



CSA waterworks line

Constant level control pilot operated
automatic control valve

Mod. XLC 460

Introduction

This manual will provide you with the information to properly install and maintain CSA automatic control valves XLC 400 series. The contents and the procedure are intended for technicians in charge of CSA valves only, prior to a theoretical and practical training by CSA qualified personnel only.

Safety

All safety messages in the instruction manual are flagged with the following symbol meaning danger, caution and warning. This means and makes reference to procedures that may lead to equipment and system damage and to severe injury or death for the personnel involved.



WARNING!

Personnel involved in the installation or maintenance of valves should always be alert to potential emission of water and pipeline material, and take the necessary safety precautions. Always wear the suitable protection like helmets, gloves, googles, when dealing and handling hazardous pipelines and valves.

Inspection

Your valve XLC 400 has been packaged to provide protection during shipment, however it can be damaged during transport. Please carefully inspect the unit for damages or discrepancies with the order upon arrival and report a claim immediately before unloading the goods.

Parts

Recommended spare parts are listed on the assembly drawing depicted on page 4. These parts should be stocked to minimize delays in case of malfunction. When ordering spare parts please make reference to the assembly drawing and identification plate present on the valve.

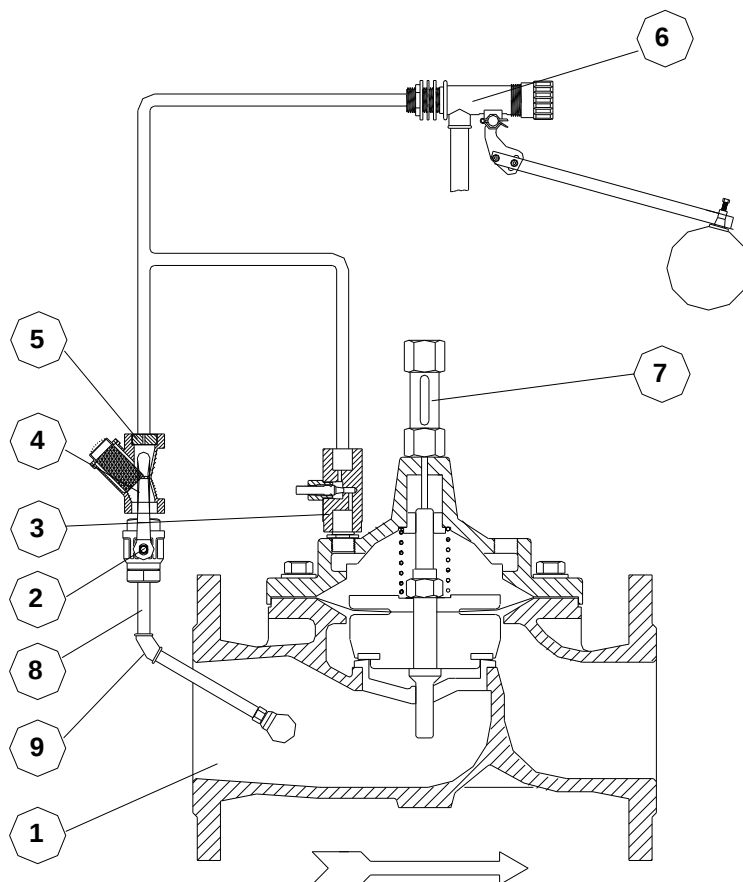
Contents

Description - - - - -	4
Handling and storage - - - - -	5
Installation - - - - -	6
Set up - - - - -	7
Maintenance - - - - -	8
Maintenance of general XLC 400 valve body- - - - -	9

Description

The pilot operated control valve XLC 400 series Mod. 460 is designed to automatically regulate a constant level inside a tank regardless of upstream pressure fluctuations and variations in demand.

Picture 1



Pos.	Component	Material
1	XLC 400 series	GJS500-7
2	Ball valve	Aisi 316
3	Needle valve	Aisi 304
4	Strainer	Bronze / AISI 304
5	Fixed orifice	Delrin
6	LCT pilot	Nickel plated brass /Aisi
7	Position indicator	Nickel plated brass /Aisi
8	Piping	Aisi 303/316
9	Fittings	Aisi 316

Handling and storage

Lifting the valve improperly may damage it and the equipment around. It is mandatory not to fasten the valve around the circuit, fittings, pipes, solenoids or position indicators. Valves must be lifted only by cables, chains, located around the body, through the flanges holes or eyebolts. During hoisting always consider that the center of mass depends on the circuitry and pilots installed.

If installation will be delayed place the valve indoors in a secure watertight storage. Should that be unavailable use a vermin proof rain cover around the valve to keep off rain , mud , humidity. Place the valve on a solid and well drained surface base to prevent moisture, flood from reaching the body.



WARNING!

Lifting the valve in the wrong way may cause malfunctioning, emission of water spurts, injuries to the personnel and permanent damages of the valve.

Installation

The automatic control valve XLC 400 must be always installed in a horizontal position with the bonnet upwards. Smaller valves, (150 mm and smaller) can be installed in a vertical pipe shouldn't be unavoidable. Prior to that consult us and specify the orientation in the order. A stable and non pulsating source of pressure is necessary for the proper performance of CSA control valves, whose minimum pressure is displayed on the technical brochure and always 0,5 bar on the pilot in addition to the headloss produced during working conditions.

For level control application it is also important to maintain a differential pressure on the inlet always below a safety value to avoid the risk of cavitation, noise and possible damages to the valve (please consult us should the static pressure value be above 7 bar).

- Gate valves or other sectioning devices must be installed upstream and downstream of CSA control valves to allow for maintenance.
- The operating fluid must be free of air, air valves (CSA Mod. FOX 3F AS combination anti-slam) should be installed upstream. This to avoid the accumulation of air pockets during working conditions, allow air discharge during pipe filling and entrance in case of pipe burst and draining.
- A suitable by-pass should be provided for servicing of the valve without interrupting the flow. For the by-pass sectioning do not use standard gate valve, likely to get damaged during modulation, but rely on globe pattern gate valves and/or CSA direct acting pressure reducing/sustaining valves depending on the installation.
- If not included in the order install pressure gauges upstream, a flow measurement device is always recommended to make sure hydraulic conditions remain within the values used for sizing. Please make sure the static pressure is below 7 bar, for higher values and doubts contact our technical support.
- A strainer with suitable basket and mesh should be installed ahead of the valve to protect internal components from debris, particles and foreign material.
- Sufficient space should be provided around the valve for disassembly.
- Check direction of flow and make sure it is according to the marking on the valve's casting.
- Make sure the flanges and pipes connection are according to the valve's standard. The nuts and bolts setting has to be conducted in the proper way, gradual and symmetrical, in order not to produced additional stress and deformation.
- During handling be sure not to damage the glass of the position indicator, if present.

Set up

For the proper set up of XLC 400 Mod. 460 reader is advised to use the following points (rif. picture 1 on page 4).



WARNING!

The set up and valve regulation has to be carried out by qualified personnel only, or directly from CSA service. Improper actions can lead to permanent damages to the valve, its internal components and system equipment along with possible injuries of the people involved.

- Make sure the isolation ball valve of the circuitry (2) is fully open
- The needle valve (3) should be open by 1 revolution (starting from the close position)
- The valve is at first isolated from the main line as both sectioning devices, upstream and downstream, are closed.



WARNING!

The difference in pressure generated by the valve when closed in static condition will produce a thrust proportional to the pressure itself.

Anchorage blocks and way of preventing valve's movement or shifting need to be taken into account.

- Keep the pilot LCT (6) to the closed position by pushing the float upwards (the opposite position compared to what is shown in the picture 1 on page 4).
- Slowly operate on the upstream gate valve to open it by 30 %, leaving the downstream sectioning device completely closed.
- Pressure will enter the valve's body, circuitry and bonnet pushing down the diaphragm and mobile block against the obturator and inducing the valve's closure
- Remove the air entrapped in the bonnet, during the operation, by means of the air release device located on top of the position indicator (7) leaving it flowing for at least 20 seconds.
- Open completely the upstream gate valve
- Slowly open the downstream gate valve to a maximum of 40% of the stroke
- Put the pilot to the open position by pushing the float downwards, as shown in the picture 1 on page 4.
- The valve will open, some flow will be discharged through the LCT proportional pilot.
- Now try to perform some opening and closing cycles acting on the position of the float and assess the reaction time of the valve, adjust the needle valve (3) throttling even further should the valve be too fast. The more the needle is open the higher flow rate will be allowed though the chamber accelerating the response time.

- Just remember to check the flow rate and maintain it within the values recommended by the catalogues as well as the static pressure. The majority of the CSA level control valves are equipped with the pressure sustaining function, in addition to level control, to allow and maintain a minimum preset upstream pressure value and flow rate limitation.



WARNING!

Regulations of pilots has to be carried out slowly to avoid unwanted pulsations and pressure surges. Always leave enough time for the system to balance, in case of doubts and problems allow for some flow through the by-pass to stabilize the line and call CSA technical support.

- Please contact us for further assistance

Maintenance

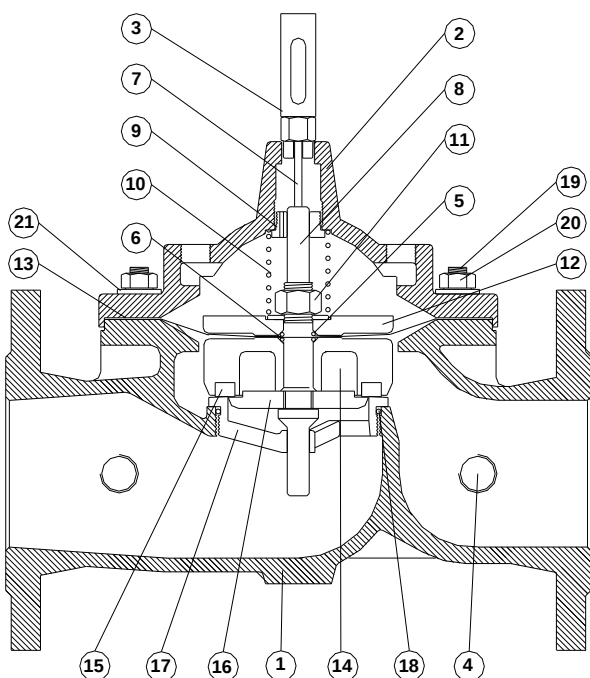
CSA automatic control valves XLC 400 series have been designed with a sturdy and reliable construction to minimize servicing and possible malfunctioning. However we recommend to inspect them at least twice per year releasing the air accumulated inside the bonnet and checking the proper performance of the LCT pilot. We recommend a thorough inspection and maintenance with complete disassembly every 4 years, according to the following instructions.



CAUTION!

Valves epoxy painted using FBT requires washers flat washers to be installed on the flanges connections to prevent the paint from cracking or chipping.

Interventions on the main XLC 400 valve



N.	Component	Material
1	Body	GJS 450-10 or GJS 500-7
2	Cap	GJS 450-10 or GJS 500-7
3	Position indicator	St. steel/Ni-plated brass
4	Pressure outlet tap	AISI 316
5	Upper flat o-ring	NBR/EPDM/Viton
6	Obturator o-ring	NBR/EPDM/Viton
7	Indicator stem	AISI 303
8	Main shaft	AISI 303/AISI 316
9	Guide ring	Bronze/AISI 303/AISI 316
10	Spring	AISI 302
11	Locking nut	AISI 303/AISI 316
12	Upper flat	Painted st./AISI 304/316
13	Diaphragm	Neoprene-nylon
14	Obturator	St. st./paint. st./GJS 450-10/500-7
15	Plane gasket	NBR
16	Gasket holder	AISI 303/AISI 304/AISI 316
17	Seat	AISI 303/AISI 316
18	Seat o-ring	NBR/EPDM/Viton
19	Studs	AISI 304/AISI 316
20	Nuts	AISI 304/AISI 316
21	Washers	AISI 304/AISI 316

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

The **external defects** mainly concerns the pilot circuit and are not related to the main body of the XLC 400 control valve.

The **internal defects** concern the mobile block, or the deterioration of the internal components.

Problems can be summed up 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 leakages is reported.

The possible causes lead to:

- **defects on the diaphragm;**

- **defects on the movements of the mobile block;**
- **friction caused by deposits and corrosion;**
- **problems on the gaskets;**
- **defects on the sealing seat.**

Problems solving

Problem	Cause	Solution
The main valve doesn't close	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, trapped inside the main body	Remove the material from the valve
	The plane gasket of the obturator is ruined	Replace the plane gasket
	The sealing seat is ruined	Replace the sealing seat
The main valve doesn't open	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 supply 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:

- slowly close the upstream and downstream gate valves;
- close all the ball valves of the circuit;
- completely open the air vent valve from the position indicator, if the latter is not present the fitting of the isolation valve on the chamber;
- open the upstream gate valve slowly but not completely little by little so that the pressure enters the main valve body.

The water that flows will raise the mobile block and the membrane therefore, the air vent will discharge the remaining water trapped inside the main valve bonnet.

When all the water of the main chamber has been expelled (this operation could take a few 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 you can be sure the cause of the problem has to be found 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, therefore intervene accordingly, simply by replacing the diaphragm or setting the nut tight.

Warning: remember to close the upstream gate and decrease all the remaining pressure inside the valve before removing the bonnet.

Movement of the mobile block

In order to verify the proper movement of the mobile block to proceed as follows: isolate the main chamber closing the two isolation ball valves on the upstream and downstream side of the valve's body, and open the drain port located on top of the position indicator. In this way you will relief the pressure out of the valve's bonnet.

Attention: with this operation we will basically open the valve completely, therefore no regulation will be performed. Make sure to avoid dangerous consequences of the pressure system onto which the valve is acting.

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

Now close leave the isolation ball valve downstream and open the correspondent upstream, also close the air release valve on the position indicator. The main valve will close.

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 and please contact us immediately.

DN in mm	50	65	80	100	125	150	200	250	300/400
Stroke in mm	15	18	21	27	27	43	56	70	84

The clogging can be located 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 do some manual opening and closing operations putting the main chamber under pressure and discharging it. This operation proved to be enough in some situations to flush the dirt downstream. If not take the cover apart.

3) Friction of the shaft

One of the more frequent causes of the mobile group movement obstruction are the corrosion and deposits on the main shaft causing friction. They can be due to 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.

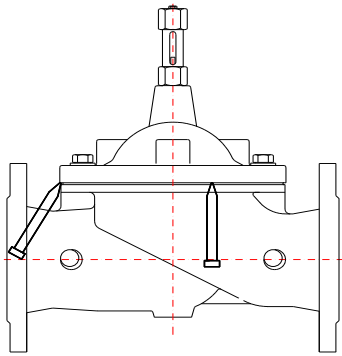
Should that be the case simply proceed to a proper cleaning leaving it in a muriatic acid solution 5% as long as necessary, shouldn't that be sufficient then proceed with a fine abrasive cloth until the deposit is completely removed.

4) Plane gasket

The valve must close watertight once the pressure has entered the main chamber and if we have enough pressure to do it which is at least 0,5 bar acting on the pilot in addition to headloss during outflow, if that doesn't happen proceed with the inspection of the plane gasket performance assuring the closure between the obturator and the sealing seat.

5) Sealing seat

One more reason that could be responsible for the improper closure of the valve may be the sealing seat, occurring in case of dirt and deposits or damaged due to cavitation. In these cases we must proceed with an accurate inspection to clean the component by means of sandpaper then polish it, if the problem can't be solved on the spot please contact our 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.

Relieve 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 a 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 plastic hammer and a chisel driving it upwards. After that, hoisting the valve vertically using eyebolts. Remove the internal mobile block and put it into a grip with **clamps in soft material such as brass or aluminum**, be extremely careful doing that because the upper and lower main shaft surface responsible of the valve's guiding mechanism, 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 damage and, after having pulled out the plane gasket (13) by means of a screw driver (please make sure not to wear the gasket itself or its housing) 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 and for possible sign of cavitation.

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

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

Inspection

After all the components have been dismantled we need to look for any damage caused by wear of the surface, deposits, corrosion or something else.

It is strongly advised to replace every 4 years all the components made in rubber, responsible for the water tightness of the valve, such as O-Rings, the diaphragm, the plane gasket.

Reassembly

To reassemble do the reverse of the disassembly procedure positioning the main shaft back into the grip along with all the pieces. It is very important not to forget the O-Ring (21) and to **set the nut tight (10)** to assure a proper torque between the diaphragm and the plane gasket. Please be extremely careful with this step because a nut not properly tight may engender movements making the mobile block unstable, therefore affecting the valve's performance.

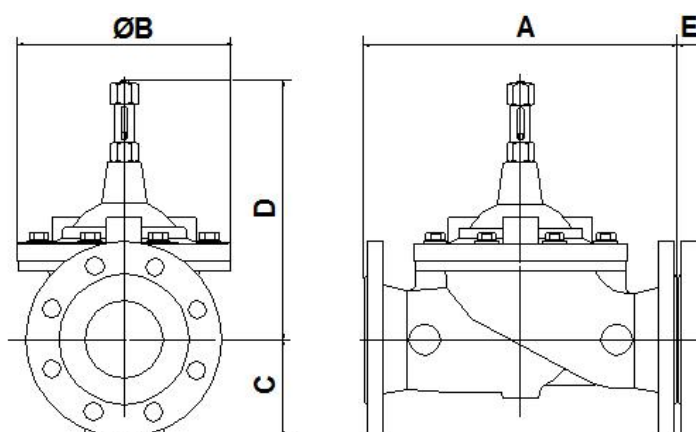
Put the mobile group back into the valve's body placing the shaft into the sealing seat guide, make the holes of the diaphragm match the studs and position the spring (9) under the cover.

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

Final inspection

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

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 through the cover or the nuts, should that happen set them tighter.



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.
Standard flange PN16; PN10-25 on request.
Testing procedure according to UNI EN 1074.

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



We reserve the right to incorporate our latest design and material changes without notice or obligation.

Design features, materials of construction and dimensional data, as described in this manual, are provided for your information only.