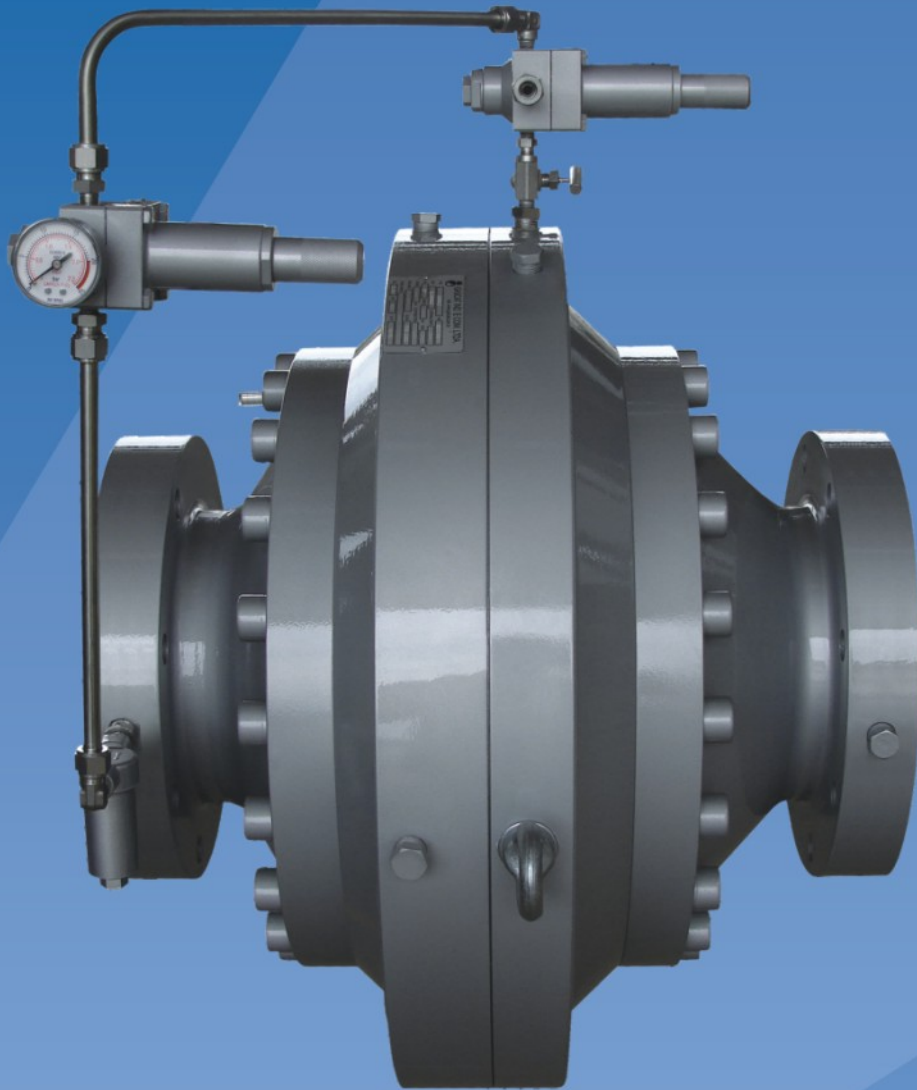


HORUS

*Axial Flow Piloted Operated
Pressure Regulator*



GASCAT

INTRODUCTION

The Horus Series pressure regulators were developed by Gascat's Engineering, in order to attend the most varied applications and can operate in a variety of operation conditions, however, it is particularly applicable in situations requesting high flows associated to high pressures, typically found in natural gas transport and for custody transfer in natural gas delivery points. The Horus belongs to the family of "pilot operated" pressure regulators and can be used for all types of non-corrosive gases and for corrosive gases when built in special versions.

The Horus regulator is also known by its silence operation even on high flows, high performance on high differential pressure conditions and 1% pressure regulation accuracy with high flow capacities.

FEATURES

- Extreme precision of pressure control (+ / -) 1%
- The differential pressure regulator developed by Gascat eliminates pumping action, the most common problem found in regulators designed for high flow rates.
- High versatility for different applications.
- Minimum installation space required.
- Main valve position indicator.

APPLICATIONS

- City Gate stations - Applications where basic requirements are high flow rates, high pressure and high precision.
- Regulation and Measurement Stations - Applications requiring high precision and low noise level.
- Gas Production on Wells - Where pressures may reach 100 bar. By introducing an orifice plate a differential signal is produced and the regulator can be adjusted to work as a flow limiter regulator.

SPECIFICATIONS

- FITTINGS: Flanged 1", 2", 3", 4", 6", 8" and 10" 150# / 300# / 600# RF or 600# RTJ
- Building materials options of the body: carbon steel, stainless steel. (Other materials under request).
- Pilot loaded self-operated regulator.

PILOTS OPERATION PRESSURES

Springs Regulation Range (Pilots G30/G31/G32/G33/G38/G38HP)			
Spring Code	Spring Color	Spring Range	Pilot Model
01.49.61	Silver	0.7 – 2.8 bar	G-30/G31
01.49.65	Green	1.7 – 6.3 bar	G-30/G31
01.49.64	Red	4.2 – 14 bar	G-30/G31/G38
01.49.33	Brown	7 – 18.3 bar 14 – 36.6 bar	G-30/G31/G38 G-32/G33/G38HP
01.49.59	Black	14 – 32 bar 28 63.5 bar	G-30/G31/G38 G 32/G33/G38HP

OPERATION PRESSURES

	CL 150#	CL 300#	CL 600#
Max. Inlet Pressure (bar)	20	52	102
Max. Outlet Pressure (bar)	15	40	60
Min. Outlet Pressure (bar)	0,7	0,7	0,7

FLOW COEFFICIENT PRESSURES AND STANDARDS

ND	1"	2"	3"	4"	6"	8"	10"
KG	620	2481	5024	9924	18920	34735	54275

Accuracy and Lock-up Features (according DIN EN 334)		
AC	SG	SZ
up to 1%	up to 2,5%	10% to 2,5%

SIZING FORMULAS

Sub-Critic Flow

$$P_2 / P_1 \geq 0,53$$

$$Q = KG \cdot \sqrt{P_2 \cdot (P_1 - P_2)}$$

Critic Flow

$$P_2 / P_1 < 0,53$$

$$Q = (KG \cdot P_1) / 2$$

where:

Q = Maximum regulator flow (Nm³/hr)

KG = Regulator coefficient (see table)

P₁ = Regulator inlet pressure (bar - abs)

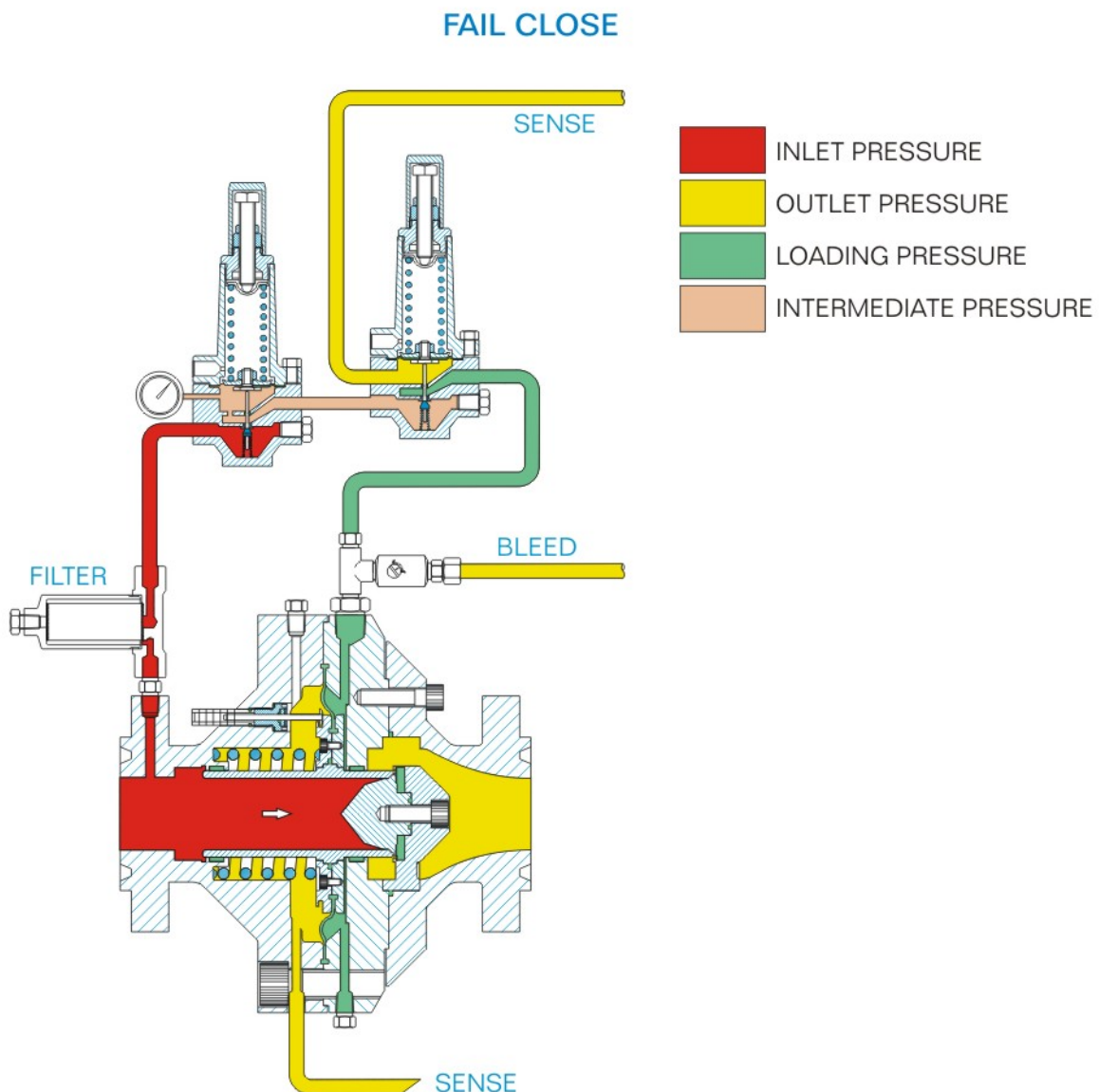
P₂ = Regulator outlet pressure (bar - abs)

OPERATING PRINCIPLE - FAIL CLOSE

The Horus Series pressure regulator operates by pilot loading in the diaphragm camera at the outlet side of the main regulator that, through the differential between the loading pressure and the inlet pressure, moves the diaphragm and, consequently, the piston, increasing or decreasing the passage opening of the valve. In case of flow absence, the consequent increase of outlet pressure transmitted through the sensor piping to the pilot's diaphragm and to the main regulator, provokes the closing of the same ones, making the closing spring to move the diaphragm, consequently, the piston against the shutter, shutting the gas passage. When consumption starts, the inverse effect to the flow absence causes the pilot passage to open, increasing the loading pressure on the diaphragm chamber at the outlet side that, added by the output pressure fall on the opposite chamber of the same diaphragm, makes this to increase the passage opening through the valve of the main regulator.

Depending on the configuration, the Horus regulator can be supplied, with the G38/ G38HP pilot pre-regulator that limits and stabilizes the pilot feeding pressure, providing better precision in adjusting pressure, as well as, additional safety in case of variation in the inlet pressure or bad pilot operation.

The Horus can be supplied just with one pilot (without regulators) on applications for work operations where the differential pressures are lower than 4bar ($\Delta P < 4 \text{ bar}$).



OPERATING PRINCIPLE - FAIL OPEN

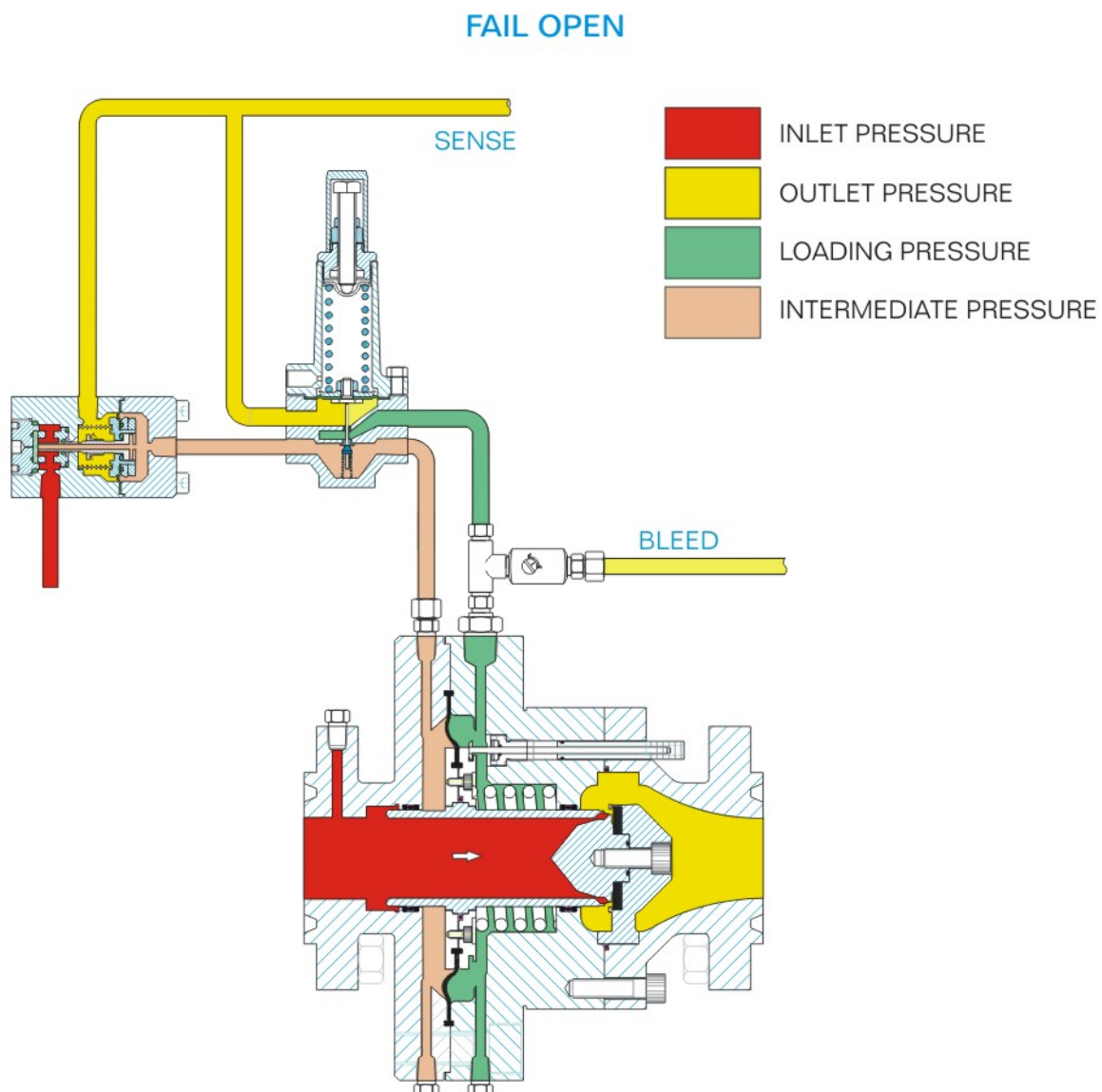
In case there is no pressure, the shutter is maintained in the totally open position by the spring force. In the same way as the Fail Close regulator, the stem shutter group is fully balanced.

The pressure that modifies the shutter position, and thus controls flow, passes through the filter, reaches the feeder that reduces its value to a value conveniently near to the outlet pressure and communicates this pressure directly to the pilot's input and to the main regulator diaphragm.

Pilot (G30 / G32) controls pressure variations on the diaphragm of the main regulator and, per consequence, the position of the main regulator shutter, comparing the outlet pressure under the pilot's diaphragm with the spring load on the same.

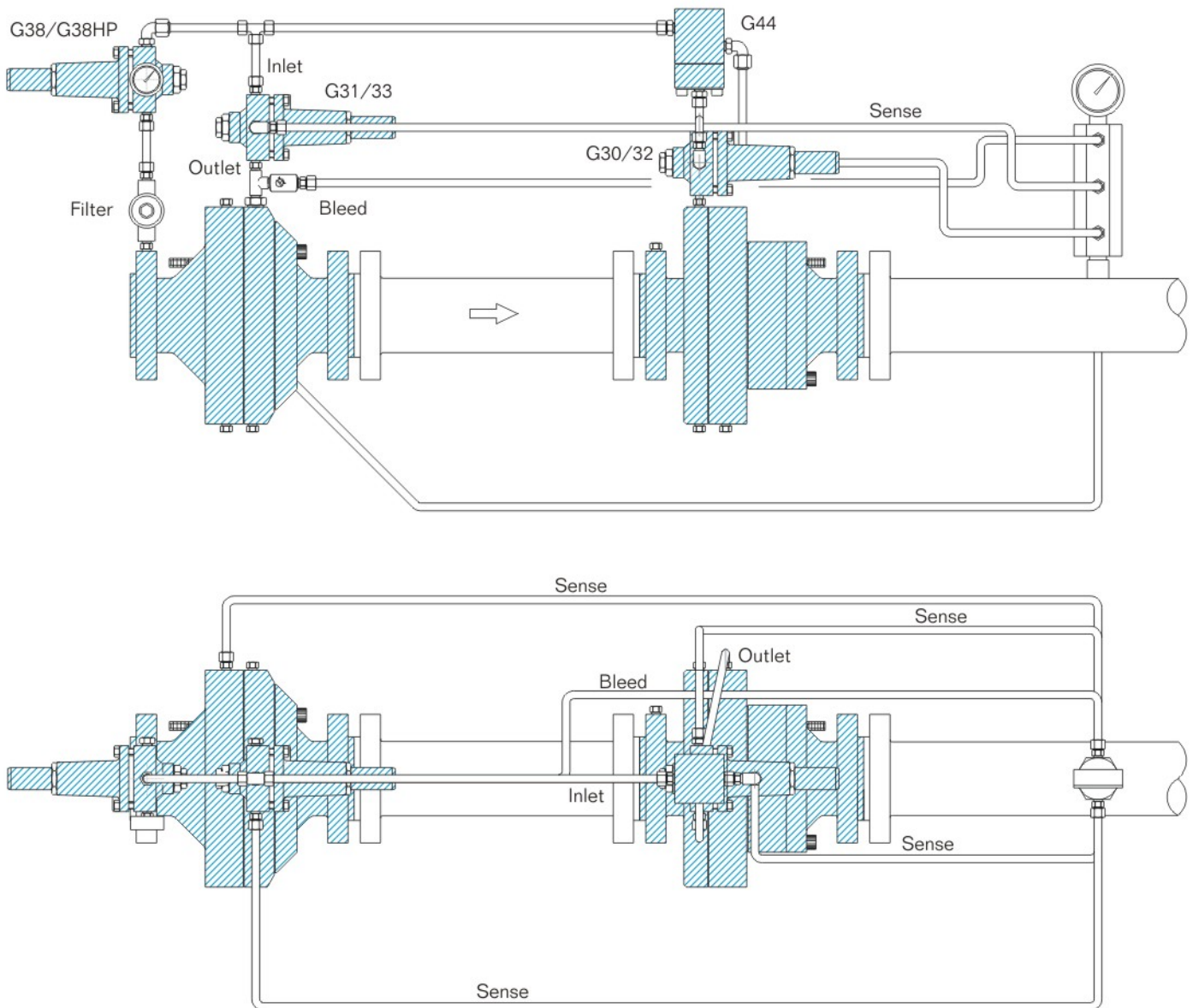
Thus, if the outlet pressure decreases, the pilot increases pressure on the main diaphragm making the regulator to increase opening and restore the set pressure value.

Regulators speed of response can be regulated through the bleed valve (needle).



ASSEMBLY OPTIONS

- Assembly with a single regulator
- Assembly with monitor and active regulator
- Fail close (FC- FAIL CLOSE) or fail open (FO-FAIL OPEN) regulator.
- For FC application, regulator with G 38 pre-regulator and G 31 pilot (G 31 is applicable for medium pressure) or regulator with G 38 HP pre-regulator and G 33 pilot (G 33 applicable for high pressure)
- For FO application, regulator with G 44 booster and G 30 pilot (G 30 is applicable for medium pressure) or regulator with G 32 pilot (G 32 applicable for high pressure)



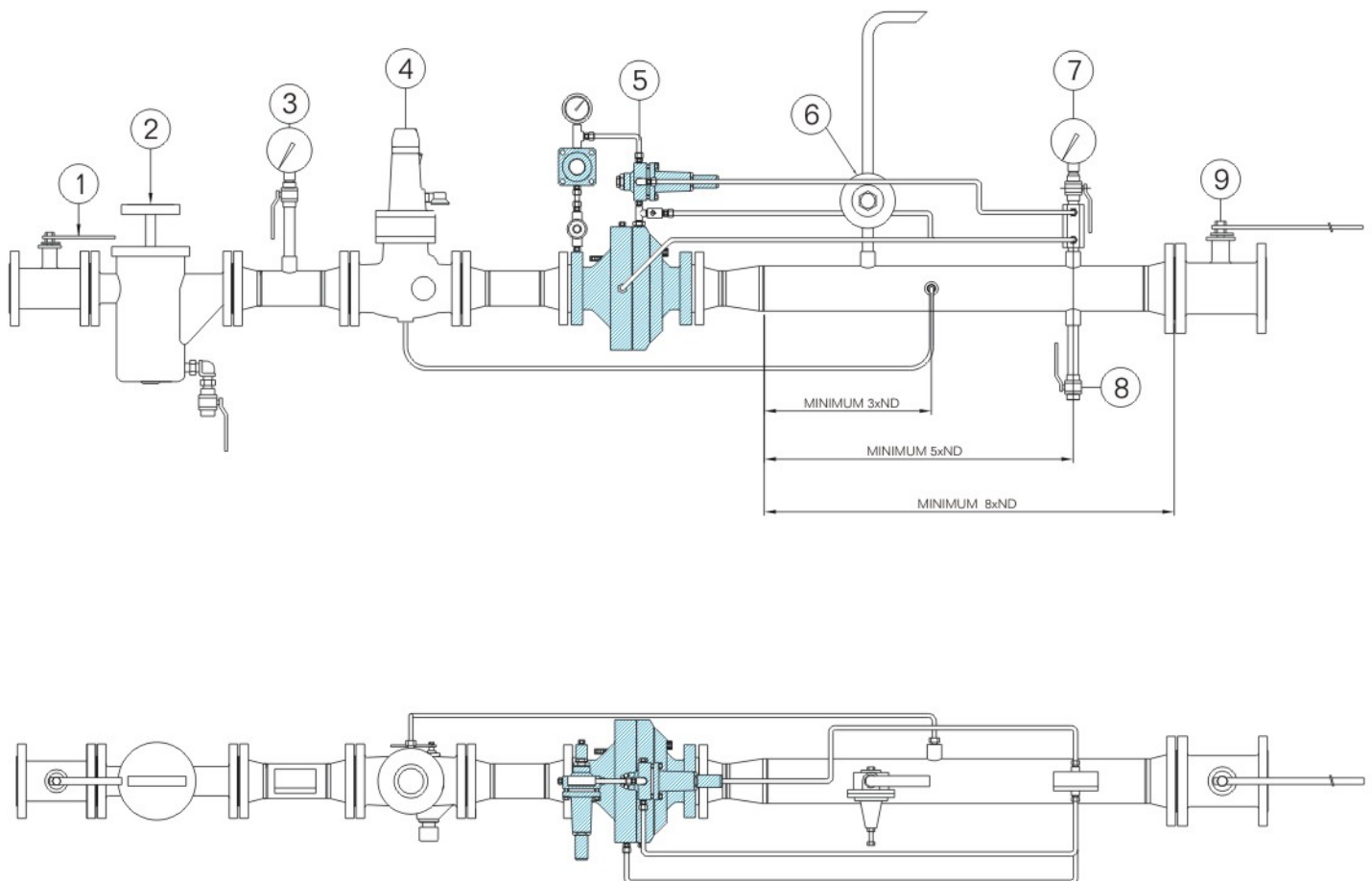
Assembled with Horus Monitor regulator Fail close /
Active Fail open with G38 pre-regulator, G31/G33 pilot and G30/32 pilot.

IMPORTANT DEVICES FOR A SAFE INSTALLATION (DIN EN 12186 and DIN EN 1776)

A safe installation shall contain, at least (see outline drawing proposed below):

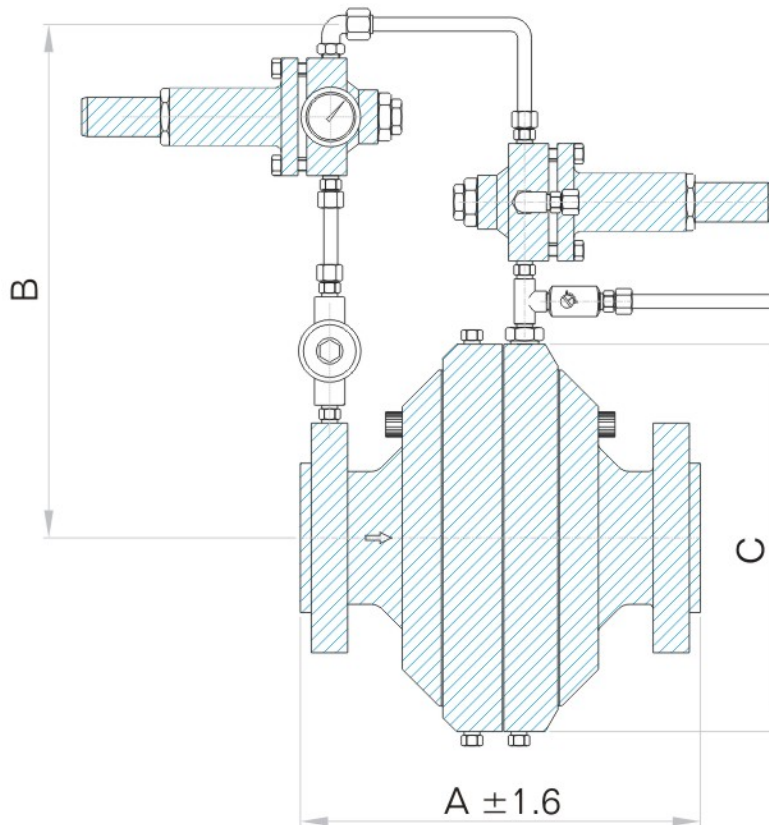
1. Manual blocking valve (ball type or similar).
2. Filter with drain.
3. Inlet pressure gauge.
4. Security shut-off valve (Gascat's GIPS model).
5. Pressure regulator (Horus).
6. Partial relief valve (Gascat's Junior model or Argos Relief).
7. Outlet pressure gauge.
8. Purge valve $\text{\O} \frac{1}{2}$ ".
9. Manual blocking valve (ball type or similar).

RECOMMENDED INSTALLATION OUTLINE



MAIN DIMENSIONS

ND	A				B	C	WEIGHT (Kg)			
	150#RF	300#RF	600#RF	600#RTJ			150#RF	300#RF	600#RF	600#RTJ
1"	184	197	210	210	230	196	22	22	23	23,5
2"	254	267	286	289	290	276	64	65,5	67,5	68
3"	299	318	337	340	320	337	93	97	99	99,5
4"	352	368	395	398	360	400	147	150	157	158
6"	451	473	508	511	450	545	280	300	340	345
8"	568	594	635	638	520	710	580	610	650	655
10"	673	708	753	758	590	850	812	854	905	920



CERTIFICATIONS

ISO 9001



ASME - U-STAMP



NATIONAL BOARD



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