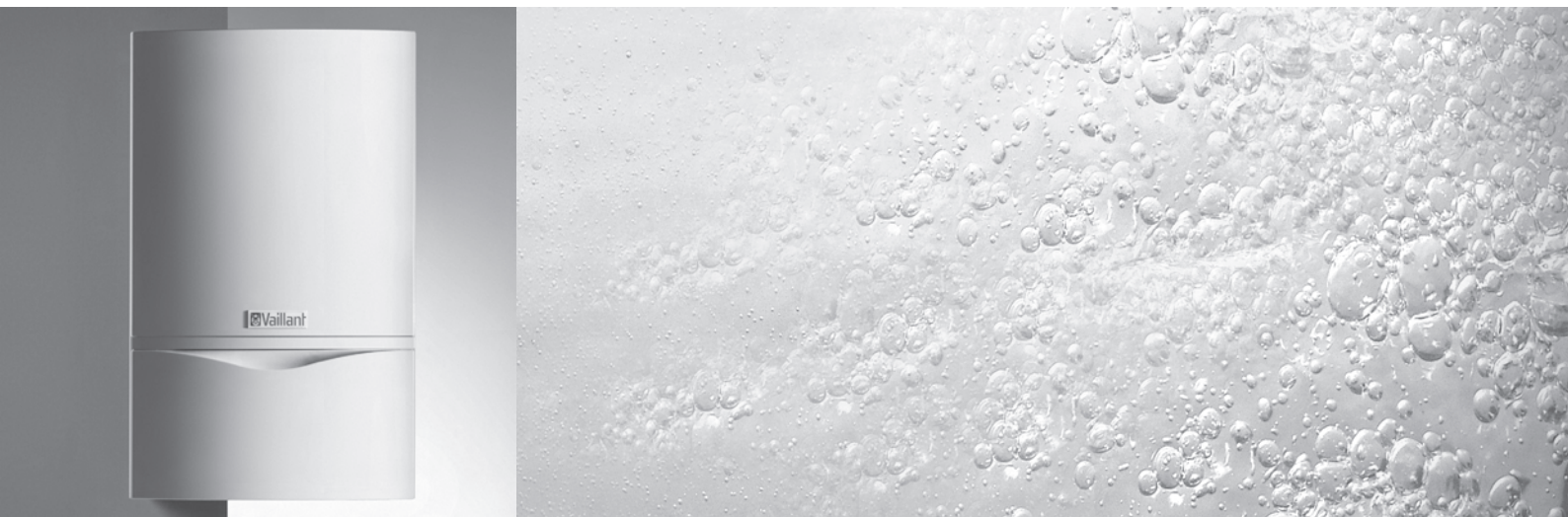


For the installer

Instructions for installation and servicing ecoTEC plus



Wall hung open vent condensing boiler

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1 Introduction

1 Introduction

1.1 Notes on the documentation.

To ensure clarity of information in instructions a new European standard of advice and symbols is being introduced. To ensure compliance with this new standard the following details are included. The following information is intended to help you throughout the boilers entire instruction pack. **We assume no liability for any damage caused by non-observance of these instructions.**

1.1.1 Other instructions supplied with this appliance.

For the owner:

Instructions for use no. 0020020829

Short operating instructions no. 838404

Warranty card with return envelope no. 802922

For the installer/service engineer:

Flue installation instructions no. 834449

The instructions for any accessories and controllers used also apply.

The Benchmark gas boiler commissioning checklist (in the installation manual) should be completed by the installer and/or the commissioning engineer.

If, after reading these instructions, you have any questions on the operation of the boiler, please contact either your installer or Vaillant Technical Department.

1.1.2 Retention of documents

Please retain this literature and all related documents so that they are available whenever they are required. If you move please pass on the documents to the buyer.

1.1.3 Safety instructions and symbols

Please observe the safety instructions in this literature for the operation of the appliance.



Danger!
Immediate risk of serious injury or death!



Danger!
Risk of death from electric shock!



Danger!
Risk of burns or scalding!



Caution!
Potentially dangerous situations for the product and environment.



Note!
Useful information and instructions.

•Symbol for a necessary task



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 in compliance with safe and satisfactory standard.

1.2 ecoTEC plus boilers

The ecoTEC plus boilers are designed to provide central heating from a fully pumped open-vented or sealed water system. The central heating water temperature can be adjusted on the boiler. The domestic hot water can only be adjusted on the boiler if it is installed with a Vaillant uniSTOR unvented cylinder and relevant controls. Once the controls are set the boiler operates automatically. A frost protection programme is also included. Please read these instructions and follow them carefully for the correct and economical use of your boiler.

These instructions are applicable to the following ecoTEC plus boilers, available in Natural Gas. All ecoTEC plus boilers can be converted to LPG.

APPLIANCE	MAXIMUM OUTPUT
ecoTEC plus 415	15kW
ecoTEC plus 418	18kW
ecoTEC plus 428	28kW
ecoTEC plus 438	38kW

1.3 General notes

The boiler has been designed for use with a open-vented central heating system, and comes fully tested and assembled. The boiler is easily mounted on any internal wall and can be installed with either a horizontal or vertical RSF (room sealed fan assisted) flue. The boiler uses a standard flue system (100 mm or 125 mm outside diameter). Flue extensions and additional bends and elbows are available for the flue system to increase the flexibility. If desired, an inhibitor may be used in the system. Guidance on the use of inhibitors is contained in these instructions. The boiler has a built in diagnostic system which indicates the operational status of the boiler. This feature provides key information to aid commissioning and fault finding. The data badge is fitted to the combustion chamber cover of the boiler. See text of General Requirements for installation requirements or notes.

The Vaillant ecoTEC plus boilers have been constructed in accordance with recognised safety regulations. Nevertheless, danger to the life and limb of the user or third parties can still occur or the appliance or other material assets be damaged in the event of improper use. The appliances are designed for central heating systems. Any other use or extended use is considered to be use other than intended. The manufacturer/supplier is not liable for any resulting damage. Intended use includes the observance of the operating and installation manual and the adherence to the inspection and maintenance conditions.



Caution!
Any incorrect use is forbidden.

The appliances must be installed by a competent person, who is responsible for adhering to the existing regulations, rules and guidelines.

1.4 General information

Thank you for choosing a Vaillant boiler. The information given in this booklet will enable you to obtain the best performance from your boiler. The Benchmark logbook should be completed by the installer and/or commissioning engineer and handed to the user.

1.4.1 Gas category

The boiler is supplied factory set for use on Natural Gas (G20). The ecoTEC plus boilers can be field adjusted for use on LPG (propane G31), see section 7 for instructions or contact Vaillant Service, 0870 6060 777.

1.4.2 Gas safety (installation and use) regulations

In your own interests and that of safety, it is the Law that ALL gas appliances are installed by a competent person in accordance with the current issue of the above regulations.

1.4.3 Gas testing and certification

The boiler is tested and certificated for safety and performance. It is, therefore, important that no alteration is made to the boiler.

1.4.4 Control of substances hazardous to health

Under Section 6 of The Health and Safety at Work Act 1974, we are required to provide information on substances hazardous to health.

The adhesives and sealants used in this appliance are cured and give no known hazard in this state.

1.4.5 Insulation pads

These can cause irritation to skin, eyes and the respiratory tract.

If you have a history of skin complaint you may be susceptible to irritation. High dust levels are usual only if the material is broken.

Normal handling should not cause discomfort, but follow normal good hygiene and wash your hands before eating, drinking or going to the lavatory. If you do suffer irritation to the eyes or severe irritation to the skin seek medical attention.

1.4.6 Spare parts

Only original Vaillant spare parts may be used.

1.4.7 Manual handling guidance

During the appliance installation and the replacement of the heat exchanger it will be necessary to employ caution and assistance whilst lifting as the appliance or component exceeds the recommended weight for a one man lift.

In certain situations it may be required to use a mechanical handling aid.

Take care to avoid trip hazards, slippery or wet surfaces.



Danger

Smell of gas. Risk of poisoning and explosion due to a malfunction

1.4.8 Gas leak or fault

If you smell gas or suspect a gas leak:

- Do not switch lights on or off.
- Do not use any other electrical switches.
- Do not use a telephone in the hazardous area.
- Do not use naked flames, such as matches or cigarette lighters.
- Do not smoke.
- Turn off the gas supply at the gas meter.
- Open the windows and doors.
- Warn other residents.
- Get out of the house.
- Consult your gas supplier, service agent or other competent person.

1.4.9 Clearances

If fixtures are positioned close to the boiler, space must be left as shown in fig 4.1. Enough space must also be left in front of the boiler to allow for servicing.

1.4.10 Sheet metal parts

This boiler contains metal parts (components) and care should be taken when handling and cleaning, with particular regard to edges.

1.4.11 Sealed components

Under no circumstances must the User interfere with any sealed component as this could result in a potentially dangerous situation arising.



Danger

This boiler must be earthed.

1.4.12 Electrical supply failure

The boiler will not work without an electrical supply. Normal operation of the boiler should resume when the electrical supply is restored.

Reset any external controls to resume normal operation of the central heating.

If the boiler does not resume normal operation.

(The burner fails to ignite after five attempts).

The overheat thermostat may have operated.

Automatic ignition can only take place after you manually reset the fault, refer to section 5.1.3. to reset.

1 Introduction

1.4.13 Protection against freezing

The boiler has a built in frost protection programme as long as the electricity and gas are left switched on. This device operates the burner and system pump when the temperature inside the boiler falls to 3°C. Any other exposed areas of the system should be protected by a separate frost thermostat.

If the mains electricity and gas are to be turned off for any long periods during severe weather, it is recommended that the whole system, including the boiler, should be drained to avoid the risk of freezing. Make sure that, if fitted, the immersion heater in the cylinder is switched off.

If you have a sealed water system contact your installation/ servicing company as draining, refilling and pressurising MUST be carried out by a competent person.

As a safety feature the boiler will stop working if the condensate drain becomes blocked. During freezing conditions this may be due to the forming of ice in the condense drain external to the house. Release an ice blockage by the use of warm cloths on the pipe. The boiler should then restart. Contact your installation/ servicing company if the fault persists.

1.4.14 Boilers installed in a compartment or cupboard

If the boiler is fitted into a compartment or cupboard it does not require ventilation openings.

Do not use the compartment or cupboard for storage.

1.4.15 Boiler casing

Do not remove or adjust the casing in any way, as incorrect-fitting may result in incorrect operation or failure to operate at all.

1.4.16 Condensate drain

The condensate drain must not be modified or blocked.

1.4.17 Plumbing from flue terminal

All condensing boilers produce a plume of water vapour from the flue terminal. This is due to the high efficiency and hence low flue gas temperature. This may increase in wet, damp weather but this is completely normal and indicates that the boiler is operating correctly.

1.4.18 Cleaning

This appliance contains metal parts and care should be taken when handling and cleaning with particular regard to edges.

The boiler casing can be cleaned using a mild liquid detergent with a damp cloth, then a dry cloth to polish. Do not use any form of abrasive or solvent cleaner as you may damage the paint work.

1.4.19 Maintenance and servicing

For the continued efficient and safe operation of the boiler it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the installation conditions and usage, but in general, once a year should be enough.

If this appliance is installed in a rented property there is a duty of care imposed on the owner of the property by the current issue of the Gas Safety (Installation and Use) Regulations, Section 35.

Servicing/maintenance should be carried out by a competent person in accordance with the rules in force in the countries of destination.

To obtain service, please call your installer or Vaillant Service Solutions (0870 6060 777).

Please be advised that the installation engineer on completion of commissioning and servicing should complete the 'Benchmark' logbook.

All CORGI Registered Installers carry a CORGI ID card, and have a registration number. Both should be recorded in your boiler Logbook. You can check your installer is CORGI registered by calling CORGI direct on: - 01256 372300.

1.4.20 Technical data

All dimensions are given in millimetres (except as noted). The data label is positioned on the combustion chamber cover. The Seasonal Efficiency Domestic Boilers UK (SEDBUK) is:

All ecoTEC plus boilers : Class 'A'.

The value is used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings. The test data from which it has been calculated has been certified by B.S.I.

1.4.21 Guarantee

Vaillant provide a full two year parts and labour warranty for your appliance.

The appliance must be installed by a suitably competent person in accordance with the gas safety (installation and Use) Regulations 1998, and the manufacture's instructions. In the UK 'CORGI' registered installers undertake the work in compliance with safe and satisfactory standards.

Terms and conditions apply to the warranty, details of which can be found on the warranty registration card included with this appliance.

Failure to install and commission this appliance in compliance with the manufacture's instructions may invalidate the warranty (this does not affect your statutory rights).

1.5 Statutory requirements

The appliance is suitable only for installation in GB and IE and should be installed in accordance with the rules in force. In GB the installation of the boiler must be carried out by a competent person as described in the following regulations:

The manufacturer's instructions supplied.

The Gas Safety (Installation and Use) Regulations.

The appropriate Buildings Regulations either The Building Regulations, The Building Regulations (Scotland), The Building Regulations (Northern Ireland).

The Water Fittings Regulations or Water bye laws in Scotland. The Health and Safety at Work Act, Control of Substances Hazardous to Health (COSHH).

The Current I.E.E. Wiring Regulations.

Where no specific instructions are given, reference should be made to the relevant British Standard Code of Practice. In IE, the installation must be carried out by a competent person and installed in accordance with the current edition of I.S.813 "Domestic Gas Installations", the current Building Regulations and reference should be made to the current ETCI rules for Electrical Installation.

In GB the following Codes of Practice apply:

BS4814, BS6798, BS5440 Part 1 and 2, BS5546 Part 1, BS5449, BS6891, BS6700, BS7074 Part 1 and 2, BS7593, BS7671.

In IE: I.S.813, BS5546, BS 5449, BS 7074, BS 7593.

Manufacturer's instructions must not be taken as overriding statutory requirements.

Note: For further information, see the current issue of the

Building Regulations, approved document L1 (in the UK) and the current issue of the following:

1) Central heating system specification (CheSS)

2) Controls for domestic central heating system and hot water. BRECSU.

Certification

This boiler certificated to the current issue of EN 483 for performance and safety.

It is important that no alteration is made to the boiler, without permission, in writing, from Vaillant.

Any alteration that is not approved by Vaillant, could invalidate the warranty and could also infringe the current issue of the Statutory Requirements.

1.6 Regulations, rules and guidelines.

This boiler meets the requirements of Statutory Instrument, No. 3083 The Boiler (Efficiency) Regulations, and therefore is deemed to meet the requirements of Directive 92/42/EEC on the efficiency requirements for new hot water boilers fired with liquid or gaseous fuels.

Type test for purposes of Regulation 5 certified by: Notified body 0087.

Product/production certified by: Notified body 0086.



1.7 CE mark

The CE mark on this appliance shows compliance with:

- Directive 90/396/EEC on the approximation of the laws of the Member States relating to appliances burning gaseous fuels.
- Directive 73/23/EEC on the harmonisation of the Laws of the Member States relating to electrical equipment designed for use within certain voltage limits.
- Directive 89/336/EEC on the approximation of the Laws of the Member States relating to electromagnetic compatibility.

1.8 Benchmark



Vaillant Ltd. support the Benchmark initiative. At the rear of the installation manual, you will find a Benchmark gas boiler commissioning checklist. It is very important that this is completed correctly at the time of installation, commissioning and hand over to the user.



The code of practice for the installation, commissioning & servicing of gas central heating

1.9 Gas council numbers

Appliance	Gas council numbers
ecoTEC plus 415	41-044-53
ecoTEC plus 418	41-044-54
ecoTEC plus 428	41-044-55
ecoTEC plus 438	41-044-57

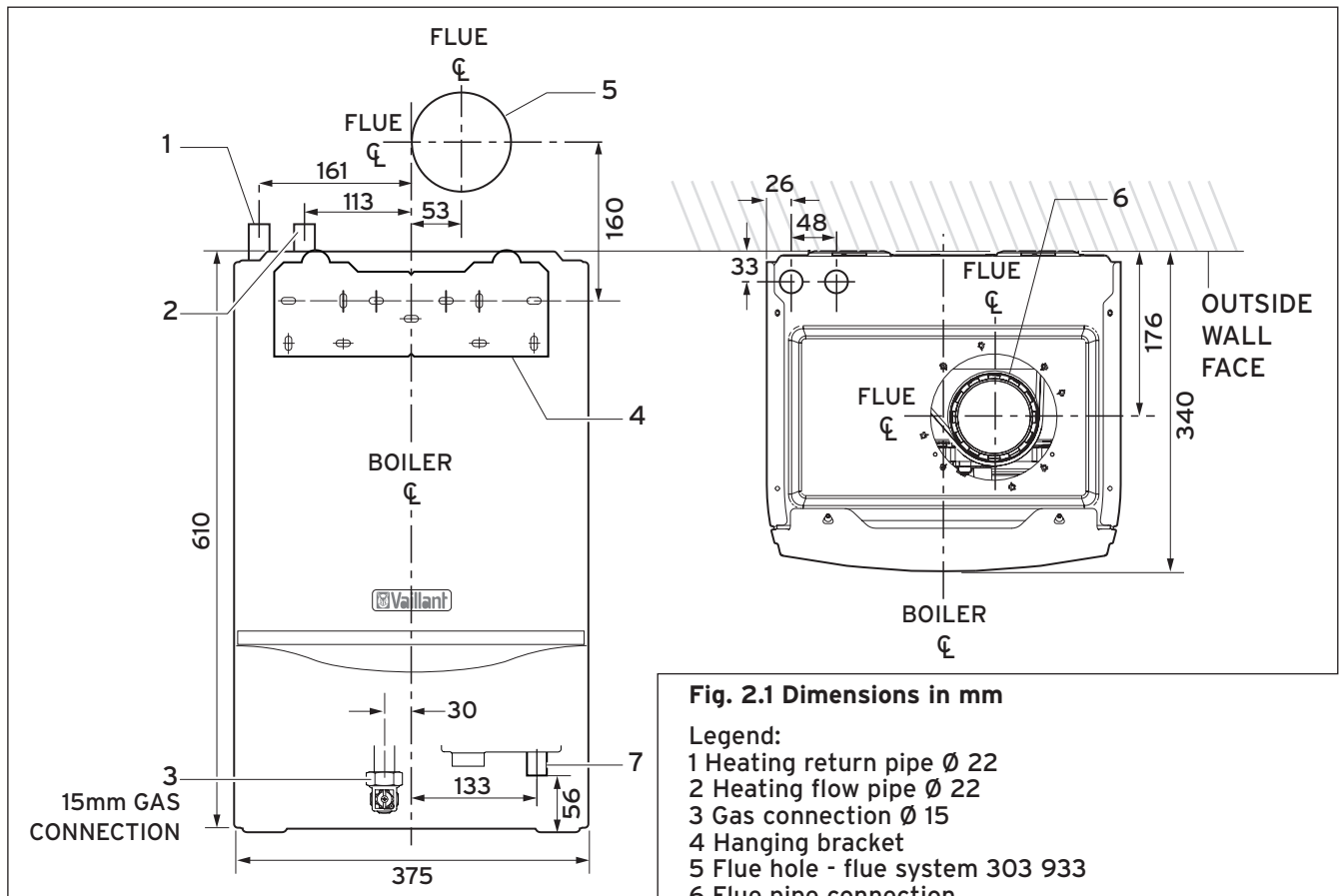
2 Boiler specifications

2 Boiler specifications

2.1 Technical data

Description	Unit	ecoTEC plus 415	ecoTEC plus 418	ecoTEC plus 428	ecoTEC plus 438
Maximum CH heat input (net)	kW	15.3	18.9	28.6	38.4
CH heat output (80/60 °C)	kW	5.0 - 15.0	5.0 - 18.6	5.3 - 28.2	6.3 - 38.0
CH heat output (50/30 °C)	kW	5.3 - 16.2	5.3 - 20.0	5.7 - 30.6	6.8 - 41.0
SEDBUK Band		A	A	A	A
SAP Seasonal Efficiency	%	90.5	90.4	90.6	90.8
NOx Class		5	5	5	5
"IP rating"		IPX4D	IPX4D	IPX4D	IPX4D
Inlet gas working pressure required (natural gas)	mbar	20	20	20	20
Gas supply (G20) Gross CV (s.t.)	MJ/ m ³	37.8	37.8	37.8	37.8
Maximum gas rate	M ³ /h	1.61	2.0	3.02	4.06
Minimum gas rate	M ³ /h	0.53	0.53	0.56	0.71
Burner % CO ₂ (Case on)	%	9.3 + 0.2 - 0.5	9.3 + 0.2 - 0.5	9.3 + 0.2 - 0.5	9.0 + 0.2 - 0.5
Gas connection (compression)	mm	15	15	15	15
Water connections (compression)	mm	22	22	22	22
Condensate drain (internal diameter)	mm	19 min.	19 min.	19 min.	19 min.
Fuse ratings fan supply PCB	A	3.15 AT	3.15 AT	3.15 AT	3.15 AT
Main PCB	A	125 mAT	125 mAT	125 mAT	125 mAT
Minimum flow rate of water through the boiler	L/min.	10.8	12.9	20.3	27.2
Weight	kg	3.1	3.1	3.3	3.3
Electrical supply	V~/ HZ	230/~50	230/~50	230/~50	230/~50
External fuse	A	3	3	3	3
Power input	W	60	60	60	60
Case height	mm	600	600	600	600
Case width	mm	375	375	375	375
Case depth	mm	334	334	334	334

2.1.2 Dimensions



2.1.3 Installation

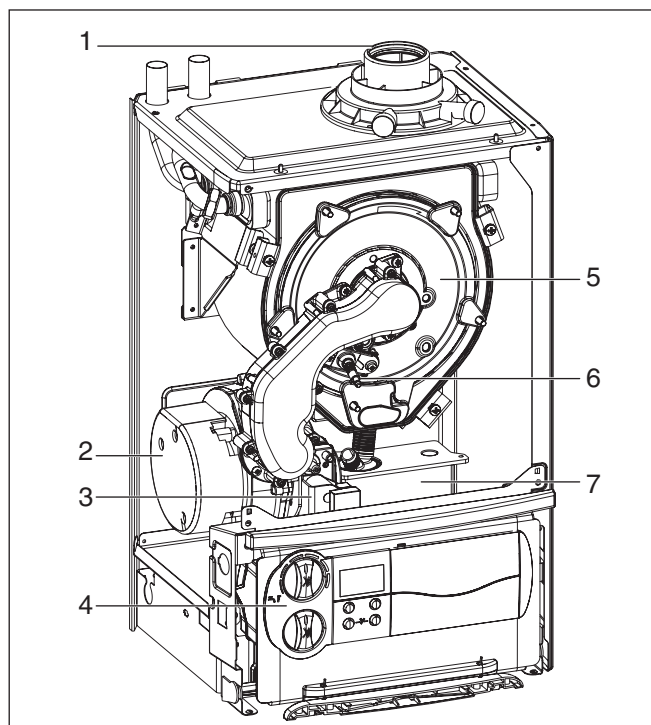


Fig. 2.2 Function elements of boiler

3 General requirements

3 General requirements

3.1 Preliminary remarks for room sealed appliances

This appliance should only be installed with a Vaillant flue system.

Install the flue system as detailed in the separate flue installation instructions supplied with this boiler.

3.2 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 Water Supply (Water Fitting) Regulations 1999, or The Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, The Building Regulations (Scotland), The Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards: 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 pipe work 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 IGE/UP/7/1998: "Guide for gas installations in timber framed housing". IGE/UP1: Soundness testing and purging of industrial and commercial gas installation. IGE/UP2: Gas installation pipe work, boosters and compressors on industrial and commercial premises. IGE/UP10: Installation of gas appliances in industrial and commercial premises. BS. 6644: Installation of gas fired hot water boilers of rated inputs between 60 kW and 2 MW (2nd and 3rd family gases). BS. 5449: Forced circulation hot water central heating systems for domestic premises. Note: only up to 45 kW. BS. 6880: Low temperature hot water heating systems of output greater than 45 kW.

Part 1 Fundamental and design considerations.

Part 2 Selection of equipment.

Part 3 Installation, commissioning and maintenance.

BS. 4814: Specification for: Expansion vessels using an internal diaphragm, for sealed hot water heating systems. BS. 5440: Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases).

Part 1 Specification for installation of flues.

Part 2 Specification for installation and maintenance of ventilation for gas appliances. European installation directive



Caution!

The appliance must be installed and serviced by a competent person as stated in the Gas Safety (Installation and Use) Regulations 1998. In IE, the installation must be in accordance with the current edition of I.S.813 'Domestic Gas Installations', the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.



Caution!

When tightening or slackening screwed connections always use suitable open-ended spanners (not pipe wrench, or extensions, etc.). Incorrect use and/or unsuitable tools can lead to damage being caused (e.g. gas or water leakage)!

3.3 Installation site

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 BS 7671 (IEE Regulations), the electrical provisions of the Building Standards (Scotland) Regulations, and in IE the current edition of IS 813 and the current ETCI rules, in respect of the installation of a boiler in a room containing a bath or shower.



Note!

If a room sealed boiler is installed in a room with a bath or shower, electrical switches or boiler controls using the mains power supply must be placed at locations that cannot be reached by the person in the bath or shower.

If the boiler is installed 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 Authorities 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 IGE/UP/7/1998 "Guide for Gas Installation in Timber Framed Housing". Please note the safety instructions below before deciding where to install the boiler:



Caution

Do not install the appliance in rooms prone to frost. In rooms with aggressive steam or dust, the appliance must be operated independent of the ambient air.

When choosing the place of installation and while operating the appliance, make sure that the air supply is free of chemical substances containing fluorine, chlorine, sulphur etc. Sprays, solvents and cleaning agents, paints, adhesives etc. contain the kind of substances that can lead to corrosion even in the exhaust system when the appliance is operated depending on the ambient air in the worst case scenario. Particularly in hair-cutting salons, lacquering and finishing, cleaning facilities, the appliance must be operated independent of the ambient air! Otherwise, a separate installation room is required to guarantee that the air supply is free of the above mentioned substances.

3.4 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. In IE the current edition of IS 813. Pipe work 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 checked for leaks and purged as described in BS 6891.



Danger!

Vaillant appliances are certified only for use with genuine Vaillant flue pipes. Only use genuine Vaillant flue pipes. Malfunctions can occur if you use other accessories.

These may result in damage and injury. You will find a list of genuine flue pipes in the Vaillant installation manual for flue pipes. The CE mark is valid only if the appliance is operated with Vaillant flue pipes.

3.5 Flue options

There are various flue systems to choose from, as follows:

- 60/100 standard horizontal air/flue duct, see fig 3.1.
 - 60/100 telescopic horizontal air/flue duct, see fig 3.2.
 - 60/100 Vertical air/flue duct and terminal, see fig 3.3.
 - 80/125 horizontal air/flue duct, see fig 3.4.
 - 80/125 Vertical air/flue duct and terminal, see fig 3.5.
- Flue extensions are available to extend the length, both 90° bends and 45° elbows are also available.

Refer to flue system installation instructions for full details.

When extension pipes are used the flue system must be designed to have a continuous fall to the boiler of at least 3° to allow condensate to run out via the drain.

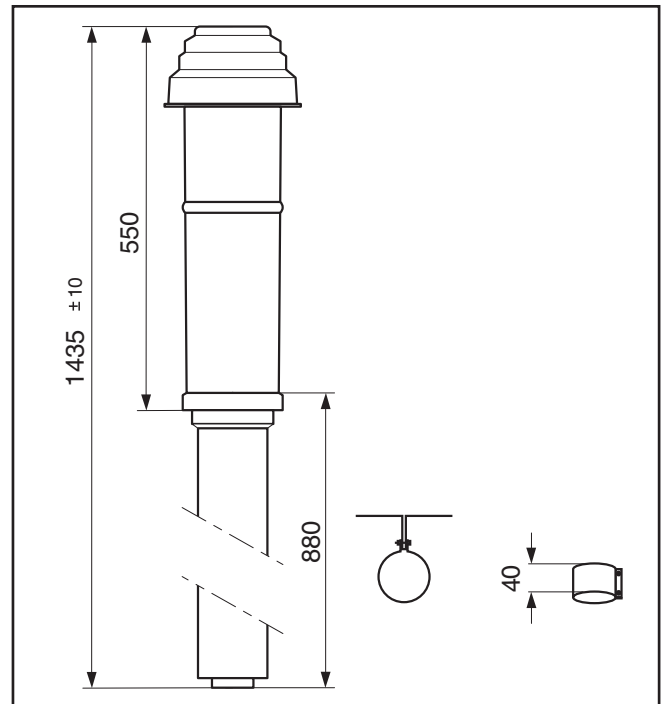


Fig. 3.3 Art. No. 303900

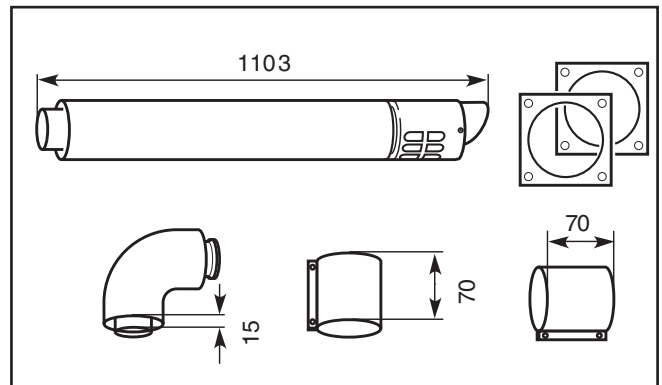


Fig. 3.4 Art. No. 303209

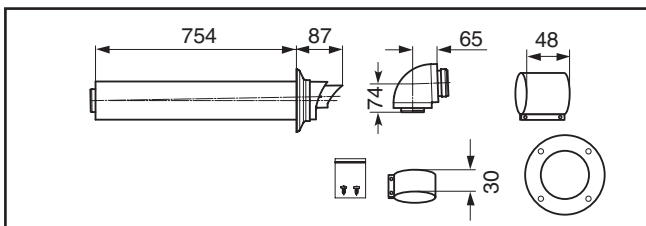


Fig. 3.1 Art. No. 303933

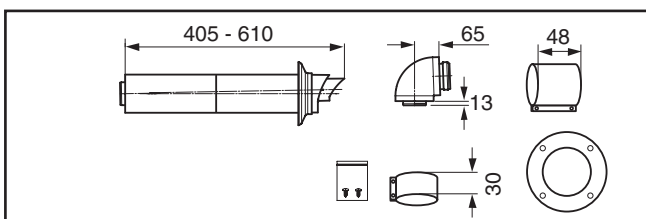


Fig. 3.2 Art. No. 303936

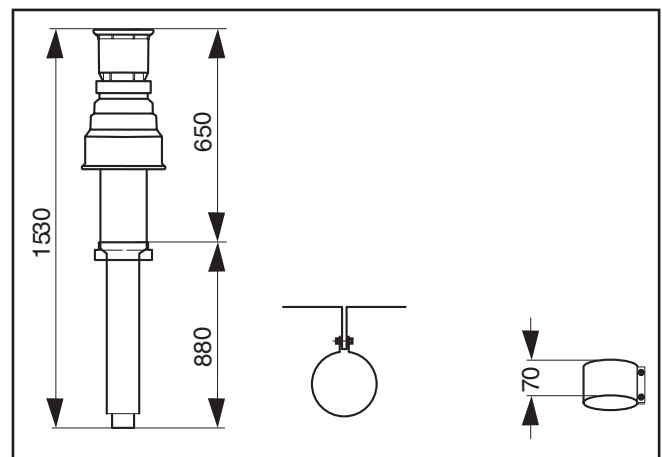


Fig. 3.5 Vertical Flue System Art. No. 303200

3 General requirements

3.5.1 Flue termination

The following details refer to both flue systems.

- The terminal must be located where the combustible substances can escape freely at all times.
- A plume of water vapour will sometimes be visible from the flue terminal. Positions where this could be a nuisance should be avoided.
- 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 (made by Tower Flue Components, Tonbridge, TN9 1TB, Model K3, plastic coated).

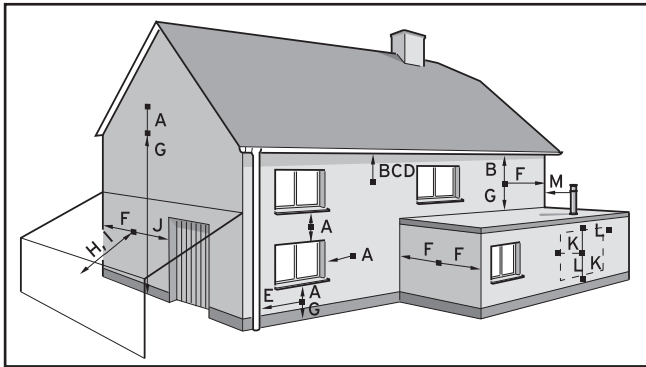


Fig. 3.6 Flue termination



Note!

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

The flue assembly shall be so placed or shielded as to prevent ignition or damage to any part of the building.

	Terminal position	mm
A	Directly below an opening, above an opening or horizontal to an opening, air brick, opening window, etc.	300
B	Below gutters, soil pipes or drain pipes	75
C	Below eaves	200
D	Below balconies	200
E	From vertical drain pipes and soil pipes	25
F	From internal or external corners	300
G	Above ground, roof or balcony	300
H	From a surface facing a terminal	600
I	From a terminal facing a terminal	1200
J	From an opening in the car port (e.g. door, window) into the dwelling	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 3.1 Flue terminal position for a fan assisted concentric flue



Note!

In addition, the terminal should not be nearer than 150 mm to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window.

BS 5440-1: It is recommended that the fanned flue terminal should be positioned as follows:

- at least 2 m from an opening in the building directly opposite, and
- so that the products of combustion are not directed to discharge across a boundary.

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. 3.7.

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. For IE, recommendations are given in the current edition of IS 813.

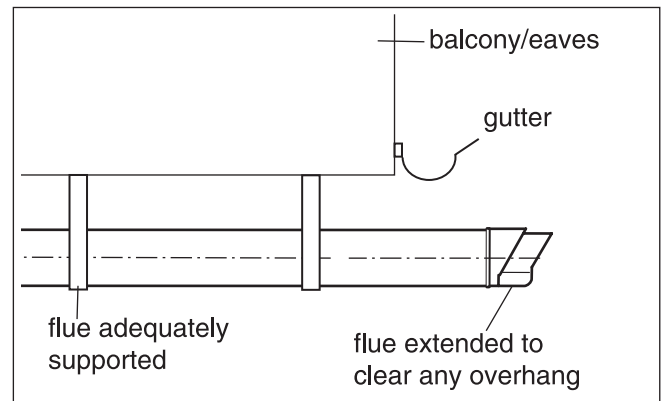


Fig. 3.7 Flue termination under balcony/eaves

3.5.2 Internal flue installation

The flue can be installed from inside the building when access to the outside wall face is not practicable.

3.6 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.

3.7 Cupboard or compartment ventilation

The 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.

3.8 Domestic hot water cylinder



Caution!

Single feed indirect cylinders are not suitable. The domestic hot water cylinder must be of the double feed fully indirect coil type. It must be suitable for working at a gauge pressure of 0.35 bar above the safety valve setting.

3.8.1 Unvented hot water cylinder

The ecoTEC plus can be connected to an unvented hot water cylinder. Vaillant offer a range of cylinders called uniSTOR with capacities from 125 litres to 310 litres. All unvented domestic hot water cylinders must be installed by a competent person to the current building regulations and water regulations at the time of installation.

For building regulations refer to G3 and for water regulations guidance G17 to G24 and recommendation R17 to R24.

For Ireland: The current issue of BS5546 and BS6700. If fitting to an existing system the local authority should be informed.

3.9 Condensate drain

A plastic drain pipe must be fitted to allow discharge of condensate to a drain.

Condensate should, if possible, be discharged into the internal household draining system. If this is not practical, discharge can be made externally into the household drainage system or a purpose designed soak away, see Section 4.3.5 for more details.

3.10 Heating system controls

It is recommended that a programmer and room thermostat control the boiler. Vaillant have a range of optional easy fit controls available.

Thermostatic radiator valves must be installed, however they must not be fitted in a room where the room thermostat is located.



Note!

All systems must have at least one radiator not fitted with a thermostatic valve.



Note!

For further information, see the current issue of the Building Regulations, approved document L1, and the following current issues of:

- 1) Central heating system specification (CheSS) and
- 2) Controls for domestic central heating system and hot water. BRECSU.

3.11 Draining tap

A draining tap must be provided at all the lowest points of the system, which will allow the entire system and hot water system to be drained.

Draining taps shall be to the current issue of BS 2879.

3.12 Safety valve

A safety valve need not be fitted to an open-vented system.

3.13 Bypass

A system bypass will be required fitted at least 1.5 metres away from the boiler, refer to the current issue of central heating system specifications (CHeSS).

3.14 Pump specification

The pump should be fitted on the flow pipe from the boiler and have isolating valves each side.

A variable duty pump should be set to give a temperature difference of no greater than 20°C

3.15 Cleanser and inhibitor

In the case of an existing installation, it is ESSENTIAL that prior to installing the new boiler the system is thoroughly flushed. For optimum performance after installation of a new system, the boiler and its associated central heating system should also be flushed. Flushing should be carried out in accordance with BS7593: 1992 using a cleanser such as Sentinel X300 or X400, or Fernox Superfloc.

For long-term corrosion protection, after flushing, an inhibitor suitable for stainless steel heat exchangers should be used, refer to the current issue of BS 5449 and BS 7593 on the use of inhibitors in central heating systems. Examples are Sentinel X100 and Fernox.



Caution!

It is ESSENTIAL that the cleanser is fully removed from the system after flushing and before adding inhibitor. Take care to ensure that all low points in the system are fully drained.

For all systems follow the manufacture's instructions, but where new radiators are fitted do not leave the cleanser in the system for longer than 24 hours.

For optimum performance the boiler and its associated central heating system should be flushed in accordance with BS7593: 1992 using a cleanser.

For optimum performance the boiler and its associated central heating system should be flushed in accordance with BS7593: 1992 using a cleanser.

For advice on the application of system cleansers and inhibitors contact either;

Fernox, Alpha-Fry Technologies

Tandem House

Marlow Way

Beddington Farm Road

Croydon CR0 4XS

Tel: 0870 601 5000

Fernox technical help line

01799 550811

or:

Sentinel, GE Betz

Widnes

Cheshire, WA8 8UD

Tel: 0151 420 9595.

3 General requirements

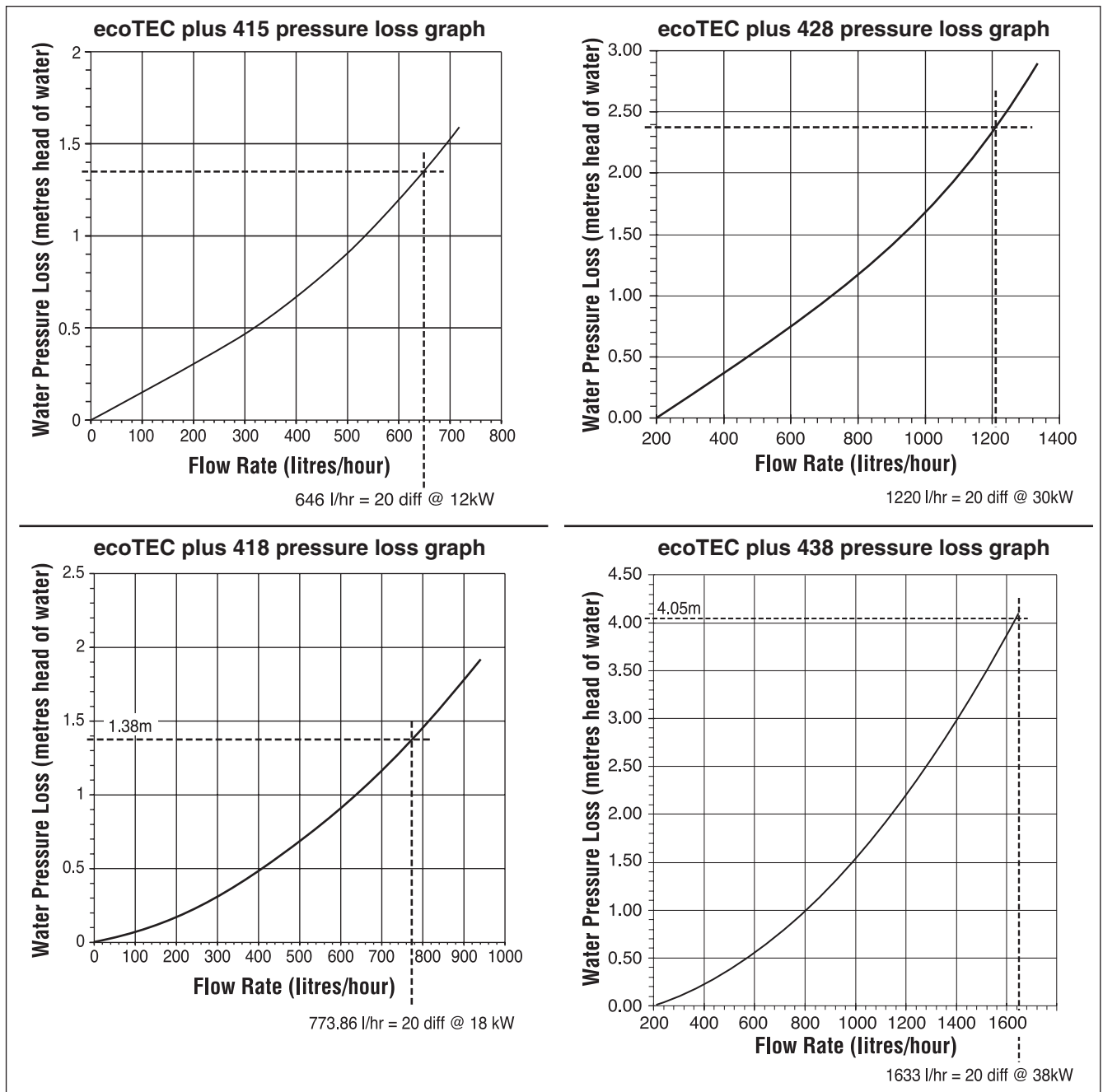


Fig. 3.8 Pressure loss

3.16 Open vented heating system

The boiler must be supplied from an unrestricted water supply taken from a feed and expansion cistern situated at a maximum height of 27 metres (90ft) above the boiler.

The cold feed must be 15mm minimum size.

The vent must rise continuously and be unrestricted. It is important that the relative positions of the pump, cold feed and open vent are as shown in fig 3.9.

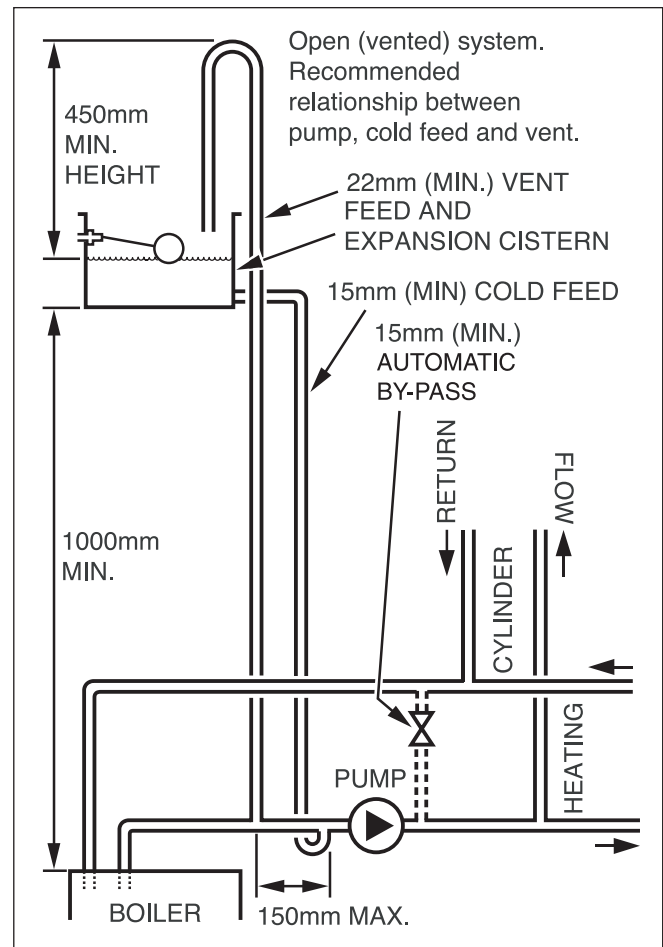


Fig. 3.9 Open vented system

3 General requirements

3.17 Sealed water systems

The installation must comply with the appropriate requirements of the current issue of BS4814, BS5449, BS6759, BS6798 and BS7074 Part 1 and 2. For IE your attention is drawn to the current edition of IS 813. See fig 3.10 for a suggested layout.

3.17.1 Safety valve

A safety valve must be fitted to a sealed system. It shall be preset, non-adjustable with a lift pressure of 3-bar, incorporating seating of a resilient material, a test device and a connection for drain. The safety valve discharge pipe must be routed to outside the building, must not discharge above an entrance or window or any type of public access area, be clear of any electrical fittings and positioned so that any discharge can be seen.

3.17.2 Expansion vessel

A diaphragm type expansion vessel, conforming to the current issue of BS4814 (see also BS7074 Part 1 and 2). For IE the current edition of IS 813, must be connected at a point close to the inlet side of the circulating pump, see the Typical installation, Fig. 3.10. unless laid down differently by the manufacturer. The expansion vessel volume depends on the total water system volume and the initial system design pressure. For any system an accurate calculation of vessel size is given in the current issue of BS5449 and BS7074 Part 1.

Example: For an initial design pressure of 0.7 bar, the minimum total vessel volume required is $0.063 \times \text{Total System Volume}$.



Note!

A higher initial design pressure requires a larger volume expansion vessel.

The charge pressure must not be less than the static head of the system, that is, the height of the highest point of the system above the expansion vessel.

3.17.3 Pressure gauge

A pressure gauge with a set pointer and covering at least 0 to 4 bar (0 to 60 lb/in²) shall be fitted permanently to the system in a position where it can be seen when filling the system.

3.17.4 Water make up

Provision should be made for replacing water loss from the system using a make up bottle mounted in a position higher than the top point of the system, connected through a non-return valve to the return side of either the heating circuit or the hot water cylinder.

Alternatively, provision for make up water should be made using a proprietary filling loop.

3.17.5 Filling a sealed water system

Provision for filling the system at low level must be made. This can be achieved by the use of a proprietary filling loop.

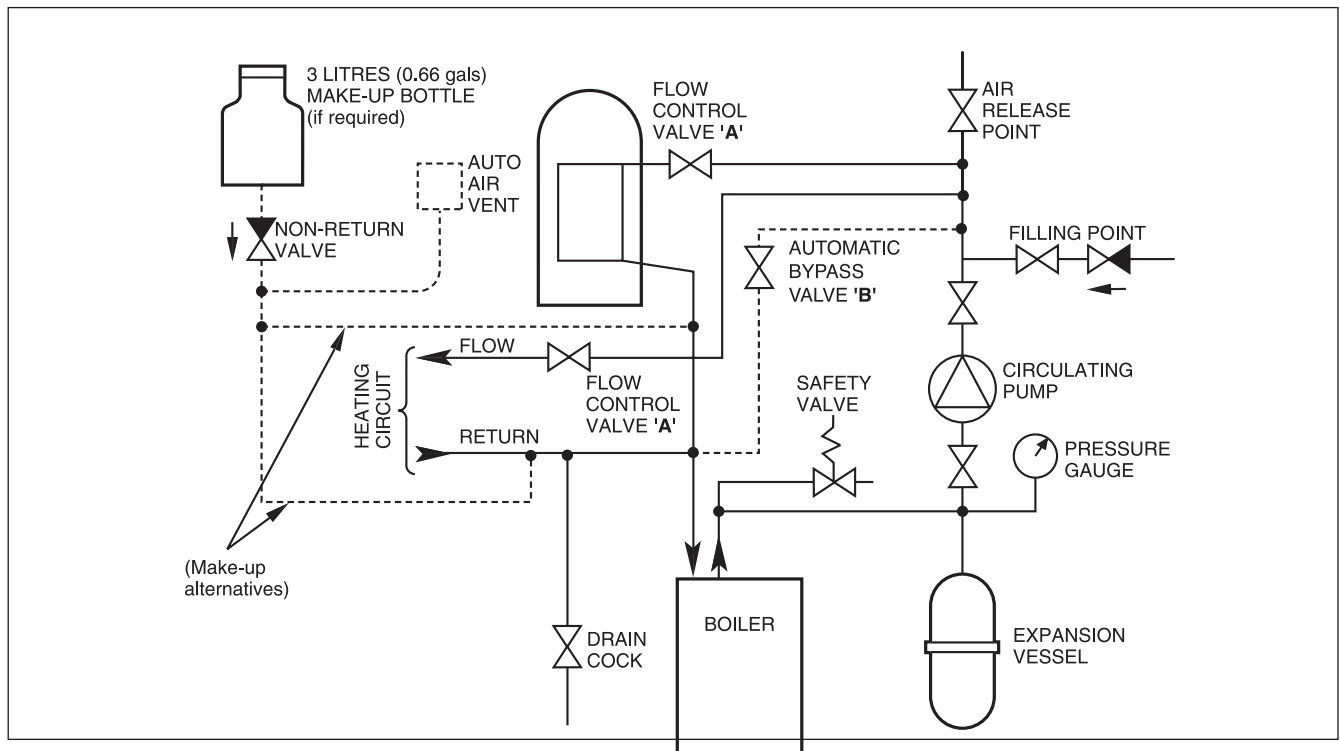


Fig. 3.10 Typical installation

4 Boiler installation sequence

4.1 Boiler location



Note!

This boiler is not suitable for outdoor installation.

This boiler may be installed in any room, although particular attention is drawn to the installation of a boiler in a room containing a bath or shower where reference must be made to the relevant requirements.

This boiler is suitable for installation in bathroom zones 2 and 3.

4.1.1 Sheet metal parts



Caution!

When installing the appliance, care should be taken to avoid any possibility of personal injury when handling sheet metal parts.

In GB this is the current I.E.E. WIRING REGULATIONS and BUILDING REGULATIONS. In IE reference should be made to the current edition of I.S.813 "Domestic Gas Installations" and the current ETCI rules. The boiler must be mounted on a flat wall, which is sufficiently robust to take its total weight, see boiler specifications 2.1.

4.1.2 Clearances

The boiler should be positioned so that at least the minimum operational and servicing clearances are provided, see fig 4.1.

Additional clearances may be beneficial around the boiler for installation and servicing.

For flue installations where external access is not practicable, consideration should be given for the space required to insert the flue internally, which may necessitate clearance larger than those specified in fig 4.1.

4.1.3 Timber frame buildings

If the boiler is to be installed in a timber frame building it should be fitted in accordance with the Institute of Gas Engineers document IGE/UP/7/1998. If in doubt seek advice from the local gas undertaking or Vaillant.

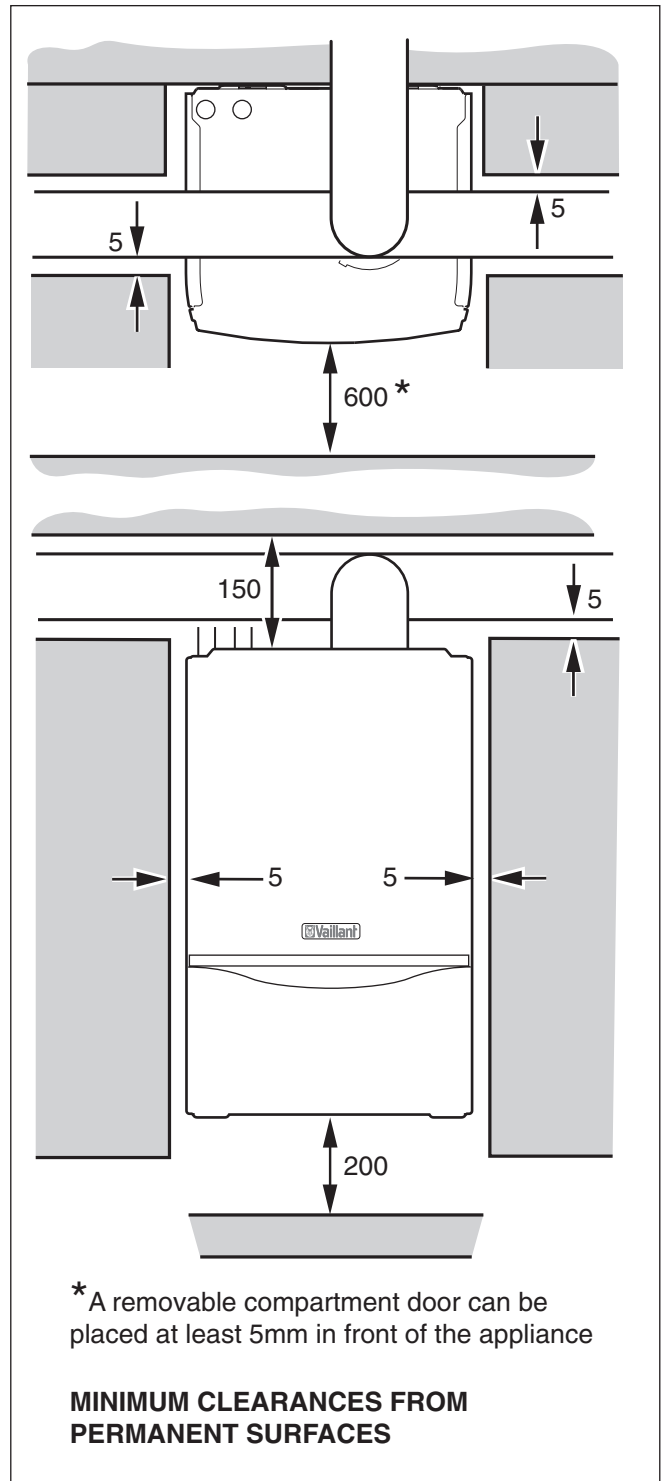


Fig. 4.1 Distance during installation

4 Boiler installation sequence

4.1.4 Contents included with delivery

The Vaillant ecoTEC plus is delivered pre-mounted in a package unit. Check that all the parts have been delivered intact (see fig. 4.2 and table 4.1). DO NOT remove the boiler from the polystyrene base at this stage.

Place aside the flue adaptor and connections pack until required.



Note

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

4.2 Flue exit

Refer to flue system installation instructions for full details.



Danger!

Vaillant appliances are certified only for use with genuine Vaillant flue pipes. Only use genuine Vaillant flue pipes. Malfunctions can occur if you use other accessories. These may result in damage and injury. You will find a list of genuine flue pipes in the Vaillant installation manual for flue pipes.

The CE mark is valid only if the appliance is operated with Vaillant flue pipes.

4.2.1 Other flue options

Flue instructions for other flue systems such as vertical RSF flues, flues run to the side of the boiler and the use of additional bends etc. are detailed in the flue installation instructions.

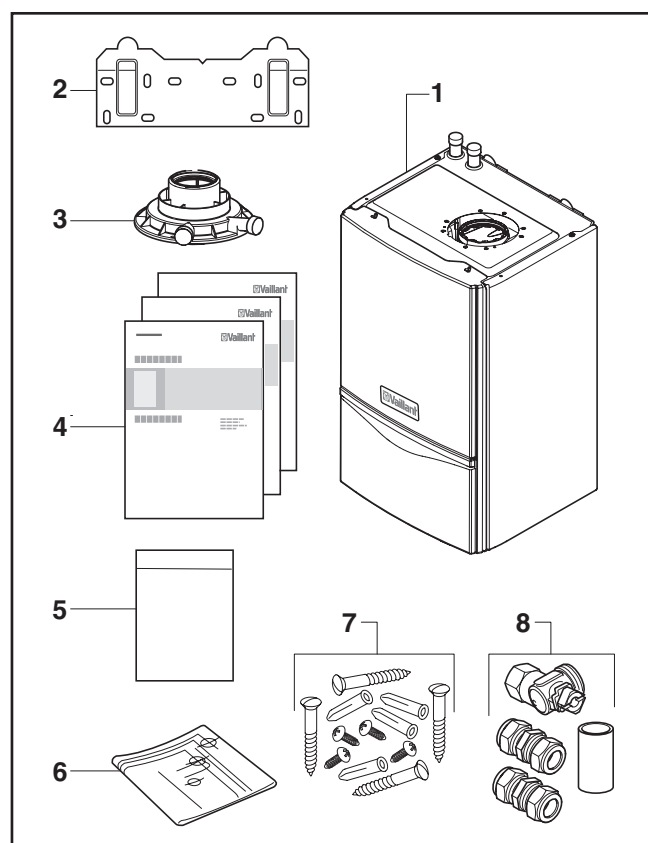


Fig. 4.2 Contents included with delivery

Item	Quantity	Description
1	1	Boiler
2	1	Hanging bracket
3	1	Flue connection adaptor
4	1	Instruction booklets
5	2	Guarantee card, envelope and log book
6	1	Template
7	1	Screws/wallplugs
8	1	Gas service valve, compression couplers and condensate drain pipe coupler

Table 4.1 Contents included with delivery

4.3 Fitting the boiler hanging bracket

Reposition the wall template over the flue hole ensuring the template is vertical and mark the position of the fixing holes for the hanging bracket, see fig 4.3. Mark and drill the fixing holes and secure the hanging bracket. Fix the hanging bracket to the wall using the screws supplied. Ensure the uppermost set of screw positions are used (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.

4.3.1 Boiler fixing

Lift the boiler into position in the following manner: Lean the top of the boiler slightly to the wall and position just above the hanging bracket. Allow the boiler to slowly move downwards until engaged in the hanging bracket.

4.3.2 Removing the front casing

Remove the front casing securing screws then lift the case upwards off the two top retaining dowels, see fig 4.4.



Note!

Take care not to damage the front casing.

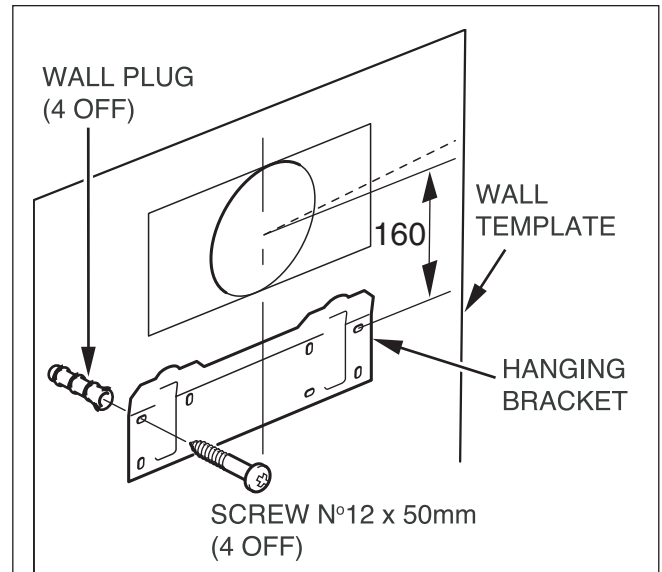


Fig. 4.3 Boiler hanging bracket

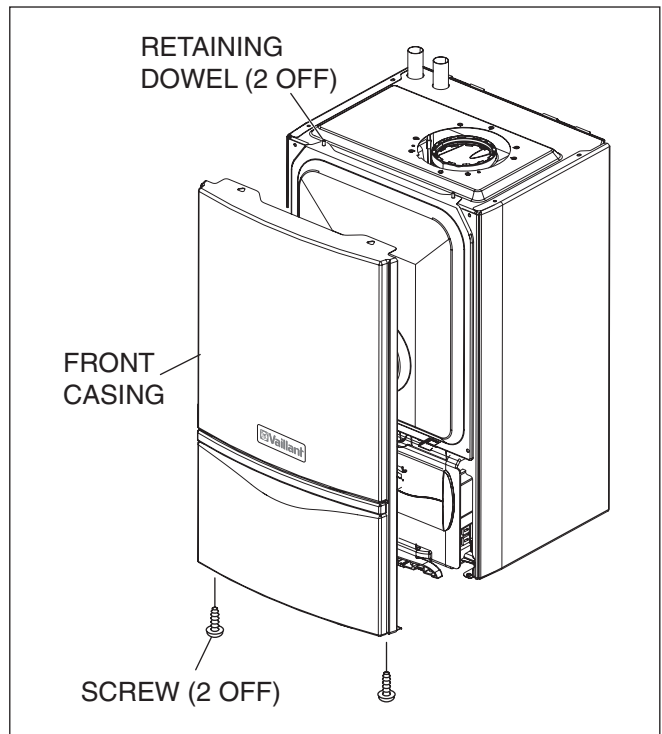


Fig. 4.4 Removing front casing

4 Boiler installation sequence

4.3.3 Gas connection



Danger!

The gas connection may only be made by a competent person.
The legal directives and the local regulations for gas supply companies must be observed.



Caution!

Ensure a stress-relief assembly of the gas pipes to avoid leakages!



Caution!

The gas regulating block may be tested for leakage only with a maximum pressure of 150 mbar!
Higher testing pressures can damage the gas fitting.



Caution!

When making final connection to the boiler, if using soldered fittings, extra care should be taken to avoid damage to isolation valves through heat transfer.
Before connection check the supply of local gas.



Note!

Ensure the gas supply pipe work is adequately sized so that a 20 mbar gas pressure is available at the boiler inlet at full flow rate.

- Tighten all connections.
- Check the gas connection with leak indicator spray for leakage.

The gas supply can be connected from below, or through the wall at the rear of the boiler. See fig 4.5. and refer to section 3.4.

The whole of the gas installation, including the meter, should be inspected, tested for soundness and purged in accordance with the current issue of BS6891 and in IE the current edition of I.S.813 "Domestic Gas Installations".

4.3.4 Water connections



Caution!

When making final connection to the boiler, if using soldered fittings, extra care should be taken to avoid damage through heat transfer.

Provision is made for the water connections to be made from above the boiler, see fig 4.6 (using the two 22mm compression couplers supplied). The position is shown on the wall template.

Flush out the domestic hot water and the heating systems before connecting to the boiler.

4.3.5 Condensate trap and siphonic drain connection

Refer to fig 4.5.

The condensate drain connection is at the underside rear of the boiler.

The condensate drain is suitable for use with standard "Push fit" overflow pipe and couplings DO NOT use adhesive when connecting to the spigot (1) The condensate drain pipe (2) should be non corrosive plastic. The drain pipe should have a continuous fall

of at least (45mm per metre) away from the boiler. Condensate should, if possible be discharged into the household internal drainage system.

The condensate is discharged periodically in 'slugs' by siphonic action.

It is not necessary to provide air breaks or extra traps in the discharge pipe as there is already a 75mm high trap inside the boiler. Fitting an extra trap may cause the boiler siphon to work incorrectly.

Refer to BS5546 or BS6798 for advice on disposal of boiler condensate.

(a) Preferably the drain pipe should run and terminate internally to the house soil and vent stack at least 450mm above the invert of the stack. There must be an air break in the discharge pipe upstream of the trap. This should be designed so that the condensate cannot be discharged into the house if the condensate drain pipe becomes blocked.

(b) Connecting into the internal discharge branch (e.g. sink waste or washing machine) with an external termination, the condensate drain pipe should have a minimum diameter of 22mm with no length restriction and should incorporate a trap with a 75mm (3) seal. The connection should preferably be made downstream of the sink waste trap, if the connection is only possible upstream, then an air break is needed between the two traps. This is normally provided by the sink waste.

(c) Termination in a gully (5) below grid level (6) and above the water level. The external pipe length should be kept as short as possible to minimise the risk of freezing and should not be more than 3 metres.

(d) At a condensate absorption point (soak away) (7). The external pipe length should not be more than 3 metres.

Refer to the latest issue of BS 6798 Specification for installation of gas fired boilers of rate input not exceeding 70kW net for further information.

Before operating the boiler the condensate trap must be filled with water.

4.3.6 Installing the flue system

- Install the flue system (refer to the separate air/flue duct installation instructions).

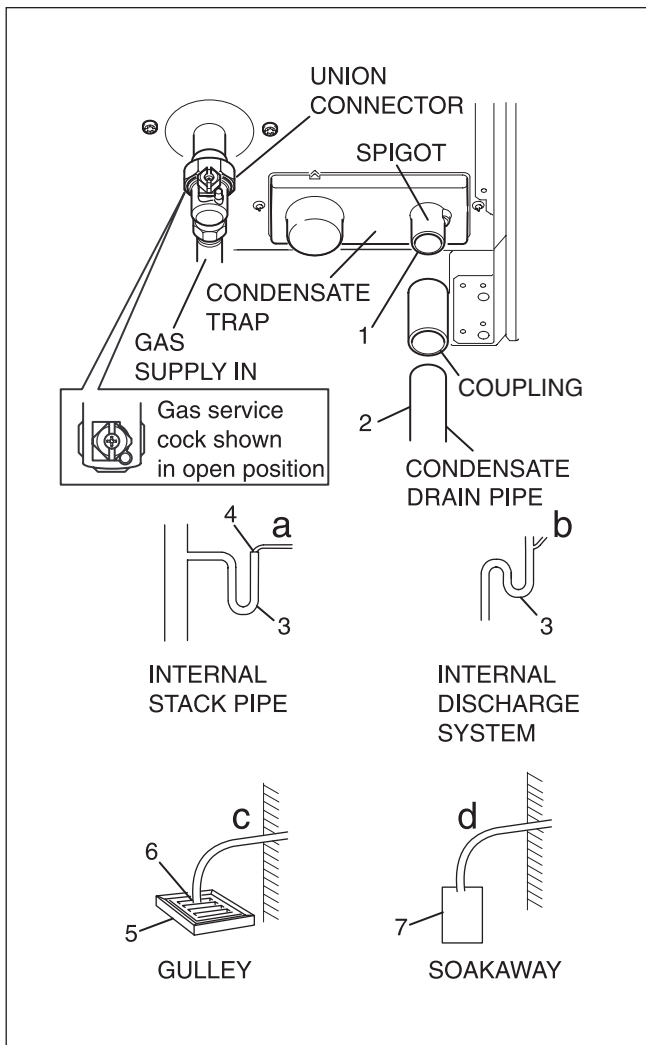


Fig. 4.5 Gas and condensate connections

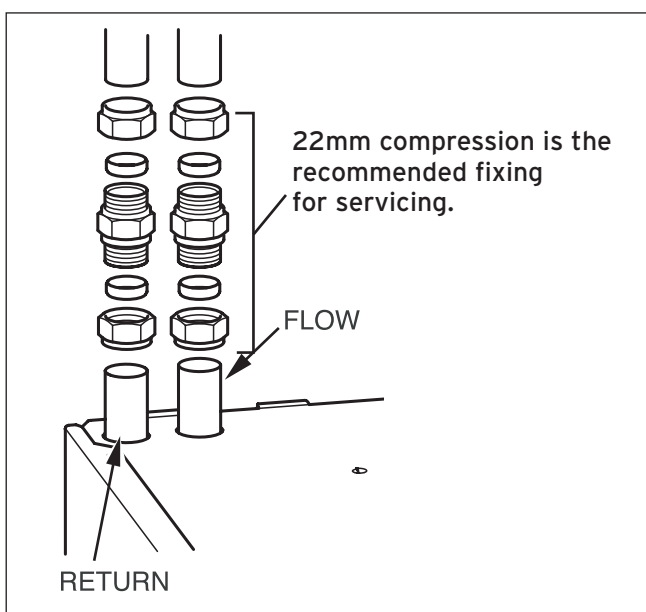


Fig. 4.6 Water connections

4.4 Electrical connections



Danger!

This appliance must be earthed. Electrocutation caused by touching live parts can be fatal. Before working on the appliance, turn off the power supply and secure against restart.

The boiler must be earthed.

All system components shall be of an approved type and all wiring to current I.E.E. wiring regulations. External wiring must be correctly earthed, polarised and in accordance with the relevant standards.

In GB this is BS 7671.

In IE this is the current edition of I.S.813 "Domestic Gas Installations".

The boiler must be connected to a permanent 230V ac, 50Hz supply.

Connection of the whole electrical system of the boiler, including any heating controls, to the electrical supply must be through one common isolator and must be fused 3 Amp maximum.

Isolation should be by a double pole switched fused spur box, with a minimum gap of 3mm for both poles. The fused spur box should be readily accessible and preferably adjacent to the appliance. It should be identified as to its use.

Alternatively connection can be made through an unswitched shuttered socket and 3A fused 3-pin plug both to the current issue of BS 1363 may be used, provided they are not used in a room containing a bath or shower.

A 3 core flexible cord according to BS6500 tables 6, 8 or 16 (3 x 0.75 to 3 x 1.5mm²) should be used.



Caution!

This appliance must be wired in accordance with these instructions. Any fault arising from incorrect wiring cannot be put right under the terms of the Vaillant guarantee.



Danger!

Mains connection terminals L and N remain live "unless isolated at the fused spur or electrical outlet supplying the boiler".



Caution!

Do not connect any mains 230V power to the connections 7-8-9 or BUS (+,-).



Note!

Ensure that all cables pass through grommets in the outer casing and are securely fixed by the cable clamps in the rear of the electronics box. Ensure that the power supply is connected such that the current carrying conductors become taut before the earth conductor should the supply cable slip from the cable clamp

4 Boiler installation sequence

4.4.1 Connection to the main supply

- Lower the electronics box, see fig. 4.7.

Opening the electronics box

- Unclip the bottom of the electronics box cover and hinge back to reveal the connection plugs.
- Feed the power supply flex into the appliance and the electronics box through the cable clamps provided.

4.4.2 Wiring system

- Connect the flex to the L, N and earth terminal block, see fig 4.8.

Green/yellow (earth) wire	- boiler terminal Earth
sign Blue (neutral) wire	- boiler terminal N
Brown (live) wire	- boiler terminal L



Caution!

Do not connect any mains 230V power to the connections 7-8-9 or BUS (+,-).



Note!

Ensure that the wires are securely fixed in the terminal block.

- Refit the electronics box cover by pushing into place until it clips back into position.
- Raise the electronics box.

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

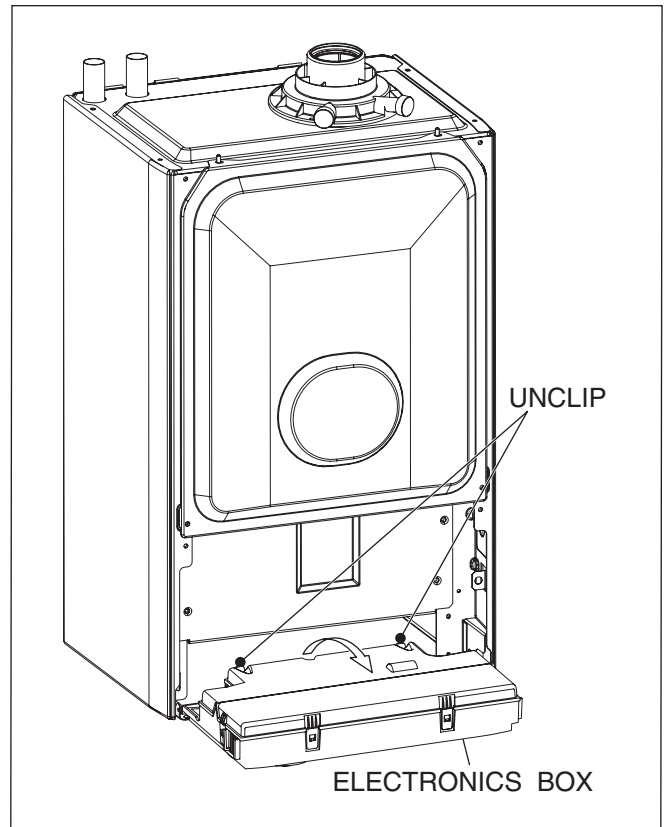


Fig. 4.7 Mains Supply Connection

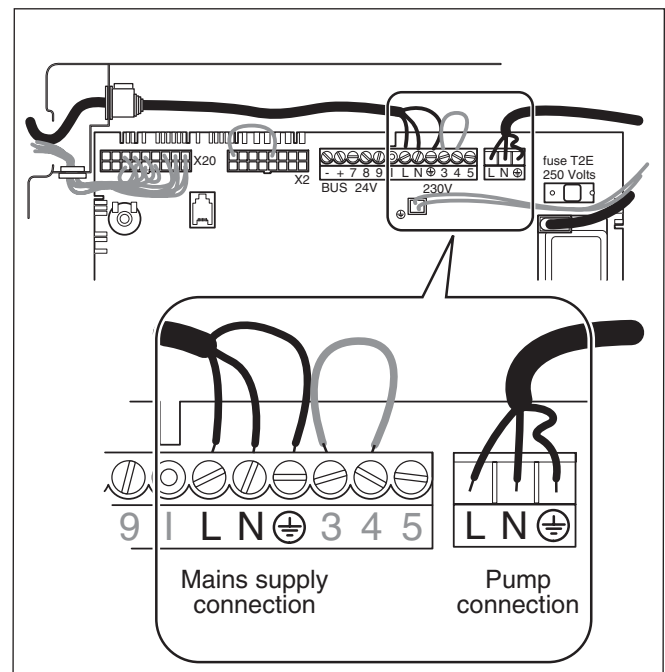


Fig. 4.8 Mains Supply Connection

4.4.3 Electrical board layout

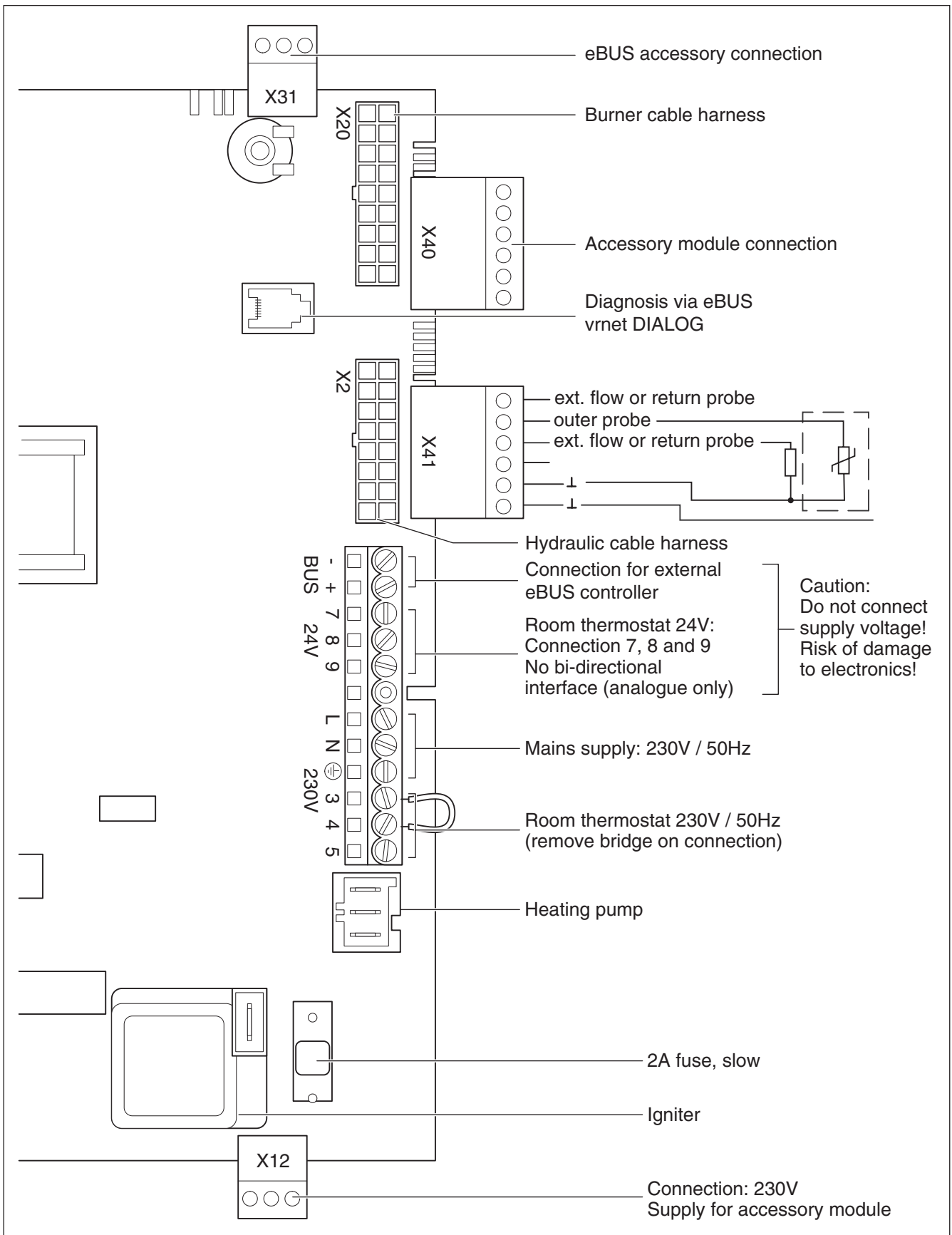


Fig. 4.9 Connection wiring

4 Boiler installation sequence

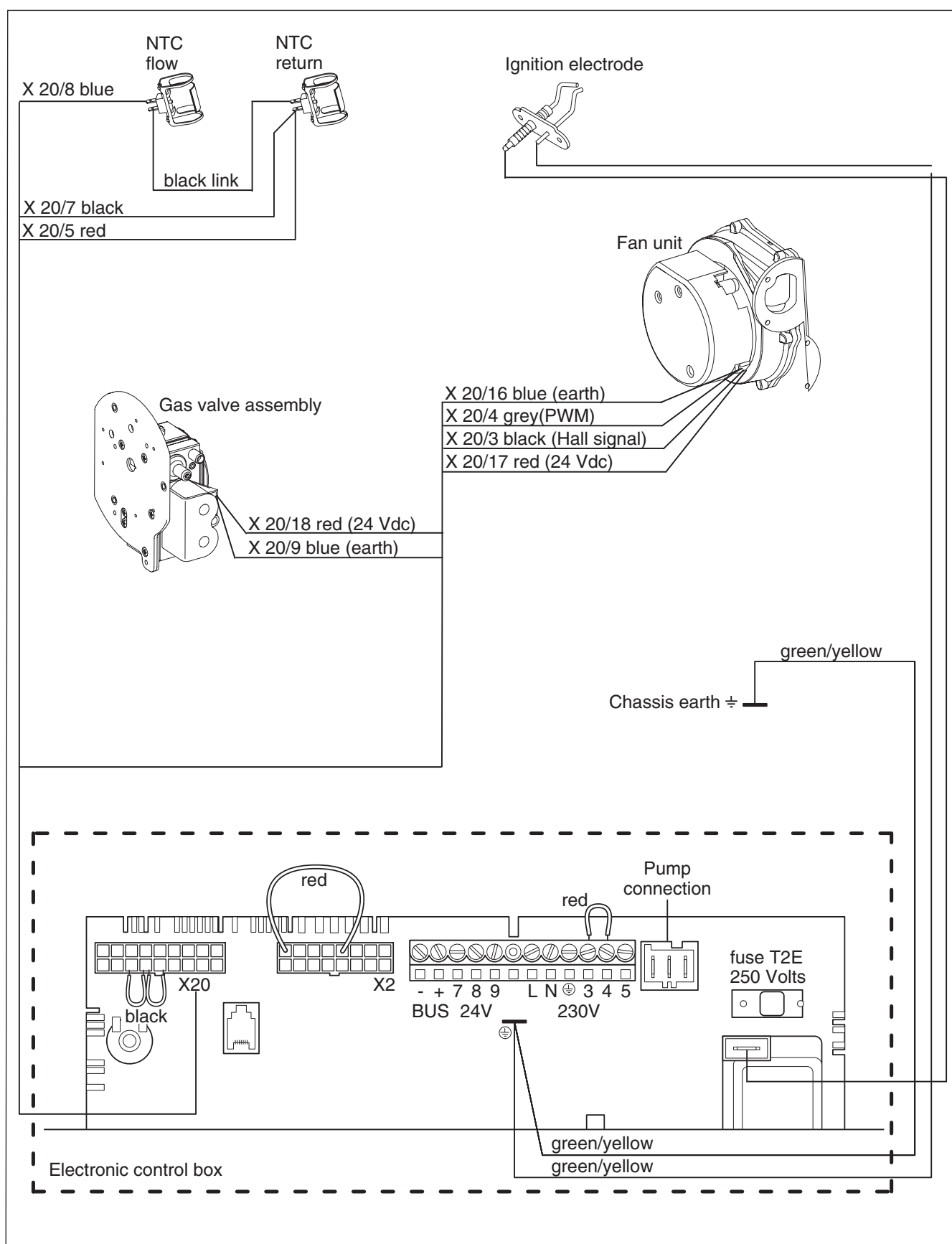


Fig. 4.10 Mains Supply Connection

4.4.4 Controls

Table 4.2 Vaillant controls (used in conjunction with the VR 65 accessory)

Controls	Item no.	Connection
VRC 400 (1-circuit controller, weather-controlled)	00 2001 0843	Installation in electronics box or wall-mounted (plug-and-play)
VRT 360 (room temperature controlled)	00 2001 0842	Wall-mounted, 2-wire bus (plug-and-play)
timeSWITCH 140 (timer)	306 760	Installation in electronics box (plug-and-play)
Accessory	Item no.	Connection
VR 65 control centre for UK cylinder installation (eBUS)	307 215	System solution for UK cylinder connection

4.4.5 External electrical controls

The boiler terminals 3, 4 and 5 are for connecting external electrical controls. 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 to terminal 4. Terminal 5 is an additional neutral connection for external neutrals such as from the anticipator of a room thermostat.

4.4.6 Connection details for external switches and boiler terminal strip.

See schematic layout, fig. 4.11.

4.4.7 Vaillant optional plug in timer accessories

Refer to the instructions supplied with the optional accessories for connection details. Upon completion of all electrical connections refit the terminal box cover by pushing into place. The cover is secured by two locking clips.

4.4.8 Connection details using the VR 65 control centre

The Control Centre VR 65 is an eBUS system component. In a storage unit cylinder installation, it is responsible for the communication between the ecoTEC plus boiler and external 2- or 3-way-valves. Connect the VR 65 Control Centre as described in the enclosed manual.

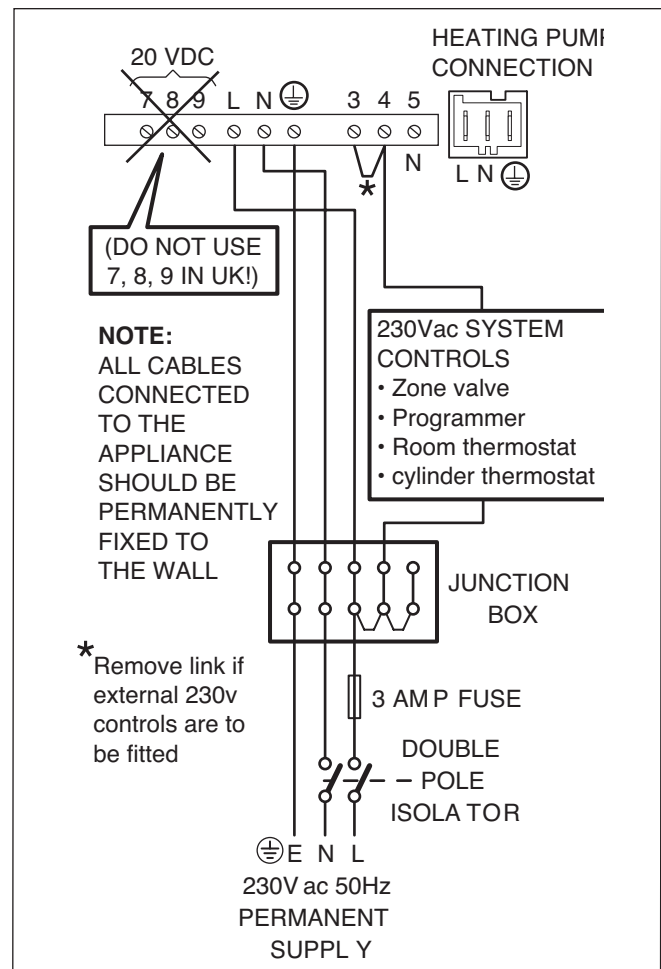


Fig. 4.11 Mains Supply and External Controls

5 Commissioning (Part I)

5 Commissioning (Part I)

Please ensure the "Benchmark" commissioning check list is completed and left with the user.

5.1 Preliminaries - all systems

A competent person should carry out commissioning, in accordance with the current issue of BS 6798.

Remove the two screws on the inner case then lift the case upwards off the two top retaining dowels. Drop down the electronics box into the service position.

Remove the four screws from the chassis panel. Remove the chassis panel by pulling it out at the top from its retaining slots, see fig 5.1.

Note!
When replacing chassis panel ensure the bottom fits behind lip.

Make sure that the system has been thoroughly flushed out with cold water, prior to filling the system refer to section 3.15 inhibitor cleaning. Refill the system with water, making sure that all the air is properly vented from the system and pump.

5.1.1 Gas supply

Isolate the boiler from the mains electrical supply. The complete gas installation including the gas meter must be isolated, tested for soundness and purged in accordance with BS 6891, in IE the current edition of IS 813.

The gas supply to the boiler can be purged by slackening the union connection on the gas service valve beneath the boiler, see fig 5.2. Ensure that there is adequate ventilation, extinguish all naked flames and do not smoke whilst purging.

After purging, the gas service union 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).

The gas valve is factory set for natural gas (G20) and should need no adjustment.

The supply pressure should be checked when the boiler is firing at full rate. Check the inlet pressure at the pressure test point on the gas valve shown in fig 5.3 the values should be between those shown below.

! Natural gas:
DO NOT proceed with the adjustment or attempt to put the unit into service if the inlet working pressure lies outside the 17-25 mbar range.

! LPG:
DO NOT proceed with the adjustment or attempt to put the unit into service if the inlet working pressure is lower than 34 mbar.

! Caution!
Before operating the boiler check the type plate and ensure that the correct gas type

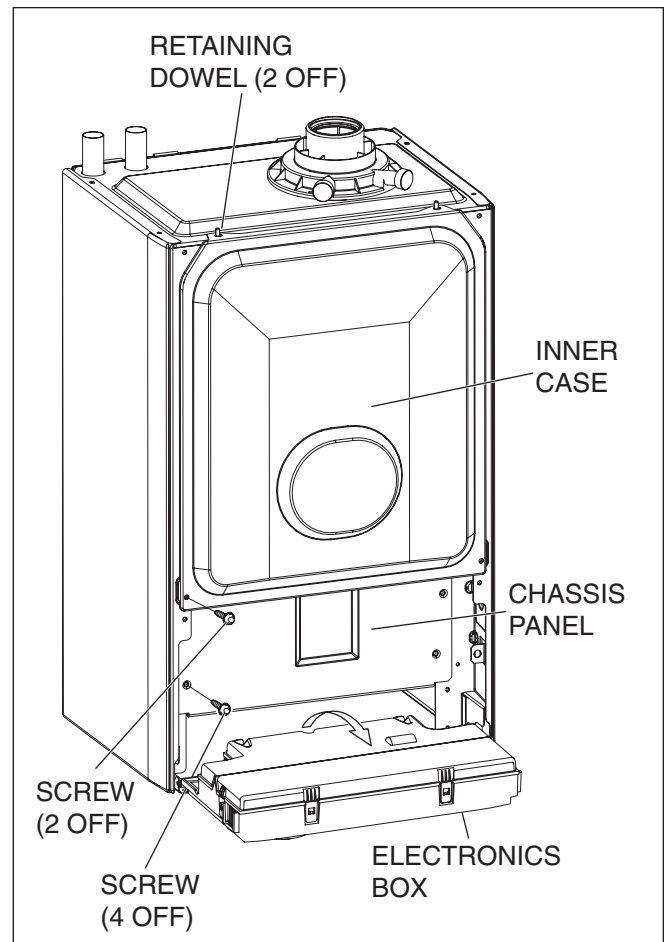


Fig. 5.1 Inner case and chassis removal

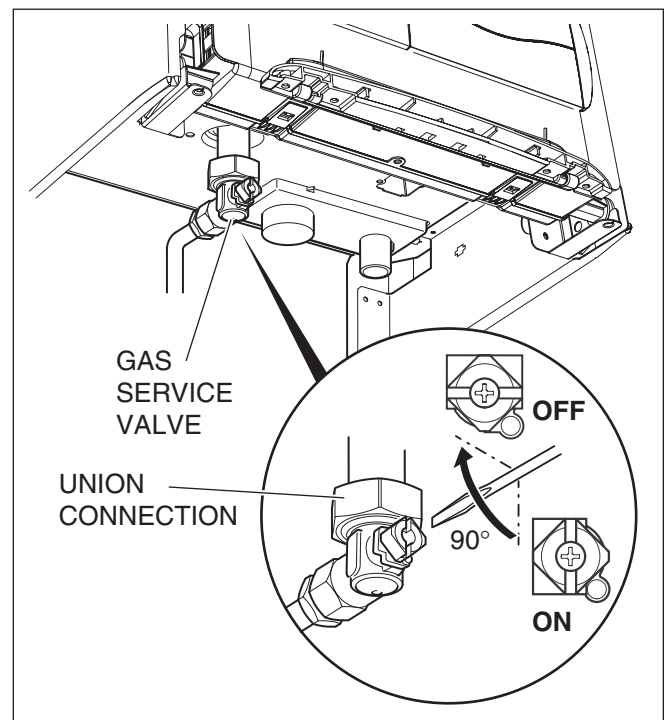


Fig. 5.2 Gas service valve

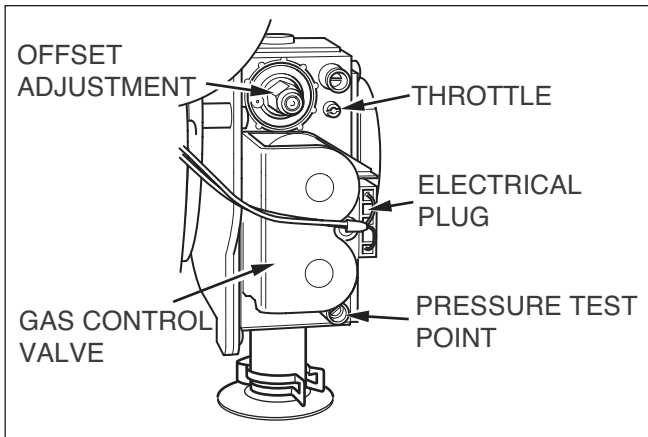


Fig. 5.3 Gas control valve

5.1.2 Initial Lighting

The lighting procedure of the boiler is fully automated. To prepare the boiler for initial lighting first ensure that all external controls are not calling for heat. For access open the front flap by pulling at the centre of the case strip.

Turn on the appliance at control (1), see fig 5.4. When you turn on the appliance, the current operating status appears in the display (2), see fig 5.4.

Adjust the control (1) anti-clockwise to its lowest setting (The indent position just before off). Turn on external heat demand to boiler. The fan should start and after a few seconds the ignition will commence.

Turn domestic hot water control knob (4) to max if accessory VR 65 is fitted.

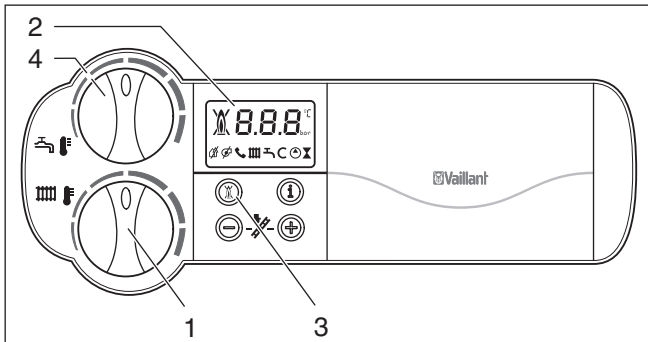


Fig. 5.4 Switching on the appliance

Note!
Allow the boiler to run on minimum until commissioning is complete.

In the unlikely event that a problem occurs with the operation of the ecoTEC boiler, the following points should be checked:

Boiler fails to operate:

- Is the gas supply turned on?
- Is there enough water in the heating system?
- Is the electrical supply switched on?
- Is the control knob (1, fig 5.4) in the operating position?
- Is there an ignition problem?



Caution!
Inappropriate modifications can cause damage. If your boiler still does not operate then please consult the trouble shooting section of this literature.

5.1.3 Ignition problems

If the burner fails to ignite after five attempts, the device does not start up and switches to "Fault". This is indicated by the fault code "F.28" or "F.29" in the display.

The display also shows the flame symbol with a cross through it (2), see fig 5.4.

Automatic ignition can only take place after you manually reset the fault.

- To reset the fault, press the reset button (3), see fig 5.4. and hold it down for one second.



Caution!
If the boiler still shuts off after three attempts of resetting, please consult the trouble shooting section of this literature.

5.1.4 Flue problems

This appliance is fitted with a fan. If the fan does not work properly, the appliance will switch itself off. The display shows the symbols flame and flame and the fault message "F.32".



Note!
If contacting Vaillant Service Solutions please remember to quote the fault code, as this will help to pinpoint the fault.

5.1.5 Testing - gas

The boiler is supplied ready adjusted and no further gas adjustments are necessary, however both the gas inlet working pressure and the maximum gas rate should be checked at least 10 minutes after the burner has lit, see table 5.1.

The gas inlet working pressure can be checked at the pressure test point on the gas valve (fig 5.3.). The gas inlet working pressure should be between 17 mbar to 25 mbar when the boiler is firing at full rate, refer section 9. After testing the inlet pressure remove the U gauge, tighten the sealing screw and test for soundness



Note!
The burner pressure cannot be measured at the gas valve due to the fan/burner design. Replace the inner and front casing panels. Record appliance working gas inlet pressure (mbar) in Benchmark Installation,

Model	Max. nett heat input (kW)	Gas Rate					
		Natural gas (m ³ /h)			Propane (kg/h)		
		nom.	+ 5%	- 5%	nom.	+ 5%	- 5%
415	15.26	1.62	1.70	1.54	1.19	1.25	1.13
418	18.9	2.00	2.10	1.90	1.47	1.54	1.40
428	28.6	3.03	3.18	2.88	2.22	2.33	2.11
438	38.35	4.06	4.26	3.86	2.98	3.13	2.83

Table 5.1

6 Natural gas to LPG conversion

6 Natural gas to LPG conversion

The ecoTEC plus is able to be field adjusted for use on LPG - propane G31 gas. To enable conversion the use of a combustion analyser is necessary.

Caution!
After converting from natural gas to LPG, commission and check boiler function as described in commissioning section of the servicing and installation instructions.

Caution!
This conversion must only be carried out by a competent person in accordance with the Gas Safety (Installation and Use) Regulation 1998. In the UK CORGI registered installers undertake the work to a safe and satisfactory standard.

Before starting any work.
Isolate the electrical supply to the boiler.
Turn off the gas supply at the gas service cock fitted to the appliance.
Turn the gas valve "A" throttle screw (Ref fig.6.1) fully clockwise.
Turn the "A" throttle screw back anti-clockwise the required number of turns as stated in Table 9.1 for the boiler installed.
Ensure the gas analyser is set to the correct fuel setting propane.

To obtain conversion follow the procedure as listed below.
Ensure that the gas supply pressure is = 34mbar.
The gas inlet working pressure can be checked at the pressure test point on the gas valve (fig 5.3.).
Turn gas supply on.
Ensure there is an external heat demand.
Enter the test programs by holding the "+" key, see fig 6.2. and turning power on.
Press "+" until "P.1" is displayed for max rate.
Press "i" to operate appliance in this mode.
Allow appliance to stabilise.
Measure the CO₂ at the combustion products test point, see fig 9.1.
Check CO₂ value (for case off) as stated in table 6.1 for the boiler installed.
If required, using a screwdriver, adjust the "A" throttle to obtain correct value. (rotating anti-clockwise to increase).
Appliance will remain in this mode for 15 minutes or exit by pressing "i" and "+" simultaneously.

Repeat the process above and select "P.2" for min rate.
Press "i" to operate appliance in this mode.
Allow appliance to stabilise.
Check CO₂ value (for case off) as stated in table 9.1 for the boiler installed.
If required, using a 2mm allen key, adjust the "B" offset to obtain correct value. (rotating clockwise to increase)
After checking the combustion, exit by pressing "i" and "+" simultaneously
Refit the chassis panel and the inner case.
(Note the CO₂ will increase slightly).

	NAT.GAS G20		PROPANE G31		
	CASE OFF CO ₂ %	CASE ON CO ₂ %	CASE OFF CO ₂ %	CASE ON CO ₂ %	THROTTLE ADJUSTMENT
ecoTEC plus 415	9.1+0.2-0.5	9.3+0.2-0.5	10.1+0.5-0.5	10.3+0.5-0.5	5 TURNS
ecoTEC plus 418	9.1+0.2-0.5	9.3+0.2-0.5	10.1+0.0-1.0	10.3+0.0-1.0	5 TURNS
ecoTEC plus 428	9.1+0.2-0.5	9.3+0.2-0.5	10.5+0.3-0.8	10.7+0.3-0.8	5 TURNS
ecoTEC plus 438	8.8+0.2-0.5	9.0+0.2-0.5	9.8+0.2-0.8	10.0+0.2-0.8	8 TURNS

Table 6.1

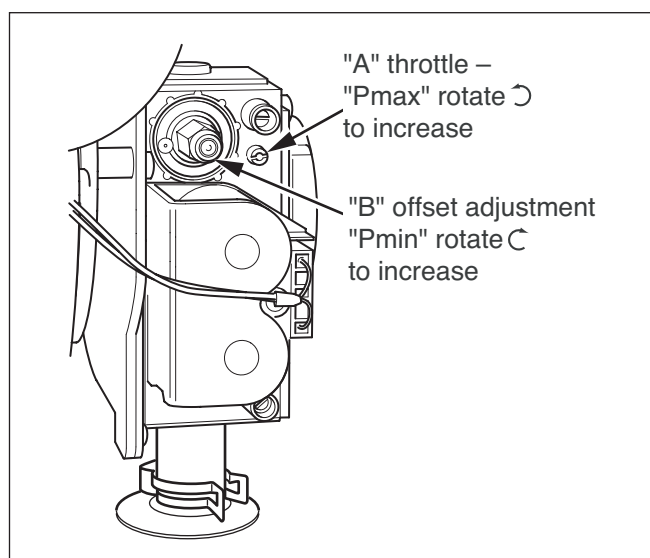


Fig. 6.1 Gas control valve

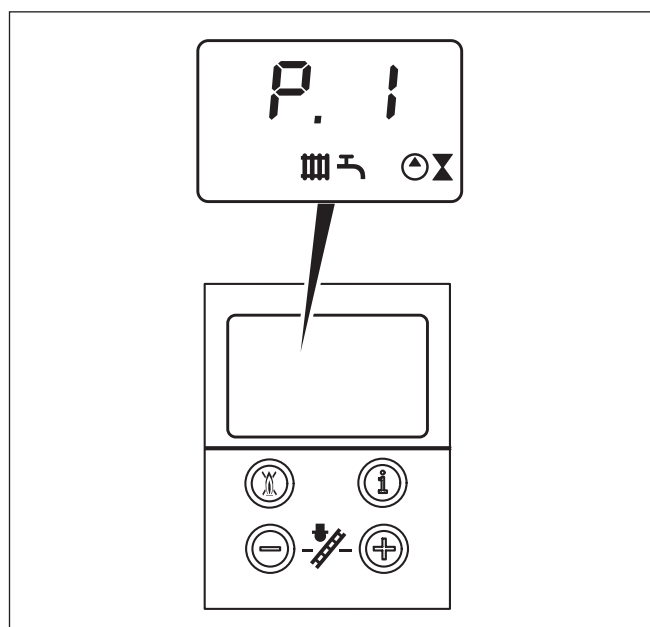


Fig. 6.2 ecoTEC plus controls

Commissioning and Service log.

7 Functional checks commissioning (part II)

Functional checks

Procedure:

After installing and checking the gas supply pressure, perform a function check before commissioning the appliance and handing over to the user.

- Commission the appliance according to the relevant operating manual.
- Check the gas supply pipe, flue system, heating system and the hot water pipes for leaks.
- Check that the flue system has been installed properly according to the flue system installation manual.
- Check for ignition and an even flame on the burner.
- Perform a function check on the heating system (see Section 7.1.).
- Perform a function check on the domestic hot water system (If applicable optional accessories are fitted) (see Section 7.1.1)

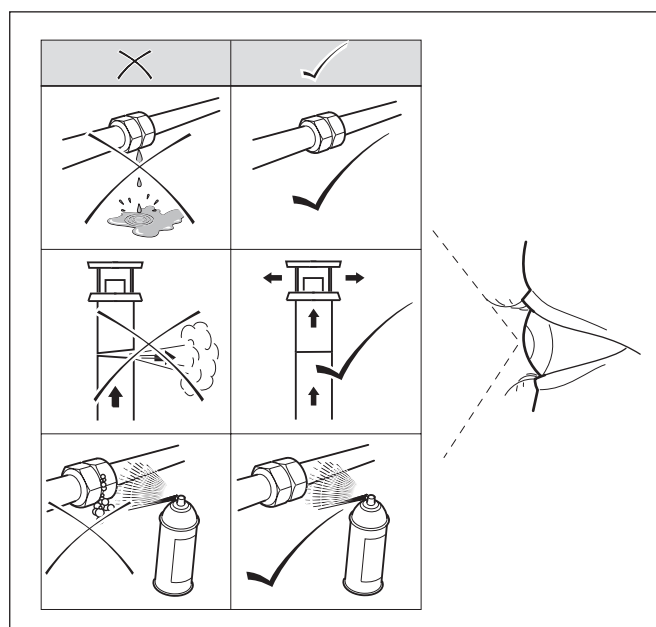


Fig. 7.1 Functional checks (appliance on)

7.1 Heating

- Switch on the appliance.
- Make sure that there is a heating demand.
- Press "i" to activate the status indicator.

As soon as a heat demand is received, the appliance runs through the status indicators "S. 1" to "S. 3", until the appliance is running correctly in normal mode and the display shows "S. 4".

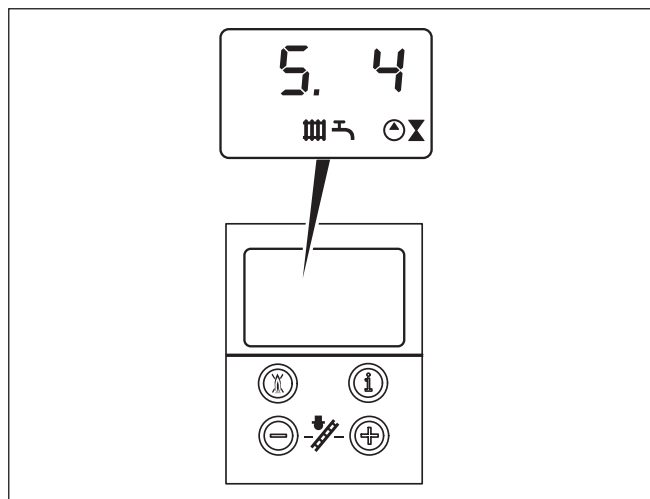


Fig. 7.2 Display indicator during heating mode

7.1.1 Domestic hot water (If optional VR65, uniSTOR cylinder & Vaillant control are installed)

- Switch on the appliance.
 - Fully open the hot water tap.
 - Press "i" to activate the status indicator.
- If the water heating is working correctly, the display shows the following: "S.24".

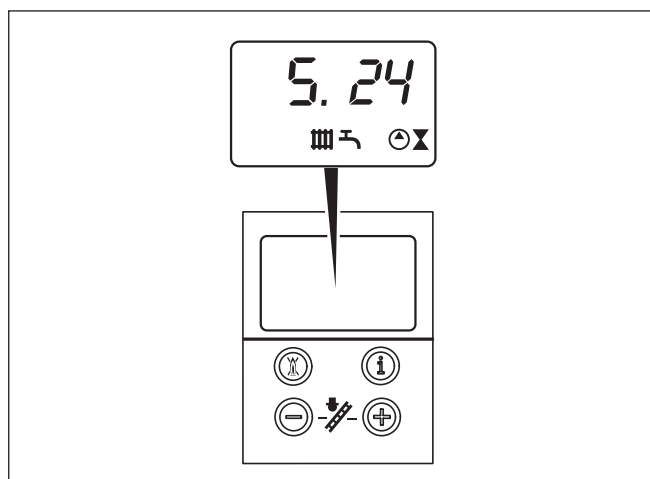


Fig. 7.3 Display indicator during water heating

7.1.2 Pump exercise programme

After a power cut or every 23 hour in frost protection mode the pump will run for one minute to prevent it from sticking. This will also occur during normal operating if there is no demand for more than 24 hours.

7 Functional checks commissioning (part II)

7.1.3 Final flush of the heating system (hot)

- Operate the appliance until the heating system is up to temperature.
- Check the heating system for leaks.
- Connect a hose to the drain valve located at the lowest position of the heating system.
- Shut off the appliance, open the drain valve and all bleed valves on the radiators and allow the water to flow out of the heating system and the boiler quickly and fully.
- Close the drain valve.
- Fill the heating system again with water.
- If fitted to a sealed system.
Release water from the system until the system design pressure is attained. (The actual reading on the digital pressure gauge 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 an 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 in accordance with the manufacturer's instructions. Further information can be obtained from Sentinel, Betz Dearborn Ltd., Tel: 0151 420 9595, or Fernox, Alpha-Fry technologies. Tel: 0870 8700362.
- Refit the boiler casing (see section 5.10)

7.2 Handing over to the user



Note!

If fitted to a sealed system.

- Set the maximum radiator temperature control to the desired setting.
- Set the maximum hot water temperature control to the desired setting (If optional Vaillant accessories are fitted).
- Instruct the user in the safe and efficient operation of the boiler.
- 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 (0870 6060 777) for further details.
- If applicable record central heating operating pressure in the Benchmark gas boiler commissioning checklist along with the heat input (kW) and temperature difference between flow and return.
- Leave the user instructions and the installation instructions with the user.

7.3 Vaillant warranty

Vaillant provide a full parts and labour warranty for this appliance.

The appliance must be installed by a competent person in accordance with the Gas Safety (Installation and Use) Regulations 1998, and the manufacturer's instructions. In the UK 'CORGI' registered installers undertake the work in compliance with safe and satisfactory standards.

All unvented domestic hot water cylinders must be installed by a competent person to the prevailing building regulations at the time of installation (G3).

Terms and conditions apply to the warranty, details of which can be found on the warranty registration card included with this appliance.

Failure to install and commission this appliance in compliance with the manufacturer's instructions may invalidate the warranty (this does not affect the customer's statutory rights).

8 Inspection and maintenance

8.1 Initial inspection

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.



Danger!

It is law that all servicing work is carried out by a competent person (CORGI registered). Inspections/Maintenance work not carried out by a competent person can result in damage to property and personal injury.

Only genuine Vaillant spare parts may be used for inspections, maintenance and repair work to ensure the long term working order of all functions of your Vaillant appliance. Any spare parts which might be required are contained in the current spare parts catalogues. Information can be obtained from Vaillant Customer Service Centres.

8.1.1 Safety instructions

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 use new seals and O rings when parts are replaced.
- Always test for gas soundness and always carry out functional checks after any service work and after replacing any gas carrying component.
- Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after replacing any electrical component.



Danger!

Electrocution by touching live parts can be fatal! The supply terminals in the appliance are permanently live unless the appliance is isolated from the electrical supply either by removing the fuse from a fused spur or pulling the plug out if connected to a socket outlet. Protect the electronics box from spray water. Before working on the appliance, turn off the power supply and secure against restart!

Always perform the following steps after completing any inspection tasks:

- Sealed system only. If necessary, refill the appliance with cold water up to a pressure of approx. 1.5 bar and bleed air from the entire heating system.
- Open the service valve of the gas supply pipe.
- Turn on the power supply and the main switch.
- Check the appliance for gas and water leaks.
- Fill and bleed air from the heating system again, if necessary.



Note!

If it is necessary to keep the main switch on for certain inspection and maintenance, this is indicated in the description of the maintenance task.



Note!

The boiler is fitted with a combustion analysis test point. A suitable combustion analyser can be connected to this point to establish the combustion performance of the boiler. Checking/adjustment of this value is required in the following instances; replacement of gas valve, conversion to or from Natural Gas/ LPG as part of the service schedule or if incorrect combustion is suspected (see section 9).

8.1.2 Maintenance

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

- Inspect the flue, pipe work and electrical connections for indications of damage or deterioration.
- Inspect the air supply and ventilation arrangements of the installation.
- 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.

8.1.3 Functional check of boiler operation

- Carry out a functional check of the boiler operation as previously detailed.
- Remove the appliance casing as detailed and operate the boiler.
- 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.

8 Inspection and maintenance

Overview of the inspection and maintenance tasks

No.	Activity	Column 1 Inspection must be carried out once a year	Column 2 Maintenance
1	Check the air/ gas flue system and ensure it is not blocked, damaged and is fitted correctly.	x	
2	Measure the gas rate during operation (see table 5.1. inside section 5 commissioning part I). If the gas rate is lower than the minimum gas rate, follow the maintenance schedule in column 2.	x	
3	Check combustion by measuring CO and CO ₂ values, compare to table 9.1. If the measurement is outside the tolerances follow the maintenance schedule in column 2. If a flue gas analyser is not available check the ignition and burner flame picture through the viewing window if incomplete combustion is evident perform the maintenance schedule in column 2.	x	
4	Isolate the appliance from the electrical mains supply, close the gas service valve.		x
5	Visually inspect the general heat exchanger area for signs of corrosion, sooting or other forms of damage. If damage is evident perform the tasks in the maintenance schedule in column 2.	x	
6	Remove the burner module (as described in section 8.1.6.) if maintenance schedule is required from steps 2, 3 or 5 above. Clean the primary heat exchanger. Fit new burner door seal kit (observe the assembly instructions enclosed with the kit). Refit the burner module and tighten the nuts.		x
7	Check all appliance electrical connections and make adjustments, if necessary.	x	x
8	If applicable check/re-pressurise system expansion vessel as necessary.	x	x
9	Check the appliance generally, check for dirt/dust and clean if necessary.	x	x
10	Check and clean condensate trap and flexible condensate hose.	x	x
11	Perform a test operation of the appliance including the heating and hot water systems and bleed the system if necessary.	x	x
12	Measure the gas rate during operation and ensure it is inside the tolerances specified (see table 5.1 inside section 5 commissioning part I).		x
13	Re-check combustion by measuring CO and CO ₂ values, compare to table 9.1. Ensure the measurement is within the tolerances. If a flue gas analyser is not available check the ignition and burner flame picture visually, through the viewing window.		x
14	Check boiler for leaks of any kind, rectify as necessary.	x	x
15	Complete gas boiler commissioning checklist (Benchmark).	x	x

Table 8.1 Inspection and maintenance steps

8.1.4 General

All routine servicing requirements can be achieved by the removal of the front casing, inner case and chassis panel only.

Remove the two screws on the underside of the front casing and lift off.

Remove the two screws on the front of inner case and lift off, see fig 8.1.

Drop down the electronics box into the service position.

Remove the four screws from the chassis panel, see fig 8.2. Remove the chassis panel by pulling it out at the top from its retaining slots.



Note!

When replacing chassis front panel ensure the bottom fits behind lip.

Unless stated otherwise any part removed during servicing should be replaced in the reverse order to removal.

With the appliance operational carry out the following functional checks:

1. Check the combustion, preferably with a flue gas analyser, see section 9. If a flue gas analyser is not available remove the outer and inner case, see figs 8.1 and 8.2, and taking care not to touch any components, check the flame picture through the viewing window, fig 8.3.

Should the flame show signs of lift, sooting or appear yellow then it will be necessary to service the burner, if the servicing does not correct the condition, then proceed to the combustion test described in section 9.

2. Measure the gas rate during operation. If the gas rate is lower than the minimum gas rate the burner will require servicing.

Should the combustion measurement or flame and gas valve be correct, then it is not necessary to remove the burner assembly for a service.

3. Check the operational performance of the central heating agrees with the technical specification.

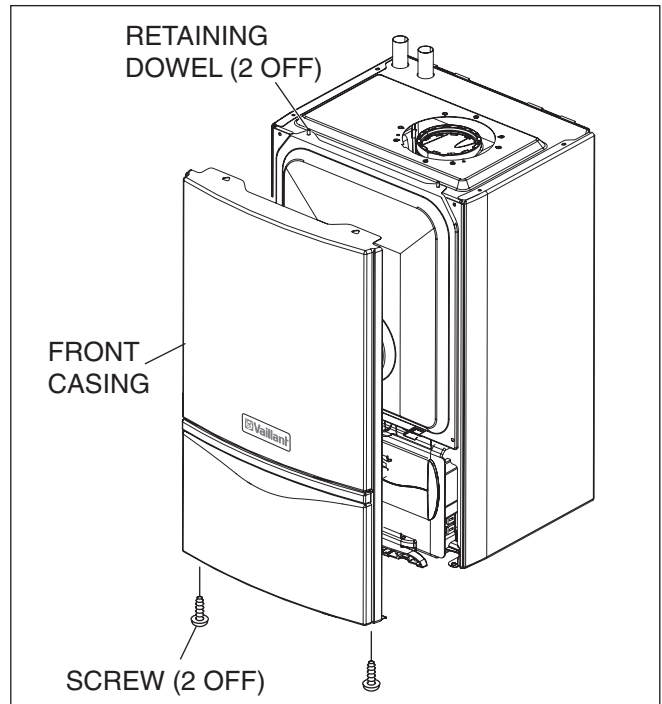


Fig. 8.1 Panels

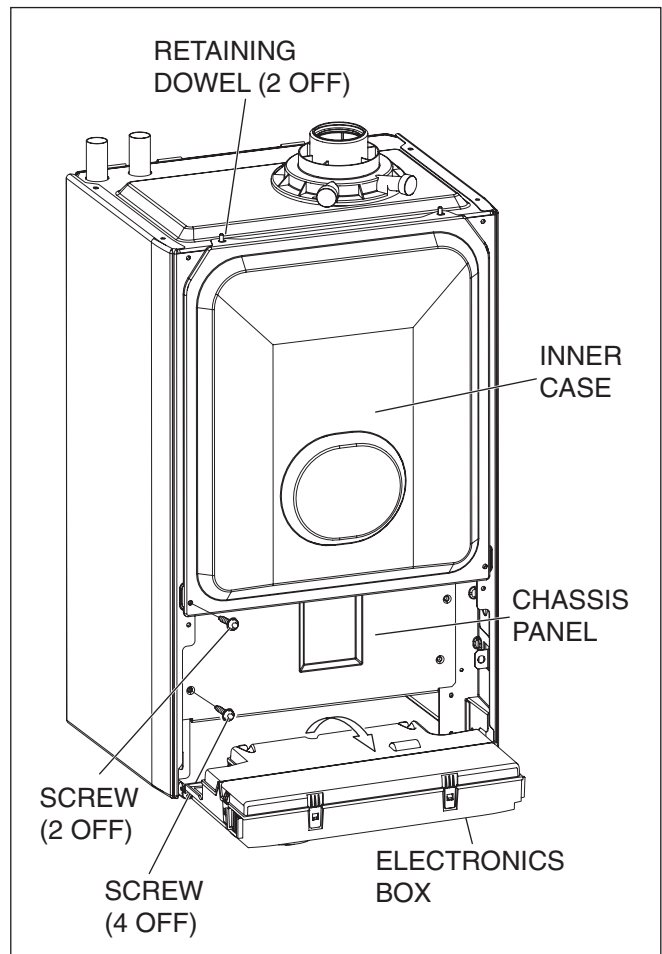


Fig. 8.2 Control panel

8 Inspection and maintenance

8.1.5 Spark electrode

Disconnect the ignition lead and earth lead from the igniter unit and two securing screws at the spark electrode. Withdraw the spark electrode carefully from the combustion chamber, see fig 8.4.

Inspect the tips for damage.

Clean away any debris and check the spark gap is 3.5 -4.5 mm.

Check the electrode gasket for signs of damage and replace if necessary.

8.1.6 Removing the burner



Note!

If the functional checks did not indicate poor combustion then it is not necessary to service the burner.



Caution!

The burner door seal and combustion chamber burner door securing nuts on the burner module, see figs 8.6 and 8.7 must be replaced each time the module is removed for example during maintenance if the burner flange insulation shows any signs of damage or small cracks it must also be replaced.

Isolate the gas supply at the gas service cock.

Disconnect the gas supply at the gas service cock.



Note!

Do not disconnect at the gas valve.
Remove the two gas pipe bracket securing screws from underside of inner case, see fig 8.5.
Drop down the electronics box into the service position.
Remove the four screws from the chassis front, see fig 8.2.
Remove the chassis front by pulling it out at the top from its retaining slots.



Note!

When replacing chassis front panel ensure the bottom fits behind lip.

Disconnect the gas valve electrical plug at the gas valve.

Disconnect the electrical leads from the fan.

Remove the five combustion chamber burner door securing nuts, these should be discarded and replaced with the new nyloc nuts supplied in the burner door seal kit.

Gently remove the fan, gas valve and burner assembly from the combustion chamber complete with the gas pipe bracket and seal, see fig 8.6.

Clean the burner with a soft brush taking great care not to damage the front insulation. DO NOT use wire or sharp instruments to clean the holes of the burner. Inspect the burner for any signs of damage.

Remove and discard the burner door seal and replace with new, see fig 8.7.

Removal of the burner is not necessary during a normal service.

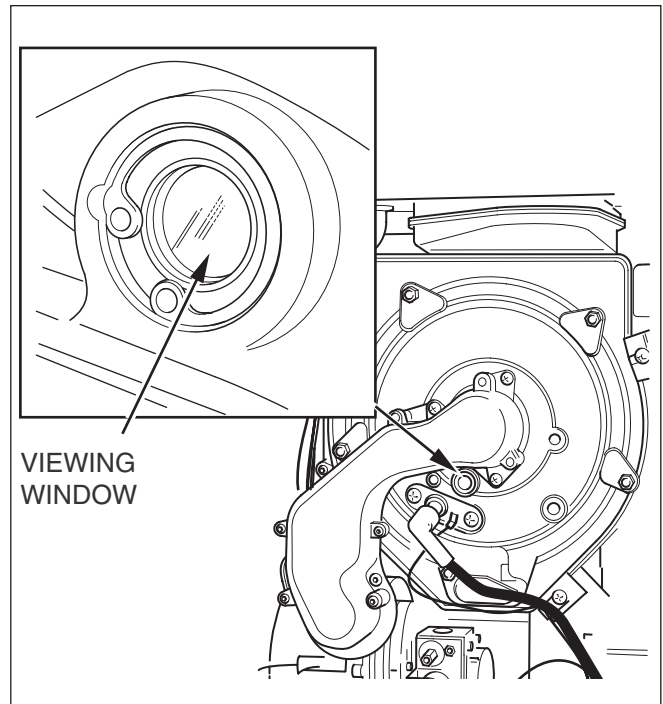


Fig. 8.3 Flame picture

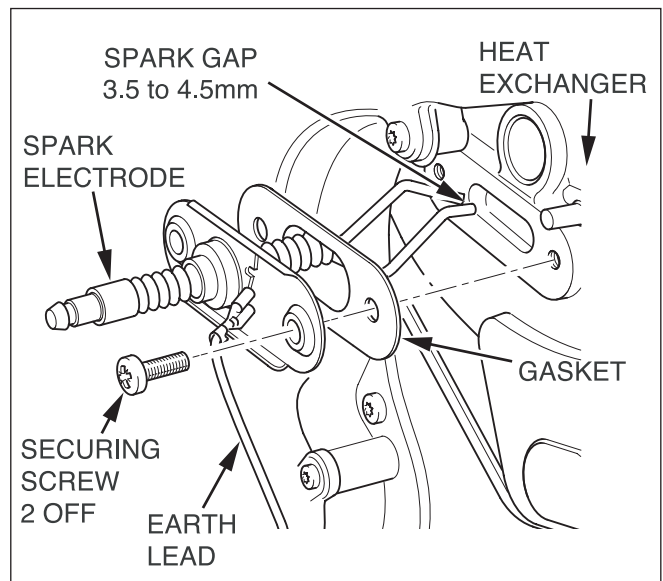


Fig. 8.4 Gas service cock

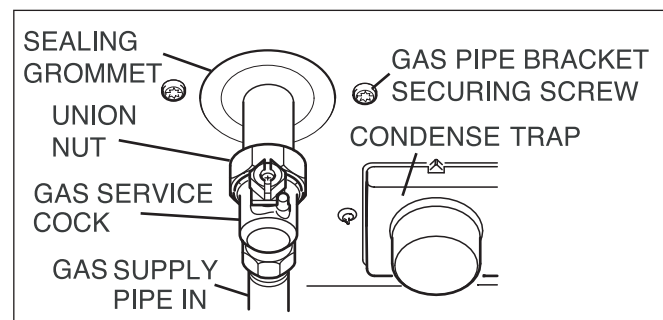


Fig. 8.5 Gas service cock



Note!

If the burner has to be removed it will require a new gasket when refitted.



Note!

When replacing ensure that the sealing grommet, situated below the gas valve is correctly re-seated.

8.1.7 Combustion chamber and heat exchanger

Refer to fig 8.8.

Remove loose debris from combustion chamber using a soft brush and vacuum cleaner. Carefully flush any remaining debris through the condensate trap (ensure the water is kept away from electrical components).

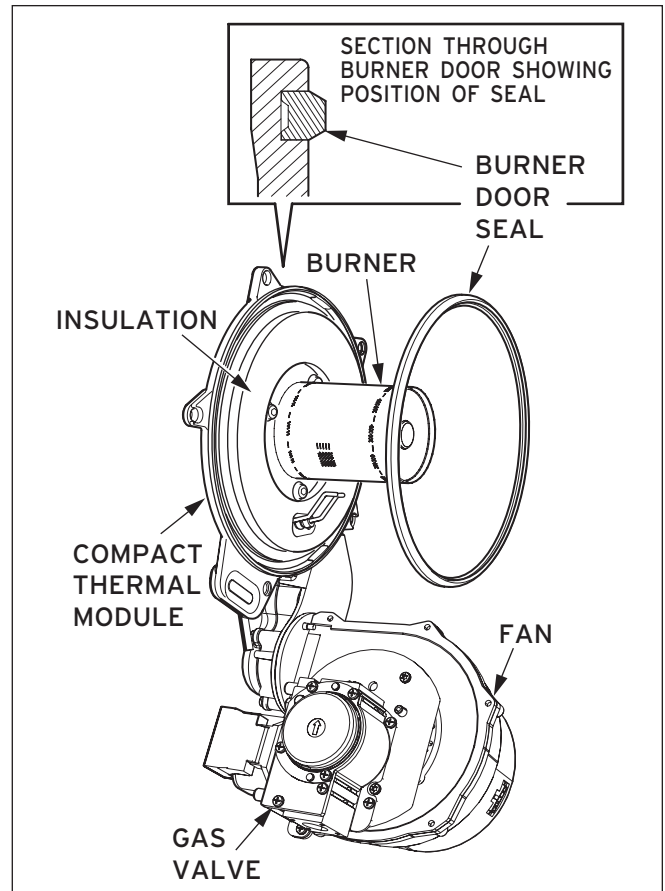


Fig. 8.7 Compact thermal module

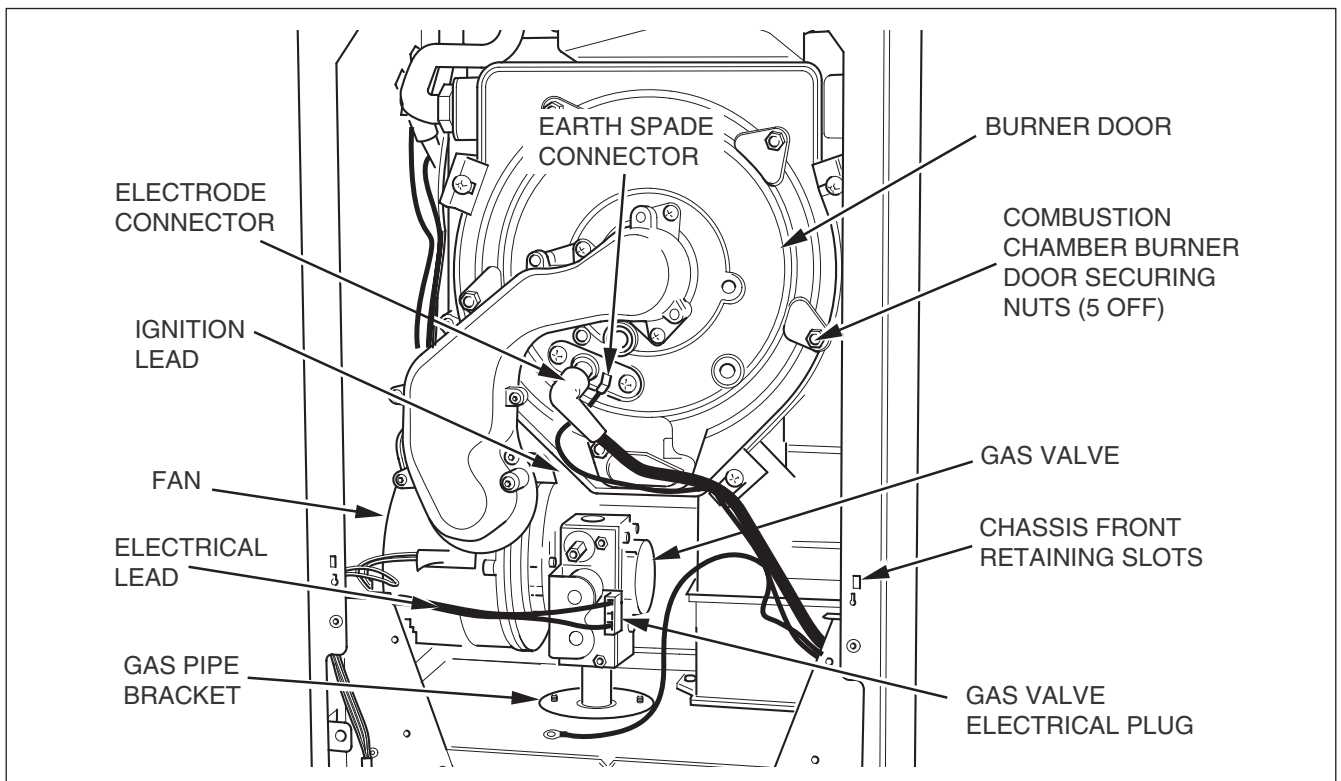


Fig. 8.6 Fan, Gas valve and Burner

8 Inspection and maintenance

8.1.8 Condensate drain

The condensate drain does not normally need removing during servicing.

To flush the condensate drain carefully pour water into the heat exchanger and check that water flows freely to drain. If the condensate drain is blocked, refer to parts replacement section 11 for removal.

8.1.9 Inner casing panel seal check

Refer to fig 8.9.

Check the condition of the seal, replace as required. To replace remove the old seal, thoroughly clean the casing surfaces. Fit the new seal, it is supplied to the correct length.

8.1.10 Checking the expansion vessel (If fitted).



Note!

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

- Release the pressure from the boiler.
- Remove valve cap from expansion vessel charge point.
- Check that the internal charge pressure of the expansion vessel is to the correct design pressure. If the pressure is lower than this the vessel should be re pressurised using an air pump.
- Refit the valve cap.
- Re pressurise boiler and heating system.

8.1.11 Re commissioning the boiler

- Carry out electrical safety checks.
- Turn on the electrical supply.
- Open the boiler CH service valves.
- Carry out function checks of boiler operation as previously detailed.
- Check gas rate as previously detailed.
- Check for water leaks.
- Refit case, ensuring that a good seal is obtained.

8.1.12 Test operation

Always perform the following checks after completing any maintenance task:

- Commission the appliance according to the relevant operating manual.
- Check the appliance for gas and water leaks.
- Check the air/flue gas system for leaks, check its fastening
- Check for ignition and an even flame on the burner.
- Check that the heating system is working.
- Fill out the Benchmark gas boiler commissioning checklist at the rear of this guide.

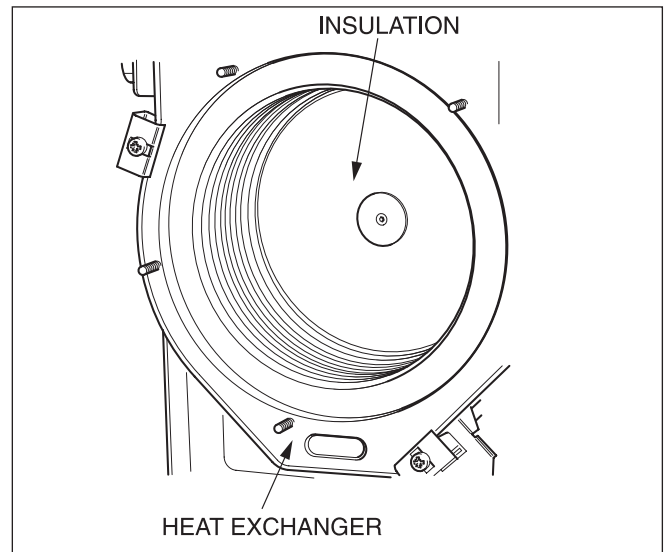


Fig. 8.8 Insulation

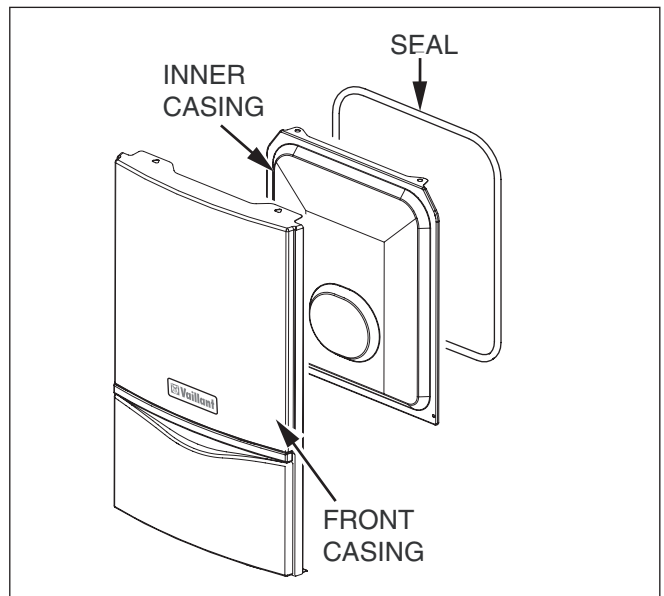


Fig. 8.9 Panels

9 Combustion analysis



Note!

The boiler is fitted with a combustion analysis test point. A suitable combustion analyser can be connected to this point to establish the combustion performance of the boiler.

9.1 Check CO₂ content

Refer to table 9.1 and if necessary set (air-ratio adjustment).



Note!

Combustion analysis must be carried out at annual service if a flue gas analyser is available, if no analyser is available then visual checks should be carried out as per service schedule. Checking/adjustment of this value is also required in the following instances: replacement of gas valve, conversion to or from natural gas/LPG or if incorrect combustion is suspected!

- Remove the front and inner cover.
- Press the "+" and "-" keys simultaneously. The "Full load mode" is activated.
- Wait at least 5 minutes until the appliance reaches its operating temperature.
- Measure the CO₂ content at the combustion products test point, see fig 9.1.
- If necessary, set the corresponding flue gas value (value with removed appliance front, see table 9.1) by turning "A" throttle, see fig 9.2.
 - > Turn to the left: higher CO₂ content,
 - > Turn to the right: lower CO₂ content,



Note!

Only for natural gas:

Adjust only in increments of 1/8 turn and wait approx. 1 minute after each adjustment until the value stabilises.

Only for liquid gas: Adjust only in very small increments (approx. 1/16 turn), and wait approx. 1 minute after each adjustment until the value stabilises.

- Check the CO₂ content again.
- If necessary, repeat setting.
- Press the "+" and "-" keys simultaneously. The "Full load mode" is turned off. The full load mode is also turned off if no key is pressed for 15 minutes.
- Attach the inner and front cover.

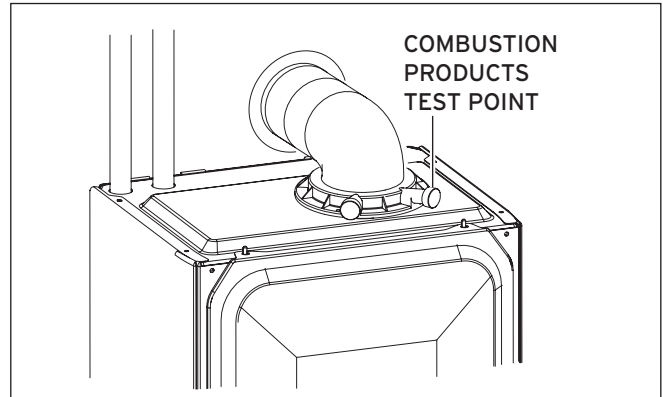


Fig. 9.1 Test point

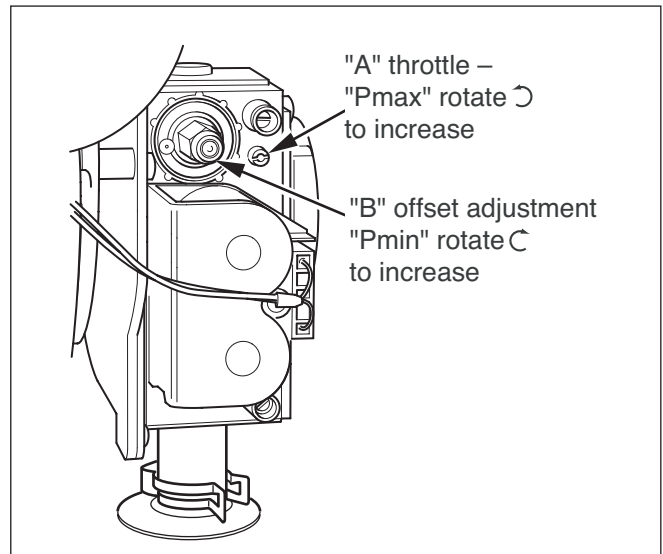


Fig. 9.2 Gas control valve

	NAT.GAS G20		PROPANE G31		THROTTLE ADJUSTMENT
	CASE OFF CO ₂ %	CASE ON CO ₂ %	CASE OFF CO ₂ %	CASE ON CO ₂ %	
ecoTEC plus 415	9.1+0.2-0.5	9.3+0.2-0.5	10.1+0.5-0.5	10.3+0.5-0.5	5 TURNS
ecoTEC plus 418	9.1+0.2-0.5	9.3+0.2-0.5	10.1+0.0-1.0	10.3+0.0-1.0	5 TURNS
ecoTEC plus 428	9.1+0.2-0.5	9.3+0.2-0.5	10.5+0.3-0.8	10.7+0.3-0.8	5 TURNS
ecoTEC plus 438	8.8+0.2-0.5	9.0+0.2-0.5	9.8+0.2-0.8	10.0+0.2-0.8	8 TURNS

Table 9.1

10 Troubleshooting

10.1 Logical fault finding procedure

These checks must be carried out before attempting to use the fault finding guide.

1. Carry out electrical safety checks (see section 4 'Wiring system').
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 'Gas Supply').
4. Ensure the heating system is full of water and the system design pressure is attained. (sealed systems only). If not, refill and vent the system. Ensure any flow and return isolating valves (if fitted) are fully open.
5. Set the central heating temperature to maximum.
6. Set the domestic hot water temperature to maximum. (Only if additional Vaillant accessories are fitted).
7. 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.

10.1.1 Status codes

The status codes that you can see on the display provides information about the current operating condition of the appliance.

The display of the status codes can be called as follows:

- Press the "i" key.
The display shows the status code, e.g. S.4 for "Burner mode - Heating". The display of the status codes can be cancelled as follows:
- Press the "i" key.
- Do not press any key for approx. 4 minutes.
The current heating flow temperature appears in the display again.

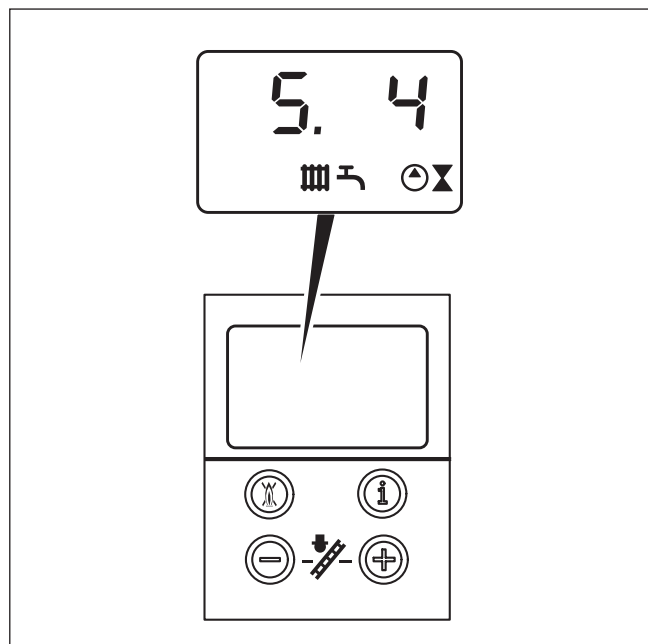


Fig. 10.1 Display of status codes

Display	Meaning
	Heating mode (all models):
S. 0	No heat demand
S. 1	Fan running
S. 2	Water pump running
S. 3	Ignition sequence
S. 4	Burner ignited
S. 5	Fan and pump running
S. 6	Fan over run
S. 7	Pump over run
S. 8	Anti cycling mode
	Domestic hot water mode (when accessories are fitted)
S.20	Warmstart demand
S.21	Fan running
S.22	Pump running
S.23	Ignition sequence
S.24	Burner ignited
S.25	Fan and water pump running
S.26	Fan over run
S.27	Pump over run
S.28	Anti cycling mode

Table 10.1 Status codes

Display	Meaning
	Charge hot water cylinder (when accessories are fitted):
S.20	Warmstart demand
S.21	Fan running
S.22	Pump running
S.23	Ignition sequence
S.24	Burner ignited
S.25	Fan and water pump running
S.26	Fan over run
S.27	Pump over run
S.28	Anti cycling mode
	All boilers:
S.30	No heating demand from external controls (clamp 3-4 open)
S.31	Central heating thermostat knob turned off or no heat demand by the eBUS control unit
S.32	Heat exchanger antifreeze active, as fan speed variation is too high. Appliance is within the waiting time of the operation block function
S.34	Anti frost mode active
S.36	No heating demand from low voltage controls (clamp 7-8-9)
S.41	Water pressure > 2,9 bar
S.42	Response from accessory module or defective condensate pump is blocking burner operation
S.53	Appliance is within the waiting period of the operation block function due to water shortage (VL-RL spread too big)
S.54	Appliance is within the waiting period of the operation block function due to water shortage (temperature gradient)
S.96	Return-sensor check is running, demand (DHW or heating) is blocked
S.98	Flow-/Return-sensor check is running, demand (DHW or heating) is blocked

Table 10.1 Status codes (continued)

10.1.2 Diagnostic codes

In the diagnostic mode, you can change certain parameters or display more information. The diagnostic information is divided into two diagnostic levels. The second diagnostic level can be reached only after entering a password.



Caution!

Access to the second diagnostic level must be used exclusively by a qualified technician.

First Diagnostic level

- Press the "i" and "+" keys simultaneously. The display shows "d.0".
- Use the "+" or "-" keys to scroll through the desired diagnostic numbers of the first diagnostic level (see table 10.2).
- Press the "i" key. The display shows the relevant diagnostic information.
- If necessary, use the "+" or "-" keys to change the value (display flashes).
- Save the new value by holding down the "i" key for approx. 5 seconds until the display no longer flashes. You can end the diagnostic mode as follows:• Press the "i" and "+" keys simultaneously.
- Do not press any key for approx. 4 minutes. The current heating flow temperature appears in the display again.

Second diagnostic level

- As described above in the first diagnostic level, scroll through the diagnostic number d.97.
- Change the displayed value to 17 (password) and press the "i" button. You are now in the second diagnostic level where all information from the first diagnostic level (see table 10.2) and the second diagnostic level (see table 10.3) is displayed. Scrolling and changing values and exiting the diagnostic mode is done as described in the first diagnostic level.



Note!

After exiting the second diagnostic level, if you press "i" and "+" within 4 minutes, you will directly reach the second diagnostic level with out having to enter the password again.

10 Troubleshooting

Display	Meaning	Display value/adjustable value
d. 0	Heating part load	Adjustable heating part load in kW (factory setting: max. output)
d. 1	Water pump over run time for heating mode	2 - 60 min (factory setting: 5 min)
d. 2	Max. burner anti cycling period at 20 °C Flow temperature	2 - 60 min (factory setting: 20 min)
d. 3	Hot water flow temperature reading (when accessories are fitted)	in °C
d. 4	Current temperature for warm start sensor (when accessories are fitted) Current storage tank sensor	in °C
d. 5	Flow temperature target value or return target value when return regulation is set.	in °C, max. the value set in d.71 Limited by the eBUS controller (if an eBUS controller is connected)
d. 6	Hot water temperature target value	in °C, 35 to 65 °C
d. 7	Warm start temperature target value (when accessories are fitted) Storage temperature target value (system boiler only)	in °C, 40 to 65 °C in °C, 15 °C for left stop, then 40 to 70 °C
d. 8	External controls heat demand (terminals 3-4)	0 = open (no heat request) 1 = closed (heat request)
d. 9	Flow target temperature from external analogue regulator to terminal 7-8-9/eBUS	in °C, minimum from ext. eBUS target value and target value terminal 7
d.10	Status internal heating pump	1 = on, 0 = off
d.11	Status external heating pump	1 to 100 = on, 0 = off
d.12	Cylinder charging pump (via accessory module)	1 to 100 = on, 0 = off
d.13	Hot water circulation pump (via accessory module)	1 to 100 = on, 0 = off
d.22	Hot water demand	1 = on, 0 = off
d.23	Summer/Winter function	1 = Winter, 0 = Summer
d.25	Hot water activation via eBUS Control	1 = yes, 0 = no
d.30	Control signal for both gas valves	1 = on, 0 = off
d.33	Fan speed target value	in rpm/10
d.34	Fan speed actual value	in rpm/10
d.35	Position of diverter valve (when accessories are fitted)	0 = Heating; 100 = Hot water; 40 = Centre position
d.36	Hot water flow sensor	in l/min
d.40	Flow temperature Actual value	in °C
d.41	Return temperature Actual value	in °C
d.44	Digitised ionisation potential	Display range of 0 to 102, > 80 no flame, < 40 even flame
d.47	Outside temperature (with weather compensating Vaillant controller only)	Actual value in °C
d.67	Remaining burner anti cycling time	in min
d.76	Appliance variant (device specific number)	00 to 99
d.90	Digital regulator status	1 = identified, 0 = unidentified (eBUS Address <=10)
d.91	DCF status with connected external probe with DCF77 receiver	0 = no reception, 1 = reception, 2 = synchronised, 3 = valid
d.97	Activation of the second diagnostic level	Password: 17

Table 10.2 Diagnostics codes of the first diagnostic level

Display	Meaning	Display value/adjustable value
d.17	Heating flow/return regulation change over	0 = flow, 1 = return (factory setting: 0)
d.18	Pump mode (return)	0 = return, 1 = nonstop, 2 = winter (factory setting: 0)
d.19	Operating modes of the two-speed heating pump	0 = pre ignition speed 1, hot water or heating speed 2, overrun speed 1 1 = pre ignition speed 1, hot water speed 2, heating speed 1 overrun speed 1 2 = like 1, but speed in heating mode dependent on heating part load d. 0 (if d.0 is below 60% of full load, then pump speed 1, other-wise speed 2) 3 = always speed 2 (factory setting: 2)
d.20	Maximum set value for target cylinder temperature (system boilers only)	Setting range: 50 to 70 °C (factory setting: 65 °C)
d.27	Switching accessory relay 1 in the accessory module	1 = Circulation pump (default) 2 = Ext. pump 3 = Storage charging pump 4 = Flue gas flap/extractor hood 5 = External gas valve 6 = External error message
d.28	Switching accessory relay 2 in the accessory module	1 = Circulation pump 2 = Ext. pump (default) 3 = Storage charging pump 4 = Flue gas flap/extractor hood 5 = External gas valve 6 = External error message
d.50	Offset for minimum speed	in rpm/10, adjustment range: 0 to 300
d.51	Offset for maximum speed	in rpm/10, adjustment range: -99 to 0
d.58	From the third quarter of 2006: Activation of solar reheating	Setting range: 0 to 30 = solar reheating disabled (factory setting) 3 = activation of min. hot water target value = 60 °C for solar reheating
d.60	Number of safety temperature limiter cut offs	Quantity
d.61	Number of lock outs	Number of unsuccessful ignitions in the last attempt
d.64	Average ignition time	in seconds
d.65	Maximum ignition time	in seconds
d.68	Unsuccessful ignitions in the first attempt	Quantity
d.69	Unsuccessful ignitions in the second attempt	Quantity
d.70	Set diverter valve position	0 = Normal mode (factory setting) 1 = Centre position 2 = permanent heating position
d.71	Maximum setting of heater control knob	Adjustment range in °C: 40 to 85 (Factory setting: 75)
d.72	Pump overrun time after warm start (combination boilers only) or charging an electronically controlled hot water storage through C1-C2 (system boilers only)	Adjustment range in sec: 0, 10, 20 to 600 Factory setting (when accessories are fitted): 80 Factory setting for system boilers: 300
d.73	Offset for warm start target value (when accessories are fitted)	Adjustment range: -15 K to +5 K (Factory setting: OK)
d.75	Maximum charging time for a storage without own controller (system boilers only)	Adjustment range in min: 20, 21, 22 to 90 (Factory setting: 45)
d.77	Storage partial load (storage charging capacity limit, system boilers only)	Adjustment range in kW: appliance specific Factory setting: max output

Table 10.3 Diagnostics codes of the second diagnostic level

10 Troubleshooting

Display	Meaning	Display value/adjustable value
d.78	Storage charging temperature limit (target flow temperature in storage mode, system boilers only)	Adjustment range in °C 55 to 90 (Factory setting: 80)
d.80	Heating operating hours	in h ¹⁾
d.81	Water heating operating hours (when accessories are fitted)	in h ¹⁾
d.82	Cycles in heating mode	Quantity/1001) (3 corresponds 300)
d.83	Cycles in hot water operation	Quantity/1001) (3 corresponds 300)
d.84	Maintenance indicator: Number of hours until the next maintenance	Adjustment range: 0 to 3000 h and "--" for disabled Factory setting: "--" (300 corresponds to 3000 h)
d.93	DSN appliance variant setting	Adjustment range: 0 to 99
d.96	Factory setting	1 = Resetting adjustable parameters to factory setting

1) Five-digit numbers are saved with the diagnostics codes 80 to 83. If d.80, for example, is selected, only the first two digits of the number are displayed (e. g. 10). The display switches to the last three digits (e. g. 947) by pressing "i". In this example the number of operating hours of the heating is 10947 h. The display returns to the selected diagnostics item by pressing "i" again.

Table 10.3 Diagnostics codes of the second diagnostic level (continued)

10.1.3 Fault codes

Fault codes take priority over all other display functions in the event of a system fault occurring. If multiple faults occur, the corresponding fault codes are displayed alternately for about two seconds each.

10.1.4 Fault memory

The fault memory stores details of the ten most recent faults.

- Press the "i" and "--" buttons simultaneously.
 - Use the "+" button to scroll back through the list of memorised errors.
- To cancel fault error memory display mode, proceed as follows:
- Press the "i" button below the display or
 - Do not touch any key for about four minutes.
- The display will now revert back to showing the current flow temperature.

Code	Meaning	Cause
F. 0	Flow-NTC open circuit	NTC broken, NTC cable broken, Defective connection at NTC, Defective connection at electronics
F. 1	Return-NTC open circuit	NTC broken, NTC cable broken, Defective connection at NTC, Defective connection at electronics
F.10	Flow NTC short circuit	NTC defective, short circuit in cable harness, cable/casing short cut
F.11	Return NTC short circuit	NTC defective, short circuit in cable harness, cable/casing short cut
F.13	Tank NTC short circuit	NTC defective, short circuit in cable harness, cable/casing short cut
F.20	Safety temperature limiter by NTC activated	Flow-NTC not correctly thermal-connected or defective; appliance does not shut down
F.22	Dry fire	Too little water in the appliance, water pressure sensor defective, cable to pump or water sensor defective, pump blocked or defective, pump output too low
F.23	Water shortage, temperature difference between flow and return NTC too large	Pump blocked or defective, pump output too low, flow and return NTC interchanged
F.24	Water shortage, temperature rise too quick	Pump blocked, insufficient pump output, air in appliance, water pressure too low

Table 10.4 Error codes

Code	Meaning	Cause
F.27	Incorrect sensing of flame	Flame detector defective
F.28	Appliance does not start: Attempts to ignite during start failed	Faults in the gas supply such as:- - Gas meter or gas pressure detector defective - Air in gas- Gas flow pressure too low - Fire protection tap has disengaged Faults in the gas valve, wrong gas setting, igniter (ignition transformer, ignition cable, ignition plug) defective, ionisation current stopped (cable, electrode), faulty earthing in appliance, electronics defective
F.29	Flame goes off during operation and subsequent	ignition attempts failed Gas supply temporarily stopped, faulty earthing of appliance
F.32	Fan speed variation	Fan blocked, plug not inserted correctly on fan, hall sensor defective, fault in cable harness, electronics defective
F.49	eBUS under voltage	Short circuit on eBUS, overload on eBUS or two power sources on eBUS with different polarity
F.61	Gas-valve control defective	Short circuit/earth (ground) leak in cable harness to gas valves, gas valve assembly defective (earth/ground leak from coils), electronic control system defective
F.62	Gas valve shut off delay	Gas valve leaking, electronics defective
F.63	EEPROM error	Electronics defective
F.64	Electronics/NTC fault	Short-circuit in flow or return NTC or electronics defective
F.65	Electronics temperature too high	Electronics too hot due to external effect, electronics defective
F.67	Flame detector input signal is outside the limits (0 or 5 V)	Electronics defective
F.70	No valid DSN in display and/or main board	Spare part failure display and main board interchanged at same time and device specific number not adjusted
F.71	Flow NTC reports constant value (stuck at)	Flow NTC is defective
F.72	Flow and/or return NTC fault	Flow and/or return NTC is defective (tolerances too big)
F.75	No pressure rise was detected on turning on the pump	Water pressure sensor or/and pump defective Air in the heating system, quick bleeder defective Too little water in appliance; check adjustable by-pass; connect external expansion vessel to return
F.76	Overheating protection on primary heat exchanger triggered	Cable or cable connection of fuse in the primary heat exchanger defective, or primary heat exchanger defective
F.77	Condensate pump or feedback of accessories blocks heating	Condensate pump defective or flume flap feedback triggered
F.78	Wrong configuration with accessory	link box VR65 connected to combination boiler
con	No communication to main board	Connection error display main board

Table 10.4 Error codes (continued)

10 Troubleshooting

11 Parts Replacement

10.2 Test programs

Special functions can be triggered on the appliances by activating various test programs.

These programs are given in detail in the Table 10.5.

- The test programs P.0 to P.6 will be started when "Power ON" is turned on and the "+" key is pressed for 5 s. The display shows "P.0".
- Press the "+" key to start counting the test number upwards.
- Press the "i" to operate the appliance now and to start the test program.
- Press "i" and "+" simultaneously to exit the test programs. You can also exit the test programs by not pressing any key for 15 minutes.

Display	Meaning
P.0	Bleeding test program. The heating circuit and hot water circuit (when accessories are fitted) is bled via the automatic air vent (the cap on the automatic air vent must be loosened).
P.1	Test program where the appliance is operated in full load after successful ignition
P.2	Test program where the appliance is operated with minimum gas volume (ignition gas volume) after successful ignition
P.3	Not available
P.4	Not available
P.5	Test program for the safety temperature limit check; appliance heats up by by-passing a regulating shut down through the flow regulator until the shut off temperature of 97 °C is achieved.
P.6	Filling test program. The diverter valve moves to the centre position

Table 10.5 Test programs

10.3 Resetting parameter to factory settings

Besides the option to reset individual parameters manually to the factory settings specified in tables 10.2 and 10.3, you can also reset all parameters simultaneously.

- In the second diagnostic level, under the diagnostic number "d.96" change the value to 1 (see section 10.1.2).
The parameters of all adjustable diagnostic numbers now correspond to the factory settings.

11 Parts replacement

The tasks listed below in this section may be carried out only by a qualified engineer.

- Only use genuine spare parts for repairs.
- Make sure the parts are correctly fitted and that their original position and alignment are retained.

11.1 Safety instructions



Danger!

Each time the components are replaced, comply with the safety instructions below for your own safety and to avoid damage to the appliance!

- Put the appliance out of operation.



Note!

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).

Close the service valve in the gas supply.

Isolate the boiler flow and return if possible.

Empty the appliance if you want to replace water bearing components of the appliance!

Make sure that no water drops on live components (e.g. switch box etc.)!

Use only new seals and O-rings!

After completing the work, check for gas leaks and perform a function check (see section 7)!

Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after exchanging any electrical component.

11.2 Replacing the burner.

For access refer to section 8.1.4.

Remove the burner refer to section 8.1.6

11.3 Replacing the gas valve

For access refer to section 8.1.4.

Remove the gas valve, fan and burner refer to the relevant parts of section 8.1.6.

Before removing the gas valve note its position on the fan. Remove the three securing screws, which fix the gas valve, plastic swirl plate to the venturi on the fan.

Remove the gas valve.

Remove the gas supply pipe from the gas valve.

When refitting the gas valve take care as it can be fitted more than one way.

After assembly test for gas soundness and purge in accordance with the current issue of BS6891 or in IE, the current edition of I.S.813 "Domestic Gas Installations".

11.4 Replacing the fan

Remove the gas valve refer to section 11.3.

Remove the venturi plate secured with three screws and remove the two screws securing the fan to the gas manifold, see fig 11.1.

Check the gasket and replace if necessary.



Note!

The ecoTEC plus 428 and 438 fan is secured through an extension piece with two securing screws, check and replace any seals or gaskets if necessary.

11.5 Replacing the heat exchanger

For access refer to section 8.1.4.

Remove the gas valve, fan and burner refer to the relevant parts of section 8.1.6.

Drain the boiler.

Remove the clip securing the clear condensate pipe to heat exchanger.

Pull to remove clamps (two at the top and one at the bottom) to remove the heat exchanger, see fig 11.2.



Note!

There will be water in the heat exchanger.

Remove clear condensate pipe connector from bottom of heat exchanger.

11.6 Replacing the condensate trap and siphonic drain

Refer to fig 11.3.

Remove the clips securing the flexible tubes to the adapter by twisting the clips slightly to disengage the clip jaws from each other.

Remove flexible tubes from adapter.

Lift off the adapter.

Remove the drain connection downstream of the condensate trap.

Remove the two condensate trap securing screws.

Lift up and carefully remove the condensate trap taking care not to spill any water which may be left in the unit. As the unit is lifted remove the flexible pipe on the outlet.

Remove any solids found.

Before removing the float note it's orientation.

Remove the float to clean it.

Flush water through the trap to remove any remaining solids.

Check for any debris in the outlet pipe of the condensate drain and clean as necessary.

Reassemble and refit the condensate trap.



Note!

If a replacement trap is required remove spigot bung before fitting condensate drain connection.

Using a suitable container, flush the heat exchanger until the water appears clear in the container. Reassemble adapter.

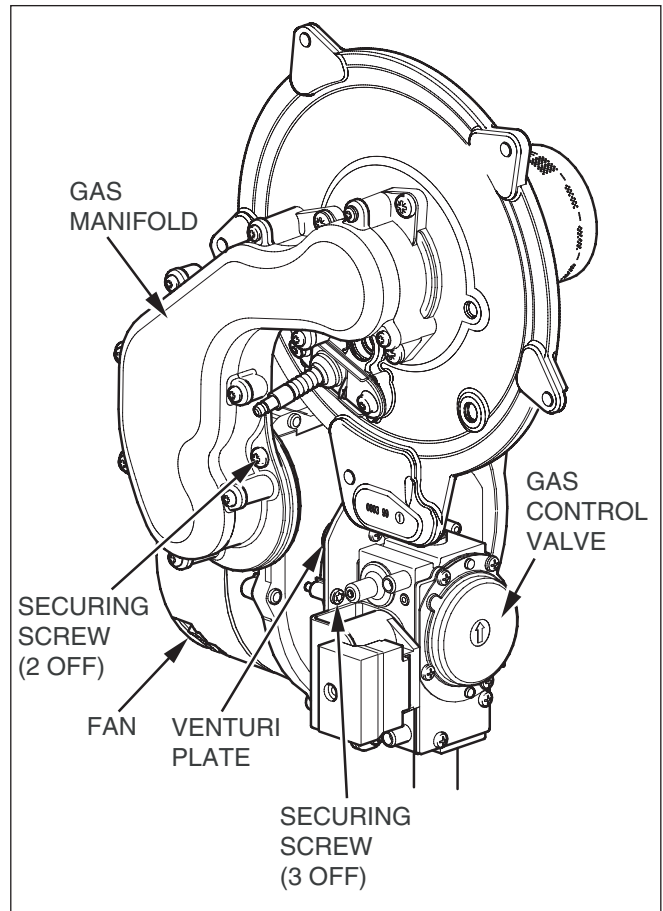


Fig. 11.1 Fan removal

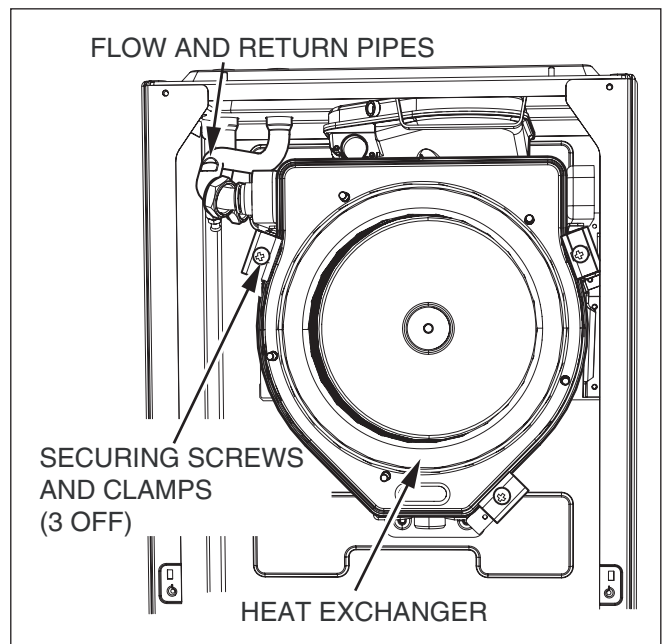


Fig. 11.2 Heat exchanger removal

11.7 Replacing electronics and display



Danger!
Before replacing the component, comply with the safety instructions in Section 11.1.

- Comply with the assembly and installation manuals provided with the spare parts.

Replacing display or electronics

If you are replacing only one of the two components, the parameter adjustment functions automatically. On turning on the appliance, the new component takes over the previously set parameters from the components that are not replaced.

Replacing display and electronics

When replacing both components, after being turned on, the appliance goes to fault and displays the error message "F70".

- In the second diagnostic level, under the diagnostic number "d.93" enter the number of appliance variant according to Table 11.1 (see section 10.1.2).

The electronics is now set to the appliance type and the parameters of all adjustable diagnostics numbers correspond to the factory settings.

Appliance	Device specific number
ecoTEC plus 415	0
ecoTEC plus 418	1
ecoTEC plus 428	2
ecoTEC plus 438	3

Table 11.1 Device specific numbers

12 Recycling and disposal

The design of all Vaillant products takes into account the subsequent recycling and/or eventual safe scrapping of each component used. Vaillant's in-house rules set strict standards in this respect. The selection process used for choosing raw materials includes full consideration of their recycling characteristics, and of the breakdown and separation properties of sub assemblies. We also take fully into account the environmental and health hazards involved in recycling and in the disposal of non-reusable waste items.

12.1 Appliance

The Vaillant ecoTEC plus consists largely (92 %) of metal components designed for eventual recycling by incorporation into the smelting process of a steelworks. This gives these parts virtually unlimited scope for subsequent re-use. All plastic materials are duly identified to facilitate sorting and separation when the time comes to recycle the unit.

12.2 Packaging

Vaillant endeavours to keep the amount of transport packaging used for its equipment to the bare minimum necessary. Subsequent re-use is taken into account when selecting packaging materials. High-quality cardboard has long been a valuable secondary raw material for the card and paper industry. The sections of EPS (Styropor®) are required in order to protect equipment in transit. EPS is 100 % recyclable and CFC-free. The foil-wrapping and securing straps are likewise made of recyclable plastic.

13 Vaillant service

To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement. Please contact Vaillant Service Solutions (0870 6060 777).

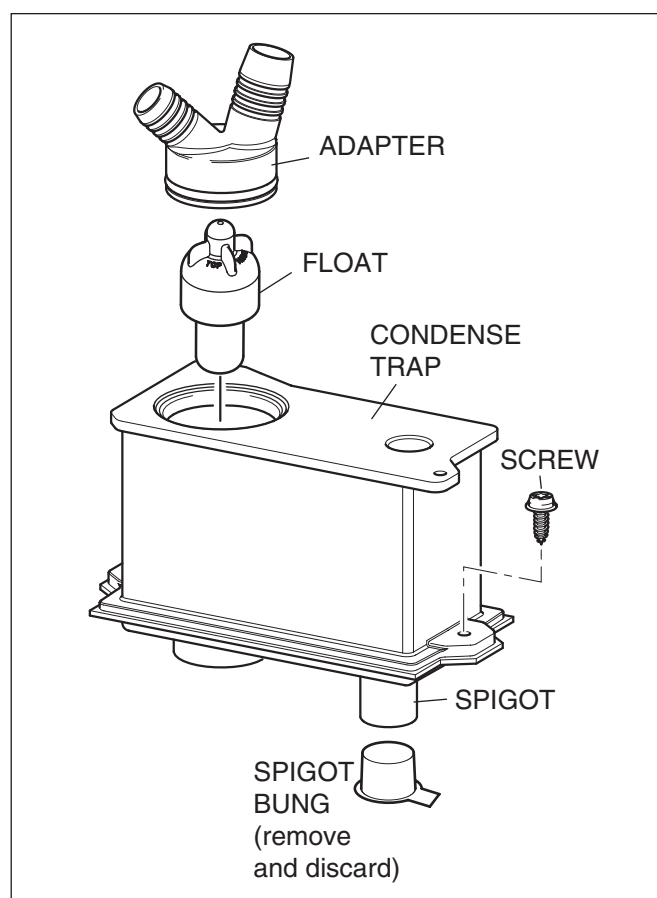


Fig. 11.3 Condense trap



EC declaration of conformity

Name and Address of the manufacturer:

Vaillant GmbH
Berghauser Str. 40
42859 Remscheid

Identification of product:

Vaillant ecoTEC plus
 Condensing - Open Vented Boilers

Appliance type:

ecoTEC plus 415
 ecoTEC plus 418
 ecoTEC plus 428
 ecoTEC plus 438

The appliance types satisfy the essential requirements of the relevant directives and Standards:

90/396/EEC including amendments

"Directive on the approximation of the law of the member states relating to appliances burning gaseous fuels"

Designed and built to CE-type examination certificate:

PIN no: **87B042**

92/42/EEC including amendments

"Directive of efficiency relating to boiler burning gaseous fuels"

Designed and built according to European Standards:

73/23/EEC including amendments

"Directive on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits"

EN 483
EN 677
EN 625
EN 60335-1
EN 60529
EN 50165
EN 55014
EN 61000-3-2
EN 61000-3-3

89/336/EEC including amendments

"Directive on the approximation of the law of the member states relating to electromagnetic compatibility"

Any change to the appliance and/or any use not according to the instructions will lead to the invalidation of this Declaration of Conformity

Belper, July 2006

(place, date)

Program Manager
 S. Keeton

Certification Manager
 A. Beardsley

Vaillant GmbH

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Ltd. company ■ Registered office: Remscheid ■ Registry court: Amtsgericht Wuppertal HRB 11775

Directors: Dr. Michel Brosset, Claes Göransson ■ Chairman of the Supervisory Board: Gert Krüger

Commerzbank Remscheid (code 340 400 49) account no. 621 833 300 ■ USt.-Ident-Nr. DE 811142240

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BENCHMARK No. | | | | | | |

GAS BOILER COMMISSIONING CHECKLIST

BOILER SERIAL No. _____ NOTIFICATION No. _____

CONTROLS To comply with the Building Regulations, each section must have a tick in one or other of the boxes

TIME & TEMPERATURE CONTROL TO HEATING	ROOM T/STAT & PROGRAMMER/TIMER ☐	PROGRAMMABLE ROOMSTAT ☐
TIME & TEMPERATURE CONTROL TO HOT WATER	CYLINDER T/STAT & PROGRAMMER/TIMER ☐	COMBI BOILER ☐
HEATING ZONE VALVES	FITTED ☐	NOT REQUIRED ☐
HOT WATER ZONE VALVES	FITTED ☐	NOT REQUIRED ☐
THERMOSTATIC RADIATOR VALVES	FITTED ☐	
AUTOMATIC BYPASS TO SYSTEM	FITTED ☐	NOT REQUIRED ☐

FOR ALL BOILERS CONFIRM THE FOLLOWING

THE SYSTEM HAS BEEN FLUSHED IN ACCORDANCE WITH THE BOILER MANUFACTURER'S INSTRUCTIONS? ☐

THE SYSTEM CLEANER USED _____

THE INHIBITOR USED _____

FOR THE CENTRAL HEATING MODE, MEASURE & RECORD

GAS RATE _____ m³/hr _____ ft³/hr

BURNER OPERATING PRESSURE (IF APPLICABLE) ☐ N/A _____ mbar

CENTRAL HEATING FLOW TEMPERATURE _____ °C

CENTRAL HEATING RETURN TEMPERATURE _____ °C

FOR COMBINATION BOILERS ONLY

HAS A WATER SCALE REDUCER BEEN FITTED? YES ☐ NO ☐

WHAT TYPE OF SCALE REDUCER HAS BEEN FITTED? _____

FOR THE DOMESTIC HOT WATER MODE, MEASURE & RECORD

GAS RATE _____ m³/hr _____ ft³/hr

MAXIMUM BURNER OPERATING PRESSURE (IF APPLICABLE) ☐ N/A _____ mbar

COLD WATER INLET TEMPERATURE _____ °C

HOT WATER OUTLET TEMPERATURE _____ °C

WATER FLOW RATE _____ lts/min

FOR CONDENSING BOILERS ONLY CONFIRM THE FOLLOWING

THE CONDENSATE DRAIN HAS BEEN INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS? YES ☐

FOR ALL INSTALLATIONS CONFIRM THE FOLLOWING

THE HEATING AND HOT WATER SYSTEM COMPLIES WITH CURRENT BUILDING REGULATIONS ☐

THE APPLIANCE AND ASSOCIATED EQUIPMENT HAS BEEN INSTALLED AND COMMISSIONED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS ☐

IF REQUIRED BY THE MANUFACTURER, HAVE YOU RECORDED A CO/CO₂ RATIO READING? N/A ☐ YES _____ CO/CO₂ RATIO

THE OPERATION OF THE APPLIANCE AND SYSTEM CONTROLS HAVE BEEN DEMONSTRATED TO THE CUSTOMER ☐

THE MANUFACTURER'S LITERATURE HAS BEEN LEFT WITH THE CUSTOMER ☐

COMMISSIONING ENG'S NAME PRINT _____ CORGI ID No. _____

SIGN _____ DATE _____

SERVICE INTERVAL RECORD

It is recommended that your heating system is serviced regularly
and that you complete the appropriate Service Interval Record Below.

Service Provider. Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the boiler manufacturer's instructions. Always use the manufacturer's specified spare part when replacing all controls

SERVICE 1 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 2 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 3 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 4 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 5 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 6 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 7 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 8 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 9 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

SERVICE 10 DATE _____
ENGINEER NAME _____
COMPANY NAME _____
TEL No. _____
CORGI ID CARD SERIAL No. _____
COMMENTS _____
SIGNATURE _____

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