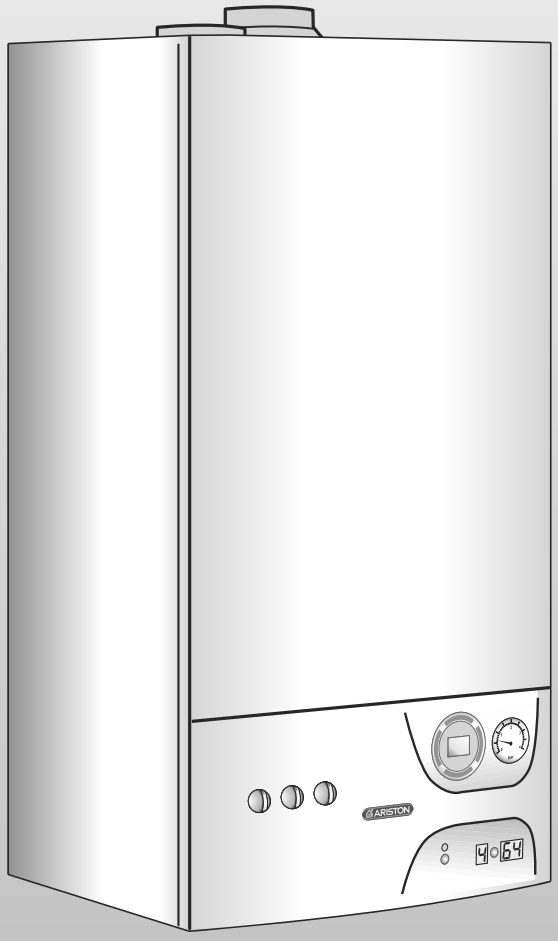
micro CONDENS SERIES

Installation and Servicing Instructions Type C Boilers

G.C.N: 47-116-23
41-116-08

LEAVE THESE INSTRUCTIONS WITH THE END-USER



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9. TECHNICAL INFORMATION

1. GENERAL INFORMATION

This manual is an integral and essential part of the product. It should be kept with the appliance so that it can be consulted by the user and our authorised personnel.

Please carefully read the instructions and notices about the unit contained in this manual, as they provide important information regarding the safe installation, use and maintenance of the product.

For operating instructions please consult the separate End User Manual.

1.1. GENERAL INFORMATION

Read the instructions and recommendations in these Installation Instructions carefully to ensure proper installation, use and maintenance of the appliance.

Keep this manual in a safe place. You may need it for your own reference while Servicing Technicians or your installer may need to consult it in the future.

This is a combined appliance for the production of Central Heating (C.H.) and Domestic Hot Water (D.H.W.).

This appliance **must be used only** for the purpose for which it is designed.
The manufacturer declines all liability for damage caused by improper or negligent use.

No asbestos or other hazardous materials have been used in the fabrication of this product.

Before connecting the appliance, check that the information shown on the data plate and the table on the last page comply with the electric, water and gas supply of the property. You will find the data plate on the reverse of the control panel.
The gas with which this appliance operates is also shown on the label at the bottom of the boiler.

Do not install this appliance in a damp environment or close to equipment which spray water or other liquids.
Do not place objects on the appliance.
Do not allow children or inexperienced persons to use the appliance without supervision.

If you smell gas in the room, **do not** turn electrical switches **on or off**, use the telephone or any other object which might cause sparks.
Open doors and windows immediately to ventilate the room.
Shut the gas mains tap (on the gas meter) or the valve of the gas cylinder and call your Gas Supplier immediately.
If you are going away for a long period of time, remember to shut the mains gas tap or the gas cylinder valve.

Always disconnect the appliance either by unplugging it from the mains or turning off the mains switch before cleaning the appliance or carrying out maintenance.

In the case of faults or failure, switch off the appliance and turn off the gas tap. Do not tamper with the appliance.
For repairs, call your local Service Agent and request the use of original spare parts.
For in-guarantee repairs contact MTS (GB) Limite1d.

1.2. OVERALL VIEW

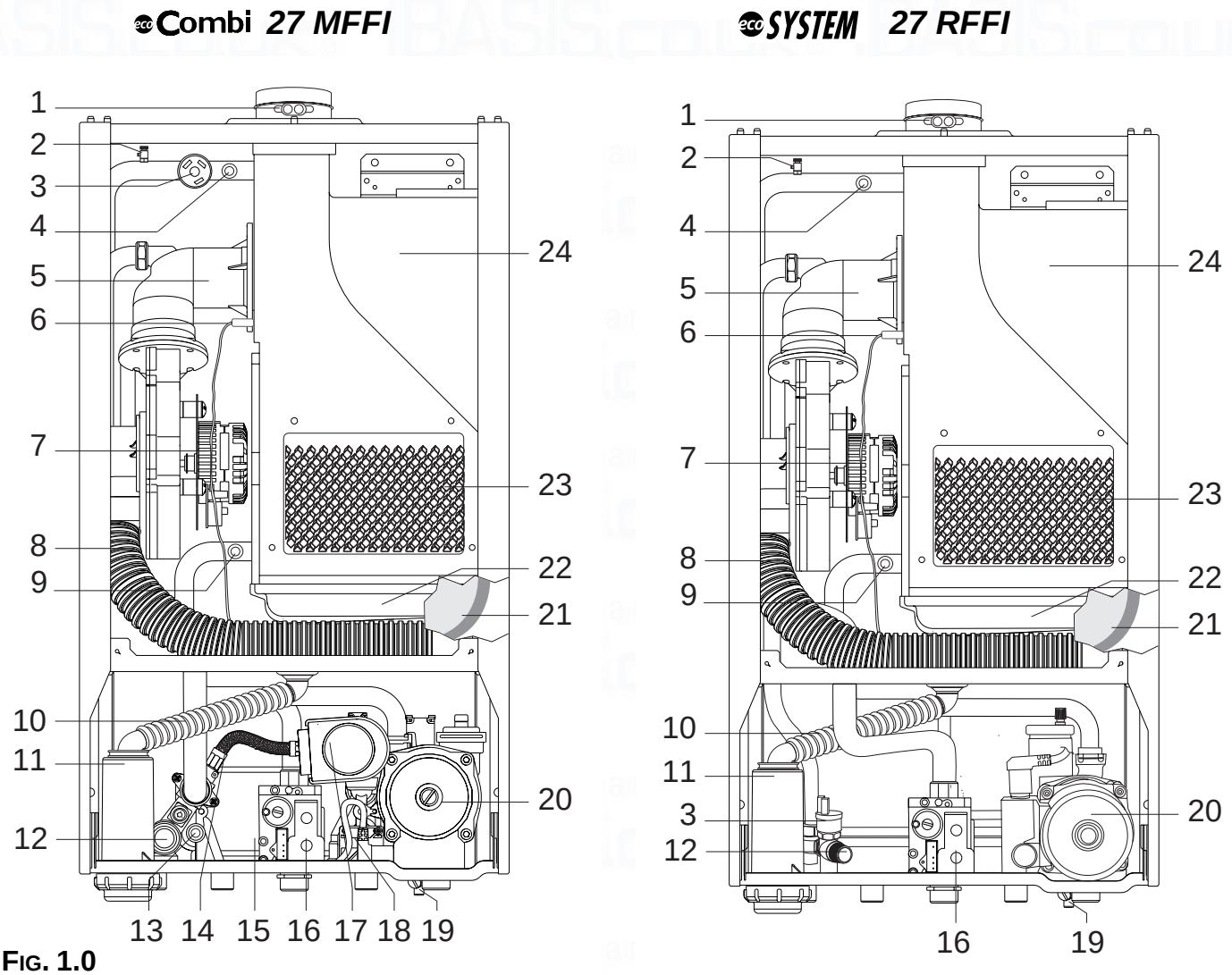


FIG. 1.0

LEGEND:

1. Flue connector
2. Air release valve
3. Pump pressure switch
4. Central Heating flow temperature probe
5. Mixer
6. Ignition and detection electrode
7. Fan
8. Silencer
9. Central Heating return temperature probe
10. Condensate trap (tube)
11. Condensate trap
12. Safety valve (3 bar)
13. Domestic Hot Water temperature probe
14. Automatic by-pass
15. Secondary heat exchanger
16. Gas valve
17. Diverter valve
18. Domestic Hot Water flow switch
19. Drain valve
20. Circulation pump with automatic air release valve
21. Expansion vessel
22. Condensate collector
23. Combustion chamber inspection hatch
24. Main heat exchanger (aluminium)

2. INSTALLATION

The technical information and instructions provided herein below are intended for the installer so that the unit may be installed correctly and safely.

2.1. REFERENCE STANDARDS

The installation and initial start up of the boiler must be by a CORGI Approved Installer in compliance with the installation standards currently in effect, as well as with any and all local health and safety standards i.e.. CORGI .

This appliance must be installed by a competent installer in accordance with current Gas Safety Regulations (Installation & Use) 1996.

The installation of this appliance must be in accordance with the relevant requirements of the current Gas Safety Regulations (Installation & Use) 1996, current Building Regulations, the current I.E.E. Wiring Regulations, current Water Regulations/ Byelaws, in Scotland in accordance with the Building Standards (Scotland - Consolidated) Regulations and Health and Safety document No. 635 “Electricity at work regs. 1989” and in Ireland the local Building Regulations (IE).

C.O.S.H.H

Materials used in the manufacture of this appliance are non-hazardous and no special precautions are required when servicing.

Gas installations	BS 6891	1988
Boilers of rated input not exceeding 60 kW	BS 6798	1987
Forced circulation hot water system	BS 5449	1990
Installation of gas hot water supplies for domestic purposes (2nd family gases)	BS 5546	1990
Flues	BS 5440-1	1990
Air supply	BS 5440-2	1989
Treatment of water in domestic hot water central heating systems	BS 7593	1992
I.E.E. wiring regulations	BS 7671	1992
Specification for expansion vessels	BS 4814	1990
Installation of L.P.G.	BS 5482	1994

2.2. SITING THE APPLIANCE

Installation should also comply with the following British Standard Codes of Practice:The appliance may be installed in any room or indoor area, although particular attention is drawn to the requirements of the current I.E.E. Wiring Regulations, and in Scotland, the electrical provisions of the Building Regulations applicable in Scotland, with respect to the installation of the combined appliance in a room containing a bath or shower.

Where a room-sealed appliance is installed in a room containing a bath or shower the boiler and any electrical switch or appliance control, utilising mains electricity should be situated so that it cannot be touched by a person using the bath or shower.

The location must permit adequate space for servicing and air circulation around the appliance as indicated in paragraph 2.4.

The location must permit the provision of an adequate flue and termination.

For unusual locations special procedures may be necessary.

BS 6798-1987 gives detailed guidance on this aspect.

A compartment used to enclose the appliance must be designed specifically for this purpose. No specific ventilation requirements are needed for an installation within a cupboard.

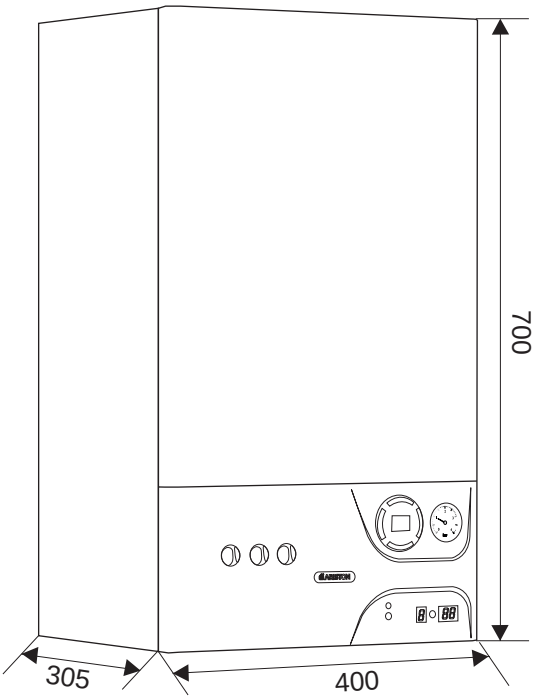
This appliance is not suitable for outdoor installation.

The type C appliances (in which the combustion circuit, air vent intake and combustion chamber are air-tight with respect to the room in which the appliance is installed) can be installed in any type of room.

There are no limitations with respect to ventilation and the volume of the room itself. The boiler must be installed on a solid, permanent wall to prevent access to the electrical parts (when live) through the aperture on the back frame.

2.3. OVERALL DIMENSIONS

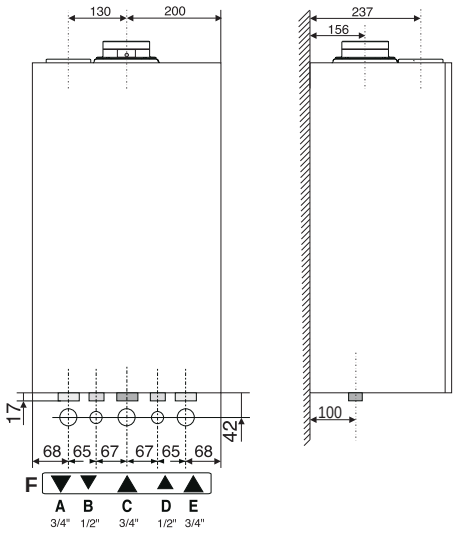
FIG. 2.0



LEGEND:

A = Central Heating Flow (3/4”)
B = Domestic Hot Water Outlet (1/2”)
C = Gas Inlet (3/4”)
D = Domestic Cold Water Inlet (1/2”)
E = Central Heating Return (3/4”)
F = Condensate discharge

eco Combi 27 MFFI



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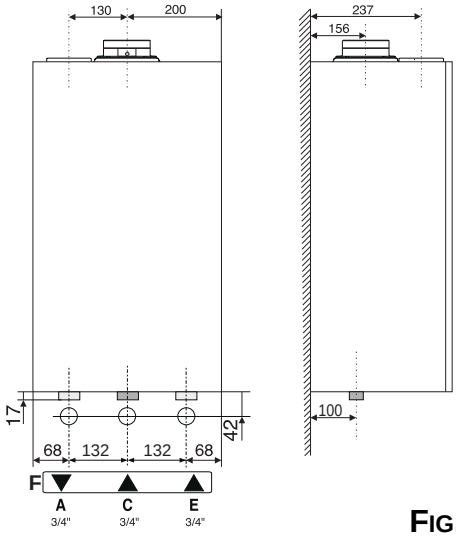

FIG. 2.1

2.4. MINIMUM CLEARANCES

In order to allow for access to the interior of the boiler for maintenance purposes, the boiler must be installed in compliance with the clearance requirements indicated in the diagram below.

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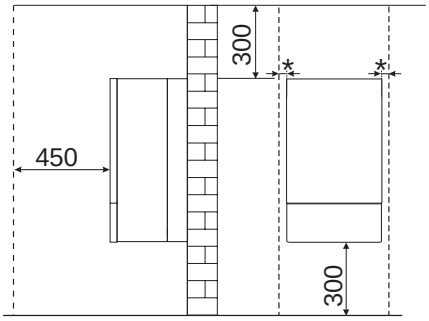
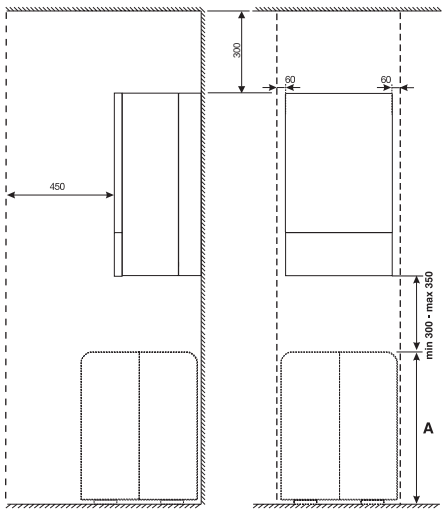


eco SYSTEM 27 RFFI

FIG. 2.2



	A
SUPER BRAVO SB 125	880
SUPER BRAVO SB 150	1010
SUPER BRAVO SB 200	1270

2.5. Mounting the Appliance

Fasten the boiler in place using the template and anchors supplied with the unit. It is highly recommended that a spirit level be used to position the boiler so that it is perfectly level.
For additional information, please consult the instructions contained in the connection kit and the flue kit.

2.6. Electrical Connection

For safety purposes, have a competent person carefully check the electrical system in the property, as the manufacturer will not be held liable for damage caused by the failure to earth the appliance properly or by anomalies in the supply of power. Make sure that the residential electrical system is adequate for the maximum power absorbed by the unit, which is indicated on the rating plate. In addition, check that the section of cabling is appropriate for the power absorbed by the boiler.

The boiler operates with alternating current, as indicated in the technical data table (1.2), where the maximum absorbed power is also indicated. Make sure that the connections for the neutral and live wires correspond to the indications in the diagram. The appliance electrical connections are situated on the reverse of the control panel (see the servicing manual for further information)

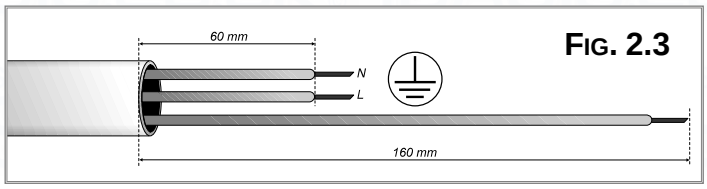


Fig. 2.3

Important!
In the event that the power supply cable must be changed, replace it with one with the same specifications. Make the connections to the terminal board located within the control panel, as follows:
- The yellow-green wire should be connected to the terminal marked with the earth symbol; make sure to re-use the ferrule mounted on the other supply cord;
- The blue wire should be connected to the terminal marked “N”;
- The brown wire should be connected to the terminal marked “L”.
Note: The diagrams for the electrical system are indicated in section 2.11.

Warning, this appliance must be earthed.
External wiring to the appliance must be carried out by a qualified technician and be in accordance with the current I.E.E. Regulations and applicable local regulations. This range of boilers are supplied for connection to a 230 V~ 50 Hz supply.
The supply must be fused at 3 A.
The method of connection to the electricity supply must facilitate complete electrical isolation of the appliance, by the use of a fused double pole isolator having a contact separation of at least 3 mm in all poles or alternatively, by **means of a 3 A** fused three pin plug and unswitched shuttered socket outlet both complying with BS 1363.
The point of connection to the Electricity supply must be readily accessible and adjacent to the appliance unless the appliance is installed in a bathroom when this must be sited outside the bathroom.

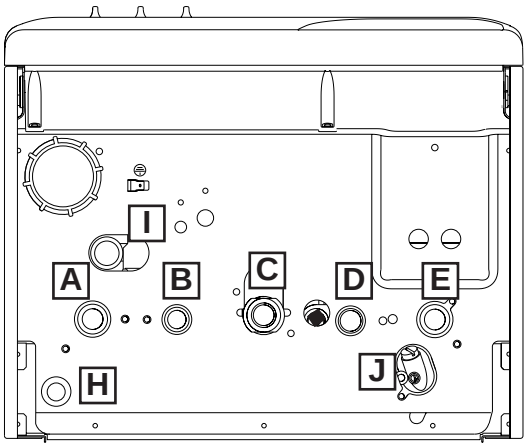
2.7. Gas Connection

The local gas region contractor connects the gas meter to the service pipe.
If the gas supply for the boiler serves other appliances ensure that an adequate supply is available both to the boiler and the other appliances when they are in use at the same time.
Pipe work must be of an adequate size. It should not be less than 22mm to within 1 metre of the boiler.

2.8. WATER CONNECTIONS

VIEW OF THE BOILER CONNECTIONS

eco Combi *27 MFFI*



eco SYSTEM *27 RFFI*

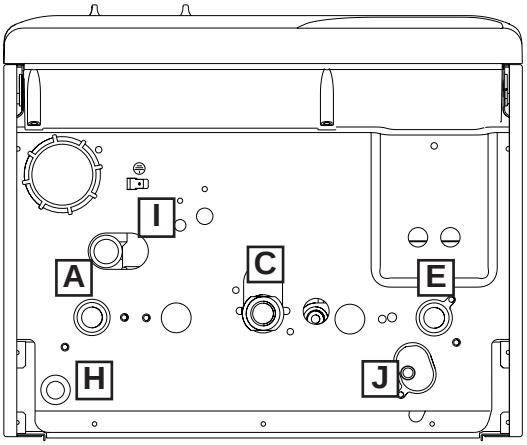


FIG. 2.4

Legend:

A = Central Heating Flow
B = Domestic Hot Water Outlet
C = Gas Inlet
D = Domestic Cold Water Inlet
E = Central Heating Return
H = Condensate discharge
I = Safety valve discharge
J = Drain valve

Central Heating

Detailed recommendations are given in BS 6798:1987 and BS 5449-1:1990, the following notes are given for general guidance.

PIPE WORK:

Copper tubing to BS EN 1057:1996 is recommended for water pipes. Jointing should be either with capillary soldered or compression fittings.

Where possible pipes should have a gradient to ensure air is carried naturally to air release points and water flows naturally to drain taps.

The appliance has a built-in automatic air release valve, however it should be ensured as far as possible that the appliance heat exchanger is not a natural collecting point for air.

Except where providing useful heat, pipes should be insulated to prevent heat loss and avoid freezing.

Particular attention should be paid to pipes passing through ventilated spaces in roofs and under floors.

BY-PASS:

The appliance includes an automatic by-pass valve, which protects the main heat exchanger in case of reduced or interrupted water circulation through the heating system, due to the closing of thermostatic valves or cock-type valves within the system.

SYSTEM DESIGN:

This boiler is suitable only for sealed systems.

DRAIN COCKS:

These must be located in accessible positions to permit the draining of the whole system. The taps must be at least 15mm nominal size and manufactured in accordance with BS 2870:1980.

SAFETY VALVE DISCHARGE:

The discharge should terminate facing downwards on the exterior of the building in a position where discharging (possibly boiling water & steam) will not create danger or nuisance, but in an easily visible position, and not cause damage to electrical components and wiring.

The discharge must not be over an entrance or a window or any other type of public access.

CONDENSATE DISCHARGE:

The condensate discharge hose from the boiler must be inserted by at least 50 mm into a suitable acid resistant pipe - e.g. plastic waste or overflow pipe. The condensate discharge pipe must have a continuous fall and preferably be installed and terminated within the building to prevent freezing.

The discharge pipe must be terminated in a suitable position:

i) Connecting in to an internal soil stack (at least 450 mm above the invert of the stack). A trap giving a water seal of at least 75 mm must be incorporated into the pipe run , there also must be an air break upstream of the trap.

ii) Connecting into the waste system of the building such as a washing machine or sink. The connection must be upstream of the washing machine/sink (If the connection is down stream of the waste trap then an additional trap giving a minimum water seal of 75 mm and an air break must be incorporated in the pipe run, as above.

iii) Terminating into a gully, below the grid level but above the water level.

iv) Into a soakway.

NOTE: If any condensate pipe work is to be installed externally, then it should be kept to a minimum and be insulated with a waterproof insulation and have a continuous fall.

AIR RELEASE POINTS:

These must be fitted at all high points where air naturally collects and must be sited to facilitate complete filling of the system.

The appliance has an integral sealed expansion vessel to accommodate the increase of water value when the system is heated.

It can accept up to 7 l (1.5 gal) of expansion water. If the heating circuit has an unusually high water content, calculate the total expansion and add an additional sealed expansion vessel with adequate capacity.

MAINS WATER FEED - CENTRAL HEATING:

There must be no direct connection to the mains water supply even through a non-return valve, without the approval of the Local Water Authority.

FILLING:

A temporary method for initially filling the system and replacing lost water during servicing and initial filling (in accordance with Water Supply Byelaw 14), is provided as an integral part of the connection kit (**see FIG. 2.5**). The flexible hose must be removed once the system has been filled. The D.H.W. inlet valve on the connection kit has two positions, one for winter and one for the summer.

DOMESTIC WATER

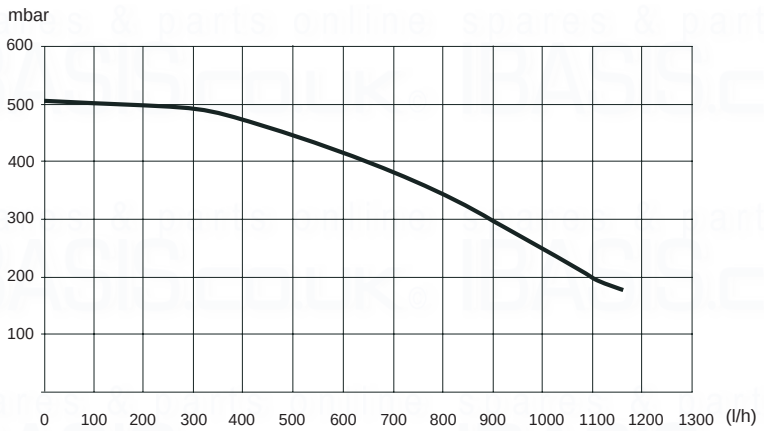
The domestic water must be in accordance with the relevant recommendation of BS 5546:1990. Copper tubing to BS EN 1057:1996 is recommended for water carrying pipe work and must be used for pipe work carrying drinking water.

UNDER FLOOR HEATING SYSTEMS:

In the event of an under floor heating system, fit a safety thermostat on the boiler flow (see paragraph 2.10). This thermostat should be positioned at a safe distance from the boiler to ensure the correct operation of the same. If the thermostat is positioned too close to the boiler, the water remaining in the boiler after a domestic hot water draw will flow in the system and may cause the thermostat contact to open without there being any real danger of the system being damaged, this would lead to a boiler shutdown both in D.H.W. mode and C.H. mode, and the error code “E08” would be displayed; boiler operation resumes automatically when the thermostat contact closes on cooling.

Should the thermostat fail to be installed as recommended, the under floor heating system can be protected by installing a thermostatic valve upstream from the thermostat in order to prevent the flow of excessively hot water towards the system.

RESIDUAL HEAD OF THE BOILER



2.9. FLUE CONNECTIONS

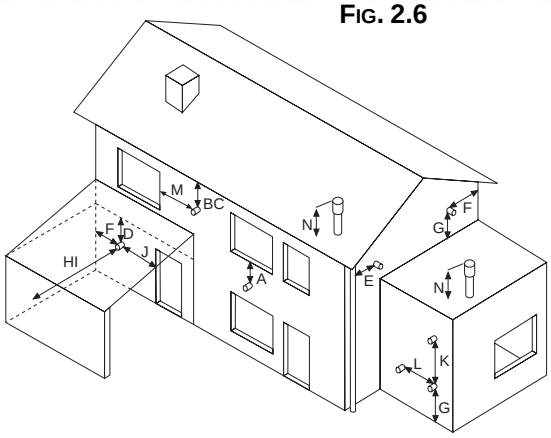
FLUE SYSTEM

The provision for satisfactory flue termination must be made as described in BS 5440-1.
The appliance must be installed so that the flue terminal is exposed to outdoor air.
The terminal must not discharge into another room or space such as an outhouse or lean-to.
It is important that the position of the terminal allows a free passage of air across it at all times.
The terminal should be located with due regard for the damage or discolouration that might occur on buildings in the vicinity.
In cold or humid weather water vapour may condense on leaving the flue terminal.
The effect of such "steaming" must be considered.
If the terminal is less than 2 metres above a balcony, above ground or above a flat roof to which people have access, then a suitable terminal guard must be fitted. When ordering a terminal guard, quote the appliance model number.

A suitable terminal guard is available from:
TOWER FLUE COMPONENTS
Morley Road
Tonbridge
Kent TN9 1RA

The minimum acceptable spacing from the terminal to obstructions and ventilation openings are specified in Fig. 2.6

FIG. 2.6

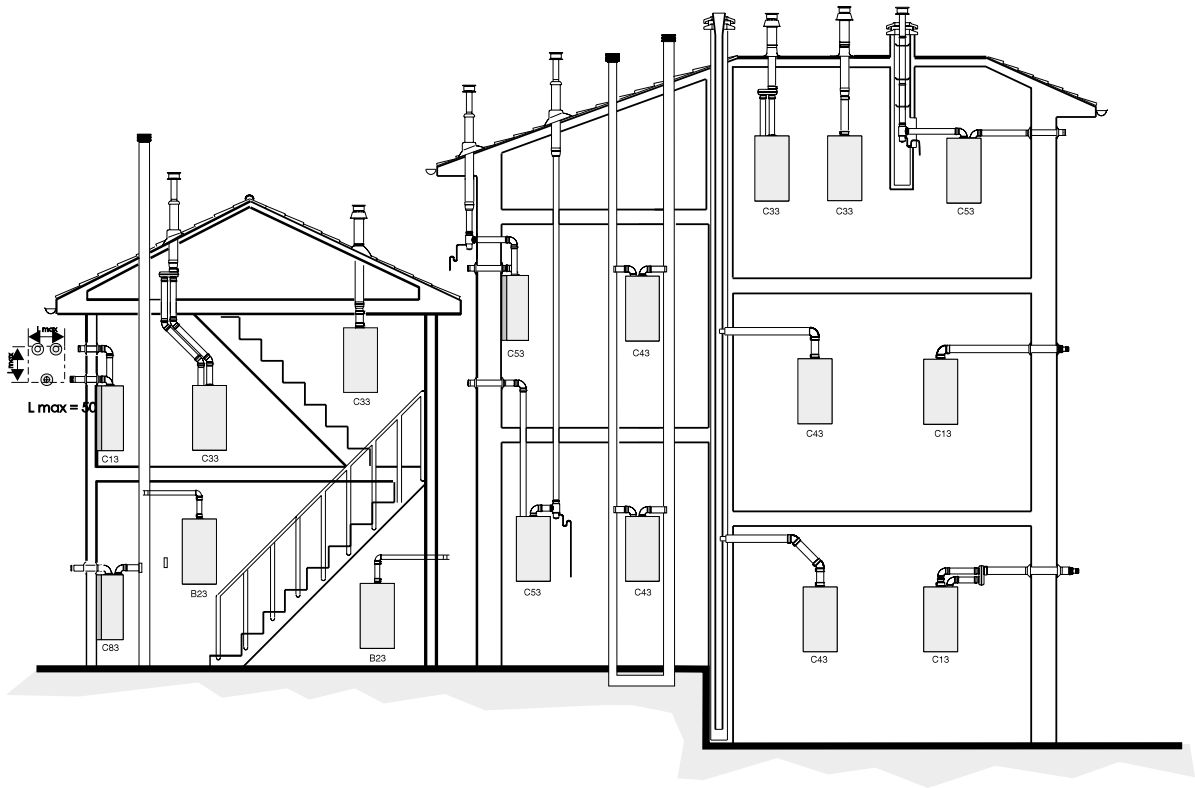


TERMINAL POSITION	*mm*
A - Directly below an open window or other opening	*300*
B - Below gutters, solid pipes or drain pipes	*75*
C - Below eaves	*200*
D - Below balconies or car-port roof	*200*
E - From vertical drain pipes and soil pipes	*75*
F - From internal or external corners	*300*
G - Above ground or below balcony level	*300*
H - From a surface facing a terminal	*600*
I - From a terminal facing a terminal	*1200*
J - From an opening in the car port (e.g. door, window) into dwelling	*1200*
K - Vertically from a terminal in the same wall	*1500*
L - Horizontally from a terminal in the same wall	*300*
M - Horizontally from an opening window	*300*
N - Fixed by vertical flue terminal	

In **FIG. 2.7** below, several different types of flue systems are shown.
For additional information regarding the flue accessories, please consult the Flue Pipe Accessories manual.

	Exhaust Type	Maximum Extension Exhaust/Air (m)	Diameter of Pipes (mm)
Coaxial Systems	C_{13}	4	Ø 60/100
	B_{33} outlet of fumes in chimney or exhaust flue	4	Ø 60/100
Twin Pipe Systems	C_{13}, C_{33}, C_{43}	42 (S1=S2)	Ø 80/80
	C_{53}, C_{83}	76 (S1+S2)	Ø 80/80
	B_{23}	75 (S2)	Ø 80

FIG. 2.7



2.10. ACCESSORY CONNECTION

IMPORTANT!!
Before carrying out any repairs to the appliance always ensure that the external power supply has been isolated. The boiler will remain live even when the ON/OFF knob is in the "O"(off) position.

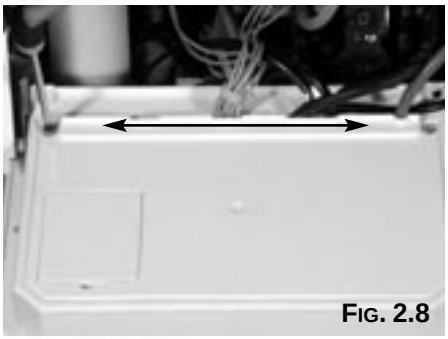


FIG. 2.8

In order to gain access to the external control connections, it is first necessary to lower the control panel (as shown in Section 3.2) then proceed as follows:

1. Remove the service cover on the control panel **(FIG 2.8)**.
2. Pierce the grommett **'M1' (FIG. 2.9)** and pass any cables for the external controls through before connecting to the terninals.
3. Connect any external controls to their respective connections as shown in **(FIG. 2.10)**.

SE - EXTERNAL SENSOR
SP - UNDERFLOOR HEATING SAFETY THERMOSTAT
CR - REMOTE CONTROL
TA - ROOM THERMOSTAT
US - SECONDARY OUTLET ~230V÷50HZ (Secondary Pump, L.P.G. Valve etc.)

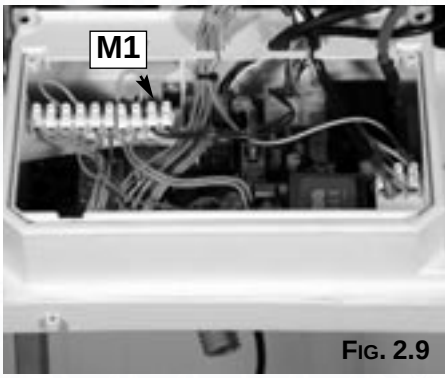


FIG. 2.9

IMPORTANT!!
Only remove the links from SP and TA if they are to be connected to external controls.

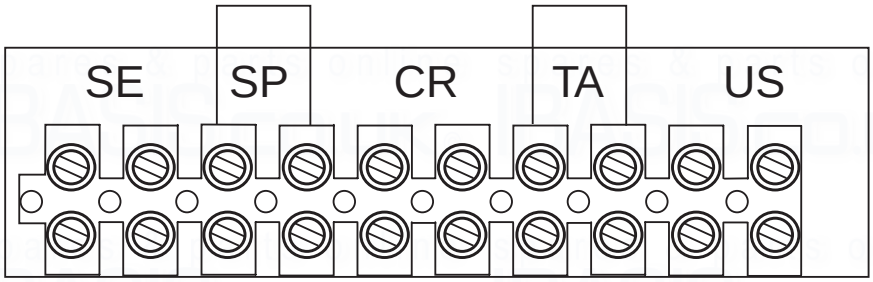
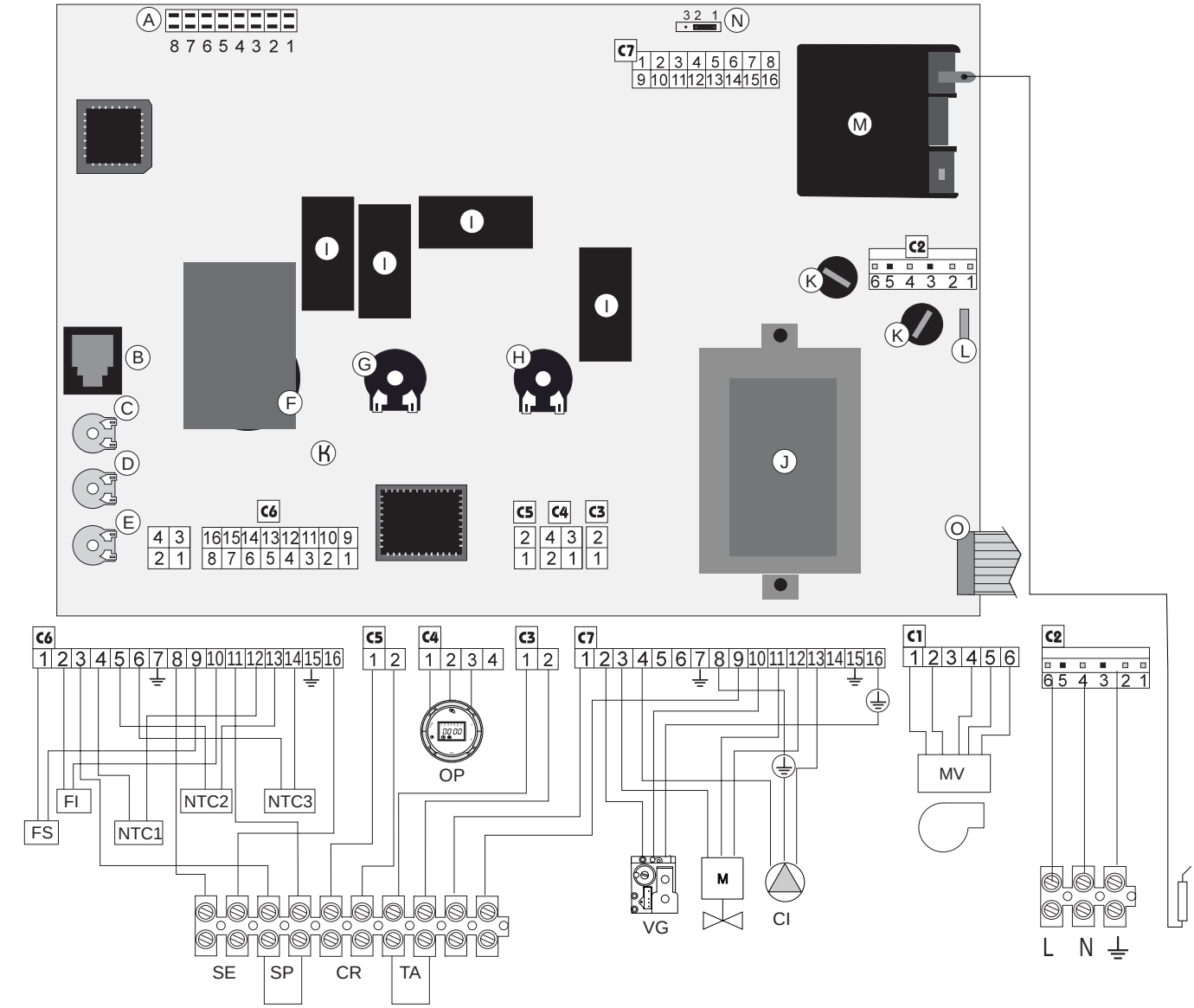
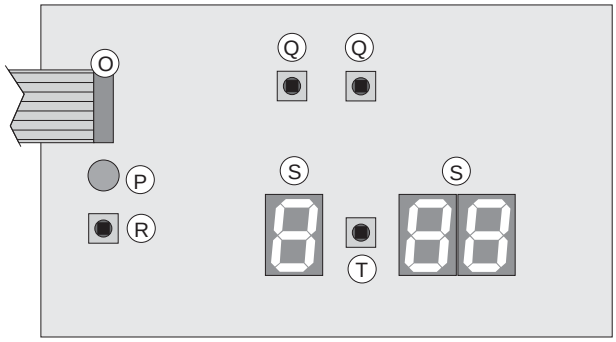


FIG. 2.10

2.11. ELECTRICAL DIAGRAM

The P.C.B. is fitted with 2 fuses, on the live and the neutral.
The fuse holder contains:
- 5 x 20mm “3.15A Slow” glass fuses





LEGEND:

A: JUMPER

When needed, the P.C.B. allows the different options to be selected by means of a wire link.

The boiler has the following basic arrangement:

1 OPEN
2 CLOSED (jumper)
3 OPEN
4 OPEN
5 OPEN
6 CLOSED
7 CLOSED(MFFI); OPEN (SYSTEM)
8 OPEN (MFFI); OPEN (SYSTEM)

This is the factory configuration. It is recommended that this set-up not be changed, unless under the following particular circumstances:

JUMPER 3: if the contact is closed, the Secondary Output (flying clamp connected to connection C7; positions 1-9) controls a LPG valve (optional).

JUMPER 4: if the contact is closed, the continuous operation of the pump is selected. If the contact remains open, it has no effect and there is no change in the operation of the boiler.

JUMPER 5: if the contact is closed, the signal transmitted by the connection of the secondary output clasp (connected to C7; positions 1-9) relates to a secondary pump (optional). If the contact remains open, the output signal controls a zone valve (optional).

JUMPER 6: not used

To configure the P.C.B. for the various boiler combinations, use JUMPERS 7 and 8 as illustrated in the table below:

Jumper 7	***Jumper 8***	***CONFIGURATION***
contact open	contact open	RFFI + connection to an indirect cylinder
contact closed	contact open	MFFI
contact open	contact closed	not used
contact closed	contact closed	not used

NOTE: it is essential that the operations involving setting of the jumpers be carried out only with the device turned off.

C: Anti-cycling device (RA)
D: Maximum heating output regulation (PR)
E: Soft-light regulation (RLA)
F: ON/OFF - Operating mode selector knob
G: Central Heating temperature adjustment
H: Domestic Hot Water temperature adjustment
I: Relay
J: Transformer (PRI: 230V-50Hz; SEK: 10V-0.8VA; SEK:10V-3.5VA; SEK:10V-3.5VA)
K: Fuses (2 x 3.15 A SLOW)
L: Earth
M: Spark generator
N: Flame detection jumper (under no circumstances should this jumper be moved from the 1-2 position)
O: Connection to the main P.C.B.
P: Comfort light
Q: Programming keys
R: Comfort key
S: Alpha-numeric display
T: Set and reset key
FS: Domestic Hot Water flow switch
PM: Pump pressure switch
NTC1: Central Heating flow temperature probe
NTC2: Central Heating return temperature probe
NTC3: Domestic Hot Water temperature probe (mod. 27 MFFI)

OP: Timer
VG: Gas valve
M: Diverter valve
CI: Circulation pump with automatic air release valve
MV: Fan
SE: External sensor (Optional)
SP: Under Floor Heating Connection (Optional)
CR: Remote Control (Optional)
TA: Room Thermostat (Optional)
US: Secondary outlet (Optional)

C1 = FAN

1: “Hall” sensor power supply 12V (red)
2: “Hall” sensor neutral (blue)
3: Not used
4: Start of coil (black)
5: “Hall” sensor input (white)
6: End of coil (brown)

C2 = POWER SUPPLY

1: Earth (yellow/green)
2: Earth (yellow/green)
3: Not connected
4: Neutral (blue)
5: Not connected
6: Live (brown)

C3 = CONNECTION TO ROOMSTAT

1: Input - 1
2: Input - 2

C4 = TIMER (Factory fitted for MFFI - Oprtional extra for RFFI)

1: 3 V output
2: Timer ground
3: Timer output
4: Not connected

C5 = REMOTE CONTROL (Bus+/Bus-)

1: Input/output-1
2: Input/output-2

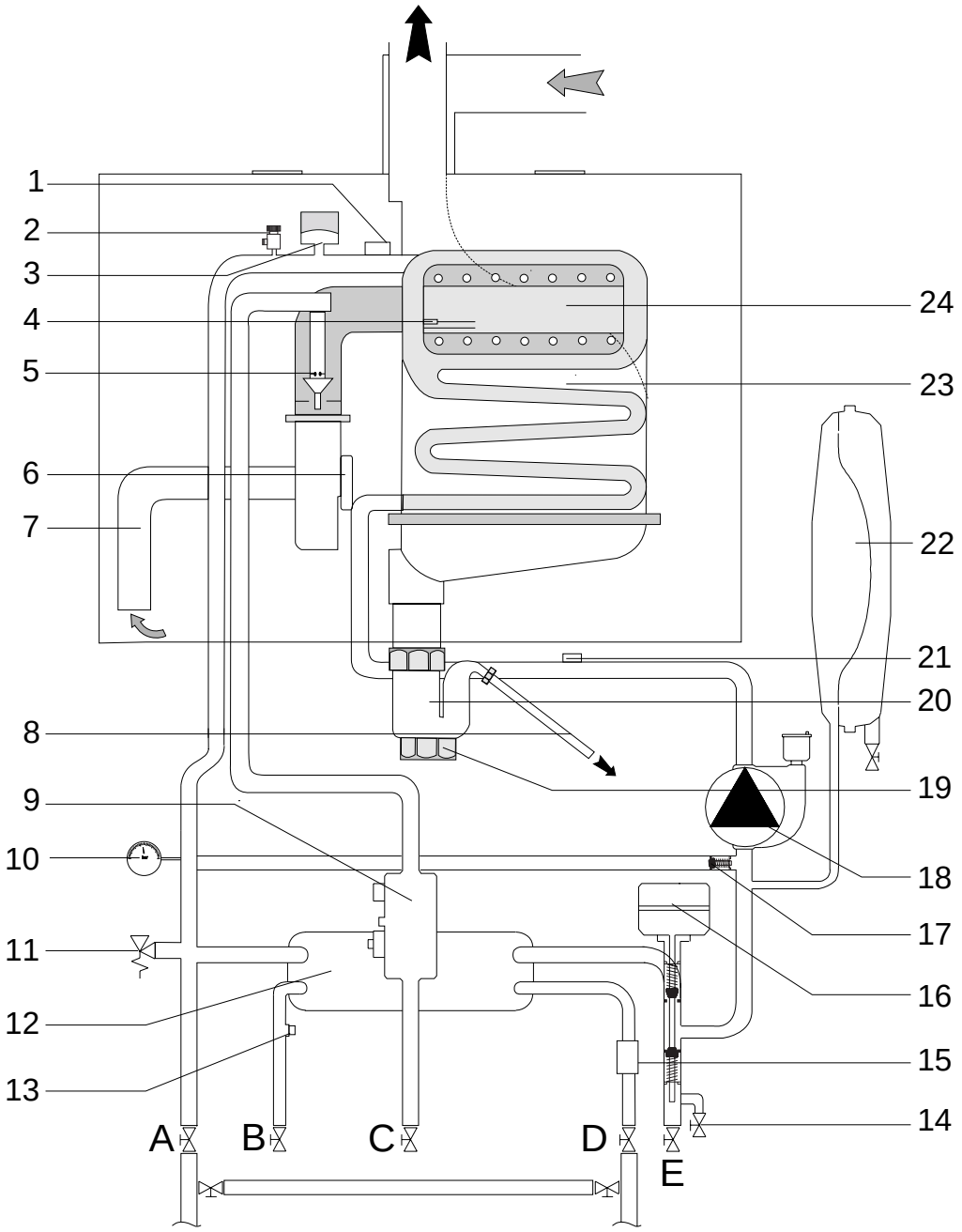
C6 = SENSOR CONNECTOR

1: Domestic Hot Water flow switch (grey)
2: Pump pressure switch (grey)
3: Under floor heating thermostat (grey)
4: Heating flow sensor (grey)
5: Central Heating return sensor (grey)
6: Domestic Hot Water sensor (grey)
7: Not used: jumper
8: Outdoor sensor (grey)
9: Domestic Hot Water flow switch (grey)
10: Pump pressure switch (grey)
11: Under floor heating thermostat (grey)
12: Flow sensor (grey)
13: Central Heating sensor (grey)
14: Domestic Hot Water sensor (grey)
15: Not used: under floor heating
16: Outdoor sensor (grey)

C7 = EQUIPMENT CONNECTIONS

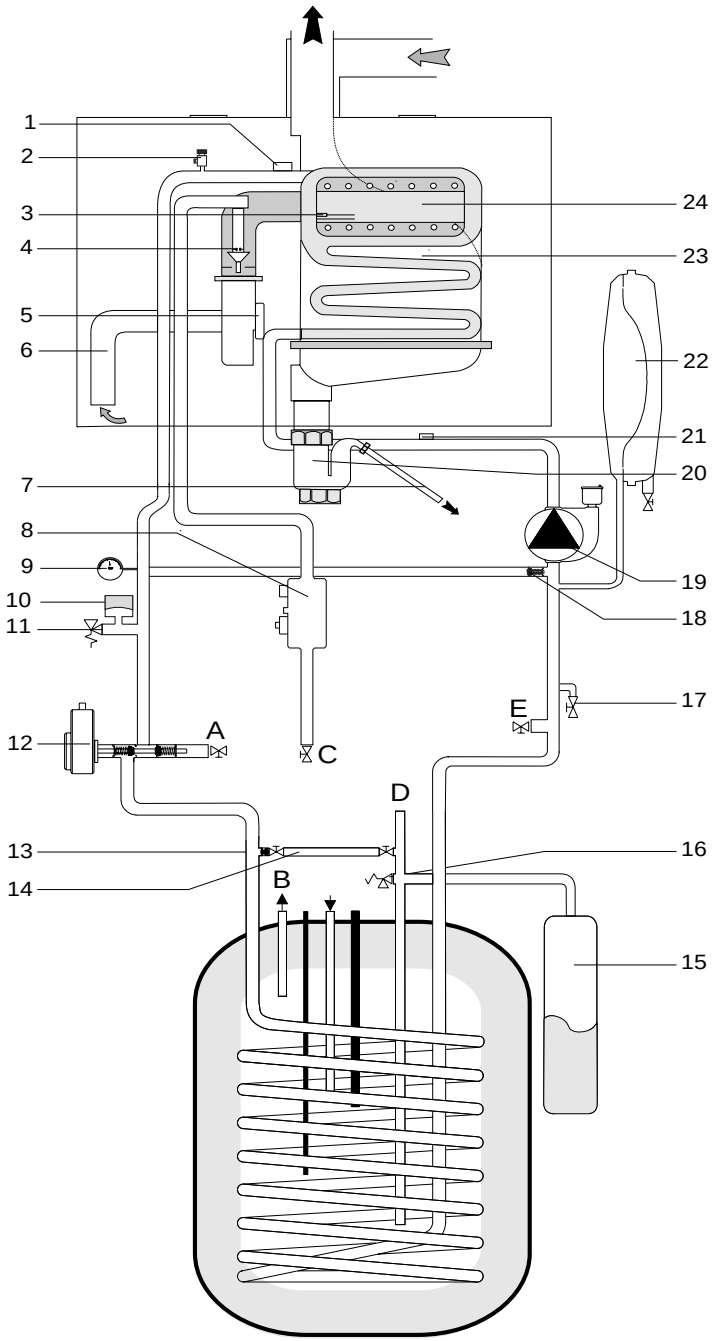
1: Secondary output (optional)
2: Gas valve (white)
3: 3-way valve neutral (white)
4: Pump (white)
5: Ionisation (black)
6: Not connected
7: Earth
8: Pump earth (yellow/green)
9: Secondary output (optional)
10: Gas valve (brown)
11: 3-way valve (Domestic Hot Water) (brown)
12: 3-way valve (Central Heating) (brown)
13: Pump (brown)
14: Not connected
15: Earth
16: Gas valve earth (yellow/green)

2.12. WATER CIRCUIT DIAGRAMS



LEGEND:

1 - Heating flow temperature probe
2 - Air release valve
3 - Pump pressure switch
4 - Ignition/detection electrode
5 - Injector
6 - Fan
7 - Silencer
8 - Condensate discharge tube
9 - Gas valve
10 - Pressure gauge
11 - Safety valve
12 - Secondary heat exchanger
13 - Domestic hot water temperature probe
14 - Drain valve
15 - Domestic hot water flow switch
16 - Motorised valve
17 - Automatic By-pass
18 - Circulation pump with automatic air release valve
19 - Condensate trap inspection cap
20 - Condensate trap
21 - Heating return temperature probe
22 - Expansion vessel
23 - Main Heat exchanger
24 - Burner



Legend:

1 - Heating flow temperature probe
2 - Air release valve
3 - Ignition/detection electrode
4 - Injector
5 - Fan
6 - Silencer
7 - Condensate discharge tube
8 - Gas valve
9 - Pressure gauge
10 - Pump pressure switch
11 - Safety valve (3 bar)
12 - D.H.W. priority valve (Optional extra)
13 - Non-return valve (integral to Jig Kit)
14 - Filling loop (integral to Jig Kit)
15 - Indirect cylinder expansion vessel
16 - Expansion relief valve
17 - Drain valve
18 - Automatic by-pass
19 - Circulation pump with automatic air release valve
20 - Condensate trap
21 - Heating return temperature probe
22 - Expansion vessel
23 - Main Heat exchanger
24 - Burner

3. COMMISSIONING

3.1. INITIAL PREPARATION

Preliminary electrical system checks to ensure electrical safety must be carried out by a competent person i.e. polarity, earth continuity, resistance to earth and short circuit.

FILLING THE HEATING SYSTEM:

Remove the panels of the case and lower the control panel (see section 3.2. for further information).
Open the central heating flow and return cocks supplied with the connection kit.
Unscrew the cap on the automatic air release valve one full turn and leave open permanently.
Close all air release valves on the central heating system.
Gradually open valve(s) at the filling point (filling-loop) connection to the central heating system until water is heard to flow, do not open fully.
Open each air release tap starting with the lower point and close it only when clear water, free of air, is visible.
Purge the air from the pump by unscrewing the pump plug and also manually rotate the pump shaft in the direction indicated by the pump label to ensure the pump is free.
Close the pump plug.
Continue filling the system until at least 1 bar registers on the pressure gauge.
Inspect the system for water soundness and remedy any leaks discovered.

FILLING OF THE D.H.W. SYSTEM:

Close all hot water draw-off taps.
Open the cold water inlet cock supplied with the connection kit.
Open slowly each draw-off tap and close it only when clear water, free of bubbles, is visible

GAS SUPPLY:

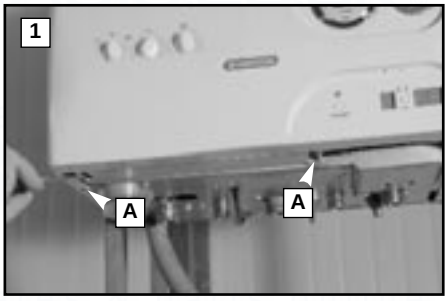
Inspect the entire installation including the gas meter, test for soundness and purge, all as described in BS 6891:1988.
Open the gas cock (supplied with the connection kit) to the appliance and check the gas connector on the appliance for leaks.

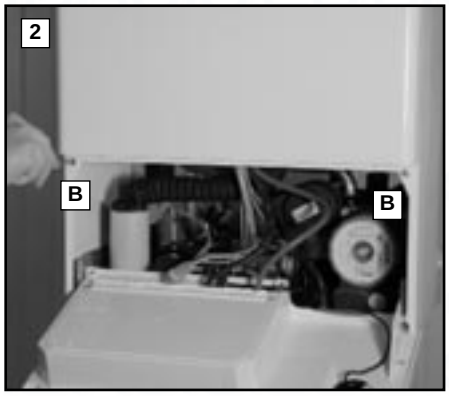
When the installation and filling are completed turn on the central heating system (sect. 3.4) and run it until the temperature has reached the boiler operating temperature.
The system must then be immediately flushed through.
The flushing procedure must be in line with BS 7593:1992 Code of practice for treatment of water in domestic hot water central heating systems.
During this operation, we highly recommend the use of a central heating flushing detergent (Fernox Superfloc or equivalent), whose function is to dissolve any foreign matter that may be in the system.
Substances different from these could create serious problems to the pump or other components.
The use of an inhibitor in the system such as Fernox MB-1 or equivalent is strongly recommended to prevent corrosion (sludge) damaging the boiler and system.
Failure to carry out this procedure may invalidate the appliance warranty.

3.2. REMOVING THE CASING

To remove the front casing panel, follow these steps:

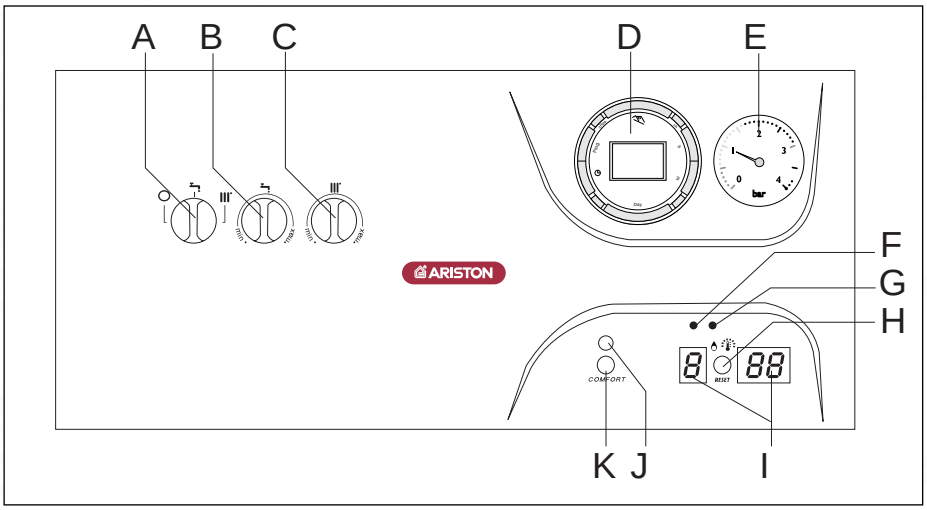
1. Remove the screws “A” and lower the control panel;
2. Remove the screws “B”;
3. Lift and unhook the case panel.



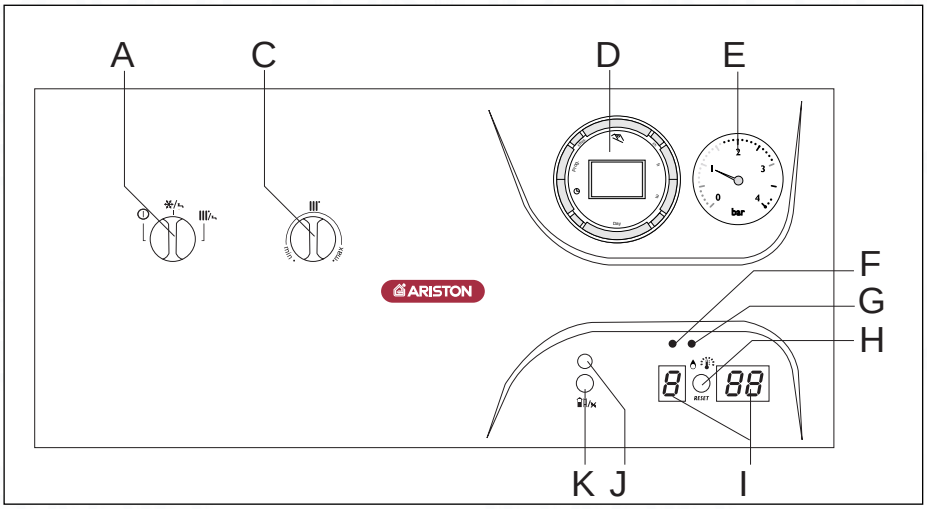


3.3. CONTROL PANEL

ecoCombi 27 MFFI



ecoSYSTEM 27 RFFI



A. Selector Knob for ON/OFF-Summer-Winter
B. Domestic Hot Water Temperature Adjustment Knob
C. Central Heating Temperature Adjustment Knob
D. Time Clock (Optional for ecoSYSTEM)
E. Heating System Pressure Gauge
F. Programming “+” key
G. Programming “-” key
H. Reset Button
I. Multifunction Display
J. “COMFORT” Function L.E.D./Heating Only (ecoSYSTEM)
K. “COMFORT” Function Push-Button/Heating Only (ecoSYSTEM)/Test Mode **(*)**

(*) See Section 3.7.5 Flue Test Mode

3.4. INITIAL START-UP

1. Make sure that:
- the cap of the automatic air release valve is loosened;
- the system pressure is at least 1 bar on the pressure gauge;
- the gas cock is closed;
- the electrical connection has been carried out in the correct manner.

To allow the air to escape from the system, proceed as follows:
- turn on the On/off knob **"A"** to the "winter" position. The boiler pump will start up and three consecutive attempts will be made to ignite the burner. After the third attempt, the electronic system will shutdown the boiler, because the supply of gas has been cut off. The message "A01" will appear on the display;
- let the pump operate until all the air has escaped from the system;
- repeat the procedure for bleeding the radiators of air;
- draw hot water for a short while;
- check the system pressure and, if it has gone down, fill it with water until it returns to 1 bar.

2. Check the flue system for products of combustion.

3. Fill the boiler condensate trap with water.
N.B. In the event of a prolonged period of system shutdown, the condensate trap should be filled before any renewed use. A shortage of water in the trap is dangerous because it could possibly lead to a leakage of fumes into the air.

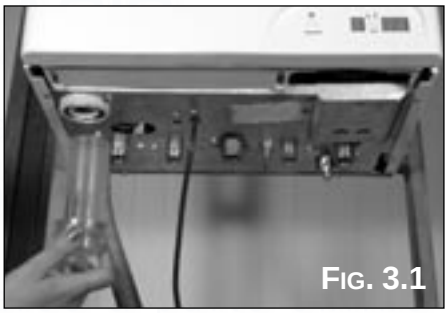


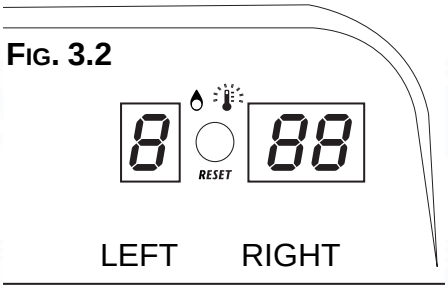
FIG. 3.1

4. Turn on the gas cock and check the seals on the connections, including the one for the burner, making sure that the meter does not signal the passage of gas. Check the connections with a soap solution and eliminate any leaks.

5. Press the reset button **"H"** for the lighting system; the spark will light the main burner. If the burner does not light the first time, repeat the procedure.
The boiler is configured in the factory for the gas type in question. To check the air/gas ratio, please refer to section 3.6.4.

3.5. Display: Messages Shown During Normal Operation

FIG. 3.2



During operation of the boiler, while it is carrying out its normal operations, the left-hand display shows a series of characters that refer to the operations indicated below:

- Diagnostics phase (precedes the other operations)

0	No request for heat
C	Heating, burner off
C.	Heating, burner on
c	Pump overrun for heating
d	Domestic hot water, burner off
d.	Domestic hot water, burner on
h	Pump overrun for domestic hot water
b	Storage cylinder, burner off (SYSTEM version)
b.	Storage cylinder, burner on (SYSTEM version)

Note: the **flashing dot** on the left-hand display always indicates *"burner off"*; while the **still dot** indicates *"burner on"*.

The right-hand display (two-digit) shows:
- in CENTRAL HEATING mode: temperature of the Central Heating system flow;
- in DOMESTIC HOT WATER mode: temperature of the Domestic Hot Water (MFFI only).

3.6. Operating Parameters

The boiler has been designed to allow easy intervention with regard to the operating parameters.

3.6.1 Regulation Menu Table

Summary of the functions accessed when the RESET button is pushed for 5 seconds.

left-hand display	right-hand display	Function	factory setting
A	da01 a24	Pump overrun	set to 03
r	00 01	Selects low temperature systems or std systems	set to 01
d	da12 a28	Correction of heat curve translation	set to20
n	da00 a12	night-time lowering of the temperature	set to 00
F	da01 a09	curve incline	set to 09
S	da81 a89	do not use	
t	— --	test mode	see next paragraph
t/s	00 01	do not use	set to 00

Important!!
Parameters *d*, *n* and *F* are only enabled when the outdoor sensor is connected.

To return to the normal display, press the **"H"** reset key repeatedly until all the sequence of "readout" functions have scrolled through the display and until one of the "display of normal operations" has appeared (the message that appears will depend on the current operating mode of the boiler).

Pump Overrun

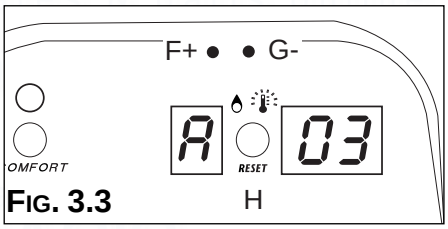


Fig. 3.3

The pump overrun may be varied (after the burner has been turned off). To access this function, it is necessary to press the reset button for over 5 seconds and then press it repeatedly until the character "A" appears on the left-hand display.
The following modes are available:

01	1 minute of pump overrun
03	3 minutes of pump overrun
06	6 minutes of pump overrun
09	9 minutes of pump overrun
12	12 minutes of pump overrun
15	15 minutes of pump overrun
C0	24 hours of pump overrun

It is also possible to set a continuous pump operation by closing the contact of jumper 4 (see section 2.11.).

Setting the Temperature Field

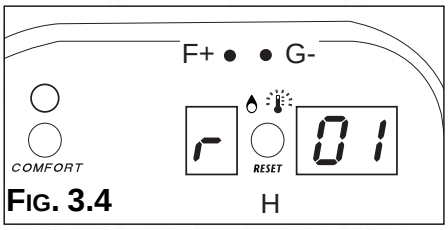


Fig. 3.4

Using the programming key, the setting may be changed. It is possible to choose two fields of regulation of the flow temperature.

"00" signifies that the flow temperature (which may be set by means of the knob on the front control panel) may be regulated from 30 to 75°C.

"01" signifies that the flow temperature (which also may be set by means of the knob on the front control panel) may be regulated from 42 to 82 °C.

Setting the Curve Incline

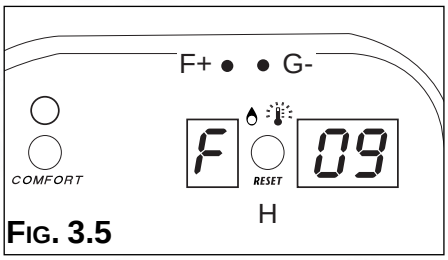
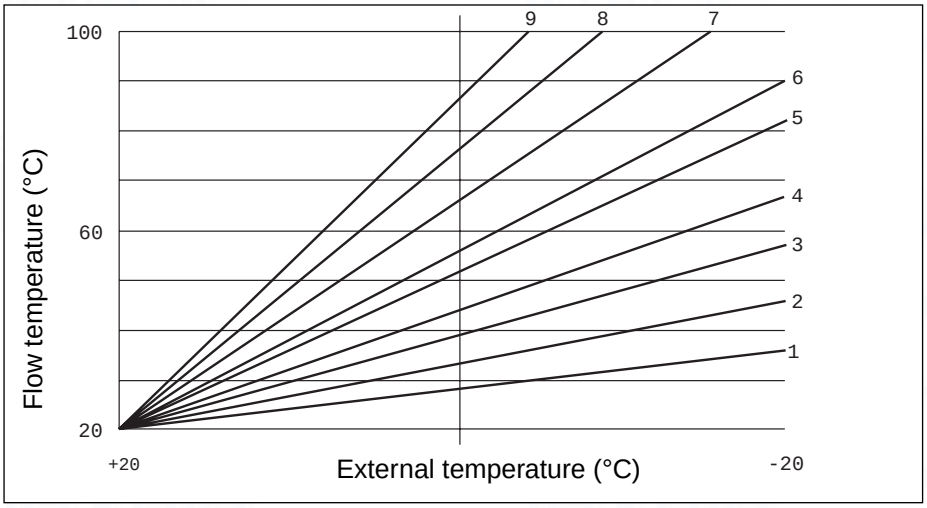


Fig. 3.5

(Only enabled when an outdoor sensor is installed)

In the case of the use of an outdoor sensor, the microprocessor-controlled P.C.B. calculates the most suitable flow temperature, taking into account the external temperature and the type of system. The microprocessor is capable of doing this because it is possible to establish a link between the external temperature and the flow temperature of the Central Heating system water. This link translates into a "thermal curve".

The type of curve should be chosen in correspondence with the planned temperature of the system and the nature of the heat loss present in the building.



Using programming keys F and G, the curve setting may be changed. The possibility of setting curves varies according to parameter r:
r = 00 (low temperature range) from curve 1 to 6
r = 01 (high temperature range) from curve 5 to 9.

CURVE 1: *under floor heating (radiant panels at ultra-low temperature). Planned temperature 30/20°C.*

CURVE 2-3: *under floor heating (radiant panels, low temperature radiant plate systems). Planned temperature 40/30°C.*

CURVE 4-5: *conventional low temperature boilers (cast iron and aluminum radiators, radiant plate systems). Planned temperature 60/45°C.*

CURVE 6-7: *conventional low temperature boilers (cast iron and aluminum radiators, radiant plate systems). Planned temperature 75/60°C.*

CURVE 8-9: *boilers with higher temperatures (radiators, convectors, fan coils). Planned temperature 90/75°C.*

WARNING
(*) - If curve 1, 2 or 3 is set, a system safety thermostat must be connected to the main terminal board (see paragraph 2.10)

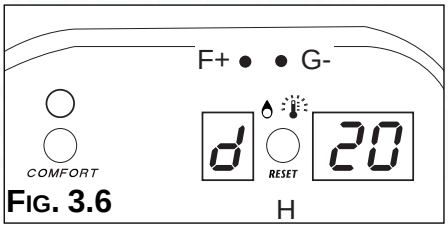


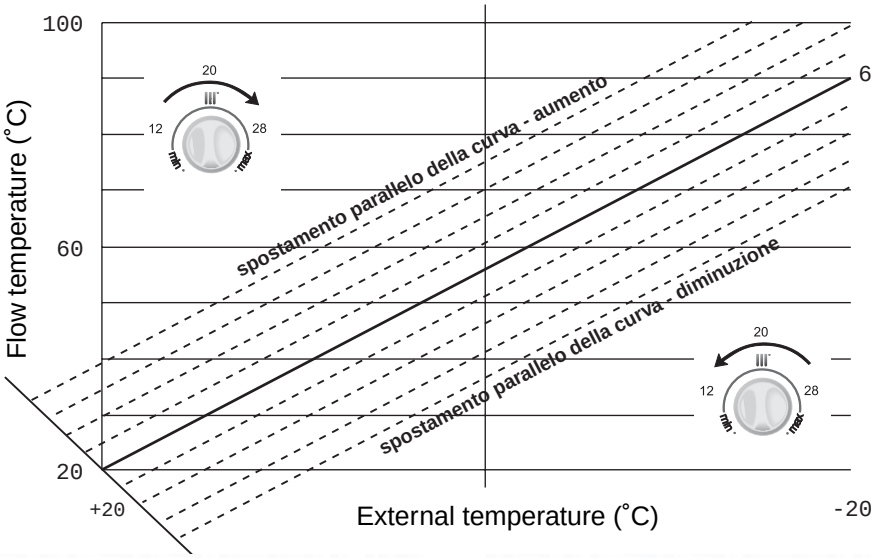
FIG. 3.6

Adapting the heat curve "*d*" set"

(Only enabled when an outdoor sensor is installed)

To adapt the heat curve to the system requirements, set parameter "***d***" in order to shift the curve in parallel, so that the flow temperature calculated is changed, along with the ambient temperature.

When "***d***" appears on the left-hand display, use the heating control knob to shift the curve in parallel as illustrated in the figure below. The shift value can be read on the right-hand display, from 12 to 28.



Night-time lowering of the temperature n

(Only enabled when an outdoor sensor is installed and the timer is connected)

If the remote control is installed (see paragraph 2.10), two different temperatures can be set: one for the day-time and one for night-time. It is therefore possible to lower the temperature that the P.C.B. calculates in relation to the values provided by the outdoor sensor by a quantity decided by the user for night-time operation. To do so, select the night-time function "**n**" and using programming keys F and G, select a value between 0 and 12, depending how much the night-time temperature is to be lowered.

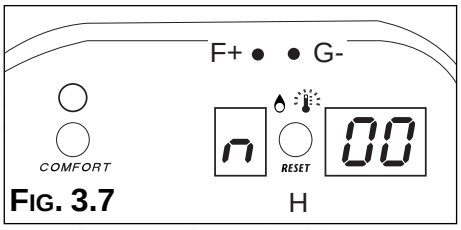


FIG. 3.7

Test Function t

The P.C.B. allows the boiler to be forced to the maximum or minimum power. Enable the test function and OO will appear on the right-hand display (see Fig. 3.8).

To select operation at maximum power, press the programming key + "F", two dashes will appear at the top of the right-hand display (see Fig. 3.9).

This function is disabled when you press reset key "H" to quit the adjustments menu.

To select operation at minimum power, press the programming key - "G", two dashes will appear at the bottom of the right-hand display (see Fig. 3.10). This function is disabled when you press reset key "H" to quit the adjustments menu.

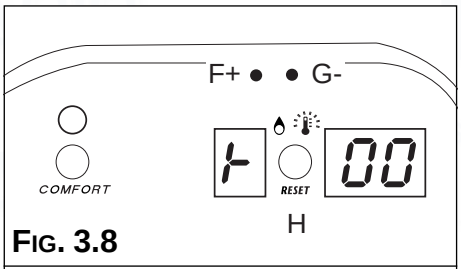


FIG. 3.8

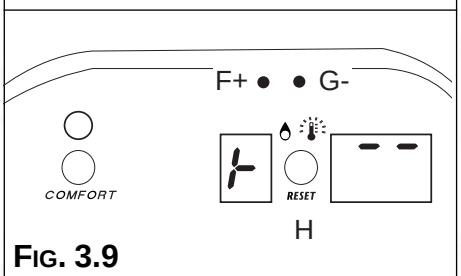


FIG. 3.9

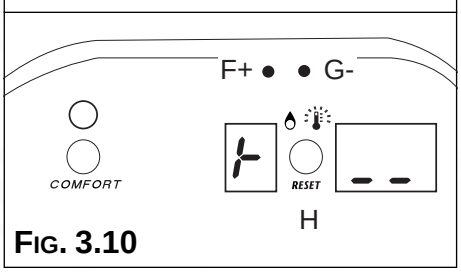


FIG. 3.10

Note: The boiler can be forced to the maximum and minimum power even without enabling the test function but via the adjustments menu:

a - by pressing the Comfort key "K", the boiler is automatically forced to maximum power (flue sweep function), two dashes appear at the top of the right-hand display (see Fig. 3.9). This function is disabled by pressing the reset key "H".

b - by pressing keys "K" and "H" simultaneously, the boiler is forced to operate at minimum power, two dashes appear at the bottom of the right-hand display (Fig. 3.10). This function is disabled by pressing the reset key "H".

3.6.2 SETTINGS DISPLAY

The boiler is designed to monitor some operating variables and settings by means of the display on the front control panel. Keeping the reset key pressed for over 10 seconds allows access to the "readout" function of the main system variables. By pressing the button repeatedly after that, it is possible to read the following information in sequence:

Indication on the left-hand display	*Value read on right-hand display*
U/1	*Flow temperature of the Central Heating circuit (°C)*
U/2	*Return temperature of the Central Heating circuit (°C)*
U/5	*Domestic Hot Water output temperature (°C)*
U/F	*Ionisation current (expressed in bT)*
U/T	*Main circuit flow switch*
P/A	*Heating ignition delay (see section 3.6.4. - expressed in min.x1)*
P/-	*Maximum thermal power for heating (expressed in a percentage of the difference between the maximum power allowed by the boiler and the minimum)*
P/L	*Soft light power (expressed in a percentage of the difference between the maximum power allowed by the boiler and the minimum)*
B	*Last safety shut-off (see section 3.7.)*
L	*Last shutdown (see section 3.7.)*

To return to the normal display, press the **"H"** reset key repeatedly until all the sequence of "readout" functions have scrolled through the display and until one of the "display of normal operations" has appeared (the message that appears will depend on the current operating mode of the boiler).

* **NOTE 1:** U/1 means that "U" and "1" blink alternately on the display
NOTE 2: the value 100% appears as "00" on the display

3.6.3 COMFORT KEY:

Combi ***27 MFFI***

The boiler allows the convenience level to be increased in the output of domestic hot water by means of the "COMFORT" function. This function keeps the secondary exchanger warm during the periods in which the boiler is inactive, thereby allowing the initial water drawn to be at a higher temperature. The function may be activated by pressing the **"K"** key on the control panel (see section 3.3.). When the function is active, a green light comes on, again located on the control panel.
NOTE: During the overrun period of the pump, the "COMFORT" function, if selected, is temporarily deactivated. The L.E.D. light remains on to indicate that the boiler will return to the "COMFORT" mode once the pump overrun is terminated.

3.6.4 Gas regulation check

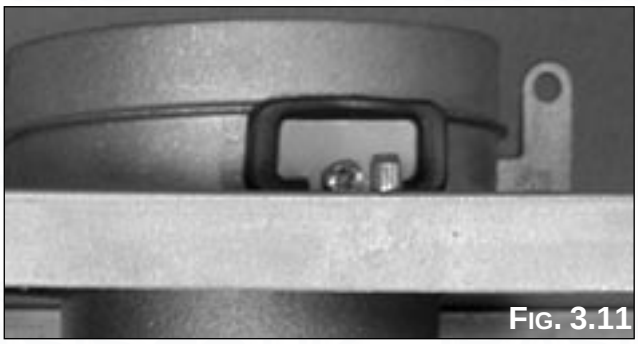


Fig. 3.11

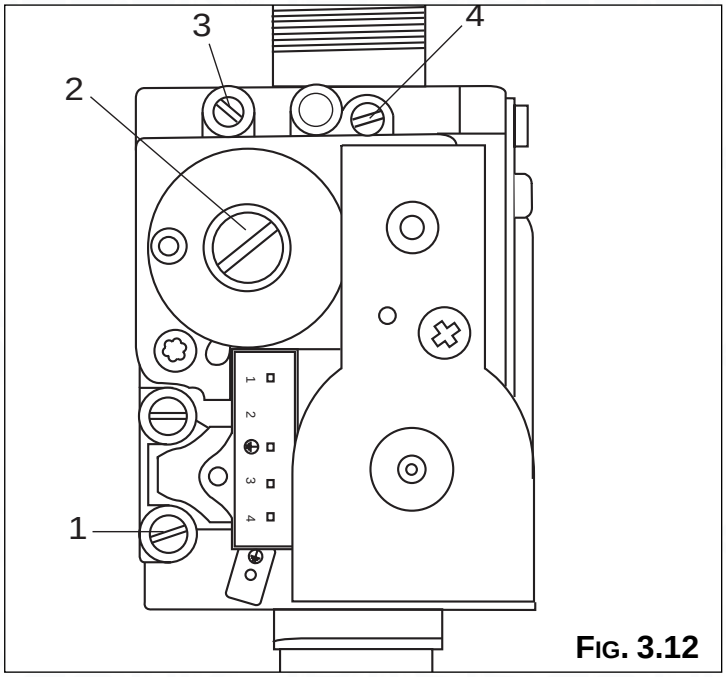


Fig. 3.12

Supply pressure		
G20	**methane**	17-25 mbar
G30	**butane**	25-35 mbar
G31	**propane**	25-45 mbar

Supply pressure check

1. Loosen screw "**1**" (Fig. 3.12) and insert the pressure gauge connection pipe into the pipe tap.
2. Turn the boiler on at maximum power, enabling the "flue sweep" function (press the Comfort key "**K**" for 5 seconds). The supply pressure should correspond to that foreseen for the type of gas the boiler is designed for (See table 4C).
3. When the check is over, tighten screw "**1**" and make sure it is securely in place.
4. Disable the flue sweep function by pressing the reset key "**H**".

Air/gas ratio check

Air/gas ratio at minimum power

To check the air/gas ratio at minimum power, proceed as follows:

1. Connect the combustion analyser to the analysis point (Fig. 3.11) after removing the cover plate.
2. Turn the boiler on at minimum power via the test function (see paragraph 3.6.1) or by pressing keys "K" and "H" simultaneously on the control panel. Ensure the CO_2 value on the analyser corresponds with the value indicated in table 4D. If this is not the case, adjust screw "2" with a screwdriver, after removing the cap, until you obtain the correct CO_2 reading. Allow the reading to become stable for at least 4 minutes.
3. When the check is over, replace the cap on screw "**2**" (Fig. 3.11).
4. Disable operation at minimum power by pressing key "**H**".

Air/gas ratio at maximum power

To check the air/gas ratio at maximum power, proceed as follows:

1. With the combustion analyser already connected to the analysis point, set the boiler to maximum power via the test function (see paragraph 3.6.1) or enabling the "flue sweep function" by pressing the Comfort key "**K**" for 5 seconds.
   Ensure the CO_2 value on the analyser corresponds with the value indicated in table 4D. If this is not the case, adjust screw "**4**" with a screwdriver (Fig. 3.12), until you obtain the correct CO2 reading. Allow the reading to become stable for at least 4 minutes.
2. Disable the "flue sweep function" by pressing key "H".
   The "flue sweep function" is automatically disabled after 5 minutes.
3. **Repeat the air/gas ratio at minimum power check (see above).**
4. Disconnect the analyser, remount the cover plate and check it is securely in place.

Air/gas ratio setting				
Calibration values check	**methane**	**G20**	**% vol**	**10 ±0.2**
CO_2 at minimum power	**butane**	**G30**	**% vol**	**11.5 ±0.2**
after 4 minutes of operation	**propane**	**G31**	**% vol**	**11.5 ±0.2**

3.6.5 Ignition Delay Adjustment

The ignition delay can be adjusted to between 0 and 15 minutes. The delay is factory set to 2 minutes.
The value set can be displayed as illustrated in paragraph 3.6.2.
To access the potentiometer "**C**" (Fig. 3.14), open the control panel as illustrated in paragraph 3.2 and open up the service flap (Fig. 3.13).

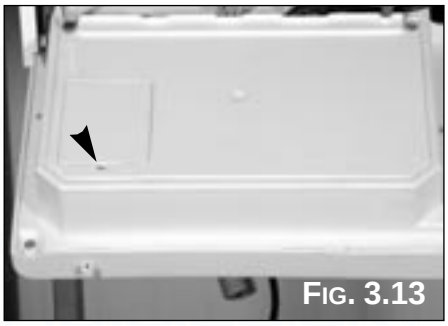


Fig. 3.13

3.6.6 Adjusting the Maximum Heating Power

The maximum heating power can be adjusted to between the maximum power allowed by the boiler (24 kW) and the minimum one (8 kW). The value is factory set to 70% of the maximum power.
The value set (expressed as a percentage) can be displayed as illustrated in paragraph 3.6.2.
To access the potentiometer "**D**" (Fig. 3.14), open the control panel as illustrated in paragraph 3.1 and open up the service flap (Fig. 3.13).

The display shows the value between 100% ("00" on the display) and 1% ("01") of this interval.

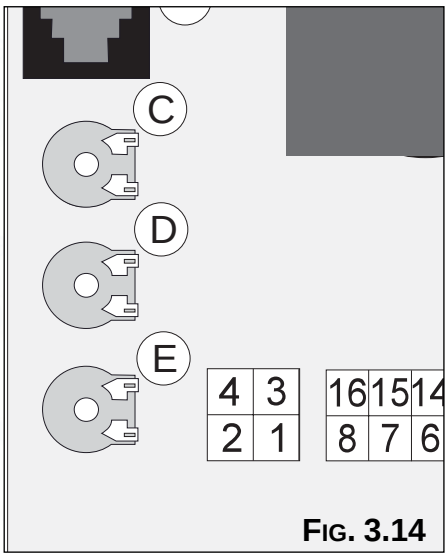
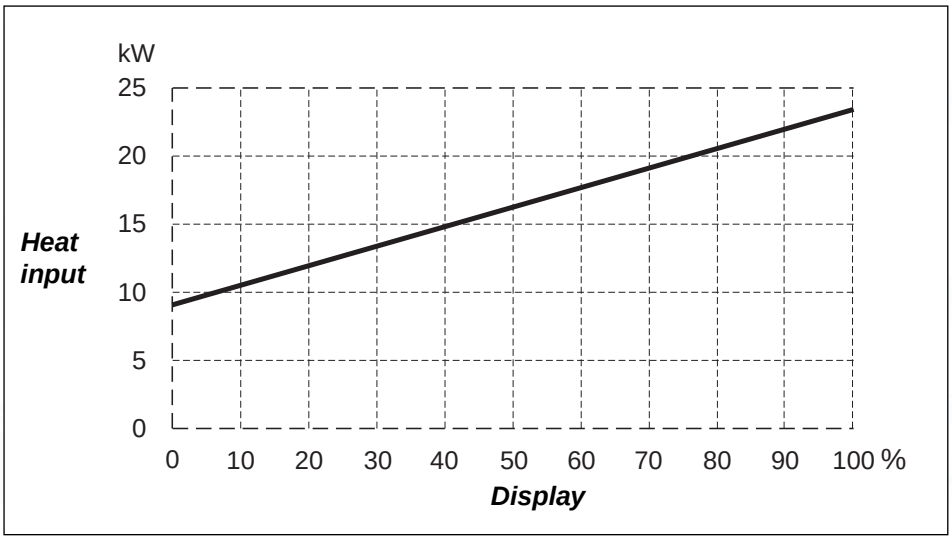


Fig. 3.14



3.6.7 Soft Light Adjustment

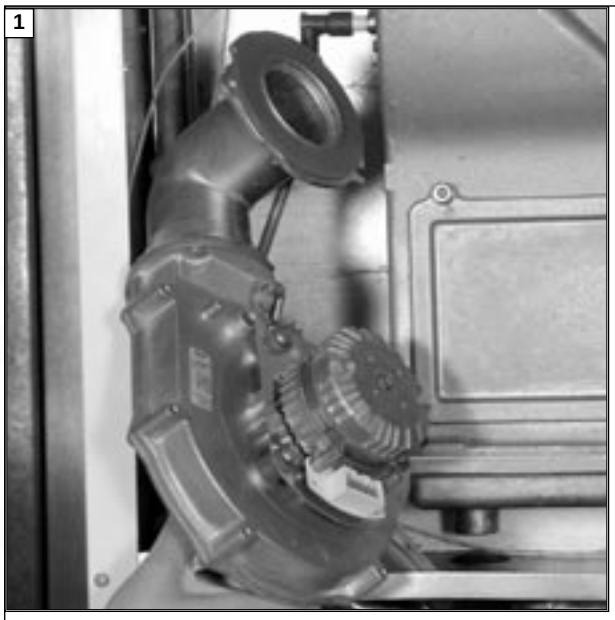
The soft light can be adjusted between the maximum power (shown on the display as "00", i.e. 100%) and minimum power (shown on the display as "01", i.e. 1%). The boiler is factory set to a value which is suitable for ignition with any type of gas (approx. 33%).
The value set (expressed as a percentage) can be displayed as illustrated in paragraph 3.6.2.
To access the potentiometer "**E**" (Fig. 3.14), open the control panel as illustrated in paragraph 3.1 and open up the service flap (Fig. 3.13).

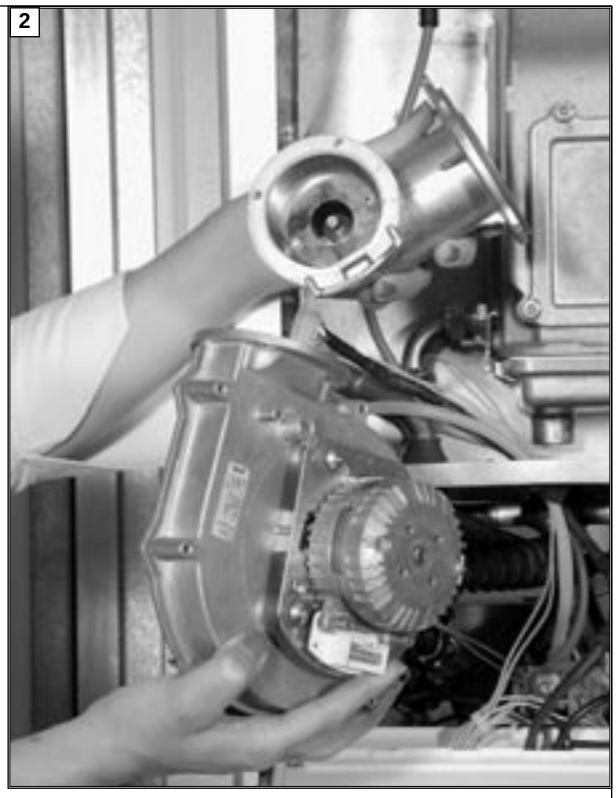
3.7 Gas Changeover

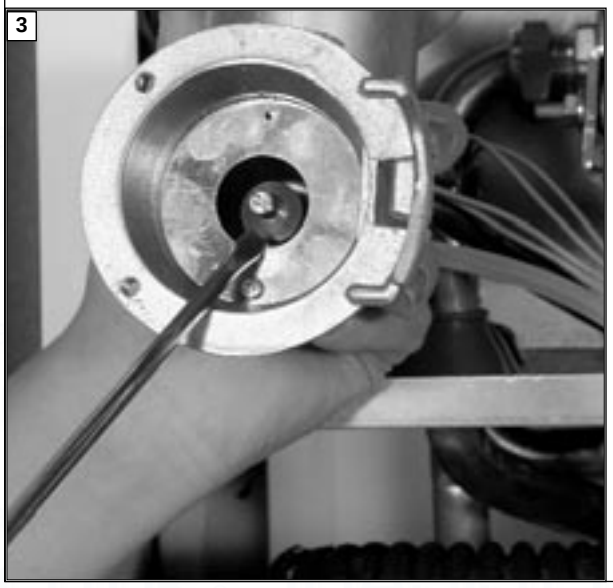
The boiler operation can be changed over from methane gas (G20) to Liquid Gas (G30-G31) or vice versa, an operation that must be performed by an Authorised Service Centre.
The operations to carry out are the following:
1. Replacement of the nozzle (see table);
2. Replacement of the gas label;
3. Air/gas ratio adjustment to be made in accordance with paragraph 3.6.4

	GAS METANO	***GAS LIQUIDO***	
	G20	***G30***	***G31***
Diameter of 6 nozzle holes (mm)	2.8	2.0	2.0
Display of recommended soft light power	33%	33%	33%

- Place the boiler in operation in accordance with the End User Manual.
- Check the seal on the gas and water sides.
- Check that the ignition operates correctly and visually check the burner flame.
- Check that the domestic hot water is being correctly produced by drawing hot water. Check the rate of flow and/or temperature of the water, depending on the case.
- Check that the condensate drips without difficulty into the discharge.







3.8. BOILER SAFETY SYSTEMS

The boiler is protected from malfunctioning by means of internal checks by the P.C.B., which brings the boiler to a stop if necessary.
In the event of the boiler being shut off in this manner, a code appears on the display which refers to the type of shut-off and the reason behind it.
There are two types of shut-off:

- ***SAFETY SHUTDOWN:*** for this group of errors (characterised on the display by the letter "E") the situation is automatically removed as soon as the cause behind it is resolved.
  As soon as the origin of the shutdown disappears, the boiler starts up again and returns to its normal operation.

- ***SHUTDOWN:*** (characterised on the display by the letter "A"), is not removed unless a manual intervention is made.
  The boiler may return to operation only if reset by pressing the button **"H"** located at the centre of the display.

There follows a list of the shutdown modes and the respective codes shown on the display.
Shutdown ("A" type): if such a situation occurs, it is necessary to reset the boiler using the appropriate key. If this shutdown occurs again, your local Service Agent should be contacted.

DISPLAY	CAUSE
A01	*Too many attempts to ignite on starting up*
A02	*After three attempts at ignition, no increase in DT was detected*
A03	*The heating flow temperature exceeds 100°C during operation*
A07	*Too many failures to flame in one period during operation*
A19	*The flame was detected after the gas valve had closed*
A20	*The flame was detected before the gas valve opened*
A21	*The flow switch does not close*
A22	*The flow switch does not open*
A33	*Problem with the fan*
A99	*Problem with the electronic monitoring*

NOTE: When there is no ignition, check that the gas cock is open.

Safety shutdown: In the event that a safety shutdown occurs, it is necessary to contact an Authorised Service Centre.

DISPLAY	*CAUSE*
E01	*Insufficient water pressure*
E56	*Heating flow temperature probe in open circuit*
E66	*Heating flow temperature probe short-circuited*
E04	*Domestic hot water temperature probe in open circuit*
E05	*Domestic hot water temperature probe in short circuit*
E08	*Under floor heating temperature probe in open circuit*
E20	*Flame detected with gas valve closed*
E21	*Error in the electrical connection (live and neutral crossed)*
E22	*Problem with the 50Hz power supply*
E23	*Flame detection electrode short-circuited*
E64	*Heating return temperature probe in open circuit*
E74	*Heating return temperature probe in short circuit*
E99	*Problem within the electronic system*

DAILY TEST.
In order to prevent the shutdown of the components, the boiler carries out a self-diagnosing test every 24 hours: the pump turns on for 3 seconds and the diverter valve moves.

ANTI-FROST DEVICE.
The boiler is fitted with an anti-frost device consisting of three separate functions:
- Monitoring of the system flow temperature: if this temperature goes below 5°C, the

pump turns on (heating system circulation). If the temperature goes below 2°C, the boiler turns on at the minimum power and remains on until the return temperature is over 10°C.

- Outdoor sensor installed: the pump turns on if the external temperature goes below -3°C, it turns off when the external temperatures raises above -1°C.
- Continuous operation of the pump: select by means of jumper 4 (see paragraph 2.11).

NOTE: In all cases, the circulation takes place in the heating system.

The anti-frost device activates only when (with the boiler operating correctly):

- the system pressure is correct;
- the boiler is electrically powered;
- there is a supply of gas.

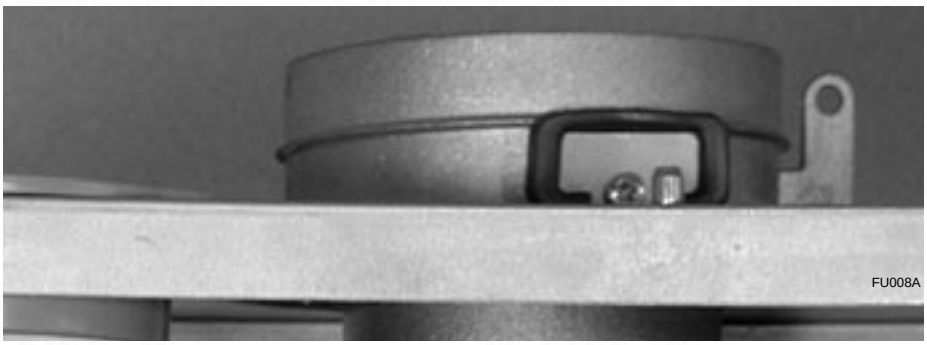
ANTI-SCALE DEVICE.

When producing domestic hot water, the burner shuts off whenever the output temperature of the hot water exceeds 62°C or the flow temperature of the primary circuit exceeds 72°C. It will not turn on if the temperature of the primary circuit is greater than 72°C.

3.9. COMBUSTION ANALYSIS

The boiler is designed to allow for easy analysis of the products of combustion.
Using the special traps, it is possible to detect the temperature of the burnt gas, the combustion air, the concentrations of O_2, CO_2, etc.

To access these traps, unscrew the front screw and remove the metal plate and relevant seal.
The best test conditions, with the maximum heating power, are achieved when the FLUE SWEEP FUNCTION is enabled (press the RESET KEY "**H**" for 5 seconds). The boiler will return to normal operating conditions automatically after 5 minutes, or if you press the reset key "H". When you have finished, reposition the metal plate correctly and make sure the seal fits perfectly.



3.10 DRAINING

The draining of the heating system must be carried out as follows:

- Turn off the boiler and the bipolar switch;
- Loosen the automatic air release valve;
- Open the system's discharge valve and gather the water that comes out in a container;
- Empty out from the lowest points of the system (where provided).

If the system is to be left active in areas where the room temperature may go below 0°C during winter, it is recommended that anti-freeze liquid be added to the water in the heating system in order to avoid the need for repeated draining.

Draining the domestic hot water system
Every time that there is a danger of freezing, the domestic hot water system must be drained as follows:

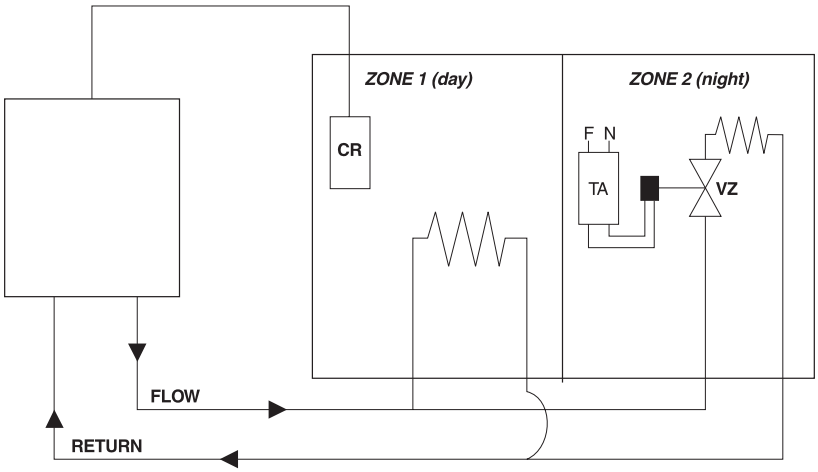
- close the water mains stop-cock;
- open all the hot and cold water outlets;
- empty out from the lowest points (where provided).

4. ZONE VALVES

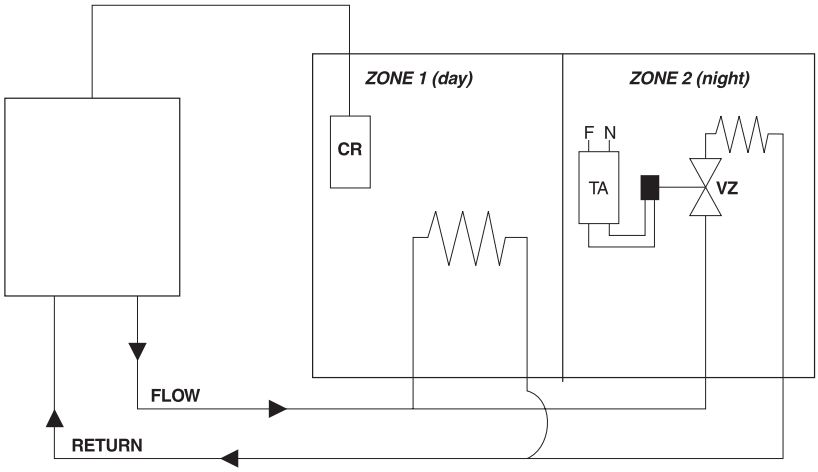
The boiler is capable of managing a heating system that uses zone valves. The electrical connection of these valves is carried out by means of the appropriate terminal board (indicated in the **"ELECTRICAL CONNECTION"** section).
By way of example, two possible types of systems would be:

1. System with 2 valves with independent regulation of the zones (day and night).
2. System with 1 valve (regulation of the night zone subordinated to that of the day).

A possible set-up for the first type of system is as follows:



CR = remote control
VZ1,2 = zone valve 1 and 2
TA = room thermostat or timer-thermostat
= radiators
F,N = electrical connection (live and neutral)
RL = relay



A possible set-up for the system with a single zone valve is as follows:
This set-up is simpler and more economical because it does not involve the use of the special relay. The night zone, however, may only be heated during the time periods in which the remote control timer gives consent to the heating of the day zone. Example:

- day zone programming (remote control): 8:00 - 22:00
- night zone programming (timer-thermostat): 20:00 - 22:00

5. MAINTENANCE

5.1. General Remarks

It is recommended that the following inspections be carried out on the boiler at least once a year:

1. Check the seals in the water group and, if necessary, replace the gaskets and restore the seal to perfect working order.
2. Check the seals in the gas group and, if necessary, replace the gaskets and restore the seal to perfect working order.
3. Visually check the overall state of the boiler.
4. Visually check the combustion and, if necessary, disassemble and clean the burner.
5. Following inspection 3, disassemble and clean the combustion chamber, if necessary.
6. Following inspection 4, disassemble and clean the injector, if necessary.
7. Clean the primary heat exchanger (see section 6.2)
8. Regulate the correct rate of flow of the gas: rate of flow on ignition, partially loaded and at maximum load.
9. Check the correct functioning of the heating safety devices:
   - temperature limit safety device.
10. Check the correct functioning of the gas group safety devices:
    - absence of gas or flame safety device (Ionisation).
11. Check that the electrical connections are correct (in conformity with the instructions manual).
12. Check the efficiency of the production of domestic hot water (test the rate of flow and temperature).
13. Carry out a general inspection of the functioning of the boiler.
14. Check the characteristics for expulsion of the products of combustion.
15. Remove the oxide from the detection electrode by means of an emery cloth.

5.2. Cleaning the Primary Exchanger

CLEANING THE EXHAUST SIDE

Remove the combustion chamber inspection hatch (see section 1.3). Check that the exhaust passages between the blades of the block are free; if there are deposits present, wash the blades with compressed air, water or a vinegar-based detergent.

NOTE: it is possible to use a brush in order to mechanically remove the residues.

Use of detergents:

- soak the blades well
- allow the detergent to act for about 20 minutes
- rinse with a strong jet of water to remove the deposits (the control panel must be kept closed)
- make sure that there are no traces of detergents in the exchanger.

CLEANING THE WATER SIDE

Use detergents that dissolve $CaCO_3$. Leave to act for a short time (in order not to damage the aluminum) and then rinse. Make sure that the detergent does not remain inside the exchanger.

5.3. Cleaning the Condensate Trap

Unscrew the lower part of the condensate trap and clean it. Lastly, fill it with water and replace the stopper.

NB: if the boiler is not to be used for a prolonged period, the condensate trap should be filled before igniting it again. A shortage of water in the trap is dangerous because there is the risk of exhaust fumes escaping into the air.

5.4. Operational Test

After having carried out the maintenance operations, fill the heating circuit to a pressure of approx. 1.5 bar and release the air from the system. Also fill the domestic hot water system.

- Place the boiler in operation.
- If necessary, release the air again from the heating system.
- Check the settings and the correct functioning of all the control, regulation and monitoring parts.
- Check the seal and the correct functioning of the system for expelling fumes/drawing of combustion air.
- Check that the boiler ignites properly and carry out a visual check on the burner flame.

6. SERVICING INSTRUCTIONS

To ensure efficient safe operation, it is recommended that the boiler is serviced annually by a competent person.

Before starting any servicing work, ensure both the gas and electrical supplies to the boiler are isolated and the boiler is cool.
Before and after servicing, a combustion analysis should be made via the flue sampling point (please refer to the Installation Manual for further details).

After servicing, preliminary electrical system checks must be carried out to ensure electrical safety (i.e. polarity, earth continuity, resistance to earth and short circuit).

6.1. Replacement of Parts

The life of individual components vary and they will need servicing or replacing as and when faults develop.
The fault finding sequence chart in chapter 2 will help to locate which component is the cause of any malfunction, and instructions for removal, inspection and replacement of the individual parts are given in the following pages.

6.2. To Gain General Access

All testing and maintenance operations on the boiler require the control panel to be lowered. This will also require the removal of the casing.

To lower the control panel and dismantle the front part of the casing, proceed as follows:

1. Unscrew screws “A” (Fig. 6.1) and rotate the control panel forward;
2. Unscrew the screws “B” (Fig. 6.2 + Fig. 6.3) and unhook the front panel by lifting it.

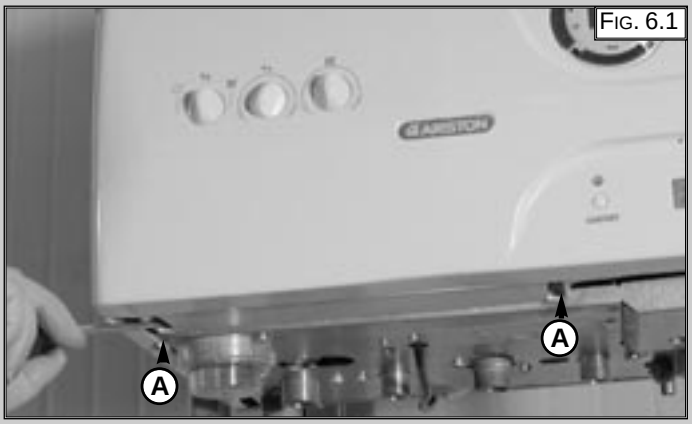


Fig. 6.1

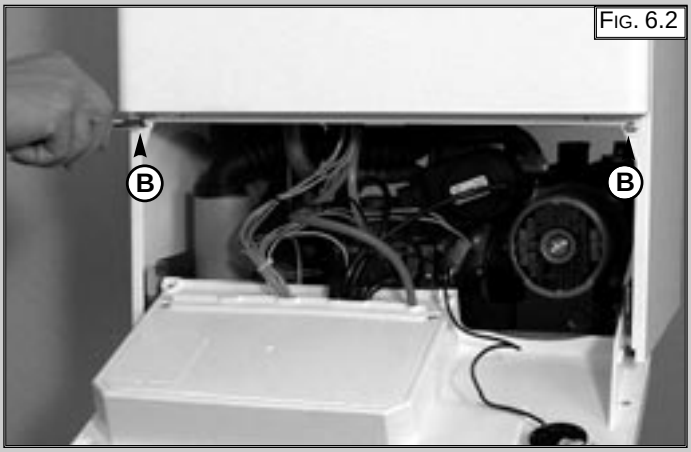


Fig. 6.2

Fig. 6.3

6.2.1. Removing the Side Panels

1. Remove the screws “C” (Fig. 6.4);
2. Pull each panel away from the boiler, then lift the panel up and away from the boiler.

Fig. 6.4

6.3. Access to the Combustion Chamber

Removing the sealed chamber front cover

1. Remove the screws “D” (Fig. 6.5);
2. Pull the cover away from the boiler (Fig. 6.6).

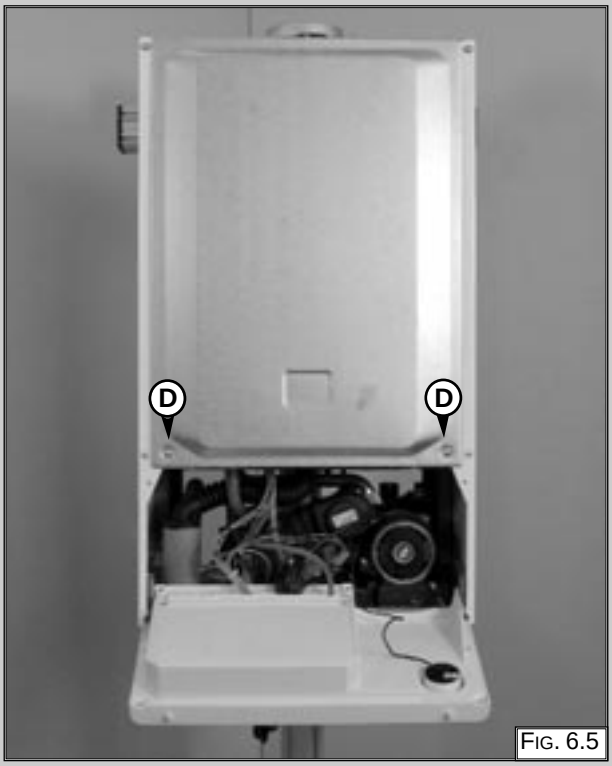


Fig. 6.5

Fig. 6.6

6.3.1. Removing the Fan

1. Disconnect the electrical connector “E” (Fig. 6.7);
2. Disconnect the compensation tube “F” (Fig. 6.8);
2. Unscrew the three screws “G” (Fig. 6.9);
3. Pull the fan away from the mixing tube (Fig. 6.10).
4. Unscrew the screws “H” (Fig. 6.11) and remove the silencer.

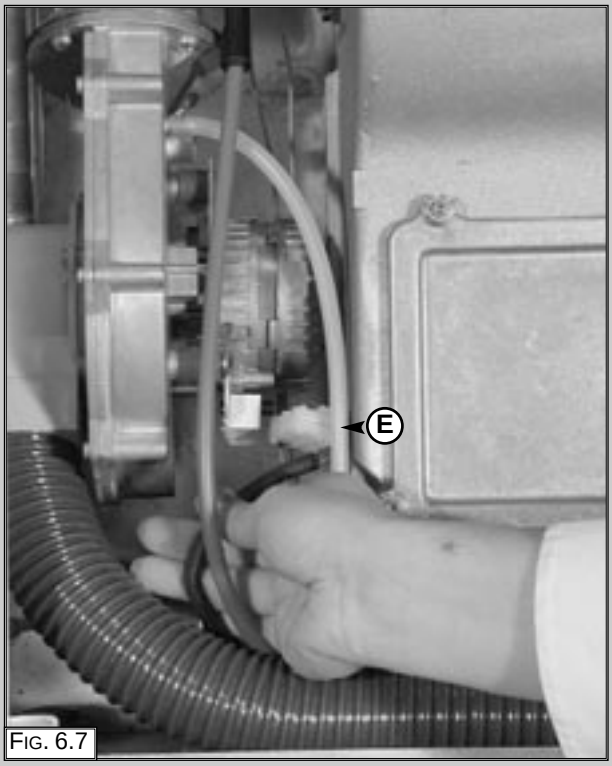


Fig. 6.7

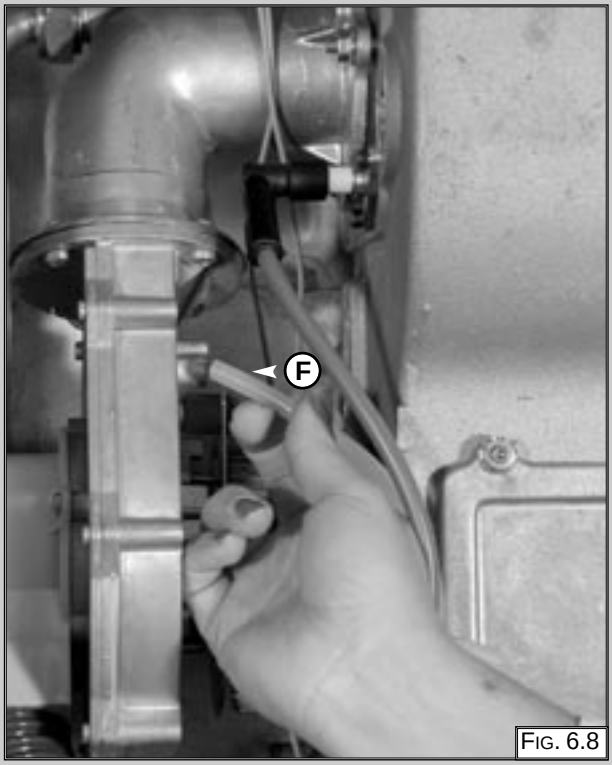


Fig. 6.8

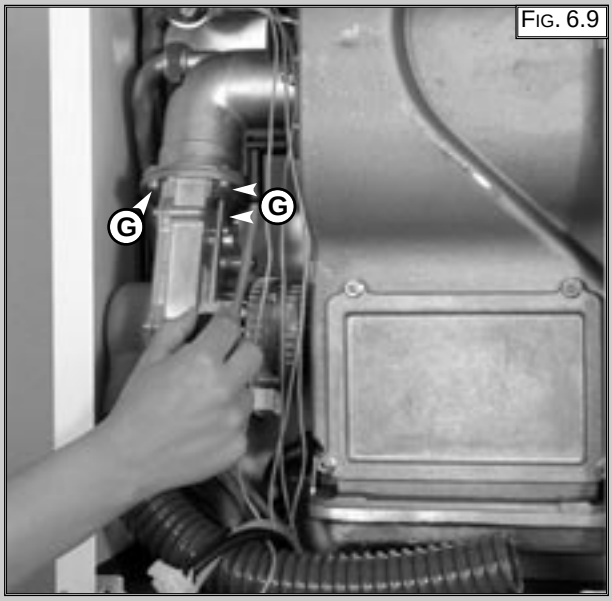


Fig. 6.9

Fig. 6.10

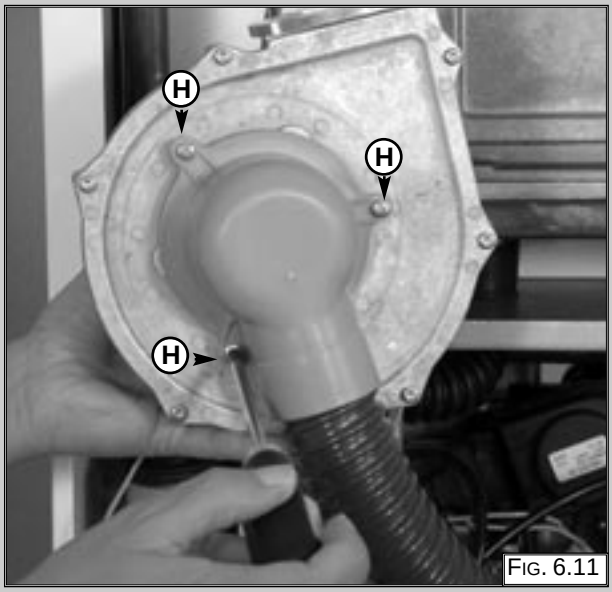


Fig. 6.11

6.3.2. Removing the Burner

With the fan removed (see previous section);

1. Loosen nut “I” (Fig. 6.12);
2. Remove nuts “J” (Fig. 6.13);
3. Remove mixing tube (Fig. 6.14);
4. Slide the burner from its housing (Fig. 6.15).

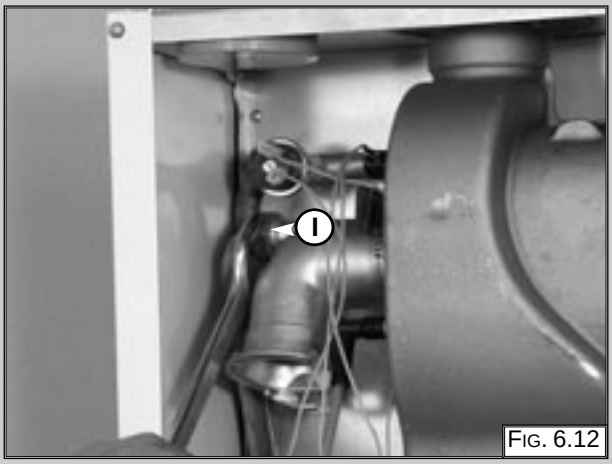


Fig. 6.12

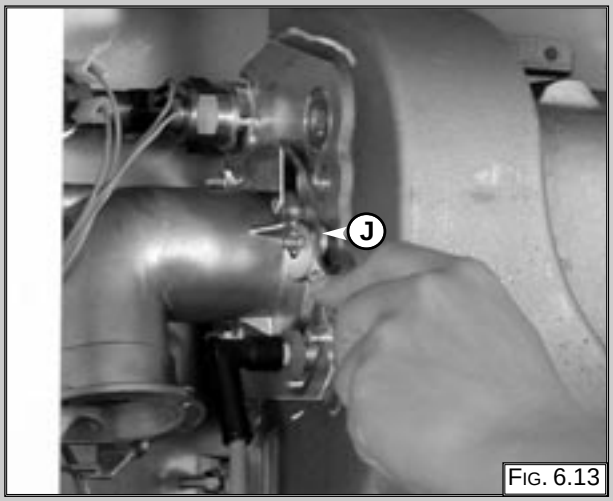


Fig. 6.13

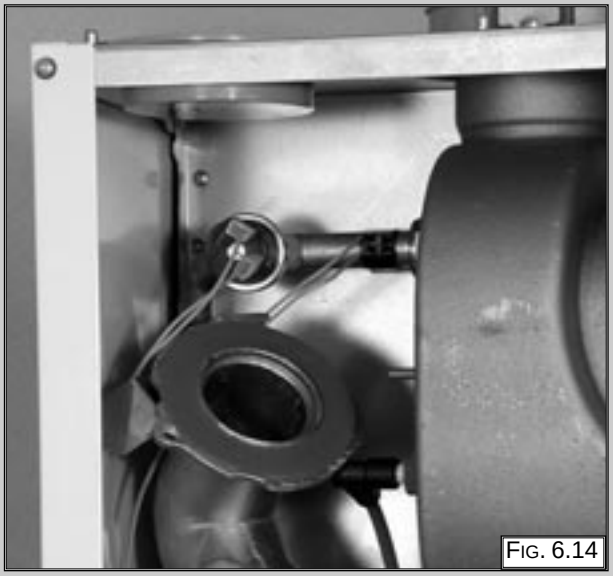


Fig. 6.14

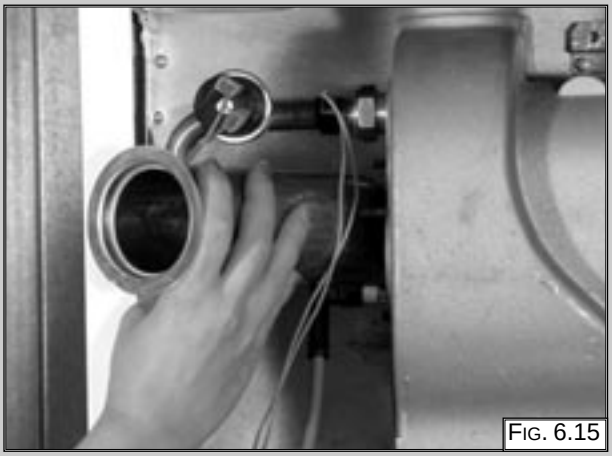


Fig. 6.15

6.3.3. Removing the Electrodes

1. Pull off the ignition cable “K” (Fig. 6.16);
2. Remove the two allen screws “L” (Fig. 6.17);
3. Extract the electodes (Fig. 6.18).

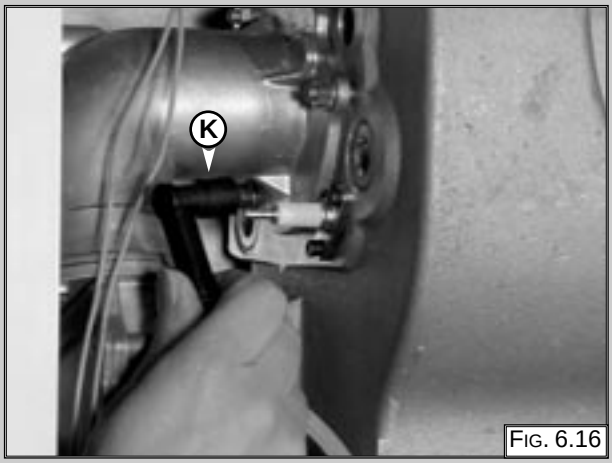


Fig. 6.16

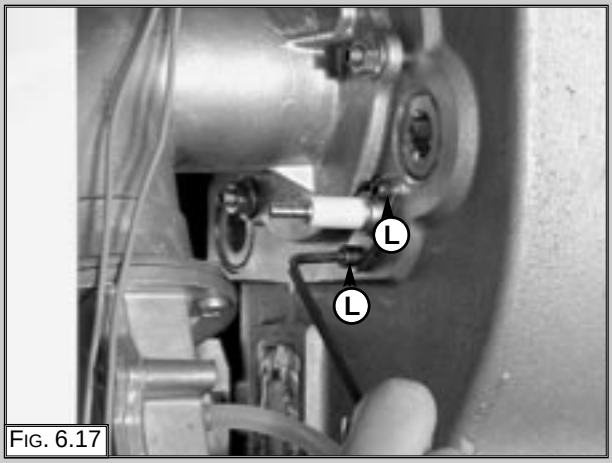


Fig. 6.17

FIG. 6.18

Removing the combustion chamber inspection panel

1. Remove the four nuts “M” (FIG. 6.19);
2. Remove the inspection panel (FIG. 6.20).

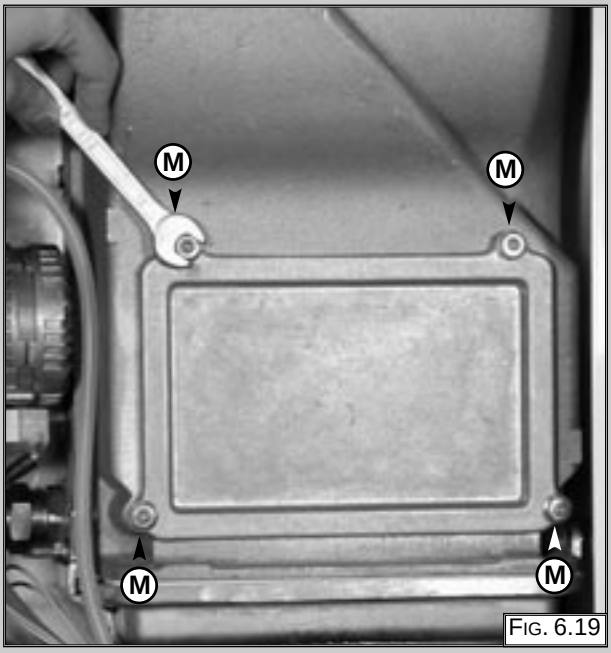


FIG. 6.19

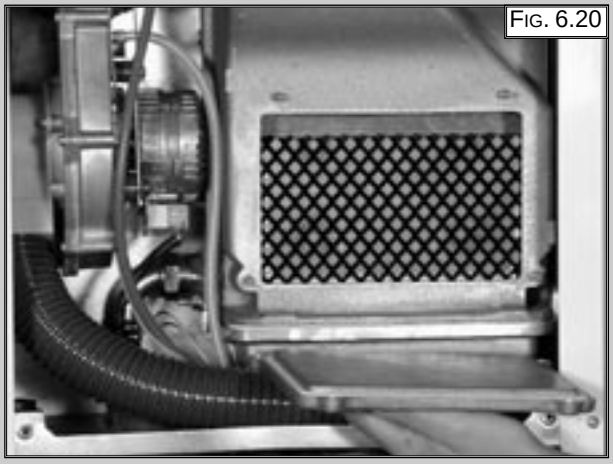


FIG. 6.20

6.3.5. REMOVING THE HEAT EXCHANGER

1. Remove the two nuts “N” (FIG. 6.21+6.22);
2. Pull off the ignition cable (FIG. 6.23);
3. Loosen the two nuts “O” (FIG. 6.24);
4. Unscrew the two screws “P” (FIG. 6.25);
5. Unscrew the screw “Q” (FIG. 6.26);
6. Pull foward rhe heat exchanger (FIG. 6.27);

FIG. 6.21

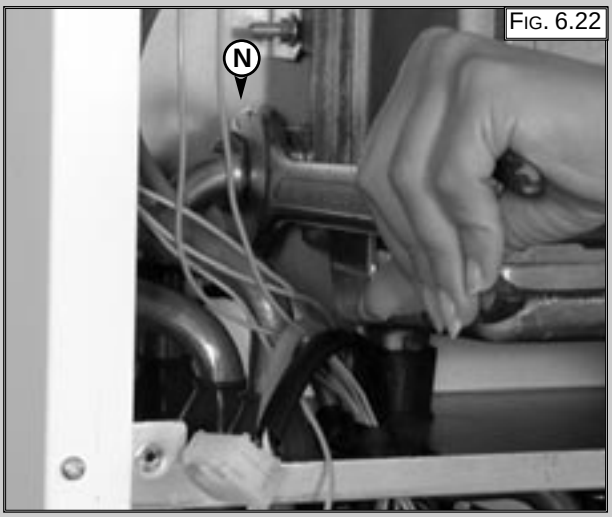


FIG. 6.22

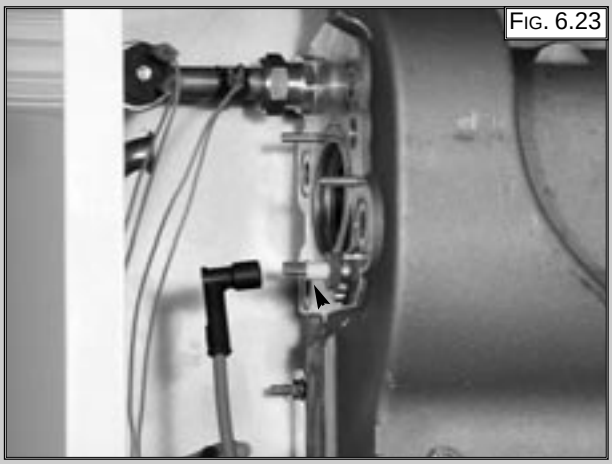


FIG. 6.23

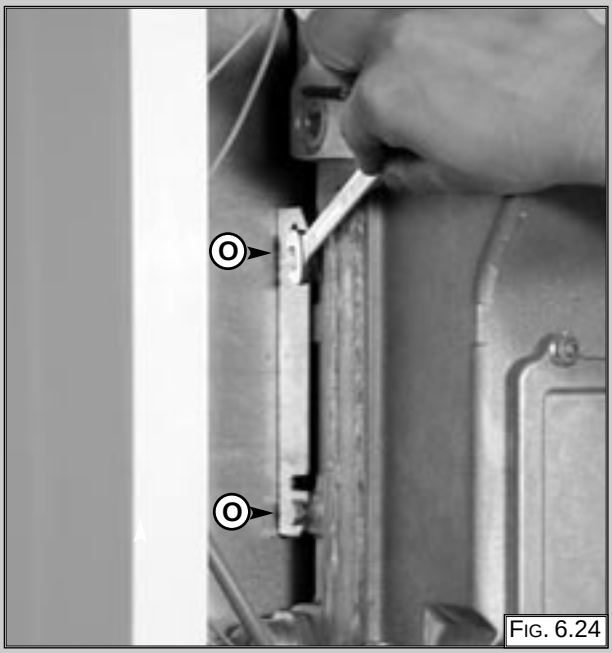


FIG. 6.24

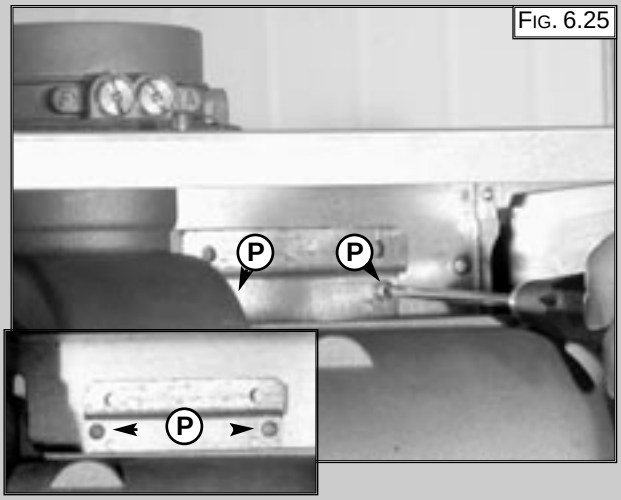


FIG. 6.25

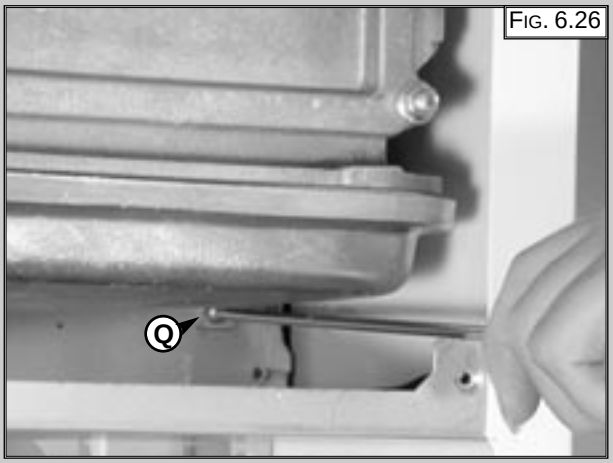


FIG. 6.26

FIG. 6.27

FIG. 6.28

6.3.6. Removing the Condensate Collector

1. Open the clamp and remove the condensate trap connection pipe “R” (Fig. 6.29);
2. Remove the nuts “S” (Fig. 6.30);
3. Remove the condensate collector (Fig. 6.31).

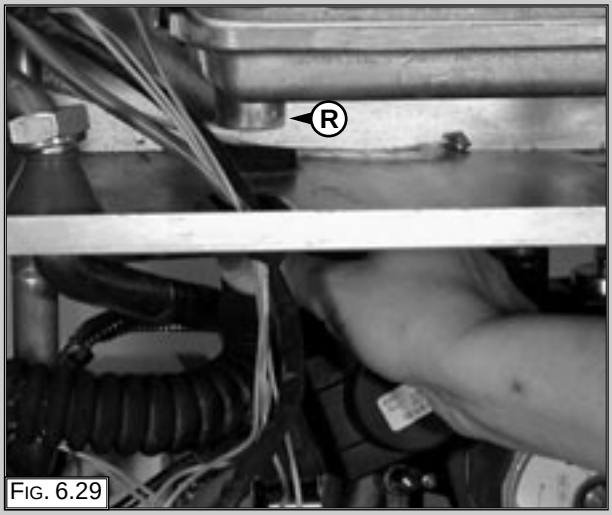


Fig. 6.29

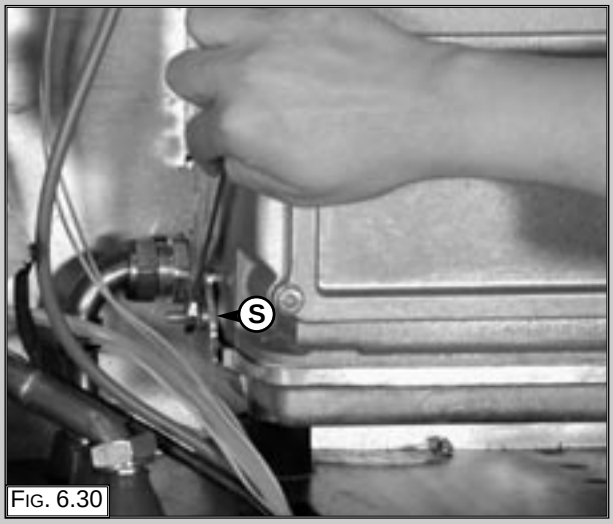


Fig. 6.30

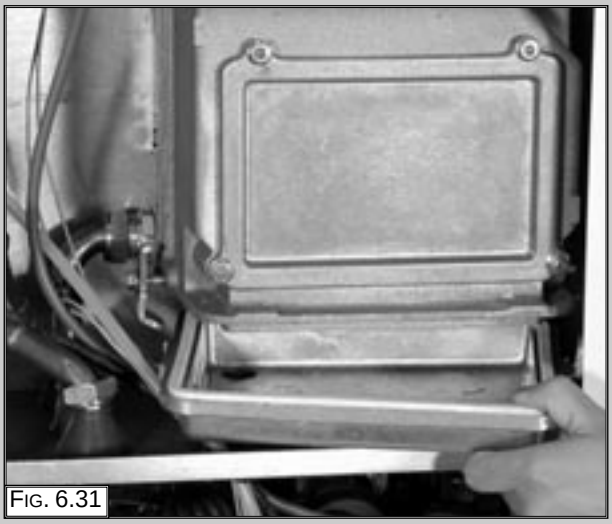


Fig. 6.31

6.3.7. Removing the Condensate Trap

1. Open the clamp and remove the condensate trap connection pipe (Fig. 6.29+6.32);
2. Unscrew and remove the trap from the boiler (Fig. 6.33).
3. Remove the condensate trap (Fig. 6.34+6.35).

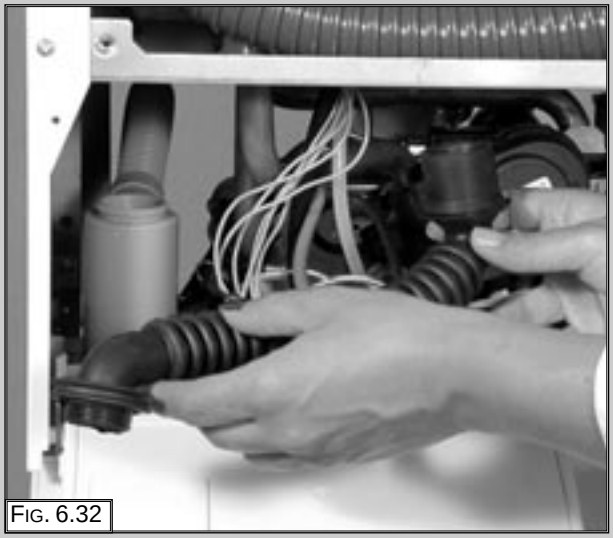


Fig. 6.32

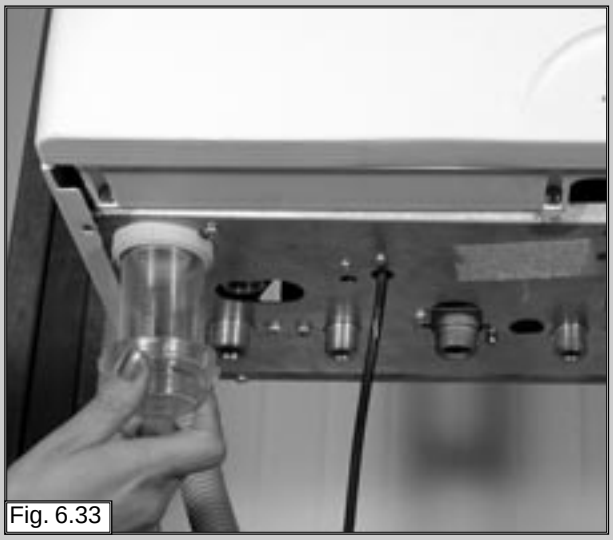


Fig. 6.33

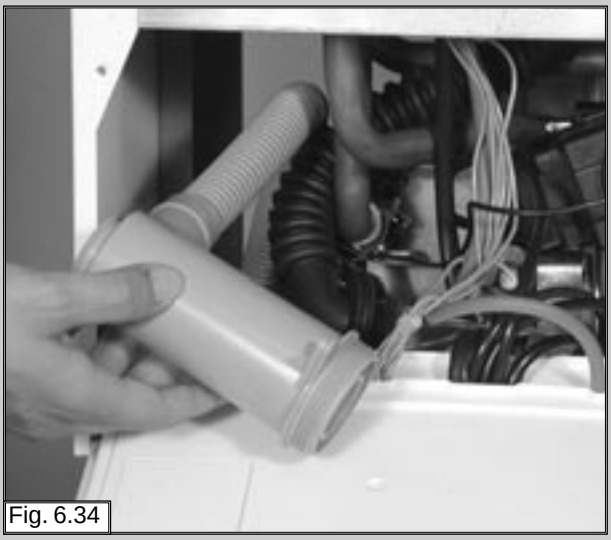


Fig. 6.34

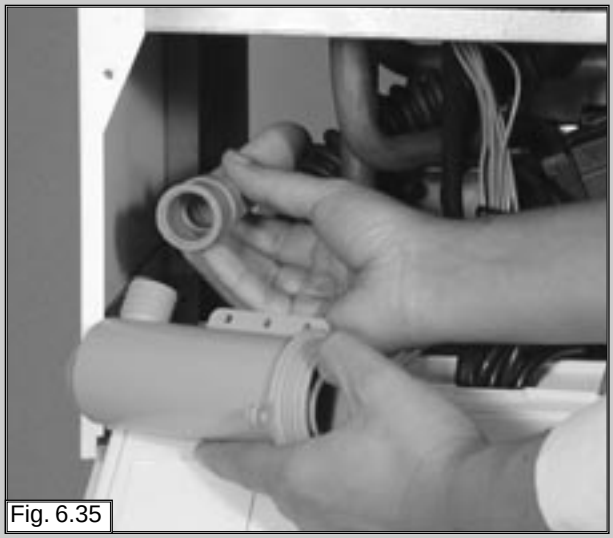


Fig. 6.35

6.3.8. Removing the Injector

1. Remove mixing pipe (Fig. 6.12+6.13);
2. Remove the fan, unscrew the screws “T” (Fig. 6.36+6.37);
3. Unscrew the injector “U” using a suitable screwdriver (Fig. 6.38);
4. Remove the injector (Fig. 6.39).

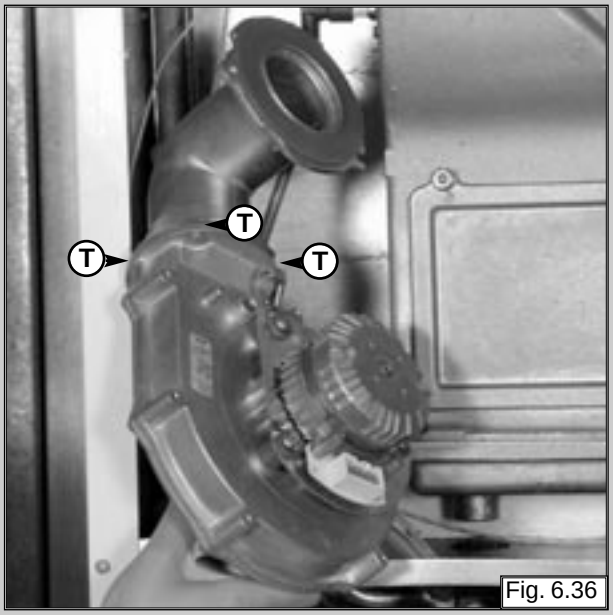


Fig. 6.36

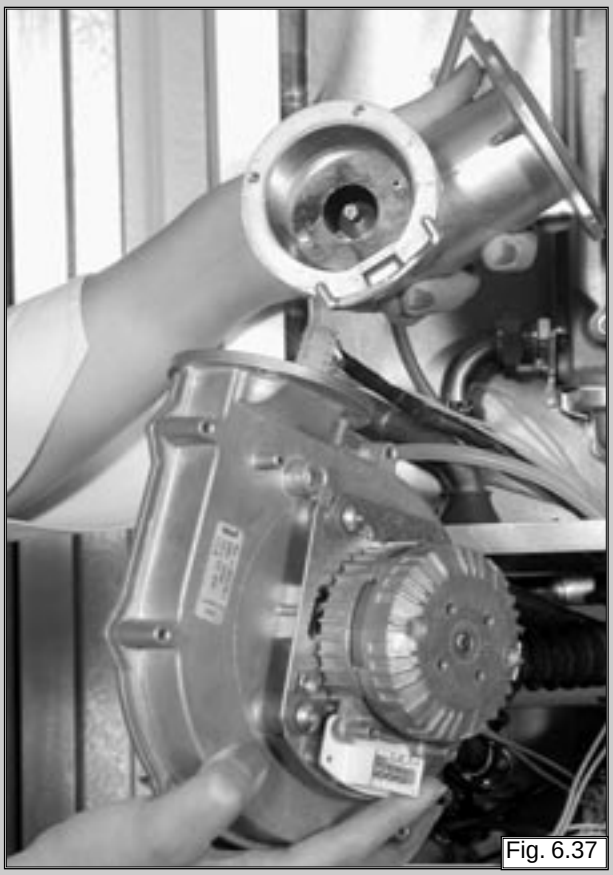


Fig. 6.37

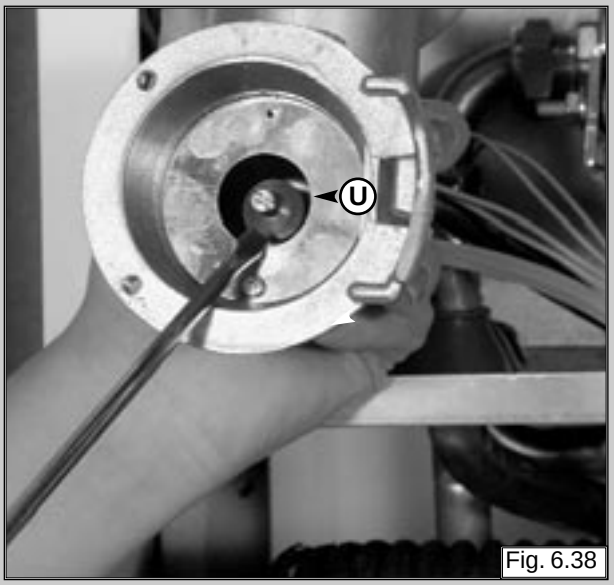


Fig. 6.38

Fig. 6.39

6.4 ACCESS TO THE GAS VALVE

6.4.1. REMOVING THE GAS VALVE

1. Disconnect the electrical connection “V” from the gas valve (FIG. 6.40);
2. Release the top nut “W” (FIG. 6.41);
3. Remove the screws “X” from the bottom of the gas valve pipe (FIG. 6.42);
4. Remove the gas valve (FIG. 6.43).

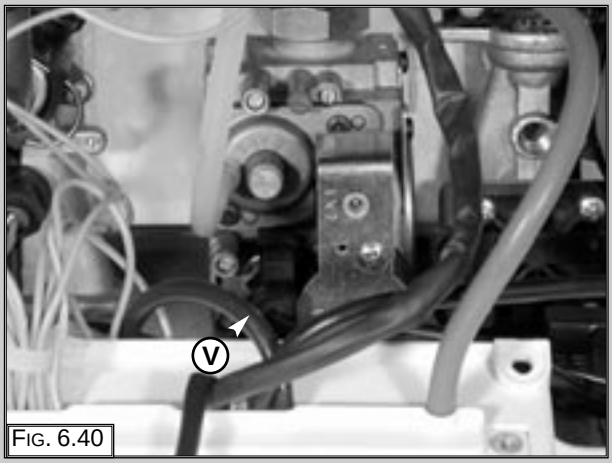


FIG. 6.40

FIG. 6.41

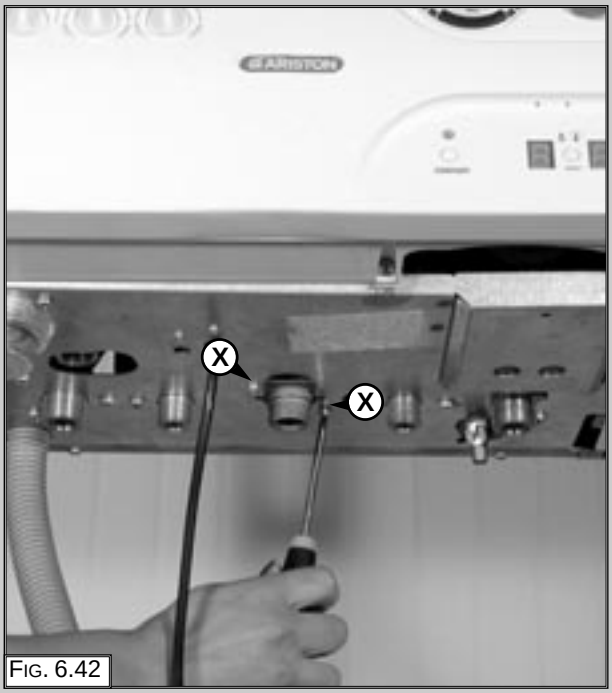


FIG. 6.42

FIG. 6.43

6.5 Access to the Water Circuit

Important! Before any component is removed, the boiler must be drained of all water.

6.5.1. Removing the D.H.W. (Secondary) Exchanger

1. Remove the screws "Y" (Fig. 6.44);
3. Push the exchanger towards the rear of the boiler, lift upwards and remove from the front of the boiler (Fig. 6.45 - 6.46);
4. Before replacing the exchanger ensure that the O-rings are in good condition and replace if necessary.

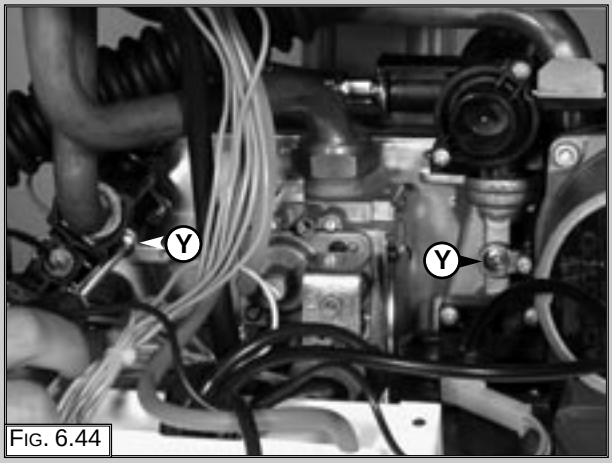


Fig. 6.44

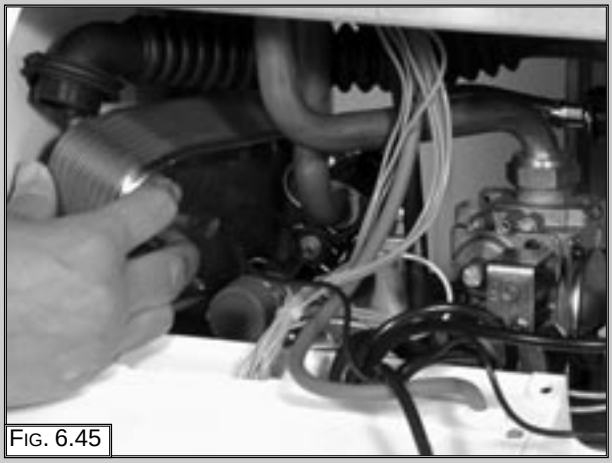


Fig. 6.45

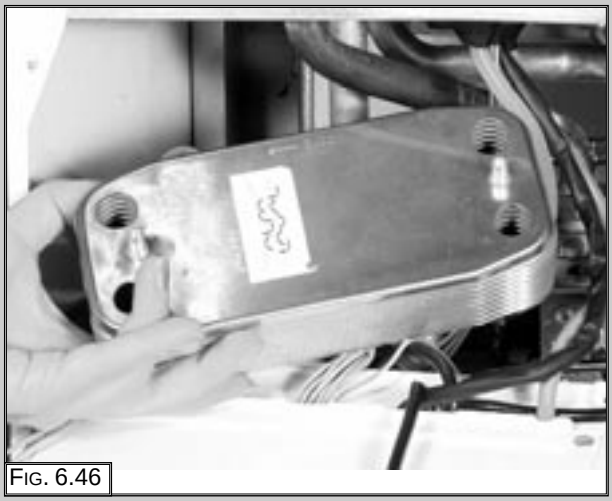


Fig. 6.46

6.5.2. Removing the Safety Valve (ecoCombi 27 MFFI)

1. Remove the U-clip "Z" (Fig. 6.47);
2. Unscrew and remove the valve (Fig. 6.48).

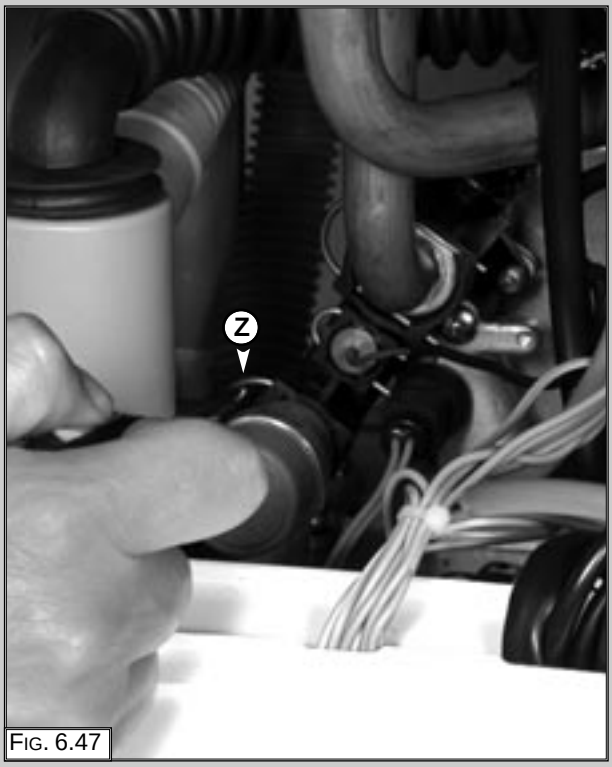


Fig. 6.47

Fig. 6.48

6.5.2. Removing the Safety Valve (ecoSystem 27 RFFI)

1. Loosen union “A1” (Fig. 6.49);
2. Unscrew and remove the valve (Fig. 6.50).

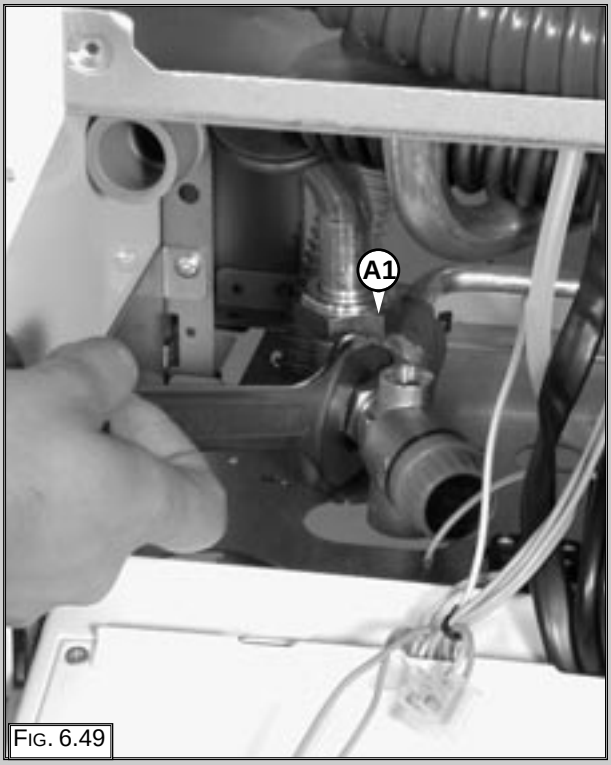


Fig. 6.49

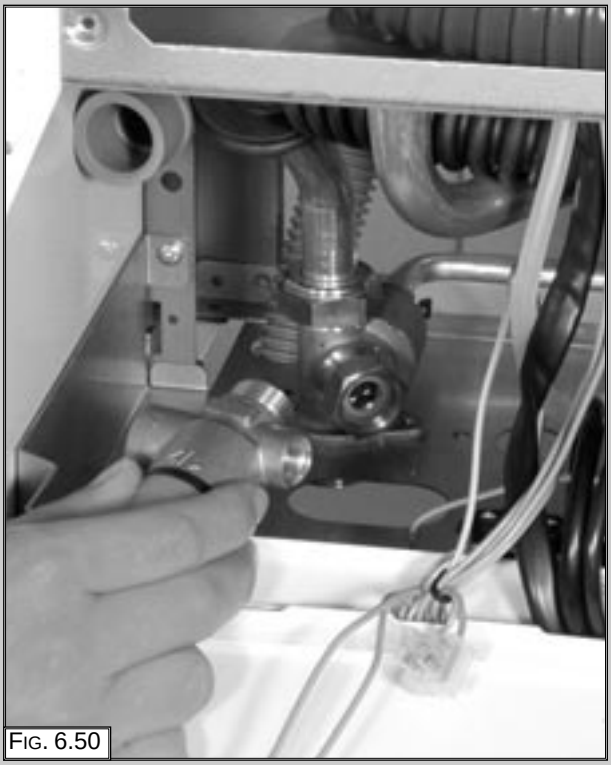


Fig. 6.50

6.5.2. Removing the Automatic Air Vent (ecoCombi 27 MFFI)

1. Remove the U-clip “A2” (Fig. 6.51);
2. Unscrew valve (Fig. 6.52);
3. Remove (Fig. 6.53).

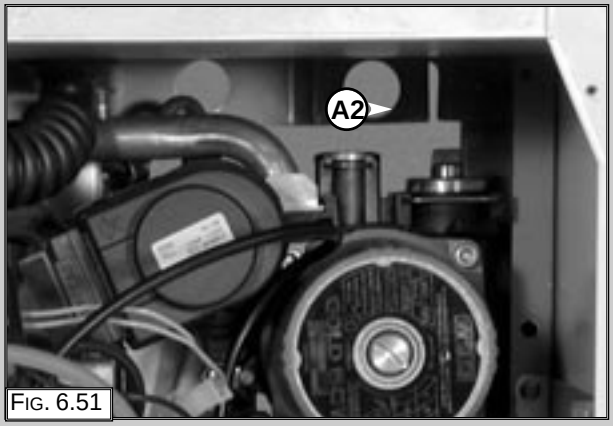


Fig. 6.51

Fig. 6.52

Fig. 6.53

6.5.3. Removing the Automatic Air Vent (ecoSystem 27 RFFI)

1. Unscrew valve “A3” (Fig. 6.54);
2. Remove (Fig. 6.55).

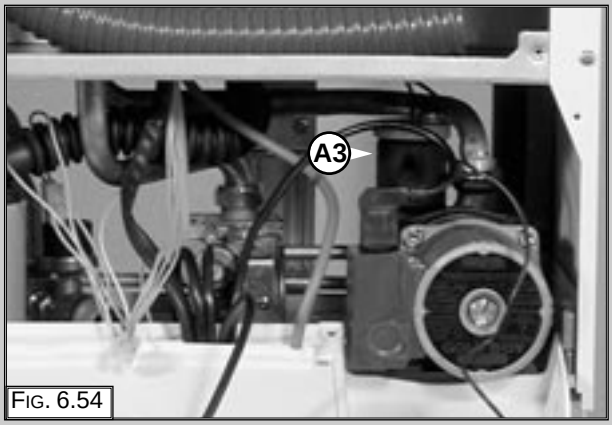


Fig. 6.54

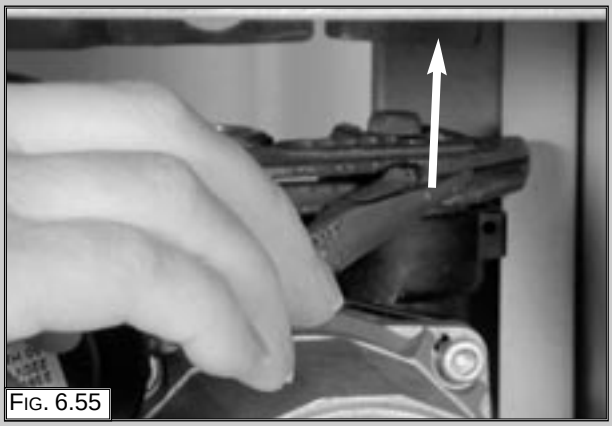


Fig. 6.55

6.5.4. Removing the Pump Pressure Switch (ecoCombi 27 MFFI)

1. Remove the electrical connections “A4” (Fig. 6.56);
2. Unscrew and remove (Fig. 6.57).

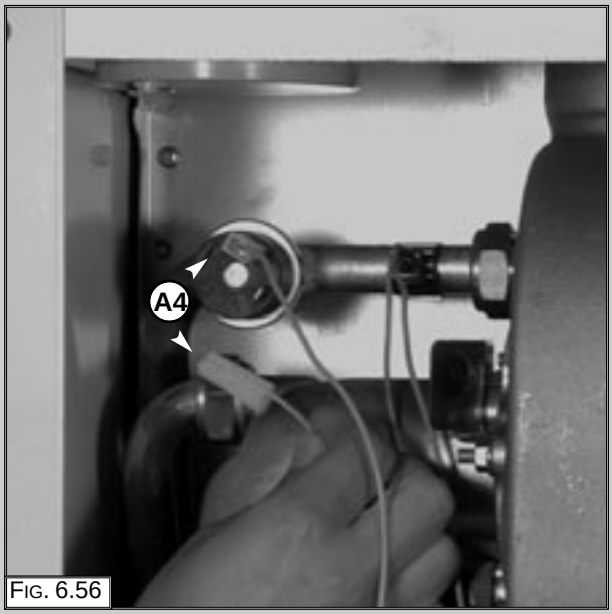


Fig. 6.56

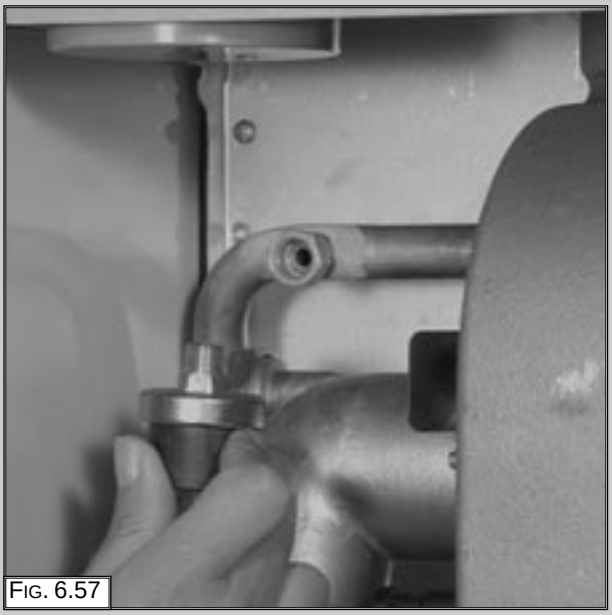


Fig. 6.57

6.5.4. Removing the Pump Pressure Switch (ecoSystem 27 RFFI)

1. Remove the electrical connections “A5” (Fig. 6.56);
2. Unscrew and remove (Fig. 6.57).

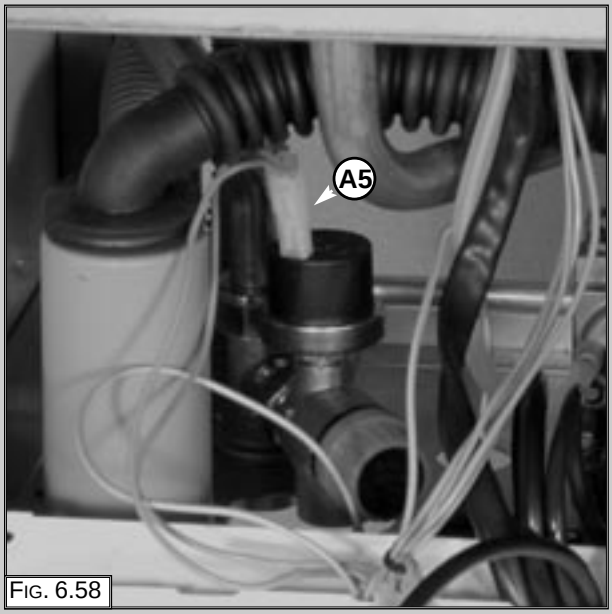


Fig. 6.58

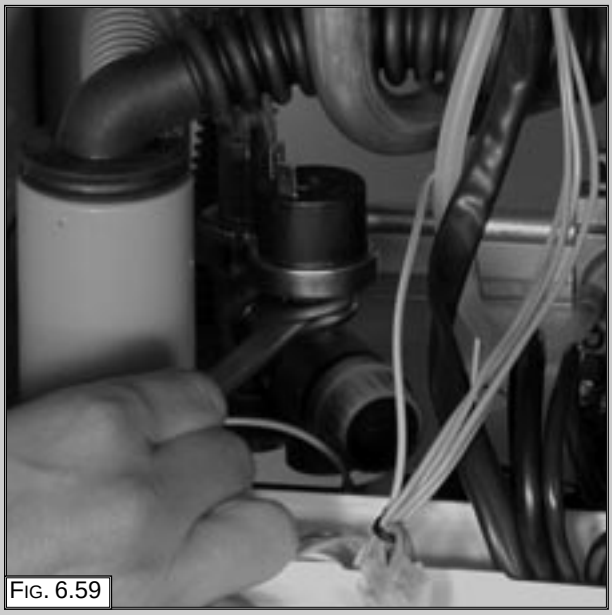


Fig. 6.59

6.5.5. Removing the Diverter Valve Actuator

1. Unplug the electrical connector “A6” (Fig. 6.60);
2. Release the retaining clip “A7” and remove the diverter valve actuator (Fig. 6.61).
3. Unscrew the two screws “A8” (Fig. 6.62);
4. Remove the “actuator” “A9” (Fig. 6.63 - 6.64).

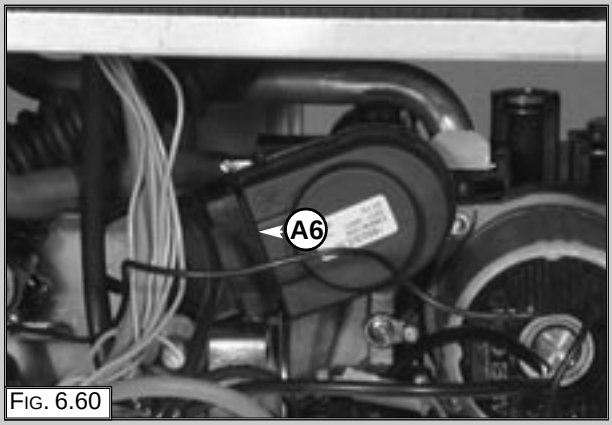


Fig. 6.60

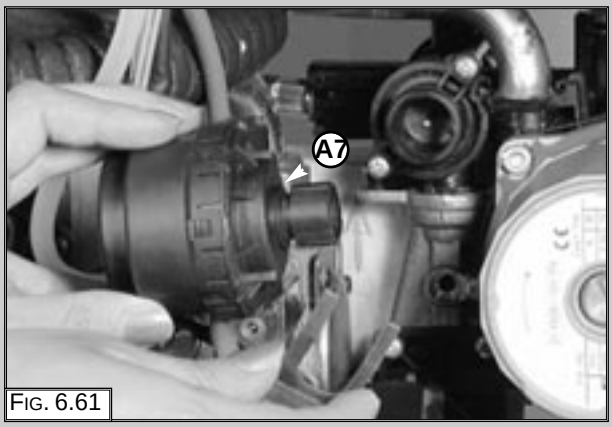


Fig. 6.61

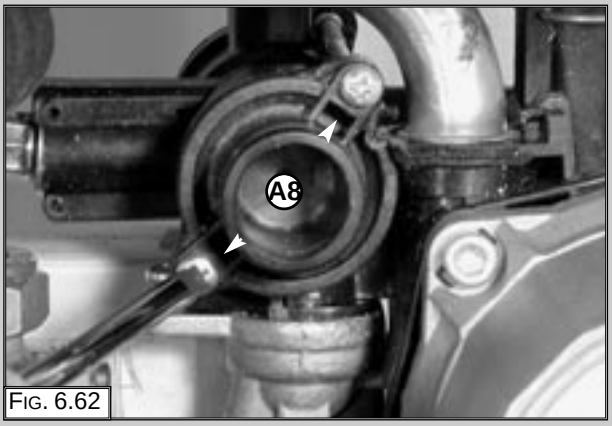


Fig. 6.62

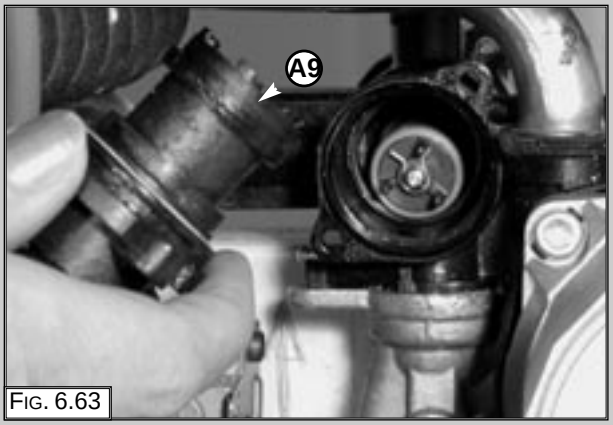


FIG. 6.63

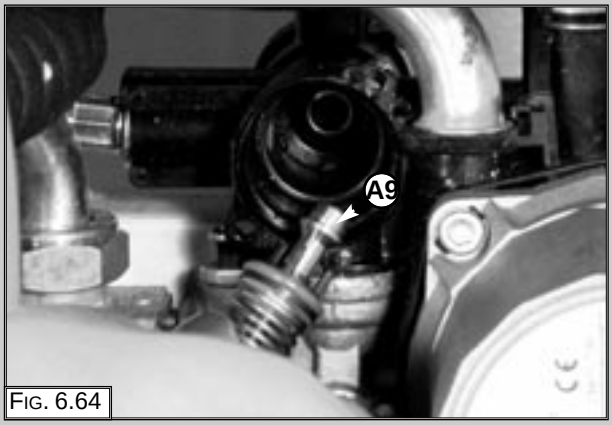


FIG. 6.64

6.5.6. REMOVING THE D.H.W. FLOW SWITCH

1. Unplug the electrical connector “B1” (FIG. 6.65);
2. Unscrew the four screws “B2” (FIG. 6.66);
3. Remove the D.H.W. flow switch (FIG. 6.67).

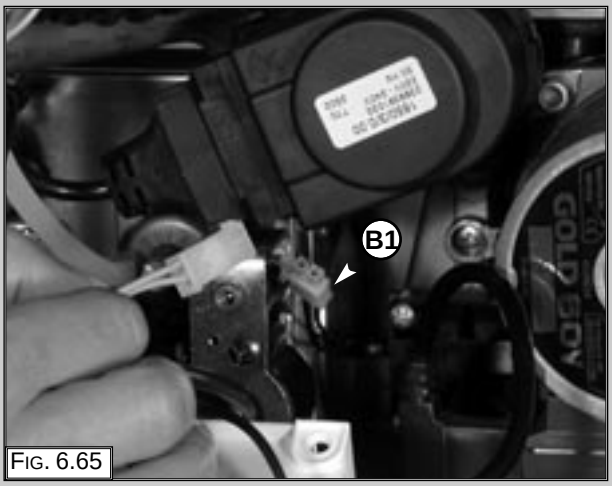


FIG. 6.65

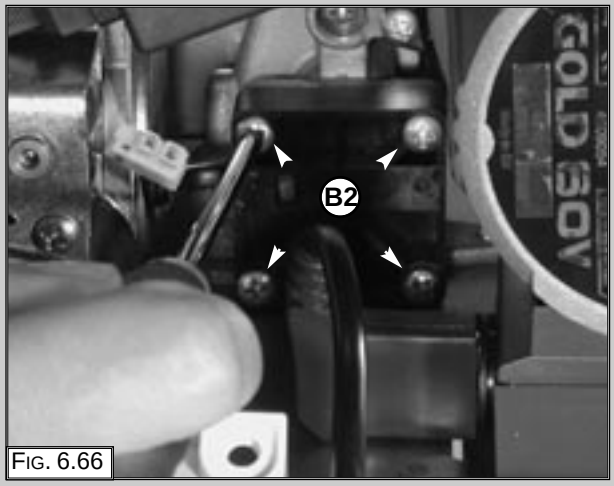


FIG. 6.66

FIG. 6.67

6.5.7. Removing the Pump (ecoCombi 27 MFFI)

1. Unplug the electrical connection “B3” (Fig. 6.68);
2. Unscew the four scews “B4” (Fig. 6.69);
3. Remove the pump (Fig. 6.70 - 6.71).

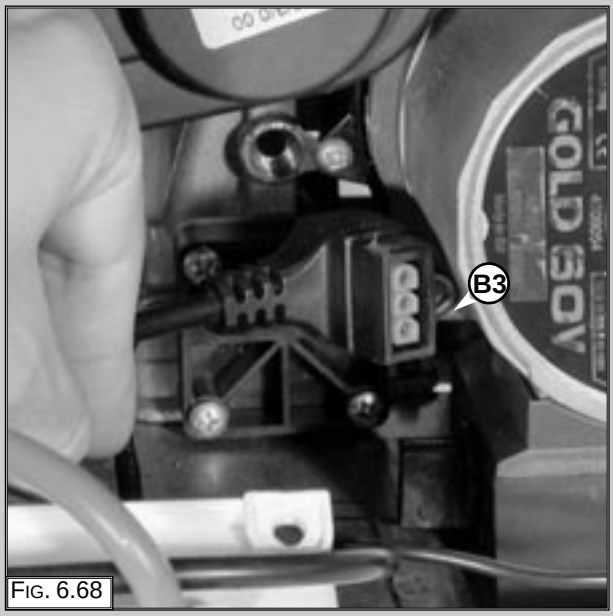


Fig. 6.68

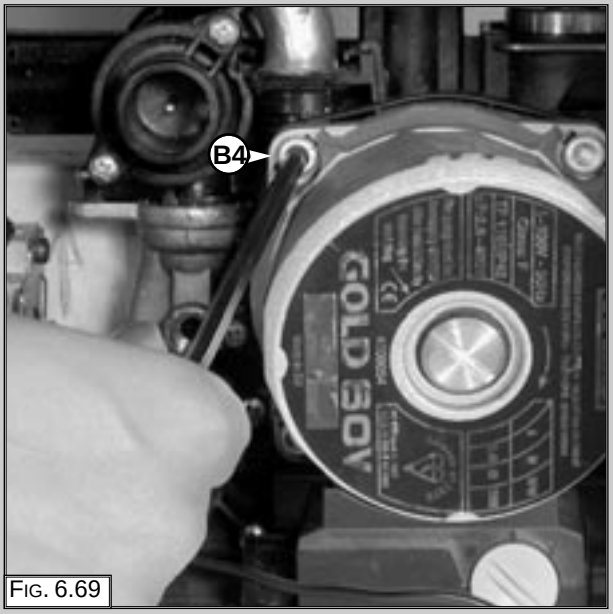


Fig. 6.69

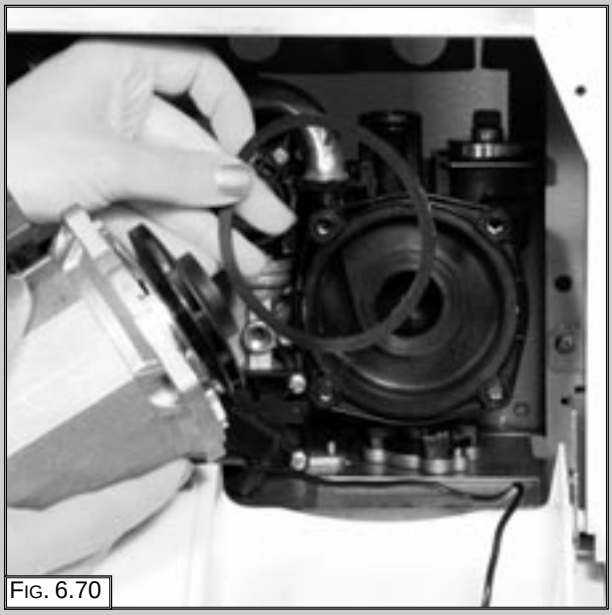


Fig. 6.70

Fig. 6.71

6.5.7. Removing the Pump (ecoSystem 27 RFFI)

1. Unplug the electrical connection “B5” (Fig. 6.72);
2. Remove the U-clip “B6” (Fig. 6.73);
3. Remove the slide plate “B7” (Fig. 6.74);
4. Unscew the screw “B8” under the boiler (Fig. 6.75);
5. Remove the U-clip “B9” of the pressure gauge (Fig. 6.76);
6. Remove the pump (Fig. 6.77).

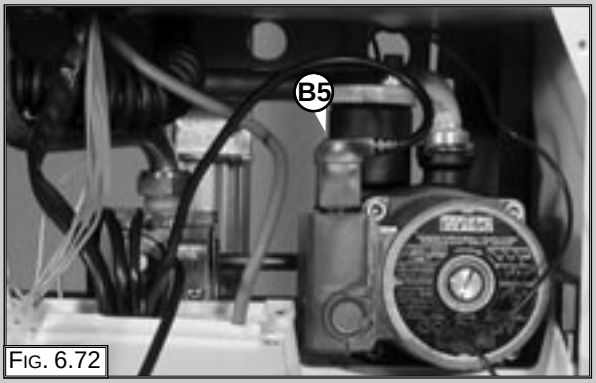


Fig. 6.72

Fig. 6.73

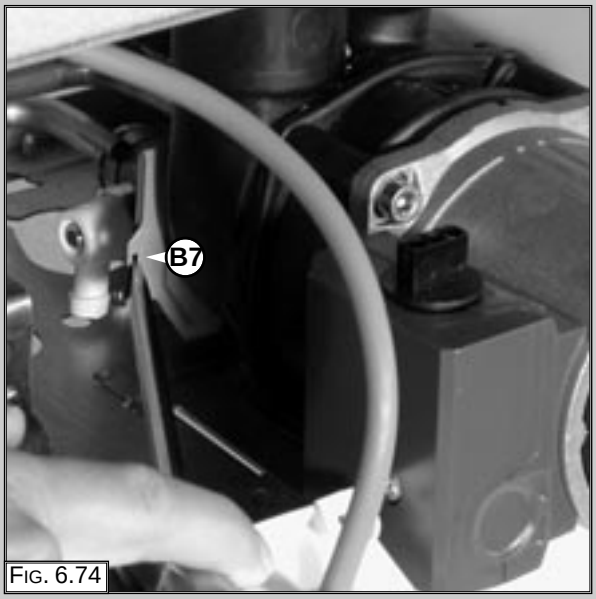


Fig. 6.74

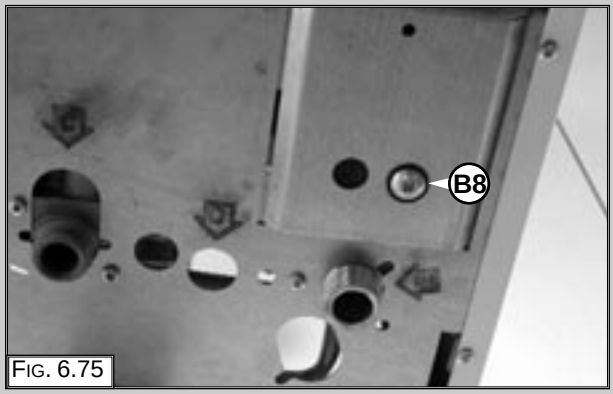


Fig. 6.75

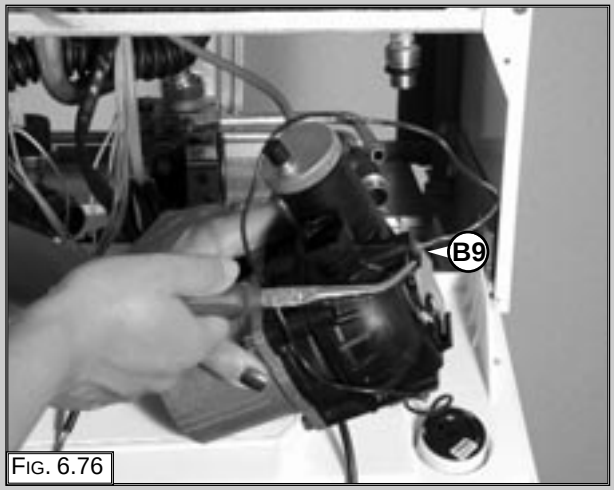


Fig. 6.76

Fig. 6.77

6.5.8. Removing the Pressure Gauge (ecoCombi 27 MFFI)

1. Release U-clip “C1” (Fig. 6.78 - 6.79);
2. Ease the pressure gauge through the control panel from the rear (Fig. 6.80);
3. Remove the pressure gauge. (Fig 6.81).

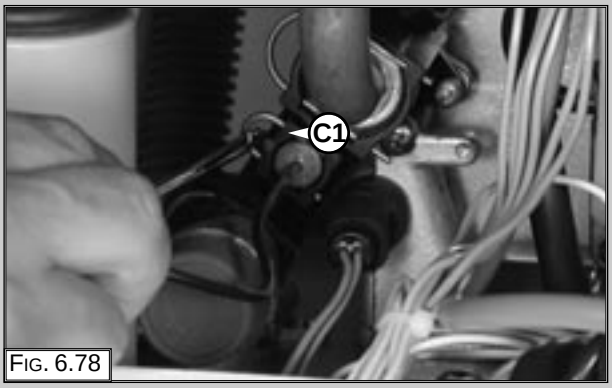


Fig. 6.78

Fig. 6.79

Fig. 6.80

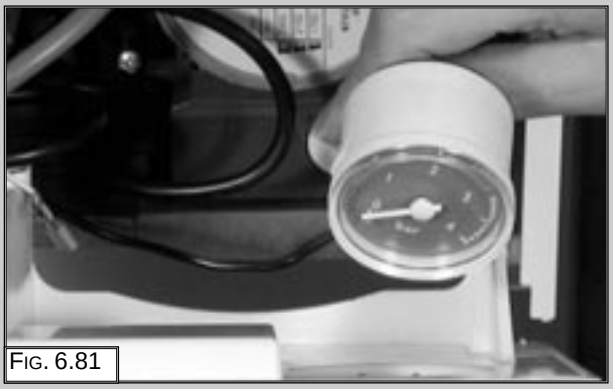


Fig. 6.81

6.5.8. Removing the Pressure Gauge (ecoSystem 27 RFFI)

1. Ease the pressure gauge through the control panel from the rear (Fig. 6.82 - 6.83);
2. Remove the pressure gauge. (Fig 6.84).

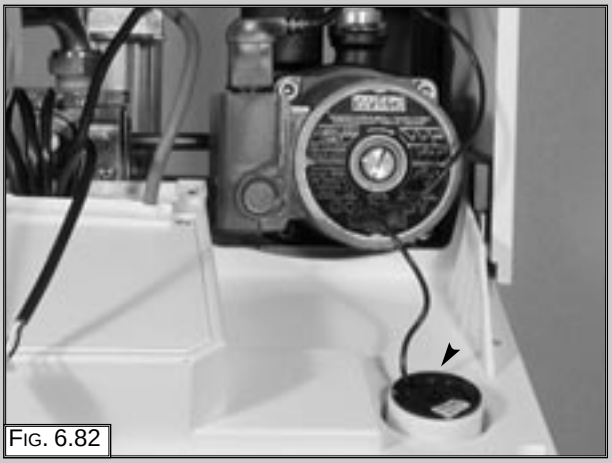


Fig. 6.82

Fig. 6.83

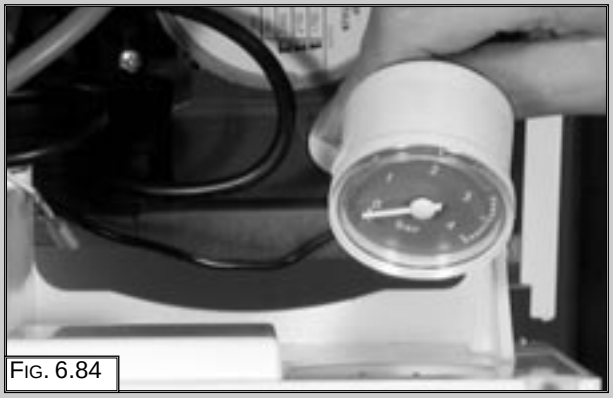


Fig. 6.84

6.5.9. Removing the Expansion Vessel

1. Loosen nut “C2” (Fig. 6.85);
2. Loosen nut “C3” (Fig. 6.86);
3. Remove the expansion vessel (Fig. 6.87).

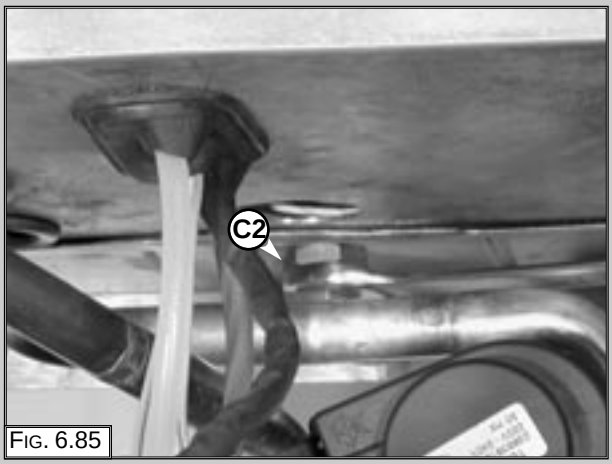


Fig. 6.85

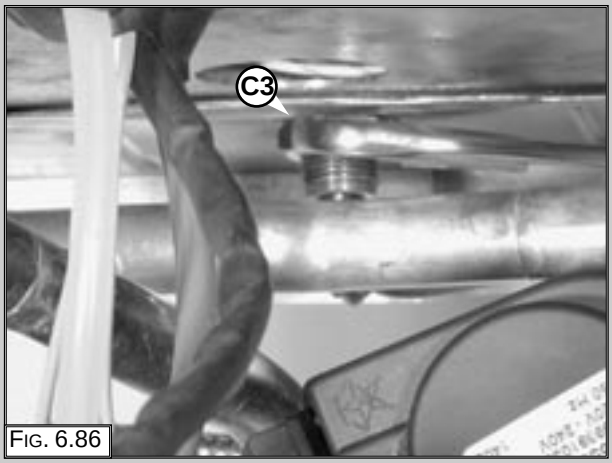


Fig. 6.86

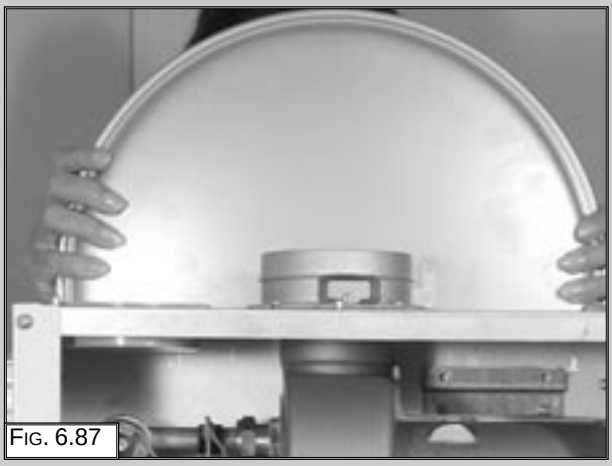


Fig. 6.87

6.5.10 Removing the D.H.W. Temperature Probe (N.T.C.) (MFFI only)

1. Remove the electrical connector “C4” by pulling off (Fig. 6.88);
2. Unscrew and remove the D.H.W. temperature probe “C5” (Fig. 6.89).

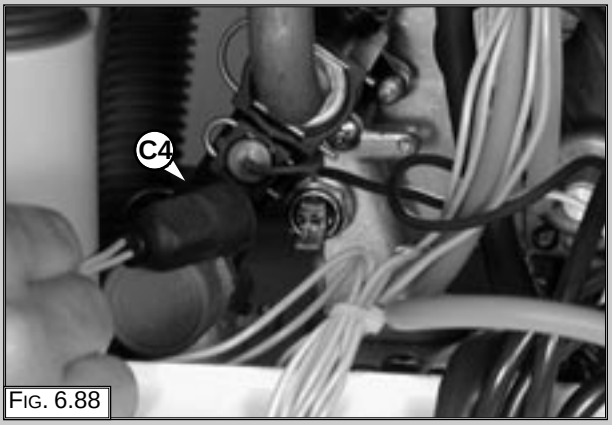


Fig. 6.88

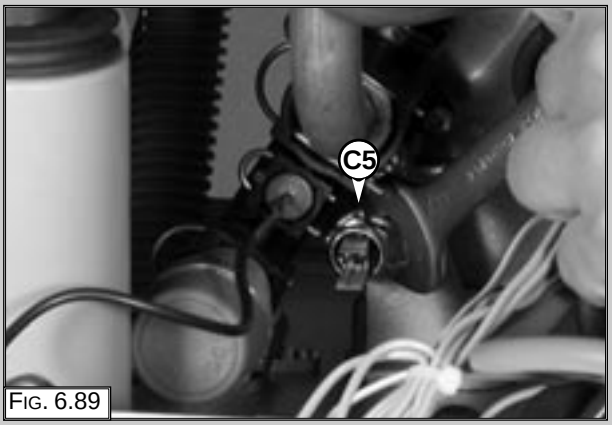


Fig. 6.89

6.5.11. Removing the C.H. Flow Temperature Probe (N.T.C.)

1. Remove the C.H. flow temperature probe “C6” by pulling off (Fig. 6.90);
2. Remove the electrical connection from the C.H. flow temperature probe “C7” (Fig. 6.91).

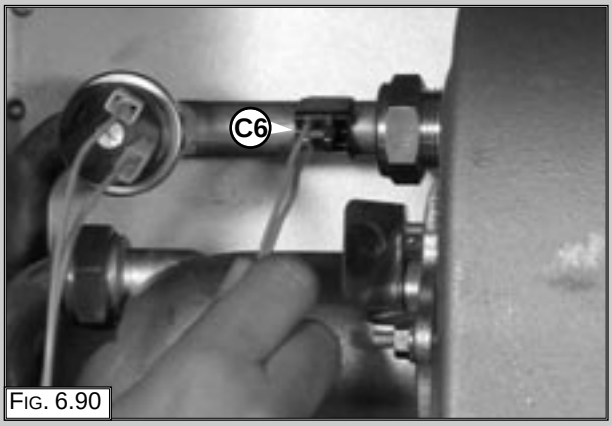


Fig. 6.90

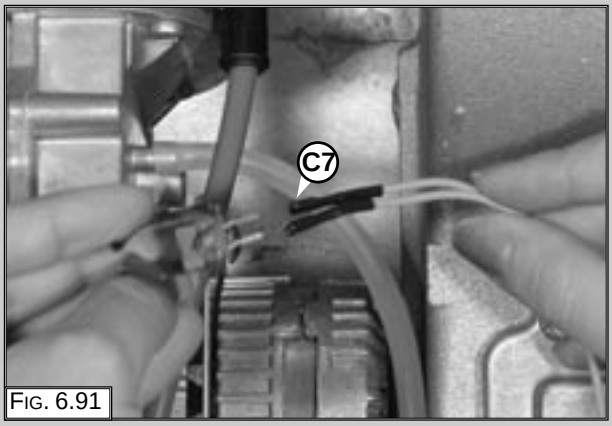


Fig. 6.91

6.5.12. Removing the C.H. Return Temperature Probe (N.T.C.)

1. Remove the C.H. return temperature probe “C8” by pulling off (Fig. 6.92);
2. Remove the electrical connection from the C.H. return temperature probe “C9” (Fig. 6.93).

Fig. 6.92

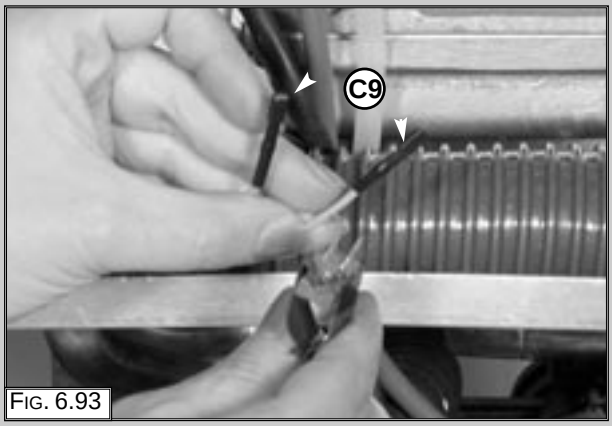


Fig. 6.93

6.6 ACCESS TO THE CONTROL SYSTEM

6.6.1. CHECKING THE FUSES

1. Remove the inspection cover on the reverse of the control panel (FIG. 6.94);
2. Remove the fuses by pushing and rotating fuse holders “D1” (FIG. 6.95).

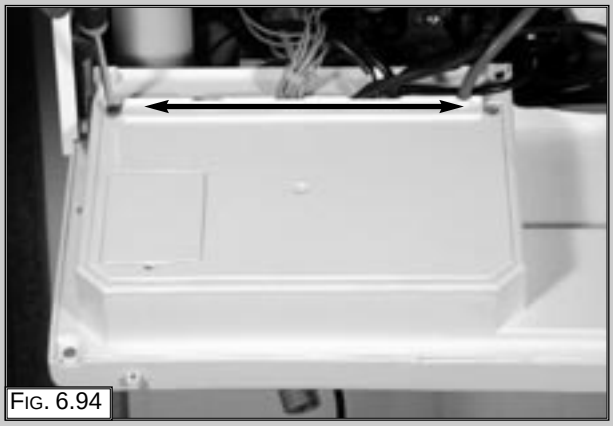


FIG. 6.94

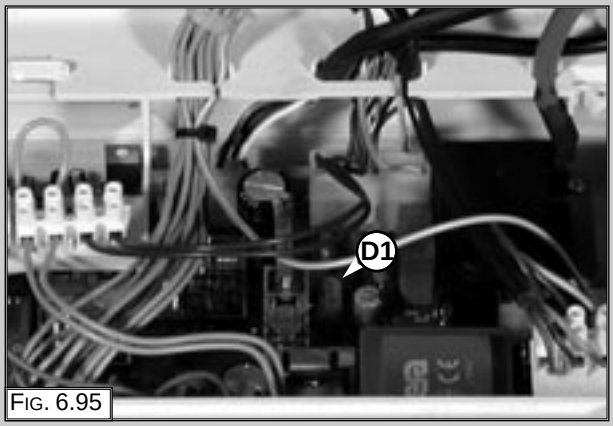


FIG. 6.95

6.6.2. REMOVING THE P.C.B.S

1. Remove the inspection cover on the reverse of the control panel (FIG. 6.94);
2. Unplug all the electrical connections (FIG. 6.96);
3. Unscew the screws “D2” (FIG. 6.97);
4. Remove the facia panel (FIG. 6.98);
5. Unscrew the screws “D3” (Fig. 6.99);
6. Remove the main P.C.B. (FIG. 6.100);
7. Unscew the display P.C.B. mounting screws “D4” and disconnect the P.C.B. connection cable “D5” (FIG. 6.101);
8. Remove the display P.C.B. (FIG. 6.102);
9. Replace either P.C.B. in reverse order.

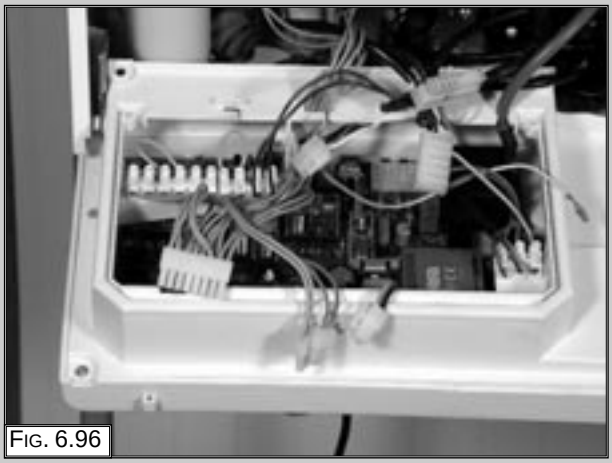


FIG. 6.96

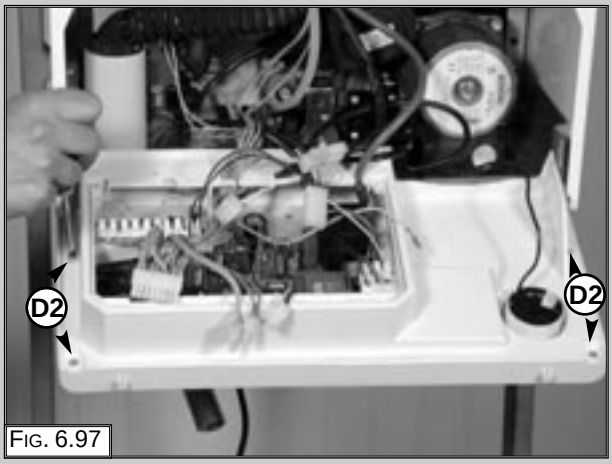


FIG. 6.97

FIG. 6.98

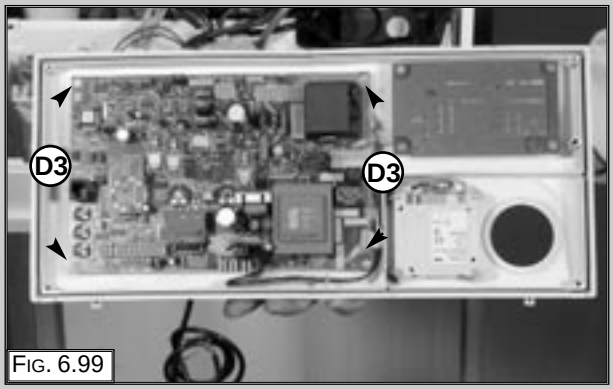


FIG. 6.99

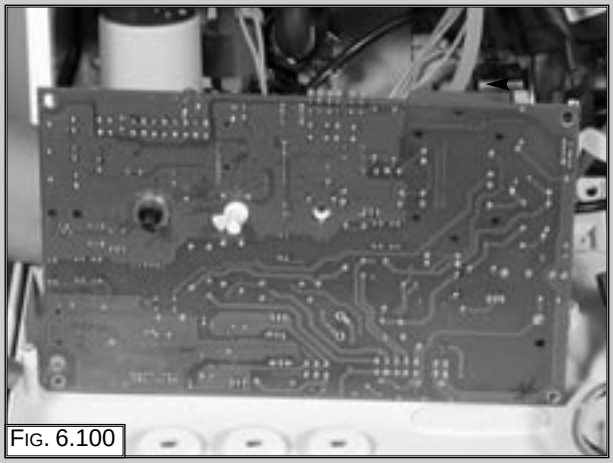


FIG. 6.100

FIG. 6.101

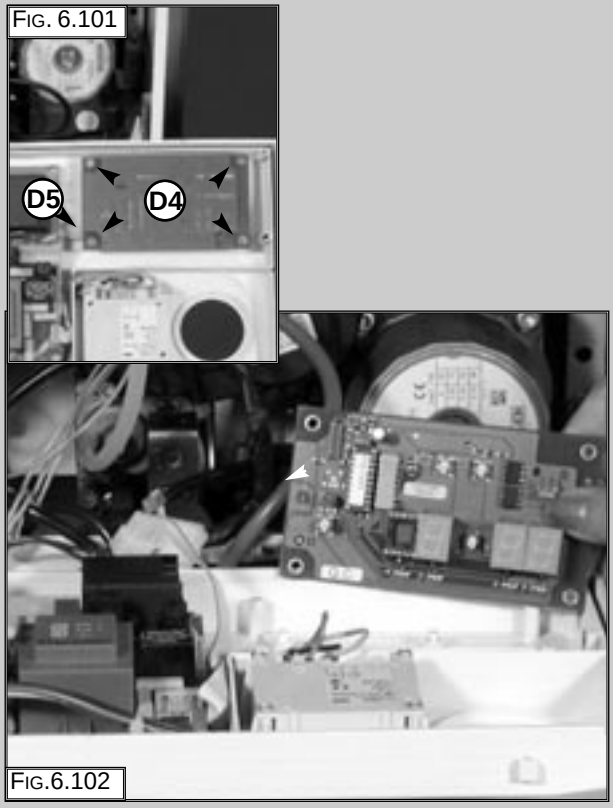


FIG.6.102

6.6.3. REMOVING THE TIME CLOCK

1. Open the control panel (see the paragraph "*Removing the P.C.B.s"*);
2. Unplug the electrical connection from the time clock and unscews the four scews (FIG. 6.103);
3. remove the time clock (FIG. 6.104).

FIG. 6.103

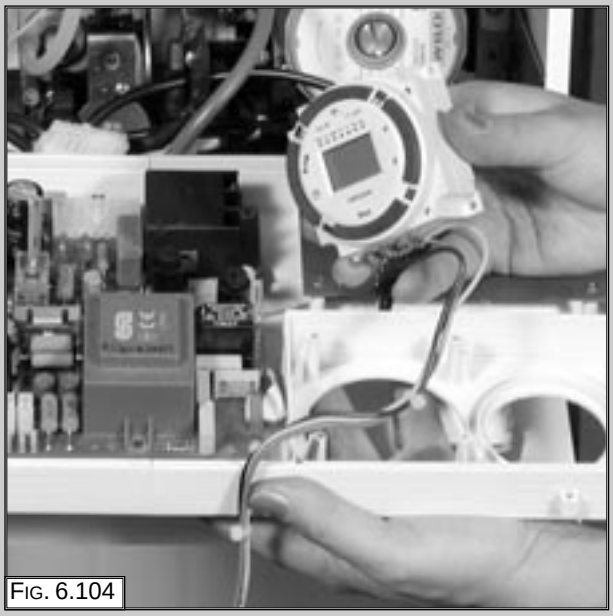


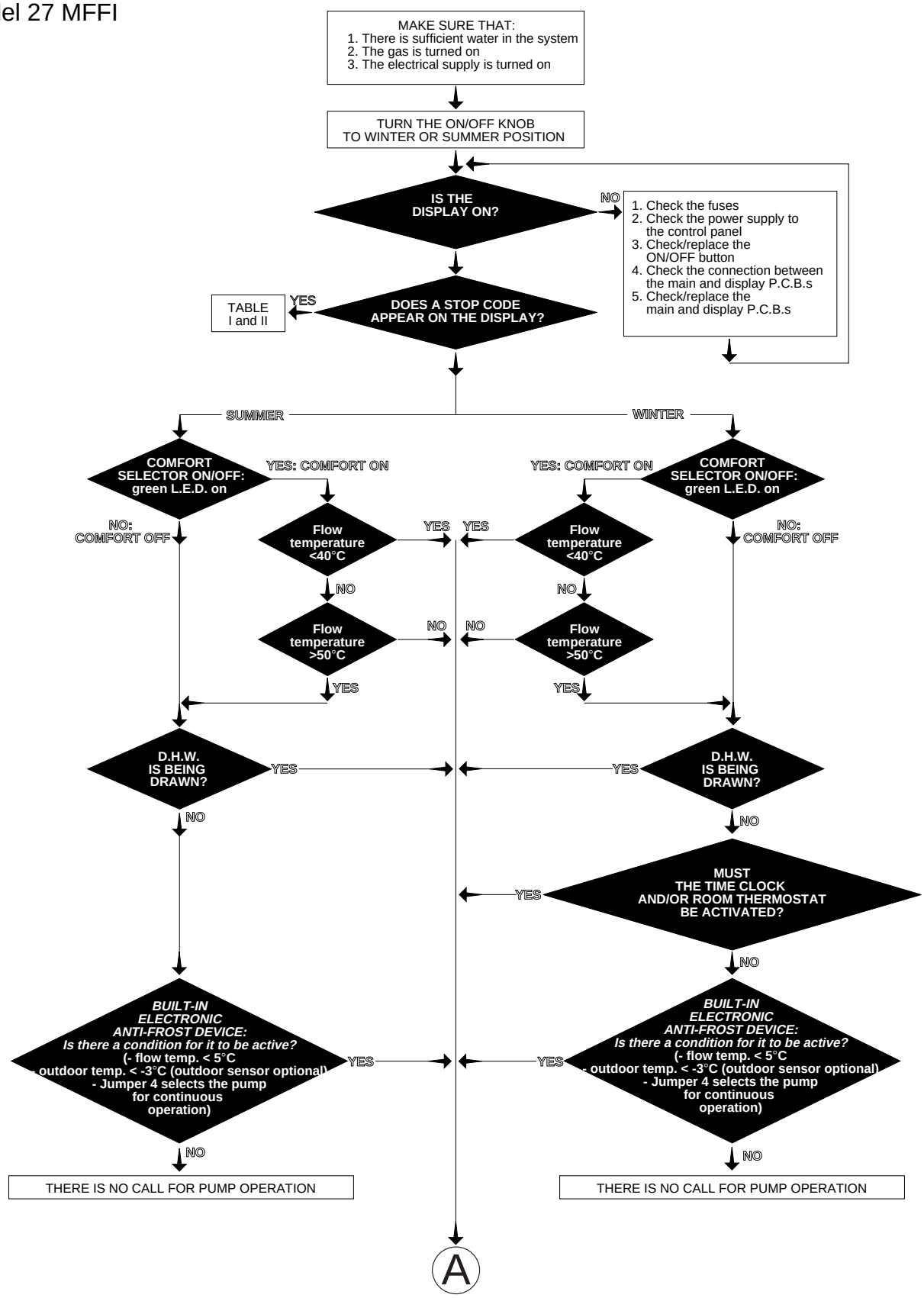
FIG. 6.104

7. FAULT FINDING

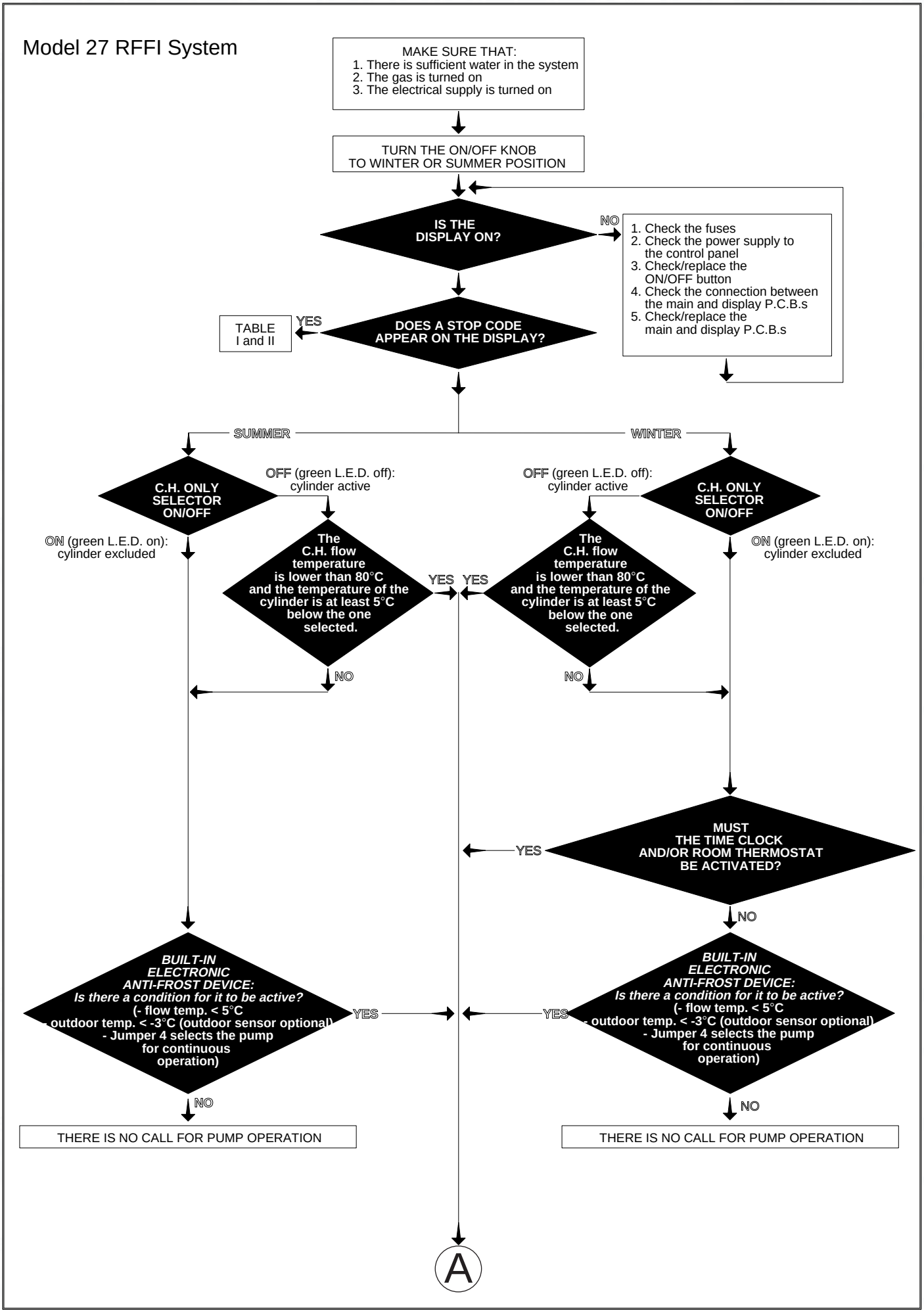
7.1. FAULT FINDING GUIDE (FLOW-CHARTS)

It is possible to detect and correct any defect by using the standard fault finding diagrams described in this chapter.

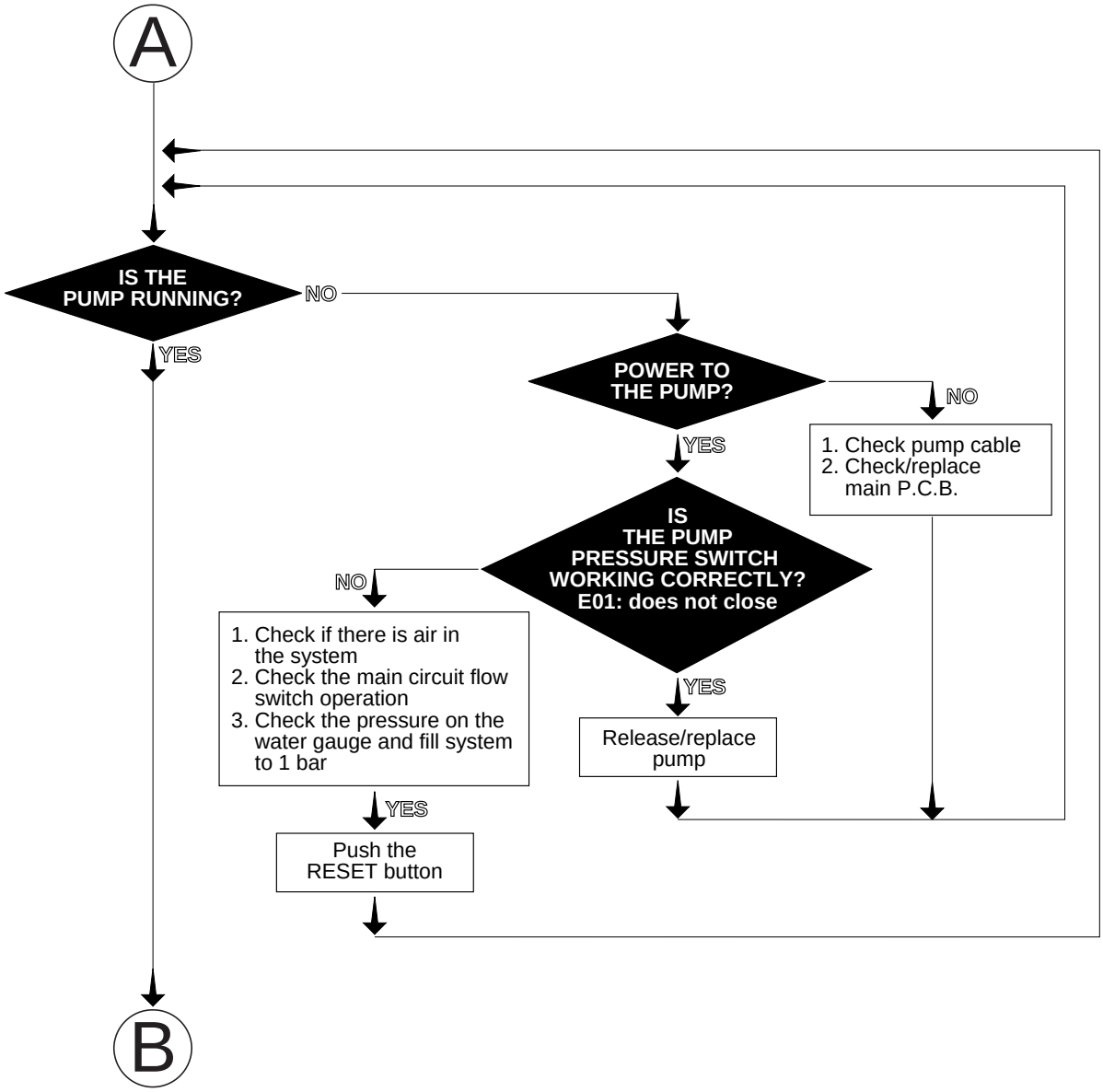
Model 27 MFFI



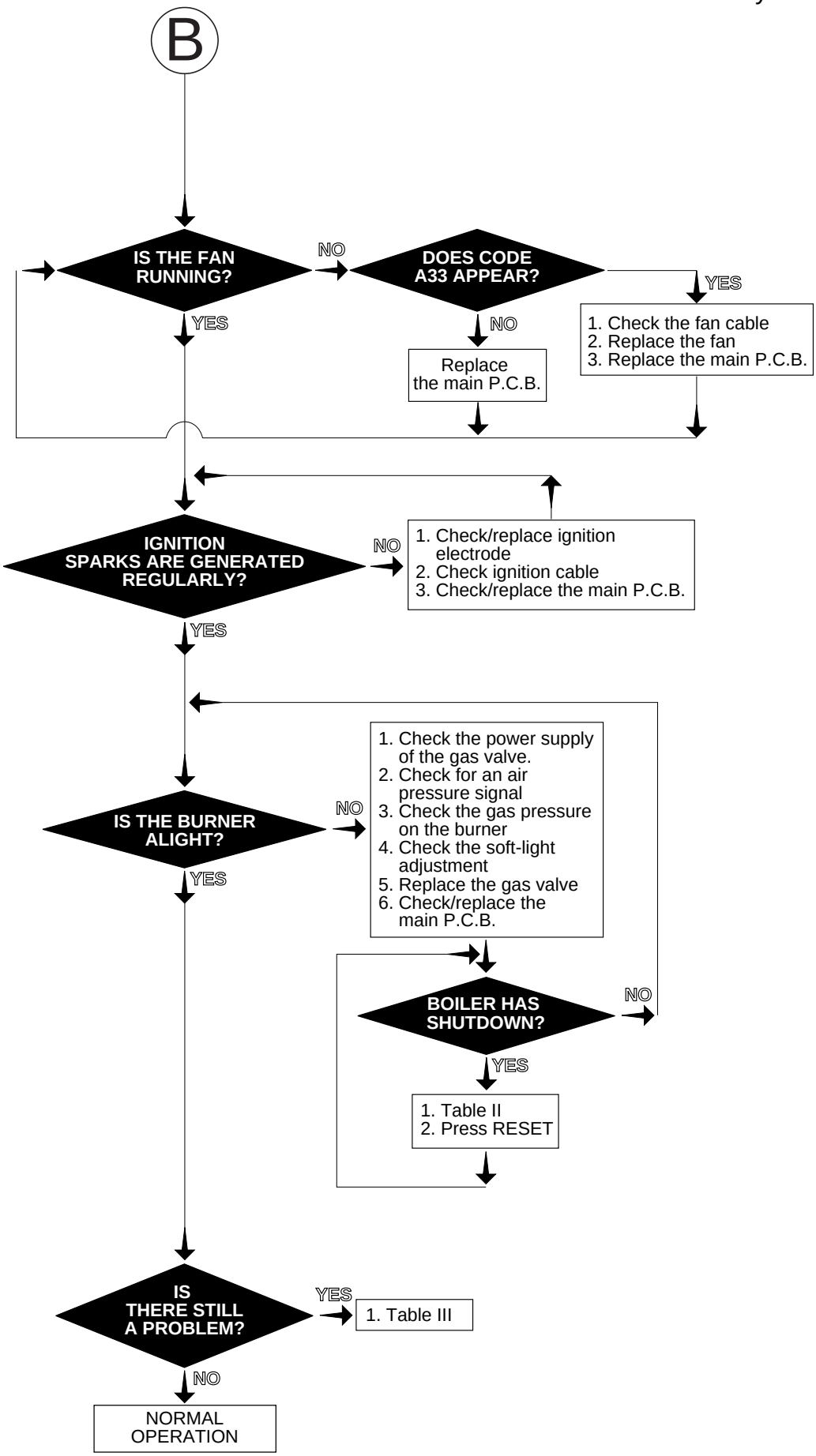
Model 27 RFFI System

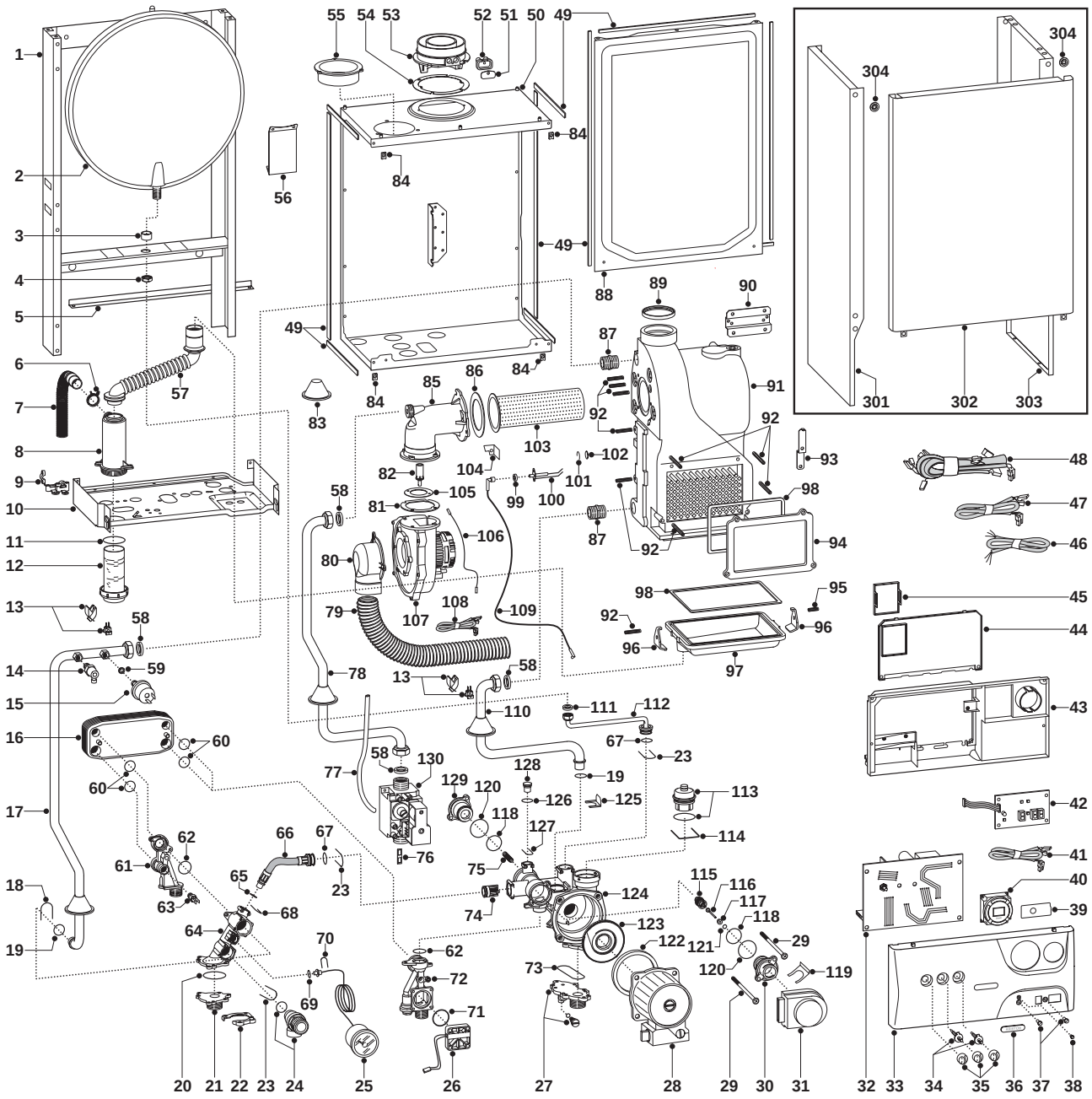


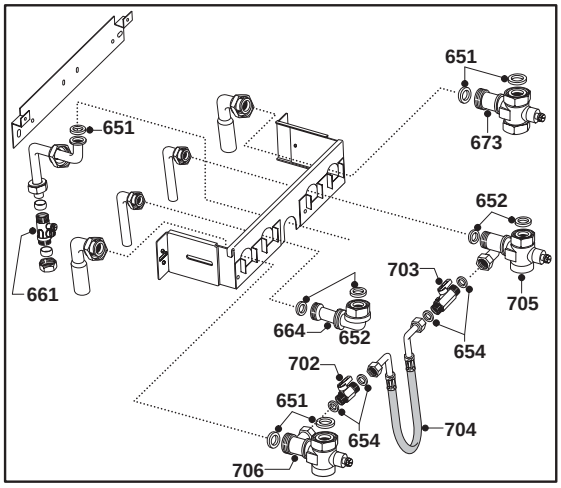
Model 27 MFFI/27RFFI System



Model 27 MFFI/27RFFI System





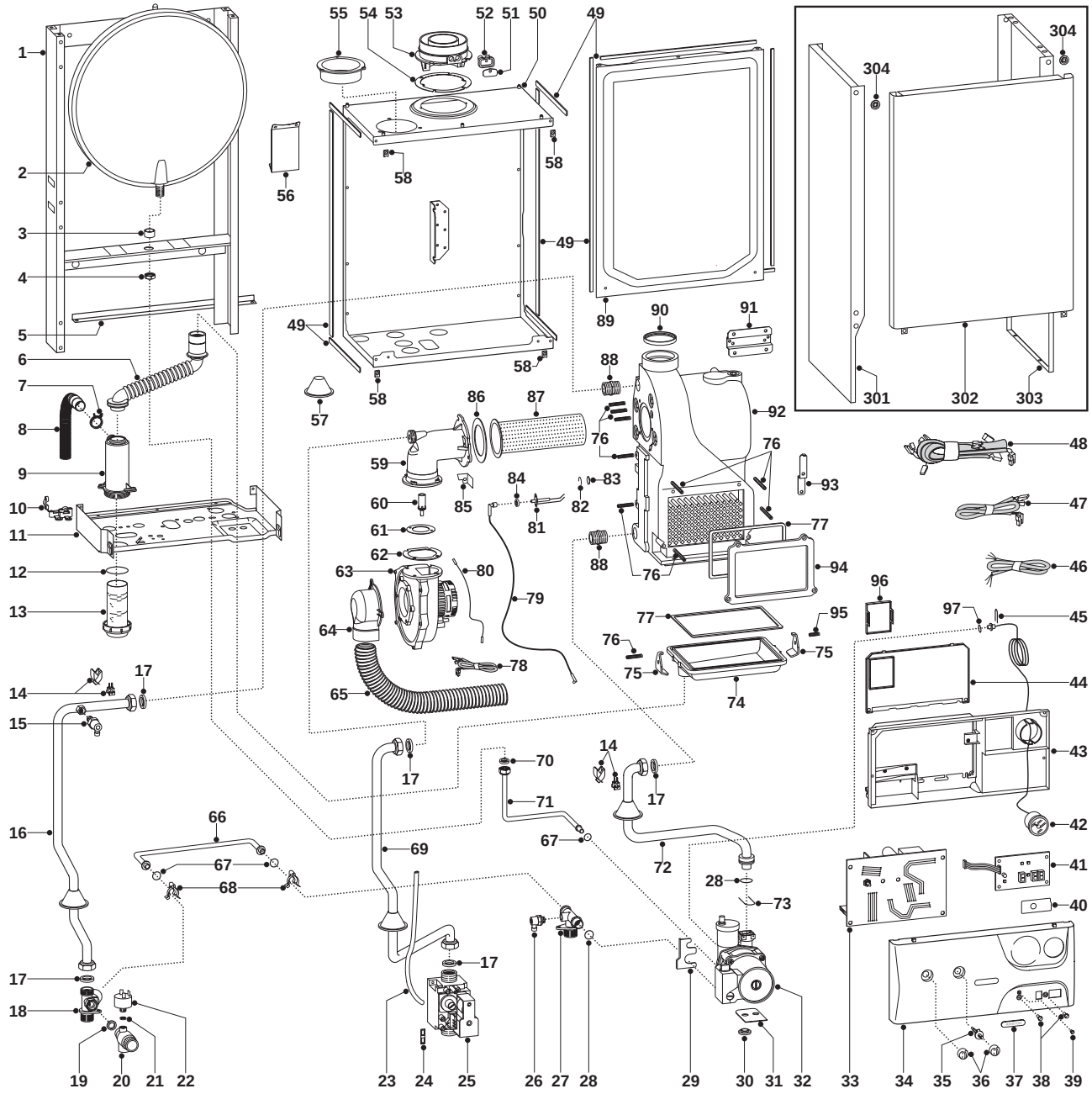


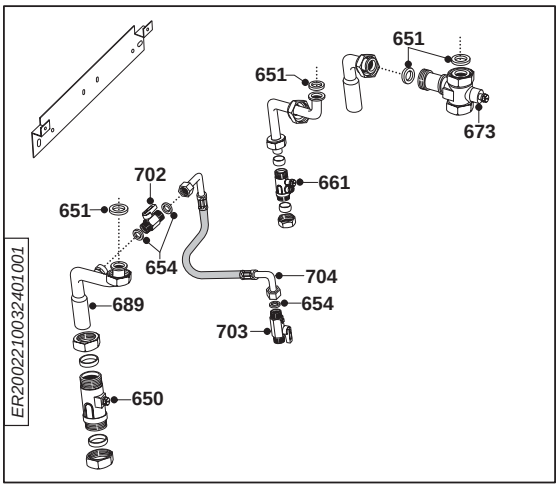
MODEL	CHARACTERISTICS	SERIAL NO. VALIDITY	REF.
ECOCOMBI 27 MFFI	METHANE	2320224700001	A
ECOCOMBI 27 MFFI	LPG	2320224700001	B

ecoCOMBI 27 MFFI

Key no.	G.C. part no.	Description		ARISTON Part No.
2		Expansion vessel		990683
8		Condensate trap (upper)		990658
11		'O' Ring (condensate trap)		990695
12		Condensate trap (lower)		990659
13		Temperature probe (C.H. - T335D) + clips (18)		990686
14		Drain valve		573727
15		Low water pressure switch		995903
16		Secondary exchanger		990685
18		U clips		997153
19		'O' Ring (C.H. flow pipe - lower)		997181
20		'O' Ring (C.H. flow manifold)		990383
24		Safety valve (3 bar)		997088
25		Pressure gauge		999245
26		Flow switch (D.H.W.)		995948
28		Pump motor		995896
31		Motor (3-way valve)		997147
32		Printed circuit board (main)		990692
40		Time clock		999600
42		Printed circuit board (display)		990693
49		Seal (combustion chamber - 10x6 - 5 pieces)		998516
57		Flexible pipe (condensate tray - condensate trap)		990664
58		Gasket 3/4"		573520
59	164 225	Gasket 1/4"		569390
60	164 261	'O' Ring (secondary exchanger)		573825
61		Manifold (D.H.W.)		995934
62		'O' Ring (3081)		990387
63		Temperature probe (D.H.W.)		998458
64		Manifold (C.H. flow)		990384
65		'O' Ring (C.H. flow manifold - by-pass pipe)		998077
67		'O' Ring (by-pass pipe - return housing)		995976
68		Clip (C.H. flow manifold - by-pass)		990386
69		Gasket (pressure gauge - C.H. flow manifold)		998517
71		'O' Ring (D.H.W. flow switch)		990392
72		Manifold (cold water inlet)		990745
73		'O'Ring (C.H. return flange - return manifold)		990393
74		By-pass (FUGAS)		999473
75		Spring (diverter valve)		990391
81		Gasket (fan)		990694
82		Injector (L.P.G.)		990656
82		Injector (N.G.)		990657
86		Gasket (burner)		998680
97		Condensate tray		990677
98		Seal (condensate tray)		999497
99		Gasket (insulation - ignition/detection electrode)		998769
100		Electrode (ignition/detection)		995964
103		Burner		998668
107		Fan		998888
108		Cable (fan)		990689
109		Cable (ignition/detection electrode)		995983
111	164 282	Gasket 3/8"		573521
113		Auto air vent		995865
115		Actuator (diverter valve)		995930
116		Spindle (diverter valve)		995910
117		Spindle guide (diverter valve)		990366
118		'O' Ring (3100 - diverter valve)		990489
120		'O' Ring (3118 - diverter valve)		990488
121		'O' Ring (R1XP70 - diverter valve)		990487
122		Gasket (pump)		996123
124		Return manifold		990395
126		'O' Ring (3030)		990378
130		Gas valve (Sigma 848)		990682

ecoSYSTEM 27 RFFI





MODEL	CHARACTERISTICS	SERIAL NO. VALIDITY	REF.
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ECOSYSTEM 27 RFFI	LPG	2320224700001	B

ecoSYSTEM 27 RFFI

Key no.	G.C. part no.	Description		ARISTON Part No.
2		Expansion vessel		990683
6		Condensate pipe		990664
9		Condensate trap (upper)		990658
12		'O' Ring (condensate trap)		990695
13		Condensate trap (lower)		990659
14		Temperature probe (C.H.) + clips		990686
15	378 814	Drain valve		573727
17	164 225	Gasket 3/4"		573520
20		Safety valve (1/4" 3 bar)		998447
21	164 261	Gasket 1/4"		569390
22		Low water pressure switch		995903
25		Gas valve (Sigma 848)		990682
26		Auto air vent		998809
27		Return manifold		990708
28		'O' Ring (Pump - return manifold)		998424
30		Lock washer		999100
32		Pump		999091
33		Printed circuit board (main)		990692
41		Printed circuit board (display)		990693
42		Pressure gauge		999245
60		Injector (L.P.G.)		990656
60		Injector (N.G.)		990657
62		Gasket (fan)		990694
63		Fan		998888
67		'O' Ring (by-pass pipe)		998077
68		Clip (by-pass pipe)		998064
70	164 282	Gasket 3/8"		573521
73		'U' clip		997153
74		Condensate tray		990677
77		Seal (condensate tray)		999497
79		Cable (ignition/detection electrode)		995983
81		Electrode (ignition/detection)		995964
86		Gasket (burner)		998680
87		Burner		998668
97		Gasket (pressure gauge - pump)		998517

9. TECHNICAL INFORMATION

		27 MFFI	27 RFFI
Certification		0694BM3593	0694BM3593
Category		II2H3B/P	II2H3B/P
Thermal Capacity C.H.W. min/max	kW	8.9/26.7	8.9/26.7
Thermal Capacity D.H.W. min/max	kW	8.9/30	----
Power for Hot Water Production min/max	kW	7.8/23.6	----
Efficiency at Nominal Thermal Capacity (30/50°C)	%	94.0	94.0
Efficiency at 30% of Nominal Thermal Capacity (47°C of return)	%	91.0	91.0
Efficiency at 30% of Nominal Thermal Capacity (30°C of return)	%	96.7	96.7
Gas Consumption after 10 Minutes* (C.H.W.)	m^3	0.30	0.30
Maximum Heat Loss to the Casing (ΔT=50°C)	%	0.1	0.1
Flue Heat Loss with Burner Operating	%	1.5	1.5
Flue Heat Loss with Burner Off	%	0.4	0.4
Maximum Discharge of Fumes (D.H.W.)	Kg/h	38.54	38.54
Maximum Temperature of Discharge Fumes (D.H.W.)	°C	72.6	72.6
Minimum Room Temperature	°C	5	5
Heating Temperature min/max (High Temperature range)	°C	42/82	42/82
Heating Temperature min/max (Low Temperature range)	°C	30/75	30/75
Temperature of Water for Domestic Use min/max	°C	36/56	----
Class NOX		5	5
CO_2 Content (C.H.W.)	%	10.5	10.5
O_2 Content (C.H.W.)	%	2	2
CO Content (C.H.W.)	%	108.7	108.7
Inlet Pressure/Methane Gas G20 (boiler at maximum)	mbar	20	20
Inlet Pressure/Liquid Gas G30 - G31 (boiler at maximum)	mbar	30	30
Residual Discharge Head	mbar(Pa)	0.95(94)	0.95(94)
Maximum Head Loss on Water Side (ΔT=20°C)	mbar	200	200
Residual Head of System (60/80°C)	bar	0.2	0.2
Maximum Heating Pressure	bar	3	3
Maximum Water Content in System	l	130	130
Expansion Vessel Capacity	l	6	6
Expansion Vessel Pre-load Pressure	bar	1	1
Pressure of Water for Domestic Use min/max	bar	0.2/6	-----
Nominal Capacity of Hot Water for Heating (residual head 0.25 bar)	l/h	820	820
D.H.W. Flow Rate: ΔT=25°C	l/min	15,0	-----
ΔT=30°C	l/min	12.5	-----
ΔT=35°C	l/min	10.7	-----
D.H.W. Flow Minimum Rate	l/min	2.5	-----
Quantity of Condensed Water with a (30/40°C)	l/h	1.8	1.8
pH Condensation Value		3.5÷4	3.5÷4
Electrical Supply	V/Hz	230/50	230/50
Power Consumption	W	135	135
Protection Grade of Electrical System	IP	24D	24D
Internal Fuse Rating	A	3.15 SLOW	3.15 SLOW
Width mm		400	400
Height mm		700	700
Depth mm		305	305
Central Heating Connections	BSP	3/4	3/4
Domestic Hot Water Connections	BSP	1/2	-----
Gas Connection	BSP	3/4	3/4
Net Weight	Kg	44	41
G.C. Number		**47-116-23**	**41-116-08**

*Calculated at 70% maximum output

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