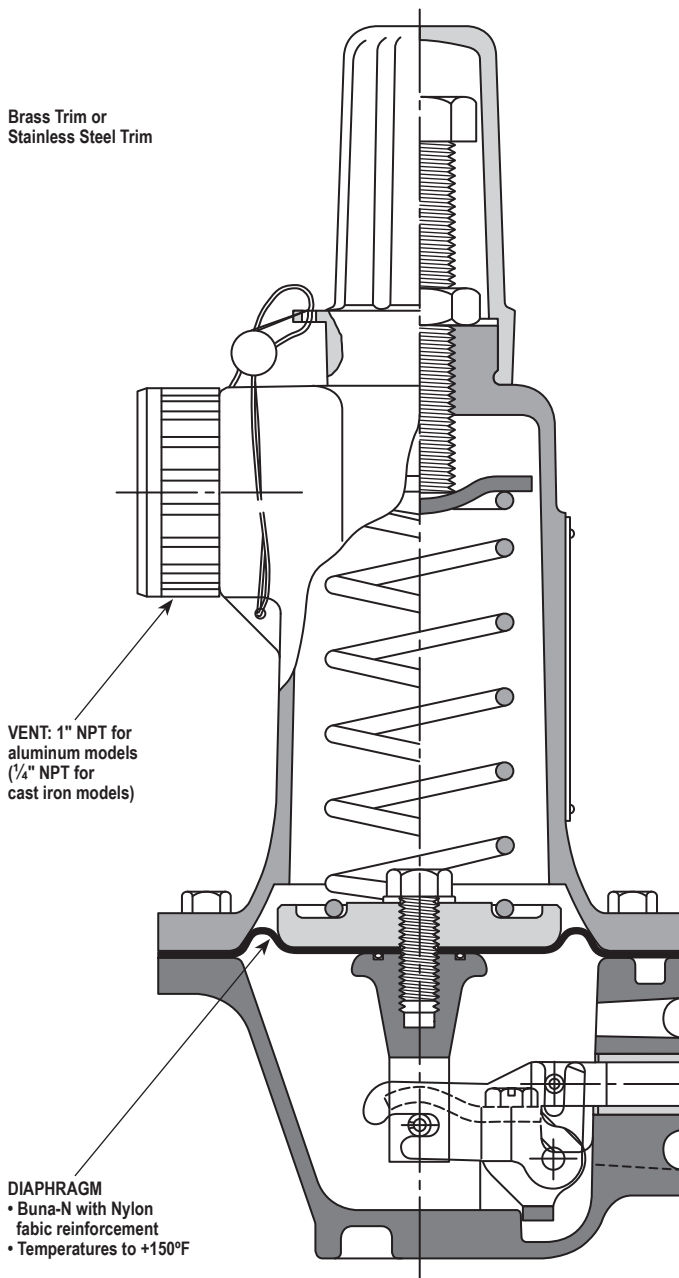
046 Regulators are designed for outdoor and indoor installation.

Operating temperature range, all materials: -20°F to +150°F

Higher temperature materials available. Contact your sales representative for application.

Minimum Melting Temperature:	Casing: +700°F Ductile Iron Body: +1000°F
Inlet Pressure Range:	5 to 1000 psig
Outlet Pressure Range:	3 to 200 psig

Pipe Sizes 3/4", 1" and 1 1/4" NPT



Valve Assembly Maximum Pressures -Non IRV Units

Material	Differential	Inlet*
Poly-U-Tan	800 psig	1000 psig
Buna-N	400 psig	600 psig
Viton	250 psig	300 psig

Valve Assembly Maximum Pressures-IRV Units

Material	Differential	Inlet*
Poly-U-Tan	800 psig	1000 psig
Buna-N	400 psig	525 psig
Viton	250 psig	300 psig

The maximum inlet pressure and valve material are determined by a review of pressure limitations on the spring, orifice, differential pressure (maximum inlet minus minimum outlet pressure), and the required inlet pressure.

*For best performance the differential should be limited to 800 psid; however, the regulator has handled higher differential pressures.

Maximum Inlet Pressure-Model 046 Regulator

Orifice	Springs		
	Yellow	Aluminum, White, Green, Tan	Grey
1/8"	500 psig	1000 psig	1000 psig
3/16"	500 psig	1000 psig	1000 psig
1/4"	500 psig	500 psig	500 psig
5/16"	300 psig	400 psig	400 psig
3/8"	300 psig	300 psig	400 psig
1/2"	100 psig	100 psig	100 psig

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size	
			Orifice	Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4
Outlet Pressure 3 to 10 psi Yellow Spring 04600-021-00	5	10	325	700	1050	700	1050
		15	450	920	1450	920	1450
		20	540	1100	1650	1100	1800
		30	690	1450	2200	1450	2300
		40	840	1800	2950	1800	3000
		50	1000	2100	3100	2100	3800
		75	1400	2950	3700	2950	5300
		100	1800	3800	4350	3800	6900
		125	2150	4500	4850	4600	7800
Outlet Pressure 10 to 95 psi Dark Green Spring 04600-021-05	10	15	177	265	355	265	355
		20	232	347	464	347	464
		25	276	413	553	413	553
		50	456	682	912	682	912
		75	633	947	1266	947	1266
		100	810	1211	1620	1211	1620
		150	1164	1741	2329	1741	2329
		200	1518	2270	3037	2270	3037
		300	2227	3329	4453	3329	4453
Outlet Pressure 8 to 20 psi Aluminum Spring 04600-021-01	15	20	450	950	1600	950	1600
		25	575	1200	2100	1200	2100
		50	1000	2100	3600	2100	3700
		75	1400	2950	4850	2950	5200
		100	1800	3800	6000	3800	6900
		150	2600	5400	8100	5400	9900
		200	3300	7100	9750	7100	12800
		300	4800	10400	12400	10400	18900
		400	6400	13700	12500	13700	24500
		500	8000	14500	15800	17000	30500
		750	11500	20000	--	25000	--
1000	15500	25000	--	34000	--		

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size	
			Orifice	Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4
Outlet Pressure 8 to 20 psi Aluminum Spring 04600-021-01	20	25	500	1050	1950	1050	1950
		30	640	1350	2400	1350	2400
		50	1000	2100	3800	2100	3800
		75	1400	2950	4950	2950	5300
		100	1800	3800	6700	3800	6900
		150	2600	5400	8500	5400	9900
		200	3300	7100	10000	7100	12800
		300	4800	10400	12450	10400	18900
		400	6400	13700	14200	13700	24500
		500	8000	17000	19400	17000	30500
		750	11500	20000	--	25000	--
1000	15500	25000	--	34000	--		
Outlet Pressure 10 to 95 psi Dark Green Spring 04600-021-05	25	30	575	982	1314	982	1314
		50	1000	1701	2275	1701	2275
		75	1400	2366	3166	2366	3166
		100	1000	3028	4051	3028	4051
		150	2600	4352	5822	4352	5822
		200	3300	5675	7592	5675	7592
		300	4800	8322	11133	8322	11133
		400	6400	10969	14675	10969	14675
		500	8000	13618	18216	13616	18216
		750	11500	20000	--	20233	--
		1000	15500	25000	--	26851	--
Outlet Pressure 15 to 52 psi White Spring 04600-021-02	30	35	640	1350	2300	1350	2300
		40	780	1650	2800	1650	2800
		50	980	2100	3500	2100	3500
		75	1400	2950	5000	2950	5000
		100	1800	3800	6400	3800	6400
		150	2600	5400	9200	5400	9200
		200	3300	7100	11600	7100	12000
		300	4800	10400	15200	10400	17500
		400	6400	13700	18850	13700	23000
		500	8000	17000	23000	17000	29000
		750	11500	20000	--	25000	--
		1000	15500	25000	--	34000	--

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size	
			Orifice	Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4
Outlet Pressure Range 15 to 52 psi White Spring 04600-021-02	40	45	760	1620	2900	1620	2900
		50	900	1950	3400	1950	3400
		75	1400	2950	5200	2950	5200
		100	1800	3800	6900	3800	6900
		150	2600	5400	9900	5400	9900
		200	3300	7100	12200	7100	12800
		300	4800	10400	16650	10400	18900
		400	6400	13700	19600	13700	24500
		500	8000	17000	22600	17000	30500
	750	11500	20000	-	25000	--	
	1000	15500	25000	-	34000	--	
	60	60	1020	2150	3950	2150	3950
		75	1350	2850	5250	2850	5250
		100	1760	3800	6900	3800	6900
		150	2600	5400	9900	5400	9900
		200	3300	7100	12800	7100	12800
		300	4800	10400	17500	10400	18900
		400	6400	13700	20000	13700	24500
		500	8000	17000	24500	17000	30500
750		11500	25000	--	25000	--	
1000	15500	29000	--	34000	--		
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	75	80	1190	2300	3450	2300	3450
		90	1450	2900	4250	2900	4250
		100	1680	3450	4900	3450	4900
		150	2500	5400	7300	5400	7300
		200	3300	7100	9700	7100	9700
		300	4800	10400	14200	10400	14200
		400	6400	13700	18700	13700	18700
		500	8000	17000	23000	17000	23000
		750	11500	25000	--	25000	--
1000	15500	29000	--	34000	--		

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size		3/4", 1" Pipe Size		1 1/4" Pipe Size	
			Orifice	Orifice		Orifice		Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4	5/16	3/8	5/16	3/8
Outlet Pressure Range 50 to 125 psi Tan Spring 04600-021-03	100	110	1640	3500	5900	3500	5900	6300	7900	6300	7900
		125	2000	4300	7300	4300	7300	8400	10400	8400	10400
		150	2500	5400	9100	5400	9100	11300	13700	11300	13700
		200	3300	7100	12000	7100	12000	16200	19300	16200	19300
		300	4800	10400	17600	10400	17600	23700	24750	23700	28400
		400	6400	13700	23000	13700	23000	29650	--	31200	--
		500	8000	17000	28800	17000	28800	--	--	--	--
		750	11500	25000	----	25000	--	--	--	--	--
	1000	15500	29000	----	34000	--	--	--	--	--	
	125	135	1960	4200	7600	4200	7600	9500	11400	9500	11400
		150	2340	5000	9100	5000	9100	12000	15000	12000	15000
		200	3300	7100	12800	7100	12800	19000	22650	19300	23600
		300	4800	10400	18900	10400	18900	22850	28550	28300	34700
		400	6400	13700	24500	13700	24500	28000	--	37300	--
500		8000	17000	29500	17000	30500	--	--	--	--	
750		11500	25000	--	25000	--	--	--	--	--	
1000		15500	29000	--	34000	--	--	--	--	--	
Outlet Pressure Range 100 to 200 psi Gray Spring 04600-021-04	100	125	1420	2300	3200	2300	3200	4400	5300	4400	5300
		150	1750	3000	4000	3000	4000	5500	6650	5500	6650
		200	2300	4100	5300	4100	5300	7300	8800	7300	8800
		300	4100	6300	7800	6300	7800	10700	12900	10700	12900
		400	5400	8300	10300	8300	10300	14100	17000	14100	17000
		500	6700	10300	12800	10300	12800	--	--	--	--
		750	10000	15300	--	15300	--	--	--	--	--
		1000	13100	20200	--	20200	--	--	--	--	--
	150	175	2400	4300	6900	4300	6900	8900	10000	8900	10000
		200	2900	5700	8300	5700	8300	10800	12000	10800	12000
		300	4400	9450	12600	9450	12600	16300	18200	16300	18200
		400	5800	12400	16600	12400	16600	21600	24000	21600	24000
		500	7200	15400	20600	15400	20600	--	--	--	--
		750	10700	23000	--	23000	--	--	--	--	--
		1000	14200	30500	--	30500	--	--	--	--	--
		200	225	3100	7000	10600	7000	10600	14600	17000	14600
	300		4600	10000	15600	10000	15600	21500	24700	21500	24700
	400		6200	13500	20600	13500	20600	28500	33000	28500	33000
	500		7700	16500	25800	16500	25800	--	--	--	--
	750		11400	24500	--	24500	--	--	--	--	--
	1000		15200	33000	--	33000	--	--	--	--	--

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾" Pipe Size			1" Pipe Size			1¼" Pipe Size		
			Orifice			Orifice			Orifice		
			5/16	3/8	1/2	5/16	3/8	1/2	5/16	3/8	1/2
Outlet Pressure Range 3 to 10 psi Yellow Spring 04600-021-00	5	10	1400	1550	1900	1550	2100	2600	1550	2100	2600
		15	1800	1950	2450	2150	2800	3500	2150	2800	3500
		20	2050	2400	2850	2550	3400	4850	2550	3400	5100
		30	2600	3050	3550	3500	4700	6450	3500	4900	7039
		40	3400	3550	4400	4900	5600	8800	4900	6000	8625
		50	3500	4000	4550	6200	6650	9950	6200	7645	10210
		75	4200	4500	5350	8500	8200	12950	8500	10612	14174
		100	5000	5350	6100	10600	10450	14500	10600	13580	18137
		125	5650	6050		13000	12200		13000	16547	
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	10	15	443	523	699	443	523	699	443	523	699
		20	580	685	915	580	685	915	580	685	915
		25	690	815	1089	690	815	1089	690	815	1089
		50	1139	1345	1797	1139	1345	1797	1139	1345	1797
		75	1581	1868	2494	1581	1868	2494	1581	1868	2494
		100	2023	2390	3192	2023	2390	3192	2023	2390	3192
		150	2907	3434		2907	3434		2907	3434	
		200	3792	4479		3797	4479		3797	4479	
		300	5560	6568		5560	6568		5560	6568	
Outlet Pressure Range 8 to 20 psi Aluminum Spring 04600-021-01	15	20	2100	2650	3450	2150	2900	4000	2150	2900	4000
		25	2750	3650	4450	2900	3700	5500	2900	3700	5500
		50	5200	5400	7500	6000	7600	11350	6000	7600	11400
		75	6550	6850	9900	8300	10500	16000	8300	10800	18000
		100	7850	8700	10950	10600	13800	18350	10600	15000	21800
		150	9750	10700		15000	17850		15000	21000	
		200	11300	12400		19500	21600		19500	27000	
		300	13350	15250		29000	28850		29000	40000	
	20	400	14050			34000			38000		
		25	2600	3450	4600	2600	3450	4900	2600	3450	4900
		30	3300	4200	5800	3400	4300	6600	3400	4300	6600
		50	5450	6850	8650	6200	7800	11700	6200	7800	11700
		75	6950	8200	10950	8500	10800	17050	8500	10800	18000
		100	8150	10350	12100	10600	15000	19900	10600	15000	23000
		150	10350	12900		15000	20450		15000	21000	
		200	12300	15100		19500	24850		19500	27000	
300	15700	18100		29000	32500		29000	40000			
400	17100			34000			38000				

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046, 046-C, 046M, 046-2M* and 046CM in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾" Pipe Size			1" Pipe Size			1¼" Pipe Size			
			Orifice			Orifice			Orifice			
			5/16	3/8	1/2	5/16	3/8	1/2	5/16	3/8	1/2	
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	25	30	1640	1937	2587	1640	1937	2587	1640	1937	2587	
		50	2841	3355	4481	2841	3355	4481	2841	3355	4481	
		75	3952	4669	6236	3952	4669	6236	3952	4669	6236	
		100	5058	5974	7979	5058	5974	7979	5058	5974	7979	
		150	7268	8586		7268	8586		7268	8586		
		200	9479	11197		9479	11197		9479	11197		
		300	13900	16419		13900	16419		13900	16419		
		400	18321			18321		18321				
Outlet Pressure Range 15 to 52 psi White Spring 04600-021-02	30	35	2650	3500	4400	2650	3500	4500	2650	3500	4500	
		40	3250	4400	5400	3250	4400	5700	3250	4400	5700	
		50	4250	5600	6900	4250	5600	7600	4250	5600	7600	
		75	6150	7900	8950	6300	8500	11500	6300	8500	11500	
		100	7900	9200	10950	8300	10800	16000	8300	10800	16000	
		150	11150	12800		12400	16500		12400	16500		
		200	13750	15500		16000	21500		16000	21500		
		300	18100	19500		23500	31500		23500	31500		
	400	21000			31000			31000				
	40	45	3300	4800	5900	3300	4800	6000	3300	4800	6000	
		50	4000	5800	7000	4000	5800	7200	4000	5800	7200	
		75	6400	8150	11600	6450	8600	12500	6450	8600	12600	
		100	8250	10500	14400	8600	12000	15600	8600	12000	17000	
		150	11700	14200		13000	18000		13000	18000		
		200	14850	17250		17500	22700		17500	23500		
		300	19500	21900		26000	29850		26000	34500		
		400	22450			34000			34000			
	50	80	4950	6300	8650	4950	6300	8900	4950	6300	8900	
		75	6700	8900	12400	6900	8900	13500	6900	8900	13500	
		100	9300	11100	15250	9700	12500	16750	9700	12500	18500	
		150	13300	15200		14500	19000		14500	19000		
		200	16550	18600		19000	23700		19000	25500		
		300	21900	23300		28000	30800		28000	37500		
		400	26000			34000			37000			
	Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	75	80	3800	5000	6250	3800	5000	6250	3800	5000	6950
			90	4700	6300	7100	4700	6300	7100	4700	6300	11800
			100	5400	7600	8050	5400	7600	8050	5400	7600	15500
			150	8150	12000		8150	12000		8150	12000	
200			11800	15700		11800	15700		11800	17000		
300			17150	20450		17150	20450		17300	25200		
400			21650			21650			22800			

Capacities are based on 20% droop.

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

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size	
			Orifice	Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4
Outlet Pressure 3 to 10 psi Yellow Spring 04600-021-00	5	10	325	700	893	700	893
		15	450	782	1233	782	1233
		20	540	935	1403	935	1530
		30	690	1233	1650	1233	1725
		40	714	1530	2213	1530	2250
		50	850	1785	2325	1785	2850
		75	1190	2213	2775	2213	3975
		100	1530	2850	3263	2850	5175
Outlet Pressure 10 to 95 psi Dark Green Spring 04600-021-05	10	15	177	265	355	265	355
		20	232	347	464	347	364
		25	276	413	553	413	553
		50	456	682	775	682	775
		75	633	805	1076	805	1076
		100	689	1030	1377	1030	1377
		150	990	1480	1747	1480	1747
		200	1291	1703	2278	1930	2278
		300	1670	2497	3340	2497	3340
		500	2732	4085	4736	4085	5465
Outlet Pressure 8 to 20 psi Aluminum Spring 04600-021-01	15	20	450	808	1360	808	1360
		25	575	1020	1785	1020	1785
		50	850	1785	2700	1785	2775
		75	1190	2213	3638	2213	3900
		100	1530	2850	4500	2850	5175
		150	1950	4050	5265	4050	6435
		200	2475	4615	6338	4615	6656
		300	3600	6448	6820	6448	6993
		400	4160	6850	7250	6850	8085
		500	5200	7250	8690	7140	10065
		750	5750	8000	-	8750	-
925	6200	8750	-	10200	-		

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	3/4", 1", 1 1/4" Pipe Size	3/4" Pipe Size		1", 1 1/4" Pipe Size	
			Orifice	Orifice		Orifice	
			1/8	3/16	1/4	3/16	1/4
Outlet Pressure 8 to 20 psi Aluminum Spring 04600-021-01	20	25	500	893	1658	893	1658
		30	640	1148	1800	1148	1800
		50	850	1785	2850	1785	2850
		75	1190	2213	3713	2213	3975
		100	1530	2850	4355	2850	5175
		150	1950	4050	5525	4050	6435
		200	2475	4615	6500	4615	6656
		300	3600	6448	6848	6448	6993
		400	4160	6850	7384	6850	8085
		500	5200	7140	7760	7140	10065
		750	5750	8500	-	8750	-
925	6200	8750	-	10200	-		
Outlet Pressure 10 to 95 psi Dark Green Spring 04600-021-05	25	30	575	835	1117	835	1117
		50	850	1446	1934	1446	1934
		75	1190	1775	2374	1775	2374
		100	1530	2271	3038	2271	3038
		150	1950	3264	4366	3264	4366
		200	2475	3689	4935	4256	4935
		300	3600	5160	6123	5409	6123
		400	4160	5484	6310	6252	6457
		500	5200	5719	6740	6536	6740
		750	5980	7082	-	7486	-
		925	6200	8592	-	8592	-
Outlet Pressure 15 to 52 psi White Spring 04600-021-02	30	35	640	1148	1725	1148	1725
		40	780	1403	2100	1403	2100
		50	833	1785	2625	1785	2625
		75	1190	2213	3750	2213	3750
		100	1530	2850	4800	2850	4800
		150	1950	4050	5520	4050	5520
		200	2475	4615	5800	4615	6000
		300	3600	5928	6080	6448	7000
		400	4800	6165	6975	6850	8050
		500	5200	6800	8050	7650	10150
		750	5750	8000	-	8750	-
925	6200	8750	-	10200	-		

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾", 1", 1¼" Pipe Size	¾" Pipe Size		1", 1¼" Pipe Size	
			Orifice	Orifice		Orifice	
			⅜	⅜	¼	⅜	¼
Outlet Pressure Range 15 to 52 psi White Spring 04600-021-02	40	45	760	1377	2175	1377	2175
		50	765	1658	2550	1658	2550
		75	1190	2213	3900	2213	3900
		100	1530	2850	4485	2850	4485
		150	1950	4050	5445	4050	6435
		200	2475	4615	5734	4615	6656
		300	3600	6448	6660	6448	6993
		400	4800	6850	7252	6850	8085
		500	5200	7140	7910	7140	10065
	750	5750	8000	-	8750	-	
	925	6200	8750	-	10200	-	
	50	60	867	1828	2963	1828	2963
		75	1148	2138	3938	2138	3938
		100	1496	2850	4485	2850	4485
		150	1950	4050	5940	4050	6435
		200	2475	4615	6016	4615	6656
		300	3600	6448	6650	6448	6993
		400	4160	6850	8000	6850	8085
		500	5200	7140	8575	7140	10065
750		5750	8750	-	8750	-	
925	6200	9280	-	10200	-		
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	75	80	1012	1955	2588	1955	2588
		90	1233	2175	3188	2175	3188
		100	1428	2588	3675	2588	3675
		150	1875	4050	5110	4050	5110
		200	2475	5325	6305	5325	6305
		300	3600	6760	7100	6760	7100
		400	4800	7535	7854	7124	7480
		500	5200	7990	8050	7650	7820
		750	6555	8750	-	8750	-
925	6975	10150	-	10880	-		

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾", 1", 1 ¼" Pipe Size	¾" Pipe Size		1", 1¼" Pipe Size		¾", 1" Pipe Size		1¼" Pipe Size	
			Orifice	Orifice		Orifice		Orifice		Orifice	
			⅛	⅜	¼	⅜	¼	⅝	⅜	⅝	⅜
Outlet Pressure Range 50 to 125 psi Tan Spring 04600-021-03	100	110	1394	2625	3835	2625	3835	4095	5135	4095	5135
		125	1700	3225	4745	3225	4745	5208	5720	5208	5720
		150	1875	4050	5642	4050	5642	6215	6439	6215	6439
		200	2475	4615	6000	4615	6000	6480	6755	6480	6755
		300	3600	6240	6512	6448	6512	8295	8663	8295	9940
		400	4800	7535	8050	6850	8050	10378	-	10920	-
		500	5200	8500	10080	7140	10080	-	-	-	-
		750	5750	8750	-	8750	-	-	-	-	-
	925	6200	10150	-	10200	-	-	-	-	-	
	125	135	1666	3150	4940	3150	4940	6175	6270	6175	6270
		150	1755	3750	5642	3750	5642	6600	6750	6600	6750
		200	2475	4615	6656	4615	6656	7600	7927	7720	8260
		300	3600	6448	6993	6448	6993	7997	9993	9056	11104
		400	4800	6850	8085	6850	8085	9800	-	11936	-
		500	5200	7140	9440	7140	10065	-	-	-	-
		750	5750	8750	-	8750	-	-	-	-	-
925		6200	9280	-	10200	-	-	-	-	-	

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾" Pipe Size			1" Pipe Size			1¼" Pipe Size		
			Orifice			Orifice			Orifice		
			5/16	3/8	1/2	5/16	3/8	1/2	5/16	3/8	1/2
Outlet Pressure Range 3 to 10 psi Yellow Spring 04600-021-00	5	10	1190	1318	1615	1318	1785	1950	1318	1785	1950
		15	1530	1658	1838	1828	2100	2625	1828	2100	2625
		20	1743	1800	2138	1913	2550	3638	1913	2550	3825
		30	1950	2288	2663	2625	3525	4193	2625	3675	4680
		40	2550	2663	3300	3675	4200	5720	3675	4500	6600
		50	2625	3000	3413	4650	4988	6468	4650	5850	6750
		75	3150	3375	4013	6150	6375	7123	6375	8100	7030
		100	3750	4013	4575	6793	6890	7250	7950	8550	8820
		125	4238	4538		7930	8450		8450	11700	
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	10	15	443	523	699	443	523	699	443	523	699
		20	580	685	778	580	685	778	580	685	778
		25	690	815	926	690	815	926	690	815	926
		50	968	1143	1527	968	1143	1527	968	1143	1527
		75	1344	1587	1871	1344	1587	1871	1344	1587	1871
		100	1720	1792	2394	1720	1792	2394	1720	1792	2394
		150	2180	2576		2180	2576		2180	2576	
		200	2844	3359		2844	3359		2844	3359	
		300	4170	4269		4170	4269		4170	4269	
Outlet Pressure Range 8 to 20 psi Aluminum Spring 04600-021-01	15	20	1575	1988	2588	1613	2175	3000	1613	2175	3000
		25	2063	2738	3338	2175	2775	4125	2175	2775	4125
		50	3900	4050	4875	4500	4940	5675	4500	4940	5700
		75	4258	4453	6435	5395	5775	5920	5395	5940	6660
		100	5103	5655	7118	6360	6486	6790	6360	6750	7630
		150	6338	6955		7500	8033		7500	8400	
		200	6780	7440		8190	8640		8190	9450	
		300	7343	8388		10150	10675		10150	12800	
			400	7728		11900		12160			
	20	25	1950	2588	3082	1950	2588	3185	1950	2588	3185
		30	2475	3150	3480	2550	3225	3630	2550	3225	3630
		50	4088	4453	5623	4650	5070	5850	4650	5070	5850
		75	4518	5330	6241	5525	6156	6309	5525	6480	6660
		100	5298	6210	6655	6360	6750	6965	6360	6750	8050
		150	6210	7095		6600	7567		6600	7770	
		200	6765	7550		6825	8698		6825	9450	
300		7065	8145		10150	11375		10150	14000		
		400	7695		11900		13300				

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Capacity Tables – Models 046-2 in SCFH of Natural Gas

(0.6 Specific Gravity – 14.65 psia – 60°F) (Continued)

Outlet Pressure and Spring	Outlet Pressure psi	Inlet Pressure psi	¾" Pipe Size			1" Pipe Size			1¼" Pipe Size			
			Orifice			Orifice			Orifice			
			5/16	3/8	1/2	5/16	3/8	1/2	5/16	3/8	1/2	
Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	25	30	1394	1647	1941	1394	1647	1941	1394	1647	1941	
		50	2130	2516	3361	2130	2516	3361	2130	2516	3361	
		75	2964	3502	4677	2964	3502	4677	2964	3502	4677	
		100	3793	4481	5187	3793	4481	5187	3793	4481	5187	
		150	4724	5581		4724	5366		4724	5581		
		200	6161	6382		5877	6158		5687	6158		
		300	6533	6896		6255	6568		6255	6568		
		400	6779			7328			7328			
Outlet Pressure Range 15 to 95 psi White Spring 04600-021-02	30	35	1988	2625	3300	1988	2625	3375	1988	2625	3375	
		40	2438	3300	4050	2438	3300	4275	2438	3300	4275	
		50	3188	4200	4485	3188	4200	4940	3188	4200	4940	
		75	4613	5135	5818	4725	5525	5750	4725	5525	5750	
		100	5056	5520	7118	5146	6156	6400	5146	6156	6400	
		150	5798	6016		6200	6930		6200	7425		
		200	6188	6510		6720	7525		6720	8600		
		300	6335	6825		8225	10080		8225	11025		
	400	7350			9920			10850				
	40	45	2475	3600	4425	2475	3600	4500	2475	3600	4500	
		50	3000	4350	4550	3000	4350	4680	3000	4350	4680	
		75	4800	5298	5800	4838	5590	5875	4838	5590	5922	
		100	5115	5985	6048	5160	6600	6864	5160	6600	7140	
		150	5850	6674		6500	8460		6500	8460		
		200	5940	6900		7350	9080		7350	9400		
		300	6825	7665		9100	10448		9100	12075		
		400	7857			11900			11900			
	50	80	3713	4095	4758	3713	4095	5340	3713	4095	5518	
		75	4355	5340	5580	4485	5785	5940	4485	5785	6075	
		100	5766	6105	6405	5820	6500	6700	5820	6500	6845	
		150	6251	6384		7250	7980		7250	7980		
		200	6455	6510		7980	8295		7980	8925		
		300	7665	8155		9800	10780		9800	12000		
		400	9100			11900			11840			
	Outlet Pressure Range 10 to 95 psi Dark Green Spring 04600-021-05	75	80	2850	3750	4063	2850	3750	4063	2850	3750	
			90	3525	4536	4615	3525	4725	4615	3525	4725	
			100	4050	4940	5233	4050	4940	5233	4050	4940	
			150	5298	6600		5298	6240		5298	6240	4518
200			6726	7065		6490	6751		6490	6800	6136	
300			7203	7567		7203	7567		6920	8064	6510	
400			8119			7577			7980			

Capacities are based on 20% droop.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Full Open Capacity

Use the following formulae 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:

- $Q = K\sqrt{P_o(P_i - P_o)}$ (for $\frac{P_i}{P_o}$ less than 1.894)
- $Q = \frac{KP_i}{2}$ (for $\frac{P_i}{P_o}$ greater than 1.894)

Q = maximum capacity of the 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 (psia)
 P_o = **absolute** outlet pressure (psia)

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

Overpressurization Protection

The downstream piping system and the low pressure chambers of the regulator need to be protected against overpressurization caused by 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, Sensus Bulletin RDS-1498 or other applicable standards.

The method of overpressurization protection can be a relief valve, monitor regulator, automatic shutoff device, or other mechanism with similar function.

Periodic Inspection

Regulators are pressure control devices with numerous moving parts which are subject to wear that is dependent on particular operating conditions. To ensure continuous satisfactory operation, a periodic inspection schedule must be followed, with the frequency of inspection determined by the severity of service and applicable laws and regulations. See bulletin IN-G-REG-1312 for field service instructions.

Maximum Emergency Pressure

Maximum Inlet Pressure

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

The Maximum Allowable Inlet Pressure + 100 psig.

Maximum Outlet Pressure

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

Outlet Pressure Set Point + 100 psig.

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

Maximum Total Outlet Pressure is 400 psig.

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 or suspected 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 CO₂ air and 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

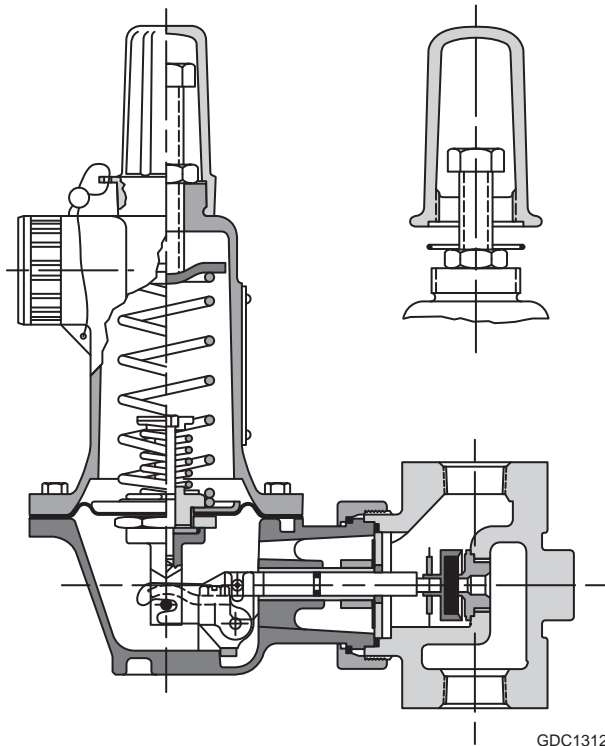
For other non-corrosive gases use the following formula:

$$\text{CORRECTION FACTOR} = \sqrt{\frac{0.60}{\text{Specific gravity of the gas}}}$$

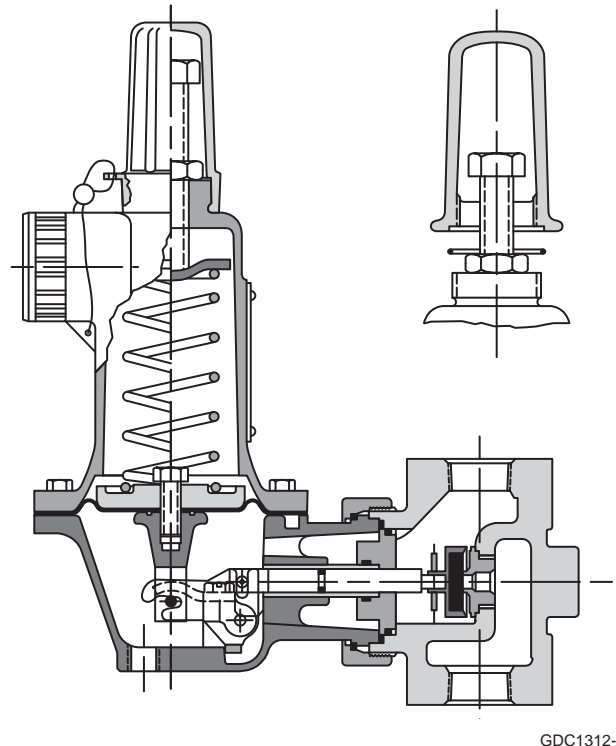
For use with gases not listed above, please contact your Sensus representative or Industrial Distributor for recommendations.

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

046-2 Regulator with Internal Relief Valve



046-M Monitor Regulator



046-2 and 046-2M field regulators have internal relief protection (IRV) to prevent damage to internal parts and the downstream system caused by regulator malfunction or failure to achieve complete lockup. The relief valve is activated by internal overpressurization of the outlet chamber above the set outlet pressure of the regulator. For added safety, integral IRV stops reduce relief pressure build-up. The 046-2M can be utilized as a monitor regulator. It has remote pressure sensing and relief protection through the control line.

Internal Relief Valves, like all relief valves, must be carefully checked for adequate capacity. IRV's 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:

$$Q = \frac{KP_o}{2} \text{ for 0.6 specific gravity gas, where}$$

K = 600 (the IRV constant) and

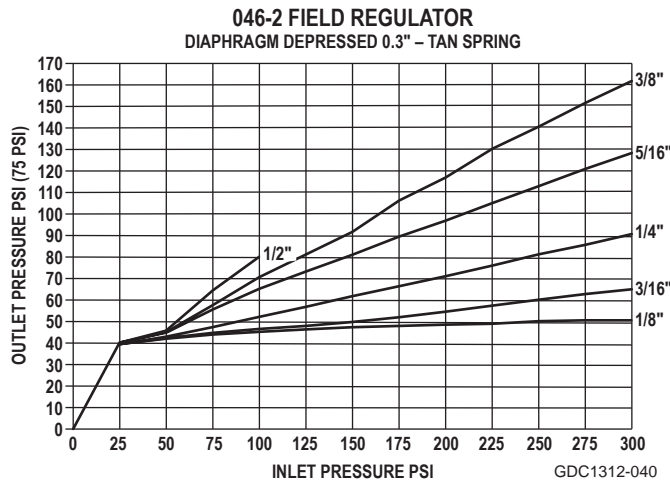
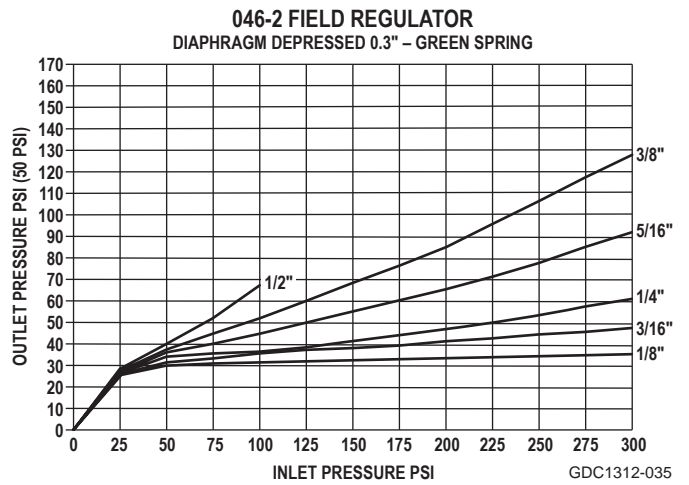
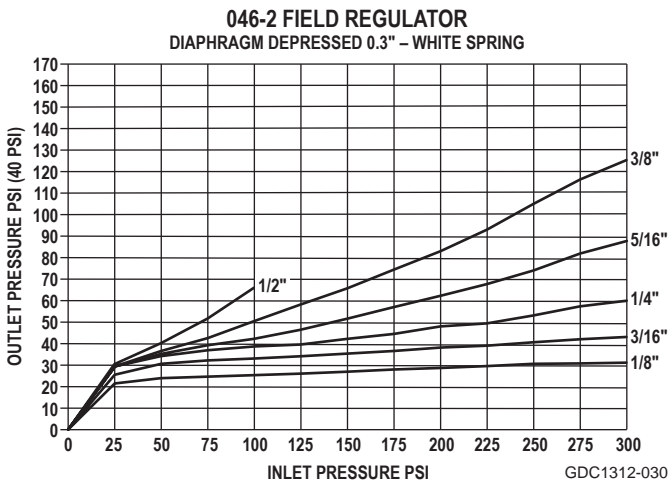
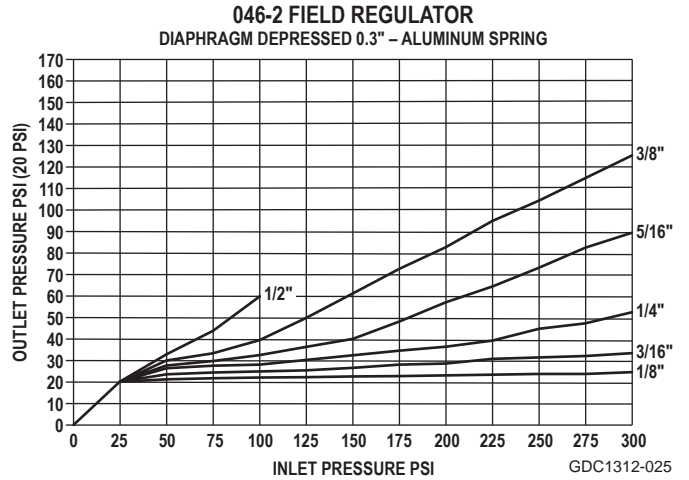
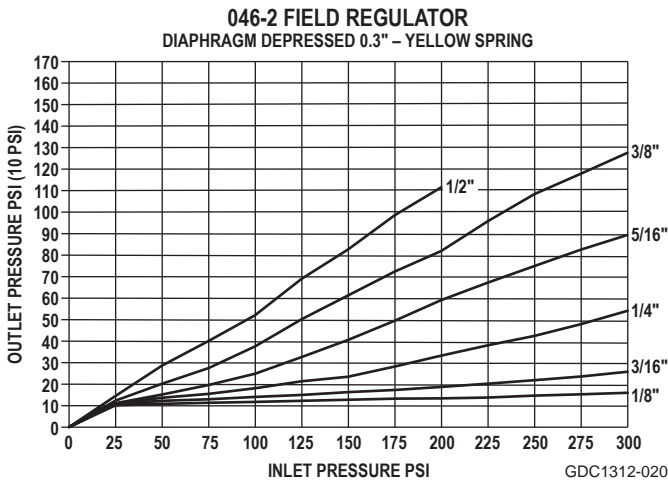
P_o = absolute outlet pressure (psia)

See graphs on page 17 for more information.

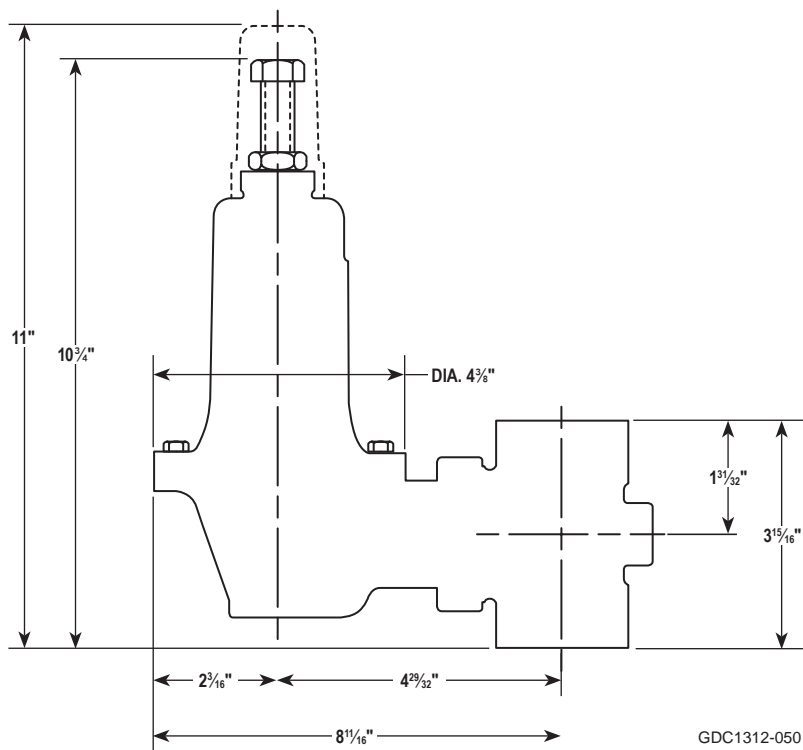
The 046-M, 046-2M and 046-CM field regulators have a blocked throat and a stem seal. They are designed for remote pressure sensing. These regulators have no integral boost tube and require separate overpressure protection to prevent damage to the downstream system. They are intended to be used as the upstream regulator in a monitor set (see illustration), or for other applications requiring a control line. Pipe sizes are 3/4", 1", and 1 1/4". Maximum inlet pressure is 1000 psi. For capacities see tables.

When an 046 is used to monitor another 046 with an identical inner valve, the total maximum capacity through both regulators is approximately 70% of the capacity of a single regulator. This applies whether the monitor is installed upstream or downstream.

IRV Relief Buildup – Regulator Blocked Open



Dimensions



Model	Body Material	Diaphragm Case	Internal Relief Valve	Maximum Inlet Pressure ²	Outlet Pressure Range
046	Ductile Iron (ASTM A395-71 gr 60-40-18)	Aluminum	No	1000 psig	3 to 200 psig
046-M ¹			No	1000 psig	
046-2			Yes	1000 psig	3 to 125 psig
046-2M ¹			Yes	1000 psig	
046-C	Cast Iron	No	1000 psig	3 to 200 psig	
046-CM ¹		No	1000 psig		

¹ Regulator requires a control line.

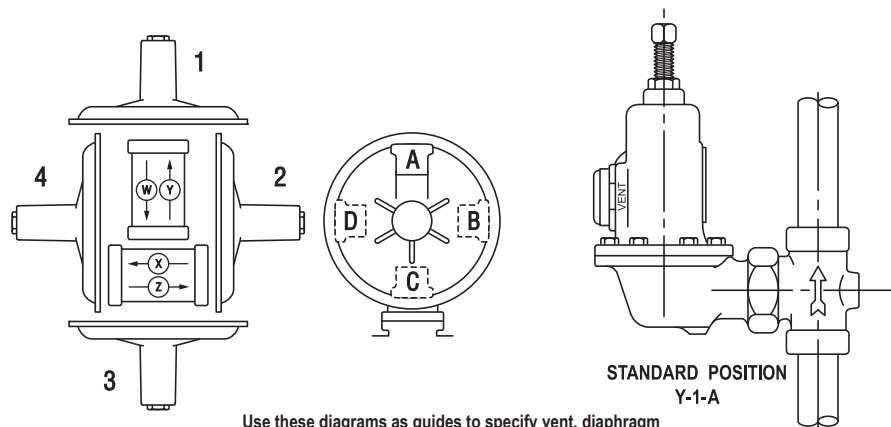
² Maximum inlet pressure is limited by orifice size, spring ranges and valve material (see tables on page 3).

For specific maximum allowable inlet pressures, see tables on pages 1 and 2 and capacity tables.

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



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.

GDC1312-010

Model 046 Field Regulators

Construction and Design Features



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