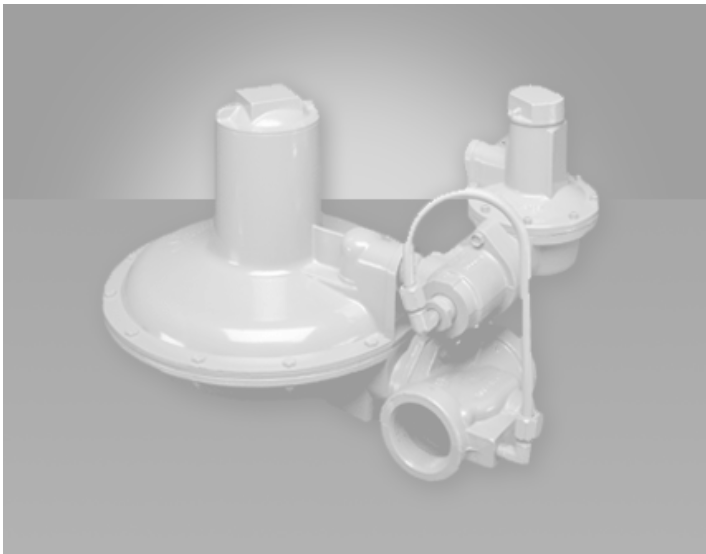


# NORGAS CONTROLS INC.

Regulation & Measurement

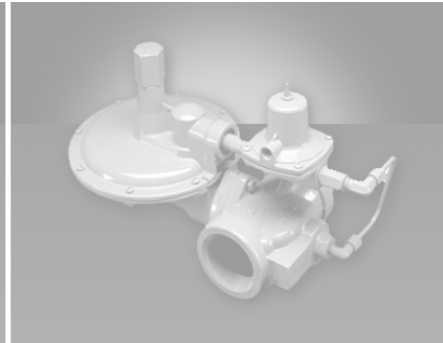
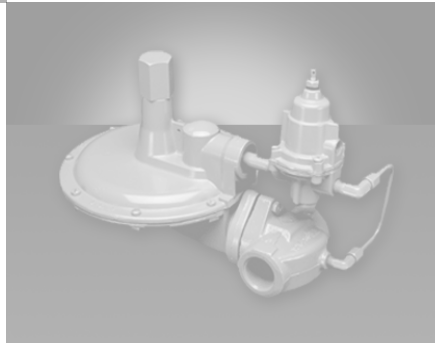


Distributed By



## Pilot Operated Regulators and Relief Valves

Master Distributor  
for



[www.norgascontrols.com](http://www.norgascontrols.com)

# CL31 & CL231 Series Regulators

## Principle of Operation

(See Operating Schematic below)

Inlet pressure (Tint 1), connected by tubing to the pilot regulator, is utilized as supply pressure for the pilot. Setting of the pilot regulator spring determines the desired outlet pressure (Tint 3) of main regulator.

Outlet pressure of the pilot regulator is applied to the top of the main diaphragm (B). Loading pressure (Tint 2) is a constant pressure equal to the desired outlet pressure plus the pressure required to counterbalance the light closing spring (C). When rate of flow is less than 50 cfh, the only regulator in operation is the pilot regulator. The Main valve (D) is closed any time flow rate is less than that supplied by the pilot

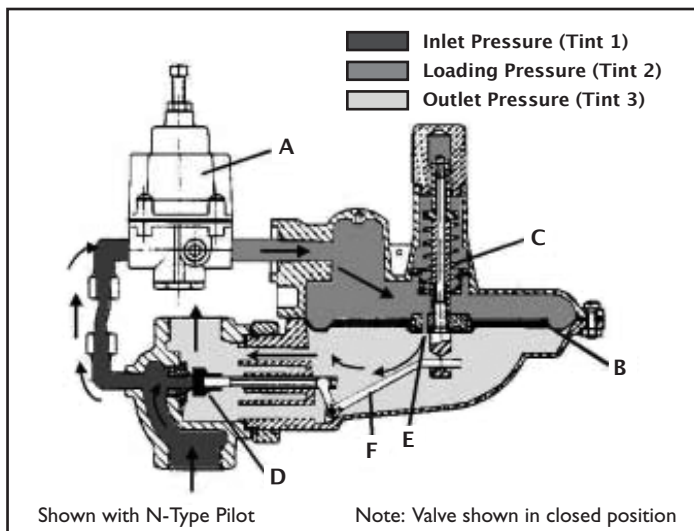
regulator (through the bleed orifice (E) between the upper and lower diaphragm case) and the pressure is equalized in both the upper and lower diaphragm chambers (tints 3 and 2). No flow, or lock up pressure, is the outlet pressure required to close the pilot regulator.

### Increasing Load:

If the demand for gas is increased, the outlet pressure (tint 3) is reduced and loading pressure (tint 2) above the diaphragm forces the diaphragm downward. This motion is transmitted through the lever (F) to open the main valve (D) to the proper position to match the demand.

### Decreasing Load:

When flow rate is decreased, outlet pressure (tint 3) will increase. This pressure increase decreases the pressure differential across the main diaphragm (B). This allows the closing spring (C) to move the diaphragm upward, closing the valve (D) and throttling the gas flow.



## CL31 Operating Schematic

### CL31R & CL231R

**CL-R:** Is a constant pressure loaded regulator equipped with a pilot internal relief valve. The pilot relief valve is not designed for "full capacity" relief, but rather to limit the loading chamber pressure to a safe value in the event of failure.

- ◀ Constant pressure loading provides "Fixed Factor" Measurement Accuracy
- ◀ Internal bleed
- ◀ Light closing spring for low lock-up
- ◀ Wide outlet pressure range (1 psig to 20 psig)
- ◀ One adjustable outlet spring (N version only)
- ◀ Built in strainer screen in pilot regulator (N version only)
- ◀ Extremely light weight
- ◀ Compact design
- ◀ Safety advantage of second gas tight lock-up seat with IM Version

## Features

- The CL31 & CL231 regulator can produce substantial savings for users in lower initial costs, lower installation costs and lower maintenance costs. Optimum valve design limits over boosting or rapid drop-off as the capacity requirement changes, including fast on-off loads.
- Controlled size pilot breather orifice eliminates pulsation and provides normal breathing operation.
- "Stop Stem" in pilot insures token internal relief valve operation.
- No special start-up procedures.

## Applications

The CL31 & CL231 was designed for systems requiring highly accurate pressure regulation such as:

- A) Utility "Fixed-Factor" metering of relatively small loads (up to 7500 scfh)
- B) Industrial Heating equipment requiring constant high burner pressures (1 psig to 20 psig)

## Option Designations

### CL31N & CL231N

**CL-N:** Is a constant pressure loaded regulator that utilizes a pilot with no internal relief (N). This regulator can be used where psig to psig regulation is required with no internal relief.

# CL31 & CL231 Series Regulators

**CL31 Capacity Table (1% Droop)\***

Inlet Pressure PSIG	Outlet Pressure PSIG	Capacity in SCFH (0.6 SP. GR. Gas)		
		Orifice		
		3/16	1/4	3/8
5	1	550	850	1650
	2	500	800	1450
10	1	825	1450	2550
	2	825	1450	2550
	5	625	1050	1700
15	1	1025	1750	3300
	2	1025	1750	3300
	5	1025	1700	2750
	10	700	1000	1700
20	1	1275	2100	3700
	2	1275	2100	3700
	5	1200	2100	3500
	10	1075	1750	3000
	15	825	800	1700
30	1	1600	2800	4000
	2	1600	2800	4000
	5	1600	2800	4000
	10	1600	2800	4000
	15	1450	2100	4000
	20	1200	1900	3200
40	1	1975	3400	4000
	2	1975	3400	4000
	5	1975	3400	4000
	10	1975	3400	4000
	15	1975	3300	4000
50	1	2350	4000	4000
	2	2350	4000	4000
	5	2350	4000	4000
	10	2350	4000	4000
	15	2350	4000	4000
20	2350	4000	4000	

**CL231 Capacity Table (1% Droop)**

Inlet Pressure PSIG	Outlet Pressure PSIG	Capacity in SCFH (0.6 SP. GR. Gas)	
		Orifice	
		3/8	1/2
5	1	1650	2600
	2	1550	2300
10	1	2700	4350
	2	2700	4200
	5	2100	3000
15	1	3550	5950
	2	3550	5950
	5	3200	5200
	10	2100	2950
20	1	4300	7250
	2	4300	7250
	5	4100	6700
	10	3450	5700
	15	1650	2600
30	1	5800	7500
	2	5800	7500
	5	5800	7500
	10	5350	7500
	15	4350	7450
	20	3600	6300
40	1	7100	7500
	2	7100	7500
	5	7100	7500
	10	7100	7500
	15	6100	7500
50	1	7500	7500
	2	7500	7500
	5	7500	7500
	10	7500	7500
	15	7500	7500
20	7500	7500	

**Models CL31N & CL231N**

Pilot Spring Color	Outlet Pressure Range (PSIG)
Blue	1-20

**Models CL31R & CL231R**

Pilot Spring Color	Outlet Pressure Range (PSIG)
Orange	1.0 to 1.6
Brown	1.6 to 2.6
Green	3.5 to 7.4
Black	3.8 to 13.3
Blue	4.6 to 21.5

**Spring Range Data**

Main Regulator Closing Spring:  
Light green only

Pilot Regulator Vent Connection:  
1/4" NPT

**\*Maximum Capacities on CL31 Valve Bodies:**

1" outlet connection - 3000 scfh  
3/4" outlet connection - 2000 scfh

**Operating Temperature Range:**

-20°F to 150°F  
-29°C to 65°C

**Weight:**

CL31: 10 lbs  
CL231: 15 lbs

# CL34 & CL38 Series Regulators

## Principle of Operation

(See Operating Schematic below)

Inlet pressure connected by tubing to the pilot regulator, is utilized as supply pressure for pilot. Outlet pressure of the Pilot Regulator is applied to top of Main Regulator diaphragm. This Loading pressure is a constant pressure equal to the desired outlet pressure plus the pressure required to counter-balance the Light Closing Spring.

### Increasing Load Condition

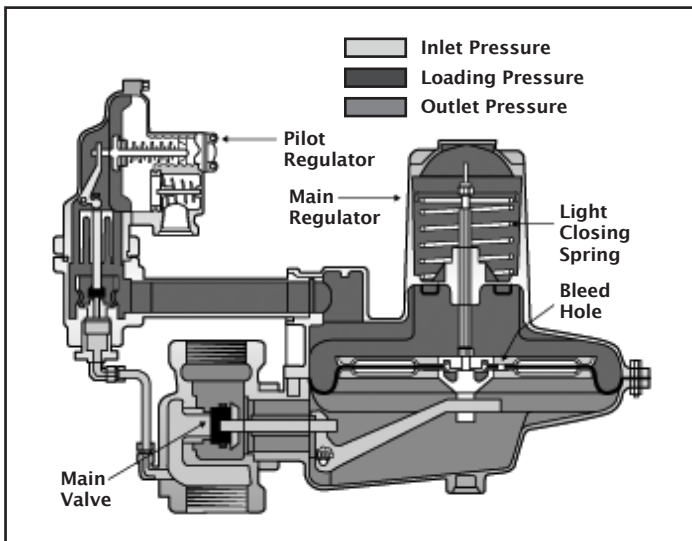
As load increases downstream, the outlet pressure in lower diaphragm chamber is reduced and constant pressure above the main diaphragm forces the diaphragm downward. This motion is transmitted through the Main Regulator lever to open the main valve to the proper position to meet the flow rate. Gas simultaneously begins to flow across the Bleed Hole, which momentarily reduces the loading pressure. The pilot diaphragm senses the reduced loading pressure and the pilot valve opens to maintain a constant loading pressure.

### Decreasing Load Condition

When the flow rate is decreased, the outlet pressure tends to increase. The pressure increase is reflected in the lower diaphragm chamber increasing pressure below the main diaphragm, thereby decreasing the differential pressure across the main diaphragm. This allows the closing spring to move diaphragm upward, closing the main valve and throttling gas flow. The pilot then senses a pressure rise in the loading pressure chamber and closes its valve.

### No-Load (Lock-up) Condition

As load decreases to zero, the downstream pressure begins to rise, which stops the flow of gas through the bleed hole in the main diaphragm. At the same time, the pressure across the main diaphragm is equalized, which allows the closing spring to close the main valve. The upward movement of the main diaphragm causes the loading chamber pressure to increase slightly, which in turn causes the pilot to close.



CL34 Operating Schematic

- ◀ Economical
- ◀ Light weight
- ◀ Accurate pressure control for "fixed-factor" measurement applications
- ◀ No special start-up procedures required
- ◀ Internal Monitor version eliminates the need for external relief valves or separate monitoring devices
- ◀ No special tools required for outlet pressure adjustment
- ◀ No minimum differential pressure requirement
- ◀ Internal Registration (no control line required)

## Features

- Constant Loaded pilot design ("fixed-factor" pressure control)
- Interchangeable brass orifice
- 78 in<sup>2</sup> of diaphragm area
- Spring-loaded Pilot internal relief valve assembly
- Field interchangeable pilot adjustment spring
- Controlled internal bleed hole eliminates pulsation
- Wide range of valve body sizes including NPT and flange connections

## Applications

Appropriate for commercial and industrial applications where very accurate pressure control is required such as "fixed-factor" metering applications or large boiler and furnace applications.

# CL34 & CL38 Series Regulators

## CL34 Capacity Table (1% Droop)\*

Inlet Pressure PSIG	Outlet Pressure PSIG	Capacity in 1000 SCFH (0.6 SP GR. Gas)				
		Orifice				
		3/8	1/2	5/8	3/4	7/8
5	1	2.2	3.9	5.4	7	9.3
	2	2	3.5	4.9	6.3	8.3
	3	1.7	2.9	4.1	5.3	7
10	1	3.4	5.8	8.2	10.5	14
	2	3.3	5.7	8	10.1	13.5
	5	2.8	4.9	6.9	8.9	11.7
	8	1.9	3.3	4.7	6	8
15	1	4.2	7.2	10	13	17.5
	2	4.2	7.2	10	13	17
	5	4	6.9	9.7	12.5	16.7
	8	3.6	6.2	8.7	11	15
	10	3.1	5.5	7.7	9.9	13
20	13	2.1	3.7	5.1	6.6	8.8
	5 or less	4.9	8.5	12	15.4	20
	10	4.5	7.8	10.9	14	18.5
	15	3.5	6	8.5	10.8	14.5
30	18	2.8	4.9	6.9	8.9	11.5
	11 or less	6.3	11	15.4	19.8	26
	15	6	10.5	14.7	18.7	25
	20	5.4	9.3	13	16.7	22
40	25	4	7	9.8	12.5	16.8
	16 or less	7.8	13.5	18.8	24	32
	20	7.5	13	18	23	31
	30	6	10.5	14.7	18.7	25
50	35	4.5	7.8	11	14	18.5
	22 or less	9.3	16	22	28	38
	30	8.7	15	21	27	36
	40	6.7	11.5	16	21	28
50	45	4.9	8.5	12	15	20

## CL38 Capacity Table (1% Droop)

Inlet Pressure PSIG	Outlet Pressure PSIG	Capacity in 1000 SCFH (0.6 SP GR. Gas)		
		Orifice		
		5/8	1	1 3/8
5	1	5.05	9.45	12.7
	2	4.5	8.5	11.5
	3	3.9	7.15	9.55
10	1	7.85	14.0	19.3
	2	7.6	13.6	18.8
	5	6.6	11.8	16.3
	8	4.65	8.25	11.5
15	1	10.0	17.8	25.2
	2	10.0	17.7	25.0
	5	9.55	16.9	23.9
	8	8.6	15.2	21.6
	10	7.65	13.5	19.2
20	13	5.3	9.45	13.3
	3.5 or less	11.8	20.8	29.4
	5	11.7	20.6	29.1
	10	10.7	18.9	26.8
	15	8.45	14.9	21.1
30	18	5.85	10.4	14.7
	9 or less	15.4	26.8	37.9
	10	15.3	26.7	37.7
	15	14.5	25.4	35.9
	20	12.9	22.6	31.9
40	25	10.0	17.4	24.7
	14 or less	18.8	32.8	46.5
	15	18.7	32.7	46.3
	20	18.1	31.7	44.9
50	30	14.7	25.8	36.5
	19.5 or less	22.3	38.8	54.9
	20	22.2	38.6	54.6
50	30	20.6	36.0	51.1

## Main Regulator Closing Spring Data

Closing Spring Color	Orifice Size						
	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-3/8"
	Maximum Differential Pressure Across Orifices PSIG*						
Orange	75	50	30	21	18	10	7
Brown	265	140	90	60	40	30	19
Green	-	200	120	80	55	40	25
Black	-	-	245	150	115	85	51

\*The Maximum recommended pressure differential and closing spring are based on a 2:1 safety factor.

## Spring Range Data

Pilot Regulator Vent Connection: 3/4" NPT

Pilot Spring Color	Outlet Pressure Range (PSIG)	Pilot Spring Color	Outlet Pressure Range (PSIG)
Brown	0.75 to 2.25	Green/White	7 to 19
Green	1 to 8	Blue	9 to 30
Black	5 to 10	Silver*	25 to 60

\*Maximum Outlet Pressure from a CL38 is 30 PSIG.

## Operating Temperature Range:

-20°F to 150°F

-29°C to 65°C

## Weight:

CL34 - NPT: 35 lbs

CL34 - Flanged: 50 lbs

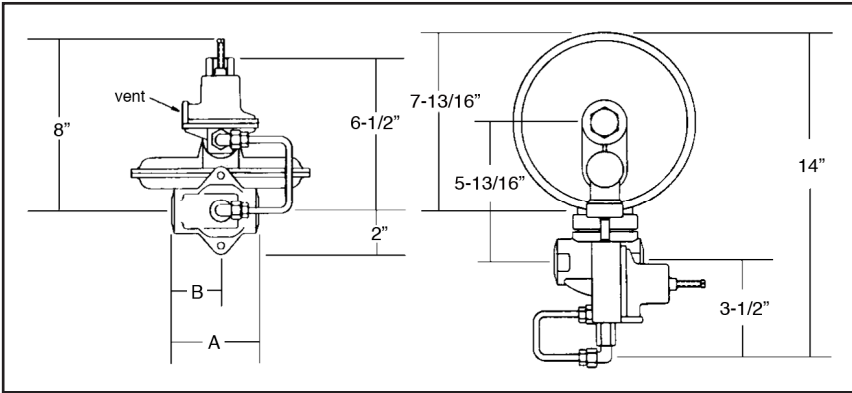
CL38 - NPT: 45 lbs

CL38 - Flanged: 65 lbs

# Dimensions & Valve Body Sizes

## CL31 & CL231 Series Regulators

### Dimensions



**CL31**

Valve Body Size	A	B
3/4" & 1"	3 3/4"	2 1/8"
1-1/4"	4"	2 1/8"

**CL231**

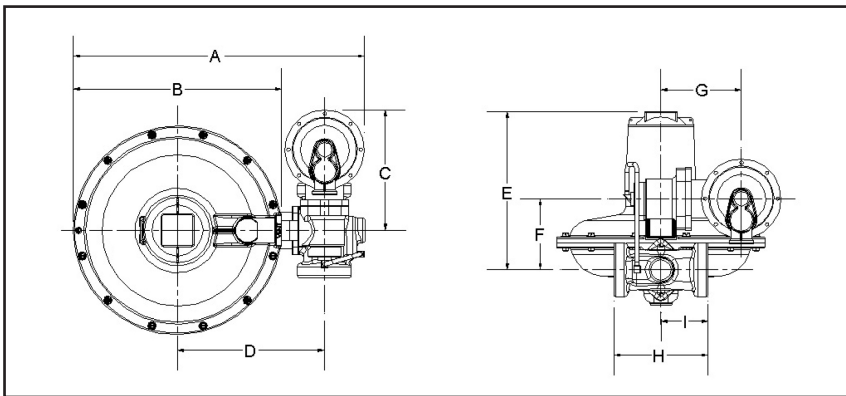
Valve Body Size	A	B
1-1/4", 1-1/2" & 2"	5-3/4"	3"

### Valve Body Sizes

	Inlet	Outlet
CL31 ONLY	3/4" x 3/4"	
	1" x 1"	
CL231 ONLY	1-1/4" x 1-1/4"	
	1-1/2" x 1-1/2"	
	2" x 2"	

## CL34 & CL38 Series Regulators

### Dimensions



### Valve Body Sizes

	Inlet	Outlet
CL34 ONLY	1-1/4" x 1-1/4"	
	1-1/2" x 1-1/2"	
	2" x 2"	
	2" Flanged	
	3" Flanged	

Valve Body Type	Dimensions								
	A	B	C	D	E	F	G	H	I
CL34 NPT (all sizes)	19-5/16"	12-3/4"	7-5/16"	8-11/16"	10"	4-5/16"	4-7/8"	5-3/4"	2-7/8"
CL34 Flanged (all sizes)	20-1/2"	12-3/4"	7-5/16"	8-11/16"	10"	4-5/16"	4-7/8"	10"	5"
CL38 NPT (all sizes)	19-5/16"	12-3/4"	7-5/16"	10-5/8"	10"	4-5/16"	4-7/8"	7-1/2"	3-3/4"
CL38 Flanged (all sizes)	20-1/2"	12-3/4"	7-5/16"	10-5/8"	10"	4-5/16"	4-7/8"	10"	5"

# Internal Monitor Option

Single valve body ▶  
with built-in  
monitor operation

Features added ▶  
safety advantage  
of second gas tight  
lock-up seat

Designed to meet D.O.T. ▶  
Safety Standards

No venting of ▶  
relief gas—or controlled,  
minimal relief volume  
if preferred

IM regulators are designed specifically to comply with DOT OPS 192.197 Paragraph B which states, "or if the gas contains materials that seriously interfere with the operation of a service regulator, there must be suitable protective devices to prevent unsafe overpressuring of the customer's appliance, if the service regulator fails." The code lists the devices, one of which is regulator and monitor. The code further states these devices may be installed as an internal part of the service regulator or as a separate unit.

The "IM" Internal Monitor is a newly designed, single valve body regulator with built-in monitor operation. It features the safety advantage of a second gas tight lock-up seat if the normal orifice face and valve seat fail to produce the adjusted outlet pressure. The monitor also controls gas flow between the failed open flow and no flow, thereby providing complete secondary regulation and monitor regulation function without relieving gas to the atmosphere or shutting off the gas flow to the customer. IM regulators are designed especially for industrial and commercial installations where gas consumption is high but the venting of large volume of relief gas would be hazardous due to location, and/or the type of load would not allow shut-off in the event of an overpressuring.

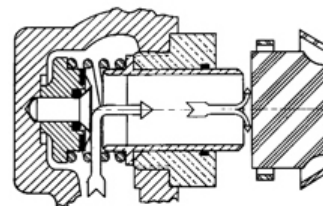
## Principle of Operation

**A. Normal Operation** - The internal monitor "IM" orifice performs like a standard regulator and monitor orifice, in that the monitor orifice is wide open under normal operation and the regulating orifice and valve seat actuate to control outlet flow and pressure. The regulator is free to lock-up in the usual manner, with pressure increase to position the valve seat "bubble" tight against the regulating orifice face. However, both the monitor seat and the regulator seat may close together if the positive shock lockup exceeds the monitor spring setting.

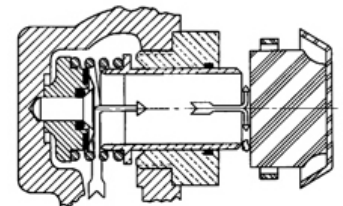
**B. Monitor Operation** - If the main valve seat fails to control the gas flow and pressure, due to foreign matter between the seat and orifice face, or if the seat is eroded, the internal monitor orifice automatically goes into operating position at a slightly higher outlet pressure (See internal Monitor lockup pressure tables). Any time the pressure on the large main diaphragm exceeds the force of the fixed monitor spring and the adjusted pressure of the main spring, this increase in outlet pressure causes the main valve seat to push against the sliding orifice, compressing the monitor spring and positions the monitor orifice to control the gas flow. The IM orifice now functions as a monitor regulator and will continue to monitor so long as the main seat fails to control at the normal adjusted outlet pressure. However, if the gas load demand is increased beyond the Internal Monitor's capacity, the outlet pressure is reduced to normal adjusted pressure and the regulator resumes normal regulation.

**C. Monitor "Lock-Up"** - However, if the demand for gas is decreased to zero flow during monitor operation, the sliding orifice continues to close until its orifice is in the gas tight position (monitor lock-up) against the BUNA-N monitor valve seat. Outlet pressure required for Internal Monitor "lock-up" is shown in the Internal Monitor Lock-Up Pressure Table.

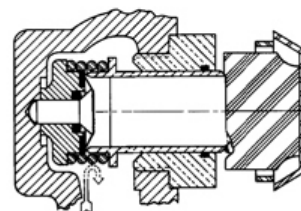
**D. "V Option"** - On installations where a small volume of over-pressure gas can be safely vented to atmosphere, the advantage of both internal relief valve and monitor safety can be combined. As the Internal Monitor closes, the vent hole in the sliding orifice allows a slow leak of gas to the downstream which causes the pilot's relief valve to open. The combined effect allows the monitor to hold overpressure buildup to a low pressure increase, and PILOT relief gas vented to atmosphere indicates that the main valve has failed and the regulator is on monitor operation.



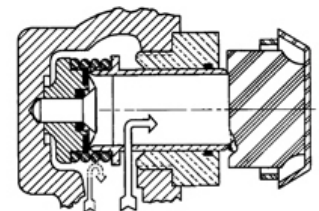
A. Standard Regulator and upstream monitor orifice



B. Standard Regulator orifice failed - upstream monitor orifice control



C. Standard Regulator orifice failed - upstream monitor orifice in No Flow



D. IMRV - Vent small volume to atmosphere

# Internal Monitor Option

## CL34

### Internal Monitor Lock-up Pressure Data\*

	Pilot Spring Color	Outlet Pressure Set Point	IM Lock-up Pressure
With CL34-2 Pilot	Green	1 PSIG	1.4 PSIG
	Green	2 PSIG	2.5 PSIG
	Green	3 PSIG	3.5 PSIG
	Green	5 PSIG	5.6 PSIG
	Green	8 PSIG	8.6 PSIG
	Black	10 PSIG	10.6 PSIG
	Green/White	10 PSIG	10.6 PSIG
	Green/White	15 PSIG	15.6 PSIG
	Blue	15 PSIG	15.6 PSIG
	Blue	20 PSIG	20.6 PSIG
	Blue	25 PSIG	25.7 PSIG
	Silver	30 PSIG	31.2 PSIG
	Silver	35 PSIG	36.5 PSIG
	Silver	40 PSIG	41.5 PSIG
Silver	50 PSIG	51.5 PSIG	
Silver	60 PSIG	61.7 PSIG	

\*The Internal Monitor Lock-up Pressure refers to the outlet pressure necessary to close the Internal Monitor valve in the event there is no downstream demand.

### IMRV Flow Chart (All models)

	Inlet Pressure PSIG	Flow SCFH
Vented gas flow, regulator seat failed; monitor seat closed	1 PSIG	1.4 PSIG
	2 PSIG	2.5 PSIG
	3 PSIG	3.5 PSIG
	5 PSIG	5.6 PSIG
	8 PSIG	8.6 PSIG
	10 PSIG	10.6 PSIG

### Option Designations

#### CL-31 IMN

The CL-31 IMN is a constant pressure loaded regulator featuring Internal Monitoring (IM) operation with no pilot internal relief (N). It provides the important added advantage of a second, bubble-tight lock-up seat in series with the primary seat. If the primary seat fails to close or control the gas flow, the Internal Monitor seat assumes control of the downstream gas pressure.

#### CL-31 IMR

The CL-31 IMR provides the same features as the 'IMN' model but with token pilot relief valve backup of the monitor orifice if both the primary seat and monitor seat fail simultaneously.

#### CL-31 IMRV

Operation is identical to the 'IMR' except that at no flow position of the monitor orifice a small volume of gas is vented through the relief valve to serve as a signal that the regulator is on monitor operation and the primary seat has failed. No gas is vented until the gas load is less than the volume going through the orifice vent hole and the regulator is on monitor operation.

#### CL-34 IMR & CL 38 IMR

Equipped with an Internal Monitor orifice; Internal Registration (no control line required) and token relief.

#### CL-34 IMRV & CL 38 IMRV

Equipped with an Internal Monitor orifice plus Vent hole option for Monitor warning indication; Internal Registration (no control line required).

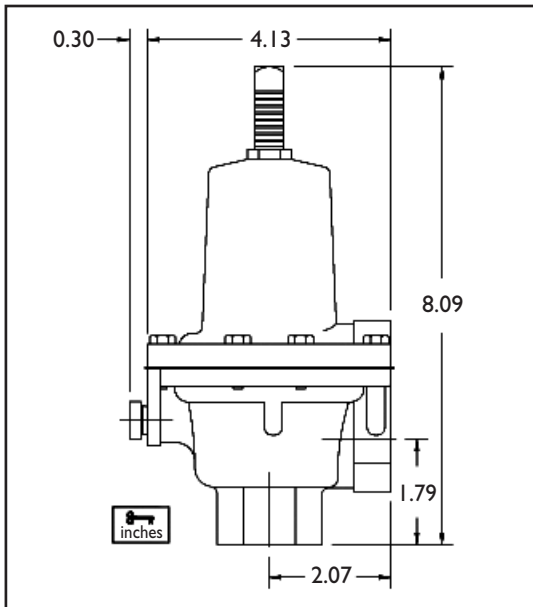
#### Note:

For Capacity Tables with the "IM" Option, Please contact Norgas Controls Inc.

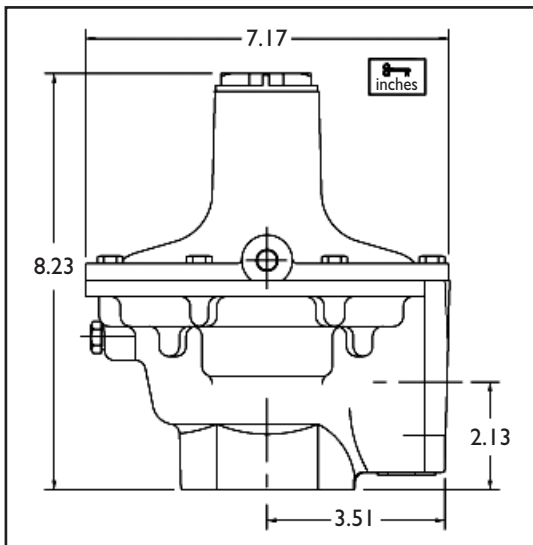
# P289 Relief Valve

- Throttling Type Relief ▶
- Compact ▶
- Tight Shutoff ▶
- High Flow Rates ▶
- Reliability Due to Simplicity ▶

## P289 1" Dimensions



## P289 2" Dimensions



## Principle of Operation

The P289 Series relief valve is a throttling relief valve used downstream of pressure regulators to protect the downstream system from overpressure. A smooth throttling action minimizes pressure surges in the system during emergency operation.

The P289 Series feature a pitot tube booster for achieving the highest possible relief capacity with a minimum buildup of system pressure. When the valve is opening, high gas velocity through the orifice creates an area of relatively low pressure near the end of the pitot tube. This pitot tube effect forms a partial vacuum above the diaphragm which helps to open the valve.

The P289 Series are ideal for low pressure settings due to the increased sensitivity provided by the large diaphragm area.

## Specifications

	P289 - 1"	P289 - 2"
Port Size	1" NPT	2" NPT
Max. Relief Inlet Pressure	100 PSIG	25 PSIG
Relief Set Pressure Ranges	1-4.5 PSIG	7-18" W.C.
	4-15 PSIG	0.5-2.25 PSIG
	10-20 PSIG	1.75-7 PSIG
	15-50 PSIG	4-10 PSIG
Approximate Weight	4 lbs.	15 lbs.

## Operating Temperature Range:

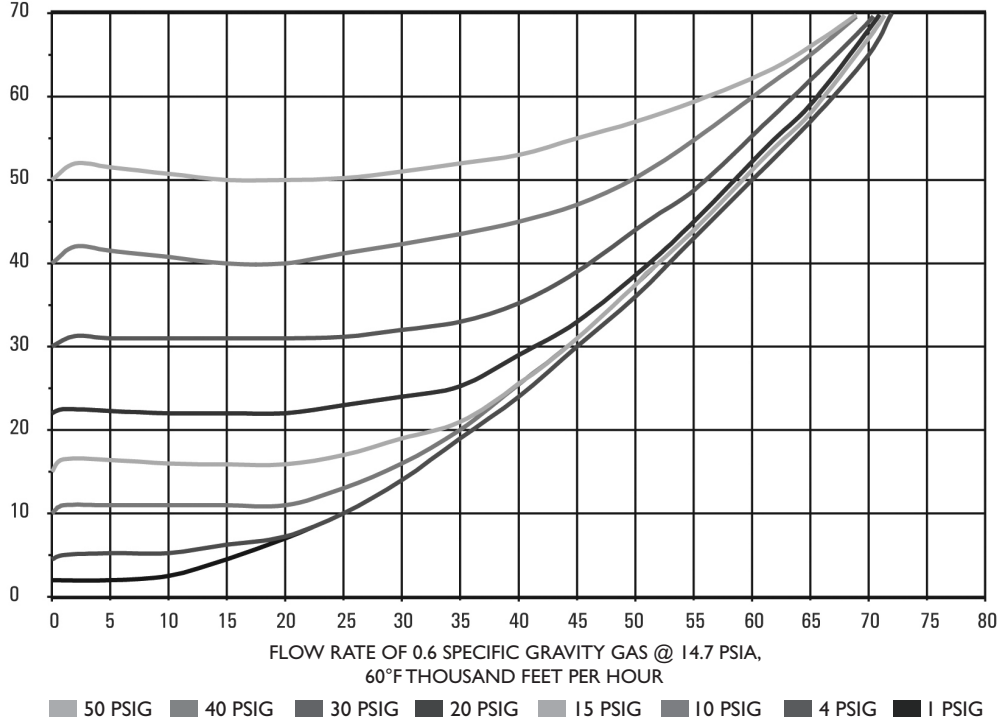
-20°F to 150°F  
-29°C to 65°C



# Capacity Table

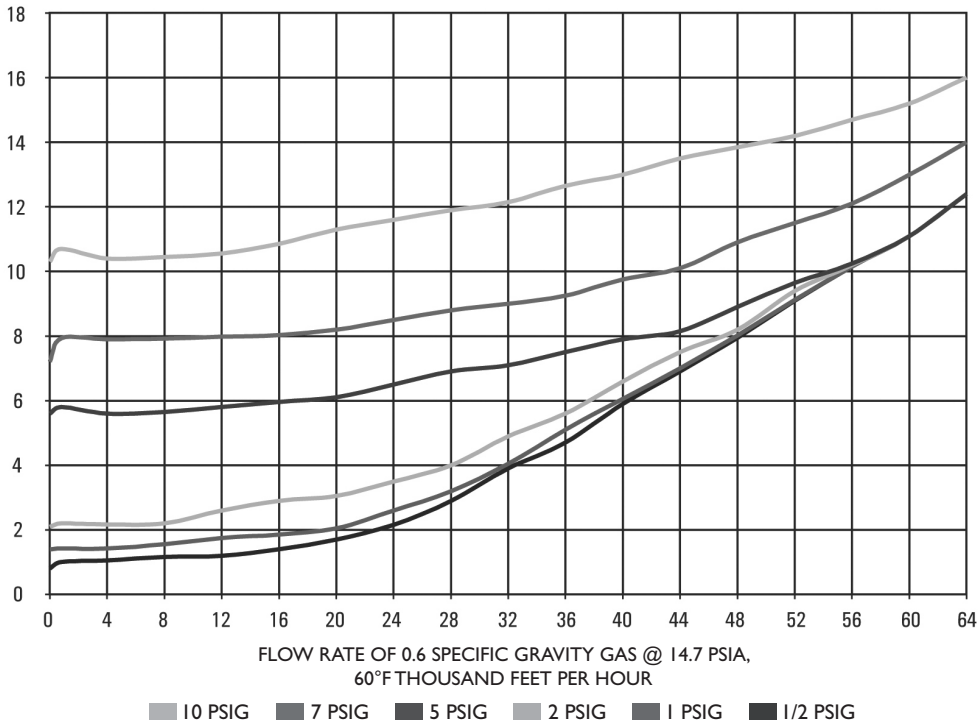
INLET PRESSURE  
PSIG

**P289-1" NPT**  
Vent screen installed



INLET PRESSURE  
PSIG

**P289-2" NPT**  
Vent screen uninstalled



# Notes

Other products available from



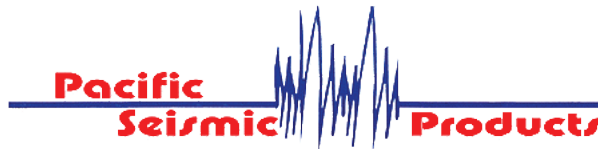
Regulators for Natural & Propane Gas,  
Spring Loaded & Direct Acting



Regulators for Natural & Propane Gas  
High Pressure Regulators up to 5000 PSI  
Filter Regulators & Gauges

## MILLIKEN

Lubricated two way & three way Plug Valves  
CSA/CGA Approved



Seismic "Earthquake" Valves  
available from 3/4" to 8"

## METERS

Diaphragm, Rotary, Turbine,  
Dattus and Accessories

Manufacturer standard warranty applies. For a copy please contact us.