Wall hung, fan flue, room sealed, high efficiency gas boiler

Service manual

RIVA ADVANCE HE

Models:	G.C. Appl. No.
M110.24SM/C	**47–970–29**
M110.32SM/C	**47–970–30**

Leave this manual adjacent to the gas meter

energy saving recommended

BIASI

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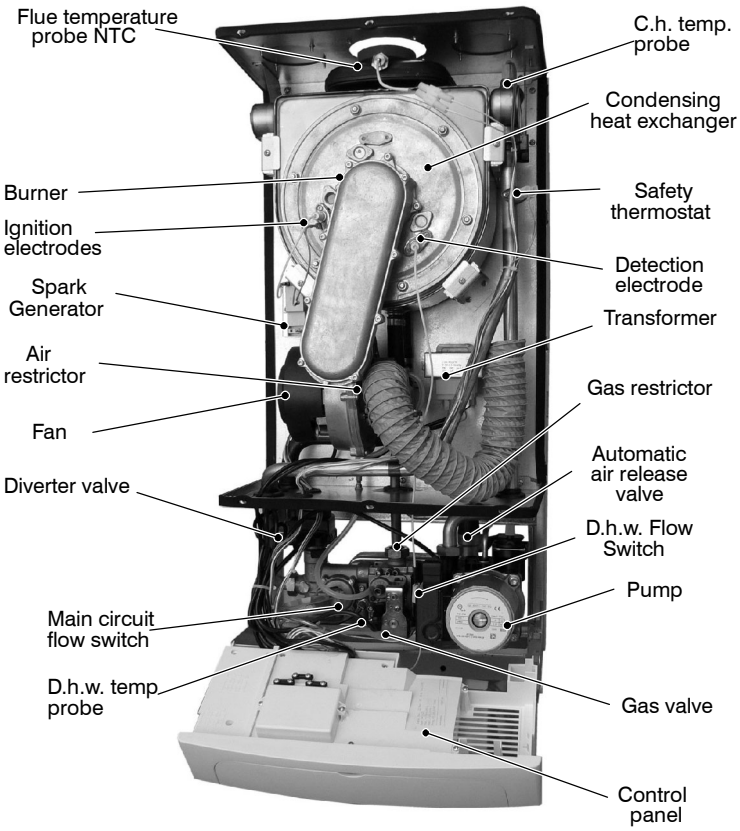
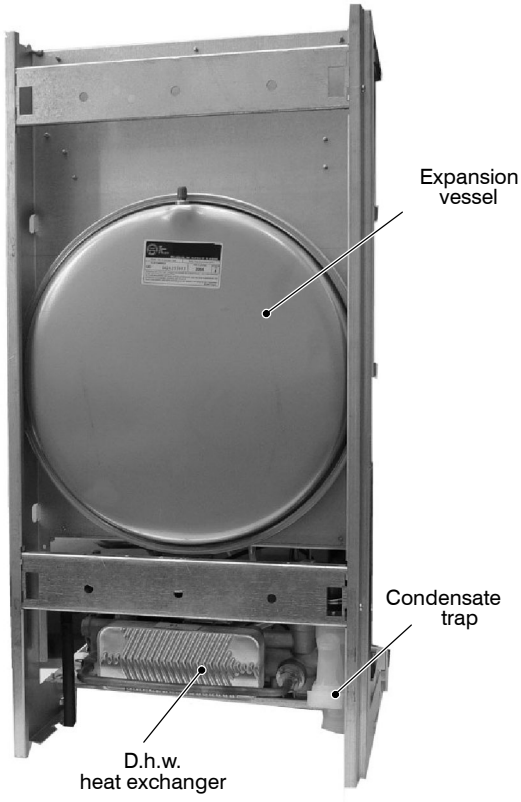
1 Overall information

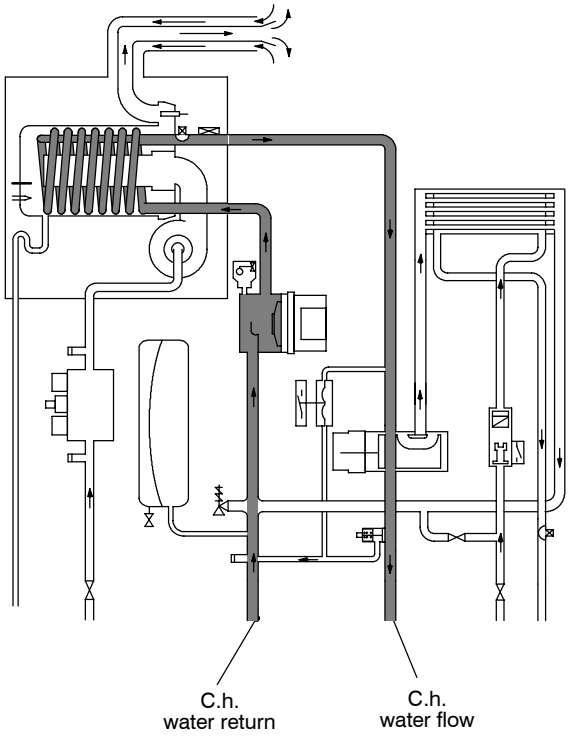
1.1 Overall View



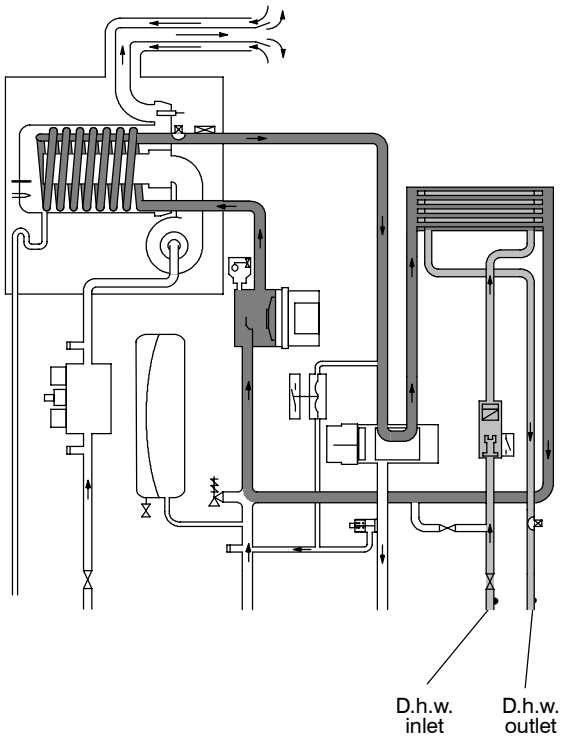


1.2 Hydraulic diagram

Central heating (c.h.) operation



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



2 General access and emptying hydraulic circuits

2.1 Nomenclature

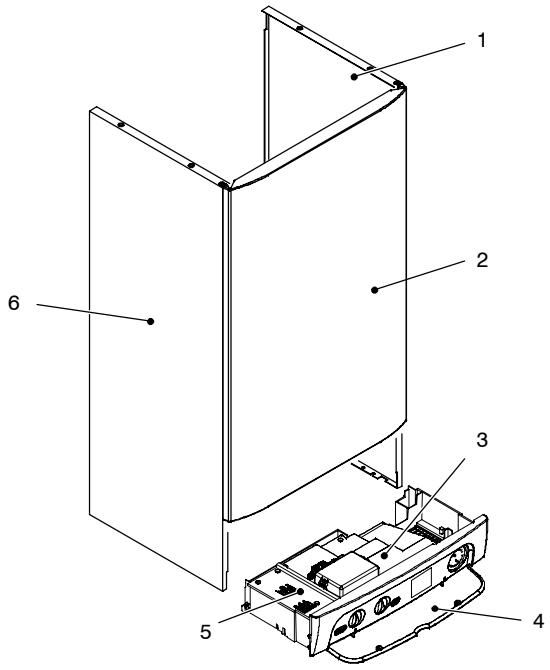


Fig. 2.1

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* (Fig. 2.2), lift the panel and remove it.

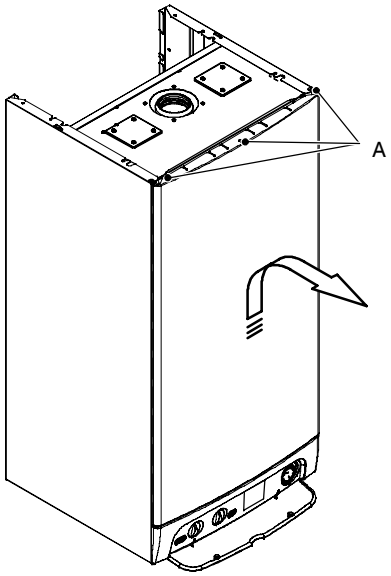


Fig. 2.2

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

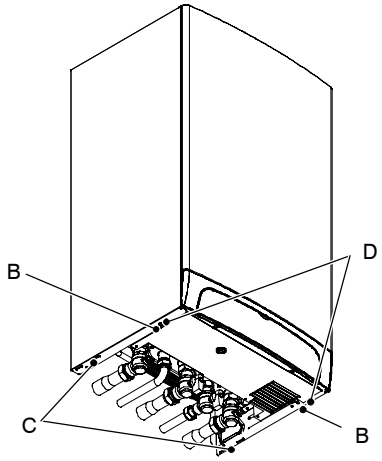


Fig. 2.3 – bottom view of the boiler

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 *B* and *C* (Fig. 2.3).
3 Remove the screws *D*
4 Move the lower part of the side panels as indicated in Fig. 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.

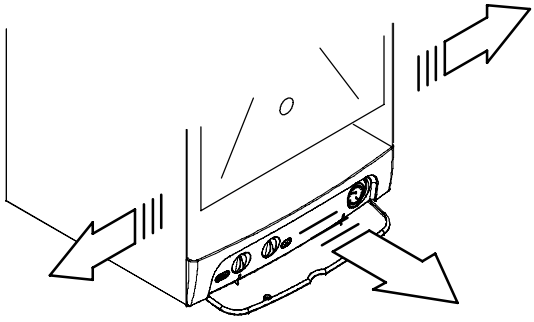


Fig. 2.4

5 Remove the screws *E* and remove the service panel (Fig. 2.5);

If the external temperature probe (optional) is fitted follow the steps 6 to 9.

6 Remove the screws *F* and remove external temperature probe lid.

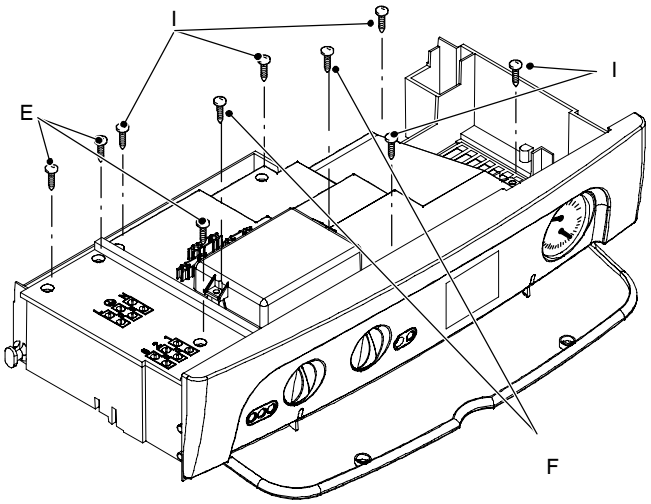


Fig. 2.5

7 With the help of a screwdriver disconnect the terminal block *G* (Fig. 2.6).

8 Remove the clamp *H* that holds the cable.

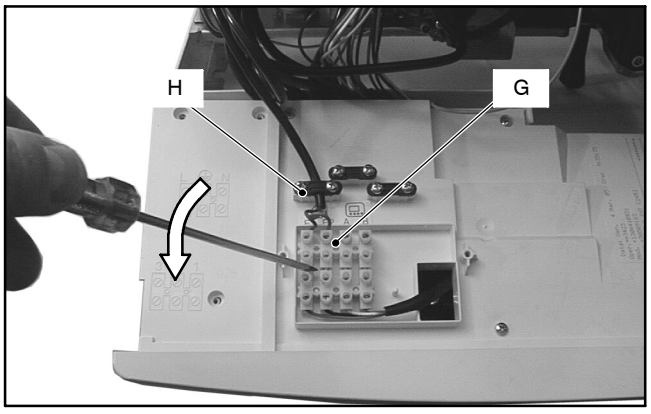


Fig. 2.6

9 Pass the terminal block connected to the boiler through the hole of the control panel lid (Fig. 2.7).

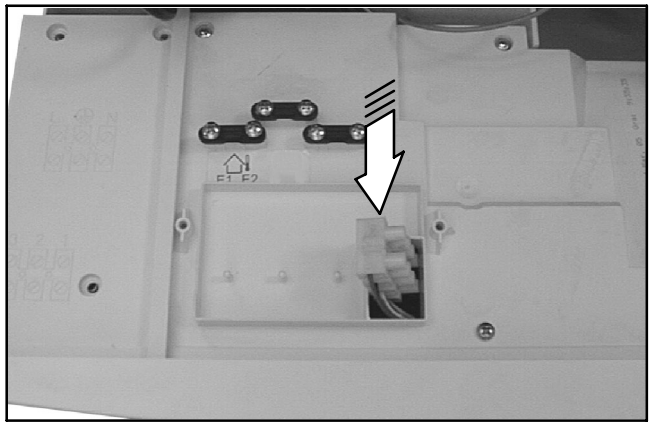


Fig. 2.7

10 Remove the screws *I* and remove the control panel lid (Fig. 2.5);

2.4 Access to the sealed chamber

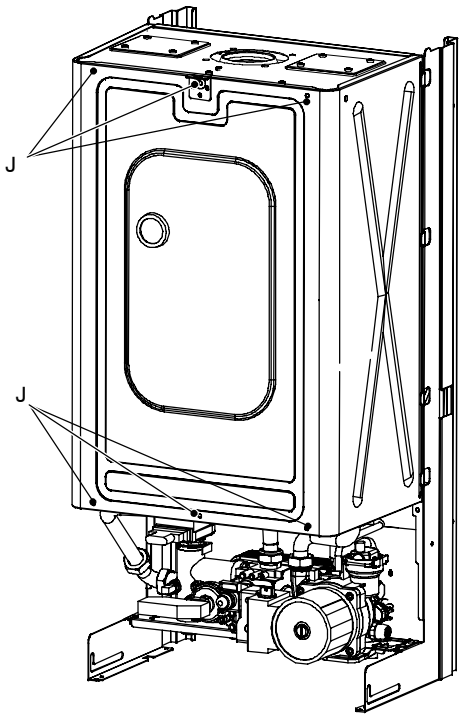


Fig. 2.8

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 *J* as indicated in Fig. 2.8 and remove the lid.

2.5 Emptying the primary circuit

1 Close the c.h. circuit flow and return cocks *K*. (Fig. 2.9).

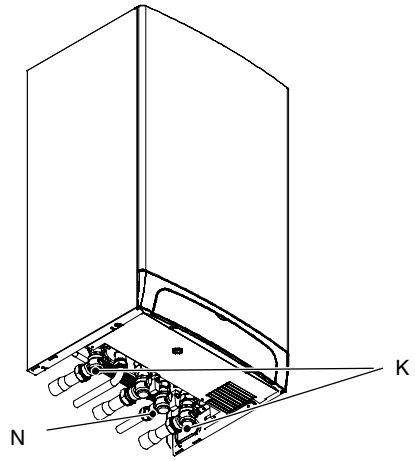


Fig. 2.9 – bottom view of the boiler

2 Remove the front and right panels of the boiler.

3 Open the drain tap *L* (Fig. 2.11) until the boiler is completely emptied.

4 To help the draining of the primary circuit loose the condensing heat exchanger air purger valve *M*

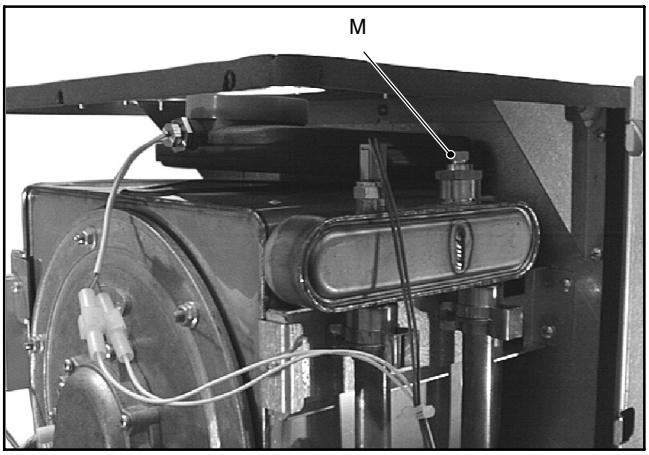


Fig. 2.10

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

5 Close drain tap once the emptying has been completed.

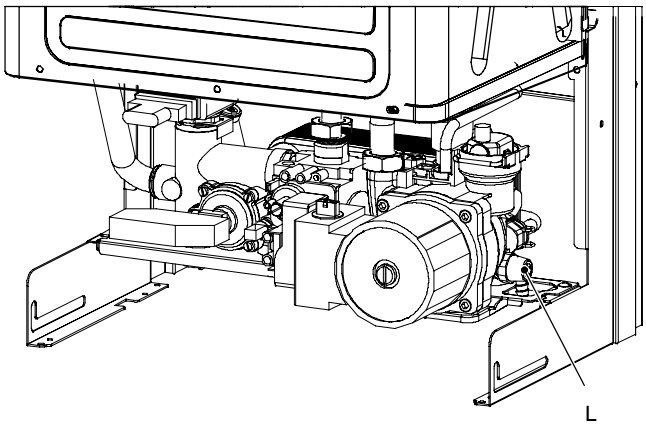


Fig. 2.11

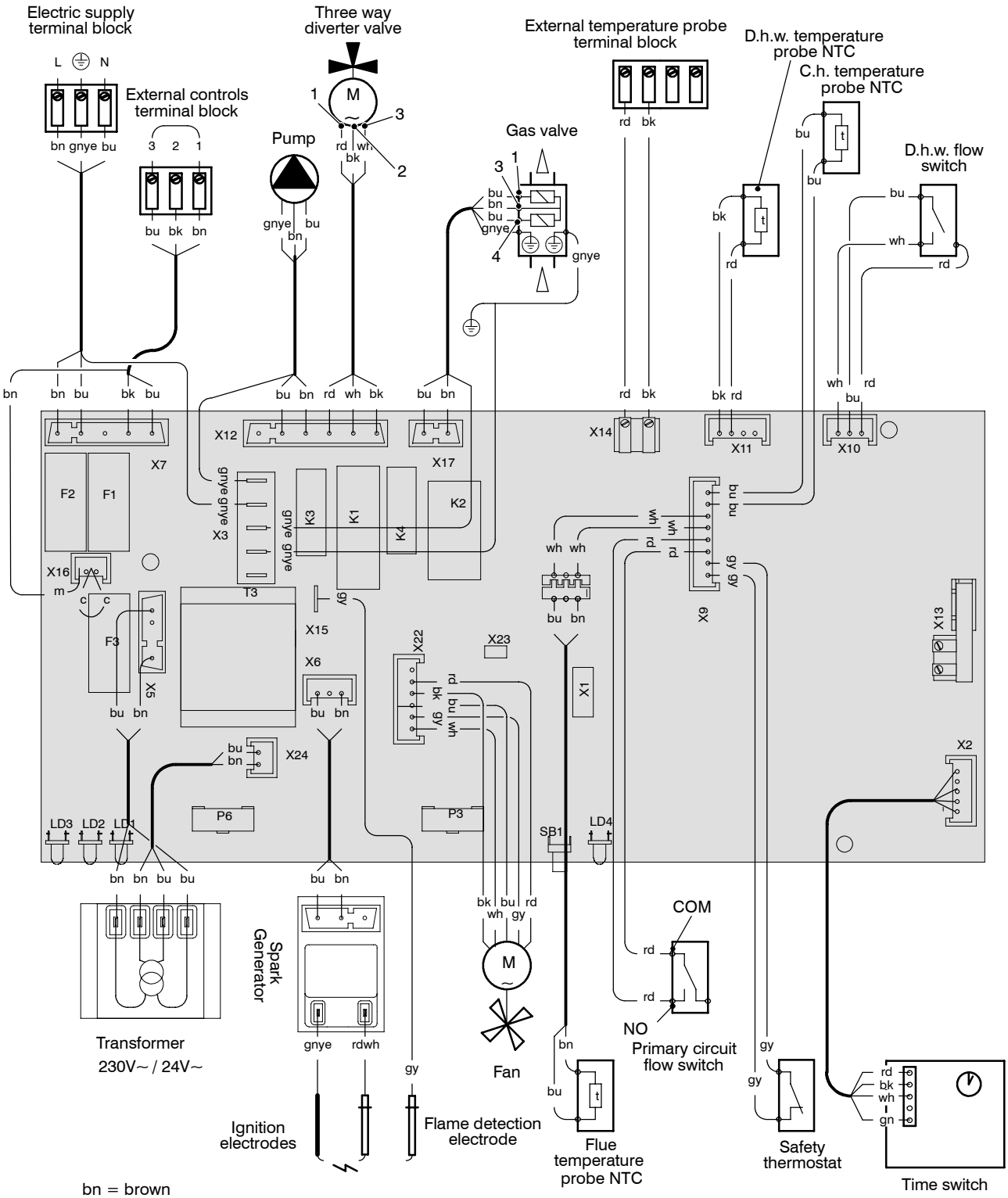
2.6 Emptying the d.h.w. circuit

6 Close the d.c.w. inlet cock *N* (Fig. 2.9);

7 Open one or more hot water taps until the boiler has been completely emptied.

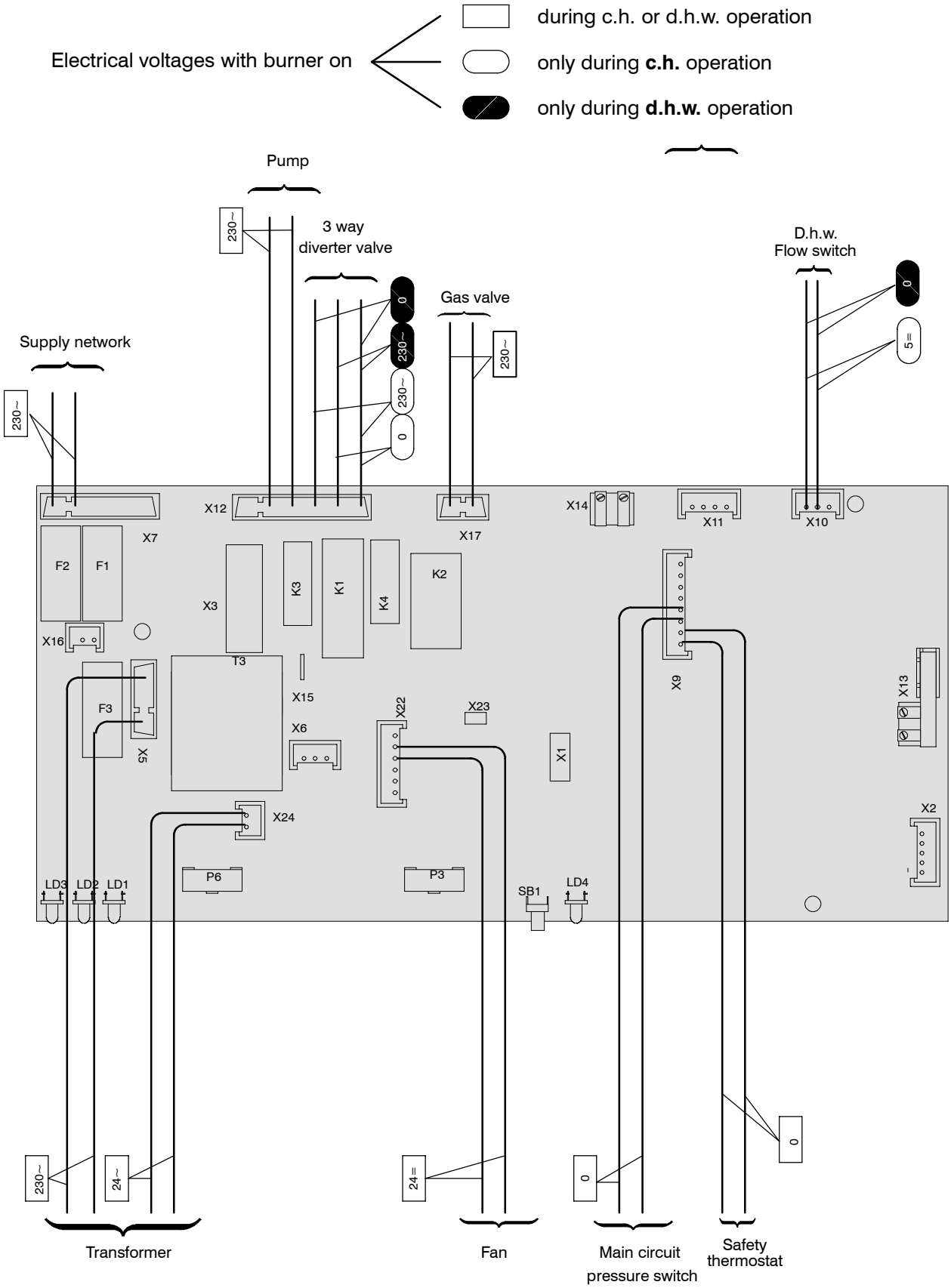
3 Diagrams

3.1 Wiring diagram



bn = brown
bu = blue
bk = black
wh = white
rd = red
gy = grey
gn = green
ye = yellow
vt = violet
og = orange
gnye = green/yellow
rdwh = red/white

3.2 Circuit voltages



4 Fault finding

			Components to check																															
Section of the manual → (note ref. in brackets)		10	– (1)	– (2)	– (3)	21.1	– (4)		6	7.2	8.2		9.8			11.4	12.2	14.5	15.2		16	17	18.8	18.8		19.2	19.2	20.1	– (7)	–	–
Lock–out signal lamp red	Defect ↓	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
ON	By pressing the reset push–button the boiler turns on and operates correctly.			■	■									■		■						■		■	■	■	■	■			
	By pressing the reset push–button the boiler starts the ignition cycle. The burner **doesn't light on** and the boiler locks again.			■	■	■								■		■						■	■	■		■	■	■			
	By pressing the reset push–button the boiler starts the ignition cycle. The burner **lights on** and the boiler locks again.													■		■						■			■		■				
OFF	The boiler does not start either in c/h or d.h.w. mode. All the operation lights OFF Fan still.	■	■										■	■																	
	The burner doesn't light either in c.h. or d.h.w. mode. Fan turns.													■								■	■	■							
	The burner doesn't light either in c.h. or d.h.w. mode. Fan **doesn't** turn.									■							■		■		■	■									
	The boiler doesn't control the d.h.w. temperature. Turning the d.h.w. temp. adjustment knob hasn't effect on the modulation of the flame. The boiler operates correctly on c.h.													■						■											
	The boiler lights for a short while on c.h. Normal operation on d.h.w. function.						■			■				■					■		■											

			Components to check																																
Section of the manual → (note ref. in brackets)		10	– (1)	– (2)	– (3)	21.1	– (4)		6	7.2	8.2		9.8			11.4	12.2	14.5	15.2		16	17	18.8	18.8		19.2	19.2	20.1	– (7)	–	–					
Lock–out signal lamp red	Defect ↓	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				
OFF	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.										■	■		■																					
OFF	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.										■	■		■																					
OFF	Incorrect modulation													■					■	■		■													
OFF	Noisy bolier			■	■					■						■					■	■													
OFF	Poor c.h. / d.h.w. temperature (9)			■	■									■								■						■							
OFF	Poor d.h.w. temperature. Regular operation in c/h mode.								■		■							■ (8)		■															
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 Verify the soundness of the gas supply pipe, the position of stop valves.

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_2 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.

5 Condensing heat exchanger

5.1 Function

The Condensing heat exchanger *A* in Fig. 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.

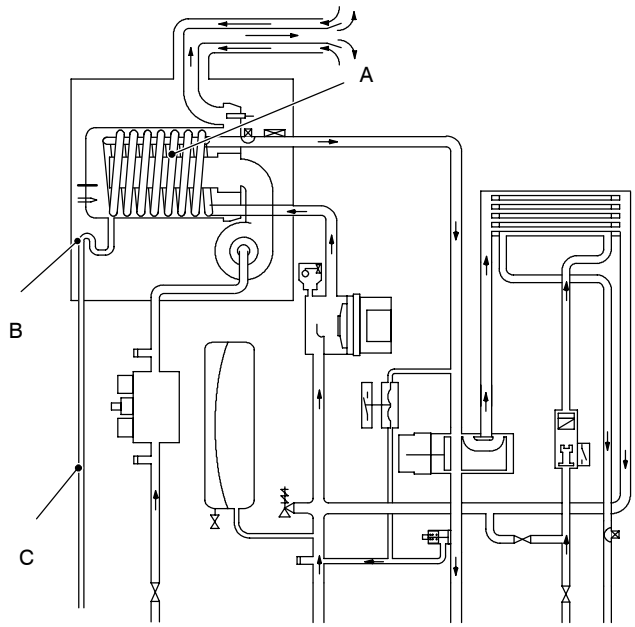


Fig. 5.1

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 air box following the instructions from 1 to 6 in section 17.2

3 Disconnect the detection electrode connector *D*, the ignition electrodes connector *E* and the earth wire *F* .

4 Disconnect the fan connector *G* by pressing the plastic hook placed on the rear side of the connector (Fig. 5.3).

5 Unscrew the nuts *H* (Fig. 5.2).

6 Remove the fan – burner group *I*.

7 Empty the primary circuit of the boiler.

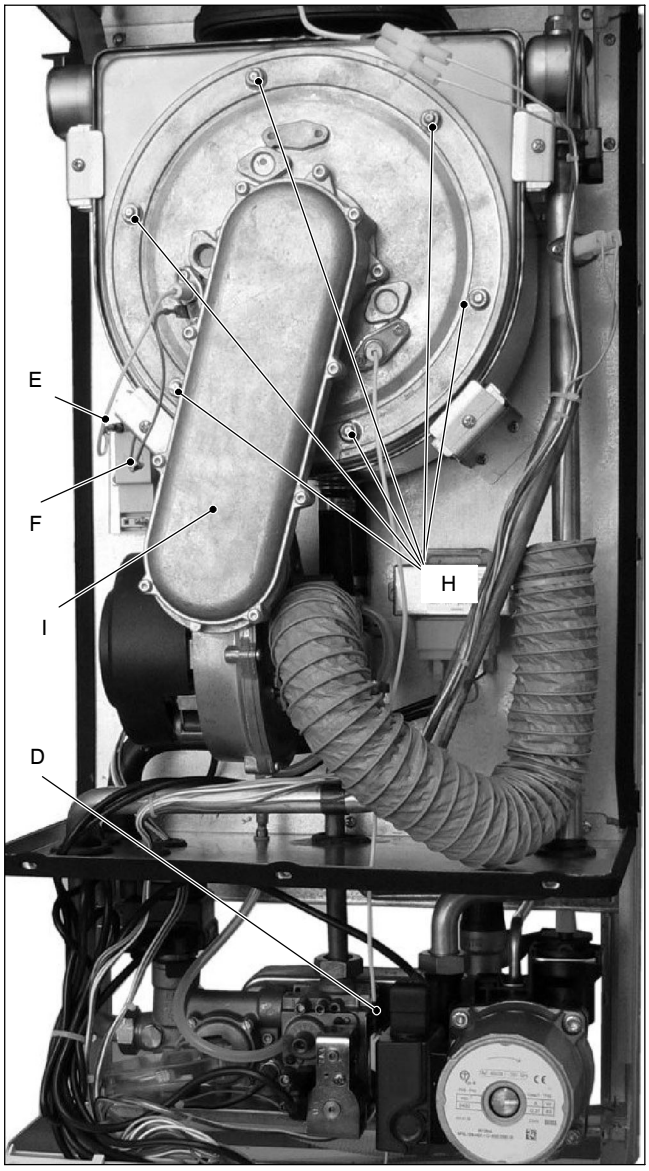


Fig. 5.2

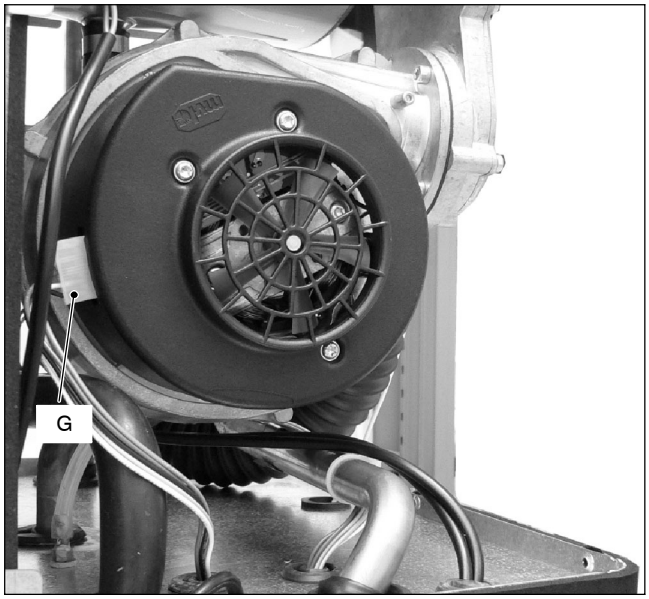


Fig. 5.3

8 Disconnect the C.h. temperature probe *J* and the flue temperature probe connector *K* (Fig. 5.4).

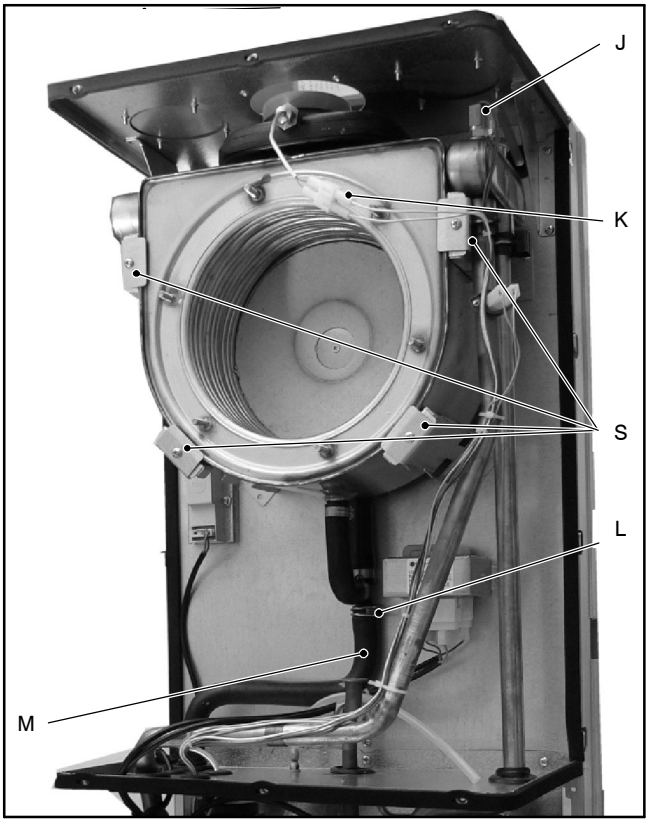


Fig. 5.4

9 Using pliers, remove the spring *L* moving it downwards and disconnect the rubber pipe *M* (Fig. 5.4).

10 Remove the clips *N* (Fig. 5.6).

11 Completely loosen the connection *O* and slightly move the pipe *P* upwards, then turn it towards right (Fig. 5.5)

12 Completely loosen the connection *Q* and move the pipe *R* downwards (Fig. 5.5).

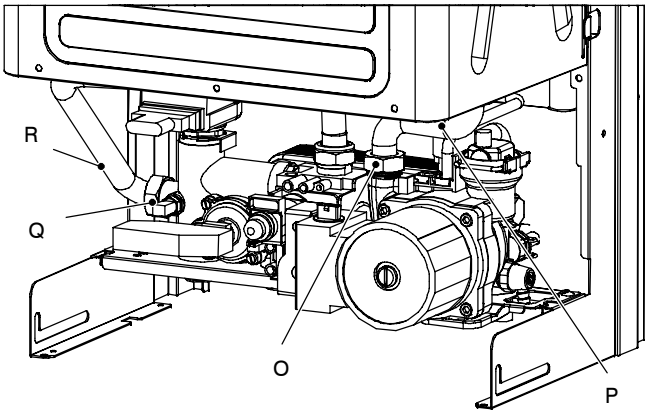


Fig. 5.5

13 Free the pipes R and P from the connection of the Condensing heat exchanger (Fig. 5.6).

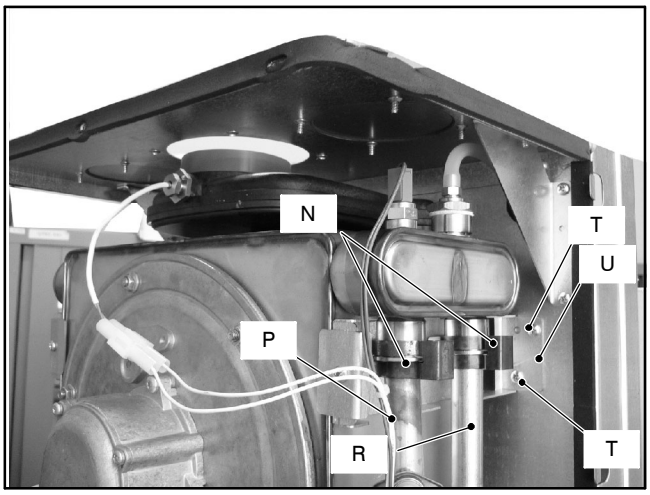


Fig. 5.6

14 Unscrew the screws *S* and remove the clamps (Fig. 5.4).

15 Unscrew the screws *T* and remove the support *U* (Fig. 5.6).

16 Remove the Condensing heat exchanger by levering it and sliding it forwards.

17 Reassemble the Condensing heat exchanger carrying out the removal operations in reverse order.

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, refer to the appropriate chapter *Maintenance* of the installation instructions manual.

6 D.h.w. heat exchanger

6.1 Function

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

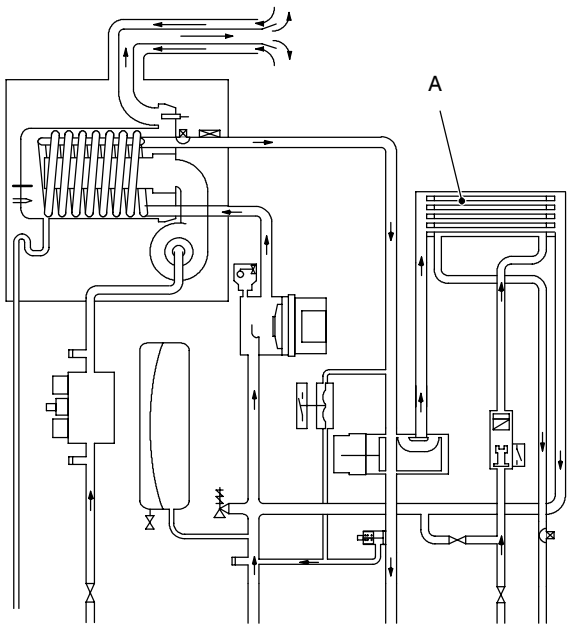


Fig. 6.1

The schematic structure is shown in Fig. 6.2.

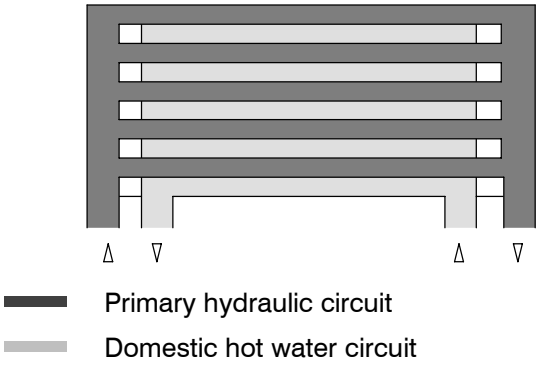


Fig. 6.2

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 Completely unscrew the two Allen key screws *B* (Fig. 6.3) which hold the exchanger to the brass groups.

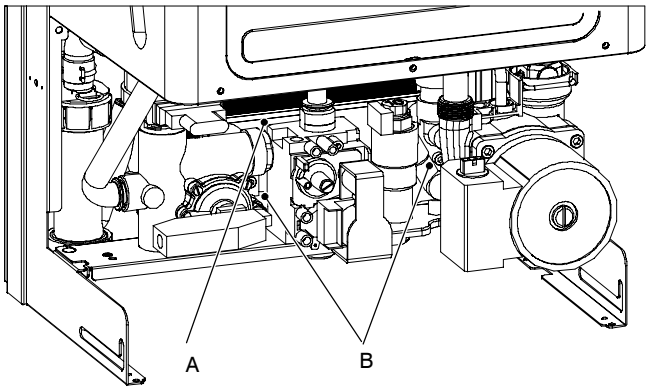


Fig. 6.3

4 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.

Attention. When reassembling the exchanger be sure to put the off centre location/securing pin indicated in Fig. 6.4 towards the left side of the boiler.

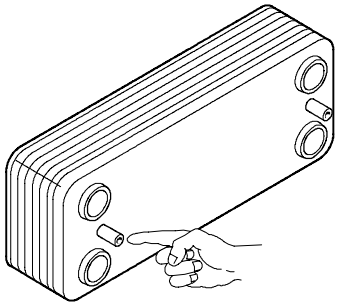


Fig. 6.4

7 Pump

7.1 Function

The pump *A* in Fig. 7.1 and Fig. 7.2 has the function of making the water in the main circuit circulate through the main 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).

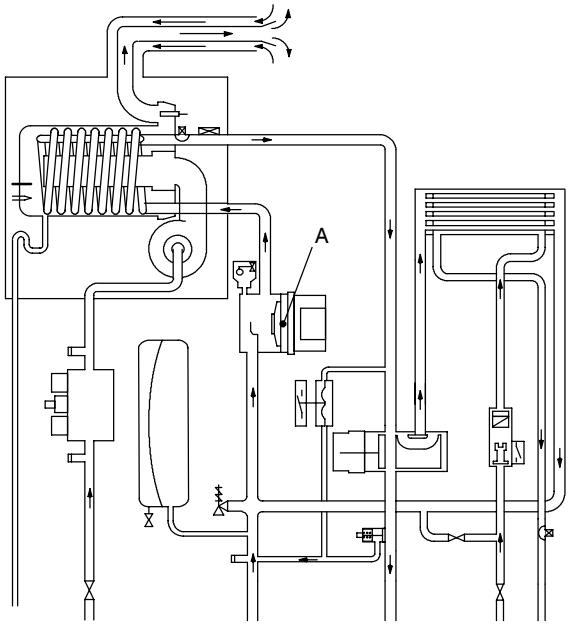


Fig. 7.1

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 *B* (Fig. 7.3).

Measure the electrical resistance between the pump supply connections.

Electrical resistance of the windings (at ambient temperature) must be about 230 Ω

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.

7.3 Removal

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

1 Remove the front and right hand side case panels
2 Empty the primary circuit of the boiler.
3 Extract and lower the control panel.
4 Disconnect the connector B (Fig. 7.2).
5 Loosen the connection *C*, remove the fork *D* and the pipe *E*.

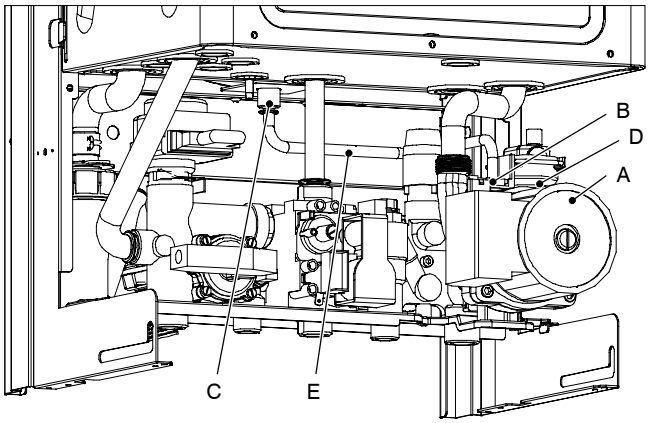


Fig. 7.2

6 Remove the fork *F* (Fig. 7.3) and the connection of the capillary pipe of the pressure gauge.
7 Remove the locking plate *G*
8 Completely loosen the connection *H*.
9 Unscrew the two screws *I* that hold the pump on the frame and remove the pump.

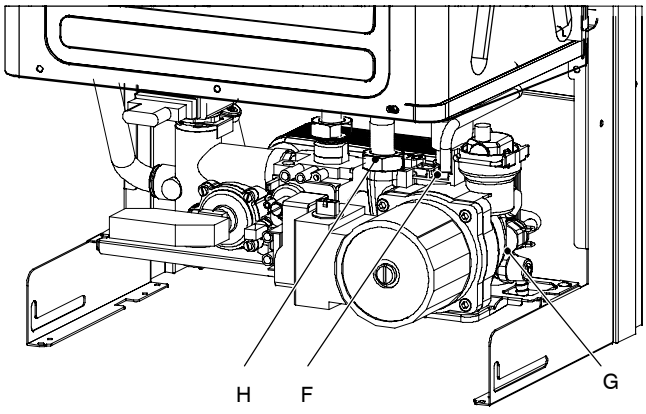


Fig. 7.3

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 brass group.

8 Three way diverter valve

8.1 Function

The diverter valve *A* (Fig. 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.

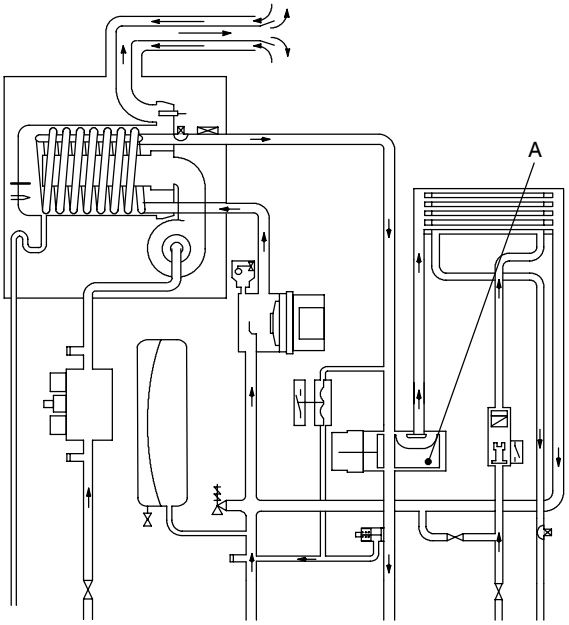


Fig. 8.1

8.2 Checks

Check the electrical continuity

Fig. 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.**

Fig. 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.

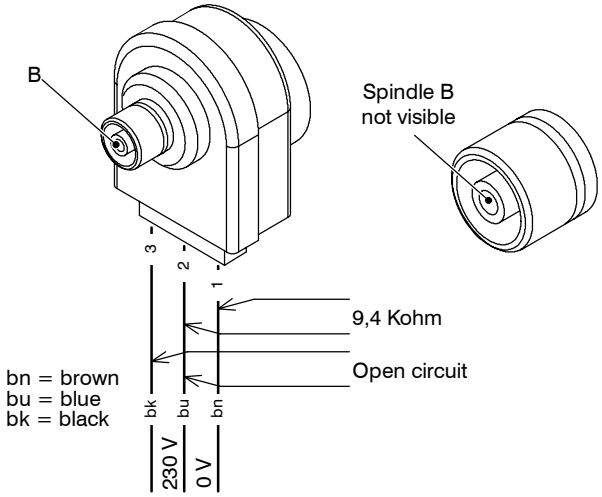


Fig. 8.2 – D.h.w. mode

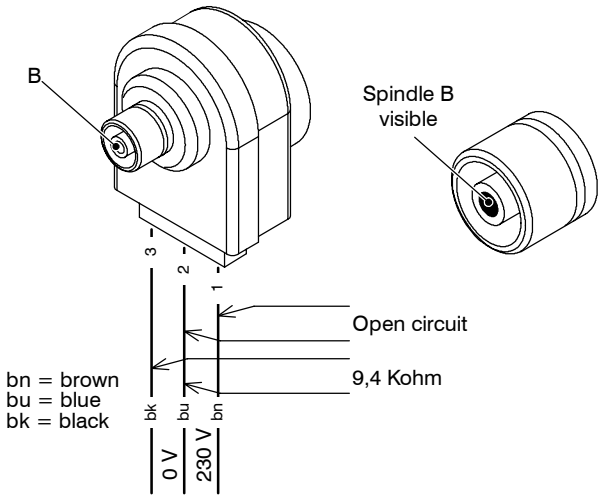


Fig. 8.3 – C.h. mode

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* (Fig. 8.4).

3 Remove the fixing spring *D* and remove the actuator *E*.
Reassemble the actuator carrying out the removal operations in the reverse order.
When reassembling the actuator, refer to Fig. 8.2 or to the wiring diagram in section 3.1 for the correct wiring connection.

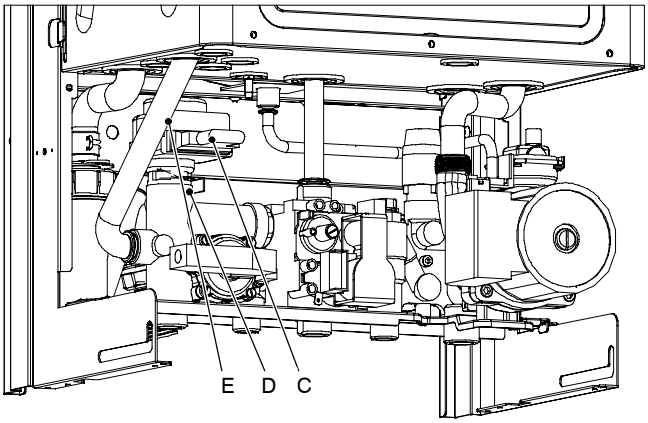


Fig. 8.4

8.4 Removal of the diverter group and its internal parts

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 (see section 8.3).

4 Remove the fixing spring *F* (Fig. 8.5) and remove the primary circuit flow switch *G*.

5 Disconnect d.h.w. temperature probe *H* .

6 Unscrew the connector *I*, the c.h. flow connector and the d.h.w. outlet connector.

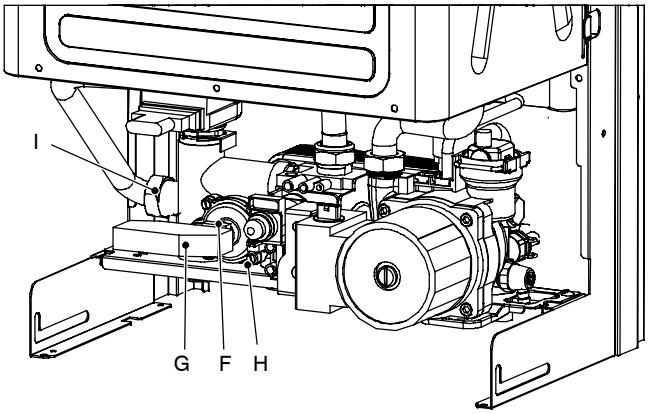


Fig. 8.5

7 Remove the d.h.w. heat exchanger (see section 6.2).

8 Remove the fork *J* and move away the pipe *K* (Fig. 8.6).

9 Unscrew the screw *L* and remove the diverter group.

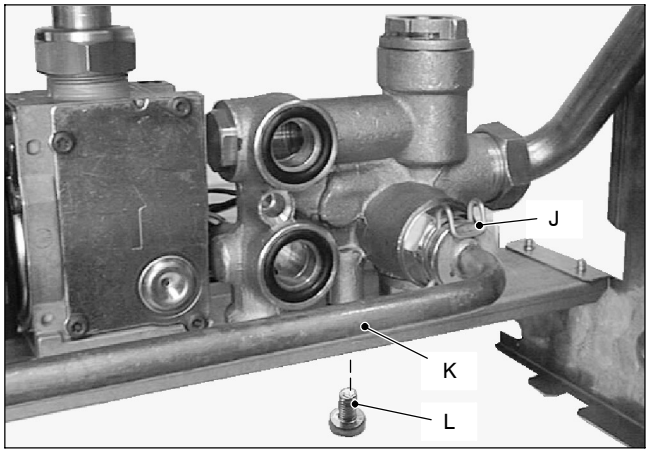


Fig. 8.6 Rear view of the boiler

10 Refer to the exploded view in Fig. 8.7 to remove the internal parts of the three way diverter valve.

Fig. 8.7

11 Reassemble the diverter group carrying out the removal operations in the reverse order.

9 Electronic control/ignition p.c.b.

9.1 Function

Inlet Information

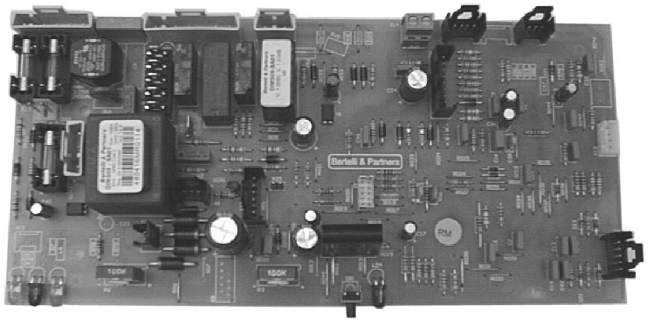
On the Electronic control/ignition p.c.b.....

Function control
C.h. temperature adjustment
D.h.w. temperature adjustment
Boiler reset button

(control panel fascia)

From other boiler devices....

C.h. temperature probe NTC
D.h.w. temperature probe NTC
D.h.w. flow switch
Primary circuit flow switch
Flue temperature probe NTC
Safety thermostat
Flame detection electrode
Room thermostat (if fitted)
External temperature probe (if fitted)
Time switch



Outlet command

Pump
Three way diverter valve
Gas valve
Fan
Ignition electrodes
Appliance operation lights*
Lock–out signal lamp*

*control panel fascia

Fig. 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 (Fig. 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.

Fig. 9.14 and Fig. 9.15 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. (Fig. 9.2).

Some of these devices are directly accessible by the user (function control, temperature adjustment poten-

tiometers etc.) others, like the fuses, are accessible by removing the service panel.

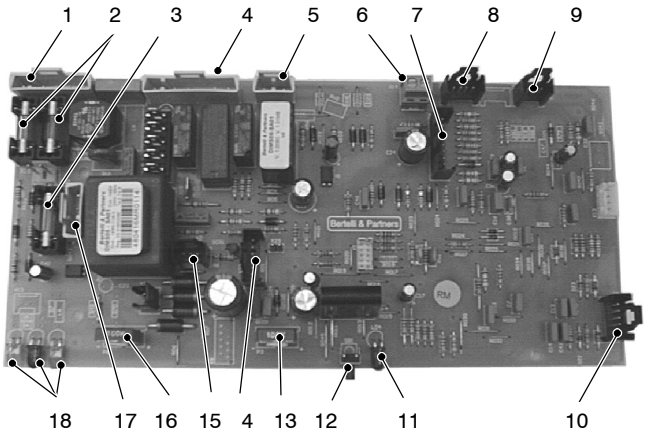


Fig. 9.2

1 x7 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 x12 connector – pump and 3way diverter valve
5 x17 connector – gas valve
6 x14 connector – external temperature probe (optional)
7 x9 connector – safety thermostat, flue temperature probe NTC, c.h. temperature probe NTC
8 x11 connector – d.h.w. temperature probe
9 x10 connector – d.h.w. flow switch
10 x2 connector – timer
11 Lock–out signal lamp
12 Boiler reset button
13 Function control / C.h. temperature adjustment
14 x22 connector – fan
15 x24 connector – transformer
16 D.h.w. temperature adjustment
17 x5 connector – transformer
18 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 (13 and 16 in Fig. 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 (Fig. 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.

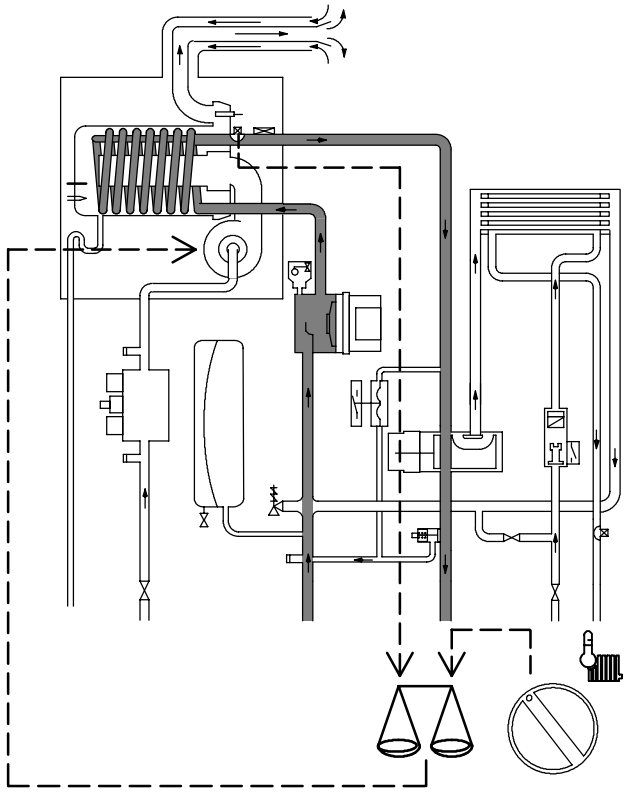


Fig. 9.3

When the boiler functions in d.h.w. (Fig. 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).

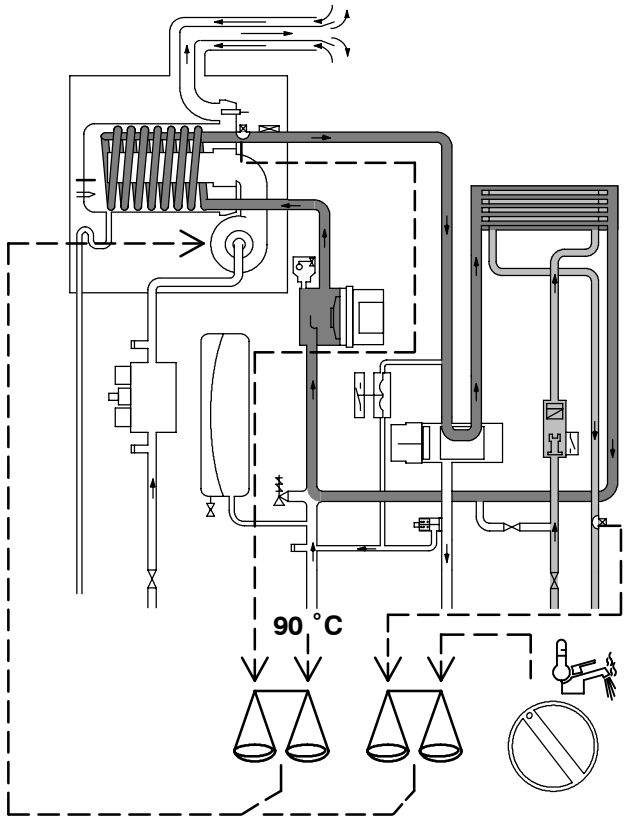


Fig. 9.4

Normally, the result of the comparison between these two signals directly operates the fan speed adjusting the useful output generated in order to stabilize the temperature of the exiting water.

If during the d.h.w. mode operation, the temperature of the primary circuit goes over 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 9.10 and 9.11.

9.4 Operation lights

The Electronic control/ignition p.c.b. is provided with three lamps (L.E.D. indicators) 18 in Fig. 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 1 second OFF	Boiler ON condition (function control in or position)

With the boiler switched ON (or) all the lamps (18 in Fig. 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 flue temperature probe NTC
○ ◑ ◑	Faulty external 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
☼ ☼ ☼	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 an other lamp.	Flashing lamp, alternate with another lamp.

* These conditions are normal only for a short time when the power supply is applied to the boiler.

If permanent they indicate a faulty p.c.b.

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 A and the D.h.w. temperature control knob B (Fig. 9.5).

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

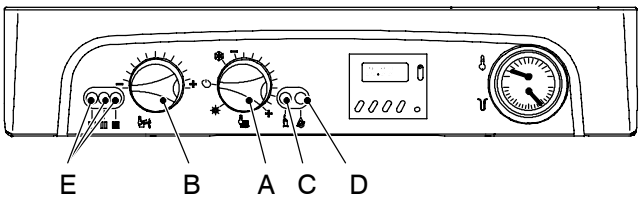


Fig. 9.5

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 A as indicated in Fig. 9.6.

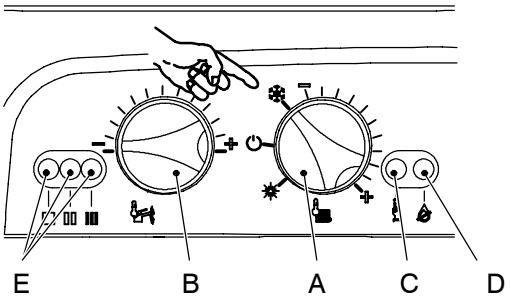


Fig. 9.6

2 Keep pressed the reset button C for about 10 seconds until the lock–out signal lamp D blinks.

3 The lamps E should give the indication as in Fig. 9.7 (maximum c.h. useful output adjustment). If not, press the reset button repeatedly to obtain it.

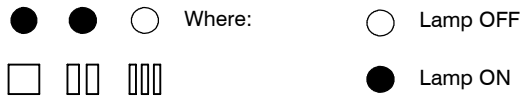


Fig. 9.7

At this step it is possible to visualize the current setting by keeping the reset button C pressed for more than 5 seconds. The lamps will flash a number of times corresponding to the setting (Tab. 9.1 and Fig. 9.8).

4 To change the setting turn the knob B on a position corresponding to the desired maximum useful output (Tab. 9.1 and Fig. 9.8).
By turning the knob B, the lock–out signal lamp D 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)	
	M110.24SM/...	M110.32SM/...
1	5,8 (19 788)	10,6 (36 165)
2	10,3 (35 142)	13,2 (45 036)
3	13,8 (47 083)	16,3 (55 612)
4	16,7 (56 977)	21,0 (71 648)
5	19,9 (67 895)	24,9 (84 954)
6	22,6 (77 107)	29,2 (99 625)
7	24,4 (83 248)	32,7 (111 566)

Tab. 9.1

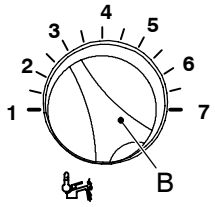


Fig. 9.8

5 To memorize the setting keep pressed the reset button C for about 5 seconds until the lights E briefly blinks simultaneously.

6 To reset the boiler to the normal operation turn it OFF and ON by the function selector knob A. 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.

1 Turn the boiler ON positioning the function selector knob A as indicated in Fig. 9.9.

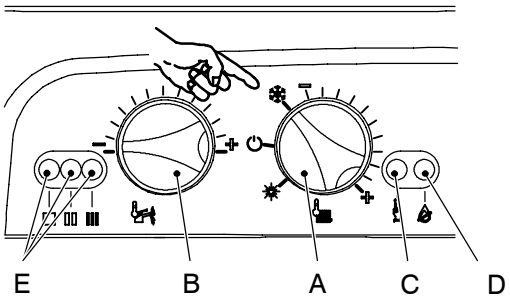


Fig. 9.9

2 Keep pressed the reset button C for about 10 seconds until the lock–out signal lamp D blinks.

3 The lamps E should give the indication as in Fig. 9.10 (reignition frequency). If not, press the reset button repeatedly to obtain it.

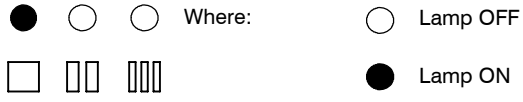


Fig. 9.10

At this step it is possible to visualize the current setting by keeping the reset button C pressed for more than 5 seconds. The lamps will flash a number of times corresponding to the setting (Fig. 9.11).

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

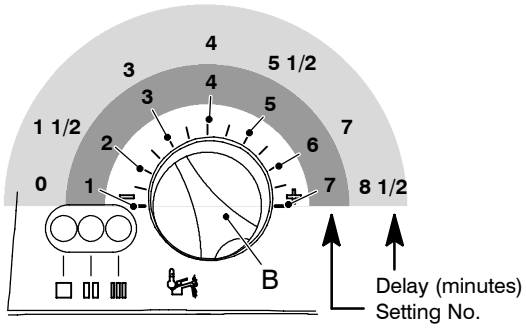


Fig. 9.11

5 To memorize the setting keep pressed the reset button C for about 5 seconds until the lights E briefly blinks simultaneously.

6 To reset the boiler to the normal operation turn it OFF and ON by the function selector knob A. In any case, the boiler automatically resets to its normal operation after 10 minutes.

Factory setting = 3 minutes

9.8 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(Fig. 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 four complete ignition cycles and then, after about 4 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.

9.9 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.

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.

1 Gain access to the parts located inside the control panel as explained in the section 2.3 of this manual.

2 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.

3 Remove the spindles of the c.h. and d.h.w. temperature adjustment knobs by delicately pulling them with pliers in the direction shown by the arrow in Fig. 9.12.

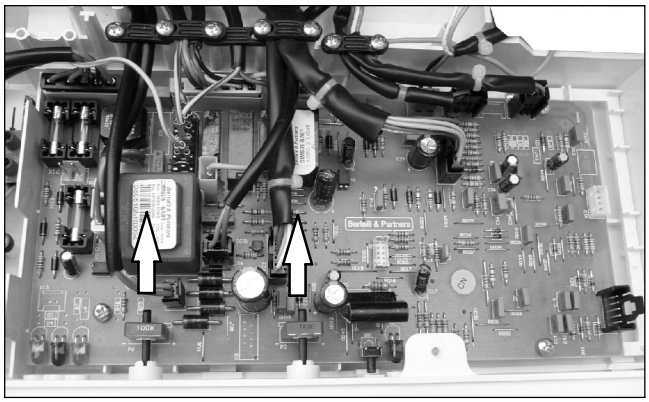


Fig. 9.12

4 Unscrew the four screws that hold the Electronic control/ignition p.c.b. on to the control panel.

5 Remove it by lifting its rear edge and freeing it from any of the wiring.

6 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.:

7 It is not necessary to utilise static protections but it is advisable to ensure that the pcb is handled with care and held at the edges and with clean dry hands.

8 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.

9 Insert the spindles in the control panel knobs until the notch *A* (Fig. 9.13) reaches the potentiometer edge. It is not necessary to force them in the knob.

10 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* (Fig. 9.13).

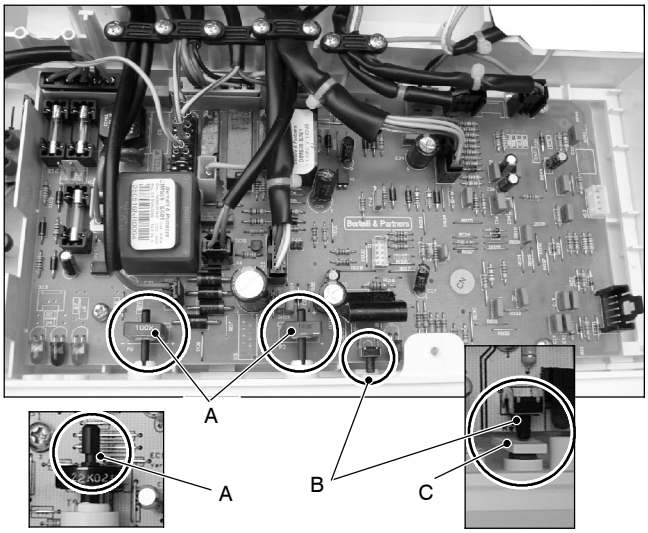


Fig. 9.13

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 9.5.

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, refer to the appropriate chapter *Maintenance* of the installation instructions manual.**

9.10 Thermal control in the "✳" mode

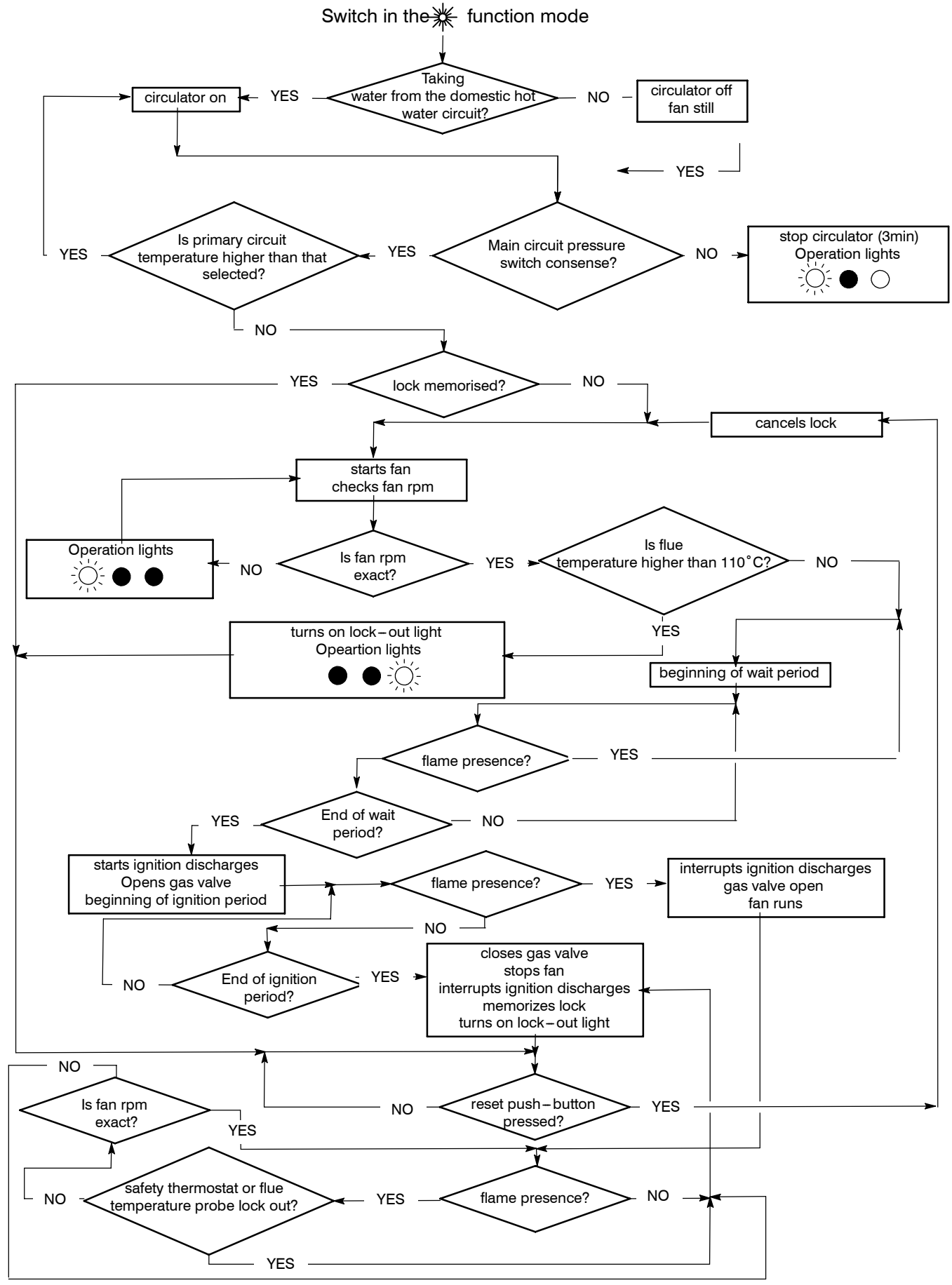


Fig. 9.14

9.11 Thermal control in the "❄" mode

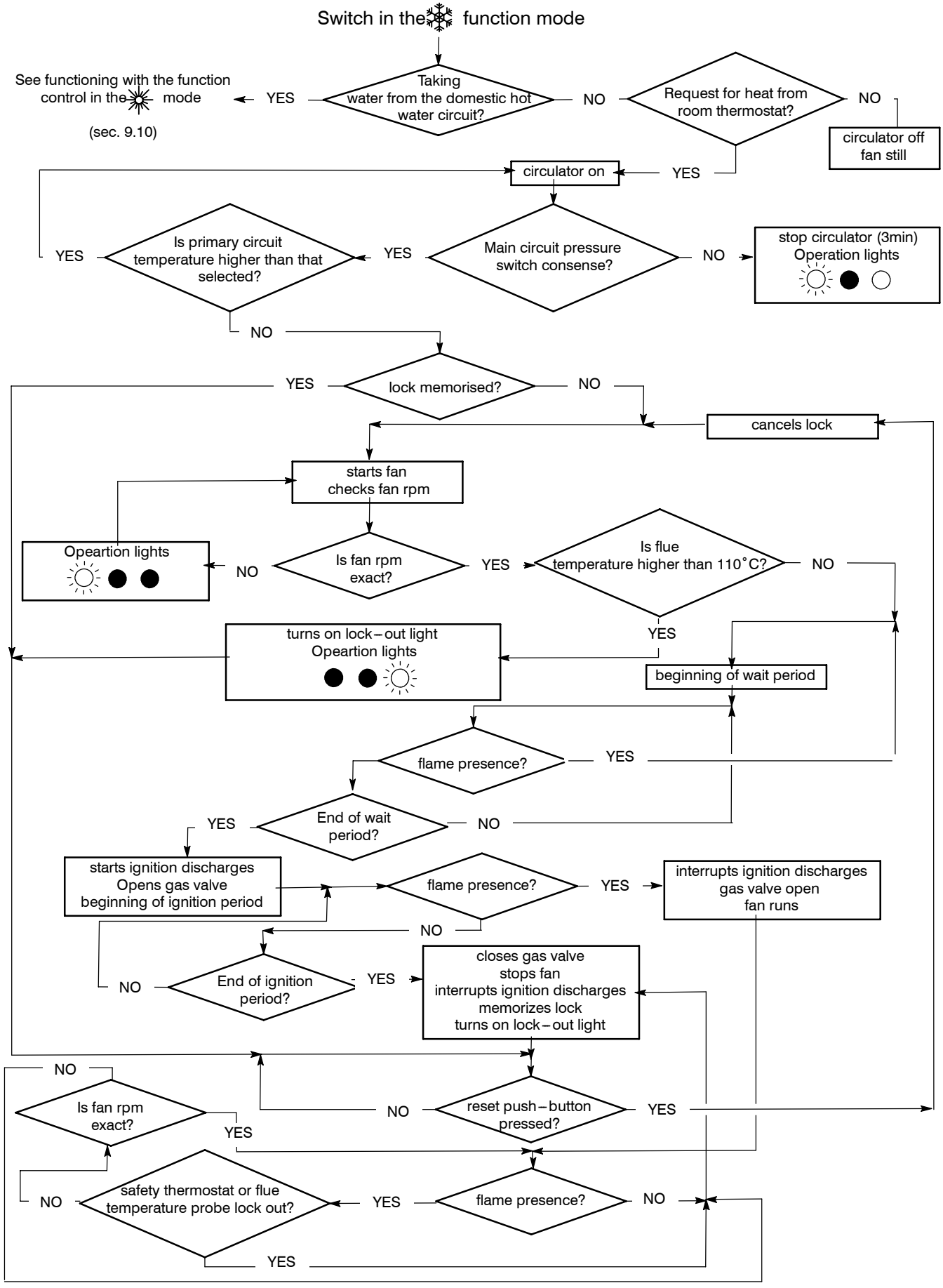


Fig. 9.15

10 Transformer

10.1 Removal

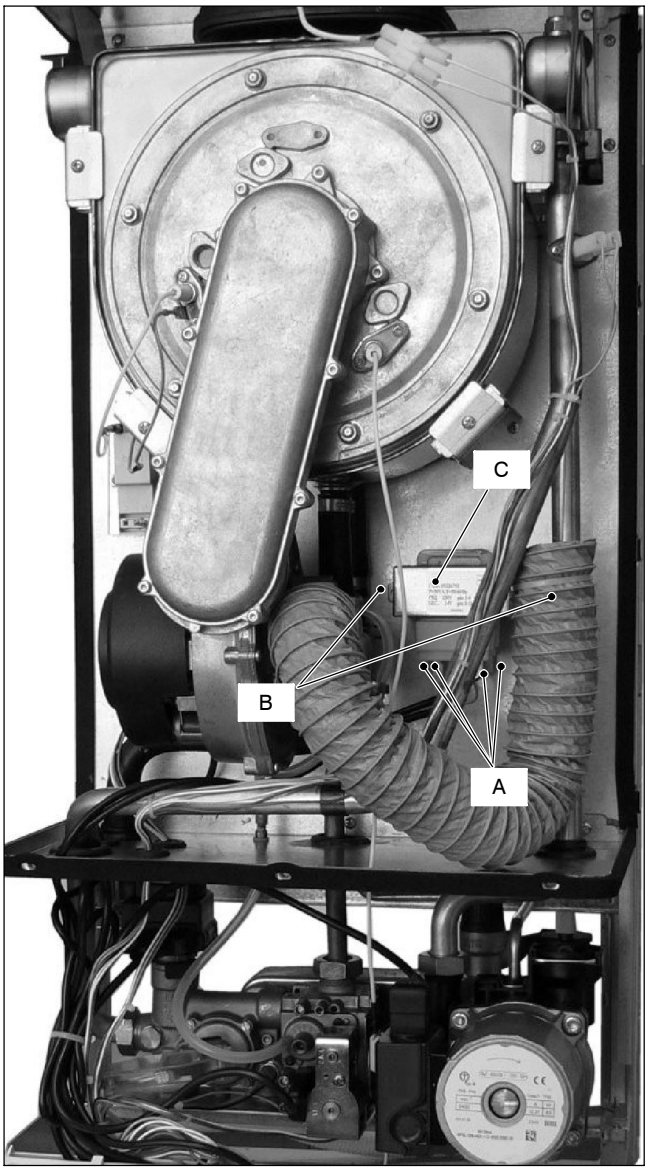


Fig. 10.1

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 2).

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 Fig. 10.2)

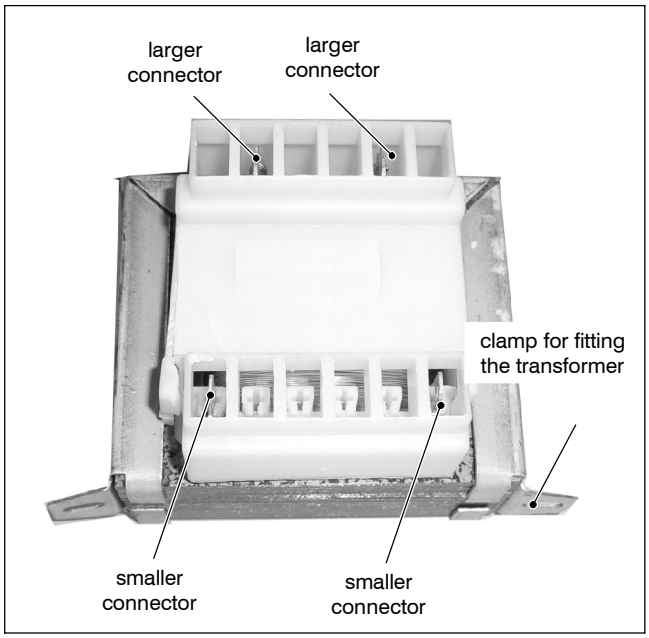


Fig. 10.2

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 10.1)

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 Fig. 11.1 controls the gas inflow to the boiler burner.

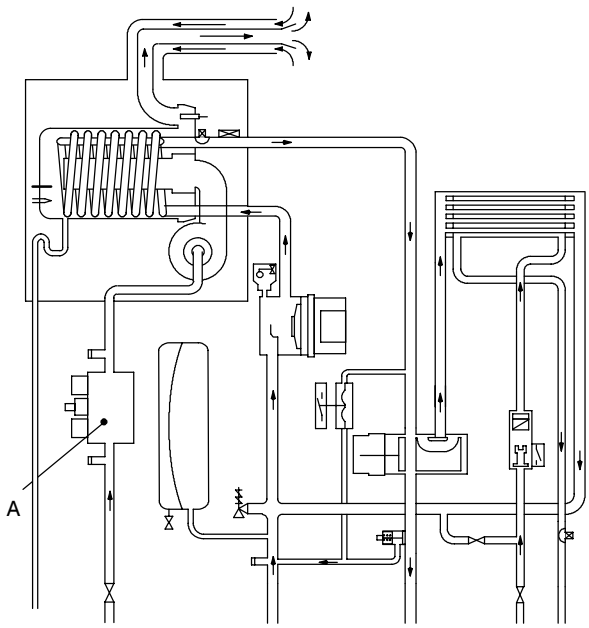


Fig. 11.1

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 Description of the parts (Fig. 11.2)

1 Minimum gas pressure adjustment

2 On–off operators

3 On–off operators electric connector

4 Gas valve inlet pressure test point

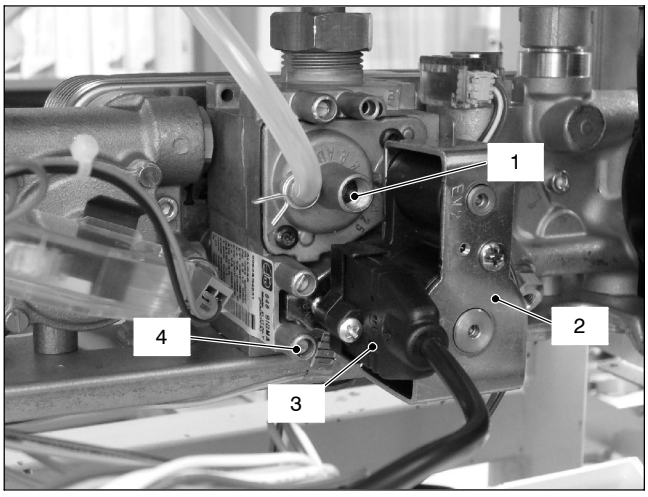


Fig. 11.2

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 2.2 and 2.3).

3 Loosen the internal screw on the Inlet Pressure Test Point 4 (Fig. 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 Fig. 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 4 (Fig. 11.2).

Gas valve adjustment

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

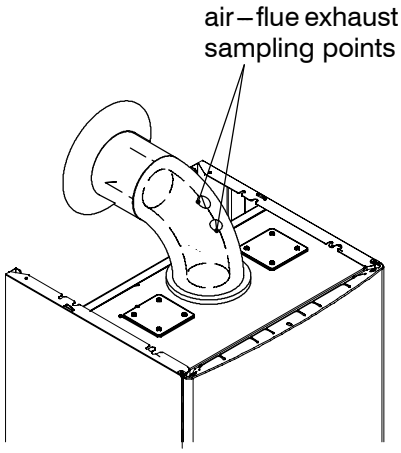


Fig. 11.3

12 Turn on the boiler, switching on the fused spur isolation switch.

13 Open the gas inlet valve.

14 Set the function knob *B* as indicated in Fig. 11.4.
The appliance operation light on the left will flash every 4 seconds.

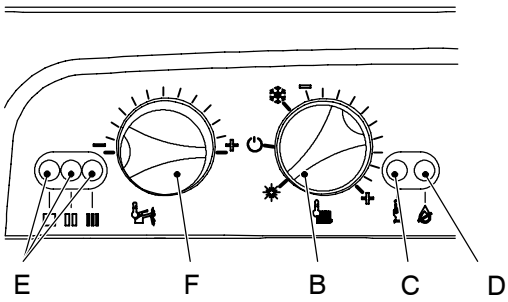


Fig. 11.4

15 Keep pressed the reset button *C* for about 10 seconds (Fig. 11.4) until the lock–out signal lamp *D* blinks.

16 The lamps *E* should give the indication as in Fig. 11.5.

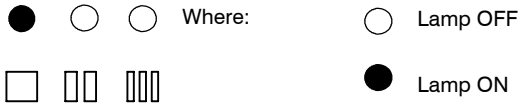


Fig. 11.5

17 Release and keep the reset button C pressed for more than 5 seconds until the lock–out signal lamp D 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 *F* to the minimum position as illustrated in Fig. 11.6

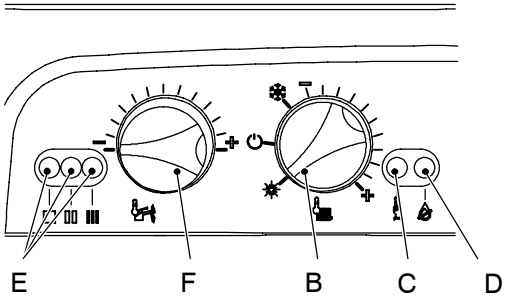


Fig. 11.6

20 Allow the analyser to give a stable reading.

21 Read the CO_2 % value.
It should be between 8,8 and 9,0 %.
To adjust the CO_2 % value remove the brass plug by unscrewing it and rotate the plastic screw 1 (Fig. 11.2) (by rotating it clockwise the CO_2 % increases).

Checking the maximum gas valve setting

22 Set the knob F to the maximum position as illustrated in Fig. 11.7

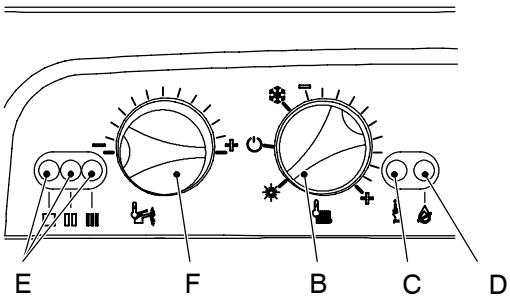


Fig. 11.7

23 Allow the analyser to give a stable reading.

24 Read the CO_2 % value. It should be between 8,3 and 9,3 %.

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 (1, Fig. 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

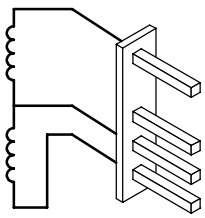
1 Remove the front panel of the case.

2 Disconnect the electrical connector 3 (Fig. 11.2).

3 Measure the electrical resistance between the connector pins of the on–off operators as illustrated in Fig. 11.8.

ON–OFF Operator
approx. 6 400 Ω*

ON–OFF Operator
approx. 920 Ω*



* at ambient temperature.

Fig. 11.8

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 2.3 of this manual.

2 Remove the screw *G* and disconnect the connector *H* (Fig. 11.9).

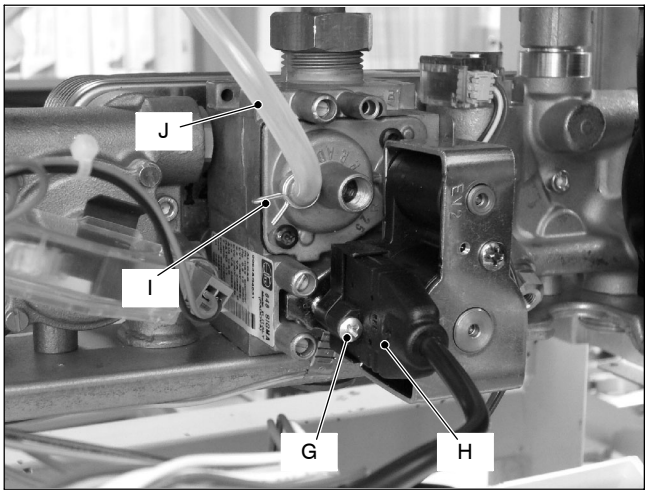


Fig. 11.9

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*.

5 Unscrew the connectors *K* and remove the pipe *L* (Fig. 11.10).

6 Unscrew the screws *M* and remove the valve.

7 Reassemble the valve carrying out the removal operations in reverse order.

Before to fit a new valve it is advisable to pre–set it as hereafter explained.

8 Remove the brass plug and turn the plastic screw 1 (Fig. 11.2) fully clockwise until it stops. Do not overtight.

9 Turn it counter–clockwise 2 and 3/4 turns.

10 Adjust the gas valve using the flue analyser as described in section 11.3.

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 chapter 11.3 section 11.

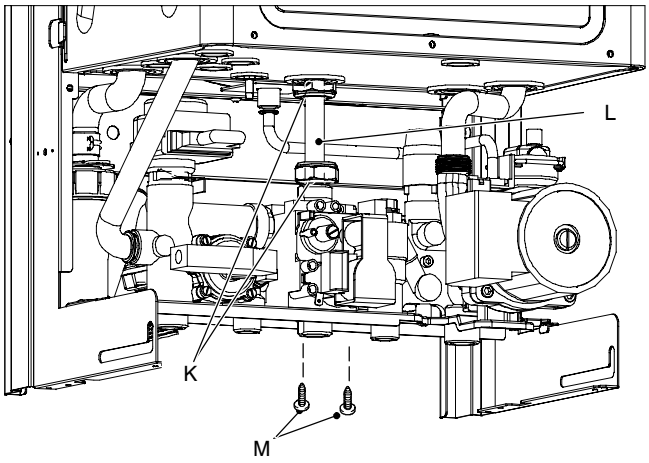


Fig. 11.10

12 Primary circuit flow switch

12.1 Function

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

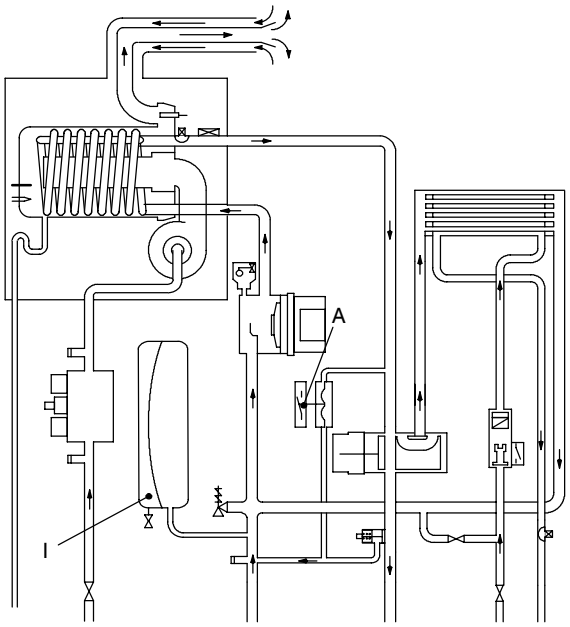


Fig. 12.1

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 9.4 of this manual) has occurred.

12.2 Checks

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

Mechanical function

1 Remove the front panel of the case.

2 Start and stop the boiler either in d.h.w. or c.h. mode.

3 Looking through the switch box verify the position of the shaft *B* referring to Fig. 12.2.

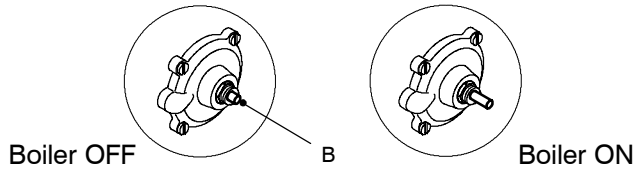


Fig. 12.2

Electrical check

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

1 Remove the switch as explained in section 12.3.

2 Measure the electrical resistance between the tabs marked C. and N.O. (Fig. 12.3).
The contact must be normally open.

3 Operate the switch by hand and verify that the contact is now closed.

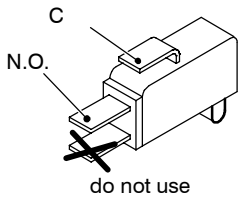


Fig. 12.3

12.3 Removal

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

Removal of the switch

1 Remove the front panel of the case.

2 Remove the fork *C* (Fig. 12.4).

3 Open the box and disconnect the switch.

4 Re–assemble the parts in reverse order of removal. Refer to Fig. 12.3 for the correct wiring connectors on the switch

Removal of the membrane

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 *C* that holds the micro–switch housing *D* (Fig. 12.4).

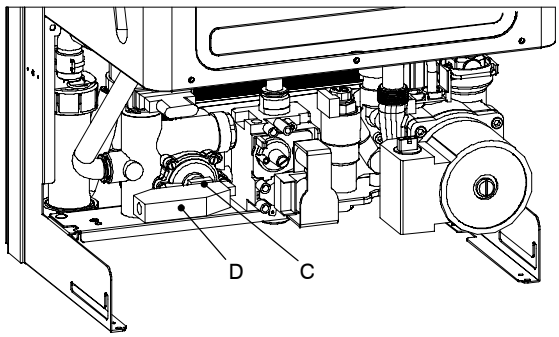


Fig. 12.4

3 Unscrew the four screws *E* (see Fig. 12.5) open the hydraulic operator and remove the membrane *F*.

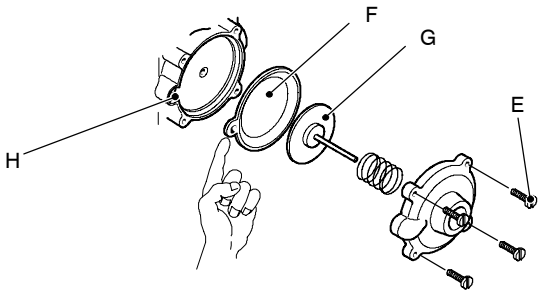


Fig. 12.5

4 Reassemble the parts in reverse order of removal.

When assembling the membrane, ensure that its concave side faces towards the actuator plate *G* and the reference indicated aligns with the seat *H* (see Fig. 12.5).

13 Expansion vessel and temperature–pressure gauge

13.1 Function

The Expansion vessel (*I* in Fig. 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 *J* (Fig. 13.1) from the valve on the top of the expansion vessel and connect a suitable air pressure gauge.

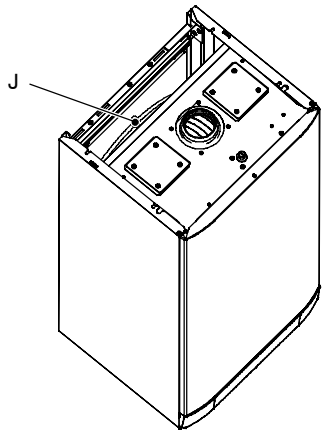


Fig. 13.1

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 *K*, the locknut *L* (Fig. 13.2) and remove the expansion vessel from the top of the boiler.

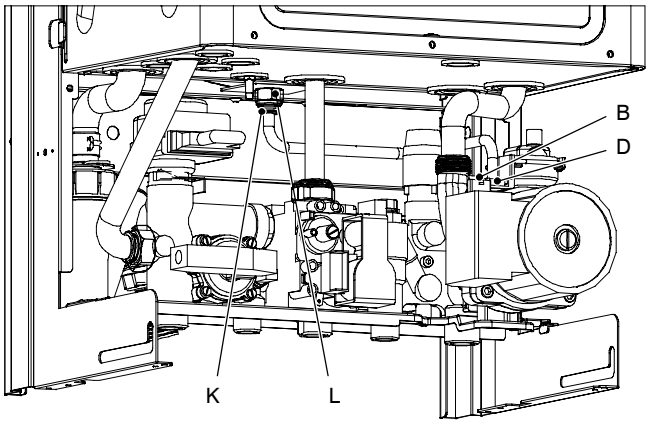


Fig. 13.2

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 *M* and the probe holder spring *N* (Fig. 13.3).

3 Squeeze the tabs *O* to release the temperature–pressure gauge *P* and remove it.

4 Re–assemble the parts in reverse order of removal.

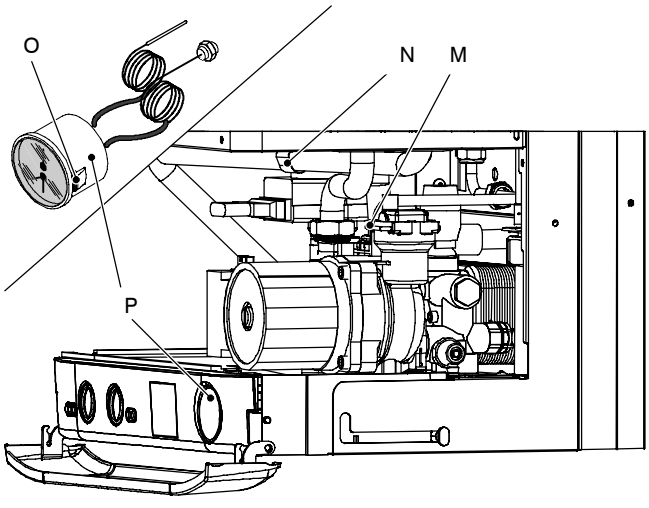


Fig. 13.3

14 D.h.w. flow switch, filter and flow limiter

14.1 Function

The d.h.w. flow switch *A* in Fig. 14.1 is a device that generates an electrical signal when hot water is drawn.

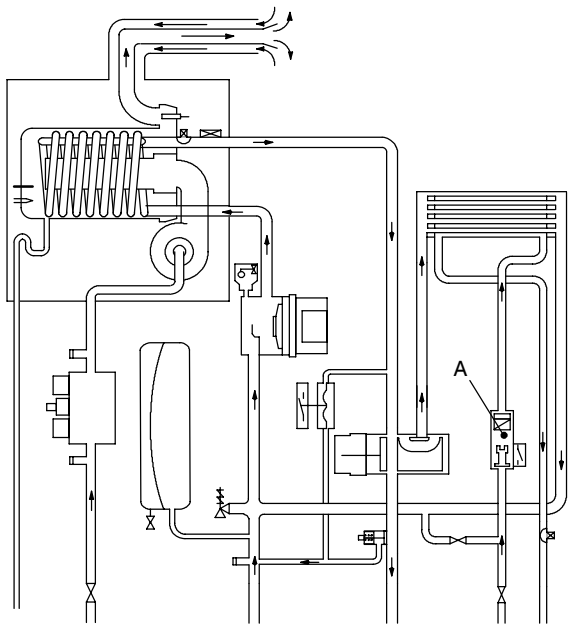


Fig. 14.1

When the flow rate through the d.h.w. circuit reaches about 2,5 litres/min', the float 6 (Fig. 14.3) is drawn towards the right.
The resulting magnetic field of ring 5 increases and reaches the flow switch sensor 1.
The sensor generates an electrical signal that switches the boiler d.h.w operation ON.

The state of the sensor is also indicated by means of the lamp *B* placed on the sensor body.

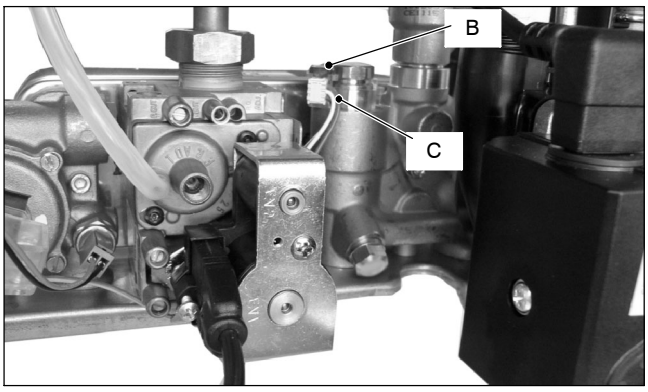


Fig. 14.2

14.2 Description and location of parts (Fig. 14.3)

1 Flow switch sensor
2 Body
3 O–ring
4 Spring
5 Magnetic ring
6 Float
7 Threaded ring
8 Flow limiter (M110.28SM/... optional accessory)
9 Filter
10 Spring seat

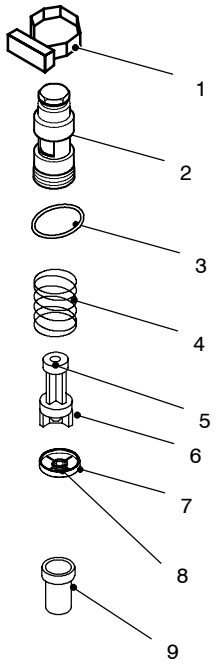


Fig. 14.3

14.3 Checks

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

Flow switch sensor operation

1 Remove the front panel of the case.
2 Switch on the boiler and open a d.h.w. tap. The lamp *B* (Fig. 14.2) placed on the sensor body is switched on when the flow rate reaches about 2,5 litres/min'.

14.4 Removal of the flow switch sensor

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

1 Remove the front panel of the case.
2 Disconnect the connector *C* (Fig. 14.2) and remove the sensor by delicately levering downwards with a screwdriver.

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.

1 Remove the front panel of the case and empty the d.h.w. circuit.
2 Remove the flow switch sensor (see section 14.4).

3 Unscrew the body 2(Fig. 14.3) and extract the flow switch group.

4 To remove the filter from the flow switch group separate the filter 9 from the threaded ring (Fig. 14.3) by levering it.

5 Reassemble the parts following the removing sequence in reverse order.

14.6 Flow limiter

The M110.24SM/... model is factory fitted with a 10 litre/min. flow limiter.

If on the M110.32SM/... model the flow rate of the d.h.w. circuit is too high, it is possible to limit it by installing a flow limiter. The following sizes are available:

Nominal flow rate (litres/min)	Colour
10	Yellow
12	Brown

To install the threaded ring with the flow limiter:

1 Remove the flow switch group as explained in the section 14.5.

2 Remove the filter from the flow switch group.

3 Unscrew the threaded ring 7 (Fig. 14.3) and remove it from the body 2.

4 Reassemble the group following the above sequence in reverse order.

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 Fig. 15.1.

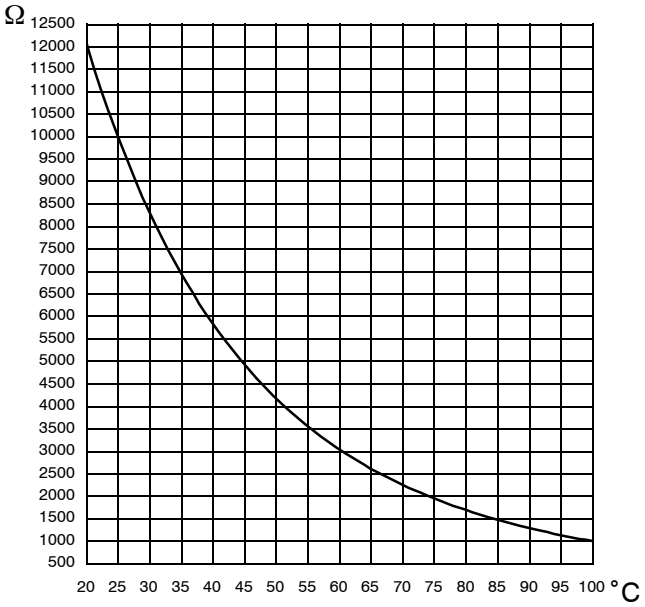


Fig. 15.1

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

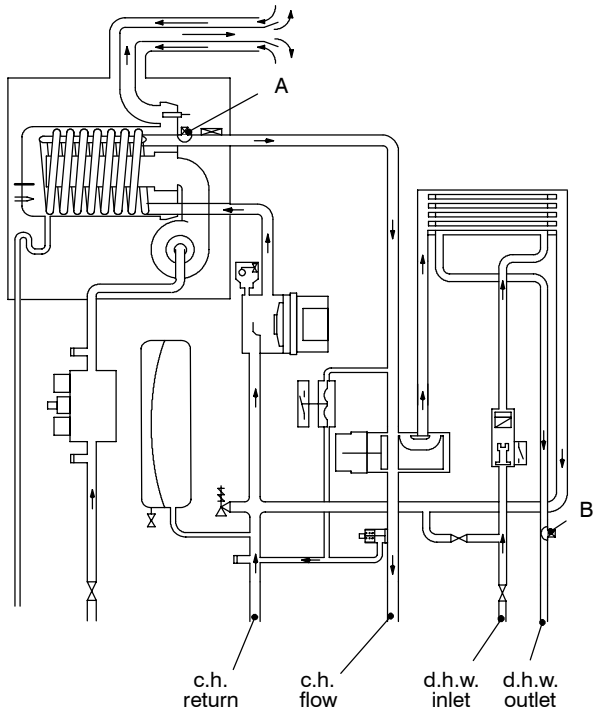


Fig. 15.2

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 brass group where the Temperature probe is located and check the electrical resistance according to the graph in Fig. 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.

2 Empty the primary circuit of the boiler.

3 Remove the electric connector and unscrew the c.h. Temperature probe (Fig. 15.3).

4 Reassemble the c.h.Temperature probe carrying out the removal operations in reverse order.

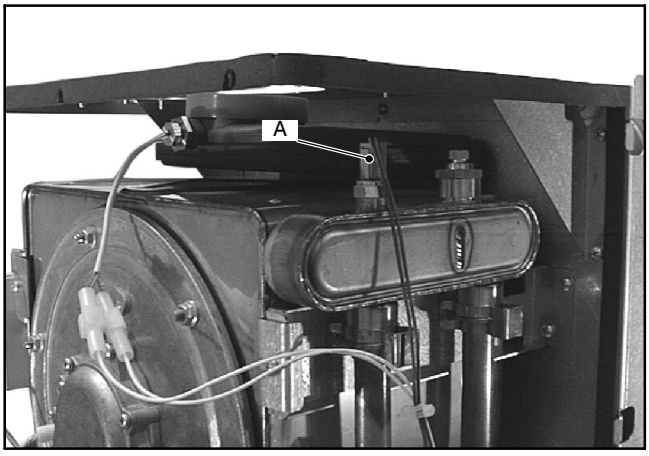


Fig. 15.3

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 Empty the d.h.w circuit of the boiler.

3 Remove the electric connector and unscrew the d.h.w. Temperature probe (Fig. 15.4).

4 Reassemble the d.h.w. Temperature probe carrying out the removal operations in reverse order.

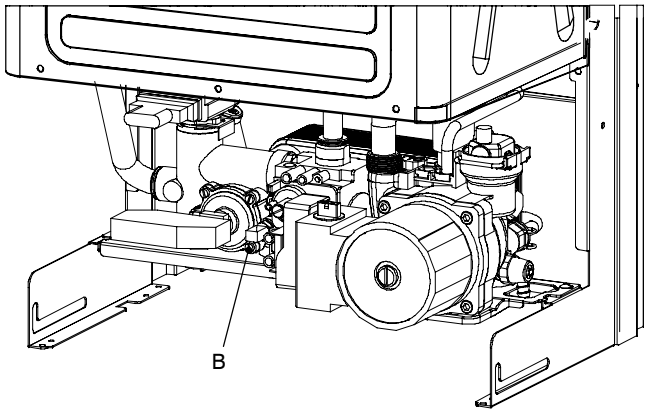


Fig. 15.4

16 By–pass valve

16.1 Function

The By–pass valve *A* in Fig. 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.

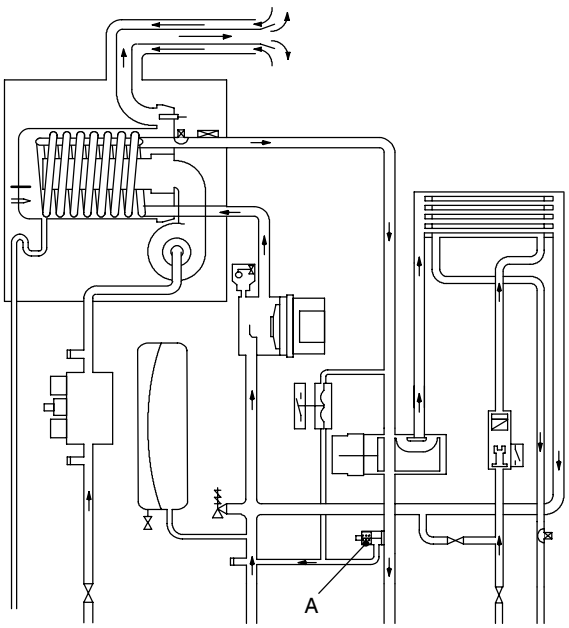


Fig. 16.1

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 diverter group as described in the section 8.4 of this manual.

4 Unscrew the connector *B* and remove the by–pass valve *C* (Fig. 16.2).

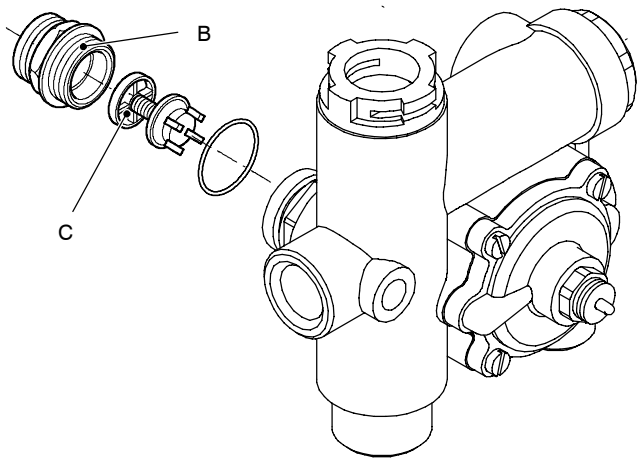


Fig. 16.2

5 Reassemble the by–pass valve as illustrated in Fig. 16.2 reversing the order of removal.

17 Fan and Air box

17.1 Function

The function of the Fan *A* (Fig. 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.

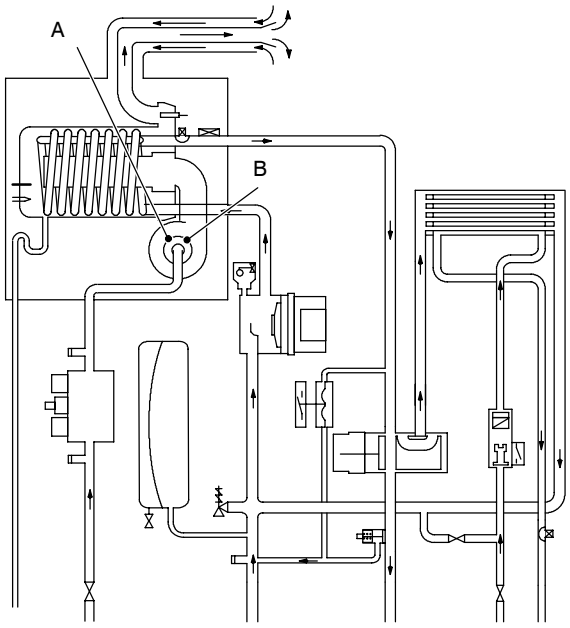


Fig. 17.1

17.2 Removal of the fan group

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 2).

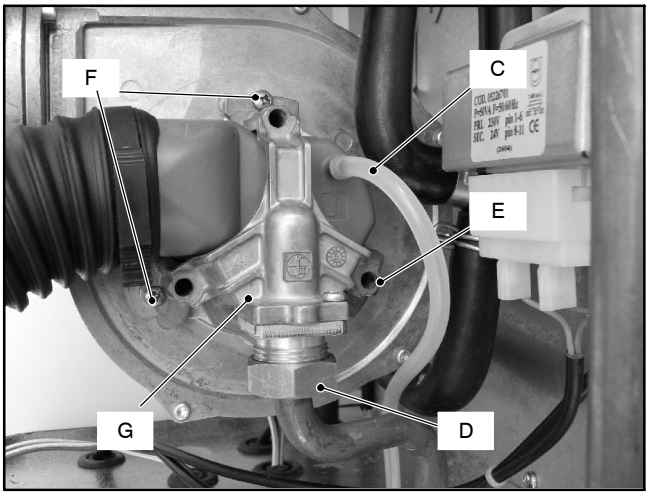


Fig. 17.2

3 Disconnect the rubber pipe *C* (Fig. 17.2).

4 Completely loosen the gas connection *D* (Fig. 17.2).

5 Loosen without removing the screw *E*.

6 Remove the screws *F* and the air box *G*. Leave the air box with the air hose clamped to the water pipe.

7 Disconnect the fan connector *H* by pressing the plastic hook placed on the rear side of the connector (Fig. 17.3).

8 Unscrew the screws *I* (Fig. 17.4) .

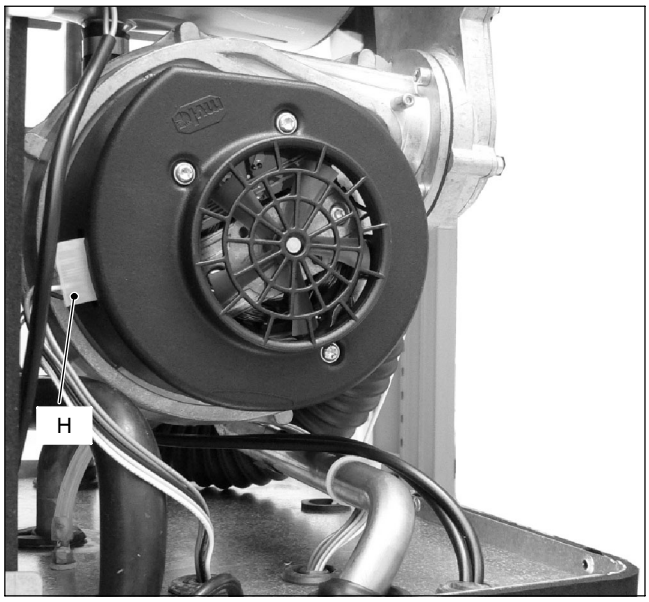


Fig. 17.3

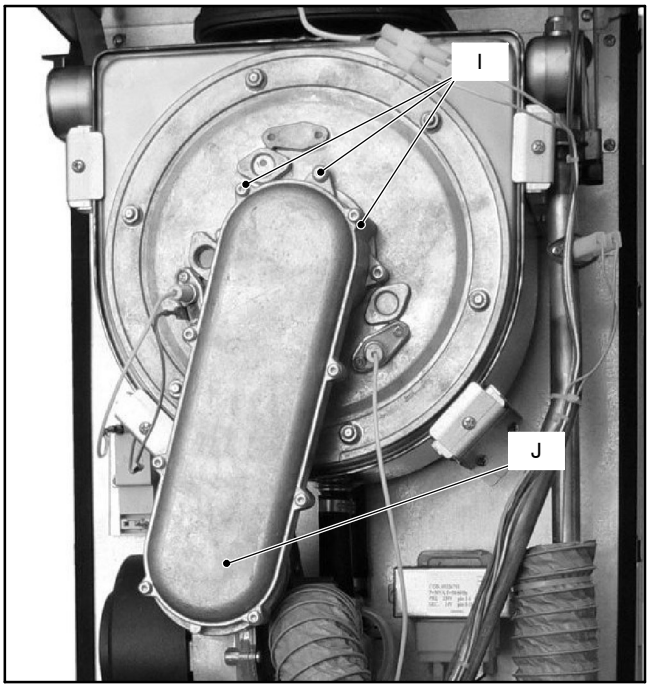


Fig. 17.4

9 Remove the fan group *J* by sliding it forwards.

10 Assemble the fan group carrying out the removal operations in reverse sequence.

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

the appropriate chapter *Maintenance* of the installation instructions manual.

17.3 Removal of the Air box

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

1 Carry out the operations 1 to 6 of section 17.2.

2 Unscrew the screws *K* and remove the gas connection *L* (Fig. 17.5).

3 Open the strip *M* by sliding the edges with the help of a screwdriver and remove the Air box G.

4 Assemble the Air box carrying out the removal operations in reverse sequence.

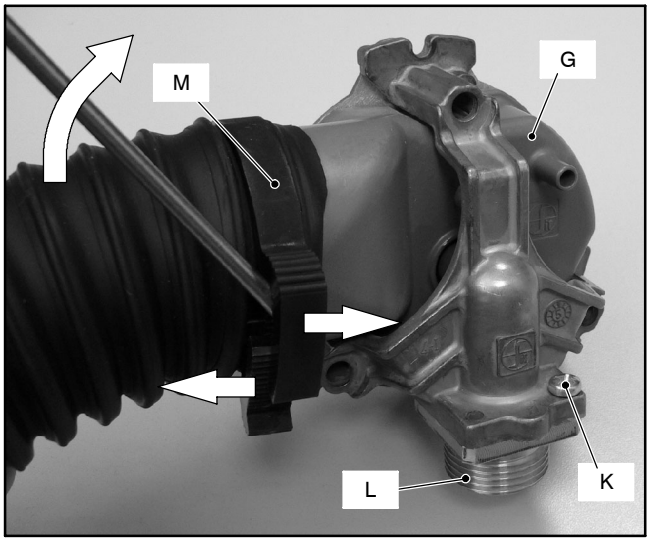


Fig. 17.5

Warning: After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis, refer to the appropriate chapter *Maintenance* of the installation instructions manual.

17.4 Removal of the Fan

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

1 Remove the fan group (see section 17.2).

2 Unscrew the screws *N* (Fig. 17.6).

3 Assemble the Fan carrying out the removal operations in reverse sequence.

Before reassembling ensure the fan gasket is correctly mounted.

Warning: After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis, refer to the appropriate chapter *Maintenance* of the installation instructions manual.

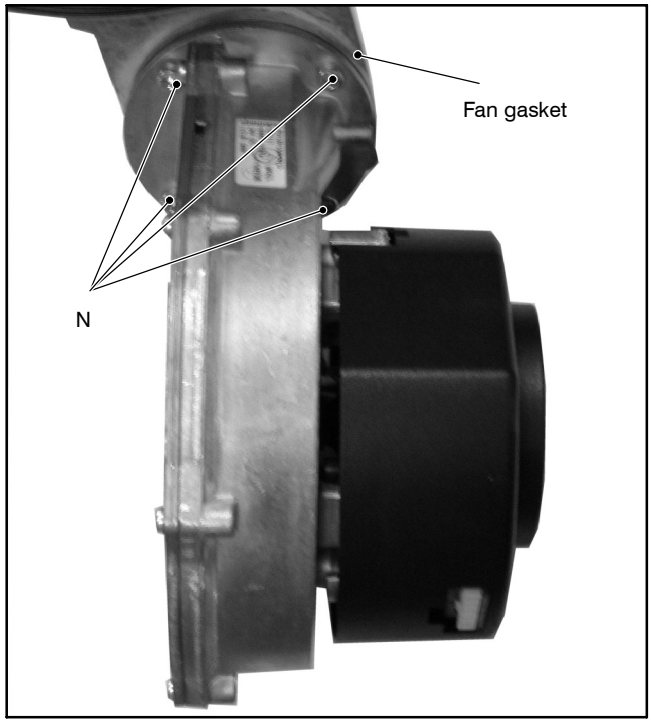


Fig. 17.6

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 left side of the fan–burner group *A*, are the ignition electrodes *B* and are connected to the spark generator *C*.

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

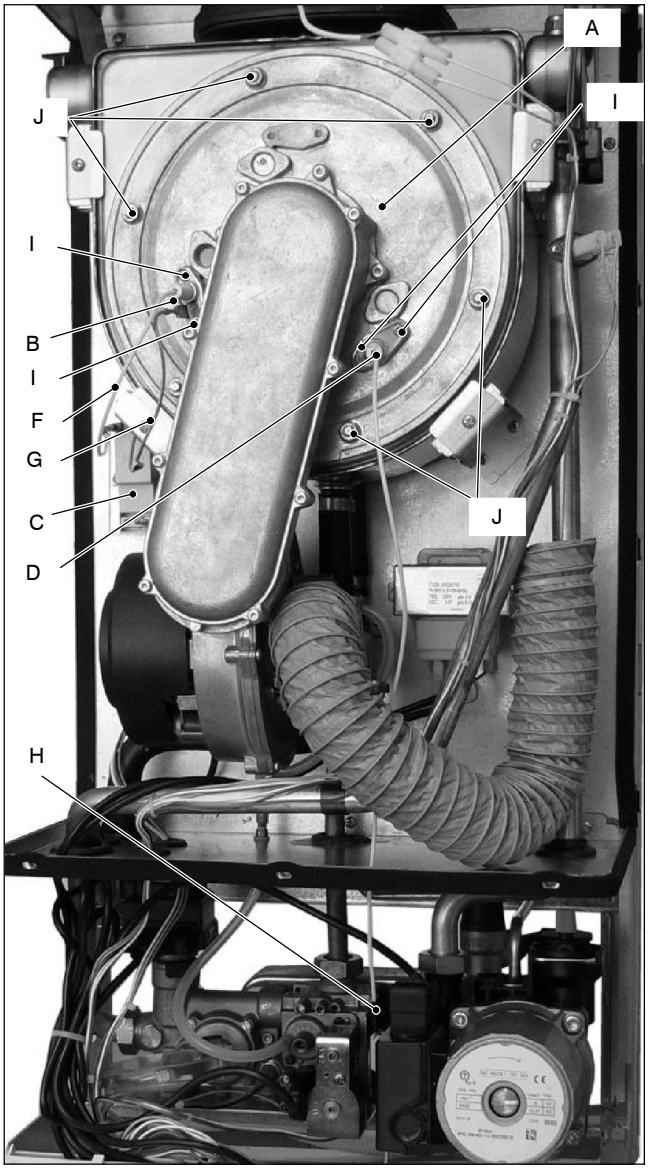


Fig. 18.1

The burner *E* is fitted on the rear of the fan–burner group A.

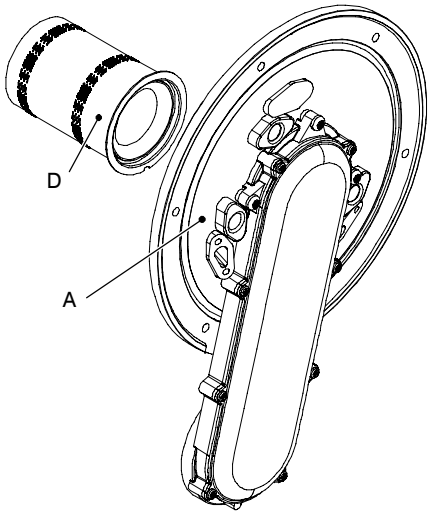


Fig. 18.2

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 2) .

2 Disconnect the ignition electrodes connector *F* and the earth wire *G* from the spark generator (Fig. 18.1) and disconnect the detection electrode connector *H*.

3 Unscrew the screws *I* and remove the ignition electrodes B and the detection electrode D (Fig. 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 (see Fig. 18.3)

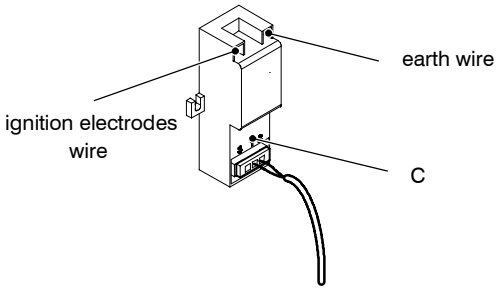


Fig. 18.3

18.3 Removal of the burner

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

1 Remove the fan group (see section 17.2)

2 Remove the burner by sliding it forward.

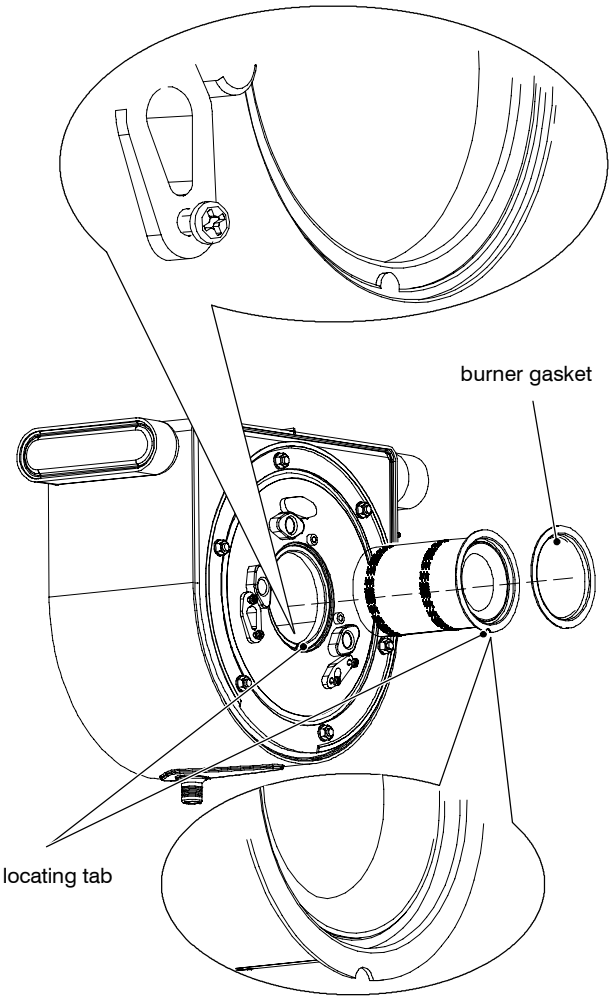


Fig. 18.4

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

Before reassembling ensure the burner gasket is correctly located.

⚠ **Warning: After cleaning or replacement as detailed above, if it deemed necessary to undertake a combustion analysis, refer to the appropriate chapter *Maintenance* of the installation instructions manual.**

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 18.2).

2 Do the operations of section 17.2 from step 1 to step 7.

3 Unscrew the nuts *J* (Fig. 18.1)and remove the cover of the combustion chamber.

4 Remove the front insulation panel (Fig. 18.5).

5 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.

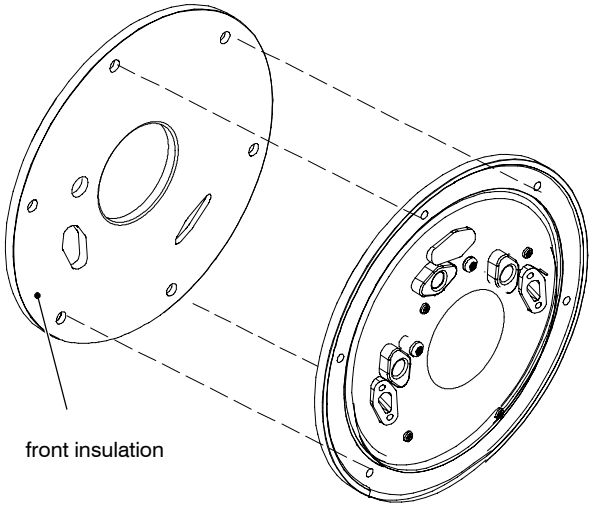


Fig. 18.5

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 Disconnect the Ignition and detection electrodes.

2 Do the operations of section 17.2 from step 1 to step 7.

3 Unscrew the nuts *K* (Fig. 18.1)and remove the cover of the combustion chamber.

4 Unscrew the screw *L*, remove the washer *M* and the rear insulation *N* (Fig. 18.6).

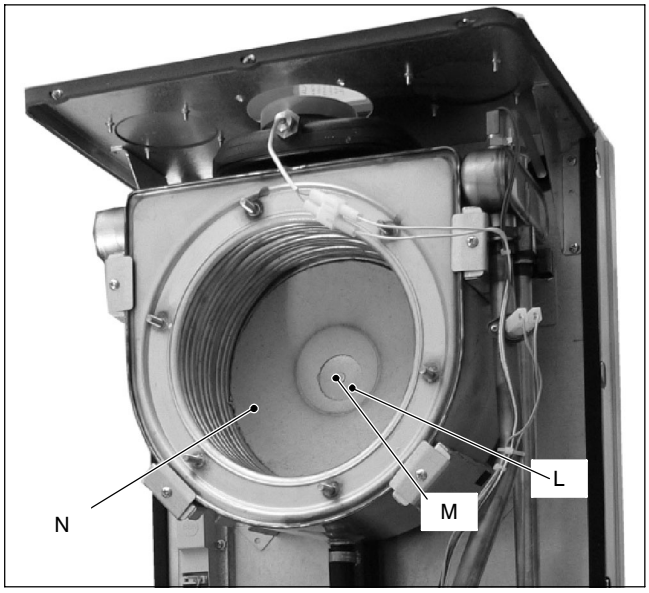


Fig. 18.6

5 Assemble the new rear insulation carrying out the removal operation in reverse order.

18.6 Removal of the flue hood

1 Remove the condensing heat exchanger (see section 5.2).

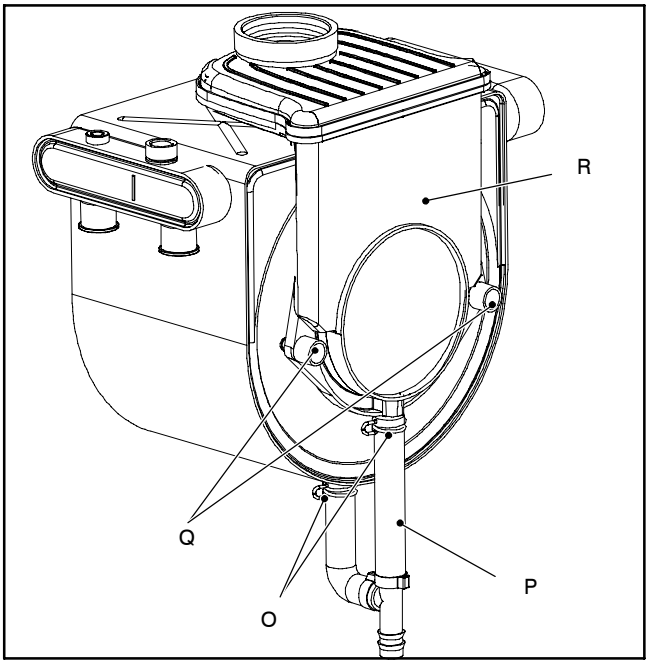


Fig. 18.7

2 Using pliers, remove the spring *O* moving it downwards and disconnect the rubber pipe *P* (Fig. 18.7).

3 Remove the screws *Q* and remove the flue hood *R*.

4 Assemble the flue hood carrying out the removal operation in reverse order.

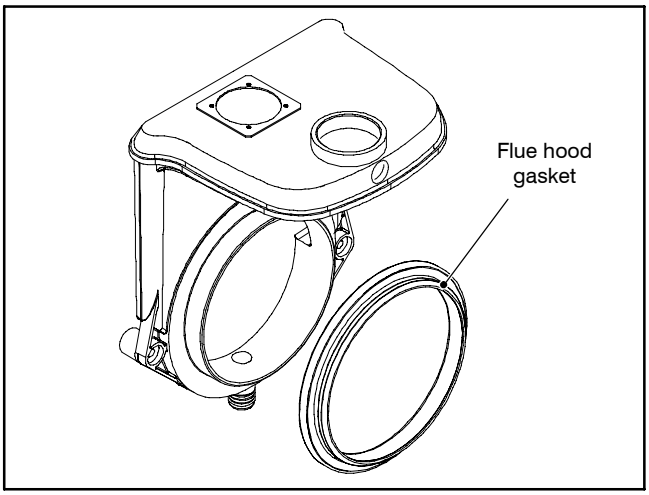


Fig. 18.8

Before reassembling ensure that the flue hood gasket is correctly mounted (Fig. 18.8).

18.7 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 electrodes wire and the earth wire coming from the ignition electrodes (Fig. 18.9).

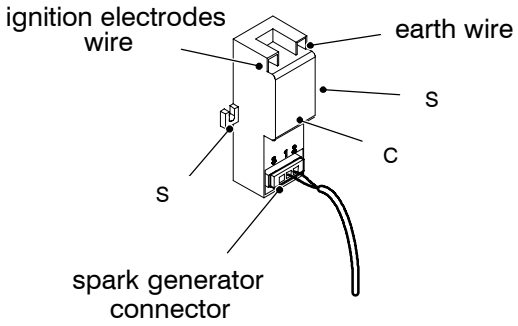


Fig. 18.9

3 Unscrew the screws *S* 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.

18.8 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 18.2)

2 Check for the correct distance between the metallic edges of the ignition electrode (see Fig. 18.10).

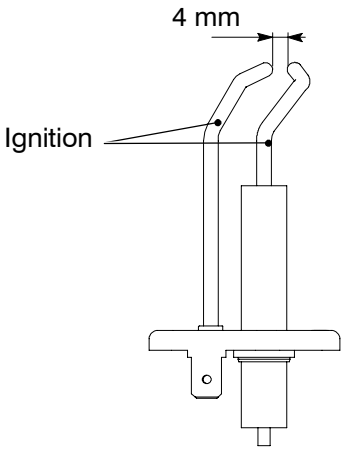


Fig. 18.10

Check the connection wires.

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

1 Remove all the case panels 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.

19 Safety thermostat

19.1 Function

The safety thermostat *A* in Fig. 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.

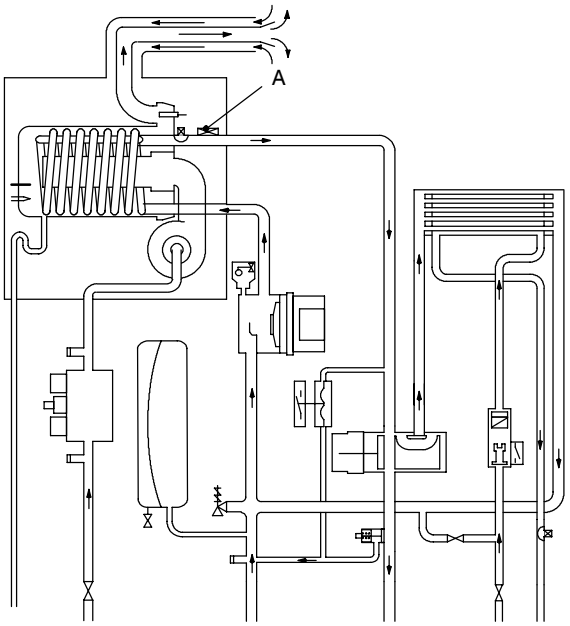


Fig. 19.1

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 Ω).

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 Fig. 19.2).

3 Unscrew the screws *C* which hold the overheat thermostat on the pipe of the condensing heat exchanger and remove it.

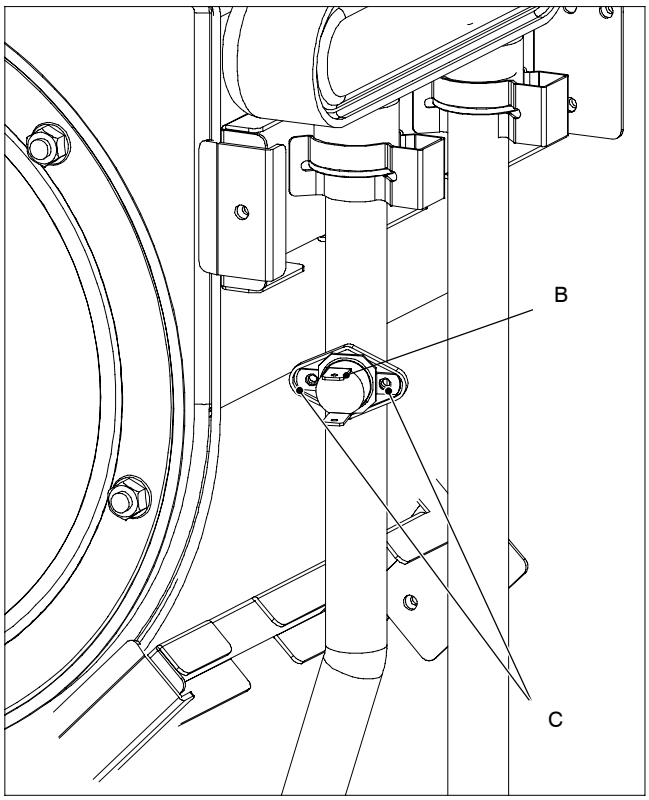


Fig. 19.2

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, refer to the appropriate chapter *Maintenance* of the installation instructions manual.**

20 Flue temperature probe NTC

20.1 Function

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

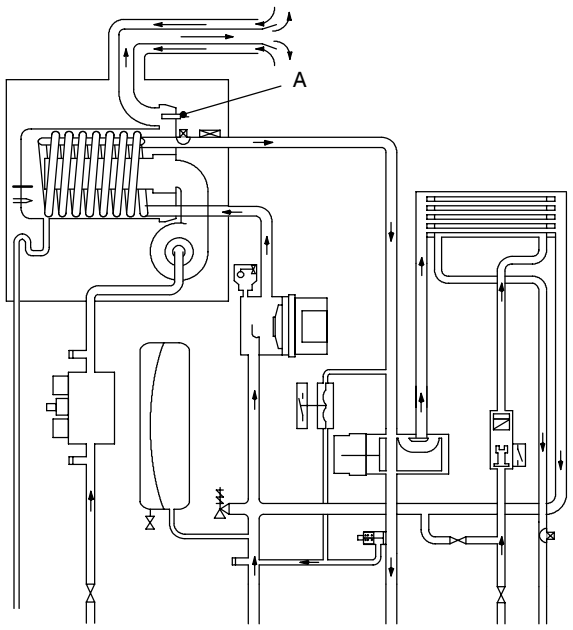


Fig. 20.1

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. It is therefore allowed 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.

If not, the electronic control/ignition p.c.b. attempts to light the burner and, at the end, locks the boiler and lights the lock–out signal lamp.

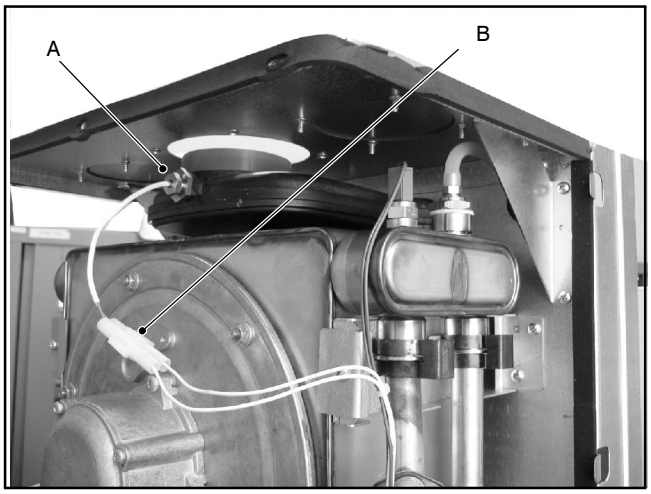


Fig. 20.2

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 wires *B* from the Flue temperature probe NTC.

3 Unscrew and remove the flue temperature probe A (Fig. 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 (see section 20.2).

2 Measure the Flue temperature probe NTC electrical resistance at the ambient temperature and check it according to the graph in Fig. 20.3

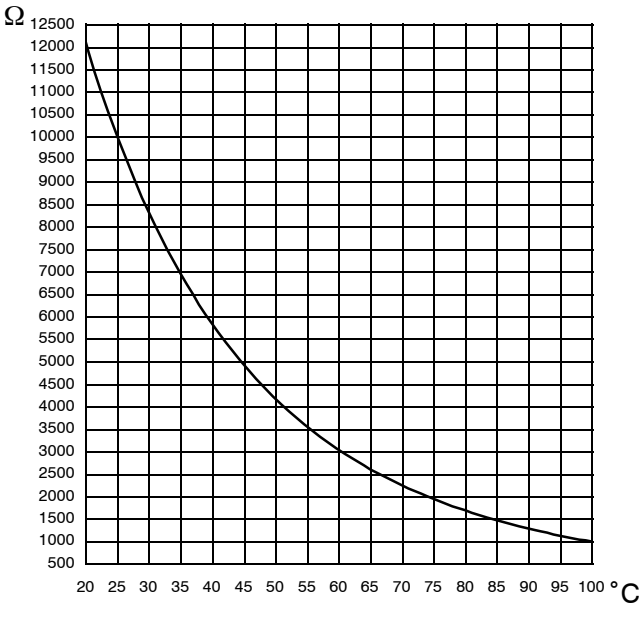


Fig. 20.3

21 Condensate trap

21.1 Function

The condensate trap *A* in Fig. 21.1 and Fig. 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.

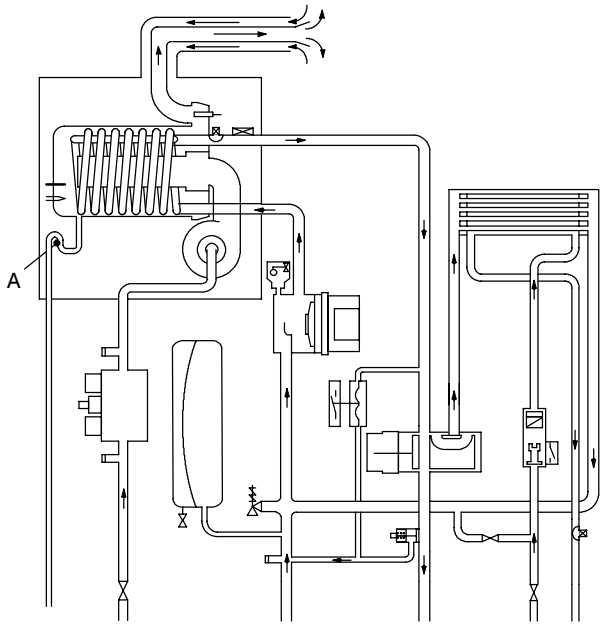


Fig. 21.1

If the drain pipe is plugged or in any case in which the condensate isn't correctly evacuated, the condensate level in the trap rises till it reaches thus causing the boiler lock–out.

21.2 Removal

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

1 Remove the front and right case panels.

2 Remove the motor of three way diverter valve (see section 8.4).

3 Disconnect the trap from the draining pipe.

4 Using pliers, remove the spring *B* moving it upwards.

5 Unscrew the lock–nut *C* and lower the trap.

6 Reassemble carrying out the removal operations in reverse order.

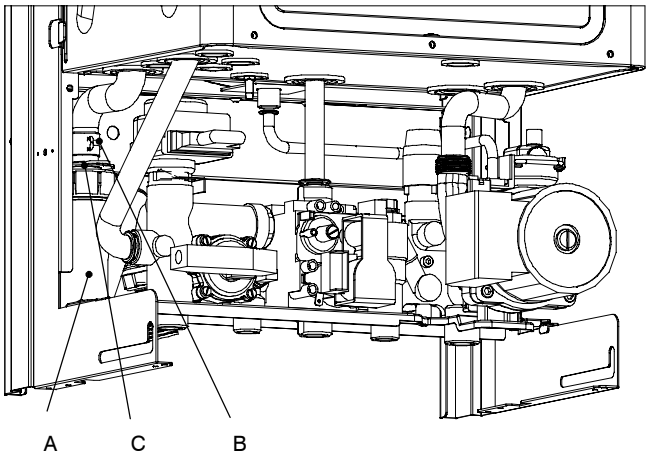


Fig. 21.2

22 External temperature probe (optional)

22.1 Function

The External temperature probe if fitted, allows to adjust automatically the temperature of the c.h. flow with reference to the external temperature.

The relationship between the external temperature and the c.h. flow temperature is represented by the coefficient K (Fig. 22.1) that can be set between 0 and 6.

More details concerning the coefficient K and the setting procedure are given in the *Commissioning* section of the installation manual.

The coefficient K is factory set to 0 that is the setting for the operation with no external temperature probe fitted.

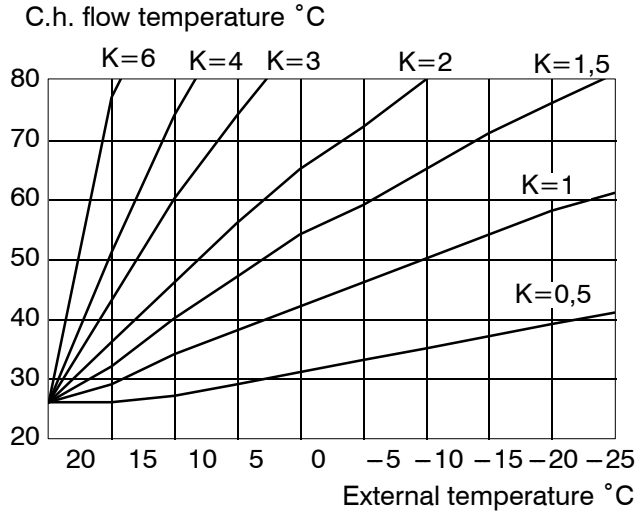


Fig. 22.1

22.2 Checks

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

Disconnect the cable from the External temperature probe.

Measure the external temperature where the External temperature probe is located and check the electrical resistance according to the graph in Fig. 22.2.

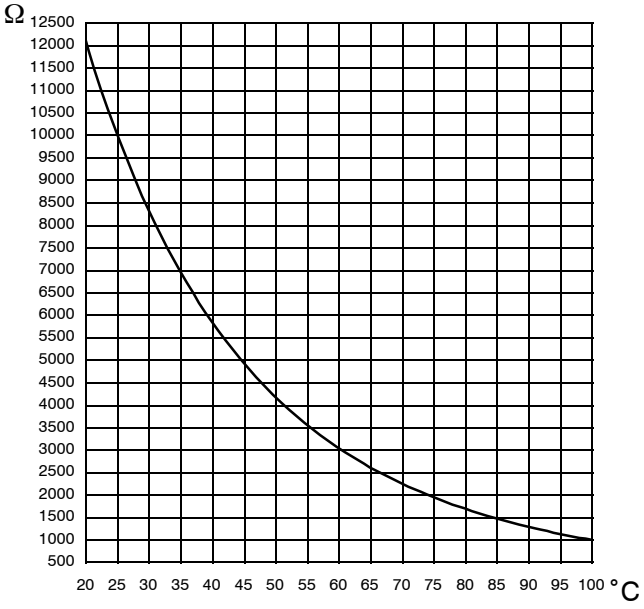
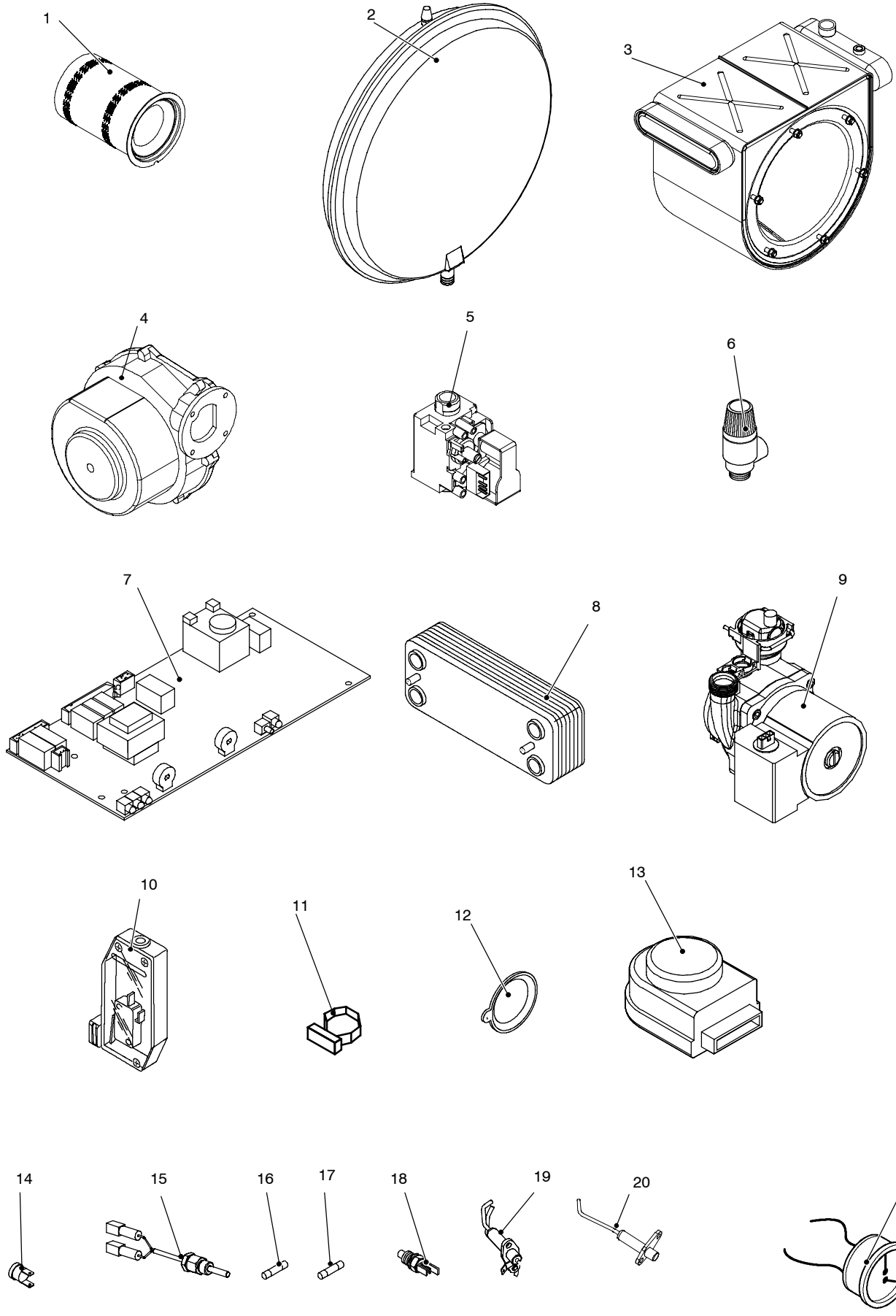


Fig. 22.2

23 Short spare parts list

Key	G.C. part no.	Description	Q.ty	Manufac-turer part no.	Manufacturer's reference
1		Burner (mod. M110.24SM/...)	1	BI1223 101	
		Burner (mod. M110.32SM/...)	1	BI1223 102	
2		Expansion vessel	1	BI1182 105	CIMM 7 litres
3		Condensing heat exchanger (mod. M110.24SM/...)	1	BI1282 101	
		Condensing heat exchanger (mod. M110.32SM/...)	1	BI1282 102	
4		Fan	1	BI1223 113	EBM RG128 24V 54W
5		Gas valve	1	BI1223 111	SIT 848 Sigma
6		Safety valve	1	BI1131 100	Watts Orkly (alternative)
7		Electronic regulation p.c.b. (mod. M110.24SM/...)	1	BI1805 103	Bertelli & Partners
		Electronic regulation p.c.b. (mod. M110.32SM/...)	1	BI1805 101	
8	E01–204	D.h.w. heat exchanger (M110.24SM/...)	1	BI1001 101	
	E01–205	D.h.w. heat exchanger (M110.32SM/...)	1	BI1161 100	
9	H20–993	Pump	1	BI1262 103	
10		Primary circuit flow switch	1	BI1251 501	
11		D.h.w. flow switch	1	BI1271 101	
12	E00–688	Main. flow switch membrane	1	BI1011 103	
13	E83–086	Three way diverter valve (electric actuator)	1	BI1101 102	Elbi
14	E83–101	Overheat thermostat	1	BI1172 105	ELTH – type 261
15		Flue temperature probe NTC	1		
16		Fuse 3,15 AF	2	BI1295 108	
17		Fuse 400 mA T	1	BI1665 104	
18	164–026	Temperature probe (main or D.h.w. circuit)	2	BI1001 117	
19		Ignition electrode	1		
20		Detection electrode	1	BI1233 104	
21	E83–145	Temperature–pressure gauge	1	BI1475 108	IMIT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