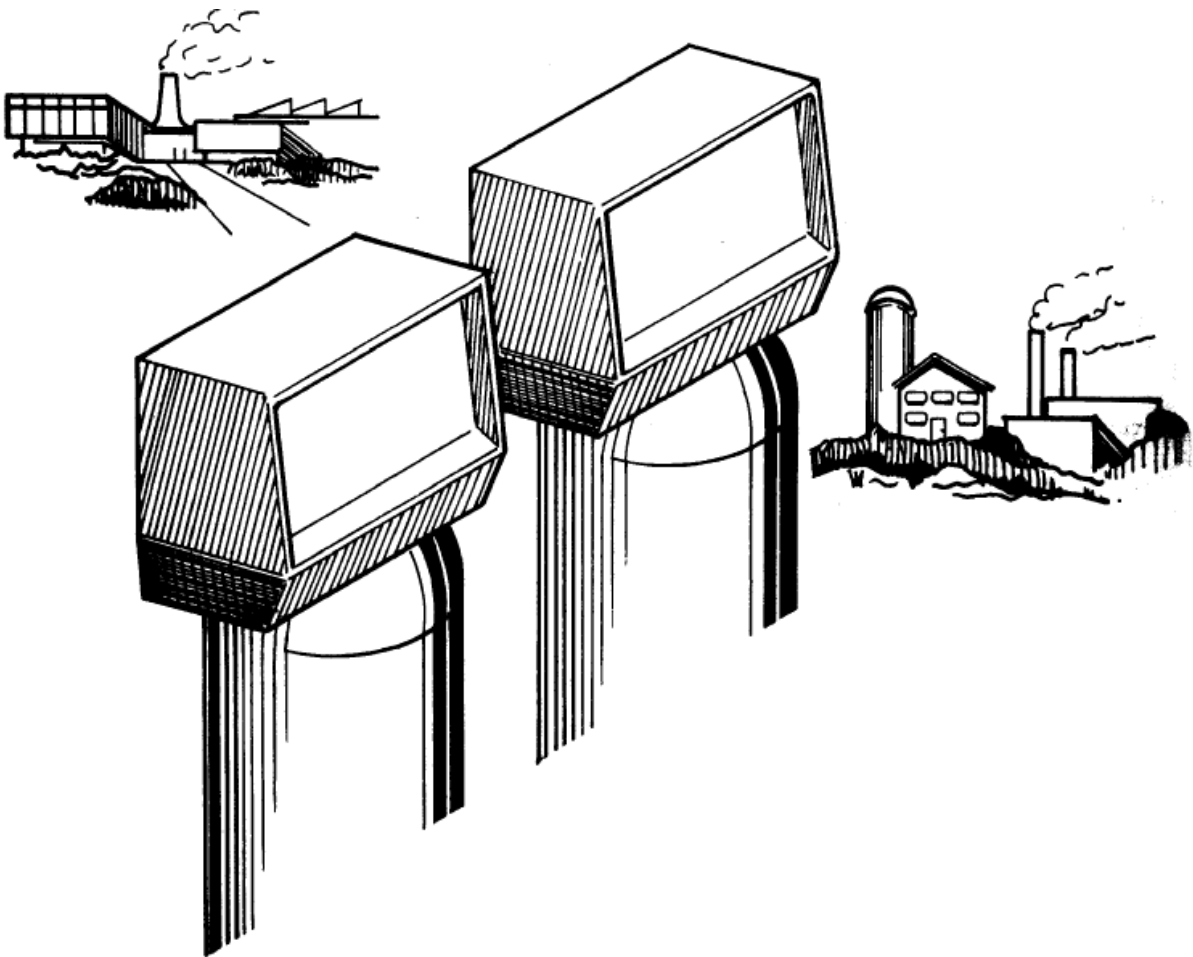


OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Automatic softening filter

SYSTEM FVD 602

Manual



Description

Application

HOH's automatic softening filter type FVD first of all is intended for installation at industrial plants, municipal waterworks, residential areas etc. which make high demands for efficient, reliable and economical softening.

In general

HOH's automatic softening filter type FVD is used in systems where, for different reasons, there is a need for softened water.

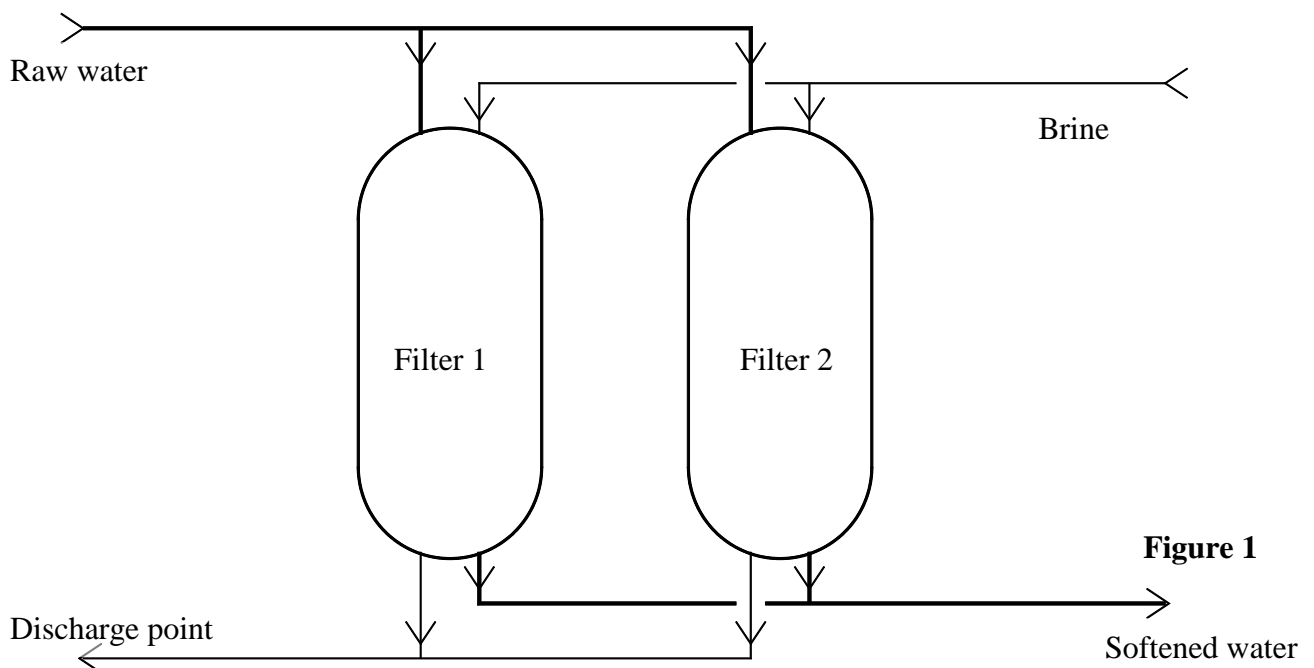
The plant is built of two filter tanks which operate alternately. Dependent on the raw water quality and the amount, a change of filters will be made by the water meter placed in the outlet product water line which mechanically transfers the measured values to a program inside the control unit of the plant.

When a pre-adjusted amount of water has passed filter 1, which is in operating position, filter 2 automatically changes to operating position. The outgoing filter, filter 1, is immediately regenerated. When regeneration of filter 1 is completed, the filter will be in standby position and will be reconnected at next filter change.

The filter tanks are produced of glasfibre reinforced polyester for maximum working pressure of 0.8 MPa (8 bar), and the multiport valve and water meter are produced of bronze.

Salt tanks are produced of Polyethylene and equipped with cover.

Basic circuit flow is indicated by figure 1.



Installation Guide

Conditions

To ensure that the regeneration automatics function properly within the working range of the filters, an inlet water pressure of minimum 0.4 MPa (4 bar) is required.

The inlet water pressure should not exceed 0.8 MPa (8 bar). If it does, you must install a pressure reduction valve in the inlet pipeline.

Temperature of incoming water must not exceed + 40 °C. Furthermore, the plant shall naturally be installed in a frost-free environment.

There may be many reasons why the water contains iron, but it usually occurs in connection with too low pH value. By too high iron content the softening plant may suffer damage which means that the ion exchange resin in the filter tank become ineffective and finally cease to function. Manganese-containing water cause similar problems.

You should always consult the filter supplier about these problems.

Always place the softening plant near a floor drain.

Included Components

Prior to installation – check that following components have been supplied:

FVD 602

- 2 nos. Filter with multiport valve and flow meter
- 1 no. Connecting hose for connection of above-mentioned filter (C)
- 1 no. Salt tank with suction hose/filler hose
- 1 no. Transformer
- 1 no. Instruction
- 1 no. Discharge hose
- 1 no. Test equipment for residual hardness in outgoing clean water
- Ion exchange resin

Check that correct amounts of resin have been supplied, see Technical specification page 16.

Installation

Place the filter with valve in the intended place.

Fill in resin

Unscrew the multiport valve. The distribution pipe will follow along and shall be loosened by pulling (can be retightened with an O-ring).

Put the pipe back into the tank. Protect the pipe with a sort of seal (e.g. insulating tape).

Fill in resin – a funnel facilitates the filling. Clean the thread of the tank and the distribution pipe and remove the insulation on the pipe (insulation tape or equal).

Fill in water using an external hose in order to eliminate water hammering by start up. Refit the multiport valve on the distribution pipe. Check that the distribution pipe is centered in the tank and screw down the multiport valve on the tank.

Install the salt suction/filling hose between valve and salt tank.

Connect discharge.

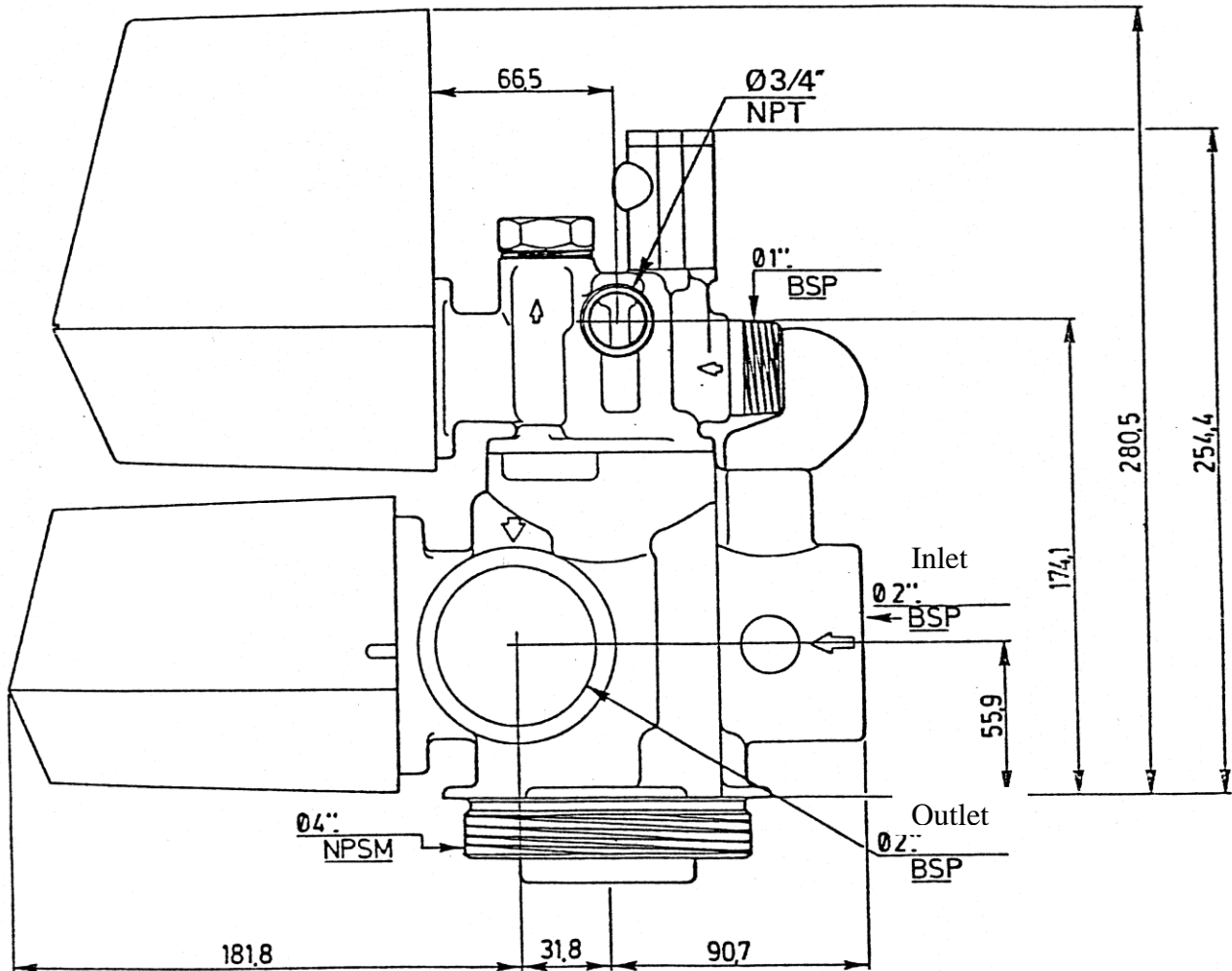
Then connect the filters on the water meter with the necessary closing valves for incoming and outgoing lines.



Spilt resin makes the floor slippery

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Dimensions – Multiport valve



Commissioning

Description of multiport valve

Under the hood of the multiport valve there are control units with preset values. All adjustment and control is done on the program work 3240 which is located on the water meter. This sends signals to the individual filters and decides which shall be in operation and which shall be regenerated.

FVD 602 is equipped with 2 program works type 3230 placed in the control unit on both filters. Moreover there is a program work type 3240 which is placed in the water meter. Program work 3240 starts regeneration of one filter as soon as the pre-adjusted water amount has passed the filter.

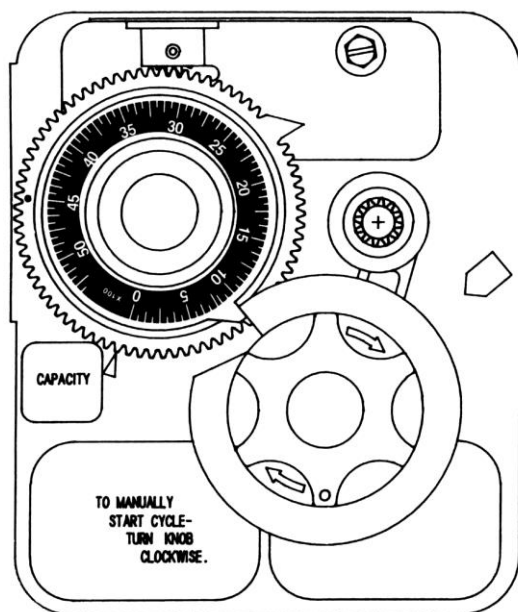


Figure 4

In the water meter cabinet

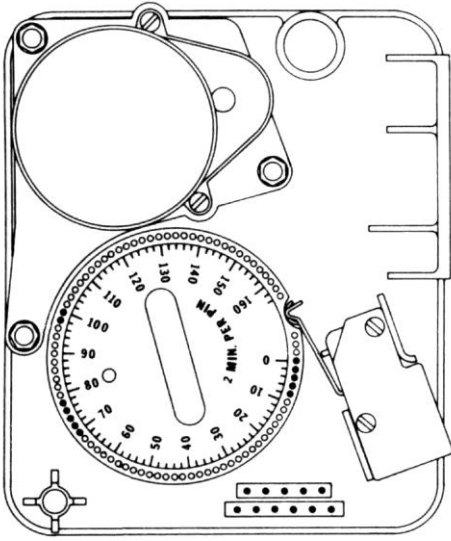
The capacity is adjusted on the volume disc, i.e. m^3 water between regenerations.

Lift and turn the outer disc to the correct quantity m^3 as stated at the white dot on the bottom disc.

By means of the knob for manual regeneration you may start the regeneration process manually.

Turn clockwise until you hear a click. Then the process starts and the knob automatically returns to operating position when the process is finished.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602



Control work 3230 placed in the control unit of the respective filters.

At the inside of the program work you find the program disc which regulates time in the regeneration sequence. See figure 5.

To get to the program disc you grab the right bottom corner of the program work and pull. The program work is sitting on hinges on the left side.

If you intend to reprogram the times you must loosen the program disc by pressing the dowels towards the middle and lift out the disc. Be careful not to damage the contact arms of the micro switch.

NOTE! The pin is fixed.

Use a pair of tongs and instrument hammer.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Commissioning

Clean and rinse the connecting lines with clean water.

Open any external bypass valve so that the raw water can be led out through the discharge line. Then open the valves for incoming and outgoing connection lines. Open a tap place near the plant and let it be flushed.

Close the connecting lines again.

Check that the filter is in operating position, see figure 6 page 10.

If not, connect the electric cable to the wall outlet. Turn the disc for "manual regeneration" slowly clockwise until the valve motor starts. Let the valve motor finish before making next turn.

Continue in the same way until the cylinder unit stands as indicated by figure 6 page 10.

Cut off the power to the control unit. Reset the automatics at "operating" position.

Connect the electric cables to the wall outlet. Turn the disc slowly clockwise until the valve motor(s) start and remain in next position: backwash. Check that the cylinder units are positioned as figure 7 page 11 indicates.

Cut off power to the control units.

Shut off the water to discharge line on the softening filters with a possible external bypass valve.

Slowly open the valve for inlet water. Now the filter tank will be filled up with water. Proceed with this until the discharge flow seems clear and without air bubbles. Then close the valve.

Connect current to the control valve and turn the disc gradually until the cylinder units are in position "brine fill". See figure 10 page 12. Immediately open the connection valve for incoming water and let the voltage remain connected.

The salt tank will now be filled with water. Let the automatic program finish the filling. Measure the amount of water. Dependent on type of filter the salt tank must be filled with an amount of water that corresponds fairly to the calculated pre-setting. Adjust the setting in accordance with chapter "Adjustment of program work" if the amount differs considerably from the setting.

Repeat procedure on the other filter.

Fill salt (tablets) intended for softening filter into the salt tank. There should never be less than 10 cm of salt tablets in the tank. Gradually, as the water surface becomes visible, you must refill with salt.

Connect the drive wire between the water meter and the counter.

(Fit the hood on the control unit)

Carefully open the connection valve for outlet softened water. (The unit shall now have voltage continuously.)

The plant is now in operation. The filter supplies softened water until the amount set on the volume disc is obtained and then regeneration of the filter is started at the same time as the other filter takes over the supply.

After regeneration the newly regenerated filter goes in standby position and does not start again until at next filter change.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602



Under the hood of the multiport valve there are control units. Do not touch these after commissioning!

Adjustment of program work

Softening filter type is default programmed and equipped with commonly occurring conditions. However, local conditions may sometimes deviate considerably from the standard conditions, and then it is necessary to carry out an adjustment of the programme on site.

Capacity

The capacity (regeneration interval) of the softening filter is principally dependent on the total hardness (°dH) of the raw water.

As a standard the filters are adjusted at a salt consumption of approx. 120 gram NaCl per litre ion exchange resin. This amount gives the most economical index capacity. If the salt amount is doubled, the capacity will only be increased by approx. 25%.

Regeneration program

When the water amount set on the volume disc has passed the plant, the outgoing filter will be regenerated simultaneously as a shift to filter in stand-by.

The regeneration sequence is divided into different phases adjusted in duration so that the most efficient and economical charge of the filter is obtained.

The filters are supplied with regeneration program acc. to table 1.

Table 1

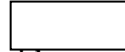
Regeneration phase	Type FVD 602
Backwash number of <u>pins</u> /minutes	3/6
Brine & Rinse number of <u>holes</u> /minutes	40/80
Rapid rinse number of <u>pins</u> /minutes	5/10
Brinefill number of <u>holes</u> /minutes	7/14
Completion number of <u>pins</u> /minutes	2/4

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

The adjustment is done on the program disc (see figure 5). If required by local conditions, the re-generation phases may be prolonged or reduced as necessary. Each pin or hole corresponds to 2 minutes.

The program disc, e.g. FVD 602, is designed as follows:

Backwash starts at 0 min. with	3 pins = 6 minutes
Then there is Brine + Rinse with	40 holes = 80 minutes
Followed by Rapid Rinse with	5 pins = 10 minutes
Finally Brinefill with	7 holes = 14 minutes
Always terminate with	2 pins



NOTE! It is important to always end the final phase with two pins.

The program disc continues to rotate until the contact arm of the inner micro switch falls into the track of the disc.

Adjustments of program after commissioning:

Backwash min.
Brinefill min.
Rapid rinse min.
Refilling of brine tank min.

Service

Water is led in through the resin where it is softened. The softened water is then led back via the distribution pipe to outlet.

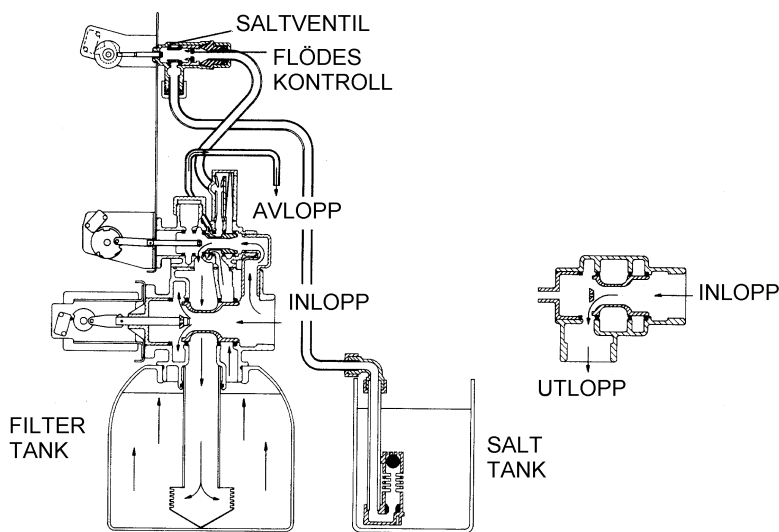


Figure 6

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Backwash means that the water flow inside the filter tank is reversed and flows from the bottom through the resin and out through the top of the tank to outlet. The purpose of this is to loosen the resin mass and flush out possible deposits. The flow is adjusted by means of a flow control in the discharge line, so that the flow velocity becomes heavy enough to lift (expand) the mass by approx. 50 %.

See figure below.

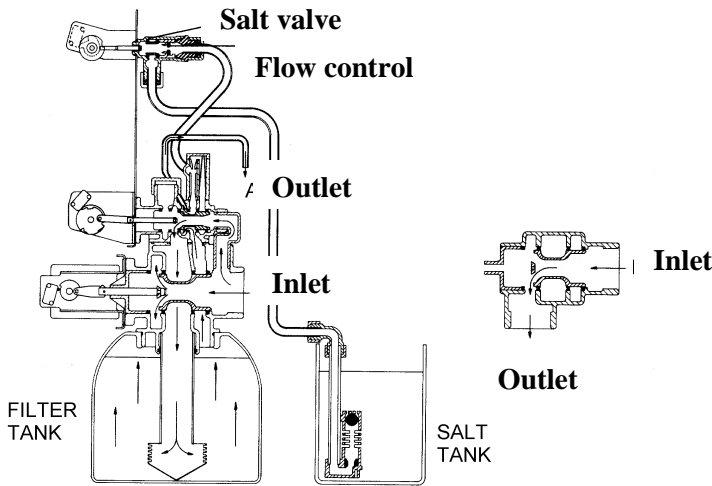


Figure 7

Brine & Rinse implies that the brine is led in from the top, through the resin out out through the bottom distributor to outlet. The brine is sucked in by means of an ejector which is adjusted to add the calculated amount in less than 20 minutes. Then the rinse phase is resumed which means that a water amount corresponding to approx. one filling of resin slowly flows through the resin. This is done to give the resin a longer contact time with the salt and with that a better efficiency. See figure below.

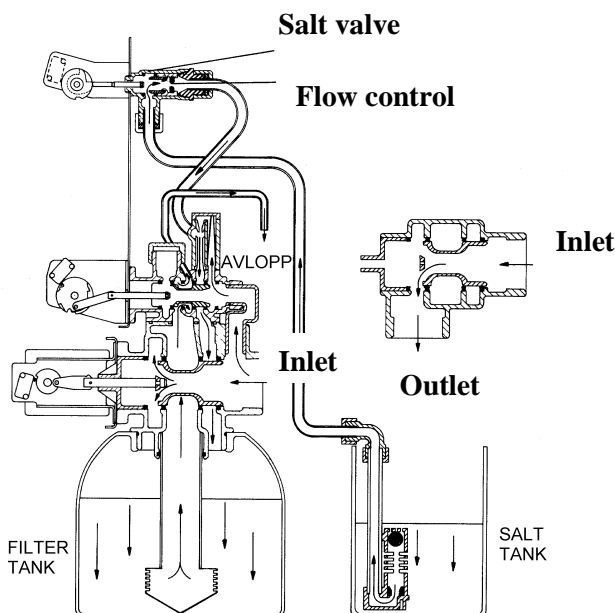


Figure 8

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Rapid rinse is a rinsing of the resin mass for surplus salt. The water is led in from the top, runs through the resin and out through the distribution pipe to outlet. The rapid rinse time is adapted so that approx. 2 fillings of water have passed the resin after a completed cycle. In case the outlet water still contains residue salt after a finished rapid rinse, the time shall be prolonged correspondingly. See figure below.

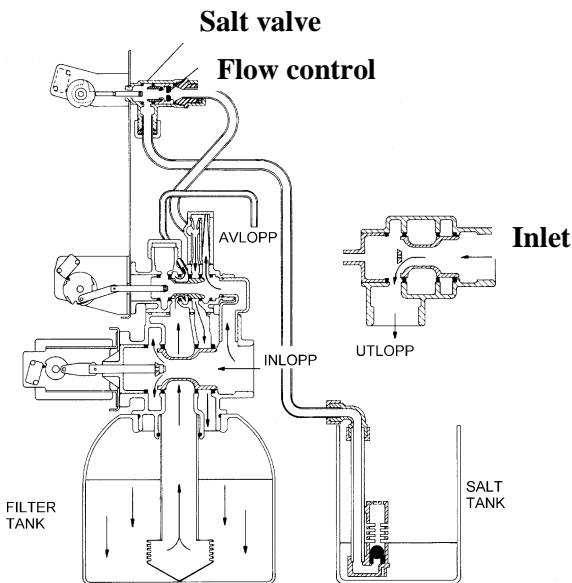


Figure 9

Brinefill means that the salt tank is filled up with the amount of water that corresponds to the amount of brine for the filter in question. A flow control in the line sees to it that the water flow is relatively insensitive towards pressure variations and thus the amount of water can easily be determined by means of time adjustment of the filling in phase. See figure below.

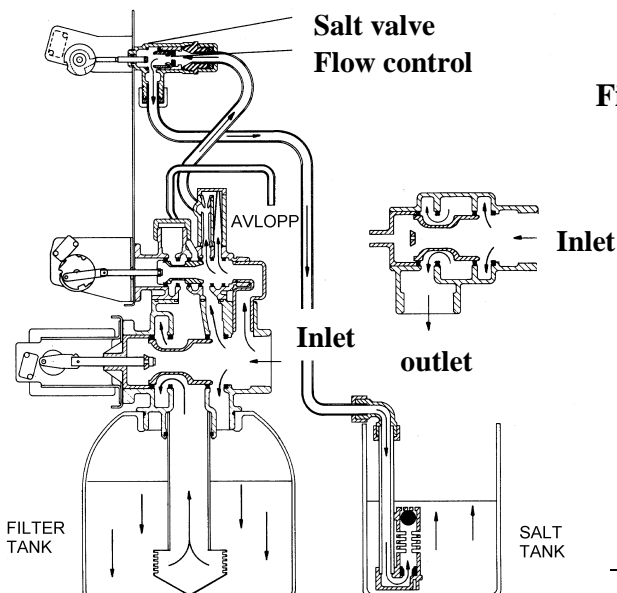


Figure 10

Regeneration frequency

Depending on the hardness of the raw water, the regeneration frequency must be set as shown in below example:

Preconditions:

Filter type: FVD-602

Raw water hardness: 9.3°dH

On page 16 "Technical specification " you will see that FVD-602 has an index capacity of 1920 m³ at 1 °dH. This means that the index capacity in this example will be:

$$\frac{1920}{9.3} = 206 \text{ m}^3$$

In order for the regeneration to take place at the right time, the programme must be adjusted at 206 m³ in accordance with the result in above-mentioned example.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Periodic Control

Softening filter type FVD requires a minimum of maintenance. In order to guarantee an unproblematic operation, however, certain inspections and controls should be made.

Every week:

- Check the salt tank. Fill in salt tablets when necessary.
- Take water samples of incoming and outgoing water. The tests shall be made with enclosed test equipment in accordance with separate instruction.
- Write down the values in the journal.

Every month:

- Supervise a regeneration sequence.
- Check times and flow according to set programming.
- Taste the water at the end of the rapid rinse phase. The water must not taste salty. Check that the salt tank takes in water again to the correct level.

Every 6 months:

- Empty and clean the salt tank.
- Dismount and clean salt valve and overflow protection.
- Clean strainer and flow control in the brine line (placed in the salt cylinder in the multiport valve).
- Clean the ejector unit and strainer (placed under the plastic cover in the multiport valve).
- Clean and wipe the filter tank and control unit.
- Lubricate the valve spindles with silicone spray.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

Trouble Shooting

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
1. The filter does not regenerate	no voltage to the control unit.	Check fuses, cable connections, plug.
	The counter is not working.	Check water meter and wire and that the gears of the works interact. If the volume disc has reached final position, reset.
2. Hard water	Bypass valve open.	Close the valve.
	No/too little salt in the salt tank.	Fil lup with salt tablets.
	Ejector clogged.	Dismount and clean ejector and strainer.
	Too little brine.	Check refill valve. Dismount and clean flow control.
	Leak in the brine hose.	Check and retighten hose connections.
3. Too high level in the brine tank.	Internal leak in the multiport valve.	Dismount valve. Clean and replace gaskets and seals.
	Refill time set incorrectly	Check programme disc.
	Brine line clogged.	Dismount and clean ejector, strainer, overflow protection or salt valve.
4. Ion exchange resin in outlet line.	Flow control in discharge line clogged.	Demonter og rengør flowkontrollen.
	Top or bottom distributor damaged and backwash flow too high, or there is air in the system.	Dismount the filter. Replace the top distributor. Check flow control in outlet line. Examine the cause for air in the system.
5. Regeneration does not terminate.	Micro switch broken.	Replace defective micro switch.
6. Continous flow to outlet.	Control unit is not in position.	Reset volume disc. Reset manually to operating position.
	Filth in the multiport valve.	Operate the valve manually for a couple of cycles and see if that helps. If not, dismount the valve and clean it.
	Internal leak in the multiport valve.	Dismount the multiport valve. Replace seals and gaskets.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

<h2 style="margin: 0;">Technical specification</h2>

Technical Data

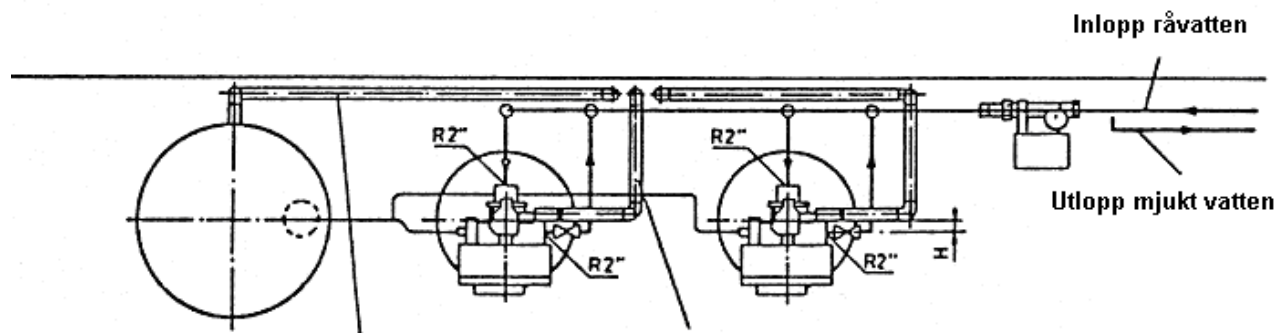
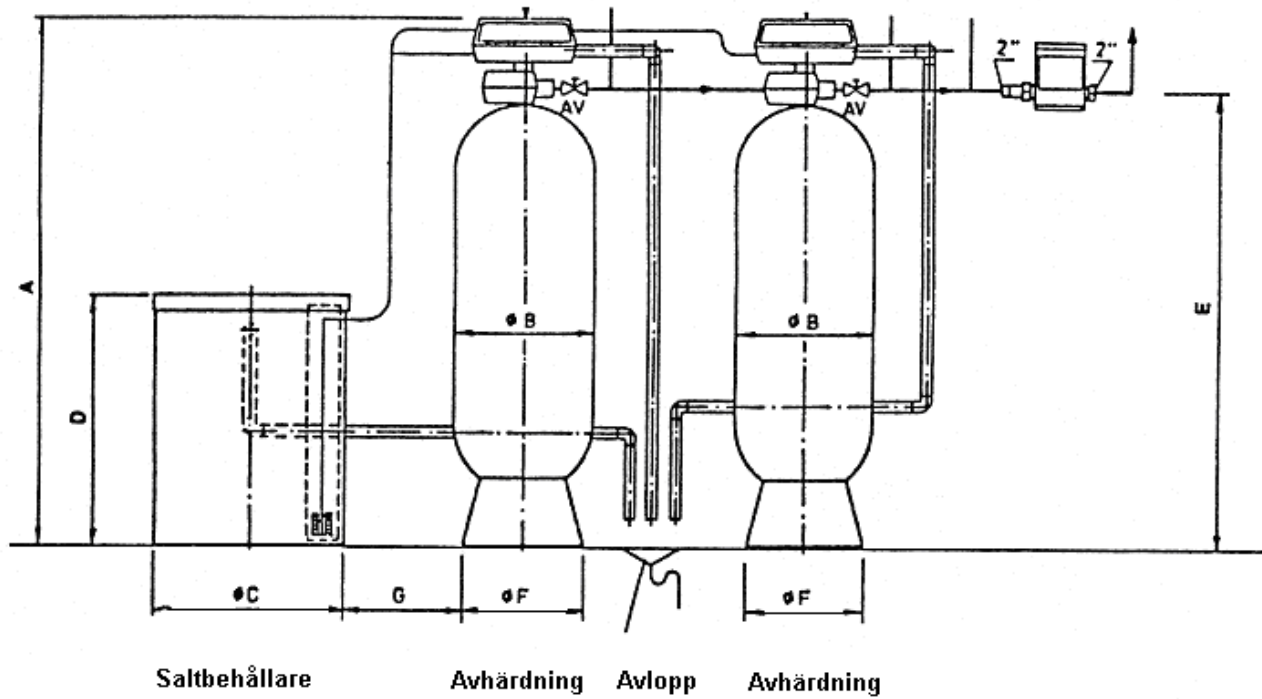
Type of filter	Unit	FVD 602
Capacity* at a pressure drop of maximum 1.0-1.2 bar	m ³ /h	20
Index capacity/reg. at a hardness of 1 °dH	m ³	1920
Salt consumption/regeneration	Kg	72
Brine/regeneration	ℓ	360
Flow to outlet by regeneration, approx.**	l/min	114
Amount of resin	ℓ	600
Height of filter, total (A)***	mm	2390
Width of filter (B)	mm	914
Diameter salt tank (C)	mm	1040
Height salt tank (D)	mm	1560
Connection height filter (E)	mm	2121
Foot diameter (F)	mm	770
Maximum space between filter and salt tank (G)	mm	2000

See picture next page.

- * By continuous operation, max 30-35 dH°.
- ** Min. operating pressure by regeneration 0.4 MPa (4 bar).
- *** Necessary clearance over the filter min. 500 mm.
We reserve the right to make constructional changes.

OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

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OPERATING AND MAINTENANCE INSTRUCTIONS FOR
AUTOMATIC SOFTENING FILTER
TYPE FVD 602

SYSTEM #7-ALTERNATING REGENERATION *Multi-Valve System Valve Wiring*

