

# URANO

*Pilot Operated  
Pressure Regulator*



CE 0085 DVGW



# GASCAT

## INTRODUCTION

URANO is a pilot operated pressure regulator developed by Gascat Engineering for use with natural gas in high differential pressure application.

Its outstanding application is in natural gas transmission and/or distribution systems. The regulator is also applicable to a variety of industrial processes.

URANO construction adopted the "top entry" concept that allows any maintenance and/or cleaning operation with no need to remove the body regulator from the line, which is the main feature of this configuration type besides the facility and speed of maintenance that requires just one operator and one tool.

The flow tangent to the valve seat, reduces the valve seat seal wear under high-speed flow conditions, which occur at low flow rates and high-pressure differential conditions.

The loading pressure drain system provides discharge downstream of the regulator, consequently there is not discharge of gas to atmosphere noway, improves installation operational safety and decrease overall cost by framing the installation in a less severe classification.

URANO interchangeable orifice provides more flexibility in adapting the regulator to the installation conditions with substitution of single orifices. The valve seat assembly substitution by simple component fitting, allows for the fastest sealing change of this category regulators.

The following URANO features stand-out and shall be mentioned:

- High Accuracy
- High rangeability
- Large flows
- Low noise level (special trim can be supplied upon request for special conditions of flow)
- Bubble tight lock up
- Easy, fast and inexpensive maintenance
- Low maintenance costs due to be top entry regulator
- Design integral strenght

## SPECIFICATIONS

	Component	Material
<b>MAIN REGULATOR</b>	Body	Carbon Steel ASTM A 216 Gr. WCB or ASTM A352 LCB / LCC
	Covers	Carbon Steel ASTM A 516 / ASTM A 216 Gr. WCB or ASTM A 352 LCB / LCC
	Diaphragm	Convuluted Diaphragm (Buna -N with nylon fabric)
	Seats	Stainless Steel ASTM A276 TP 316 or TP 416 with polyurethane molded packing
	Stem	Stainless Steel ASTM A 276 TP 304 or TP 416
	Shutter	Stainless Steel ASTM A276 TP 316 or TP 416
	Tubings	Stainless Steel seamless ASTM A269 (316SS polished)
	Compression Fittings	ASTM A276 or ASTM A182 (316SS)

The materials listed above are for standard products. Special materials in order to follow different specification or for other applications type can be supplied under request.

Accuracy and Lock-up Features		
AC	SG	SZ
up to ±1%	up to ±2.5%	2,5% / 5%

Classification according to EN 334

Maximum Work Pressure	
Class 300 <sup>#</sup>	Class 600 <sup>#</sup>
51 bar	100 bar

High accuracy are only guaranteed for applications with a wide temperature range and temperatures far below 0° C if the pilot are heated.

G-40 High Pressure Pilot and G-42 Medium Pressure Pilot: Springs Regulation Range		
Spring Color	Spring Range	Pilot Model
Green	1.0 - 4.5 bar	G-42
Gray	4.5 - 12.0 bar	G-42
Blue	11.0 - 17.0 bar	G-42
Red	16.0 - 30.0 bar	G-42
	25.0 - 50.0 bar	G-40
Yellow	27.0 - 55.0 bar	G-42
	47.0 - 80.0 bar	G-40

### SIZING FORMULAS

#### Sub-Critical Flow

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

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

#### Critical Flow

$$P_2 / P_1 < 0,53$$

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

where:

Q = Regulator Maximum Flow (Nm<sup>3</sup>/h)

KG = Regulator factor (See table)

P<sub>1</sub> = Regulator inlet pressure (bar - absolute)

P<sub>2</sub> = Regulator outlet pressure (bar - absolute)

#### Notes:

- We suggest that the regulator sizing calculation considers a minimum safety factor of 20% above the calculated value.
- For application with other gases, the calculated flow shall be converted to an equivalent flow in natural gas, using the table below:

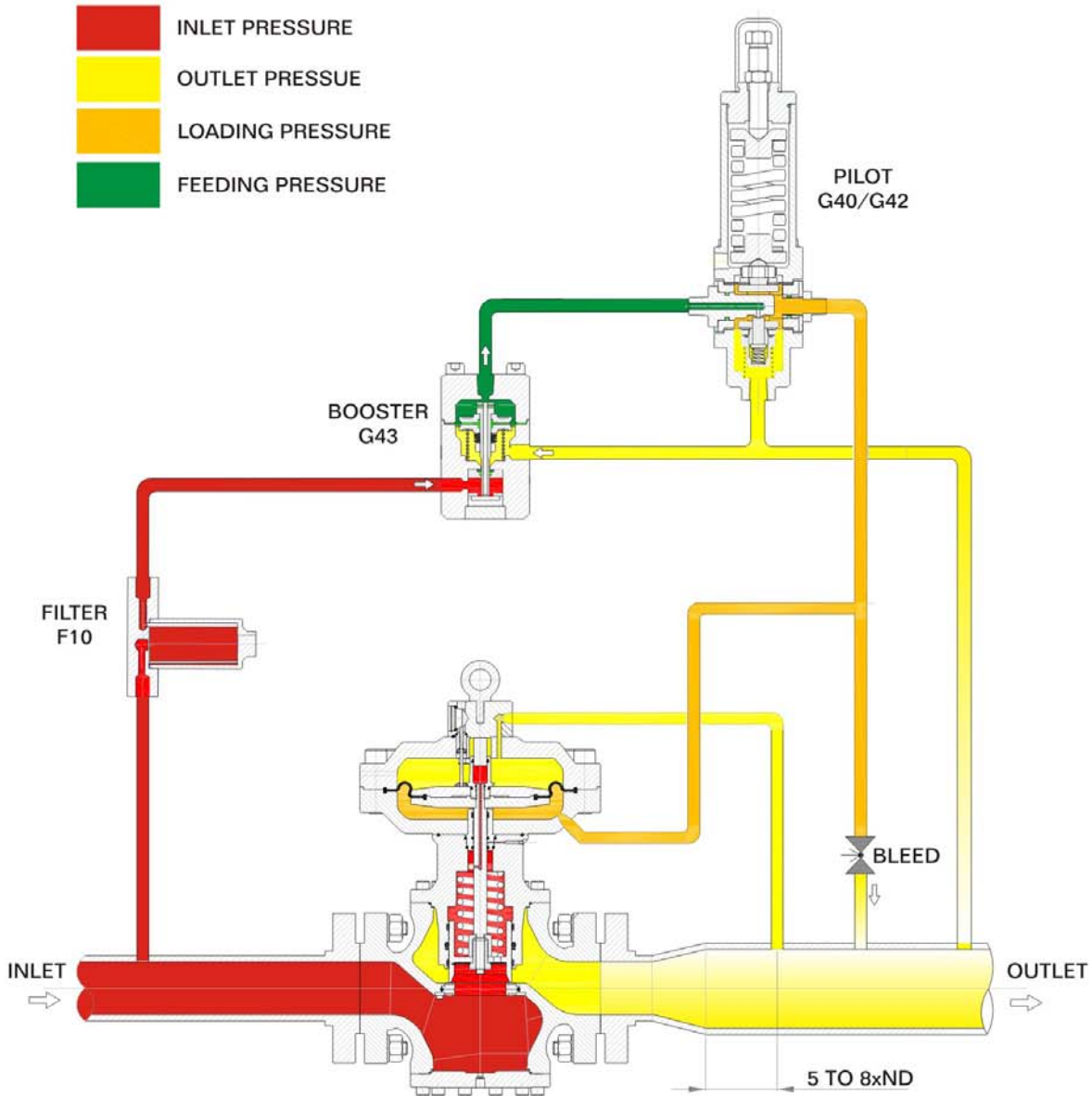
### FLOW FACTOR

ND	CV	KG	Gas	Specific Gravity (Kg/m <sup>3</sup> )	Correction factor	For other gases
2"	63	1950	Air	1.29	0.77	Correction Factor = $\frac{0.78}{\sqrt{\text{Spec. Gravity}}}$
3"	123	3800	Nitrogen	1.25	0.79	
4"	220	6850	Propane	2.02	0.62	
6"	486	15080	Butane	2.70	0.53	
8"	900	28250				

#### Notes:

- DVGW registered & CE marked
- Absolute tight shut-off for all classes
- Flanged connections according to ANSI B16.5 Class 300<sup>#</sup>600<sup>#</sup>RF/RTJ and DIN PN 25/PN40
- Max / Min operation temperature from - 20° to 60° C
- The Booster (G-43 or G-44) guarantees a pressure supply to the pilot (G-40 or G-42) of 0.8 to 2.0 bar above the pilot set -point
- Recommended inlet pressure: 3 to 51 bar ANSI 300<sup>#</sup>, 100 bar ANSI 600<sup>#</sup>
- Outlet pressure range: 1 to 49.5 bar ANSI 300<sup>#</sup>, 1 to 80 bar ANSI 600<sup>#</sup>
- Other pressure classes up to 1500<sup>#</sup> are available

URANO FAIL CLOSE



OPERATING PRINCIPLE - FAIL CLOSE

In the absence of the gas in the system, the valve is kept in the closed position by the action of the spring that keeps the valve pressed against the obturator. This is independent of inlet pressure, since the valve is fully balanced.

If there is gas flow, the pilot compares the variation of the outlet pressure sensed by its diaphragm, with the spring set-point adjusted in the pilot G40/42, controlling the pressure loaded under the diaphragm of the main regulator.

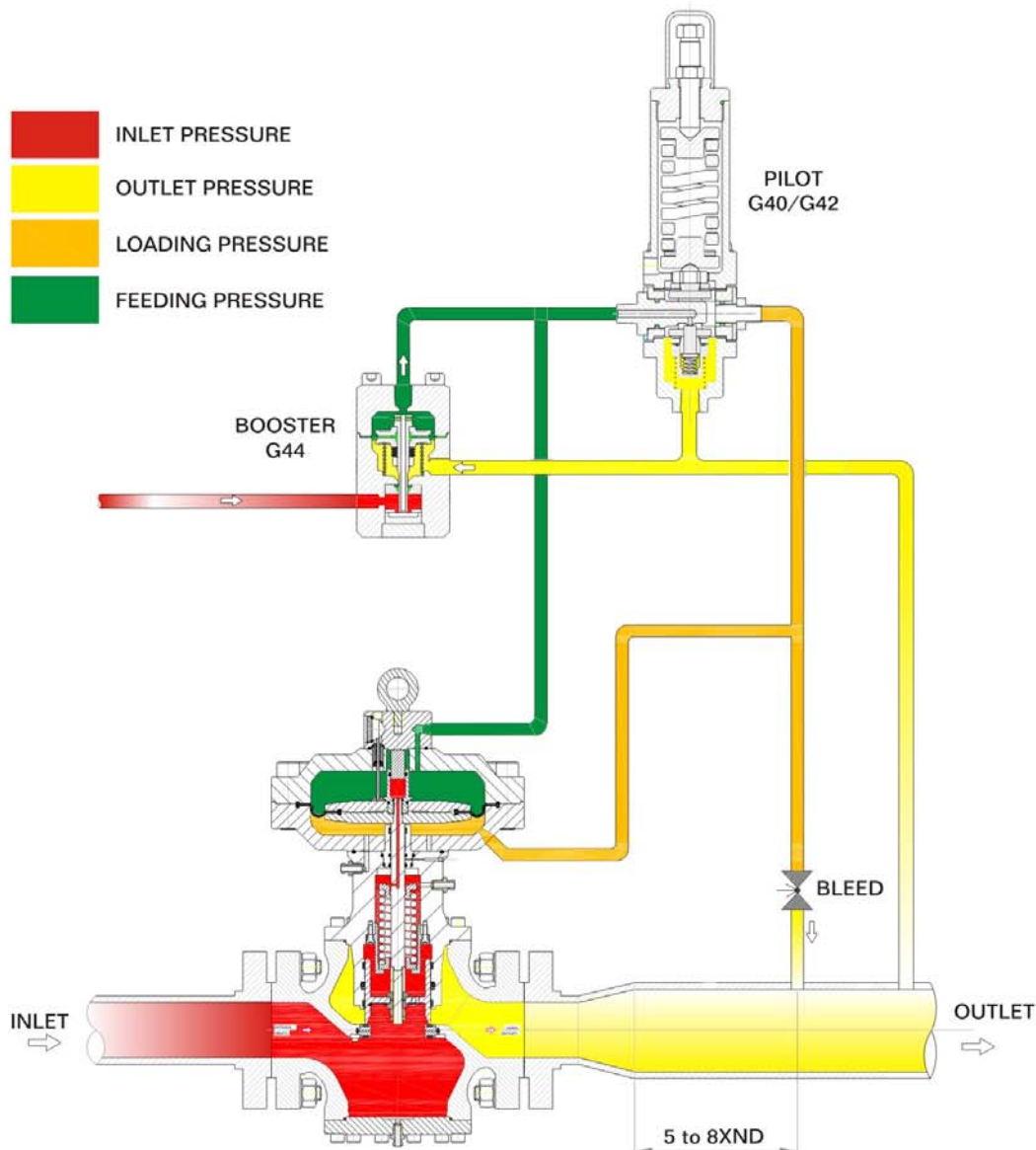
If the outlet pressure is lower than the set-point, the pilot will supply the lower chamber of the main valve with more loading pressure. Thus the pressure in the lower chamber of the main valve actuator will be larger than upper chamber, therefore the main valve will open allowing gas flow until achieve the pressure set-point. As soon as the pressure set-point is achieved, the main valve keeps this position.

The response speed of the system is controlled by the bleed valve located a downstream of the pilot, increasing or decreasing the response speed for opening of main regulator and, consequently, an inverse reaction in the shut-off speed, achieving the adjustment of the needed balance to achieve the characteristic consumption for each installation.

The desired control pressure is adjusted through the regulating screw of the pilot sensor (G-40 / G-42).

The pre-regulator (Booster G43) is a differential regulator, it must supply the pilot (G40/G42) with 0.8 up to 2.0bar higher the pilot set-point , this provides a better accuracy.

## URANO FAIL OPEN



### OPERATING PRINCIPLE - FAIL OPEN

In case there is no pressure, the valve is kept in a fully open position due to the spring force. In the same way as the Fail Close regulator, the stem valve and the trims are fully balanced.

The pressure that modifies the valve position and thus controls flow, is feed by the Booster G44 that reduces this pressure 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 (G40/G42) controls pressure variations over the diaphragm of the main regulator and per consequence, the position of the main regulator valve, comparing the outlet pressure under the pilot's diaphragm with the spring load over it.

Thus, if the outlet pressure decreases, the pilot increases the pressure under the main diaphragm in order to making the regulator to open further and restore the set-point pressure value.

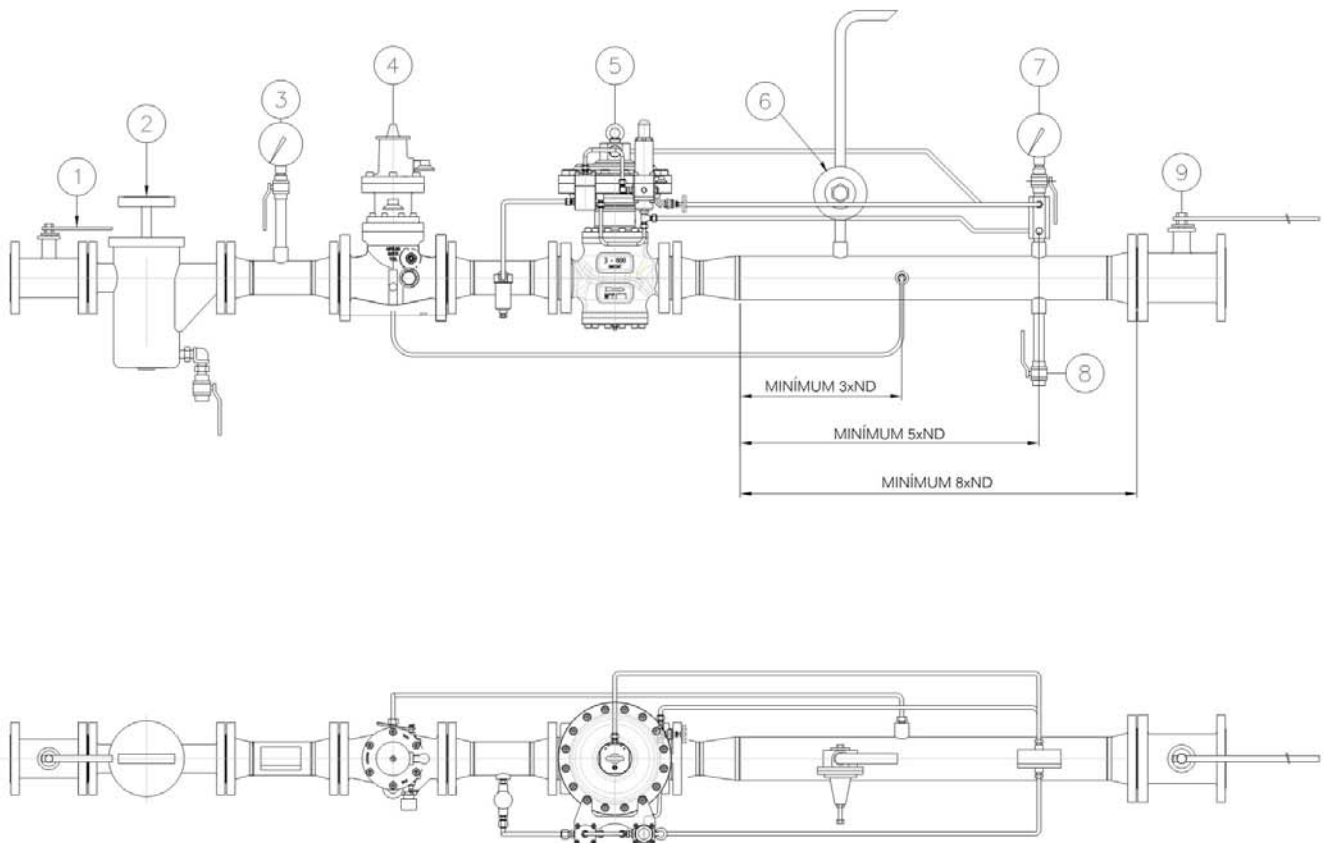
The opposite, if the outlet pressure starts increasing, the force exercised under the pilot's diaphragm moves its obturator to close it; the pressure decreases under the main regulator diaphragm by flowing through the drainage bleed valve, while the pressure load over the main diaphragm increases rapidly supplied by the Booster G44, causing the displacement of the valve downwards, thus restoring the set-point.

The response speed of regulator can be regulated through the bleed valve, likewise which the Fail Close Regulator.

## RECOMMENDED INSTALLATION

A safe installation must have, at least (check the following proposed scheme):

1. Manual lock-out valve (ball type or similar)
2. Filter with draining
3. Pressure gauge for inlet pressure reading
4. Automatic shut-off Fail Close valve (Gascat model GIPS-FC)
5. Pressure regulator
6. Partial relief valve (Gascat model Relief CH)
7. Pressure gauge for outlet pressure reading
8. ½" purge valve
9. Manual lock-out valve (ball type or similar)



### Note:

For monitor and active regulator (Fail Open) installation, the monitor regulator (Fail Close) is installed upstream of active regulator. If desired a fast response time of monitor, due to faulty operation of main regulator (active) can be supplied with a accelerator pilot.

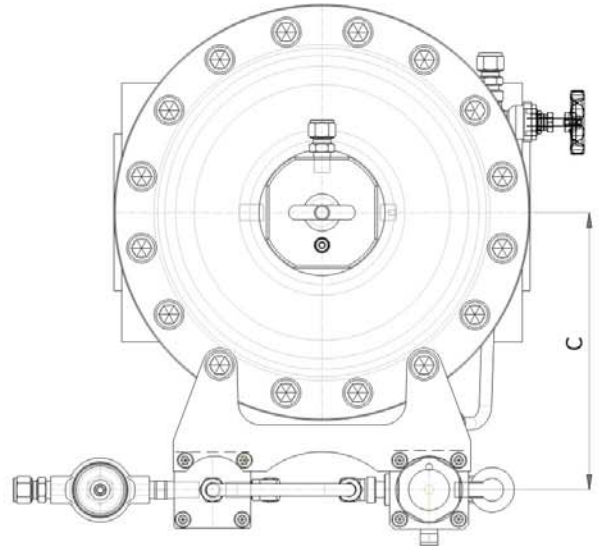
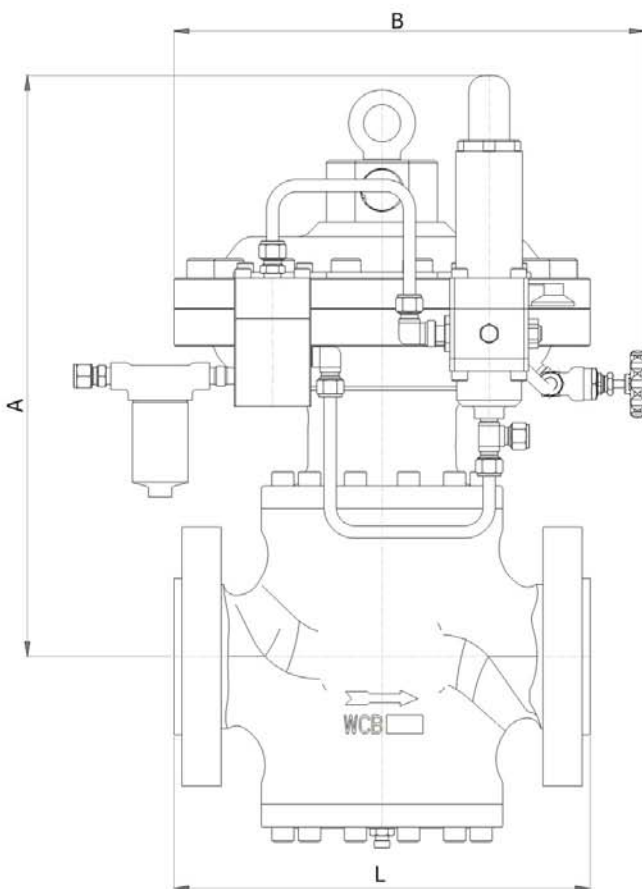
This device exhausts gas from monitor motorization chamber allowing a faster intervention of monitor. Request specific documents.

## DIMENSIONS (mm) & WEIGHT (kg)

Size (ND)	L <sup>(1)</sup>		A (FC)	A (FO)	B	C	WEIGHT (kg)	
	300 <sup>#</sup>	600 <sup>#</sup>	300 <sup>#</sup> /600 <sup>#</sup>	300 <sup>#</sup> /600 <sup>#</sup>	300 <sup>#</sup> /600 <sup>#</sup>	300 <sup>#</sup> /600 <sup>#</sup>	300 <sup>#</sup>	600 <sup>#</sup>
50/2"	267	286	395	430	300	360	100	112
80/3"	318	337	565	610	350	415	105	130
100/4"	368	394	640	695	370	440	195	215
150/6"	473	508	845	915	450	535	500	570
200/8"	568	610	950	1025	500	600	600	690

Regulator Pilots connection: OD10mm x 1,0mm or 3/8"OD x 0,035" for Class 300<sup>#</sup> and 600<sup>#</sup> in 316 Stainless Steel Seamless Tubing (A269); Fittings in A276 or A182 (316SS)

(1) According EN 334 and ISA 75.03; (FC: fail close); (FO: fail open)





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