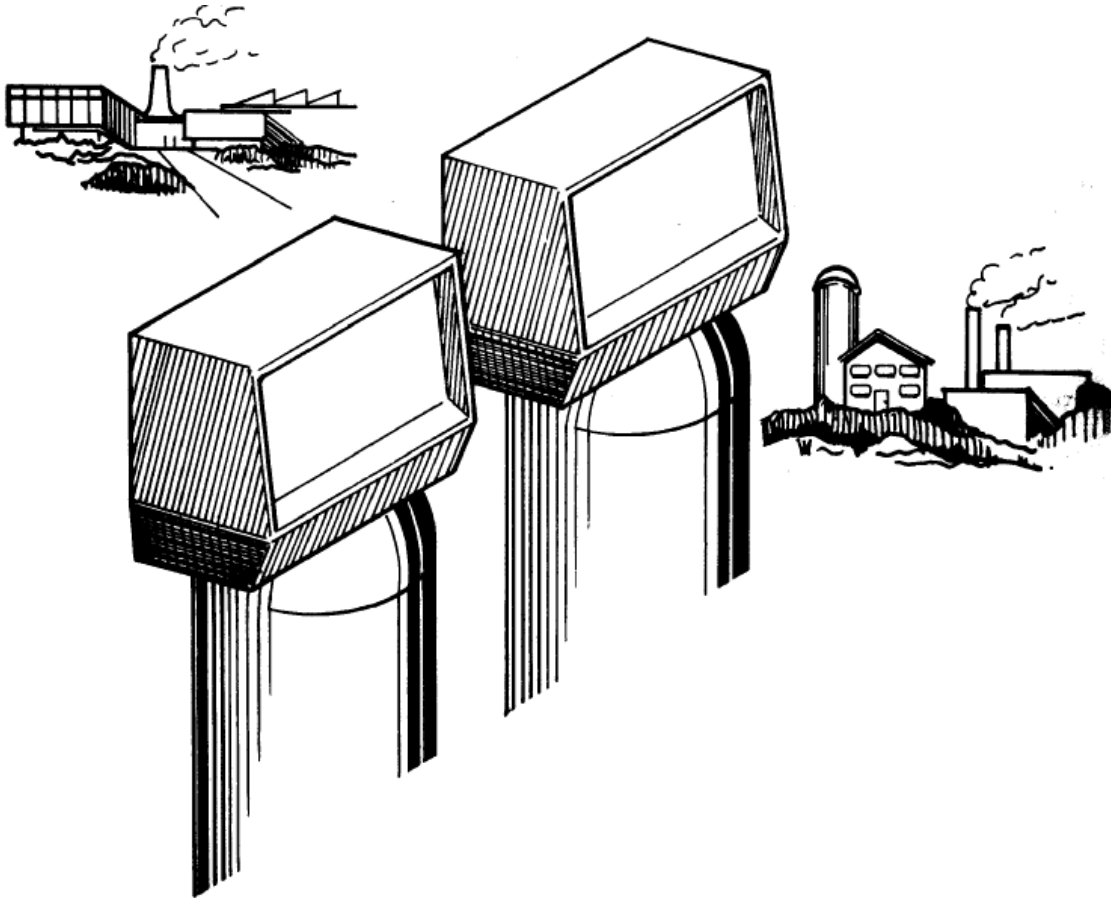


**Automatic softening filter**

**SYSTEM FVD 302-452**

**MANUAL**



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## Description

### Application

HOH's automatic softening filter type FVD is first of all intended for installation in industry, municipal waterworks, housing sectors etc. which make heavy demands on effective, reliable and economical softening.

When a preset amount of water has passed filter 1, which is in operating position, filter 2 automatically shifts to operating position. The filter that is taken out, filter 1, is regenerated immediately. When regeneration of filter 1 has been completed, the filter is placed in stand-by position and will be re-engaged at next filter shift. .

### In general

HOH's automatic softening filter type FVD is employed in systems where softened water is needed for various reasons

The filter tanks are produced of fibre-glass reinforced polyester for maximum working pressure 0.8 Mpa (8 bar) and multiport valve and valve are produced of bronze.

The plant is designed with two filter tanks working alternately. Dependent on the raw-water quality and amount, a filter shift is started by the water meter placed in the outlet product waterline, which mechanically transfers the measured values to a program in the control unit of the plant.

Salt tanks are produced of polyethylene and will be supplied with a cover.

Principle flow is showed by figure 1.

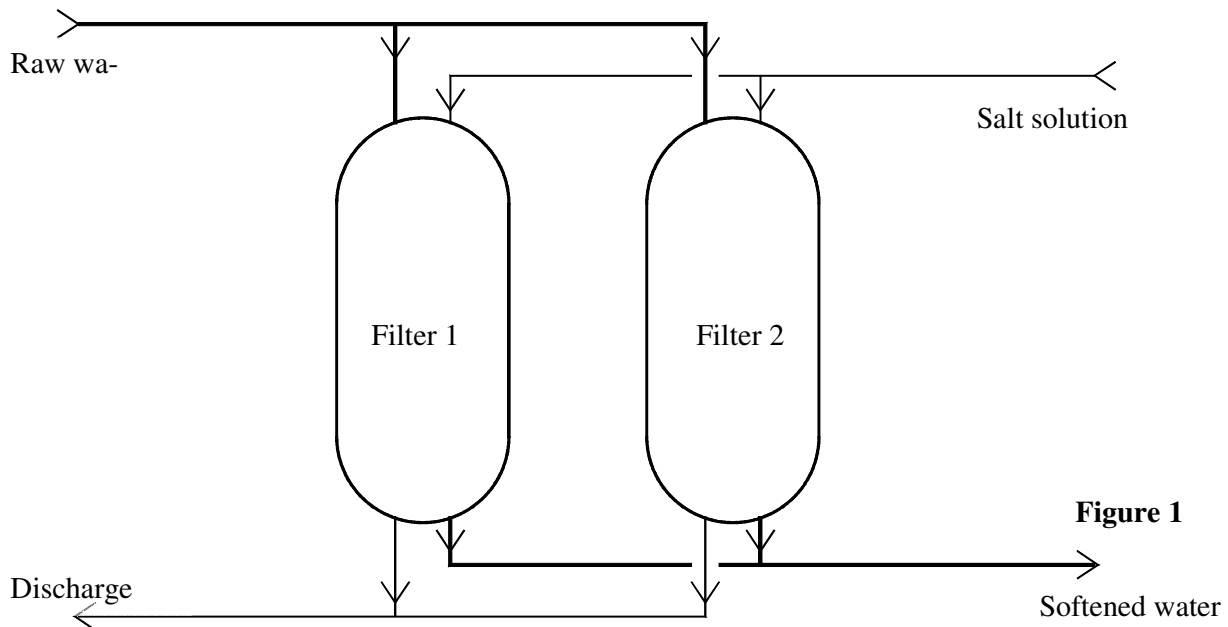


Figure 1

## Installation Guide

### Requirements

If the regeneration automatism of the plant is to work within the range of capacity of the filters, then an intake water pressure of min. 0.4 MPa (4 bar) is required.

The intake water pressure should not exceed 0.8 MPa (8 bar). If this is the case, then a pressure reducing valve must be installed in the inlet pipeline.

The temperature on incoming water should not exceed + 40°C. Furthermore, the plant naturally must be installed in frost-free environment.

Ferrous water can be caused by a number of conditions, but usually appears in connection with too low pH-value. In case of a too high iron content the softening plant may suffer damage, causing the ion exchange resin inside the filter tanks to become inefficient and finally ceases to work. Manganiferous water causes 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 302-452

- 2 off Filter med multiport valve and flow meter
- 1 off Connecting hose for connection of above-mentioned filter (C)
- 1 off Salt tank with suction hose/filling hose
- 1 off Transformator
- 1 off Instruction
- 1 off Discharge hose
- 1 off Testing equipment for residual hardness outgoing pure water.
- Ion exchange resin

Check that the respective resin amounts have been supplied; see Technical specification page 16.

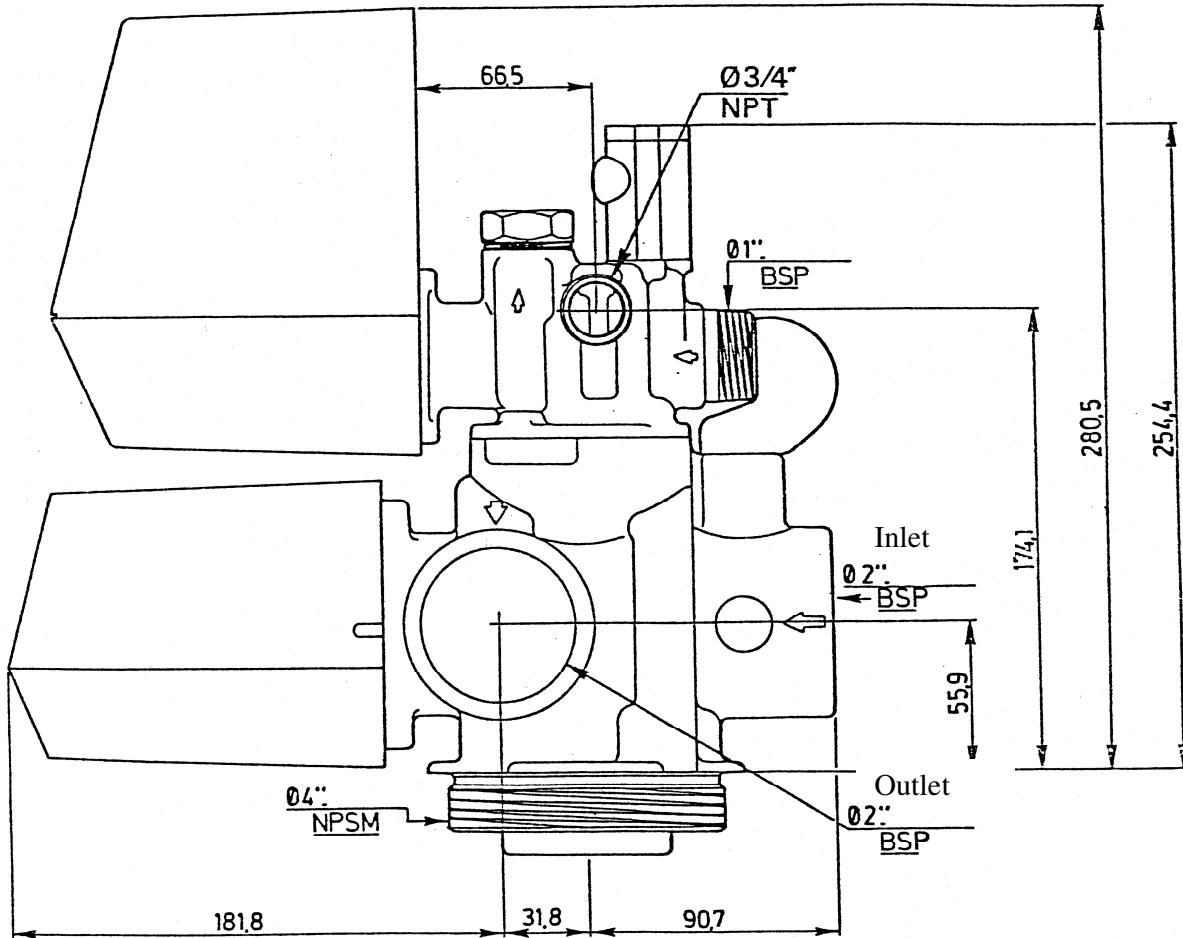
## Installation

1. Fill in ion exchange resin  
Unscrew the multiport valve. The distribution pipe will follow with the valve and is loosened by pulling (tighten with an O-ring).  
Refit the pipe in the tank. Protect the pipe with some sort of seal (e.g. insulating tape).  
Fill in resin – a funnel will make the filing easier. Clean the thread of the tank and the distribution pipe and remove the seal from the pipe (insulation tape or similar).  
Fill in water by means of an external hose in order to eliminate the risk of air blasting at commissioning. Refit the multiport valve on the distribution pipe and check that the distribution pipe is centered in the tank and fasten the multiport valve on the tank.
2. Place the filter with valve in the intended space.
3. Fit the salt suction/filling hose between the valve and the salt tank.
4. Connect outlet
5. Then the filters at the water meter are to be joined with the necessary closing valves for incoming and outgoing lines.



**Resin on the floor causes slippery**

Measuring specifications – multiport valve

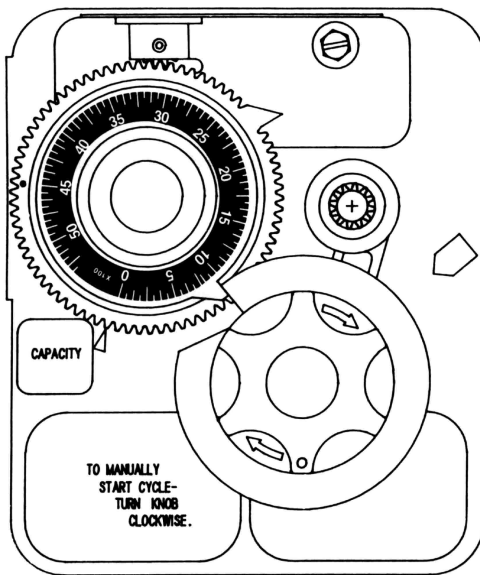


## Commissioning

### Description of the multiport valve

Under the cover of the multiport valve you find units with pre-adjusted values. All adjustment and control is done on program controller 3240 placed on the water meter. This sends signals to the individual filters and decides which filter shall be operating and which filter shall be regenerated.

FVD 302-452 is equipped with 2 program controllers type 3230 placed in the control unit on both filters. Besides this there is a program controller type 3240 placed in the water meter. Program controller 3240 starts regeneration of one filter as soon as the preset water amount has passed the filter.



#### In the water meter cabinet

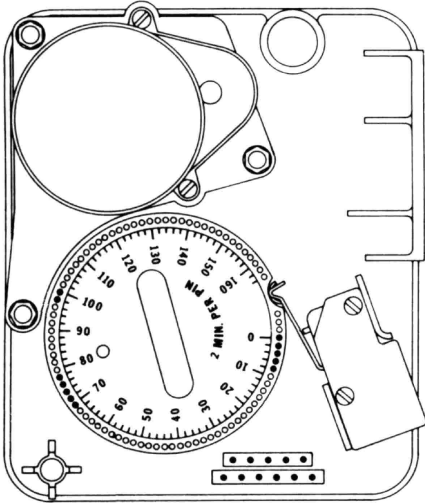
On the volume dial the capacity is adjusted, i.e. m<sup>3</sup> of water between regenerations. Lift and turn the outer dial to the correct number of m<sup>3</sup> which is stated at the white dot on the bottom dial.

With the dial selector for manual regeneration you can start the regeneration sequence manually. Turn clockwise until a click is heard. The sequence is now started and the dial selector automatically returns to operating position when the sequence is finished.

Figure 4

OPERATING AND MAINTENANCE INSTRUCTIONS FOR  
AUT. SOFTENING FILTER  
TYPE FVD 302-452

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Controller 3230 placed in the control unit of the different filters.

On the inside of the program controller you find the program dial which adjusts time during the regeneration sequence. See figure 5.

In order to get to the program dial you must take hold of the bottom right corner of the program controller and pull. The program controller is hinged on the left side.

When reprogramming the times, loosen the program dial by pressing the dowels towards the middle and lifting out the dial. Beware of the contact levers of the micro-breaker.

**NOTE!** The pin is stuck.

Use pliers and an instrument hammer.

## Commissioning

1. Clean and rinse the connection lines with clean water.  
Open possible 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 tapping cock near the plant and let it rinse through.  
Close the connection valves again.
2. Check that the filter is in operating position, see figure 6 page 10.  
If this is not the case, connect the electric cable to the wall socket outlet. Turn the dial for "manual regeneration" slowly clockwise until the valve motor starts. Let the valve motor finish working until next turn is made.  
Continue likewise until the cylinder unit is positioned as shown on figure 6 page 11.  
Cut the power to the control unit. Reset the automatics to "operating" position.
3. Connect the electric cables to the wall socket outlet. Turn the dial slowly clockwise until the valve motor(s) starts and remains standing in next position: backwash. Check that the cylinder units are positioned as shown on figure 7 page 12.  
Cut the power to the control units.  
On softening filters with possible external bypass valve, the raw water to outlet line is turned off.
4. Slowly open the valve for the inlet water. The filter tank will now be filled with water. Continue with this until the outlet flow seems clear and without air bubbles. Then close the valve.
5. Connect power to the control valve and turn the dial gradually until the cylinder units are in position "brine fill". See figure 10 page 13. Immediately open connection valve for incoming water and leave the power on.  
Now the salt tanks is being filled with water. Let the automatics finish the filling. Measure the quantity of water. Dependent on type of filter the salt tank shall be filled with an amount of water corresponding fairly accurately to the calculated presetting. Adjust the setting in accordance with chapter: "Adjustment of program controller" if the quantity differs considerably from this setting.
6. Repeat this procedure on the other filter.
7. Fill the salt tank with salt (tablets) intended for softening filters. There should never be less than 10 cm salt tablets in the tank. Gradually refill with salt when the water surface starts to become visible.
8. Connect the driving wire between the water meter and the counter.  
(Fit the cover on the control unit.)  
Carefully open the connection valve for discharge of softened water. (The unit now must have continuous voltage).  
The plant is now in operation.. The filter supplies softened water until the preset volume is obtained, and after that regeneration of the filter is started at the same time as the other filter takes over the supply.



OPERATING AND MAINTENANCE INSTRUCTIONS FOR  
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After regeneration the newly regenerated filter goes in stand-by position and does not start again until at next filter shift.



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

## Adjustment of program

On delivery the softening filter type FVD is supplied with the standard program and equipped with ordinarily existing qualifications. However, local conditions can sometimes deviate considerably from the standard conditions, and that is why adjustment of the program controller is necessary to perform on site.

### Capacity

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

Generally the filters are pre-adjusted at a salt consumption of approx. 120 gram NaCl per litre resin mass. This amount gives the most economical index capacity. If the salt amount is doubled up, the capacity will only increase by approx. 25%.

### Regeneration program

When an amount of water corresponding to the amount preset on the volume dial has passed the plant, regeneration of the outgoing filter takes place and simultaneously a shift to the stand-by filter is made.

The regeneration sequence is divided into various phases adapted in duration, so that the most effective and economical charge of the filter is obtained.

The filters are supplied with regeneration program in accordance with table 1.

Regeneration phase	Type	FVD 302	FVD 452
Backwash			
Number of pins/minutes		3/6	3/6
Brine & Rinse			
Number of holes/minutes		37/74	36/72
Rapid rinse			
Number of pins/minutes		7/14	5/10
Brinefill			
Number of holes/minutes		7/14	6/12
Termination			
Number of pins/minutes		2/4	2/4

**Table 1**

The adjustment shall be done on the program dial (see figure 5). If local conditions demands it, the regeneration phases may be prolonged reduced as needed. Each pin or hole corresponds to 2 minutes.

The program dial, e.g. FVD 302, looks as follows:

Backwash starts at 0 min. with	3 pins = 6 minutes
Then follows Brine & Rinse with	37 pins = 74 minutes
Then Rapid Rinse with	7 pins = 14 minutes
Finally Brine Fill with	7 holes = 14 minutes

Always terminate with 2 pins

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

The program dial continues to rotate until the contact lever of the inner micro breaker falls into the track on the dial.

Adjustment of the program after commissioning:

- Backwash ..... min.
- Brine intake ..... min.
- Rapid rinse ..... min.
- Brine fill ..... min.

Service – (operation)

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

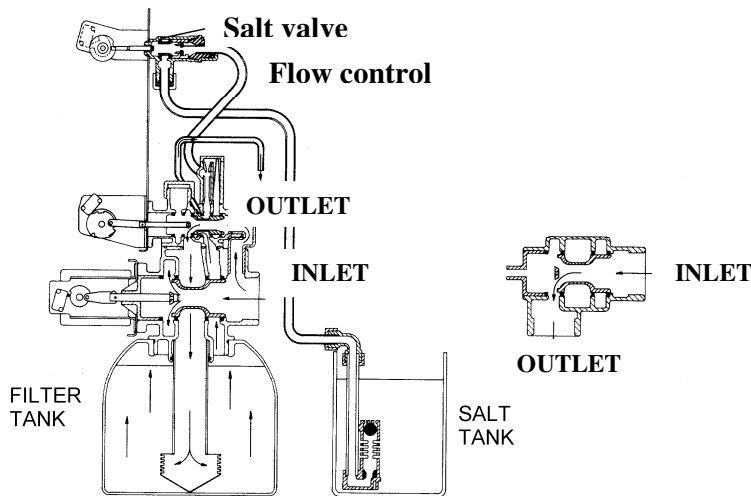


Figure 6

**Backwash** means that the water flow inside the filter tank is reversed and stream from the bottom, through the resin mass and out through the top of the tank. The purpose of this is to loosen the resin and rinse out possible filth deposits. The flow is adapted by means of a flow control device in the outlet line, so that the flow velocity becomes strong enough to lift (expand) the resin mass approx. 50%.

See figure below.

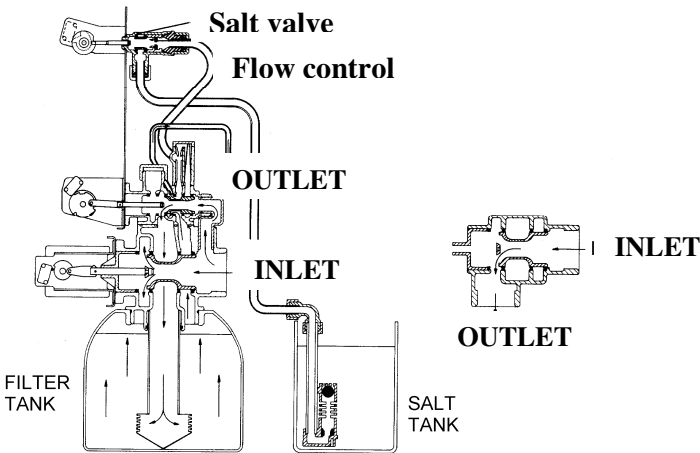


Figure 7

**Brine & Rinse** implies that the brine solution is led in from the top, through the resin and out through the bottom distributor to outlet. The brine solution will be sucked in via an ejector adjusted so that the calculated amount is added in less than 20 minutes. Then the displacement phase is resumed, which implies that the resin is slowly pervaded by a water amount corresponding to approx. one bed of resin. This is done in order to give the resin longer contact time and hence a better yield. See figure below.

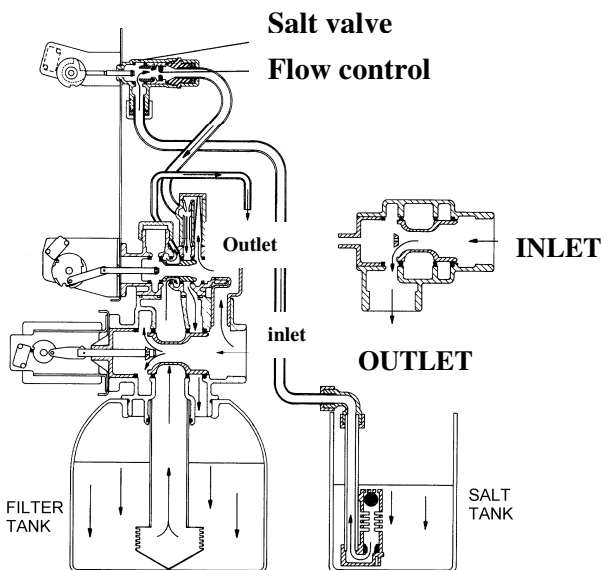
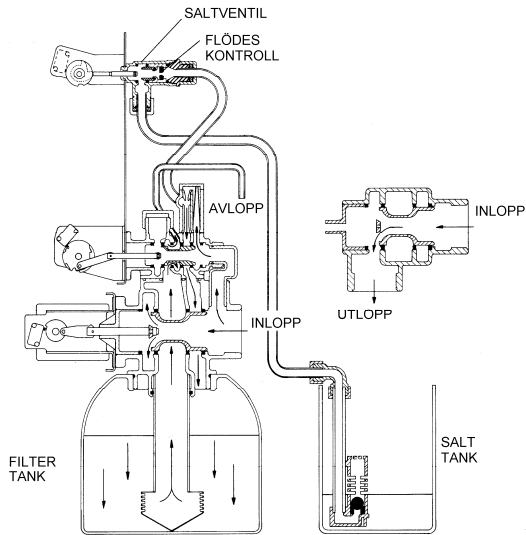


Figure 8

**Rapid rinse** includes clarification of the resin for surplus salt. The water is led in through the top, through the resin and out through the distribution pipe to outlet. The rinse time is adjusted so that approx. 2 beds of water have passed the resin mass after finished cycle. If the outlet water still contains residual salt after the rinse, then the time will be prolonged correspondingly. See figure below.



Figur 9

**Brinefill** means that the salt tank is filled up with the amount of water corresponding to the brine amount for the filter in question. A flow control in the line causes the water flow to be relatively insensitive towards pressure variations and consequently the amount of water can easily be decided by means of time regulation of the refilling phase. See figure below.

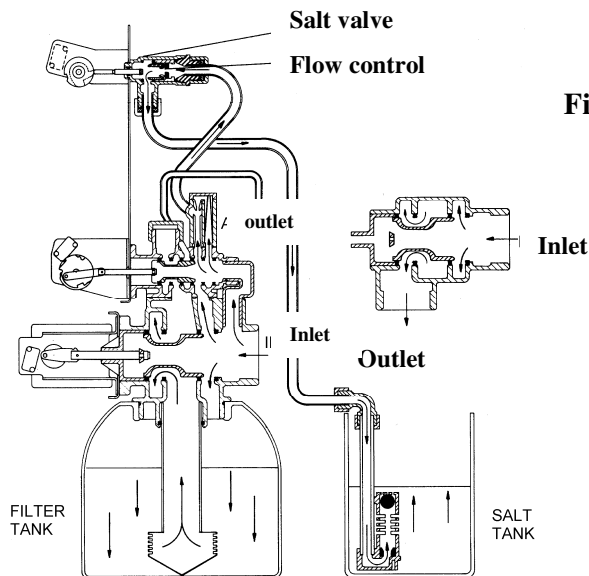


Figure 10

## **Regeneration frequency**

Dependent of the hardness of the raw water, adjustment of the regeneration frequency must be made in accordance with below mentioned example:

### Requirements

Type of filter: FVD-302

Hardness of rawwater: 9.3°dH

From page 16 "Technical specifications" it appears that FVD-302 has an index capacity of 930 m<sup>3</sup> at 1°dH. This means that the index capacity in this example:

$$\frac{930}{9.3} = 100 \text{ m}^3$$

In order to make the regeneration take place at the right time, the program controller must be set at 100 m<sup>3</sup> in accordance with the result in above-mentioned example.

## **Periodic inspection**

Softening filter type FVD requires minimum maintenance. In order to guarantee unproblematic operation, however, certain inspections and check-ups should be made.

### **Every week:**

- Check the brine tank. Refill salt tablets when required.
- Take out water samples of incoming and outgoing water. The tests should be carried out with enclosed test equipment in accordance with separate instruction.
- Make a note of the values in the journal.

### **Every month:**

- Monitor a regeneration sequence
- Check times and flow in acc. With set programming.
- Taste the water at the end of the rapid rinse phase. The water must not taste salty.
- Check that the brine tank is refilled with water to correct level.

### **Every 6 months:**

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

## Trouble shooting

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY ACTION
1. The filter does not regenerate	No voltage on the control unit	Check fuses, cable connection, plugs.
	Counter out of order.	Check water meter and wire and that the controller's gear teeth engage. If the volume dial has reached end position, reset.
2. Hard water	Bypass valve open.	Close the valve
	No/too little sant in brine tank	Refill with salt tablets
	Ejector clogged.	Disassemble and clean ejector and stainer
	Too little brine solution	Check the refilling valve. Disassemble and clean flow control.
	Leak in the brine solution hose	Check and retighten hose connections
	Internal leak in multiport valve.	Disassemble the valve. Clean and replace seals and gaskets.
3. Too high level in the brine tank	Refilling time not correctly adjusted.	Check program dial
	Brine solution line clogged.	Disassemble and clean ejector, strainer, overflow valve or brine valve.
	Flow control in outlet line clogged.	Disassemble and clean the flow control.
4. Ion exchange resin in the outlet line	Top or bottom distributor damaged and backwash flow too high, or there is air in the system	Disassemble filter. Replace top distributor. Check flow control in the outlet line. Examine the cause for air in the system.
5. Regeneration is not terminated	Micro breaker damaged	Replace defective micro breaker
6. Continuous flow to outlet	Control unit out of position.	Reset volume dial. Reset manually to operating position.
	Filth in the multiport valve	Operate the valve manually for some cycles and see if it helps. If not, demount the valve and clean it.
	Intern leak in the multiport valve.	Demount multiport valve. Replace seals and gaskets.



## Technical specification

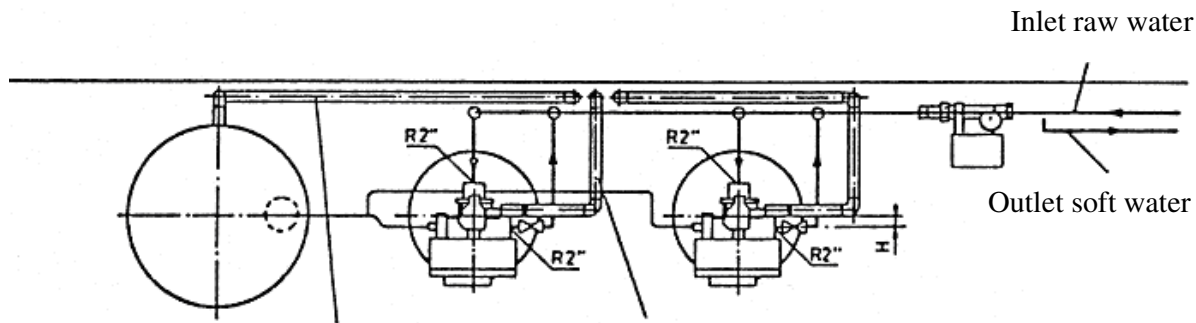
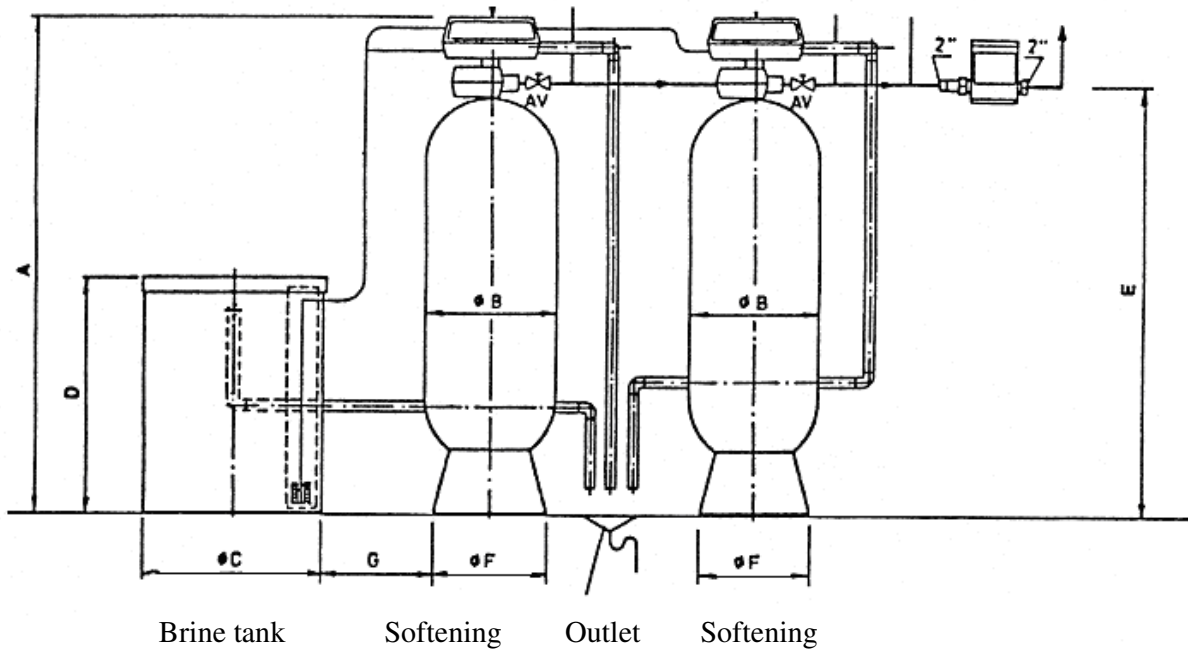
### Technical data

Type of filter	Unit	FVD 302	FVD 452
<b>Capacity* at a pressure drop of maximum 1.0-1.2 bar.</b>	m <sup>3</sup> /h	10	15
<b>Index capacity/regeneration</b>	m <sup>3</sup>	930	1440
<b>Salt consumption/regeneration</b>	kg	36	54
<b>Salt solution/regeneration</b>	ℓ	180	270
<b>Flow to outlet by regeneration, approx.**</b>	l/min	45	95
<b>Amount of resin</b>	ℓ	300	450
<b>Height of filter, totally (A)***</b>	mm	2300	2350
<b>Width of filter (B)</b>	mm	614	764
<b>Diameter brine tank (C)</b>	mm	900	1040
<b>Height brine tank (D)</b>	mm	1130	1560
<b>Connection height filter (E)</b>	mm	2067	2081
<b>Foot diameter (F)</b>	mm	540	770
<b>Maximum distance between filter and brine tank</b>	mm	2000	2000

See picture next page.

\* By continuous operation, max 30-35 dH°.  
 \*\* Min. operating press. by regeneration 0.4 MPa (4 bar).  
 \*\*\* Necessary headway over the filter min. 500 mm.  
 The right to constructional changes is reserved.

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