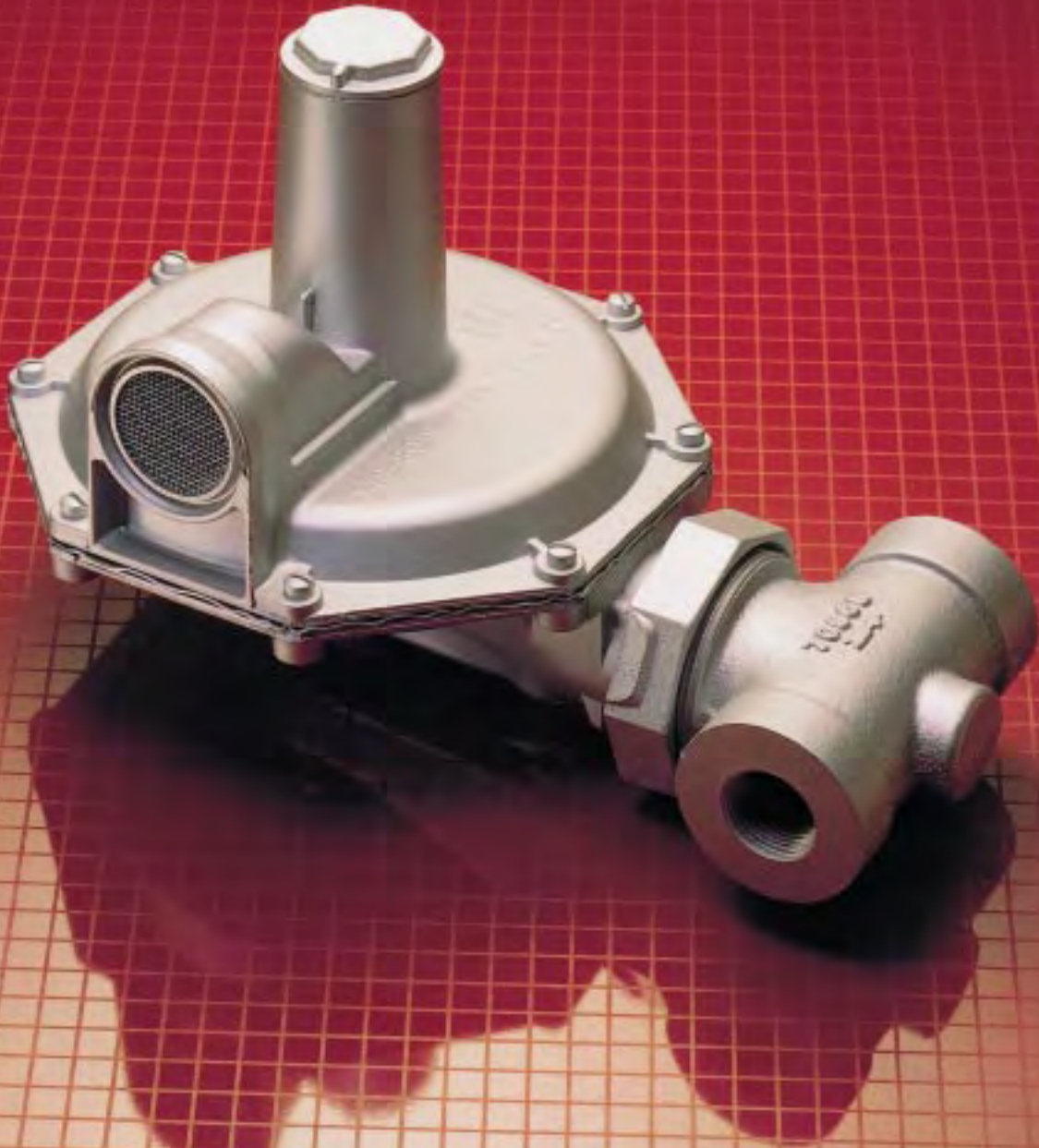

Model 143-80

Service Regulators

R-1301
Rev. 6



**SENSUS**

Model 143-80 Service Regulators

The 143-80 is designed and built for domestic gas service, as well as for commercial and industrial applications; burners, furnaces, ovens, heaters, gas engines, etc. It can also be used for air, LPG, nitrogen, dry CO₂ and other gases.

Simple, rugged construction means dependability. Yet, it provides precise pressure control over an amazing range of pressure and load conditions.

It is simple to install and adjust. The union nut connection makes it easy to locate the regulator in the best installed position, and servicing is easy and convenient.

The Sensus Model 143-80 Service Regulator...outstanding performance, utility, and dependability at an economical price...

Basic Models	Basic Models	Description	High Pressure Models
	143-80-1 143-80-2	Standard Regulator Regulator with Internal Relief Valve (IRV)	

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" w.c. to 1 psi	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 psi to 6 psi	Black*	139-16-021-01

*Only use these springs in high pressure model **143-80-2HP**

Maximum Inlet Pressures—Standard IRV Models and High-Pressure Models	Orifice Sizes	5/8"	1/2"	3/8"	5/16"	1/4"	3/16"	1/8"
	Max Inlet Pressure		10 psi	20 psi	40 psi	40 psi	60 psi	125 psi

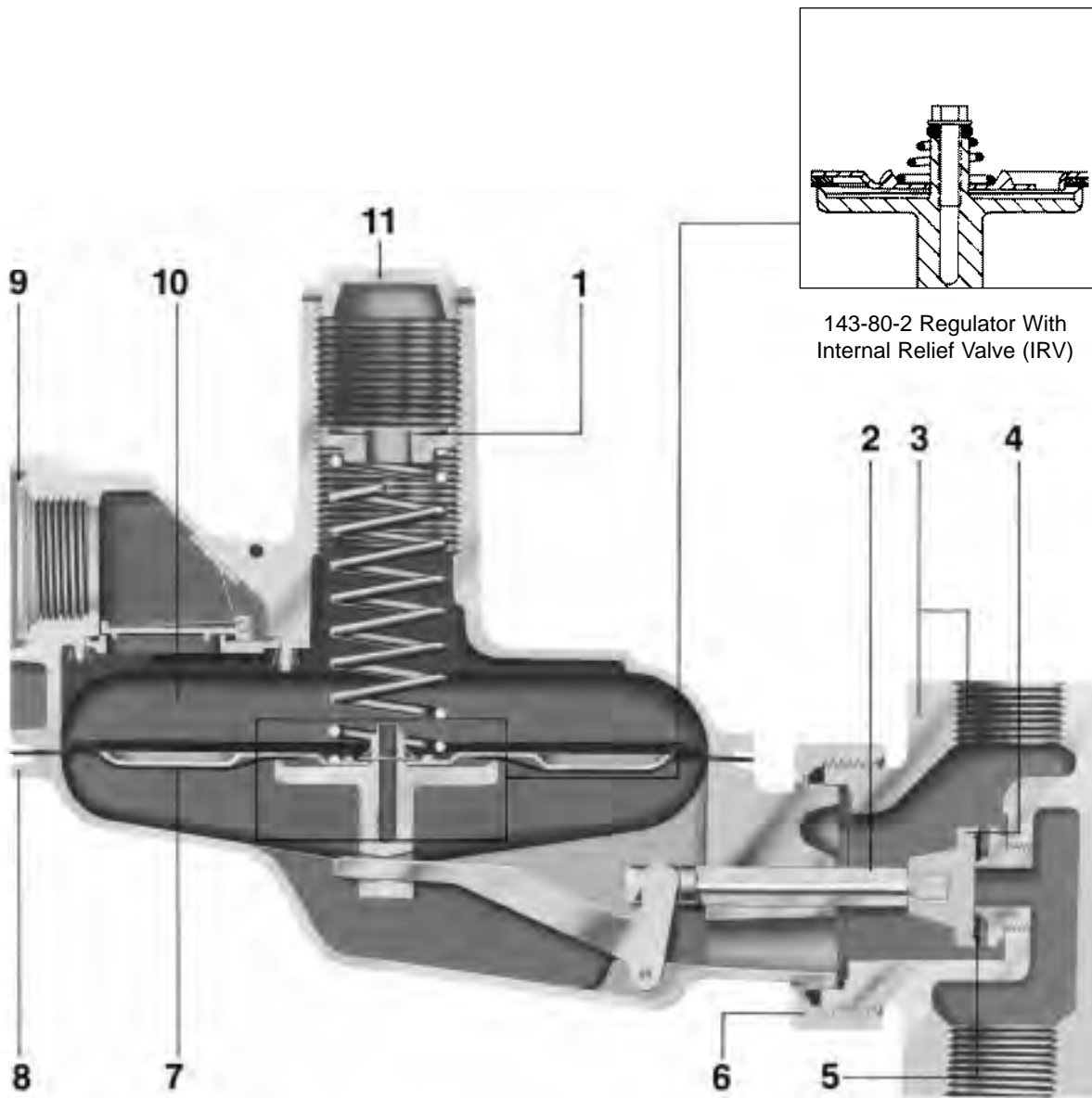
Pipe Sizes	Inlet x Outlet NPT
	3/4" x 3/4"
	3/4" x 1"
	3/4" x 1 1/4"
	1" x 1"
	1" x 1 1/4"
	1 1/4" x 1 1/4"

Temperature Limits

143-80 Service Regulators can be used for temperatures from -20°F. to 150°F.

Buried Service

143-80 Regulators are not recommended for buried service.



143-80-2 Regulator With
Internal Relief Valve (IRV)

143-80-1 Standard Regulator Construction Features

- | | | | |
|---|--|--|---|
| <p>1. Spring Adjustment</p> <p>2. Fiberglass Reinforced Nylon Valve Stem
Minimum friction, minimum dimensional changes over operating temperature range.</p> <p>3. Cast Iron Body
(ASTM A 126 Class B)
(Test Connections
$\frac{1}{8}$" NPT Available on inlet and outlet)</p> | <p>4. Buna-N Soft Seat
Positive tight lock-up</p> <p>5. Aluminum Orifices
interchangeable between $\frac{1}{8}$" thru $\frac{1}{2}$"</p> | <p>6. Union Nut Connection
Full 360° rotation...easy servicing</p> <p>7. Buna-N Diaphragm
Nylon fabric reinforced Full 26 in.² effective area</p> | <p>8. Die Cast Aluminum Alloy Diaphragm Case
High strength, light-weight corrosion resistant.</p> <p>9. Vent
$\frac{3}{4}$" or 1" NPT Screened</p> <p>10. Vent Valve</p> <p>11. Seal Cap</p> |
|---|--|--|---|

Service Regulator Capacity Tables

Sensus Model 143-80-2HP, 143-80-1, 143-80-2 Capacity* in SCFH natural gas (0.6 specific gravity–14.65 psia–60° F.)

Pipe Size (inches)	Inlet Pressure (psig)	Orifice Size (inches)						
		1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
3/4" x 3/4"	1/2					340	450	510
	1			530	480	500	510	530
	2			560	560	570	580	600
	3			600	620	630	650	670
	5	250	420	700	720	730	770	790
	7 1/2	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					
3/4" x 1" 1" x 1"	1/2					350	460	520
	1			530	480	550	600	650
	2			650	700	840	880	780
	3		420	890	870	1000	920	810
	5	250	580	890	1120	1160	950	970
	7 1/2	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					
3/4" x 1 1/4" 1" x 1 1/4" 1 1/4" x 1 1/4"	1/2					350	460	520
	1			530	480	550	680	760
	2			650	700	840	1020	1030
	3		420	890	870	1030	1200	1050
	5	250	580	890	1180	1350	1490	1060
	7 1/2	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					

based on the following maximum variations in outlet pressure:
RED and BLUE SPRINGS: 1" w.c. droop
GREEN SPRING: 2" w.c. droop

ORANGE SPRING: 3" w.c. droop
BLACK/WHITE AND CADMIUM SPRINGS: 1/4 psig droop
BLACK SPRING: 10% droop

Capacities for 1/2, 1 and 2 psig pressures apply only to RED and BLUE springs. Note carefully these capacities do not apply to the green, orange and black springs.

NOTE: Last figure in each column is the maximum capacity for each orifice at recommended pressure within the optimum performance range.

Sensus Model 43-80-6 Low Pressure Cut-Off Capacity* in SCFH natural gas (0.6 specific gravity–14.65 psia–60°F.)

Pipe Size (Inches)	Inlet Pressure (psig)	Outlet Pressures Red Spring* 4 1/2" to 7 1/2" w.c. Blue Spring* 6 1/2" to 9 1/2" w.c.				Outlet Pressures Green Spring* 7 1/2" to 15" w.c.			
		Orifice Size (inches)				Orifice Size (inches)			
		7/16"	3/8"	5/16"	1/4"	7/16"	3/8"	5/16"	1/4"
3/4" x 3/4"	1/2	240	180	90		140	120	90	
	1	400	300	200	100	250	200	160	90
	2	580	420	300	140	370	320	240	140
	5	800	750	600	230	580	530	460	220
	10	1050	990	740	380	780	720	700	370
	15	1140	1050	950	460	920	860	800	480
	25		1100	1100	640		900	1000	660
	60			1300	870			1300	910
3/4" x 1" 1" x 1"	1/2	270	210	90		160	120	90	
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	410	350	270	140
	5	1100	750	610	230	800	730	470	220
	10	1300	1120	760	380	1220	1090	740	370
	15	1300	1300	960	460	1300	1300	930	480
	25		1300	1300	640		1300	1160	660
	60			1300	870			1300	910
1 1/4" x 1 1/4"	1/2	270	210	90		160	120	90	
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	430	350	270	140
	5	1100	750	510	230	870	730	470	220
	10	1300	1120	760	380	1300	1090	740	370
	15	1300	1300	960	460	1300	1300	930	480
	25		1300	1300	640		1300	1160	660
	60			1300	870			1300	910

NOTE: Last figure in each column is the maximum capacity for each orifice at recommended inlet pressure within the optimum performance range.
*RED Spring is Part No. 143-62-021-15, BLUE Spring is Part No. 143-62-021-16, GREEN Spring is Part No. 143-62-021-17.

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.

Internal Relief Valve



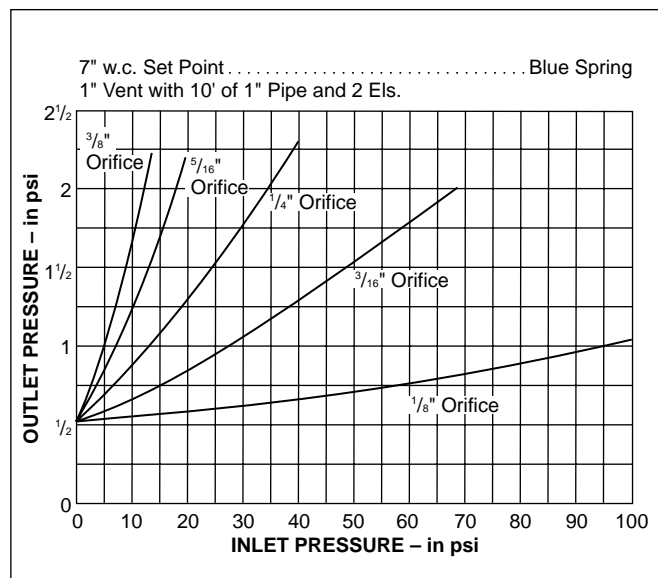
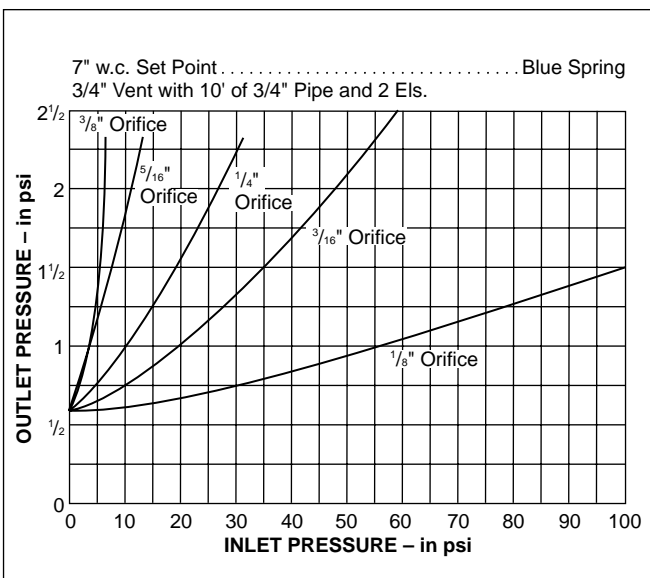
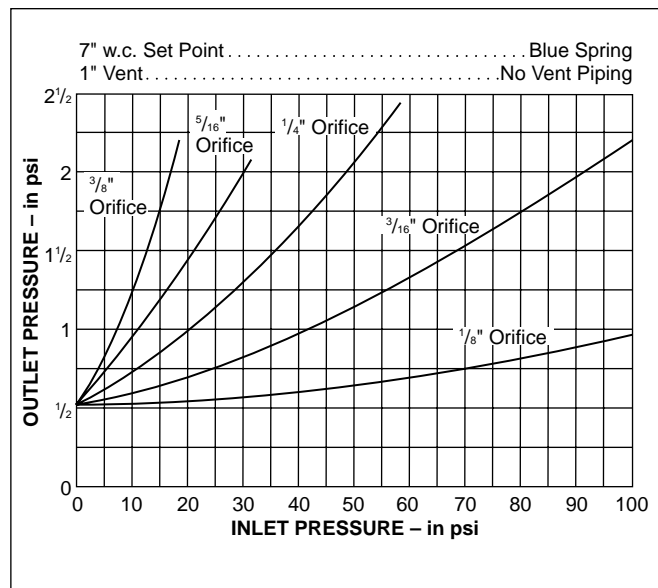
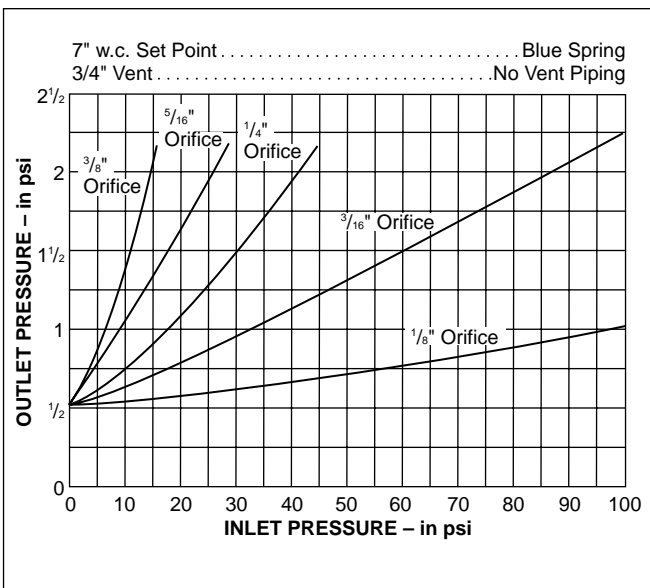
The Internal Relief Valve begins to open when outlet pressure exceeds regulator set-point by approximately 7" w.c. At lower pressures, it is closed.

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 have full capacity relief capability and will not be able to prevent the outlet pressure from exceeding the maximum allowable limit.

The curves below are for checking this condition. They are based on the regulator blocked open to simulate a failure in which the valve goes wide open.

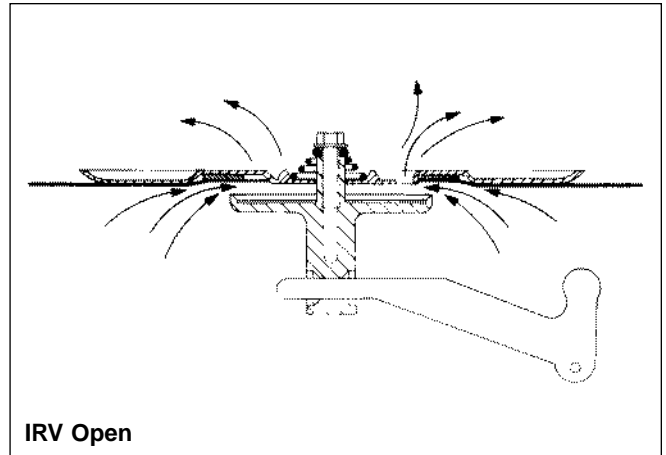
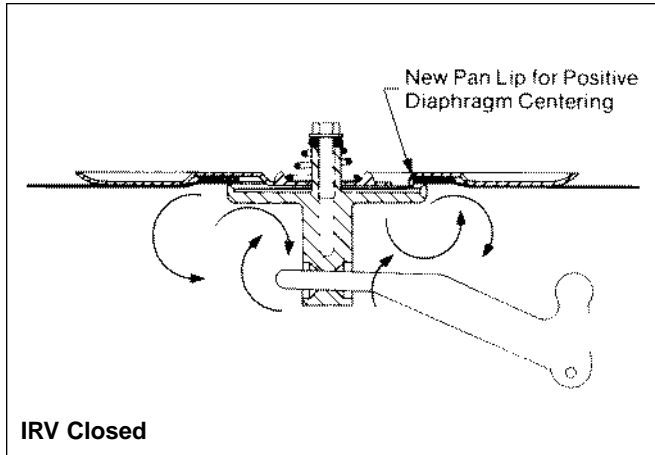
Find the maximum inlet pressure on the horizontal scale. Trace it vertically upwards to the curve for the size orifice used. Trace that point horizontally leftward to the vertical scale and read the outlet pressure. If it is below the maximum allowable outlet pressure for the application, the IRV has full capacity relief capability for a wide open regulator failure.

Note that the curves are based upon a 7" w.c. setpoint and a 5" - 8 1/2" (blue) spring. Curves are presented showing the 3/4" and 1" vent configurations, with and without vent piping. The curves based on vent piping assume 10 ft. of vent piping plus two elbows. If additional vent piping is used it must be carefully sized to avoid restricting the capacity of the IRV.



Caution: It is the user's responsibility to assure that a service regulator vents and/or vent lines exhaust to a non-hazardous location away from **any potential** sources of ignition. Refer to **Sensus Bulletin RM-1301** for more detailed information.

Operation of the Internal Relief Valve



Maximum Emergency Pressures

The maximum outlet pressure to which the 143-80 diaphragm case can be subjected under abnormal conditions without causing damage to the regulator internals is 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 contained means "no leakage" and "no bursting".

143-80-1	143-80-2	}	...Maximum Inlet Pressure +50 psi
	143-80-2HP		
143-80-6		}	...Maximum Inlet Pressure +10 psi

Overpressurization Protection

Protect the downstream piping system and the regulator's low pressure chambers against overpressurization due to the possible regulator malfunction or fail-

ure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, Equimeter Bul-

letin RDS-1498, or other applicable standards. The method of protection can be a relief valve, monitor regulator, shutoff device, or similar mechanism.

Periodic Inspection: Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operating conditions. To assure 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. **See bulletin RM-1301 for field service instructions.**

Standard Construction:

The following items will be considered standard construction for the 143-80 regulator (options are available at additional charge):

1. Body - no pressure taps
2. Orifice - aluminum
3. Valve & stem assembly - plastic w/Buna-N valve
4. Seal wire - none

5. Vent - 1" side vent
6. Cover cap - plastic
7. Spring ferrule - plastic
8. External nuts and bolts - plated steel
9. Identification - stamped on diaphragm cover (no badge)
10. Paint - AGA gray
11. Packaging - six per carton
12. Position

Standard Testing:

The following will be considered standard testing for the 143-80 regulator (optional testing at additional charge):

1. Set point adjustment at customer specified:
 - A. Inlet pressure
 - B. Outlet pressure (set point)
 - C. Minimum and maximum rate of flow within 50 to 350 SCFH
2. Lock-up test (will not exceed 1 1/2" w.c. above set point)
3. Leak test
4. Internal relief valve test
 - A. Initial relief at 7" w.c. ±2" above set point
 - B. Reseat at 20% below initial relief pressure (10" w.c., minimum)

Full Open Capacity:

Use the following formulae for the full open capacity of 143-80 regulators.

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

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

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).

P_O = 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

When sizing relief valves for use with 143-80 regulators, use full open capacity, except for LPCO models.

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.

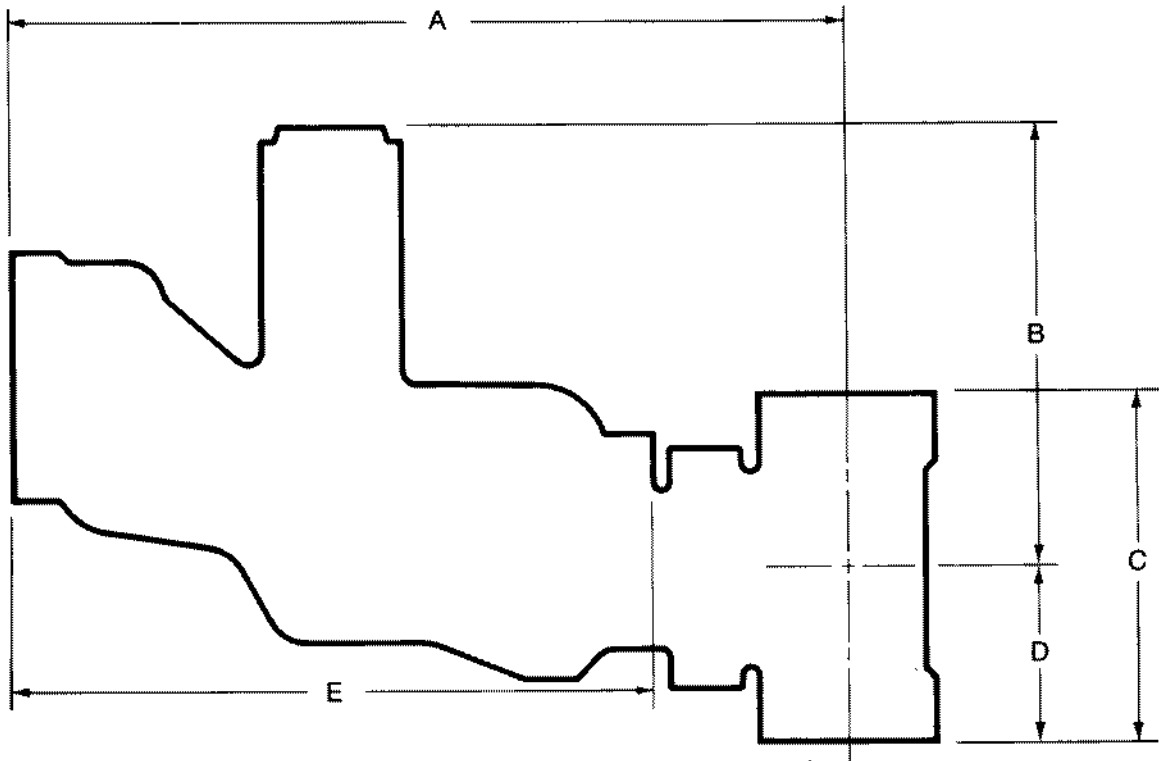
OTHER GASES	CORRECTION FACTOR
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1350 BTU Propane-Air Mix (1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63
For other noncorrosive gases: CORRECTION FACTOR =	$\sqrt{\frac{0.6}{\text{Specific Gravity of the Gas}}}$

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

How to Order

- Specify:
1. Pipe size and model number
 2. Mounting position
 3. Orifice Size

4. Inlet pressure (also maximum and minimum if available)
5. Outlet Pressure set-point
6. Capacity required (scfh)
7. Type of gas (natural gas, propane, etc.)
8. Spring part number
9. Vent Size



Regulator	A	B	C	D	E
143-80	9 ³ / ₈ "	5 ³ / ₄ "	3 ¹⁵ / ₁₆ "	1 ³¹ / ₃₂ "	6 ⁷ / ₈ "

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.
See bulletin RM-1301 for more detailed start-up procedures.

143-80 Service Regulator With Low Pressure Cut-Off

This is the low pressure, cut-off version of the 143-80 residential service regulator.

It is a safety device which stops the inlet gas supply if the outlet pressure drops below a certain point.

Hazardous conditions sometimes develop as a result of a loss in service pressure. A good example of this would be flame or pilot outage resulting from a line break, an interruption in the gas supply, or an excessive demand. The low pressure "cut-off" acts as a safety device for the gas service.

The cut-off unit consists of an extra valve which seats against the inlet side of the orifice. As the main valve moves away from its seat to increase flow, in response to a decreasing outlet pressure signal, the cut-off valve moves toward its seat. If the main valve movement becomes excessive, the cut-off valve will take over and go closed. At this point the gas supply is shut off and cannot be resumed until the cut-off unit is manually reset.

Basically, "cut-off" is triggered by an excessive drop in outlet pressure. However, the specific outlet pressure at which "cut-off" occurs also depends on the size of the orifice and the inlet pressure.

As mentioned previously, once the cut-off valve closes, it must be manually opened to put the regulator back into operation. It must also be manually opened when put into ser-

vice initially or when returned to service after being shut down. This is easily done by removing the cover cap and pulling upwards on the diaphragm post extension.

Installation is simple and quick. It is the same as for other standard types of self-contained domestic service regulators.

Adjustment for the outlet pressure set point is accomplished by removing the cover cap and screwing the adjustment ferrule down or up to raise or lower pressure.

The 143-80 regulator with low pressure cut-off is furnished WITH AN INTEGRAL INTERNAL RELIEF. It is used on LP and manufactured gas as well as natural gas. In addition it can also be used on air, CO₂, nitrogen and other industrial gases.

Basic LPCO Models

143-80-6	Regulator with IRV and LPCO
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Inlet Pressure Range...in. w.c. to 60 psi

Outlet Pressure Range 4 1/2" to 15" w.c.

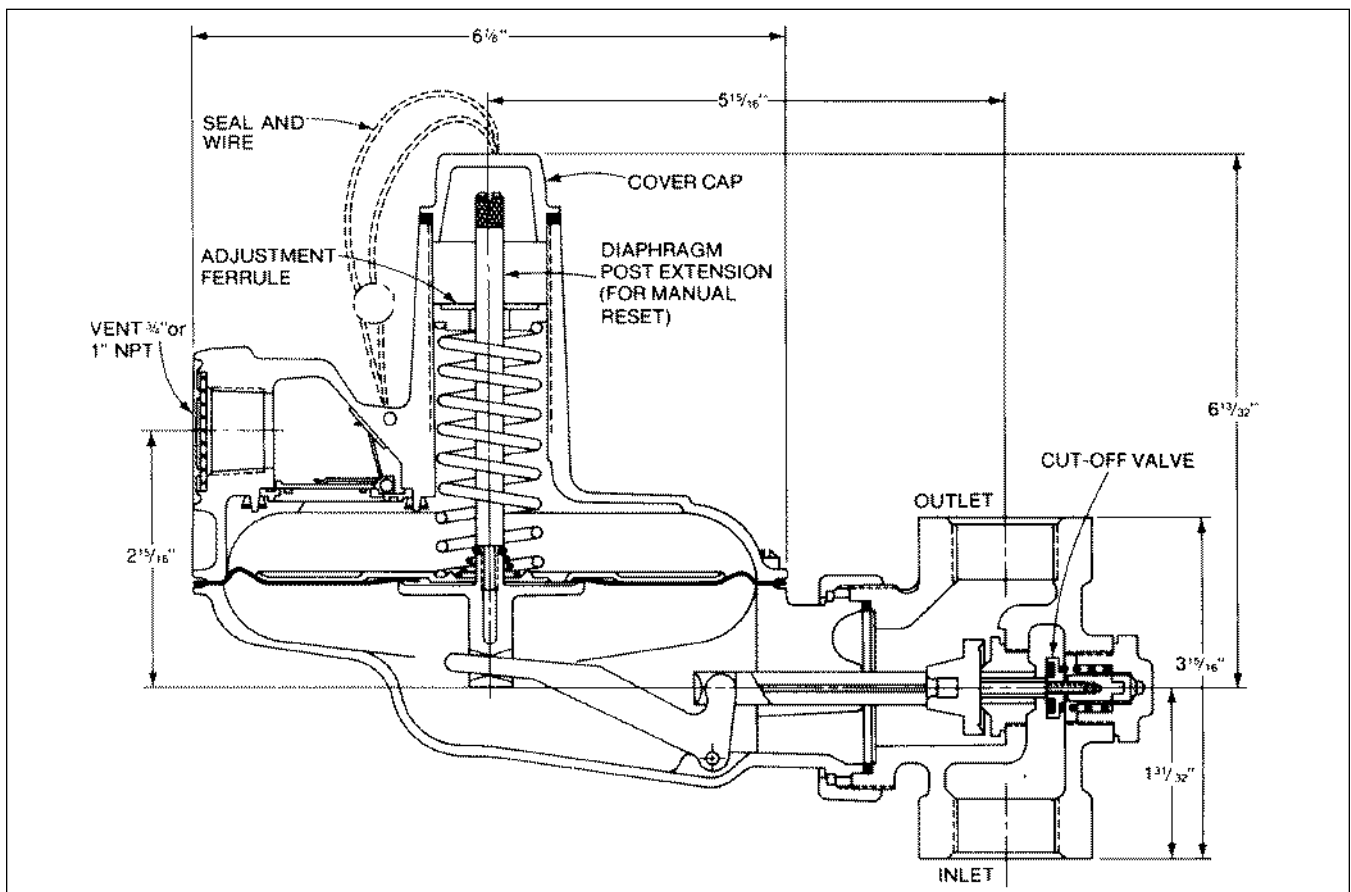
Orifices...aluminum, 1/4"-5/16"-3/8"-7/16"

Spring Ranges LPCO Models

Outlet Pressure Ranges	Spring Color
4 1/2" to 7 1/2" w.c.	Red Spring
6 1/2" to 9 1/2" w.c.	Blue Spring
7 1/2" to 15" w.c.	Green Spring

Maximum Inlet Pressure

ORIFICE SIZE	1/4"	5/16"	3/8"	7/16"
Maximum Inlet Pressure	60 psig	40 psig	25 psig	15 psig





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Authorized Distributor

Limited Warranty

Seller warrants the Goods to be free from defects in materials manufactured by Seller and in Seller's workmanship for a period of one (1) year after tender of delivery (the "Warranty Period"). THIS LIMITED WARRANTY (a) IS IN LIEU OF, AND SELLER DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, STATUTORY, EXPRESS OR IMPLIED, INCLUDING, WITH LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR OF CONFORMITY TO MODELS OR SAMPLES; (b) does not apply to any Goods which have been (i) repaired, altered or improperly installed; (ii) subjected to improper use or storage, (iii) used or incorporated with other materials or equipment, after buyer or anyone using the Goods has, or reasonably should have, knowledge of any defect or nonconformance of the Goods; or (iv) manufactured, fabricated or assembled by anyone other than Seller, (c) shall not be effective unless buyer notifies Seller in writing of any purported defect or nonconformance with (thirty days) after Buyer discovers or should have reasonably discovered such purported defect or nonconformance; and (d) shall only extend to Buyer and not to any subsequent buyers or users of the Goods. Buyer shall provide Seller access to the Goods as to which Buyer claims a purported defect or nonconformance, upon request by Seller, buyer shall, at its own risk and expense, promptly return the Goods in question to Seller's Plant.