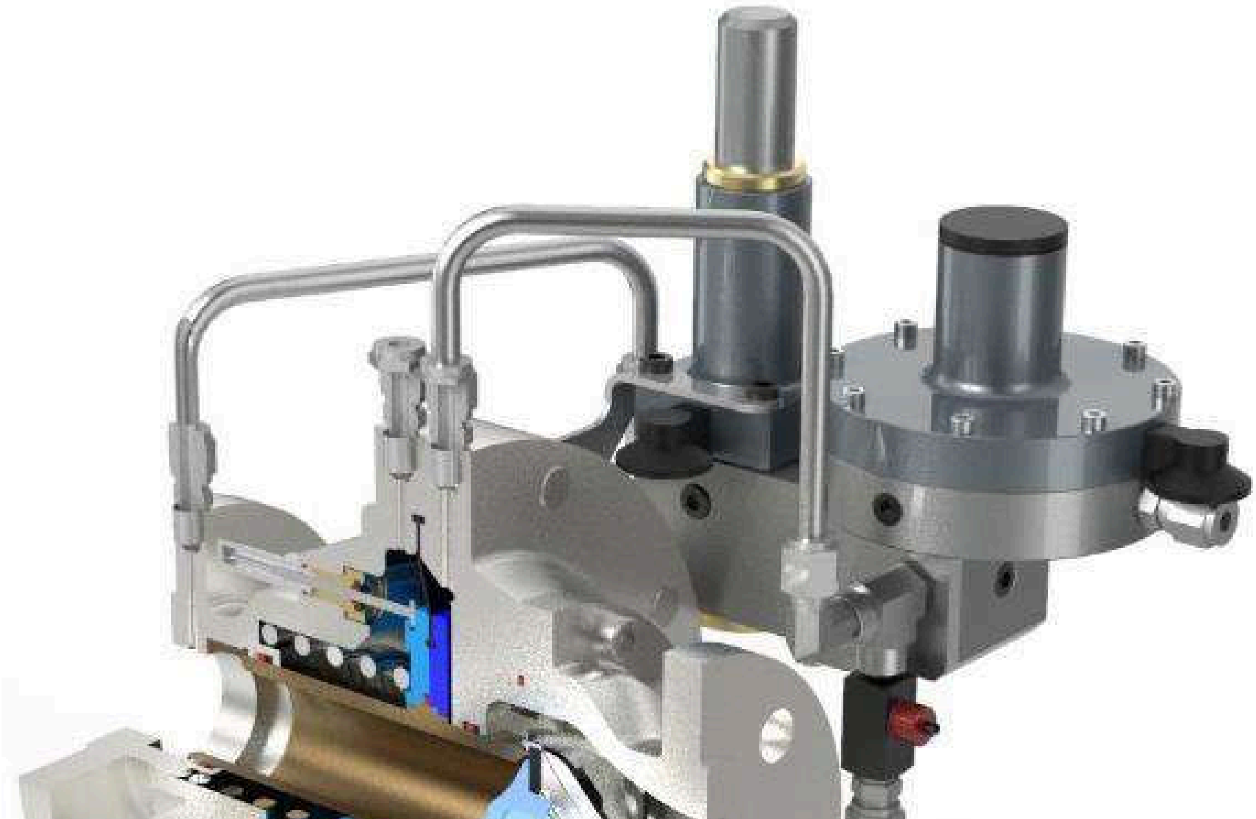
HORUS
Piston Axial Flow Model

GASCAT

ADVANTAGEOUS OF AXIAL FLOW TYPES IN COMPARISON OF “TOP ENTRY” DEVICES

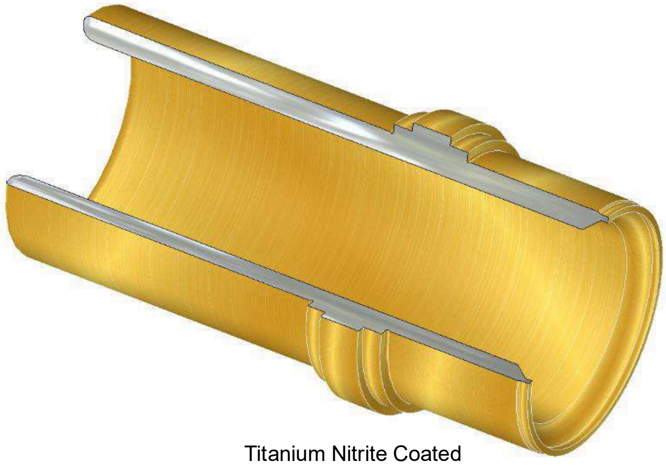
- Higher Flow Capacities.
- High differential pressures across the regulator.
- Less Erosion Parts.
- Lower costs in spares material
- Less internal parts
- Less Pressure Loss.
- Accurate Control due to moulded wave diaphragm allowing excellent control sensivity.
- Hard aluminium anodized parts to low pressure regulator given higher accuraty on low pressures set pressures such as 50 mbar.
- Easier to install silencers devices due its design optimizing as very quite regulator.
- Piston sleeves have special coated depending on application like titanium vapor 4µ thickness; teflon coated 22µ; or stellite welded at piston ends (longer life) depend on aplication.



Piston seals:
BUNA N
FKM

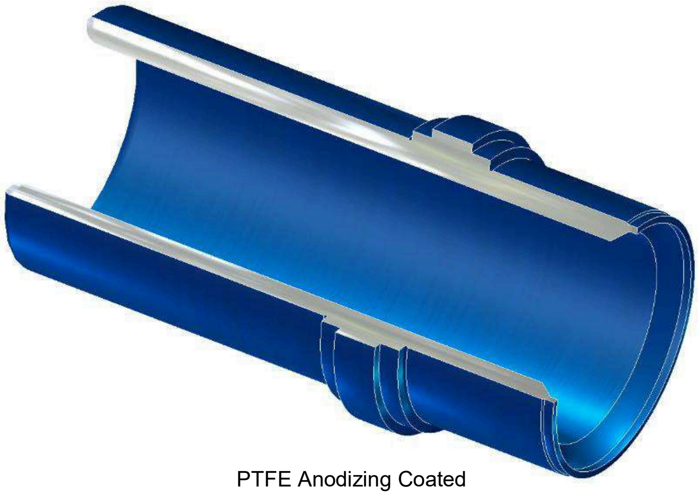
PISTON SLEEVES SPECIAL COATED

Titanium Nitrite Vapour process can be applied in Stainless Steel or Aluminium Hard Anodized Piston surface up to 4µ for the Horus Pressure Regulator. This Technology is called PVD Physical Vapour of Titanium deposit on this surface. The advantageous are increase the material life because the increase of hardness surface and increase of corrosion resistance. Very good of humidity gas or sourgas contaminated by H_2S.



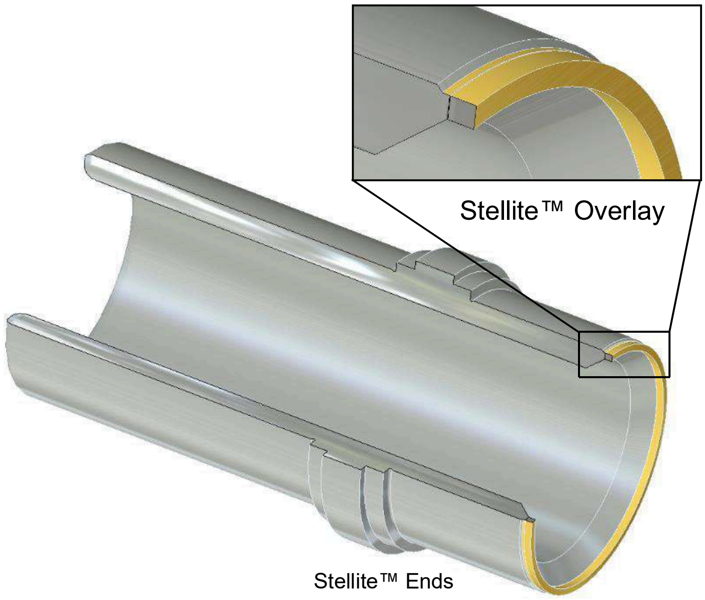
Titanium Nitrite Coated

Hardcoat/ PTFE Anodizing is a special application of a controlled oxide film on aluminum with the inclusion of polytetrafluoroethylene (PTFE) molecules. The resultant coating offers the dense, hard protection of Type III hardcoat anodizing coupled with the excellent dry lubrication for which PTFE is so well known. Hardcoat/PTFE Anodizing provides a very good surface for aluminum surfaces, as the lubricity of the surface translates into superior release characteristics and regulator faster response, and the coating remains stable even at high temperatures. Additionally, the mechanical synergy between the crystalline formation of the oxide film and the molecular structure of the PTFE yields very good wear characteristics. The coefficient of friction of the Hardcoat/PTFE Anodizing is 50% lower than that of hard anodizing alone. Hardcoat/PTFE Anodizing is highly resistant to atmospheric and marine corrosion and serves as an electrically insulating coating.



PTFE Anodizing Coated

Stellite™ material deposited by welding is known as the worldwide material solution in wear, heat and corrosion applications. The deposit is made by welding/ electrodes and can be deposit at the end of piston in case of abrasive particles containing at the gas like “black powder” or other abrasive contaminants particles.
These of Stellite™ family alloys are non-magnetic and highly resistant to corrosion. A range of different alloy compositions are prepared by combining different elements in varying proportions and the properties of an individual alloy composition might vary from an alloy of a different composition. Different alloy compositions are used for different purposes and valued for their functional flexibility.



Stellite™ Ends

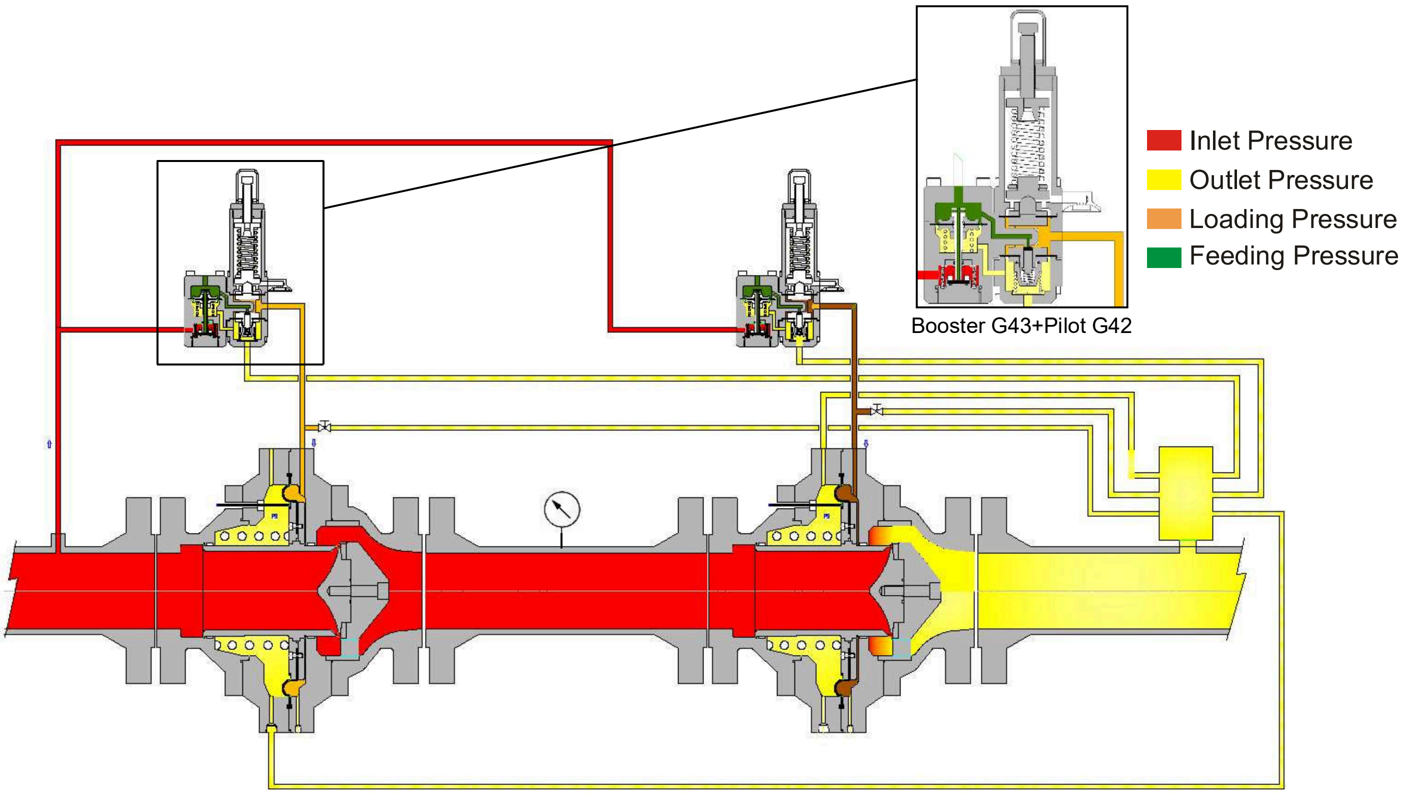
1.OPERATION PRINCIPLE

The inlet pressure gets into the booster G43 through the external feed tubing line. The booster does the first pressure dropping maintaining a fixed differential pressure across the pilot G42 or G31 even with any variation of upstream pressure. With this low differential pressure across the pilot we can succeed that main pilots (G42;G31 or G80) can supply very high accuracy. When gas demand in the downstream system has been supplied, the outlet pressure acts on the button diaphragm and results in a force that overcomes the pilot spring setting and forces the assembly to word the piston closing it. The loading pressure acting on the main valve diaphragm bleeds to the downstream system through the adjusted restriction needle valve connected to the outlet pressure chamber. When rapid main valve closure is required by unusual control conditions the bleed valve allows adjustments for increased bleed rate. The force of increased outlet pressure acting on the main valve spring force overcomes the force of decreased loading pressure acting on the main valve diaphragm and moves the throttling sleeve (piston) toward the stationary valve plug to decrease the gas flow to the downstream system. The top diaphragm in the pilot acts as a sealing member for the loading chamber and as a balancing member to the bottom diaphragm. The piston stays idle when the two forces are equal, under these condition the downstream set pressure is reached. Any movements or variations in flow rate give a variation in downstream regulated pressure and the main regulator operated by the pilot opens and closes to give more or less volume in order to stabilize the set pressure.

2. CONFIGURATIONS IN PRESSURE REGULATING STATION UNIT

2.1 WIDE OPEN MONITOR. ALSO KNOWN AS ACTIVE/MONITOR SYSTEM.

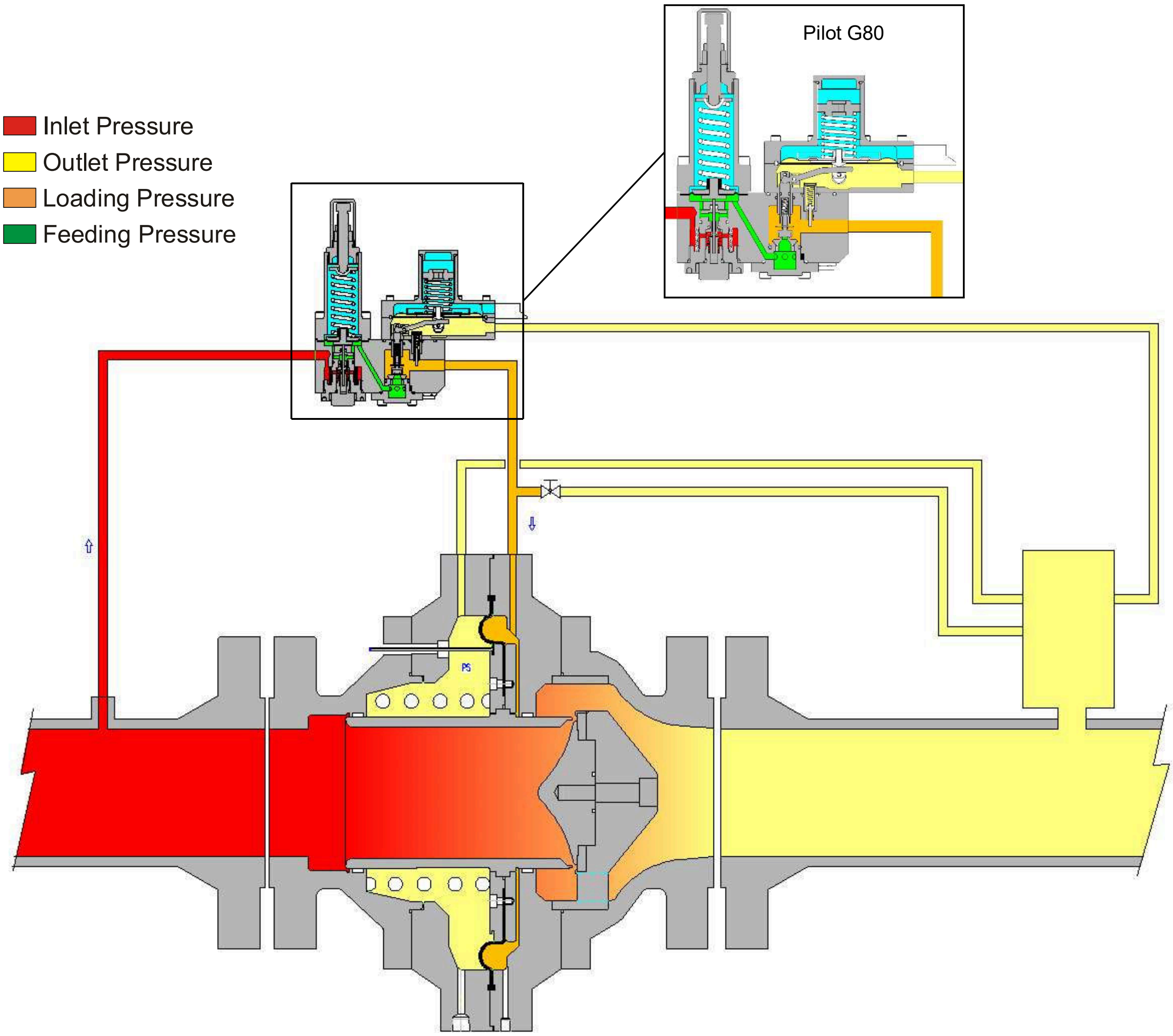
- Monitor regulators in this case acts as safety device for overpressure protection in order to limit the system pressure in the event of failure of the active regulator. The control line of the wide open monitoring regulator should be connected downstream of the active regulator; therefore during normal operation the wide open monitoring regulator is standing wide open with the pressure reduction being taken across the active regulator. Only in case of working regulator failure then the wide open monitor start operate since its set point is little higher that active regulator.



2.2 ACTIVE/MONITOR SYSTEM PILOT G80

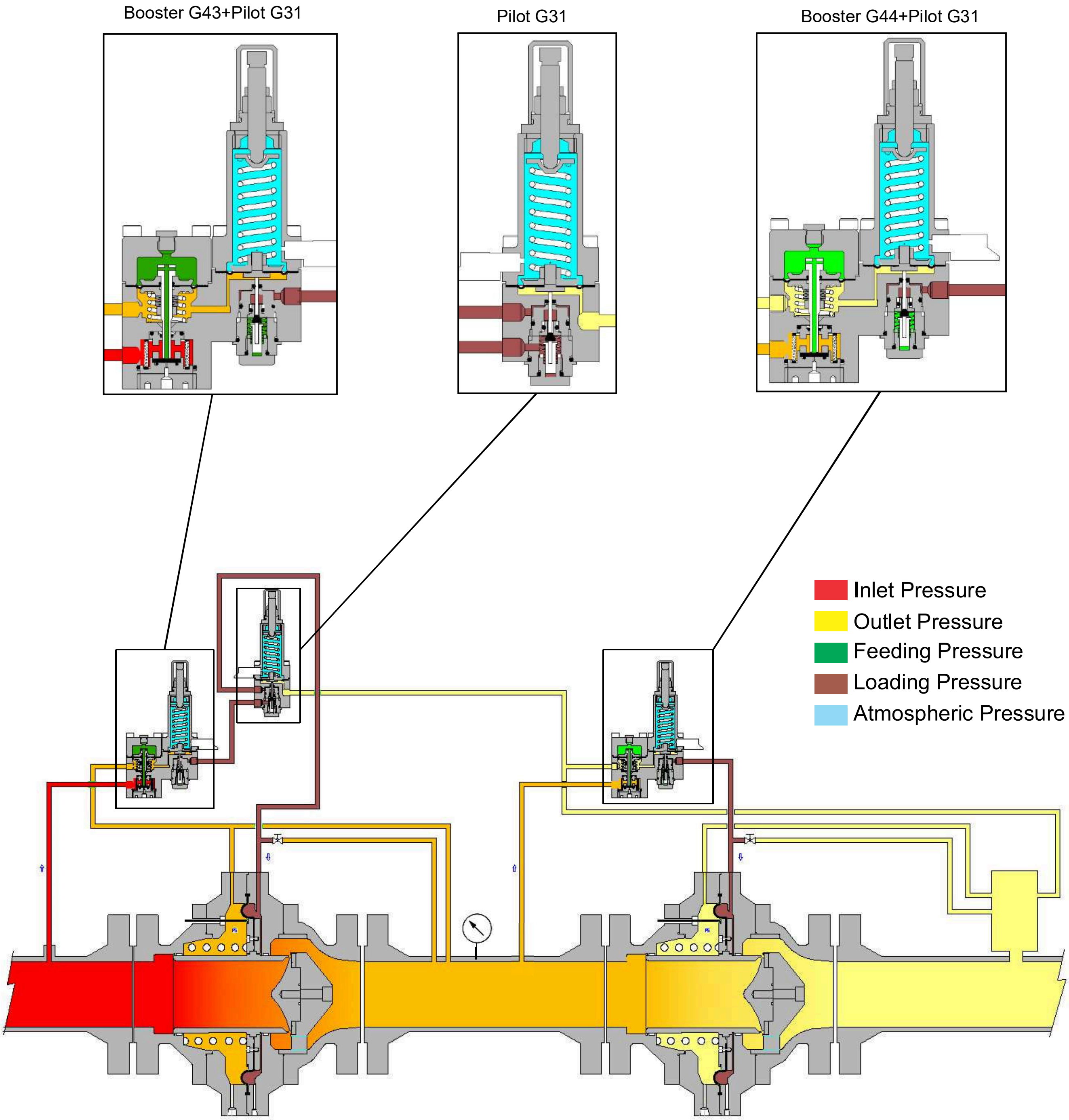
The Horus with G80 Pilot is a Gas Pressure Regulator ideal for low-pressure gas regulation. The self-pressure contained, low-pressure gas regulator is for use on control low pressure network as district stations; engines or fixed factor station metering, gas burners, and other low-pressure or any natural gas applications. The G 80 pilot is quite new development having as main function a fixed differential pressure across the G42 pilot given to the whole regulator better accuracy up to 1% even on low pressures and inlet pressure variations.

- Load-limiting keeping fixed differential pressure across the control pilot in one housing (two-stage)
- Adaptable to various types of gas pressure regulators and regulating lines
- Equipped with loading pressure gauge and upstream fine mesh filter 5μ
- May be equipped with electric remote set point adjustment
- Suitable for non-aggressive gases, other gases on enquiry
- Special version available for oxygen
- CE registration according to PED in combination
- According to DIN EN 334, the pilot is an integral component of this device
- Max. admissible pressure 100 bar with SS internals. Standard is maximum 20 bar with hard anodized aluminium internals.
- Outlet pressure range Wd: 50 mbar up to 2.5 bar



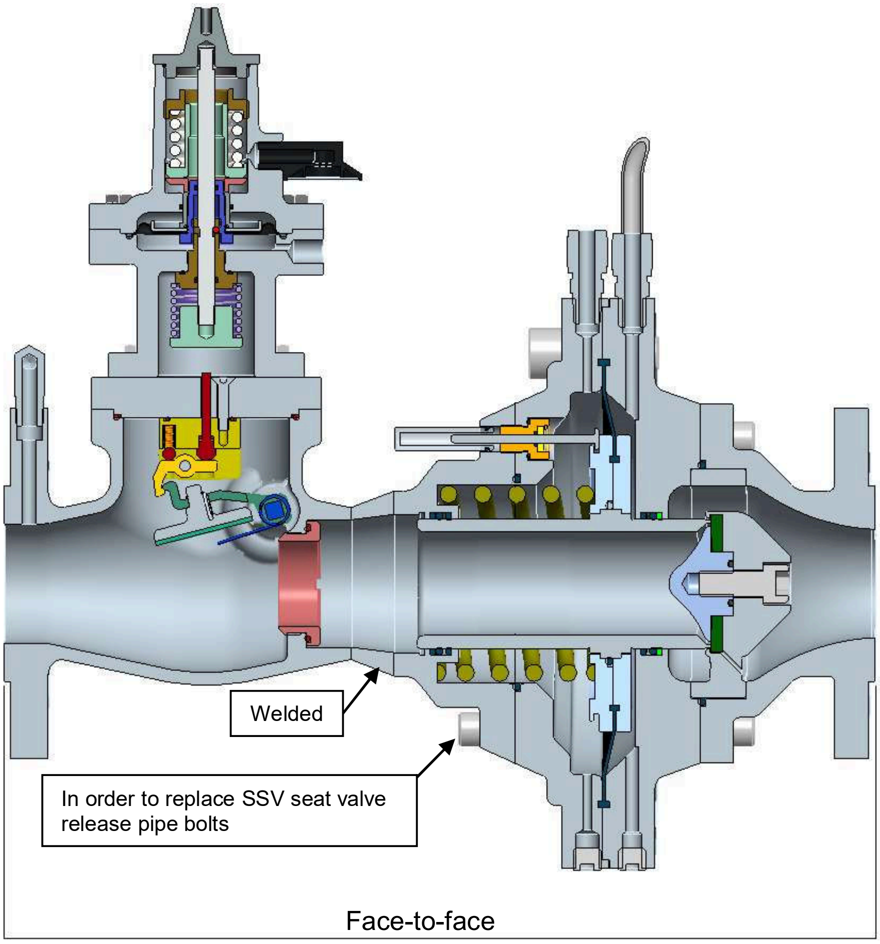
2.3 WORKING MONITOR SYSTEM.

- The working monitoring system the inlet pressure is reduced to pre determined pressure wich is further reduced to the active regulator. For this installation there is a need of spacer between the two regulator is order to install sensing line as shown in figure…In case of any failure of active regulator the monitor regulator assumes the active set pressure. So there is a need of third pilot as illustrated on same figure.



2.3 REGULATOR + SHUT-OFF COMBINED BETWEEN FLANGES.

The series "GIPS-HORUS" slam shut valves are installed in pressure regulating or metering skid units in order to protect the pipe line or the gas equipments and all downstream instruments from an unexpected over pressure or also in case of gas source interruption or even in case of rupture of it's own tubing's. With under pressure blocking (it is adjusted in Gascat plant) the slam shut valve matchs the requirements of EN 14382 standard. The slam shut valves are very fast disengaging, less than 1s and totally bubble tight; they are totally manually reset and due to it's design, have a very low pressure drop with a wide range of set pressures. They are easy to install and accept any position even upside down. Due to its design the set pressure are not affected by the inlet pressure variation (EN 14382 class A).

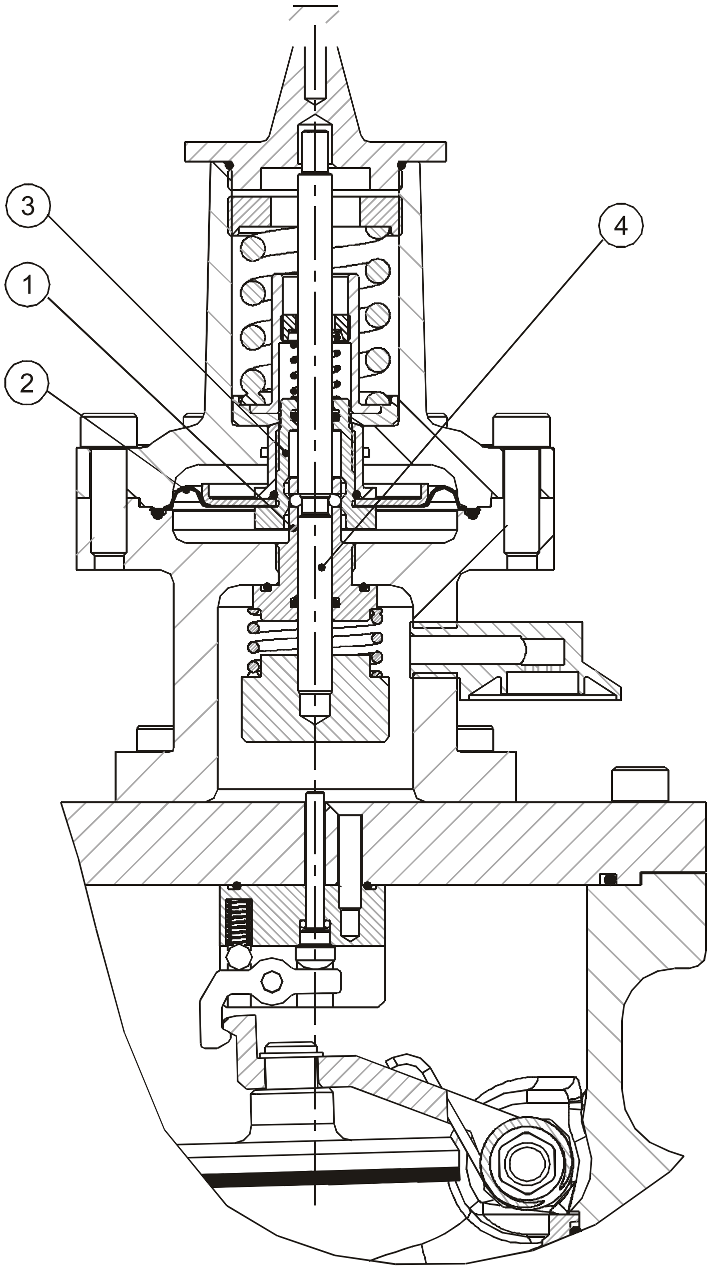


ND	DIMENSIONS [MM] - FACE - TO - FACE		
	150 #	300 #	600 #
2"	444	457	497
3"	582	601	620
4"	656	672	712
6"	921	943	1013
8"	1163	1213	1295
10"	1461	1534	1623

Note:
For class 900# the Gascat Engineering Departament should be previously consulted.

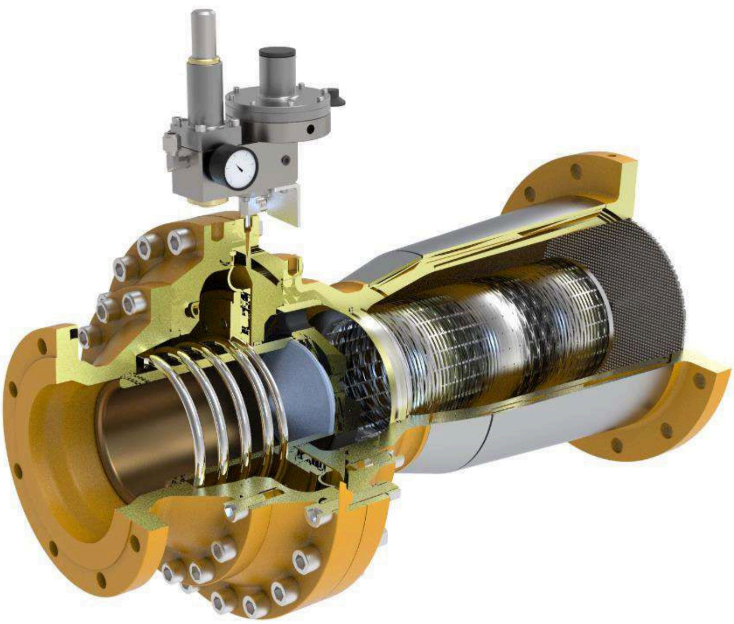
PRINCIPLE OF OPERATION

The slam shut valves “GIPS-HORUS” have an actuator with spheres holder (1) accomplish connected to the sensor element (2) and this one is sensitive to the downstream pressure. For the following cases:
a) downstream increase pressure beyond the set limit,
b) diaphragm rupture,
c) sensing tubings ruptures,
d) downstream pressure bellow the set limit,
as per the sense of any above case under the diaphragm, the tripping bush (3) moves to the release position with the ball mechanism disengaging the valve stem (4) to close the control element.
After normal external control pressure has been restored the valve must be manually reset to the open position to able the reset the upstream and downstream pressures must be equalized by an integral push button type which eliminate the need of a separate bypass (avoiding leaks). This push button is at the closed position valve.

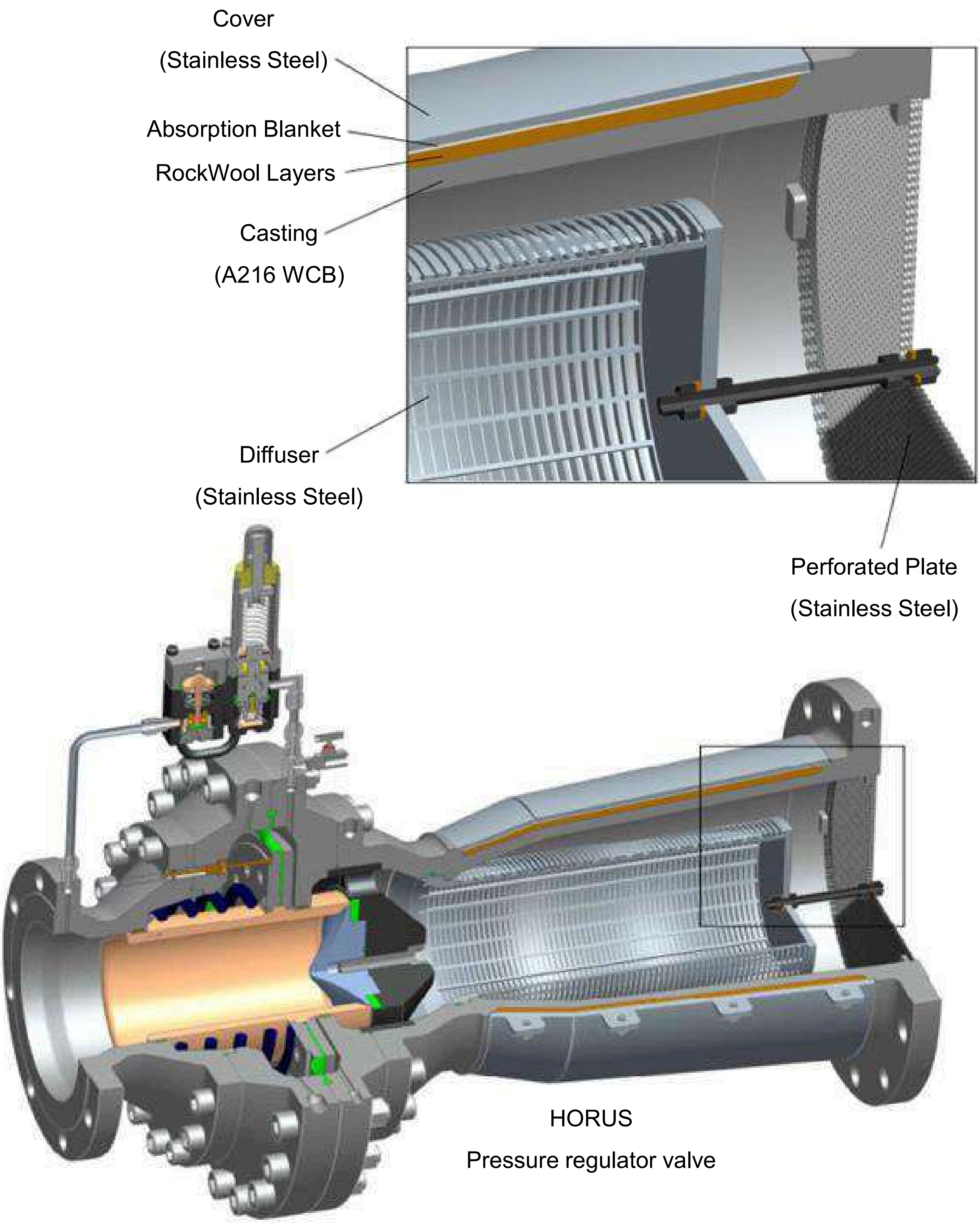


NOISE ABATEMENT

In order to avoid high noise emission the main valve is equipped with a perforated expansion piece which splits the gas steam up into many thin partial streams moving against one another. For further noise attenuation three concentric perforated plates are located around the outlet of the main valve control element, thus causing a pressure cut of several stages and again dividing the gas steam into a great number of partial streams. A rectifying cone and filling material are installed in the outlet duct of the main valve to achieve additional noise suppression. Optionally, the perforated expansion piece can be fitted with an internal layer of metal foam material, with which an additional noise reduction of at least 10 dB(A) can be achieved. The usual perforated expansion piece can be replaced offhand by a perforated expansion piece with internal layer of metal foam material. Please note that when using the metal foam insert the KG-value (flowrate coefficient) is reduced accordingly (see page 11, table of valve data).



GASCAT IN LINE SILENCER - SILEX



MATERIALS AND TECHNICAL DATA.

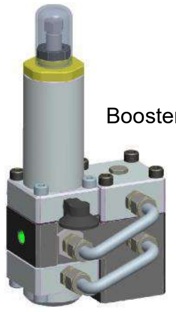
- Max. operating pressure 150 bar for class 900#
- Outlet pressure ranges with Pilot G42 and Pilot G31
- Accuracy class AC up to 1%
- Lock up pressure category SG up to 5%
- Electro pneumatic control stage for pressure and flow control
- electric remote control
- Travel indicator (available)
- Min. outlet pressure 50 mbar and max. outlet pressure 90 bar
- min. required differential pressure between inlet and outlet Δp 0.5 bar / 0.2 bar for 150#
- Connections flanged: DIN PN 25 to PN 100 and ANSI 300 RF, RTJ, ANSI 600 RF, RTJ, ANSI 900#
- EX-protection standard regulators do not apply to ATEX 95 (available electronic accessories fully comply with the ATEX requirements).
- Materials main Valve body A516 grade 70 (with charpy test for low temperature); available in LCB/LCC cast carbon steel;
- Internal parts Stainless Steel or Aluminium Hard Anodized
- Pilot material body A516 grade 70 or Aluminium Hard Anodized, internals stainless steel AISI 316
- Diaphragm NBR, FKM
- Application, Features, Technical data
- Temperature class 2 -20°C to +60°C (other ranges on request)
- Body inlet size DN 50, DN 80, DN 100, DN 150, DN 200, DN 250
- Outlet flanged size : can be used bigger in comparison inlet flange setting less velocity inside the body also causing less noise and less erosion on internal parts regulators
- Function and strength acc. to EN 334
- CE – marked according to PED 2014/68/EU

COMPONENT	MATERIAL
Body	ASTM A516 GR.70 *Optional see note*
Piston	Stainless Steel *Aluminium (optional)*
Internals	Stainless Steel *Aluminium (optional)*
Seals	BUNA N *Viton (optional)*

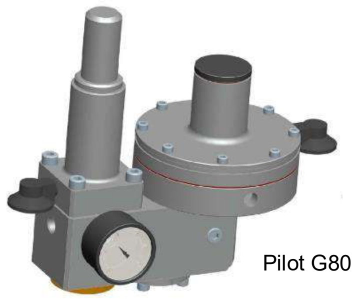
OPERATION LIMIT	
Temperature range	-20°C ~ +60°C
AC - Regulator Accuracy Class SG - Lock Up	Up to ± 1% / Hasta ± 1% Up to 5% / Hasta 5%

Note: Gascat should be consulted for optinal material different than mentioned above.

Pressure Pilot: Springs Regulation Range		
SPRING RANGES	SPRING COLOR	PILOT
20 ~ 130 mbar	Blue	G80
90 ~ 250 mbar	White/Gray	G80
230 ~ 400 mbar	Silver	G80
350 ~ 1100 mbar	Gray	G80
0.7 ~ 2.8 bar	Silver	G31F
2 ~ 5.5 bar	Green	G31F
4.5 ~ 14 bar	Red	G31F
7 ~ 18.3 bar	Brown	G31F
1.5 ~ 4.5 bar	Green	G42
4 ~ 12 bar	Red	G42
10 ~ 18 bar	Blue	G42
15 ~ 32 bar	Red	G42
25 ~ 50 bar	Red	G40
45 ~ 62 bar	Yellow	G40

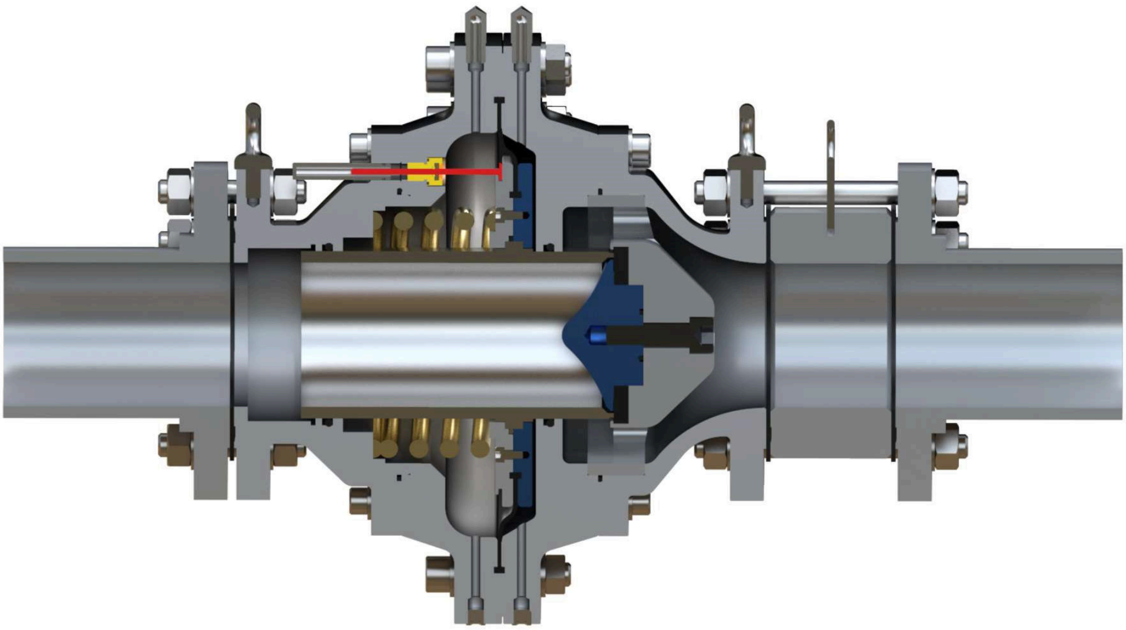

Booster G43+Pilot G42


Pilot G31

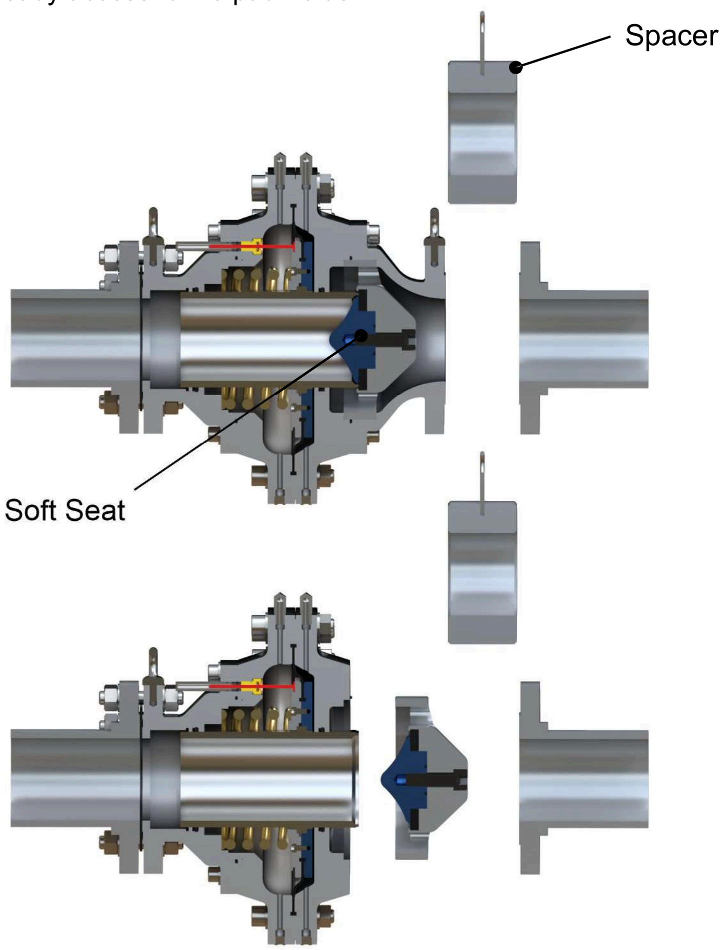

Pilot G80

MAINTENANCE BENEFITS

During the maintenance operations the pad is easily accessible and, unlike in other regulators, there is no need to remove the regulator from the line or to disassemble the diaphragm in order to replace the pad.



A special spacer has been installed downstream of the regulator so that, once the spacer is removed, the outlet flange can also be easily removed for ready access to the pad-holder.



Easy access to the pad-holder

CALCULATION OF KG VALUE

$$\text{if } \frac{pd}{pu} \geq 0.53 \qquad K_G = \frac{Q_n}{\sqrt{pd.(pu - pd)}} \quad \text{or} \quad Q_n = K_G.\sqrt{pd.(pu - pd)}$$ Sub-Critic Flow

$$\text{if } \frac{pd}{pu} < 0.53 \qquad K_G = \frac{2.Q_n}{pu} \quad \text{or} \quad Q_n = \frac{(K_G.pu)}{2}$$ Critic Flow

pd = outlet pressure [bar]
pu = inlet pressure [bar]

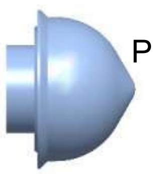
Pressure for the formulas to be inserted in absolute values

TRIM SIZE		DN / ND				
		2" x 2" (50mm)	3" x 3" (80mm)	4" x 4" (100mm)	6" x 6" (150mm)	8" x 8" (200mm)
30%	KG	710	1500	3000	5700	10420
50%	KG	1230	2518	4300	9500	15700
70%	KG	1740	3500	7000	13200	18000
100%	KG	2481	5200	9924	18920	34735

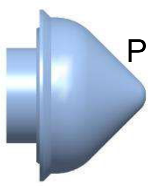
K_G values in Nm^3 /h of natural gas, for gases different than indicated in table below, the correction factor can be obtained using the equation.

GAS	SPECIFIC GARVITY	CORRECTION FACTOR
AIR	1.29	0.77
NITROGEN	1.25	0.79
PROPANE	2.02	0.62
BUTANE	2.70	0.53

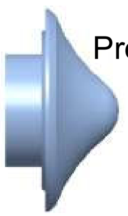
$$\text{Correction Factor} = \sqrt{\frac{0.78}{\text{Specific Gravity}}}$$



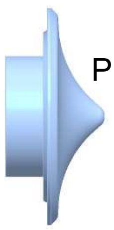
Profile 70% flow restriction



Profile 50% flow restriction



Profile 30% flow restriction



Profile no flow restriction

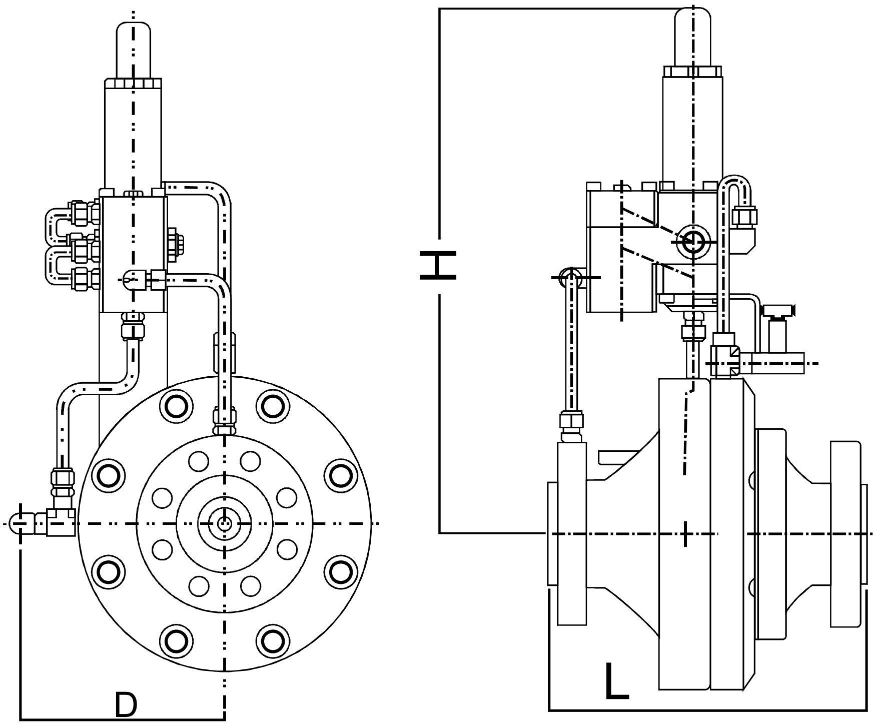
NOTE
For process service conditions where the required K_G is different then the standard informed, the Gascat Engineering Departament should be previously consulted.

GASCAT

DIMENSIONS AND WEIGHT

DIMENSIONS (mm) AND WEIGHT (kg)												
DN/ND	L			H			D			Weight		
	150#	300#	600#	150#	300#	600#	150#	300#	600#	150#	300#	600#
2”	254	267	286	271	271	271	91	91	140	13	14.5	16.5
3”	299	318	337	313	313	313	124	124	124	27	30	33
4”	352	368	395	337	337	337	137	175	175	34.5	41.5	53.5
6”	451	473	508	509	509	509	200	200	200	107	125	169
8”	568	594	635	578	578	578	25	250	250	157	184	248
10”	673	708	753	650	650	650	-	-	-	568	660	700

Note
For class 900# the Gascat Engineering Departament should be previously consulted.



GASCAT

Gascat Indústria e Comércio Ltda.
Rodovia SP 73, nº 1141 - Distrito Industrial
Indaiatuba - SP - Brasil - CEP 13.347-390
Fone: (55 19) 3936-9300
vendas@gascat.com.br / sales@gascat.com.br

www.gascat.com.br

Representante / *Distributor*

12/2022