

For the heating engineer

Installation and maintenance instructions ecoCRAFT



Modular Gas Condensing Boiler

VKK GB 806/2
VKK GB 1206/2
VKK GB 1606/2
VKK GB 2006/2
VKK GB 2406/2
VKK GB 2806/2

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1 Notes on the documentation

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

We accept no liability for any damage caused by failure to observe these instructions.

Documents which are also valid and auxiliary service equipment

For the owner of the system:

Operating manual	No. 0020029295
Warranty card	No. 802961_06
	No. 802922_09
Sticker "Read Instructions"	No. 835593

For the heating engineer:

Installation instructions	No. 0020029294
Assembly manual for flue pipe	No. 0020029296

Auxiliary service equipment:

The following test and measuring equipment is required for inspection and maintenance:

- Flue gas analyser
- U gauge/manometer
- Leak detection fluid
- TSuitable tools to undertake the work

Storage of the documents

Please hand this installation and maintenance instruction manual and the auxiliary equipment to the operator of the installation, whose responsibility it is to ensure the manuals and auxiliary equipment are available whenever required.

Symbols used

Please observe the safety instructions in this installation manual when installing the device.



Danger!
Immediate risk of serious injury or death!



Danger!
Danger of death by electrocution!



Caution!
Potentially dangerous situation for the product and environment!



Note!
Useful information and instructions

- Symbol for a necessary task

2 Description of the appliance

2 Description of the appliance

2.1 Type overview

Appliance type	Designated country (designation in accordance with ISO 3166)	Approval category	Type of gas	Nominal heat production range P (kW)
VKK GB 806/2	GB (Great Britain) IE (Eire)	I _{2H}	G 20 (natural gas H)	12.5 - 83.5 (40/30 °C) 11.6 - 77.4 (80/60 °C)
VKK GB 1206/2				12.5 - 125.0 (40/30 °C) 11.6 - 116.6 (80/60 °C)
VKK GB 1606/2				12.5 - 167.0 (40/30 °C) 11.6 - 155.9 (80/60 °C)
VKK GB 2006/2				12.5 - 209.0 (40/30 °C) 11.6 - 195.5 (80/60 °C)
VKK GB 2406/2				12.5 - 251.0 (40/30 °C) 11.6 - 235.4 (80/60 °C)
VKK GB 2806/2				12.5 - 292.0 (40/30 °C) 11.6 - 275.5 (80/60 °C)

Table 2.1 Overview of types of unit

Identification plate

The identification plate is mounted on the front of the boiler under the front cladding. It becomes visible after the front section of the cladding is removed.

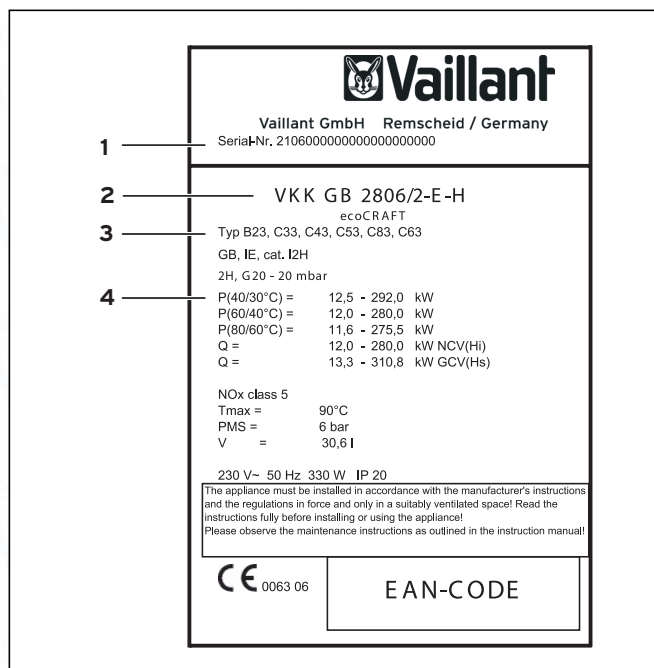


Fig. 2.1 Identification plate

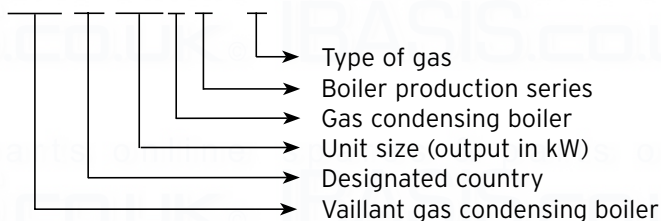
Explanation of the identification plate:

- 1 Fabrication No.
- 2 Type designation
- 3 Designation of the type approval
- 4 Specification of the unit
- 5 CE label

Explanation of the type designation

VKK GB 2806/2

Equipment



2.2 CE label

CE labelling shows that the appliances comply with the basic requirements of the following directives:

- Gas appliances directive (90/396/EEC)
- Electromagnetic compatibility directive with threshold class B (89/336/EEC)
- Low voltage directive (73/23/EEC)

The appliances meet the basic requirements of the efficiency requirements directive (Council Directive 92/42/EEC) as condensing boilers.

The above units emit less than 80 mg/kWh oxides of nitrogen (NO_x) when using natural gas.

2.3 Intended use

The Vaillant gas condensing boilers VKK GB 806/2 – VKK GB 2806/2 are constructed in accordance with state of the art technology and recognised safety-technological 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 impaired if subject to improper use.

The unit is a low temperature hot water boiler for use on sealed system central heating installations. Any other use or extended use is considered to be improper. The manufacturer or supplier is not liable for any resulting damage. The user alone bears the risk.

Intended use includes the observance of the operating and installation manual and the adherence to the inspection and maintenance conditions.

2.4 Design and function

The ecoCRAFT is a gas condensing boiler in modular construction which is used as a heat producer for hot water central heating installations designed for low temperature hot water applications.

It is suitable for operation in new installations and for replacement installations in multi-occupancy houses and in business.

The boiler type; ecoCRAFT is intended for connection to a heating controller or BEMS with weather compensation modulation by 0-10Vdc.

The boiler is suitable for connection to open flue systems as defined under the classification 'Type B' where the flue system evacuates the products of combustion to the outside air and draws combustion air directly from the room or enclosure containing the appliance. The construction of the flue must be constructed of a material suitable for use on condensing boilers and provide a suitable means of condensate discharge.

The boiler is suitable for connection to room sealed flue systems under the classification 'Type C' where the combustion system is sealed from the room in which the boiler is located, and which obtains air for combustion from the open air outside the premises and vents the products of combustion directly to open air outside the premises. The flue system must also be constructed of a material suitable for a condensing boiler and incorporate a suitable means of condensate removal.

Equipment Specification

- Modulation range see table 2.2
- Reduced environmental stress by extremely low emission of toxic substances, NO_x <60 mg/kWh and CO < 20mg/kWh
- Efficiency of 108.4% (net) measured at 30% load.
- Compact high-efficiency heat exchanger in V-Form
- Modulating surface burner gas unit with automatic digital ignition sequence control
- Pre-mix burner
- Electronically controlled fan
- Feed manifold with NTC sensor
- Return manifold with NTC sensor
- Each module of the heat exchanger contains one flow NTC and one safety temperature limiter (STB)
- Central module control
- User interface with multi-function display
- Flue gas temperature max. 80 °C
- Stainless steel condensate collector (removeable)
- PP siphon
- Integrated wooden handling pallet
- Internal frost protection function
- 0 - 10 Vdc output to control modulating shunt pump
- 0 - 10 Vdc input terminals to accept temperature or kW output modulation by BEMS
- Adjustable boiler feet

Appliance type	Minimum Load		Maximum Load	
	kW	%	kW	%
VKK GB 806/2	12	15.0	80	100
VKK GB 1206/2	12	10.0	120	100
VKK GB 1606/2	12	7.5	160	100
VKK GB 2006/2	12	6.0	200	100
VKK GB 2406/2	12	5.0	240	100
VKK GB 2806/2	12	4.3	280	100

Table 2.2 Modulation ranges

2 Description of the appliance

Functional elements

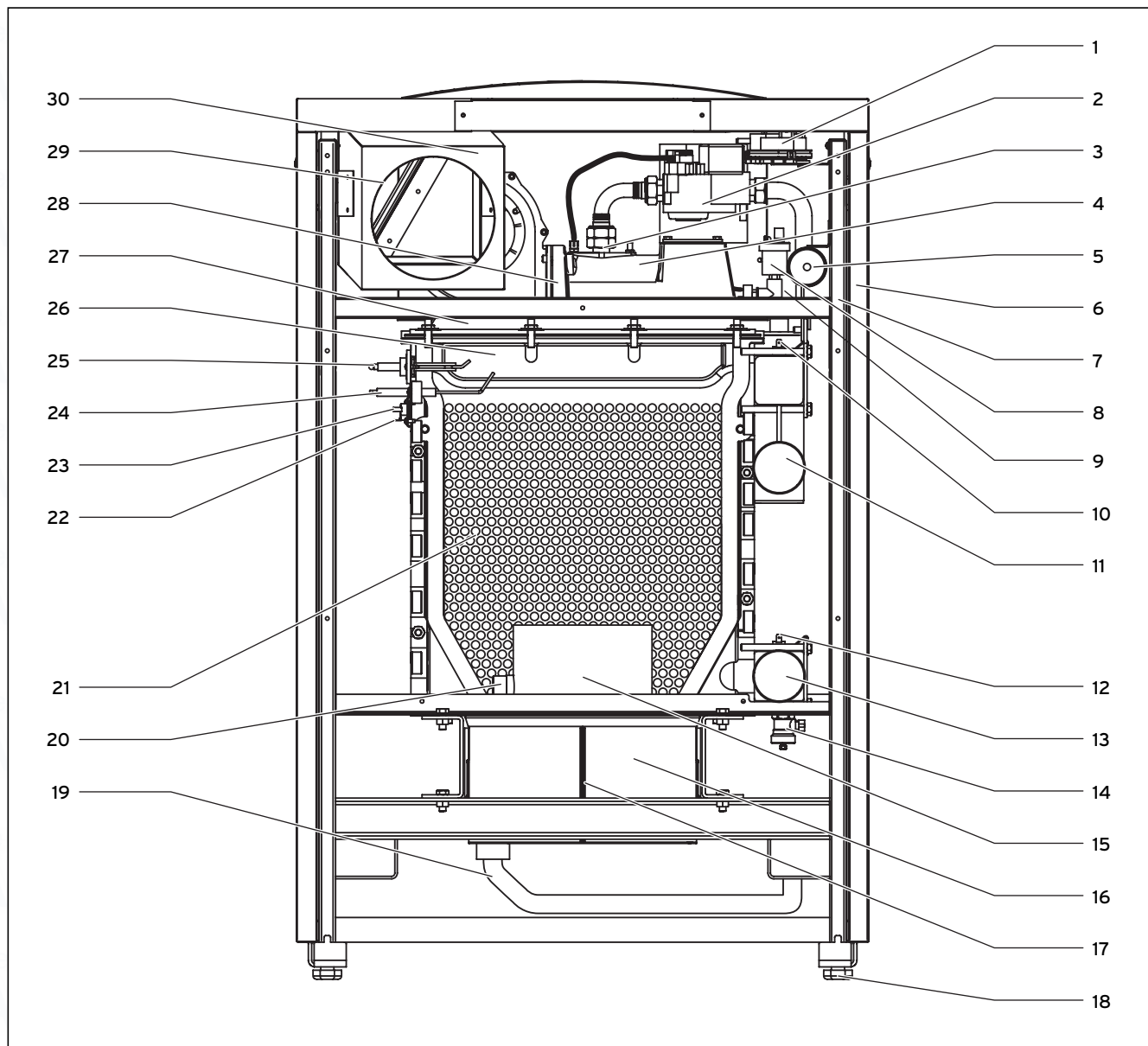


Fig. 2.2 Functional elements

Key:

- 1 Air pressure switch
- 2 Gas unit with automatic digital firing
- 3 Gas injector
- 4 Flue gas non-return flap
(in the burner hood, not shown)
- 5 Gas pipe
- 6 Boiler casing
- 7 Boiler stand
- 8 Automatic quick air vent
- 9 Water pressure switch (not visible)
- 10 Boiler flow NTC
- 11 Flow manifold
- 12 Boiler return NTC
- 13 Return manifold
- 14 Boiler drain cock
- 15 Flue gas connection

- 16 Condensate collector
- 17 Flue gas diverter plate
(in the condensed water collector, not shown)
- 18 Height-adjustable boiler feet
- 19 Condensate drain
- 20 Sampling point, flue gas analysis
- 21 High-efficiency heat exchanger in V-Form
- 22 Temperature monitor (STB)
- 23 Module flow NTC
- 24 Ionisation electrode
- 25 Ignition electrode
- 26 Modulating surface burner
- 27 Mixing chamber
- 28 Air filter
- 29 Air inlet
- 30 Fan

3 Safety instructions and regulations

The local gas supplier should be consulted when planning the installation. This will establish the availability of an adequate supply of gas.

An existing service pipe may not be used without prior consultation to the local gas supplier.

The connection of a gas meter to a gas service pipe may only be undertaken by the local gas supply company or by a CORGI registered technician who is qualified to perform this task ("Competent person").

The installation must be checked for gas tightness and be vented of air in accordance with the relevant guideleines. The appliance may only be installed by a suitably qualified person. The installing engineer is responsible for the safe installation and operation of the gas appliance and that the environment around it is safe to operate such a device.

3.1 Safety instructions

The combustion air fed to the unit must be free of chemicals which contain, e.g. fluorine, chlorine or sulphur. Sprays, release or cleaning agents, paints and adhesives can contain such materials which can, in certain circumstances, lead to corrosion when operating the unit, including the flue gas system.



Caution!

The combustion air must be free of particles or the burner can be contaminated with dirt. Take particular care that no building dust or fibres of insulating material are present in the combustion air.

In business premises such as hairdressing salons, painting or carpentry workshops, cleaning businesses etc., when installed with on open flue system ,Type B' mode, a separate room must always be used for the installation which will ensure that the supply of combustion air is technically free from chemicals. At a total nominal heat rating of the unit in excess of 50 kW, a separate room for the installation must be chosen. BS 6644 does not refer to a specific heat input where a boiler is to be installed in a plant room. The text in BS 6644 quotes „It is desirable that consideration always be given to the installation of boiler in purpose-constructed boiler rooms“

A specific distance between the unit and of combustible material is not required (minimum distance from the wall 5 mm.), (However, the recommended minimum distance in section 4.3.2 must be observed).

On sealed installations, a type-approved safety valve corresponding to the heat capacity must be fitted, sized, set, located and terminated in strict accordance with BS 6644.

Note concerning flue design:

Due to the high efficiency of ecoCRAFT boilers the flue gas temperatures are low and the buoyancy in the stack will be relatively small. The integral fans are fully matched to the boiler to provide correct combustion air and overcome the flue resistance.

Installation

Flush the heating system thoroughly before connecting the appliance! By doing that, residue such as fluxes, oils, welds, cinder, hemp, putty, rust, rough dust and similar substances are removed from the pipes.

Otherwise such substances can be deposited in the appliance and cause damage.

Make sure that the connection and gas pipes are not under stress when installed to avoid leakage in the heating installation or in the gas connection!

To tighten or loosen bolts, only use suitable open-ended spanners (do not use pliers or extensions etc.) Improper use or unsuitable tools can cause damage, such as gas or water leaks.

Always tighten the bolts fixing the burner hoods, the feed distributor and the return collector to the heat exchanger block with a torque wrench set to 12 Nm.



Caution!

The gas valve may be tested for leakage only with a maximum pressure of 110 mbar! The operating pressure may not exceed 60 mbar. If these pressures are exceeded, the gas fitting may be damaged.

The electrical installation may only be performed by a person qualified as an electrician or qualified electrical controls engineer.

There is a danger to life by electrocution from current-carrying components! The supply terminals in the terminal box of the device are under voltage even if the appliance mains switch is off. Before working on the appliance, turn off the power supply ensuring that there is no supply to the appliance and that any controls circuits that may be connected to the appliance are isolated with fuses removed and warning notices displayed at the point of isolation to prevent unauthorised re-start!

Start-up

After the heating system water has been cleaned you can use a commercial corrosion inhibitor, as long as it is suitable for use with ALUMINIUM and does not cause damage to the gaskets or membranes in the unit. We recommend that suitable products be obtained direct from the manufacturer.

G E Betz Ltd. Sentinel Division, Foundry Lane, Widnes, Cheshire. WA8 8UD. Tel. 0151 424 5351 or Fernox Manufacturing Co Ltd. Cookson Electronics, Forsyth Road, Sheerwater, Woking, Surrey. GU21 5RZ. Tel. 01799 521 133

3 Safety instructions and regulations



Note!

The addition of chemicals to the heating water, especially frost-preventatives, is not allowed!

Only for natural gas:

The installation should be designed in accordance with the relevant guidelines. The tested dynamic inlet operating pressure measured at the gas valve of the unit should, however, be at least 17 mbar, assuming that the unit ignites without disturbance.

Inspection and maintenance

Inspection, maintenance and repair work should only be undertaken by an approved heating installation company. Inspections / Maintenance work not carried out can result in damage to property and personal injury.

Danger to life by electrocution from current-conducting components! The supply terminals in the terminal box of the device are under voltage even if the appliance on/off switch is off. Before working on the appliance, turn off the power supply and secure against restart. Protect the switchgear cabinet from sprays and splashes.

Danger of explosion by gas leakage! When installing, maintaining and repairing the unit, always test for gas soundness by the appropriate method using an approved leak detector method including the burner seals, for gas leaks.

There is danger of being injured or scalded by the boiler and by all components carrying water. Only carry out work on these components once they have cooled down. All casing components are earthed. If casing sections need to be removed for maintenance work on the boiler, care must be taken to ensure that a temporary continuity bond is fitted if required, a test made to ensure that the equipotential bond is re-instated after the work is completed.

Troubleshooting

Disconnect the unit from the mains before starting to work. Close the gas isolation valve and the water service valves. Empty the appliance if you want to replace water-bearing components of the appliance!

Danger to life by electrocution from current-conducting components! The supply terminals in the terminal box of the device are under voltage even if the appliance on/off switch is off. Before working on the appliance, turn off the power supply and secure against restart!

Make sure that no water drips onto live components (e.g. electronic box etc.)!

Use only new gaskets and O-rings!

Once you have finished this work run a test.

3.2 Regulations

For installation of the appliance laws, regulations, technical rules and standards must be considered and adhered to ensure the safe installation of your appliance

Regulations (Great Britain and Eire)

Attention shall be made to the regulations, guidelines and standards in force. In particular reference shall be given to the following regulations, guidelines, standards and rules:

- The electrical connections to the boiler must be in accordance with the I.E.E Wiring Regulations, and tested accordingly.
- The Clean Air Act 1993 and the 3rd Edition of the 1956 Clean Air Act.
- The Building Regulations England and Wales, The Building Standards Scotland and any requirements determined by the local authorities within.
- Water supply (water fittings) regulations 1999
- Gas Safety (Installation and Use) Regulations 1998

Detailed recommendations are also contained in the following documents:

- BS 5854
Code of practice for flues and flue structures in buildings.
- BS EN 12828
Design for water-based heating systems.
- BS 6644
Specification for Installation of gas-fired hot water boilers of rated inputs between 70kW (net) and 1.8MW (net) (2nd and 3rd family gases).
- BS 6880
Code of practice for low temperature heating systems of output greater than 45kW.
Part 1 Fundamental and design considerations.
Part 2 Selection of equipment.
Part 3 Installation, commissioning and maintenance.
- BS 6981
Installation of low pressure gas pipework of up to 28mm in domestic premises.
- BS 7074
Application selection and installation of expansion vessels and ancillary equipment for sealed water systems.
Part 1 Code of practice for domestic heating and hot water.
Part 2 Code of practice for low and medium temperature hot water systems.
- BS 6700
Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

Institute of Gas Engineers Publications

- IGE/UP/1
Soundness testing and purging of industrial and commercial gas installations.
- IGE/UP/1A
Soundness testing and purging of small low pressure industrial and commercial natural gas installations.
- IGE/UP/10
Installation of gas appliances in industrial and commercial premises.
Part 1 Flued appliances

4 Assembly

The boilers are supplied ready for connection in a packaging unit with mounted housing. There is a handling pallet fitted to the unit.



Caution!

The smaller auxiliary pallette is only for transport purposes. It is located directly below the water condensate collector and must be removed after the boiler is installed in position in order to prevent fire.



Caution!

Take care when handling. You are responsible for your own safety when handling this appliance. Only use appropriate safe handling methods for the weight of the appliance involved. A risk assessment in every case shall be made by the person responsible for health and safety on site. Vaillant cannot be held responsible for any injury caused.

- Release the two side screws and remove the pallette.

4.1 Scope of delivery

- Check the delivery for completeness and potential damage using the following overview.

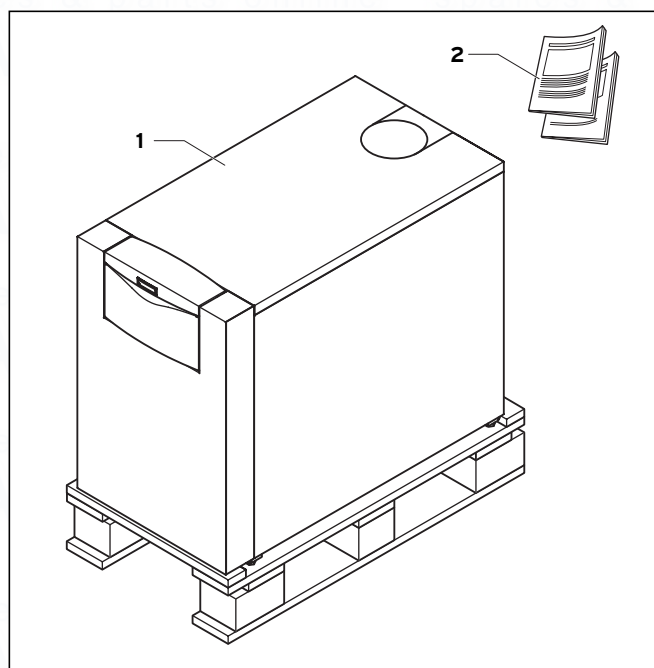


Fig. 4.1 Scope of delivery

Position	Amount	Name
1	1	Unit (cladding fitted)
2	2	Installation instructions

Table 4.1 Scope of delivery

4.2 Accessories

In addition to the necessary safety and isolation instructions, the following accessories are required for the installation of the unit:

- Heating regulator (e.g. VRC 630),
- Low loss header (optional),
- Boiler circulating pump (with fixed or variable speed),
- Condensate neutralisation device, if required.



Note!

The minimum water circulation flow must be secured. Vaillant recommends the use of a Low loss header and, dependent upon the boiler output, speed-regulated boiler circulation pumps (see Table 5.1).

4.3 Installation site

The unit should be installed in a frost protected room.

The unit can be operated in ambient temperatures between ca. 4 °C and ca. 50 °C.

When selecting the site of installation, the weight of the boiler including the water inside in accordance with the table "Specifications" (Chapter 11) must be taken into account.

A heating boiler pedestal (sound-deadening) or similar installation can be used to provide noise deadening; it is recommended to install the unit on a boiler support foundation 5 to 10 cm thick.

4.3.1 Regulations concerning installation site



Note!

BS 6644 does not refer to a specific heat input where a boiler is to be installed in a plant room. The text in BS 6644 quotes „It is desirable that consideration always be given to the installation of boiler in purpose-constructed boiler rooms“

The approval of the relevant building regulations authority must be obtained for the selection of the installation site and for the characteristics of the ventilation and flue systems of the installation room. The combustion air fed to the unit must be technically free of chemicals which contain, e.g. fluorine, chlorine or sulphur. Sprays, paints, release and cleaning materials and adhesives contain such substances, which can, during operation of the unit, lead to corrosion under certain conditions, including in the flue gas installation.



Caution!

The combustion air must be free of particles or the burner can be contaminated with dirt. Take particular care that no building dust or fibres of insulating material are present in the combustion air.

4 Assembly

The boiler is fitted in the factory with a building dust filter to prevent this. During the building period, the boiler may only be operated with this filter in position. The filter should be replaced at least after 10 weeks, earlier if there is a lot of dirt present on site. After the building period is complete, the filter can be removed. Should the filter be left in it should be replaced as part of the annual maintenance schedule in normal plant room conditions. Under conditions where the air is subject to dust contamination then the filter will require more frequent replacement.

4.3.2 Recommended minimum distance for installation

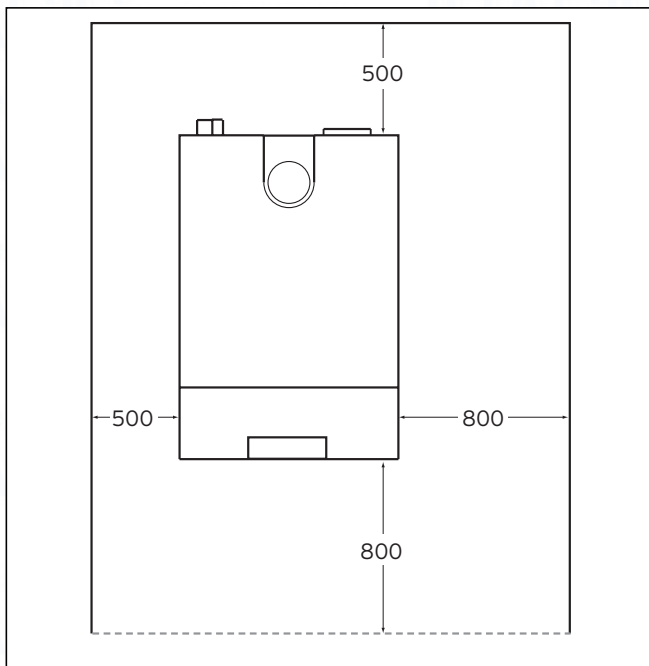


Fig. 4.2 Recommended distances during installation
(dimensions in mm)

The minimum distances from the wall, quoted in Fig. 4.2, should be maintained to be able to undertake installation and maintenance work without difficulty.

4.3.3 Levelling the boiler

- The boiler should be levelled using the height-adjustable feet to prevent water condensate from flowing out of the condensate collector.

4.4 Dimensions

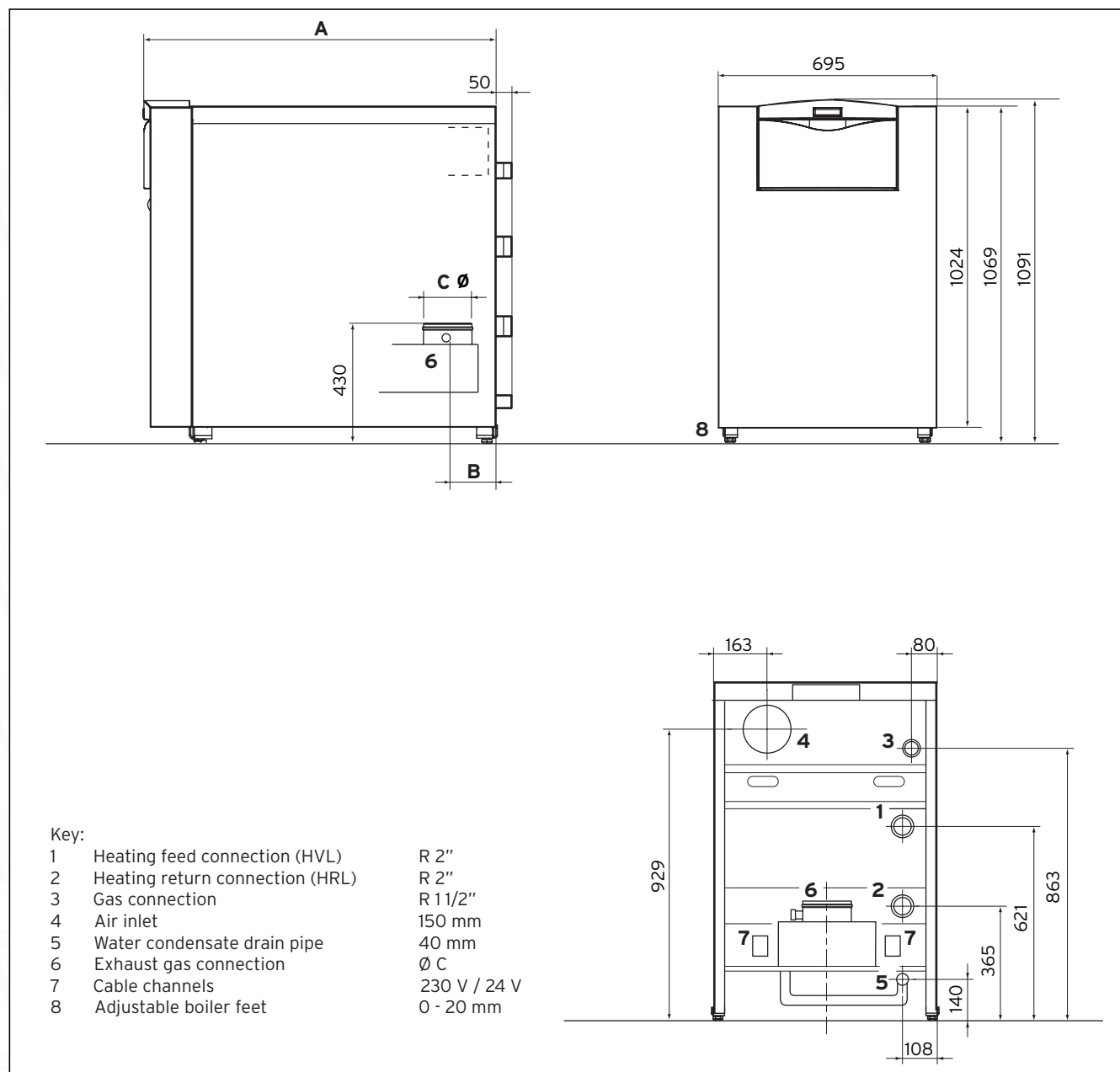


Fig. 4.3 Dimensions

Boiler Type	806/2-E	1206/2-E	1606/2-E	2006/2-E	2406/2-E	2806/2-E
A	995	995	1325	1325	1605	1605
B	142	142	142	167	167	167
C	150	150	150	200	200	200

Table 4.2 Dimensions (all measurements in mm)

5 Installation

5.1 General instructions for heating system



Caution!

Flush the heating system thoroughly before connecting the appliance! By doing that, residue such as welds, cinder, hemp, putty, rust, rough dust and similar substances are removed from the pipes. Otherwise such substances can be deposited in the appliance and cause damage.

- In accordance with BS 6644 the discharge pipe from the safety valve shall be self-draining and shall terminate in a visible position and in a location as to not cause a hazard to any person or the plant.
- Air vents shall be fitted at high points in the system and it is good practice that a dirt/air separator is installed on the return to the appliance or a dedicated dirt separator be fitted on the return.
- A commercial manual or automatic water make-up device shall be fitted it is necessary to ensure that an interlock exists should such equipment fail or the water supply be isolated to it.
- The safety temperature limiter fitted to the boiler, in addition to the water pressure switch, also serves as a low water level safety device.
- The switch-off temperature of the boiler in the event of a malfunction is ca. 95 °C. A suitable thermostat must be mounted in the heating feed line by the user if plastic pipes are used in the installation. This is required to protect the heating installation from temperature-related damage. The thermostat can be electrically wired to the plug of the safety switch (blue ProE plug on terminal 23/24).
- If non-oxygen barrier plastic pipes are used in the heating installation, a plate heat exchanger must be added to protect the system and to prevent corrosion in the heating boiler. Such heat exchangers can be used should the connection to an open vent type system be required or for practical reasons benefits the installation (different pressures in primary and secondary circuits or as a means of protection from corroded installations). Should a plate heat exchanger be fitted ensure that a means of expansion, discharge and make of water is provided to both circuits.

5.2 Gas connection

The gas installation may only be established by an competent person. The legal guidelines and any relevant local regulations of the gas supply company must be observed. The installation of the unit may only be undertaken by an approved gas installer in accordance with the "Gas Safety (Installation and Use) Regulations 1998". In Great Britain it is imperative that the current regulations are enforced, up to date guidance issued by CORGI is deemed to be adequate. Registered installation companies are committed to the maintenance of safe satisfactory standards of work.



Danger!

Make sure that the connection and gas pipes are not under stress when installed to avoid leakage in the heating installation or in the gas connection!

- The internal diameter of the gas pipes should be selected to suit the nominal boiler load.
- A gas ball valve should be installed in the gas feed pipe to the unit. This must have at least the same nominal size as the gas connection (R 1 1/2") and should be mounted in an easily-accessible location.



Caution!

The gas valve may be tested for leakage only with a maximum pressure of 110 mbar! The operating pressure may not exceed 60 mbar. If these pressures are exceeded, the gas fitting may be damaged.

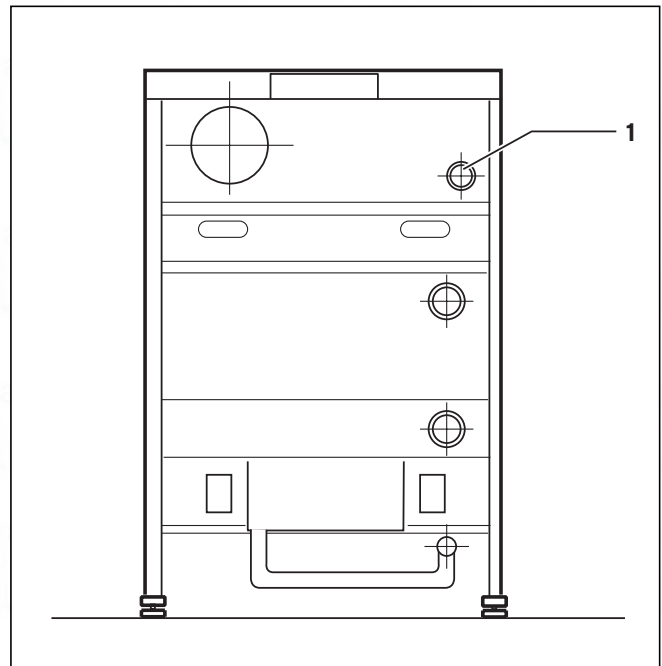


Fig. 5.1 Gas connection

- Close the gas inlet at the gas connection (1) on the boiler.
- Check the gas connection for leaks.

5.3 Heating side connection

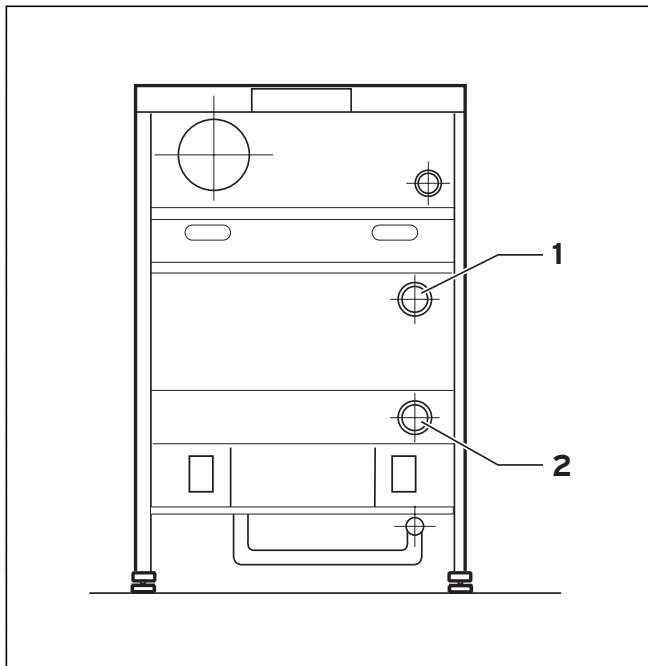


Fig. 5.2 Gas connection

- Connect the heating feed to the heating feed connection (1).
- Connect the heating return to the heating return connection (2).
- Fit the required isolation devices between the heating installation and the boiler and fit the relevant safety devices and a pressure gauge.

Caution!
If the nominal water circulation quantity is not met, the differential will be excessive and the individual modules start to sequence. For this reason it is necessary to ensure the water circulation quantities as shown in Table 4.1.

In order to ensure the minimum water circulation quantity a suitable Low loss header or a suitable plate heat exchanger should be fitted.

The boiler circulation pump is not integrated in the boiler and must be fitted upon installation. The connection of the 0 to 10V control line of a speed-regulated pump is on the twin pole green plug in the connection field. Make sure that the polarity is correct! The following pumps and Low loss headers are recommended for use with the individual boilers:

Boiler:	Nominal water circulation volume at 20 K spread [m ³ /h]	Low Loss Header
VKK GB 806/2	3.5	WH 95 (Art.-Nr. 306721)
VKK GB 1206/2	5.2	WH 160 (Art.-Nr. 306726)
VKK GB 1606/2	6.9	WH 160 (Art.-Nr. 306726)
VKK GB 2006/2	8.6	WH 280 (Art.-Nr. 306725)
VKK GB 2406/2	10.4	WH 280 (Art.-Nr. 306725)
VKK GB 2806/2	12.1	WH 280 (Art.-Nr. 306725)

Table 5.1 Recommendation list

5 Installation

5.4 Connecting the hot water cylinder

The VKK GB 806/2 - 2406/2 can be combined with the hot water cylinder units.



Note!

Do not connect the cylinder unit directly to the boiler but connect it to a system header on the secondary side.

5.5 Schematic hydraulic diagram of a heating installation

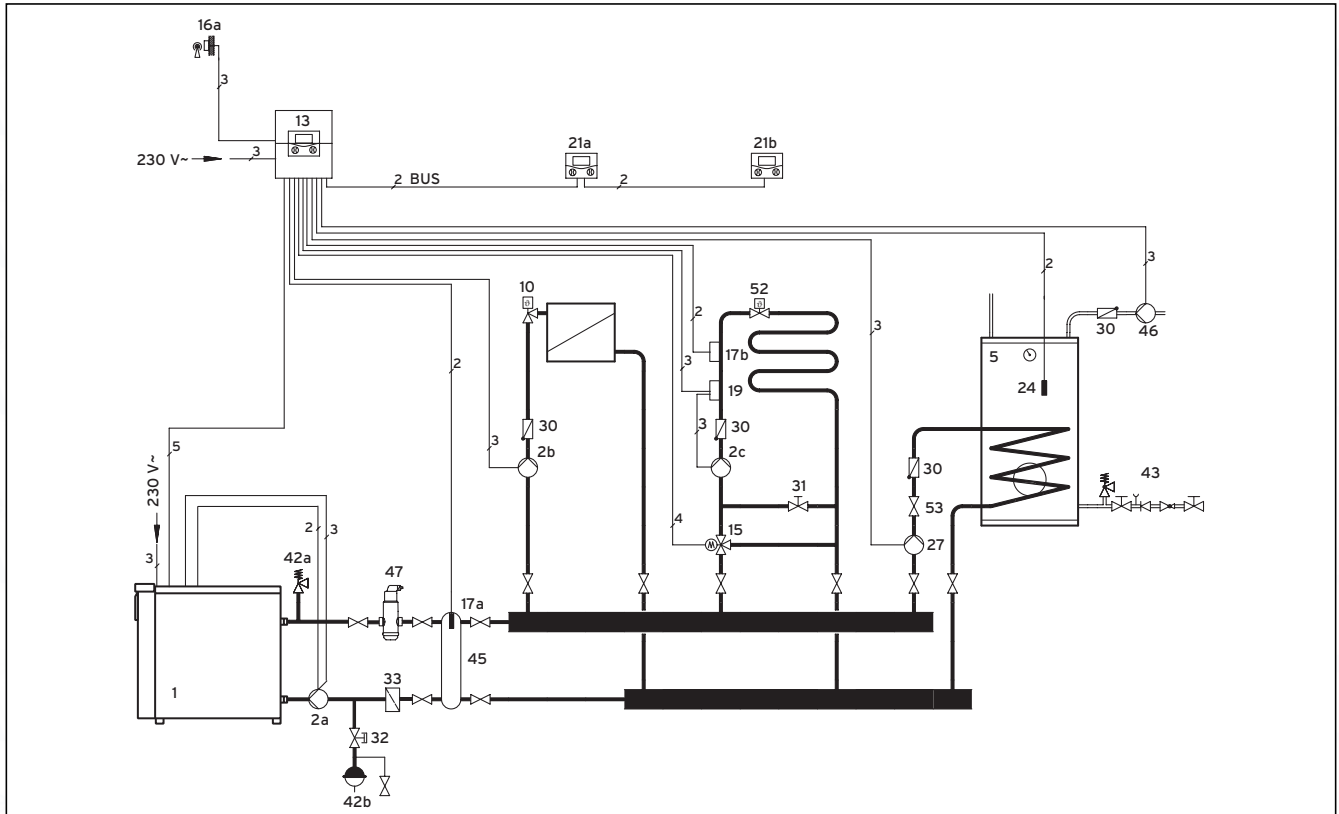


Fig. 5.3 Schematic hydraulic diagram with hydraulic track switch

Key:

- | | |
|--|---|
| 1 Gas condensing boiler ecoCRAFT | 27 Cylinder charging pump |
| 2a Boiler circulation pump (electronically regulated) | 30 non return valve |
| 2b Heating circulation pump (mixer circuit 1) | 31 Balancing |
| 2c Heating circulation pump (mixer circuit 2) | 32 Service valve |
| 5 Hot water cylinder unit | 33 Dirt separator |
| 10 Radiator thermostat | 42a Safety valve |
| 13 BEMS or heating controller | 42b Expansion vessel |
| 15 3-way mixer | 43 Safety group |
| 16 Outdoor sensor | 45 Low loss header |
| 17a Feed temperature sensor (heating circuit 1) | 46 Circulation pump |
| 17b Feed temperature sensor (heating circuit 2, mixer circuit) | 47 Air separator |
| 19 Maximum thermostat | 52 Thermostatic underfloor heating type valve |
| 21a Room thermostatic controller | 53 Un-vented hot water cylinder safety valve |
| 21b Thermostatic room controller | |
| 24 Cylinder temperature sensor | |

5.6 Flue gas connection, Room sealed applications

The combustion air is fed to the boiler via ducting from the outside. The installation room still has to be ventilated in accordance with any relevant regulations as defined by its use.

You may only use flue pipes which have been tested and approved in accordance with the installation instructions for flue systems suitable for condensing gas appliances.

5.7 Flue gas connection, open flue systems

The combustion air is taken from the installation room. The ventilation openings in the installation room must be in accordance with the BS 6644.

The ventilation to the boiler shall be designed, sized, located and installed in accordance with BS 6644.

Mechanical ventilation can be used but must be interlocked to the boiler across terminals 23 and 23 of the Pro-E terminals. The mechanical unit must be sized and operate as defined in BS 6644.

5.8 Connecting the boiler to the flue gas system

All ecoCRAFT condensing boilers are fitted with special flue seals for the connection of condensate-water secure and over-pressure leak-tight flue gas system.

The flue shall be designed and installed under the requirements of The Building Regulations Approved Document J, BS EN 1856-1, BS EN 1856-2, BS 5854, IGE/UP/10 and the 1956 Clear Air Act Memorandum on chimney heights (third edition) in all cases it must be located to avoid subjection to adverse wind pressures that may interfere with the flue. The design of the flue in any instance should be the shortest route the use of 87degree bends are acceptable however flue design in any case is that these are kept to a minimum, further guidance can be found in BS 6644:2005

Note!

A flue gas sampling point shall be provided in any flue pipe external to the boiler case within the primary flue.

If necessary, the flue gas system should be fitted with a safety temperature limiter (exhaust gas installation).

The flue gas system must be approved for use at a temperature of at least 120 °C.

If required by building regulations, an external exhaust gas STB must be fitted to exhaust gas ducting (matched to the temperature resistance).

This exhaust gas STB must be incorporated in the safety chain of the boiler.

5.9 Condensate discharge

The pH value of the exhaust gas condensate water, which is produced at a rate of max. 1 kg/m³, is between 3.5 and 4.5.

The condensate water does not contain any prohibited heavy metal ions.

The boiler is fitted with a condensate water drain. This drain must be connected to a water drain point which contains a water condensate drain via a connection pipe which exclusively runs downwards.

All pipes, fittings and accessories which conduct condensate water must exclusively be made of plastic. The pipes should, wherever possible, not run outside, and should be protected from freezing up.

Note!

If neutralisation is required please consult the local water authorities.

- Before starting the boiler up, the condensate water siphon should be filled with water.



Danger!

If the device is operated with empty condensate water siphon, there is a risk of poisoning from the flue gases which are emitted.

If the condensate water drain pipe needs to be extended during installation, use only plastic drain pipes.

Connecting the condensate water drain.

The flue system shall have a condensate trap where condensate can stand (e.g. at the base of any flue system) drain should be installed at an angle and be made of suitable plastic, minimum cross-section DN 20. The condensate water piping to the waste outlet is also installed at an angle via a DN 25 pipe (plastic) and must go to the nearest waste water outlet. The drain from the boiler is via a plastic pipe DN 40. It should be possible to inspect the pipe to remove debris if necessary.

Note!

For boilers up to 200 kW:

If required, a neutralisation device with condensate water feed pump from the range of Vaillant accessories can be connected.

For boilers above 200 kW:

If required, a standard neutralisation device from the range of Vaillant accessories can be connected.

5 Installation

5.10 Electrical connection



Danger!

Danger to life by electrocution from current-conducting components! Before working on the appliance, turn off the power supply and secure against restart.

The electrical connection must be done by a suitably qualified person qualified as an electrician or qualified electrical controls engineer who is responsible for complying with the existing standards and guidelines. All electrical work must be undertaken and checked in accordance with the relevant IEE Wiring Regulations (BS 7671) and relevant local rules.

All casing components are earthed. Make sure that all earth cables are connected and tested for equipotential continuity.

Mains and low-voltage cables (e.g. sensor wiring) must be run separately from each other.



Danger!

The automatic ignition system, the gas fittings and the fans are connected to a 230 V/50 Hz power supply.

The connection should be wired as follows:

5.10.1 Connecting the mains feed

The nominal voltage of the mains must be 230 V; if the mains voltage is more than 253 V and below 190 V functional impairment is possible.

The mains feed must be connected via a fixed connection and a separating device having a minimum contact opening of 3 mm (e.g. fuses, power switch).

- Run the mains feed to the connection rail at the front under the boiler.



Danger!

**The phasing always be observed - the boiler will otherwise malfunction!
Connect the boiler to the mains before actuating the On/Off switch!**

- Connect the mains feed to the terminals provided , N and L, in the plug.

5.10.2 Connecting a regulating unit

A weather-compensated heating control or BEMS can be used to control ecoCRAFT.

The 0...10 V input of a heating controller or BEMS (direct or via a control panel incorporating relays) are connected to the terminals 15 and 16 of the connection rail. The connections 7-8-9 are not to be used except where a Vaillant controller is installed utilising 7-8-9 connections. Should a Vaillant controller with the 7-8-9

connections be used then the bridge between terminals 13 and 14 must then be left in place.

Further information can be obtained from the regulator instructions.

5.10.3 Internal regulation types

Using Parameter 8, see Table 7.1, the following operating modes can be set.

- external 2-point regulator (Par 8-00)
- 0...10 V Temperature regulated (Par 8-02)
- 0...10 V Output regulated (Par 8-03)

Building site operation, i.e. the boiler runs at maximum boiler temperature without external regulation. Set by unplugging the connection cable from the 7-8-9-Coupler (terminals 22, 23, 24).

5.10.4 Connecting electrical accessories

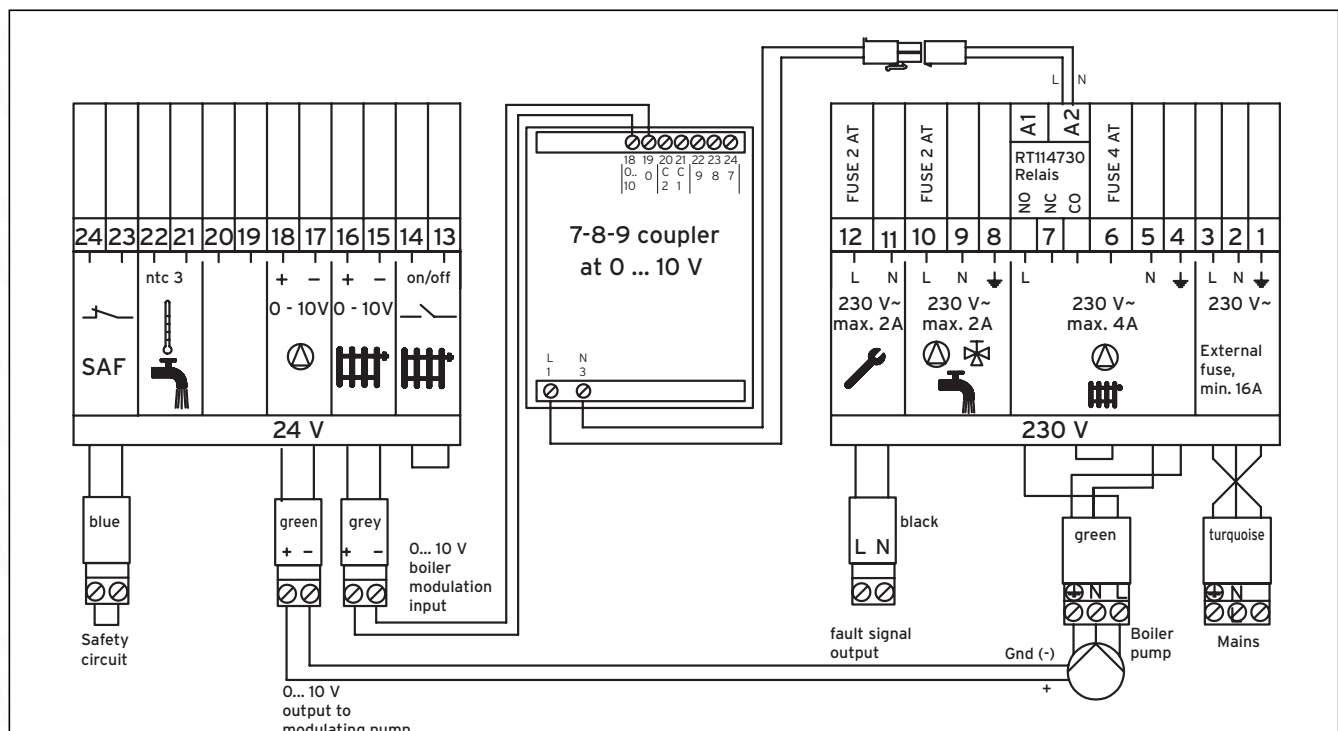


Fig. 5.4 Connection terminal rail

Boiler circulation pump, fixed speed

- Connect the boiler circulation pump to the ProE plug connector on the connection rail.

Boiler circulation pump, Modulating

In the case of speed regulated pumps, an additional twin core cable is connected from terminals 17 and 18 of the Pro E plug to the corresponding 0...10 V input in the connection box of the pump. Make sure that the polarity is correct! Also consult the installation instructions of the boiler circulation pump or the 0...10 V module of the pump.

External fault signal

- Connect an external fault signalling device (Alarm or BEMS contacts for an alarm signal) via a delayed switch-on, self-holding relay. The electrical connection is on terminals 11 and 12 (output alarm contact). In the event of a fault, the output carries a 230 V signal.

External flow or safety thermostat

A feed thermostat can be incorporated in the safety circuit (series connection only) electrically by connection to the terminals 23 and 24 e.g. for protection of underfloor heating systems.

Water condensate feed pump

- Connect the alarm output of a water condensate feed pump electrically to the terminals 23 and 24 (safety circuit (series connection only)).

6 Start-up

Initial start-up and operation of the appliance, and instruction for the user, must be performed by a heating engineer. For subsequent installation/operation instructions, see the relevant section of the operating manual.



Caution!

Before start-up, and after inspection, maintenance and repair work, the gas unit must be checked for leaks!

The operation of the boiler and the setting of various parameters or operating conditions takes place using the multi-function switching field on the boiler display.

The setting parameters are sub-divided into two levels: General parameters and displays which are relevant to the entire boiler can be selected directly using the buttons "Mode" and "i" (see operating instructions). The specialist technician level with parameters for the individual burner modules and installation-relevant settings can be accessed after entering the service code.

6.1 Entering the service code

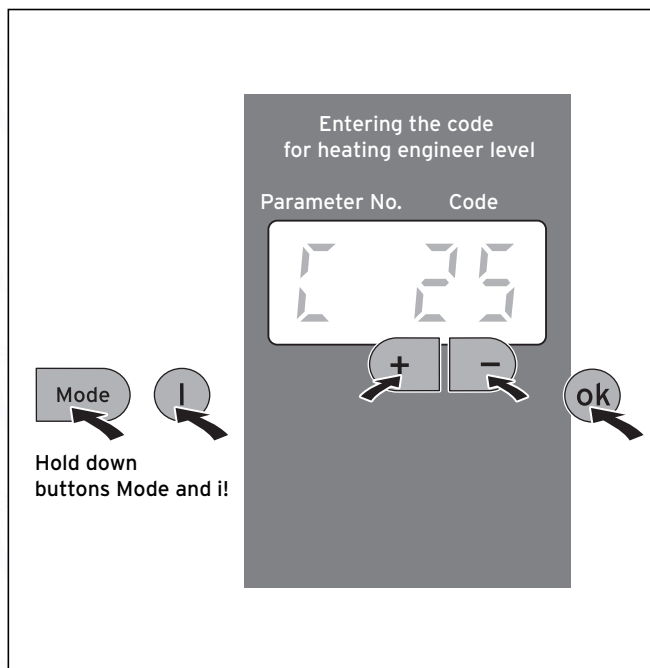


Fig. 6.1 Entering the service code

To enter the service code proceed as follows:

- Hold down the buttons "Mode" and "i". Two figures appear in the display.
- Use the buttons "+" and "-" to set the figure **25**.
- Store the value using the "OK" button.

The storing function is confirmed by the flashing of the display.



Note!

The specialist technician level is exited automatically after 15 minutes.

Each time the service code is entered this causes a further extension of 15 minutes.

The following schematic shows an overview of the operation levels. The points on a dark background only appear after the service code has been entered.



6 Start-up

6.3 Start-up checklist

Proceed in accordance with the following checklist during start-up. A description of the individual steps can be obtained from the following sections.



Caution!

All casing components are earthed. If casing sections need to be removed, care must be taken to ensure that the earth cable is disconnected and then reconnected after the work is completed.

The casing must be removed from the boiler before start-up.

- Remove the 2 bolts on the right and left hand sides of the multi-function switching field, pull the front hood away, pull the casing cover forwards and finally remove the side parts.

No.	Process	Remarks	Tools required
1	Check the gas connection pressure at any gas fitting	Pressure over ambient must be 17 to 21 mbar	U-tube or digital pressure gauge
2	Check whether siphon is full	If necessary fill via flue gas measuring point	
3	Check electrical connection rail	Mains supply: Terminals 1, 2, 3 Regulator 0 - 10 V: Terminals 15, 16 or Room thermostat: Terminals 13, 14 Vaillant Regulator Connection: 7, 8, 9, C1, C2 on the coupler module	
4	Switch unit on, display lights up	Otherwise check fuses	
6	Operate all modules in Test Mode on High (ALL = HHH) (or chimney sweep control)	After latest 15 minutes the Service Code must be re-entered	
7	Check the entire gas route for leaks	Leak detection fluid or a gas sensing instrument is recommended (especially for checking the burner gaskets for leaks if necessary tighten the burner gasket to 12 Nm).	Leak detection equipment
8	Measuring the flue draught	The maximum draught must not exceed 20 Pa. If the draught is too great the flue draught must be reduced by suitable measures.	Draught guage
9	CO ₂ measurement	acceptable range 8.6 to 9.6 Vol.-%	Flue gas analyser
10	If CO ₂ not within tolerance, gas setting: enter Code C25, each time set one module to LOW in Test Mode and set other modules to OFF set CO ₂ to 8.4 to 8.8 Vol.-%		Torx 40
11	After gas setting, all modules to HHH (or chimney sweep control) and re-measure CO ₂	acceptable range 8.6 to 9.6 Vol.-%	Flue gas analyser
12	CO measurement	Ideal value < 80 ppm	Flue gas analyser
13	Check condensate trough, siphon and condensate drain for leaks	Visual check or by additional approved check for escaping products of combustion.	
14	Switch boiler off and on again	Safe exit from the Test Mode and Reset	
15	Programme heating controller with customer and check user water/heating	Hand the operating instructions for the controller to the customer	
16	Affix sticker 835593 "Read Operating Instructions" in user's language to the front of the unit		

Table 6.1 Start-up checklist

6.4 Filling the installation



Caution!

The boiler should be isolated from the mains 230V electric supply during filling.

The entire heating installation must be thoroughly flushed out before filling. ecoCRAFT boilers consist of a heat-exchanger made of ALUMINIUM alloy.

In order to prevent the natural corrosion process in a heating or hot water system, the system must be thoroughly flushed out before start-up. Deposits of lime-scales and the formation of gas in the water can lead to damage in the boiler, and the system must be water-tight to avoid damage

Corrosion protection by water treatment

After the heating system water has been cleaned you can use a commercial corrosion inhibitor, as long as it is suitable for use with ALUMINIUM and does not cause damage to the gaskets or membranes in the unit. We recommend that suitable products be obtained direct from the manufacturer.

G E Betz Ltd. Sentinel Division, Foundry Lane, Widnes, Cheshire. WA8 8UD. Tel. 0151 424 5351
or

Fernox Manufacturing Co Ltd. Cookson Electronics, Forsyth Road, Sheerwater, Woking, Surrey. GU21 5RZ. Tel. 01799 521 133

6.4.1 Filling the heating side

- Release the cap of the quick venting system (1) by up to two turns. Make sure that the opening of the cap does not point towards the electronic components.
- Fill the installation up to a system pressure of 2.3 to 2.5 bar.
- Fill the installation via the boiler filling and draining device provided on the installation.
- Close the venting nipple on the boiler.
- Vent the radiators.
- Read the pressure again on the pressure gauge. If the installation pressure has fallen, the installation should be filled up again and vented once again.
- Check all connections and the entire system for leaks.

6.4.2 Siphon filling



Danger!

If the device is operated with empty condensate water siphon, there is risk of poisoning through emitting flue gases.

Therefore, before commissioning, it is mandatory to fill the siphon as described below.



Caution!

All casing components are earthed. If casing sections need to be removed, care must be taken to ensure that the earth cable is disconnected and then reconnected after the work is completed.

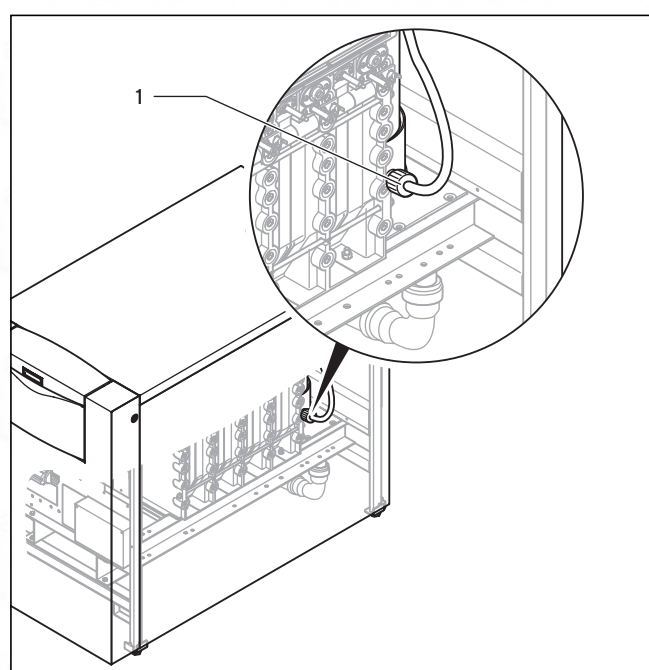


Fig. 6.3 Siphon filling

- Remove the boiler casing.
- Remove the tube from the plug (1).
- Unscrew the plug (1) from the flue gas outlet adaptor and fill the siphon with tap-water through this opening.
- Close the opening on the flue gas connection with the plug (1).
- Reconnect the tube to the flue gas pressure switch.

6.5 Checking the gas setting

The unit is set to the values quoted in Chapter 12 "Specifications" in the factory.

6 Start-up



Caution!

Before start-up of the unit compare the details concerning the set type of gas on the identification plate with the type of gas supply at the installation site.

Ensure that all statutory tests have been carried out as far as practical before start-up then complete operational tests as part of commissioning or re-commissioning.

The units are supplied for use on Natural Gas G20 only.



Note!

The unit cannot be operated using liquid gas.

6.5.1 Checking the dynamic inlet pressure (inlet working pressure)

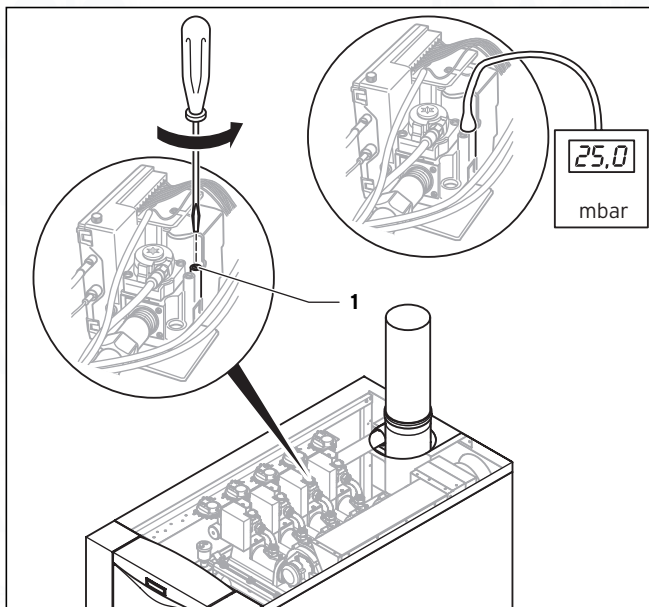


Fig. 6.4 Check the dynamic inlet pressure (inlet working pressure)

Proceed as follows to check the connection pressure:



Caution!

All casing components are earthed. If casing sections need to be removed, care must be taken to ensure that the earth cable is disconnected and then reconnected after the work is completed.

- Remove the cover of the boiler case.
- Release the sealing screw (1) on one of the gas fittings.
- Connect a pressure gauge (2).
- Start up the appliance.
- Switch the unit to maximum output in Test Mode; Operating condition "ALL = HHH" (see Chapter 6.5.2).

- The total measured pressure must be between 17 and 21 mbar.



Caution!

If the dynamic inlet pressure (inlet working pressure) is outside the range 17 to 21 mbar, no adjustment should be undertaken, and the unit must not be started up until the pressure is improved to the gas appliance by correct adjustment of the meter governor (by the gas supply company) or the supply improved.!

In this case proceed as follows:

- Take the appliance out of operation.
- Remove the pressure gauge and screw the sealing screw (1) back in again.
- Make sure that the sealing screw is not leaking.

6.5.2 Test mode

The Test Mode can be used to switch on/off the modules individually and to perform setting (CO₂ setting). The Test Mode is only accessible via the Service Code. The display shows alternate flashing displays of the burner number (bur. 1) and the status (OFF, HI or LO). The button "+/-" is used to change the individual status and this is then confirmed using "OK".

Test Code	Setting facility	Description
ALL	OFF	All modules are off
	HI	All modules are burning at full capacity
	LO	All modules are burning at part capacity
bur.1	OFF	Module 1 is off
	HI	Module 1 is burning at full capacity
	LO	Module 1 is burning at part capacity
bur.2	OFF	Module 2 is off
	HI	Module 2 is burning at full capacity
	LO	Module 2 is burning at part capacity
bur.3	OFF	Module 3 is off
	HI	Module 3 is burning at full capacity
	LO	Module 3 is burning at part capacity
bur.4	OFF	Module 4 is off
	HI	Module 4 is burning at full capacity
	LO	Module 4 is burning at part capacity
bur.5	OFF	Module 5 is off
	HI	Module 5 is burning at full capacity
	LO	Module 5 is burning at part capacity
bur.6	OFF	Module 6 is off
	HI	Module 6 is burning at full capacity
	LO	Module 6 is burning at part capacity
bur.7	OFF	Module 7 is off
	HI	Module 7 is burning at full capacity
	LO	Module 7 is burning at part capacity

Table 6.2 Overview of the Test Codes



Caution!

The combustion air must be free of particles or the burner can be contaminated with dirt. Take particular care that no building dust or fibres of insulating material are present in the combustion air.

The boiler is fitted in the factory with a building dust filter to prevent this. During the building period, the boiler may only be operated with this filter in position. The filter should be replaced at least after 10 weeks, earlier if there is a lot of dirt present on site. After the building period is complete, the filter must be removed.

6.5.3 Check CO₂ content and adjust if necessary

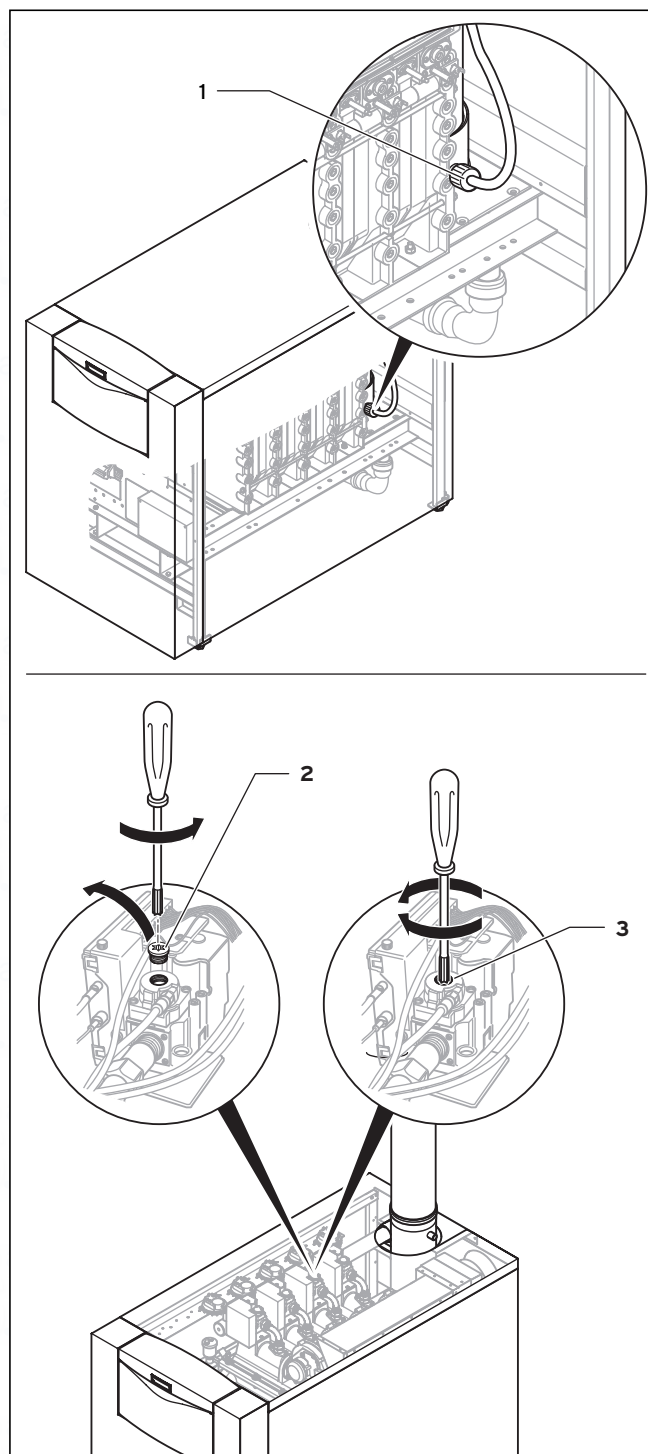


Fig. 6.5 CO₂ test

6 Start-up

- Push the buttons "Mode" and "+" simultaneously and hold them down until the burners have ignited. The boiler will now run at maximum capacity for 15 minutes.



Note!

The maximum flue draught must not exceed 20 Pa otherwise the results of the CO₂ measurement will be invalid. If necessary you can remove the cover of the inspection opening in the external flue gas ducting during the measurement and then replace it after the measurement.

The measurement opening (1) for CO₂ measurement is located in the flue gas connection duct or provided in proprietary supplied flue system.

- Measuring the CO₂ content in the flue gases.

If the value lies between 8.6 and 9.6 Vol.-%, no further adjustment is required. If the measured CO₂ content is outside this range, the individual burner modules will need to be adjusted.



Note!

The Test Mode is automatically exited after 15 minutes. If you have not been able to complete the measurement in this time period, the Test Mode must be re-activated.

The adjustment of the gas is by the gas adjusting screw (3) on the gas valve assembly.

Proceed as follows to measure the CO₂ content of the individual modules:

- Turn all modules to "Off" and then each individual module to operating mode "Low" to minimum capacity, e.g. "bur1=Lo".
- Unscrew the cover cap (2).
- If necessary, adjust the CO₂ value using the setting screw (3).
Turning to the right -> increasing CO₂ content
Turning to the left -> reducing CO₂ content



Note!

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

- Set the CO₂ content to a value between 8.4 and 8.8 Vol.-%.
- Repeat this process for all the boiler modules.

6.6 Checking the equipment function

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

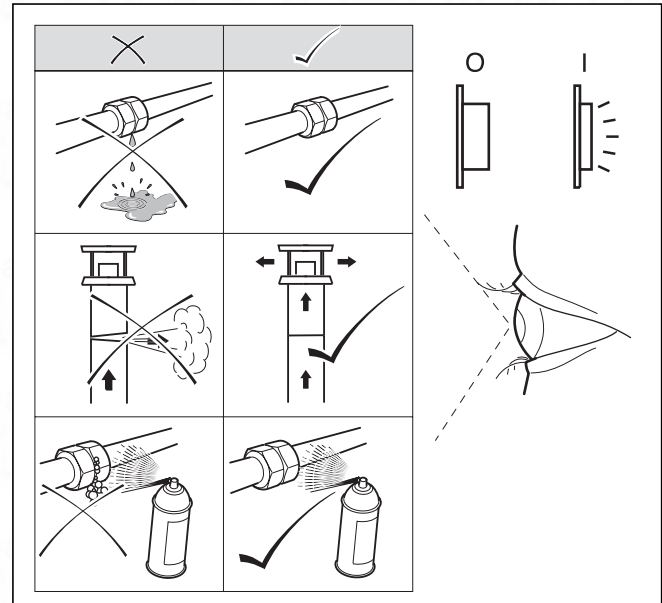


Fig. 6.6 Visual check of the unit and the installation

- Commission the appliance in accordance with BS 6644:2005 and taking particular note of any specific requirements of controls.
- Particularly check the burner gasket using a CO₂ measuring instrument for leaks. If necessary tighten the burner gasket to approximately 12 Nm.
- Check the gas dynamic inlet pressure, gas rate, ventilation, safety valve setting and discharge, boiler and its installation that it is safe to put into operation.
- Check the correct fitting of the flue gas system and the combustion using a flue gas analyser.
- Check the flame pattern of the burner.
- Check the heating and hot water function.
- Hand the unit over to the user completing commissioning forms to hand over to the user.

6.7 Instructing the operator

The operator of the heating installation must be instructed in the handling and functions of his heating installation. The following measures need to be specially taken into account:

- Hand over the manuals intended for the owner as well as the documents of the appliance.
- Tell the owner to keep the manuals nearby the controller.



Note!

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



Caution!

The unit may only be operated

- for start-up
 - for testing
 - for continuous operation
- with front of the unit closed and with the flue pipe fully assembled and enclosed.**

Instruction for the heating installation

- Instruct the user about the importance of not restricting the ventilation and ensuring that the flue gas system is kept free from blockages. In particular, point out that these measures must not be altered.
- Explain to the user how to check the required water level/filling pressure of the plant as well as measures for refilling and evacuating the heating system if needed.
- Point out to the user the correct (economical) settings for temperatures, controls and thermostat valves.
- Instruct the owner on the need for regular yearly inspection and maintenance of the system. We recommend making a maintenance agreement.
- You must always point out to the user that the combustion air should be free of particles since otherwise the burners can become contaminated with dirt.

7 Adapting the appliance to the heating system

7 Adapting the appliance to the heating system

The matching of the boiler to the heating installation is undertaken in the Parameter Mode.
The operating concept for the selection of the various parameters and their setting is shown in Section 6.2.
The settings from Parameter 4 onwards are only intended for the heating engineer and can only be called up after the Service Code has been entered.
An overview of the adjustable Parameters is shown in Table 7.1.

Parameter	Description	Default setting	Setting range
1	Maximum feed temperature for heating operation	80	30 - 90 °C
2	Hot water set temperature	60	40 - 65 °C
3	Heating operation = HZ Hot water heating = BW	02	00 = HZ off, BW off, 01 = HZ off, BW on, 02 = HZ on BW off, 03 = HZ on, BW on
Can only be called up after entering Service Code C25			
4	Number of modules (burners) in the boiler	dependent upon the size of the boiler	0 - 7
5	Minimum fan speed	2400	1000 - 6000 r.p.m.
6	Start speed of fan	5100	1000 - 6000 r.p.m.
7	Number of burners malfunctioning to initiate lock out signal	1	0 - 7
8	Type of heating operation requirement (01 and 04 not used by Vaillant)	02	00 = external controller 01 = external temp. sensor on boiler 02 = 0...10 V temperature led modulation 03 = 0...10 V output led kW modulation, 04 = as 02, Room thermostat function with Auto-Optimisation
9	Switching hysteresis for heating operation	9	0 - 9 °C
10	Max. temp. for heating operation which can be set under Parameter 1	85	30 - 90 °C
11	Minimum design outside temperature setting (weather compensation)	-10	-20 - 10 °C
12	Minimum flow temperature (weather compensation)	15	15 - 60 °C
13	Pre-set flow temperature during summer off period	20	16 - 61 °C
14	Outside temperature offset (weather compensated operation)	0	-5 - 5 °C
15	Drop value from feed set temperature If terminals 13 and 14 are open circuit the flow temperature will be reduced by this value.	40	0 - 40 °C
16	Flow temperature delivered at 0V input	15	0 - 50 °C
17	Flow temperature at 10V	95	51 - 127 °C
18	Boiler output (% of maximum output) at 0V	0	0 - 50 %
19	Boiler output (% of maximum output) at 10V	100	51 - 127 %
20	Minimum voltage on terminals 15 - 16 for heat demand	1	0 - 5 V

Table 7.1 Overview of the Parameter Modes

Parameter	Description	Default setting	Setting range
21	Room thermostat optimisation (not used)	15	1 - 255 sec.
22	Heating pump overrun	5	0 - 99 min
23	max. number of boiler modules for heating operation	7	1 - 7
24	Waiting time for start of the next module to fire, in central heating mode.	0.3	0.3 - 5 min
25	Maximum speed of the fan for heating operation	6000	1000 - 6000 r.p.m.
26	Type of hot water preparation	01	00= 3 way valve, 01= Cylinder charging pump 02= Inverted 3 way valve
27	Cylinder temperature hysteresis	5	5 - 15 °C
28	Over heating the feed temp. for cylinder charging degree C rise above DHW set point (for boiler flow temperature) - when direct cylinder connection via sensor is used	25	5 - 25 °C
29	Cylinder charging pump overrun	1	0.1 - 12 min
30	Maximum number of boiler modules to fire, in hot water mode.	dependent upon the size of the boiler	1 - 7
31	Waiting time for start of the next module for cylinder charging	0.3	0.3 - 5 min
32	Maximum speed of the fan for cylinder charging	6000	1000 - 6000 r.p.m.

Table 7.1 Overview of the Parameter Modes, continuation

7.1 Setting the maximum boiler flow temperature

The maximum boiler flow temperature can be set under Parameter 1 (see Table 7.1).

7.2 Setting the pump overrun time

The overrun time of the boiler circulation pump can be set under Parameter 22. The overrun time of a cylinder charging pump directly connected to the boiler can be set under Parameter 29.

7.3 Power restriction when loading the cylinder

The maximum number of active boiler modules for cylinder charging can be set under Parameter 30. Each module has a maximum output of 40 kW. This adjustment is only effective if the cylinder charging takes place via the internal boiler control system and not via an external cylinder.

7.4 Start-up behaviour

The speed at which the output is provided to meet heat demand from the heating operation and the cylinder charging can be set independently via Parameters 24 and 31. You can set the waiting time until the next module is added between 0.3 and 5 minutes.

8 Maintenance

8.1 General notes

Permanent operational readiness, safety, reliability and a long service life require inspections and maintenance work to be carried out regularly every year by a heating engineer. We recommend making a maintenance agreement.



Danger!

Inspection, maintenance and repair work should only be undertaken by an approved heating installation company.

Inspections / Maintenance work not carried out can result in damage to property and personal injury.

Only genuine Vaillant spare parts should be used for inspections, maintenance and repair work to ensure the perfect long-term working order of all functions of your Vaillant appliance and to prevent the allowed series condition from being changed.

Any spare parts which might be required are listed in the relevant current spare parts catalogues. Information can be obtained from Vaillant Customer Service Centres.

8.2 Safety instructions

Always perform the following steps prior to inspection work:



Note!

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

- Switch off the mains switch.
- Close the gas shut-off valve.
- Close the heating feed and return.



Danger!

The supply terminals of the device are under voltage even if the boiler on/off switch is off.



Caution!

All casing components are earthed. If the case need to be removed, care must be taken to ensure that the earth cable is disconnected and then reconnected after the work is completed and tested for earth continuity.

8.3 Operating hours indicator

This Mode is only accessible via the Service Code. The operating hours of the individual modules are displayed here. The number of the burner and the total burner operating hours for the corresponding module in "h" are shown flashing alternately in the display.

Display:

x.xxx 0 to 9999 hours

xx.xx 10000 to 99990 hours

xxx.x 100000 to 999900 hours

Examples of readings:

1.234 = 1.234 hours

12.34 = 12.340 hours

8.4 Chimney sweep setting (not in UK)

For the emissions measurement by the chimney sweep (not UK), and for other measurements, it may be necessary to run the boiler at maximum output for an extended period of time. For this reason there is a chimney sweep operation mode.

- Push the buttons "Mode" and "+" simultaneously and hold them down until the burners have ignited.

The boiler will now run at maximum for 15 minutes at the maximum range rated output.

8.5 Maintenance checklist

In the framework of the inspection work, check the points listed here and perform the relevant maintenance work in accordance with the following chapters if necessary.

Remove the cladding from the boiler before undertaking the maintenance. The cladding is interlocked with two screws on the left and right hand sides of the switching field. Note the sequence:
First the front hood, then the interlock cover, lastly the side components.

No.	Process	Remarks	Tools
1	Unplug the grey ProE plug on terminals 15 and 16 (Regulator 0 to 10 V).	Regulator setting must not be altered Test Mode is not influenced by the regulator	
2	Check filling pressure of heating installation	Top up if necessary (set to recommended installation pressure)	
3	Visual check for leaks in heating circuit	Check function of quick vent system	
4	Visual check of safety valve	check that the valve is installed in the correct place is the correct size and the correct setting. Ensure that the valves discharges to a safe location in accordance with BS 6644:2005	
5	Check water condensate collector, siphon and exhaust gas route for dirt contamination and leaks. Check gaskets of the condensate trough, the inspection opening and between the exhaust gas flange and the heat exchanger for damage and replace if necessary.	See: 8.5 and 8.6	
6	Switch unit on - enter Service Code	C 25	
7	Test Modes of all modules set to High (ALL = HHH)	Allow unit to warm up	
8	CO ₂ measurement (ideal value 8.6 to 9.6 Vol.-%) CO measurement (ideal value < 80 ppm)	If the values are not within this range, you need to perform a CO ₂ setting operation before the inspection can continue (see: 6.5.3)	Flue gas analyser
9	Capacity measurement	Check the gas rate.	Stop watch or clock with second hand
10	Check CVI: Unplug the ionisation cable. The burner must go out without delay.	Check all modules one after the other and then re-connect the ionisation cable after completion.	
12	Check flue gas pressure switch monitor, visual check of all tubes and measuring nipples, functional check by exhaust gas full block with exhaust gas baffle or similar equipment	At nominal capacity and full blockage the burner must go out after latest two minutes, and then thereafter continuous automatic re-starting. Ensure that the siphon is full of water to perform the test.	
13	Check siphon and condensate drain for leaks		
14	Check flue gas system for leaks	Visual check of connection and fixing fittings. No condensate should drip out of the connection points, pipes have a gradient of > 3° in the direction of the boiler.	
15	Reconnect grey ProE plug to terminals 15 and 16 (Regulator 0...10 V).		
16	Replace casing components, fully assemble boiler		
17	Unit off - switch unit on - check function of any external controls		

Table 8.1 Inspection Checklist

8 Maintenance

8.6 Cleaning the condensate water collector

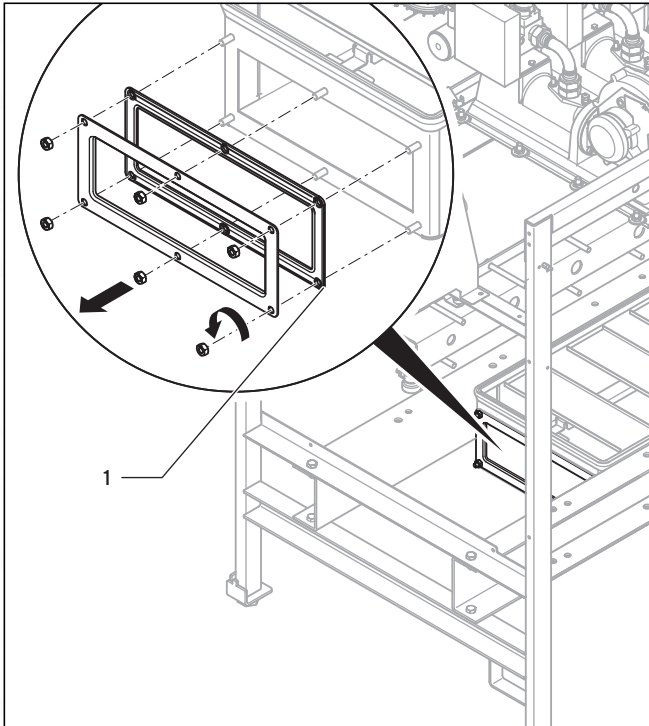


Fig. 8.1 Cleaning the condensate water collector

- Remove the front section of the boiler casing.
- Remove the cover on the inspection opening.
- Check the water condensate collector for dirt contamination and clean if required.
- Check the gasket (1) on the inspection opening for damage before re-assembly. If required, a new gasket should be fitted.

8.7 Removal and fitting of the condensate trough

Removal:

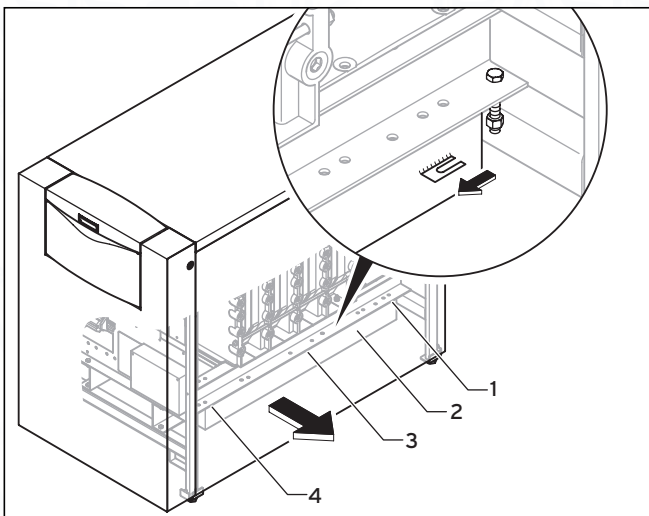


Fig. 8.2 Removing the condensate trough



Note!

Condensed water can run out when the siphon is removed.

- Pull the siphon off.
- Release the two back screws (1), but do not remove completely.
- Unscrew the two middle screws (3).
- Unscrew the front screws (4) and pull the condensate trough (2) off the rear screws by a short distance towards the front.
- Pull the condensate trough out to the side under the boiler.

Fitting:

- Apply the water condensate trough gasket to the rim of the water condensate trough.
- Make sure that the gasket is correctly located!
- Insert the rear screws a short way.
- Slide the water condensate trough under the boiler.
- Carefully lift the rear section up and hang onto the two rear screws.
- If available, slide a wooden block under the water condensate trough to help with the installation.
- Insert the rest of the screws.
- Check the correct location of the water condensate trough gasket once again.
- Tighten the screws in an offset pattern.
- Clean the siphon, place in position and fill.

8.8 Cleaning the siphon

- Remove the boiler casing.



Note!

When the drain pipe is removed condensed water will run out.

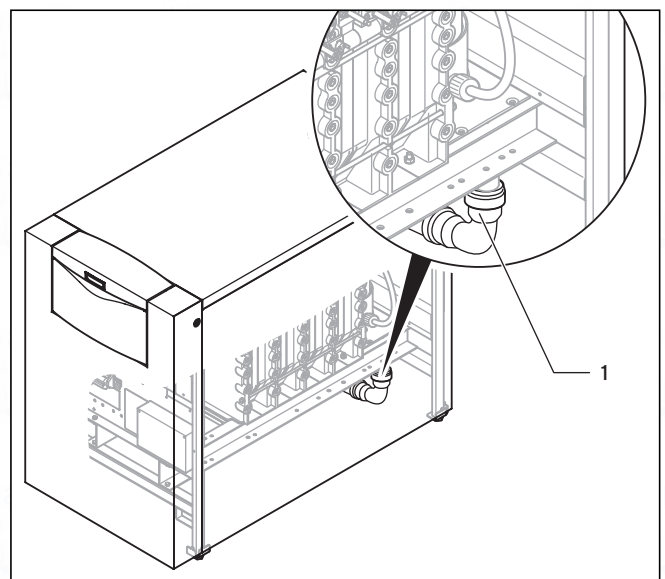


Fig. 8.3 Cleaning the siphon

- Pull the siphon off the water condensate collector.
- Clean the pipe and siphon and replace in position.
- Remove the tube from the plug.
- Unscrew the plug from the measuring opening and fill the siphon with water through this opening.
- Close the opening on the exhaust gas connection with the plug.
- Reconnect the tube to the exhaust gas pressure monitor.

8.9 Checking the flue gas pressure switch

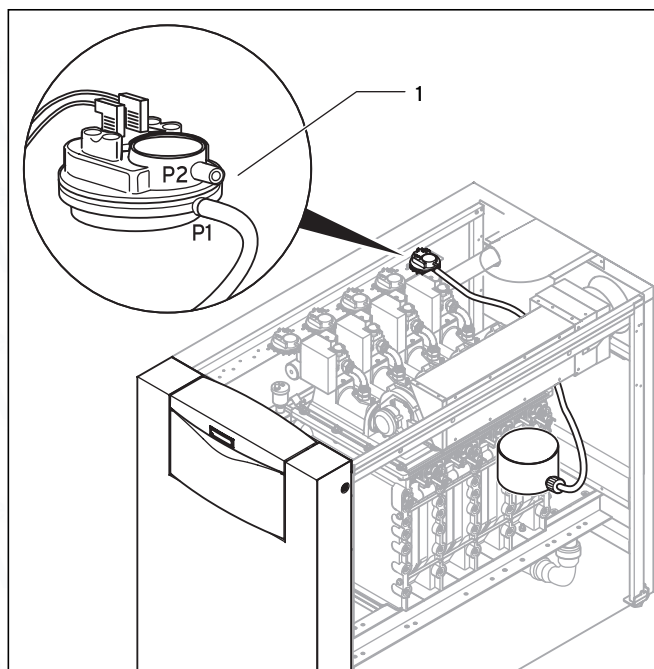


Fig. 8.4 Checking the flue gas pressure switch

- Check the tube (1) to the flue gas pressure switch for dirt contamination and correct location.



Caution!

The tube should be connected to the connection marked P1 on the flue gas pressure switch.

8.10 Cleaning the burner

If the burner needs to be cleaned, the burner ventilation unit of the relevant module must be removed.

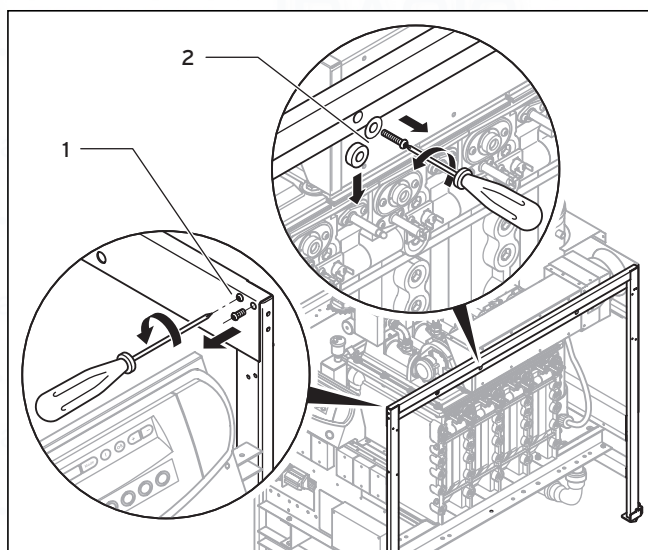


Fig. 8.5 Cleaning the burner

Proceed as follows:

- Release the front casing and remove it.
- Remove the casing cover and the right hand side panel.
- Release and remove the two screws and the spacer (2) between the air box and the upper struts of the framework.
- Release the four screws (1) at the ends of the struts.
- Lift the struts up out of the way.

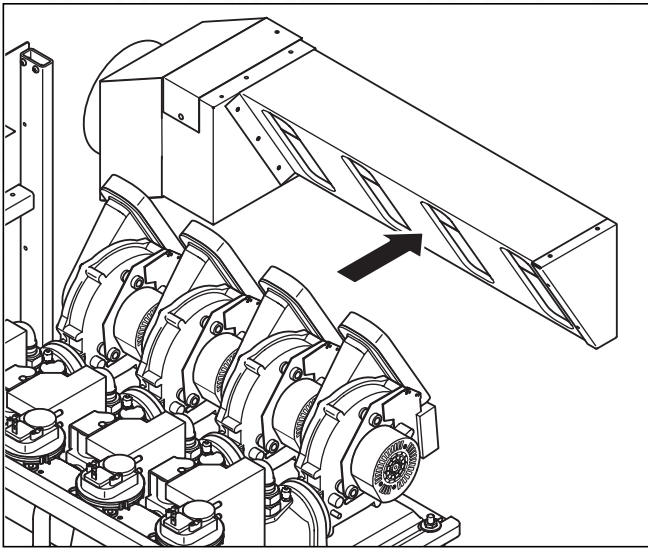


Fig. 8.6 Removing the air box

- Lift the air box off the fans.
- Release the two flange screws on the specific fan to remove the fan and pull it off the module.
- Release the tubes from the module to be removed.
- Pull the plug off the gas valve assembly and release the coupling piece of the gas valve assembly.
- Remove the burner hood and the burner.



Caution!

Take care that when cleaning the burner area does not get damaged!

- Blow out the burner with compressed air outside the installation room from the slot plate towards the metal fleece. If the burner is heavily contaminated it must be replaced.
- Check for free movement of the non-return valve flap in the burner hood.



Caution!

On each module, replace the two brown burner gaskets and the gasket between the black air inlet funnel on the fan and the air box.

- Re-assemble all the components in reverse order.



Note!

Tighten the screws on the burner hood to 12 Nm.

- Tighten the screws on the burner hood equally to approximately 12 Nm.
- Open the gas valve and check for leaks up to the gas valve assembly.
- Switch the boiler on, enter the Service Code and set all the modules to maximum output (ALL = HHH).
- Check that the burner seals are sound and retighten if necessary.
- Tighten the screws to 12 Nm if necessary.

8.11 Function check

After completion of all inspection and maintenance work, always carry out a function check as described in Section 6.6.

9 Troubleshooting

9.1 Data mode

In the data mode various parameters can be read off to allow display of the operating conditions and for fault diagnosis.

The "OK" button is used for calling up the individual parameters, and the corresponding value is displayed.

The "i" button is used to display the parameters of the individual burner modules (data block).

In the first data block (tot.) the global parameters for the entire unit are summarised. This is accessible by the user.

The remaining blocks can only be accessed after entering the Service Code. The data for the individual burner modules are given here (bur. 1 to 7).

All the parameters are summarised in the following table:

Block	Diagnosis codes	Description	Unit
tot.	1.	Boiler flow temperature	°C
	2.	Boiler return temperature	°C
	3.	No function (display - 37)	-
	4.	No function (display - 37)	-
	5.	No function	-
	6.	Pre-set flow temperature The pre-set temperature from the controller or BEMS can be checked here by the connection of a regulator instrument to the 0 - 10 V interface.	°C
	7.	Fan speed, pre-set value, push "OK button" again, actual value	mins ⁻¹
	8.	Capacity enquiry, 1 module (40 kW) = 100 % e.g. 250 % = 250 % x 40 = 100 kW	%
The following codes for the individual modules can only be called up after entering the Service Code: (bur. x shows the number of the individual module, module 1 is at the front on the switching rail, the number of modules depends upon the capacity of the boiler)			
bur.1	1.	Local flow temperature (left-hand NTC)	°C
	2.	Local flow temperature (right-hand NTC)	°C
	3.	Pre-set fan speed of the individual module	mins ⁻¹
	4.	Actual fan speed of the individual module	mins ⁻¹
bur.2	1.	...	
	2.	...	
	3.	...	
	4.	...	

Table 9.1 Overview of the Parameter Mode

9.2 General notes - no read-out in display

If the boiler does not start, and there is no display in the read-out of the switching field, the following points should be checked:

- Electrical connection 230 V/50 Hz at the connection plug.
- Main switch turned on?
- Check all fuses and that the polarity of the mains is correct.



Danger!

The fuse 2 AF is at 230 V. The boiler will have to be isolated for checking and replacement.

- Ribbon cable between display and central boiler control.

9.3 Boiler circulation pump does not run

- If the boiler circulation pump fails to start, check the fuse above the pump connection terminals.

If the fuse is OK, check whether

- the red LED lights up on the relay,
- the relay contacts are OK,
- and these are correctly located on the base plinth.

If a modulating high-efficiency pump is used, you will need to check whether this is correctly wired. You can find details on this in Chapter 5.10.4 "Connection of electrical accessories".

9 Troubleshooting

9.4 Boiler does not react to regulator

9.4.1 Boiler does not react to 0...10-V-heat demand (controller/BEMS / control panel)

- First check whether the remote controller is designed to control the appliance modulation by temperature or by output (kW) using the 0...10V signal.

You must set the Parameter 08 correspondingly to

- 02 (Modulation by temperature)
- 03 (modulation by output (kW))

Make sure that there is a bridge between 13 and 14 on the terminal field of the boiler. In addition, check that a 0 - 10-V-signal is being provided by the external regulator. Note the polarity as the controllers are all polarity conscious.

On the boiler, in "Data Mode", you can check the pre-set feed value under point 6 and the boiler capacity under point 8. The displayed boiler capacity must be divided by the number of modules in order to be able to compare the value with the external controller.

9.4.2 Boiler does not react to 2 point regulation

- Check on the System ProE whether the switch contact between terminals 13 and 14 has been closed by the external regulator.

Note!

If a bridge is applied between terminals 13 and 14 and the ecoCRAFT starts up, the external regulator must be checked.

- Check the setting of the Parameter 08 to the regulator process. The value 00 is required in this location (On/ Off - thermostat).

9.5 Boiler does not react to hot water priority

- Check the settings of the controller.
- Check the charging pump has voltage and spins freely.
- Check whether the connection C1/C2 is secure on the 7-8-9 coupler if required.

Special solution

Check wiring:

	Connection rail ecoCRAFT
C1/C2	Cylinder thermostat terminals 21, 22
7-8-9	
Cylinder sensor	
Charging pump	

Table 9.2 Wiring special solution

- Check the parameters.

Further information can be obtained from Chapter 8 "Hydraulic and Electrical Schematics".

9.6 Diagnostic system

A malfunction which locks the boiler module is indicated by a flashing point after the first character in the display, in addition, the red fault lamp lights up. The other 3 characters indicate the type of malfunction. Malfunctions which are not specific to an individual module, but are applicable to the entire boiler, are indicated by the letters "E" in front of the number.

General electronic malfunctions which lead to the replacement of the central module control system are described in the following section.

9.6.1 Lock out conditions

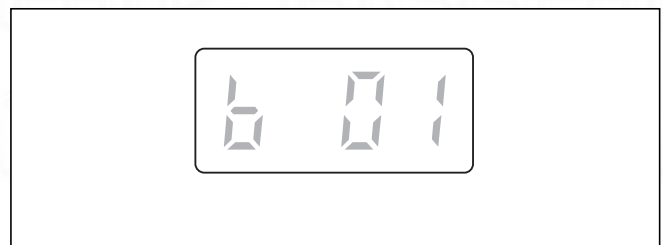


Fig. 9.1 Example Display of multifunction displays

	Meaning	Fault code
B	Burner faults	
	Burner module 1 is in fault condition	b 01
	Burner module 2 is in fault condition	b 02
	...	...
	Burner module 7 is in fault condition	b 07
A	All modules in fault condition	E 92

Table 9.3 Lock out conditions

9.6.2 Blocking errors

Fault code	Meaning
L 11	Local NTC 1 - Boiler return > 40 K
L 12	Local NTC 2 - Boiler return > 40 K
...	...
L 81	Local NTC 8 - Boiler return > 40 K Possible cause: Water-flow in boiler circuit too low. Check: Boiler circulation pump, deposits in boiler, air in the sytem, pressure losses in boiler circuit
L 12	Local NTC 1 > 100° C:
L 22	Local NTC 2 > 100° C:
...	...
L 82	Local NTC 8 > 100° C: Possible cause: Post heating Check: Boiler circulation pump overrun (Parameter 22), Checking the maximum boiler temperature (Parameter 1)
L 13	Local NTC 1 is open circuit:
L 23	Local NTC 2 is open circuit:
...	...
L 83	Local NTC 8 is open circuit: Possible cause: Cable faulty, not correctly contacted, NTC faulty Check: Cabling, check NTC and replace if necessary
L 14	Local NTC 1 is short-circuited:
L 24	Local NTC 2 is short-circuited:
...	...
L 84	Local NTC 8 is short-circuited: Possible cause: Cable faulty, plug not OK, dampness, NTC faulty Check: Cabling, check NTC and replace if necessary

Table 9.4 Blocking errors, Section 1

Fault code	Meaning
E 05	Communication fault on the central module control replace central module control
E 11	Communication fault on the boiler bus (X7) Possible cause: Ribbon cable faulty or incorrectly connected, central module control faulty Check: Location of the ribbon cable, replace central module control
E 15	Fault on the central module control replace central module control
E 18	Boiler flow in excess of 95° C: Possible cause: Post-heating, heat demand without consumption (e.g. faulty cylinder charging pump) Check: Boiler circulation pump overrun (Parameter 22), Checking the maximum boiler temperature (Parameter 1) No heat consumption by: faulty pumps, mixers, sensors or logic errors in regulator programming
E 19	Boiler flow in excess of 95° C: Possible cause: Post-heating, heat demand without water flow (e.g. faulty cylinder charging pump) Check: Boiler circulation pump overrun (Parameter 22), Checking the maximum boiler temperature (Parameter 1) No water flow by: faulty pumps, mixers, sensors or logic errors in regulator programming
E 26	Interruption of flue gas pressure switch, water pressure switch or switch in the safety chain (terminals 23/24). Is the installation pressure OK? (above minimum set pressure) Check: the individual components by "bridging" the NC contacts Any device connected in series to the external safety circuit
E 31	Boiler flow sensor is short-circuited: Possible cause: Cable faulty, plug not OK, dampness, NTC faulty Check: Cabling, check NTC and replace if necessary

Table 9.5 Blocking errors, Section 2

9 Troubleshooting

Fault code	Meaning
E 32	Boiler return sensor is short-circuited: Possible cause: Cable faulty, plug not OK, dampness, NTC faulty Check: Cabling, check NTC and replace if necessary
E 36	Boiler flow sensor is interrupted: Possible cause: Cable faulty, not correctly contacted, NTC faulty Check: Cabling, check NTC and replace if necessary
E 37	Boiler return sensor is interrupted: Possible cause: Cable faulty, not correctly contacted, NTC faulty Check: Cabling, check NTC and replace if necessary
E 43	EEPROM error (circuit board error) replace central module control
E 60	Parameters outside the permissible setting range Possible cause: Error in initialisation of the central module control (factory fault) Solution: replace central module control
E 90	Regulator interface (AM4) is not recognised: Possible cause: Cable faulty, incorrectly contacted Check: Ribbon cable (X7), power supply 230 V (X1), replace regulator interface
E 91	Extension board for central boiler control is not recognised: Possible cause: DIP switch not set correctly e.g. after board change central module control is incorrectly parametrised (Parameters 4, 23, 30), Cable fault, incorrectly contacted Check: Parameters and DIP switch, Ribbon cable (X7), Power supply 230 V (X1), replace extension board if necessary

Table 9.6 Blocking errors, Section 3

Fault code	Meaning
E 92	All modules in fault condition see table of locking malfunction switch-off
E 101	Set number of modules does not agree with the recognised number: Possible cause: The number of local NTCs does not agree with the number of modules. (nModules = nNTCs-1), NTC sensor is interrupted Check: Parameter 4 (number of modules), if E101 appears with error signal L..., proceed as per error search L....

Table 9.7 Blocking errors, Section 4

9.7 Measured values of the components (summary)

9.7.1 Pressure monitor

The switching points of the air inlet pressure switch:

123 Pa: ON

100 Pa: OFF

(All switching points refer to the installation location).

The switching point of the flue gas pressure switch:

> 400 Pa OFF, removes the heat requirement

(interrupts the safety chain)

< 325 Pa ON

The switching points of the water pressure switch

> 0.6 Pa OFF

< 0.2 Pa ON

9.7.2 NTC

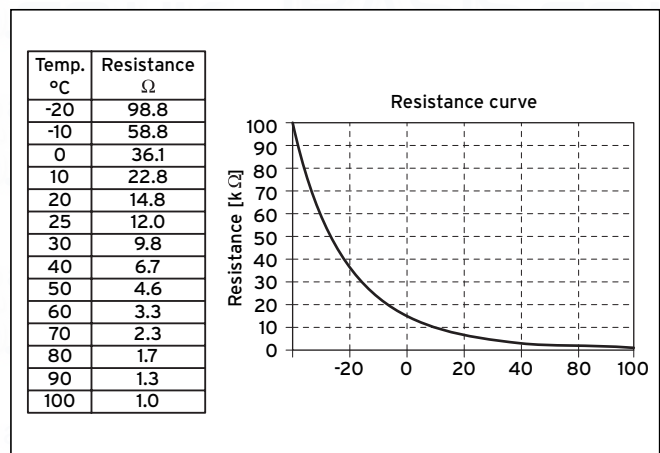


Fig. 9.2 Resistance curve of NTC

9.7.3 Ionisation current

The ionisation current is at least 1.5 μ A.

9.8 Error search trees

9.8.1 Inadequate heat production

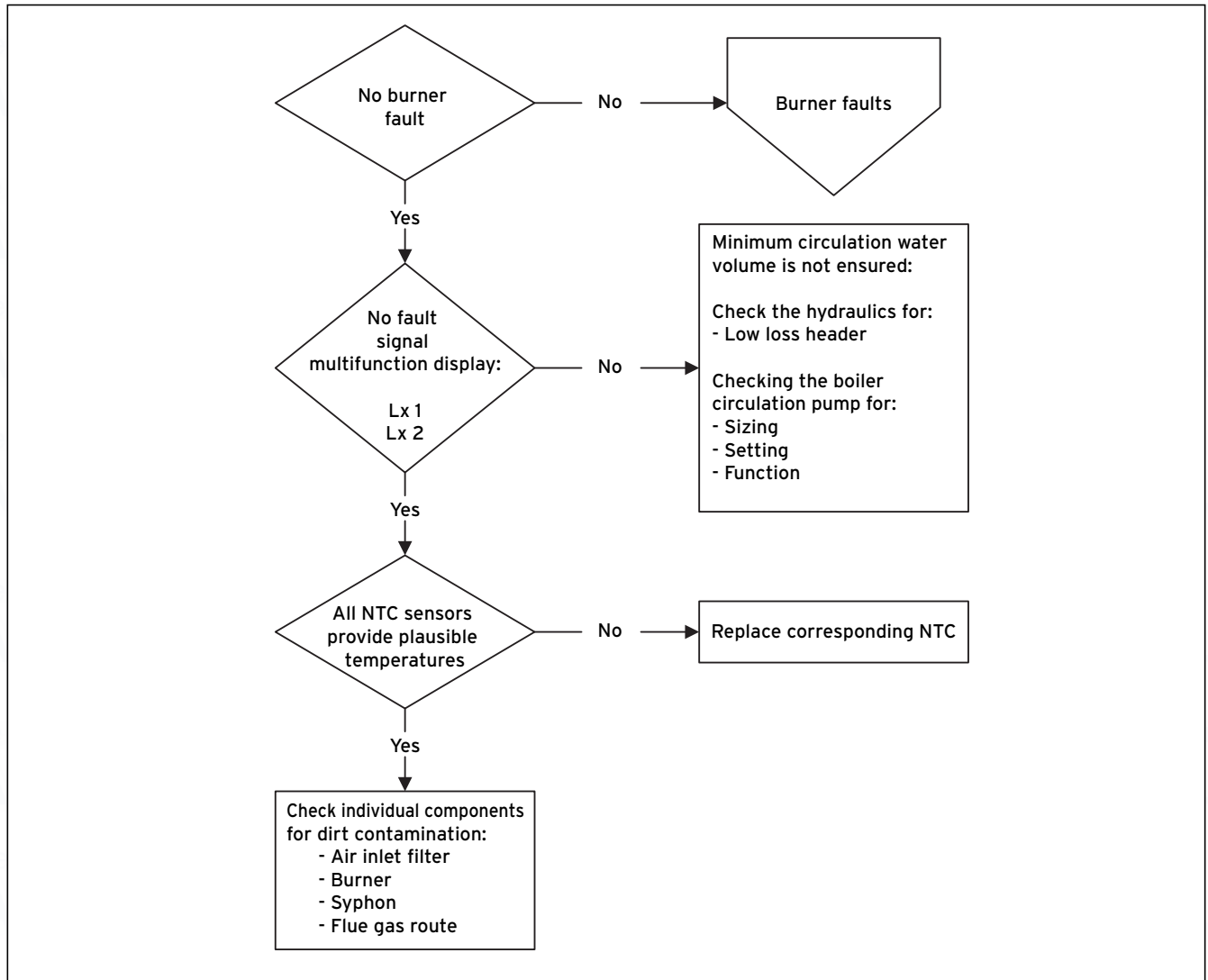


Fig. 9.3 Error access tree

9.8.2 Burner malfunctions (b 01...b 07)

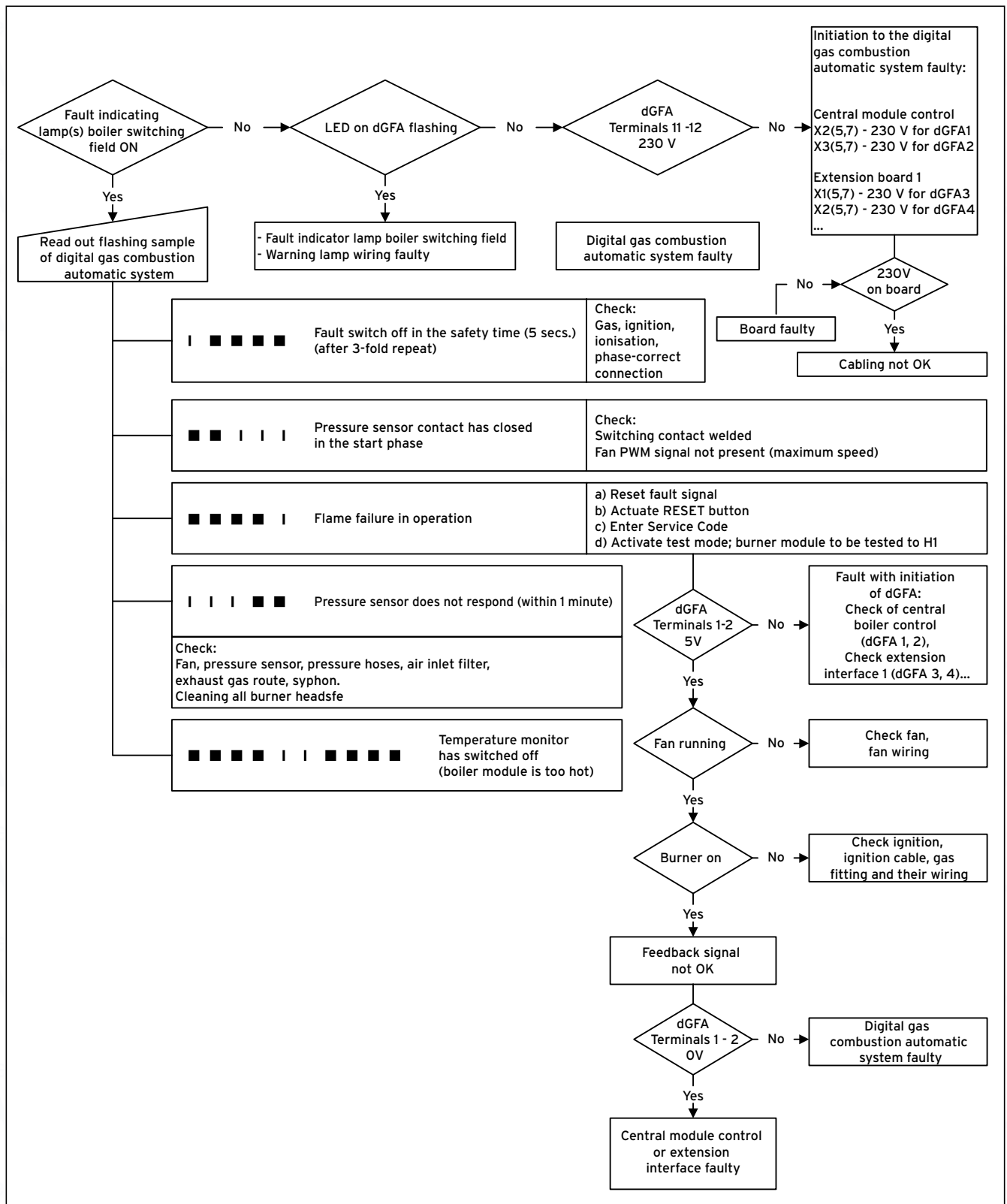


Fig. 9.4 Error access tree

9.8.3 No heat in the heating circuits

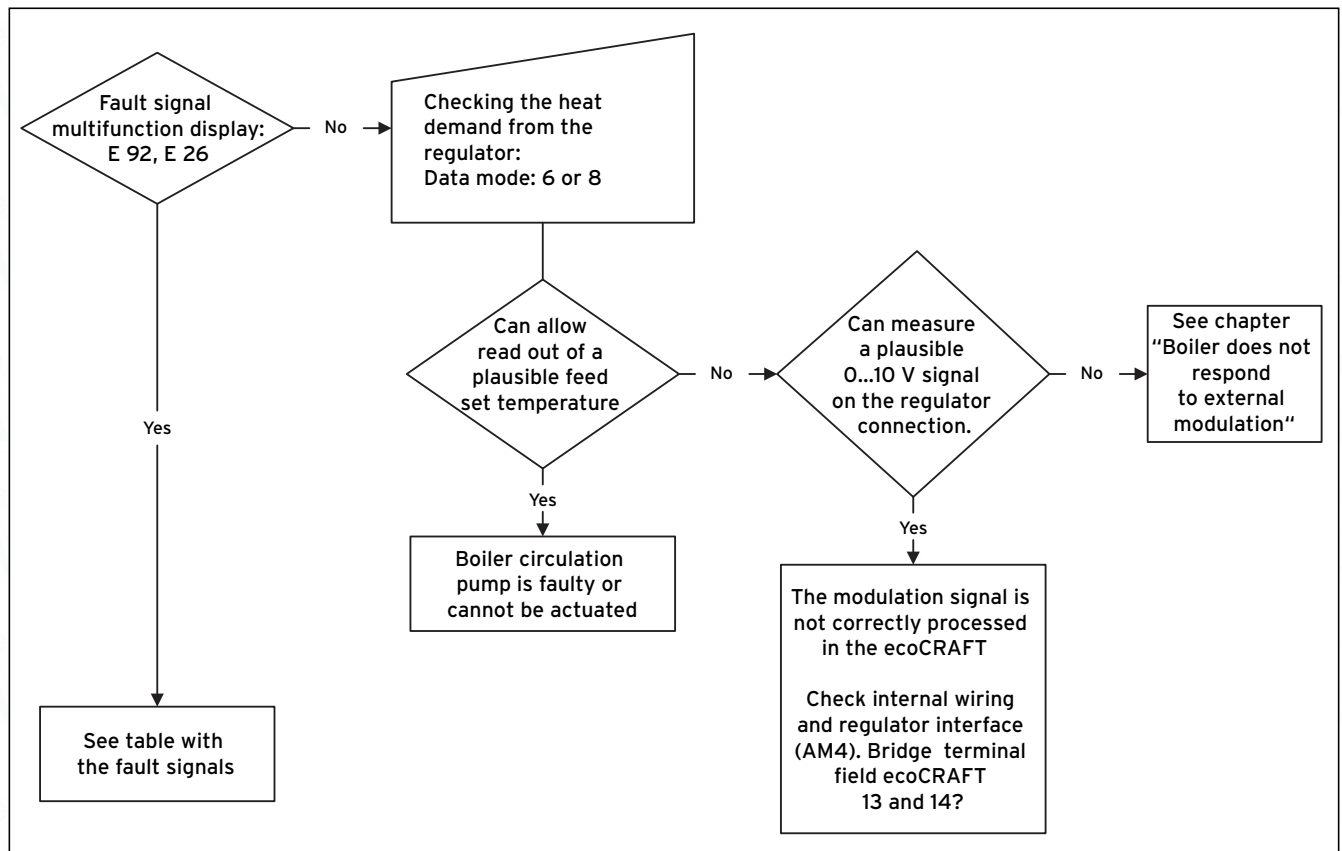


Fig. 9.5 Error access tree

9 Troubleshooting

10 Vaillant service

11 Recycling and disposal

9.9 Removing malfunctions in the boiler

Manual - without Service Code:

The individual module fault should firstly be rectified.

- To do this, push the large red module fault indicator underneath the operator field.

Then remove the fault on the unit electronics.

- To do this, push the reset button next to the display.

If the fault cannot be removed in this way, see description "Semi-automatic with Service Code".

Semi-automatic with Service Code:

- Select the mode "RST" by pushing the "Mode" button. Start this mode by pushing the "OK" button. The read-out "Hold" appears in the display.

All automatic combustion systems are initiated for 30 seconds. "RST" and "CVI" appear in the display.

All automatic combustion system faults can be reset during this period.

- To do this, push the red illuminated buttons.

After 30 seconds the control system automatically resets and thus also clears the faults.

10 Vaillant service

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

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Training

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Fax 01634 292354
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Commercial Service

Telephone 0870 850 3072
Mon - Fri 8.30 - 17.30

Fax 01773 525 946
email aftersales@vaillant.co.uk

11 Recycling and disposal

Recycling and disposal are already taken into account during the development of all Vaillant products. Vaillant works standards make strict demands. The recyclability, demountability and separability of materials and components are taken into account for the selection of materials in the same way as environmental hazards and health risks during recycling and the disposal of unavoidable remains of unusable residue.

11.1 Appliance

The Vaillant boiler consists of 92 % metallic materials which can be melted down again at iron and steel works and therefore can be recycled almost any number of times.

The EPS (Styropor)® EPP used to isolate the storage and other components is recyclable and CFC-free.

The plastic materials used are labelled, and thus are already prepared for sorting for subsequent recycling.

11.2 Packaging

Vaillant has reduced the transport packaging of the appliances to a minimum. The strict selection of packaging materials is based on their recyclability. The high-quality cardboard types are secondary raw materials which have been in demand in the cardboard and paper industry for a long time.

EPS and EPP (polystyrene)® are used to protect the products during transport. EPS is recyclable and CFC-free.

Even the films and tightening bands are made of recyclable plastic.

12 Technical data

Technical data	Unit	VK 806/2	VK 1206/2	VK 1606/2	VK 2006/2	VK 2406/2	VK 2806/2
Nominal heat capacity range							
at 40/30 °C	kW	12.5 - 83.5	12.5 - 125.0	12.5 - 167.0	12.5 - 209.0	12.5 - 251.0	12.5 - 292.0
at 60/40 °C	kW	12.0 - 80.0	12.0 - 120.0	12.0 - 160.0	12.0 - 200.0	12.0 - 240.0	12.0 - 280.0
at 80/60 °C	kW	11.6 - 77.4	11.6 - 116.6	11.6 - 155.9	11.6 - 195.5	11.6 - 235.4	11.6 - 275.5
Nominal heat load range	kW	12.0 - 80.0	12.0 - 120.0	12.0 - 160.0	12.0 - 200.0	12.0 - 240.0	12.0 - 280.0
Part L2 efficiency (net) Part Load (30%)	%	108.4	108.4	108.4	108.4	108.4	108.4
Part L2 efficiency (net) Full Load	%	96.8	97.2	97.4	97.8	98.1	98.4
Exhaust gas values:							
Exhaust gas temperature in heating mode	°C	35	35	35	35	35	35
Max. exhaust gas temperature	°C	80	80	80	80	80	80
Max. exhaust gas mass flow	kg/h	146	218	303	336	404	470
CO ₂ content (max. heat load)	%	9.0	9.0	9.0	9.0	9.0	9.0
NO _x class	-	5	5	5	5	5	5
NO _x -Emission	mg/kWh	< 60	< 60	< 60	< 60	< 60	< 60
Fan over pressure	Pa	90	90	90	70	70	70
Condensed water volume (40/30 °C), ca.	l/h	13	20	27	34	40	47
pH value, ca.	-	3.4	3.4	3.4	3.4	3.4	3.4
Water side resistance at ΔT = 20 K	mbar	106	117	125	132	138	143
Max flow temperature (adjustable)	°C	90.0	90.0	90.0	90.0	90.0	90.0
Maximum primary operating	bar	4.0	4.0	4.0	4.0	4.0	4.0
Connection values:							
Natural gas G 20	m ³ /h	8.5	12.7	16.9	21.2	25.4	29.6
Gas connection pressure:							
Suitable for gas supplied at:	mbar	20	20	20	20	20	20
Electrical connection	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50
Nominal electrical consumption	W	110	150	200	240	290	330
Electrical power consumption (Standby)	W	35	40	45	50	55	60
Connections:							
Feed and return	Thread	R 2"	R 2"	R 2"	R 2"	R 2"	R 2"
Gas connection	Thread	R 1 1/2"	R 1 1/2"	R 1 1/2"	R 1 1/2"	R 1 1/2"	R 1 1/2"
Condensed water return flow	mm Ø	40	40	40	40	40	40
Draining	Thread	R 3/4"	R 3/4"	R 3/4"	R 3/4"	R 3/4"	R 3/4"
Flue gas connection	mm Ø	150	150	150	200	200	200
Device dimensions:							
Height	mm	1091	1091	1091	1091	1091	1091
Width	mm	695	695	695	695	695	695
Depth	mm	995	995	1325	1325	1605	1605
Weight	kg	166	193	249	288	334	365
Water content	kg	10	14	18	22	27	31
Total weight	kg	176	207	267	310	361	396
Category	-	I _{2H}					
Electrical protection rating	-	IP20					

Table 12.1 Technical data







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