

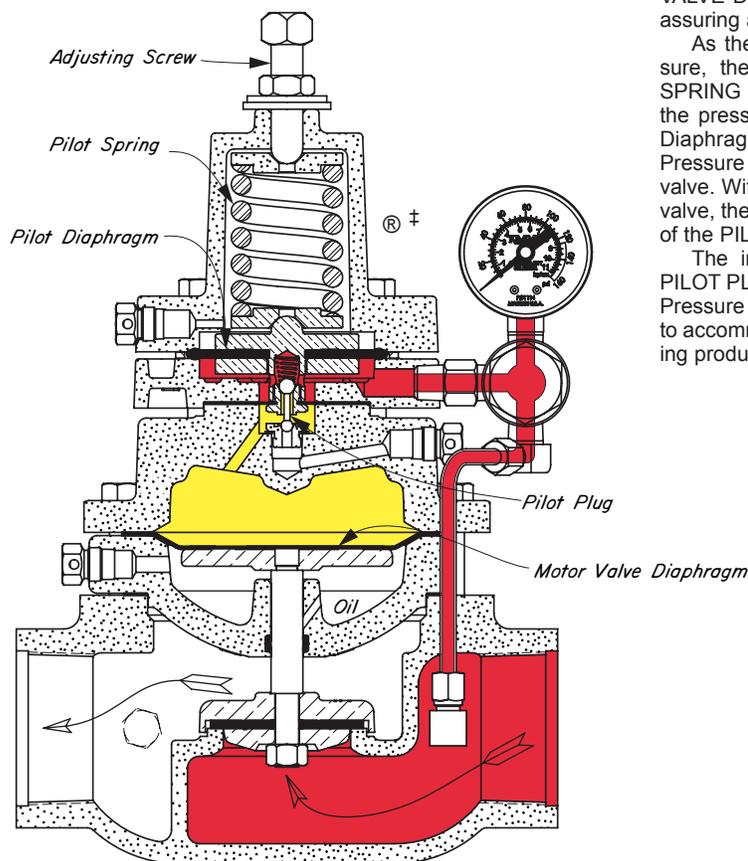
APPLICATION:

Vent lines on oil separators, flow treaters, compressor stations, gas gathering systems.

CERTIFICATIONS:

Canadian Registration Number (CRN):
 0C16234.24567890NTY (Ductile)
 0C15604.24567890NTY (Steel)

-  Pilot Assembly
-  Motor Valve Stem Assembly
-  Upstream Pressure
-  Motor Valve Diaphragm Pressure



OPERATION:

The Pilot Assembly and Motor Valve Stem Assembly (Crosshatched) are the only moving units in the regulator. The PILOT PLUG consists of two stainless balls rigidly connected together. The upper seat for the PILOT PLUG is the Motor Valve Diaphragm Pressure inlet (Red to Yellow). The lower seat for the PILOT PLUG is the pressure vent (Yellow to Atmosphere).

The PILOT SPRING in the bonnet loads the upper side of the Pilot Assembly and is opposed on the underside by Upstream Pressure (Red).

Assume the PILOT SPRING is compressed with the ADJUSTING SCREW for a set pressure greater than the Upstream Pressure (Red). The Pilot Assembly is forced downward by the PILOT SPRING. The lower seat for the PILOT PLUG (Yellow to Atmosphere) is closed and the upper seat for the PILOT PLUG (Red to Yellow) is open. This lets full Upstream Pressure (Red) load the motor valve. The area of the MOTOR VALVE DIAPHRAGM is twice the area of the motor valve seat, assuring a Class VI positive shut-off.

As the Upstream Pressure (Red) increases to the set pressure, the Pilot Assembly moves upward against the PILOT SPRING to first close the upper seat (Red to Yellow) and open the pressure vent (Yellow to Atmosphere). As the Motor Valve Diaphragm Pressure (Yellow) is decreased, the Upstream Pressure (Red) acting under the motor valve seat, opens the valve. With relief of Upstream Pressure (Red) through the motor valve, the Pilot Assembly assumes a position in which both seats of the PILOT PLUG are closed.

The intermittent vent pilot, three-way valve action of the PILOT PLUG against its seat adjusts the Motor Valve Diaphragm Pressure (Yellow), repositioning the Motor Valve Stem Assembly to accommodate any rate of flow. The rapid but stable repositioning produces a true throttling action.



Kimray is an ISO 9001- certified manufacturer.

| Table 1 - Flow Coefficient(Cv) at % stem travel for Pilot Operated Regulators | | | | | | | | | | | |
|--|-------------|--------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|
| 1" Pressure Regulator | | | | | | | | | | | |
| Trim Size in.(mm) | Cf | Valve Opening Percentage | | | | | | | | | |
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1/2 in (12mm) Reduced | 0.75 | 0.4 | 0.7 | 0.9 | 1.3 | 1.8 | 2.5 | 3.2 | 3.9 | 4.5 | 5 |
| 1 in (25mm) Full Port | 0.74 | 1.1 | 1.8 | 2.4 | 3.4 | 4.8 | 6.6 | 8.5 | 10.2 | 11.9 | 13.2 |
| 2" Pressure Regulator | | | | | | | | | | | |
| Trim Size in. (mm) | Cf | Valve Opening Percentage | | | | | | | | | |
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1 1/4 in (31 mm) Reduced | 0.75 | 1.8 | 2.8 | 3.9 | 5.4 | 7.7 | 10.5 | 13.6 | 16.2 | 19.0 | 21.0 |
| 2 in Removable Full Port * | 0.84 | 4.0 | 6.2 | 8.6 | 12.1 | 17.2 | 23.5 | 30.4 | 36.3 | 42.5 | 47.0 |
| 2 in (50 mm) Full Port * | 0.75 | 4.4 | 6.9 | 9.5 | 13.4 | 19.1 | 26.0 | 33.6 | 40.2 | 47.0 | 52.0 |
| 3" Pressure Regulator | | | | | | | | | | | |
| Trim Size in. (mm) | Cf | Valve Opening Percentage | | | | | | | | | |
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1 5/8 in (66 mm) Reduced | 0.82 | 2.9 | 4.5 | 6.2 | 8.8 | 12.5 | 17.0 | 22.0 | 26.3 | 30.7 | 34.0 |
| 3 in (76 mm) Full Port | 0.75 | 9.9 | 15.6 | 21.5 | 30.2 | 42.9 | 58.6 | 75.7 | 90.4 | 105.7 | 117.0 |
| 4" Pressure Regulator | | | | | | | | | | | |
| Trim Size in. (mm) | Cf | Valve Opening Percentage | | | | | | | | | |
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 2 in (50 mm) Reduced | 0.80 | 4.7 | 7.3 | 10.1 | 14.2 | 20.2 | 27.5 | 35.6 | 42.5 | 49.7 | 55.0 |
| 4 in (100 mm) Full Port | 0.75 | 17.8 | 27.9 | 38.6 | 54.2 | 77.0 | 105.2 | 135.9 | 162.2 | 189.8 | 210.0 |
| 6" Pressure Regulator | | | | | | | | | | | |
| Trim Size in. (mm) | Cf | Valve Opening Percentage | | | | | | | | | |
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 3 in (76 mm) Reduced | 0.80 | 10.2 | 16.0 | 22.0 | 30.9 | 44.0 | 60.1 | 77.7 | 92.7 | 108.4 | 120.0 |
| 6 in (152 mm) Full Port | 0.75 | 40.6 | 63.8 | 88.1 | 123.8 | 176.0 | 240.4 | 310.6 | 370.7 | 433.7 | 480.0 |

Kimray flow equations conform to ANSI/ISA - 75.01.01-2002

Kimray inherent flow characteristics conform to ANSI/ISA 75.11.01 -1985

* Use "2 inch Removable Full Port" values for regulators with operating pressure ranges of 10-250psig, 10-285psig & 10-300psig

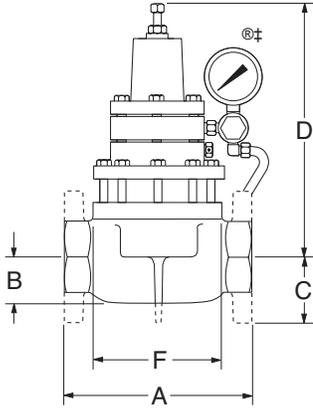
PRESSURE REGULATORS



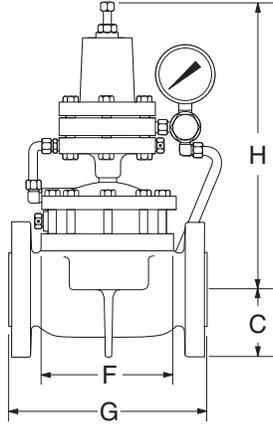
DIMENSIONS

FOR: BACK PRESSURE
UPSTREAM DIFFERENTIAL PRESSURE
PRESSURE REDUCING-BALANCED
PRESSURE REDUCING VACUUM

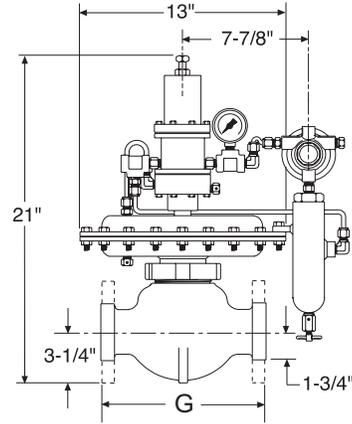
PRESSURE DIFFERENTIAL
PRESSURE REDUCING
BACK PRESSURE VACUUM
LIQUID BACK PRESSURE



DUCTILE

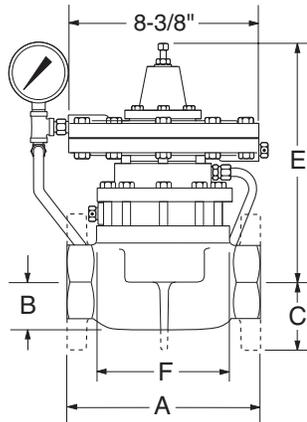


STEEL

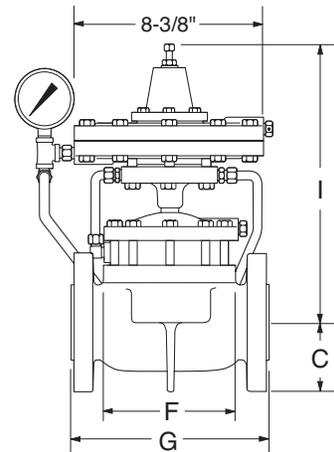


250 S/FGT-BP-S

FOR: LOW PRESSURE BACK PRESSURE
OUNCES BACK PRESSURE TO VACUUM
OUNCES PRESSURE REDUCING
OUNCES PRESSURE REDUCING VACUUM
VACUUM BACK PRESSURE TO VACUUM



DUCTILE

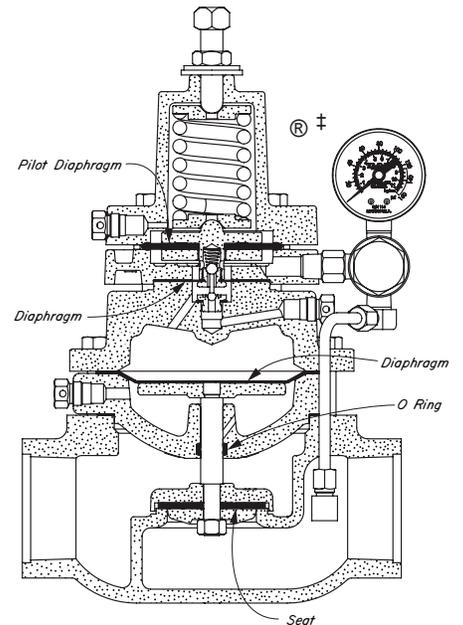


STEEL

| LINE SIZE | BODY SIZE | A | B | C | D* | E | F | G | H* | I |
|-----------|-----------|-----------|---------|--------|---------|----------|---------|-----------|---------|-----------|
| 1" | NPT | 4 3/8" | 1 1/8" | | 7 1/2" | 11 5/8" | 3 1/4" | | | |
| 2" | NPT | 8 1/2" | 2 1/8" | | 11 1/2" | 10 1/2" | 6 1/2" | | | |
| | FLANGED | 9" | | 3" | 11 1/2" | 10 1/2" | 6 1/2" | 9 1/8" | 14 1/2" | 14" |
| | GROOVED | 8 3/4" | 2 1/8" | | 11 1/2" | 10 1/2" | 6 1/2" | | | |
| 250 S/FGT | NPT | | | | | | | 10 1/2" | | |
| | FLANGED | | | | | | | 10 3/8" | | |
| 3" | NPT | 12 1/16" | 3 1/16" | | 13" | 12" | 8 1/2" | | | |
| | FLANGED | 12 3/16" | | 3 3/4" | 13" | 12" | 8 1/2" | 12 3/8" | 16 1/2" | 15 1/2" |
| 4" | NPT | 15" 1/16" | 4" | | 14 1/2" | 13 3/16" | 10 1/2" | | | |
| | FLANGED | 15 1/16" | | 4 1/2" | 14 1/2" | 13 3/16" | 10 1/2" | 15 1/16" | 18 1/2" | 16 11/16" |
| 6" | FLANGED | 22" | | 5 1/2" | 17" | 17 7/8" | 16" | 21 15/16" | 20 1/2" | 18 3/8" |

FLANGE DIMENSIONS ARE ANSI 125/150 STANDARD. *Add 7/8" to Pressure Reducing Balanced and Up Stream Differential Pressure Regulators for this dimension.

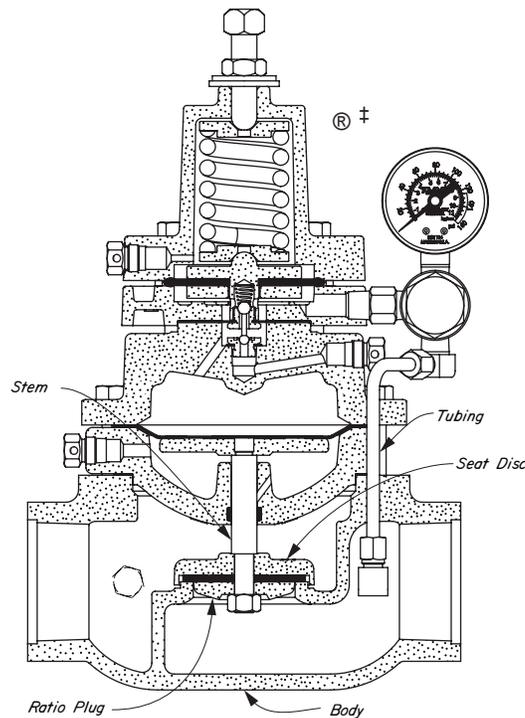
| Part | Standard Material | Optional Material |
|--|-------------------|--------------------------|
| Seat | Nitrile | FKM, HSN, AFLAS®, Gylon® |
| O-rings | Nitrile | FKM, HSN, AFLAS®, Gylon® |
| All Diaphragms Except Pilot Diaphragm | Nitrile | FKM, HSN, AFLAS®, Gylon® |
| Pilot Diaphragm | Polyurethane | FKM, HSN, AFLAS®, Gylon® |



| | | NITRILE | HIGHLY SATURATED NITRILE | FKM | AFLAS® | POLY-URETHANE | GYLON |
|-------------------|-------------------------|---------------|--------------------------|----------------|----------------|----------------|----------------|
| | Kimray Suffix | - | HSN | V | AF | P | GY |
| Resistance | Abrasion | G | G | G | GE | E | E |
| | Acid | F | E | E | E | P | E |
| | Chemical | FG | FG | E | E | FG | E |
| | Cold | G | G | PF | P | G | E |
| | Flame | P | P | E | E | P | P |
| | Heat | G | E | E | E | F | E |
| | Oil | E | E | E | E | G | E |
| | Ozone | P | G | E | E | E | E |
| | Set | GE | GE | E | PF | F | P |
| | Tear | FG | FG | F | PF | GE | E |
| | Water/Steam | FG | E | P | GE | P | E |
| | Weather | F | G | E | E | E | E |
| | CO2 | FG | GE | PG | GE | G | E |
| | H2S | P | FG | P | E | G | E |
| Methanol | G | E | PF | PF | P | E | |
| Properties | Dynamic | GE | GE | GE | GE | E | P |
| | Electrical | F | F | F | E | FG | E |
| | Impermeability | G | G | G | G | G | E |
| | Tensile Strength | GE | E | GE | FG | E | E |
| | Temp. Range (°F) | -40 to +220°F | -15° to +300°F | -10° to +350°F | +25° to +450°F | -40° to +220°F | -350 to +500°F |
| | Temp. Range (°C) | -40 to +105°C | -26° to +149°C | -23° to +177°C | 0° to +232°C | -40° to +104°C | -212 to +260°C |
| | Form | O,S,D | O,S,D | O,S,D | O,S,D | S,D | S,D |

RATINGS: P-POOR, F-FAIR, G-GOOD, E-EXCELLENT

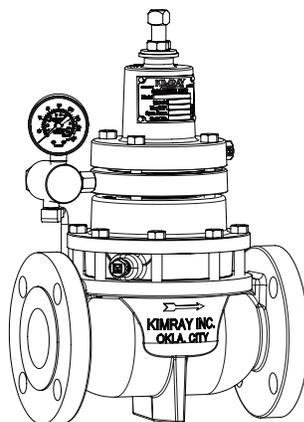
| Table 5 - Materials of Construction | | | |
|-------------------------------------|-------------------------|--------------------------------------|---------------------------------|
| Part Description | Valve Size | Standard Material | Optional Material(s) |
| Ratio Plug | 1" & 2" | 316 Powdered Metal SS-316NI-25 | N/A |
| | 1" & 2" Reduced Trim | Steel, ASTM A-108 | 316 Stainless Steel ASTM A-479 |
| | 3" | Powdered Metal F-008 | 316 Stainless Steel ASTM A-479 |
| | 4" & 6" | Ductile, ASTM A-395 | 316 Stainless Steel ASTM A-479 |
| Seat Disc | 1" | Powdered Metal F-0008-30 | 316 Stainless Steel ASTM A-479 |
| | 2", 3" & 4" | Ductile, ASTM A-395 | Stainless Steel ASTM A-351 CF8M |
| | 6" | Ductile, ASTM A-395 | Stainless Steel ASTM A-240 |
| Stem | 1" thru 6" | 303 Stainless Steel, ASTM A-582 | 316 Stainless Steel ASTM A-479 |
| Body | 1" thru 6" | Ductile, ASTM A-395 | N/A |
| Body | 2" thru 6" | Steel, ASTM A-216 WCB | Stainless Steel ASTM A-351 CF8M |
| Tubing | 175 W.P. or Less | Copper Tubing ASTM B-380 UNS C-12200 | 316 Stainless Steel ASTM A-213 |
| | | Copper Tubing ASTM B-280 UNS C-12200 | 316 Stainless Steel ASTM A-213 |
| | Greater Than 175 W.P. | 304 Stainless Steel ASTM A-249 | 316 Stainless Steel ASTM A-213 |
| Removable Seat | 2" thru 6" Ductile Body | Ductile, ASTM A-395 | Stainless Steel ASTM A-351 CF8M |
| | 2" thru 6" Steel Body | Stainless Steel ASTM A-351 CF8M | N/A |



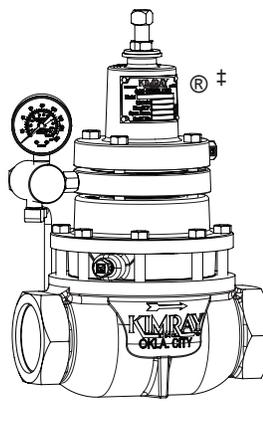
| Table 4 - Material Specification | | | | | |
|----------------------------------|------------|--------------|---------------------|---------------------|-------------------------|
| | Body | | Inner Parts | | |
| | CAST STEEL | CAST DUCTILE | 303 STAINLESS STEEL | 316 STAINLESS STEEL | 17-4 PH STAINLESS STEEL |
| KIMRAY SUFFIX | CS | CD | SS6 | SS6 | PH |
| ASTM GROUP | ASTM A-216 | ASTM A-395 | ASTM A-582 | ASTM A-479 | ASTM A-564 |
| GRADE | WCB | 60-40-18 | 303 | 316 | 630 |
| UNS | J03002 | F32800 | S30300 | S31600 | S17400 |
| NACE Compliant | Yes | Yes | No | Yes | Yes |

Table 6 - Temperature vs. Pressure Rating

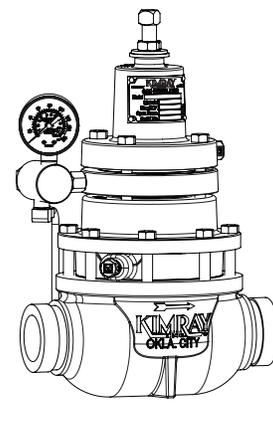
| ASTM Class Temperature °F (°C) | Flange Class |
|---|-----------------------------|
| | 150 RF |
| | Static Test Pressure (psig) |
| | 450 (31 bar) |
| Maximum Allowable Non-Shock Pressure (psig) | |
| CAST DUCTILE ASTM A-395 | |
| | Flange Class |
| | 150 RF |
| -20 to 100 (-28 to 37) | 250 (17.2 bar) |
| 200 (93) | 235 (16.2 bar) |
| 300 (148) | 215 (14.8 bar) |
| 400 (204) | 200 (13.7 bar) |
| 500 (260) | 170 (11.7 bar) |
| 600 (315) | 140 (9.6 bar) |
| 650 (343) | 125 (8.6 bar) |
| 700 (371) | |
| CAST STEEL ASTM A-216 - WCB | |
| | Flange Class |
| | 150 RF |
| -20 to 100 (-28 to 37) | 285 (20.0 bar) |
| 200 (93) | 260 (17.9 bar) |
| 300 (148) | 230 (15.9 bar) |
| 400 (204) | 200 (13.8 bar) |
| 500 (260) | 170 (11.7 bar) |
| 600 (315) | 140 (9.7 bar) |
| 650 (343) | 125 (8.6 bar) |
| 700 (371) | 110 (7.6 bar) |



FLANGED (150RF)



SCREWED (NPT)



GROOVED

Kimray valves conform to ASME B16.34-2009 for working pressure vs working temperature & ASME B16.5-1996 for flanges and flanged fittings.