

# Riva COMBI

## WALL HUNG GAS BOILER FOR CENTRAL HEATING AND DOMESTIC HOT WATER SUPPLY

**Please Read Instructions Carefully  
Save for Future Reference**

**WARNING:** If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
  - Do not try to light any appliance.
  - Do not touch any electric switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  - If you can not reach your gas supplier call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Manufactured by:

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Verona, Italy

Distributed By:

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**1 The Technical Manual**

The aim of this manual is to provide technical assistance operators with all the information necessary to facilitate maintenance of Biasi products.

To use this manual in the best possible way and to find the information in it quickly it is necessary to understand how it is laid out by reading the following carefully:

**2 Manual layout**

The manual is divided into three different parts (fig. 1).

The first part contains the general instructions on how to use and consult the manual; the nomenclature of the models illustrated in this manual and the grouping criteria for each family.

The second part contains booklets with technical data, hydraulic and wiring diagrams, troubleshooting instructions and start-up checks, grouped into product families.

The third part contains the technical data sheets relative to each component, its basic characteristics, checking its condition and replacing and/or servicing.

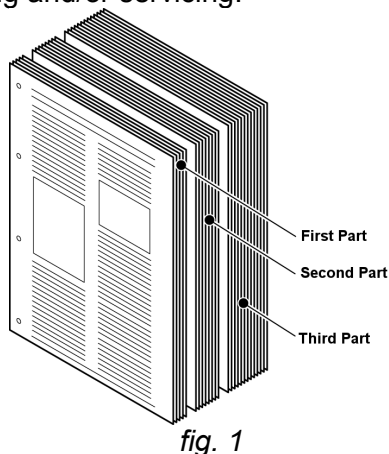


fig. 1

Parts two and three are preceded by an index that gives the contents and their order of arrangement.

**3 Topic, numbering, edition**

The topic dealt with on each card is also shown in the top outer corner of each page, the part in the inner top corner. The pages are numbered in the bottom corner (fig. 2).

Technical sheet edition date (month and year) is given between part and argument on top of the page.

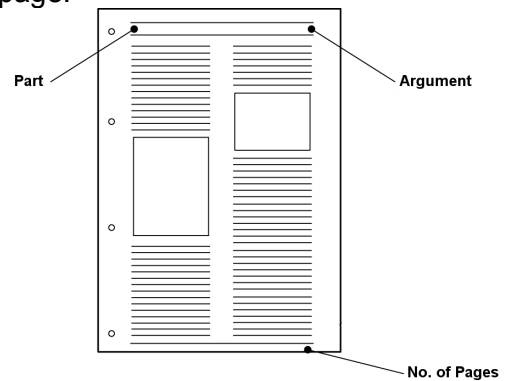


fig. 2

Part one is laid out with consecutive numbers (fig. 3).

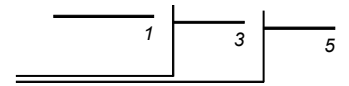


fig. 3

Part two is arranged on two levels (fig. 4). The first gives the acronym of the family to which the technical sheet belongs; the number that follows indicates technical sheet order sequence inside each family.

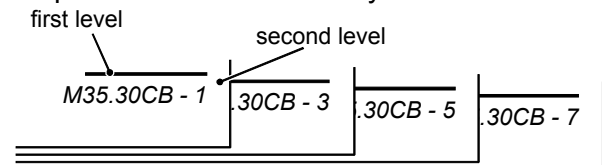


fig. 4

Part three is also arranged on two levels (fig. 5); the first is a number assigned to each component, the second indicates technical

sheet order sequence. Correspondence between component and number is given in the index at the beginning of part three.

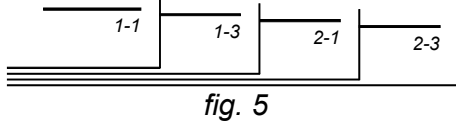


fig. 5

**4 Updating**

The evolution of Biasi products entails updating the technical assistance personnel and relative documentation.

The updated documentation which will be sent to the Assistance Service Centres, whether in the shape of a circular or technical sheets to be added to the manual or to replace others, must be properly inserted.

All technical service personnel must be informed immediately of their contents.

**5 Models**

All models of products manufactured are identified with a name. This name (*from here referred to as model*) is determined by the unit's construction characteristics (fig. 6)

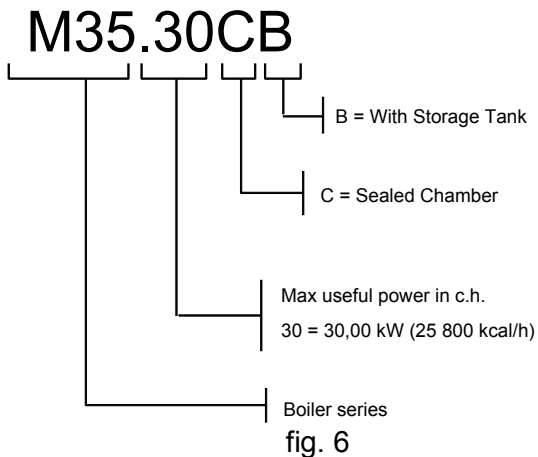


fig. 6

The information contained in this manual is applicable to the following models:

M35.30CB

**6 Serial number**

Each unit has its own serial number, the meaning of which is given in fig. 7).

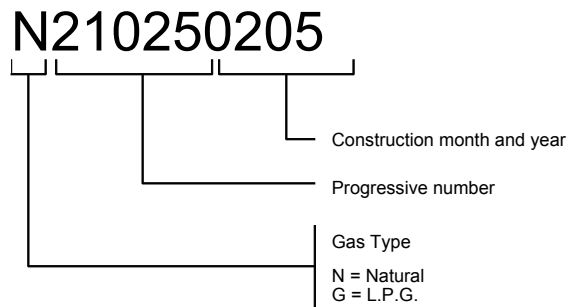


fig. 7

**7 Series**

The boilers are grouped into families in part two of this manual, each group including models with identical construction features and, hence, with identical maintenance.

Within each family the models differ only in their nominal thermal capacity or other characteristics that do not call for different maintenance.

Series	Models
M35-----	M35.30CB

## Summary

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**1 Overall View**

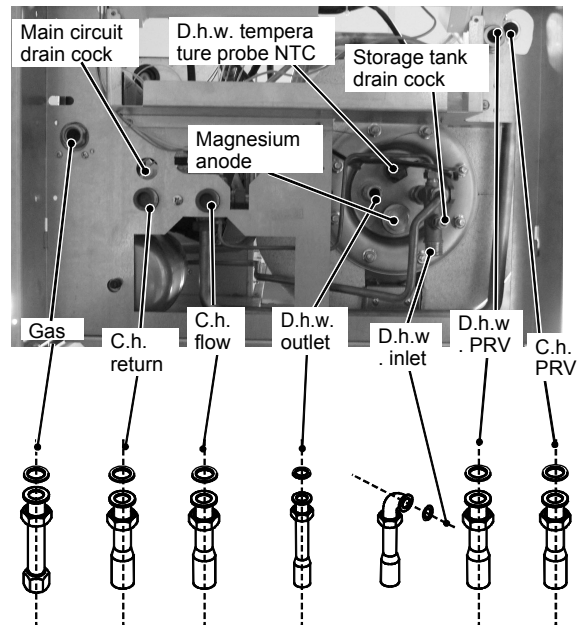
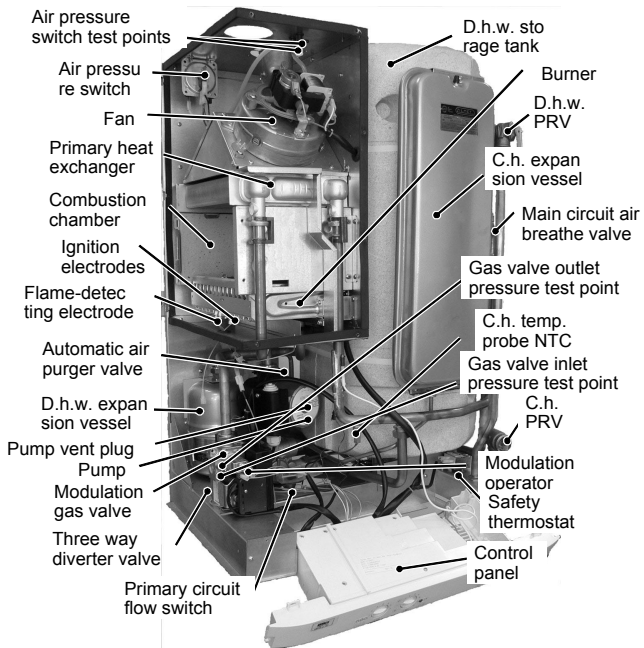


fig. 1

**2 Hydraulic Diagram**

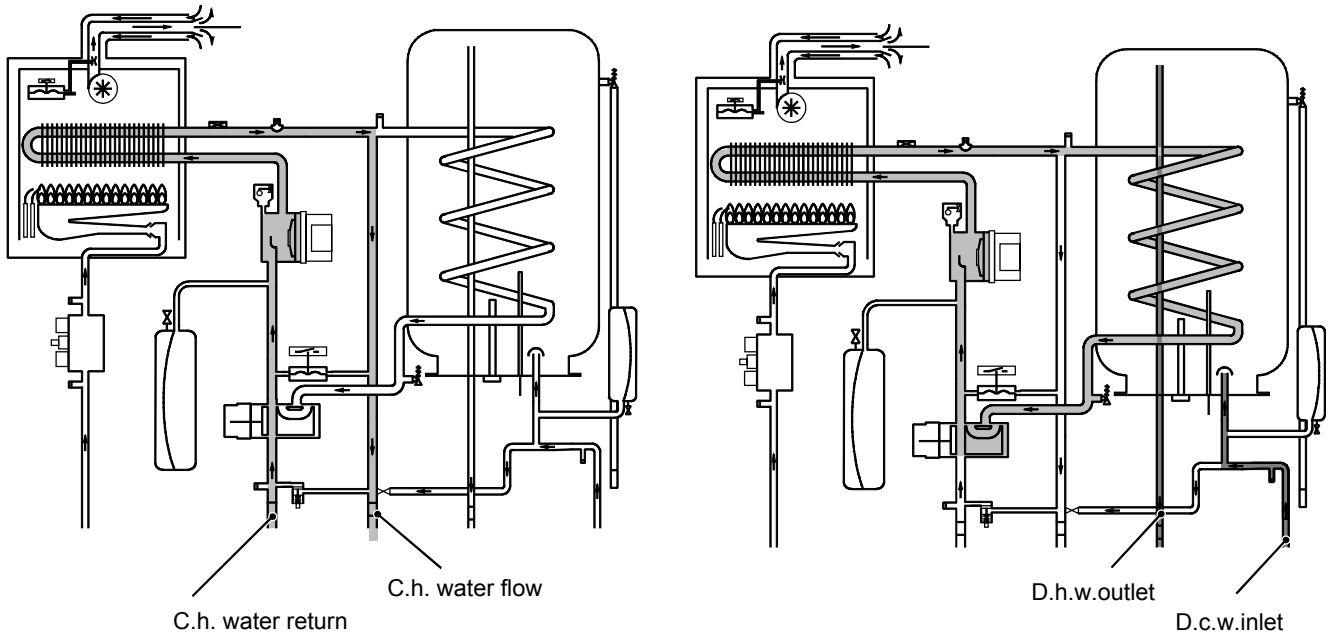


fig. 2

**3 Electrical Diagram**

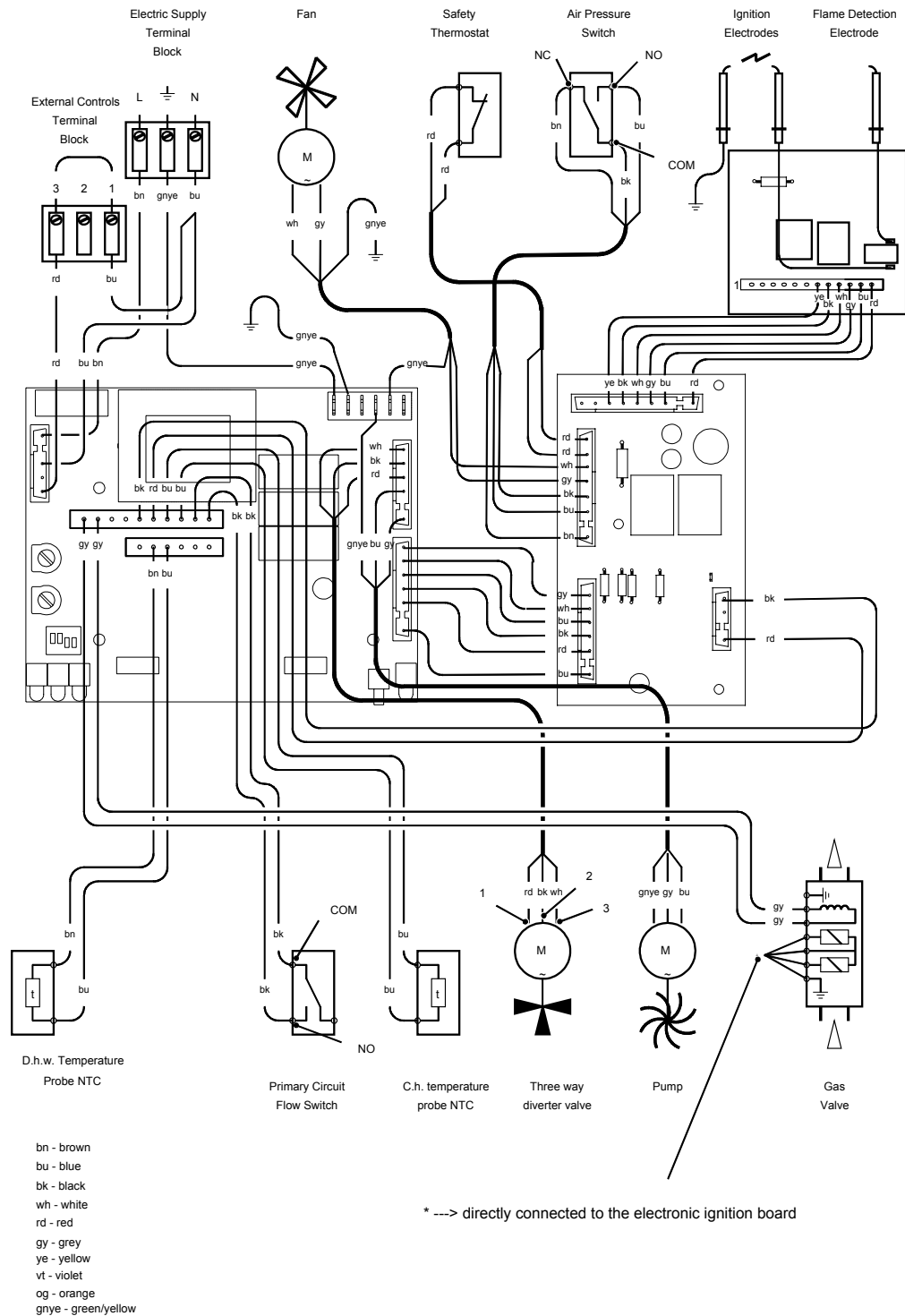


fig. 3



**4 Gas Adjustment Data**

<b>Maximum gas pressure at the injectors</b> Natural (G20) Propane (G31)	inwc inwc	5.3 9.0
<b>Minimum gas pressure at the injectors</b> Natural (G20) Propane (G31)	inwc inwc	0.8 1.4
<b>Ignition pressure</b> Natural (G20) Propane (G31)	inwc inwc	2.4 5.2
<b>Maximum gas rate</b> Natural (G20) Propane (G31)	ft <sup>3</sup> /h lb/h	121.1 5.55
<b>Minimum gas rate</b> Natural (G20) Propane (G31)	ft <sup>3</sup> /h lb/h	48.7 2.23
<b>Injectors</b> Natural (G20) Propane (G31)	n°/Φ	14/130 14/89

<b>Useful output</b>	KW Kcal/h	10.8 9288	12.0 10320	14.0 12040	17.0 14620	20.0 17200	23.0 19780	26.0 22360	29.5 25370
Natural	Pa	220	250	330	470	640	830	1050	1330
	inwc	0.88	1.00	1.32	1.89	2.57	3.33	4.22	5.34
	m <sup>3</sup> /h	48.7	53.0	60.7	72.4	84.0	96.0	107.7	121.1
Propane	Pa	360	420	560	800	1080	1400	1760	2230
	inwc	1.45	1.69	2.25	3.21	4.34	5.62	7.06	8.95
	lb/h	2.2	2.4	2.8	3.3	3.9	4.4	4.9	5.5

**5** Fault Finding

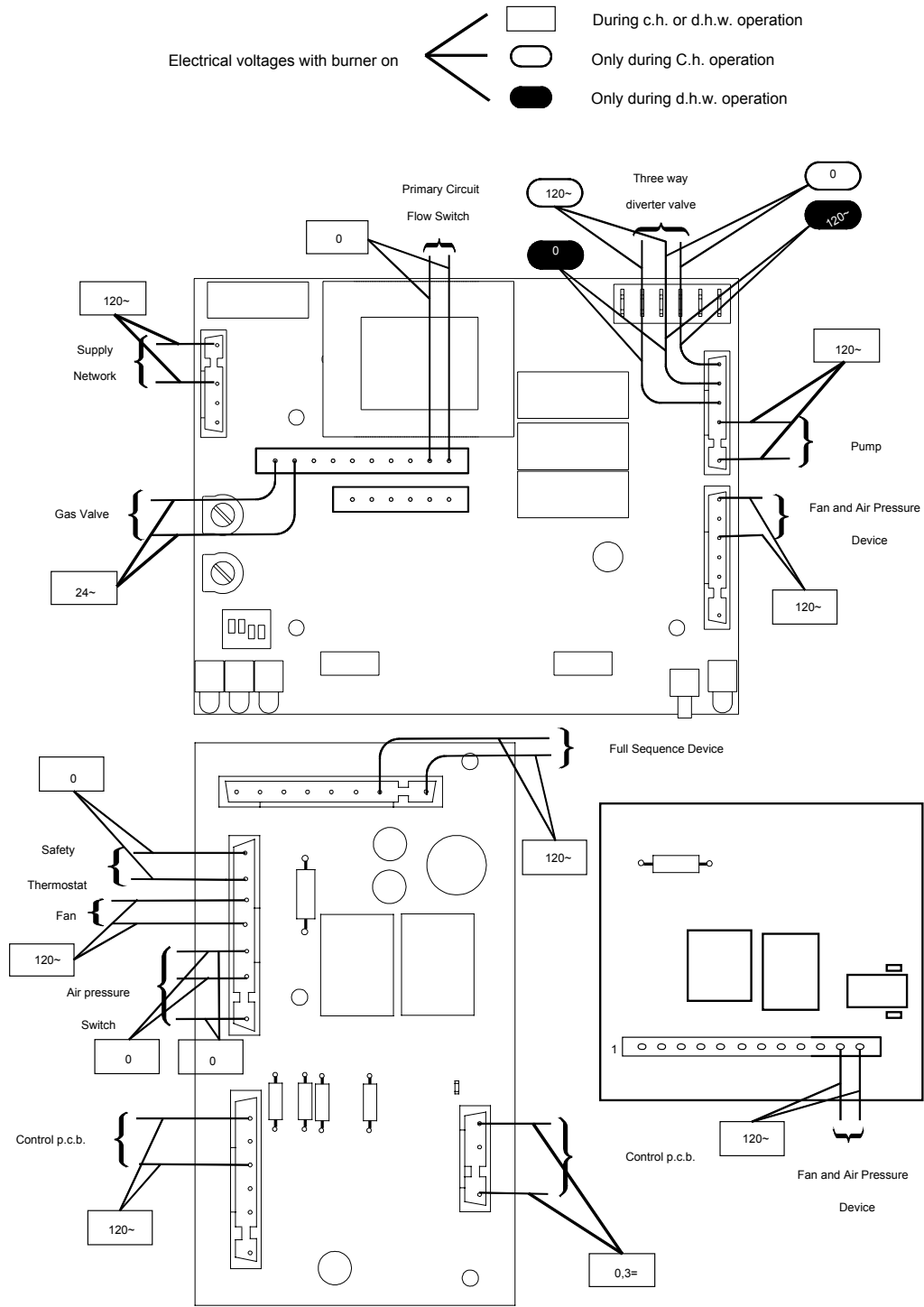
Defect ↓	Components to check																							
	(1)	(2)	(3)	(4)	3-1	4-1	5-1	(5)	6-1	8-1	7-1	9-1	10-1	-	12-1	13-1	14-1	15-1	(6)	11-1	-	11-1		
Section of the manual (third part of manual) + (Note ref. in brackets)																								
Lock-out signal lamp red	■	■										■	■											
By pressing the reset push – button the boiler turns on and operates correctly.																								
By pressing the reset push – button the boiler starts the ignition cycle. The burner <b>doesn't light on</b> , the ignition sparks continue and the boiler locks again.	■	■										■	■											
By pressing the reset push – button the boiler starts the ignition cycle. The burner <b>lights on</b> , the ignition sparks continue and the boiler locks again.	■																							
The boiler does not start either in c.h. or d.h.w. mode. All operation lights OFF Fan doesn't turn.	■																							
The boiler does not start either in c.h. or d.h.w. mode. Fan turns.																								
The boiler does not start either in c.h. or d.h.w. mode. Fan <b>doesn't</b> turn.																								
The boiler doesn't control the d.h.w. temperature. Turning the d.h.w. temperature adjustment knob hasn't effect on the modulation of the flame. The boiler operates correctly on c.h.																								
The boiler lights for a short while on c.h. Normal operation on d.h.w. function.																								

Section of the manual (third part of manual) + (Note ref. in brackets)		Components to check																								
		(1)	(2)	(3)	(4)	3-1	4-1	5-1	(5)	6-1	8-1	7-1	9-1	10-1	-	12-1	-	13-1	14-1	15-1	(6)	11-1	-	11-1		
Defect ↓																										
Lock-out signal lamp red																										
The boiler does not supply d.h.w. (cold water from the tap). Regular operation in c.h. mode even during a drawing off d.h.w.																										
On c.h. mode the temperature of the main circuit reaches 90 °C and the c.h. system does not heat. The boiler operates correctly on d.h.w. mode.																										
Incorrect modulation																										
Noisy boiler																										
The boiler operates correctly but the gas pressure to the burner remains at minimum.																										
Poor d.h.w. temperature																										
Low d.h.w. flow rate																										
Water leaks from the c.h. pressure relief valve during operation on c.h.																										
Water leaks from the c.h. pressure relief valve when the boiler is off.																										
Water leaks from the d.h.w. pressure relief valve.																										

Notes:


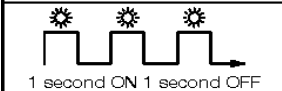



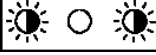
- 1 Check for 120V ~ between line (L) and neutral (N). Verify the integrity of supply cable, plug and external fuses. Check the polarity of the line and neutral.
- 2 Verify the soundness of the gas supply pipe, the position of stop valves. Check the gas pressure at the inlet point of the gas valve with the boiler at rest and during operation and compare it with the values given on the installation booklet.
- 3 Check for soundness and absence of obstructions. Verify that the flue terminal is correctly installed (see clearances) and ensure that exhaust gas is not sucked back by the boiler.
- 4 Check for soundness of the circuit and verify its correct filling (see also installation manual).
- 5 A jammed by-pass could cause the over-heating of the main circuit and the intervention of the safety thermostat.
- 6 Check the **minimum** gas pressure at the outlet point of the gas valve (see section 9) and compare it with the value given on the installation booklet.
- 7 Verify the cleanliness of injectors.
- 8 Check the pressurization of the expansion vessel. Refer to the installation manual for proper values.
- 9 If the fan still turns after 30 seconds from the beginning of flashing of the lock-out lamp it is impossible that the cause of the fault is the fan and air pressure device.
- 10 If the fan doesn't turn before 30 seconds from the beginning of flashing of the lock-out lamp it is impossible that the cause of the fault is the fan and air pressure device.

**6** Circuit Voltages









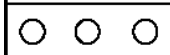





## 7 Operation Lights

The Electronic control p.c.b. is provided with three lamps (LED indicators) that give optical information during the operation of the boiler. The green lamp on the left gives information whether the boiler is in stand-by mode or during the normal operation of the boiler. The following table gives the relationship between the lamp indication and its meaning.

	Boiler in stand-by condition. (function control in position). Anti-freeze system active.
	Boiler ON condition (function control in position)
	
	Normally operating boiler (see the previous table for details)
	C.h. operation
	D.h.w. operation

## 8 Start-up Checks

- 1) **Connection to the gas supply system:**  
Check that current regulations have been complied with and that safe running and use are guaranteed.  
Check that there are no leaks.
- 2) **Gas supply pressure:**  
Check gas supply pressure at valve input when the boiler is off and when it is running at full power. Carry out the same check if there are any other user points on.
- 3) **Connection to the electrical system:**  
Check for proper connection to the power supply and to external control devices.  
**Check that the unit is connected to the electrical protection system (earth).**
- 4) **Check the C.h. circuit:**  
Check that the circuit is properly filled at a suitable pressure and that there are no leaks  
Check it is correctly bled of air.
- 5) **Combustion by-product expulsion system:**

	Frost protect operation		
	D.h.w. operation Excessive temperature on primary circuit		
	Faulty c.h. temperature probe NTC		
	Faulty d.h.w temperature probe NTC		
	Faulty primary circuit (no water or absence of flow)		
	Lack of burner ignition (no ignition signal from the full sequence ignition device)		
	Lack of power supply or faulty electronic control p.c.b. *		
	Faulty Electronic control/ignition p.c.b.. *		
			
Lamp OFF	Lamp ON	Flashing lamp, alone or simultaneously with an other lamp.	Flashing lamp, alternate with another lamp.
* These conditions are normal only for a short time when the power supply is applied to the boiler. If permanent they indicate a faulty p.c.b.			

Check that the flue pipe and the air intake pipe have been made correctly and mechanical stability is guaranteed.

- 6) **Correct operation:**  
When starting the boiler check the burner maximum, minimum and ignition gas pressures.  
Check that the Venturi pressure is sufficient to ensure proper operation.  
Check that the unit runs properly in the c.h. mode and in the d.h.w. mode using the function knob of the control panel.
- 7) **Safety and control devices:**  
Check that safety thermostat, ignition device, air pressure switch, and the main circuit flow switch work properly.
- 8) Instruct the user on how to use the unit correctly and explain to him the functions of the external commands, the actions he needs to take and what to do in case of malfunction or emergency.

**9 Gas Conversion**

- 1) Check that the gas cock fitted on the gas supply pipe is turned off and the appliance is switched off at the circuit breaker.
- 2) Remove the front and side panels of the case.
- 3) Take off the lid of the sealed chamber.
- 4) Loosen the screws A on figure 9.1 and move to the left the side panel of the combustion chamber.

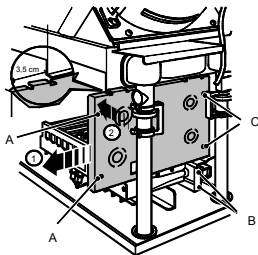


Figure 9.1

- 5) Loosen the screws B and remove the air deflector (figure 9.1).
- 6) Loosen the screws C and remove the front panel of the combustion chamber moving it to the left for about 1.5 in, rotating it inside the combustion chamber (figure 9.1 follow the arrows) and then pulling it outside the combustion chamber (figure 9.2).

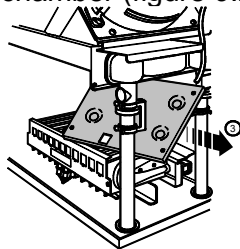


Figure 9.2

- 7) Remove the connections of the ignition and detection electrodes.
- 8) Remove the burner moving it to the left, rotating it upward and then pulling it outside the combustion chamber (follow the arrows on figure 9.3).

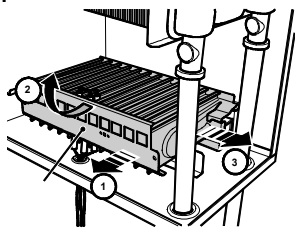


Figure 9.3

- 9) Carry out the conversion for the type of gas, replacing the burner injectors correctly.
- 10) Re-assemble the burner, the front panel of the combustion chamber and the lid of the sealed chamber.
- 11) Extract the control panel.
- 12) Loosen the screws K and remove the service panel (figure 9.4)

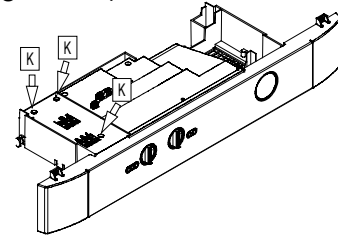


Figure 9.4

- 13) Set correctly the dip-switch "2" to the correct position (Fig. 9.5) in accordance with the following table.

Gas supply	Position of the switch 2
Natural gas	On
L.P.G.	Off

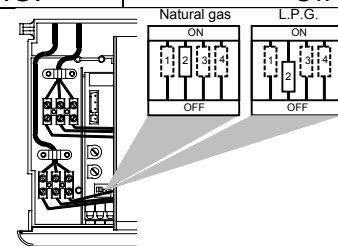


Figure 9.5

- 14) Close the service panel.
- 15) Turn on the boiler.
- 16) Calibrate the gas valve according to the instructions given in the section 9 of the third part of this manual.
- 17) Set the correct gas pressure for central heating output required.
- 18) Stick on the inside of the left hand side panel adjacent to the data badge the self-adhesive label (included with the conversion kit) indicating the type of gas, and the gas pressures to which the appliance has been set.
- 19) Reassemble the front and side panels of the case.

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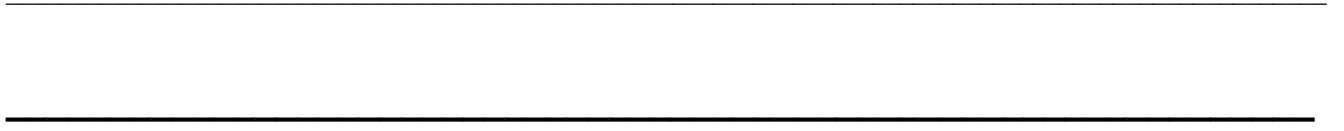
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**General Access and Emptying Hydraulic Circuits**

- 1) Nomenclature
- 2) Body Panels
- 3) Control Panel
- 4) Access to the Sealed Chamber
- 5) Emptying the Primary Circuit
- 6) Emptying the D.h.w. Circuit

**1 Nomenclature**

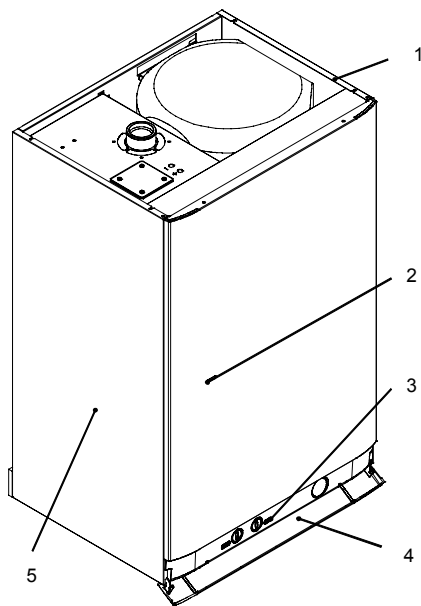


Figure 1

- 1) Right Side Panel
- 2) Front Panel
- 3) Control Panel Lid
- 4) Control Panel Cover
- 5) Left Side Panel

**2 Body Panels**

**Warning:** Isolate the boiler from the mains electricity supply before removing any covering or component.

For the most part of the check and maintenance operations it is necessary to remove one or more panels of the case.

The side panels can be removed only after the removal of the front panel.

To remove the front panel remove screws A (Figure 2) , lift the panel and remove it.

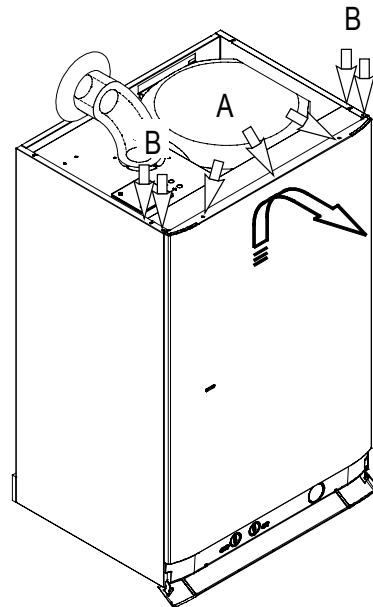


Figure 2

To remove the side panels, remove the screws B (Figure 2) and the screws C (Figure 3), bring the base of the panels away from the boiler (Figure 4) and lift them, freeing them from the top hooks.

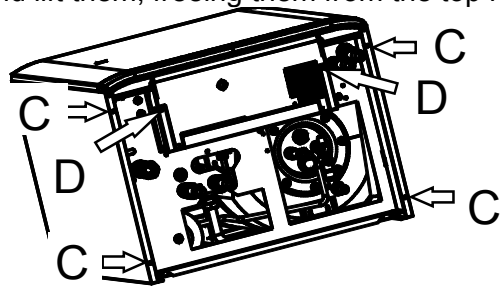


Figure 3

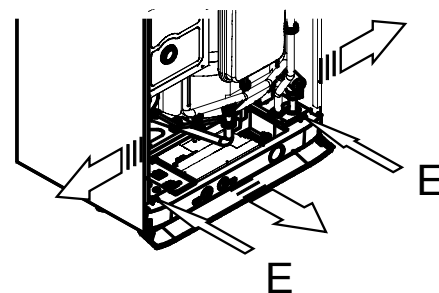


Figure 4

### 3 Control Panel

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

To gain access to the parts located inside the control panel proceed as follows:

- 1) Remove the front panel of the case.
- 2) Loosen the screws and C and D (Figure 3).
- 3) Remove the screws E (Figure 4).
- 4) Move the lower part of the side panels as indicated in Figure 4 and pull the control panel. When completely pulled out, the panel can rotate 45° downwards to facilitate the service operations on the internal parts.

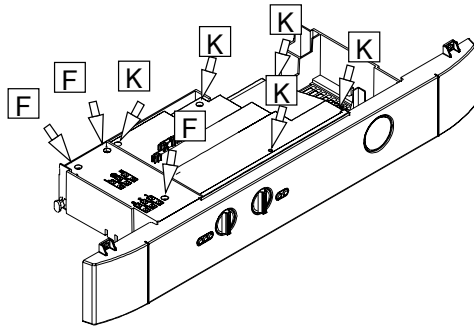


Figure 5

- 5) Remove the screws F and remove the service panel (Figure 5).
- 6) To gain access to the electronic control p.c.b. and the fan and air pressure device remove the screws K and remove the control panel lid (Figure 5).

### 4 Access to the Sealed Chamber

To gain access to the parts contained in the sealed chamber it is necessary to remove the lid of the sealed chamber.

For this purpose, remove the front and side panels of the case, remove the screws G as indicated in Figure 6 and remove the lid.

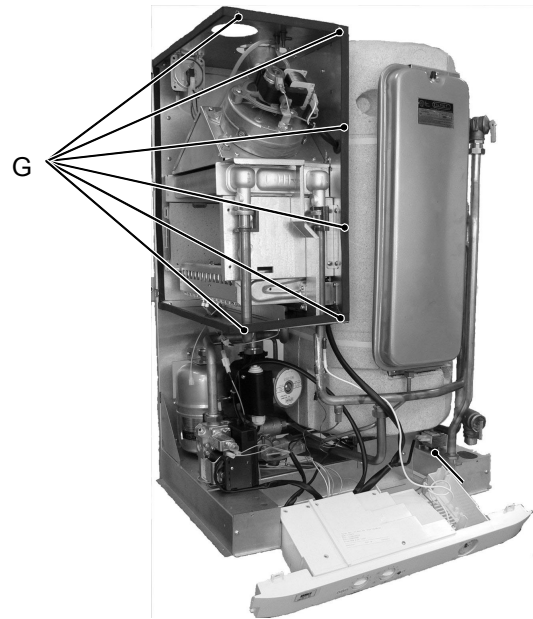


Figure 6

### 5 Emptying the Primary Circuit

- 1) Close the pressure reducing automatic fill valve.
- 2) Open the c.h. drain cock H (Figure 7).
- 3) Loosen the d.h.w. storage tank air purge valve I (Figure 8).

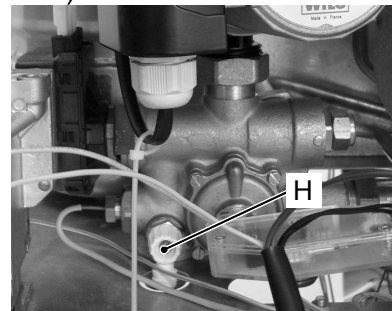


Figure 7

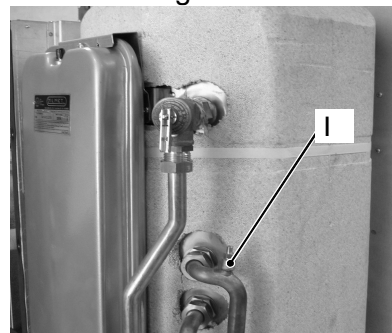


Figure 8

## **6** Emptying the D.h.w. Circuit

- 1) Turn off the domestic cold water inlet cock and turn on the hot water taps and any drain cock.
- 2) Turn on the storage tank drain cock L in Figure 9 and empty the d.h.w. tank.

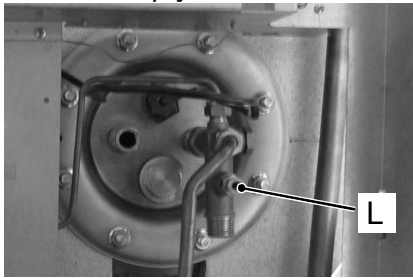


Figure 9



**Primary Heat Exchanger**

- 1) Function
- 2) Removal
- 3) Cleaning

**1 Function**

The primary heat exchanger A in Figure 1 has the function of transferring heat produced from combustion of the gas to the water circulating in it.

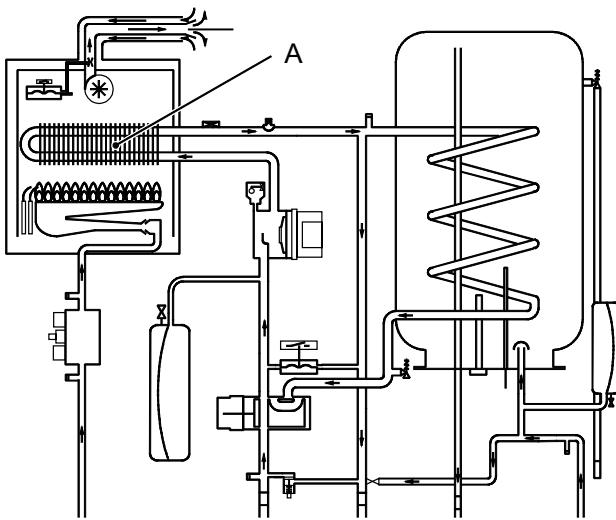


Figure 1

The hydraulic circuit is composed of 8 elliptical pipes connected in parallel (Figure 2).

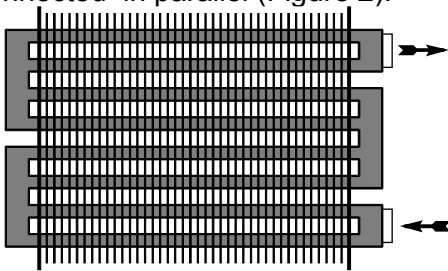


Figure 2

**2 Removal**

- 1) Remove the case panels.
- 2) Empty the primary circuit.
- 3) Remove the sealed chamber lid.

- 4) Remove the side panel B of the combustion chamber by unscrewing the screws C (figure 3).
- 5) Remove the screws and the deflector D.
- 6) Remove the clips E (Figure 3).



Figure 3

- 7) Loosen the connection F, rotate to the left and then move downwards the pipe G freeing it from the connection of the primary heat exchanger (Figure 4).



Figure 4

- 8) Loosen the connection H (Figure 4)
- 9) Loosen the connection L (Figure 5) and move downwards the pipe I (Figure 4) freeing it from the connection of the primary heat exchanger.



Figure 5

- 10) Remove the screws M (Figure 3).  
 11) Remove the front panel of the combustion chamber moving it to the left for about 1.5 in, rotating it inside the combustion chamber (Figure 6 follow the arrows) and then pulling it outside the combustion chamber (Figure 7).

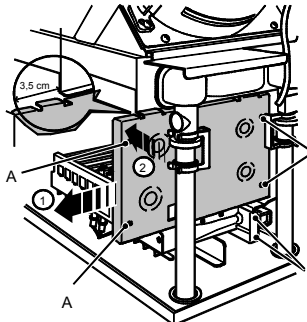


Figure 6

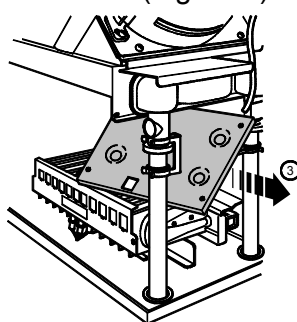


Figure 7

- 12) Remove the heat exchanger moving it for about 1.5 in, moving it downwards and then pulling it outside (Figure 8).



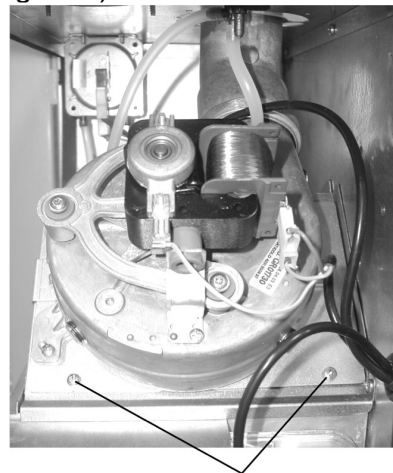
Figure 8

- 13) Reassemble the boiler carrying out the removal operations in reverse order.

### 3 Cleaning

To clean the outside of the primary heat exchanger, it is not necessary to drain the primary circuit of the boiler. It is enough to open the combustion chamber as previously described without removing pipes.

To remove the fan in order to clean the upper part of the heat exchanger, loosen the 2 screws N as in (Figure 9).



N

Figure 9

If there are deposits of soot or dirt between the blades of the heat exchanger, clean with a brush or non-metallic bristle brush.

In any case, avoid any actions that can damage the protective varnish with which the exchanger has been covered.



**D.h.w. Storage Tank**

- 1) Function
- 2) Removal of the Magnesium Anode
- 3) Internal Cleaning of Tank and Removal of the Tank Flange
- 4) Removal of the Storage Tank

**1 Function**

The d.h.w. storage tank makes possible the instantaneous transfer of heat from the primary hot water circuit to the domestic hot water circuit, while keeping the water in the storage tank at a constant temperature.

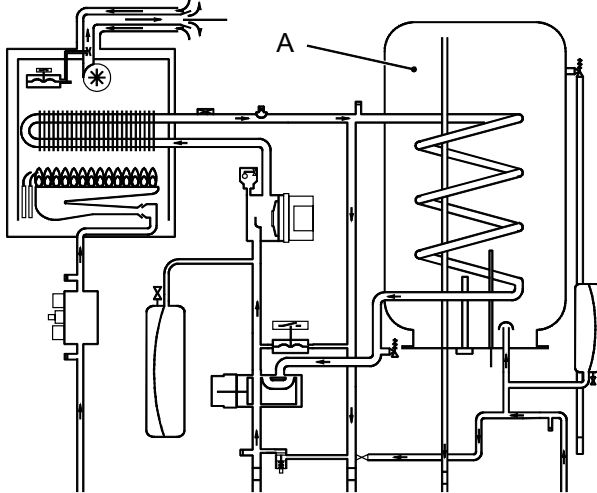


Figure 1

Both structure and water paths are schematised in Figure 2.

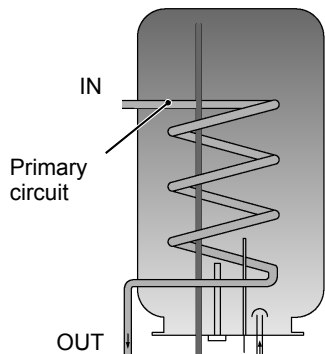


Figure 2

The flow of the primary circuit runs through the coil from the top to the bottom. The domestic cold water flows against the current

**2 Removal of the Magnesium Anode**

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove the front and side panels.
- 2) Emptying the primary and the d.h.w. circuits.
- 3) Loosen the connection B and pull the anode downwards (Figure 3).

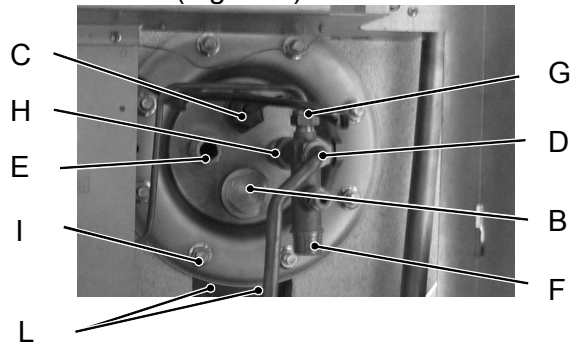


Figure 3

Check its wear and replace it if it is overly worn, prior to first maintenance (Figure 4).

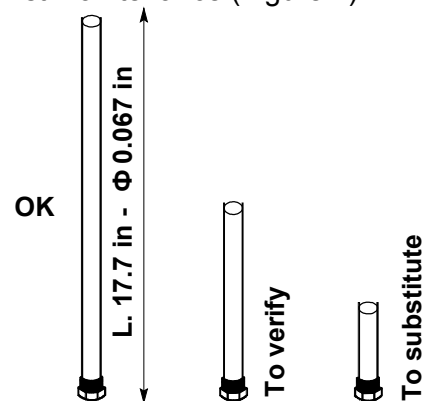


Figure 4

**3 Internal Cleaning of Tank and Removal of the Tank Flange**

- 1) Remove the fork C and pull out the probe.
- 2) Remove the d.h.w. expansion vessel pipe D loosening the connection.
- 3) Loosen the connection E and remove the d.h.w. outlet pipe.
- 4) Loosen the connection F and remove the d.h.w. inlet pipe.
- 5) Loosen completely the connection G and move apart the small pipe.

- 6) Loosen the connection H and remove the group.
- 7) Before removing the tank flange mark its position for the reassembling.
- 8) Remove the eight nuts I and pull down the flange.
- 9) Cleaning of the coil and the inside of the storage tank should be done with a rag to remove any lime deposits.

#### 4 Removal of the Storage Tank

Perform the operations described above up to point 6 to remove the lower fitting. For the upper fitting do the following:

- 1) Unscrew the connections M,N,O (Figure 5).

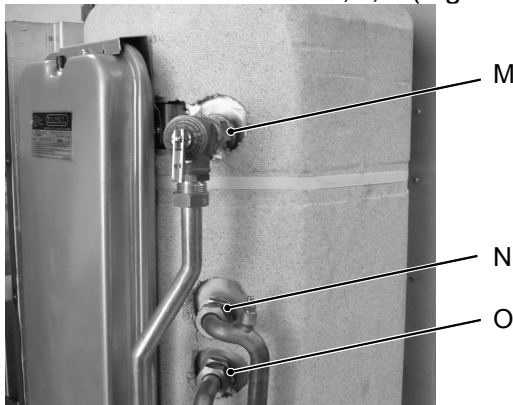


Figure 5

- 2) Unscrew the nut P (Figure 6).

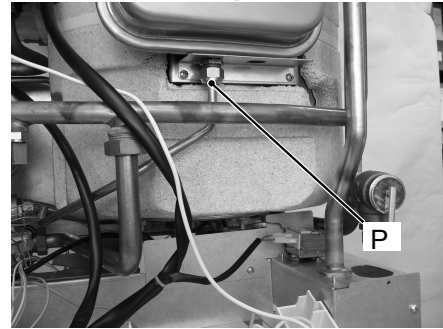


Figure 6

- 2) Loosen the screws L (Figure 3).
- 3) Lift the storage tank, which is attached to the case by a bracket, and remove it.
- 4) Reassemble the boiler carrying out the removal operations in reverse order.

**Attention - Only use the lubricant recommended in the spare parts catalogue to lubricate the O-rings.**

**Pump**

- 1) Function
- 2) Checks
- 3) Removal

**1 Function**

The pump A in Fig. 1 has the function of making the water in the main circuit circulate through the main heat exchanger and therefore through the c.h. system (during the c.h. function) or through the storage tank coil (during the d.h.w. function).

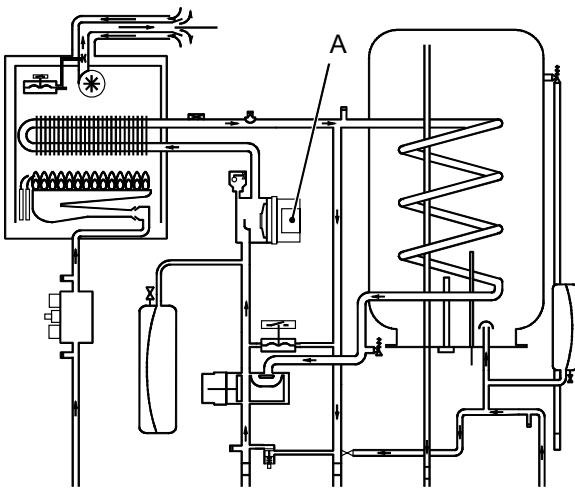


Figure 1

**2 Checks**

**A** Check that the pump is not seized and that the movement of the rotor is not subject to mechanical impediments.

With the boiler off, remove the front panel. Remove the air release plug of the pump and turn the rotor with a screwdriver.

**B** Check the electrical continuity.

With the boiler off, remove the control panel lid as described on page 1-2 of the third part and measure the electrical resistance on the control p.c.b. (Figure 2) removing the pump power supply cable and measuring the resistance of said wiring.

Electrical resistance of the windings (at ambient temperature) must be about 51.7  $\Omega$ .

RIVA COMBI SERVICE MANUAL – REV A

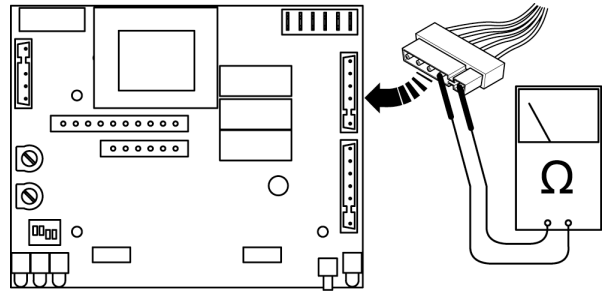


Figure 2

**C** Check the absence of starting defects.

With the boiler off remove the front case panel. Remove the air release plug from the pump. Start the boiler and with a screwdriver, turn the rotor in the direction of the arrow. If there is a defect in starting, the rotor will begin to turn normally only starting it manually.

**D** Check that the impeller is integral with the rotor.

With the boiler off remove the front and right hand side case panels, lower the control panel and empty the primary circuit. Remove the pump head by undoing the screws which hold it to the pump body and check that the impeller is firmly joined to the rotor.

**3 Removal**

- 1) Remove the front and the side panels of the boiler.
- 2) Empty the primary circuit of the boiler.
- 3) Extract and lower the control panel.
- 4) Unscrew the screw B and remove the black case C (Figure 3).

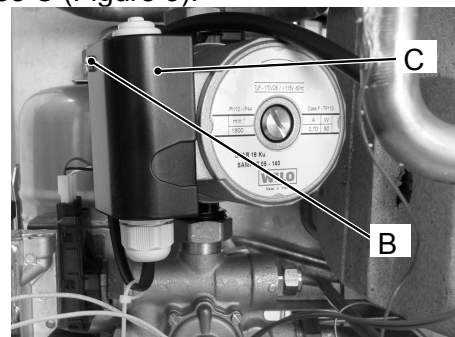


Figure 3

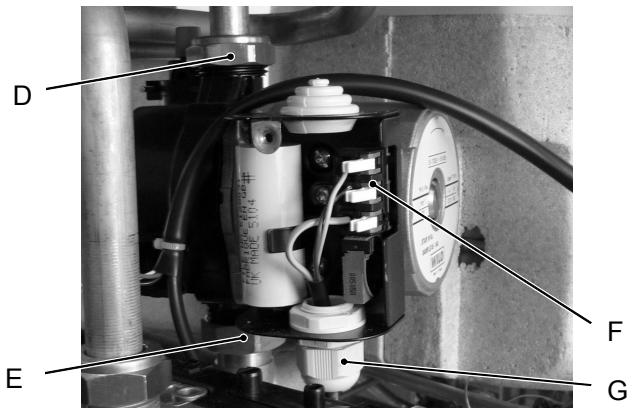


Figure 4

- 5) Loosen the connections D and E.
- 6) Unscrew the connection G.
- 7) Disconnect the connector F and pull out the power supply cable.
- 8) Remove the pump.
- 9) Reassemble the pump carrying out the removal operations in reverse order.

### Three Way Diverter Valve

- 1) Function
- 2) Checks
- 3) Removal of the Electric Actuator
- 4) Removal of the Diverter Group and Its Internal Parts

## 1 Function

The diverter valve A (Figure 1) has the function of modifying the hydraulic circuit of the boiler by means of an electric command given by the control p.c.b. in order to send the water that exits the primary heat exchanger towards the c.h. system or towards the d.h.w. storage tank coil.

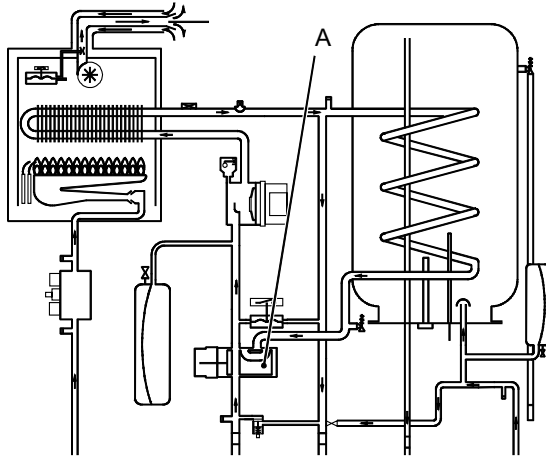


Figure 1

## 2 Checks

### A Check the electrical continuity

Figure 2 indicates the relationship between the electric command coming from the electronic control p.c.b. and the position of the actuator B (brass spindle) when the boiler operates in d.h.w. mode.

Figure 3 indicates the relationship between the electric command coming from the electronic control p.c.b. and the position of the actuator B (brass spindle) when the boiler operates in c.h. mode.

In both figures the relationship between the position of the actuator and the resistance of the motor windings (the motor must be disconnected from the wiring) is also given.

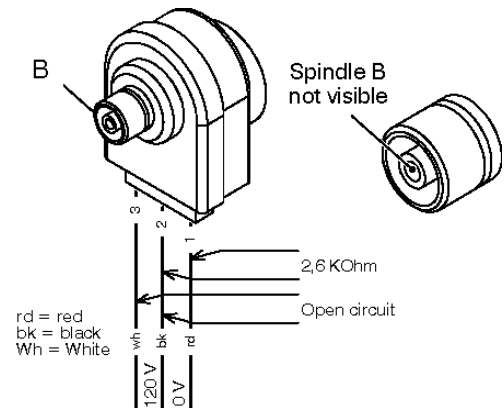


Figure 2 (D.h.w. Mode)

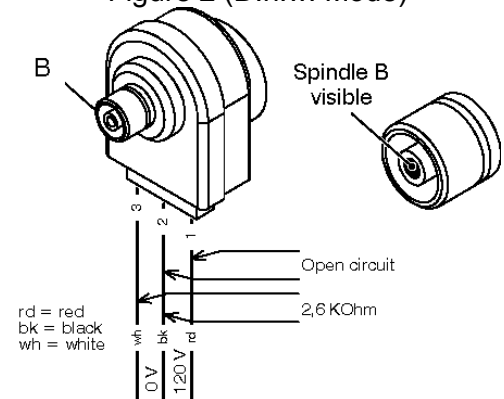


Figure 3 (C.h. Mode)

Push the shaft of the diverter mechanism C (Figure 4) and check that there are no mechanical obstructions

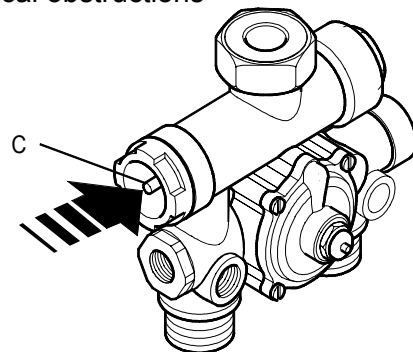


Figure 4

## 3 Removal of the Electric Actuator

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove the front and the side panels of the boiler.
- 2) Disconnect the connectors D (Figure 5).



Figure 5

- 3) Remove the fixing spring E and remove the electric actuator F (Figure 6).

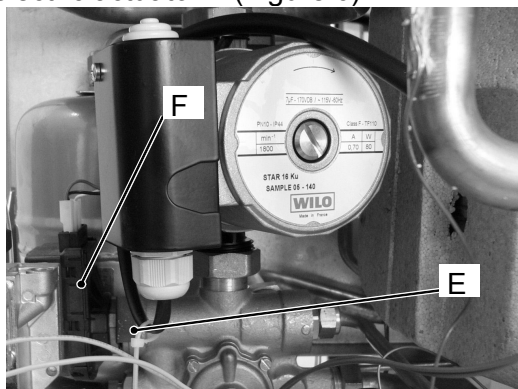


Figure 6

- 4) Reassemble the electric actuator carrying out the removal operations in reverse order.

#### 4 Removal of the Diverter Group and Its Internal Parts

- 1) Remove the front and side panels of the boiler.
- 2) Empty the primary circuit and the d.h.w. circuit of the boiler.
- 3) Remove the electric actuator (see previous section).
- 4) Remove the fixing spring G and remove the primary circuit flow switch H (Figure 7).
- 5) Remove the pump (see chapter of the pump).
- 6) Unscrew the connections I,J,K,L (Figure 7).
- 7) Unscrew the connections connected to N,O,P (Figure 8).
- 8) Loosen the screw M (Figure 8).

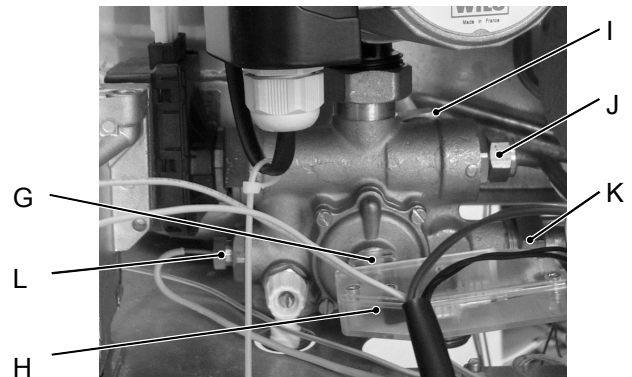


Figure 7

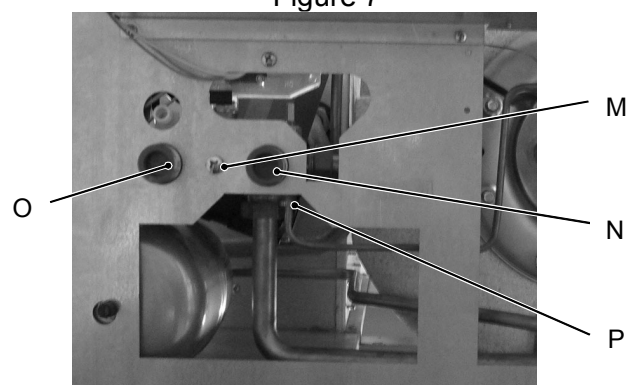


Figure 8

- 9) Remove the diverter group and refer to the exploded view (Figure 9) to remove the internal parts of the three way diverter valve.

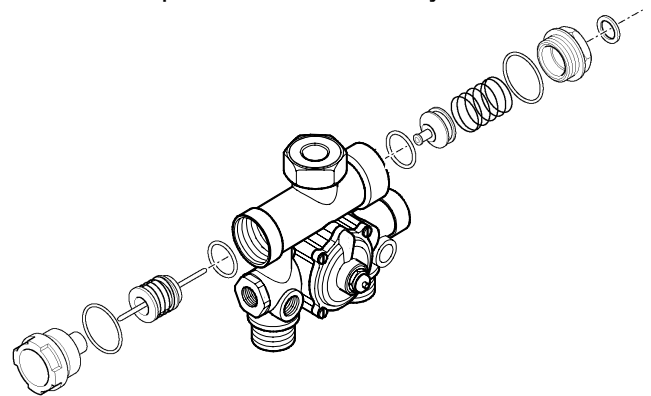
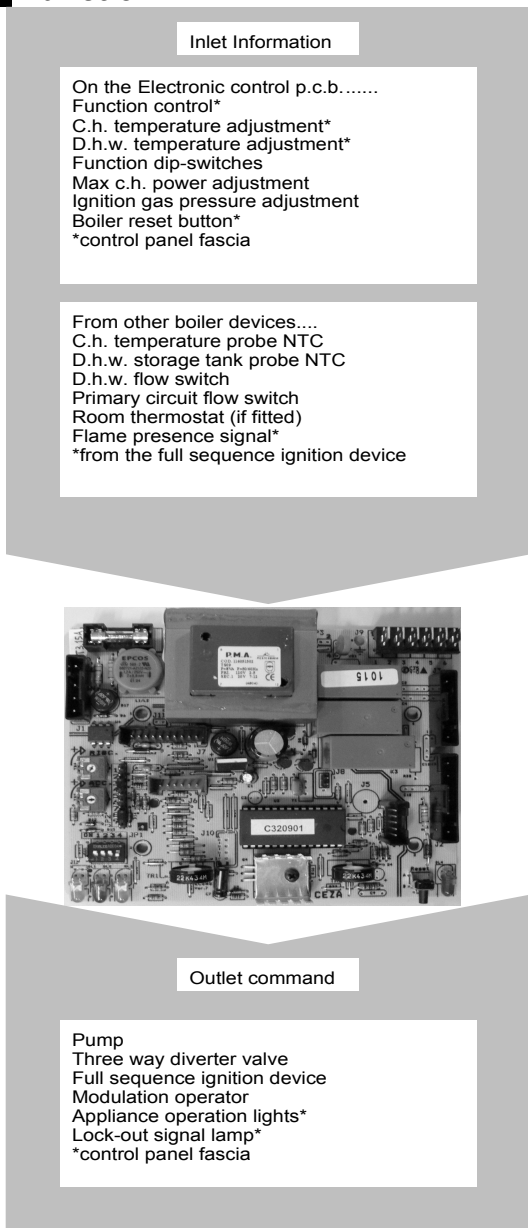


Figure 9

- 10) Reassemble the diverter group carrying out the removal operations in reverse order.

<p><b>Control p.c.b. 11.62</b></p> <ol style="list-style-type: none"> <li>1) Function</li> <li>2) Selection and Adjustment Devices</li> <li>3) Checking the Temperature</li> <li>4) Operation Lights</li> <li>5) Dip-switch Selector</li> <li>6) Ignition Gas Pressure Adjustment</li> <li>7) Max C.h. Power Regulation</li> </ol>	<ol style="list-style-type: none"> <li>8) Anti-frost System</li> <li>9) Uniform Temperature System</li> <li>10) Hydraulic Parts Checking System</li> <li>11) Advanced Probe Control System</li> <li>12) Checks</li> <li>13) Removal of the Control p.c.b.</li> <li>14) Thermal Control in the Winter Mode</li> <li>15) Thermal Control in the Summer Mode</li> </ol>
--	--

**1 Function**



The fundamental function of the Control p.c.b. is that of controlling the boiler in relation to the external needs (i.e. heating the dwelling or heating the water for d.h.w. use) and operating in order to keep the temperature of the hydraulic circuits constant.

This is obviously possible within the useful power and maximum working temperature limits foreseen.

Generally, the Control p.c.b. receives inlet information coming from the boiler (the sensors) or from the outside (knobs, room thermostat, etc.), processes it and consequently acts with outlet commands on other components of the boiler.

**2 Selection and Adjustment Devices**

On the Control p.c.b. several selection, adjustment and protection devices are located. (Figure 1).

Some of these devices are directly accessible by the user (function control, temperature adjustment potentiometers etc.) others are accessible by removing the service panel or the control panel lid.

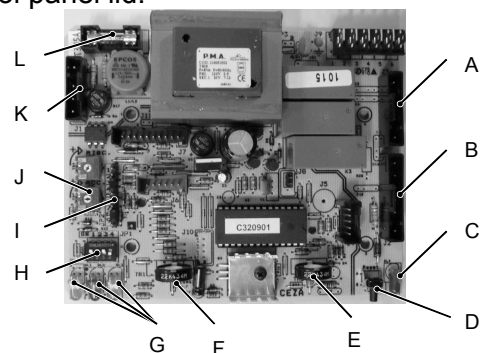


Figure 1

- A) J3 connector
- B) J2 connector
- C) Lock-out signal lamp
- D) Boiler reset button
- E) Function control / C.h. temperature adjustment
- F) D.h.w. temperature adjustment
- G) Appliance operation lights
- H) Dip-switch selectors
- I) Setting jumpers
- J) Ignition gas pressure adjustment (ACC.)
- K) J1 connector
- L) Fuse 4.0 A

### 3 Checking the Temperature

The Electronic control p.c.b. makes it possible to separately adjust the c.h. water flow temperature and d.h.w. outlet temperature.

The temperature of the water is converted into an electric signal by means of temperature probes. The user, setting the desired temperature with the control panel knobs operates the variable elements (E,F in Figure 1) of the control p.c.b. If the power requested is lower than 40% of the maximum power output then control is achieved by switching ON the burner at minimum power, then switching OFF (ON/OFF function). If the power requested is higher, then the burner is switched ON at maximum power and will control by modulating to 40% of the maximum power output.

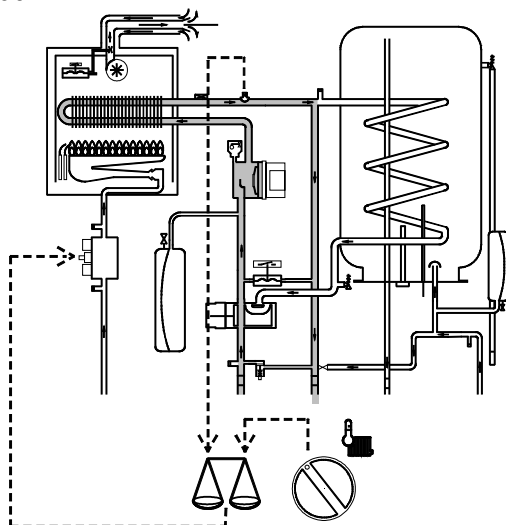


Figure 2

During the c.h. operation (Figure 2), the signal coming from the c.h. temperature probe is compared to the signal given by the control panel through the adjustment made by the user (knob in Figure 2). The result of such a comparison operates the modulation of the gas valve, consequently changing the useful output of the boiler.

When the boiler functions in d.h.w. (Figure 3), the signal coming from the d.h.w. storage tank temperature probe is compared with the signal given by the control panel through the adjustment made by the user (knob in Figure 3).

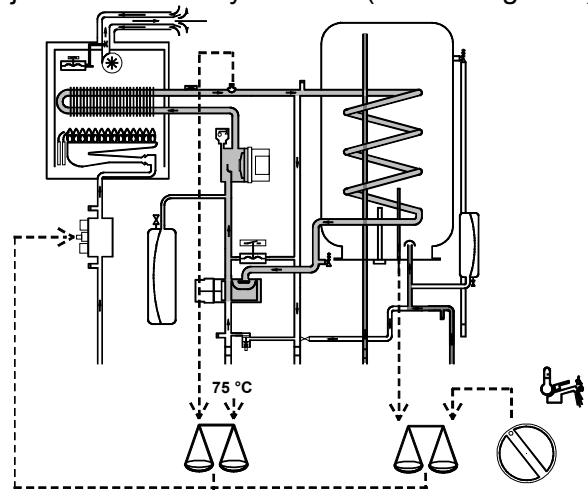


Figure 3

Normally, the result of the comparison between these two signals directly operates the adjustment elements of the gas valve modulation device, adjusting the useful output generated in order to stabilize the temperature of the exiting water.

If during the d.h.w. mode operation, the temperature of the primary circuit goes over 75°C, the useful output is automatically reduced so that the primary circuit cannot reach excessive temperatures.

The control sequences in function winter and in function summer are illustrated in detail in sections 14 and 15.

### 4 Operation Lights

The Control p.c.b. is provided with three lamps (L.E.D. indicators) G in Figure 1 that give optical information during the operation of the boiler.



The green lamp on the left gives information whether the boiler is in stand-by mode or during the normal operation of the boiler.

The following table gives the relationship between the lamp indication and its meaning.






 A short pulse every 4 seconds	Boiler in stand-by condition. (function control in  position). Anti-freeze system active.
 1 second ON 1 second OFF	Boiler ON condition (function control in  or  position)

Figure 4

With the boiler switched ON ( winter or summer) all the lamps (G in Figure 1) are activated. The following table gives the relationship between each of the possible lamp combinations and their meaning.












































			Normally operating boiler (see the previous table for details)
			C.h. operation
			D.h.w. operation
			Frost protect operation
			D.h.w. operation Excessive temperature on primary circuit
			Faulty c.h. temperature probe NTC
			Faulty d.h.w temperature probe NTC
			Faulty primary circuit (no water or absence of flow)
			Lack of burner ignition (no ignition signal from the full sequence ignition device)
			Ignition gas pressure adjustment
			Minimum gas pressure adjustment
			Lack of power supply or faulty electronic control p.c.b. *
			Faulty electronic control p.c.b. *
			
Lamp OFF	Lamp ON	Flashing lamp, alone or simultaneously with another lamp.	Flashing lamp, alternate with another lamp.
* These conditions are normal only for a short time when the power supply is applied to the boiler. If permanent they indicate a faulty p.c.b.			

Figure 5

### 5 Dip-switch Selectors

The function selectors H (Figure 1) are microswitches with which it is possible to select the various boiler control function modes. In Figure 6 the selectors are illustrated in the configuration in which the boiler is set in the factory (natural gas boiler).

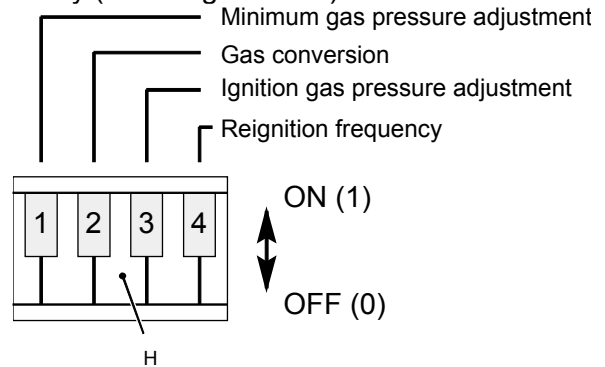


Figure 6

 Selector 1

This forces the boiler to operate at the minimum gas pressure in order to allow the adjustment of the minimum gas pressure at the burner (on the modulation operator of the gas valve). After any adjustment operation the selector has to be brought back to the normal position (ON).

 Selector 2

This selects the boiler functions on the basis of the type of gas used. It allows the selection of the maximum supply current given to the modulator device. To set selector 2 correctly follow the table in Figure 7.

Gas Supply	Position of selector
Natural gas	ON
L.P.G.	OFF

Figure 7

 Selector 3

This forces the functioning of the boiler in order to allow the optimal gas pressure at the burner to be adjusted during the ignition phase. The adjustment is done by means of the potentiometer J marked "ACC" (Figure 1 on page 6-1).

After the adjustment operations bring the selector back to the normal position (ON).

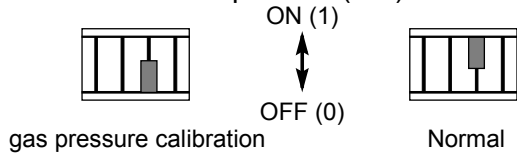


Figure 8

#### O Selector 4

This allows you to select the minimum time that must pass between two ignitions of the burner in c.h. function.

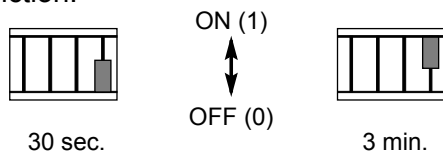


Figure 9

### 6 Ignition Gas Pressure Adjustment

By using the device "J" (Figure 1) marked "ACC.", it is possible to adjust the gas pressure at the injectors in the ignition phase.

This pressure is maintained at the injectors until ignition occurs (ionization signal).

To carry out the adjustment move the function selector 3 to the OFF position (Figure 8) and use the adjustment device "J" (ACC).

Adjust the gas pressure at the injectors to the value indicated in the tables of the User/Installation manual (Technical information section, Gas pressures at the burner table).

By rotating the device clockwise the pressure increases.

Check the regular ignition of the burner by turning the boiler on and off repeatedly.

After the adjustment operations bring the selector 3 back to the normal position ON in Figure 8.


### 7 Max C.h. Power Regulation

By using the device J (Figure 1) marked "RISC.", it is possible to limit the maximum useful output delivered in c.h. function. This adjustment does not influence the maximum useful output delivered in d.h.w. function.

By rotating the device clockwise the pressure increases.

### 8 Anti-frost System

With the boiler turned on, the anti-frost control is always active, which briefly starts the boiler until shutdown at 35°C (primary circuit), so that the temperature of the c.h. circuit does not drop below 5°C.

The request is signalled by the LED  "G" in Figure 1.

If there is no gas, the pump runs continuously to keep the water from freezing.

This function is also active in standby mode.

### 9 Uniform Temperature System

This system uniform the temperature of the water in the d.h.w. storage tank at the end of each request of the d.h.w. temperature probe NTC, thus preventing temperature layering in the storage tank.

It is activated at the end of each NTC probe request for three minutes.

### 10 Hydraulic Parts Checking System

With the boiler operating (both in winter function and in summer function) the hydraulic parts checking system is always active.

This system makes it possible to maintain the efficiency of the hydraulic parts (pump and three way diverter valve) by activating them in case of long periods of unusing.

It is activated when the boiler is inactive for more than 24 hours.

- A) It turns on the pump for 1 minute
- B) It makes commuting the 3-way diverter valve

### 11 Advanced Probe Control System

By means of this system, the boiler is able to work quite well even if there is a problem with the NTC probes.

The table below summarizes the boiler operation.

	Defect	C.h.	D.h.w.
C.h. NTC	Short circuit	Not function	Function
C.h. NTC	Interrupted	Not function	Function
D.h.w. NTC	Short circuit	Function	Not function
D.h.w. NTC	Interrupted	Function	Not function

**12 Checks**

**A** Check that the fuse is complete

If the Electronic control p.c.b. does not supply any device (pump, 3 way, etc.) check that the fuse L (Figure 1) is complete.

If the fuse has blown replace it with one that has the same characteristics after having identified the reason for failure.

**B** Check the setting jumpers position

Two setting jumpers must be fitted on the Control p.c.b. as shown in Figure 10.



The numbers refer to the marking printed on the circuit board.

**13 Removal of the Control p.c.b.**

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Gain access to the parts located inside the control panel as explained on page 1-2 of the third part of this manual.
- 2) Remove all the wiring connected to the Control p.c.b.. To disconnect the connectors J1, J2 and J3 (A,B and K in Figure 1) delicately flex the hook present on one side of each socket.
- 3) Remove the spindles of the c.h. and d.h.w. temperature adjustment knobs by delicately pulling them with pliers in the direction shown by the arrow in Figure 11.

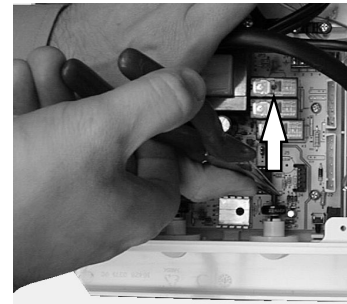


Figure11

- 4) Unscrew the four screws that hold the Control p.c.b. on the control panel.
- 5) Remove it by lifting its rear edge and freeing it from any of the wiring.
- 6) Re-assemble the Control p.c.b. following the removal procedures in the reverse order.

**Important**

When re-assembling the Control p.c.b.:

- 7) Fit the p.c.b. into the control panel by first inserting the front lower edge under the control knob shafts. Lower the rear edge and ensure that no wiring is trapped beneath.
- 8) Insert the spindles in the control panel knobs until the notch M (Figure 12) reaches the potentiometer edge. It is not necessary to force them in the knob.
- 9) While tightening the screws that fix the Control p.c.b. on the control panel, keep the p.c.b. towards the control panel fascia making sure of the contact between the boiler reset button N and the tab O (Figure 12).

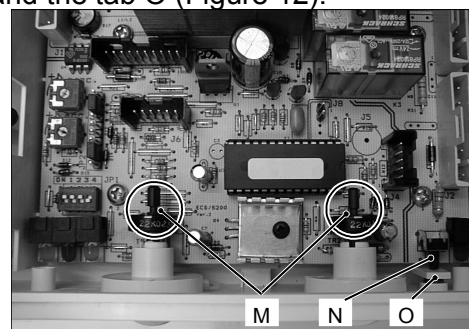


Figure 12

**Attention**

After installing the Control p.c.b. :

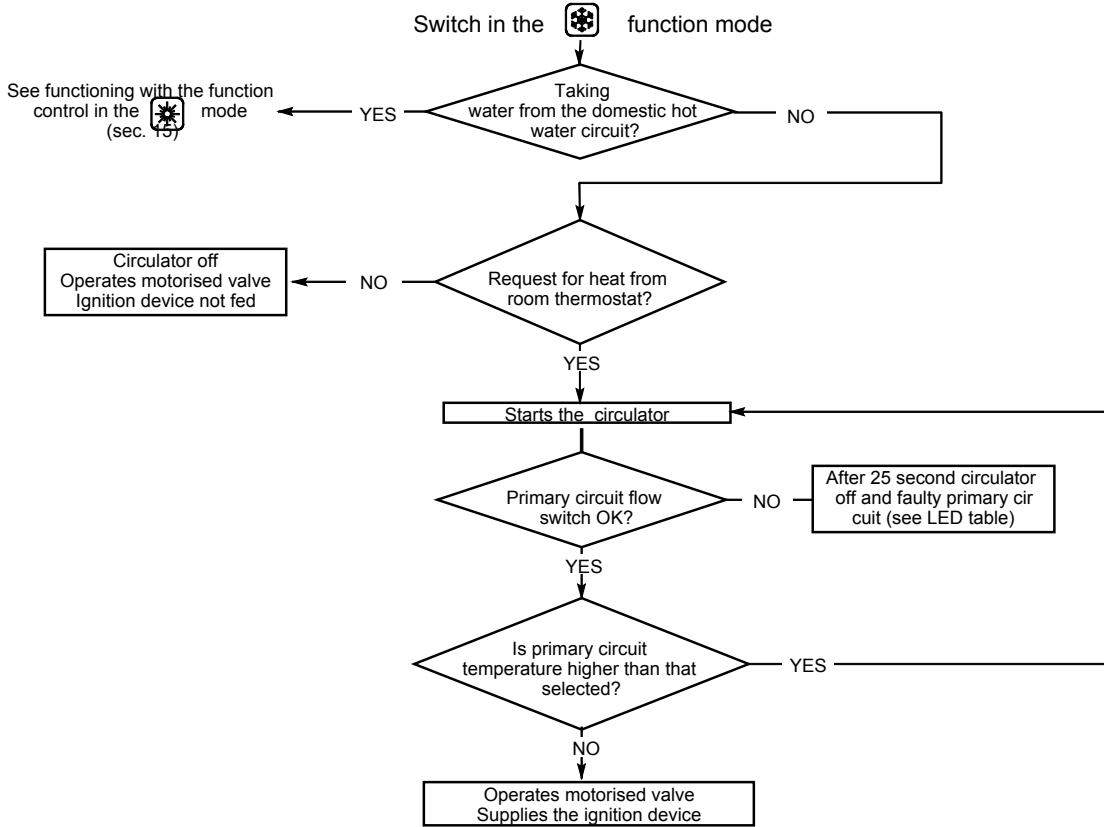
- 10) Make sure the c.h. and d.h.w. temperature adjustment knobs can move freely for the complete range. If not, remove the spindle

again as described at step 3, turn the knob half a turn and re-insert the spindle.

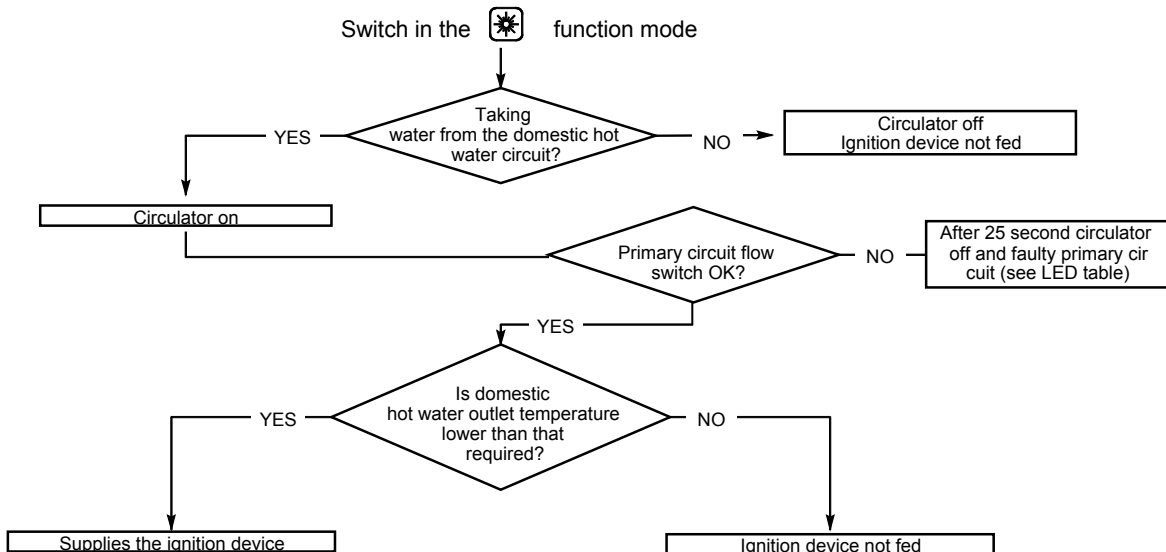
- 11) Operate the boiler and close the gas supply so that the boiler goes into the safety lock-

out state. Verify the correct operation of the boiler reset button by pressing and releasing it.

**14 Thermal Control in Winter Mode**



**15 Thermal Control in Summer Mode**



### Fan and Air Pressure Device 11.61

- 1) Function
- 2) Checks
- 3) Removal

## 1 Function

The Fan and air pressure device A (Figure 1) used on the boiler carries out the following fundamental functions:

- supplies the fan and checks its functioning by means of the signal coming from the air pressure switch.
- supplies the air pressure switch and makes it commutate.
- supplies the safety thermostat.

The Fan and air pressure device is supplied by the electronic control p.c.b. see Second part of this manual chapter 6 (Circuit Voltages).

The Fan and air pressure device also has a safety function and any wrong interventions or tamperings could cause the boiler to function under hazardous operating conditions.

The Fan and air pressure device can lock the functioning of the boiler (lock state) and stop its functioning up to the resetting intervention. The lock is signalled by the lighting of the lock-out signal lamp and the device can be reset only by using the boiler reset button and the function knob placed on the control panel.

Some components which are connected to the device can activate the lock state. The causes of a lock state could be:

- The intervention of the safety thermostat (overheat of the primary circuit).
- The air pressure switch can temporarily stop the ignition of the burner but allow its ignition when the cause of the intervention has stopped.

## 2 Checks

### A Fan and Air Press. Switch functioning device

With the boiler operating and the burner on, open the negative pressure test point of the Venturi device.

At the moment of opening the burner must turn off.

### B Checking Voltages

Refer to Second part of manual chapter 6 to determine the connector pins where to check the supply voltages.

## 3 Removal

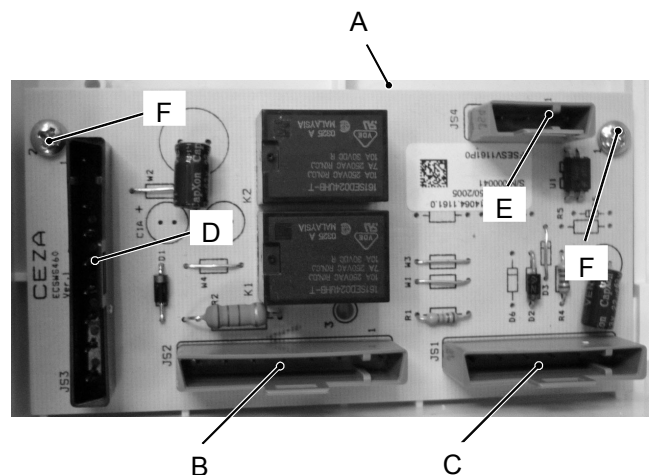


Figure 1

- 1) Remove the front panel of the case and lower the control panel.
- 2) Open the control panel as explained in the first section of the third part (General access and emptying hydraulic circuits).
- 3) Disconnect the connectors B,C,D,E by delicately flexing the hook present on one side of each socket.
- 4) Loosen the screws F and remove the device.
- 5) Re-assemble the device following the removal procedures in the reverse order.



## Full Sequence Ignition Device S4567A-1019

- 1) Function
- 2) Checks
- 3) Removal
- 4) Ignition and Control Sequence

### 1 Function

The Full sequence ignition device A (Figure 1) used on the boiler carries out the following fundamental functions:

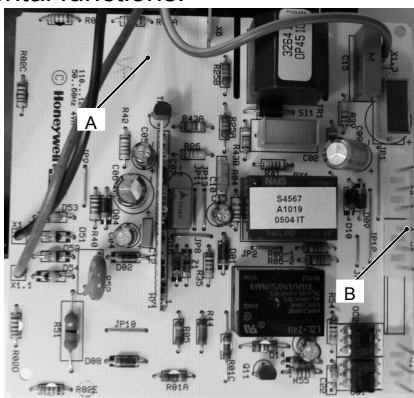


Figure 1

- does a sequence of operations (ignition cycle) which lead to the ignition of the gas at the burner.
- checks the presence of the flame during the entire period in which it is activated.

The Full sequence ignition device is supplied by the fan and air pressure device when the ignition of the burner is requested (see Second part of this manual chapter 6, Circuit Voltages).

The Full sequence ignition device has a safety function and any incorrect interventions or tampering can result in conditions of dangerous functioning of the boiler.

The Full sequence ignition device can lock the functioning of the boiler (lock state) and stop its functioning up to the resetting intervention. The lock is signalled by the lighting of the lock-out signal lamp and the device can be reset only by using the boiler reset button and the function knob placed on the control panel.

The ignition device has some components connected to it which can cause triggering of the shutdown condition; these components are:

- the modulating gas valve;
- the flame detection electrode.

The causes of a lock state could be:

- A fault on gas supply.
  - Faulty ignition (faulty ignition electrodes, their wiring or connection).
  - Faulty flame detection (faulty detection electrode, its wiring or connection).
  - Gas injectors blocked.
  - Faulty modulation gas valve (faulty on-off operators or not electrically supplied).
  - Faulty Full sequence ignition device.
- Section 4 shows the sequence of the operations that are carried out at the start of every ignition cycle and during normal functioning.

### 2 Checks

#### A Lock sequence

- 1) Start the boiler until the burner is ignited.
- 2) With the burner firing, interrupt the gas supply. The Full sequence ignition device must carry out a complete ignition cycle and then stop.
- 3) By turning the boiler on and off by means of the function switch the device must not unlock and the burner must not turn on.

### 3 Removal

- 1) Remove the front body panel and tilt the card holder panel.

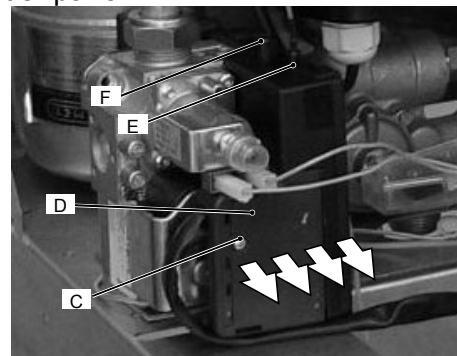


Figure 2

- 2) Unscrew the screw C and remove protection cover D of the connection; disconnect flame

detection cable E and ignition cable F (Figure 2).

3) Remove the connector G (Figure 3).

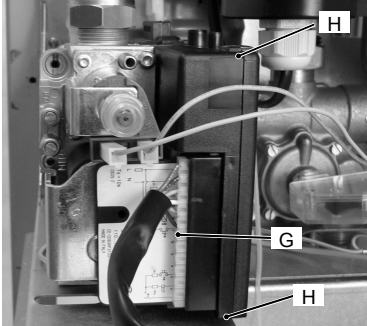


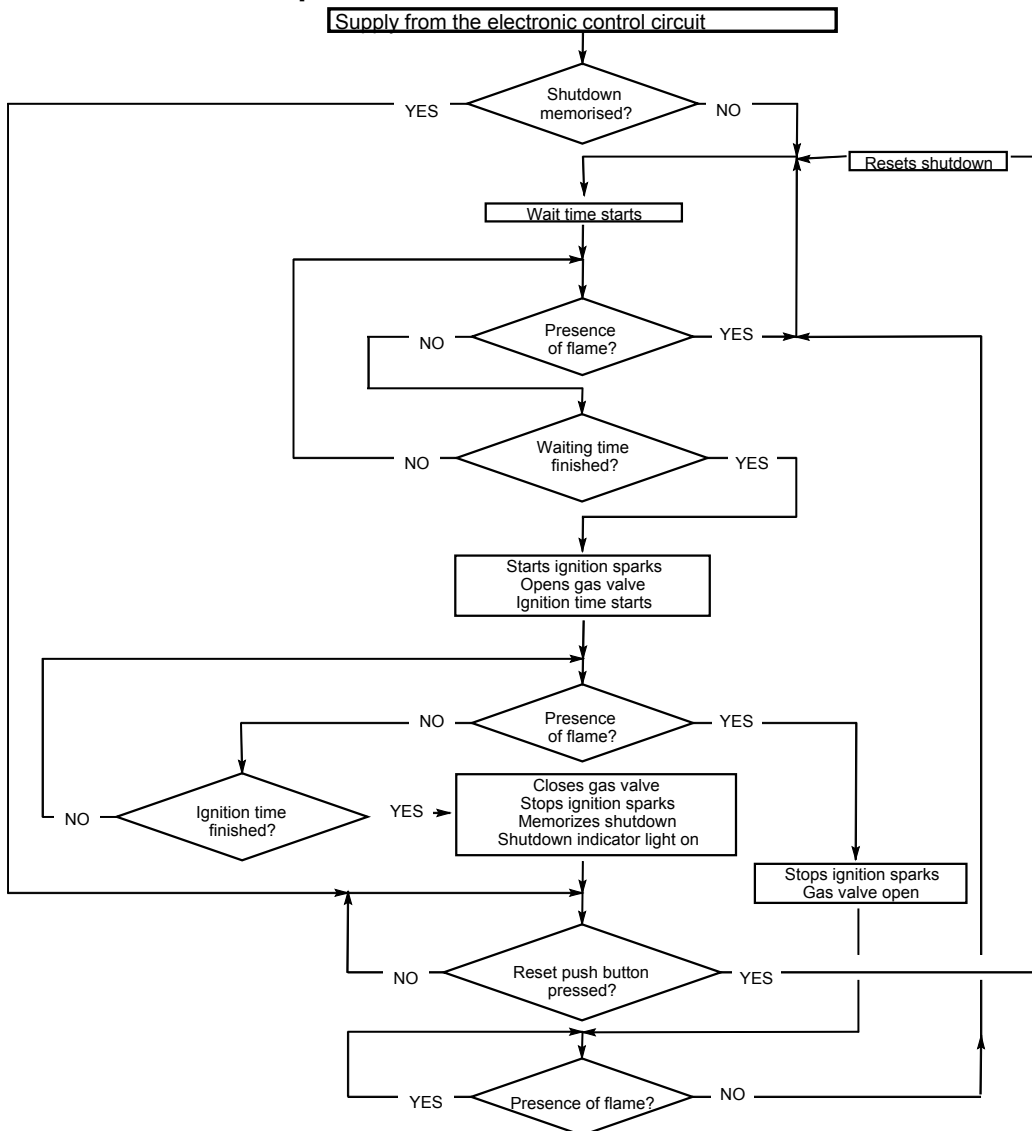
Figure 3

4) Pull the ignition device out, pulling it frontally (follow the arrows on Figure 2).

5) With the help of a screwdriver open the four clamps H (two on top and two on bottom of the device) (Figure 3).

6) Re-assemble the device following the removal procedures in the reverse order.

**4 Ignition and Control Sequence**





## Modulating Gas Valve

- 1) Function
- 2) Nomenclature
- 3) Adjustment
- 4) Checks
- 5) Removal of the Gas Valve

### 1 Function

The Modulating gas valve A in Figure 1 controls the gas inflow to the boiler burner.

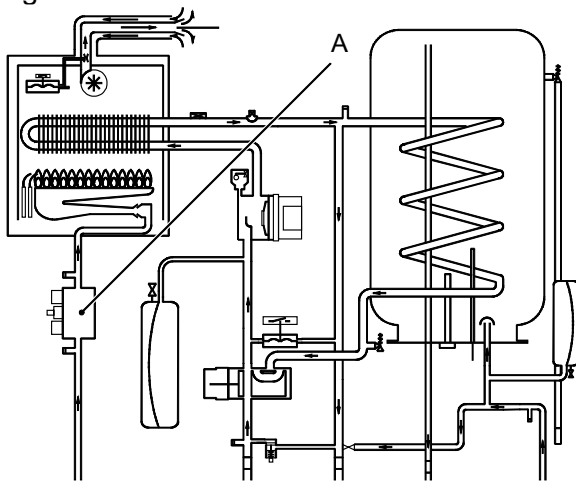


Figure 1

By means of an electric command given to the on-off operators the passage of the gas through the Modulating gas valve can be opened or closed.

By means of an electric command given to the modulation operator the pressure can be varied and therefore the gas flow rate to the burner (modulation). The modulation operator has mechanical components which allow the adjustment of the minimum and maximum pressure exiting the valve.

### 2 Nomenclature

- B Minimum gas pressure adjustment.
- C Maximum gas pressure adjustment.
- D Modulation operator's electric connectors.
- E On-off operators electric connector.
- F On-off operators.
- G Gas valve inlet pressure test point.

- H Gas valve outlet pressure test point.
- I Modulation operator.

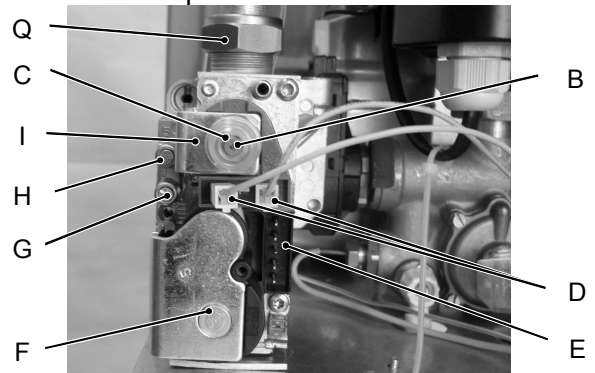


Figure 2

### 3 Adjustment

**Warning: isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove the front panel of the case.
- 2) Open the gas valve inlet pressure test point (G in Figure 2) at the valve input, connect a suitable pressure gauge and check the gas pressure of the supply network.
- 3) Remove the gauge and close the pressure test point G.
- 4) Open the gas valve outlet pressure test point (H in Figure 2) and connect the gauge.
- 5) Remove the protection cap L (Figure 3) from the mechanical pressure adjustment components levering with a flat screwdriver in the slots M.
- 6) Start the boiler at its maximum power. Operate the boiler in d.h.w. mode or ensure that the boiler is not range rated if the test is carried out in c.h. mode.

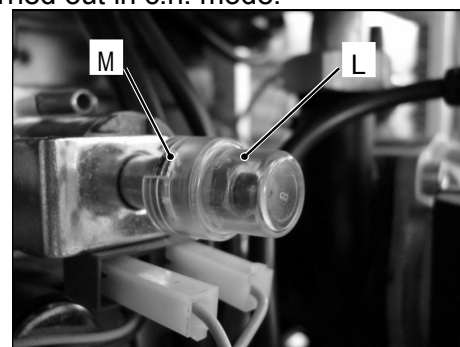


Figure 3

- 7) Rotate the maximum gas pressure adjustment (C in Figure 2) until you obtain the required pressure (by rotating clockwise the pressure increases).
- 8) Turn the boiler off and disconnect one of the two connectors (D in Figure 2).
- 9) Start the boiler and rotate the minimum gas pressure adjustment (B in Figure 2) until you obtain the required pressure (by rotating clockwise the pressure increases).
- 10) Turn the boiler off and re-connect the wire to the modulating operator.
- 11) Start the boiler and check again the maximum gas pressure setting.
- 12) Turn the boiler off and disconnect the gauge.

**Important: after the gas pressure checks and any adjustment operations, all of the test points must be sealed.**

#### 4 Checks

##### A Check the modulation operator coil

- 1) Remove the front panel of the case.
- 2) Disconnect the connectors D (Figure 2) from the modulating operator and measure the electrical resistance of the coil. Its electrical resistance value must be approx. 114  $\Omega^*$ .

##### B Check the on-off operators coils

- 1) Remove the front panel of the case.
- 2) Disconnect the Full sequence ignition device N (Figure 4).
- 3) Measure the electrical resistance between the connector pins of the on-off operators as illustrated in Figure 5.

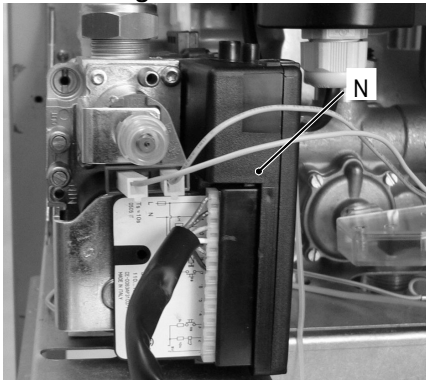
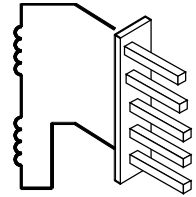


Figure 4

On-off operator  
approx. 1 122  $\Omega^*$



\* at ambient temperature

Figure 5

#### 5 Removal of the Gas Valve

- 1) Remove the front panel of the case.
- 2) Disconnect the connector D (Figure 2) and remove the full sequence ignition device N (Figure 4)
- 3) Turn off the gas supply and remove the gas supply pipe O (Figure 6).

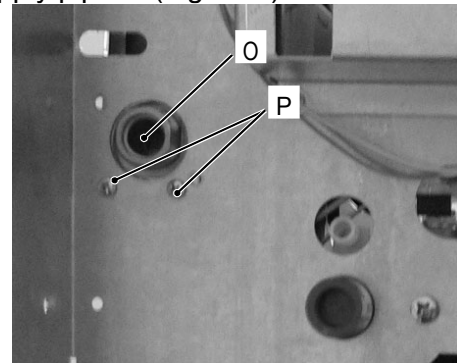


Figure 6

- 4) Loosen the connection Q (Figure 2) and pull backwards the gas pipe above the gas valve.
- 5) Loosen the screws P (Figure 6).
- 6) Remove the gas valve.
- 7) Reassemble the gas valve carrying out the removal operations in reverse order.

**After any service operation on the components of the gas circuit check all the connections for gas leaks.**

**Warning: After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis.**

## Primary Circuit Flow Switch

- 1) Function
- 2) Checks
- 3) Removal

### 1 Function

The Primary circuit flow switch (A in Figure 1) function is to detect water flowrate through the primary hydraulic circuit of the boiler.

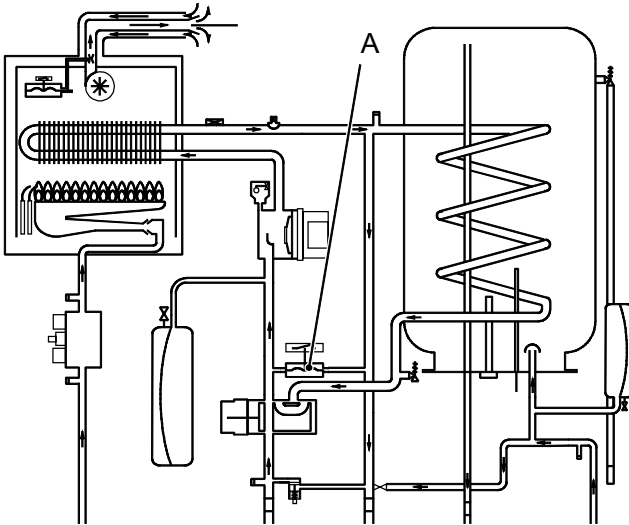


Figure 1

This hydraulic/membrane operated electrical micro-switch device will control the functioning of the ignition control circuit, providing there is an adequate quantity and flow of water in the primary circuit. Any failure of the pump or obstructions in the primary circuit, whilst in either c.h. or d.h.w. modes, will not allow the device to operate.

This device is connected to the electronic control p.c.b. and if, after the pump operates, it does not activate within 30 seconds the control board will indicate that a fault condition has occurred.

### 2 Checks

**Warning:** Isolate the boiler from the mains electricity supply before removing any covering or component.

#### A Mechanical function

- 1) Remove the front panel of the case.
- 2) Start and stop the boiler either in d.h.w. or c.h. mode.
- 3) Looking through the switch box verify the position of the shaft B referring to Figure 2.

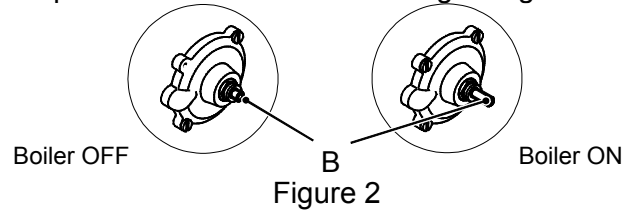


Figure 2

#### B Electrical check

It is possible to verify the general operation of the switch by measuring the electric resistance between the contacts C. and N.O. of the switch.

- 1) Remove the switch as explained in next section.
- 2) Measure the electrical resistance between the tabs marked C. and N.O. (Figure 3). The contact must be normally open.
- 3) Operate the switch by hand and verify that the contact is now closed.

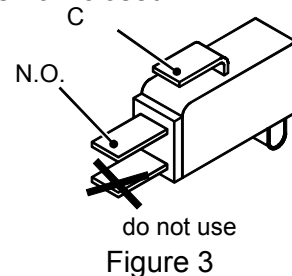


Figure 3

### 3 Removal

**Warning:** Isolate the boiler from the mains electricity supply before removing any covering or component.

#### A Removal of the switch

- 1) Remove the front panel of the case.
- 2) Remove the fork C (Figure 4).
- 3) Open the box D (Figure 4) and disconnect the switch.
- 4) Re-assemble the parts in reverse order of removal. Refer to Figure 3 for the correct wiring connectors on the switch.

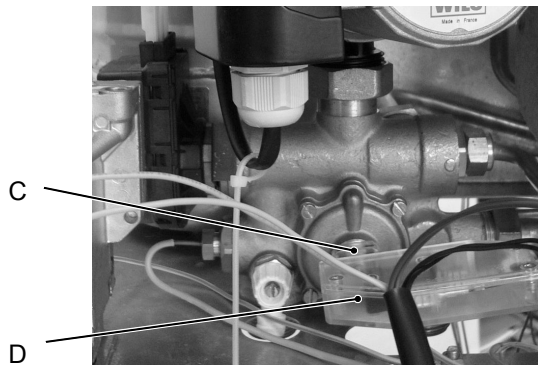


Figure 4

**B Removal of the membrane**

- 1) Remove the front and side panels of the case and empty the primary circuit.
- 2) Remove the fork C that holds the micro-switch housing D (Figure 4).
- 3) Unscrew the four screws E (see Figure 5) open the hydraulic operator and remove the membrane F.

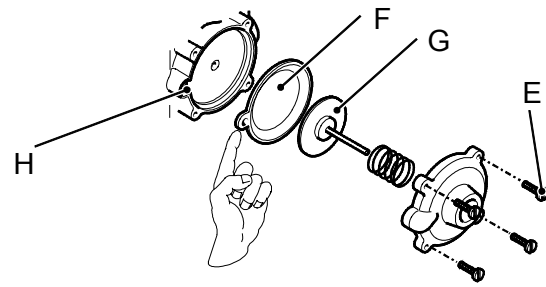


Figure 5

- 4) Reassemble the parts in reverse order of removal.

**When assembling the membrane, ensure that its concave side faces towards the actuator plate G and the reference indicated aligns with the seat H (see Figure 5).**

**Expansion Vessels and Temperature-Pressure Gauge**

- 1) Function
- 2) Checks
- 3) Removal of the C.h. Expansion Vessel
- 4) Removal of the D.h.w. Expansion Vessel
- 5) Removal of the Temperature-Pressure Gauge

**1 Function**

The C.h. expansion vessel (A in Figure 1) function is to allow for the volume expansion of the c.h. circuit water due to the temperature rise. The D.h.w. expansion vessel (B in Figure 1) function is to allow for the volume expansion of the d.h.w. circuit water due to the temperature rise.

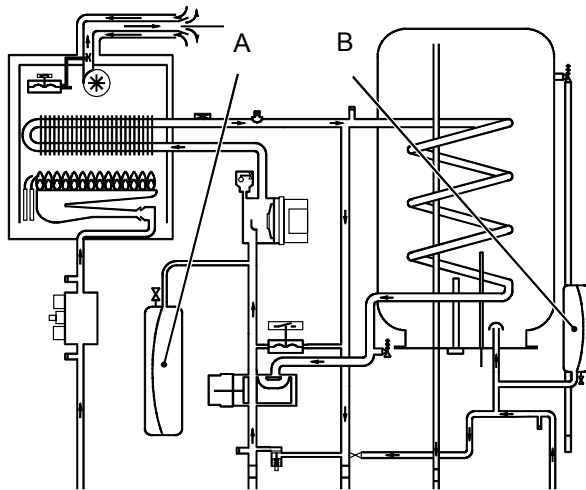


Figure 1

**2 Checks**

- 1) Empty the primary circuit of the boiler.
- 2) Remove the protective cap C (Figure 2) from the valve on the top of the c.h. expansion vessel and connect a suitable air pressure gauge.
- 3) Check the pre-load pressure. It would be 14.5 psi.

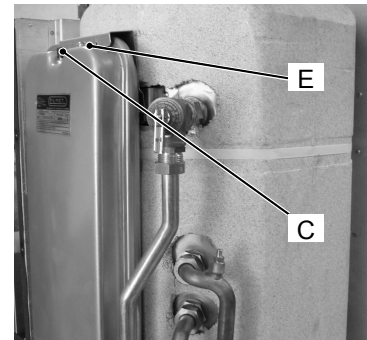


Figure 2

- 4) Remove the protective cap D (Figure 3) from the valve on the bottom of the d.h.w. expansion vessel and connect a suitable air pressure gauge.
- 5) Check the pre-load pressure. It would be 50.75 psi .

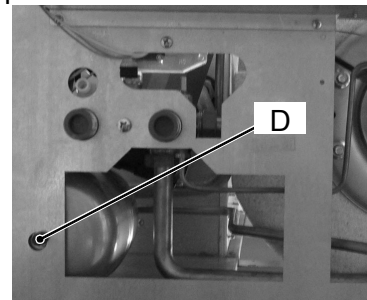


Figure 3

**3 Removal of the C.h. Expansion Vessel**

- 1) Remove the front panel of the case.
- 2) Loosen the screw E (Figure 2).
- 3) Loosen the screws F and unscrew the connection G (Figure 4).
- 4) Unscrew the lock-nut H (Figure 4) and remove the c.h. expansion vessel.

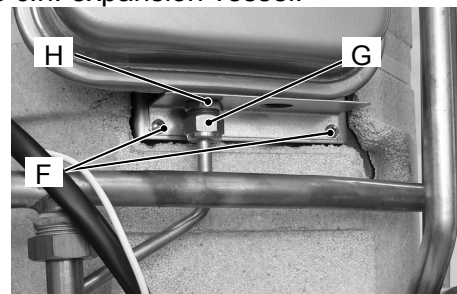


Figure 4

- 5) Re-assemble the parts in reverse order of removal.

#### 4 Removal of the D.h.w. Expansion Vessel

- 1) Remove the front and the side panels of the case.
- 2) Loosen the screws J (Figure 5).
- 3) Unscrew the connection K and the lock-nut L (Figure 5).

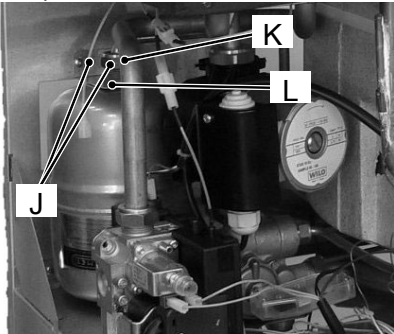


Figure 5

- 4) Remove the d.h.w. expansion vessel lifting it to the left side of the boiler.
- 5) Re-assemble the parts in reverse order of removal.

#### 5 Removal of the Temperature-Pressure Gauge

- 1) Remove the front and side panels of the case.
- 2) Empty the primary circuit.
- 3) Unscrew the connection M and remove the probe N (Figure 6).

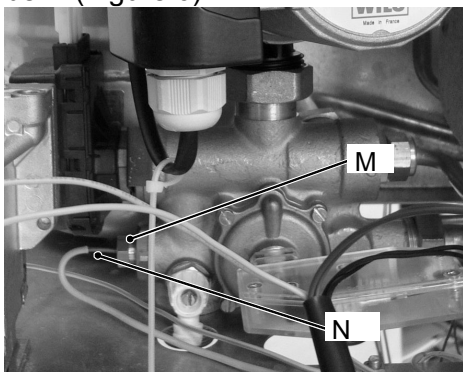


Figure 6

- 4) Remove the probe holder spring O freeing the probe P (Figure 7).



Figure 7

- 5) Squeeze the tabs R to release the temperature-pressure gauge Q and remove it (Figure 8).

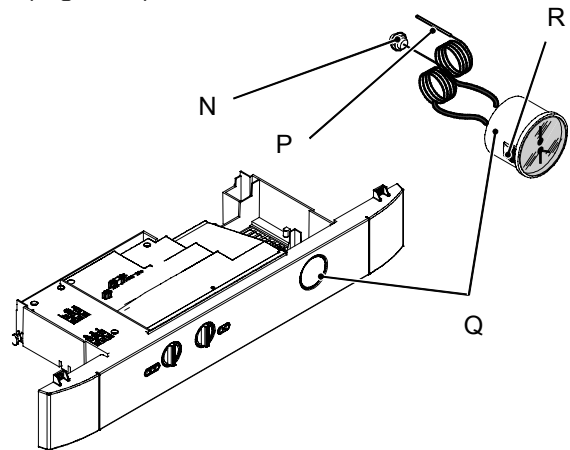


Figure 8

- 6) Re-assemble the parts in reverse order of removal.

## Temperature Probe NTC

- 1) Function
- 2) Checks
- 3) Removal

### 1 Function

The Temperature probe has the function of converting the temperature of the water in the hydraulic circuit where it is installed into an electrical signal (resistance). The relation between temperature and electrical resistance is stated in Figure 1.

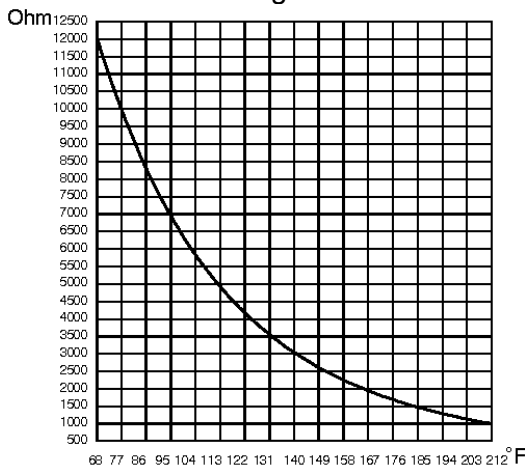


Figure 1

On the boiler there are two Temp. probes. One on the output of the primary heat exchanger (c.h. NTC) A in Figure 2; one on the bottom of the d.h.w. storage tank (d.h.w. NTC) B in Figure 2.

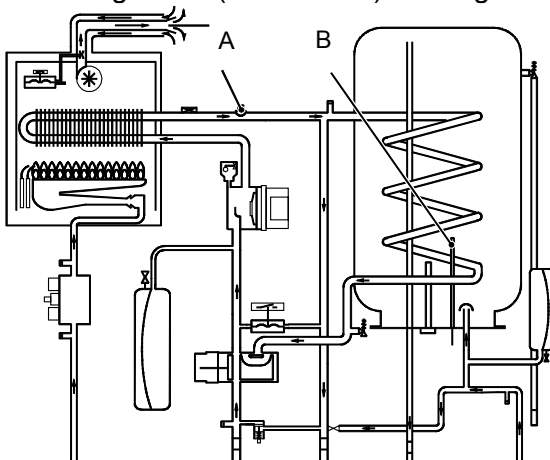


Figure 2

### 2 Checks

#### A Temperature-resistance relationship

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

Disconnect the cable from the Temperature probe.

Measure the temperature of the brass group where the Temperature probe is located and check the electrical resistance according to the graph in Figure 1.

If the temperature that the NTC give to the control p.c.b. is more than 100°C, the NTC is probably in short circuit.

If the temperature that the NTC give to the control p.c.b. is less than 0°C, the NTC is probably disconnected or interrupted.

### 3 Removal

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) To remove the Temperature probes remove the front panel of the case.
- 2) To remove the c.h. NTC empty the primary circuit of the boiler. To remove the d.h.w. NTC empty the d.h.w. circuit of the boiler.
- 3) *Remove of the c.h. NTC:* Remove the electric connector of the NTC probe C and unscrew it (Figure 3).

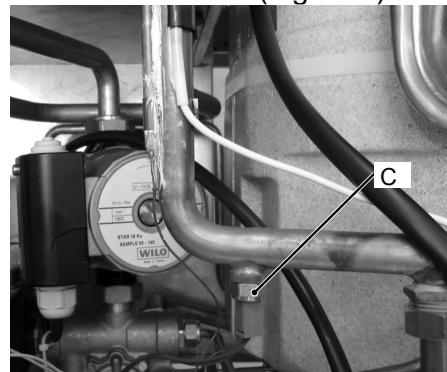


Figure 3

- 4) *Remove of the d.h.w. NTC:* Remove the fork that blocks the probe cable. Pull downwards the cable connected to the

probe D (Figure 4) and then disconnect the cable from the control p.c.b.

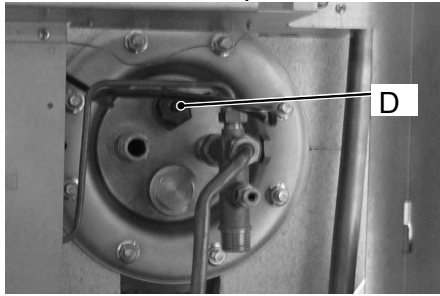


Figure 4

- 5) Reassemble the Temperature probe carrying out the removal operations in reverse order.



## Fan, Venturi Device and Air Pressure Switch

- 1) Function
- 2) Checks
- 3) Removal of the Fan
- 4) Inspection and Removal of the Venturi Device
- 5) Removal of the Air Pressure Switch

### 1 Function

The function of the Fan A (Figure 1) is to force the products of combustion to the outside air via the flue system.

The Fan is supplied by the Fan and air pressure device at the beginning of the ignition cycle. Its correct functioning is controlled by means of a system incorporating a built in venturi device B and an Air pressure switch C (Figure 1).

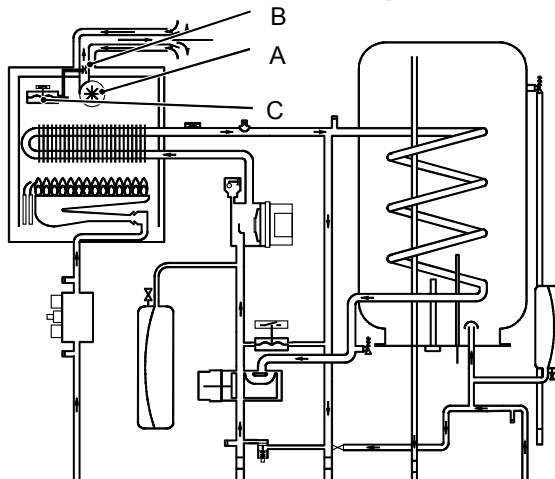


Figure 1

### 2 Checks

#### A Check of the fan

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove all the case panels and the sealed chamber lid.
- 2) Disconnect the connectors D (Figure 2) and measure the electrical resistance of the motor that has to be about: 7.2 Ω.

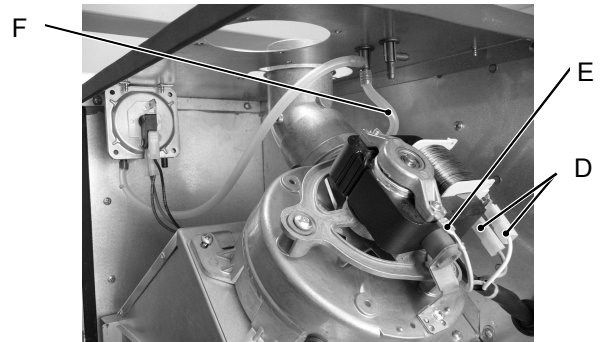


Figure 2

#### B Check of the Air pressure switch operation

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove all the case panels and the sealed chamber lid.
- 2) Disconnect the wires and check the electrical resistance between the connections of the Air pressure switch.

Refer to the Figure 3 in accordance with the type of air pressure switch used.

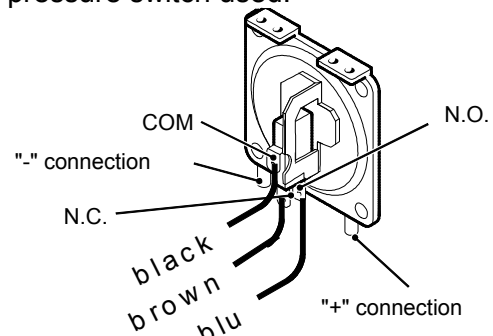


Figure 3

Between COM and N.O. the contact must be open.

Between COM and N.C. the contact must be closed (electrical resistance zero).

- 3) Connect the black (COM) and the brown wire (N.C.).
- 4) Run the boiler (the Fan must run) and check the electric resistance between COM and N.O.. Between COM and N.O. the contact must be closed (electrical resistance zero).

#### C Check of the venturi device

**This test must be carried out with the sealed chamber closed.**

- 1) Remove the caps of the pressure test points located on the top of the boiler and connect a differential pressure gauge (Figure 4).
- 2) Switch on the boiler.

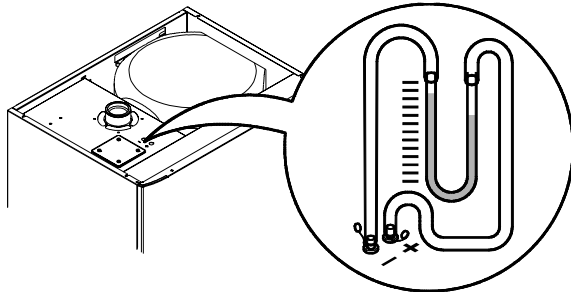


Figure 4

- 3) Compare the value on the gauge with the following minimum value: 0,66 inwc.

### 3 Removal of the Fan

- 1) Remove all the case panels and the sealed chamber lid.
- 2) Disconnect the connectors D and E (Figure 2).
- 3) Disconnect the pipe F which connect the venturi device to the pressure test point (Figure 2).



Figure 5

- 4) Unscrew the screws G (Figure 5).
- 5) Remove the fan by sliding it frontally.
- 6) Re-assemble the fan carrying out the removal operations in reverse sequence.

**Warning: Re-assembling the fan ensure that the hooks around the inlet port of the fan hung correctly on the flue hood.**

**Warning: To correctly connect the venturi device to the Air pressure switch, refer to Figure 6.**

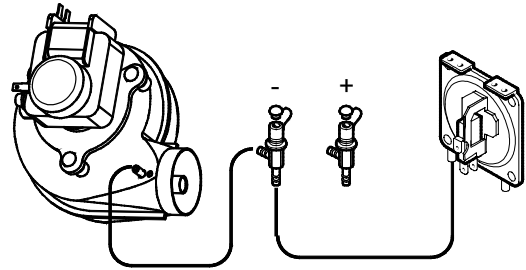


Figure 6

### 4 Inspection and Removal of the Venturi Device

- 1) Remove all the case panels and the sealed chamber lid.
- 2) Remove the fan.
- 3) Remove the venturi device by unscrewing the screw H (Figure 7).

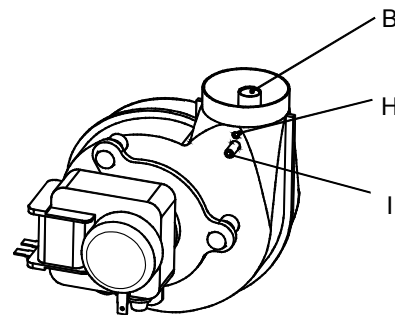


Figure 7

- 4) Inspect the venturi device B and the connection pipe I. Ensure they are clean.
- 5) Re-assemble the parts in reverse order of removal.

### 5 Removal of the Air Pressure Switch

- 1) Remove all the case panels and the sealed chamber lid.
- 2) Disconnect the wires from the Air pressure switch.
- 3) Remove the pipe from the Air pressure switch.
- 4) Unscrew the screws which hold the Air pressure switch to the frame.
- 5) Assemble the Air pressure switch carrying out the removal operations in reverse sequence.

**Warning: To correctly connect the Air pressure switch, refer to Figure 6 and Figure 3 for the correct wiring.**

**Ignition and Detection Electrodes, Burner and Injectors**

- 1) Function
- 2) Checks
- 3) Removal

**1 Function**

Three electrodes are fitted on the burner. Two of them are the ignition electrodes and are fitted near the front part of the burner. The ignition sparks take place between their metallic edges over the central ramp of the burner during the ignition sequence.

The third electrode is the detection electrode and it detects the presence of the flame.

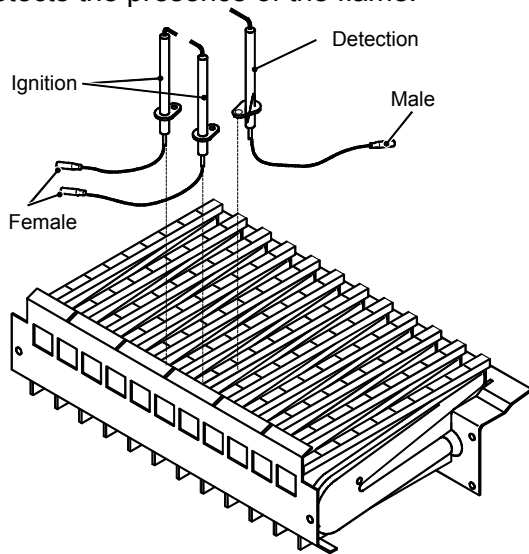


Figure 1

**2 Checks**

**A Check the position of the electrode edges**

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove all the case panels, the sealed chamber lid and the combustion chamber lid.
- 2) Check for the correct distance between the metallic edges of the ignition electrodes (see Figure 2).

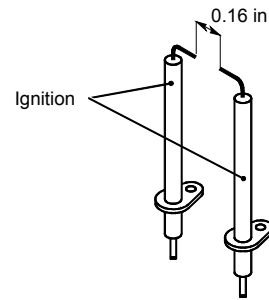


Figure 2

- 3) Check the integrity of the detection electrode and ensure that its metallic edge is correctly placed over the ramp of the burner.

**B Check the connection wires.**

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove all the case panels, the sealed chamber lid and the combustion chamber lid.
- 2) Check for the integrity of the insulation of wires which connect the electrodes to the ignition device.

**3 Removal**

- 1) Remove all the case panels, the sealed chamber lid and the combustion chamber lid.
- 2) Remove the deflector by unscrewing the screws A and B (Figure 3).

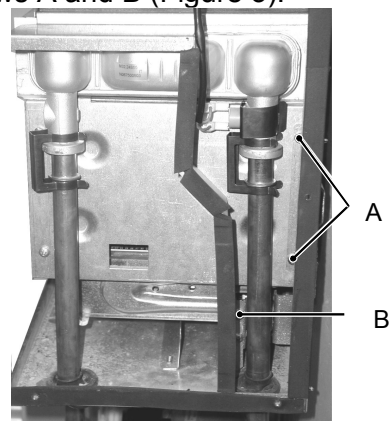


Figure 3

- 3) Do the same operation as in section "Primary exchanger" point 11.
- 4) Disconnect the electrode wires from the full sequence ignition device.
- 5) Unscrews the screws C (Figure 4).

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## Third Part (*edition-0106*) Ignition and Detection Electrodes, Burner and Injectors

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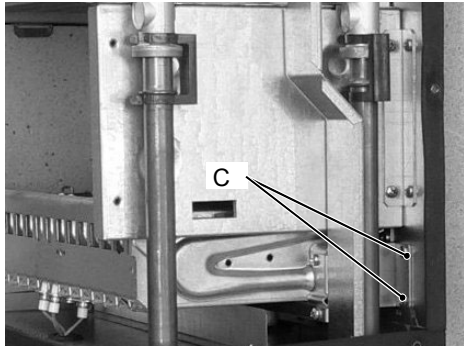


Figure 4

- 6) Remove the burner moving it to the left, rotating it upward and then pulling it outside the combustion chamber (follow the arrows on Figure 5).

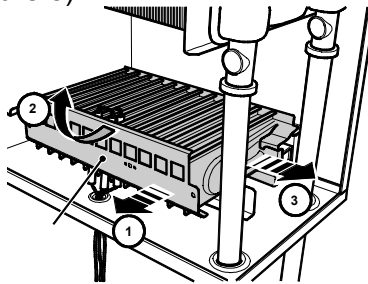


Figure 5

- 7) Unscrew the screws D (Figure 6) which hold the electrodes to the burner.

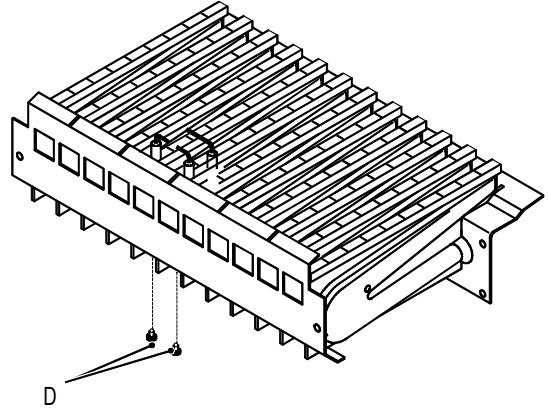


Figure 6

- 8) Extract the electrodes from the burner.  
9) Re-assemble the parts carrying out the removal operation in reverse order.

**Note: The metallic edge of the detection electrode is longer than the one of the ignition electrodes.**

## Safety Thermostat

- 1) Function
- 2) Checks
- 3) Removal

### 1 Function

The safety thermostat A in Figure 1 is a device that senses the temperature of the primary circuit water which flows in the outlet pipe of the primary heat exchanger.

If the temperature control system of the boiler fails and the temperature of the primary circuit reaches a dangerous temperature, the safety thermostat opens the electric circuit that supplies the on-off operators of the gas valve.

Consequently, the full sequence ignition device attempts to light the burner and, at the end, locks the boiler and lights the lock-out signal lamp.

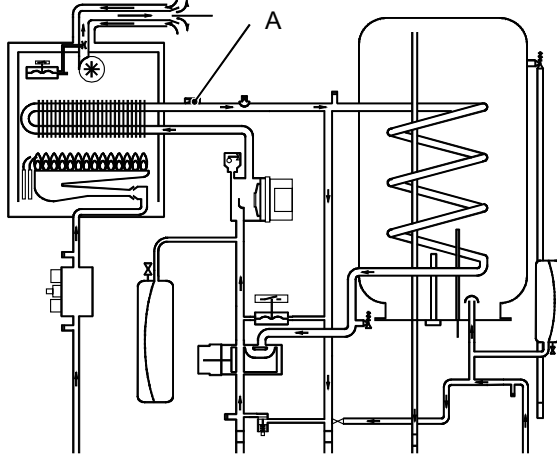


Figure 1

### 2 Checks

#### A Overheat temperature value

- 1) Set the temp. control knobs to their max. position and run the boiler in d.h.w. and c.h.
- 2) Allow the boiler to reach its maximum operating temperature (monitor the temperature gauge on the instrument panel). The boiler should maintain a temperature below that of the safety thermostat and no overheat intervention should occur.

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

#### B Electrical function

- 1) Remove all the case panels and the lid of the sealed chamber.
- 2) Disconnect the safety thermostat and check its electrical function. Normally (no intervention) the contact must be closed (electrical resistance zero  $\Omega$ ).

### 3 Removal

**Warning: Isolate the boiler from the mains electricity supply before removing any covering or component.**

- 1) Remove all the case panels and the lid of the sealed chamber.
- 2) Remove the probe holder spring B freeing the probe C (Figure 2).

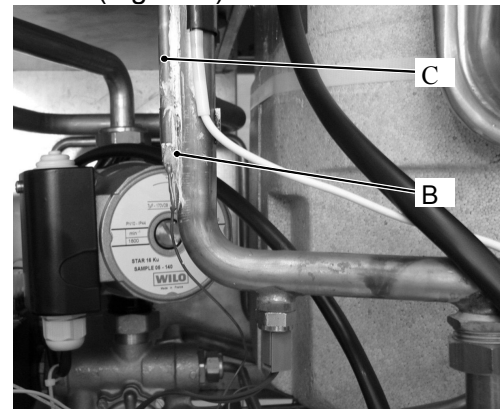


Figure 2

- 3) Unscrew the three screws D (Figure 3).

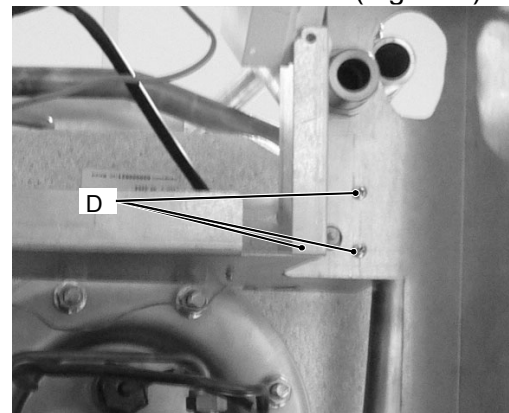


Figure 3

- 4) Disconnect the connectors E (Figure 4).

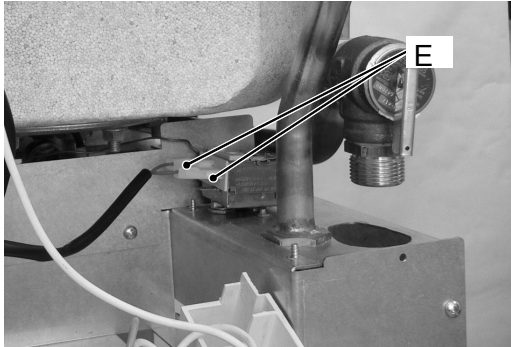


Figure 4

- 5) Re-assemble the parts carrying out the removal operation in reverse order.
- 6) Apply an adequate quantity of heat conducting compound between the pipe and the thermostat.

**Electric Resistances**

- 1) Pump Resistance
- 2) Gas Valve Resistance
- 3) Temperature Probe NTC Resistance
- 4) Fan Resistance

Resume of the electric resistances in  $\Omega$  of the boiler parts.

**1 Pump Resistance**

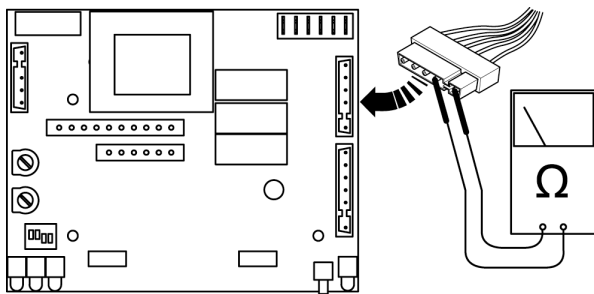


Figure 1

Pump Resistance = 51.7  $\Omega$ .

**2 Gas Valve Resistance**

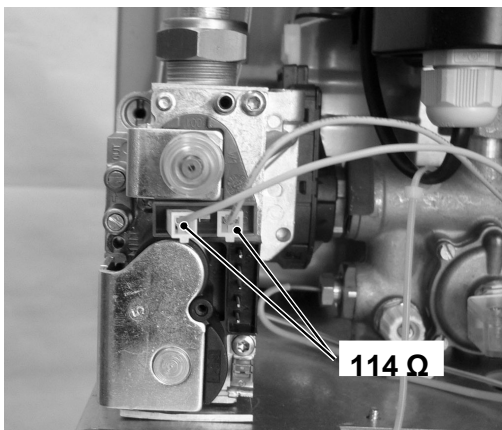


Figure 2

On-off operator  
approx. 1 122  $\Omega$ \*

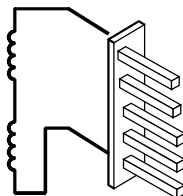


Figure 5

\* at ambient temperature

**3 Temperature Probe NTC Resistance**

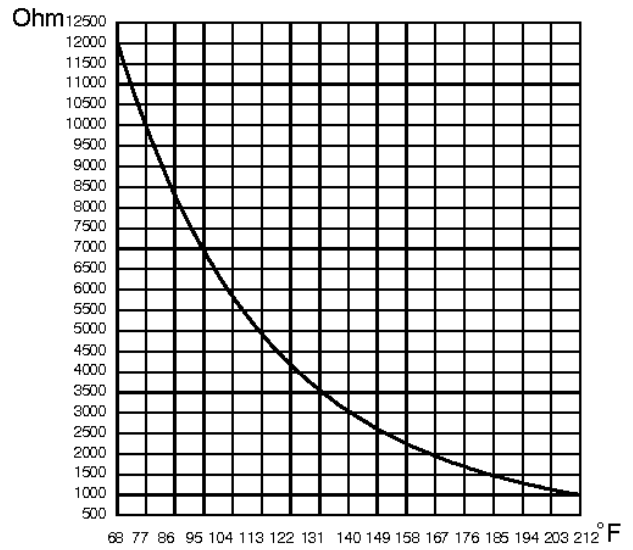


Figure 3

**4 Fan Resistance**

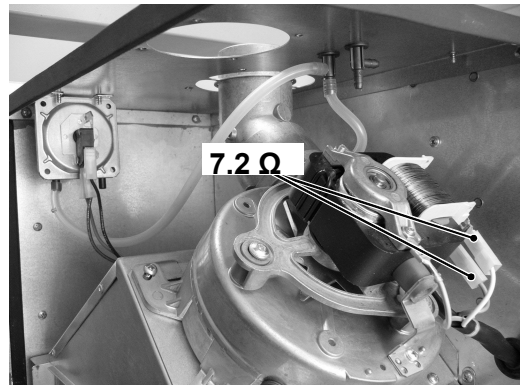


Figure 4

Key	Description	Quantity	Manufacturer Part No.	Manufacturer's Reference
1	Burner	1	BI1203 103	Polidoro
2	Injectors for Natural Gas	14	BI1203 502	Polidoro
	Injectors for L.P.G.	14	BI1203 503	Polidoro
3	Modulation Gas Valve	1	BI1203 104	Honeywell
4	C.h. Expansion Vessel	1	BI1242 105	Zilmet
5	Primary Heat Exchanger	1	BI1242 108	Mgm
6	Fan	1	BI1386 118	Fime
7	Air Pressure Switch	1	BI1386 119	Yamatake
8	Magnesium Anode	1	BI1191 119	
9	Combustion Chamber Front Panel	1	BI1386 108	
10	Combustion Chamber Rear Panel	1	BI1386 114	
11	Combustion Chamber Left Panel	1	BI1386 112	
12	Combustion Chamber Right Panel	1	BI1386 107	
13	Control p.c.b.	1	BI1555 107	Ceza
14	Fan and Air Pressure Dev.	1	BI1555 108	Ceza
15	Full Sequence Ignition Dev.	1	BI1555 109	Honeywell
16	D.h.w. Temp/Pres. Relief Valve	1	BI1191 120	Conbraco Industries
17	C.h. Pressure Relief Valve	1	BI1191 121	Conbraco Industries
18	Safety Thermostat	1	BI1242 109	Imit
19	Primary Circuit Flow Switch	1	BI1011 505	
20	Pump	1	BI1242 110	Wilo
21	3-Way Diverter Valve	1	BI1201 100	Elbi
22	D.h.w. Storage Tank 60l	1	BI1191 122	Oemmepi
23	Fuse 4.0A	1	BI1555 110	
24	Primary Circuit Temp. Probe	1	BI1001 117	I.T.S.
25	Ignition Electrode (left)	1	BI1203 105	Network Components
26	Ignition Electrode (right)	1	BI1203 106	Network Components
27	Detection Electrode	1	BI1203 107	Network Components
28	Temperature Pressure Gauge	1	BI1555 100	Wika Italiana
29	D.h.w. Expansion Vessel	1	KI1051 106	Zilmet



