FAULT FINDING

SEALED PILOTLESS ELECTRONIC WATER HEATERS

1.- NO IGNITION — No spark present.

SYMPTOM	POSSIBLE CAUSE OF FAILURE	SOLUTION
No Spark		
All models	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. DISCONNECT THE WATER HEATER FROM THE MAINS BEFORE DOING THIS. **Photo 17.**
	The switch in the electronic circuit PG is in off position.	Turn the switch on (inner position). **Photo 3.**
	The micro switch or Flow switch are not correctly connected or the connectors are loose.	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 correctly.	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.**
	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.**
	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. The electrode connector is defective.	Replace the electrode unit. **Photo 4.**
	The Ground connection of the electronic circuit is not correctly connected. --> The Servo hasn't any Voltage.	Tighten the ground connection terminal. **Photo 5.**
	The pressure switch contact is closing before the micro switch closes.	Check Pressure Switch. Pressure switch defective or water heater incorrectly installed – the vent is the wrong size.
	Wires badly connected to electronic circuit.	Check the wiring installation.
	Water valve diaphragm broken. Communication channel between chambers obstructed.	Disassemble Water Valve. Change the diaphragm. 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.**
	Main gas valve seal is blocked.	Work the gas pin manually to unblock the O-ring. **Photo 10.**

2.- NO IGNITION — It is sparking but the burner does not ignite.

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
It sparks but the burner does not ignite	No gas. Low gas pressure.	Open gas valve. / Check gas pressure / Change gas bottle /
	Main Gas Valve is not open Microswitch needs adjustment	Adjust Microswitch. Must be activated only with main valve opened
	The spark is not reaching the earthing 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.**
	There is no voltage in Servo valve terminal.	Check the PG circuit earth connection**. Photo 5.** Check the wiring. Change the PG 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 PG circuit. Banana wiring tool Change the FE 100 circuit.

3.- THE WATER FLOW IS VERY SMALL

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
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.

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

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
Continuous sparking and burner is ignited	The electronic circuit is not working correctly.	Replace the PG electronic circuit. **Photo 1**.

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

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
The burner switches off after remaining on for a few seconds	Air in gas pipes.	Purge air from gas pipes.
	Low gas pressure.	Check gas pressure.
	The electrode unit has come loose. The electrode flame sensor is out of position. The electrode flame sensor is deformed. See manual: electrodes life.... The electrode connector is not properly connected.	Tighten the electrode fixing screw. **Photo 11.** Change the electrodes. Check the connection and refix. **Photo 14.**
	The electronic circuit Ground terminal is not properly connected.	Tighten the Ground connection terminal. **Photo 5.**
	The PG electronic circuit is defective.	Change the electronic circuit.
	Servo Valve is defective	Check Voltage in Servo terminal**. Photo 18.**

6.- WATER HEATER IGNITES SUDDENLY AND THERE IS AN EXPLOSION

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
The burner ignites WITHOUT SOFT 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 Post purge after burning. Check Servo valve closes when not energised. Check fan function.
	There is air in the gas supply line.	Purge 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 injectors are incorrect size.	The change of gas type has not been made correctly.
	The FE 100 circuit voltage is not sufficient. The sparking noise is weak and the frequency is very slow.	Change the FE 100 circuit.

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

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
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). Sparkling only occurs for 5 seconds.	Change the micro switch – check functioning of micro switch with Banana Wiring.
	The PG electronic circuit is faulty.	Change the PG electronic circuit. Check function of micro switch with Banana Wiring.

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

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
The water heater switches off after functioning for a few minutes	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 PG circuit and FE circuit is defective	Test wiring status - Check Connectors.
	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 TTB jumper wire has come loose or there are problems with the connector.	Check the state of the TTB jumper. **Photo 16.**
	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.
	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 PG 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.**

9.- 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.

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
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.**

10.- FLAMES IN BURNER ARE YELLOW

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
Sparking occurs, the water heater ignites, but the fan does not start up.	Fan wiring is defective.	Check the wiring.
	Fan is faulty.	Change the fan.
	The connection between the FE circuit and the PG circuit (terminal 12) has been cutted.	Check / replace the wiring between FE and PG circuit.
	The fan is not working and Fault LED is ON in the PG circuit.	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 circuit.

11.- PROBLEMS WITH EXTRACTOR FAN

SYMPTOM	*POSSIBLE CAUSE OF FAILURE*	*SOLUTION*
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 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 9. The FE circuit has failed. Change the FE circuit.

12.- ADJUSTMENTS

12.1 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.

13.- CHECKING TOOLS

NAME	*DESCRIPTION*	*ILLUSTRATION*
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.	

13.1 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. Micro switch connector.
- Two banana connectors for connection to a multimeter.

13.2 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.**

13.3 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 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 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

13.4 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 PG 102-3 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 voltammeter, 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. See next
        3. Change the FE circuit.
    - **The voltage is below this value:**
        1. Check the mains supply voltage (230 Vac). IMPORTANT: readjust scale in Voltammeter.
        2. The power supply circuit is defective – change the FE circuit.

13.5 Checking the Internal Fuse in FE Circuit

There is one possibility to check the internal Fuse in FE circuit without open it.

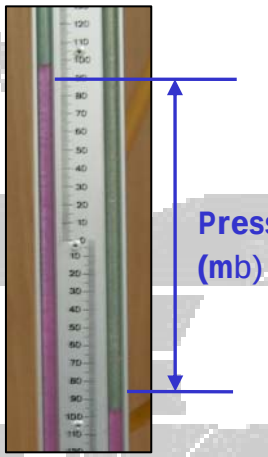
1. Disconnect the water heater from the mains.
2. Adjust voltammeter in Ohms.
3. Check continuity between the Neutral and Phase pole in the AC connector.
4. In case the Value in Ohms is near 2k Ohm the fuse is correct.
5. In case the value is higher or ∞ the fuse must be replaced and to do so the FE circuit must be opened.
6. NOMINAL VALUE FOR THE FUSE: 500 mA / 250 V / Time Lag… (T)

14.- USEFUL DATA

14.1 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:



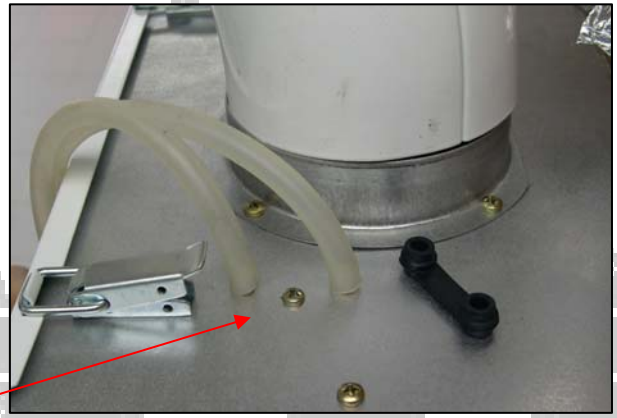
Pressure at water heater burner (mb)			
NG G20	NG G25	Butane G30	Propane G31
12.7	16.0	27.0	33.5

14.2 Correct Gas Pressures at the Water Heater Inlet.

Pressures considered valid at water heater inlet (mb)			
NG G20	NG G25	Butane G30	Propane G31
20.0	20.0 /25.0	28.0-30.0	37.0

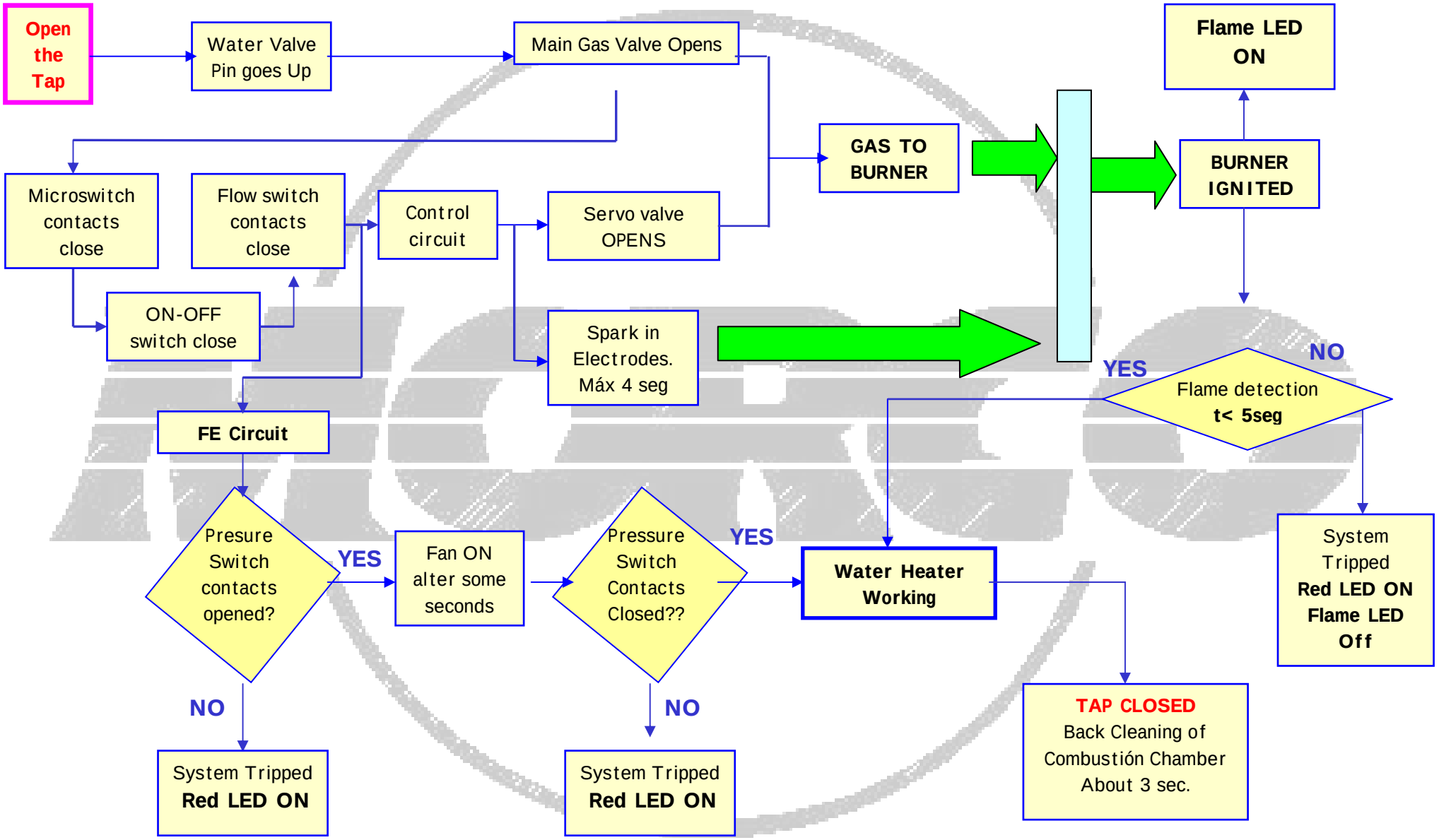
14.3 Air pressure switch characteristics.

150/135 Pa Pressure Switch closes contacts above 150 Pa.
Pressure switch opens contacts below 135 Pa.



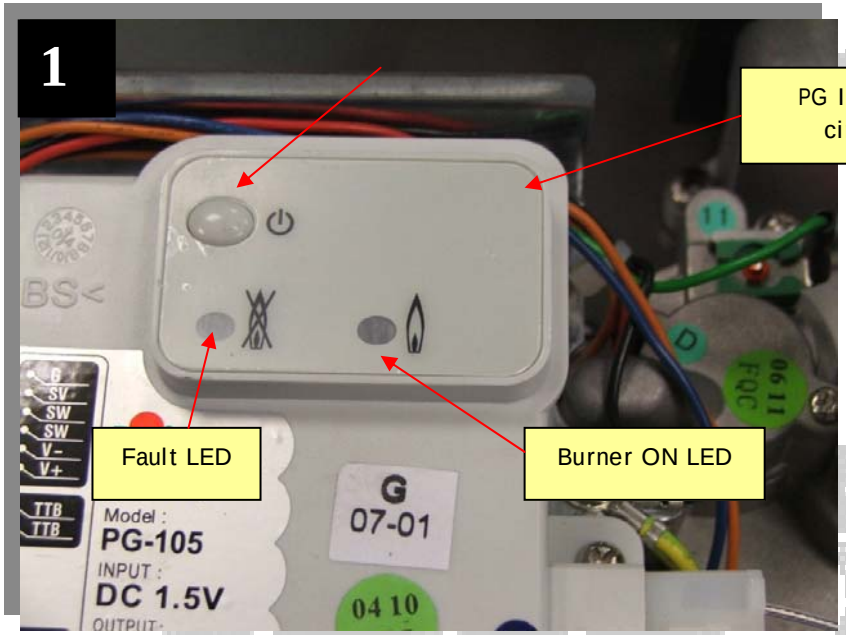
Pressure intake to test the Venturi differential Pressure

15.- IGNITION SEQUENCE



16.- PHOTO GALLERY

1

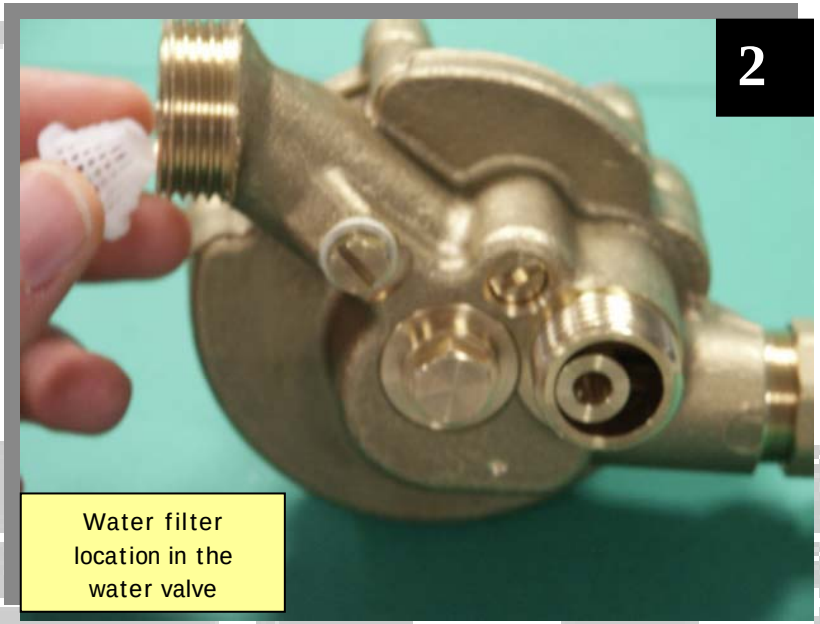


PG Ignition circuit

Fault LED

Burner ON LED

2



Water filter location in the water valve

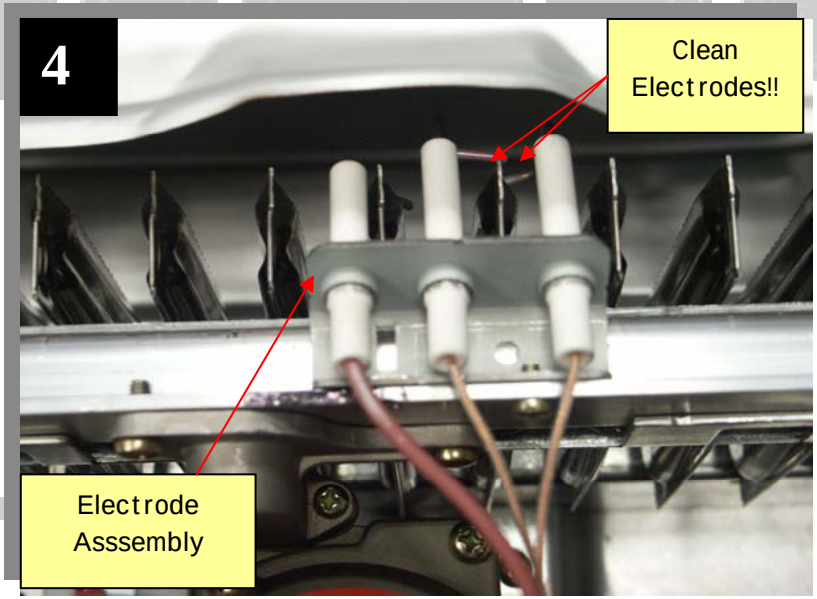
3

ON OFF Switch
Fault LED
Burner ON

Gas Temperature selector

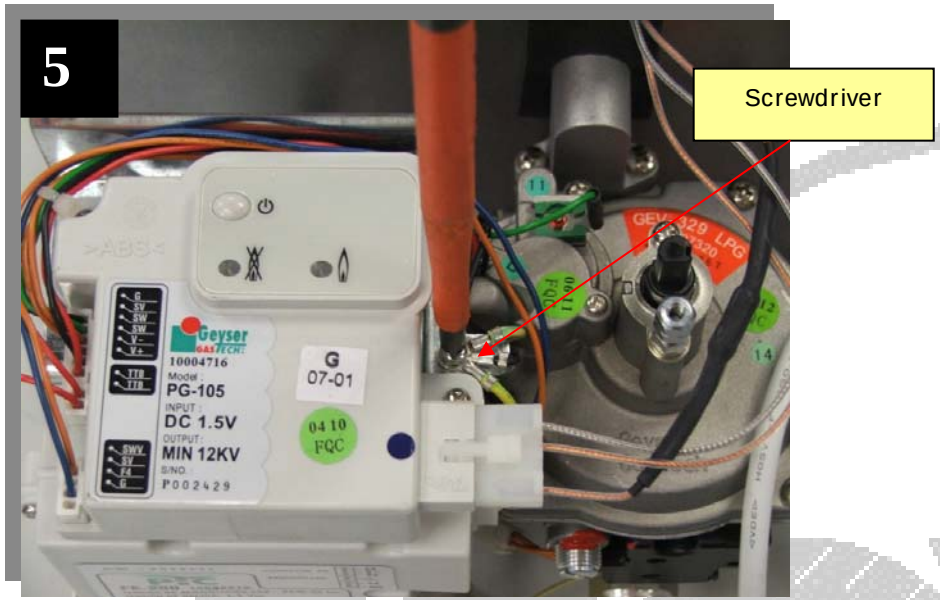
Water Temperature selector

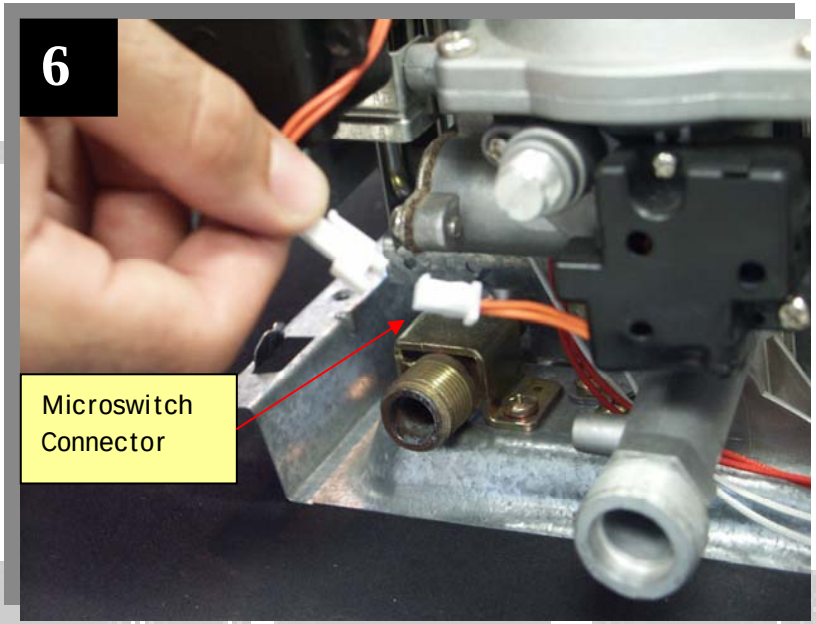
4



Clean Electrodes!!

Electrode Asssembly


5
Screwdriver
Geyser
10004716
Model
PG-105
INPUT:
DC 1.5V
OUTPUT:
MIN 12KV
S/NO.
P002429
G
07-01
04 10
FQC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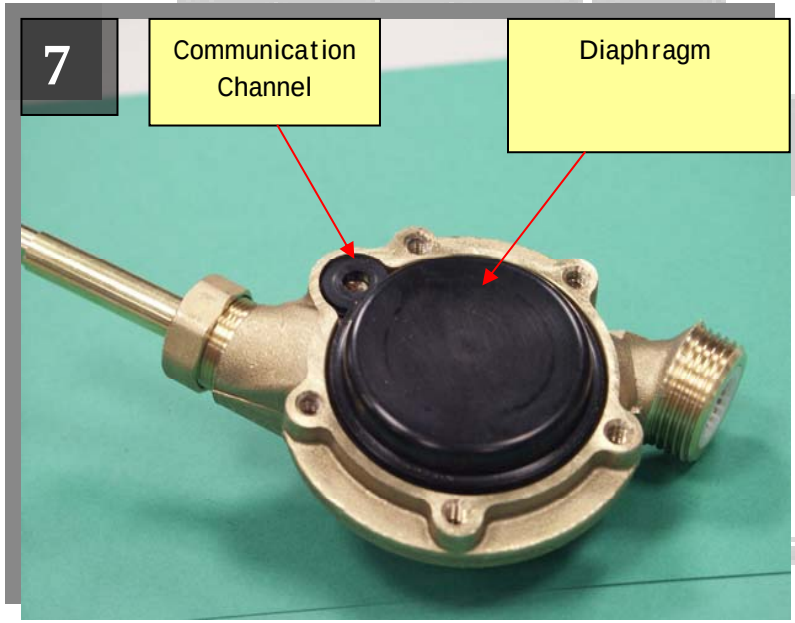
Microswitch
Connector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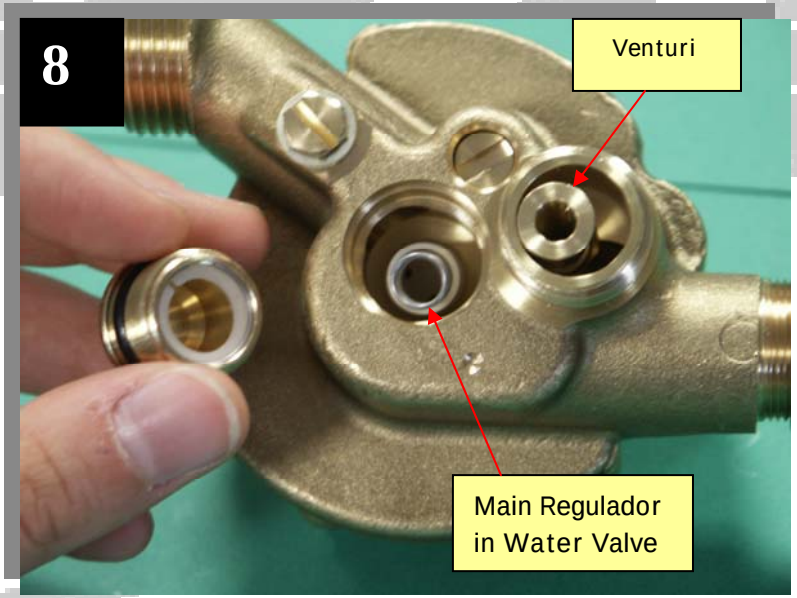
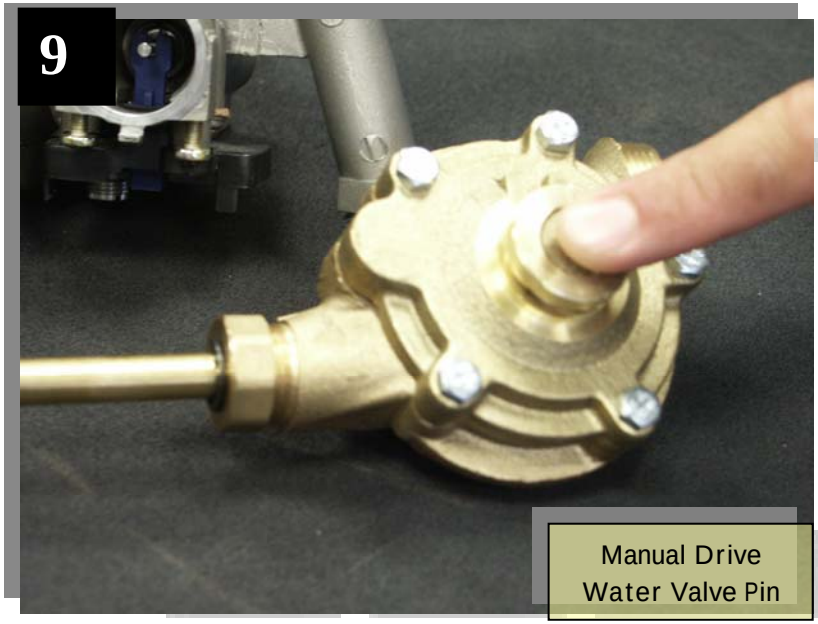
Communication
Channel
Diaphragm

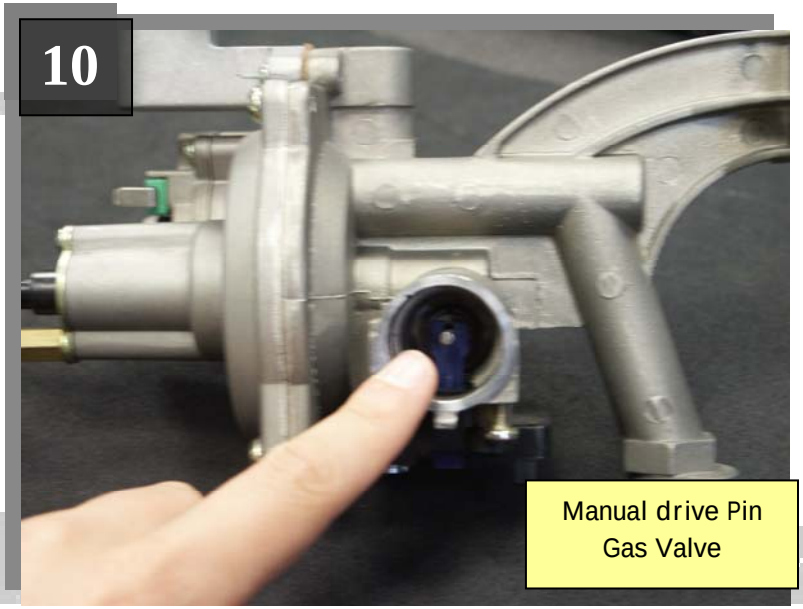

8
Venturi
Main Regulador
in Water Valve

9



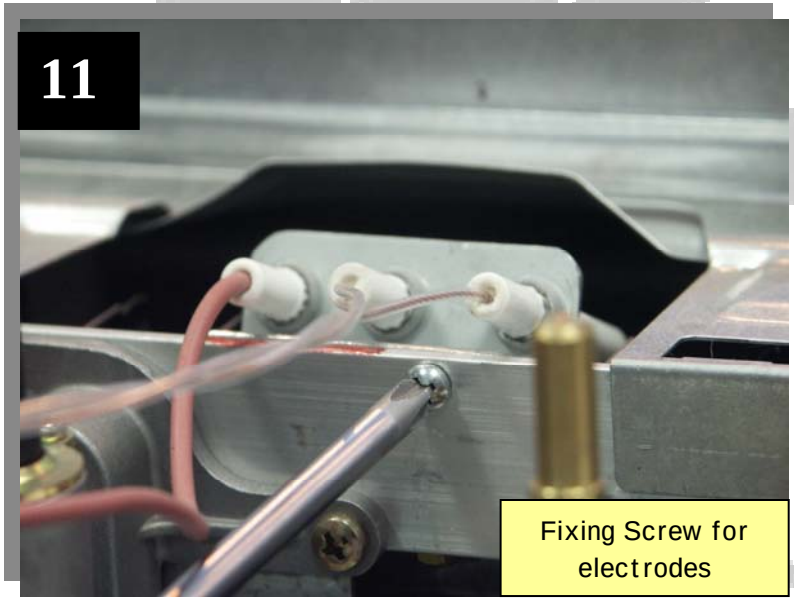
Manual Drive
Water Valve Pin

10



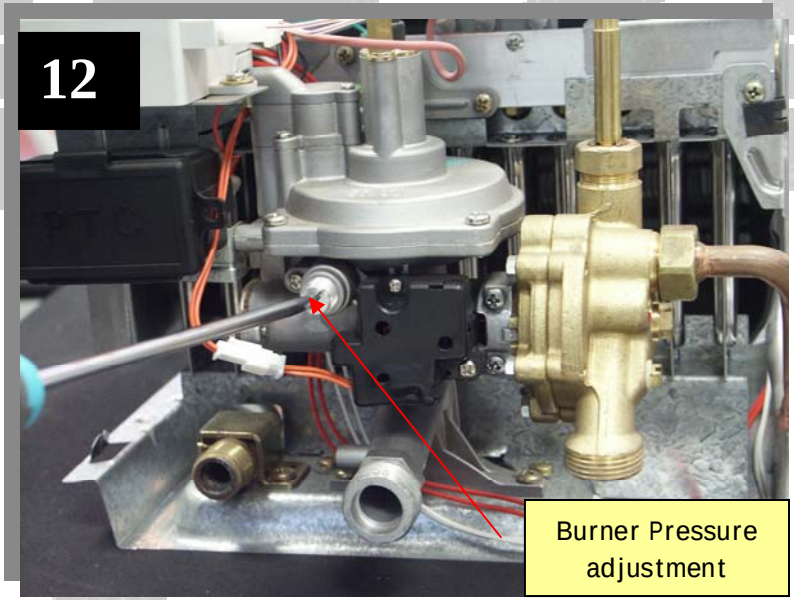
Manual drive Pin
Gas Valve

11



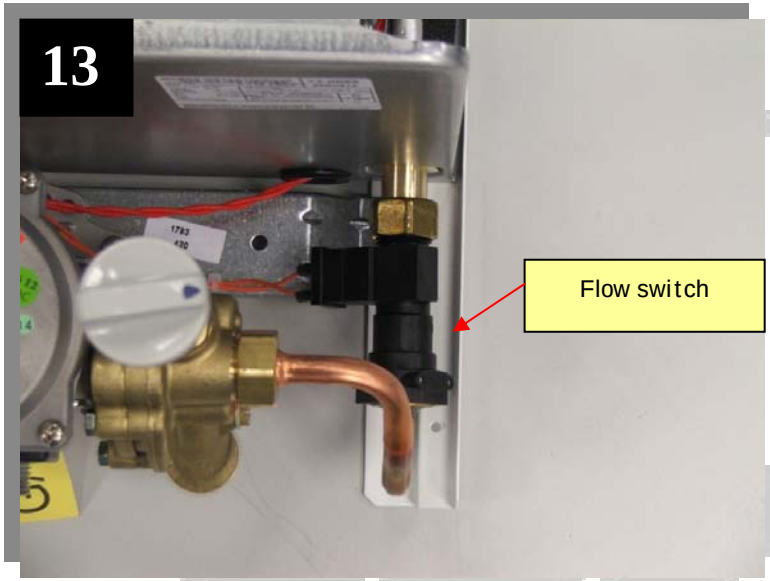
Fixing Screw for
electrodes

12

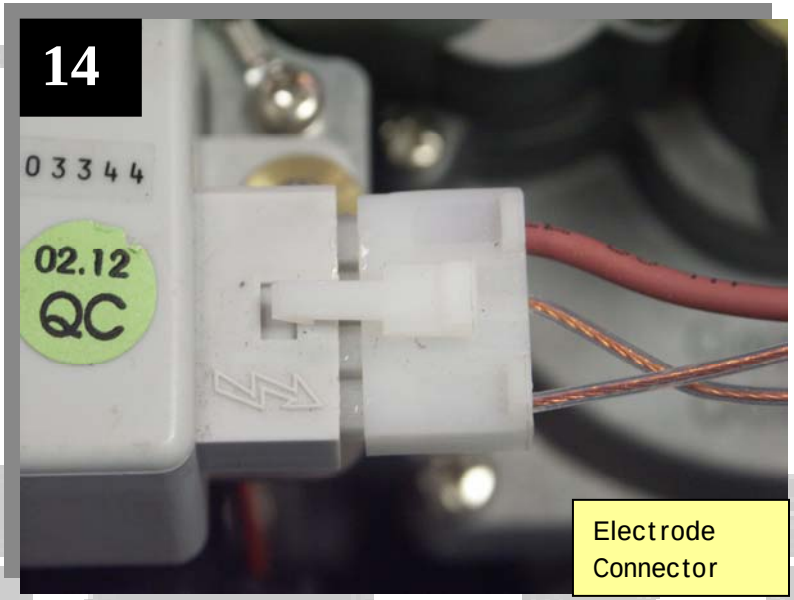


Burner Pressure
adjustment

13


Flow switch

14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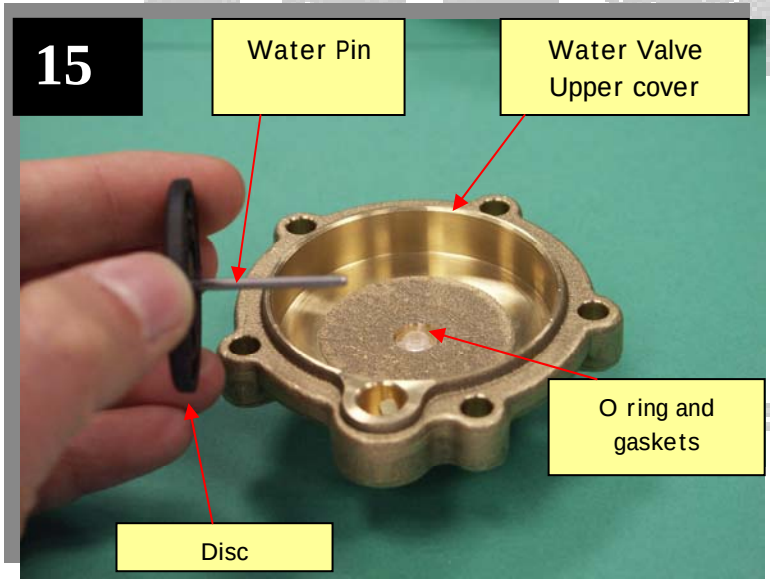
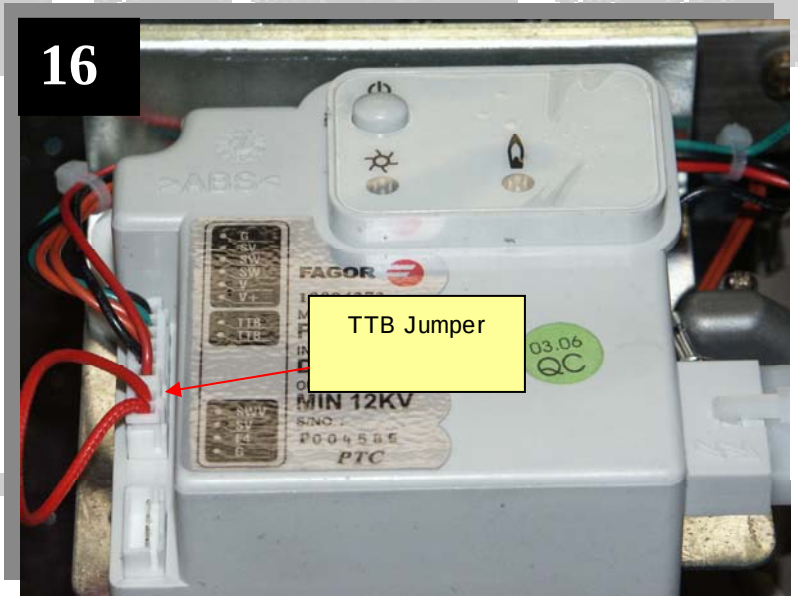
02.12
QC
Electrode
Connector

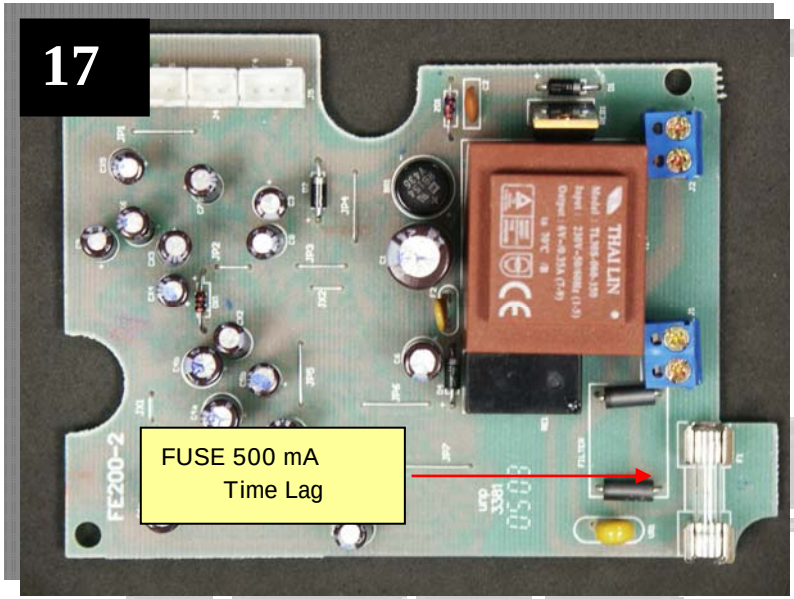
15


Water Pin
Water Valve
Upper cover
O ring and
gaskets
Disc

16


FAGOR
TTB Jumper
03.06
QC
MIN 12KV
PTC

17



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