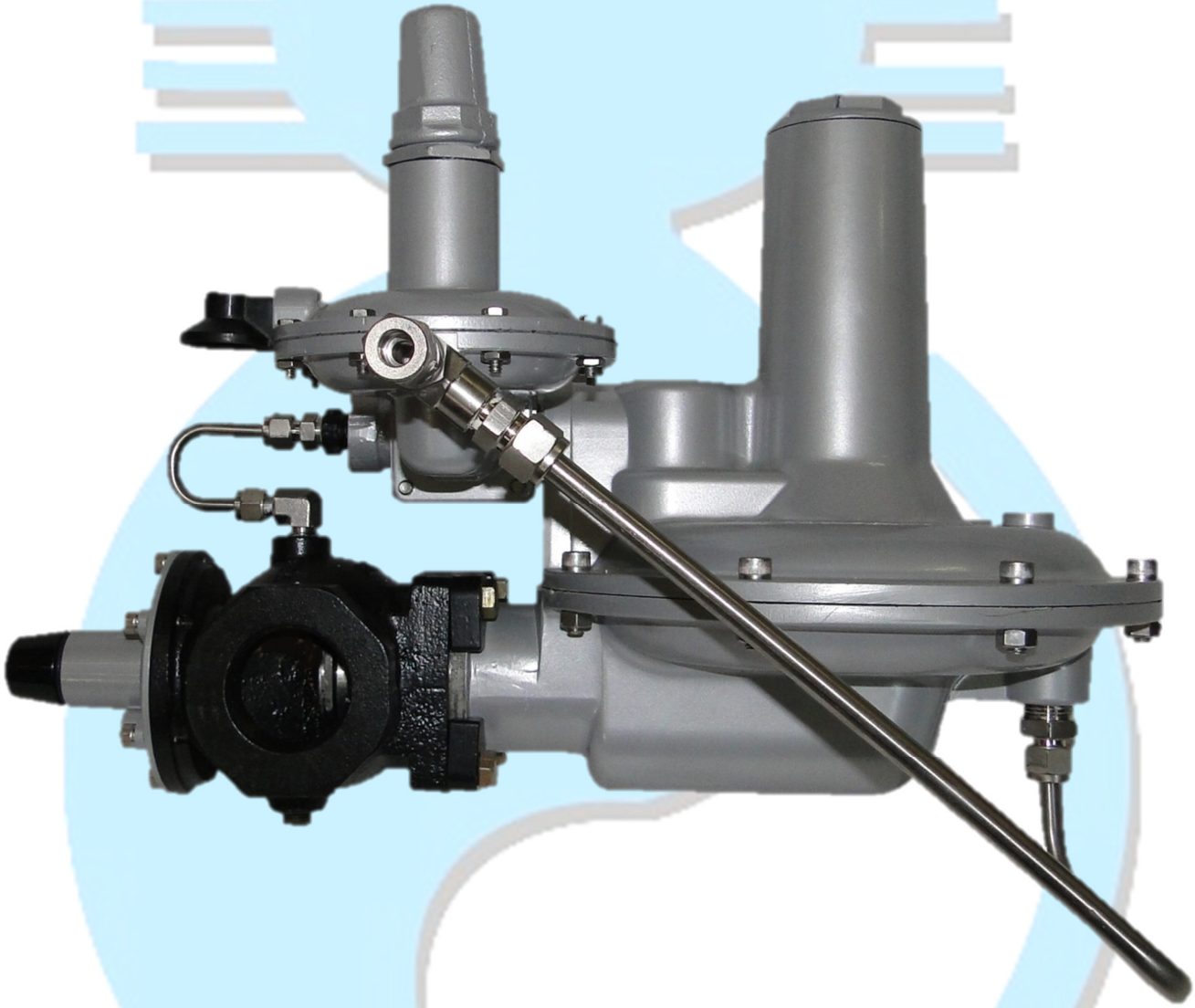
GASCAT

Installation, Maintenance and Operating Manual
Pressure Regulator Valve
Model ATHOS



GASCAT

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1.0 - GENERAL ADVERTSIMENT

1.1 – INSTRUCTIONS PRIOR COMMISSIONING

It should be clearly understood that with these information hereby presented in the instructions for commissioning that follows, there is no intention to revenue or replace the instructions determined by any other organ or institute and should be done reference to the relevant Standards and/or recommendations existents over this subject.

Before any commissioning, it is understood that the execution of proper purification and cleanness procedures that shall be observed and all instructions about pressurization and standard of safety and health, should be strictly observed.

The valve suppliers recommendation, as for example, open slowly and open very slowly should be strictly observed.

1.2 – HEALTH AND SAFETY

Regulators, valves and other pressurized components that contain toxic, flammable gases, or other dangerous products, are potentially dangerous if not operated and kept correctly. It is imperative that all users of such equipment had been adequately educated and oriented for the potential hazards and certified that the responsible personnel for the installation, test, commissioning, operation and maintenance of factory are competent to do this job. The instruction manuals are provide for orientation of users, but presume that they have a basic knowledge level. In case of any doubt or ambiguity that affect the correct procedure, ***GASCAT*** must be contacted in order to inform or offer the service and instruction. **DO NOT TAKE THE RISK.** The phone numbers and email for contact are described below:

Gascat Indústria e Comércio Ltda.
Rodovia SP 73, 1141 – Indaiatuba / São Paulo.
CEP 13347-990
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Fax: +55 19 3935-6009
Email: sales@gascat.com.br

The following commentaries, while not exaustive, provide orientation of possible hazard sources against the heath and safety.

1.2.1 – NOISE

Regulators, valves and other pressure regulators can generate high noise level, which can be prejudicial for people exposed for long period. The users should assure that adequate precautions was take in order to foresee security for the health of employees, according to the standards and recommendations.

1.2.2 – INSTALLATION

All the equipment, pipe and vessels are designed to support mechanical efforts as, for example, torch and bending moment, in addition to the internal pressure. However, all care shall be taken during the installation to avoid excess of charge that can cause damage when the system in operation. Excessive tensions can also be caused due of not support the pipe length that can be adequate supported by base frame.

All the pressure regulators, slam shut valves, relief valves etc, shall be installed with correct flow direction.

Sensing lines are important components of all control systems and it is essential that are correctly installed without insulating valves.

Sensing line shall be adequate support to reduce excessive vibration that can cause its rupture. It shall be positioned in order to avoid be used as foot or hand support. It shall be lightly inclined to allow liquid and condensate flow to the main pipe.

When necessary (in underground or buried installation) it shall be installed venting pipe with Ø ¼" NPT, positioned in the housing (spring or diaphragm) which shall be extended and positioned in a safety and ventilated place, with protected vent to avoid water and incepts block the way.

Auxiliary systems shall not be changed or modified without knowledge of process service conditions and permission of responsible staff.

1.2.3 – OPERATION

Depending on regulator type, the valve can be positioned totally open. Consequently, when in operation, the slam shut valve shall be opened slowly in order to the regulator assume its regulating position. If the valves are opened quickly, the upstream pressure can pass to downstream through the pressure regulator over pressurizing the main downstream pipe.

All the regulators shall operate with regulating spring specified by manufacture. It is specially important when operating relief and slam shut valve, since non correct spring can avoid the relief to open and slam shut to close.

It shall take precautions to avoid water in the venting ways.

1.2.4 – MAINTENANCE

Regulators and valves contain gases with pressure sometimes over than the atmospheric pressure. Before trying to investigate the problem or execute the maintenance service in the equipment it shall be safely depressurized. Beyond this, as the gases can be flammable, toxic, corrosive, it means, dangerous, it can be necessary to purge the installation using inert gas. Special precautions are necessary for operation with gases as oxygen or hydrochloric gas and the user shall be protected and the safety procedures implemented.

Eventually it is not enough to isolate the device of high pressure, since the high pressure can be retained in the isolating valves. Do not try to remove cover, plugs and similar, before device properly released. It is still prudent to consider that the gas in high pressure can be present during cover and plug removal.

Practically, all regulators use spiral springs. It is important to reduce the charge of spring. In some case it can contain some charge due of spring housing of device.

2.0 – INTRODUCTION

2.1 MANUAL SCOPE

This manual has the objective to provide information of operation, installation and maintenance about the pressure regulator model ATHOS manufactured by GASCAT.

2.2 DESCRIPTION

The pressure regulator pilot operated model ATHOS was designed by ***Gascat*** Engineering, to assist different applications and process service conditions. It has large utilization in gas distribution.

Main characteristic is the operating simplicity and easy handling, quick maintenance and relation cost-benefit.

2.3 SPECIFICATIONS

2.3.1 AVAILABLE CONFIGURATIONS

- Active / Monitor System
- Working / Monitor System
- Pressure Regulator with SSV for both configurations above

2.3.2 AVAILABLE CONNECTIONS

ND	CONNECTIONS
11/2”	Thread NPT / 150# RF / PN16
2”	Thread NPT / 150# RF / PN16

Note: for other diameter / connection consult Gascat Sales Department.

2.3.3 TEMPERATURE LIMITS

Operating Temperature: -4℉ to 140℉ (-20℃ to 60℃).

Environment Temperature: -4℉ to 140℉ (-20℃ to 60℃).

The temperature limits hereby informed or in any applicable standard shall not exceed under any hypotheses, under risk of equipment damage, installation security or of people involved.

2.3.4 MAXIMUM WORKING PRESSURE

MAXIMUM INLET PRESSURE	SEAT
145 psi (10 bar)	1/4”, 3/8”, 1/2”
130 psi (9 bar)	3/4”
87 psig (6 bar)	1”
29 psi (2 bar)	11/4” *

* Only for version without internal relief.

The pressure limits hereby informed or in any applicable standard shall not exceed under any hypotheses, under risk of equipment damage, installation security or of people involved.

2.3.5 ESTIMATE WEIGHTS (kg)

ND	NPT	150# / PN16
11/2”	15	-
2”	16	18

2.3.6 PRESSURE REGULATOR SPRING RANGE

The pressure regulator model ATHOS uses the pilog G-50 for pressure control.

PILOT G-50		
SPRING COLOR	P/N	RANGE
Red	01.50.08	7.5 – 16.5 mbar
Blue	01.50.09	12.5 – 21 mbar
Green	01.50.10	15 – 35 mbar
Orange	01.50.11	30 – 70 mbar
Black	01.50.67	55 – 140 mbar
White	01.50.21	70 – 350 mbar
Grey	01.50.24	200 – 1000 mbar
Brown	01.50.12	700 – 2400 mbar

2.3.7 SLAM SHUT VALVE SPRING RANGE

The pressure regulator model ATHOS can be supplied with slam shut valve incorporated in the regulator body. These models are G-10 or G-10 HP.

SSV – MODEL G10		
SPRING COLOR	**P/N**	**RANGE**
Grey	01.51.77P	10 – 40 mbar
Yellow	01.51.78P	25 – 70 mbar
Brown	01.51.88P	50 – 120 mbar
Blue	01.51.89P	80 – 280 mbar
White	01.51.90P	220 – 600 mbar

SSV – MODEL G10 HP		
SPRING COLOR	**P/N**	**RANGE**
Rede	01.51.91P	500 – 1000 mbar
Purple	01.51.92P	800 – 2500 mbar
Orange	01.52.14_50	2200 – 3500 mbar

2.3.8 PRE-REGULADOR SPRING RANGE

The pressure regulator model ATHOS when applied under process service conditions with outlet pressure less than 700 mmwc and inlet pressure over than 43.5 psi (3 bar), simultaneously, utilize pre-regulador.

PRE-REGULADOR	
SPRING COLOR	**RANGE**
Silver	0 – 2.4 bar

2.3.9 ACCURACY AND LOCK UP

Accuracy Class - AC up to 1%;

Lock Up – SG: up to 5%.

3.0 – WORKING PRINCIPLE

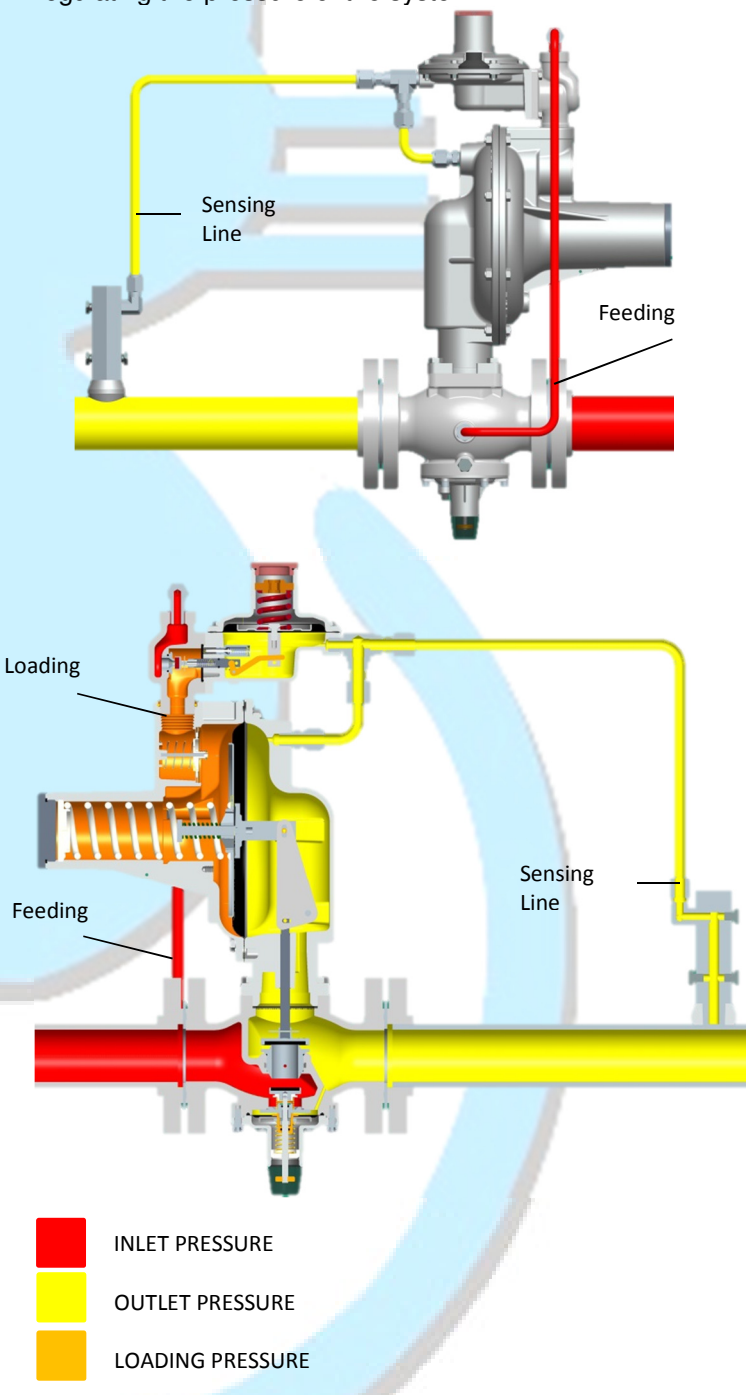
3.1 REGULATOR

The pressure regulator model Athos works by principle of drop pressure in the diaphragm lower chamber of main valve.

In case of flow absence the regulator remain closed, because the pressure in the diaphragm upper chamber (feed by the pilot) is the same pressure of lower chamber, prevailing only the force of main spring that will close the regulator.

The pilot, in this condition of flow absence, remain closed, because the pressure under the diaphragm added to the obturator spring are higher than the regulating spring force (over the diaphragm), and move the obturator set against the pilot set, closing the gas passage of the pilot.

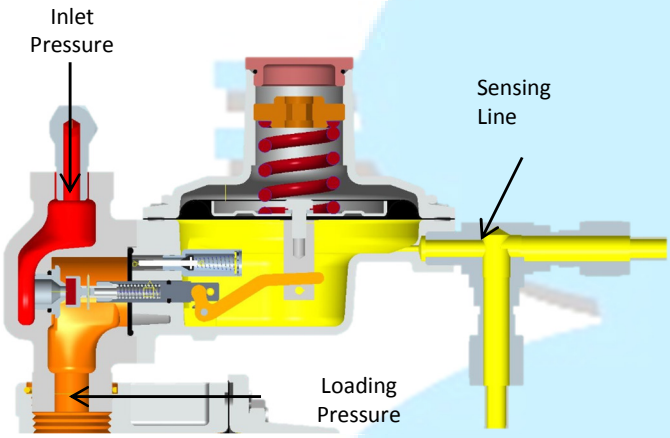
In case of gas consumption, the pressure in the pilot sensing line will decrease, opening the pilot because the pilot regulating spring force is higher than the obturator spring added to the pressure under its diaphragm. In parallel, the pressure under the diaphragm of main valve decrease. In this condition, the regulator open and start regulating the pressure of the system.



3.2 PILOT (G-50)

The pilot series G-50 has simple diaphragm design, actuated by lever, for low pressure.

It is responsible to feed with exact loading pressure the main valve for open or close it, under normal process service conditions, assisted by the equilibrium that there is between the regulating spring force and the pressure of sensing line.



The pressure under the pilot diaphragm, outlet pressure, moves the pilot diaphragm set upward. In this condition, the obturator shaft moves to the left and assisted by the obturator spring contact the pilot seat, closing the gas passage.

When there is gas consumption, the pressure under the diaphragm decrease and the regulating spring has enough force to move the shaft downward to open the pilot. In this condition, the pressure in the diaphragm upper chamber of main valve (feeding pressure / loading) is the same, while the pressure under the diaphragm is discharged through the sensing line assuming a value lower than the pressure over the diaphragm, allowing the main valve open to feed the process gas demand.

In case of damage in the obturator set and pilot seat can occur small passage of gas resulting in outlet pressure increasing. Then, in case of relief of pressure during flow absence or shutting down of slam shut valve, the obturator seat of the seat can be damaged.

The pilot diaphragm rupture result in pressure equalization over and under the diaphragm, resulting in possible pilot opening, once the regulating spring force moves the diaphragm set downward opening the pilot.

3.3 REGULATOR – ACTIVE / MONITOR SYSTEM

In the active / monitor system, the working principle of active pressure regulator is similar than the explained in item 3.1.

The upstream regulator (monitor) remain opened, because the pilot sensing line monitors the outlet pressure of active regulator and, as its set point is lightly higher, the pilot remain opened. The reason that this pilot remain opened is due of the pressure under the pilot diaphragm added to the obturator spring force that are lower than the pilot regulating spring force that moves the obturator set downward opening the pilot.

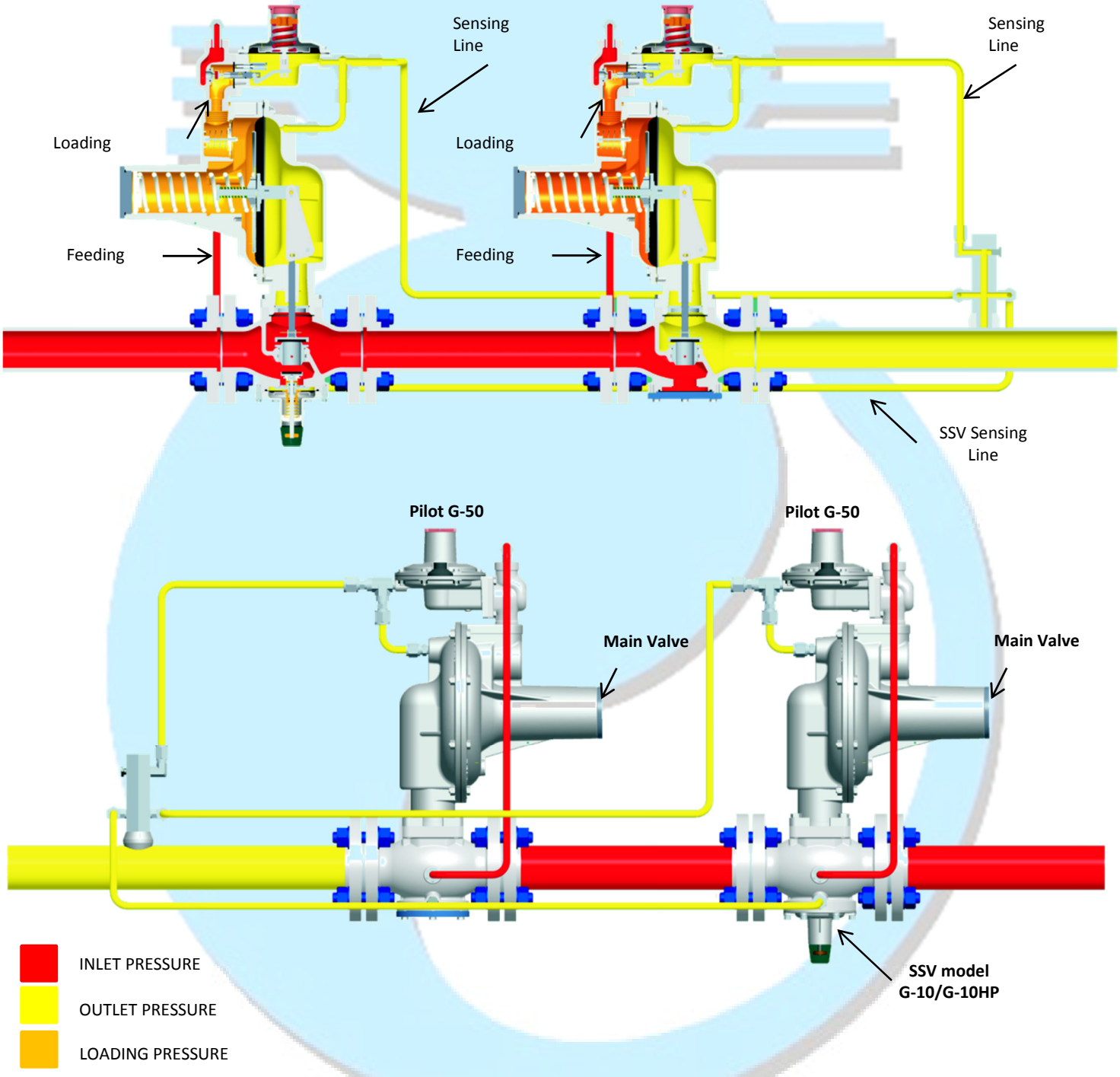
With this, the pressure in the diaphragm upper chamber of monitor regulator remain lightly higher than the outlet pressure allowing the regulator remain in the opened position during under normal process service conditions.

In case of active regulator failure that result in increase in outlet pressure, the pilot of monitor regulator that is opened starts closing until achieve its set point to allow the monitor pressure assuming the regulating control of the system. From this moment, the working principle of this valve is the same of active regulator.

The assembling configuration active / monitor system is largely applied in transmission and gas distribution. This configuration is usually applied when the difference between inlet and outlet pressure is over than 232 psi (16 bar) and the pipe pressure effort test and other components downstream the regulator is lower than the inlet as specified. For example, DIN EN 12186, in this case the objective to use a monitor regulator is to increase the system safety level.

However, this is a specific recommendation of DIN EN 12186 and there other standards that specifies the use of this configuration for different process service conditions.

The active / monitor system consists of utilization of two pressure regulators assembled in series where one is the active (work regulating the pressure) and other is the monitor that remain totally open and will assume the pressure regulating in case of active regulator failure.



4.0 – INSTALLATION

4.1 FILTER

It is recommended the cartridge filter installation with filtration degree of 5 micra, as close as possible of regulator, without install flange to flange, because, the filter installed immediately upstream the regulator can cause turbulence disturbing the pressure regulating. The care with the filter installation is essential to the perfect operation of equipment, because eventual particles in the pipe can achieve the seat and obturator, damaging it causing direct gas passage.

4.2 CLEANING

Verify the cleaning of pipe before the valve installation. It is recommended to purge completely the line with nitrogen or air.

4.3 FLOW DIRECTION AND SYSTEM INTEGRITY

Before proceeding with equipment installation, it is necessary to verify if:

1) The equipment is in perfect conditions or have evidences of damages in function of transport; in case of some damages with installation contact GASCAT.
2) The space foresee for the access and installation of equipment is adequate; also for future maintenance.
3) The installation was designed to support the charge of equipment.
4) The connection of inlet and outlet where the regulator will be installed are perfectly aligned.
5) All sensing line necessary in the pipe downstream the equipment for were properly installed respecting the distance recommended.
6) It was foresee gauge manometer or other equipment to indicate pressure upstream and downstream to allow the adjustment of operation.
7) There is a vent line between the regulator and the first outlet ball valve to assist the technician during start-up.
8) Verify the flow direction in the body valve and check during the installation and attempt if is in the correct position.

4.4 SENSING LINE

The correct position of sensing line in the pipe is essential for a good working of the pressure regulator, because of this, install the pilot sensing line downstream the regulator with distance minimum of 5 times of nominal diamter of pipe in a stretch free of obstruction, with diameter of the pipe where the gas velocity is not higher 25 m/s (considering the lowest pressure and maximum flow).

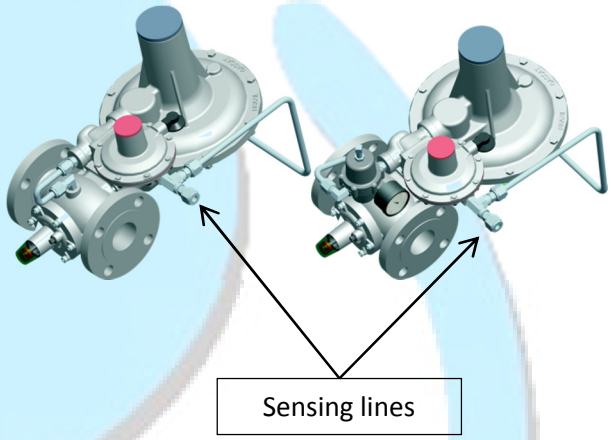
To obtain better pneumatic signal utilize tubings D.E ½" in AISI 316 to connect the sensing lines of the regulator to the process.

In order to avoid accumulate particles and condensates in the sensing line it is recommended that the sensing lines have inclination of 5%~10% in direction to the connector located in the pipe.

Atentar para as conexões soldadas a tubulação para que as mesmas estejam totalmente desobstruídas, sem qualquer resíduo de solda que possa interferir no sinal pneumático.

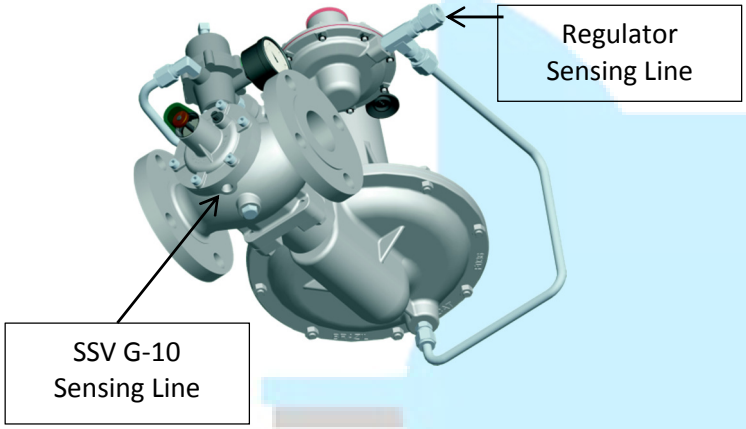
Do not install block valve in the sensing line of pressure regulator or slam shut valves.

The pressure regulator model ATHOS needs only one connection to the process, per regulator, that is the pilot sensing line, independently if it is configured as active or active / monitor system. The loading and discharging lines are connected directly in the valve body.



ATHOS + G-10

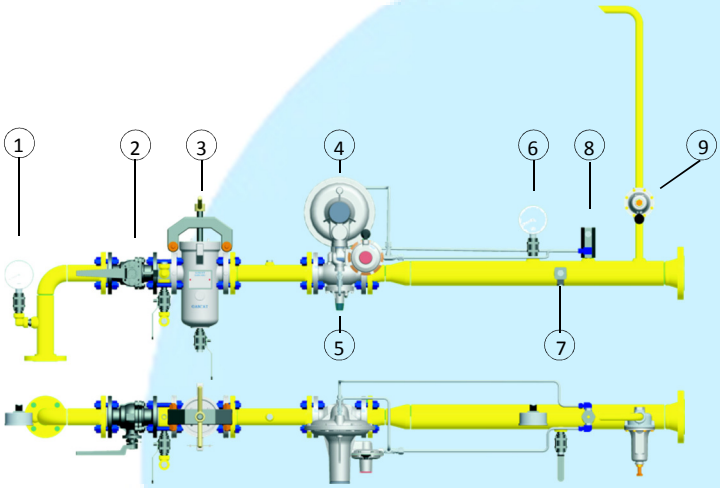
The SSV model G-10 incorporated is supplied with standard version of internal sensing line, however, for ATHOS MONITOR it is supplied with external sensing line. In this case, two connections to the process is needed; one for the regulator + one for the SSV.



ATHOS MONITOR + G-10

4.5 RECOMMENDED INSTALLATION SCHEME

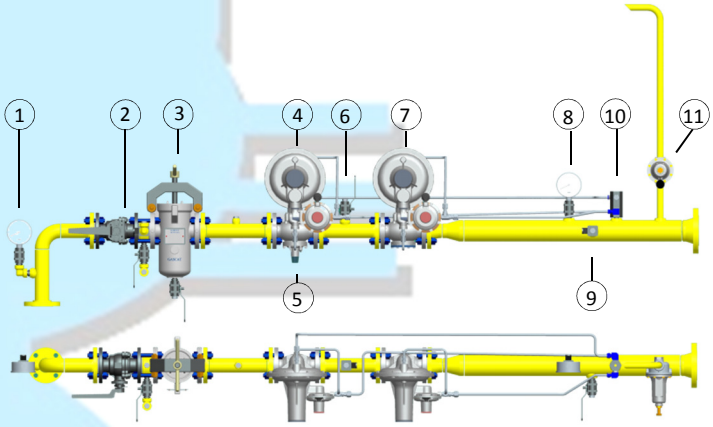
4.5.1 REGULATOR (ACTIVE ONLY)



1 – Inlet pressure gauge
2 – On-off manual ball valve
3 – Cartridge filter model Metrius – 5 micra
4 – Pressure regulator valve model ATHOS
5 – Incorporated SSV model G10
6 – Outlet pressure gauge
7 – Vent
8 – Colector 5 ways
9 – Partial pressure relief valve series JR CH / LP

Notes:
1) The position indicate for the sensing line can be less than 5D if the project of installation had been analyzed and approved by GASCAT.
2) Other option of installation recommended is the utilization of a slug pipe parallel to the main one to connect all sensing lines close to the equipment, with the following advantages:
   a. Maintenance;
   b. Stable pneumatic signal;
   c. Reduction of damages to the sensing lines during transport and maintenance.

4.5.2 WORKING MONITOR SYSTEM



1 – Inlet pressure gauge
2 – On-off manual ball valve
3 – Cartridge filter model Metrius – 5 micra
4 – Monitor pressure regulator model ATHOS + G10
5 – Incorporated SSV model G10
6 – Manometer connection point
7 – Active pressure regulator model ATHOS
8 – Outlet pressure gauge
9 – Vent
10 – Colector 5 ways.
11 – Partial pressure relief valve series JR CH / LP

Notes:
1) The position indicate for the sensing line can be less than 5D if the project of installation had been analyzed and approved by GASCAT.
2) Other option of installation recommended is the utilization of a slug pipe parallel to the main one to connect all sensing lines close to the equipment, with the following advantages:
   a. Maintenance;
   b. Stable pneumatic signal;
   c. Reduction of damages to the sensing lines during transport and maintenance.

4.6 COMMISSIONING AND START-UP

4.6.1 GENERAL RECOMMENDATIONS

Before proceeding with commissioning of equipment it is important:

1) Verify if the equipment is properly installed according to the recommendations hereby described.

2) Close the blocking valves of inlet, outlet and by-pass, when application, of each stream.
3) Open the vent valve downstrem the last regulator in the respective stream.
4) Certify that the Skid is NOT pressurizeda.

ATENTION:

* Under none hypotheses proceed with the stream pressurization where the equipment is installed by the valve downstream the equipment.
* Under none hypotheses proceed with the stream pressurization where the equipment is installed by the valve upstream the equipment, as drain filer, for example.

5) Verify if all connectors are properly tight before proceed with stream pressurization.
6) Verify if all equipment installed are adequate to the operating conditions, based on nameplate data attached in each equipment.
7) Verify if SSV (slam shut valve) is in the closed position.

GASCAT SSV are supplied already adjusted, however, due of transport conditions and equipment handling it can be changed.
So that, it is recommended to verify the set-point of SSV using (for example) external pneumatic source directly in the actuator before proceed with stream pressurization.

ATHOS is not supplied adjusted in order to preserve internal parts life time, so that, it is necessary to adjust the set point of ATHOS before operation.

The Skid configuration shall be according to DIN EN 12186 / NBR 12712 and all-active standards of region where it will work.

4.6.2 COMMISSIONING (UNIQUE REGULATOR STREAM)

Utilizing as reference the assembly scheme presented in the item 4.5.1 proceed with the descriptive indicate for commissioning of regulator model ATHOS in a single stream, considering that all recommendations of item item 4.6.1 were fully observed.

The procedure considers utilization of ATHOS pressure regulator with slam shut valve incorporated model G-10 GASCAT.

1) Close the vent valve.
   As the blocking valves are closed use the vent valve to simulate a low flow and then adjust the regulator set point.
2) Verify if the regulating spring of pre-regulator and pilot is released (with no charge).
   Releasing the regulating spring assure that the regulator will remain closed when pressurized.
3) In the regulator has pre-regulator its spring shall be with no charge to assure that the regulator will remain closed during pressurization of respective stream.
4) Reset the SSV model G-10, pulling the obturator using the SSV cover.
5) Open **SLOW AND GRADUALLY** the inlet blocking valve, or when the Skid has by-pass for these valves, use it for pressurization.
6) For ATHOS without pre-regulator, at this stage, occur a small counter-pressure around 5~10 mbar necessary to close the pilot G50.
7) In the version of ATHOS with pre-regulator, turning clockwise the regulating spring, assisted by the pressure gauge, adjust it around 7.25~14.5 psi (0.5 – 1 bar) above the desired set point.
   In this stage the same counter-pressure informed in item 6 occur.
8) Adjust the pilot G-50 turning clockwise its regulating spring screw, slowly, to admit a low pressure downstream the regulator; utilize the pressure gauge to achieve the desired set point.
9) Open the vent valve around 20%, and verify if the pressure remain in the value adjusted.
10) Since the pressure is adjusted, open the vent valve ½" turn and verify the pressure regulating.
11) If the pressure is according to the desired set pint, close the vent valve slowly to check the regulator lock up. Make this procedure 3 times before proceeding to the next step.
12) With the line pressurized and the blocking valves closed verify if there is leak in the connectors and other fittings of the respective stream.
13) Open **SLOW AND GRADUALLY** the outlet blocking valve to release the stream for operation.

4.6.3 RESERVE (STAND BY) STREAM

When the regulator is installed in a reserve (by-pass) line it is recommended to realize the same procedure informed in the item 4.6.2, however the set point of pressure regulator shall be adjusted 10% – 20% less than the set point of regulator of working stream.

After this, open **SLOW AND GRADUALLY** the outlet blocking valve then the downstream pressure of regulator equalize the reserve (by-pass) stream with the pressure of working stream; the by-pass regulator will remain closed.

To make the regulator in the reserve (by-pass) line assumes the regulating pressure of the system, turn clockwise the regulating spring, slowly, until the set point of this regulator achieve a value superior than the set point of regulator of working stream; in this case, the regulator in the reserve line will open slowly and assume the pressure regulating.

It is important that both regulators keep with difference in set point of at least 5% - 10%, avoiding over position in set point, resulting in looping between the two streams where while one regulator is working the other is trying and vice-versa.

Note: the values hereby informed are basic recommendations based on good practices, however the set points can be changed with previous consult and approval of GASCAT.

4.6.4 COMMISSIONING (ACTIVE / MONITOR SYSTEM)

Utilizing as reference the installation scheme of item 4.5.2 the description below is about the commissioning of pressure regulator ATHOS in a stream where the configuration active / monitor system is utilized, considering that all recommendations of item 4.6.1 were fully observed.
The procedure considers the utilization of slam shut valve incorporated model G-10 da GASCAT and the pressure regulator model ATHOS MONITOR.

1) Close the vent valve.
   As the blocking valves of the stream are closed utilize the vent valve to simulate a low flow and proceed with regulator adjusting before regulating the stream.
2) With the stream non pressurized yet turn clockwise the pre-regulator and pilot spring of active pressure regulator and release completely the spring of pre-regulator and pilot of monitor regulator.
   The springs are released to assure that the monitor pressure regulator will remain closed; turning totally the spring of active regulator it will remain in the open position during the pressurization procedure.
3) Reset the SSV model G-10, using the spring housing cover to pull up the shaft.
4) Open **SLOW AND GRADUALLY** the inlet blocking valve, or when the Skid has by-pass for such valve utilize it to pressurize the stream.
5) Adjust the pre-regulator of monitor regulator turning clockwise the regulating spring, using the pressure gauge to achieve a value of 7.25~14.5 psi (0.5 – 1) over than the desired set point.
6) Adjust the pilot G-50 of monitor pressure regulator turning clockwise the regulating spring, slowly, to admit a low flow downstream the pressure regulator; utilize the pressure gauge to achieve the desired set point.
   As the pilot spring of active regulator is totally tight this valve will remain opened during this procedure.
7) Open the vent valve around 20%; check if the pressure remain adjusted.
8) Once adjusted the monitor regulator the next is the active regulator. Still with the vent valve opened release slow and gradually the pilot regulating spring of active regulator until achieve its set point that shall be lower than the monitor regulator.
   Gradually is possible to verify that the active regulator is assuming the outlet pressure regulating of main line.
9) Once the pressure is stable, open the vent valve ½" turn and check the accuracy.
10) With the set point adjusted, close the vent valve to check the lock up of the system.
    The lock up in the active / monitor system is done by the monitor pressure regulator.
11) While verifying the lock up of the system a simulating of stop in gas consumption is done what is a normal condition of operating and in this case both valves shall remain closed.
12) Check if there is any leak in the connectors and other fittings of this stream.
13) Open **SLOW AND GRADUALLY** the outlet ball valve for normal operation.

4.6.5 ADJUSTE OF RESERVE STREAM (ACTIVE / MONITOR SYSTEM)

When the pressure regulator is installed in a reserve (stand-by) stream with the configuration

of active / monitor system it is recommended to do the same procedure informed in the item 4.6.4, however, the set point of active pressure regulator of this stream shall be adjusted between 15%~20% lower than the set point of the regulator in the working stream.
After this, open **SLOW AND GRADUALLY** the outlet blocking valve in order that the outlet pressure downstream the pressure regulator of reserve stream equalizes with the pressure of the working one; the pressure regulator of reserve stream will remain closed.
To make the pressure regulator of reserve stream assume the pressure regulating turn clockwise the regulating spring of active pressure regulator slowly until achieve a set point higher than the working stream; in this case the pressure regulator of reserve stream will assume the operation.
It is important that both regulators keep with difference in set point of at least 5% - 10%, avoiding over position in set point, resulting in looping between the two streams where while one regulator is working the other is trying and vice-versa.

Note: the values hereby informed are basic recommendations based on good practices, however the set points can be changed with previous consult and approval of GASCAT.

4.6.6 LIST OF RECOMMENDED TOOLS

For set point adjustment, commissioning and start-up the pressure regulators model ATHOS is necessary a combined tool of 3/8" and 8 mm to adjust the regulating spring of pilot and pre-regulator.

1 

2 

The pressure regulator model ATHOS is supplied with connectors for tubing of DN 10 mm in the sensing lines, so that, it is recommended the utilization of combined tools of 18mm and 19mm for the sensing lines.

ND	1	2
11/2" & 2"	3/8", 8mm, 18mm, 19mm	1"

For set point adjustment of slam shut valve incorporated it is recommended only a screwdriver.

5.0 TROUBLE SHOOTING

In this section of this manual the objective is to clarify possible problems at field and respective causes.

The problems listed in this section can come from different situations, however, part of them is related to the gas conditions (particles), natural waste and fails during equipment operations.

It is important to keep in mind that the operation as well the maintenance of GASCAT equipment shall be realized by trained technicians, preferentially by ones trained by GASCAT instructors.

For training and qualification of operators and technicians, contact GASCAT to check details about it.

E-mails:
vendas@gascat.com.br
sales@gascat.com.br
Phone: +55-19-3936-9301.

PROBLEM	PROBABLE CAUSE	CORRECTION
Poor performance, Outlet pressure variation	Low Flow (lower than 5% of maximum flow capacity).	Check the operating conditions related to the sizing of regulator.
	Sensing line wrongly installed.	Change the sensing line position according to this manual or contact GASCAT for analyzes.
Direct passage	Obturator or seat of pilot damaged	Check obturator and seat conditions and replace or clean it.
	Linha de impulso rompida ou danificada	Check the condition of sensing line and replacing it if necessary.
Outlet pressure decreasing and/or flow insufficient	Filter element clogged	Clean or replace it.
	Lack of feeding	Check the pilot seat.
	Main diaphragm rupture	Replace it.
Vent of gas by pilot venting	Pilot diaphragm rupture	Replace it.

6.0 MAINTENANCE

The preventive maintenance of pressure regulators model DOMUS is essential for a good performance of equipment as well as has direct relation with the reliability of the system, avoiding problems of different origins.

The periodicity of these maintenances changes according to each installation, process service conditions and quality of gas; for example if the equipment is working with presence of contaminants as black powder, yellow powder, oil, condensates etc, certainly the period between maintenance will be lower.

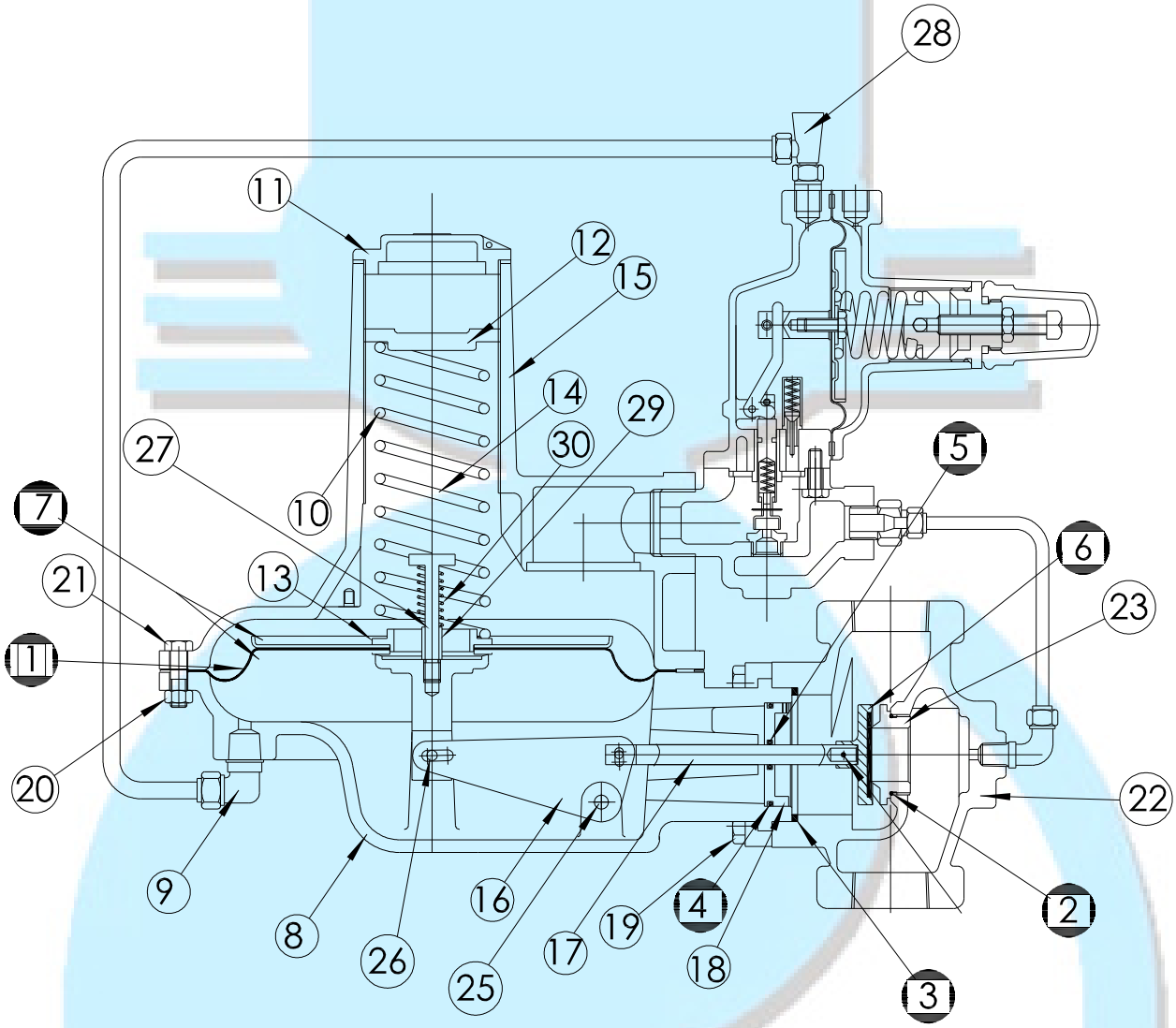
GASCAT has spare part kits composed of for most important parts of DOMUS pressure regulator. This list of components is in this manual for orientation.

The components of GASCAT pressure regulators are designed, manufactured and test with exclusivity by GASCAT in order to provide the best efficiency and security to the operation. The use of NON-GENUINE parts become the operation non-safety and can affect the process efficiency.
GASCAT is not responsible for equipment that work with NON-GENUINE components.

Before start the maintenance of GASCAT pressure regulator certify to have the correct spare part kit with original parts only provided by GASCAT, as well as this manual for instruction and reference to how proceed with safety and eficiente procedure during equipment maintenance.

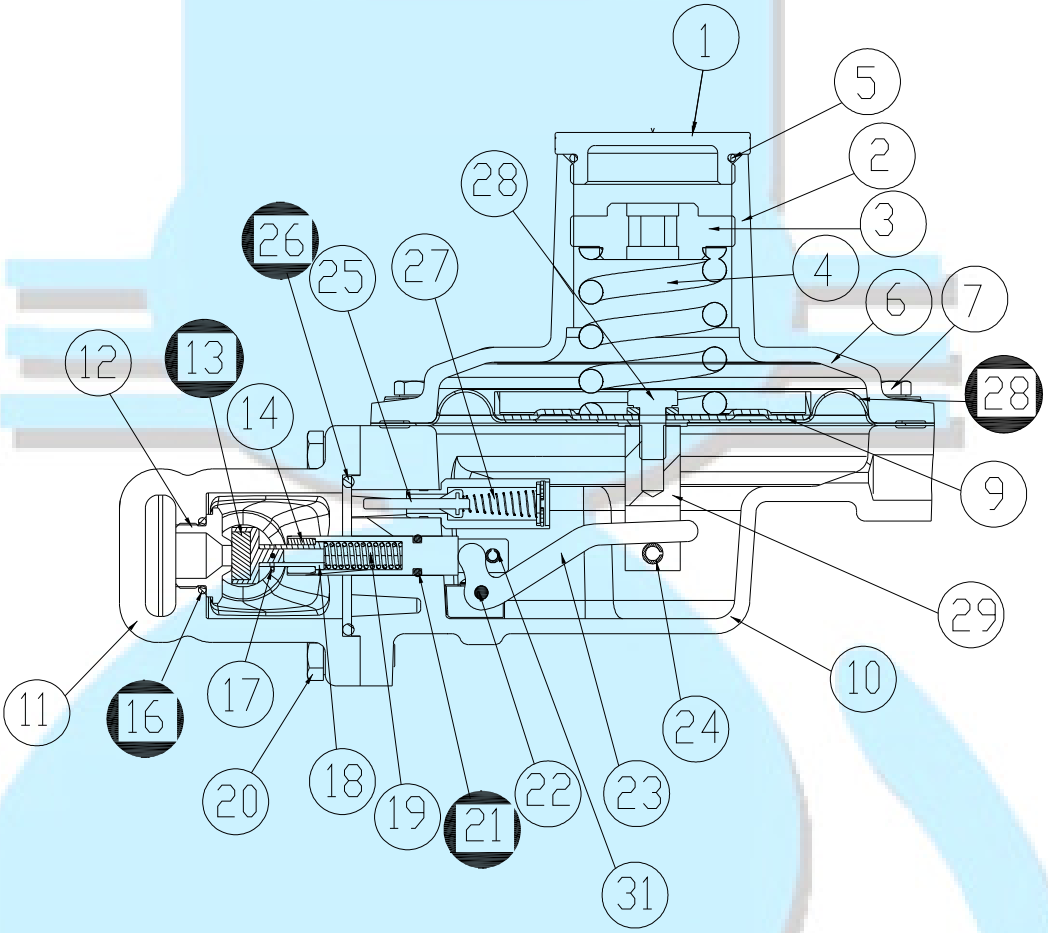
7.0 DRAWINGS / PARTS LIST

7.1 MAIN VALVE



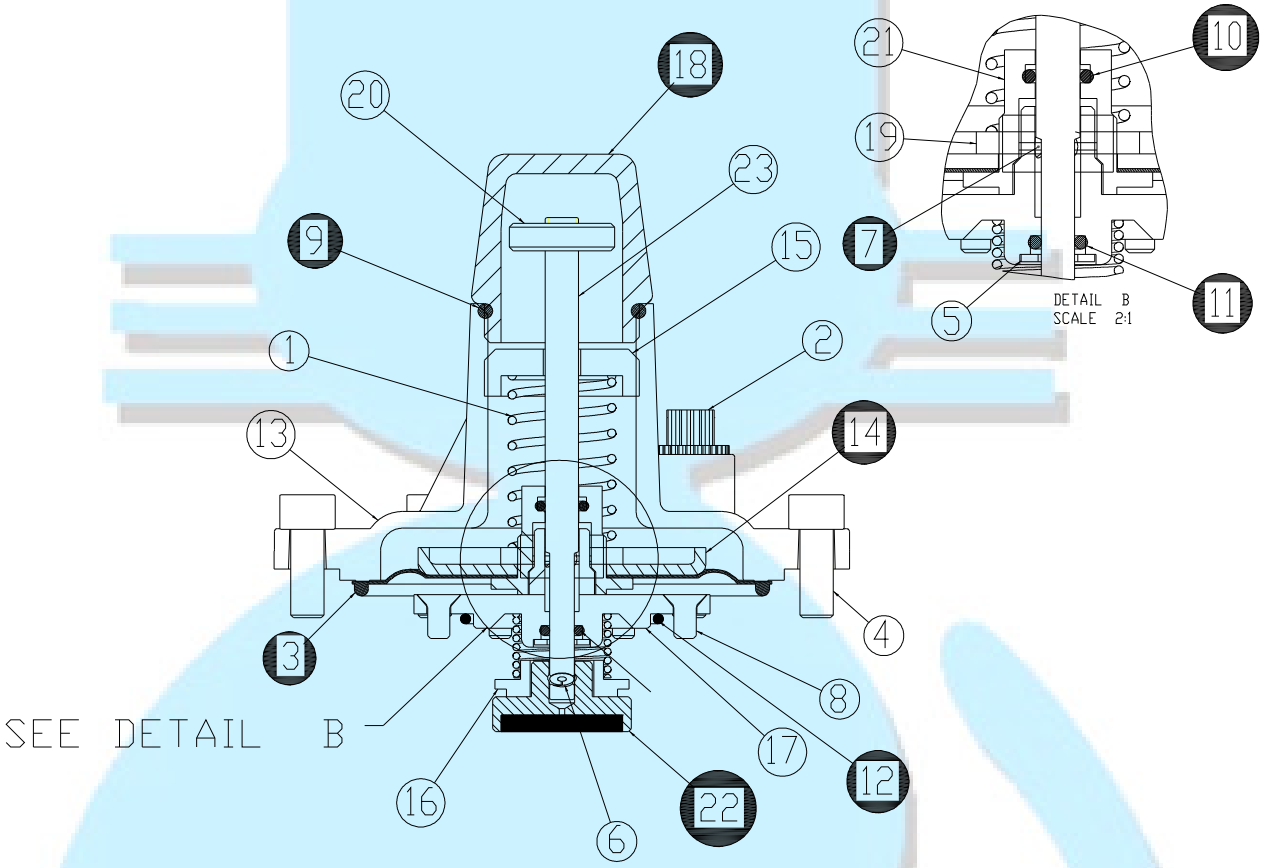
Position	Description	Quantity per valve 1.1/2'' & 2"
1	Diaphragm – Buna N	1
2	O'ring – Buna N	1
3	O'ring – Buna N	1
4	O'ring – Buna N	1
5	O'ring – Buna N	1
6	Obturator	1
7	Diaphragm Plate	2

7.2 PILOT G50



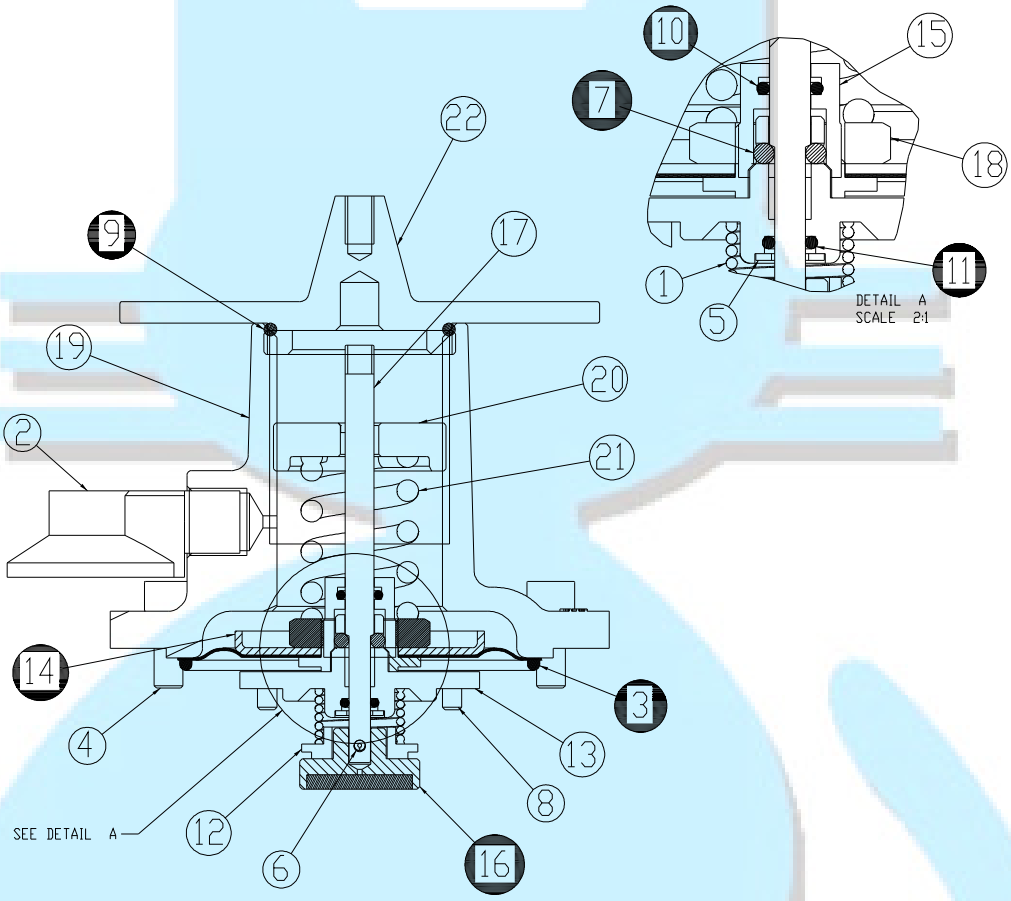
Position	Description	Quantity
13	Obturator	1
16	O'ring – Buna-N	1
21	O'ring – Buna-N	1
26	O'ring – Buna-N	1
28	Diaphragm	1

7.3 SLAM SHUT VALVE – G-10



Position	Description	Quantity
3	Diaphragm – Buna-N	1
7	Spheres	4
9	O'ring – Buna-N	1
10	O'ring – Buna-N	1
11	O'ring – Buna-N	1
12	O'ring – Buna-N	1
14	Diaphragm Plate	1
18	Actuator Cover	1
22	Obturator	1

7.4 SLAM SHUT VALVE – G-10 HP



Position	Description	Quantity
3	Diaphragm – Buna-N	1
7	Spheres	4
9	O'ring – Buna-N	1
10	O'ring – Buna-N	1
11	O'ring – Buna-N	1
14	Diaphragm Plate	1
16	Obturator	1