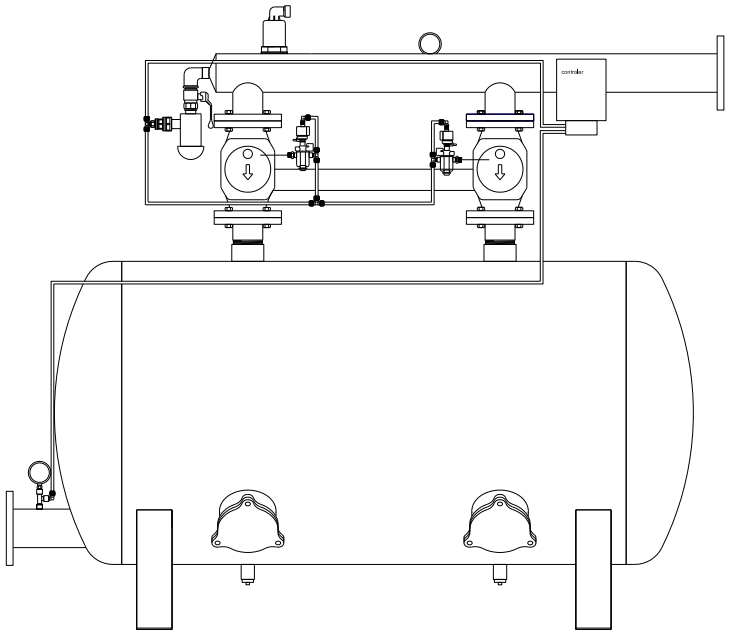
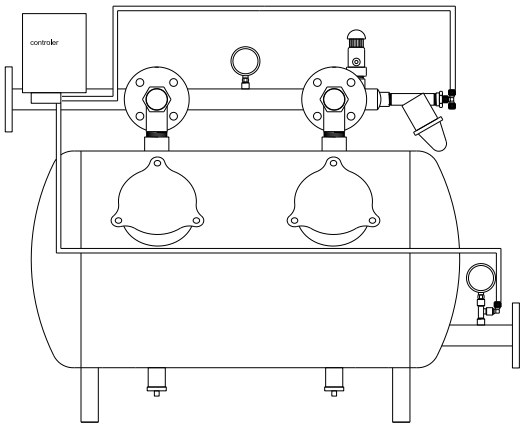
DROP
Filtration systems
Irrigation equipment

Operation, Installation and Maintenance Instructions.

Sand media filters dual chamber automatic





CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

DROP – N. KIOSIDIS S.A.
Thessaloniki, Greece

has been approved by Lloyd's Register Quality Assurance
to the following Quality Management System Standards:

BS EN ISO 9001:2000

The Quality Management System is applicable to:

Design and production of steel filters for irrigation and water supply use. Sales of irrigation equipment.

Approval
Certificate No: 362611

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Certificate Expiry: 15 February 2010

Issued by: Lloyd's Register of Shipping & Industrial Services S.A.
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87, Akti Miaouli, 185 38, Piraeus, Greece

DROP appreciates you for the purchase of its products and they inform you that as much in its production as in its design they have put all its care.

Detailed reading of this manual will help you in the system installation and good operation for many years. Do not forget to give to the end user this information when making the filtrate system starting, in problem avoidance and for the correct use of the systems.

All the systems need of a periodic maintenance, revisions, consumable replacements, in function of the qualities of the waters and of the work conditions. A competent technician should advise the selection of the system and filtering equipment, as well as its measurement design and operation conditions. The qualities of the waters can vary with the step of the time and consequently the filters can work in a different way.

Any suggestion of you, about our products or about this manual, will be very received and rewarded in its case.

In case of doubt, consult with your supplier..

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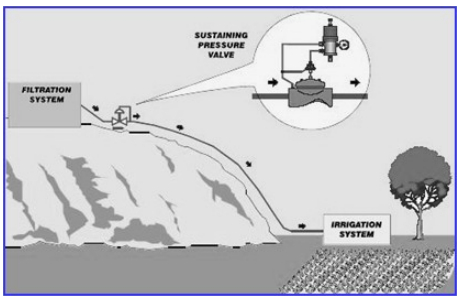
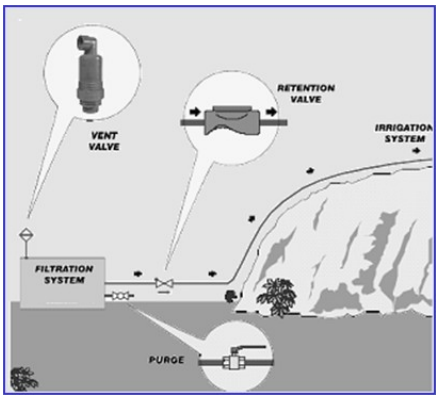
RECOMMENDATIONS



• In small facilities, with few filter elements, it is recommendable to install a sustaining pressure valve under the filtrate system, with the purpose of guaranteeing sufficient pressure for the backwash process of. This valve must go provided with a control mechanism (electrical or hydraulic) that manages its total opening during the filtration process.

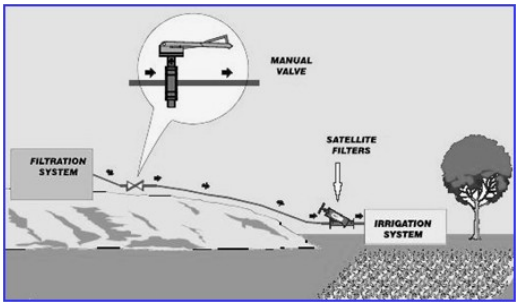
• In any case, whenever the installation does not allow to maintain necessary the sufficient pressure for the backwash one, it is advisable to place a manual valve when coming out (of butterfly), regulated properly to stabilize the pressure.



• With the purpose of eliminating the air that could arrive at the filter elements, it is recommendable to place a vent valve in an advisable place of the system.

• In order to avoid the inverse flow, from the irrigation towards the filtrate, before a shutdown of the pumping system, the installation of a retention valve is advisable, in cases in that the height waters down is greater than where the pressure system is located.

• With the purpose of being able to eliminate the water of the system for operations of maintenance one is



• The use of satellites filters in the water takings of the irrigation sectors eliminates risks of clogging of emitters. These clogging could be caused by the grain formation by agglutinations of dissolved substances that precipitate throughout the conduction. Also risk of clogging by a possible accidental breakage of the conduction is run.

• As protection against overpressures safety valves can be installed in the system.

TECHNICAL FEATURES

Type of Filter	Inlet/Outlet	Nom. Flow m^3/h	River m^3/h	Canal m^3/h	Waste m^3/h
X 11/2''	11/2''	16	12	9	4
X 2'' DC	2''	33	23	17	8
X 3'' DC	3''	60	30	20	10
X 4'' DC	4''	80	41	31	14

Type of system	Quantity of silica sand (kg.)	Quantity of bags (pcs)
X 11/2'' DC	182	7
X 2'' DC	364	14
X 3'' DC	650	25
X 4'' DC	988	38

Max. operating pressure: 8 bar

Min. operating pressure: 2.5 bar (for efficient backwashing)

Connections: Flanges according to DIN2576 (other standards on request),

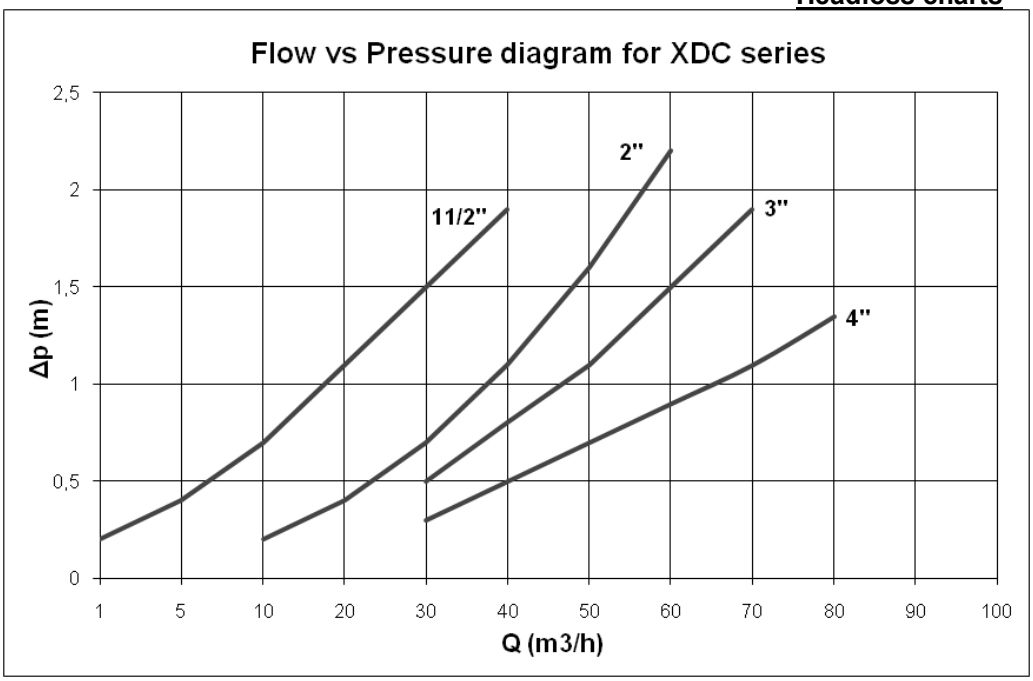
Threads according to DIN2999 (other standards on request).

Materials: Steel sheet according to DIN17100, longitudinally welded steel pipe according to DIN2458, DIN2440 (other standards on request)

Coating: Polyester electrostatic painting-oven baked (other type of coatings on request)

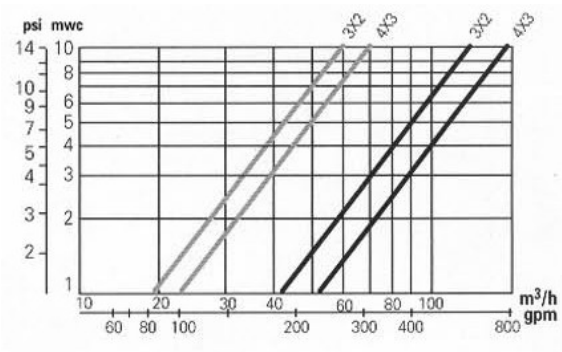
TECHNICAL FEATURES

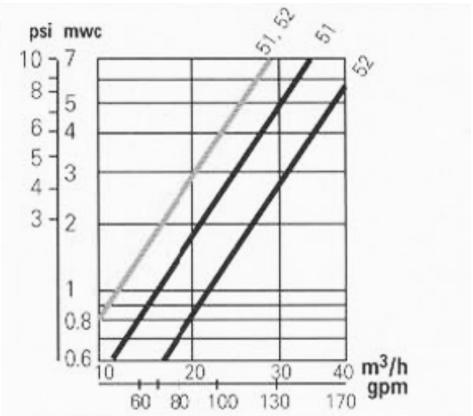
Headloss charts



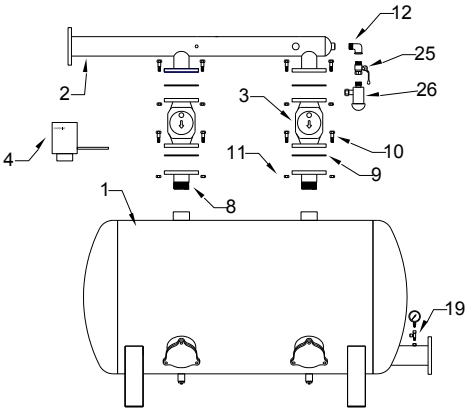
Note: All the measurements have been taken with media size 1.2-2.4mm, in clean water conditions.

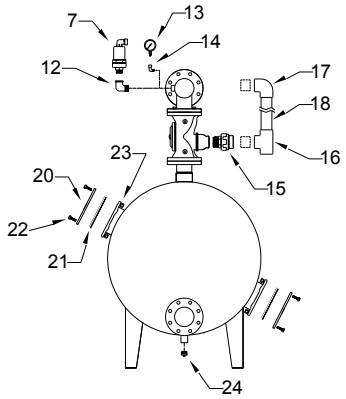
Backwashing valves

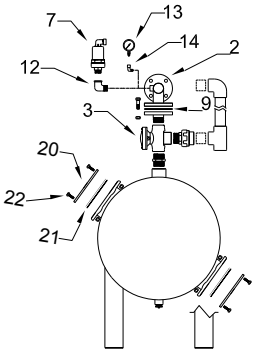


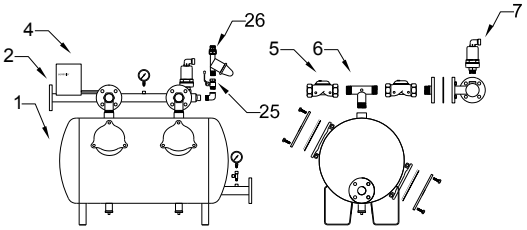


TECHNICAL FEATURES - XDC'' systems









Number	Description
1	Sand media filter dual chamber
2	Inlet collector pipe
3	3way backwashing valve
4	Two station controller with PD
5	Hydraulic valve 11/2''
6	Metal tee 11/2''
7	Air relief valve 1''
8	Metal flange male threaded 3''
9	Rubber flange
10	Bolt 5/8'' x 60
11	Nut 5/8''
12	Elbow 1'' M-F
13	Pressure gauge glycerin 0-10bar
14	Elbow 1/4'' M-F
15	Union male threaded Ø63-2'' pvc
16	Tee Ø63 pvc
17	Elbow Ø63 pvc
18	Drain pipe Ø63 pvc
19	Tee 1/4'' F-F-M
20	Lid of the filter
21	O' ring seal
22	Bolt M12 x 35
23	Nut M12 x 17
24	Drain plug
25	Ball valve
26	Plastic screen filter

Installation

Before start to install the system please advise very carefully the designs.

- It is recommended to install the filter in a flat surface and for better stability in a surface made of concrete.
- Install the metal flanges male threaded on the top sockets of the filters. In the 11/2'' install the metal tee 11/2''. In the 2'' screw the nipples 2''.
- On the metal flanges install the 3way valves using the appropriate gaskets and bolts. Be careful the arrow of the valves must sow direction to the filter. In the 11/2'' screw the hydraulic valves to the metal tees. In the 2'' screw the 3way valves on the nipples and after screw on them the 3way 2'' valves. Do not tight the bolts.
- Install the inlet collector to the 3way valves using the appropriate gaskets and bolts. In the 11/2'' first screw the metal flanges male threaded. Do not tight the bolts.
- It is proposed to install a butterfly valve or a pressure sustaining valve in case of low pressure downstream the system.
- Make the last modifications you want concerning the position of the system and after tight very well the bolts.
- Open the top lids of media filters and fill them with water. This allows you to observe any leakages to the system and also to fill the filters with silica sand without have any problem of damage in diffusers.
- Take care with the quantity of silica sand you will fill the filters.
- Be careful with the type of silica sand you will use because you must have the appropriate diffusers.
- If you will use 2 or 3 layers of silica sand the diffusers must have opening smaller or equal with the thinnest size of the silica sand.
- After filling the filters close very tight the lids and install the air relief valve to the filter.
- Install the plastic screen filter with the ball valve at the end of inlet collector. This filter is important for the protection of the automation.
- Install the metal base support of the controller and make the hydraulic and electric connections according to the relative designs.
- Install the appropriate fittings to connect the drain pipe.
- It is recommended to install at the end of the drain pipe a ball valve or a pressure sustaining valve (backflush restriction valve) In case of pressure problems and to ensure any losses of silica sand.
- The backflushed water should be discharged through an open pipe (to atmosphere) and not connected to any pressurized line.

Installation

Electric and hydraulic connections

- Before start the connections please advise very carefully the relative designs and the operation manual of the controller.
- The controller and the solenoid valves are assembled together in the metal base from our company.
- In case of not assembly please follow the designs.
- Make the electric connections of the solenoid valves according to the operation manual of the controller.
- Connect each solenoid valve to each backflush valve (P2, P3….)
- Connect the solenoid valves with hydraulic pressure from line P1.
- It is important to have screen filter to protect the automation from particles.
- From line P1 connect also the red tube of the Differential pressure gauge(15) the HP line (inlet pressure).
- Connect the black tube of the Differential pressure gauge(15) the LP line to port L1 (outlet pressure).
- When you make certain that make all the hydraulic and electric connections according to the designs, adjust the controller and the PD to the prices you want the system to work (pay attention to the manual of the controller).

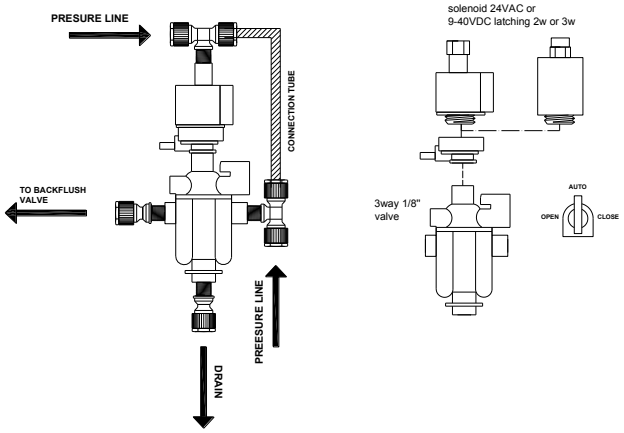
Recommended adjustment:

Pressure Difference: 0.7bar

Interval between cycles: 4 hours (or at least once a day)

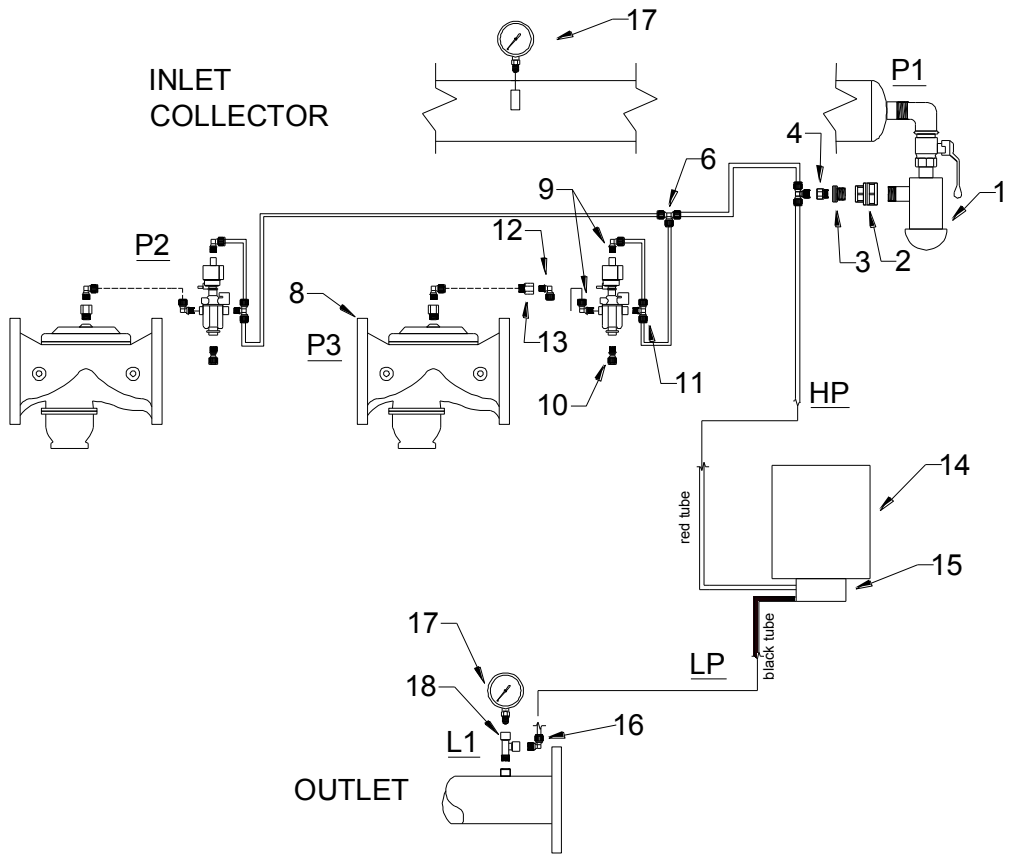
Flushing time per station: 60-90sec

- The controller might be operated with 220VAC supply and is connected with 24VAC solenoid valves or with 12VDC (different type of controller) and connected with 9-40VDC latching solenoids.



Installation

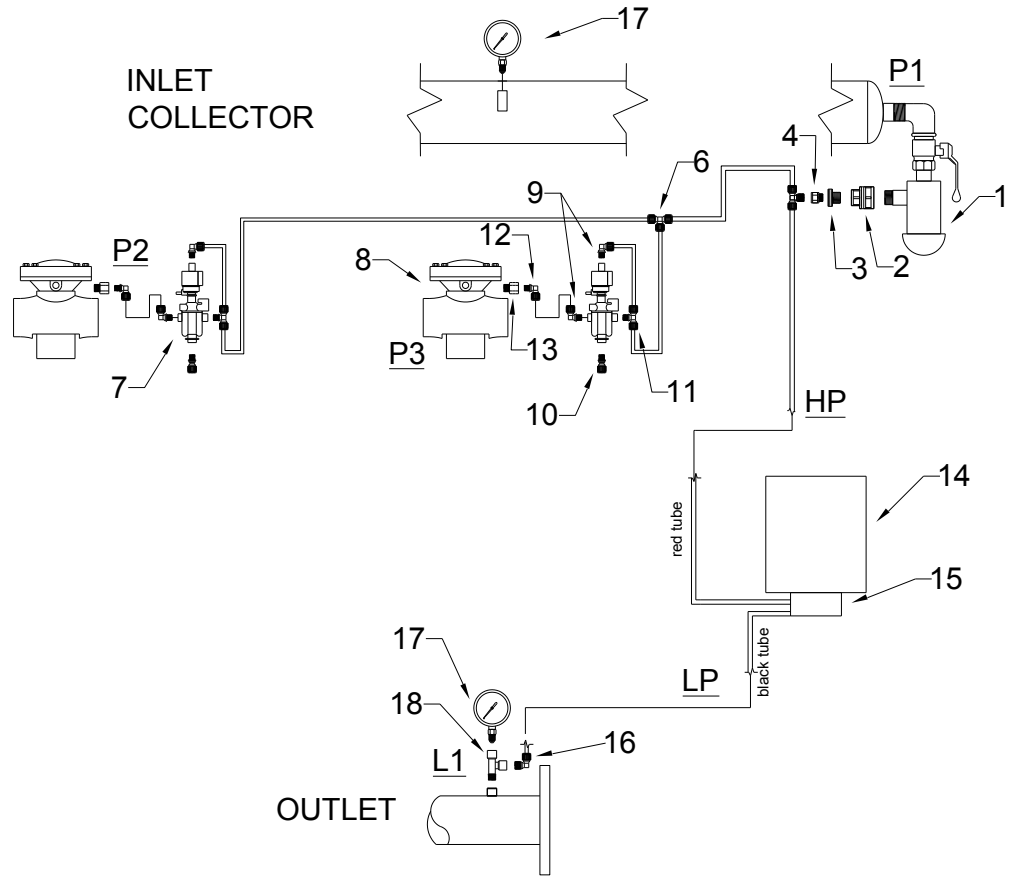
XDC3-4'' hydraulic design



1	Screen filter 1''-3/4'' (plastic)	**12**	Elbow Ø6x1/4''
2	Reducing socket 3/4''-1/2''	**13**	Nipple 1/4''F-1/4''M
3	Reducing socket 1/4''-1/2''	**14**	Controller
4	Nipple 1/4''F-1/4''M	**15**	Differential pressure gauge
5	Tee Ø6x1/4''XØ6	**16**	Elbow Ø6x1/4''
6	Tee Ø6	**17**	Pressure gauge
7	Solenoid valve	**18**	Tee 1/4''Mx1/4''Fx1/4''M
8	Backflush valve 3''x2''		
9	Elbow Ø6x1/8''		
10	Rakor Ø6x1/8''		
11	Tee Ø6x1/8''xØ6		

Installation

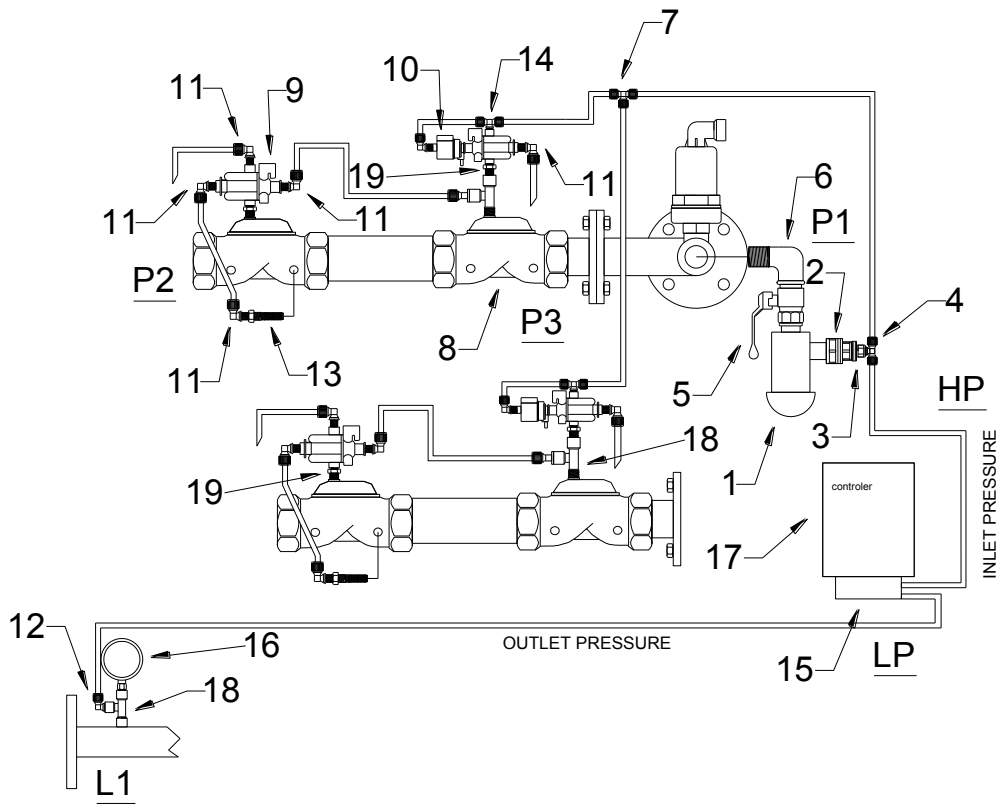
XDC2'' hydraulic design



1	Screen filter 1''-3/4'' (plastic)	**12**	Elbow Ø6x1/4''
2	Reducing socket 3/4''-1/2''	**13**	Nipple 1/4''F-1/4''M
3	Reducing socket 3/4''-1/2''	**14**	Controller
4	Nipple 1/4''F-1/4''M	**15**	Differential pressure gauge
5	Tee Ø6x1/4''XØ6	**16**	Elbow Ø6x1/4''
6	Tee Ø6	**17**	Pressure gauge
7	Solenoid valve	**18**	Tee 1/4''Mx1/4''Fx1/4''M
8	Backflush valve 2''x2''		
9	Elbow Ø6x1/8''		
10	Rakor Ø6x1/8''		
11	Tee Ø6x1/8''xØ6		

Installation

XDC11/2'' hydraulic design

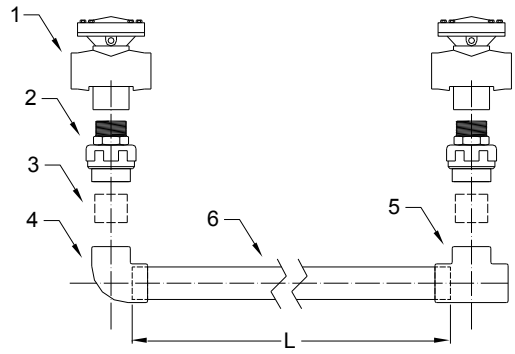


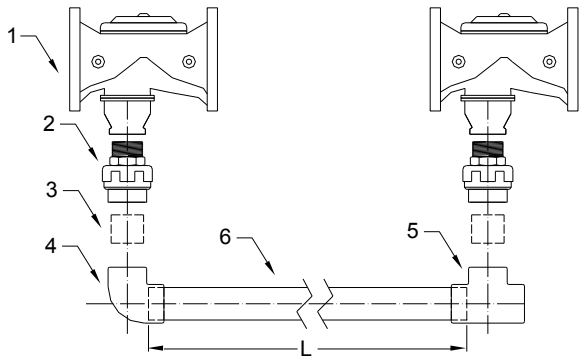
1	Screen filter 1''-3/4'' (plastic)
2	Reducing socket 3/4''-1/2''
3	Reducing socket 3/4''-1/2''
4	Tee Ø6x1/4''XØ6
5	Ball valve 1'' (M-F)
6	Elbow 1'' (M-F)
7	Tee Ø6
8	Hydraulic valve 11/2''
9	Hydraulic relay 1/8'' (galit)
10	Solenoid valve
11	Elbow Ø6 x 1/8''

12	Elbow Ø6x1/4''
13	Filter 1/8'' (finger)
14	Tee Ø6
15	Differential pressure gauge
16	Pressure gauge
17	Controller 2 station
18	Tee 1/4''Mx1/4''Fx1/4''M
19	Nipple 1/4''F-1/4''M

Installation

Drain parts and design

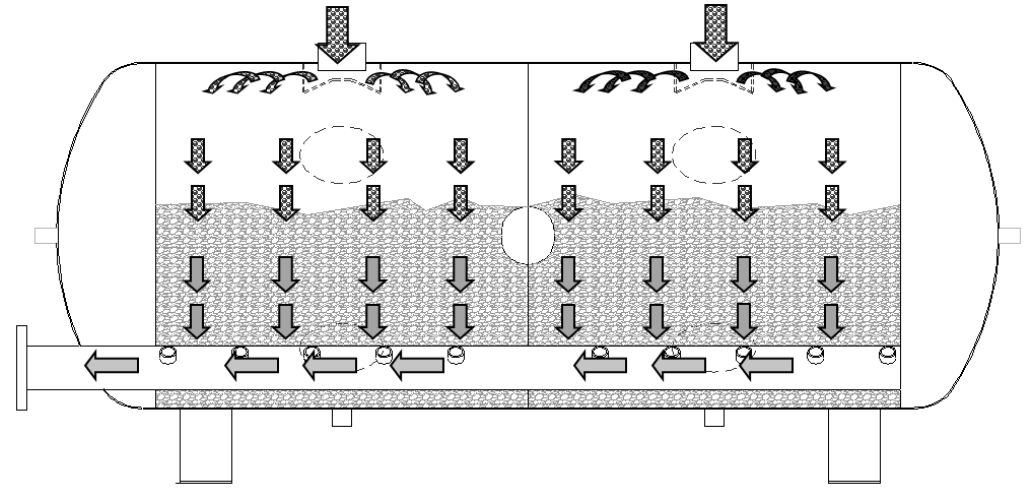


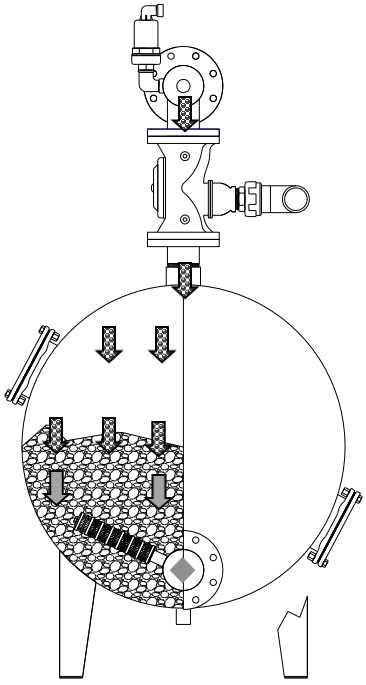


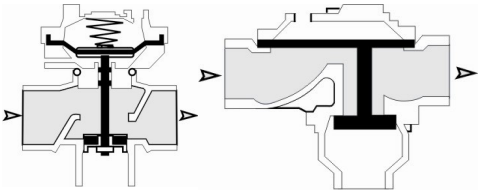
1	Backflush valve
2	Rakor PVC Ø63x2''
3	Connection PVC pipe Ø63
4	Elbow PVC Ø63
5	Tee PVC Ø63
6	Drain pipe PVC Ø63/6atm

Operation

Filtration







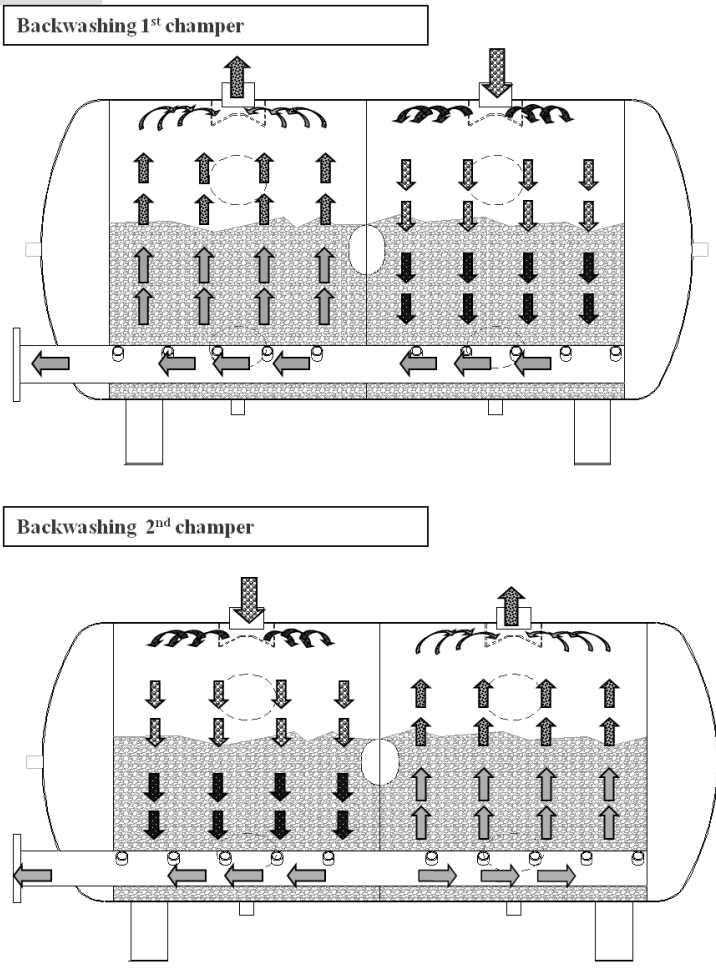
During filtration the water passes through the inlet collector, through the backflush valves and get into the chambers of sand media filter from the top of it.

The water is being cleaned as it penetrates into the bed of sand where the solids are trapped and discharged from the bottom of the filter. To avoid filter media (sand) being taken away, diffusers are fitted at the lower side of the filtration chambers.

Screen or disk filter is recommended to install downstream to the filter to retain any fine particles that may pass from the sand media filter.

Operation

Backflush



- During the backflush operation the filter is cleaning the chambers one by one. When the operation is activated by the controller or the PD or manually the system while is continuous to filtrate and supply water to the application and clean the chambers with reverse flow. This reverse flow is creating because the backflush valve of the filter is closing and gives passage to the water to pass through the filter out to the outlet. This movement of the water from the diffusers, inside the silica sand is freeing the accumulating debris and flush out from the top of the filter through the backflush valve into the drain pipe to a suitable location.

- As debris builds up in the media filter, a pressure loss will develop across the filter. The dirtier the filter becomes, the greater the pressure loss. When the pressure loss reaches a critical limit, the filter is dirty and in need of a backflush. Backflush controllers will sense the pressure loss through hydraulic connections and command a backflush sequence to begin when necessary.
A pressure sustaining valve is recommended to be installed to prevent the sand from being washed out with the dirty water. .
- It is recommended to have minimum pressure downstream the system 2-2.5 bar for efficient backflush.

Operation

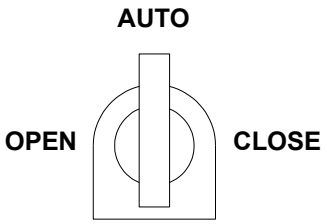
Backflush

Setting the controller and the pressure differential switch (PD)

- There are 2 types of controllers. In any case please advise their manuals.
- Three basic parameters you must adjust to the controller for the system.
- **The interval time.** This setting establishes a time schedule for backflushing to ensure that a backflush takes place if there is a failure in the pressure differential switch. Typical Periodic Flush times can be set anywhere from 2 to 4 hours depending on the water quality.
- **The flush time** setting determines the duration of the backflush for each filter. The recommended Flush Time setting is 60 to 90 seconds.
- **The Dwell Time** is the time period between the flushing of each chamber in a given back-flushing cycle. This is necessary to let the sand settle down. A recommended Dwell Time setting is 20 to 40 seconds.
- The DP switch either is embedded to the controller either is separate has the same adjustments.
- The DP in the backflush controller reads the current pressure loss and has dip switches to adjust the set- point for backflush cycle initiation.
- The DP has an adjustable setting from 0.1 to 2 bar (or 2-30psi).
- The pressure differential is the combined headloss through the filter and the valve when the sand is clean. With the filters clean and in filtration mode, read the current pressure loss. This is the standard pressure loss for clean filters, usually 0.2 to 0.3 bar.
- To establish a backflush set point pressure, add 0.5 to 0.7 bar to the standard pressure loss and set the dip switches to this set point. The filter system will now enter into a backflush cycle any time this pressure loss set point is reached.
- In case of external DP (like optical) connect it and adjust it following its instructions.

Manual Backflush

- The controller has an override bottom which gives you the choice of making a manual backflush to the system. When you push this bottom (or turn) the cycle of backflush begins to run.
- A second choice of manual backflush is through the solenoid valves. Its solenoid valve has behind it a rotary knob. If you turn it 90^{o} on your left (open or 2 position) this activates the solenoid and puts the valve/media filter into a backflush mode. Maintain the backflush until the water becomes clear. Return the knob to the auto position.



Operation

Start up

- Make sure that all connections (flanges or threads) are tight. Secure the top lid of the media filter by tighten the bolts evenly but do not over tighten as it may damage the paint or the construction of the lid.
- Open the main valve supplying water to the filters and start the pump. Let the downstream pressure gradually build up to 2-2.5 bar and perform a manual flush to the filter chamber one at a time for at least 2 minutes.
- Check for any leaks and tighten the bolts of cover gaskets a little more if necessary.
- Check the backflush water by letting the water flow against your hand and feel if the water contains sand. New sand has contaminants and fines. After a few backflush cycles, it will be removed and the water will become clean.
- Proper adjustment of the backflush restriction valve will allow for proper backflush flow with only a trace of media being lost through the backflush. A small loss of media is considered optimum. To check if sand is being washed out with the backflush water, place a screen over the outlet of the backflush manifold and examine the water for sand. Another method is cupping your hand under the backflush water as it exits the backflush manifold and feeling for sand grittiness.
- Adjust the backflush restriction valve. Repeat this adjustment at normal system operation and perform an automatic flush by pushing the manual start button.
- Solenoids do click when an electric signal is sent and the metal screw on top of the coil becomes magnetic (test with a screwdriver – it sticks). Verify the activation of the flush valves.
- The ball valve of the hydraulic assembly before the plastic screen filter must be open. Check the setting on the PD switch.

Recommendations.

- When pumping from a ditch or reservoir, the pump inlet should be 3 to 4 feet below the surface and a minimum of 2.5 feet from the bottom to prevent intake of extra dirt.
- Downstream pressure of 2-2.5 bar should be maintained for proper backflushing of a filter. Use a Pressure Sustaining Normally Open valve for enhanced backflush.
- Different operating pressures for different block sizes may cause loss of sand. Use a flow control valve in the backflush line.
- CAUTION: Do not tighten or open covers during operation or under pressure.
- Install to the system a quick pressure relief valve to ensure any damages of water hammers.
- If you have attitude difference between the system and the application install a check valve downstream the system to ensure it from backflow.
- Pay attention to the maximum operating pressure. The maximum pressure for the system is 8bar. Install a pressure relief valve to ensure the pressure.
- Dismantle the screen filters periodically in order to clean the element. Close the pump (or a valve if you have installed) open the cover and clean thoroughly the element.

Maintenance

- Check the plastic screen filter for the automation every few weeks. Close the ball valve and clean the element.

- At the end of the season drain all the water of the system. Open the upper lids of the media filters so you can dry the silica sand. It is recommended to get out the silica sand form the filters dry it to the sun and store it in a dry place.

- The silica sand media is usually changed every 3 to 5 years depending on how much the system operates. Close all the valves, open the top service lid and the bottom lids. Start the pump, drain and flush all the sand from the tank. Do not use sharp tools to help remove the sand – diffusers can be damaged. Rinse and clean the inside of the tank. Check the diffusers and reattach the side covers. Add the correct amount of sand media, open the valves for normal operation and readjust the backflush restriction valve in the drain manifold line. See system adjustments for further instructions.
- Any damage to the protective coating of the filter must be repaired as soon as possible. Prior to the application of the protective paint, thoroughly clean the damaged spot with a wire brush.
- At the end of the irrigation season, initiate a backflush cycle, at a minimum of 2-2.5bar, to ensure a clean sand bed during the off season. Also clean the elements of the screen filters of the system.

Troubleshooting

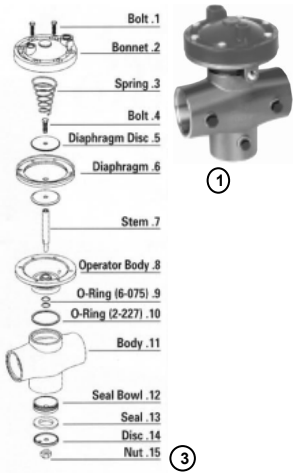
SYMPTOM	POSSIBLE CAUSE	SOLUTION
One of the champers don't back-flush	Controller output problem	Check the controller output with a multi tester.
	Solenoid wiring is defective	Use ohmmeter to verify that wiring is intact. Attempt to manually activate the solenoid with the knob on the base
	The rotary knob of solenoid valve in wrong position	Check the knob and turn it to its vertical position ''auto''
	3way valve clogged by a big object	Open the lid of the valve and check inside.
	Diaphragm of the 3way valve damaged	Open the lid of the valve and check the diaphragm.
	Solenoids clogged or damaged	Open solenoids and inspect internal ports for evidence of clogging. Open carefully to avoid losing the internal spring-loaded plunger.
Filter differential increases rapidly during operation, especially at start -up	Excessive flow rate	During system start-up, throttle downstream flow to the designed flow rate. Use a manual valve or pump control/ sustaining valve.
	Unusual concentration of contaminants	Check water source quality.
All the chambers of the filter will not backflush	Controller output problem	Check that the controller is on and programmed correctly. Attempt to manually actuate the solenoid with the clock. The solenoids should emit a clicking noise when actuated.
	Insufficient downstream pressure for backflush	Use the manual knob of the solenoid to backflush one tank. Note the downstream pressure reading. If the pressure falls below 2 bar, it may be necessary to throttle the field valves to build up sufficient backflush pressure.
	Hydraulic command system failure	Check to be sure the isolation valve is in the "on" position. Remove one of the hydraulic tubes leading to the solenoids and verify that pressurized water is available. Inspect the hydraulic command filter for contamination.
Filter differential remains high after backflush	Gauge error	Check gauge differential on manifolds against the differential gauge in the controller. If there is a discrepancy, check readings with a new gauge.
	Insufficient backflush pressure	Verify that the downstream pressure during backflush is at least 1.5 bar. If it is not, it may be necessary to throttle a valve downstream of the filter station to develop sufficient backflush pressure.
	Insufficient backflush flow	Check the Backflush Restriction Valve setting. Adjust according to the procedures outlined in the System Adjustments.
	Excessive contamination of media	Open the access cover and inspect the media bed after a backflush. Verify that the sand level is correct and that there is not an excessive amount of debris in the sand. Verify that the backflush manifold line meets the size requirements outlined in the Flush Manifold Sizing and Assembly section.

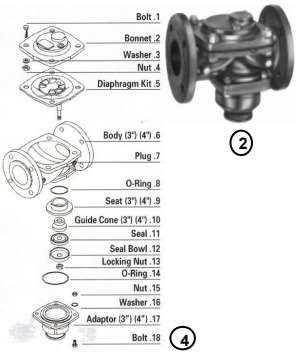
Troubleshooting

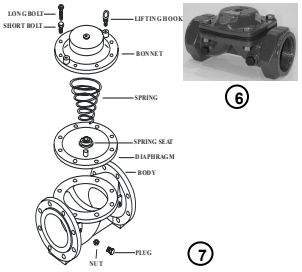
SYMPTOM	POSSIBLE CAUSE	SOLUTION
Water flushing out through drainage	Low pressure.	Minimum pressure is 2-2.5bar. Install a pressure sustaining valve downstream the system.
	Valve blocked by a strange object	Open the lid of the valve and check inside
	Wrongly assembled latching solenoids	Reassemble the solenoid as the instructions.
Losses of silica sand during backwashing	Flow is to high.	Decrease the flow. Install a ball valve at the drain pipe and throttle till the point you don't have losses or install a pressure sustaining valve.

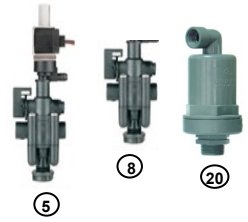
Spare parts

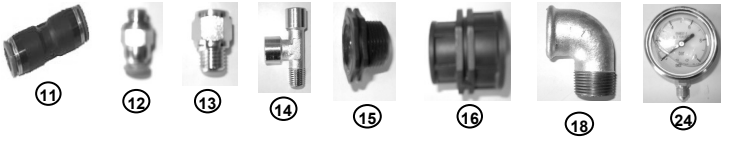
Item No.	Description	Part number
1	3way valve 2''x2''(for X2''DC)	02-04-108
2	3way valve 3''x2''(for X3''DC & X4''DC)	02-04-105
3	2" Backflush Valve Diaphragm Assembly with O-Rings	Contact with the company
4	3" Backflush Valve Diaphragm Assembly with O-Rings	Contact with the company
5	Solenoid valve 24VAC	02-07-000
	Solenoid valve 9-40VDC(2wire) latching	02-07-012
	Solenoid valve 9-40VDC(3wire) latching	02-07-023
6	Hydraulic valve 11/2" (for X11/2"DC)	02-04-101
7	11/2" hydraulic valve diaphragm assembly with O-Rings	Contact with the company
8	Hydraulic relay 1/8'' (Galit)	02-07-013
9	Tee Ø6x1/4''	02-05-049
10	Tee Ø6	02-05-013
11	Connector Ø6	02-05-170
12	Rakor Ø6x1/8''	02-05-031
13	Nipple 1/4''Mx1/4''F	02-05-108
14	Tee 1/4''Mx1/4''Fx1/4''F	02-05-053
15	Reducing nipple 1/2''x1/4''	02-05-829
16	Reducing nipple 3/4''x1/2''	02-05-117
17	Plastic filter 1''-3/4''	05-00-036
18	Elbow 1'' M-F	02-04-007
19	Nipple 2''	02-05-153
20	Air relief valve 1'' (kinetic)	05-20-002
21	Elbow Ø6x1/4''	02-05-006
22	Elbow Ø6x1/8''	02-05-008
23	Tee Ø6x1/8''	02-05-052
24	Pressure gauge (glycerin)	06-02-001
25	6mm Control tubing	02-07-209











Spare parts

Item No.	Description	Part number
26	Sand media filter X11/2''-20'' DC	05-08-155
	Sand media filter X2''-24'' DC	05-08-206
	Sand media filter X3''-36'' DC	05-08-307
	Sand media filter X4''-36'' DC	05-08-451
27	Lid X	02-01-062
28	Lid X seal	02-02-030
29	Tee 11/2'' (for X11/2''DC)	02-05-054
30	Controller 2 station & DP (AC)	02-07-170
	Controller 2 station & DP (DC-2w)	02-07-177
31	Controller 2 station (AC) under request	02-07-174
	Controller 2 station (DC-3w) under request	02-07-181
32	Diffuser L113 x 3/4'' (X11/2''DC&X2''DC)	02-03-113
	Diffuser L237 x 3/4'' (for X3''DC)	02-03-114
	Diffuser L268 x 3/4'' (for X4''DC)	02-03-115
33	Digital differential pressure gauge (UR)	06-02-008
34	Optical analogical differential pressure gauge (under request)	06-02-006
35	Inlet collector (for X11/2''DC)	02-05-448
	Inlet collector (for X2''DC)	02-09-000
	Inlet collector (for X3''DC)	02-05-464
	Inlet collector (for X4''DC)	02-05-465
36	Rakor PVC Ø63x2''	02-05-208
37	Tee PVC Ø63	02-05-062
38	Elbow 90^{o} PVC Ø63	02-05-012

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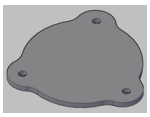
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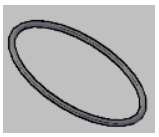
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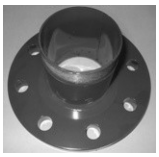
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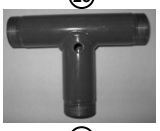
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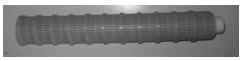
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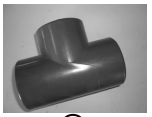
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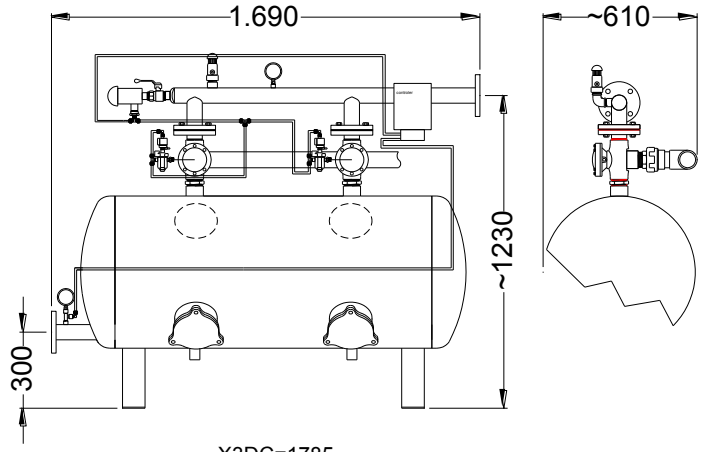
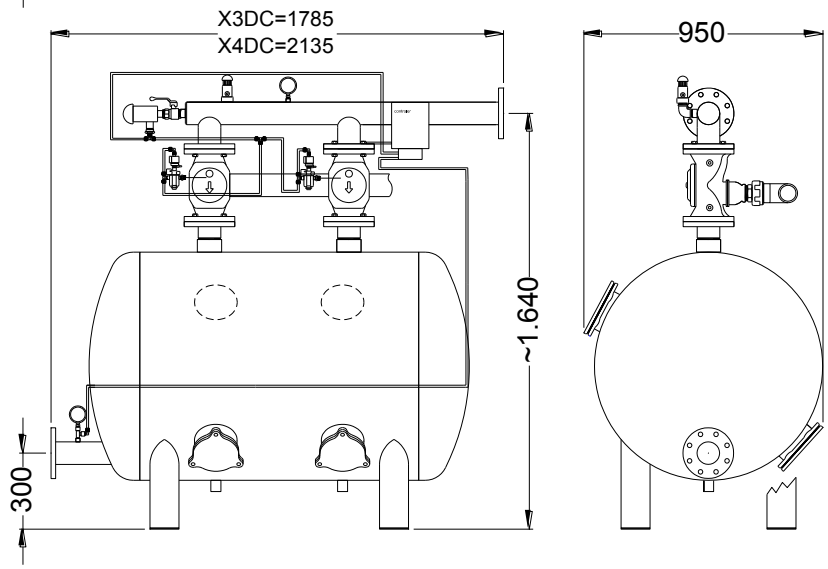
Dimensions

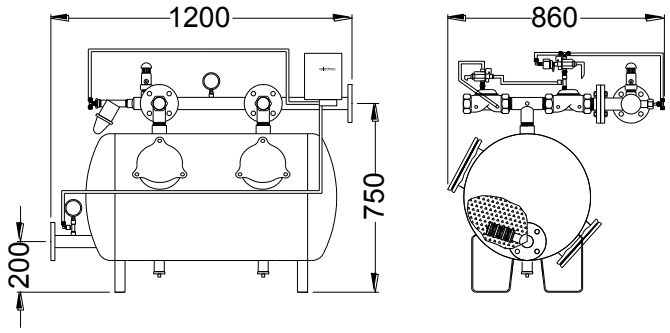
X2''DC



X3''-4''DC



X11/2''DC



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DROP
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