ACTARIS
metering systems

B531 Series Commercial Regulator

Advanced Metering
and Regulation
Technology at Work

Features

- Interchangeable brass orifice
- Combined 54 in^2 of diaphragm area
- Twin spring-loaded internal relief valve assemblies
- Field interchangeable adjustment springs
- No special adjustment tools required
- Controlled size breather orifice eliminates pulsation and provides normal actuation at low flows
- Wide range of valve body sizes
- Six different assembly position options

Benefits

- Eliminates parallel regulator piping installations
- Light weight
- Fast response protects equipment from shock damage
- Field inspection of the Interal Monitor (IM) and Internal Relief valves without customer shut-off or by-pass
- Unmatched overpressure protection with Internal Monitor plus Internal Relief (IMR) option

Applications

Appropriate for Utility light to medium commercial service applications where a high degree of Safety or Overpressure Protection are required such as schools, hospitals, etc. The B531 is an excellent replacement for parallel regulator piping systems.

Model Descriptions Included in this Bulletin

B531N – The B531N is a spring loaded self-operated regulator with no internal relief. This regulator can be used on low or intermediate inlet pressures where an internal relief, or other type of over-pressure protection device is not required.

B531R – The B531R is the internal relief version of the B531R Series. This model features twin 1" internal relief valves. Due to its excellent relief characteristics, the B531R can be used on any inlet pressure system up to the regulator's maximum operating pressure rating.

B531IMN (See page 12 schematic) **–** The B531IMN is equipped with an Internal Monitor (IM) orifice that operates upon failure of the main valve. The "N" designation signifies No internal relief valve.

B531IMR (See Page 12 schematic) **–** The B531IMR is equipped with an Internal Monitor (IM) orifice as a primary form of overpressure protection that operates upon failure of the main valve. The B531IMR is also equipped with Secondary twin internal relief valves that open in the event that both the main seat and the internal monitor cannot function.

B531IMRV (See page 12 schematic) **–** The B531IMRV is equipped with an Internal Monitor (IM) orifice as a primary form of overpressure protection that operates upon failure of the main valve. It is also equipped with the Vent-Hole "V" option which gives a warning indication that the regulator is on monitor control in the event of main valve failure. The vent-hole "V" option consists of a 0.049" hole in the sliding orifice that allows a small amount of gas to bleed into the downstream which causes the relief valves to "weep" gas. In the unlikely event the main valve and monitor valve fails to function, the B531IMRV is equipped with secondary or back-up twin internal relief valves.

Option Designations

N – No Internal Relief
R – Internal Relief
IMR – Internal Monitor with Internal Relief
IMN – Internal Monitor with no Internal Relief
IMRV – Internal Monitor with Internal Relief and Vent

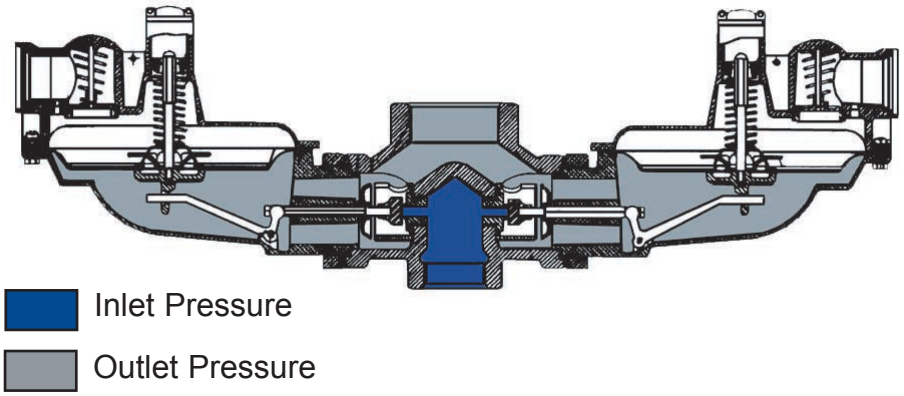
Principle of Operation

The Series B531 is a Spring-Loaded regulator equipped with a valve body that is effectively two regulators in parallel. This design allows for nearly double the capacity that can be achieved with a single 6" diaphragm regulator. The B531 design is symmetric about that downstream piping so all parts are identical in both diaphragm cases.

Increasing Load - As downstream demand increases, the gray shaded pressure begins to fall. Both diaphragm cases of the B531 are adjusted to the same Set Point so they both respond as the load changes. The loading springs push the diaphragms down which opens both valves and allows gas to flow into the downstream.

Decreasing Load - As downstream demand decreases, the gray shaded pressure begins to rise. The rise in pressure under the diaphragm overcomes the force of the adjustment spring. This repositions the diaphragms upward closing the main valves.

Operating Schematic



Specifications

Construction

Valve body	High tensile strength cast iron (ASTM A-126, Class A)
Orifices	Aluminum – R and N Models; Brass (ASTM B16, Alloy 360) - IMR, IMN, and IMRV models
Valve seats	Buna-N (standard) Silicone (for temperatures below -20º F)
Valve stems	Anodized Aluminum
Lever pins	Stainless steel (Type 303)
Levers	Zinc and dichromate plated steel (AISI C1010)
Upper diaphragm plates	Zinc and dichromate plated steel (14 gage steel)
Lower diaphragm plates	Die cast aluminum (ASTM B-85 Alloy SC84A)
Diaphragms	Buna-N and nylon reinforcing fabric
Vent valve seats	Neoprene
Vent screens	Stainless steel (16 mesh)
Adjustment ferrule	Cast aluminum (ASTM CS43A)
Seal caps	Die cast aluminum (ASTM CS43A)
Diaphragm cases	Die cast aluminum (ASTM B85 –Alloy SC84A)

Shipping Weight:

2 Regulators per box
Regulator weight: 22 lbs.
Gross weight per box: 45 lbs.

Correction factors for non-natural gas applications:

The B531 may be used to control materials other than natural gas. To determine the capacity of the B531 for gases other than natural gas, it will be necessary to multiply the values within the capacity tables by a correction factor. The table below lists the correction factors for some of the more common gases:

Gas Type	Specific Gravity	Correction Factor (CF)
Air	1.0	0.77
Butane	2.01	0.55
Carbon Dioxide (Dry)	1.52	0.63
Carbon Monoxide (Dry)	0.97	0.79
Natural Gas	0.60	1.00
Nitrogen	0.97	0.79
Propane	1.53	0.63
Propane-Air-Mix	1.20	0.71

To calculate the correction factor for gases not listed on the table above, it will be necessary to know the specific gravity of the gas and use it in the formula listed below:

$$\text{Correction Factor (CF)} = \sqrt{\frac{S.G._1}{S.G._2}}$$

Where:

SG_1 = Specific Gravity of the gas in which the capacity is published.

SG_2 = Specific Gravity of the gas to be controlled.

SPRING RANGES

Models N & R

SPRING COLOR	SPRING RANGE	Basic Setting
Brown	4.5 - 5.25" w.c.	5" w.c.
Dark Green	5.0 - 6.75" w.c.	6" w.c.
Light Green	5.5 - 7.5" w.c	7" w.c.
Black	7.0 - 10.0" w.c.	9" w.c.
Blue	8.0 - 11.0" w.c.	11" w.c.
Silver	11.0 - 15.0" w.c.	14" w.c.
Red/Gray	0.75 - 1.1 psig	1.0 psig
Yellow	1.1 - 1.5 psig	1.25 psig
Red	1.3 - 2.0 psig	1.5 psig
White	1.75 - 2.5 psig	2.0 psig

Models IMN, IMR, IMRV

SPRING COLOR	SPRING RANGE	Basic Setting
Brown	4.5 - 5" w.c.	5" w.c.
Dark Green	5.5 - 6" w.c.	6" w.c.
Light Green	6 - 7" w.c.	7" w.c.
Black	7 - 9" w.c.	9" w.c.
Blue	8 - 10" w.c.	10" w.c.
Silver	9 - 13" w.c.	11" w.c.
White/Red	12" - 1 psig	1.0 psig
Yellow	1.1 - 1.5 psig	1.25 psig
Red	1.25 - 1.75 psig	1.5 psig
White	1.5 - 2.25 psig	2.0 psig

ORIFICE DATA - Wide Open Flow Coefficients and Maximum Pressures

Orifice Size	Wide-Open Orifice Coefficient (K-Factor)	Maximimum Operating Inlet Pressure (psig)	Maximum Emergency Inlet Pressure (psig)	Maximum Emergency Outlet Pressure (psig)
1/8"	60	125	300	60
1/8" IM	70	125	300	
3/16"	140	125	300	
3/16" IM	135	125	300	
1/4"	155	125	300	
1/4" IM	130	60	300	
5/16"	187	75	150	
5/16" IM	180	60	150	
3/8"	580	60	150	
1/2"	1000	30	100	

For wide-open orifice flow calculations use the following equations:

For $P_1/P_2<1.89$ use: $Q = K\sqrt{P_1(P_1-P_2)}$

For $P_1/P_2>1.89$ use: $Q = 1/2KP_1$

Where: P_1 = absolute inlet pressure (psia)

P_2 = absolute outlet pressure (psia)

Q = flow rate (scfh)

K = orifice coefficient (scfh/psi)

VALVE BODY SIZES*

Inlet	Outlet
3/4"	3/4"
3/4"	1-1/4"
1"	1-1/2"
1"	2"
1-1/4"	1-1/4"
1-1/4"	1-1/2"
1-1/4"	2"

*All sizes available with 1/8" NPT inlet tap

MISCELLANEOUS SPECIFICATIONS

Available Vent Sizes: 3/4", & 1" NPT

Operating Temperature Range: -20 F to 150 F*

(Silicone valve seats available for applications below –20 F)

Loading Ring Position: Always 0 degrees (directly downstream)

Pressure Taps: Optional 1/8" NPT on inlet side

B531 DIMENSIONS