



**Rondomat HVD 400-1550**  
Softening Unit

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## 1 General

BWT's Rondomat HVD – Series of volume controlled softening units are designed for industry, municipal waterworks, and residential complexes and delivers efficient, reliable and economical softening.

Softened water is used in various reasons.

E.g., BWT's Rondomat HVD units pre-treat water to:

- BWT's Permaq PRO RO-Units
- Cooling towers
- Boilers

The advantages using a quantity-controlled plant is the good economy, as the plant always consumes its entire capacity on column in operation, before it automatically switches to the standby column and starts regeneration on the exhausted column.

This causes that the plant supplies soft water during regeneration, which is necessary for continuous or varied operation.

The plant has extremely low salt and water consumption during operation due to the built-in conductivity measurement.

The system is controlled by a PLC, so it is always possible to change the operating parameters. The PLC is connected to a HMI at the front of the board, where all operating parameters can be monitored.

The filter columns is made out of glass fibre reinforced polyester for an overpressure of max. 10 bar. At max. 40 ° C.

The filter is fitted with an inner plastic jet system that distributes water evenly throughout the filter area.

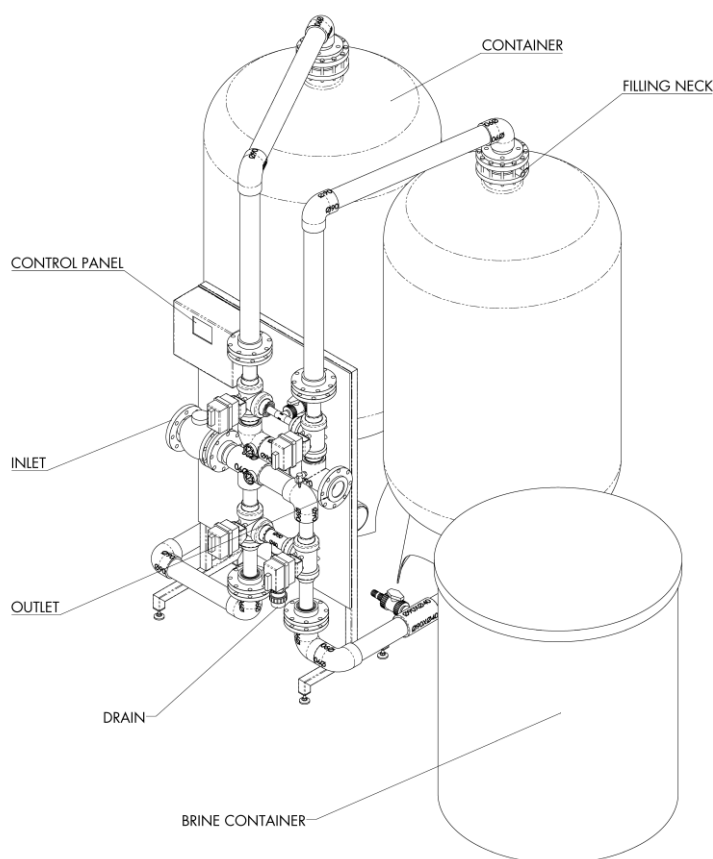
The filter columns, the pipe system and valve rack in PVC and ABS are pre-assembled and pressure tested for direct connection to pipeline at the mounting site.

Appropriate electrical equipment is connected to 220 V, 10A.

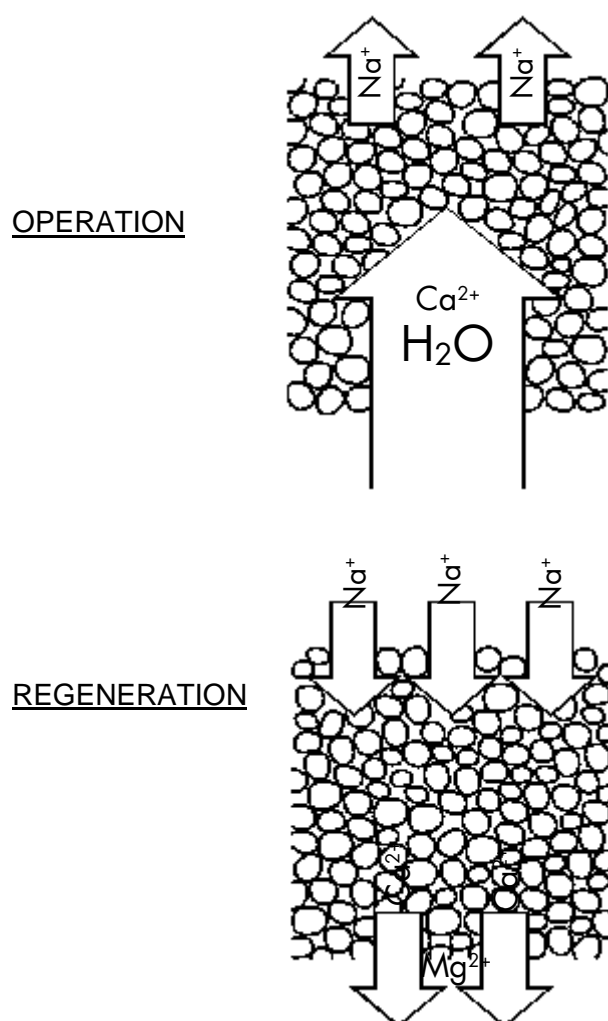
On the side is there a salt container supplied with a lid. It is made of polyethylene

The plant requires no continuous supervision in addition to filling the salt container.

### 1.1 The Unit - Rondomat HVD



## 2 Function



### 2.1 Ion exchange

When the water passes the filter, calcium and magnesium ions are absorbed by the ion exchange mass while the corresponding amount of sodium ions is carried to the water. This procedure is called ion exchange (in this case softening).

### 2.2 Regeneration

When the ion exchange mass is saturated with calcium and magnesium, it must be treated so it can soften the water again. This treatment is called regeneration.

Regeneration begins by adding the diluted salt solution (brine) with regulated flow to achieve even distribution and sufficient contact time in the ion exchange mass.

Calcium and magnesium are consequently released and rinsed to drain while the ion exchange mass is again saturated with sodium.

Once the salt solution is introduced, the regeneration continues with the first rinse, which displaces the salt solution through the ion exchanger.

The regeneration ends with a second flush that is controlled by the conductivity of the wastewater.

After 2nd flush, the filter is automatically switched on for operation.

## 3 Installation

- Place the unit on a flat surface, with the salt container on the side.
- Connect the top and bottom pipes to the tanks and the valve rack.
- Fill both tanks half with water before filling them with ion exchange resin. (see chap. 4.1)
- Connect the inlet to the raw water supply and the outlet for consumption – the flange connections is DN50 for HVD 400, 600, 900 and DN100 for HVD 1200/1550. Be aware, that the connected pipes shall be relieved.
- Connect the waste water – flange size DN40
- The dynamical pressure shall be at min. 3 bar and max 10 bar.
- Connect the unit to power supply 230 V AC.

## 4 Commissioning

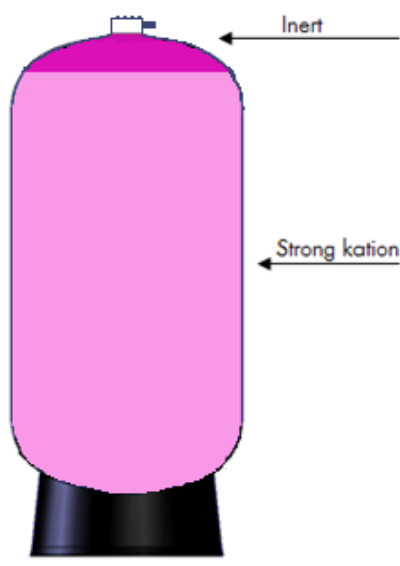
Please note that during operation of the filters, ensure that no ion exchange is flushed out

If this is the case, there is a leak in the jet system at the top of the filter.

There must be mounted an aperture on the outlet to ensure pressure on the system, if the treated water goes directly to a reservoir.

It would be advisable to contact BWT before commissioning, which will assist in answering any questions.

#### 4.1 Handling and filling the ion exchange resin



Before the softening unit can go into operation, fill in the supplied ion exchanger as follows:

The amount of ion exchange resin should be divide into two equally.

Remove the upper connection of the filter column via coupling and screw the remaining parts of (eg the top sprayer) connected to the tank. Disassemble the flange connection, by removing all M8 screws and the PVC adapter for the tank.

Fill approx. 0.5-1 meters of water in the tank.

Place a funnel in the top of the tank. First, fill the container with half of the ion exchange resin. Then fill the rest of the container with water. It is very important to use a

submersible pump with plastic impeller to fill the rest of the container.

In the top of the drawing a filling neck is displayed. This valve is for filling the last part of the Strong cation and the inert resin. Firstly, the top pip have to be removed so the water can over float when the resin is filled into the container. At the same time the nozzles have to mounted to makes sure that resin is not getting out together with the water.

Now the actual filling of the resin can start. The water will over float the container has to be filled up completely

When the container is full, the pipe should be mounted correctly again. Lubricate the O-ring with Vaseline or similar and reconstruct the upper compound. Adjust so that the connection ends with the link.

Then open the valve for incoming water **slowly** to check for any leak.

When this is done and the salt container is filled, a manual regeneration is performed to make sure everything is properly executed.

After this check, the filter is set into operation.

It is very important in order to secure good water quality that the amount of resin is correct.

After 1 – 2 months of operation BWT suggest that the amount of resin is controlled. Possibly fill extra if needed.

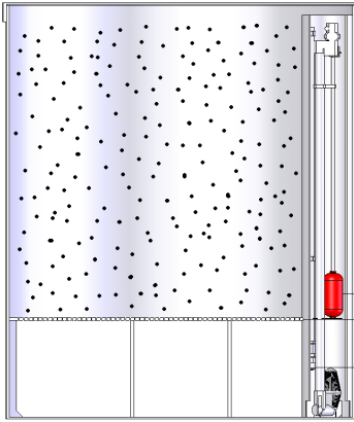


Spilled ion exchange resin makes surfaces very slippery.

#### 4.2 Filing of salt

- a. Close the valve for the incoming water to the salt container.
- b. Fill the salt container with salt tabs

- c. Fill the salt container with water, by opening the valve for incoming water. Let the valve stay open for operation.



**Keep undissolved salt out  
of the tube**

*Figure 2 - Salt Container*

## 5 Control panel

### 5.1 Menu

#### 5.1.1 Information in menu

All screen images are designed with a header with logo, time, menu and alarm keys.

If an alarm occurs, the “alarm” key will flash in a slow frequency.

Press **Alarm**

**In the Alarm screen, all active alarms will be displayed.**

Press the **Menu** and return to the shown screen.

Press the **yy/mm/dd**. For setting the date and time.

#### 5.1.2 Functions in the menu

Press **Operation**

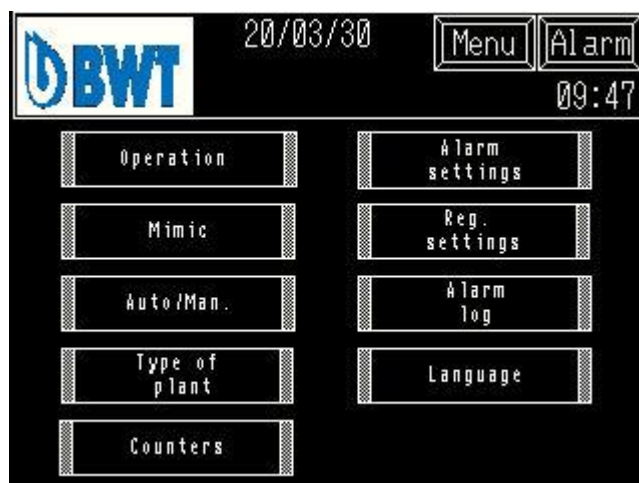
Press **Mimic**

Press **Auto/Man**

Press **Plant type**

Press **Alarm settings**

Press **Reg. settings**



On the operating screen it is possible to start and stop the operation and regeneration.

On the mimic screen is indicated status of operation and valve/pump..

On the Auto/Man. Screens you can select auto & manual operation of pumps and valves.

On the plant type screen you select type of filter  
*This screen image is protected by a Password: see chapter 5.13*

In alarm settings you select settings for set point and delays of alarm.

*This screen image is protected by a Password: see chapter 5.13*

In reg. Settings you select settings for capacity and regeneration.

*This screen image is protected by a Password: see chapter 5.13*



Press **Alarm log**

Changes to alarm history where all alarm occurrences are stamped with time and date.

Press **Counter**

In the counter screen image is shown operating hours, valve operations and capacities.

Press **Language**

In the Language screen image, you can choose various languages directly on the screens.

## 5.2 Operation

### 5.2.1 Information in operation

Start/Stop of the plant (only with reservoir).  
Activate with the on/off button  
Operation status on each filter is indicated.

Reg. Status:  
Indicates which step of the regeneration that is activated.

Reg. Timer:  
Regeneration time in the activated step.

### 5.2.2 Functions in Operation

Press **OFF-ON**

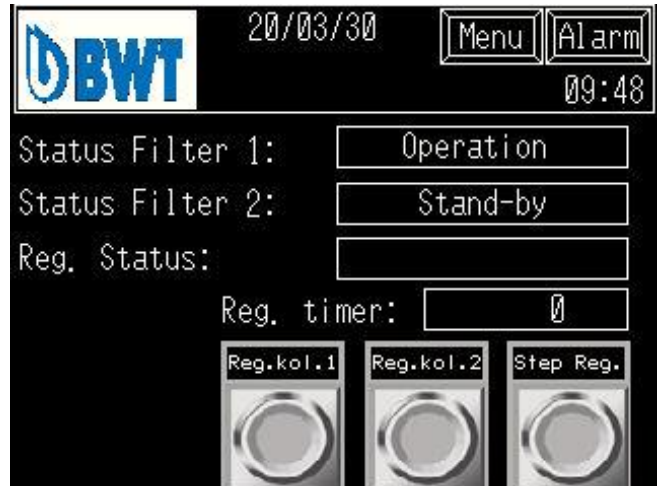
Start/stop of the unit

Press **Start Reg.**

Manual start of a regeneration..

Press **Step Reg.**

Manual step forward in the regeneration sequence.



## 5.3 Mimic

### 5.3.1 Information in Mimic

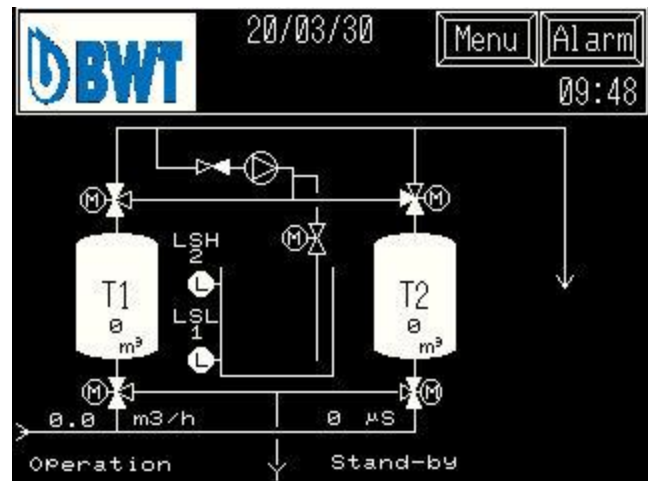
- Conductivity in waste water under regeneration
- Capacity left in each column before regeneration
- Operation status on valves and pumps

Pumps:

(Black = OFF, White = ON)

Valves:

(Black = closed, White = open)



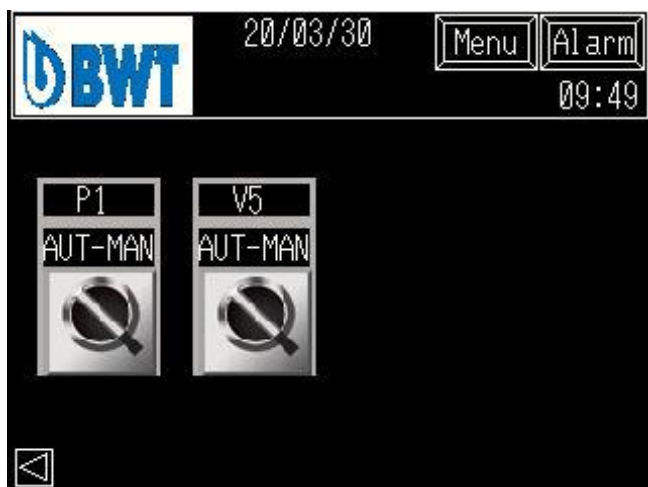
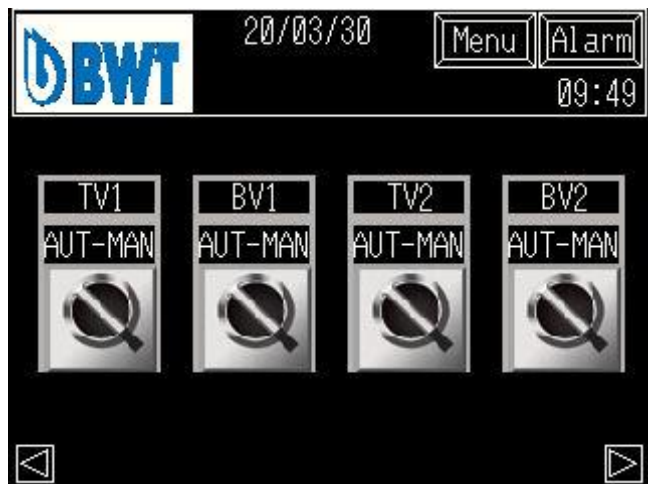
## 5.4 Auto/Man

### 5.4.1 Information in Auto/Manuel

This function visualize the manual interference (AUT-MAN)

### 5.4.2 Functions in Auto/Manuel

Selected Valves & Pumps for Automatic operation where the equipment is automatically controlled from the PLC or in Manual, where it is possible to start / open the pump & valves directly.



## 5.5 Plant type

### 5.5.1 Information in plant type

- The K-factor of the water meter
- The selected plant type

Selected options:

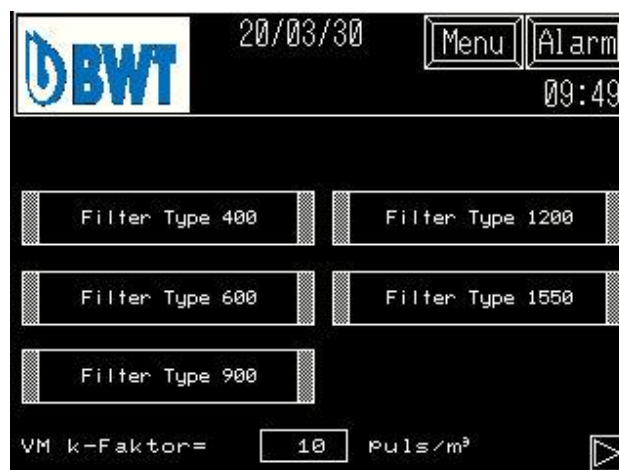
- Reservoir
- Saturator
- Testomat

### 5.5.2 Functions in Plant type

Select the filter size that matches the unit.

Set the k-factor for the water meter (number of impulses pr.m<sup>3</sup>)

Select options.



## 5.6 Alarm settings

### 5.6.1 Information in Alarm Settings

Delay of various alarms and set points for the conductivity in the second flush.

### 5.6.2 Functions in Alarm Settings

Setting different alarm time delays and setting the set point of the conductivity in the second flush.

#### Changing the parameters:

To change a value, press the selected field. A pop up menu with a keyboard will appear. Type in the selected value and press "ENT" for confirmation. *Password (See chapter 5.13)*



## 5.7 Reg. Settings

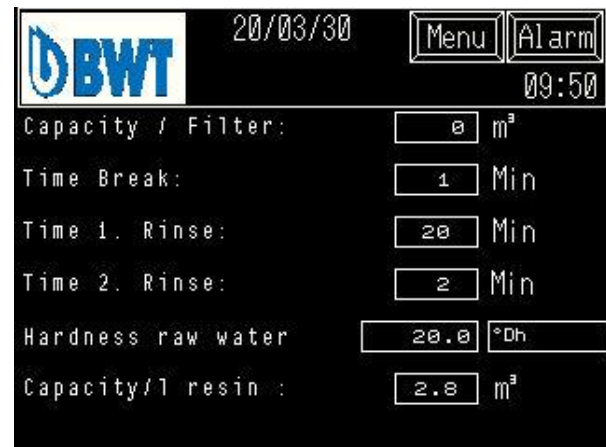
### 5.7.1 Information in Reg. Settings

The capacity between each regeneration is shown in "capacity/ Filter".

### 5.7.2 Functions in Reg. Settings

- Change the times in the regeneration sequence.
- Define the hardness of the raw water
- It's possible change between °dH, °fH and ppm CaCO<sub>3</sub>.
- The capacity in the Ion exchange resin (preconfigured to 2.8 m<sup>3</sup>)

*Password (See chapter 5.13)*



## 5.8 Alarm

### 5.8.1 Information in Alarm

See all active alarms by pressing the "Alarm" button in the top right corner. If an alarm appears, the alarm button will blink. The alarm will show date and time when it occurred.

Reset alarm by pressing "Reset"



## 5.9 Alarm Log

### 5.9.1 Information in Alarm Log

In this picture, the last 128 alarms are displayed with the date and time of the alarm. When more than 128 alarms have occurred, the oldest alarms will be deleted.

### 5.9.2 Functions in Alarm Log

By pressing the "START" button, can the UP/DOWN, buttons be used, to go through the registered alarms

"CLEAR ALL" Deletes the log.

Password (Se *afsnit5.13*)



## 5.10 Counters

### 5.10.1 Information in Counters

Time for pump P1.

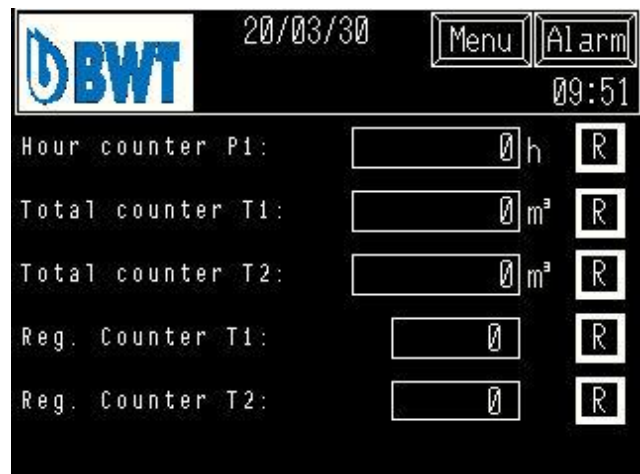
Total time for capacity on filter 1 and 2.

Total amount of regenerations on filter 1 and 2.

### 5.10.2 Functions in counters

Press the **R** button to reset all counters.

Password (See *chapter 5.13*)



## 5.11 Language

### 5.11.1 Information in Language

Displays all the available language options.

### 5.11.2 Functions in Language

To select a language, Press the preferred language



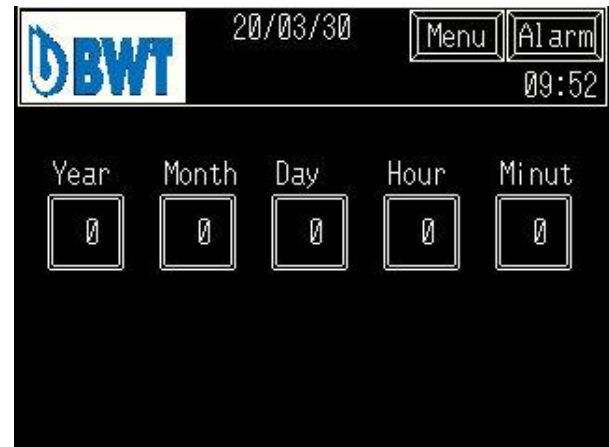
## 5.12 Time and date

### 5.12.1 Information in time/date

Date and time.

### 5.12.2 Functions in time/date

Date and time can be changed by pressing the individual buttons, and set the value and confirm with "ENT".



## 5.13 Password

### 5.13.1 Information's in Password

The password image will automatically appear if a select feature is password protected.

If the correct password is entered, the desired image will appear.

If the correct password is not entered within 10 seconds, the image will automatically return to Menu.

Password can be given out by calling  
BWT Denmark  
Tlf. +45 43 600 500



## 6 Maintenance

### 6.1 Salt container

We recommend to use salt tablets or granulated vacuum salt if using a Saturator.

The plant is designed for a brine solution of 300g / liter of water.

Frequently empty and rinse the salt container. The quality of the salt is crucial for the time interval between these rinses.

NOTE! The minimum level for undissolved salt must never fall below 10 cm.

Make sure the filter sucks sufficient amounts of brine during regeneration. See "TECHNICAL DATA".

### 6.2 Samples

Check regularly that the water is soft. Checking the softened water is carried out with the supplied test kit according to the instructions with the test kit

## 7 Periodic inspections

The HVD Rondomat requires a minimum of maintenance. However, in order to guarantee trouble-free operation, must be performed certain inspections and control of functions.

It is important that the individual parts of the plant be inspected and maintained according to the manufacturer's instructions.

### Note

**Guarantees, etc. Is provided on condition that inspection / maintenance is carried out with time intervals as prescribed and that the results are noted in the operating record.**

Daily:

Weekly:

Each month

Each 6. Months

### 7.1 Periodically shut down

The cation ion exchanger can be stored in their container under proper conditions when the regenerated ion exchanger is left in contact with 1-2% HCl or H<sub>2</sub>SO<sub>4</sub>.

After a prolonged period of closure, take the following precautions:

Drain the filter containers for liquid and perform a double regeneration on the ion exchanger.

BWT Denmark A/S offers various types of service agreements to ensure a smooth operation. Inquiry can be made at:

Tel. +45 43 600 50

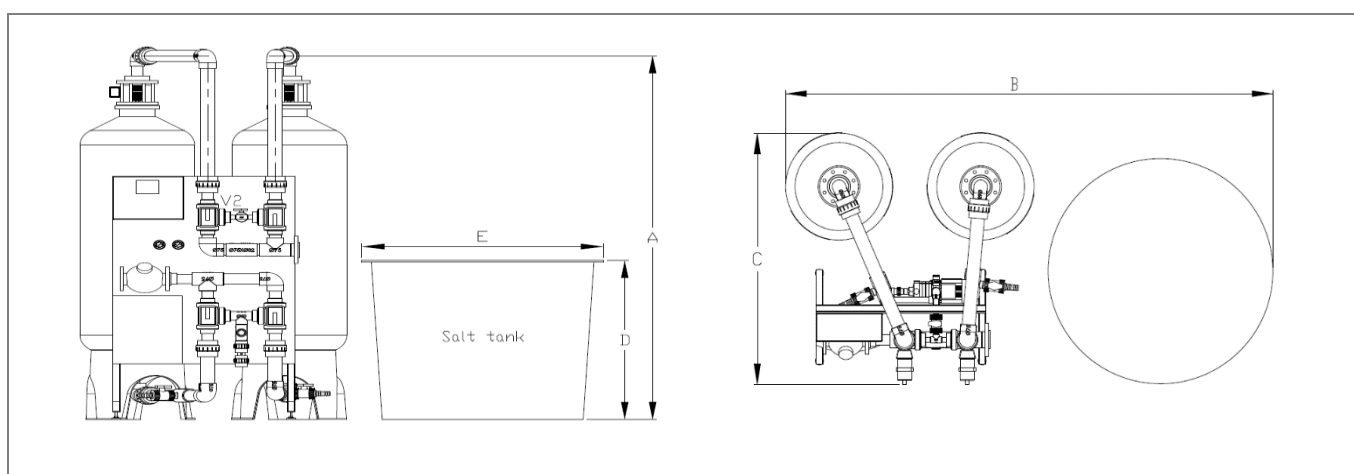
|  |
|--|
| Control the water hardness   |
| Check the salt level in the salt container.<br>Fill if needed.<br><br>Keep record in journal   |
| Monitor a regeneration sequence.<br><br>Check times and flow according to set values.<br><br>During the salting and displacement phase, all the salt solution must be sucked in according to the markings made.<br><br>By the termination of the rapid rinse phase it must be checked if the water is soft.<br><br>Check that the salt tank fills up again with water to the correct level |
| Empty and clean the salt tank.<br><br>Dismount and clean the salt valve plus the overflow valve.<br><br>Clean the pressure reduction valve.<br><br>Clean and wipe off the filter tanks and the control units.  |



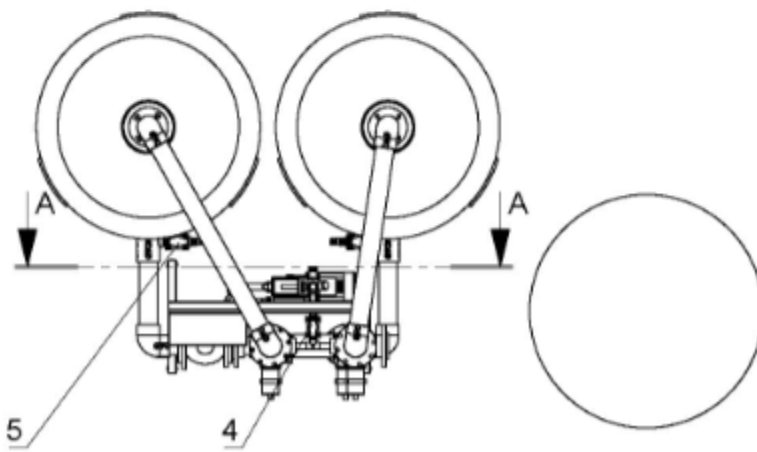
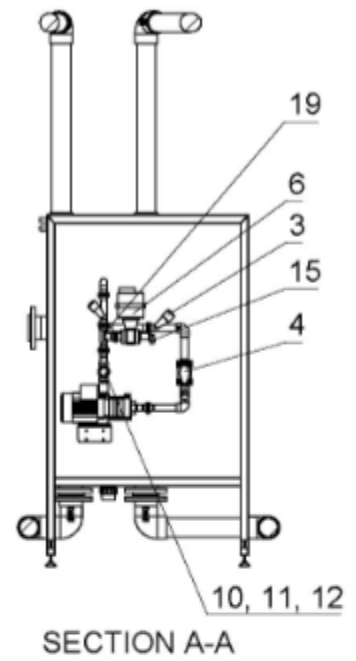
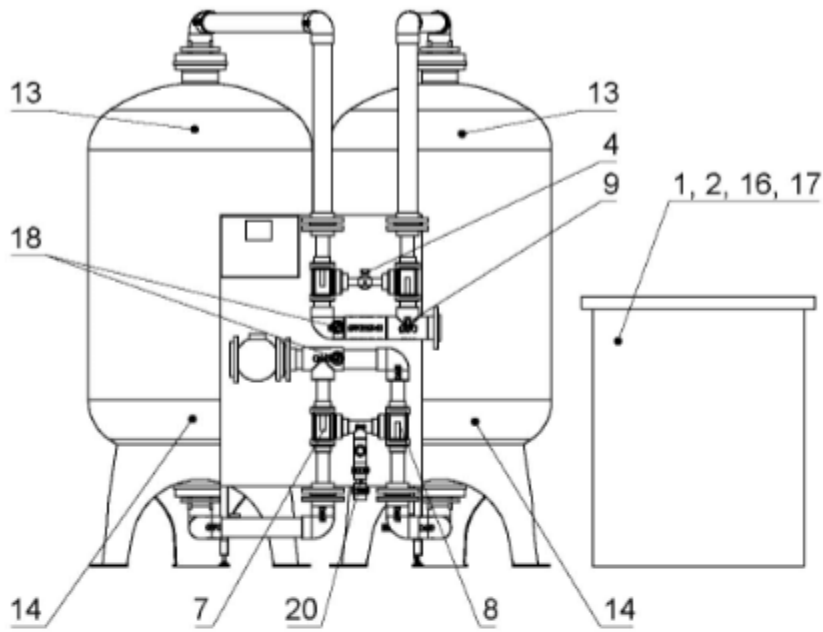
## 8 Technical data

| Rondomat HVD                        | Unit              | 400       | 600       | 900       | 1200      | 1550      |
|-------------------------------------|-------------------|-----------|-----------|-----------|-----------|-----------|
| Max. flow velocity*                 | m <sup>3</sup> /t | 10/15     | 18/21     | 25/30     | 32/39     | 41/50     |
| Pressure drop at max. flow velocity | bar               | 1,1 / 1,5 |           |           |           |           |
| Min. flow velocity *                | m <sup>3</sup> /t | 0,08      | 0,35      | 0,35      | 3,0       | 3,0       |
| Capacity at 1°dH                    | m <sup>3</sup>    | 1085      | 1680      | 2520      | 3290      | 4340      |
| Capacity at 5°dH                    | m <sup>3</sup>    | 217       | 336       | 504       | 658       | 868       |
| Capacity at 15°dH                   | m <sup>3</sup>    | 72        | 108       | 168       | 220       | 289       |
| Capacity at 20°dH                   | m <sup>3</sup>    | 54        | 84        | 126       | 165       | 217       |
| Salt consumption pr. regeneration   | kg.               | 31        | 48        | 72        | 94        | 124       |
| Time pr. regeneration               | min.              | 50        | 55        | 60        | 65        | 70        |
| Max. water temperature              | °C                | 35        |           |           |           |           |
| Water pressure max.                 | bar               | 10        |           |           |           |           |
| Pipe connection                     | DN                | 50        |           |           | 100       |           |
| Water connection                    | DN                | 40        |           |           |           |           |
| Height [A]                          | mm                | 2520      | 2600      | 2800      | 2750      | 2800      |
| Width [B]                           | mm                | 2800      | 3000      | 3120      | 3550      | 4000      |
| Depth [C]                           | mm                | 1400      | 1500      | 1600      | 1800      | 1900      |
| Height Salt container [D]           | mm                | 1120      |           |           |           |           |
| Diameter salt container [E]         | mm                | 1350      |           |           |           |           |
| Capacity salt container             | litre             | 1000      |           |           |           |           |
| Water consumption pr. Regeneration* | m <sup>3</sup>    | 0,55      | 0,75      | 1,05      | 1,48      | 2,0       |
| Product number:                     |                   | 422162320 | 422162470 | 422162670 | 422162920 | 422163220 |
| Product number; hardness test       |                   | 701995010 |           |           |           |           |
| Product number; Salt alarm          |                   | 401528200 |           |           |           |           |

\*At 15 °C, 3,0 bar before the unit and new clean ion exchange resin. At continually operation should the capacity on some models be reduced, depending on the condition of the raw water. \* Brine is not included in the water consumption pr. regeneration.



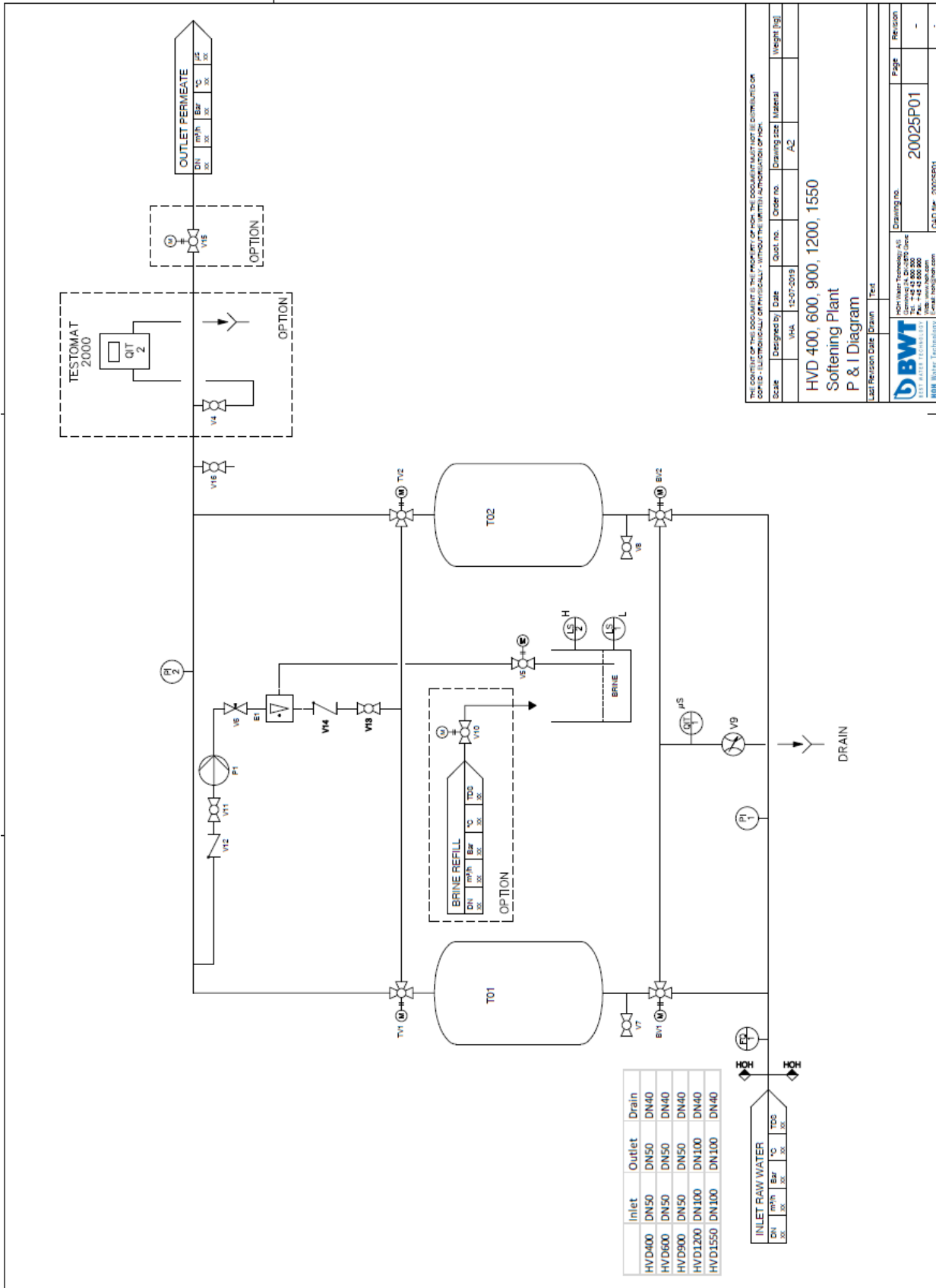
9 Spare part drawing



## 10 Spare parts list

| Position No. | BWT Rondomat HVD  | Spare part No. | Recommended spare parts | Recommended replacement frequency |
|--------------|---|----------------|-------------------------|-----------------------------------|
| 1            | Level switch 5 m. cable.  | 110851050      | 2                       | 2-4 years                         |
| 2            | Weight for level switch.  | 110860000      | 1                       |                                   |
| 3            | Non-return valve 25 mm PVC.                                       | 200315025      |                         |                                   |
| 4            | Ball valve 25 mm. PVC.  | 200712025      |                         |                                   |
| 5            | Ball valve 32 mm. PVC.  | 200712032      |                         |                                   |
| 6            | Ball valve 25 mm. PVC with actuator.                              | 200713025      |                         |                                   |
| 7            | 3-way ball valve 63 mm. T-drilled.                                | 200718063      | 1                       | 3-4 years                         |
| 8            | Actuator 230V AC 90-degrees.                                      | 200718100      | 1                       |                                   |
| 9            | Sample valve ¼" PVC .   | 200721020      | 1                       |                                   |
| 10           | Reduc. valve ¾" D06F .  | 200771006      |                         |                                   |
| 11           | Filter for reduc. valve ½" - ¾".                                  | 200772016      | 1                       | Once a year                       |
| 12           | Pressure gauge for reduc. valve.                                  | 200781108      |                         |                                   |
| 13           | Dist. syst. T/14"-36" flange top.                                 | 350244100      | 1                       |                                   |
| 14           | Dist. syst. T/24"flange bottom.                                   | 350244108      | 1                       |                                   |
| 15           | Salt hose 5/8.  | 401528050      | 1                       |                                   |
| 16           | Drain elbow ½".   | 405378730      |                         |                                   |
| 17           | Nozzle-pipe 1".   | 409000480      |                         |                                   |
| 18           | Pressure gauge ¼" 0-10 BAR stainless steel.                       | 452264000      |                         |                                   |
| 19           | Ejector, size. 3  | 600101103      | 1                       |                                   |
| 20           | Flow restrictor 40 mm. CPVC.                                      | 600220400      |                         |                                   |
|              | Water meter DN50, Q3: 40 m³/h. puls/10 liter. (HVD 400, 600, 900) | 409705050      |                         |                                   |
|              | Water meter DN100, Q3: 160 m³/h. puls/10 liter. (HVD 1200, 1550)  | 409705100      |                         |                                   |
|              | Pump CM 3-5 1X200/240V 50Hz                                       | 454100950      |                         |                                   |
|              | Jumo ecotrans LF 01   | 750000391      |                         |                                   |
|              | Conductivity probe, Jumo blackline K=1,0                          | 750000393      |                         |                                   |
|              | Proface-panel   | 750001291      |                         |                                   |
|              | Ion exchange resin, inert   | By request     | 10% of the volume       | Once a year                       |
|              | Ion exchange resin, active  | By request     | 10% of the volume       | Once a year                       |

11 P & I Diagram



## 12 Declaration of Conformity

## EC Declaration of Conformity

Machinery Directive 2006/42/EC, Annex II, A

Low Voltage Directive

EMC-Directive



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Here by declares that:

- **HVD 400, 600, 900,1200 & 1550**
- is in conformity with the provisions of the Machinery Directive (Directive 2006/42/EC)
- is in conformity with the provisions of the following other EC directives
- Low Voltage Directive (2014/35/EU)
- EMC Directive (2014/30/EU)
  
- Place: Greve, Denmark
  
- Date: 31-08-2018

Signature:

Name: Lars Jensen









*Bwt.com*

FOR YOU AND PLANET BLUE.