

For the competent person

Installation and maintenance instructions



ecoTEC exclusive

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Publisher/manufacturer

Vaillant GmbH

Berghauser Str. 40 ■ D-42859 Remscheid
Tel. +49 21 91 18-0 ■ Fax +49 21 91 18-2810
info@vaillant.de ■ www.vaillant.de



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1 Safety

1 Safety

1.1 Action-related warnings

Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

Warning symbols and signal words

**Danger!**

Imminent danger to life or risk of severe personal injury

**Danger!**

Risk of death from electric shock

**Warning.**

Risk of minor personal injury

**Caution.**

Risk of material or environmental damage

1.2 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The product is intended as a heat generator for closed heating installations and for hot water generation.

Depending on the gas-fired boiler type, the products referred to in these instructions must only be installed and operated in conjunction with the air/flue pipe accessories listed in the other applicable documents.

Intended use includes the following:

- observance of accompanying operating, installation and servicing instructions for the product and any other system components
- installing and fitting the product in accordance with the product and system approval
- compliance with all inspection and maintenance conditions listed in the instructions.

Intended use also covers installation in accordance with the IP class.

Any other use that is not specified in these instructions, or use beyond that specified in

this document shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

Caution.

Improper use of any kind is prohibited.

1.3 General safety information

1.3.1 Risk caused by inadequate qualifications

The following work must only be carried out by competent persons who are sufficiently qualified to do so:

- Installation
 - Disassembly
 - Installation
 - Start-up
 - Maintenance
 - Repair
 - Decommissioning
- ▶ Observe all instructions that are included with the product.
 - ▶ Proceed in accordance with the current state of technology.
 - ▶ Observe all applicable directives, standards, laws and other regulations.

1.3.2 Risk of death from escaping gas

What to do if you smell gas in the building:

- ▶ Avoid rooms that smell of gas.
- ▶ If possible, open doors and windows fully and ensure adequate ventilation.
- ▶ Do not use naked flames (e.g. lighters, matches).
- ▶ Do not smoke.
- ▶ Do not use any electrical switches, mains plugs, doorbells, telephones or other communication systems in the building.
- ▶ If it is safe to do so, close the emergency control valve or the main isolator.
- ▶ If possible, close the gas isolator cock on the product.
- ▶ Warn other occupants in the building by yelling or banging on doors or walls.
- ▶ Leave the building immediately and ensure that others do not enter the building.
- ▶ Notify the gas supply company or the National Grid +44 (0) 800 111999 by tele-



phone once you are outside of the building.

1.3.3 Risk of death from leaks if the product is installed below ground level

Liquid gas accumulates at floor level. If the product is installed below ground level, liquid gas may accumulate at floor level if there are any leaks. In this case, there is a risk of explosion.

- ▶ Make sure that liquid gas cannot escape from the product or the gas line under any circumstance.

1.3.4 Risk of death due to blocked or leaking flue gas routes

Installation errors, damage, tampering, unauthorised installation sites or similar can cause flue gas to escape and result in a risk of poisoning.

What to do if you smell flue gas in the property:

- ▶ Open all accessible doors and windows fully to provide ventilation.
- ▶ Switch off the product.
- ▶ Check the flue gas routes in the product and the flue gas diversions.

1.3.5 Risk of poisoning and burns caused by escaping hot flue gases

- ▶ Only operate the product if the air/flue pipe has been completely installed.
- ▶ With the exception of short periods for testing purposes, only operate the product when the front casing is installed and closed.

1.3.6 Risk of death due to explosive and flammable materials

- ▶ Do not use or store explosive or flammable materials (e.g. petrol, paper, paint) in the installation room of the product.

1.3.7 Risk of death due to cabinet-type casing

Cabinet-type casing can give rise to dangerous situations when used on a product which is operated with an open flue.

- ▶ Ensure that the product is supplied with sufficient combustion air.

1.3.8 Risk of poisoning caused by insufficient supply of combustion air

Conditions: Open-flued operation

- ▶ Ensure that the air supply to the product's installation room is permanently unobstructed and sufficient in accordance with the relevant ventilation requirements.

1.3.9 Risk of death due to lack of safety devices

The schematic drawings included in this document do not show all safety devices required for correct installation.

- ▶ Install the necessary safety devices in the system.
- ▶ Observe the applicable national and international laws, standards and guidelines.

1.3.10 Risk of death from electric shock

There is a risk of death from electric shock if you touch live components.

Before commencing work on the product:

- ▶ Disconnect the product from the power supply by switching off all power supplies (electrical partition with a contact opening of at least 3 mm, e.g. fuse or line protection switch).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the capacitors have discharged.
- ▶ Check that there is no voltage.

1.3.11 Risk of being burned or scalded by hot components

- ▶ Only carry out work on these components once they have cooled down.

1.3.12 Risk of death from escaping flue gas

If you operate the product with an empty condensate trap, flue gas may escape into the room air.

- ▶ In order to operate the product, ensure that the condensate trap is always full.



1 Safety



1.3.13 Risk of material damage caused by using an unsuitable tool

- ▶ Use the correct tool to tighten or loosen screw connections.

1.3.14 Risk of material damage caused by frost

- ▶ Do not install the product in rooms prone to frost.

1.3.15 Risk of corrosion damage due to unsuitable combustion and room air

Sprays, solvents, chlorinated cleaning agents, paint, adhesives, ammonia compounds, dust or similar substances may lead to corrosion on the product and in the air/flue pipe.

- ▶ Ensure that the supply of combustion air is always free of fluorine, chlorine, sulphur, dust, etc.
- ▶ Ensure that no chemical substances are stored at the installation site.
- ▶ If you are installing the product in hairdressing salons, painter's or joiner's workshops, cleaning businesses or similar locations, choose a separate installation room in which the room air is technically free of chemical substances.

1.3.16 Risk of damage to the flexible gas pipe

The corrugated gas pipe may become damaged if weight is placed on it.

- ▶ Do not suspend the compact thermal module on the flexible gas pipe, for example during maintenance work.

1.4 Regulations (directives, laws, standards)

1.4.1 Related documents

Installation and maintenance of the boiler must only be performed by a competent person with valid accreditation from the Health and Safety Executive in accordance with the "Gas Safety (Installation and Use) Regulations 1998" (hereinafter abbreviated to "competent person" or "heating specialist company"). The existing regulations, rules and guidelines must be observed when doing so.

Any special requirements of Local Authorities, gas undertakings or insurers must be complied with. The competent person is also responsible for inspection, maintenance and repairs to the boiler, and for checking gas volume setting and flue gas analysis.

Installers shall carry out a full site risk assessment and put into place all necessary steps and procedures to comply with Health and safety at work act and ensure safety of themselves and others with regard to manual handling and working at height requirements.

During the appliance installation (and any subsequent work, such as, the replacement of major parts) it will be necessary to employ caution. All installers and operatives involved from unloading the appliance until it is fully mounted on the wall in its final installed location must exercise full duty of care for themselves and others with regard to safety. When lifting and handling this appliance, operatives should employ assistance. In certain situations it may be necessary to use mechanical handling aids. Take care to avoid trip hazards, slippery or wet surfaces.

Employers and installers should refer to the HSE web site for full advice and manual handling assessment charts (MAC) tool.

In addition where no specific instructions are given then reference shall be made, but not restricted to, all applicable and relevant British Standards and codes of practice such as the following:

- Gas Safety (Installation and Use) regulations.
- All current Building Regulations for England, Northern Ireland and Wales, (as amended). This includes Approved Codes of Practice and approved documents and guidance for building regulations. (A to P and 7)
- The Building Standards, Scotland, and any requirements determined by the local authorities within.
- The Health and safety at work act
- COSHH Control of Substances Hazardous to Health.
- BS 7671 Requirements for electrical installations. IEE Wiring Regulations





- The Electricity at Work Regulations.
- The Water supply (water fittings) regulations 1999.
- Water bylaws 2000 (Scotland)
- BS 5854 Code of practice for flues and flue structures in buildings.
- BS EN 12828 Design of water-based heating systems.
- BS EN 806 Parts 1 - 5.
- BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
- BS 6880 Code of practice for low temperature heating systems with outputs above 45 kW, Part 1, 2, and 3.
- BS 6891 Installation of low pressure gas pipe work of up to 35mm in domestic premises.
- BS 4814 Specification for: Expansion vessels using an internal diaphragm, for sealed hot water and heating systems.
- BS 7074 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems., Part 1 and 2.
- BS 7593 Code of practice for treatment of water in domestic hot water central heating systems.
- BS 12831 Heating systems in buildings. Method for calculating design heat load.
- BS EN 13831 Closed expansion vessels with built in diaphragm.
- EN 14336 Heating systems in buildings. Installation and commissioning of water based heating systems.
- BS 5440 – 1 Installation of flues and ventilation for gas appliances of rated input not exceeding 70kW*
- BS 5440 – 2 Flueing and ventilation for gas appliances of rated input not exceeding 70kW*
- * 1st 2nd and 3rd family gases.
- BS 5449 Forced circulation hot water systems up to 45kW.
- BS EN 6798 Installation & maintenance of gas fired hot water boilers of rated input not exceeding 70kW net.
- BS 5482 - Part 1 Domestic butane and propane gas burning installations



Institute of Gas Engineers Publications:

- IGE/UP/1B (Edition 2) Tightness testing and direct purging of small natural gas installations.
- IGE/UP/ 7 (Edition 2) Gas in timber and light steel framed buildings.

Additionally for gas boilers systems with outputs greater than 70KW.

- BS 6644 Installation of gas boilers between 60 kW and 2 MW (2nd and 3rd family gases)
- BS 5449
- IGE/UP/1 (Edition 2) Strength testing, tightness testing and direct purging of industrial and commercial gas installations.
- IGE/UP/1A (Edition 2) Strength testing, tightness testing and direct 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.
- The installation must comply with the current version of the Clean Air Act.

1.4.2 Related documents

- I.S. 813 Domestic Gas Installations
- I.S. 820 Non Domestic Gas Installations
- Building Control Act 2007
- ETCI Regulations for installing electrical systems

2 Notes on the documentation

2 Notes on the documentation

2.1 Observing other applicable documents

- ▶ You must observe all the operating and installation instructions included with the system components.

2.2 Storing documents

- ▶ Pass these instructions and all other applicable documents on to the system operator.

2.3 Applicability of the instructions

These instructions apply only to:

Product article number

	Article number	Gas Council Number
835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	0010017064	47-044-66
843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive	0010017065	47-044-67

2.4 Benchmark

Vaillant is a licensed member of the Benchmark Scheme. Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by a competent person approved at the time by the Health and Safety Executive and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the Scheme.

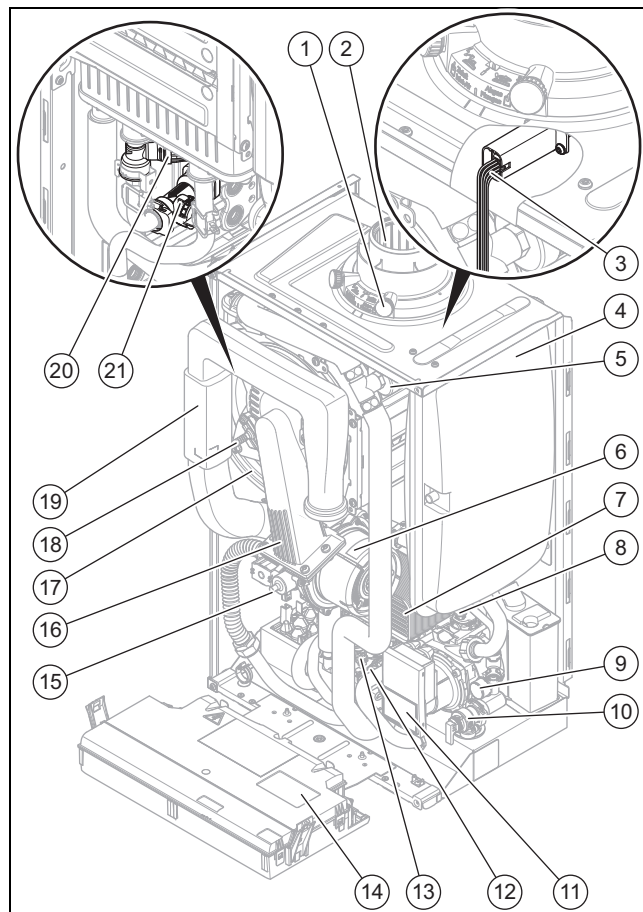
Benchmark is managed and promoted by the Heating and Hotwater Industry Council.



For more information visit www.centralheating.co.uk

3 Product description

3.1 Product design






- | | | | |
|----|------------------------------|----|------------------------|
| 1 | Flue gas measuring stub pipe | 11 | High-efficiency pump |
| 2 | Connection for the flue pipe | 12 | Diverter valve |
| 3 | All-gas sensor | 13 | Bypass valve |
| 4 | Expansion vessel | 14 | Electronics box |
| 5 | Water hammer arrester | 15 | Gas valve |
| 6 | Fan | 16 | Compact thermal module |
| 7 | Secondary heat exchanger | 17 | Heat exchanger |
| 8 | Automatic air vent | 18 | Ignition electrode |
| 9 | Pressure gauge | 19 | Air intake pipe |
| 10 | Expansion relief valve | 20 | Water pressure sensor |
| | | 21 | Volume flow sensor |

3.2 Information on the identification plate

The identification plate is mounted on the underside of the product in the factory.

Information on the identification plate	Meaning
	Read the instructions.
VU(W) ...	Type designation
..6/5-7	Calorific value power/product generation equipment
ecoTEC exclusive	Product description

Information on the identification plate	Meaning
2H, G20 – 20 mbar (2.0 kPa)	Gas group and gas connection pressure as set at the factory
ww/yyyy	Date of manufacture: Week/year
Cat.	Approved unit categories
Types	Approved gas-fired units
PMS	Permissible total overpressure in heating mode
PMW	Permissible total overpressure during hot water generation
T _{max.}	Max. flow temperature
ED 92/42	Current efficiency directive fulfilled with 4* rating
V Hz	Mains voltage and mains frequency
W	Max. electrical power consumption
IP	Level of protection
	Heating mode
	Hot water generation
P	Nominal heat output range
Q	Heat input range
D	Nominal hot water draw-off rate
	Bar code with serial number, 7th to 16th digit = product article number

3.3 CE label



The CE label shows that the products comply with the basic requirements of the applicable directives as stated on the identification plate.

The declaration of conformity can be viewed at the manufacturer's site.

3.4 Energy Saving Trust Endorsed Products



Only the most energy efficient products can carry the 'Energy Saving Trust Endorsed Product' brandmark making it easy for consumers to choose products that have met strict energy performance criteria.

Available for: Boilers, Heating controls and chemical inhibitors, the Energy Saving Trust endorsed product brandmark gives consumers confidence that a product will cost less to run, help lower energy bills and reduce carbon emissions.

About the Energy Saving Trust

Energy Saving Trust is an independent and impartial organisation that provides trusted energy saving advice to empower millions of people to lead affordable, low energy lifestyles. For more information visit energysavingtrust.org.uk

3.5 Compartment Ventilation

The boilers are very high efficiency appliances.

As a consequence the heat loss from the appliance casing during operation is very low.

Compartment ventilation is not required as the products are only certified, and can only be fitted with a concentric flue system.

4 Installation

4.1 Unpacking the product

1. Remove the product from its box.
2. Remove the protective film from all parts of the product.

4.2 Scope of delivery

Number	Description
1	Heat generator
1	Installation kit containing the following:
1	- Product retainer
1	- Expansion relief valve connector
1	- Gas isolator cock
1	- Gas connector, dia. 20 mm
1	- Hot water connector
1	- Cold water connector
3	- Service valve
2	- Heating flow/return connection pipe
3	- Bag with small parts
1	Installation template
1	Enclosed documentation

4.3 Transporting the product

4.3.1 General

- ▶ Hold the load as close as possible to your body. Do not twist your body – instead, reposition your feet.
- ▶ If the unit is being lifted by two persons, ensure your movements are coordinated during lifting.
- ▶ Avoid bending your upper body – do not lean forwards or to the side.
- ▶ Wear appropriate cut-resistant and non-slip gloves to protect yourself against sharp edges and maintain a safe and secure grip.
- ▶ If required, get somebody to assist you in this.

4.3.2 Unloading the box from the delivery van

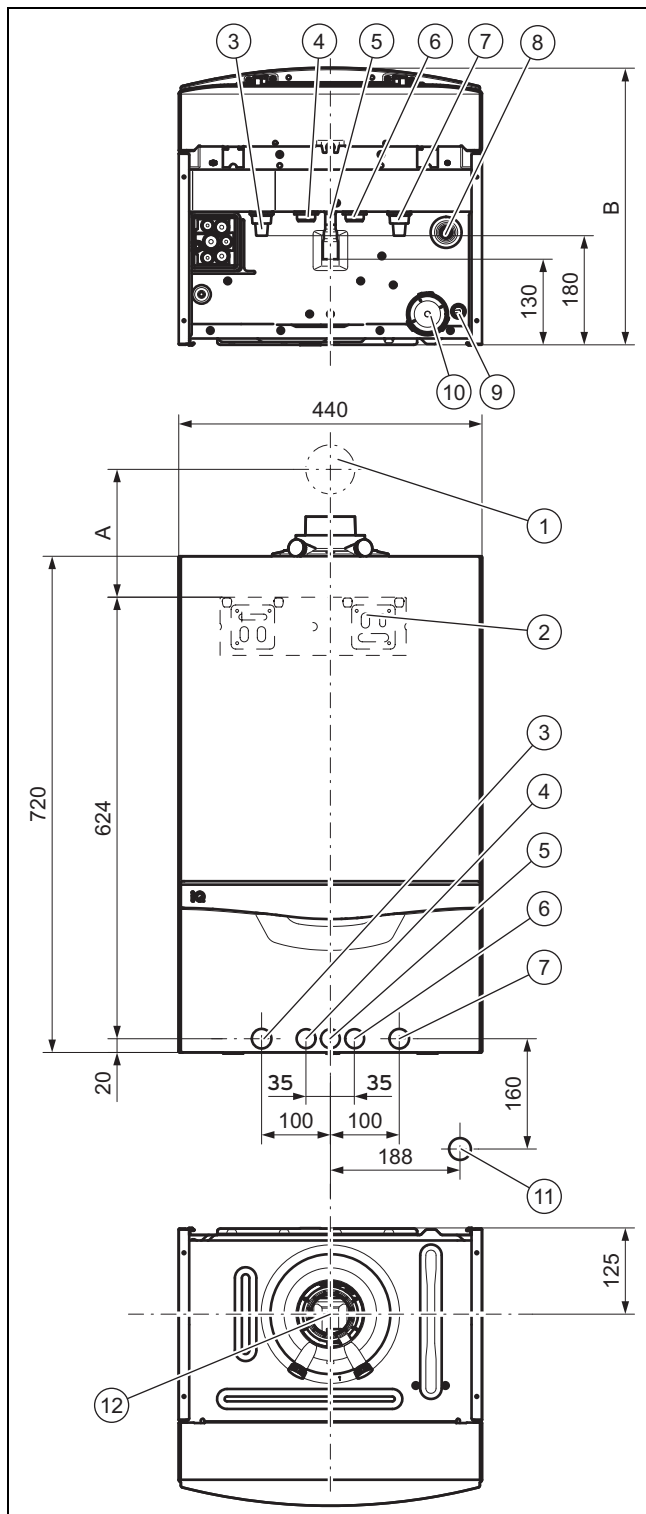
- ▶ It is recommended that two people lift the unit together.
- ▶ Lift the box using the straps provided.
- ▶ Use safe lifting techniques – keep your back straight and bend your legs at the knee.
- ▶ Hold the load as close as possible to your body.
- ▶ If the unit is being lifted by two persons, ensure your movements are coordinated during lifting.
- ▶ If required, get somebody to assist you in this.

4 Installation

4.3.3 Transporting the box from the delivery point to the installation site – ground floor

- ▶ It is recommended that two people lift the unit together.
- ▶ Use safe lifting techniques – keep your back straight and bend your legs at the knee.

4.4 Dimensions



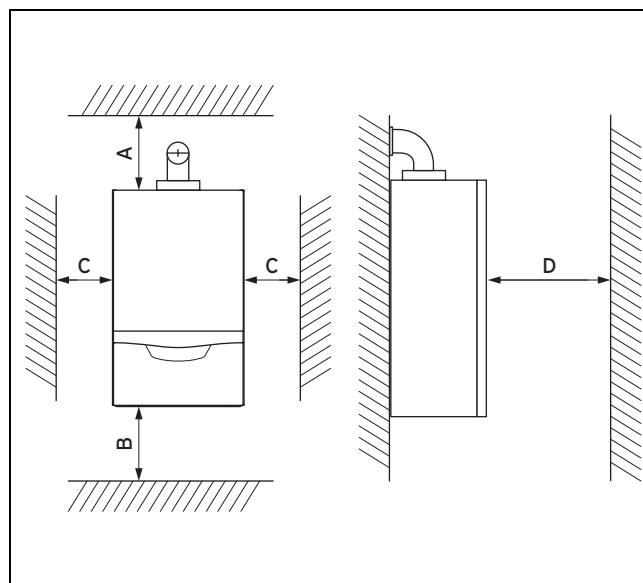
- | | | | |
|---|----------------------|---|-----------------------|
| 1 | Flue pipe wall duct | 5 | Gas connection |
| 2 | Product holder | 6 | Cold water connection |
| 3 | Heating flow | 7 | Heating return |
| 4 | Hot water connection | | |

- | | | | |
|---|--|----|---------------------------------------|
| 8 | Connection for the heating expansion relief valve drain line | 10 | Condensate trap |
| 9 | Condensate trap connection | 11 | R1 tundish/condensate trap connection |
| | | 12 | Flue pipe connection |

Consult the installation template that is supplied to find the dimension A.

The product's installation depth B can be found in the technical data in the appendix.

4.5 Minimum clearances

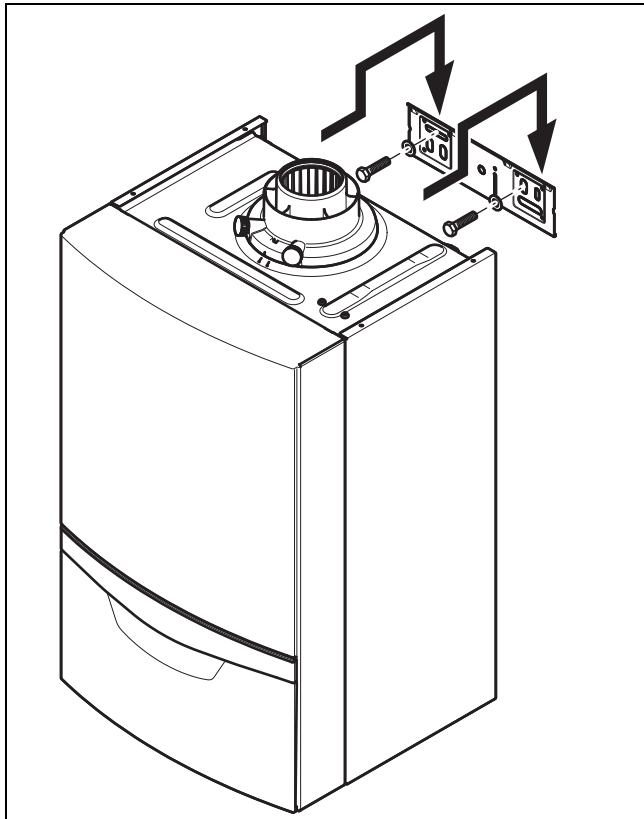


Minimum clearance	
A	165 mm: Air/flue pipe, 60/100 mm diameter 275 mm: Air/flue pipe, 80/125 mm diameter
B	VUW 356/5-7: 180 mm; optimum approx. 250 mm VUW 436/5-7: 300 mm; optimum approx. 340 mm
C	5 mm; optimum approx. 50 mm
D	500 mm in front of the heat generator to enable easy access for maintenance work (may be provided by an opening door).

4.6 Using the installation template

- ▶ Use the installation template to ascertain the locations at which you need to drill holes and make perforations.

4.7 Wall-mounting the product



1. Check whether the wall has sufficient load-bearing capacity to bear the operational weight of the product.
2. Check if the supplied fixing material may be used for the wall.

Conditions: The load-bearing capacity of the wall is sufficient, The fixing material may be used for the wall

- ▶ Wall-mount the product as described.

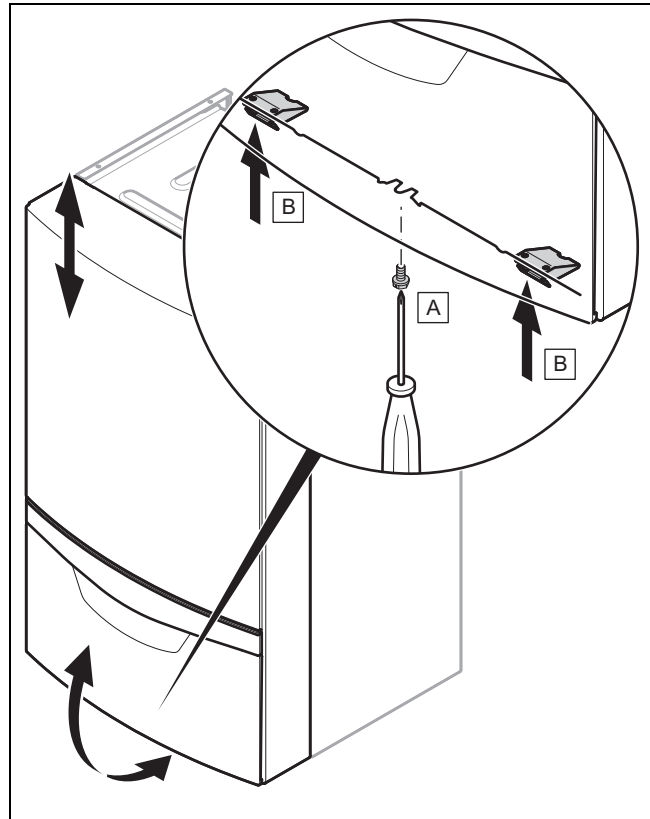
Conditions: The load-bearing capacity of the wall is not sufficient

- ▶ Ensure that wall-mounting apparatus on-site has a sufficient load-bearing capacity. Use individual stands or primary walling, for example.
- ▶ Do not wall-mount the product if you cannot provide wall-mounting apparatus with a sufficient load-bearing capacity.

Conditions: The fixing material may not be used for the wall

- ▶ Wall-mount the product as described in the illustration using the permitted fixing material provided on-site.

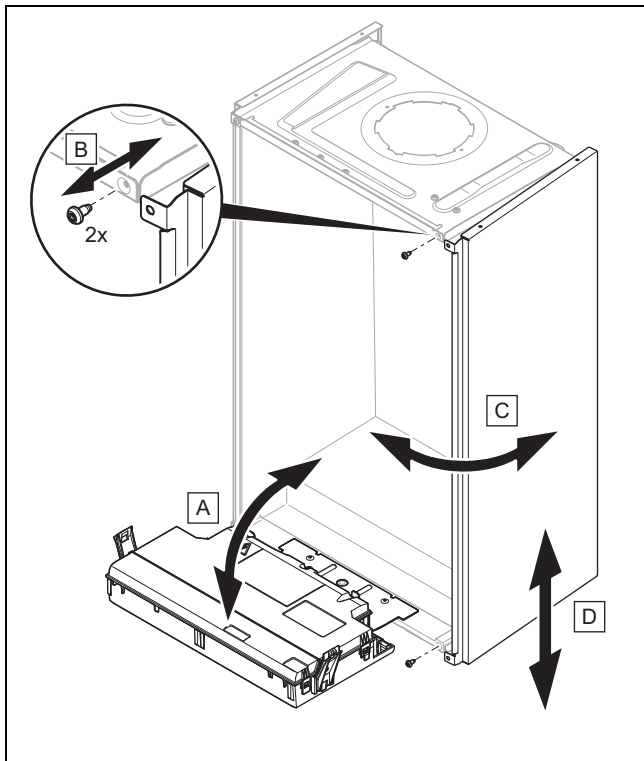
4.8 Removing the front casing



- ▶ Remove the front casing as shown in the illustration.

5 Installation

4.9 Removing the side section



Caution.
Risk of material damage caused by mechanical deformation.

Removing **both** side sections may cause mechanical distortion in the product, which may cause damage to the piping, for example, and potentially result in leaks.

- ▶ Depressurise the product on the water side.
- ▶ Always remove **only one** side section – never both side sections at the same time.

- ▶ Remove the side section as shown in the illustration.

5 Installation



Danger!
Risk of scalding and/or risk of material damage due to incorrect installation leading to escaping water.

Stresses in supply lines can cause leaks.

- ▶ Install the supply lines without tension.



Caution.
Risk of material damage due to the gas leak-tightness test.

At a test pressure of >11 kPa (110 mbar), gas leak-tightness tests may cause damage to the gas valve.

- ▶ If, during gas leak-tightness tests, you also place the gas lines and the gas valve in the product under pressure, use a max. test pressure of 11 kPa (110 mbar).
- ▶ If you cannot limit the test pressure to 11 kPa (110 mbar), close any gas isolator cocks that are installed upstream from the product before you carry out the gas leak-tightness test.
- ▶ If, during gas leak-tightness tests, you have closed the gas isolator cock that is installed upstream of the product, relieve the gas line pressure before you open this gas isolator cock.



Caution.
Risk of material damage due to corrosion.

If non-diffusion-tight plastic pipes are used in the heating installation, this may cause air to enter the heating water and corrosion of the heat generation circuit and the heat generator.

- ▶ If using non-diffusion-tight plastic pipes in the heating installation, partition the system by installing an external heat exchanger between the heat generator and the heating installation.



Caution.
Risk of material damage due to heat transfer during soldering.

- ▶ Only solder connection pieces if the connection pieces are not yet screwed to the service valves.

If you also want to install an external heating pump without a low loss header, install the external pump in the return and connect it via the auxiliary relay.

5.1 Installation requirements

5.1.1 Information on liquid gas operation

In the as-delivered condition, the product is preset for operation with the gas group indicated on the identification plate.

If you have a product that has been preset for operation with natural gas, you must convert it to run on liquid gas when starting it up for the first time with the installation assistant. No conversion kit is needed as the product comes with a self-adaptive gas system. The type of gas can also be changed at a later point using diagnostics code **D.087**.

If you have selected the "liquid gas" type of gas, after the start-up process is complete, affix the enclosed "Liquid gas" conversion sticker onto the identification plate and affix the enclosed tank sticker (propane quality) so that it is clearly visible on the tank or the cylinder cabinet, if possible close to the filler nozzle.

5.1.2 Purging the liquid gas tank

If the liquid gas tank is not purged properly, this may result in ignition problems.

- ▶ Ensure that the liquid gas tank has been purged properly before installing the product.
- ▶ If required, contact the filler or the liquid gas supplier.

5.1.3 Using the correct type of gas

Using the incorrect type of gas may cause fault shutdowns in the product. Ignition and combustion noise may occur in the product.

- ▶ Only use the gas type listed on the identification plate.

5.1.4 Required preliminary work

1. Install a stop cock in the gas line.
2. Make sure that the existing gas meter is capable of passing the rate of gas supply required.
3. Check that the volumetric capacity of the expansion vessel is sufficient for the system volume.

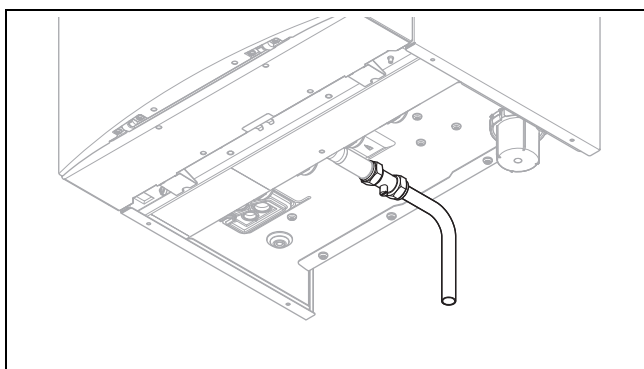
Conditions: The volume of the installed expansion vessel is insufficient

- ▶ Install an additional expansion vessel, connected as close to the product as possible, in the heating return.

Conditions: External expansion vessel installed and warm start active

- ▶ Install a non-return valve in the product outlet (heating flow) or decommission the internal expansion vessel in order to prevent the warm start function from being increasingly activated due to backflow.
4. Install a tundish with siphon for the condensate discharge and the exhaust pipe on the expansion relief valve. Lay as short a drain line as possible, at a downward gradient away from the tundish.
 5. Insulate bare pipes exposed to environmental influences to protect them from frost using suitable insulating material.

5.2 Installing the gas connection

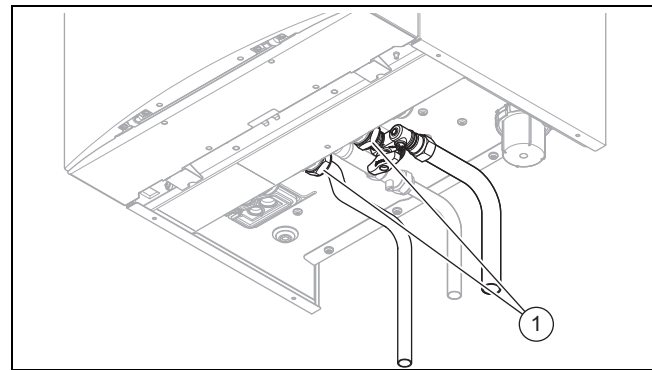


1. Install the gas line in accordance with the recognised rules of technology.
2. Connect the product to the gas line in accordance with the recognised rules of technology.
3. Remove the residues from the gas line by blowing through the gas line beforehand.
4. Purge the gas line before start-up.

5.3 Checking the gas line for leak-tightness

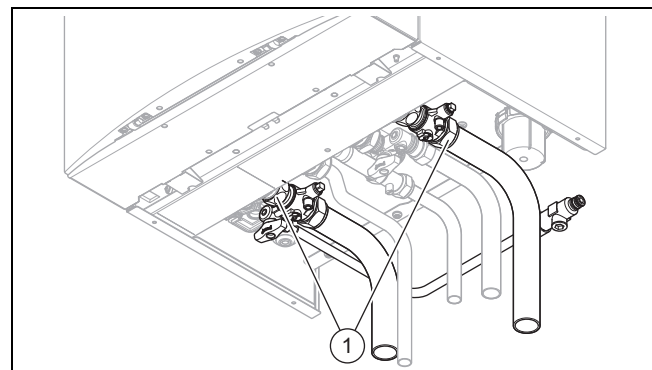
- ▶ Check the entire gas line properly for leak-tightness.

5.4 Installing the hot and cold water connection



1. Make the water connections (1) in accordance with the relevant standards.
2. Ensure correct water pressure and flow requirements and that any expansion can be accommodated with the cold supply pipe work.

5.5 Connecting the heating flow and heating return



- ▶ Establish the heating connections (1) in accordance with the relevant standards.

5.6 Connecting the condensate drain pipework



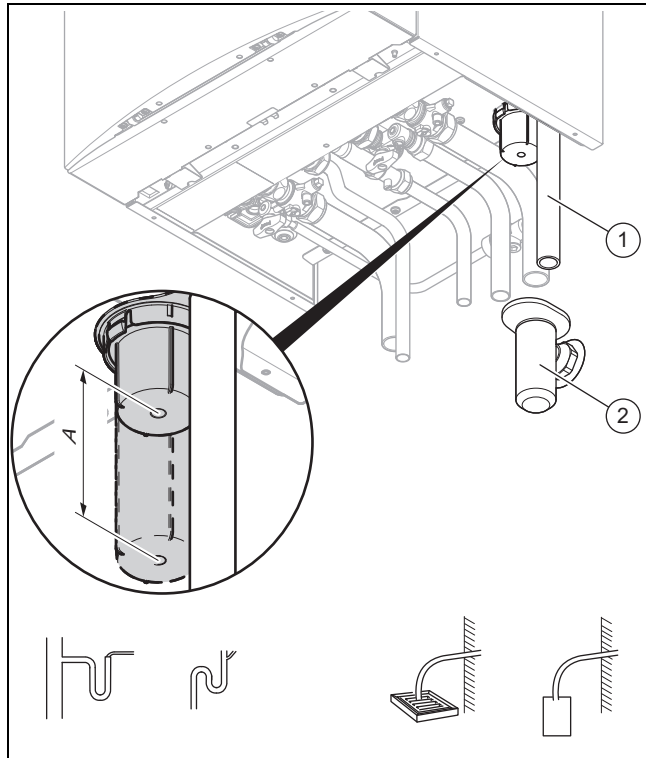
Danger!

Risk of death from escaping flue gases!

The condensate drain pipework of the condensate trap must not be connected tightly to waste-water piping because, otherwise, the internal condensate trap may be drained fully and flue gas may escape.

- ▶ Do not connect the condensate drain pipework tightly to the waste-water piping.

5 Installation



The product is equipped with a condensate trap (2). (The filling height is 145 mm). The condensate trap collects the condensate that has formed in a vessel with a capacity of approximately 200 ml, and intermittently releases the contents into the discharge pipe freezing. This minimises the risk of the discharge pipe freezing.

- ▶ Fit the condensate discharge (1) onto the condensate trap.
- ▶ Connect the condensate discharge (1) to a condensate discharge pipe (3) that has a minimum internal diameter of 19 mm (30 mm internal diameter for all externally installed lines) and is made from an acid-resistant material (e.g. plastic overflow pipe).
 - The condensate discharge pipework must have a continuous fall (45 mm per metre) and should whenever possible terminate at a suitable discharge point within the heated envelope of the building that will remain frost free under long periods of low external temperatures.
- ▶ During installation remove all burrs from inside of cut pipe work and avoid excessive adhesive which may trap small pockets of water close to the pipe wall which can freeze and build into a larger ice plug.
- ▶ As with other pipe work insulate the condensate discharge pipe to minimise any risk of freezing and beware when crossing cavities that the fall is maintained and the pipe sleeved.
- ▶ Ensure that the condensate drain pipework terminates in a suitable location. Further information can be obtained from BS 6798 Specification for installation of gas-fired boilers of rated input not exceeding 70 kW net.
- ▶ Leave the following installation space beneath the condensate trap:

Conditions: VUW 356/5-7 (H-GB) ecoTEC exclusive

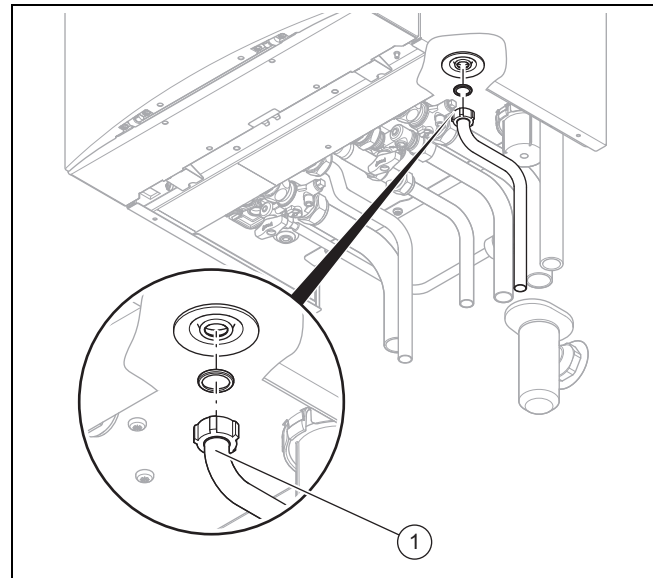
- A = at least 180 mm

Conditions: VUW 436/5-7 (H-GB) ecoTEC exclusive

- A = at least 340 mm

5.7 Installing the discharge pipe on the expansion relief valve

1. Install the discharge pipe for the expansion relief valve so that it does not interfere with the removal and fitting of the lower section of the condensate trap.



2. Install the discharge pipe as shown (do not shorten).
3. Make sure that the end of the pipe is visible.
4. Ensure that discharged water or steam cannot cause injury to persons or damage to electronic components.
5. Ensure the discharge pipe work is installed, routed and terminated correctly to minimise the risk of freezing up.

5.8 Flue gas installation

5.8.1 Installing and connecting the flue pipe

1. You can find out which flue pipes may be used by consulting the enclosed flue pipe installation manual.

Conditions: Installation in damp rooms

- ▶ You must connect the product to a room-sealed air/flue gas installation. The combustion air must not be taken from the installation room.



Caution.

Risk of poisoning due to escaping flue gas.

Mineral-oil-based greases can damage the seals.

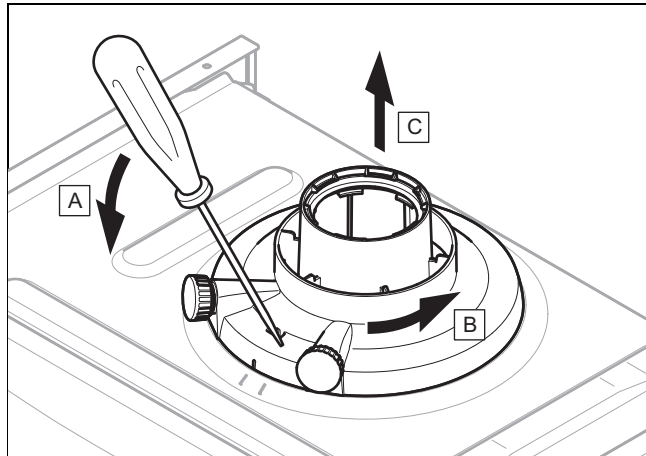
- ▶ Instead of grease, use only water or commercially available soft soap to aid installation.

2. Install the flue pipe using the installation manual.

5.8.2 Replacing the connection piece for the air/flue pipe as required

1. Replace the connection piece for the air/flue pipe as required. The product-specific standard equipment is listed under Technical Data in the appendix.
2. Remove the connection piece for the air/flue pipe. (→ Page 15)

5.8.2.1 Removing the connection piece for the air/flue pipe



1. Insert a screwdriver into the slot between the measuring stub pipes.
2. Press the screwdriver carefully down.
3. Turn the connection piece anticlockwise as far as it will go and then remove it by pulling it upwards.

5.9 Electrical installation

Only qualified electricians are allowed to carry out the electrical installation.

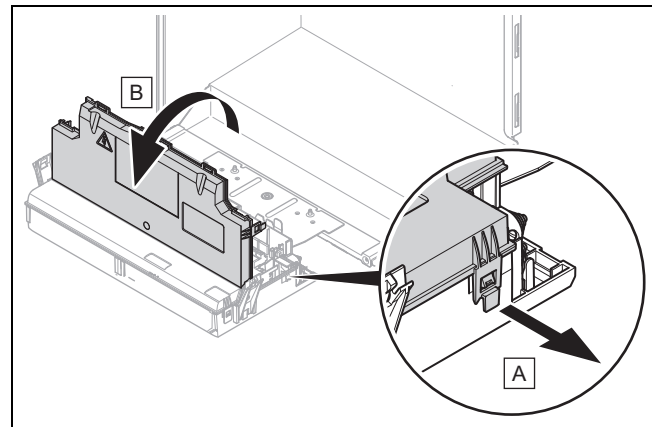


Danger! **Risk of death from electric shock!**

Mains connection terminals L and N remain live even if the on/off switch is turned off.

- ▶ Switch off the power supply.
- ▶ Secure the power supply against being switched on again.

5.9.1 Opening the electronics box



- ▶ Open the electronics box as shown in the illustration.

5.9.2 Carrying out the wiring



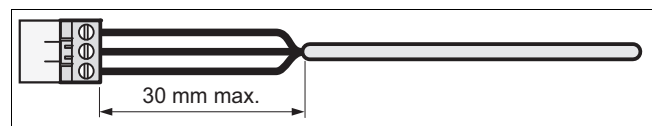
Caution.

Risk of material damage caused by incorrect installation.

Mains voltage at incorrect terminals and plug terminals may destroy the electronics.

- ▶ Do not connect any mains voltage to the eBUS terminals (+/-).
- ▶ Only connect the mains connection cable to the terminals marked for the purpose.

1. Route the supply lines of the components to be connected through the cable duct provided on the underside of the product on the left.
2. Use strain reliefs.
3. Shorten the supply lines as necessary.



4. To prevent short circuits if a strand accidentally comes loose, only strip the outer sheathing of flexible lines to a maximum of 30 mm.
5. Ensure the inner conductor insulation is not damaged when stripping the outer sheathing.
6. Only strip inner conductors just enough to establish good, sound connections.
7. To avoid short circuits resulting from loose individual wires, fit conductor end sleeves on the stripped ends of the conductors.
8. Screw the respective plug to the supply line.
9. Check whether all conductors are sitting mechanically securely in the terminals of the plug. Remedy this if necessary.
10. Plug the plug into the associated PCB slot; see the connection diagram in the appendix.

5 Installation

5.9.3 Establishing the power supply



Caution.

Risk of material damage due to high connected voltage.

At mains voltages greater than 253 V, electronic components may be damaged.

- ▶ Make sure that the rated voltage of the mains is 230 V.

1. Make sure that the nominal mains voltage is 230 V.
2. Provide one common electricity supply for the boiler and for the corresponding controller:
 - Power supply: Single-phase, 230 V, 50 Hz
 - Fuse protection: ≤ 3 A
3. Open the electronics box. (→ Page 15)
4. Install a fused spur adjacent to the boiler.
5. Connect the product using a fixed connection and an electrical partition with a contact opening of at least 3 mm (e.g. fuses or power switches).
6. Route a three-core mains connection cable that complies with the relevant standards through the cable duct and into the product.
 - Mains connection line: Flexible line
7. Carry out the wiring. (→ Page 15)
8. Remove the supplied plug from the bracket in the electronics box and screw the plug onto the mains connection cable.
9. Close the electronics box.
10. Make sure that access to the mains connection is always available and is not covered or blocked.

5.9.4 Installing the product in a moist environment



Danger!

Risk of death from electric shock!

If you install the product in a room with high levels of moisture, e.g. a bathroom, observe the nationally recognised technical standards for electrical installations. If you use the factory-installed connection cable, if installed, with an earthed plug, there is a risk of death from electric shock.

- ▶ Never use the factory-installed connection cable with earthed plug when installing the product in a moist environment.
- ▶ Connect the product using a fixed connection and an electrical partition with a contact opening of at least 3 mm (e.g. fuses or power switches).
- ▶ Use a flexible line for the mains connection line, which is routed through the cable duct into the product.

1. Open the electronics box. (→ Page 15)
2. Detach the ProE plug from the PCB slot for the mains connection (X1).
3. Unscrew the ProE plug for the factory-installed mains connection cable, if installed.
4. Instead of the factory-installed mains connection cable, if installed, use a suitable three-core mains connection cable which complies with the relevant standards.
5. Carry out the wiring. (→ Page 15)
6. Close the electronics box.
7. Observe the flue-gas connection that is required on a room-sealed air/flue gas installation. (→ Page 14)

5.9.5 Connecting controllers to the electronic system

1. Install the controller if necessary.
2. Open the electronics box. (→ Page 15)
3. Carry out the wiring. (→ Page 15)
4. Observe the connection diagram in the appendix.

Conditions: Connecting a weather compensator or a room temperature controller via eBUS

- ▶ Connect the controller to the eBUS connection.
- ▶ Bridge the 24 V = **RT** connection (X100 or X106), if there is not already a bridge.

Conditions: Connecting a low-voltage controller (24 V)

- ▶ Remove the bridge and connect the controller to the 24 V = **RT** connection (X100 or X106).

Conditions: Connecting 230 volt controller

- ▶ Connect the switched live supply with the terminal marked **RT** at X1 (beside the LNPE connections) then remove the link at X100 (do NOT connect 230 volt to any other terminal than the **RT** connection).

Conditions: Connecting a limit thermostat for underfloor heating

- ▶ Remove the bridge and connect the limit thermostat to the **Burner off** connection.
5. Close the electronics box.
 6. For multi-circuit controllers, change **D.018** from **Eco** (intermittently operating pump) to **Comfort** (continuously operating pump). (→ Page 25)

5.9.6 Connecting additional components

You can actuate an additional component with the aid of the auxiliary relay that is installed, and you can actuate two other components with the multi-functional module.

5.9.6.1 Using the auxiliary relay

1. Connect an additional component directly to the integrated auxiliary relay using the grey plug on the PCB.
2. Carry out the wiring.
3. Activate the component via **D.026**, see section "Adapting to the heating installation".

5.9.6.2 Using the VR 40 ("2 in 7" multi-functional module)

1. Install the components in accordance with the respective instructions.

Conditions: Components connected to relay 1

- ▶ Activate **D.027**, see section "Adapting to the heating installation".

Conditions: Components connected to relay 2

- ▶ Activate **D.028**, see section "Adapting to the heating installation".

5.9.7 Connecting the circulation pump and actuating it according to requirements

1. Carry out the wiring. (→ Page 15)
2. Connect the 230 V supply line to the plug from slot X13 and plug it into the slot.
3. Connect the supply line for the external button using terminals 1 (0) and 6 (functional drawing) on the X41 edge connector, which is supplied with the controller.
4. Plug the edge connector into the PCB slot X41.

6 Operation





6.1 Operating concept

The operating concept and the read-off and setting facilities of the operator level are described in the operating instructions.

An overview of the reading and setting options for the installer level is included in the table in the appendix.

Installer level – Overview (→ Page 35)

6.2 Calling up the installer level

1. Only call up the installer level if you are a competent person.
2. Press  and  at the same time.
3. Navigate to **Menu → Installer level** and confirm by pressing .
4. Set the value **17** (code) and confirm by pressing .

6.3 Live Monitor (status codes)

Menu → Live monitor

Status codes in the display provide information on the product's current operating status.

Status codes – Overview (→ Page 42)

6.4 Setting the hot water temperature



Danger!

Risk of death from Legionella.

Legionella multiply at temperatures below 60 °C.

- ▶ Ensure that the operator is familiar with all of the Anti-legionella measures in order to comply with the applicable regulations regarding legionella prevention.

Conditions: Water hardness: > 3.57 mol/m³

- ▶ Set the hot water temperature to a maximum of 50 °C.

7 Start-up

7.1 Carrying out the initial start-up

Initial start-up must be carried out by a customer service technician or an authorised competent person using the commissioning checklist. The commissioning checklist in the appendix (→ Page 52) of the installation instructions must be filled in and stored carefully along with the unit's documentation.

- ▶ Carry out the start-up procedure using the commissioning checklist in the appendix.
- ▶ Fill in and sign the commissioning checklist.

7.2 Switching the product on/off

- ▶ Press the on/off button on the product.
 - ◀ The basic display appears on the display.

7.3 Running the installation assistants


The installation assistant is displayed whenever the product is switched on until it has been successfully completed. It provides direct access to the most important check programmes and configuration settings for starting up the product.

To recheck and reset the most important system parameters, call up the **Appliance config.**

Menu → Installer level → Appliance config.

The settings options for more complex systems can be found in the **Diagnostics menu**.

Menu → Installer level → Diagnostics menu

- ▶ Press  to confirm the start of the installation assistant.
 - ◀ All heating and hot water requests are blocked whilst the installation assistant is active.

7 Start-up



Note

If you do not confirm the launch of the installation assistant within 10 seconds of switching the system on, the basic display reappears.

- ▶ To access the next point, confirm by pressing in each case.

7.3.1 Language

- ▶ Set the required language.
- ▶ To confirm the set language and to avoid unintentionally changing it, press to confirm this twice.

If you have unintentionally set a language that you do not understand, proceed as follows to change it:

- ▶ Press and hold and **at the same time**.
- ▶ Also briefly press .
- ▶ Press and hold and until the display shows the language setting option.
- ▶ Select the required language.
- ▶ Confirm twice by pressing .

7.3.2 Filling mode

Filling mode (check programme **P.06**) is activated automatically in the installation assistant for as long as the filling mode appears on the display.

- ▶ Fill the heating installation. (→ Page 20)

7.3.3 Purging

1. Unlike in the **Check programs** menu, to purge the system, start check programme **P.00** by pressing or .
2. If you need to change the circuit that is to be purged, press .

7.3.4 Target feed temperature, hot water temperature, Comfort mode

1. To set the target flow temperature, hot water temperature and comfort mode, press and in each case.
2. In each case, confirm by pressing .

7.3.5 Heating partial load

The heating partial load of the product is set to **Auto** at the factory. The product independently determines the optimum heating output depending on the current heat demand of the system. You can retroactively adjust the setting in the **Diagnostics menu** under **D.000**.

7.3.6 Green iQ

- ▶ Set **Green iQ** mode (energy-saving mode for hot water generation with cylinder and heating mode) (default setting: On).



Note

Green iQ mode is a special operating mode that can be used to save energy. If this mode is activated, the product operates in the heating and cylinder charging mode in such a way that the maximum benefits associated with condensing technology are achieved. Under certain circumstances, this may result in comfort bottlenecks because, in this operating mode, the cylinder charging time may be extended, for example.

7.3.7 Auxiliary relay and multi-functional module

1. If you have connected additional components to the product, assign these components to the individual relays.
2. In each case, confirm by pressing .



Note

This setting can be retroactively changed in the **Diagnostics menu** using **D.026**, **D.027** and **D.028**.

7.3.8 Type of gas

1. The product comes with a self-adaptive gas system. Select the type of gas that is available at the installation location (default setting: Natural gas). If required, retroactively change the type of gas using diagnostics code **D.087** and plug the correct coding resistor (plug X24) into the PCB.

Conditions: Liquid gas set

- ▶ If you have selected the "liquid gas" type of gas, after the start-up process is complete, affix the enclosed "Liquid gas" conversion sticker onto the identification plate and affix the enclosed tank sticker (propane quality) so that it is clearly visible on the tank or the cylinder cabinet, if possible close to the filler nozzle.

7.3.9 Contact data

- ▶ If required, store your telephone number in the **Appliance config.** (max. 16 digits/no blank spaces). The operator can view the telephone number.

7.3.10 Ending the installation assistant

- ▶ Once you have run through the installation assistant successfully, confirm by pressing .
- ◀ The installation assistant will close and will not launch again when the product is next switched on.

7.4 Restarting the installation assistants

Menu → Installer level → Start inst. assistant

You can restart the installation assistant at any time by calling it up in the menu.

7.5 Test programmes

Menu → Installer level → Test programs

As well as the installation assistants, you can also call up the following test programmes for start-up, service and troubleshooting.

- Check programs
- Function menu
- Electronics self-test

7.6 Using check programmes

Menu → Installer level → Test programs → Check programs

Display	Meaning
P.00	<p>Purging check programme: The internal pump is cyclically actuated. The heating circuit and hot water circuit are purged adaptively by automatically switching the circuits via the automatic air vent (the cap for the automatic air vent is loosened at the factory). Hot water circuit active or Heating circuit active display. 1 x : Start purging 1 x (Cancel): End purge programme Note The duration of the purge programme is displayed by a countdown timer. The programme then ends.</p>
P.01	<p>Maximum load check programme: After successful ignition, the product is operated at maximum heat input.</p>
P.02	<p>Minimum load check programme: After successful ignition, the product is operated at minimum heat input.</p>
P.04	<p>Reset eGas CH (Central Heating) check programme: Calling up the programme deletes all of the CH correction values that have been saved from previous calibration processes. The products then starts by fully calibrating the combustion regulation (status S.09).</p>
P.06	<p>Filling mode check programme: The diverter valve is moved to the mid-position. The burner and pump are switched off (to fill or drain the product).</p>
P.14	<p>Reset eGas DHW (Domestic Hot Water) check programme: Calling up the programme deletes all of the DHW correction values that have been saved from previous calibration processes. The products then starts by fully calibrating the combustion regulation (status S.19).</p>

7.7 Checking and treating the heating water/filling and supplementary water



Caution.

Risk of material damage due to poor-quality heating water

- ▶ Ensure that the heating water is of sufficient quality.

- ▶ Before filling or topping up the system, check the quality of the heating water.

Checking the quality of the heating water

- ▶ Remove a little water from the heating circuit.
- ▶ Check the appearance of the heating water.
- ▶ If you ascertain that it contains sedimentary materials, you must desludge the system.
- ▶ Use a magnetic rod to check whether it contains magnetite (iron oxide).
- ▶ If you ascertain that it contains magnetite, clean the system and apply suitable corrosion-protection measures, or fit a magnet filter.
- ▶ Check the pH value of the removed water at 25 °C.
- ▶ If the value is below 8.2 or above 10.0, clean the system and treat the heating water.
- ▶ Ensure that oxygen cannot get into the heating water.

Checking the filling and supplementary water

- ▶ Before filling the system, measure the hardness of the filling and supplementary water.

Treating the filling and supplementary water

- ▶ Observe all applicable national regulations and technical standards when treating the filling and supplementary water.

Provided the national regulations and technical standards do not stipulate more stringent requirements, the following applies:

You must treat the heating water in the following cases:

- If the entire filling and supplementary water quantity during the operating life of the system exceeds three times the nominal volume of the heating installation, or
- If the guideline values listed in the following table are not met, or
- If the pH value of the heating water is less than 8.2 or more than 10.0.

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³
< 50	< 300	< 3	200	2	2	0.02
> 50 to ≤ 200	200	2	150	1.5	2	0.02
> 200 to ≤ 600	150	1.5	2	0.02	2	0.02
> 600	2	0.02	2	0.02	2	0.02

1) Nominal capacity in litres/heating output; in the case of multi-boiler systems, the smallest single heating output is to be used.

7 Start-up



Caution.

Risk of material damage if the heating water is treated with unsuitable additives.

Unsuitable additives may cause changes in the components, noises in heating mode and possibly subsequent damage.

- ▶ Do not use any unsuitable frost and corrosion protection agents, biocides or sealants.

No incompatibility with our products has been detected to date with proper use of the following additives.

- ▶ When using additives, follow the manufacturer's instructions without exception.

We accept no liability for the compatibility of any additive or its effectiveness in the rest of the heating system.

Additives for cleaning measures (subsequent flushing required)

- Fernox F3
- Sentinel X 300
- Sentinel X 400

Additives intended to remain permanently in the system

- Fernox F1
- Fernox F2
- Sentinel X 100
- Sentinel X 200

Additives for frost protection intended to remain permanently in the system

- Fernox Antifreeze Alphi 11
- Sentinel X 500

- ▶ If you have used the above-mentioned additives, inform the operator about the measures that are required.
- ▶ Inform the operator about the measures required for frost protection.

7.8 Preventing low water pressure

To ensure that the heating installation operates smoothly, the indicator on the pressure gauge must point to the upper half of the grey area or to the middle of the bar graph display in the display (marked by the dashed limit values) when the heating installation is cold. This corresponds to a filling pressure of between 0.1 MPa and 0.2 MPa (1.0 bar and 2.0 bar).

If the heating installation extends over several storeys, higher filling pressures may be required to avoid air entering the heating installation.

If the filling pressure falls below 0.08 MPa (0.8 bar), the product indicates low pressure by displaying a flashing pressure value. If the filling pressure falls below 0.05 MPa (0.5 bar), the product switches off. The display shows **F.22**.

- ▶ Top up the heating water to start the product up again.

The pressure value flashes in the display until a pressure of 0.11 MPa (1.1 bar) or higher has been reached.

7.9 Flushing the heating installation for the first time ("cold")

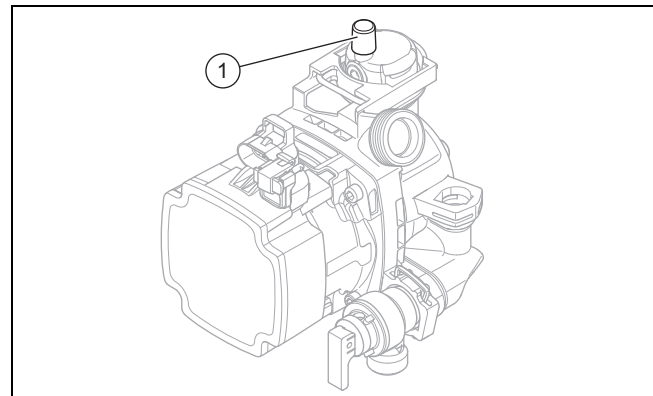


Note

The complete heating system must be flushed at least twice: Once with cold water and once with hot water in accordance with the following instructions.

1. Check whether all thermostatic radiator valves and both service valves on the product are open.
2. Connect a hose to the drain valve that is located at the lowest position in the heating system.
3. Open the radiator valves and the drain valves so that the water can drain quickly. Start at the next point in the system and open the purging valves on the radiators so that the contaminated water can completely drain.
4. Close the drain cocks.
5. Refill the heating system with water.
6. Check that the expansion relief valve of the heating system is functioning correctly by turning the handle on the valve.
7. Check the pressure in the heating system and top up with water if necessary.
8. Close the filling valve and the cold water valve.

7.10 Filling the heating installation



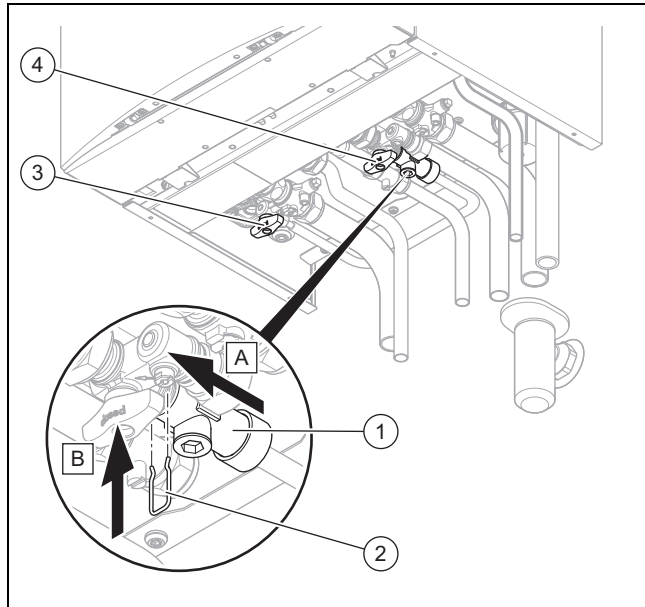
1. Flush the heating installation through.
2. Select the check programme **P.06**.
 - ◀ The diverter valve moves to the mid-position, the pumps do not run and the product does not switch to heating mode.



Note

The cap on the automatic air vent (1) has already been opened at the factory.

3. Observe the information on treating heating water. (→ Page 19)
4. Check all connections and the entire system for leaks.



5. Open all radiator valves (thermostatic radiator valves) of the heating installation.
6. Fit the double non-return valve (1) of the filling line to the cold water stop valve and secure the valve with the spring clip (2).
7. To fill, first open the stop valve (3).
8. Open the stop valve (4) so that the water flows into the heating system. Fill the heating system.
9. Purge the lowest radiator until water flows out of the purging valve without bubbles.
10. Purge all other radiators until the entire heating system has been filled with water.
11. Close all purging valves.
12. Monitor the rising filling pressure in the heating installation.
13. Fill with water until the required filling pressure is reached.
14. After filling, close both stop valves and disconnect the filling device by removing the double non-return valve from the cold water stop valve.



Note

Both stop valves must be closed while the heating system is operating and the filling line must be removed from the double non-return valve again.

7.11 Purging the heating installation

1. Select the check programme **P.00**.
 - ◁ The product does not start up, the internal pump operates intermittently and purges either the heating circuit or the hot water circuit.
 - ◁ The display shows the filling pressure of the heating installation.
2. Make sure that the filling pressure of the heating installation does not fall below the minimum filling pressure.

- $\geq 0.08 \text{ MPa}$ ($\geq 0.80 \text{ bar}$)
- ◁ At the end of the filling procedure, the filling pressure of the heating installation should be at least 0.02 MPa (0.2 bar) above the counter-pressure of the expansion vessel ("Exp") ($P_{\text{Installation}} \geq P_{\text{Exp}} + 0.02 \text{ MPa}$ (0.2 bar)).

3. If there is still too much air in the heating installation at the end of the check programme **P.00**, repeat the check programme.

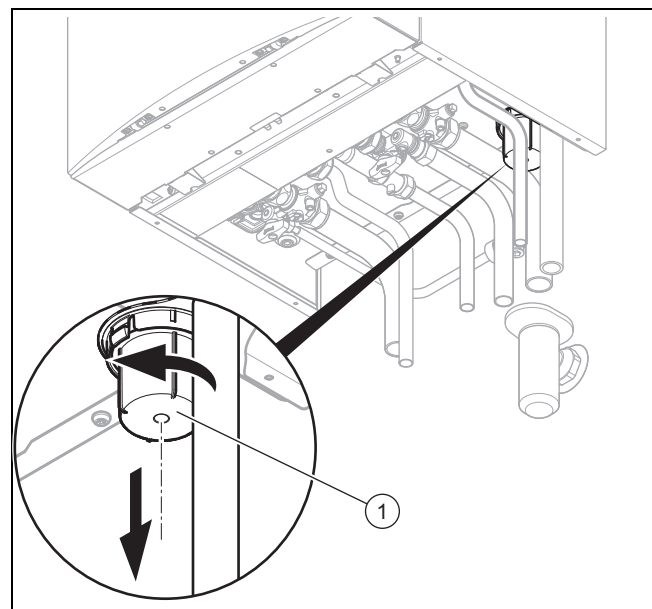
7.12 Filling and purging the hot water system

1. Open the cold water stop valve on the product.
2. Fill the hot water system by opening all the hot water draw-off valves until water escapes.

7.13 Filling the condensate trap

7.13.1 Filling the condensate trap

Applicability: 835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive

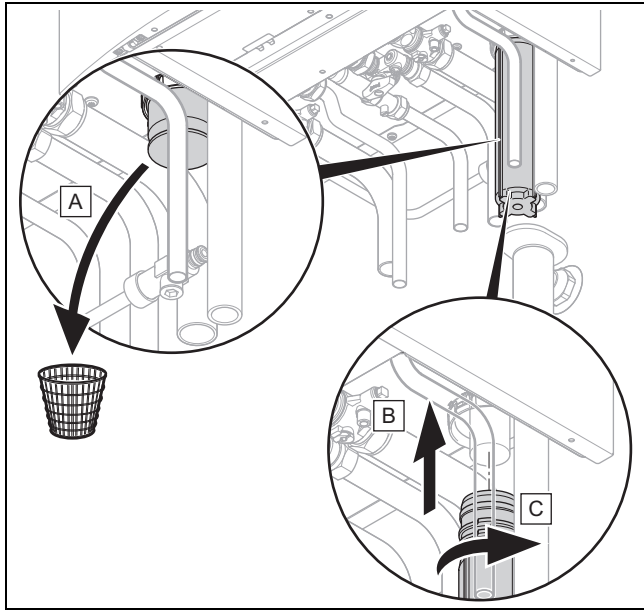


1. Remove and, if required, clean the lower section of the condensate trap (1).
2. Fill the lower section with water up to 10 mm below the upper edge.
3. Attach the lower section to the condensate trap.

7 Start-up

7.13.2 Filling the condensate trap

Applicability: 843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive



1. Remove the plug from the condensate trap connection.
2. Take the lower section of the condensate trap out of the enclosure.
3. Lubricate the O-ring on the lower section using the grease that is supplied.
4. Fill the lower section with water up to two thirds.
5. Install the lower section of the condensate trap by placing the lower section in position and turning it clockwise until it clicks into place.

7.14 Carrying out the initial start-up

The product has a gas-adaptive heat cell that automatically adjusts to the relevant type of gas. We recommend that you start up the heat cell using the following steps. Calibration establishes the operational readiness. This calibration is also a prerequisite for the correct measurement of gas flow pressure and CO₂ content.

- Deleting existing calibration values
- Calibrating in maximum mode
- Calibrating in minimum mode
- ▶ Install the front casing.
- ▶ Ensure that there is sufficient hot water circulation.
- ▶ Navigate to **Menu** → **Installer level** → **Check programs** and confirm by pressing
- ▶ Start check programme **P.04**.
 - ◁ Existing calibration points are deleted. The display shows the successful deletion.
- ▶ Start check programme **P.01**.
 - Duration: 7-10 minutes. Automatic programme end after 15 minutes
 - ◁ If the circulation in the heating system is sufficient, the test routine starts and determines the calibration points for maximum power. **S.93** is displayed.
 - ◁ After max. 10 minutes, **S.04** is displayed.
- ▶ Press to end the check programme.

- ▶ Start check programme **P.02**.
 - Duration: 3-5 minutes. Automatic programme end after 15 minutes
 - ◁ If the circulation in the heating system is sufficient, the test routine starts and determines the calibration points for minimum power. **S.93** is displayed.
 - ◁ After max. five minutes, **S.04** is displayed.
- ▶ Press to end the check programme.
 - ◁ All calibration points have been determined.

7.15 Gas inspection

7.15.1 Checking the leak-tightness of the flue gas installation and flue gas recirculation

1. Check the flue gas installation is intact in accordance with the latest gas safe technical bulletin and information supplied in the installation instructions.
2. For extended flue gas installations check for flue gas recirculation using the air analysis point.
3. Use a flue gas measuring instrument.
4. If you discover CO or CO₂ in the supply air, search for the leak in the flue gas installation or for signs of flue gas recirculation.
5. Eliminate the damage properly.
6. Check again whether the supply air contains any CO or CO₂.
7. If you cannot eliminate the damage, do not start up the product.

7.15.2 Checking the gas flow rate

The boiler is fitted with a multifunctional automatic gas valve which ensures that the precise air/gas ratio is provided under all operating conditions. The gas flow rate has been set during production and does not require adjustment. With the front casing fitted check the gas flow rate of the boiler as follows:

- ▶ Start up the product with the check programme **P.01**.
- ▶ In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.
- ▶ Wait at least 5 minutes until the boiler has reached its operating temperature.
- ▶ Ensure that all other gas appliances in the property are turned off.
- ▶ Measure the gas flow rate at the gas meter.
- ▶ Compare the measured values with the corresponding values in the table.

Nominal value for the net heat supply in kW in accordance with DIN EN 15502	H gas in m ³ /h			P gas in kg/h		
	Nom.	+5%	-10%	Nom.	+5%	-10%
12	1.31	1.38	1.18	0.96	1.01	0.86
15	1.64	1.72	1.48	1.20	1.26	1.08
18	1.97	2.07	1.77	1.44	1.51	1.30
24	2.61	2.74	2.35	1.92	2.02	1.73
30	3.27	3.43	2.94	2.40	2.52	2.16

Nominal value for the net heat supply in kW in accordance with DIN EN 15502	H gas in m ³ /h			P gas in kg/h		
	Nom.	+5%	-10%	Nom.	+5%	-10%
37	4.03	4.23	3.63	2.96	3.11	2.66
25	2.72	2.86	2.45	2.00	2.10	1.80
32	3.41	3.58	3.07	2.52	2.65	2.27
35	3.78	3.97	3.40	2.78	2.92	2.50
38	4.15	4.36	3.73	3.05	3.20	2.75

Conditions: Gas flow rate **not** in the permissible range

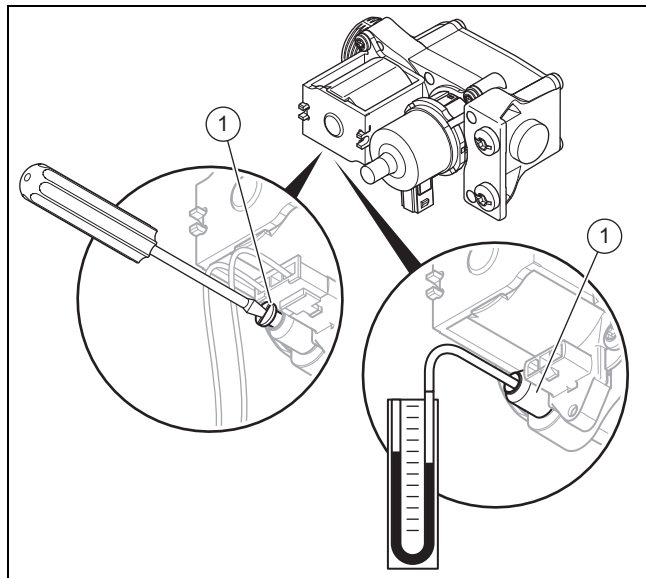
- ▶ Check all of the piping and ensure that the gas flow rates are correct.
- ▶ Only put the product into operation once the gas flow rates have been corrected.

Conditions: Gas flow rate in the permissible range

- ▶ End the check programme **P.01**.
- ▶ Allow the boiler to cool down by allowing pump overrun to operate for a minimum of two minutes.
- ▶ Record the boiler maximum gas flow rate onto the Benchmark gas boiler commissioning checklist.

7.15.3 Checking the gas flow pressure

1. Close the gas isolator cock.
2. Remove the front casing. (→ Page 11)



3. Use a screwdriver to undo the sealing screw of the measuring nipple (1) at the gas valve.
4. Connect a pressure gauge (2) to the measuring nipple (1).
5. Open the gas isolator cock.
6. Start up the product with the check programme **P.01**.
 - ◁ **S.93** is briefly displayed.
 - ◁ If the display switches to **S.04**, the product is ready for the measurement.

7. In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.
8. With the boiler operating at full load check that the gas inlet working pressure at the reference test point complies with the requirements.
9. Measure the gas flow pressure in comparison with the atmospheric pressure.
 - Permissible gas flow pressure for operation with G20 natural gas: 1.3 ... 2.3 kPa (13.0 ... 23.0 mbar)
 - Permissible gas flow pressure for operation with G31 liquid gas: 2.3 ... 4.3 kPa (23.0 ... 43.0 mbar)
10. Should the pressure recorded at the reference test point in the boiler be lower than indicated check if there is any blockage in the pipework or if the pipework is undersized.
11. Decommission the product.
12. Close the gas isolator cock.
13. Remove the pressure gauge.
14. Tighten the screw on the measuring nipple (1).
15. Open the gas isolator cock.
16. Check the measuring nipple for gas tightness.

Conditions: Gas flow pressure not in the permissible range



Caution.

Risk of material damage and operating faults caused by incorrect gas connection pressure.

If the gas connection pressure lies outside the permissible range, this can cause operating faults in and damage to the product.

- ▶ Do not make any adjustments to the product.
- ▶ Do not start up the product.

- ▶ If you cannot correct the failure, notify the gas supply company and proceed as follows:
- ▶ End the check programme **P.01**.
- ▶ Allow the boiler to cool down by allowing pump overrun to operate for a minimum of two minutes.
- ▶ Close the gas isolator cock.
- ▶ Remove the pressure gauge and retighten the sealing screw (1) for the measuring nipple.
- ▶ Open the gas isolator cock.
- ▶ Check the measuring nipple for gas tightness.
- ▶ Close the gas isolator cock.
- ▶ Install the front casing.
- ▶ Disconnect the product from the power mains.
- ▶ You must not start up the boiler.

Conditions: Gas flow pressure in the permissible range

- ▶ End the check programme **P.01**.
- ▶ Allow the boiler to cool down allowing pump overrun to operate for a minimum of two minutes.
- ▶ Close the gas isolator cock.
- ▶ Remove the pressure gauge and retighten the sealing screw (1) for the measuring nipple.
- ▶ Open the gas isolator cock.

7 Start-up

- ▶ Check the measuring nipple for gas tightness.
- ▶ Install the front casing.
- ▶ Reset boiler controls for normal operation.
- ▶ Record the appliance gas inlet working pressure (kPa resp. mbar) in the Benchmark gas boiler commissioning checklist.

7.15.4 Checking the CO₂ content



Caution.

Risk of operating faults caused by the corruption of the measured values during the calibration.

Operating the product with the front casing open or not completely installed, or with the flue pipe open, may negatively influence the calibration of the gas-air mixture.



- ▶ During the calibration and when measuring the CO₂ content, you must operate the product with the front casing installed and closed, and with the flue pipe completely installed.

1. Start up the product.



Note

Since the combustion can be continuously monitored by the product, you do not need to check the combustion.

2. Press  and  at the same time to activate the maximum output operation.
 - ◁ The display shows **Chimney sweep** and **S.93** at the same time.
 - ◁ The product runs through a calibration process on the flue gas installation and the gas quality.
3. Wait until the calibration process has taken place.
 - ◁ After the calibration procedure ends, the display shows **Chimney sweep** and **S.04** at the same time.
4. Now measure the CO₂ content at the flue gas analysis point.
 - ◁ The product restarts the measuring programme after the burner has been operating for five minutes so that it can take heating effects into consideration.
 - ◁ The combustion automatically optimises itself. CO₂ content of 8.0 to 10.5 vol.% (natural gas) and of 9.0 to 11.8 vol.% (liquid gas) can be measured.
 - ◁ CO value at full load: ≤ 250 ppm, CO/CO₂: 0.0031



Note

After initial start-up or starting the check programmes **P.04** and **P.14**, depending on the heating partial load that is set and the existing heat consumption by the heating installation, it may be the case that the product runs through the measuring programme several times. During the calibration process, no flue gas analysis is possible.

7.16 Checking leak-tightness

- ▶ Check the gas line, the heating circuit and the hot water circuit for leak-tightness.
- ▶ Check that the air/flue pipe has been installed correctly.

Conditions: Room-sealed operation

- ▶ Check whether the vacuum chamber has been sealed so that it is leak-tight.

7.16.1 Checking the heating mode

1. Make sure that there is a heat requirement.
2. Call up **Live monitor**.
 - ◁ If the product is working correctly, the display shows **S.04**.

7.16.2 Checking the hot water generation

1. Open a hot water valve all the way.
2. Call up the **Live Monitor**.
 - ◁ If hot water generation is working correctly, the display shows **S.24**.

7.17 Thoroughly flushing the heating installation ("hot")

1. Operate the appliance until the boiler and the heating system are up to temperature.
2. Check the heating system for leaks.
3. Connect a hose to the drain valve located at the lowest position of the heating system.
4. Shut off the boiler, open the drain valve and all purge valves on the radiators and allow the water to flow out of the heating system and the boiler quickly and fully.
5. Close the drain valve.
6. Fill the heating system again with water as described in Filling the heating installation (→ Page 20) and Purging the heating installation (→ Page 21).
7. Re-fill the system until the system design pressure of 0,1 MPa (1,0 bar) is attained.



Note

The actual reading on the digital pressure gauge should ideally be 0,05 MPa (0,5 bar) plus an additional pressure corresponding to the highest point of the system above the base of the boiler – 10 m head equals an additional 1 bar reading on the pressure gauge. The minimum pressure should not be less than 0,1 MPa (1 bar) in any installation. If the system is to be treated with an inhibitor it should be applied at this stage in accordance with the manufacturer's instructions. Further information can be obtained from Sentinel, Betz Dearborn Ltd., Tel: 0151 420 9595, or Fernox, Alpha– Fry technologies. Tel: 0870 8700362.

8. Install the front casing.

8 Adapting the unit to the heating installation

To reset the most important system parameters, use the **Appliance config.** menu point.

Menu → Installer level → Appliance config.

Or manually relaunch the installation assistant.

Menu → Installer level → Start inst. assistant

8.1 Calling up diagnostics codes

The settings options for more complex systems can be found in the **Diagnostics menu**.

Menu → Installer level → Diagnostics menu

Overview of diagnostics codes (→ Page 37)

You can use the parameters that are marked as adjustable in the overview of diagnostics codes to adapt the product to the heating installation and the needs of the customer.

8.2 Burner anti-cycling time

To prevent frequent switching on and off of the burner and thus prevent energy losses, an electronic restart lockout is activated for a specific period each time the burner is switched off. The burner anti-cycling time is only active for the heating mode. Hot water handling during a burner anti-cycling time does not affect the time function element (default setting: 20 mins).

8.2.1 Setting the burner anti-cycling time

1. Navigate to **Menu → Installer level → Diagnostics menu → D.002 Max. anti-cycl. time: Heating** and confirm by pressing .
2. Set the burner anti-cycling time and confirm by pressing .

T _{Flow} (target) [°C]	Set maximum burner anti-cycling time [min]						
	1	5	10	15	20	25	30
30	2.0	4.0	8.5	12.5	16.5	20.5	25.0
35	2.0	4.0	7.5	11.0	15.0	18.5	22.0
40	2.0	3.5	6.5	10.0	13.0	16.5	19.5
45	2.0	3.0	6.0	8.5	11.5	14.0	17.0
50	2.0	3.0	5.0	7.5	9.5	12.0	14.0
55	2.0	2.5	4.5	6.0	8.0	10.0	11.5
60	2.0	2.0	3.5	5.0	6.0	7.5	9.0
65	2.0	1.5	2.5	3.5	4.5	5.5	6.5
70	2.0	1.5	2.0	2.5	2.5	3.0	3.5
75	2.0	1.0	1.0	1.0	1.0	1.0	1.0

T _{Flow} (target) [°C]	Set maximum burner anti-cycling time [min]					
	35	40	45	50	55	60
30	29.0	33.0	37.0	41.0	45.0	49.5
35	25.5	29.5	33.0	36.5	40.5	44.0
40	22.5	26.0	29.0	32.0	35.5	38.5
45	19.5	22.5	25.0	27.5	30.5	33.0
50	16.5	18.5	21.0	23.5	25.5	28.0

T _{Flow} (target) [°C]	Set maximum burner anti-cycling time [min]					
	35	40	45	50	55	60
55	13.5	15.0	17.0	19.0	20.5	22.5
60	10.5	11.5	13.0	14.5	15.5	17.0
65	7.0	8.0	9.0	10.0	11.0	11.5
70	4.0	4.5	5.0	5.5	6.0	6.5
75	1.0	1.0	1.0	1.0	1.0	1.0

8.2.2 Resetting the remaining burner anti-cycling time

1. Alternatives 1 / 2

- ▶ Navigate to **Menu → Reset anti-cycl. time.**

◀ The current burner anti-cycling time appears in the display.

- ▶ Press to reset the burner anti-cycling time.

1. Alternatives 2 / 2

- ▶ Press the **Fault clearance** button.


8.3 Setting the maintenance interval

1. Navigate to **Menu → Installer level → Diagnostics menu → D.084 Maintenance in** and confirm by pressing .
2. Set the maintenance interval (operating hours) until the next maintenance work is due and confirm by pressing .

Heat demand	Number of persons	Guideline value for burner operating hours until the next inspection/maintenance work is due for an average operating time of one year (dependent upon the system type)
5.0 kW	1 - 2	1050 h
	2 - 3	1150 h
10.0 kW	1 - 2	1500 h
	2 - 3	1600 h
15.0 kW	2 - 3	1800 h
	3 - 4	1900 h
20.0 kW	3 - 4	2600 h
	4 - 5	2700 h
25.0 kW	3 - 4	2800 h
	4 - 6	2900 h
> 27.0 kW	3 - 4	3000 h
	4 - 6	3000 h

8 Adapting the unit to the heating installation

8.4 Setting the pump output

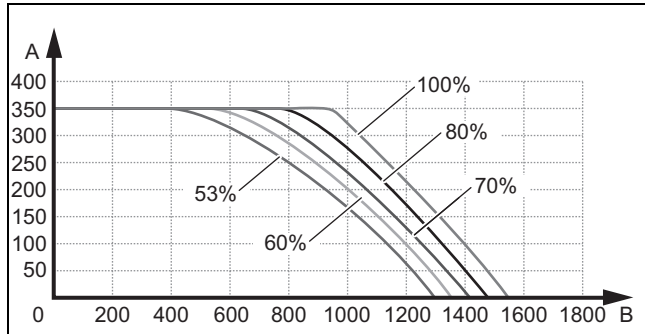
1. Navigate to **Menu** → **Installer level** → **Diagnostics menu** → **D.014 Pump speed target value** and confirm by pressing .
2. Set the required pump output.

Conditions: Low loss header installed

- ▶ Switch off the speed regulation and set the pump output to a fixed value.

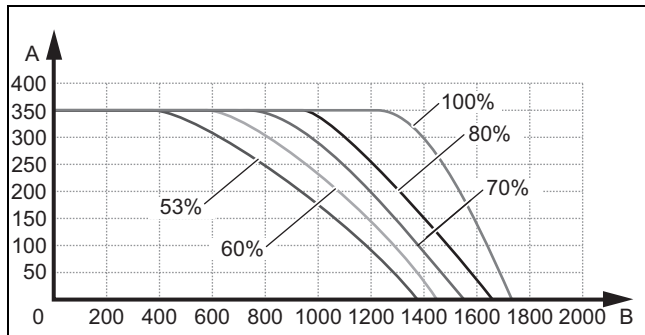
8.5 Remaining feed head of the pump

8.5.1 Pump characteristic line 835 (VUW 356/5-7)



A Remaining feed head [hPa (mbar)] B System volume flow [l/h]

8.5.2 Pump characteristic line 843 (VUW 436/5-7)



A Remaining feed head [hPa (mbar)] B System volume flow [l/h]

8.6 Setting the bypass valve



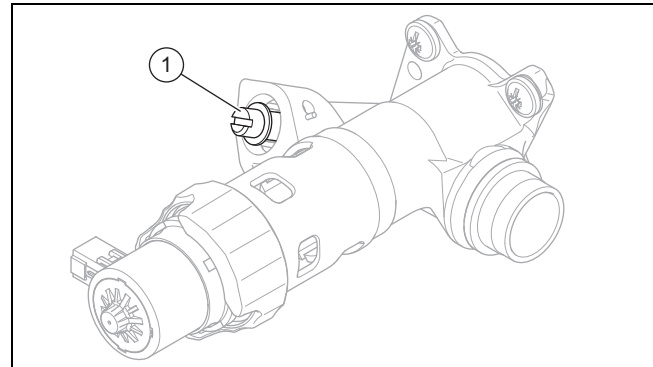
Caution.

Risk of material damage caused by incorrect setting of the high-efficiency pump

If the pressure at the bypass valve is increased (by turning it clockwise) and the pump output is set to less than 100%, the product may not operate correctly.

- ▶ In this case, set the pump output to 5 = 100% using diagnostics code D.014.

- ▶ Remove the front casing. (→ Page 11)



- ▶ Regulate the pressure using the adjusting screw (1).

Position of the adjusting screw	Pressure in MPa (mbar)	Notes/application
Right-hand stop (turned all the way down)	0.035 (350)	If the radiators do not heat up sufficiently at the default setting. In this case, you must set the pump to the maximum speed.
Mid-position (5 turns to the left)	0.025 (250)	Default setting
5 further turns to the left from the mid-position	0.017 (170)	If noises are produced in the radiators or radiator valves


- ▶ Install the front casing.

8.7 Handing the product over to the operator

- ▶ When you have finished the installation, affix the enclosed sticker (which requests that the user reads the instructions) to the front of the product in the operator's language.
- ▶ Explain to the operator how the safety devices work and where they are located.
- ▶ Inform the operator how to handle the product.
- ▶ In particular, draw attention to the safety information which the operator must follow.
- ▶ Inform the operator of the necessity to have the product maintained according to the specified intervals.
- ▶ Pass all of the instructions and documentation for the product to the operator for safe-keeping.
- ▶ Inform the operator about measures taken to ensure the supply of combustion air and flue gas guiding, and instruct the operator that he must not make any changes.
- ▶ Inform the operator that they must not store or use explosive or highly flammable substances (such as petrol, paper or paint) in the installation room of the product.
- ▶ Complete and sign off the Benchmark commissioning check list.
- ▶ Complete and sign off the guarantee documentation.

9 Troubleshooting

9.1 Comfort safety mode for the heat cell

Conditions: Neither  nor a fault code **F.xx** are shown in the display

Unusual operating noises are emitted from the heat cell in the product.


- ▶ Check whether **S.40** is displayed in **Live monitor**.

If **S.40** is displayed, the product is in a temporary test mode, which it again exits automatically.

Conditions:  is displayed.

The **Live monitor** shows **S.40** and **D.118** is at 0. The heat cell is in permanent comfort safety mode. This is not caused by the all-gas sensor.

- ▶ Check the combustion.

Conditions:  and **F.55** are displayed

The **Live monitor** shows **S.40** and **D.118** ≥ 1 . The heat cell is in permanent comfort safety mode.

- ▶ Check and, if required, replace the all-gas sensor.

9.2 Checking service messages

- ▶ To obtain further information, call up the **Live monitor**. (→ Page 17)

Conditions: **S.40** is displayed

The product is in Comfort protection mode. The product has detected a temporary fault and continues to run with restricted comfort. The product switches back to the normal operating mode.

- ▶ To establish whether or not a component is defective, read the fault memory. (→ Page 27)




Note

If no fault message is present, the product will automatically switch back to normal operating mode after a certain time.

Conditions: **S.86** is displayed

The product remains in comfort safety mode and does not switch back to normal operating mode.

- ▶ Check the component that is mentioned and, if required, replace it.
- ▶ To establish whether or not a component is defective, read the fault memory (→ Page 27).


 appears if you have set a maintenance interval, for example, and this has passed or a service message is issued.

9.3 Rectifying faults

- ▶ If fault messages (**F.XX**) appear, rectify the fault by referring to the table in the appendix or using the Function menu (→ Page 31) and the Check programmes (→ Page 19).





Overview of fault codes (→ Page 44)

If several faults occur at the same time, the display shows the corresponding fault messages for two seconds each in alternation.




- ▶ Press  (max. three times) to restart the product.
- ▶ If you are unable to remedy the fault and the fault recurs despite fault clearance attempts, contact customer service.

9.4 Calling up/clearing the fault memory

If faults have occurred, the last ten (max.) fault messages are available in the fault memory.

- ▶ Navigate to **Menu** → **Installer level** → **Fault list** and confirm by pressing .
 - ◀ The display shows the number of faults that have occurred, the fault numbers and the corresponding plain text display.
- ▶ Press  or  to call up individual fault messages.
- ▶ Press  twice to delete the fault list.

9.5 Resetting parameters to factory settings

1. Navigate to **Menu** → **Installer level** → **Diagnostics menu** → **D.096 Reset to factory settings?** and confirm by pressing .
2. Press  to set the value to 1 and confirm by pressing .

9.6 Preparing the repair work

1. Temporarily decommission (→ Page 33) the product.
2. Disconnect the product from the power mains.
3. Remove the front casing. (→ Page 11)
4. Close the service valves in the heating flow, in the heating return and in the cold water pipe.
5. Drain the product (→ Page 33) if you want to replace any of the product's water-bearing components.
6. Make sure that water does not drip on live components (e.g. the electronics box).
7. Use only new seals.

9.6.1 Procuring spare parts

The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may void the conformity of the product and it will therefore no longer comply with the applicable standards.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the reverse of these instructions.

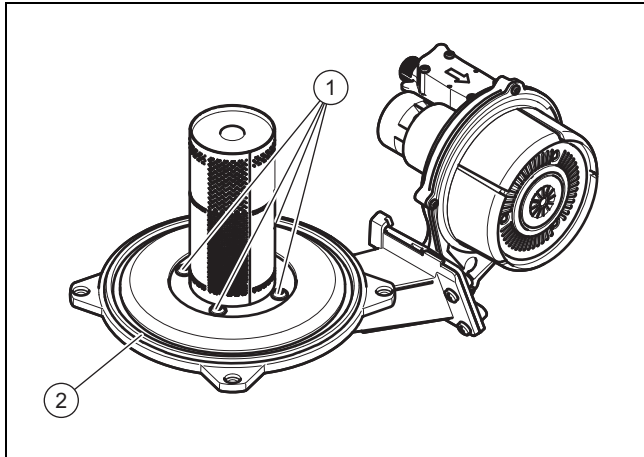
9 Troubleshooting

- ▶ If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

9.7 Replacing defective components

9.7.1 Replacing the burner

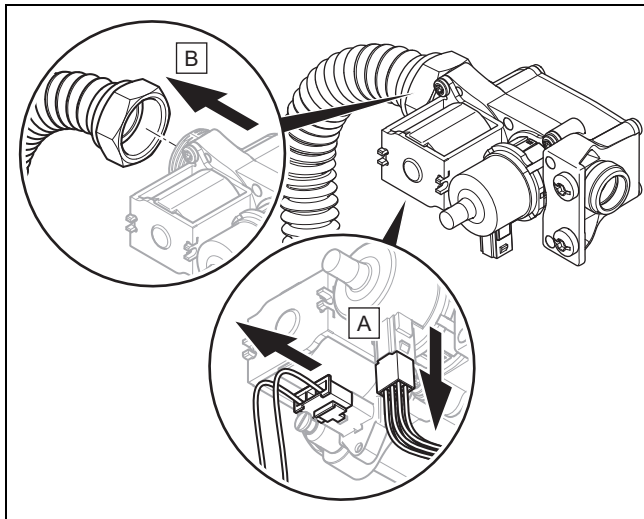
1. Remove the compact thermal module. (→ Page 31)



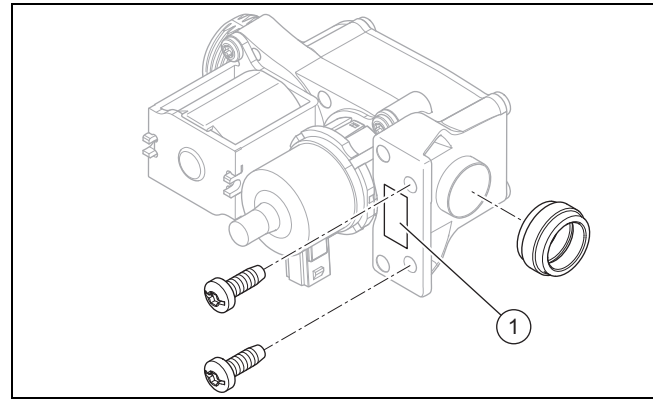
2. Undo the four screws (1) on the burner.
3. Remove the burner.
4. Install a new seal (2) on the new burner.
5. Install the compact thermal module. (→ Page 32)



9.7.2 Replacing the gas valve

1. Switch off heating mode and hot water generation (→ Operating instructions).



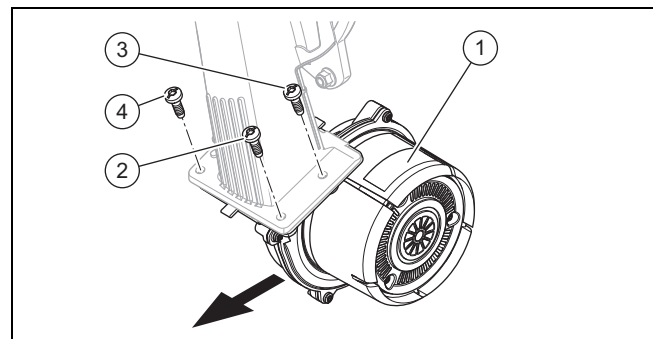
2. Remove the air intake pipe.
3. Remove the plugs from the gas valve.
4. Unscrew the cap nut from the gas valve.



5. Unscrew both screws to secure the gas valve to the fan.
6. Reinstall the new gas valve in the reverse order. Use new seals for this.
7. Read the offset value (1) that is imprinted on the new gas valve.
8. After installing the new gas valve, carry out a leak-tightness test (→ Page 24).
9. Close the front casing.
10. Switch on the product.
11. Navigate to **Menu** → **Installer level** → **Diagnostics menu** → **D.052 Min. gas valve steps offset** and confirm by pressing .
12. Enter the offset value that you read off and confirm by pressing .
13. Carry out initial start-up. (→ Page 22)

9.7.3 Replacing the fan

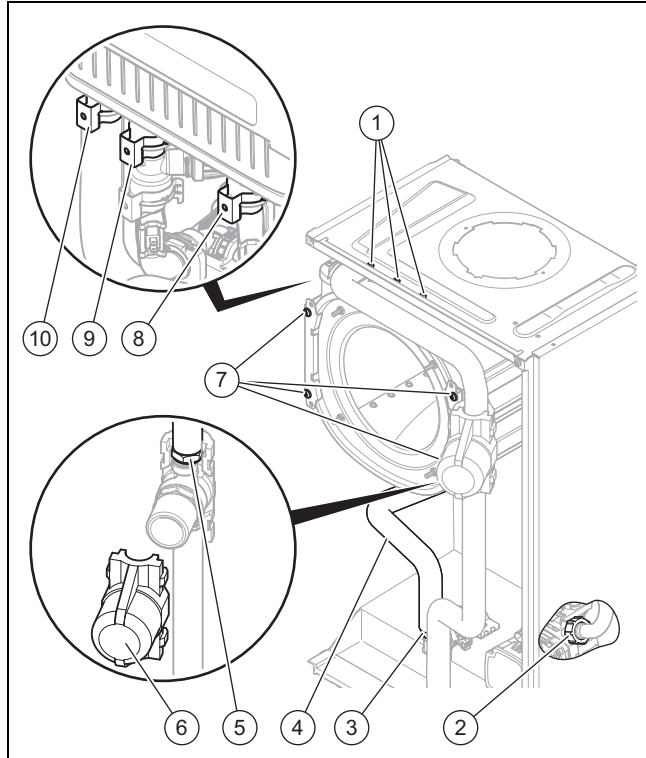
1. Remove the air intake pipe.
2. Remove the gas valve (→ Page 28).



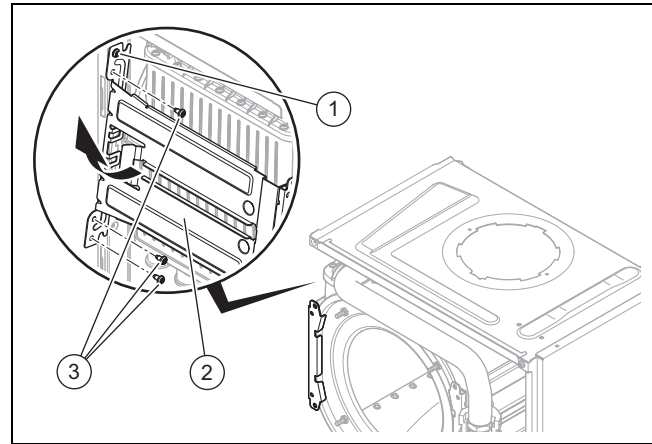
3. Remove all plugs from the fan (1).
4. Unscrew the three screws between the mixture pipe and the fan flange.
5. Replace the defective fan.
6. Reinstall the new fan in the reverse order. You must use new seals for this. Ensure that the order in which the three screws are screwed in between the fan and the mixture pipe corresponds to the numbering (2), (3) and (4).

9.7.4 Replacing the heat exchanger

1. Drain the product. (→ Page 33)
2. Remove the compact thermal module. (→ Page 31)
3. Remove the left side section.
4. Detach the condensate drain hose from the heat exchanger.



5. Remove the clamps on the hot water connection (10), on the return connection (9) and on the flow connection (8).
6. Unscrew the cap nut (3) on the hot water pipe to the secondary heat exchanger. Remove the hot water pipe (4) from the connection on the heat exchanger and take it out of the product. Ensure that you do not damage the heat insulation.
7. Undo the cap nut (2) on the pump's return connection and remove the pipe from the return connection on the heat exchanger.
8. Remove the pipe from the flow connection on the heat exchanger.
9. Remove the water hammer arrester's casing (6).
10. Unscrew the cap nut (5) on the cold water pipe above the water hammer arrester.
11. Remove the screws (1) on the support plate for the heat exchanger on the casing top.
12. Remove two screws (7) on each of the two retainers.
13. Remove the all-gas sensor. (→ Page 30)



14. Remove the lower three screws (3) on the rear section of the retainer on the left.
15. Support the heat exchanger and swing the retainer (2) to the side around the top screw (1).
16. Pull the heat exchanger downwards and to the left, and remove it from the product.
17. Push the new heat exchanger into the air/flue gas connection from above.
18. Push the heat exchanger into the groove in the retainer on the right and swing the retainer on the left back into its original position.
 - ◀ The heat exchanger is now held in place by the guides in the two retainers.
19. Install the two front clamps on the retainers and then fit the screws you removed in the retainer on the left (always work in this order).
20. Install all the connections and the all-gas sensor in the reverse order.
21. Replace the seals and install the water hammer arrester's casing.



Note

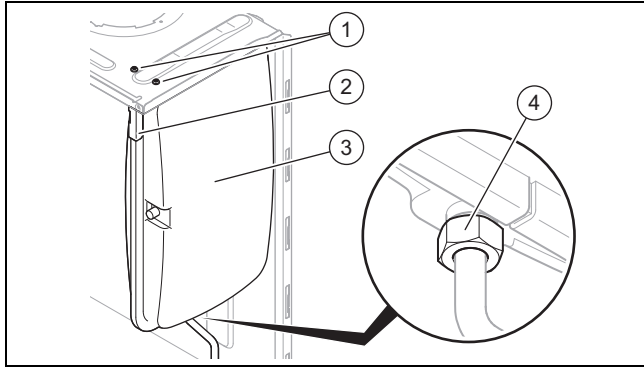
To make the installation easier, use only the lubricant that may be included with the Vaillant spare part. If no lubricant is included with the Vaillant spare part, use only water or commercially available soft soap.

22. Ensure that the clamps on the heat exchanger's connections are seated correctly.
23. Install the compact thermal module. (→ Page 32)
24. Install the left-hand side section.
25. Fill (→ Page 20) and purge (→ Page 21) the product and, if required, the heating installation.

9.7.5 Replacing the expansion vessel

1. Drain the product. (→ Page 33)
2. Remove the right side section.

9 Troubleshooting



3. Undo the screwed connection (4).
4. Remove both screws (1) on the support plate (2).
5. Remove the support plate (2).
6. Pull out the expansion vessel (3) towards the front.
7. Insert the new expansion vessel into the product.
8. Screw the new expansion vessel to the water connection. Use a new seal for this.
9. Attach the support plate using both screws (1).
10. Install the right side section.
11. Fill (→ Page 20) and purge (→ Page 21) the product and, if required, the heating installation.

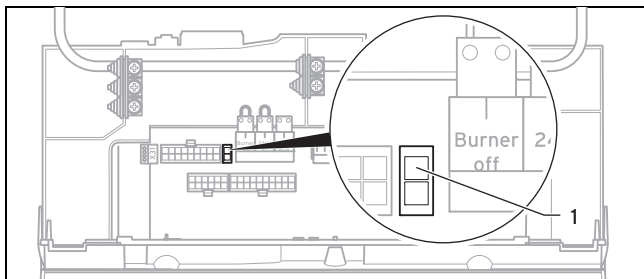
9.7.6 Replacing the PCB or the display



Note

If you only replace one component, when the product is switched on, the new component adopts the parameters that were previously set from the component that was not replaced.

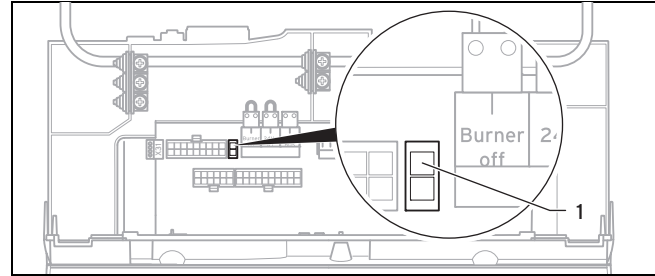
1. Open the electronics box. (→ Page 15)
2. Replace the PCB or display according to the assembly and installation instructions supplied.





3. If you are replacing the PCB, remove the coding resistance (1) (plug X24) from the old PCB and plug the plug into the new PCB.
4. Close the electronics box.

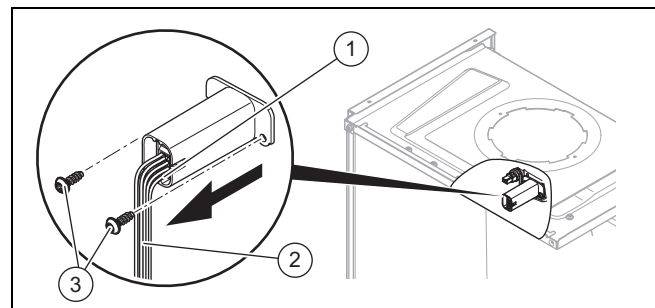
9.7.7 Replacing the PCB and the display

1. Open the electronics box. (→ Page 15)
2. Replace the PCB and display according to the assembly and installation instructions supplied.



3. Remove the coding resistance (1) (plug X24) from the old PCB and plug the plug into the new PCB.
4. Close the electronics box.
5. Press the on/off button on the product. (→ Page 17)
 - ◁ After switching on, the product switches directly to the menu to select the language. The default language setting is English.
6. Select the required language and confirm by pressing .
 - ◁ You are automatically taken to **D.093** to set the device specific number.
7. Remove the correct value for the relevant product type from the technical data in the appendix, and press  to confirm.
 - ◁ The electronics are now set to the product type and the parameters of all diagnostics codes are set to default settings.
 - ◁ The installation assistant starts. (→ Page 17)
8. Make the system-specific settings.

9.7.8 Replacing the all-gas sensor



1. Remove the air intake pipe; see Removing the compact thermal module (→ Page 31).
2. Undo the screws (3) just enough so that you can pull out the all-gas sensor by the cable (2).
3. Remove the plug (1) by pushing in the latching lug.
4. Reinstall the new all-gas sensor in the reverse order.

9.8 Completing repair work

1. Establish the power supply.
2. Switch the product back on if this has not yet been done. (→ Page 17)
3. Install the front casing.
4. Open all service valves and the gas isolator cock.
5. Check that it works correctly and is leak-tight. (→ Page 24)

10 Inspection and maintenance

- ▶ Adhere to the minimum inspection and maintenance intervals. The inspection may require maintenance to be carried out earlier, depending on the results.
Inspection and maintenance work – Overview (→ Page 50)

10.1 Function menu

Menu → Installer level → Test programs → Function menu

The function menu allows you to actuate and test individual components in the heating installation.

Display	Test programme	Action
T.01	Check internal pump	Switch the internal pump on and off.
T.02	Check 3-way valve	Move the diverter valve to the heating position or to the hot water position.
T.03	Check fan	Switch the fan on and off. The fan runs at maximum rotational speed.
T.04	Check cylinder charge pump	Switch the cylinder charging pump on and off.
T.05	Check circulation pump	Switch the circulation pump on and off.
T.06	Check external pump	Switch the external pump on and off.
T.08	Checking the burner	Product starts up and switches to minimum load. The flow temperature is shown in the display.

10.2 Electronics self-test

Menu → Installer level → Test programs → Electronics self-test

You can use the electronics self-test to check the PCB.

10.3 Working on the compact thermal module

10.3.1 Removing the compact thermal module



Note

The compact thermal module consists of four main components:

- Speed-regulated fan,
- Gas valve,
- Burner flange,
- Premix burner.



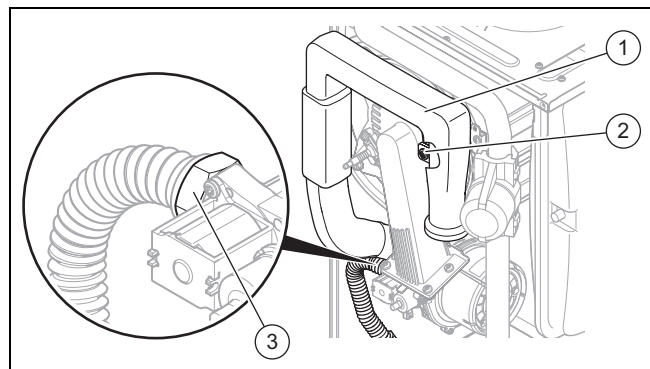
Danger!

Risk of death and risk of material damage caused by hot flue gas.

The seal, insulating mat and self-locking nuts on the burner flange must not be damaged. Otherwise, hot flue gases may escape and cause personal injury and material damage.

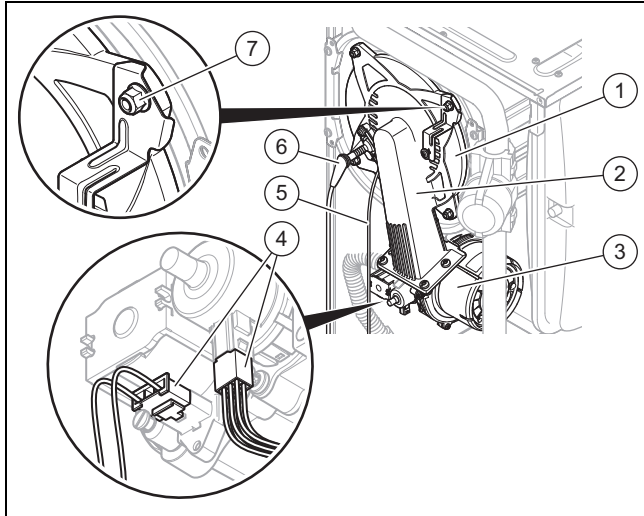
- ▶ Replace the seal each time you open the burner flange.
- ▶ Replace the self-locking nuts on the burner flange each time you open the burner flange.
- ▶ If the insulating mat on the burner flange or on the back wall of the heat exchanger shows signs of damage, replace the insulating mat.

1. Disconnect the product from the power supply.
2. Close the gas isolator cock.
3. Remove the front casing. (→ Page 11)
4. Tilt the electronics box forward.



5. Unscrew the retaining screw (2) and remove the air intake pipe (1) from the intake stub.
6. Unscrew the cap nut from the gas valve (3).

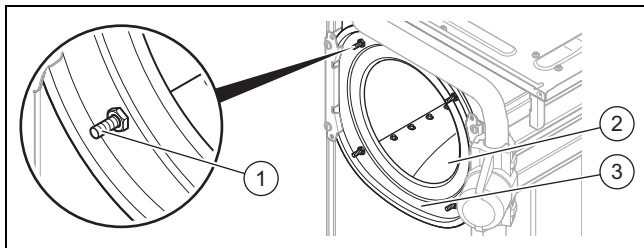
10 Inspection and maintenance



7. Remove the ignition line plug (6) and the earth line plug (5) from the ignition electrode.
8. Remove all plugs from the fan motor (3) by pushing in the latching lug.
9. Remove the two plugs from the gas valve (4).
10. Unscrew the four nuts (7).
11. Remove the entire compact thermal module (2) from the heat exchanger (1).
12. Check the burner and the heat exchanger for damage and dirt.
13. If necessary, clean or replace the components according to the following sections.
14. Fit a new burner flange seal.
15. Check the insulating mat on the burner flange and on the back wall of the heat exchanger. If you notice any signs of damage, replace the relevant insulating mat.

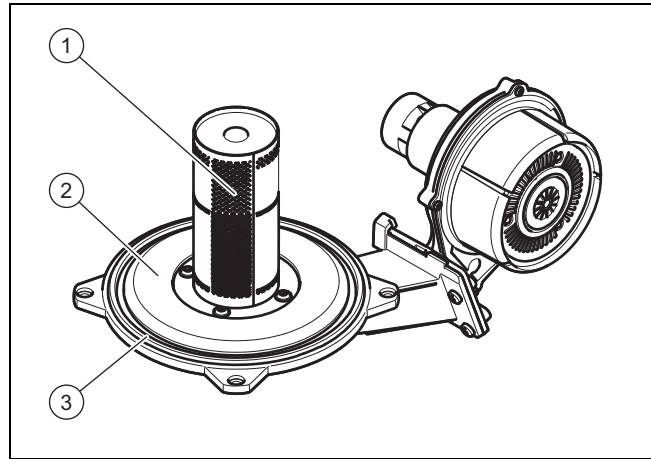
10.3.2 Cleaning the heat exchanger

1. Protect the folded down electronics box against sprayed water.



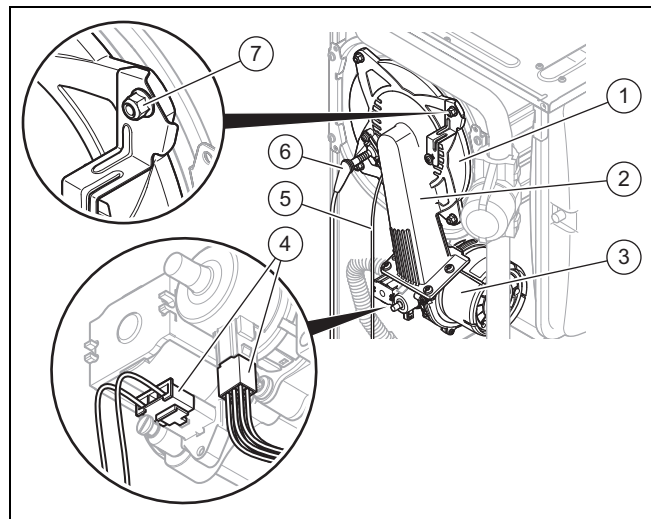
2. Never undo the four nuts on the stud bolt (1) or tighten them.
3. Clean the heating coil (2) of the heat exchanger (3) using water or, if required, vinegar (to a maximum of 5% acid). Allow the vinegar to act on the heat exchanger for 20 minutes.
4. Rinse away any loose dirt with a sharp jet of water or use a plastic brush. Do not point the water jet directly at the insulating mat on the rear of the heat exchanger.
 - ◁ The water flows out of the heat exchanger through the condensate trap.

10.3.3 Checking the burner



1. Check the surface of the burner (1) for damage. If you see any damage, replace the burner.
2. Fit a new burner flange seal (3).
3. Check the insulating mat (2) on the burner flange. If you notice any signs of damage, replace the insulating mat.

10.3.4 Installing the compact thermal module

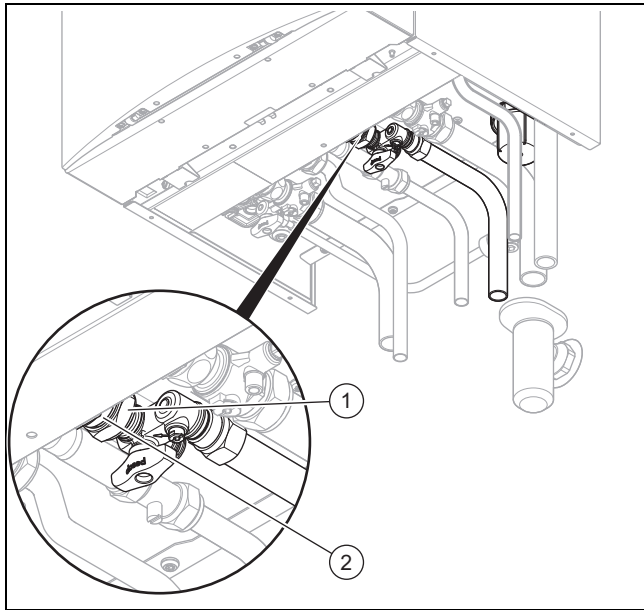


1. Connect the compact thermal module (2) to the heat exchanger (1).
2. Tighten the four nuts (7) in a cross-wise pattern until the burner flange fits closely and uniformly onto the mating surfaces (if a torque spanner is available, set at 6 Nm).
3. Reconnect the plug (4) to the gas valve.
4. Reconnect the plug (5) for the earth line and the plug (6) for the ignition line.
5. Reconnect all of the plugs to the fan motor (3).
6. Connect the gas line using a new seal. In the process, secure the gas pipe against twisting.
7. Open the gas isolator cock.
8. Make sure that there are no leaks.
9. Check that the sealing ring in the air intake pipe is positioned correctly in the seal seat.
10. Reconnect the air intake pipe to the intake nozzle.
11. Secure the air intake pipe with the retaining screw.
12. Check the gas flow pressure. (→ Page 23)

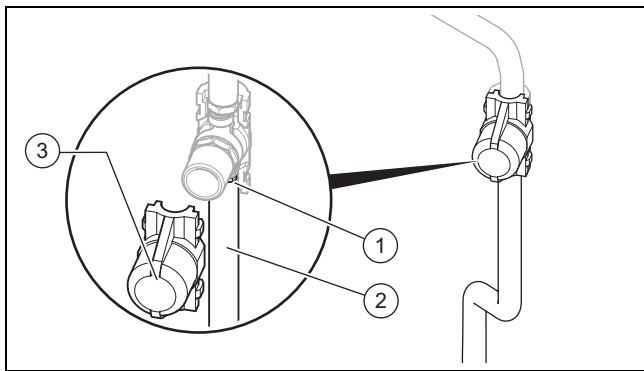
10.4 Cleaning the condensate trap

1. Remove the lower section from the condensate trap.
2. Flush out the lower section with water.
3. Fill the lower section:
 - VUW 356/5-7: With water until around 10 mm below the upper edge
 - VUW 436/5-7: With water until two-thirds full
4. Attach the lower section to the condensate trap.

10.5 Cleaning the filter in the cold water inlet



1. Close the cold water stop valve.
2. Drain the product on the hot water side.
3. Unscrew the cap nut (1) and the lock nut (2) from the product's casing.
4. Tilt the electronics box forward.



5. Remove the water hammer arrester's casing (3).
6. Unscrew the cap nut (1) underneath the water hammer arrester.
7. Remove the pipe (2) from the product.
8. Ensure that you do not damage the heat insulation on the pipe.
9. Rinse the filter under a jet of water, holding it against the direction of flow.
10. If the filter is damaged or it can no longer be cleaned sufficiently, you must replace the filter.
11. Refit the pipe.
12. Always use new seals.

13. Retighten the cap nut on the water hammer arrester and fit the casing.
14. Retighten the cap nuts and the lock nuts on the cold water inlet.
15. Open the cold water stop valve.

10.6 Draining the product

1. Close the service valves of the product.
2. Start the check programme **P.06** (diverter valve mid-position).
3. Open the drain valves.
4. Make sure that the cap of the automatic air vent on the internal pump is open so that the product can be drained fully.

10.7 Checking the pre-charge pressure for the internal expansion vessel

1. Close the service valves and drain the product.
2. Measure the pre-charge pressure of the expansion vessel at the vessel valve.

Conditions: Pre-charge pressure < 0.075 MPa (0.75 bar)

- ▶ Ideally, you should top up the expansion vessel with nitrogen. Otherwise, top it up with air. Ensure that the drain valve is open when topping up.
3. If water escapes from the valve of the expansion vessel, you must replace the expansion vessel (→ Page 29).
 4. Fill the heating installation. (→ Page 20)
 5. Purge the heating installation. (→ Page 21)

10.8 Completing inspection and maintenance work

- ▶ Check the gas flow pressure. (→ Page 23)
- ▶ Check the CO₂ content. (→ Page 24)
- ▶ If required, reset the maintenance interval. (→ Page 31)
- ▶ Check that the product is leak-tight. (→ Page 24)
- ▶ Install the front casing.
- ▶ Fill out the relevant Service Record section in the Benchmark Checklist.

11 Decommissioning

11.1 Temporarily decommissioning the product

- ▶ Press the on/off button.
 - ◀ The display goes out.
- ▶ Close the gas isolator cock.
- ▶ For products with hot water generation and products with a connected domestic hot water cylinder, you must also close the cold water stop valve.

12 Recycling and disposal

11.2 Decommissioning the product

- ▶ Press the on/off button.
 - ◀ The display goes out.
- ▶ Disconnect the product from the power mains.
- ▶ Close the gas isolator cock.
- ▶ Close the cold water stop valve.
- ▶ Drain the product. (→ Page 33)

12 Recycling and disposal

Disposing of the packaging

- ▶ Dispose of the packaging correctly.
- ▶ Observe all relevant regulations.

13 Customer service

To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement. Please contact Vaillant Service Solutions for further details:

Telephone: 0330 100 3461

Appendix

A Installer level – Overview

Setting level	Values		Unit	Increment, select, explanation	Default setting
	Min.	Max.			
Installer level →					
Enter code	00	99	–	1 (competent person code 17)	–
Installer level → Fault list →					
F.XX – F.XX ¹	Current value		–	–	–
Installer level → Test programs → Check programs →					
P.00 Purging	–	–	–	Yes, No	–
P.01 Maximum load	–	–	–	Yes, No	–
P.02 Minimum load	–	–	–	Yes, No	–
P.04 Reset eGas CH	–	–	–	Yes, No	–
P.06 Filling mode	–	–	–	Yes, No	–
P.14 Reset eGas DHW	–	–	–	Yes, No	–
Installer level → Test programs → Function menu →					
T.01 Internal pump	–	–	–	On, Off	–
T.02 3-way valve	–	–	–	On, Off	–
T.03 Fan	–	–	–	On, Off	–
T.04 Cylinder charging pump	–	–	–	On, Off	–
T.05 Circulation pump	–	–	–	On, Off	–
T.06 External pump	–	–	–	On, Off	–
T.08 Burner	–	–	–	On, Off	–
Installer level → Test programs → Electronics self-test →					
Self-test	–	–	–	Yes, No	–
Installer level → Appliance config. →					
Language	–	–	–	Languages available for selection	Country-specific
Target flow temp.	30	75	°C	1	–
DHW temperature	30	60	°C	1 Product with hot water generation or connected domestic hot water cylinder	–
Green iQ	–	–	–	On, Off	On
Auxiliary relay	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
¹ Fault lists are only displayed, and can only be deleted, if faults have occurred.					

Appendix

Setting level	Values		Unit	Increment, select, explanation	Default setting
	Min.	Max.			
Accessory relay 1	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
Accessory relay 2	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
Heating partial load	–	–	kW	Partial load only, full load only, auto	Auto
Contact details	Phone number	–	–	0 – 9	Auto
Factory setting	–	–	–	On, Off	–
Installer level → Diagnostics menu →					
D.XXX - D.XXX	Current value	–	–	–	–
Installer level → Start inst. assistant →					
Language	–	–	–	Languages available for selection	Country-specific
Filling mode: 3-way valve is in mid-position	0	2	–	0 = Normal operating mode 1 = Mid-position (parallel operation) 2 = Permanent heating mode position	–
Purge program: Select circ. using +/-	–	–	–	Automatic adaptive purging of the heating circuit and hot water circuit Not active Active	–
Target flow temp.	30	75	°C	1	–
DHW temperature	35	60	°C	1 Product with hot water generation	–
Green iQ	–	–	–	On, Off	On
Heating partial load	–	–	kW	Partial load only, full load only, auto	Auto
Auxiliary relay	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
*Fault lists are only displayed, and can only be deleted, if faults have occurred.					

Setting level	Values		Unit	Increment, select, explanation	Default setting
	Min.	Max.			
Accessory relay 1	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
Accessory relay 2	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2
Set the type of gas	0	2	–	0: Natural gas 1: Propane 50 mbar 2: Propane 30/37 mbar	–
Contact details	Phone number		–	0-9	–
End the installation assistant?	–	–	–	Yes, No	–
*Fault lists are only displayed, and can only be deleted, if faults have occurred.					

B Overview of diagnostics codes

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.000	Heating partial load	Output-range-specific		kW	Adjustable heating partial load Auto: Product automatically adjusts max. partial load to current system demand	Auto	
D.001	Pump overrun: Heating	1	60	min	Overrun time of internal heating pump for heating mode 1	5	
D.002	Max. anti-cycl. time: Heating	2	60	min	Max. burner anti-cycling time heating at 20 °C flow temperature 1	20	
D.003	Outlet temperature actual value	Current value		°C	–	–	Not adjustable
D.004	Cylinder temperature actual value	Current value		°C	Measured value of hot water sensor	–	Not adjustable
D.005	Heating target flow temperature	Current value		°C	Flow temperature target value (or return target value)	–	Not adjustable
D.006	Outlet temperature target value	Current value		°C	Hot water temperature target value (only products with integrated hot water generation)	–	Not adjustable
D.007	Cylinder temperature target value Comfort mode target value	Current value		°C	Only products with integrated hot water generation Only products with no integrated hot water generation and with a connected cylinder	–	Not adjustable

Appendix

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.008	Controller 3-4	Current value		–	0: Open (Room thermostat at terminal RT open = No heat requirement) 1: Closed (Room thermostat at terminal RT closed = Heat requirement)	–	Not adjustable
D.009	eBUS controller target value	Current value		–	Target value from external eBUS controller	–	Not adjustable
D.010	Internal pump	Current value		–	0: Off 1: On	–	Not adjustable
D.011	External pump	Current value		–	0: Off 1: On	–	Not adjustable
D.012	Cyl. charging pump	Current value		–	0: Off 1: On	–	Not adjustable
D.013	Circulation pump	Current value		–	0: Off 1: On	–	Not adjustable
D.014	Pump speed target value	Current value		%	Target value of internal high-efficiency pump. Possible settings: 0 = Auto 1 = 53 2 = 60 3 = 70 4 = 85 5 = 100	0 = Auto	
D.015	Pump speed actual value	Current value		%	High-efficiency pump	–	Not adjustable
D.016	Controller 24 V DC: Heating mode	Current value		–	Heating mode 0: Off 1: On	–	Not adjustable
D.017	Control type	0	1	–	Heating flow/return temperature control changeover 0: Flow 1: Return (conversion for underfloor heating) If you have activated the return temperature control, the function for automatically limiting the heating output using the volume flow remains active. The heating partial load that is selected under D.000 (auto = max.) continues to be the upper limit.	0	
D.018	Pump operating mode	1	3	–	Setting 1 = Comfort (continuously operating pump) The internal pump is switched on when the heating flow temperature is not at Heating off and the heat requirement is enabled via an external controller 3 = Eco (intermittently operating pump) Internal pump is switched on every 25 minutes for 5 minutes once the overrun time has elapsed	3	
D.020	Max. DHW temperature target value	50	70	°C	Max. setting for cylinder target value 1	65	
D.022	DHW demand	Current value		–	Hot water requirement via C1/C2, impeller or APC 0: Off 1: On	–	Not adjustable

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.023	Heating mode status	Current value		–	Summer/winter mode (heating off/on) 0: Blocked 1: Released	–	Not adjustable
D.024	Air pressure sensor actual value	Current value		Pa	–	–	Not adjustable
D.025	Ext. eBUS signal: Cylinder charging	Current value		–	Hot water generation enabled by eBUS controller 0: Off 1: On	–	Not adjustable
D.026	Auxiliary relay	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2	
D.027	Accessory relay 1	1	10	–	Switching of relay 1 on the VR 40 "2 in 7" multi-functional module 1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2	
D.028	Accessory relay 2	1	10	–	Switching of relay 2 on the VR 40 "2 in 7" multi-functional module 1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Legionella protection pump (not active) 10 = Solar valve (not active)	2	
D.029	Water circulation vol. actual value	Current value		m ³ /h	Actual value: Circulation water quantity for flow rate sensor	–	Not adjustable
D.033	Fan speed target value	Current value		rpm	–	–	Not adjustable
D.034	Fan speed actual value	Current value		rpm	–	–	Not adjustable
D.035	3-way valve position	Current value		–	Position of the diverter valve 0. Heating mode 1: Parallel operation (mid-position) 2: DHW mode	–	Not adjustable

Appendix

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.036	DHW flow rate	Current value		l/min	–	–	Not adjustable
D.039	Solar inlet temp. actual value	Current value		°C	–	–	Not adjustable
D.040	Flow temperature actual value	Current value		°C	–	–	Not adjustable
D.041	Return temperature actual value	Current value		°C	–	–	Not adjustable
D.044	Ionisation value actual value	Current value		–	> 800 = No flame < 400 = Good flame	–	Not adjustable
D.046	Pump mode	0	1	–	0 = Relay with disable facility 1 = PWM with disable facility	0	
D.047	Current outside temperature	Current value		°C	(with Vaillant weather compensator)	–	Not adjustable
D.050	Offset min. speed	0	3000	rpm	Nominal value set in factory	–	
D.051	Offset max. speed	-990	0	rpm	Nominal value set in factory	–	
D.052	Min. gas valve steps offset	0	99	–	The offset is specified at the gas valve. 1	–	
D.058	Solar post-heating	0	3	–	Only products with integrated hot water generation 0 = Solar post-heating deactivated 3 = Hot water activated (min. target value 60 °C)	0	
D.060	Number of safety therm. shut-downs	Current value		–	Number of safety cut-out shut-downs	–	Not adjustable
D.061	No. of shut-downs in ign. flame controller	Current value		–	–	–	Not adjustable
D.064	Avg. ignition time	Current value		s	–	–	Not adjustable
D.065	Max. ignition time	Current value		s	–	–	Not adjustable
D.067	Remaining anti-cycl. time for heating	Current value		min	–	–	Not adjustable
D.068	Number of first start attempts	Current value		–	Unsuccessful ignitions at 1st attempt	–	Not adjustable
D.069	Number of second start attempts	Current value		–	Unsuccessful ignitions at 2nd attempt	–	Not adjustable
D.070	3-way valve operation	0	2	–	0 = Normal operating mode 1 = Mid-position (parallel operation) 2 = Permanent heating mode position	0	
D.071	Max. heating target flow temp.	40	80	°C	Target value maximum heating flow temperature 1	75	
D.072	Pump overrun after cylinder charging	0	10	min	Internal pump 1	2	
D.073	Offset setting for comfort mode	-15	5	K	Only products with integrated hot water generation 1	0	
D.074	Anti-legionella funct. with integrated cyl.	0	1	–	0: Off 1: On	1	
D.075	Max. cylinder charging time	20	90	min	Max. charging time for domestic hot water cylinder without independent control system 1	45	
D.076	Device Specific Number	Current value		–	(Device specific number = DSN)	–	Not adjustable

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.077	DHW partial load	Output-range-specific		kW	Adjustable cylinder charging output	100 %	
D.078	DHW max. flow temperature	55	80	°C	Limit on cylinder charging temperature 1 Note The chosen value must be at least 15 K above the cylinder target value.	75	
D.080	Heating operating hours	Current value		h	–	–	Not adjustable
D.081	DHW operating hours	Current value		h	–	–	Not adjustable
D.082	Heating burner starts	Current value		–	–	–	Not adjustable
D.083	DHW burner starts	Current value		–	–	–	Not adjustable
D.084	Maintenance in	„ – – “	3000	h	Number of hours until the next maintenance 1 " – – " = Deactivated	–	
D.086	Maintenance messages	0	1	–	0: Off 1: On	1	
D.087	Set the type of gas	0	2	–	0: Natural gas 1: Propane 50 mbar 2: Propane 30/37 mbar	–	
D.088	Min. DHW flow rate	0	1	–	Start delay for hot water draw-off detection via impeller (only products with integrated hot water generation) 0 = 1.5 l/hr (no delay) 1 = 3.7 l/hr (2 s delay)	0	
D.089	Ignition gas-air ratio offset	–10	15	%	–	8	
D.090	eBUS controller	Current value		–	0: Not recognised 1: Recognised	–	Not adjustable
D.091	Status DCF77	Current value		–	0: No reception 1: Reception 2: Synchronised 3: Valid	–	Not adjustable
D.092	actoSTOR communication status	Current value		–	actoSTOR module detection 0: Not connected 1: Connection error 2: Connection active	–	Not adjustable
D.093	Adjust Device Specific Number	0	999	–	835 (VUW 356/5-7 (H-GB)) = 211 843 (VUW 436/5-7 (H-GB)) = 212	–	
D.094	Clear fault history	0	1	–	0: No 1: Yes	–	
D.095	Software version: PeBUS participant	Current value		–	0: BMU 1: AI 2: APC 3: SMU	0	
D.096	Reset to factory settings?	0	1	–	0: No 1: Yes	–	

Appendix

Code	Parameter	Values		Unit	Increment, select, explanation	Default setting	Own setting
		Min.	Max.				
D.118	CO sensor fault number	Current value		–	1: Heater short circuit 2: Heater open circuit 3: Heater temperature control fault 4: Heater temperature plausibility check not OK 5: Sensor short circuit/open circuit 6: Reference resistance measurement not OK 7: Sensor impedance too high 8: Standby reference resistance not OK 9: EEPROM error 10: Sensor open circuit 11: Not used 12: Sensor plausibility test fault 13: Electrical power consumption too low 14: Electrical power consumption too high 15: Reference voltage too low 16: Reference voltage too high	–	Not adjustable
D.145	Flue gas monitoring	0	1	–	0: Off 1: On	1	

C Status codes – Overview



Status code	Parameter	Meaning
Heating mode		
S.00	Heating: No heat demand	Heating: No heat demand
S.01	Heating mode: Fan start-up	Heating mode: Fan start-up
S.02	Heating mode: Pump pre-run	Heating mode: Pump pre-run
S.03	Heating mode: Ignition	Heating mode: Ignition
S.04	Heating mode: Burner on	Heating mode: Burner on
S.05	Heating mode: Pump/fan overrun	Heating mode: Pump/fan overrun
S.06	Heating mode: Fan overrun	Heating mode: Fan overrun
S.07	Heating mode: Pump overrun	Heating mode: Pump overrun
S.08	Heating mode: Anti-cycling time	Heating mode: Remaining anti-cycling time
S.09	Heating mode: Measuring program	Heating mode: Measuring program
DHW mode		
S.10	DHW demand	Hot water requirement via flow sensor
S.11	DHW mode: Fan start-up	DHW mode: Fan start-up
S.13	DHW mode: Ignition	DHW mode: Ignition
S.14	DHW mode: Burner on	DHW mode: Burner on
S.15	DHW mode: Pump/fan overrun	DHW mode: Pump/fan overrun
S.16	DHW mode: Fan overrun	DHW mode: Fan overrun
S.17	DHW mode: Pump overrun	DHW mode: Pump overrun
S.19	DHW mode: Measuring program	DHW mode: Measuring program
Comfort mode, warm start or hot water handling mode with actoSTOR		
S.20	DHW demand	DHW demand
S.21	DHW mode: Fan start-up	DHW mode: Fan start-up
S.22	DHW mode: Pump pre-run	DHW mode: Pump pre-run
S.23	DHW mode: Ignition	DHW mode: Ignition
S.24	DHW mode: Burner on	DHW mode: Burner on

Status code	Parameter	Meaning
S.25	DHW mode: Pump/fan overrun	DHW mode: Pump/fan overrun
S.26	DHW mode: Fan overrun	DHW mode: Fan overrun
S.27	DHW mode: Pump overrun	DHW mode: Pump overrun
S.28	DHW anti-cycling time	Hot water burner anti-cycling time
S.29	DHW mode: Measuring program	DHW mode: Measuring program
Others		
S.30	No heat demand: Controller	Room thermostat (RT) is blocking heating mode
S.31	No heat demand: Summer mode	Summer mode active or no heat requirement from eBUS controller
S.32	Waiting time deviation: Fan speed	Waiting period because of fan speed deviation
S.33	Waiting time: Air monitor	Waiting period: Air pressure sensor/switch reports that the pressure signal is too low
S.34	Heating mode: Frost protection	Frost protection mode active
S.36	Target value for ext. controller lower than 20 °C	Reference setting for continuous controller 7-8-9 or eBUS controller is < 20°C and blocks the heating mode
S.37	Waiting time: Deviation in fan speed	Waiting time: Fan failure in operation
S.39	Contact thermostat triggered	"Burner off contact" has responded (e.g. contact thermostat or condensate pump)
S.40	Comfort protection active	Comfort protection mode is active: Product running with limited heating comfort
S.41	Water pressure too high	Water pressure > 2.8 bar
S.42	Flue non-return flap closed	Flue non-return flap response blocks burner operation (only in conjunction with accessory VR40) or condensate pump defective; heat requirement is blocked
S.46	Comfort protection: Minimum load, loss of flame	Comfort protection mode, flame loss at minimum load
S.53	Waiting time: Water shortage	Product is within the waiting period of the modulation block/operation block function as a result of low water pressure (flow/return spread too large)
S.54	Waiting time: Water shortage	Product is within the waiting period of the operation blocking function as a result of low water pressure (temperature gradient)
S.55	Waiting time: CO sensor	Waiting time: CO sensor
S.56	Waiting time: CO limit value exceedance	Waiting time: CO limit value exceedance
S.57	Waiting time: Measuring program	Calibration unsuccessful. Waiting period, comfort safety mode
S.58	Burner modulation limitation	Modulation limitation due to noise/wind
S.59	Waiting time: Water circulation vol.	Minimum circulation water volume
S.76	Service message: Check water pressure	System pressure too low. Top up water.
S.86	Service message: Check vortex sensor	Service message: Check vortex sensor
S.88	Purging programme is running	Purging programme is running
S.92	Water circulation volume self-test	Water circulation volume self-test
S.93	Flue gas measurement not possible	Flue gas measurement not possible because not all measuring programs have yet run
S.96	Return temperature sensor self-test	Return sensor test running, heating demands are blocked.
S.97	Water pressure sensor self-test	Water pressure sensor test running, heating demands are blocked.
S.98	Flow/return temperature sensor self-test	Flow/return sensor test running, heating demands are blocked.
S.99	Vaillant self-test	Self-test

Appendix

D Overview of fault codes

Code	Parameter	Possible causes
F.00	Interruption: Flow sensor	NTC plug not plugged in or has come loose, multiple plug on the PCB not plugged in correctly, interruption in cable harness, NTC defective
F.01	Interruption: Return sensor	NTC plug not plugged in or has come loose, multiple plug on the PCB not plugged in correctly, interruption in cable harness, NTC defective
F.02	Interruption: DHW outlet sensor	Only in conjunction with F.91 NTC defective, NTC cable defective, defective plug connection on NTC, defective plug connection on the actoSTOR electronics
F.03	Interruption: Cylinder sensor	Only in conjunction with F.91 NTC defective, NTC cable defective, defective plug connection on NTC, defective plug connection on the actoSTOR electronics
F.10	Short circuit: Flow sensor	NTC defective, short circuit in cable harness, cable/casing
F.11	Short circuit: Return sensor	NTC defective, short circuit in cable harness, cable/casing
F.12	Short circuit: DHW outlet sensor	Only in conjunction with F.91 NTC defective, short circuit in cable harness, cable/casing
F.13	Short circuit: Cylinder sensor	Combination product: Warm start sensor/cylinder sensor short circuit Combination product with actoSTOR : Short circuit cylinder sensor (NTC) only in combination with F.91 NTC defective, short circuit in cable harness, cable/casing
F.20	Safety switch-off: Temperature limiter	Incorrect earth connection between cable harness and product, flow or return NTC defective (loose connection), black discharge via ignition cable, ignition plug or ignition electrode
F.22	Safety switch-off: Low water pressure	No or insufficient water in the product, water pressure sensor defective, cable to pump or water pressure sensor loose/not connected/defective
F.23	Safety switch-off: Temp.spread too large	Pump blocked, insufficient pump output, air in product, flow and return NTC connected the wrong way round
F.24	Safety switch-off: Temp. incr. too fast	Pump blocked, insufficient pump output, air in product, system pressure too low, non-return valve blocked/incorrectly installed
F.25	Safety switch-off: Flue temp. too high	Break in plug connection for optional flue gas safety temperature limiter (STB), break in cable harness
F.26	Fault: Fuel valve not working	Gas valve stepper motor not connected, multiple plug on the PCB not plugged in correctly, interruption in cable harness, gas valve stepper motor defective, electronics defective
F.27	Safety switch-off: Flame simulation	Moisture on the electronics, electronics (flame monitor) defective, gas solenoid valve leaking
F.28	Start-up failure: Ignit. unsuccessful	Gas meter defective or gas pressure monitor has triggered, air in gas, gas flow pressure too low, thermal isolator device (TAE) has triggered, condensate duct blocked, incorrect gas restrictor, incorrect spare part gas valve, value in D.052 does not correspond to the printed value on the current gas valve, fault on the gas valve, multiple plug on PCB incorrectly plugged in, break in cable harness, ignition system (ignition transformer, ignition cable, ignition plug, ignition electrode) defective, ionisation current interrupted (cable, electrode), incorrect earthing of product, electronics defective
F.29	Start-up failure: Ignit. unsuccessful	Gas supply temporarily stopped, flue gas recirculation, condensate duct blocked, defective earthing of product, ignition transformer has spark failure
F.32	Fault: Fan	Plug on fan not correctly plugged in, multiple plug on PCB not correctly plugged in, break in cable harness, fan blocked, Hall sensor defective, electronics defective

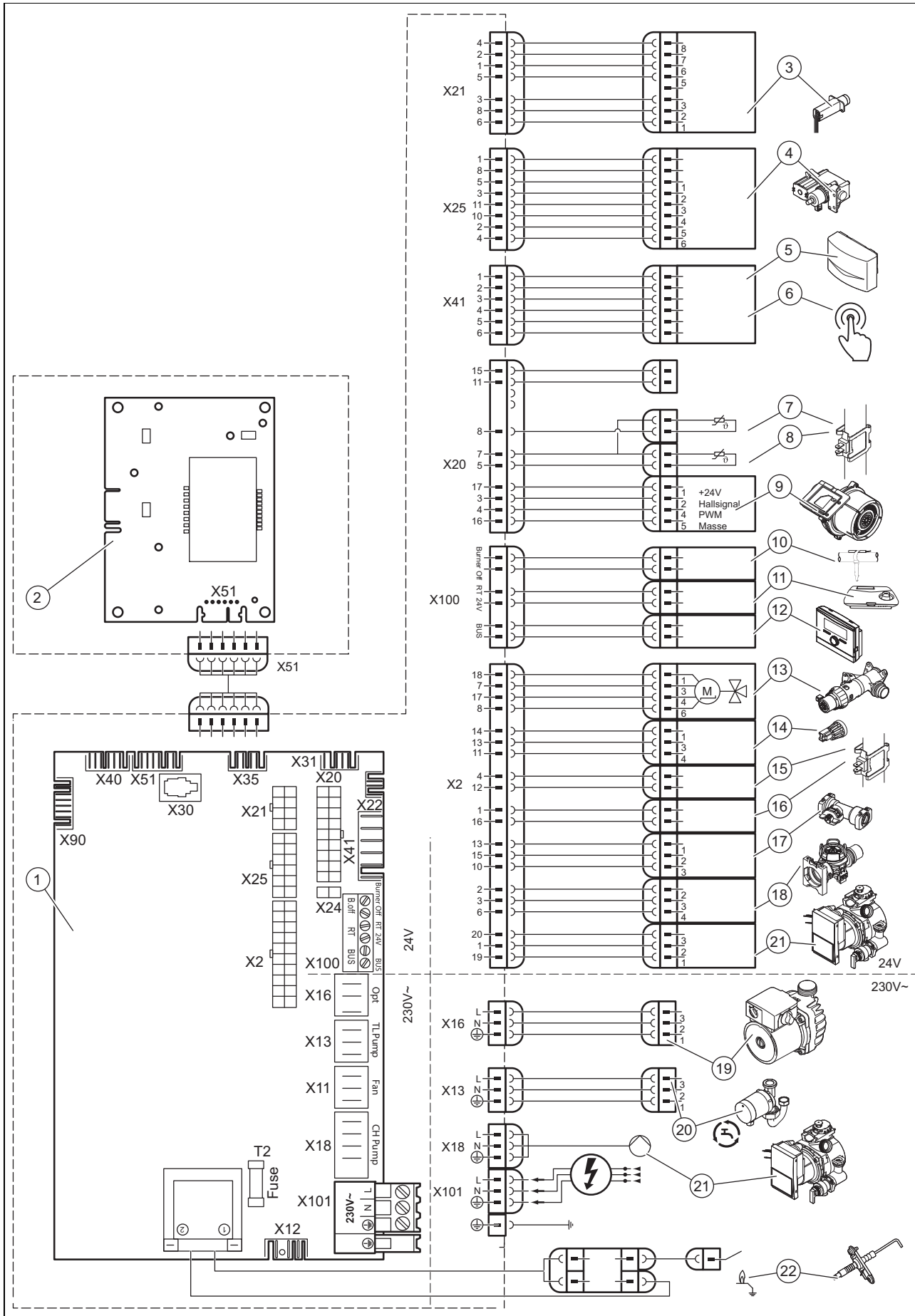
Code	Parameter	Possible causes
F.35	Fault: Air/flue gas duct	<p>Check the entire air/flue pipe for:</p> <ul style="list-style-type: none"> – Permitted design – Restriction or blockage in the air/flue pipe caused by obstructions – Damage <p>The air/flue pipe must be installed in accordance with the recognised rules</p> <p>If the supply of combustion air (air pipe) or discharge of flue gas (flue gas pipe) occurs with no problems, clear any faults in the product with  and start it up</p> <p>If F.35 occurs again after start-up and the air/flue pipe is present and correct, the function for checking the air/flue pipe can be deactivated via D.145</p> <p>If the function is deactivated via D.145, any faults can be cleared in the product  and it can be started up</p> <p>Note D.145 can be used to permanently activate or deactivate the function After the function is deactivated, the product no longer automatically checks whether there are restrictions for the air/flue pipe.</p>
F.49	Fault: eBUS	Short circuit on eBUS, eBUS overload or two power supplies with different polarities on the eBUS
F.55	Fault: CO sensor	<p>Checking the cable harness</p> <p>All-gas sensor defective, replace the all-gas sensor</p> <p>Electronics defective, replace the PCB</p>
F.56	Safety switch-off: CO limit exceeded	<p>Safety switch-off: CO limit exceeded</p> <p>A component in the combustion regulation is defective</p> <ul style="list-style-type: none"> – Contact fault at the gas valve (plug not plugged in correctly or not plugged in, plug defective, slot is defective (loose connection)) – If the fault occurs again after being cleared: The gas valve is defective
F.57	Fault: Measuring program	<p>Active comfort protection mode has detected a regulation fault</p> <ul style="list-style-type: none"> – Ignition electrode highly corroded
F.61	Fault: Fuel valve actuation	<p>The gas valve cannot be actuated</p> <ul style="list-style-type: none"> – Cable harness supply line to the gas valve is defective (short to earth, short circuit) – Gas valve defective – PCB defective
F.62	Fault: Fuel valve switch-off delay	<p>Delayed shutdown of gas valve detected</p> <ul style="list-style-type: none"> – Secondary light (ignition and monitoring electrode indicates delayed extinguishing of the flame signal) – Gas valve defective – PCB defective
F.63	Fault: EEPROM	Electronics defective
F.64	Fault: Electronics/sensor	Flow or return NTC short circuited, electronics defective
F.65	Fault: Electronics temp.	Electronics overheating due to external influences, electronics defective
F.67	Fault: Electronics/flame	Implausible flame signal, electronics defective
F.68	Fault: Flame signal unstable	Air in gas, gas flow pressure too low, incorrect air ratio, condensate duct blocked, ionisation flow interruption (cable, electrode), flue gas recirculation, condensate duct
F.70	Fault: Invalid Device Specific Number	If spare parts fitted: Display and PCB replaced at same time and DSN not reset, incorrect or missing output range coding resistance
F.71	Fault: Flow sensor	<p>Flow temperature sensor signalling constant value:</p> <ul style="list-style-type: none"> – Flow temperature sensor incorrectly positioned at supply pipe – Flow temperature sensor defective
F.72	Fault: Flow/return sensor	Flow/return NTC temperature difference too great → flow and/or return temperature sensor defective
F.73	Fault: Water press. sensor	Interruption/short circuit of water pressure sensor, interruption/short circuit to GND in supply line to water pressure sensor or water pressure sensor defective

Appendix

Code	Parameter	Possible causes
F.74	Fault: Water press. sensor	The line to the water pressure sensor has a short circuit to 5 V/24 V or internal fault in the water pressure sensor
F.75	Fault: Pump/ water shortage	Water pressure sensor and/or pump defective, air in the heating installation, insufficient water in the product; connect external expansion vessel to the return
F.77	Fault: Flue non-ret. valve/condens. pump	No response from flue non-return flap or condensate pump defective
F.78	Interrupt.: DHW outlet sensor on ext. contr.	UK link box is connected but the hot water NTC is not bridged
F.80	Fault: actoSTOR inlet sensor	Only in conjunction with F.91 NTC defective, NTC cable defective, defective plug connection on NTC, defective plug connection on the actoSTOR electronics Sensor plug has short to earth to the casing, short circuit in cable harness, sensor defective
F.81	Fault: cylinder charging pump	Only in conjunction with F.91 Cylinder is not fully charged after specified time. <ul style="list-style-type: none"> - Check cylinder charging sensor and cylinder sensor - Air in the actoSTOR pump - Inspect cable harness for pump - Check the impeller sensor and/or limiter in the product - Diverter valve defective - Secondary heat exchanger blocked - Pump faulty
F.82	Fault: Ext. current anode	External current anode not connected: <ul style="list-style-type: none"> - X43 edge connector with bridge missing from the PCB External current anode connected: <ul style="list-style-type: none"> - Power supply to the external current anode was interrupted - Cable between PCB and external current anode defective - External current anode defective
F.83	Fault: NTC temp. gradient	When the burner starts, the temperature change registered at the flow and/or return temperature sensor is non-existent or too small. <ul style="list-style-type: none"> - Insufficient water in product - Flow or return temperature sensor not in correct position at pipe
F.84	Fault: NTC temp. diff. implausible	Flow and return temperature sensors returning implausible values. <ul style="list-style-type: none"> - Flow and return temperature sensors have been inverted - Flow and return temperature sensors have not been correctly installed
F.85	Fault: NTCs fitted incorrectly	The flow and/or return temperature sensors have been installed on the same pipe/incorrect pipe
F.90	Fault: Communication	Check the cable harness from the product to the actoSTOR module (PEBus). If the product is to be operated without an actoSTOR module, set D.092 = 0.
LED actoSTOR module	actoSTOR electronics status	LED on: Communication OK LED flashing: Communication not OK LED off: No power supply
Communication fault	Communication fault	Communication fault between display and PCB in the electronics box

E Connection diagrams

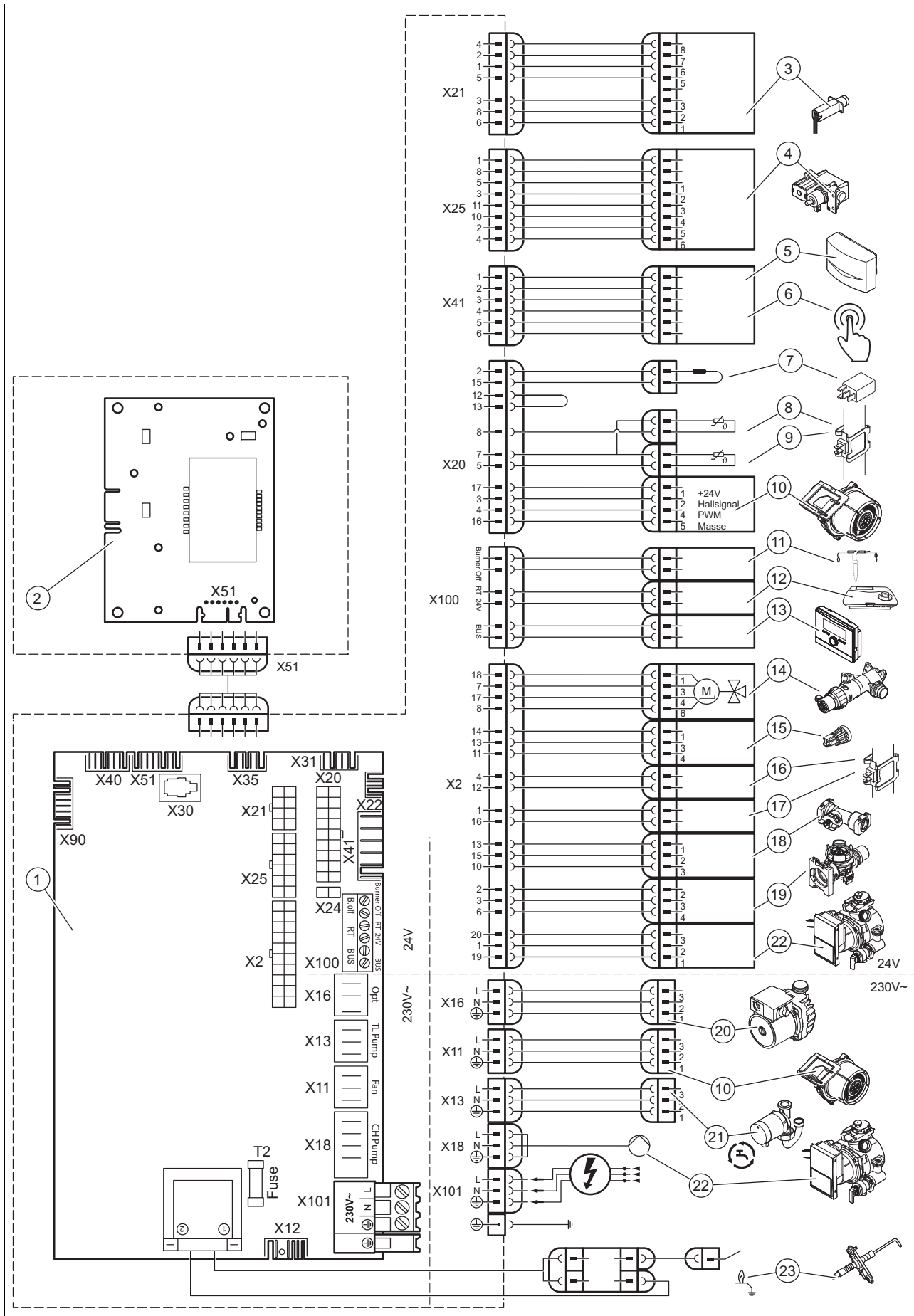
E.1 Connection diagram 12 - 35 kW



Appendix

1	Main PCB	12	Bus connection (digital room thermostat/controller)
2	Operator control panel PCB	13	Diverter valve
3	All-gas sensor	14	Water pressure sensor
4	Gas valve	15	Warm start sensor
5	Outside temperature sensor, flow temperature sensor (optional, external), DCF receiver	16	Hot water sensor
6	Circulation pump remote control	17	Internal heating circuit flow rate sensor
7	Return temperature sensor	18	Impeller sensor
8	Flow temperature sensor	19	Auxiliary relay (select via D.026)
9	Fan	20	Circulation pump connection
10	Contact thermostat/burner off	21	Internal pump
11	24 V DC room thermostat	22	Ignition electrode

E.2 Connection diagram ≥ 37 kW



Appendix

1	Main PCB	12	24 V DC room thermostat
2	Operator control panel PCB	13	Bus connection (digital room thermostat/controller)
3	All-gas sensor	14	Diverter valve
4	Gas valve	15	Water pressure sensor
5	Outside temperature sensor, flow temperature sensor (optional, external), DCF receiver	16	Warm start sensor
6	Circulation pump remote control	17	Hot water sensor
7	Coding resistance	18	Internal heating circuit flow rate sensor
8	Return temperature sensor	19	Impeller sensor
9	Flow temperature sensor	20	Auxiliary relay (select via D.026)
10	Fan	21	Circulation pump connection
11	Contact thermostat/burner off	22	Internal pump
		23	Ignition electrode

F Inspection and maintenance work – Overview



Note

The table below lists the manufacturer requirements with respect to minimum inspection and maintenance intervals. If national regulations and directives require shorter inspection and maintenance intervals, you should observe these instead of the intervals listed in the table.

No.	Work	Inspection (annual)	Maintenance (must be carried out at regular intervals)
1	Check the air/flue pipe for leak-tightness and to ensure that it is fastened correctly. Make sure that it is not blocked or damaged and has been installed in accordance with the relevant Installation Manual.	X	X
2	Check the general condition of the product. Remove any dirt from the product and the vacuum chamber.	X	X
3	Visually inspect the general condition of the product. In doing so, pay particular attention to signs of corrosion, soot and other defects.	X	X
4	Check the gas connection pressure at maximum heat input. If the gas connection pressure is not within the correct range, carry out maintenance work.	X	X
5	Check the CO ₂ content (the air ratio) of the product and, if necessary, adjust it. Keep a record of this.	X	X
6	Disconnect the product from the power mains. Check that the electrical plug connections and other connections are seated correctly and correct these if necessary.	X	X
7	Close the gas isolator cock and the service valves.		X
8	Drain the product on the water side (observe the pressure gauge). Check the pre-charge pressure of the expansion vessel, and top up the vessel, if necessary (approx. 0.03 MPa/0.3 bar under the system filling pressure).		X
9	Products with integrated hot water generation with actoSTOR only: Check the pre-charge pressure in the shift-load cylinder's expansion vessel. Correct the pressure, if necessary.	X	X
10	Remove the compact thermal module.		X
11	Check the insulating mats in the combustion area. If you notice any damage, replace the insulating mats. Replace the burner flange seal each time it is opened and accordingly each time maintenance work is carried out.		X
12	Clean the heat exchanger.		X
13	Check the burner for damage and replace it if necessary.		X
14	Check the condensate siphon in the product, clean and fill if necessary.	X	X
15	Install the compact thermal module. Caution: Replace the seals.		X
16	Products with integrated hot water generation only: If the volume of water is insufficient or the outlet temperature is not reached, replace the secondary heat exchanger if necessary.		X
17	Products with integrated hot water generation only: Clean the filter in the cold water inlet. Replace the filter if impurities can no longer be removed or if the filter is damaged. In this case, also check the impeller sensor for dirt and damage, clean the sensor (do not use compressed air for this) and replace the sensor if it is damaged.		X

No.	Work	Inspection (annual)	Maintenance (must be carried out at regular intervals)
18	Open the gas isolator cock, reconnect the product to the power mains and switch the product on.	X	X
19	Open the service valves, fill up the product/heating installation to 0.1-0.2 MPa/1.0-2.0 bar (depending on the static height of the heating installation) and start the purging programme P.00 .		X
20	Perform a test operation of the product and heating installation, including hot water generation, and purge the system once more if necessary.	X	X
21	Check the type of gas.		X
22	Visually inspect the ignition and burner behaviour.	X	X
23	Check the CO ₂ content (the air ratio) of the product again.		X
24	Check the product for gas, flue gas, hot water and condensate leaks, and repair if necessary.	X	X
25	Record the inspection/maintenance work carried out.	X	X

G Commissioning Checklist

Benchmark Commissioning and Servicing Section

It is a requirement that the boiler is installed and commissioned to the manufacturers instructions and the data fields on the commissioning checklist completed in full.

To instigate the boiler guarantee the boiler needs to be registered with the manufacturer within one month of the installation.

To maintain the boiler guarantee it is essential that the boiler is serviced annually by a Gas Safe registered engineer who has been trained on the boiler installed. The service details should be recorded on the Benchmark Service Interval Record and left with the householder.



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GAS BOILER SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the boiler as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission according to the manufacturer's instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

Customer name:	Telephone number:
Address:	
Boiler make and model:	
Boiler serial number:	
Commissioned by (PRINT NAME):	Gas Safe register number:
Company name:	Telephone number:
Company address:	
Commissioning date:	

To be completed by the customer on receipt of a Building Regulations Compliance Certificate*

Building Regulations Notification Number (if applicable):

CONTROLS (tick the appropriate boxes)			
Time and temperature control to heating	Room thermostat and programmer/timer		Programmable room thermostat
	Load/weather compensation		Optimum start control
Time and temperature control to hot water	Cylinder thermostat and programmer/timer		Combination Boiler
	Heating zone valves	Fitted	Not required
Hot water zone valves	Fitted		Not required
Thermostatic radiator valves	Fitted		Not required
Automatic bypass to system	Fitted		Not required
Boiler interlock			Provided

ALL SYSTEMS			
The system has been flushed and cleaned in accordance with BS7593 and boiler manufacturer's instructions	Yes		
What system cleaner was used?			
What inhibitor was used?	Quantity	litres	
Has a primary water system filter been installed?	Yes	No	

CENTRAL HEATING MODE measure and record:			
Gas rate	m ³ /hr	OR	ft ³ /hr
Burner operating pressure (if applicable)	mbar	OR Gas inlet pressure	mbar
Central heating flow temperature			°C
Central heating return temperature			°C

COMBINATION BOILERS ONLY			
Is the installation in a hard water area (above 200ppm)?	Yes	No	
If yes, and if required by the manufacturer, has a water scale reducer been fitted?	Yes	No	
What type of scale reducer has been fitted?			

DOMESTIC HOT WATER MODE Measure and Record:			
Gas rate	m ³ /hr	OR	ft ³ /hr
Burner operating pressure (at maximum rate)	mbar	OR Gas inlet pressure at maximum rate	mbar
Cold water inlet temperature			°C
Hot water has been checked at all outlets	Yes	Temperature	°C
Water flow rate			l/min

CONDENSING BOILERS ONLY	
The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5546/BS6798	Yes

ALL INSTALLATIONS					
Record the following:	At max. rate:	CO	ppm	AND	CO/CO ₂ Ratio
	At min. rate: (where possible)	CO	ppm	AND	CO/CO ₂ Ratio
The heating and hot water system complies with the appropriate Building Regulations					Yes
The boiler and associated products have been installed and commissioned in accordance with the manufacturer's instructions					Yes
The operation of the boiler and system controls have been demonstrated to and understood by the customer					Yes
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer					Yes

Commissioning Engineer's Signature
Customer's Signature
(To confirm satisfactory demonstration and receipt of manufacturer's literature)

*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.



Appendix

SERVICE RECORD

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

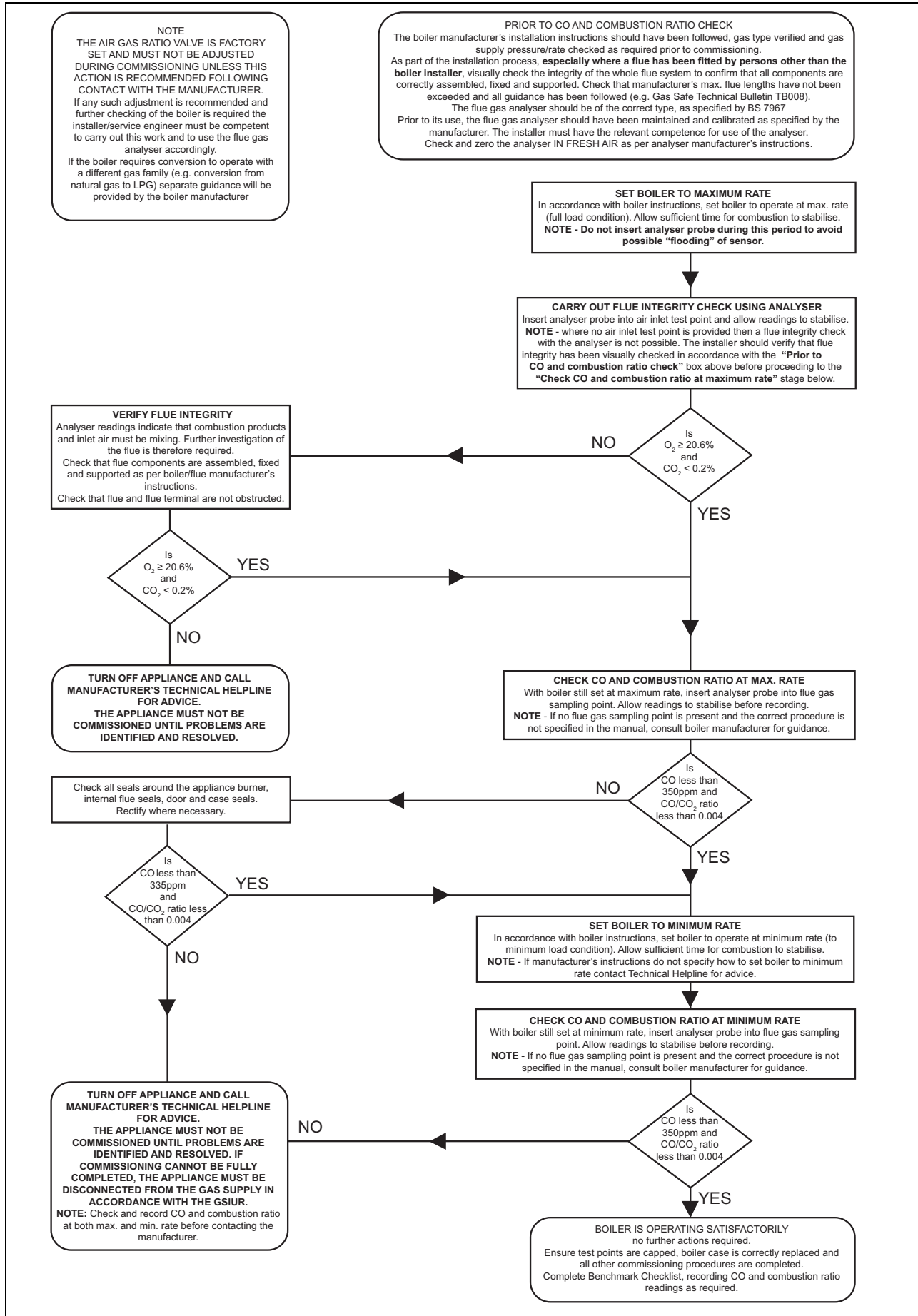
Service Provider

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

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">SERVICE 01</td> <td colspan="2">Date:</td> </tr> <tr> <td colspan="4">Engineer name:</td> </tr> <tr> <td colspan="4">Company name:</td> </tr> <tr> <td colspan="4">Telephone No:</td> </tr> <tr> <td colspan="4">Gas safe register No:</td> </tr> <tr> <td>Record:</td> <td>At max. rate:</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td></td> <td>At min. rate: (Where Possible)</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td colspan="4">Comments:</td> </tr> <tr> <td colspan="4">Signature</td> </tr> </table>	SERVICE 01		Date:		Engineer name:				Company name:				Telephone No:				Gas safe register No:				Record:	At max. rate:	CO ppm	AND CO ₂ %		At min. rate: (Where Possible)	CO ppm	AND CO ₂ %	Comments:				Signature				<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">SERVICE 02</td> <td colspan="2">Date:</td> </tr> <tr> <td colspan="4">Engineer name:</td> </tr> <tr> <td colspan="4">Company name:</td> </tr> <tr> <td colspan="4">Telephone No:</td> </tr> <tr> <td colspan="4">Gas safe register No:</td> </tr> <tr> <td>Record:</td> <td>At max. rate:</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td></td> <td>At min. rate: (Where Possible)</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td colspan="4">Comments:</td> </tr> <tr> <td colspan="4">Signature</td> </tr> </table>	SERVICE 02		Date:		Engineer name:				Company name:				Telephone No:				Gas safe register No:				Record:	At max. rate:	CO ppm	AND CO ₂ %		At min. rate: (Where Possible)	CO ppm	AND CO ₂ %	Comments:				Signature			
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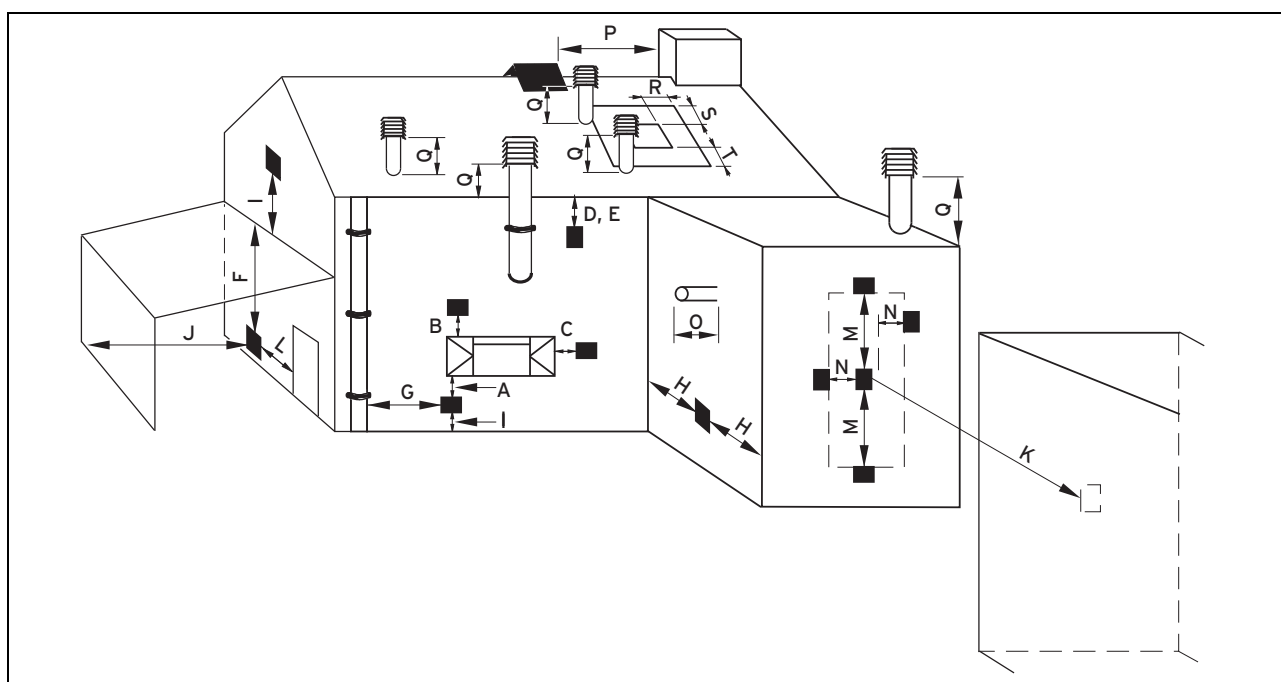
*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.





Appendix

H Opening of the flue pipe



H.1 Positioning of the opening of a fan-supported flue gas pipe

	Installation site	Minimum dimensions
A	Directly below an opening, air bricks, opening windows, etc., that can be opened.	300 mm
B	Above an opening, air bricks, opening windows, etc., that can be opened.	300 mm
C	Horizontally to an opening, air bricks, opening windows, etc., that can be opened.	300 mm
D	Below temperature-sensitive building components, e.g. plastic gutters, down pipes or wastewater pipes	75 mm
E	Below eaves	200 mm
F	Below balconies or car port roofs	200 mm
G	From vertical wastewater pipes or down pipes	150 mm
H	From external or internal corners	200 mm
I	Above floors, roofs or balconies	300 mm
J	From a surface facing a terminal	600 mm
K	From a terminal facing a terminal	1200 mm
L	From an opening in the car port (e.g. door, window) which leads into the dwelling	1200 mm
M	Vertical from a terminal on the same wall	1500 mm
N	Horizontal from a terminal on the same wall	300 mm
O	From the wall on which the terminal has been installed	0 mm
P	From a vertical structure on the roof	N/A
Q	Above the roof area	300 mm
R	Horizontal from adjacent windows on pitched or flat roofs	600 mm
S	Above adjacent windows on pitched or flat roofs	600 mm
T	Below adjacent windows on pitched or flat roofs	2000 mm

I Horizontal terminal positioning

BS 5440-1 recommends that fanned flue chimney terminals should be positioned as follows:

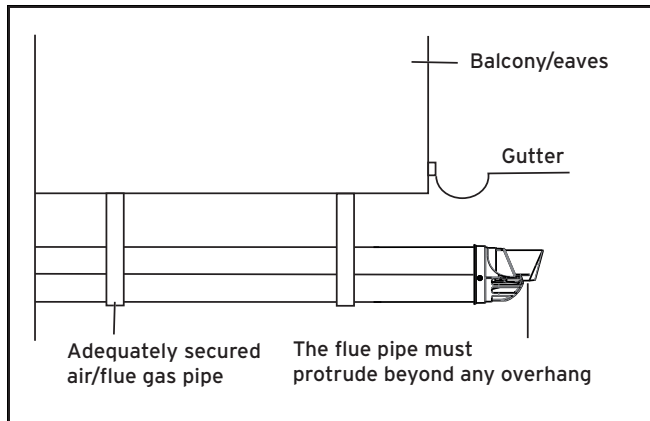
- a) at least 2 m from an opening in the building directly opposite, and
- b) so that the products of combustion are not directed to discharge directly across a boundary if the products are likely to cause a nuisance to a neighbour or discharge over a walkway or patio.

For IE see current issue of IS 813.

For boilers covered within this manual.

1) Dimensions D, E, F and G:

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 below.

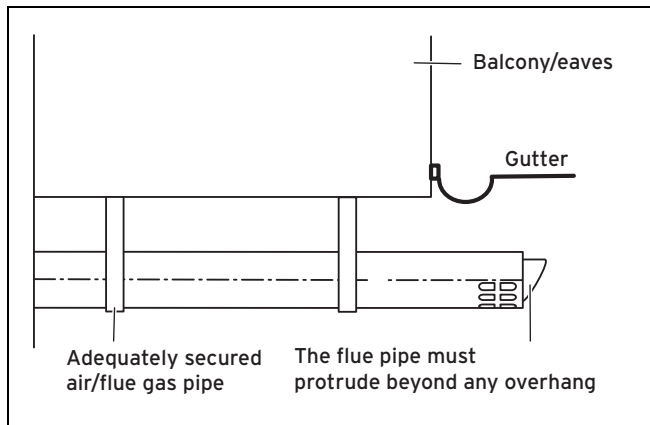


2) Dimension H:

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 1 and 2 above you can use a flue gas management kit to enable the termination point to be positioned and directed away from the building fabric.

J Opening of the flue pipe below eaves and balconies



Appendix

K Technical data

Technical data – General

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Designated country (designation in accordance with ISO 3166)	GB (United Kingdom)	GB (United Kingdom)
Approved unit categories	II _{2H3P}	II _{2H3P}
Gas connection, boiler side	15 x 1.0 mm	20 x 2.0 mm
Flow/return heating connections, boiler side	22 x 1.5 mm	22 x 1.5 mm
Hot and cold water connection, boiler side	15 x 1.5 mm	15 x 1.5 mm
Expansion relief valve connector (min.)	15 mm	15 mm
Air/flue gas connection	60/100 mm	60/100 mm
Condensate drain pipe-work (min.)	19 mm	19 mm
Gas connection pressure, G20 natural gas	2.0 kPa (20.0 mbar)	2.0 kPa (20.0 mbar)
Gas connection pressure, G31 propane	3.7 kPa (37.0 mbar)	3.7 kPa (37.0 mbar)
Gas flow rate at 15 °C and 1013 mbar (based on hot water generation, if applicable), G20	3.5 m ³ /h	4.3 m ³ /h
Gas flow rate at 15 °C and 1013 mbar (based on hot water generation, if applicable), G31	2.54 kg/h	3.12 kg/h
Min. flue gas mass rate (G20)	1.62 g/s	2.02 g/s
Min. flue gas mass rate (G31)	3.62 g/s	3.62 g/s
Max. flue gas mass rate	14.68 g/s	18.04 g/s
Min. flue gas temperature	40 °C	40 °C
Max. flue gas temperature	65 °C	65 °C
Approved gas-fired units	C13, C33, C53	C13, C33, C53
30% efficiency	109.7 %	109.8 %
NOx class	6	6
Device Specific Number (DSN)	211	212
SEDBUK (2005)	A	A
SEDBUK (2009) (G20/G31)	89.3 %	89.3 %
Boiler dimension, width	440 mm	440 mm
Boiler dimension, height	720 mm	720 mm
Boiler dimension, depth	406 mm	474 mm
Mounting weight	47.5 kg	55.0 kg
Operating weight (with water)	48.7 kg	57.0 kg

Technical data – G20 power/loading G20

* The lowest nominal heat output may be higher than the value in the technical data, depending on the design of the system and the current operating status.

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Nominal heat output range P at 50/30 °C *	3.9 ... 26.4 kW	4.8 ... 36.0 kW
Nominal heat output range P at 80/60 °C *	3.4 ... 24.6 kW	4.3 ... 33.4 kW
Maximum heat output for hot water generation	35.3 kW	43.4 kW
Maximum heat input for hot water generation	32.7 kW	40.2 kW
Maximum heat input, heating side	24.8 kW	33.7 kW
Minimum heat input	3.6 kW	4.5 kW
Heating adjustment range	4 ... 25 kW	5 ... 34 kW

Technical data – Power/loading G31

* The lowest nominal heat output may be higher than the value in the technical data, depending on the design of the system and the current operating status.

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Nominal heat output range P at 50/30 °C *	8.6 ... 26.4 kW	8.5 ... 36.0 kW
Nominal heat output range P at 80/60 °C *	7.6 ... 24.6 kW	7.6 ... 33.4 kW
Maximum heat output for hot water generation	35.3 kW	43.4 kW
Maximum heat input for hot water generation	32.7 kW	40.2 kW
Maximum heat input, heating side	24.8 kW	33.7 kW
Minimum heat input	8.0 kW	8.0 kW

Technical data – Heating

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Maximum flow temperature	85 °C	85 °C
Max. flow temperature adjustment range (default setting: 75 °C)	30 ... 80 °C	30 ... 80 °C
Permissible total overpressure	0.3 MPa (3.0 bar)	0.3 MPa (3.0 bar)
Minimum pressure for full operation	0.08 MPa (0.80 bar)	0.08 MPa (0.80 bar)
Expansion vessel capacity	10 l	10 l
Circulation water volume (with reference to $\Delta T = 20$ K)	1,058 l/h	1,436 l/h

Appendix

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Approx. condensate rate (pH value 3.5 to 4.0) in 50/30 °C heating mode	2.48 l/h	3.37 l/h
Remaining feed head of pump (at nominal circula- tion water volume)	0.025 MPa (0.250 bar)	0.024 MPa (0.240 bar)

Technical data – Hot water handling mode

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Lowest water volume	1.5 l/min	1.5 l/min
Water volume (at $\Delta T = 30$ K)	16.9 l/min	20.7 l/min
Water volume (at $\Delta T = 35$ K)	14.5 l/min	17.8 l/min
Water volume (at $\Delta T = 45$ K)	11.2 l/min	13.8 l/min
Permitted overpressure	1.0 MPa (10.0 bar)	1.0 MPa (10.0 bar)
Required connection pressure	0.035 MPa (0.350 bar)	0.035 MPa (0.350 bar)
Hot water output temper- ature range	35 ... 65 °C	35 ... 65 °C

Technical data – Electrics

	835 (VUW 356/5-7 (H-GB)) ecoTEC exclusive	843 (VUW 436/5-7 (H-GB)) ecoTEC exclusive
Electric connection	230 V/50 Hz	230 V/50 Hz
Permissible connected voltage	190 ... 253 V	190 ... 253 V
Built-in fuse (slow-blow)	2 A	2 A
Min. electrical power con- sumption	47 W	46 W
Max. electrical power consumption for heat- ing mode (nominal heat loading)	79 W	78 W
Max. electrical power consumption for cylinder charging	89 W	121 W
Standby electrical power consumption	< 1.9 W	< 1.9 W
Level of protection	IP X4 D	IP X4 D
Test symbol/registration no.	CE- 0085CM0320	CE- 0085CM0320

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Vaillant Ltd.

Nottingham Road ■ Belper ■ Derbyshire ■ DE56 1JT

Telephone 0330 100 3461

info@vaillant.co.uk ■ www.vaillant.co.uk

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