



**CMO VALVES**  
manufacturing the valve you need

# 53A SERIES



**INSTALLATION, MAINTENANCE AND  
SECURITY MANUAL**

*CONTROL VALVES*



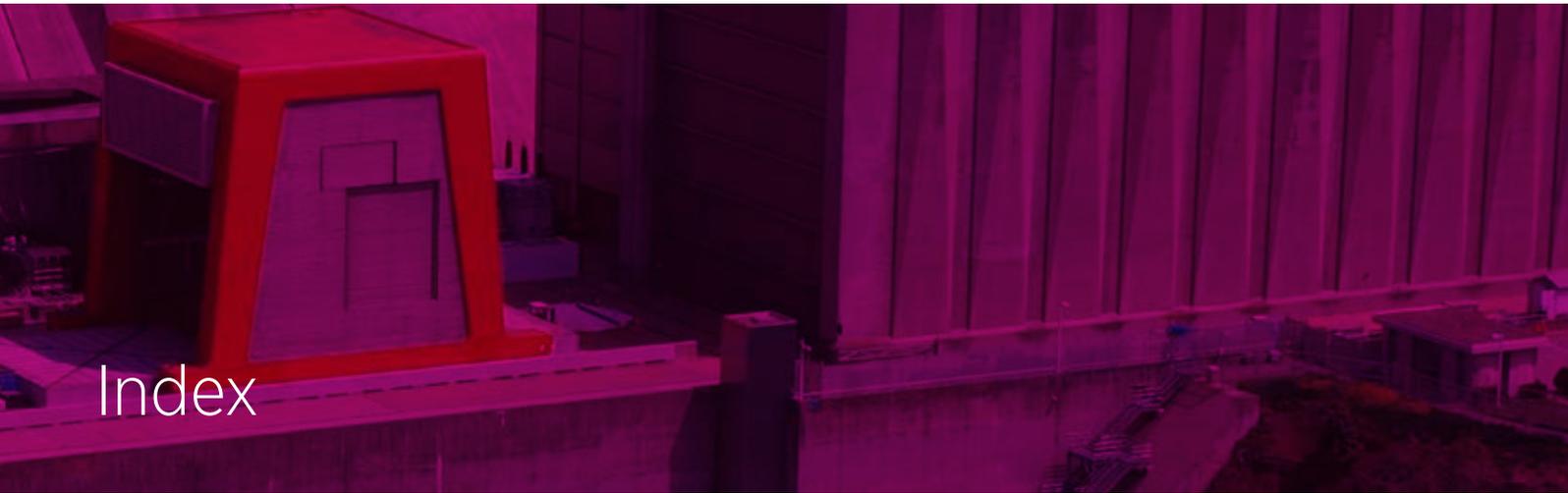
## Range

This installation, maintenance and security manual includes the whole range of control valves manufactured by CMO VALVES TECHNOLOGY S.L.

The CMO control valves are piston type actuated by a reinforced EPDM diaphragm, this system provides great precision, both when adjusting the valve and when the difference between inlet and outlet pressure is very small.

There are as many pilots as functions for the control valves, furthermore, the pilots can be combined to allow one valve to make different functions, this way, for example, we may combine a pressure reducing valve with a pressure sustaining and flow control valve, so that downstream the valve we always have a controlled minimum value of pressure, a maximum value of pressure and a maximum value of flow rate.





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## INTRODUCTION

The CMO control valves are designed to be used with clean water, this is, without solid waste. They are very versatile valves, they can combine their applications, as it has already been explained.

This manual includes all the necessary details for the installation, use and maintenance of these valves. It is recommended to read the manual and get use to the valve before installing them.

The control valves are suitable to be used in installations both indoor and outdoor.

The CMO control valves are manufactured under a certified quality system ISO9001, assuring by this, the best characteristics, functioning and resistance.

The CMO control valves are manufactured with high quality materials, according to the most important manufacturing standards.

The CMO control valves can be considered as automatic valves, they need no external action to work, this fact must be taken into account during installation and maintenance.

The control valves have a casted arrow in the body, the flow must follow that sense, otherwise the valve will not work.



## GENERAL PRECAUTIONS

These valves must be dimensioned correctly, if a drastic pressure reducing or other change is required in the conditions of the fluid, must be communicated, as one valve may not be enough to do it securely and two or more valves may be needed.

When installing, uninstalling or doing any maintenance operation on the check valves, we will take into consideration all the existing circumstances in that moment, this means, both the environmental conditions as well as the technical circumstances of the place where the valve is going to be installed. We will take the next into consideration:

### Installing security

The installation of the valves must be carried out by qualified and expert personnel, with the electrical and mechanical knowledge required.



When installing or repairing an equipment, disconnect all the devices or machines involved, checking previously that the disconnection will not mean a risk.

Before proceeding with the installation or reparation, remove the hydraulic or pneumatic pressure of the installation, devices, machines or the factory and empty the fluid of the pipeline.

Any necessary precautions will be taken so that the machinery of the pipeline is not started, this can be done by placing signals, cutting the electric supply, or any other considered action.

Check the applicable security and accident prevent regulations when the installation or maintenance is carried out.

### Starting up security

When starting up the installation, the pilot of the valve must be closed, and then start the regulation. This means that the fluid will not pass through the valve, this must be taken into account.



In case of failure of the valve the next will be considered:

- The need or not of replacing immediately for a new valve.
- The need or not of dismantling the valve completely.
- The need or not of stopping the work in the factory, etc.

In the event of an incident, inform as soon as possible to the person in charge of the equipment, the safety engineer or the administrator to:

- Stop the devices, machines or energy of the factory.
- Install alarms if necessary to avoid:
  - The uncontrolled start of devices, machines or factory.
  - The start of production.

Do not mount, act or do any adjustment in the valve, if the pipeline or the area of the factory where the valve is installed is damaged.



After a reparation and/or maintenance, check the correct functioning of the valve and that the connections to the pipeline are correct.

### Product security

The CMO control valves are quality products, manufactured according to well-known industry standards and stored in perfect conditions by the manufacturer.

In order to keep those conditions, the installer or user will do their duty according to these instructions:



- The installer will be considered specialist with solid knowledge in mechanics and electricity.
- The control valves will only be used in applications that correspond to the constructive characteristics of the valves.
- They will be used knowing the allowed temperature range.
- Never use the valve over the nominal pressure.
- No maintenance or repairing operation will be done without removing the pressure of the pipeline.

## TRANSPORT AND STORAGE

It is recommended to transport the valves in closed containers. The holes of the flange will be used for handling operations.

The butterfly valves are packed with plastic. Please keep the original packing while the valves are stored.

The valves must be stored at a temperature between 0° y 30°, in dry and clean places.

If the valves are stored outdoor, the valves must be placed over wooden platforms or pallets, but they must never be in contact with the floor. In that case cover them with a plastic blanket.



## INSTALLATION

It is important to know the range of acting of the control valves, this means that we must know, for example, if a pressure reducing valve is able to reduce the pressure as much as we may need. If the reduction is too high, it may cause cavitation and harm the valve.

The control valves will be located in an area with space enough to work comfortably, so that we can do any operation that we need on them. It is fundamental to respect the flow arrow casted in the body.

Once this considerations have been taken into account and being sure that the position of the valve is the right one, we will proceed with the installation this way:

- We will clean the dust, rust and any other dirt from the flanges of the pipeline and the valve to assure that there is nothing left that can create a leaking point.
- We will make sure that the pipe and the valve have the correct support and fastening, we must avoid the transmission of efforts or fatigue.
- We must choose the correct gaskets according to the fluid conducted, and the size and pressure of the valve.
- We must use the correct bolts, as it is stated in the standard ISO 7005-2, and as it is listed in the next table.

DN	PN10	PN16
50	M16X4	M16X4
65	M16X8	M16X8
80	M16X8	M16X8
100	M20X8	M20X8
125	M24X8	M24X8
150	M20x8	M20x8
200	M20x8	M20x12
250	M20x12	M24x12
300	M20x12	M24x12
350	M20x16	M24x16
400	M24x16	M27x16

- The tightening of the bolts must be done in cross section.
- The re-tightening of the bolts is recommended after some time of use of the installation, as the vibrations may have loosen them.

## MAINTENANCE

The CMO control valves require no specific maintenance. Only we will make sure that the pipes of the pilots are clean, for that, we will regularly clean the filter, this will avoid that the manometers show wrong pressure values, and will allow the pilot to fulfil its function.

## CONTROL VALVES

### RANGE

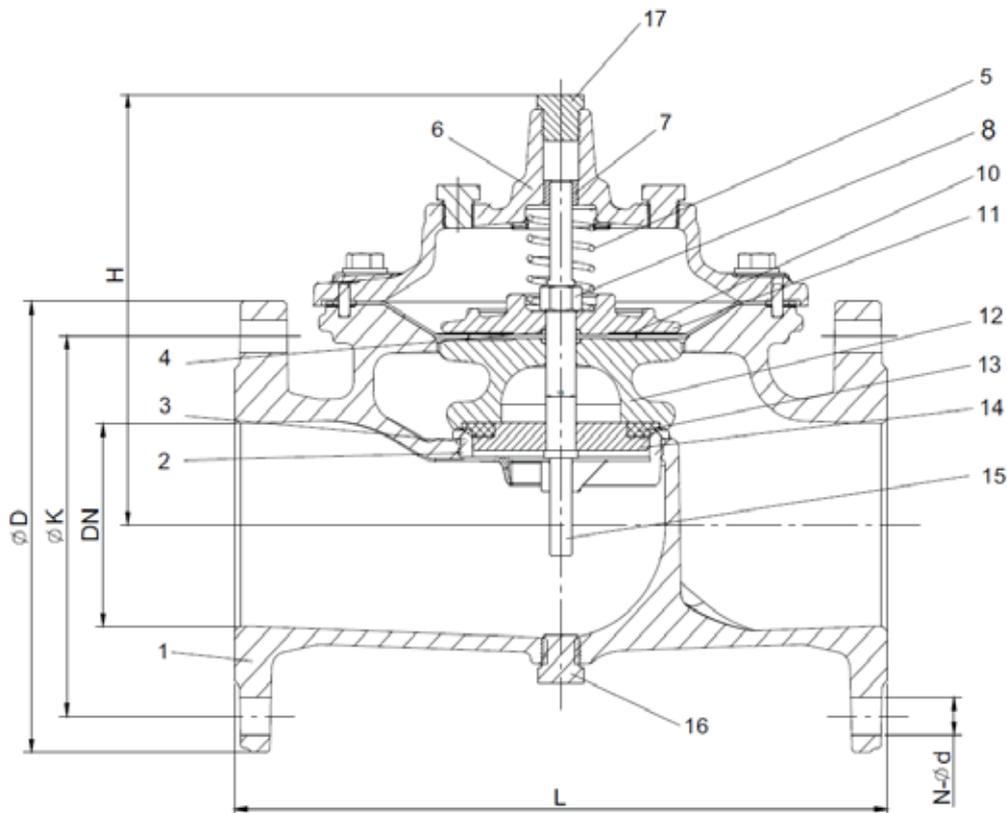
MODEL	NOMINAL PRESSURE	NOMINAL DIAMETER	FACE TO FACE DISTANCE	FLANGES
SERIE - 53A	10/16 BAR	DN 50-400	DIN 3202 F1	ISO 7005-2

### MAIN FEATURES:

- Controls the conditions of the fluid.
- 100% Water tight.
- Max. working pressure according to design pressure PN 10/16.
- Working temperature between -10°C and 90°C.

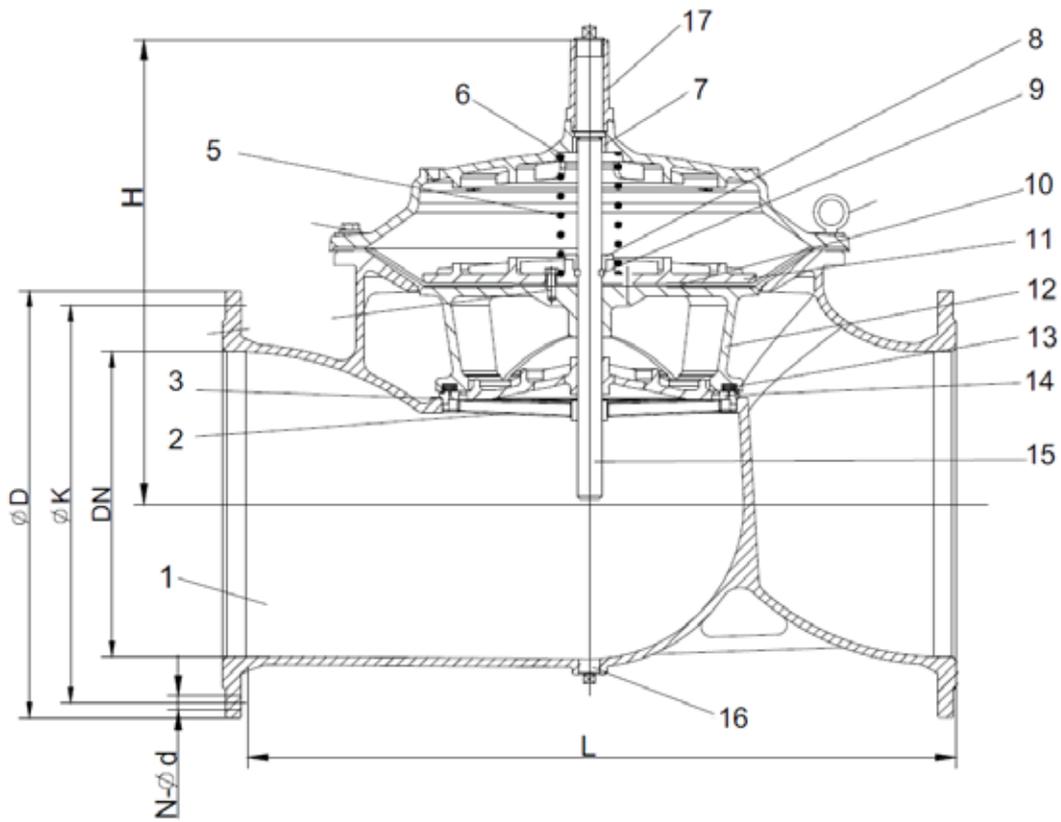
### STANDARDS APPLIED:

- Hydrostatic tests according to EN 12266-1, class A.
- Fabricaction according to EN 1074-5.
- Distance between flanges according to DIN 3202-F1.
- EC directive.
- Lateral flanges according to ISO 7005-1.



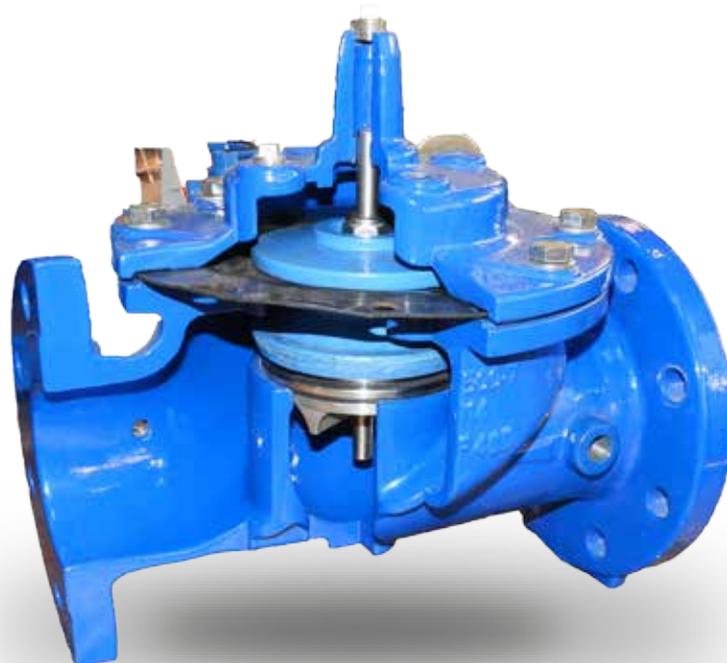
### DIMENSIONS

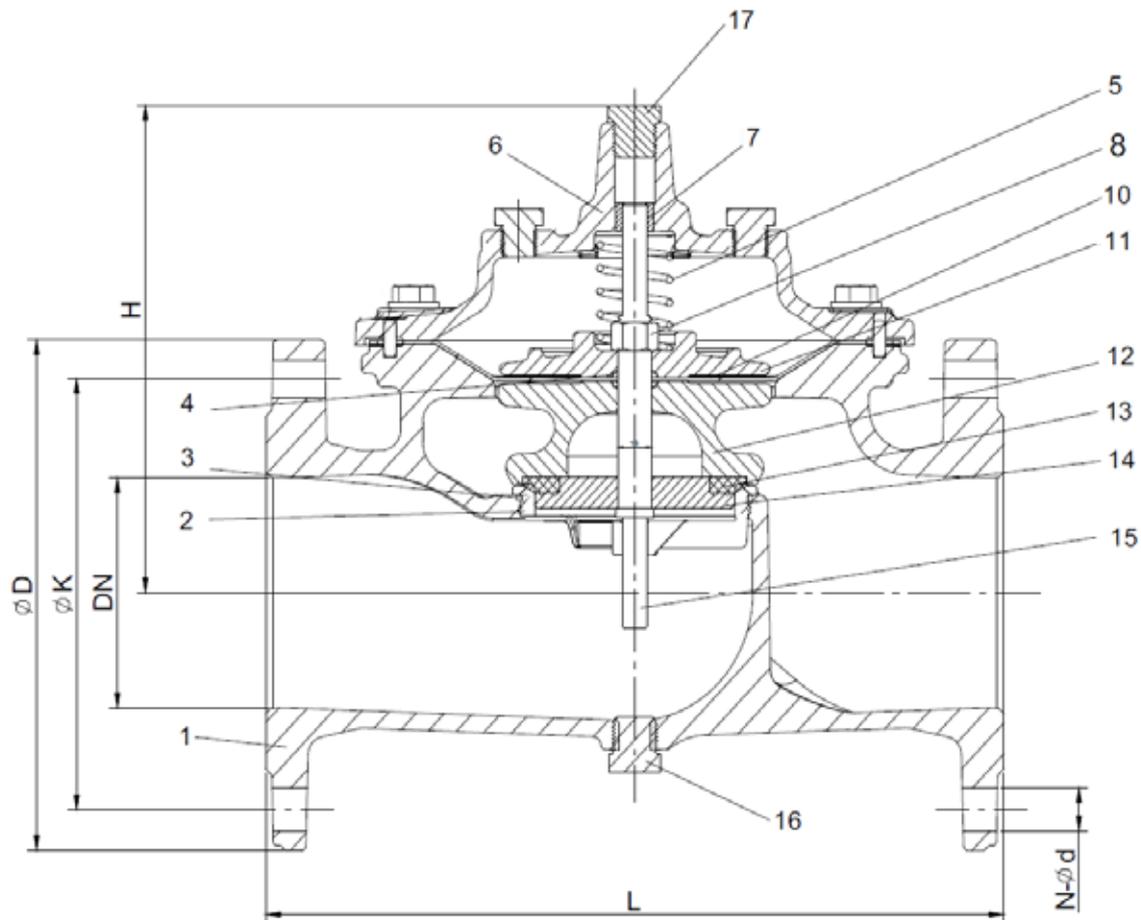
DN	L	H	D			K			n-Ød			Weight Kg
			PN10	PN16	PN25	PN10	PN16	PN25	PN10	PN16	PN25	
50	230	139	165	165	165	125	125	125	4-Ø19	4-Ø19	4-Ø19	14
65	290	159	185	185	185	145	145	145	4-Ø19	4-Ø19	8-Ø19	19
80	310	179	200	200	200	160	160	160	8-Ø19	8-Ø19	8-Ø19	23
100	350	214	220	220	235	180	180	190	8-Ø19	8-Ø19	8-Ø23	32
150	480	333	285	285	300	240	240	250	8-Ø23	8-Ø23	8-Ø28	68
200	600	407	340	340	360	295	268	310	8-Ø23	12-Ø23	12-Ø28	125
250	730	476	405	405	425	350	355	370	12-Ø23	12-Ø28	12-Ø31	200
300	850	526	460	460	485	400	410	430	12-Ø23	12-Ø28	16-Ø31	260
350	850	526	520	520	555	460	470	490	16-Ø23	16-Ø28	16-Ø34	310



**DIMENSIONS**

DN	L	H	D			K			n-φd			Weight Kg
			PN10	PN16	PN25	PN10	PN16	PN25	PN10	PN16	PN25	
400	1100	650	580	580	620	515	525	550	16-Ø28	16-Ø31	16-Ø37	560
450	1100	650	640	640	670	565	585	600	20-Ø28	20-Ø31	20-Ø37	620
500	1250	650	715	715	730	620	650	660	20-Ø28	20-Ø34	20-Ø37	880
600	1450	930	840	840	845	725	770	770	20-Ø31	20-Ø37	20-Ø40	1300
700	1450	930	910	910	960	840	840	875	24-Ø31	24-Ø37	20-Ø43	1400





**DESCRIPTION:**

<b>1</b>	BODY	GJS500
<b>2</b>	BODY SEAT	AISI 304 (DN<400) BRASS / BRONZE
<b>3</b>	O-RING	NBR
<b>4</b>	O-RING	NBR
<b>5</b>	SPRING	AISI 304
<b>6</b>	BONNET	GJS500
<b>7</b>	GUIDE	BRASS / BRONZE
<b>8</b>	SHAFT NUT	AISI 304 / BRONZE
<b>9</b>	FIXATION WASHER	BRASS / BRONZE
<b>10</b>	DIAPHRAGM	EPDM + NYLON
<b>11</b>	FIXING HOLDER	GJS500
<b>12</b>	DISC HOLDER	GJS500
<b>13</b>	SEAT	EPDM / NBR
<b>14</b>	SEAT HOLDER	AISI 304 (DN<400) GJS500
<b>15</b>	SHAFT	AISI 304
<b>16</b>	PLUG	AISI 304
<b>17</b>	PLUG	AISI 304 (DN<400) CARBON STEEL
	BOLTS	A2
	PAINTING RAL 5015	Epoxy 250 μm



## FUNCTIONING

The control valves are hydraulic valves of automatic operation, this means, they require no external power supply, not electric nor pneumatic.

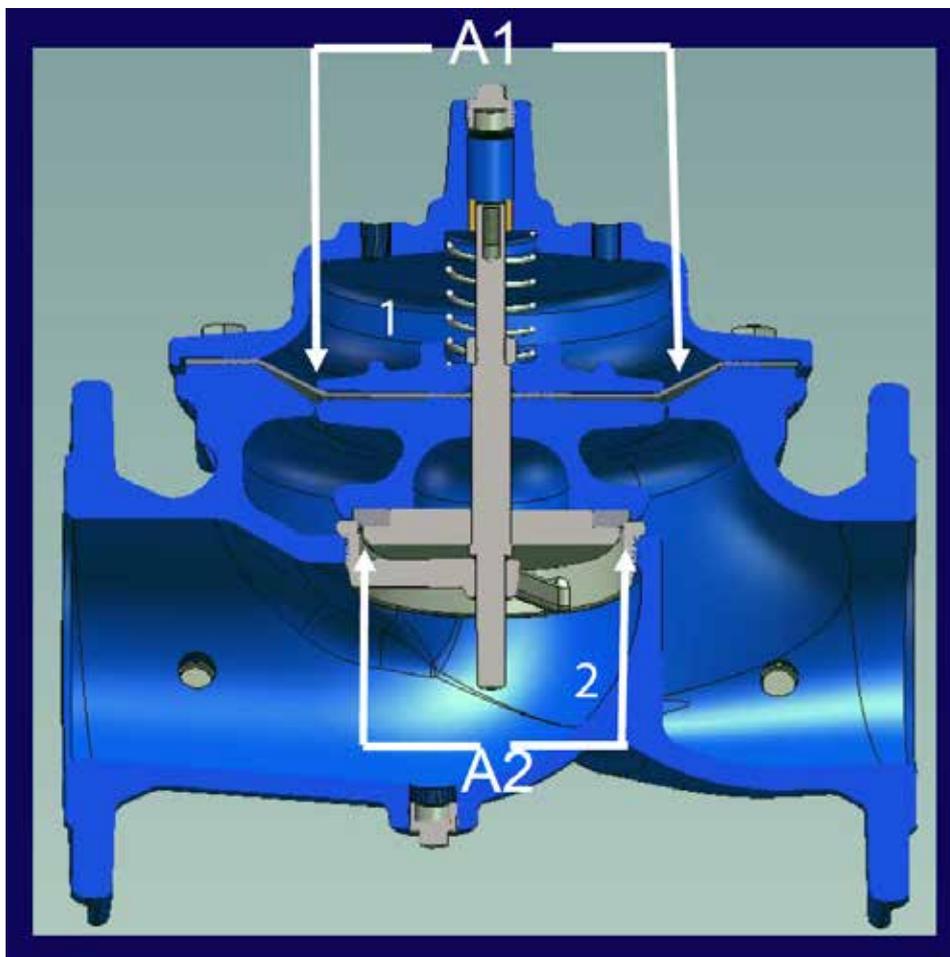
This valves are operated due to a pressure difference that take place in the body of the valve, the movement of the pilots will regulate this pressure difference, and those pilots will be the ones who define the function of the valve, but the body is the same and will operate under the same principle.

Inside the body of the valve we will distinguish two main changers, chamber 1 and chamber 2, and we will call A1 and A2 to the areas upon which the water will make pressure.

As this pressure exerts a force directly proportional to the area, the bigger the area, the bigger the force, and so, when the pressure is the same, the force over A1 will be bigger and so the valve will remain closed. In the event that the pressure decreases in chamber 1, the exerted force on A1 will be smaller and the piston will raise, allowing the flow of the water through the valve.

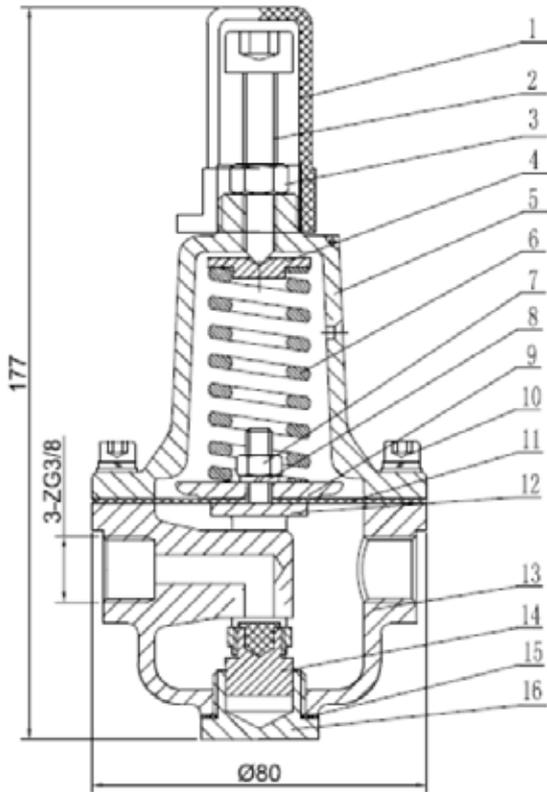
As long as the valve opens or closes, the pressure and the flow will change until the conditions stablished with the pilots are reached.

The pressure in chamber 2 is the inlet pressure, the pressure in chamber 1 will be conditioned by the movement of the pilot, when the pilot opens, the water will flow through it and the pressure will decrease, keeping the valve open.



## PRESSURE REDUCING

The pressure reducing valve keeps a maximum value of pressure downstream the valve. This value will be settled with the upper bolt of the pilot.



### DESCRIPTION:

		MATERIAL
1	CAP	ABS
2	AJUSTING BOLT	AISI 304
3	HOLDING NUT	A2
4	SPRING GUIDE	AISI 304
5	BONNET	AISI 304
6	SPRING	Cr-VA
7	NUT	A2
8	WASHER	A2
9	FIXATION SUPPORT	AISI 304
10	BOLT	A2
11	DIAPHRAGM	EPDM + Nylon
12	WASHER	AISI 304
13	BODY	AISI 304
14	DISC	AISI 304 + EPDM
15	PLUG	AISI 304



The pilot has an internal diaphragm that will be in charge of opening or closing the pilot. This will happen because there is a difference of forces. The pressure of the fluid of the outlet exerts a force on the diaphragm that is countered by the tension of the spring. If the pressure decreases, the force of the spring will be bigger, pushing the diaphragm down and opening the pilot.

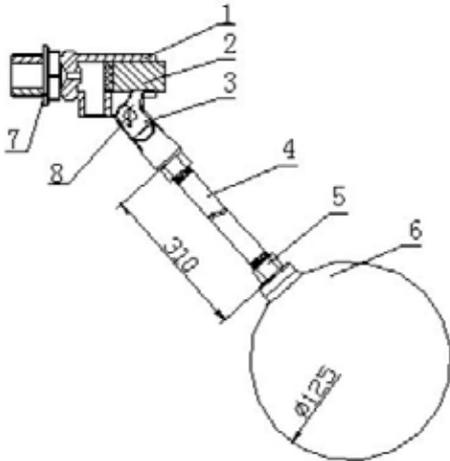
Once the pilot is open, the pressure in the top chamber decreases, so the valve opens, allowing more flow of water, increasing the pressure in the outlet up to the desired value. When that value is reached, the force exerted by the water and the spring will be the same, and so the valve will not move, keeping the pressure constant in the outlet.

If the pressure increases in the outlet, over the desired value, the pilot will close increasing the pressure in the upper chamber of the valve, the valve will close a little bit, which will decrease the flow and so the pressure in the outlet.



## LEVEL CONTROL

The level control valve opens or closes the valve depending on the level of the fluid that we want to control. In this case it is just an On/Off valve, we have no control on the conditions of the fluid, only the valve will open when the fluid is too low and will close when the desired level is reached.



### DESCRIPTION:

<b>1</b>	<i>BODY</i>	<i>AISI 304</i>
<b>2</b>	<i>DISC</i>	<i>AISI 304 + RUBBER</i>
<b>3</b>	<i>YOKE</i>	<i>AISI 304</i>
<b>4</b>	<i>ROD</i>	<i>AISI 304</i>
<b>5</b>	<i>NUT</i>	<i>AISI 304</i>
<b>6</b>	<i>FLOAT</i>	<i>AISI 304</i>
<b>7</b>	<i>JAM NUT</i>	<i>AISI 304</i>
<b>8</b>	<i>PIN ROLL &amp; SPLIT PIN</i>	<i>AISI 304</i>

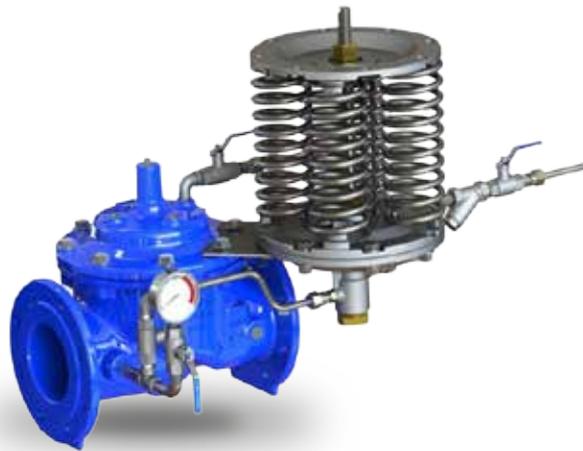


In this case, when the level of the deposit decreases, the arm and the float go down, opening the pilot. The valve will open allowing the flow until the desired level is reached, closing the pilot, equalizing the pressures in the chambers of the valve and closing the valve. The movement is constant whenever the level of the deposit changes.

There is a pilot for level control valve that allows a bigger difference between levels of the deposit, so the movement in the valve is produced when the float reaches the lower limit of its path, so the valve remains inactive more time.



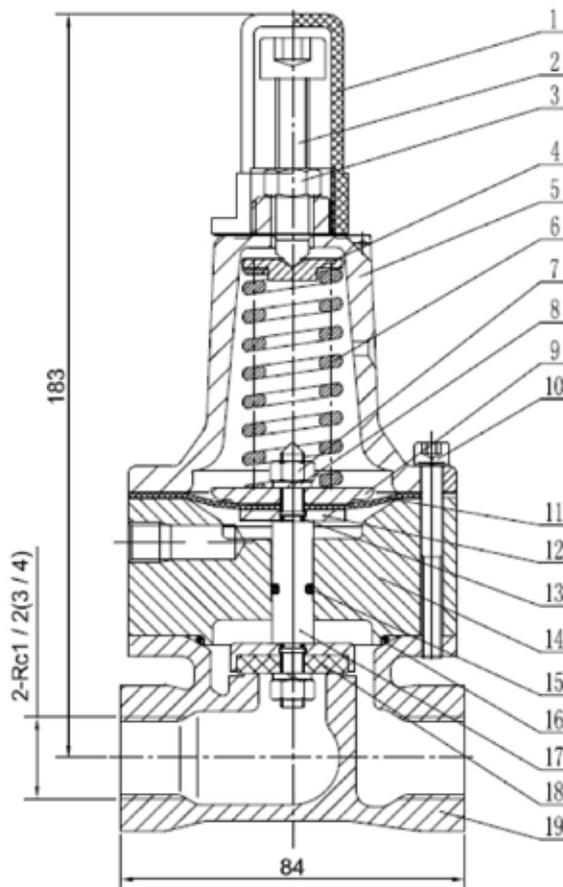
There is also a pilot for deposits placed in very high locations, in which the weight of the water in the pipes of the pilot could distort the measurement, this pilot is more precise and avoids the effects of that weight.





## SUSTAINING AND PRESSURE RELIEF

This valve can be configured as pressure relief or pressure sustaining, depending of the value that we establish in the pilot, as the function will be done the same way.



### DESCRIPTION:

		MATERIAL
1	CAP	ABS
2	ADJUSTING SCREW	AISI 304
3	JAM NUT	A2
4	SPRING GUIDE	AISI 304
5	BONNET	AISI 304
6	SPRING	Cr-VA
7	NUT	A2
8	WASHER	A2
9	FIXATION SUPPORT	AISI 304
10	SCREW	A2
11	DIAPHRAGM	EPDM + Nylon
12	GASKET	AISI 304
13	O-RING	EPDM
14	INTERNAL BODY	AISI 304
15	O-RING	EPDM
16	O-RING	EPDM
17	STEM	AISI 304
18	DISC	AISI 304
19	BODY	AISI 304



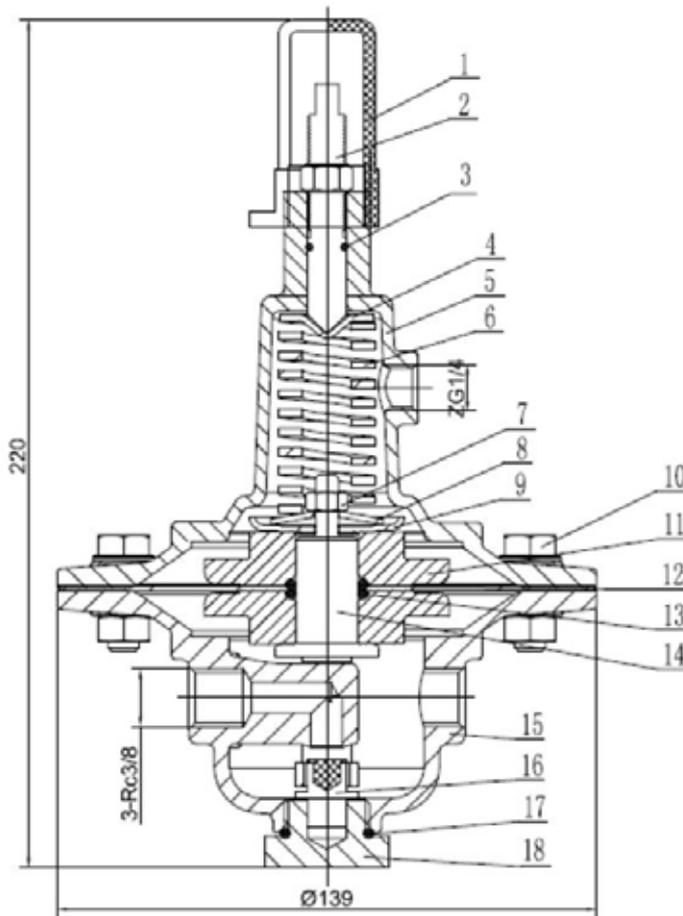
In this case, the diaphragm of the pilot is going to be actuated by the inlet pressure of the valve.

If we want to use it as pressure relief, we will regulate the pilot with a high value of pressure, so as long as the inlet pressure is below that value, the pilot will remain close, and so the valve will remain close too. If the pressure increases over that value, the diaphragm will open the pilot, opening the valve and relieving the pressure, until the settled value is reached again.

If we want to use it as pressure sustaining, we will regulate the pilot with a low value of pressure, so as long as the inlet pressure is over that value, the valve will be open, if the inlet pressure decreases, the valve will close avoiding the exit of water.

## FLOW CONTROL

The flow control valve allow to establish a maximum value of flow, so the flow downstream the valve will remain constant even if the demand increases.



### DESCRIPTION:

		MATERIAL
1	CAP	ABS
2	ADJUSTING SCREW	AISI 304
3	O-RING	EPDM
4	SPRING GUIDE	AISI 304
5	BONNET	AISI 304
6	SPRING	Cr-VA
7	NUT	A2
8	WASHER	A2
9	FIXATION SUPPORT	AISI 304
10	SCREW	A2
11	DIAPHRAGM PLATE	AISI 304
12	DIAPHARGM	EPDM + Nylon
13	O-RING	EPDM
14	STEM	AISI 304
15	BODY	AISI 304
16	DISC	AISI 304 + EPDM
17	O-RING	EPDM
18	PLUG	AISI 304



For this function, an additional flange must be added, it will strangle the section, increasing the speed of the flow in it, creating a pressure difference, this difference will be used by the pilot to open or close the valve and maintain the flow constant as we have settled.



## FINAL CONSIDERATIONS

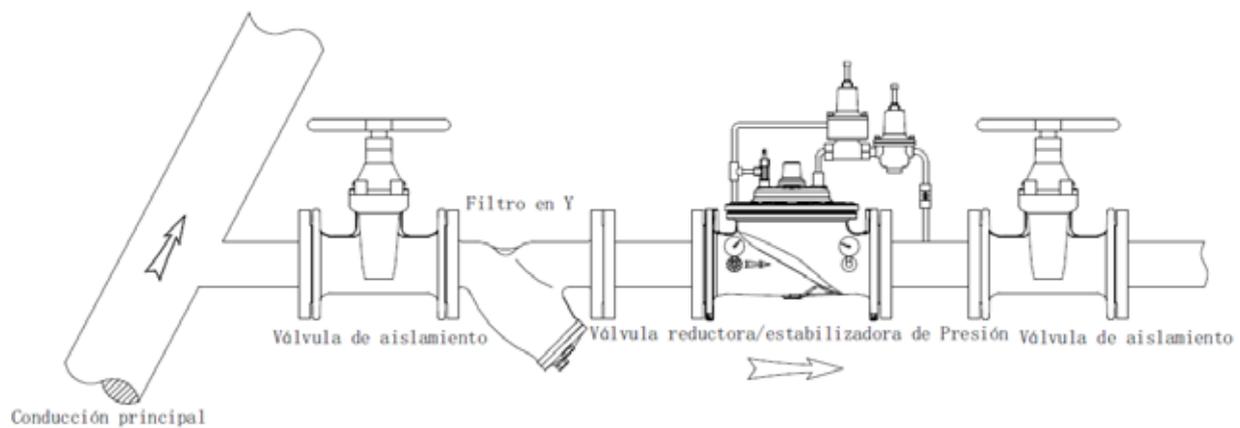
We are going to point out some of the most important aspects of these valves.

- They are automatic valves, no external power supply is needed, this allows them to be installed in remote areas where there are no infraestructur.

- The pilots can be combined, this means that the functions of these valves are more than what has been detailed in this manual, tell us your specific need so that we can find the best configuration to meet your project requirements.

- It is possible to add electronic pilots, so that we can have remote control over the valves.

- This valves are designed for clean water, so a strainer must be installed before the valve. It is also recommended to place gate valves on both sides of the valve, so if it is necessary to do any maintenance or reparation, the valve can be easily isolated. So the correct way to install these valves is as follows:



- These valves are sent with the manometers and accesories needed for their installation.

## TROUBLE SHOOTING

Problem	Cause	Solution
The valve doesn't close.	The seat is damaged.	Change the piston.
The pilot doesn't work.	The pilot / pipes are dirty.	Clean the pilot / pipes.
The valve doesn't close or open	The pilot is broken.	Change the diaphragm.