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# Model 143-80

## Service Regulators

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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 CO<sub>2</sub> 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<br>143-80-2 | Standard Regulator<br>Regulator with Internal Relief Valve (IRV) | 143-80-2HP           |

| Spring Ranges | Outlet Pressure Ranges | Spring Color  | Spring Part Number |
|---------------|------------------------|---------------|--------------------|
|               | 3½" to 6½" w.c.        | Red           | 143-62-021-15      |
|               | 5" to 8½" 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      |
|               | ½ psi to 2 psi         | Black & White | 143-62-021-22      |
|               | ½ 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      | ⅝"     | ½"     | ⅜"     | ⅚"     | ¼"     | ⅜"      | ⅛"      |
|----------------------------------------------------------------------|--------------------|--------|--------|--------|--------|--------|---------|---------|
|                                                                      | Max Inlet Pressure | 10 psi | 20 psi | 40 psi | 40 psi | 60 psi | 125 psi | 125 psi |

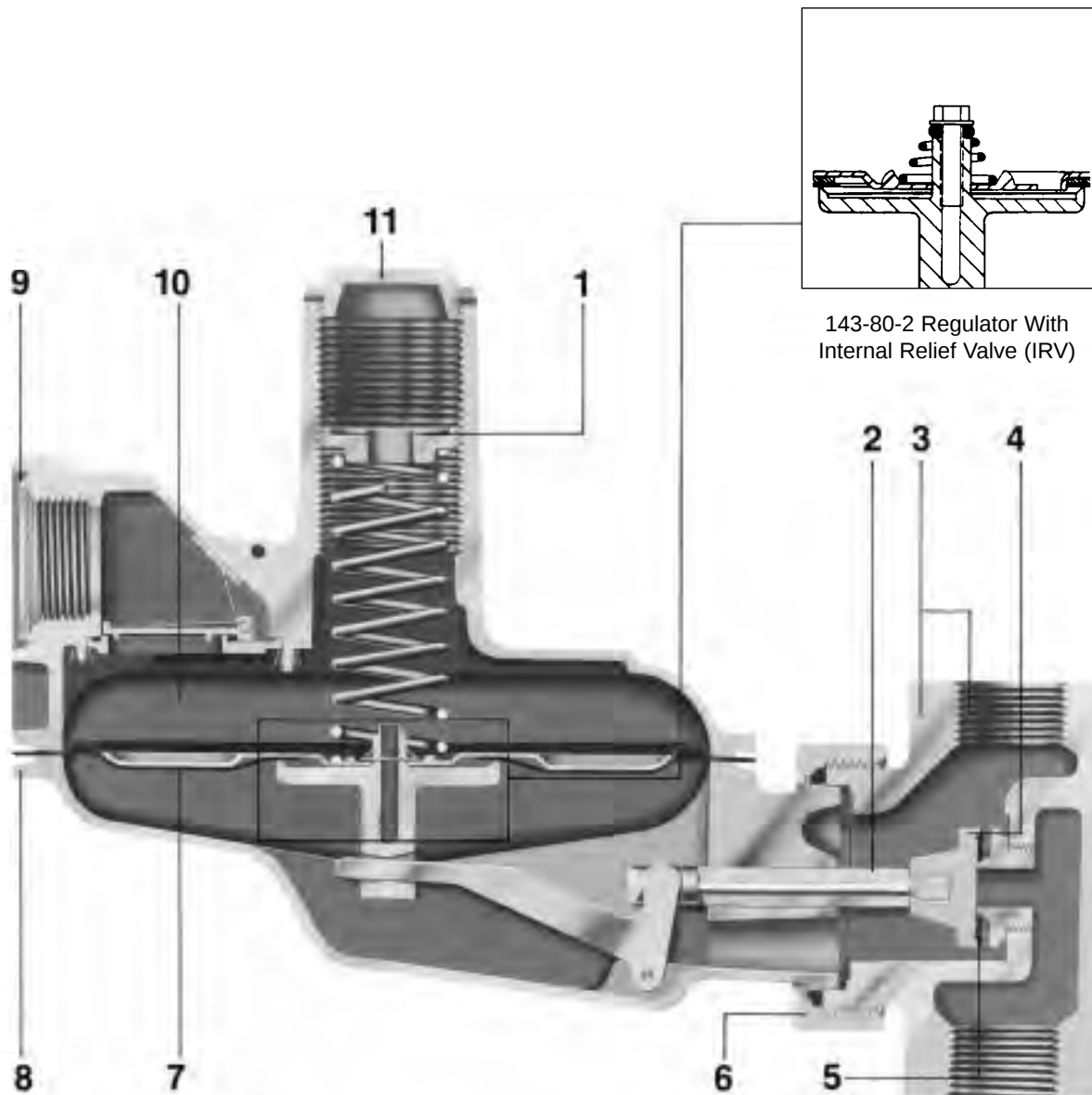
| Pipe Sizes | Inlet x Outlet NPT |
|------------|--------------------|
|            | ¾" x ¾"            |
|            | ¾" x 1"            |
|            | ¾" x 1¼"           |
|            | 1" x 1"            |
|            | 1" x 1¼"           |
|            | 1¼" x 1¼"          |

## 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.



## 143-80-1 Standard Regulator Construction Features

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

# 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<br>(inches)                           | Inlet Pressure<br>(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                        |                       |       |      | 480   | 500  | 510  | 530  |
|                                                 | 2                        |                       |       |      | 560   | 570  | 580  | 600  |
|                                                 | 3                        |                       |       |      | 620   | 630  | 650  | 670  |
|                                                 | 5                        | 250                   | 420   | 600  | 720   | 730  | 770  | 790  |
|                                                 | 7 1/2                    | 310                   | 560   | 700  | 860   | 880  | 900  | 900  |
|                                                 | 10                       | 370                   | 700   | 840  | 970   | 1000 | 1020 | 1020 |
|                                                 | 20                       | 530                   | 1200  | 1220 | 1240  | 1250 | 1270 |      |
|                                                 | 40                       | 860                   | 1570  | 1330 | 1340  |      |      |      |
|                                                 | 60                       | 1200                  | 1660  | 1520 |       |      |      |      |
|                                                 | 80                       | 1500                  | 1710  |      |       |      |      |      |
|                                                 | 125                      | 1800                  | 1900  |      |       |      |      |      |
| 3/4" X 1"<br>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   | 1120 | 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"<br>1" X 1 1/4"<br>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   | 1180 | 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 rec-  
ommended 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<br>(Inches) | Inlet Pressure<br>(psig) | Outlet Pressures<br>Red Spring* 4 1/2" to 7 1/2" w.c.<br>Blue Spring* 6 1/2" to 9 1/2" w.c. |      |       |      | Outlet Pressures<br>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"<br>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.

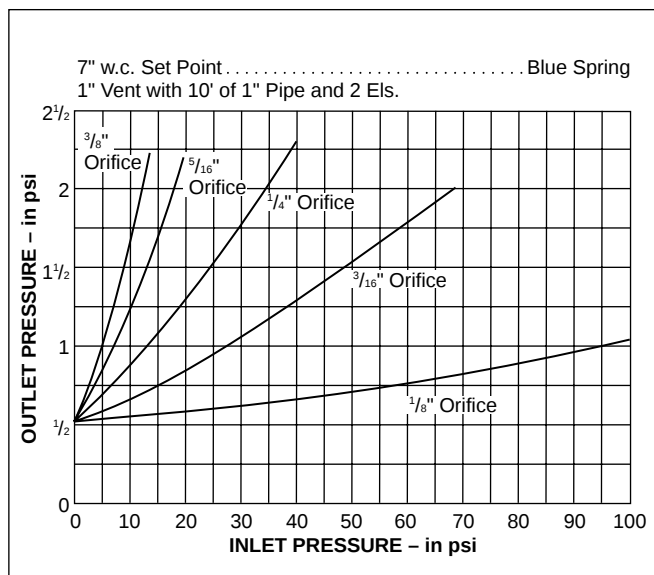
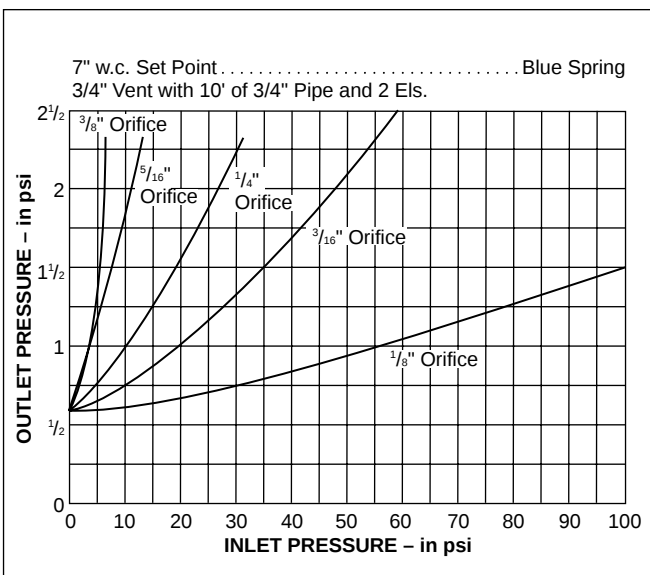
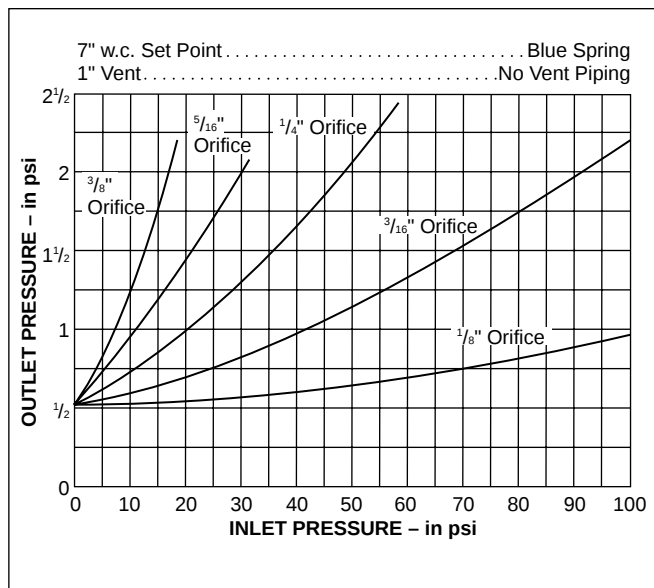
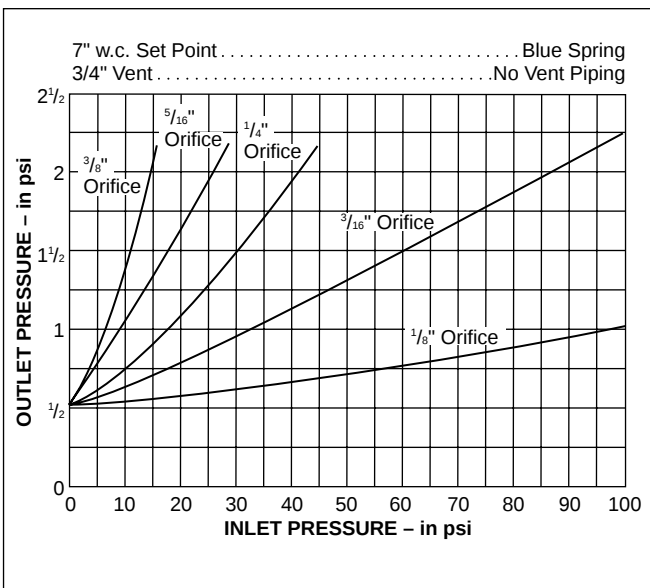
The Internal Relief Valve begins to open when outlet pressure exceeds regulator set-point by approximately 7" w.c. At lower pressures, it is closed.

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.

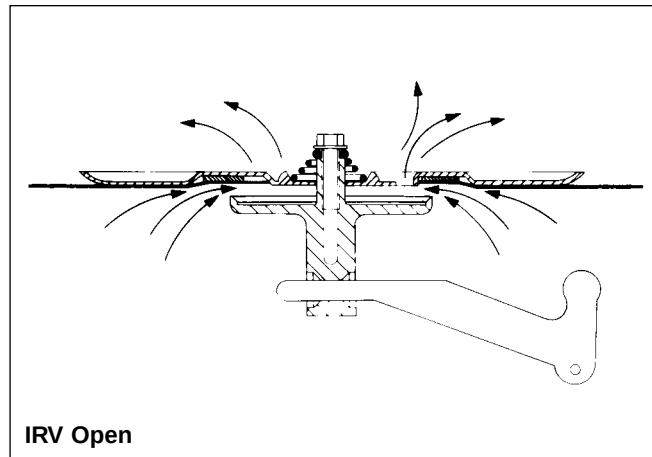
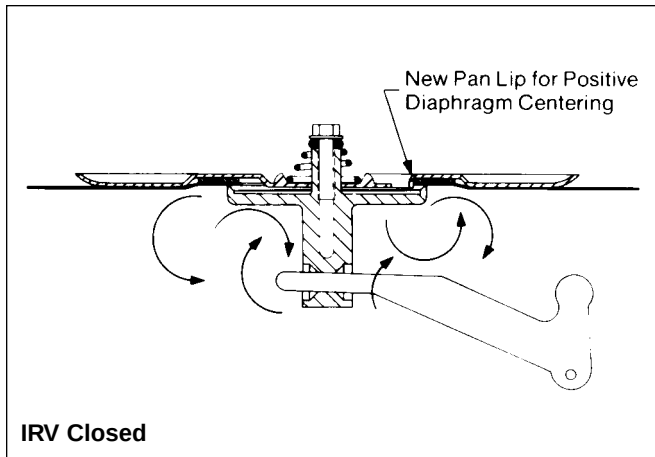
Find the maximum inlet pressure on the horizontal scale. Trace it vertically upwards to the curve for the size orifice used. Trace that point horizontally leftward to the vertical scale and read the outlet pressure. If it is below the maximum allowable outlet pressure for the application, the IRV has 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 $\frac{1}{2}$ " (blue) spring. Curves are presented showing the  $\frac{3}{4}$ " 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.

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

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

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).

P<sub>I</sub> = absolute inlet pressure (psia).

P<sub>O</sub> = 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 CO<sub>2</sub>, air and others.

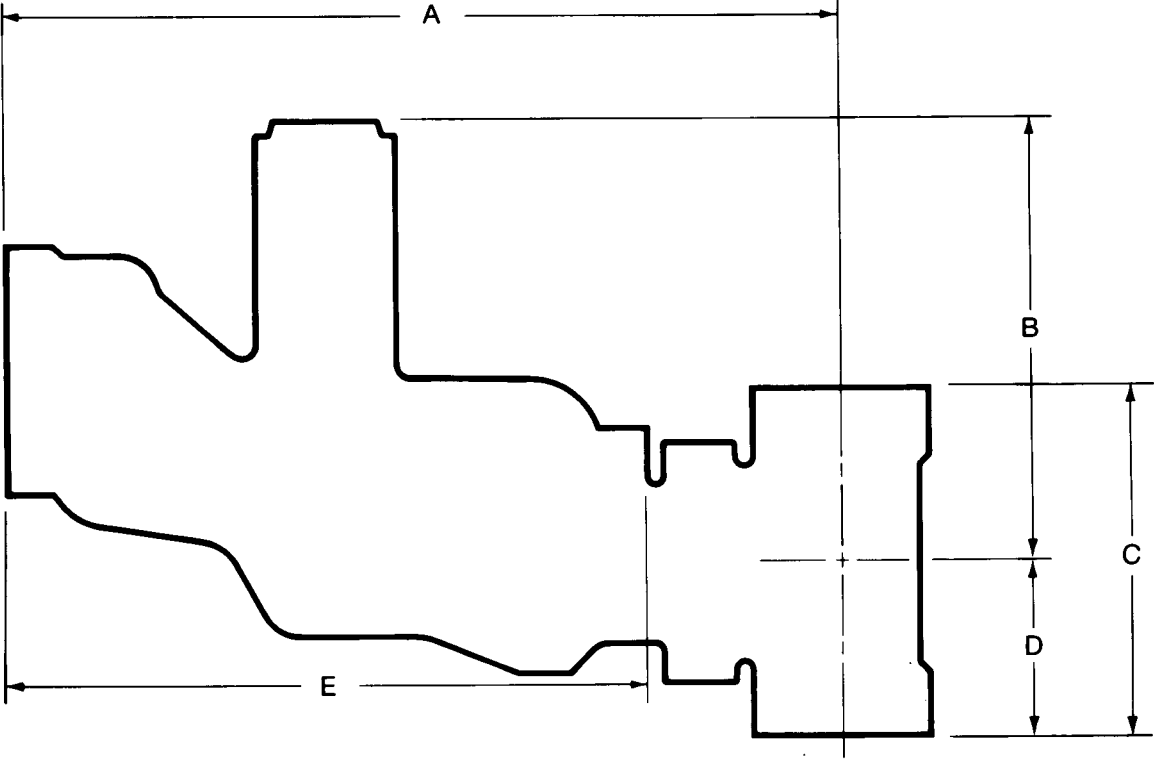
| OTHER GASES                                          | CORRECTION FACTOR                                       |
|------------------------------------------------------|---------------------------------------------------------|
| Air (Specific Gravity 1.0)                           | 0.77                                                    |
| 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:<br>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 <sup>3</sup> / <sub>8</sub> " | 5 <sup>3</sup> / <sub>4</sub> " | 3 <sup>15</sup> / <sub>16</sub> " | 1 <sup>31</sup> / <sub>32</sub> " | 6 <sup>7</sup> / <sub>8</sub> " |

**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, CO<sub>2</sub>, nitrogen and other industrial gases.

## Basic LPCO Models

|          |                             |
|----------|-----------------------------|
| 143-80-6 | Regulator with IRV and LPCO |
|----------|-----------------------------|

Inlet Pressure Range...in. w.c. to 60 psi

Outlet Pressure Range 4½" to 15" w.c.

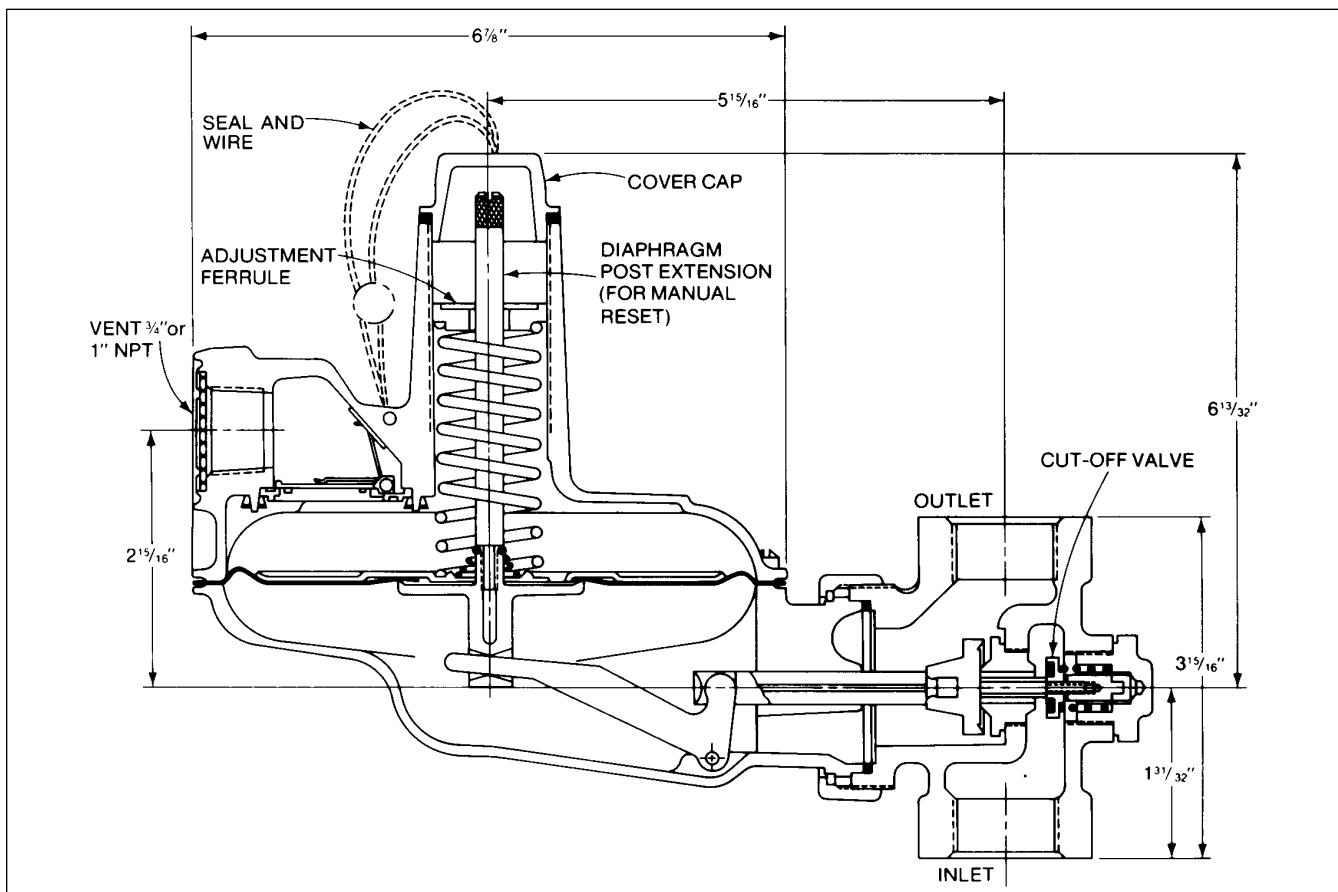
Orifices...aluminum, ¼"-5/16"-3/8"-7/16"

## Spring Ranges LPCO Models

| Outlet Pressure Ranges | Spring Color |
|------------------------|--------------|
| 4½" to 7½" w.c.        | Red Spring   |
| 6½" to 9½" w.c.        | Blue Spring  |
| 7½" to 15" w.c.        | Green Spring |

## Maximum Inlet Pressure

| ORIFICE SIZE           | ¼"      | 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.