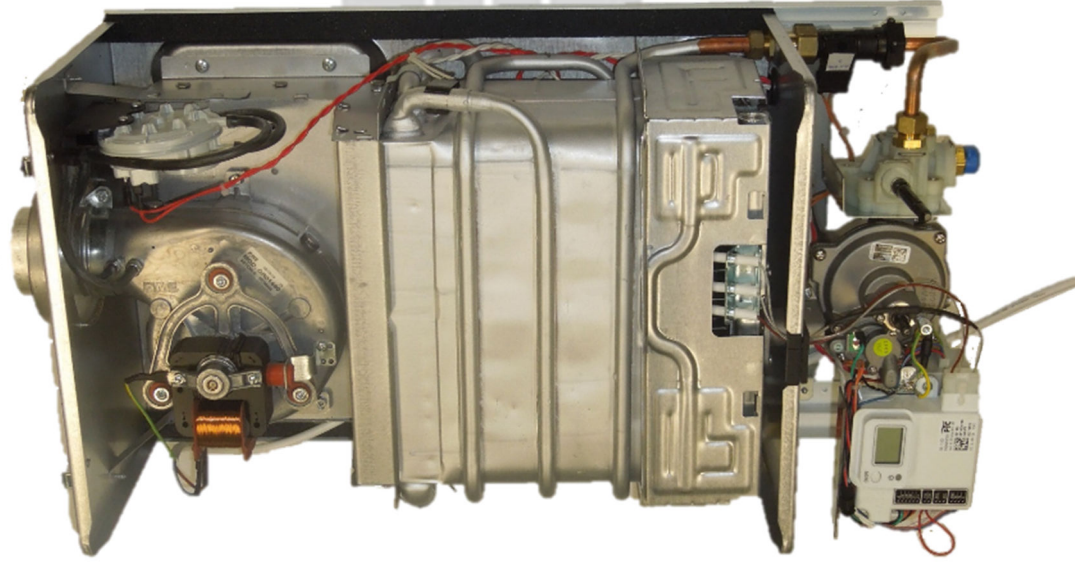




F-11EL FAULT FINDING

SEALED PILOTLESS ELECTRONIC WATER HEATERS



- 1.- NO IGNITION. No start up cleaning.
- 2.- NO IGNITION. Bad sparking
- 3.- NO IGNITION. It is sparking but the burner does not ignite.
- 4.- THE WATER FLOW IS VERY SMALL.
- 5.- THERE IS CONTINUOUS SPARKING AND THE WATER HEATER REMAINS IGNITED.
- 6.- THERE IS SPARKING. THE BURNER IGNITES FOR A FEW SECONDS AND THEN SWITCHES OFF.
- 7.- WATER HEATER IGNITES WITH LOUD IGNITION.
- 8.- THE WATER HEATER GENERATES IGNITION SPARKS WHEN THE TAP IS TURNED OFF.
- 9.- WATER HEATER SWITCHES OFF AFTER A FEW MINUTES OF OPERATION.
- 10.- WATER HEATER BURNING BUT NO OUTLET WATER TEMPERATURE IN THE DISPLAY.
- 11.- THE WATER HEATER REMAINS IGNITED WHEN TAP IS CLOSED.
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1.- NO IGNITION**No start up cleaning.**

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
Green LED does not light	There is no voltage in the AC outlet plug.	Check there is voltage in AC outlet using a voltmeter.
	The internal fuse in the FE circuit is blown out.	Change the fuse.
	The internal fuse in the plug of the FE circuit is blown out	DISCONNECT THE WATER HEATER FROM THE MAINS BEFORE DOING THIS. Photo 17 .
	The switch in the electronic circuit DL-103 is in off position.	Turn the switch on (inner position). Photo 3 .

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
F2 fault code will show in the display	The pressure switch contact is closing before the micro switch closes	Pressure switch defective Check Pressure Switch and its wiring. - Exhaust fumes outlet blocked or the vent is the wrong size. Review the outlet
	Wiring between FE circuit and DL-103 control circuit in disrepair or improperly connected.	Check the wiring installation.

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
F4 fault code will show in the display	TTB jumper connector is missing.	Connect the jumper. Check the wiring and connections. Photo 16

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
Green LED lights, no fault code in the display but no start up fan cleaning	The micro switch or Flow switch are not correctly connected or the connectors are loosen	Check the status of the micro switch and Flow Switch connection. Use a banana wiring checking tool. Photo 6.
	The micro switch or Flow Switch are not working properly.	Disconnect the micro switch. Shut off the gas inlet. Check the micro switch & Flow switch with Banana Wiring. Adjust / Change the micro switch. In case it is necessary.
	The water inlet filter is dirty.	Clean the water filter. Photo 2
	Water valve diaphragm broken.	Disassemble Water Valve. Change the diaphragm.
	Communication channel between chambers obstructed.	Clean the communication channel. Photo 7.
	Venturi obstructed.	Check and change venturi. Photo 8.
	Water valve O-rings are blocked.	Disassemble Water Valve. Work the water pin manually to unblock them / Change the top cover of the water valve. Photo 9.
	Low water pressure. The main gas valve is not opening.	Check the water pressure. Change the position of the temperature selector to Max temperature. (Min Water Flow) Photo 3.
	Main gas valve seal is blocked.	Work the gas pin manually to unblock the O-ring. Photo 10.
	Gas valve pin and water valve pin are non-aligned	Disassemble water valve and assemble again taking care to align properly both pins. Photo 19

2.- NO IGNITION

Bad sparking.

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
No continuous spark. F1 fault code could be shown in the display	High ambient humidity. No sparking between electrodes.	Dry the electrodes and clean them. Photo 4.
	The spark electrode wires have lost their insulation. Sparking is taking place between the wires and earth or between the two wires.	Replace the electrode unit. Photo 4.
	The electrode connector is defective.	
	Electrodes are not properly screwed to burner and sparks go to burner instead of the return electrode	Tighten properly the electrodes Photo 11.
	Electrodes are deformed	Unbend the deformed electrode

3.- NO IGNITION

It is sparking but the burner does not ignite.

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
It sparks but the burner does not ignite F1 fault code shows in the display	No gas. Low gas pressure / air in the gas circuit	Open gas valve. / Check gas pressure / replace gas bottle
	Main Gas Valve is not opened. Microswitch needs adjustment	Adjust Microswitch. Must be activated only with main valve opened
	The spark is not reaching the confirmation electrode.	Check humidity on electrodes. Photo 4. Check position of electrodes or whether they are deformed.
	There is voltage in servo terminal.	Change the servo head. The servo is incorporated in the gas valve. Photo 18.
	The Ground connection of the electronic circuit is not correctly connected. --> The Servo hasn't any Voltage.	Tighten the ground connection terminal. Photo 5.
	There is no voltage in Servo valve terminal.	Check the DL circuit earth connection. Photo 5. Check the wiring. Change the DL-103 electronic circuit. Photo 1.
	The voltage in the FE circuit is not sufficient. The sparking noise is weak and the frequency is very slow.	Test the Supply voltage to the DL circuit. Banana wiring tool Change the FE circuit.

4.- THE WATER FLOW IS VERY SMALL

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The water flow is very SMALL and the water is coming out VERY HOT.	Water pressure is too low.	Change the position of the water selector to MAX. Photo 3.
	The water filter is dirty.	Clean the water filter. Change the water filter. Photo 2.
	The heat exchanger in combustion chamber is obstructed.	Clean the heat exchanger. Change the combustion chamber.

5. THERE IS CONTINUOUS SPARKING AND THE WATER HEATER REMAINS IGNITED

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
Continuous sparking and burner is ignited	The electronic circuit is not working correctly.	Replace the DL-103 electronic circuit. Photo 1.

6.- THERE IS SPARKING, THE BURNER IGNITES FOR A FEW SECONDS AND THEN SWITCHES OFF

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The burner switches off after remaining on for a few seconds F3 fault code shows in the display	Air in gas pipes.	Purge air from gas pipes.
	Low gas pressure.	Check gas pressure.
	The electrode unit has come loose.	Tighten the electrode fixing screw. Photo 11.
	The electrode flame sensor is out of position.	Change the electrodes.
	The electrode flame sensor is deformed.	Check the connection of this connector. Photo 14.
	The electrode connector is not properly connected.	Tighten the Ground connection terminal. Photo 5.
	The electronic circuit Ground terminal is not properly connected.	Change the electronic circuit.
	The DL-103 electronic circuit is defective. Servo Valve is defective	Check Voltage in Servo terminal. Photo 18.

7.- WATER HEATER IGNITES WITH LOUD IGNITION

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The burner ignites WITHOUT SHOFT START	The electrodes are not correctly fixed to the manifold. They are too high referred to the burner blades.	Fix the electrodes correctly using the fixing screw. Photo 11.
	There is unburned gas in the combustion chamber	Allow finish Post purge after burning cycle. Check Servo valve closes when no energized. Check fan function.
	There is air in the gas supply line.	Drain the gas circuit.
	Excessive gas pressure.	Check the gas pressure in the burner / Adjust the gas pressure in the burner. Photo 12.
	The Ground terminal of the electronic circuit is not properly connected.	Tighten the Ground connection terminal. Photo 5.
	Defective wiring of electronic circuit.	Check the wiring and change it if necessary.
	The servo is not working correctly. No soft start function	Change the servo. The Servo is integrated in the gas valve. Photo 18.
	The nozzles are not well fitted.	The change of gas type has not been made correctly.
	The FE 200 circuit voltage is not sufficient. The sparking noise is weak and the frequency is very slow.	Change the FE 200 circuit.

8.- THE WATER HEATER GENERATES IGNITION SPARKS WHEN THE TAP IS TURNED OFF

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The water heater is sparking when the tap is turned off.	Micro switch not properly adjusted.	Check micro switch adjustment.
	The micro switch has broken (The contacts are stuck). Sparking only occurs for 5 seconds.	Change the micro switch - check functioning of micro switch with Banana Wiring.
	The DL-103 electronic circuit is faulty.	Change the DL-103 electronic circuit. Check function of micro switch with Banana Wiring.

9.- WATER HEATER SWITCHES OFF AFTER A FEW MINUTES OF OPERATION

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The water heater switches off after functioning for a few minutes F2 fault code shows in the display	The pressure switch contact has opened meanwhile the water heater was working. Fault LED ON	Fan defective. Vent installation defective. Pressure switch wiring defective. Pressure switch faulty - change Pressure switch.
	Fan wiring or Pressure switch wiring is defective	Test wiring status - change wiring in case it is necessary.
	Wiring between DL-103 circuit and FE circuit is defective	Test wiring status - Check Connectors.

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The water heater switches off after functioning for a few minutes F4 fault code shows in the display	The TTB jumper wire has come loose or there are problems with the connector.	Check the state of the TTB jumper. Photo 16.

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
The water heater switches off after functioning for a few minutes F4 fault code shows in the display	Gas pressure/flow insufficient.	Check gas pressure. Check there is gas left in the gas bottle.
	Drop in water pressure during functioning of the water heater.	Check the water pressure.
	The water filter is dirty.	Check the status of the water filter. Change or clean it if necessary. Photo 2.
	Membrane in water valve broken.	Change the membrane. Photo 7.
	Venturi dirty / obstructed.	Remove and check the venturi. Change it if necessary. Photo 8.
	Fuse in FE circuit has blown out - Test Fuse. The voltage of the FE circuit is not O.K.	Check Voltage (Banana wiring) Replace fuse or FE circuit.
	Fuse in the plug of the FE circuit has blown out	Check Fuse. Replace fuse from the plug if necessary
	The electrode unit has become loose.	Tighten the electrode fixing screw. Photo 11.
	The electrode connector is not properly connected.	Check the connection of this connector. Photo 14.
	The Ground terminal of the electronic circuit is not correctly connected.	Tighten the Ground connection terminal. Photo 5.
	Electronic circuit is defective.	Change the DL-103 control circuit.
	The Servo is defective.	Test Voltage in Servo. Change the servo head in case there is no function. The servo is integrated within the gas valve. Photo 18.

10.- WATER HEATER BURNING BUT NO OUTLET WATER TEMPERATURE IN THE DISPLAY

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
The water heater is working but blinking F0 fault code shows in the display	Fault in the NTC sensor or defect in wiring.	Check the NTC and its wiring. Photo 20.

11.- THE WATER HEATER REMAINS IGNITED WHEN TAP IS CLOSED

This is a DANGEROUS situation because the Pressure and Temperature in the combustion chamber is increasing very fast.

DISCONNECT THE GAS SUPPLY TO THE WATER HEATER.

PERMANENT DAMAGES AND DEFORMATIONS IN WATER VALVE AND COPPER PIPES.

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The water heater remains on when the tap is turned off.	Gas pin blocked.	Check the gas pin O-ring / change the O-ring.
	Water pin blocked.	Check the water valve / change the top cover of the water valve. Photo 15.
	Water leak from upper cover - rust in water neck blocking up the pins.	Change the water and gas valves.
	Main or secondary regulator of open selector in water valve is blocked..	Check the regulators move freely in their housing. Photo 8.
	Venturi obstructed.	Check / change venturi. Photo 8.
	The communication channel between the two chambers is obstructed.	Check / clean communication channel. Photo 7.

12.- FLAMES IN BURNER ARE YELLOW

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
Sparking occurs, the water heater ignites, but the fan does not start up. F2 fault code shows in the display	Fan wiring is defective.	Check the wiring.
	Fan is faulty.	Change the fan.
	The connection between the FE circuit and the DL-103 circuit (terminal 12) has been cut.	Check / replace the wiring between FE and DL-103 circuit.
	The fan is not working.	The pressure switch contact is closed before the micro switch closes. - Check fume exhaust installation. Change Pressure switch.
	The FE circuit has failed.	The relay activating the fan inside the FE has failed - change the FE 200 circuit.

13.- PROBLEMS WITH EXTRACTOR FAN

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE OF FAILURE</i>	<i>SOLUTION</i>
The fan does not stop.	The fan continues running when the water heater is switched off.	Micro switch not opening. The water heater stops due to the main water valve. Fault F1 or F3 appears on display. Adjust / change the micro switch. The relay activating the fan in the FE circuit has failed. Change the FE circuit.
	Post purge is too long when the water heater is switched off.	Microswitch doesn't open when water flow is zero. Test that Microswitch is opened - See point 10. The FE circuit has failed. Change the FE circuit.

14.- ADJUSTMENTS

14.1 Micro switch adjustment.

Micro switch regulation is to be done with the tap turned off.

- 1.- Turn the micro switch screw until you hear a click - With the Service 1 cable, the reading should be 0 Ohms.
The screw turning direction for reaching this point will depend on the position it happens to be in.
- 2.- From the previous position, turn the screw one turn anticlockwise.

15.- CHECKING TOOLS

<i>NAME</i>	<i>DESCRIPTION</i>	<i>ILLUSTRATION</i>
BANANA WIRING	Cable for checking the power supply. It is fitted with the connector used in the flow switch (photo 13) and micro switch. It is for checking: • The status of the micro switch • The voltage of the ADC and FE power sources.	

15.1 Banana Wiring - How to Use The Banana Wiring.

The Banana Wiring cable consists of the following elements:

- Female connector for adjustment in: Electrical installation micro switch connector.
- Male connector for adjustment in: Electrical installation power supply connector.
- Two banana connectors for connection to a multimeter. Micro switch connector.

15.2 Checking Micro Switch Operation.

The procedure for checking the status of the micro switch is as follows:

1. Disconnect the micro switch connector from the main wiring. Photo 6.
2. Connect the Service 1 cable to the micro switch connector only.
3. Connect the banana connectors to the voltammeter, previously adjusted in Ohms.
4. If there is no water flow, the indication will be "Infinite".
5. Turn on the water flow. If the pressure / flow is correct, the micro switch will close the contacts and the reading will be 0 Ohms.
6. If the pressure is correct but the contacts do not close, the micro switch is defective and needs to be changed.
7. **IN CASE THE MICRO SWITCH IS CHANGED, IT MUST BE ADJUSTED AS DESCRIBED ABOVE.**

15.3 Checking Flow Switch Operation.

The procedure for checking the status of the Flow switch is as follows:

1. Disconnect the Flow switch connector from the main wiring.
2. Connect the Service 1 cable to the Flow switch connector only.
3. Connect the banana connectors to the voltmeter, previously adjusted in Ohms.
4. If there is no water flow, the indication will be "Infinite".
5. Turn on the water flow. If the pressure / flow is correct, the Flow switch will close the contacts and the reading will be 0 Ohms.

If the pressure is correct but the contacts do not close, the Flow switch is defective and needs to be changed

15.4 Checking the voltage In Mains-connected water heaters.

1. Disconnect the water heater from the mains.
2. Disconnect the power supply circuit FE from the DL-103 main wiring (red and black wires).
3. Connect the Service 1 cable/female connector to the power source, and the male connector to the electrical installation.
4. Connect the banana connectors to a voltmeter, adjusted in Vcc. (Ensure the polarity is correct).
5. Connect the water heater to the mains.
6. The voltage at the voltmeter must be over 1.4 V.
7. Possible cases:

- **The voltage is zero:**

1. Check there is voltage in the mains. **IMPORTANT:** readjust scale in Voltmeter.
2. Check the fuse inside the FE circuit.
3. Check the fuse inside the plug of the FE circuit
4. Change the FE circuit.

- **The voltage is below this value:**

1. Check the mains supply voltage (230 Vac). **IMPORTANT:** readjust scale in Voltmeter.
2. The power supply circuit is defective - change the FE circuit.

15.5 Checking the Internal Fuses in FE Circuit

Two fuses can be blown; fuse inside the mains plug and fuse inside the FE circuit

To check the internal fuse in the plug or the FE circuit proceed with the following steps:

1. Disconnect the water heater from the mains.
2. Remove the fuse cover of the plug.
3. Adjust voltmeter in Ohms.
4. Check continuity between both poles of the fuse inserted in the fuse cover of the plug.
5. In case the Value in Ohms is near 2k Ohm the fuse is correct.
6. In case the value is higher or ∞ the fuse must be replaced with the following spare part:

7. NOMINAL VALUE FOR THE FUSE: 3A / 250 V
8. Insert again the fuse cover of the plug
9. Check continuity between the Neutral and Phase pole in the AC connector.
10. In case the Value in Ohms is near 2k Ohm the fuse is correct.
11. In case the value is higher or ∞ the fuse must be replaced and to do so the FE circuit must be opened.
12. NOMINAL VALUE FOR THE FUSE: 500 mA / 250 V / Time Lag... (T)

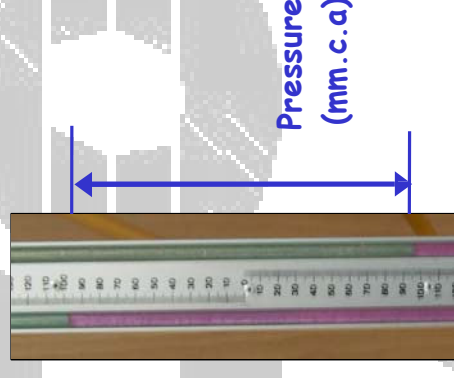
16.- USEFUL DATA

16.1 Adjusting the Burner Pressure.

The burner pressure is regulated using the adjustment screw shown in **photo 12**. The procedure for adjusting it correctly is as follows:

1. Place a manometer at the burner pressure measurement point.
2. Turn on the water tap with the temperature selector dial on its highest setting and the gas power selector dial set to the maximum.
3. Measure the pressure. The values should be as shown in the table:

Pressure at water heater burner (mm.c.a)			
NG G20	NG G25	Butane G30	Propane G31
127	160	270	335



16.2 Correct Gas Pressures at the Water Heater Inlet.

Pressures considered valid at water heater inlet (mm.c.a)			
NG G20	NG G25	Butane G30	Propane G31
200	200 / 250	280-300	370

16.3 Air pressure switch characteristics.

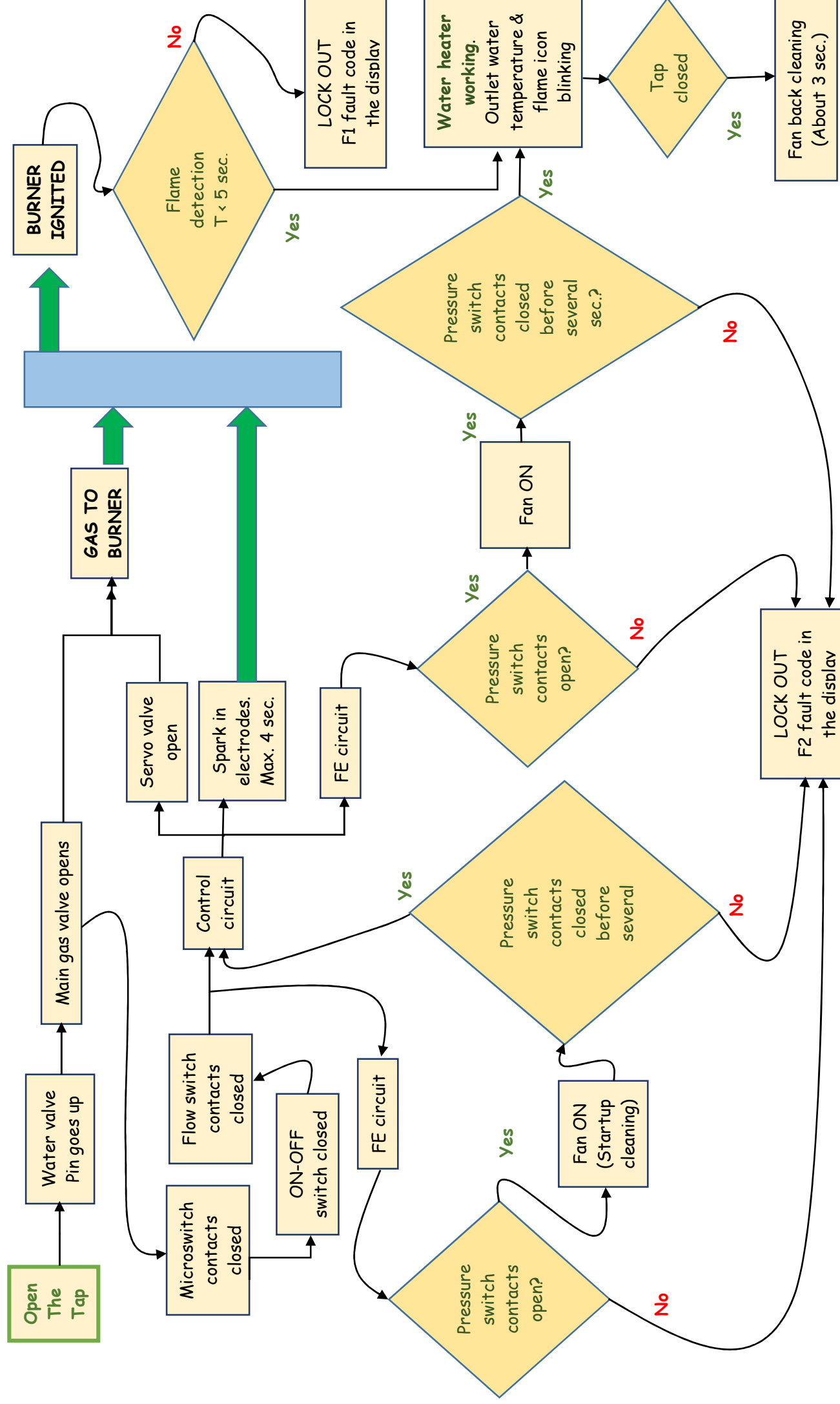
120/80 Pa

Pressure switch closes contacts above 120 Pa.
Pressure switch opens contacts below 80 Pa.

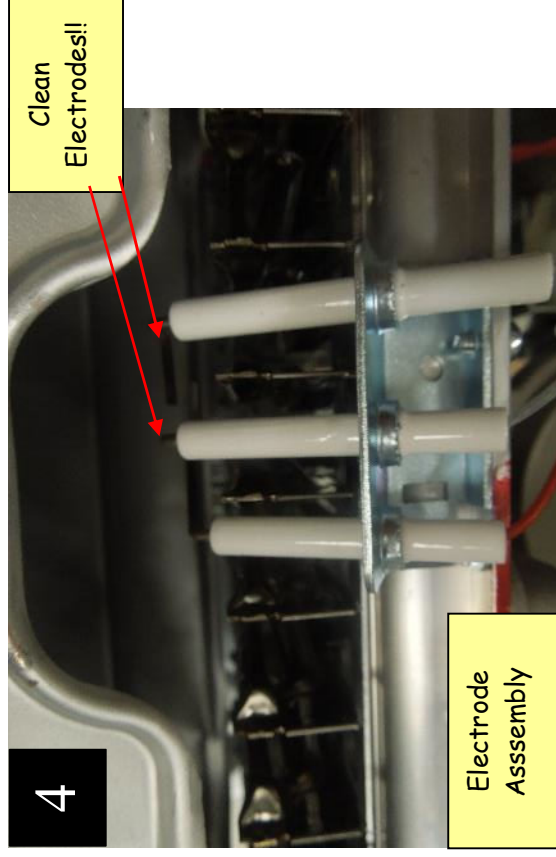
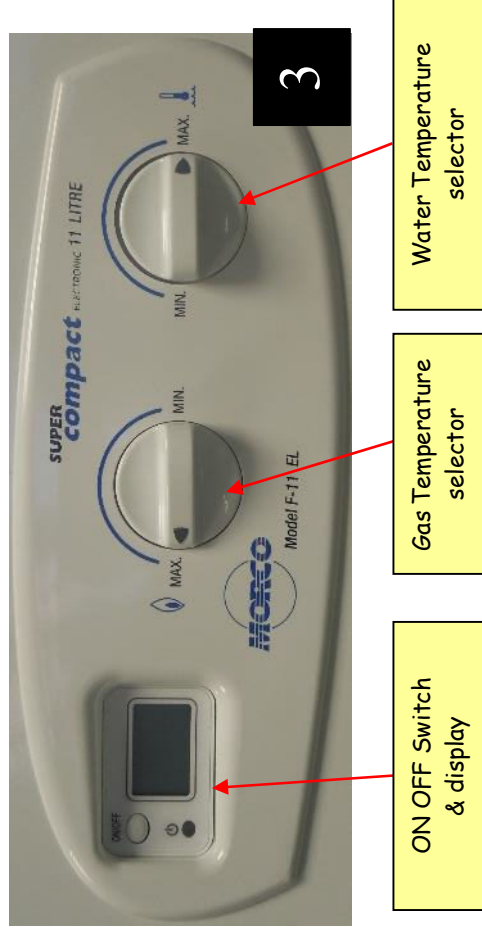
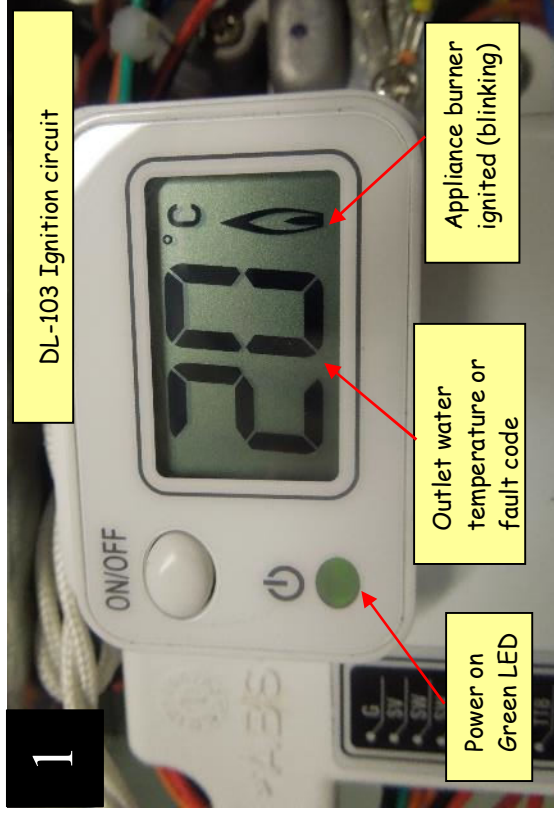


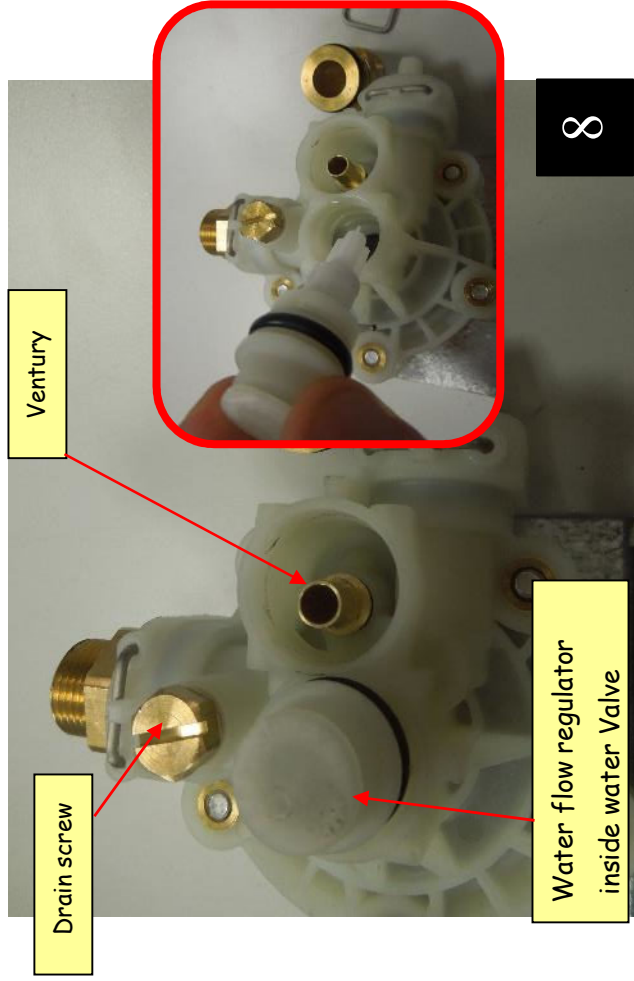
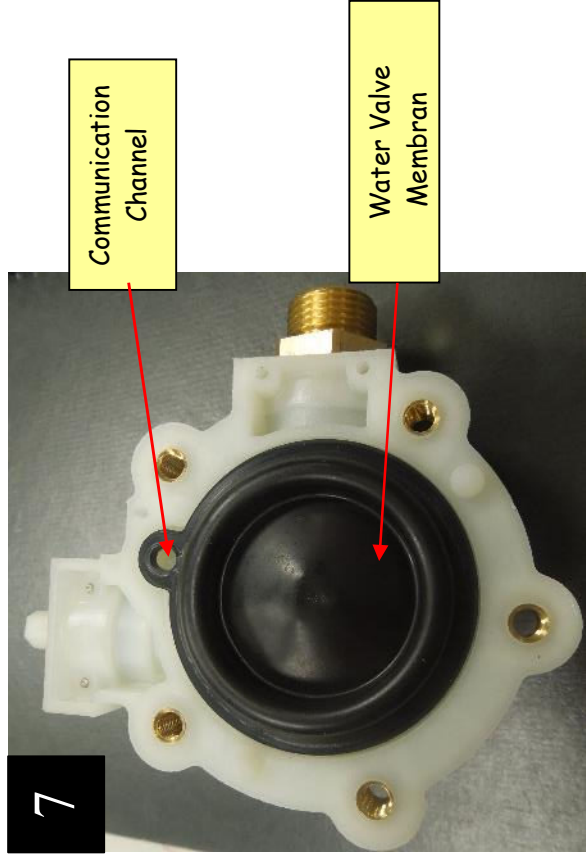
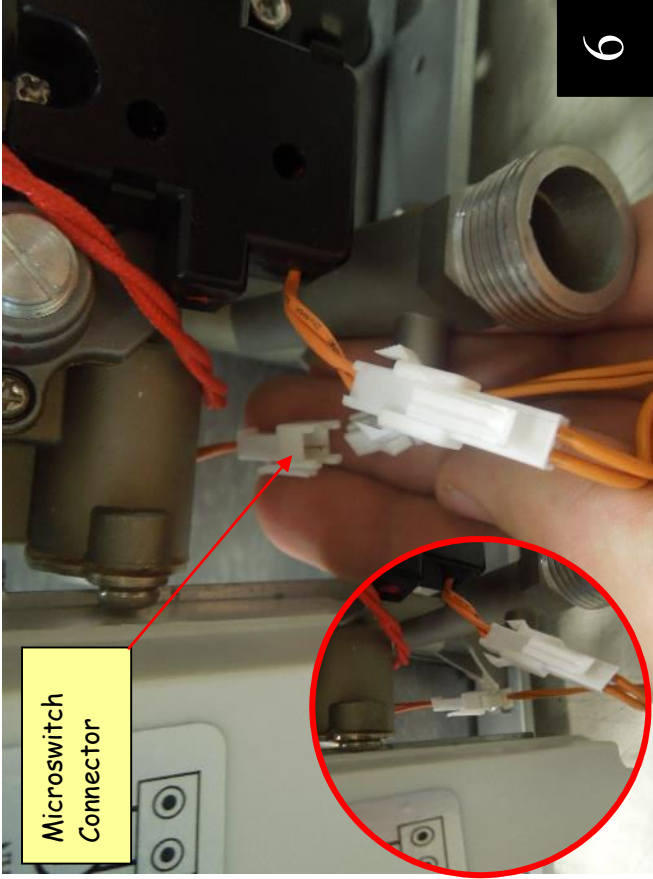
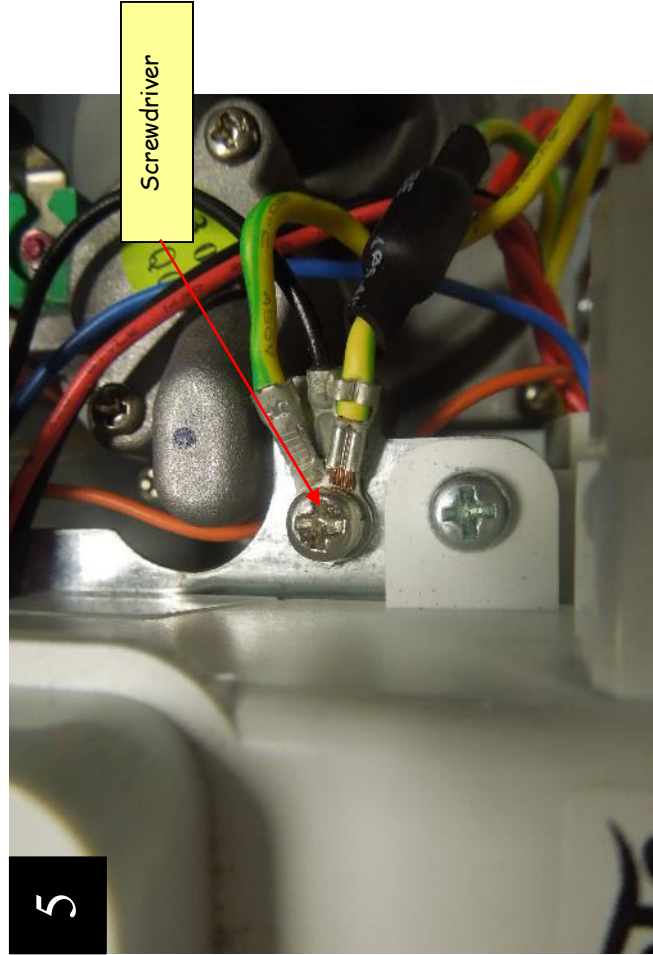
Pressure intake to test the Ventury differential Pressure

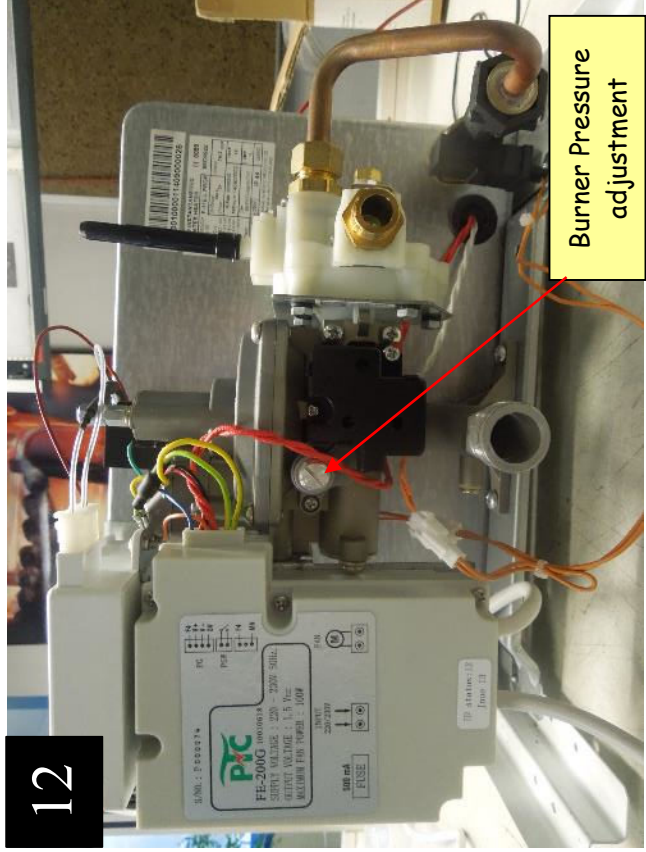
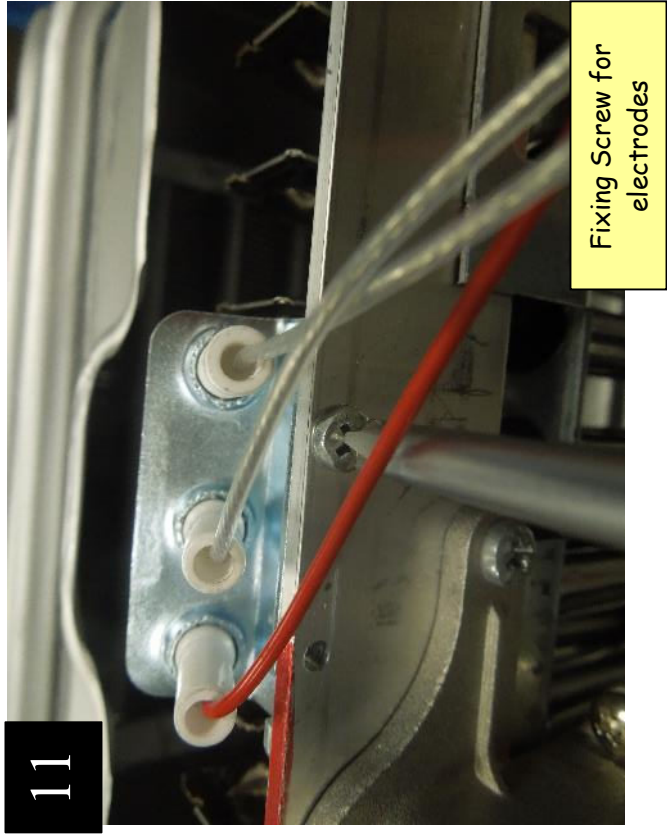
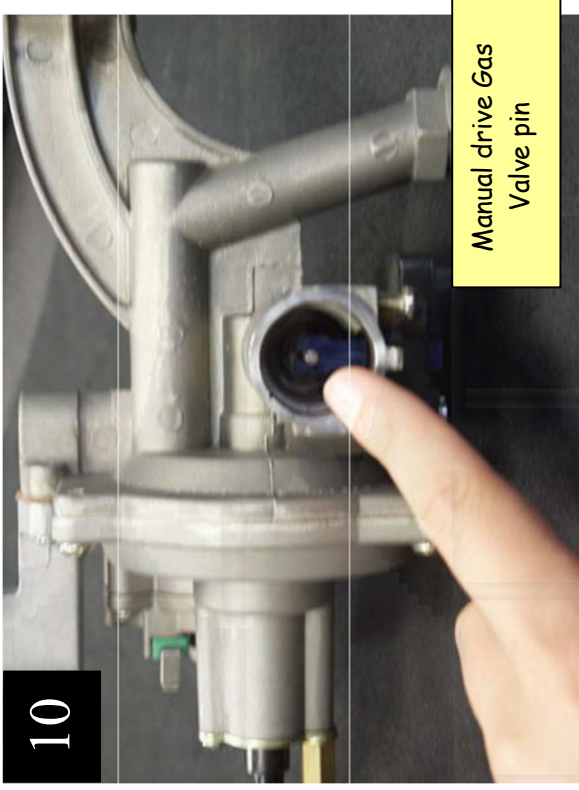
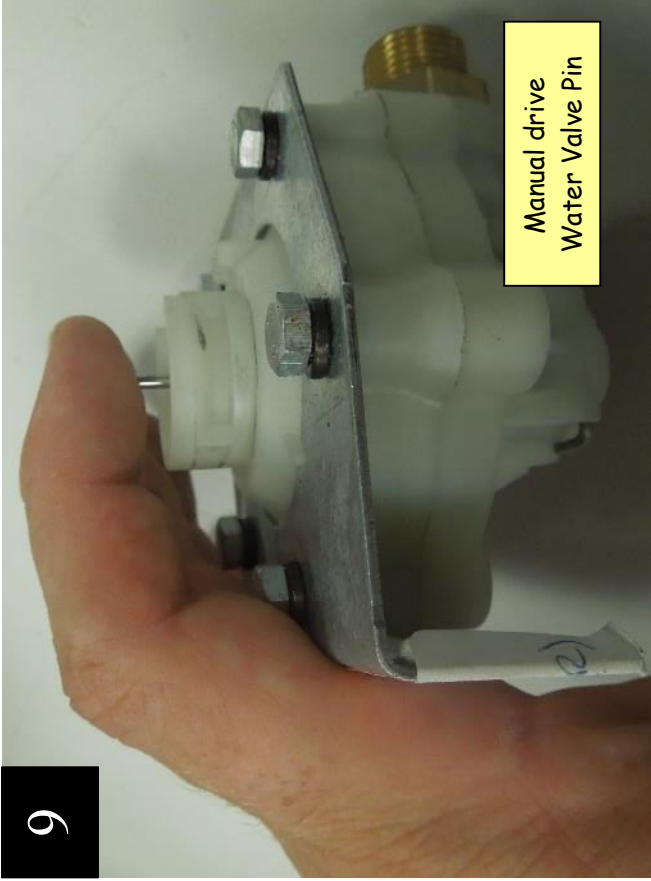
17.- IGNITION SEQUENCE

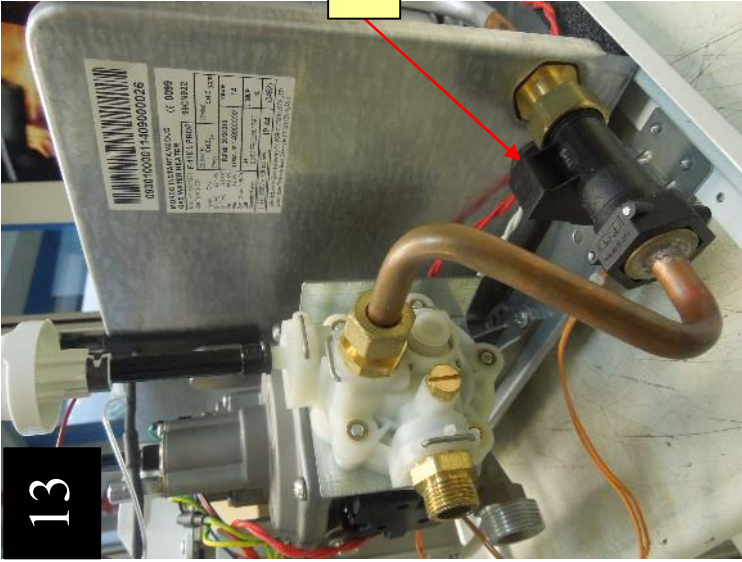


18.- PHOTO GALLERY

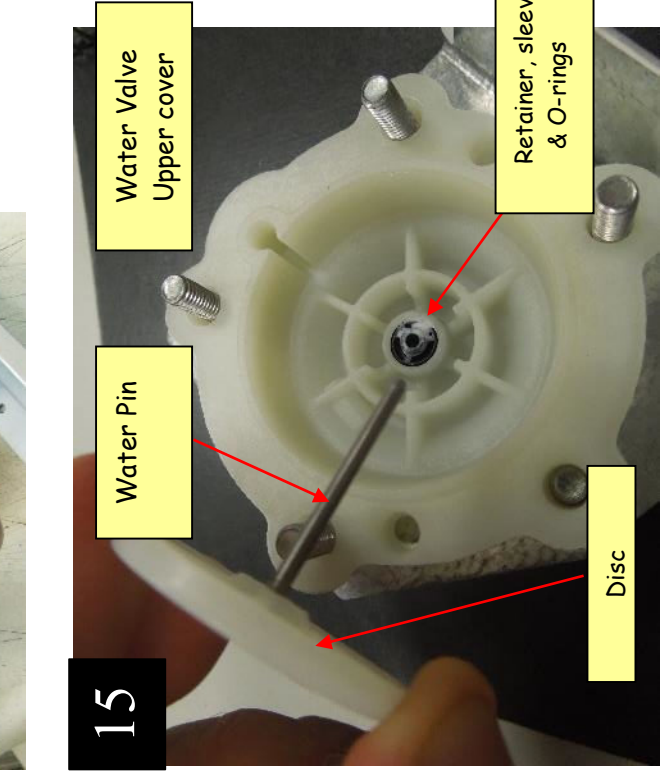
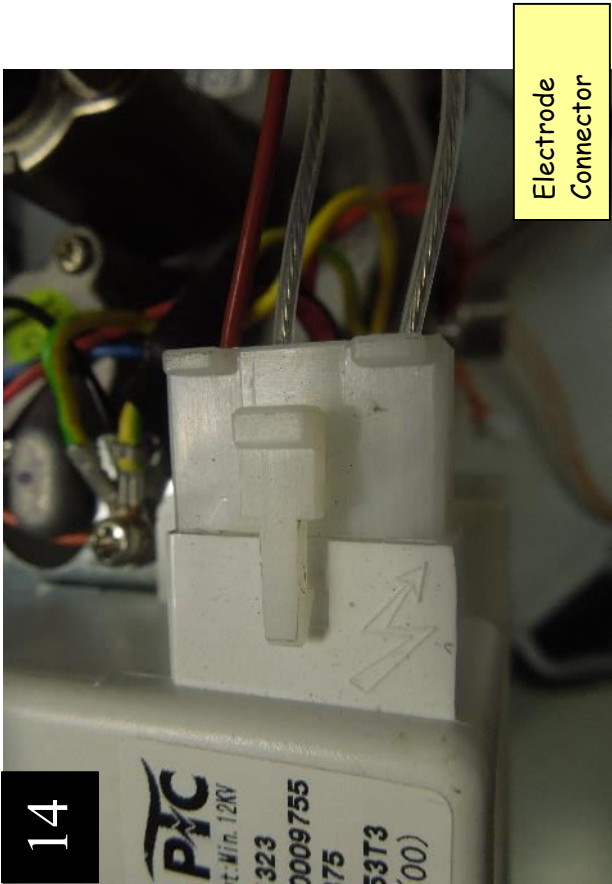








14



16

