



© ELECTROLUX HOME PRODUCTS
Customer Care - EMEA
Training and Operations Support
Technical Support

Publication
number

599 77 29 – 40

EN

Dishwashers with electronic
control system

DOROTEA

CONTENTS

1. Purpose of this manual.....	4
2. Precautions	4
3. Technical details.....	5
1.1 Product Overview	5
1.2 Structural Parts	6
1.3 Base Details	7
1.4 BottomTray	8
1.5 Assembly instructions of the bottom tray	9
1.6 Lower Front closing & adjustment screw	10
1.7 Metal cover for Main Board.....	11
1.8 Grounding to Metal cover.....	11
1.9 Water circuit	12
1.10 Hydraulic circuit	13
1.11 Hydraulic circuit - Overview	14
1.12 Sump Circ Motor (Variants), Pump and Heater	16
1.12.1 Single phase asynchronous washing pump motor with FD	17
1.12.2 Three phase washing pump BLDC motor with FC.....	17
1.13 Wash Pump with Integrated Heater	18
1.14 Omega Heater an Pump.....	19
1.15 Sump and Drain System (Motor Variants)	20
1.16 Flow controller	22
1.17 Pressure Sensor.....	23
1.18 Turbidity Sensor (High Power Sensor)	24
1.19 Automatic Cycle: AutoSense	25
1.20 Global Dispenser	26
1.21 Multi Dosage – Specification.....	27
1.22 Water Reuse.....	29
1.23 Electronic Main Board.....	30
1.23.1 PB100 With existing EU User Interfaces	31
1.23.2 PB200 With existing EU User Interfaces	32

1.24	Electronic Box for PB100 / PB200	33
1.25	Assembling Sequence for Electronic Box.....	34
1.26	Operation Diagram PB100 - NO WATER REUSE MODEL.....	35
1.27	Operation Diagram PB100 – WITH WATER REUSE	36
1.28	Operation Diagram PB200	37
1.29	Components check for motor	38


1. Purpose of this manual

The purpose of this Service Manual is to provide Service Engineers with technical information regarding the new range of “Dorothea” dishwashers and to give a description of the service functionality.

This Manual describes:

- General characteristics
- Technical characteristics
- Guide to diagnostics

2. Precautions

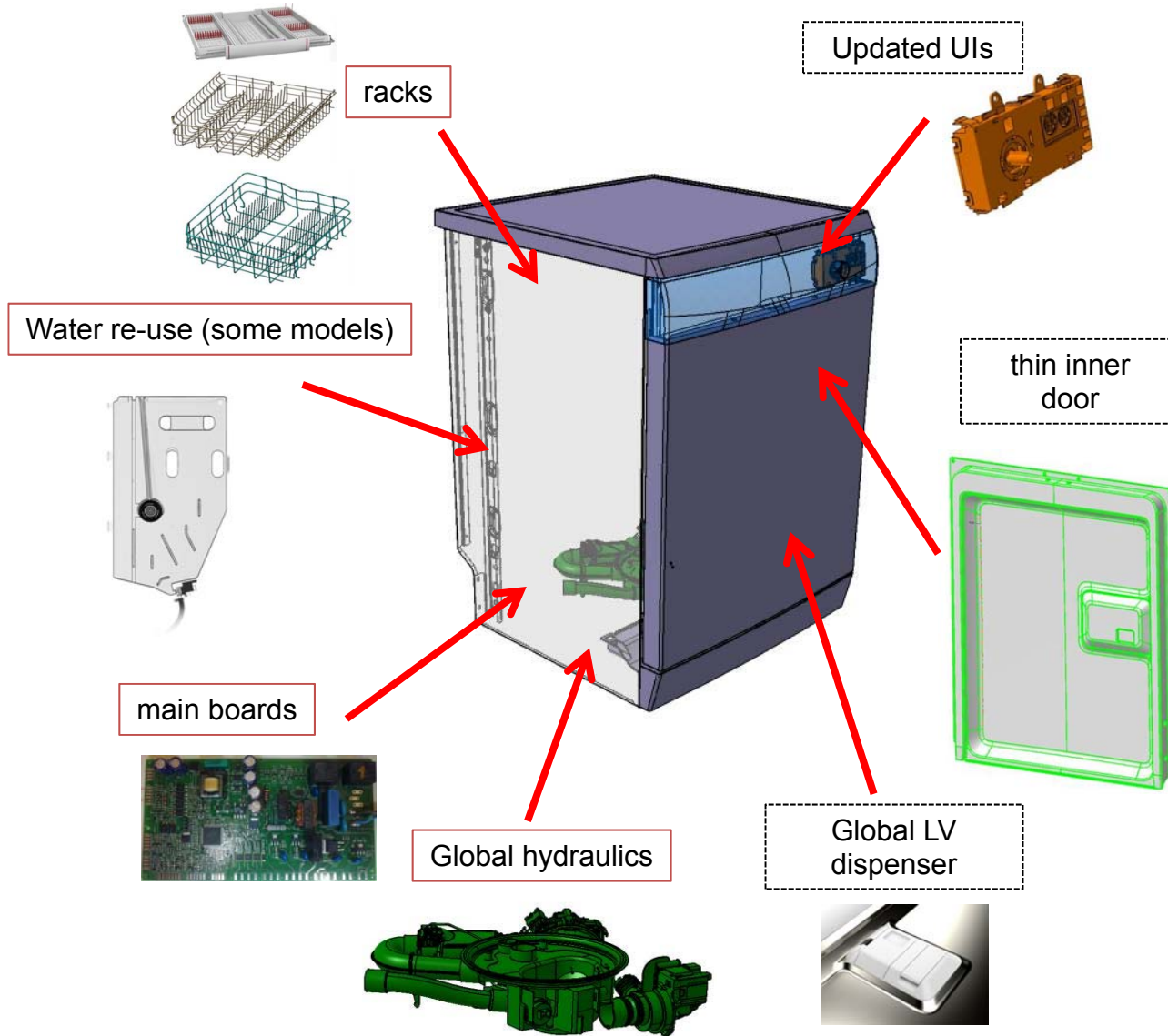
	<ul style="list-style-type: none">▪ Electrical appliances must be serviced only by qualified Service Engineers.▪ Always remove the plug from the power socket before touching internal components.
--	---

Document Revisions

Revision	Date	Description
v0.0	10/2013	Document creation
v0.1	10/2013	UI function
v0.3	10/2013	Technical Details updated
v0.4	12/2013	UI function Details updated
v0.5	01/2014	Technical Details updated
V1.0	06/2014	Technical Details updated
V1.1	08/2014	Technical Details updated
V2.0	10/2014	Technical Details updated
V3.0	01/2015	Technical Details updated
V4.0	08/2015	Alarm codes on separate Service Manual
V5.0	03/2016	Service Mode on separate Service Manual
V6.0	03/2017	Components check

3. Technical details

1.1 Product Overview



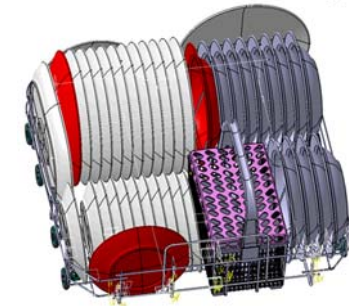
Technical Support – A.R.

5/39

15 place settings –
additional 3. rack for cutlery.

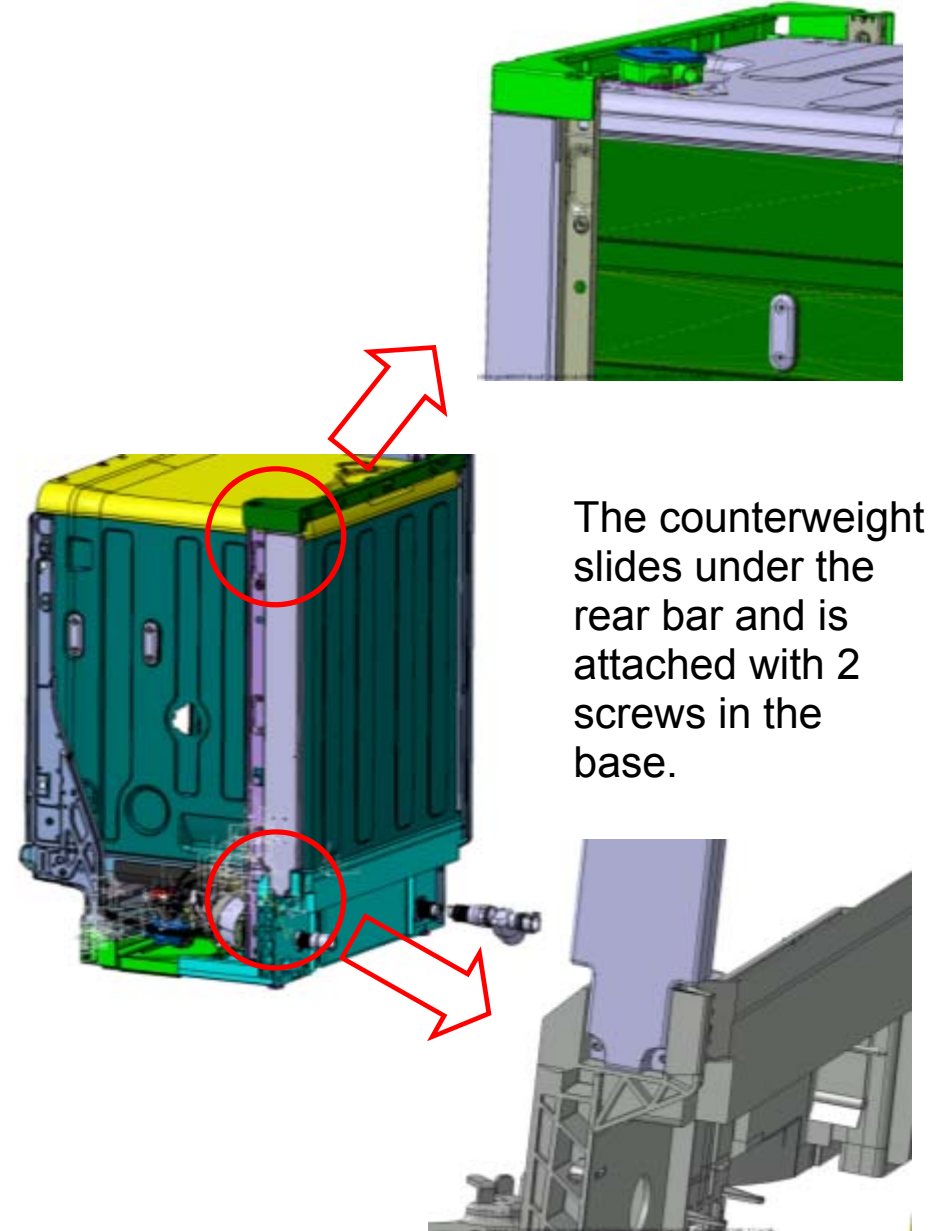
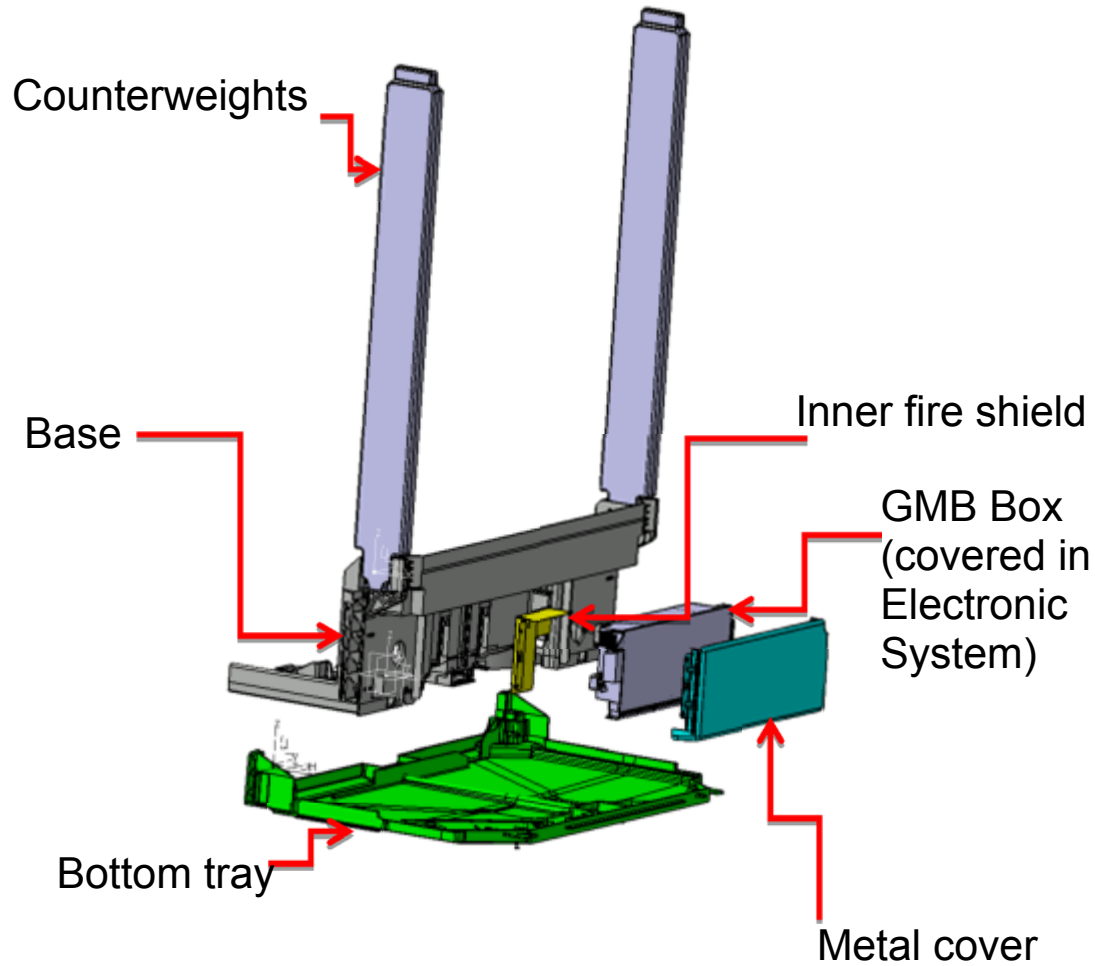


13 Place settings
Existing layout with
added tines and clips



599 77 29 - 40 Rev. 06

1.2 Structural Parts



1.3 Base Details

Rear side

Ribs to prevent that water sprays in to the circuit board if the hose is damaged on the outside just after coming out from dish washer.

Water outlet

Channels for inserting the hooks from the mainboard box when assembling.

Ribs to prevent cables from mainboard to fall down.

Water inlet

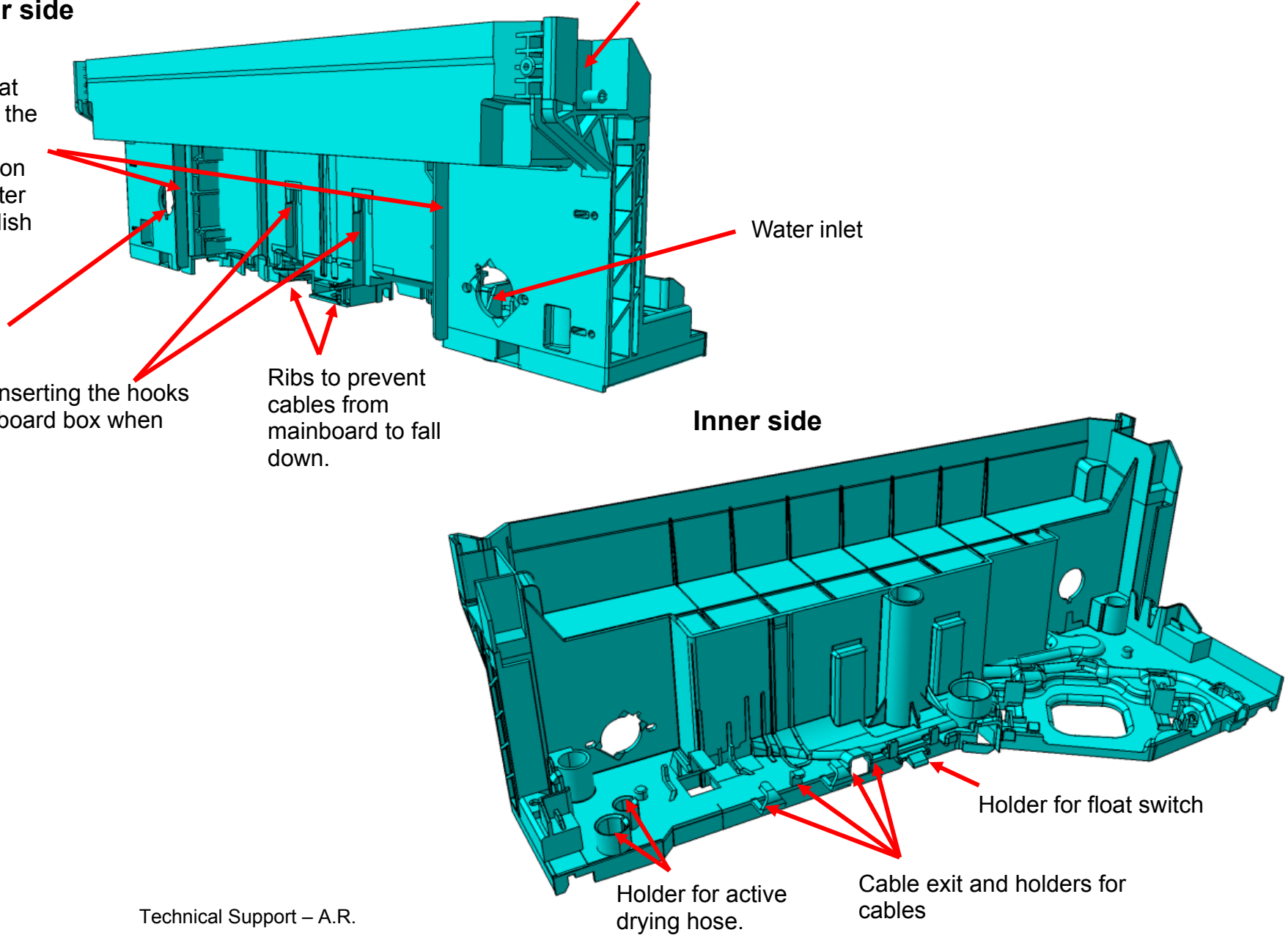
Inner side

Holder for float switch

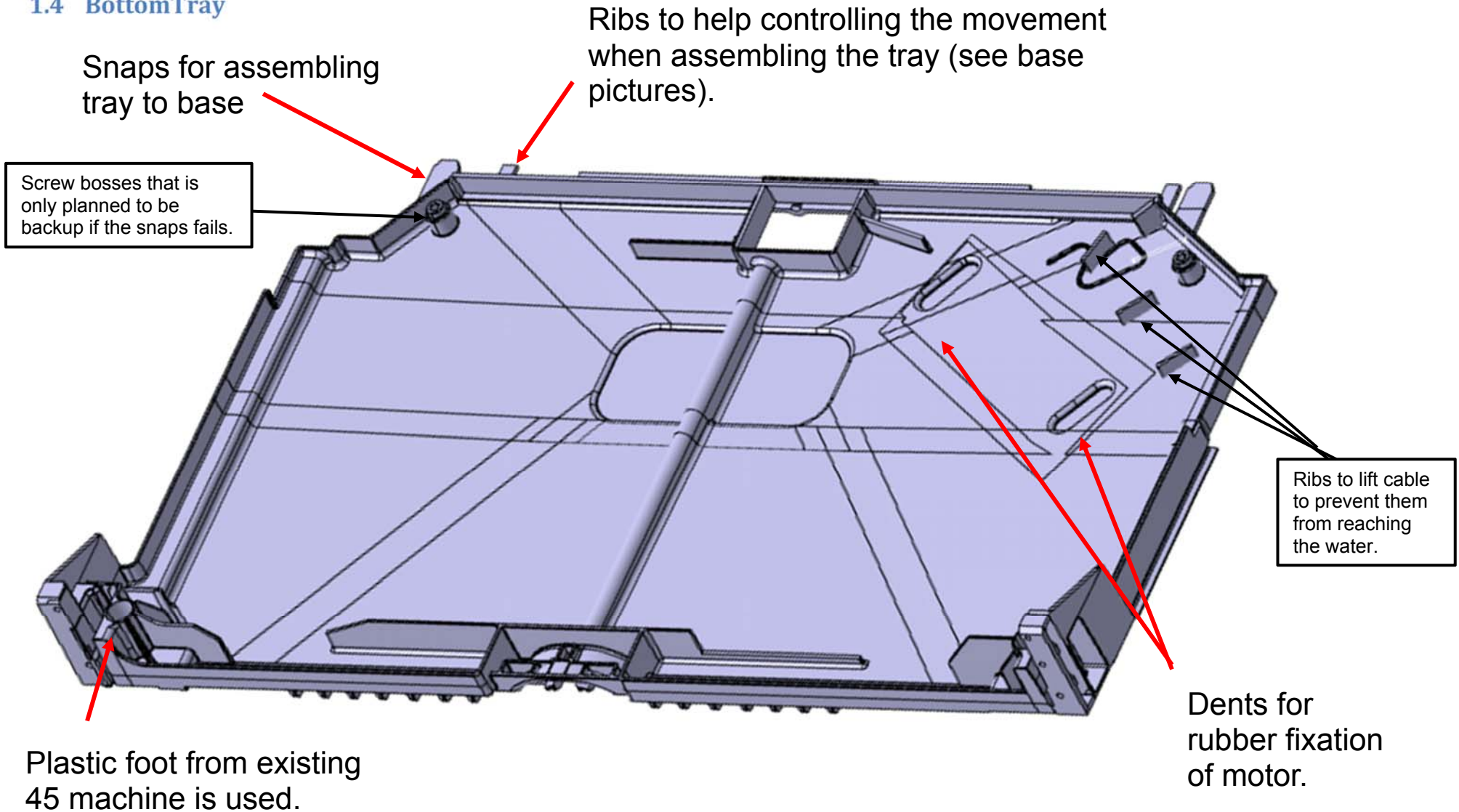
Holder for active drying hose.

Cable exit and holders for cables

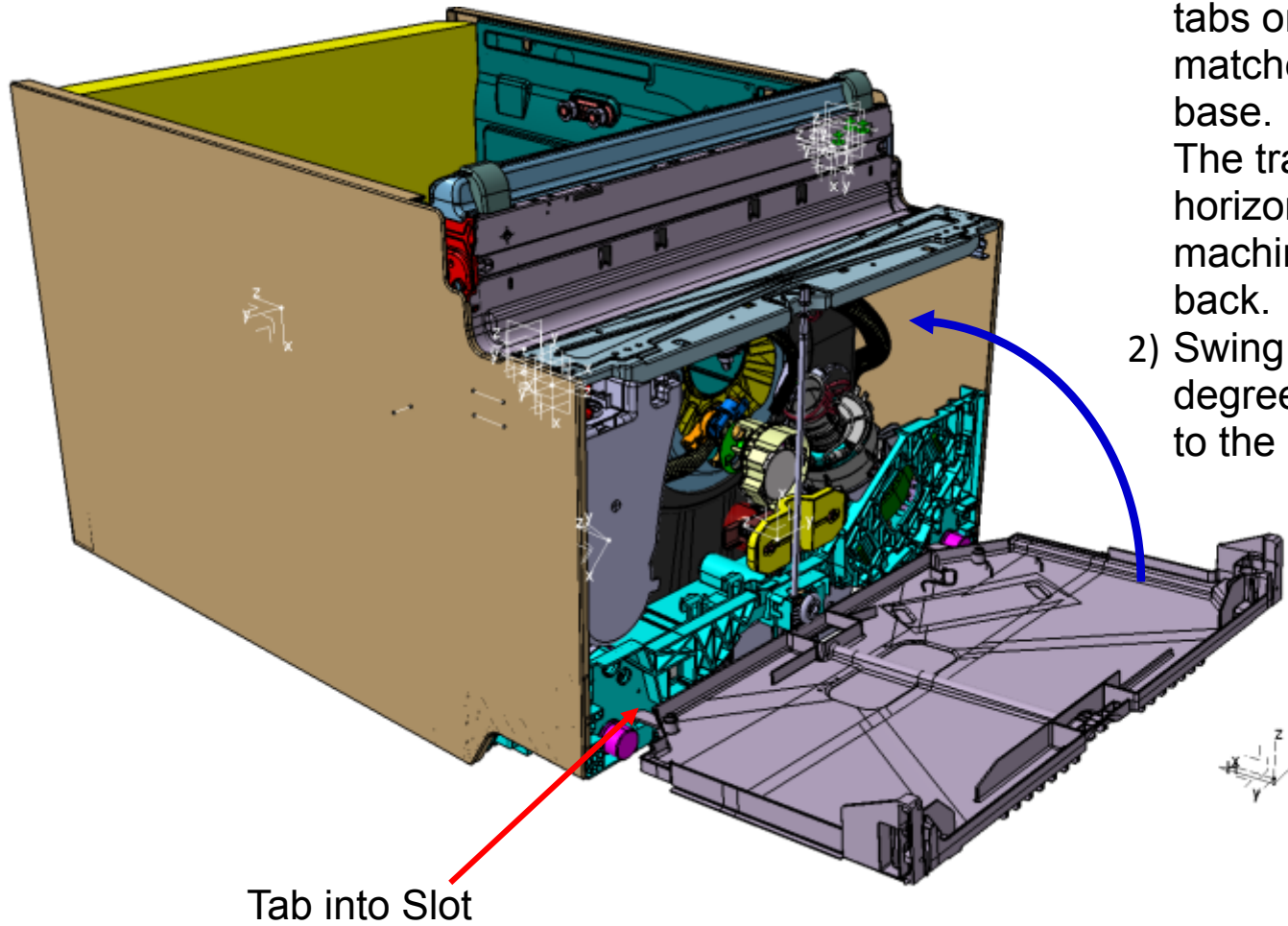
Technical Support – A.R.



1.4 BottomTray



1.5 Assembly instructions of the bottom tray

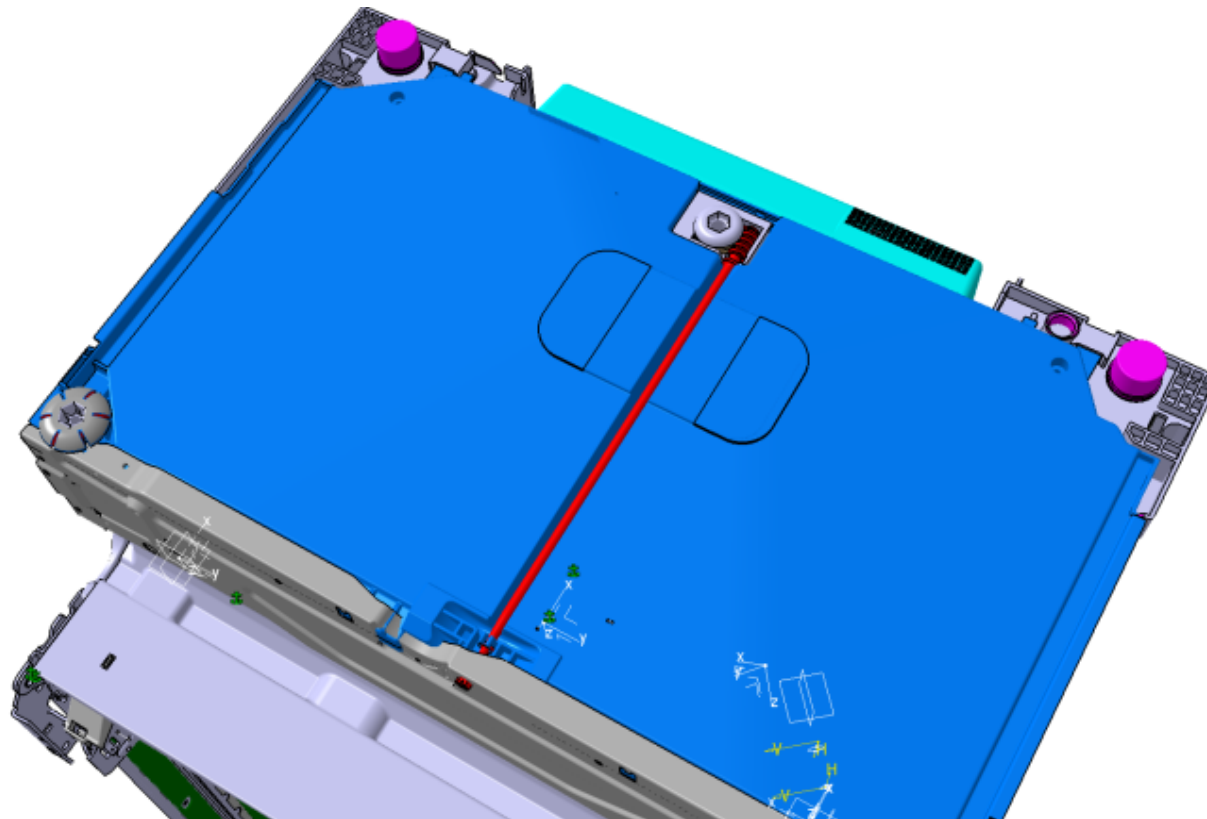


- 1) Locate the tray so the tabs on the tray matches the slots in the base.
The tray should be horizontal if the machine lays on its back.
- 2) Swing the tray 90 degrees and push it on to the hinge bars.

Tab into Slot

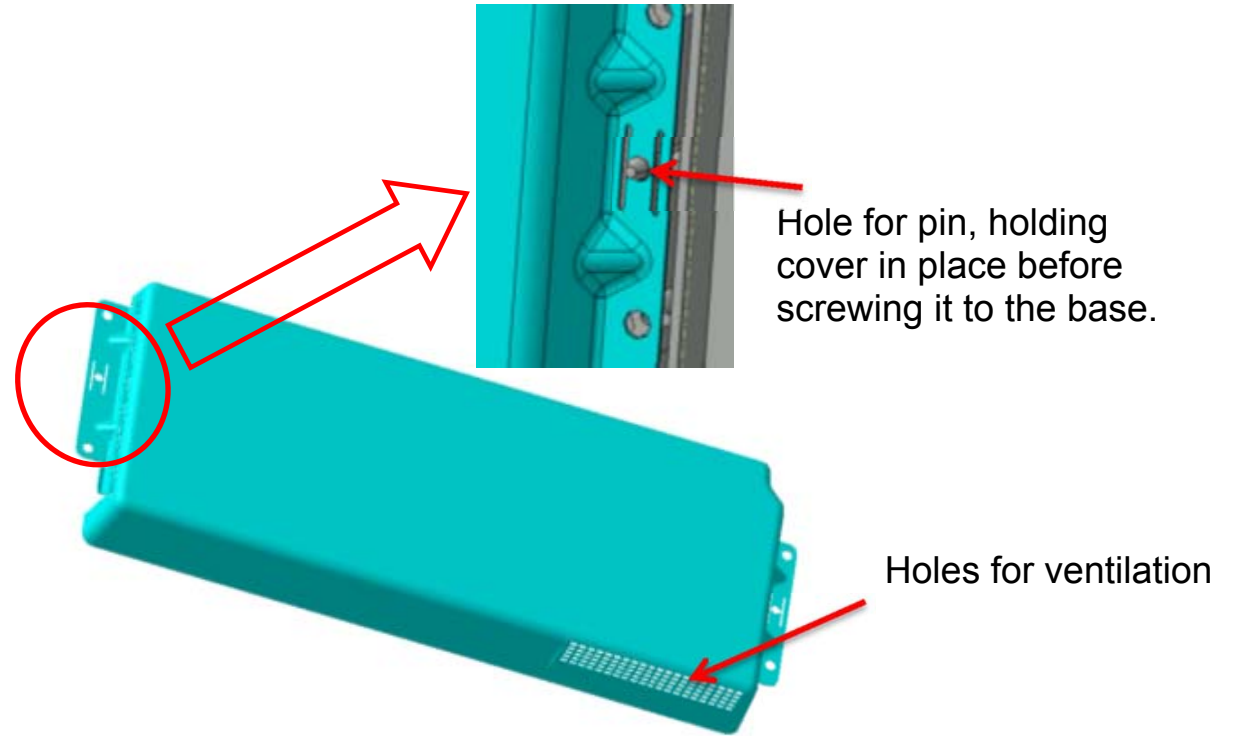
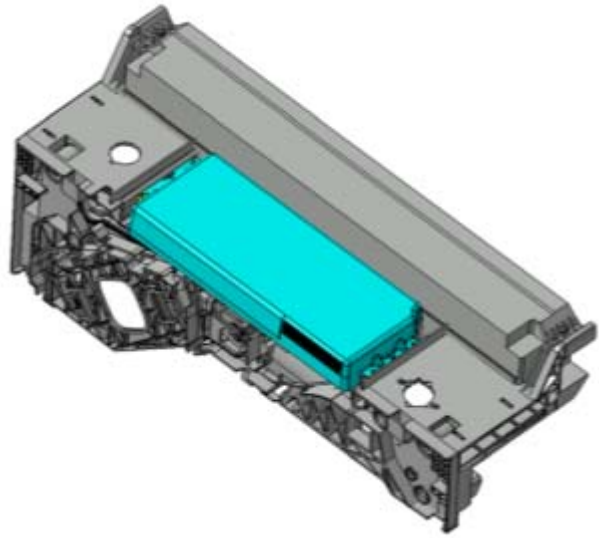
1.6 Lower Front closing & adjustment screw

All machines need shorter adjustment screws since the rear centre foot is moved forward due to pushing forward the electronic box and steel cover to get 40 mm clearance behind the machine for pipes etc in the kitchen.



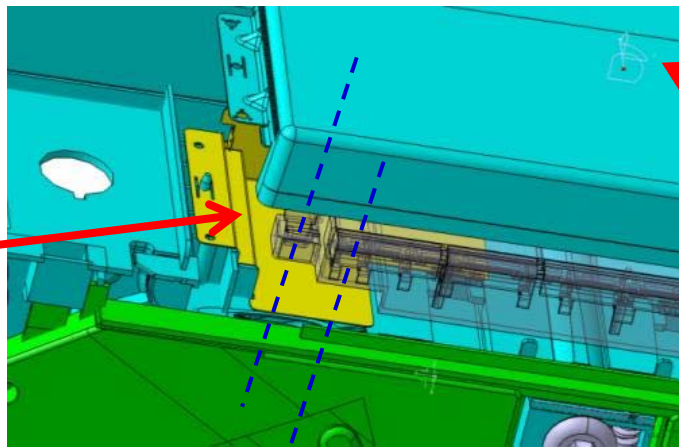
1.7 Metal cover for Main Board

The metal cover is a fire shield and protects the electronics from mechanical stress.



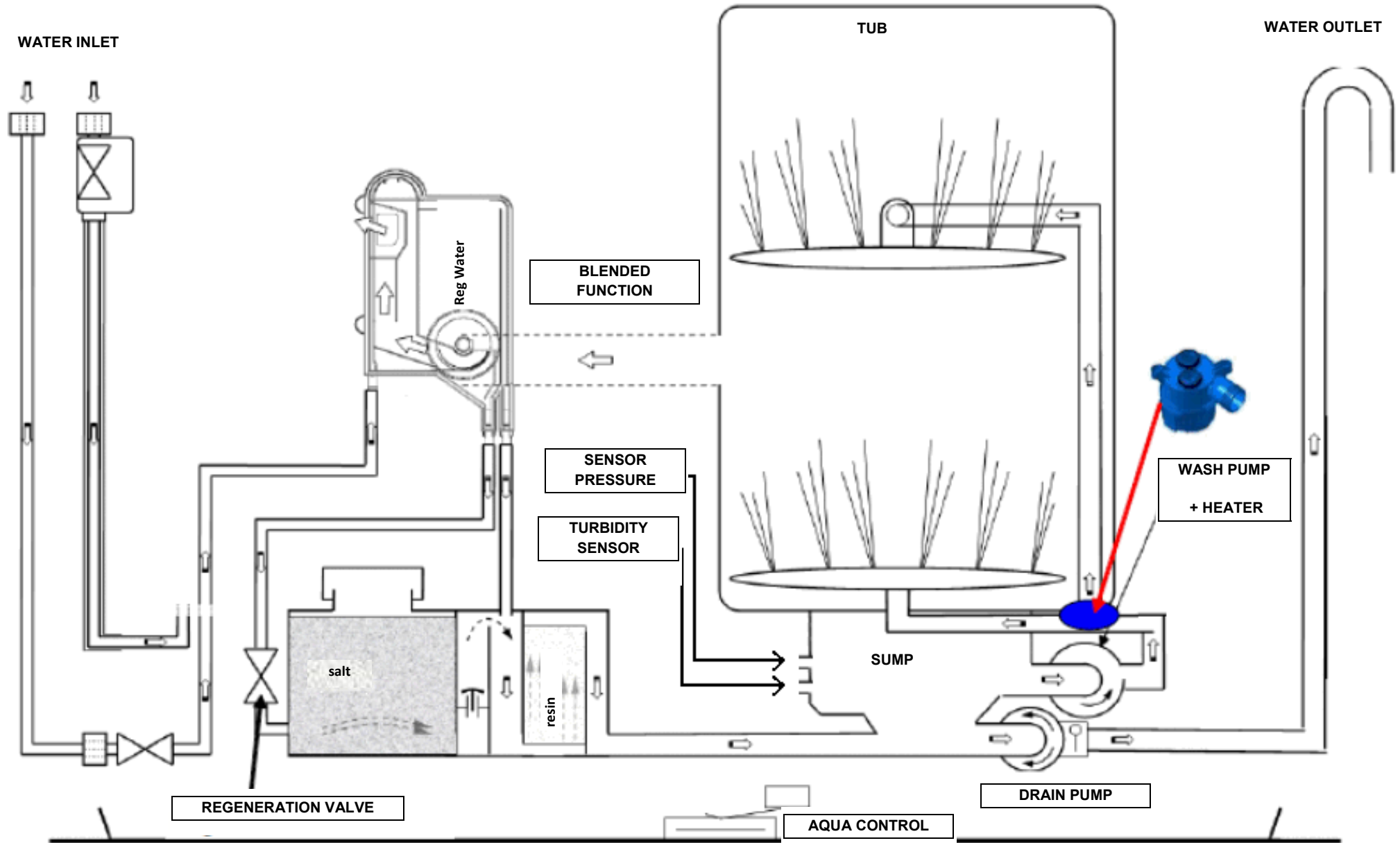
1.8 Grounding to Metal cover

Inner fire shield

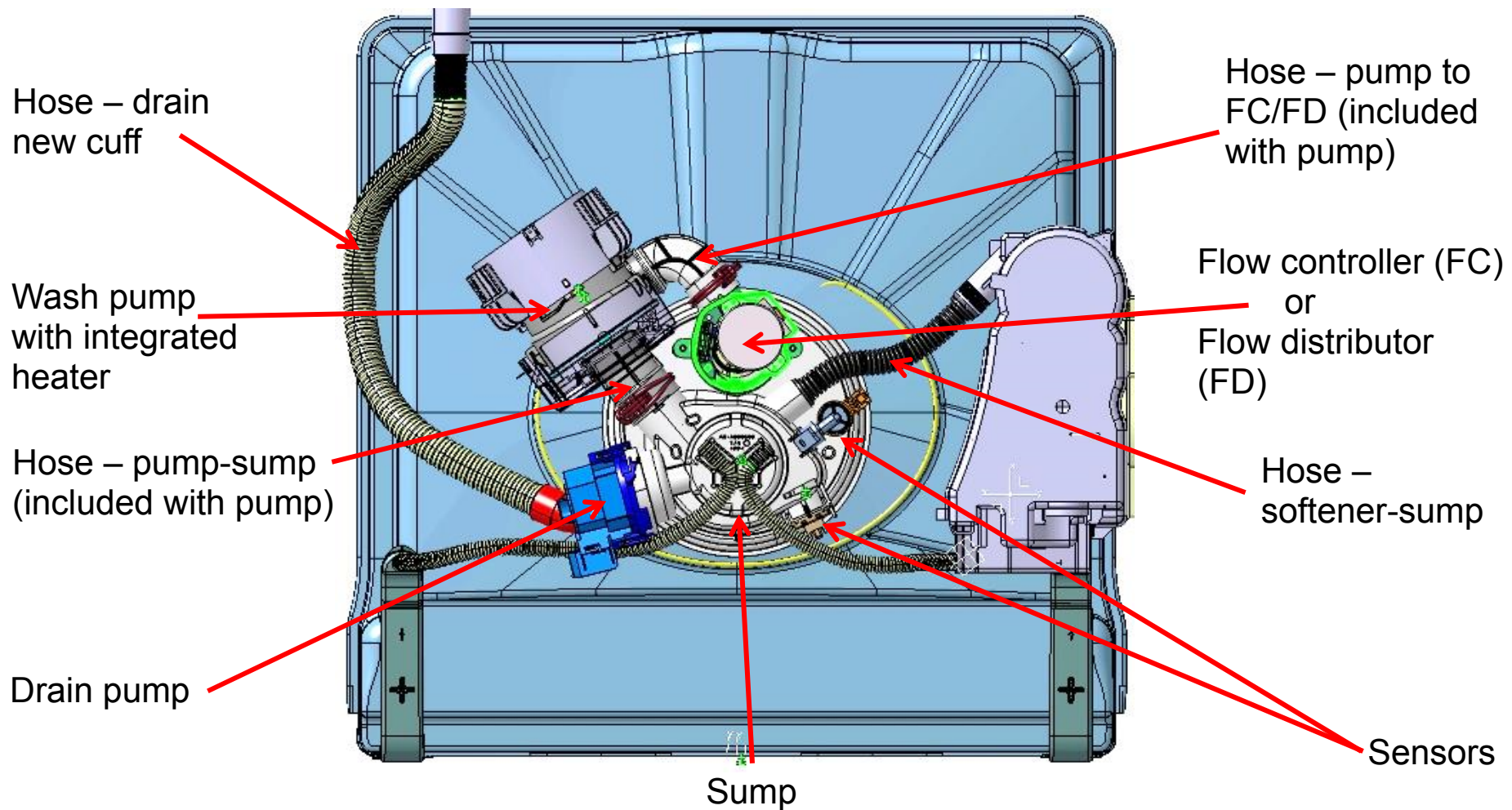


Metal cover to be assembled on top of electronic box

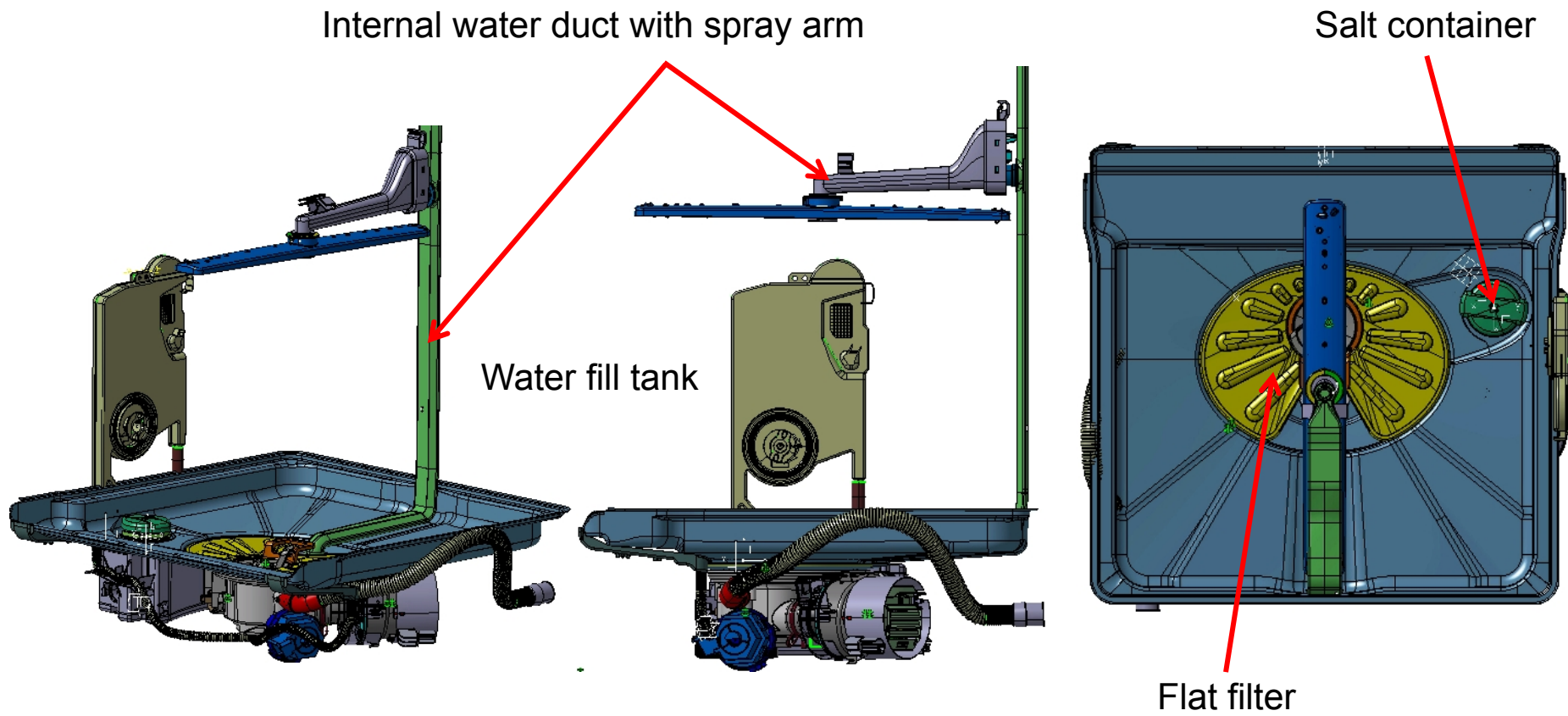
1.9 Water circuit

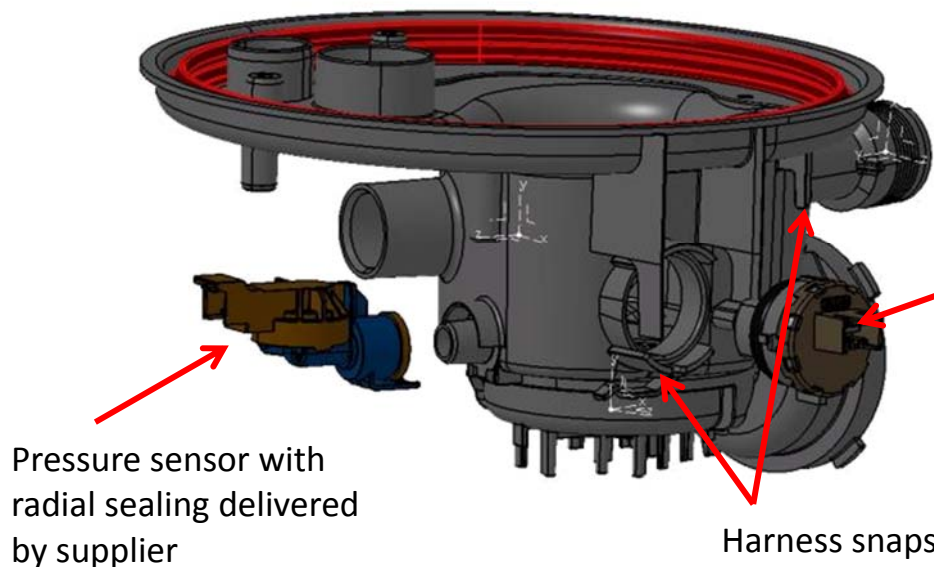


1.10 Hydraulic circuit



1.11 Hydraulic circuit - Overview





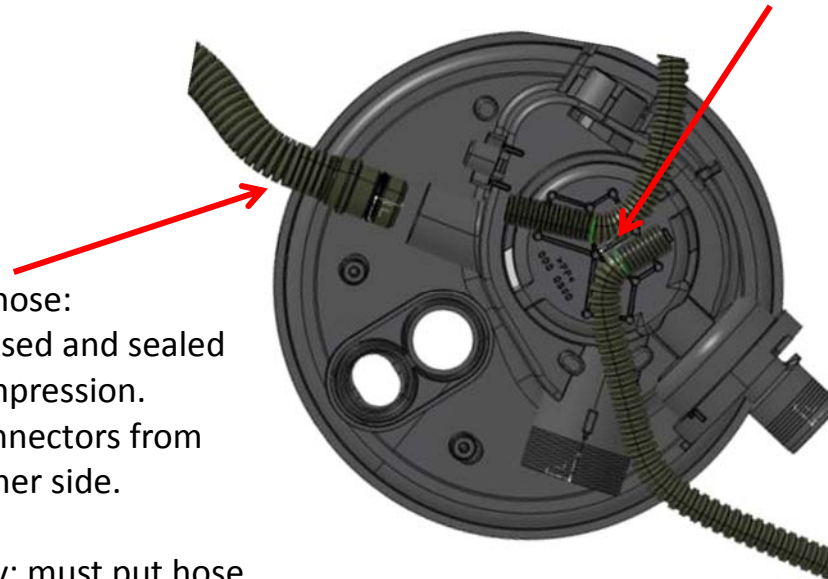
Pressure sensor with radial sealing delivered by supplier

- robust snap from bottom
- ribs in sump to limit rotation
- half-round rib to limit move upward

Harness snaps

Turbidity sensor snap similar as today. Located in main chamber. Includes overmoulded sealing

Overflow hoses: The same parts for both sides. Position provided by friction with sump ribs. Ribs are indicating correct assembly position



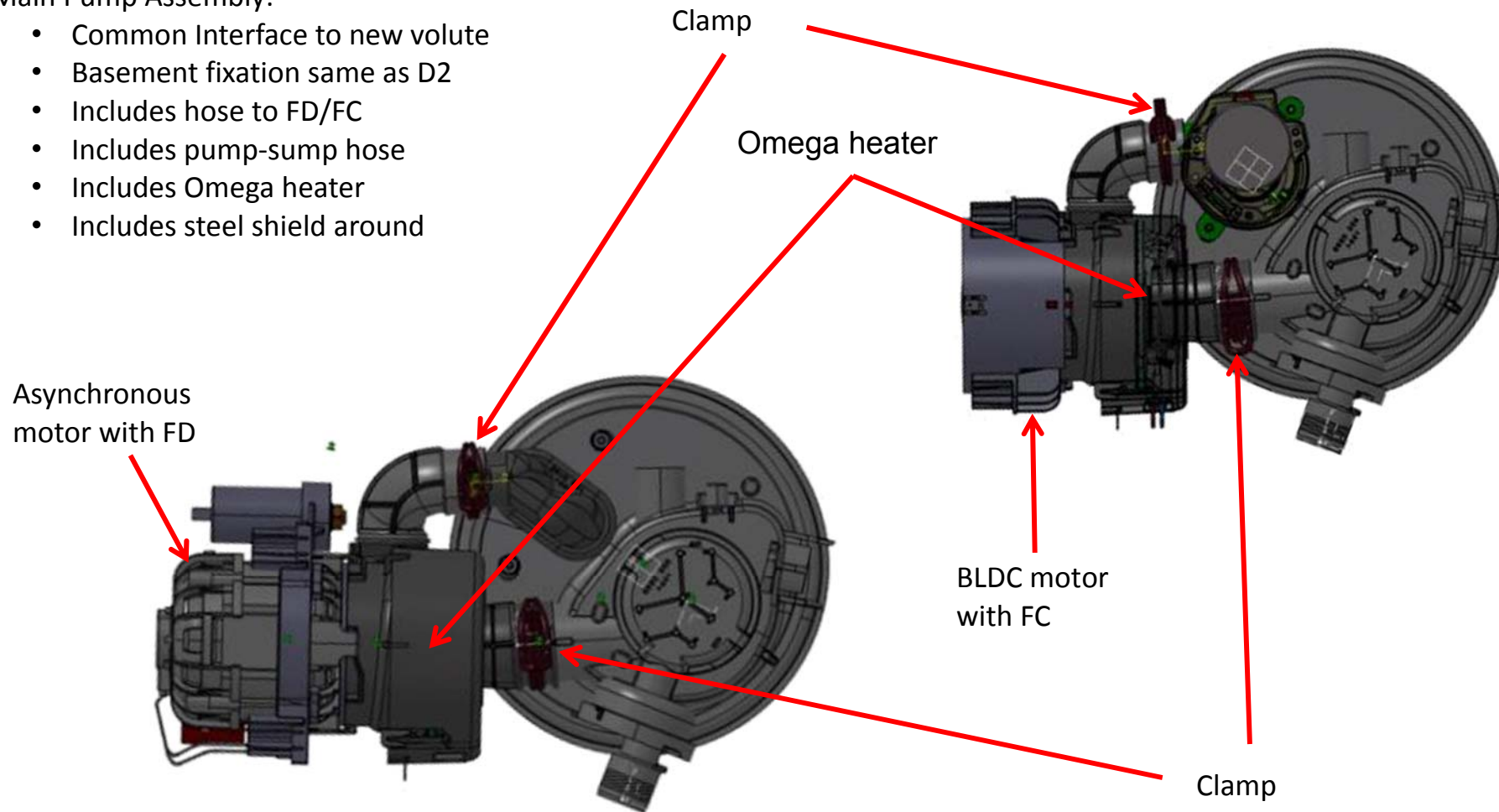
Softener-sump hose: Corrugated pressed and sealed using o-ring compression. Symmetrical connectors from sump and softener side.

Proper assembly: must put hose to the sump and than to the softener.

1.12 Sump Circ Motor (Variants), Pump and Heater

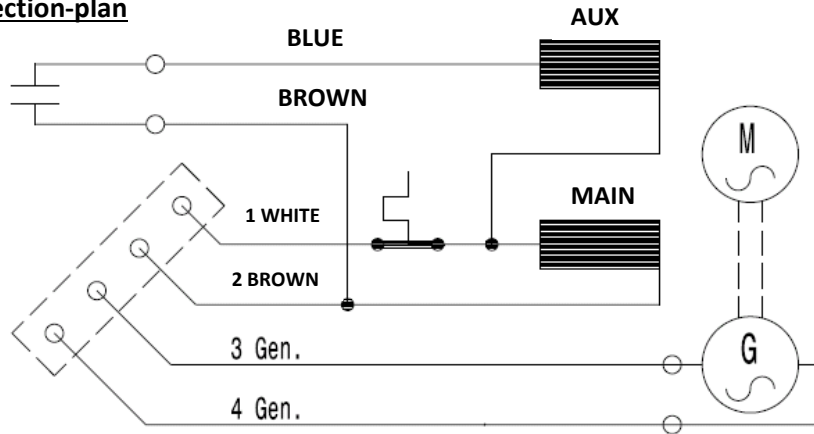
Main Pump Assembly:

- Common Interface to new volute
- Basement fixation same as D2
- Includes hose to FD/FC
- Includes pump-sump hose
- Includes Omega heater
- Includes steel shield around



1.12.1 Single phase asynchronous washing pump motor with FD

Connection-plan

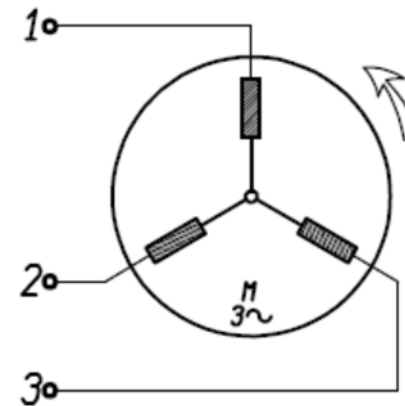


1.12.2 Three phase washing pump BLDC motor with FC

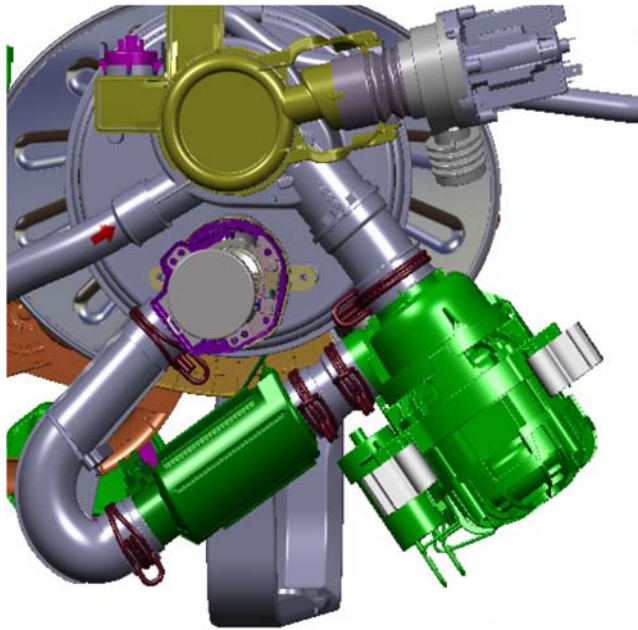
Electrical details:

230/240 V 50/60 Hz Class F

Resistance: 1-2: 56 ohms/2-3: 56 ohms/3-1: 56 ohms

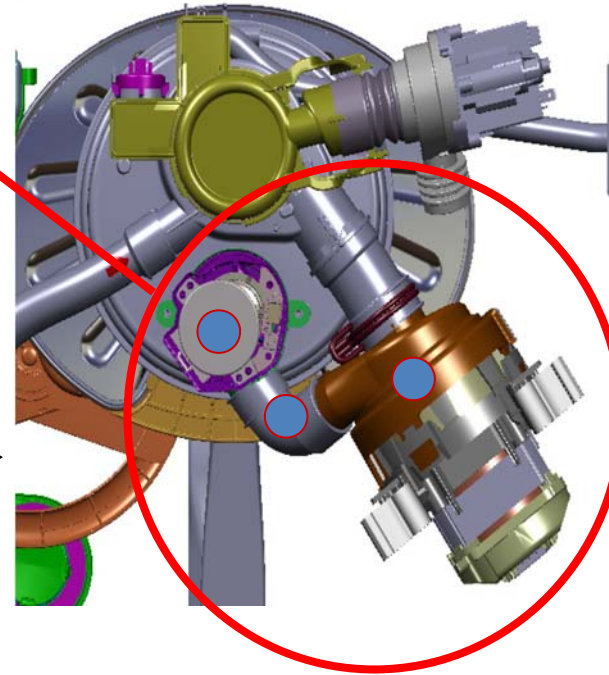


1.13 Wash Pump with Integrated Heater



Previous Hydraulic solution

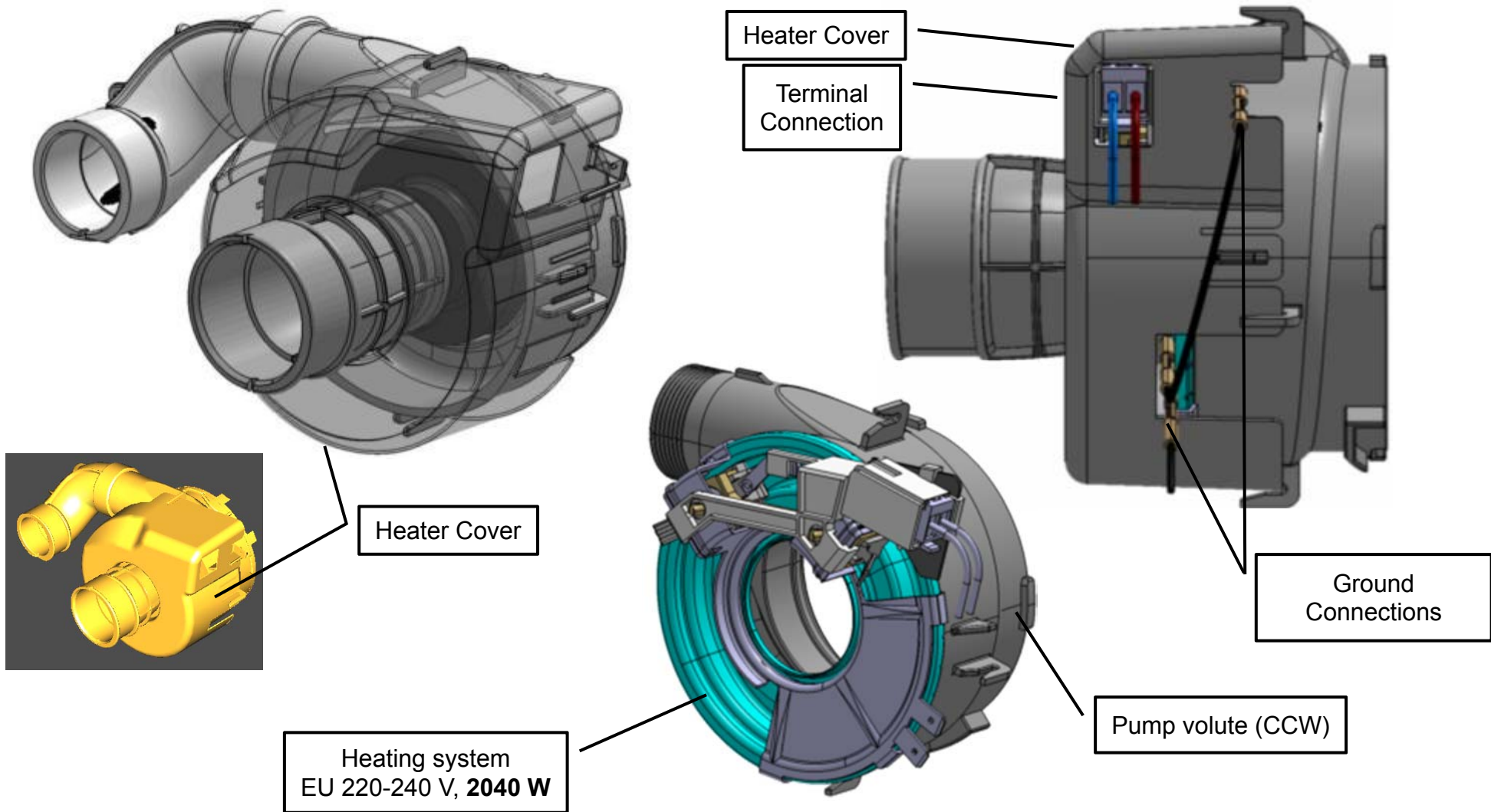
New Global module implemented on different structures



Flow Controller/Divider turned 90degrees

- Integration of the heating element into the pump
- Reduction of the length hose to reduce water/energy consumption

1.14 Omega Heater an Pump

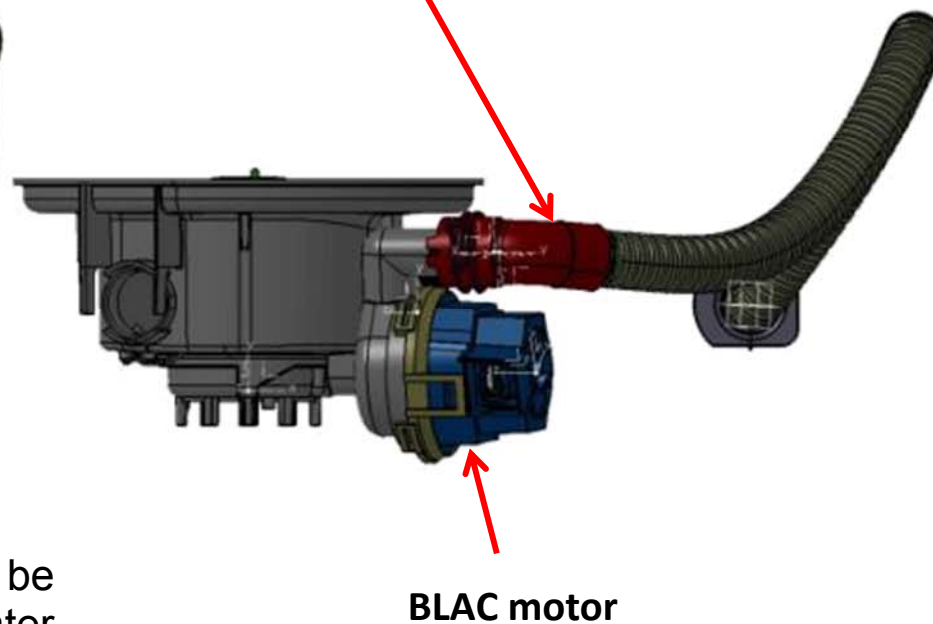
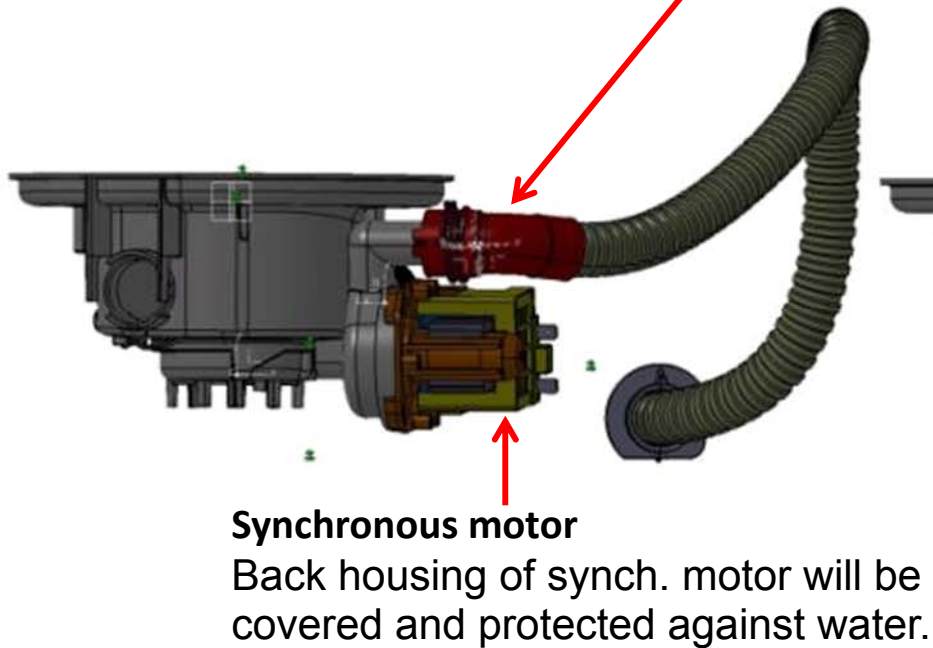
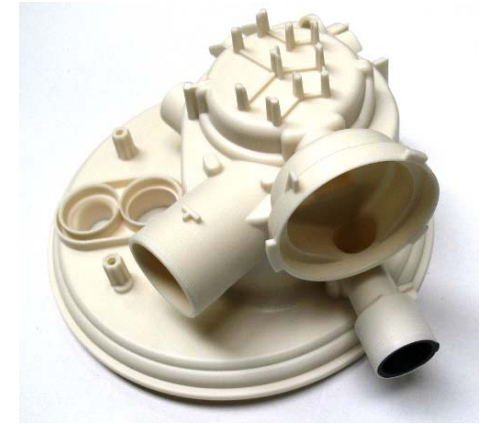


1.15 Sump and Drain System (Motor Variants)

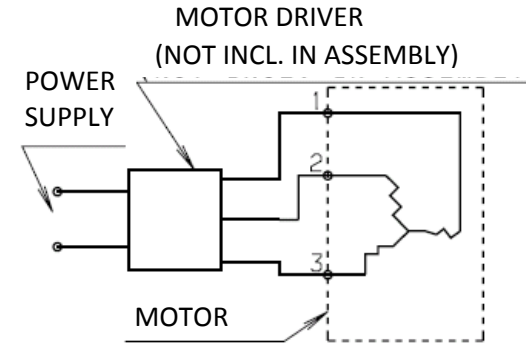
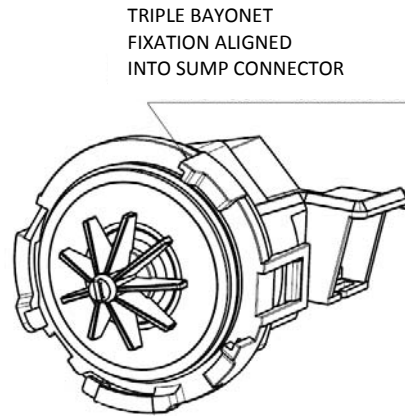
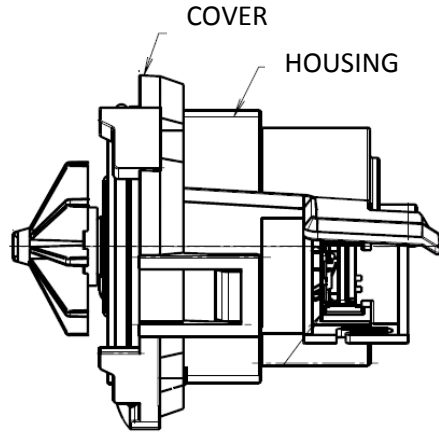
- Fixed directly in sump built-in volute using
- Bajonette system, common for both types of motor.
- Back of protection hook provided for both motors

New Cuff on drain hose.

- Clamped to drain outlet.
- Positioned by rib in sump and ribs in cuff.
- Common for both types of motor



Three-phase Synchronous BLDC motor:

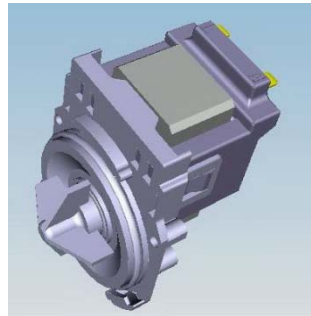
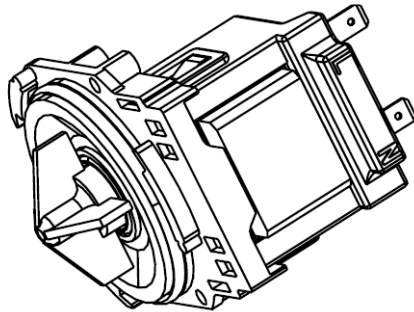


Voltage 230 V 50 Hz

Power: 21 W → resistance 93 ohms +/- 10%

Max flow rate: 15 litre/min

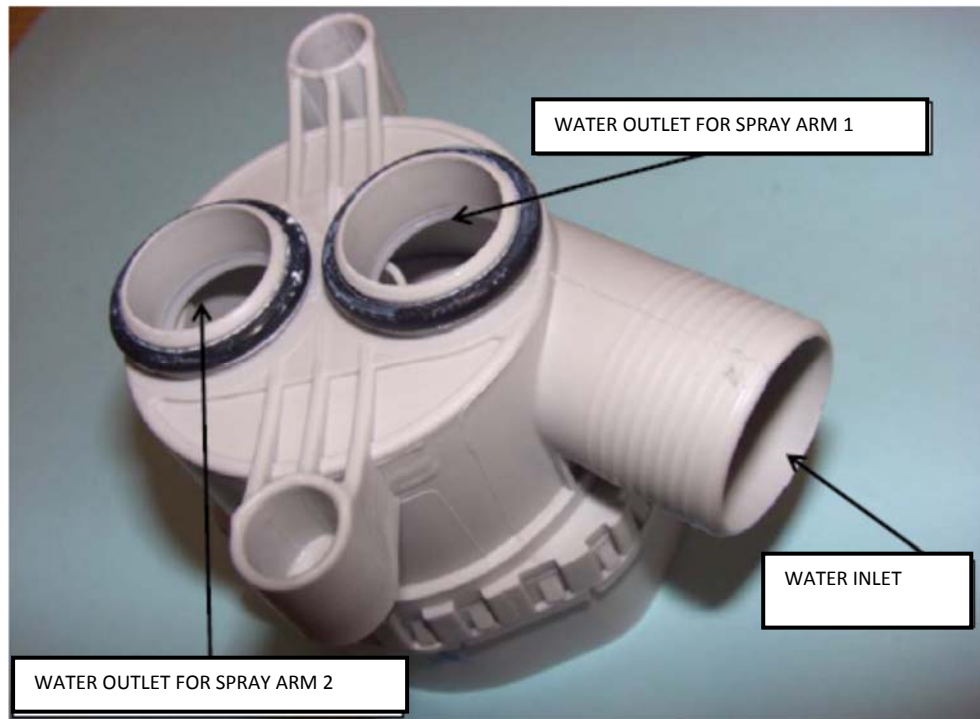
Single-phase Synchronous motor:



Voltage 230 V 50 Hz

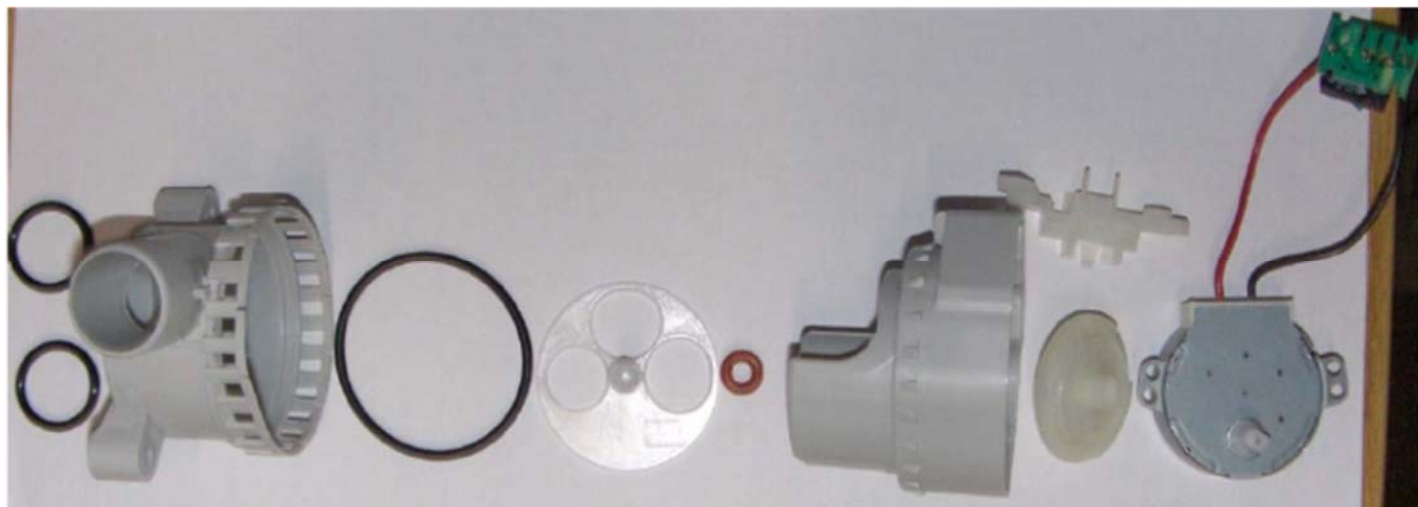
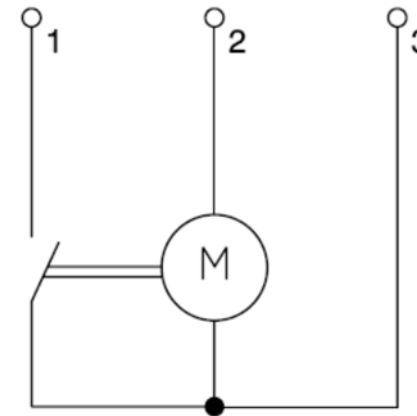
Power: 30 W → resistance approx. 225 ohms Max. flow rate: 15 litres/min

1.16 Flow controller



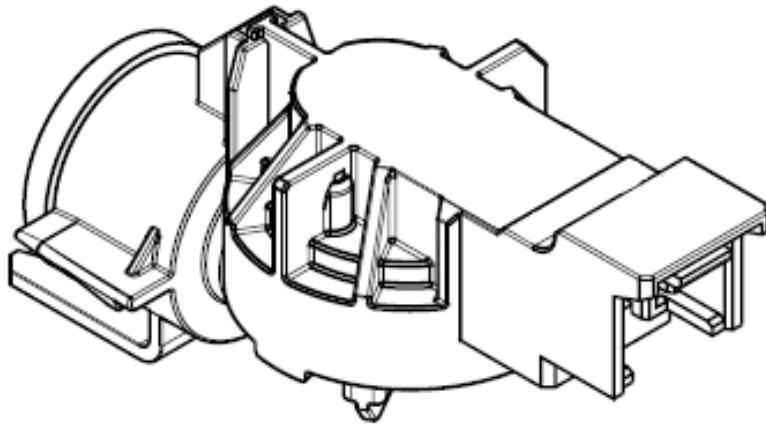
The flow controller controls the water flow towards the dishwasher spray arms.

The flow controller is designed to control the water flow towards the top spray arm only, bottom spray arm only or towards both spray arms.



Synchronous motor
230V AC, 50/60 Hz
2.5/3 rpm
Anti-clockwise rotation

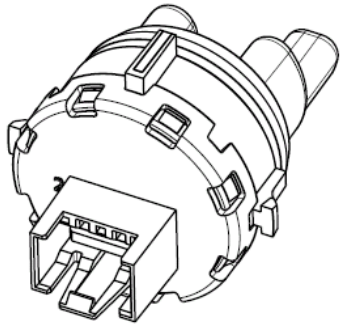
1.17 Pressure Sensor



Pressure mmWc/PA	Frequency	Tolerance 20°C	Tolerance 70°C
-	44.3	+/- 3mmWC / 1%	+/- 5mmWC / 1.7%
75	42.16	+/- 3mmWC / 1%	+/- 5mmWC / 1.7%
150	40.0	+/- 6mmWC / 2%	+/- 8mmWC / 2.7%
225	37.77	+/- 9mmWC / 3%	+/- 11mmWC / 3.7%

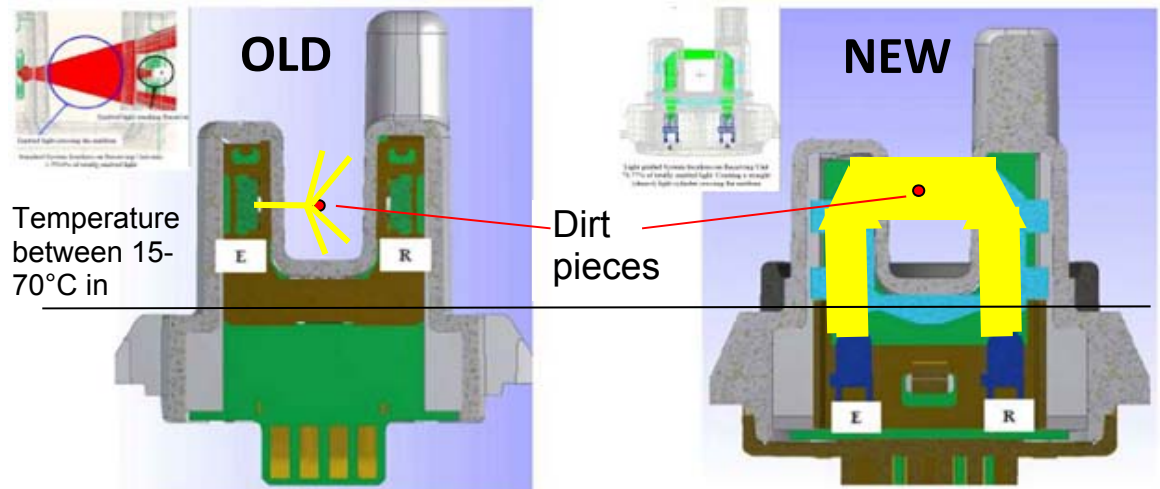
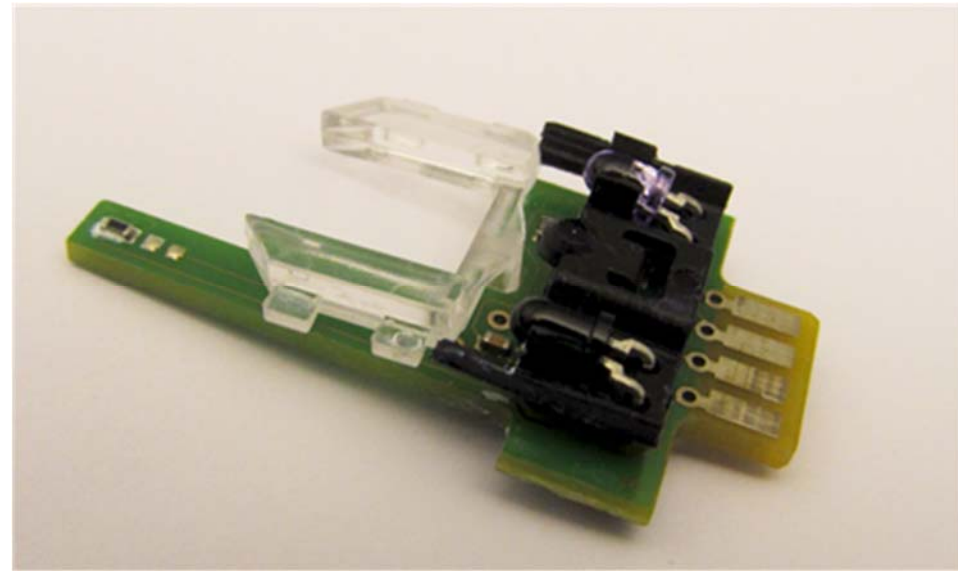
1.18 Turbidity Sensor (High Power Sensor)

The light is collected by a new technology and guides the light into the measurement zone.



Advantage:

- Use of larger LEDs
 - > the light area increases from 3 to 20sqmm
 - > small dirt pieces cannot block the light beam anymore
 - > measurement also possible with higher pump speed
- LEDs can be located in a colder area
 - > less temperature fluctuations around the LED's
 - > higher precision during measurement



Constant 23°C measured, because LEDs are outside the hot water area.

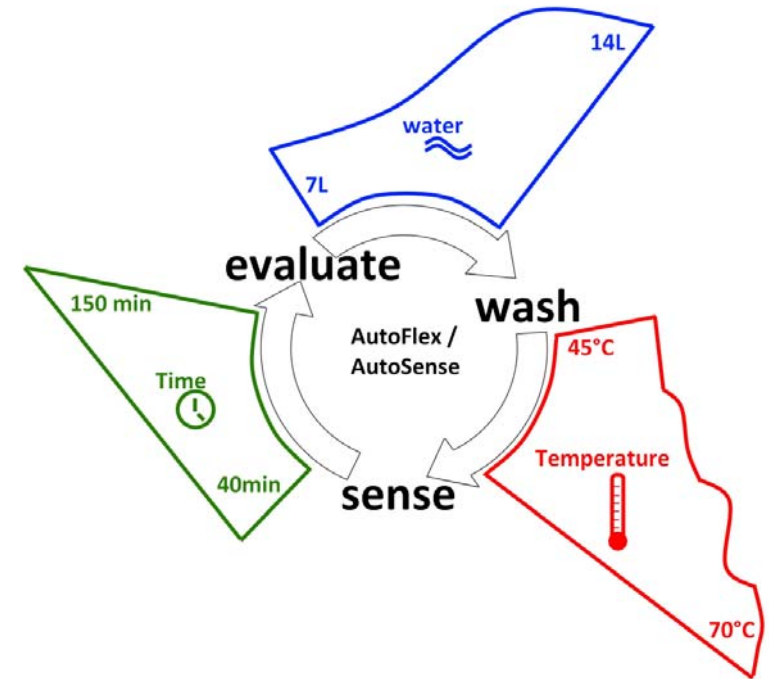
Disturbances caused by bubbles and dirt pieces in the old turbidity sensor

A bigger light beam will not be disturbed by impurities.

- > improved signal stability
- > measurement during higher pump speed is possible

1.19 Automatic Cycle: AutoSense

- The AutoSense software
 - Washes the dishes and detaches the dirt continuously
 - In this way the turbidity sensor can detect the degree of dirtiness
 - And will define, if additional rinses are necessary.
 - The measurements will be done continuously during the cycle.
- Temperature, water consumption and duration is adjusted to the degree of dirtiness.



Comparison Auto 45-70 vs AutoSense 45-70

AUTO
SENSE
45°-70°



0.6 ... 1.4kWh



7 ... 14 l



40 ... 150min

AUTO
45°-70°



0.9 ... 1.6kWh



8 ... 15 l



90 ... 160min

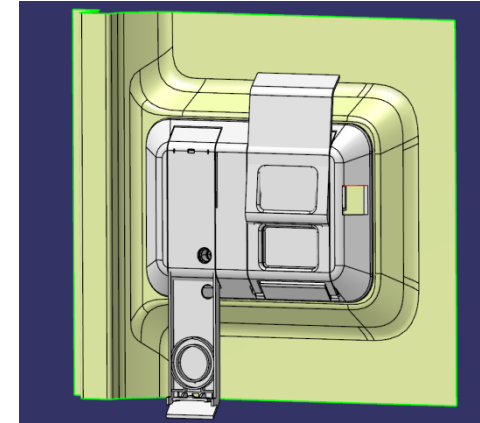
1.20 Global Dispenser

The new dispenser will have the following main features:

- Low voltage driving - 5VDC => Safety improvement
- Multiple dosage => Performance/Quality improvement
- Sliding lid => Performance/Quality improvement

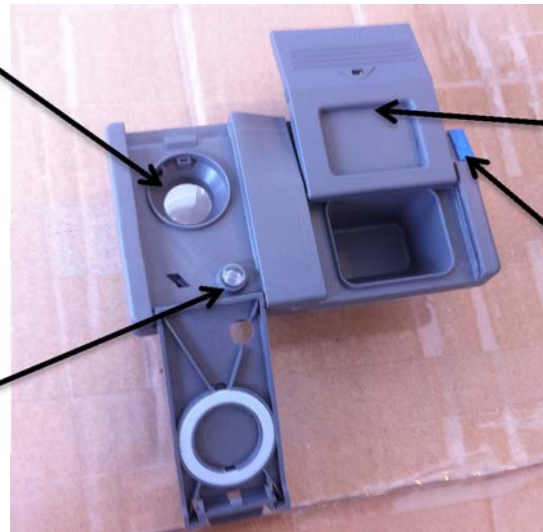
The dispenser will only fit into dishwashers where “Thin inner door” is present.

Assembly process as today. It is screwed in to door cut out in an automated line.



Rinse aid

Multi dosage -> No knob



Sliding door. Improved access to wash compartment and no interaction with basket.

Activation button on side

No pre-wash chamber

Rinse aid level detection variants

Optical (Shown on picture)

Electrical (For signal to MB)

1.21 Multi Dosage – Specification

▪ **PERFORMANCE**

The dosage of the rinse-aid has to be independent of the filling status of the container, as long as the refill indication isn't reached. After indicating the refill minimum for another 2 dosage cycles the nominal volume has to be guaranteed.

▪ **Dosage procedure – Multiple dosage**

The first activation impulse opens the detergent lid, no rinse aid should be dosed into the tub.

With each further activation impulse a dosage volume of 1,5 ml has to be dosed into the tub.

The allowed dosage time for 4 dosage cycles is max. 7 minutes.

The nominal dosage volume with 4 dosage cycles is 6 ml.

The maximum number of dosage cycles is 6.

The maximum dosage volume with 6 dosage cycles is 9 ml.

▪ **Rinse aid volume**

The rinse aid container must have an available volume of 120 ml +-3%. All dead volumes in the container have to be minimized. The design has to avoid air chambers in the container, which might influence the available volume or the exactness of the dosage.

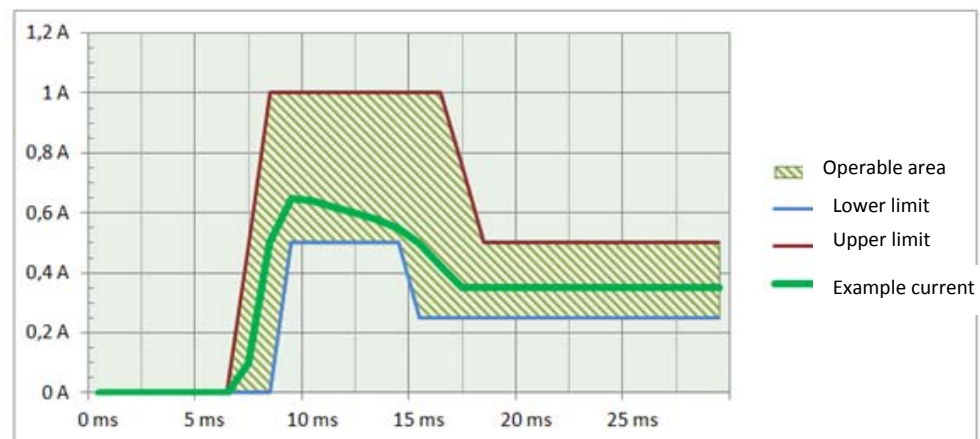
During main wash phase – Detergent lid opening:

Step	Action	Time	Purpose
1	Activation of coil	0,3 s	Opening the detergent lid to release detergent

During hot rinse phase – Rinse aid delivery:

Step	Action	Time	Purpose
1	Dosage check	-	Check if rinse aid should be delivered If 0 → no delivery the rinse aid delivery process should be stopped.
2	Activation of coil	5 s	Delivery of dose of rinse aid – 1,5ml nominal
3	Pause	10 s	Refill of dosage chamber
4	Repeat from step 2	-	Number of dosages according to set level.

Rise time	$0.5 \leq T_r \leq 4$	ms
Pulse amplitude	$0.5 \leq P_A \leq 1.0$	A
Pulse width	$5 \leq P_w \leq 15$	ms
Holding current	$0.25 \leq I_h \leq 0.5$	A



Visualization of current pulse specification

1.22 Water Reuse

A water Reuse tank is placed on the right side of the dishwasher.

The tank purpose is to save 3,5 lt of water from the cold and hot rinse in Elabel & Intensive programs and use them in the Pre wash of next cycle.

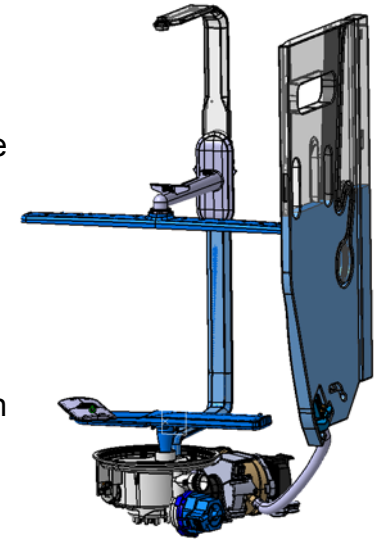
This allows to reduce the water consumption.

The tank is conditioned after every 6 cycles.

5-6 lt of hot water are used to clean the tank, water contained in the tank is pumped out and replaced by fresh water.

The 'Sanitize' or 'Extra Hygiene' option.

Can be run to also clean the tank and the dishwasher not only the load.



Water raises during the last rinses →



Water reuse valve →



→ Tank is not visible inside, and is located on the right side.

→ Plastic nut with grid

1.23 Electronic Main Board

Features possible to support (Depending on mounting option)	PB100	PB200
Existing HV main switch	Y	Y
Existing LV main switch	Y	Y
Auto-off functionality	Y	Y
Future logic main switch	Y	Y
BLDC Wash pump	Y	N
BLDC Drain pump	Y	N
Async Wash pump	N	Y
Sync Drain pump	N	Y
Wash pump Taco input	N	Y
Safety isolated low voltage UI interface	Y	Y
Auto Door Opener (ADO)	Y	N
Integrated main filter	Y	Y
Integrated tub lights driver with up to 3x1W LEDs	Y	N
Leakage Switch	Y	Y
Flow control	Y	Y
Existing HV dispenser	Y	Y
Future Low voltage dispenser (TBD)	Y *	Y *
Inlet valve	Y	Y
Regeneration valve	Y	Y
Pressure sensor	Y	Y
Salt sense	Y	Y
Rinse sense	Y	Y
Display on Floor (DOF)	Y	Y
Beam on Floor (BOF) Two-colored	Y	Y
DAAS	Y	Y
Extra MACS connector for future modules	Y	Y **
JTAG IF to microcontroller for development	Y	Y
* = Depends on the LV Dispenser solution		
** = Can not be combined with DOF		

Power Boards

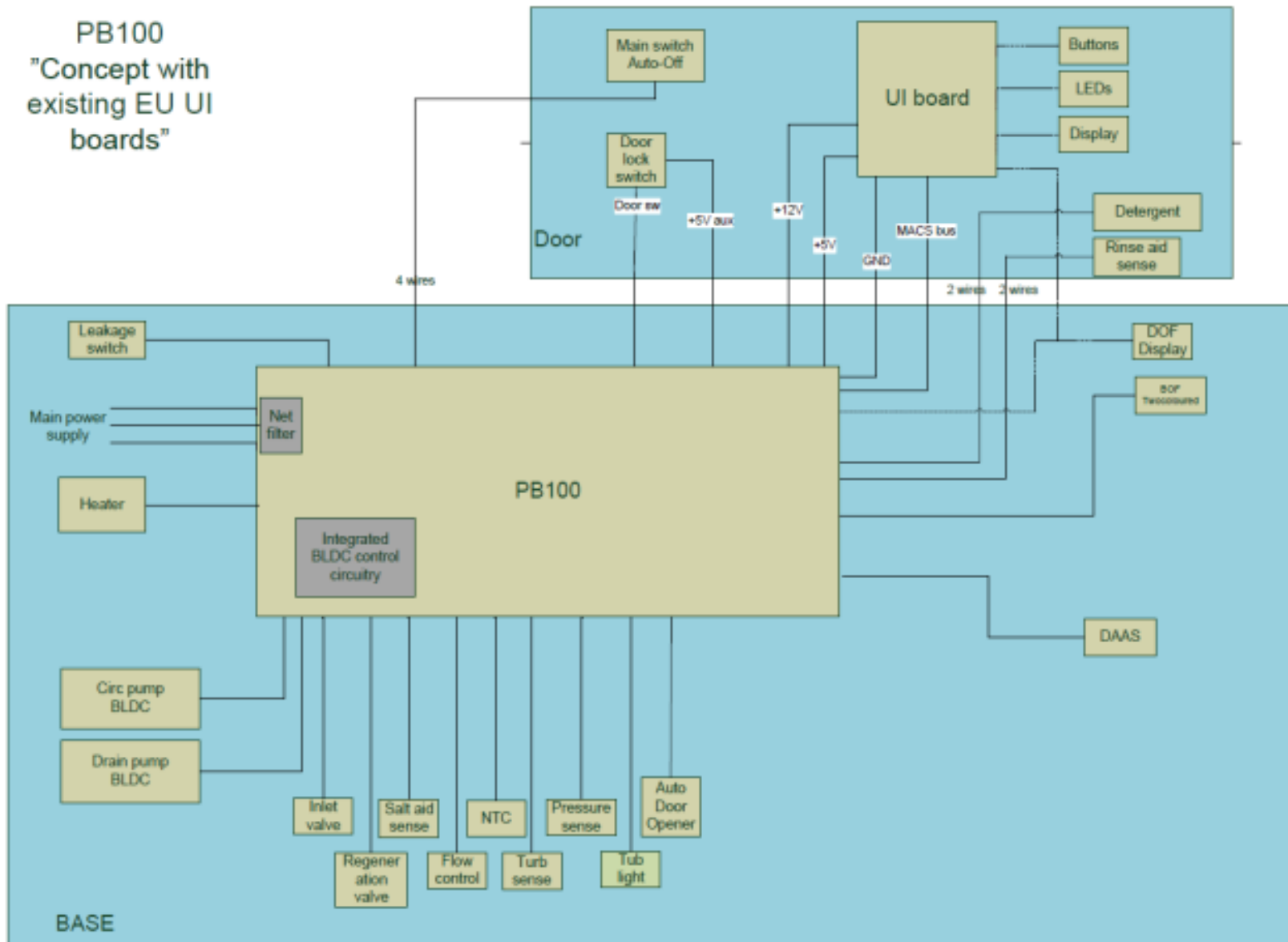
EDW-PB100

- High and Mid range covering all platforms. Supports both EU and NA requirements via population options. BLDC wash and drain motors.
 - Non insulated EU variant (supports all of the existing DIVA 2 UI boards)
 - Insulated EU variant
 - Insulated NA variant

EDW-PB200

- Low range supports both EU and NA. Async wash motor.
 - Non-insulated variant
 - Insulated variant

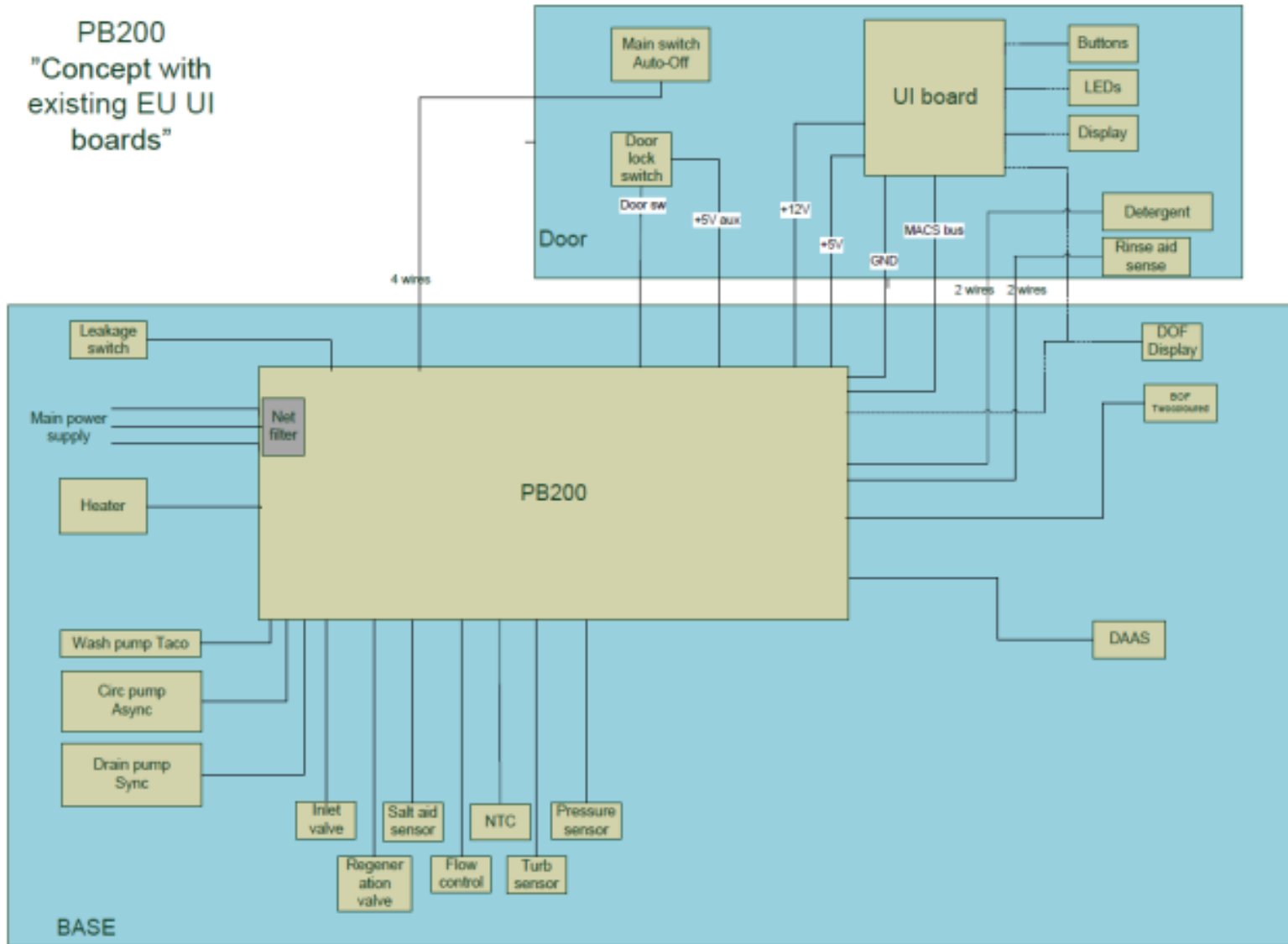
1.23.1 PB100 With existing EU User Interfaces



EDW-PB100
High and Mid range covering all platforms. Supports both EU and NA requirements via population options

Non insulated EU variant (supports all of the existing Diva2 UI boards)

1.23.2 PB200 With existing EU User Interfaces

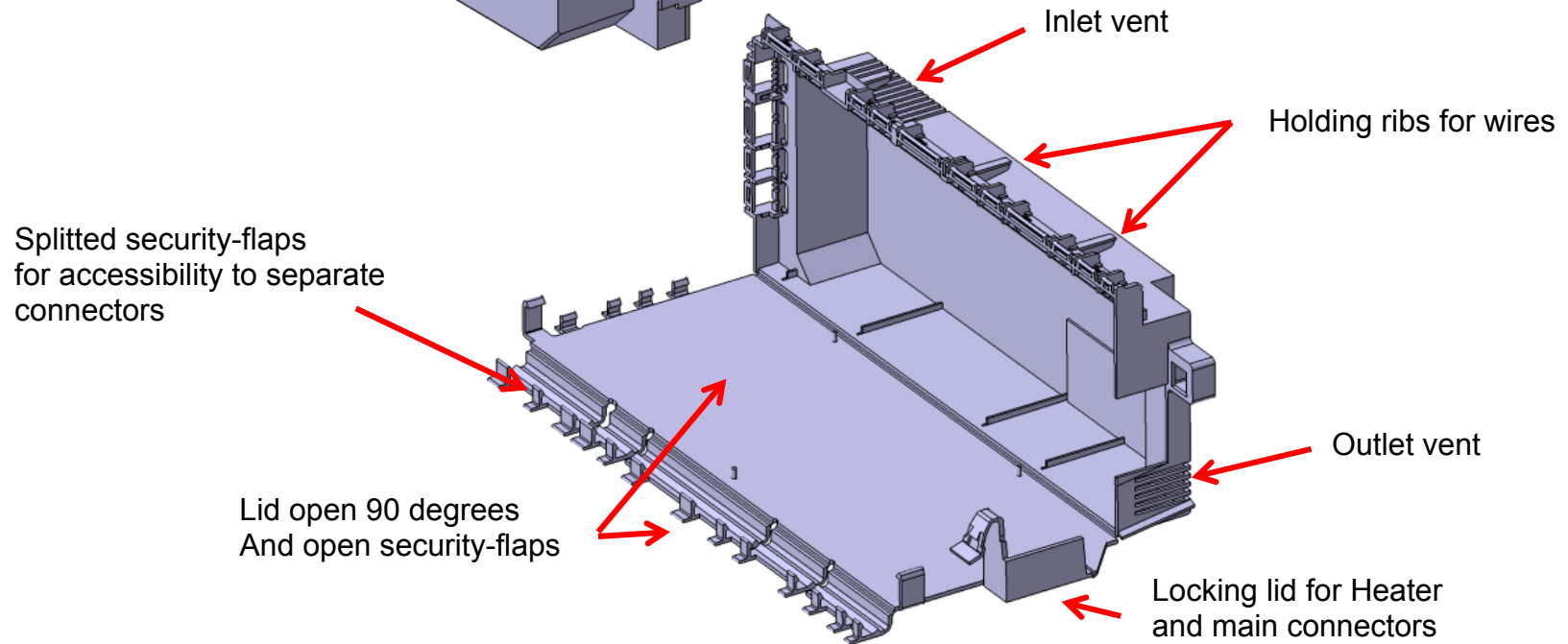
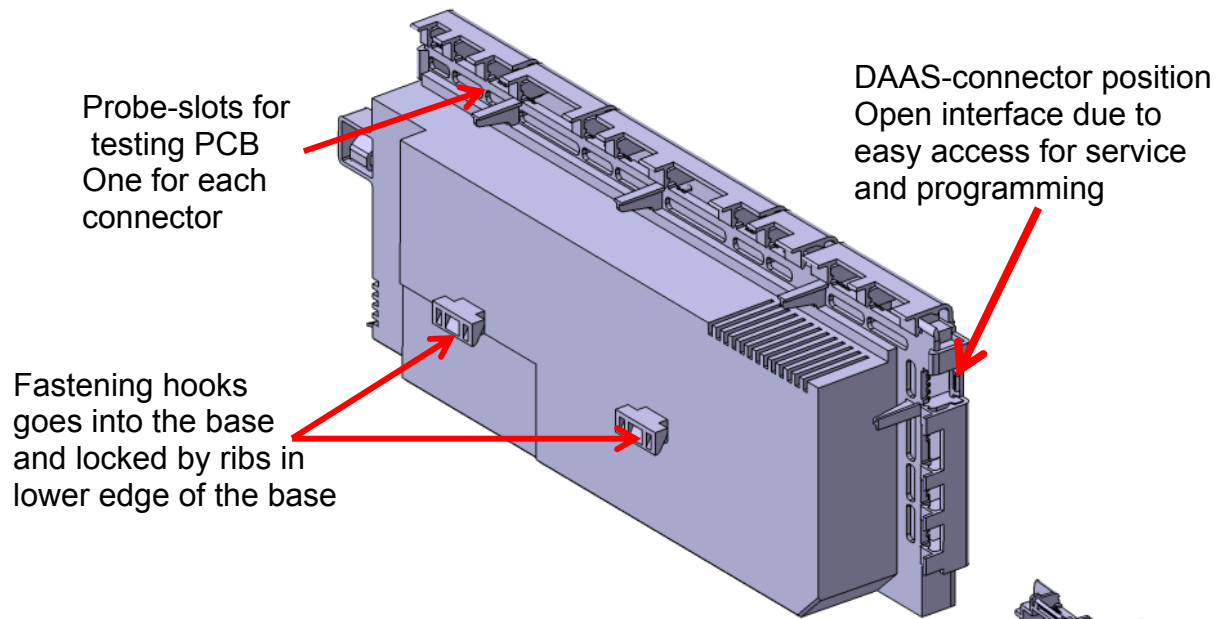


EDW-PB200

Low range supports both EU and NA

Non-Insulated variant

1.24 Electronic Box for PB100 / PB200

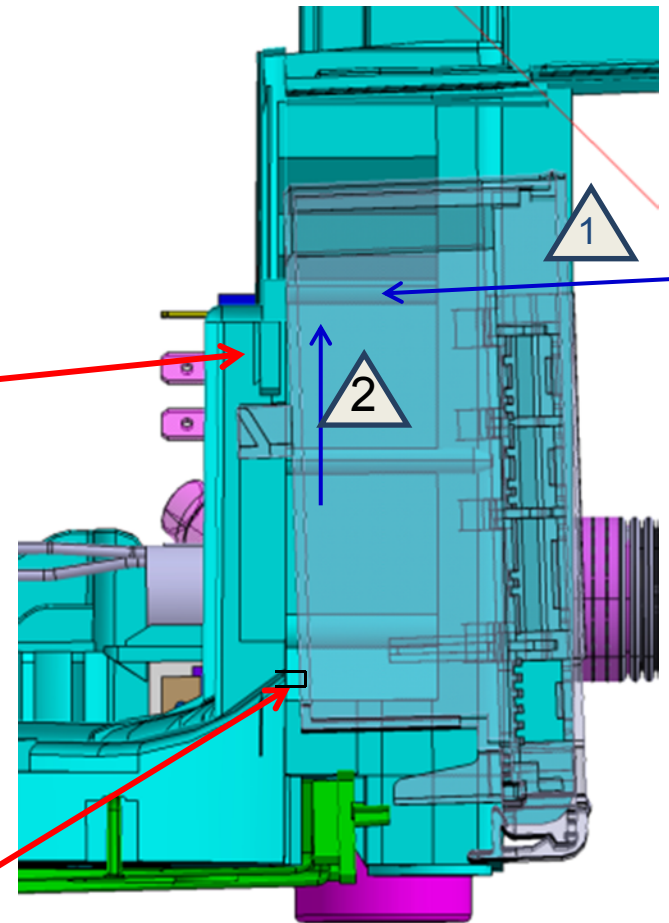


1.25 Assembling Sequence for Electronic Box

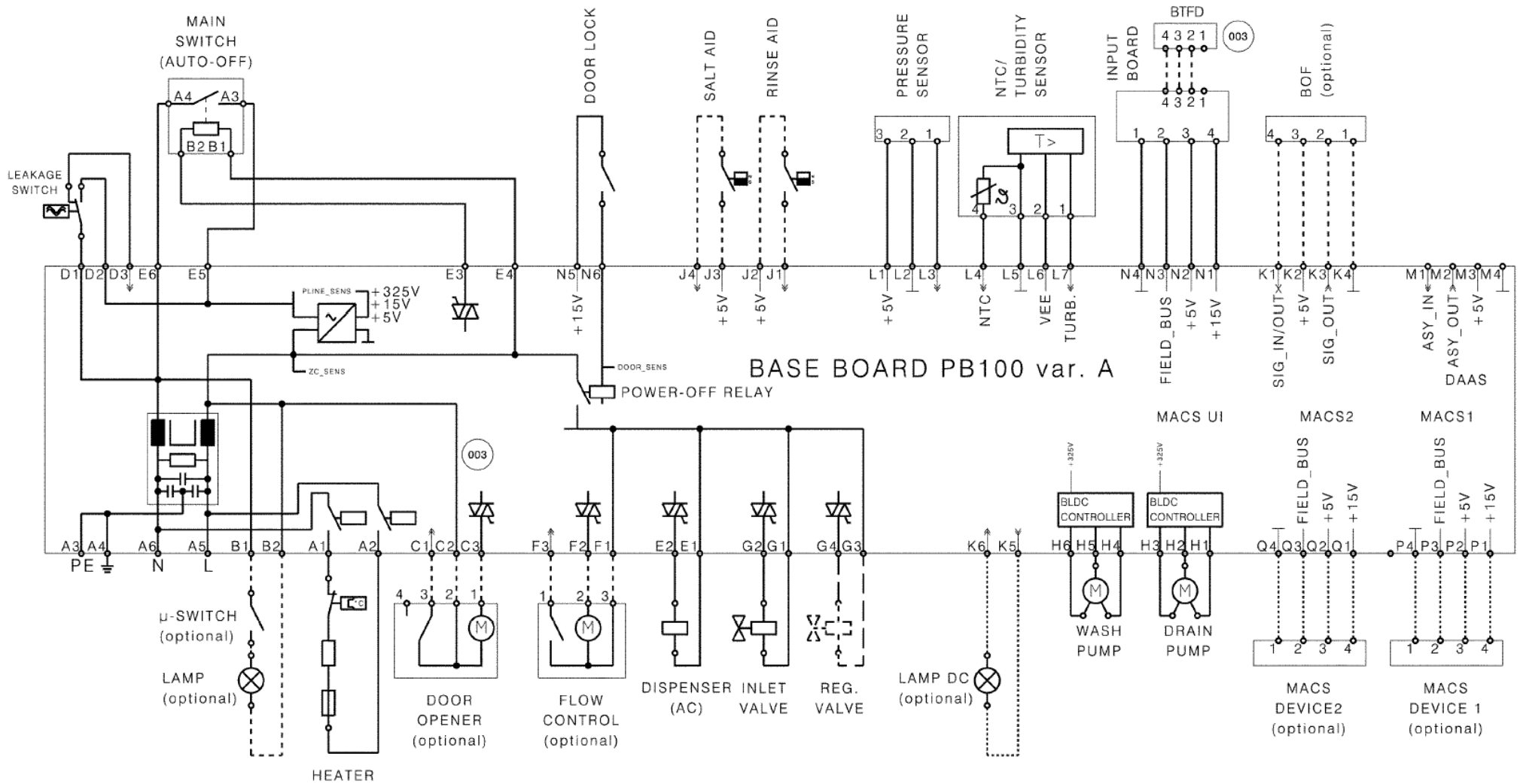
- 1- Move the box towards the base and enter the slot.
- 2- Push the box in upwards direction until it snaps over the fixation ribs.

Slot in the base for hooks in the box

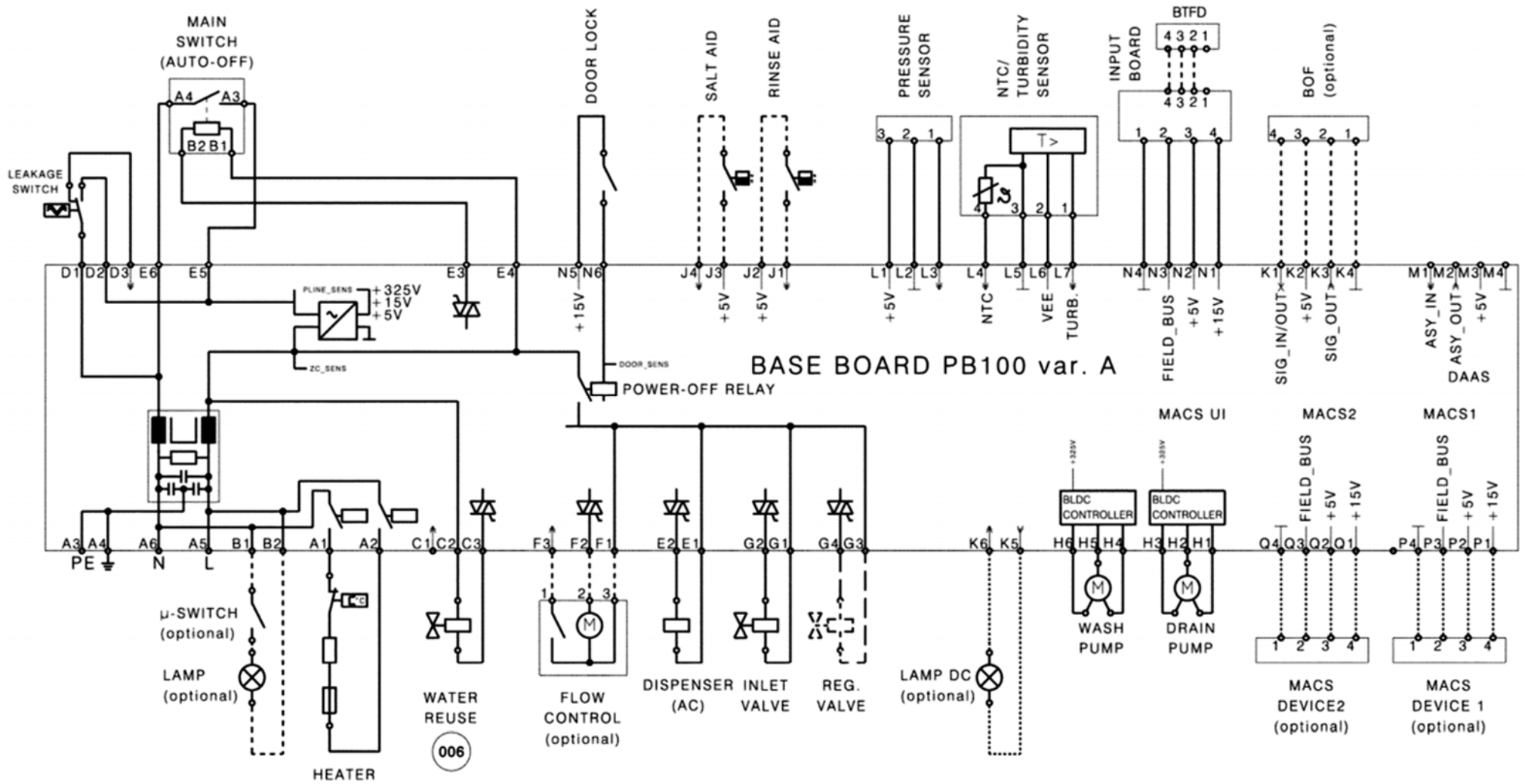
Fixation rib in the base



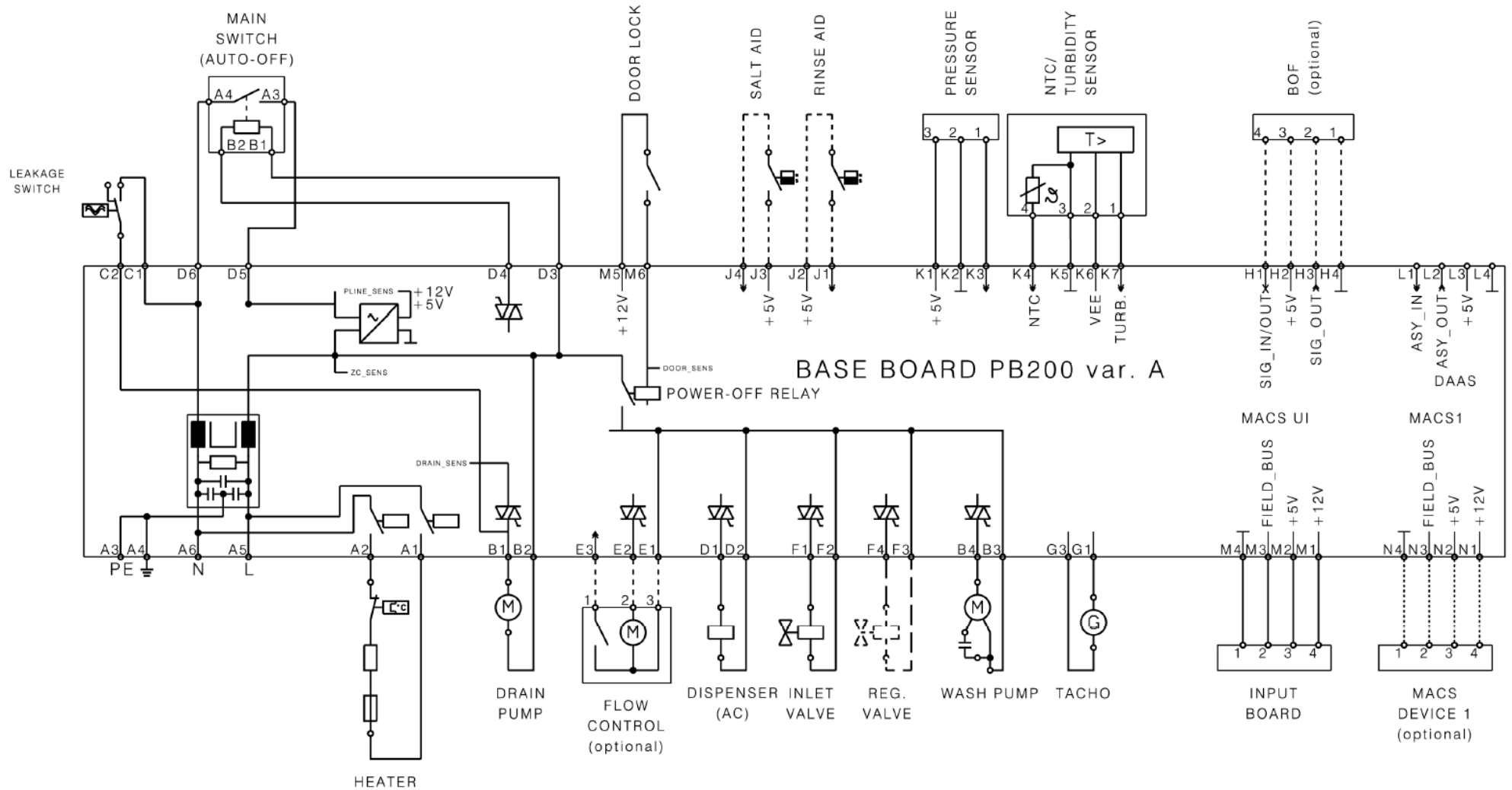
1.26 Operation Diagram PB100 - NO WATER REUSE MODEL



1.27 Operation Diagram PB100 - WITH WATER REUSE



1.2.8 Operation Diagram PB200



3.1. Components check for motor

PARTS	PB100 BLDC LEAD CONNECTIONS	PB200 ASY LEAD CONNECTIONS	PB300 ASY LEAD CONNECTIONS	CORRECT VALUE	REMARKS
POWER CABEL	A5 ↔ L	A5 ↔ L	A5 ↔ L	0 Ω	
	A6 ↔ N	A6 ↔ N	A6 ↔ N	0 Ω	
ON/OFF SWITCH	E5 ↔ E6	D5 ↔ D6	↔	0 Ω	
AUTO OFF COMMAND	E3 ↔ E4	D3 ↔ D4	↔		
				130 Ω ± 8%	DW off
Heating ELEMENT 2040W + Safety THERMOSTAT	A2 ↔ A1	A2 ↔ A1	A2 ↔ A1	25.9 Ω + 11.1% - 4.7%	Serial connection 2040W
Heating ELEMENT 1800W + Safety THERMOSTAT	A2 ↔ A1	A2 ↔ A1	A2 ↔ A1	28,7 Ω +/- 5%	Serial connection 1800W
DOOR SWITCH	N5 ↔ N6	M5 ↔ M6	↔	0 Ω	Door closed
DISPENSER	E1 ↔ E2	D1 ↔ D2	D1 ↔ D2	3900 Ω ± 8%	
RINSE AID SENSOR	J1 ↔ J2	J1 ↔ J2	↔	0 Ω	Without Rinse Aid
				INFINITE	With Rinse Aid
SALT SENSOR	J4 ↔ J3	J4 ↔ J3	E1 ↔ E2	0 Ω	Without Salt
				INFINITE	With Salt
TEMPERATURE SENSOR	L4 ↔ L5	K4 ↔ K5	G4 ↔ G5	4836 Ω ± 2.5%	At 25 °C
				915 Ω ± 4%	At 70 °C
TACHO SENSOR		G3 ↔ G1	E4 ↔ E3	223 Ω ± 5%	The motor has stopped
REGENERATION solenoid valve	G4 ↔ G3	F4 ↔ F3	D7 ↔ D6	3800 Ω ± 8%	
FILL solenoid valve	G1 ↔ G2	F1 ↔ F2	D4 ↔ D5	4100 Ω ± 10%	solenoid valve in fill pipe
				3750 Ω ± 10%	solenoid valve in base
ASY WASHING MOTOR		B4 ↔ B3	B6 ↔ B5	95 Ω ± 7%	ASY Motor
BLDC WASHING MOTOR	H4↔H5↔H6			56 Ω +5/-10%	BLDC Motor (phase-to-phase)
ASY DRAIN MOTOR + Anti-flooding		B1 ↔ B2	B1 ↔ B2	230 Ω ± 8%	Serial connection
BLDC DRAIN MOTOR	H1↔H2↔H3			93 Ω ± 10%	BLDC Motor (phase-to-phase)
FLOW CONTROLLER	F1 ↔ F2	E1 ↔ E2	↔	10400 Ω ± 8%	Motor
	F1 ↔ F3	E1 ↔ E3	↔	0 / INFINITE	Micro-switch

