

Installation and maintenance instructions



ecoPOWER 3.0 /2,
ecoPOWER 4.7 /2

VNC 88+3/2 - H, - P, VNC 138+5/2 - H, - P

AT, DE

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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.

During operation, the product generates various emissions (heat, noise, etc.). The product therefore has to be installed in a separate boiler room in the building's cellar. This may affect other installations in this boiler room and the use of this boiler room.

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 code.

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:

- Set-up
- Dismantling
- Installation
- Start-up
- Inspection and maintenance
- Repair
- Decommissioning
- ▶ Observe all instructions that are included with the product.
- ▶ Proceed in accordance with current technology.
- ▶ Observe all applicable directives, standards, laws and other regulations.

1.3.2 Danger caused by a lack of additional qualifications

Only a certified competent person who has completed special training for the ecoPOWER 3.0 / 4.7 can carry out work on the product.

1.3.3 Informing the responsible departments

Applicability: Germany

There is a duty of disclosure to the responsible authorities. The regulations are governed by the regional building control. The local regulations, such as the TAB (technical connec-

1 Safety

tion requirements) of the following authorities must be observed:

- Energy supply company
- Building authority
- Main customs office (for energy tax exemptions)
- Chimney sweep (acceptance certificate, obligation to have flues cleaned by a chimney sweep on a regular basis)

1.3.4 Risk of injury due to the heavy weight of the product

- ▶ The product weighs approx. 400 kg.
- ▶ Before transporting/lifting the product, remove the side panels (each weighs 37 kg) to reduce the weight.
- ▶ Transport the product using a fork-lift truck that is suitable for the weight of the product. Secure the product against slipping and tipping over.
- ▶ When lifting the product, use hoisting and rigging gear that is suitable for the weight of the product. Secure the rigging material or hoist the product only in the load-carrying area of the product, between the product's feet. Secure the rigging gear against slipping.

1.3.5 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.
- ▶ 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.
- ▶ Alert the police and fire brigade as soon as you are outside the building.

- ▶ Use a telephone outside the building to inform the emergency service department of the gas supply company.

1.3.6 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.

1.3.7 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.

1.3.8 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 at all poles (electrical partition with a contact gap of at least 3 mm, e.g. fuse or circuit breaker).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the capacitors have discharged.
- ▶ Check that there is no voltage.



1.3.9 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 due to explosive and flammable materials

- ▶ Do not use the product in storage rooms that contain explosive or flammable substances (such as petrol, paper or paint).

1.3.11 Risk of poisoning caused by insufficient combustion air supply

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.

1.3.12 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 flue system.

- ▶ 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.
- ▶ Ensure that the combustion air is not routed through chimneys which have previously been used with floor-standing oil-fired boilers, or with other boilers, which could cause soot to build up in the chimney.

1.3.13 Risk of material damage caused by frost

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

1.3.14 Risk of being burned or scalded by hot components

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

1.3.15 Risk of material damage caused by using an unsuitable tool

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

1.3.16 Risk of material damage caused by radio interference

This equipment is not intended for use in living areas and it may not be possible to guarantee appropriate protection for the radio reception in such environments.

- ▶ Do not install the product in living areas.

1.4 Regulations (directives, laws, standards)

- ▶ Observe the national regulations, standards, guidelines and laws.



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 Validity of the instructions

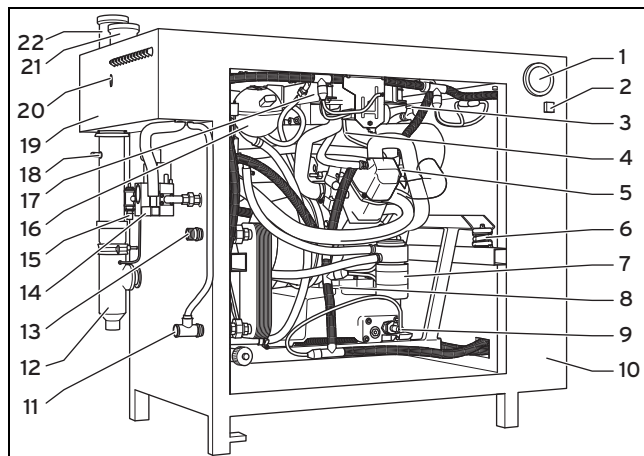
These instructions apply only to:

Product type and article number

VNC 138+5/2 - H	0010020568 (natural gas)
VNC 138+5/2 - P	0010020569 (liquefied petroleum gas)
VNC 88+3/2 - H	0010020570 (natural gas)
VNC 88+3/2 - P	0010020571 (liquefied petroleum gas)

3 Product description

3.1 Product design



- | | |
|---|--|
| 1 Viewing glass for the net electricity meter | 12 Condensate discharge |
| 2 Motor switch | 13 Heating flow |
| 3 Purging valve | 14 Gas valve assembly (example: natural gas) |
| 4 Ignition cable | 15 Gas connection |
| 5 Lambda sensor | 16 Coolant reservoir |
| 6 Vibration damper | 17 Intake air damper |
| 7 Oil filter | 18 Inspection opening |
| 8 Dipstick | 19 Rear electronics box |
| 9 Oil level switch | 20 Diagnostics interface |
| 10 Front electronics box | 21 Connection for the air pipe |
| 11 Heating return | 22 Connection for flue system |

3.2 Information on the data plate

The data plate is attached to the control cabinet at the factory.

Information on the data plate	Meaning
Serial no.	Serial number (the 7th to 16th digits of the serial number form the article number)
VNC ...	Type designation
Installation type (e.g. B)	Approved flue connections
Cat. (e.g. I2ELL)	Approved gas category
2E/2H, G20 – 20 mbar 3P, G31 – 50 mbar	Gas group set at factory, gas connection pressure
P _(75/50 °C)	Thermal power, modulating
Q	Input power
P _{el.}	Electrical power, modulating
Speed range	Variable motor speed
Min. methane number/min. octane number	∞
PMS (e.g. 3 bar (0.3 MPa))	Permissible total overpressure in heating mode
Tmax	Maximum flow temperature
I _{Nominal, max./phase}	∞
El. fuse protection	Electrical fuse protection
... V, .. Hz	Mains voltage, mains frequency
.. - ... W	Electrical power consumption
IP ..	IP rating
	Read the instructions.

3.3 CE marking



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

The declaration of conformity can be found in the appendix to the operating instructions.

4 Set-up

4.1 Transport

When transporting the product, observe the following warnings:



Danger!

Risk of severe injury when lifting and transporting the product!

The product weighs approx. 400 kg.

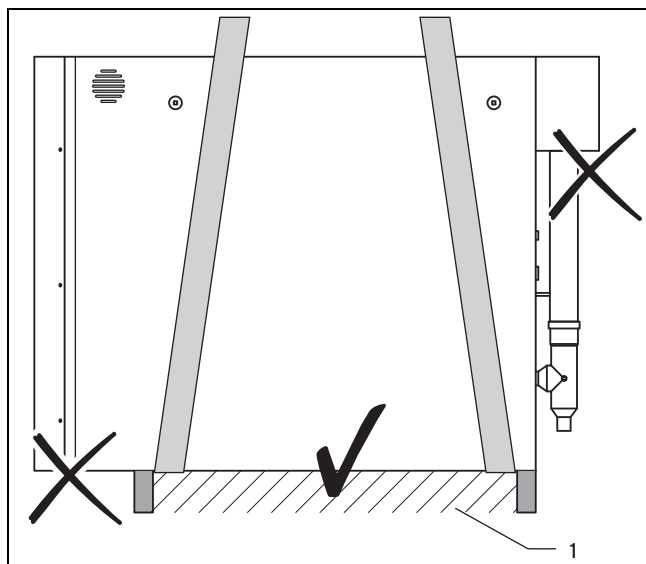
- Before transporting/lifting the product, remove the side panels (each weighs 37 kg) to reduce the weight.

- ▶ Transport the product using a fork-lift truck that is suitable for the weight of the product. Secure the product against slipping and tipping over.
- ▶ When lifting the product, use hoisting and rigging gear that is suitable for the weight of the product. Secure the rigging material or hoist the product only in the load-carrying area of the product, between the product's feet. Secure the rigging gear against slipping.

**Caution.**

Risk of motor damage when the maximum lateral angle of inclination is exceeded.

- ▶ Have the product at a maximum lateral angle of inclination of up to 45°.



Load-carrying area (1) between the feet, to secure rigging gear and to lift the product.

4.2 Unpacking the product

1. Remove the protective film from all parts of the product.
2. Remove the collapsible boxes and polystyrene sections from the product.

4.3 Checking the scope of delivery

- ▶ Check that the scope of delivery is complete and intact.

Number	Designation
1	ecoPOWER
7	VR 10 standard sensor
1	Condensate siphon
1	Square spanner for the side panels
1	NI 1000 room temperature sensor
1	VRC 693 outdoor temperature sensor
4	Absorption damper

Number	Designation
Various	Operating instructions, installation and maintenance instructions, commissioning checklist, service record

4.4 Required accessory

The following accessories are required for the installation:

- Connection kit
 - Return retention group
 - Gas safety hose
 - Heating flow hose
 - Heating return hose

The following accessory is available for the optional remote monitoring system:

- VPN communication unit (requires Internet access)

4.5 Installation site

When selecting and equipping the installation room, observe the national regulations, standards, directives and laws that are relevant for operating heat production sources.

The product meets the requirements of Class A in accordance with CISPR 11. The product may cause radio interference in the living area.

During operation, the product generates various emissions (heat, noise, etc.). For operation as intended and without disruptions, installation must therefore be carried out in a separate room in the cellar of the building. Other installations in the same installation room as the product may be influenced.

4.5.1 Influence of the installation height on the electrical power

The product's electrical power varies depending on the installation height.

Based on an environmental temperature of 20 °C and 100% nominal output at sea level (0 m NHN (above sea level)), the product has the following electrical power depending on the installation height (above sea level):

Installation height [m]	VNC 88+3/2 electrical power	VNC 135+3/2 electrical power
0	3.0 kW _{el}	4.7 kW _{el}
500	2.8 kW _{el}	4.4 kW _{el}
1000	2.7 kW _{el}	4.2 kW _{el}
1500	2.5 kW _{el}	3.9 kW _{el}
2000	2.3 kW _{el}	3.7 kW _{el}

4.5.2 Sound insulation

Due to the operating noises that are produced, sound insulation measures are particularly necessary when installing the system in residential buildings, hotels, etc.

- ▶ To isolate structure-borne sound, we recommend placing the product on a floor panel (base) that weighs at least 400 kg and is separated from the rest of the building structure.
- ▶ Connect the product using the flexible connection pipes.
- ▶ Equip the flue pipework at the chimney opening with an insulation jacket (mineral wool).

4 Set-up

- The flue pipework must not be completely walled in.
- ▶ Secure the flue pipework using pipe clamps that are isolated from structure-borne sound.
- ▶ Consider additional sound insulation measures in each case.

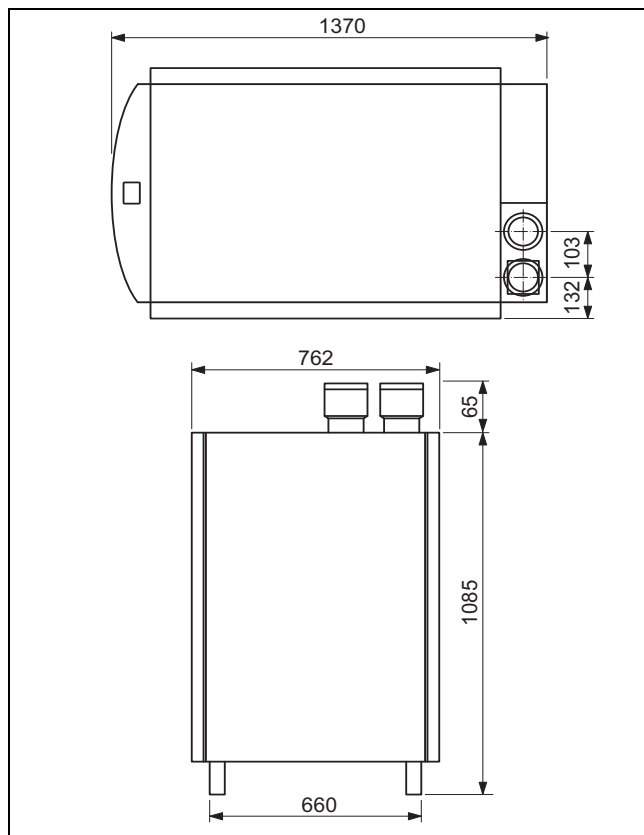
4.5.3 Environmental conditions

The product is designed for installation in dry, frost-free rooms with non-explosive atmospheres.

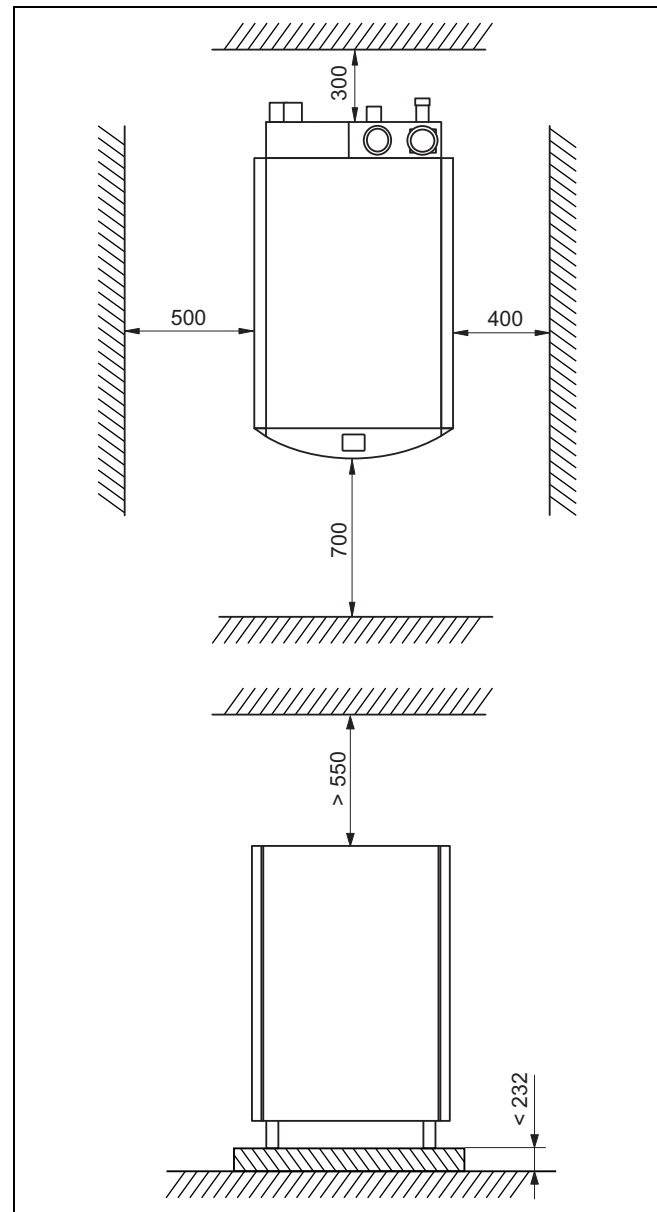
The product's electronics are cooled using room air. To ensure sufficient cooling, the temperature in the installation room must not exceed 40 °C.

The air humidity must not be higher than 75%.

4.6 Product dimensions



4.7 Minimum clearances and installation clearances

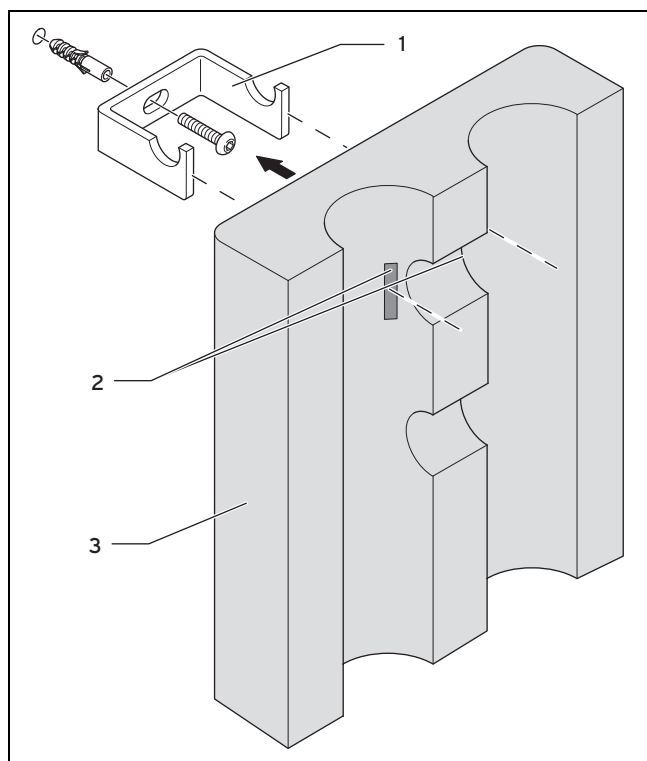


The specified minimum clearances and installation clearances are required for installing/setting up the product as well as for carrying out future maintenance work.

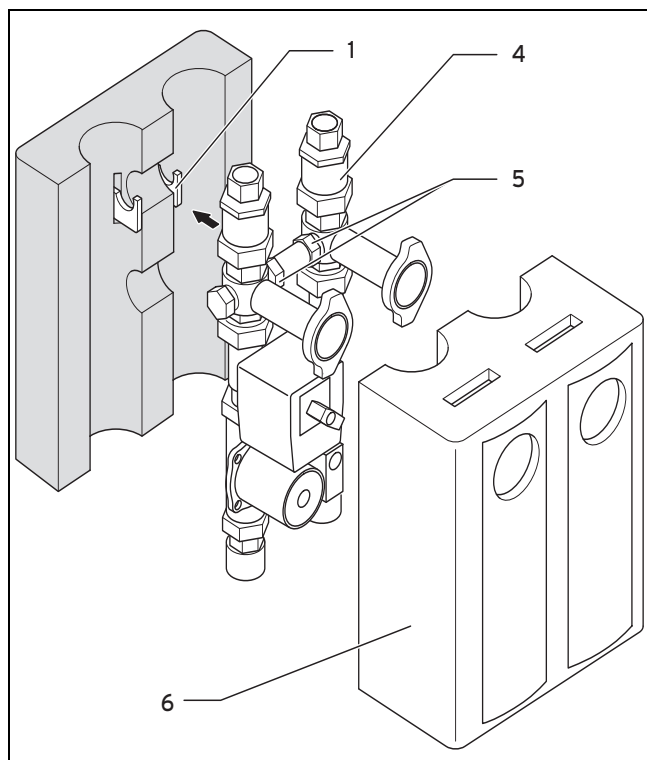
4.8 Installing the product

1. Place the product on level ground.
2. Place the absorption dampers under the product's feet.
3. Remove the transport lock (cable tie) from the coolant reservoir's retainer.
4. Refit the side panels if you removed for transport.

4.8.1 Installing the return retention group



1. Drill a hole in the wall at a suitable location.
2. Insert the plastic rawl plug.
3. Screw in the wall bracket (1) tightly.
4. Cut out the pre-punched slits (2) in the rear insulation jacket (3).
5. Fit the insulation jacket on the wall bracket.



6. Hook the return retention group (4) into the wall bracket such that the wall bracket engages in the ball valve's hex socket (5) on the right and left.
7. Fit the front insulation jacket (6) onto the return retention group.

4.8.2 Installing sensors

You must connect different sensors depending on the configuration of the heating system and the control type. The basic hydraulic diagram shows where to fit the sensors.

4.8.2.1 Installing the outdoor temperature sensor

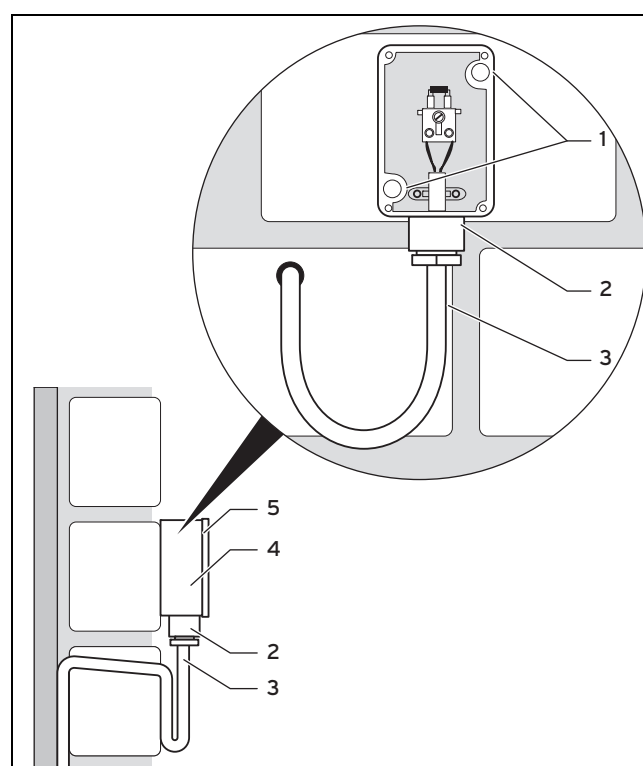


Caution.

Risk of material damage caused by incorrect installation of the outdoor temperature sensor

Incorrect installation may cause damage to the product or to the wall of the building, e.g. from the penetration of dampness.

- Install the connection cable with a slight incline to the outside and with a loop to catch drips.
- Install the outdoor temperature sensor with the grommet downwards.



1. Mark a suitable position on the external wall. Observe the cable laying for the outdoor temperature sensor.
2. Route the connection cable (3) on-site with a slight incline to the outside and with a loop to catch drips.
3. Remove the housing cover (5) from the outdoor temperature sensor.
4. Position the housing cover on the external wall and mark the drill holes through the mounting holes (1).
5. Drill two holes.

5 Installation

- Diameter: 6 mm
- 6. Insert the wall plugs supplied.
- 7. Use two screws to secure the wall base (4) to the external wall such that the grommet points downwards.
- 8. Unfasten the union nut (2) slightly and slide the connection cable through the grommet from below.
- 9. Connect the connection cable to the outdoor temperature sensor and to the connection provided for it in the product's electronics box (→ Electrical installation).
- 10. Retighten the union nut (2). The seal in the grommet adapts to the diameter of the cable used.
 - Cable diameter: 4.5-10 mm
- 11. Place the seal between the wall base and the housing cover.
- 12. Push the casing cover onto the wall base until it clicks in position.

4.8.2.2 Installing the room temperature sensor

- Install the room temperature sensor in a living room with a height of approx. 1.5 m, and ensure that there is sufficient clearance to heat sources, windows or doors.

4.8.2.3 Installing the VR 10 standard sensor

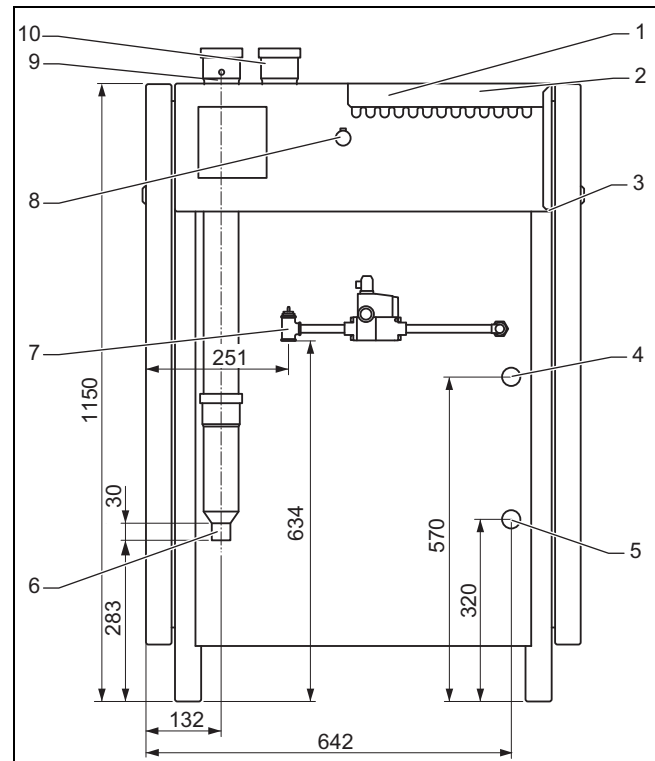
The VR 10 standard sensor can be used as follows:

- As a cylinder temperature sensor (e.g. as a immersion sensor in a dry pocket),
- As a flow temperature sensor (e.g. in a low loss header),
- With the enclosed strap as a surface-mounted sensor on a flow or return pipe.

4.8.2.4 Installing the modulating VR 34 bus coupler

Conditions: A Vaillant peak load unit should be actuated by modulation.

- Install the optional VR 34 bus coupler as described in the installation instructions for the bus coupler.



1	Electrical connections (extra-low voltage)	6	Condensate discharge, 40 mm diameter
2	Electrical connections (mains voltage)	7	Gas connection, diameter Rp1/2" ISO 7-1
3	Power supply	8	Diagnostics interface
4	Heating flow, diameter R3/4" ISO 7-1	9	Flue system connection, 75 mm diameter
5	Heating return, diameter R3/4" ISO 7-1 (incl. return temperature sensor)	10	Air pipe connection, 75 mm diameter



Note

Seals made of rubber-like materials may be subject to plastic deformation, which can lead to pressure losses. We recommend using seals made of a paste-like fibre material.

5 Installation



Danger!

Risk of scalding and/or damage due to incorrect installation leading to escaping water.

Mechanical stresses in the connection pipes may lead to leaks.

- Ensure that there is no mechanical stress when installing the connection pipes.



Caution.

Risk of material damage caused by residues in the pipelines.

Welding remnants, sealing residues, dirt or other residues in the pipelines may damage the product.

- Flush the heating installation thoroughly before installing the product.

5.1 Gas installation

5.1.1 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.

5.1.2 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 data plate.

5.1.3 Installing the gas connection



Note

The dynamic gas connection pressure must be at least 1.5 kPa (15 mbar) and at most 5.0 kPa (50 mbar).

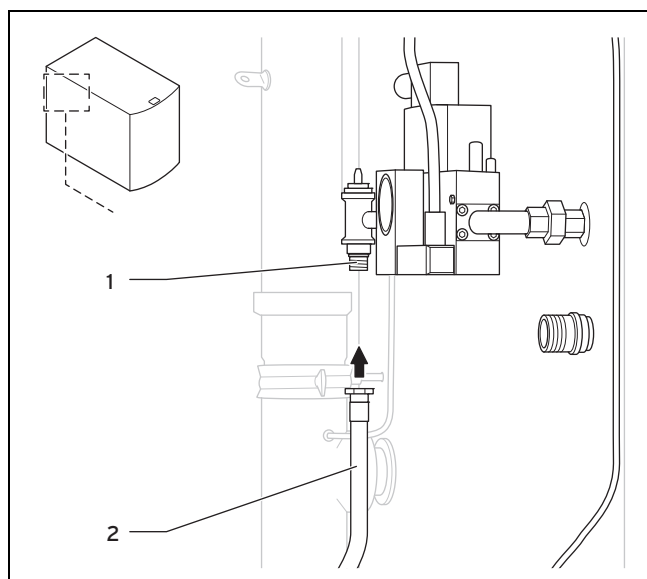
1. Check that the gas used is compatible with the information on the data plate.

Conditions: Fuel: Natural gas, Gas connection pressure > 5.0 kPa (50 mbar)

- Install a pressure regulator.

Conditions: Fuel: Liquefied petroleum gas

- Install a pressure reducer.



2. Blow the gas safety hose from the connection kit clean.
3. Fit the gas safety hose (2) to the gas connection (1) so that it sags and is without tension. Secure the gas safety hose using pipe clamps with rubber inserts.
4. Install an easily accessible stopcock upstream of the gas connection.
5. Purge the gas pipe before start-up.
6. Check the gas connection for leak-tightness.

5.2 Installing the product on the heating side

5.2.1 Connecting the product to the heating installation



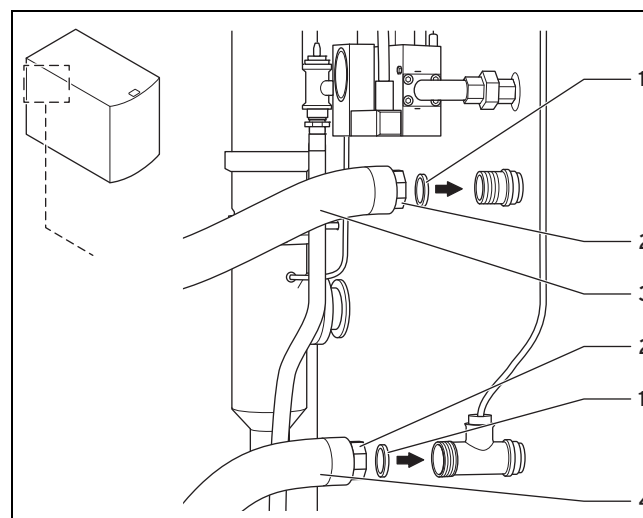
Caution.

Risk of material damage caused by residues in the pipelines.

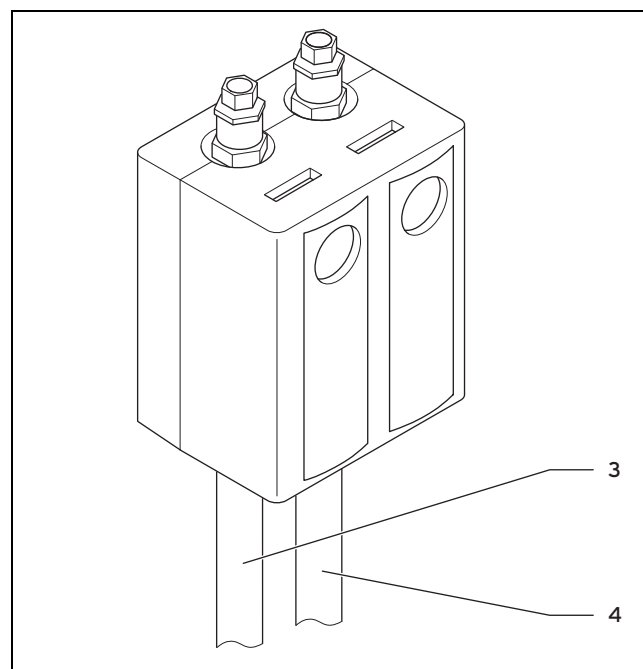
Welding remnants, sealing residues, dirt or other residues in the pipelines may damage the product.

- Flush the heating installation thoroughly before installing the product.

1. Ensure that the heating installation's operating pressure is within the permissible limit values.



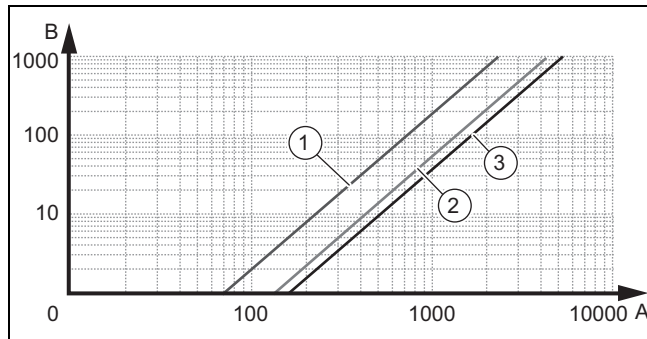
2. In each case, insert a seal (1) into the union nuts (2) on the hoses.
3. Screw the hoses (3, 4) to the product's flow and return connections.
4. Ensure that it is possible to rinse the plate heat exchanger that is installed in the product.



5. Screw the hose (3) from the product's flow connection to the bottom-left connection of the return retention group.
6. Screw the hose (4) from the product's return connection to the bottom-right connection of the return retention group.
7. Open the stopcocks to the heating circuit.
8. Secure the stopcocks against being unintentionally closed again.
9. Purge the heating circuit.
10. Check that the heating circuit is leak-tight.

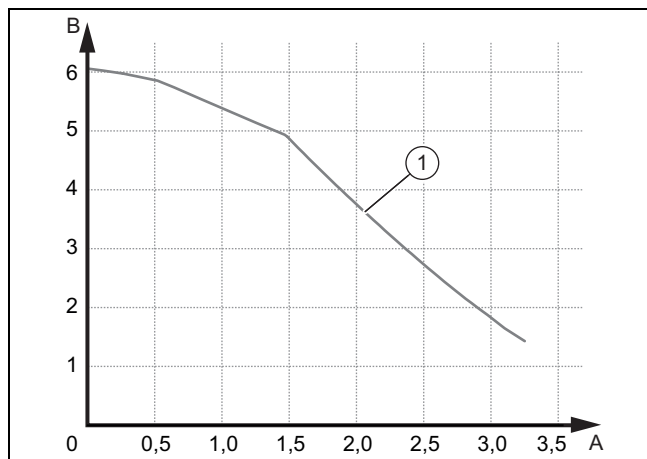
5 Installation

5.2.2 Pressure loss in the 3-port diverter valve



A	Volume flow [l/h]	2	KVs = 6.3 m³/h (mixing valve)
B	Pressure loss [mbar]	3	KVs = 8.0 m³/h
1	KVs = 2.5 m³/h		

5.2.3 Return retention group pump diagram



A	Flow rate [m³/h]	1	Max. Δp
B	Remaining feed head [m]		

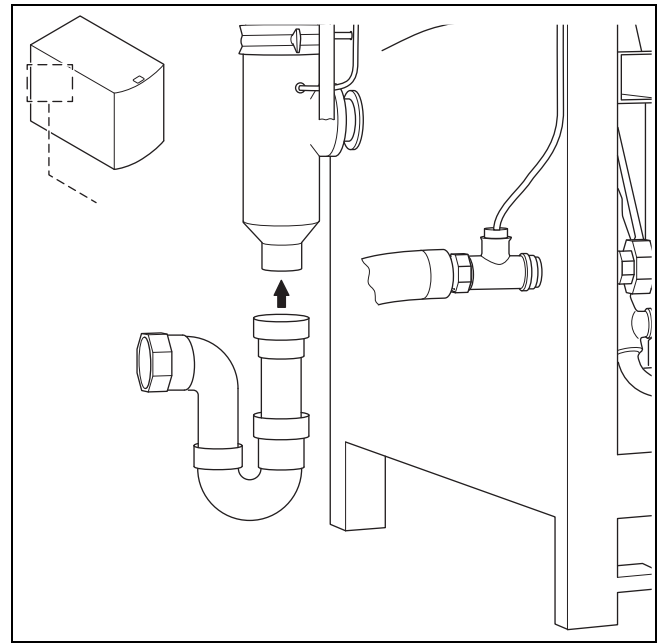
5.2.4 Installing a sludge separator

- In the product's return, install a coarse filter and a sludge separator with magnetite function (not included in the scope of delivery) to protect the internal heat exchanger against dirt deposits.

5.2.5 Installing the pressure expansion vessel

- Install a pressure expansion vessel and a safety assembly in the return to the product.
- Check that the volumetric capacity of the expansion vessel is sufficient for the system volume.

5.3 Connecting the condensate siphon and condensate discharge pipe



Danger!

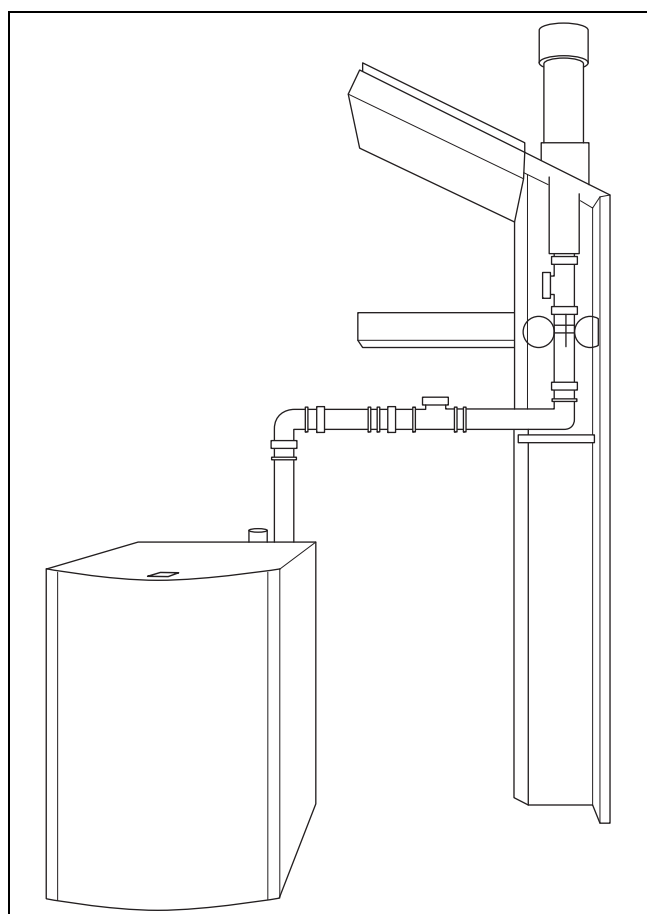
Risk of death caused by incorrectly installed condensate discharge pipes

Drain pipework that is tightly connected to the waste-water pipework can be used to drain the condensate siphon and to therefore let flue gas escape through the empty condensate siphon.

- Do not connect the condensate discharge pipe tightly to the waste-water pipework.
- Fill the condensate siphon with water before starting up for the first time and before starting up again after extended interruptions to operations.

- Install the supplied condensate siphon on the condensate drain pipe.
- Fill the condensate siphon with water.
- Install a condensate discharge pipe on the condensate siphon. Use only pipes made of acid-resistant material (e.g. plastic) for the condensate discharge pipe.
- Install a tundish to the rear of or beside the product in such a way that the tundish can be seen.
- Guide the condensate discharge pipe into the tundish with a downward gradient.

5.4 Installing the fresh air supply and flue system



The fresh air supply and the flue pipework must correspond to installation type B. The product features a flue connection and a 75 mm diameter fresh air spigot as standard. You can use a parallel two-pipe system for the air/flue pipe. Selecting the perfect system depends on the specific installation and application conditions. The maximum length of the flue pipework (for a 75 mm diameter) is 20 m with a maximum of six 90° elbows.

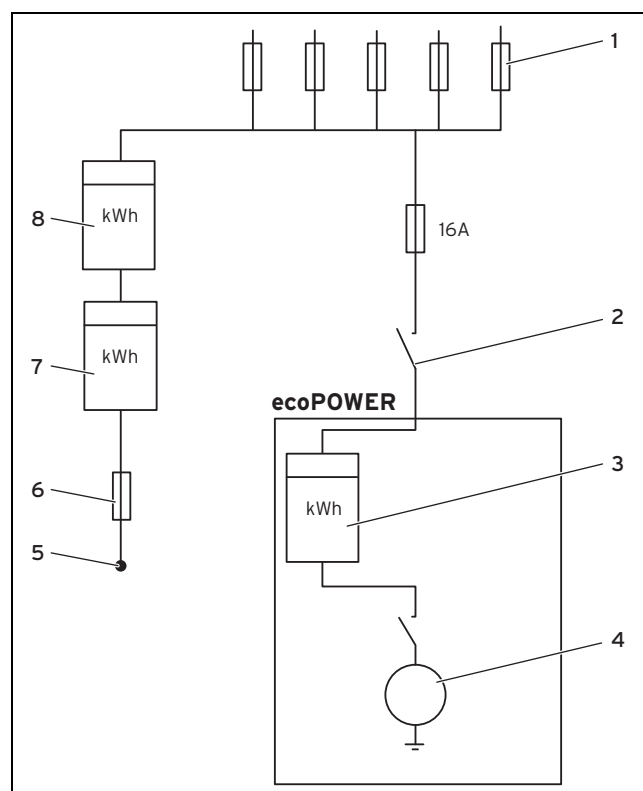
- ▶ Only use flue systems from Technaflon.
- ▶ Install the air/flue pipe in accordance with TRGI regulations.
- ▶ Agree on the air/flue pipe with the chimney sweep.
- ▶ Observe the installation instructions for flue gas systems.
- ▶ Lay the flue pipework within the building in an L90 shaft.
- ▶ Lay the flue pipework within the building such that the entire length is ventilated from behind/washed.
- ▶ Lay the flue pipework with an upward gradient of at least a 3° to the shaft so that the condensate can drain away.

To protect the sound insulation, observe the following:

- ▶ Clad the chimney opening in an insulation jacket (mineral wool).
- ▶ Do not immerse the flue pipework directly at the chimney opening.
- ▶ Secure each flue pipe in the installation room to the wall or ceiling using a pipe clamp that is isolated from structure-borne sound.

5.5 Electrical installation

5.5.1 Connecting the product to the public power grid



- | | | | |
|---|--|---|--------------------------------|
| 1 | Consumer | 4 | Power generation system |
| 2 | All-pole pipe joint L1, L2, L3, N | 5 | Mains supply line |
| 3 | Net electricity meter (can be retrofitted as an option, in consultation with the network operator) | 6 | Connection overvoltage breaker |
| | | 7 | Reference energy meter |
| | | 8 | Feed-in energy meter |

1. Connect the product to the public power grid as shown in the circuit diagram.
2. Agree on the installation with the network operator.

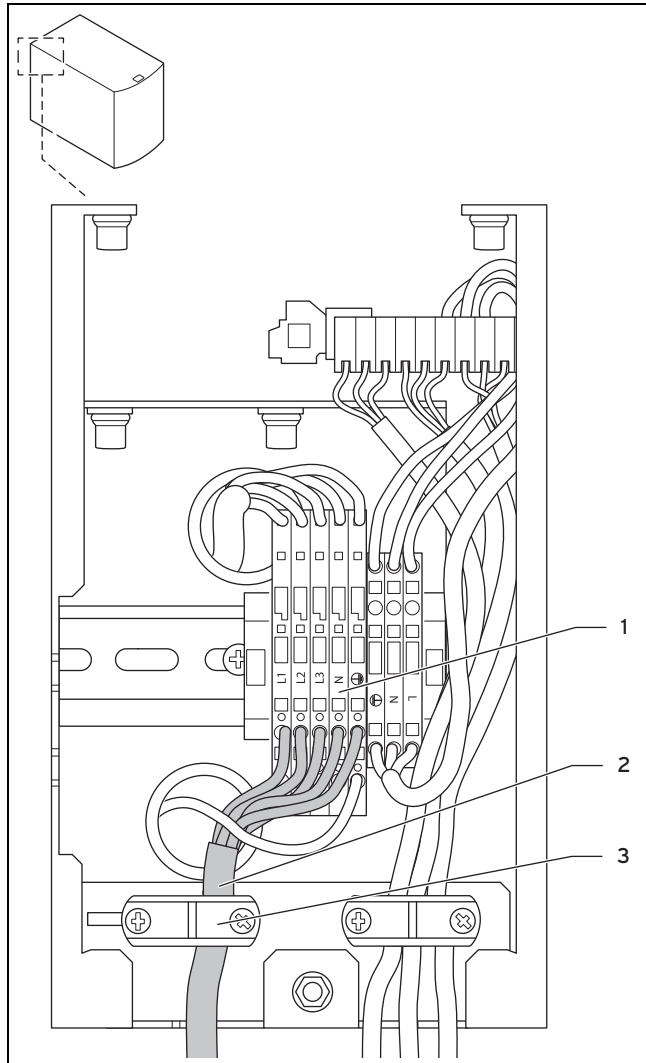


Note

If more power is produced than is needed (in the building), the product with installed optional energy meter feeds electrical energy into the public power grid. If demand is greater than what is produced and cannot be covered by the product, the building draws electrical energy from the public power grid.

5 Installation

5.5.2 Establishing the power supply



1. Before carrying out the electrical installation, check whether the local mains voltage matches the information on the product data plate.
2. Undo the five screws on the electronics box on the rear of the product.
3. Remove the cover from the electronics box.
4. Use a flexible cable for the power supply within the product (fine-wire copper strand 5 x 2.5 mm² – type: H07RR-F 5x2.5). Outside of the product, you can use a fixed cable (e.g. small distribution box on the wall).
5. Run the power supply cable (2) through the grommet on the underside of the electronics box. Leave all unused grommets installed on the electronics box.
6. Install the power supply cable and secure it using the installed strain relief (3).
7. Shorten the power supply cable to the required length, strip the cable to approx. 20-30 mm, and strip 8-9 mm of insulation from the conductors.
8. Connect the power supply cable's conductors to the corresponding terminals (1) in the electronics box: Open the terminals by inserting a screwdriver (size 1) with a tilting movement into the square opening as far as it will go. Insert the conductors into the round opening on the terminal as far as they will go. Pull out the screwdriver again.

9. Ensure that the conductors are mechanically fixed in place in the terminals.
10. Close the electronics box by positioning the cover and tightening the five screws.
11. Connect the power supply cable via an all-pole partition with a contact gap of at least 3 mm in the circuit distributor (sub-distribution).
12. Secure the cable with 3 x 16 A and, if prescribed, a neutral conductor isolator.

5.5.3 Connecting accessories and external installation components



Note

The electrical connections use proE connection technology. The connection plugs are colour-coded and labelled so that you can allocate the components to the right connections.

1. Install accessories and external installation components in accordance with the relevant installation instructions.
2. Undo the five screws on the electronics box on the rear of the product.
3. Remove the cover from the electronics box.
4. Run the connection cable for each component being connected through one of the grommets on the rear of the electronics box.
5. Install the cables with the installed strain relief.
6. Shorten each cable to the required length and strip the cable to approx. 20-30 mm.
7. Insulate the conductors and fit conductor end sleeves to the ends of the conductors.
8. Connect the conductors to the relevant ProE plugs or slots of the electronics (→ connection diagram in the appendix).
9. Ensure that the conductors are held mechanically securely in the screw terminals of the ProE plug.
10. Close the electronics box by positioning the cover and tightening the five screws.

5.5.4 Connecting a return retention group

1. Connect the accessories and/or external installation components to the electricity supply. (→ Page 14)
2. Connect the return retention group's 3-port mixing valve to the **BHKW Mischer** terminal.
3. Connect the return retention group's pump to the **BHKW Pumpe** terminal.

5.5.5 Connecting sensors

- Connect the sensors that are required for the relevant configuration of the heating system and the control type (heating/domestic hot water parameters) (→ Overview of the required sensors in the appendix).

5.6 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 installation, 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 installation.
- Use a magnetic rod to check whether it contains magnetite (iron oxide).
- If you ascertain that it contains magnetite, clean the installation and apply suitable corrosion-protection measures, or fit a magnetic filter.
- Check the pH value of the removed water at 25 °C.
- Ensure that oxygen cannot get into the heating water.

Checking the filling and supplementary water

- Before filling the installation, 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.

Applicability: Germany

- In particular, observe VDI directive 2035, sheets 1 and 2.

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.

Applicability: Austria

OR Germany

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	°dH	mol/m³	°dH	mol/m³	°dH	mol/m³
< 50	< 16.8	< 3	11.2	2	0.11	0.02
> 50 to ≤ 200	11.2	2	8.4	1.5	0.11	0.02
> 200 to ≤ 600	8.4	1.5	0.11	0.02	0.11	0.02
> 600	0.11	0.02	0.11	0.02	0.11	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.



Caution.

The use of unsuitable filling and supplementary water may cause aluminium corrosion and therefore result in leaks.

In contrast to steel, grey cast iron or copper, for example, aluminium reacts with alkaline filling and supplementary water to produce substantial corrosion.

- In installations with a buffer cylinder, only use filling and supplementary water that has a low salt content and that has electrical conductivity (at 25 °C) of max. 100 µS/cm.
- Make sure that the pH value (at 25 °C) is between 8.2 and 8.5.
- Make sure that the oxygen content is below 0.1 mg/l.

6 Start-up



Danger!

Risk of personal injury caused by hot surfaces or hot operating liquids.

The product's surfaces and operating liquids are hot for operational reasons.

- Allow the product to cool before you work on it.

- When starting up the product, proceed in accordance with the start-up overview in the appendix.
- Document your course of action using the commissioning checklist and commissioning report.

6.1 Presetting the start values for the gas mixer and restrictor flap



Note

Instructions on how to operate the service software are described in the separate operating instructions.

1. Switch on the power supply to the product.
2. Switch off the motor switch on the product.
3. Connect a laptop that has the service software installed on it to the diagnostics interface on the rear of the product.
4. Start the service software.
5. Start the product by clicking on the **CHP ON** button.
6. Open the menus for the gas mixer and the restrictor flap (Settings → MOMO Ind Para).
7. Ensure that the start values for the gas mixer and the restrictor flap match the values in the following table:

6 Start-up

Gas type	Gas mixer		Restrictor flap
	Starting position	Warm-up position	Starting position
Natural gas	70±20	160	35
Liquid gas	70±20	200	25

6.2 Carrying out a test run

Conditions: The laptop with the installed service software is connected to the rear of the product via the RJ-45 connection, Service software has started

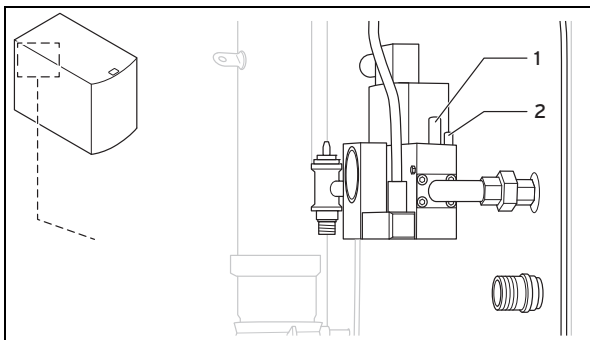
- ▶ Click on **engine** in the lower part of the window in the service software.
 - ▶ During the test run, observe the values under "System status" and "Engine".
1. Start the product.
 2. Specify a speed via the service software.
 3. During the starting procedure, ensure that the temperature of the coolant remains below 50 °C.

Conditions: The temperature of the coolant rises above 50 °C

- ▶ Switch off the product and check the coolant circuit.
4. Set the default setting on the gas valve assembly and the zero pressure regulator:

5. Alternatives 1 / 2

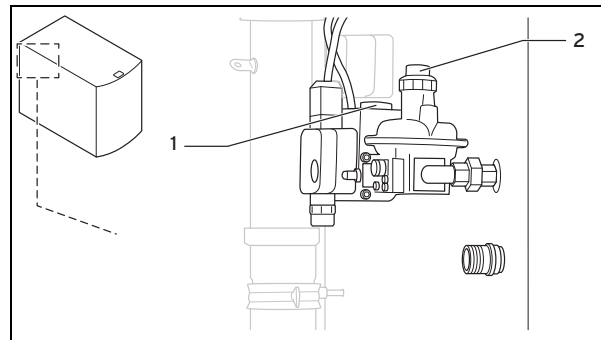
Conditions: Fuel: Natural gas



- ▶ Remove the black plastic cover from the gas valve assembly.
- ▶ Measure the pressure at the test nipple (1).
 - 0.8 ... 0.9 kPa (8.0 ... 9.0 mbar)
- ▽ If the measured value deviates from the target value, proceed as follows:
 - ▶ Turn the adjusting screw (2) of the zero pressure regulator anti-clockwise by at least 39 rotations to ensure that the zero pressure regulator is completely open.
 - ▶ Turn the adjusting screw for the zero pressure regulator by 15 rotations in a clockwise direction.

5. Alternatives 2 / 2

Conditions: Fuel: Liquefied petroleum gas



- ▶ Turn the volume restrictor (1) as far as it will go in the direction of –.
 - ▶ Turn the volume restrictor by 39 rotations in the direction of +.
 - ▶ Remove the black plastic cover (2) from the adjusting screw on the zero pressure regulator.
 - ▶ Turn the adjusting screw on the zero pressure regulator anti-clockwise as far as it will go.
 - ▶ Turn the adjusting screw for the zero pressure regulator by 15 rotations in a clockwise direction.
6. Let the product warm up at 2100 rpm until the temperature of the coolant reaches 75 °C.
 7. Observe the lambda oxygen sensor value (lambda sensor: Motor actual value).
 - Target value (lambda sensor: Target) ±0.02
 8. Observe the gas mixer position.
 - Natural gas target value: 160–170
 - Liquefied petroleum gas target value: 200–210
 9. Increase the speed to:
 - VNC 88+3/2: 2400 rpm
 - VNC 138+5/2: 3400 rpm
 10. Observe the lambda sensor voltage.
 - The lambda sensor voltage must be adapted to the target value within five minutes.
 11. Turn the adjusting screw on the zero pressure regulator clockwise or anti-clockwise in order to decrease or increase the gas mixer position to a value within the following value range.
 - VNC 88+3/2: 200 ... 230
 - VNC 138+5/2: 350 ... 380



Note

If you have to turn the adjusting screw of the zero pressure regulator by more than one rotation, check the default settings for the zero pressure regulator again.

12. In doing so, observe the lambda sensor target value.
 - Target value (lambda sensor: Target) ±0.02
13. Use the service software to restart the product.
 - ▽ Potential starting problems: No ignition/ignition malfunction and/or the set speed is not reached or is only reached briefly.
 - ▶ Repeat the settings.

6.3 Measuring and setting flue gas values



Note

Use a flue gas analyser that can measure CO and NOx or NO values. Analysers that can only operate in a lean range (excess air) are not suitable for this. Analysers with chemical measurement cells must be compensated for H₂.

1. If required, close the side panel of the product.
2. Start the product via the motor switch.
3. Connect a laptop that has the service software installed on it to the diagnostics interface on the rear of the product.
4. Start the service software.
5. In the menu for the service software, select the flue gas test (Settings → Flue gas setting).
6. Start initialisation.
7. Set the corresponding emissions for the four setting points by changing the lambda target values:
 - For each speed, set two setting points in order to reduce the setting time.
 - Use a measuring programme with the specifications 5 minutes rinsing, 5 minutes stabilising, 5 minutes measuring. The measuring programme should generate an average value every second over a period of five minutes.
 - Change the lambda target value for the presetting in large steps by 0.010, for example, and in small steps by 0.002, for example.



Note

Lambda limit values are determined during the measurement. These limit values are required for calculating the lambda target values and they must be carefully determined. The deviation from NOx-160 ppm must be a maximum of ±20%, the deviation from CO-1000 ppm must be a maximum of ±10%.

8. Start up the two checkpoints and ensure that the NOx value is ≤ 160 ppm and the CO value is ≤ 332 ppm during start-up.

6.4 Checking the product

1. Use leak detection spray to check the gas pipe, flue system, heating installation and domestic hot water pipes for leaks.
2. Check that the air/flue pipe has been installed without any problems.
3. Ensure that the electronics boxes and side panels are properly closed.

7 Handing over to the end user

- ▶ Explain to the end user how the safety devices work and where they are located.
- ▶ Inform the end user how to handle the product.
- ▶ Draw attention to the safety information that the end user must follow.

- ▶ Inform the end user that they must have the product maintained in accordance with the specified intervals.
- ▶ Inform the end user about measures taken to guarantee the combustion air supply and flue system, and instruct them that they must not make any changes to the combustion air supply and flue system.
- ▶ Explain to the end user how to check the water level/filling pressure of the installation.
- ▶ Explain to the end user how to fill or purge the heating installation when required.
- ▶ Explain to the end user how to set temperatures, controls and thermostatic valves (economically).
- ▶ Show the end user how to switch off the product via the all-pole joint point in the event of emergency.
- ▶ Pass all of the instructions and documentation for the product to the end user for safe-keeping. Tell the end user that the instructions must be stored close to the product.

8 Operation

The product has two operating levels:

- The end user level
- The installer level

The operating concept and the reading and setting options of the end user level are described in the operating instructions.

You can find an overview of the installer level's menu structure in the appendix.

9 Troubleshooting

9.1 Faults and warnings

Faults and abnormal operating modes are displayed via faults (E...) or warnings (W...).

If a fault occurs, the display shows E... and a 20-digit fault code.

Fault	Source of the fault	Effect
E0	No unit fault	No action required
E1	Control process safety fault	– Product undergoes an emergency shutdown – Product remains locked
E3	Inverter (generator-side)	– Product undergoes an emergency shutdown – A new start attempt takes place if energy is required – If faults occur repeatedly → Fault E1
E5	Engine	
E6	Inverter (network-side)	– Product is shut down – A new start attempt takes place if energy is required – If faults occur repeatedly → Fault E1
E7	Control	

You can find an overview of the 20-digit fault codes in the appendix. You can find a detailed description in the online help for the service software.

You can find an overview of the warnings and their effects and possible measures to remedy them in the appendix.

10 Inspection and maintenance

The product saves the last faults and warnings in a list.

- ▶ Open the list containing the last faults and warnings using the display (basic display → **current values** → **errors & warnings**) or using the service software (Status → Delete event list).
- ▶ To determine the cause of a sensor fault, open the corresponding menu using the display (Basic display → **current values** → **buffer storage** or **heating circuit 1** or **heating circuit 2**).
 - ◁ **s.c.** is displayed if a short circuit occurs.
 - ◁ If a sensor breaks (or if no sensor is connected), **n.c.** is displayed.

9.2 Sensor fault

Sensor faults affect the relevant sensors as follows:

Outdoor temperature sensor AF (T_outside1/2)

- A fault message is created.
- The outdoor sensor value is set to -60 °C (greatest negative value).
- The control system continues to run normally. A back-up boiler is actuated if required.
- The product is blocked.

VF1/VF2 flow temperature sensor (T_flow1/2)

- A fault message is created.
- The heating pump 1/2 is switched on.
- The heating circuit mixer 1/2 is permanently open.
- The flow temperature target value for heating circuit 1/2 is set to 0 °C.
- The control system continues to run normally. A back-up boiler is actuated if required.
- The product is blocked.

RF1/RF2 return temperature sensor (T_return1/2)

- A fault message is created if night shut-off is activated.
- The return temperature actual value for heating circuit 1/2 is set to 20 °C. Night shut-off is deactivated.
- The control system continues to run normally. A back-up boiler is actuated if required.

RF room temperature sensor (T_room1/2)

- A fault message is created if A_room heating mode is activated.
- The target values for the room temperature (day, night, comfort) are set to 20 °C.
- The control system continues to run normally. A back-up boiler is actuated if required.

SP_1_dhw cylinder charging pump (T_SP1_DHW)

- A fault message is created.
- The cylinder charging pump is switched off.
- The cylinder is not charged.
- The control system continues to run normally. A back-up boiler is actuated if required.

SP_2_medium cylinder charging pump (T_SP2_medium)

- The control system continues to run normally. A back-up boiler is actuated if required.
- Medium- and high-level production can no longer be activated.
- A fault message is created if medium-level production or high-level production is activated.

SP_3_down cylinder charging pump (T_SP3_down)

- A fault message is created.
- The product is blocked.
- The sensor fault from the slave is transmitted in parallel operation.
- The control system continues to run normally. A back-up boiler is actuated if required.

VF_total flow temperature sensor (T_VL_total)

- A fault message is created.
- The combined target flow temperature is calculated from the highest target flow temperature of the heating circuits + 2 K. The integral values are eliminated. The actual value of the combined flow temperature is set to 10 °C or 10 °C below the highest target flow temperature in order to guarantee operation.
- If this fault occurs together with a VF1/VF2 fault, the combined target flow temperature is generated directly via the heat curve.

RLF CHP return temperature sensor (T_RL_CHP)

- A fault message is created.
- The control system continues to run normally. A back-up boiler is actuated if required.
- The product is blocked.

10 Inspection and maintenance



Danger!

Risk of material damage or personal injury caused by delayed or improper inspection and maintenance work.

Inspection and maintenance work that is delayed or not carried out correctly may impair the operational safety of the product.

- ▶ Inspection and maintenance work must only be carried out by certified competent persons who have completed additional special product training.
- ▶ During inspection and maintenance work, carry out all of the work listed in the relevant overviews in the specified sequence.
- ▶ If you replace any components, use certified Vaillant original spare parts in order to continue to guarantee the product's EC conformity.
- ▶ Use the maintenance set for maintenance work.
- ▶ Use the oil inspection set for oil inspections.



Danger!

Risk of personal injury caused by hot surfaces or hot operating liquids.

The product's surfaces and operating liquids are hot for operational reasons.

- Allow the product to cool before you work on it.



Note

You can find an overview of the installer level in the appendix.

10.1 Inspection and maintenance interval

Regular maintenance work and oil inspections must be carried out on the product to ensure faultless operation:

- Maintenance work: Every 4000 operating hours, but at least once every 12 months
- Oil inspections: If a warning message (low oil level) is shown in the display
- If the product reports a low oil level after 3500 to 4000 operating hours, carry out regular maintenance instead of an oil inspection.



Note

If an oil inspection has been carried out, the interval until the next regular maintenance work is automatically extended from 4000 to 5000 operating hours.

If a specified maintenance deadline has been exceeded by 200 operating hours (or four weeks), the product switches to limp home mode (at a maximum speed of 2100 rpm).

If the maintenance deadline has been exceeded by 400 operating hours (or six weeks), the product (with active frost protection function) is shut down. It will only be possible to restart the product once the maintenance work has been carried out.

10.2 Inspection and maintenance work



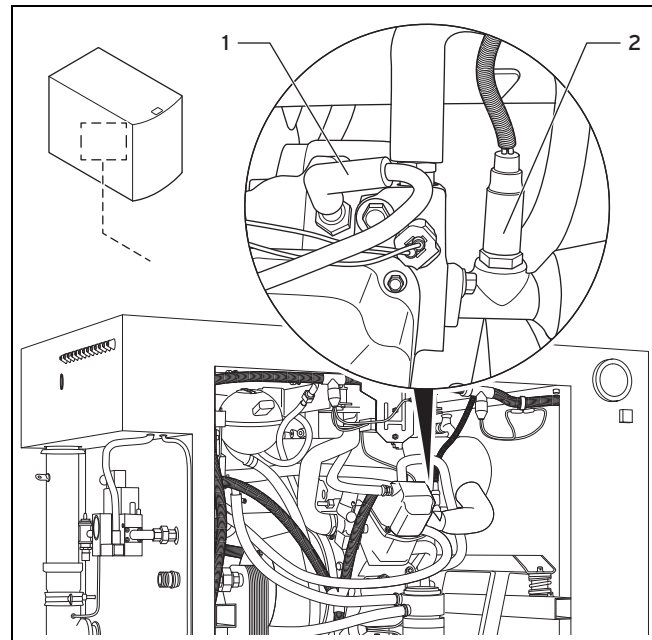
Note

You can find an overview of all of the work that must be carried out during inspection and maintenance in the appendix.

10.2.1 Preparing inspection and maintenance work

1. Switch off the product at least two hours before the maintenance work is due to be carried out to allow the motor to cool.
2. Disconnect the product from the power grid by de-energising the product using the all-pole joint point.
3. Close the gas stopcock.
4. Close the service valves in the heating flow and return.
5. Remove the left-hand side panel from the product.
6. Log all of the work in the end user's service record.

10.2.2 Replacing the ignition cable and spark plug



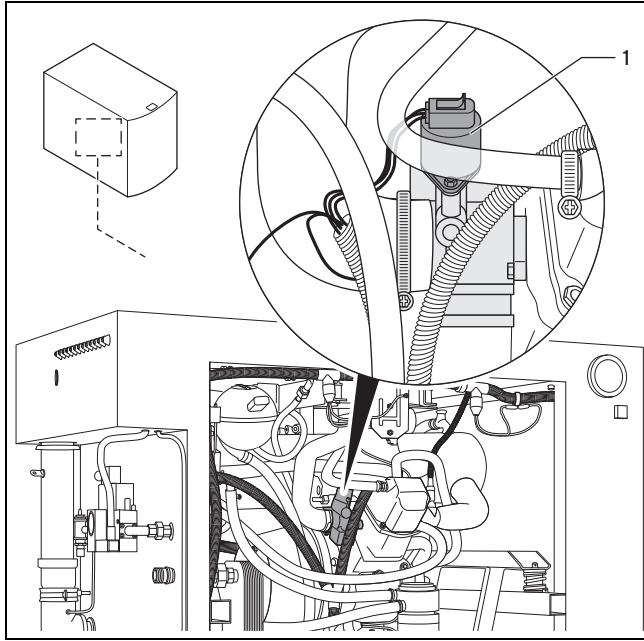
1. Remove the ignition cable (1).
2. Use a spark plug spanner to unscrew the spark plug.
3. Screw in a new spark plug by hand as far as it will go.
4. Use a torque spanner to tighten the new spark plug.
 - 20 Nm
5. Install a new ignition cable.
6. Ensure that the ignition cable plug is securely seated on the spark plug and the ignition coil.

10.2.3 Replacing the lambda sensor

1. Carefully remove the cable for the lambda sensor (2) from the cable duct.
2. Undo the electrical connection for the lambda sensor cable.
3. Use the lambda sensor socket spanner kit to unscrew the lambda sensor and cable.
4. Check the lambda sensor thread on the flue gas heat exchanger for damage.
5. Screw in a new lambda sensor by hand.
6. Use a torque spanner to tighten the new lambda sensor.
 - 45 Nm
7. Run the new cable through the cable duct.
8. Connect the cable to the electricity supply.

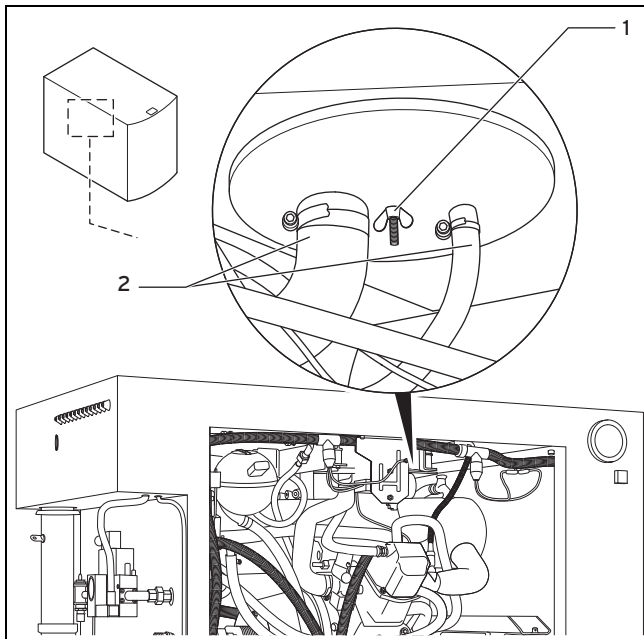
10 Inspection and maintenance

10.2.4 Replacing the stepper motor for the gas mixer



1. Unplug the plug from the upper stepper motor (1) in the gas mixer.
2. Undo the two screws on the stepper motor.
3. Remove the stepper motor, including the O-ring.
4. Fit a new O-ring and a new stepper motor on the gas mixer.
5. Use a torque spanner to tighten the stepper motor.
– 4 Nm
6. Plug the plug into the connection on the stepper motor.
◁ The plug clicks into place.

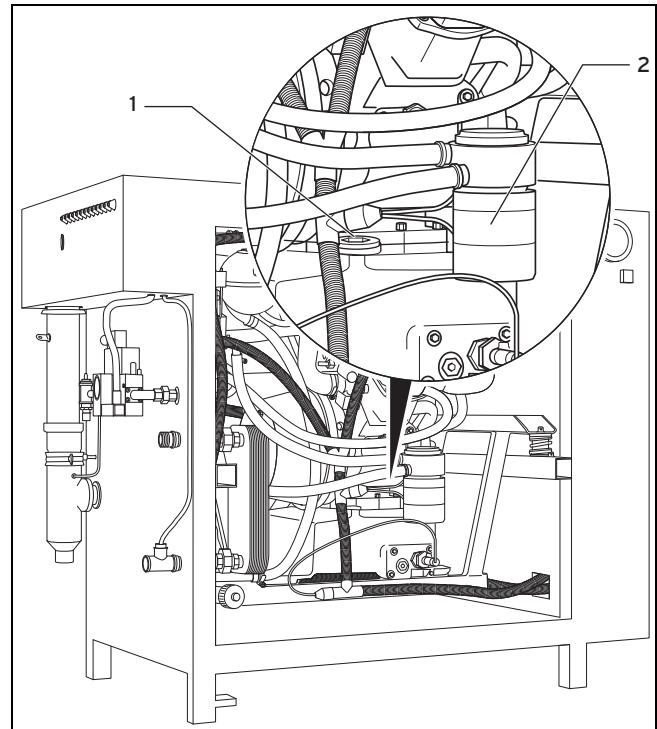
10.2.5 Replace the air filter



1. Loosen the hoses (2) on the intake air damper.
2. Loosen the wing nut (1) in the centre of the cover.
3. Pull the cover downwards and away from the intake air damper.

4. Remove the old air filter insert.
5. Check the intake air damper for dirt.
6. If required, clean the intake air damper.
7. Insert a new air filter insert.
8. Tighten the cover using the wing nut.
9. Check the hoses for defects.
10. Replace any defective hoses.
11. Install the hoses without kinks.
12. Check that the hoses are positioned securely.

10.2.6 Oil and oil filter



1. Measure the oil level. (→ Page 20)

Conditions: You carry out an oil inspection.

- Top up the oil as required. (→ Page 21)

Conditions: You carry out maintenance work.

- Change the oil and the oil filter. (→ Page 21)

10.2.6.1 Measuring the oil level

1. Unscrew the dipstick (1) from the oil filler neck.
2. Clean the dipstick using a clean cloth.
3. Insert the dipstick as far as it will go in the oil filler neck.
Do not screw the dipstick in tightly.
4. Pull out the dipstick again.
5. Read the oil level at the markings on the dipstick.
6. Make a note of the oil level in the maintenance report.
7. Place the dipstick in the oil filler neck and tighten the dipstick to 25 Nm.

10.2.6.2 Topping up the oil

Conditions: The measured oil level is below the F marking on the dipstick., You carry out an oil inspection.

- ▶ Unscrew the dipstick (1).
- ▶ Fill the oil filler neck with oil until the oil level is at the F marking on the dipstick.

1. Measure the oil level. (→ Page 20)

Conditions: The measured oil level is above the F marking on the dipstick.

- ▶ Use an oil scavenge pump to draw off oil until the measured oil level is at the F marking on the dipstick.
2. Place the dipstick in the oil filler neck and tighten the dipstick to 25 Nm.

10.2.6.3 Changing the oil and replacing the oil filter

1. Unscrew the dipstick (1) from the oil filler neck.
2. Use an oil scavenge pump to drain off the all of the oil (up to 11 litres).
3. Place a container or cloth underneath the oil filter (2).
4. Use a suitable tool to unscrew the oil filter, including the seal.
5. Clean the oil filter's sealing face on the motor.
6. Insert a new seal.
7. Wet the seal with fresh oil.
8. Screw in a new oil filter by hand.
9. Fill the oil filler neck with new oil (approx. 11 litres) until the measured oil level is at the F marking on the dipstick.
10. Measure the oil level. (→ Page 20)
11. Place the dipstick in the oil filler neck and tighten the dipstick to 25 Nm.

10.2.7 Checking and topping up the coolant

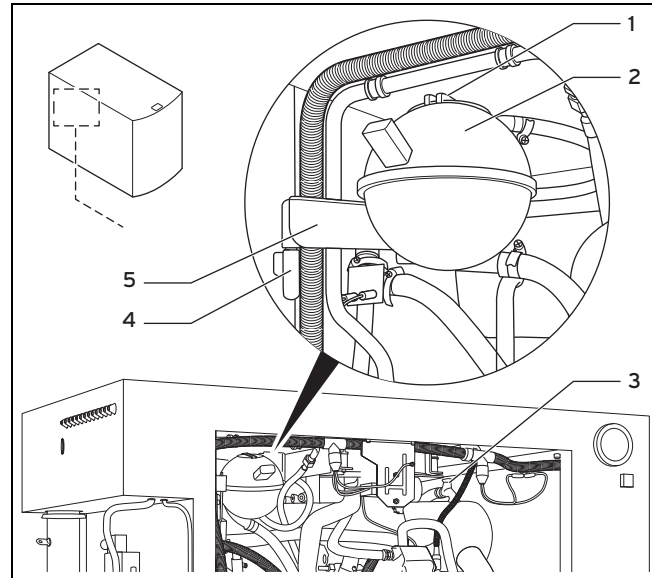


Danger!

Risk of personal injury when handling coolants.

The coolant may irritate the skin, eyes and respiratory system.

- ▶ Avoid direct contact with the skin and eyes.
- ▶ Ensure that the room is sufficiently aerated.
- ▶ Do not inhale the vapours.
- ▶ Wear suitable protective equipment.
- ▶ Carefully open the cover on the coolant reservoir so that any excess pressure can safely escape.



1. Remove the left-hand side panel.
2. Carefully loosen the cover (1) on the coolant reservoir (2) but do not yet remove the cover.
3. Open the purging valve (3) on the flue gas heat exchanger.
4. Remove the cover from the coolant reservoir.
5. Check whether the coolant is contaminated.

Conditions: The coolant is dull or has become a black or brown colour.

OR: The coolant has been used for at least 20,000 operating hours.

- ▶ Change the coolant (→ Repair instructions).
6. Check the coolant fill level on the coolant reservoir.
 - ◁ The fill level should be between the MIN and MAX markings.

Conditions: The coolant fill level is below the MIN marking.

- ▶ Lift the coolant reservoir, including the retainer (5), from the hinge (4).
- ▶ Attach the retainer to the hinge such that the coolant reservoir is outside the product.
- ▶ Fill the coolant reservoir with coolant until the fill level reaches the MAX marking. If you add more coolant than this, coolant will flow out of the purging valve.
 - The total volume of coolant is approximately 13 l.
 - Use a mixture of 30% CARIX and 70% water with max. 20 °dH (3.6 mol/m³) as the coolant.
- 7. Close the purging valve.
- 8. Close the cover on the coolant reservoir.

Conditions: The coolant reservoir, including retainer, was swivelled outwards to top up the coolant.

- ▶ Swivel the retainer and coolant reservoir back inside the product.

11 Decommissioning

10.2.8 Completing the inspection and maintenance work

1. Open the service valves in the heating flow and return.
2. Open the gas stopcock.
3. Connect the product to the power mains.
4. Switch on the motor switch.
5. If required, fill and purge the heating installation again.
6. Check that the product is leak-tight. (→ Page 17)
7. Measure the oil level. (→ Page 20)
8. Purge the coolant circuit.
9. Close the left-hand side panel.
10. Log all of the work in the end user's service record.
11. Fill out the sticker that is enclosed with the maintenance set or oil inspection set.
12. Affix the sticker to the product.
13. Reset the maintenance or confirm the oil inspection via the maintenance menu (→ Appendix) or via the service software (**settings** → **maintenance /oilinspection** → **reset maintenance**).
14. Dispose of replaced components and operating materials correctly.

11 Decommissioning

11.1 Decommissioning the product

- ▶ Disconnect the product from the power grid by de-energising the product using the all-pole joint point.
- ▶ Close the gas stopcock.
- ▶ Close the service valves in the heating flow and return.
- ▶ Disconnect all of the electrical connections for the power supply and sensor connection PCB.
- ▶ Disconnect the product from the gas supply.
- ▶ Disconnect the product from the heating circuit.
- ▶ Disconnect the product from the air supply and the flue system.
- ▶ Remove all operating liquids.
- ▶ Secure the partitions in the power and gas supply against being switched back on.

12 Recycling and disposal

Disposing of the packaging

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

13 Customer service

13.1 Customer service

Applicability: Austria, Vaillant

Vaillant Group Austria GmbH
Clemens-Holzmeister-Straße 6
1100 Wien
Österreich

E-Mail Kundendienst: termin@vaillant.at

Internet Kundendienst: <http://www.vaillant.at/werkskunden-dienst/>

Telefon: 05 7050-2100 (zum Regionaltarif österreichweit, bei Anrufen aus dem Mobilfunknetz ggf. abweichende Tarife - nähere Information erhalten Sie bei Ihrem Mobilnetzbetreiber)

Der flächendeckende Kundendienst für ganz Österreich ist täglich von 0 bis 24 Uhr erreichbar. Vaillant Kundendienst-techniker sind 365 Tage für Sie unterwegs, sonn- und feiertags, österreichweit.

Applicability: Germany, Vaillant

Auftragsannahme Vaillant Kundendienst: 021 91 5767901

Appendix

A Overview of the required sensors

Component	Heating/domestic hot water parameters	Sensor										
		1	2	3	4	5	6	7	8	9	10	11
ecoPOWER	Always								X	X	X	X
Multi-functional buffer cylinder	Domestic hot water generation								X	X	X	X
Buffer cylinder	Always									X	X	X
Domestic hot water cylinder	Always								X			X
Heating circuit 1	Constant flow	X	X									X
	Normal outdoor temperature	X	X				X					X
	Outdoor temperature night shut-off	X	X	X			X					X
	Outdoor and room temperature with night shut-off	X	X				X	X				X
	Heating off											X
Optional:												
Heating circuit 2	Constant flow	X			X							X
	Normal outdoor temperature	X			X		X					X
	Outdoor temperature night shut-off	X			X	X	X					X
	Outdoor and room temperature with night shut-off	X			X		X	X				X
	Heating off											X
Sensor: 1: VF_total flow temperature sensor 2: VF1 flow temperature sensor 3: RF1 return temperature sensor 4: VF2 flow temperature sensor 5: RF2 return temperature sensor 6: AF outdoor temperature sensor 7: RF room temperature sensor 8: SP_1_dhw cylinder charging pump 9: SP_2_centre cylinder charging pump 10: SP_3_bottom cylinder charging pump 11: RLF CHP system return temperature sensor (pre-installed)												

B Overview of the 20-digit fault codes

Control process safety fault

	Fault code (20-digit*)								Description
	1	2	3	4	5-8	9-12	13-16	17-20	
E1				1					Self-test
E1				2					Programme flow
E1				4					Motor electronics/inverter speed difference
E1				8					Too many false starts or power starts
E1			1						Too many emergency switch-offs
E1			2						Lambda motor electronics
E1			4						Difference between the lambda motor electronics and the lambda control process
E1			8						Lambda 1/2 control process difference
		1							Reserve
E1		2							Incorrect motor electronics status
E1		4							Too many inverter communication faults
* Blank spaces are shown in the display with the value 0									

Appendix

	Fault code (20-digit*)								Description
	1	2	3	4	5-8	9-12	13-16	17-20	
E1		8							Too many motor electronic system communication faults
E1	1								Safety chain
E1	2								Flue gas counter pressure
E1	4								Coolant temperature > 110 °C
E1	8								Flue gas temperature > 116 °C
* Blank spaces are shown in the display with the value 0									

Control process fault

	Fault code (20-digit*)								Description
	1-4	5	6	7	8	9-12	13-16	17-20	
E7					1				Temperature sensor for the product's return
E0					2				Back-up boiler temperature sensor
E5					4				Gas pressure too low during operation
E5					8				Motor false start
E5				1					Power start false start
E0				2					MODBUS
E7				4					CHP system temperature sensor
E5				8					Enable motor electronic system
E5			1						Switch off motor
E3			2						Coupling time exceeded
E7			4						Motor compartment temperature > 100 °C
			8						Reserve
E7		1							Inverter locked
		2							Reserve
E3		4							Inverter communication
E5		8							Motor electronics communication
* Blank spaces are shown in the display with the value 0									

Inverter fault

	Fault code (20-digit*)								Description
	1-4	5-8	9	10	11	12	13-16	17-20	
E3						1			Direct current link voltage too low
E3						2			Direct current link voltage too high
E6						4			Network frequency too high
E6						8			Network frequency too low
E6					1				Network voltage too high
E6					2				Network voltage too low
E6					4				Network synchronisation
E3					8				Inverter power
E6				1					IGBT temperature too high
E6				2					Power module
E3				4					Low speed
E3				8					Overspeed
E3			1						Control process communication
E6			2						Average network voltage too high
E6			4						Self-test
E1			8						No rotating field for mains voltage
* Blank spaces are shown in the display with the value 0									

Motor electronics fault

	Fault code (20-digit*)								Description
	1-4	5-8	9-12	13	14	15	16	17-20	
E5							1		CJ-125: Fault Vbatt too low
E5							2		CJ-125: Heater fault (short circuit to Vbatt)
E5							4		GM stepper motor: Interruption
E5							8		GM stepper motor: Blocked
E5						1			DK stepper motor: Interruption
E5						2			DK stepper motor: Blocked or too many step losses
						4			Reserve
E5						8			Coolant temperature too high
E5					1				Coolant sensor (invalid value)
E5					2				Motor false start
E5					4				12 V supply voltage too high/too low
E5					8				Communication to the control process
E5				1					Electronics not enabled (emergency shutdown)
E5				2					Target speed deviation
				4					Reserve
				8					Reserve
* Blank spaces are shown in the display with the value 0									

Motor electronics safety fault

	Fault code (20-digit*)								Description
	1-4	5-8	9-12	13-16	17	18	19	20	
E1								1	Oil pressure
E1								2	Lambda sensor (deviation from the control process)
E1								4	Gas relay
E1								8	Programme flow
E1							1		Self-test
E1							2		CJ-125: VM fault (short circuit to GND)
E1							4		CJ-125: VM fault (short circuit to Vbatt)
E1							8		CJ-125: UN fault (short circuit to GND)
						1			Reserve
E1						2			CJ-125: UN fault (short circuit to Vbatt)
E1						4			CJ-125: Pump current fault (short circuit to GND)
E1						8			CJ-125: Pump current fault (short circuit to Vbatt)
E1					1				CJ-125: Heater current fault (short circuit to GND)
E1					2				CJ-125: Heater fault (interruption)
E1					4				GM stepper motor: Too many step losses
					8				Reserve
* Blank spaces are shown in the display with the value 0									

C Overview of the warning messages

Warning	Warning message	Effect	Remedy
W1	engine switch off	- Product undergoes an emergency shut-down - Restart is not possible	Switch on the motor switch
W2	mini-CHP is locked	- Product is shut down - Restart is not possible	Enable the product with the service software.
W3	gas pressure too low	- Product undergoes an emergency shut-down - Restart is not possible	Ensure that the gas stopcock is open. When operating with liquefied petroleum gas: Ensure that there is sufficient fuel in the tank. Check the gas pressure at the gas valve assembly.
W4	buffer- or warm water temp- too high	- Product is shut down - Restart is not possible	Wait until the cylinder has cooled down.
W5	maintenance required	The product runs in normal operating mode for a further 200 hours or four weeks, after which it switches to limp home mode at a limited speed	Carry out maintenance on the product. Use the product's display or the service software to reset the maintenance.
W6	engine temp. too high	Product does not start	Wait until the coolant has cooled.
W7	locked for service technician	- Product is shut down - Restart is not possible	Carry out maintenance on the product. Use the product's display or the service software to reset the maintenance.
W8	maintenance required. use only original ecopower maintenance kit!	- Product is in limp home mode. - Rotational speed is limited to 2100 rpm. The product is locked after 200 hours or 14 days	Carry out maintenance on the product. Use the product's display or the service software to reset the maintenance.
W9	Heat consumption too low (RL sensor on the product)	- Product is shut down - Product remains locked for at least two hours	Check the heating system for contamination. Check the coolant fill level.
W10	Return temperature too high on the ecoPOWER	- Product is shut down - Product remains locked for at least 30 minutes	Check the heating system for contamination. Check the coolant fill level. Check whether the flow temperatures of any back-up boilers are set too high.
W11	maintenance required. dynamic interval limit. use only original ecopower maintenance kit!	- Product is in limp home mode. - Rotational speed is limited to 2100 rpm. The product is locked after 200 hours or 14 days	Carry out maintenance on the product. Use the product's display or the service software to reset the maintenance.
W12	maintenance required. mini-CHP is locked. use only original ecopower maintenance kit!	- Product is shut down - No restart possible	Carry out maintenance on the product. Use the product's display or the service software to reset the maintenance.
W13	oilinspect. required. emergency operation xxx hours to go. use only original ecopower inspections kit!	- Product is in limp home mode. - Rotational speed is limited to 2100 rpm. The product is locked after 200 hours or 14 days	Carry out an oil inspection. Use the product's display or the service software to confirm the oil inspection.
W14	oilinspect. required. emergency operation xxx hours to go. extended maintenance interval after inspection. use only original ecopower inspections kit!	- Product is in limp home mode. - Rotational speed is limited to 2100 rpm. The product is locked after 200 hours or 14 days	Carry out an oil inspection. Use the product's display or the service software to confirm the oil inspection.
W15	oilinspect. required. mini-CHP is locked. use only original ecopower inspections kit!	- Product is shut down - No restart possible	Carry out an oil inspection. Use the product's display or the service software to confirm the oil inspection.

D Overview of the maintenance work

No.	Required work	See section
1	Prepare the inspection and maintenance work.	10.2.1
2	Replace the ignition cable and spark plug.	10.2.2
3	Replace the lambda sensor.	10.2.3
4	Replace the stepper motor for the gas mixer.	10.2.4
5	Replace the air filter.	10.2.5
6	Measure the oil level.	10.2.6.1
7	Change the oil and replace the oil filter.	10.2.6.3
8	Check the fill level and quality of the coolant (top it up or change it, if required).	10.2.7
9	Check whether the return retention group is working.	
10	Check the vibration damper for damage*.	
11	Rinse the plate heat exchanger on the heating side.	
12	Rinse the sludge separator/magnetite separator.	
13	Check the buffer on the intake air damper for damage*.	
14	Check the heat insulation on the flue elbow for damage*.	
15	Check the seals on the side panels for damage*.	
16	Check that the cables, hoses, electrical plug connections and other connections are seated correctly and whether they are damaged*.	
17	Check the power electronics system for dirt. If required, clean it with compressed air or a brush/soft brush (not made from metal).	
18	Check the general condition of the product and remove any dirt*.	
19	Check the condensate siphon. If required, clean and fill it.	
20	Clean the condensate discharge pipe.	
21	Clean the coarse filter and sludge separator that were installed on-site.	
22	Open the service valves in the heating flow and return, and the gas stopcock. Start the product.	
23	Measure and set the flue gas values.	6.3
24	Complete the inspection and maintenance work.	10.2.8
* If you notice any damage during the checks, replace the damaged components.		

E Overview of the oil inspection work

No.	Required work	See section
1	Prepare the inspection and maintenance work.	10.2.1
2	Replace the spark plug.	10.2.2
3	Replace the air filter.	10.2.5
4	Measure the oil level.	10.2.6.1
5	Top up the oil, if required.	10.2.6.2
6	Complete the inspection and maintenance work.	10.2.8

Appendix

F Overview of the work required for start-up

Document the work that is carried out in the following overview.

1. Preparatory work

Work	Completed
Switching off the gas and power supply	☐
Cleaning the housing	☐
Checking the plug in the electronics box to ensure that the mechanical connection is correct	☐

2. Checking the installation

Work	Completed
Checking the flow, return, pumps and mixing valves	☐
Filling the condensate siphon with water	☐
Checking the gas connection	☐
Checking the flue connection	☐
Checking the flow and return on the product	☐
Checking the connection to the public power grid with all-pole joint point	☐
Checking that the heating pump, return retention group, cylinder temperature sensors and surface-mounted sensors have been connected correctly on-site in accordance with the basic hydraulic diagram	☐
Checking that the temperature sensor is correctly installed with heat-sink paste and that it is seated firmly	☐

3. Switching on the installation for the first time

Work	Completed
Switching off the motor	☐
Switching on the power supply	☐
Checking the mains voltage in the rear electronics box (also neutral conductor)	☐
Opening the gas supply	☐
Starting the service software, specified value = 0	☐
Connecting the laptop to the product via the diagnostics interface	☐
Switching on the motor	☐
Checking the actuation of the heating pump group and the return retention group (service software test function)	☐

Work

Completed

Increasing the speed to 2400 rpm

☐

Leaving the installation running for 10 minutes, using a leak detection spray to check the gas line assembly inside and outside of the product for leaks

☐

Checking the temperature retention (coolant temperature 75 °C)

☐

Checking the position of the mixing valve (return retention group and heating)

☐

Testing the peripherals, if required: Approval, external alarm in the case of faults, options

☐

Checking the temperature values (correct connection of the temperature sensors)

☐

4. Setting the installation- and customer-specific parameters (documenting the special features in the start-up report)

Work

Completed

Setting the target temperatures (heating circuits and underfloor heating, heat curves)

☐

Setting the heating programmes

☐

Setting the holiday programmes

☐

Setting the circulation timer

☐

Setting the time and date

☐

If required, setting the production or speed programmes for special applications in accordance with the end user's specifications

☐

5. Adjusting the peak load unit

Work

Completed

Checking the peak load unit's cabling

☐

Setting the parameters on the peak load unit in accordance with the basic connection diagrams

☐

Changing the electrical connections for the peak load unit in accordance with the basic connection diagrams

☐

Testing the actuation of the peak load unit (service software test function)

☐

The peak load unit starts and runs without any faults

☐

6. Carrying out a test run

Work

Completed

Allowing the product to run for at least 30 minutes

☐

Appendix

7. Setting the flue gas values

Work

Completed

Configuring the flue gas settings via the service software

☐

8. Securing the gas valve assembly

Work

Completed

Securing the adjusting screws on the gas valve assembly using multi-purpose sealant

☐

9. Setting the remote monitoring system

Work

Completed

Checking the approval option

☐

Registering the installation on the hotline

☐

Entering the number for the fault notification computer (requesting the current telephone number from customer service)

☐

Triggering the test alarm. Checking whether the installation has been correctly identified

☐

10. Resetting the maintenance

Work

Completed

Resetting the maintenance

☐

11. Setting the operating mode

Work

Completed

Switching the product to **Auto**

☐

12. Handing over the installation to the end user

Work

Completed

Teaching the end user how to handle and operate the installation

☐

13. Filling out the service record

Work

Completed

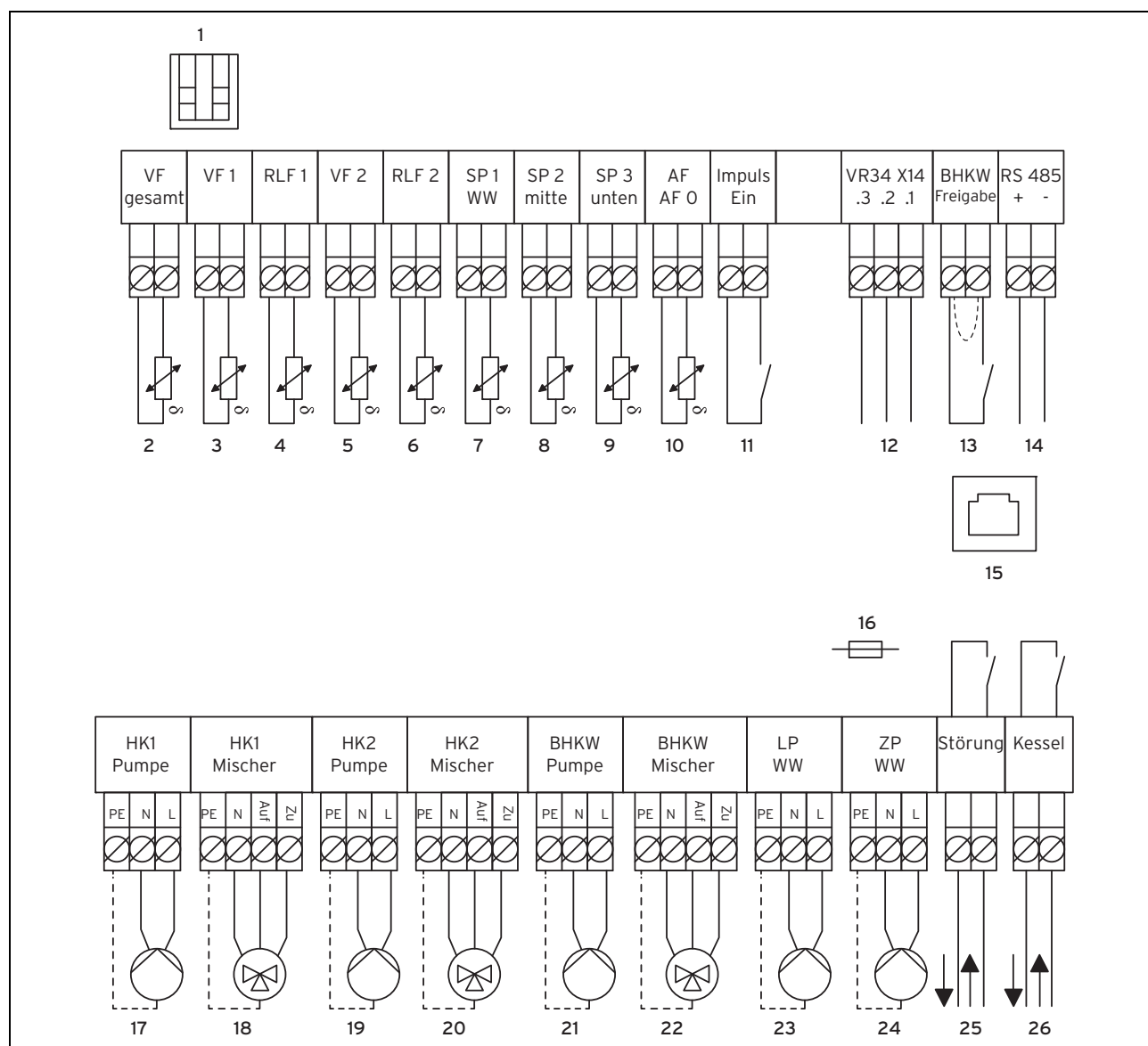
Filling out the start-up report in the service record

☐

Saving the parameters and overview using the service software

☐

G Connection diagram for extra-low and mains voltage



Extra-low voltage

1	Room temperature control	9	Cylinder temperature of the bottom buffer cylinder
2	Total flow temperature	10	Outdoor temperature sensor
3	Flow temperature of heating circuit 1	11	Connecting a potential-free contact (12 V/10 mA)
4	Return temperature of heating circuit 1	12	VR 34 module (approval for Vaillant heat generator)
5	Flow temperature of heating circuit 2	13	External approval for CHP system, connection of a potential-free contact (12 V/10 mA) (remove bridge during use)
6	Return temperature of heating circuit 2	14	RS485 interface for parallel operation
7	Cylinder temperature of the domestic hot water cylinder	15	Diagnostics interface for VPN unit
8	Cylinder temperature of the central buffer cylinder		

Mains voltage (max. 900 V)

16	T 4 A 250 V fuse	22	Mixing valve return retention group
17	Heating circuit 1, pump	23	Domestic hot water cylinder charging pump
18	Heating circuit 1, mixing valve	24	Domestic hot water circulation pump
19	Heating circuit 2, pump	25	Fault notification contact, max. contact loading 230 V/10 A
20	Heating circuit 2, mixing valve	26	Actuation of the peak load unit, max. contact loading 230 V/10 A
21	Pump return retention group		

Appendix

H Main menu: System settings, sub-menu: Maintenance

Setting level	Detailed information	Values		Unit	Increment, select	Default setting
		Min.	Max.			
→ password						
	Enter the four-digit numeric code for the installer level.	0000	9999		1	1995
→ manual operation						
1st line: Control process S	S: Status of the control process Li: Measured lambda sensor voltage (control process) R: Calculated target motor speed F: Status of the gas relay for the control process	Current value				
2nd line: Inverter Z	Z: Status of the inverter – L Lm: Measured lambda sensor voltage (motor electronics) R: Motor speed (inverter) 00: Exit status for last gas relay fault	Current value				
3rd line: Motor electronics M	M: Status of the motor electronics Ls: Target lambda sensor voltage R: Motor speed (motor electronics) F: Status of the motor electronic system gas relay	Current value				
th line: Current operating mode, T: Current temperature of the coolant	AUTO: Automatic mode MANU: Manual operation R232: Specification via the diagnostics interface BOOT: Restart the product RPAR: Switch on the motor electronics and inverter P_SP: Program the control process P_ZE: Program the inverter DOWN: Shut down the product	Current value				
→ option						
	Enable different options by entering a 12-digit code. The product then automatically shuts down and restarts with the relevant option activated.	xxxx-xxxx-xxxx				
→ reset master error						
	Remove the automatic product lock after the security fault has been reset four times within 24 hours.					
→ reset maintenance						
	Reset the number of operating hours to 0, after product maintenance.				YES or NO	
→ do oilinspection						
	Acknowledge that the oil inspection is carried out.				YES or NO	
→ start behavior						
working data	Operating data displays	Current value				
start behavior	Operating data displays	Current value				

I Technical data

General

	VNC 88+3/2	VNC 138+5/2
Product dimensions, length	1,370 mm	1,370 mm
Product dimensions, width	762 mm	762 mm
Product dimensions, height	1,085 mm	1,085 mm
Weight (operating materials)	395 kg	395 kg
Maintenance interval	4000 operating hours (but at least once a year)	4000 operating hours (but at least once a year)
Sound pressure level in accordance with EN ISO 3744 (distance: 2 m)	< 46 dB(A)	< 50 dB(A)
NOx class	3	3

Engine

	VNC 88+3/2	VNC 138+5/2
Displacement	272 cm ³	272 cm ³
Rotational speed	1,400 ... 2,400 rpm	1,400 ... 3,600 rpm
Condensate volume	2 l/h	2 l/h
Flue gas temperature	≤ 90 °C	≤ 90 °C
Coolant temperature	75 ... 90 °C	75 ... 90 °C

Power

	VNC 88+3/2	VNC 138+5/2
Electrical power, modulating (natural gas/liquefied petroleum gas)	1.5 to 3.0 kW / 1.6 to 3.0 kW	1.5 to 4.7 kW / 1.6 to 4.7 kW
Thermal power, modulating (natural gas/liquefied petroleum gas)	4.7 to 8.0 kW / 5.2 to 9.0 kW	4.7 to 12.5 kW / 5.2 to 13.8 kW
Power consumption (natural gas/liquefied petroleum gas)	6.9 to 12.0 kW / 7.5 to 12.6 kW	6.9 to 19.0 kW / 7.5 to 20.0 kW
Own electrical consumption without peripheral devices	50 ... 100 W	50 ... 100 W
Efficiency	≥ 90 %	≥ 90 %
Fuel consumption (natural gas/liquefied petroleum gas)	0.7 to 1.3 m ³ /h / 0.59 to 0.97 kg/h	0.7 to 1.9 m ³ /h / 0.59 to 1.55 kg/h

- Electrical power in accordance with EN 60335/1; the ratio of thermal power to electrical power is almost constant across the entire output range; specified values may vary depending on the air density and gas quality.

Connections

	VNC 88+3/2	VNC 138+5/2
Flow/return connection	R3/4"	R3/4"
Gas connection	Rp1/2"	Rp1/2"
Air/flue pipe connection	75 mm	75 mm
Condensate discharge connection	40 mm	40 mm
Electric connection	3/N/PE 400 V~, 50 Hz	3/N/PE 400 V~, 50 Hz
Dynamic gas connection pressure	1.5 ... 5 kPa (15.0 ... 50 mbar)	1.5 ... 5 kPa (15.0 ... 50 mbar)

Heating system

	VNC 88+3/2	VNC 138+5/2
Return temperature	35 ... 65 °C	35 ... 65 °C
Maximum flow temperature	75 °C	75 °C

Appendix

	VNC 88+3/2	VNC 138+5/2
Maximum permissible operating pressure (heating side)	0.3 MPa (3.0 bar)	0.3 MPa (3.0 bar)
Pressure loss at the intermediate heat exchanger (at a volume flow of 800 l/h)	0.007 MPa (0.070 bar)	0.007 MPa (0.070 bar)

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