

# VESTEL WATER HEATER SERVICE MANUAL

COVERS ALL BATH STOVES IN THE FIELD MANUFACTURED IN VESTEL  
FACTORIES

# VESTEL WATER HEATER SERVICE MANUAL

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## 1- GENERAL INFORMATION ABOUT WATER HEATERS

**Safety:** Each part of the water heater is checked carefully to provide excellent operation durability. Electrical circuit is completely insulated from the water circuit. All models are equipped with at least 3 safety equipments.

**Ease of use:** All models can easily be mounted at any place.

**Low heat loss:** It is preferred to position water heaters that can be installed anywhere as close to the hot water source as possible to keep the heat loss in the piping minimum.

**Small amount of hot water:** In order to avoid unnecessary energy consumption, models with different capacities are designed for spaces such as kitchen or service room where small amounts yet continuously running hot water is needed.

## 2- PROPERTIES OF THE WATER HEATER

### 2-1 Efficient insulation, low energy consumption

High density, thick polyurethane foam layer offer excellent insulation in all electrical heaters and reduces energy consumption significantly.

### 2-2 Drum with long service life

Special process of enameling that protects the tank against corrosive (abrasive) effects of the water and water-soluble substances. It provides longevity and reliability for the mentioned protection drums.

### 2-3 Magnesium anode.

By using more magnesium anodes in the products, an electro-chemical anti-corrosive system that prolongs the service life of the drum is used. In addition, it is positioned to allow easy access to anode drum for control and part replacement when required.

### 2-4 High quality heating elements.

Heating coils are manufactured using first-class material to ensure long service life.

### 2-5 Water temperature control

Products are equipped with a temperature control button that helps to maintain the temperature between 35°C and 85°C. Thanks to this button, every user can select the appropriate water temperature according to requirements and hence achieve energy savings.

### 2-6 Thermostat.

Hot water heaters are equipped whit thermostats which guarantee high performance and maximum safety. The electronic card assumes the function of the thermostat in electronic models.

### 2-7 Limit thermostat.

Hot water heaters are equipped with "maximum temperature" thermostat. This safety device deactivates the main thermostat and heating coils in case of a failure.

## **2-8 Pressure safety.**

Water heaters are equipped with a certified safety valve in terms of pressure values standards. Without the need to remove discharge pipe, a check-valve is used to drain the unit when required.

## **2-9 Freezing Safety.**

When water temperature in your water heater falls below 5°C, heating resistance is automatically activated and heats the water up to 16°C. In the meantime, lamps with anti ice and heating coil signs illuminate and indicate the temperature of the water. The anti-freeze safety system activates while the water heater is in stand-by. Install the water heater in a location safe from risk of freezing. "This safety system is only available in electronically controlled models."

## **2-10 Bacteria Prevention System.**

Researches show that when the water is kept under below 60°C for a long time it will become suitable for bacteria growth. While the device in stand-by, to prevent bacteria from growing the water is heated at least once a week above 65°C and kept at this level for 1 hour. "This safety system is only available in electronically controlled models."

## **2-11 Dry Operation Safety.**

If your device is operating without water for any reason whatsoever, the system will be activated automatically and generate E3 error code in the display. In this case disconnect the device using V-automated switch and ensure that the water heater is filled with water. After ensuring that it is filled with water reconnect to the mains supply, the water heater will commence its normal operation. "This safety system is only available in electronically controlled models."

## **2-12 Low Voltage Protection.**

If voltage is dropped to a level harmful for the device due to mains fluctuations, then the low voltage safety system is activated and E2 error code is displayed. After the voltage is restored to desired level E2 error will disappear and the water heater will commence its normal operation. "This safety system is only available in electronically controlled models."

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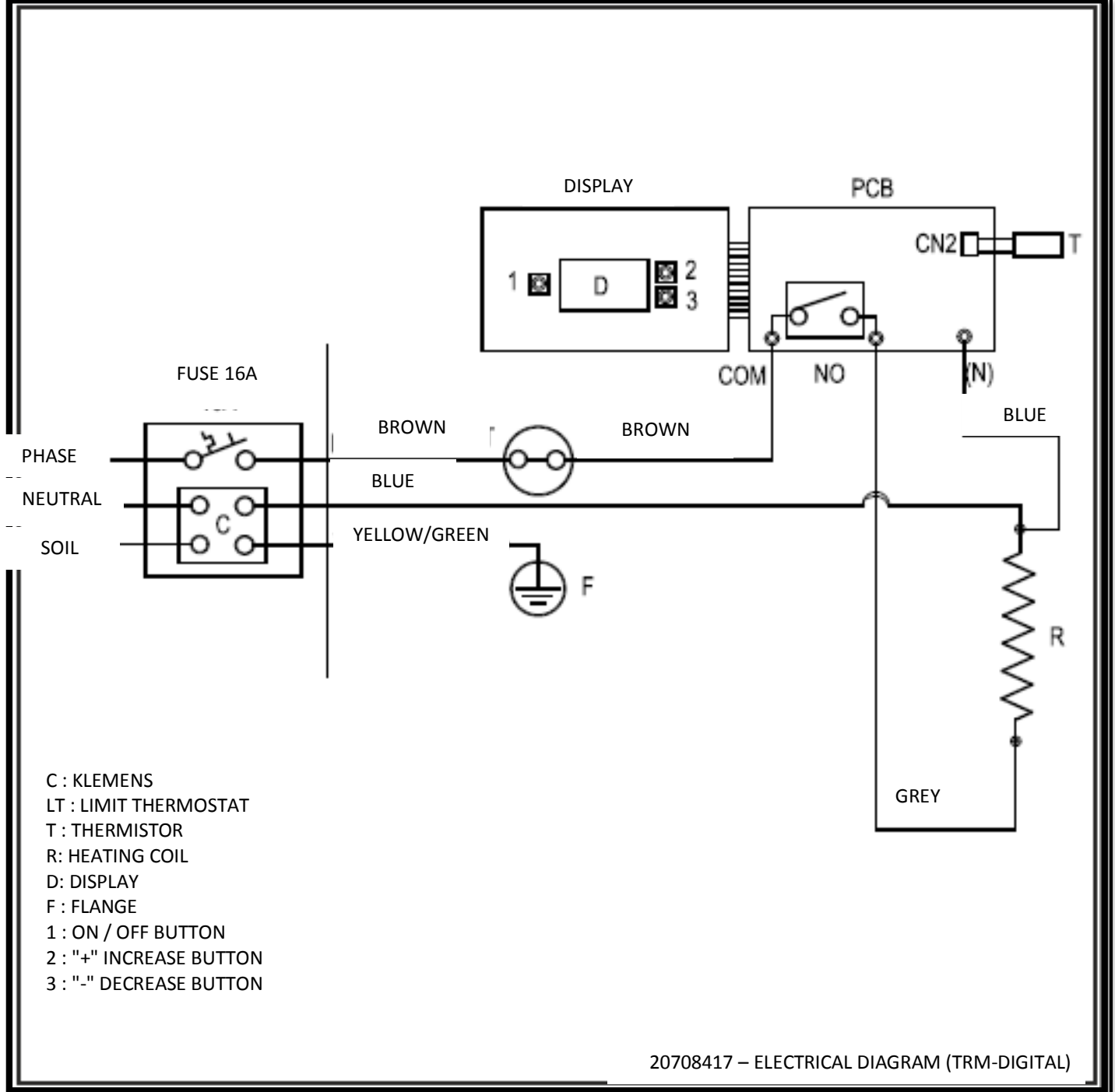
## 3- TECHNICAL SPECIFICATIONS TABLE

MODEL	UNIT	STANDARD			DIGITAL		
		TRV 50	TRV 65	TRV 80	TRV 50 E	TRV 65 E	TRV 80 E
CAPACITY	Lt	50	65	80	50	65	80
CONTROL PANEL	-	Thermostat led	Thermostat led	Thermostat led	Digital	Digital	Digital
WATER TEMPERATURE SETTING RANGE	°C	35-85	35-85	35-85	35-85	35-85	35-85
VOLTAGE	V	230	230	230	230	230	230
CURRENT	A	9	9	9	9	9	9
RESISTANCE POWER	W	1980	1980	1980	1980	1980	1980
OPERATING PRESSURE	Bar/Mpa	8/0,8	8/0,8	8/0,8	8/0,8	8/0,8	8/0,8
SAFETY VALVE MAX.	Bar	9	9	9	9	9	9
WATER CONNECTION	inch	1/2	1/2	1/2	1/2	1/2	1/2
ANTI-BACTERIAL PROTECTION	-	-	-	-	√	√	√
DRY OPERATION SAFETY	-	-	-	-	√	√	√
FREEZING CONTROL	-	-	-	-	√	√	√
PROTECTION CLASS	-	IPx4	IPx4	IPx4	IPx4	IPx4	IPx4
ANTI-CORROSIVE SYSTEM	Enameled interior drum and magnesium anode						

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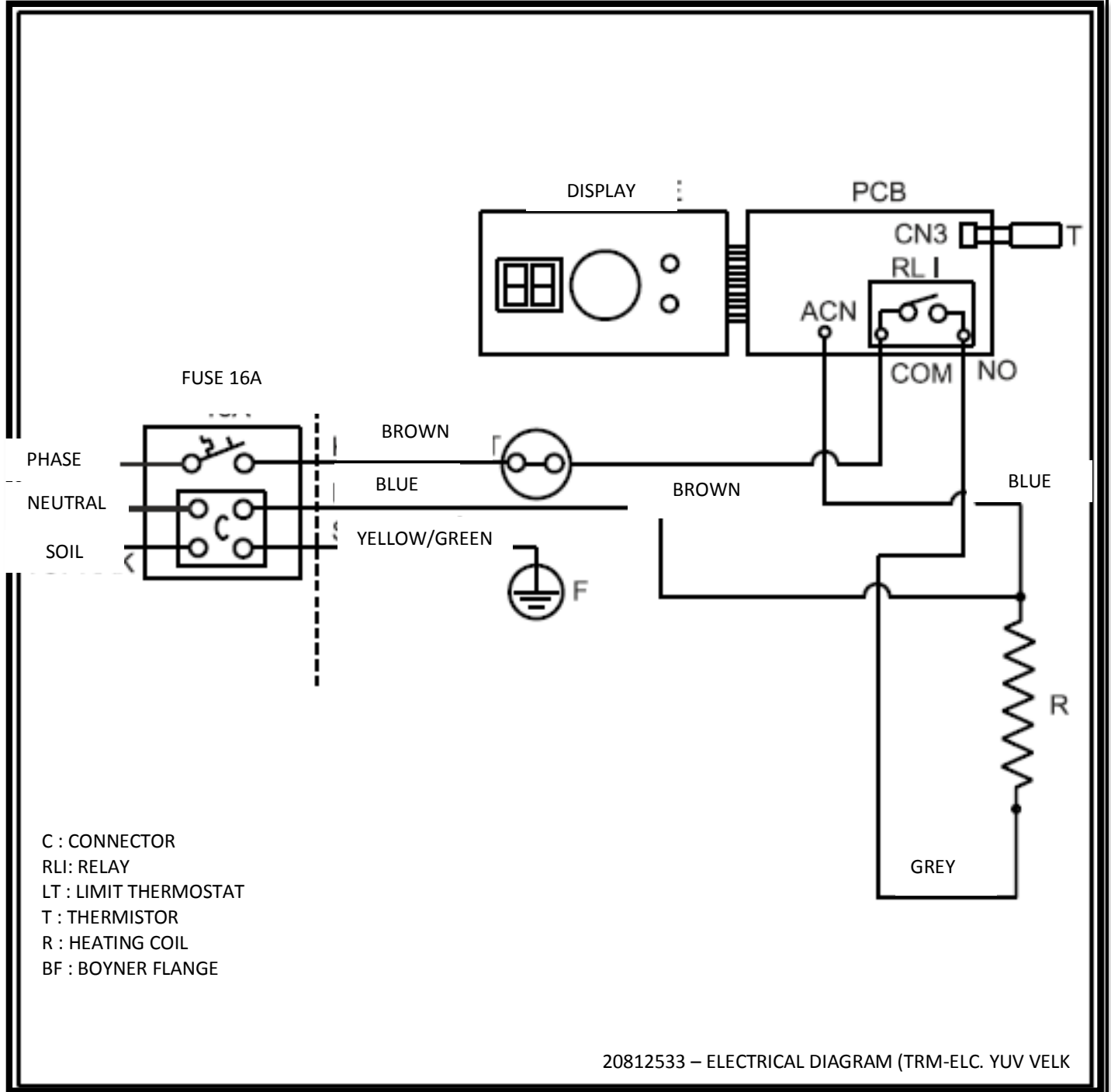
## 4- BATCH STOVE ELECTRIC GRAPHICS

### 4-1 FOR DIGITAL MODELS (SQUARE)



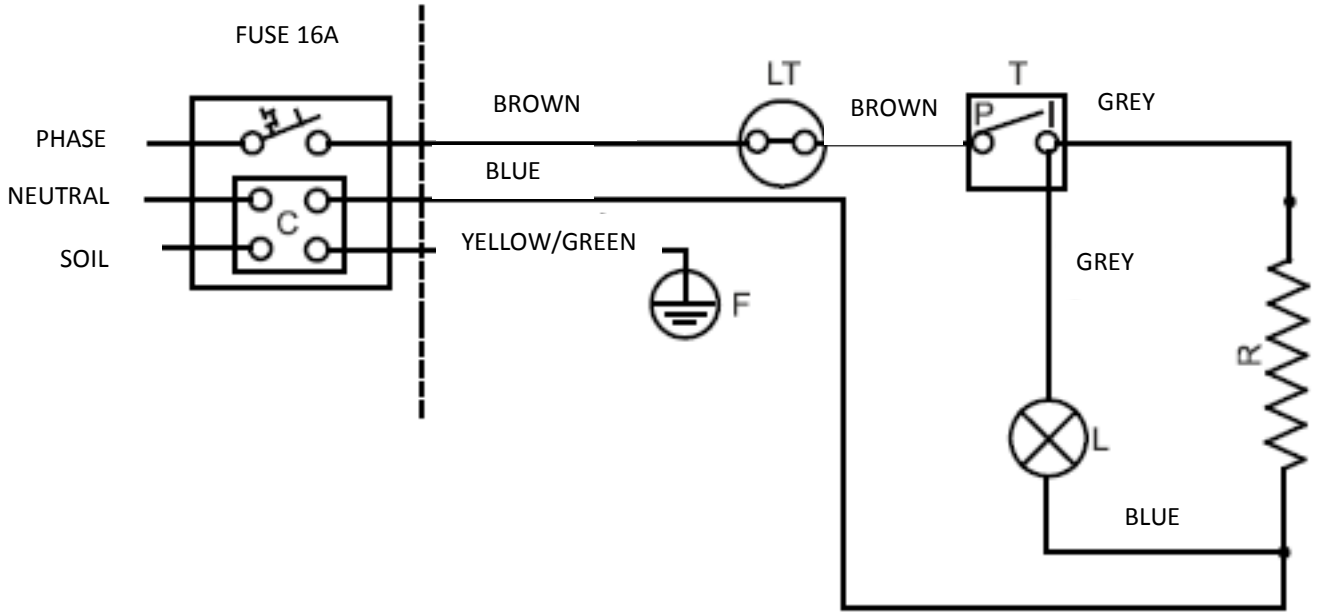
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## 4-2 FOR DIGITAL MODELS (CYLINDER)



# VESTEL WATER HEATER SERVICE MANUAL

## 4-3 FOR MECHANICAL (ANALOG) MODELS



C : KLEMENS  
LT : LIMIT THERMOSTAT  
T : THERMOSTAT  
R: HEATING COIL  
L : SIGNAL LAMP  
F : FLANGE

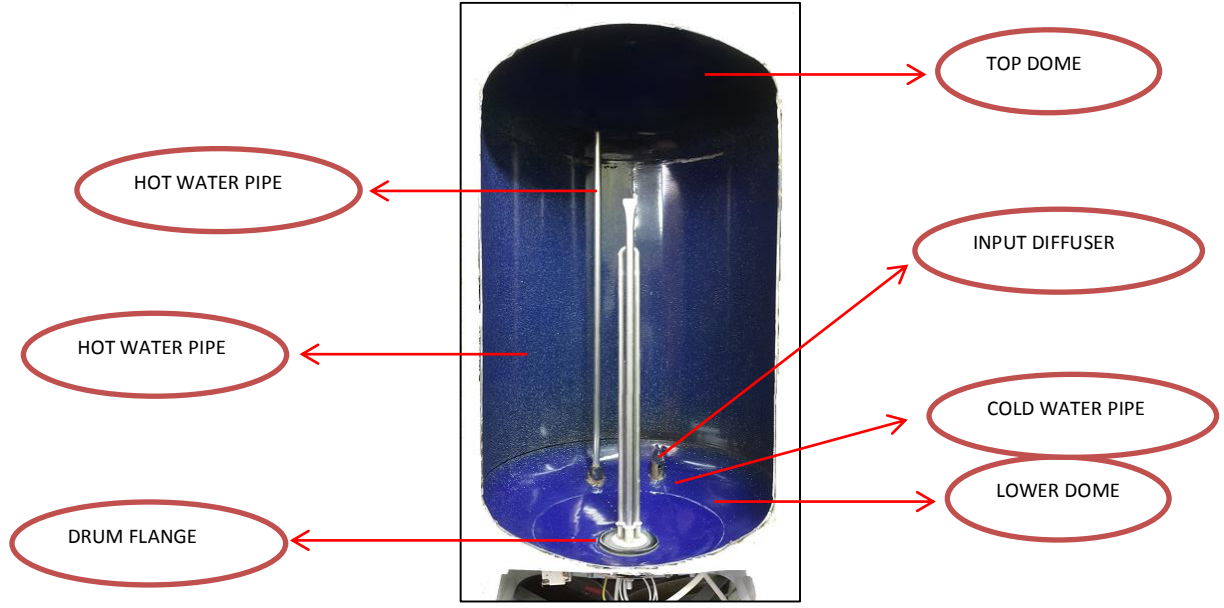
20850064 – ELECTRICAL DIAGRAM ANALOG TYPE



## 5- WATER HEATER COMPONENTS

### 5-1 DRUM

Water heater is manufactured from steel sheet suitable for enameling. Interior is coated with enamel with water-resistant titanium enamel up to 850°C.



(1) Top dome

(2) Hot water outlet pipe. Depending on the model, different lengths of pipes can be used for hot water outlet. Hot water always is always received at the top of the tank.

(3) Lower dome

(4) Drum flange

(5) Cold water inlet pipe

(6) Input diffuser. Prevents turbulence and provides cold water inlet from the bottom of the tank.

(7) Drum

## 5-2 OUTER BODY

Water heater outer body is manufactured from sheet with cataphoresis and electrostatic oven-drying and lower and upper cover parts are manufactured from heat-resistant plastic material.

## 5-3 INSULATION

Gap between drum and outer body is filled with polyurethane foam with the most suitable density and pressure for heat insulation.



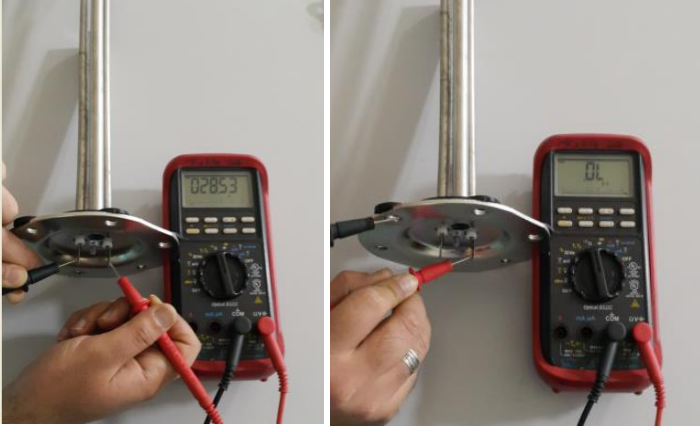
## 5-4 HEATING COIL

Outer part of the heating coil is made of stainless steel and inner part is made of heating coil wire and magnesium oxide insulation. Heating coil flange includes heating coil, thermocouple pipe and anode bar mounting bracket. It can be in different shapes and powers depending on the model. Mechanical thermostat, electronic thermostat and limit thermostat thermocouples installed in thermocouple pipe must be secured to the deepest section and a rubber plug must be mounted at the end to prevent them from falling.



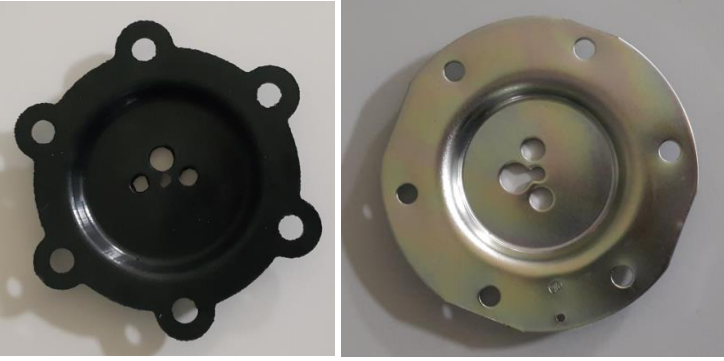
**Heating coil measurement method;**

**Move the level of your measurement device to  $\Omega$  (ohm) position and measure the resistance. If you can read the circuit as illustrated, then you need to check if there is any leakage to the body. Contact one of the probes to one of the ends and other probe to flange gasket. If the value is shown, it is defective, if not it is intact.**



## 5-5 FLANGE GASKET

Sealing and electrical insulation between tank flange and flange of the heating element is provided by a gasket. In cases where flange is removed, for example, when thermostat drum scale is cleaned, it must afterwards be replaced.



## 5-6 THERMOSTAT

Mechanical thermostat is used to set water temperature in desired level. Thermostat is mounted on front display panel. For the thermostat to detect water temperature, it is placed in the steel pipe in capillary pipe thermocouple heating coil flange. Thermocouple must be installed in the steel pipe such a way that it is secured to the bottom part. Signal lamp is lit red while water is heated to temperature that thermostat is set. Signal lamp lights up green when water reaches the desired temperature.

# VESTEL WATER HEATER SERVICE MANUAL

## A-MECHANICAL CONTROL



On-Off signal Lamp

Temperature Adjustment Button



Thermostat.

### Mechanical thermostat stability control;

Temperature is set in mechanical thermostats by expanding the gas in the bulb and it has an adjustment button. This button is used to set the temperature value. If the temperature of the water in the water heater is lower than the set temperature, contact is opened to allow heating coil to start. It has two ends with phases in both. Line is turned on or off manually or with heat change.

Move the level of your measurement device to  $\Omega$  (ohm) position and measure the resistance. First, lower the thermostat adjustment button below the water temperature and contact probes to both ends of the thermostat. Value must be displayed in the measurement device. If not, it is faulty. When you see the value, measure again by moving adjustment button above water temperature. The value must disappear. If you see the value, thermostat is faulty and it must be replaced.



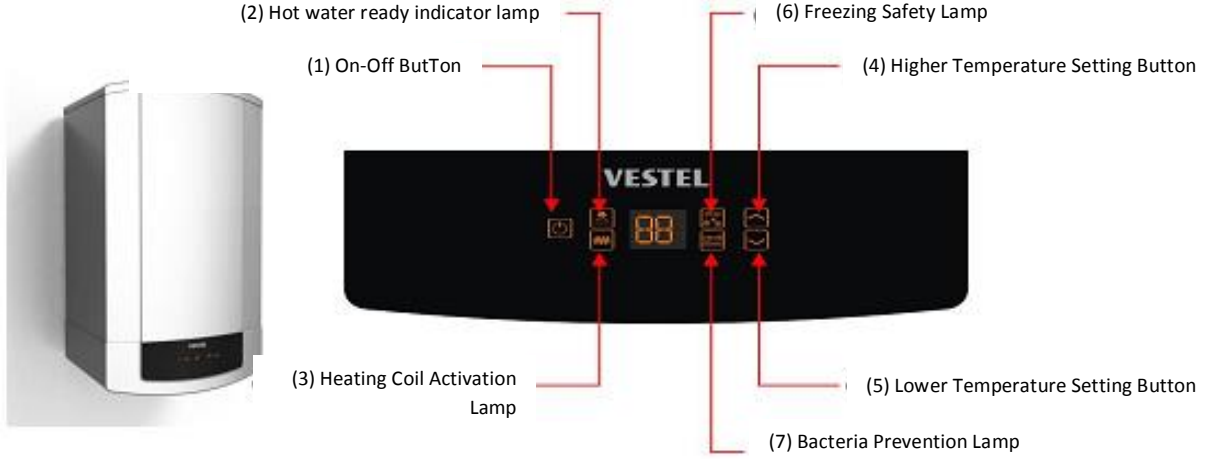
## ELECTRONIC THERMOSTAT

Temperature control and some of the safety functions are performed with an electronic card in electronically controlled water heaters. Electronic card is located on the front panel. To set the temperature, there are two touch buttons and one on/off touch button. Temperature value, heating coil active, hot water ready, freezing prevention and bacteria prevention signal leds are located on the display. Electronic thermostat is removed by removing the screws on both sides in display panel when service cover is removed. The protective lexan film tag in front of the display must be replaced when it is deformed.

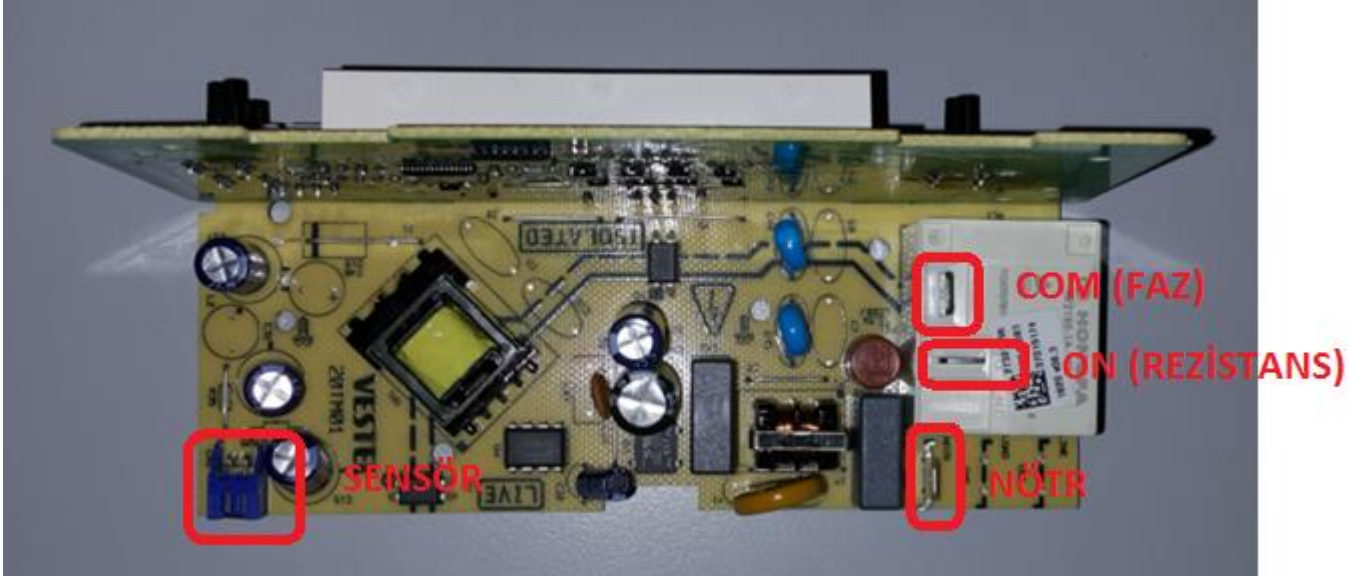
# VESTEL WATER HEATER SERVICE MANUAL

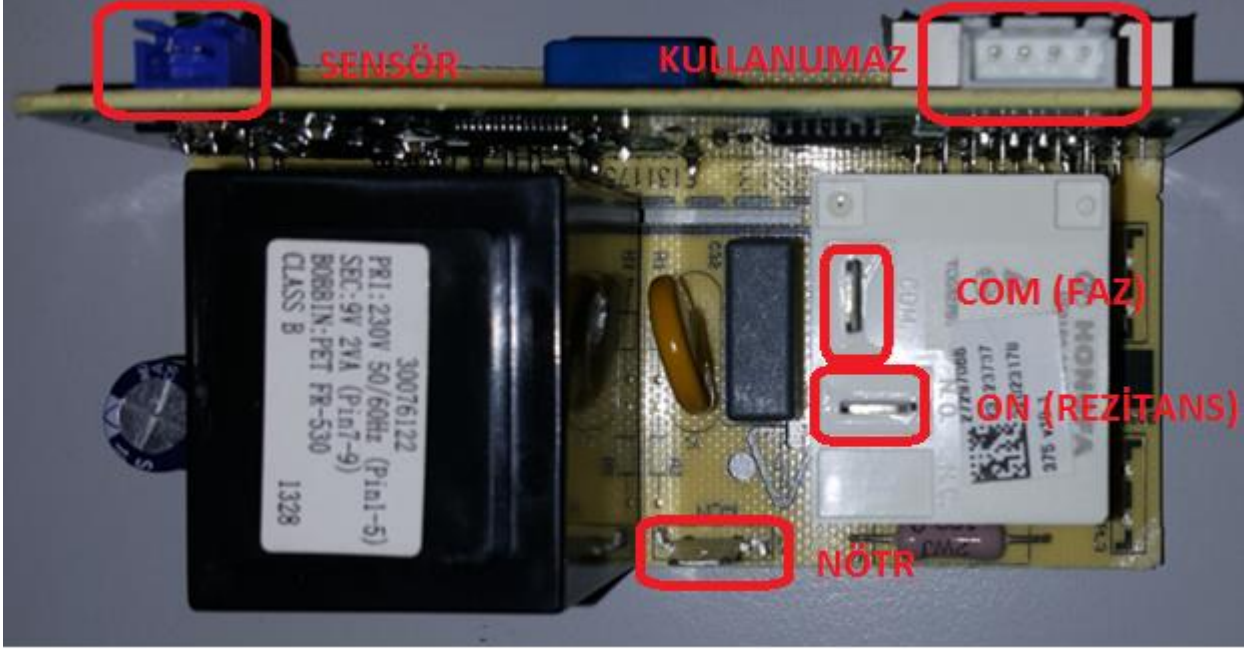
Water temperature is set to desired value with electronic card. Setting can only be made using the up-down temperature adjustment keys. At the end of the operation, current temperature in the water heater appears on the screen. The heating coil active signal lamp on the left side lights up. When water reaches the desired temperature, hot water ready signal lamp lights up.

## B-ELECTRONICAL CONTROL



Electronic thermostat.





## Electronic Thermostat Error Codes:

Following codes appear on the electronic card indicator in some error cases.

E1	Thermistor Error	Check the thermistor socket. Replace the thermistor with a new one.
E2	Low Voltage Warning	When voltage is back to normal, error will automatically disappear.
E3	Dry operation	When drum is filled with water, and power is turned off and on, the error will be eliminated.

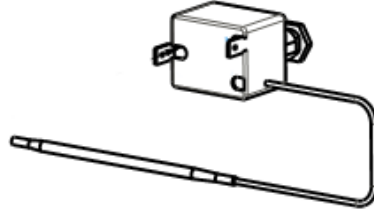
## 5-7 LIMIT THERMOSTAT

The limiting thermostat will disable the resistance in case of excessive temperatures in the drum or the failure of temperature setting thermostat. When limit thermostat trips, check if thermostat is intact. After troubleshooting, press reset button on limit thermostat to activate again.

Limit thermostat protection values;

- 1- Circuit cutting temperature is 104 °C.
- 2- Circuit is cut when gas in the bulb leaks, the product will not operate.
- 3- When circuit is cut, the red button will come out.
- 4- When limit thermostat cuts the circuit, water temperature in the drum is decreased to 60°C for reactivation by pressing the red button.
- 5- Minimum 30 minutes must pass for limit thermostat to be reactivated.
- 6- Limit thermostat has a lifespan of 10 trippings.





Limit thermostat.

Performing controls,

is the most important protection element in the circuit. It allows you to control the increasing pressure depending on the water temperature. Phase in and phase out and shuts of contacts according to the value measured by the bulb. Unless water temperature rises to 105°C, it keeps the circuit open at all times. Water must be cooled and minimum 30 minutes must pass for it to be reactivated after tripping. It is checked using measurement device as follows.

**Move the level of your measurement device to  $\Omega$  (ohm) position and measure the resistance.**

- 1- Limit thermostat is constantly active if it is not tripped.



- 2- If limit thermostat is tripped, red button comes out and breaks the circuit.



## 5-8 SAFETY VALVE

Safety valve checks the water pressure in the tank . It provides protection against high pressure and it is activated when internal pressure exceeds 8 bar. Valve is closed so that it prevents the discharge of thermostat when water supply is off. Minimum pressure value required to allow valve opening and water inlet is 0,2 bar that is considered to be equal to 2 m of water height. Safety valve has a latch that opens the valve. This latch can be used for water tank discharge.

Safety valve is installed on the cold water inlet of the water heater. The following conditions must be observed while installing and using the safety valve.

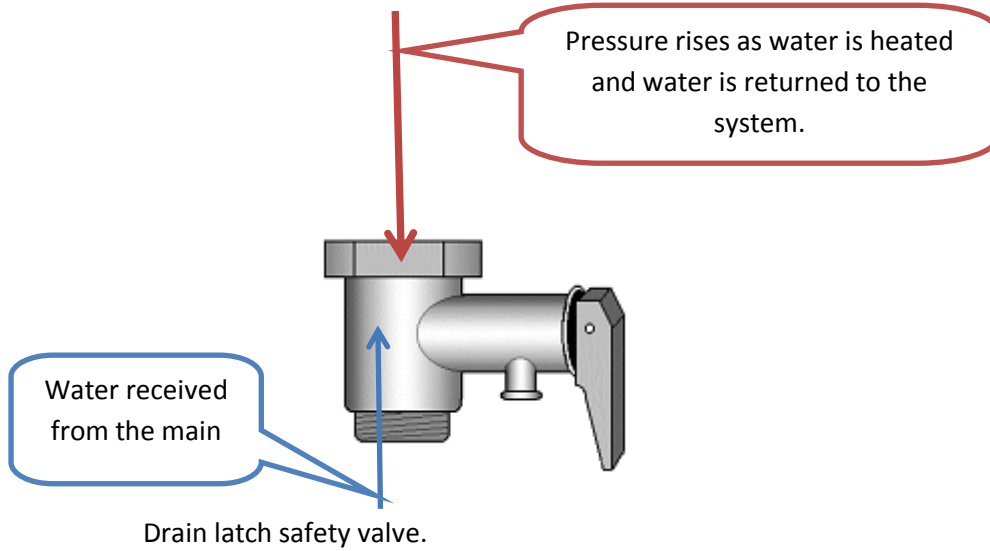
1-As water may drip from the drainage tip, this pipe should be left open to the atmosphere. In order to prevent the dripping waters from causing any harm to the environment, you can connect it to a sewage drain by means of a discharge hose.

2-The appliance should be operated with intervals pressing the latch in order to prevent caustic lime accumulation and confirm that it is not blocked.

3-While connecting the safety valve to the appliance, make sure that the drainage tip is downwards.

Methods of protecting the device;

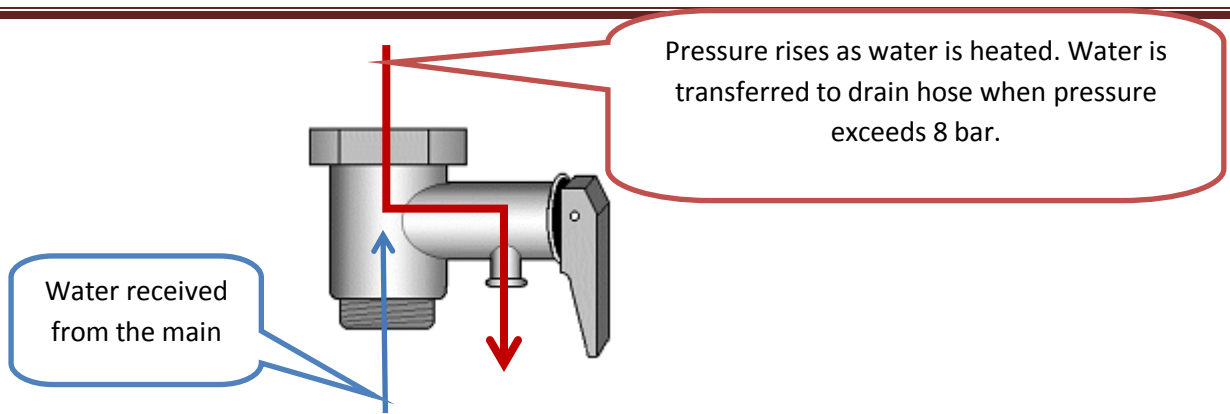
- 1- Protection 1: Drum pressure is reduced by transferring water to water system if drum pressure exceeds the system pressure by 0.5-1.



- 2- Protection 2: It is activated when drum pressure exceeds 8 bar. It discharges the water inside through drain hose to reduce drum pressure.



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### 5-9 ANODE STICK

Corrosion is a chemical process that occurs between water heater metal (tank, pipes, heating coils) and water surrounding it. Corrosion causes punctures in the tank, reduces mechanical resistance of elements and damages heating element. Reasons that cause corrosion are as follows:

1. Oxygen solution (example: from 5 mg/l at high temperature and up to a maximum of 12 mg/l at low temperature)
2. Salts that harden water.

Magnesium anode is used to prevent tank from punctures.

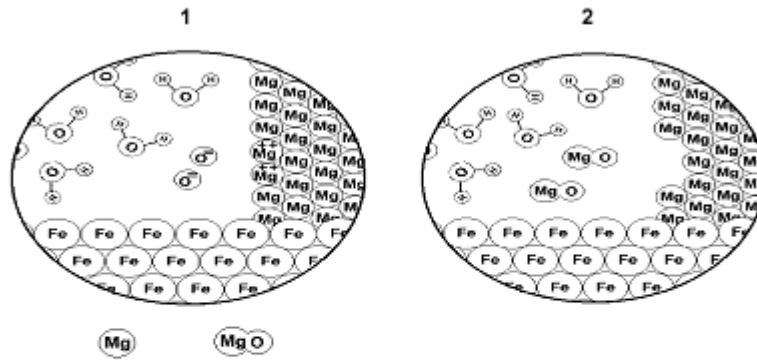
Corrosion develops in three phases:

1. Water soluble oxygen comes into contact with the inner surface of the drum.
2. Drum iron starts to dissolve (atom loses two electrons and become  $\text{Fe}^{++}$  ion).
3. Iron ion is separated from drum surface and turns into rust by combining with oxygen ( $\text{FeO}$ ). In this case, formation of punctures start within the tank.
4. Grounding connections must certainly be provided during product installation as floating power connections prevent chemical reactions between anode and drum and cause corrosion and punctures in the drum.

Both iron and magnesium are water soluble; magnesium is more electropositive compared to iron (become  $\text{mg}^{++}$  more easily). Thus, it is the magnesium that becomes a solution.

At this point, magnesium leaves anode and combines with oxygen atoms. Corrosion ends, in other words, while thermostat stays the same magnesium anode is abraded.

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Magnesium atom (the element forming anode)

Magnesium oxide MgO

Service life of the anode depends on water temperature, amount and quality. Anode must be checked and replaced before it is completely out of service. Recommended duration is to check every two years.



Anode stick

## 7- OPERATION PRINCIPLE OF WATER HEATER

### OPERATION

Tank is always filled with pressurized water. When desired temperature is reached, the control thermostat turns off the electrical resistance. When hot water is used, cold water intake starts to tank through cold water intake pipe.

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Thermostat cools and heating coil is re-activated. Cold water is heated until it reaches the set temperature value in the thermostat. Water in the tank stays hot and ready for use until more water is drawn.

## LAMINATION OF HOT AND COLD WATER LAYERS

Operation principle of a water heater is to create layers that do not mix in different water temperatures.

This principle is extremely simple to explain: water expands when heated and water density is reduced compared to cold water. In this case, density reduces when water is heated and accumulates at the top of the tank. Water at lower temperature creates a layer in the lower part.

When hot water is drawn from the top of the tank, this water is replaced by the cold water at the bottom. In this way, the density balance is provided.

## ELECTRICAL WATER HEATER INSTALLATIONS

Service life of a water heater largely depends on the installation to be made correctly. We recommend that installation must be performed by a professional. The plumber, first of all, must check if water supply, power supply and waste water connections are in conformity with manufacturer's recommendations.

Water heater installation and first operation must be performed in accordance with the instructions in the user manual.

## PLACEMENT AND INSTALLATION OF THE UNIT

Attention must be paid to the following issues in the wall-mounting of the stove.

- Water heater must be in a position to align with the water connection in the wall.
- Dowels and hanger screws should be strong enough. An 80 liter water heater can exceed 100 kg including its own weight. As this weight will be loaded completely on hanger screws, screws must be strong enough to stay in the wall.
- After hanging, it is ensured that the device is parallel to the wall using the adjustment plastic section at the bottom of the stove.
- There must be no damage on the device that will adversely affect the electrical isolation.
- Power cable of the device must be connected to the fuse supplied with the device.
- Safety valve must be mounted to the cold water inlet pipe with blue ring.
- Water connection hose sleeves have flexible gaskets. Sleeves must be sufficiently tightened to prevent water leakage. If extremely tightened, sleeves and gaskets may be damaged. If hose length is not sufficient, different sizes of hoses recommended by Vestel Service Center must be used.
- Water heater must be installed where water inside will not freeze.

## 6- WATER HEATER MAINTENANCE

### CLEANING SCALE ON HEATING COIL

Scale (scaling) can lead to operating problems mentioned below:

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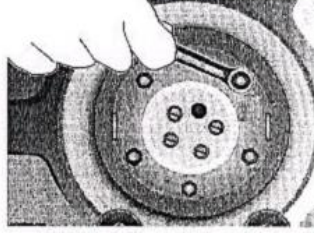
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- Reduction in the volume of available hot water
- Increase in heating coil failure risk
- Noisy water heater operation during heating
- Thermostat turning on-off frequently

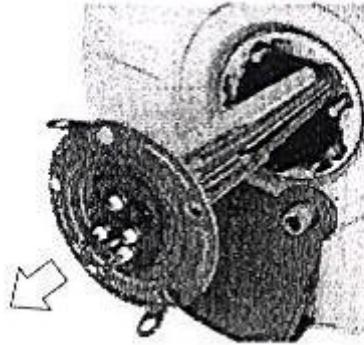
Therefore, water heater cleaning is required in frequency depending on the quality of the water and use of the appliance. Recommended cleaning period is at least once in two years.

## Operation:

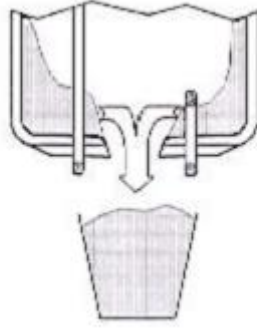
1. Be sure to disconnect electrical connection before clearing the water heater.
2. Turn off the valve to cut water delivered to the appliance.
3. To eliminate the pressure, turn on hot water tap and then turn off.
4. Disconnect intake pipe water system connections.
5. Remove safety valve and connect a rubber pipe the appropriate length for the discharge.
6. Open hot water tap for the discharge of remaining water in the water heater.
7. Remove the screws that holds the flange (that heating coil is connected).



8. Remove the flange.



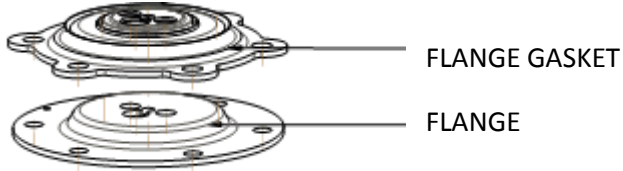
9. Clean the scale manually or using a tool (depending on appliance type) carefully.



10. The magnesium anode stick must be replaced every 2 years.



11. Flange gasket must be replaced every time heating coil is removed from the drum.



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## 7- ERROR CODES AND TROUBLESHOOTING

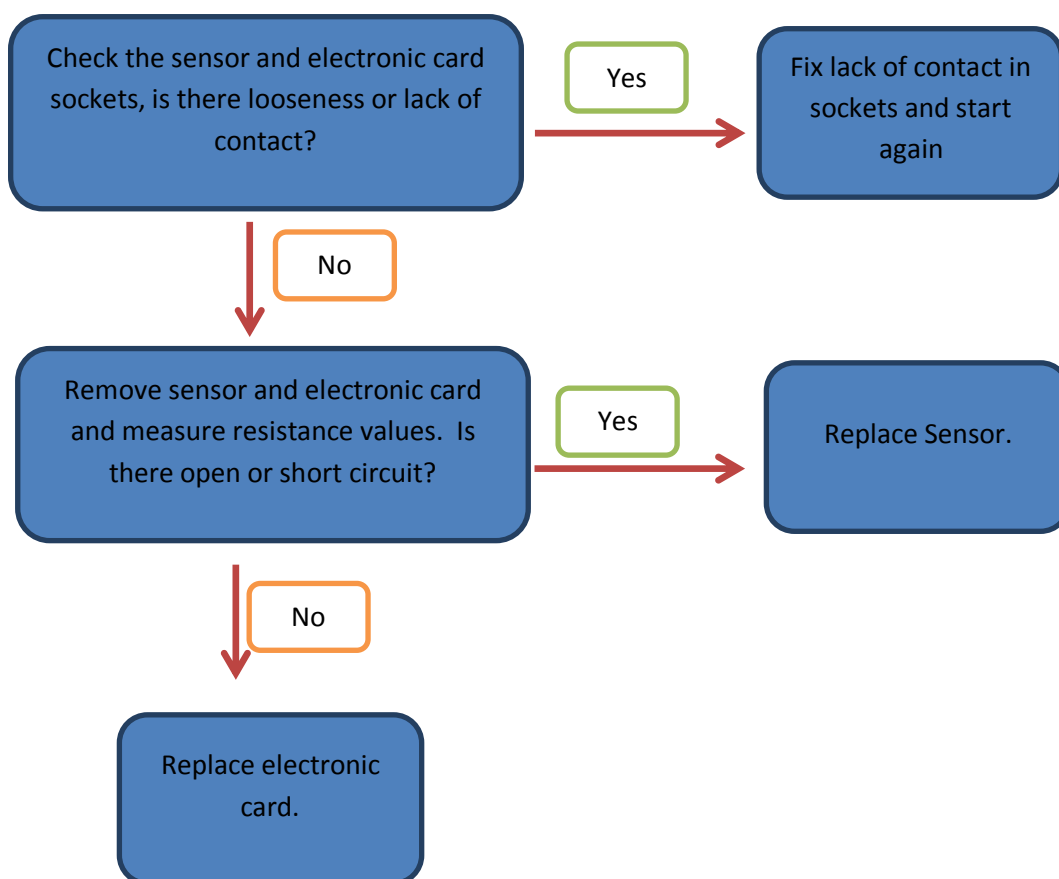
### A- ERROR CODES

E1	Thermistor Error	Check the thermistor socket. Replace the thermistor with a new one.
E2	Low Voltage Warning	When voltage is back to normal, error will automatically disappear.
E3	Dry operation	When drum is filled with water, and power is turned off and on, the error will be eliminated.

### B- TROUBLESHOOTING

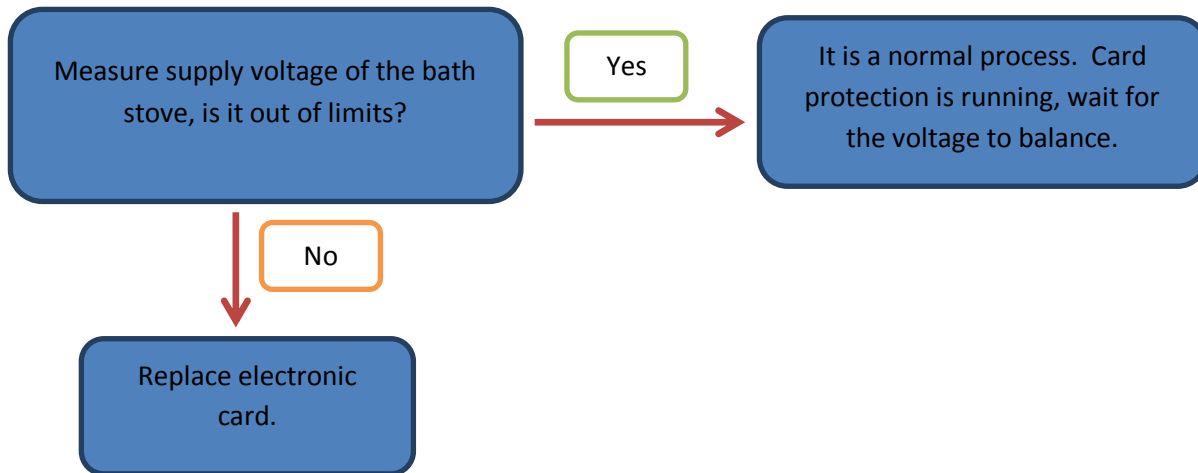
#### E1 ERROR

This is an error code that occurs only in digital models. It means that temperature sensor is open or there is short circuit.



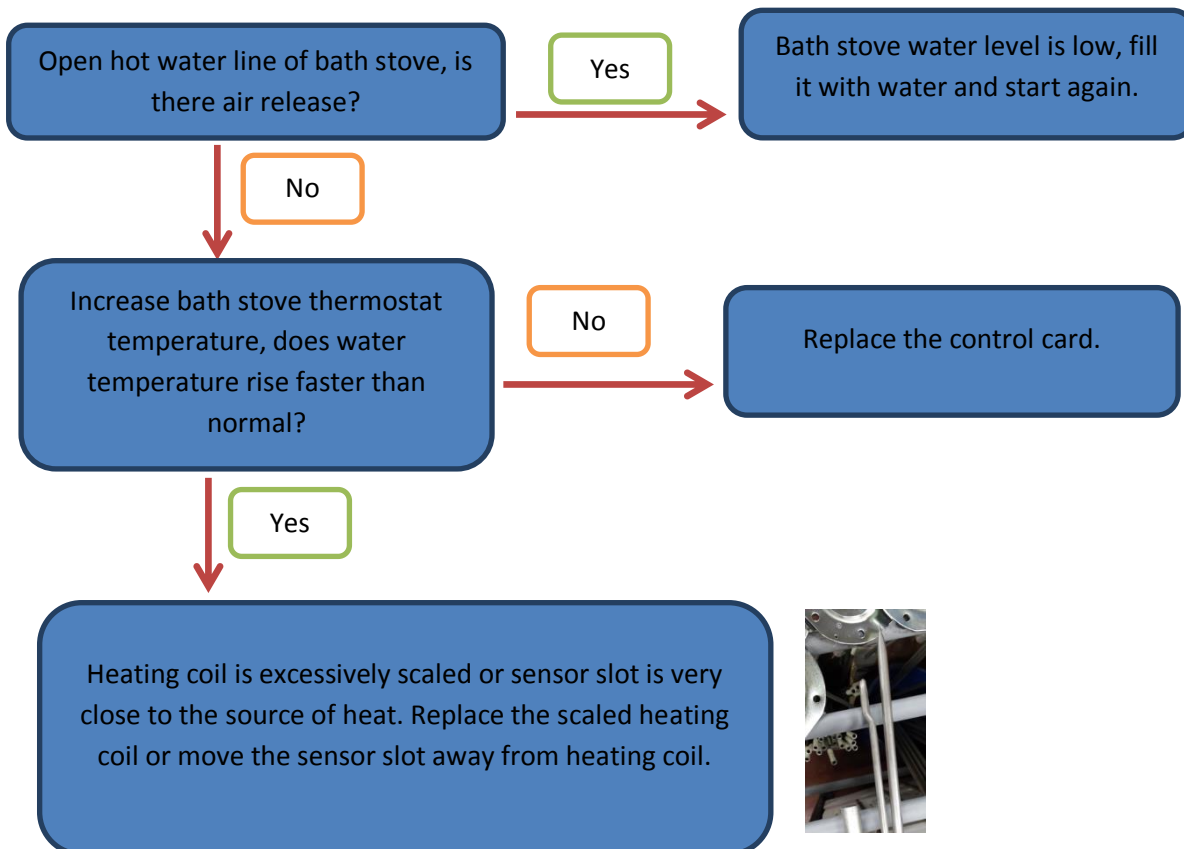
## E2 ERROR

This is low-high voltage error in digital water heaters. Its protection range is between 165-270V.



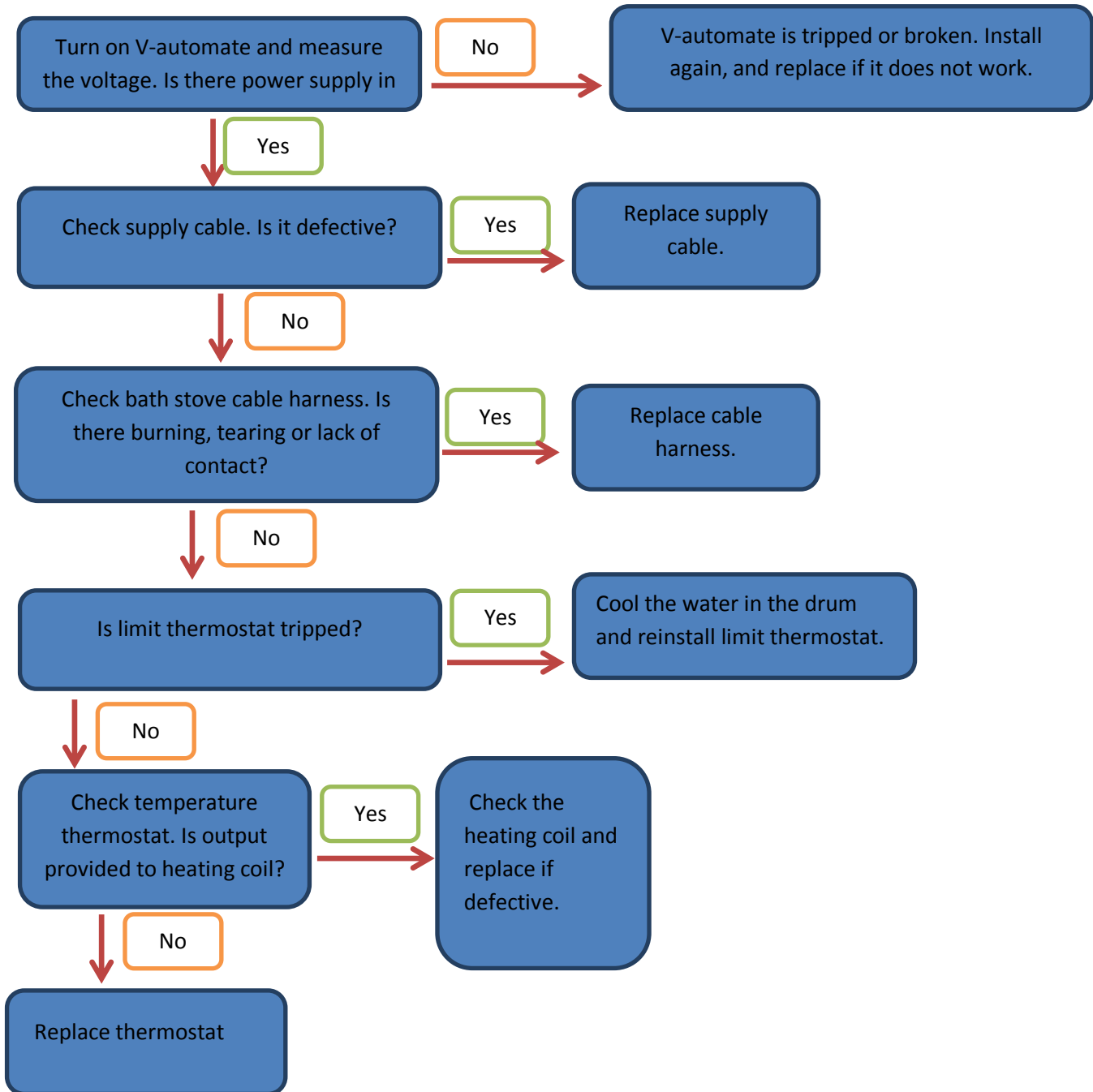
## E3 ERROR

This is dry operation warning in digital water heaters. If temperature of the water is increased by 1°C in 5 seconds, it means that water level is low.



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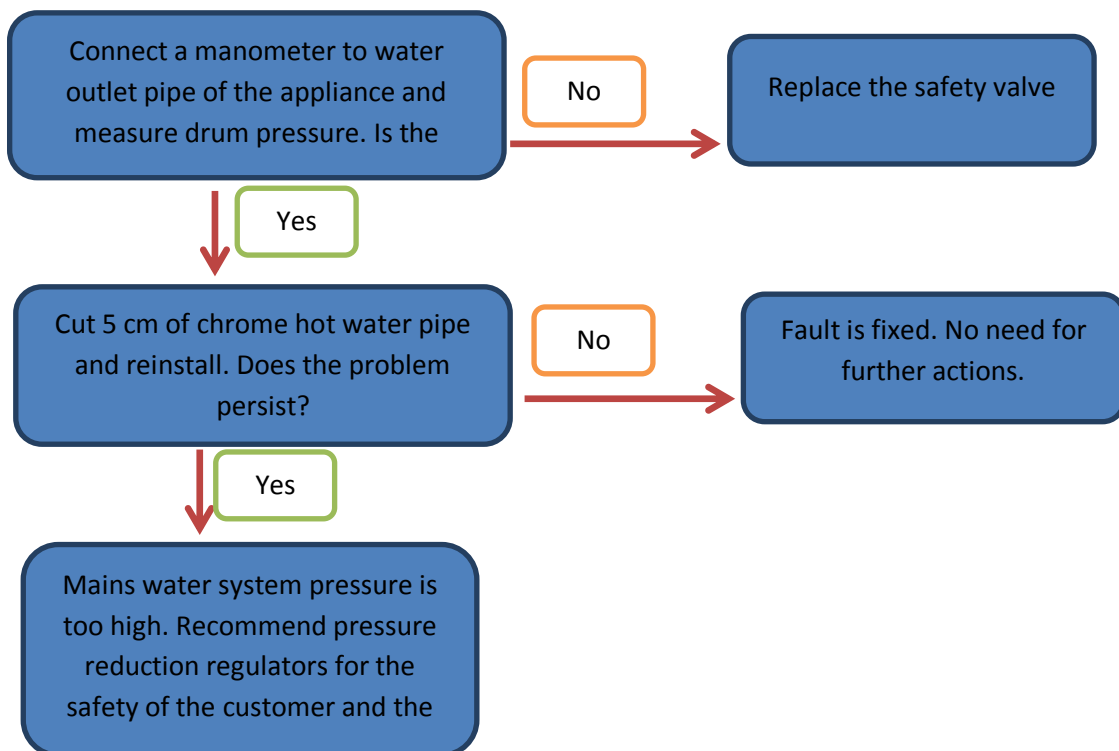
## WATER HEATER NOT WORKING



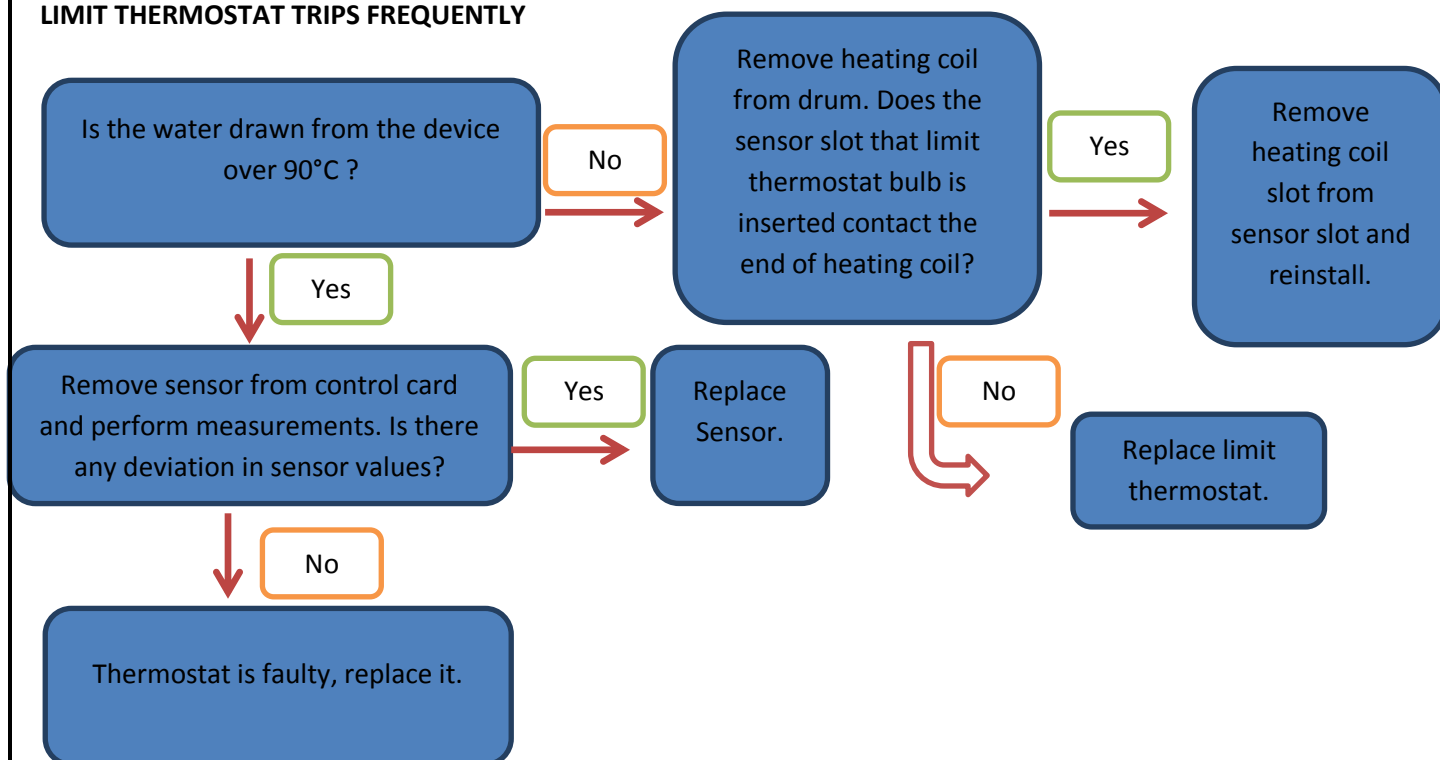


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## SAFETY VALVE LEAKING WATER

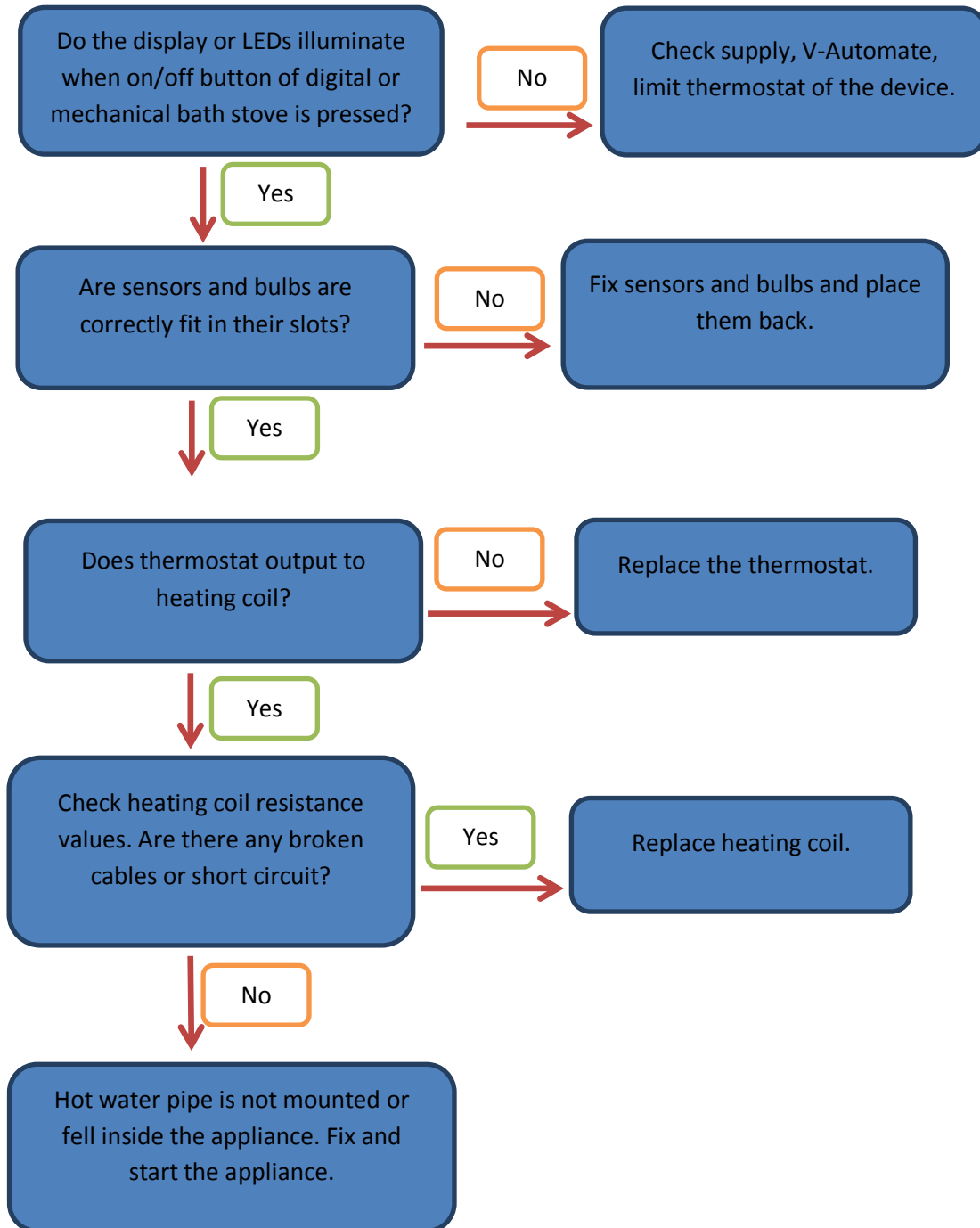


## LIMIT THERMOSTAT TRIPS FREQUENTLY



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## WATER HEATER DOES NOT HEAT WATER



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## OTHER MALFUNCTIONS

MALFUNCTION	CAUSE OF MALFUNCTION	TROUBLESHOOTING
Insufficient hot water.	<ul style="list-style-type: none"><li>* Hot/cold water pipe connection may be blocked.</li><li>* Connections may be incorrect.</li></ul>	<ul style="list-style-type: none"><li>* Connect the pipes correctly.</li><li>* Ensure that the system conforms to the schema.</li></ul>
Formation of excessive hot water or steam.	<ul style="list-style-type: none"><li>* Thermostat setting may be incorrect or it may be stuck.</li><li>* There may be formation of scale deposits or mud in the tank.</li></ul>	<ul style="list-style-type: none"><li>* Adjust the thermostat setting correctly or replace thermostat.</li><li>* Clean scale or mud.</li></ul>
It takes a long time for the thermostat to start again.	<ul style="list-style-type: none"><li>* Thermostat sensor and drum connection may be irregular.</li><li>* Thermostat sensitivity may be lost.</li></ul>	<ul style="list-style-type: none"><li>* Place the thermostat sensor correctly.</li><li>* Replace the thermostat with a new one.</li></ul>
Heating time is long, energy consumption is high water heater cannot reach maximum temperature.	<ul style="list-style-type: none"><li>* There may be leakage in hot water system.</li><li>* Heating coil may be malfunctioning.</li></ul>	<ul style="list-style-type: none"><li>* Detect and repair the leak.</li><li>* Replace heating coil.</li></ul>
Hot water drawn from water heater smells bad.	<ul style="list-style-type: none"><li>* Bacteria may have grown in water heater due to infrequent use.</li></ul>	<ul style="list-style-type: none"><li>* Completely drain and clean the water in water heater.</li></ul>
Water heater is enabled/disabled frequently.	<ul style="list-style-type: none"><li>* Thermostat may be faulty.</li><li>* Heating coil may be covered with scale.</li><li>* There may be faulty power input.</li></ul>	<ul style="list-style-type: none"><li>* Replace the thermostat.</li><li>* Clean heating coil.</li><li>* Check the supply voltage.</li></ul>

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MALFUNCTION	CAUSE OF MALFUNCTION	TROUBLESHOOTING
Water heater is making noise during heating.	<ul style="list-style-type: none"><li>* Heating coil may be covered with scale.</li><li>* It may be the boiling sound of water while heating coil is heating.</li></ul>	<ul style="list-style-type: none"><li>* Clean heating coil.</li><li>* It is a normal process. There is no need for further actions.</li></ul>
There is water leak in heating coil and flange unit	<ul style="list-style-type: none"><li>* Flange or heating coil gaskets may be damaged.</li><li>* Corrosion may have caused puncture in flange.</li></ul>	<ul style="list-style-type: none"><li>* Replace gaskets.</li><li>* Replace flange and gaskets (mount the flange carefully in both cases).</li></ul>

NOTE: Temperature control is electronic in certain models of water heaters. For this reason, thermostat used for heat control is digital. It detects heat through a sensor.