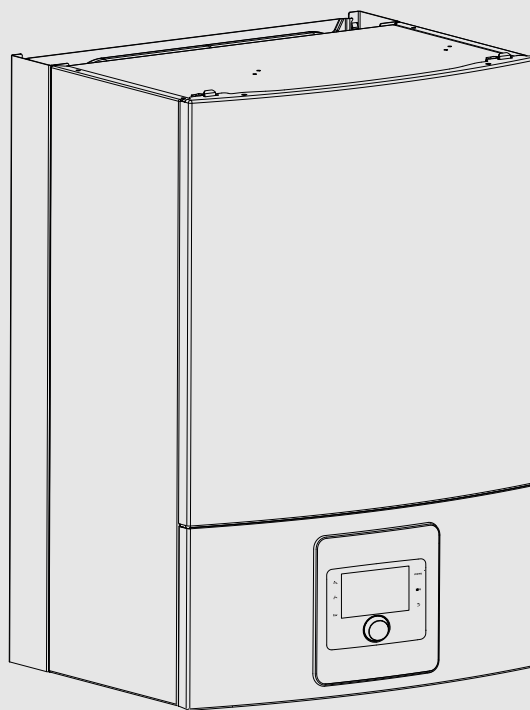




Installation manual

# Indoor Unit for Air to Water Heat Pump **Compress 3400i AWS**

CS3400iAWS 10 E



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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





Symbol	Meaning
	Warning low burning velocity material. This appliance uses a flammable refrigerant with low burning velocity (A2L). If refrigerant leaks and is exposed to an external ignition source, there is a risk of fire.
	Warning strong magnetic field.
	Maintenance by a qualified person should be carried out while following the instructions of the service manual.
	For operation, follow the instructions of the user manual.

Table 2

## 1.2 General safety instructions

### ⚠ Notices for the target group

These installation instructions are intended for 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. Non-compliance with safety instructions may result in electric shock, water leakage, fire or other dangerous situations.
- ▶ The appliance must be installed, maintained, repaired and removed in accordance with the installation manual by a qualified installer or service technician.  
A qualified installer or qualified service technician is a person who has the qualifications and knowledge described in the installation manual.
- ▶ This unit is part of a system that contains fluorinated gases as refrigerant. For specific information on the type of gas and its amount, please refer to the relevant label on the outdoor unit.
- ▶ Only qualified personnel can handle, fill, purge and dispose of the refrigerant.
- ▶ 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.

### ⚠ Risk of burn from hot surfaces

Exterior pipework of the appliance can reach temperatures above 60 °C, these should not be touched while the appliance is in operation. Suitable insulation on the pipework must be installed.

### ⚠ Electrical work

Electrical work must only be carried out by electrical installation contractors.

Before starting electrical work:

- ▶ Isolate all poles of the mains voltage and secure against reconnection.
- ▶ Make sure the mains voltage is disconnected.
- ▶ Before touching live parts: Wait at least 5 minutes to discharge the capacitors.
- ▶ Observe the wiring diagrams of other system components as well.

### ⚠ What to do if refrigerant leaks

If refrigerant leaks and touches the skin, it can cause frostbite.

- ▶ In case of a refrigerant leak, never touch any components of the air to water system.
- ▶ Avoid skin or eye contact with refrigerant.
- ▶ Seek medical attention if you get refrigerant on your skin or in your eyes.

### ⚠ 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.

#### 1.2.1 Refrigerant

##### ⚠ Refrigerant R32

- ▶ This appliance is filled with refrigerant R32. If refrigerant gas gets into contact with fire, it may generate a toxic gas or fire.
- ▶ Do not let any other substance than the specified refrigerant enter the refrigerant circuit.
- ▶ Ensure that the refrigerant pipe is connected before running the compressor.
- ▶ Be aware that refrigerant may not contain any odour.
- ▶ Read all safety instructions for handling flammable refrigerants provided with this appliance in a separate document.

##### ⚠ Installation, commissioning and service

- ▶ Do not smoke and make sure that any other possible ignition sources are kept away from the working area. Ensure that the installation area is adequately ventilated.
- ▶ Do not pierce or burn.
- ▶ This appliance must be stored in a room without continuously operating ignition sources (e.g. open flames, operating gas or operating electric heater).
- ▶ Prior and during installation, make sure that there are no refrigerant leaks using an appropriate refrigerant detector that is adequately sealed and intrinsically safe (i.e. no sparking). Never use potential sources of ignition to search for refrigerant leaks. A halide torch (or any other detector using a naked flame) may not be used. If a refrigerant leak is detected, ventilate the room immediately.
- ▶ When performing any hot work, a dry powder or CO<sub>2</sub> fire extinguisher should be kept ready.
- ▶ Wear protective gloves during installation.
- ▶ Do not use means to accelerate the defrosting process or to clean the appliance, other than those recommended by the manufacturer.

##### ⚠ Maintenance

- ▶ When changing electrical components assure that these correspond with the correct specification. Maintenance and service guidelines must always be followed.
- ▶ Before any repair and maintenance procedure, an initial safety check and component inspection procedures should be performed to check that:
  - Capacitors are discharged.
  - All electrical components are switched off and wiring is not exposed.
  - Earth bonding continuity is ensured.
- ▶ Do not connect any electrical supply to the circuit if a fault that can compromise safety is detected.

## 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 system require recurrent filling or where a heating water sample don't 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 to the heating system volume.
- ▶ Replace the expansion vessel.
- ▶ Check the heating system for leaks.

A system separation with the help of a heat exchanger may be required if the limits in table 3 can not be achieved.

#### **Do not use any water additives except for a non-toxic pH-enhancer and keep the water clean.**

The limits stated in table 3 are required to ensure the output data and operation of the heat pump throughout its entire service life.

Water quality	
Hardness	<3 °dH
Oxygen content	<1 mg/l
Carbon dioxide, CO <sub>2</sub>	<1 mg/l
Chloride ions, CL <sup>-</sup>	<250 mg/l
Sulphate, SO <sub>4</sub>	<100 mg/l
Conductivity	<350 µS/cm
pH	7,5 – 9

Table 3 Water quality

#### **Additional water treatment to prevent lime-scale deposits**

A 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 "Prevention of damage in water heating installations" 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.



If the limits for water hardness stated in table 3 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 service life.

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

Table 4 Table for heat pumps

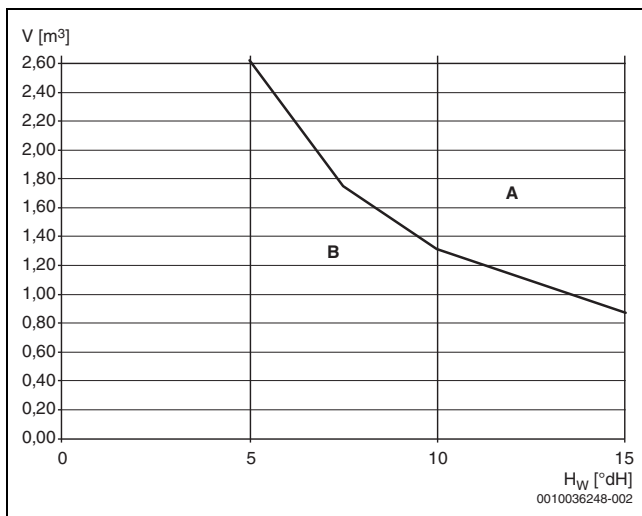


Fig. 1 Limits for water treatment in heat pump systems

- A Use completely de-mineralized fill water above the curve, conductivity  $\leq 10$  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 service life of the heat pump.

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

Suitable measures are:

- Use of fully de-mineralized fill water with a conductivity of  $\leq 10$  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.

### 3 Product description

#### 3.1 Supplied parts

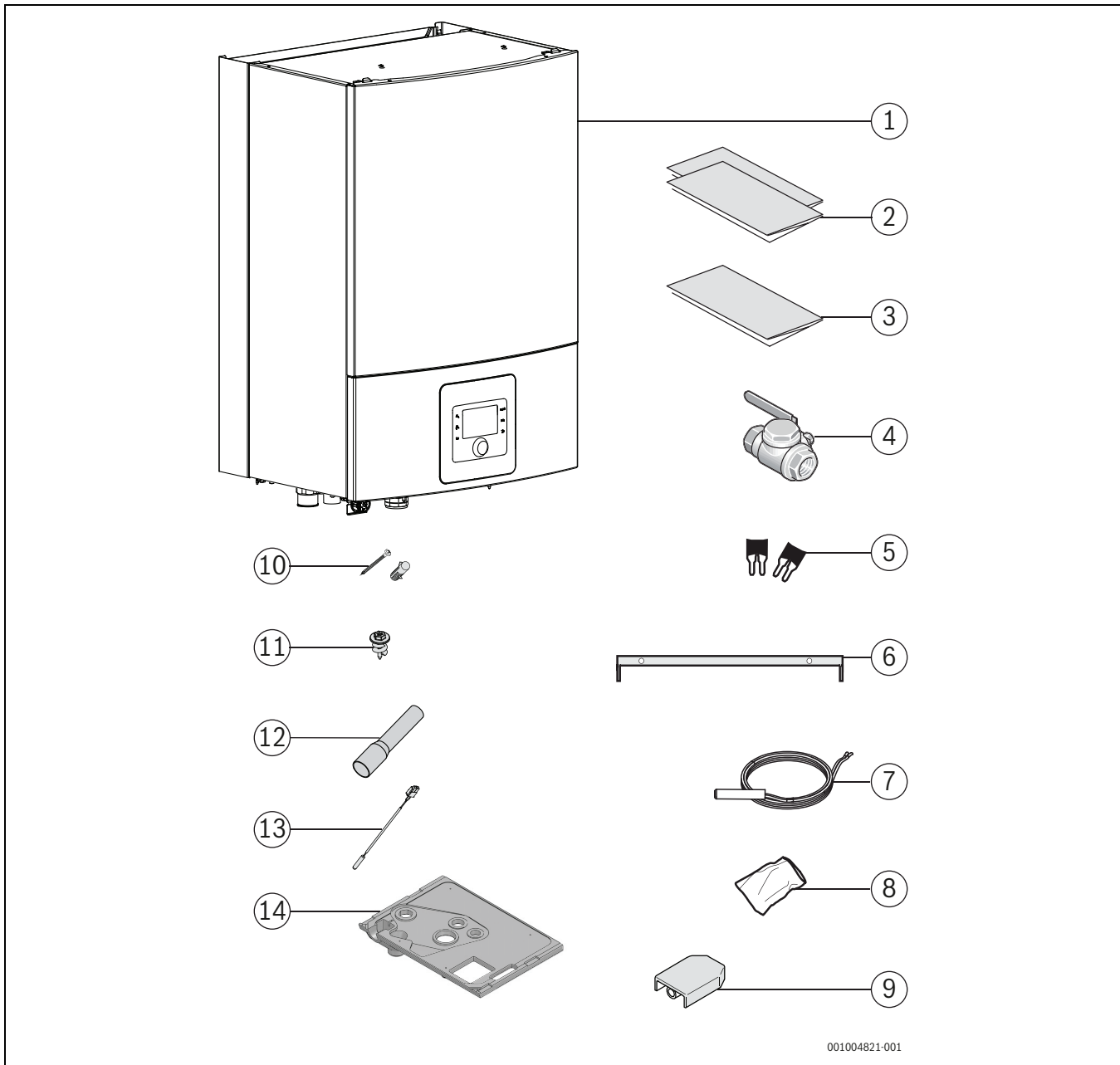


Fig. 2 Supplied parts

- [1] Indoor unit
- [2] Documentation
- [3] Drill template
- [4] Magnetic particle filter with strainer
- [5] Jumpers for 1-phase installation
- [6] Mounting rail
- [7] DHW (domestic hot water) temperature sensor
- [8] Bag with connectors for the installation module
- [9] Outdoor temperature sensor
- [10] Screws (x2) and dowels (x2) for mounting bracket
- [11] Screws for drip tray (x4)
- [12] Copper pipe
- [13] Heating circuit flow temperature sensor
- [14] Drip tray

### 3.2 Information on the indoor unit

The AWS E indoor units are intended for installation inside the building and for connection to the outdoor unit.

Possible combinations of indoor unit with different outdoor units:

AWS E	CS3400iAWS
CS3400iAWS 10 E	CS3400iAWS 4 OR-S <sup>1)</sup>
CS3400iAWS 10 E	CS3400iAWS 6 OR-S
CS3400iAWS 10 E	CS3400iAWS 8 OR-S
CS3400iAWS 10 E	CS3400iAWS 10 OR-S

1) A 5/8" to 1/2" adapter is provided with CS3400iAWS 4 OR-S

Table 5 Possible combinations

AWS E is equipped with an integrated electric booster heater.

### 3.3 Declaration of Conformity

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



The UKCA and CE markings declare that the product complies with all the applicable British and European legislation, which is stipulated by attaching these markings.

You can request the complete text of the Declaration of Conformity from the UK address indicated in this document.

### 3.4 Type plate

The type plate of the indoor unit is on the side of the appliance. It contains information on the part number and serial number as well as the date of manufacture of the device.

### 3.5 Functional principle

The function is based on the demand-actuated control of the compressor output and, if needed, by switching on the integrated electric booster heater via the indoor unit. The control unit controls the outdoor unit depending on the set heating curve.

If the outdoor unit is unable to satisfy the heat energy demand of the house, the indoor unit automatically starts the integrated electric booster heater which produces the desired temperature in the house together with the outdoor unit.

The DHW heating is controlled via the TW1 sensor in the DHW cylinder. During the heat-up phase of the DHW cylinder, the heating mode of the heating system is temporarily switched off via a 3-way valve. Once the DHW cylinder is heated up, heating mode is resumed by the outdoor unit.

#### Heating and DHW mode when the outdoor unit is deactivated

When the outdoor temperature is below -20 °C (approximately) or exceeds 45 °C (approximately), the outdoor unit is automatically turned off and is unable to produce any heat. In this case, the integrated electric booster heater of the indoor unit adopts the heating and DHW mode.

### 3.6 Product overview

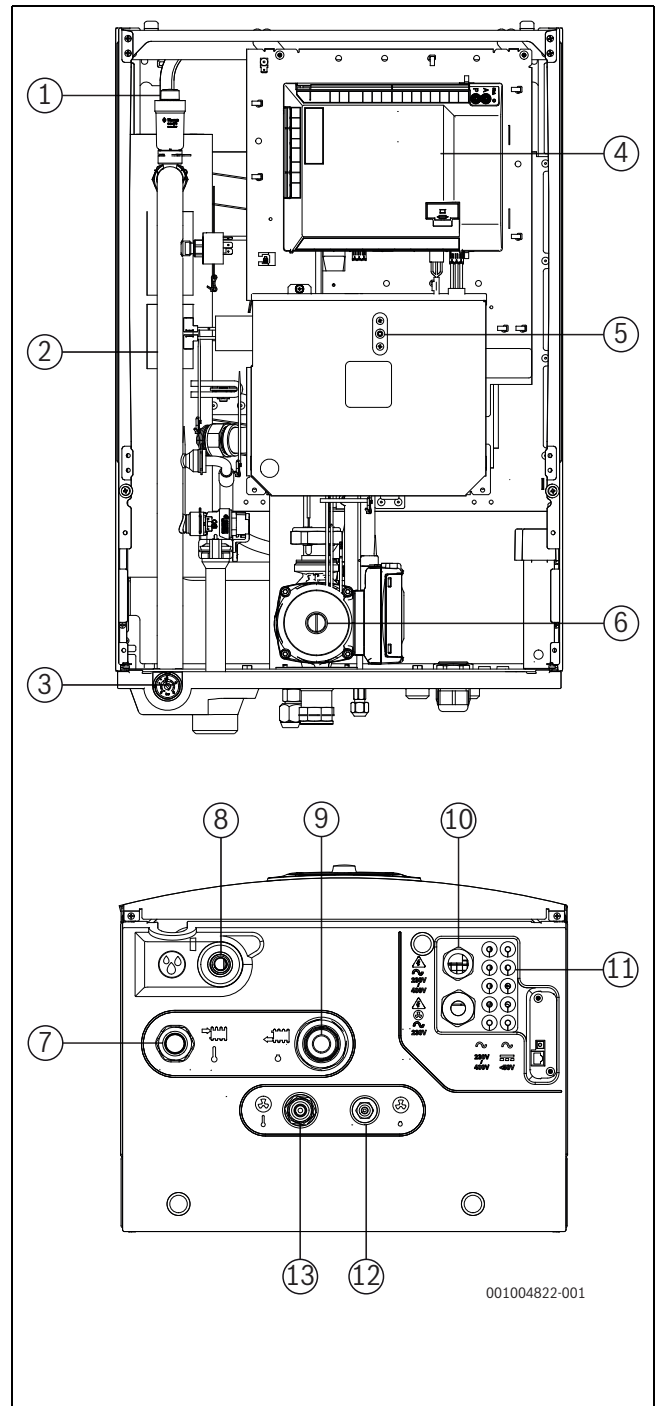


Fig. 3 Components and pipework connections of the indoor unit with electric booster heater (views with drip tray)

- [1] Automatic air vent valve (VL1)
- [2] Electric booster heater
- [3] Pressure gauge
- [4] Installer module
- [5] Reset of the overheating protection
- [6] Primary circulation pump (PCO)
- [7] Flow to the heating system
- [8] Drain of the pressure relief valve and condensates
- [9] Return from the heating system
- [10] Cable feed for power supply
- [11] Cable feed for sensor, CAN-BUS and EMS BUS
- [12] Refrigerant out to outdoor unit (liquid)
- [13] Refrigerant in from outdoor unit (gas)



### 3.7 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.

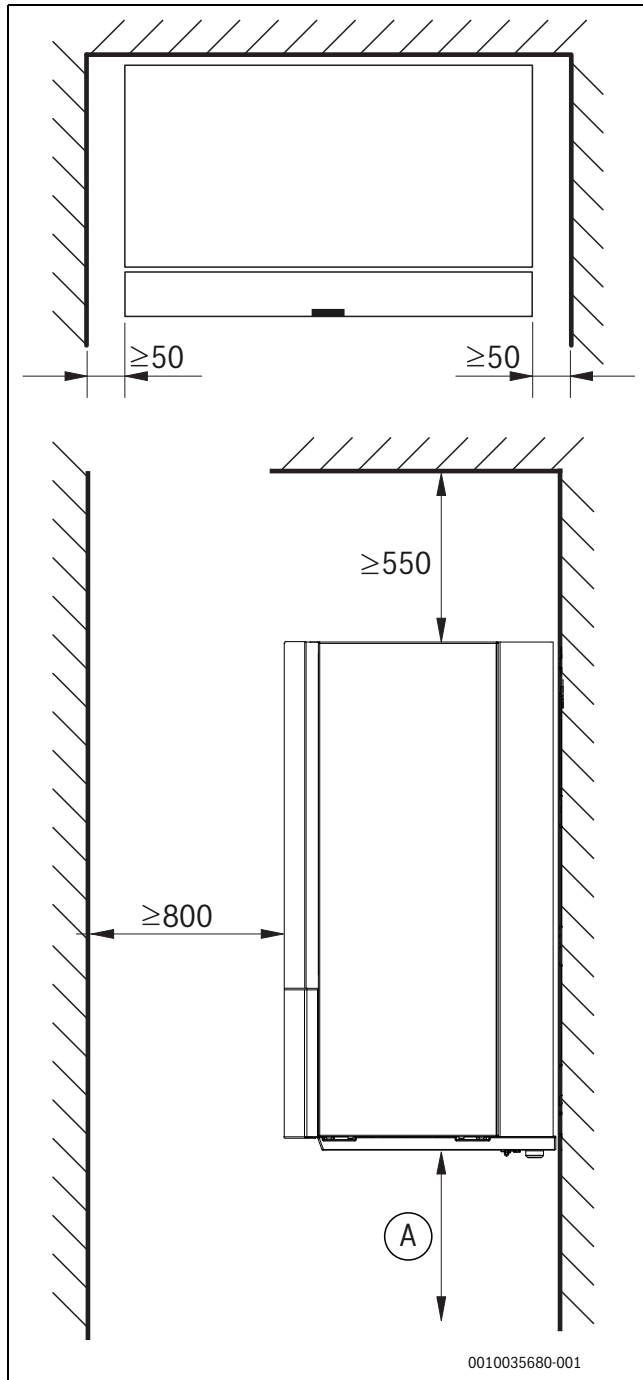


Fig. 4 Minimum distance (mm)

[A] It is recommended to ensure a minimum volume of 1 m<sup>3</sup> underneath the indoor unit. If this is not possible, ensure that the room is not air-tight by allowing an air vent passage at a height lower than the bottom of the indoor unit.

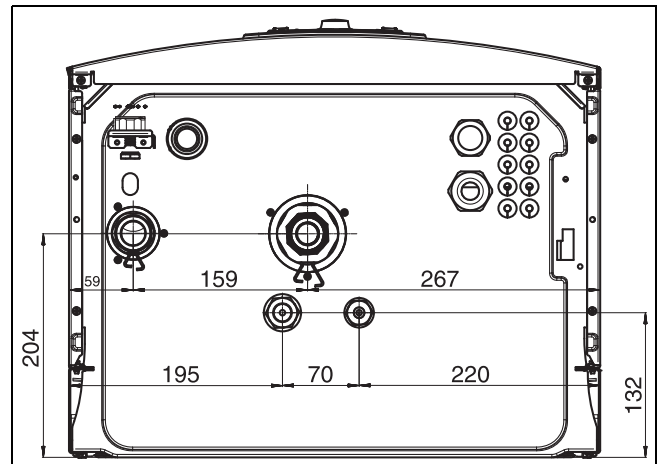


Fig. 5 Dimensions and connections (view without drip tray)

### 3.8 Connection dimensions

Pipe	Connections
Heating system flow	1" male thread
Heating system return	1" female thread
Drain/discharge	ø 22
Refrigerant pipe to/from outdoor unit	1/4" - 5/8" <sup>1)</sup>

1) A 5/8" to 1/2" adapter is provided for connection with CS3400iAWS 4 OR-S

Table 6 Pipe dimensions for CS3400iAWS 10 E

## 4 Preparing for installation



### CAUTION

#### Risk of fire or explosion!

All possible ignition sources must be kept away from the installation site as it may lead to fire or explosion.

- ▶ This appliance must be stored in a room without continuously operating ignition sources (e.g. open flames, cigarette smoking, an operating gas or operating electric heater).

### NOTICE

#### Risk of damaging the product!

The indoor unit must not be installed in areas where it is exposed to water splashes.

- ▶ Do not install the indoor unit in bathrooms or exterior areas.



### WARNING

#### Strong magnet

Can be harmful to pacemaker wearers.

- ▶ Do not clean the filter or check the magnetite indicator if you are pacemaker wearer.



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 Considerations for assembling the indoor unit**

- Mount the indoor unit at a suitable location within the house. Use a spirit level to ensure that the appliance is in the correct position.
- Make sure that there are no operating ignition sources in the room where the indoor unit is installed.
- Pipe work between the outdoor and indoor units must be as short as possible. Use insulated pipes.
- Check that all pipe connections are intact and have not come loose during transportation.
- Ensure all pipes and connections are protected against physical damage. Mechanical connections to the indoor unit must be accessible for maintenance purposes.
- Follow the instructions of the outdoor unit installation manual.
- Water discharged from the pressure relief valve should be routed away from the indoor unit to visibly terminate in a frost-free outlet.
- The installation location of the indoor unit must have a drain.
- The low voltage cables must be routed with a minimum clearance of 100 mm from live 230V cables.

**4.2 Heating system minimum volume and flow**



A sufficient amount of energy stored in the system is required to avoid multiple start/stop cycles, incomplete defrosting or unnecessary alarms. Energy is stored in the heating system water volume, as well as in the system components (radiators and underfloor heating).

For the defrost operation of the outdoor unit, a minimum volume and flow must be ensured and permanently available.

The minimum volume can be provided by the open circuits (the necessary zone valves/thermostats must be always fully open) and/or by a buffer tank. For an optimal and most efficient defrost operation a recommended volume is stated.

The minimum flow must be ensured within the minimum volume available. If the minimum flow is not met, additional measures are needed, e.g. differential bypass valve or parallel buffer. Note that if an hydraulic separator is present it requires an additional heating circuit pump.

In certain circumstances depending on the available energy stored in the system, the auxiliary heater may be used to ensure the complete defrost.

Outdoor Unit	CS3400iAWS 4 OR-S	
	Minimum	Recommended
Underfloor/fan coils	13l	35l
Radiators	4l	13l
Minimum flow	15l/min	

Table 7 Minimum volume and flow for outdoor unit CS3400iAWS 4 OR-S

Outdoor Unit	CS3400iAWS 6-10 OR-S	
	Minimum	Recommended
Underfloor/fan coils	27l	40l
Radiators	10l	15l
Minimum flow	15l/min	

Table 8 Minimum volume and flow for outdoor unit CS3400iAWS 6-10 OR-S

**5 Installation**

**NOTICE**

**Residue in the pipework can damage the system.**

Residue and particles in the heating system impair the flow rate and lead to faults.

- ▶ Before connecting the indoor unit, flush the pipe system to remove any foreign bodies.



**CAUTION**

**Risk of injury!**

During transport and installation there is a risk of crushing injury. During maintenance, internal parts of the appliance may become hot.

- ▶ The installer is obliged to wear gloves during transport, installation and maintenance.

The indoor unit is part of a heating system. Faults in the indoor unit can occur from poor water quality in the radiators or pipework of the underfloor heating system, or when the oxygen content in the system is persistently high.

Oxygen causes corrosion products in the form of magnetite and sediment.

Magnetite is an abrasive material which affects pumps, valves and components with turbulent flow characteristics, e.g. in the condenser.

If heating systems have to be regularly refilled or if hot water samples from these systems are cloudy, corresponding measures such as retrofitting magnetite separators and air vents are required.

- ▶ Ensure the insides of the pipes are clean and do not contain any harmful contaminants such as sulphuric compounds, oxidants, debris and dust.
  - Never store refrigerant pipes outdoors.
  - Only remove seals from the pipe ends when you are ready to connect them.
  - Utmost care must be taken when routing refrigerant lines.
  - Only shorten refrigerant lines using pipe cutters and seal the ends afterwards to prevent the ingress of dirt and moisture.

Dust, foreign bodies and moisture inside the refrigerant lines can be detrimental to oil quality or can result in compressor failure.

- ▶ After cutting, immediately reseal reusable lengths of refrigerant pipes.
- ▶ Purge the refrigerant pipes with nitrogen.

**NOTICE**

**Danger of malfunction due to contaminants in pipework!**

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.



**WARNING**

**Risk of personal injury and damage to property**

Using the incorrect sensors may lead to personal injury such as scalding as well as damage to property due to an excessively high or low

temperature. Comfort can also be adversely affected by using the incorrect sensors.

- Make sure that you use the correct sensor with the appropriate characteristics when exchanging a sensor (Chapter 11.6). Using sensors with other characteristics will lead to problems because the system will be controlled with reference to the incorrect temperature.

### 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  $-10^{\circ}\text{C}$ .

### 5.2 Insulation

#### NOTICE

#### Material damage from frost!

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

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

If it is envisaged that the cooling operation will be carried out below the dew point, all connections and pipes must be appropriately insulated in accordance with the valid regulations (minimum insulation thickness 13 mm).

### 5.3 Checklist



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



As a recommendation, the refrigerant line should be connected before the hydraulic connections.



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

1. Remove the front cover of the indoor unit.
2. Assemble the drip tray.
3. Mount the leakage copper pipe and assure the proper pipework from the indoor unit.
4. Connect the refrigerant pipes from the outdoor unit to the indoor unit.
5. Connect the indoor unit to the heating system.
6. Connect, fill and vent the DHW cylinder (if installed).
7. Before starting operation, fill the heating system.
8. Vent the heating system.
9. Install the outside temperature sensor and, if necessary, the room controller.
10. Connect the CAN-BUS cable to the outdoor and indoor unit.
11. Install accessories (heating circuit module, etc.).
12. If required, connect the EMS BUS cable to the accessory.
13. Establish the electrical connection of the system.
14. Put the heating system into operation. Use the control unit to make the necessary settings (→ instructions for control unit).
15. Check that all sensors display the appropriate values.
16. Check and clean the particle filter.

17. Check the operation of the heating system after starting up (→ instructions for control unit).

### 5.4 Removing the front cover of the indoor unit

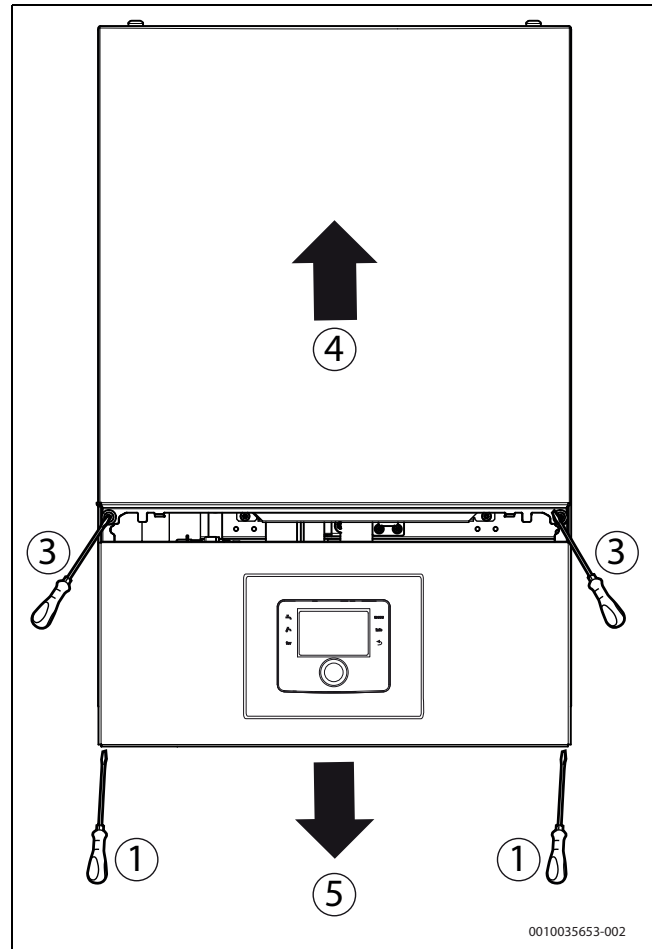


Fig. 6 Remove front cover

To remove the front cover of the indoor unit, follow these steps:

1. Unscrew the lower part of the front cover.
2. Hold the lower part of the front cover on the holders.
3. Unscrew the upper part of the front cover.
4. Remove the upper part of the front cover.
5. Remove the intermediate connector of the control device and complete the removal of the lower part of the front cover.

## 5.5 Assembling the drip tray

**NOTICE****Risk of material damage!**

Drip tray should be installed to prevent water drips or leaks to the ground that are formed by condensation.

- ▶ Always install the drip tray before mounting the pipes.

To assemble the drip tray:

- ▶ Remove the front cover of the indoor unit.
- ▶ Use the drip tray screws to fix the drip tray to the bottom of the indoor unit, screw it on slightly. Do not overtighten as it can damage the drip tray. Observe the following figure for reference:

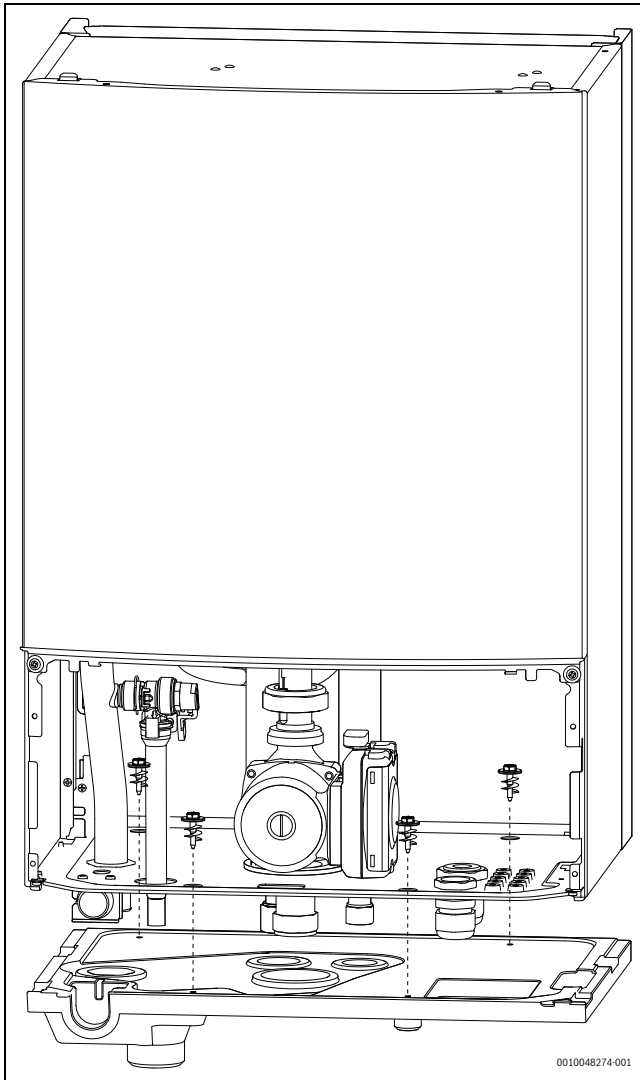


Fig. 7 Assemble of the drip tray

## 5.6 Connection

### 5.6.1 Connecting the indoor unit with integrated electric booster heater

Install the following connections at the indoor unit (check the numbers of Fig. 8):

1. Perform the connection from the drain pipe [6] to an applicable frost protected outlet.
2. Connect refrigerant pipe (gas) from the outdoor unit to [2].
3. Connect refrigerant pipe (liquid) to the outdoor unit to [4].
4. Connect the flow pipe to the heating system to [1].
5. Connect the return pipe from the heating system to [5].

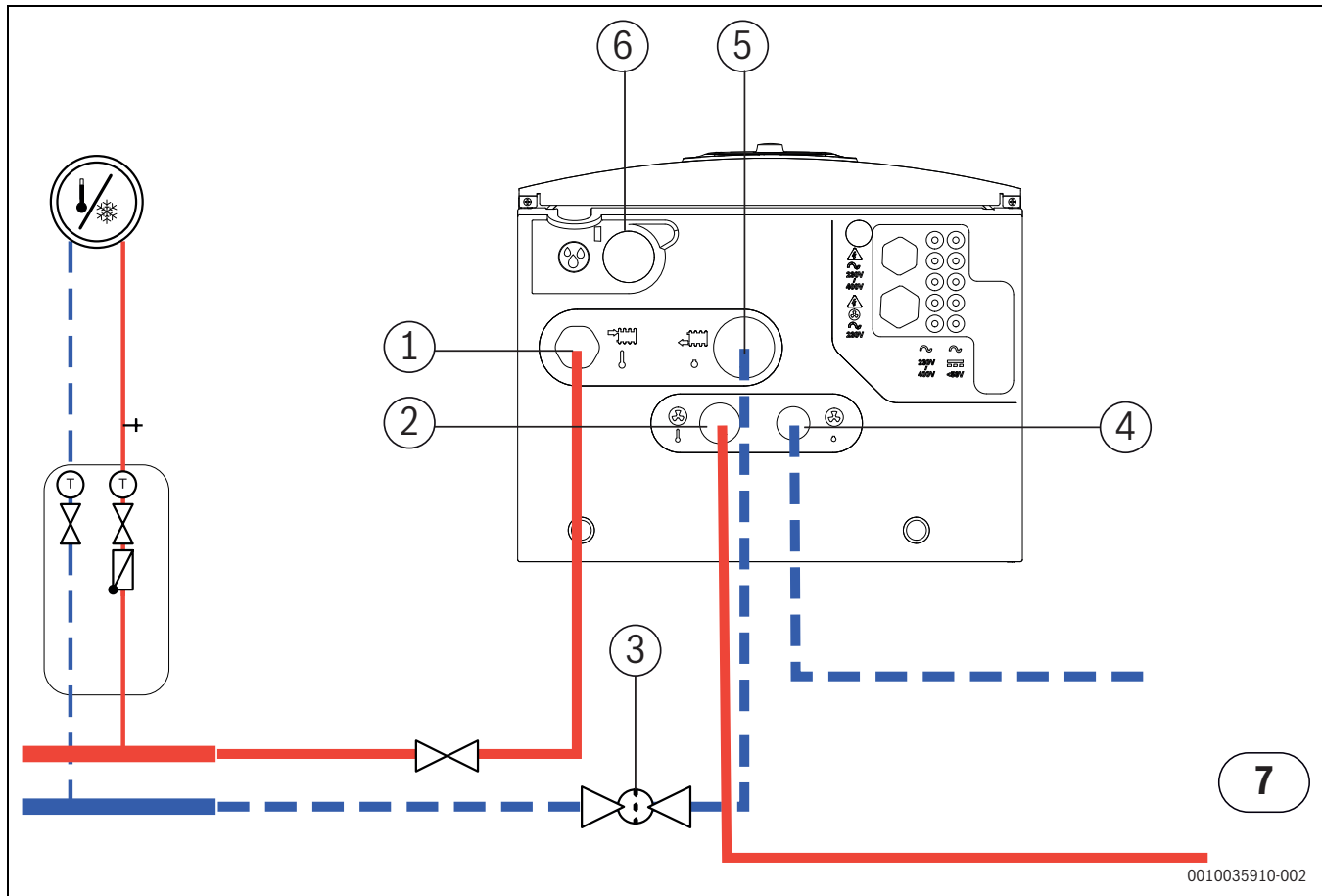


Fig. 8 Connection of an indoor unit with an integrated electric booster heater to an outdoor unit and heating system

- [1] Flow pipe to heating system
- [2] Refrigerant in from the outdoor unit (gas)
- [3] Magnetic filter valve
- [4] Refrigerant out to the outdoor unit (liquid)
- [5] Return pipe from heating system
- [6] Drain of the pressure relief valve and condensates
- [7] Outdoor unit

**5.6.2 Filling the outdoor unit, indoor unit and heating system**

Purge the heating system first. If the DHW cylinder is connected to the system, it must be filled with water and also purged. Then fill the heating system.



After the system has been filled, vent it thoroughly and clean the water filter.

- ▶ Fill the system according to these instructions.
- ▶ Start the system according to the instructions for the control unit.
- ▶ Vent the system according to chapter 6.2.
- ▶ Clean the particle filter as described in chapter 8.1.

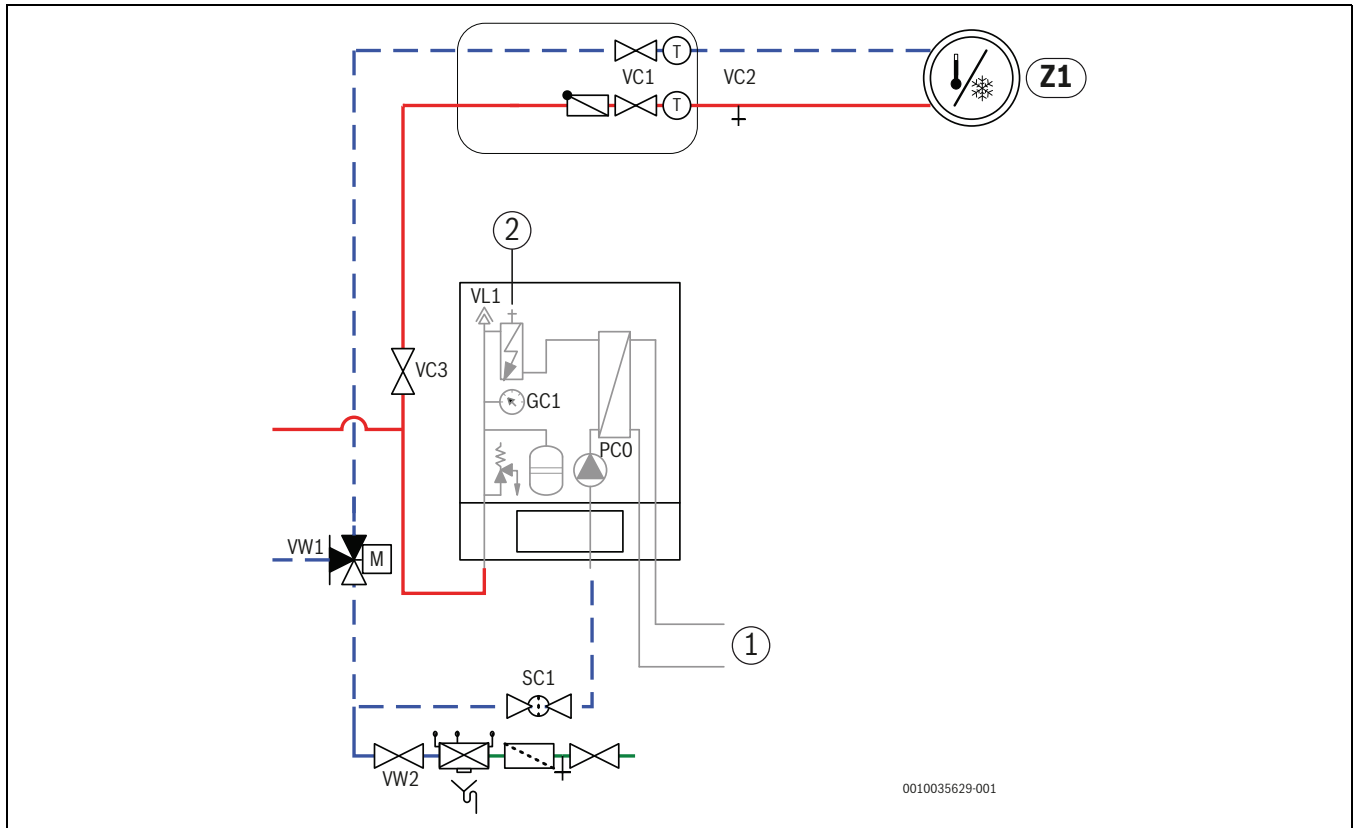


Fig. 9 Indoor unit with integrated electric booster heater and heating system

- [Z1] Heating system (without mixing valve)
- [1] Outdoor unit
- [2] Manual air vent valve
- [PC0] Primary circulation pump
- [VC1] Heating system valves
- [VC2] Drain valve
- [VC3] Valves for the heating system
- [VL1] Automatic air vent valve
- [GC1] Pressure gauge
- [SC1] Magnetic filter valve
- [VW1] 3-way diverter valve
- [VW2] Fill valve

See Fig. 9:

1. Make sure the power supply to the outdoor and indoor units is not connected before the system has been completely filled and vented.
2. Activate automatic venting of VL1 by unscrewing the cap a couple of turns without removing it.
3. Connect a hose to the heating system drain valve VC2.
4. Open the valve VC3, drain valve VC2 and fill valve VW2 to fill the heating system.
5. Open the manual air vent valve on top of the electric heater until water discharges without air. Close the valve afterwards.
6. Continue filling until only water comes out of the outlet hose and bubbles no longer form in the heating system. Where appropriate, take additional measures to vent the heating system.
7. Close the drain valve VC2.

8. Keep filling until the pressure display GC1 shows 2 bar.
9. If a DHW cylinder is installed, also fill and vent it.
10. Close the fill valve VW2.
11. Remove the hose from VC2.
12. → Chapter 6.2.

**5.6.3 Primary circulation pump (PC0)**

The PC0 circulation pump (integrated into CS3400iAWS 10 E) is equipped with a PWM control (speed-controlled). The pump settings are made at the control unit of the indoor unit for the given heating system (→ instructions of the control unit).

The pump speed is automatically adjusted for optimum operation.

**5.6.4 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,  $\cos\phi > 0.4$ . If the load is higher, install an intermediate relay.

## 5.7 Electrical connection



**DANGER**

### Electrical shock!

The heat pump components conduct electricity.

- ▶ Before working on the electrical system, disconnect the appliance from the power supply.

### NOTICE

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

If the system is turned on before it is filled with heating system water, the heating system components can overheat.

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



The indoor unit is not supplied with its own safety switch from mains power supply.

- ▶ For a safe operation, install a disconnection device that provides a full disconnection under overvoltage category III conditions in the mains wiring in accordance to the wiring rules.



CAN-BUS and EMS-BUS are not compatible.

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



Voltage should not vary more than 10% from the rated voltage.



The voltage between earth and neutral must be below 3V. Attention must be made when connecting the phases of this appliance in the whole electrical installation, so there is no phase unbalance in the household 3-phase system (if there is any).

- ▶ Select the appropriate conductor cross-sections and cable types for the respective fuse protection and routing method.
- ▶ Connect the heat pump according to the wiring diagram.
- ▶ When changing the PCB, note the colour coding.

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

- Cable length up to 20 m: 0.75 to 1.50 mm<sup>2</sup>
- Cable length up to 30 m: 1.0 to 1.50 mm<sup>2</sup>

### 5.7.1 Connecting the indoor unit

- ▶ Remove the front cover of the indoor unit.
- ▶ Remove the cover of the electrical box.
- ▶ Insert the CAN-BUS, sensors and other signals circuit cables through the respective cable feed, marked with <50V. Lead the cables all the way until they reach the front of the appliance and connect them as indicated in Fig. 10.
- ▶ Insert the power circuit cables through the glands marked with 230V/400V. Lead them all the way until they reach the front of the appliance.
- ▶ Connect the power supply cables in the respective terminal blocks as indicated in chapter 5.7.7.
- ▶ Fasten the cable ties.
- ▶ After assuring all electric cables are correctly and safely connected and secured, reassemble the electrical box cover and the front cover of the indoor unit.

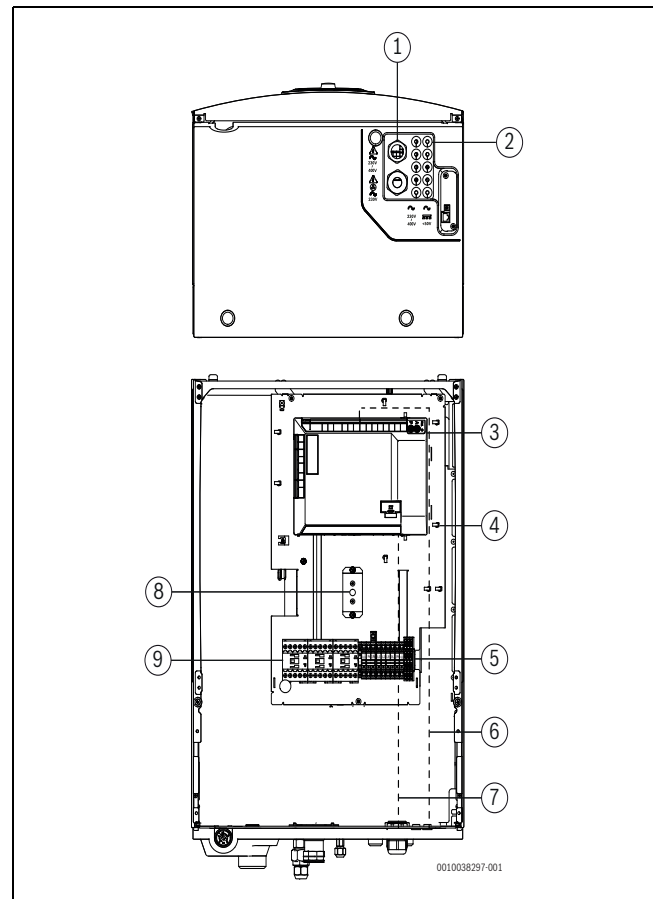


Fig. 10 Cable feeds (bottom and front view)

- [1] Cable feed for power circuit cables (230V/400V)
- [2] Cable feed for sensor, CAN-BUS, EMS BUS and signal circuit cables (<50V)
- [3] Installer module
- [4] Support for cable ties
- [5] Terminal blocks
- [6] Cable circuit for sensor, CAN-BUS, EMS BUS and signal circuit cables (<50V)
- [7] Cable circuit for power circuit cables (230V/400V)
- [8] Overheating protection (OHP)
- [9] Relay 1,2 and 3 for electric booster heater



When routing the electrical cables in and out of the electrical box, make sure they do not become strained.



Signal circuit cables and power circuit cables cannot be in the same cable feed.

**5.7.2 Connections to installer module of the indoor unit**



**Risk of electric shock!**

Opening the installer module may cause injury by electric shock.

- ▶ Never open the installer module.

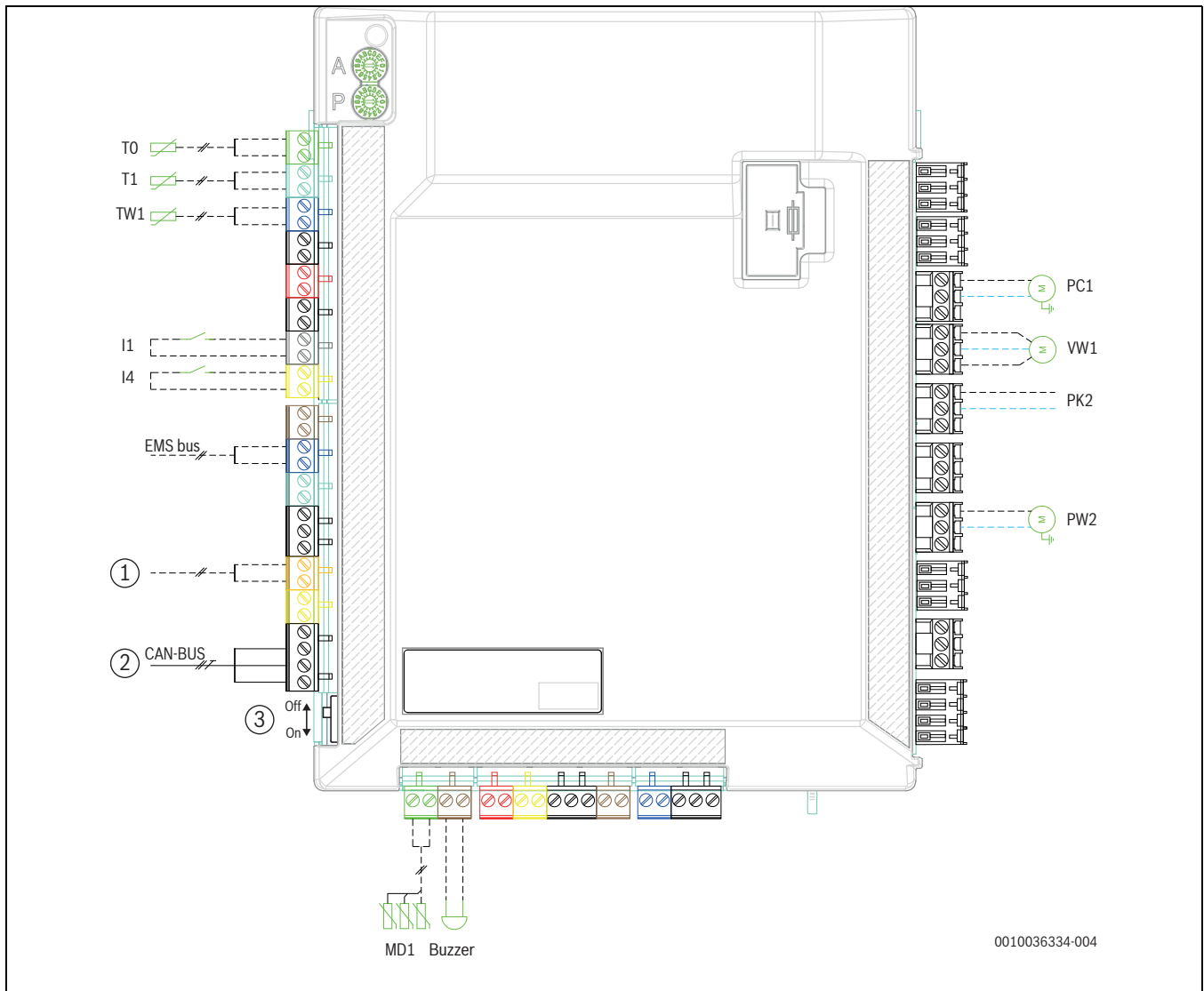


Fig. 11 Installer module of the indoor unit

- [1] Connectivity gateway (accessory)
- [2] CAN-BUS to outdoor unit
- [3] CAN termination switch
- [T0] Heating circuit flow temperature sensor
- [T1] Outside temperature sensor
- [TW1] DHW temperature sensor
- [I1] External input 1
- [I4] External input 4
- [MK2] Condensation sensor(s)
- [Buzzer] Alarm buzzer (accessory)
- [PW2] DHW circulation pump
- [PK2] Relay output, cooling mode, 230V~
- [VW1] DHW 3-way valve
- [PC1] Heating circulation pump



Max load for relay outputs PW2, PK2, VW1, PC1: 2A,  $\cos \phi > 0.4$ .  
Maximum load for CUHP inst.: 6.3A



Note regarding input I1 (connection 13, 14) and I4 (connection 15,16).  
The contact on the component or relay that is connected to this input must be suitable for 5V and 1mA.





Coding switches A and P must not be adjusted! Otherwise malfunctions and faults will occur.

Important: check the coding when a replacement part is used (→ Fig. 36).

### 5.7.3 CAN-BUS

#### NOTICE

#### Malfunction due to faults!

Power circuit cables (230V~) cannot be near any CAN-BUS, sensor and other signal circuit cables (12V DC).

- ▶ Ensure there is a minimum distance of 100 mm between power circuit cables and CAN-BUS, sensor and other signal circuit cables.



CAN-BUS: do not connect 12V direct voltage output "Out 12V DC" on the installation module.

#### NOTICE

#### Mixing up the 12V and CAN-BUS connections will result in a system fault!

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

- ▶ Make sure that both cables are connected to the correspondingly marked connections on the printed circuit board (CAN high / CAN low).

The outdoor unit and indoor unit are connected to each other via a communication cable, the CAN-BUS.

A LIYCY cable (TP) 3x0.75 mm<sup>2</sup> (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<sup>2</sup> can be used. One of the shielded ends must be connected to the nearest grounding terminal in the indoor unit structure. The other end cannot be connected to the grounding or any metal part of the outdoor unit structure.

The maximum permissible cable length is 30 m.

The **Can Termination Switch** marks the start and end of the CAN-BUS connection. Make sure that the right boards are terminated and that all other boards within the CAN-BUS connection are not terminated.

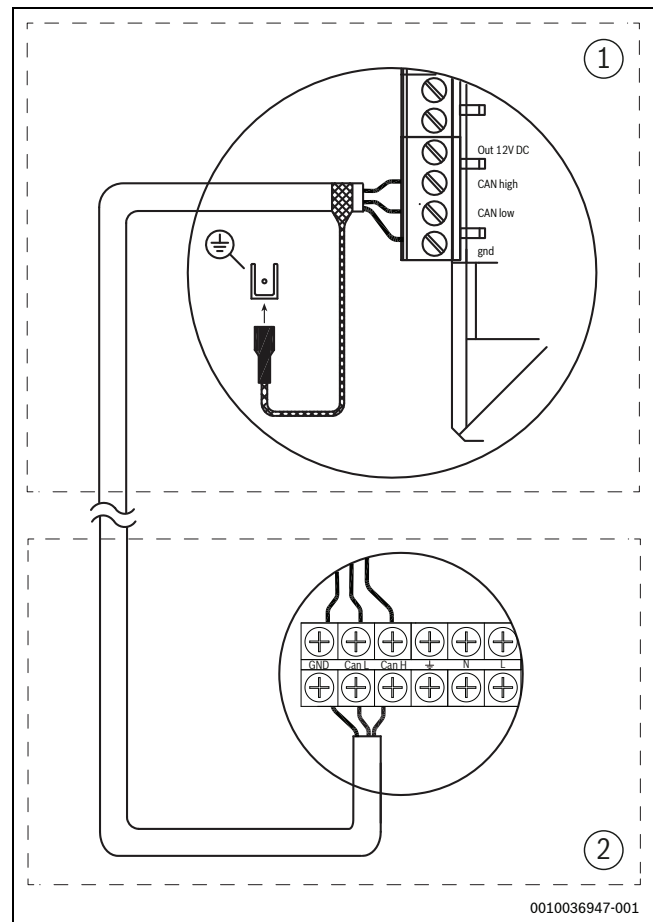


Fig. 12 CAN-BUS connection

- [1] Indoor unit
- [2] Outdoor unit

### 5.7.4 EMS BUS

#### NOTICE

#### Malfunction due to faults!

Power circuit cables (230V~) cannot be near any EMS-BUS, sensor and other signal circuit cables (12V DC).

- ▶ Ensure there is a minimum distance of 100 mm between power circuit cables and EMS-BUS, sensors and other signal circuit cables.

The control unit is connected via the EMS-BUS to the installer module of the indoor unit.

The control unit is supplied with power via the BUS cable. The polarity of the two EMS-BUS cables is irrelevant.

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 parallel or in a star configuration.
- ▶ Use cable with a minimum cross-section of 0.5 mm<sup>2</sup>.
- ▶ In case of external inductive interferences (e.g. from PV systems), use screened cables. Connect only one end of the cable shield to the nearest ground.

### 5.7.5 Fitting temperature sensors

In the default setting, the control unit automatically controls the flow temperature based on the outdoor temperature. A room controller can be installed for greater comfort. **If cooling mode is intended, a room controller is absolutely essential.**

#### Flow temperature sensor T0

The temperature sensor is part of the scope of delivery of the indoor unit.

- ▶ Install the temperature sensor 1-2 meters downstream of the junction of the DHW coil circuit, if installed.
- ▶ 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<sup>2</sup>
- 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.

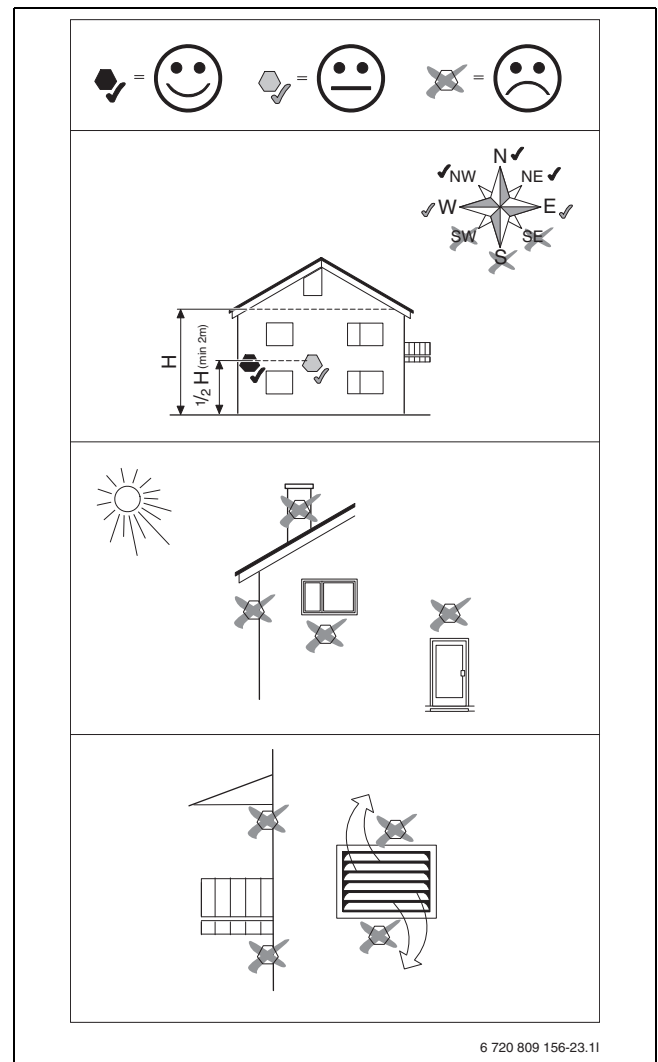


Fig. 13 Position of the outdoor temperature sensor

### 5.7.6 External connections

#### NOTICE

#### Material damage due to incorrect connection!

The electrical components may become damaged if connected to the wrong voltage or current.

- ▶ Only make connections that are adapted for 5 V and 1 mA to the external connections of the indoor unit.
- ▶ If coupling relays are required, only use relays with gold contacts.

The external inputs I1 and I4 can be used for remote control of individual control unit functions.

Functions which are activated via the external inputs are described in the instructions for the control unit.

The external input is either connected to a manual switch or a control device with a 5 V relay output.

**5.7.7 Terminals for electrical connections**

**Terminals for electrical connection of integrated electric booster heater (factory configuration, three-phase)**

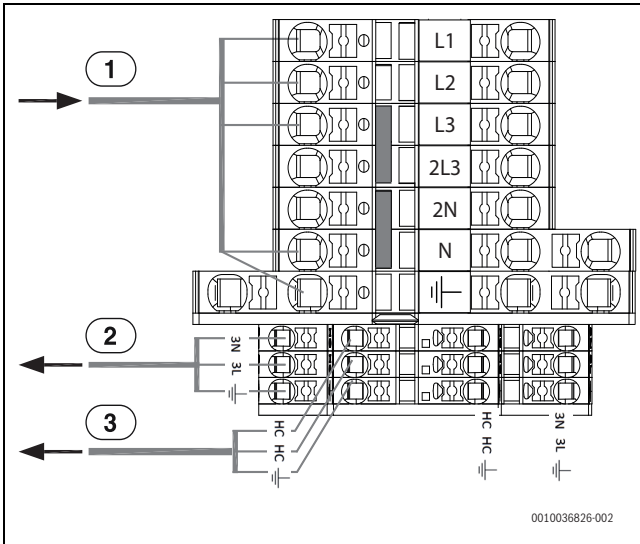


Fig. 14 Terminals for electrical connection, 5.85kW 400V 3N~

- [1] 400V 3N~ 10A, power supply to indoor unit
- [2] 230V~, controller (EMS modules) accessory
- [3] 230V~, power supply for heating cable (accessory)

**Terminals for electrical connection of integrated electric booster heater (alternative configuration, single-phase)**

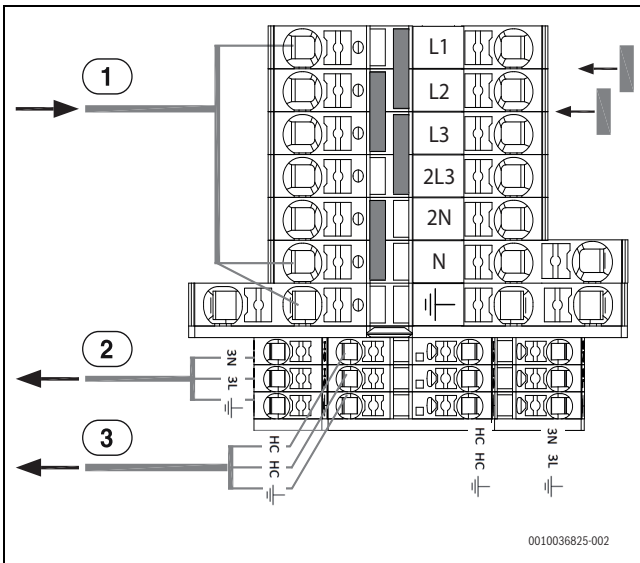


Fig. 15 Terminals for electrical connection, 5.85kW 230V~

- [1] 230V~ 32A, power supply for indoor unit
- [2] 230V~, controller (EMS modules) accessory
- [3] 230V~, power supply for heating cable (accessory)



Power to the outdoor unit is supplied separately from the distribution board (230V~).

**6 Commissioning**



Before you turn on the appliance please check that all external connected devices are well earth connected.

**6.1 Commissioning checklist**

1. Power on the unit.
2. Commission the heating system. Use the control unit to make the necessary settings (→ instructions for control unit).
3. Vent the entire heating system after commissioning.
4. Check that all sensors display the appropriate values.
5. Check and clean the particle filter.
6. Check the operation of the heating system after startup (→ instructions for control unit).

**6.2 Venting the indoor unit**

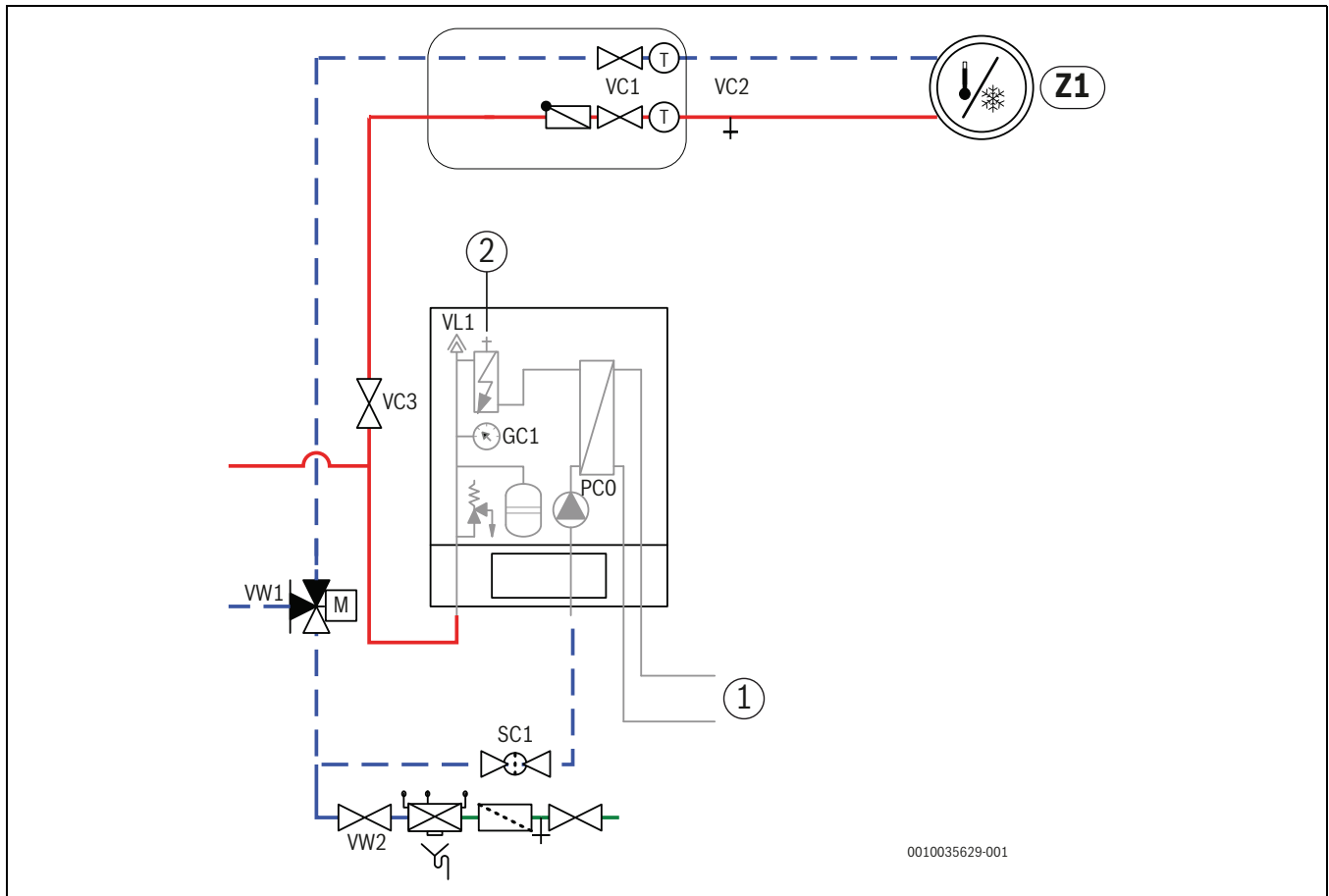


Fig. 16 Indoor unit with an integrated electric booster heater and heating system

- [Z1] Heating system (without mixing valve)
- [1] Outdoor unit
- [2] Manual air vent valve
- [PC0] Primary circulation pump
- [VC1] Heating system valves
- [VC2] Drain valve
- [VC3] Valves for the heating system
- [VL1] Automatic air vent valve
- [GC1] Pressure gauge
- [SC1] Magnetic filter valve
- [VW1] 3-way diverter valve
- [VW2] Fill valve

See Fig. 16:

1. Connect the power supply to the outdoor and indoor units.
2. Activate "Only auxiliary heater" and make sure that the heating circulation pump PC1 is running (if installed).
3. Remove the pulse width modulation plug PC0 from the primary circulation pump PC0 so that it can operate at maximum speed.
4. Deactivate the "Only auxiliary heater" function when no more air is coming out of the VL1 or the manual air vent valve on top of the electric heater. Close the manual air vent valve.
5. Connect the PC0 pulse width modulation plug to the heating pump.
6. Clean the particle filter SC1.
7. Also vent via the other air vent valves of the heating system (e.g. radiators).
8. Check the pressure on the pressure gauge GC1 and top up with the fill valve VW2 if needed. The pressure should be 0.3–0.7 bar above the pressure set in the expansion vessel.
9. Check that the heat pump is running and that there are no alarms.

**6.3 Adjusting the operating pressure of the heating system**

Display on the pressure gauge	
1.2 bar	Minimum charge pressure. When the system is cold, the operating pressure must be kept at roughly 0.3–0.7 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 9 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.

## 6.4 Pressure switch and overheating protection



The pressure monitor and overheating protection are only installed in indoor units with integrated electric booster heater.

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 primary circulation 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 primary circulation pump PC0 and the outdoor unit 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, and check whether an additional expansion vessel is necessary in the system.
- ▶ Check the system for leaks, and use a larger expansion vessel if necessary.
- ▶ Slowly increase the pressure in the heating system by adding water through the fill valve.

#### Overheating protection

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

- ▶ Check the operating pressure.
- ▶ Check the heating and DHW settings.
- ▶ Reset the overheating protection. To do this, press the button on the terminal box.

## 6.5 Function test

- ▶ Start the system according to the instructions for the control unit.
- ▶ Vent the system according to chapter 6.2.
- ▶ Test the active components of the system as described in the instructions for the control unit.
- ▶ Check if the start conditions have been met for the outdoor unit.
- ▶ Check if there is a heating or hot water demand.

**-or-**

- ▶ Draw off DHW or increase the heating curve to generate demand (if necessary, adjust the setting for **Heating mode down** if the outside temperature is high).
- ▶ Check if the outdoor unit starts.
- ▶ Make sure that there are no current alarms (see instructions for the control unit).

**-or-**

- ▶ Eliminate any faults according to the control unit instructions.
- ▶ Check the operating temperatures in accordance with the instructions for the control unit.

## 6.5.1 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 when the heat pump is operating for more than 10 minutes 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 5 K as temp.diff. Setting heating.
- ▶ With radiators 8 K as temp.diff. Setting heating.

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 out, sensor TC3) and return temperature (heat transfer medium in, 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 without the outdoor unit (individual operation)

The indoor unit can be started without the outdoor unit being connected, for example if the outdoor unit is to be installed at a later date. This is termed individual operation or stand-alone operation.

With individual operation, the indoor unit only uses the integrated or external auxiliary heater for heating and DHW heating.

Commissioning in individual operation:

- ▶ In the «**Heat pump**» service menu, select the option «**Stand-alone mode**» (→ instructions for the control unit).

## 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 needs to be replaced, remove the installer module completely and replace with 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. 6.5).

#### Install power cable

- ▶ Check the power cable for mechanical damage. Replace damaged cables.

### 8.1 Particle filter

### **WARNING**

#### Strong magnet!

Can be harmful to pacemaker wearers.

- ▶ Do not clean the filter or check the magnetite indicator if you are a pacemaker wearer.

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



The system does not need to be emptied to clean the filter. The filter is integrated into the shut-off valve.

#### Cleaning the strainer

- ▶ Close the valve (1).
- ▶ Unscrew the cap (manually) (2).
- ▶ Take out the strainer and clean it with running water over it or by pressure cleaning.
- ▶ Check attached debris on the cap's magnet (3) and clean it.
- ▶ Reinstall the strainer (4). For proper assembly, make sure that the guide bumps fit into the recesses in the valve.
- ▶ Screw the cap back on (hand tight).
- ▶ Open the valve (5).

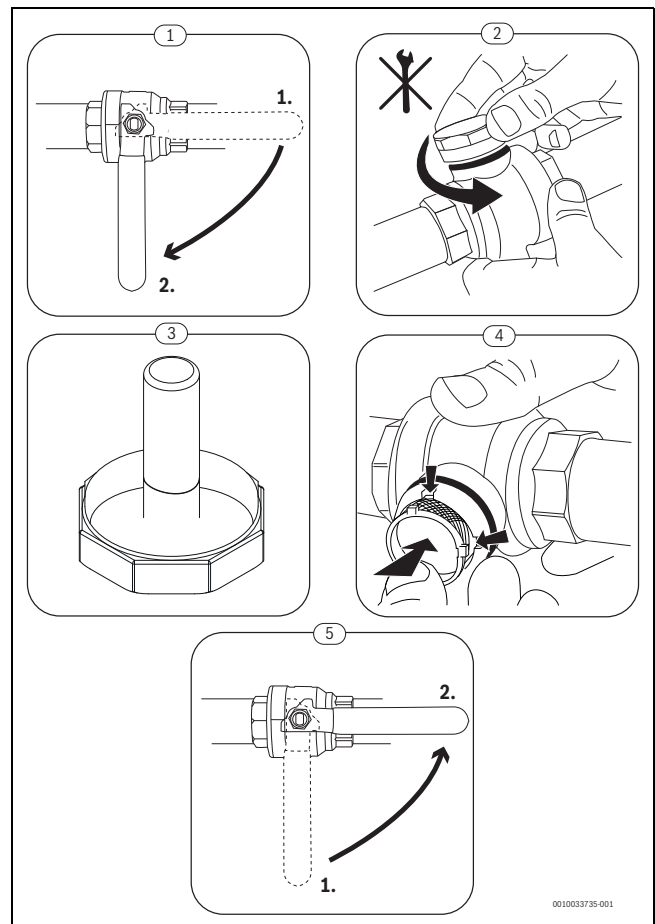


Fig. 17 Cleaning the strainer

### 8.2 Replacing components

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

1. Switch off the outdoor and the indoor units.
2. Make sure that the automatic air vent valve VL1 is open.
3. Close the valves to the heating system, particle filter SC1 and valve VC3.
4. Drain the appliance via a suitable drain in the system.
5. Wait until no more water flows into the drain.
6. Replace components.
7. Open the filling valve VW2 to load water into the pipe leading to the indoor unit.
8. Continue filling until only water emerges from the hose at the drain and the indoor unit no longer contains air bubbles.
9. Close the drain and continue filling the system until the reading at the pressure gauge GC1 is 2bar.
10. Close the filling valve VW2.
11. Reconnect the power supply to the outdoor and indoor units.
12. Ensure that the heating circulation pump PC1 (if installed) is running.
13. Pull the connector PC0 PWM cable off the primary circulation pump (PC0) so that it runs at maximum speed.
14. Activate "auxiliary heater only" at the control unit.
15. The pressure must remain the same for 10 minutes. Only then should the electric booster heater be deactivated at the control unit.
16. Connect the PC0 PWM contact to the primary circulation pump (PC0).
17. Clean the particle filter SC1.
18. Open valves VC3 and SC1 to the heating system.
19. Check the pressure at the pressure gauge GC1, if the pressure is less than 2bar top up via the filling valve VW2.

## 9 Installation of accessories

### 9.1 CAN-BUS accessories

Accessories to be connected to the CAN-BUS are connected in parallel to the CAN-BUS connection for the outdoor unit on the installation card in the indoor unit. Accessories can also be connected in series with other units connected to the CAN-BUS.



With accessories, all 4 connections must be assigned. You should therefore also connect the "Out 12 V DC" connection on the installation module.

Max. Cable length 30 m

Minimum cross-section dia. = 0.75 mm<sup>2</sup>

### 9.2 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<sup>2</sup>.
- ▶ 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. 18.

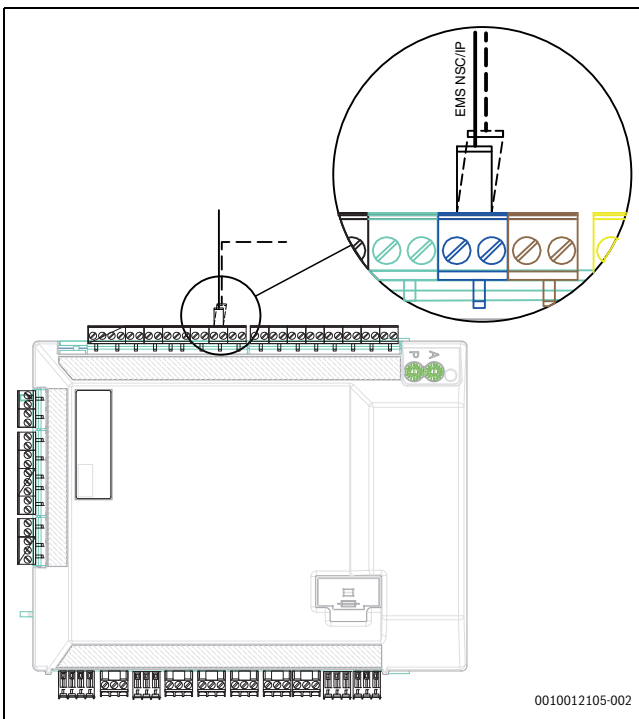


Fig. 18 EMS connection on the installer module



**9.3 External inputs**

Route all low voltage cables (measuring current) separately from cables carrying 230 V or 400 V to avoid inductive interference (minimum separation of 100 mm).

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

- Cable up to 20 m in length: 0.75 to 1.50 mm<sup>2</sup>
- Cable up to 30 m in length: 1.0 to 1.50 mm<sup>2</sup>

The relay output PK2 is active in cooling mode and can be used to control the cooling/heating mode of a fan convector or a heating pump, or to control underfloor heating circuits in humid rooms.

**i** Maximum load at relay outputs: 2 A, cosφ > 0.4. If the load is higher, it will be necessary to use an intermediate relay.

**! WARNING**  
**Material damage from incorrect connection!**

The electrical components may become damaged if connected to the wrong voltage or current.

- ▶ Only make connections that are adapted for 5 V and 1 mA to the external connections of the indoor unit.
- ▶ If coupling relays are required, only use relays with gold contacts.

**9.4 Installation of the domestic hot water cylinder**

**i** If the domestic hot water cylinder (DHW) is installed lower than the outdoor unit (e.g. in the cellar), a natural circulation may 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 DHW cylinder is below the outdoor unit.

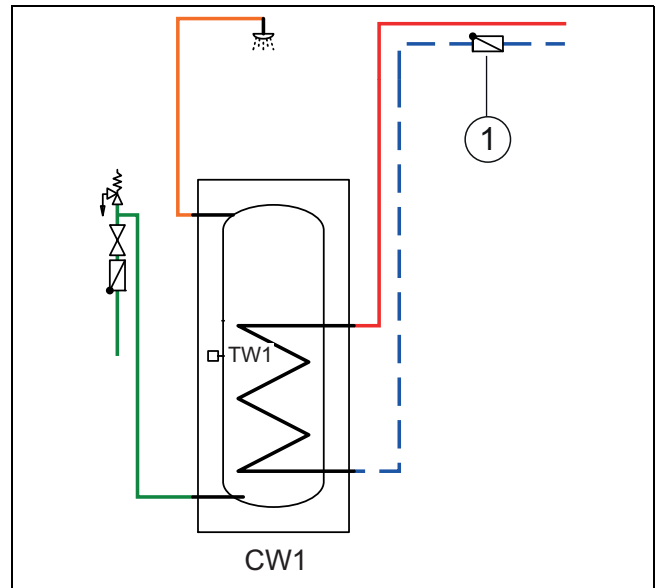


Fig. 19 Domestic hot water cylinder

[1] Non-return valve

**i** Follow the mounting and connection instructions from the DHW cylinder documentation.

The selection of the volume of the DHW cylinder depends on the type of consumption, as showed in the following table:

Time <sup>2)</sup>	DHW output for CS3400iAWS 4 OR-S <sup>1)</sup>								
	5 minutes			10 minutes			20 minutes		
Tap consumption (l/min) <sup>3)</sup>	5	10	15	5	10	15	5	10	15
<b>1 shower</b>									
Total consumption volume (l) <sup>4)</sup>	25	50	75	50	100	150	100	200	300
Possible tank volume (l) <sup>5)</sup>	100	100	100	100	100	100	100	160	160
<b>2 showers</b>									
Total consumption volume (l) <sup>4)</sup>	50	100	150	100	200	300	200	400	600
Possible tank volume (l) <sup>5)</sup>	100	100	120	100	160	200	160	300	500
<b>4 showers</b>									
Total consumption volume (l) <sup>4)</sup>	100	200	300	200	400	600	400	800	1200
Possible tank volume (l) <sup>5)</sup>	100	160	200	160	300	500	300	600	1000

- 1) DHW set to 60 °C and inlet temperature 15 °C
- 2) Time per shower
- 3) Maximum tap flow
- 4) Maximum volume of water consumed during a shower for one time period and type of tap flow
- 5) Optimized cylinder volume to the domestic hot water consumption profile

Time <sup>2)</sup>	DHW output for CS340iAWS 6-10 OR-S <sup>1)</sup>								
	5 minutes			10 minutes			20 minutes		
Tap consumption (l/min) <sup>3)</sup>	5	10	15	5	10	15	5	10	15
<b>1 shower</b>									
Total consumption volume (l) <sup>4)</sup>	25	50	75	50	100	150	100	200	300
Possible tank volume (l) <sup>5)</sup>	100	100	100	100	100	100	100	100	200
<b>2 shower</b>									
Total consumption volume (l) <sup>4)</sup>	50	100	150	100	200	300	200	400	600
Possible tank volume (l) <sup>5)</sup>	100	100	100	100	160	200	160	300	500
<b>4 shower</b>									
Total consumption volume (l) <sup>4)</sup>	100	200	300	200	400	600	400	800	1200
Possible tank volume (l) <sup>5)</sup>	100	160	250	160	300	450	300	600	1000

- 1) DHW set to 60 °C and inlet temperature 15 °C
- 2) Time per shower
- 3) Maximum tap flow
- 4) Maximum volume of water consumed during a shower for one time period and type of tap flow
- 5) Optimized cylinder volume to the domestic hot water consumption profile

**i**  
The coil area of the DHW tank must be  $\geq 2 \text{ m}^2$ .

### 9.5 DHW cylinder temperature sensor TW1

When a DHW cylinder is installed, a temperature sensor TW1 must be connected to the system.

- ▶ Connect the hot water temperature sensor TW1 to terminal TW1 on the installer module in the indoor unit.

### 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 installer module in the indoor unit to terminal VW1 (fig. 20).

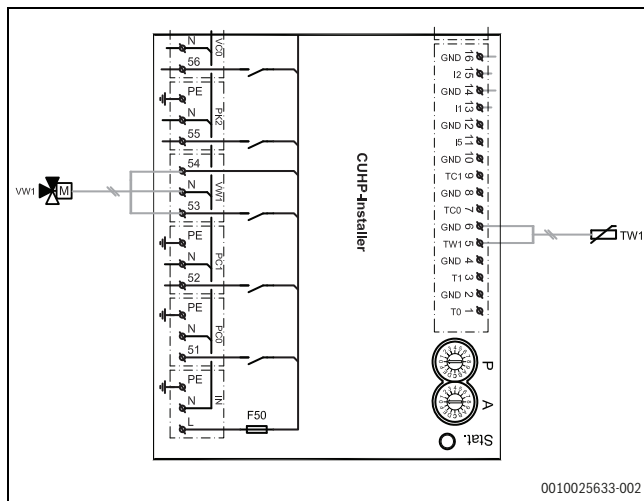


Fig. 20 Connection of the diverter valve VW1 on the installer module

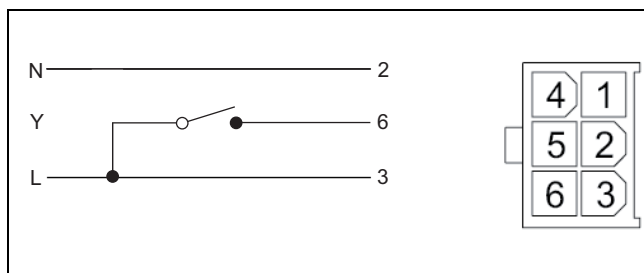


Fig. 21 Molex plug

The 3-way diverter valve has a Molex plug in which only terminals 2, 3 and 6 are assigned.

Make the following connections on the installer module:

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

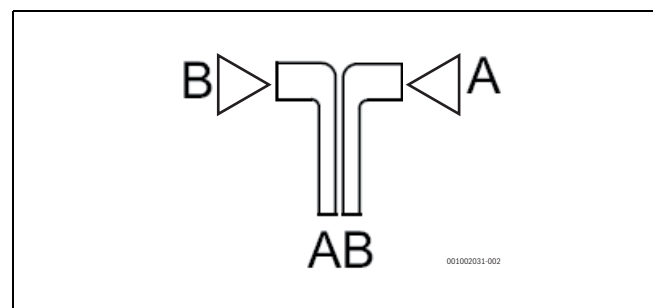


Fig. 22 Hydraulic for diverter valve TW1

- [A] Return from domestic hot water cylinder
- [B] Return from heating system (or buffer cylinder)
- [AB] Flow from the indoor unit

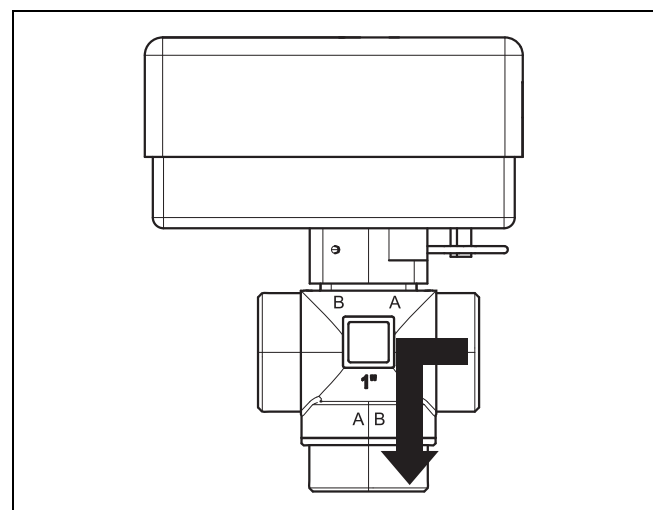


Fig. 23 Contact closed, connection A open

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

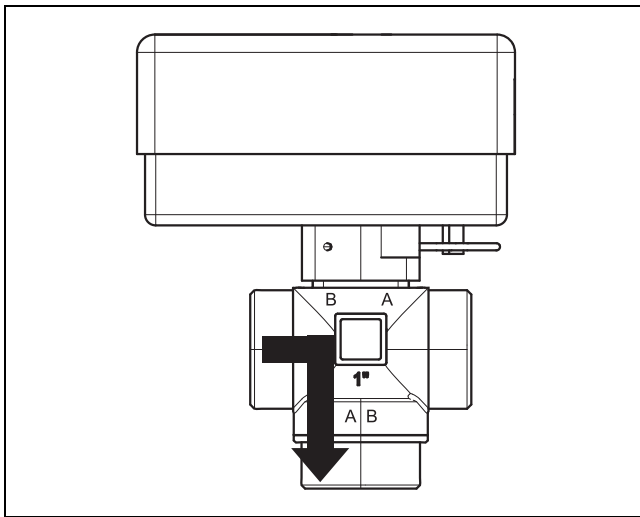


Fig. 24 Contact open, connection B open

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

### 9.7 DHW circulation pump PW2 (accessory)

The pump settings are made on the control unit of the indoor unit (→ instructions of the control unit).

### 9.8 Several heating circuits (with heating circuit module)

At delivery, a heating circuit without mixing valve can be controlled via the controller. If more circuits are to be installed, a heating circuit module is required for each one.

- ▶ Install the heating circuit module, mixing valve, heating circulation pump and other components according to the selected hydraulic solution.
- ▶ Connect the heating circuit module to the installer module in the electric box of the indoor unit on terminal EMS.
- ▶ Perform the settings for multiple heating circuits according to the instructions for the control unit.

### 9.9 Installation with swimming pool

**NOTICE**

**Danger of faults!**

If the swimming pool mixer is installed at 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 connection piece 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).

- ▶ Install 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 for control unit).

- ▶ Make the necessary settings for the swimming pool mode (→ instructions for control unit).

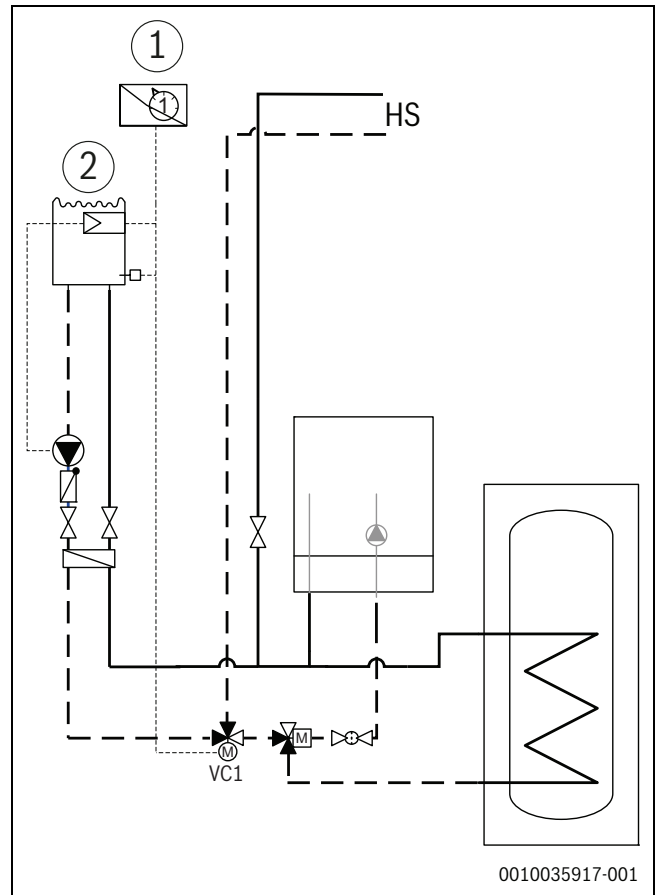


Fig. 25 Example showing swimming pool installation

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

## 9.10 Connect-Key K 30 RF

Connect-Key K 30 RF is a WLAN communication module for controlling and monitoring your heating system remotely. It is used as an interface between the heating system and the Internet.

For further information on how to use and install the Connect-Key K 30 RF, please read the installation manual of the accessory.



A WLAN router, internet connection and the **Bosch HomeCom Easy** app are required to use this product.

### Installation on the wall:

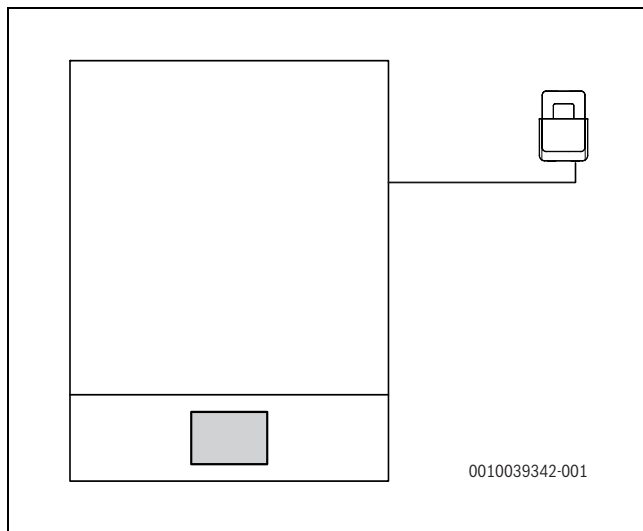


Fig. 26 Placing the Connect-Key K 30 RF

When installing the holder for the Connect-Key K 30 RF on the wall:

1. Find a place next to the indoor unit that has sufficient signal quality to communicate to the WLAN router.
2. Drill the holes to fix the bracket on the wall. For that, use a suitable drill bit.
3. Screw on the bracket firmly to the wall.

The holder may also be placed on the side cover of the indoor unit using the holder's incorporated magnet.

## 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. "(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)". 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/](http://www.weee.bosch-thermotechnology.com/)

## 11 Technical information

### 11.1 Specifications - Indoor unit with integrated electric booster heater

CS3400iAWS 10 E	Unit	CS3400iAWS 4 OR-S	CS3400iAWS 6 OR-S	CS3400iAWS 8 OR-S	CS3400iAWS 10 OR-S
<b>Electrical wiring specifications</b>					
Power supply	V	400 <sup>1)</sup> / 230 <sup>2)</sup>			
Recommended fuse size	A	3x10 / 32 <sup>3)</sup>			
Backup Electrical Heater Load	kW	1.95/3.90/5.85			
<b>Heating system</b>					
Connection type		G1"			
Maximum operating pressure	kPa/bar	300/3.0			
Minimum operating pressure	kPa/bar	120/1.2			
Expansion vessel	l	8			
Nominal flow (underfloor heating)	l/s	0.20	0.30	0.39	0.49
Max. externally available pressure at nominal flow (underfloor heating)	kPa	74	64	51	38
Nominal flow (radiators)	l/s	0.13	0.19	0.26	0.32
Max. externally available pressure at nominal flow (radiators)	kPa	75	75	70	61

CS3400iAWS 10 E	Unit	CS3400iAWS 4 OR-S	CS3400iAWS 6 OR-S	CS3400iAWS 8 OR-S	CS3400iAWS 10 OR-S
Minimum flow (during defrosting) <sup>4)</sup>	l/min	15			
Minimum/maximum water operating temperature (cooling <sup>5)</sup> /heating mode)	°C	7/80			
Pump type		Grundfos UPM2K 25-75 PWM (EEI≤0,23) <sup>6)</sup>			
<b>General Information</b>					
Installation altitude		up to 2000m above sea level			
IP rating		IPX1			
Dimensions (width x depth x height)	mm	485 x 398 x 700			
Weight	kg	41			

- 1) 400V 3N ~ AC 50 Hz. The outdoor unit must have a separate power supply.
- 2) For 230V ~ 1N AC 50 Hz. The outdoor unit must have a separate power supply.
- 3) Fuse characteristic gL/C.
- 4) If the minimum flow rate in the system cannot be ensured, a buffer cylinder is essential.
- 5) If cooling is available.
- 6) The benchmark for the most efficient circulators is EEI ≤ 0,20.

Table 10 Indoor unit with integrated electric booster heater

### 11.2 Primary circulation pump diagram (PC0)

Primary circulation pump diagram (PC0) for the heating system CS3400iAWS 10 E.

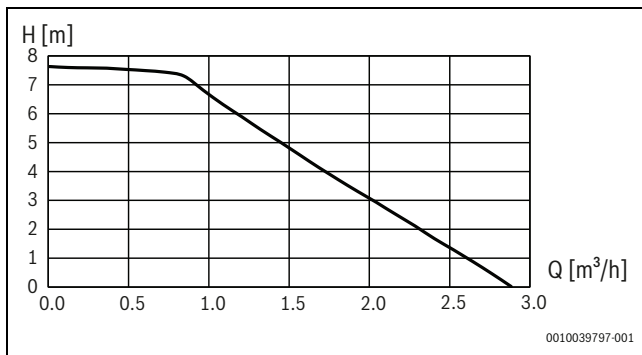


Fig. 27 Capacity curve of the primary circulation pump (PC0)

### 11.3 System solutions



The outdoor unit and the indoor unit may only be installed according to the manufacturer's official system solutions. Deviating system solutions are impermissible. Warranty may be voided in the case of damage and problems resulting from impermissible installation.

The indoor unit is prepared to work without bypass/buffer, if the volume and minimum flow declared in chapter 4.2 are permanently met and if the pressure drop in the circuit is below the pressure available from the primary circulation pump (PC0) as stated in table 10.



If the appliance is directly connected to the heating circuit (without bypass or buffer tank) and consequently no heating circulation pump (PC1) is installed, the primary circulation pump (PC0) must be set to continuous operation mode. Use the control unit to select: Service menu > Heat pump > Pumps > Prim. heating pump mode > On.

Some system configurations require accessories (buffer cylinder, 3-way valve, mixing valve, DHW circulation pump). If a heating circulation pump (PC1) is installed, this is controlled by the controller in the indoor unit.

The following table shows different system solutions:

Heat distribution system	Type of valves in system	Outdoor unit	Open system size (l)	Electric booster heater On/Off	System solution
UF heating/ Fan coils	No auto control valves or on/off valves with open circuits	CS3400iAWS 4 OR-S	<13	-	Buffer <sup>1)</sup>
			13<35	Electric booster heater on	Direct system <sup>2)</sup> or bypass
				Electric booster heater off	Buffer <sup>1)</sup>
	>35		-	Direct system <sup>2)</sup> or bypass	
	On/off valves with no open circuits		-	-	Buffer <sup>1)</sup>
			No open circuits and differential pressure	-	-

Heat distribution system	Type of valves in system	Outdoor unit	Open system size (l)	Electric booster heater On/Off	System solution
UF heating/ Fan coils	No auto control valves or on/off valves with open circuits	CS3400iAWS 6-10 OR-S	<27	-	Buffer <sup>3)</sup>
			27<40	Electric booster heater on	Direct system <sup>2)</sup> or bypass
				Electric booster heater off	Buffer <sup>3)</sup>
	>40			Direct system <sup>2)</sup> or bypass	
	On/off valves with no open circuits		-	Buffer <sup>3)</sup>	
	No open circuits and differential pressure		-	Serial buffer <sup>3)</sup>	
Radiators	No auto control valves or on/off valves with open circuits	CS3400iAWS 4 OR-S	<4	-	Buffer <sup>4)</sup>
			4<13	Electric booster heater on	Direct system <sup>2)</sup> or bypass
				Electric booster heater off	Buffer <sup>4)</sup>
	>13		-	Direct system <sup>2)</sup> or bypass	
	On/off valves with no open circuits		-	Buffer <sup>4)</sup>	
	No open circuits and differential pressure		-	Serial buffer <sup>4)</sup>	
Radiators	No auto control valves or on/off valves with open circuits	CS3400iAWS 6-10 OR-S	<10	-	Buffer <sup>5)</sup>
			10<15	Electric booster heater on	Direct system <sup>2)</sup> or bypass
				Electric booster heater off	Buffer <sup>5)</sup>
	>15		-	Direct system <sup>2)</sup> or bypass	
	On/off valves with no open circuits		-	Buffer <sup>5)</sup>	
	No open circuits and differential pressure		-	Serial buffer <sup>5)</sup>	

- 1) Buffer size must be more than 35l.
- 2) Direct system only if minimum volume and flow are permanently met.
- 3) Buffer size must be more than 40l.
- 4) Buffer size must be more than 13l.
- 5) Buffer size must be more than 15l.

Table 11 System solutions for underfloor heating, fan coils and radiators

### 11.3.1 Explanations of the system solutions

General	
SEC 20	Installation module integrated in the heat pump module
HPC 410	Control unit
CR 10 H	Room controller (accessories)
T1	Outdoor sensor
MK2	Humidity sensor (accessory)
CW1	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	
MM 100	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 ...

**11.3.2 Bypass of the heating system**

**i**  
 If the heating system is not able to permanently meet the minimum volume and flow and if the pressure loss in the circuit is more than allowed, a bypass should be installed according to the instructions.

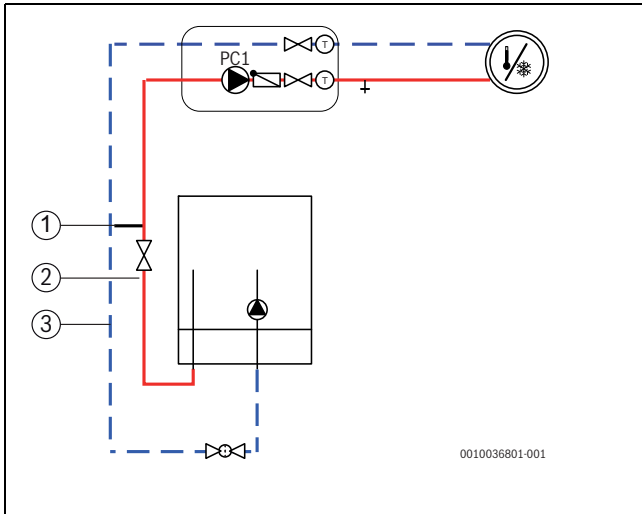


Fig. 28 Indoor unit with heating circuit and bypass

- [1] Bypass
- [2] Flow pipe diameter
- [3] Return pipe diameter

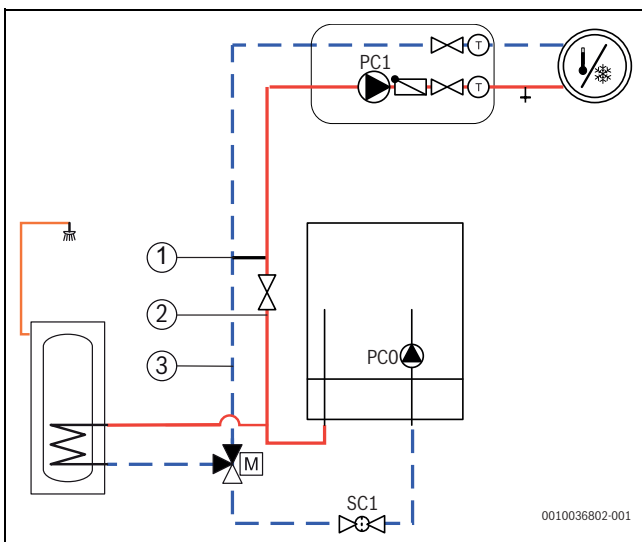
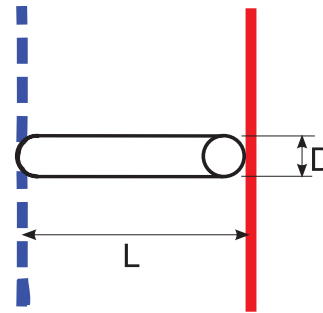


Fig. 29 Indoor unit with heating circuit and DHW heating

- [1] Bypass
- [2] Flow pipe diameter
- [3] Return pipe diameter



6 720 810 933-12.3T

Fig. 30 Bypass details (→ [1] [CS3400iAWS 10 E fig. 28 and 29])

- [L] Minimum bypass length
- [D] Pipe diameter

**i**  
 The bypass must have an outer pipe diameter of 22 mm (Cu) and be installed between the supply and return. The bypass must be installed close to the indoor unit (CS3400iAWS 10 E), and no more than 1.5 m away from it.

Outdoor unit	([2] and [3] → fig. 28 [CS3400iAWS 10 E] and 29) external flow/return pipe diameter	([1] → fig. 28 and 29) external bypass pipe diameter ([D] → fig. 30)	Bypass design	
			([A] → fig. 31) Minimum bypass length ([L] → fig. 30)	([B] → fig. 31) Minimum bypass length ([L] → fig. 30)
	mm	mm	mm	mm
CS3400iAWS 4-10 OR-S	22	22	200	100

Table 12 Pipe diameter and bypass lengths

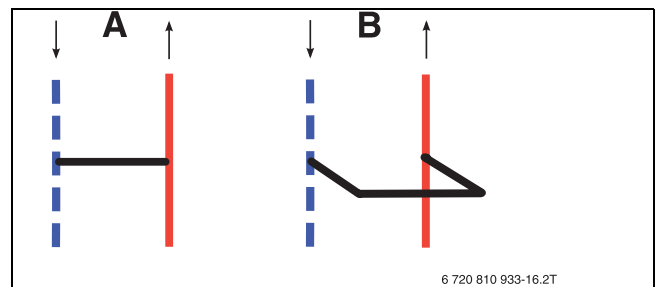
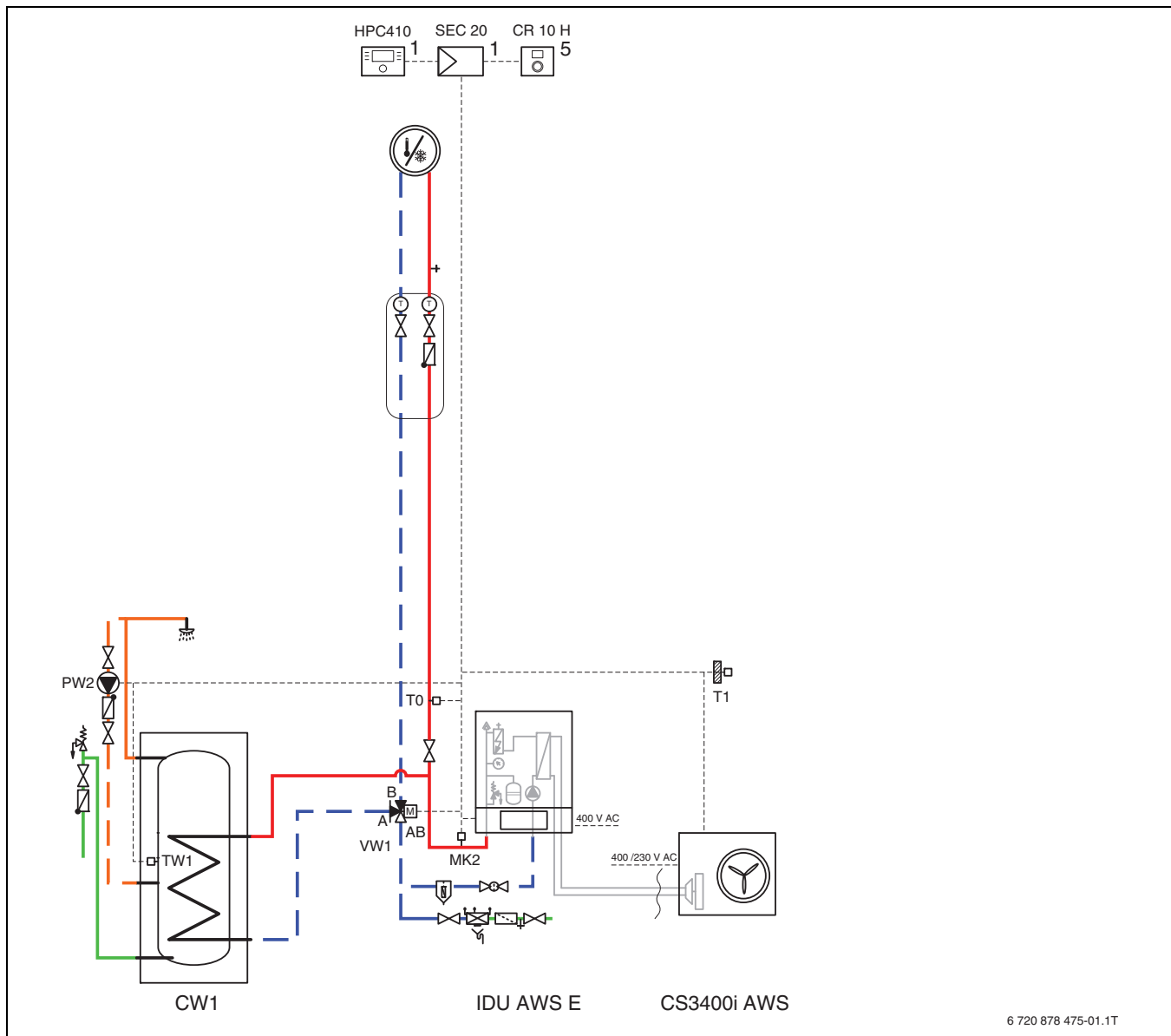


Fig. 31 Bypass

- [A] Bypass, straight design
- [B] Bypass, U-shaped design



**11.3.3 System with integrated booster heater, DHW and heating circuit without bypass and mixing valve**



6 720 878 475-01.1T

Fig. 32 Outdoor unit with indoor unit and one heating circuit

[1] Installed in the indoor unit.

[5] Mounted on the wall.



This hydraulic system is only envisaged for heating systems that comply with the requirements of flow, volume and pressure loss.

**11.3.4 System with integrated booster heater, DHW and heating circuit with or without mixing valve and with bypass**

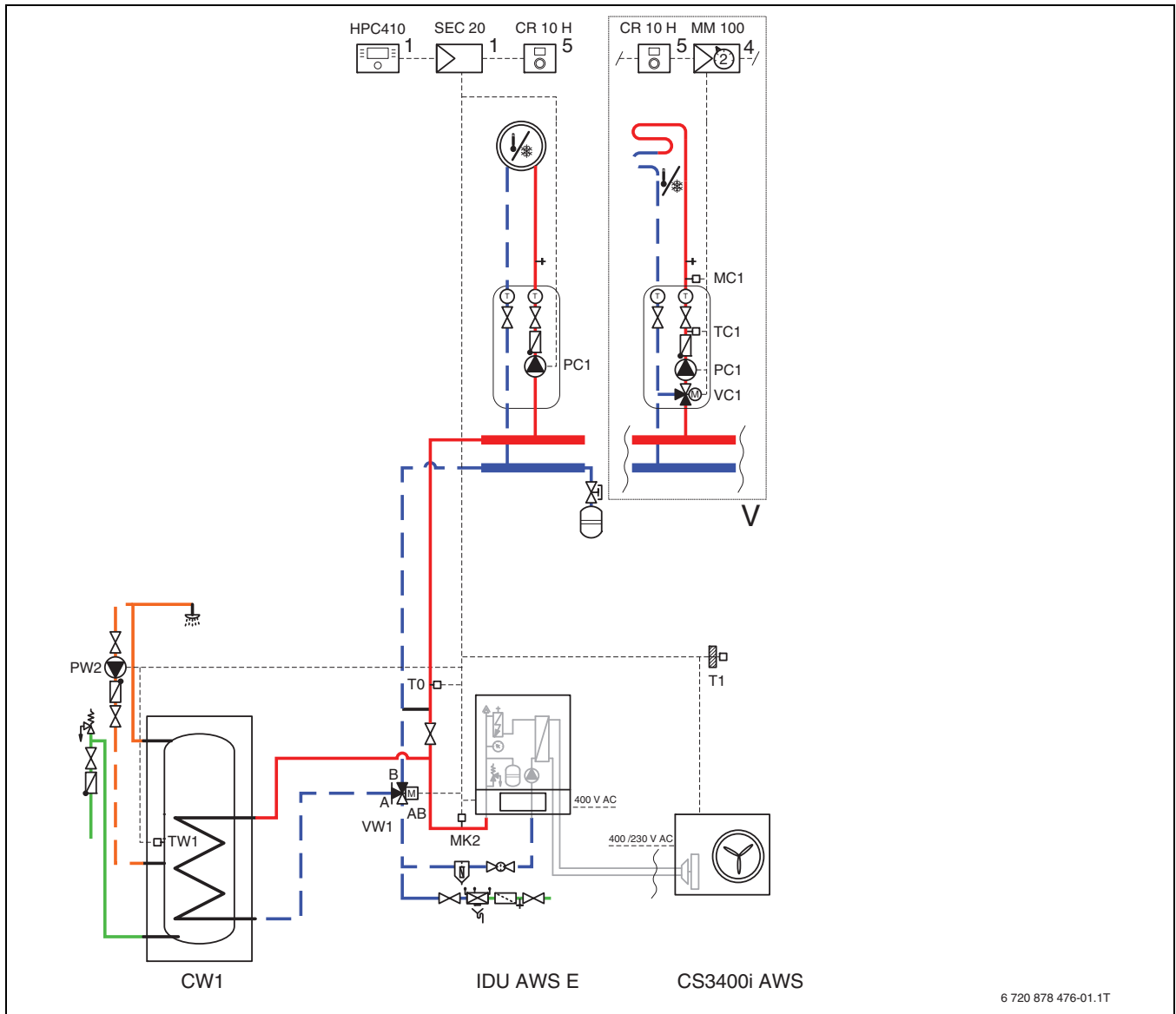


Fig. 33 Outdoor unit with indoor unit, DHW and one or more heating circuits

- [1] Installed in the indoor unit
- [4] Mounted in the station or on the wall
- [5] Mounted on the wall

**i** PC1 and bypass are required in this hydraulic system (→ Chapter 11.3.2).

**11.3.5 System with integrated booster heater, buffer, DHW and heating circuit with or without mixing valve**

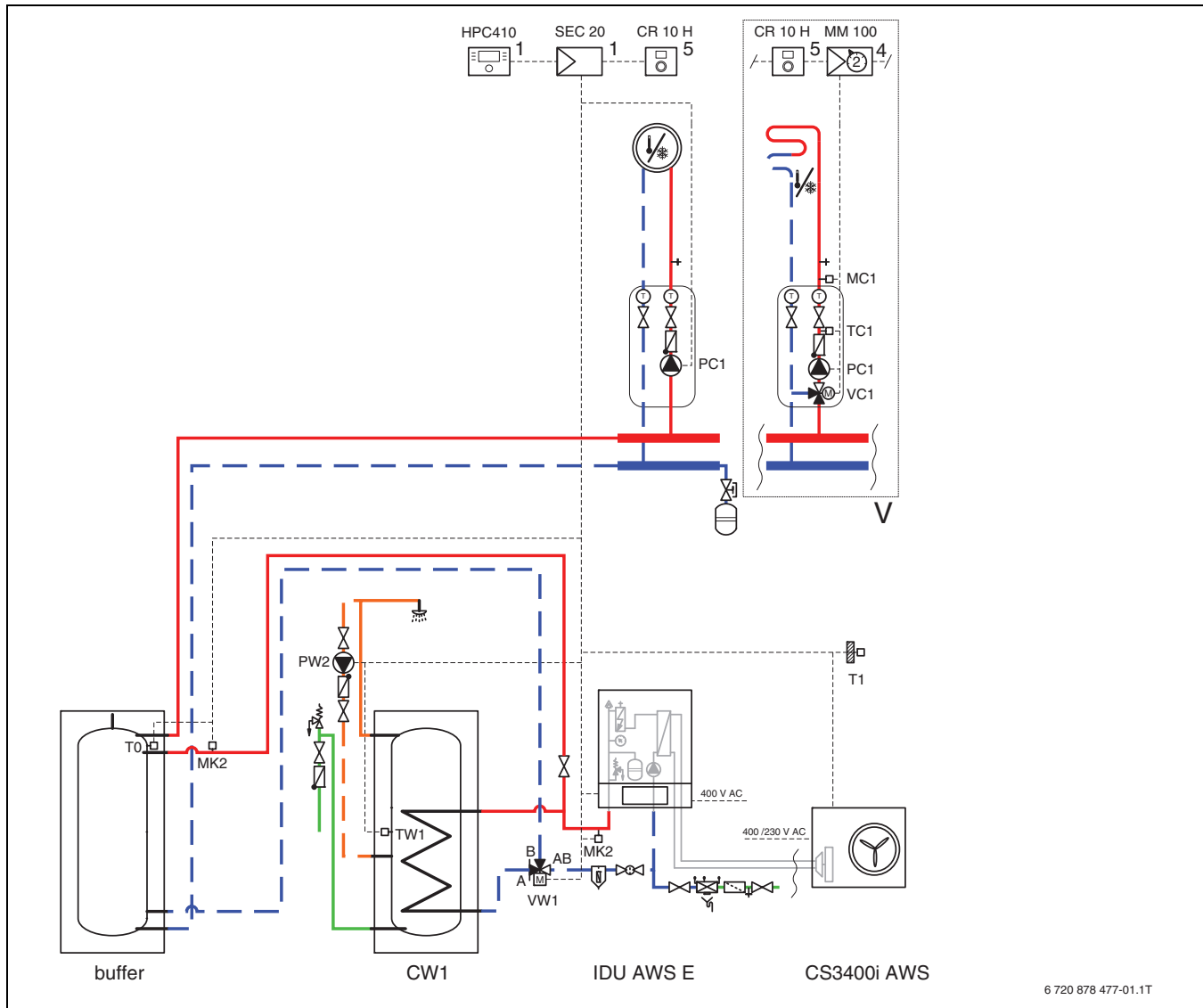


Fig. 34 Outdoor unit with indoor unit, buffer and one or more heating circuits

- [1] Installed in the indoor unit
- [4] Mounted in the station or on the wall
- [5] Mounted on the wall

**i** PC1 is required in this hydraulic system (→ Chapter 11.3.2).

**11.3.6 Explanation of symbols**






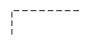


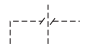

















































Symbol	Description	Symbol	Description	Symbol	Description
<b>Pipework/cables</b>					
	Flow - heating/solar		Brine circuit out		DHW circulation
	Return - heating/solar		Potable water		Electrical Wiring
	Brine flow		Hot water		Electrical wiring with break
<b>Mixing valves/valves/temperature sensors/pumps</b>					
	Valve		Differential pressure regulator		Pump
	Revision bypass		Water pressure relief valve		Non-return valve
	Flow regulating valve		Safety assembly		Temperature sensor / switch
	Overcurrent valve		3-way mixing valve (mixing/distribution)		High limit safety cut-out
	Filter shut-off valve		DHW mixer, thermostatic		Flue gas temperature sensor / switch
	Cap valve		3-way mixing valve (changeover)		Flue gas temperature limiter
	Valve, motorized		3-way mixing valve (change over, de-energised when closed to II)		Outdoor ambient temperature sensor
	Valve, thermal		3-way mixing valve (change over, de-energised when closed to A)		Wireless outside temperature sensor
	Shut-off valve, magnetically controlled		4-way mixing valve		...wireless...
<b>Miscellaneous</b>					
	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 rate measuring device
	Water filter		Magnetite separator		Water sink
	Heat meter		Air separator		Heat. circ.
	DHW outlet		Automatic air vent valve		Underfloor heating circuit
	Relay		Expansion joint		Low-loss header
	Immersion heater				

Table 13 Hydraulic symbols

## 11.4 Wiring diagram

### 11.4.1 Installer module of indoor unit with integrated electric booster heater

 **DANGER**

#### Risk of electric shock!

Opening the installer module may cause injury by electric shock.

► Never open the installer module.

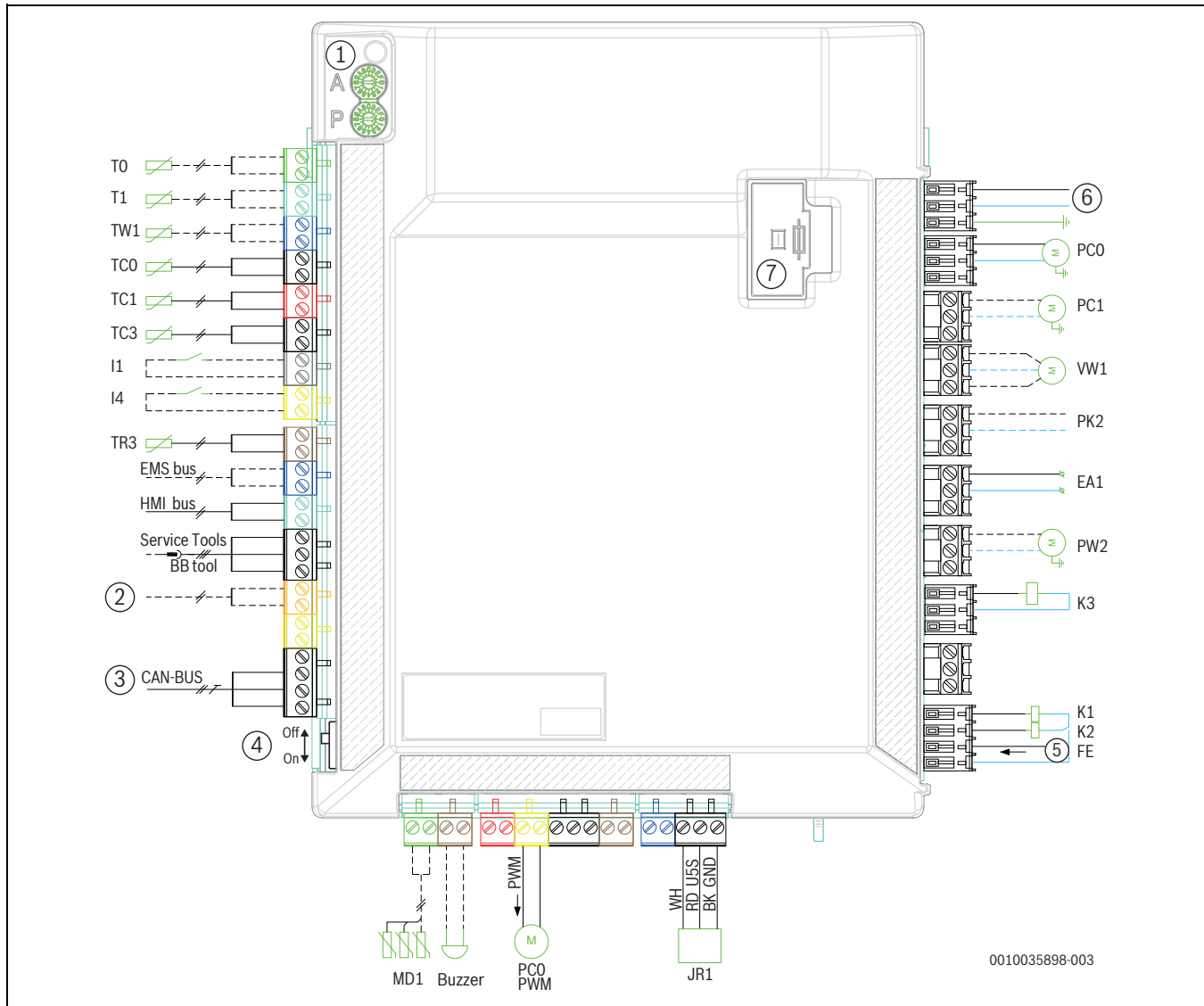


Fig. 35 Installer module of the indoor unit

- |   |  |
|---|--|
| [1] A and P encoders                                    | [Buzzer] Alarm buzzer (accessory)  |
| [2] Connectivity gateway (accessory)                    | [PC0 PWM] PWM signal, primary circulation pump                             |
| [3] CAN-BUS to outdoor unit                             | [JR1] Refrigerant gas pressure sensor                                      |
| [4] CAN termination switch                              | [FE] Electric booster heater overheating alarm                             |
| [5] Alarm electric heater (230V~ input voltage)         | [K2] Electric booster heater contactor EE2                                 |
| [6] Power supply, 230V~ from terminal blocks            | [K1] Electric booster heater contactor EE1                                 |
| [7] Fuse 5x20, 6.3A time lag                            | [K3] Electric booster heater contactor EE3                                 |
| [T0] Heating circuit flow temperature sensor            | [PW2] DHW circulation pump   |
| [T1] Outside temperature sensor                         | [EA1] Connection to heating cable terminal blocks (outdoor unit accessory) |
| [TW1] DHW temperature sensor                            | [PK2] Relay output, cooling mode, 230V~                                    |
| [TC0] Return temperature sensor                         | [VW1] DHW 3-way valve  |
| [TC1] Flow temperature sensor (electric booster heater) | [PC1] Heating circulation pump   |
| [TC3] Condenser temperature sensor                      | [PC0] Primary circulation pump   |
| [I1] External input 1                                   |  |
| [I4] External input 4                                   |  |
| [TR3] Refrigerant liquid temperature                    |  |
| [MK2] Condensation sensor(s)                            |  |



The power supply cable of the Installer Module of the indoor unit has an integrated fuse. In case of damage, the power supply cable [6] must be replaced (see spare part list manual).



Max load for relay outputs PW2, PK2, VW1, PC1: 2A, cos φ > 0.4.  
Maximum load for CUHP inst.: 6.3A



Note regarding input I1 (connection 13, 14) and I4 (connection 15,16). The contact on the component or relay that is connected to this input must be suitable for 5V and 1mA.



Note regarding [1]:  
Coding switches A and P must not be adjusted! Otherwise malfunctions and faults will occur.  
Important: check the coding when a replacement part is used.



Note regarding [4]: to avoid reflection of messages in the CAN-BUS, the CAN terminator switch should be switched on.

_____	Connected at factory/connected during installation
-----	Accessories

**11.4.2 CAN & EMS BUS**

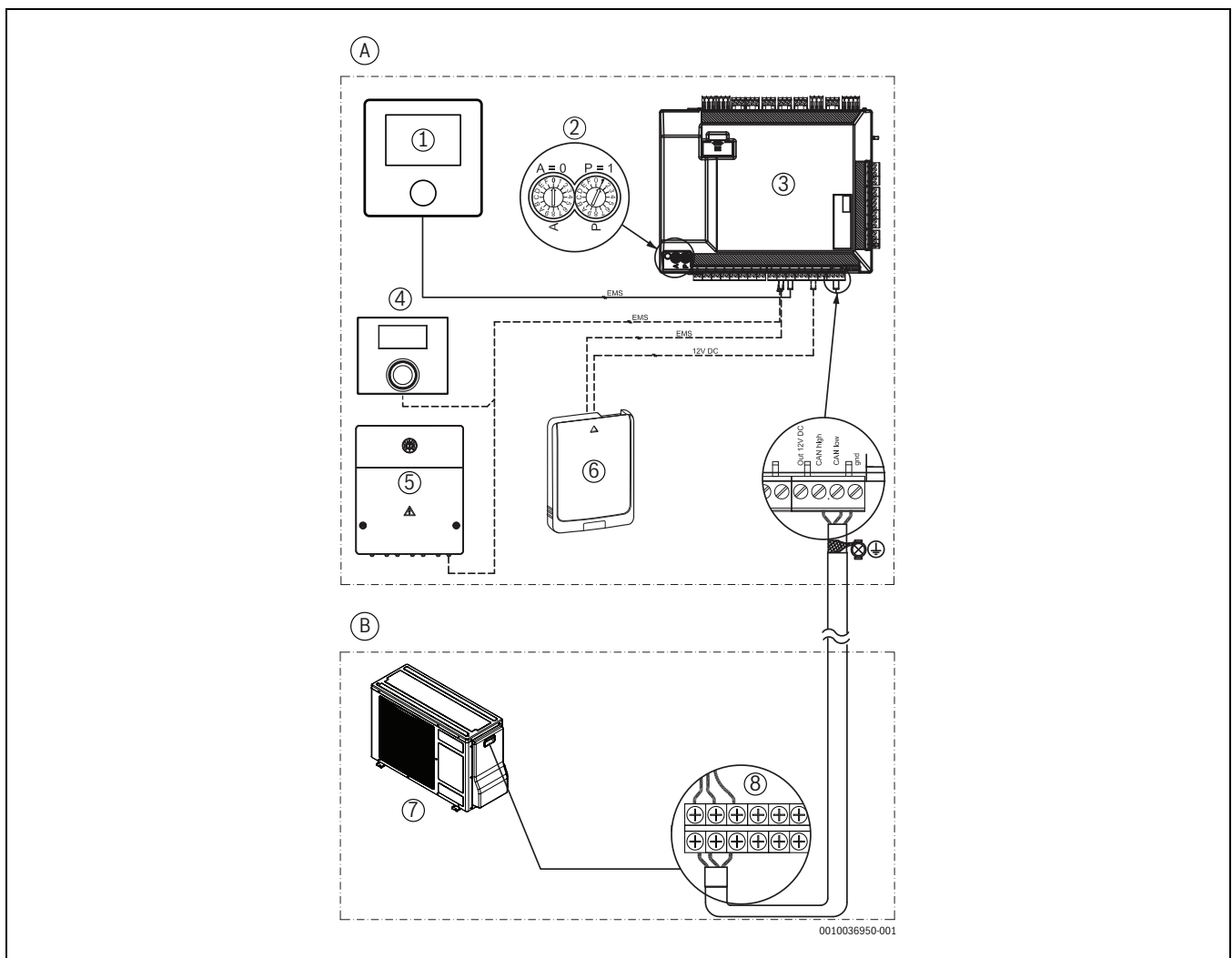


Fig. 36 CAN and EMS connections

**Continuous line = connection made at the factory**

**Dashed line = connection made during installation:**

- [A] Indoor unit
- [B] Outdoor unit
- [1] Control unit (user interface)
- [2] Coding switch setting for A and P encoders (A=0, P=1)
- [3] Installer module
- [4] Room controller (accessories)
- [5] EMS module (accessory)
- [6] Connect-Key K 30 RF (accessory)

- [7] Outdoor unit
- [8] Outdoor unit terminals

**11.4.3 Wiring diagram for 5.85kW 230V~ electric booster heater, CS3400iAWS 4-10 OR-S 230V~**

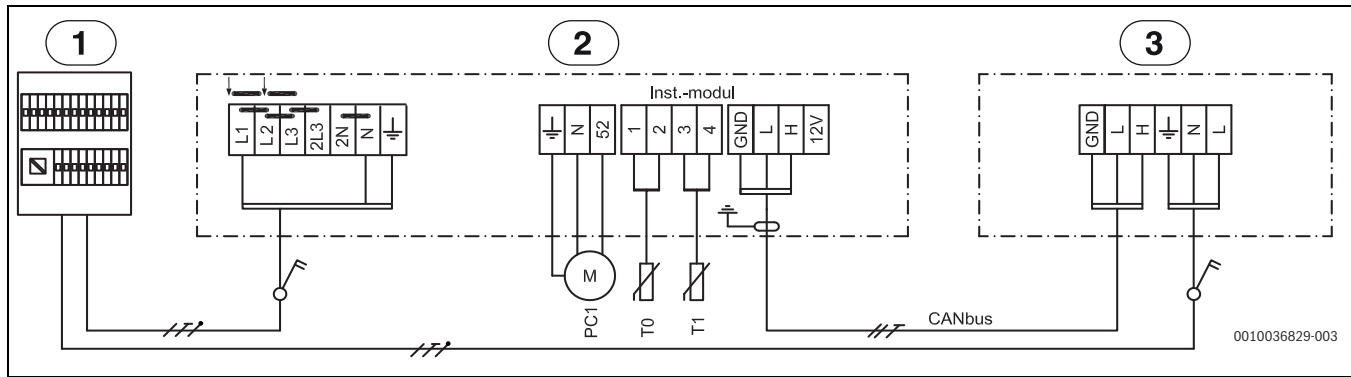


Fig. 37 Wiring diagram 5.85kW 230V~

- [1] Distribution board
- [2] Indoor unit 5.85kW, 230V~
- [3] Outdoor unit 230V~
- [PC1] Heating circulation pump
- [T0] Flow temperature sensor
- [T1] Outdoor temperature sensor

**11.4.4 Wiring diagram for 5.85kW 3N ~ electric booster heater, CS3400iAWS 4-10 OR-S 230V~**

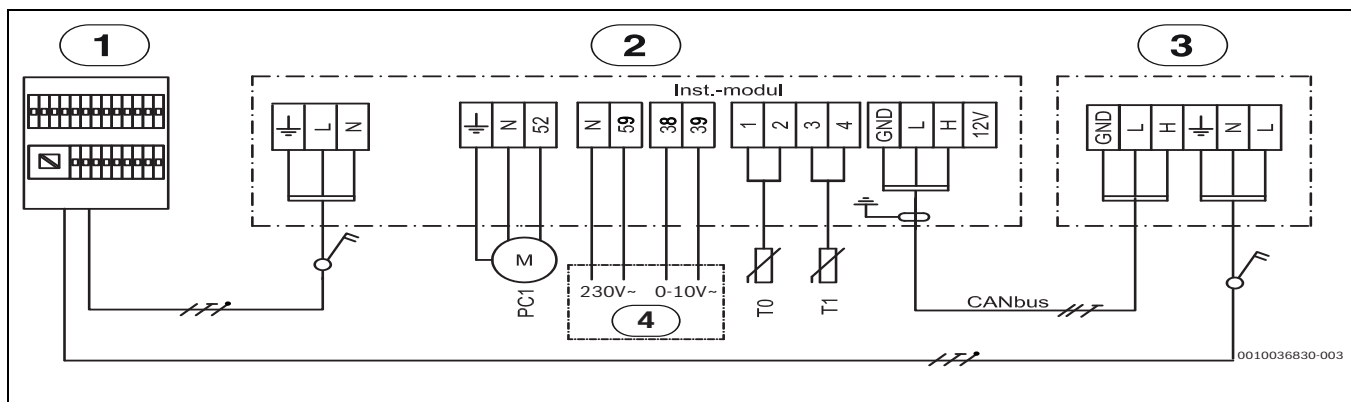


Fig. 38 Wiring diagram 5.85kW 3N~

- [1] Distribution board
- [2] Indoor unit 5.85kW, 400V 3N~
- [3] Outdoor unit 230V~
- [PC1] Heating circulation pump
- [T0] Flow temperature sensor
- [T1] Outdoor temperature sensor



**11.4.5 400V 3N~ indoor unit with 230V~ outdoor unit**

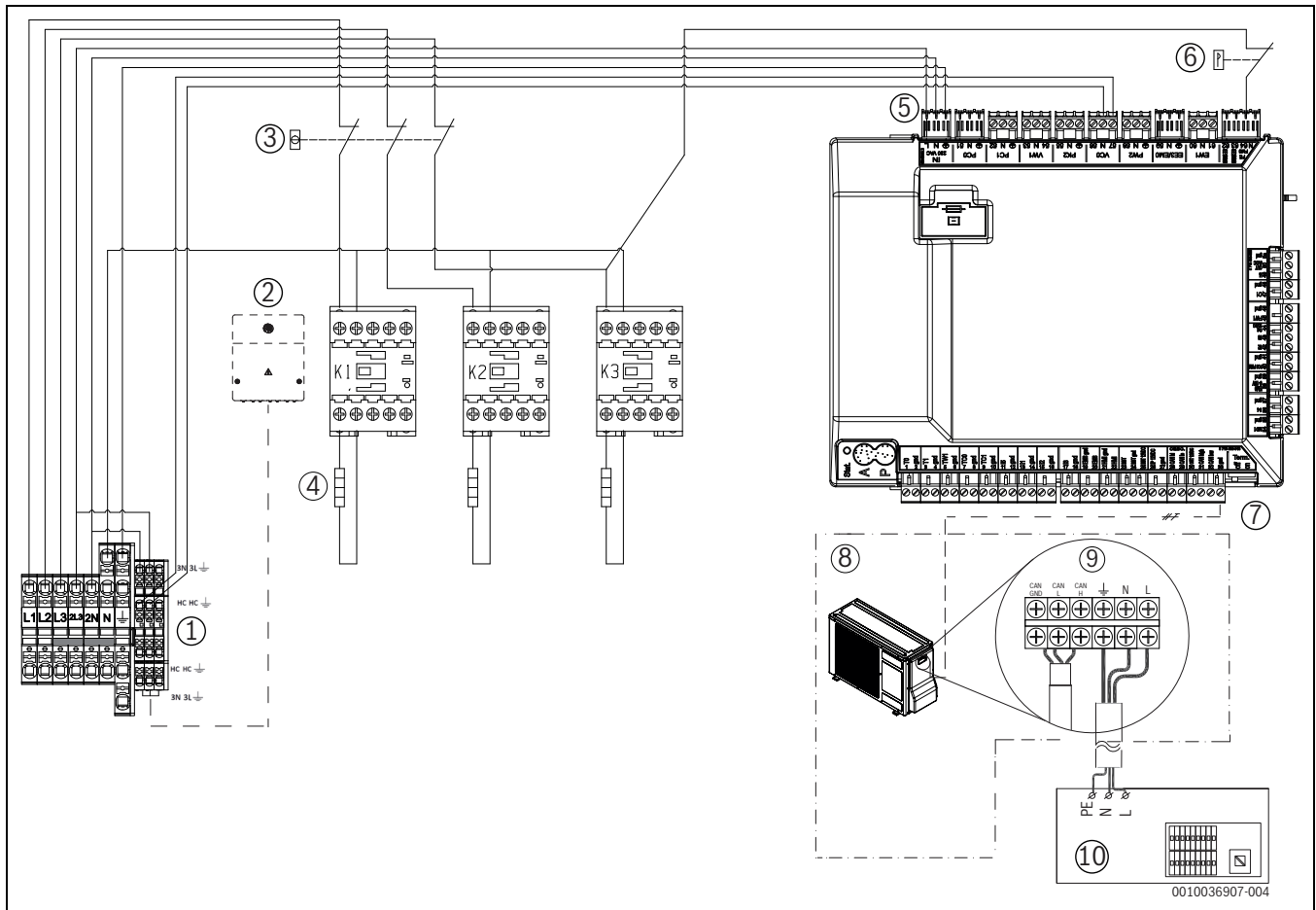


Fig. 39 400V 3N~Indoor unit with 230V~ outdoor unit

- [1] Indoor unit terminals
- [2] EMS module (accessory)
- [3] Overheating protection
- [4] Electrical heater (3x1,95kW)
- [5] Installer module power supply
- [6] Pressure switch
- [7] CAN bus line
- [8] Outdoor unit
- [9] Outdoor unit terminals
- [10] 230V ~ power supply from the distribution board to the outdoor unit

**i**  
 The output of the electric booster heater must be limited to a maximum of 3.9kW with the configuration in parallel mode with the outdoor unit.

- Electric booster heater in compressor mode: 1.95-3.9kW (K3 blocked)
- Only electric booster heater, compressor off: 1.95-3.9-5.85kW

**11.4.6 Connection alternative for EMS bus**

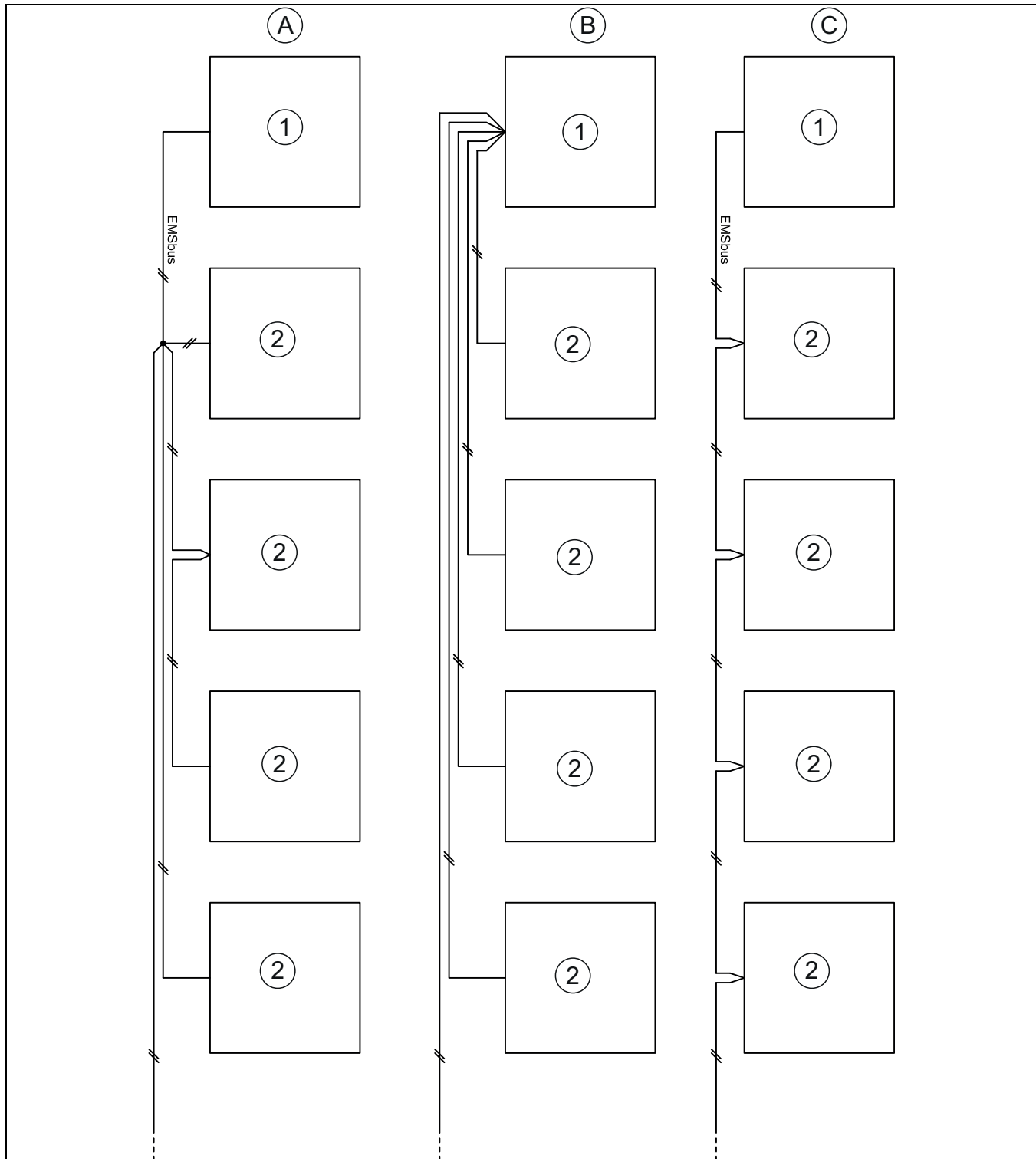


Fig. 40 Connection alternative for EMS bus

- [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)

**11.4.7 EVU/SG wiring diagram for the indoor unit with an integrated electric booster heater**

**11.4.8 Photovoltaic**



Since there are only two external inputs for the energy supplier and PV, these cannot be used at the same time.

PV connection to external input 1 or 4.

The heat pump is able to process a control signal of a PV system.

If the PV system has sufficient current for operating the heat pump, it can communicate this information to the heat pump in the form of a start command via a control cable. The control cable must be connected to one of the available external connections. The selected external connection must be configured in the control unit for the PV function.

The heating system must have a buffer cylinder and only heating circuits with a mixer in order for a start command to be effective. A start command causes the buffer cylinder to be charged up to the maximum temperature achievable by the heat pump. However, it can only be charged when the temperature in the buffer cylinder is below the maximum temperature. Otherwise, the heat pump remains off.

### 11.5 Cable scheme

	Designation	Min. cross-section	Type of cable	Max. length	Connected at:	Connection terminal:	Power source
3-way diverter valve	VW1	3x1.5 mm <sup>2</sup>	cable integrated		Indoor unit	53 / 54 / N	IDU
Heating circuit pump 1	PC1	3x1.5 mm <sup>2</sup>	H05VV-F		Indoor unit	52 / N / PE	
DHW pump	PW2	3x1.5 mm <sup>2</sup>	H05VV-F			58 / N / PE	
Signal cable IDU - ODU	CAN-BUS	3x0.75 mm <sup>2</sup>	LiYCY (TP)	30 m		CAN High 31(H) CAN Low 32(L), GND 33	connection, shielded cable connected to IDU
Power supply (single phase)	IDU AWS E	3x6 mm <sup>2</sup>	NYN		Indoor unit	L / N / PE	1xC32
Power supply (three phase)	IDU AWS E	5x1.5 mm <sup>2</sup>	NYN		Indoor unit	L1 / L2 / L3 / N / PE	3xC10
Heating cable		3x1.5 mm <sup>2</sup>	NYN	3 m	Indoor unit	56 / N - (HC / HC)	IDU - HC / HC
EMS - Module	MM100, MS100.	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x0,6	100 m	Indoor unit	19 / 20	
0-10V control boiler	EM0	2x0.75 mm <sup>2</sup>	LiYCY (TP)		Indoor unit (IDU AWS E)	38 / 39	
PV-Function		0.4 mm <sup>2</sup>	J-Y (ST)Y 2x2x0,6		From inverter on terminal I1 or I4 in IDU, EVU-block or Smart Grid		
Smart Grid		0.4 mm <sup>2</sup>	J-Y (ST)Y 2x2x0,6		From load management controller on terminal I4, connection 15, 16 in IDU		
EVU-terminal block		3x1.5 mm <sup>2</sup>	H05VV-F <sup>1)</sup>		From load management controller on terminal I1, connection 13, 14 in IDU		

1) EVU cable should be shielded

Table 14 Connections in indoor units AWS E

Sensor	Designation	Min. cross-section	Type of cable	Max. length	Connected at:	Connection terminal:	Power source
Outdoor	T1	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x 0,6		Indoor unit	3 / 4	
Flow	T0	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x 0,6		Indoor unit	1 / 2	
Hot water (DHW)	TW1	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x 0,6		Indoor unit	5 / 6	
Dew sensor	MK2 (max. 5x)	0.5 mm <sup>2</sup>	cable integrated		Indoor unit	34 / 35	
Mixed heating circuit	TC1	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x 0,6	100 m	MM100	1 / 2	
Pool temperature	TC1	0.5 mm <sup>2</sup>	J-Y (ST)Y 2x2x 0,6	100 m	MP100	1 / 2	

Table 15 Cable plan sensor

### 11.6 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 16 Sensor T0, TCO, TC1, TC3, TR3

°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 17 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 18 Sensor T1

## 12 System Commissioning Report

Commissioning date:	
<b>Customer address:</b>	Last name, first name:
	Postal address:
	Town:
	Telephone:
<b>Installation company:</b>	Last name, first name:
	Street:
	Town:
	Telephone:
<b>Product information:</b>	Product type:
	TTNR:
	Serial number:
	FD-no.:
<b>System components:</b>	Receipt/value
Room controller	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Room controller with humidity sensor	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Type:	
Solar integration	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Buffer cylinder	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Type/Volume (l):	
Hot water cylinder	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Type/Volume (l):	
Other components	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Which?	
<b>Minimum clearances heat pump:</b>	
Is the heat pump standing on a solid, flat surface?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Is the heat pump stably anchored?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Is the heat pump standing in a location where snow cannot slide off the roof onto it?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Minimum wall clearance? .....mm	
Minimum clearances at sides? .....mm	
Minimum distance to roof? .....mm	
Minimum distance in front of the heat pump? .....mm	
<b>Condensate hose, heat pump</b>	
Does the condensate hose have a heating cable?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
<b>Connections at the heat pump</b>	
Were the connections established correctly?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Who installed/prepared the connecting pipework?	
<b>Minimum clearances, indoor unit:</b>	
Minimum wall clearance? .....mm	
Minimum distance in front of the unit? .....mm	
<b>Heating:</b>	
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?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Has the particle filter been cleaned?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
<b>Electric connection:</b>	

Were the low voltage cables installed with a minimum distance of 100 mm from 230 V/400 V cables?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Were the CAN-BUS connections established as specified in the instructions?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Has a power guard been connected?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Is the outside temperature sensor T1 on the coldest side of the house?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
<b>Power supply:</b>	
Is the phase sequence of L1, L2, L3, N and PE in the outdoor unit correct?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Is the phase sequence of L1, L2, L3, N and PE in the indoor unit correct?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Does the power supply correspond to the installation instructions?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Fuse for heat pump and electric booster heater, tripping characteristics?	
<b>Manual operation:</b>	
Was a function check of individual component groups performed (pump, mixing valve, diverter valve, compressor, etc.)?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Comments:	
Have the temperatures in the menu been checked and documented?	<input type="checkbox"/> Yes   <input type="checkbox"/> No
T0	_____ °C
T1	_____ °C
TW1	_____ °C
TC0	_____ °C
TC1	_____ °C
<b>Settings for auxiliary heater:</b>	
Time delay, auxiliary heater	
Block auxiliary heater	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Electric booster heater connected load settings	
Auxiliary heater, maximum temperature	_____ °C
<b>Safety functions:</b>	
Block heat pump at low outside temperatures	
<b>Has the commissioning been performed correctly?</b>	<input type="checkbox"/> Yes   <input type="checkbox"/> No
<b>Does the installer have to perform additional measures?</b>	<input type="checkbox"/> Yes   <input type="checkbox"/> No
Comments:	
<b>Installer signature:</b>	
<b>Customer's signature:</b>	

Table 19 System Commissioning Report

### 13 Maintenance protocol, refrigerant (log book)

In accordance with current EU legislation (the F-gas regulation, EC Regulation No 817/2014 which came into effect on 1 January 2015), Operators of equipment that contains fluorinated greenhouse gases in quantities of 5 tonnes of CO<sub>2</sub> equivalent or more and not contained in foams shall ensure that the equipment is checked for leaks. EU Directive (EC) 517/2014 of 1.01.2015 prescribes tightness tests and record keeping in the form of a log book for heat pumps with the following criteria:

- Cooling circuit is not hermetically sealed.
- Refrigerant fill volume
- ▶ Copy maintenance protocol, refrigerant.
- ▶ Complete maintenance protocol, refrigerant.
- ▶ Read off appliance-specific data (e.g. serial number) at data plate of heat pump
- ▶ File completed maintenance protocol for refrigerant in a folder (log book)

Heat pump type:		Serial number:	
Part number:		Appliance index:	
Refrigerant / fill volume:			

Table 1 Maintenance protocol, heat pump information

Maintenance carried out by:			
Contractor:			

Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Maintenance carried out by:			
Contractor:			
Refrigerant type:		topped up?	
Refrigerant charge:		recovered?	
Result of inspection:			
Next inspection due on:		Signature, stamp	

Table 1 Maintenance protocol, refrigerant (log book)

Bosch Thermotechnik GmbH  
Junkersstrasse 20-24  
73249 Wernau, Germany  
[www.bosch-thermotechnology.com](http://www.bosch-thermotechnology.com)

GB Importer:  
Bosch Thermotechnology Ltd.  
Cotswold Way, Warndon  
Worcester WR4 9SW, United Kingdom