

INSTRUCTIONS FOR INSTALLATION AND SERVICING

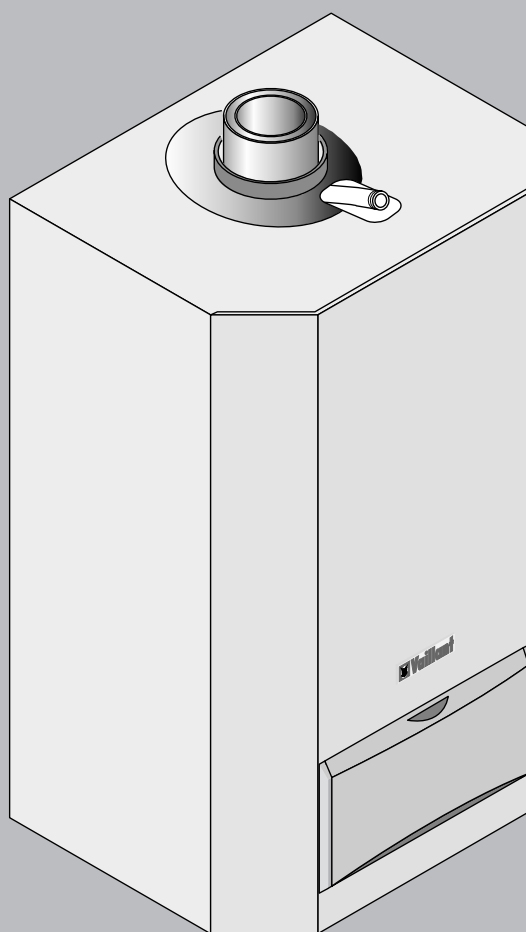
Vaillant ECOmax 824 E

G.C. No. 47 044 07

Vaillant ECOmax 828 E

G.C. No. 47 044 08

Wall hung room sealed fan assisted condensing combination boilers



CONTENTS

	page
1 INTRODUCTION	4
2 BOILER SPECIFICATION	2.1 Technical data .5 2.2 Dimensions .6 2.3 Boiler connections .6 2.4 Functional diagram .7
3 GENERAL REQUIREMENTS	3.1 Related documents .8 3.2 Boiler location .8 3.3 Gas supply .8 3.4 Flue system .9 3.5 Air supply .11 3.6 Electrical supply .11 3.7 Guide to system requirements .11
4 BOILER INSTALLATION SEQUENCE	4.1 General .14 4.2 Boiler delivery .14 4.3 Preparation of boiler location .16 4.4 Installing the flue system .17 4.5 Mounting the boiler .18 4.6 Connecting flue assembly to boiler .23 4.7 Electrical connections .25 4.8 Controls .26
5 COMMISSIONING	5.1 Preliminary electrical checks .28 5.2 Gas supply .28 5.3 Water supply .28 5.4 Filling the heating system .28 5.5 Initial system flush (`cold`) .29 5.6 Filling condensate trap .29 5.7 Initial lighting .30 5.8 Gas inlet working pressure .31 5.9 Check gas rate .31 5.10 Fitting the front casing .32 5.11 Adjusting the central heating output .32 5.12 Functional checks .33 5.13 Checking flame supervision device .36 5.14 Final system flush `hot` .36 5.15 Fitting the bottom cover .37 5.16 Hand over to user .38
6 SERVICING	6.1 Initial inspection .42 6.2 Routine maintenance .42

7 PARTS REPLACEMENT

	page
7.1 Initial preparation	46
7.2 Removal of burner, gas valve and fan assembly .48	
7.3 Replacement of fan	49
7.4 Replacement of gas valve	49
7.5 Replacement of burner	50
7.6 Replacement of electrode	50
7.7 Replacement of temperature sensors	50
7.8 Replacement of main heat exchanger	51
7.9 Replacement of central heating expansion vessel .52	
7.10 Replacement of the electronic control board52	
7.11 Replacement of main transformer	53
7.12 Replacement of pump	53
7.13 Replacement of automatic air release	54
7.14 Replacement of automatic by-pass	54
7.15 Replacement of diverter valve actuator	55
7.16 Replacement of pressure gauge	55
7.17 Replacement of water flow switch	55
7.18 Replacement of DHW heat exchanger	56
7.19 Replacement of DHW NTC sensor	56
7.20 Replacement of condensate trap	57
7.21 Replacement of pressure relief valve	57

8 FAULT FINDING

8.1 Introduction	58
8.1.1 Normal Mode	58
8.1.2 Fault Mode	58
8.1.3 Diagnostic Mode	58
8.2 Logical fault finding procedure	59
8.3 Fault diagnosis using the boiler fault mode60	
8.4 Fault diagnosis using boiler status codes62	
8.4.1 Introduction	62
8.4.2 Status codes	62
8.4.3 Fault diagnosis using boiler status codes: Central Heating Mode	63
8.4.4 Fault diagnosis using the boiler staunts codes: Domestic Hot Water Operation	64

9 ELECTRICAL DIAGRAMS

9.1 Functional flow diagram	65
9.2 Wiring diagram	65
9.3 Schematic appliance circuit diagram	67

10 SHORT PARTS LIST

.	68
-----------	----

1 INTRODUCTION

Note: This boiler must be installed and serviced by a competent person in accordance with the Gas Safety (Installation and Use) Regulations 1998. In the UK 'CORGI' registered installers undertake the work to a safe and satisfactory standard.



ECOmax 800 boilers carry the 'CE' Mark. This demonstrates that the boilers fulfil the essential requirements of the Gas Appliance Directive (90/396/EEC) and the Gas Appliance (Safety) Regulations 1992.

The 'CE' Mark also demonstrates that the boilers comply with the requirements of the Electromagnetic Compatibility Directive (89/336/EEC), the Low Voltage Directive (72/23/EEC), the Boiler Efficiency Directive (92/42/EEC) and the Boiler (Efficiency) Regulations 1993.

The ECOmax 800 range are fully automatic, wall mounted, room sealed condensing (high efficiency) combination boilers for central heating and domestic hot water. Domestic hot water is supplied directly from the boiler, without requiring a copper cylinder, cold water tank, feed and expansion tank and associated pipework. Domestic hot water has priority over central heating.

The boiler has been designed for use with a sealed central heating system, and comes fully tested and assembled with a built in circulating pump, bypass, expansion vessel and diverter valve.

The boiler, because it has a larger heat exchanger, extracts more heat from the flue gases. The conversion of this otherwise wasted heat into useable warmth means the boiler has a higher efficiency. Because the flue gases are reduced to such a low temperature, the water vapour contained within them can condense. To discharge this condensate a drain is provided on the boiler, and must be connected to a drainage point on site.

The ECOmax 800 range consists of two models of combination boiler with outputs to domestic hot water of 23 and 28 kW. The boiler is easily sited on any internal wall and can be installed with either a horizontal or vertical RSF (room sealed fan assisted) flue. Two types of flue system are available, the standard concentric flue system (95 mm outside diameter) which allows flue lengths up to 3 m and a larger diameter concentric flue system (125 mm outside diameter) which allows flue lengths up to 10 m. Flue extensions and additional bends and elbows are available for both flue systems to increase the siting flexibility.

The boiler is not suitable for external installation.

If desired, an inhibitor may be used in the system. Guidance on the use of inhibitors is contained in these instructions. The boiler does not utilise aluminium in the water system and does not require a special inhibitor.

The appliance is only suitable for use with natural gas.

ECOmax 800 combination boilers incorporate a warmstart facility that keeps the domestic hot water heat exchanger hot, providing an instantaneous delivery of domestic hot water. The temperature in the heat exchanger is limited by the boiler control system and it is not necessary to install a scale reducer on the cold mains inlet to the boiler. However, in exceptionally hard water areas to prevent scale formation in the property hot water system pipework, a scale reducer may be fitted.

ECOmax 800 combination boilers have a built in diagnostic system that indicates the operational status of the boiler. This feature provides key information to aid commissioning and fault finding.

The data badge is fitted to underside of the combustion chamber.

See text of General Requirements for installation requirements or notes.

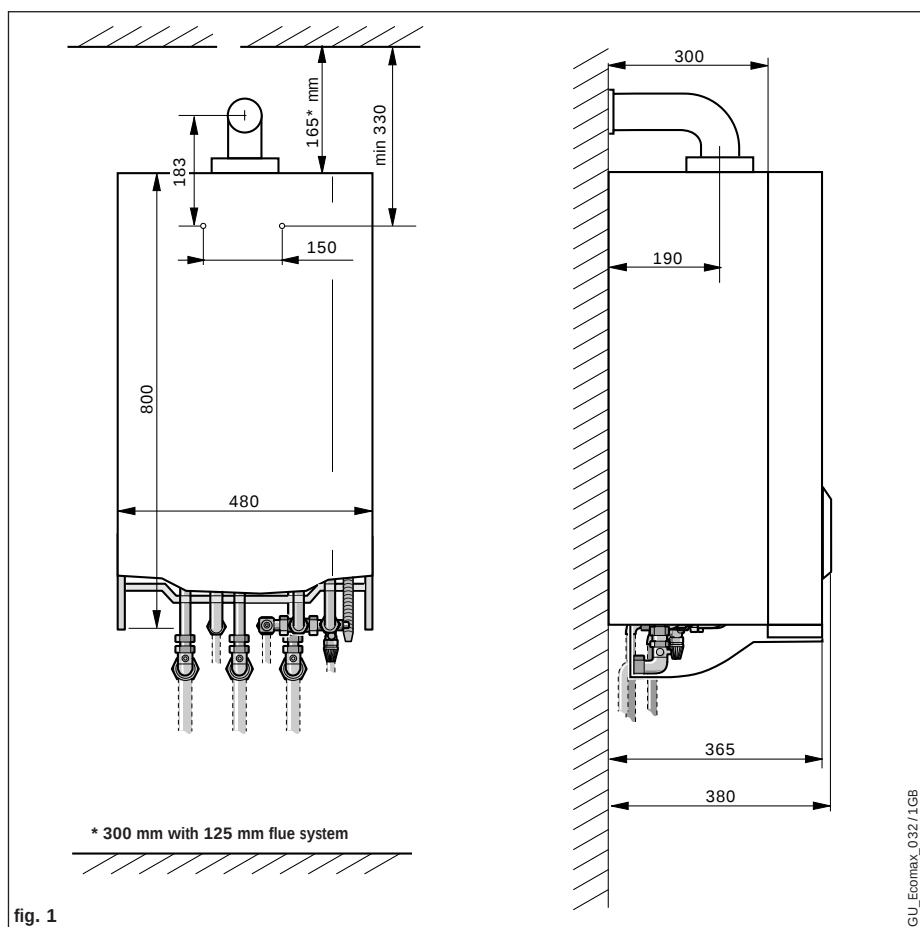
2 BOILER SPECIFICATION

2.1 TECHNICAL DATA

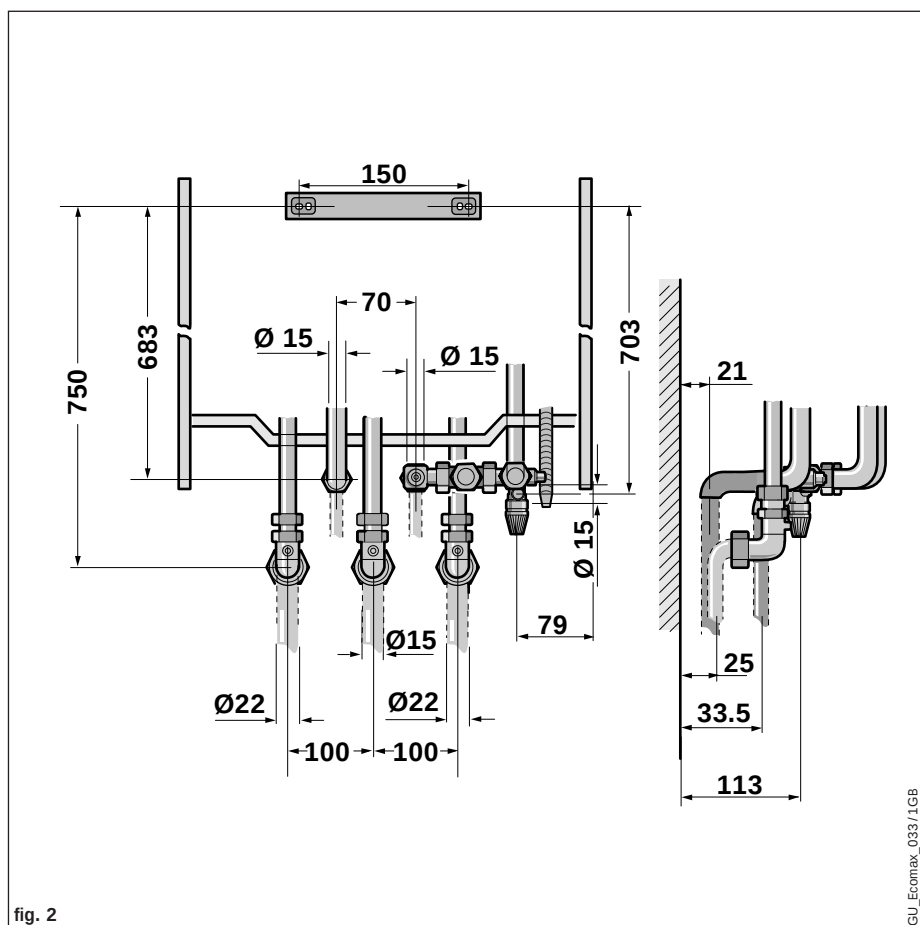
	ECOmax 824	ECOmax 828	Units
Maximum CH heat input	20.9	25.4	kW
CH heat output range			
80 °C flow / 60 °C return	11.0 - 17.7	13.4 - 21.5	kW
50 °C flow / 30 °C return	12.2 - 19.6	14.9 - 23.8	kW
Maximum DHW heat input	26.1	31.8	kW
DHW output range	23	28	kW
DHW flow rate 35 °C rise	9.4	11.5	l/min
DHW flow rate at factory set temperature (42 °C rise)	8.0	9.6	l/min
Mains water pressure required for max. flow rate	1	1	bar
Minimum water flow rate	2.8	2.8	l/min
Mains water pressure required for min. flow rate	0.2	0.2	bar
Maximum inlet water pressure	10	10	bar
Inlet gas working pressure required (natural gas)	20	20	mbar
Gas supply (G20) Gross CV (s.t.)	37.8	37.8	MJ/m ³
Gas rate max. (DHW)	2.49	3.03	m ³ /h
CH temperature flow range	30 - 90	30 - 90	°C
Minimum CH water flow (for 20 °C rise)	760	925	l/h
Pump pressure available	0.25	0.25	bar
10l expansion vessel pre-charge pressure	0.75	0.75	bar
Maximum CH system pressure	3	3	bar
Connections			
Heating flow / return	22	22	mm
Cold water inlet	15	15	mm
DHW outlet	15	15	mm
Gas inlet	15	15	mm
Pressure relief discharge pipework (min.)	15	15	mm
Condensate drain (min. internal drain)	19	19	mm
Weight	47	49	kg
Primary water content	1.8	2.0	l
Volume of condensate (max.)	2.1	2.5	l/h
Maximum flue gas temperature	70	70	°C
Electrical supply voltage	230/50	230/50	V ~ / Hz
Internal fuse (fast)	2	2	A
Internal fuse (slow)	4	4	A
Power input	115	115	W

2 BOILER SPECIFICATION

2.2 DIMENSIONS



2.3 BOILER CONNECTIONS



2.4 FUNCTIONAL DIAGRAM

- 1 Air duct
- 2 Main heat exchanger
- 3 Temperature sensor (NTC 1)
- 4 Temperature sensor (NTC 2)
- 5 Condensate trap
- 6 Automatic air vent
- 7 Circulating pump
- 8 Boiler display
- 9 Main on/off control
- 10 Pressure gauge
- 11 DHW heat exchanger
- 12 CH flow service valve
- 13 DHW outlet
- 14 Gas service valve
- 15 Cold water inlet service valve
- 16 Water switch (DHW)
- 17 CH return service valve
- 18 Pressure relief valve
- 19 Temperature sensor (NTC 3)
- 20 Automatic bypass valve
- 21 Diverter valve
- 22 Gas valve
- 23 Fan
- 24 Expansion vessel
- 25 Expansion vessel charging valve
- 26 Flue gas duct

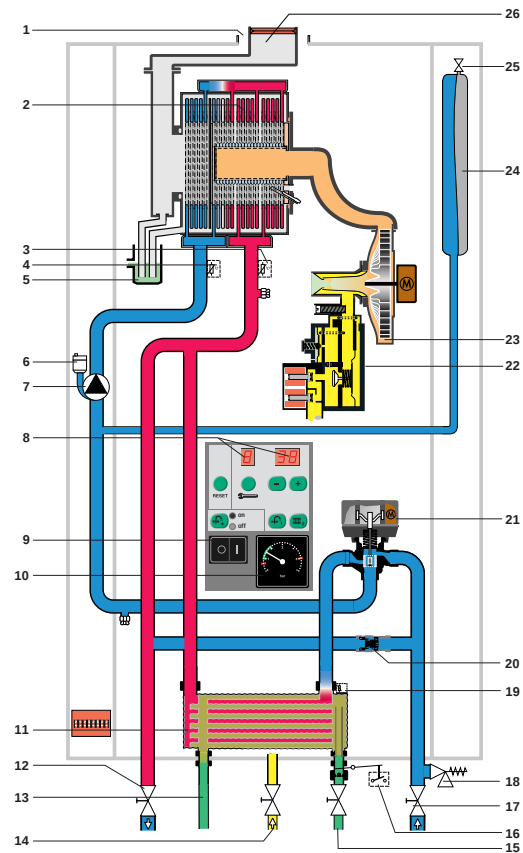


fig. 3a: Functional diagram heating

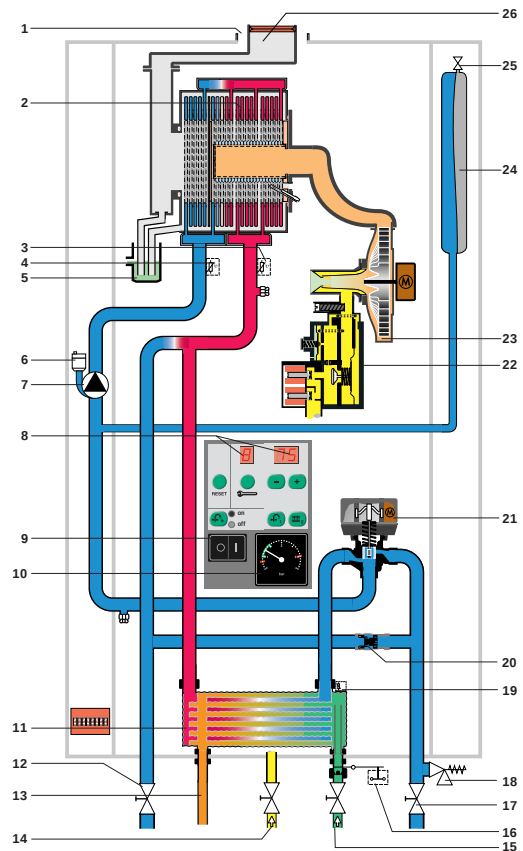


fig. 3b: Functional diagram DHW

GU_Ecomax_018/0GB

GU_Ecomax_019/1GB

3 GENERAL REQUIREMENTS

3.1 RELATED DOCUMENTS

The installation of the boiler must be in accordance with the relevant requirements of Gas Safety (Installation and Use) Regulations 1998, Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS7671 (IEE Wiring Regulations) and the bylaws of the local Water Undertaking. It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, Building Standards (Scotland) Regulations and the relevant recommendations of the following British Standards :

BS 5440: Flues and ventilation of gas fired boilers not exceeding 60 kW:

- Part 1: Flues
- Part 2: Ventilation

BS 5449: Specification for forced circulation hot water for domestic premises.

BS 5546: Specification for gas hot water supplies for domestic premises.

BS 6700: Services supplying water for domestic use within buildings and their curtilages.

BS 6798: Specification for installation of gas fired boilers not exceeding 60 kW input.

BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1) in domestic premises (2nd family gas).

BS 7593: Treatment of water in domestic hot water central heating systems.

Institute of Gas Engineers Publication I GE/UP/7/1998:

'Guide for gas installations in timber framed housing'

Important: The appliance must be installed and serviced by a competent person as stated in the Gas Safety (Installation and Use) Regulations 1998.

3.2 BOILER LOCATION

The location chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, although particular attention is drawn to the requirements of BS7671 (IEE Regulations) and, in Scotland, the electrical provisions of the Building Standards (Scotland) Regulations, in respect of the installation of a boiler in a room containing a bath or shower.

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

Where the installation of the boiler will be in an unusual location, special procedures may be necessary and BS 5546 and BS 6798 give detailed guidance on this aspect. The boiler must be mounted on a flat, vertical wall, which must be sufficiently robust to take the weight of the boiler. The boiler may be installed on a combustible wall, subject to the requirements of the Local Authority and Building Regulations.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. (An existing cupboard or compartment may be used provided that it is modified for the purpose). Details of essential features of cupboard/compartment design including airing cupboard installations are given in BS 6798. If the boiler is to be fitted in a timber framed building, it should be fitted in accordance with Institute of Gas Engineers Publication I GE/UP/7/1998 'Guide for gas installations in timber framed housing'.

3.3 GAS SUPPLY

The gas supplier should ensure the availability of an adequate supply of gas.

A gas meter may only be connected to the service pipe by the supplier of gas or their contractor.

An existing meter should be checked to ensure that it is capable of passing the rate of gas supply required.

Installation pipes should be fitted in accordance with BS 6891.

Pipework from the meter to the boiler must be of an adequate size. Do not use pipes of a smaller size than the boiler gas connection (15 mm).

The complete installation must be tested for soundness and purged as described in BS 6891.

3.4 FLUE SYSTEM

3.4.1 Standard concentric flue system (95 mm outside diameter)

The standard horizontal concentric flue terminal (Art. No. 300 931) is suitable for installations up to 1m measured from the centre of the boiler flue outlet to the outside face of the wall (A, fig. 4). Flue extensions are available to extend this length up to 2960 mm. Both 90° bends and 45° elbows are also available to increase siting flexibility.

A vertical flue system is also available (Art. No. 300 945).

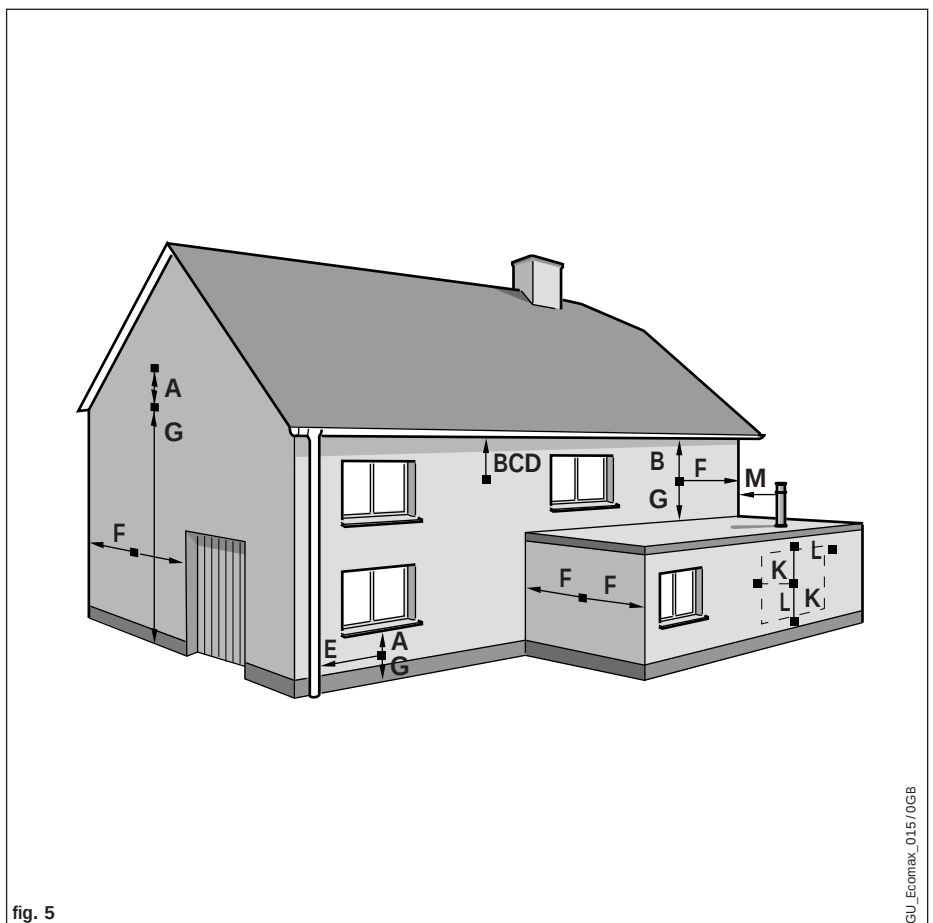
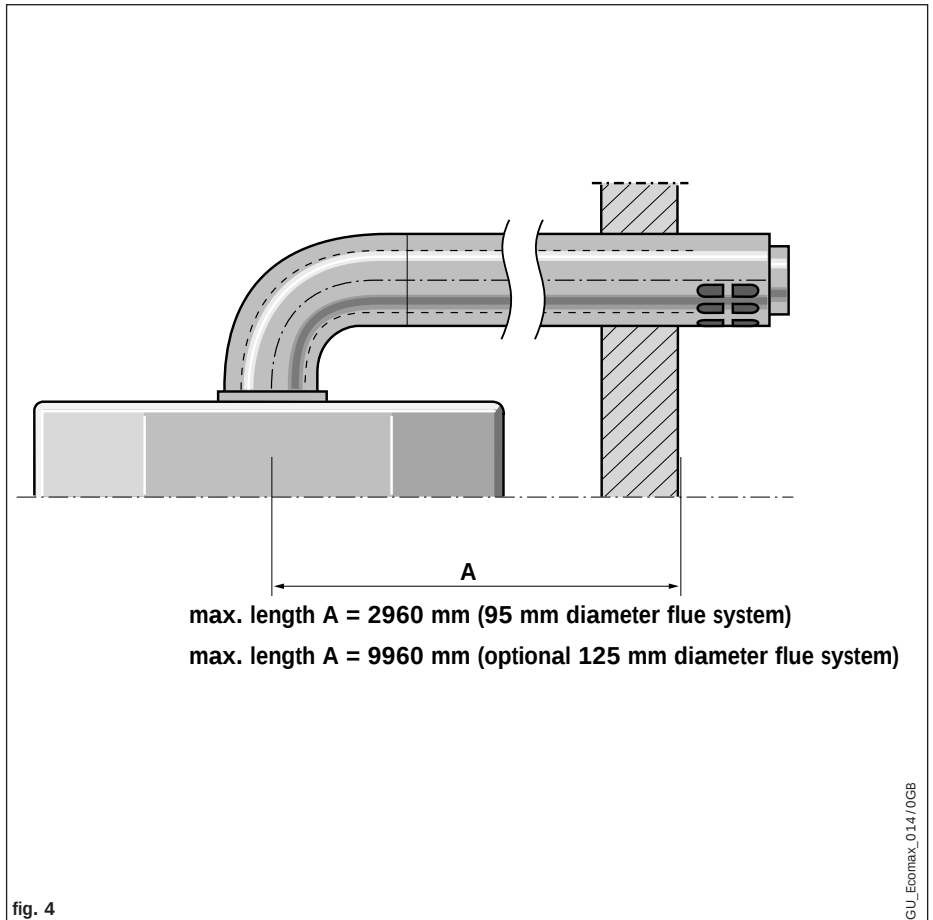
Refer to flue system installation instructions for full details.

3.4.2 Extended concentric flue system (125 mm outside diameter)

A concentric flue system of 125 mm outside diameter is also available and can be used to achieve flue lengths of up to 9960 mm. Both 45° and 90° bends and elbows are also available to increase siting flexibility.

A vertical extended concentric flue system is also available.

Refer to flue system installation instructions for full details.



3 GENERAL REQUIREMENTS

3.4.3 Flue termination (fig. 5)

The following details refer to both flue systems.

1. The terminal must be positioned such that the products of combustion can disperse freely at all times.
2. Flue gases from high efficiency condensing boilers are emitted at relatively low temperatures, leading to a tendency for a plume of water vapour to be visible at or near the terminal. More care should therefore be taken when choosing the site for a terminal of a condensing boiler. If possible avoid placing the terminal below a window, next to a door or close to opposing walls. It is also recommended that the flue is not terminated beneath a car port roof.
3. If the terminal is fitted less than 2 m above a balcony, above ground or above a flat roof to which people have access then a suitable terminal guard must be provided and fitted (available from Tower Flue Components, Tonbridge, TN9 1TB: reference CGDK3BL).

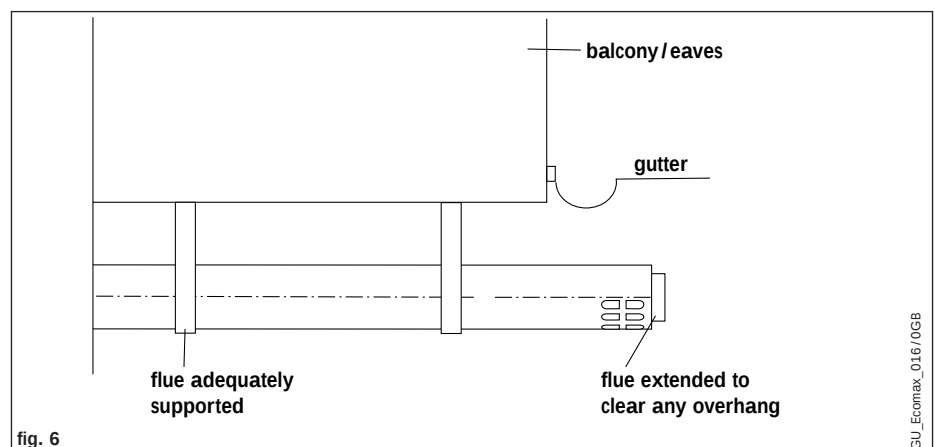
		mm
A	Directly below an openable window or other opening (e. g. air brick)	300
B	Below gutters, soil pipes or drain pipes	75 ¹⁾
C	Below eaves	200 ¹⁾
D	Below balconies	200 ¹⁾
E	From vertical drain pipes and soil pipes	25
F	From internal or external corners	300 ²⁾
G	Above ground or balcony level	300
H	From a surface facing a terminal	600
I	From a terminal facing a terminal	1200
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	300
M	Distance from adjacent wall for vertical flue	500

Table 1: Terminal position for a fan assisted concentric flue (see fig. 5)

¹⁾ Dimensions B, C and D: These clearances may be reduced to 25 mm without affecting the performance of the boiler. In order to ensure that the condensate plume does not affect adjacent surfaces the terminal should be extended as shown in fig. 6.

²⁾ Dimension F: This clearance may be reduced to 25 mm without affecting the performance of the boiler. However, in order to ensure that the condensate plume does not affect adjacent surfaces a clearance of 300 mm is preferred.

Note: Vertical flues must not terminate within 600 mm of an openable window, air vent or any other ventilation opening.



3.5 AIR SUPPLY

Detailed recommendations for air supply are given in BS 5440: Part 2.

It is not necessary to have an air vent in the room or internal space in which the boiler is installed.

3.5.1 Cupboard or compartment air supply

ECOMax 800 condensing combination boilers are very high efficiency appliances. As a consequence the heat loss from the appliance casing during operation is very low. For cupboard or compartment installations it is therefore not necessary to provide any high or low level permanent air vents for cooling purposes.

3.6 ELECTRICITY SUPPLY

A 230 V~ +10 %/-15%, 50 Hz single phase electricity supply fused to 3 Amp must be provided in accordance with the latest edition of BS7671 (IEE Wiring Regulations) and any other local regulations that may apply.

THIS APPLIANCE MUST BE EARTHED.

The method of connection to the mains electricity supply must provide a means of completely isolating the boiler and its ancillary controls. Isolation is preferably by the use of a fused three pin plug and unswitched shuttered socket outlet, both complying with the requirements of BS 1363. Alternatively, a 3 Amp fused double-pole switch with a 3 mm contact separation on both poles may be used.

3.7 GUIDE TO SYSTEM REQUIREMENTS

3.7.1 Water circulation system

Detailed recommendations for the water circulation system are given in BS 6798 and BS 5449: Part 1 (for small bore and micro bore central heating systems).

Pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated underfloor spaces.

Draining taps must be located in accessible positions that permit the draining of the whole system including the boiler and the hot water system. Draining taps should be at least 1/2 in. BSP nominal size and be in accordance with BS 2879. The boiler is suitable for use with minibore or microbore systems. Copper tubing to BS 2871: Part 1 should be used for water carrying pipework. All capillary joints in the DHW pipework must be made with lead free solder.

Particularly where a new boiler is to be fitted to an existing system, it is good practice that the system is thoroughly cleansed. This cleansing should take place prior to the fitting of the new boiler and be in accordance with BS 7593. For advice on the application of system cleansers contact Sentinel, Betz Dearborn Ltd. Widnes, Cheshire, WA8 8UD. Tel : 0151 495 1861.

3.7.2 Filling and make up

The system should be filled with water via a separate filling point fitted at a convenient position on the heating circuit. Where local Water Authority regulation allows, a temporary connection to the mains may be used (fig. 7). The connection must be removed when filling is completed. Where local Water Authority regulation does not allow temporary connection, a sealed system filler pump with break tank must be used. The heating system will not be filled automatically from the domestic hot water side.

(Alternative methods of filling sealed systems are given in BS 5449).

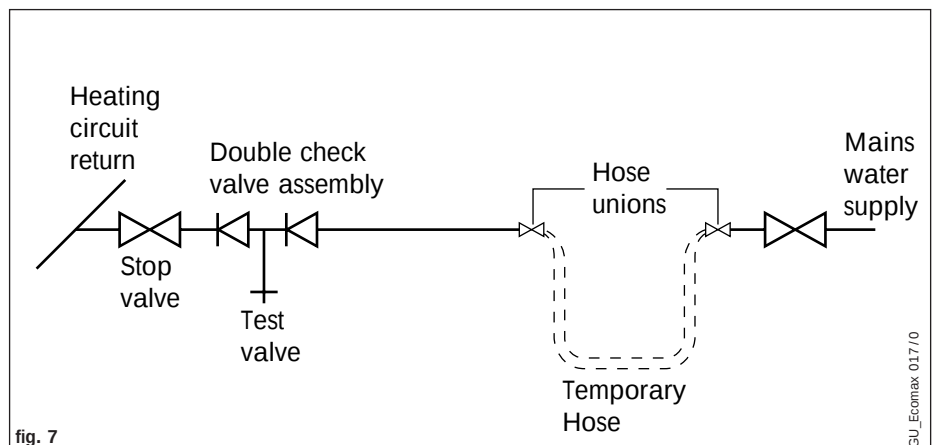


fig. 7

GU_Ecomax 017/0

3 GENERAL REQUIREMENTS

3.7.3 Pressure relief valve

A pressure relief valve is provided within the boiler cardbox and should be assembled as shown in 6, fig. 8. This safety device is required on all sealed C.H. systems and is pre-set at 3 bar and provided with a 15 mm compression connection for a discharge pipe, which must be of no less than 15 mm in diameter.

3.7.4 Pressure gauge

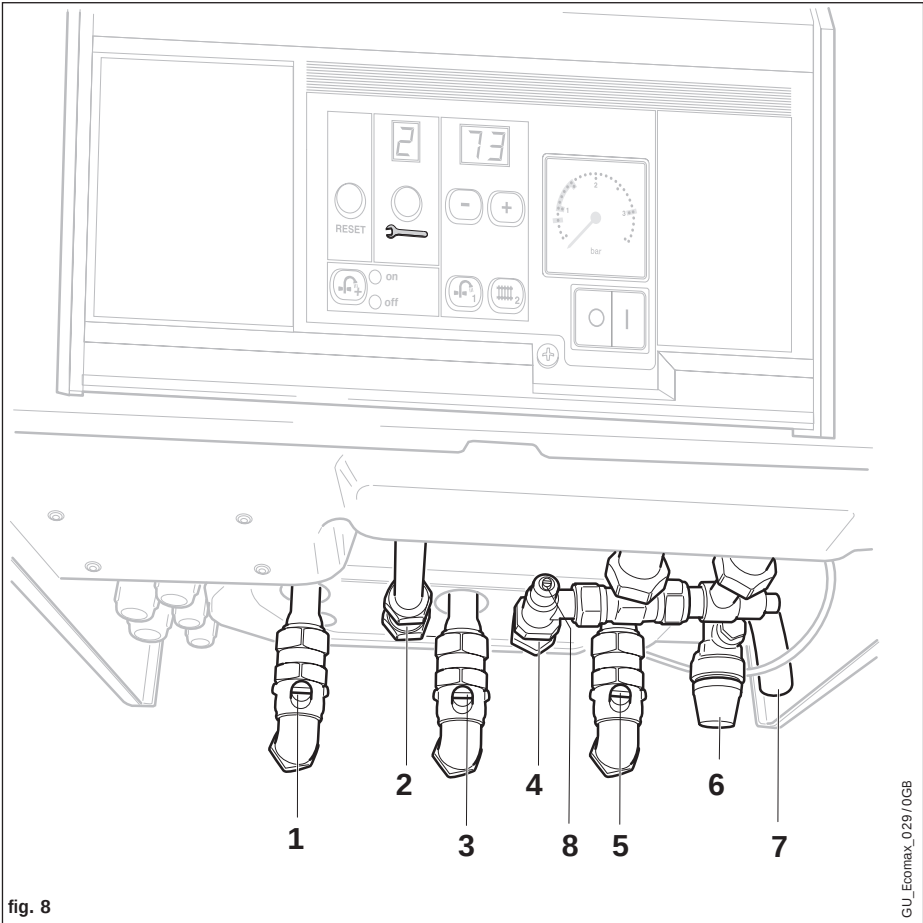
This is factory fitted to the boiler and indicates the primary circuit pressure to facilitate filling and testing.

3.7.5 Expansion vessel

An expansion vessel is incorporated into the boiler suitable for a sealed heating system with a maximum water content of 120 litres.

If the nominal capacity of the built in expansion vessel is not sufficient for the heating system (for instance in case of modernisation of old open systems) an additional expansion vessel can be installed external to the boiler. It should be fitted in the return pipe as close as possible to the boiler in accordance with BS 5449: Part 1.

Guidance on the sizing of an additional expansion vessel is given in Table 2.



Safety valve setting		3.0 bar	
Initial system pressure		1.0 bar	1.5 bar
		Vessel Volume [L]	
Total water content of system			
litres			
25		2.7	3.9
50		5.4	7.8
100		10.9	15.6
125		13.6	19.5
150		16.3	23.4
175		19.1	27.3
200		21.8	31.2
225		24.5	35.1
250		27.2	39.0
275		30.0	42.9
300		32.7	46.8
325		35.7	50.7
350		38.1	54.6
375		40.9	58.5
400		43.6	62.4
425		46.3	66.3
450		49.0	70.2
475		51.8	74.1
500		54.5	78.0
For system volumes other than those given above, multiply the system volume by the factor		0.109	0.156

Table 2: Sizing of additional expansion vessel

3.7.6 Circulating pump

The circulating pump is included in the boiler. The pump head available for the heating system is shown in fig. 9.

3.7.7 System by-pass

An automatic system by-pass is included within the boiler. The boiler is suitable for use in systems with thermostatic radiator valves and no additional by-pass is required.

3.7.8 Venting

The boiler is fitted with an automatic air vent. Additional provision should be made to enable the heating system to be vented during filling and commissioning either by automatic air vents or manually.

3.7.9 DHW expansion vessel accessory

A DHW expansion vessel kit is available as an optional extra from Vaillant Ltd. This expansion vessel kit should be fitted to the boiler whenever, either a stop valve of the loose jumper type or a non return valve are present in the cold water mains supply to the boiler (fig. 10).

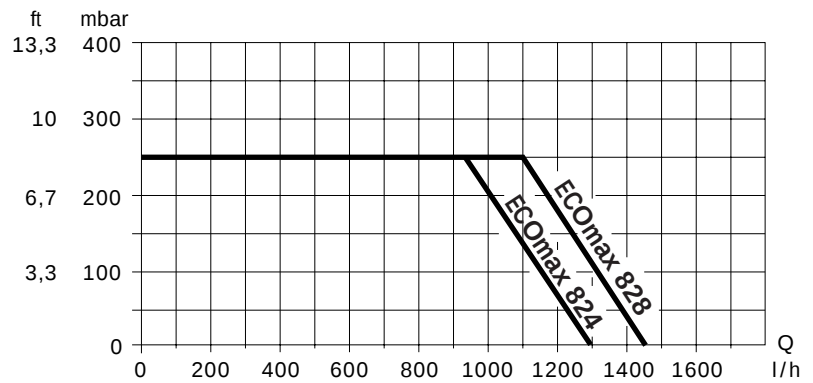


fig. 9

GU_Ecomax_090/0GB

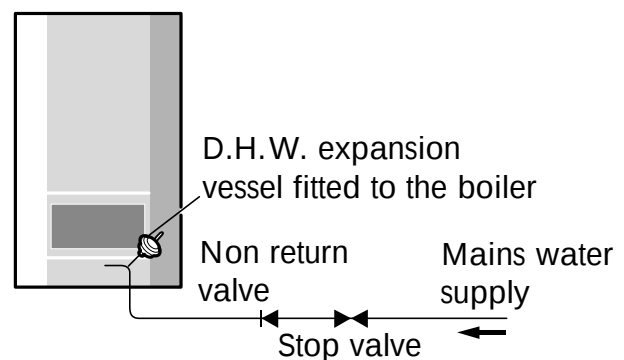


fig. 10

GW 494/1

4 BOILER INSTALLATION SEQUENCE

4.1 GENERAL

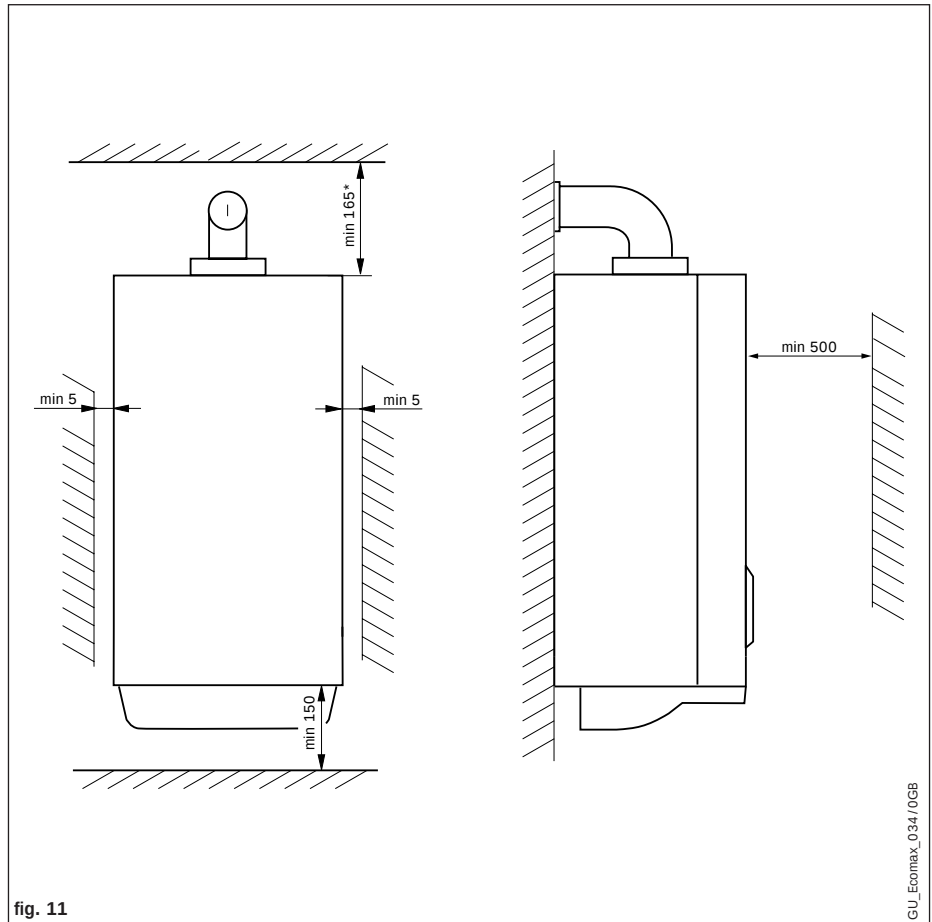
The boiler should be mounted on a flat and vertical area of wall of sufficient area for the boiler plus the required clearances for installation and servicing (fig. 11). These are shown on the installation template supplied with the boiler and are :

- 5 mm either side of the boiler
- 150 mm below the boiler
- 165 mm above the boiler*
- 500 mm in front of the boiler**

* A clearance of 300 mm is required above the boiler when using the 125 mm diameter flue system.

** This clearance is only required to enable easier access to the boiler for servicing and may be provided by an openable door, etc.

Note: If the boiler is to be fitted in a timber framed building, it should be fitted in accordance with Institute of Gas Engineers Publication I GE/UP/7/1998 'Guide for gas installations in timber framed housing'.



4.2 BOILER DELIVERY

The ECOmax 800 range is delivered in two packs :

- a. the carton containing the boiler
 - b. separately boxed flue accessory, either :
- 95 mm diameter horizontal flue accessory (Art. No. 300 931) ;
or
 - 95 mm diameter vertical flue accessory (Art. No. 300 945) ;
or
 - 125 mm diameter horizontal flue accessory (Art. No. 303 609) ;
or
 - 125 mm diameter vertical flue accessory (Art. No. 303 600)

4.2.1 Installation accessories

Table 3 lists the standard and optional accessories available for the ECOmax 800 range.

4 BOILER INSTALLATION SEQUENCE

Standard accessories - 95 mm diameter flue system	Art. No.	
1. Horizontal air/flue duct and terminal assembly	300 931	
Optional accessories - 95 mm diameter flue system	Art. No.	
2. Vertical air/flue duct and terminal assembly	300 945	
3. 1 m Extension	300 923	
4. 0,5 m Extension	300 922	
5. Additional 90° elbow	300 934	
6. Additional 45° bends	300 949	
7. Internal flue fixing kit	8098	
8. Flue supporting clips (box of five)	8098	
9. Pitched roof adjustable roof tile (for 95 mm and 125 mm flue systems)	9076	
10. Flat roof penetration collar (for 95 mm and 125 mm flue systems)	9056	
Optional accessories - 125 mm diameter flue system	Art. No.	
11. Horizontal air/flue duct and terminal assembly	303 609	
12. Vertical air/flue duct and terminal assembly	303 600	
13. Adaptor	303 620	
14. 1 m Extension	303 603	
15. 2 m Extension	303 605	
16. Additional 87° elbow	303 610	
17. Additional 45° bend (pair)	303 611	
18. Sliding sleeve	303 617	
19. Flue supporting clips	303 616	
Optional installation accessories	Art. No.	
20. Plug in 24 hour central heating timer	300 881	
21. Plug in 7 day central heating timer	300 880	
22. DHW expansion vessel accessory	303 800	
23. Pre-installation connecting group	303 879	

Table 3: Installation accessories

4 BOILER INSTALLATION SEQUENCE

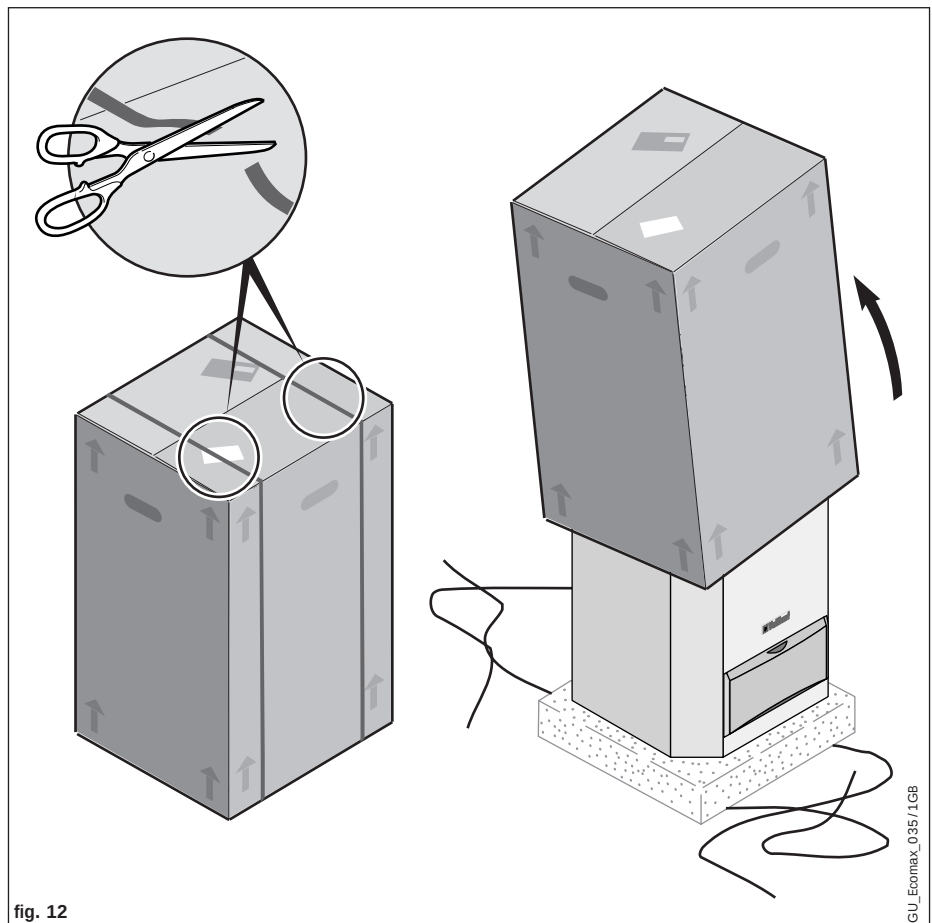
4.2.2 Unpack the boiler (fig. 12)

To unpack the boiler, cut both plastic carton straps and lift the cardboard upwards.

Note: Care should be taken not to scratch the white surface of the boiler casing.

Packed in the boiler carton are the following:

- boiler
- flow and return central heating service valves
- gas service valve
- pressure relief valve
- pre-formed copper pipework (for central heating flow and return, gas and pressure relief valve connections)
- boiler installation template
- boiler hanging bracket
- fixing screws, wall plugs and washers
- installation and user instructions
- horizontal and vertical flue installation instructions
- Options breakdown insurance/guarantee card and brochure



4.3 PREPARATION OF BOILER LOCATION

4.3.1 Select position of boiler

Refer to section 3.2 'Boiler location' for information regarding siting the appliance. In general the boiler must be positioned such that :

- there is adequate space around the boiler for service and maintenance
- the boiler can be correctly flued, i.e. the flue terminal position is sited in accordance with section 3.4.3 and the air/flue duct can be installed in accordance with the flue installation instructions supplied.
- all necessary pipework can be connected, including the pressure relief valve and condensate drain.

4 BOILER INSTALLATION SEQUENCE

4.3.2 Using the boiler template (fig. 13)

4.3.2.1

Once a suitable location has been chosen, fix the paper template to the wall ensuring that the centreline of the template is vertical using a spirit level or plumbline.

The template shows the position of the fixing holes for the boiler hanging bracket and the position of the connections. The template also shows the position of the flue exit hole, for use where the 95 mm diameter air/flue duct is to be installed directly to the rear of the boiler, e.g. where the boiler is installed on an outside wall and the flue terminates directly behind.

4.3.2.2

A pre-installation connection group is available as an optional accessory. It is used to allow the installation of the central heating and domestic hot water pipework without the need to have the boiler in position.

4.3.2.3

Mark on the wall the position of the hanging bracket fixing holes (2, fig. 13). Drill 2 holes Ø 8 mm for the hanging bracket.

Note: Use the alternative fixing holes where necessary.

4.3.2.4 Rear flue exit – 95 mm diameter flue system.

Mark the position of the centre of the air/flue duct and its circumference, e.g. by drilling through the template (1, fig. 13).

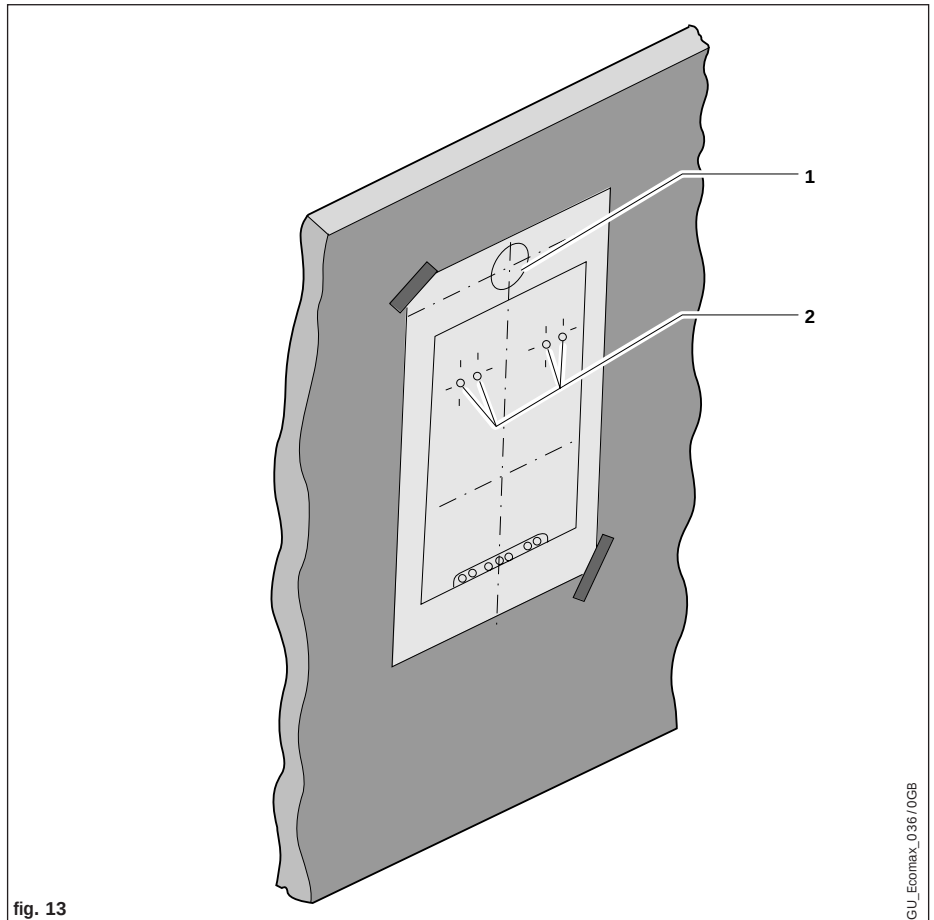


fig. 13

GU_Ecomax_036/0GB

4.3.2.5 Other flue options

Refer to the installation instructions supplied with the flue accessory for detailed instruction on other flue options such as vertical RSF flues, flues run to the side of the boiler, the use of additional bends etc. and use of the 125 mm diameter flue system.

4.3.2.6

Remove the template from the wall and plug the drilled holes using the wallplugs supplied.

4.3.3 Fitting the boiler to the hanging bracket

Secure the hanging bracket to the wall using the screws supplied. (If the condition of the wall is poor it may be necessary to use additional or alternative fixings to ensure adequate support).

Note: If the boiler is to be fitted in a timber framed building ensure that the bracket is secured to a substantial part of the timber frame capable of taking the weight of the boiler.

4.4 INSTALLING THE FLUE SYSTEM

At this stage install the flue system (refer to separate instructions supplied with the flue system).

4 BOILER INSTALLATION SEQUENCE

4.5 MOUNTING THE BOILER

4.5.1 Fitting the boiler (fig. 14)

Lift the boiler up to the wall so that it is slightly above the hanging bracket.

Note: Lift the boiler from under the front edge of the side panels.

Lower the boiler slowly onto the hanging bracket so that the cross member at the top rear of the boiler fully engages into the hanging bracket.

Lower control cover and remove the front case securing screw (1, fig. 15). Press the front case spring retaining clips located beneath the front edge of the appliance (2, fig. 16).

Remove the front casing by easing forward the bottom edge and gently lifting (fig. 17).

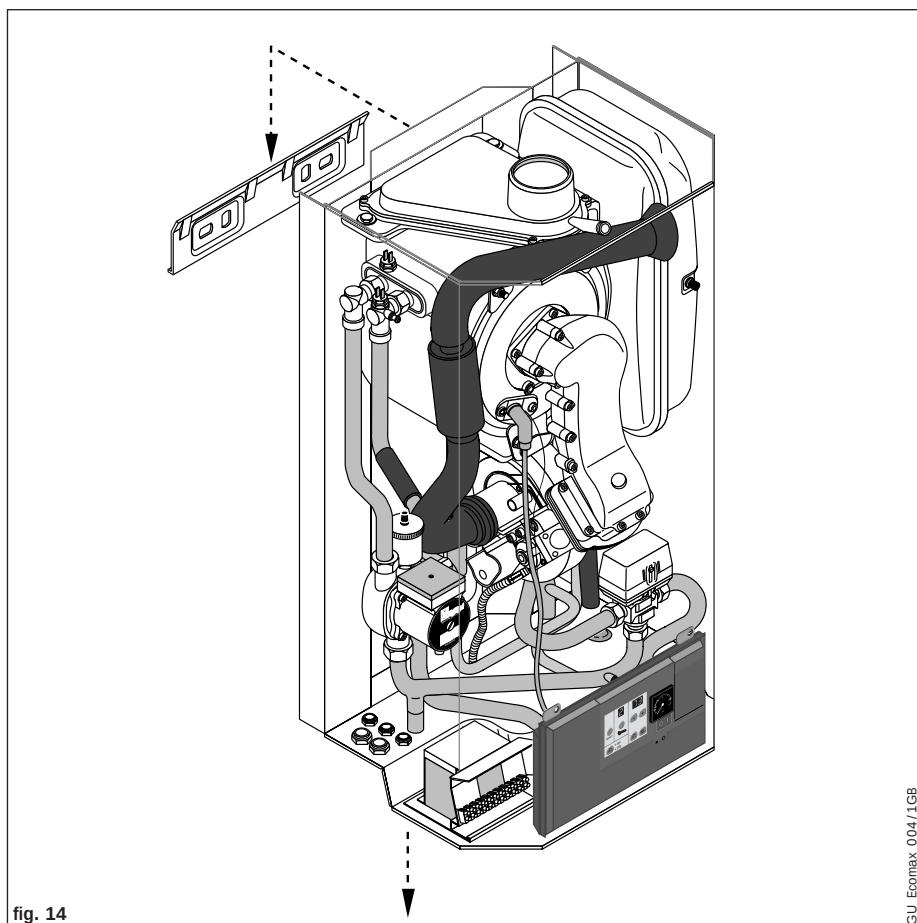


fig. 14

GU_Ecomax_004/1GB

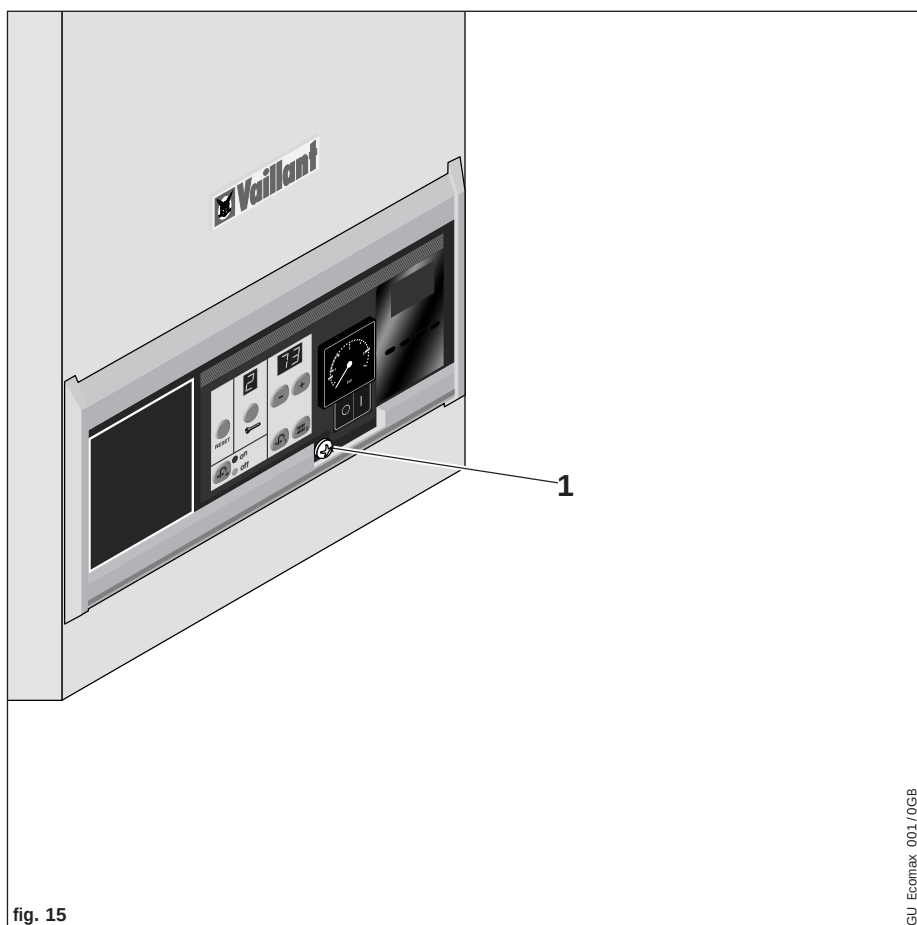
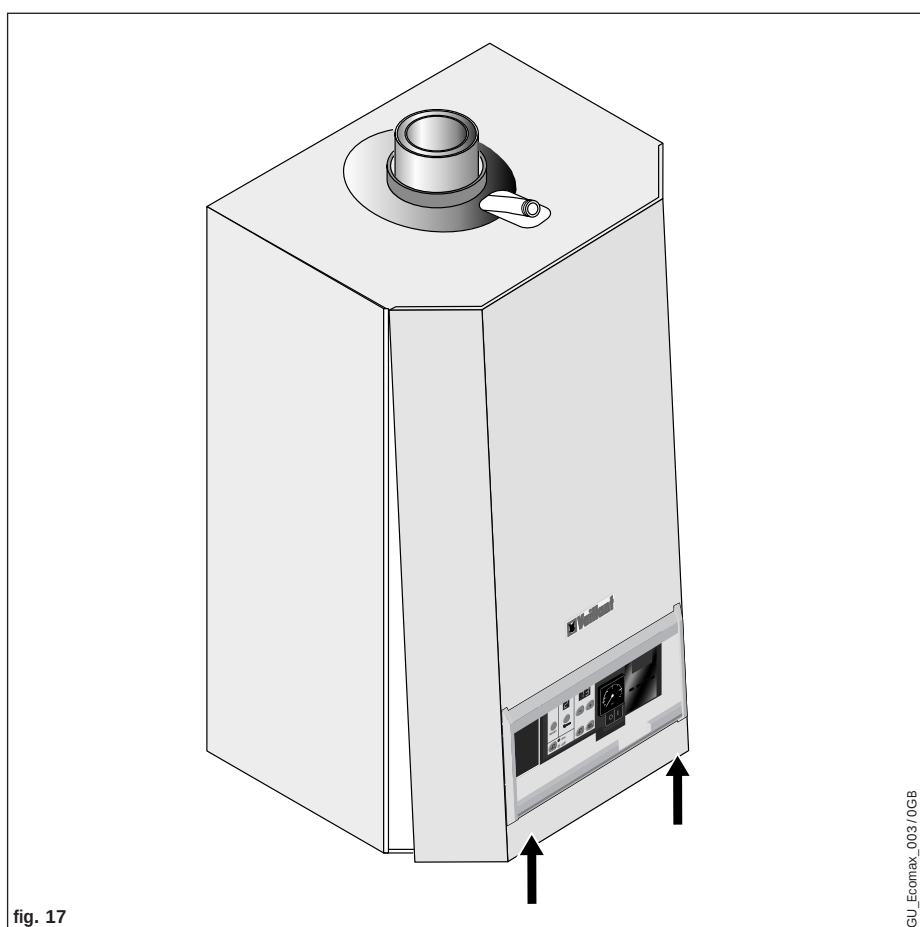
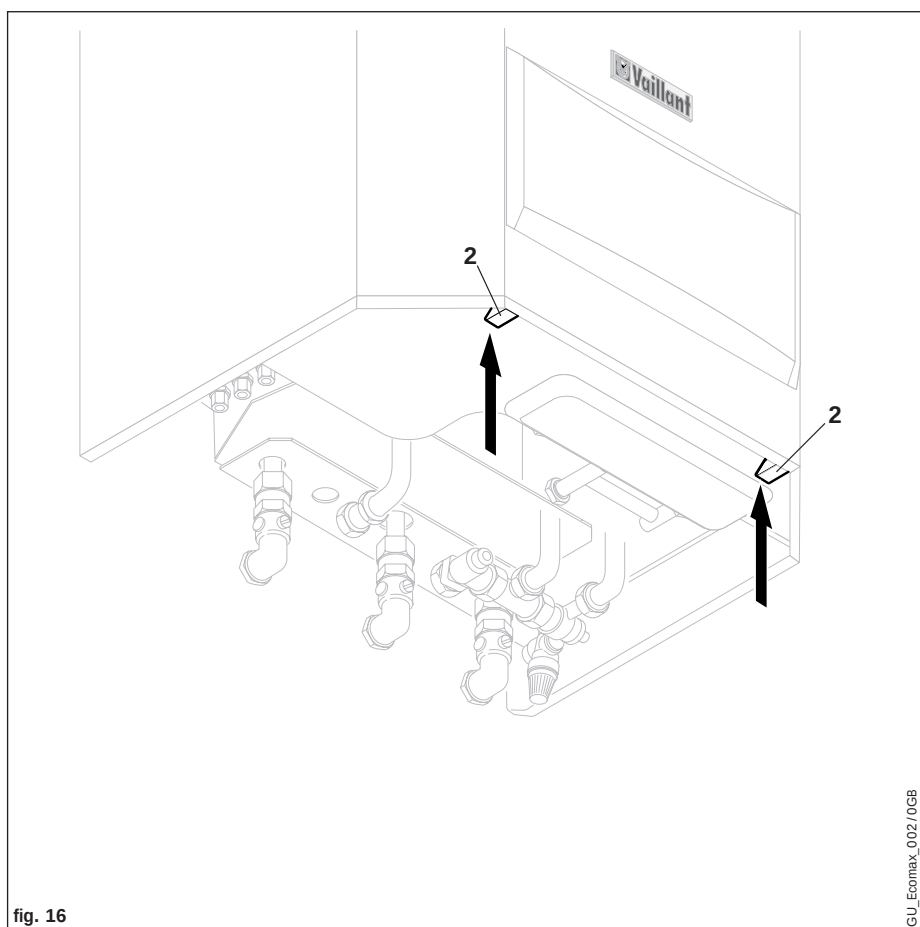


fig. 15

GU_Ecomax_001/0GB

4 BOILER INSTALLATION SEQUENCE



4 BOILER INSTALLATION SEQUENCE

4.5.2 Pipework connections (fig. 18)

4.5.2.1 Central heating flow and return

The central heating flow and return services valves are supplied separately within the boiler cardbox.

Connect the 20 mm compression connection of the central heating service valves to the boiler and tighten. Insert the pre-formed copper pipework into the 22 mm connections of the service valves and tighten the compression nuts (fig. 19a).

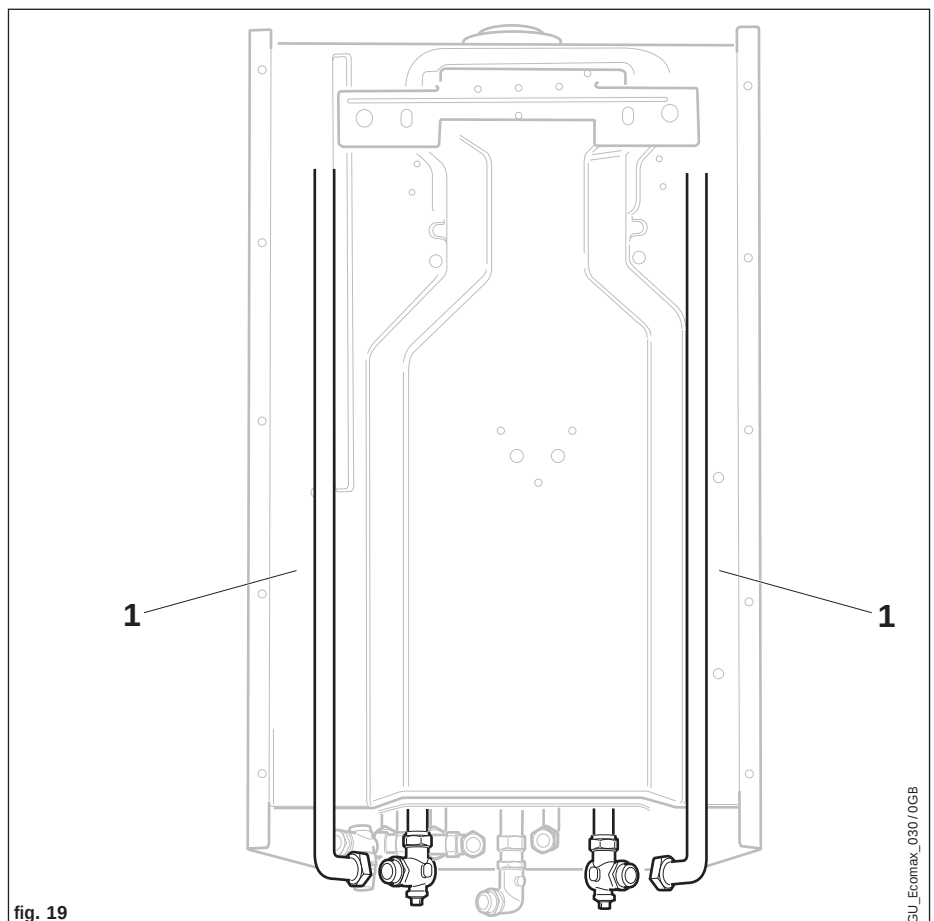
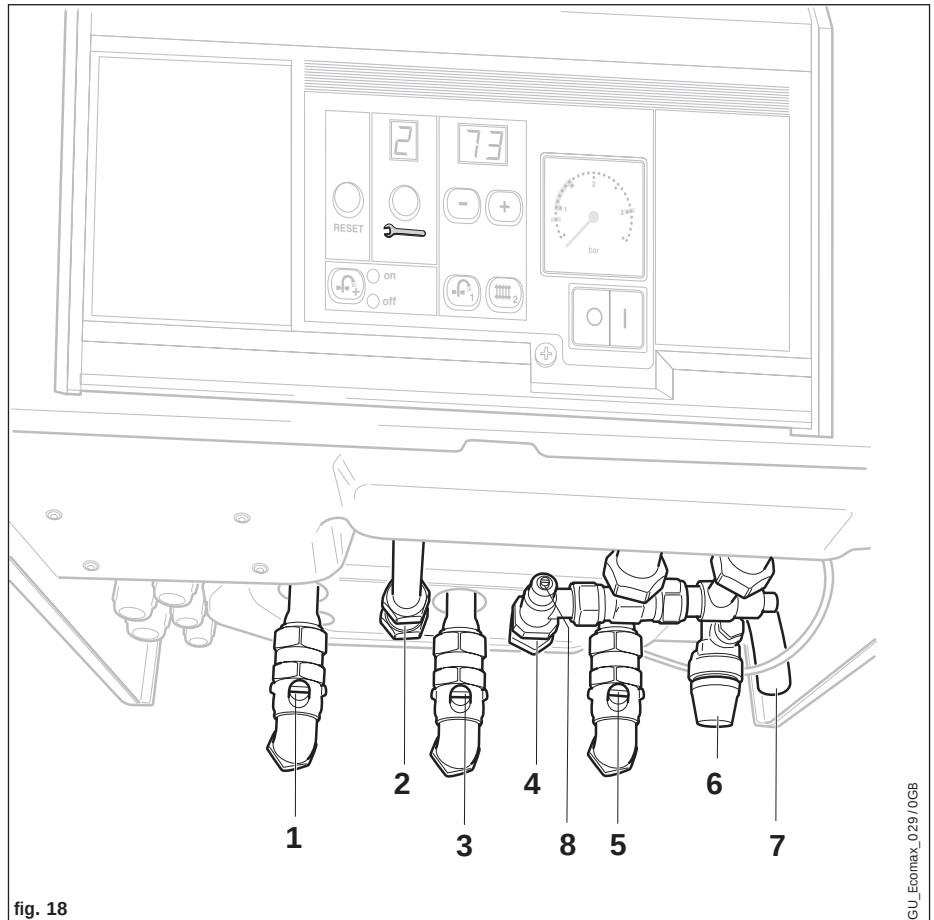
Note: The pre-formed copper pipework is designed to allow top and bottom connections to a standard pipe clip distance from the rear wall. Where bottom connections are used, the shorter end of the pre-formed copper pipework must be connected to the service valves. The longer end is to be used for top connections.

Before connecting the heating circuit to the boiler, all pipework and radiators must be thoroughly flushed to remove any installation debris. Connect the 22 mm pre-formed copper pipework to the central heating system flow and return. If solder fittings are used ensure that the pre-formed pipework is temporarily removed from the service valve to prevent damage from heating.

4.5.2.2 Top pipe work connection (fig. 19)

If it is desired to run heating and water pipework to above the boiler, the purpose provided voids at the rear left and right sides of the boiler maybe used (1, fig. 19).

The service valves should be angled toward the rear left and right sides of the appliance. The longer end of the pre-formed copper pipework must be connected to the service valves.



4 BOILER INSTALLATION SEQUENCE

4.5.2.3 Cold mains water inlet

Flush out all foreign matter from the mains supply pipe before connecting to the boiler.

Connect the mains water supply and hot water outlet pipework to the 15 mm compression connections (2 and 4, fig. 18).

Note: The boiler has a maximum domestic water working pressure of 10 bar. If the cold mains water supply pressure exceeds 10 bar, a pressure reducing valve must be fitted to the cold water inlet.

4.5.2.4 Pressure relief valve

The pressure relief valve required for a sealed central heating system is supplied loose within the appliance cardbox. Connect the pressure relief valve to the boiler (6, fig. 18).

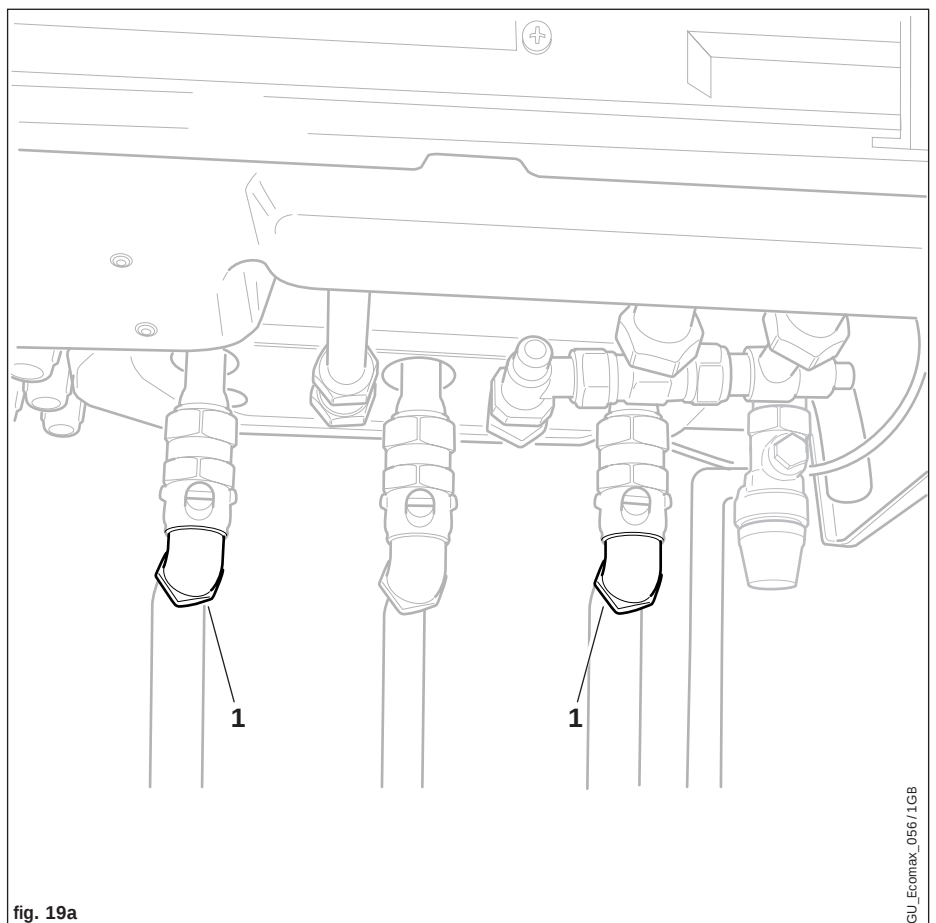
Connect the pre-formed copper pipe to the pressure relief valve.

The discharge pipework from the pressure relief valve should be as short as possible and installed with a continuous fall away from the boiler. The pipe should terminate in a position which ensures that any discharge of water or steam from the valve cannot create a hazard to persons in or about the property, or cause damage to any electrical components or external wiring, and the point of discharge should be clearly visible. The discharge must not terminate above a window, an entrance or any type of public access. The installer must consider that the pipe could discharge boiling water.

4.5.3 Gas supply

The boiler is supplied with a 20 mm x 15 mm compression gas service valve (3, fig. 18). Fit the 20 mm compression fitting to the boiler gas inlet and tighten. Connect the pre-formed copper pipework to the gas service valve. Install a gas supply pipe not less than 15 mm diameter and connect to the pre-formed copper pipework (Ensure the gas supply pipework is adequately sized such that a 20 mbar (8" w.g.) gas pressure is available at the boiler inlet at full flow rate). Tighten all union connections.

If solder fittings are used ensure that the pre-formed pipework is temporarily removed from the service valve to prevent damage from heating.



4 BOILER INSTALLATION SEQUENCE

4.5.4 Condensate drain (fig. 20)

Connect the boiler condensate drain (1) to the condensate discharge pipe (2). The condensate discharge pipe should be a minimum of 19 mm internal diameter (32 mm internal diameter for any pipework installed external to the property) and be made of an acid resistant material (e.g. plastic overflow pipe).

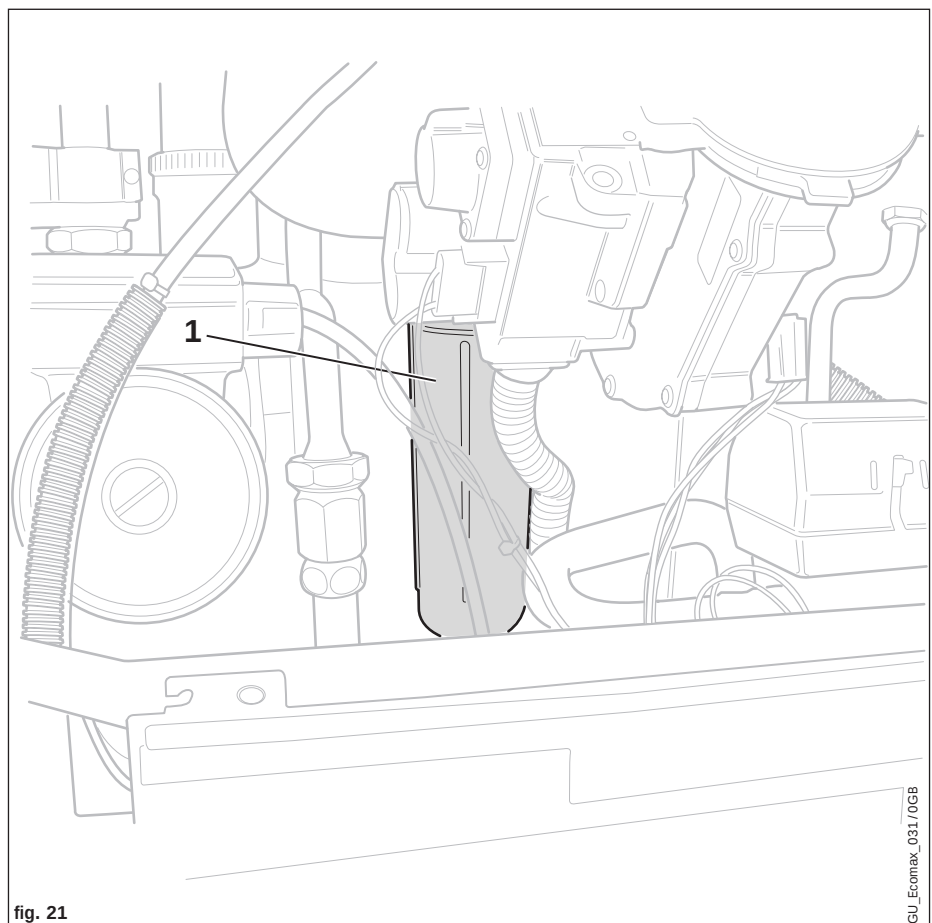
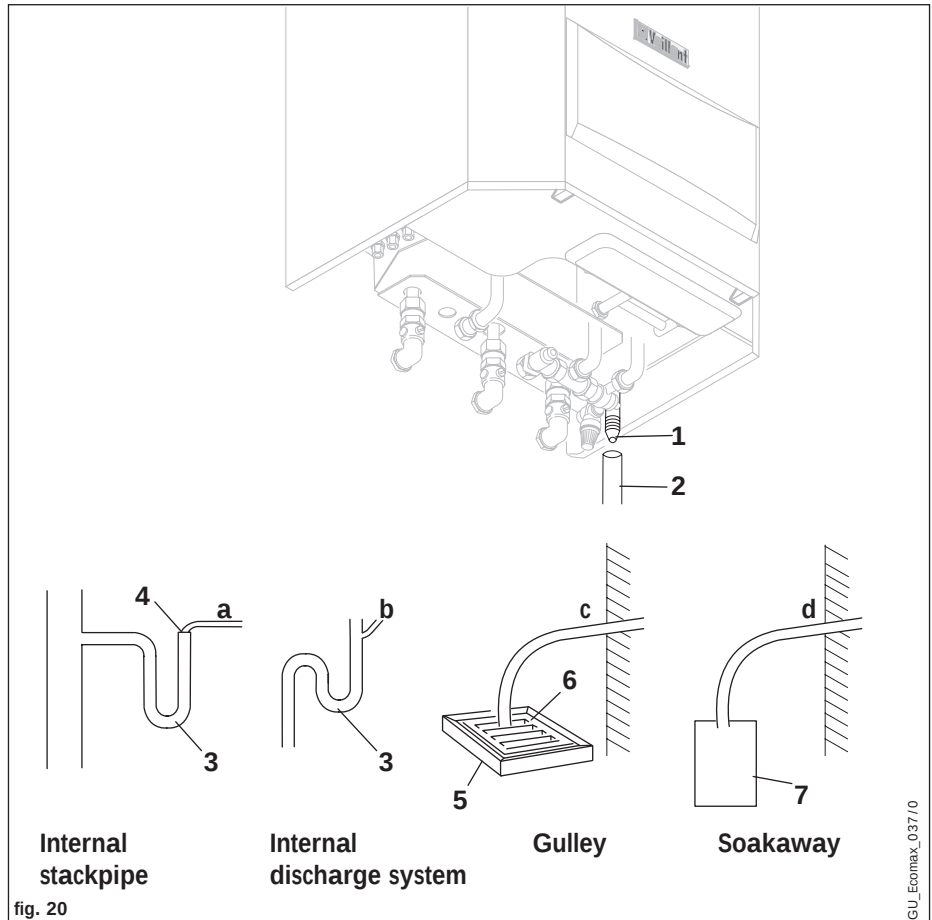
The discharge pipe from the boiler condensate drain must have a continuous fall and preferably be installed and terminated within the building to prevent freezing.

The discharge pipe must terminate in a suitable position, e.g.:

- connecting into the internal stack pipe of the property (at least 450 mm above the invert of the stack). A trap giving a water seal of at least 75 mm (3) should be incorporated into the pipe run, and there must be an air break (4) in the discharge pipe upstream of the trap.
- connecting into the internal discharge system of the property such as a sink or washing machine waste. The connection should be made upstream of the sink/washing machine waste trap. (If the connection is downstream of the waste trap then an additional trap giving a water seal of at least 75 mm (3) and an air break must be incorporated into the pipe run, as in a).
- terminating in a gully (5) below grid level (6) and above water level.
- at a condensate absorption point (soakaway) (7).

Note: If it is necessary to install any condensate pipework externally, then it should be kept as short as possible, be insulated with waterproof insulation and have a continuous fall of at least 2.5° (i.e. 45mm for every metre length).

Refer to British Gas publication 'Guidance notes for the installation of domestic condensing boilers' for further information. Before operating the boiler the condensate trap (1, fig. 21) must be filled with water as described in Section 5.7.



4.6 CONNECTING FLUE ASSEMBLY TO BOILER

Note: Refer to air/flue duct installation instructions for full details of installation of air/flue duct. This section is included for further reference only e.g. in case the boiler has to be removed from the wall.

4.6.1 Horizontal flue (95 mm diameter flue systems)

Note: Refer to separate instructions supplied with 125 mm diameter flue system for connection method.

Place a 95 mm diameter x 88 mm long air duct clamp (1, fig. 22) over the air flue duct.

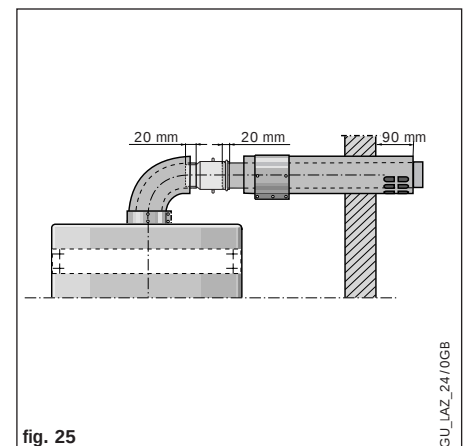
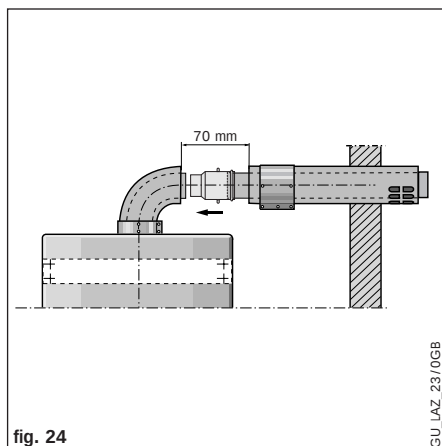
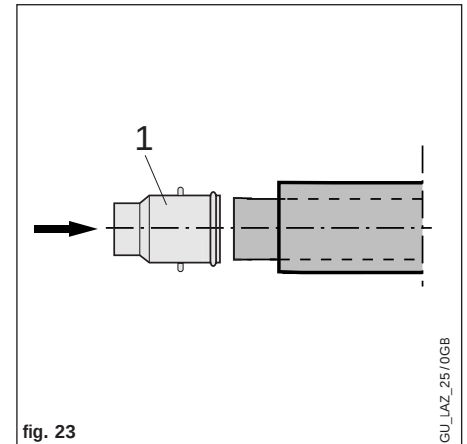
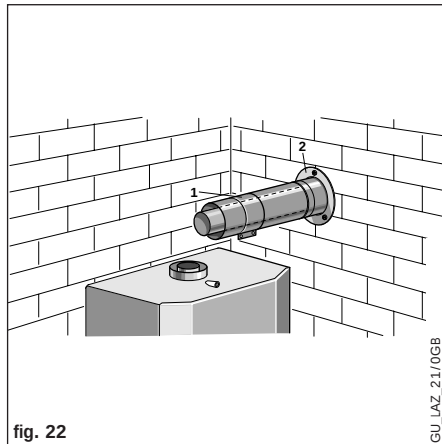
Push the sliding sleeve (1, fig. 23) over the cut end of the flue duct.

Fit the flue elbow to the boiler by inserting the spigot of the flue elbow into the flue outlet socket of the boiler. When correctly fitted the air duct of the flue elbow should butt up to the boiler air duct.

Line up the flue elbow socket with the air/flue duct and pull back the sliding sleeve so that it engages into the socket of the flue elbow. The sliding sleeve must penetrate the flue elbow socket such that there is at least 20 mm engagement at both ends of the sliding sleeve (fig. 25).

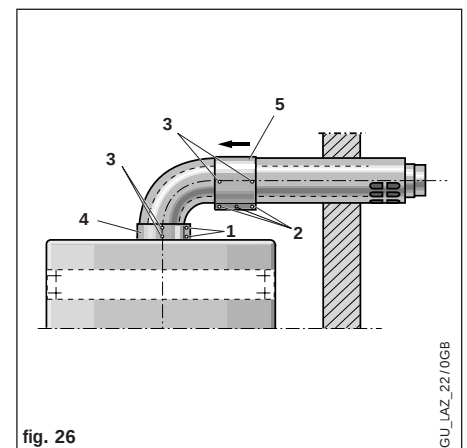
Ensure that the air/flue duct and terminal assembly is not displaced through the wall, and that the terminal assembly projects 90 mm as shown in fig. 25.

Fit the 95 mm diameter x 25 mm long air duct clamp (4, fig. 26) over the elbow and the boiler flue outlet spigot. Tighten the two screws (1, fig. 26).



Slide the 88 mm long air duct clamp (5, fig. 26) back onto the elbow so that it is located centrally over the 70mm gap between the elbow and flue assembly. Tighten the three screws (2, fig. 26).

Secure the clamps to the air duct using the sheet metal screws supplied (3, fig. 26).



4 BOILER INSTALLATION SEQUENCE

4.6.2 Vertical flue (95 mm diameter flue systems)

Note : Refer to separate instructions supplied with 125 mm diameter flue system for connection method.

Lower the flue assembly and engage the flue duct spigot into the socket of the boiler flue outlet.

With correct assembly there will be a gap between the boiler and flue assembly of 10 mm (fig. 27).

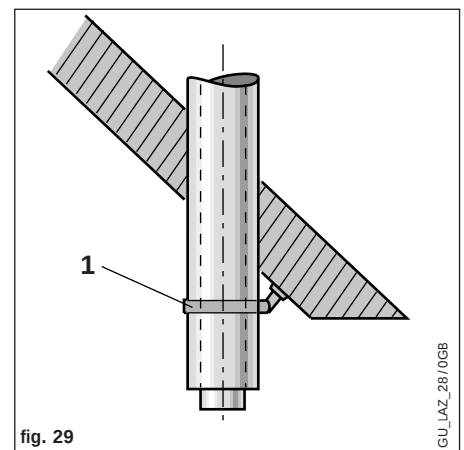
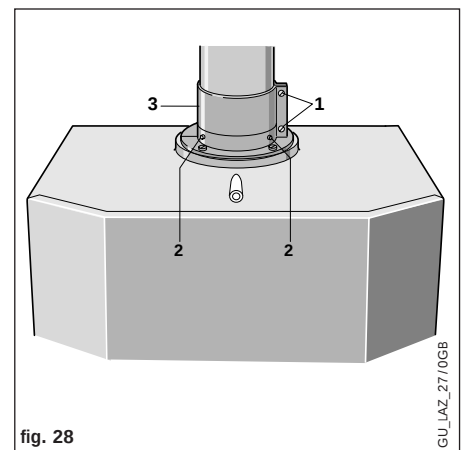
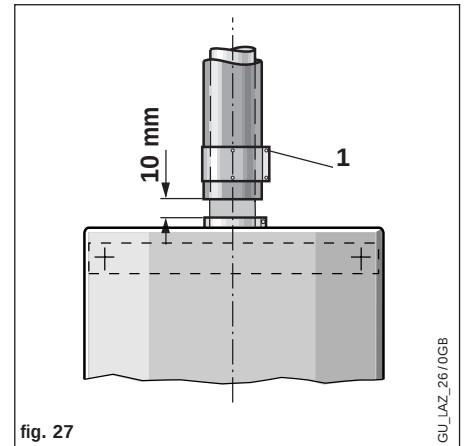
Fit the 95 mm diameter x 55 mm long air duct clamp (3, fig. 28) over the gap between the air duct of the boiler and the bottom of the air /flue duct and terminal assembly.

Tighten the clamp screws (1, fig. 28).

Secure the clamp to the boiler air duct using the sheet metal screws supplied (2, fig. 28).

Note : The air duct clamp must not be screwed to the bottom of the air/flue duct and terminal assembly. The air/flue duct and terminal assembly must be able to slide in the air duct clamp to absorb any slight movements in the roof structure.

Ensure that the air flue duct and terminal assembly is aligned vertically and secured from inside using the fixing bracket (1, fig. 29) over the air/flue duct at a convenient position.



4.7 ELECTRICAL CONNECTION

4.7.1 General electrical requirements

All electrical work shall be carried out by a competent person and shall comply with BS7671 (IEE Regulations).

The boiler is supplied for connection to 230 V~, 50 Hz supply fused at 3 A rating. Connection to the mains supply shall be made via a fused 3 pin plug to an unswitched shuttered socket, both complying to the requirements of BS1363.

(Alternatively, connection may be made via a 3 Amp fused double pole isolator having a contact separation of at least 3mm in all poles and supplying the boiler and controls only).

The point of connection to the mains supply must allow complete electrical isolation of the boiler and its ancillary controls. It should be readily accessible and adjacent to the boiler. A 3 core flexible cord according to BS6500 tables 6, 8 or 16 (3 x 0.75 to 3 x 1.5 mm) should be used.

Warning: This appliance must be earthed.

4.7.2 Connecting to the mains supply

Remove the control panel securing screw (1, fig. 30).

Lower the control panel (2, fig. 31).

Pass the mains electrical 3 core flexible cord through the cable entry grommet in the bottom of the case (3, fig. 31) and connect as follows:

Green/yellow (earth) wire boiler terminal $\oplus$
 Blue (neutral) wire boiler terminal N
 Brown (Live) wire boiler terminal L

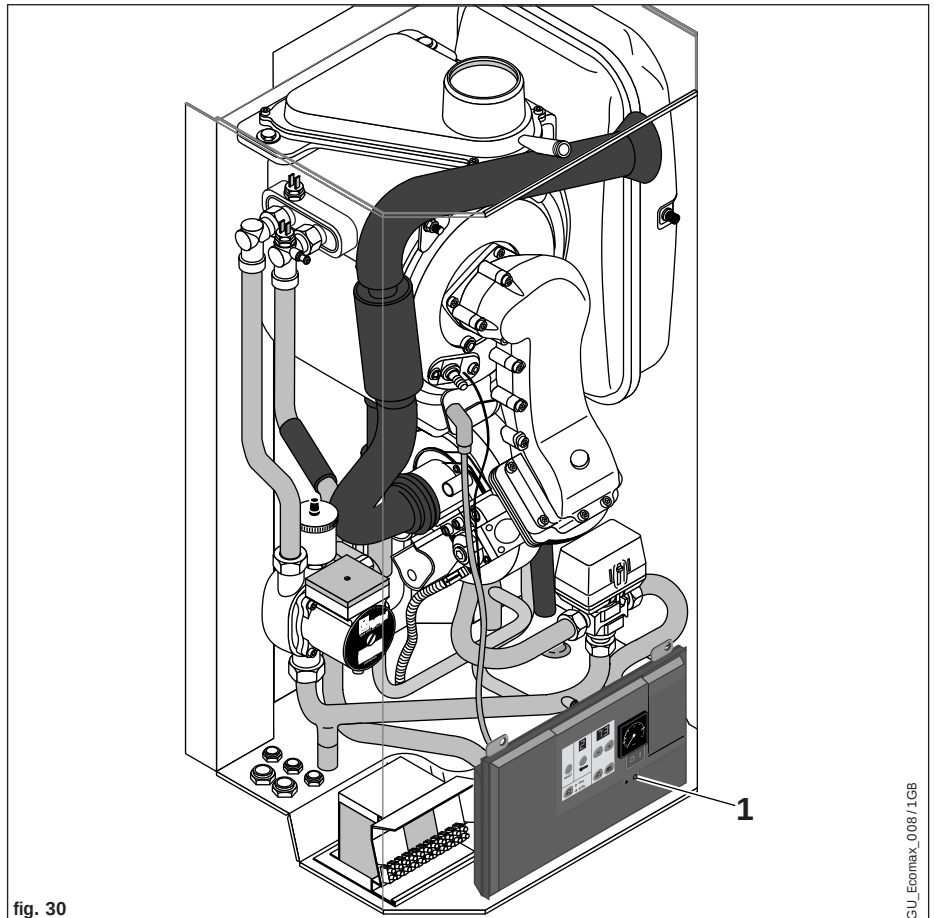


fig. 30

GU_Ecomax_008/1GB

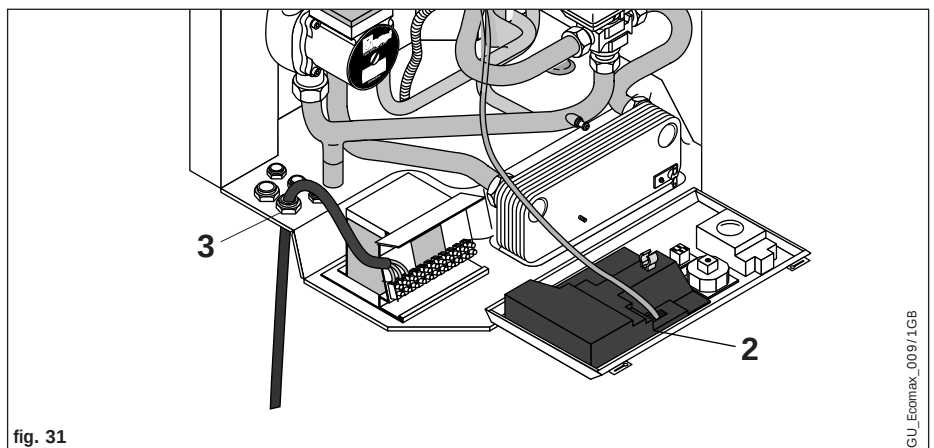


fig. 31

GU_Ecomax_009/1GB

Note: Do not use boiler terminal connections 7-8-9

Important: Ensure that all cords pass through the cable entry grommets in the bottom of the appliance case and are securely fixed. Ensure that the power supply cord is connected such that the current carrying conductors become taut before the earth conductor should the supply cord slip from the cable grommet.

4 BOILER INSTALLATION SEQUENCE

4.8 CONTROLS

4.8.1 External electrical controls

The boiler terminals 3, 4 and 5 are for connecting external electrical controls such as a time switch and/or room thermostat.

Terminals 3 and 4 are linked together when the boiler is supplied. If external controls are used, this link must be removed, and the controls connected across terminals 3 and 4.

Terminal 5 is an additional neutral connection for external neutrals such as from the anticipator of a room thermostat.

Refer to section 4.8.2 for full connection details.

4.8.2 Connection of external controls

4.8.2.1 Connection details for programmable room thermostat and boiler terminal strip (refer to fig. 32)

Fig. 32 shows the connection details where a programmable room thermostat (time switch with built in room thermostat) is used to control the boiler.

Important: The arrowed numbers indicate connection into the relevant terminal in the boiler terminal strip.

4.8.2.2 Connection details for external time switches and boiler terminal strip (refer to fig. 33)

Fig. 33 shows the connection details where a time switch is used without a room thermostat to control the boiler.

Important: The arrowed numbers indicate connection into the relevant terminal in the boiler terminal strip.

Connection details for programmable thermostats

Vaillant Calotrol (VRT 9083 and VRT 9084)	N L 3 4 1 2 3 4
ACL Drayton Digistat 2 and 3	3 4 1 2 3
ACL Drayton PT110, PT170	N L 3 4 N L 1 2 3 4
ACL Drayton Lifestyle CT171, CT172, PT271, PT371	N L 3 4 N L 1 2 3 4 OFF ON
Danfoss Randall TP2, TP3, TP4, TP5	3 4 1 2 3
Honeywell CM51, CM41	3 4 A B C ON OFF
Landis & Gyr REV 10 and 21	3 4 Q1 Q2
Potterton Myson PET 1	3 4 5 ⊕ 2 L 1 N C OFF ON
fig. 32	

Connection details for time switch

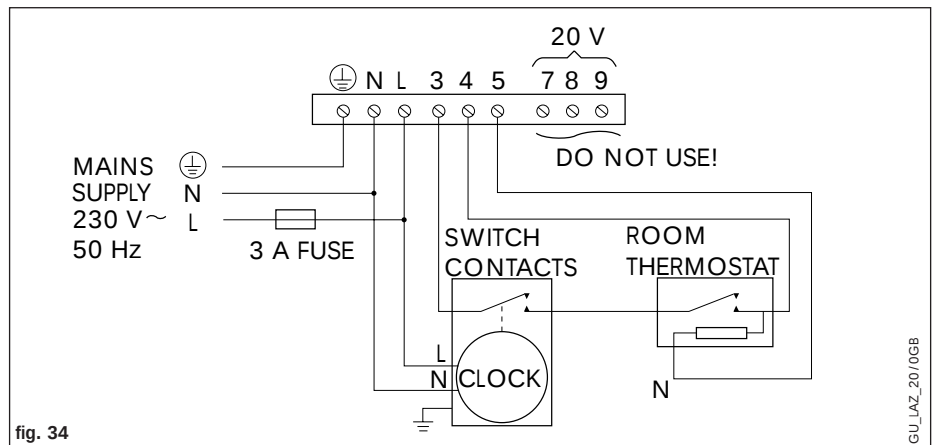
ACL Drayton Lifestyle LP711	N L 3 4 N L 1 2 3 4 OFF ON
ACL Drayton Switchmaster 300 (Please note: Remove Link N-2 and L-4)	N L 4 3 N L 1 2 3 4 ON
Grässlin Towerchron Dt71, T2001	N L 3 4 N L 1 2 3 4 ON
Honeywell ST6100	N L 3 4 N L 1 2 3 4
Honeywell ST7000B (Battery operated)	3 4 L 2 3 4 OFF ON
Horstmann 425 Coronet Channel Plus, H17, H11	⊕ N L 4 E N L 1 2 3 4 5 6 ON OFF
Landis & Gyr RWB100, 152, 170	N L 3 4 N L 1 2 3 4
Potterton Myson EP4001, EP5001	N L 4 3 ⊕ N L 1 2 3 4 5 E OFF ON
Danfoss Randall 103, 103E, 103E7	4 3 ⊕ N L 1 2 3 E 5 6 ON
Danfoss Randall Set 1E, TS975	⊕ N L 4 3 E N L 1 2 3 4 5 6 ON OFF
fig. 33	

4 BOILER INSTALLATION SEQUENCE

If a room thermostat is to be connected in addition to a time switch the wire between the time switch 'ON' terminal and boiler terminal 4 should be broken by the contacts of the room thermostat (see schematic layout, fig. 34).

4.8.2.3 Vaillant optional plug in timer accessories

Refer to the instructions supplied with the optional accessories for connection details.



4.8.3 Thermostatic radiator valves

The boiler has a built in automatic bypass valve making it ideal for use in systems with thermostatic radiator valves (no separate system bypass is required).

For optimum fuel economy it is recommended that where TRV's are used they are used in conjunction with a programmable room thermostat or separate timer and room thermostat to ensure complete boiler shut down when the heating demand is satisfied. (The radiator in the room containing the room thermostat should not be fitted with a TRV).

4.8.4 Frost protection

The boiler has an integral frost thermostat which is designed for protection of the boiler.

To protect remote or exposed parts of the heating system or property additional frost protection measures must be taken such as the installation of an external frost thermostat. This frost thermostat should be connected across the boiler terminals 3 and 4, in parallel with any external heating controls.

4.8.5 Circulating pump

The boiler incorporates a built in circulating pump that is fully pre-wired (no additional wiring is necessary). The pump incorporates an automatic overrun period after the boiler switches off.

4.8.6 Anti-cycling 'economiser' control

The boiler incorporates a built in anti-cycling control to ensure that energy wasteful short cycling of the boiler cannot occur. This control prevents the boiler from re-igniting for a pre-set period of 5 minutes after central heating operation (the hot water operation is unaffected by this control and hot water can be drawn at any time).

Note: To temporarily override the anti-cycling control turn the main boiler on/off switch to the off position '0' and then back to the on position 'I' after a few seconds.

4.8.7 Automatic pump spin control (APS)

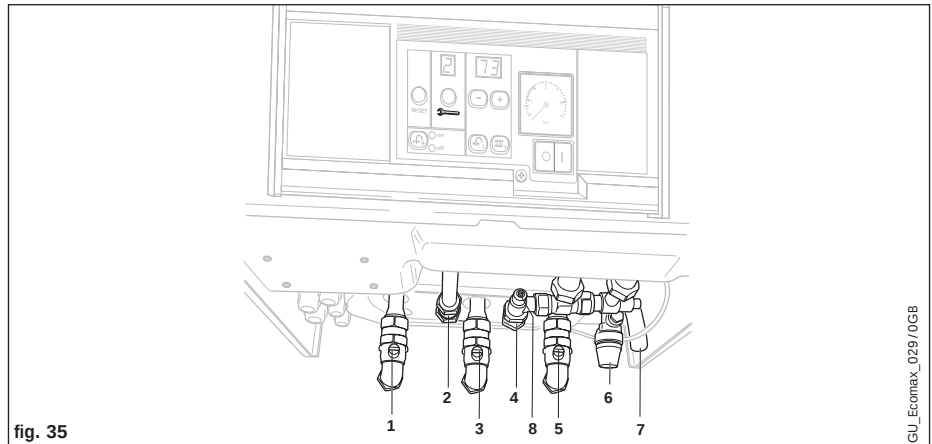
The boiler incorporates a built in control which will spin the built in circulating pump and operate the diverter valve once in a 24 hour period. This control helps to prevent seizure when the boiler is not operated for a period of time. This control is not active when the power supply to the appliance is turned off.

5 COMMISSIONING

5.1 PRELIMINARY ELECTRICAL CHECKS

Check the electrical installation by carrying out short circuit, earth continuity and resistance to earth tests and a check for correct polarity.

Warning: During boiler commissioning mains voltage is present at the boiler terminal strip. Ensure that due care is taken when working on the boiler with the front casing removed.

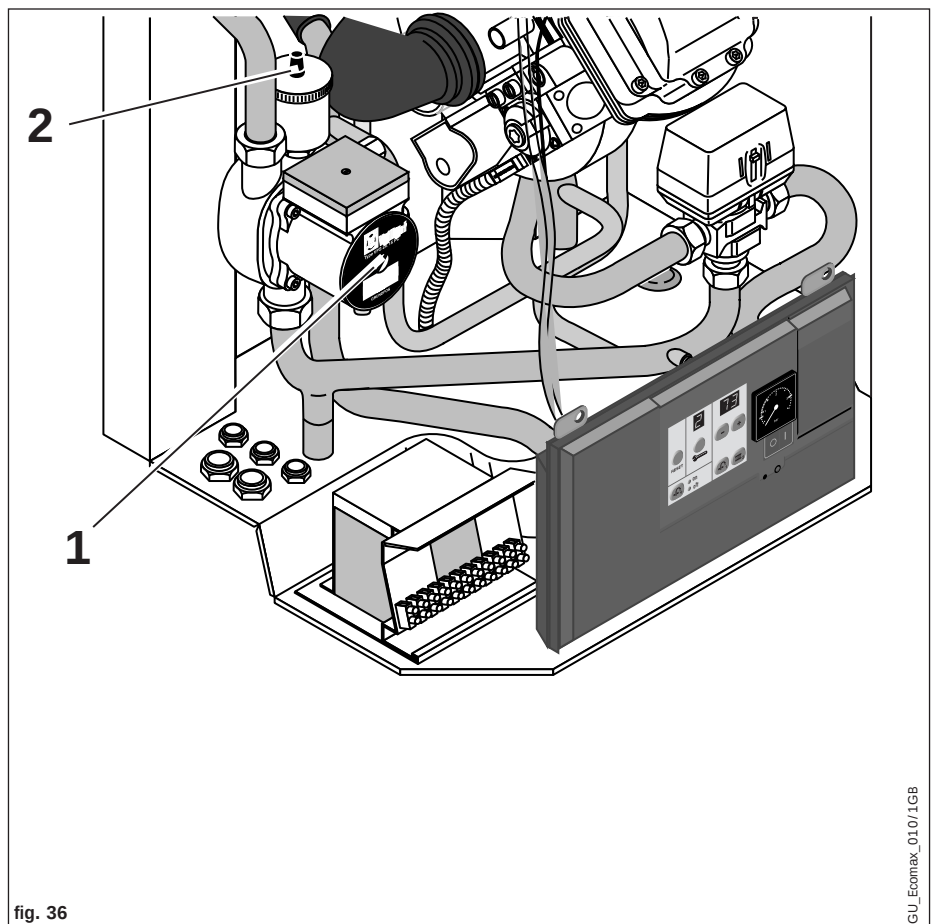


5.2 GAS SUPPLY

The complete gas installation including the gas meter must be inspected, tested for soundness and purged in accordance with BS 6891.

The gas supply to the boiler can be purged by slackening the gas service valve beneath the boiler (3, fig. 35). Ensure that there is adequate ventilation, extinguish all naked flames and do not smoke whilst purging.

After purging, the gas service valve connection must be re-tightened and tested for soundness. (The boiler itself does not require purging as this will be done by the automatic burner sequence control).



5.3 WATER SUPPLY

Open all domestic hot water taps supplied by the boiler, turn on the mains water supply to the boiler and open the mains water isolating valve below the boiler (8, fig. 35).

Water will now flow through the boiler to the hot taps. Starting with the lowest tap supplied, turn the hot taps off one at a time until the hot water pipework is purged of air.

Check all hot and cold water pipework for leaks.

5.4 FILLING THE HEATING SYSTEM

The boiler primary circuit and the heating system should be filled using a filling method as described in Section 3.7.2.

Ensure that the boiler CH service valves (1 and 5, fig. 35) are open. Partially open the filling valve and allow water to enter the system. Starting with the lowest radiator, open the radiator air release until water (clear of bubbles) is emitted.

Repeat this at all radiators until the complete system is full, all air locks have been cleared and the boiler pressure gauge reads 1.5 bar. Release any air from the pump by

slackening the centre screw (1, fig. 36).

The boiler is equipped with an automatic air release valve. To allow this to vent the boiler, the cap on top (2, fig. 36) must be slackened by 1-2 turns. (This cap must be left slackened during boiler operation to ensure any residual air or system gases are released).

Check the heating system and boiler connections are sound.

5.5 INITIAL SYSTEM FLUSH ('COLD')

The whole of the heating system must be flushed out at least twice: once cold, and once hot as instructed later in Section 5.14.

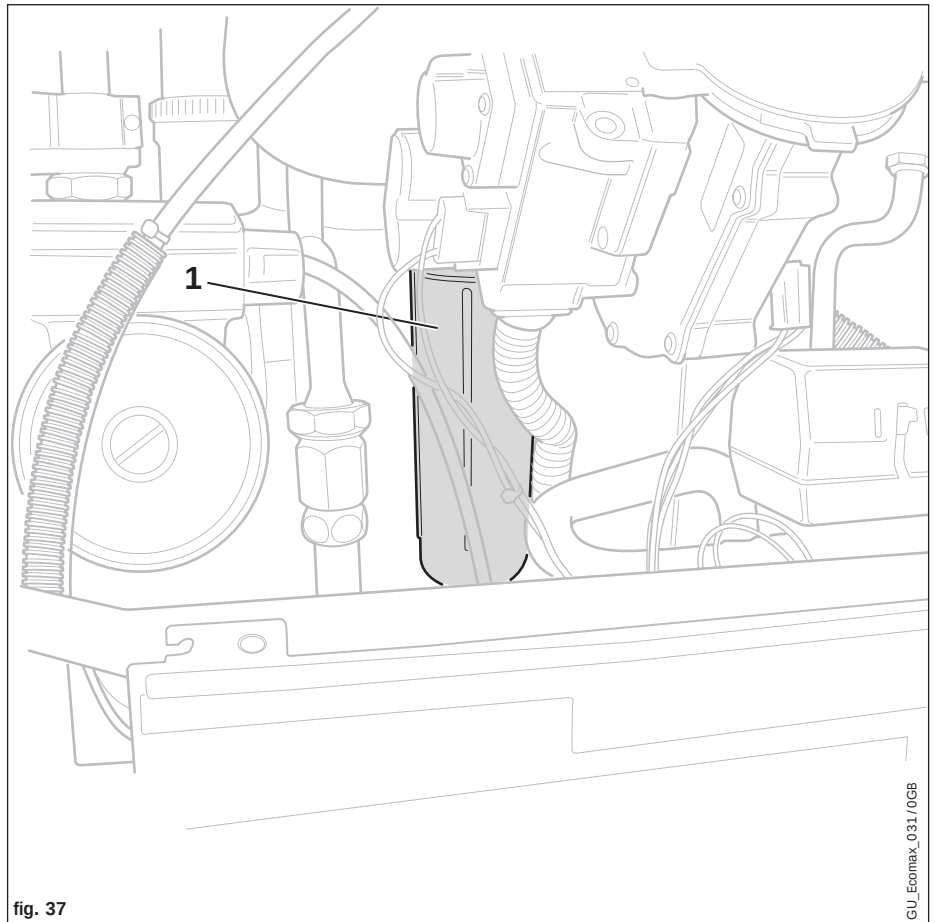
Open all radiator or heating valves and the boiler CH service valves and drain the heating system and boiler completely from the lowest points of the system via 1/2" BSP drain taps (opened full bore to remove any installation debris prior to lighting the boiler).

Refill the heating system as described in Section 5.4. Filling the heating system.

Check the operation of the pressure relief valve by rotating the knob on the valve (6, fig. 35).

5.6 FILLING CONDENSATE TRAP

Remove the lower part of the condensate trap (1, fig. 37) by unscrewing and fill with water to about 10 mm from the top. Refit in boiler.



5 COMMISSIONING

5.7 INITIAL LIGHTING

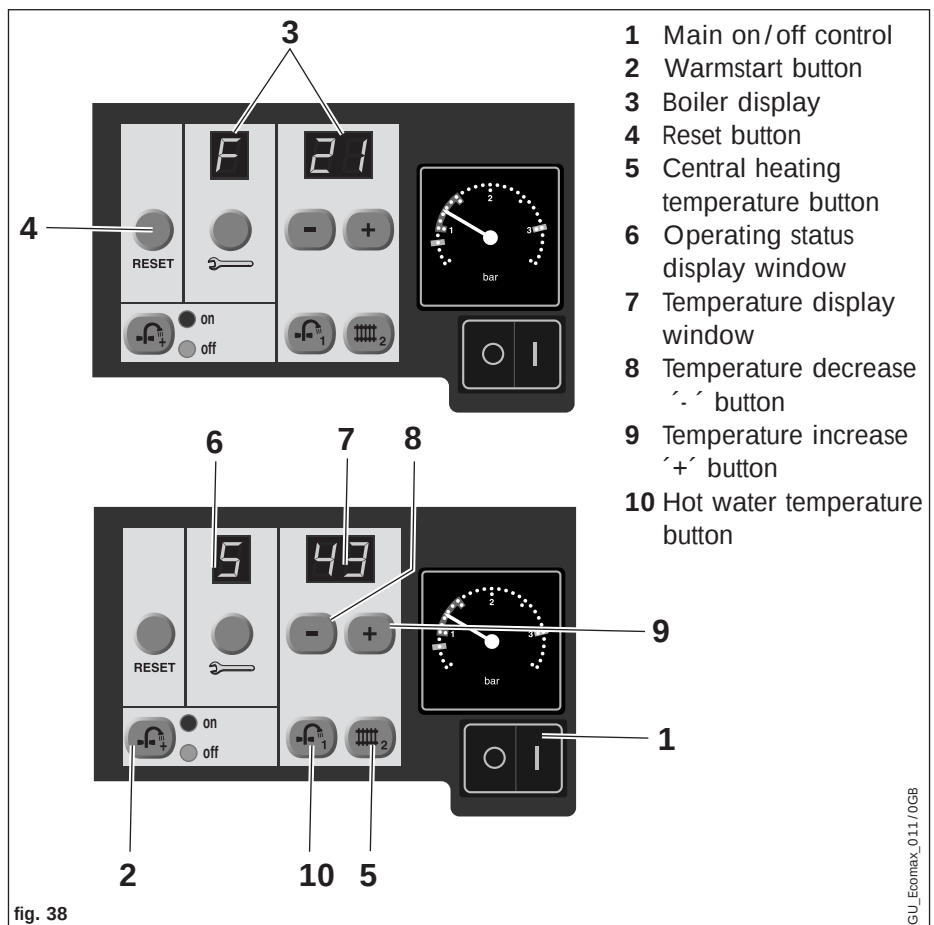
Important: The boiler should only be operated for short periods of time, such as during initial lighting, when checking the gas inlet working pressure or checking the main gas rate, without the front casing correctly fitted.

- Ensure the cold water shut off valve (8, fig. 35) is open by turning anti-clockwise.
- Open the gas service valve (3, fig. 35).
- Check that the CH service valves (1 and 5, fig. 35) are open.
- Check that all external controls are calling for heat.
- Raise the control panel and refit the securing screw (1, fig. 30).
- Switch on the electricity supply to the boiler.
- Turn the main on/off control (1, fig. 38) to on.
- Check that the warmstart off indicator is illuminated (if not, press and release the  button).

The boiler will carry out an internal self check before lighting in the central heating mode. Allow the boiler to run for a few minutes to clear any air remaining in the primary circuit.

Note: If the boiler should fail to light the diagnostic display (3, fig. 38) will show 'F 21'. This usually indicates that the gas supply is turned off or is not purged correctly. Check the gas supply, push the **RESET** button on the control panel (4, fig. 38) and repeat the lighting procedure.

- Allow the boiler to run for a few minutes and then turn off the central heating as follows:
- Press the central heating temperature button (5, fig. 38).



Note: The status display will now show a flashing figure '2' and the central heating temperature setting will be shown in the temperature display (Note: The central heating temperature setting range is from 0 to 12).

- Fully open a hot water tap. The boiler will now operate for hot water.
- Fully turn off the hot water tap.
- Press the  button (8, fig. 38) to decrease the central heating setting to '0'.
- **Once '0' is displayed, press and hold the central heating temperature button until the display flashes indicating that the setting has been memorised.**
- The boiler will now switch off.
- Approximately 10 seconds after the central heating temperature has been adjusted the boiler display will revert to showing the boiler operating status code and actual boiler flow temperature.

5.8 GAS INLET WORKING PRESSURE (FIG. 39)

- Slacken the sealing screw (1, fig. 39) and attach a U gauge (2, fig. 39) to the inlet test point on the gas valve.
- Fire the boiler at full rate by opening a hot water tap. Check that the U gauge is reading 20 mbar. (If the pressure is not 20 mbar this should be investigated before continuing with the commissioning procedure. A pressure lower than 20 mbar is indicative of an incorrectly sized or partially blocked gas supply).
- Turn off the hot water tap. Remove U gauge. Tighten the test point screw and test for soundness.

5.9 CHECK GAS RATE

The boiler is fitted with a fully modulating automatic gas valve which ensures that the precise air/gas ratio is provided under all operating conditions. **The gas rate has been set during production and does not require adjustment.**

The gas rate of the boiler should be checked with the front case fitted, as follows:

- Set the domestic hot water temperature to maximum setting 12 (see Section 5.16.2).
- Fire the boiler at full rate by fully opening a hot water tap.
- Allow the appliance to run for at least 5 minutes.
- With all other gas appliances turned off measure the gas rate at the meter. Check that the gas rate is as stated in Table 4.
- After measurement set D.H.W. temperature back to original setting.

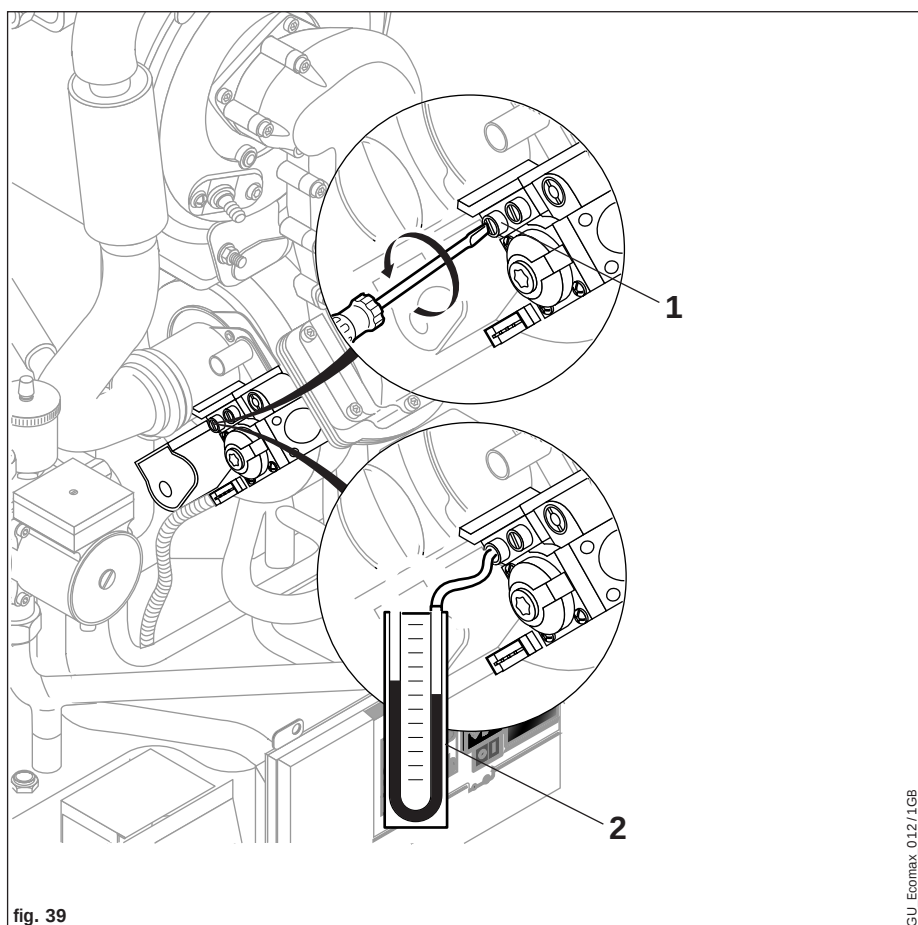


fig. 39

GU_Ecomax_012/1GB

	ECOmax 824 E	ECOmax 828 E
Maximum gas rate (DHW)	2.49 m ³ /h	3.03 m ³ /h

Table 4

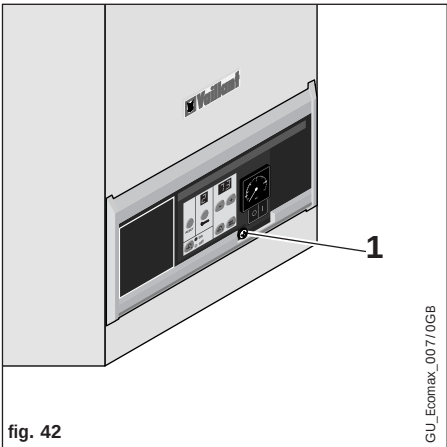
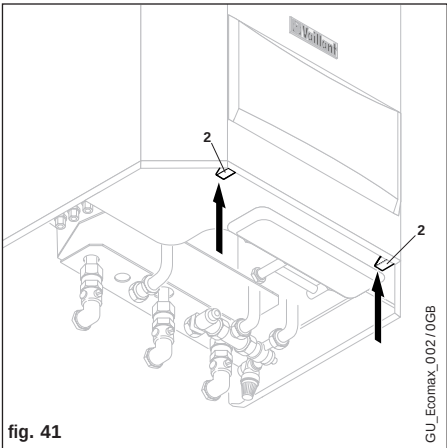
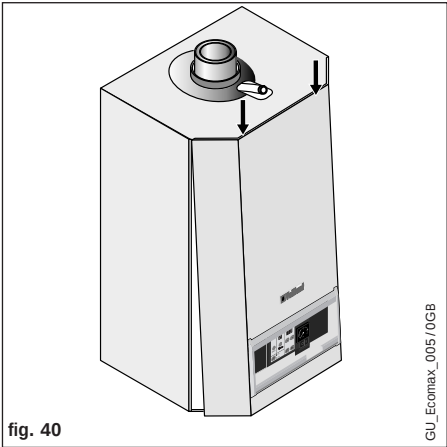
If the gas rate is found to be outside the tolerances detailed, check that an inlet pressure of 20 mbar is available. If the inlet pressure is correct at 20 mbar contact Vaillant Technical Department on 01634 292392.

5 COMMISSIONING

5.10 FITTING THE FRONT CASING

Note: Ensure that the front panel retaining strings are positioned such that they will not become trapped in the casing.

- Hook the top of the front casing over the lip on the top of the boiler chassis and push the bottom of the front casing into place (fig. 40).
- Ensure that the spring retaining clips, located beneath the front edge of the appliance, engage correctly in the bottom lip of the front casing (2, fig. 41).
- Replace front case securing screw (1, fig. 42).



5.11 ADJUSTING THE CENTRAL HEATING OUTPUT (RANGE RATING)

ECOmax 800 is fully modulating for central heating, and it is therefore not necessary to range rate the boiler. The boiler operates at a very high efficiency across its output range, however, even greater efficiencies may be obtained by range rating the boiler as follows:

- Simultaneously press and release the (+) and (-) buttons (8, 9, fig. 38).

Note: This enters the diagnostic mode of the appliance and 'd00' is shown on the diagnostic display.

- Press the  button and the diagnostic display will now show the percentage range rating of the central heating (compared to the maximum nominal output for domestic hot water).

Note: The factory set maximum figure is 80.

- Central heating output can be altered using the (-) and (+) buttons. (See Table 5 for the required output settings).
- After setting, press and hold the  button until the display flashes indicating that the new setting has been memorised.

Note: 10 seconds after releasing the  button, the diagnostic display will revert to showing the boiler flow temperature and operating status of the boiler.

Range rating (Diagnostic code `d00`)	Output to Central Heating in kW (with return temperature of 60 °C)	
	ECOmax 824 E	ECOmax 828 E
80 (maximum)	17.7	21.5
70	15.5	18.8
60	13.3	16.1
50 (minimum)	11.0	13.4

Table 5

5.12 FUNCTIONAL CHECKS

5.12.1 Introduction

The boiler display (1 and 2, fig. 43) normally indicates boiler operating status and boiler flow temperature. Whilst this display is showing the boiler has internally self checked and is operating normally.

The operating status of the boiler is permanently displayed by a series of codes which appear in the status window (2, fig. 43) of the boiler display. This information can be used to carry out a functional check of the boiler DHW and CH operation. Table 6 details the meaning of the status indicators.

5.12.2 Functional check of domestic hot water operation

- Press the central heating temperature  button (3, fig. 43).
- The status display will now show a flashing figure '2' and the central heating temperature setting will be shown in the temperature display (Note: The central heating temperature setting range is from 0 to 12).
- Press the  button to decrease the central heating temperature to '0'.
- Once '0' is displayed, press and hold the central heating temperature button  until the display flashes indicating that the setting has been memorised.
- Approximately 10 seconds after the central heating temperature has been adjusted the boiler display will revert to showing the boiler operating status code and actual boiler flow temperature.

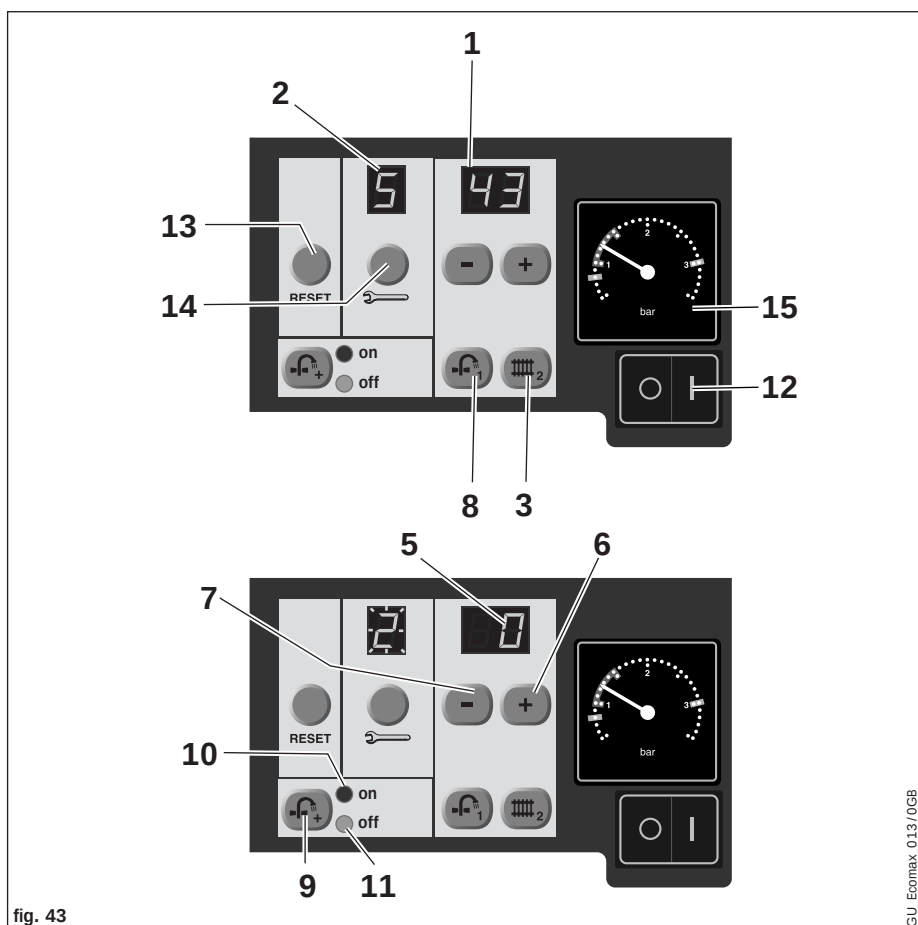


fig. 43

Status code	Boiler operating status
0	External controls not calling for heat
1	Fan running and proving
2	Combustion chamber being purged
3	Ignition
4	Boiler operating in heating mode
5	Boiler operating in DHW mode
6	Boiler shut down on CH or DHW thermostat
7	Pump overrun
8	Anti-cycling mode
9	Frost protection mode

Table 6

5 COMMISSIONING

- Turn on a hot water tap and draw water at high rate.
- The boiler display will now step through the status codes in the sequence shown in Table 7.
- Turn off the hot water tap. The burner will be extinguished and the display will step through the codes in the sequence shown in Table 8.
- By stepping correctly through these codes the boiler has demonstrated correct functioning for DHW.

Note: In order to cool the appliance and allow the next functional check to be carried out, turn off the main on/off switch and open a hot water tap for 2 to 3 minutes.

5.12.3 Functional check of domestic hot water operation (warmstart mode)

Note: ECOMax 800 combination boilers incorporate a warmstart facility that keeps the domestic hot water heat exchanger hot, providing an instantaneous delivery of domestic hot water. When the warmstart facility is activated, the boiler will automatically light periodically to maintain the internal boiler temperature at approximately 40 °C.

- The boiler is supplied with the warmstart facility turned off.
- To turn on the warmstart facility, press the warmstart  button (9, fig. 43). The green 'On' indicator will now illuminate (10, fig. 43).
- The boiler will automatically light for about 15 to 20 seconds to raise the internal boiler temperature to approximately 40°C. During this time the boiler will step through the status codes in the sequence shown in Table 9.

Status code	Boiler operating status	Approx. duration
0	External controls not calling for heat	---
1	Fan running and proving	3 s
2	Combustion chamber being purged	3 s
3	Ignition	5 s
5	Boiler operating in DHW mode	As long as tap is open

Table 7

Status code	Boiler operating status	Approx. duration
5	Boiler operating in DHW mode (displayed before tap is turned off)	As long as tap is open
2	Combustion chamber being purged	5 s
7	Pump overrun	30 s
0	External controls not calling for heat	---

Table 8

Status code	Boiler operating status	Approx. duration
0	External controls not calling for heat	---
1	Fan running and proving	3 s
2	Combustion chamber being purged	3 s
3	Ignition	5 s
5	Boiler operating in DHW mode	approx. 20 s
2	Combustion chamber being purged	5 s
7	Pump overrun	30 s
0	External controls not calling for heat	---

Table 9

- To turn off the warmstart facility, press the warmstart  button (9, fig. 43). The red 'Off' indicator will illuminate.
- By stepping correctly through these codes the boiler has demonstrated correct functioning for the warmstart facility.

5.12.4 Functional check of central heating operation

- Press the central heating temperature button  (3, fig. 43).
- The status display will now show a flashing figure '2' and '0' will be shown in the temperature display (Note: The central heating temperature setting range is from 0 to 12).
- Press the  button to increase the central heating temperature.
- **Once the desired temperature has been set, press and hold the central heating temperature button  until the display flashes indicating that the setting has been memorised.**
- Turn on all external controls (room thermostat, timer etc.).
- The boiler will now light and the display will step through the status codes in the sequence shown in Table 10.
- Turn the external controls off. The burner will be extinguished and the display will step through the status codes in the sequence shown in Table 11.

Status code	Boiler operating status	Approx. duration
0	External controls not calling for heat	—
1	Fan running and proving	3 s
2	Combustion chamber being purged	3 s
3	Ignition	5 s
4	Boiler operating in CH mode	As long as external controls are calling for heat

Table 10

Status code	Boiler operating status	Approx. duration
4	Boiler operating in CH mode (Before external controls turned off)	As long as external controls are calling for heat
2	Combustion chamber being purged	5 s
7	Pump overrun	5 mins
8	Anti-cycling mode	5 mins
0	External controls not calling for heat	—

Table 11

Note: The anti-cycling economiser ensures that energy wasteful short cycling of the boiler cannot occur, by preventing the boiler igniting for a pre-set period of 5 minutes after central heating operation. The hot water operation is not affected by the control and hot water can be drawn at anytime. To temporarily override the anti-cycling control turn the main boiler on/off switch to the off position '0' and then back to the on position '1' after a few seconds.

- By stepping correctly through these codes the boiler has demonstrated correct functioning for CH.

5 COMMISSIONING

5.13 CHECKING FLAME SUPERVISION DEVICE

Operate boiler and turn off gas supply at boiler gas service valve. The boiler should attempt to relight for approximately 5 seconds before shutting down. The boiler will attempt re-ignition five times after which fault code F21 will be displayed on the diagnostic display. Open the gas service valve and press the reset button (13, fig. 43). The boiler should now relight.

5.14 FINAL SYSTEM FLUSH ('HOT')

Turn on the boiler for central heating and allow the boiler and system to reach temperature. Check that the heating system is watertight. Turn the boiler off and rapidly drain both boiler and system while still hot (A drain point is provided on the boiler, see Section 7.1.4 'Releasing CH water pressure and drain the boiler').

Refill the system and release all air as described in Section 5.4. Release water from the system until the system design pressure of 1.2 bar is attained.

(The actual reading on the pressure gauge (15, fig. 43) should ideally be 0.5 bar plus an additional pressure corresponding to the highest point of the system above the base of the boiler - 10 m head equals and additional 1 bar reading on the pressure gauge. The minimum pressure should not be less than 1 bar in any installation.)

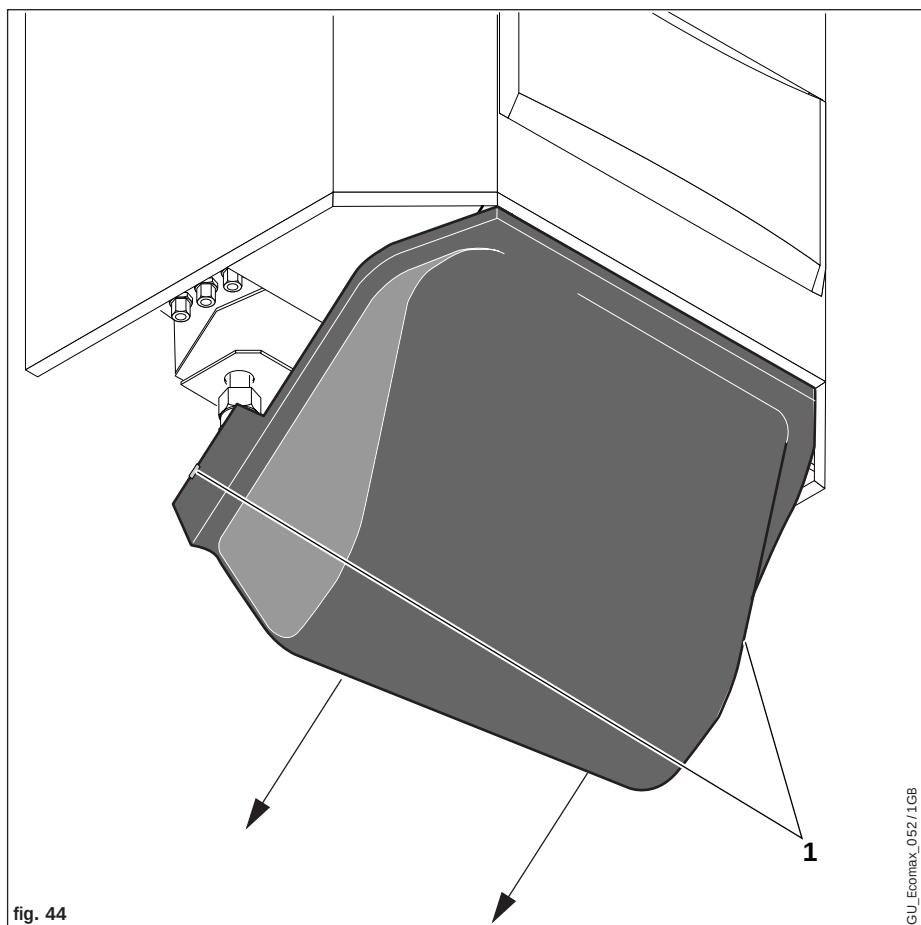
If the system is to be treated with an inhibitor it should be applied at this stage. Sentinel X100 is suitable for this purpose and it should be applied in accordance with the manufacturers instructions.

Further information can be obtained from Sentinel, Betz Dearborn Ltd.,
Tel : 0151 4951861.

Disconnect the temporary filling connection.

5.15 FITTING THE BOTTOM COVER

- Slide the front edge of the bottom cover into the lip at the front bottom edge of the appliance chassis (fig. 44)
- Carefully push the rear of the bottom cover upwards until the spring retaining clips (1, fig. 44) engage at the side of the appliance.



5 COMMISSIONING

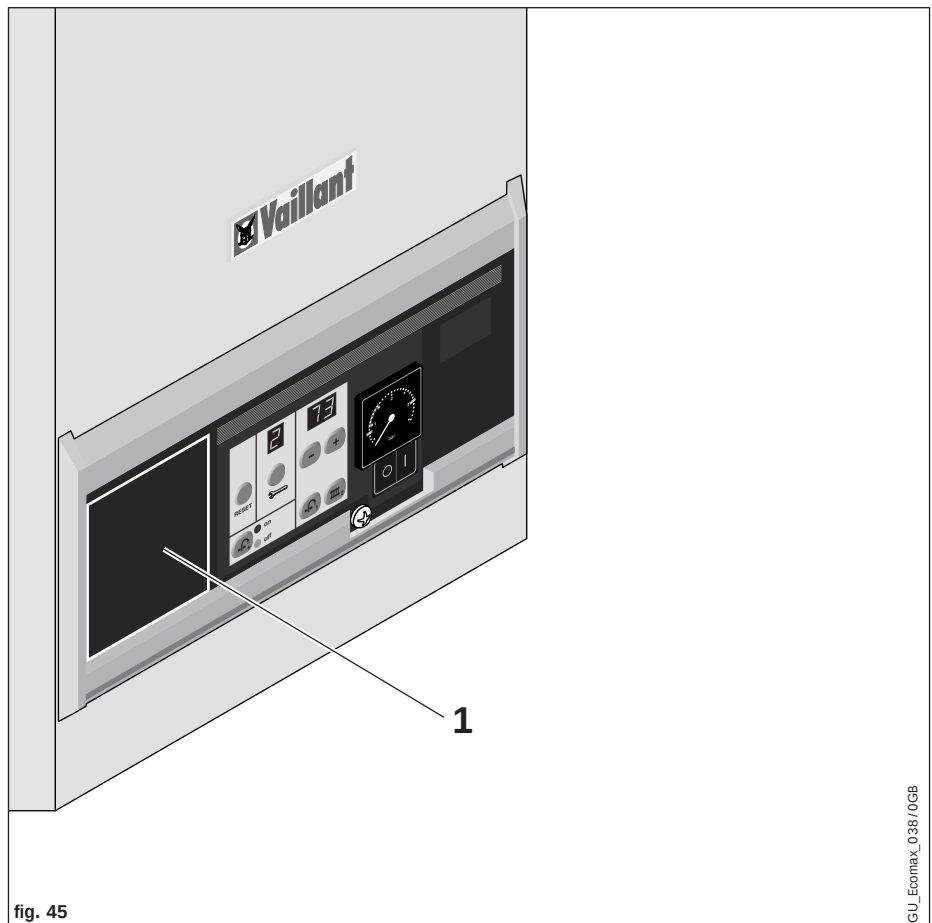
5.16 HAND OVER TO USER

Set the boiler to the customers requirements and explain the safe and efficient operation of the appliance.

ECOMax 800 boilers have an advanced multifunctional boiler display which provides key information during commissioning, operation and fault finding (fig. 45a).

When the main on/off control is in the position 'I', the display will normally show a code which represents the operating status of the boiler in the status window (1, fig. 45a) and the actual boiler flow temperature in the temperature window (2, fig. 45a). This shows that the boiler is functioning correctly.

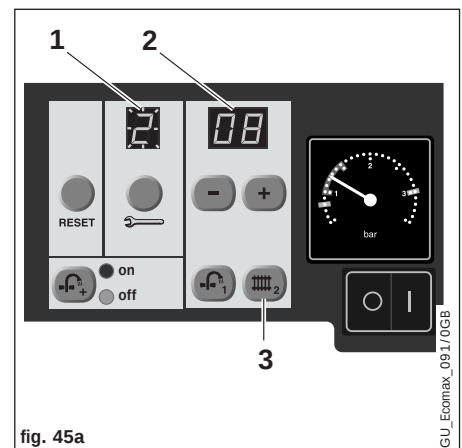
In the unlikely event of a fault developing which prevents the boiler from operating the display will show a fault code. This will appear as either the letter 'F' or the letter 'E' followed by a number. Refer to Section 8 'Fault finding' for full details of the fault codes.



5.16.1 Adjustment of central heating temperature

To adjust the maximum central heating temperature

- Press the central heating temperature button  (3, fig. 45a).
 - The status display will now show a flashing figure '2' and the central heating temperature setting will be shown by the temperature display. (Note: The central heating setting range is from 0 to 12).
 - Press the  button to increase the central heating temperature or the  button to decrease the central heating temperature. The following settings may be used as a guide:
- Spring and autumn: 6 - 7,
- Winter (normal): 8 - 9,
- Winter (severe): 9 - 12

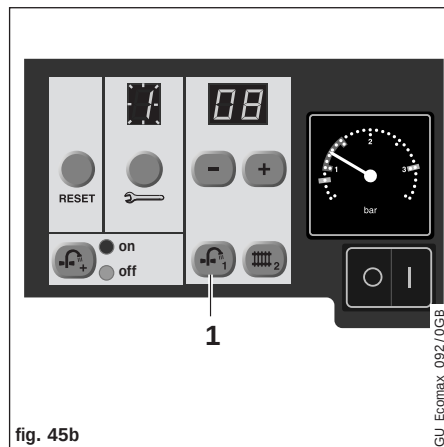


- Once the desired temperature has been set, press and hold the central heating temperature button until the display flashes indicating that the setting has been memorised.
- Approximately 10 seconds after the central heating temperature has been adjusted the boiler display will revert to showing the boiler operating status code and the actual boiler flow temperature.

5.16.2 Adjustment of domestic hot water temperature

To adjust the maximum domestic hot water temperature:

- Press the domestic hot water temperature button  (1, fig. 45b).
- The status display will now show a flashing figure '1' and the domestic hot water temperature setting will be shown in the temperature window. (Note: the DHW temperature setting range is from 1 to 12, setting 1 is minimum and setting 12 is maximum).
- As a guide for normal circumstances the maximum domestic hot water temperature should be set to 8.
- Press the  button to increase the domestic hot water temperature or the  button to decrease the domestic hot water temperature.
- **Once the desired temperature has been set, press and hold the hot water temperature button until the display flashes indicating that the setting has been memorised.**
- Approximately 10 seconds after the domestic hot water temperature has been adjusted the boiler display will revert to showing the boiler operating status code and the actual boiler.



Note: The control adjusts the **maximum** domestic hot water temperature. If adjusting the control upwards appears to have no effect on the temperature then the boiler is already operating at full output for the selected flow rate. If hotter water is required, the flow rate should be reduced by partially closing the hot water tap.

5 COMMISSIONING

5.16.3 Warmstart facility

ECOmax 800 boilers incorporate a warmstart facility which provides an instantaneous delivery of domestic hot water from the boiler (When the warmstart system is switched off, a short delay may be experienced in obtaining hot water at the tap). When the warmstart facility is activated, the boiler will automatically light periodically in order to maintain the internal temperature of the boiler at approximately 40 °C.

5.16.3.1 To turn on the warmstart facility

Press the warmstart button  (9, fig. 43) once. The green 'On' indicator (10, fig. 43) illuminates to show that the warmstart facility is in operation.

5.16.3.2 To turn off the warmstart facility

Press the warmstart button  (9, fig. 43) once. The red 'Off' indicator (11, fig. 43) illuminates to show that the warmstart facility is turned off.

5.16.4 Switching off the central heating

Normally the central heating will be switched off by the external heating system controls. However, if required, for example in the summer months, the central heating can be turned off at the boiler in the following way:

- Press the central heating temperature button  (3, fig. 43)
- The status display will now show a flashing figure '2' and the central heating temperature setting will be shown in the temperature display. (**Note:** the central heating setting range is from 0 to 12).
- Press the  button (7, fig. 43) to decrease the central heating temperature to '0'.
- **Once '0' is displayed, press and hold the central heating temperature button until the display flashes, indicating that the setting has been memorised.**
- The central heating is now switched off but the boiler will continue to provide domestic hot water whenever a hot water tap is opened.
- Approximately 10 seconds after the central heating temperature has been adjusted the boiler display will revert to showing the boiler status code and the actual boiler flow temperature.

5.16.5 Switching on the central heating

- Press the central heating temperature button  (3, fig. 40)
- The status display will now show a flashing figure '2' and '0' will be shown in the temperature display. (**Note:** the central heating setting range is from 0 to 12).
- Press the  button (6, fig. 43) to increase the central heating temperature.
- **Once the desired temperature has been set, press and hold the central heating temperature button until the display flashes indicating that the setting has been memorised.**
- Approximately 10 seconds after the central heating temperature has been adjusted the boiler display will revert to showing the boiler status code and the actual boiler flow temperature.

5.16.6 Main on/off switch (12, fig. 43)

A main on/off switch is provided on the control panel.

5.16.7 Boiler Reset Button (13, fig. 43)

When central heating or hot water is required the boiler will automatically ignite and start to operate. If automatic ignition does not occur within a safety period of 5 seconds the boiler will shut down. After five attempts to ignite the code 'F21' appears in the boiler display.

A further ignition attempt can only take place after the boiler reset button (RESET) (13, fig. 43) has been pressed.

If the boiler fails to light after pressing the reset button contact your installer or Vaillant Service Solutions.

5.16.8 Diagnostic Button (14, fig. 43)

ECOmax 800 appliances have a built in diagnostic system which assists during commissioning and fault finding. The diagnostic system is accessed using the  button (14, fig. 43). Refer to the Section 8. Fault finding for further information.

Unless the diagnostic mode has been entered, as detailed in Section 8, this button has no function.

Advise the user that the boiler has an internal frost protection, and in very cold weather may therefore operate automatically to prevent damage to itself.

Show the user how to operate any external controls.

Explain to the user the importance of having the boiler regularly serviced by a competent servicing company. To ensure regular servicing it is strongly recommended that arrangements are made for a maintenance agreement. Please contact Vaillant Service Solutions (FREEPHONE 0870 6060777) for further details.

Leave the user instructions in the purpose provided pocket on the front of the control panel (1, fig. 45).

Leave the installation and service instructions with the user.

6 SERVICING

To ensure the continued safe and efficient operation of the boiler it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once per year should be adequate. It is law that all servicing work is carried out by a competent person (Corgi registered).

Important: Before starting any maintenance work :

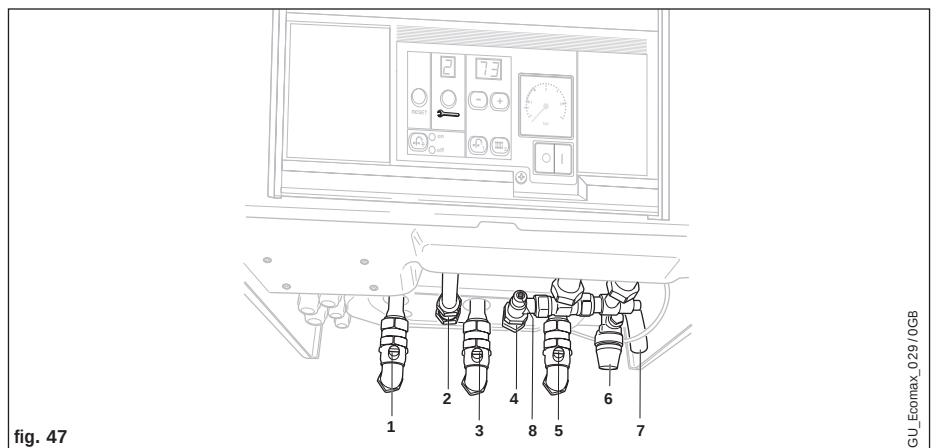
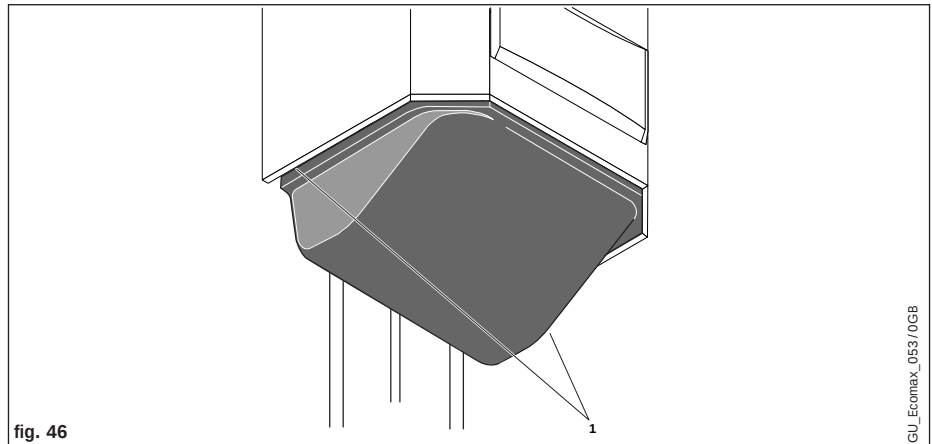
- Isolate the mains electricity supply by disconnecting the plug at the socket outlet (if there is only an isolating switch remove the fuse from the switch).
- Turn off the gas supply at the gas service valve fitted to the boiler.
- Always test for gas soundness and always carry out functional checks after any service work and after exchanging any gas carrying component.
- Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after exchanging any electrical component.

Note: The boiler is fitted with a combustion analysis test point (2, fig. 53). A suitable combustion analyser can be connected to this point to establish the combustion performance of the boiler. A CO₂ figure of 9% ±1% can be expected with the front casing fitted.

6.1 INITIAL INSPECTION

Before commencing any servicing or maintenance work, carry out an initial inspection of the system as follows:

- Inspect the flue, pipework and electrical connections for indications of damage or deterioration.
- Inspect the air supply and ventilation arrangements of the installation, ensuring that the requirements of Section 3.5. are met.



- Check the heating and water system, in particular the condition of radiator valves, evidence of leakage from the heating system and dripping hot water taps.

6.2 ROUTINE MAINTENANCE

6.2.1 Turn off the boiler

6.1.1 Functional check of boiler operation

- Carry out a functional check of the boiler operation as detailed in Section 5.12.
- Remove the appliance casing as detailed in Section 6.2.2, and operate the boiler by fully opening a hot water tap. Inspect the burner operation through the viewing window. Check that the flames are evenly covering the surface of the burner. Inspect for signs of excessive flame lift or sooting.

- Isolate the electrical supply to the boiler.
- Remove boiler bottom cover by releasing the two spring retaining lugs (1, fig 46) and lowering the rear of the bottom cover. Gently pull the bottom cover backwards to remove from the appliance.
- Turn off the gas service valve (3, fig. 47).
- Turn off the boiler CH service valves (1, 5, fig. 47).
- Turn off the cold water inlet service valve (8, fig. 47).

6.2.2 Remove front case

- Lower control panel cover.
- Remove screw (1, fig. 48).
- Release the front case spring retaining clips located beneath the front edge of the appliance (fig. 49).
- Remove the front casing by easing forward the bottom edge and gently lifting (fig. 50).

6.2.3 Remove burner (fig. 51)

- Lower electronic control box by removing screw (1, fig. 30).
- Lift and remove control panel cross member (1, fig. 51).
- Remove screw (2, fig. 51) and disconnect air inlet pipe (3, fig. 51).
- Disconnect gas supply from gas valve by undoing union (5, fig. 51).
- Disconnect HT lead and earth lead from spark electrode (6, fig. 51).
- Remove five nuts from burner manifold (4, fig. 51).
- Pull forward complete burner, gas valve and fan assembly.
- Disconnect two electrical connections from fan and gas valve (7 and 8, fig. 51).
- Remove burner, gas valve and fan assembly from boiler.

6.2.4 Inspect burner

- Visually inspect burner for signs of damage or deterioration.
- Ensure a gap of 4 mm exists between the spark electrode and earth probe.
- Check that the burner manifold sealing gasket is in good condition.

6.2.5 Inspect main heat exchanger

With the burner and fan assembly removed it is now possible to inspect the main heat exchanger. Remove any loose deposits from the heat exchanger using a soft brush and jet of water (ensure that water is kept away from all electrical components. Any water used to clean the main heat exchanger will drain through the condensate trap).

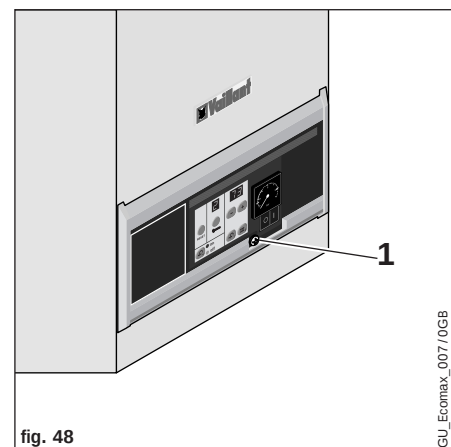


fig. 48

GU_Ecomax_007/0GB

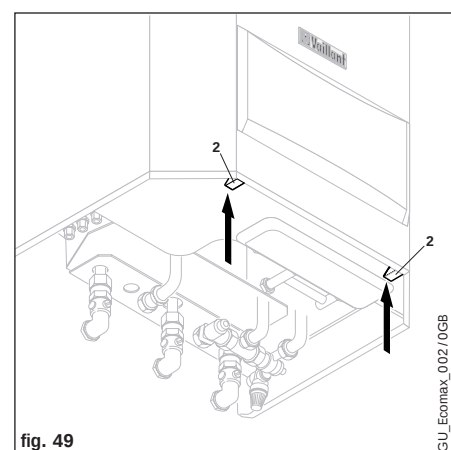


fig. 49

GU_Ecomax_002/0GB

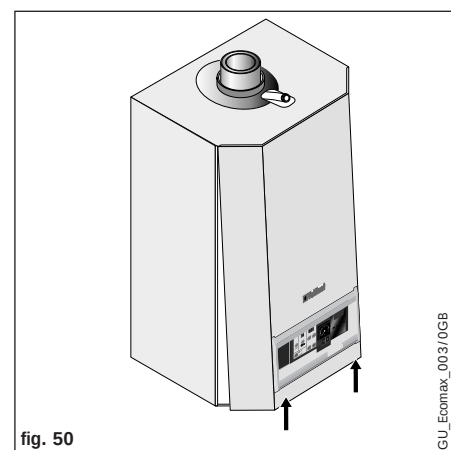


fig. 50

GU_Ecomax_003/0GB

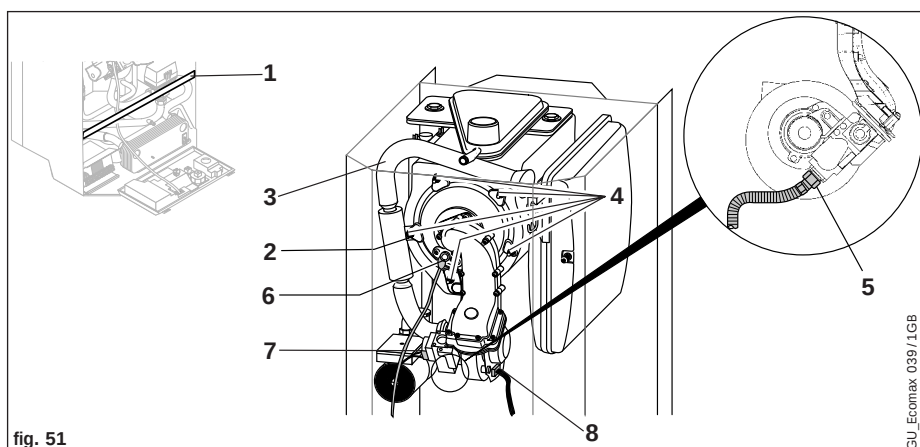


fig. 51

GU_Ecomax_039/1GB

6 SERVICING

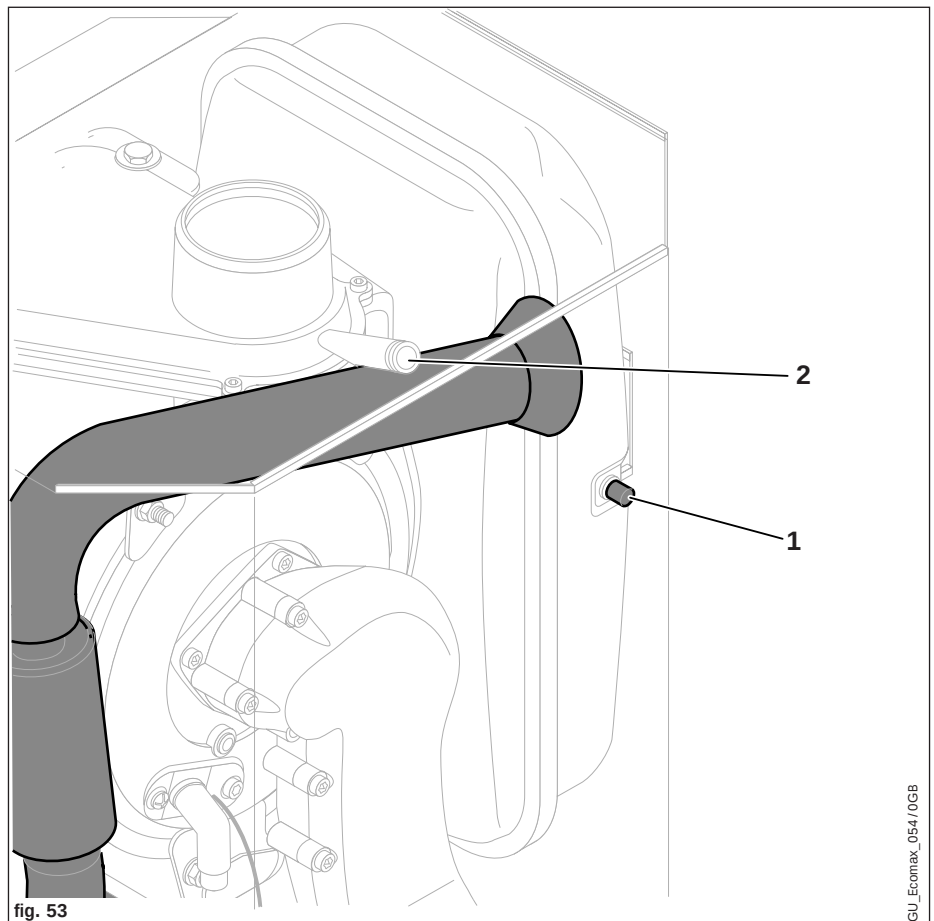
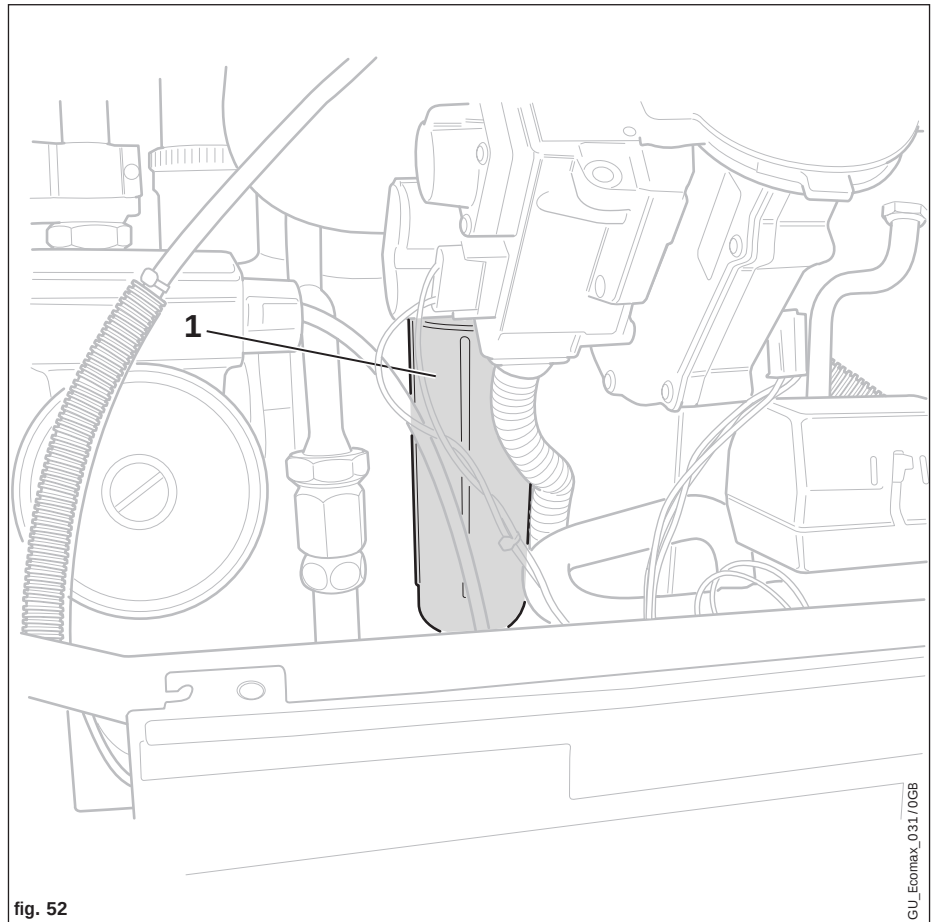
6.2.6 Clean condensate syphon (fig. 52)

Remove the lower part of the condensate trap (1) by unscrewing. Empty contents of trap and clean (ensuring that any debris that has fallen whilst cleaning the main heat exchanger is removed). Refill with water to about 10 mm from the top and refit to boiler.

6.2.7 Check expansion vessel (fig. 53)

Note: It is not necessary to perform this check every year - a check every three years is sufficient.

- Ensure the boiler CH service valves are closed (1 and 5, fig. 47).
- Release the pressure from the boiler as described in Section 7.1.2.
- Remove valve cap from expansion vessel charge point (1).
- Check that the internal charge pressure of the expansion vessel is between 0.75 and 0.9 bar. If the pressure is lower than this the vessel should be repressurised using an air pump.
- Refit the valve cap.
- Repressurise boiler and heating system if necessary.



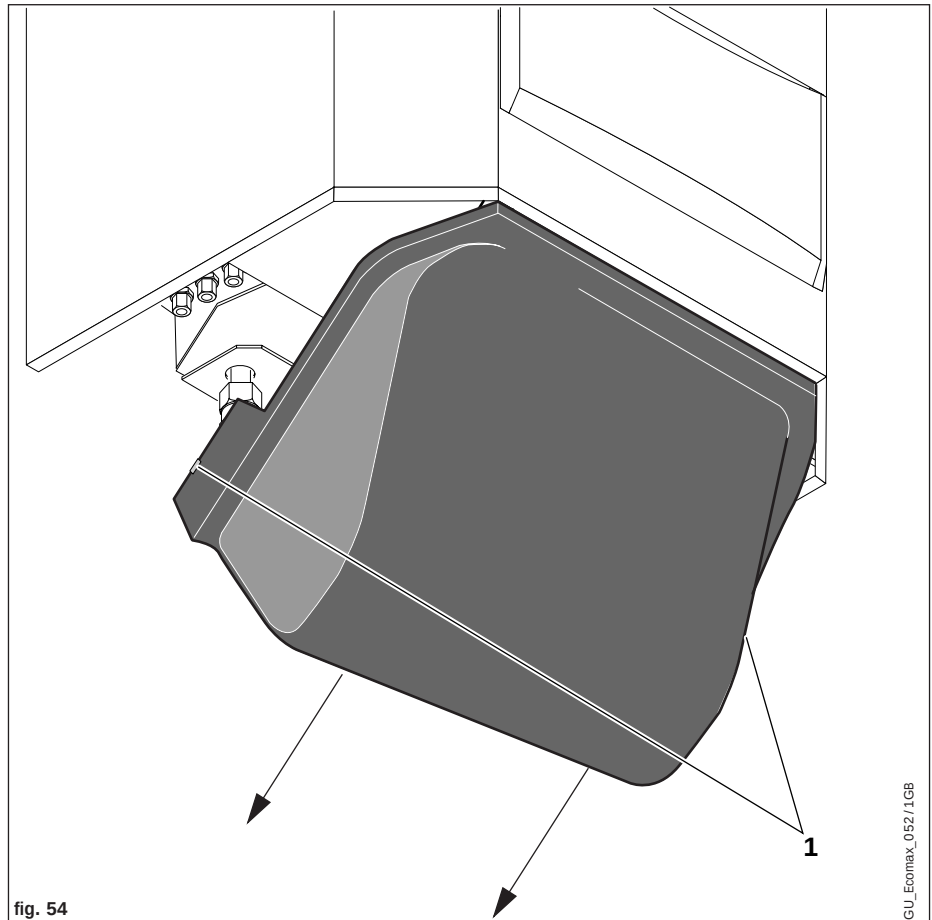
6.2.8 Recommissioning the boiler

- Loosely position the burner, fan and gas valve assembly in place and reconnect the two electrical connections to the fan (7 and 8, fig. 51).
- Refit the burner, fan and gas valve assembly. Ensure that the burner manifold gasket is correctly fitted and that a good seal is obtained.
- Reconnect the gas supply to the gas valve (5, fig. 51), ensuring that a new sealing washer is used and correctly located.
- Turn on the gas supply and test for soundness.
- Reconnect the HT lead and earth lead to the spark electrode (6, fig. 51).
- Refit the air inlet pipe (3, fig. 51).
- Carry out electrical safety checks.
- Turn on the electrical supply.
- Open the boiler CH service valves (1 and 5, fig. 47).
- Carry out function checks of boiler operation as detailed in Section 5.12.
- Check gas rate as detailed in Section 5.9.
- Check water soundness.
- Refit case as detailed in Section 5.10, ensuring that a good seal is obtained.

7 PARTS REPLACEMENT

Important: Before starting any maintenance work:

- Isolate the mains electricity supply by disconnecting the plug at the socket outlet (if there is only an isolating switch remove the fuse from the switch).
- Turn off the gas supply at the gas service valve fitted to the boiler.
- When removing any water carrying components ensure that water is kept away from all electrical components.
- Always test for gas soundness and always carry out functional checks after any service work and after exchanging any gas carrying component.
- Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after exchanging any electrical component.

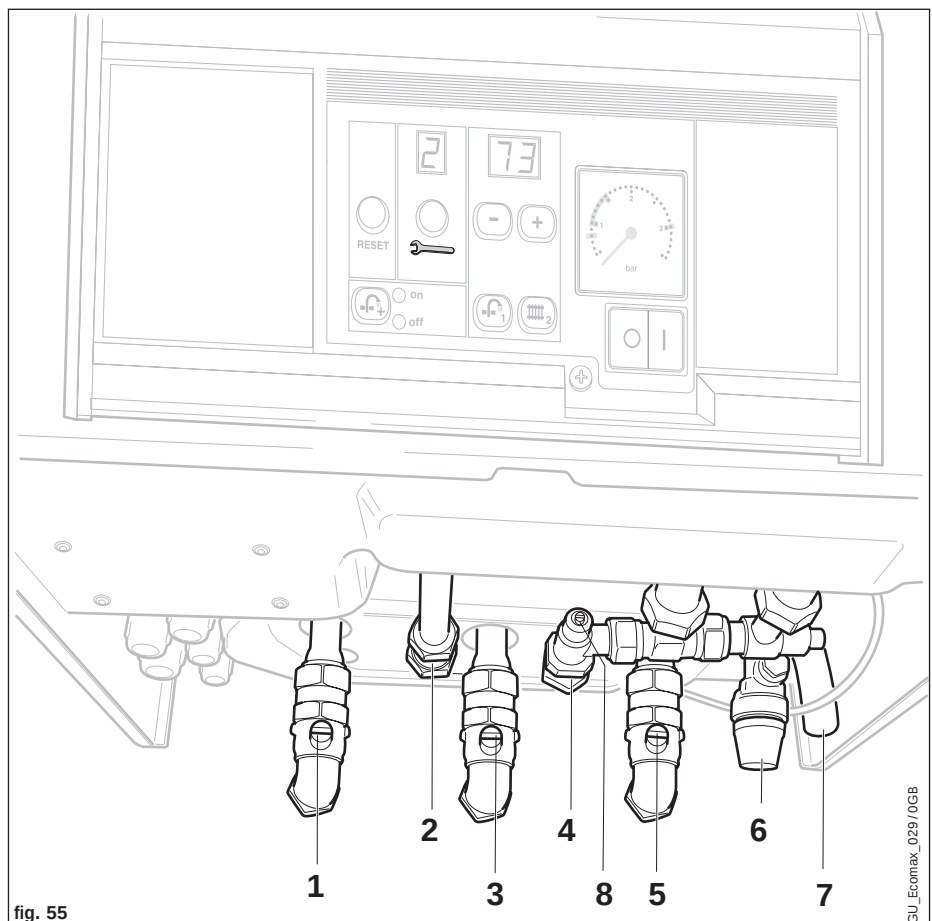


7.1 INITIAL PREPARATION

(These initial preparation procedures need only be carried out where specifically mentioned in the individual component replacement procedures).

7.1.1 Turning off the boiler (fig. 54 and fig. 55)

- Isolate the electrical supply to the boiler.
- Remove boiler bottom cover by releasing the two spring retaining lugs (1, fig 54) and lowering the rear of the bottom cover. Gently pull the bottom cover backwards to remove from the appliance.
- Turn off the gas service valve (3, fig. 55).
- Turn off the boiler CH service valves (1 and 5, fig. 55)).
- Turn off the cold water inlet service valve (8, fig. 55).



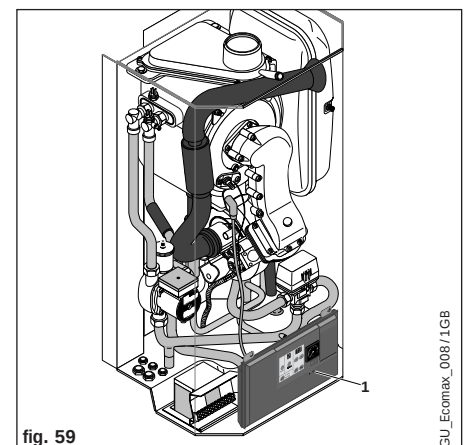
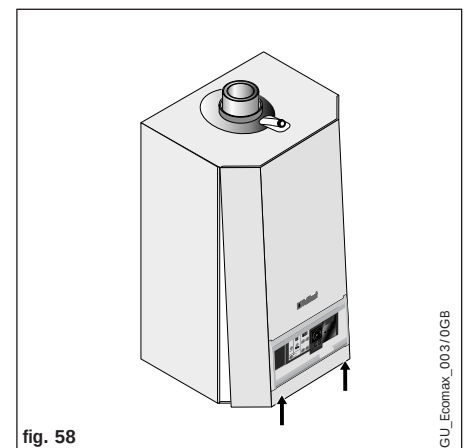
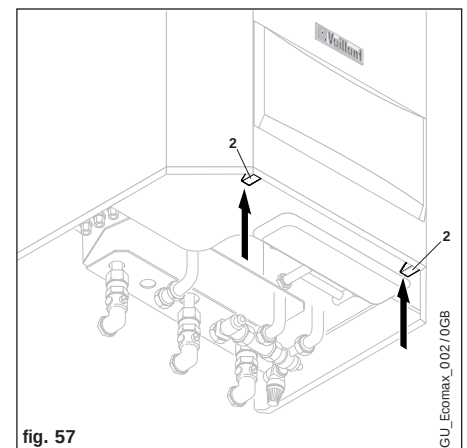
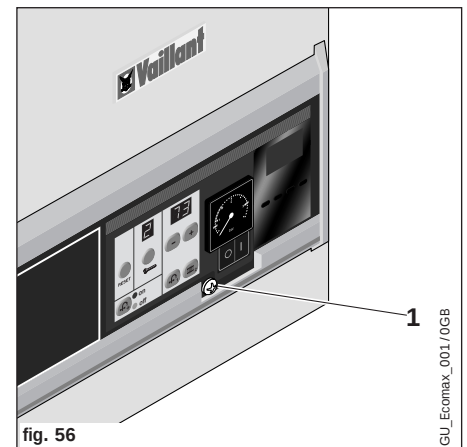
7 PARTS REPLACEMENT

7.1.2 Removal of front casing (fig. 56 - 58)

- Lower control panel cover.
- Remove screw (1, fig. 56).
- Release the front case spring retaining clips located beneath the front edge of the appliance (2, fig. 57).
- Remove the front casing by easing forward the bottom edge and gently lifting (fig. 58).

7.1.3 Lower electronic control box (fig. 59)

- Remove front casing as detailed in Section 7.1.2.
- Remove control box securing screw (1, fig. 59) and lower control box.



7 PARTS REPLACEMENT

7.1.4 Releasing CH water pressure and draining boiler (fig. 60)

- Isolate the electrical supply to the boiler.
- Remove front casing, as detailed in Section 7.1.2.
- Remove boiler bottom cover by releasing the two spring retaining lugs (1, fig 54) and lowering the rear of the bottom cover. Gently pull the bottom cover backwards to remove from the appliance.
- Turn off the CH service valves (1 and 5, fig. 55).
- Lower control box as detailed in Section 7.1.3.
- Attach a length of rubber hose to draining point (1), turn drain point one turn to open and drain water from the boiler into a suitable container.

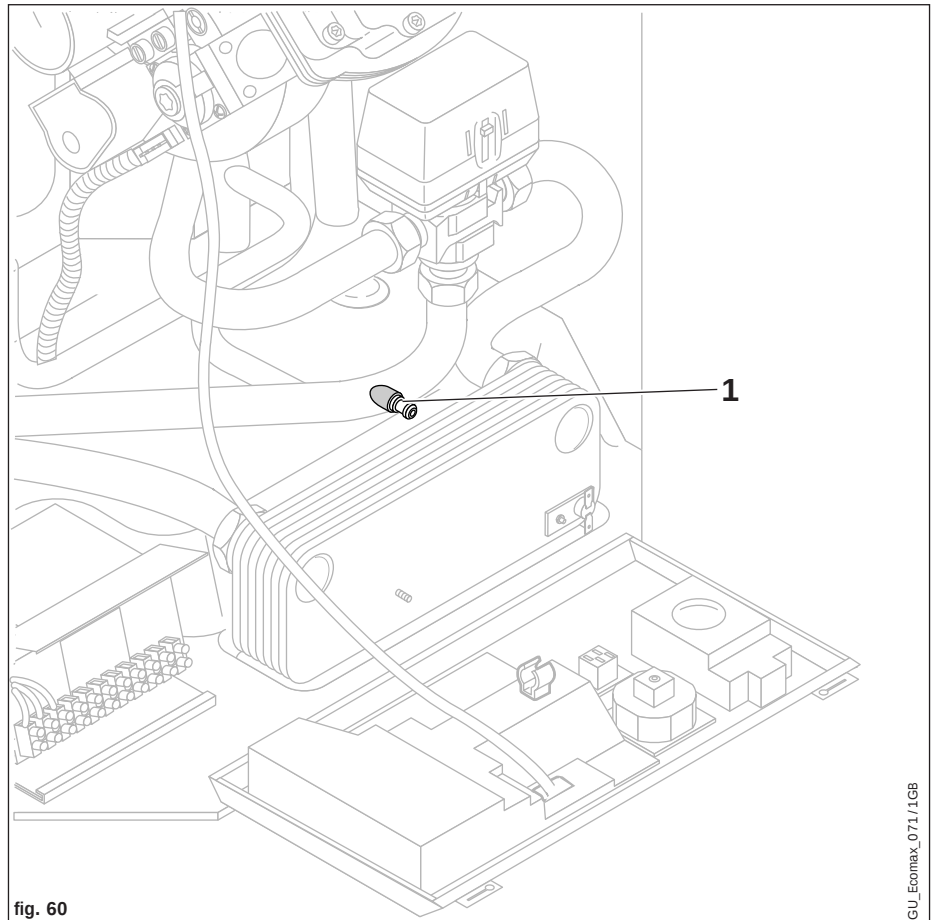


fig. 60

GU_Ecomax_071/1GB

7.2 REMOVAL OF BURNER, GAS VALVE AND FAN ASSEMBLY (FIG. 61)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Lift and remove control panel cross member (1).
- Remove screw (2) and disconnect air inlet pipe (3).
- Disconnect gas supply from gas valve by undoing union (5).
- Disconnect HT lead and earth lead from spark electrode.
- Remove five nuts from burner manifold (4).
- Pull forward complete burner, gas valve and fan assembly.
- Disconnect two electrical connections from fan and gas valve (7 and 8).
- Remove burner, gas valve and fan assembly from boiler (7 and 8).
- Pull forward burner, gas valve and fan assembly to remove from appliance.
- Reassemble in reverse order using new sealing washers.
- Recommission boiler as detailed in Section 5.

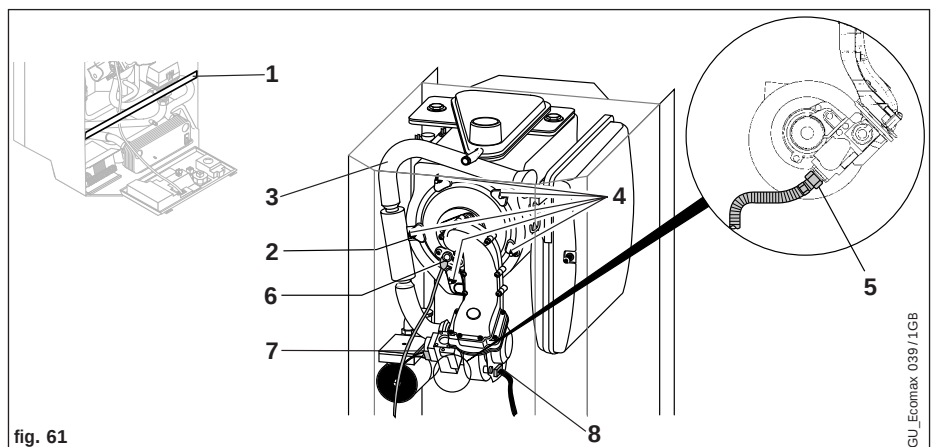
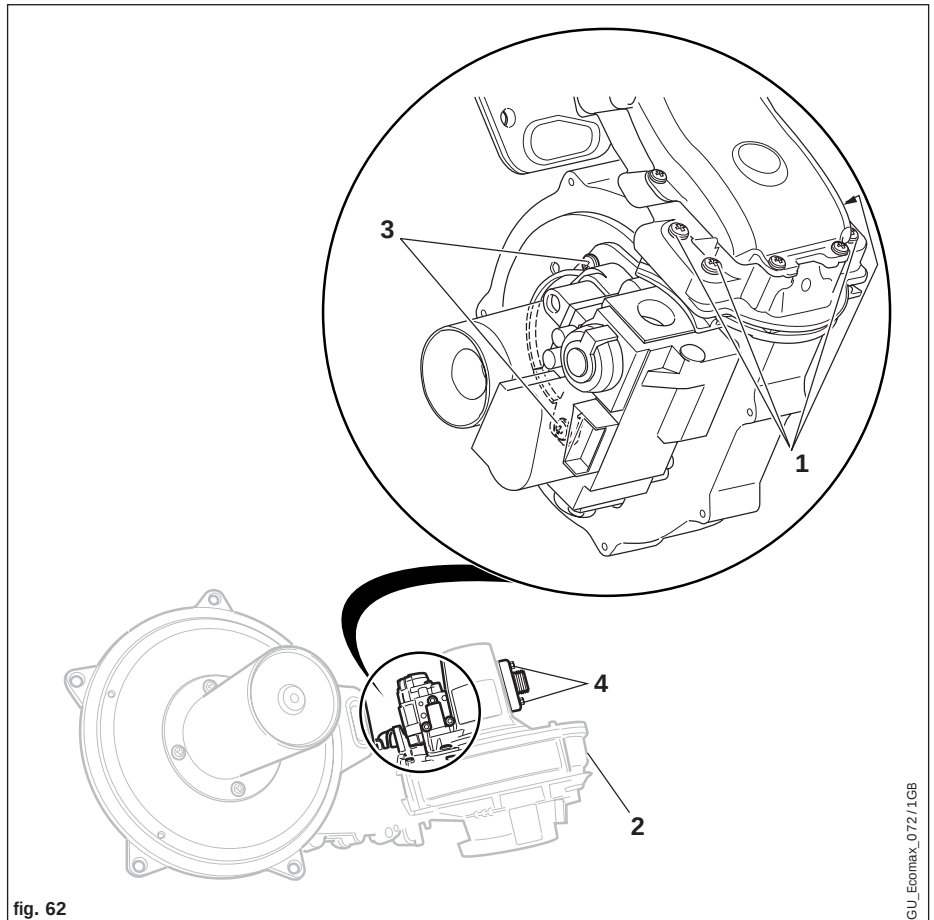


fig. 61

GU_Ecomax_039/1GB

7.3 REPLACEMENT OF FAN (FIG. 62)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Remove burner, gas valve and fan assembly as detailed in Section 7.2.
- Slacken 4 screws (1) but do not fully remove.
- Separate gas valve and fan assembly from burner manifold by sliding gas valve and fan (2) assembly out of retaining clamp.
- Remove 3 screws (3) securing gas valve to fan.
- Fit gas valve to new fan using the new sealing gasket supplied.
- Refit gas valve and fan assembly to burner manifold using the new sealing gasket supplied. Equally tighten the four screws (1) to ensure a good seal is made.
- Reassemble burner, gas valve and fan assembly in reverse order.
- Recommission boiler as detailed in Section 5.



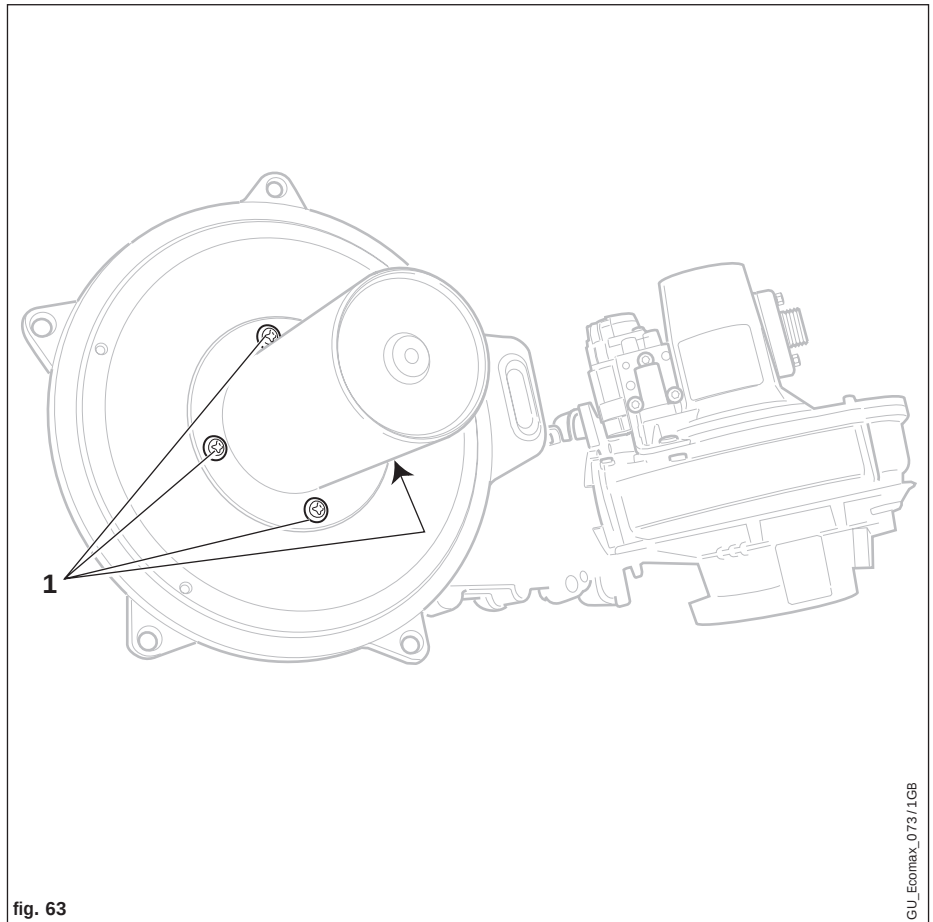
7.4 REPLACEMENT OF GAS VALVE (FIG. 62)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Remove burner, gas valve and fan assembly as detailed in Section 7.2.
- Slacken 4 screws (1) but not fully remove.
- Separate gas valve and fan assembly from burner manifold by sliding gas valve and fan (2) assembly out of retaining clamp.
- Remove 3 screws (3) securing gas valve to fan.
- Disconnect gas inlet supply connection from gas valve by removing four screws (4). Refit the gas inlet supply connection to the new gas valve using the new sealing gasket supplied.
- Fit new gas valve to fan using the new sealing gasket supplied.
- Refit gas valve and fan assembly to burner manifold using the new sealing gasket supplied. Equally tighten the four screws (1) to ensure a good seal is made.
- Reassemble burner, gas valve and fan assembly in reverse order.
- Recommission boiler as detailed in Section 5.
- Check gas rate as detailed in Section 5.9.

7 PARTS REPLACEMENT

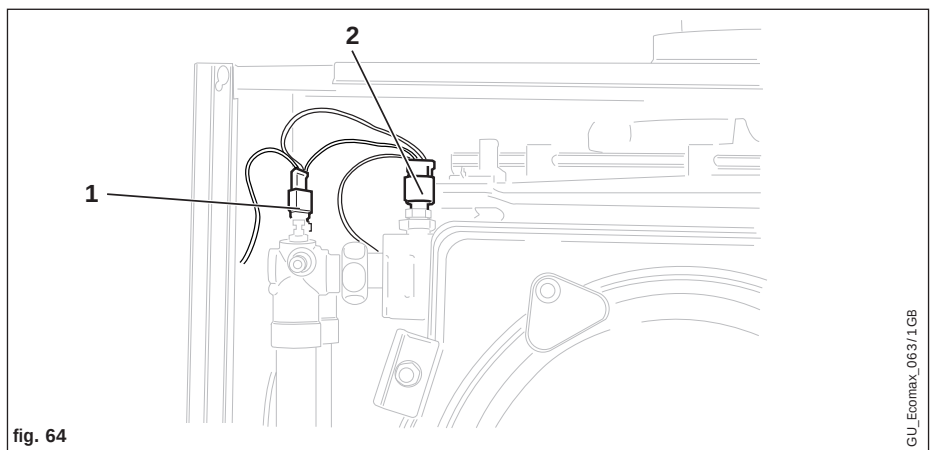
7.5 REPLACEMENT OF BURNER (FIG. 63)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Remove burner, gas valve and fan assembly as detailed in Section 7.2.
- Remove 4 screws (1) securing burner to burner manifold.
- Fit new burner to manifold using the new sealing gasket supplied.
- Reassemble in reverse order, ensuring that the notch in the burner aligns with the burner viewing window.
- Recommission boiler as detailed in Section 5.



7.6 REPLACEMENT OF ELECTRODE (FIG. 67)

- Isolate the boiler from the electrical supply.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Disconnect HT lead and earth wire from electrode (3 and 4, fig. 67).
- Remove two screws (5, fig. 67) and pull forward electrode.
- Fit new electrode using the new sealing gasket supplied.
- Reassemble in reverse order.
- Recommission boiler as detailed in Section 5.

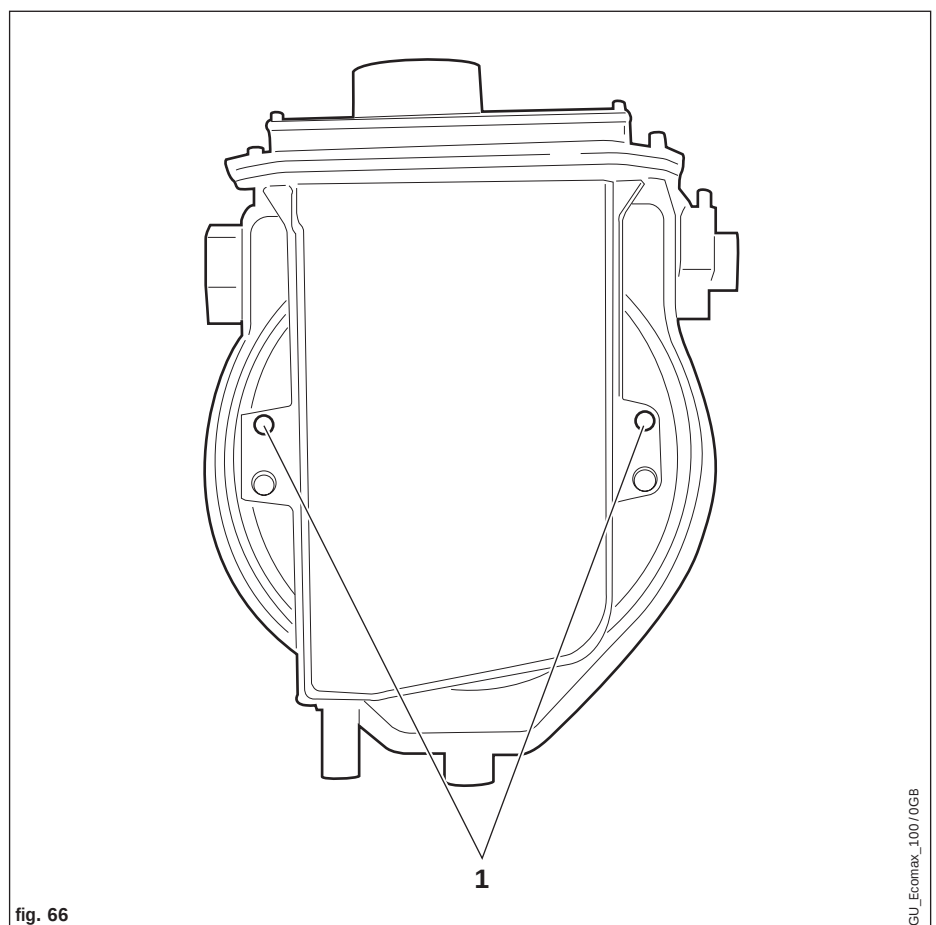
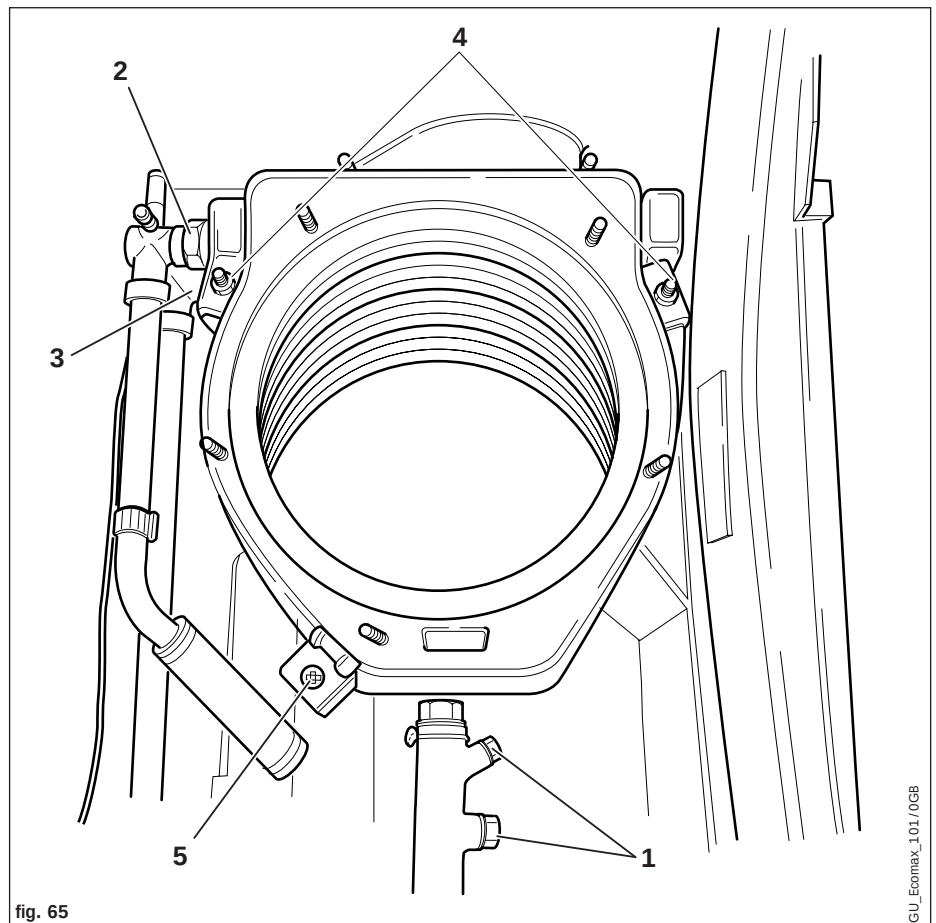


7.7 REPLACEMENT OF TEMPERATURE SENSORS (NTC'S) (FIG. 64)

- Isolate the boiler from the electrical supply.
- Remove front casing as detailed in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Remove screw (2, fig. 61) and disconnect air inlet pipe (3, fig. 61).
- Identify which sensor(s) is to be replaced.
- Pull off connecting wire from sensor.
- Unscrew NTC sensor (1) or (2).
- Replace NTC sensor.
- Reassemble in reverse order.
- Recommission boiler as detailed in Section 5.

7.8 REPLACEMENT OF MAIN HEAT EXCHANGER (FIG. 65)

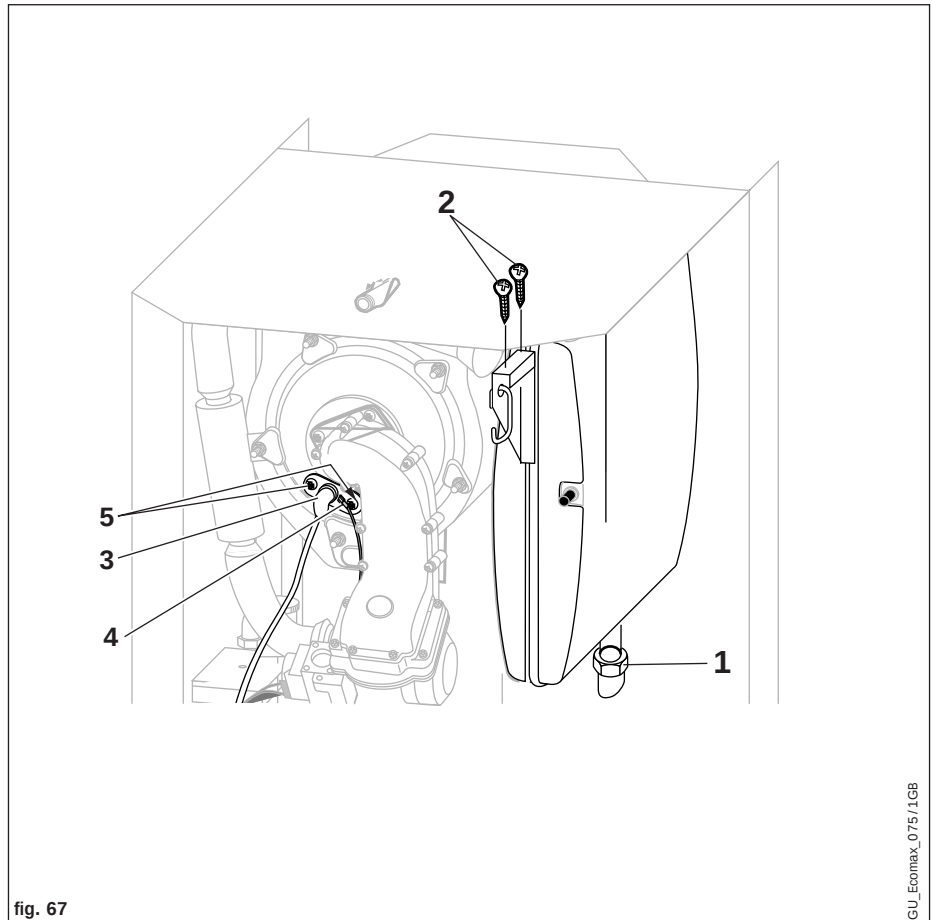
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Remove burner, gas valve and fan assembly as detailed in Section 7.2.
- Disconnect two condensate connection unions (1).
- Disconnect primary flow connection (2) from main heat exchanger. (A flexible connection has been provided in the flow pipe to allow easier access to the return connection. The flow pipe can be carefully eased out of the way by bending at the flexible connection).
- Disconnect primary return connection (3) from main heat exchanger.
- Disconnect flue elbow from boiler.
- Slacken the two securing bolts (4) and rotate clamps away from heat exchanger.
- Fully remove screw and securing clamp (5).
- Pull bottom of heat exchanger forwards and down in order to remove from the boiler.
- Drain any residual water from the heat exchanger.
- Lay old heat exchanger face down and remove two screws (1, fig. 66) securing flue duct to heat exchanger.
- Fit flue duct to new heat exchanger using new sealing gasket supplied.
- Reassemble in reverse order.
- Recommission boiler as detailed in Section 5.



7 PARTS REPLACEMENT

7.9 REPLACEMENT OF CENTRAL HEATING EXPANSION VESSEL (FIG. 67)

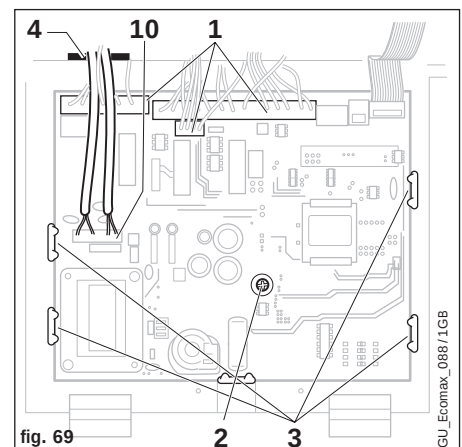
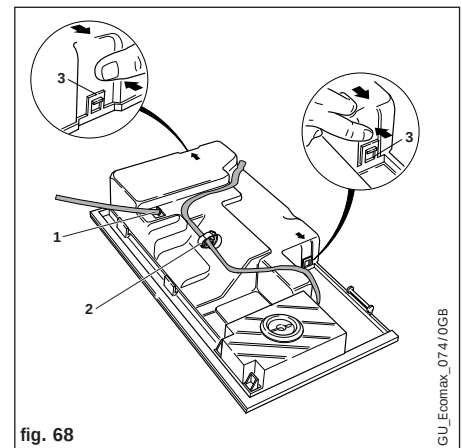
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Disconnect union (1) from expansion vessel.
- Remove two screws (2) and remove retaining bracket.
- Slide the expansion vessel forward to remove from the boiler.
- Reassemble in reverse order.
- Recommission boiler as detailed in Section 5.



7.10 REPLACEMENT OF THE ELECTRONIC CONTROL BOARD (FIG. 68, FIG. 69)

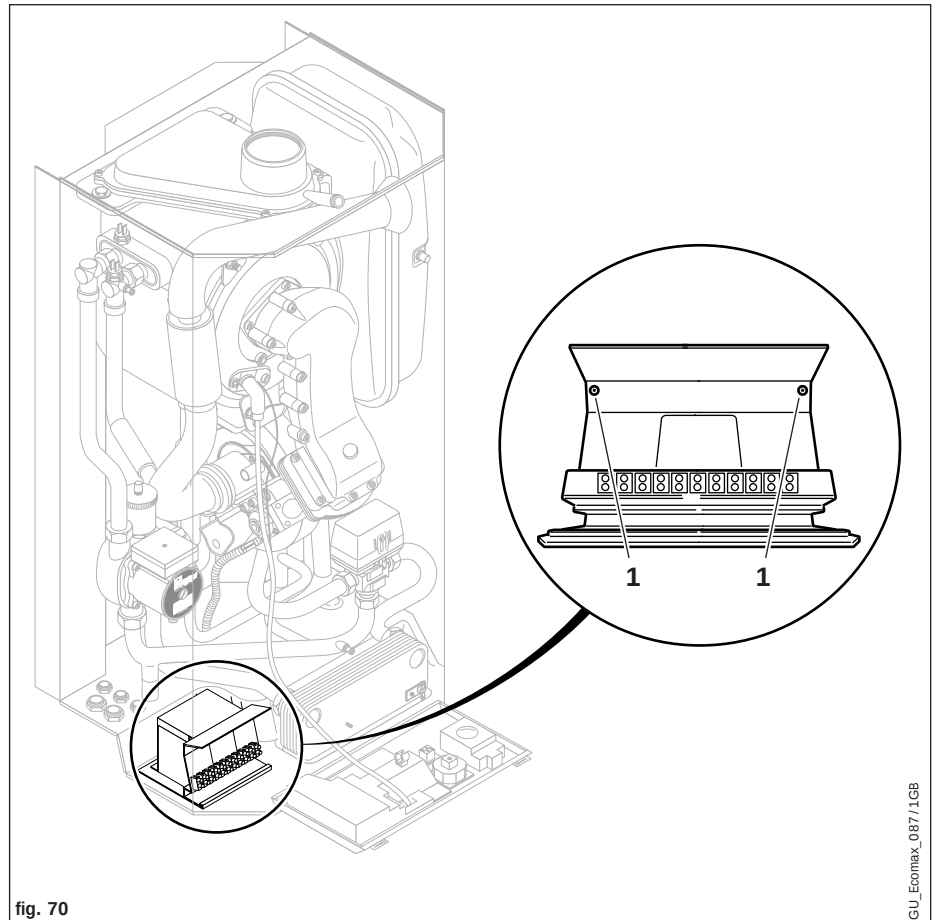
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Disconnect HT lead from rear of control box (1, fig. 68).
- Release mains electrical lead from securing clip on rear of control box (2, fig. 68).
- Release control box rear cover retaining clips (3, fig. 68) by gently easing outwards.
- Carefully lift control box rear cover and remove from boiler.
- Disconnect four connection plugs (1 and 4, fig. 69).
- Remove securing screw (2, fig. 69) from centre of control board.
- Release the spring retaining lugs (3, fig. 69) which hold the board in place.

- Carefully lift out control board.
- Carefully insert the new control board.
- Re-assemble in reverse order taking care that the main transformer leads are correctly located in the cable guides (4, fig. 69).
- Recommission boiler as detailed in Section 5.



7.11 REPLACEMENT OF MAIN TRANSFORMER (FIG. 70)

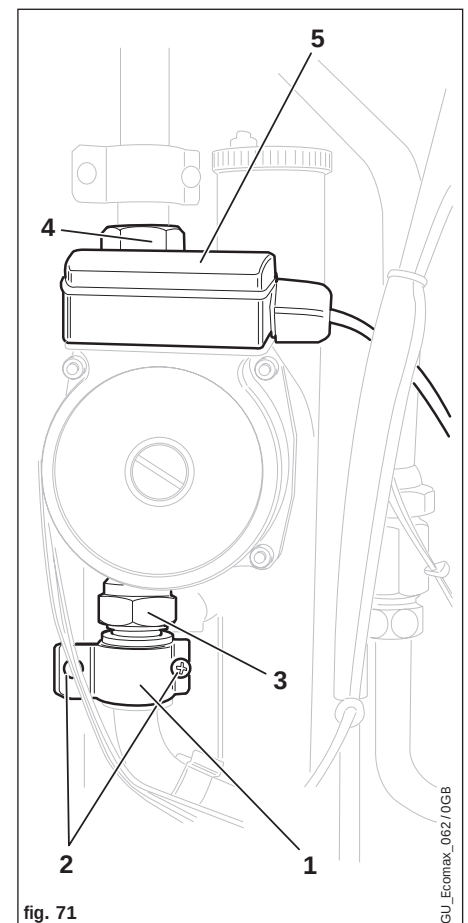
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Disconnect HT lead from rear of control box (1, fig. 68).
- Release mains electrical lead from securing clip on rear of control box (2, fig. 68).
- Release control box rear cover retaining clips (3, fig. 68) by gently easing outwards.
- Carefully lift control box rear cover and remove from boiler.
- Disconnect transformer connection plug (10, fig. 69).
- Remove two screws (1, fig. 70) from transformer housing.
- Tilt forward top of terminal strip mounting plate. Slide bottom of terminal strip mounting plate backwards and lift to allow access to transformer.
- Gently push backwards rear of transformer mounting and pull transformer forward to remove.
- Insert the new transformer and re-assemble in reverse order taking care that the main transformer leads are correctly located in the cable guides (4, fig. 69).
- Re-commission the boiler as detailed in Section 5.



7.12 REPLACEMENT OF PUMP (FIG. 71)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Lift and remove control panel cross member (1, fig. 61).

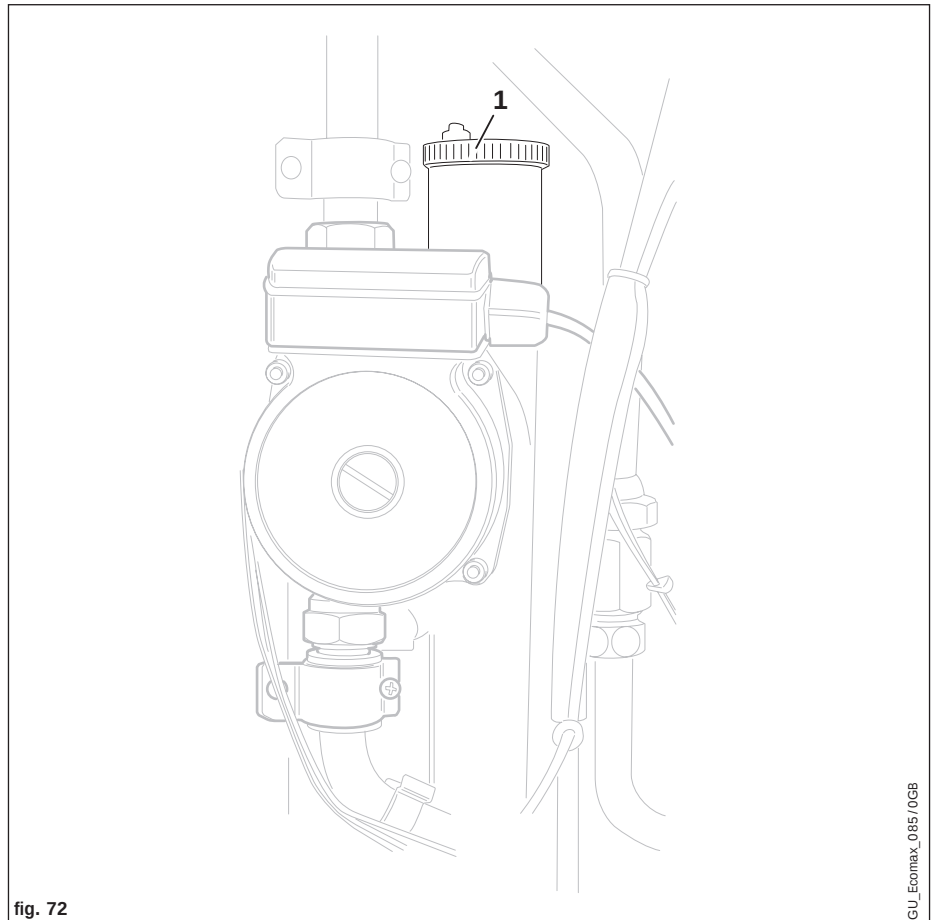
- Remove the lower pump securing bracket (1) by undoing two screws (2).
- Disconnect bottom pump union (3).
- Disconnect top pump union (4).
- Pull pump forward, taking care not to drop water on the control box.
- Remove electrical connection cover from pump by undoing screw (5).
- Disconnect electrical connections from pump.
- Remove automatic air release and fit to new pump.
- Reassemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



7 PARTS REPLACEMENT

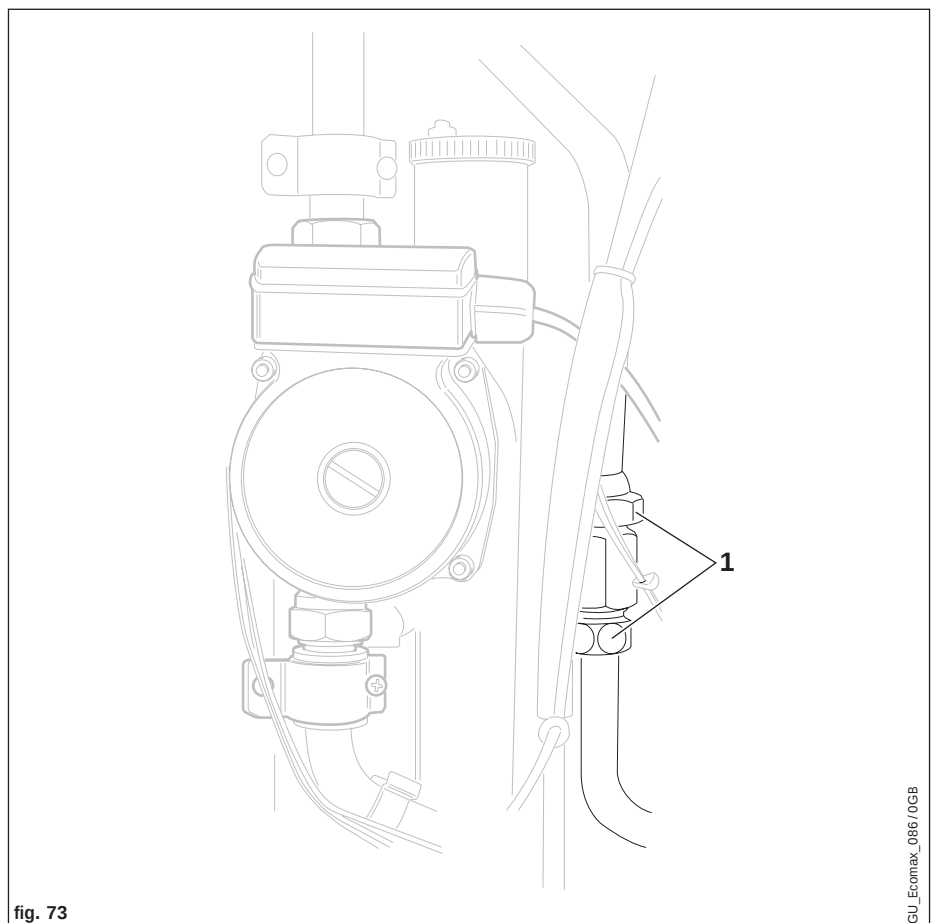
7.13 REPLACEMENT OF AUTOMATIC AIR RELEASE (FIG. 72)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Lift and remove control panel cross member (1, fig. 61).
- Remove screw (2, fig. 61) and disconnect air inlet pipe (3, fig. 61).
- Unscrew cap (1) of the automatic air release and remove inner components.
- Replace with new inner components.
- Reassemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



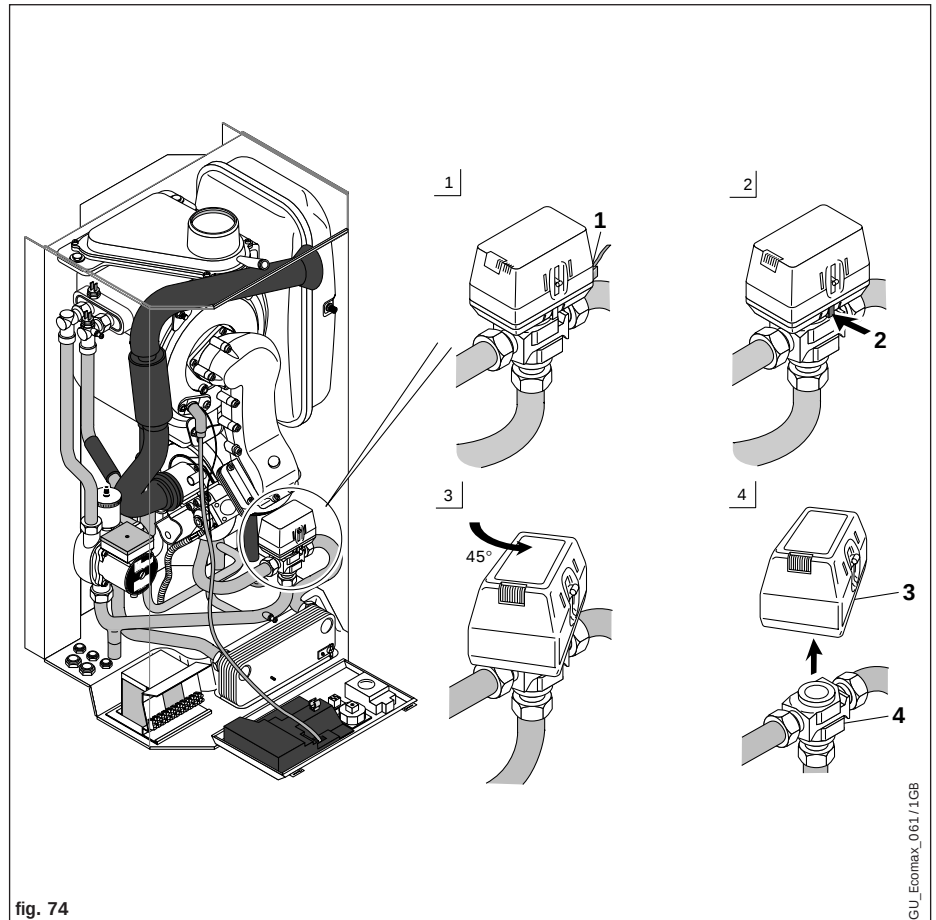
7.14 REPLACEMENT OF AUTOMATIC BY-PASS (FIG. 73)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Lift and remove control panel cross member (1, fig. 61).
- Remove automatic bypass by undoing two unions (1).
- Replace automatic bypass using new sealing washers supplied.
- Reassemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



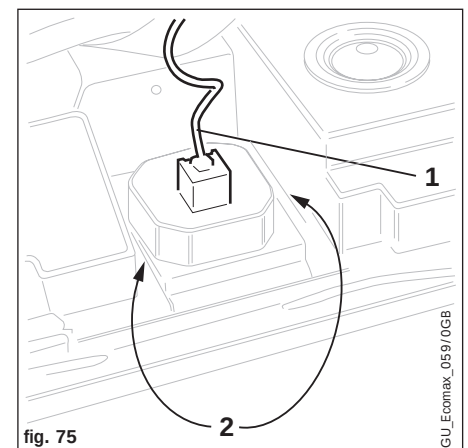
7.15 REPLACEMENT OF DIVERTER VALVE ACTUATOR (FIG. 74)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Disconnect electrical connection plug (1) from diverter valve.
- Push in locking catch (2) and twist diverter valve actuator through 45°.
- Lift diverter valve actuator (3) from valve body (4).
- Re-assemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



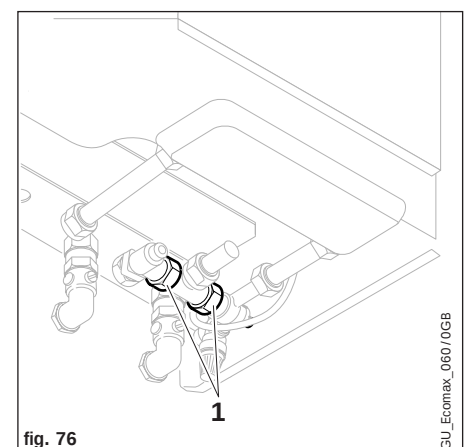
7.16 REPLACEMENT OF PRESSURE GAUGE (FIG. 75)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Disconnect capillary tube union (1) from CH return pipe.
- Gently depress pressure gauge retaining lugs (2) whilst pushing gauge forward and out of control panel.
- Re-assemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



7.17 REPLACEMENT OF WATER FLOW SWITCH (FIG. 76)

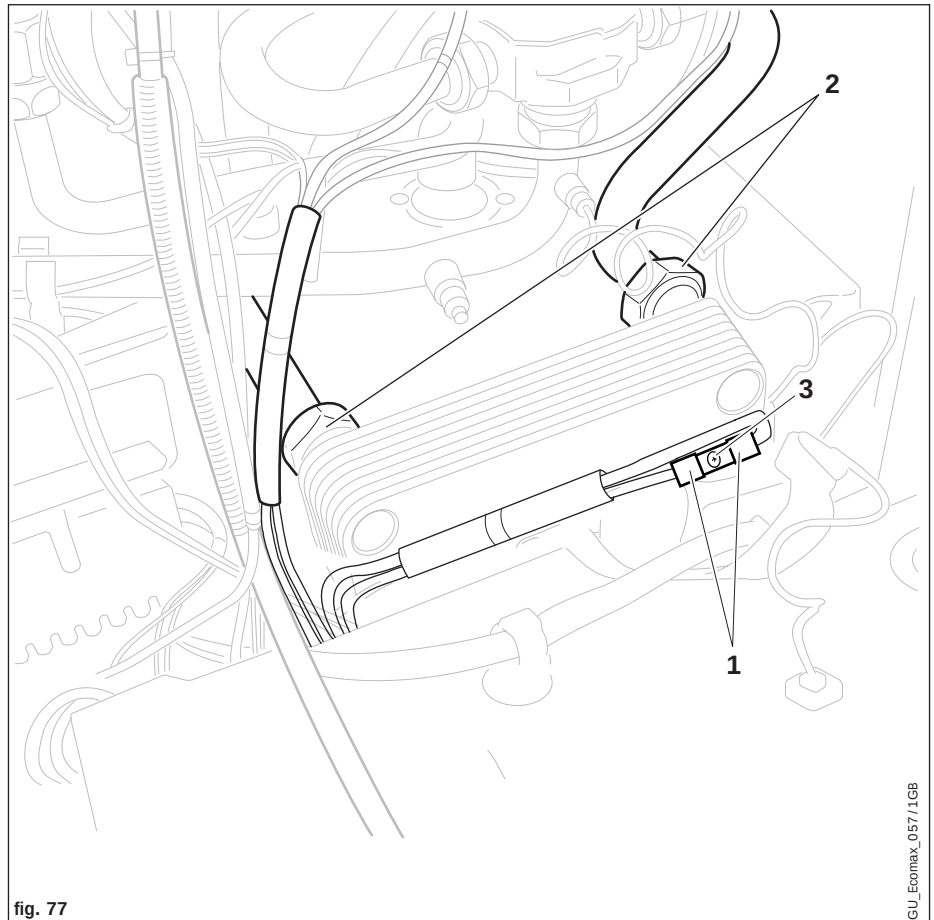
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Open hot water tap to drain DHW system.
- Place a suitable container below the water flow switch to catch any residual water.
- Disconnect microswitch leads from terminal block.
- Disconnect two unions (1).
- Re-assemble in reverse order ensuring that the new sealing washers supplied with the replacement flow switch are correctly located.
- Recommission boiler as detailed in Section 5.



7 PARTS REPLACEMENT

7.18 REPLACEMENT OF DHW HEAT EXCHANGER (FIG. 77, FIG. 78)

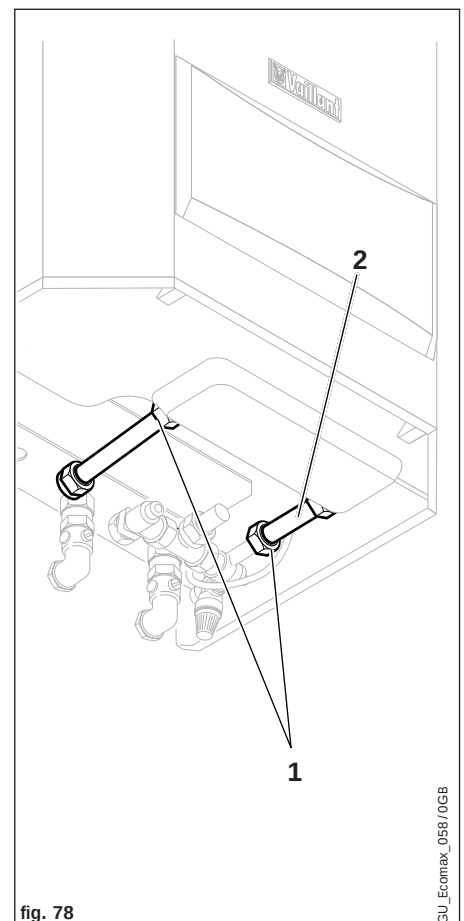
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Open hot water tap to drain DHW system.
- Lift and remove control panel cross member (1, fig. 61).
- Disconnect two wires from NTC sensor (1, fig. 77).
- Disconnect the two unions (2, fig. 77) from the DHW heat exchanger.
- Disconnect the two unions (1, fig. 78) from the DHW heat exchanger.
- Disconnect the water flow limiter (2, fig. 78) from the DHW heat exchanger.
- Lift DHW heat exchanger forward and out of the boiler.
- Reassemble in reverse order. Ensure the new O-Rings supplied are correctly located between the rear of the DHW heat exchanger and combustion chamber. Ensure that a good seal is made between the bottom connections of the DHW heat exchanger and the boiler chassis.
- Re-commission the boiler as detailed in Section 5.



7.19 REPLACEMENT OF DHW NTC SENSOR (FIG. 77)

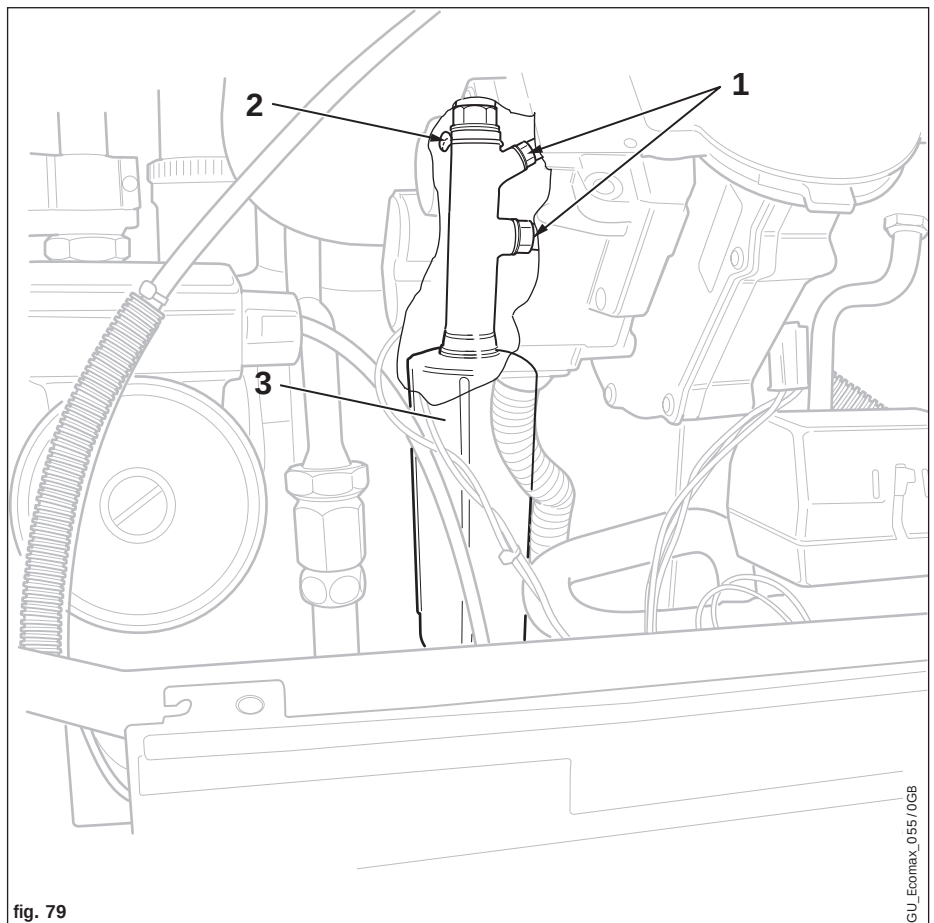
- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Lift and remove control panel cross member (1, fig. 61).

- Disconnect two wires from NTC sensor (1).
- Remove NTC sensor by undoing screw (3) and pulling forward NTC sensor and retaining bracket.
- Remove NTC from retaining bracket.
- Reassemble in reverse order.
- Re-commission the boiler as detailed in Section 5.



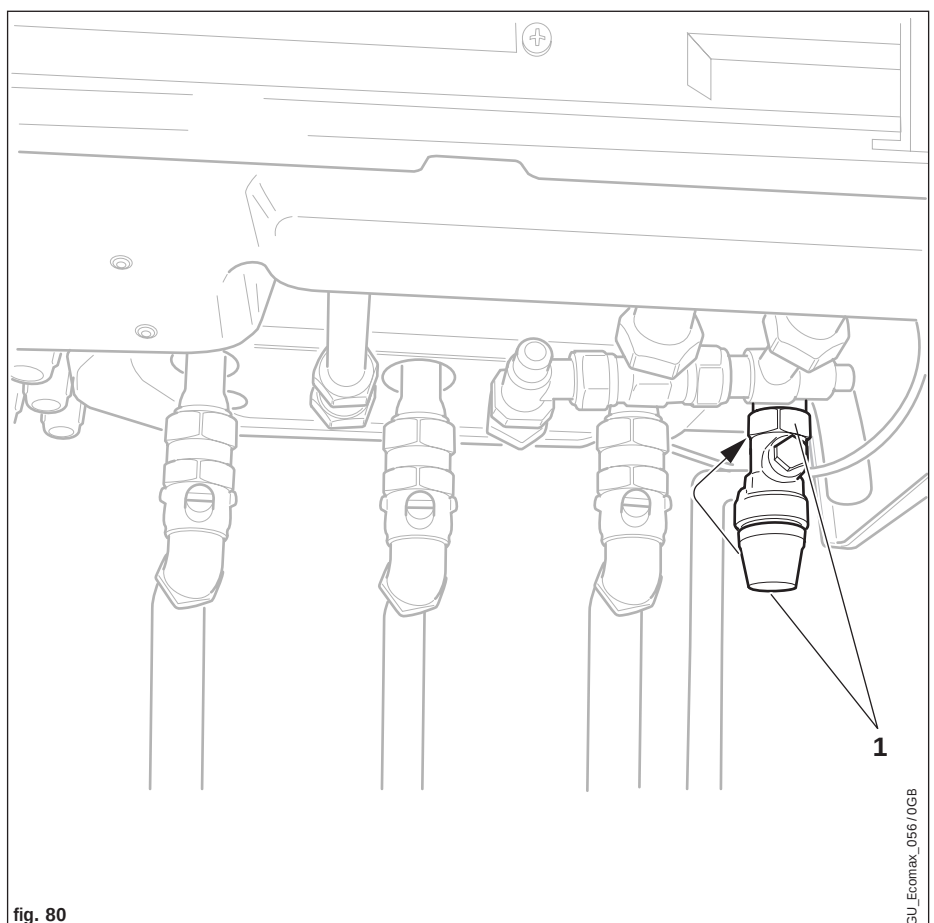
7.20 REPLACEMENT OF CONDENSATE TRAP (FIG. 79)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Lift and remove control panel cross member (1, fig. 61).
- Remove burner, gas valve and fan assembly as detailed in Section 7.2.
- Disconnect two condensate connection unions (1).
- Remove spring retaining clip (2).
- Pull down trap (3) to remove from boiler.
- Re-assemble in reverse order. Ensure that the two sealing rings supplied are correctly fitted to the condensate connections and the trap is refilled with water to about 10 mm from the top.
- Re-commission the boiler as detailed in Section 5.



7.21 REPLACEMENT OF PRESSURE RELIEF VALVE (FIG. 80)

- Turn off boiler as in Section 7.1.1.
- Remove front casing as in Section 7.1.2.
- Lower control box as in Section 7.1.3.
- Drain boiler as in Section 7.1.4.
- Disconnect two unions (1) and lower pressure relief valve.
- Re-assemble in reverse order, ensuring that the sealing washer supplied is correctly fitted.
- Re-commission the boiler as detailed in Section 5.



8 FAULT FINDING

8.1 INTRODUCTION

ECOMax 800 boilers have an inbuilt advanced multifunction diagnostic display (1, fig. 81) to assist with fault finding in the unlikely event of a boiler malfunction.

The display features the following three modes:

8.1.1 Normal Mode

Under normal conditions the boiler display will show the boiler operating status and flow temperature, e.g. 5 and 82 °C (fig. 82). This indicates that the boiler is operating correctly after an internal self check.

The status display is helpful in diagnosing faults where a fault code is not displayed. (See Section 8.4 'Fault diagnosis using the boiler status codes').

8.1.2 Fault Mode

Should a fault develop in the boiler the display will show a fault code indicating what the problem may be. The fault code will appear as a letter, either 'F' or 'E', and two digits, e.g. F21 (fig. 83).

Note: The letter remains static in the display whilst the two digits flash.

8.1.3 Diagnostic Mode

In order to assist with the pinpointing of a particular fault it is possible to use the boiler display in a diagnostic mode to interrogate the boiler about the status of certain components.

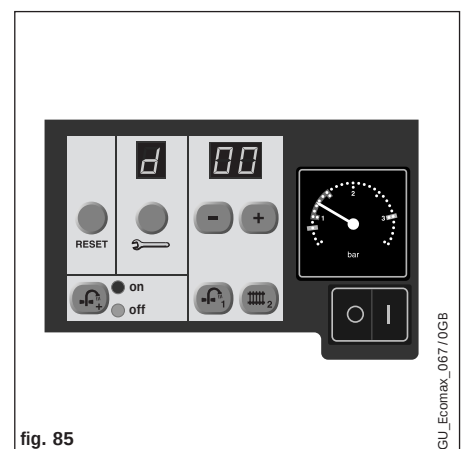
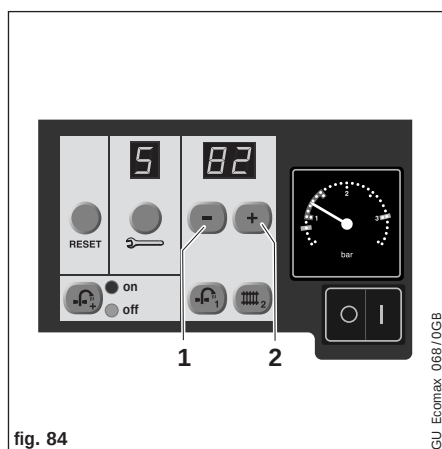
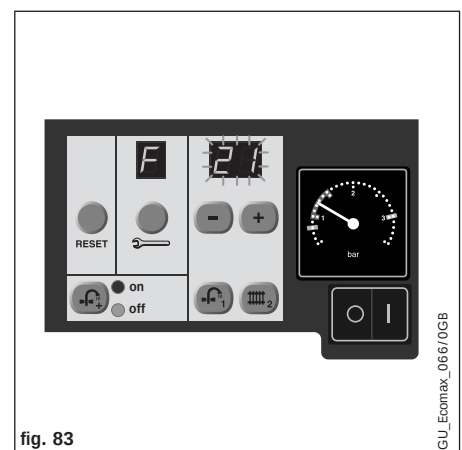
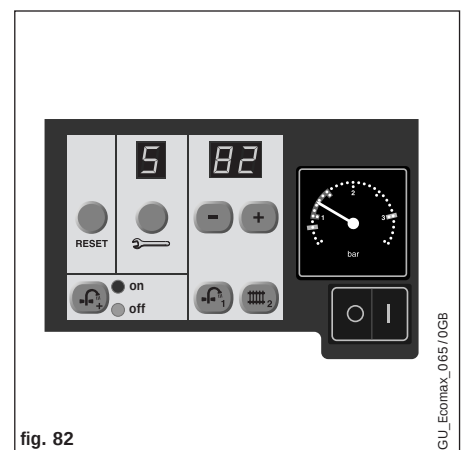
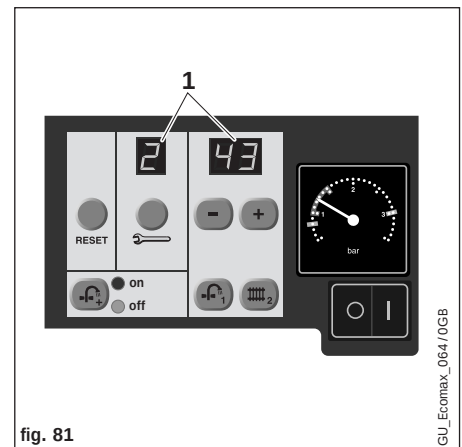
To display the diagnostic mode simultaneously press and release the '+' and '-' buttons (1 and 2, fig. 84). Once the diagnostic mode has been entered the display shows 'd 00' (fig. 85).

Once in the diagnostic mode the required diagnostic code is selected by pressing the '+' or '-' button as appropriate. If the '+' or '-' buttons are held in the display will scroll quickly through all diagnostic codes.

Once the required diagnostic code is displayed, press the  button; this instructs the microprocessor to carry out the particular check and the relevant information is displayed.

To return from a diagnostic enquiry, press the  button again.

Further diagnostic checks can now be carried out (as described above) or press and release both '+' and '-' buttons simultaneously to exit back to the normal mode. (See Section 8.3. 'Fault diagnosis using the boiler fault mode' for further details).



8.2 LOGICAL FAULT FINDING PROCEDURE

8.2.1 These checks must be carried out before attempting to use the fault finding guide:-

1. Carry out electrical safety checks (See Section 5.1 'Preliminary Electrical Checks').
2. Check that the external electricity supply to the boiler is on, and a supply of 230 V~ is present between boiler terminals 'L' and 'N'.
3. Check that the gas supply to the boiler is on, that it has been correctly purged and that an inlet pressure of 20 mbar is available at the gas valve. (See Section 5.2. 'Gas Supply').
4. Ensure the heating system is full of water and charged to between 1 and 1.5 bar. If not, refill and vent the system. (See Section 5.4. 'Filling the heating system'). Ensure boiler flow and return service valves are open. Check condensate trap is filled. (See Section 5.6 'Filling the condensate trap').
5. Check that the main on/off control is set to the 'on' position.
6. Set the central heating temperature to maximum. (See Section 5.16.2. 'Adjustment of maximum central heating temperature').
7. Set the domestic hot water temperature to maximum. (see Section 5.16.3. 'Adjustment of maximum domestic hot water temperature').
8. Check that all external controls are on and calling for heat (if, no external controls are fitted, boiler terminals 3 and 4 must be linked). Check that the boiler anti-cycling economiser is not engaged (See Section 4.8.6. 'Anti-cycling economiser control').

8.2.2 Procedure

Note: Always check the operation of the boiler for central heating first before checking hot water operation. Do not open a hot water tap unless instructed to do so by the fault finding guide.

1. If a fault code is showing in the boiler display go to section 8.3. 'fault diagnosis using the boiler fault mode'.

2. If the boiler is not functioning correctly and a fault code is not showing in the boiler display go to section 8.4. 'fault diagnosis using the boiler status codes'.

3. **Note:** If the boiler display is completely blank initially check the two fuses (f1 and f2, fig. 86). (Isolate the electrical supply before checking the fuses). (Spare fuses are located on the inside of the control box rear cover).

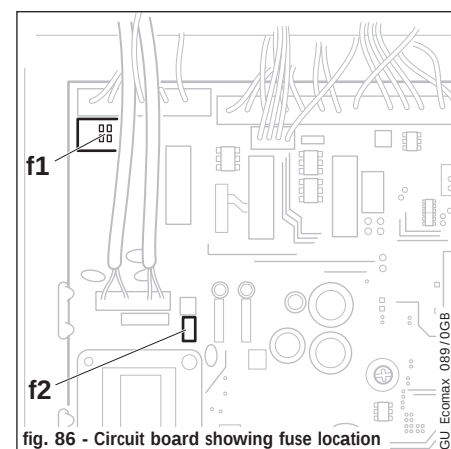


fig. 86 - Circuit board showing fuse location

8 FAULT FINDING

8.3 FAULT DIAGNOSIS USING THE BOILER FAULT MODE.

Note: There are two different letters which may appear as fault code. The letter 'E' denotes that the boiler has detected a fault and that further operation has been blocked for a set period of time before the boiler will automatically re-attempt ignition. The letter 'F' denotes that the boiler has detected a fault and that the RESET button must be pressed before a further ignition attempt can be undertaken.

Fault code	Description of fault	Possible causes
F00	Interruption of flow NTC (NTC1)	1. Loose wire/poor connection to NTC1 – repair as necessary 2. Defective NTC – replace NTC1
F04	Interruption of return NTC (NTC2)	1. Loose wire/poor connection to NTC2 – repair as necessary 2. Defective NTC – replace NTC2
F05	Interruption of DHW heat exchanger NTC (NTC3)	1. Loose wire/poor connection to NTC3 2. Defective NTC – replace NTC3
F10	Short circuit of flow NTC (NTC1)	1. NTC1 connection wire short circuit – repair as necessary 2. Defective NTC – replace NTC1
F14	Short circuit of return NTC (NTC2)	1. NTC2 connection wire short circuit – repair as necessary 2. Defective NTC – replace NTC2
F15	Short circuit of DHW heat exchanger NTC (NTC3)	1. NTC3 connection wire short circuit – repair as necessary 2. Defective NTC – replace NTC3
F20	Shut down by overheat thermostat	Reset by pressing RESET button
F21	Flame failure fault	1. No gas – check availability of correctly purged gas supply 2. HT lead loose/poor connection – repair as necessary 3. Flue restricted or partially blocked – repair as necessary (does d 33 = d 34?) 4. Ignition transformer defective – replace ignition transformer 5. Incorrect/poor earthing of appliance – repair as necessary
F22	Dry fire protection activated	1. No water in primary heat exchanger – repair as necessary 2. RESET button pressed while appliance hot

8 FAULT FINDING

Fault code	Description of fault	Possible causes
F23	Water deficiency protection activated	1. Insufficient water in primary heat exchanger – repair as necessary 2. Lack of pressure in boiler/system – repair as necessary
F26	Flame Simulation	1. Spark electrode/earth probe short circuit – repair as necessary 2. Flame detected with gas valve de-energised – repair as necessary
F32	Lack of air flow through the appliance	1. Fan wire loose/poor connection – repair as necessary (does d 33 = d 34?) 2. Fan failed to reach ignition speed 3. No fan signal
F40	Electrical supply fault	1. 4 A fuse defective after overload/short circuit of 24 V~ circuit 2. Transformer wire loose/poor connection – repair as necessary 3. Transformer defective – replace transformer 4. Gas valve wire loose/poor connection – repair as necessary 5. RESET pressed without fault on appliance – press RESET button 6. Safety shut down caused by internal electronic fault
E11	Temperature comparison error – Appliance blocked	Flow and return NTC's confused – appliance blocked
E12	Water deficiency error – Appliance blocked	NTC1 is hotter than NTC2 by more than 35 °C caused by lack of water in primary heat exchanger or low system pressure – appliance blocked for 150 seconds
E13	Water deficiency error – Appliance blocked	Maximum permissible temperature rise of NTC1 has been exceeded. Appliance blocked for 10 minutes

8 FAULT FINDING

8.4 FAULT DIAGNOSIS USING BOILER STATUS CODES

Note: If a fault code (e.g. F21) is displayed refer to Section 8.3. 'Fault diagnosis using the boiler fault mode'.

8.4.1 Introduction

As the boiler operates, passing through the various stages from initial demand for heat (central heating or DHW) to eventual shut down when heat demand is satisfied, the sequence can be followed by using the boiler status codes.

In the unlikely event that a fault occurs and is not indicated by a displayed fault code, the status codes can be used to help identify the problem or problem area.

8.4.2 Status codes

The status codes are permanently displayed in the status window (1, fig. 87).

Status code	Boiler operating status
0	External controls not calling for heat
1	Fan running and proving
2	Combustion chamber being purged
3	Ignition
4	Boiler operating in heating mode
5	Boiler operating in DHW mode
6	Boiler shut down on CH or DHW thermostat
7	Pump overrun
8	Anti-cycling mode
9	Frost protection mode

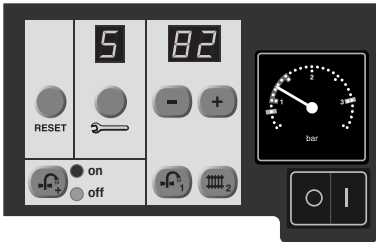
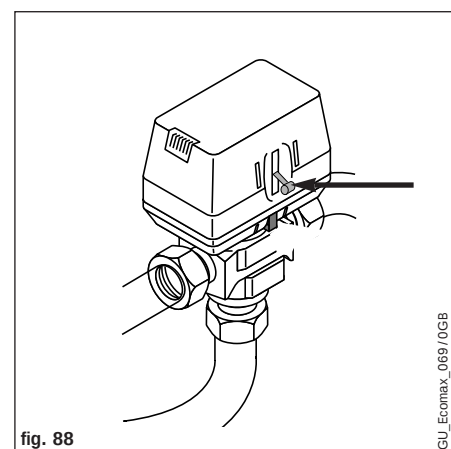


fig. 87

GU_Ecomax_065/0GB

8.4.3 Fault diagnosis using boiler status codes: Central Heating Mode

Symptom : Radiators not getting hot.

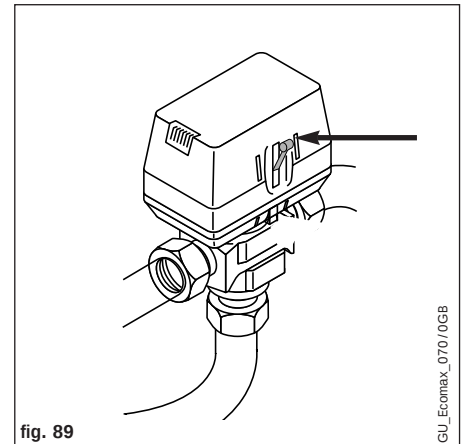


Status code	Description of fault	Possible causes
0	External controls not calling for heat	Check settings of all external controls. If no external controls are fitted, ensure that terminals 3 and 4 are linked.
4	Boiler operating in central heating mode	- Lack of water in primary flow to heating system - Check central heating service valves are fully open - Check heating system is correctly filled and vented of air - Diverter valve not switching to central heating position - Check that diverter valve indicator moves from DHW position to heating position (fig. 88). (does d 35 = 0?) - Check pump is operating (does d 10 = 1?)
6	Boiler shut down on CH thermostat	Maximum radiator temperature set too low – adjust temperature as detailed in Section 5.16.2

8 FAULT FINDING

8.4.4 Fault diagnosis using the boiler status codes: Domestic Hot Water Operation

Symptom : Boiler will not operate for domestic hot water production.



Fault code	Description of fault	Possible causes
0	No demand for domestic hot water production	- Poor mains water inlet pressure / water flow - Check availability of adequate mains water supply to boiler (see Section 2.1. 'Technical Data'). - Check and clean inlet water filter - If above checks are satisfactory, replace flow switch
5	Boiler operating in DHW mode	- Lack of water in primary flow to heating system - Appliance gas supply partially blocked or undersized - Diverter valve not switching to DHW position (does d 35 = 1?) - Check heating system is correctly filled and vented of air - Check gas rate at meter, check gas supply pipework - Check pump is operating (does d 10 = 1?) - Check that diverter valve indicator moves from CH position to DHW position (fig. 89).
6	Boiler shut down on DHW thermostat	Maximum domestic hot water temperature set too low – adjust temperature as detailed in Section 5.16.3

9.1 FUNCTIONAL FLOW DIAGRAM

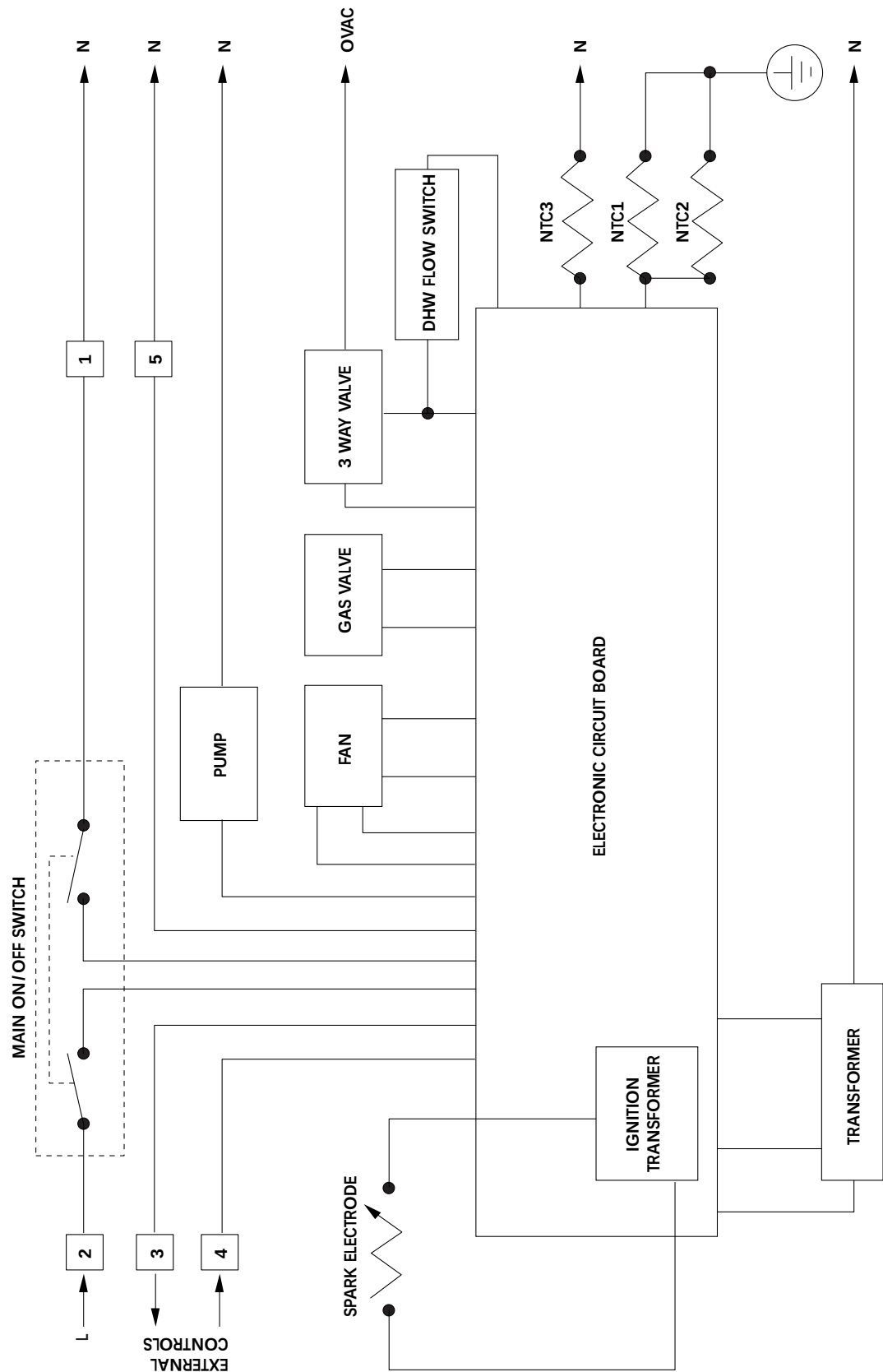


fig. 90

9 ELECTRICAL DIAGRAMMS

9.2 WIRING DIAGRAM

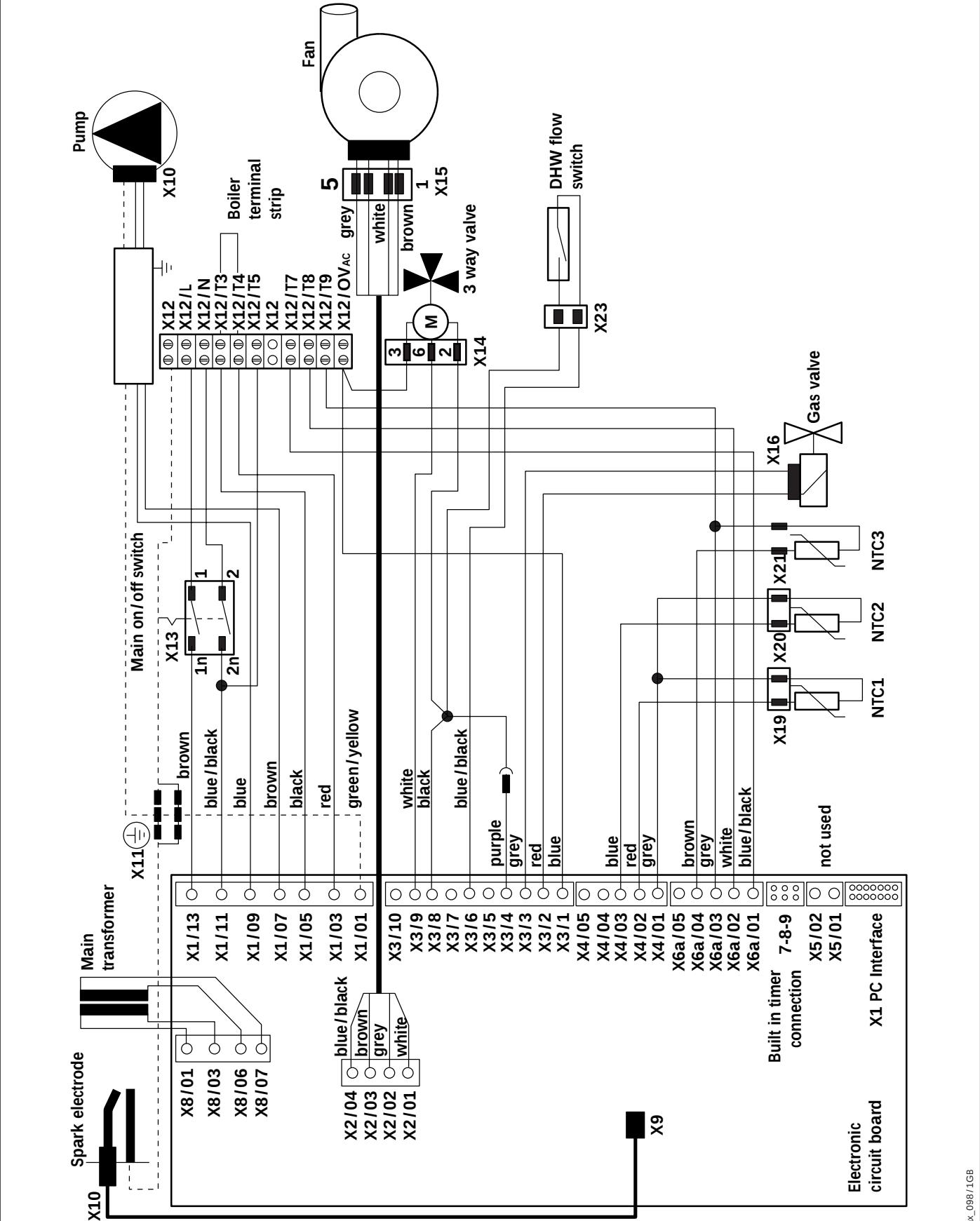


fig. 91

9.3 SCHEMATIC APPLIANCE CIRCUIT DIAGRAM

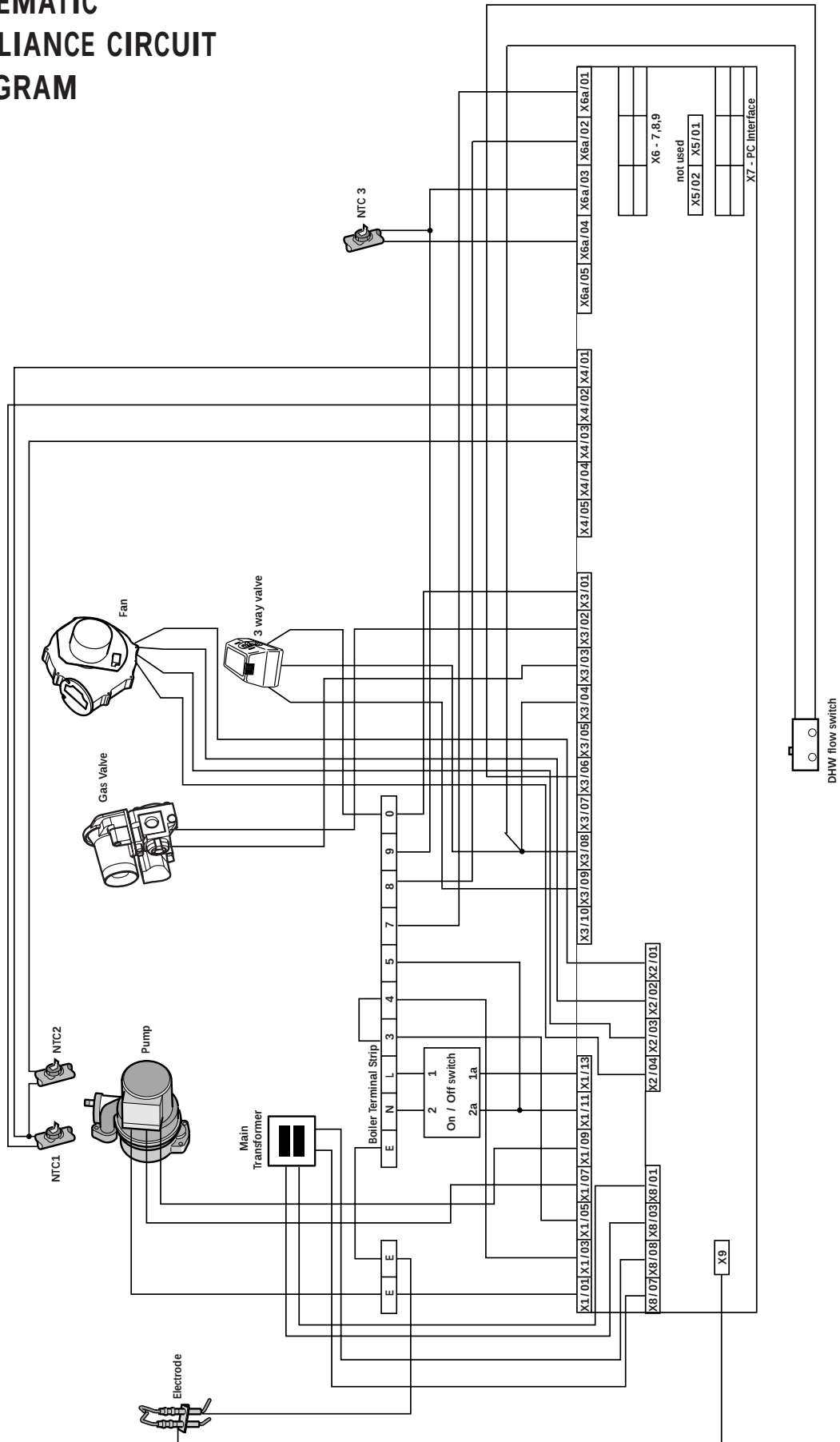
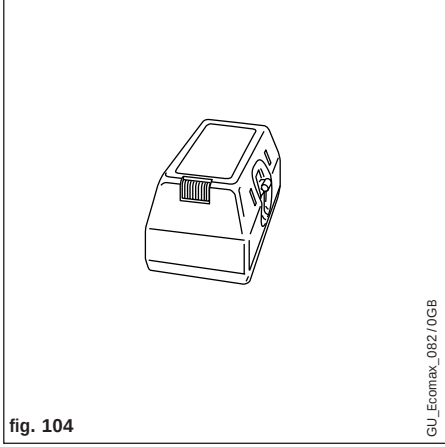
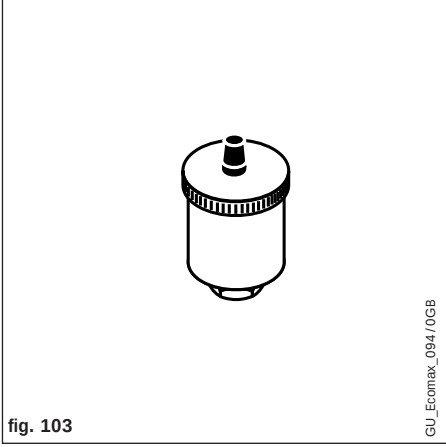
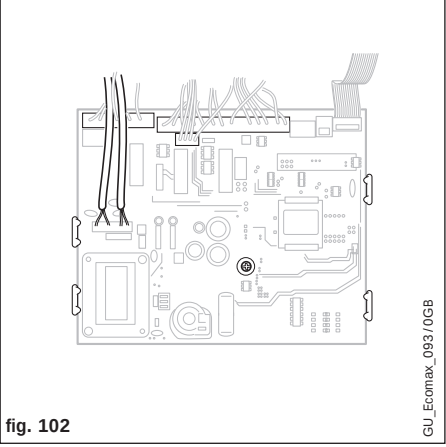
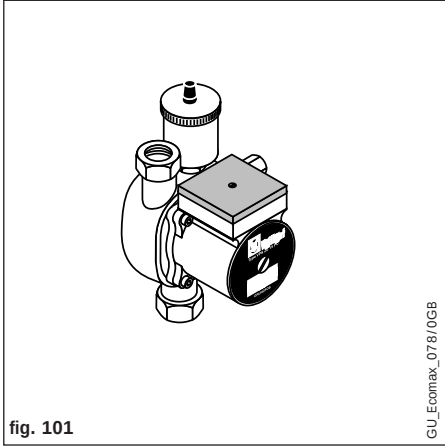
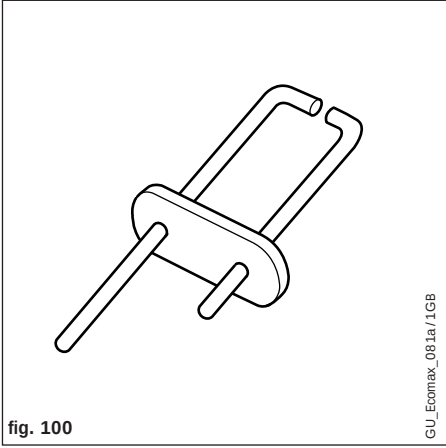
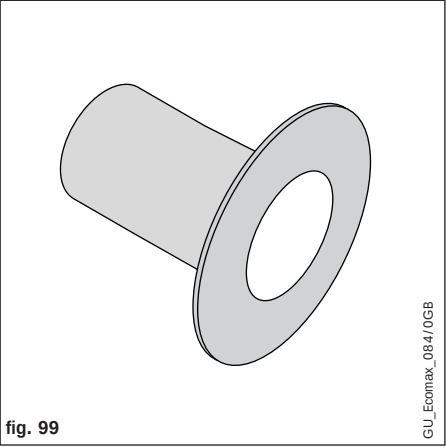
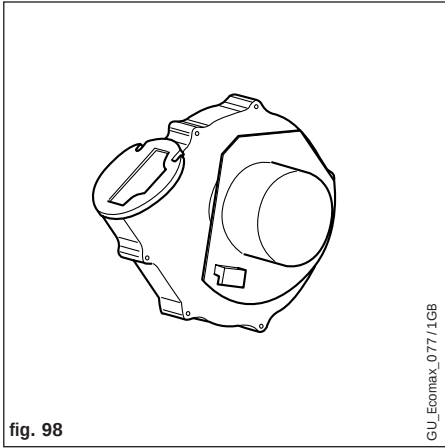
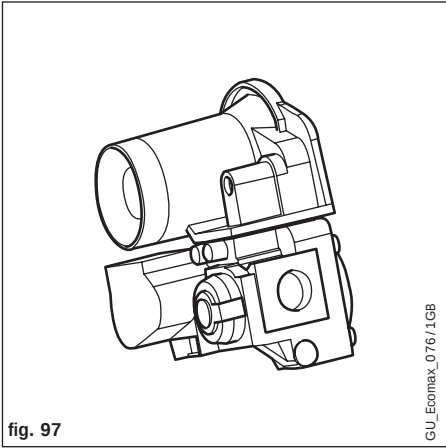
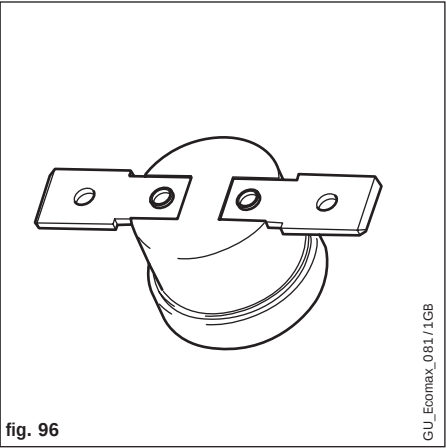
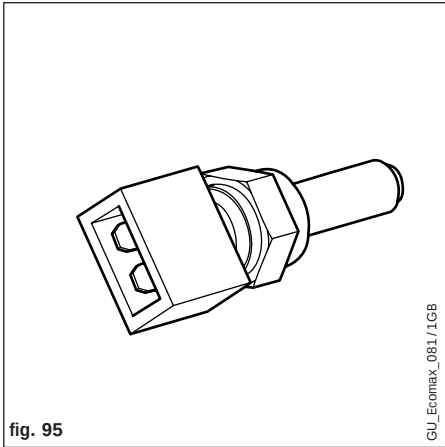
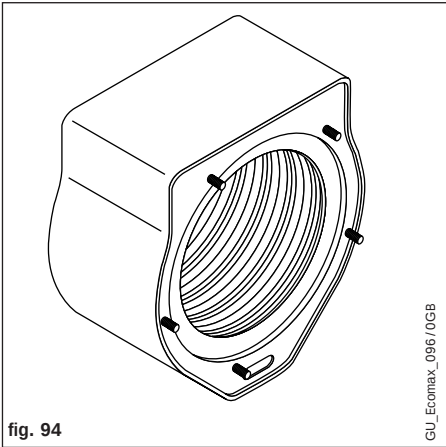
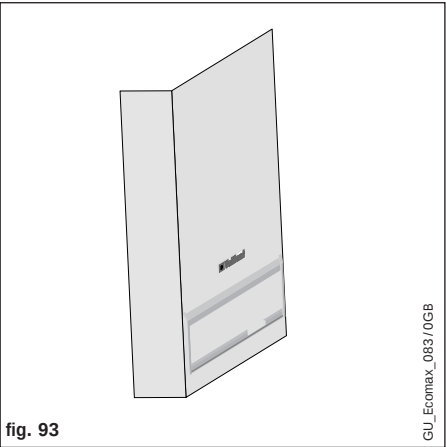


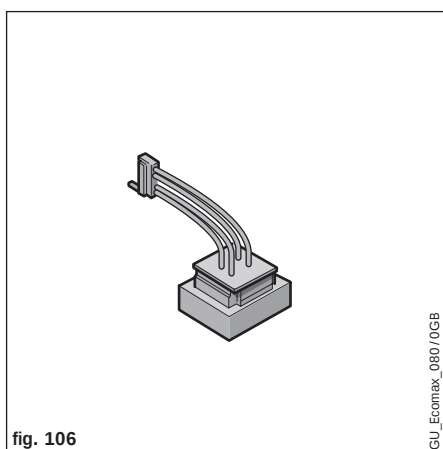
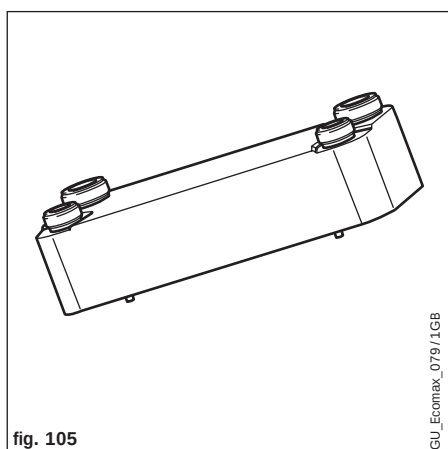
fig. 92

10 SHORT PARTS LIST



10 SHORT PARTS LIST

Key No.	Description	Part No.	G.C. No.
93	Front casing	077362	
94	Primary heat exchanger	ECOMax 824 065029 ECOMax 828 065048	
95	NTC1	287607	
95	NTC2	287607	
96	NTC3	287606	
97	Gas valve	ECOMax 824 053363 ECOMax 828 053356	
98	Fan	190186	
99	Burner	ECOMax 824 049324 ECOMax 828 049345	
100	Spark electrode	090709	
101	Pump	161106	
102	Circuit board	130448	
103	Automatic air vent	061707	
104	Diverter valve – head	255025	
105	DHW heat exchanger	065053	
106	Transformer	287448	





Head Office	Sales	01634	292310
Vaillant Ltd. , Vaillant House,	Service Solutions	0870	6060 777
Medway City Estate, Trident Close,	Technical Advice	01634	292392
Rochester, Kent ME2 4EZ	Training	01634	292370