GASCAT

INSTALLATION & OPERATION MANUAL
PRESSURE REGULATOR VALVE
MODEL PROTEU

GASCAT

INDEX

1.0 – GENERAL RECOMMENDATIONS

1.1 – INSTRUCTIONS PRIOR TO COMMISSIONING

It should be clearly understood that the information given under the Commissioning Instructions below do not intend to revoke or substitute instructions laid by any relevant entity and reference should be made to the relevant Standards and/or existent recommendations on this subject.

It is implied that before Commissioning the performance of the appropriate "Cleaning and Purification Procedures" will be observed and all the instructions contained in "Pressurization" and "Labor Safety and Health Standards" shall be strictly attended.

The recommendations of valves' suppliers, as for instance, "open slowly" or "open very slowly" should be strictly observed.

1.2 – SAFETY AND HEALTH

Regulators, valves, and other pressurized components that contain toxic or flammable gases, or other hazardous products, are potentially dangerous if not correctly operated and maintained. It is mandatory that all users of these equipments are properly instructed and warned on their potential danger, and certify yourself that the personnel responsible for installation, test, commissioning, operation, and maintenance of the plant are skilled enough to perform their duties. Instruction manuals are provided for orientation of the operators, but it is supposed that they have a basic knowledge level. If any doubts or ambiguities remain that could affect the proper procedures ask ***Gascat*,** which will be pleased to instruct, or to provide the suitable service or instruction. **NOT TO TAKE ANY RISK**. Our telephone, fax numbers, and e-mail are the following:

Gascat Indústria e Comércio Ltda.
Rodovia SP 73, 1141 – Indaiatuba / São Paulo.
CEP 13347-390 – Brazil
Phone: 55 19 3936-9300
Fax: 55 19 3935-6009
E-mail sales@gascat.com.br

The comments below, while not completely inclusive, provide guidance on possible sources of risk to safety and health.

1.2.1 – NOISE

Regulators, valves, and other pressure reducers can produce high noise levels, which can be harmful to persons exposed to them for long periods of time. Users should assure themselves that appropriate provisions will be taken, in order to foresee health safety of employees and/or third parties, according to valid standards and recommendations.

1.2.2 – INSTALLATION

All equipment, piping, and vessels are designed to support mechanical efforts, as, for instance, torque and bending momentum, in addition to internal pressure. However, careful shall be exercised during installation not to develop excessive efforts, which can cause cracks that may result in serious breakage when the regulator is put into operation. Excessive tensions can also be caused if the equipment is overburden by piping, which should be otherwise appropriately supported.

All regulators, shutoff valves, relief valves, etc., shall be installed taking into account the correct flow sense.

Impulse lines are important components of any control system and it is essential for them to be correctly installed according to instructions.

Impulse lines should be appropriately supported to reduce excessive vibration, which can provoke fatigue breaks. They should also be positioned so that they cannot serve as feet or hands supports. Impulse lines should be slightly sloping so that liquids and condensates drain towards the main piping.

Auxiliary systems should not be changed, or modified, without knowledge of the operation conditions and permission of the responsible in charge.

1.2.3 – OPERATION

Depending on the regulator type, its valve can be positioned fully open. Consequently, when a regulator is put into operation, the shutoff valves should be open slowly so that the regulator valve can assume its regulating position. If the valves are quickly opened the upstream pressure can pass downstream through the regulator and over-pressurize downstream the main line.

All regulators, etc., should operate with the regulating spring specified by the manufacturer. This provision is particularly important when operating relief or shutoff valves, since incorrect springs can hinder a relief valve to open and a shutoff valve to close at the proper time.

Provisions should be taken to avoid water input through breathing and ventilation openings.

1.2.4 – MAINTENANCE

Regulators and valves contain gases at pressures that sometimes are higher than the atmospheric pressure. Before trying to investigate any problem or to perform service maintenance of the equipment, they should be safely de-pressurized. Besides, as most gases can be flammable, poisonous, corrosive, or somehow, dangerous, it may be necessary to purge the installation with an inert gas, as nitrogen. Special precautions are necessary for operation with oxygen or hydrochloric gas and the user should be reassured that appropriate procedures are implemented.

Eventually, it is not enough to isolate the high-pressure device, since high pressures can be retained downstream of isolation valves. Do not try to remove covers, plugs, etc., before these parts are properly freed-up. Even so, it is advisable to consider if high-pressure gas can be present at the time of removal of covers and plugs.

Most regulators use spiral springs as the loading device. It is important to reduce the load of these springs relieving their loaders as much as possible. In some cases, some residual load may last, even though the spring is relaxed to the limits of its housing.

There is not a recommendation about the frequency to change the repair kit due several different variables in the process that changes installation by installation as, for example, process gas quality, service conditions etc. The repair kit should be changed when the regulator has problems during operation, as leakage, increase in set pressure and also others that become the quality and regulator performance different.

However, ***Gascat*** recommends that after all regulators opening during maintenance service the repair kit must be changed. It is also indicated to change a complete repair kit and not only specific part (example o'ring, obturator), to have the all spare parts with same life time.

Gascat already inform to avoid all non original and genuine parts.

2.0 – INTRODUCTION

2.1 – SCOPE OF MANUAL

This Instruction manual has as objective supply information about operation, installation and maintenance about PROTEU pressure regulator manufactured by GASCAT.

2.2 – DESCRIPTION

The Proteus Series regulators are single stage, self-operated regulators by direct spring action, for heavy-duty work under high, medium, and low pressure applications, for all types of non-corrosive gases and for corrosive gases, when built in special versions.

These regulators were developed with the purpose of facilitating their maintenance, or parts substitution, as much as possible. Therefore, because of their top entry characteristic, there is no need to remove them from the line for maintenance or cleaning. The Proteus Series regulators are also known for their constructive simplicity and soundness.

For valves intended for use with oxygen, all necessary precautions shall be taken for operation with this gas, avoiding oil or grease presence in tools, and use of lubricants that are not compatible with oxygen. Always use building materials for the valve that are compatible with the type of used gas.

2.3. – AVAILABLE CONFIGURATIONS

PROTEU (SO): Self operated pressure regulator fail open (spring to open)

PROTEU pressure regulators are classified as SO in accordance with standard DIN EN 334 directives, for fail condition.

2.4 – AVAILABLE CONNECTIONS

ND	FLANGE ASME B16.5	FLANGE DIN 2633	THREAD
1”	150#RF / 300#RF	PN 16 / PN 40	NPT-F[1]
2”	150#RF / 300#RF	PN 16 / PN 40	NPT-F[1]
3”	150#RF / 300#RF	PN 16 / PN 40	-
4”	150#RF / 300#RF	PN 16 / PN 40	-
6”	150#RF / 300#RF	PN 16 / PN 40	-
8”	150#RF / 300#RF	PN 16 / PN 40	-

Note:

1. *It is just avaliable with the body in bronze material.*

2.5 – TEMPERATURE LIMITS

Operating temperature: -20°C a 60°C

Ambient temperature: -20°C a 60°C

The temperature limits informed at this manual or in any applicable standard must not be exceeded under any circumstances, at risk of damage the equipment, safety of installation and safety of people involved in the operation.

2.6 – FLOW TABLES

Pressão de entrada bar(g)	Pressão de saída bar(g)	DN 1”	DN 2”	DN 3”	DN 4”	DN 6”	DN 8”
1,0	**0,5**	254	498	1841	3304	7280	13650
	0,8	181	355	1275	2275	5040	9450
1,4	**0,5**	333	653	2450	4410	9800	18200
	0,9	245	482	2065	3710	8190	15400
1,8	**0,6**	378	739	2430	4900	10920	19600
	1,0	349	686	2660	4830	10640	19950
	1,4	266	522	2079	3710	8260	15400
2,0	**0,6**	451	885	2730	4900	10850	19600
	1,0	426	834	2940	5390	11900	22050
	1,5	378	739	2310	4270	9380	17500
2,8	**1,0**	552	1083	3430	6090	13650	24500
	1,4	533	1046	3885	7000	15400	28700
	1,8	490	966	3500	6370	14000	26460
	2,0	428	842	3290	5880	12950	24500

Pressão de entrada bar(g)	Pressão de saída bar(g)	DN 1”	DN 2”	DN 3”	DN 4”	DN 6”	DN 8”
3,5	1,0	652	1281	3430	6090	13720	24500
	1,5	637	1251	4305	7651	17227	30625
	2,0	604	1185	4508	8134	17913	33530
	2,8	471	929	3465	6251	13769	25795
4,0	1,0	752	1478	3444	6125	13720	24500
	2,0	742	1456	5145	9170	20650	36750
	2,8	666	1310	4543	8190	17990	33740
	3,5	514	1010	3192	5754	12663	23730
5,5	2,5	956	1873	6027	10710	24080	42840
	2,8	947	1859	6545	11627	26187	46550
	3,5	889	1749	6370	11508	25333	47460
	4,0	780	1537	5824	10500	23100	43295
	4,5	585	1156	4970	8890	19803	37100
6,5	3,0	1161	2276	6853	11893	27293	49000
	3,5	1151	2261	7749	13783	30912	55132
	4,0	1108	2173	7497	13299	29855	55895
	4,5	1018	2005	7000	12600	28000	52468
	5,5	880	1727	5425	9730	21525	39899
7,0	0,8	1322	2598	9395	16835	37248	69700
	1,4	1085	2129	8229	14808	32604	61166
8,5	4,0	1413	2773	8610	15257	34439	61095
	4,5	1384	2715	9471	16806	37770	67310
	5,5	1322	2598	9395	16835	37248	69700
	6,5	1085	2129	8229	14808	32604	61166
10	1,4	1665	3264	10195	18170	41271	73159
	2,8	1651	3242	11137	19742	44505	79100
	5,0	1665	3264	10195	18170	41271	73159
	5,5	1651	3242	11137	19742	44505	79100
	6,5	1536	3015	10839	19097	43095	80890
12	5,5	1922	3769	11157	19556	44459	79596
	6,5	1879	3696	12589	22599	50598	90472
15	6,5	2683	5269	11749	22837	46105	25944
20	6,5	3192	6264	18160	32560	71850	130500

Nota:

1. *For Natural Gas*

2.7 – VALVE WEIGHT

ND	NPT-F	150# PN16	300# PN40
1”	14,5 Kg	16 Kg	17 Kg
2”	20 Kg	23 Kg	25 Kg
3”	-	40 Kg	43 Kg
4”	-	60	64
6”	-	90	95
8”	-	112	118

2.8 – MAXIMUM WORKING PRESSURE

NPT-F	150#	300#	PN 25	PN 40
40 bar	19 bar	51 bar	25 bar	40 bar

The pressure limit informed at this manual or in any applicable standard must not be exceeded under any circumstances, at risk of damage the equipment, safety of installation and safety of people involved in the operation.

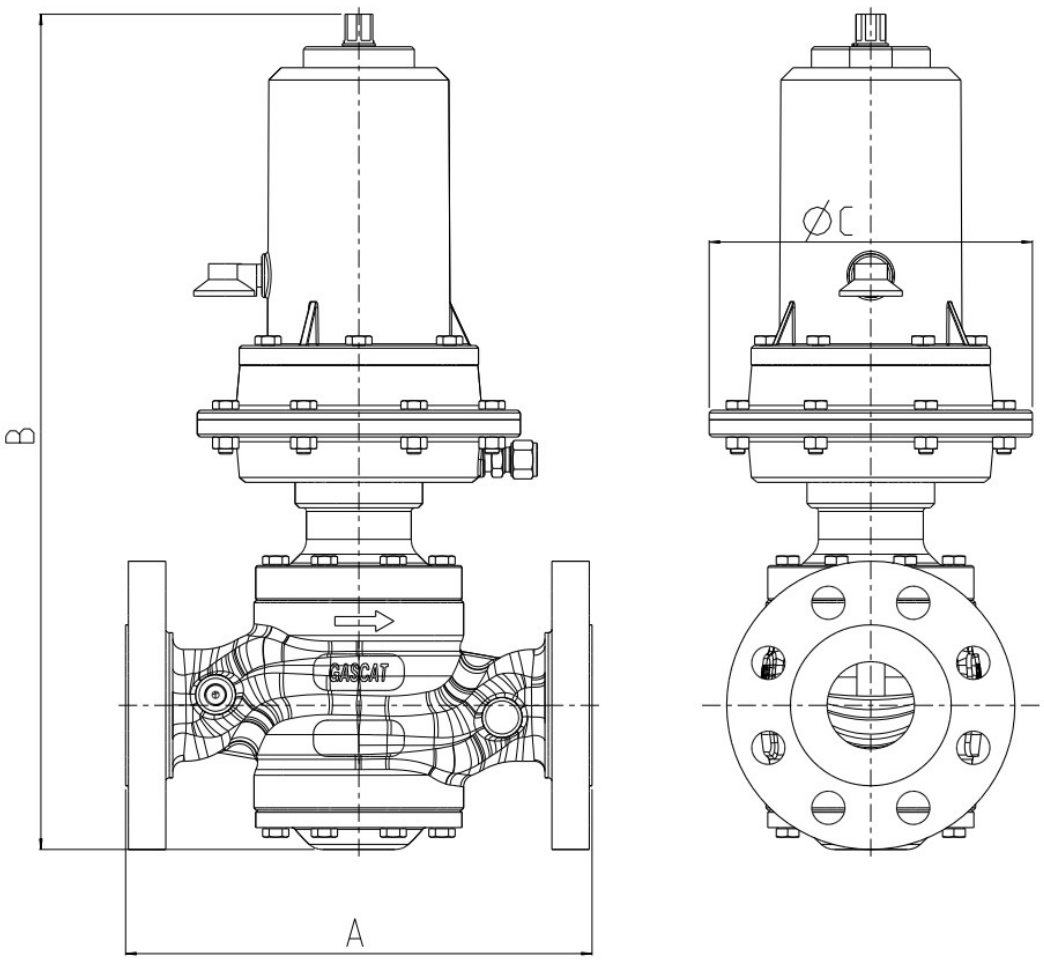
2.9 – PRESSURE REGULATOR SPRING RANGE (SET-POINT)

SPRING COLOR	CODE	RANGE
GREEN	01.53.08E	0.1 – 1.0 bar
WHITE	01.53.08D	0.5 – 2.5 bar
BLUE	01.53.08C	2.0 – 4.0 bar
RED	01.53.08B	4.0 – 6.0 bar
BLACK	01.53.08	6.0 – 10.0 bar

2.10 – ACCURACY AND LOCK UP

Pressure regulator: AC up to 10 / SG up to 20

2.11 – PRESSURE REGULATOR DIMENSIONS



DIMENSIONS (mm)					
ND	A			B	C
	NPT-F	150#	300#		
1”	115[1] / 203	184	197	450	185
2”	150[1]	254	267	478	185
3”	-	298	318	580	260
4”	-	353	368	600	260
6”	-	452	473	670	320
8”	-	568	594	780	320
General Tolerances ± 2					

Nota:

1. *Only available with bronze body.*

3 – OPERATING PRINCIPLE

Pressure regulators of the Proteus Series operate by direct spring action on the output pressure sensor element (diaphragm) that, with consumption variation and consequent pressure change on the sensor element, will re-position the shutter stem increasing or reducing the valve aperture, in order to keep the adjusted output pressure constant.

A variation of this system uses external piloting for Proteus Regulators. Operation is by action of this pilot pressure directly on the sensor element of the output pressure (diaphragm) that, with consumption variation and consequent pressure change on the sensor element, in the same way as for regulators operated by direct spring action, will re-position the shutter shaft increasing or reducing valve aperture, in order to keep constant the set output pressure.

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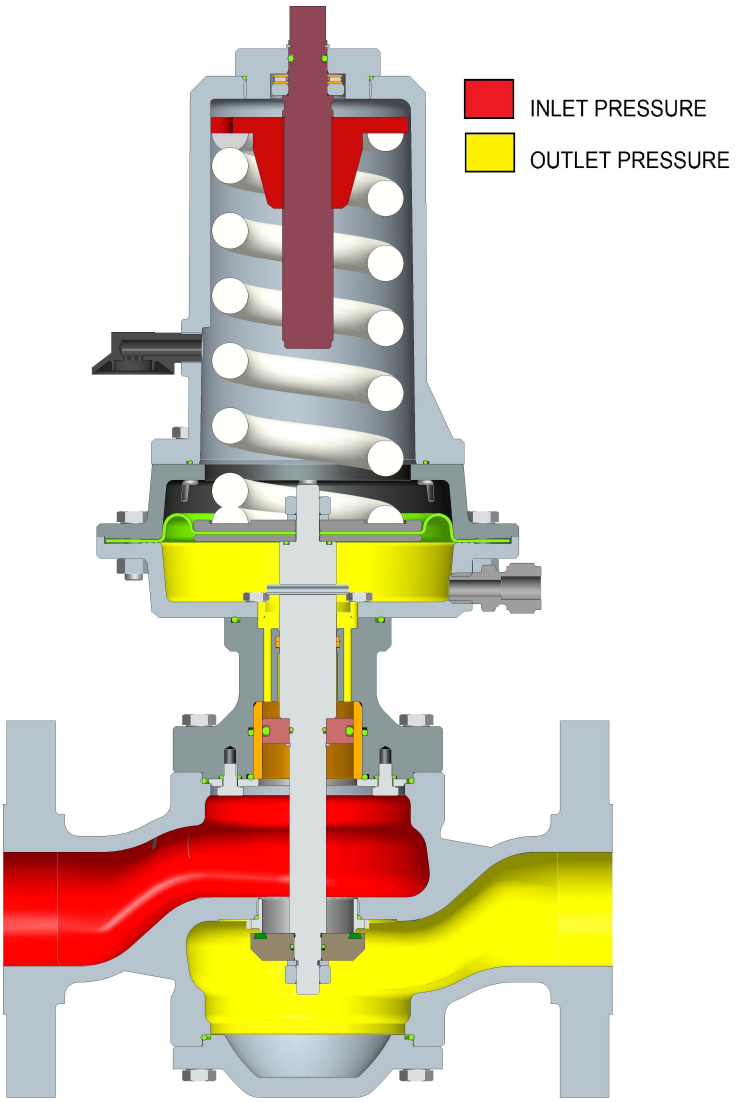


4.0 – INSTALLATION

4.1 – CHECKING SYSTEM INTEGRITY

Before installing the pressure regulator it's necessary to insure that:

1) The equipment are in perfect conditions or has evidences of damage during the transport, in case of perceptible damage in the equipment do not proceed with installations and get in contact with GASCAT.
2) The space provided for the acess and installation of equipment is appropriate, including future maintenance.
3) The installation was designed to support the load imposed by the equipment.
4) The inlet and outlet pipe connections are in the same level.
5) All connections for sense line and discharge line requested by the model of pressure regulator are arranged in the pipeline and respect the dimensions provided by manufacturer.
6) Was arranged pressure indicators at the inlet and outlet of the pressure regulator to insure the correct adjustment of set point during the commissioning.
7) Was arranged a vent line between the pressure regulator and the first block valve in the outlet of stream to help the operator during the start-up.
8) Check the flow direction in the valve body and pay attention in the installation to assure that the valve are in the correct position.

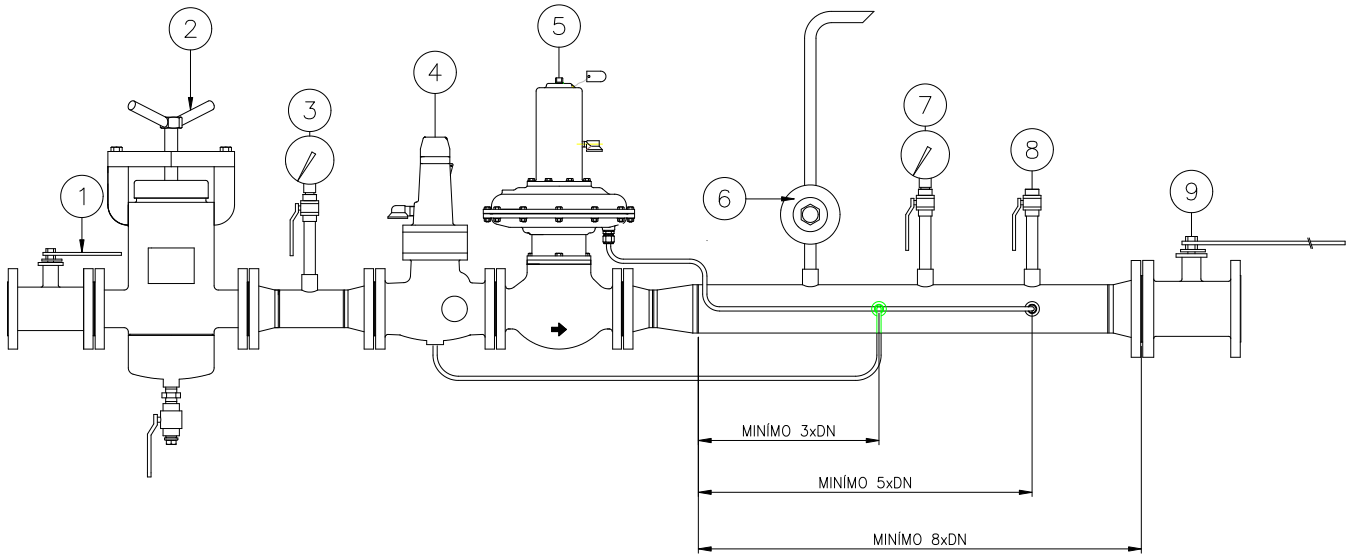
4.2 – FILTER

We recommended the installation of a basket type filter, with minimum 150 mesh, as close as possible to the regulator input, without being joined flange to flange, because, if the filter is installed immediately upstream of the regulator, it can produce turbulence that will cause disturbances in the pressure control of the regulator. Care with the filter installation is essential to the perfect operation of the apparatus, because, particles eventually found in the piping can lodge themselves the seat and the shutter, damaging them and producing direct flow.

4.3 – CLEANING

Check piping cleaning before the installation of the regulator. We recommended a complete purge of the line with nitrogen or compressed air.

4.4 – RECOMMENDED INSTALLATION SCHEME



It is recommended for a safety installation:

1. Manual blocking valve (ball type, or similar).
2. Filter with drain (Metrius by Gascat).
3. Pressure gauge for input pressure reading.
4. Automatic slam shut valve (GIPS by Gascat).
5. PROTEU pressure regulator
6. Partial pressure relief valve (JR Series by Gascat)
7. Pressure gauge for output pressure reading.
8. Purge valve, Ø ½".
9. Manual blocking valve (ball type, or similar).

5.0 – OPERATION (START UP)

1) Close slowly the on-off manual valve upstream of regulator.
2) Close slowly the on-off manual valve downstream of regulator.
3) Certify that the springs of pre pilot and pilot are totally released.
4) Certify that bleed (discharge valve / needle valve) is open in 1/8 of turn.
5) Open the purge valve installed downstream of regulator 1/8 of turn.
6) Open slowly the on-off manual valve upstream of regulator verifying the gas pressure.

5.1 – REGULATOR ADJUSTMENT

1) Open the purge valve located downstream of the regulator to, approximately, 20% of the passage.
2) Adjust the regulator pressure with the regulating screw located in its top cap to the requested operation pressure (turn it clockwise to increase pressure and counter clockwise to reduce pressure).
3) Close the purge valve.
4) Check for regulator tightness with the pressure gauge located downstream of the same; a stable pressure indication for, approximately, 2 minutes after closing attends this requisite.
5) Slowly open the gas outlet-blocking valve.
6) Make fine pressure adjustments.

5.2 – RECOMMENDED TOOLS FOR START-UP

For commissioning and start-up set-up adjustment of the GASCAT PROTEU regulators, it is only necessary to use a 5/8" (for regulators 1” and 2”) or 17mm (for regulators 3” and 4”) combination wrench to adjust the adjusting spring.

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6.0 – TROUBLE SHOOTING

To maintain the pressure regulator in the correct conditions of operation, the pressure regulators model BRISE must be submitted to preventive maintenance, the periodicity depends of the flow, quantity/type of contaminants and the operation conditions.

Defect	Cause	Correction
Vibration	Problems in the installation	Verify if the pipe is correctly supported, if the vibration doesn't come from other devices or if it is inadequate sizing of some equipment.
	Damaged diaphragm or stem assembly of main valve damaged	Change the damaged pieces.
Outlet Pressure Variation	Low flow (less than 5% of maximum flow)	Verify the regulator sizing (check if is available a reduced orifice).
	Sensing line installed wrongly	Verify if the sensing line is too close of main valve of near of an equipment that my cause flow turbulence
	Bleed valve wrongly adjusted	Proced the adjustment of bleed valve with the regulator operating (working) to find the best position oo work.
Direct passage through the regulator or main valve totally opened	Main regulator stem locked	Verify the respective stem and change it if necessary.
	Sensing line damaged	Verify the sensing line and change it if necessary.
Outlet drop pressure / non-enough flow	Filter element dirty	Clean or change the filter element.
No Flow and No Outlet Pressure	Main diaphragm damaged	Change the main diaphragm.
Outlet pressure increase / Direct passage	Particles between obturator / seat or these parts damaged	Remove the inspection cover and obturator and clean the components (obturator e seat). Verify all other components and change if necessary.
	Particles between obturator / seat or these parts damaged	Remove the pilot balancin, clean it or change if necessary.

7 – WARRANTY

We warrant our products, for a 12 months period from the date of invoicing, if the products are in operation, extending the warrant up to 18 months, in case they are in stock. Such warranty only covers those cases for which the occurrence of production defects are evidenced, which remained unnoticed at the time the product delivery.

To present warranty is not valid if it is found that the defect or mishap was caused by accident, normal wear, inadequate installation, improper maneuvering or use, inadequate storage, assembly disregarding technical standards or if the buyer undertook repairs or changes in equipment by himself, without the manufacturer's previous authorization.

The information contained in this manual contains Gascat's supply conditions, independently of the verified performance.

The information herein contained shall not be interpreted or suggest performance warranty in relation to the final products, or the system usage purpose, nor should they serve as usage recommendation for any product or process mentioned in the specifications. This system should only be operated by qualified technician trained for this purpose; and no changes that may affects the system safety can be executed without our previous authorization.

GASCAT Ind and Com. Ltda. withhold the right to make changes without notice, introducing improvements in the described products drawings or specifications.

8 – STORAGE

The regulators should not suffer mechanical shock, not to risk internal components' damages.

The regulators should be stored at a clean and dry place, protected from bad weather

9.0 MAINTENANCE

It is essential to perform preventive maintenance of pressure regulators' model PROTEU for proper operation of the equipment over time, and it is directly related to the reliability of the pressure control system, avoiding operating problems to the user.

The frequency of maintenance varies considerably according to the installation, operating conditions and the quality of the fluid in question, for example, if the equipment is subject to a large presence of contaminants such as black powder, yellow powder, oil, condensate, etc. certainly the service intervals should be shorter.

GASCAT has standard repair kits for each component of the pressure regulator model URANO containing the most likely items to wear with time; this list of components is given in this manual for users guiding.

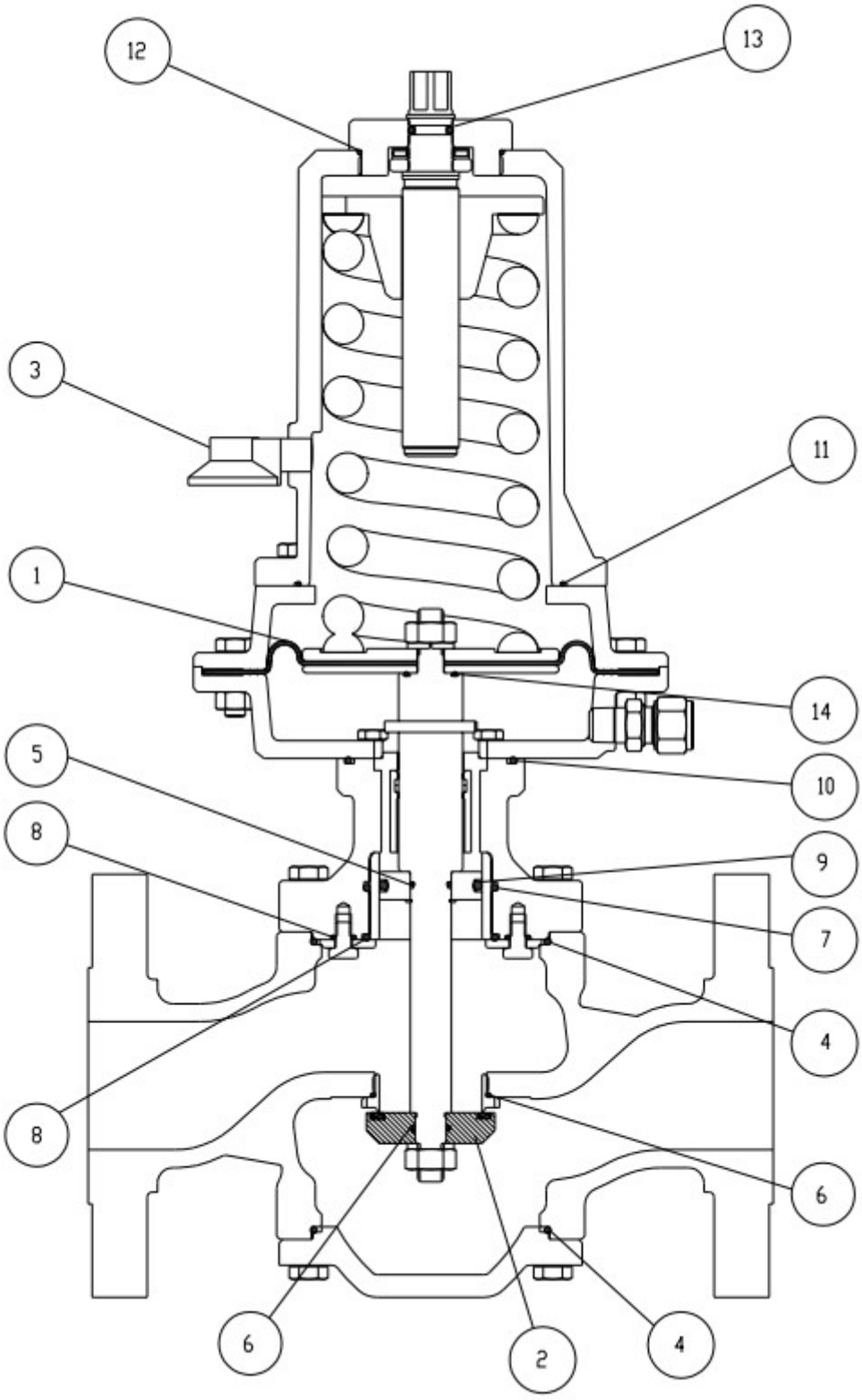
ATTENTION:

GASCAT's pressure regulator valves components are developed, manufactured and tested exclusively by GASCAT to provide the highest efficiency and safety of operation. Non-using GASCAT's original components make the operation unsafe and compromise the process efficiency.

GASCAT takes no responsibility for the operation of equipment using non-original components.

Before starting maintenance of GASCAT's pressure regulators, you shall always assure yourself to have a replacement kit with original GASCAT parts, as well as this instruction manual for reference of how to work safely and efficiently during the equipment maintenance.

10 – COMPONENTS & SPARE PARTS



POS.	DESCRIPTION	QTY
1	DIAPHRAGM	1
2	SHUTTER	1
3	RELIEF	1
4	O'RING	2
5	O'RING	1
6	O'RING	1
7	O'RING	2
8	O'RING	8
9	O'RING	1
10	O'RING	1
11	O'RING	1
12	O'RING	1
13	O'RING	1
14	O'RING	1