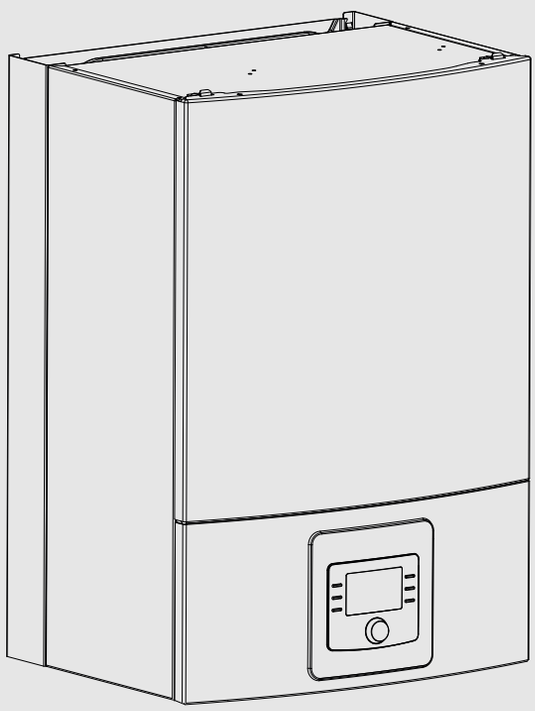
BOSCH

Installation Manual

Indoor unit for air to water heat pump

AWE

AWE 5-9 | 13-17



6721835317 (2021/09) GB

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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe or life-threatening personal injury will occur.

WARNING

WARNING indicates that severe to life-threatening personal injury may occur.

CAUTION

CAUTION indicates that minor to medium personal injury may occur.

NOTICE

NOTICE indicates that material damage may occur.

Important information

The info symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document
•	a list entry
–	a list entry (second level)

Table 1

1.2 General safety instructions

⚠ Notices for the target group

These installation instructions are intended for gas, plumbing, heating and electrical contractors. All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life.

- ▶ Read the installation, service and commissioning instructions (heat source, heating controller, pumps, etc.) before installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.
- ▶ Record all work carried out.

⚠ Intended use

This product is intended for use in sealed heating systems in residential buildings.

Any other use is considered as not intended. Liability will not be assumed for any resulting damage.

⚠ Installation, commissioning and service

The product may only be installed, brought into operation and maintained by trained personnel.

- ▶ Use only original spare parts.

⚠ Handover to the user

When handing over, instruct the user how to operate the heating system and inform the user about its operating conditions.

- ▶ Explain how to operate the heating system and draw the user's attention to any safety relevant action.
- ▶ In particular, point out the following:
  - – Modifications and repairs must only be carried out by an approved contractor.
  - – Safe and environmentally compatible operation requires inspection at least once a year and proper cleaning and maintenance.
- ▶ Point out the possible consequences (personal injury, including danger to life or material damage) of non-existent or improper inspection, cleaning and maintenance.
- ▶ Leave the installation instructions and the operating instructions with the user for safekeeping.

2 Regulations

This is an original manual. This manual may not be translated without the approval of the manufacturer.

Follow the directives and regulations given below:

- Local provisions and regulations of the electricity supplier and corresponding special rules
- National building regulations
- **F-Gas regulation**
- **EN 50160** (Voltage characteristics of electricity supplied by public electricity networks)
- **EN 12828** (Heating systems in buildings - Design for water-based heating systems)
- **EN 1717** (Protection against pollution of potable water installations and general requirements of devices to prevent pollution by backflow)
- **EN 378** (Refrigerating systems and heat pumps - Safety and environmental requirements)

2.1 Water quality

Water quality in the heating system

Heat pumps operate at lower temperatures than other heating systems which means that the thermal de-airing is not as effective and oxygen levels are never as low as with a system incorporating an electric/oil/ gas boiler. This means that the heating system will be more susceptible to corrosion when exposed to aggressive water.

Preventive actions are required if the heating systems require recurrent filling or where a heating water sample does not show clear water.

Preventive actions can be to supplement the heating system with a magnetite filter and a de-airing valve.

Actions when the heating system requires recurrent filling:

- ▶ Check that the volume of the expansion vessel is sufficient for the heating system volume.
- ▶ Replace the expansion vessel.
- ▶ Check the heating system for leakages.

A system separation with the help of a heat exchanger may be required if the limits in table 2 can not be achieved.

The limits stated in table 2 are required to ensure the output data and operation of the heat pump throughout its entire life span.

Water quality	
Hardness	<3 °dH
Oxygen content	<1 mg/l
Carbon dioxide, CO_2	<1 mg/l
Chloride ions, CL^-	<250 mg/l
Sulphate, SO_4	<100 mg/l
Conductivity	<350 µS/cm
pH	7,5 – 9

Table 2 Water quality

Additional water treatment to prevent lime-scale deposits

Poor quality of the heating water promotes the formation of sludge and lime-scale. This can lead to malfunctions and damage of the heat exchanger in the heat pump. According to the current guideline VDI 2035 “Avoidance of Damage in hot water heating systems” and depending on the degree of hardness of the filling water, the system volume and the total output of the system, water treatment may be required to avoid damage due to the formation of lime-scale.

NOTICE

Risk of damage to system or appliance!

Debris from the system can damage the appliance and reduce efficiency.

- ▶ Follow the guidance of BS7593 for treatment of water in domestic hot water heating systems[1)].
- ▶ Do not use anti-freeze/glycol products.

Suitable water treatment products (inhibitors/cleaners) can be obtained from the following manufacturers:

ADEY	01242 546700
	www.adey.com
FERNOX	0330 100 7750
	www.fernox.com
SENTINEL	01928 704330
	www.sentinelprotects.com/uk

Table 3

If the limits for water hardness stated in table 2 are exceeded, the performance of the heat pump will deteriorate over time. If this performance degradation can be accepted, the limits in figure 1 are required to ensure the operation of the heat pump throughout its entire life span.

Heat pump output [kW]	Total alkalinity / total hardness of the filling water [°dh]	Maximum fill and top-up water volume V_{max} [m^3]
$\dot{Q}$ < 50	Requirements according to figure 1	Requirements according to figure 1

Table 4 Table for heat pumps

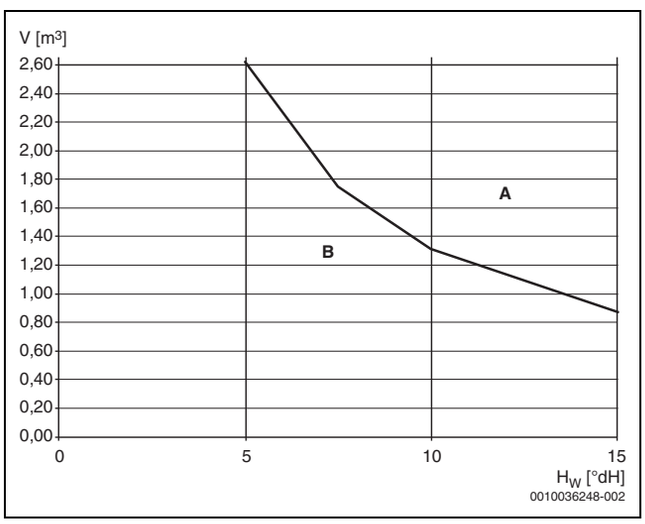

Fig. 1 Limits for water treatment in heat pump systems

A Use completely de-mineralized fill water above the curve, conductivity ≤ 10 microsiemens /cm.
B Use untreated tap water below the curve. Fill according to the drinking water regulation.
H_W Water hardness.
V Total water volume: Fill volume of the heating system and top-up volume over the life span of the heat pump.

If the total water volume is above the limit curve in the diagram (→Fig. 1) suitable measures are required for water treatment.

Suitable measures are:

- Use of fully de-mineralized fill water with a Conductivity of ≤ 10 microsiemens / cm.

To prevent oxygen from entering the heating water, the expansion vessel must be adequately dimensioned.

When installing diffusion open pipes, a system separation with the help of a heat exchanger is required.

1) Only applicable in the United Kingdom.

3 Product description

3.1 Supplied parts

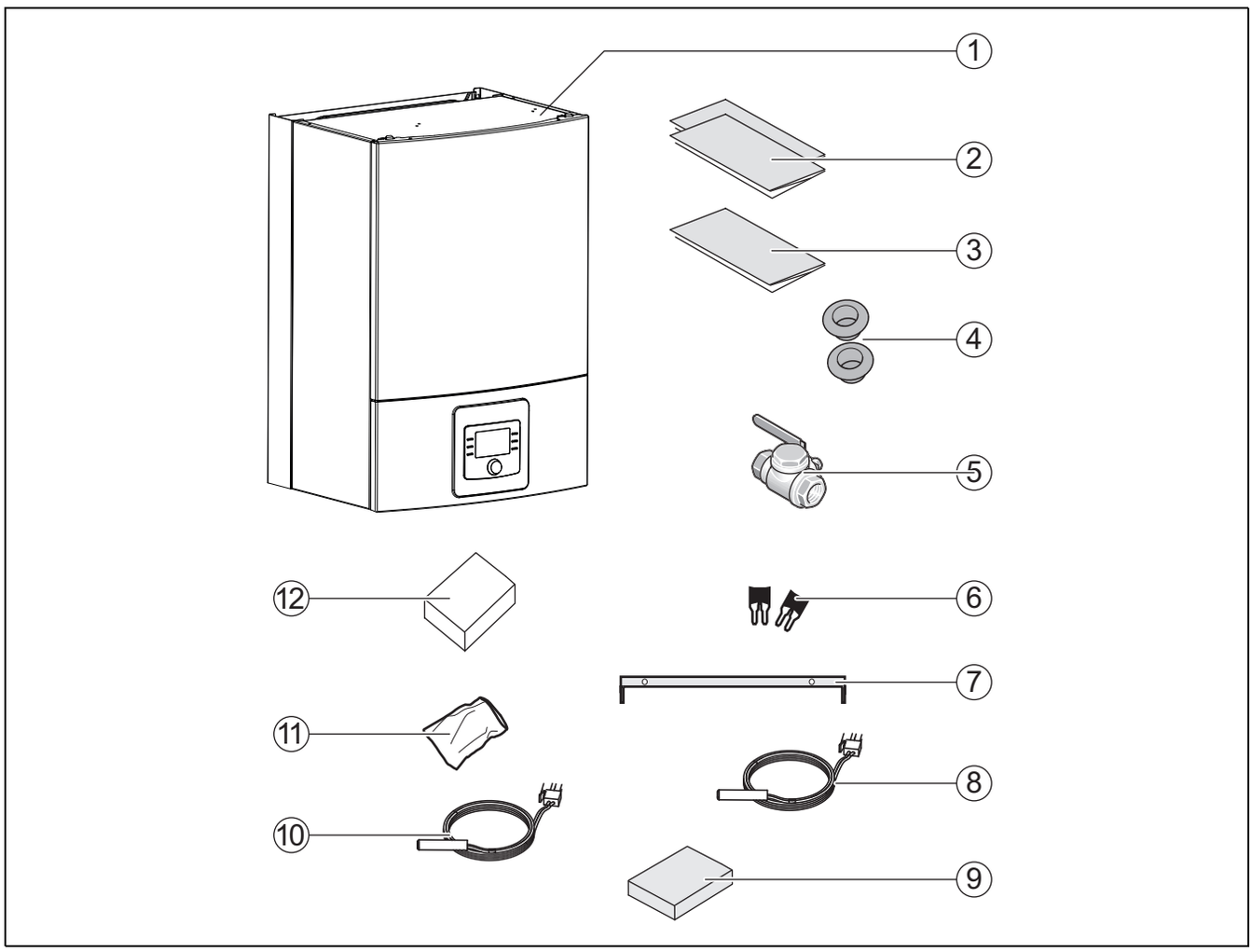

Fig. 2 Supplied parts

[1] Indoor unit
[2] Documentation
[3] Drill template
[4] Cable feeds
[5] Particle filter with strainer
[6] Jumpers for 1-phase installation (not used in Sweden)
[7] Mounting rail
[8] Flow temperature sensor
[9] Box with terminals for the installation module
[10] DHW temperature sensor
[11] Bag with screws
[12] Outdoor sensor

3.2 Information on the indoor unit

The indoor units AWE are intended for assembly in a house and for connection to Compress 7001i AW/Compress 7400i AW heat pumps installed outdoors.

Possible combinations:

AWE	Compress 7001i AW/Compress 7400i AW
5-9	5
5-9	7
5-9	9
13-17	13
13-17	17

Table 5 Possible combinations

3.3 Declaration of conformity

The design and operating characteristics of this product comply with the European and national requirements.

CE The CE marking declares that the product complies with all the applicable EU legislation, which is stipulated by attaching this marking.

The complete text of the Declaration of Conformity is available on the Internet: worcester-bosch.co.uk.

3.4 Type plate

The data plate of the indoor unit is on the control device behind the cover. It contains information on the part number and serial number and also the date of manufacture of the device.

3.5 Product overview

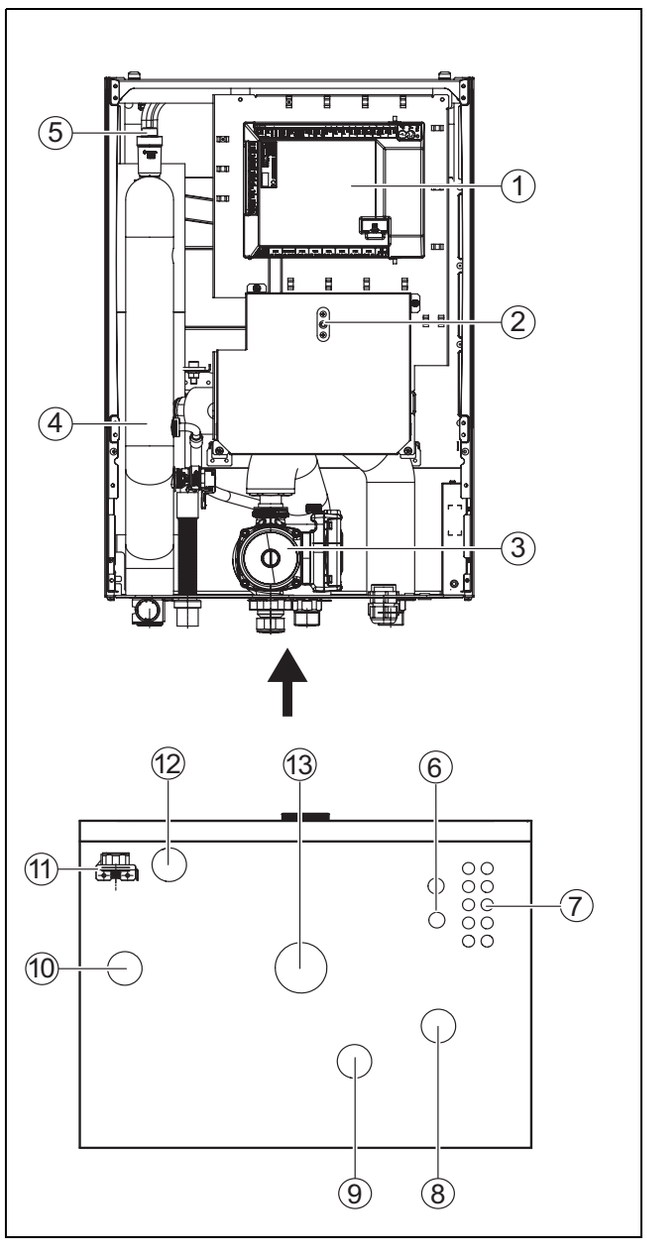

Fig. 3 Components and pipework connections of the indoor unit with auxiliary heater

[1] Installation circuit board
[2] Resetting the overheating protection
[3] Heating pump (heat transfer medium)
[4] Electrical heater
[5] Automatic air vent valve (VL1)
[6] Cable feed for power input
[7] Cable feed for sensor CAN-BUS and EMS-BUS
[8] Heat transfer medium inlet (primary) from the heat pump
[9] Heat transfer medium outlet (primary) to the heat pump
[10] Flow to heating system
[11] Pressure gauge
[12] Overpressure discharge from the pressure relief valve
[13] Return from the heating system

3.6 Product dimensions and minimum clearances

Mount the indoor unit high enough so that the control unit is easy to use. In addition, take into account pipes and connections under the indoor unit.

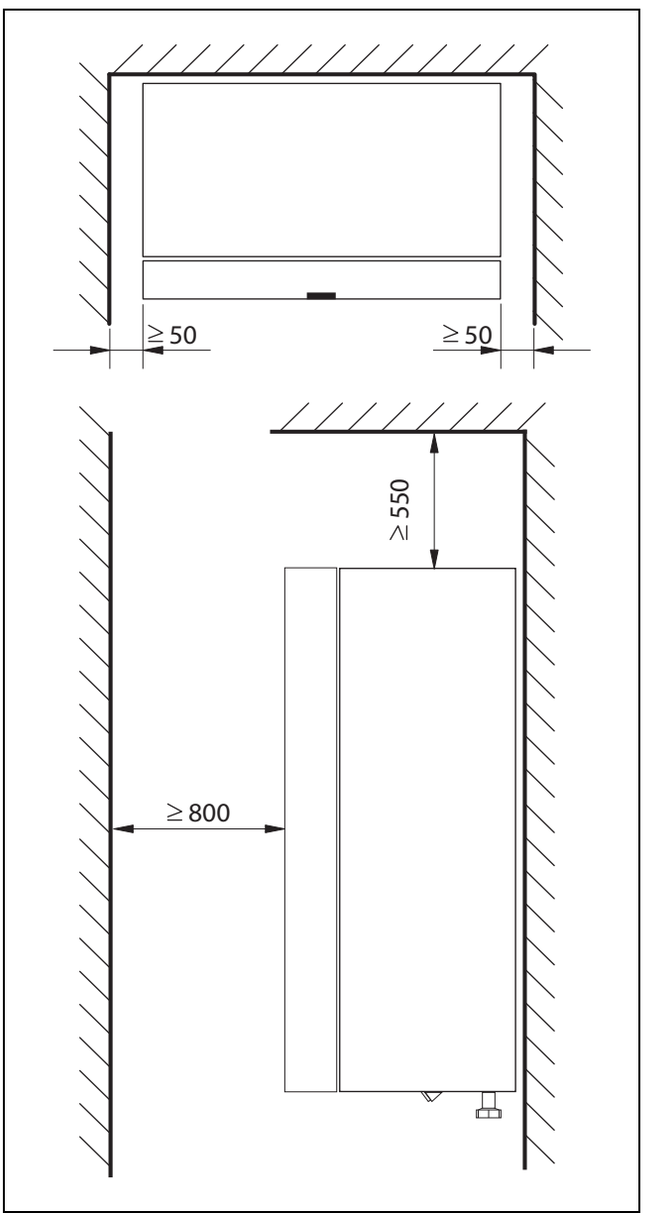

Fig. 4 Minimum distance (mm)

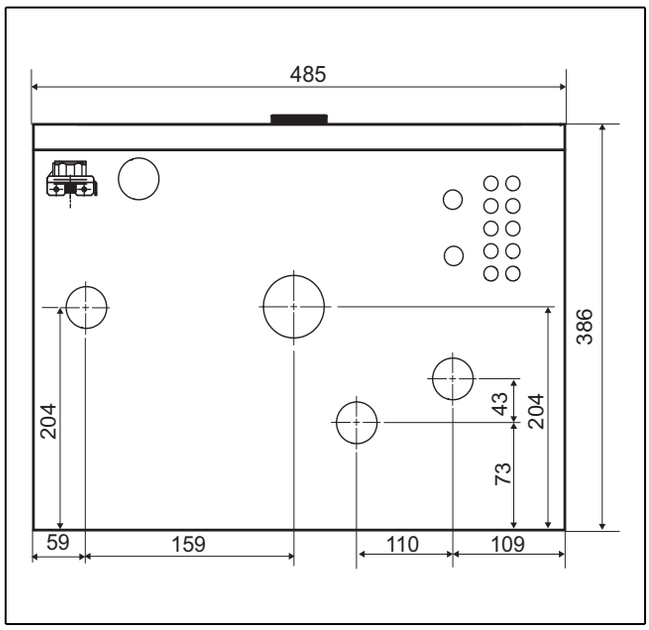

Fig. 5 Dimensions and connections

4 Preparing for installation

The particle filter is installed horizontally in the return of the heating system. Note the direction of flow of the filter.

The drain pipe of the pressure relief valve in the indoor unit must be installed so that it is protected against frost, and the drain pipe must be routed to the drain.

▶ Run the connector pipes for the heating system and cold/domestic hot water in the building up to the installation location of the indoor unit.

4.1 Assembly of the indoor unit

- The indoor unit is placed in the building. The pipework between the heat pump and indoor unit must be as short as possible. Use insulated pipes.
- The installation location for the indoor unit must have a drain.

4.2 Minimum volume and execution of the heating system

To safeguard the heat pump function and avoid an excessive number of start/stop cycles, incomplete defrosting and unnecessary alarms, it must be possible to store a sufficient amount of energy in the system. This energy is stored in the water volume of the heating system, and also in the components of the system (radiators) and concrete floor (underfloor heating system).

As the requirements for different heat pump installations and heating systems vary considerably, a minimum water volume in litres is generally not specified. Instead, the system volume is considered to be sufficient if certain conditions are met.

Underfloor heating system without buffer cylinder

A room temperature-dependent control unit should be installed in the largest room (reference room) instead of room thermostats. Small floor areas can lead to the auxiliary heater being activated in the final phase of the defrosting process.

- ≥ 6 m^2 floor area required for heat pump 5 – 9.
- ≥ 22 m^2 floor area required for heat pump 13 – 17.

To ensure maximum energy savings and avoid auxiliary heater operation, the following configuration is recommended:

- ≥ 30 m^2 floor area for heat pump 5 – 9.
- ≥ 100 m^2 floor area for heat pump 13 – 17.

System with radiators without mixer and buffer cylinder

If the system only contains a few radiators, the auxiliary heater may be activated in the final phase of the defrosting process. The radiator thermostats must be opened fully.

- ≥ 1 radiator with 500 W rating required for heat pump 5 – 9.
- ≥ 4 radiators each with roughly 500 W rating required for heat pump 13 – 17.

To ensure maximum energy savings and avoid auxiliary heater operation, the following configuration is recommended:

- ≥ 4 radiators with 500 W rating for heat pump 5 – 9.

Heating system with underfloor heating system and radiators in separate heating circuits without buffer cylinders

A room temperature-dependent control unit should be installed in the largest room (reference room) instead of room thermostats. Small floor areas or only a few radiators in the system can lead to the auxiliary heater being activated in the final phase of the defrosting process.

- ≥ 1 radiator with 500 W rating required for heat pump 5 – 9.
- ≥ 4 radiators each with roughly 500 W rating required for heat pump 13 – 17.

Although a minimum floor area is not required for the underfloor heating circuit, to avoid auxiliary heater operation and achieve optimum energy savings, additional heating thermostats or several valves of the underfloor heating system must be at least partially open.

Only heating circuits with mixer

A buffer cylinder is essential in heating systems consisting only of heating circuits with mixer.

- Required volume for heat pump 5 – 9 = ≥ 50 litres.
- Required volume for heat pump 13 – 17 = ≥ 100 litres.

Only fan convectors

To prevent the auxiliary heater from being activated in the final phase of the defrosting process, a buffer storage tank with a capacity of ≥ 10 l is required.

Cooling mode

If cooling mode is activated and run in combination with fan coils it is recommended to add a buffer cylinder ≥ 100 litres in the system for best performance and comfort.

5 Installation

5.1 Transport and storage

The indoor unit must always be transported and stored in an upright position. If needed, it may be leaned temporarily.

The indoor unit may not be stored or transported at temperatures below – 10 °C.

5.2 Unpacking

- ▶ Remove the packaging according to the instructions on the packaging.
- ▶ Take out enclosed accessories.
- ▶ Check that all package contents are present.

5.3 Checklist

Each installation is different. The following checklist contains a general description of the recommended installation steps.

1. Fit the drain hose of the indoor unit.
2. Connect the indoor unit to the heat pump.
3. Install the particle filter according to the system solution.
4. Connect the indoor unit to the heating system.
5. Install the outdoor temperature sensor and, if necessary, the room temperature-dependent controller.
6. Connect CAN-BUS cable to heat pump and indoor unit.
7. Install any accessories (solar module, pool module, etc.).
8. If required, connect EMS-BUS cable to accessories.
9. If present, fill and vent the DHW cylinder.
10. Fill and vent the heating system.
11. Establish the electrical connection of the system.
12. Bring the heating system into operation. Use the control unit to make the necessary settings (→ instructions for control unit).
13. Vent entire heating system following commissioning.
14. Make sure that all sensors are displaying permissible values.
15. Check and clean filters.
16. Check the operation of the heating system after startup (→instructions for the control unit).

5.4 Connection

5.4.1 Connecting the indoor unit to the heat pump and the heating system

NOTICE

Residue in the pipework can damage the system.

Solids, metal/plastic filings, flux and thread tape residue and similar material can get stuck in pumps, valves and heat exchangers.

- Keep foreign bodies from entering the pipework.
- Do not leave pipe parts and connections directly on the ground.
- When deburring, make sure that no residue remains in the pipe.
- Before connecting the heat pump and indoor unit, rinse the pipe system to remove any foreign bodies.

NOTICE

Material damage from frost!

In case of a power outage the water in the pipes may freeze.

- Use insulation with a thickness of at least 19 mm for pipework outdoors.
- In buildings, use insulation with a thickness of at least 12 mm for pipework. This is also important for safe and efficient DHW mode.

All heat-conducting pipework must be provided with suitable thermal insulation according to applicable regulations.

In cooling mode, all connections and lines must be insulated according to applicable standards to prevent condensation.

- Route a leakage water hose downwards to a frost-free drain.
- Size pipework as specified in the installation instructions for the heat pump.
- Connect the piping from the heat pump to the heat transfer medium inlet.
- Connect the piping to the heat pump at the heat transfer medium outlet.
- Connect the return from the heating system.
- Connect the flow to the heating system.

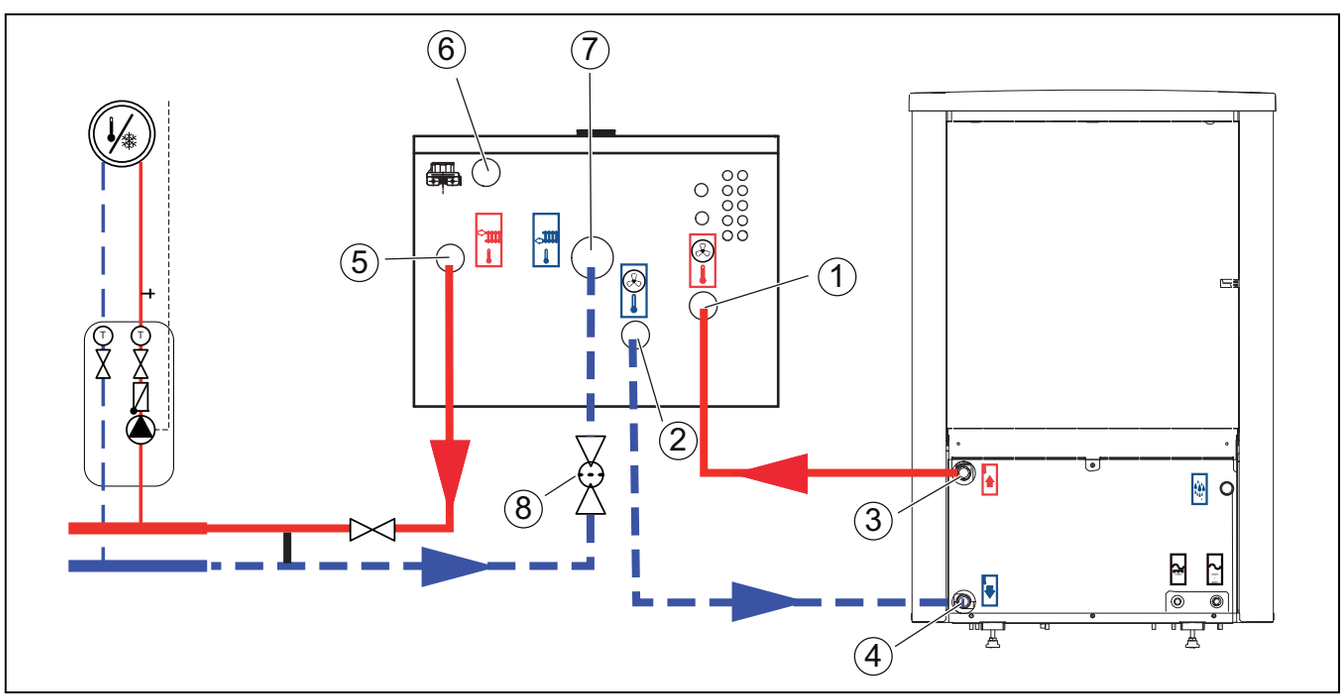

Fig. 6 Connection of the indoor unit with electric booster heater to the heat pump and heating system

[1] Heat transfer medium inlet (primary) from the heat pump
[2] Heat transfer medium outlet (primary) to the heat pump
[3] Flow from the heat pump
[4] Return to the heat pump
[5] Flow to the heating system
[6] Overpressure discharge from the pressure relief valve
[7] Return from the heating system
[8] Particle filter

5.4.2 Outdoor unit, indoor unit and heating system filling

NOTICE

The system will be damaged if it is turned on without water.

The system may be damaged if it is turned on without water.

- ▶ Fill the DHW cylinder and heating system **before** turning on the heating system, and establish the correct pressure.

Vent also at other ventilation punts in the heating system, e.g. radiators.

Fill preferably to a higher pressure than the final one so that there is a margin when the temperature of the heating system rises and the air that has been dissolved in the water is vented out via VL1.

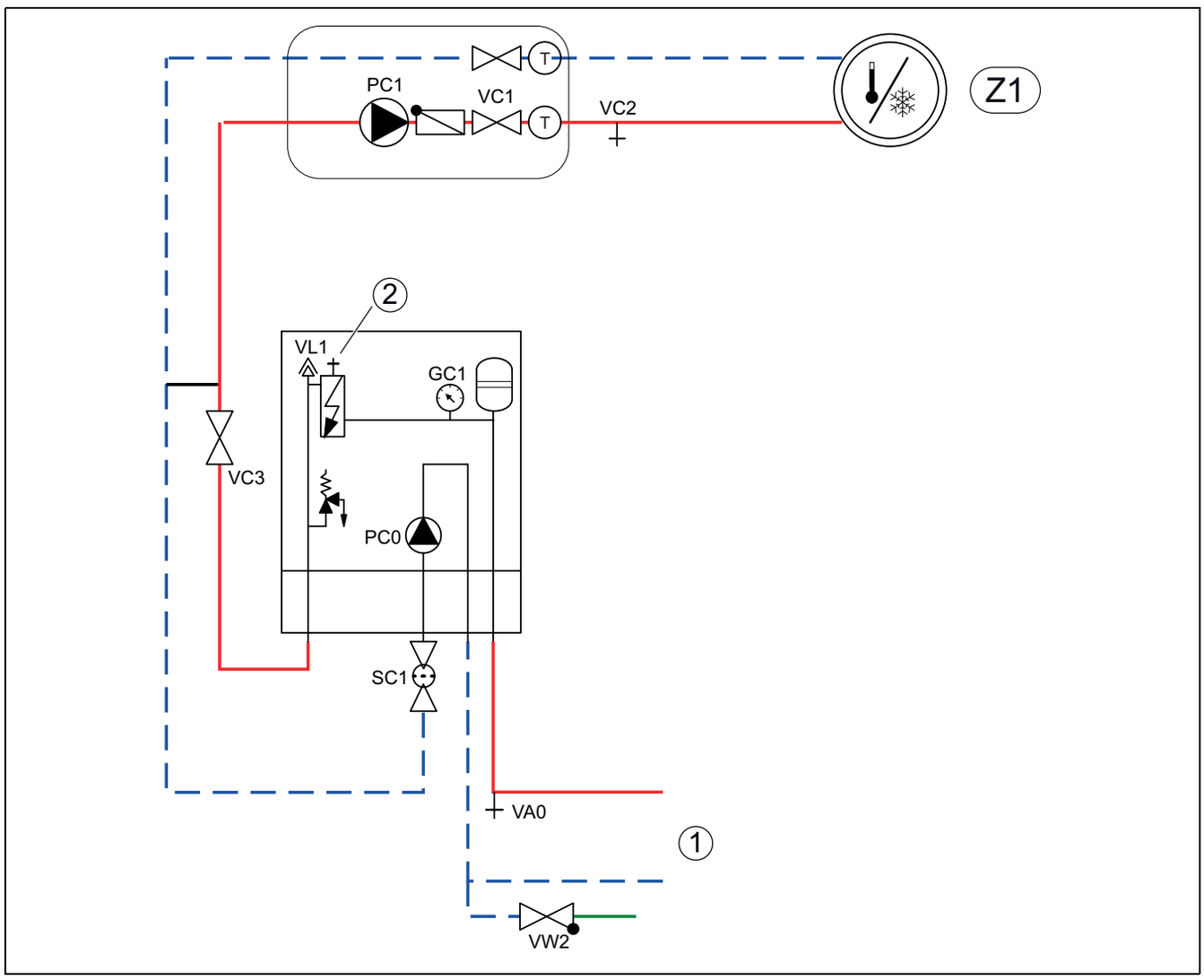

Fig. 7 Indoor unit and heating system

[Z1] Heating system (without mixing valve)
[1] Heat pump
[2] Manual purge valve

1. Disconnect the power supply to the heat pump and indoor unit.
2. Close the heating system valves; particle filter SC1 and VC3.
3. Connect a hose to VA0 and route the other end to a drain. Open the drain valve VA0.
4. Open the fill valve VW2 and admit water into the pipes leading to the heat pump.
5. Open the manual air vent until water flows without air and close the vent again.
6. Continue filling until only water comes out of the hose by the drain and the outdoor unit's condenser does not form bubbles any more.
7. Close the drain valve VA0 and the fill valve VW2.
8. Move the hose to the heating system drain valve VC2.
9. Open the valve VC3, the drain valve VC2 and the fill valve VW2 to fill the heating system.
10. Continue filling until only water comes out of the hose by the drain and the heating system does not form bubbles.
11. Close the drain valve VC2.
12. Open the particle filter SC1 and keep filling until the pressure gauge GC1 shows 2 bar.
13. Close the fill valve VW2.
14. Remove the hose from VC2.

5.4.3 Heating circuit pump (PC1)

Depending on the configuration of the heating system, a pump is needed that is selected depending on the flow rate and pressure drop requirements.

The pump PC1 must always be connected to the installation module of the indoor unit according to the wiring diagram.

Maximum load at the relay output of the pump PC1: 2A, cosφ > 0.4. If the load is higher, install an intermediate relay.

5.4.4 Electrical connection

NOTICE

Malfunction due to faults!

High-voltage lines (230/400 V) in the vicinity of communication lines can cause the heat pump to malfunction.

- ▶ Route sensor cable, EMS-BUS cable and shielded CAN-BUS cable separately to power cables. Maintain a minimum distance of 100 mm. The BUS cable can be routed together with sensor cables.

EMS-BUS and CAN-BUS are not compatible.

- ▶ Do not connect EMS-BUS units to CAN-BUS units.

It must be possible to safely interrupt the power supply to the device.

- ▶ Install a separate safety switch that completely de-energizes the indoor unit. When the power supply is separate, a separate safety switch is needed for each supply line.

- ▶ Select the appropriate conductor cross-sections and cable types for the respective fuse protection and routing method.
- ▶ Mount the enclosed terminals on the installation PCB.
- ▶ Connect the unit according to the wiring diagram. No additional consumers may be connected.
- ▶ When changing the PCB, note the colour coding.

When extending temperature sensor cables, use the following conductor diameters:

- up to 20 m long cable: 0.75 to 1.50 mm^2
- up to 30 m long cable: 1.0 to 1.50 mm^2

CAN-BUS

NOTICE

The system will be damaged if the 12 V- and the CAN-BUS connections are incorrectly connected!

The communication circuits are not designed for 12 V constant voltage.

- ▶ Check to ensure that the cables are connected to the contacts with the corresponding markings on the modules.

Accessories such as output limiters to be connected to the CAN-BUS are connected in parallel on the installation module card in the indoor unit to the CAN-BUS connection for the heat pump. Accessories can also be connected in series with other units connected to the CAN-BUS.

The heat pump and indoor unit are connected to each other by a communication line, the CAN-BUS.

A LIYCY cable (TP) 2 x 2 x 0.75 (or equivalent) **is suitable as an extension cable outside of the unit.** Alternatively, twisted pair cables approved for outdoor use with a minimum cross-section of 0.75 mm^2 can be used. In doing so, only earth the shielding on one side (indoor unit) and to the casing.

The maximum permissible cable length is 30 m.

The connection is made with four wires, as the 12 V supply is also connected. The 12 V and CAN-BUS connections are marked on the module.

The **"Term" changeover switch** identifies the start and end of CAN-BUS loops. Ensure that the correct modules are terminated and that all other modules are not terminated.

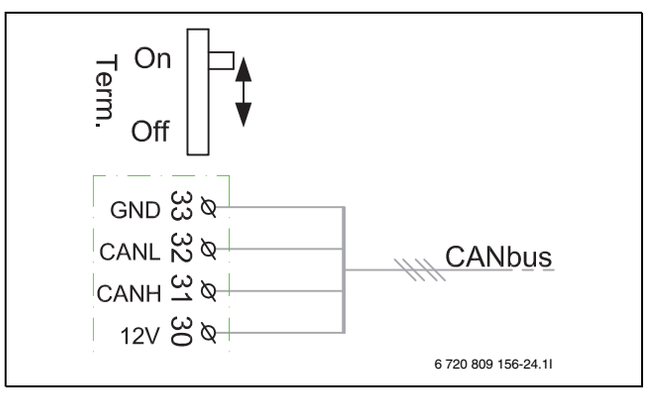

Fig. 8 Termination CAN-BUS

On CAN-BUS completed
Off CAN-BUS not completed

Installation of the temperature sensor

In the default setting, the controller automatically regulates the flow temperature depending on the outside temperature. A room temperature-dependent controller can be installed for greater comfort.

Flow temperature sensor T0

Sensor is included in the delivery.

- ▶ Install the sensor 1-2 metres behind the diverter valve or at the buffer cylinder or at the low loss header if present.
- ▶ Connect the flow temperature sensor on the installation module in the control device of the indoor unit to terminal T0.

Outdoor temperature sensor T1

A screened cable must be used if the outdoor temperature sensor cable is longer than 15 m. The screened cable must be earthed to the indoor unit. The max. length of a screened cable is 50 m.

The cable to the outdoor temperature sensor must meet the following minimum requirements:

- Cable diameter: 0.5 mm^2
- Resistance: max. 50 Ω/km
- Number conductors: 2

- ▶ Install the sensor on the coldest side of the house, normally facing north. The sensor must be protected against direct sunlight, air vents or other factors which could affect the temperature measurement. The sensor must not be installed directly under the roof.
- ▶ Connect the outdoor temperature sensor T1 to the terminal T1 on the installer module.

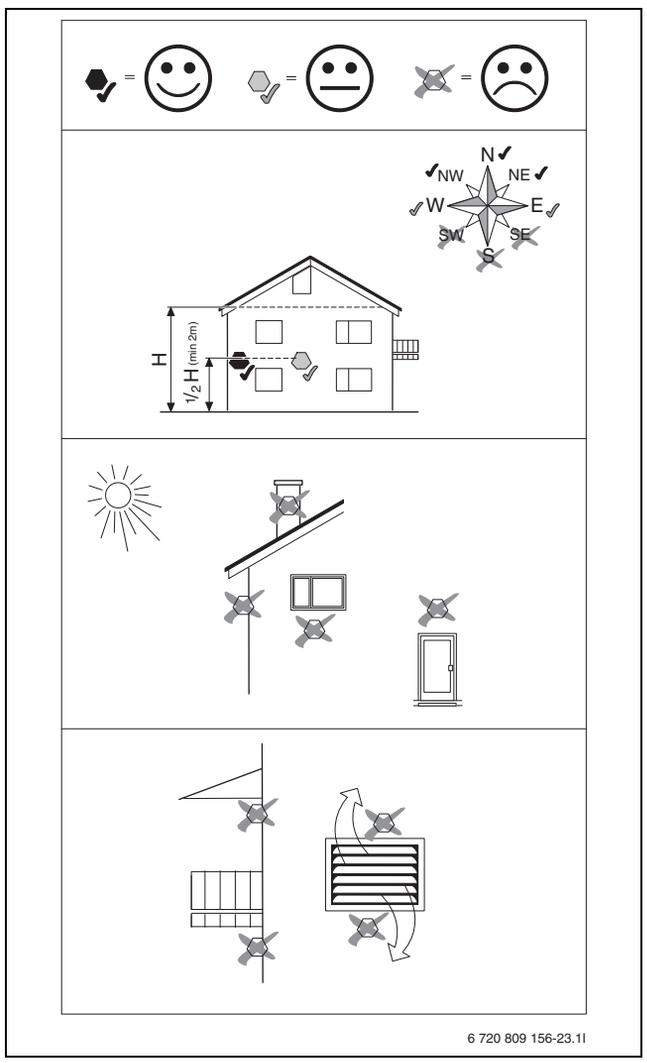

Fig. 9 Position of the outdoor temperature sensor

External inputs

NOTICE

Damage due to incorrect connection!

Connections intended for a different voltage or current can damage electrical components.

- ▶ Only perform connections to the heat pump's external inputs which are designed for 5 V and 1 mA.
- ▶ If an intermediate relay is required, use only relays with gold-plated terminals.

The external inputs can be used for the remote control of certain functions in the user interface.

Those functions which are activated by the external inputs are described in the operating manual for the user interface.

The external inputs are connected either to a circuit breaker for manual activation or a control device with a relay output for 5 V.

Connect the indoor unit

- ▶ Remove the lock of the control device.
- ▶ Feed the connecting lead through the cable feeds to the control device.
- ▶ Connect cable as shown in the wiring diagram.
- ▶ Reattach the cover of the control device and the front plate of the indoor unit.

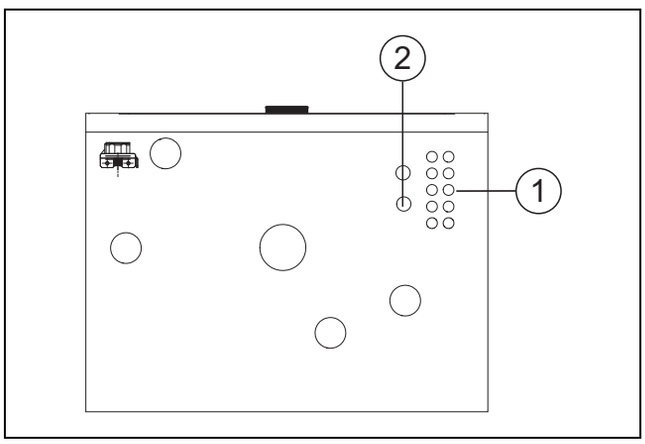

Fig. 10 Cable feeds

[1] Cable feed for sensor, CAN-BUS and EMS-BUS
[2] Cable feed for electrical connection

Considerations for three phase and single phase connections

NOTICE

Risk of product malfunction!

The fuse size should be appropriate to the selected setting for power output of the electric booster heater (→ table 6).

- ▶ If the indoor unit is connected with a single phase connection, fuse sizes up to 50A are required.
- ▶ Always ensure that the selected power limitation fits the available fuse size and cable cross-section during commissioning and servicing.

Fuse sizes for three phase and single phase connections:

Limitation of electric heater	Required fuse size for 3-phase	Required fuse size for 1-phase
2kW	10A	16A
4kW	10A	25A
6kW	25A	32A
9kW	25A	50A

Table 6 Required fuse sizes

The maximum power consumption of the electric heater can be limited via the control unit. A stepwise limitation of 2/4/6/9kW (stand-alone operation) and 2/4/6kW (during compressor operation) can be selected. Depending on this setting, the required fuse size can be reduced to the values shown in table 6. The correct setting for the available fuse sizes must be ensured.

Comfort reduction may occur if the power output of the electric heater is reduced.

Standard: Electrical connection for integrated auxiliary heater (factory configuration)

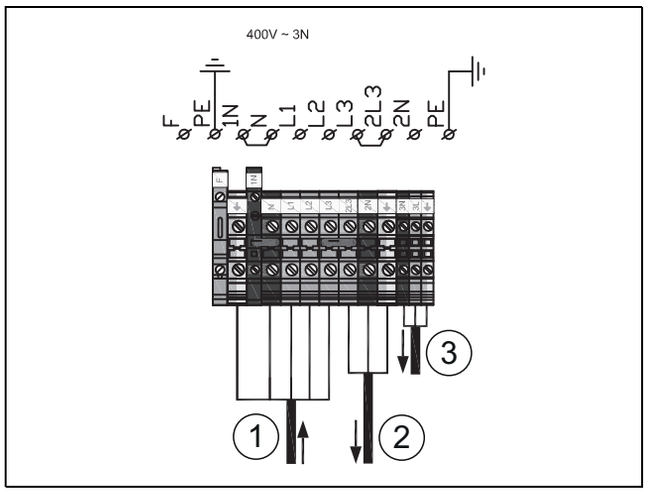

Fig. 11 Electrical standard connection for the integrated electric booster heater

[1] 400 V (three-phase current) mains voltage for indoor unit
[2] 230 V (alternating current) mains voltage for heat pump (alternating current)
[3] 230 V ~1 N mains voltage for accessories

Capacity		K1	K2	K3
2000	W	X		
4000	W		X	
6000	W	X	X	
9000	W	X	X	X

Table 7 Power steps of the electric booster heater

K3 is blocked during compressor mode. When only the electric booster heater is running and the compressor is switched off, the following power steps apply: 3/6/9 kW.

Alternative version, alternating current, see arrangement of jumpers

The heat pump has a separate power supply and is connected via the building connection.

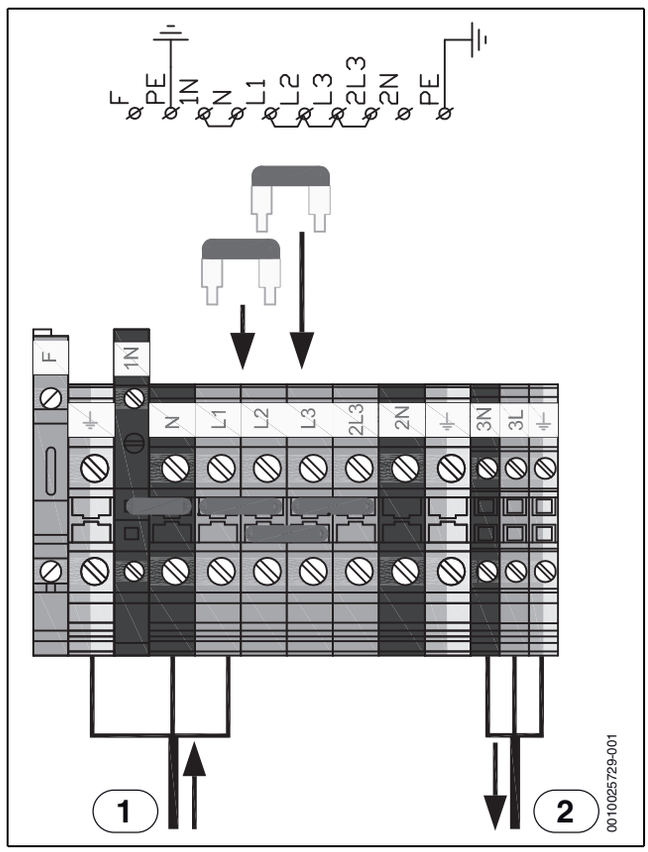

Fig. 12 Alternative version

[1] 230 V 1 N~, mains voltage
[2] 230 V 1 N~, EMS accessory

Connections to installation module

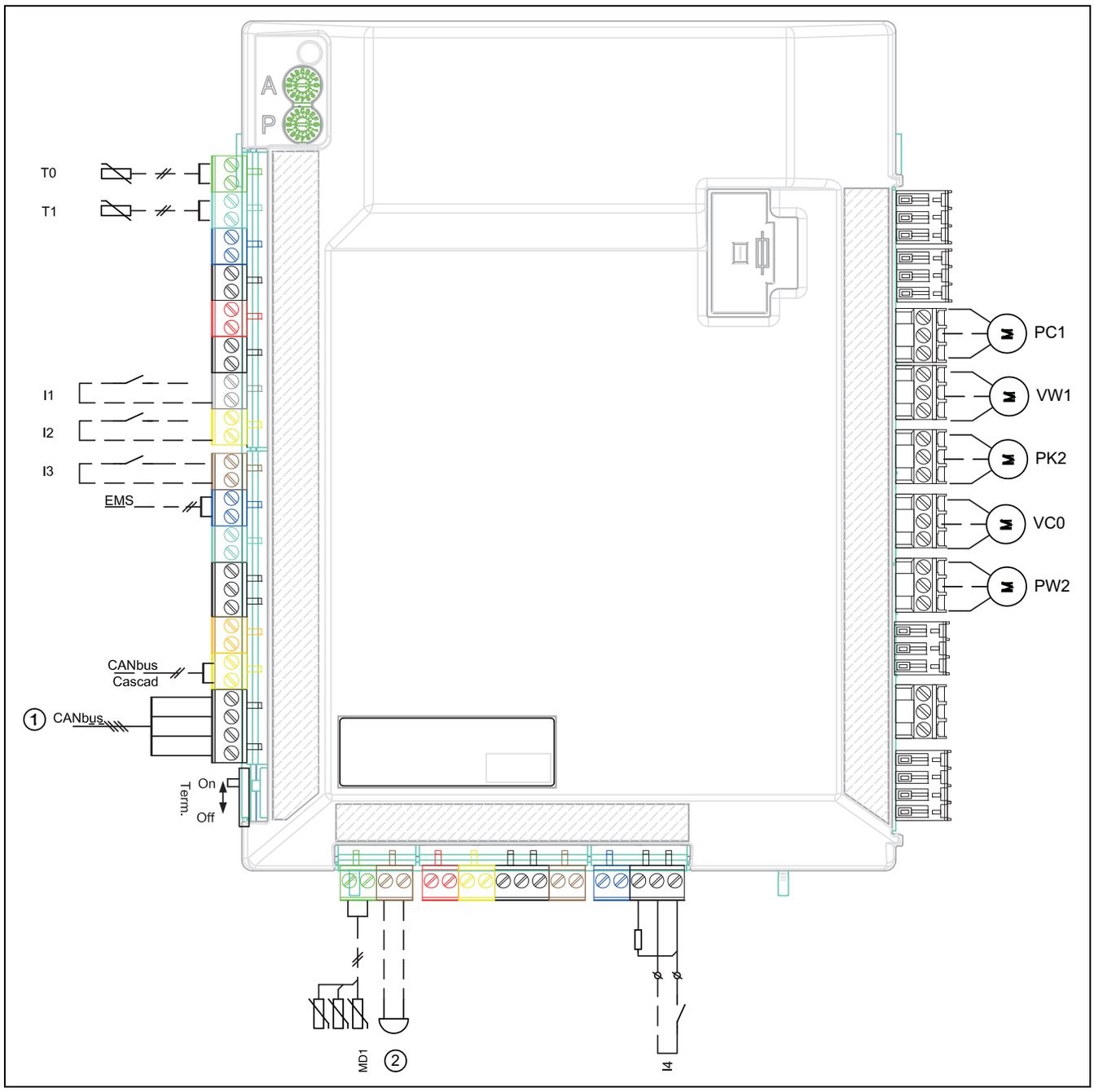

Fig. 13 Connections to installation module

[I1] External input 1 (energy supplier)
[I2] External input 2
[I3] External input 3
[I4] External input 4 (control unit)
[MD1] Humidity sensor (accessory for cooling mode)
[T0] Flow temperature sensor
[T1] Outdoor sensor
[PC1] Circulation pump, heating circuit
[VW1] Heating / DHW diverter valve (accessory)
[PK2] Relay output for cooling season, 230 V
[VC0] Circulation diverter valve, 230 V output (accessory)
[PW2] DHW circulation pump (accessory, required for cooling operation)
[1] CAN-BUS to heat pump (I/O PCB)
[2] Alarm buzzer (accessory)

Connection alternative for EMS bus

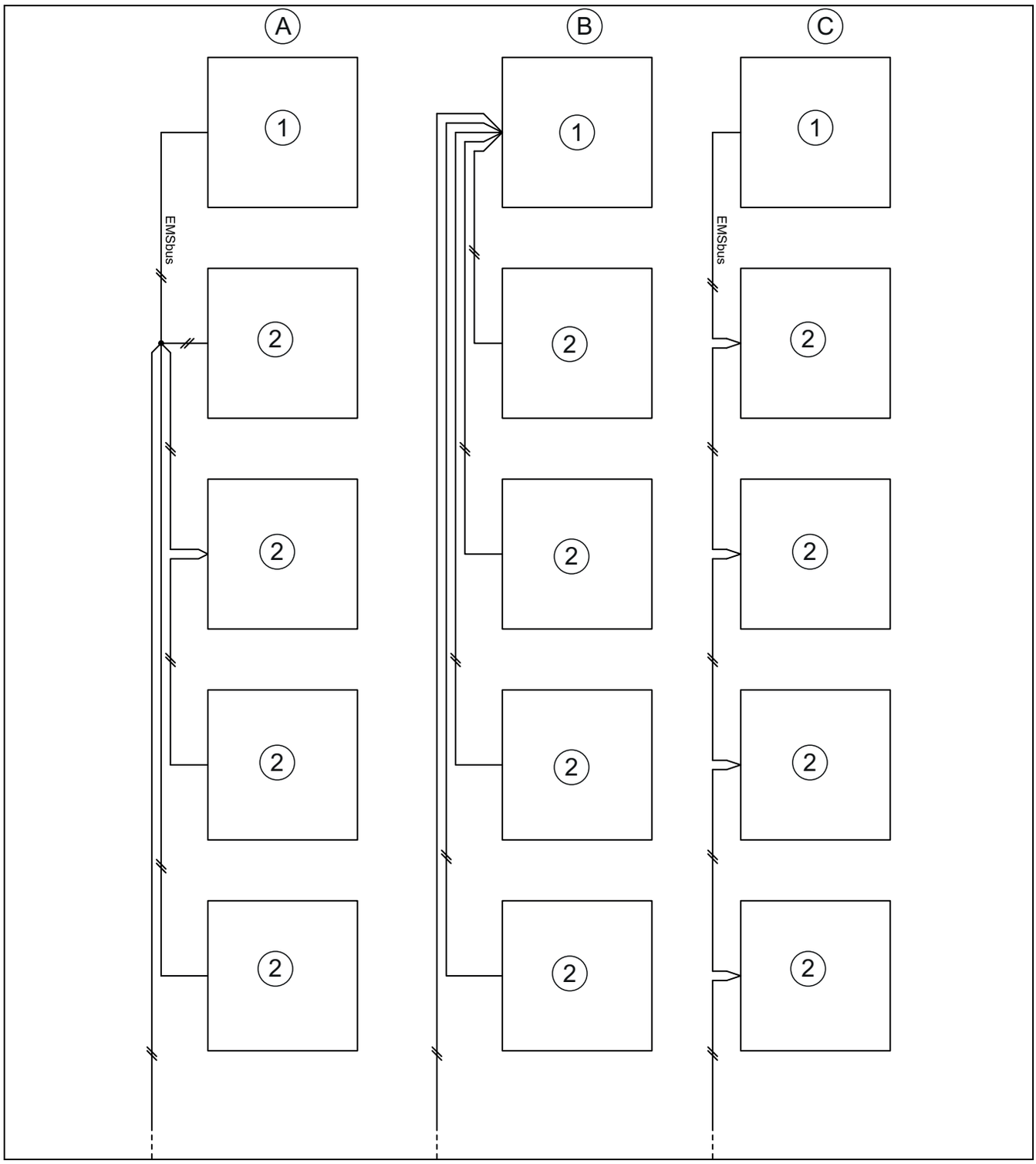

Fig. 14 Connection alternative for EMS bus

[A] Star configuration and connection in series with external junction box
[B] Star configuration
[C] Serial connection
[1] Installation circuit board
[2] Accessory modules (room temperature-dependent controller, heating circuit module and solar module)

6 Commissioning

6.1 Venting the outdoor unit, indoor unit and heating system

NOTICE

If the system is not correctly ventilated, this will damage the indoor unit!

The auxiliary heater may overheat or be damaged if it has not been fully vented prior to activation.

- ▶ Carefully vent the system when filling.
- ▶ Carefully vent the system once again during commissioning.

Also vent heating system at other venting points (e.g. radiators).

Always set the pressure slightly higher than the reference pressure as this ensures a degree of tolerance to allow the air dissolved in the heating water to be vented via VL1 as the temperature rises.

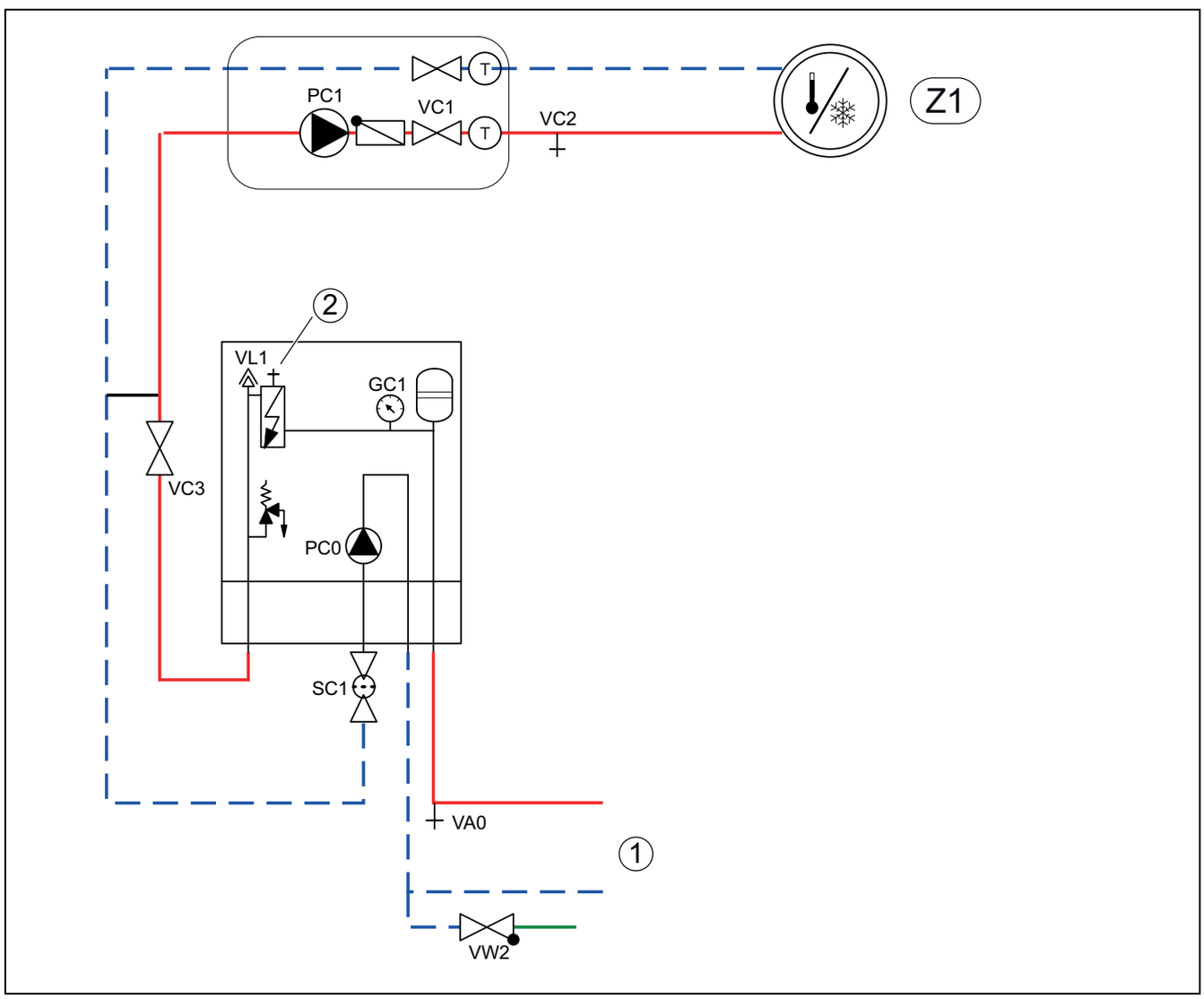

Fig. 15 Indoor unit with an integrated electric booster heater and heating system

[Z1] Heating system (without mixer)
[1] Heat pump
[2] Manual air vent valve

1. Connect the power supply of the outdoor and indoor unit.
2. Activate only the electric booster heater and make sure that the pump PC1 is running.
3. Pull PWM contact PC0 off the pump PC0 so that it runs at maximum speed.
4. Only deactivate the auxiliary heater when the pressure has not decreased for 10 minutes and no more air emerges from the manual air vent valve.
5. Connect the contacts PC0 to the pump.
6. Clean the particle filter SC1.
7. Check the pressure at the pressure gauge GC1, if the pressure is less than 2 bar top up via the VW2 fill valve.
8. Check that the heat pump is running and that there are no alarms.
9. Vent the system at the other air vent valves of the heating system (e.g. radiator) as well.

6.2 Adjusting the operating pressure of the heating system

Display on the pressure gauge	
1 bar	Minimum charge pressure. When the system is cold, the operating pressure must be kept at roughly 0.2–0.5 bar above the pre-charge pressure of the nitrogen cushion in the expansion vessel. The pre-charge pressure is 0.7–1.0 bar as a rule.
3 bar	Maximum charging pressure at maximum heating water temperature: must not be exceeded (the pressure relief valve will open).

Table 8 Operating pressure

- ▶ Top up to 1.5–2.0 bar unless otherwise specified.
- ▶ If the pressure does not remain constant, check whether the heating system has any leaks and if the capacity of the expansion vessel for the heating system is sufficient.

6.3 Operation without heat pump (individual operation)

The indoor unit can be put into operation without a connected heat pump, for example, if the heat pump is installed at a later date. This is termed individual operation or stand-alone operation.

In individual operation, the indoor unit only uses the auxiliary heater for heating and DHW heating.

If the indoor unit and the heating system are to be filled before the heat pump is connected, connect the inlet and outlet of the heat transfer medium to/from the heat pump to ensure circulation.

- ▶ Open any shut-off valves that are installed in the heat transfer medium circuit.

Commissioning in individual operation:

- ▶ In the **Heat pump** service menu, select the option **Operation without heat pump** (→control unit manual).

6.4 Function test

The compressor is preheated before starting. This can take up to 2 hours, depending on the outdoor temperature. The prerequisite for starting is that the value recorded by the temperature sensor of the compressor (TR1) is 10 K higher than the temperature sensor at the supply air terminal device (TL2). The temperatures are displayed in the diagnosis menu of the control unit.

- ▶ Test active components of the system.
- ▶ Check whether the start condition for the heat pump has been satisfied.
- ▶ Check if there is a heating or hot water demand.

-or-

- ▶ Draw off DHW or increase the heating curve to generate demand (→ instructions for control unit).
- ▶ Check whether the heat pump starts.
- ▶ Make sure that no alarms are currently active.

-or-

- ▶ Troubleshooting.
- ▶ Check the operating temperatures (→ instructions for the control unit).

6.4.1 Pressure switch and overheating protection

The pressure switch and overheating protection are connected in series. Alarms or information triggered at the control unit indicate either that the operating pressure is too low, or that the temperature of the electric booster heater is too high.

NOTICE

Material damage from running dry!

When the heating pump PC0 is operated for a long time when the operating pressure is too low, it can be damaged.

- ▶ Eliminate any leaks in the system that are indicated when the pressure switch is triggered.

The triggering of the pressure switch only blocks the electric booster heater. The heating pump PC0 and the heat pump can continue to run if there is a risk of frost.

Pressure switch

The indoor unit has a pressure switch which triggers once the pressure in the heating system falls below 0.5 bar. Once the pressure exceeds 0.5 bar, the pressure switch is automatically reset.

- ▶ Make sure that the expansion vessel and pressure relief valve are configured for the indicated operating pressure.
- ▶ Check for any leaks.
- ▶ Slowly increase the pressure in the heating system by adding water through the fill valve.

Overheating protection (OHP)

The overheating protection triggers when the temperature of the electric booster heater rises above 95 °C.

- ▶ Make sure that the particle filter is not blocked and that the flow through the heat pump and heating system is unimpeded.
- ▶ Check the operating pressure.
- ▶ Check the heating and DHW settings.
- ▶ Reset the overheating protection. To do this, press the button on the bottom of the terminal box.

6.4.2 Operating temperatures

The operating temperature check must be performed in heating mode (not in DHW or cooling mode).

For optimum system operation, the flow rate in the heat pump and heating system must be monitored. This check should be performed after 10 minutes heat pump operating time and during high compressor heating output.

The temperature differential for the heat pump must be set for the different heating systems.

- ▶ With underfloor heating system: set a temperature difference of 5 K.
- ▶ With radiators: set a temperature difference of 8 K.

These settings are optimal for the heat pump.

Check the temperature differential at high compressor heating output:

- ▶ Open the diagnosis menu.
- ▶ Select Monitored values.
- ▶ Select Heat pump.
- ▶ Select Temperatures.
- ▶ Read the primary flow temperature (heat transfer medium off, sensor TC3) and return temperature (heat transfer medium on, sensor TC0) in heating mode. The flow temperature must be higher than the return temperature.

- ▶ Calculate the difference TC3–TC0.
- ▶ Check whether the difference corresponds to the delta value set for heating mode.

If the temperature differential is too large:

- ▶ Vent the heating system.
- ▶ Clean filters / strainers.
- ▶ Check pipe dimensions.

Temperature differential in the heating system

- ▶ Set the output at the heating pump PC1 so that the following difference is achieved:
- ▶ With underfloor heating system: 5 K.
- ▶ With radiators: 8 K.

7 Operation

WARNING

Material damage from frost!

The heating or auxiliary heater may be irreparably damaged by frost.

- ▶ Do not start the indoor unit if there is a possibility of the heating or auxiliary heater being frozen.

8 Maintenance

DANGER

Electrical shock!

- ▶ Before working on the electrics, the main power supply must be switched off.

DANGER

Risk of electric shock!

Opening the installer module may cause injury by electric shock.

- ▶ Do not open the installer module to replace a component. If the installer board or one of its components need to be replaced, remove the installer module completely and replace by a new one.

NOTICE

Deformation due to heat!

If the temperature is too high, the insulation (EPP) in the indoor unit deforms.

- ▶ When carrying out brazing work in the heat pump, protect the insulation with a heat resistant cloth or damp cloth.

- ▶ Only use original spare parts!
- ▶ Refer to the spare parts list when ordering spare parts.
- ▶ Replace removed gaskets and O-rings with new ones.

The tasks described below must be carried out during an inspection.

Display activated alarm

- ▶ Check the alarm log (→instructions for the control device).

Function test

- ▶ Carry out function check (→ Chap. 6.4).

8.1 Particle filter

The filter prevents particles and contamination from entering the heat pump. Over time, the filter can become blocked and must be cleaned.

To clean the filter, the system does not need to be emptied. The filter and shut-off valve are integrated.

Cleaning the strainer

- ▶ Close the valve (1).
- ▶ Unscrew the cap (manually) (2).
- ▶ Take out the strainer and clean it by running water over it or by pressure cleaning.
- ▶ Reinstall the strainer. For proper assembly, make sure that the guide bumps fit into the recesses in the valve.

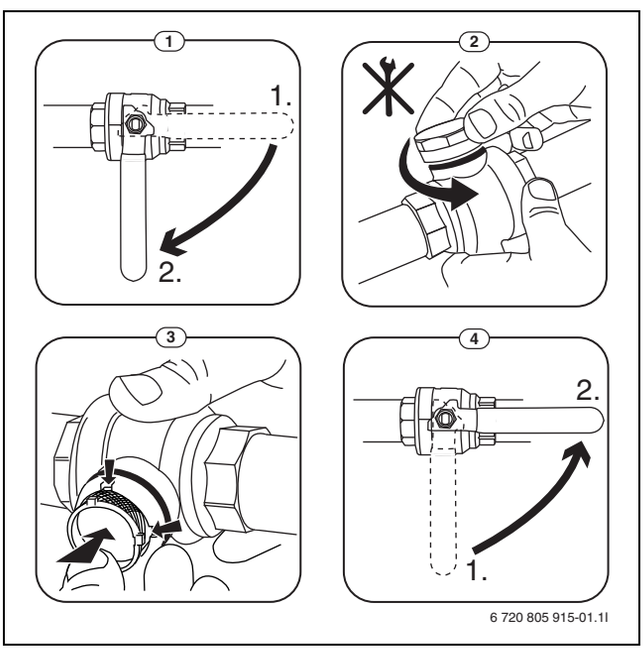

Fig. 16 Cleaning the strainer

- ▶ Screw the cap back on (tighten handtight).
- ▶ Open the valve (4).

Check the magnetite indicator

After installation and startup the magnetite indicator must be checked at more frequent intervals. If a lot of magnetic dirt is clinging to the magnetic bar in the particulate filter and that dirt frequently causes an alarm related to the poor flow (e.g., low or poor flow, high flow supply or HP alarm) an approved magnetite filter must be installed to avoid regular draining of the indicator. The magnetic filter must be installed in addition to the mesh filter and be placed in the secondary circuit after the hydraulic separation. A filter also increases the longevity of components in the heat pump as well as the remaining parts of the heating system. When installing a magnetic filter, consideration should be made for the product specific impact on the pressure drop on the system.

8.2 Replacing components

If you intend to replace a component and the indoor unit needs to be emptied and refilled to do this, carry out the following steps:

1. De-energise the heat pump and indoor unit.
2. Make sure that that automatic air vent valve VL1 is open.
3. Close the valves to the heating system; particle filter SC1 and VC3.
4. Connect a hose to the drain valve VA0 and route the other end to a drain. Open the valve.
5. Wait until no more water flows into the drain.
6. Replace components.

7. Open the fill valve VW2 and admit water into the pipe leading to the heat pump.
8. Continue filling until only water emerges from the hose at the drain and the outdoor unit no longer contains air bubbles.
9. Close the drain valve VA0 and continue filling the system until the reading at the pressure gauge GC1 is 2 bar.
10. Close the fill valve VW2.
11. Connect the power supply to the heat pump and indoor unit.
12. Remove the hose from the drain valve VC0.
13. Clean the particle filter SC1.
14. Close the valves VC3 and SC1 to the heating system.
15. Check the pressure after a while and add more via the fill valve VW2 if the pressure is below the required pressure.

9 Installation of accessories

9.1 EMS-BUS for accessories

The following applies to accessories that are connected to the EMS-BUS (see also the installation instructions for the respective accessories):

- ▶ If several BUS units are installed, there must be a minimum spacing of 100 mm between them.
- ▶ If several BUS units are installed, connect them in series or in a star configuration.
- ▶ Use cable with a minimum cross-section of 0.5 mm^2.
- ▶ In case of external inductive interferences (e.g. from PV systems), use screened cables. Only earth the shielding to the casing on one side.
- ▶ Connect the cable on the installation module to terminal EMS-BUS.

If a component is already connected to the EMS terminal, establish the connection in parallel to the same terminal according to fig. 17.

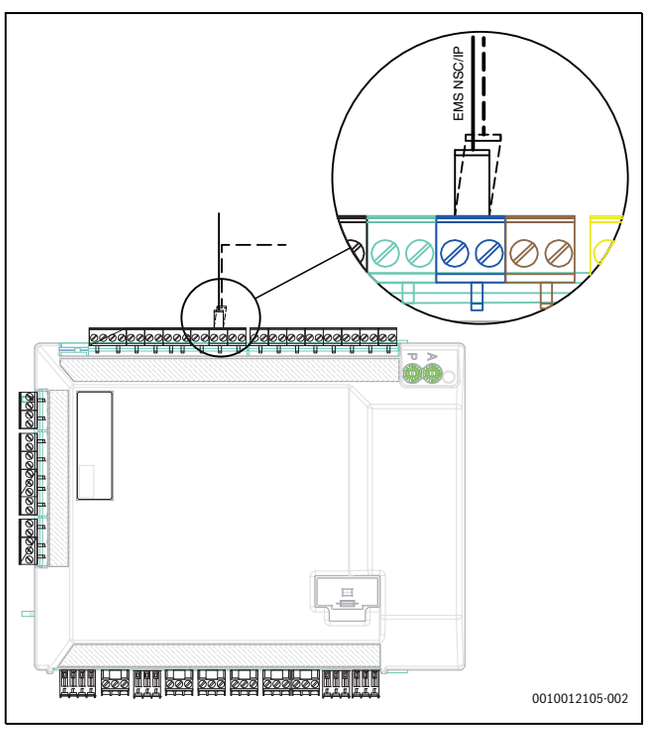

Fig. 17 EMS connection on the installer module

9.2 External connections

Max. load at the relay outputs: 2 A, $\cos\varphi > 0{,}4$. If the load is higher, it is necessary to install an intermediate relay.

- Output VC0 switches when changing over between heating and DHW mode and is used if a buffer storage tank is installed.
- Relay output PK2 is active in cooling mode. Possible application areas:
  - Changing between cooling/heating for fan convectors. The control device of the fan convector must feature the relevant function.
  - Pump control in a separate circuit which is exclusively intended for cooling mode.
  - Control of underfloor heating circuits in damp areas.
  - If the setting "Switch off PC1 in DHW mode" has been set to "No", PK2 also switches when defrosting. This function serves as a backdraught shutter for fan convectors.

9.3 Maximum sensor

In some countries a high limit safety cut-out is required in underfloor heating circuits. The high limit safety cut-out is connected to the installation module at the external input 1–3 (→ Fig. 34). Adjusting the function for the external input (→ instructions for control device).

9.4 Installation of the domestic hot water cylinder

If the domestic hot water cylinder is installed lower than the heat pump (e.g. in the cellar), a natural circulation can occur that leads to heat loss in the cylinder.

- ▶ Install a non-return valve in the circuit to prevent natural circulation if the installation height of the domestic hot water cylinder is below the heat pump.

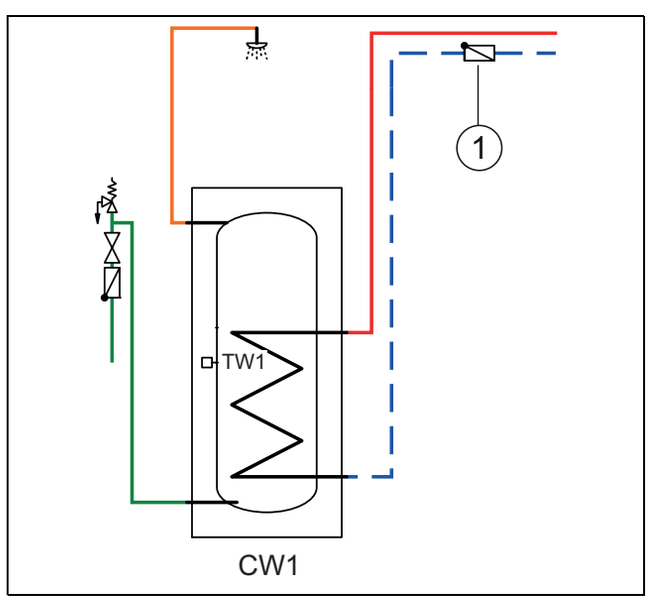

Fig. 18 Hot water cylinder

[1] Non-return component

The connection instructions are in the cylinder documentation.

When using a DHW cylinder (circuit flow cylinder) in the heating system, an automatic air vent valve must be mounted on the cylinder. This also applies to twin wall cylinders.

When using a circuit flow cylinder in the heating system, an automatic air vent valve must be installed at the inlet to the cylinder with a micro-bubble separator.

9.5 DHW cylinder temperature sensor TW1

When a DHW cylinder is connected and TW1 is connected to the system, this is automatically actuated upon starting.

- Connect the hot water temperature sensor TW1 on the installation module in the control device to terminal TW1.

9.6 Diverter valve VW1

System solutions with a domestic hot water cylinder require a diverter valve (VW1). Connect the diverter valve VW1 on the installation module in the indoor unit to terminal VW1.

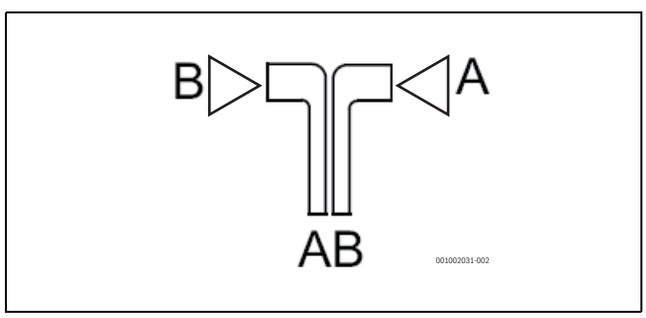

Fig. 19

[A] To the domestic hot water cylinder
[B] To the heating system (or buffer cylinder)
[AB] From the indoor unit

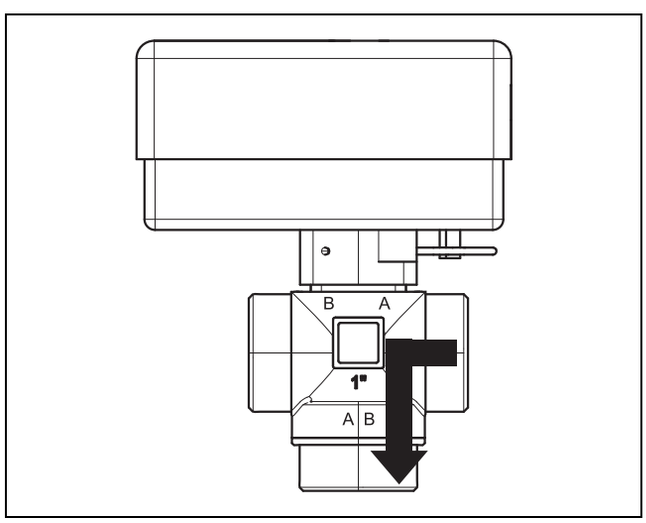

Fig. 20 Contact closed, connection A open

During domestic hot water heating, the contact is closed and connection A is open.

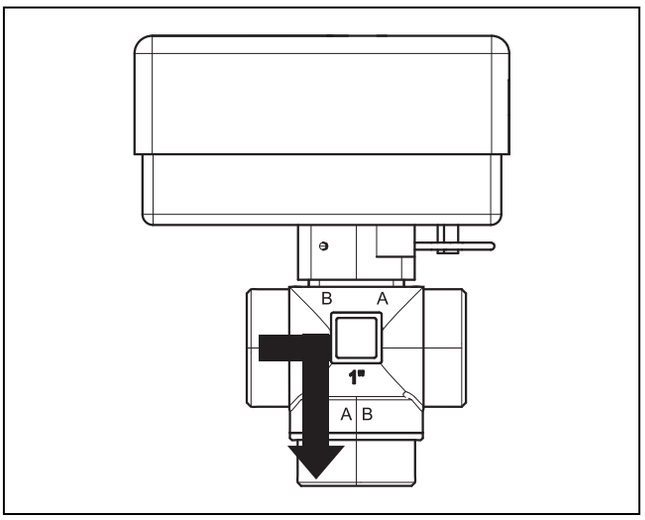

Fig. 21 Contact open, connection B open

In heating mode, the contact is opened and connection B is open.

If the 3-way diverter valve has a Molex plug, only terminals 2, 3 and 6 are assigned.

Make the following connections on the installation module:

- **N** – Connection to terminal N, VW1 on the installation module
- **Y**– Connection to terminal 53, VW1 on the installation module
- **L** – Connection to terminal 54, VW1 on the installation module

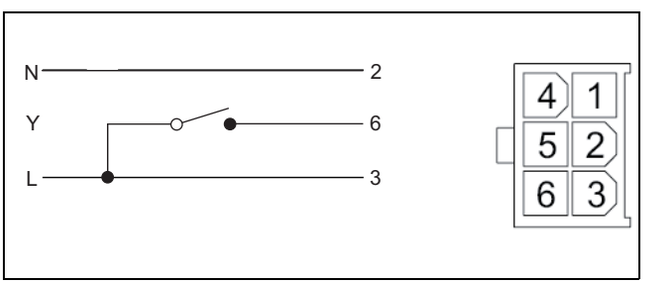

Fig. 22 Molex plug

If the 3-way diverter valve has a cabled connection, make the following connections on the installation module:

- **N** – Connection to terminal N, VW1 on the installation module
- **Y**– Connection to terminal 53, VW1 on the installation module
- **L** – Connection to terminal 54, VW1 on the installation module

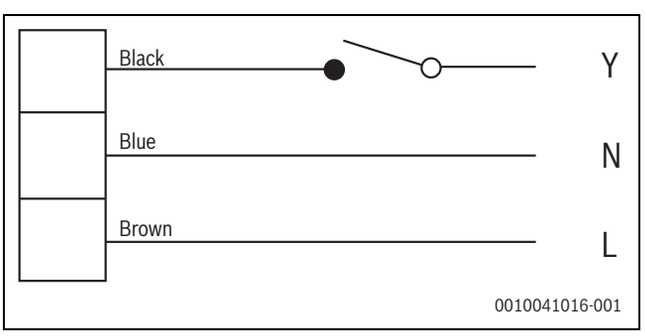

Fig. 23 Cabled connection

9.7 Domestic hot water cylinder, solar thermal heating

A domestic hot water cylinder for solar thermal heating is available as an accessory. Installation and handling instructions are supplied with the domestic hot water cylinder.

9.8 Room controller (Bosch CR10H only)

If the room temperature-dependent control unit is installed after commissioning the system, it must be set as the control unit for heating circuit 1 in the commissioning menu (→ controller manual).

- Install the room temperature-dependent control unit according to the instructions for the room temperature-dependent control unit.
- The selection “Ext room controller” must always be set to “no” even if the room controller is installed.
- Before commissioning the system, set the room temperature-dependent control unit as remote control "Fb" (→ manual for room temperature-dependent control unit).
- Before commissioning the system, make the setting for the heating circuit at the room temperature-dependent control unit, if required (→ manual for room temperature-dependent control unit).
- When commissioning the system, specify an installed room temperature-dependent control unit as the control unit for heating circuit 1 (→ controller manual).
- Make the room temperature settings as described in the controller manual.

9.9 Several heating circuits (with heating circuit module)

In the default setting, a heating circuit without mixer can be controlled via the controller. If other circuits are installed, a heating circuit module is required for each one.

- Install the heating circuit module, mixer, pump and other components according to the selected system solution.
- Before commissioning the system, make the setting for the heating circuit at the heating circuit module, if required (→ manual for heating circuit module).
- Make the settings for several heating circuits as described in the controller manual.

9.10 Circulation pump for DHW PW2

The domestic hot water circulation pump PW2 is connected to the installation module. The settings for operation are made on the control unit (→instructions for the control unit).

9.11 Installation with swimming pool

NOTICE

Danger of faults!

If the swimming pool mixer is installed in the wrong location in the system, faults may occur. The swimming pool mixer must not be installed in the flow where it could block the pressure relief valve.

- Assemble the swimming pool mixer in the return to the indoor unit (as shown in the example image for swimming pool installation).
- Mount the tee in the flow from the indoor unit upstream of the bypass.
- Do not install the swimming pool mixer as heating circuit in the system.

A prerequisite for using the swimming pool heating is the installation of a swimming pool module (accessory).

- Installing the swimming pool (→ swimming pool instructions).
- Installing the swimming pool mixer.
- Insulate all pipes and connections.
- Install the pool module (→ Instructions for the pool module).
- Set the elapsed time of the swimming pool diverter valve during commissioning (→ instructions of control unit).
- Make the necessary settings for the swimming pool mode (→ instructions for control unit).

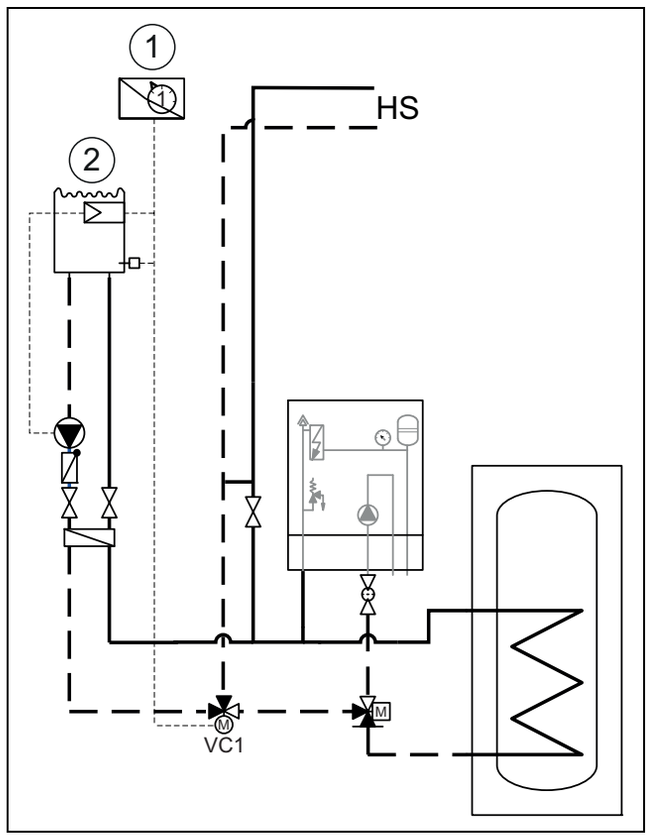

Fig. 24 Example showing swimming pool installation

[1] Swimming pool module
[2] POOL
[VC1] Swimming pool mixer
[HS] Heating system

9.12 Buffer, VC0 bypass valve

When using a buffer cylinder and DHW cylinder, a 3-way valve (VC0) must be installed so the hydraulic system can be provisionally short-circuited between the indoor and outdoor unit if required.

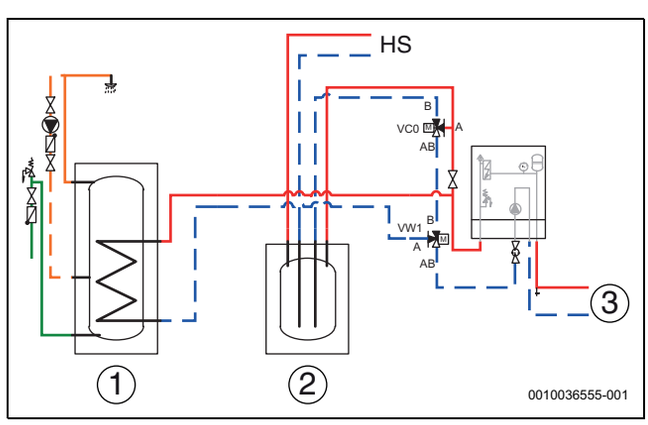

Fig. 25 Buffer, VC0 bypass valve

[1] DHW cylinder
[2] Buffer cylinder
[3] Heat Pump
[VC0] 3-way valve
[HS] Heating system

If a 3-way valve is not installed in a hydraulic system incorporating buffer cylinders (VC0), malfunctions may occur and efficiency may be reduced.

9.13 IP module

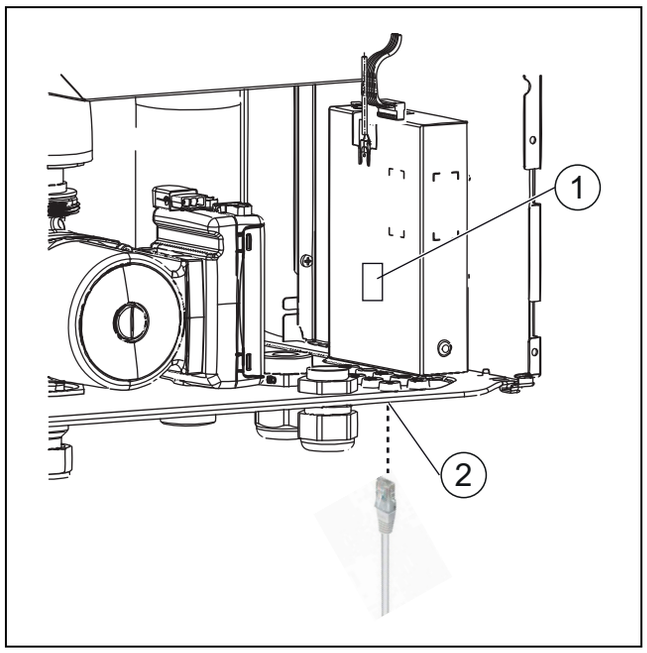

Fig. 26 IP module

[1] Type plate of IP module
[2] Connection RJ45

10 Environmental protection and disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.
The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.
We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.
All of our packaging materials are environmentally compatible and can be recycled.

Used appliances

Used appliances contain valuable materials that can be recycled.
The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

Old electrical and electronic appliances

This symbol means that the product must not be disposed of with other waste, and instead must be taken to the waste collection points for treatment, collection, recycling and disposal.

The symbol is valid in countries where waste electrical and electronic equipment regulations apply, e.g. "European Directive 2012/19/EC on old electronic and electrical appliances". These regulations define the framework for the return and recycling of old electronic appliances that apply in each country.

As electronic devices may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of electronic scrap helps preserve natural resources.

For additional information on the environmentally compatible disposal of old electrical and electronic appliances, please contact the relevant local authorities, your household waste disposal service or the retailer where you purchased the product.

You can find more information here:
www.weee.bosch-thermotechnology.com/

11 Technical information

11.1 Specifications – Indoor unit with electrical booster heater

AWE	Unit	5-9	13-17
Electrical wiring specifications			
Power supply	V	400[1)]/230[2)]	400[1)]/230[2)]
Fuse size (recommended), class gL/C	A	16[1)]/50[2)]	16[1)]/50[2)]
Electrical heater	KW	2/4/6/9	2/4/6/9
Heating system			
Type of connection (heating flow, heat pump and flow/return of the auxiliary heater)		G1 external	G1 external
Type of connection (heating return)		G1 internal (travelling nut)	G1 internal (travelling nut)
Maximum operating pressure	kPa	300	300
Minimum operating pressure	kPa	50	50
Expansion vessel	l	8	8
Heat transfer medium			
Available pressure decrease for pipes and components between the indoor and outdoor unit	kPa	[3)]	
Minimum flow (during defrosting)	l/s	0.32	0.56
Pump type PC0		Grundfos UPM2K 25-75 PWM	Grundfos UPM GEO 25-85 PWM
General			
Waste water connection	mm	Ø 32	
IP rating	IP	X1	
Dimensions (width x depth x height)	mm	485 x 386 x 700	
Weight	kg	32	
Installation altitude		up to 2000 m over NN	

1) 3N AC, 50 Hz

2) 1N AC, 50 Hz

3) The flow rate and residual head depend on the connected heat pump, for more information see the instructions for the heat pump

Installation of energy metering equipment will result in additional pressure drops through the system and could have a direct impact on the performance of the heat pump.

11.2 Hydraulic configuration

The product must only be installed according to the manufacturer's official system solutions. Other system solutions are not permitted. Liability is voided in the case of damage and problems resulting from impermissible installation.

Certain system solutions require accessories (buffer cylinder, diverter valve, mixer, heating pump). The heating pump PC1 is activated by the controller in the indoor unit.

When a freshwater station is installed, it must have its own control.

If a buffer cylinder is used, the diverter valve VC0 must be installed in accordance with the system solution.

11.2.1 Explanations of the system solutions

	General
SEC 20	Installation module integrated in the heat pump module
HPC410	Control unit
CR10H	Room controller (accessories)
T1	Outdoor sensor
MK2	Humidity sensor (accessory)
CC1	DHW cylinder (accessory)
VW1	Diverter valve (accessory)
PW2	DHW circulation pump (accessory)
TW1	Hot water temperature sensor

	Heating circuit without mixer
PC1	Circulation pump, heating circuit
T0	Flow temperature sensor

	Heating circuit with mixer
MM100	Heating circuit module (control unit for circuit)
PC1	Pump for heating circuit 2
VC1	Mixer
TC1	Flow temperature sensor, heating circuit 2, 3 ...
MC1	Thermal shut-off valve, heating circuit 2, 3 ...

11.2.2 Bypass for the heating system

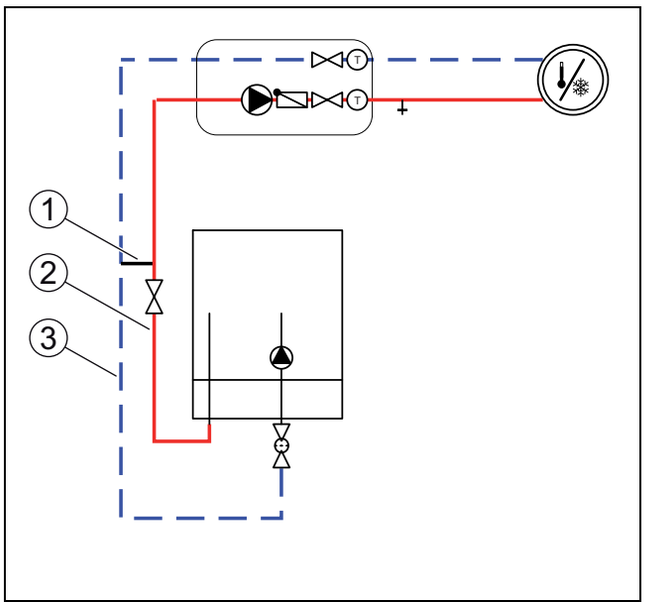

Fig. 27 Indoor unit with heating circuit and bypass

[1] Bypass
[2] Flow
[3] Return

If no buffer cylinder is installed, a bypass is required. The bypass must be at least 10 times longer than the internal pipe diameter.

11.2.3 Non-return valve in the heating circuit

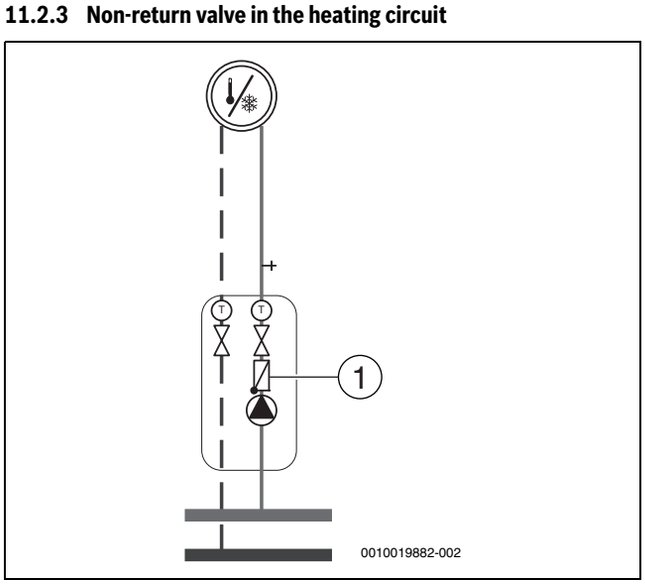

Fig. 28 Heat. circ.

[1] Non return valve

A non-return valve is required in each heating circuit to prevent natural circulation in summer mode. Natural circulation can occur if the diverter valve of the DHW line is open in the direction of the heating system during DHW heating.

11.2.4 Heat pump with indoor unit, electric booster heater and domestic hot water cylinder

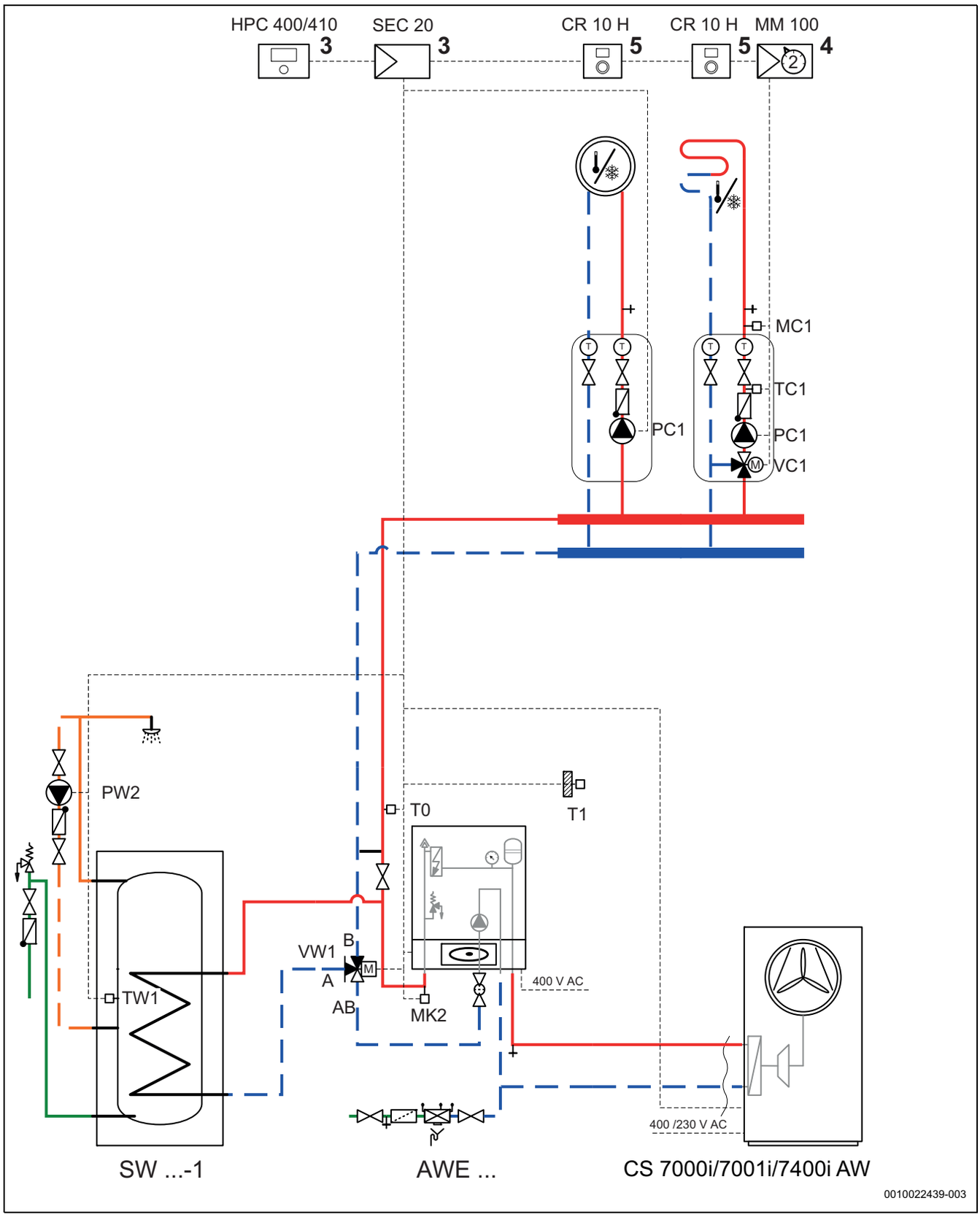

Fig. 29 Electric booster heater with water heater

[3] Assembled in the indoor unit

[4] Assembly in the indoor unit or on the wall

[5] Assembly on the wall

11.2.5 Heat pump with indoor unit, electric booster heater, domestic hot water cylinder and buffer

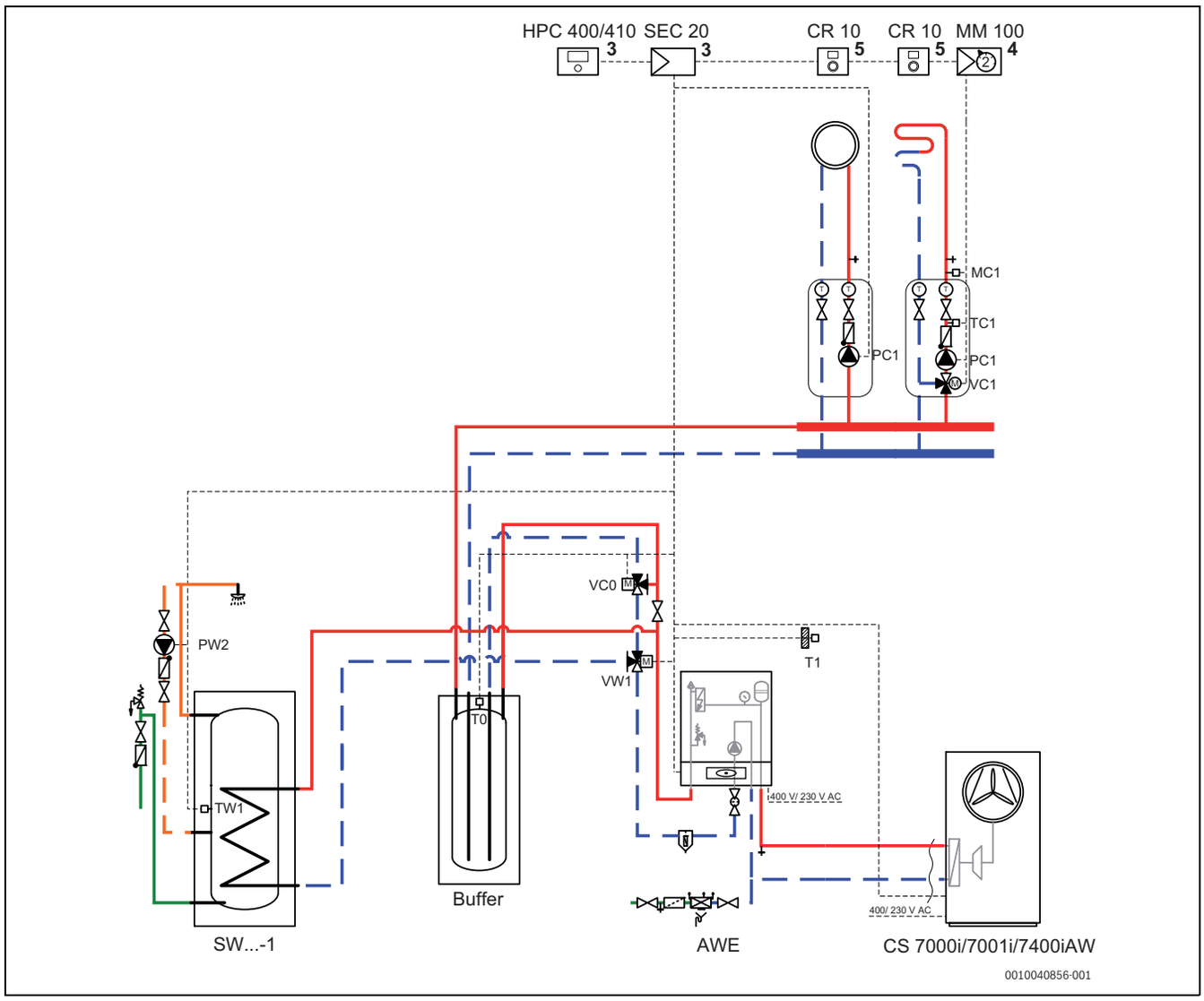

Fig. 30 Electric booster heater with water heater

[3] Assembled in the indoor unit

[4] Assembly in the indoor unit or on the wall

[5] Assembly on the wall

Depending on the hydraulic system, a second 3-way valve (accessory) could be required (e.g. if a buffer tank is used alongside a hot water tank or if the heating system has neither a PC1 nor a bypass).

11.2.6 Explanation of symbols

Symbol	Description	Symbol	Description	Symbol	Description
Pipework/cables					
	Flow - heating/solar		Brine circuit out		DHW circulation
	Return - heating/solar		Potable water		Electrical Wiring
	Brine flow		Hot water		Electrical wiring with break
Mixing valves/valves/temperature sensors/pumps					
	Valve		Differential pressure regulator		Pump
	Revision bypass		Water pressure relief valve		Non-return valve
	Flow regulating valve		Safety assembly		Temperature sensor / switch
	Overcurrent valve	M	3-way mixing valve (mixing/distribution)		High limit safetycut-out
	Filter shut-off valve	T	DHW mixer, thermostatic		Flue gas temperature sensor/ switch
T	Cap valve	M	3-way mixing valve (changeover)		Flue gas temperature limiter
M	Valve, motorized	I M II III	3-way mixing valve (change over, de-energised when closed to II)		Outdoor ambient temperature sensor
T	Valve, thermal	AB M A B	3-way mixing valve (change over, de-energised when closed to A)		Wireless outside temperaturesensor
	Shut-off valve, magnetically controlled	M	4-way mixing valve		...wireless...
Miscellaneous					
T	Thermometer		Drain outlet with siphon		Low loss header with sensor
	Pressure gauge		System separation according to EN1717		heat exchanger
	Filling/draining		Expansion vessel with cap valve		Volumetric flow ratemeasuring device
	Water filter		Magnetite separator		Water sink
000	Heat meter		Air separator		Heat. circ.
	DHW outlet		Automatic air vent valve		Underfloor heating circuit
R	Relay		Expansion joint		Low-loss header
	Immersion heater				

Table 9 Hydraulic symbols

11.3 Wiring diagram

11.3.1 CAN-BUS/EMS-BUS for indoor unit with electric booster heater – Overview

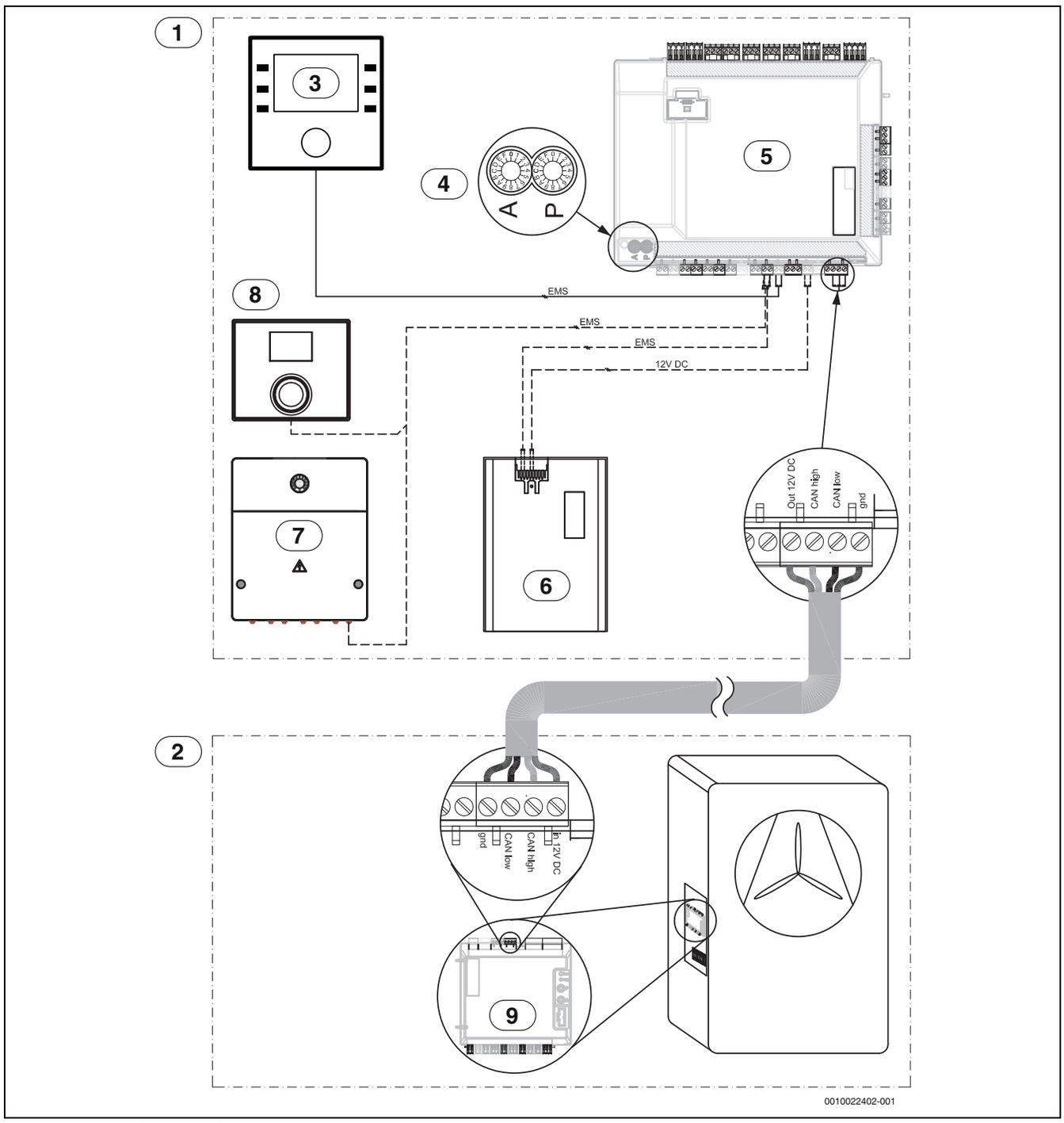

Fig. 31 CAN-BUS/EMS-BUS for indoor unit with electric booster heater – Overview

[1] Indoor unit
[2] Heat pump
[3] Control unit
[4] AWE 5-9: A = 0, P = 1
AWE 13-17: A = 0, P = B
[5] Installation circuit board
[6] IP module
[7] Accessories
[8] Room controller (accessories)
[9] I/O - module

————————	Factory connection
– — — — —	Connected during installation / accessories

11.3.2 Single-phase heat pump with three-phase integrated electric booster heater

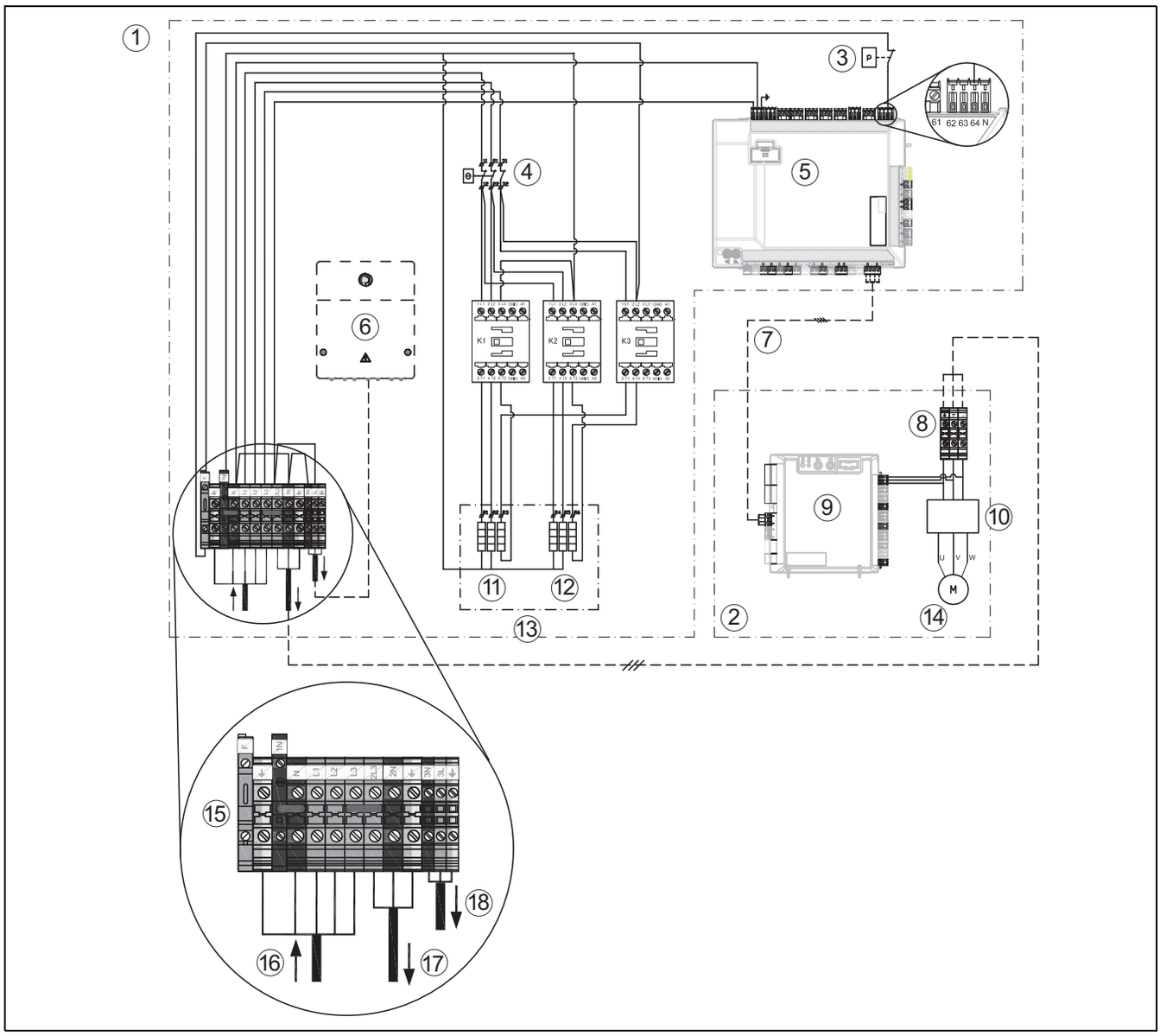

Fig. 32 Single-phase heat pump with integrated electric booster heater (three-phase current)

[1] Indoor unit
[2] Heat pump
[3] Pressure switch
[4] Overheating protection (OHP)
[5] Installation module of the indoor unit
[6] Accessories
[7] CAN-BUS
[8] Power supply to heat pump
[9] I/O module
[10] Inverter
[11] Heating element 3 x 1 kW (3 x 53 Ω)
[12] Heating element 3 x 2 kW (3 x 27 Ω)
[13] Electrical heater
[14] Compressor
[15] Terminals
[16] Mains voltage 400 V ~3 N
[17] Power supply to heat pump
[18] Power supply for accessories

————————	Factory connection
– — — — —	Connected during installation / accessories

The connection of a heat pump operated with single phase AC current to an indoor unit operated with three-phase AC current (three-phase current) must be done according to the wiring diagram.

Maximum output of the electric booster heater when operated in tandem with a compressor: 6 kW.

▶ K3 not together with a compressor.

Indoor unit is set up as a three phase appliance. If single phase connection is required, refer to fig. 12 for the correct jumper setting. For single phase connections, the heat pump has a separate power supply and is connected via the building connection.

11.3.3 Heat pump (three-phase current) with integrated electric booster heater (three-phase current)

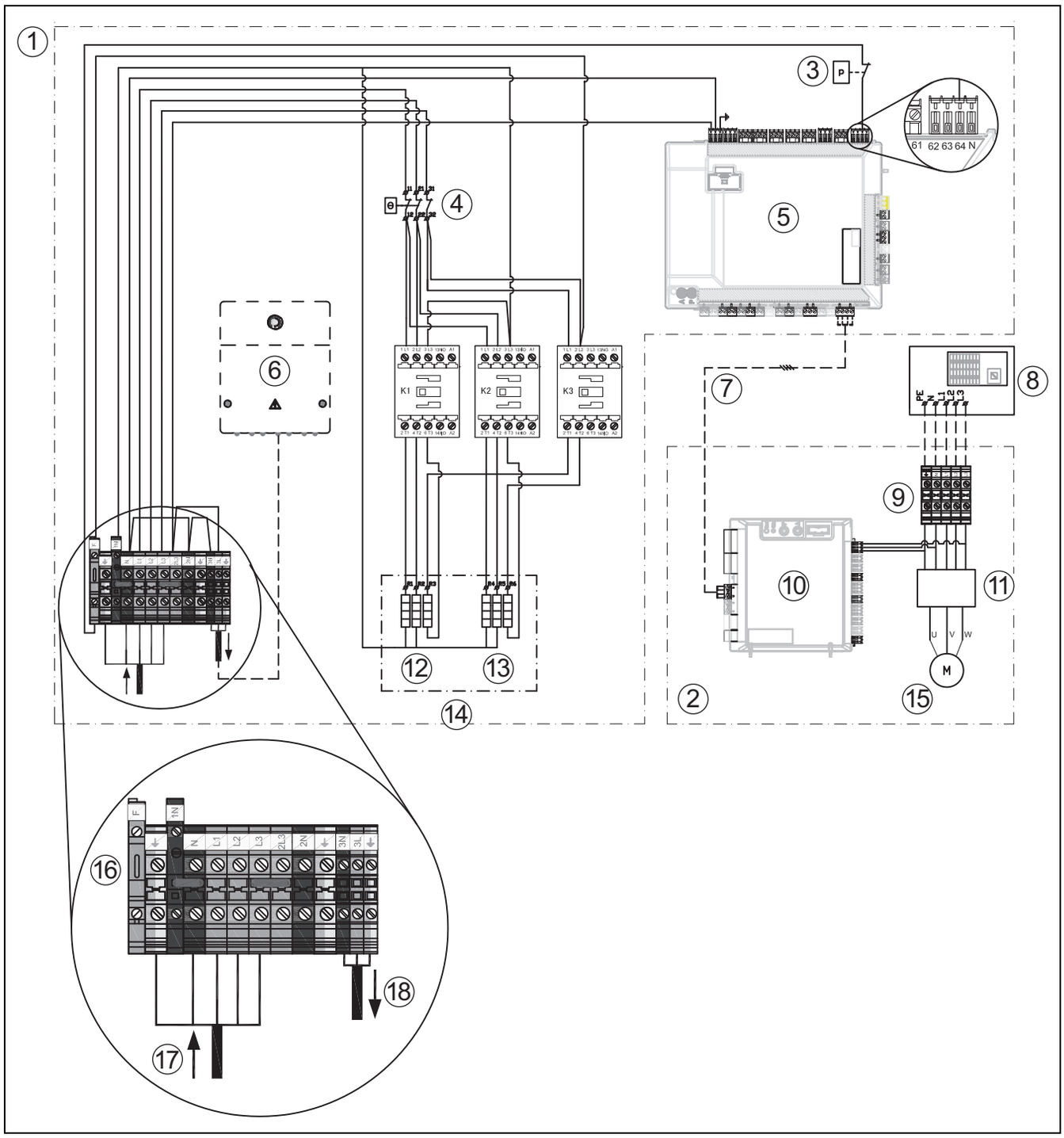

Fig. 33 Heat pump (three-phase current) with integrated electric booster heater (three-phase current)

[1] Indoor unit
[2] Heat pump
[3] Pressure switch
[4] Overheating protection (OHP)
[5] Installation module of the indoor unit
[6] Accessories
[7] CAN-BUS
[8] Distribution board
[9] Power supply to heat pump
[10] I/O module
[11] Inverter
[12] Heating element 3 x 1 kW (3 x 53 Ω)
[13] Heating element 3 x 2 kW (3 x 27 Ω)
[14] Electrical heater
[15] Compressor
[16] Terminals
[17] Mains voltage 400 V ~3 N
[18] Power supply for accessories

————————	Factory connection
– — — — –	Connected during installation / accessories

Indoor unit is set up as a three phase appliance. If single phase connection is required, refer to fig. 12 for the correct jumper setting. For single phase connections, the heat pump has a separate power supply and is connected via the building connection.

11.3.4 Wiring diagram of installation module with integrated electric booster heater

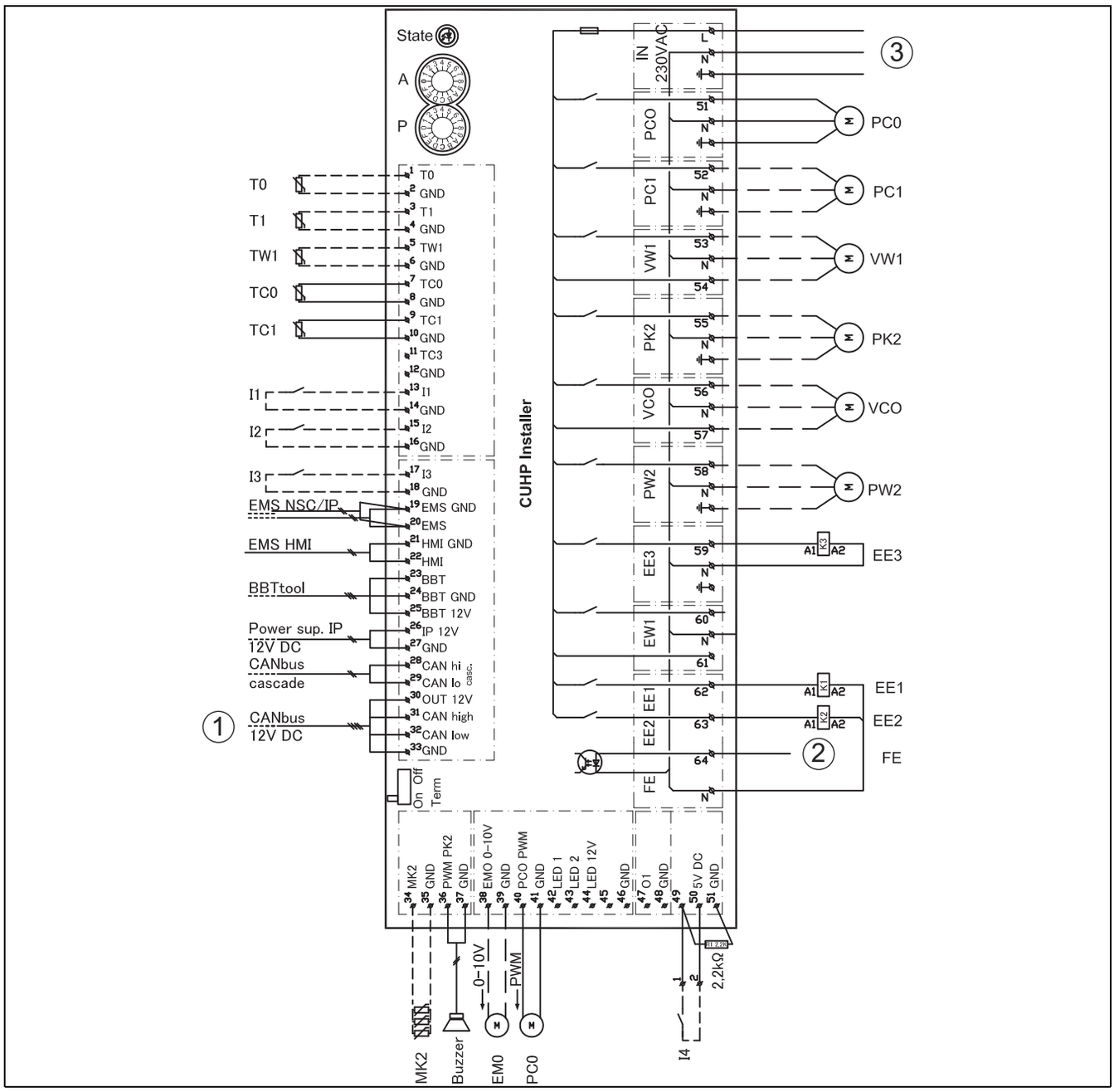

Fig. 34 Wiring diagram of installation module with integrated electric booster heater

[I1] External input 1
[I2] External input 2
[I3] External input 3
[I4] External input 4
[MK2/MD1] Humidity sensor
[Buzzer] Alarm buzzer (accessory)
[T0] Flow temperature sensor
[T1] Outdoor sensor
[TW1] Hot water temperature sensor
[TC0] Return heat transfer medium temperature sensor
[TC1] Temperature sensor for heat transfer medium flow
[F50] Fuse 6.3 A
[PC0] Pump PWM signal
[PC0] Heating pump
[PC1] Pump of heating system
[PK2] Cooling/fan convector relay output
[PW2] Hot water DHW circulation pump
[VC0] Circulation diverter valve, 230 V output
[VW1] Heating / DHW exchange valve
[EE1] Electric heater, step 1
[EE2] Electric heater, step 2
[EE3] Electric heater, step 3
[1] CAN-BUS for heat pump (I/O-module)
[2] FE, alarm of pressure switch, 230 V input
[3] Operating voltage, 230 V~

Maximum load at relay output: 2 A, cosφ> 0.4 In case of a higher load, install an intermediate relay.

————————	Factory connection
– — — — —	Connected during installation / accessories

11.3.5 Alternative installation of 3-way diverter valve

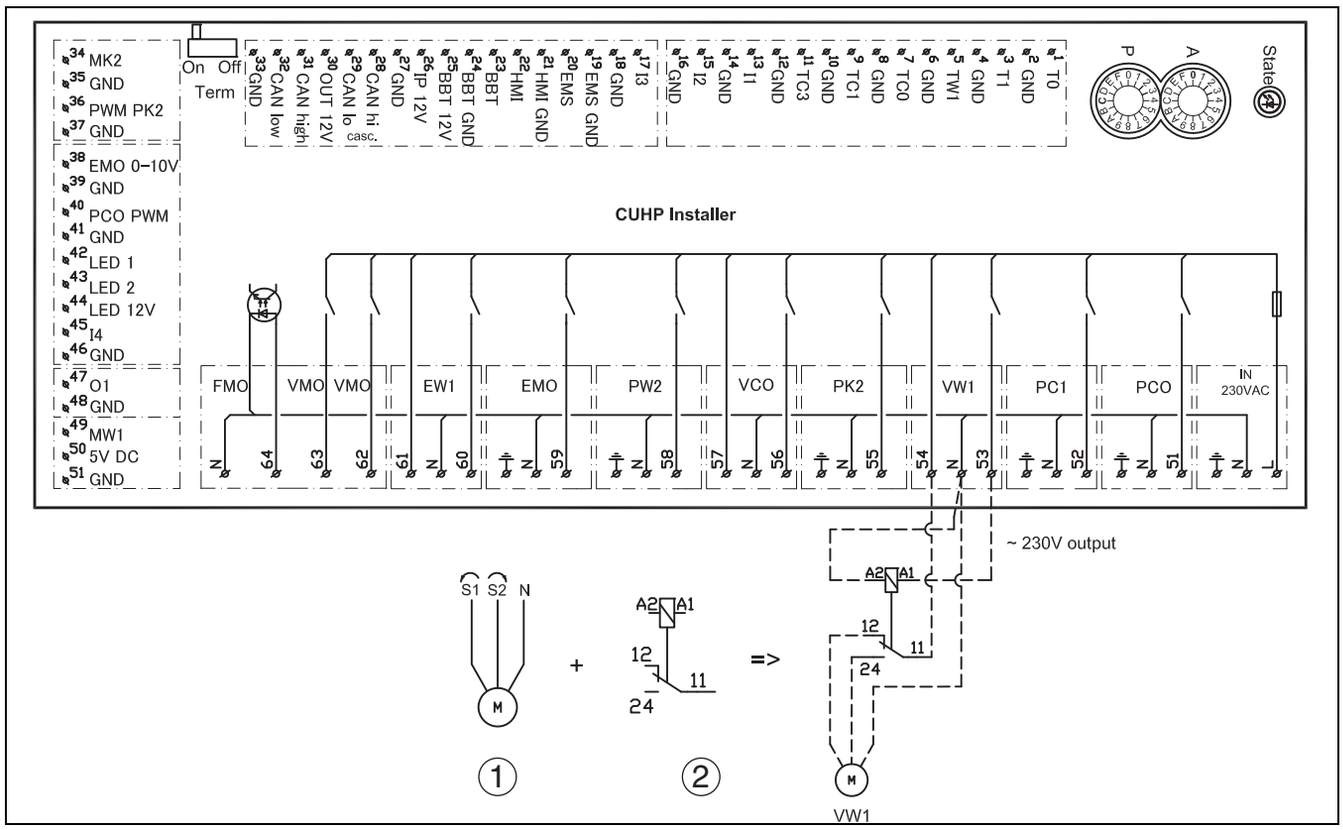

Fig. 35 Alternative installation of 3-way diverter valve

[1] Motor for 3-way diverter valve, can be set for S1/S2
[2] This type of 3-way diverter valve requires a 2-pin relay (not included in the scope of delivery)

11.3.6 Measurements from temperature sensors

CAUTION

Physical injury or material damage due to incorrect temperature

If sensors with incorrect characteristics are used, the temperatures may be too high or too low.

- ▶ Make sure that the temperature sensors used comply with the specified values (see tables below).

°C	Ω	°C	Ω	°C	Ω	°C	Ω
20	12488	40	5331	60	2490	80	1256
25	10001	45	4327	65	2084	85	1070
30	8060	50	3605	70	1753	90	915
35	6536	55	2989	75	1480	-	-

Table 10 Sensor T0, TC0, TC1

°C	Ω	°C	Ω	°C	Ω	°C	Ω
20	14772	40	6653	60	3243	80	1704
25	11981	45	5523	65	2744	85	1464
30	9786	50	4608	70	2332	90	1262
35	8047	55	3856	75	1990	-	-

Table 11 Sensor TW1

°C	Ω	°C	Ω	°C	Ω
– 40	154300	5	11900	50	1696
– 35	111700	10	9330	55	1405
– 30	81700	15	7370	60	1170
– 25	60400	20	5870	65	980
– 20	45100	25	4700	70	824

°C	Ω	°C	Ω	°C	Ω
– 15	33950	30	3790	75	696
– 10	25800	35	3070	80	590
– 5	19770	40	2510	85	503
0	15280	45	2055	90	430

Table 12 Sensor T1

11.3.7 Cable diagram

	Description	Min. cross-section	Type of cable	Max. length	Connect to	Connect to terminal	Voltage source
Diverter valve	VW1	3 x 1.5 mm²	Integrated cable		Indoor Unit	53 / 54 / N	IDU
Diverter valve	VC0	3 x 1.5 mm²	Integrated cable		Indoor Unit	56 / 57 / N	IDU
Pump HC 1	PC1	3 x 1.5 mm²	PVC hose line		Indoor Unit	52 / N / PE	
Circulating pump	PW2	3 x 1.5 mm²	PVC hose line			58 / N / 58	
Connecting cable IDU - ODU	CAN-BUS	2 x 2 x 0.75 mm²	LIYCY (TP)	30 m		30(12V) 31(H) 32(L) 33(GND)	IDU
Power infeed	IDU AWE/ AWM/AWMS	5 x 2.5 mm²					Sub-distribution 3 x C16
Power infeed	IDU AWB	3 x 1.5 mm²				L / N SL	Sub-distribution 1x C16
EMS - Modules	SM100, MM100...	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6	100 m	Indoor Unit	19 / 20	
0-10 V actuation, boiler	EM0	2 x 2 x 0.75 mm²	LIYCY (TP)		Indoor Unit	38 / 39	Basic controller, boiler
PV function		0.4 mm²	J-Y (ST)Y 2 x 2 x 0.6		From inverter to terminal I2 or I3 of the IDU		
Smart Grid		0.4 mm²	J-Y (ST)Y 2 x 2 x 0.6		From ripple control receiver to contact I4, terminal 49, 50 of the IDU		
Energy supplier blocking signal	Screened cable	3 x 1.5 mm²	PVC hose line		From ripple control receiver to contact I1, terminal 13, 14 of the IDU		

Table 13 Connection to indoor units IDU AWE/AWB/AWM and AWMS

Sensors	Description	Min. cross-section	Type of cable	Max. length	Connect to	Connect to terminal	Voltage source
Outdoors	T1	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6		Indoor Unit	3 / 4	
Flow	T0	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6		Indoor Unit	1 / 2	
Hot water	TW1	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6		Indoor Unit	5 / 6	
Heat source	TL2		Cable with plug		Indoor unit, cable with mating connector		
Condensation point sensor	MK2 (max. 5x)	0.5 mm²	Integrated cable		Indoor Unit	34 / 35	
Sensor HC with mixer	TC1	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6	100 m	MM100	1 / 2	
Sensor, swimming pool temperature sensor	TC1	0.5 mm²	J-Y (ST)Y 2 x 2 x 0.6	100 m	MP100	1 / 2	

Table 14 Cable diagram, sensor

11.4 System Commissioning Report

Commissioning date:	
Customer address:	Last name, first name:
	Postal address:
	Town:
	Telephone:
Installation company:	Last name, first name:
	Street:
	Town:
	Telephone:
Product information:	Product type:
	TTNR:
	Serial number:
	FD-no.:
System components:	Receipt/value
Room controller	☐ Yes | ☐ No
Room temperature-dependent control unit with humidity sensor	☐ Yes | ☐ No
Solar integration	☐ Yes | ☐ No
Buffer cylinder	☐ Yes | ☐ No
Type/Volume (l):	
Hot water cylinder	☐ Yes | ☐ No
Type/Volume (l):	
Other components	☐ Yes | ☐ No
Which?	
Minimum clearances heat pump:	
Is the heat pump standing on a solid, flat surface?	☐ Yes | ☐ No
Is the heat pump stably anchored?	☐ Yes | ☐ No
Is the heat pump standing in a location where snow cannot slide off the roof onto it?	☐ Yes | ☐ No
Minimum wall clearance? .....mm	
Minimum clearances at sides? .....mm	
Minimum distance to roof? .....mm	
Minimum distance in front of the heat pump? .....mm	
Condensate hose, heat pump	
Does the condensate hose have a heating cable?	☐ Yes | ☐ No
Connections at the heat pump	
Were the connections established correctly?	☐ Yes | ☐ No
Who installed/prepared the connecting pipework?	
Minimum clearances, indoor unit:	
Minimum wall clearance? .....mm	
Minimum distance in front of the unit? .....mm	
Heating:	
Pressure determined in the expansion vessel? ..... bar	
The heating system has been filled according to the pressure determined in the expansion vessel to ..... bar	
Has the heating system been flushed before installation?	☐ Yes | ☐ No
Has the particle filter been cleaned?	☐ Yes | ☐ No
Electric connection:	
Were the low voltage cables installed with a minimum distance of 100 mm from 230 V/400 V cables?	☐ Yes | ☐ No
Were the CAN-BUS connections established as specified in the instructions?	☐ Yes | ☐ No
Has a power guard been connected?	☐ Yes | ☐ No
Is the outside temperature sensor T1 on the coldest side of the house?	☐ Yes | ☐ No
Power supply:	
Is the phase sequence of L1, L2, L3, N and PE in the heat pump correct?	☐ Yes | ☐ No
Is the phase sequence of L1, L2, L3, N and PE in the indoor unit correct?	☐ Yes | ☐ No
Does the power supply correspond to the installation instructions?	☐ Yes | ☐ No

Fuse for heat pump and electric booster heater, tripping characteristics?	
Manual operation:	
Was a function check of individual component groups performed (pump, mixing valve, diverter valve, compressor, etc.)?	☐ Yes | ☐ No
Comments:	
Have the temperatures in the menu been checked and documented?	☐ Yes | ☐ No
T0 T1 TW1 TC0 TC1	_____ °C _____ °C _____ °C _____ °C _____ °C
Settings for auxiliary heater:	
Time delay, auxiliary heater	
Block auxiliary heater	☐ Yes | ☐ No
Electric booster heater connected load settings	
Auxiliary heater, maximum temperature	_____ °C
Safety functions:	
Block heat pump at low outside temperatures	
Has the commissioning been performed correctly?	☐ Yes | ☐ No
Does the installer have to perform additional measures?	☐ Yes | ☐ No
Comments:	
Installer signature:	
Customer or installer signature:	

Table 15 System Commissioning Report

12 Benchmark Commissioning

Benchmark Commissioning & Warranty Validation Service Record

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

To instigate the warranty the heat pump needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the heat pump is serviced in line with the manufacturers' recommendations, at least annually. This must be carried out by a competent, certified operative. The service details should be recorded on the Benchmark Service and Interim Heat Pump Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.

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This Commissioning Checklist is to be completed in full by the competent person who commissioned the heat pump and associated equipment 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 manufacturers' instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

* 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.

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AIR TO WATER HEAT PUMP COMMISSIONING CHECKLIST

Address:					
Heat Pump make and model:					
Heat Pump serial number:					
Commissioned by (PRINT NAME):			Certified Operative Reg number (1):		
Company name:			Telephone number:		
Company email:			Company address:		
				Commissioning date:	
Heating and hot water system complies with the appropriate Building Regulations?				Yes	
DNO notification?				Yes	
Building Regulations Notification Number (if applicable) (2)					
MCS installer registration Number (if applicable)			MCS product certification number (if applicable)		
F-gas certification number (split heat pump only)					
G3 certification number (if applicable)					
Heat Pump Type (Tick)	Split	Monoblock	Peak heat loss of building kW		
Is Heat Pump Installed as part of a cascade?	Yes		Cascade Heat Pump Series	( ) of ( )	
Heat Pump Refrigerant Type			Refrigerant weight (total)		kg

Electrical and Hydronic Controls – SYSTEM AND HEAT PUMP (Tick the appropriate boxes)					
Time and temperature control to heating	Room thermostat and programmer/timer		Programmable Roomstat		
	Load/weather compensation		Optimum start control		
Time and temperature control to hot water	Cylinder thermostat and programmer/timer		Combined with Heat pump main controls		
Hybrid system – synchronised control of boiler and heat pump fitted				Yes	
If Yes – boiler model switching point – (Quote Tariff or Temperature Level)					

Heating zone valves (including underfloor loops)	pre-existing		Fitted		Not required	
Hot water zone valves	pre-existing		Fitted		Not required	
Thermostatic radiator valves	pre-existing		Fitted		Not required	
Outdoor Sensor	pre-existing		Fitted		Not required	
Heat Pump Safety Interlock (3)	pre-existing		Fitted		Not required	
Automatic bypass to system	pre-existing		Fitted		Not required	

Buffer Vessel Fitted	Yes		No		If yes volume:		Litres
Plate Heat Exchanger fitted to give hydronic separation of the heat pump circuit to the heating circuit					Yes		No
Expansion vessel for heating is sized, fitted & charged in accordance with manufacturer's instructions						Yes	
Legionella protection for stored hot water provided by timed temperature control?						Yes	

Water Treatment – SYSTEM AND HEAT PUMP (Tick the appropriate boxes/Measure and Record)						
System has been cleaned and treated in accordance with BS 7593:2019 and heat pump manufacturers' instructions?					Yes	
What system cleaner was used?	Brand:		Product:			
What heating system inhibitor was used?	Brand:		Product:			
What heat pump system anti-freeze/inhibitor was used? (monoblock only)	Brand:		Product:		% concentration	
System filter fitted in accordance with BS7593 : 2019?					Yes	

Heat Pump outdoor unit (Tick the appropriate boxes/Measure and Record)		
Is the heating system adequately frost protected and pipes insulated to prevent heat loss?	Yes	
Split only: The refrigerant circuit has been evacuated and charged in accordance with manufacturer's instructions	Yes	
The heat pump is fitted on a solid/stable surface capable of taking its weight	Yes	
The necessary heat pump defrost provision been put in place	Yes	
The heat pump fan free from obstacles and operational	Yes	
Condensate drain installed to manufacturer's instructions	Yes	

CENTRAL HEATING MODE (Tick the appropriate boxes/Measure and Record)					
The heating system has been filled and pressure tested				Yes	
Heating Flow Temperature		ºC	Heating Return Temperature		ºC
System correctly balance/rebalanced				Yes	

DOMESTIC HOT WATER MODE (Tick the appropriate boxes)								
Is the heat pump connected to a hot water cylinder?		Unvented		Vented		Thermal Store		Not connected
Hot water cylinder size		Litres	Stored hot water temperature					ºC
Hot water has been checked at all outlets		Yes	Have Thermostatic Blending Valves been fitted?		Yes		Not required	

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ADDITIONAL SYSTEM INFORMATON (Tick the appropriate boxes/Measure and Record)										
Water flow rate setting of the heat pump at commissioning (l/min):										
Additional heat sources connected:		Gas Boiler		Oil Boiler		Electric Heater		Solar Thermal		Other:
ALL INSTALLATIONS										
All electrical work complies with the appropriate Regulations									Yes	
The heat pump and associated products have been installed and commissioned in accordance with the manufacturer's instructions									Yes	
The operation of the heat pump 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 manufacturers' literature)										

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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.

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

* 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.

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Service provider

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Always use the manufacturer's specified spare part when replacing controls.
*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE/INTERIM WORK	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

* 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.

benchmark
COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

www.hhic.org.uk
Issue date: 20.08.2020

TECHNICAL SUPPORT:	0330 123 3366
RENEWABLE SUPPORT:	0330 123 9229
CONTROLS AND CONNECTIVITY TEAM:	0330 123 3641
APPOINTMENTS:	0330 123 9339
SPARES:	0330 123 9779
LITERATURE:	0330 123 9119
TRAINING:	0330 123 0166
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