

---

Wall hung, fanflue, roomsealed, high efficiency gas boiler

## Service manual

### RIVA ADVANCE HE

Models	G.C. Appl. No.
<b>M110B.24SM/C</b>	<b>47---583---11</b>
<b>M110B.32SM/C</b>	<b>47---583---12</b>
<b>M110B.24SR/C</b>	<b>41---583---07</b>

Leave this manual adjacent to the gas meter

**Warning:**

Service / repairs must be carried out, only by a qualified Gas Safety Registered Engineer, who will be responsible for the current Regulations for gas appliances.

**Note:**

After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist of the user and installation manual.





# TABLE OF CONTENTS

<b>1</b>	<b>OVERALL INFORMATION</b>	<b>4</b>	<b>12</b>	<b>PRIMARY CIRCUIT FLOW SWITCH</b>	<b>32</b>
1.1	Overall View	4	12.1	Function	32
1.2	Hydraulic diagram	4	12.2	Checks	32
<b>2</b>	<b>GENERAL ACCESS AND EMPTYING HYDRAULIC CIRCUITS</b>	<b>5</b>	12.3	Removal	32
2.1	Nomenclature	5	<b>13</b>	<b>EXPANSION VESSEL AND TEMPERATURE-PRESSURE GAUGE</b>	<b>33</b>
2.2	Body panels	5	13.1	Function	33
2.3	Control panel	5	13.2	Checks	33
2.4	Access to the sealed chamber	6	13.3	Removal of the expansion vessel	33
2.5	Emptying the primary circuit	6	13.4	Removal of the temperature-pressure gauge	33
2.6	Emptying the d.h.w. circuit	6	<b>14</b>	<b>D.H.W. FLOWMETER, FILTER AND FLOW LIMITER</b>	<b>34</b>
<b>3</b>	<b>DIAGRAMS</b>	<b>7</b>	14.1	Function	34
3.1	Wiring diagram M110B.24SM/... M110B.32SM/...	7	14.2	Description and location of parts - (Figure 14.2)	34
3.2	Wiring diagram M110B.24SR/...	8	14.3	Removal of the sensor	34
3.3	Circuit voltages	9	14.4	Checks	34
<b>4</b>	<b>FAULT FINDING</b>	<b>10</b>	14.5	Removal of the flow switch group and d.h.w. circuit filter	34
<b>5</b>	<b>CONDENSING HEAT EXCHANGER</b>	<b>12</b>	14.6	Flow limiter	35
5.1	Function	12	<b>15</b>	<b>TEMPERATURE PROBE</b>	<b>36</b>
5.2	Removal	12	15.1	Function	36
5.3	Cleaning	13	15.2	Checks	36
<b>6</b>	<b>D.H.W. HEAT EXCHANGER</b>	<b>14</b>	15.3	Removal of the c.h. Temperature probe	36
6.1	Function	14	15.4	Removal of the d.h.w. Temperature probe	36
6.2	Removal	14	<b>16</b>	<b>BY-PASS VALVE</b>	<b>38</b>
<b>7</b>	<b>PUMP</b>	<b>15</b>	16.1	Function	38
7.1	Function	15	16.2	Removal	38
7.2	Checks	15	<b>17</b>	<b>FAN AND AIR BOX</b>	<b>39</b>
7.3	Removal pump	15	17.1	Function	39
7.4	Removal electrical capacitor	16	17.2	Removal of the Air box and the Fan	39
<b>8</b>	<b>THREE WAY DIVERTER VALVE</b>	<b>17</b>	<b>18</b>	<b>IGNITION AND DETECTION ELECTRODES, BURNER AND SPARK GENERATOR</b>	<b>40</b>
8.1	Function	17	18.1	Function	40
8.2	Checks	17	18.2	Removal of the Ignition and detection electrodes	40
8.3	Removal of the electric actuator	17	18.3	Removal of the burner	40
8.4	Removal of the tree way diverter valve	18	18.4	Removal of the front insulation panel	41
8.5	Removal of the diverter group	18	18.5	Removal of the rear insulation	41
<b>9</b>	<b>ELECTRONIC CONTROL/IGNITION P.C.B.</b>	<b>19</b>	18.6	Removal of the spark generator	42
9.1	Function	19	18.7	Checks	42
9.2	Selection and adjustment devices	19	<b>19</b>	<b>SAFETY THERMOSTAT</b>	<b>43</b>
9.3	Checking the temperature	20	19.1	Function	43
9.4	Operation lights	21	19.2	Checks	43
9.5	Setting the boiler control function modes	21	19.3	Removal	43
9.6	Adjustment of maximum useful output in c.h. mode	21	<b>20</b>	<b>FLUE TEMPERATURE PROBE NTC AND SAFETY THERMAL FUSE</b>	<b>44</b>
9.7	Reignition frequency setting	22	20.1	Function	44
9.8	Combi / C.H. only mode setting	22	20.2	Removal	44
9.9	Setting the d.h.w. flowmeter operation mode	23	20.3	Checks	44
9.10	Checks	24	<b>21</b>	<b>CONDENSATE TRAP</b>	<b>45</b>
9.11	Removal of the electronic control p.c.b.	24	21.1	Function	45
9.12	Thermal control in the  mode	26	21.2	Check the cleanness of the trap	45
9.13	Thermal control in the  mode	27	21.3	Removal	45
<b>10</b>	<b>TRANSFORMER</b>	<b>28</b>	<b>22</b>	<b>SHORT SPARE PARTS LIST</b>	<b>46</b>
10.1	Removal	28			
10.2	Check the transformer	28			
<b>11</b>	<b>GAS VALVE</b>	<b>29</b>			
11.1	Function	29			
11.2	Nomenclature of the parts	29			
11.3	Adjustment	29			
11.4	Checks	30			
11.5	Removal of the gas valve	30			

# OVERALL INFORMATION

## 1 OVERALL INFORMATION

### 1.1 Overall View

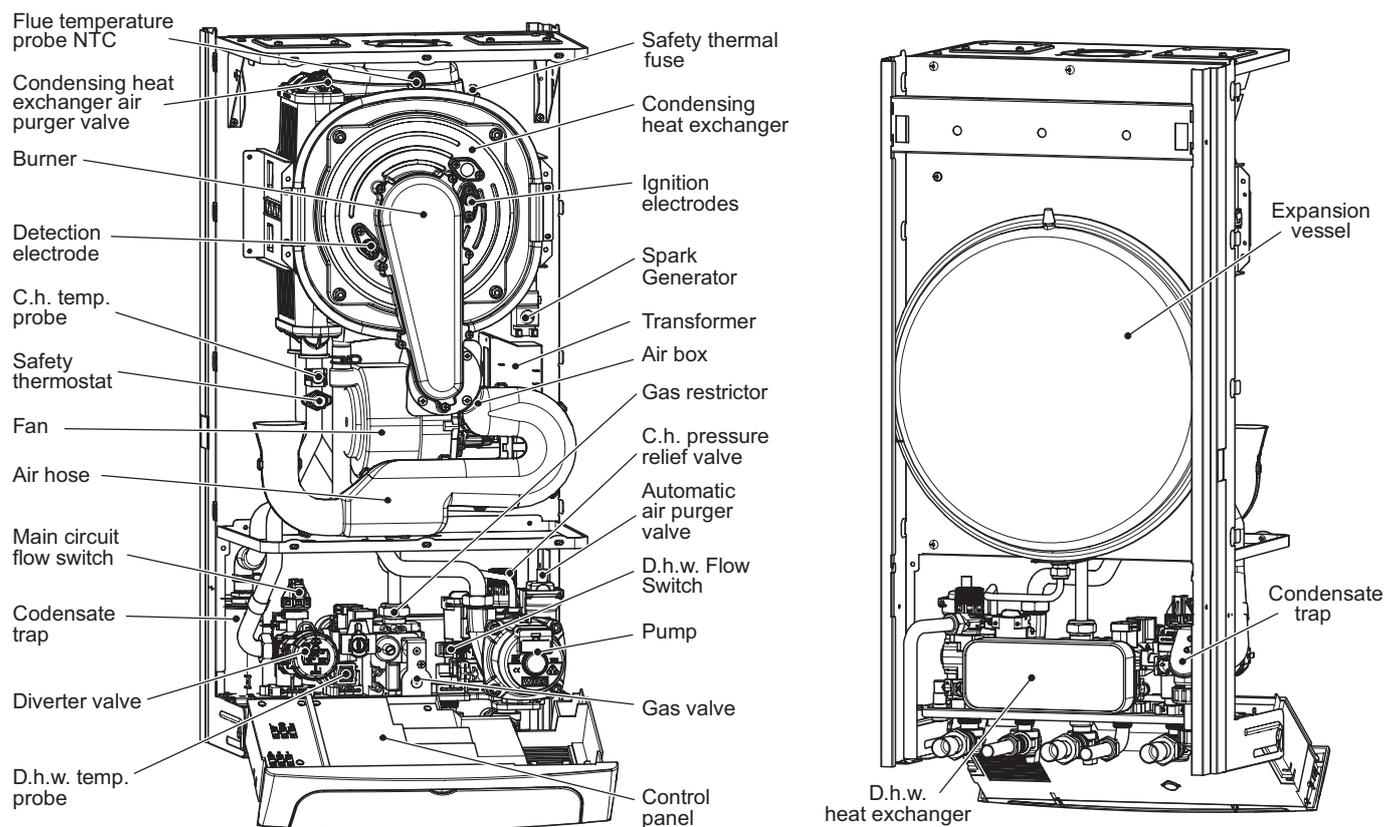
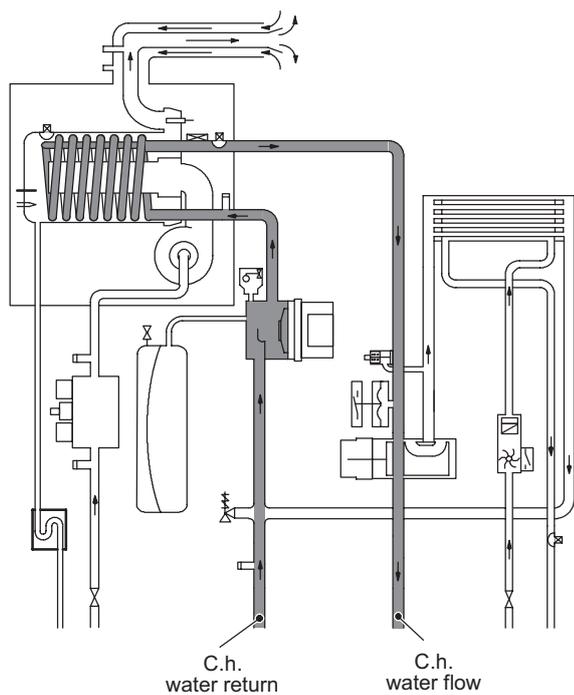


Figure 1.1

### 1.2 Hydraulic diagram

#### Central heating (c.h.) operation



#### Domestic hot water (d.h.w.) operation

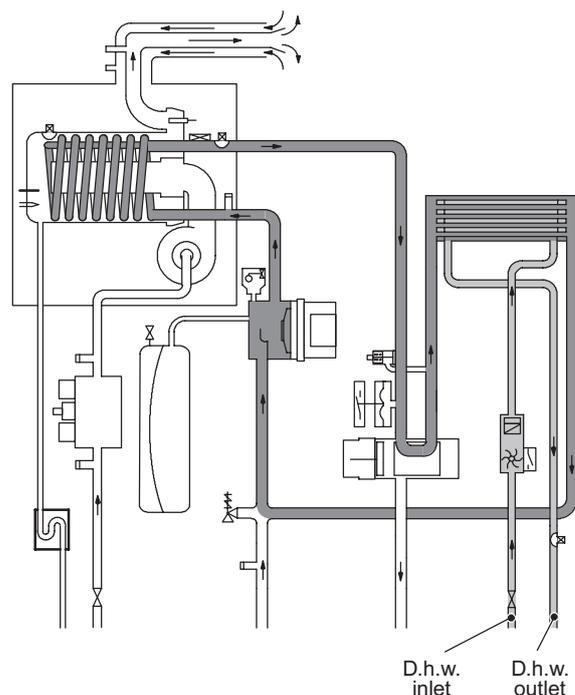


Figure 1.2

# GENERAL ACCESS AND EMPTYING HYDRAULIC CIRCUITS

## 2 GENERAL ACCESS AND EMPTYING HYDRAULIC CIRCUITS

### 2.1 Nomenclature

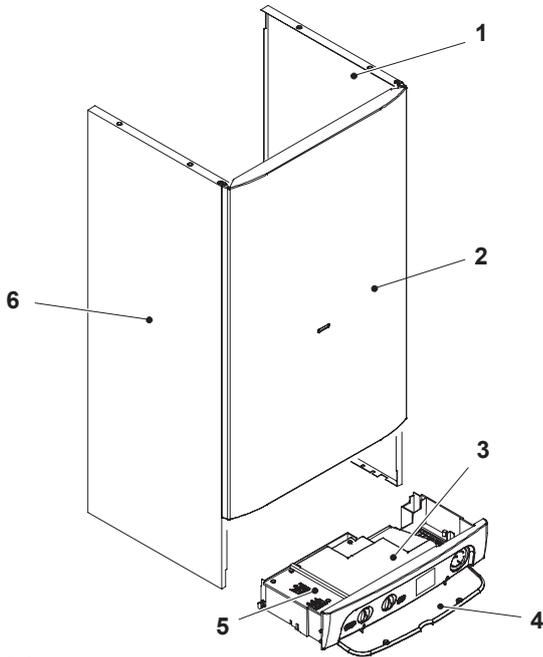


Figure 2.1

- 1 Right side panel
- 2 Front panel
- 3 Control panel lid
- 4 Control panel cover
- 5 Service panel
- 6 Left side panel

### 2.2 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 2.2), lift the panel and remove it.

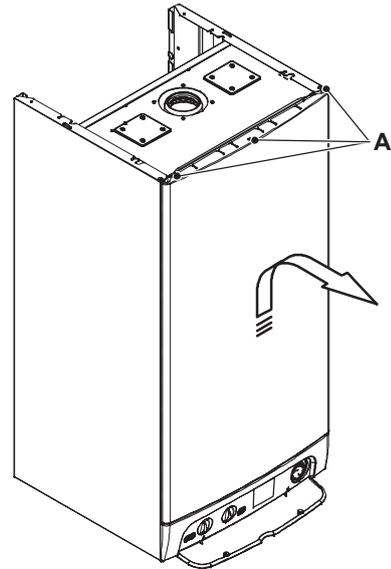


Figure 2.2

To remove the side panels loosen the screws C and D (Figure 2.3), bring the base of the panels away from the boiler and lift them, freeing them from the top hooks.

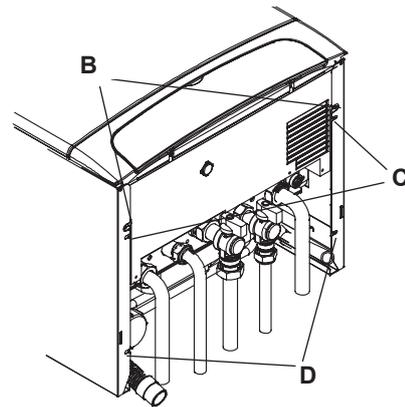


Figure 2.3 - Bottom view of the boiler

### 2.3 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 C and D (Figure 2.3).
- 3 Remove the screws B.
- 4 Move the lower part of the side panels as indicated in Figure 2.4 and pull the control panel.

When completely pulled out, the panel can rotate 45° downwards to facilitate the service operations on the internal parts.

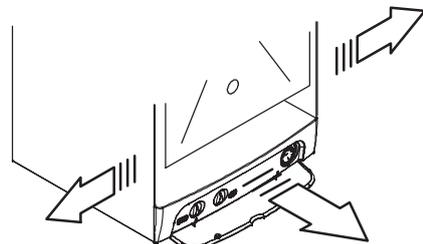


Figure 2.4

## GENERAL ACCESS AND EMPTYING HYDRAULIC CIRCUITS

- 5 Remove the screws E and remove the service panel (Figure 2.5);
- 6 Remove the screws F and remove the control panel lid (Figure 2.5).

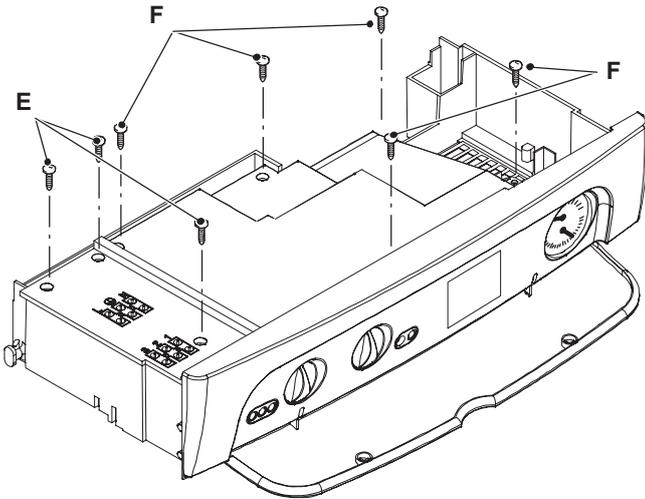


Figure 2.5

### 2.4 Access to the sealed chamber

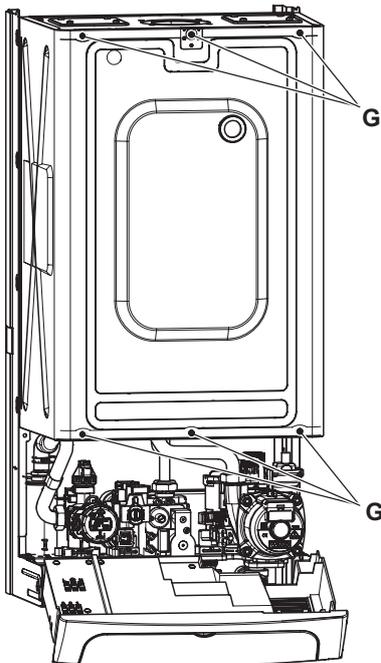


Figure 2.6

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 2.6 and remove the lid.

### 2.5 Emptying the primary circuit

- 1 Close the c.h. circuit flow and return cocks fitted by the installer.
- 2 Remove the front and right panels of the boiler.
- 3 Open the drain tap I (Figure 2.8 combi or Figure 2.9 only c.h.) until the boiler is completely emptied.
- 4 To help the draining of the primary circuit loose the condensating heat exchanger air purger valve H (Figure 2.7).

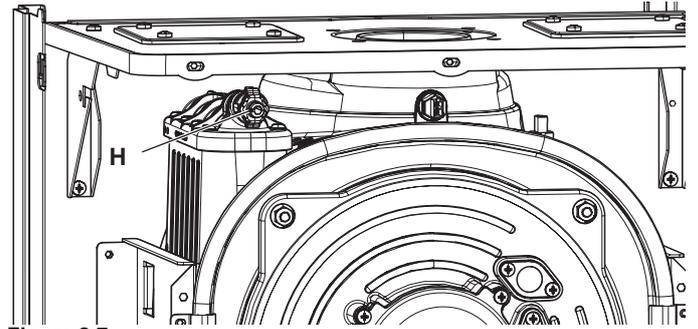


Figure 2.7

**Attention: some water could remain in the condensing heat exchanger.**

- 5 Close drain tap once the emptying has been completed.

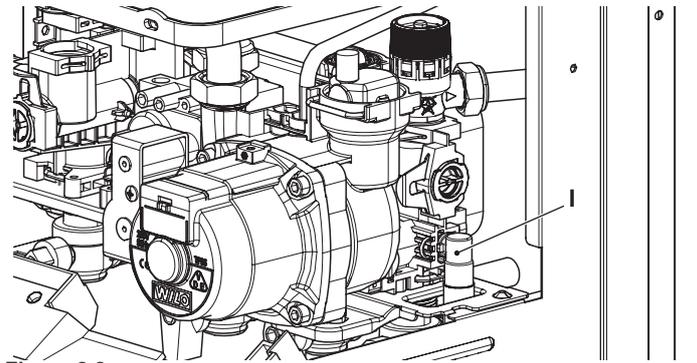


Figure 2.8

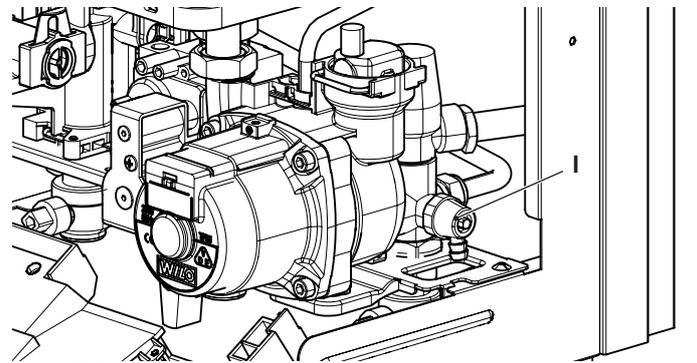


Figure 2.9

### 2.6 Emptying the d.h.w. circuit

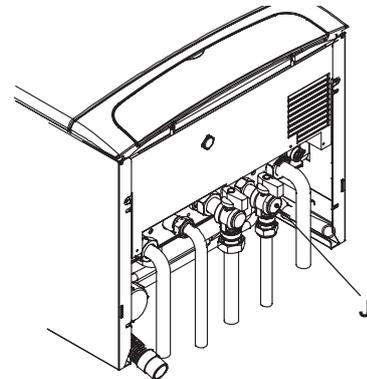


Figure 2.10

- 1 Close the d.c.w. inlet cock J (Figure 2.10).
- 2 Open one or more hot water taps until the boiler has been completely emptied.

# DIAGRAMS

## 3 DIAGRAMS

### 3.1 Wiring diagram M110B.24SM/... M110B.32SM/...

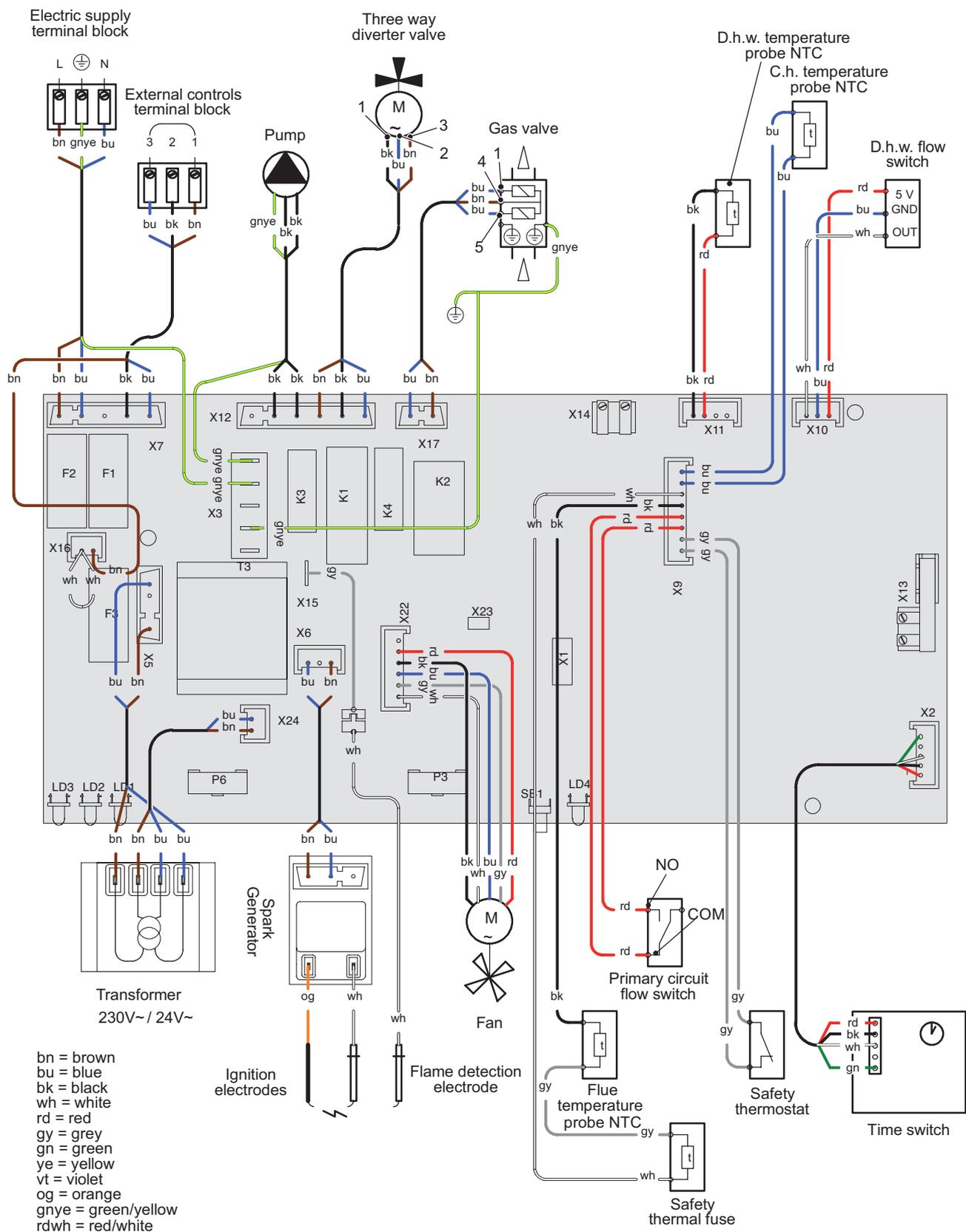


Figure 3.1

# DIAGRAMS

## 3.2 Wiring diagram M110B.24SR/...

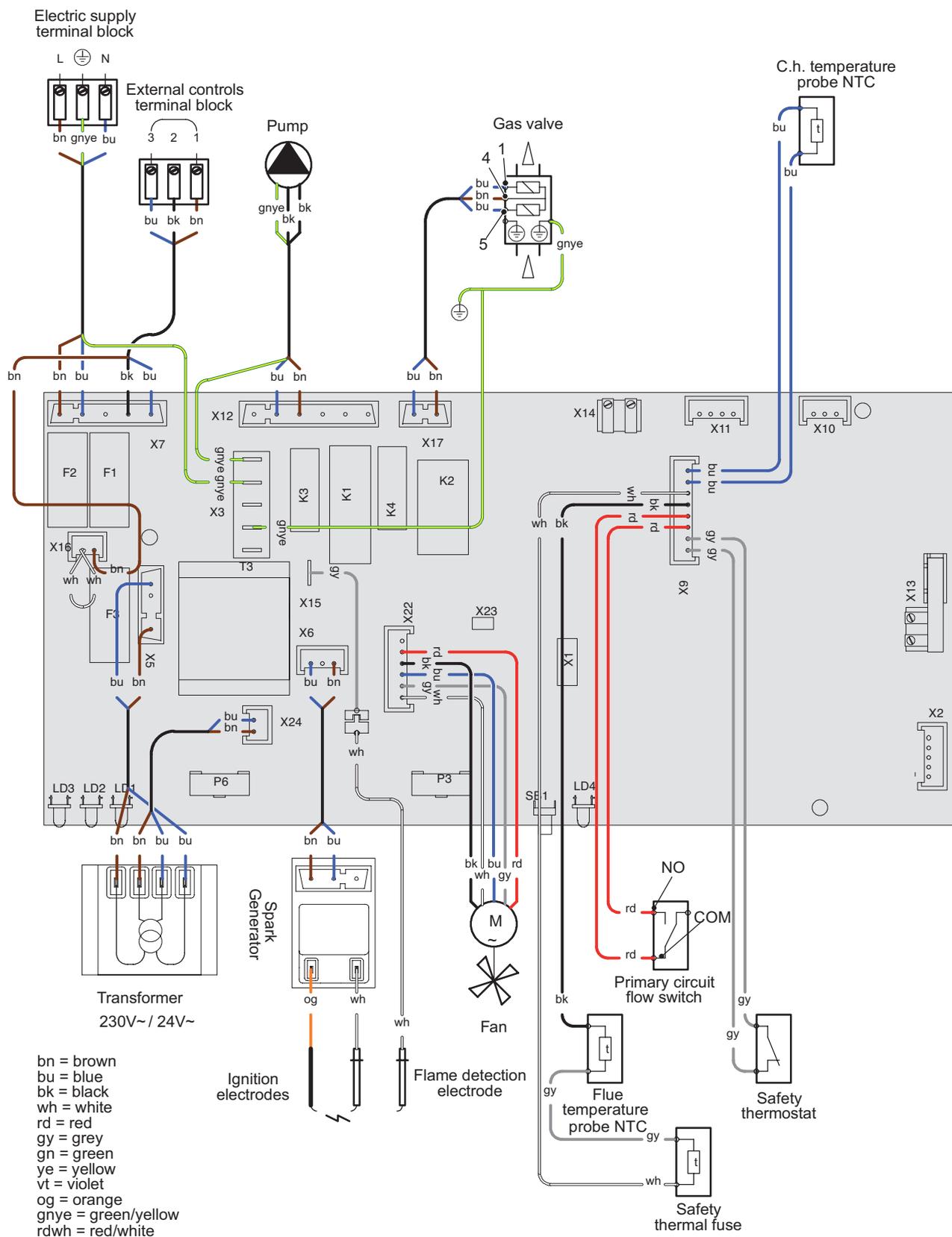


Figure 3.2

# DIAGRAMS

## 3.3 Circuit voltages

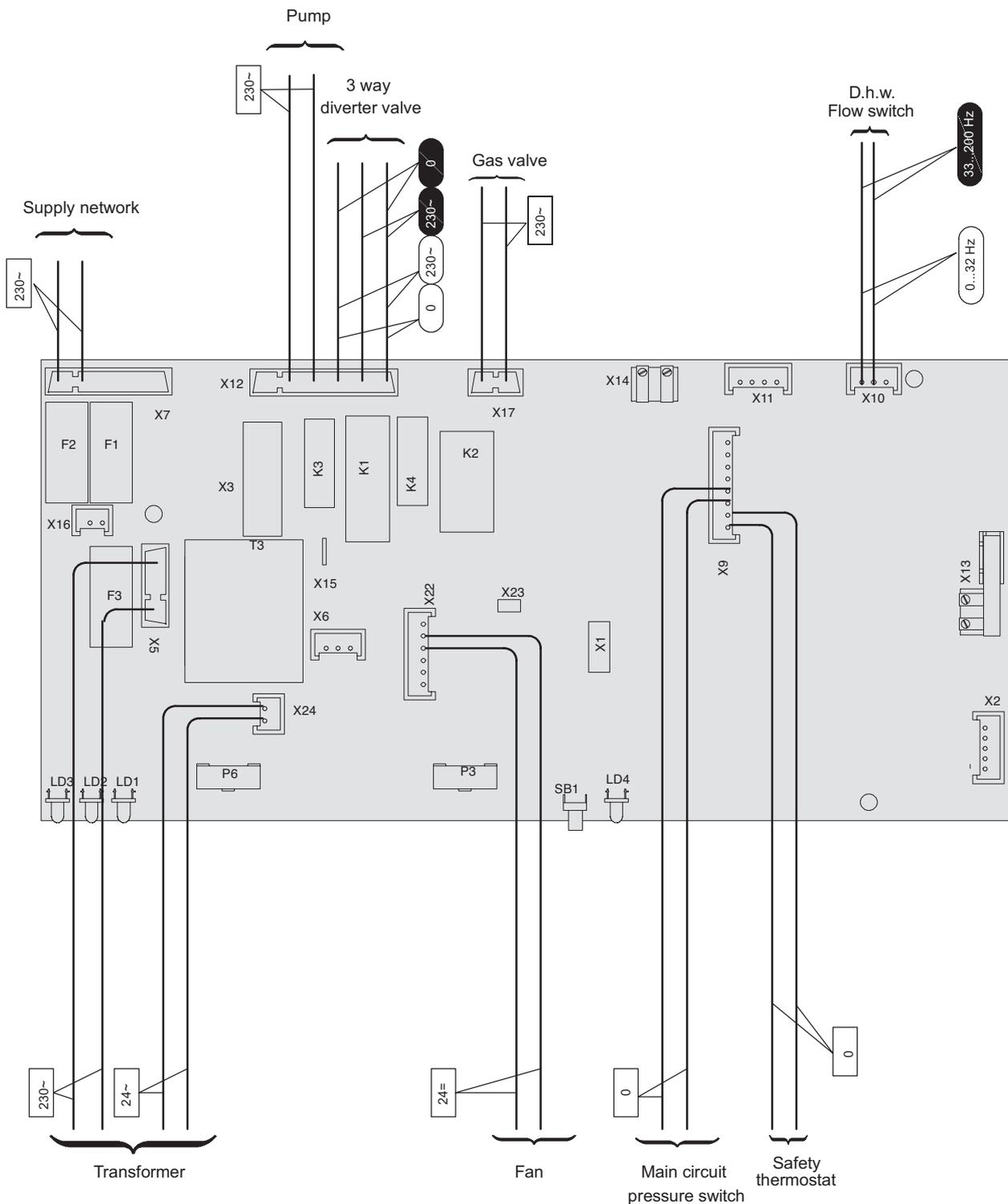
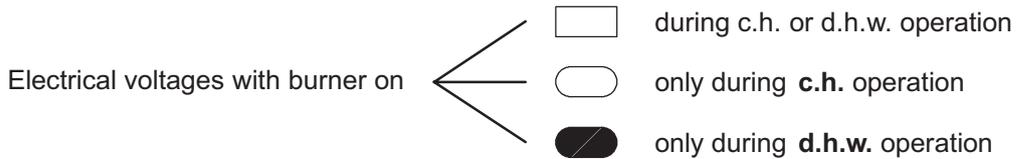


Figure 3.3



# FAULT FINDING

Section of the manual → (note ref. in brackets)		Components to check																														
		10	(1)	( NO TAG )	(3)	21.1	(4)	6	7.2	8.2	9.9	11.4	12.2	14.5	15.2	16	17	18.7	18.7	19.2	19.2	20.1	(7)	-								
	Transformer	Power supply line	Gas supply line	Flue pipes	Condensate drain pipe and trap	C. h. circuit	D. h. w. circuit	D. h. w. heat exchanger	Pump	Diverter valve	D. h. w. flow switch	Fuses (Electronic p. c. b.)	Electronic p. c. b.	Boiler settings	Gas valve	Main circuit flow switch	D. h. w. filter	Main circuit temp. probe	D. h. w. temp. probe	By-pass valve	Fan air restrictor	Spark generator	Ignition electrode	Detection electrode	Safety thermostat	Gas restrictor	Flue temperature probe NTC	Expansion vessel	Safety valve	Pressure gauge		
Defect →																																
	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																															
	Poor c. h. / d. h. w. temperature (9)																															
	Poor d. h. w. temperature. Regular operation in c/h mode.																															
Off	Low d. h. w. flow rate																															
	Water leaks from the safety valve during operation on c/h																															
	Water leaks from the safety valve when the boiler is off.																															

**Note**

**Useful information can be obtained also from the optical indication given by the appliance operation lights (see section 9.4).**

- 1 Check for 230V~ between line (L) and neutral (N). Verify the integrity of supply cable, plug and external fuses. Check the polarity of line and neutral connection
- 2 Check the gas supply pipe and isolation tap for gas tightness.
- 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 Using the flue analyzer, check the CO<sub>2</sub> value of the flue gases. This reading is a reference value for the gas valve setting.
- 7 Check the pressurization of the expansion vessel. Refer to the installation manual for proper values.
- 8 d.h.w. pressure too high or flow rate too high. If necessary insert a flow rate limiter (14.6).
- 9 The boiler doesn't reach the nominal heat input.

# CONDENSING HEAT EXCHANGER

## 5 CONDENSING HEAT EXCHANGER

### 5.1 Function

The Condensing heat exchanger A in Figure 5.1 has the function of transferring heat produced from combustion of the gas and from the flue exhausted gas to the water circulating in it.

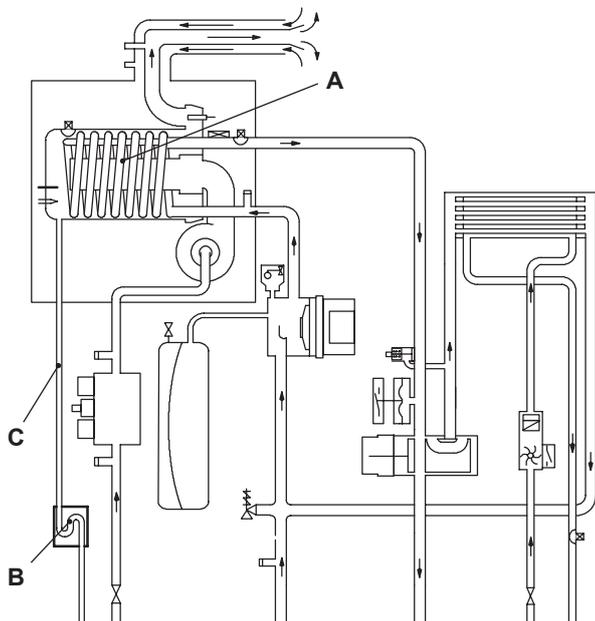


Figure 5.1

By reducing the combustion products temperature, the latent heat of the vapour is transferred to the water circuit, allowing an extra gain of useful heat.

The condensed vapour is then drained through the condensate trap B and the draining pipe C.

### 5.2 Removal



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

- 1 Disconnect the flue system from the boiler.
- 2 Remove the fan group (rubber pipe, gas pipe) following the instructions from 1 to 6 in section "Removal of the Air box and the Fan" page 39.
- 3 Disconnect the detection electrode connector D, the ignition electrodes connector L and the earth wire M.
- 4 Disconnect the fan connector I by pressing the plastic hook placed on the side of the connector (Figure 5.2).
- 5 Unscrew the nuts N (Figure 5.2).
- 6 Remove the fan-burner group H.
- 7 Empty the primary circuit of the boiler.
- 8 Remove the clips E (Figure 5.2).
- 9 Loosen the connection J and slightly move the pipe K upwards, turn it towards left (Figure 5.2) and then move the pipe downwards freeing it from the Condensing heat exchanger.

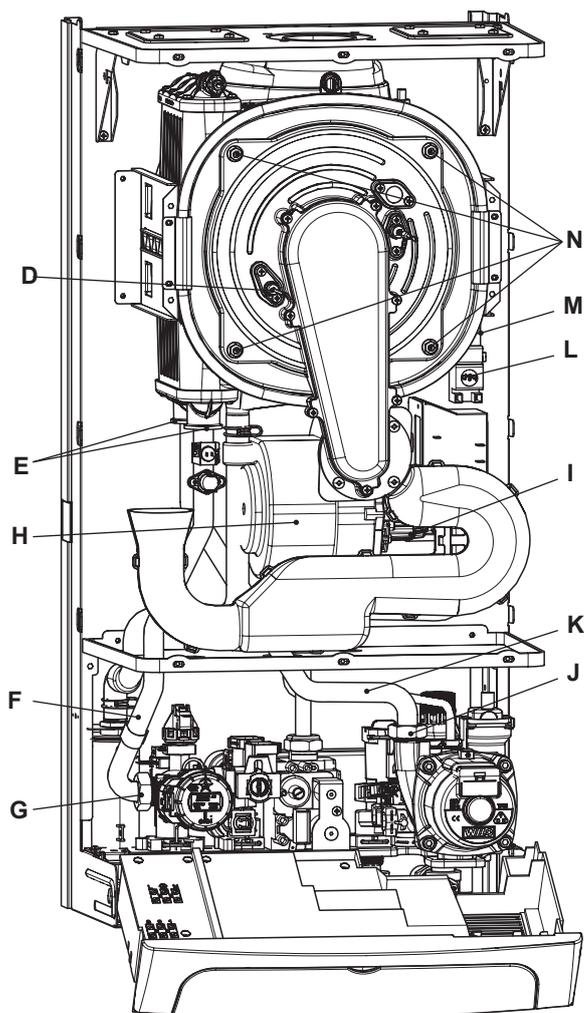


Figure 5.2

- 10 Loosen the connection G and slightly move the pipe F upwards, turn it towards left (Figure 5.2) and then move the pipe downwards freeing it from the Condensing heat exchanger.

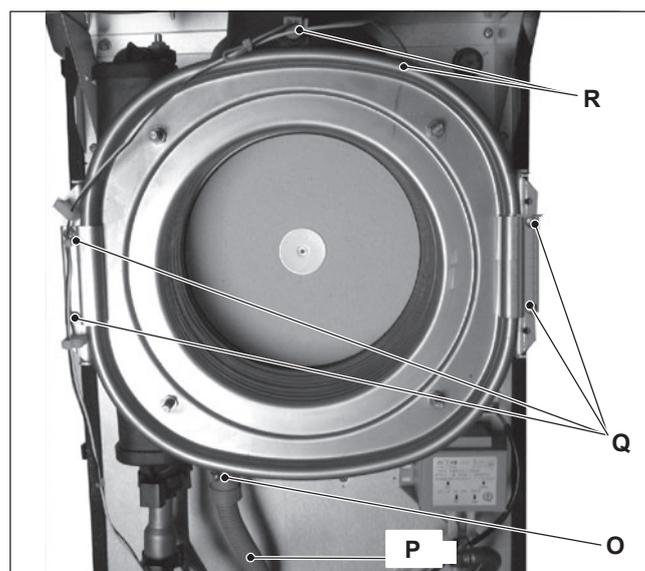


Figure 5.3

- 11 Using pliers, remove the spring O moving it downwards and disconnect the rubber pipe P (Figure 5.3).
- 12 Unscrew the screws Q and remove the clamps (Figure 5.3).
- 13 Disconnect the two connectors R by pressing the plastic hook placed on the side of the connector (Figure 5.3).

---

## CONDENSING HEAT EXCHANGER

---

- 14 Remove the Condensing heat exchanger by levering it and sliding it forwards.
- 15 Reassemble the Condensing heat exchanger carrying out the removal operations in reverse order.

**Ensure to tighten the nuts N - Figure 5.2 firmly.**

### 5.3 Cleaning

If there are deposits of dirt on the coil of the Condensing heat exchanger, clean with a bristle paintbrush and remove the dust with a Hoover.



**Warning:** After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis as detailed in chapter 11.3 section 11.

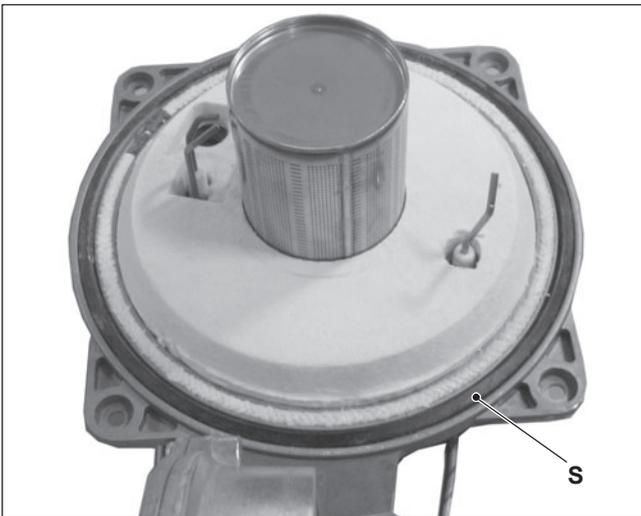


Figure 5.4

**Caution:**

After any periodical servicing or disturbance the combustion chamber silicon seal S Figure 5.4 must be fully inspected and replaced at the discretion of the service engineer.

After any disturbance to the chamber door seal the appliance must undergo a full analytical combustion performance check.

# D.H.W. HEAT EXCHANGER

## 6 D.H.W. HEAT EXCHANGER

### 6.1 Function

The d.h.w heat exchanger A in Figure 6.1 and Figure 6.3 allows the instantaneous transfer of heat from the primary hydraulic circuit to the water destined for d.h.w use.

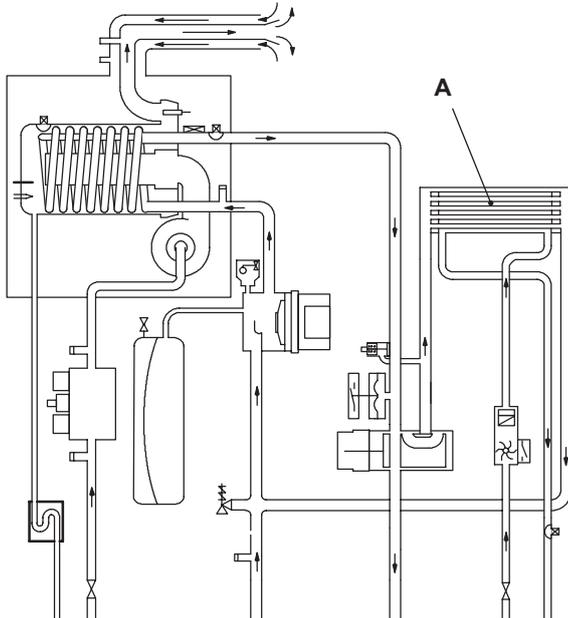


Figure 6.1

The schematic structure is shown in Figure 6.2.



-  Primary hydraulic circuit
-  Domestic hot water circuit

Figure 6.2

### 6.2 Removal

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

- 1 Remove the front and right hand side panels of the case.
- 2 Empty the primary circuit and the d.h.w circuit of the boiler.
- 3 Remove the pump B in Figure 6.3 (see section "Removal pump" page 15).
- 4 Remove the clip C and remove the primary circuit pressure switch D by lifting it upwards. It is not necessary to disconnect it from the wiring.
- 5 Remove the clip E and remove the electric actuator F by pulling it. It is not necessary to disconnect it from the wiring.

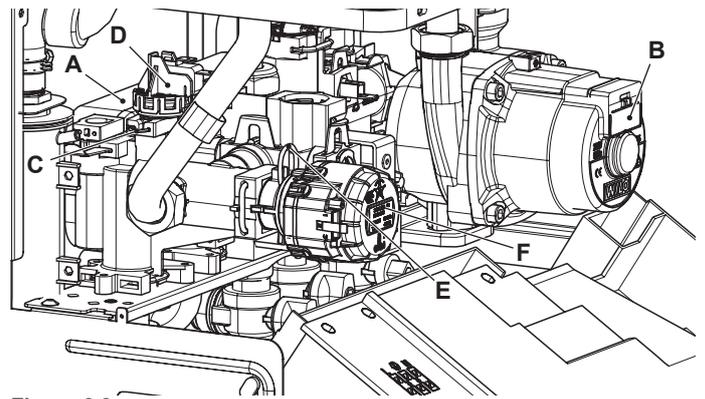


Figure 6.3

- 6 Completely unscrew the Allen key screws G (Figure 6.4) which hold the exchanger to the plastic groups.

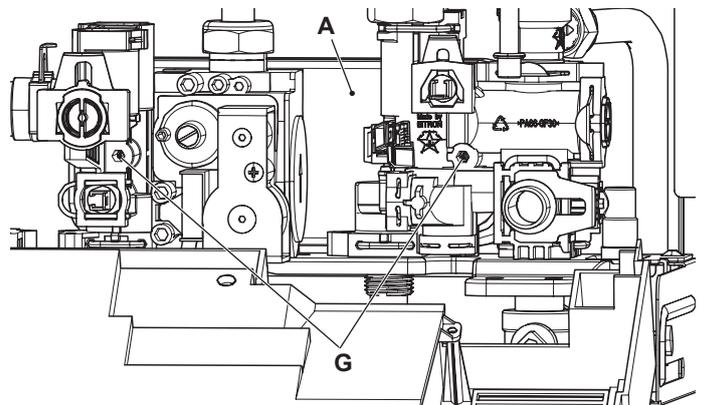


Figure 6.4

- 7 Move the exchanger towards the rear of the boiler and extract it.

Reassemble the d.h.w heat exchanger carrying out the removal operations in the reverse order.

 **Warning:** to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.

 **Warning:** When reassembling the exchanger be sure to put the off center location/securing pin indicated in Figure 6.5 towards the left side of the boiler.

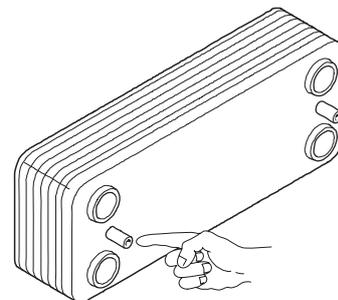


Figure 6.5

## 7 PUMP

### 7.1 Function

The pump A in Figure 7.1 and Figure 7.4 has the function of making the water in the main circuit circulate through the main heat exchanger, the condensing heat exchanger and therefore through the c.h. system (during the c.h. function) or through the secondary heat exchanger (during the d.h.w. function).

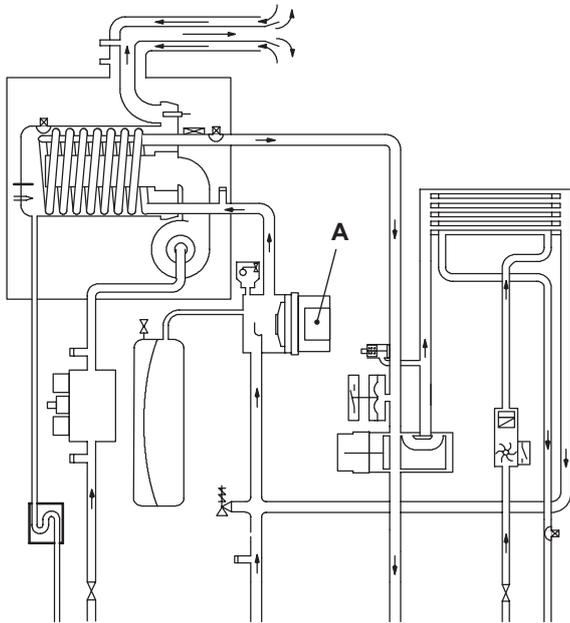


Figure 7.1

### 7.2 Checks



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

✓ 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.

✓ Check the electrical continuity.

With the boiler off, remove the front panel and disconnect the connector G (Figure 7.4).

Measure the electrical resistance between the pump supply connections.

Electrical resistance of the windings (at ambient temperature) must be about 213  $\Omega$  (coil 1) and 480  $\Omega$  (coil 2) (Figure 7.2).

✓ 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.

✓ 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.

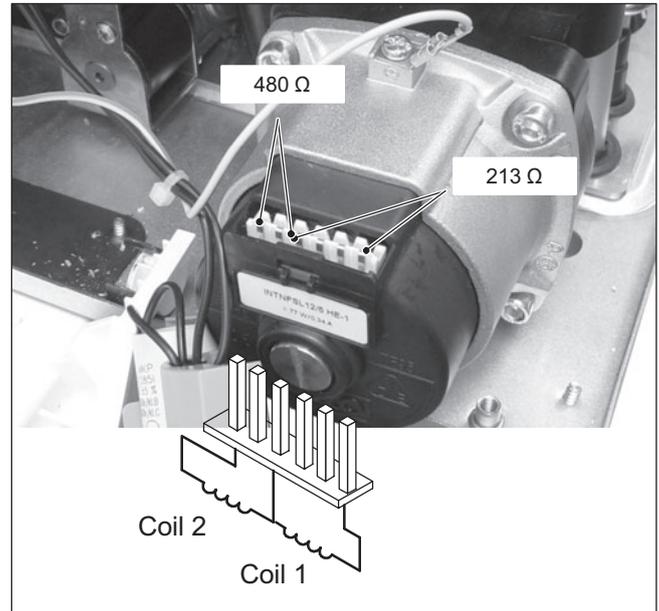


Figure 7.2

### 7.3 Removal pump



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

- 1 Remove the case panels and the sealed chamber lid (section "Body panels" page 5).
- 2 Empty the primary circuit of the boiler.
- 3 Disconnect the connector G (Figure 7.4) following the indications given on the connector box.
- 4 Disconnect the earth connector E (Figure 7.4).
- 5 Loosen the connection D (Figure 7.3), and pull up and turn to the left the pipe C.
- 6 Remove the locking plate H (Figure 7.5).

# PUMP

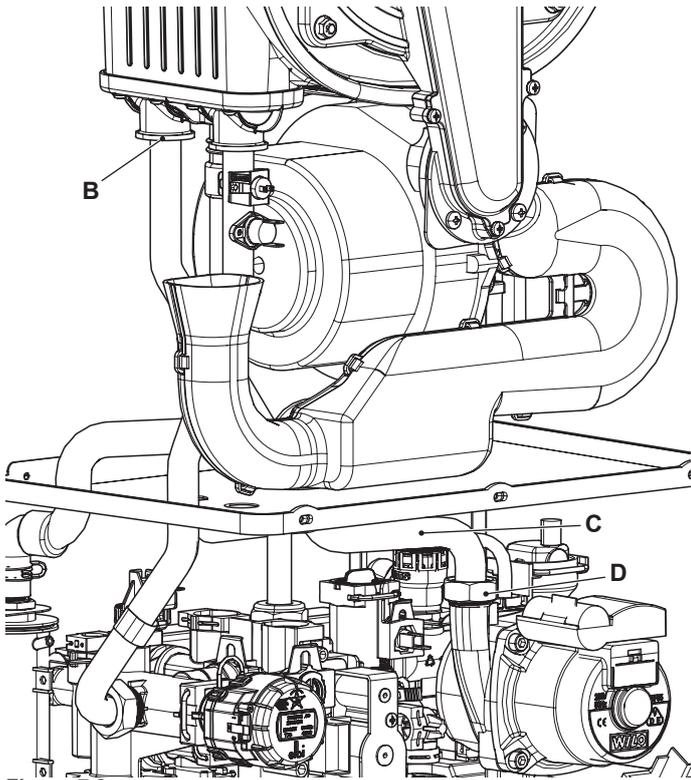


Figure 7.3

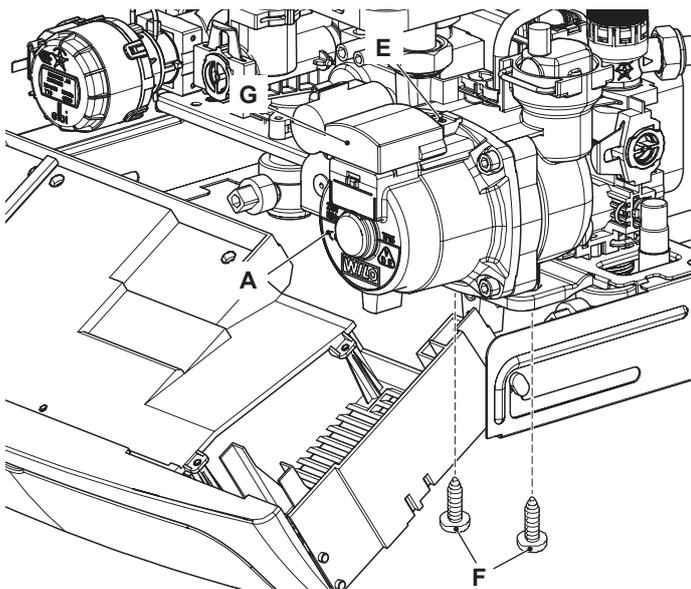


Figure 7.4

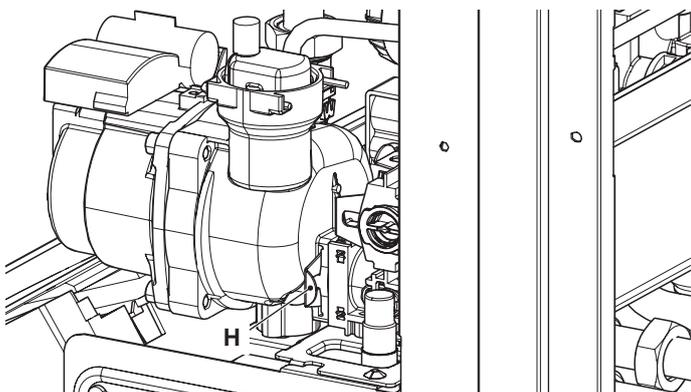


Figure 7.5

- 7 Unscrew the two screws that hold the pump on the frame and remove the pump.

Reassemble the pump carrying out the removal operations in the reverse order. When reassembling the pump, check the correct location of the O-ring gasket in the inlet port of the pump that seals the connection between the pump and the return water group.

## 7.4 Removal electrical capacitor



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

- 1 Remove the front and right hand side case panels.
- 2 Disconnect the connector G (Figure 7.4) following the indications given on the connector box.
- 3 Remove the connector I of the cover box by levering with a screwdriver in as shown in (Figure 7.6).

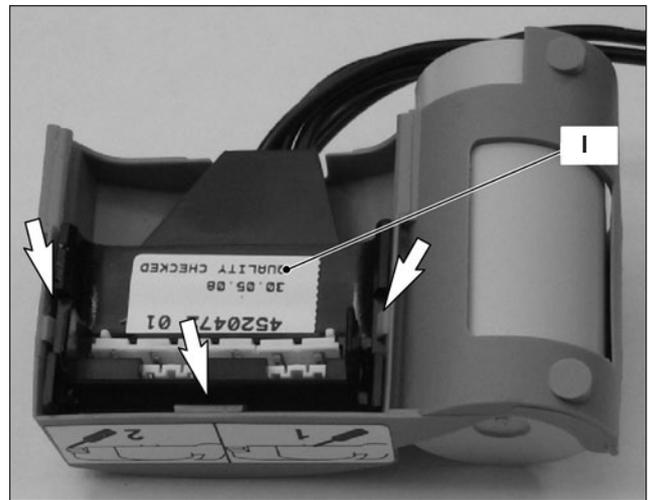


Figure 7.6

- 4 Remove the capacitor connection block J freeing it from the hook K and pulling it as indicated by the arrow (Figure 7.7).

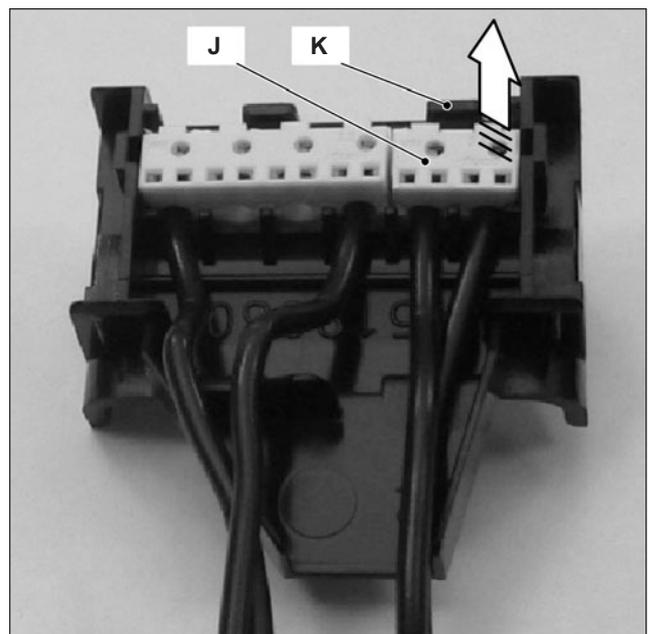


Figure 7.7

# THREE WAY DIVERTER VALVE

## 8 THREE WAY DIVERTER VALVE

### 8.1 Function

The diverter valve A (Figure 8.1) has the function of modifying the hydraulic circuit of the boiler by means of an electric command given by the electronic 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. heat exchanger.

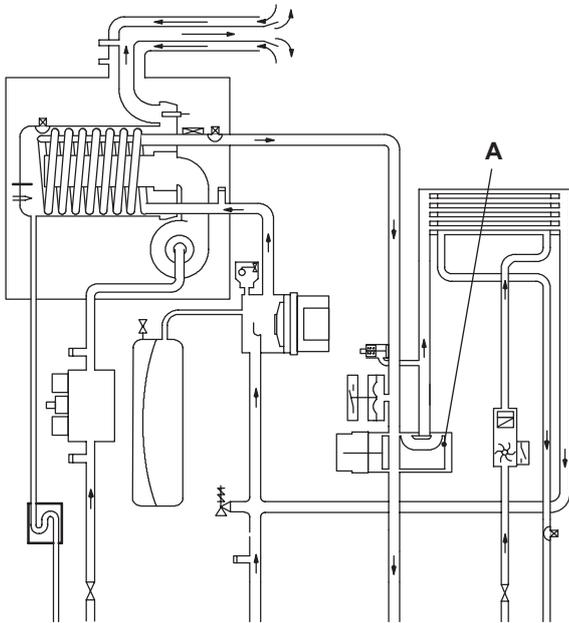


Figure 8.1

### 8.2 Checks



**Warning: check the electrical continuity.**

Figure 8.2 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 8.3 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.

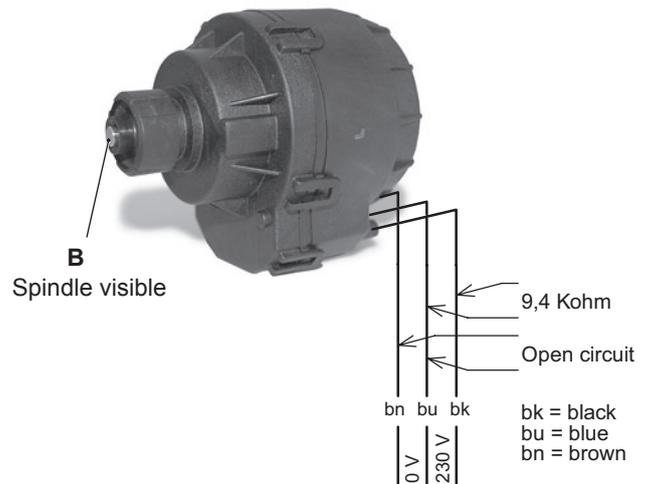


Figure 8.2 D.h.w. mode

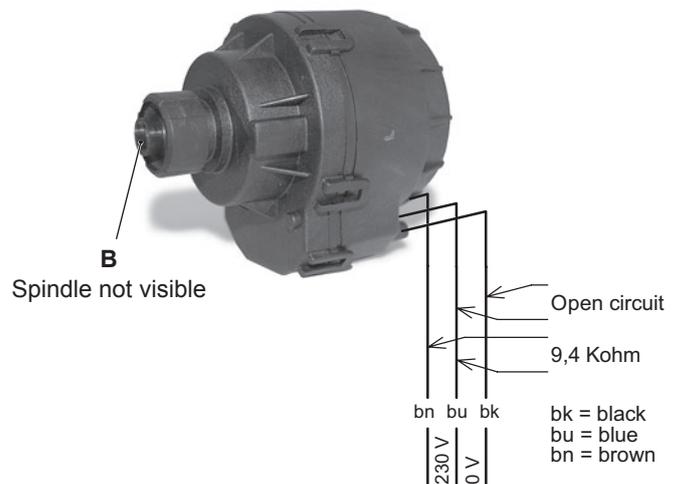


Figure 8.3 C.h. mode

### 8.3 Removal of the electric actuator



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

- 1 Remove the front case panel.
- 2 Disconnect the connectors C (Figure 8.4).
- 3 Remove the fixing spring D and remove the actuator B. Reassemble the actuator carrying out the removal operations in the reverse order. When reassembling the actuator, refer to Figure 8.2 or to the wiring diagram in section "Checks" page 17 for the correct wiring connection.

## THREE WAY DIVERTER VALVE

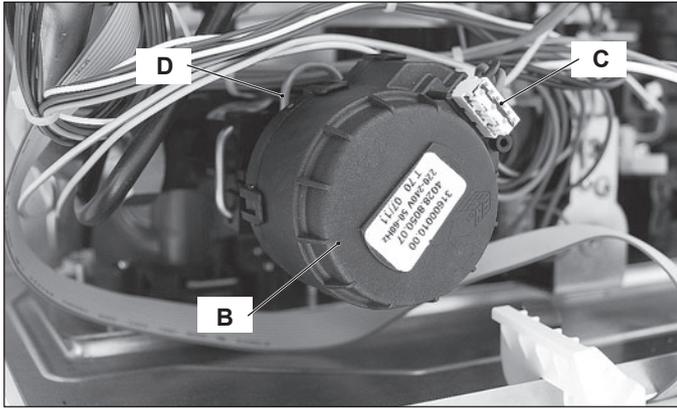


Figure 8.4

### 8.4 Removal of the tree way diverter valve

- 1 Remove the front and both side case panels.
- 2 Empty the primary circuit and the d.h.w circuit of the boiler.
- 3 Remove the electric actuator (section "Removal of the electric actuator" page 17).
- 4 Remove the fixing spring E (Figure 8.5)
- 5 Remove the tree way diverter valve F by levering with a screwdriver in as shown in Figure 8.5.

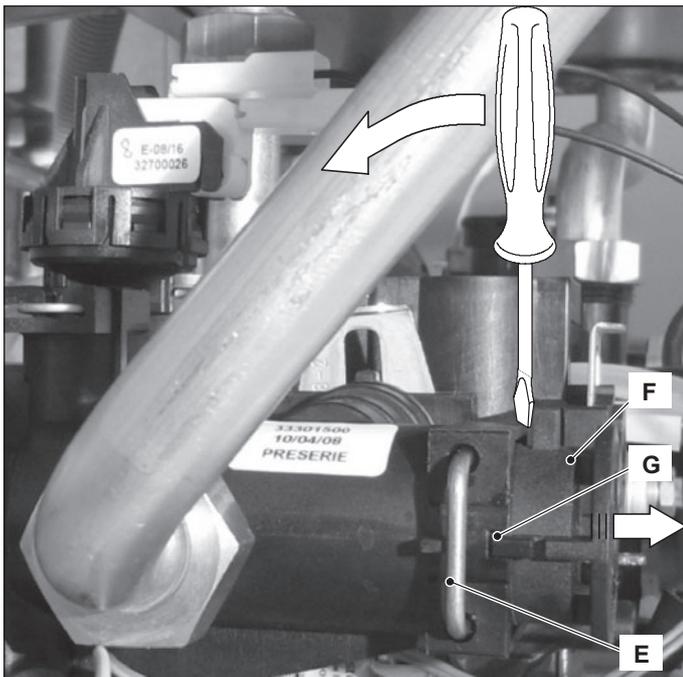


Figure 8.5

Reassemble the tree way diverter valve carrying out the removal operations in the reverse order.

 **Warning:** to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.

 **Warning:** When reassembling the tree way diverter valve be sure that the tree way diverter is correctly oriented by matching the reference G with the notch of the water group Figure 8.5.

### 8.5 Removal of the diverter group

- 1 Remove the front and both side case panels.
- 2 Empty the primary circuit and the d.h.w circuit of the boiler.
- 3 Remove the electric actuator (section "Removal of the electric actuator" page 17).
- 4 Remove the fixing spring H (Figure 8.6) and remove the primary circuit pressure switch I.



Figure 8.6

- 5 Disconnect d.h.w. temperature probe, respectively K (Figure 8.7).

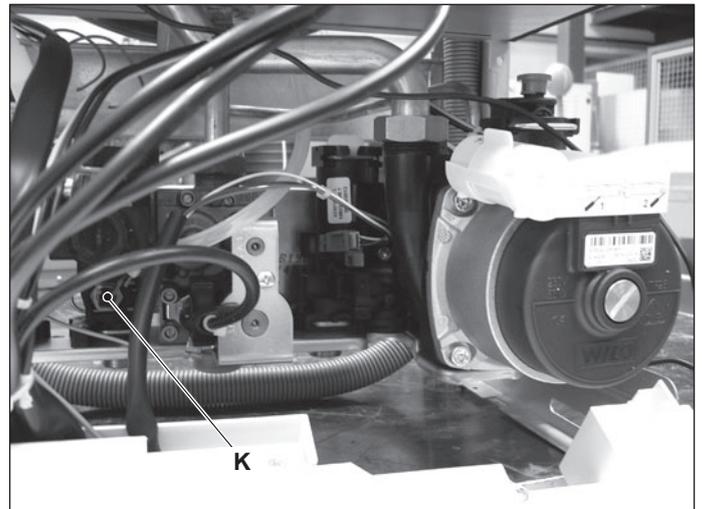


Figure 8.7

- 6 Unscrew the connector I (Figure 8.6), the c.h. flow connector and the d.h.w. outlet connector.
- 7 Remove the d.h.w. heat exchanger (section "Removal pump" page 15).
- 8 Unscrew the screws and remove the diverter group.
- 9 Reassemble the diverter group carrying out the removal operations in the reverse order.

 **Warning:** to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.

## 9 ELECTRONIC CONTROL/IGNITION P.C.B.

### 9.1 Function

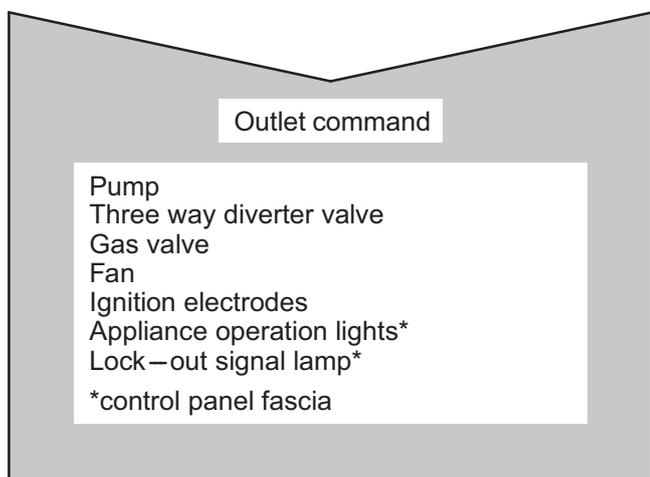
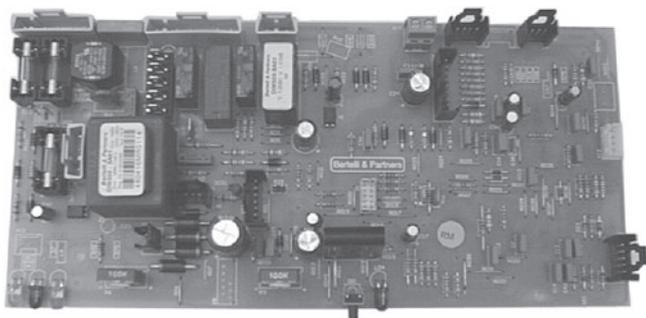
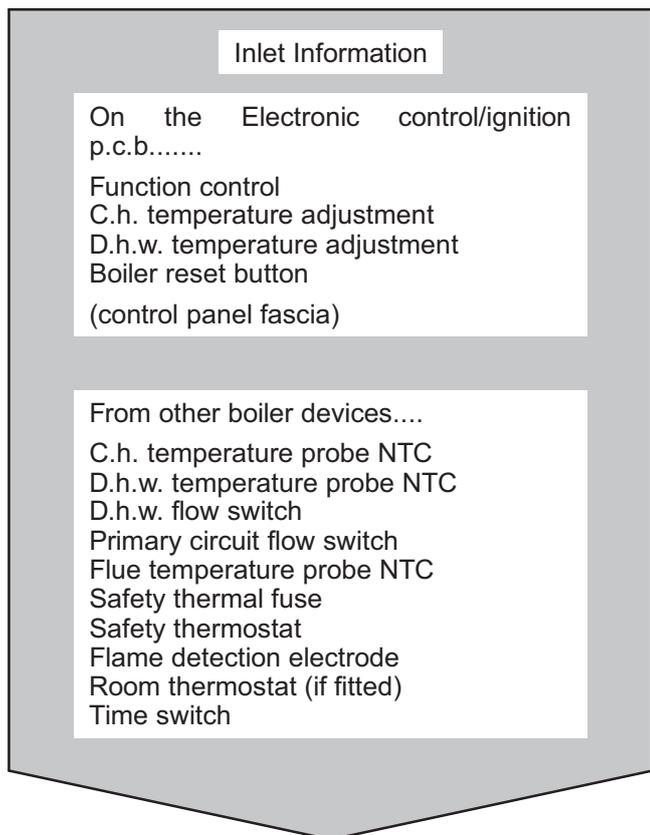


Figure 9.1

The fundamental function of the Electronic control/ignition 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 Electronic control/ignition 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 (Figure 9.1).

The Electronic control/ignition p.c.b. is also a full sequence ignition device and does a sequence of operations (ignition cycle) which lead to the ignition of the gas at the burner.

It checks the presence of the flame during the entire period in which it is activated and supplies the fan regulating its speed.

The Electronic control/ignition p.c.b. has a safety function and any incorrect interventions or tampering can result in conditions of dangerous functioning of the boiler.

The Electronic control/ignition p.c.b. 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 placed on the control panel fascia.

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 intervention of the flue temperature probe (overheat of the combustion products).
- A fault on gas supply.
- Faulty ignition (faulty ignition electrodes, their wiring or connection).
- Faulty flame detection (faulty detection electrode, its wiring or connection).
- Faulty condensate drainage.
- Faulty gas valve (faulty on-off operators or not electrically supplied).
- Faulty Electronic control/ignition p.c.b.

Other components like the primary circuit flow switch can temporarily stop the ignition of the burner but allow its ignition when the cause of the intervention has stopped.

Figure 9.23 and Figure 9.24 show the sequence of the operations that are carried out at the start of every ignition cycle and during normal functioning.

### 9.2 Selection and adjustment devices

On the Electronic control/ignition p.c.b. several selection, adjustment and protection devices are located. (Figure 9.2).

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

## ELECTRONIC CONTROL/IGNITION P.C.B.

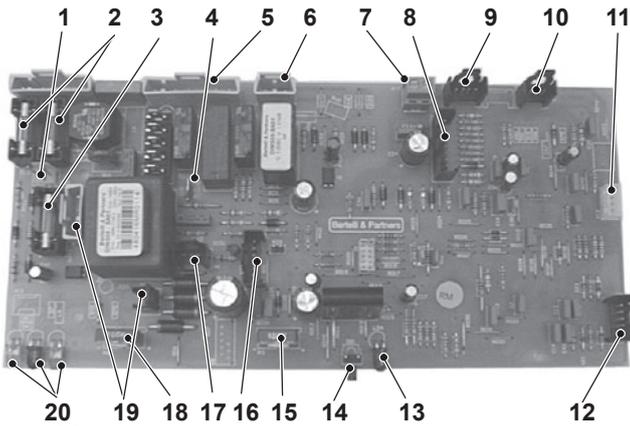


Figure 9.2

- 1 x7 - x16 connector - electric supply terminal block and external controls terminal block.
- 2 Fuse F1, F2 3,15 A F
- 3 Fuse F3, 400 mA T
- 4 x15 connector - flame detection electrode
- 5 x12 connector - pump and 3 way diverter valve
- 6 x17 connector - gas valve
- 7 x14 connector - external temperature probe (optional)
- 8 x9 connector - safety thermostat, flue temperature probe NTC, c.h. temperature probe NTC
- 9 x11 connector - d.h.w. temperature probe
- 10 x10 connector - d.h.w. flow switch
- 11 x13 connector - remote control (optional)
- 12 x2 connector - timer
- 13 Lock-out signal lamp
- 14 Boiler reset button
- 15 Function control / C.h. temperature adjustment
- 16 x22 connector - fan
- 17 x6 connector - spark generator
- 18 D.h.w. temperature adjustment
- 19 x5 - x24 connector - transformer
- 20 Appliance operation lights

### 9.3 Checking the temperature

The Electronic control/ignition 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 (15 and 18 in Figure 9.2) of the electronic 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.

During the c.h. operation (Figure 9.3), 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 ). The result of such a comparison operates the fan speed thus regulating the gas flow rate and consequently changing the useful output of the boiler.

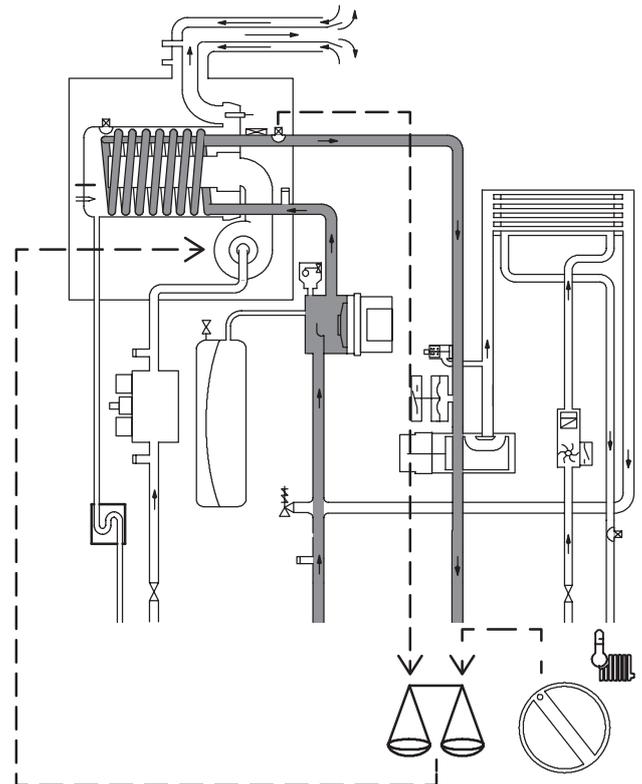


Figure 9.3

When the boiler functions in d.h.w. (Figure 9.4), the signal coming from the d.h.w. temperature probe is compared with the signal given by the control panel through the adjustment made by the user (knob ).

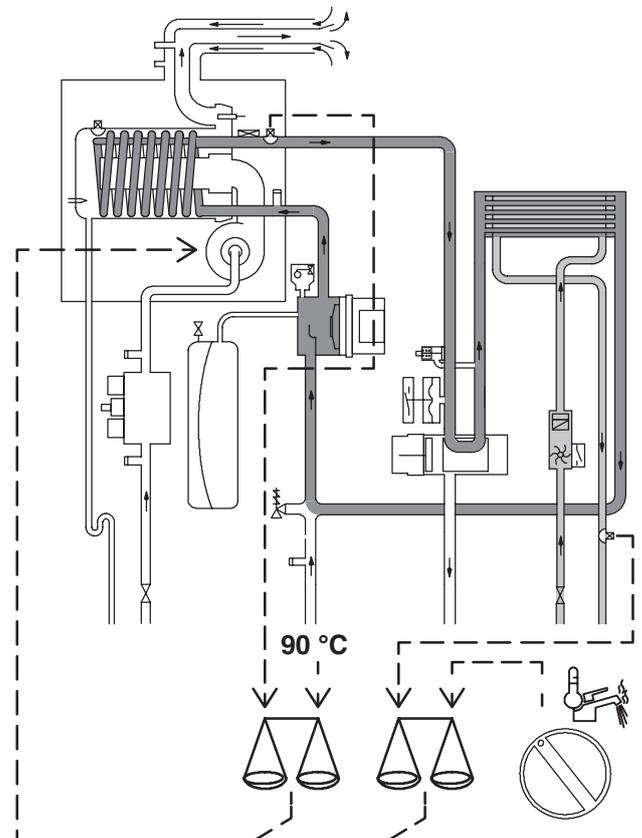


Figure 9.4

Normally, the result of the comparison between these two signals directly operates the fan speed adjusting the useful output gen-

# ELECTRONIC CONTROL/IGNITION P.C.B.

erated 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 90°C, the useful output is automatically reduced so that the primary circuit cannot reach excessive temperatures.

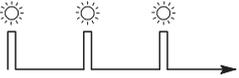
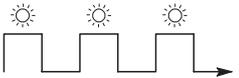
The control sequences in  function and in  function are illustrated in detail in sections 9.12 page 26 and 9.13 page 27.

## 9.4 Operation lights

The Electronic control/ignition p.c.b. is provided with three lamps (L.E.D. indicators) 20 in Figure 9.2 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 lamps indication and their meaning.

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

With the boiler switched ON ( or ) all the lamps (20 in Figure 9.2) 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
			Safety thermostat lock out
			Faulty fan control system

			
			Flue temperature probe NTC lock out
			Open flue temperature probe NTC
			Faulty external temperature probe NTC
			Flame detection error
			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 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.

## 9.5 Setting the boiler control function modes

It is possible to select the various boiler control function modes by using the function selector knob 7 and the D.h.w. temperature control knob 8 (Figure 9.5).

On model M110B.24SR/... the knob 8 is used just for boiler setting and doesn't affect the boiler functions during the normal operation.

During the function modes setting, the boiler does not operate.

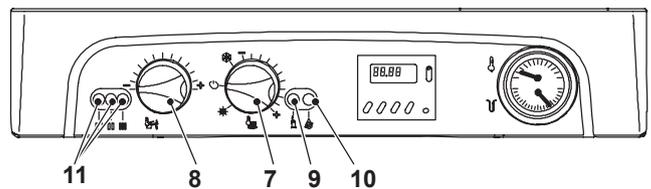


Figure 9.5

## 9.6 Adjustment of maximum useful output in c.h. mode

The following procedure allows the output of the boiler for c.h. to be limited to meet the system requirement. Adjusting the maximum useful output in c.h. mode does not prevent the boiler firing at maximum rate for d.h.w. production.

- 1 Turn the boiler ON positioning the function selector knob 7 as indicated in Figure 9.6.

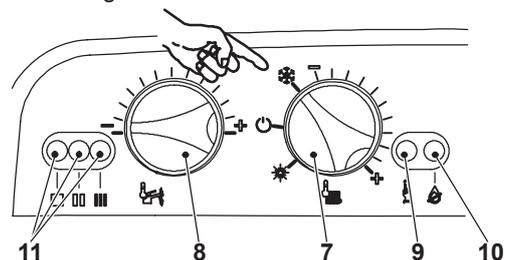


Figure 9.6

# ELECTRONIC CONTROL/IGNITION P.C.B.

- Keep pressed the reset button 9 for about 10 seconds until the lock-out signal lamp 10 blinks.
- The lamps 11 should give the indication as in Figure 9.7

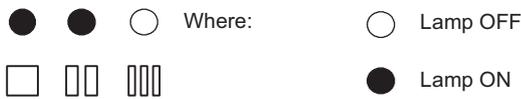


Figure 9.7

At this step it is possible to visualize the current setting by keeping the reset button 9 pressed for more than 5 seconds. The lamps will flash a number of times corresponding to the setting (Figure 9.8 and Figure 9.9).

- To change the setting turn the knob 8 on a position corresponding to the desired maximum useful output (Figure 9.8 and Figure 9.9). By turning the knob 8, the lock-out signal lamp 10 blinks quickly (2 per seconds) indicating that the setting has changed and must be memorised.

Knob position	Maximum useful output in c.h. mode non condensing kW (BTU/h)	
	M110B.24SM/... M110B.24SR/...	M110B.32SM/...
1	5,8 (19 789)	8,2 (27 977)
2	9,0 (30 707)	12,4 (42 307)
3	12,2 (41 625)	16,5 (56 296)
4	15,5 (52 884)	20,7 (70 626)
5	18,7 (63 802)	24,8 (84 614)
6	21,9 (74 720)	29,0 (98 944)
7	25,1 (85 638)	33,1 (112 933)

Figure 9.8

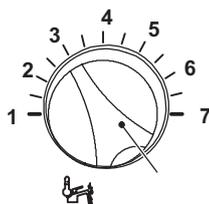


Figure 9.9

- To memorize the setting keep pressed the reset button 9 for about 5 seconds until the lights 11 briefly blinks simultaneously.
- To reset the boiler to the normal operation turn it OFF and ON by the function selector knob 7. In any case, the boiler automatically resets to its normal operation after 10 minutes.

## 9.7 Reignition frequency setting

It is possible to select the minimum time that must pass between two ignitions of the burner in c.h. function mode.

- Turn the boiler ON positioning the function selector knob 7 as indicated in Figure 9.10.

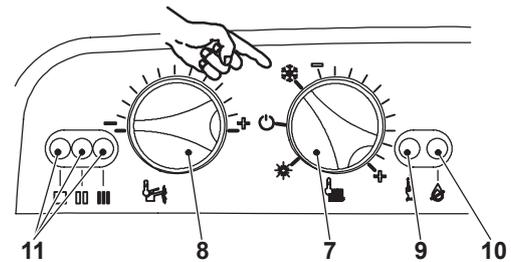


Figure 9.10

- Keep pressed the reset button 9 for about 10 seconds until the lock-out signal lamp 10 blinks.
- The lamps 11 should give the indication as in Figure 9.11

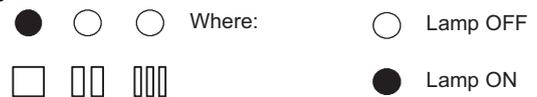


Figure 9.11

At this step it is possible to visualize the current setting by keeping the reset button 9 pressed for more than 5 seconds. The lamps will flash a number of times corresponding to the setting (Figure 9.12).

- To change the setting turn the knob 8 on a position corresponding to the desired delay. By turning the knob 8, the lock-out signal lamp 10 blinks quickly (2 per seconds) indicating that the setting has changed and must be memorised.

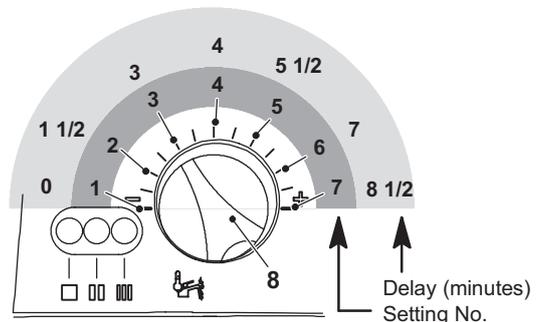


Figure 9.12

- To memorize the setting keep pressed the reset button 9 for about 5 seconds until the lights 11 briefly blinks simultaneously.
- To reset the boiler to the normal operation turn it OFF and ON by the function selector knob 7. In any case, the boiler automatically resets to its normal operation after 10 minutes.

Factory setting = 3 minutes

## 9.8 Combi / C.H. only mode setting

Two different options are available on the Electronic control/ignition p.c.b. and proper setting must be done after a replacement of the p.c.b.

- Remove the front panel of the case.
- Turn ON the power supply.
- Position the function selector 7 as in Figure 9.14 and disconnect the C.h. temperature probe. Lamps 11 give the indication as in Figure 9.13.

# ELECTRONIC CONTROL/IGNITION P.C.B.

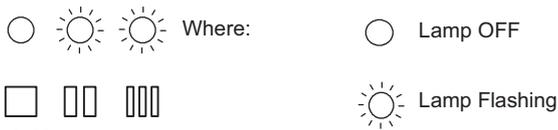


Figure 9.13

- Keep pressed the reset button 9 for about 10 seconds (Figure 9.14) until the lock-out signal lamp 10 blinks.
- Connect the c.h. temperature probe.

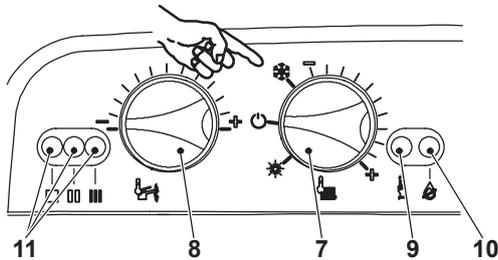


Figure 9.14

- Press the reset button 9 repeatedly (2 times) until the lamps 11 give the indication as in Figure 9.15 (boiler mode).

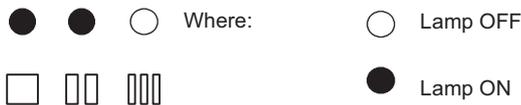


Figure 9.15

At this step it is possible to visualize the current setting by keeping the reset button 9 pressed for more than 5 seconds. The lamps 11 will flash a number of times corresponding to the setting (Figure 9.16).

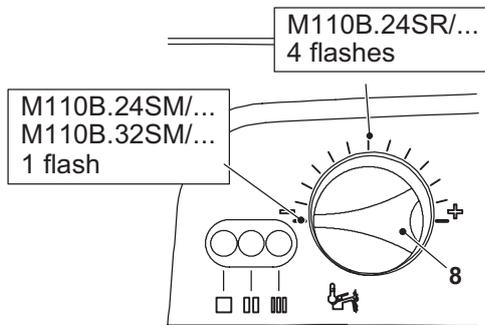


Figure 9.16

- To change the setting turn the knob 8 on a position corresponding to the boiler models (Figure 9.16). By turning the knob 8, the lock-out signal lamp 10 blinks quickly (2 per seconds) indicating that the setting has changed and must be memorised.
- To memorize the setting keep pressed the reset button 9 for about 5 seconds until the lights 11 briefly blinks simultaneously.
- Press the reset button 9 once until the lamps 11 give the indication as in Figure 9.17 (boiler mode).

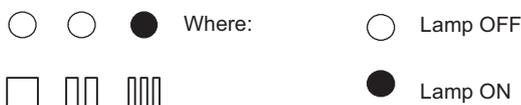


Figure 9.17

It's now possible to check the current setting by pressing reset button 9 for more than 5 seconds. The three lamps 11 will flash

a number of times corresponding to the setting as in Figure 9.16 (once for the combination and four times for system boilers). At this point only the right green light flashes.

- Turn the water control to minimum. Lock-out lamp blinks (2 per second) indicating the setting has changed
- To change the setting turn the knob 8 on a position corresponding to the boiler model (Figure 9.16).
- To memorize the setting keep pressed the reset button 9 for about 5 seconds until the lights 11 briefly blinks simultaneously. At this point only the right green light flashes.
- To reset the boiler to the normal operation turn it OFF and ON by the function selector knob 7.

## 9.9 Setting the d.h.w. flowmeter operation mode

When replacing the Electronic control/ignition p.c.b., it must be set for the correct operation of the d.h.w. flowmeter.

Note: the Electronic control/ignition p.c.b. spare part is factory set on mode 1.

For all the models covered by this manual:

- Turn the boiler ON positioning the function selector knob 7 as indicated in Figure 9.18.
- Turn knob 8 as indicated in Figure 9.18.

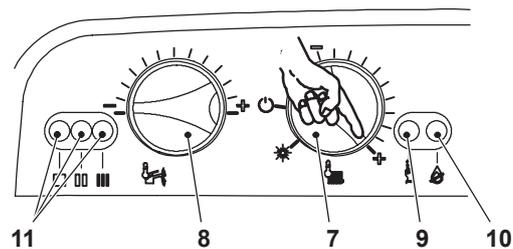


Figure 9.18

- Keep pressed the reset button 9 for about 10 seconds until the lock-out signal lamp 10 blinks.
- Press the reset button 9 repeatedly (4 times) until the lamps 11 give the indication as in Figure 9.19 (setting the d.h.w. flowmeter mode operation).

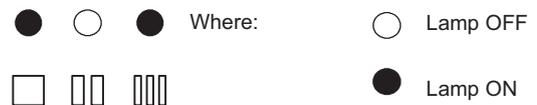


Figure 9.19

At this step it is possible to visualize the current setting by keeping the reset button 9 pressed for more than 5 seconds. The lamps 11 will flash a number of times corresponding to the setting (Figure 9.20).

- Change the setting by turning the knob 8 on the position corresponding to the desired setting (Figure 9.20). By turning the knob 8, the lock-out signal lamp 11 blinks quickly (2 per seconds) indicating that the setting has changed and must be memorised.
- To memorize the setting keep pressed the reset button 9 for about 5 seconds until the lights 11 briefly blinks simultaneously.

## ELECTRONIC CONTROL/IGNITION P.C.B.

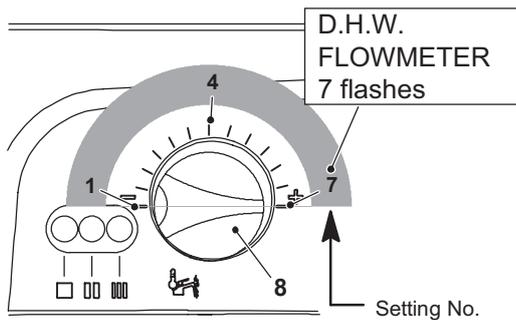


Figure 9.20

At this step it is possible to visualize the current setting by keeping the reset button 9 pressed for more than 5 seconds. The lamps 11 will flash a number of times corresponding to the setting of Figure 9.20 that must be seven times.

- To reset the boiler to the normal operation turn it OFF and ON by the function selector knob 7 checking the ignition pressure and that the burner lights up uniformly. In any case, the boiler automatically resets to its normal operation after 10 minutes.

### 9.10 Checks

- ✓ Check that the fuses are complete

If the Electronic control/ignition p.c.b. does not supply any device (pump, fan, etc.) check that the fuses 2 and 3 (Figure 9.2) are complete.

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

- ✓ Lock sequence

Start the boiler until the burner is ignited.

With the burner firing, interrupt the gas supply. The Electronic control/ignition p.c.b. must carry out three complete ignition cycles and then, after about 3 minutes, goes to lock-out state.

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.

### 9.11 Removal of the electronic control p.c.b



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

When replacing the Electronic control/ignition p.c.b. it is advisable to go through the setting modes of the boiler here described in sections 9.5 to 9.7.

The spare electronic control/ignition p.c.b. is set for natural gas. If the boiler is fed with different gas type, go through the *Gas conversion operations* described in the *Installation manual*. If an external temperature probe (optional) is fitted, the coefficient K has also to be set as described in the *Commissioning chapter* of the installation manual.

- Gain access to the parts located inside the control panel as explained in the section "Control panel" page 5.
- Remove all the wiring connected to the Electronic control/ignition p.c.b.  
To disconnect the connectors delicately flex the hook present on one side of each socket.

- 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 9.21.

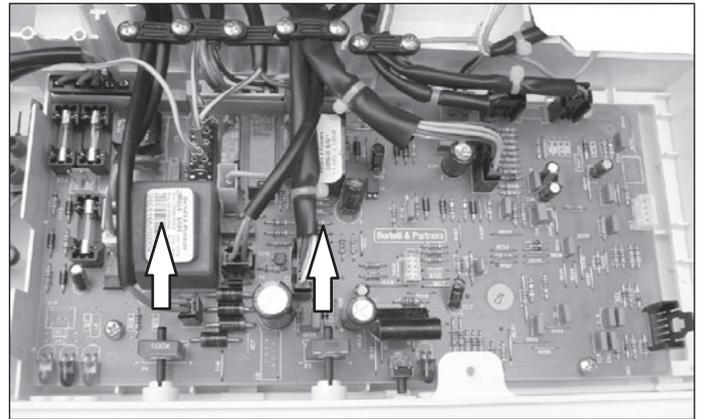


Figure 9.21

- Unscrew the four screws that hold the Electronic control/ignition p.c.b. on to the control panel.
- Remove it by lifting its rear edge and freeing it from any of the wiring.
- Re-assemble the Electronic control/ignition p.c.b. following the removal procedures in the reverse order.

### Important

When re-assembling the Electronic control/ignition p.c.b.:

- It is not necessary to utilise static protections but it is advisable to ensure that the p.c.b. is handled with care and held at the edges and with clean dry hands.
- 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.
- Insert the spindles in the control panel knobs until the notch A (Figure 9.22) reaches the potentiometer edge. It is not necessary to force them in the knob.
- While tightening the screws that fix the Electronic control/ignition 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 B and the tab C (Figure 9.22).

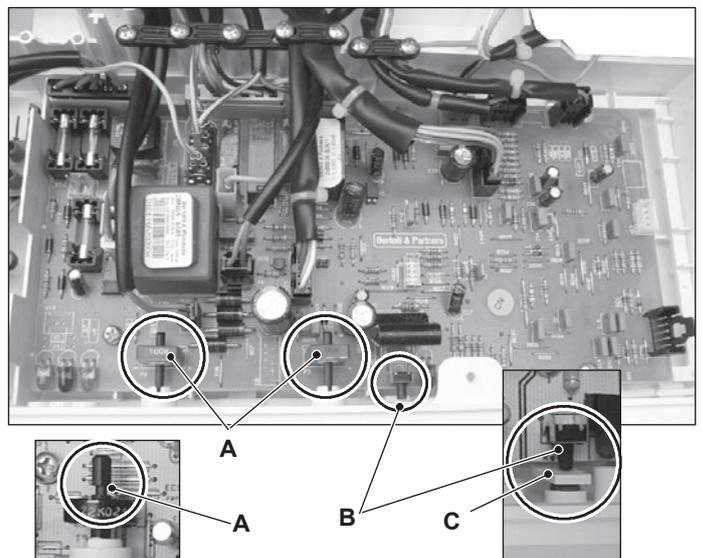


Figure 9.22

### Attention

After installing the Electronic control/ignition p.c.b.:

- 11 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.
- 12 Make sure that the settings comply with the indications given in section "Setting the boiler control function modes" page 21.
- 13 Operate the boiler and close the gas inlet cock 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.



**Warning:** After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis as detailed in section "Removal" page 32.



## 9.13 Thermal control in the ❄️ mode

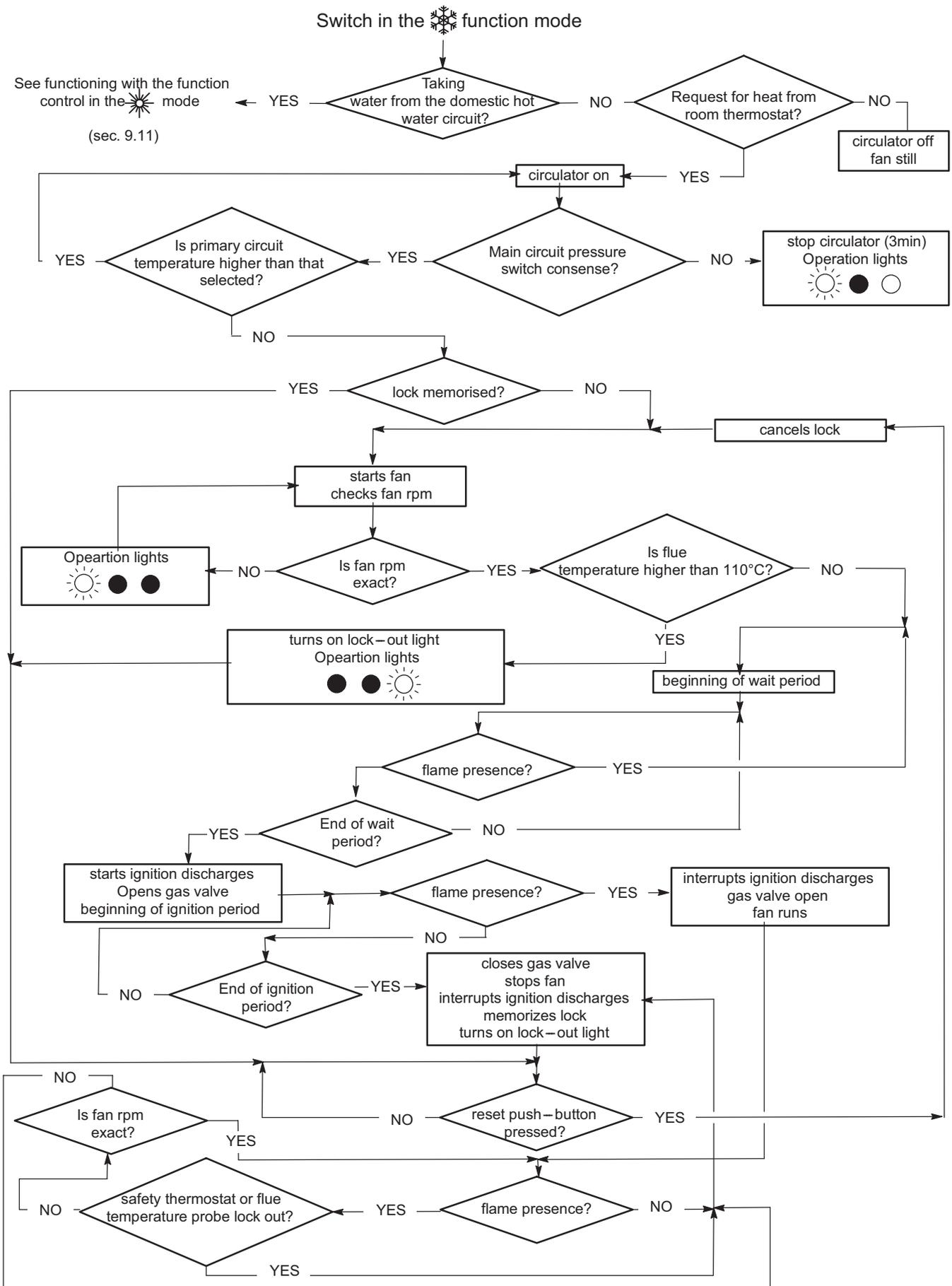


Figure 9.24

# TRANSFORMER

## 10 TRANSFORMER

### 10.1 Removal

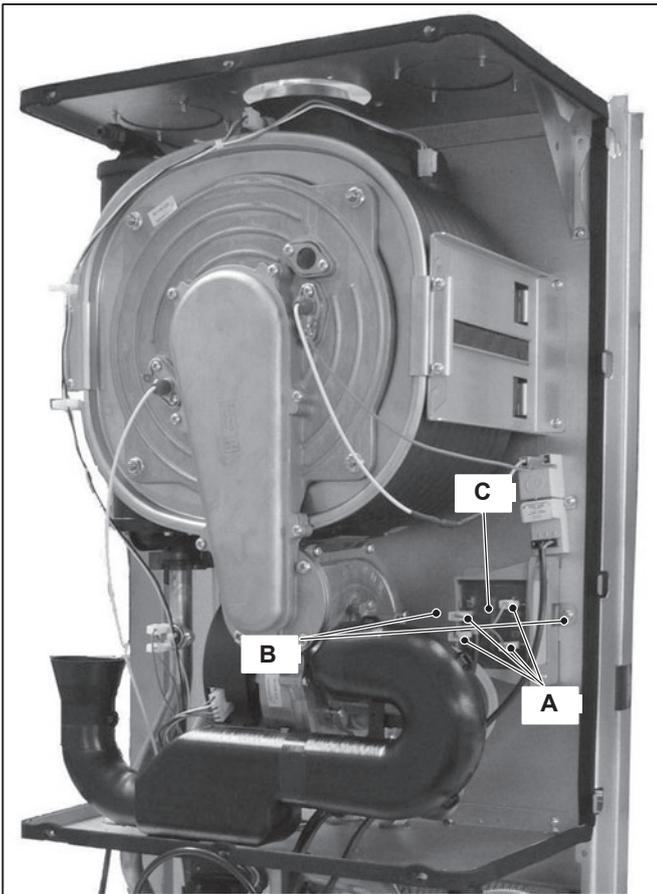


Figure 10.1



**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 (see section "General access and emptying hydraulic circuits" page 5).
- 2 Disconnect the four connectors A.
- 3 Unscrew the screws B and remove the Transformer C by sliding it forward.
- 4 Reassemble the Transformer carrying out the removal operations in the reverse order.

After reassembling ensure the wires are correctly connected (see Figure 10.2).

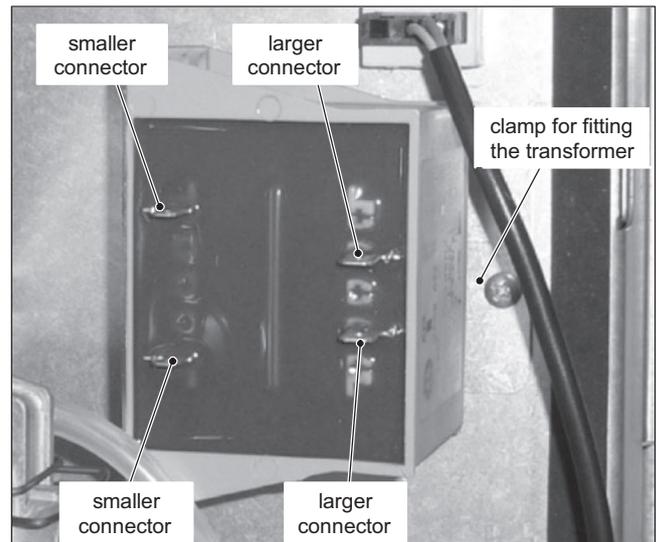


Figure 10.2

### 10.2 Check the transformer



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

- 1 Remove the Transformer (see section "Removal" page 28)
- 2 Measure the electrical resistance of the primary and secondary windings.  
The primary should have a resistance approx. 35 ohm and the secondary approx. 1,4 ohm.

## 11 GAS VALVE

### 11.1 Function

The gas valve A in Figure 11.1 controls the gas inflow to the boiler burner.

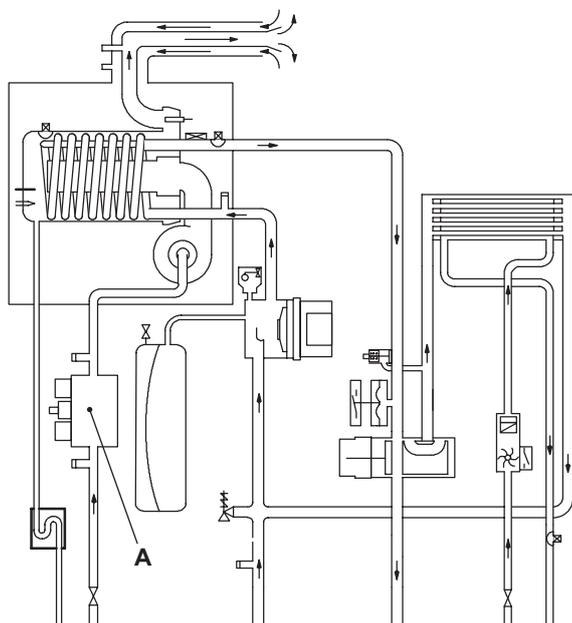


Figure 11.1

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

### 11.2 Nomenclature of the parts

- (Figure 11.2)

- B Maximum gas pressure adjustment
- C Minimum gas pressure adjustment
- D On-off operators
- E On-off operators electric connector
- F Gas valve inlet pressure test point

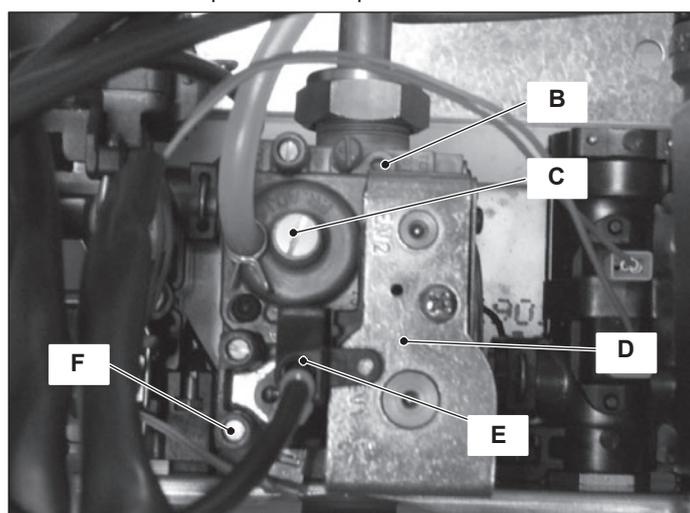


Figure 11.2

### 11.3 Adjustment



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

**Check the supply pressure before making any adjustment to the gas valve.**

- 1 Close the gas inlet valve.
- 2 Remove the front panel of the case and lower the control panel (see sections "Body panels" and "Control panel" page 5).
- 3 Loosen the internal screw on the Inlet Pressure Test Point F (Figure 11.2) of the Gas valve and connect a pressure gauge using a suitable hose.
- 4 Open the gas inlet valve.
- 5 Turn on the electricity supply to the boiler, switching on the fused spur isolation switch. The appliance operation light on the left will flash every 4 seconds.
- 6 Set the function knobs as illustrated in Figure 11.4.
- 7 Open at least one hot water tap fully.
- 8 Read the inlet pressure value and ensure that it is within the limits given in the table *Gas supply pressures*, of the user/installation manual. If it does not comply with the required pressure check the gas supply line and governor for faults and/or correct adjustment.
- 9 Switch off the boiler, close the gas inlet valve and close the water tap.
- 10 Disconnect the pressure gauge and close the Inlet Pressure Test Point F (Figure 11.2).

#### Gas valve adjustment



The person carrying out a combustion measurement should have been assessed as competent in the use of a flue gas analyser and the interpretation of the results. The flue gas analyser used should be one meeting the requirements of BS7927 or BS-EN50379-3 and be calibrated in accordance with the analyser manufacturers' requirements, and have a current calibration certificate.

- 11 Fit the probe of the flue analyser in the flue exhaust sampling point located on the exhaust pipes of the boiler (Figure 11.3).

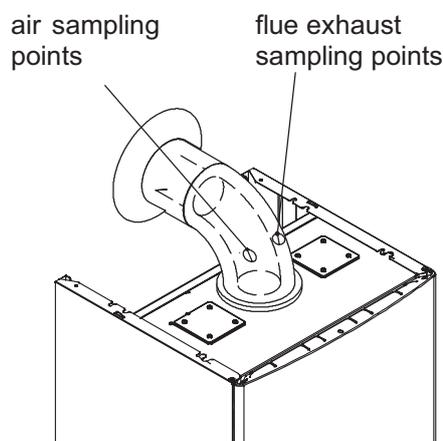


Figure 11.3

- 12 Turn on the boiler, switching on the fused spur isolation switch.
- 13 Open the gas inlet valve.
- 14 Set the function knob 8 as indicated in Figure 11.4. The appliance operation light on the left will flash every 4 seconds.

# GAS VALVE

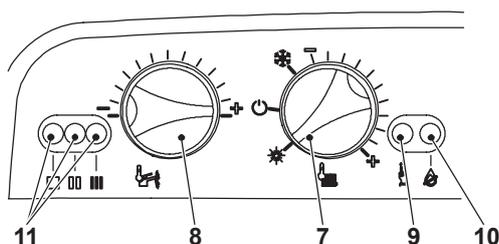


Figure 11.4

15 Keep pressed the reset button 9 for about 10 seconds (Figure 11.4) until the lock-out signal lamp 10 blinks.

16 The lamps 11 should give the indication as in Figure 11.5.

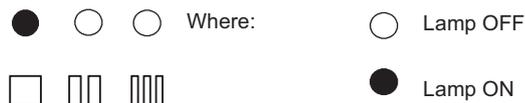


Figure 11.5

17 Release and keep the reset button 9 pressed for more than 5 seconds until the lock-out signal lamp 10 is switched off. The boiler will now go through an ignition sequence and the burner will light.

18 Open at least one hot water tap fully.

### Adjusting minimum gas valve setting

19 Set the knob 8 to the minimum position as illustrated in Figure 11.6.

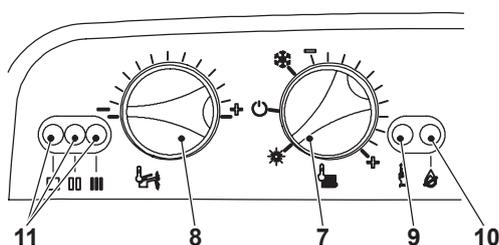


Figure 11.6

20 Allow the analyser to give a stable reading.

21 Read the CO<sub>2</sub> % value. It should be between 9,0 and 9,8 % (natural gas G20) or between 10,0 and 11,0 % (LPG G31). To adjust the CO<sub>2</sub> % value remove the brass plug by unscrewing it and rotate the Allen key screw  $\varnothing$  4 mm (C - Figure 11.2) (by rotating it clockwise the CO<sub>2</sub> % increases).

### Checking the maximum gas valve setting

22 Set the knob 8 to the maximum position as illustrated in Figure 11.4.

23 Allow the analyser to give a stable reading.

24 Read the CO<sub>2</sub> % value. It should be between 9,0 and 9,8 % (natural gas G20) or between 10,0 and 11,0 % (LPG G31). To adjust the CO<sub>2</sub> % value rotate screw (B - Figure 11.2) (by rotating it clockwise the CO<sub>2</sub> % decreases).

25 Switch off the boiler and turn off the hot water tap(s).

26 Close the air-flue sampling points.

27 After adjustment fit the protective brass plug (C - Figure 11.2).

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

### 11.4 Checks



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

✓ Check the on-off operators coils

- 1 Remove the front panel of the case.
- 2 Disconnect the electrical connector E (Figure 11.2).
- 3 Measure the electrical resistance between the connector pins of the on-off operators as illustrated in Figure 11.7.

Upper on-off operator  
approx. 6400  $\Omega$ \*

Lower on-off operator  
approx. 920  $\Omega$ \*

\*at ambient temperature.

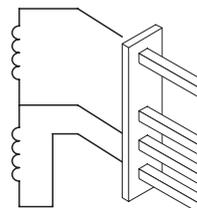


Figure 11.7

### 11.5 Removal of the gas valve



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

- 1 Remove the front panel of the case as explained in the section "Control panel" page 5, and the sealed chamber lid.
- 2 Remove the screw G and disconnect the connector H (Figure 11.8).

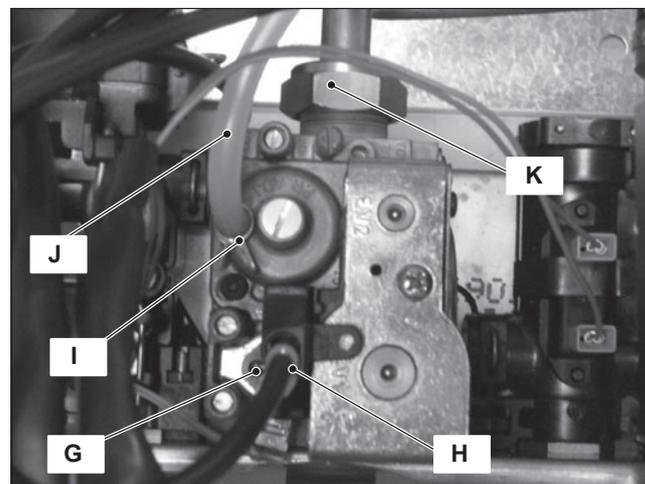


Figure 11.8

- 3 Turn off the gas supply and disconnect the gas isolation cock connector from the inlet port of the gas valve.
- 4 Using pliers, remove the spring I and the rubber pipe J (Figure 11.8).
- 5 Unscrew the connector K (Figure 11.8), remove the fixing fork L and remove the pipe M (Figure 11.9).

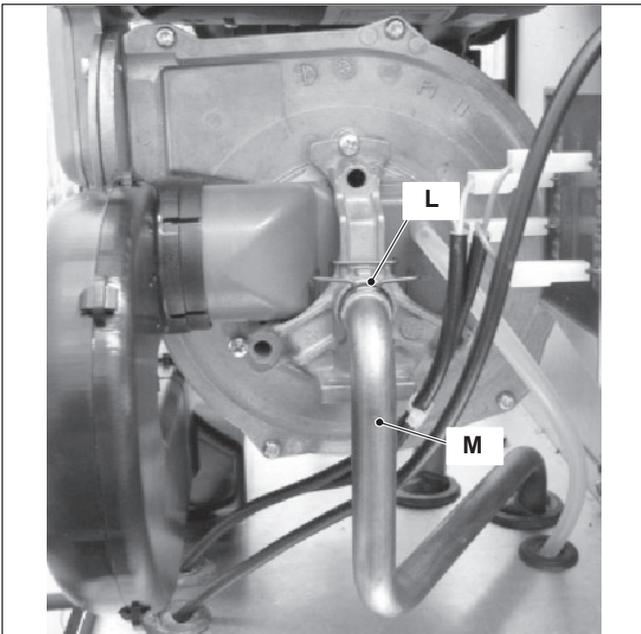


Figure 11.9

- 6 Unscrew the screws N and remove the valve (Figure 11.10).
- 7 Reassemble the valve carrying out the removal operations in reverse order.

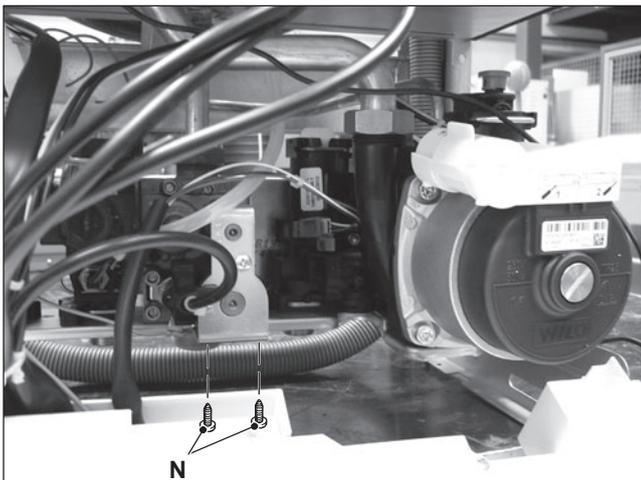


Figure 11.10

Before fitting a new gas valve, it is advisable to pre-set it as hereafter explained.

- 8 Remove the brass plug and turn the plastic screw inside it fully clockwise until it stops. Do not over tight.
- 9 Turn it counter-clockwise 2 and 3/4 turns.
- 10 Adjust the gas valve using the flue analyser as described in section "Adjustment" page 29.

**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, it is deemed necessary to undertake a combustion analysis as detailed in section "Adjustment" page 29.

# PRIMARY CIRCUIT FLOW SWITCH

## 12 PRIMARY CIRCUIT FLOW SWITCH

### 12.1 Function

The Primary circuit flow switch (A in Figure 12.1) function is to detect water flow rate through the primary hydraulic circuit of the boiler.

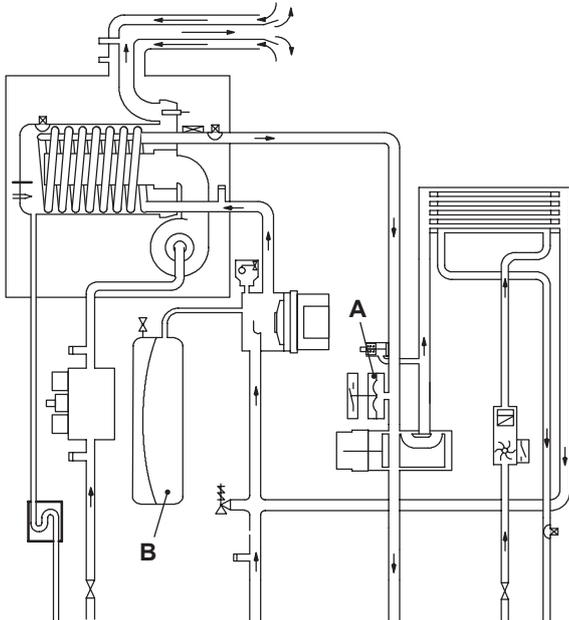


Figure 12.1

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 20 seconds the control board will indicate that a fault condition (see section "Operation lights" page 21) has occurred.

### 12.2 Checks



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

#### ✓ 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 Measure the electrical resistance between the tabs marked C and N.O. (Figure 12.2).  
The contact must close (resistance zero) with c.h. pressure of 0,35 bar or higher.

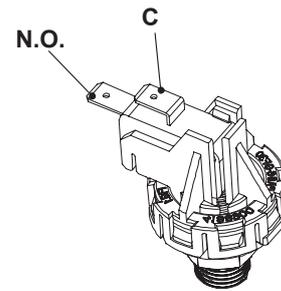


Figure 12.2

### 12.3 Removal



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

- 1 Remove the front and right hand side panels of the case, turn off the flow and return isolation valves and empty the primary circuit.
- 2 Remove the fixing spring D (Figure 12.3) and remove the primary circuit pressure switch E.
- 3 Disconnect the connectors.



Figure 12.3

- 4 Reassemble the primary circuit pressure switch in reverse order of removal.



**Warning:** to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.

# EXPANSION VESSEL AND TEMPERATURE-PRESSURE GAUGE

## 13 EXPANSION VESSEL AND TEMPERATURE-PRESSURE GAUGE

### 13.1 Function

The Expansion vessel (B in Figure 12.1 function is to allow for the volume expansion of the c.h. circuit water due to the temperature rise.

### 13.2 Checks

- 1 Turn off the flow and return isolation valves and empty the primary circuit of the boiler.
- 2 Remove the protective cap F (Figure 13.1) from the valve on the top of the expansion vessel and connect a suitable air pressure gauge.

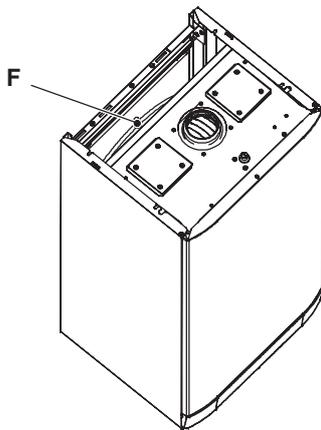


Figure 13.1 Rear view of the boiler

- 3 Check the pre-load pressure and refer to the section *Expansion vessel* in the *User manual and installation instructions* for the correct value.

### 13.3 Removal of the expansion vessel

If there is at least 400 mm clearance above the boiler and the rear exit flue can be easily removed, the expansion vessel can be changed without removing the boiler.



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

- 1 Remove the front and left hand side panels of the case, turn off the flow and return isolation valves and empty the primary circuit.
- 2 Completely unscrew the connection G, the locknut H (Figure 13.2) and remove the expansion vessel from the top of the boiler.

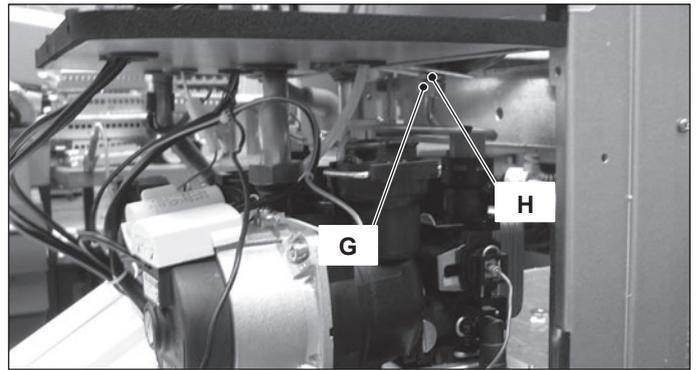


Figure 13.2

- 3 Re-assemble the parts in reverse order of removal.

### 13.4 Removal of the temperature-pressure gauge

- 1 Remove the front and right hand side panels of the case, turn off the flow and return isolation valves and empty the primary circuit.
- 2 Remove the fork I and the probe holder spring J (Figure 13.3).
- 3 Squeeze the tabs K to release the temperature-pressure gauge L and remove it.
- 4 Re-assemble the parts in reverse order of removal.

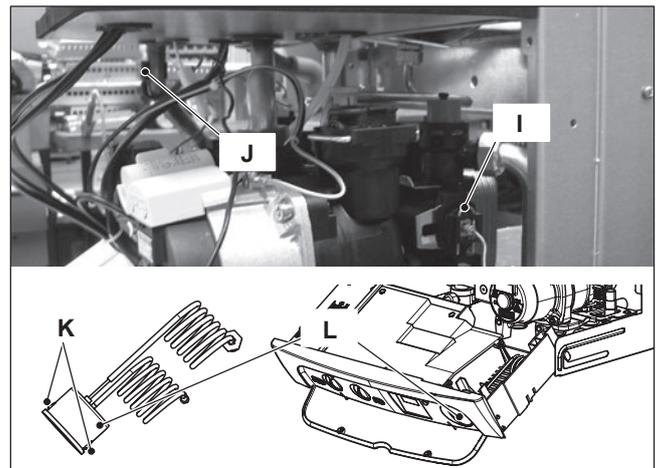


Figure 13.3

# D.H.W. FLOW SWITCH, FILTER AND FLOW LIMITER

## 14 D.H.W. FLOWMETER, FILTER AND FLOW LIMITER

### 14.1 Function

The d.h.w. flowmeter A in Figure 14.1 is a device that generates an electrical signal when hot water is drawn.

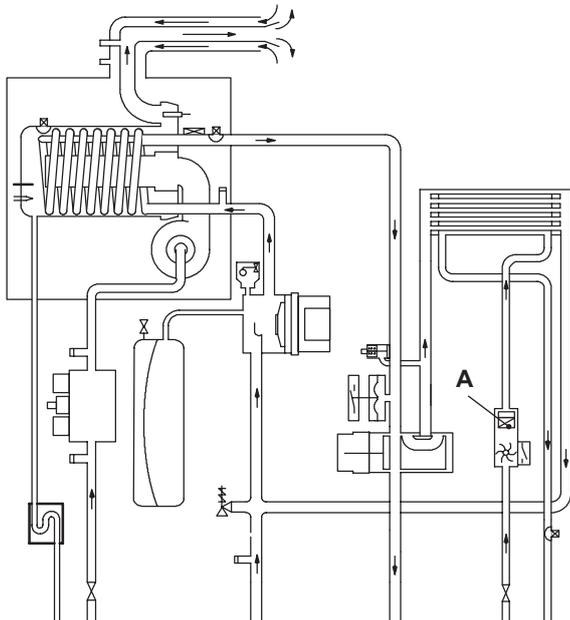


Figure 14.1

When the flow rate through the d.h.w. circuit reaches about 2,5 litres/min', the sensor closes the electric contact that switches the boiler d.h.w operation ON.

### 14.2 Description and location of parts - (Figure 14.2)

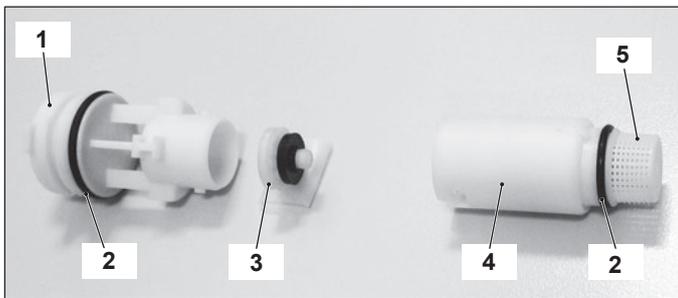


Figure 14.2

- 1 Flow switch plug
- 2 O-ring
- 3 Flow limiter (optional accessory)
- 4 Body with flow meter turbine
- 5 Filter

### 14.3 Removal of the sensor

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

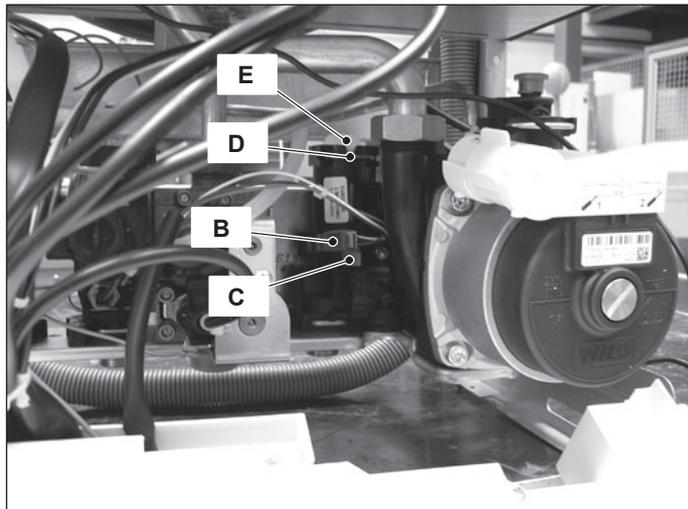


Figure 14.3

- 1 Remove the front panel of the case.
- 2 Disconnect the connectors B and remove the sensor holder C (Figure 14.3).
- 3 Remove the sensor.

### 14.4 Checks



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

#### ✓ Sensor operation

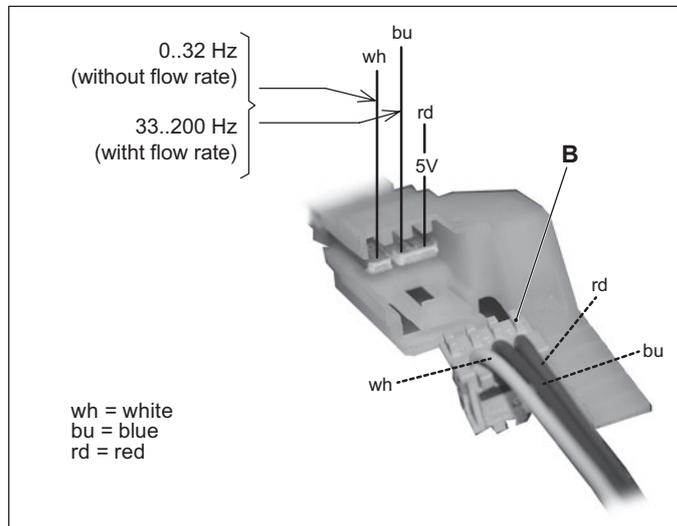


Figure 14.4

- 1 Remove the front panel of the case.
- 2 Don't disconnect the connectors B
- 3 Measure the electrical frequency at the leads of the sensor. Without flow rate the electrical frequency must be 0÷32Hz. With flow rate the electrical frequency must be 33÷200Hz.

### 14.5 Removal of the flow switch group and d.h.w. circuit filter



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

---

## D.H.W. FLOW SWITCH, FILTER AND FLOW LIMITER

---

- 1 Remove the front panel of the case and empty the d.h.w. circuit.
- 2 Remove the fork D and pull up the flow switch plug E (Figure 14.3) with the help of a screwdriver.
- 3 To remove the body 4 with the filter from the flow switch group rotate the flow switch plug 1 (Figure 14.5).
- 4 Reassemble the parts following the removing sequence in reverse order.

### 14.6 Flow limiter

The M296.24SM/C model is factory fitted with a 10 litres/min. flow limiter (white).

To install the flow limiter:

- 1 Remove the flow switch group as explained in the section 14.5.
- 2 Rotate the flow switch plug 1 to separate it from the body 4 (Figure 14.5).

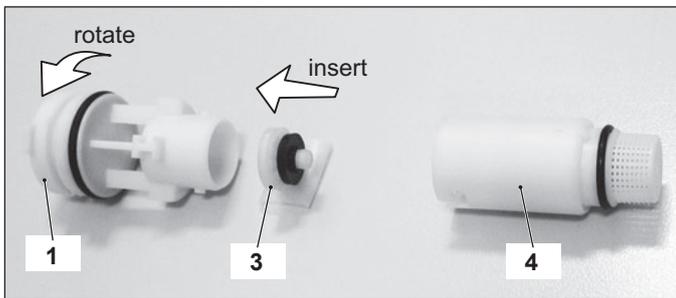


Figure 14.5

- 3 Insert the flow limiter 3 as shown in Figure 14.5.
- 4 Reassemble the group following the above sequence in reverse order.

# TEMPERATURE PROBE

## 15 TEMPERATURE PROBE

### 15.1 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 15.1.

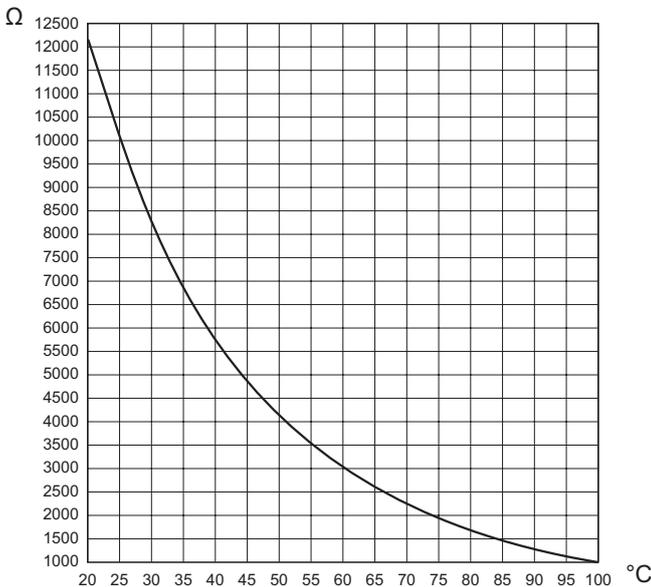


Figure 15.1

On the boiler there are two Temperature probes. One on the output of the primary heat exchanger (c.h. Temperature probe) A in Figure 15.2 and Figure 15.3; one on the output of the d.h.w. heat exchanger (d.h.w. Temperature probe) B in Figure 15.2 and Figure 15.4.

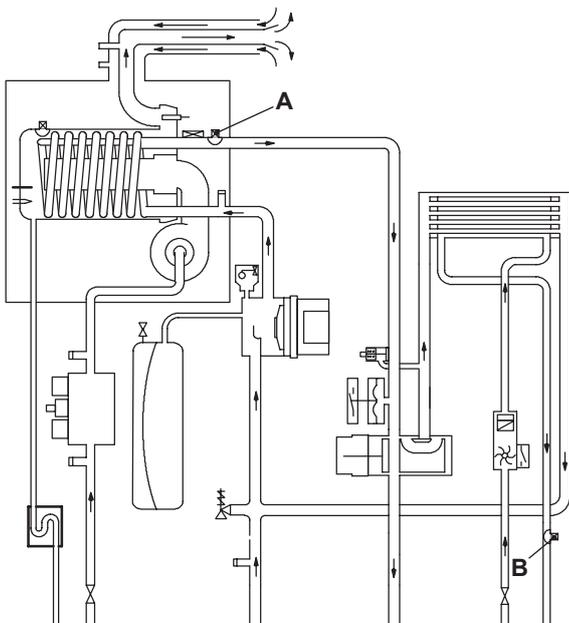


Figure 15.2

### 15.2 Checks

✓ 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 pipe near the Temperature probe and check the electrical resistance according to the graph in Figure 15.1.

### 15.3 Removal of the c.h. Temperature probe



**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 (see section "General access and emptying hydraulic circuits" page 5).
- 2 Empty the primary circuit of the boiler.
- 3 Remove the electric connector C and remove the c.h. temperature probe D - Figure 15.3.
- 4 Reassemble the c.h. temperature probe carrying out the removal operations in reverse order.

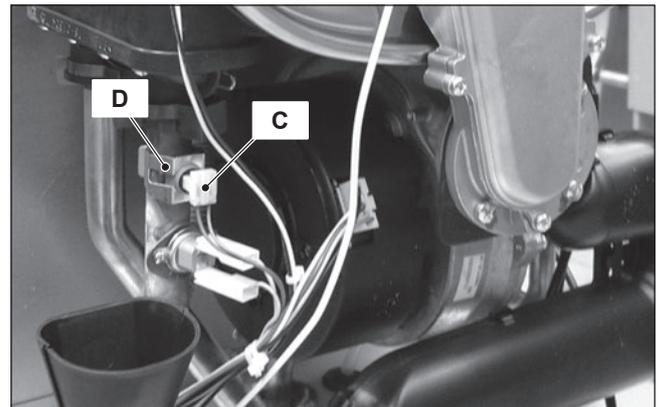


Figure 15.3

### 15.4 Removal of the d.h.w. Temperature probe



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

- 1 Remove the front panel of the case.
- 2 Remove the electric connector E (Figure 15.4)
- 3 Remove the fork F and pull the d.h.w. Temperature probe G.
- 4 Reassemble the d.h.w. Temperature probe carrying out the removal operations in reverse order.



**Warning: to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.**

---

## TEMPERATURE PROBE

---

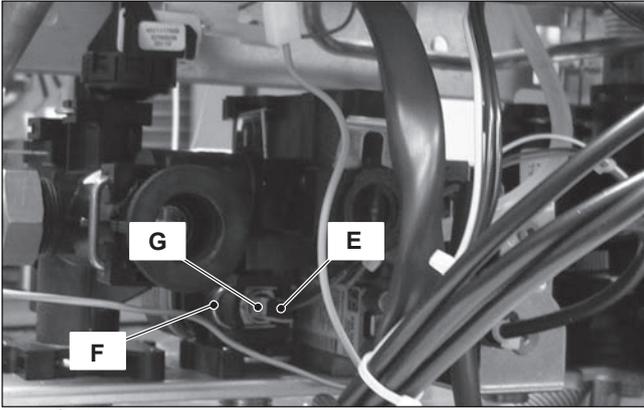


Figure 15.4

# BY-PASS VALVE

## 16 BY-PASS VALVE

### 16.1 Function

The By-pass valve A in Figure 16.1 is located between the c.h. water flow and return and its function is that of guaranteeing a minimum flow across the primary heat exchanger if the circulation across the c.h. system is completely closed.

The By-pass valve is fitted on the rear side of the diverter group.

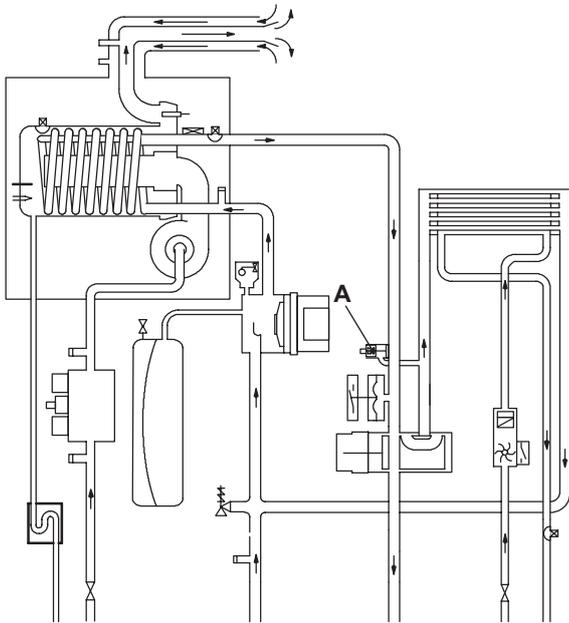


Figure 16.1



**Warning:** to lubricate the O-ring gaskets exclusively use a silicone base grease compatible to be in contact with foods and approved by the local water Authorities.



**Attention:** when reassembling the By-pass valve be sure that it is correctly oriented by matching the reference C with the notch D of the water group Figure 16.3.

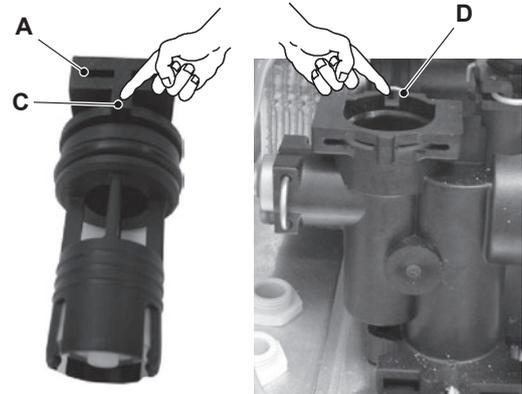


Figure 16.3

### 16.2 Removal



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

- 1 Remove all the case panels.
- 2 Empty the primary circuit of the boiler.
- 3 Remove the locking plate B and pull up the by-pass valve A (Figure 16.2).

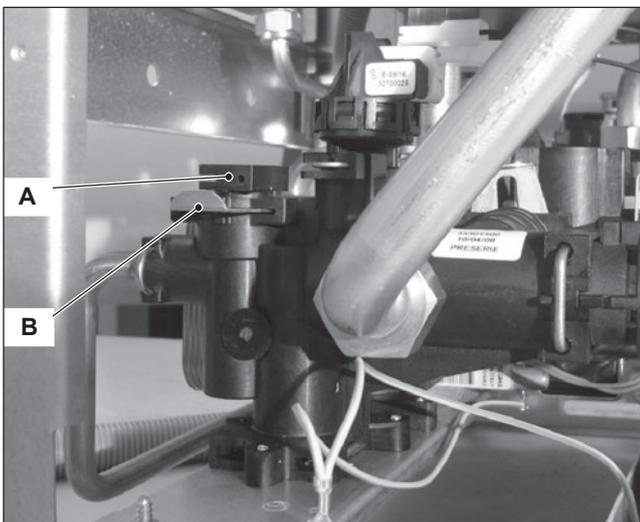


Figure 16.2

- 4 Reassemble the by-pass valve as illustrated in Figure 16.2 reversing the order of removal.

# FAN AND AIR BOX

## 17 FAN AND AIR BOX

### 17.1 Function

The function of the Fan A (Figure 17.1) is to force the mixture of air and gas into the burner.

The function of the Air box B is to mix the gas and the air in the right proportion.

The flow rate of the air-gas mixture and consequently the input power of the boiler is proportional to the speed of the fan that is controlled by the electronic control p.c.b.

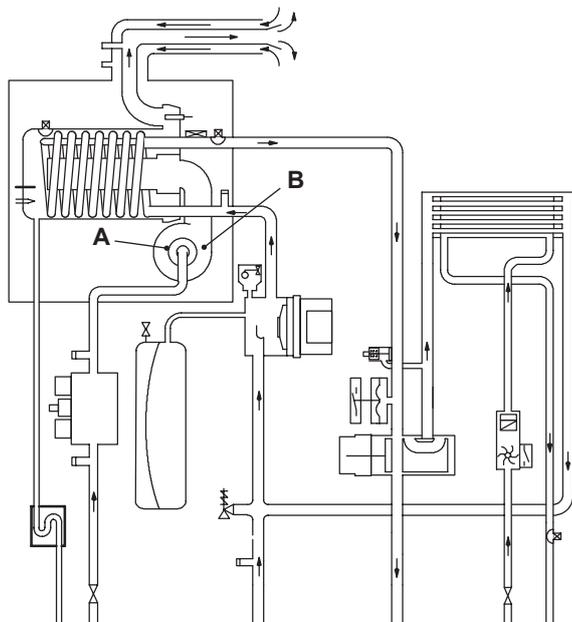


Figure 17.1

### 17.2 Removal of the Air box and the Fan



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

- 1 Turn off the gas supply.
- 2 Remove all the case panels and the sealed chamber lid (see section "General access and emptying hydraulic circuits" page 5).

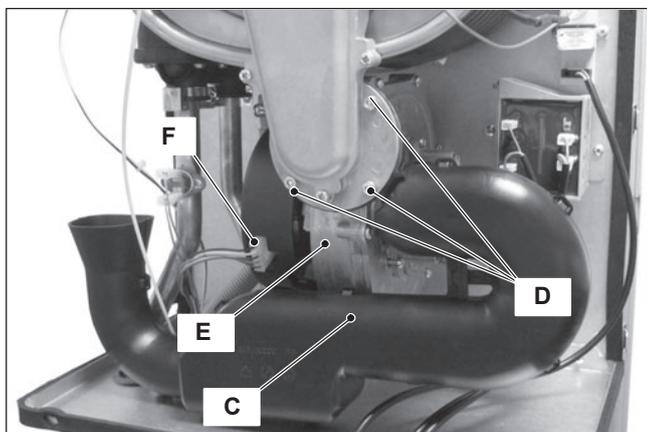


Figure 17.2

- 3 Disconnect the air manifold C (Figure 17.2) by pulling it.

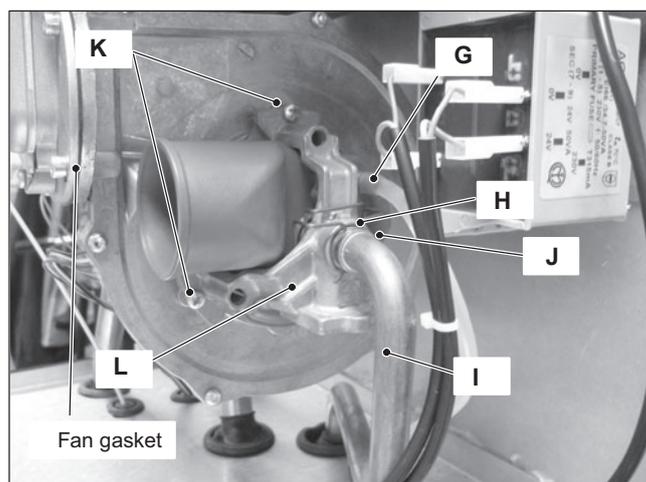


Figure 17.3

- 4 Disconnect the rubber pipe G (Figure 17.3).

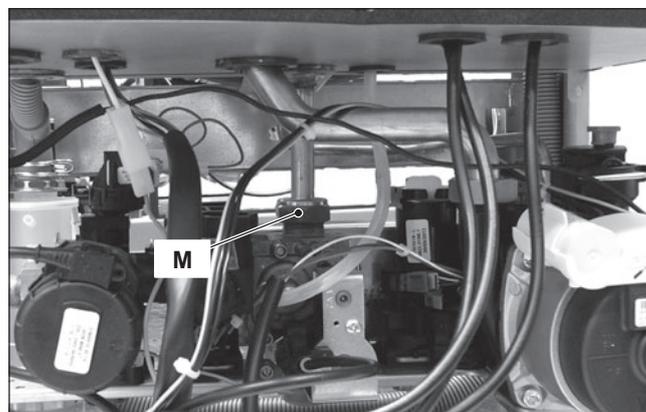


Figure 17.4

- 5 Unscrew the gas connector M (Figure 17.4)
- 6 Remove the fixing fork H and remove the gas pipe I (Figure 17.3).
- 7 Loosen without removing the screw J.
- 8 Remove the screws K and the air box L. Leave the air box with the air manifold clamped to the water pipe.
- 9 Disconnect the fan connector K by pressing the plastic hook placed on the side of the connector (Figure 17.2).
- 10 Unscrew the screws D (Figure 17.2).
- 11 Remove the fan E.
- 12 Assemble the Fan and the Air box carrying out the removal operations in reverse sequence.

**Before reassembling ensure the fan gasket (Figure 17.3) is correctly mounted.**



**Warning:** After cleaning or replacement as detailed above, it is deemed necessary to undertake a combustion analysis as detailed in section "Adjustment" page 29.

## IGNITION AND DETECTION ELECTRODES

### 18 IGNITION AND DETECTION ELECTRODES, BURNER AND SPARK GENERATOR

#### 18.1 Function

Three electrodes are fitted on the fan-burner group. Two of them, fitted on the right side of the fan-burner group A, are the ignition electrodes B and are connected to the spark generator C.

On the left side is the detection electrode D and it detects the presence of the flame.

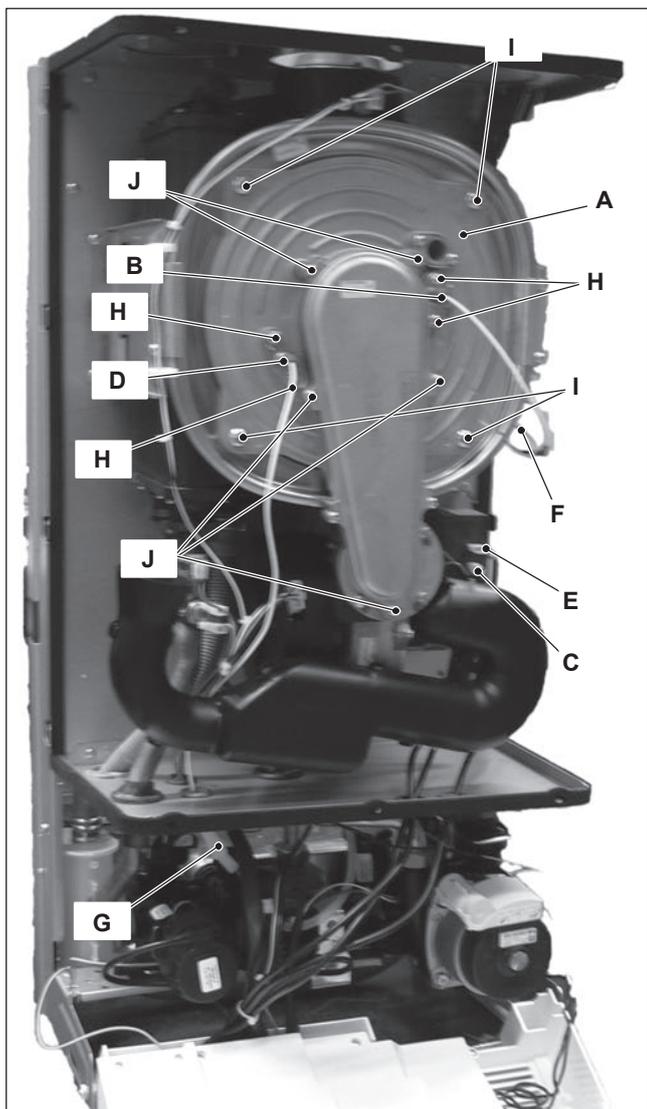


Figure 18.1

The burner K is fitted on the rear of the fan-burner group A.

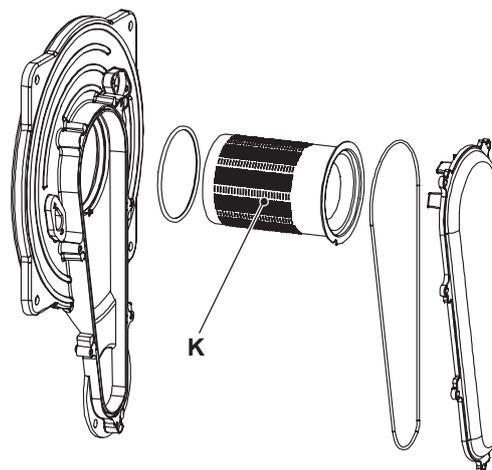


Figure 18.2

#### 18.2 Removal of the Ignition and detection electrodes



**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 (see section "General access and emptying hydraulic circuits" page 5).
- 2 Disconnect the ignition electrodes connector E and the earth wire F from the spark generator C (Figure 18.1) and disconnect the detection electrode connector G.
- 3 Unscrew the screws H and remove the ignition electrodes B and the detection electrode D (Figure 18.1).
- 4 Assemble the Ignition and detection electrodes carrying out the removal operation in reverse order.

**When reassembling the ignition electrodes be sure to connect correctly the wires to the spark generator (Figure 18.3.)**

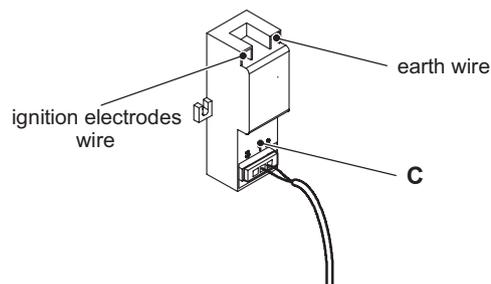


Figure 18.3

#### 18.3 Removal of the burner



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

- 1 Remove the air box and the fan (see section "Removal of the Air box and the Fan" page 39).
- 2 Remove the Ignition and detection electrodes (see section "Removal of the Ignition and detection electrodes" page 40).
- 3 Unscrew the screws I (Figure 18.1) and remove the cover of the combustion chamber.
- 4 Unscrew the screws J (Figure 18.1) and remove the Air-gas duct lid.
- 5 Remove the burner by sliding it forward.

# IGNITION AND DETECTION ELECTRODES

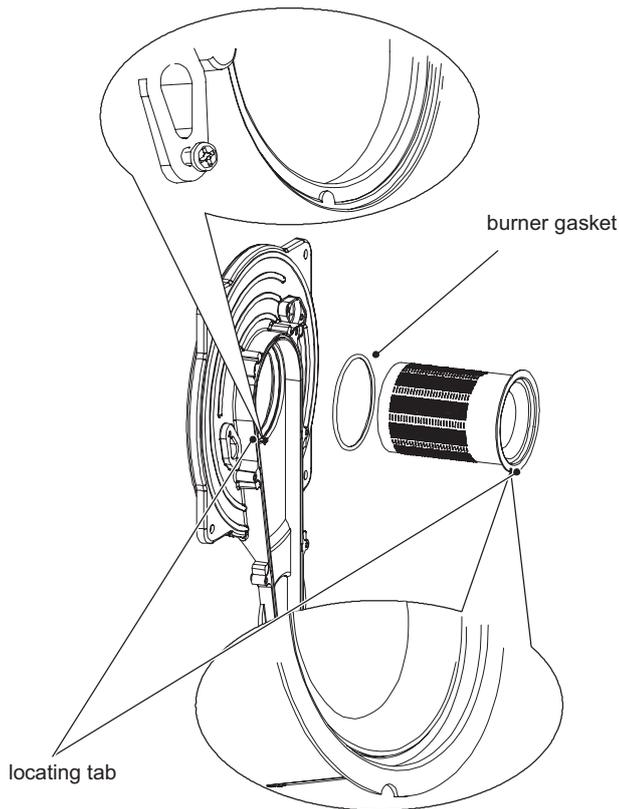


Figure 18.4

- 6 Assemble the burner carrying out the removal operation in reverse order. Ensure the burner is correctly located by lining up the locating tab (Figure 18.4).

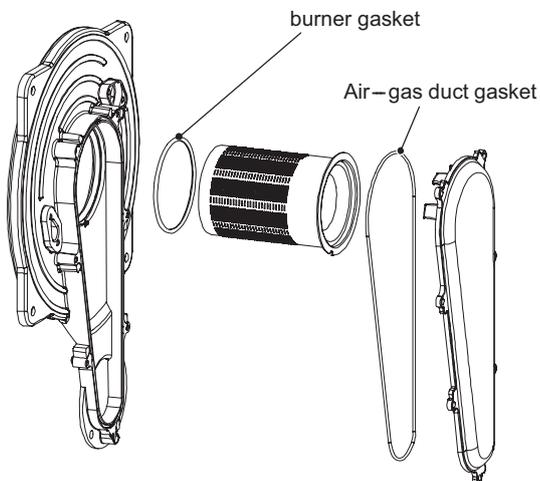


Figure 18.5

Before reassembling ensure the burner gasket is correctly located.



**Warning:** After cleaning or replacement as detailed above, it is deemed necessary to undertake a combustion analysis as detailed in section "Adjustment" page 29.

## 18.4 Removal of the front insulation panel

See warning note at the end of this chapter before to remove this part.

- 1 Remove the Ignition and detection electrodes (see section "Removal of the Ignition and detection electrodes" page 40).
- 2 Remove the burner (see section "Removal of the burner" page

40).

- 3 Remove the front insulation panel (Figure 18.6).
- 4 Assemble the new front insulation carrying out the removal operation in reverse order. When fitting the new panel ensure that the electrodes holes coincide with the holes of the combustion chamber.

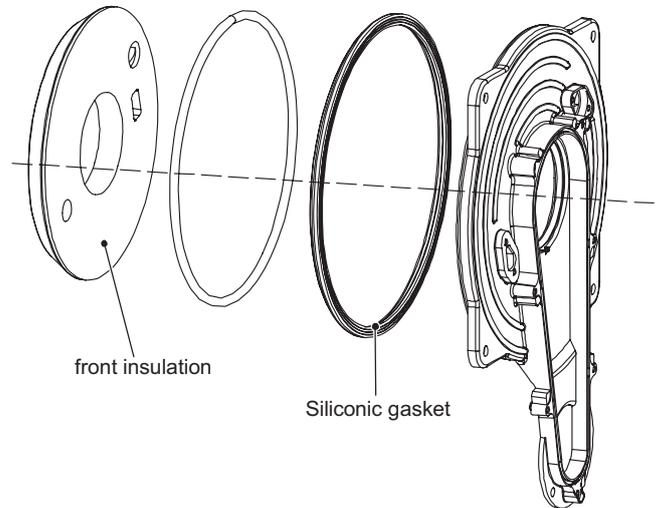


Figure 18.6

### Caution:

After any periodical servicing or disturbance the combustion chamber silicon seal (Figure 18.6) must be fully inspected and replaced at the discretion of the service engineer.

After any disturbance to the chamber door seal the appliance must undergo a full analytical combustion performance check.

## 18.5 Removal of the rear insulation

See warning note at the end of this chapter before to remove this part.



**Attention:** Cover the inner of the condensing heat exchanger to avoid that dirt and debris fall in the coil.

- 1 Do the operations of section "Removal of the burner" page 40 from step 1 to step 3.
- 2 Unscrew the screw L, remove the washer M and the rear insulation N (Figure 18.7).

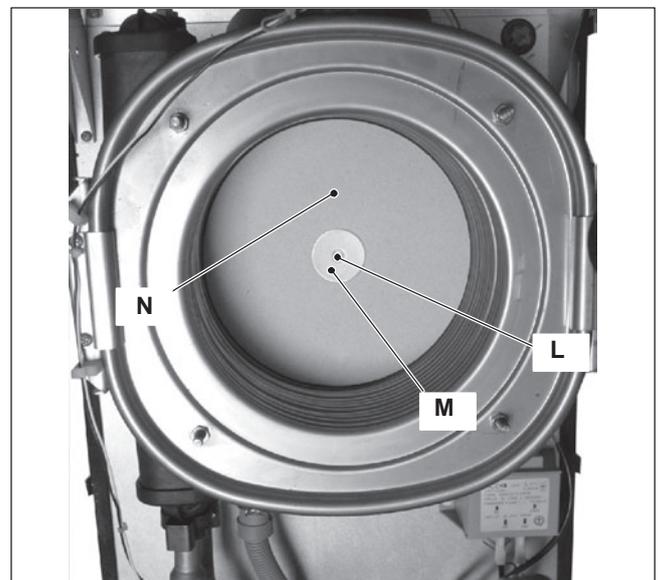


Figure 18.7

## IGNITION AND DETECTION ELECTRODES

### 18.6 Removal of the spark generator



**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 spark generator connector coming from the control p.c.b, the electrode swire and the earth wire coming from the ignition electrodes (Figure 18.8).

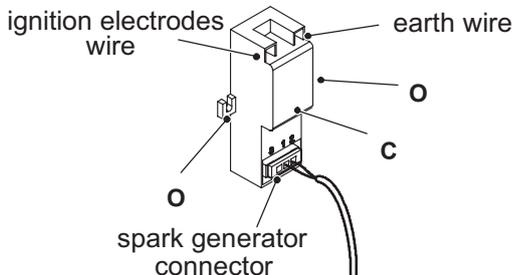


Figure 18.8

- 3 Unscrew the screws O and remove the spark generator.
- 4 Assemble the spark generator carrying out the removal operation in reverse order.

**When reassembling the spark generator be sure to connect correctly the wires.**

### 18.7 Checks

- ✓ Check of the spark generator



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

There is not a significant way to verify the integrity of the spark generator. When the fan turns but the burner does not light a possible cause is a faulty spark generator and it is advisable to replace it to locate the fault.

- ✓ Check the position of the electrode edges



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

- 1 Remove the ignition electrodes (see section "Removal of the Ignition and detection electrodes" page 40).
- 2 Check for the correct distance between the metallic edges of the ignition electrode (see Figure 18.9 - Figure 18.10).

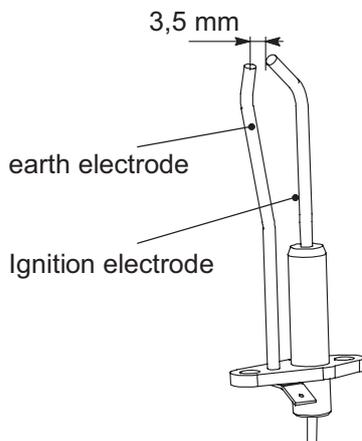


Figure 18.9

- ✓ Check the connection wires



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

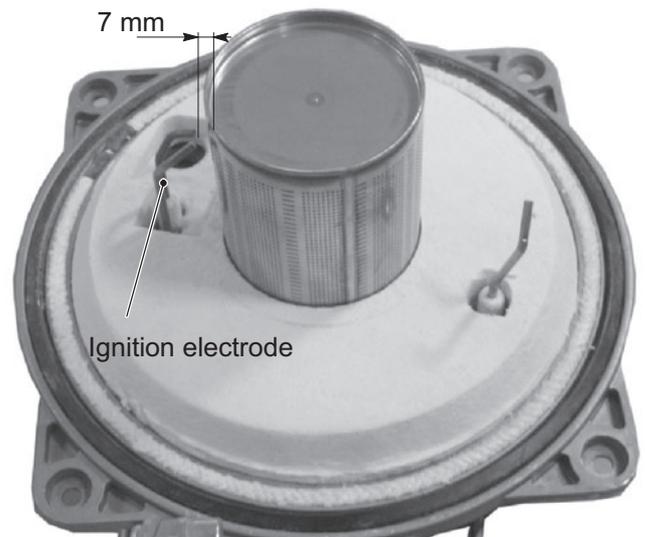


Figure 18.10

- 1 Remove all the case panels and the sealed chamber lid.
- 2 Check for the integrity of the insulation of wires which connect the electrodes to the spark generator and to the control/ignition p.c.b.

### Warning - Insulation panels material handling care

Mineral fibres are used in this appliance for the insulation panels of the combustion chamber

Excessive exposure to these materials may cause temporary irritation to eyes, skin and respiratory tract.

Known hazards - Some people can suffer reddening and itching of the skin. Fibre entry into the eye will cause foreign body irritation, which can cause severe irritation to people wearing contact lenses. Irritation to respiratory tract.

Precautions - Dust goggles will protect eyes. People with a history of skin complaints may be particularly susceptible to irritation. High dust levels are only likely to arise following harsh abrasion. In general, normal handling and use will not present high risk, follow good hygiene practices, wash hands before, touching eyes, consuming food, drinking or using the toilet.

First aid - Medical attention must be sought following eye contact or prolonged reddening of the skin.

# SAFETY THERMOSTAT

## 19 SAFETY THERMOSTAT

### 19.1 Function

The safety thermostat A in Figure 19.1 is a device that senses the temperature of the primary circuit water which flows in the outlet pipe of the condensing 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.

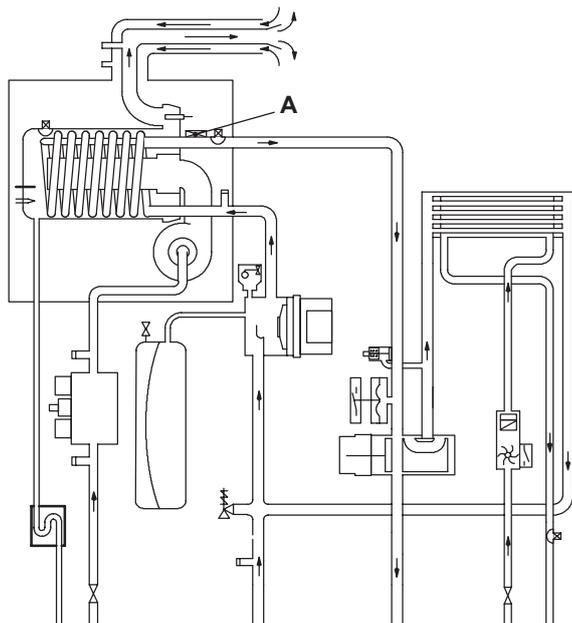


Figure 19.1

### 19.2 Checks

✓ Overheat temperature value

- 1 Set the temperature 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.

✓ 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  $\Omega$ ).

### 19.3 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 Disconnect the wiring B (detail in Figure 19.2).
- 3 Unscrew the screws C which hold the overheat thermostat on the pipe of the condensing heat exchanger and remove it.

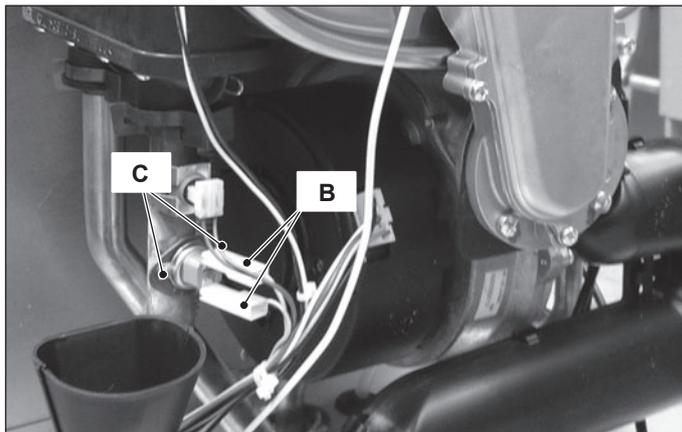


Figure 19.2

- 4 Reassemble the overheat thermostat carrying out the operations in reverse order.
- 5 Apply an adequate quantity of heat conducting compound between the pipe and the thermostat.



**Warning:** After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis as detailed in section "Adjustment" page 29.

# FLUE TEMPERATURE PROBE NTC AND SAFETY THERMAL FUSE

## 20 FLUE TEMPERATURE PROBE NTC AND SAFETY THERMAL FUSE

### 20.1 Function

The Flue temperature probe NTC A in Figure 20.1 and Figure 20.2 senses the temperature of the combustion products that flow through the condensing heat exchanger.

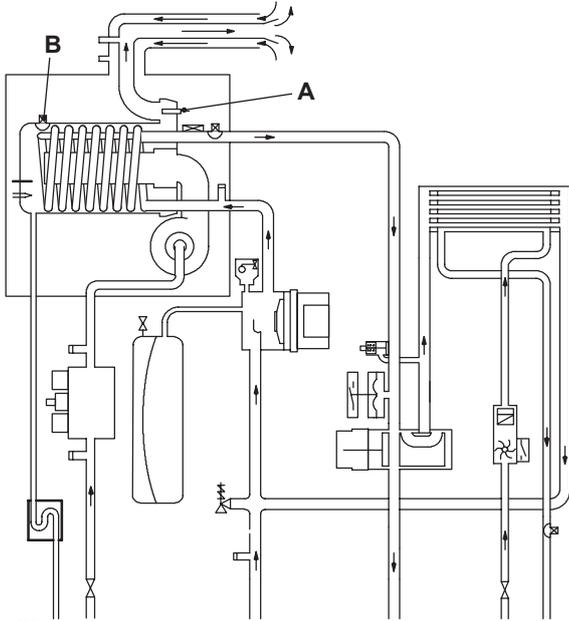


Figure 20.1

If the temperature of the combustion products circuit reaches the limit temperature, the Flue temperature probe NTC reduces the gas flow rate to the burner. The temperature of the combustion products should decrease to a safe value temperature.

In the case that the temperature of the combustion products reaches a potentially dangerous value, it stops the boiler operation (lock-out).

This allows the use of plastic materials for the flue outlet pipes and bends.

The use of kits different from the original isn't however allowed, since the flue pipes are integral parts of the boiler.

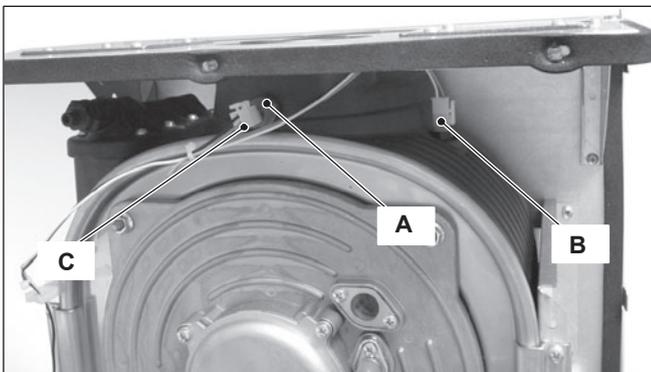


Figure 20.2

A Safety thermal fuse B in Figure 20.1 - Figure 20.2 is also connected in series with the Flue temperature probe NTC and acts as a safety device in extreme case of incorrect operation of the Flue temperature control system.

Reaching the breakdown temperature it opens the circuit and locks out the boiler.

In case of intervention of this safety device the heat exchanger (part

shown in Figure 20.3) may be damaged and must be replaced.



Figure 20.3

### 20.2 Removal



**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 connector C from the Flue temperature probe NTC by pressing the plastic hook placed on the side of the connector.
- 3 Unscrew and remove the flue temperature probe A (Figure 20.2) from the condensing heat exchanger.
- 4 Assemble the Flue temperature probe NTC carrying out the removal operations in reverse sequence.

### 20.3 Checks

✓ Overheat temperature value

- 1 Set the temperature 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 Flue temperature probe NTC and no overheat intervention should occur.

✓ Temperature-resistance relationship.

- 1 Remove the Flue temperature probe NTC section "Removal" page 44).
- 2 Measure the Flue temperature probe NTC electrical resistance at the ambient temperature and check it according to the graph in (Figure 20.4)

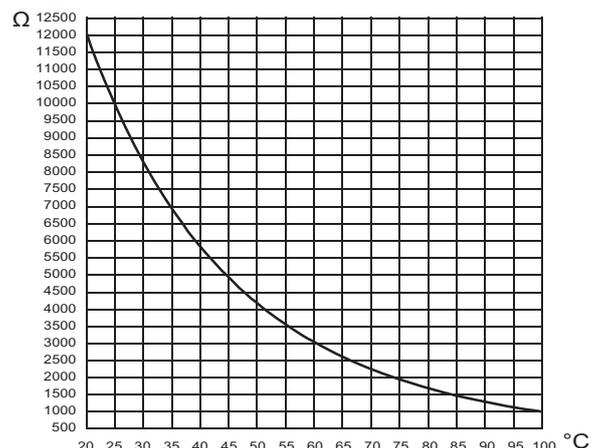


Figure 20.4

# CONDENSATE TRAP

## 21 CONDENSATE TRAP

### 21.1 Function

The condensate trap A in Figure 21.1 and Figure 21.2 allows the discharge of the condensate via the condensate drain pipe avoiding in the mean time the escape of combustion products. A plastic ball closes the trap outlet in case that the trap is empty.

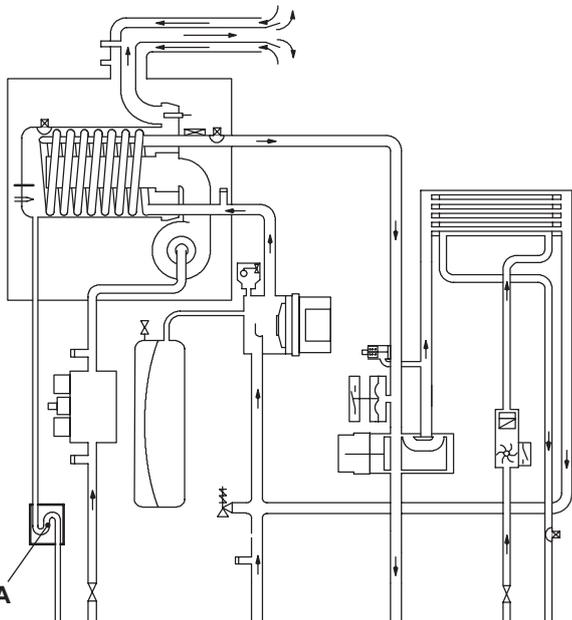


Figure 21.1

If the drain pipe becomes blocked, or condensate cannot drain, the condensate level in the trap rises until it reaches the screw attached to the flame detection electrode, this will cause the boiler lock out.

### 21.2 Check the cleanness of the trap

Unscrew the plug on the bottom of the trap and remove dirt eventually deposit.

### 21.3 Removal



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

- 1 Remove the front and left case panels.
- 2 Disconnect the trap from the draining pipe.
- 3 Using pliers, remove the spring B moving it upwards and remove the flexible pipe C.
- 4 Unscrew the screw D and remove the trap.
- 5 Unscrew the lock-nut E and separate the trap from its bracket.
- 6 Reassemble carrying out the removal operations in reverse order.

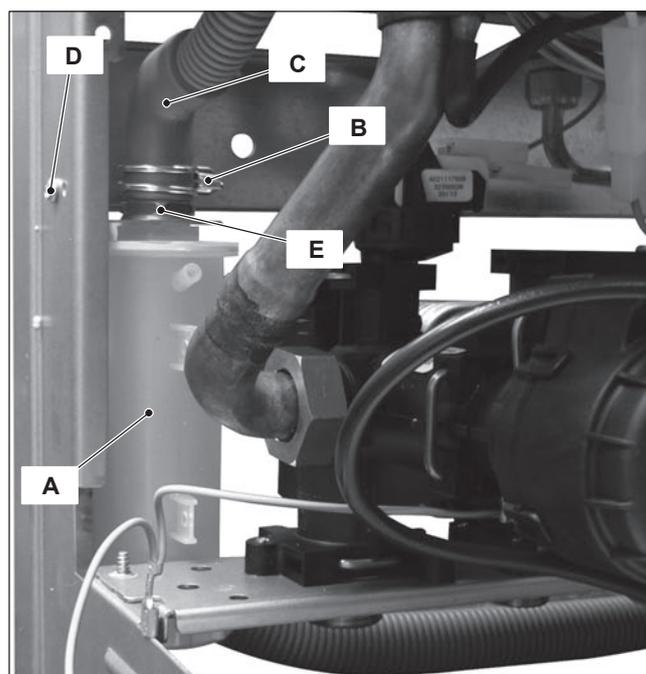


Figure 21.2

## SHORT SPARE PARTS LIST

### 22 SHORT SPARE PARTS LIST

Key	G.C. part no.	Description	Q.ty	Manufacturer part no.	Manufacturer's reference
1	H58 - 688	Burner (mod. M110B.24SM/..., M110B.24SR/...)	1	BI1293 100	
	H58 - 689	Burner (mod. M110B.32SM/...)	1	BI1293 101	
2	E94 - 576	Expansion vessel	1	BI1182 105	CIMM 7 litres
3	H58 - 659	Condensing heat exchanger (mod. M110B.24SM/..., M110B.24SR/...)	1	BI1432 100	
	H58 - 660	Condensing heat exchanger (mod. M110B.32SM/...)	1	BI1432 101	
4	H58 - 702	Fan	1	BI1293 105	EBM RG128 24V 54W
5	H58 - 694	Gas valve	1	BI1293 104	SIT 848 Sigma
6	H50 - 189	Safety valve (mod M110B.24SM/..., M110B.32SM/...)	1	BI1441 101	Elbi
	E83 - 013	Safety valve (mod. M110B.24SR/...)	1	BI1131 100	Watts
7		Electronic regulation p.c.b. (mod. M110B.24SM/..., M110B.24SR/...)	1	BI1955 118	Bertelli & Partners
		Electronic regulation p.c.b. (mod. M110B.32SM/...)	1	BI1955 119	
8	H22 - 543	D.h.w. heat exchanger (mod. M110B.24SM/...)	1	BI1181 122	
	E01 - 205	D.h.w. heat exchanger (mod. M110B.32SM/...)	1	BI1001 102	
9		Pump	1	BI1552 100	Wilo
10	H74 - 545	Primary circuit flow switch	1	BI1351 118	
11		D.h.w. flowmeter	1	BI1441 104	
12		Temperature probe (main circuit)	1	BI1441 106	
13		Three way diverter valve (electric actuator)	1	BI1431 100	Elbi
14	E83 - 101	Overheat thermostat	1	BI1172 105	ELTH - type 261
15	H58 - 661	Flue temperature probe NTC	1	BI1432 102	
16	H44 - 170	Fuse 3,15 AF	2	BI1295 108	
17	H58 - 716	Fuse 400 mA T	1	BI1665 104	
18	169 - 016	Temperature probe (D.h.w. circuit)	1	KI1042 501	
19	H58 - 709	Detection electrode	1	BI1293 103	
20	H58 - 680	Ignition electrode	1	BI1293 102	
21	E83 - 145	Temperature - pressure gauge	1	BI1475 108	IMIT

SHORT SPARE PARTS LIST

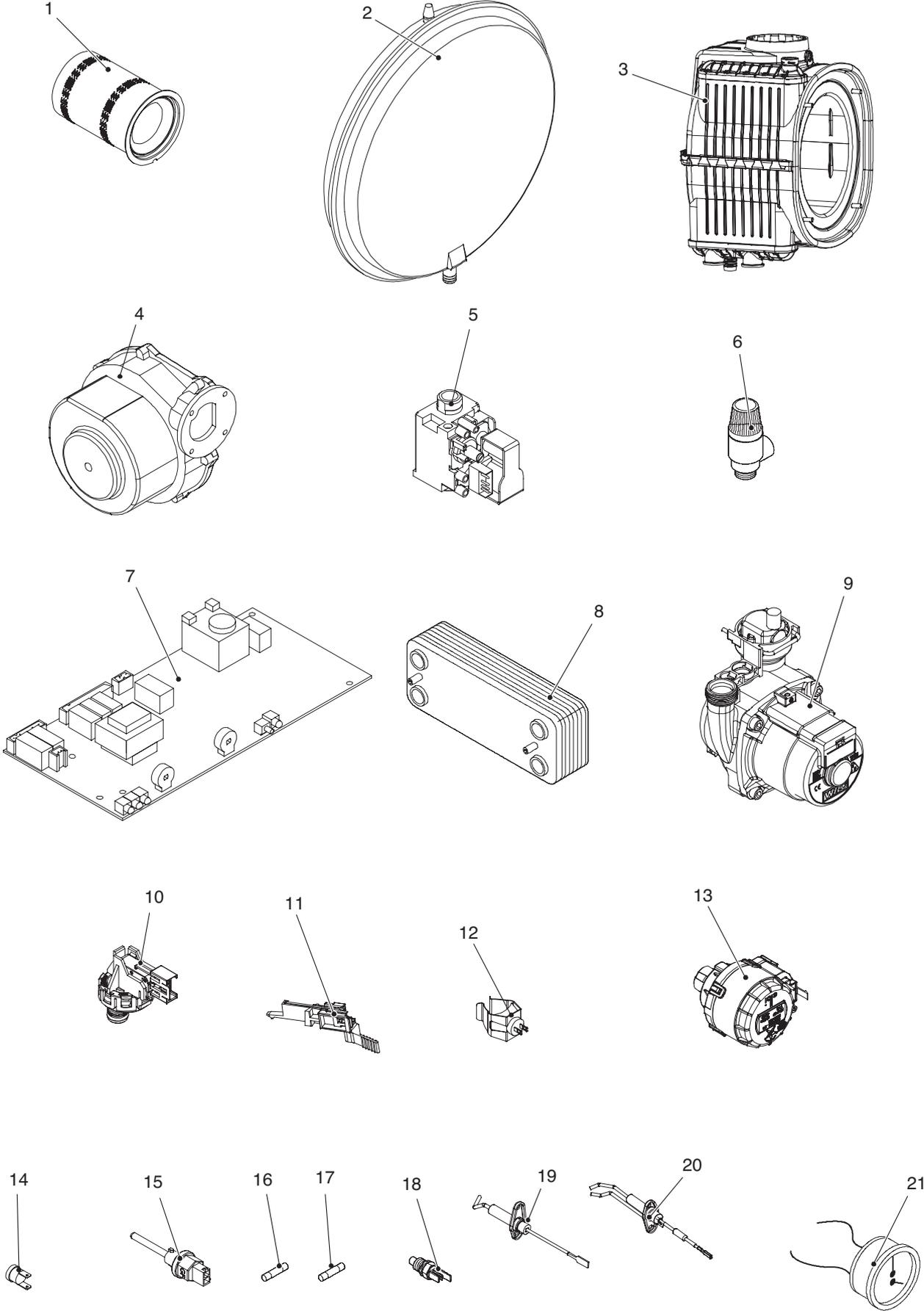


Figure 22.1



17962.1340.4 3513 48A4 UK

**Biasi UK Ltd**  
Commercial Road  
Leamore Enterprise Park  
WALSALL

WS2 7NQ

Sales Tel. 01922 714600  
Tech. Service Tel. 01922 714636  
[www.biasi.co.uk](http://www.biasi.co.uk)