



Electrolux

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Customer Care - EMEA
Training and Operations Support
Technical Support

SERVICE MANUAL

WASHING MACHINES

Washing Machines Front Loaded - Module

WATER SOFTENER

1 PRECAUTION



Information "Safety"

- All the work to be performed inside the appliance requires specific skills and knowledge and may only be carried out by qualified and authorised Service Engineers
- This platform is not fitted with an ON/OFF switch. Before you access internal components, take the plug out of the socket to disconnect the power supply.
- Some of the components in the mechanical part could cause injuries, so wear suitable protection and proceed with caution.
- Always empty the appliance of all the water before laying it on its side.
- If the appliance has to be placed on its side for maintenance or another reason, lie it on its left side, to avoid the risk of any residual water falling onto the main circuit board.
- Never place the appliance on its right side (electronic control system side): some of the water in the detergent dispenser could leak onto the electrical/electronic components and cause these to burn.
- When replacing the heating element, replace it with one that has the same characteristics (2 thermal fuses) in order not to compromise the safety of the appliance. NEVER remove/switch the NTC sensors between heating elements.

Document Revisions

Revision	Date	Description
0.0	12/2016	Document creation

2 PURPOSE OF THIS MANUAL

The purpose of this Service Manual is to provide Service Engineers who are already familiar with the repair procedures with information regarding: **Washing machines**

fitted with **EWX14** electronic control systems and **Water Softener**.

The document no. **599 802-898** describes the basic functional concepts of all User Interface types designed for:

➤ POne

For each aesthetic level, according to buttons/lights layout, specific electronic boards are provided.

Such boards are separated from the main power board that controls the appliance and communicates with it by means of MACS serial protocol.

The compatible main boards are based on:

	EWX11	EWX13	EWX14
POne			x

The manual deals with the following topics:

- Technical and functional characteristics
- Access

3 CONTENTS

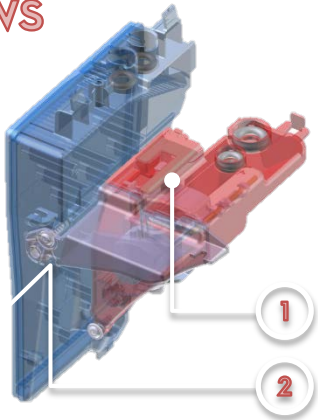
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4 WATER SOFTENER

4.1 EXPLODED VIEW

This specification has for its object all DDWS for household washing appliances in order to reduce water hardness.

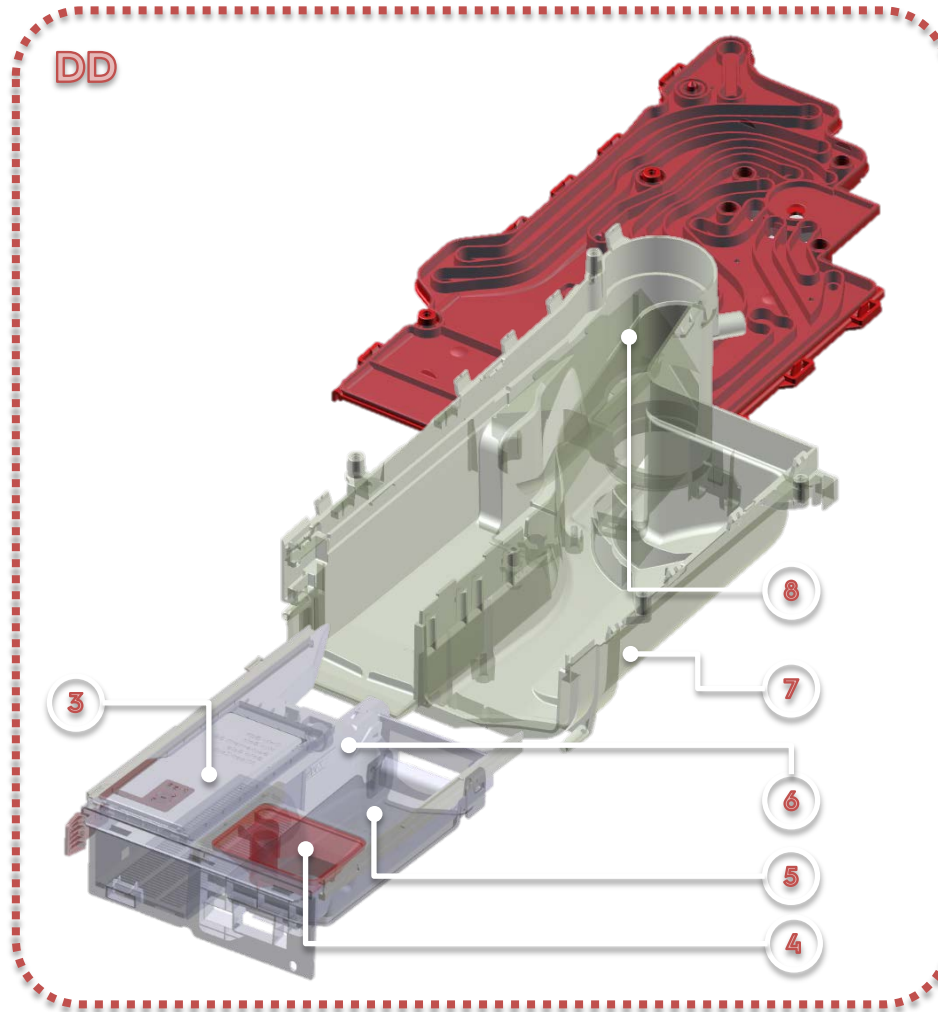
WS



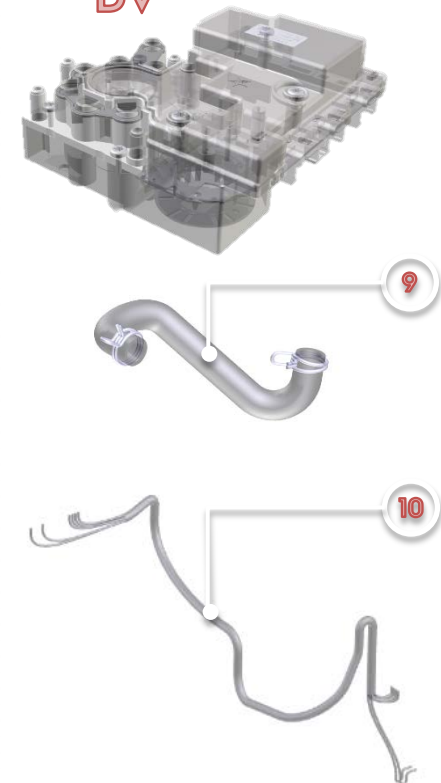
Legend

1	Brine tank
2	Resin tank
3	Salt tank
4	Softener chamber
5	Main wash chamber
6	Drawer
7	Housing
8	Conveyor asmy
9	Drain pipe
10	DV-WS wiring harness
WS	Water Softener
DD	Detergent Dispenser
DV	DiVerter

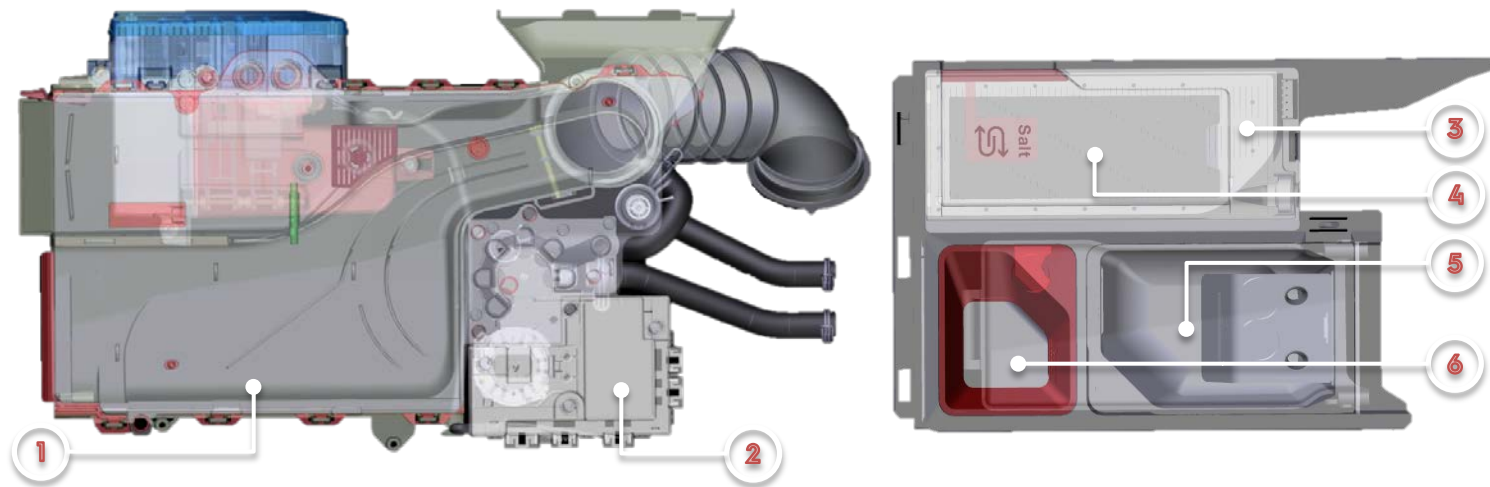
DD



DV



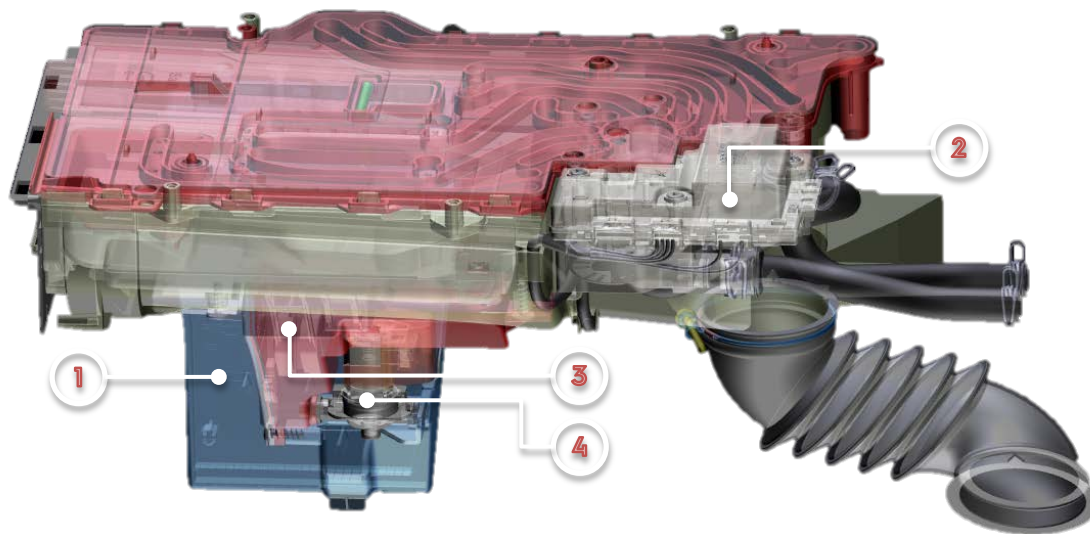
4.2 DETERGENT DRAWER



Detergent, additives and salt are loaded in the DD by the end customer.

1. Conveyor cover
2. DiVerter
3. Salt tank
4. Salt tank cover
5. Main wash chamber
6. Softener chamber

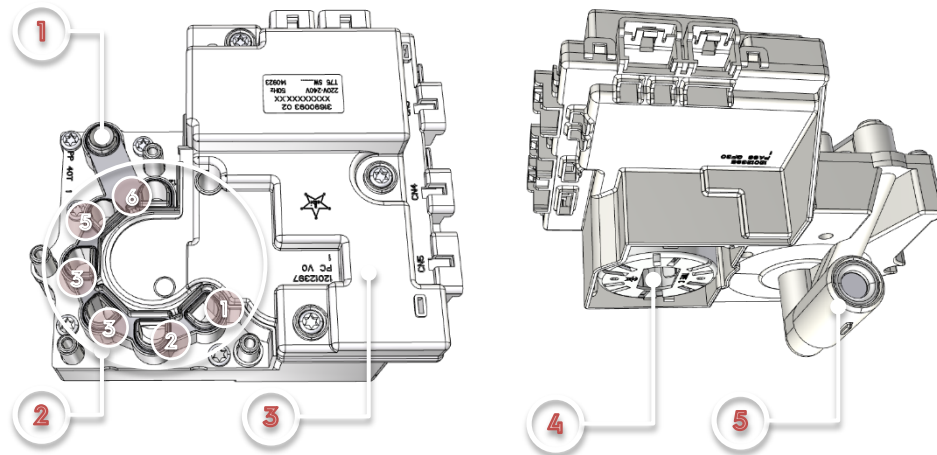
4.3 DETERGENT DRAWER WITH WATER SOFTENER



The resin is contained in the WS (not accessible to the end user) and periodically chemically regenerated by brine.

1. Resin tank
2. Diverter with motor
3. Brine tank with density and level sensors
(to manage and control the brine flow to the brine and resin tanks)
4. Water softener pump
(to fill brine and resin tanks with brine and to discharge them)

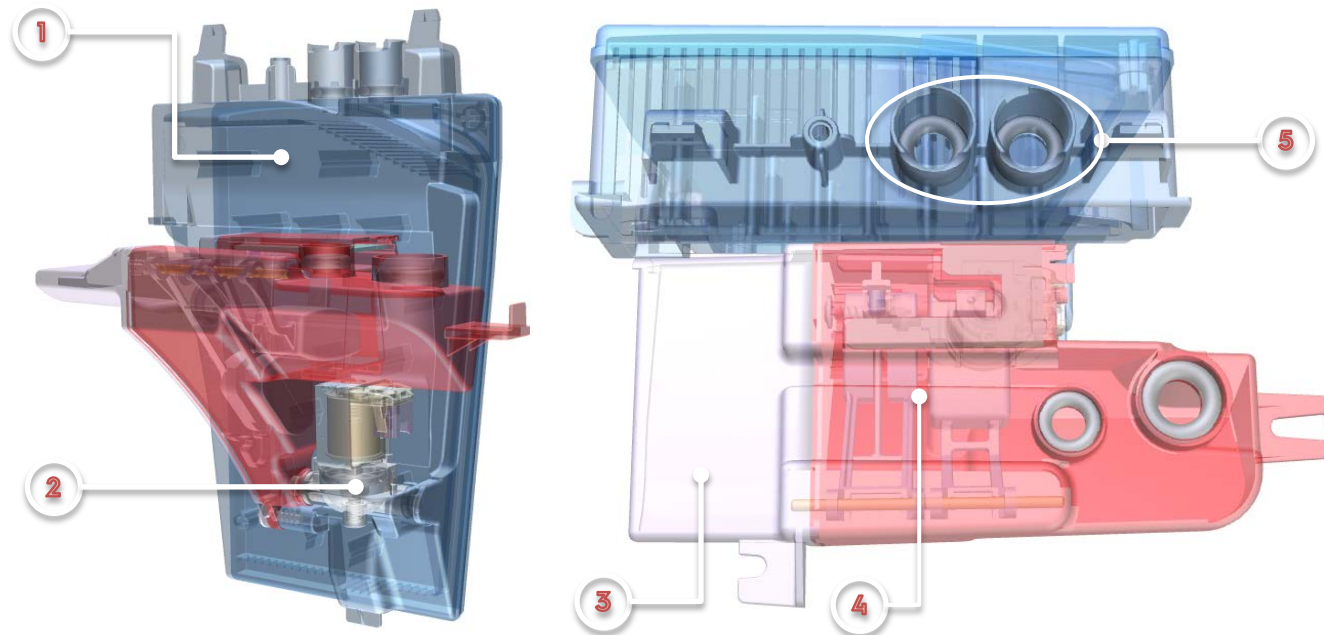
4.4 DIVERTER ASSEMBLY



All inlet and outlet water flows are managed by DV.

1. Water inlet
2. Water outlets
3. DiVerter electronic board
4. 230V AC motor
5. Water inlet for hard water valve

4.5 BRINE TANK

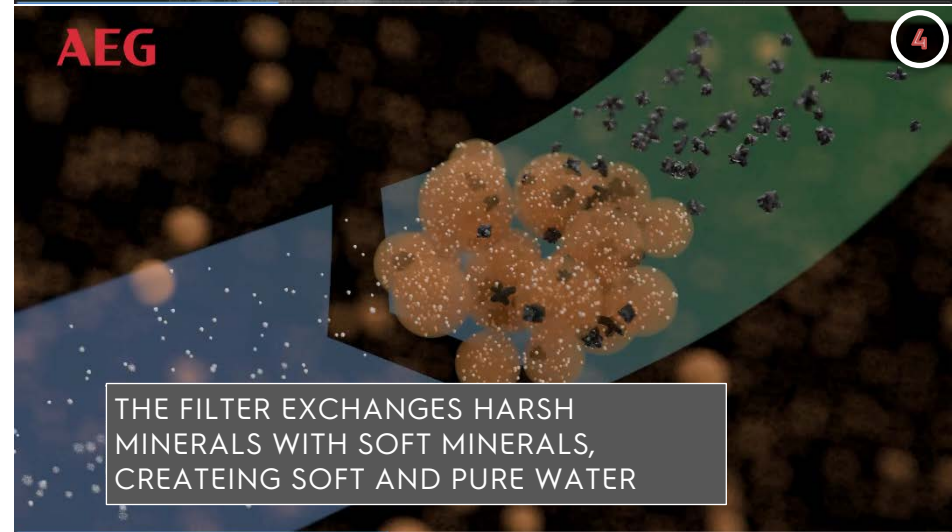
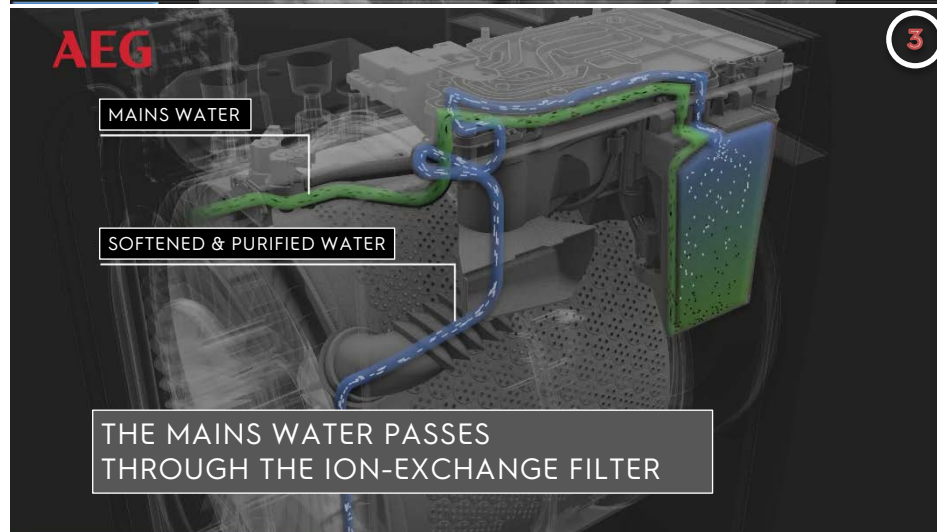
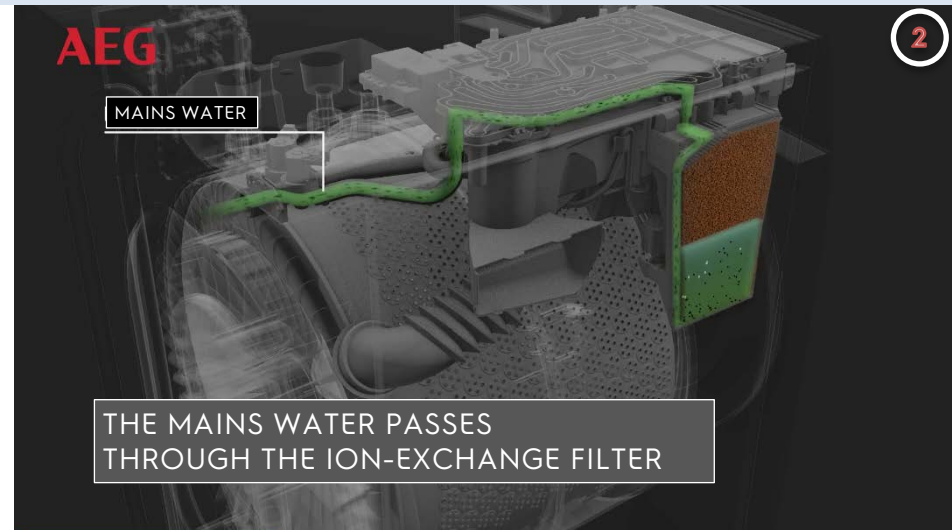
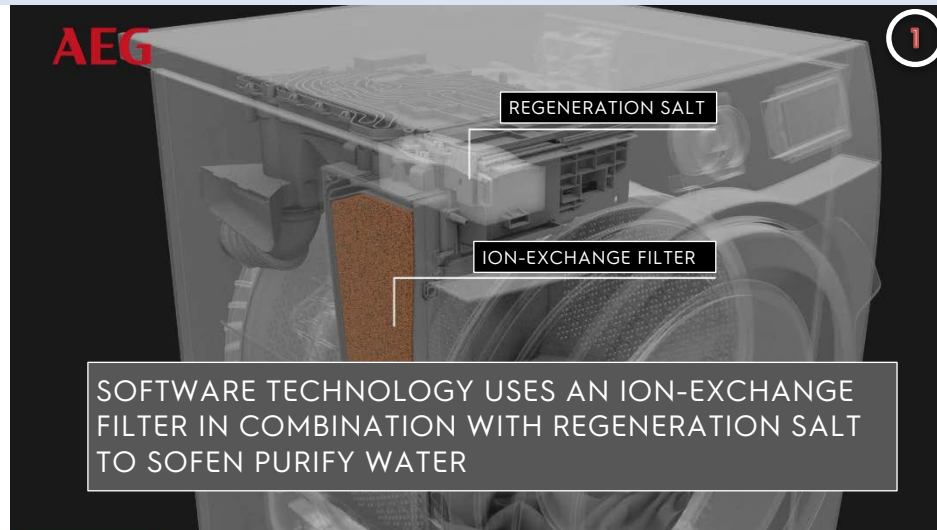


The brine is a sodium chloride solution created dissolving salt in water. The resin exchanges the hardness collected from water with the sodium ion present in the brine.

1. Resin container
2. Vibration pump
3. Brine chamber
4. Density and level sensors
5. Water inlet/outlet for resin container

5 TECHNICAL AND FUNCTIONAL DESCRIPTION

5.1 WORKING PRINCIPLE

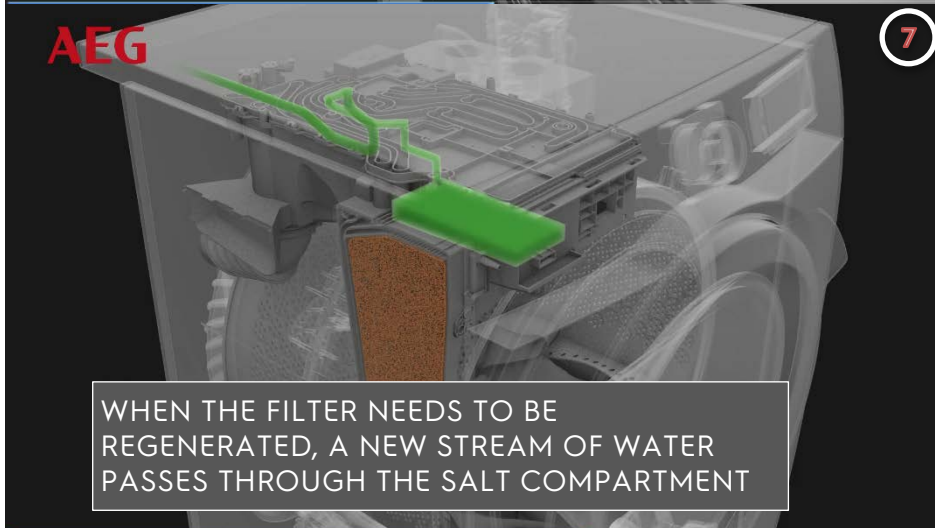




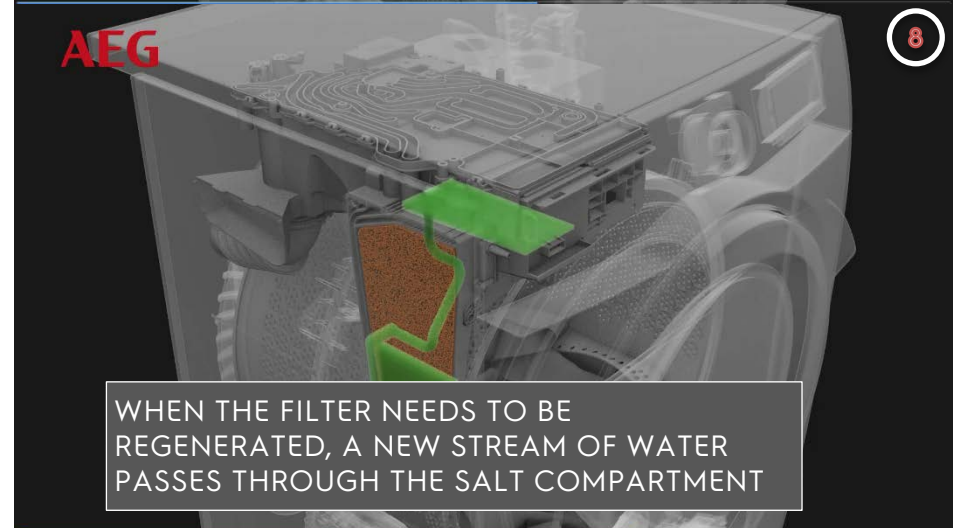
THE SOFTENED AND PURIFIED WATER IS USED FOR WASHING GARMENTS



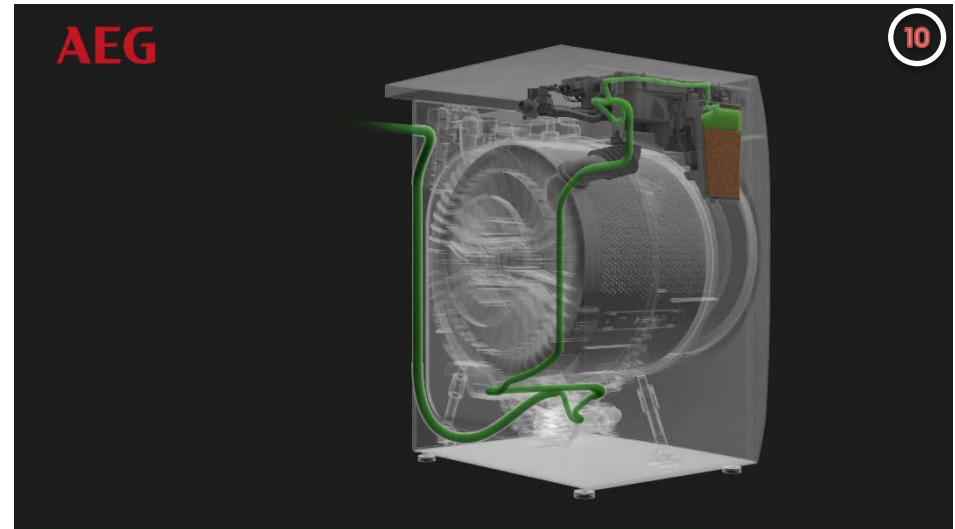
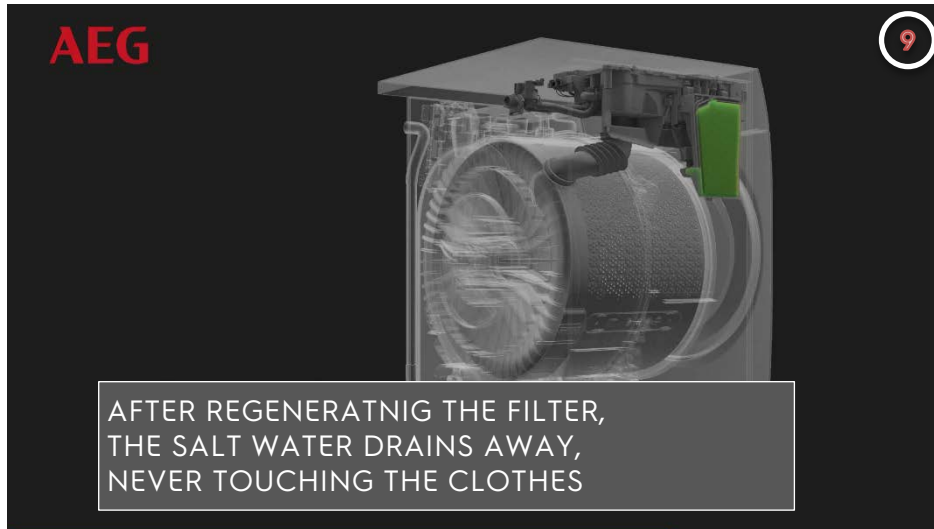
WHEN THE FILTER NEEDS TO BE REGENERATED, A NEW STREAM OF WATER PASSES THROUGH THE SALT COMPARTMENT



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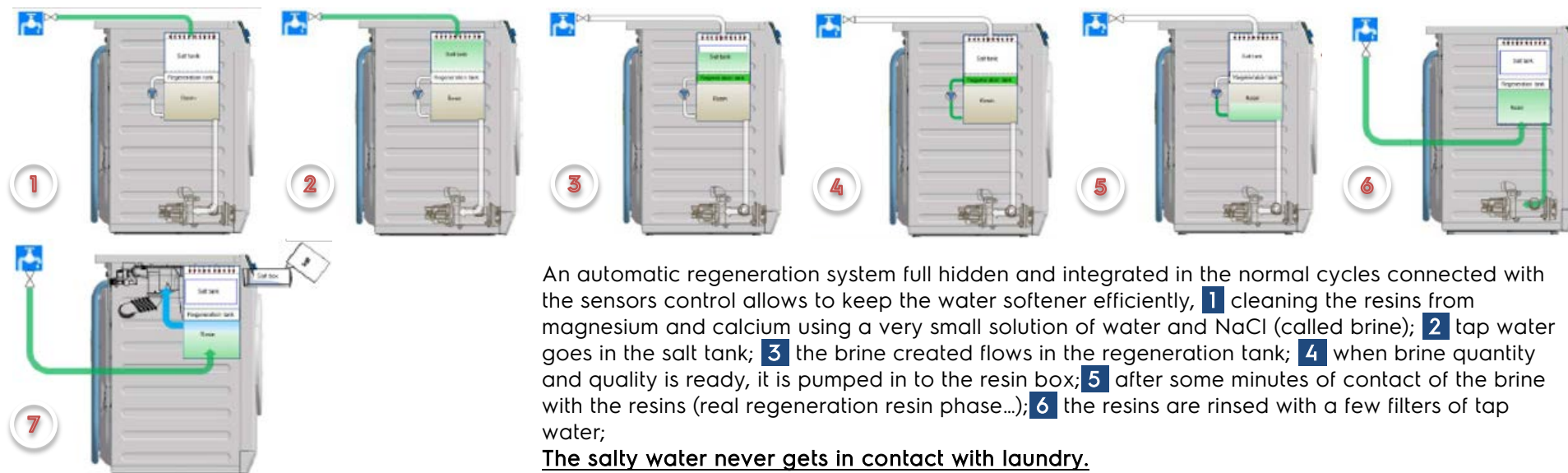


5.2 DETERGENT DISPENSER W/ WATER SOFTENER (DD WS) -NORMAL CYCLES



The detergent dispenser with **1** integrated **water softener** device consists of an automatic filtering system ; **2** the water loaded for washing **3** passes through this **resins** filter **4** it makes the water hardness <math><5^{\circ}f</math> **5** and it is used for washing and rinsing phases (optional).

5.3 DETERGENT DISPENSER W/ WATER SOFTENER(DD WS) -REGENERATION SYSTEM PHASE



An automatic regeneration system full hidden and integrated in the normal cycles connected with the sensors control allows to keep the water softener efficiently, **1** cleaning the resins from magnesium and calcium using a very small solution of water and NaCl (called brine); **2** tap water goes in the salt tank; **3** the brine created flows in the regeneration tank; **4** when brine quantity and quality is ready, it is pumped in to the resin box; **5** after some minutes of contact of the brine with the resins (real regeneration resin phase...); **6** the resins are rinsed with a few filters of tap water;

The salty water never gets in contact with laundry.

7 To keep the system efficiency, it's needed to refill salt after;

5.4 WATER HARDNESS LEVELS

User can set the water hardness among 7 available levels to tune at best the water softener device. Setting using buttons combination on control panel UI. Water hardness value of local tap water could be provided by municipality or by the use of a water hardness detection strips.

Level	Water hardness mmol/l CaCO ₃	°fH (French degrees)	°dH (German degrees)	°e (Clark degrees)
C01	≤ 0.5	≤ 5	≤ 2.8	≤ 3.5
C02	0.6 - 1.3	6 - 13	3.3 - 7.3	4.2 - 9.1
C03	1.4 - 2.1	14 - 21	7.8 - 11.7	9.8 - 14.7
C04*	2.2 - 2.9	22 - 29	12.3 - 16.2	15.4 - 20.4
C05	3.0 - 3.7	30 - 37	16.2 - 20.1	21.1 - 26.0
C06	3.8 - 4.5	38 - 45	21.2 - 25.1	26.7 - 31.6
C07	≥ 4.6	≥ 46	≥ 25.7	≥ 32.3

*factory settings

The optimal water hardness settings guarantee:

- The right salt consumption
- Optimal device functionality (no resin oversaturation)

5.5 SALT REFILL SCENARIO

Level	Hardness	°fH (French degrees)	Amount of water treated (l)	Soft water used only in main wash		Soft water used only in full wash	
				Number of cycle before regeneration	Salt refilling every (weeks)	Number of cycle before regeneration	Salt refilling every (weeks)
C01	Very soft	≤ 5	520	32	70	8	18
C02	Soft	6 - 13	260	16	35	4	9
C03	Medium-Soft	14 - 21	108	7	15	2	4
C04*	Medium	22 - 29	65	4	8	1	2
C05	Medium-Hard	30 - 37	46	3	6	1	2
C06	Hard	38 - 45	36	2	5	1	1
C07	Very Hard	≥ 46	30	2	4	0	1

*factory settings

- Functionality of the device maintained at best (soft water upper threshold set at 5fH)
- Coarse salt refill amount 650gr (useful for 10 regenerations)
- Estimation done on ICRT averaged cycles: 1 cotton 80% FL, 1 synthetic 4kg, 1 cotton 40% FL => avg main wash water 16.5l
- Estimation refers to 4.5 cycles per week (Washing Behaviour European Consumers 2015 UNIBONN)

5.6 MAIN FUNCTIONALITIES

By default during all rinses hard water is loaded in the DD, but optionally soft water can be selected by the end user as well. The WS is used for:

- Soft water load into the main wash chamber and detergent and/or additives removal.
- Resin regeneration.

In the first case the hard EV activation allows hard water from supply network to enter directly in the resin tank for softening process and then to pass by RTO through the main wash chamber. The resin regeneration is a chemical process that foresees the following steps:

- Brine tank filling: soft EV is activated to let hard water from supply network pass through salt tank and to storage brine, created by dissolution of salt in water, in the brine tank.
- Resin tank filling: WS pump is activated to pump brine in the resin tank and allow resin regeneration process.
- Resin tank discharge: WS pump is activated to discharge exhaust brine into the drain circuit.
- Brine tank wash: hard EV is activated to clean brine tank by hard water from supply network.
- Brine tank discharge: WS pump is activated to discharge hard water mixed with residues of brine into the drain circuit.
- Resin tank wash: soft EV is activated to clean resin tank by hard water from supply network.

Cycle phase	DDWS functionality	DDWS functionality description	DV position	Hard EV	Soft EV	WS pump	WS lever sensor	WS density sensor
Main wash	Preload	Load hard water directly into tub	3	Default				
	Main load	Load soft water into main wash chamber to remove detergent	4		Default			
Intermediate rinse	Main load	Load hard water into main wash chamber	4	Default	Optional			
Final rinse	Main load	Load hard water into softener chamber	2	Default	Optional			
Resin regeneration	Brine tank filling 1	Fill brine tank (through salt tank) if level sensor value is zero	5		Default		Read	Read
	Pause	Pause to wait for brine outflow						
	Brine tank filling 2	Fill brine tank (through salt tank) to guarantee tank filling if level sensor value is zero and store sensor values	5		Default		Read	Read
	Pause	Pause to wait for brine outflow						
	Resin tank filling 1	Pour brine inside resin tank if allowed by sensors (DV in position 3 to allow overflow from resin tank to tub)	3			ON	Read	Read
	Brine tank filling 3	Fill brine tank (through salt tank) if requested by level sensor	5		Default		Read	Read
	Pause	Pause only if brine tank filling 3 done						
	Resin tank filling 2	Pour brine inside resin tank (DV in position 6 to allow overflow from resin tank to brine tank)	6			ON		
	Pause	Pause for chemical reaction between resin and brine						
	Resin tank discharge	Discharge brine into drain circuit and update DV alarms table (comparing last sensor values with stored ones)	3			ON	Read	Read
	Brine tank wash	Load water to clean brine tank	6	Default				
	Brine tank discharge	Discharge water into drain circuit until sensor values are zero or an established time is elapsed	3			ON	Read	Read
	Resin tank wash	Load water to clean resin	3		Default			

Table. Functionalities description and their relationship with DV positioning and the use of electro-valves, WS pump and WS sensors

5.7 HYDRAULIC & ELECTRIC AND ELECTRONIC SCHEME

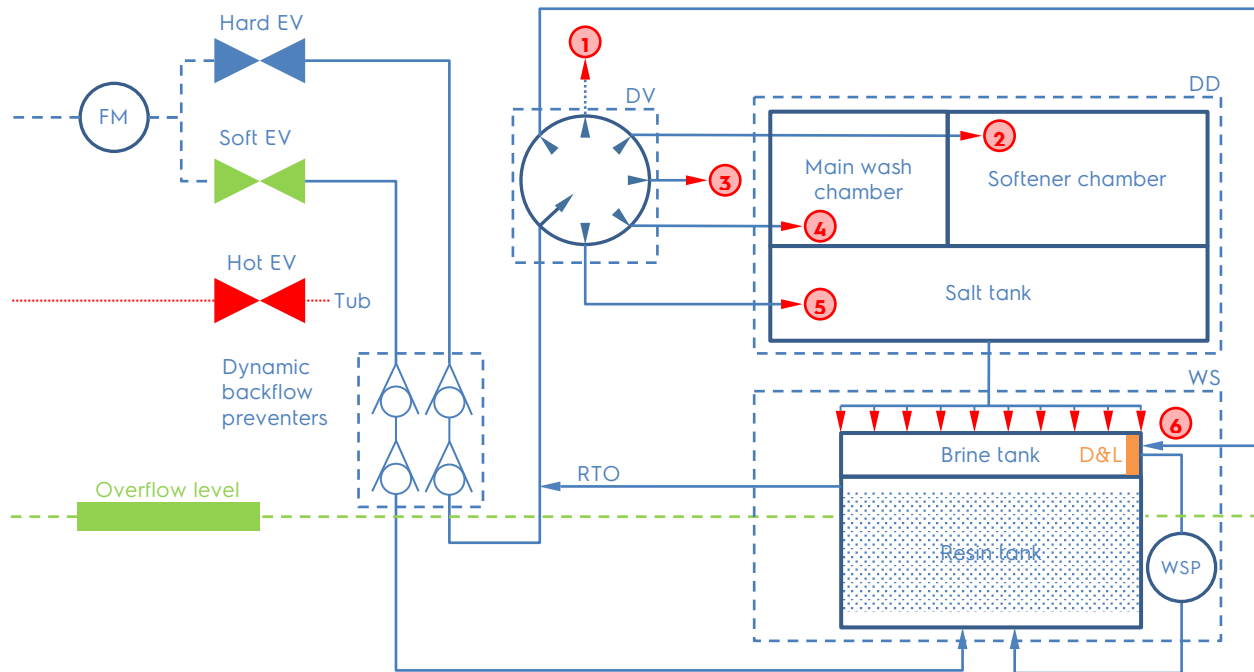


Fig. DDWS hydraulic scheme

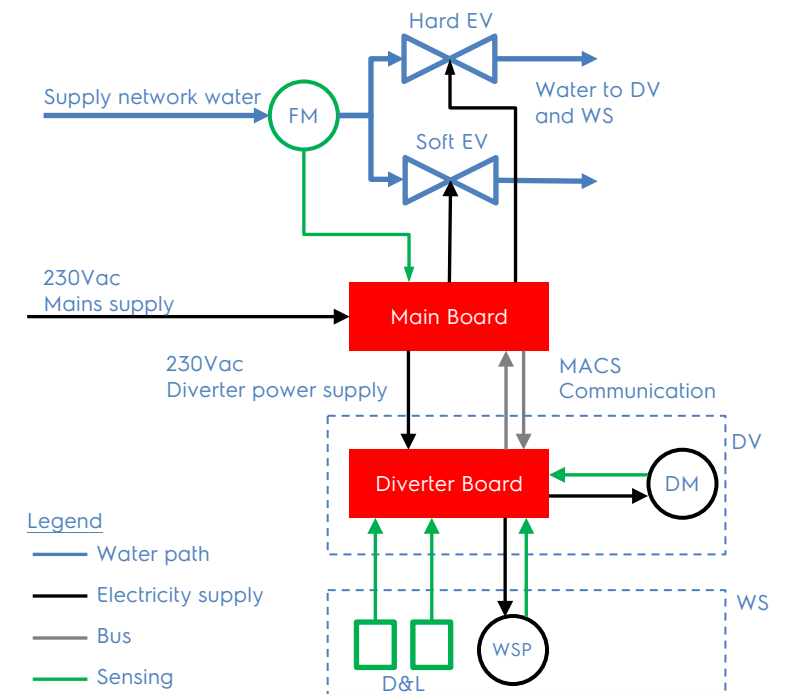
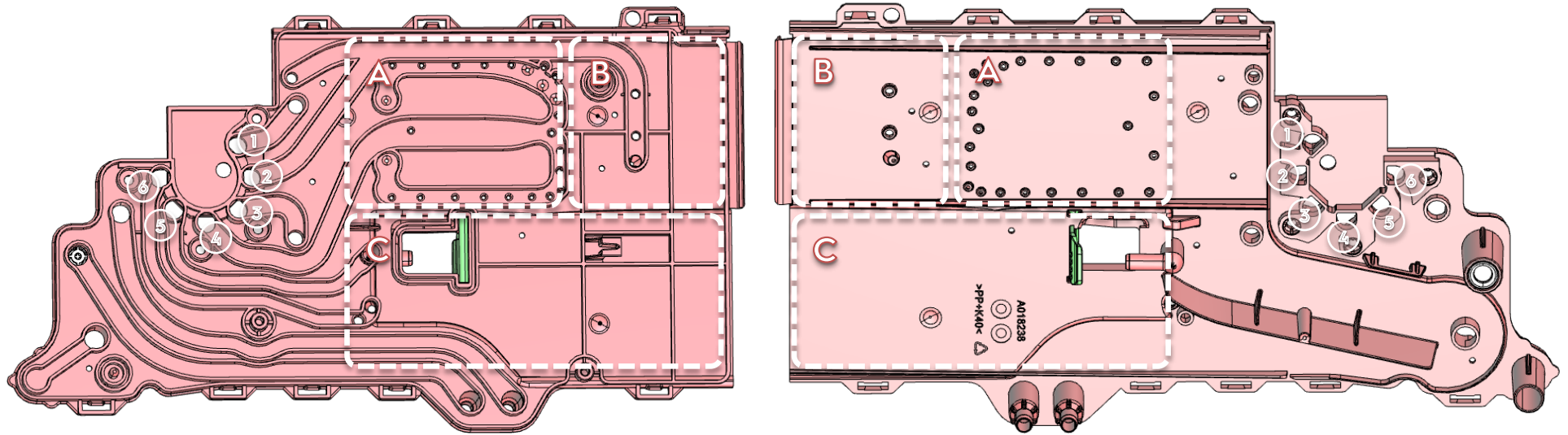


Fig. DDWS electrical scheme

Hot EV is optional and loads hard water directly into the tub. Different DV positions in the hydraulic scheme are identified by the numbers in the red circles. Each position is associated to specific cycle phases and DDWS functionalities.

Electro-valves nominal flow characteristic:

- Hot EV \approx 5.5 l/min.
- Soft EV \approx 5.5 l/min.
- Hard EV \approx 8.0 l/min



DV position	Cycle phase	DDWS functionality
1	Not used	Water load into stain/bleach chamber or prewash chamber
2	Final rinse	Hard water load into softener chamber (soft water optional)
3	Main wash	Hard water preload directly into tub
	Resin regeneration	Resin tank overflow management to tub Resin tank discharge Brine tank discharge Resin tank wash
4	Main wash	Soft water load into main wash chamber
	Intermediate rinse	Hard water load into main wash chamber (soft water optional)
5	Resin regeneration	Brine tank filling through salt tank
6	Resin regeneration	Resin tank overflow management from resin to brine tank Brine tank wash

- A. Main wash chamber
- B. Softener chamber
- C. Salt tank

Table. Relationship among DV positions, cycle phases and DDWS functionalities

5.8 WATER INLET PATHS FROM SUPPLY NETWORK (REPRESENTATIVE ONLY)

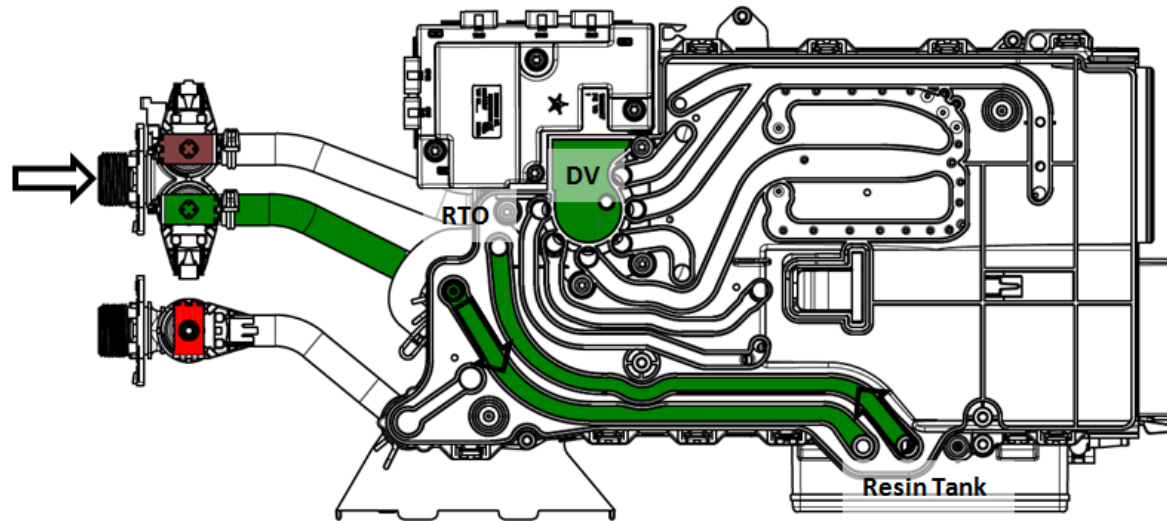


Fig. Soft EV water inlet

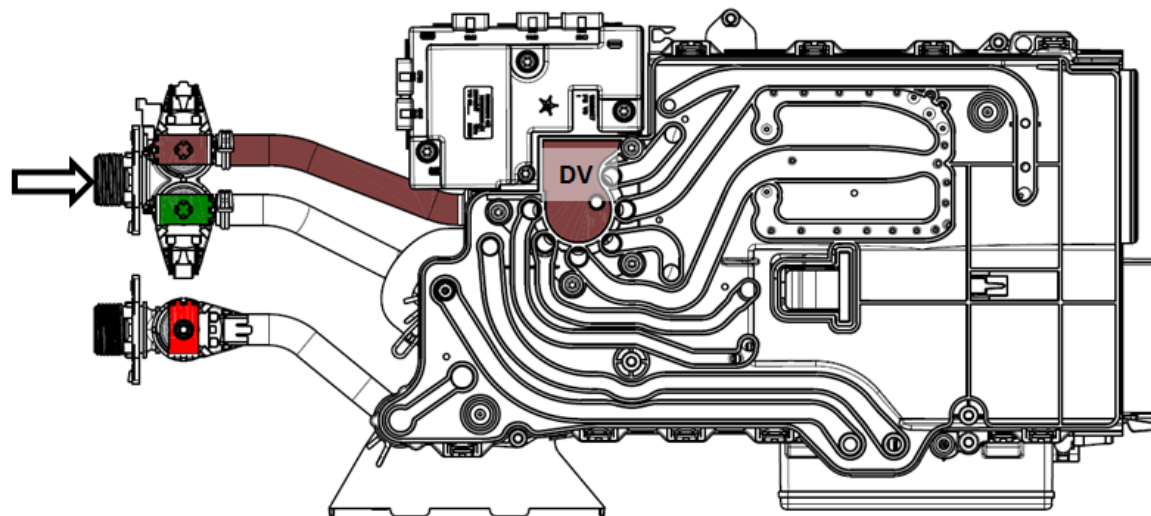


Fig. Hard EV water inlet

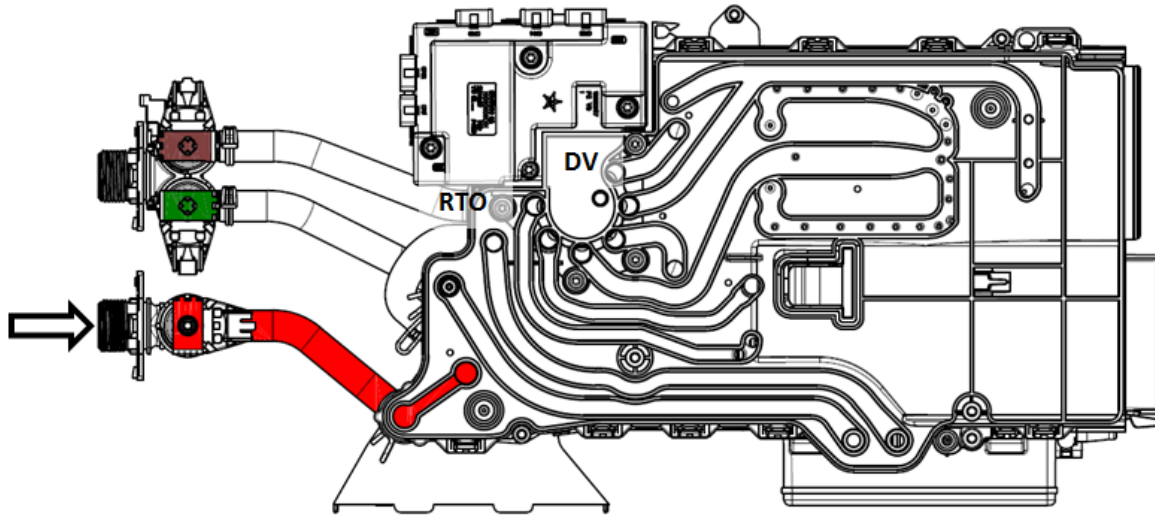


Fig. Hot EV water inlet

5.9 WATER LOAD PATHS INTO DD AND WS (REPRESENTATIVE ONLY)

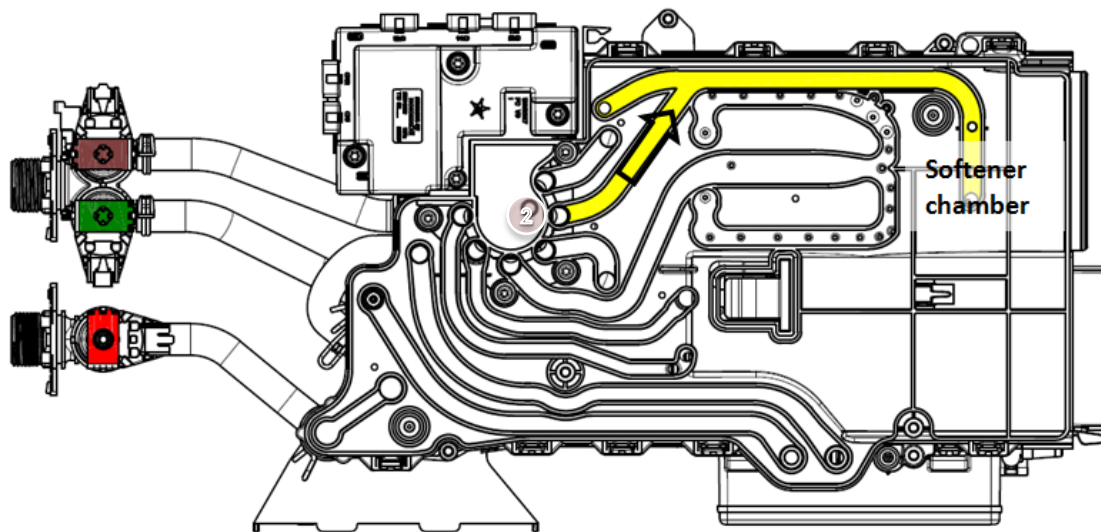


Fig. DV position 2: by default hard EV (optionally soft EV) water load into softener chamber

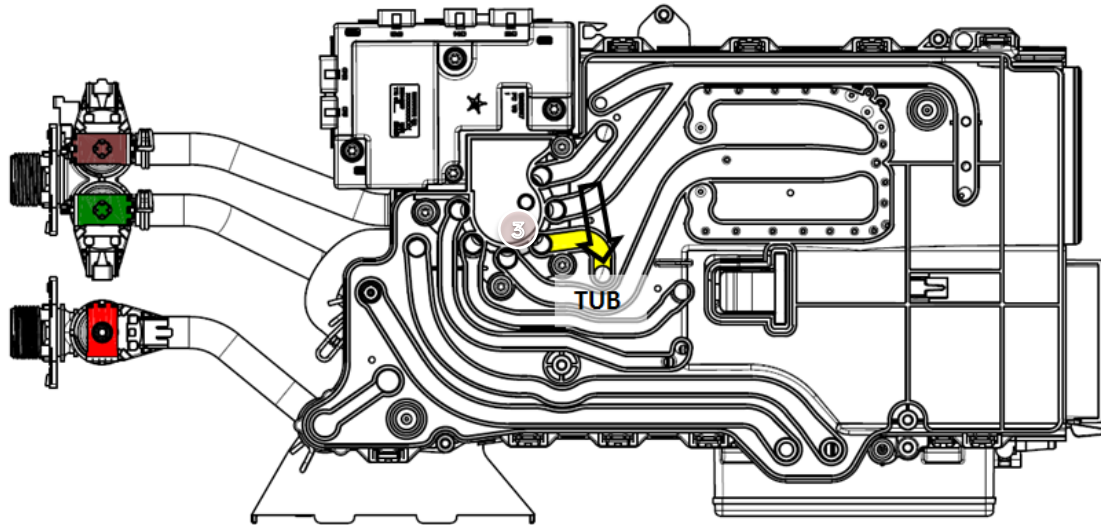


Fig. DV position 3: hard EV water load directly into tub or soft EV water load into tub through resin tank for resin cleaning purpose

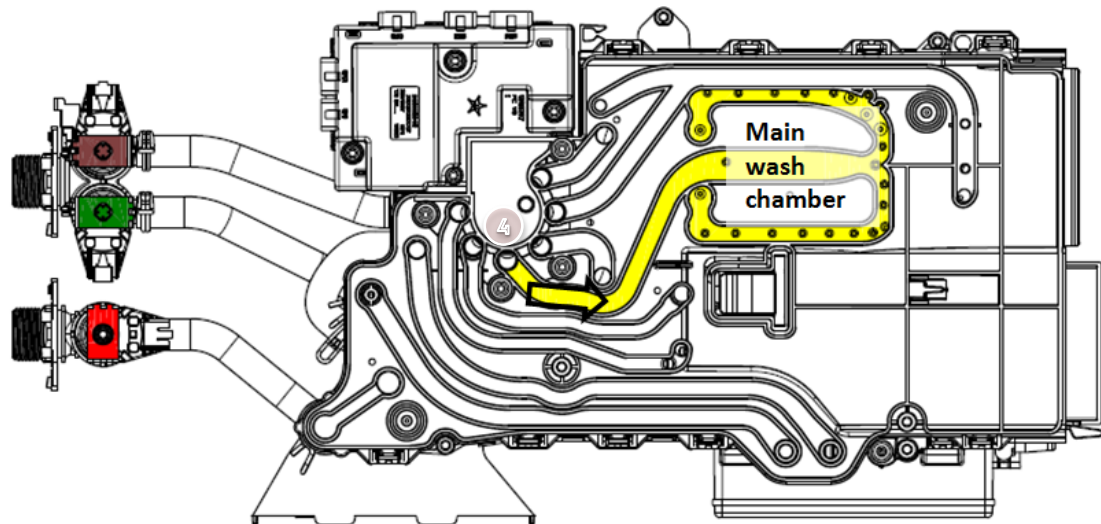


Fig. DV position 4: hard EV or soft EV water load into main wash chamber

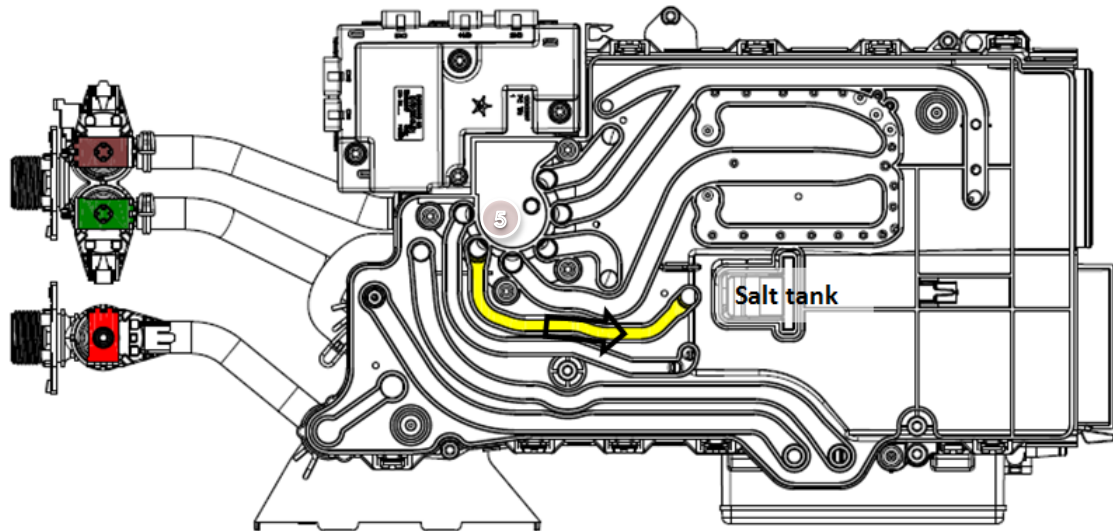


Fig. DV position 5: soft EV water load into salt tank (and brine tank)

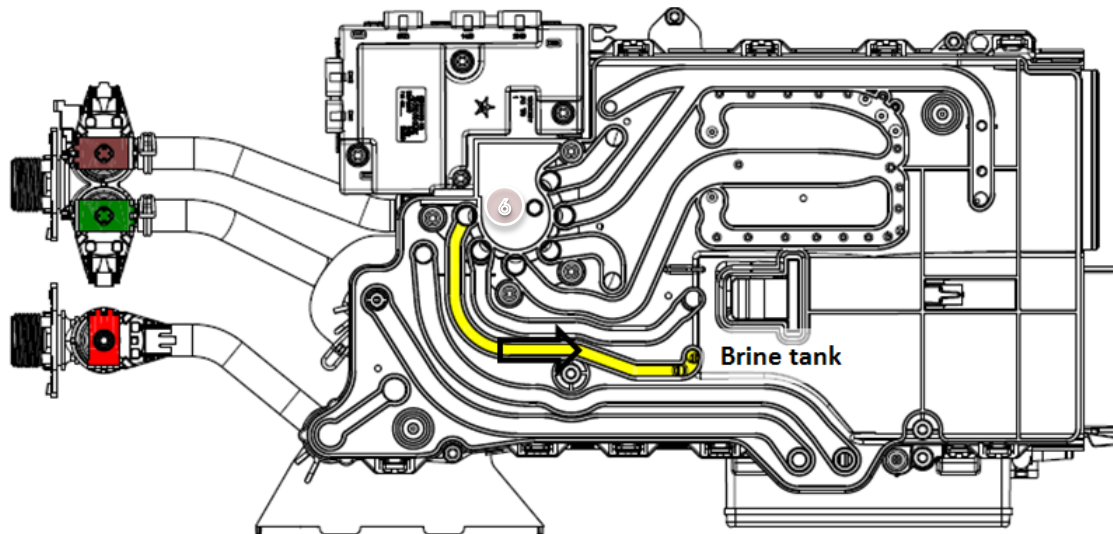


Fig. DV position 6: hard EV water load into brine tank

6 STANDARD AND OPERATING CONDITIONS

6.1 STANDARD AND OPERATING CONDITIONS FOR THE APPLIANCE

Standard conditions specify ambient, supply water and power conditions that must be withstood by the appliance, on which the component is fitted, whenever a performance test is carried out.

Physical magnitude	Unit of measure	Standard conditions			Appliance operating conditions		
		Europe range	North America range(AHAM)	Asia Pacific range	Europe Range	North America Range	Asia Pacific Range
Ambient temperature	°C	In compliance with internal documents			5÷40	5÷40	5÷40
Ambient relative humidity	%				30÷93	30÷93	30÷93
Ambient pressure	Bar	Atmospheric pressure			Atmospheric pressure		
Supply water temperature	°C	10÷20	13÷19	10÷20	2÷20	2÷20	2÷20
Supply water static pressure	Bar	1.9÷2.9	0.7÷8	1.9÷2.9	0.3÷8	0.7÷8	0.3÷8
Supply water hardness	°F	23÷27	=<5	23÷27	5÷40	5÷40	5÷40
Supply power voltage	V	In compliance with nominal values in internal documents			In compliance with working range in internal document		
Supply power frequency	Hz	In compliance with internal document			In compliance with internal document		

Instead operating conditions specify acceptable limits of ambient, supply water and power conditions that the appliance must be able to withstand when used in the field by the customer or whenever a not performance test is carried out.

6.2 NOTES ON MACHINE SETTINGS AND RESET



Information

Machine reset or main board replacement

- In case of machine reset or main board replacement the machine restore the factory functionality
Water softener "ON" in main wash and hardness level set on C04.
*If hardness level is not changed by the end user, the machine will perform 10 cycles (cycles could be any kind of cycle including also a simple drain) without any regeneration. **After 10 cycles regeneration will be performed and machine will work in a normal conditions.***
- **This functionality is not valid for the water hardness levels other than C04**
If the machine is reset or main board replaced and factory level has been changed by the end user (from C04 to other level) machine will work in normal conditions and will require the regeneration when needed.

Based on the previous considerations service need to take care to restore the resin functionality when reset is done. It can be done in different ways:

Option A)

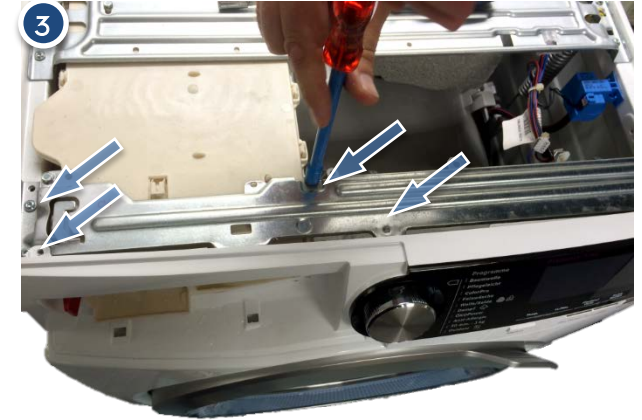
1. Fill with salt
2. Do 1 regeneration in diagnostic mode
3.
 - a) if C04 is set, do 10 "fake" cycles (drains) and run machine normally
 - b) if hardness is moved from C04 to other, run machine normally, no action

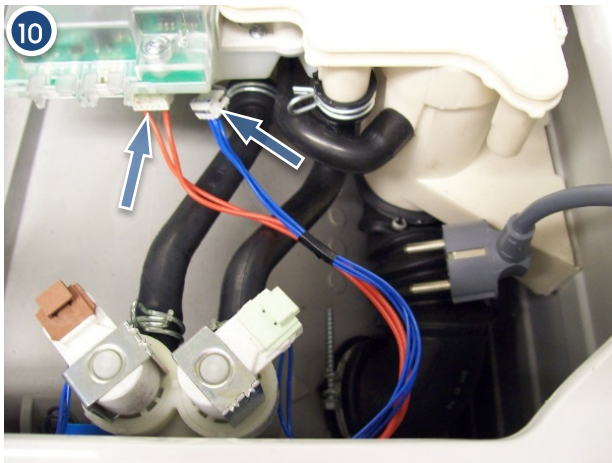
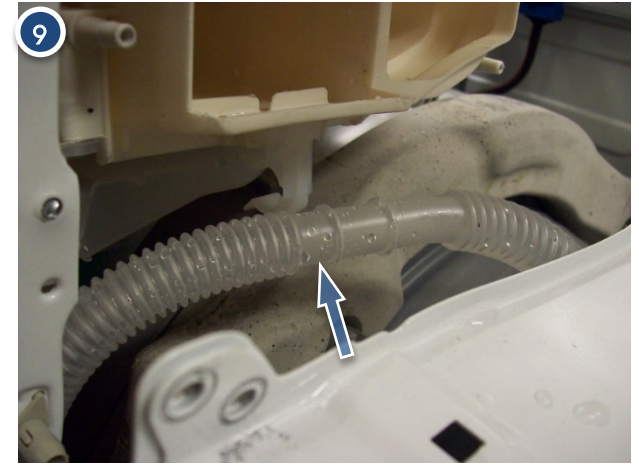
Option B)

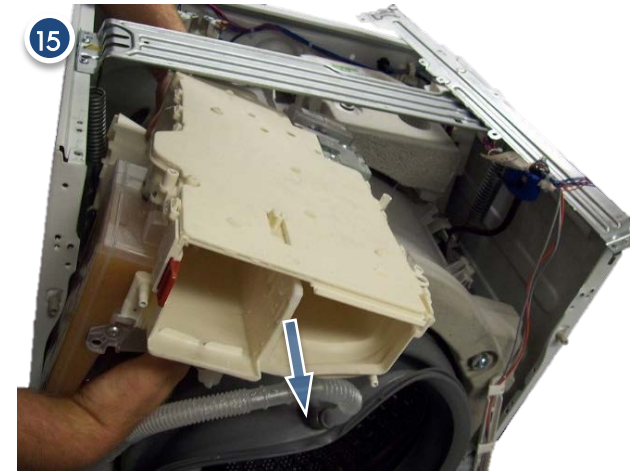
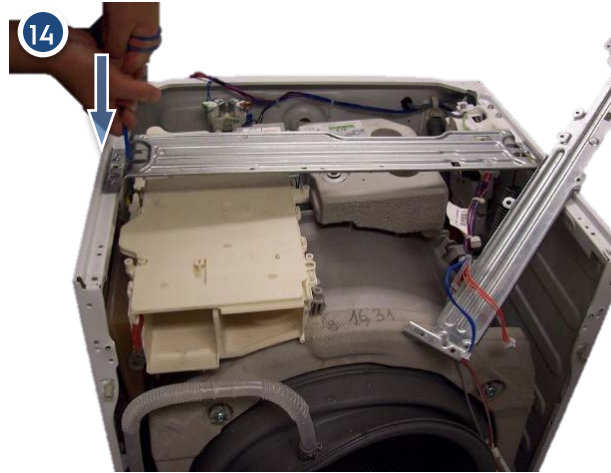
1. Fill with salt
2. Do 4-5 consecutive regenerations in diagnostic mode
3.
 - a) if C04 is set, run machine normally
 - b) if hardness level is moved from C04 to other, run machine normally

7 DISASSEMBLY

7.1 WATER SOFTENER







- 1** Remove worktop and detergent drawer
- 2** Loosen the 2 screws that secure the control panel to the conveyor
- 3** Unfasten the screws which secure: the control panel <=> crossbar / detergent drawer <=> crossbar / crossbar <=> sides of the cabinet
- 4** Disconnect the connector to UI.
- 5** Remove the control panel (making sure to introduce protection to prevent scratching) and put the crossbar on the side of the cabinet.
- 6** Remove the iron ring securing the bellow seal to the unit. Release the bellows seal from the cabinet.
- 7** Detach the door lock.
- 8** Unfasten the screws securing the front panel to the left and right side (indicated by the arrows).
- 9** Unclip the circulation pump hose.
- 10** Disconnect all electric connections to the DiVerter.
- 11** Pull out the tubes from the solenoid valve and the pipe from the tub.
- 12** Place a strong wire or a similar tool under the hook of the left washing group's spring.
- 13** Position of the wire.
- 14** Carefully lower the spring. Keep the wire in place so it will be use later to put the spring back.
- 15** Take the water softener module carefully out towards the front of the machine.
- 16** Water Softener module removed.

8 DEFINITION OF TERMS, ACRONYMS AND ABBREVIATIONS

WM	Washing Machine
WD	Washer Dryer
UI	User Interface
PCB	Printed Circuit Board
MB	Main board, Motherboard
AB	Anti Boiling
NTC	Negative Temperature Coefficient
MCF	Machine Configuration File
CCF	Cycle Configuration File
FCV	Field Control Vectorial, generally used to indicate motor control board
DSP	Digital Signal Processors
DDWS	Detergent Dispenser assemblies with integrated a Water Softener
DV	DiVerter
WS	Water Softener
DD	Detergent Dispenser
Hot EV	Electro-Valve to load hot hard water directly into the tub
Soft EV	Electro-Valve to load soft water in the DD
Hard EV	Electro-Valve to load hard water in the DD
FM	Flow-Meter sensor
WSP	Water Softener Pump
RTO	Resin Tank Outlet to DV
D&L	Density & Level sensors
DM	Diverter Motor