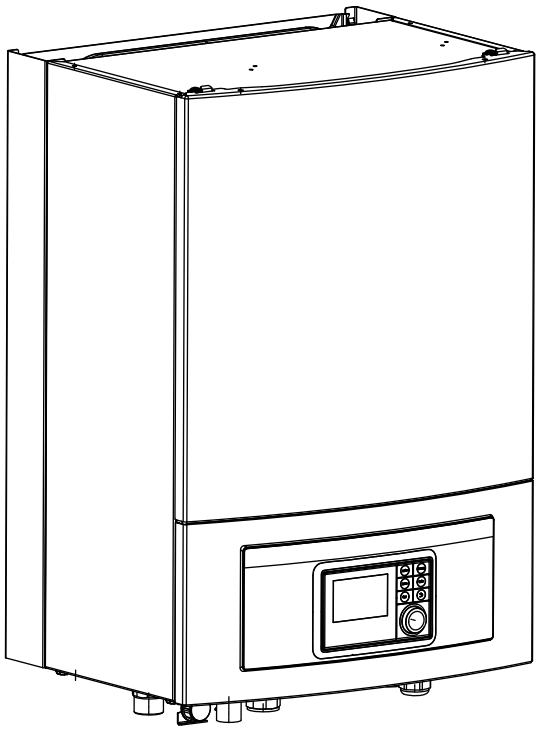
Airbox E/S

230V 1N~ / 400V 3N~



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Installer Guide

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Table of Contents

1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background.
Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

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

- **NOTICE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

Important information

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

Additional symbols

Symbol	Explanation
▶	Step in an action sequence
→	Cross-reference to another part of the document
•	List entry
–	List entry (second level)

Table 1

1.2 General safety instructions

These installation instructions are intended for plumbers, heating engineers and electricians.

- ▶ Read any installation instructions (heat pump, heating controls, etc.) carefully before starting the installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Observe national and regional regulations, technical rules and guidelines.
- ▶ Record all work carried out.

Intended use

This heat pump must only be used as a heat appliance in a sealed hot water heating system for domestic purposes.

Any other use is considered inappropriate. Any damage that results from such use is excluded from liability.

Installation, commissioning and servicing

Installation, commissioning and servicing must only be carried out by an authorised contractor.

- ▶ Only use original spares.

Electrical work

Electrical work must only be carried out by a qualified electrician.

- ▶ Before starting electrical work:
  - Isolate the mains electrical supply and secure against unintentional reconnection.
  - Check for zero potential.
- ▶ Also observe connection diagrams of other system components.

Handover to the user

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

- ▶ Explain how to operate the heating system and draw the user's attention to any safety-relevant action.
- ▶ Explain that modifications and repairs must only be carried out by an authorised contractor.
- ▶ Point out the necessity of inspection and servicing for safe and environmentally compatible operation.
- ▶ Leave the installation instructions and the operating instructions with the user.

2 Standard delivery

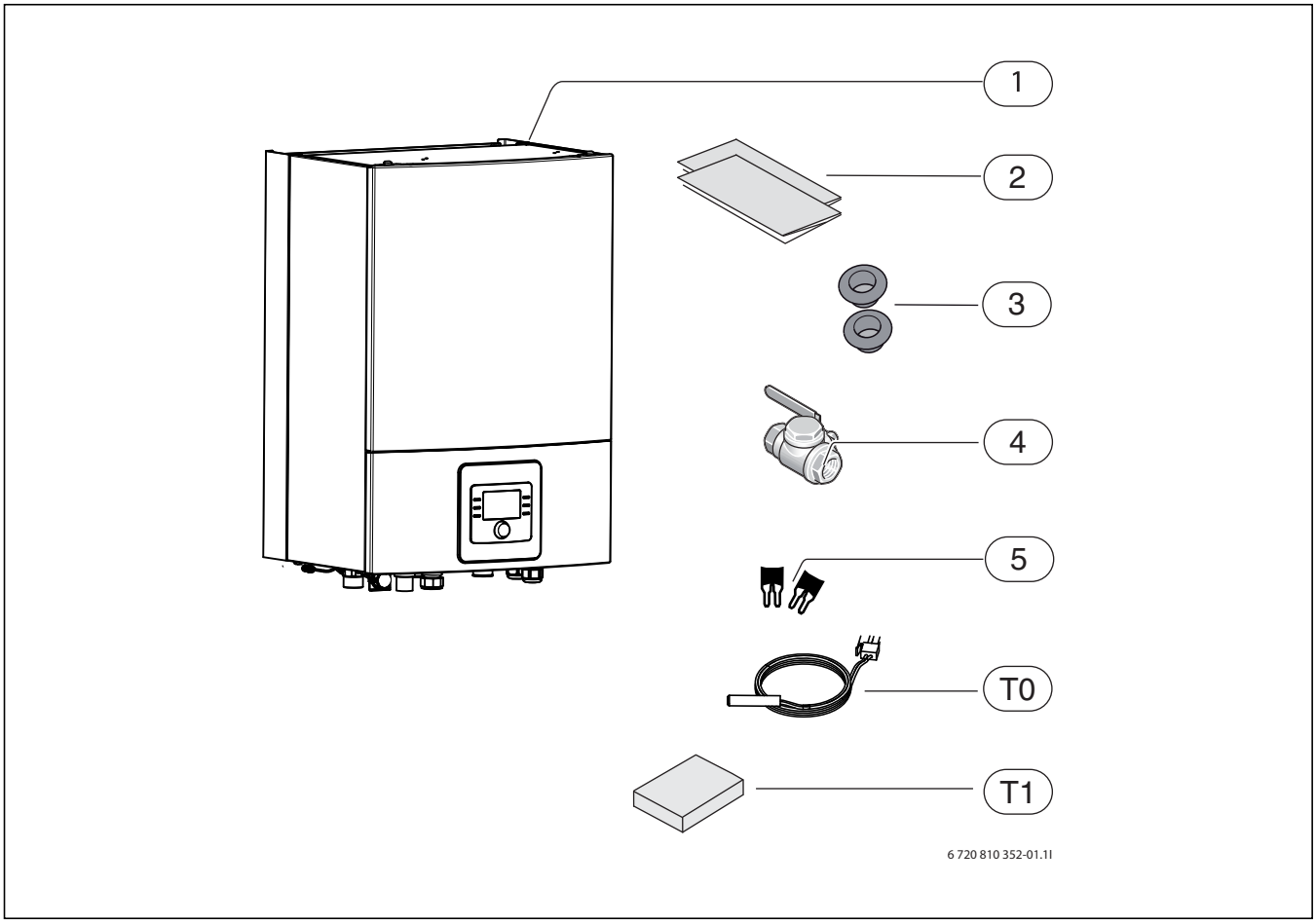


Fig. 1 Wall mounted heat pump module, delivered parts

[1] Heat pump module (example)
[2] Installation instructions, operating instructions and mounting information
[3] Cable feed
[4] Particle filter with strainer
[5] Bridges for single phase installation (for AWE model)
[T0] Flow temperature sensor
[T1] Outside temperature sensor

3 General

The language of the original manual is Swedish, other languages are a translation of the original manual.

Only trained personnel may perform this installation. The installer must comply with local rules and regulations as well as the information in the installation and operating instructions.

Cooling is disabled in the UK model to comply with the regulations for RHI.

3.1 Information on the heat pump module

AWB/AWE are heat pump modules that are intended for indoor use and for connection with outdoor Compress 6000 AW heat pumps.

The following combinations are possible:

Airbox	AirX
50-90 E/S	50
50-90 E/S	70
50-90 E/S	90
13-17 E/S	130
13-17 E/S	170

Table 2

The AWE heat pump module has an integrated immersion heater.

The AWB heat pump module is intended for an external booster heater (with mixing valve) with an electric, oil, or gas boiler.

Max. heating output for the external booster heater with the AWB heat pump module is twice the heat pump heating output, 10-35 kW equivalent.

3.2 Application area

The heat pump module may only be used in closed heating systems in accordance with EN 12828.
Other usage is prohibited. Any damage resulting from prohibited usage is excluded from liability.

3.3 Heating system minimum volume and operation

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

Since the requirements vary for different heat pump installations and heating systems, no general minimum volume is stated. Please refer to the following prerequisites for all heat pump sizes instead:

Underfloor heating system without a buffer cylinder

To ensure that a sufficient amount of energy is available for defrosting, the largest room should not contain room thermostats but room controllers should be used instead. At least 30 m^2 floor surface should be regulated by a room controller, since the heat pump then will adjust flow temperature automatically.

Radiator system without a buffer cylinder

To ensure that a sufficient amount of energy is available for defrosting, there should be at least 4 water radiators of 500 W/unit in one system without mixing valve. A room controller is recommended, since the heat pump then will automatically adjust flow temperature.

Radiator and underfloor heating systems on different circuits without a buffer cylinder

To ensure that a sufficient amount of energy is available for defrosting, there should be at least 4 water radiators of 500 W/unit in the circuit without mixing valve. No minimum floor surface is required for the underfloor heating system circuit with mixing valve. A room controller is recommended, since the heat pump then will automatically adjust flow temperature.

Only circuits with mixing valve

To ensure that a sufficient amount of energy is available for defrosting, a buffer cylinder of at least 50L is required for heat pump sizes 5-9 and of at least 100L for heat pump sizes 13-17.

Fan convector

To ensure that a sufficient amount of energy is available for defrosting, a buffer cylinder of at least 10L is required.

3.4 Type plate

The heat pump module data plate is found on the module electric box, inside the front panel.

3.5 Transport and storage

The heat pump module must always be transported and stored upright. If needed, it may be leaned temporarily.

The heat pump module may not be stored or transported in temperatures below − 10 °C.

3.6 Heat pump module positioning

- The heat pump module is placed indoors. Pipework between the heat pump and the heat pump module should be as short as possible. The pipes must be insulated (→ Chapter 7.11).
- Leakage drain water from the pressure relief valve should be drained from the heat pump module to a frost protected outlet.
- The space where the heat pump module is placed must have a drain.

3.7 Checks before installation

- ▶ Check that all pipe connections are intact and have not shaken loose during transportation.
- ▶ Before commissioning of the heat pump module, the heating system and possibly the water heater, including the heat pump, must be filled and depressurized.
- ▶ Wiring should be kept as short as possible to protect the system from downtime, for example during a thunderstorm.
- ▶ Low voltage wiring must be separated from high voltage wiring by at least 100 mm.

3.8 Connection principle

The principle is based on floating condensation and an integrated/ external booster through the heat pump module. The user interface manages the heat pump according to a set heating curve.

When the heat pump is not able to heat the house on its own, the heat pump module automatically starts the booster heater and produces together with the heat pump the desired temperature in the house.

DHW is prioritized and is managed by a sensor TW1 in the water heater (if installed). While the heater is heated, the heating system heating mode is temporarily disconnected by a 3-way valve. When the hot water cylinder is heated, the heat pump heating mode continues.

Heating and DHW mode when heat pump is inactive:

At outside temperatures below app. −20 °C (adjustable value) the heat pump stops automatically and cannot produce hot water. The immersion heater in the heat pump module or the external booster heater will in this case take over both the heating mode and the DHW production. The heat pump will restart when the temperature gets above −17 °C.

4 Technical information

4.1 Technical information - heat pump module with mixing valve for external booster heater

Heat pump module AWB	Unit	50- 90	130-170
Electrical information			
Power supply	V	230[1)]	230[1)]
Recommended fuse size[2)]	A	10	10
Connected load	kW	0.5	0.5
Heating installation			
Connection type (heating, flow, heat pump and booster heater flow/return)		G1 External	G1 External
Connection type (heating return)		G1 Internal (adapter)	G1 Internal (adapter)
Maximum operating pressure	kPa	250	250
Expansion vessel		N/A	N/A
Pressure drop available for pipes and components between indoor and outdoor unit.	kPa	3)	3)
Minimum flow (in connection with defrosting)	L/s	0.32	0.56
Circulation pump model		Grundfos UPM2 25-75 PWM	Grundfos UPM GEO 25-85 PWM
General			
IP rating		IP X1	
Dimensions (WxDxH)	mm	485x386x700	
Weight	kg	30	

Table 3 heat pump module with mixing valve for external booster heater

1) 1N AC 50Hz,

2) Fuse characteristic gL/C

3) This depends on the type of connected heat pump, see table 11

4.2 Technical information - heat pump module with immersion heater

AWE heat pump module	Unit	50-90	130-170
Electrical information			
Power supply	V	400[2)]/230[1)]	400[2)]
Recommended fuse size[3)]	A	16[2)]/50[1)]	16[2)]
Immersion heater	kW	3/6/9	3/6/9
Heating installation			
Connection type (heating flow and heat pump flow/return)		G1 External	G1 External
Connection type (heating return)		G1 Internal (adapter)	G1 Internal (adapter)
Maximum operating pressure	kPa	250	250
Minimum operating pressure	kPa	50	50
Expansion vessel	L	10	10
Pressure drop available for pipes and components between indoor and outdoor unit.	kPa	4)	4)
Minimum flow (in connection with defrosting)	L/s	0.32	0.56
Circulation pump model		Grundfos UPM2 25-75 PWM	Grundfos UPM GEO 25-85 PWM
General			
IP rating		IP X1	
Dimensions (WxDxH)	mm	485x386x700	
Weight	kg	35	

Table 4 heat pump module with immersion heater

1) 1N AC 50 Hz

2) 3N AC 50 Hz

3) Fuse characteristic gL/C

4) This depends on the type of connected heat pump, see table 12

4.3 System configurations

The heat pump and heat pump module may be installed only in accordance with the official system solutions provided by the manufacturer.
Other system solutions are not allowed. Any damage and problems resulting from prohibited installation are excluded from liability.

Some system solutions require accessories (buffer cylinder, 3-way valve, mixing valve, DHW circulation pump). Circulation pump PC1 is controlled by the control unit in the heat pump module.

If the external booster heater does not have a built in circulation pump, an external one should be installed.

If the external booster heater has a large volume and a separate DHW cylinder installed, it is recommended that the cylinder is fitted with an electrical booster heater controlled by the user interface in the heat pump module. This will prevent excessive energy consumption during thermal disinfection when the external booster heater is not producing heat.

If a fresh water station is installed, it must have its own control unit.

Bypass is installed according to system solution with a length = 10 x inner diameter.

4.3.1 System configuration explanations

	General
Installermodul	Installer module integrated into the heat pump module
ProControl 600	User interface
CR10H	Room controller (accessories)
CU-EM1	External booster heater user interface
EM1	External booster heater
T1	Outside temperature sensor
MK2	Condensation sensor (accessories)
CW1	DHW cylinder (accessories)
VW1	3-way valve (accessories)
TW1	DHW cylinder temperature sensor (accessories)
PW2	DHW circulation pump hot water (accessories)

Table 5 General

Z1	Heating circuit without mixing valve
PC1	Circulation pump, heating circuit
T0	Flow temperature sensor

Table 6 Z1

Z2	Heating circuit with mixing valve (accessories)
MM100	Mixing valve module (controller for circuit)
PC1	Circulation pump, heating circuit 2
VC1	Mixing valve
TC1	Flow temperature sensor, heating circuit 2
MC1	Thermal shut-off, heating circuit 2

Table 7 Z2

4.3.2 Heating installation bypass

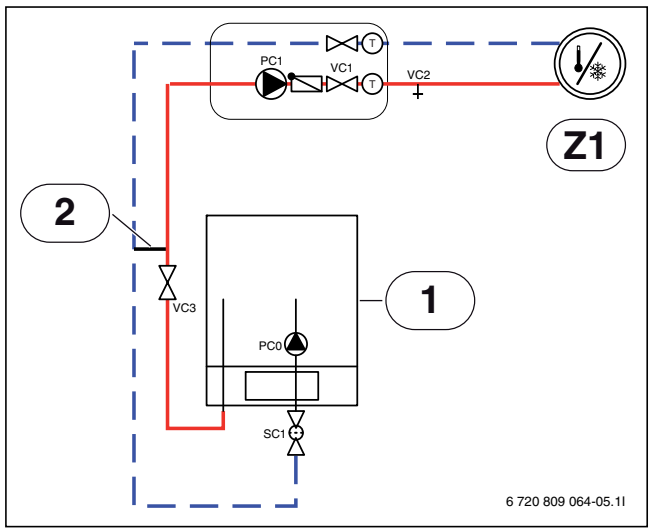


Fig. 2 Heat pump module with heating circuit and bypass

[1] Heat pump module
[2] Bypass

If no buffer cylinder is installed in the system, a bypass is required. The length of the bypass must be at least 10 times the inner diameter of the pipe.

4.3.3 Non-return valve in heating circuit

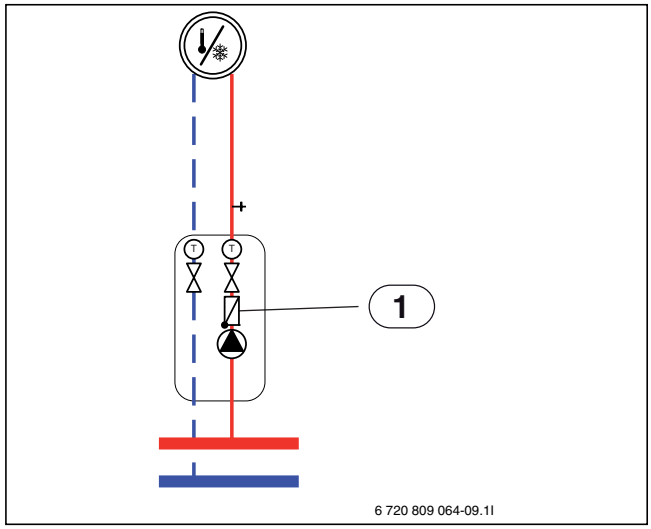


Fig. 3 Heating circuit

[1] Non-return valve

One non-return valve in each heating circuit is required for preventing natural circulation in summer mode. Natural circulation may arise as the domestic hot water 3-way valve is open to the heating system when the heat pump prepares DHW heating.

4.3.4 System solution with heat pump, heat pump module with immersion heater, and water heater

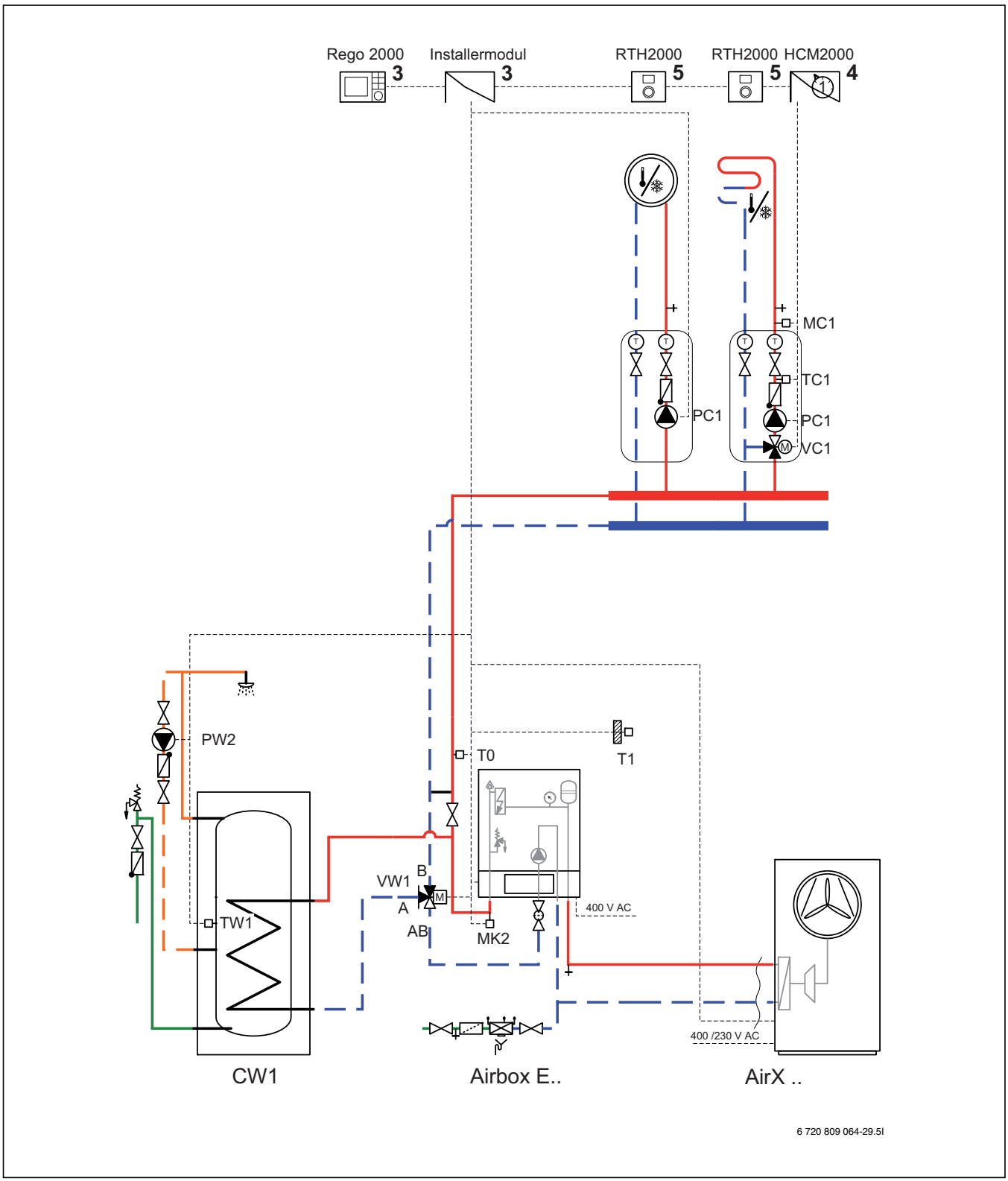


Fig. 4 Immersion heater with water heater

[3] Installed in the heat pump module
[4] Installed either in the heat pump module or mounted to the wall
[5] Installed on the wall

4.3.5 Heat pump, heat pump module with external booster heater with mixing valve, and water heater

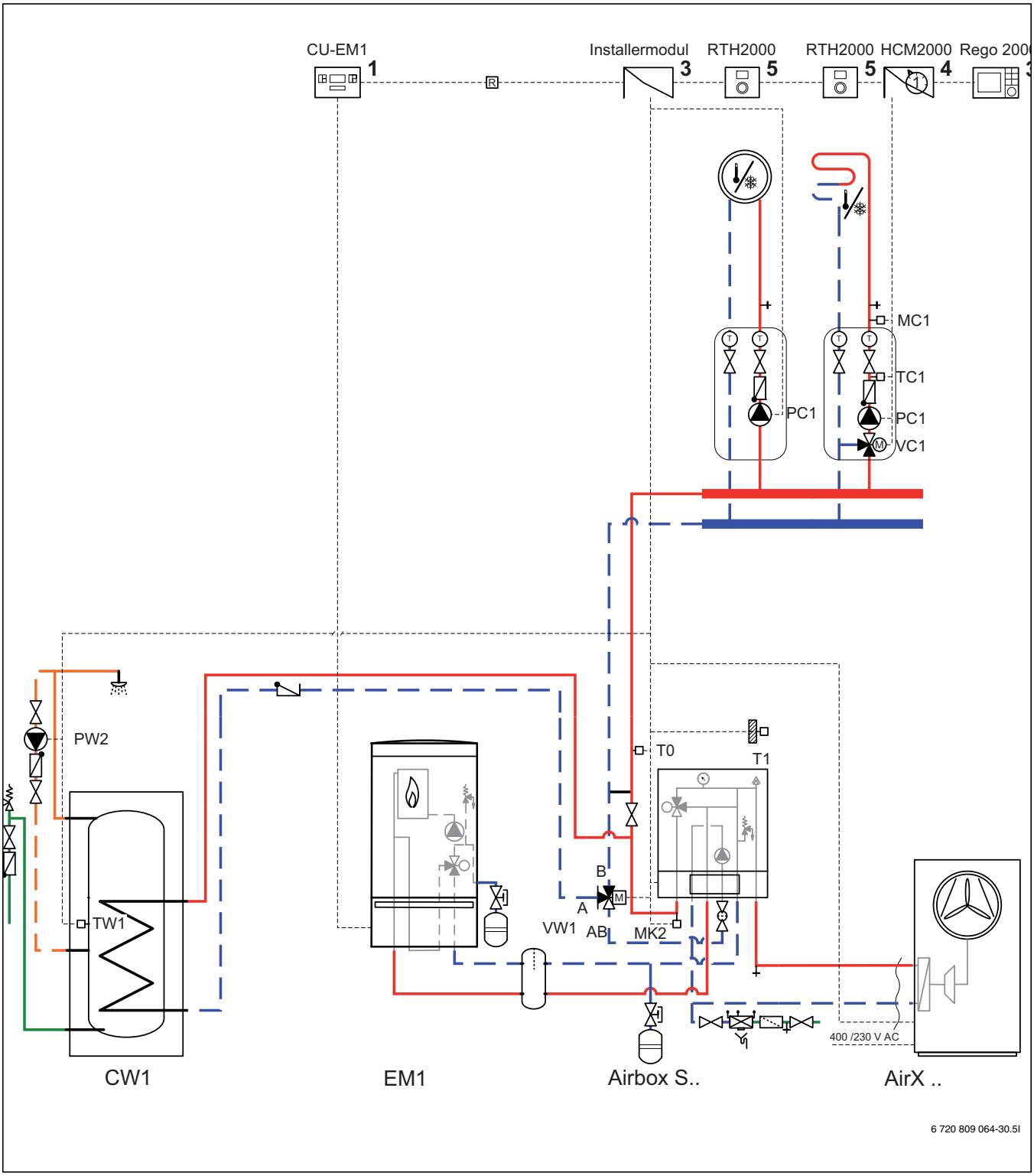


Fig. 5 Booster heater with mixing valve with water heater

[1] Installed by the external booster heater
[3] Installed in the heat pump module
[4] Installed either in the heat pump module or mounted to the wall
[5] Installed on the wall

Bypass/buffer cylinder/Low loss header for the external booster heater is needed only if the booster has a built-in flow monitor.

4.3.6 General symbol explanation

Symbol	Designation	Symbol	Designation	Symbol	Designation
Pipework/Wiring					
	Flow - heating/solar circuit		DHW		Electric wire
	Return - heating/solar circuit		Potable water		Electric wire disconnected
			DHW circulation		
Actuators/Valves/Temperature sensors/Pumps					
	Valve		Differential pressure regulator		DHW circulation pump
	Revision bypass		Pressure relief valve		Non-return valve
	Adjustment valve		Safety assembly		Temperature sensor/switch
	Overcurrent valve		3-way mixing valve (mixing/distributing)		Overheating protection (temperature)
	Filter valve (particle filter)		Thermal DHW mixing valve		Outside temperature sensor
	Shut-off valve with unintentional closure control		3-way valve (change)		Wireless outside temperature sensor
	Valve, motorized		3-way valve (changing, normally closed to II)		...Radio (wireless)...
	Valve, thermal		3-way valve (changing, normally closed to A)		
	Shut-off valve, magnetic		4-way valve		
Other					
	Thermometer		Funnel with siphon		Low loss header with sensor
	Pressure gauge		Return flow safety module in accordance with EN1717		Heat exchanger
	Fill / drain valve		Expansion vessel with shut-off valve with closure		Flow meter
	Water filter		Collector		Heat meter
	Air separator		Heating circuit		DHW outlet
	Automatic air vent valve		Underfloor heating circuit		Relay
	Compensator (devibration)		Low loss header		Immersion heater

Table 8 Symbols key

5 Regulations

The following regulations and requirements must be observed:

- Local rules and regulations, including special rules, of the responsible power supply company
- National building regulations
- **EN 50160** (Voltage properties in power grids for public distribution)
- **EN 12828** (Heating systems in buildings - Design and installation of water-based heating systems)
- **EN 1717** (Water supply - Protection against pollution of potable water).

6 Measurements, positioning distance, and pipe connections

Mount the heat pump module on the wall according to the mounting instruction.

6.1 Positioning clearances

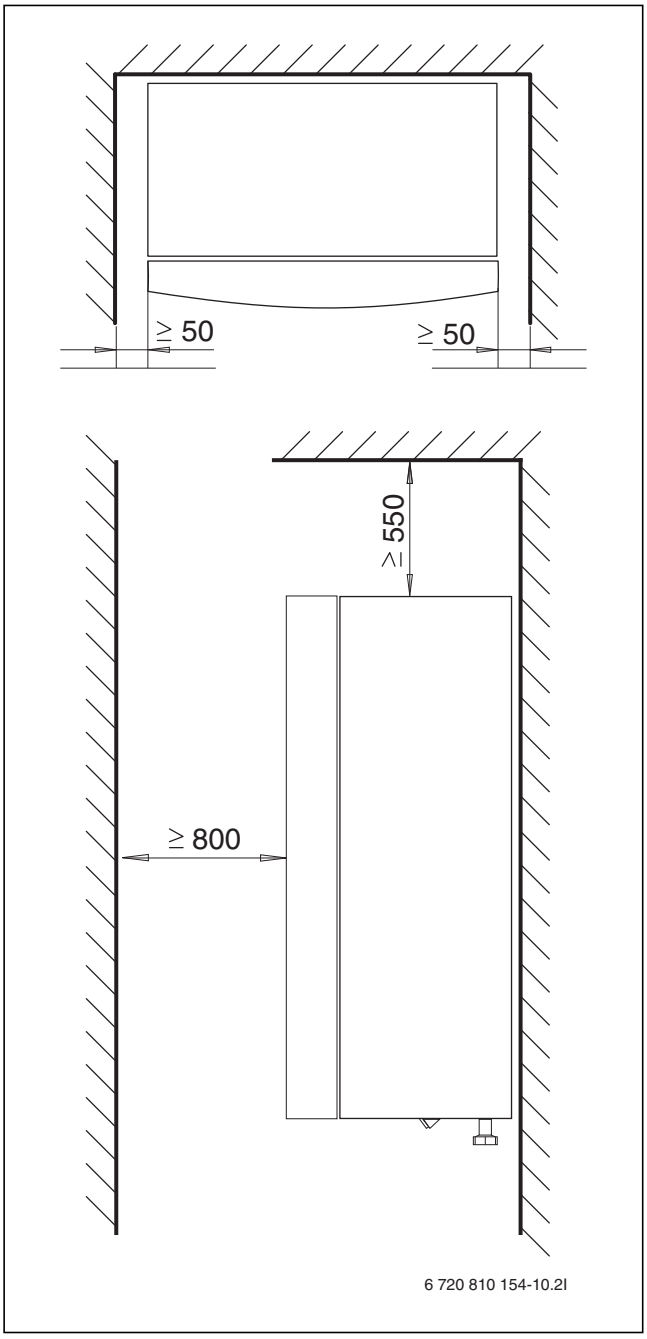


Fig. 6 Minimum clearances

The heat pump module is installed at a height above the floor that is convenient for use of the user interface. Also consider pipework and connections under the module.

6.2 Pipe dimensions

Please refer to table 11 or table 12 for information on pipes for heat transfer medium between heat pump and heat pump module.

Pipe dimensions (mm)	Airbox S	Airbox E
Heating system flow	G1 External	G1 External
Heating system return (adapter)	G1 Internal	G1 Internal
External booster heater flow/return	G1 External	
Heat transfer medium to/from heating pump	G1 External	G1 External
Process water/drain	Ø 32	Ø 32

Table 9 Pipe dimensions

7 General installation

General installation instructions for all heat pump modules.

NOTICE: Risk of operating problems due to pipe contamination!
Particulates, metal/plastic filings, flax and thread tape residue and similar material can get stuck in pumps, valves and heat exchangers.

- ▶ Avoid particulates in the pipework.
- ▶ Do not leave pipe parts and connections directly on the ground.
- ▶ Ensure that no filings remain in the pipes following deburring.

7.1 Preparatory pipework

The particle filter is installed horizontally in the return from the heating system. Please observe the filter flow direction.

The safety valve drain in the heat pump module should be secured against frost and the drain pipe should lead to a drain.

- ▶ Fit heating system and cold/hot water connector pipes in the space up to the heat pump module position.

7.2 Positioning

- ▶ Remove the packaging according to the instructions on the packaging.
- ▶ Remove the supplied accessories.

7.3 Checklist

Each installation is different. The following check list will provide a general description of the installation process.

1. Install the heat pump module incoming and drain pipes.
2. Fit the heat pump module leakage water hose.
3. Connect the heat pump and the heat pump module (→Chapter 9.2.1 or Chapter 10.2).
4. Connect the heat pump module to the heating system (→Chapter 9.2.2 or Chapter 10.2).
5. Install the outside temperature sensor (→Chapter 7.13.3) and room controller (optional).

6. Connect the CAN BUS wires between the heat pump and the heat pump module (→Chapter 8.1).
7. Install any accessory (mixing module, solar module, pool module, etc).
8. Connect EMS-BUS wire (optional) to accessories (→Chapter 8.2).
9. Fill up and bleed the hot water cylinder.
10. Fill and vent the heating system before commissioning (→Chapter 9.3.1 or Chapter 10.3.1).
11. Connect the heating system to the electrical system (→Chapter 8).
12. Commission the heating system by managing necessary settings, using the control panel (→Chapter 13).
13. Vent the heating system (→Chapter 16).
14. Check that all sensors show reasonable values (→Chapter 14.9.2).
15. Check and clean out particle filters (→Chapter 21).
16. Check the heating system function following commissioning (→Chapter 14.9).

7.4 Water quality

Heat pumps operate with lower temperatures than other heating systems, which means that the thermal degassing is not as effective and the oxygen content will never be as low as in an electric/oil/gas system. This means that the heating system will be more sensitive to rust with aggressive water.

Do not use any water additives except for pH-enhancer and keep the water clean.

Recommended pH level is 7.5 – 9.

Water quality	
Hardness	< 3°dH
Oxygen content	< 1 mg/L
Carbon dioxide, Co_2	< 1 mg/L
Chloride ions, Cl-	< 200 mg/L[1)]
Sulphate, So42-	< 100 mg/L
Conductivity	< 350 µs/cm

Table 10 Water quality

1) Please refer to the water heater information (optional) for recommendations on anodes. If an electric anode is used, it has to be purchased in connection with commissioning.

7.5 Heating system flushing

NOTICE: System damage due to objects in the pipes!
Objects in the pipes will decrease the flow and cause operational problems.

- ▶ Flush out the system to remove all dirt residues before connecting the heat pump and heat pump module.

The heat pump module is a part of a heating system. Problems in the heat pump module can be caused by poor water quality in the radiators/floor loops or by constant system oxygenation.

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

Magnetite has a grinding effect on the heating system's pumps, valves and components with turbulent flows such as the condenser.

Heating systems which require regular filling or where the heating water does not produce clear water during water sampling require measures prior to the installation of the heat pump, e.g. supplementing the heating system with magnetite filters and air vent valves.

7.6 Operation without heat pump (stand-alone)

The heat pump module can be put into operation without a connected heat pump, for example, if the heat pump is installed at a later date. This is called "stand-alone" operation.

In stand-alone mode, the heat pump module uses the integrated immersion heater or the external booster heater only for heating and DHW production.

If the heat pump module and the heating system are filled before the heat pump is connected, then the heat transfer medium in and out to / from the heat pump must be connected to secure circulation (→ [1] and [2] Fig. 18 or Fig. 31).

- ▶ Open shut-off valves on the heat transfer circuit, if applicable.

In connection with commissioning of stand-alone operation:

- ▶ Set **Stand-alone mode** in the service menu **Heat pump** (→ Chapter 14.1).

7.7 Installation with cooling

Cooling is disabled in the UK model to comply with the regulations for RHI.

NOTICE: Damage due to moisture!
Only heat pump modules with integrated immersion heaters are insulated against condensation for cooling below dew point.

- ▶ Do not use cooling mode below dew point together with a heat pump module with mixing valve for external booster heater.

Using cooling mode requires the installation of a room controller (accessory).

Installation of a room controller with integrated humidity sensor (accessory) makes cooling more secure as the user interface automatically adjusts the flow temperature in relation to the current dew point.

- ▶ Insulate all connections and pipes from condensation.

- ▶ Install a room controller, with or without an integrated moisture sensor (→ manual for the respective room controller).
- ▶ Install condensation sensors (→ Chapter 7.7.1).
- ▶ Select automatic mode heating/cooling (→ Chapter 14.3.2).
- ▶ Make the necessary cooling mode settings: start temperature, start delay, room temperature and dew point differential (offset), as well as lowest flow (→ Chapter 14.3.2).
- ▶ Set the temperature differential (delta) over the heat pump (→ Chapter 14.1.1)
- ▶ Turn off floor circuits in moist rooms (e.g. bathrooms and kitchens) and use relay outputs PK2 in order to govern this (→ Chapter 8.4).

7.7.1 Installation of condensation sensor (accessories)

NOTICE: Damage due to moisture!
Cooling below dew point will result in condensation on the surrounding material (floor).

- ▶ Do not use the underfloor heating system for cooling below dew point.
- ▶ Correctly adjust the flow temperature as described in Chapter 14.3.2.

The condensation switch will stop the cooling if condensation develops on the heating system pipes. Condensation will develop during cooling if the heating system temperature is lower than current dew point temperature.

The dew point will vary depending on temperature and humidity. The higher the humidity, the higher flow temperature is required to remain above dew point and avoid condensation.

The condensation sensors will send a signal to the operating system when they sense condensation and stop the cooling.

Instructions for installation and handling are included with the condensation sensor.

7.7.2 Condensation monitoring, fan coils only

NOTICE: Damage due to moisture!
Moisture may be transferred to surrounding materials if there are gaps in the condensation insulation.

- ▶ Apply condensation insulation to all pipes and connections up to the fan element for cooling.
- ▶ Use condensation insulation material that is intended for condensation cooling systems.
- ▶ Connect the drain to the drain outlet.
- ▶ Do not use condensation guard for cooling below dew point.

During cooling with a heat pump module with mixing valve for external booster heater, the fan element may be used only together with a condensation guard and condensation sensors and if they are designed for operation above dew point.

If only fan elements with drainage and condensation insulated pipes are used, the flow temperature can be set to 7 °C. The lowest recommended temperature is 10 °C for more balanced cooling as the freeze guard is activated at 5 °C.

7.8 Heat transfer medium low-energy circulation pump (PC0)

PC0 heat transfer pump is PWM operated (RPM controlled). The pump settings are managed via the heat pump module user interface and must be set for different heating systems (→ Chapter 18.3).

Circulation pump speed is automatically adjusted for optimal operation.

7.9 Circulation pump for the heating system (PC1)

The heating system circulation pump is required and selected based on the system pressure drop and flow requirements.

PC1 must always be connected to the installer module in the heat pump module according to the circuit diagram.

Relay output max. load for circulation pump PC1: 2 A, cosφ>0.4. Higher load requires installation of an intermediate relay.

7.10 DHW heater (accessories) connection

If the hot water cylinder is installed lower than the heat pump (e.g. in a basement), natural circulation might occur, which will cause the heater to lose heat.

- ▶ Install a non-return valve, which will prevent natural circulation from occuring in the circuit, if the hot water cylinder is installed lower than the heat pump.

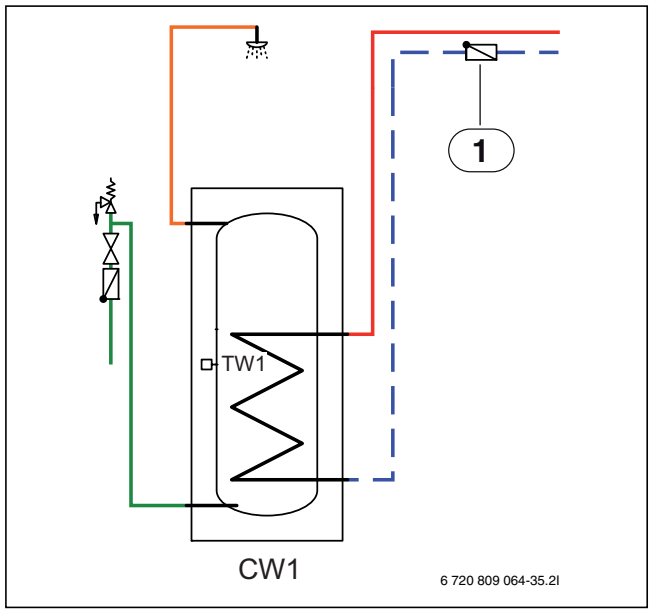


Fig. 7 Hot water cylinder

[1] Non-return valve

For connection instructions, please refer to the cylinder instruction.

If a fresh water cylinder is used in the heating system, an automatic deaerator must be installed on the cylinder. This also applies to a twin wall cylinder.

If a charge loop cylinder is used in the heating system, an automatic deaerator with a microbubble separator must be installed on the loop input to the cylinder.

Water heaters of different sizes are available as accessories.

7.10.1 DHW temperature sensor TW1

If the water heater is connected and TW1 is connected to the system, it is automatically receipted at commissioning.

- ▶ Water sensor TW1 is connected to the terminal TW1 on the installer module in the electric box.

7.10.2 3-way valve (accessory)

A system solution with a water heater requires a 3-way valve (VW1). 3-way valve installation is explained in separate instructions.

7.10.3 Hot water cylinder, solar (accessory)

A hot water cylinder for solar heating is also available as an accessory. Instructions for installation and operation are provided with the hot water cylinder.

7.10.4 DHW circulation pump PW2 (accessory)

Settings for the circulation pump PW2 is done in the control unit (→Chapter 14.4).

7.11 Insulation

All heat conducting lines must have suitable heat insulation according to applicable norms.

NOTICE: Damage due to freezing!
In case of a power outage the water in the pipes may freeze.

- ▶ Use at least 19 mm insulation for outside pipework.
- ▶ Use at least 12 mm insulation for inside pipework. This is important for safe and efficient DHW heating.

During cooling, all connections and lines must be condensation insulated according to applicable norms.

7.12 Installation with pool

NOTICE: Risk of malfunction!
Cooling mode is not possible if the mixing valve for the pool is placed in a wrong position in the system. Even other functional disturbances might arise. The mixing valve for the pool must not be positioned so that it can block the safety valve on the flow line.

- ▶ Install the mixing valve for pool on the return pipe to the heat pump module (→ [VC1] Bild 8).
- ▶ Install the T-pipe on the flow line from the heat pump module, before the bypass in the safety assembly.
- ▶ The pool mixing valve may not be installed as a heating circuit.

Installation of a pool module (accessory) is demanded to use pool heating.

- ▶ Install the pool (→ instructions for the pool).
- ▶ Install the mixing valve for pool.
- ▶ Isolate all pipes and connections.
- ▶ Install the pool module (→ instruction for the pool module).
- ▶ Set the mixing valve running time at commissioning (→ Chapter 13.2).
- ▶ Make necessary settings for the pool heating (→ Kapitel 14.5).

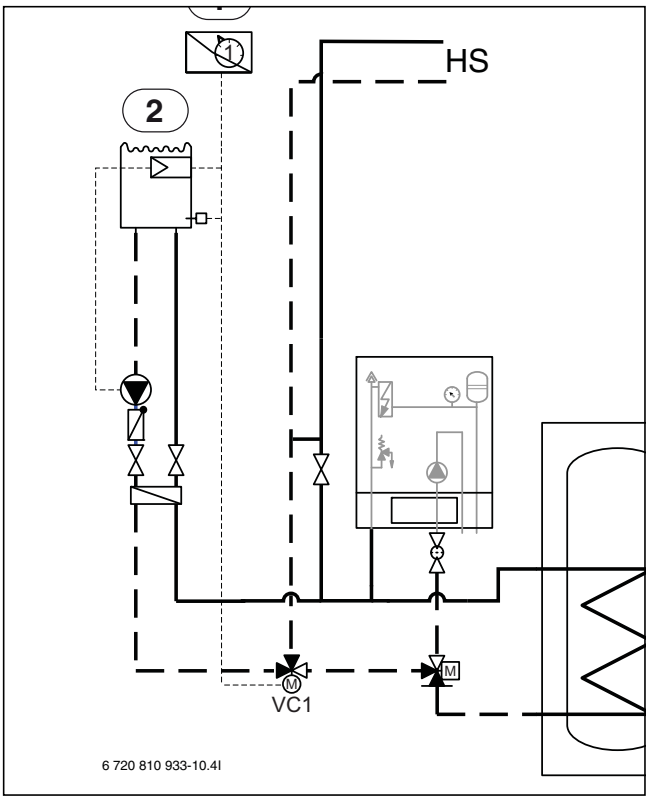


Fig. 8 Pool installation example

[1] Pool module
[2] Pool
[VC1] Pool mixing valve
[HS] Heating system

7.13 Temperature sensor installation

The user interface in the delivery configuration automatically regulates the flow temperature based on the outdoor temperature. A room controller can be installed for greater comfort. If cooling mode is used, a room controller is a must.

7.13.1 Room controller (accessories, see separate instructions)

If the room controller is installed after the system has been put into operation, it must be selected as room controller for heating circuit 1 in the start-up menu (→ Chapter 13.2).

- ▶ Install the room controller (→ room controller's instruction).
- ▶ Connect the room controller to terminal EMS on the installer module in the heat pump module electric box.
- ▶ Set room controller CR10 as remote control before the installation is put into operation (→ Room controller's instruction). does not have this option.
- ▶ Make circuit settings on the room controller before the installation is put into operation (→ Room controller's instruction).
- ▶ Indicate when the installation is put into operation that room controller (CR10 or CR10H) has been installed (→ Chapter 13.2) as a user interface for heating circuit 1.
- ▶ Make room temperature settings according to Chapter 14.3.2.

If there is already a connection on the EMS terminal, the connection is made parallel to the same terminal in accordance with Fig. 9. If several EMS modules are installed in the system, these must be connected in accordance with Fig. 14, Chapter 8.7.

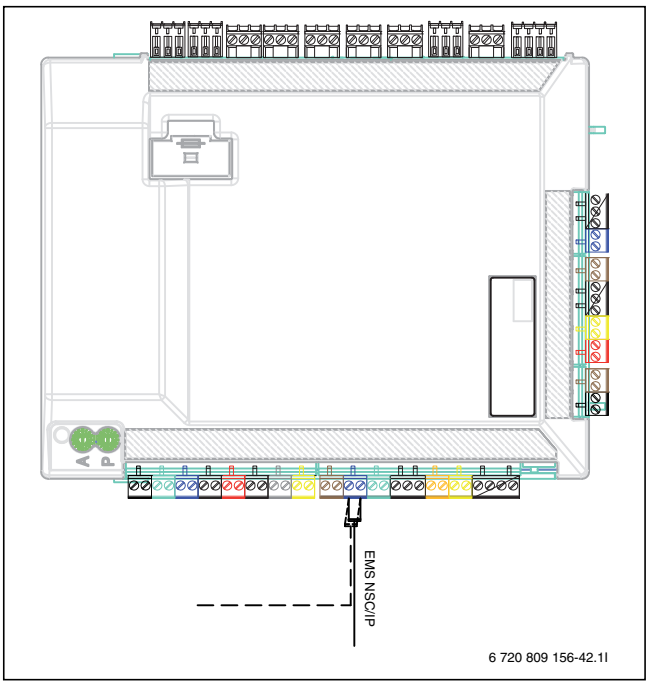


Fig. 9 EMS connection on installer module

7.13.2 Flow temperature sensor T0

The sensor is delivered with the heat pump module.

- ▶ Place the sensor 1–2 metres after the 3-way valve or on the buffer cylinder if one is installed.
- ▶ Connect the flow temperature sensor to a terminal T0 on the installer module in the heat pump module electric box.

7.13.3 Outside temperature sensor T1

A screened cable must be used if the outside temperature sensor cable is longer than 15 m. The screened cable must be grounded in the inside unit. The max. length of a screened cable is 50 m.

The outside temperature sensor cable must meet the following minimum requirements:

Cable diameter: 0.5 mm^2
Resistance: max. 50 ohm/km
No. of conductors: 2

- ▶ Install the sensor on the cold side of the house, normally north facing. It must be protected from direct sunlight, ventilation air or anything that can affect the temperature measurement. The sensor must not be installed directly beneath the roof.

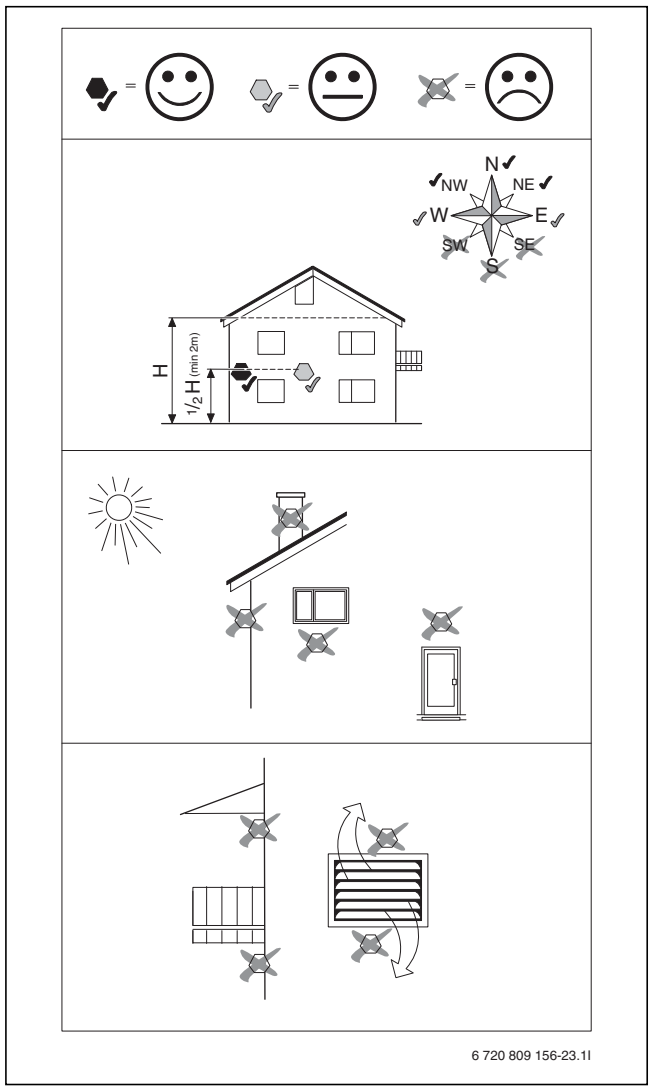


Fig. 10 Outside temperature sensor positioning

7.14 Several heating circuits (mixing valve module accessory, see separate instructions)

The user interface can handle a heating circuit without a mixing valve in standard configuration. A mixing valve module is required for each circuit if additional circuits are installed.

- ▶ Install the mixing valve module, mixing valve, circulation pump and other components in accordance with the selected system solution.
- ▶ Connect the mixing valve module to terminal EMS on the installer module in the heat pump module electric box.
- ▶ Make settings for several heating circuits in accordance with Chapter 14.3.2.

If there is already a connection on the EMS terminal, the connection is made parallel to the same terminal in accordance with Fig. 9. If several EMS modules are installed in the system, these must be connected in accordance with Fig. 14, Chapter 8.7.

8 General electric installation

DANGER: Risk of electric shock!
The heat pump components conduct electricity.
- ▶ Turn off the main power before any electrical work.

NOTICE: The installation will get damaged if the power is connected without water.
Components in the heating system can overheat if the power is connected before it has been filled up with water.
- ▶ Fill and pressurize the water heater and the heating system **before** connecting the installation to power.

The heat pump module electrical connection must be disconnected safely in accordance with the wiring rules.
- ▶ Install a separate safety switch that disconnects all power to the heat pump module. In case of separate power supplies you will need one safety switch for each supply.

The compressor warms up before it starts. This can take up to 2 hours, depending on the outside temperature. The requirement is that the compressor temperature (TR1) is 10 K above the air intake temperature (TL2). The temperatures are visible in the Diagnostics menu (→ Chapter 14.9).

- ▶ Choose cable area and type that represent the fuse protection and wire mode.
- ▶ Connect the heat pump according to the circuit diagram. Never connect any other consumers.
- ▶ If the heat pump is connected through a circuit breaker, then a separate circuit breaker for the heat pump must be used. Please observe current regulations.
- ▶ Observe the colour coding when replacing circuit boards.

8.1 CAN-BUS

NOTICE: Malfunction due to electrical disturbances!
High voltage lines (230/400 V) close to a communications line can cause the heat pump module to malfunction.
- ▶ Install screened CAN-BUS wire away from a power cord. Minimum distance 100 mm. Cabling together with bus lines is allowed.

NOTICE: The system will be damaged if the 12 V- and the CAN-BUS connections are confused!
The communication circuits are not designed for 12 V constant voltage.
- ▶ Check that the four cables are connected to plugs with corresponding rating on the printed circuit board.

The heat pump and the heat pump module are connected by a communications wire, CAN-BUS.

A suitable cable for external cable installation is wire LIYCY (TP) 2x2x0.75, or equivalent. An alternative cable should have a cross section area of at least 0.75 mm^2, and be a duplex cable, screened and approved for outside use. The screen should only be grounded in one end (indoor unit) and to the chassis.

Maximum cable length is 30 m.

The connection between the circuit boards is by four wires, because the 12V-supply between the circuit boards must also be connected. The circuit boards have markings for both the 12V and CAN-BUS connections.

Switch Term is used to mark the start and end of a CAN-BUS loop. Ensure that the correct circuit board is terminated and that all other switches are in the opposite position.

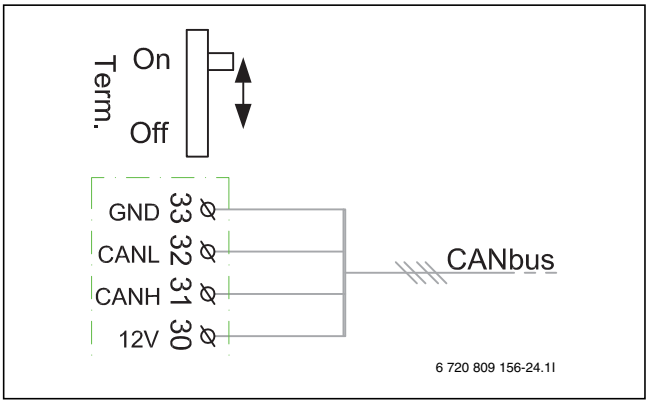


Fig. 11 Termination CAN-BUS

[On] Terminated CAN-BUS
[Off] Not terminated CAN-BUS

8.2 EMS-BUS

NOTICE: Malfunction due to electrical disturbances!
High voltage lines (230/400 V) close to a communications line can cause the heat pump module to malfunction.
- ▶ Install the EMS-BUS wire away from a power cord. Minimum distance 100 mm. Cabling together with bus lines is allowed.

EMS-BUS and CAN-BUS are not compatible.
- ▶ Do not connect EMS-BUS units with CAN-BUS units.

The user interface HPC400 and the installer module in the heat pump module are connected by EMS-BUS.

The user interface is powered via the BUS cable. Polarity is not important for the two cables in the EMS-BUS.

In case of EMS-BUS accessories it is important to note that (please also refer to the installation instructions for each accessory):
- ▶ If several BUS units are installed, they must be separated by at least 100 mm.
- ▶ If several BUS units are installed, they must be connected in a series or a star network.
- ▶ Use a cable with a cross section area of at least 0.5 mm^2.
- ▶ In case of external inductive interferences (e.g. from PV systems), use screened cables. The screen should only be grounded in one end and to the chassis.

8.3 Printed circuit board handling

Circuit boards with control electronics are sensitive to discharges of static electricity (ESD – ElectroStatic Discharge) when handled. To prevent damaging the components, special care is therefore required when handled.

CAUTION: Damage due to static electricity!
- ▶ Wear a grounded antistatic wrist strap when handling unenclosed printed circuit boards.

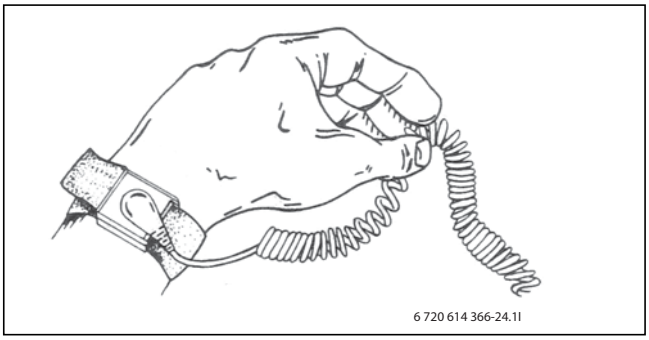


Fig. 12 Antistatic wrist strap

Damage is usually latent, and a circuit board can operate correctly during commissioning but show signs of problems later. Charged objects may only be problematic if they are in close proximity to the electronics. Keep a distance of at least one metre from expanded polystyrene, protective plastic and other packaging, synthetic material (e.g. fleeces) and similar before starting work.

A method for good ESD protection is a ground-connected bracelet when handling electronics. This bracelet must be put on before opening the screened metal bag/packaging or before exposing an installed board. The bracelet must be worn until the circuit board is enclosed in its screen packaging or closed electric box. Replaced, returned circuit boards must be handled in the same way.

8.4 External connections

To avoid inductive interference, all low voltage conductors (measure current) should be installed with a minimum distance of at least 100 mm from the conducting 230V- and 400V cables.

If the temperature sensor conductor has to be extended, the following conductor diameters should be used:

- Up to 20 m long cable: 0.75 to 1,50 mm^2
- Up to 30 m long cable: 1.0 to 1,50 mm^2

The relay output PK2 is active during cooling and can be used to manage the exchange between cooling /heating of a fan convector or a circulation pump or to regulate floor heating circuits in moist rooms.

Output VC0 is active during cooling and is used to manage a 3-way valve to recirculation, to facilitate the exchange between DHW heating and cooling.

8.4.1 External outputs

NOTICE: Damage due to incorrect connection!
Connections intended for a different voltage or current can damage electrical components.
- ▶ Only add connections to the heat pump module external outputs that are compatible with 5 V and 1 mA.
- ▶ If an intermediate relay is required, use only relays with gold-plated plugs.

External inputs I1, I2, I3 and I4 can be used to remotely manage certain functions in the user interface.

The functions that are activated by the external inputs are described in chapter 14.1.2.

The external input is connected either to a power switch for manual activation or to operating equipment with a relay output for 5 V.

8.5 Accessories

CAN-BUS connected accessories, e.g. heating output switch, are connected to the installer module card in the heat pump module parallel on the CAN-BUS connection to the heat pump.

8.6 Connecting the heat pump module

- ▶ Remove the front panel.
- ▶ Remove the electric box cover.
- ▶ Feed the connecting cables through the cable feed in the electric box.
- ▶ Connect the cables according to the circuit diagram.
- ▶ Put the electric box cover and the heat pump module front panel back.

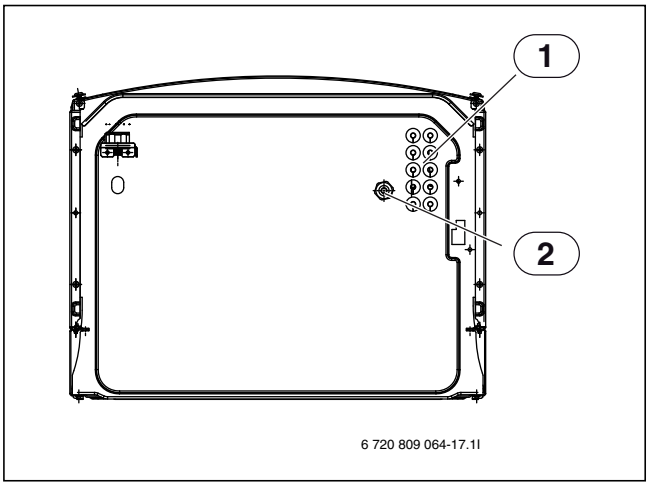


Fig. 13 Cable feed

[1] Cable feed sensor, CAN-BUS and EMS-BUS
[2] Cable feed power in

8.7 Connection option EMS bus

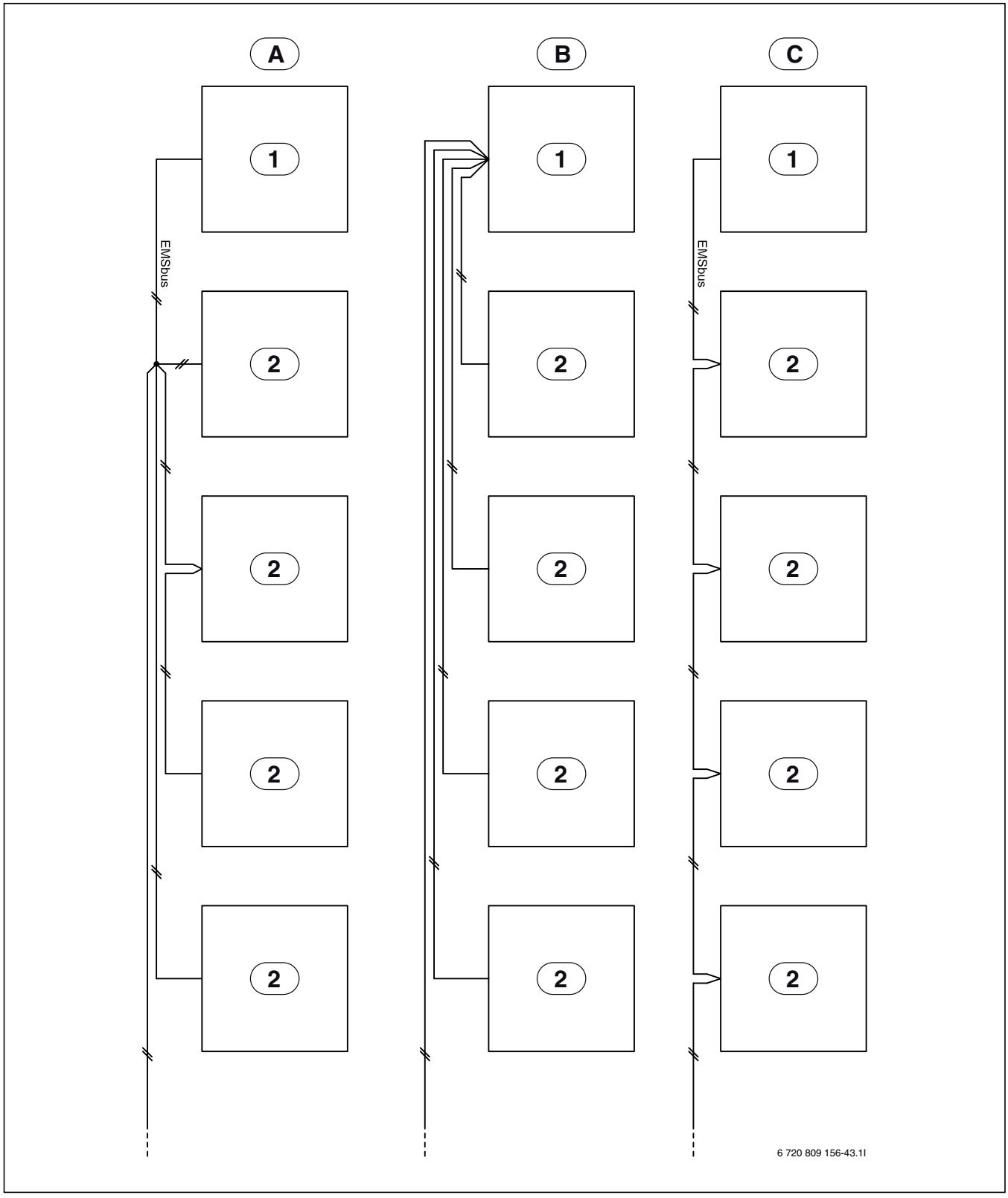


Fig. 14 Connection option EMS bus

[A] Star network or serial connection with external coupling box
[B] Star network
[C] Serial connection
[1] Installer module
[2] Accessory modules (for example: Room Controller, Mixing Valve Module, Solar Module)

9 Installation of heat pump module with mixing valve for external booster heater

Only qualified installers may carry out the installation. The installer must follow applicable rules and regulations and recommendations from the supplier.

9.1 Overview of heat pump module with mixing valve for external booster heater

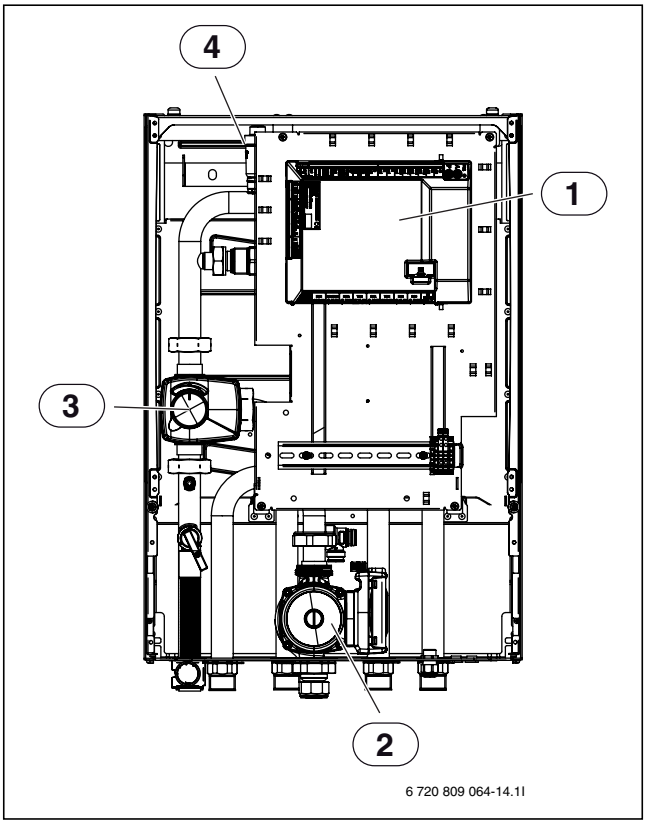


Fig. 15 Heat pump module with mixing valve for external booster heater

[1] Installer module
[2] DHW circulation pump
[3] Mixing valve
[4] Automatic air vent valve (VL1)

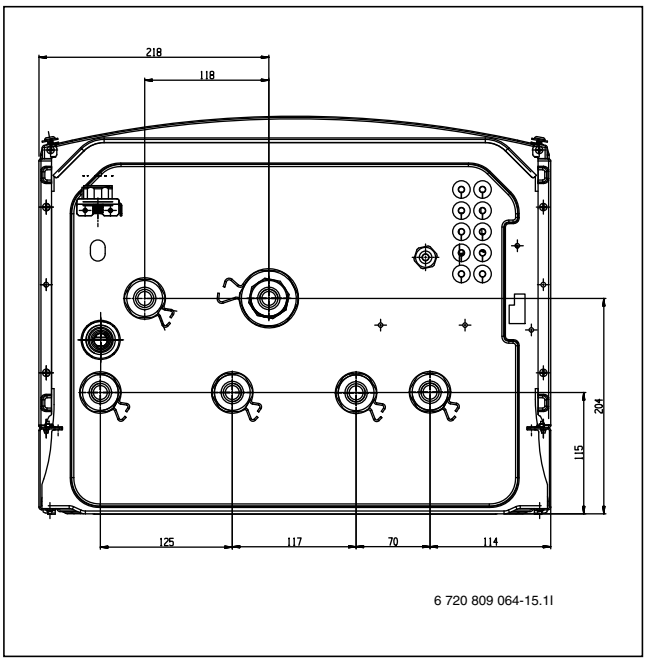


Fig. 16 Heat pump module with mixing valve for external booster heater dimensions in mm

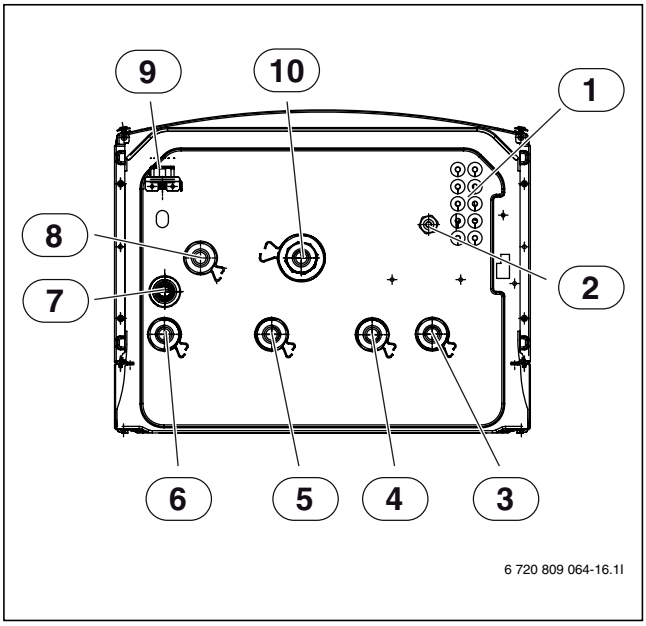


Fig. 17 Pipework for heat pump module with mixing valve for external booster heater

[1] Cable feed sensor, CAN-BUS and EMS-BUS
[2] Cable feed power in
[3] Heat transfer medium in from heat pump
[4] Return to booster heater
[5] Flow from booster heater
[6] Flow to heating system
[7] Leakage drain water drain from safety valve
[8] Heat transfer medium out to heat pump
[9] Pressure gauge
[10] Return from heating system

9.2 Heat pump module with mixing valve for external booster heater connection

9.2.1 Connection to heat pump

- ▶ Select pipe size according to table 11.
- ▶ Connect the flow from the heat pump [3] to the heat transfer medium in [1] Figure 18.
- ▶ Connect the return to the heat pump [4] to the heat transfer medium out [2] figure 18.

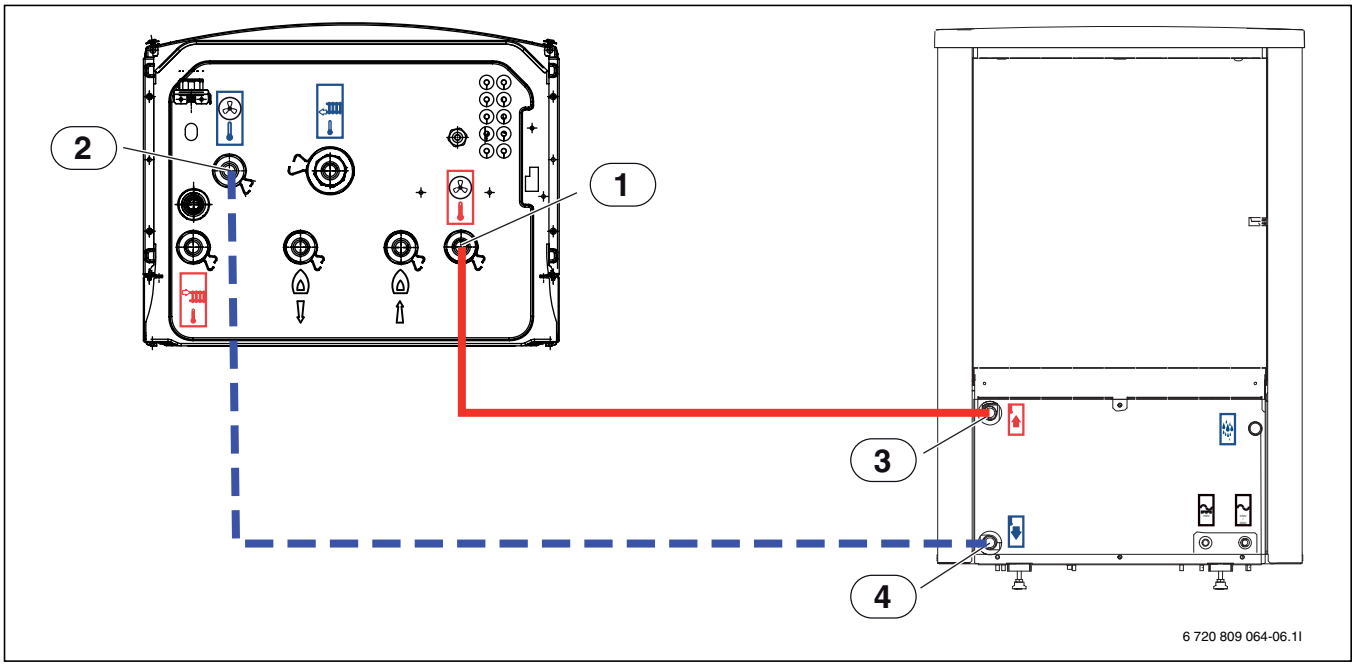


Fig. 18 Connection of the heat pump module with mixing valve for external booster heater to the heat pump

[1] Heat transfer medium in (from heat pump)
[2] Heat transfer medium out (to the heat pump)
[3] Flow from heat pump
[4] Return to heat pump

Heat pump output (kW)	Heat transfer fluid delta (K)	Nominal flow (L/s)	Maximum pressure drop (kPa)[1]	AX20 inner-Ø 15 (mm)	AX25 inner-Ø 18 (mm)	AX32 inner-Ø 26 (mm)	AX40 inner-Ø 33 (mm)
				Maximum pipe length PEX (m)[2]			
5	7	0.32	50	17	42	60	
7	7	0.32	52	17	44	60	
9	7	0.32	54		45	60	
13	7	0.56	40			60	60
17	7	0.58	40			60	60

Table 11 Pipe dimensions and max. pipe lengths for connection of heat pump to heat pump module with a mixing valve for external booster heater

1) For pipes and components between the indoor (heat pump module) and outdoor unit (heat pump).

2) Pipe lengths are calculated to allow the installation of a 3-way valve for DHW in the system.

9.2.2 Connection to an external booster heater and the heating system

The following heat pump module connections are installed:

- ▶ Run the leakage drain hose from [4] Fig. 19 down to a frost protected drain.
- ▶ Connect return to external booster heater to [1] **Fig. 19.**
- ▶ Connect the flow from the external booster heater to [2] Fig. 19.
- ▶ Connect the flow to the heating system to [3] Fig. 19.
- ▶ Connect the return from the heating system to [5] Fig. 19.

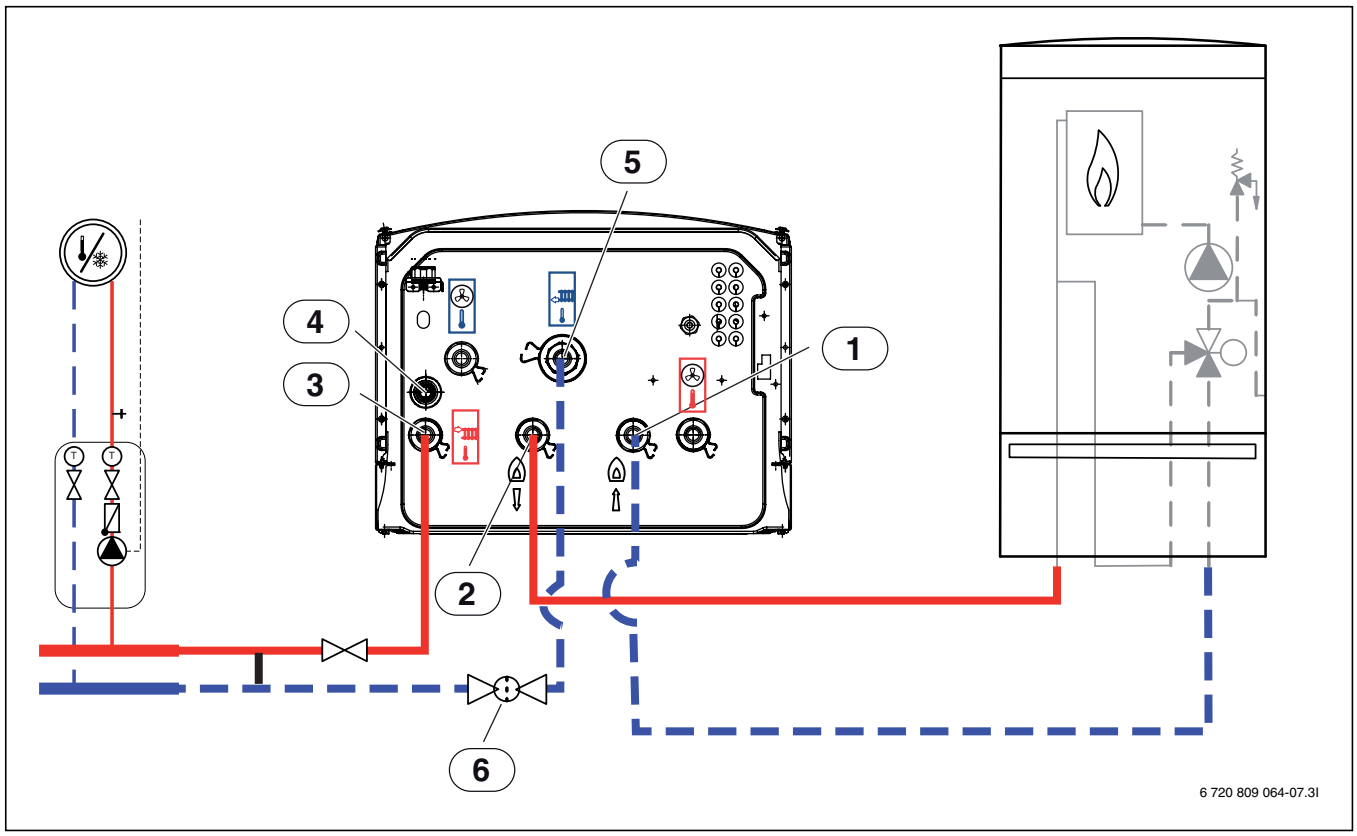


Fig. 19 Connection of the heat pump module with mixing valve for external booster heater to the heating system and booster heater

[1] Return to booster heater
[2] Flow from booster heater
[3] Flow to heating system
[4] Leakage drain water drain from safety valve
[5] Return from heating system
[6] Particle filter

9.2.3 Circulation pump for external booster heater

If the external booster heater does not have a built in circulation pump, an external circulation pump must be installed.

Contact the manufacturer of the external booster heater for information on how to regulate the circulation pump.

9.3 Filling the heating system

First flush the heating system. If a water heater is connected to the system, it must be filled with water first. The heating system is then filled.

9.3.1 Heat pump and heat pump module filling

If the heat pump module and the heating system is filled before the heat pump is connected, then the heat transfer medium in and out to / from the heat pump must be connected to secure circulation.

- ▶ Open shut-off valves on the heat transfer circuit, if applicable.

When filled, the system has to be thoroughly vented.

- ▶ Fill the system according to these instructions.
- ▶ Connect the system to power as described in Chapter 9.4.
- ▶ System commissioning as described in Chapter 13.
- ▶ Vent the system as described in Chapter 16.

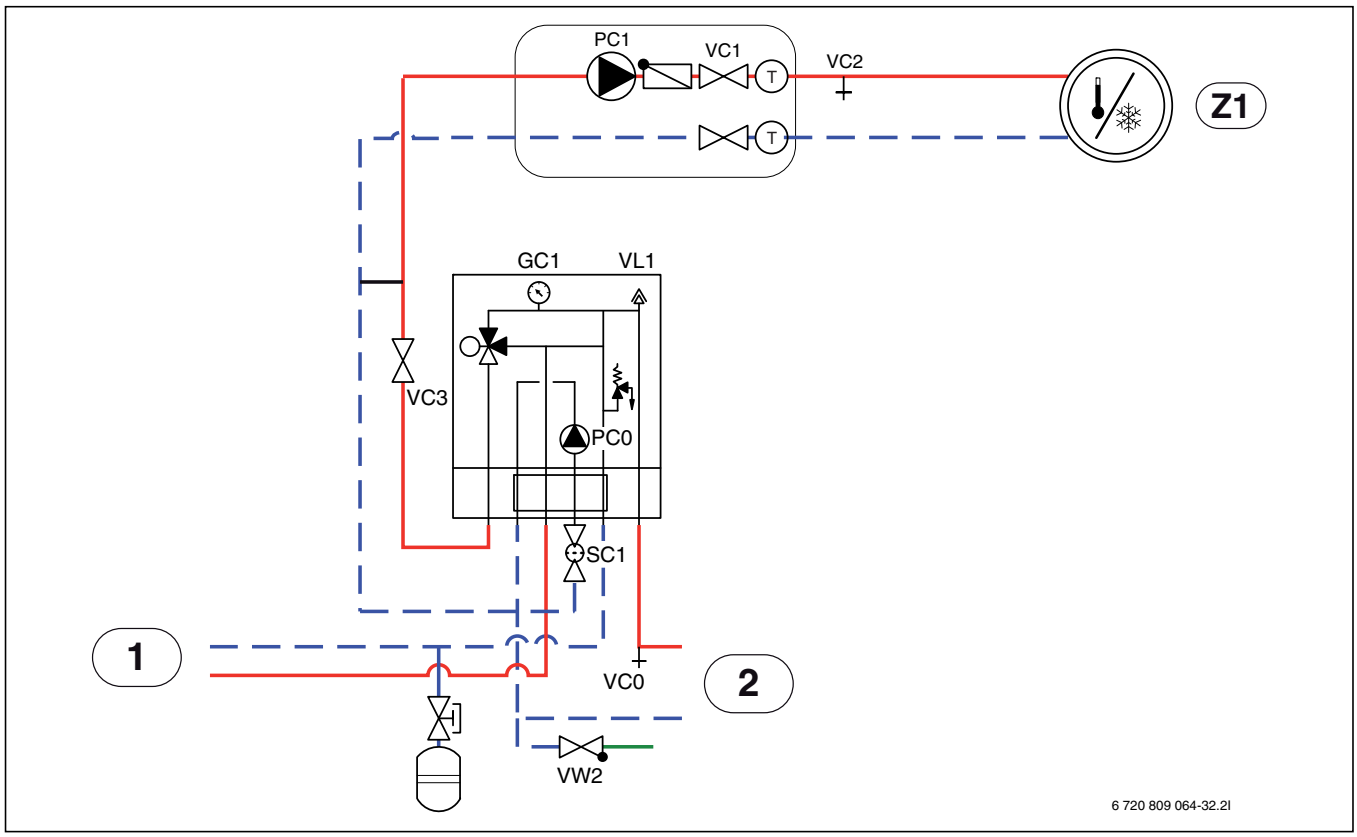


Fig. 20 Heat pump module with external booster heater and heating system

[Z1] Heating system (without mixing valve)
[1] External booster heater
[2] Heat pump

See fig. 20:

1. Disconnect the heat pump and heat pump module power.
2. Activate automatic venting of VL1 by unscrewing the screw a couple of turns without removing it.
3. Close the heating system valves; particle filter SC1 and VC3.
4. Connect one end of a hose to VC0 and the other end to a drain. Open the drain valve VC0.
5. Open the fill valve VW2 to fill the heat pump pipes.
6. Continue filling until only water comes out of the hose by the drain.
7. Close the drain valve VC0 and fill valve VW2.
8. Move the hose to the heating system drain valve VC2.
9. Open the valve VC3, the drain valve VC2 and the fill valve VW2 to fill the heating system.
10. Continue filling until only water comes out of the hose by the drain.
11. Close the drain valve VC2.
12. Vent the external booster heater according to its instructions.
13. Open the particle filter SC1 and keep filling until the pressure gauge GC1 shows 2 bar.
14. Close the fill valve VW2.
15. Remove the hose from VC2.
16. →chapter 16.

9.4 Electric connection of external booster heater

An external booster heater with mixing valve requires some extra connections and settings.

9.4.1 External booster heater alarm signal

With an external booster heater with mixing valve, the alarm signal is connected to a terminal FM0 on the heat pump module installer module (Circuit diagram → Fig. 27).

If the booster heater with mixing valve does not have a 230 V alarm output, FM0 must be connected according to alternative [1b] (circuit diagram → Fig. 27).

9.4.2 External booster heater start signal

For output EM0 (circuit diagram → Fig. 26) the following applies:

- Max. load on the 230 V signal output: 2A, cosφ>0.4.
- Higher load requires installation of an intermediate relay (not included).
- If the external booster heater requires potential free contact, an intermediate relay must be installed (not included).

Please note that the mixing valve does not open immediately after the external booster heater has been activated. This delay can be set in the user interface (→ Chapter 14.2.3).

The external booster heater may start and stop several times. This is normal. If there are problems with the external booster heater because the operating times are too short, a parallel buffer tank in the flow/return of the external booster heater can extend the operating time. For more information, consult the manufacturer of the external booster heater.

9.4.3 0 - 10V control of external booster heater

The capacity of certain external booster heaters (booster heater cassettes and modulating gas boilers) can be controlled with 0-10V signal connected to the installer module's output EMO 0-10V according to Fig 21.

If 0-10V control is used, the mixing valve (→[3] Fig. 15) must be set manually to fully open.

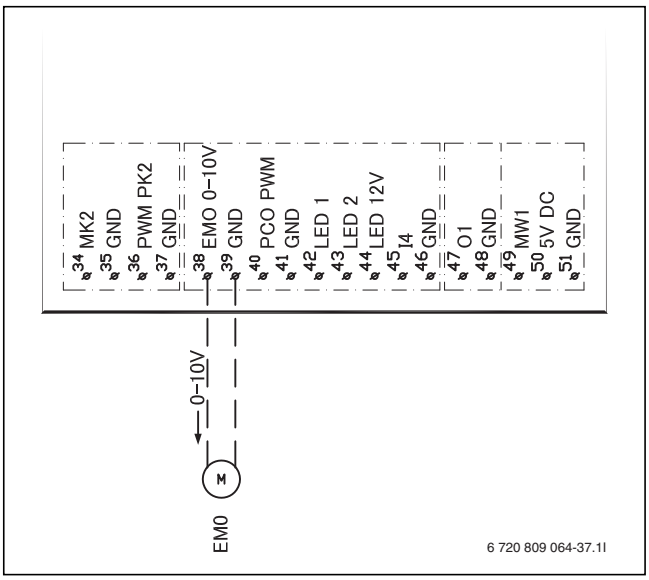


Fig. 21 0 - 10V control of external booster heater

9.4.4 Magnet valve for external booster heater with volume flow control

When an external booster heater is used, that is equipped with flow control (usually wall mounted gas boilers with low water content), a magnet valve must be installed on the external booster heater flow.

The solenoid valve must be installed in such a way that:

- a start of the boiler circulation pump opens the valve
- a stop of the boiler circulation pump closes the valve

Depending on the flow monitor sensitivity, a fast motor valve can also be used for noise reduction.

Boilers without flow rate control (such as floor standing boilers) do not require this function.

9.4.5 Open/closed mixing valve (VM0)

The mixing valve VM0 is opened with a signal from connection 62 and closed with connection 63 on connection terminal VM0 (→ fig. 25).

9.5 Heat pump module with mixing valve for external booster heater circuit diagram

9.5.1 Overview of CAN-BUS and EMS, heat pump module with mixing valve for external booster heater

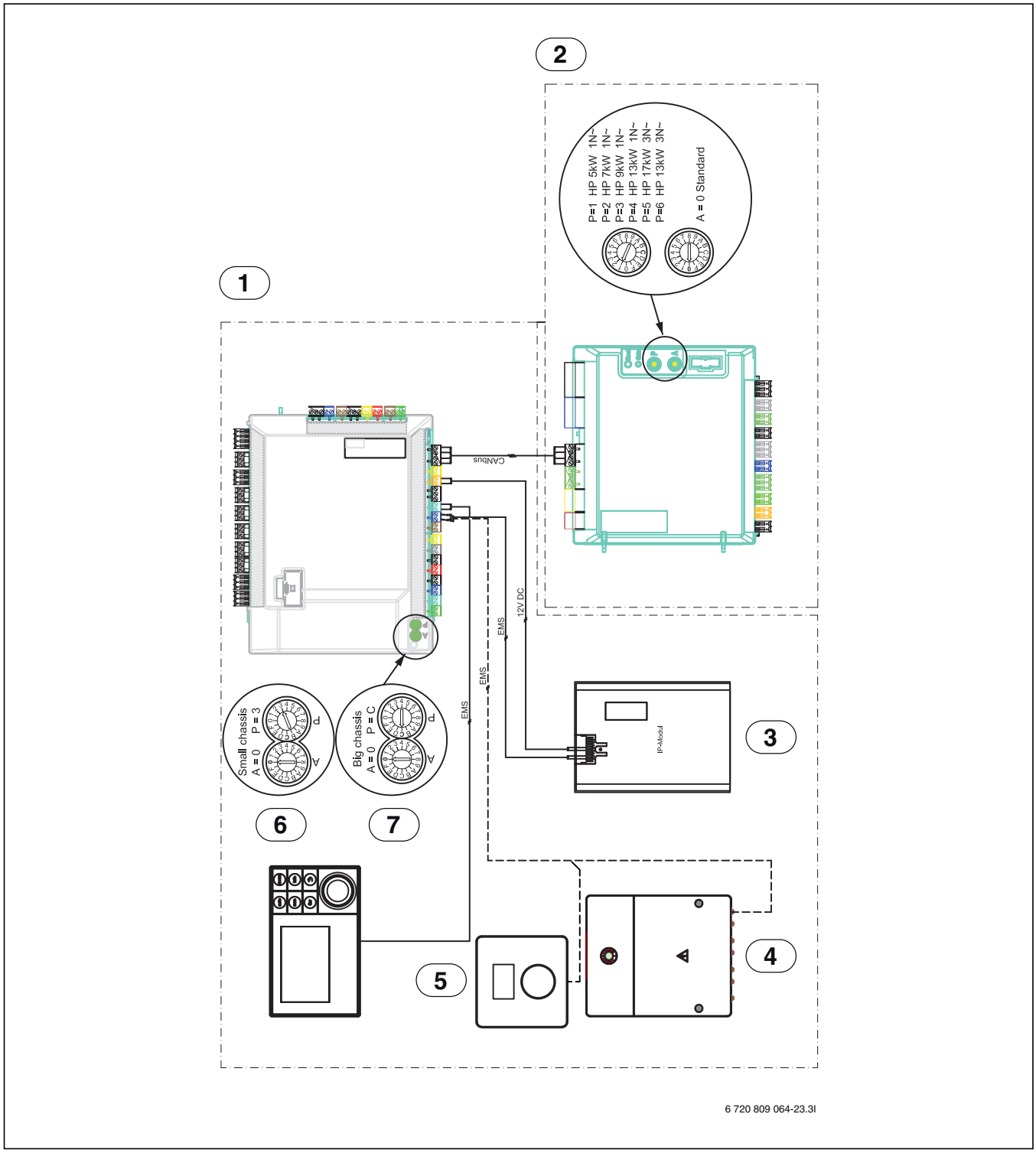


Fig. 22 Overview CAN-/EMS-BUS heat pump module with mixing valve for external booster heater

[1] Heat pump module
[2] Heat pump A = 0 is standard
[3] IP module
[4] Accessories
[5] Room controller (accessories)
[6] AWB 5-9
[7] AWB 13-17

————	Delivered connected
– — — — –	Connected during installation/ accessories

9.5.2 Single phase heat pump and external booster heater

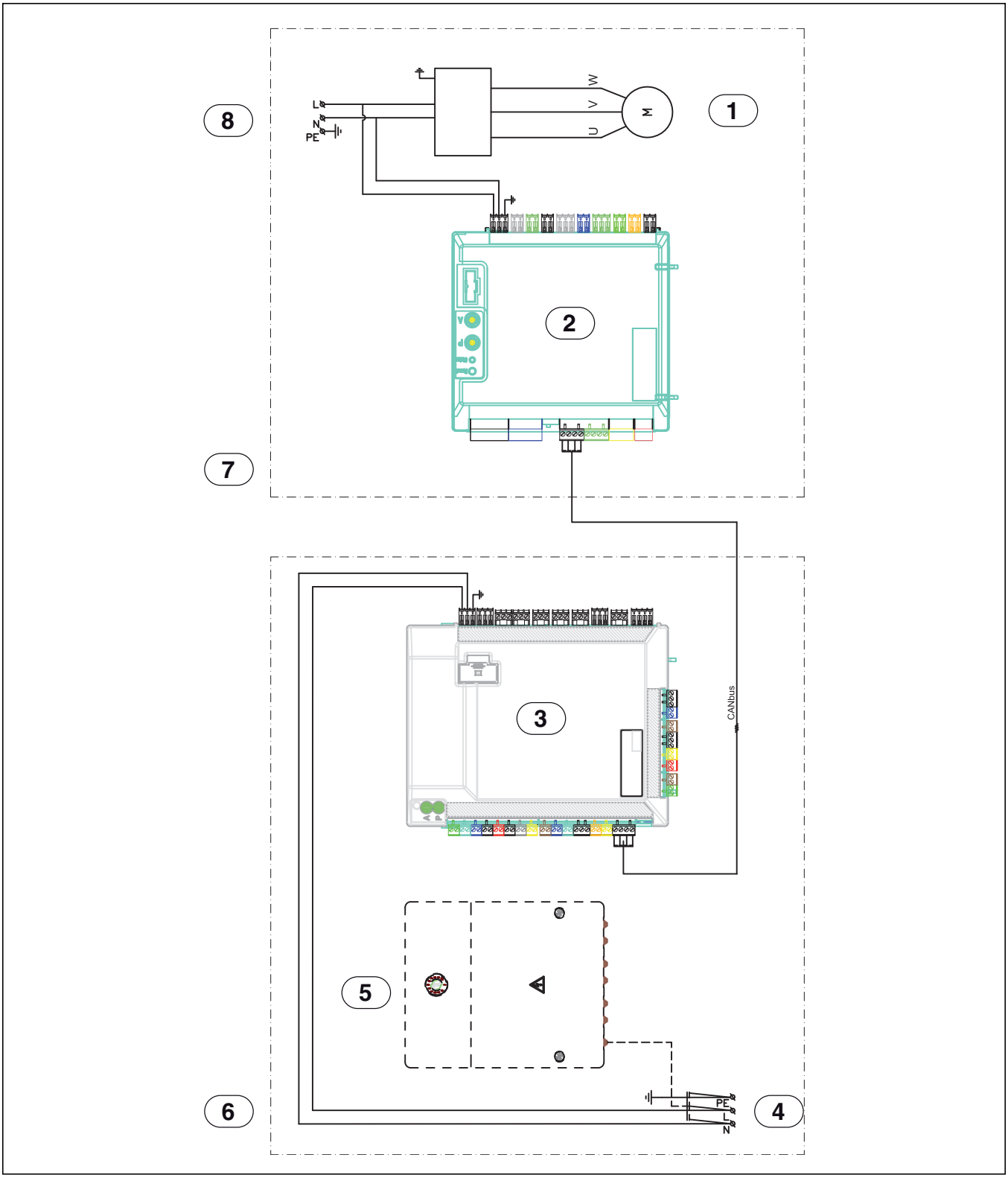


Fig. 23 Overview of heat pump module with external booster heater

[1] Compressor
[2] I/O module heat pump
[3] Installer module
[4] Input 230V ~1N
[5] Accessories
[6] Heat pump module
[7] Heat pump
[8] Input 230V ~1N

9.5.3 Triple phase heat pump and external booster heater

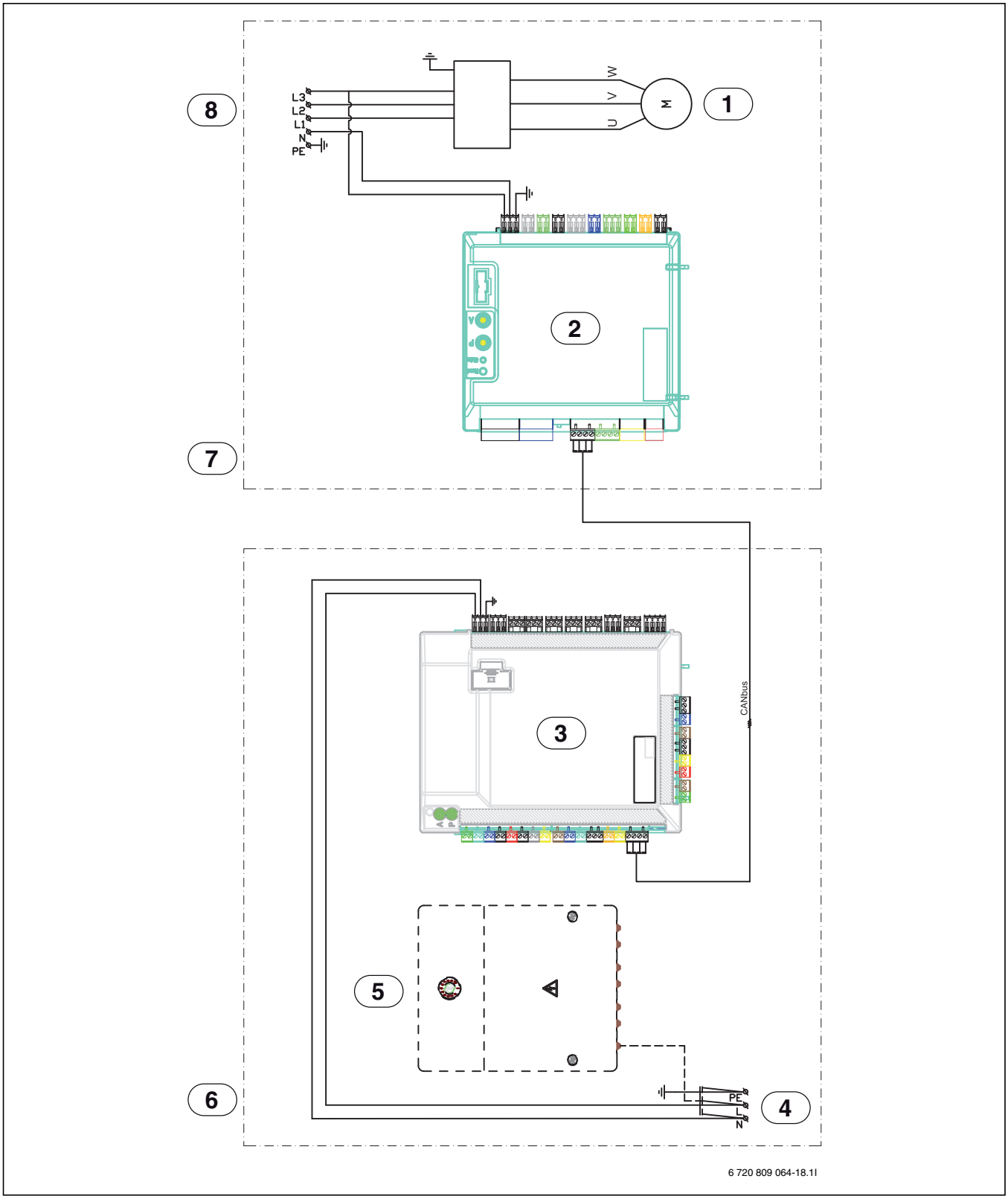


Fig. 24 Overview of heat pump module with external booster heater

[1] Compressor
[2] I/O module heat pump
[3] Installer module
[4] Input 230V ~1N
[5] Accessories
[6] Heat pump module
[7] Heat pump
[8] Input 400V ~3N

9.5.4 Installer module circuit diagram, heat pump module with mixing valve for external booster heater

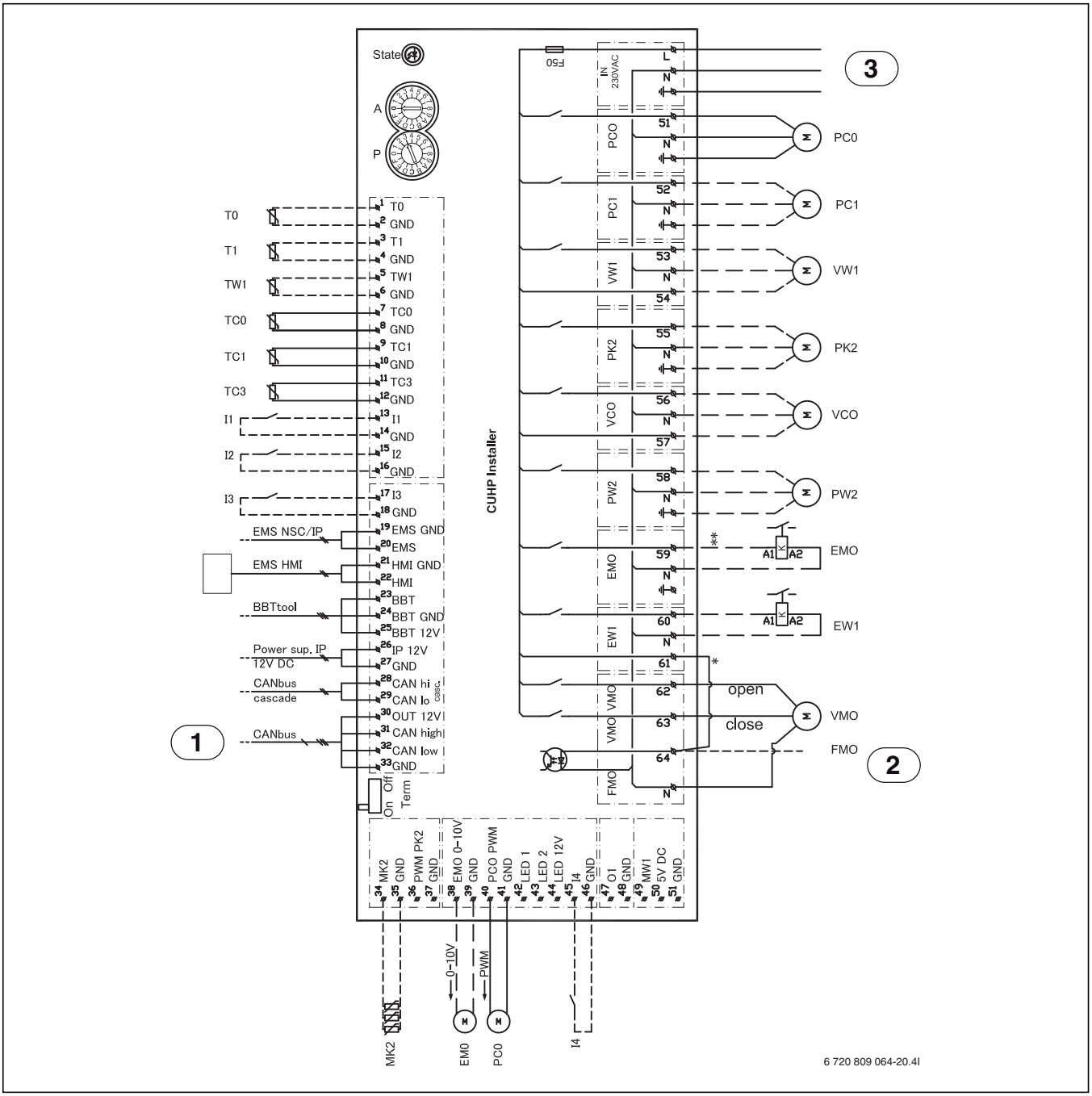


Fig. 25 Installer module circuit diagram

[I1] External input 1
[I2] External input 2
[I3] External input 3
[I4] External input 4
[MK2] Condensation sensor
[T0] Flow temperature sensor
[T1] Outside temperature sensor
[TW1] DHW temperature sensor
[TC0] Return heat transfer medium temperature sensor
[TC1] Flow heat transfer medium temperature sensor
[EW1] Immersion heater start signal in water heater (external) 230 V output
[F50] Fuse 6.3 A
[EM0] External heat source 0-10V control
[PC0] Circulation pump PWM signal
[PC0] Heat transfer medium circulation pump
[PC1] Heating system circulation pump
[PK2] Cold season relay output 230 V/cooling circulation pump
[PW2] DHW circulation pump
[VC0] Cooling exchange valve bypass, cooling off/on 230 V output
[VW1] Heating/DHW exchange valve
[EM0] External heat source start/stop
[VM0] External heat source mixing valve (open/close)
[1] CAN BUS to heat pump (I/O-module)
[2] FMO, External heat source alarm 230 V input
[3] 230 V~ operating voltage

Relay output max. load: 2A, cosφ>0.4. Higher load requires installation of an intermediate relay.

————	Delivered connected
– — — — –	Connected during installation/ accessories

9.5.5 Installer module circuit diagram, start/stop for external booster heater

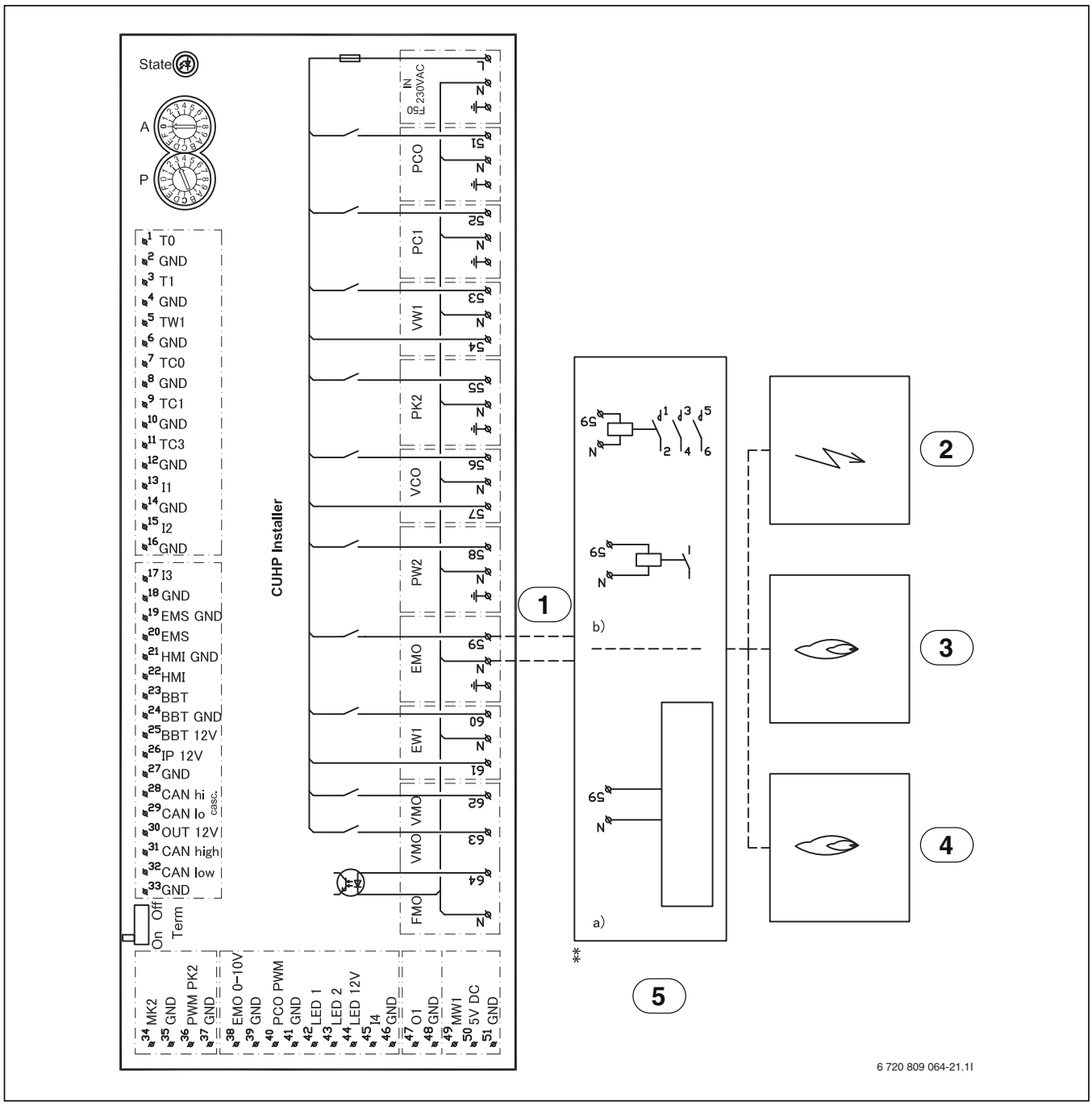


Fig. 26 Installer module circuit diagram start/stop

[1] 230 V AC output
[2] Electric boiler
[3] Oil boiler
[4] Gas boiler
[5] EM0 start/stop
[5a] Relay output max. load: 2A, cosφ>0.4
[5b] Higher relay output load requires installation of an intermediate relay

9.5.6 Installer module circuit diagram, alarm for external booster heater

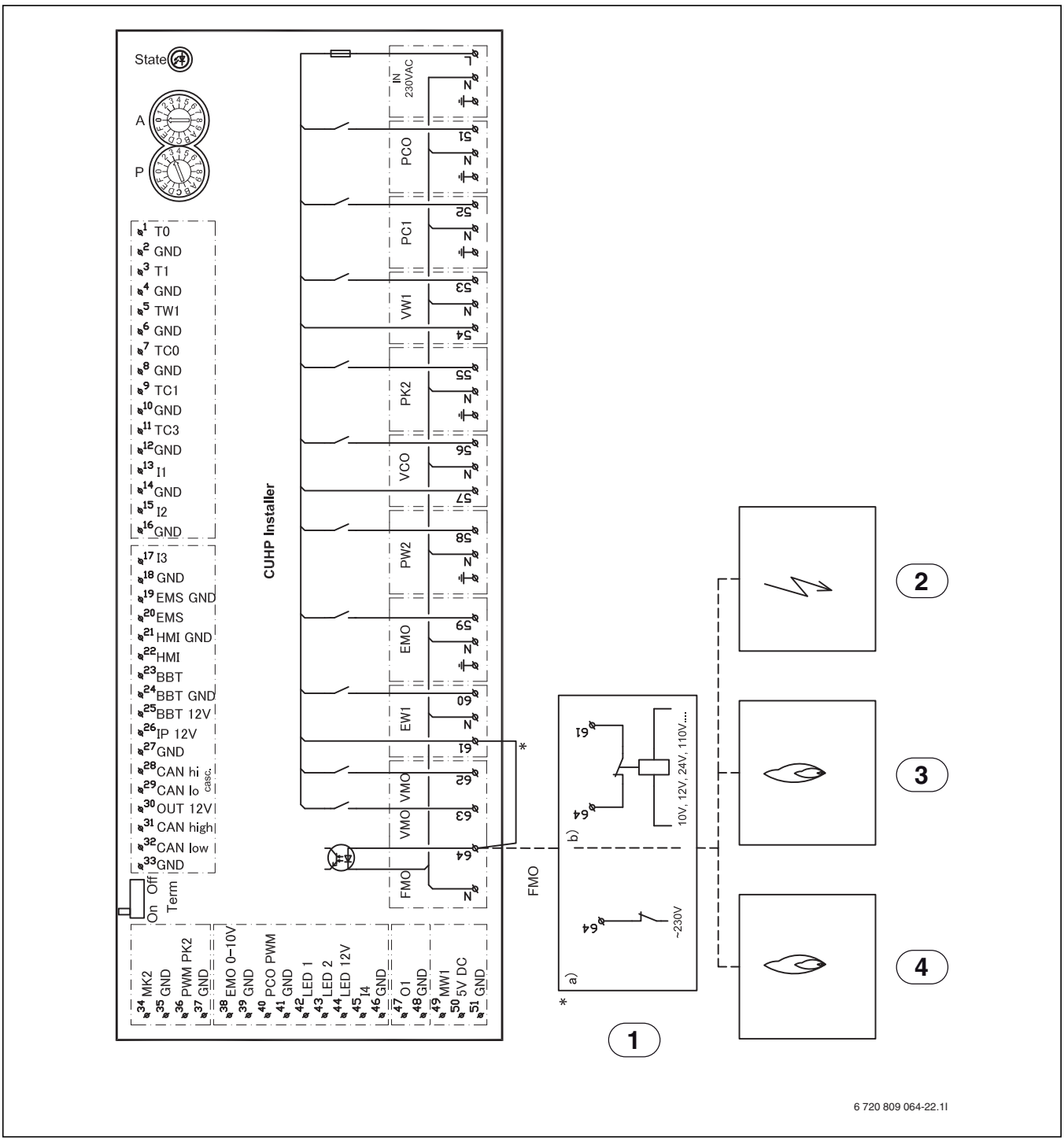


Fig. 27 Installer module circuit diagram alarm for external booster heater

[1a] 230 V AC input
[1b] Alternative connection
[2] Electric boiler
[3] Oil boiler
[4] Gas boiler

If there is a 230 V AC alarm signal from the external heat source:

- ▶ Remove the cable (*) between terminal 61 and 64.
- ▶ Connect a 230 V AC alarm signal from an external heat source to terminal 64 according to [1a].

If there is no 230 V AC alarm signal from the external heat source:

- ▶ Connect an alarm signal from an external heat source according to [1b].

10 Installation of a heat pump module with an integrated immersion heater

Only qualified installers may carry out the installation. The installer must follow applicable rules and regulations and recommendations from the supplier.

10.1 Overview of installation of a heat pump module with an integrated immersion heater

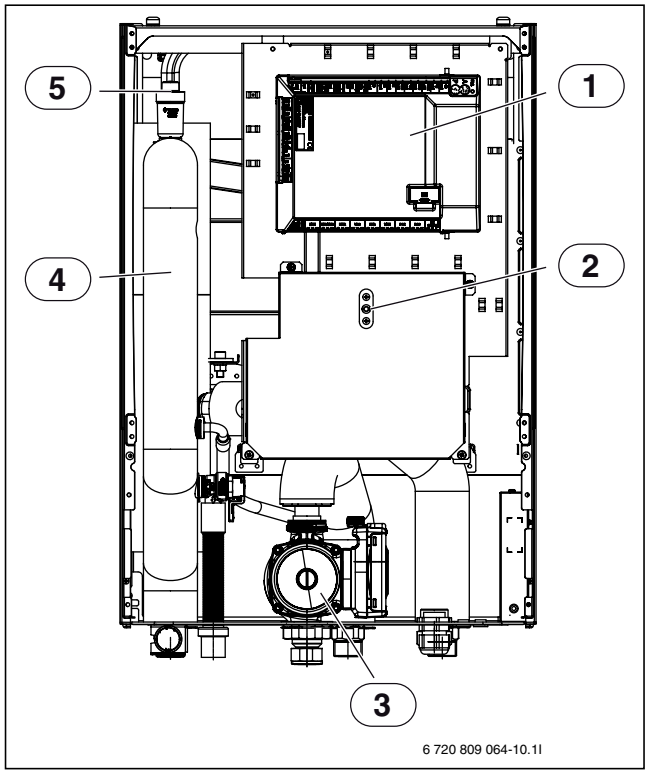


Fig. 28 Heat pump module with immersion heater

[1] Installer module
[2] Overheating protection reset
[3] Circulation pump
[4] Immersion heater
[5] Automatic air vent valve (VL1)

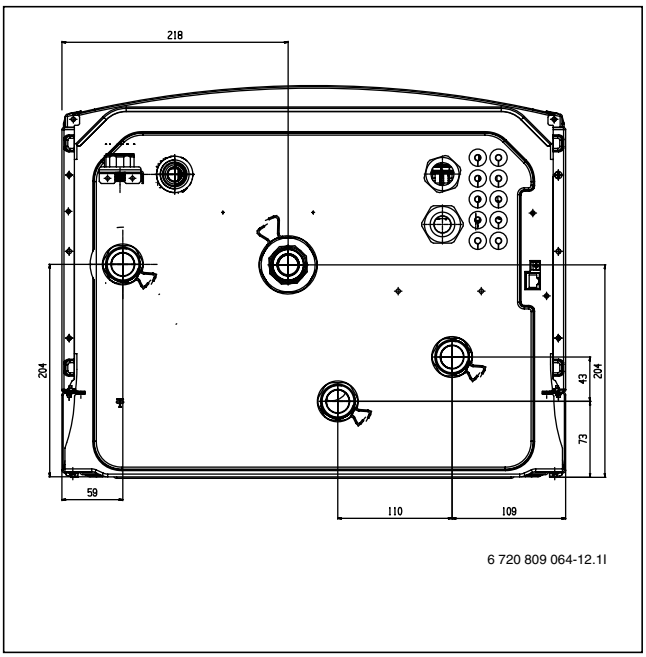


Fig. 29 Heat pump module with immersion heater, dimensions in mm

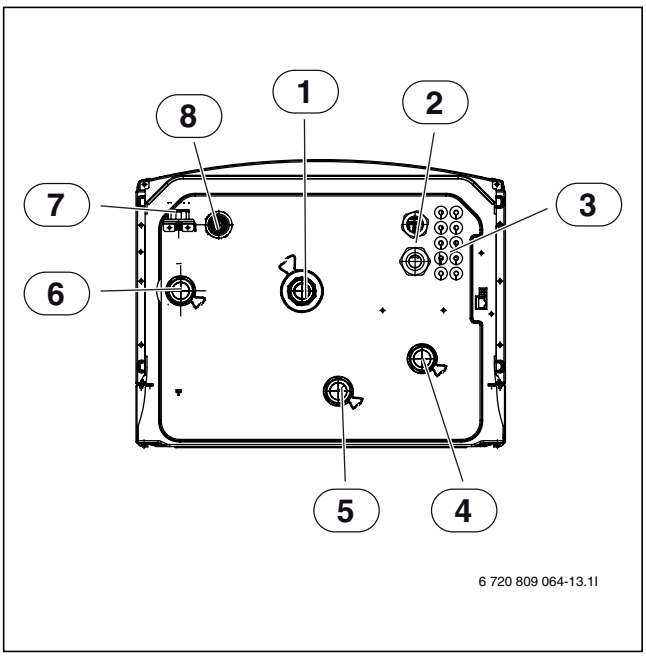


Fig. 30 Pipework for heat pump module with immersion heater

[1] Return from heating system
[2] Cable feed sensor, CAN-BUS and EMS-BUS
[3] Cable feed power in
[4] Heat transfer medium in from heat pump
[5] Heat transfer medium out to heat pump
[6] Flow to heating system
[7] Pressure gauge
[8] Leakage drain water drain from safety valve

10.2 Connection of a heat pump module with an integrated immersion heater

The following heat pump module connections are installed:

- Run the leakage drain hose from [6] Fig. 31 down to a frost protected drain.
- Select pipe size according to table 12.
- Connect heat transfer medium pipes in from the heat pump to [1] Fig. 31.
- Connect heat transfer medium pipes out to the heat pump to [2] Fig. 31.
- Connect the return from the heating system to [7] Fig. 31.
- Connect the flow to the heating system to [6] Fig. 31.

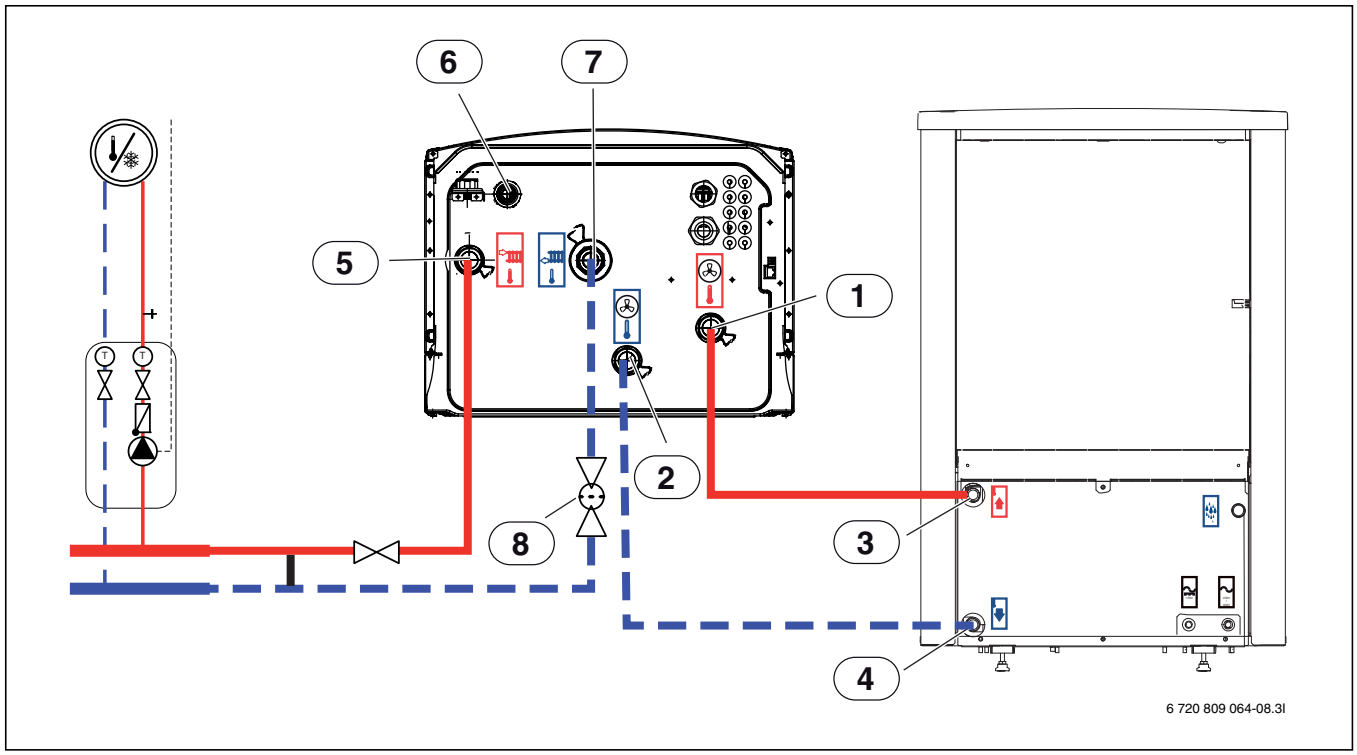


Fig. 31 Connection of a heat pump module with an immersion heater to a heat pump and heating system

[1] Heat transfer medium in from heat pump
[2] Heat transfer medium out to heat pump
[3] Flow from heat pump
[4] Return to heat pump
[5] Flow to heating system
[6] Leakage drain water drain from safety valve
[7] Return from heating system
[8] Particle filter

Heat pump output (kW)	Heat transfer fluid delta (K)	Nominal flow (L/s)	Maximum pressure drop (kPa)[1]	AX20 inner-Ø 15 (mm)	AX25 inner-Ø 18 (mm)	AX32 inner-Ø 26 (mm)	AX40 inner-Ø 33 (mm)
				Maximum pipe length PEX (m)[2]			
5	5	0.32	55	18	46	60	
7	5	0.34	57	17	43	60	
9	5	0.43	44		21	60	
13	5	0.63	34			48	60
17	5	0.82	10			22[3]	60[3]

Table 12 Pipe dimensions and max. pipe lengths for connection of heat pump to heat pump module with integrated immersion heater

1) For pipes and components between the indoor (heat pump module) and outdoor unit (heat pump).
2) Pipe lengths are generally calculated to allow the installation of a 3-way valve for DHW in the system.
3) This pipe length is valid if there is no 3-way valve for DHW installed in the system.

10.3 Filling the heating system

First flush the heating system. If a water heater is connected to the system, it must be filled with water first. The heating system is then filled.

10.3.1 Heat pump and heat pump module filling

If the heat pump module and the heating system is filled before the heat pump is connected, then the heat transfer medium in and out to / from the heat pump must be connected to secure circulation.

- ▶ Open shut-off valves on the heat transfer circuit, if applicable.

When filled, the system has to be thoroughly vented.

- ▶ Fill the system according to these instructions.
- ▶ Connect the system to power as described in Chapter 9.4.
- ▶ System commissioning as described in Chapter 13.
- ▶ Vent the system as described in Chapter 16.

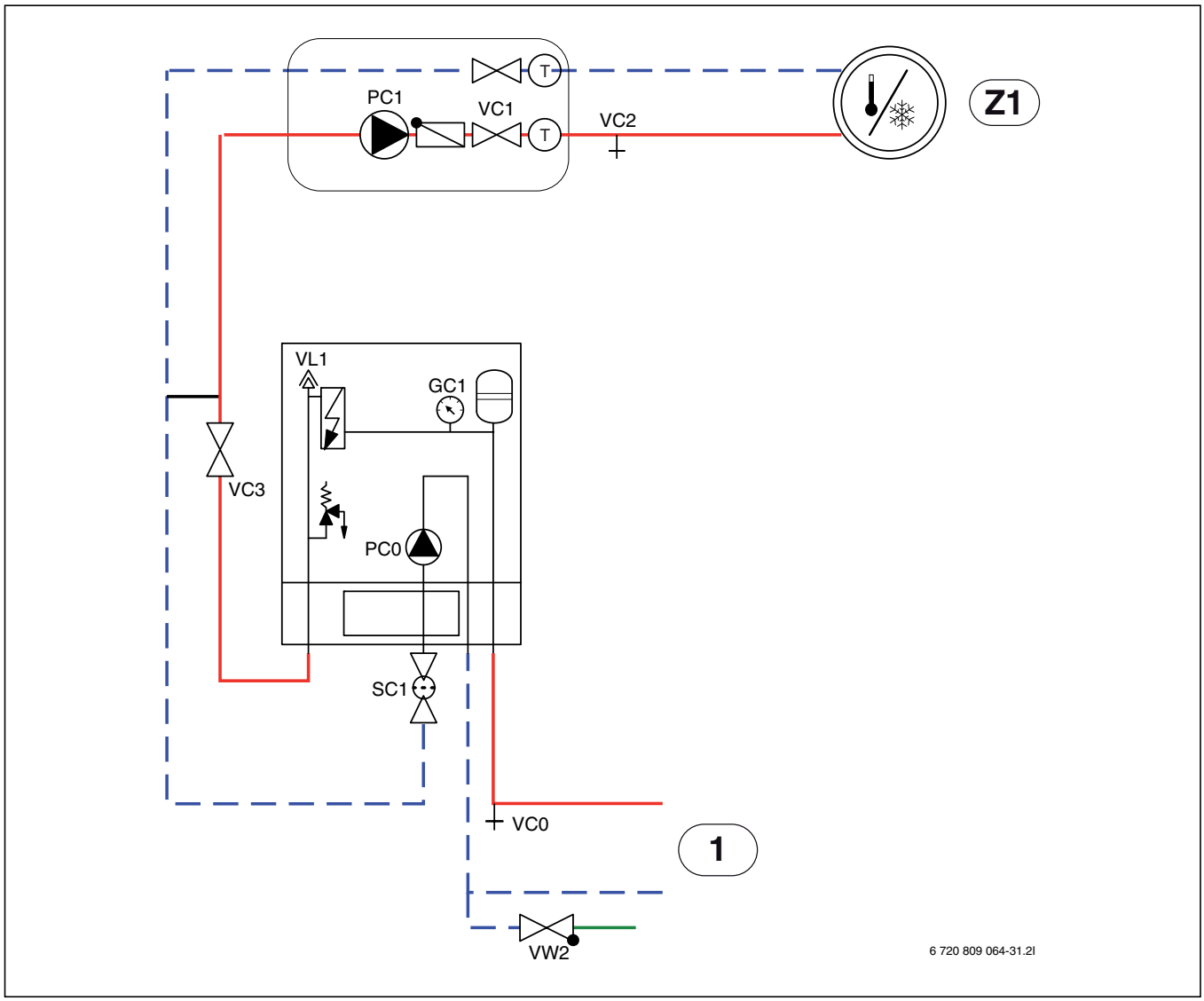


Fig. 32 Heat pump module with an integrated immersion heater and heating system

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

See fig. 32:

1. Disconnect the heat pump and heat pump module power.
2. Activate automatic venting of VL1 by unscrewing the screw a couple of turns without removing it.
3. Close the heating system valves; particle filter SC1 and VC3.
4. Connect one end of a hose to VC0 and the other end to a drain. Open the drain valve VC0.
5. Open the fill valve VW2 to fill the heat pump pipes.
6. Continue filling until only water comes out of the hose by the drain and the outdoor unit's condenser does not form bubbles any more.
7. Close the drain valve VC0 and fill valve VW2.
8. Move the hose to the heating system drain valve VC2.
9. Open the valve VC3, the drain valve VC2 and the fill valve VW2 to fill the heating system.
10. Continue filling until only water comes out of the hose by the drain and the heating system does not form bubbles.
11. Close the drain valve VC2.
12. Open the particle filter SC1 and keep filling until the pressure gauge GC1 shows 2 bar.
13. Close the fill valve VW2.
14. Remove the hose from VC2.
15. →chapter 16.

10.4 Heat pump module with an integrated immersion heater circuit diagram

10.4.1 Integrated immersion heater standard electrical connection (standard setting)

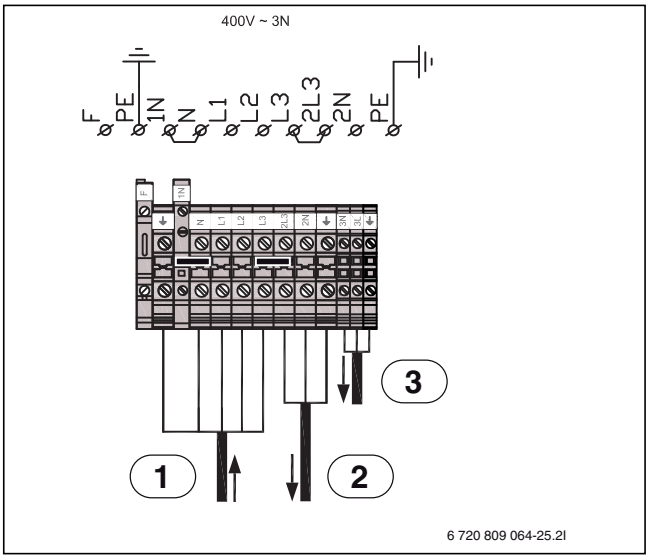


Fig. 33 Integrated immersion heater standard electrical connection

[1] 400 V ~3N input to heat pump module
[3] 230 V ~1N input to accessories
[2] 230 V ~1N output tot single phase heat pump

Heating output		K1	K2	K3
2000	W	X		
4000	W		X	
6000	W	X	X	
9000	W	X	X	X

Table 13 Immersion heater power control step

K3 is blocked during compressor mode. With only immersion heater and turned off compressor, the power control step is: 3-6-9 kW.

10.4.2 Alternative integrated single phase immersion heater

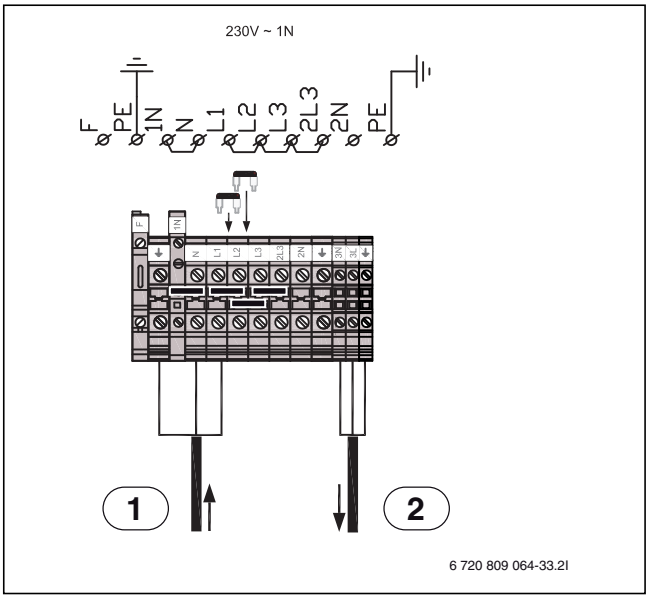


Fig. 34 Alternative electrical connection ~1N integrated immersion heater

[1] 230 V ~1N input to heat pump module
[2] 230 V ~1N input tot single phase heat pump and accessories

If single phase input is used:
- Install bridges between L1-L2 and L2-L3 according to fig.2.

10.4.3 Single phase heat pump and three phase integrated immersion heater

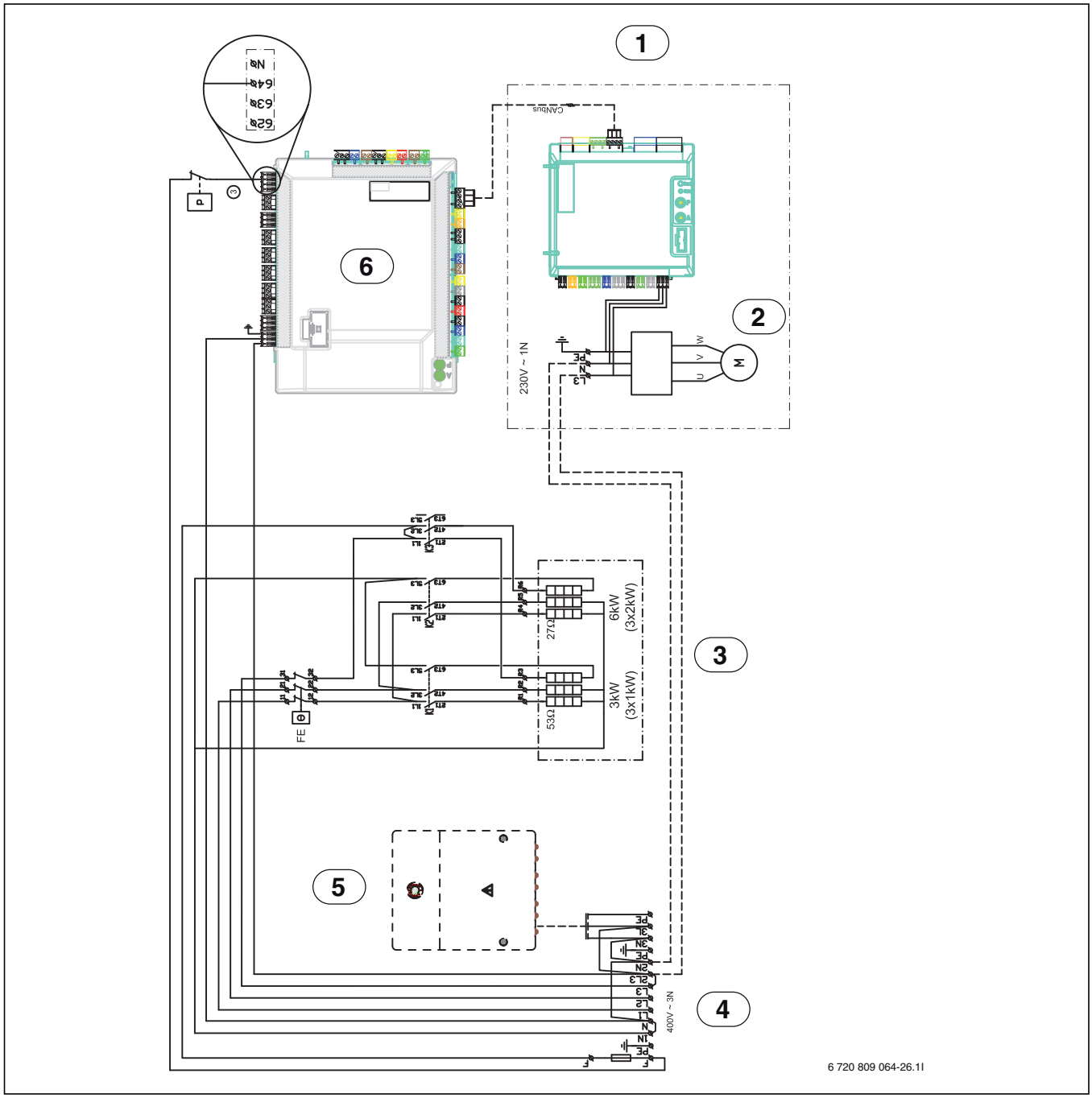


Fig. 35 Single phase heat pump and three phase integrated immersion heater

[1] Heat pump
[2] Compressor
[3] Immersion heater
[4] Input 400V ~3N
[5] Accessories
[6] Installer module in heat pump module
[P] Pressure switch

————	Delivered connected
– — — — –	Connected during installation/ accessories

Single phase heat pump must always be connected to a three phase heat pump module according to the circuit diagram.

Max. 6 kW immersion heater together with a compressor.
▶ K3 not together with the compressor.

10.4.4 Three phase heat pump and three phase integrated immersion heater

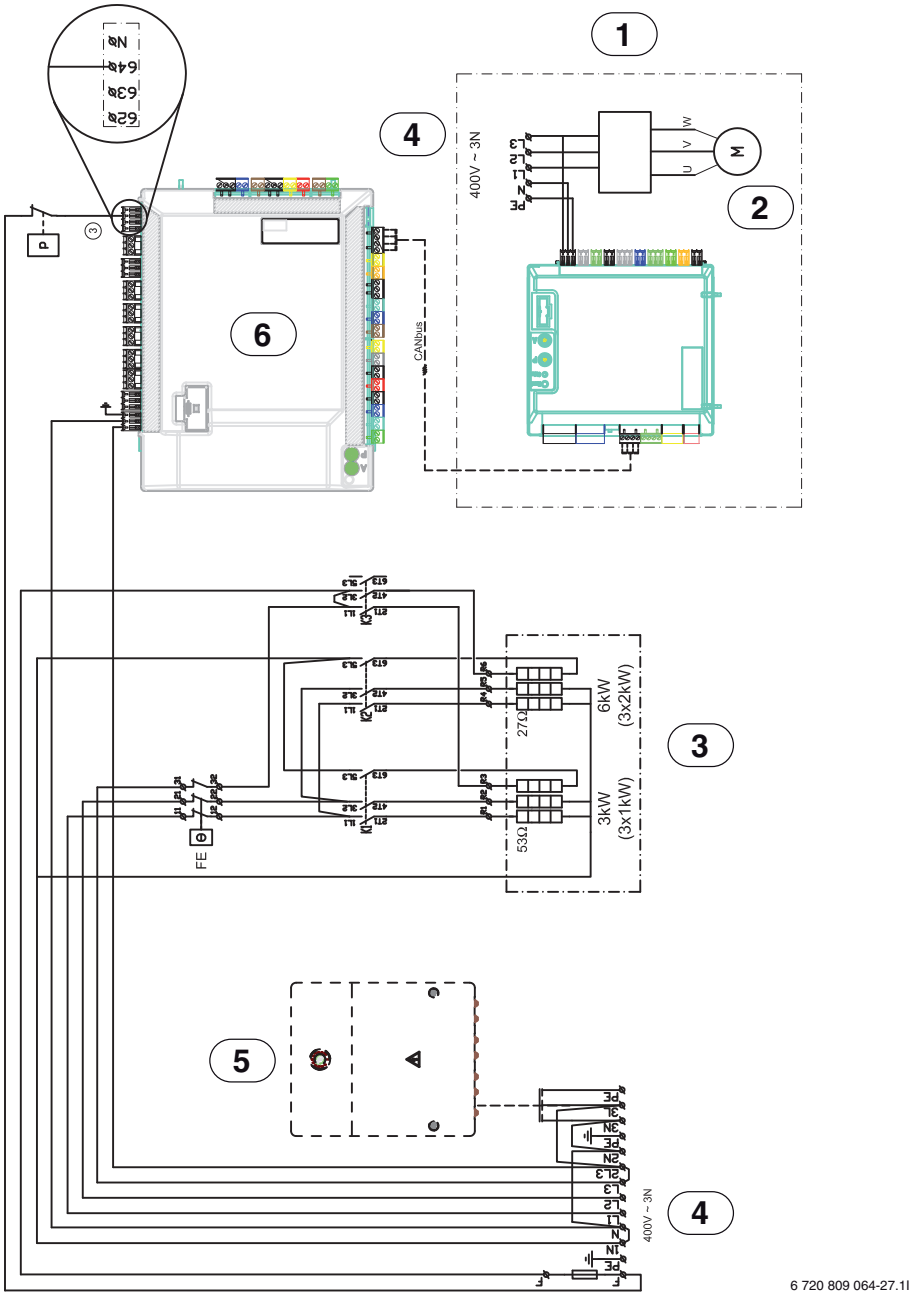


Fig. 36 Three phase heat pump and integrated immersion heater

[1] Heat pump
[2] Compressor
[3] Immersion heater
[4] Input 400 V ~3N, separate heat pump power supply
[5] Accessories
[6] Installer module in heat pump module
[P] Pressure switch

————————	Delivered connected
– — — — —	Connected during installation/ accessories

10.4.5 Installer module circuit diagram, integrated immersion heater

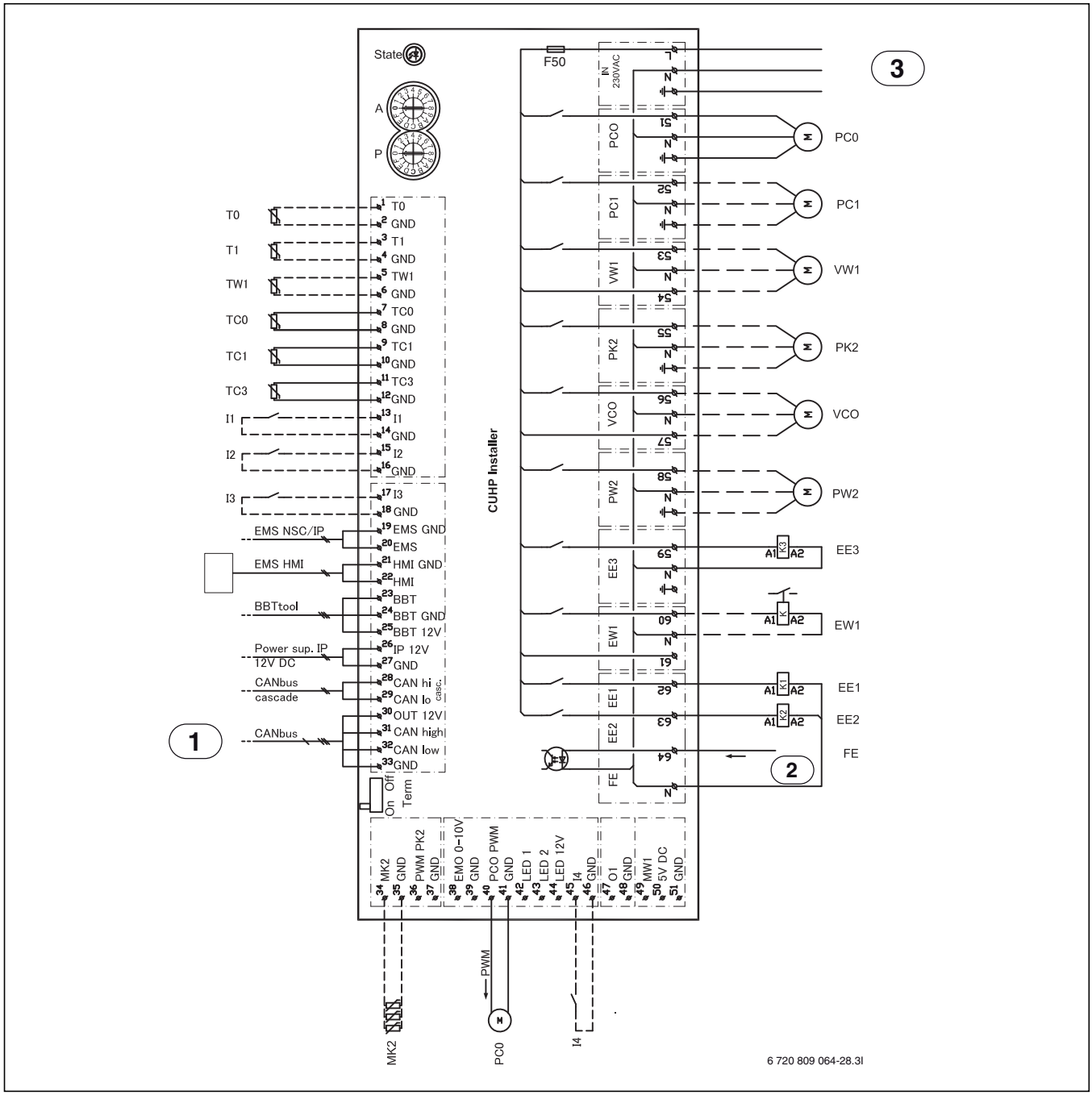


Fig. 37 Installer module circuit diagram

[I1] External input 1
[I2] External input 2
[I3] External input 3
[I4] External input 4
[MK2] Condensation sensor
[T0] Flow temperature sensor
[T1] Outside temperature sensor
[TW1] DHW temperature sensor
[TC0] Return heat transfer medium temperature sensor
[TC1] Flow heat transfer medium temperature sensor
[EW1] Immersion heater start signal in water heater (external) 230 V output
[F50] Fuse 6.3 A
[PC0] Circulation pump PWM signal
[PC0] Heat transfer medium circulation pump
[PC1] Heating system circulation pump
[PK2] Circulation pump cooling/fan convector
[PW2] DHW circulation pump
[VC0] Recirculation exchange valve. 230 V output
[VW1] Heating/DHW exchange valve
[EE1] Immersion heater step 1
[EE2] Immersion heater step 2
[EE3] Immersion heater step 3
[1] CAN-BUS to the heat pump (I/O module)
[2] FE; pressure switch alarm or immersion heater. 230 V input
[3] 230 V~ operating voltage

Relay output max. load: 2A, cosφ>0.4. Higher load requires installation of an intermediate relay.

————	Delivered connected
– — — — –	Connected during installation/ accessories

10.4.6 Overview CAN-BUS and EMS

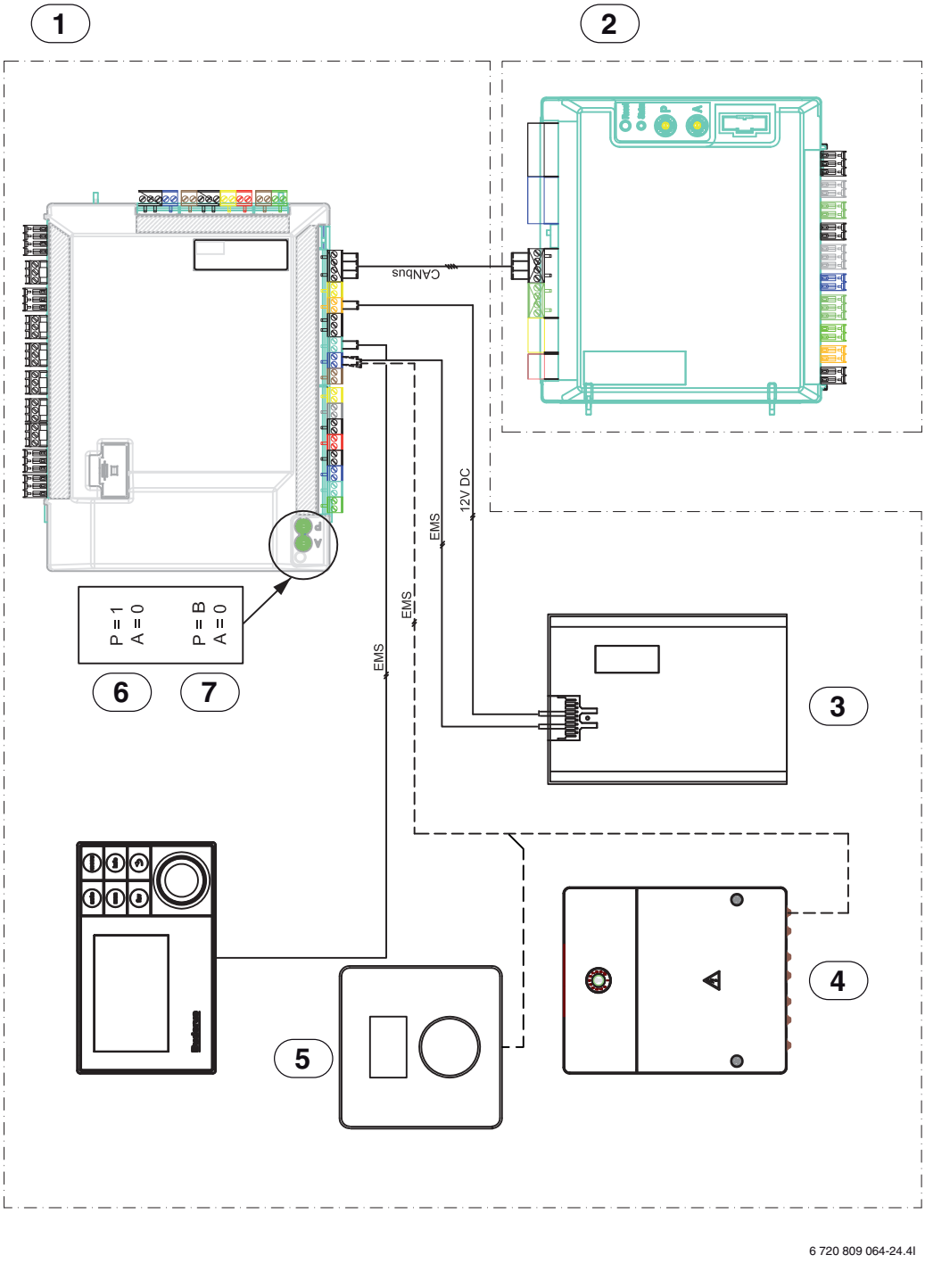


Fig. 38 Overview CAN-/EMS-BUS immersion heater

[1] Heat pump module
[2] Heat pump
[3] IP module
[4] Accessories
[5] Room controller (accessories)
[6] AWE 5-9
[7] AWE 13-17

————	Delivered connected
– — — — —	Connected during installation/ accessories

11 User interface

11.1 Product description

- The user interface will manage a heating system with max. four heating/cooling circuits, DHW heating with solar energy and heating from solar power.
- In heat pump mode, optimized operation without time program will provide the lowest energy consumption.
- The user interface can also operate according to a time program:
  - Heating: 2 time programs for each heating circuit with two break points per day. Heat circuits 2 to 4 can only change to heating mode when heating circuit 1 is in heating mode if there is no buffer cylinder installed.
  - DHW: a time program for DHW heating.
- The user interface shows information from the heat pump module and the heating system. It is also used to modify settings.
- After 1½ hour of operation the user interface has a battery life of at least 8 hours. If a power outage lasts longer than the battery life, the time and date settings will be erased. All other settings are saved.
- The functional scope and thus the menu structure of the user interface are determined by the structure of the system. Reference to the importance of the system structure to the functions will be made in relevant places. Setting ranges and standard settings may not correspond with the information in these instructions.

11.1.1 Control modes

The following main control modes are available for heating:

- **Outside temperature compensated control**: automatic flow temperature control based on outside temperature.
- **Outside temperature compensated control influenced by room temperature**: automatic flow temperature control based on outside temperature and room temperature. A room controller must be installed in the reference room.

If the cooling mode is active, it will be set to an adjustable constant temperature.

Further information on control modes and settings that influence control (→ chapter 14.3, page 48).

11.2 Important notices on usage

WARNING: Risk of scalding!
If thermal disinfection has been activated to avoid legionella, the hot water is heated once to in excess of 65 °C. The factory setting for the hot water temperature is 60 °C. There is a risk of scalding at the draw-off points if the temperature is set higher than this.

▶ Make sure that a mixing device that prevents scalding is installed. If in doubt, ask your contractor.

NOTICE: Floor damage!

▶ If using underfloor heating, ensure that the floor type max. temperature is not exceeded.

▶ Optionally, install an extra temperature switch, and connect it to one of the external inputs.

- Only products from the same distributor may be used within the EMS BUS system.

11.3 Optional accessories

For details regarding suitable accessories, please refer to the catalogue.

Function modules and user interfaces in the control system **EMS plus (designations in parenthesis are synonyms and will be used in the user interface)**:

- **Room controller CR-10 (RC100)** as a separate room controller
- **Room controller CR-10H (RC100H)** as a separate room controller, which measures relative humidity (for heating/cooling circuits)
- **MM100**: Module for heating and cooling circuits with mixing valve
- **MP100**: Module for heat pump heated pool
- **SM100**: Module for solar energy DHW heating
- **SM200**: Module for extended solar thermal systems

Instructions validity for modules supporting EMS plus

These instructions also apply to the user interface in combination with heating/cooling circuit module MM100 (accessories).

Additional setting options may be found in some menus, if your heating system is equipped with other modules (e.g. solar module, accessories). These setting options are described in the module technical information.

12 Basic principles of operation

12.1 Key and symbol overview

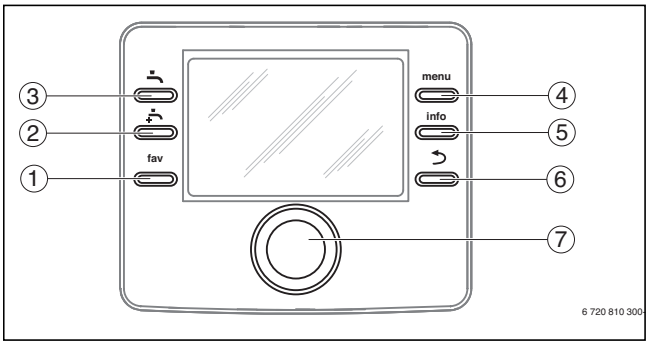


Fig. 39 Keys

If the display is turned off, it will turn on when a key is used and a function executed. Quickly press the selector to turn on the display. If you don't use any keys, the display will turn back off.

Pos.	Section	Designation	Explanation
1	fav	Favourites key	▶ Press this key to show favourite functions for heating/cooling circuit 1.
			▶ Keep this key pressed down to change Favourites menu settings (→ User interface operating instructions).
2		Extra DHW key	▶ Press this key to activate the extra DHW function (→ user interface operating instructions).
3		DHW key	▶ Press this key to activate the DHW operating mode (→ user interface operating instructions).
4	menu	Menu key	▶ Press this key to enter the main menu (→ user interface operating instructions).
5	info	Info key	When a menu is shown:
			▶ Press this key for more information about the selected item.
			When standard display is active:
			▶ Press this key to enter the information menu (→ user interface operating instructions).
6		Return key	▶ Press this key to return to the previous menu or to cancel changes.
			For maintenance or when an error has been detected:
			▶ Press this key to switch between standard display and error message.
			▶ Keep this key pressed down to switch between a menu and the standard display.
7		Selector	▶ Turn the selector to change a set value (e.g. the temperature) or to select a menu or item.
			When the display is off:
			▶ Press the selector to turn on the display.
			When the display is on:
			▶ Press the selector to open a selected menu or item, or confirm a set value (e.g. temperature) or a message, or to close a pop-up window.
			When standard display is active and the display is on:
			▶ Press the selector to activate the input window for heating/cooling circuit options in the standard display (only valid for systems with at least two heating/cooling circuits, → User interface operating instructions).

Table 14 Keys

12.2 Display symbols overview

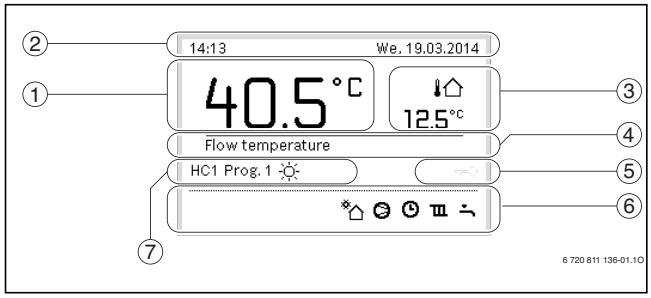


Fig. 40 An example of what the standard display might look like in a system with several heating/cooling circuits

Pos.	Symbol	Designation	Explanation
1		Temperature	Shows the heat pump module temperature
2	–	Information line	Displays time of day, day of the week and date.
3	3.0 °C	Other temperature indicator	Displays an additional temperature, e.g. outside temperature, solar panel temperature, or the DHW system temperature (→ user interface operating instructions).
4	–	Text information	E.g. the designation of the currently displayed temperature (→ [1]). No designation is displayed for room temperature. If an error occurs, corresponding information will be displayed here until the error has been addressed.
5		Key lock	If key lock is enabled, the key symbol appears on the display.
6		Information graphic	Displays information symbols, showing the user what functions are currently active in the system.
			DHW heating active
			Thermal disinfection (DHW) active
			Extra DHW function active
			Basin/pool is being heated
			Heating active
			Cooling active
			Power outage caused by energy supply company
			Closed external input (remote control)
			Holiday function active
			Time program – heating program 1 or 2 active
			Smart Grid function activated
			Screed drying active
			Immersion heater active
			Extra heat source (booster heater with mixing valve) active
			Defrosting active
			Heat pump active
			Solar pump active
7	**Optimised**	Operating mode	Energy efficient operation with a constant set room temperature.
	Program 1		The heating is controlled according to the time program active in the current heating circuit. At set times, the heating will switch between heating mode and setback mode.
	Program 2		
			Heating mode in displayed heating circuit active
			Setback mode in displayed heating circuit active

Table 15 Symbols on the standard display

12.3 Using the service menu

If the display is turned off, it will turn on when a key is used and a function executed. Quickly press the selector to turn on the display. If you don't use any keys, the display will turn back off.

Opening and closing the service menu

Opening the service menu	
	▶ Keep the menu key pressed down until the service menu appears.
Closing the service menu	
	▶ If there is no open submenu, you can return to the standard display by pressing the Return key. **-or-** ▶ Press the Return key and keep it pressed down for a few seconds to return to the standard display.

Table 16

Navigating the menu

	▶ Turn the selector to highlight a menu or an item.
	▶ Press the selector. The menu or the item is displayed.
	▶ Use the Return key to go back one step in the menu.

Table 17

Change settings

	**Selection**
	▶ Turn the selector to highlight a post.
	Slide bar
	▶ Turn the selector to set the value between the min. and max. value.
 **&** 	**Selection with slide bar** (the slide bar is visible on the display)
	▶ Turn the selector to highlight a post. ▶ Push the selector to confirm the selection. The input window and the slide bar are active. ▶ Turn the selector to set the value between the min. and max. value.
	Multiple selection
	▶ Turn the selector to highlight a post. ▶ Press the selector to select the post. ▶ Press the selector again to cancel the selection. ▶ Repeat the steps until you have selected desired posts.
	Time program
	▶ Turn the selector to highlight a switching time or an associated operating mode. ▶ Press the selector to activate the input window for switching time or operating mode. ▶ Turn the selector to modify the setting value.

Table 18

Confirm or ignore a change

Confirm a change	
 **&** 	▶ Push the selector to activate the highlighted post or confirm the change. ▶ Turn the selector to highlight **Continue** and press the selector. The display returns to the menu one level up. The user interface operates with the modified setting.
Ignore a change	
	▶ Press the Return key to ignore a change.

Table 19

Quick start process

Activate Quick start	
	▶ Open the service menu. ▶ Press the menu and info key until a popup window appears on the display. The heat pump as soon as there is a heating or DHW need.
Return to the service menu	
	▶ Press the selector. The menu or the item is displayed.

Table 20

12.4 Service menu overview

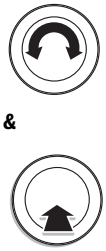
Menu		Purpose of the menu	Page
Startup		Start the configuration wizard and configure the system by checking/modifying the most important settings.	42
Heat pump		Configure the heat pump by checking/modifying the most important settings.	46
Set booster heater		Configure the booster by checking/modifying the most important settings.	47
Set heating/cooling	**System data**	Settings that apply to the entire system, e.g. min. outside temperature and type of building. In this menu you can further select settings for heating/cooling circuit 1 and the DHW system (if it is directly connected to the heat pump module).	48
	Heating circuit 1 ... 4	Specific settings for installed heating/ cooling circuits 1 to 4, e.g. frost protection and heating curve.	50
	Screed drying	Configurable program for screed drying of a new floor plate with an underfloor heating system.	54
DHW settings		DHW system settings, e.g. max. hot water temperature, time of thermal disinfection and configuration of the hot water DHW circulation pump.	56
Pool settings		Configure the pool heating by checking/modifying the most important settings.	57
Solar settings		If solar heating is installed: please refer to the solar module technical information.	57
Hybrid system		Set energy price relationship.	57
Anti-seizing protection		Determine a start time for short term activation of pumps and valves, to prevent these components from seizing (motion operation).	57
Diagnosis		System diagnostics: • Perform function test of separate actuators (e.g. pumps). • Compare set values and actual values. • Show current operating errors and error history. • Display EMS BUS unit software version. Other functions: • Enter contact address. • Reset different settings. • Calibrate the clock.	58

Table 21 Service menu overview

13 Commissioning

The compressor in the heat pump warms up before it starts. This can take up to 2 hours, depending on the outside temperature. The requirement is that the compressor temperature is 10 K above the air intake temperature. The temperatures are visible in the Diagnostics menu (→ Chapter 14.9).

13.1 General user interface commissioning



Setting the language
▶ Turn the selector to select a language and press the selector to confirm.
Setting the date
▶ Turn the selector and press it to set day, month, and year. The word **Continue** is highlighted. ▶ When the date is correctly set, press the selector to save the date.
Setting the time
▶ Turn the selector and press it to set hours and minutes. The word **Continue** is highlighted. ▶ When the time is correctly set, press the selector to save the time.
Setting the country
▶ Turn the selector and press it to set in which country the heat pump has been installed.
Setting buffer cylinder installation
▶ Turn the selector and press it to set if a buffer cylinder has been installed.
System configuration
▶ Turn and press the selector to start the (**Yes**) or skip the (**No**) configuration wizard. ▶ If the configuration wizard starts, the user interface will automatically detect the BUS units installed in the system (system analysis) and adjust the menu and standard settings accordingly. ▶ System commissioning (→ Chapter 13.2).

Table 22 Commissioning general settings

13.2 System commissioning via configuration wizard

The configuration wizard will automatically detect the BUS units installed in the system. It will adjust menu and standard settings accordingly.

System analysis could last up to a minute.

When the configuration wizard has performed the system analysis, the **Startup** menu opens. These settings must be checked and if required modified, and confirmed.

If system analysis is skipped, the **Startup** menu opens. These settings must be carefully checked and modified according to the installed system. Then the settings must be confirmed.

Please note further information on settings in Chapter 14.

Menu Item	Question	Answer/setting
Country information	In which country is the heat pump installed?	Select corresponding country
Storage cylinder	Is there a storage cylinder installed in the system?	**No** | **Yes**
Start configuration wizard	Would you like to start the configuration wizard?	**Yes** | **No**
Select an external heat source	What other heat source is used?	**Not installed** | **Serial immersion heater** | **Boost. heater with mixing valve/heat pump alt.** | **Parallel booster heater with mixing valve** | **Hybrid**
Heating circuit 1 installed	Is heating/cooling circuit 1 installed? Where is heating circuit 1 connected electrically?	**No** | **On the heat source** | **At the module**
Config. VK1 on the heat source	Is heating/cooling circuit 1 a heating circuit without mixing valve connected to the heat pump module?	**No integrated VK1** | **No own heating circuit pump** | **At circulation pump PC1**
Mixer heating circuit 1	Is heating/cooling circuit 1 a heating/cooling circuit with mixing valve?	**Yes** | **No**
Mixer runtime heat circ. 1	How long until the mixing valve in heating/cooling circuit 1 moves from one end position to the other?	**0** … **600 s**
Heating system heat circ. 1	What type of heating does heating/cooling unit 1 use?	**Radiator** | **Convector heater** | **Underfloor**
Ctrl type h. circ. 1	How will the temperature influenced by heating circuit 1 be regulated?	**Outdoor-temp.-compensated** | **Outside temp. with low end**
Prog. unit Heat. circ. 1	Which user interface or room controller is installed for heating/cooling circuit 1?	**HPC400** | **CR10**
Heating circuit 2 installed, …	equates to heating circuit 1	
Heating circuit 3 installed, …	equates to heating circuit 1	
Heating circuit 4 installed, …	equates to heating circuit 1	
DHW system (**DHW heat pump 1** | **DHW heat pump 2**)	Is a DHW system installed? How is the DHW system connected?	**Off** | **On**
DHW circulation pump installation	Is a DHW circulation pump installed in the DHW system?	**No** | **Yes**
Solar thermal sys installed	Is a solar heating system installed?	**No** | **Yes**
Pool 3-way valve	Is there a 3-way valve or a mixing valve installed for heating of basin/pool? How long does it take for the valve to changer over?	**10 s– 6000 s**
Electr. anode in cylinder	Is there an electric inert anode installed and connected to the DHW cylinder?	**Yes** | **No**
Fuse size	At what current does the installation fuse blow?	**16A** | **20A** | **25A** | **32A**
Confirm configuration	Do all the settings correspond with the installed system?	**Confirm** | **Back**

Table 23 System commissioning via configuration wizard

The DHW system is delivered activated. If the DHW system is activated, but there is no DHW system installed, the user interface will indicate an operating error.

- ▶ If there is no DHW system installed in the system, then the DHW system must be deactivated in the commissioning or DHW menu.

13.3 Commissioning other settings

If some functions are not activated, and modules, units or components are not installed, the non relevant items are hidden, while other settings are selected.

13.3.1 Checklist: adjust settings according to customer requirements

When commissioning a device, ensure the satisfaction of both parties, making sure that the heating system meets the customer's needs and will not give cause for complaints. In our experience, the following settings are very important for the satisfaction of the system user:

Menu Item	Customer requirements/settings
Ctrl type h. circ. 1	Outside temp. compensated (→ page 51)
Adjusting the heating curve	Adjust the heating curve (→ page 51). The displayed heating curve applies to a room temperature of 21 °C.
Type of building (adjustment)	Light, Medium, Heavy (→ page 49)
Operating mode	Adjust the standard settings/own time program according to the customer's requirements (→ User interface operating instructions).

Table 24 Checklist: important settings identify customer requirements

- ▶ Adjust other settings in the main menu according to the customer's requirements (→ Operating instructions).

13.3.2 Important system settings

If relative humidity is not measured in a cooled room (e.g. with a CR10H), condensation might form. In this case, it is required to set the minimum flow temperature to a suitable value to prevent condensation.

The service menu settings must under all circumstances be checked and if necessary modified during commissioning. Otherwise the system function cannot be ensured. It is best to check all displayed settings. It is possible that the set values must be verified by the system user, e.g. the cooling settings.

13.4 Performing the function test

The function test is located in the Diagnostics menu. The available items depend on the installed system. In this menu, you can test e.g. the: **DHW circulation pump**: **On**/**Off** (→ Chapter 14.9.1, page 58).

13.5 Check monitored values

Monitored values are shown in the **Diagnosis** menu (→ Chapter 14.9.2, page 58).

13.6 System handover

- ▶ Ensure that there are no temperature restrictions for heating and DHW set on the heat pump module. Otherwise the user interface cannot control the DHW or flow temperature.
- ▶ Explain to the customer how the user interface and the accessories work and how to operate them.
- ▶ Inform the customer about the selected settings.

14 Service menu

The user interface menu is automatically adjusted to the system. Some items are only displayed if they correspond with the system construction and the user interface is correctly set. Items are only displayed in systems where corresponding units are installed, e.g. a solar heating system. You will find corresponding menu posts and settings in the associated instructions.

For information on how to use the service menu, see Chapter 12 starting on page 39.

Standard settings are marked in bold in the column Setting range (→ Chapter 14.1 to 14.9).

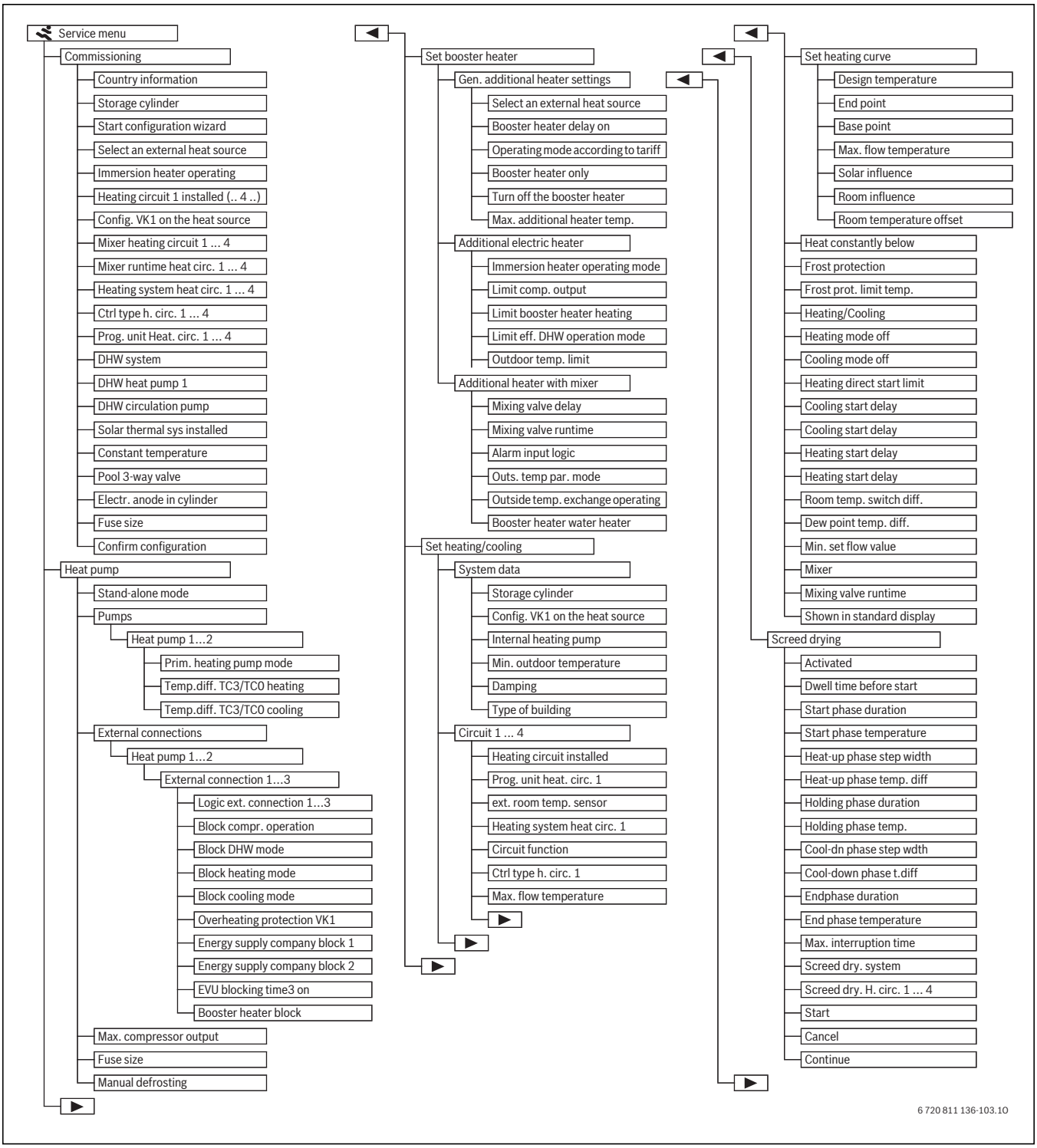


Fig. 41 Service menu overview 1/2

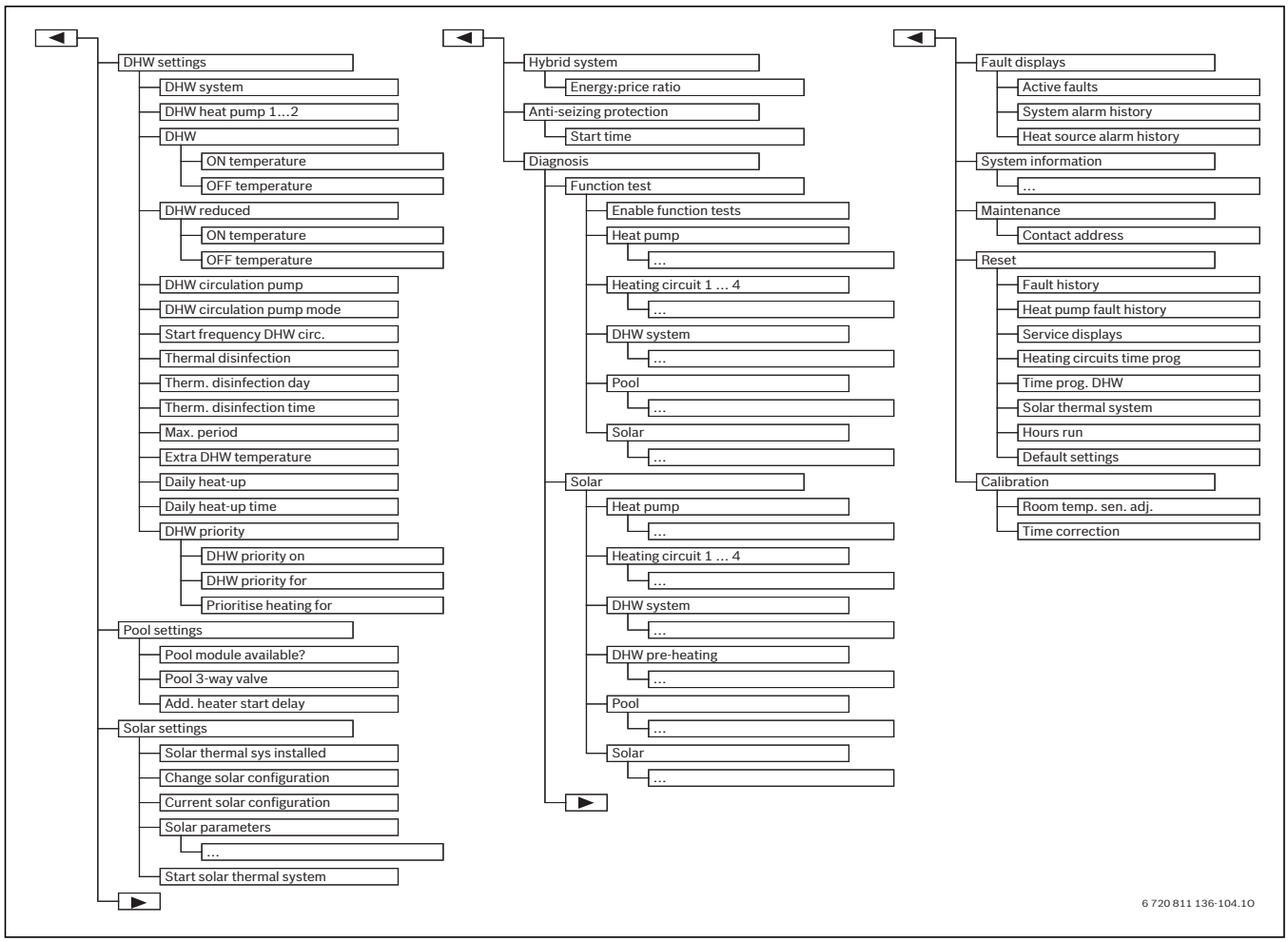


Fig. 42 Service menu overview 2/2

1) Available only for heat sources with EMS plus.

14.1 Heat pump settings

This menu contains the heat pump settings.

Menu Item	Setting range	Description
Stand-alone mode	**Yes**	The heat pump is turned off. Heat is only produced by the booster heater.
	No	Heat is produced by the heat pump and the booster heater.
Pumps		(→ Chapter 14.1.1)
External connections		(→ Chapter 14.1.2)
Max. compressor output	30 ... 100 %	Limitation of the heat pump max. compressor heating output.
Fuse size	16 ... 32A	The installation must be fitted with a fuse. Here you have to indicate the installed fuse (16 | 20 | 25 | 32 A).
Manual defrosting	Off	The evaporator is not defrosted.
	On	The heat pump starts in order to defrost the evaporator.

Table 25 Settings in the heat pump menu

14.1.1 Heat transfer pump settings (PC0)

The heat transfer pump in the heat pump module pumps heated water from the condenser in the heat pump to the hot water cylinder or directly to the heating system, alternatively to a buffer cylinder.

Menu Item	Setting range	Description
Prim. heating pump mode	Automatic	The heat transfer pump operates when the compressor operates. When the compressor is turned off, the pump is too.
	On	The heat transfer pump operates continuously.
Temp.diff. TC3/TC0 heating	3 ... 15 K	Permitted temperature differential between the heat pump flow and return in heating mode (→ Chapter 18.3).
Temp.diff. TC3/TC0 cooling	2 ... 10 K	Permitted temperature differential between the heat pump flow and return in cooling mode.

Table 26 Settings for the pumps in the heat pump

14.1.2 Settings for external inputs to the heat pump module.

In this menu it is possible to set how the voltage in the external inputs to the heat pump module are interpreted. It is possible to select several alternatives simultaneously. Depending on the system construction, heat pump 1 or 2 must be selected.

Menu Item	Setting range	Description
Logic ext. connection 1 ... 3	High input	High voltage in external input 1–3 is interpreted as “On ”and activates the corresponding function.
	Low input	Low voltage in external input 1–3 is interpreted as “On”.
Block compr. operation	Off	Compressor mode is possible.
	On	Compressor mode is blocked when input is active.
Block DHW mode	Off	DHW heating is possible when the input is active.
	On	DHW heating is blocked when the input is active.
Block heating mode	Off	Heating mode is possible when the input is active.
	On	Heating mode is blocked when the input is active.
Block cooling mode	Off	Cooling mode is possible when the input is active.
	On	Cooling mode is blocked when the input is active.
Overheating protection VK1	Off	No temperature restriction (thermostat) for heating/cooling circuit 1 (underfloor heating system).
	On	Thermostat for temperature restriction for heating/cooling circuit 1 is connected to external inputs 1-3. When the thermostat is activated, the heat pump module aborts the heating mode and turns off the heating/cooling circuit.
Booster heater block	Off	Booster heater mode is possible when the input is active.
	On	Booster heater mode is blocked when the input is active.

Table 27 Settings for external inputs to the heat pump.

14.2 Booster heater settings

Booster heater settings are selected in this menu. Booster heater heating is required if the heat pump e.g. in the winter is not able to produce sufficient heating or if the hot water demand cannot be satisfied as quick as required.

14.2.1 General settings menu for a booster heater

Booster heater settings are selected in this menu. These settings apply to all booster heater models. Here you can choose settings for e.g. how heating with booster heater is managed and when the booster heater is used.

Menu Item	Setting range	Description
Select an external heat source	**Not installed**	No booster heater connected.
	Serial immersion heater	An immersion heater is connected in a series circuit with the heat pump. The booster heater delivers extra heating when the desired temperature cannot be reached by the heat pump alone.
	Boost. heater with mixing valve/heat pump alt.	A booster heater (gas, oil, electric) is connected in parallel to the heat pump. The heat from the booster heater is regulated by a mixing valve. The heat pump and the booster heater operate in exclusive operation. This means that either the heat pump operates, or the booster heater.
	Parallel booster heater with mixing valve	A booster heater (gas, oil, electric) is connected in parallel to the heat pump. The heat from the booster heater is regulated by a mixing valve. The heat pump and the booster heater can work in parallel. In this case, the booster heater delivers extra heating when the desired temperature cannot be reached by the heat pump alone.
Booster heater delay on	0 ... 900 K × min	The booster heater turns on with delay. Only the heat pump is active during the delay. The setting means number of degrees K below the set value multiplied by number of minutes = K x min.
Booster heater only	**Yes**	Only the booster heater is used for heat production. The heat pump is turned off.
	No	Both the heat pump and the booster heater can be used for heat production.
Turn off the booster heater	**Yes**	Only the heat pump is used for heating. The booster heater will only start for the following functions: extra DHW, thermal disinfection or alarm operation.
	No	Both the heat pump and the booster heater can be used for heat production.

Table 28 General settings for one booster heater

14.2.2 Immersion heater menu

Immersion heater settings are selected in this menu. This menu is only displayed if an immersion heater has been set as an additional heat source in the General settings menu for the booster heater.

Menu Item	Setting range	Description
Limit comp. output	0 ... 15 kW	The booster heater max. heating output in compressor mode is limited to the value set here (2 | 3 | 4 | 6 | 9 | 12 | 15 kW).
Limit booster heater heating output	0 ... 15 kW	The booster heater max. heating output is limited in general to the value set here (2 | 3 | 4 | 6 | 9 | 12 | 15 kW).
Limit eff. DHW operation mode	0 ... 15 kW	The booster heater max. DHW heating output is limited to the value set here (2 | 3 | 4 | 6 | 9 | 12 | 15 kW).
Outdoor temp. limit		When outside temperature is below the value set here, the booster heater can turn on.

Table 29 General settings for one booster heater

14.2.3 Booster heater with mixing valve menu

Booster heater with mixing valve settings are selected in this menu. This menu is only displayed if a booster heater with mixing valve has been set as an additional heat source in the General settings menu for the booster heater.

Menu Item	Setting range	Description
Mixing valve delay	0 ... 120 min	Mixing valve opening delayed until booster heater has heated up
Mixing valve runtime	1 ... 6000 s	How long until the mixing valve moves from one end position to the other.
Alarm input logic	High input	The alarm is tripped by high voltage in the heat pump module alarm input.
	Low input	The alarm is tripped by low voltage in the heat pump module alarm input.
Outs. temp par. mode	-20 ... 20 °C	When the outside temperature is below the value set here, the booster heater can turn on in parallel mode. Heat pump and booster heater can operate simultaneously.
Outside temp. exchange operating mode	-20 ... 20 °C	When the outside temperature is below the value set here, the booster heater can turn on in exchange operating mode. Either the heat pump or the booster heater operates, but not simultaneously.
Booster heater water heater	**Yes**	An immersion heater is installed in the hot water cylinder.
	No	No immersion heater is installed in the hot water cylinder.

Table 30 General settings for one booster heater

14.3 Settings for heating/cooling

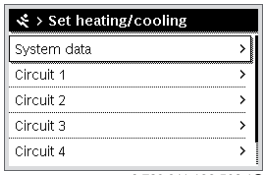


Fig. 43 Central heating settings menu

14.3.1 System data menu

System settings are selected in this menu. In this menu you can e.g. set minimum outside temperature or the heat storage capacity. In this menu you can further select settings for heating/cooling circuit 1 (if it is directly connected to the heat pump module).

If there is a buffer cylinder installed in the system, but heating/cooling circuit 1 is without mixing valve:

▶ The temperature setting for VK1 determines the highest temperature for all the circuits.

If there is a buffer cylinder installed in the system, and all heating/cooling circuits have mixing valves:

▶ The circuit with the highest temperature setting determines the highest temperature for all the circuits.

Menu Item	Setting range	Description
Storage cylinder (Buffer cylinder)	**Yes**	There is a buffer cylinder installed in the system.
	No	There is no buffer cylinder installed in the system. Heating/cooling circuit 1 is without mixing valve.
Config. VK1 on the heat source		Heating/cooling circuit 1 is directly connected to the heat pump module as a heating circuit without mixing valve.
	No integrated VK1	This menu is shown if Yes was selected in the previous menu. Heating/cooling circuit 1 is not directly connected to the heat pump module. In this case, a buffer cylinder must be installed in the system. Heating/cooling circuit 1 has a mixing valve and are electrically connected to the system with a module.
	At circulation pump PC1	Heating/cooling circuit 1 is directly connected to the heat pump module and is without mixing valve with or without buffer cylinder installed. The circulation pump PC1 in heating/cooling circuit 1 is electrically connected to the heat pump module.
Min. outside temperature	– 35 ... **– 10** ... 10 °C	The lowest outside temperature influences the heating curve in outside temperature control mode (→ Minimum outside temperature, page 48 and Menu for setting the heating curve, page 51).
Damping	**Yes**	The set type of building will influence the measured outside temperature value. Outside temperature influence is delayed (adjusted).
	No	The measured outside temperature is not adjusted before it is sent to the outside temperature compensated control.
Type of building		Heat storage capacity of the heated building (→ Type of building, page 49).
	Heavy	High heat storage capacity and strong adjustment of the outside temperature, e.g. brick houses
	Medium	Medium high heat storage capacity and medium strong adjustment of the outside temperature, e.g. hollow concrete block houses
	Light	Low heat storage capacity and weak adjustment of the outside temperature, e.g. prefabricated houses and wood frame constructions

Table 31 System data menu settings

Minimum outside temperature

The lowest outside temperature is the average value of the coldest outside temperatures of recent years, and it has an influence on the heating curve. The value for the region can be borrowed from the VPW calculation or the like.

▶ Set the lowest outside temperature for proportioning of the heating.

Minimal outside temperature °C					
Aten	– 2	**Köpenhamn**	– 13	**Paris**	– 10
Berlin	– 15	**Lissabon**	± 0	**Prag**	– 16
Bryssel	– 10	**London**	– 1	**Rom**	– 1
Budapest	– 12	**Madrid**	– 4	**Sevastopol**	– 12
Bukarest	– 20	**Marseille**	– 6	**Stockholm**	– 19
Hamburg	– 12	**Moskva**	– 30	**Valencia**	– 1
Helsingfors	– 24	**Neapel**	– 2	**Wien**	– 15
Istanbul	– 4	**Nice**	± 0	**Zürich**	– 16

Table 32 Minimal outside temperature

Type of building

When adjustment is activated, the type of building can be used to set the adjustment (equalisation) of variations in the outside temperature. The outside temperature adjustment takes into consideration the building type's thermal inertia. By setting the type of building you can thereby adjust the control to the characteristics of the building.

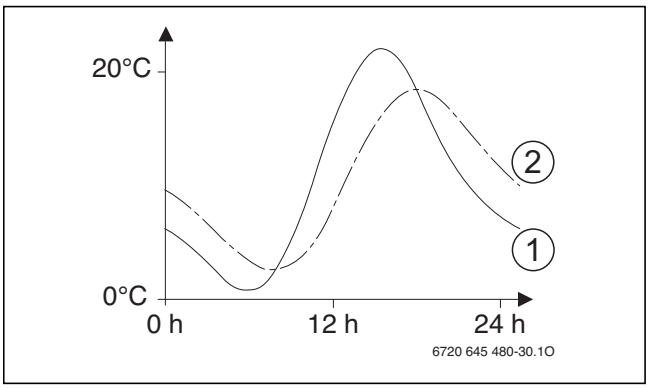


Fig. 44 Example of adjusted outside temperature

[1] current outside temperature
[2] adjusted outside temperature

This greatly simplified example shows how the adjusted outside temperature follows the current outside temperature, but does not reach its extreme values.

In the standard settings, the outside temperature influence on the control is delayed by three hours.

▶ The development of the outside temperature over the past two days is displayed in the following menu: **Info** > **Outdoor temp.** > **Outdoor temp. curve**

14.3.2 Circuit 1 to 4 menu

Settings for each separate heating/cooling circuit are selected in this menu. Here you can set the type of heating system installed for the selected heating/cooling circuit. You can also set whether there is a room controller or not, and which type of control mode to use. It is also possible to optimise the heating/cooling circuit heating curves.

NOTICE: Risk of damaging the screed!
- ▶ If an underfloor heating system is used, the max. flow temperature recommended by the manufacturer of the system should be observed.

Menu Item	Setting range	Description
Heating circuit installed	**No**	A heating/cooling circuit is not installed. If there is no heating/cooling circuit installed, the heat pump module is used for DHW heating only.
	On the heat source	Electrical units and components in the selected heating/cooling circuit are directly connected to the heat pump module (only possible with heating circuit 1).
	At the module	Electrical units and components in the selected heating/cooling circuit are directly connected to a MM100 module.
Prog. unit heat. circ. 1	**HPC400**	HPC400 independently regulates the selected heating/cooling circuit. No room controller installed.
	RC100	CR10 (RC100) installed as a room controller for selected heating/cooling circuit
	RC100H	CR10H (RC100H) installed as a room controller for selected heating/cooling circuit
ext. room temp. sensor	**Yes**	An extra room temperature sensor has been connected to the room controller (RC100/ RC100H). It enables the control of a second circuit from the same room controller.
	No	No additional room temperature sensor has been installed.
Heating system heat circ. 1	**Radiator**	Preset of the heating curve, taking type of heat into consideration, e.g. curve characteristics and system temperature
	Convector heater	
	Underfloor	
Circuit function	Heating	The selected circuit has a heating function only.
	Cooling	The selected circuit has a cooling function only.
	Heating and cooling	The selected circuit has both heating and cooling functions.
Ctrl type h. circ. 1	**Outdoor-temp.-compensated**	For more information on controlling the selected heating circuit (→ Heating control mode, page 51)
	Outside temp. with low end	
Max. flow temperature	30 ... **75** ... 85 °C (radiator) 30 ... **48** ... 60 °C (underfloor heating system/ convector)	Maximum flow temperature from the heat pump module (booster heaters are used for temperatures above the heat pump's maximum flow temperature).
Adjusting the heating curve		Fine tuning the heating curve that has been preset through the heating system (→ Setting the heating system and the heating curves for outside temperature compensated control, page 51)
Heat constantly below	**Off**	The heating operates independently from the adjusted outside temperature in the active operating mode (→ Constant heating below a certain outside temperature, page 53).
	– 30 ... 10 °C	If the adjusted outside temperature goes down below this set value, the heating will automatically change from setback mode to heating mode (→ Constant heating below a certain outside temperature, page 53).
Frost protection		**Instruction**: Set outside temperature controlled frost protection to ensure the frost protection of the entire system. This setting is independent of the set operating mode.
	Outdoor temp.	Frost protection is activated/deactivated depending on the temperature set here (→ Temperature limit for frost protection (outside temperature threshold value), page 54)
	Room temperature	
	Room and outside temp.	
	Off	Frost protection off
Frost prot. limit temp. (outside temperature threshold)	– 20 ... **5** ... 10 °C	→ Temperature limit for frost protection (outside temperature threshold value), page 54
Heating/Cooling	Off	
	Automatic mode	The heat pump will automatically switch between heating and cooling mode depending on the outside temperature.
	Constant heating	The heat pump is only active in heating mode.
	Constant cooling	The heat pump is only active in cooling mode.
Heating mode off	10 ... **17** ... 30 °C	When the outside temperature is below the value set here, the heating mode will turn on.
Cooling mode on off	– 20 ... **28** ... 35 °C	When the outside temperature is above the value set here, the cooling mode will turn on.
Heat immediately temperature differential	1 ... **1** ...10 K	When the outside temperature goes down below the heating deactivation temperature (setting value for Heating mode off) with the value set here, heating mode will start immediately.
Cooling switch-off delay	1 ... **4** ... 48 h	Cooling shutdown delay
Cooling switch-on delay	1 ... **8** ... 48 h	Cooling start delay
Heating switch-on delay	1 ... **1** ... 48 h	Cooling shutdown delay

Table 33 Settings in the Heating/cooling circuit 1 to 4 menu

Menu Item	Setting range	Description
Heating switch-on delay	1 ... **4** ... 48 h	Heating start delay
Room temperature changeover diff.	– 5 ... **2** ... 5 K	If the measured room temperature is above the set room temperature by the value set here, the cooling mode is activated (e.g. at 2 K: set room temperature = 23 °C, measured room temperature = 25 °C – cooling is activated)
Dew point temp. diff.	2 ... **5** ... 10 K	Determines the safety distance to the calculated dew point. The flow set temperature is thereby above the calculated dew point by at least the value set here.
Min. set flow value	10 ... **10** ... 35 °C	If a humidity sensor is installed for the heating/cooling circuit: the lowest set flow temperature value.
	10 ... **17** ... 35 °C	If no humidity sensor is installed for the heating/cooling circuit: the lowest set flow temperature value.
Mixer	**Yes**	Selected heating/cooling circuit is with mixing valve
	No	Selected heating/cooling circuit is without mixing valve
Mixer runtime		Selected heating/cooling circuit mixing valve operating time
Shown in standard display	**Yes**	Selected heating/cooling circuit is show in the standard display.
	No	Selected heating/cooling circuit is not show in the standard display.

Table 33 Settings in the Heating/cooling circuit 1 to 4 menu

Heating control mode

NOTICE: System damage!
If the approved operating temperature for plastic pipes (secondary circuit) are disregarded, parts of the system can get damaged.
▶ Do not exceed approved set values.

- In **Outside temperature compensation control mode** only summer mode, setback mode (depending on the selected type of setback) and adjustment of the outside temperature (by reduced heating requirements due to good insulation) can result in shutdown of the heating circuit pump.
  – Room adjustment can be set in the **Adjusting the heating curve** menu. Room adjustment influences the two outside temperature controlled operating modes. Room influence is only available if a room controller is installed in a suitable reference room.
  – **Outdoor-temp.-compensated** (optimised heating curve, standard setting)
  Used mainly for radiators and underfloor heating system.
  – **Outside temp. with low end**: → Simple heating curve, page 53.
  Used mainly for fan convectors.

Setting the heating system and the heating curves for outside temperature compensated control

▶ Setting the heating type (radiator, convector or underfloor heating) in the **Set heating/cooling** > **Circuit 1** menu **... 4** Setting > **Heating system heat circ. 1**.
▶ Setting the control mode (outside temperature controlled or outside temperature controlled with a base point) in the **Ctrl type h. circ. 1** menu.
The items not relevant to the selected heating system and the selected operating mode are hidden. The settings only apply to the selected heating circuit.

Menu for setting the heating curve

Menu Item	Setting range	Description
Design temperature (Flow temperature at lowest outside temperature)	30 ... **60** ... 85 °C (radiator) 30 ... **45** ... 60 °C (underfloor heating system/ convector)	The system temperature only applies during outside temperature compensated control without base point. The system temperature is the flow temperature that is reached at the lowest outside temperature and will therefore influence the slope of the heating curve.
or End point T_0		The end point only applies during outside temperature compensated control with base point. The end point is the flow temperature that is reached at the lowest outside temperature and will therefore influence the slope of the heating curve. When the base point has been set to a value above 30°C the base point is the minimum value.
Base point Flow temperature at an air temperature of 20 °C)	e.g. 20 – **25 °C** ... End point	The heating curve base point only applies during outside temperature compensated control with simple heating curve.
Max. flow temperature $T_{0\,max}$	30 ... **75** ... 85 °C (radiator) 30 ... **48** ... 60 °C (underfloor heating system/ convector)	Maximum flow temperature
Solar influence	– 5 ... – 1 K	Sunshine will to a certain extent influence outside temperature compensated control (the solar thermal energy decreases the required heat output).
	Off	The control does not take sunshine into consideration.
Room influence	Off	The outside temperature compensated control will operate independently from the room temperature.
	1 ... **3** ...10 K	Room temperature deviation equivalent to the setting is adjusted by a parallel offset of the heating curve (only if a room controller is installed in a suitable reference room). The higher the setting value, the greater is the max. room temperature influence on the heating curve.
Room temperature offset	– 10 ... **0** ... 10 K	Parallel offset of the heating curve (e.g. if the room temperature measured by a thermometer deviates from the selected set value)

Table 34 Heating curve settings menu

Outside temperature compensated (optimised heating curve)

The heating curve provides an economic and convenient operation of the heating system with outside temperature compensated control. The operating system will based on the settings automatically calculate the best possible heating curve. This results in a curve that is slightly bent to compensate for the heating system's increased heating output capacity in higher temperatures.

This calculation takes into account the adjusted outside temperature and the room control temperature. The room control temperature consists of the desired room temperature (set room temperature value) and the room influence.

This way, the user can influence the heating curve directly by changing the room temperature set value.

The most important settings are: system temperature, maximum flow temperature, room temperature offset (parallel offset) and minimum outside temperature.

The heating curve (→ fig. 45 and 46) is in principle determined by the curve base and end points. At an outside temperature of 20 °C the base point is 25 °C flow temperature. The heating curve end point must be set according to the heating system´s system temperature.

Decisive to the course of the heating curve (slope/gradient) are the two parameters **minimum outside temperature** (→ page 48) and **system temperature** (the flow temperature that should be reached at minimum outside temperature) (→ fig. 45 and 46, left).

The heating curve shown on the display represents the range + 20 °C to the minimum outside temperature set in **System data**.

The heating curve can also be parallel offset up or down (→ fig. 45 and 46, right) by adjusting the room temperature offset parameter and/or the set room temperature.

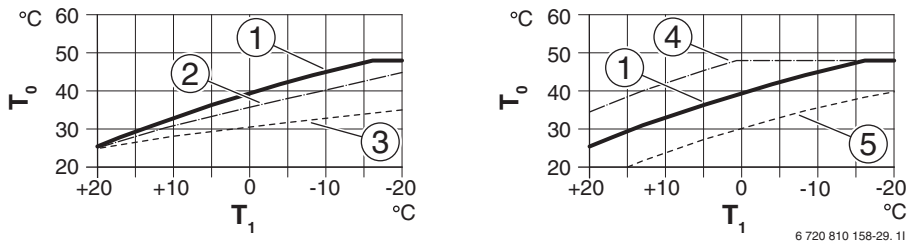


Fig. 45 Setting of Heating curve for underfloor heating systems/convectors
Left: increase with system temperature T_0 and minimum outside temperature $T_{1,min}$
Right: parallel offset with room temperature offset or desired temperature

T_1 Outside temperature
T_0 Flow temperature
[1] Setting: T_0 = 45 °C, $T_{1,min}$ = −10 °C (basic curve), Limit at $T_{0,max}$ = 48 °C
[2] Setting: T_0 = 40 °C, $T_{1,min}$ = −10 °C, Limit at $T_{0,max}$ = 48 °C
[3] Setting: T_0 = 35 °C, $T_{1,min}$ = −20 °C, Limit at $T_{0,max}$ = 48 °C
[4] Parallel offset of standard curve [1] by changing the offset +3 or by increasing the desired room temperature, limit at $T_{0,max}$ = 48 °C
[5] Parallel offset of standard curve [1] by changing the offset -3 or by decreasing the desired room temperature, limit at $T_{0,max}$ = 48 °C

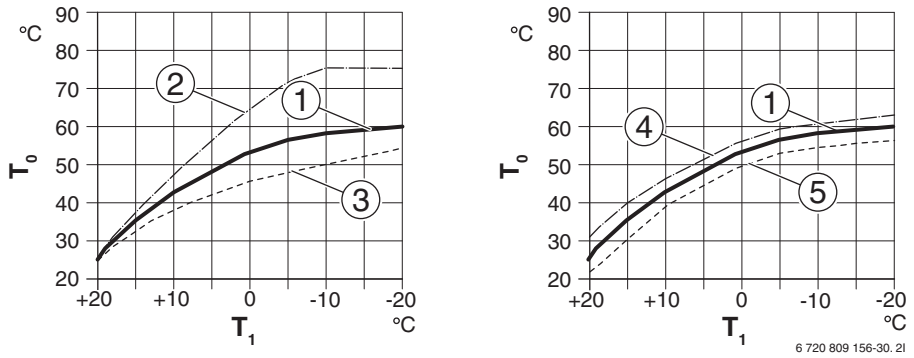


Fig. 46 Setting of The heating curve for radiators
Left: increase with system temperature T_0 and minimum outside temperature $T_{1,min}$
Right: parallel offset with room temperature offset or desired temperature

T_1 Outside temperature
T_0 Flow temperature
[1] Setting: T_0 = 60 °C, $T_{1,min}$ = −20 °C, Limit at $T_{0,max}$ = 75 °C
[2] Setting: T_0 = 75 °C, $T_{1,min}$ = −10 °C, Limit at $T_{0,max}$ = 75 °C
[3] Setting: T_0 = 55 °C, $T_{1,min}$ = −20 °C, Limit at $T_{0,max}$ = 75 °C
[4] Parallel offset of standard curve [1] by changing the offset +3 or by increasing the desired room temperature, limit at $T_{0,max}$ = 75 °C
[5] Parallel offset of standard curve [1] by changing the room temperature offset -3 or by decreasing the desired room temperature, limit at $T_{0,max}$ = 75 °C

Simple heating curve

The simple heating curve (outside temperature compensated control with base point) is a simplified representation of the heating curve. This straight heating curve is described by two points: the base point (the heating curve starting point) and the end point.

	Underfloor heating system, convector	**Radiator**
Minimum outside temperature $T_{A,min}$	– 10 °C	– 10 °C
Base point	25 °C	25 °C
End point	45 °C	60 °C
Maximum flow temperature $T_{VL,max}$	48 °C	75 °C
Room temperature offset	0,0 K	0,0 K

Table 35 Simple heating curve basic settings

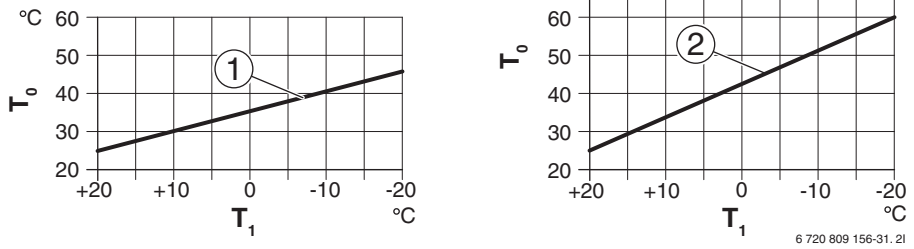


Fig. 47 Setting of simple heating curve

T_A Outside temperature
T_{VL} Flow temperature
[1] Underfloor heating system or convector
[2] Radiator

Constant heating below a certain outside temperature

SS-EN 12831 (Heating systems in buildings - Method for calculation of the design heat load) shows how heating surfaces and heat sources are dimensioned for a certain output to maintain a comfortable heating. In setback mode, the heating system can be cooled down more than what is required for this.

With the **Heat constantly below** parameter it is possible to set an outside temperature threshold value at which the temperature setback mode is shut off (applies to adjusted outside temperature). This allows smaller heating surfaces to be utilised.

Fig. 48 and fig. 49 show the function effects without and with activated parameters. Selected settings: **Setback type**: **Outside temperature threshold**; **Reduced mode below**: 5 °C.

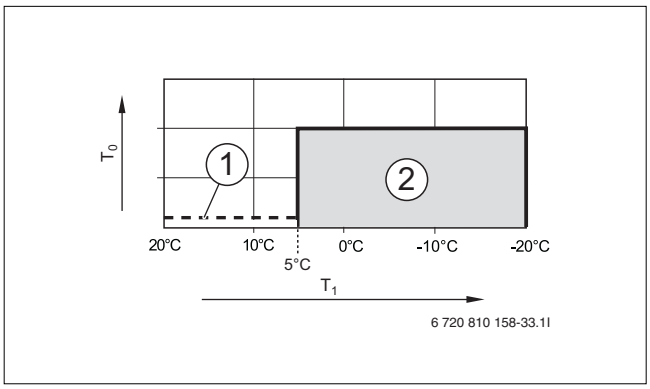


*Fig. 48 Effect from setting **Off** (standard settings)*

Key to fig. 48:

T_1 Outside temperature
T_0 Flow temperature
[1] Setback mode
[2] Frost protection mode

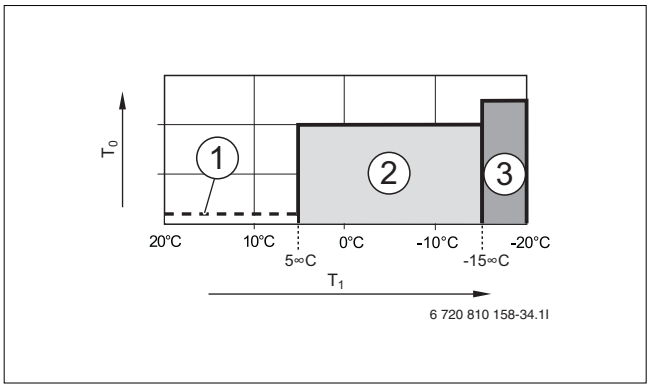


Fig. 49 Effect from setting – 15 °C

Key to fig. and 49:

T_1 Outside temperature
T_0 Flow temperature
[1] Setback mode
[2] Frost protection mode
[3] Heating mode

If the outside temperature goes below –15 °C the heating system will switch from frost protection mode to heating mode [3].

Temperature limit for frost protection (outside temperature threshold value)

You can use this item to set the temperature limit for the frost protection (threshold value for outside temperature). It is only active if either **Outdoor temp.** or **Room and outside temp.** are set in the **Frost protection** menu.

NOTICE: Water bearing system components can be destroyed if the frost protection temperature limit is too low and the outside temperature is below 0 °C for an extended period of time!

- ▶ The temperature limit for frost protection (standard setting = 5 °C) should take system prerequisites into consideration.
- ▶ Do not set the frost protection temperature limit too low. The warranty will not cover damages due to the frost protection temperature limit set too low!
- ▶ Set frost protection and a frost protection temperature limit for all heating/cooling circuits.
- ▶ In the **Frost protection** menu, set either **Outdoor temp.** or **Room and outside temp.** to ensure frost protection of the entire heating system.

- If the outside temperature exceeds the frost protection temperature limit by 1 K (°C) and there is no heating requirement, the heating circuit pump will be shut off.
- If the outside temperature is below the frost protection temperature limit, the heating circuit pump will be turned on.

The setting **Room temperature** will provide no frost protection at all since e.g. pipes in walls can freeze. This is possible even if external heat sources keep the temperature in the reference room well above 5 °C. When an outside temperature sensor is installed, the entire heating system can be frost protected:

- ▶ Set either **Outdoor temp.** or **Room and outside temp.** in the **Frost protection** menu.

14.3.3 Screed drying menu

A floor plate screed drying program is set in this menu for the selected heating circuit or the entire system. The heating system will automatically execute the floor plate screed drying program once to dry a new floor plate.

In case of a power outage, the user interface will automatically resume the floor plate screed drying program, as long as the outage does not outlast the user interface battery power or the max. outage time.

This menu is only displayed if at least one underfloor heating system circuit is installed and set up in the system.

NOTICE: Risk of damaging the screed!

- ▶ In multiple circuit systems, this function is only available together with a heating circuit with mixing valve.
- ▶ Set the floor plate screed drying program according to the screed manufacturer instructions.
- ▶ Even if the drying program is ongoing, the system should be inspected daily and the prescribed protocol observed.

Menu Item	Setting range	Description
Activated	Yes	Required drying program settings are displayed.
	No	The drying program is not active and the settings are not displayed (standard settings).
Dwell time before start	**No dwell time**	The floor plate screed drying program starts after set delay (selected heating circuits are disconnected during the delay, the frost protection is active, standard setting: no delay, → fig. 50, time before day 0)
	1 ...50 days	
Start phase duration	No start phase	Time period between the beginning of the start phase and the next phase (→ fig. 50, [1])
	1 ... **3** ...30 days	
Start phase temperature	20 ... **25** ... 55 °C	Flow temperature during the start phase (→ fig. 50, [1])
Heat-up phase step width	No heat-up phase	Time period between the steps (stage length) in the warm-up phase (→ fig. 50, [3])
	1 ...10 days	
Heat-up phase temp. diff	1 ... **5** ... 35 K	Temperature differential between the steps in the warm-up phase (→ fig. 50, [2])
Holding phase duration	1 ... **7** ... 99 days	Time period between the beginning of the maintenance phase (maintenance of max. temperature during screed drying) and the next phase (→ fig. 50, [4])
Holding phase temp.	20 ... **55** °C	Flow temperature during the maintenance phase (maximum temperature) (→ fig. 50, [4])
Cool-dn phase step wdth	No cool-down phase	Time period between the steps (stage length) during the cooling phase (→ fig. 50, [5])
	1 ...10 days	
Cool-down phase t.diff	1 ... **5** ... 35 K	Temperature differential between the steps in the cooling phase (→ fig. 50, [6])
Endphase duration	No end phase	Time period between the beginning of the end phase (the last temperature step) and the end of the drying program (→ fig. 50, [7])
	Permanently	
	1 ...30 days	
End phase temperature	20 ... **25** ... 55 °C	Flow temperature during the end phase (→ fig. 50, [7])
Max. interruption time	2 ... **12** ... 24 h	Max. duration of an interruption of the drying program (e.g. by a screed drying pause or a power outage) before an error message is displayed.
Screed dry. system	Yes	Screed drying active for all system heating circuits. **Instruction**: It is not possible to select single heating circuits. DHW heating is not possible. The menus and items with DHW settings are hidden.
	No	Screed drying is not active for all system heating circuits. **Instruction**: It is possible to select single heating circuits. DHW heating is possible. The menus and items with DHW settings are displayed.
Screed dry. H. circ. 1 ... Screed dry. H. circ. 4	Yes	Screed drying active/not active in the selected heating circuit
	No	
Start	Yes	Start screed drying now
	No	Screed drying has not yet started or is finished
Cancel	Yes	Pause the screed drying temporarily. An error message is displayed if max. time for an interruption is exceeded.
	No	
Continue	Yes	Resume screed drying after screed drying pause.
	No	

Table 36 Settings in the Screed drying menu (fig. 50 shows floor board screed drying program standard settings)

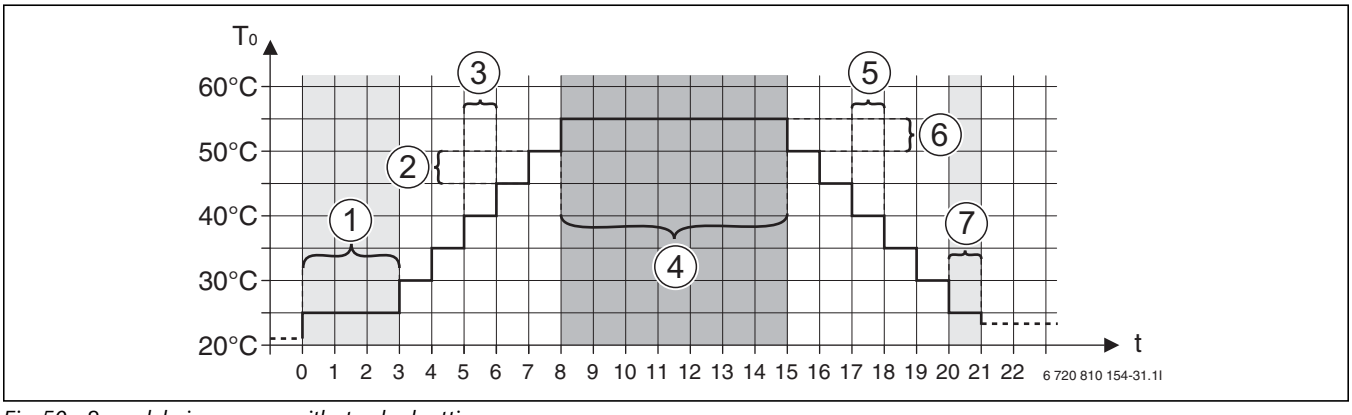


Fig. 50 Screed drying process with standard settings

t Time in days
T_0 Flow temperature

14.4 DHW settings

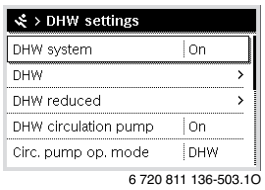


Fig. 51 DHW settings menu

This menu contains the DHW system settings. The menu is used to e.g. set maximum DHW temperature. You will also set thermal disinfection time and temperature here.

The DHW system is delivered activated. If the DHW system is activated, but there is no DHW system installed, the user interface will indicate an operating error.

- ▶ If there is no DHW system installed in the system, then the DHW system must be deactivated in the commissioning or DHW menu.

WARNING: Risk of scalding!
Maximum DHW temperature (**Max. DHW temp.**) can be set above 60 °C and during thermal disinfection the DHW will be heated to above 60 °C.

- ▶ Inform the customer and ensure that there is a thermostatic DHW mixer or a similar appliance installed to prevent scalding.

Menu Item	Setting range	Description
DHW system	Off	If there is a DHW system installed, it will be deactivated with this setting.
	Вкл	If the DHW system has been deactivated with the above item, it can be reactivated here.
DHW	e.g. 15 – **60 °C** ... 80 °C	ON temperature and OFF temperature for operation DHW; the setting range depends on the installed heat source. Comfort mode, which provides more/hotter DHW. Select this operating mode when DHW recirculation is used, to maintain the temperature in the DHW circuit.
DHW reduced	e.g. 15 – **45** ... 60 °C (80 °C)	ON temperature and OFF temperature for mode DHW reduced; the setting range depends on the installed heat source. ECO mode allows the DHW to cool down more before the heating starts and stops at a lower stop temperature than comfort mode. This decreases energy consumption.
DHW circulation pump	On	If the DHW circulation pump is controlled by the heat source, the DHW circulation pump must be activated here too. The standard settings depend on the installed heat source.
	Off	The DHW circulation pump cannot be controlled by the heat source.
DHW circulation pump mode	Off	DHW circ. OFF
	On	Circulation is permanently activated (connection frequency is followed)
	DHW circulation pump mode	Activate the same time program for circulation as for DHW heating. More information about this and about how you set your own time program (→ user interface operating instructions).
	Own time program	Activate own time program for circulation. More information about this and about how you set your own time program (→ user interface operating instructions).
Start frequency DHW circ.		If the DHW circulation pump is activated or works continuously according to the DHW circulation pump time program (operating mode DHW circulation pump: On), this setting affects the operation of the DHW circulation pump.
	1 x 3 minutes/h ... 6 x 3 minutes/h	Circulation is started 1 to 6 times per hour for operation with a duration of 3 minutes. The standard settings depend on the installed heat source.
	Permanently	The DHW circulation pump is continuously in operation.
Thermal disinfection	Yes	Thermal disinfection starts automatically at the same time (e.g. Mondays at 02:00, → Thermal disinfection, page 57)
	No	Thermal disinfection does not start automatically.
Therm. disinfection day	Monday ... **Tuesday** ... Sunday	The day that thermal disinfection is executed.
	Daily	Thermal disinfection is executed daily.
Therm. disinfection time	00:00 ... **02:00** ... 23:45	Time that the thermal disinfection starts on the set day.
Max. period	60 min ... 240 min	Maximum time of thermal disinfection. Setting range depends on the installed heat pump module.
Extra DHW temperature	50 ... 70 °C	Switch-off temperature for extra DHW
Daily heat-up	Yes	The entire DHW volume is automatically heated to 60 °C daily at the same time.
	No	No daily heating
Daily heat-up time	00:00 ... **02:00** ... 23:45	Time when daily heating to 60 °C starts.
DHW heat pump 1 (DHW heat pump 2)	On	The selected heat pump is used for DHW heating. The menu is displayed only if there is connection in series.
	Off	The selected heat pump is not used for DHW heating. The menu is displayed only if there is connection in series.
DHW priority	On	Heating need is interrupted by DHW need (→ Chapter 14.4.2 page 57)

Table 37 DHW menu settings

14.4.1 Thermal disinfection

WARNING: Risk of scalding!
During thermal disinfection, the domestic hot water is heated to above 60 °C.
- ▶ Only carry out thermal disinfection outside normal hours of use.
- ▶ Inform all parties concerned and make sure that at mixer is installed.

Execute thermal disinfection regularly to eliminate pathogens (e.g. legionella). Regulations might apply to larger DHW systems (→ e.g. Drinking water regulations and standards) for thermal disinfection.

- **Yes**:
  - The entire volume of DHW is heated up to the temperature that has been set once.
  - Thermal disinfection starts automatically at the set time according to the user interface settings.
  - It is possible to interrupt the process and start thermal disinfection manually.
- **No**: Thermal disinfection is not executed automatically. It is possible to start thermal disinfection manually.

14.4.2 DHW priority

This menu allows you to indicate if DHW heating should be prioritised or for how long DHW heating or heating must continue without any interruptions. Only DHW heating is active for DHW heating with DHW priority.

Menu: **DHW priority**

Menu Item		Description
DHW priority on	Yes	The controls alternate between heating mode and DHW operation in accordance with the settings below.
	No	Heating operation is always aborted, where necessary, by DHW heating.
DHW priority for	0 ... **30** ... 120 min	A DHW need aborts the heating requirement from the heating system after the period for which it has been set here.
Prioritise heating for	5 ... **20** ... 120 min	A heating need aborts the DHW requirement from the heating system after the period for which it has been set here.

Table 38 DHW heating operating mode

14.5 Pool settings

In this menu it is possible to set the pool mixing valve runtime and the booster heater start delay for pool heating.

Menu Item	Setting range	Description
Pool module available?	Yes	A pool module is installed in the installation.
	No	Pool heating is managed without a pool module.
Pool 3-way valve	10 ... 6000 s	Time for pool mixing valve to move from end mode to end mode.
Add. heater start delay	60 ... 1200 K*min	Booster heater start delay for pool heating.

Table 39

14.6 Solar system settings

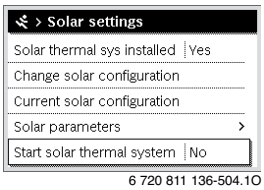


Fig. 52 Solar settings menu

If there is a solar heating system connected to the system via a module, corresponding menus and items are displayed. The extended menu for the solar system is described in the instructions for the utilised module.

On all solar systems in the **Solar settings** menu there are submenus as listed in tab. 40.

WARNING: Risk of scalding!
- ▶ If DHW temperatures above 60 °C are set or thermal disinfection is switched on, a mixer must be installed.

NOTICE: System damage
- ▶ Fill and vent the solar heating system prior to commissioning.

If the installed collector surfaces are set incorrectly, the solar power production in the information menu will be misleading!

Menu Item	Purpose of the menu
Solar thermal sys installed	If Yes is set here, the other settings are displayed.
Change solar configuration	Graphical configuration of the solar system
Current solar configuration	Graphical display of the configured solar system
Solar parameters	Settings for the installed solar system
Start solar thermal system	Once all the required parameters have been set, the solar system can be commissioned.

Table 40 General settings for the installed solar system

14.7 Hybrid system settings

The energy price relationship can be set in the **Hybrid system** menu. Additional information is available in the instructions accompanying the installation parts of the hybrid system.

14.8 Anti-seizing protection settings

In the **Anti-seizing protection** menu it is possible to set when the anti-seizing protection should be activated. It is possible to set the start time at 1-hour intervals between 00:00 and 23:00.

Remember not to set the time for at least one hour after Thermal disinfection. The functions may otherwise interfere with each other.

14.9 Diagnostics menu

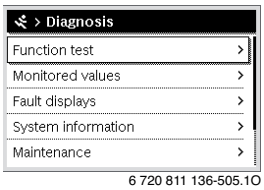


Fig. 53 Diagnostics menu

The **Diagnosis** service menu contains a number of diagnostics tools. Keep in mind that the installed system determines which items are displayed.

14.9.1 Function test menu (manual mode)

Active components in the heating system can be tested with the help of this menu. If **Enable function tests** is set to **Yes** in this menu, normal heating mode for the entire system is shut off. All settings are saved. The settings in this menu are only temporary and are reset to standard settings as soon as **Enable function tests** is set to **No** or the **Function test** menu is closed. The available functions and the possible settings vary depending on the system installed.

A function test is performed, where the set values for specified components are tested. You can check whether the mixing valve, pump or 3-way valve respond appropriately by inspecting the behaviour of the corresponding component.

E.g. test the DHW circulation pump:

- **Off**: Pump stops.
- **On**: Pump starts.

There is an automatic test sequence for the heat pump that tests by turns the functions of the components of the heat pump. The activating **Outdoor unit test** turns on and off the fan, the heating cable, the drip pan heater, the 4-way valve and both expansion valves. Each component is active for 10 to 20 seconds.

The **Evacuate/fill** function activates a special operating mode for evacuation/filling of the cooling circuit in the heat pump that is used if the amount of refrigerants needs adjustments.

14.9.2 Monitored values menu

This menu contains the heat system settings and measured values. E.g. the flow temperature or current DHW temperature is displayed.

Here, you can also find detailed information about system units, e.g. the heat pump module temperature. The information and values that are provided depend on the system that has been installed. The technical information of accessory modules and other system units must be observed.

14.9.3 Error messages menu

This menu displays current operating errors and error history.

Menu Item	Description
Active faults	All the current operating errors are displayed here, by order of severity. Here you can unlock blocking errors (→ Cancel blocking alarms, page 58).
System alarm history	The last 20 operating errors for the entire system are displayed here, sorted by date of occurrence. A snapshot of the relevant installation data when the error occurred exists for each stored error (→ Status log (Snapshot), page 58). Error history can be erased in the Reset menu (→ Chapter 14.9.5, page 58).
Heat source alarm history	The last 20 operating errors for the heat pump are displayed here, sorted by date of occurrence. Error history can be erased in the Reset menu (→ Chapter 14.9.5, page 58).

Table 41 Information in the error messages menu

Cancel blocking alarms

- ▶ Open menu **Service menu** > **Diagnosis** > **Fault displays** > **Active faults**.
- ▶ Turn the selector until the blocking alarm is displayed.
- ▶ Push and hold the menu and info buttons until a pop-up window is shown on the display.
- ▶ Select **Yes** in order to cancel the blocking.

Status log (Snapshot)

In order to get more information about taking care of errors that occur:

- ▶ Open the **Service menu** > **Diagnosis** > **Fault displays** > **Heat source alarm history** menu.
- ▶ Turn the selector until the desired error is displayed.
- ▶ Push and hold the info button until a list is displayed with the data registered when the selected error occurred.
- ▶ Turn the selector to call up additional data in the list.

14.9.4 System information menu

The software versions of installed BUS units in the system are displayed in this menu.

14.9.5 Reset menu (Reset)

Settings or lists can be erased in this menu or reset to standard settings.

Menu Item	Description
Fault history	Error history is erased. If an operating error occurs right now, it will be displayed in the error history again.
Heat pump fault history	Heat pump error history is erased. If an operating error occurs right now, it will be displayed in the error history again.
Service displays	Service messages are reset.
Heating circuits time prog	All time programs for all heating circuits are reset to standard settings.
Time prog. DHW	All time programs in the DHW system (including the circulation pump time program) are reset to standard settings.
Solar thermal system	All settings that include the solar heating system are reset to standard settings. The solar heating system must be recommissioned after this reset!
Hours run	The heat pump hours run counter is reset.
Default setting	All settings are reset to standard settings. The system must be recommissioned after this reset!

Table 42 Reset settings

14.9.6 Calibration menu

Menu Item	Description
Room temp. sen. adj.	▶ Place a suitable precision measuring instrument close to the user interface. The precision measuring instrument may not give off any heat to the user interface. ▶ Keep heat sources such as, e.g. direct sun, body heat and the like away for a period of 1 hour. ▶ Adjust the displayed room temperature correction value (– 3 ... **0** ... + 3 K).
Time correction	This correction (– 20 – **0** ... + 20 s) is performed automatically once every week. Example: the clock is offset by ca. –6 minutes per year • –6 minutes per year –360 seconds per year • 1 year = 52 weeks • –360 seconds: 52 weeks • –6.92 seconds per week • Correction factor = +7 s/week.

Table 43 Calibration menu settings

15 Troubleshooting

A system error is displayed on the user interface display. The cause can be an error in the user interface, in a component, in a module, the heat pump or the heat pump module. You can find further information in the instructions on how to solve errors, especially in the service manual, which contains detailed descriptions of errors, for each separate part and unit and the installed heat pump.

The user interface saves the latest error messages with a time stamp (→ Error history, page 58).

Use only original spare parts. Any damage resulting from use of spare parts not supplied by the manufacturer is excluded from liability.
If an error cannot be solved, please contact your local service technician or IVT service.

Error code	Sub code	Cause or error description	Test procedure/cause	Solution
A11	1000	System configuration not confirmed	System configuration incomplete	Configure the system completely and confirm
A11	1010	No communication via BUS connection EMS plus	Check if the BUS connection is correctly connected.	Correct the wiring and restart the user interface.
			Check if the BUS connection is defect. Disconnect modules from the EMS-BUS and restart the user interface. Check if a module or the module wiring is causing the error.	Repair or replace the BUS wires. Replace defect EMS-BUS unit
A11	1038	Invalid time/date	Date/time not yet set.	Set date/time.
			Prolonged power outage	Set date/time.
A11	3061 3062 3063 3064	No communication with mixing valve module *(3061 = Heating circuit 1; 3062 = Heating circuit 2; 3063 = Heating circuit 3; 3064 = Heating circuit 4)*	Check configuration (set address on the module). The selected setting requires a mixing valve module.	Modify configuration
			Check if the EMS connecting wire to the mixing valve module is damaged. BUS voltage to the mixing valve module must be between 12 and 15 V DC.	Replace damaged cables.
			Defect mixing valve module	Replace the mixing valve module
A11	3091 3092 3093 3094	Defect room temperature sensor *(3091 = Heating circuit 1; 3092 = Heating circuit 2; 3093 = Heating circuit 3; 3094 = Heating circuit 4)*	Reset the heating circuit control mode from room temperature mode to outside temperature compensated control.	Replace the system regulator or room controller.
			Reset the frost protection from room to outside.	
A11	6004	No communication w. solar module	Check configuration (set address on the module). The selected setting requires a solar module.	Modify configuration
			Check if the EMS connecting wire to the solar module is damaged. BUS voltage to the solar module must be between 12 and 15 V DC.	Replace damaged cables.
			Defect solar module	Replace the module.
A31 A32 A33 A34	3021 3022 3023 3024	Defect flow temperature sensor in the heating circuit *(A31/3021 = Heating circuit 1; A32/3022 = Heating circuit 2; A33/3023 = Heating circuit 3; A34/3024 = Heating circuit 4)*	Check configuration. The selected setting requires a flow temperature sensor.	Modify configuration.
			Check the connecting cable between the mixing valve module and the flow temperature sensor.	Establish a correct connection.
			Check the connecting cable according to the diagram.	Replace the sensor if the values are incorrect.
			Check the flow temperature sensor connecting terminal voltage on the mixer valve module according to the diagram.	If the sensor values are correct but the voltage is incorrect, the mixing valve module should be replaced.

Table 44 Error messages

Error code	Sub code	Cause or error description	Test procedure/cause	Solution
A51	6021	Defect collector temperature sensor	Check configuration. The selected setting requires a collector sensor.	Modify configuration.
			Check the connecting cable between the solar module and the collector sensor.	Establish a correct connection.
			Check the collector sensor according to the diagram.	Replace the sensor if the values are incorrect.
			Check the collector sensor connecting terminal voltage on the solar module according to the diagram.	If the sensor values are correct but the voltage is incorrect, the solar module should be replaced.
A51	6022	Cylinder 1 bottom temperature sensor defect Standby mode active	Check configuration. The selected setting requires a bottom buffer cylinder sensor.	Modify configuration.
			Check the connecting cable between the solar module and the bottom buffer cylinder sensor.	Establish a correct connection.
			Check the connecting cable electrical connection to the solar module.	Tighten screws or connections.
			Check the bottom buffer cylinder sensor according to the diagram.	Replace the sensor if the values are incorrect.
			Check the buffer cylinder sensor connecting terminal voltage on the solar module according to the diagram.	If the sensor values are correct but the voltage is incorrect, the module should be replaced.
A61 A62 A63 A64	1081 1082 1083 1084	Two master user interfaces in the system.	Check the installation level parameters. (Several user interfaces besides HPC400 have been configured as REGO in the BUS system)	Register the user interface as Master for heating circuit 1 to 4. (Configure CR10 as remote control (room controller))
H01 A61 A62 A63 A64	5203	Alarm E10 outside temperature sensor T0 error *(A61 = Heating circuit 1; A62 = Heating circuit 2; A63 = Heating circuit 3; A64 = Heating circuit 4)*	Check the connecting wire between the user interface and the outside temperature sensor.	If there is no connection, correct the error.
			Check the connecting cable electrical connection to the outside temperature sensor and/or the user interface terminal.	Clean corroded terminals in the outside temperature sensor assembly.
			Check the outside temperature sensor according to the diagram.	Replace the sensor if the values are incorrect.
			Check the outside temperature sensor connecting terminal voltage on the user interface according to the diagram.	If the sensor values are correct but the voltage is incorrect, the user interface should be replaced.
H01	5239	DHW temperature sensor alarm TW1 error If no DHW function is required, the DHW system should be deactivated in the user interface.	No DHW system installed	Deactivate the DHW system in the service menu
			Check the connecting wire between the user interface and the DHW temperature sensor.	If it is defect, the sensor should be replaced.
			Check the connecting cable electrical connection to the user interface.	Tighten screws or connections if they are loose.
			Check the DHW temperature sensor according to the diagram.	Replace the sensor if the values are incorrect.
			Check the DHW temperature sensor connecting terminal voltage on the user interface according to the diagram.	If the sensor values are correct but the voltage is incorrect, the user interface should be replaced.
H01 A41	5284 4051	Warning: Last thermal disinfection failed	Check for leakage or if water is possibly being drawn from the water heater constantly due to taps being open.	Stop such continuous hot water consumption, or change the time for thermal disinfection.
			Check the DHW temperature sensor position. It might be incorrectly installed or hanging in the air.	Position the DHW temperature sensor correctly.
			Check if the heating loop in the cylinder has been completely vented.	Vent if required.
			Inspect the connecting pipes to the cylinder and check that they are connected correctly.	Correct possible errors in the pipework.
			Check if the installed DHW circulation pump capacity is sufficient.	If there are errors, the pump should be replaced.
			Excessive DHW circulation pipe loss	Check the DHW circulation pipes
			Check the DHW temperature sensor according to the diagram.	If the sensor values do not correspond with the diagram values, it should be replaced.

Table 44 Error messages

16 Heat pump and heat pump module venting

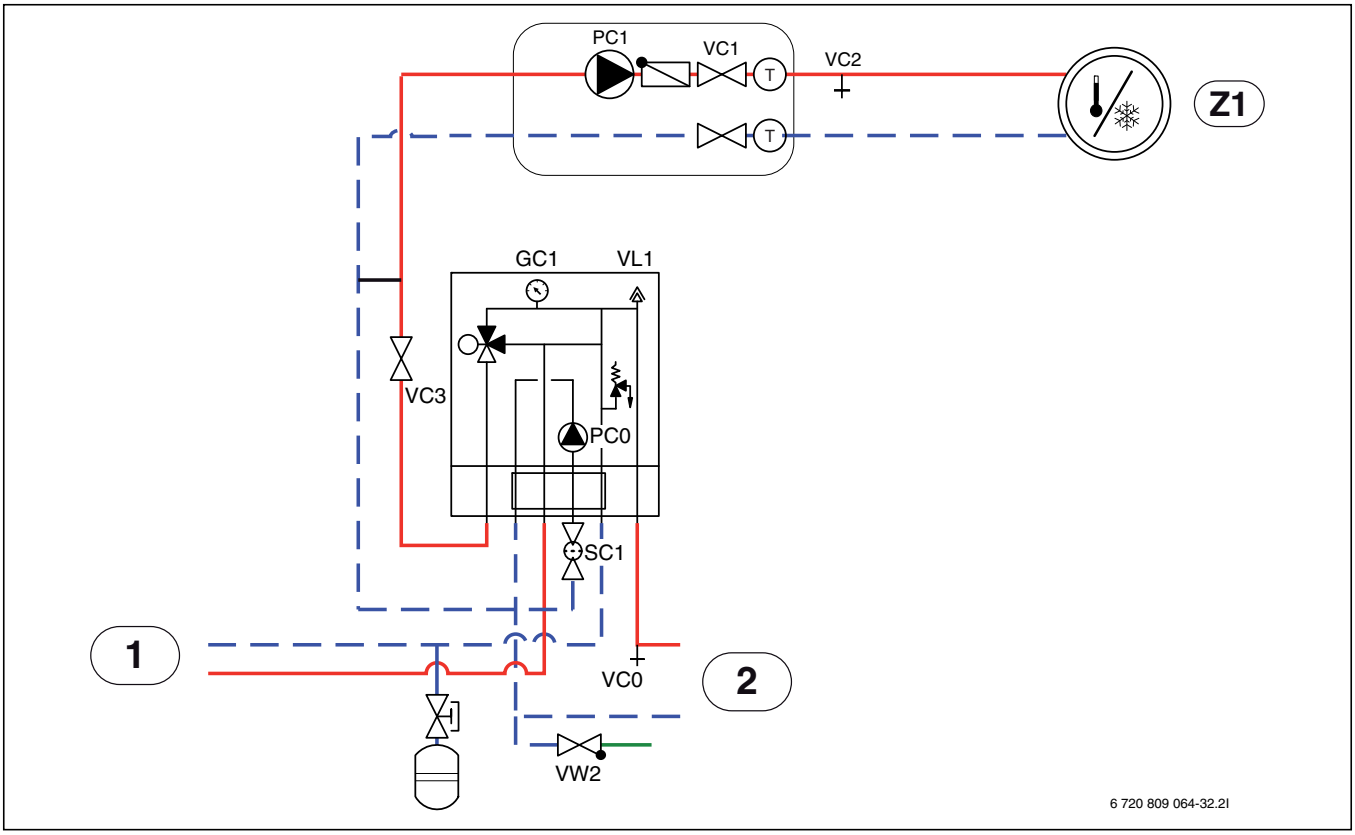


Fig. 54 Heat pump module with external booster heater and heating system

[Z1] Heating system (without mixing valve)
[1] External booster heater
[2] Heat pump

See fig. 54:

1. Connect the heat pump and heat pump module power.
2. Ensure that the circulation pump PC1 is running.
3. Remove the PC0 PWM plug from the DHW circulation pump PC0 so that it operates at a maximum speed.
4. Connect the PC0 PWM plug to the circulation pump when the pressure has not dropped within 10 minutes.
5. Vent the external booster heater according to its instructions.
6. Clean the particle filter SC1.
7. Check the pressure on the pressure gauge GC1 and add more with the fill valve VW2 if the pressure is below 2 bar.
8. Check that the heat pump is running and that there are no alarms.
9. Check the pressure after a while and add more with the fill valve VW2 if the pressure is below required pressure.
10. Also vent via the other air vent valves of the heating system (e.g. radiators).

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

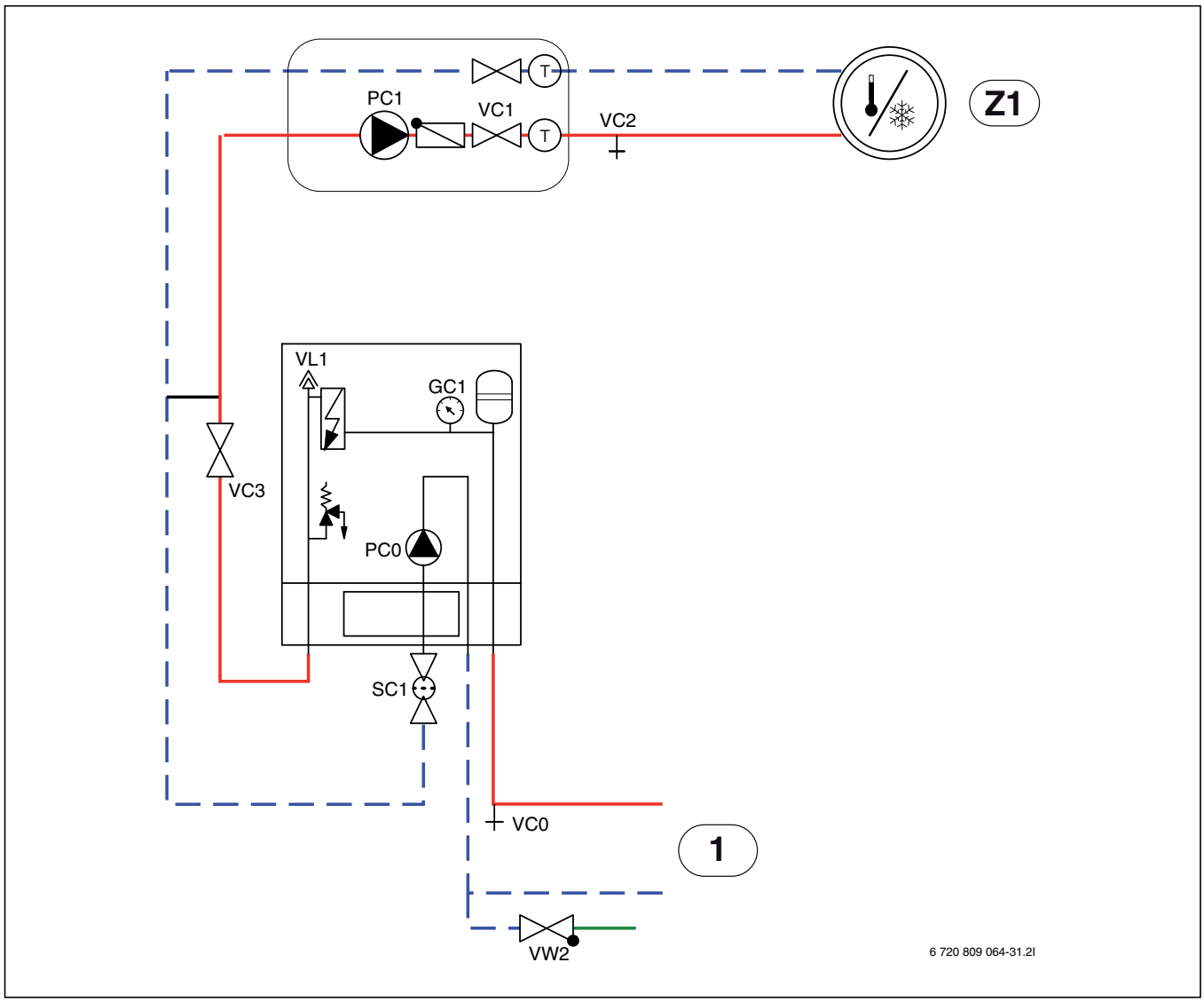


Fig. 55 Heat pump module with an integrated immersion heater and heating system

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

See fig. 55:

1. Connect the heat pump and heat pump module power.
2. Activate the booster heater only and ensure that the DHW circulation pump PC1 is running.
3. Remove the PC0 PWM plug from the DHW circulation pump PC0 so that it operates at a maximum speed.
4. Only deactivate the booster heater when the pressure has not dropped in 10 minutes.
5. Connect the PC0 PWM plug to the circulation pump.
6. Clean the particle filter SC1.
7. Check the pressure on the pressure gauge GC1 and add more with the fill valve VW2 if the pressure is below 2 bar.
8. Check that the heat pump is running and that there are no alarms.
9. Also vent via the other air vent valves of the heating system (e.g. radiators).

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

17 Heat pump module components replacement

1. Disconnect the heat pump and heat pump module power.
2. Check that automatic ventilation is active on VL1.
3. Close the heating system valves; particle filter SC1 and VC3.
4. Connect one end of a hose to VC0 and the other end to a drain. Open the drain valve VC0.
5. Wait until the water has stopped flowing to the drain.
6. Replace the components.
7. Open the fill valve VW2 to fill the heat pump pipes.
8. Continue filling until only water comes out of the hose by the drain and the outdoor unit's condenser does not form bubbles any more.
9. Close the drain valve VC0 and continue filling until the pressure gauge GC1 shows 2 bar.
10. Close the fill valve VW2.
11. Connect the heat pump and heat pump module power.
12. Remove the hose from the drain valve VC0.
13. Clean the particle filter SC1.
14. Open the heating system valve: VC3 and particle filter SC1.
15. Check the pressure after a while and add more with the fill valve VW2 if the pressure is below required pressure.

18 Function check

The compressor in the heat pump warms up before it starts. This can take up to 2 hours, depending on the outside temperature. The requirement is that the compressor temperature is 10 K above the air intake temperature. The temperatures are visible in the Diagnostics menu (→ Chapter 14.9).

- ▶ System commissioning as described in Chapter 13.
- ▶ Vent the system as described in Chapter 16.
- ▶ Test active system components as described in Chapter 14.9.1.
- ▶ Check that the heat pump commissioning requirements have been fulfilled.
- ▶ Check that there is a heating or a DHW demand.

-or-

- ▶ Create a demand either by running the hot water or by raising the heating curve (if the outside temperature is high, you can optionally also modify the setting for **Heating mode from**).
- ▶ Check that the heat pump starts.
- ▶ Check that there are no Current alarms according to Chapter 14.9.3.

-or-

- ▶ Solve operating errors according to Chapter 15.
- ▶ Check operating temperatures according to Chapter 18.3.

18.1 Set heating system operating pressure

NOTICE: Damage to appliance due to cold water!
Stress cracks can occur on the hot heat exchanger when the heating water is topped up.

- ▶ Only top up the heating water when the appliance is cold.

Indication on pressure gauge	
1 bar	Minimum system pressure (when cold)
2.5 bar	Maximum filling pressure at max. temperature of the heating water: may not be exceeded (safety valve opens).

Table 45 Operating pressure

- ▶ Fill to 2 bar unless stated otherwise.
- ▶ If there is a pressure drop: check the expansion vessel and heating system for leaks.

18.2 Pressure switch and overheating protection

A pressure switch and overheating protection exist only in a heat pump module with an integrated immersion heater.

The pressure switch and the overheating protection are connected in serial, so that a tripped alarm or information in the user interface means either that the system pressure is too low, or that the immersion heater temperature is too high.

NOTICE: Risk of damage due to dry run!
The heat transfer pump PC0 can get damaged if it operates for a longer period of time with insufficient pressure in the system.

- ▶ Repair any leaks in the system if the pressure switch is tripped.

Tripped pressure switch only blocks the immersion heater. The DHW circulation pump PC0 and the heat pump can continue to operate in case of risk of freezing.

Pressure switch

The heat pump module is equipped with a pressure switch, which is tripped when the heating system pressure is below 0.5 bar. The pressure switch will reset itself when the pressure is above 0.5 bar.

- ▶ Check that the expansion vessel and the pressure relief valve have the required pressure for the installation.
- ▶ Check for leaks in the system.
- ▶ Slowly increase the heating system pressure by adding water through the fill valve.

Overheating protection

The overheating protection is tripped if the immersion heater temperature is above 95 °C.

- ▶ Check the system pressure.
- ▶ Check the heating and DHW settings.
- ▶ Reset the overheating protection by pressing the button at the bottom of the electric box (→ [2], fig. 28).

18.3 Operating temperatures

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

For optimal operation of the installation it is important that the heat pump and heating system flow is checked. This check should be performed after 10 minutes heat pump operating time and during high compressor heating output.

The temperature differential over the heat pump should be set for different heating systems (→ Chapter 14.1.1),

- ▶ For underfloor heating system; set the heating temp. diff. to 5 K.
- ▶ For radiators; set the heating temp. diff. to 8 K.

These settings are optimal for the heat pump.

Check the temperature differential during high compressor heating output:

- ▶ Go to the Diagnostics menu.
- ▶ Select Monitored values.
- ▶ Select Heat pump.
- ▶ Select Temperatures.
- ▶ Check Primary flow temperature. (heat transfer medium out sensor TC3) and Return temperature (heat transfer medium in sensor TC0) in heating mode. The flow should have a higher temperature than the return.
- ▶ Calculate the differential by TC3 – TC0.
- ▶ Check that the differential corresponds with the set heat transfer fluid delta.

If the temperature differential is too large:

- ▶ vent the heating system.
- ▶ Clean the filters / strainers.
- ▶ check pipe dimensions.

19 Environmental protection

Environmental protection is one of the Bosch group main pillars. Results quality, efficiency and environmental protection are equally important objectives for us. Environmental laws and regulations are strictly adhered to.
To protect the environment we will, subject to economical aspects, use the best possible technology and materials.

Packaging
The packaging has been labelled with country specific information about waste disposal to facilitate optimal recycling.
All of our packaging materials are environmentally friendly and recyclable.

Waste products
The products contain recyclable material which should be extracted and disposed of separately.
The components are easy to take apart, and the plastic is labelled. This allows for sorting and recycling, incineration or other disposal of the different components.

20 Energy metering

Energy metering in the heat pump and heat pump module is an approximation based on the sum of the nominal emitted output during the relevant metering period. The calculation requires for example that the heat pump is correctly installed, and that the flow and Δ temperatures are adjusted as recommended. The value should therefore be regarded as an estimate of the actual emitted output. The margin of error in the calculation is normally put at 5-10%

In addition, the energy output is affected by the outdoor temperature, the settings for the thermostat and room controls and heat pump usage. Ventilation, indoor temperature and hot water demand can play a deciding role.

21 Maintenance

DANGER: Electric shock!
- ▶ Switch off the main power supply before starting work on the electrical part.

NOTICE: Risk of deformation due to heat!
The heat pump module insulation material (EPP) will deform if it is exposed to high temperatures.
- ▶ Only use heat protection cloth or wet cloth to protect the insulation material while performing soldering work on the heat pump module.

We recommend regular function checks performed by a licensed installer.

- ▶ Only use genuine spare parts!
- ▶ Refer to the spare parts list when ordering spare parts.
- ▶ Always renew seals and O-rings removed during servicing or repair work.

During service, the activities described below should be conducted.

Show alarms

- ▶ Check the alarm log.

Function check

- ▶ Perform function checks (→ Chapter 63).

Electric cabling

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

Temperature sensor measured values

Heat pump module
Temperature sensor in, or connected to, the heat pump module (T0, T1, TW1, TC0, TC1) contains measured values according to fig. 46 and 47.

°C	Ω	°C	Ω	°C	Ω	°C	Ω
20	12488	**40**	5331	**60**	2490	**80**	1256
25	10001	**45**	4372	**65**	2084	**85**	1070
30	8060	**50**	3605	**70**	1753	**90**	915
35	6536	**55**	2989	**75**	1480	–	–

Table 46 Flow and DHW temperature sensor T0, TW1, TC0, TC1

°C	$\Omega_{T...}$	°C	$\Omega_{T...}$	°C	$\Omega_{T...}$
–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
–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 47 Outside temperature sensor T1

21.1 Particle filter

The filter prevents particles and dirt from entering the condenser/heat exchanger. Over time, the filter can become blocked and must be cleaned.

The particle filter is located in the heat pump return.

Cleaning the strainer

- ▶ Close the valve (1).
- ▶ Screw off the hood (by hand), (2).
- ▶ Take out the strainer and clean it by running water over it or by pressure cleaning.
- ▶ Put the strainer back; it has rails that fit into the groove in the valve to avoid incorrect installation (3).

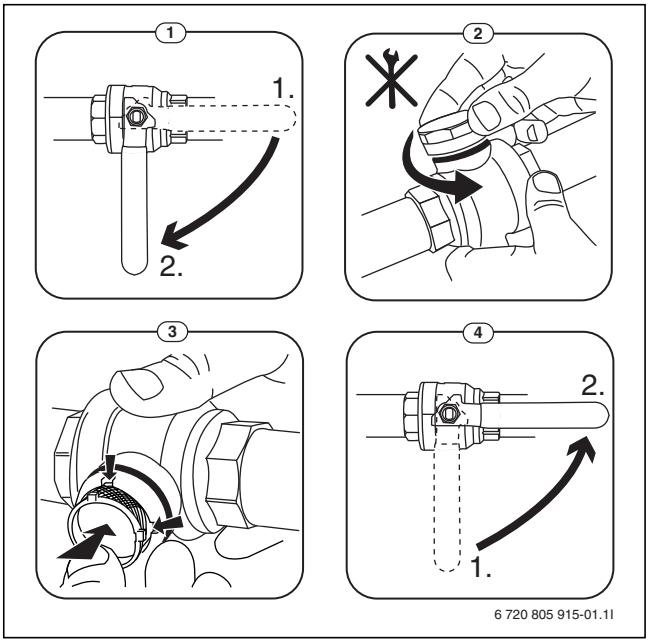


Fig. 56 Filter version without circlip

- ▶ Screw back the hood (by hand).
- ▶ Open the valve (4).

22 Connection for IP module

The heat pump module contains an IP module, which can be used to manage and monitor the heat pump module from a mobile unit. It is used as an interface between the heating system and a network (LAN) and enables the SmartGrid function.

Use of all the functions requires an internet connection and a router with an available RJ45 output. This may incur additional costs. Managing the installation from a cell phone requires the free app **IVT Anywhere**.

Commissioning

Please refer to the router documentation during commissioning.

The router must be configured as follows:

- DHCP enabled
- Ports 5222 and 5223 may not be blocked from outgoing traffic.
- Free IP address available
- The address filter (MAC filter) must not filter out the module.

During commissioning of the IP module, the following is possible:

- Internet
  The module automatically obtains an IP address from the router. The name and address of the target server are stored in the standard settings of the module. As soon as an internet connection is established, the module automatically logs on to the server.
- Local network
  The module does not have to be connected to the internet. It can also be used in a local network. In this case, however, the module cannot be reached via the internet, and the IP-module software cannot automatically update.
- The app **IVT Anywhere**
  When the app is opened for the first time, the predefined login name and password must be entered. The login information can be found on the IP-module data plate.

NOTICE: You will lose your login information when you change IP-module!
Each IP-module has its own unique login information.

- ▶ Enter your login information after commissioning in the appropriate field in your operating instructions.
- ▶ Change the information according to the new IP-module if it has been changed.
- ▶ Inform the user.

You can also change the password in the user interface.

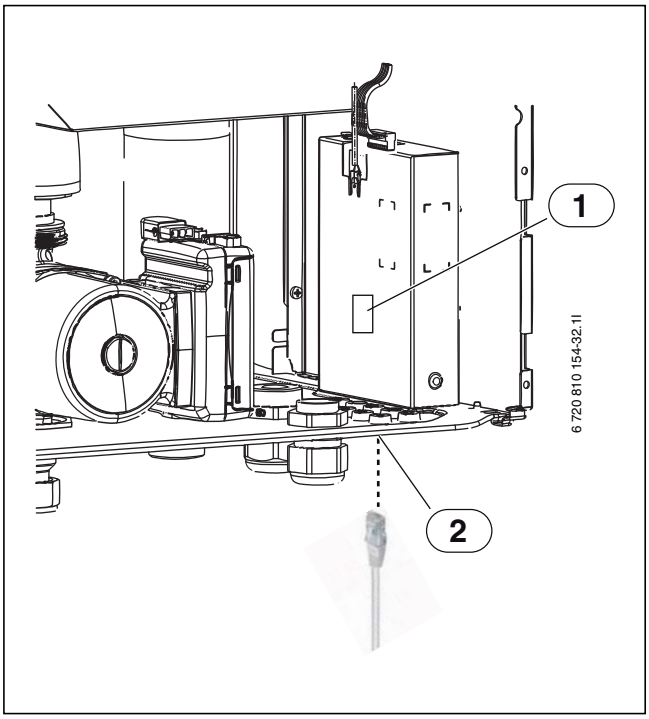


Fig. 57 IP module

[1] IP module data plate
[2] Connection RJ45

23 Commissioning protocol

Commissioning date:	
Customer address:	Surname, Given name:
	Address:
	City:
	Telephone:
Installation company:	Surname, Given name:
	Street address:
	City:
	Telephone:
Product information:	Product model:
	TTNR:
	Serial number:
	FD-no.:
Installation components:	Receipt/value
Room controller	☐ Yes | ☐ No
Room controller with condensation sensor	☐ Yes | ☐ No
Extra heat source electric/oil/gas	☐ Yes | ☐ No
Model:	
Solar energy	☐ Yes | ☐ No
Buffer cylinder	☐ Yes | ☐ No
Model/volume (L):	
Hot water cylinder	☐ Yes | ☐ No
Model/volume (L):	
Other components	☐ Yes | ☐ No
Which?	
Minimum clearances outside unit:	
Is the outside unit positioned on a solid and flat surface?	☐ Yes | ☐ No
Minimum distance to wall? ..... mm	
Minimum side panel clearance? ..... mm	
Minimum distance to roof? ..... mm	
Minimum distance in front of the heat pump? ..... mm	
Is the outside unit positioned so that no snow or rain can slide or drip down from the roof?	☐ Yes | ☐ No
Heat pump condensation water hose (outside unit)	
Has the condensation water hose been fitted with a heating cable?	☐ Yes | ☐ No
Heat pump connections (outside unit)	
Have the connections been professionally installed?	☐ Yes | ☐ No
Who laid/delivered the power cable?	
Minimum clearances inside unit:	
Minimum distance to wall? ..... mm	
Inside unit minimum front distance? ..... mm	
Heating:	
Has the expansion vessel pressure been established? ..... bar	
Has the heating system been flushed before installation?	☐ Yes | ☐ No
The heating system has according to the established expansion vessel prepressure been filled to ..... bar?	☐ Yes | ☐ No
Has the particle filter been cleaned?	☐ Yes | ☐ No
Electric connection:	
Are the low voltage wires at a distance of at least 100 mm from the 230 V/ 400 V wires?	☐ Yes | ☐ No
Have the CAN BUS connections been installed correctly?	☐ Yes | ☐ No
Has a power guard been connected?	☐ Yes | ☐ No

Table 48 Commissioning log

Is the outside temperature sensor T1 positioned correctly on the coldest side of the house?	☐ Yes | ☐ No
Power supply connection:	
Is the phase order L1, L2, L3, N and PE in the heat pump and heat pump module correct?	☐ Yes | ☐ No
Has the power been connected according to the installation instructions?	☐ Yes | ☐ No
Heat pump and booster heater fuse, trip characteristics?	
Manual mode:	
Has a function test been performed of separate component assemblies (pump, mixing valve, 3-way valve, compressor, etc.)?	☐ Yes | ☐ No
Notes:	
Have the temperature values in the menu been checked and documented?	☐ Yes | ☐ No
T0 T1 TW1 TL5 TC0 TC1	_____ °C _____ °C _____ °C _____ °C _____ °C _____ °C
Booster heater settings:	
Start delay	
Booster heater time delay	
Block booster heater	☐ Yes | ☐ No
Immersion heater connected load settings	
Booster heater max. temperature	_____ °C
Electrical output (shows actual value)	
Protective functions:	
Block the heat pump during low outside temperature_____ °C	
Has the commissioning been performed correctly?	☐ Yes | ☐ No
Are there further actions required by the installer?	☐ Yes | ☐ No
Notes:	
Installer signature:	
Customer signature:	

Table 48 Commissioning log

Notes

POWERED BY NATURE

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