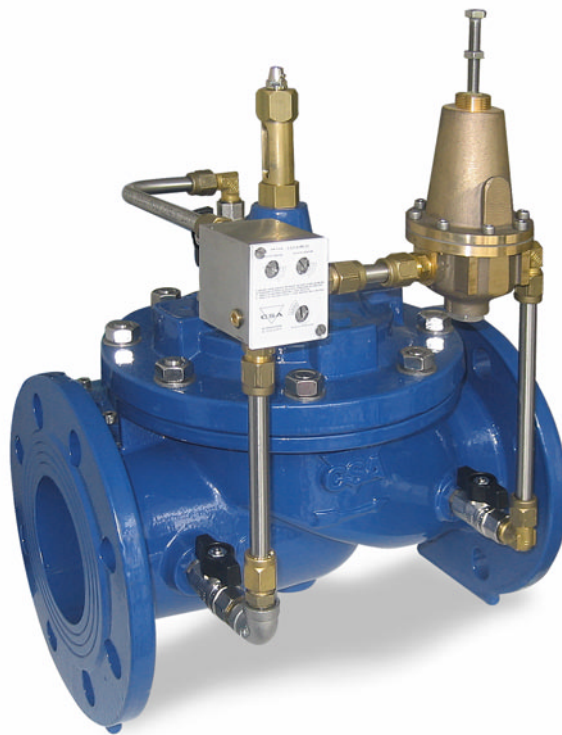




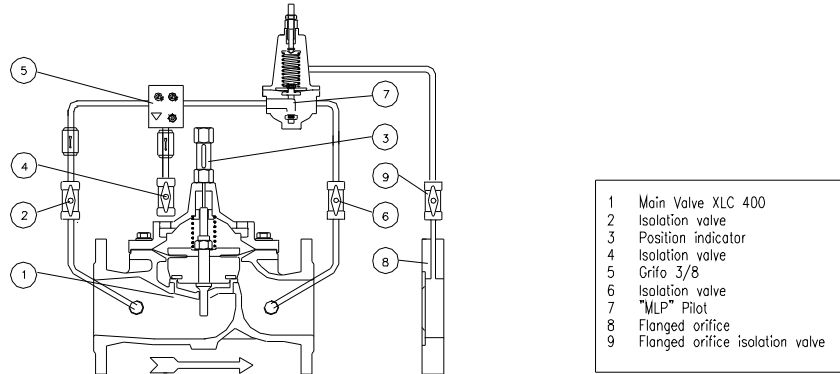
# INSTALLATION, OPERATION AND MAINTENANCE HANDBOOK



## XLC 430 FLOW CONTROL VALVE



## INSTALLATION, OPERATION AND MAINTENANCE HANDBOOK Model XLC 430



This handbook provides information about the installation, operation and maintenance of the float rate control valves.

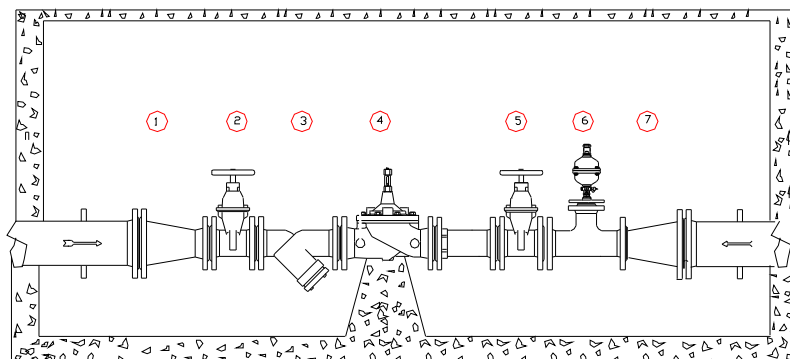
XLC 430 is an automatic valve that prevents an excessive flow rate by reducing it to a value already stabilised, independent of the upstream pressure.

The valve is operating by the pressurized fluid of the line and controlled by a 2 ways adjustable pilot, spring loaded, and preset to a differential pressure created through a flanged orifice installed downstream of the valve.

Also every variations of the pressure is immediately sensed by the pilot which sends a command to the main valve.

### Installation

- 1) Make sure that the pit is wide enough and easily accessible in order to carry out the maintenance operations and to allow the control of the pressure gauges and the position indicator; moreover it has to be equipped with a drainage for the cleaning of the filter.
- 2) Install upstream and downstream two gate valves in order to allow the maintenance and install always a filter upstream of the valve (See picture on the next page).
- 3) Before installing the valve, proceed to an accurate cleaning of the pipes and conducts in contact with the apparatus itself in order to avoid that impurities like earth, stones, pebbles and yard material can ruin the inner seats clogging the circuit pilot.
- 4) Place the valve according to the direction of the arrow cast on the body.
- 5) We suggest to install the valve in horizontal position in order to obtain the maximum efficiency and to avoid wear phenomena of the parts although up to DN 125 it is also possible to install it in vertical position.
- 6) Do never raise the valve through the circuit pilot but only use the eyebolts or flanges; before operating the valve make sure that there are no damages to the circuit of pilot, to the relative fittings or to the position indicator.
- 7) In particular cases, the difference of pressure between upstream and downstream causes a thrust that must be faced with an adequate block of anchorage.
- 8) If not already included in the order we strongly recommend to install a pressure gauge downstream of the valve in one of the outlets.
- 9) The valve is supplied with a flanged orifice, provided with the pressure outlet with the downstream side to allow for the connection with the pilot's cover. This flange has to be installed with the stainless steel disk on the upstream part and at least downstream of the main valve at a distance of 5 DN of the XLC, this is to avoid disturbances on the signal addressed to the pilot.



- ① Reduction
- ② Gate valve
- ③ Filter
- ④ XLC Valve
- ⑤ Gate valve
- ⑥ Air Valve
- ⑦ Reduction

### Set up instructions

Before setting up the valve make sure that all the pressure gauges ( if included in the order) have been placed and that the position indicator is properly installed, and make sure that the safety of persons and systems are guaranteed.

Operate very slowly to avoid water hammer effects and wait as long as necessary, after each operation, so that the valve is able to react and reach a balance.

- 1 - Open slowly the upstream gate valve while the downstream gate valve remains closed.
- 2 - Make sure that the adjustable valves to regulate the opening, closing speed and reaction time of the GRIFO are opened.
- 3 - Eliminate the air trapped inside the circuit of the main valve by means of the air valve placed at the top of the position indicator, and loose the fittings of the circuit at the higher points.  
After these operations, which must be done in an accurate and careful way, retighten everything firmly.
- 4 - Control that the connection between the pilot and the flanged orifice are operating properly and discharge all the air from the upper fitting.
- 5 - Open slowly the downstream gate valve and turn the screw of the pilot clockwise to raise the flow rate, or counter-clockwise to decrease it.

The regulation has to be made under pressure, which means working very slowly and after each sequence wait for the system to get stabilized.

### Pilot circuit

Including:

- a) 3 ball valves 3/8 PN 40 in nickel brass that must be opened during the valve operation.
- b) "GR.I.F.O." unit control device containing a fine mesh filter in stainless steel, one valve to regulate the reaction time and two other trimmers of the speed for both the opening and closing phases.
- c) Pilot differential range "MICROSTAB flow rate".
- d) Fittings in brass and pipes in stainless steel.
- e) Flange with a adjusted diaphragm and pressure outlet.

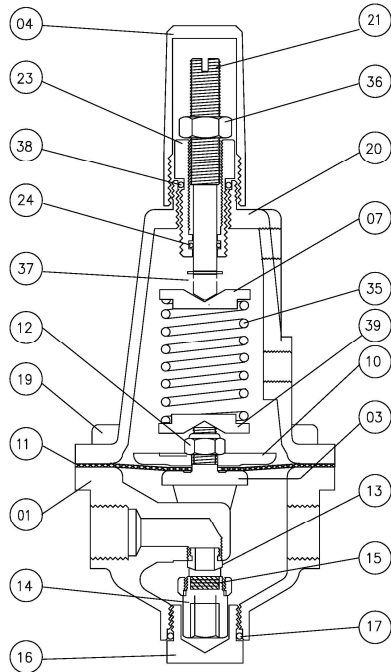
### Maintenance

- The valve and circuit do not require a particular maintenance but it is necessary to plan periodic inspections, at least once a year which can be carried out without removing the valve from the conduct, in order to check the pilot circuit and clean the filter of the GRIFO control device.
- Just in case you had to order spare parts, please refer to the serial number engraved on the metallic label applied on the upper surface of the GRIFO.
- Instructions for maintenance of the pilot and the main valve are described more in details in the following sections, shouldn't that be enough please contact immediately

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### MLP – FLOW CONTROL PILOT



POS.	COMPONENT	MATERIAL
1	Body	Bronze
3	Obturator Holder	SS 303
4	Cap	Brass
7	Spring guide	SS 303
10	Diaphragm upper disk	SS 303
11	Diaphragm	neoprene+nylon
12	Self tightening nut	SS A2
13	Sealing seat	SS 316
14	Gasket holder	SS 316
15	Plane gasket 10x4	NBR
16	Tap	SS 303
17	O-Ring 3056	NBR
19	MSX16 Screw	SS A2
20	Cover	Bronze
21	Driving screw	SS A2
23	Spacer	Bronze
24	O-Ring 2031	NBR
35	Spring	SiCr steel
36	M10X1.5 nut	SS A2
37	Elastic ring	SS A4
38	O-Ring 115	NBR
39	Spring guide	SS 303
Mobile block spare parts kit 3-10-11-12-13-15-16-17		
Set up spare parts kit 4-7-21-23-24-36-37-38-39		

The flow regulating pilot is a diaphragm valve, spring loaded and direct acting, which can basically be installed in any position.

The functioning is to control and reduce the flow rate, by keeping it constant independent of sudden pressure changes.

#### Operation

The valve is normally opened as a result of two forces acting on the diaphragm itself.

These are the compression force of the spring called "F", and the pressure taken after the flanged orifice called "B" directly connected to the pilot's cover. These forces are perfectly balanced against the downstream pressure called "A" exerted on the lower part of the main valve's downstream pressure outlet.  $F+B=A$ .

When the flow rate increases through the adjusted diaphragm, the head loss will increase and will lower the value of "B" with the result that the sum of  $F+B$  will be below A.

The pressure A will lift the diaphragm and the obturator to which it is connected, closing the passage just enough to make the main valve close.

When the flow rate decreases, the pressure B raises which causes the pilot and the main valve to open. The regulation of the flow rate value is made by turning the upper screw, placed on the cover, with a screwdriver in order to adjust the hydraulic grade line from the spring to the diaphragm.

By turning the screw clockwise the flow rate increases and by turning it anti-clockwise it decreases.

After the pressure regulation it is necessary to block the lock nut and to replace the protection cap.

#### Disassembly

It is not necessary to remove the pilot from the circuit for the disassembly. Use instead the enclosed picture which indicates the numbers specified here below performing the operations.

1- Remove the cap (4) loosen the tightening nut (36) and turn the lead screw (21) anti-clockwise until the spring is completely unloaded.

2- Remove the screws (19) while holding the cover of the pilots (20).

3- Separate the cover, the spring (35) and the spring guide (7).

4- Remove the lower tap (16) together with the gasket (17).

5- Remove the gasket holder (14) with a tube key while controlling the gasket for damages and replace it if necessary.

6- Remove the tightening nut (12), the upper disk (10) and the diaphragm (11).

7- Check the diaphragm for possible damages and replace in case of damages.

8- Check the sealing seat (13) and if necessary remove it by using a tube key.

#### Inspection and repair

During these operations check carefully every detail for possible damages, in particular the diaphragm and the sealing seat gasket.

The pilot is very sturdy and the materials are of high quality and designed to guarantee many years of working conditions for which, generally, it is sufficient to remove the deposits and make sure to keep the metallic components properly lubricated. Shouldn't that be enough we strongly recommend you to contact CSA technical support or to order the maintenance kit.

#### Reassembly

To reassembly the pilot you will have to repeat, obviously in inverse sequence, the same steps specified in the dismantling phase, while paying attention to:

- place first the diaphragm on the staple shaped gasket holder, then the upper flat and the self-locking dice in order to fit the holes of the diaphragm with the holes on the pilots body.

During this operation pay particular attention to the correct alignment of the staple shaped gasket holder with the protuberance of the body in order to avoid contacts and frictions that could affect the good operation of the pilot.

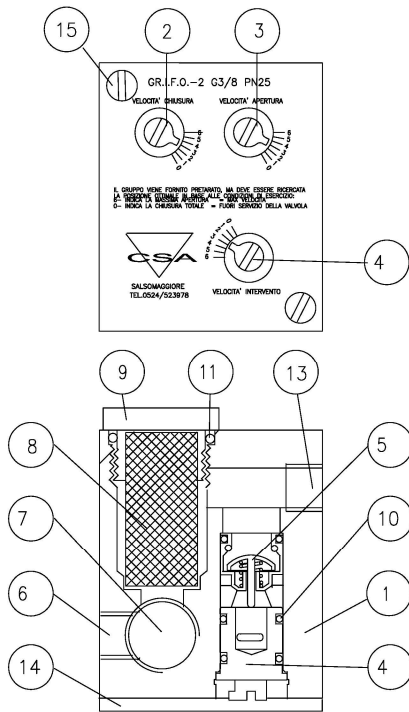
To guarantee this operation bend the diaphragm so that the two holes matches on one side the staple shaped and tighten the dice.

Insert this component in the body and with a light pressure screw the obturator on the staple shaped gasket holder and proceed with the cap provided with an o-ring so that the obturator can slide inside of it.

Place the spring, the sealing seat, the cover, set the screws and put the cap back.



## GRIFO 3/8 - PN 25



The "GR.I.F.O." (Integrated Group Filter Orifices) is a control devices that includes all the functions necessary to the regulation of the main valve and its small dimensions lighten the pilot circuit and make it more useful, compact and intuitive.

It is completely manufactured in stainless steel AISI 303 and contains :

- a fine mesh filter in AISI 316 (8) to protect the pilot circuit from possible dirt, maintained simply by unscrewing the tap (9).
- the intervention speed regulator\* (4) of the main valve that allows ranging on a scale from 0 to 6, to modify the surface of the calibrated orifice.
- the opening (3) and closing (2) speed regulators\* of the valve's main chamber.
- replaceable check valves placed upstream of every regulator and being able to limit the flow.
- an upstream outlet not filtered protected by a cap 1/8 G
- an upstream pressure outlet filtered, 1/8 G, protected by an air valve.
- The calibration is normally done in factory although it is possible to modify it on the spot in order to search the optimal regulation according to the requested functions.

The value "6" corresponds to the maximum passage surface of the fluid and therefore the maximum reaction speed, the value "0" to the total clogging.

As indicated herewith enclosed the optimal values of calibration of the most common XLC applications

POS.	COMPONENT	MATERIAL
1	Body	AISI 303
2	Closing speed control	AISI 303
3	Opening speed control	AISI 303
4	Reaction time control	AISI 303
5	Check valve	AISI 303
6	Not filtered pressure outlet 1/8G with tap	Poliacetale
7	Inlet 3/8G	Brass
8	Filter	AISI 303
9	Filter tap	AISI 316
10	O-ring	NBR
11	O-ring	NBR
13	Filtered pressure outlet 1/8G with tap	Brass
14	Cover	Plexiglass
15	Screws	SS A2

Type	Reaction speed	Opening speed	Closing speed
XLC 410	3	2	5
XLC 412	4	5	4
XLC 420	3	6	2
XLC 430	3	2	2
Altre	3	3	3

\*The regulators are hollow valves designed and exclusive property of CSA Srl

### REACTION TIME POSITION AND CORRESPONDENT DN

POSITION	Surface in mm <sup>2</sup>	DN mm
0,5	0,76	1
1	2	1,6
1,5	3,2	2
2	4,4	2,4
2,5	5,6	2,7
3	6,8	3
3,5	8	3,2
4	9,25	3,4
4,5	10,4	3,6
5	11,7	3,8
5,5	12,9	4
6	13,7	4,2

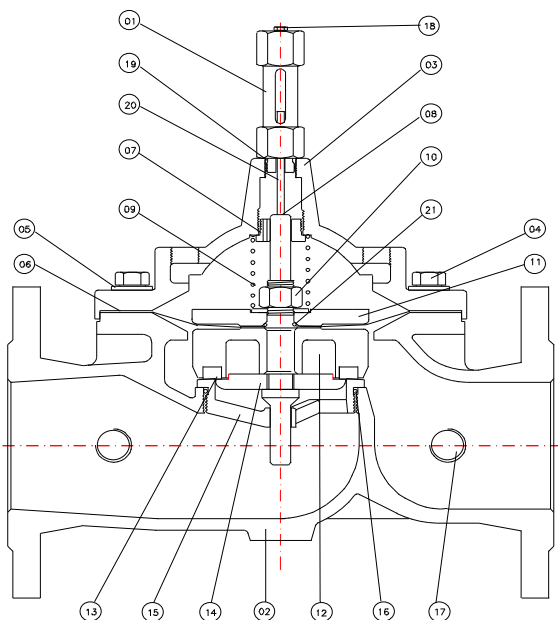
### Maintenance

The "GRIFO" is particular sturdy, extremely simple and reliable so it does not require maintenance but we strongly advise to proceed regularly with a clearing of the filter from dirt and deposits, simply by unscrewing the tap (9) and washing the mesh.

It goes without saying that it would be advisable whatever is the application to plan maintenance inspection at least twice per year that could be carried out without interrupting the flow rate but simply isolating the pilot circuit acting on the ball cock valves.



### INTERVENTIONS ON THE MAIN XLC400 VALVE



POS.	COMPONENT
1	Position indicator
2	Body
3	Cover
4	Nut
5	Washer
6	Diaphragm
7	Bush
8	Main shaft
9	Spring
10	Locking nut
11	Disk
12	Obturator
13	Plane gasket
14	Gasket holder
15	Seat
16	O-ring
17	Pressure outlets
18	Drain valve
19	O-ring
20	Stem
21	O-ring

In case of malfunctioning or defects that can be found on the main valve is possible to intervene without removing the product from the conduct. The defects can be either internal and external.

The external defects mainly concerns the pilot circuit will analyze here below more in detail. The internal defects concerns the mobile block or the deterioration of the internal components.

Problems can be summoned in three categories:

- a) the valve is blocked, the mobile block does not move;
- b) the mobile block moves but the valve does not react because the diaphragm is damaged
- c) the diaphragm is OK but the valve does not close or is leaking

The possible caused leads to:

- 1) defects on the diaphragm;
- 2) defects on the movements of the mobile block;
- 3) friction caused by encrustations of the main shaft;
- 4) imperfections on the gaskets;
- 5) defects on the sealing seat

Problem	Cause	Solution
<b>The main valve doesn't close</b>	The gate valves are closed	Open the gate valves
	The ball valves of the circuit are closed	Open the ball valves
	There is no pressure inside the main chamber	Check the pressure coming into the circuit
	The diaphragm is damaged ( see the following section "checking the diaphragm")	Replace the diaphragm
	The mobile block is stuck due to corrosion, deposits, cavitation	Clean the main shaft and replace all the components affected by deposit or corrosion
	The mobile block is stuck due to stones, pebbles, debris that remain trapped inside the valve	Remove the material from the valve
	The gasket is ruined	Replace the plane gasket/Quad-ring
<b>The main valve doesn't open</b>	The sealing seat is ruined	Replace the sealing seat
	The gate valves are closed	Open the gate valves
	The ball valves of the circuit are closed	Open the ball valves
	There is no pressure on the main line	Check the upstream pressure
	The mobile block is stuck due to stones, pebbles, debris that remain trapped inside the valve	Clean the main shaft and replace all the components affected by deposit or corrosion



### 1) Checking the diaphragm

In order to verify if the diaphragm has suffered any damage simply proceed as follows:

- close slowly the upstream and downstream gate valves;
- close all the ball valves of the circuit;
- open completely the air vent valve from the position indicator;
- open slowly and not completely the upstream gate valve so that the pressure little by little enters the valve.

The water that flows will raise the mobile block and the membrane therefore the air vent will discharge some of water trapped inside the main chamber.

When all the water of the main chamber has been expelled (this operation could take some minutes and is related to the DN of the valve as well as the opening percentage of the upstream gate valve) if the membrane is not damaged the flow will come to an end and for that you can be sure the cause of the problem has to be searched somewhere else.

On the contrary if the flow keeps going the diaphragm is surely damaged or the nut fixing the membrane to the shaft is not tightened enough, intervene accordingly simply by replacing the diaphragm or setting the nut.

As a reminder: remember to close the upstream gate valve before removing the main valve cover.

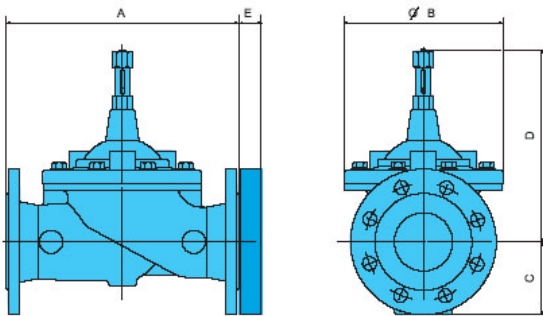
### 2) Movement of the mobile block

In order to verify the proper movement of the mobile block it is good to proceed as follows: isolate the main chamber room closing the two cock valves on the body and loosing the drainage on the position indicator. In this way we will relief the pressure of the main chamber.

Attention: after the above mentioned operations the valve won't reduce the downstream pressure anymore and therefore make sure to avoid dangerous consequences of the net. In this case close the downstream gate valve and, in order to protect the downstream net, provide with the necessary remedies.

When the valve is completely opened mark the glass of the indicator to the corresponding position.

Screw again the drainage screw and open the ball valves to put pressure back into the main chamber room.



Tech data \ DN	40	50	65	80	100	125	150	200	250	300	400
A (mm)	230	230	290	310	350	400	480	600	730	850	1100
B (mm)	162	162	194	218	260	304	370	454	570	710	710
C (mm)	83	83	93	100	118	135	150	180	213	242	310
D (mm)	233	233	255	274	316	383	431	523	620	670	709
E (mm)	30	30	30	30	30	30	30	30	40	40	40
Weight (Kg)	18	18	23.5	28	39	47	84	138	264	405	560

Standard drilling according to UNI EN 1092-2 PN 16/25  
Testing procedure according to UNI EN 1074.  
Pressure test carried out with water.

Working conditions:  
- Potable water o treated water filtered with a 2mm mesh  
- Maximum temperature +70°C

Verify that the valve closes following the movement downwards of the indication rod (a slowing down in the final phase is normal and caused by the bending and adjustment of the diaphragm).

When the valve is closed, mark the glass of the indicator to the corresponding position and verify that the movement of the rod is like the one indicated below, if different, then means that there is something preventing the proper movement of the mobile group.

ND	50	65	80	100	125	150	200	250	300/400
Obturator run	15	18	21	27	27	43	56	70	84

Valve DN and obturator run expressed in millimetres.

The clogging can be localized between the seat and obturator if the indication rod is in closed position and the flow continues, or between the sealing seat and cap if the valve does not reach the complete opening.

Before proceeding to dismantling the cover, it is suggested to execute some manual opening and closing operations putting the main chamber under pressure and discharging it.

This operation is normally sufficient to drive out whatever body remained stuck between seat and obturator, shouldn't that be sufficient then take apart the cover.

### 3) Friction of the shaft

One of the more frequent causes of the mobile group movement obstruction is the encrustations on the main shaft causing friction. They can be due to deposits of solid particles (conveyed from the water) or to limestone deposits (for extremely hard water) that in the long run cause the jamming of the main shaft on the guiding devices because of the high friction value.

In presence of encrustations on the shaft simply proceed to a proper cleaning dipping it in a muriatic acid solution 5% as long as necessary, shouldn't that be sufficient then proceed with one abrasive cloth fine thickness until the complete removal of the deposit.

### 4) Plane gasket

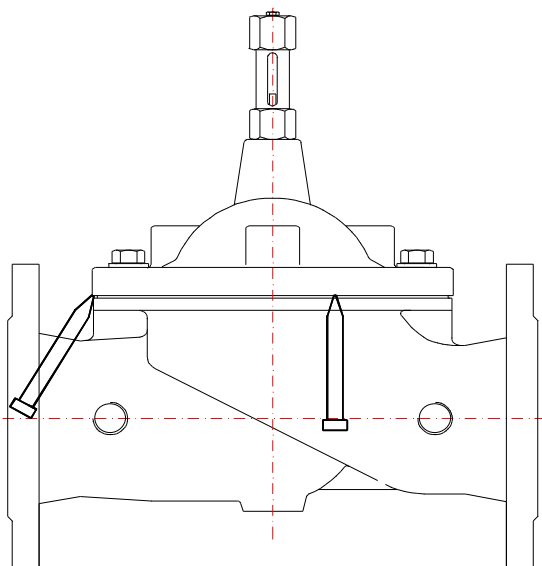
The valve must close watertight when once the pressure has entered the main chamber, if that doesn't happen proceed to the inspection of the plane gasket, placed in the obturator, and of the sealing seat.

To do this install two pressure gauges downstream and upstream of the valve, close the downstream gate valve, let the upstream pressure enter the main chamber to achieve the complete closure of the valve.

Check the value displayed by the two gauges, in standard working conditions the upstream pressure is higher than the downstream. An increase of the downstream pressure means that the plane gasket does not close perfectly.

### 5) Sealing seat

One more reason that could be responsible of the improper closure of the valve may be the sealing seat, where dirt tends to gather, or even worse etched in some part of its surface by some solid particles stuck between it and the obturator. In these cases we must proceed with an accurate inspection to clean the component by means of sandpaper then polish them, if the damage can't be solved on the spot please contact CSA technical support for immediate assistance.



#### Disassembly

As mentioned before make sure that the gate valves upstream and downstream of the valves have been properly closed and set tight.

Relief the pressure of the main chamber simply by closing the isolation valves of the circuit and opening one of its fittings.

Proceed with the removal of the circuitry, in order to facilitate the intervention on the cover, only after having noted down the layout. Remove the nuts (4) and the washers (5). If the valve has been working for long time you may notice that all the parts in contact with the diaphragm will tend to get stuck, in this case simply hit the lower part of the cover to loosen it by means of a hammer and a chisel driving it upwards. After that, hoisting the valve vertically using eyebolts or the position indicator for small DN.

Remove the internal mobile block and put it into a grip with clamps in soft material such as brass or aluminium, be extremely careful doing that because the main shaft surface, if worn or etched, may cause the blocking of the valve due to its bind in the bearings.

Remove the nut and the washer (10) take off the upper flat (11) the O-rings (21) check the diaphragm looking for damages and, after having pulled out the plane gasket by means of a screw driver (please make sure not to wear the gasket itself or its seat) examine it carefully.

Check the driving bush on the cover (7).

Examine the sealing seat (15) looking for scratches that may affect the proper water tightness.

The sealing seat is made in stainless steel and it usually doesn't require a particular maintenance, a very important thing though is to guarantee a proper cleaning by means of a sand paper.

Up to DN 150 the sealing seat is screwed in the body while for the remaining DN that is set tight by several screws. To carry out a further inspection and removal of the sealing seat please contact CSA technical support for immediate assistance.

#### Inspection

After all the components have been dismantled we need to look for any damages caused by wear if the surface, encrustations, corrosions or something else.

It is strongly advisable to replace all the components made in rubber, and responsible for the water tightness of the valve, such as O-Rings, the diaphragm, the plane basket. As far as the latter is concerned sometimes it is possible to reverse it upside down. We want to point out that in presence of encrustations on the main shaft simply proceed to a proper cleaning dipping it in a muriatic acid solution 5% as long as necessary, shouldn't that be sufficient then

proceed with one abrasive cloth or sandpaper to the complete removal of the deposit.

#### Reassembly

As far as the reassembly procedure is concerned refer to what explained before for the disassembly simply proceeding backwards so put the main shaft back into the grip along with all the pieces we took apart previously. It is very important not to forget the O-Ring (21) and to set the nut tight (10) so that to assure a proper diaphragm and the plane gasket in order to avoid they may suffer any damage. Please be extremely careful with this step because a nut not properly clenched may engender movements making the mobile block unstable therefore affecting the valve's performances.

Put the mobile group back into the valve's body placing the shaft into the sealing seat guide, make the holes of the diaphragm match the studs and position the spring (9) under the cover.

Set the nuts tight using a cross over pattern, then put the circuitry back to its original position.

#### Final inspection

Before make sure that the internal mobile block can move without any friction, this can be verified simply by putting gradually the main chamber under pressure and checking the movement of the indication rod.

Examine the status of the plane gasket simply by checking the perfect water tightness of the sealing seat. At this point proceed by opening the upstream gate valve full throttle to have the normal working conditions, check for any leakage trough the cover or the nuts, should that happens set them tighter.