



U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

NOV 18 2010

Mr. Michael H. Kyle
B. Knight Natural Gas Services
P.O. Box 5702
Midlothian, VA 23112

Dear Mr. Kyle:

In a letter to the Pipeline and Hazardous Materials Safety Administration (PHMSA) dated December 14, 2009, you requested an interpretation or opinion as to whether two specific installations of gas utilization equipment would meet the intent and requirements of 49 CFR § 192.197.

You provided two actual installations. In Installation 1, the value of outlet pressure could exceed 1 psig or 28-in water column (wc), and in Installation 2, the value of outlet pressure could approach 1psig (26-in wc). You stated your assumption is that the maximum operating inlet pressure allowed for most residential installations is limited to ½ psi (14-in wc) and that pressures in excess of 1 psi (28-in wc) are likely to cause damage to the appliance regulator.

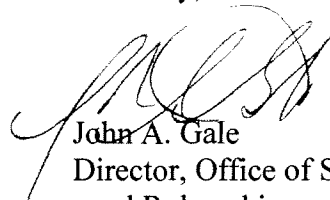
First, you asked whether the bolded words in the following two subsections of § 192.197 have the same meaning: in § 192.197(a)(5), “... *to prevent a pressure that would cause **unsafe operation** of any connected and properly adjusted gas utilization equipment*” and in § 192.197(c)(3), “... *set to open so that the pressure of gas going to the customer does not **exceed a maximum safe value***.” The answer is that they do not have the exact same meaning. The phrase “*unsafe operation*” in § 192.197(a)(5) addresses both upper and lower pressure limits and means that the connection should regulate pressure so that it is neither so high as to create excessively high pilot light flames nor so low that the pilot light could extinguish and create the possibility of gas accumulation. The phrase “*exceed a maximum safe value*” in § 192.197(c)(3) addresses only the upper limit or high pressure.

Second, you asked what inlet pressure does § 192.197(a)(5) or § 192.197(c)(3) refer to? Regarding the limit for inlet pressure, § 192.197 is a design requirement under Subpart D- Design of Pipeline Components. The design requirements under Subpart D apply to the design of pipeline system or components to operate under conditions that are known or reasonably foreseeable at the time of installation. Therefore, § 192.197 does not prescribe a specific value as long as the inlet pressure does not cause damage to the appliance’s regulator.

Finally, you asked whether your recommendations in both installations are valid and meet the intent of § 192.197. Again, § 192.197 does not specify a specific value as long as the inlet pressure does not lead to unsafe conditions or cause damage to the gas utilization equipment or associated regulators.

I hope that this information is helpful to you. If I can be of further assistance, please contact me at 202-366-4046.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Gale", is written over the typed name and title.

John A. Gale
Director, Office of Standards
and Rulemaking

PH08-036

Michael H. Kyle

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DEC 18 2009

December 14, 2009

Jeffrey D. Wiese
Associate Administrator of Pipeline Safety
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
1200 New Jersey Ave., SE
East Building 2nd Floor, Mail Stop: E24-455
Washington, DC
20590

Dear Mr. Wiese,

We would like to get an interpretation or an opinion as to whether two specific installations would meet the intent and requirement of Title 49, Part 192.197. We would also like to get your opinion about the meaning of two passages in this section.

In 192.197 (a)(5) where it states, "to prevent a pressure that would cause unsafe operation of any connected and properly adjusted gas utilization equipment." and in 192.197(c)(3) where it states, "set to open so that the pressure of gas going to the customer does not exceed a maximum safe value," does the wording essentially have the same meaning or does each passage refer to some other different value? In other words, is the point where unsafe operation and exceeding the maximum safe value, the same value? If we assume that this would be at a point at where damage could occur to any appliance regulator, would that be a correct assumption?

In the following two installations, we will provide the actual as found conditions including type of equipment. The only assumption we have made is that the type and typical characteristics of the appliance regulators meets the same requirements as for a Maxitrol appliance regulator. Some proprietary controls with built in regulators may have higher or lower maximum pressure restrictions. To arrive at realistic values of load for each installation, we used the load factors as provided by NFPA 54 (ANSI Z223.1) which approximates the actual conditions in type and size.

In accordance with Maxitrol Bulletin MI2010-6/05, all of the rated regulators have an IAS Rated inlet pressure as established by ANSI standard Z21.18, of ½ psi (14 in. w.c.). However, a minority of the appliance regulators are rated by Maxitrol at a maximum of 1 psi (28 in. w.c.) and one at a maximum of 5 psi (140 in. w.c.). Generally, none of these higher rated regulators would have the characteristics of regulators used with residential gas fired equipment however. It is also

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stated that, The maximum Operating Inlet Pressures are tested in excess of these standards, and recommended by us. For this class of appliance regulators, this value of Maximum Operating Inlet Pressure (MOIP) is the same value as the IAS rating. Maxitrol also states in paragraph 5 of the bulletin that, "Very high pressure surges in the gas supply line (or as a result of exposing the system to high pressure) may result in serious internal damage and cause leakage or affect regulator operation. If you suspect that a Maxitrol regulator has been exposed to more than twice the maximum operating inlet pressure, as shown in the following chart, turn off the gas and have the system checked by an expert." The chart simply refers to the values as stated earlier.

We assume from that statement by Maxitrol and referring to their table in their bulletin, that the maximum operating inlet pressure allowed for most residential installations is limited to ½ psi (14 in. w.c.) and that pressures in excess of 1 psi (28 in. w.c.) are likely to cause damage to the appliance regulator. The question then becomes, at what value does 192.197 (a)(5) or 192.197(c)(3) refer to? Would it be anything above ½ psi (14 in. w.c), 1 psi, or some other value.

The following information is drawn from actual installations:

Installation 1- Single Service Regulator

Premise Type: Single apartment

Maximum Load: 160,000 Btu/Hr. or 160 cu. ft./Hr.

Inlet pressure to service regulator: 92 to 98 psig (Supplier's stated average is 94 psig)

Outlet pressure set-point of service regulator: 7" w.c., or 0.25 psig (standard pressure)

Service Regulator Data

Manufacturer: American

Type: 1213B

Connection Size: 1" x 1"

Orifice: 1/8"

Nominal Capacity: @5 psig inlet = 200 SCFH
@60 psig inlet = 800 SCFH
@100 psig inlet = 1400 SCFH

Approximate Relief Valve Performance: (Note: data provided represents outlet pressure relative to inlet in worst case condition)

@5 psig inlet = 19 in. w.c.

@60 psig inlet = 27 in. w.c.

@ 100 psig inlet = 31 in. w.c.

Data Source: American Meter Bulletin, SB-8506.4

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Installation 2- Single Service Regulator

Premise Type: Single apartment

Maximum Load: 160,000 Btu/Hr. or 160 cu. ft./Hr.

Inlet pressure to service regulator: 92 to 98 psig (Supplier's stated average is 94 psig)

Outlet pressure set-point of service regulator: 7" w.c., or 0.25 psig (standard pressure)

Service Regulator Data

Manufacturer: Equimeter

Type: 143-1

Connection Size: 1" x 1"

Orifice: 1/8"

Nominal Capacity: @5 psig inlet = 250 SCFH

@60 psig inlet = 1200 SCFH

@80 psig inlet = 1540 SCFH

Approximate Relief Valve Performance: (Note: data provided represents outlet pressure relative to inlet in worst case condition)

@5 psig inlet = 19 in. w.c.

@60 psig inlet = 20 in. w.c.

@ 80 psig inlet = 22 in. w.c.

@100 psig inlet = 27 in. w.c.

Data Source: Sensus Metering Systems, TD-1301

The approximate relief valve performance is based the work case condition for a new regulator and does not take in to account any blockage of the relieve opening over time nor other conditions which might preclude degradation of the relief valve performance.

Installation 1 clearly shows that under worst case conditions, the value of outlet pressure could exceed 28 in. w.c. which is above the maximum safe value as stated by Maxitrol. In Installation 2, the value of outlet pressure under worst case conditions could approach 26 in. w.c which would be below the maximum safe value as stated by Maxitrol but well above the MOIP.

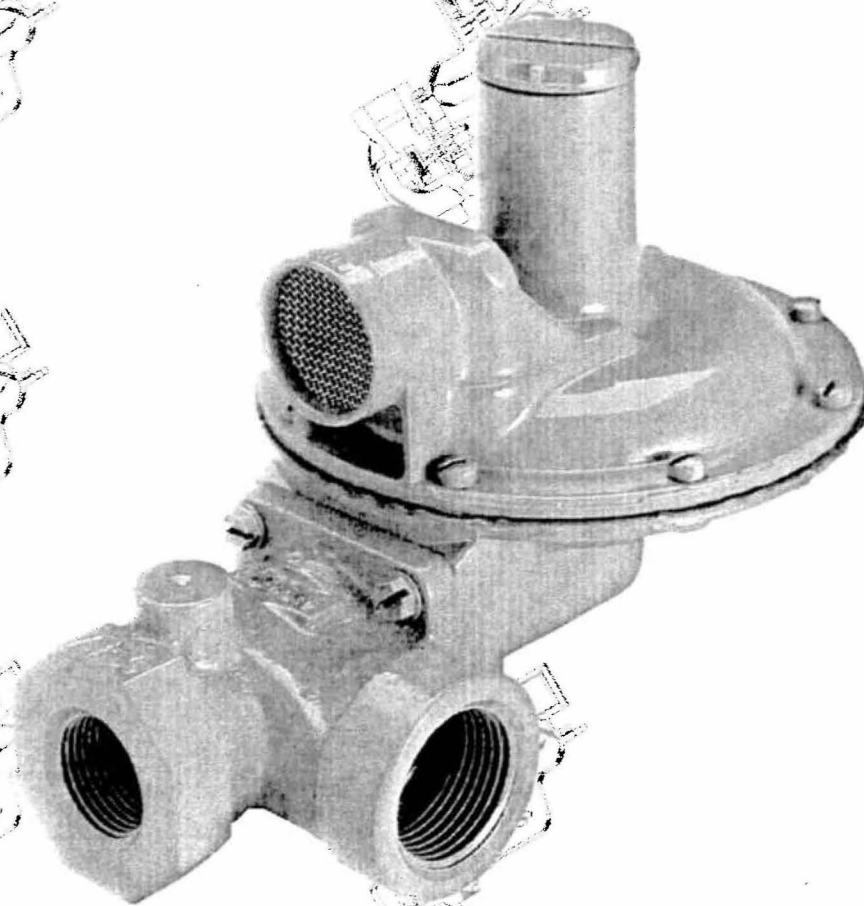
In your opinion, do these installations meet the requirements or intent of the regulations?

Our recommendations in both installations, since they already had the smallest orifice available, were to install an appropriate field cut regulator with integral relief valve ahead of the service regulator in order to reduce the inlet pressure to as low a value of inlet pressure to the service

SB-8506.4

1213B2 Service Regulators

Maximum Inlet Pressure 125 PSIG



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for Accreditation



**AMERICAN
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1213B2 Service Regulators

General Information

The American Meter Series 1213B2 pressure regulator is designed for natural gas applications and features a compact, lightweight design for fast, easy installation. Interchangeable orifices and springs provide a wide range of outlet pressures and flow rates. Outlet pressures between 3.5" W.C. and 5 PSIG are available. Operating temperature range is -20° F to 150° F (-30° C to 65° C). Maximum flow rate is 2500 SCFH (70.8 m³/h).

The diaphragm case may be easily removed for routine inspection without disturbing the line connections. All models conform to ANSI Code B109.4-1998, and CGA Service-type Regulator Specification CAN/CGA-6.18-M95.

Exclusive, 7 - Step Corrosion Protection

The protective finish on the 1213B2 regulator resists corrosive effects of weather and harsh environments better than any other in the industry. Each precision die cast aluminum regulator is treated-inside and out-with a special conversion coating that's part of an exclusive, 7-step finishing process. This coating greatly inhibits oxidation of the metal's surface that can eventually compromise the integrity of the metal. It also prevents finish paint from cracking and blistering. A single coat polyester primer and the high solid polyurethane top coat provides a long-lasting protection to all exterior regulator surfaces. The American Meter conversion coating process meets all environmental protection regulations.

High Tensile Strength Valve Bodies

Each 1213B2 regulator is equipped with a high tensile strength cast iron valve body that rotates in 90-degree increments and features extra heavy wall thickness. This provides maximum strength to withstand installation stresses without damage and prevents thread galling experienced with aluminum.

1213B2 regulator valve bodies are treated with a 5-step metal finishing process. The treated metal is painted with a single coat polyester paint.

Available valve body sizes are: 3/4" x 3/4", 3/4" x 1" and 1" x 1" NPT or BSP-TR for 180° valve bodies. Also available is a 90° valve body in 3/4" x 3/4", 3/4" x 1", 1" x 1" and 1/2" x 1" NPT and 3/4" x 3/4" BSP-TR.

Features

In response to a market survey, the following features were designed into the 1213B2 regulator to accommodate the customers needs.

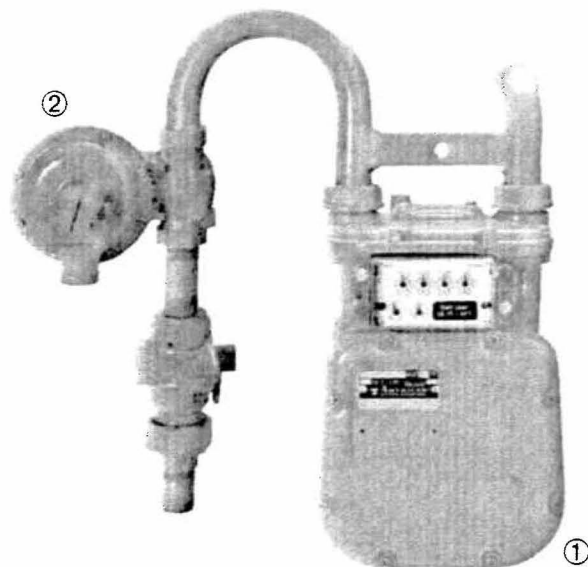
- Improved relief performance.
- Improved performance repeatability.
- Lever design provides for secondary emergency relief in the event of unauthorized removal of the seal plug.
- Snap-in internal components (quick change outs).
- Non-adjustable relief.
- Larger seat disc area.
- 1213B and 1213B2 use the same seal plug to avoid loss of emergency relief should the seal plugs be interchanged.

Application

The 1213B2 features a full capacity internal relief valve with large passages to assure the fast release of gas (See performance graphs on page 5). For added protection, a secondary relief valve stop is provided to assure operation under the most severe conditions and in the event the seal plug has been removed. The standard relief spring setting is 8.0" W.C. above the normal 7" W.C. outlet pressure.

Valve body configuration permits the 1213B2 regulator to be supplied in four positions as specified on page 7. All 1213B2 regulators are available with either right angle (90-degree) or straight flow (180-degree) valve bodies. Vents can also be supplied in four different positions.

The 1213B2 regulator is designed with an extra large, removable weather and bug-proof stainless steel screened vent to resist freeze-ups and to exclude foreign matter. The vent is threaded 3/4 inch NPT making it suitable for indoor installations.



① AC250 Aluminumcase Meter; ② 1213B2 Regulator;

1213B2 Service Regulators

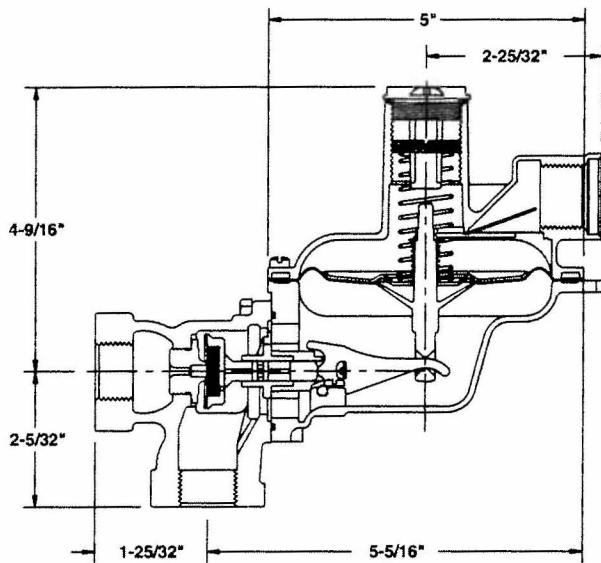
Options

Meter Bar- The 1213B2 regulator can be used with a detachable meter bar 3/4" x 3/4" (Part number 72476G001), 3/4" x 1" (Part number 72476G003) and 1" x 1" (Part number 72476G004) for compact and convenient installation to meters with 6" connection centers. Use of a meter bar prevents piping stress from being transferred to the gas meter.

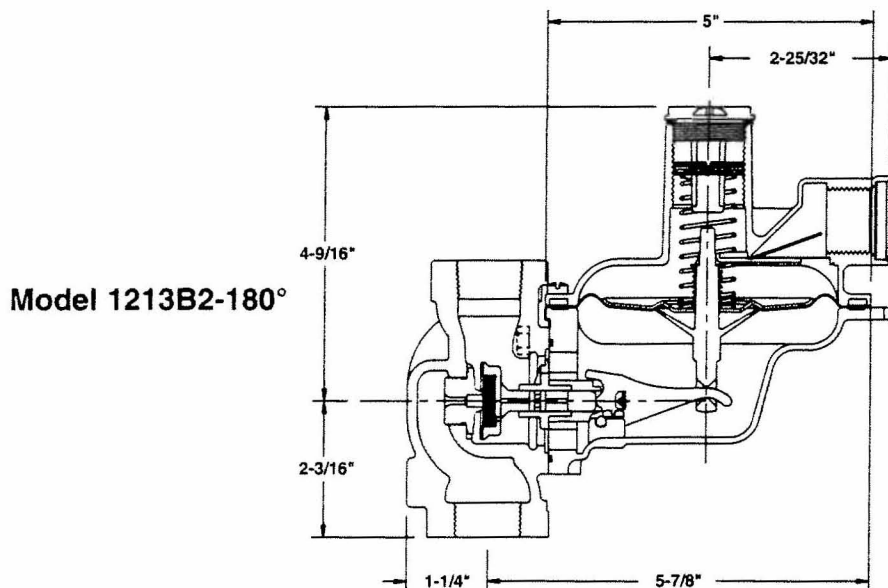
Vent Elbow- The regulator vent opening should face downward (6 o'clock) to **minimize the chance of blockage from ice and snow**. If not, a 3/4" NPT plastic, 90° vent elbow (Part number 78041P025) and separate protective screen (Part number 70400P017) may be screwed into the vent to provide the necessary protection.

Elevation Compensation- E.C. orifices are also available, which provide constant outlet pressure even when inlet pressure fluctuates greatly. The elevation compensation orifice is a device which reduces changes in regulator outlet pressure due to change in inlet pressure.

The E.C. orifice is recommended for installations where the inlet pressure may vary over a wide range. The E.C. orifice is available in two sizes: 1/8" x 3/16" (Part number 73698G006) and 3/16" (Part number 73698G005). Its capacity is the same as a standard orifice of the same size. Consult your American Meter Sales Representative for specific applications.



Model 1213B2-90°



Model 1213B2-180°

1213B2 Service Regulators

1213B2 Regulator Capacity Performance

Capacity 3/4" Outlet 1213B2 Regulator Set Point 7.0" W.C. @ 50 SCFH

SCFH 0.60 specific gravity gas @ 60° F & 14.7 PSIA. Pressure spring 70017P084. Outlet pressure variance not to exceed +2" -1" W.C. from set point, horizontal position.

Inlet (PSIG)	Orifice Size			
	1/8	3/16	1/4	5/16
1		175	225	225
2		225	400	375
3	175	275	450	500
5	200	350	650	700
10	300	600	950	1100
15	325	800	1100	1400
25	475	1100	1400	1800
35	600	1400	2200	2500
50	700	1800	2200	
60	700	2100	2200	
75	750	2200		
100	1100	2200		
125	1100			

For optimum performance, maximum inlet pressure should not exceed maximum capacity rating for any given orifice size.

Capacity 1" Outlet 1213B2 Regulator Set Point 7.0" W.C. @ 50 SCFH

SCFH 0.60 specific gravity gas @ 60° F & 14.7 PSIA. Pressure spring 70017P084. Outlet pressure variance not to exceed +2" -1" W.C. from set point, horizontal position.

Inlet (PSIG)	Orifice Size			
	1/8	3/16	1/4	5/16
1		175	225	225
2		225	400	375
3	175	275	475	500
5	200	350	650	750
10	300	600	1000	1200
15	350	800	1400	1600
25	475	1100	2000	2500
35	600	1400	2500	2500
50	700	1800	2500	2500
60	800	2100	2500	2500
75	900	2500	2500	
100	1400	2500		
125	1600			

For optimum performance, maximum inlet pressure should not exceed maximum capacity rating for any given orifice size.

Capacity 3/4" Outlet 1213B2 Regulator Set Point 2 PSIG @ 50 SCFH

SCFH 0.60 specific gravity gas @ 60° F & 14.7 PSIA. Pressure spring 70017P085. Outlet pressure variance not to exceed +/- 10% from set point, horizontal position.

Inlet (PSIG)	Orifice Size			
	1/8	3/16	1/4	5/16
3	75	100	150	150
5	125	175	225	250
10	175	250	350	375
15	225	350	475	500
25	325	475	650	750
35	350	600	850	1000
50	475	700	1100	1200
60	600	850	1200	1400
75	700	1000	1400	1800
100	900	1300		
125	1000			

For optimum performance, maximum inlet pressure should not exceed maximum capacity rating for any given orifice size.

Capacity 1" Outlet 1213B2 Regulator Set Point 2 PSIG @ 50 SCFH

SCFH 0.60 specific gravity gas @ 60° F & 14.7 PSIA. Pressure spring 70017P085. Outlet pressure variance not to exceed +/- 10% from set point, horizontal position.

Inlet (PSIG)	Orifice Size			
	1/8	3/16	1/4	5/16
3	75	125	150	150
5	125	175	225	250
10	175	250	325	375
15	225	325	400	400
25	300	425	600	600
35	375	500	750	900
50	475	700	1000	1100
60	550	800	1100	1200
75	650	1000	1400	1400
100	1000	1400		
125	1000			

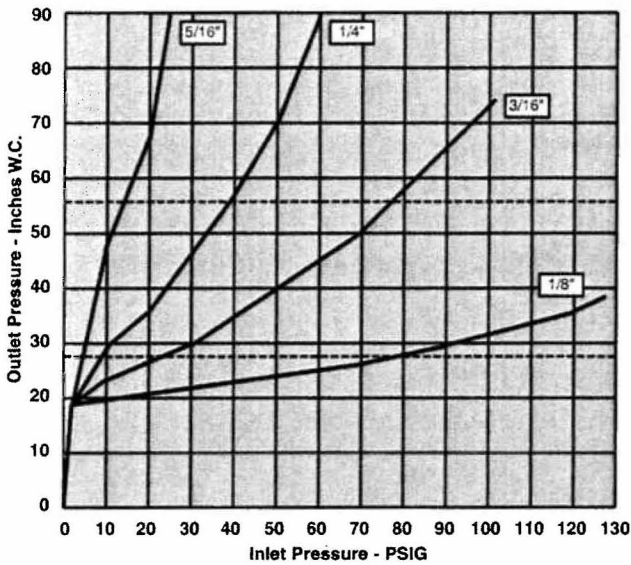
For optimum performance, maximum inlet pressure should not exceed maximum capacity rating for any given orifice size.

1213B2 Service Regulators

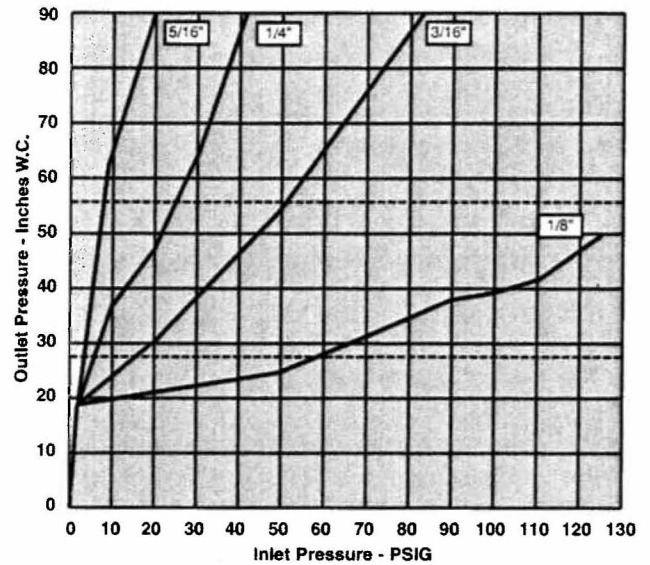
1213B2 Regulator Relief Valve Performance

There are several methods of measuring the relief performance of a regulator. For the 1213B2 service regulator, the worst case scenario will occur when the lever is disconnected. The data presented in the tables below represent this condition.

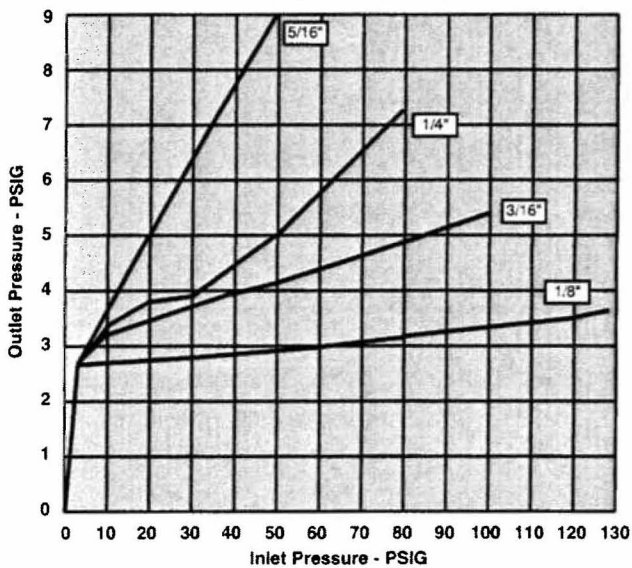
Outlet Pressure Relative To Inlet Pressure
3/4" Screened Vent - No Vent Pipe
Set Pressure 7" W.C.



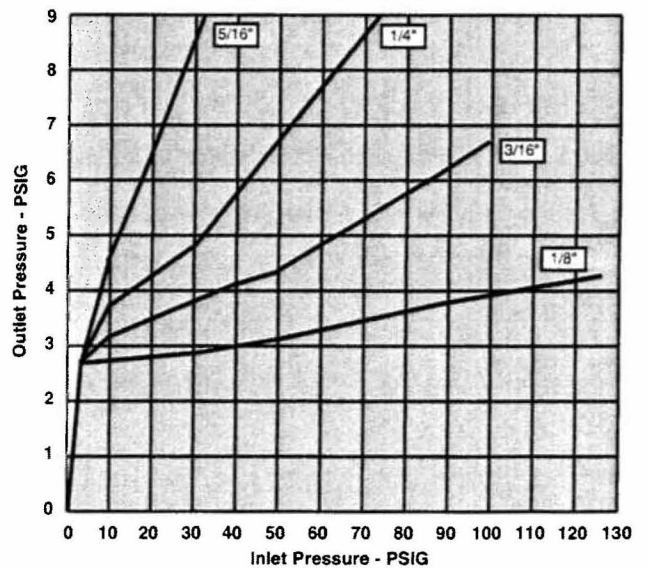
Outlet Pressure Relative To Inlet Pressure
3/4" Screened Vent - 10 Foot Vent Pipe with 2 Elbows
Set Pressure 7" W.C.



Outlet Pressure Relative To Inlet Pressure
3/4" Screened Vent - No Vent Pipe
Set Pressure 2 PSIG



Outlet Pressure Relative To Inlet Pressure
3/4" Screened Vent - 10 Foot Vent Pipe with 2 Elbows
Set Pressure 2 PSIG



1213B2 Service Regulators

Pressure Springs

Outlet Pressure	Color Code	Part Number 1213B2
3.5" to 7" W.C.	Light Blue	70017P083
5" to 9" W.C.	Lavender	70017P084
6" to 15" W.C.	Light Gray	70017P088
18" to 2 PSIG	Light Green	70017P085
2 to 4 PSIG	Pink	70017P086
4 to 5 PSIG	Turquoise	70017P087

Maximum Recommended Inlet Pressure

Orifice Size	Inlet Pressure (PSIG)
1/8"	125
3/16"	125
1/4"	125
5/16"	100

Orifice Sizes

Orifice Size	Part Number 1213B2
5/16"	72494P022
1/4"	72494P043
3/16"	72494P042
1/8"	72494P040

Full Open Regulator Relief Capacity

For sizing downstream relief valves, use the following formulas to determine the regulator full open capacity:

For critical flow rates

$$Q = 0.5 C \times \frac{P_1}{\sqrt{G}}$$

For sub-critical flows

$$Q = C \frac{\sqrt{P_2 h}}{\sqrt{G}}$$

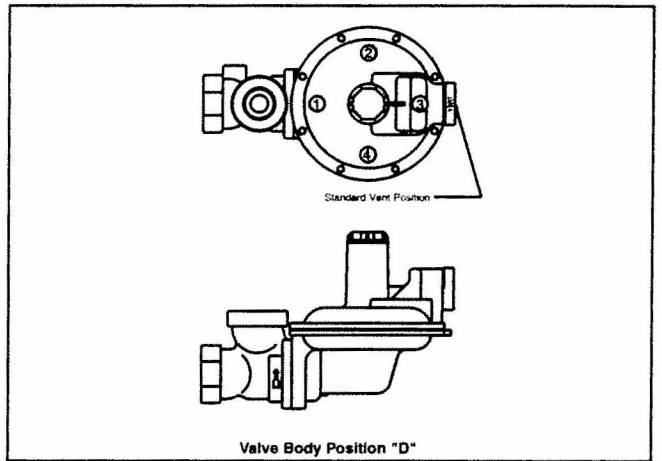
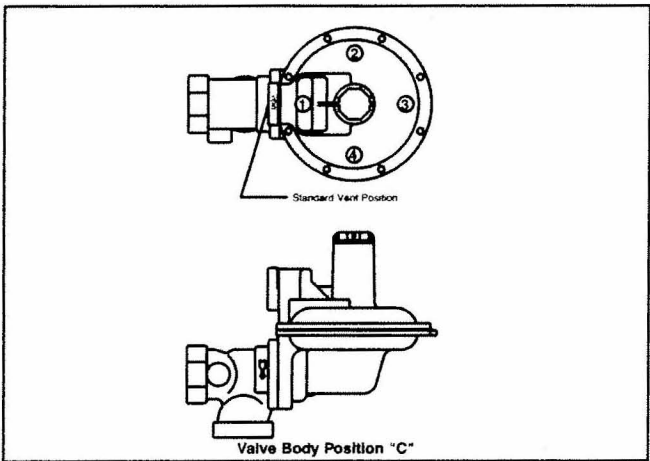
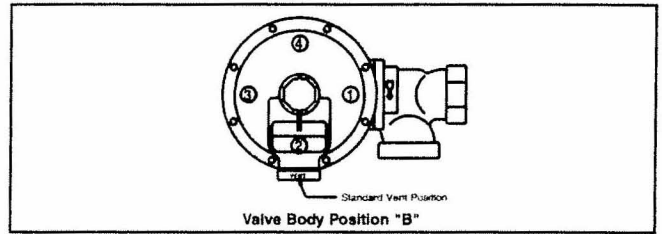
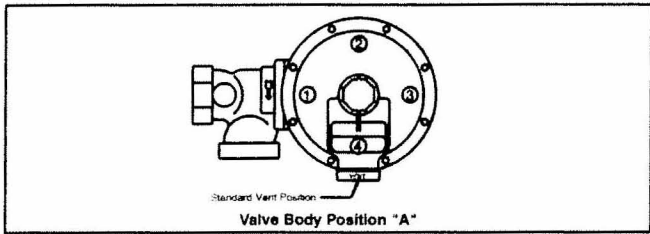
Key:

- Q = Maximum capacity of regulator
- C = Orifice constant, see table
- P₁ = Inlet absolute pressure (PSIA)
- P₂ = Outlet absolute pressure (PSIA)
- h = Differential pressure (P₁ - P₂)
- G = Specific gravity of gas

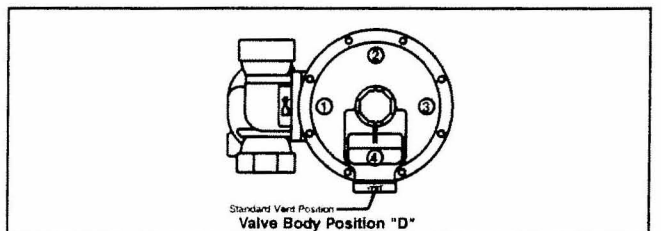
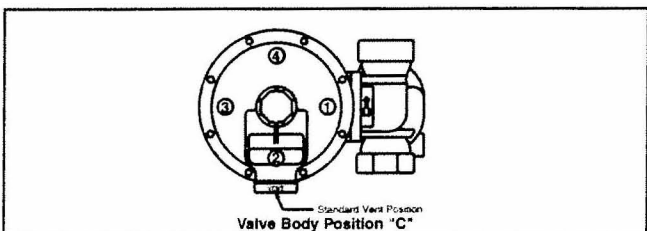
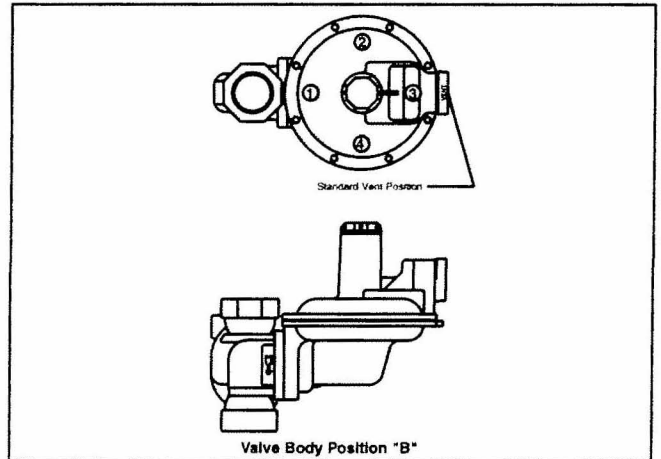
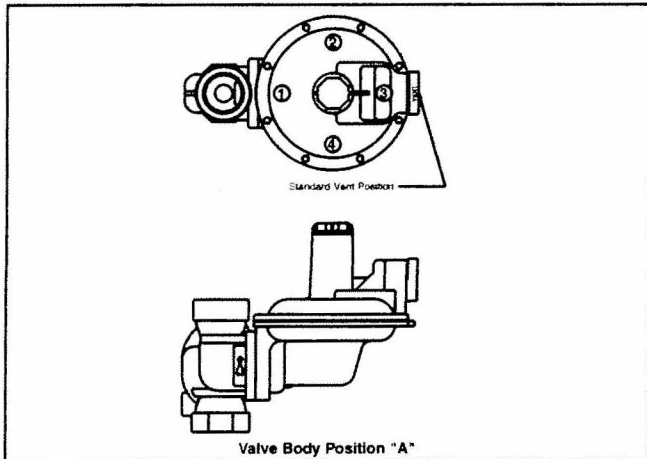
Orifice	C
1/8"	20
3/16"	46
1/4"	80
5/16"	150

1213B2 Service Regulators

Regulator Assembly Positions For 90° Models



Regulator Assembly Positions For 180° Models



1213B2 Service Regulators

Construction

Lower Diaphragm Case - Precision die cast aluminum with a exclusive 7-step advanced conversion coating, single coat polyester primer and High Solid Polyurethane Top Coat.

Top Assembly - Precision die cast aluminum with a exclusive 7-step advanced conversion coating, single coat polyester primer and High Solid Polyurethane Top Coat.

Valve Body - Cast grey iron, undercoated, single coat polyester primer and High Solid Polyurethane Top Coat, (Rotates in 90 degree increments).

Pressure Spring - Steel, Zinc plated and yellow chromate. Color coded for identification.

Diaphragm Plate - Steel, terne plated.

Seat Disc - Buna-N.

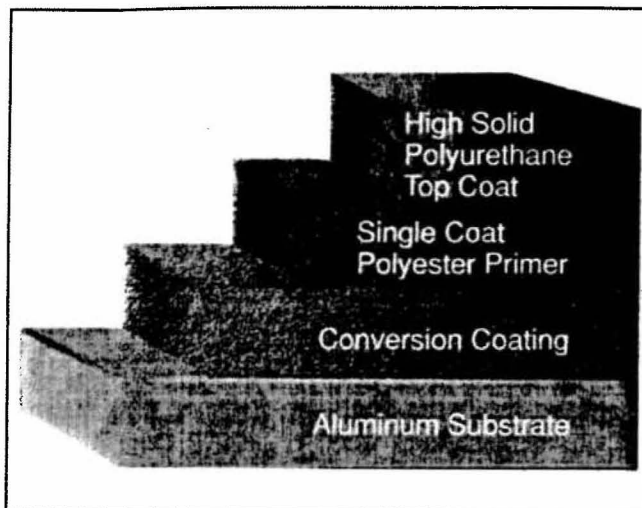
Orifice - Super high strength, corrosion-resistant, aluminum.

Lever - Stamped aluminum.

Vent Screen - Stainless steel.

Seal Plug - Ultraviolet stabilized, minlon.

Corrosion Protection



Ordering Information

- 1 Model number.
- 2 Size of inlet and outlet.
- 3 Inlet pressure, psi.
- 4 Outlet pressure, inches W.C. (or PSIG).
- 5 Flow, scfh.
- 6 Kind and specific gravity of gas.
- 7 Orifice size.
- 8 Regulator assembly position number.
- 9 Possible variation in inlet pressure for E.C. Orifice models.
Maximum _____ PSIG
Minimum _____ PSIG

Shipping Weight -

28 lbs/carton of eight regulators

Regulator Pressure Rating

125 PSIG = Maximum recommended inlet pressure for normal service. Maximum recommended pressure may vary with orifice size.

175 PSIG = Maximum inlet pressure for abnormal or emergency service, without causing damage to regulator case.

5 PSIG = Maximum outlet pressure for normal service.

10 PSIG = Maximum outlet pressure which can be contained by pressure carrying components (no flange leakage to atmosphere except for normal relief action). **If regulator is subjected to these conditions, it should be removed from service.**

50 PSIG = Maximum outlet pressure for abnormal service without damage to internal components. **If regulator is subjected to these conditions, it should be removed from service.**

Due to continuous development the information in this document is subject to change.



AMERICAN METER

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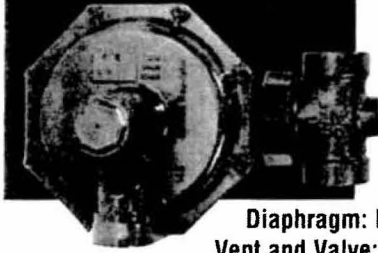
CANADIAN METER

3037 Derry Road, West • Milton, Ontario L9T 2X6 • Canada • Tel: (905) 878-2361 • Fax: (905) 878-5758

ELSTER AMCO

Model 143-80 Service Regulator

Technical Data



Models:
 143-80-1
 143-80-2
 143-80-2HP

Valve Body: Cast Iron, 125 psig Working Pressure	Straight Body
Spring and Lower Case: Die-Cast Aluminum	3/4" x 3/4"
Orifice: Stainless Steel	3/4" x 1"
Fulcrum Pin: Aluminum or Brass	3/4" x 1-1/4"
Valve Seat/Stem: One piece molded Buna-N seat pad and fiberglass reinforced nylon stem	1" x 1"
Throat/Support/Stem Guide: Cast Aluminum integral to lower case	1" x 1-1/4"
Diaphragm Plate: Plated Steel	1-1/4" x 1-1/4"

Diaphragm: Nylon fabric reinforced Buna-N with full 26 in² effective area
Vent and Valve: Precision-fit polyethylene valve and seat, threaded 3/4" or 1" NPT
Operating Temperature: -20° F to 150° F (-28.9° C to 65.5° C)
Corrosion Protection: Cases dip primed chromate conversion coating, topcoat enamel
Internal Relief Valve: Set to relieve at approximately 7" w.c. above normal outlet pressure setting

Spring Ranges

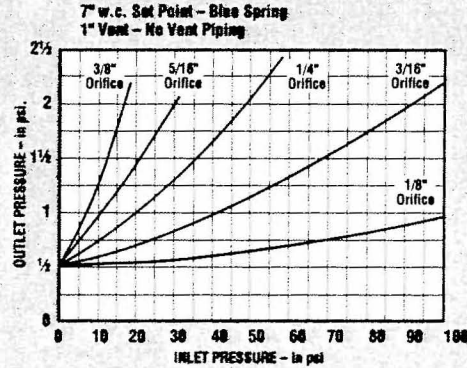
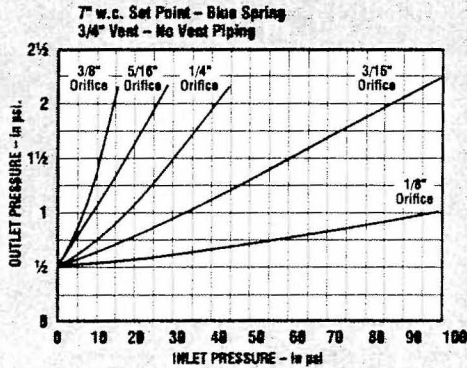
Outlet Pressure Ranges	Spring Color	Spring Part Number
3 1/2" to 6 1/2" w.c.	Red	143-62-021-15
5" to 8 1/2" w.c.	Blue	143-62-021-16
6" to 14" w.c.	Green	143-62-021-17
12" to 28" w.c.	Orange	143-62-021-18
1/2 psi to 2 psi	Black & White	143-62-021-22
1/2 psi to 3 psi	Cadmium*	173-62-021-02
2 to 6 psi	Black*	139-16-021-01

*For high pressure model 143-80-2HP

Orifice and Maximum Inlet Pressure

Orifice	Part Number	Pressure
1/8" aluminum	143-62-023-37	125 psig
3/16" aluminum	143-63-023-40	125 psig
1/4" aluminum	143-62-023-42	60 psig
5/16" aluminum	143-62-023-43	40 psig
3/8" aluminum	143-62-023-44	40 psig
1/2" aluminum	143-62-023-45	20 psig
5/8" aluminum	143-62-023-46	10 psig

Relief Valve Performance: Lever blocked with valve disc in the wide open position



Maximum Emergency Pressure

The maximum pressure that the model 143-80-1, 143-80-2 and 143-80-2HP regulator inlets may be subjected under abnormal conditions without causing damage to the regulator is the stated Maximum Inlet Pressure + 50 psi

Note: For the Low Pressure Cut Off version model 143-80-6 it is Maximum Inlet Pressure + 10 psi. See bulletin TD-1301-L

The maximum pressure to which the 143-80 diaphragm case may be subjected under abnormal conditions without causing damage to the internal parts of the regulator is the set point + 3 psi. If the outlet pressure exceeds this pressure, the regulator must be removed from service and carefully inspected. Damaged or otherwise unsatisfactory parts must be replaced before returning the regulator to service. The maximum outlet pressure that can be safely contained in the 143-80 diaphragm case is 10 psi (safely means no leakage as well as no bursting).

Full Open Capacity

Use the following formula for the full open capacity:

$$1. Q = K\sqrt{P_0(P_1 - P_0)} \dots \text{(for } \frac{P_1}{P_0} \text{ less than 1.894)}$$

$$2. Q = \frac{KP_1}{2} \dots \text{(for } \frac{P_1}{P_0} \text{ greater than 1.894)}$$

Q = maximum capacity of the regulator (in SCFH of 0.6 specific gravity natural gas).
 K = the "K" factor, the regulator constant from the table below.
 P₁ = absolute inlet pressure (psia).
 P₀ = absolute outlet pressure (psia).

Orifice	5/8"	1/2"	3/8"	5/16"	1/4"	3/16"	1/8"
K	820	520	292	206	132	74	33

Model 143-80 Technical Data

Capacities

Flow capacities in SCFH natural gas
(0.6 specific gravity – 14.65 psia – 60°F)

Capacities are based on the following maximum variations in outlet pressure:

- Red and Blue Springs – 1" w.c. droop
- Orange Spring – 3" w.c. droop
- Green Spring – 2" w.c. droop
- Black Spring – 10% droop

Note: The 1/2 psig, 1 psig and 2 psig inlet pressures apply only to Red and Blue springs.

Note: The last capacity figure in each column indicates the maximum capacity for each orifice at recommended pressure within the optimum performance range.

The performance data is based on normal testing at 70°F flowing temperature.

Changes in performance can occur at extreme low flowing temperatures.

Other Gases

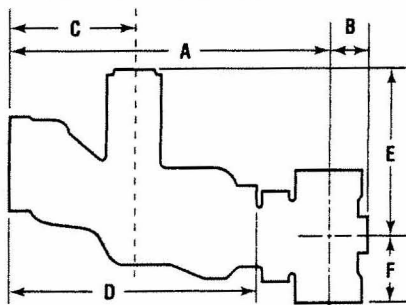
143-80 Regulators are mainly used on natural gas. However, they perform equally well on LP gas, nitrogen, dry CO₂, air and others.

Other Gases	Correction Factor
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1350 BTU Propane Air Mix (1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63

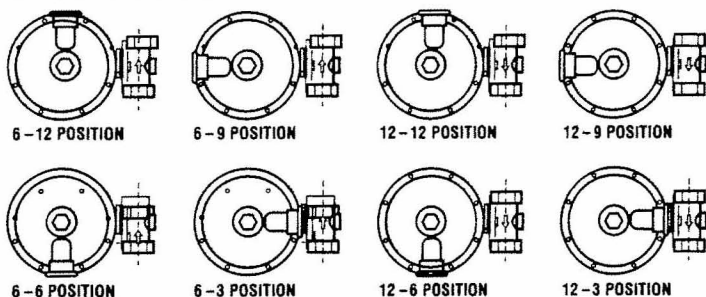
For other non corrosive gases:
CORRECTION FACTOR = $\sqrt{\frac{0.6}{\text{Specific Gravity of the Gas}}}$

Dimensions

Regulator	A	B	C	D	E	F
143-80	9 3/4"	1 1/8"	3 1/8"	6 1/4"	5 1/4"	1 3/32"



Mounting Positions



Body Size 3/4" x 3/4"

Inlet psig	Orifice						
	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
1/2	-	-	-	-	340	450	510
1	-	-	-	480	500	510	530
2	-	-	530	560	570	580	600
3	-	420	600	620	630	650	670
5	250	560	700	720	730	770	790
7.5	310	700	840	860	880	900	900
10	370	830	950	970	1000	1020	1020
20	530	1200	1220	1240	1250	1270	-
40	860	1570	1330	1340	1450	-	-
60	1200	1660	1520	-	-	-	-
80	1500	1710	-	-	-	-	-
125	1800	1900	-	-	-	-	-

Body Size 3/4" x 1" • 1" x 1"

Inlet psig	Orifice						
	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
1/2	-	-	-	-	350	460	520
1	-	-	-	480	550	600	650
2	-	-	530	700	840	880	780
3	-	420	650	870	1000	920	810
5	250	580	890	1120	1160	950	970
7.5	310	700	1140	1340	1270	1140	1060
10	370	840	1360	1500	1330	1200	1180
20	530	1230	2000	1600	1480	1400	-
40	860	1700	2000	1640	1900	-	-
60	1200	1900	2000	-	-	-	-
80	1540	2000	-	-	-	-	-
125	2100	2100	-	-	-	-	-

Body Size 3/4" x 1-1/4" • 1" x 1-1/4" • 1-1/4" x 1-1/4"

Inlet psig	Orifice						
	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
1/2	-	-	-	-	350	460	520
1	-	-	-	480	550	680	760
2	-	-	530	700	840	1020	1030
3	-	420	650	870	1030	1200	1050
5	250	580	890	1180	1350	1490	1060
7.5	310	700	1140	1500	1610	1580	1060
10	370	840	1360	1700	1710	1800	1180
20	630	1230	1600	1800	1900	1900	-
40	860	1800	2200	1900	2000	-	-
60	1200	2100	2400	-	-	-	-
80	1550	2200	-	-	-	-	-
125	2250	2400	-	-	-	-	-

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SAFETY WARNING INSTRUCTIONS

MAXITROL CSA DESIGN CERTIFIED
GAS PRESSURE REGULATORS

**NOTE: GAS PRESSURE REGULATORS WILL NOT
TURN OFF THE FLOW OF GAS.**

**SPECIAL WARNINGS**

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE. NO UNTRAINED PERSON SHOULD ATTEMPT TO INSTALL, MAINTAIN OR SERVICE GAS PRESSURE REGULATORS.

To minimize the possibility of FIRE, EXPLOSION, and OTHER HAZARDS:

1. All products, including gas pressure regulators, used with combustible gas **must** be installed and used **strictly** in accordance with the instructions of the manufacturer, with government codes and regulations, and plumbing codes and practices.
2. Do **not** use a gas pressure regulator if it appears to have been subjected to high temperatures, damaged in any way, or to have been taken apart or tampered with. Any of these may be signs of possible leakage or other damage that may affect proper operation and cause potentially dangerous combustion problems
3.
 - a. Install the regulator properly with gas flowing as indicated by the arrow on the casting.
 - b. Use pipe compound or thread sealant, properly threaded pipes and careful assembly procedure so that there is no cross threading, etc., which might cause damage or leakage.
 - c. Apply wrench or vise pressure only to the flat areas around the pipe tappings at the end being threaded to the pipe to avoid possible fracture of the regulator body which could result in leakage
 - d. Make sure markings or wording on regulator are not painted over or obliterated.
4. Check carefully for gas leaks immediately after the regulator has been installed and the gas turned on. **Do this before attempting to operate the appliance or other gas burning device.** Use a rich soap solution (or other accepted leak tester) around the diaphragm flanges, bottom plate, vent opening, seal cap, pipe connections, and all other joints. Wipe clean with a damp rag. It is a good practice to periodically check for leakage during use of the appliance. **Absolutely no leakage should occur, otherwise there is a danger of fire or explosion depending upon conditions. Never use if leakage is detected.**

**CAUTION**

NEVER CONNECT REGULATOR DIRECTLY TO THE PROPANE SUPPLY SOURCE. MAXITROL REGULATORS REQUIRE AN EXTERNAL REGULATOR (NOT SUPPLIED). INSTALL THE EXTERNAL REGULATOR BETWEEN THE PROPANE SUPPLY SOURCE AND MAXITROL REGULATOR.

5. Very high pressure surges in the gas supply line (or as a result of exposing the system to high pressure) may result in serious internal damage and cause leakage or affect regulator operation. If you suspect that a Maxitrol regulator has been exposed to more than twice the maximum operating inlet pressure, as shown in the following chart, turn off the gas and have the system checked by an expert.

(over)

DIRECTIVES DE SÉCURITÉ

RÉGULATEURS DE PRESSION DE GAZ MAXITROL
CERTIFIÉS CSA

**REMARQUE: LES RÉGULATEURS DE PRESSION DE GAZ
N'INTERROMPENT PAS L'ÉCOULEMENT DU GAZ.**

**AVERTISSEMENTS PARTICULIERS**

LA NON-CONFORMITÉ AUX DIRECTIVES QUI SUIVENT PEUT PROVOQUER UN INCENDIE OU UNE EXPLOSION QUI PEUT ENDOMMAGER LA PROPRIÉTÉ, OU ENCORE CAUSER DES BLESSURES OU ENTRAÎNER LA MORT. AUCUNE PERSONNE NE POSSÉDANT PAS LA FORMATION REQUISE NE DEVRAIT TENTER D'INSTALLER, D'ENTREtenir OU DE RÉPARER DES RÉGULATEURS DE PRESSION DE GAZ.

Pour réduire au minimum les risques d'INCENDIE, D'EXPLOSION, ET AUTRES RISQUES:

1. Tous les produits, y compris les régulateurs de pression de gaz, utilisés avec des gaz combustibles **doivent être** installés et employés en **stricte** conformité avec les directives du fabricant, les codes et règlements gouvernementaux et les codes et pratiques en matière de plomberie.
2. Ne **pas** employer un régulateur de pression de gaz qui semble avoir été soumis à des températures élevées, endommagé de quelque façon que ce soit, avoir été démonté ou manipulé. Toutes ces situations indiquent des possibilités de fuite ou de tout autre dommage qui pourrait nuire au bon fonctionnement de l'appareil et provoquer des problèmes de combustion potentiellement dangereux.
3.
 - a. Installer le régulateur correctement de sorte que le gaz s'écoule dans le sens indiqué par la flèche gravée.
 - b. Utiliser un composé ou un mastic pour joints filetés, des tuyaux filetés soudés correctement, et suivre des méthodes d'assemblage adéquates de façon à éviter les filets faussés, etc., qui puissent provoquer des dommages ou des fuites.
 - c. Appliquer la pression d'une clé ou d'une pince-étau uniquement aux surfaces plates autour des raccords des tuyaux à l'embout vissé à la canalisation pour éviter de fracturer le corps du régulateur, ce qui pourrait provoquer des fuites.
 - d. S'assurer que les marques ou les mots qui apparaissent sur le régulateur ne sont pas recouverts de peinture ou cachés de quelque autre manière.
4. Vérifier soigneusement les fuites de gaz immédiatement après l'installation du régulateur et la reprise de l'alimentation en gaz. **Procéder à la vérification avant de tenter de mettre l'appareil ou tout autre appareil au gaz en marche.** Utiliser une solution savonneuse (ou une autre solution servant à repérer les fuites) autour des brides de la membrane et autour de la plaque du fond, de l'ouverture de purge, du bouchon d'étanchéité, des raccords des canalisations et des autres joints. Essuyer le tout au moyen d'un chiffon humide. On recommande de vérifier à l'occasion la présence de fuite pendant que l'appareil fonctionne. **Il ne devrait y avoir absolument aucune fuite. Une fuite de gaz présente un danger d'incendie ou d'explosion selon la situation. Ne jamais utiliser l'appareil en cas de fuite.**

**MISE EN GARDE**

NE JAMAIS RACCORDER DIRECTEMENT LE RÉGULATEUR À LA SOURCE D'ALIMENTATION EN PROPANE. LES RÉGULATEURS MAXITROL EXIGENT LA PRÉSENCE D'UN RÉGULATEUR EXTERNE (NON FOURNI). INSTALLER LE RÉGULATEUR EXTERNE ENTRE LA SOURCE D'ALIMENTATION EN PROPANE ET LE RÉGULATEUR MAXITROL.

5. Les surpressions très élevées dans la canalisation d'alimentation (ou découlant d'une exposition du système à des pressions élevées) peuvent provoquer d'importants dommages internes et causer des fuites ou nuire au fonctionnement du régulateur. Si l'on soupçonne qu'un régulateur Maxitrol a été exposé à plus du double de la pression d'entrée maximale, comme l'indique le tableau ci-dessous, couper l'arrivée de gaz et faire vérifier le système par un spécialiste.

(verso)

MAXITROL  **company**®

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6. Venting **must** be controlled in accordance with government and plumbing codes and regulations to avoid the danger of escaping gas should there be internal leakage. Vent pipes **must** be open and the open end protected against entry of foreign matter, including water.

7. The outlet pressure of the regulator **must** be measured to make sure it is in accordance with intended usage. If a spring change is required to develop the required outlet pressure, the spring **must be one specified by MAXITROL** and the new outlet pressure recorded on the regulator.

8. Caution should be used to guarantee that there is sufficient inlet pressure to achieve the desired outlet pressure and no readjustment of the outlet pressure setting should be made unless the inlet pressure is within the proper limits for the regulator. Failure to follow this may result in overfiring of the appliance or other gas burning device. **The MAXITROL bulletin for the regulator should be consulted for specific inlet and outlet pressure relationships.**

9. For convertible regulators, simply invert the snap-in device beneath the cap to convert from natural to LP.

10. A MAXITROL regulator **must be used** within the temperature range and not in excess of the maximum inlet pressure shown in the following table and should be in the mounting position indicated. Maxitrol regulators can be used with all fuel gases.

11. In case of any doubt, please contact the Service Manager, Maxitrol Company, Southfield, MI USA. Phone: 248/356-1400.

PRESSURE RATING INFORMATION: Inlet pressures shown below are for **IAS Rated Inlet Pressures** and **Maximum Operating Inlet Pressures**. The IAS Rated Inlet Pressures are established by ANSI standard Z21.18 and CAN1-6.3 (CV47 also certified to Z21.78 and CAN1-91). The Maximum Operating Inlet Pressures are tested by Maxitrol in excess of these standards, and recommended by us.

6. L'aération **doit** être réglée conformément aux règles gouvernementales et aux codes de plomberie afin d'éviter les dangers reliés aux fuites de gaz. Les canalisations d'aération **doivent** être ouvertes et l'extrémité ouverte doit être protégée contre la pénétration de matières étrangères, y compris l'eau.

7. On **doit** mesurer la pression de sortie du régulateur et s'assurer qu'elle convient à l'usage prévu. Si l'on doit changer le ressort afin d'obtenir la pression de sortie voulue, le ressort **doit faire partie de ceux qui sont recommandés par Maxitrol** et la nouvelle pression de sortie doit être inscrite sur le régulateur.

8. On doit prendre les mesures nécessaires pour garantir que la pression d'entrée suffit à obtenir la pression de sortie voulue. On ne doit apporter aucun ajustement de pression de sortie si la pression d'entrée dépasse les limites prescrites pour le régulateur. La non-conformité à cette consigne peut provoquer la surchauffe de l'appareil ou d'un autre dispositif au gaz. **Consulter la notice sur le régulateur Maxitrol** pour connaître les relations précises entre les pressions d'entrée et de sortie.

9. Dans le cas de régulateurs combinés, il suffit d'inverser le dispositif encliquetable situé sous le couvercle pour convertir le régulateur du gaz naturel au pétrole liquéfié.

10. On **doit** employer un régulateur Maxitrol dans les limites des températures indiquées et sans dépasser la pression d'entrée maximale figurant au tableau ci-dessous. Le régulateur devrait aussi être installé dans la position de montage indiquée. Les régulateurs Maxitrol peuvent être employés avec tous les types de gaz combustibles.

11. En cas de doute, communiquer avec le directeur du service après-vente de Maxitrol, à Southfield, au Michigan. Téléphone: (248) 356-1400.

PRESSIONS NOMINALES: Les pressions d'entrée indiquées ci-dessous correspondent aux **pressions d'entrée nominales IAS** et aux **pressions d'entrée maximales de fonctionnement**. Les pressions d'entrée nominales IAS sont établies d'après la norme ANSI Z21.18 et la norme CAN1-6.3 (le modèle CV47 est également certifié conforme aux normes Z21.78 et CAN1-9.1). Les pressions d'entrée maximales de fonctionnement ont été mises à l'essai par Maxitrol à des pressions qui dépassent celles qui sont spécifiées par les normes, et recommandées par nous.

Model Number (Numéro de modèle)	IAS Rated Inlet Pressure (Pression d'entrée nominale IAS)	Maximum Operating Inlet Pressure (Pression d'entrée maximale de fonctionnement)	Pressure Range [inches w.c.] (Plage de pression réglable) [en pouce d'eau]		Ambient Temperature Range (Plage de température ambiante)	Mounting Position [see below] (Position de montage) [voir ci-dessous]
			Adjustable (Réglable)	Convertible (Combiné)		
RV12LT	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		-40° - 275° F (-40° - 135° C)	A, B, C, D
RV20L	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		-40° - 225° F (-40° - 107° C) -40° - 275° F [T Model]	A, B, C, D
RV20C	1/2 psi (34 mbar)	1/2 psi (34 mbar)		4 to 10	32° - 225° F (0° - 107° C)	A, B, C, D,
RV47C, CV47C, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)		4.5 or 6 to 10 or 11	32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV47, CV47, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	2.8-5.2, 4-8, 6-10, 8-12		32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV47A, CV47A, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3.8-4.3, 4.7-5.3, 5.6-6.4, 9.7-11.3		32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV48, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3-6, 4-8, 6-10, 5-12		32° - 225° F (0° - 107° C), 32° - 275° F [T Model]	A, B, C, D, (*1)
RV48C, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)		5 to 10	32° - 225° F (0° - 107° C)	A, B, C, D, (*1)
RV52, RV53, (*1)	1/2 psi (34 mbar)	1/2 psi (34 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
RV61, (*1)	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
RV81, RV91	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A
RV111	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8, 5-12		-40° - 205° F (-40° - 96° C)	A
R400, 500, R600, (*1)	1/2 psi (34 mbar)	1 psi (69 mbar)	3-6, 4-8 (not R400), 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
R400S, R500S, R600S, (*1)	1/2 psi (34 mbar)	5 psi (345 mbar)	3-6, 4-8 (not R400S), 5-12		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*1)
R400Z, (*2)	1/2 psi (34 mbar)	1 psi (69 mbar)	-1.5 to +1.0		-40° - 205° F (-40° - 96° C)	A, B, C, D, (*2)
R500Z, (*3)	1/2 psi (34 mbar)	1 psi (69 mbar)	-1.0 to +2.5		32° - 205° F (0° - 96° C)	A, B, C, D, (*3)

NOTE: (*1) To ensure fast response of the regulator when equipped with a ball-check type automatic vent limiting device (12A04, 12A09, 12A39), regulators **must** be in upright position (A) with non-integral vent limiter installed directly into vent threads. **Any other mounting position may interfere with lockup or cause pilot outage, where applicable.** Maximum inlet pressure for regulators with 12A09 or 12A39 is 2 psi (LP) or 5 psi (natural). Inlet pressures exceeding 2 psi (LP) or 5 psi (natural) require a vent line.

(*2) Minimum vacuum pressure -0.3 to -13.0 inches w.c., added to set pressure.

(*3) Minimum vacuum pressure -0.3 to -11.5 inches w.c., added to set pressure

Remarque (*1): Pour garantir une réponse rapide du régulateur quand l'équipement comprend un dispositif automatique de limitation de ventilation du type à clapet de non-retour à boule (12A04, 12A09, 12A39), les régulateurs doivent être en position verticale (A) avec un limiteur de ventilation non solidaire installé directement dans les filets de l'évent. **Toute autre position de montage peut gêner le verrouillage ou causer une panne du pilote, là où c'est applicable.** Les régulateurs équipés de 12A09 ou de 12A39 sont limités à des pressions maximales d'admission de 2 psi (LP) ou 5 psi (naturel). Pour toutes applications nécessitant de pressions d'admission supérieures à 2 psi (LP) ou 5 psi (naturel) un tuyau d'aération est requis.

(*2) Pression à vide minimale de -0,3 à -13,0 pouces d'eau ajoutée à la pression réglée.

(*3) Pression à vide minimale de -0,3 à -11,5 pouces d'eau ajoutée à la pression réglée.

