UNDERCOUNTER

SERVICE MANUAL

Ecoboiler UC45 8.4kW Marine

1000746

Marco Beverage Systems Ltd. 63d Heather Road, Sandyford Industrial Estate, Dublin 18, Republic of Ireland	Ireland Tel: (01) 295 2674 Ireland Fax: (01) 295 3715
	UK Tel: (0207) 274 4577 UK Fax: (0207) 978 8141

1. INTRODUCTION:

The information provided in this manual is intended to assist in the installation and maintenance of the Marco Ecoboiler Water boiler. Please read the instructions carefully to prevent accidents and ensure an efficient installation.

This manual is not a substitute for any safety instructions or technical data affixed to the machine or its packaging. All information in this manual is current at the time of publication and is subject to change without notice.

Only technicians or service providers authorised by Marco should carry out installation and maintenance of these machines.

Marco accepts no responsibility for any damage or injury caused by incorrect or unreasonable installation and operation.

2. SAFETY INSTRUCTIONS:

- Read all instructions.
- To protect against electric shock do not immerse mains cord in water or other liquid.
- To prevent chafing of the cable, do not let the mains cord hang over the edge of a table or counter; or touch hot surfaces.
- Do not operate any appliance with a damaged cord, plugs, or after the appliance malfunctions or has been damaged in any manner.
- Switch off at the mains (unplug or disconnect from outlet) and turn off the water supply when not in use and before cleaning. Allow to cool before removing components.
- The use of spares and accessories not recommended by Marco may cause damage and/or injuries.
- Do not use outdoors. Do not place on or near a hot gas or electric burner.
- Do not use the appliance for anything other than its intended use.
- Save these instructions.

3. BASIC INSTRUCTIONS:

3.1. INSTALLATION DETAILS:

Installation details:

Power Supply:

- Refer to rating plate for electrical information.
-

Water Pressure: 5 - 50 psi (min.-max.) 35 - 345 kPa (min.-max.)

Installation procedure:

- Fit a stop Valve on a cold water line and attach a 3/4" BSP male fitting,
- (e.g. 3/4" x 1/2" 311 or washing machine type stop valve).
- Connect straight tailpiece of the hose to the stop valve fitting. Make sure that the pre-attached sealing washer is fitted.
- Turn on the water to flush any impurities, dust etc from the inlet hose and water pipe. Allow several gallons through.
- Connect right-angled tailpiece of the hose to the inlet valve of the boiler (again 3/4" BSP). Make sure the sealing washer is fitted here also.
- Turn on water and check for leaks.
- Connect to a suitable power supply.

3.2. OPERATION:

- Check that all installation procedures have been carried out.
- Ensure water valve is open.
- Connect the machine to the mains power and switch the rocker switch on the top of the machine into the ON position.

The Tri-colour LED on the front of the machine will show the current status:

LED	Status
AMBER	Tank below set point temperature. Machine is heating.
GREEN	Machine ready.
FLASHING RED	Diagnostics error. See *troubleshooting.* **NOTE**: It is normal for the machine to show two flashes error (*water level below elements*) once it is filling for the first time.

3.3. TEMPERATURE CALIBRATION

The Ecoboiler control PCB (1600345) has the ability to have the desired set-point temperature at whatever setting is required. During manufacture of the PCB it is set to the default temperature of around 90°C.
If the temperature setting needs to be modified on-site please follow the steps below:

1. To Enter Calibration mode:
    a. Turn the machine off at the mains power supply.
    b. Then, whilst depressing the tactile switch on the PCB, turn the mains power back on.
    c. All available LED's on the front panel will now blink continuously.
    d. The machine is now in Calibration mode.
2. In Calibration Mode the machine will heat continuously until the tactile switch on the PCB is pressed for a second time (NB: The tactile switch should be pressed for at least 1 second)
3. Using a thermometer to measure the temperature at the thermistor pocket, the machine should be allowed to reach the desired set-temperature. (NB: It may be necessary to let the unit cool down if the desired set point is lower than the units current temperature)
4. Following a correct calibration procedure the tank temperature should be maintained within 3°C of the desired set-point temperature.

In the event of an incorrect calibration process the steps below should be followed:

5. If the tactile switch is pressed too early and the temperature is set lower than desired, the tester should simply repeat calibration.
6. If the tactile switch is pressed too late and the set temperature is too high, the tester will need to wait for the temperature in the tank to cool, or add cool water, and then repeat calibration.

NOTE: Make sure that the temperature it least 2°C below the boiling point (which may vary between 90 and 102°C depending on the air pressure). As a rule of the thumb the max temperature should not be set for more than 97.5°C.

3.4. TIME/VOLUME DISPENSE CALIBRATION

3.4.1. Setting time dispense for two left hand side pumps.

- Open the service door on the front panel
- Once the machine is full and heated up (the status LED glowing green) press the tactile switch on the TOP control PCB (timer board).
- Both pumps will turn on and off for 0.1s - that will be heard as a click meaning that the timer is in the calibration mode. For 3 pump version see note 8 below.
- Place an empty cup (measuring jug) underneath the font that is to be calibrated.
- Press and hold a font button until you get the right amount of water. The water does not have to be dispensed in a single push - if the button is pressed few times the overall time will be used.
- Do the same action with the other font if needed. If only one font is calibrated, settings for the other will not be altered.
- The minimum time possible for the time dispense operation is 1s. Setting the dispense time for less (quick font button click) will set the font back into "push & hold" mode.
- After the volumes are set properly press the tactile button on the timer board once again.
- Both pumps will turn on and off for 0.1s twice - that will be heard as a double click meaning that the timer is out of calibration.
- Please note that there is no given order which font is to be calibrated first - in fact they may be calibrated at once or only one may be calibrated (leaving the settings of the other unaltered).
- If there is no response from the user in the calibration mode (none of the font buttons pressed) for more than 25 seconds the timer will end the calibration (double pump "click" will be heard).

- The maximum allowable time of dispense is 25 seconds. Any longer times will be cut down to 25 seconds.
- The resolution of the time measurement is 0.1s.
- The timer board has its own clock on board therefore power line frequency is not used to measure the time.

3.5. TROUBLESHOOTING

The Ready/Status light signals various errors or problems.
A cycle of red flashes indicates an error. The number of flashes in a cycle corresponds to the symptom in the table below:

Status/Diagnostic light guide:

No of flashes	Symptom	Action required
2	Water level below elements. Normal when machine first fills.	Check water pressure , if this is OK then call service agent.
3	Temperature sensor failure (s/c)	Call service agent
4	Water not heating	Call service agent
5	Temperature sensor failure (o/c)	Call service agent
6	Machine not filling	Check water pressure.

Note: Some of the error sequences will be displayed if there is low water pressure. Please check that there is water pressure and that the water stop-valve is open before calling your service agent.

2 FLASH CYCLE – BELOW LOW LEVEL

Display pattern:	• 2 flashes then a short pause - repeated.
Electronic check and action:	• This indicates that the low level circuit is open i.e. the probe is not in contact with the water. • The element is switched OFF at this stage and the inlet is left ON. • (Note that if this is a low probe wiring fault, the water will stop at the high level probe regardless of the status of the low level). • This is a recoverable error i.e. the machine does not need to be reset when the problem is solved. (e.g. if a closed mains water stop valve is the problem, opening the valve will allow water into the machine and normal function will resume when the low level probe is reached)
Probable causes:	• The water level is below the low level probe, which is normal when the machine fills for the first time. (Can be flashing at start up when the machine is empty) • The low level probe wire is disconnected, or there is another wiring fault (eg. a bad earth (return) connection between the PCB and the Tank)
Action required:	• Check that the water pressure is OK and ensure that the stop valve is open. • Check that the inlet solenoid is working. • If the water level is above the level of the low probe, check the probe circuit wiring

3 FLASH CYCLE – THERMISTOR OPEN CIRCUIT

Display pattern:	• 3 flashes then a short pause - repeated.
Electronic check and action:	• This indicates that the Thermistor is measuring such a large resistance that it assumes the thermistor circuit is open. • The element and inlet valve are turned OFF when this error is detected • This is a recoverable error. When the correct range of resistance is measured, normal operation resumes
Probable causes:	• The thermistor probe is unplugged from the 4way connector on the PCB or the thermistor has failed open circuit.
Action required:	• Check that the thermistor is plugged in to the PCB correctly. If it is, replace the thermistor.

4 FLASH CYCLE – NOT HEATING

Display pattern:	• 4 flashes then a short pause - repeated.
Electronic check and action:	• This checks that the temperature is increasing when the heater is on. • Measures the rate that the temperature increases in a specified time. This error is only displayed after 20 mins of the heater being on continuously. When the error is detected, the element and inlet valve are turned off. • This is a non-recoverable error. The machine needs to be reset when this problem is solved.
Probable causes:	• The elements have failed • Wiring fault
Action required:	• Check that the resistance on the elements. If there is a reasonable resistance (15-25Ω) on the element it probably has not failed, so the wiring might be at fault.

5 FLASH CYCLE – THERMISTOR SHORT CIRCUIT

Display pattern:	• 5 flashes then a short pause - repeated.
Electronic check and action:	• This indicates that the Thermistor is measuring zero resistance. It assumes the thermistor has failed sort circuit. • The element and inlet valve are turned OFF when this error is detected • This is a recoverable error. When the correct range of resistance is measured, normal operation resumes.
Probable causes:	• The thermistor has failed.
Action required:	• Replace the thermistor.

6 FLASH CYCLE – NOT FILLING

Display pattern:	• 6 flashes then a short pause - repeated.
Electronic check and action:	• This checks that the water in the tank cools when the inlet solenoid valve is switched on. • This is a recoverable error. This checks that the water in the tank is cooled by when the inlet solenoid valve is opened. If the water pressure is within the specifications (5-50psi), the inlet solenoid should not be on for more than a few seconds.
Probable causes:	• Mains water pressure problem or the mains water stop valve is closed. • Inlet solenoid valve failure.
Action required:	• Check the mains water supply. (Note: Temporary loss of water pressure can occur in certain sites – particularly when various machines are plumbed to the same mains water supply.) If the water supply is restored machine will recover automatically. • **NOTE: If the water supply is the problem, ensure that this is rectified or this error will re-occur.** • If there is no problem with the mains water supply, check that the inlet solenoid valve is working.

3.6. MAINTENANCE:

Marco machines have been designed to give many years of trouble free service. Marco Beverage Systems manufacture and test to ISO9002:2000 standard. The only regular maintenance required is occasional de-scaling.

Descaling Procedure:

- Isolate machine from power supply.
- Isolate machine from water supply.
- ALLOW TO COOL COMPLETELY!
- Drain water from machine.
- Remove all lids.
- Remove as much scale as possible by hand, paying particular attention to level probes (White plastic with steel tab). Be very careful not to damage any attachments.
- Use ScaleKleen, Marco part No. 8000270 or similar. Follow instructions carefully.
- Thoroughly clean and flush the machine before re-use.
- Follow installation and first time operation instructions

3.7. CLEANING:

The exterior of these machines may be cleaned with a damp cloth and a light detergent. Do not use abrasive cloths or creams, as this will spoil the finish of the machine. Do not use a water jet or spray. Beware of accidentally operating the draw off tap or push button when cleaning the front of the machine.

3.8. LIMESCALE:

In common with all water boiler manufacturers, service calls resulting from limescale are not covered by warranty. Fitting a scale reducer is recommended, especially in hard water areas. This can reduce the build-up of scale but may not stop it altogether. The frequency that descaling is required depends on the local water supply; hard water areas need more attention. A scale reducer can reduce the build up of scaling, but may not stop it altogether. Descaling of the machine should ideally be carried out by qualified service personnel.

3.9. CAUTIONS AND SAFETY TIPS:

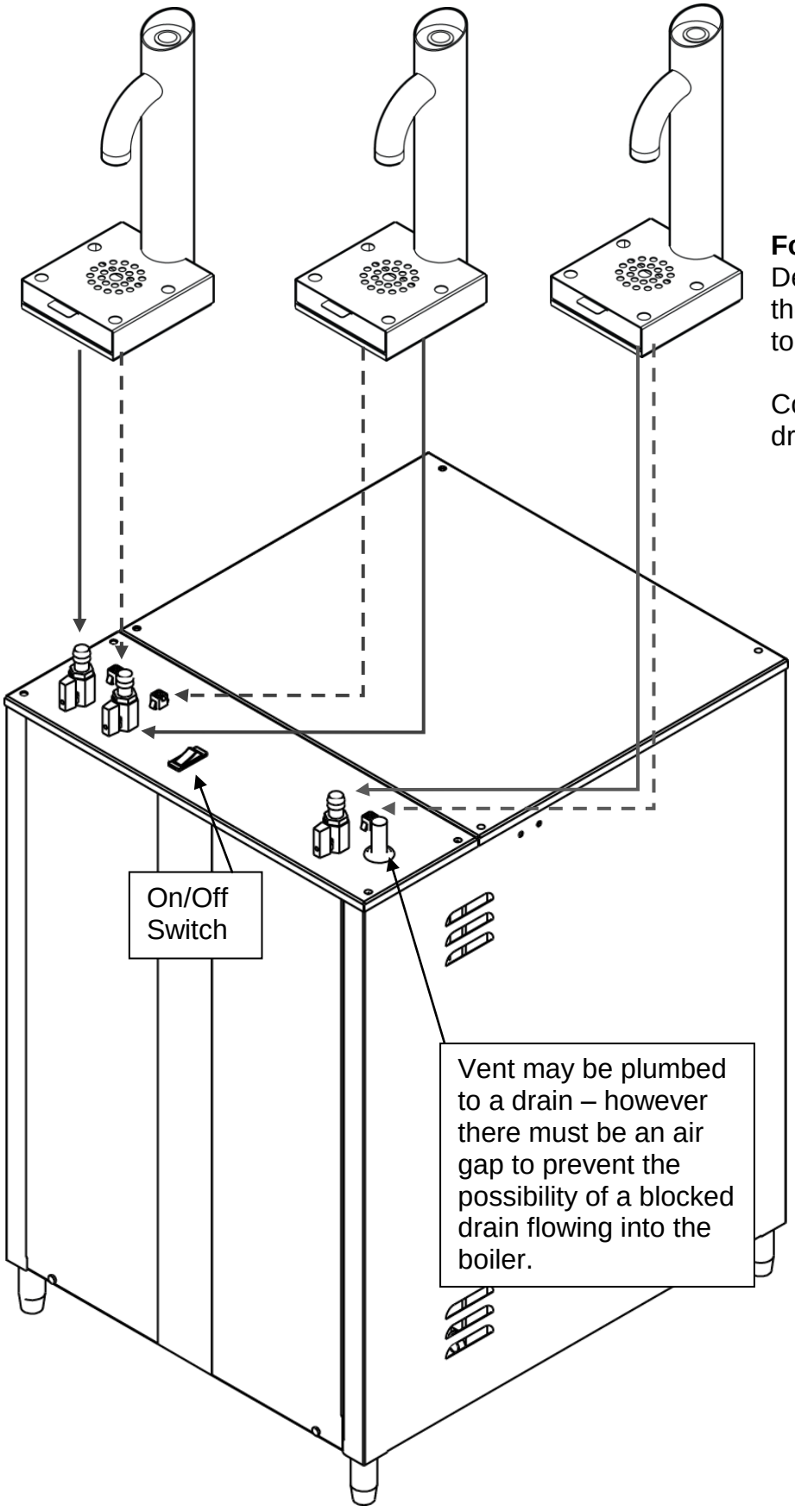
- This appliance must be earthed. If the moulded plug supplied is not used then ensure that the green/yellow cable is connected to a suitable earth.
- Risk of flooding. The hose supplied with this unit is non-toxic food quality tested to 190psi. However, a hose is not a permanent connection. It is, therefore, advisable to switch off boiler and close the stopcock valve when boiler is not in use, e.g. overnight, weekends etc.
- Risk of scalding. Beware of accidentally operating the water drawoff tap especially when cleaning the front of the boiler.
- The utmost care has been taken in the manufacture and testing of this unit. Failure to install, maintain and / or operate this boiler according to the manufacturer's instructions may result in conditions that can cause injury or damage to property. If in any doubt about the serviceability of the boiler always contact the manufacturer or your own supplier for advice.

4. Technical Data:

4.1. GENERAL DESCRIPTION:

		1000746 (8.4kW)
Dimensions	Height (mm) Width (mm) Depth (mm)	650 420 495
Performance	Immediate Draw-Off (litres) Min. Hourly Output (L/hr)	45L 84L
Electrical	Connection	8.4kW. must be connected to single phase power supply
Plumbing	Fittings Pressure	0.75” BSP Food grade inlet hose supplied 5-50 psi (35-345 kPa)

4.2. EXTERNAL ARRANGEMENT



Fonts will vary.
Depending on font the type the drip tray will either have to be manually emptied

or

Connected to a drain via drip tray outlet.

2- wire Electrical Connection Font to Boiler

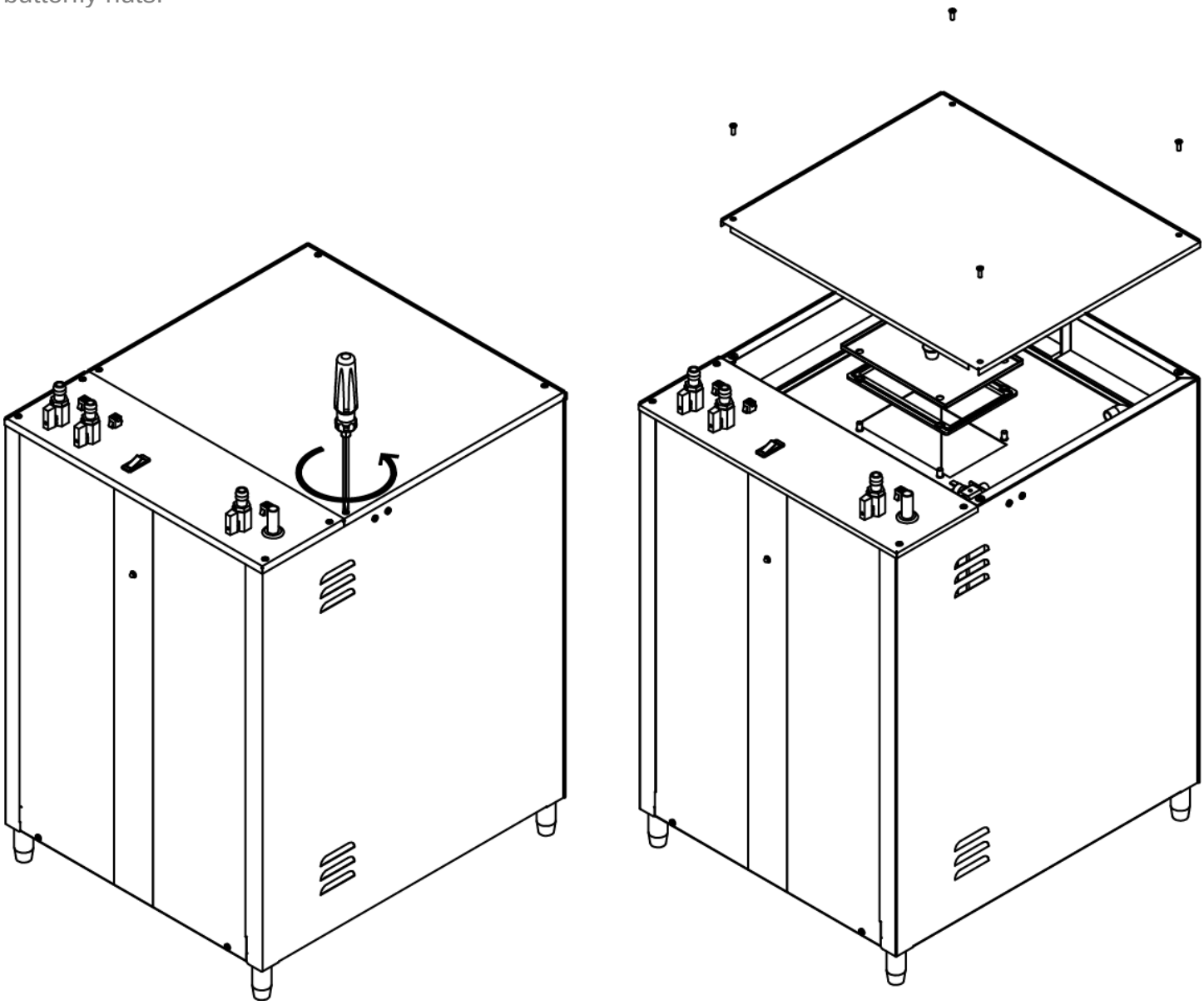
Font Water Connection.

Only machines with the “A” suffix will have 3 font connections.

4.3. ACCESS TO INTERNAL COMPONENTS:

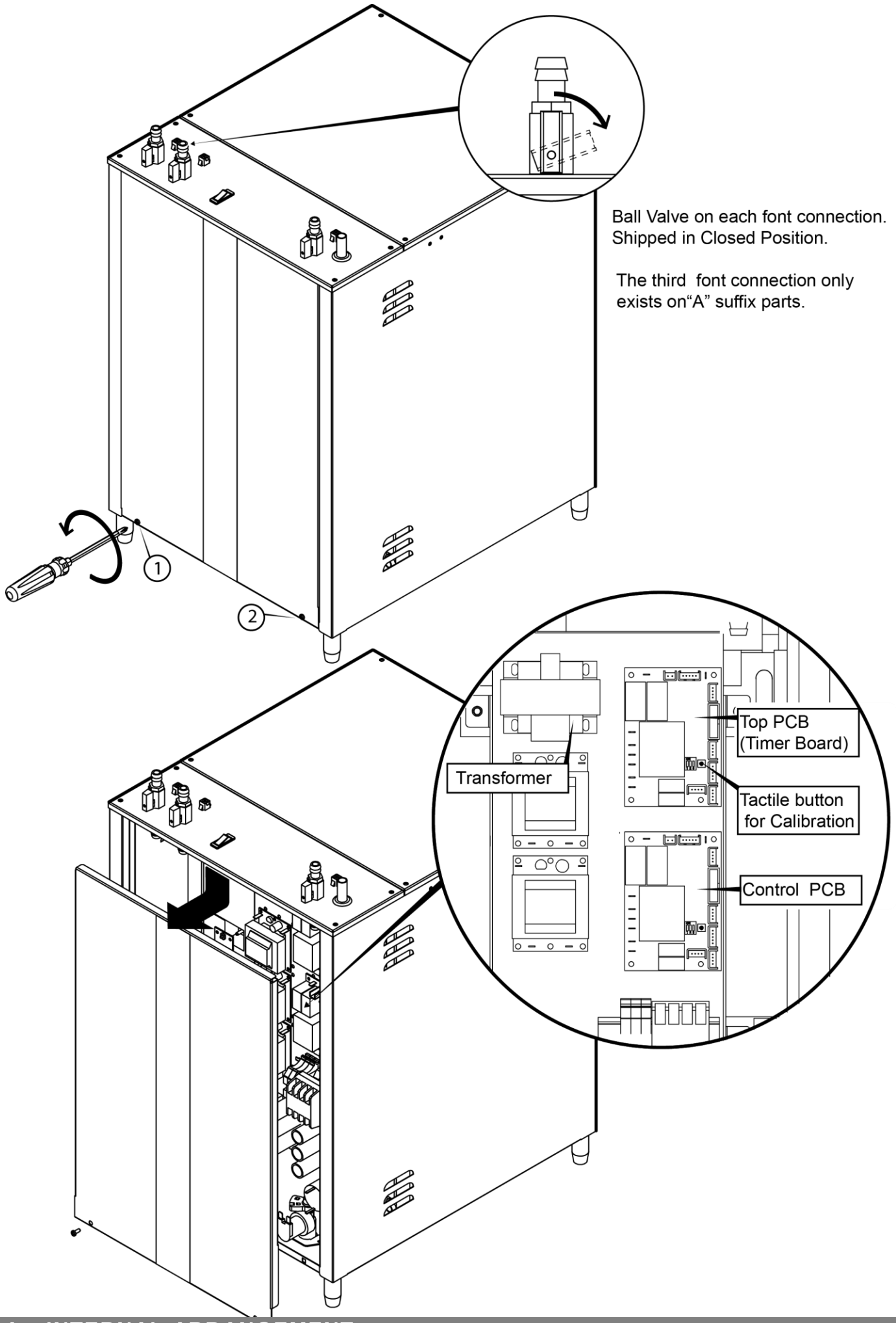
To access the tank:

Allow to cool. Remove the rear outer lid. To remove rear outer lid, undo 4 flat headed screws. Ensure that the tank is cool, before removing insulation and inner lid. To remove inner lid, undo 4 butterfly nuts.

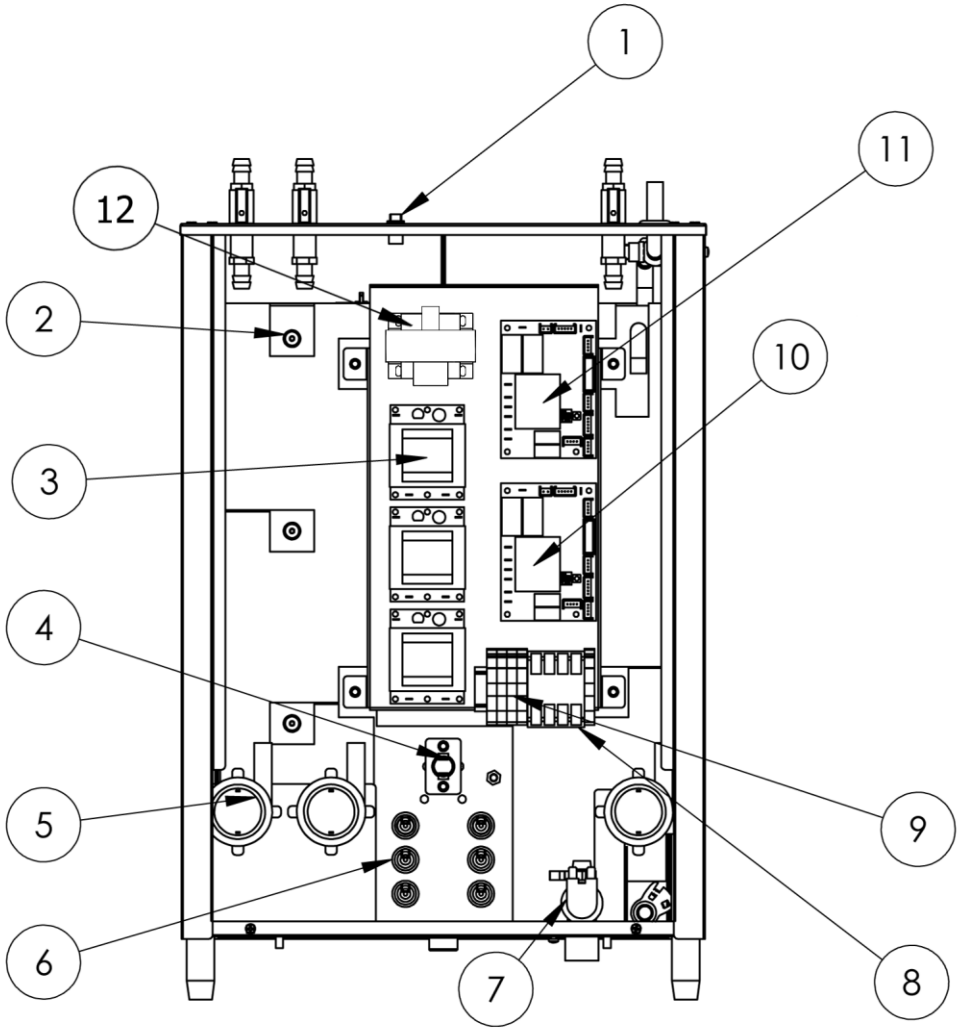


To access the internal components:

- Disconnect the machine from the electrical supply.
- Allow to cool sufficiently.
- Remove screws at points 1 & 2 on the front service panel and slide down panel and pull out from bottom
- *Place the panel to the side of the machine. This allows access to most of the internal components and the machine does not need* to be drained for most maintenance or service operations.
- The Tank can be drained by removing the plug from the end of the drain hose, and draining into an external drain or a large enough container.



4.4. INTERNAL ARRANGEMENT:



Item no:	Part number:	DESCRIPTION:
1	1501216	SWITCH POWER ON/OFF
2	UC45-010O	Probe Assembly (242x50x290mm Tab)
3	1600366	24V DC PUMP SUPPLY
4	1502087	THERMAL SWITCH 130 DEG
5	1501542	PUMP MULLER 24V DC
6	1500985	ELEMENT 2.8kW 230V
7	1502190	VALVE INLET SOLENOID 240V 3/4"
8	1500840	CONTACTOR B&J 240V AC
9	1502000	TERMINAL BLOCK
10	1600345	P.C.B. Ecoboiler Control
11	1600358	PCB Pump timer
12	1502146	Transformer 440V/230V

4.5. PCBs:

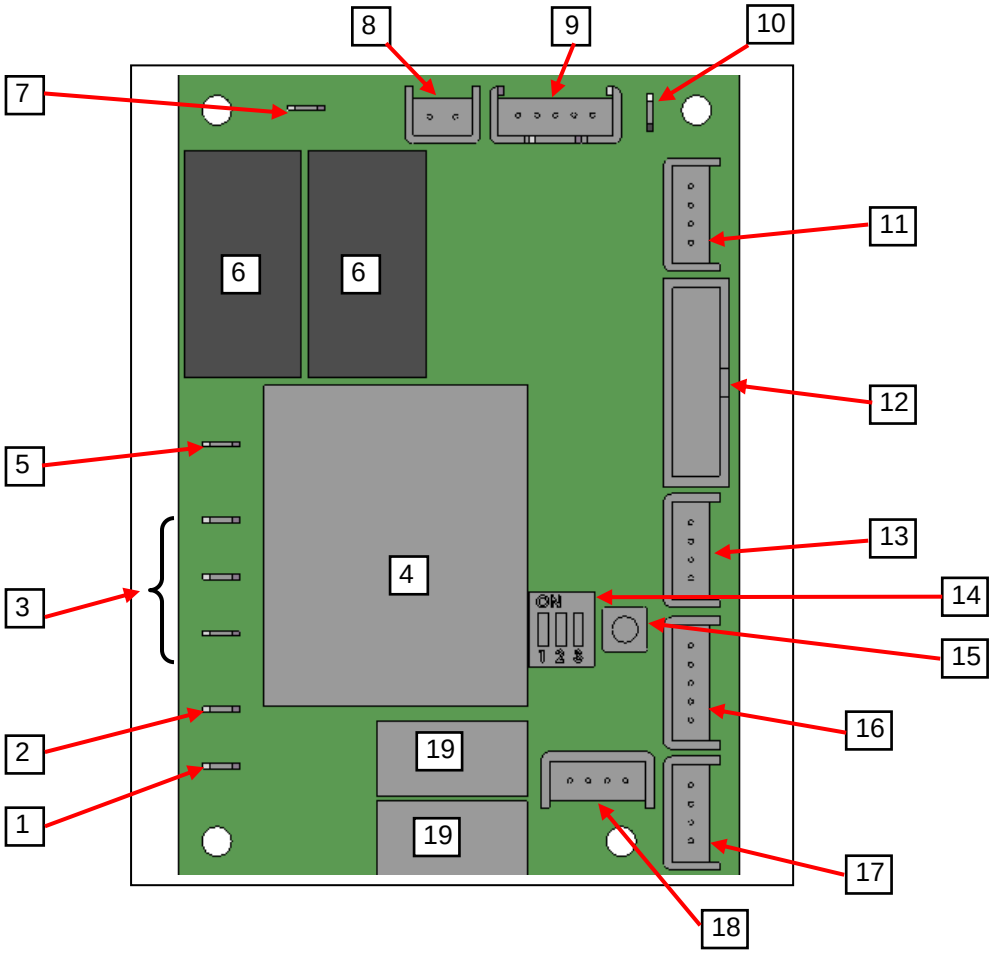
4.5.1. PCB Layout:

PCB Ecoboiler Control (1600345):

- Controls the heater switching
- Controls the water inlet switching
- Controls tank temperature/temperature adjustment

4.5.2. PCB Ecoboiler Control:

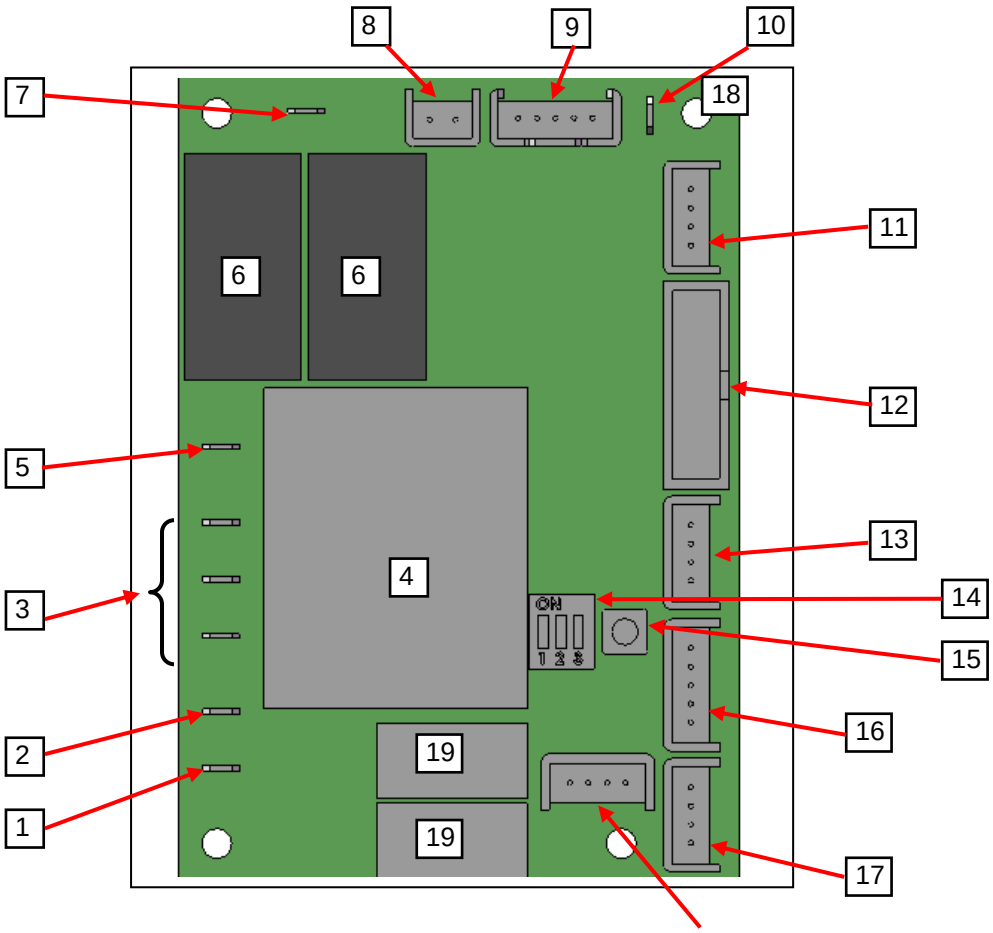
PCB Ecoboiler Control (1600345) / PCB Eco Slave (1600354):



Item No:	Description:
1	Dispense Solenoid / Pump Tab
2	Inlet Solenoid Tab
3	Neutral Tabs
4	Transformer
5	Mains Live In Tab
6	Relays - Heater. Switch the element
7	Heater Tab
8	On/Off 2-way Connector. Short circuited on this Ecoboiler.
9	LED 5-way Connector
10	Earth Tab
11	Daughter PCB Connector (low voltage). Connects to Daughter
12	External Connector
13	Thermistor Connector
14	Dip Switch – 3 way. Allows selection of software for specific machine
15	Tactile Switch. For use during calibration procedure (refer to Calibration in Sec 3.3)
16	Water Level – 5-way connector (low voltage). Connects to Low level and High level probes. Also connects push button on PB variants.
17	Button Connector – 4-way
18	Data I/O Connector – 4-way
19	Relays – Inlet Solenoid

4.5.2. PCB PUMP TIMER:

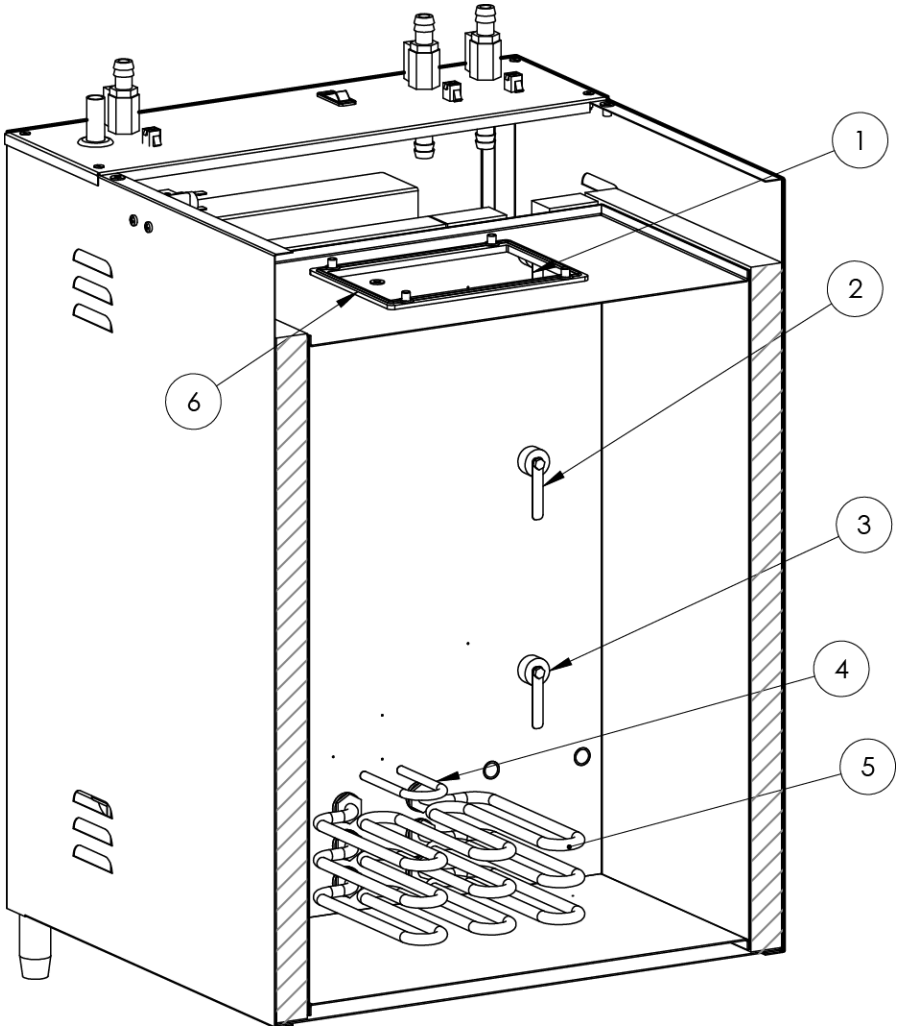
PCB Pump timer (1600358):



Item No:	Description:
1	Pump drive Tab
2	Pump drive Tab
3	Neutral Tabs
4	Transformer
5	Mains Live In Tab
6	Relays - Heater.
7	Heater Tab
8	On/Off 2-way Connector. Short circuited on this Ecoboiler machines
9	LED 5-way Connector
10	Earth Tab
11	Daughter PCB Connector (low voltage).
12	External Connector
13	Thermistor Connector
14	Dip Switch – 3 way Allows selection of software for specific machine
15	Tactile Switch. For use during calibration procedure (refer to Calibration in Sec 3.3)
16	Water Level – 5-way connector (low voltage). Connects to Low level and High level probes. Also connects push button on PB variants.
17	Button Connector – 4-way. Font switches connected here.
18	Data I/O Connector – 4-way
19	Relays for pumps.

4.6 Tank Components

The tank internals are detailed below.



Item no:	Part number:	DESCRIPTION:
1	UC45-010O	Probe Assembly – High position
2	2300463	Probe Assembly – Mid position
3	2300463	Probe Assembly – Low position
4	N/A	Thermistor Pocket – ensure that this is not touching the element.
5	1500985	Element 2.8kW 230V (Butterfly)
6	1800306	Gasket Inner Ecoboiler

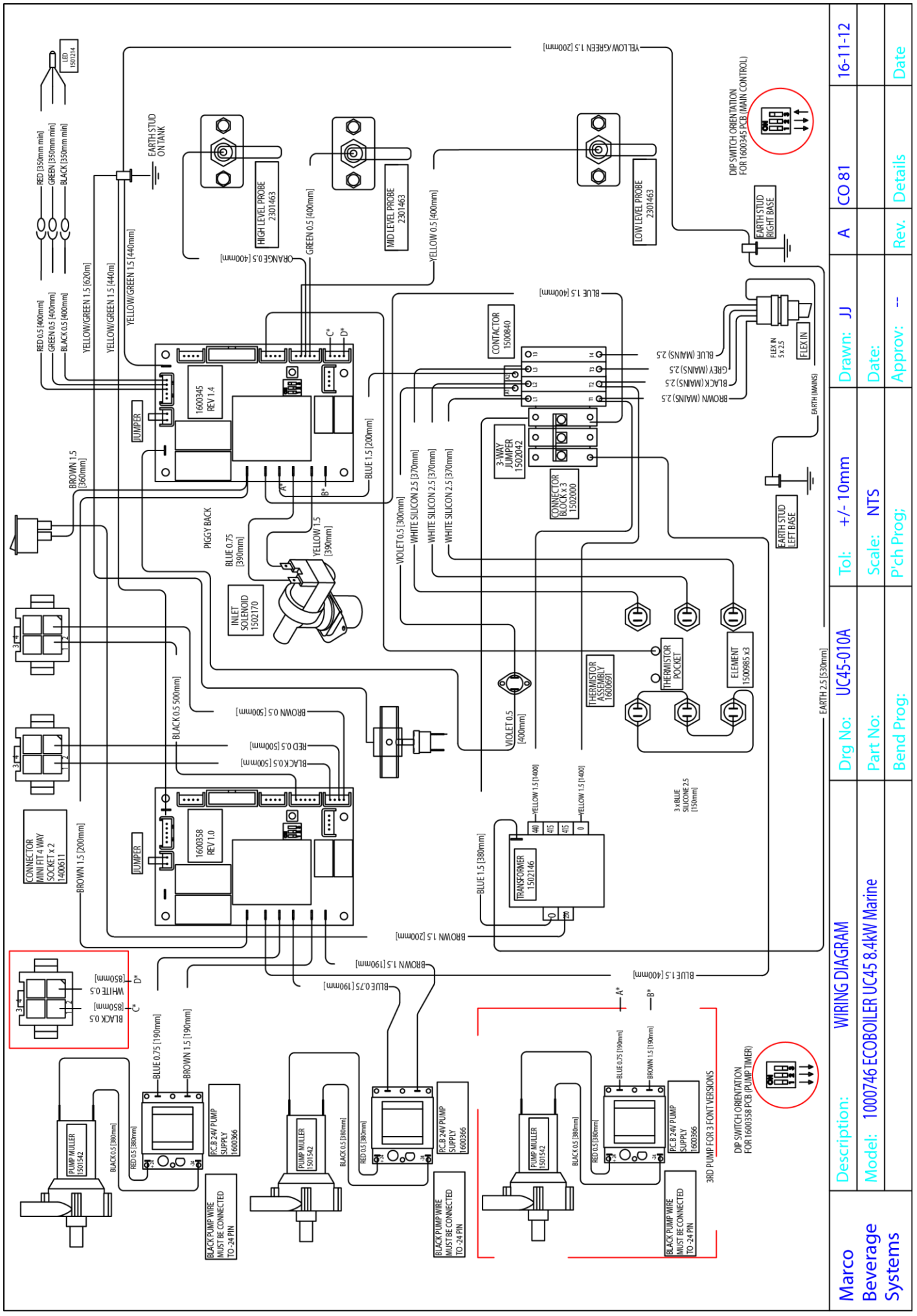
Care should be taken when cleaning inside the tank.
The level probes provide much of the control inputs into the PCB and are critical to the operation of the machine. The wiring to these should be checked regularly and the probes themselves should be cleaned whenever the machine is serviced.

4.7 Descaling Procedure

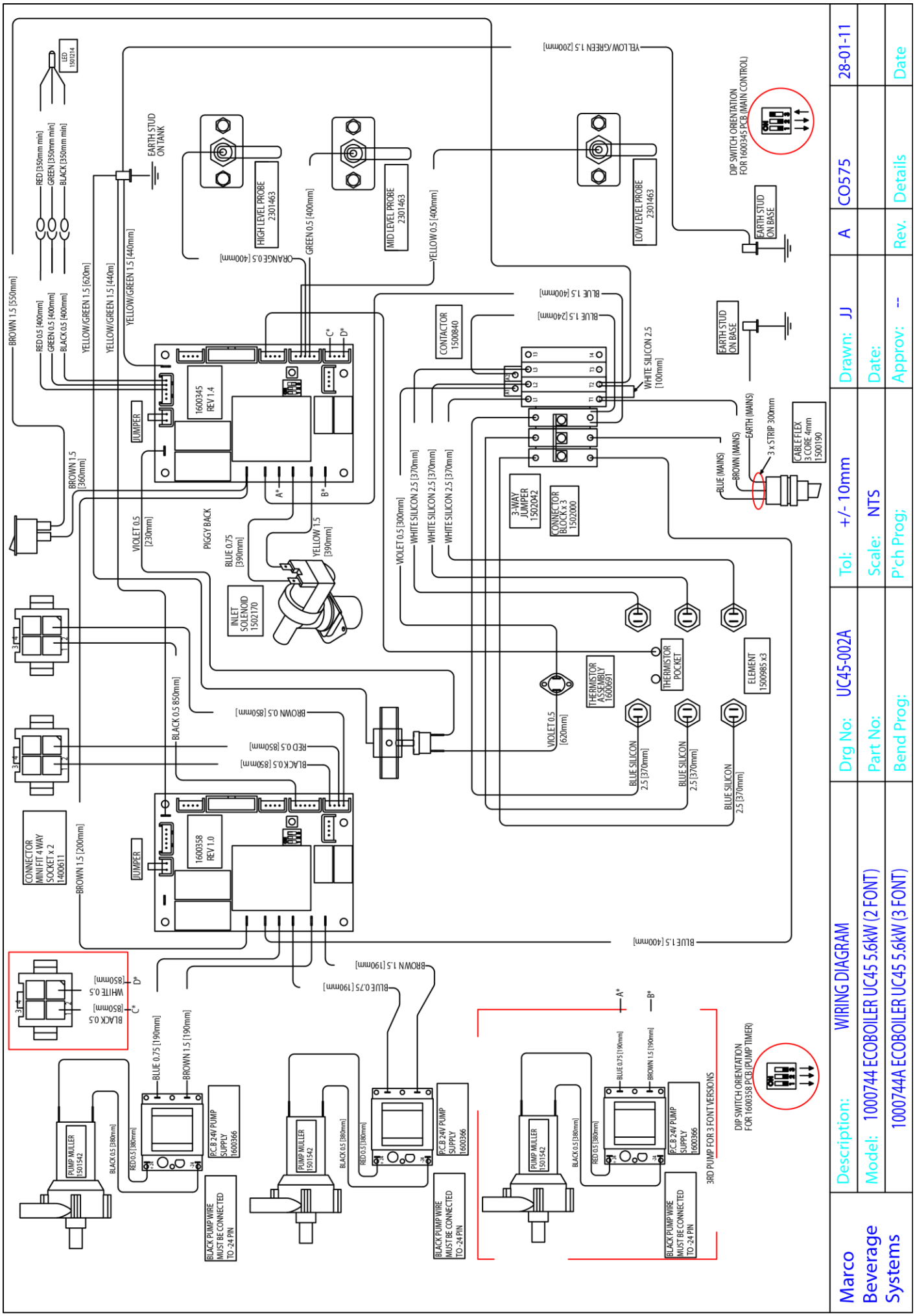
To descale the machine thoroughly:

- Unplug the machine.
- Disconnect from the water supply.
- Drain as much water from the tank as possible.
- Remove the lids and allow the machine to cool completely.
- Drain all the water from the machine.
- Attempt to remove as much scale as possible by hand.
- Reconnect machine and start up once again.
- Add a descale solution (follow instructions as given). Flush the machine thoroughly before use

4.8 Wiring diagram: 1000746



4.9 Wiring diagram:5.6kW



4.10 Spare Parts List

Part Number	Description
1500985	Element 2.8kW 230V
1500200	Moulded Plug and cord
1501542	Pump Muller 24V DC
1502087	Thermal Switch 130Deg
1502088	Thermal Switch 90deg, M4 Stud Mount
1502089	Thermal Switch Mount Brass
1502191	Valve Inlet Solenoid 240V - 2L/min
1501216	SWITCH POWER ON/OFF
1500840	Contactor B&J 240V AC
1502000	Cable Flex 5 Core X 2.5mm
1600345	P.C.B. Ecoboiler Control
1600354	P.C.B Eco Slave
1600358	P.C.B. Pump timer
1600357K	P.C.B 357 Spares Kit
1600366	P.C.B 24V DC Pump Supply
1600691	Thermistor Assembly
1800306	Gasket Inner Ecoboiler
2300395	Service Panel UC45 Ecoboiler
1900676	Label UC Ecoboiler 45L
2300384	Lid Inner Ecoboiler
2301463	Level Probe Assembly
UC45-010O	Probe Assembly (242x50x290mm Tab)
1502146	Transformer 440V/230V
8800121	Descale Box – 6 Packs

MARCO is an ISO9001:2000 Registered Company.