For the installer

Installation and maintenance manual

ecoMAX

Wall hung room sealed fan assisted condensing boiler

ecoMAX 665

GB

Contents

Information on the documentation

The following information is intended to guide you through the entire documentation.
Further documents apply in combination with this installation and maintenance manual.

We accept no liability for any damage caused by not following these instructions.

Other relevant documentation and service aids

For the owner of the system

1 brief operating instructions	no. 00 20 00 64 61
1 operating manual	no. 00 20 01 46 08

For the installer

1 installation instructions flue accessories	no. 00 20 01 46 06
1 sticker with name of appliance	no. 83 42 24
1 installation instructions for siphon	no. 83 53 11
1 checklist for start-up	no. 00 20 02 01 61
1 installation template	no. 17 90 73
1 safety sticker	no. 83 55 93

Service aids
The following test and measuring equipment is required for inspection and maintenance:
- Flue gas analyser
- manometer (u gauge)
- auxiliary tool for gas fitting (comes with appliance)

Attachment and storage of the documents
Please pass on this installation and maintenance manual as well as the aids to the owner of the system, whose responsibility it is to ensure that the manuals and auxiliary equipment are available whenever required.

Symbols used
Please observe the safety instructions in this installation manual when installing the appliance!

Danger!
Immediate risk of serious injury or death.

Caution!
Potentially dangerous situations for the product and environment.

Note!
Useful information and instructions.

- Symbol for a necessary task

1 Description of the appliance

1.1 Design

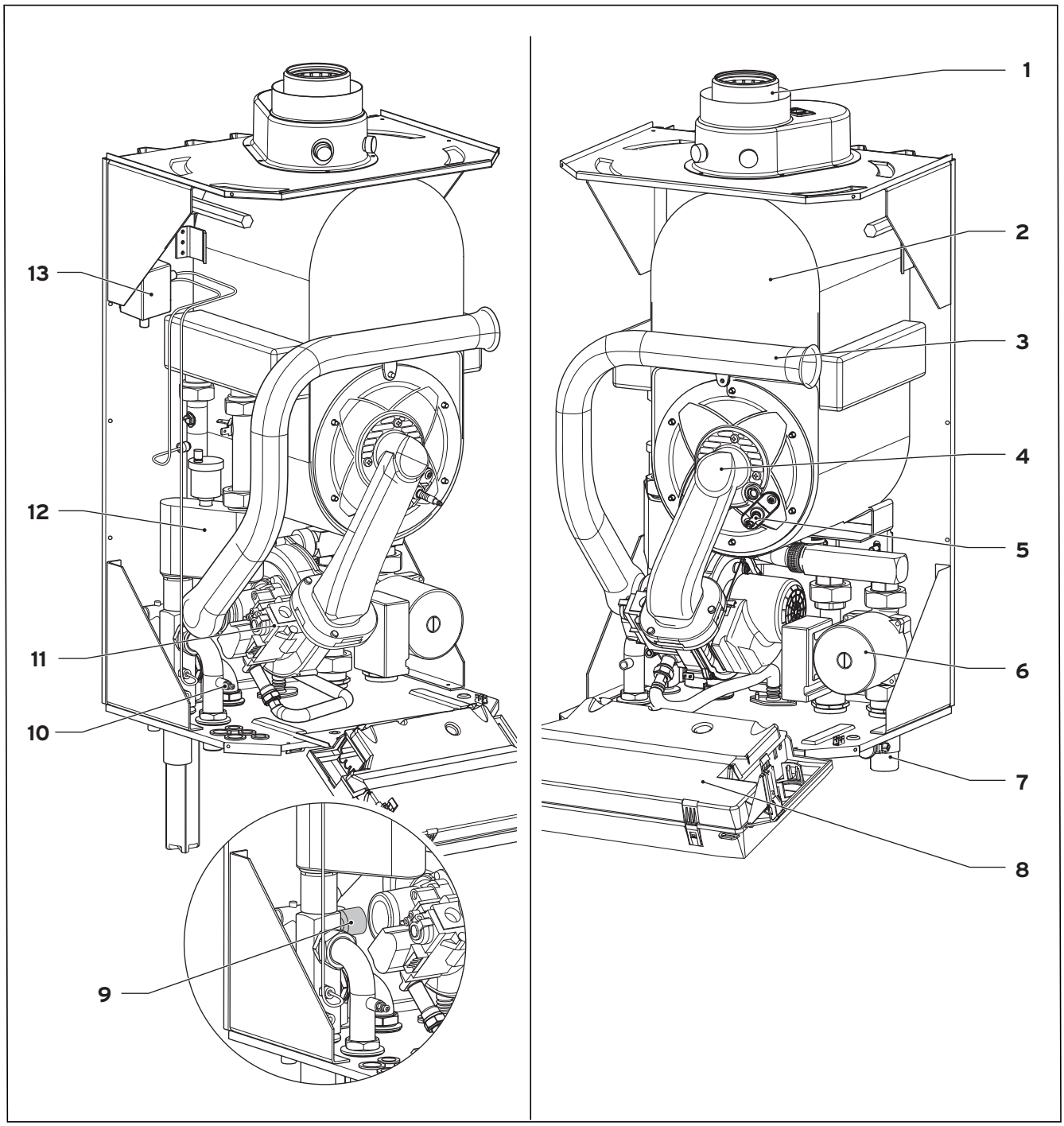


Fig. 1.1 Function elements

1 Connection to flue pipe 80/125
2 Primary heat exchanger
3 Air intake pipe
4 Compact thermal module with burner, flange, mixing tube, fan and electronic gas valve
5 Ignition electrode
6 Pump
7 Drain valve point
8 Electronics box
9 Water pressure switch
10 Discharge for supply
11 Electronic gas valve
12 Air separator with strainer
13 Water flow switch

Appliance type	Country of destination (designations according to ISO 3166)	License category	Type of gas	Nominal heat output range P (kW)	Storage charging output (kW)
ecoMAX 665	GB (Great Britain) IE (Eire)	I_{2H}	Natural gas H - G 20 - 20 mbar	15.0 - 69.6 (40/30 °C) 13.7 - 63.7 (80/60 °C)	65.0

1.3 Data badge

The data badge of the Valliant ecoMAX 665 is attached at the factory to the bottom of the appliance.

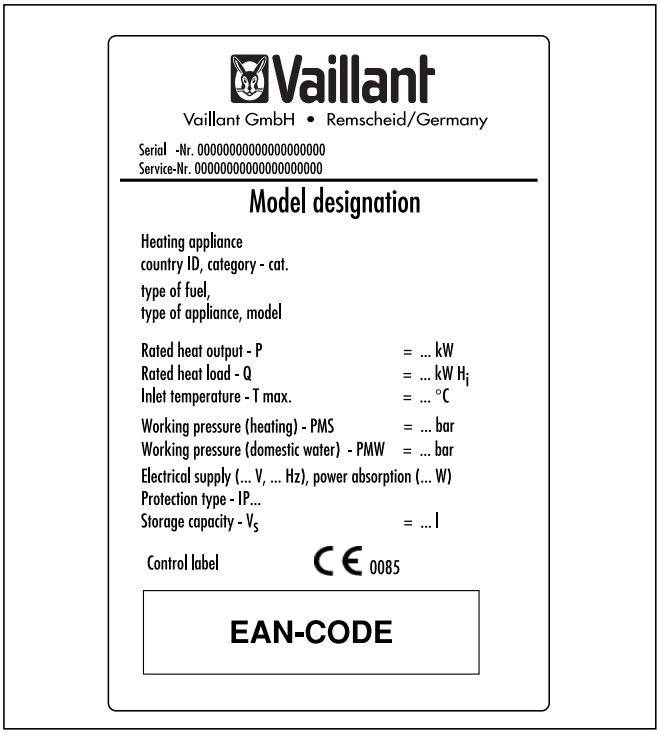


Fig. 1.2 Data badge (example)

1.4 CE mark

CE marking is used to document the fact that the appliances, in accordance with the type summary, meet the basic requirements of the directive on appliances burning gaseous fuels (Council Directive 90/396/EEC) and the EC directive on electromagnetic compatibility (Council Directive 89/336/EEC).
The appliances meet the basic requirements of the efficiency requirements directive (Council Directive 92/42/EEC) as condensing appliances.
The appliances named above emit less than 80 mg/kWh nitrogen dioxide (NOx) when natural gas is used.

1.5 Intended use

The Vaillant ecoMAX 665 is a state-of-the-art appliance which has been constructed in accordance with recognised technical 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 when using it.
The appliance is designed to be used as a boiler for closed hot water central heating systems. Any other use or extended use is considered to be improper. The manufacturer/supplier is not liable for any resulting damage. The user alone bears the risk.
Appropriate use includes the observance of the operating and installation manual and the adherence to the inspection and maintenance conditions.

1.6 Declaration of conformity

Vaillant

EC declaration of conformity

Name and Address of the manufacturer:	**Vaillant GmbH** **Berghauser Str. 40** **42859 Remscheid**
Identification of product:	Condensing wall-hung boiler with ist flue ducts
Appliance type:	VU GB 656-7

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"

92/42/EEC including amendments
"Directive of efficiency relating to boiler burning gaseous fuels"

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"

89/336/EEC including amendments
"Directive on the approximation of the law of the member states relating to electromagnetic compatibility "

Designed and built to CE-type examination certificate:

PIN no: **CE- 0085BP0435**

Designed and built according to European Standards:

EN 483
EN 677
EN 50165
EN 55014
EN 60335-1
EN 60529
EN 298

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

Remscheid, 17.03.2006		
(place, date)	Programme Manager i.V. A. de Valk	Certification Group Manager i.V. A. Nunn

Vaillant 0232006

Vaillant GmbH
Berghauser Str. 40 ▮ D-42859 Remscheid ▮ main phone no. +49 21 91/18-0 ▮ Telefax +49 21 91/18-28 10
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

2 Safety instructions and regulations

2.1 Safety instructions

2.1.1 Installing and setting the appliance

Important!
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 IS 813 ‚Domestic Gas Installations', the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

2.1.2 Smell of gas

If you smell gas, the following safety instructions should be observed:

- don't switch on any electrical switch in the danger area
- don't smoke in the danger area
- don't use a telephone in the danger area
- close the gas stop cock
- air the danger area
- Contact your gas supplier or national Grid Transco 0800 111999

2.1.3 Changes to the surroundings of the boiler

No changes must be made to the following:

- the boiler
- the gas, air, water and electricity supply pipes
- the flue system
- the discharge pipe and the safety valve for the hot water
- the constructional conditions that could affect the operational reliability of the appliance.

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

2.2 General requirements

2.2.1 Preliminary remarks for roomsealed appliances

This appliance should only be installed in conjunction with either a Vaillant flue system or an alternative approved system (details of flue approval categories can be found in the technical section of the installation manual). Install the flue system as detailed in the separate flue installation instructions supplied with this boiler.

2.2.2 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), BS 7671 (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 Stan-dards:

BS 6700: Services supplying water for domestic use within buildings and their curtilages.
BS 6798: Specification for installation of gas fired boilers not exceeding 60 kW input.
BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1) in domestic premises (2nd family gas).
BS 7593: Treatment of water in domestic hot water central heating systems. Institute of Gas Engineers Publication IGE/UP7 Edition 2
BS. 5482 Pt. 1 Domestic butane and propane gas burning installations.
IGE/UP1 Soundness testing and purging of industrial and commercial gas installation.
IGE/UP2 Gas installation pipework, boosters and compressors on industrial and commercial premises.
IG/UP/7 Edition 2 "Gas installations in timber framed and light steel framed buildings"
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.

Important!
When tightening or loosening screwed connections always use suitable open-ended spanners (not pipe wrenches or extensions etc.). Incorrect use and/or unsuitable tools can lead to damage being caused (e.g. gas or water leakage)! Preliminary remarks: This appliance should only be installed in conjunction with a Vaillant flue system. Install the flue system as detailed in the separate flue installation instructions supplied with this boiler.

Boiler location
The location chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, although particular attention is drawn to the requirements of BS7671 (IEE Regulations), the electrical provisions of the Building Regulations (Scotland) 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!
Where a room sealed boiler is installed in a room containing a bath or shower, any electrical switch or boiler control utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Where the installation of the boiler will be in an unusual location, special procedures may be necessary and BS 5546 and BS 6798 give detailed guidance on this aspect. The boiler must be mounted on a flat, vertical wall, which must be sufficiently robust to take the weight of the boiler. The boiler may be installed on a combustible wall, subject to the requirements of the Local 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 6891. In IE the current edition of IS 813.

Note!
If the boiler is to be installed in a timber framed building, it should be fitted in accordance with IGE/UP7 Edition 2 "Gas installations in timber framed and light steel framed buildings".

Gas Supply
The gas supplier should ensure the availability of an adequate supply of gas. A gas meter may only be connected to the service pipe by the supplier of gas or their contractor. An existing meter should be checked to ensure that it is capable of passing the rate of gas supply required. Installation pipes should be fitted in accordance with BS 6891. Pipework from the meter to the boiler must be of an adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be tested for soundness and purged as described in BS 6891.

3 Mounting

The Vaillant ecoMAX 665 is delivered in a package unit.

3.1 Scope of delivery and accessories

Scope of delivery
Check that all the parts have been delivered intact (see fig. 3.1 and table 3.1).

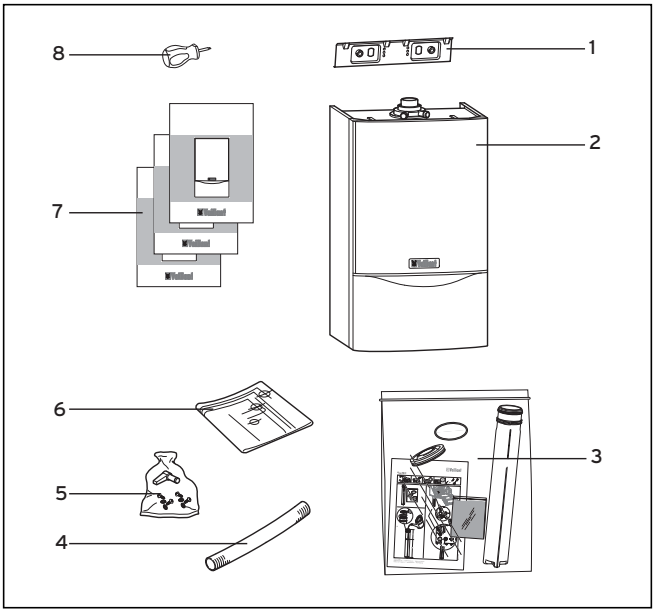


Fig. 3.1 Scope of delivery

Position	Number	Name
1	1	Hanging bracket
2	1	Boiler
3	1	Siphon
4	1	Condensate discharge hose
5	1	Bag with fixing screws, wall plugs and washers
6	1	Installation template
7	3	Manuals:
		Operating manual
		Installation instructions
		Assembly manual for flue pipe
8	1	Auxiliary tool for gas valve adjustment

Table 3.1 Scope of delivery

3.2 Installation site

Please note the following safety instructions below before choosing where to install the appliance:

Caution!
Do not install the appliance in rooms prone to frost. In rooms with aggressive steam or dust, the appliance should be room sealed, to prevent damage.

When choosing the place of installation and while operating the appliance, make sure that the combustion air is technically free of chemical substances containing fluorine, chlorine, sulphur etc. Sprays, solvents and cleaning agents, paints, adhesives etc. contain these kinds of substances, which - in the worst case scenario - can lead to corrosion, even in the exhaust system, during ambient air dependent operating of the appliance.
The appliance must be operated independently of the ambient air particularly in hairdressing salons, carpenter's shops or paint shops, cleaning companies.

Caution!
When the appliance is installed on an open flue type system ventilation requirements shall be taken from BS 6644 and IGE UP10. Design consideration for the cooling of plant rooms shall also be taken from BS 6644 and IGE UP10

3.2.1 Select position of boiler

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

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

3.2.2 Unpack the boiler

To unpack the boiler, cut both plastic carton straps, open box and lift out the polystyrene top packing. Lift the cardbox upwards.

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

Packed in the boiler carton are the following:

- Boiler
- Boiler installation template
- Boiler hanging bracket
- Fixing screws, wall plugs and washers
- Installation and user instructions
- Flue installation instructions
- Guarantee card and envelope

3.2.3 Using boiler template

Fix the paper template to the wall ensure that the template is vertical.
The template shows:

– The position of the fixing holes for the boiler mounting bracket.
– The position of the connections.
– The position of the flue exit hole.

- Mark the position of the hanging bracket fixing holes
- Drill 2 holes Ø 8 mm for the hanging bracket.

Note!
Use alternative fixing holes where necessary.

3.3 Dimensional drawing and connection dimensions

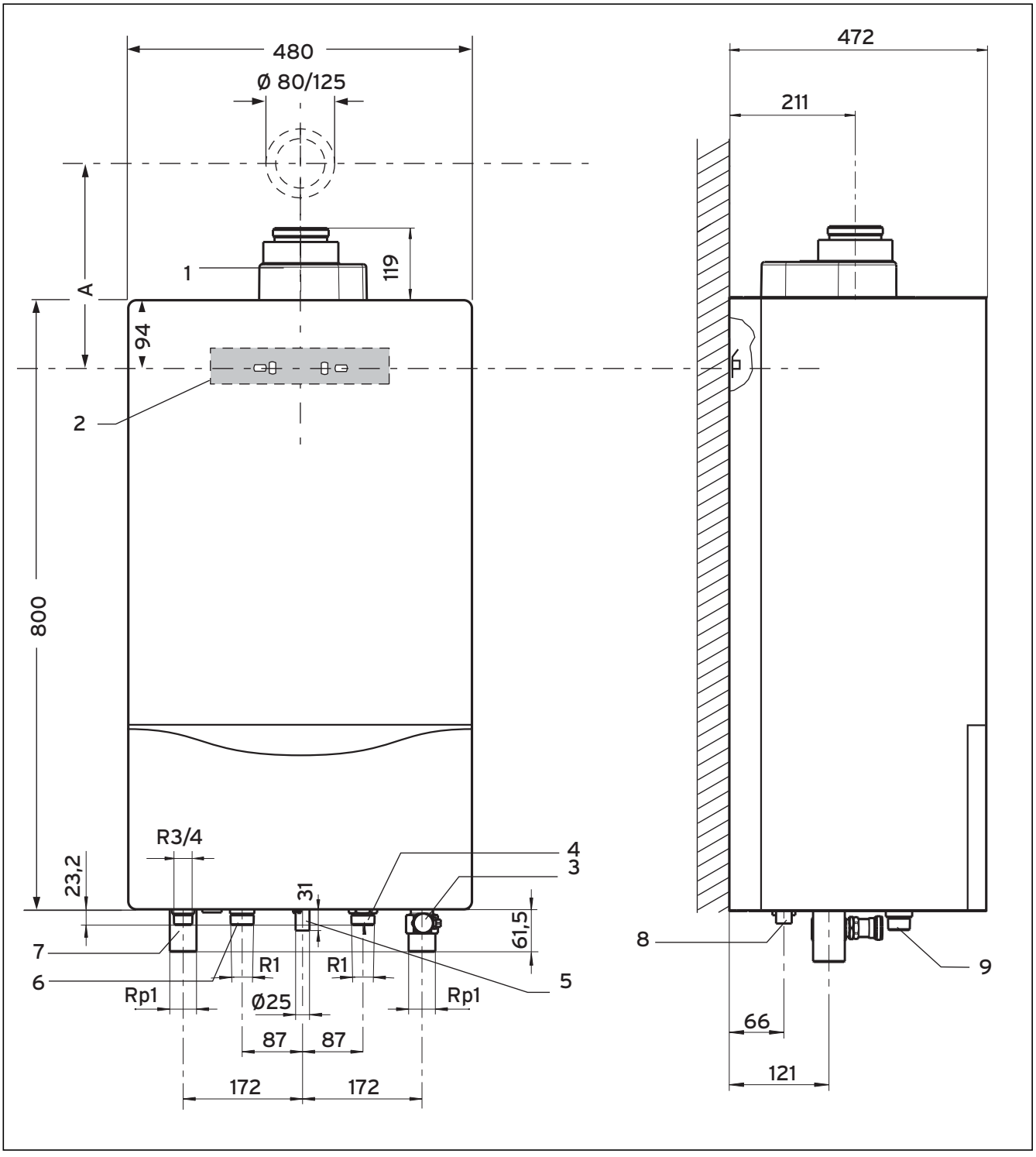


Fig. 3.2 Connection dimensions

1 Flue connection Ø 80/125 mm
Dimension A with 87° elbow: 297 mm
2 Mounting bracket
3 Heating return
4 DHW primary return (only in conjunction with cylinder)
5 Gas connection
6 DHW primary flow (only in conjunction with cylinder)
7 Heating flow
8 Siphon connection
9 Connection safety valve 3/4"

3.4 Required minimum gaps/assembly clearances

Both for the installation/assembly of the appliance and for carrying out maintenance tasks later, you need the minimum gaps and assembly clearances given below:

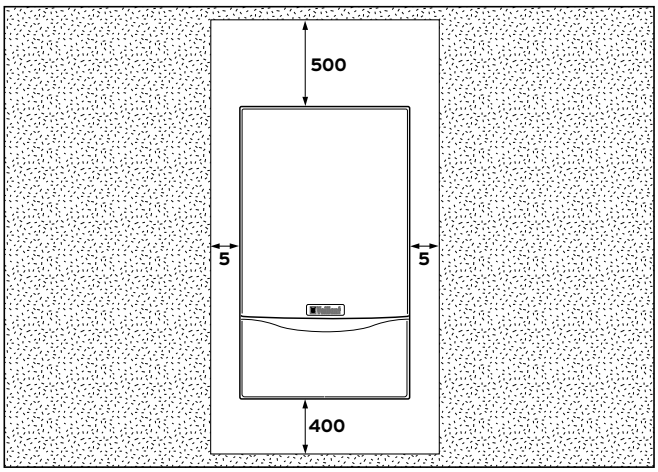


Fig. 3.3 Required minimum gaps/assembly clearances (mm)

Note!
It is very important that you keep the prescribed gap below the appliance in order to make sure you will be able to mount and service the siphon.

Combustible materials may be safely placed next to the appliance provided the minimum side clearance of 5 mm is maintained for servicing, and if required ventilation purposes. The external temperature of the appliance will never be such as to cause combustion.

3.5 Mounting the appliance

- Hang the appliance up onto the bracket (1) from above with the bracket (3).
- Mount the cable connections to the appliance, making sure they are disconnected from the power supply.

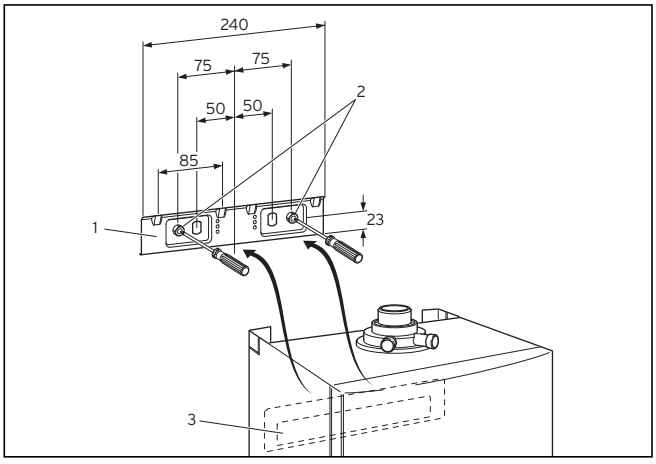


Fig. 3.4 Mounting the appliance on the bracket

3.6 Removing/Attaching the appliance casing

Removing the casing

To dismount the front casing of the appliance, proceed as follows:

- Loosen the screw (1) on the bottom of the appliance.
- Press in both retaining clips (2) on the bottom of the appliance so that the casing is released.
- Pull the casing (3) forwards by its bottom edge and lift the casing up and off (4).

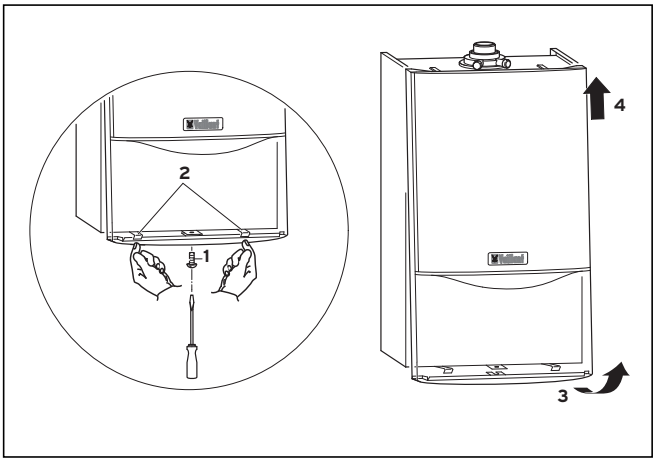


Fig. 3.5 Removing/Attaching the appliance casing

Attaching the casing

To mount the casing, proceed as follows:

- Place the casing on the upper appliance ensuring that the casing and appliance lips engage.
- Push the casing onto the appliance so that the retaining clips (2) on the casing click into place.
- Fix the casing by tightening the screw (1) on the bottom of the appliance.

4 Installation

When installing, please observe the following points in particular:
- ensure that the isolation valve with the non return valve is installed on the flow connection.
- mount the siphon cartridge

When used with direct connection to an indirect DHW cylinder using the connections provided:
- Install a primary loading pump
- Install a non-return valve in both heating and DHW primary flows to prevent reverse circulation
- please also refer to section 4.3

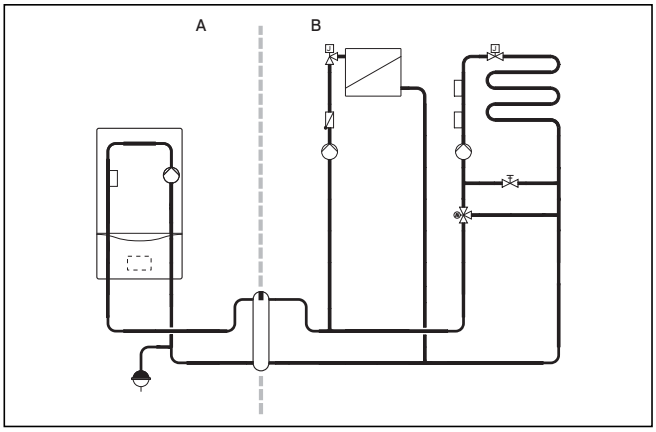


Fig. 4.1: Appliance circuit (A) and heating circuit (B)

Caution!
The ecoMAX 665 may only be put into operation when a sufficiently dimensioned low loss header has been installed between appliance circuit and heating circuit.

4.1 Preparing the installation

Safety equipment for an emergency
- The outlet of the pressure relief valve must be suitably terminated in accordance with BS 6798 or BS 6644
- The boiler is suitable for connection to plastic central heating pipes. It is preferred that the connections to the boiler are made in copper for the first 1.5 metres prior to the transition to plastic.
- Should a system be found to include non-oxygen barrier pipe then it is essential that a plate heat exchanger be installed in between the boiler and the non-oxygen barrier pipe. It is then essential that the boiler and the system have provision for water make up and expansion.

4.2 Technical instructions for the heating system

Caution!
The schematics are for diagrammatical representation only. - the system may demand further safety devices and depends fully on the control system employed. Unvented cylinders must comply with the building regulations document G3. Always refer to British Standards, Good Practice Guides and CIBSE guidelines

4.2.1 Connection to heating system via a low loss header

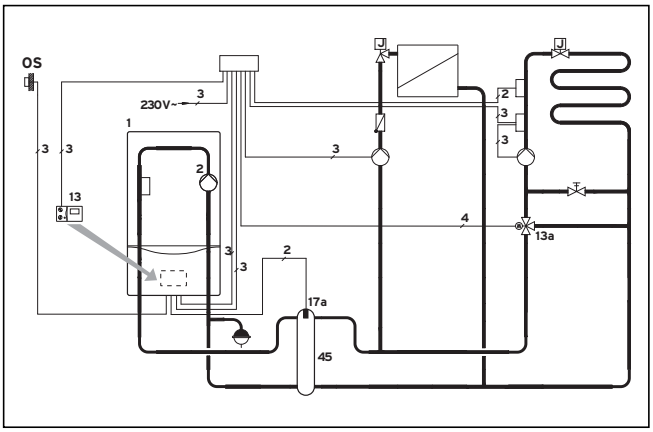


Fig. 4.2 Example 2: radiator heating and floor heating, low loss header, appliance-internal pump

1 ecoMAX 665
2 integral boiler pump
13 weather-compensated controller VRC 630
13a mixer valve
17a supply temperature sensor
45 low loss header
OS outside sensor

The pump is sized adequately to provide the correct amount of flow through the primary circuit.

Selection of the hydraulic switch
A suitable WH model low loss header (accessories) can be selected with the aid of table 4.1.
A sufficiently large water volume (minimum circulating water volume) is constantly supplied through the boiler via the low loss header in conjunction with the Vaillant system pump (item no. 178 728) built into the boiler.

heating system output	heating system spread		
	10 K	15 K	20 K
ecoMAX 665	WH 160	WH 95	WH 95
double cascade	WH 280	WH 160	WH 95
triple cascade	WH 280	WH 280	WH 160

Table 4.1: Selection of the low loss header, WH model

4.3 Technical instructions for recharging

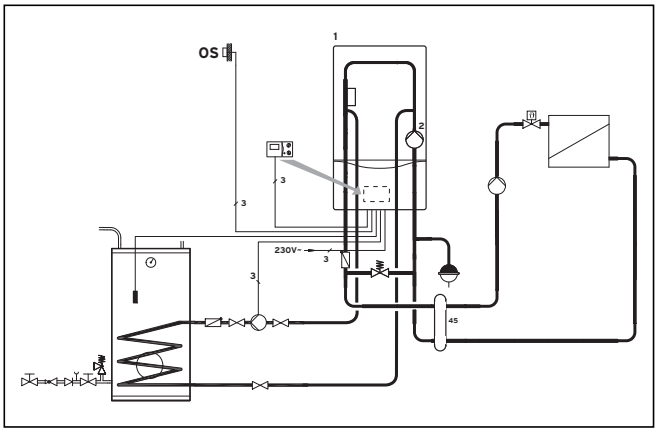


Fig. 4.3 Example 3: use of a cylinder, direct heating circuit

1 ecoMAX 665
2 Pump (internal within the appliance)
45 Low Loss header
OS outside sensor

Cylinder connection specification
It is imperative to keep to the minimum volume flow of the charging circuit of 2,200 l/h. A pump with a constant speed must be used.
When designing such a system, consideration must be made for the pressure losses of any non-return valves and piping to the system.

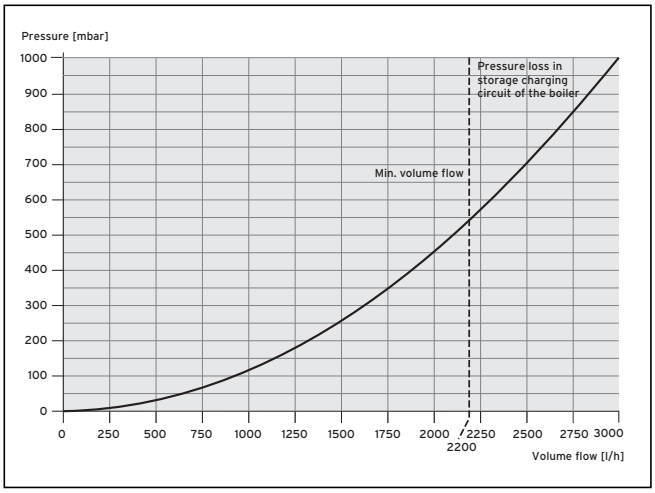


Fig. 4.4 Pressure loss characteristics of connecting a DHW cylinder.

4.4 Gas connection

Caution!
Ensure the gas line is unstressed when mounting it so that no leaks are caused.

Caution!
Risk of damaging the gas control block by exceeding the testing pressure. The gas control block may only be tested for leaks up to a maximum pressure of 110 mbar. The operating pressure may not exceed 60 mbar. If these pressures are exceeded, the electronic gas valve may be damaged.

- Screw the appliance's gas supply pipe (1) gas-tight with the (pre-installed) gas ball cock (2). To do this, use the R1 compression fitting supplied with the appliance. This is suitable for the connection of a R1 gas ball cock.
- Inspect the gas connection for leakage.

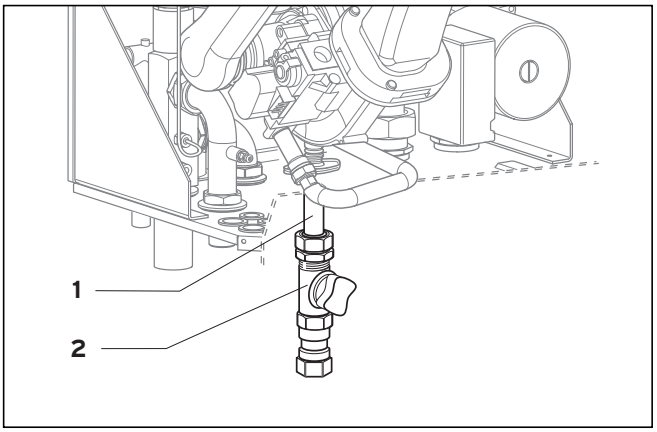


Fig. 4.5 Gas connection (only surface installation possible)

4.5 Heating side connection

Caution!
Ensure the connection lines are unstressed when mounting them so that no leaks are caused in the heating system.

The appliance is connected to the heating flow and return via maintenance cocks.

Caution!
Ensure that a filling loop or pressurisation device is installed in the return to maintain pressure in the system.

Note!
When installing a direct connection to a DHW cylinder (indirect type) ensure that the non return valve in the isolation valve is installed in the correct orientation.

- Screw in flow (3) and return (4) with the maintenance cocks.

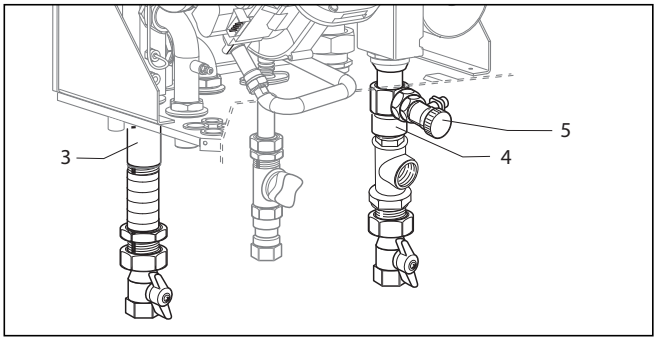


Fig. 4.6 Mounting the heating flow and return service valves

4.6.1 Flue termination

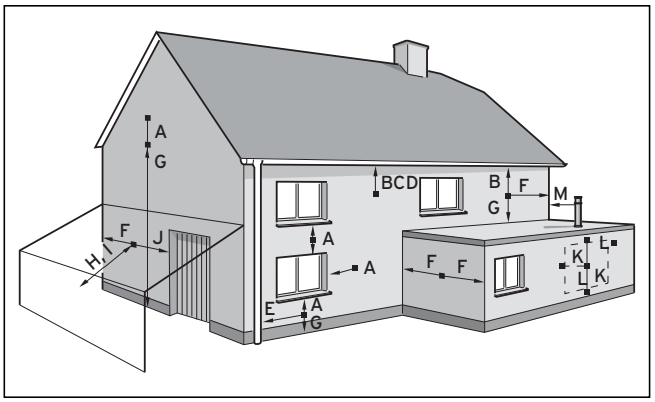


Fig. 4.7 Flue termination

	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
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	300
M	Distance from adjacent for vertical Flue	500

Table 4.2 Terminal position for a fan assisted concentric flue

The following details refer to both flue systems.

a. The terminal must be positioned such that the products of combustion can disperse freely at all times.
b. A plume of water vapour will sometimes be visible from the flue terminal. Positions where this could be a nuisance should be avoided.
c. 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 (contact Tower Flue Components, Tonbridge, TN9 1TB).

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

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

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:

a) at least 2m from an opening in the building directly opposite, and
b) so that the products of combustion are not directly 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. 4.8.
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.

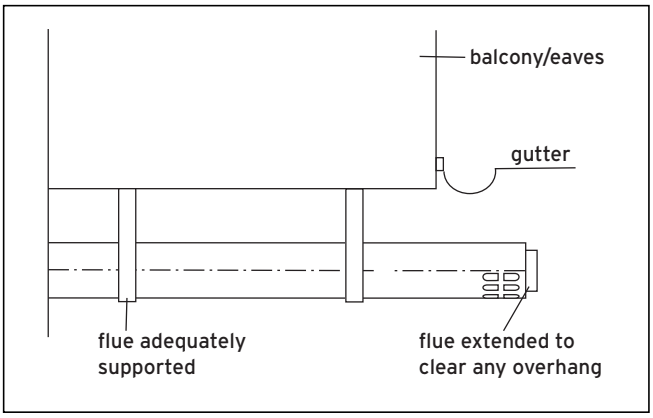


Fig. 4.8

4.6.2 Flue pipe

Danger!
Only Vaillant original 80/125 mm flue pipes may be used when installed in a room sealed application (type C). Malfunctions can occur if you use other accessories. These may result in damage and injury.

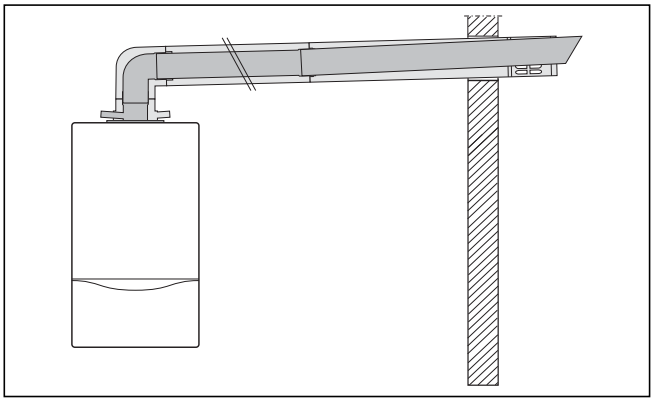


Fig. 4.9 Example of installation with horizontal air/flue duct

Concentric systems made of plastic (diameter - 80/125 mm) are combined with the appliance as flue pipes.
The most suitable system depends on the specific installation and application conditions (see also the installation manual 0020014606_00GB for the flue pipes).

- Mount the flue pipes consulting the installation manual contained in the scope of delivery of this appliance.

4.7 Condensate discharge

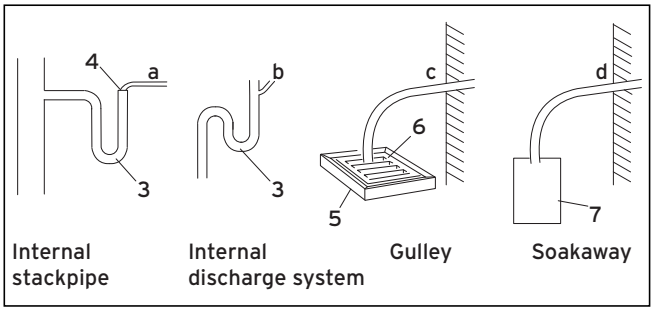


Fig. 4.10.1

The condensate generated during combustion is led from the condensate discharge pipe to the waste water connection via a draining funnel.

Note!
The discharge pipe from the boiler condensate drain must have a continuous fall (45 mm per meter) and preferably be installed and terminated within the building to prevent possible freezing.

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

a) preferably the discharge pipe should run and terminate internally to the house soil and vent stack (at least 450 mm above the invert of the stack). A trap giving a water seal of at least 75 mm (3) (built into the boiler) should be incorporated into the pipe run, and there must be an air break (4) in the discharge pipe upstream of the trap. The connection to the stack should not be made in a way that could cause cross flow into any other branch pipe, or from that branch pipe into the condensate drainpipe. This can be achieved by maintaining an offset between branch pipes of at least 110 mm on a 100 mm diameter stack and 250 mm on a 150 mm diameter stack.
b) connecting into the internal discharge branch (e.g. sink waste) with an external termination, the condensate discharge pipe should have a minimum diameter of 22 mm with no length restriction and should incorporate a trap with a 75 mm (3) (built into the boiler) seal. The connection should preferably be made down stream 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) terminating 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 m.
d) at a condensate absorption point (soakaway) (7). The external pipe length should not be more than 3 m.

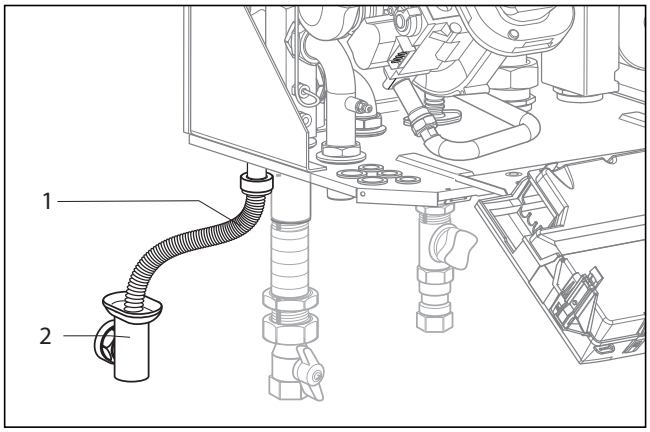


Fig. 4.10.2 Condensate discharge

Refer to 'BS 6798 Specification for installation of gas-fired boilers of rated input not exceeding 70 kW net' for further information. Before operating the boiler the condensate trap (1) must be filled with water as described in relevant section.

Danger!
Before connecting the condensate discharge it is absolutely important to install the syphon kit included correctly and filling up with water.

4.8 Electrical connection

Danger!
Risk of fatal electric shock from touching live connections. Always switch off the power supply to the boiler first. Only once this is done may you carry out the installation.
There is continuous operating voltage at the power supply terminals L and N even when the appliance on/off switch is switched off.
Attention - this appliance must be earthed!

4.8.1 Mains connection

Caution!
Supplying power to the wrong plug terminals of the Pro E system can destroy the electronics. Only connect the 230 Vac live supply to boiler terminal connections marked LNE.

The rated voltage of the mains must be 230 V; at rated voltages above 253 V and under 190 V, damage may occur. The mains supply must be connected via a fixed connection and a separator with a contact opening of at least 3 mm (e.g. fuses, circuit breakers).

4.8.2 Connecting controllers

Mounting is to be carried out as stated in the relevant installation manual. The necessary connections to the boiler's electronics (e.g. when using external controllers, external sensors or similar devices) are to be performed as follows:

- Remove the front casing of the appliance and lower the electronics box (1) forward.
- Unclip the back cover (2) of the electronic box from its fixings (3) and lift it up (see fig. 4.9).
- Pass the connecting cables of each of the components to be connected through the grommets (4) located on the bottom of the appliance to the left.
- Then insert the connecting cables (5) into the electronics box and cut them to length (see fig. 4.9).
- Strip the connecting cable by about 2-3 cm and bare the wires (see fig. 4.10).
- Connect the connecting cables as shown by fig. 4.10/4.11 to the corresponding ProE plugs or slots of the electronics.

Vaillant controllers are intended to be plugged into the front of the appliance without the need for additional wiring. If a remote wall mounted controller is required then the patress box provided can be used Additional wiring will be required as described.

Caution!
Do not connect 230 V mains to terminals 7, 8, or 9. The electronics could be destroyed by this!

- If no room/clock thermostat is in place, provide a jumper between terminals 3 and 4 if not already present. Remove the jumper if a room/clock thermostat is connected to terminals 3 and 4.
- Close the rear cover of the electronics box and press it in until you hear it click into place.
- Lift the electronics box up and press it by the two clips on its left and right against the lateral appliance casings until you hear the clips click into place.
- Attach the front casing.
- In order to attain pump mode I (continuous pump) for the multicircuit controller (e.g. VRC 630), increase the pump over-run time to 15-20 minutes (diagnosis point d.1, see chapter 6.2).

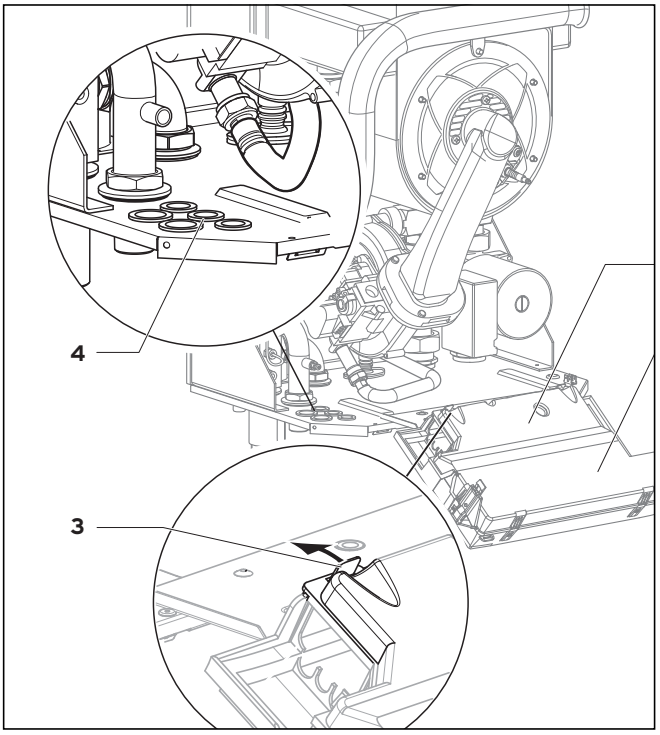


Fig. 4.11 Opening the rear of the electronics box

4.8.3 Connecting accessories and external system components

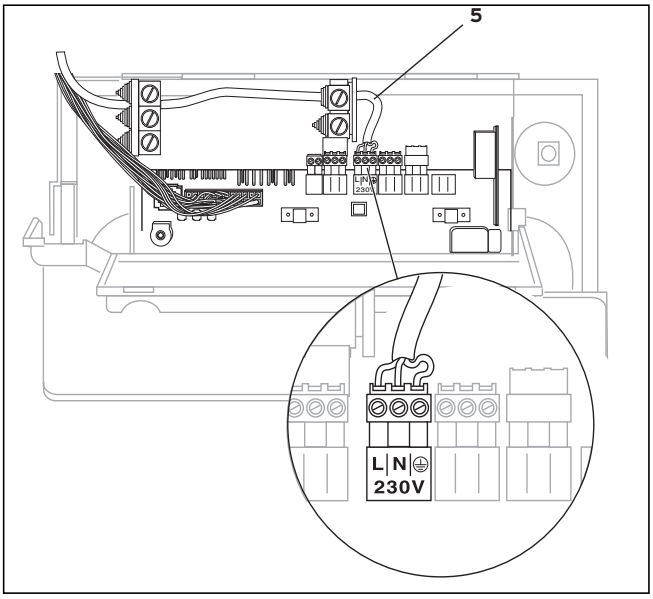


Fig. 4.12 Example of cable insertion

The Vaillant ProE plug in terminal system facilitates a quick and trouble-free connection of accessories and external system components to the appliance electronics. Proceed with the wiring up as follows:

- Take off the front casing of the appliance and lift the electronics box forward.
- Unclip the back cover of the electronics box (1) from its fixings (2) and lift it up.

- Guide the connecting cables of each of the components to be connected through the PG screw connections (4) located on the bottom of the appliance to the left.
- Then insert the connecting cables (5) into the electronics box and cut them to length.
- Strip the connecting cable by about 2-3 cm and bare the wires (see fig. 4.10).
- Connect the connecting cables as shown by fig. 4.10/4.11 to the ProE plugs or slots of the electronics.

Please note that the jumper on the ProE plug should be removed when connecting a maximum thermostat (feed thermostat) for floor heating. Should a remote safety circuit for a mini pressurisation device or a pump flow switch. This will prevent the boiler firing should such an external device fail.

- Close the rear cover of the electronics box and press it in until you hear it click into place.
- Lift the electronics box up and press it by the two clips on its left and right against the lateral appliance casings until you hear the clips click into place.
- Attach the front casing.

4.8.4 Connection diagram

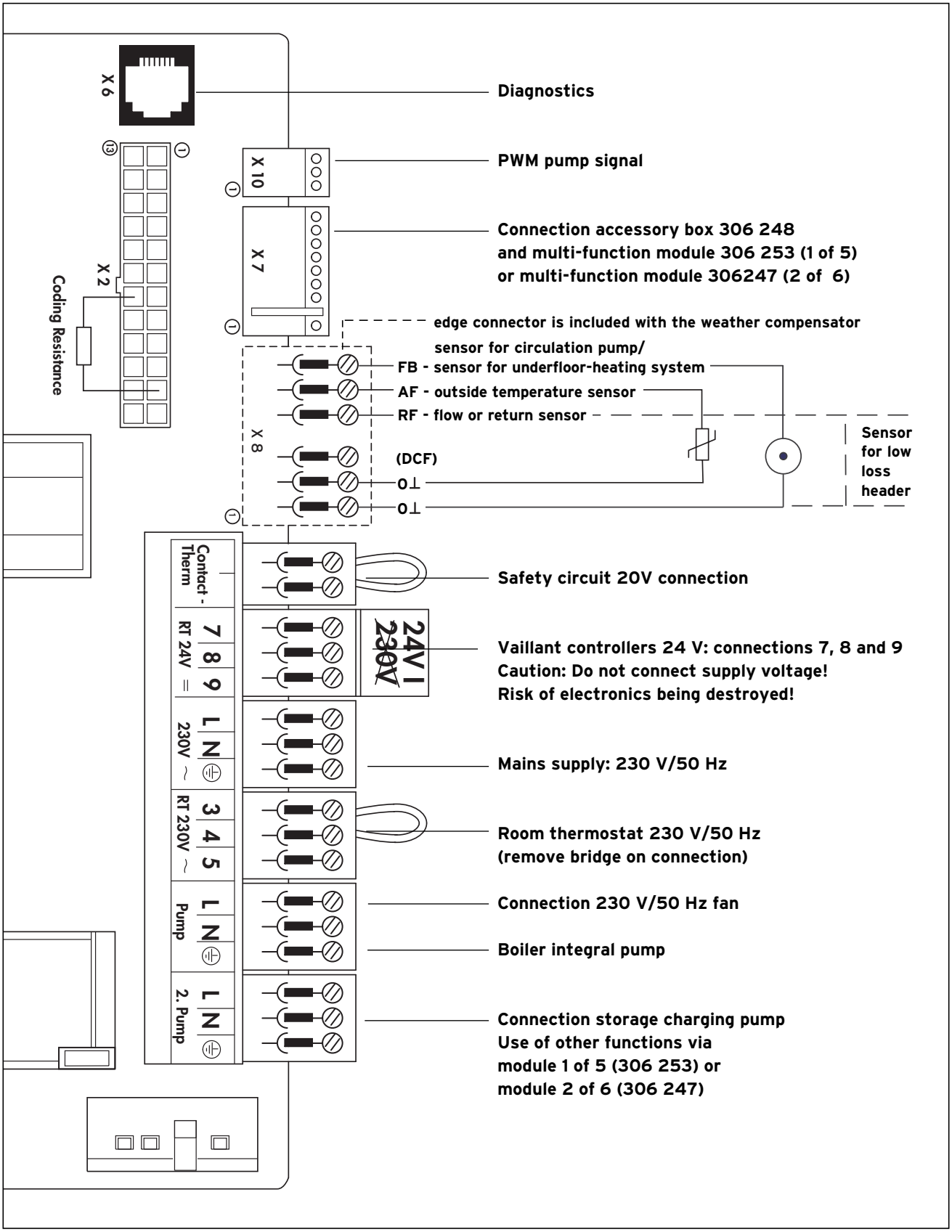


Fig. 4.13 Connection diagram ecoMAX 665

4.8.5 Wiring diagram

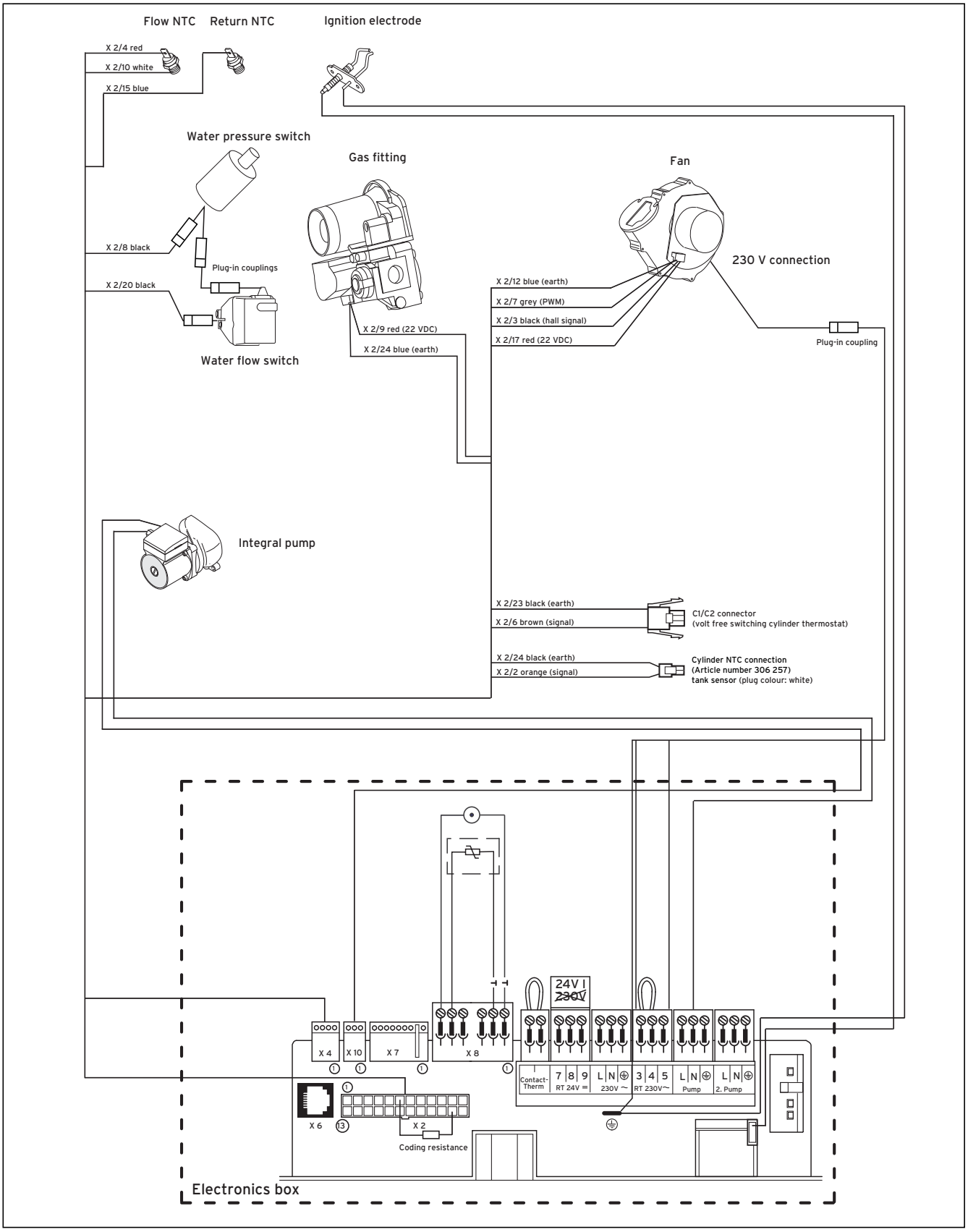


Fig. 4.14 Wiring diagram ecoMAX 665

5 Putting the boiler into service

Note!
Vaillant offer a commissioning service. If used a 2 year warranty is given, if not only a 1 year warranty is available

Observe the following when putting the boiler into service:
- Remove the cap of the automatic air vent (see 10 / fig. 5.1) before filling the heating circuit/DHW primary circuit.
- Start the venting program for the heating circuit/DHW primary circuit (see chapter 8.1.5).

Caution!
The front cover should only be removed
• for initial installation access
• for servicing
• for testing
For continuous and safe operation the front cover must be fitted together with a correctly fitted and sealed flue system.

5.1 Water circulation system

Detailed recommendations for the water circulation system are given in BS 6798 and BS 5449: Part 1 (for small bore and micro bore central heating systems). Pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated underfloor spaces. Draining points must be located in accessible positions which permit the draining of the whole system including the boiler and the hot water system. Draining points should be at least 1/2 in. BSP nominal size and be in accordance with BS 2879. The boiler is suitable for use with minibore or microbore systems. Copper tubing to BS 2871: Part 1 should be used for water carrying pipework. All capillary joints in all DHW pipework must be made with lead free solder. Particularly where a new boiler is to be fitted to an existing system, it is good practice that the system is thoroughly cleansed.

Important!
To prevent the formation of deposits and prevent serious damage to the appliance and system, cleansers must be used carefully and must be completely removed by thoroughly flushing the system. Cleansers should only be left in systems for a maximum of 24 hours.

This cleansing must take place prior to the fitting of the new boiler and be in accordance with BS 7593. For advice on the application of system cleansers contact:
Sentinel, Betz Dearborn Ltd. Widnes,
Cheshire, WA8 8UD. Tel: 0151 495 1861 — or
Fernox, Cookson Electronics, Forsyth Road, Sheerwater, Woking , Surrey GU21 5RZ,01483 793200

5.1.1 Treating the heating water

If you enrich the heating water with frost or corrosion protection fluid, changes can be caused in the seals and noises may arise during the heating operation. Vaillant assumes no liability for this (or for any subsequent resulting damage). Please inform the user as to how to go about frost protection.

5.1.2 Heating side filling and bleeding

For the heating system to function perfectly, a water pressure/filling pressure of between 1.0 and 2.0 bar is necessary. If the heating system stretches out over several storeys, higher values for the water level of the system at the pressure gauge can be necessary (maximum pressure for safety valve: 3 bar).

Caution!
Filling the system must only be carried using a proprietary filling loop in domestic applications. For commercial applications a pressurisation unit shall be installed.

5.1.3 Final system flush (''Hot'')

- Turn on the boiler for central heating and allow the boiler and system to reach temperature.
- Check that the heating system is watertight.
- Turn the boiler off and rapidly drain both boiler and system while still hot
- Refill the system and release all air.
- Release water from the system until the system design pressure of 1.0 bar is attained. (The actual reading on the 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 than1 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 4951861, or Fernox, Tel: 01483 793200
- Disconnect the temporary filling connection.
- Refit the boiler casing.

Note!
The venting program (''P.O'') runs for approx. 6.5 minutes.

Caution!
For the venting of the system, the minimum pressure must be 1.0 bar.
If pressure is too low, the boiler will not fire.

Do not allow the water pressure to drop below the above minimum during venting.

• Open the filling cock and tap valve again if necessary.

Caution!
If there is still too much air in the system after the venting program has finished, the program must be started again.

Caution!
After the filling process has finished

• Close the filling unit and remove the filling hose.
• Inspect all connections for leakage.

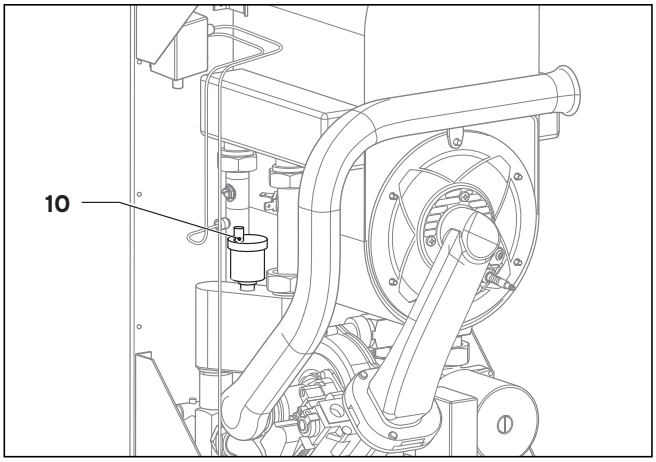


Fig. 5.1 Bleeding the appliance

5.1.4 Filling the siphon

Mount the siphon as described in the accompanying installation instructions.

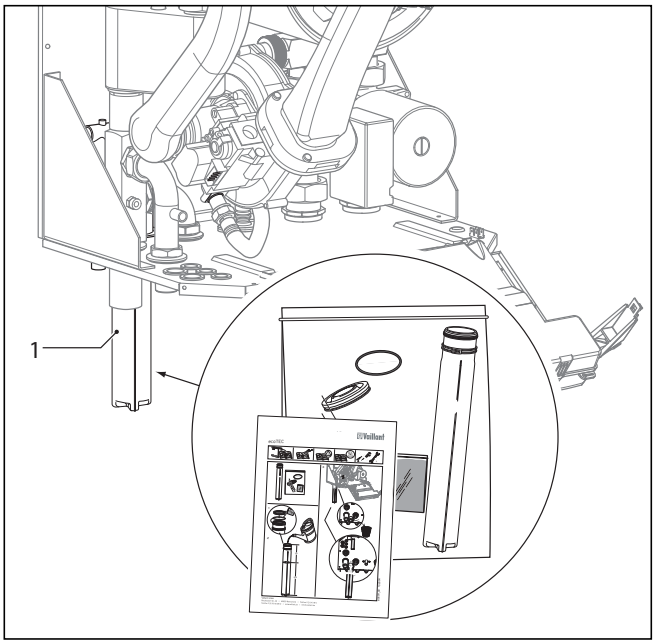


Fig. 5.2 Filling the siphon

Caution!
If the installation set is not there, do not start up the appliance, contact Vaillant customer service.

Danger!
If the device is operated with an empty condensate siphon, there is the danger of poisoning through escaping flue gases.
Therefore, it is mandatory to fill the siphon as per the accompanying description before start-up.

5.2 Checking the gas setting

5.2.1 Factory gas setting

Caution!
This appliance is suitable for use on G20 natural gas only. It is important to check the gas rate of the appliance and perform a flue gas analysis check.

The appliances are set ex works to the values listed in table.
• Check the CO_2 percentage as described in chapter 5.2.3.

ecoMAX	665
Appliance design	**Natural gas H**
Designation on the appliance badge	I2H
Factory setting to Wobbe index Ws (in kWh/m³), corresponding to 0 °C/1013 mbar	15.0
Factory setting of the hot water output (in kW)	65.0
Factory setting of the heating output (in kW)	60.0

Table 5.1 Overview of factory gas settings

5.2.2 Gas inlet working pressure

Check the inlet pressure as described below:
• Remove the front case from the boiler.
• Close the gas shutoff valve fitted to the boiler.
• Loosen the sealing screw marked "in" (1) on the gas valve assembly (Fig. 5.3).
• Connect a digital or a U gauge (2).
• Open the gas shutoff valve fitted to the boiler.
• Put the boiler into service (refer to the Instructions for Use supplied with the boiler).
• Check the U gauge reading and ensure the inlet gas pressure is between the pressures detailed below.

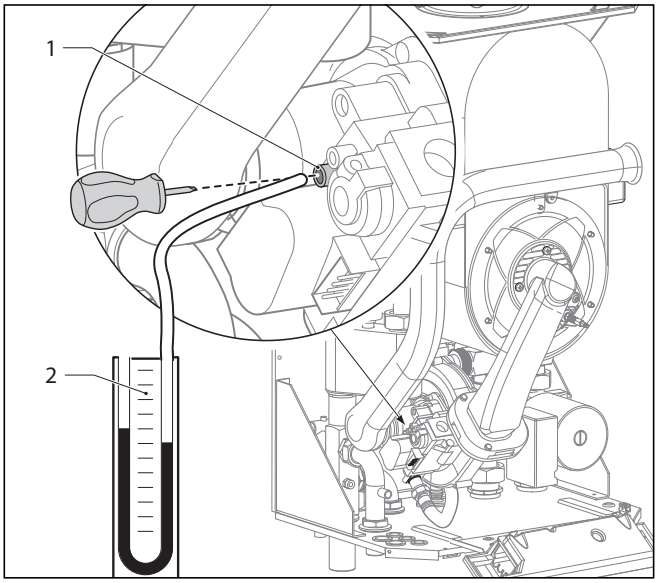


Fig. 5.3 Measuring the gas inlet working pressure

Caution!
If the connection pressure lies outside the range from 15 - 23 mbar, you must make sure that the recommended pressure loss from the meter to the appliance is not exceeded.
It may be necessary to install a test nipple to the supply at the inlet to the boiler to correctly measure the pressure loss.

If the connection pressure lies within the permissible range, proceed as follows:
- Put the appliance out of operation.
- Close the appliance's gas isolation valve.
- Remove the pressure gauge and screw the seal plug (1, fig. 5.3) back on with the auxiliary tool supplied.
- Open the appliance's gas isolation valve.
- Check that the seal plug is re-fitted and tested for leaks.
- Put the front casing back on and start the appliance up again.

If the connection pressure does not lie within the permissible range and you can't correct the error, notify the gas supplier. Proceed as follows:
- Put the appliance out of operation.
- Close the appliance's gas stop cock.
- Remove the pressure gauge and replace the seal plug (1, fig. 5.3) back on with the auxiliary tool supplied.
- Check that the seal plug is fit tight.
- Put the front casing back on.

Do not start up the appliance!

5.2.3 Checking the CO_2 content and adjusting it if needed (air ratio setting)

- Take off the appliance casing.
- Activate test program P.1:
- Press "Mains ON" or press the reset key.
- Now press the "+" key until P.0 appears in the display (approx. 5 s).
- Then press the "+" key once. The display shows P.1.
- The test program P.1 is started by pressing the "i" key.

The appliance then runs for 15 minutes at full power.
- Wait at least 5 minutes until the appliance reaches operating temperature.
- Measure the CO_2 content at the flue gas test nozzle (3) (fig. 5.4). Compare the value measured with the corresponding value in table 5.2.
- If a setting of the flue gas value is necessary, unscrew the screw (4) and move the air intake pipe (5) forward by 90°.

Do not remove the air intake pipe!
- If necessary, set the corresponding flue gas value (table 5.2) by turning the screw (6).

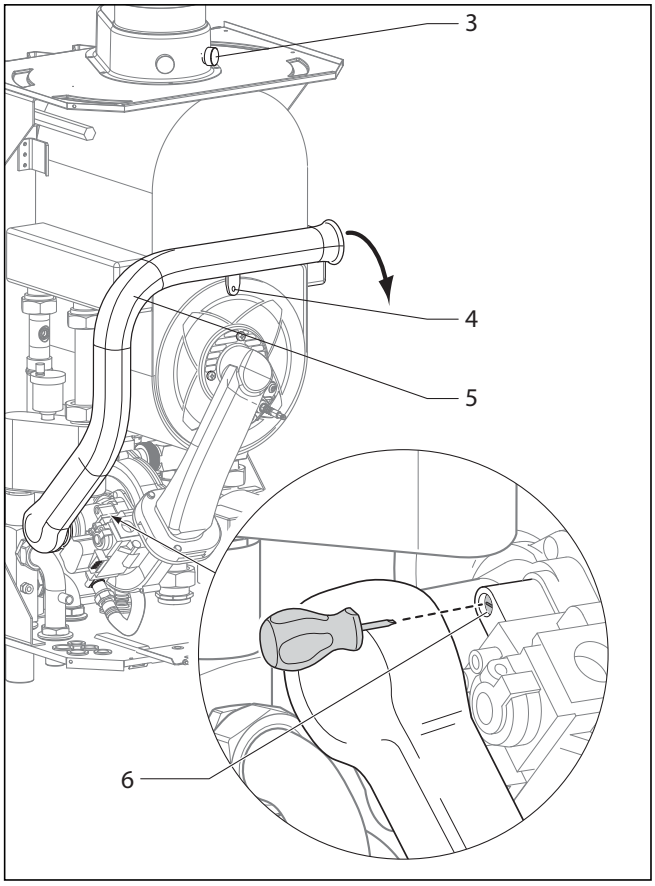


Fig. 5.4 Carrying out a CO_2 measurement, carrying out an air ratio setting (gas setting)

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

- Turn to the left (anti-clockwise): higher CO_2 content
- Turn to the right (clockwise): lower CO_2 content

Settings	Natural gas H tolerance
CO_2 after 5 minutes full-load operation	8.8 +/- 1.0
set for Wobbe index W_o	15.0

Table 5.2 Factory gas setting

- After the setting procedure, put the air intake pipe back up.
- Check the CO_2 content again. If necessary, repeat setting.
- Quit the P.1 test program by pressing the "+" and "i" keys simultaneously. The measuring operation is also quit when no key has been pressed for 15 minutes.
- Screw the screw (4) in.
- Put on the appliance casing.

5.3 Functional test

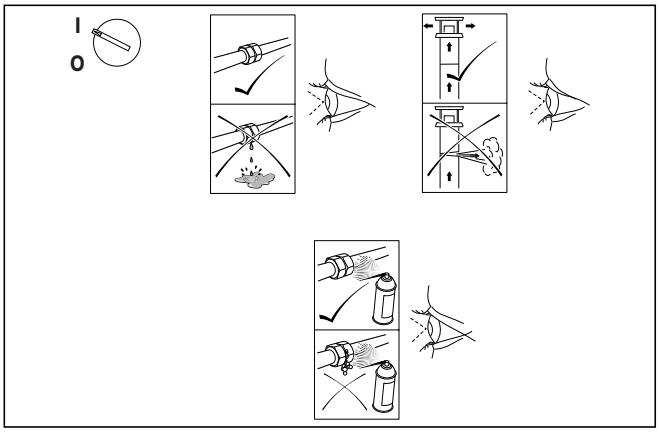


Fig. 5.5 Functional test

After installing the appliance and setting the gas, perform a functional test before commissioning the appliance and handing it over to the user.

- Commission the appliance in accordance with the instructions in the relevant operating manual.
- Check the appliance for gas and water leaks.
- Check the flue system for leaks and that it is secured and sealed properly.
- Check the ignition again and that the flame on the burner is burning evenly.
- Check that the heating and hot water generation are working properly.
- Pass the appliance on to the user.

The Vaillant ecoMAX 665 possesses status codes that display the operating status of the appliance in the DIA system display. A functional test of the hot water operation and heating operation can be carried out using these status codes by pressing the "i" key.

Filling the storage tank

- Switch on the appliance and the connected hot water cylinder.
- Make sure that the cylinder thermostat is requesting heat.
- Press the "i" key.

When the cylinder is correctly charged, the status code "S.24" appears in the display.

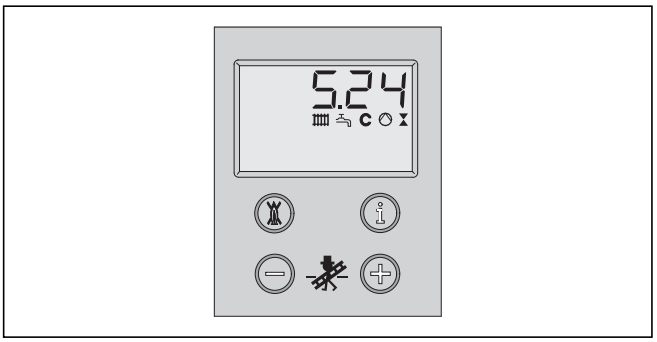


Fig. 5.6 Display during recharging

Heating mode

- Switch on the appliance.
- Make sure that heat is being requested.
- Press the "**i**" key.

When the heating is running correctly, the status code "S.4" appears in the display.

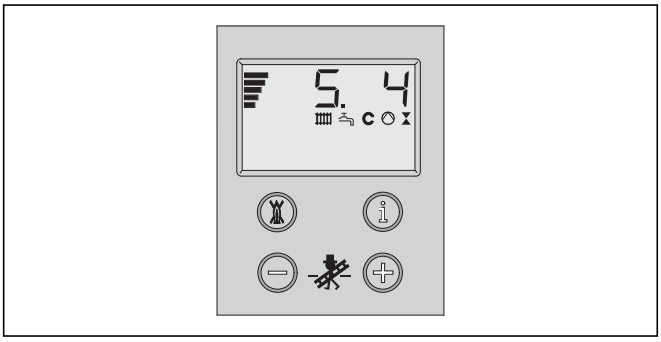


Fig. 5.7 Display during heating mode

5.4 Instructing the user

The user of the heating system must be instructed about its functions and how to operate it. The following measures in particular are to be carried out here:

- Hand over any instructions intended for the user as well as the appliance documentation.
- Inform the user that the instruction manuals should be kept near the appliance.

Note!
When you have finished the installation, attach the sticker supplied (835593) to the appliance in the user's language.

5.4.1 Instructing the user about the heating system

- Instruct the user about the methods used for combustion air supply and flueing. Be especially sure to point out that these must not be altered or obstructed in any way.
- Instruct the user on how to check the required water level/filling pressure of the system as well as on methods of refilling and venting the heating system when needed.
- Point out to the user the correct (economical) settings for temperatures, controllers and thermostat valves.
- Instruct the user on the need for yearly inspection and maintenance of the system. Recommend making a maintenance contract.

Caution!
The front cover should only be removed
• for initial installation access
• for servicing
• for testing
For continuous and safe operation the front cover must be fitted together with a correctly fitted and sealed flue system.

5.4.2 Vaillant warranty

Vaillant provide a full parts and labour warranty for this appliance. The appliance must be installed by a suitably 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).
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).

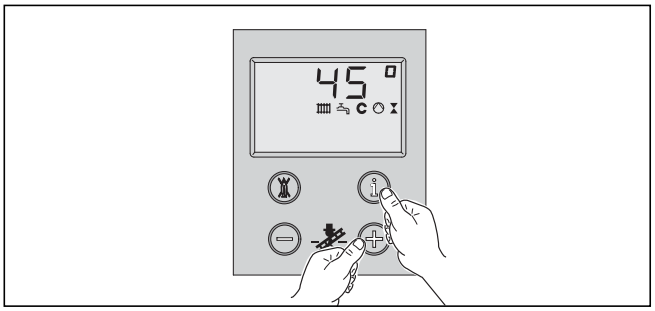
Note!
1 year warranty as standard.
2 year warranty available if commissioned by Vaillant (contact 0870 8503072 for details).

6 Adapting the appliance to the heating system

6.1 Setting central heating output (range rating)

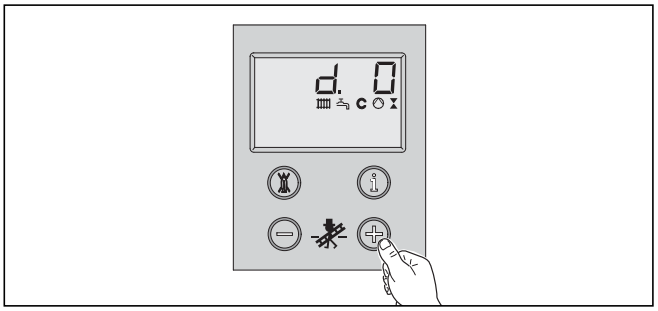
The appliances are set in the factory to the thermal load shown in table 6.1. If you want to set a different load, proceed as follows:

- Press the "i" and "+" keys simultaneously.



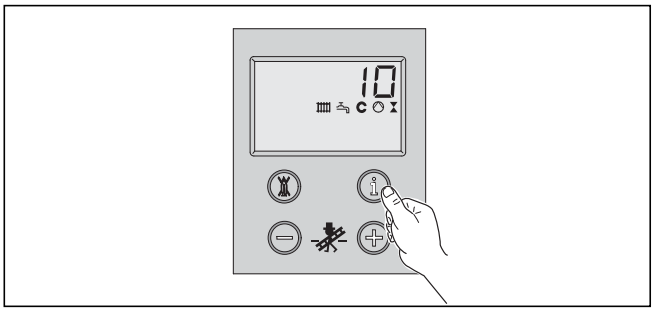
- Continue to hold the "+" key down until "d.0" appears in the display.

The display runs from "d.0" through to "d.99" and starts again at "d.0".



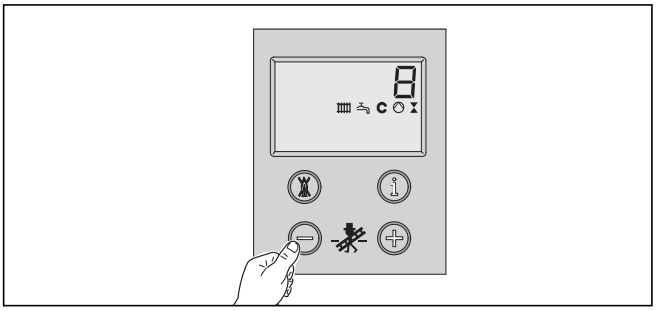
- Press the "i" key.

The "=" symbol appears in the display. Then the set partial load is displayed in kW.



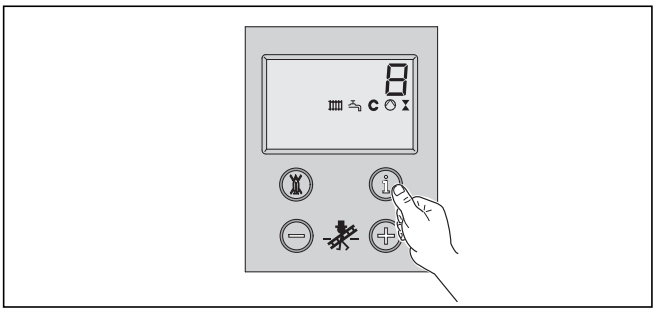
- By pressing the "+" or "-" keys you can now increase or decrease the value in 1 kW increments.

The displayed value flashes during the setting procedure. The possible setting ranges are to be found in table 6.1.



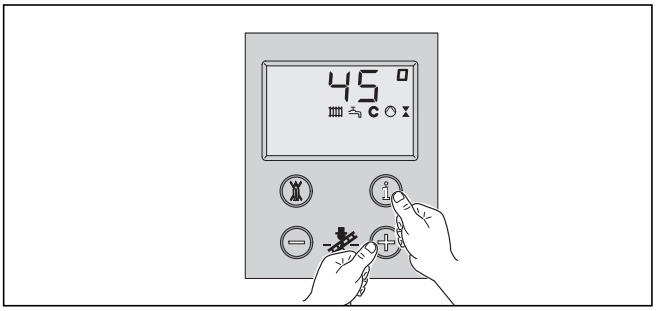
- Then hold down the "i" key for about 5 seconds until the display stops flashing.

The value is now saved. The standard display appears again in the display (current heating supply temperature, e.g. 45 °C).



- Quit the setting mode by pressing the "i" and "+" keys simultaneously.

The setting mode is also quit if you do not touch a key for 4 minutes.



ecoMAX	Setting range in kW	Factory setting in kW
665	14.0 - 65.0	60.0

Table 6.1 Setting range for partial-load heating

6.2 Setting the pump over-run time

The pump over-run time for the heating mode is set to 5 minutes in the factory. It can be varied within a range from 1 minute to 60 minutes or be in "continuous" mode. In order to change the pump over-run time, proceed as follows:

- Pull the front panel of the appliance outwards.
- Switch the appliance main switch to the "I" position.
- Press the "i" and "+" keys simultaneously and hold down the "+" key until "d.1" appears in the display.

The diagnosis code displayed is accompanied by the plain text display "Pump over-run heating".

- Press the "i" key.

The current pump over-run time in minutes appears in the display.

- By pressing the "+" or "-" keys you can now increase or decrease the value.

To set the pump mode "continuous", do not enter a number, rather select the symbol "--" with the "+" or "-" key.

- Hold down the "i" key for about 5 seconds until the display stops flashing.

The value is now saved.

- Quit the setting mode by pressing the "i" and "+" keys simultaneously.

The standard display appears again in the display (current heating supply temperature, e.g. 45 °C). The setting mode is also quit if you do not touch a key for 4 minutes.

6.3 Setting the burner anti-cycle time

In order to avoid frequent switching on and off of the burner (energy loss), an electronic block preventing re-ignition after shut down for a pre-determined period. The burner anti-cycle time can be adjusted to fit the characteristics of the heating system.
The burner anti-cycle time is only activated for the heating mode. Hot water operation during a burner anti-cycle time in progress does not affect the timer.
The maximum burner anti-cycle time can be set under diagnosis point d.2 between 2 and 60 minutes (factory setting: 20 minutes). The anti-cycle time effective in each case is then automatically calculated from the current set supply temperature and the set maximum burner anti-cycle time.
The timer can be reset or deleted by pressing the appliance main switch. The burner anti-cycle time remaining in the heating mode after a control shutdown can be viewed under diagnosis point d.67.
In order to change the lockout time, proceed as follows:

- Pull the front panel of the appliance outwards.
- Switch the appliance main switch to the "I" position.
- Press the "i" and "+" keys simultaneously and hold down the "+" key until the diagnosis code "d.2" appears in the display.

The diagnosis code displayed is accompanied by the plain text display "max. lockout time heating".

- Press the "i" key.

The symbol "=" now appears in the display and then the current burner anti-cycle time in minutes.

- By pressing the "+" or "-" keys you can now increase or decrease the value in 1 minute increments.

The displayed value flashes during the setting procedure.

- Hold down the "i" key for about 5 seconds until the display stops flashing.

The value is now saved.

- Quit the setting mode by pressing the "i" and "+" keys simultaneously.

The standard display appears again in the display (current heating supply temperature, e.g. 45 °C).
The setting mode is also quit if you do not touch a key for 4 minutes.

6.4 Adapting the appliance to larger flue pipe lengths

For flue pipes longer than 10 m (system 80/125), the appliance fan speed can be increased.

- Call up the diagnosis point d.51 in the DIA system.
- Increase the value by 20.

The maximum speed of the fan is raised by 200 r.p.m. (see chapter 8.1.2).

7 Inspection and maintenance

7.1 Inspection and maintenance intervals

Appropriate, regular inspections and maintenance and the exclusive use of original spare parts are the decisive factors in determining whether your Vaillant ecoMAX 665 will run problem-free and have a long service life.

Danger!
Inspections/Maintenance work not carried out can result in material damage and injury to persons.

We therefore recommend the conclusion of an inspection or maintenance contract. The inspection is intended to determine the actual condition of the respective device and compare it with the nominal condition. This is done by measuring, checking, observing.
Maintenance is required in order to eliminate any deviations of the actual condition from the specified condition. This is usually done by cleaning, setting and, if necessary, replacing individual components subject to wear.
With regard to the Vaillant ecoMAX 665, this means it is usually sufficient to conduct an inspection once a year.
Inspections can be performed quickly and economically without dismounting any components thanks to the data query in the DIA system, easy optical inspection and an air ratio measurement.
Experience indicates that under normal circumstances it is not necessary to clean the burner and heat exchangers yearly. These maintenance intervals and their extent are determined by a specialist, depending on the ascertained condition of the appliance during the inspection.
All inspection and maintenance work should be performed in the order specified in table 7.1.

Caution!
The front cover should only be removed
• for initial installation access
• for servicing
• for testing
For continuous and safe operation the front cover must be fitted together with a correctly fitted and sealed flue system.

7.2 Inspection and maintenance instructions

Only original Vaillant spare parts may be used for inspections, maintenance and repair work to ensure the perfect long-term working order of all functions of the Vaillant appliance.
Please contact Vaillant Service Solutions 0870 850 3072 for further details.

Note!
If inspection and maintenance work is necessary with the mains switch on, this is indicated in the description of the maintenance work.

Danger!
The supply terminals of the appliance are under voltage even if the appliance on/off switch is off.

Always perform the following steps prior to maintenance work:
- Switch off the appliance on/off switch.
- Disconnect the appliance from the mains supply by de-energising the appliance by means of a separator with a contact opening of at least 3mm (e.g. fuses or circuit breakers).
- Close the gas shut-off valve.
- Close the heating flow and return and the cold water inlet valve.
- Take the front casing off the appliance.

Always perform the following steps after performing any maintenance work:
- Open the heating flow and return and the cold water inlet valve.
- Refill the appliance, if necessary, on the hot water side up to a pressure of between 1.0 and 2.0 bar and bleed the heating system (see chapter 5.1).
- Open the appliance gas isolation valve.
- Reconnect the device to the mains supply and switch on the mains switch.
- Check the appliance for gas and water leaks.
- If necessary, refill and vent the heating system.
- Put on the appliance's front casing.

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, or if incorrect combustion is suspected (see section 5.2.3)

No.	Step	To be carried out during:	
		Inspection	Maintenance
1	Disconnect the appliance from the mains supply, close the gas supply and maintenance cocks, depressurize the appliance on the water side (observe the pressure gauge)		X
2	Dismantle thermal compact module		X
3	Clean the integral condensation heat exchanger		X
4	Check whether the burner is dirty		X
5	Install compact thermal module. **Caution: replace the seals!**		X
6	Check whether the electrical plug connections and other connections are fitted tightly and make adjustments, if necessary.	X	X
7	Cleaning the air intake tube		X
8	Open the maintenance cocks and fill the appliance/system up to about 1.0 - 2.0 bar (depending on the static height of the system); start the venting program		X
9	Check the overall condition of the appliance, remove general dirt from the appliance and the vacuum chamber	X	X
10	Check the condensate siphon in the appliance, and clean and fill it if necessary.	X	X
11	Clean the condensate paths in the appliance		X
12	Open the gas supply and switch on the appliance	X	X
13	Perform a test run on the appliance and heating system, including water heating, and bleed if necessary	X	X
14	Test ignition and burner performance	X	X
15	Check whether the appliance is leaking flue gas, water or condensate	X	X
16	Check the flue system for leaks and that it is fixed properly, and make adjustments if necessary	X	X
17	Check appliance gas setting, reset and record if necessary.		X
18	Complete the gas commissioning checklist (Benchmark)	X	X

Table 7.1: Maintenance steps

7.2.1 Servicing the compact thermal module

Removing the compact thermal module
The compact thermal module consists of the speed-controlled fan, the gas fitting, the mixer tube and the burner with flange. These four components make up the assembly that is the compact thermal module. Proceed as follows to dismount it: (see fig. 7.1)

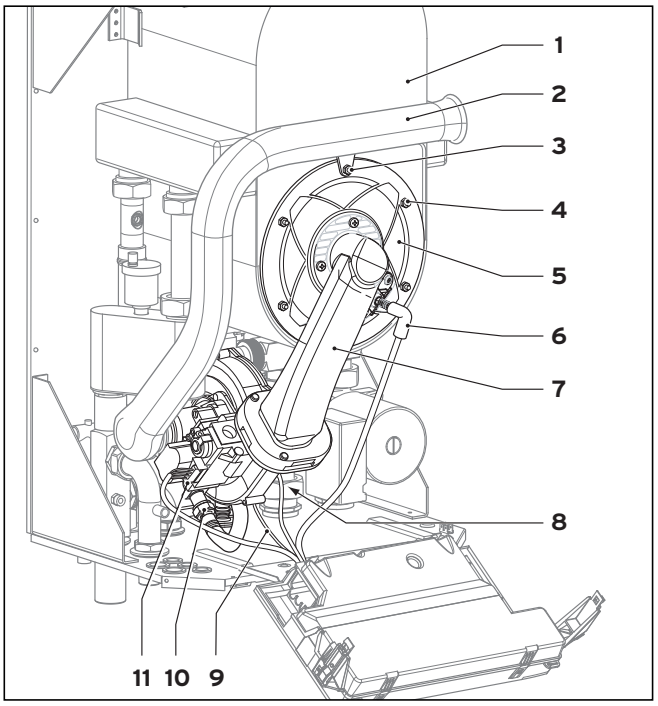


Fig. 7.1 Dismounting/Mounting the compact thermal module

Danger!
There is danger of being injured or scalded at the compact thermal module and at all components carrying water. Only work on the components once they have cooled down.
The mixer tube (7) between gas control unit and burner may not be opened. It can only be guaranteed that this component is gas-tight after it has been inspected at the factory.

- Cut off the gas supply to the appliance.
- Lower the electronics box.
- Undo the fastening screw of the air intake pipe (3) and lift the air intake pipe forward (2); remove the air intake pipe from the intake socket.
- Pull the two plugs of the ignition und grounding lines off the ignition electrode (6).
- Undo the gas supply line (10) on the underside of the electronic gas valve (fig. 7.1).
- Pull off the cable (8) at the fan motor (coupling), the PWM signal cable beneath the fan (9) and the cable for the gas fitting (11).
- Undo the six nuts (4).

Caution!
Under no circumstances may the compact thermal module be suspended from the flexible appliance gas pipe.

- Pull the entire compact thermal module (5) off the integral condensation heat exchanger (1).

Mounting the compact thermal module

Danger!
The seal (1) and silicate cord (2) on the compact thermal module (fig. 7.2) (SP no. 180904) must be replaced every time the thermo compact module is removed. The burner flange insulation (3) on the compact thermal module (SP no. 180913) must not show any signs of damage; if it does, it must also be replaced.

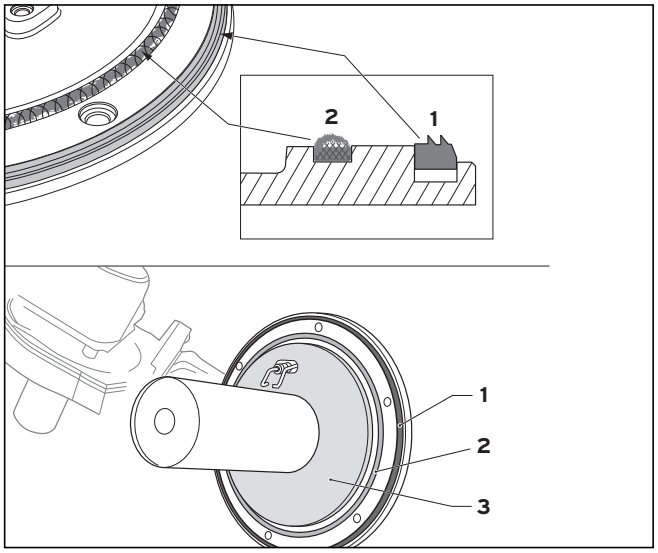


Fig. 7.2 Checking seals and burner flange insulation

- Put the compact thermal module (5) onto the heat exchanger (1) (fig. 7.1).
- Tighten the six nuts (4) evenly and crosswise.
- Put the air intake tube (2, fig. 7.1) onto the intake socket and tighten the screw (3).
- Connect the gas supply line (10) with a new seal to the gas fitting. Use a suitable open-end spanner to do so.
- Connect the two plugs of the ignition and the earth connection to the ignition electrode (6).
- Put back on the cable (8) at the fan motor (coupling), the PWM signal cable beneath the fan (9) and the cable for the gas fitting (11).
- Open the gas isolation valve to the boiler.

Danger!
Check the gas connection (10) for leaks with leak spray.

7.2.2 Clean the heat exchanger

Caution!
Protect the lowered electronics box against spray water.

- Dismantle the compact thermo module as described under 7.2.1.
- Clean the heating spiral (1) of the heat exchanger. Rinse with water.

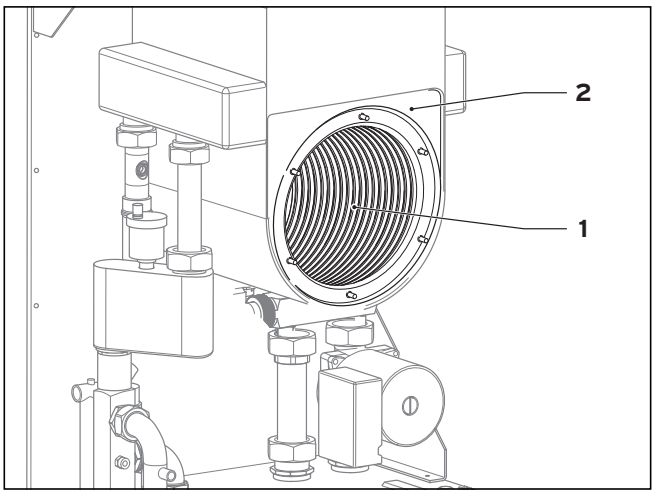


Fig. 7.3 Cleaning the heat exchanger

Note!
When the primary heat exchanger is cleaned, the condensate path and the siphon should also be cleaned, see chapter 7.2.3.
The connection elbow and the corrugated pipe can be used to help you in rinsing out the primary heat exchanger. Remove these from the siphon (2, fig. 7.4) and leave the clips and connection elbow on the primary heat exchanger.

7.2.3 Cleaning the condensate paths and siphon

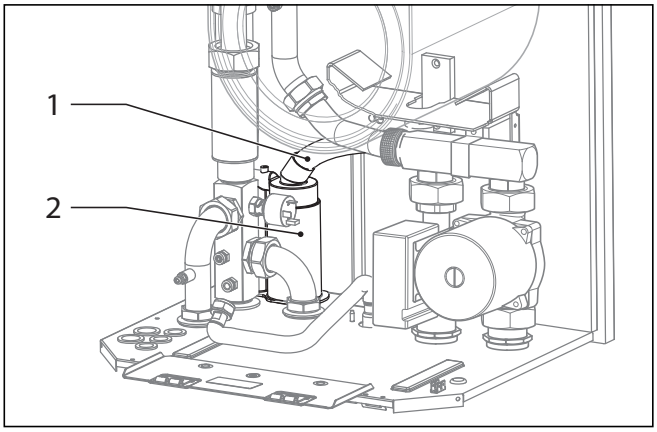


Fig. 7.4 Cleaning the condensate paths (1)

To clean the condensate paths, the condensate hose can be dismounted from the primary heat exchanger (1, fig. 7.4) and the complete condensate siphon (2) dismounted. Then both can be cleaned in a disassembled state.
Observe also the siphon installation instructions provided.

Danger!
If the appliance is operated with an empty condensate siphon, there is the danger of poisoning through escaping flue gases. Therefore, refill the siphon after each cleaning.

- Remove the condensate water trap beneath the appliance and clean it.
- Remove the clips beneath the primary heat exchanger and pull off the connection elbow.
- Remove the siphon and the corrugated pipe (consider the position of the latches).
- Clean the components.

Caution!
Make sure that no spray water comes into contact with other components. If it does, damage may be caused.

After cleaning, reinstall all condensate path components (see siphon operating instructions). Make sure you fill the condensate siphon with water. Fit new seals at all locations and test the condensate path for leakage.

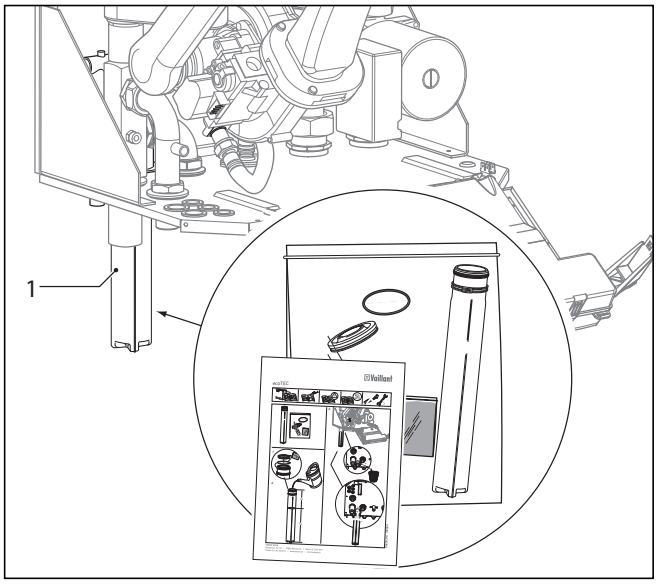


Fig. 7.5 Cleaning the siphon (2)

7.2.4 Checking the burner

The burner is maintenance-free and needs no cleaning. The surface should be checked for damage, and the burner replaced if necessary.

- After checking/replacing the burner, install the compact thermo module as described in 7.2.1.

7.3 Draining the appliance and the system

7.3.1 Draining the appliance

- Close the appliance's maintenance cocks.
- Open the drain valve in the return.
- Open the air-release valve on the cylinder supply connection in order for the appliance to be completely drained.

7.3.2 Draining the entire system

- Attach a hose to the system's drain point.
- Bring the open end of the hose to a suitable discharge point.
- Make sure that the boiler's maintenance cocks are open.
- Open the draining cock.
- Open the air-release valves on the radiators. Start with the radiator that is highest up and then continue downward.
- When the water has run out, close the radiators' vents and the draining cock again.

7.3.3 Cleaning the air separator

Danger!
There is danger of being injured or scalded at all components carrying water. Only carry out work on these components once they have cooled down.

- Dismount the air separator as shown in fig. 7.6 and rinse it with hot water.
- Remount the air separator and make sure to use new seals (SP no. 981272).

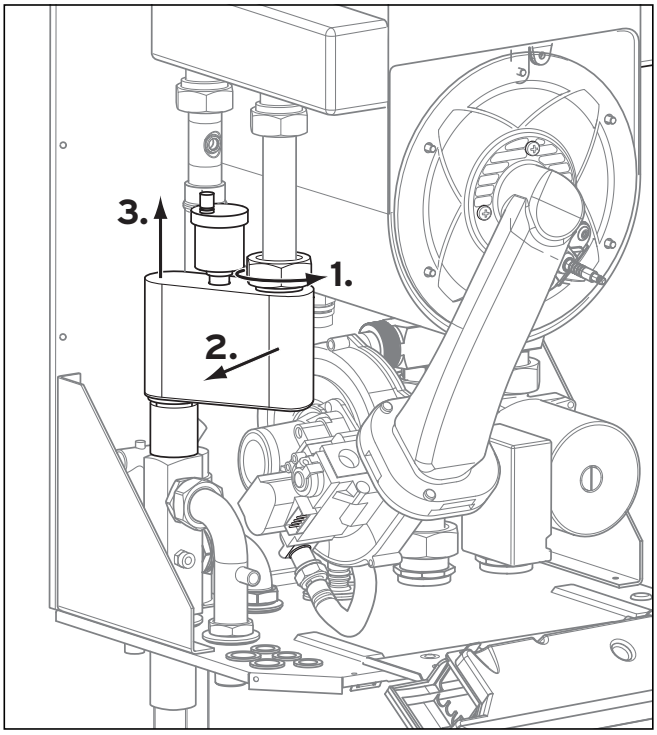


Fig. 7.6 Cleaning the air separator

7.4 Filling and venting the system

Proceed as described in point 5.1.2.

7.5 Checking the gas rate check

Perform a gas rate check as described in chapter 5.2.

7.6 Test operation

After the maintenance work has been completed, carry out a functional test (see chapter 5.3).

8 Troubleshooting

8.1 Diagnostics

8.1.1 Status codes

The status codes, which you get via the DIA system's display, give you information about the appliance's current operating status. If several operating statuses exist simultaneously, the most important status code is always shown.

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

- Press the "i" key beneath the display.
  The status code appears in the display, e.g. S.04 for "Burner mode - heating".

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

- Press the "i" key beneath the display
  or
- do not press any key for about 4 minutes. The current heating supply temperature appears in the display again.

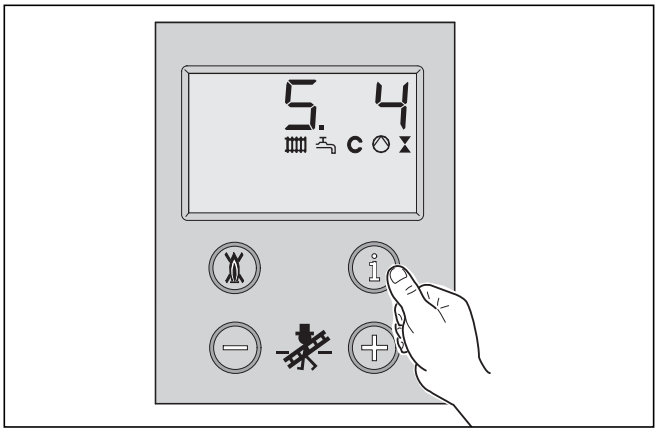


Fig. 8.1 Display of status codes

Code	Meaning
S.0	No heat required
S.1	Heating pump supply
S.2	Heating fan start
S.3	Heating ignition
S.4	Heating burner on
S.5	-
S.6	Heating fan over-run
S.7	Heating pump over-run
S.8	Remaining anti-cycle time heating
S.10	Hot water request
S.11	Hot water fan start
S.13	Hot water ignition
S.14	Hot water burner on
S.15	-
S.16	Hot water fan over-run
S.17	Hot water pump over-run
S.20	Hot water cycle mode
S.21	Hot water fan start
S.23	Hot water ignition
S.24	Hot water burner on
S.25	-
S.26	Hot water fan over-run
S.27	Hot water pump over-run
S.28	Hot water anti-cycle time
S.30	No heat requirement controller (2-point controller)
S.31	No heat demand from external controls or CH dial off
S.32	Waiting time fan
S.34	Heating frost protection
S.36	No heat requirement controller (Vaillant controller)
S.42	Flue gas flap no feedback
S.37	Waiting time fan
S.39	Safety circuit (contact-therm) external device failure
S.53	Waiting time lack of water (burner on ΔT Fl.-Ret. was > 30 K; burner off ΔT Fl.-Ret. was > 35 K
S.54	No water pressure in boiler

Table 8.1: Status codes

8.1.2 Diagnosis codes

In the diagnosis mode, you can change certain parameters or display more information (see following table).

- Press the "i" and "+" keys under the display simultaneously.

The display shows "d.0".

- Scroll to the desired diagnosis number with the "+" or "-" buttons.
- Press the "i" key.

The display shows the relevant diagnosis 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 diagnosis mode as follows:

- Press the "i" and "+" keys simultaneously
  or
- do not press any key for about 4 minutes. The current heating flow temperature appears in the display again.

Code	Meaning	Display value/adjustable value
d.0	Partial-load heating	adjustable values in kW
d.1	Pump over-run time heating	1 - 60 minutes or "continuous" (factory setting: 5 minutes)
d.2	Max. anti-cycle time heating	1 - 60 minutes (factory setting: 20 minutes)
d.4	Cylinder temperature actual value	actual value in °C; with use of solar energy: actual value of the upper cylinder temperature sensor
d.5	Flow temperature target value	target value in °C
d.6	Cylinder temperature target value	target value in °C
d.7	Cylinder temperature target value for VC appliances	target value in °C
d.8	Terminal 3-4	0 = room thermostat open (no heating operation) 1 = room thermostat closed (heating operation)
d.9	Terminal 7-8-9 target value	in °C (continuous controller)
d.10	Internal pump	1 = on; 0 = off
d.11	External pump	1 = on; 0 = off
d.12	Storage charging pump	1 = on; 0 = off
d.13	Circulation pump	1 = on; 0 = off
d.14	Pump speed target value	target value internal pump in %. possible settings:factory setting auto, 53, 60, 70, 85, 100 %)
d.15	Pump speed actual value	actual value internal pump in %
d.16	2. Pump	3 = storage charging pump (only this function can be used) for other functions, use module 1 of 5 (item no. 306 253) or module 2 of 6 (item no. 306 247)
d.17	Control type	0 = supply temperature control; 1 = return temperature control
d.22	Hot water request	1 = on; 0 = off
d.23	Operating mode	summer/winter mode: 1 = on; 0 = off
d.25	Hot water enabling via warm restart clock	1 = yes; 0 = no
d.33	Fan target value	target value in r.p.m./10
d.34	Fan actual value	actual value in r.p.m./10
d.40	Flow temperature actual value	actual value in °C
d.41	Return temperature actual value	actual value in °C
d.44	Ionisation current actual value	actual value/100 in µA
d.46	External temperature correction value	correction value in K

Code	Meaning	Display value/adjustable value
d.47	External temperature actual value	actual value in °C
d.50	Minimum speed offset	in r.p.m./10
d.51	Maximum speed offset	in r.p.m./10
d.52	Minimum air pressure offset	in Pa
d.53	Maximum air pressure offset	in Pa
d.60	Number of temperature limiting shutdowns	number
d.61	Safety thermostat shutdown	number
d.67	Remaining anti-cycle time heating	in minutes
d.68	No first start number	number of failed ignitions in the first attempt
d.69	No second start number	number of failed ignitions in the second attempt
d.71	Max. supply temperature heating	max. target value of the heating supply temperature: adjustable value 40 - 85 °C (factory setting: 75 °C)
d.72	Pump over-run hot water	pump run-out time in seconds after the charging of a hot water cylinder; factory setting: 80 s
d.75	Max. charging time hot water cylinder	maximum charging time for a cylinder without its own controller
d.76	Appliance variants	1 - 19
d.77	Partial-load hot water cylinder	limitation of the storage charging output in kW
d.78	Max. flow temperature hot water	limitation of the storage charging temperature in °C
d.80	Operating hours heating	in h
d.81	Operating hours hot water generation	in h
d.82	Burner starts - heating	number of hystereses in the heating mode x 100
d.83	Burner starts - hot water mode	number of hystereses in the hot water mode x 100
d.87	Type of gas (natural gas/liquid gas)	not necessary, must stay at 0 = natural gas
d.90	Digital controller	1 = detected, 0 = not detected
d.91	Status DCF77	DCF status with connected external sensor with DCF77 receiver: 0 = no reception; 1 = reception; 2 = synchronised; 3 = valid

Table 8.2: Diagnosis codes

8.1.3 Error codes

The error codes displace all other displays when errors occur.
An error that arises is shown in the display as "F...", e.g. "F.10" (see table on the next page).
The error code displayed is accompanied by a plain text display, e.g. for F.10: "Short circuit supply sensor".
If several errors occur simultaneously, the corresponding error codes are displayed alternately for approx. 2 seconds each.

8.1.4 Error memory

The last 10 errors are saved in the appliance error memory.
- Press the "i" and "–" keys simultaneously.
- You can scroll back through the error memory by pressing the "+" key.

You can exit the error memory display as follows:
- Press the "i" key beneath the display
  or
- do not press any key for about 4 minutes.

The current heating supply temperature appears in the display again.

Code	Meaning	Cause
F0.0	Interruption supply sensor	NTC connector not plugged in or loose, NTC defective, multi-plug on the electronics not plugged in properly
F.1	Interruption return sensor	NTC connector not plugged in or loose, NTC defective, multi-plug on the electronics not plugged in properly
F.10	Short circuit supply sensor	NTC defective, short-circuit to ground/short circuit in the cable harness
F.11	Short circuit return sensor	NTC defective, short-circuit to ground/short circuit in the cable harness
F.13	Short circuit cylinder sensor	NTC defective, short-circuit to ground/short circuit in the cable harness, inside of the plug damp
F.20	Water safety thermostat	supply or return NTC defective (intermittent contact), supply temperature too high, earth connection of the cable harness to the appliance not correct, failed discharge to the electrode via ignition cable, ignition plug or ignition electrode
F.22	Dry burning (no water in the appliance)	no water in the primary heat exchanger when commissioning, RESET activated when appliance is hot, water pressure switch has been triggered, flow switch has been triggered
F.23	Lack of water Temperature spread too large System not bled properly	pump jammed, reduced output of the pump, air in the appliance, system pressure too low, supply and return NTC mixed up, appliance not filled via appliance-internal KFE cock (fill only via return!), start venting program
F.24	Lack of water Temperature rise too fast System not bled correctly	pump jammed, reduced output of the pump, air in the appliance, system pressure too low, supply and return NTC mixed up, appliance not filled via appliance-internal KFE cock (fill only via return!), start venting program
F.25	Flue safety thermostat flue temperature too high, system pressure too low	plug connector option flue gas thermostat interrupted, water pressure switch has been triggered, flow switch has been triggered
F.27	Flame simulation (flame signal despite gas valve being switched off)	gas solenoid valve leaking, electronics (flame detector defective), dampness on the electronics
F.28	No ignition when starting	no or too little gas, ignition system (ignition transformer, ignition cable, ignition plug) defective, interruption of the ionisation current (cable, electrode), false gas setting, faulty earthing of the appliance, electronics defective
F.29	No reignition	gas supply temporarily interrupted, flue gas recirculation, faulty earthing of the appliance
F.32	Speed deviation fan (too large when starting)	fan jammed, fan plug not inserted correctly, fault in cable harness, electronics defective
F.37	Speed deviation fan (too high or too low during operation)	pressure sensor not fitted or defective (however, not short circuit or interruption)
F.42	Short circuit coding resistance	no valid value for appliance variant
F.43	Interruption coding resistance	no valid value for appliance variant
F.60	Gas valve control "+" faulty	short circuit/short-circuit to ground in the cable harness to the gas valves, gas fitting defective (short-circuit to ground of the coils), electronics defective, water pressure switch defective, flow switch defective
F.61	Gas valve control "-" faulty	Short circuit/short-circuit to ground in the cable harness to the gas valves, gas fitting defective (short-circuit to ground of the coils), electronics defective water pressure switch defective, flow switch defective
F.62	Gas valve shut-off faulty	gas fitting leaking, electronics defective
F.63	EEPROM faulty	electronics defective
F.64	Electronics/sensor fault	short circuit supply or return NTC, electronics defective
F.65	Electronics temperature too high	electronics too hot due to external influence, electronics defective
F.67	Electronics error flame (implausible flame signal)	electronics defective
Emergency run "speed"	Special message: no speed signal from the fan	fan (hall sensor) defective, error in the cable harness, electronics defective

Table 8.3: Error codes

8.1.5 Test programs

Special functions can be triggered in the appliances by activating various test programs. These programs are given in detail in the table below.

- The test programs P.0 to P.6 are started when "Power ON" is turned on and the "+" key is pressed for 5 s.

The display shows "P.1".

- 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 end the test programs by not pressing any key for 15 minutes.

Display	Meaning
P.0	**Venting test program** 1x "i" key: start venting the heating pump (display: HP) 2x "i" key: start venting the charging pump (display: LP) 3x "i" key: end venting program Note: the venting program runs for approx. 6.5 mins.
P.1	Test program where the appliance is operated in full load after successful ignition
P.2	Test program whereby the appliance is operated with minimum gas volume after successful ignition
P.5	Test program for safety thermostat test; appliance heats up by bypassing a control shutdown until the safety thermostat shutdown temperature of 97 °C is reached

9 Vaillant Service

To ensure efficient and reliable operation of your boiler it is recommended that regular servicing is carried out by your service provider.

Vaillant Applied System Sales
Vaillant Ltd., Unit D1 Lowfields Business Park, Elland.
West Yorkshire. HX5 9DG

Training
Telephone 01634 - 29 23 70
Fax 01634 - 29 23 54
email training@vaillant.co.uk

Commercial Service
Telephone 0870 - 8 50 30 72
Mon - Fri 8.30 - 17.30
Fax 01773 - 52 59 46
email aftersales@vaillant.co.uk

10 Recycling and disposal

Recycling and disposal have already been taken into account during the development of all Vaillant products. Vaillant's standards lay down strict requirements. When selecting materials, the recyclability, dismountability and separability of materials and components are taken into account, just as environmental hazards and health risks during recycling and the disposal of unavoidable remains of unusable residue are.

10.1 Appliance

The Vaillant ecoMAX 665 consists 92 % of metallic materials which can be melted down again at iron and steel works and therefore can be recycled practically any number of times. The plastic materials used are labelled and, in this way, are already prepared for sorting and fractionation for subsequent recycling.

10.2 Packaging

Vaillant has reduced the transport packaging of the appliances to a minimum. The strict selection of the packaging materials is based on their recyclability.
The high-quality cardboard articles are secondary raw materials which have been in demand in the cardboard and paper industry for a long time.
The EPS (polystyrene)® used is necessary to protect the products during transport. EPS is 100 % recyclable and CFC-free.
The films and tightening bands are also made of recyclable plastic.

11 Technical data

ecoMAX	665	Unit
heat Output Range (heating 50/30 °C)	14.6 - 67.6	kW
heat Output Range (heating 80/60 °C)	13.7 - 63.7	kW
maximum Heat Input (Net)	65	kW
net Efficiency at 100% load	97,4	%
net Efficiency at 30% load	107,6	%
SEDBUK rating	A	
SAP seasonal Efficiency	90,35	%
inlet gas working pressure required (natural gas)	20	mbar
Inlet gas working pressure required (LPG)	N/A	mbar
NOx class	5	-
NOx level	55	mg/h
CO_2 Percentage (after 5 minutes full load +/- 1)	8,8	%
recommended CO level	150	ppm
gas Rate (natural gas)	6,9	m^3/h
gas Rate (LPG)	N/A	kg/h
rated water volume (when ΔT = 20 K)	2795	l/h
residual delivery head of the pump (without non return valve)	280	mbar
residual delivery head of the pump (with non return valve)	190	mbar
max. flow temperature approx.	85	°C
maximum operating pressure	3	bar
min. required total overpressure on the heating side	0,8	bar
condensate volume (pH value: 3.0 - 4.0)	6,5	l/h
water content	6,5	l
flue gas mass flow min./max	7.2 / 29.6	g/s
flue gas temperature min./max.	52 / 75	°C
maximum length of concentric flue horizontal	15	m
maximum length of concentric flue vertical	18	m
pressure drop across the heat exchanger (at full load and ΔT 20 K)	375	mbar
connections heating flow/return	1"	mm / "
gas inlet	25	mm
pressure safety valve	3/4	mm / "
condensate drain	19	mm
flue connection	80/125	mm
lift weight	72	kg
height	800	mm
width	480	mm
depth	472	mm
electrical connection	230 / 50	V / Hz
electrical power consumption min./max. (with integrated pump)	170 / 260	W
type of protection	IP X 4 D	-

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		m^3/hr		ft^3/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		m^3/hr		ft^3/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/CO_2 RATIO READING? N/A ☐ YES | | CO/CO_2 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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