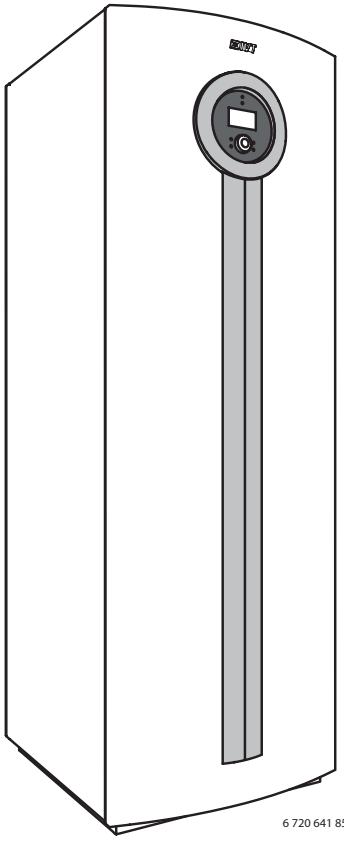
# Greenline HC

## HC 22 / HC 33




# Installation manual

6 720 645 504 (2011/04) en

IVT

# Contents

# 1 Key to symbols and safety instructions

## 1.1 Explanation of symbols

**Warning symbols**

Safety instructions in this document are framed and identified by a warning triangle which is printed on a grey background.

Electrical hazards are identified by a lightning symbol surrounded by a warning triangle.

Signal words indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTICE** indicates possible damage to property or equipment, but where there is no risk of injury.
- **CAUTION** indicates possible injury.
- **WARNING** indicates possible severe injury.
- **DANGER** indicates possible risk to life.

**Important information**

Notes contain important information in cases where there is no risk of personal injury or material losses and are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

**Additional symbols**

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

*Tab. 1*

## 1.2 Safety precautions

**General**

- ▶ Read the guide carefully and keep it to hand for future use.

**Installation and commissioning**

- ▶ The heat pump may be installed and put into operation only by a qualified installer.

**Service and maintenance**

- ▶ Only qualified personnel may carry out repairs. Incorrect repairs can lead to serious risks to the user, and a reduction in savings.
- ▶ Only use original spare parts.
- ▶ Service and maintenance must be carried out annually by an authorised service representative.

# 2 Included in the delivery

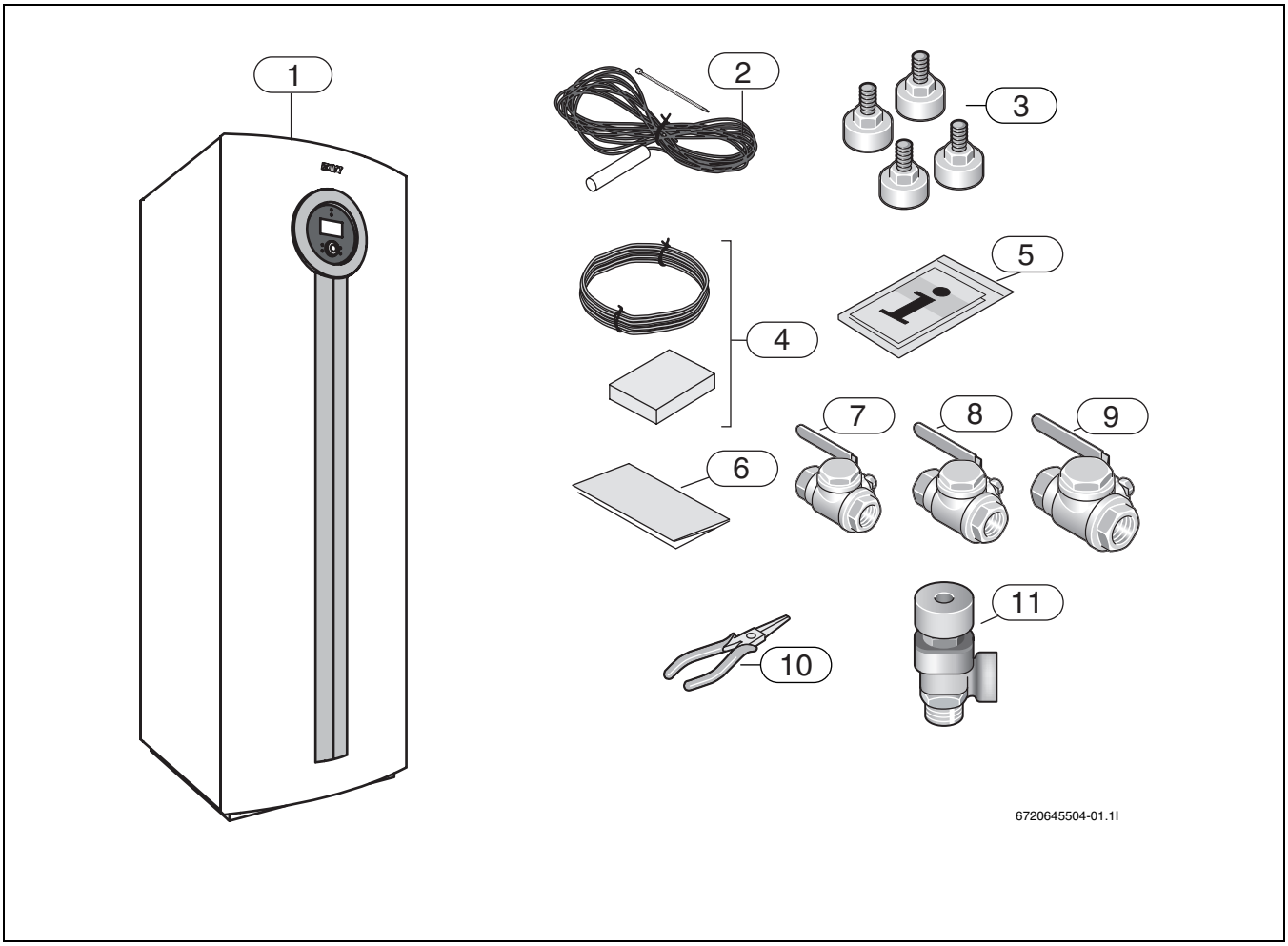



*Fig. 1*

**1** Heat pump
**2** Flow sensor
**3** Adjustable feet
**4** Outdoor sensor
**5** Warranty Card
**6** Guides
**7** Particle filter for hot water
**8** Particle filter for the heating system
**9** Particle filter for the collector circuit
**10** Pliers for particle filter
**11** Safety valve, 4 bar

# 3 Installation and transport tools

**DANGER:** Personal injuries may occur. The heat pump weighs between 330 and 360 kg.

- Never lift the heat pump by hand.

The heat pump may be transported only with a handling trolley/lift truck .

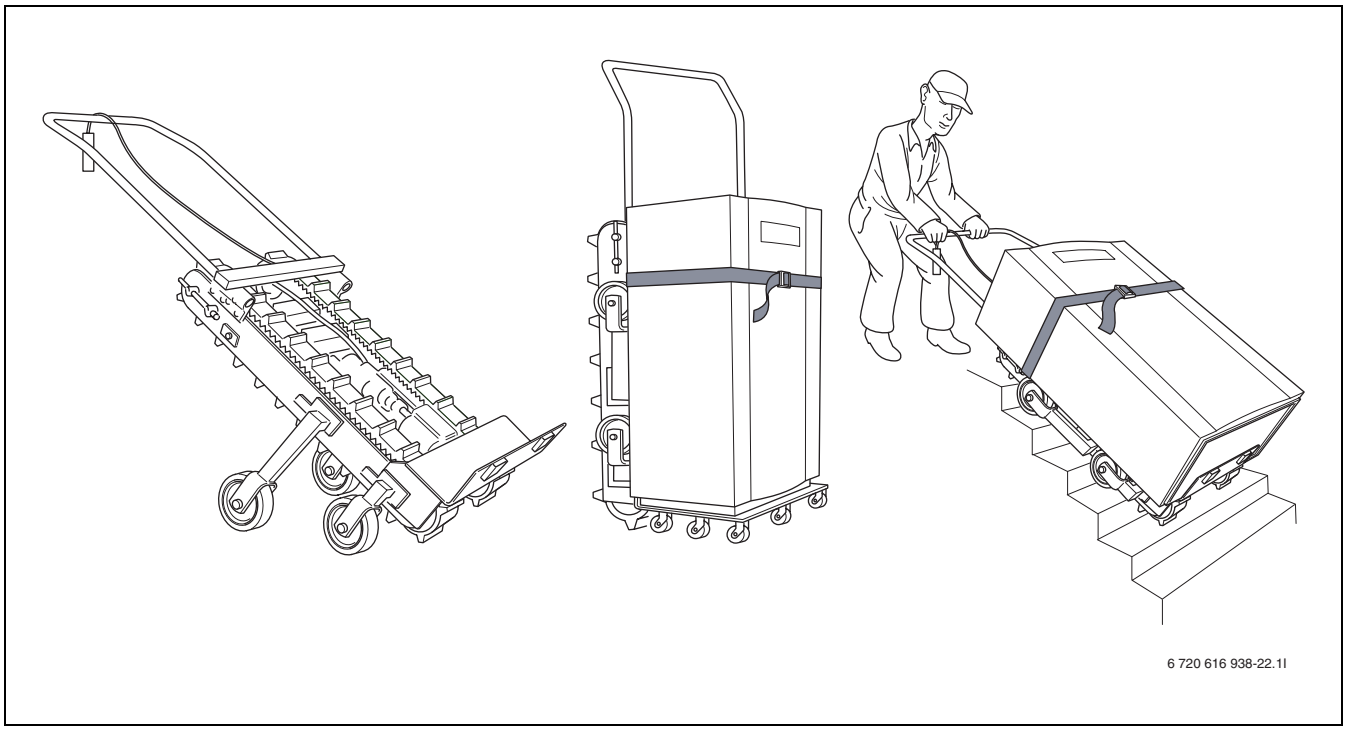



*Fig. 2 Example of a handling trolley/lift truck that can be used during installation of a heat pump*

# 4 Lifting the heat pump

**DANGER:** Personal injuries may occur. The heat pump weighs between 330 and 360 kg.

- ▶ Never lift the heat pump by hand.

Remove the packaging and the transport pallet from the heat pump. Dismantle also the front and side plates before lifting the heat pump into the building.

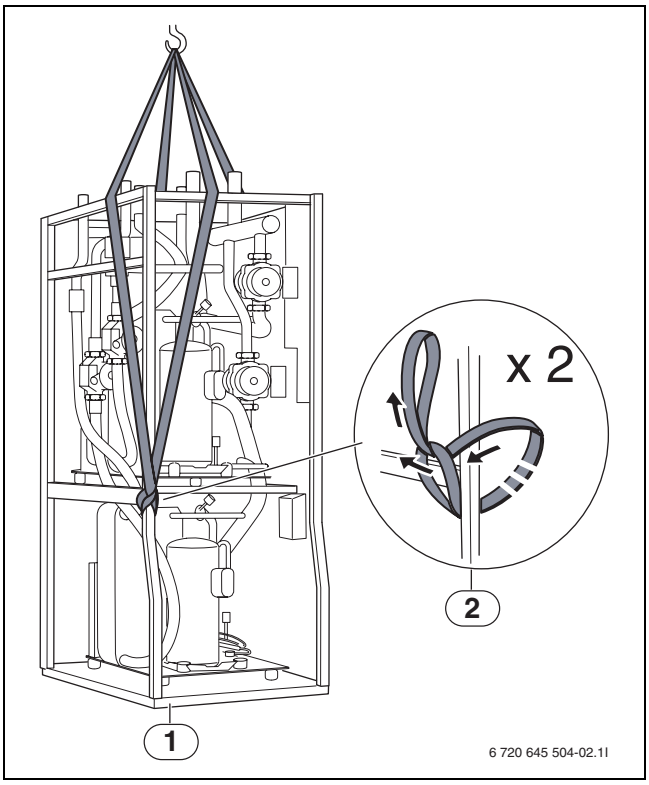



*Fig. 3 HC22-33 with lifting belts*

**1** HC 22-33 with lifting belt on opposite sides
**2** Attach the lifting belts to the heat pump according to the figure

# 5 Product details

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

HC 22-33 are ground source pumps designed to be supplemented with an external hot water heater.

## 5.1 Application area

The heat pump must only be used in a closed hot water heating system according to BS EN 12828.
Other forms of use are not permitted. We take no responsibility for damage occurring due to non-permitted use.

## 5.2 Type overview

| **HC** | HC 22 | HC 33 |
|---|---|---|
| **kW** | 21,0 | 33,8 |

*Tab. 2 Type overview*

**HC** Ground source heat pump
**kW** Heat output 0/35 (EN 14511)

## 5.3 Type plate

The type plate is located on the roof plate of the heat pump. Information about the heat pump's output, part number, serial number and date of manufacture is stated there.

## 5.4 Transport and storage

The heat pump should always be transported and stored in an upright position. However, the heat pump may be tilted temporarily, but must not be laid down.

The outer cover plates should be removed to avoid damage if the heat pump is transported without the supplied transport pallet.

The heat pump must not be stored at temperatures below -10 °C.

## 5.5 Transport locking devices

The heat pump is furnished with transport locking devices which prevent damage during transportation. Unscrew the transport locking devices installed next to the vibration dampers on the heat pump (→ figure 9).

## 5.6 Positioning the heat pump

- The heat pump is placed indoors, on a level and stable surface that withstands a weight of at least 400 kg.
- Adjust the rubber feet so the heat pump does not lean.
- The ambient temperature around the heat pump must be between 10 °C and 35 °C.
- The installer should take noice transfer to adjacent areas into consideration when positioning the heat pump.
- There must be a drain in the room where the heat pump is placed. This ensures that water can easily be carried away if there is a leak.

## 5.7 Checks before installation

- Installation of the heat pump should be performed by a qualified installer.
- Before the heat pump is commissioned, the heating system, hot water cylinder and the collector circuit system, including the heat pump, must be filled and vented.
- Check that all pipe connections are intact and have not shaken loose during transportation.
- Wiring should be kept as short as possible to protect the system from downtime, for example during a thunderstorm.
- Heat pump installation, energy drilling and collector installation must follow applicable regulations.
- Check the water quality (→ page 24, VDI 2035).

## 5.8 Checklist

Each heat pump installation is unique. The following checklist will give you a general description of how the installation should be carried out.

1. Position the heat pump on an even base. Adjust the height using the adjustable feet.
2. Fit the valves, particle filters and a filling unit.
3. Install the incoming and outgoing pipes for the heat pump, as well as the expansion vessel.
4. Connect the heating unit to the heating system.
5. Install the outdoor sensor and possible room sensors.
6. Fill and vent the heating and collector systems before commissioning.
7. Carry out the external connections.
8. Connect the heating installation to the power supply.
9. Commission the heating installation by making all the necessary settings on the control panel.
10. Check the heating installation after commissioning.
11. Top up more collector circuit fluid, if required.

## 5.9 CAN-BUS

The various circuit boards in the heat pump are joined by a communications cable, CAN-BUS. CAN (Controller Area Network) is a two-wire system for communication between microprocessor based modules/circuit boards.

**CAUTION:** Interference.

- The CAN-BUS cable must be screened and laid separately from the power cable.

**Suitable cable for external laying** is cable LIYCY (TP) 2x2x0.5. The cable must be twisted pair and screened. The screen must only be earthed at one end and to the chassis.

Maximum cable length is 30 m.

CAN-BUS cable must **not** be laid alongside power supply cables. Minimum distance 100 mm. They may be laid alongside sensor cables.

**CAUTION:** Do not mix up the 12V and CAN-BUS connections!

The processors are destroyed if 12V is connected to the CAN-BUS.

- Check that the four cables are connected to the contacts with the corresponding marking on the circuit board.

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.

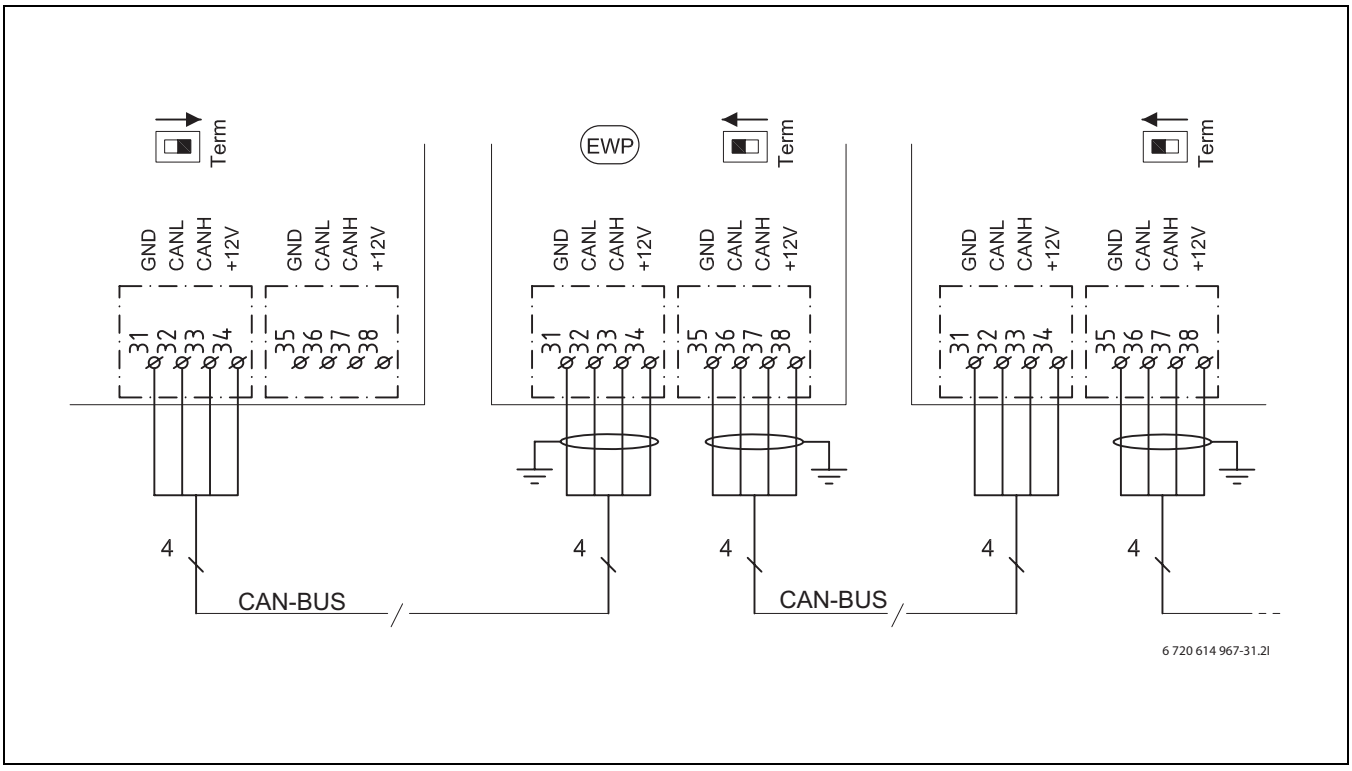



*Fig. 4*

**GND** Earth
**CANL** CAN low
**CANH** CAN high
**+12V** Connection 12V
**EWP** Heat pump

## 5.10 Handling circuit boards

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:** Never grasp a circuit board without wearing a ground-connected bracelet.

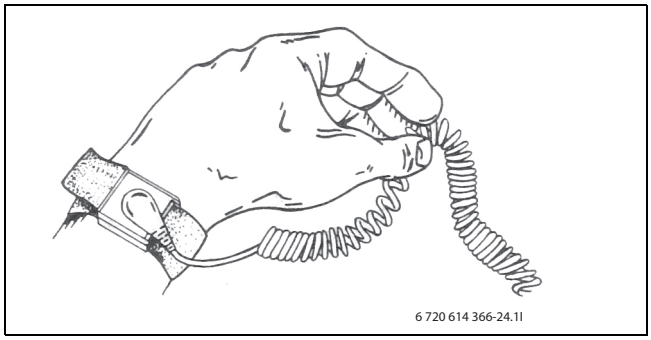



*Fig. 5 Bracelet*

Damage is usually latent, and a circuit board can operate impeccably 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 condition 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.

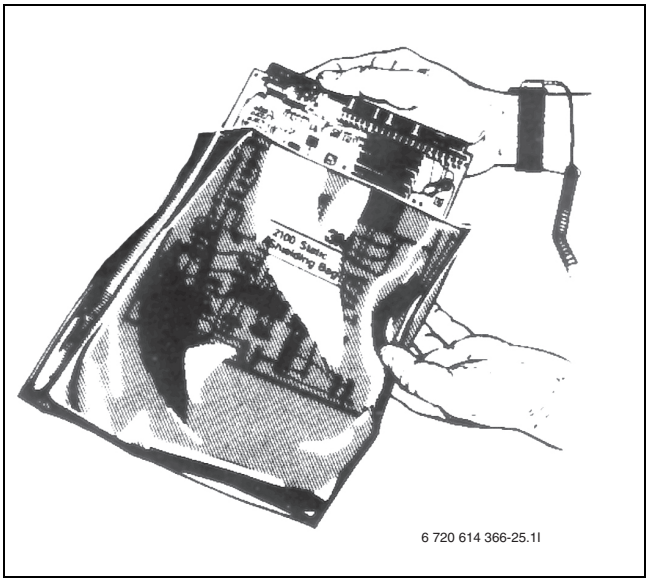



*Fig. 6*

# 6 Heating, general

## 6.1 Circuits for heating

- **Circuit 1;** the first circuit is included by default in the control unit and is controlled by the installed flow sensor, possibly in combination with an installed room sensor.
- **Circuit 2 (mixed);** control of circuit 2 is also included by default in the control unit and only needs to be supplemented with a mixing valve, circulation pump and flow sensor and possibly with an additional room sensor.
- **Circuit 3-4 (mixed);** control of up to 2 additional circuits is optional. Each circuit is then fitted with a mixing valve module, circulation pump, flow sensor and a possible room sensor.

Circuit 1 must always be installed and used.

Circuits 2 through 4 cannot have a higher flow temperature than circuit 1. This means that underfloor heating on circuit 1 cannot be combined with radiators on another circuit. Room temperature reduction for circuit 1 can affect other circuits in some cases.

When the **Use temperature from circuit with highest temperature** function under **Circuit 1** is used, the heat curve for **Circuit 1** does not need to be adapted to the mixed circuits. The heat pump automatically selects the highest flow temperature set point value.

## 6.2 Control methods for heating

- **Outdoor sensor;** a sensor is fitted on the outside wall of the house. The sensor sends signals to the control unit in the heat pump. Control with an outdoor sensor means that the heat pump automatically regulates the heating in the house depending on the outdoor temperature. The customer determines the temperature of the heating system in relation to the outdoor temperature by setting the heat curve on the control unit.
- **Outdoor sensor and room sensors** (one room sensor per circuit is possible); Control with outdoor sensor supplemented with room sensor(s) means that one (or several) sensors are mounted in a central location inside the house. They are connected to the heat pump and provide the control unit with information about the current room temperature. The signal affects the flow temperature. For example, it falls when the room sensor indicates a higher temperature than the one set. Room sensors are used when factors other than the outdoor temperature influence the indoor temperature of the house. For example, this can be when a stove or fan-assisted radiator is used in the house, or if the house is sensitive to the wind or exposed to direct sunlight.

It is only the room where the room sensor is located that can influence regulation of the temperature for the relevant heating circuit.

## 6.3 Time control for heating

- **Program control;** The control unit offers a possibility to define two individual programs for time control of the heating.
- **Holiday;** the control unit has a program for holiday mode, which means that during the selected period the room temperature changes to a lower or higher level. The program also allows switching off hot water production.
- **External control;** the control unit can make settings for external control, which means that the preselected function is performed when the control unit senses an input signal.

## 6.4 Operating modes

For all operating modes shall **Mixed additional heat** be used.

- **Without additional heat;** the heat pump is sized so as to cover at least 100 % of the peak output of the house.
  - This choice is not in the control, choose **Mixed additional heat** at **Start-up** and thereafter **Block additional heat** in the menu for additional heat (→ Chapter 16.7).
- **With electrical additional heat;** the heat pump is sized to cover less than the peak output of the house. An additional electric heat source covers the difference. The additional electric heat source is controlled by a 0-10 V signal which is connected to the mixing valve output E71.E1.Q71 on the PEL board (→ Chapter 11.6.5). Otherwise, the control of the additional electric heat source functions in the same way as the control of the mixed additional heat source. The mixing valve control delay should be set to 0, since it unnecessarily extends the start delay of the additional heat (→ Chapter 16.7).
- **With mixed additional heat;** mixed additional heat source which is allowed to work in parallel with the heat pump. Connection E71.E1.Q71 (→ Chapter 11.6.3). The additional heat is also used in alarm mode.
  For production of extra hot water and hot water peak, an additional electric heat source is required in the hot water heater.

An additional electric heat source should always be installed in the hot water heater if the heat pump should supply more than 2 flats.
If an oil/gas boiler is used as a mixed additional heat source, the boiler can be installed in such a way as to generate hot water, extra hot water and hot water peak. In this case, an additional electric heat source is not required in the hot water heater.

# 7 Dimensions and clearance

## 7.1 HC 22 - 33

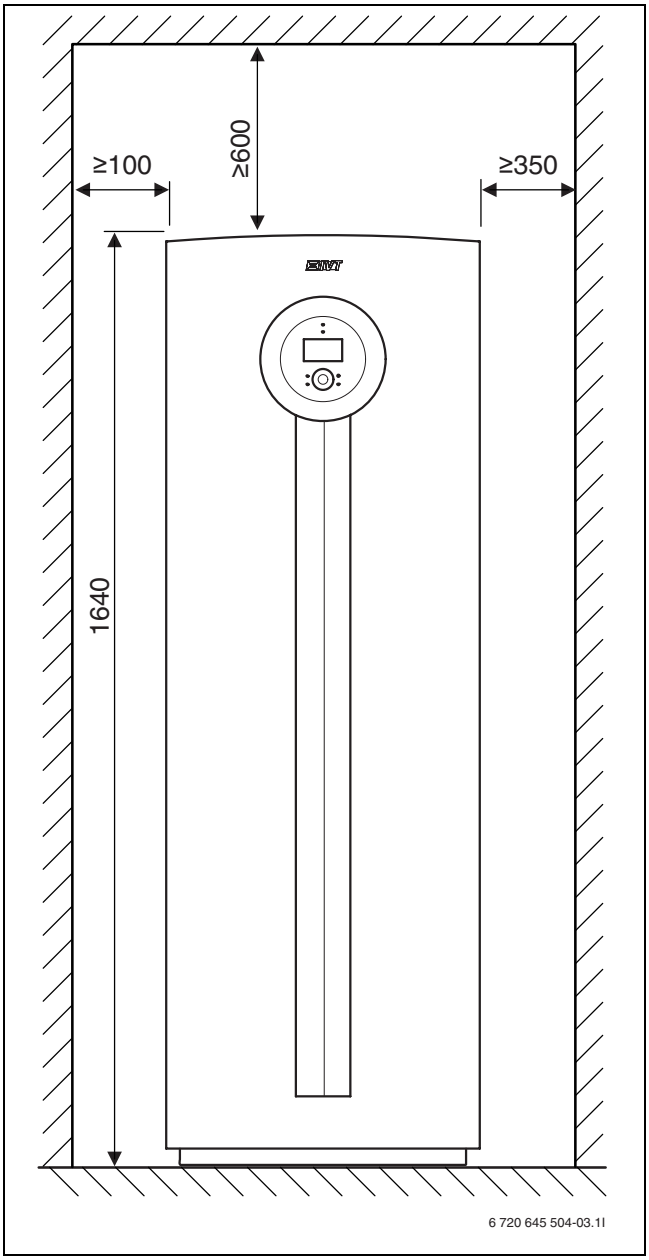



*Fig. 7 Front view*

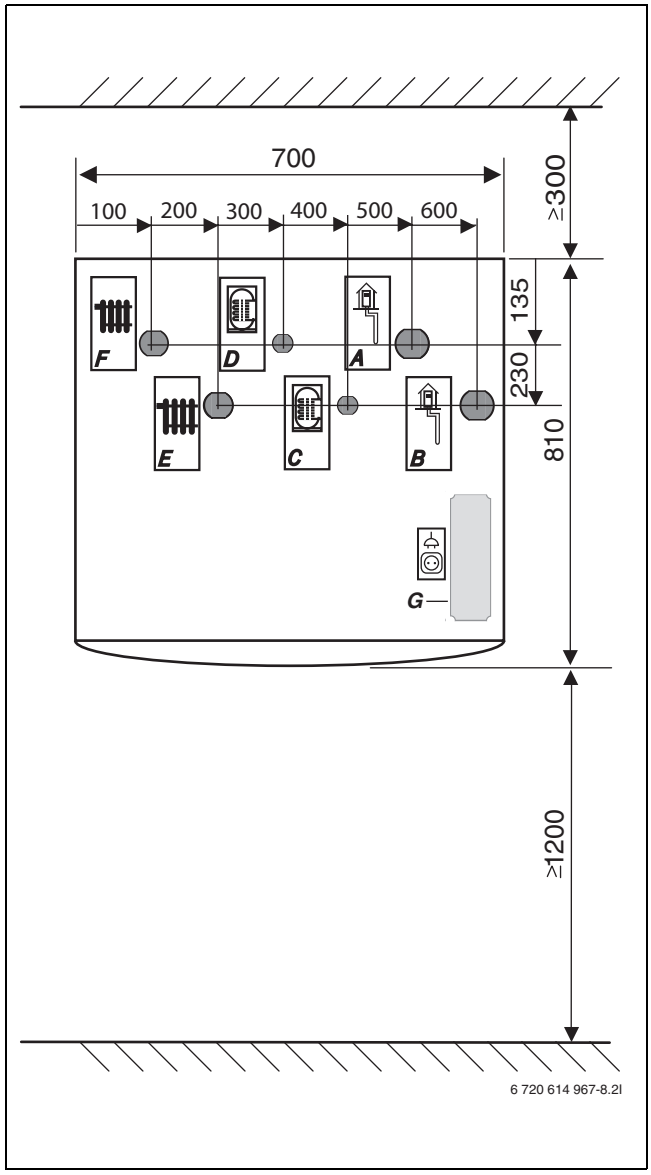



*Fig. 8 Top view*

**All dimensions are stated in mm.:**

**A** Collector circuit out
**B** Collector circuit in
**C** Return, hot water heater
**D** Flow, hot water heater
**E** Heat transfer fluid in
**F** Heat transfer fluid out
**G** Electrical connections

# 8 Technical information

## 8.1 Component parts

### 8.1.1 HC 22 - 33

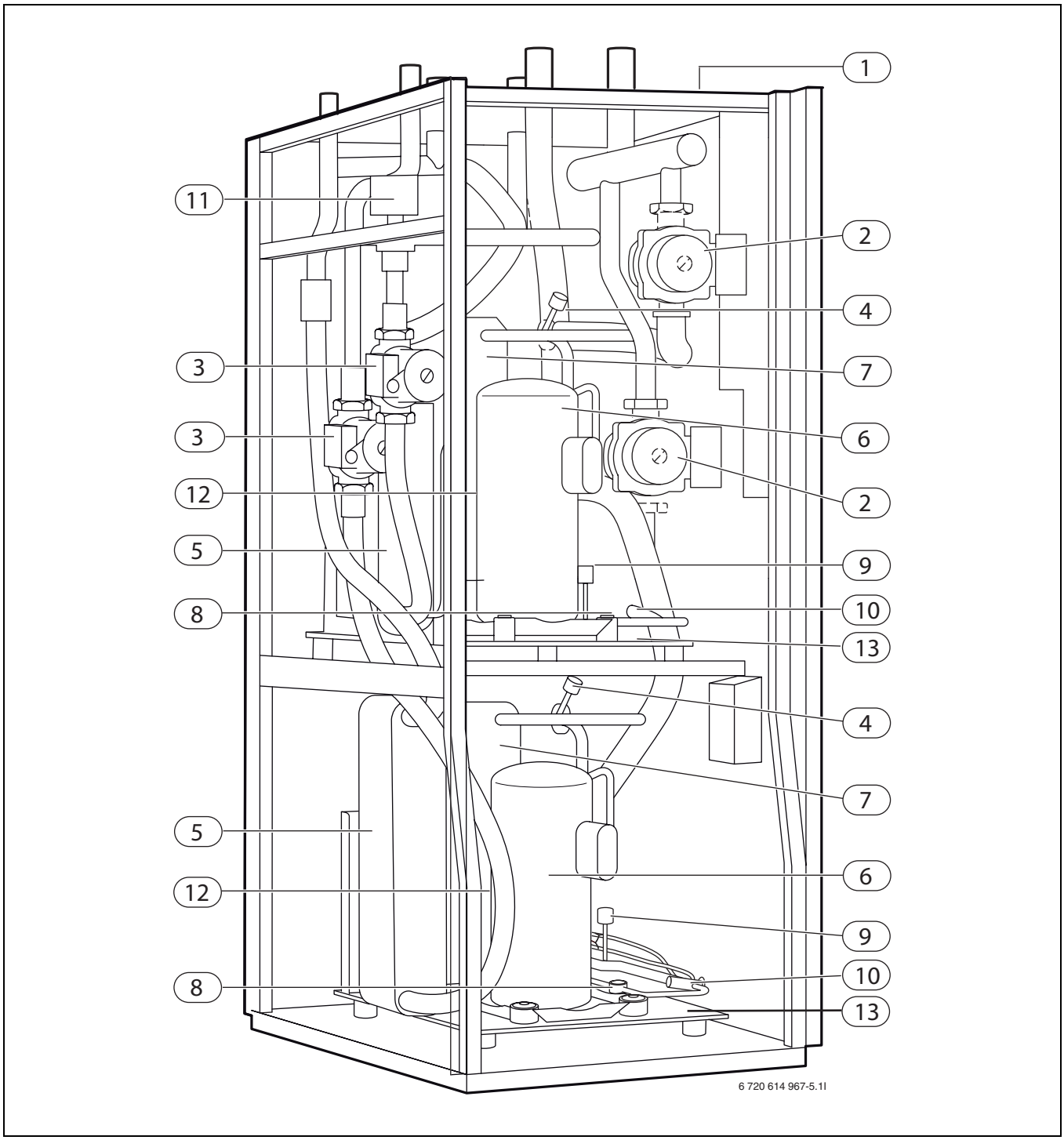



*Fig. 9*

**1** Type plate
**2** Collector circuit pump
**3** Heat carrier pump
**4** Low pressure switch
**5** Condenser
**6** Compressor (1 and 2)
**7** Evaporator
**8** Sight glass
**9** High pressure switch
**10** Expansion valve
**11** 3-way valve
**12** Drying filter
**13** Transport locking devices (2) and Vibration dampers (2)

## 8.2 System solutions

Detailed system solutions can be found in the product's planning documentation.

### 8.2.1 System solution explanations

| E10 | |
|---|---|
| E10.T2 | Outdoor sensor |

*Tab. 3 E10*

| E11 | Circuit 1 |
|---|---|
| E11.C101 | Expansion vessel |
| E11.C111 | Buffer tank |
| E11.F101 | Safety valve |
| E11.F111 | Automatic air vent |
| E11.G1 | Heating circuit pump |
| E11.P101 | Pressure gauge |
| E11.P111 | Thermometer |
| E11.P112 | Thermometer |
| E11.Q101 | Shut-off valve |
| E11.Q102 | Shut-off valve |
| E11.R101 | Non-return valve |
| E11. T1 | Flow sensor |
| E11.TT | Room sensor |

*Tab. 4 E 11 Circuit 1*

| E12 | Circuit 2 |
|---|---|
| E12.G1 | Heating circuit pump |
| E12.P112 | Thermometer |
| E12.Q101 | Shut-off valve |
| E12.Q102 | Shut-off valve |
| E12.Q11 | Mixing valve |
| E12.R101 | Non-return valve |
| E12.T1 | Flow sensor |
| E12.T5 | Room sensor |

*Tab. 5 E12 Circuit 2*

| E21 | Compressor 1 |
|---|---|
| E21 | Heat pump |
| E21.F111 | Automatic air vent |
| E21.G2 | Heat carrier pump |
| E21.G3 | Collector circuit pump |
| E21.Q102 | Shut-off valve |
| E21.Q21 | 3-way valve |
| E21.R101 | Non-return valve |
| E21.R102 | Non-return valve |
| E21.T8 | Heat transfer fluid out |
| E21.T9 | Heat transfer fluid in |
| E21.T10 | Collector circuit in |
| E21.T11 | Collector circuit out |
| E21.V102 | Filter |

*Tab. 6 E21 Compressor 1*

| E22 | Compressor 2 |
|---|---|
| E22 | Heat pump |
| E22.F101 | Safety valve |
| E22.G2 | Heat carrier pump |
| E22.G3 | Collector circuit pump |
| E22.Q101 | Shut-off valve |
| E22.Q21 | 3-way valve |
| E22.R101 | Non-return valve |
| E22.R102 | Non-return valve |
| E22.T8 | Heat transfer fluid out |
| E22.T9 | Heat transfer fluid in |
| E22.T10 | Collector circuit in |
| E22.T11 | Collector circuit out |
| E22.V101 | Filter |

*Tab. 7 E22 Compressor 2*

| E31 | Collector circuit |
|---|---|
| E31 | Collector circuit, compressor 1 |
| E31.C101 | Expansion vessel |
| E31.F101 | Safety valve |
| E31.F102 | Safety valve |
| E31.F111 | Automatic air vent |
| E31.Q21 | Ball valve filling unit |
| E31.Q22 | Ball valve filling unit |
| E31.Q23 | Shut-off valve |
| E31.Q24 | Shut-off valve |
| E31.V101 | Filter |

*Tab. 8 E31 Collector circuit*

| E41 and E42 | Domestic hot water tank 1 and 2 |
|---|---|
| E41 | Hot water heater 1 |
| E41.E1 | Hot water electric heater |
| E41.E1.G1 | Circulation pump |
| E41.F101 | Safety valve |
| E41.F102 | Safety valve |
| E41.G6 | Circulation pump hot water |
| E41.P111 | Thermometer |
| E41.P112 | Thermometer |
| E41.Q101 | Shut-off valve |
| E41.Q104 | Shut-off valve |
| E41.Q105 | Shut-off valve |
| E41.Q106 | Shut-off valve |
| E41.Q111 | Balancing valve |
| E41.R101 | Non-return valve |
| E41.R102 | Non-return valve |
| E41.T3 | Hot water sensor |
| E41.V41 | Hot water |
| E41.W41 | Cold water |
| E42 | Hot water heater 2 |

*Tab. 9 E41, E42 DHW tank 1, 2*

| E71 | Additional heat |
|---|---|
| E71 | Additional heat |
| E71.E1.F101 | Safety valve |
| E71.E1.F111 | Automatic air vent |
| E71.E1.G71 | Circulation pump |
| E71.E1.P111 | Thermometer |
| E71.E1.P101 | Pressure gauge |
| E71.E1.Q1Q1 | Shut-off valve |
| E71.E1.Q1Q2 | Shut-off valve |
| E71.E1.Q71 | Mixing valve |

*Tab. 10 E71 Additional heat*

### 8.2.2 System solution without additional heat

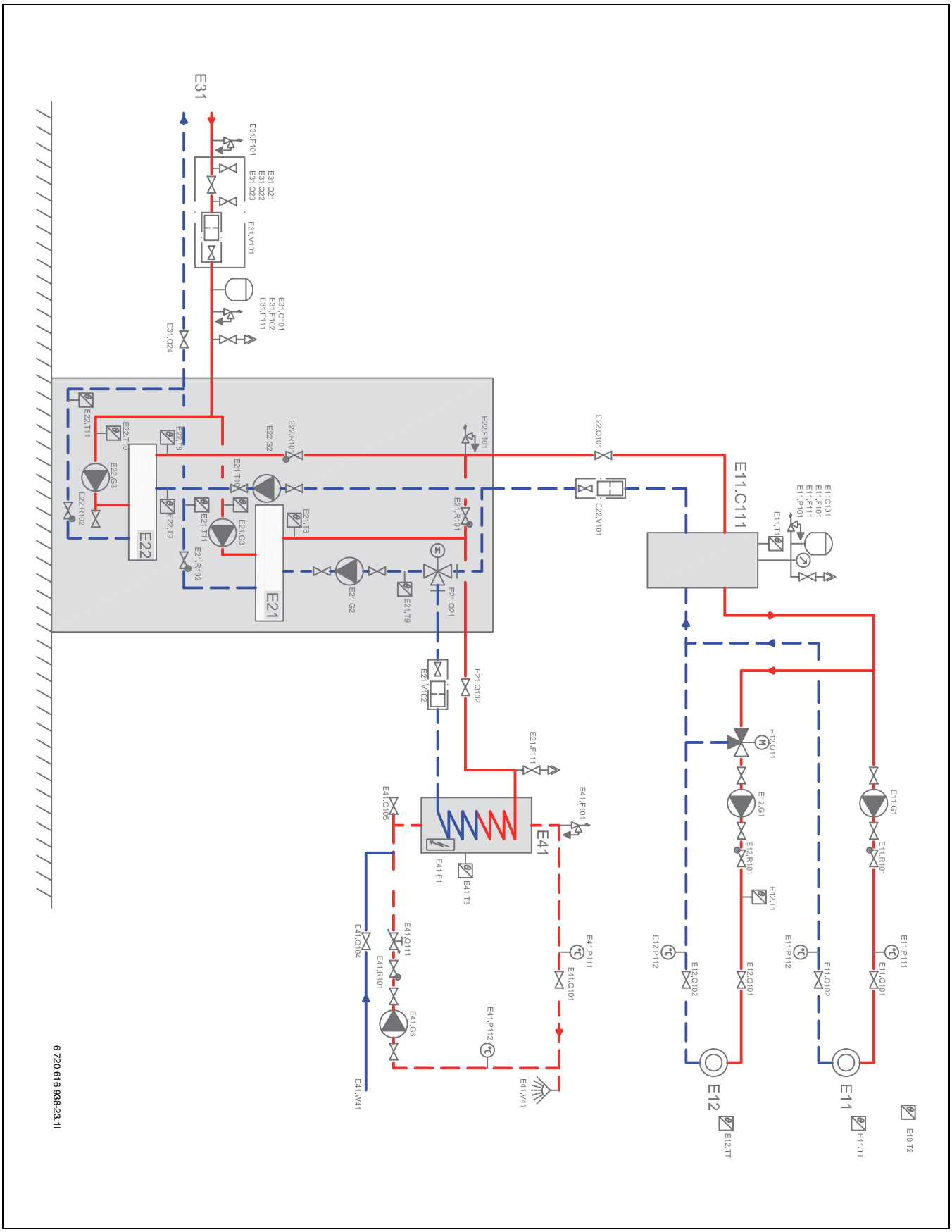



*Fig. 10 Heating circuit and buffer tank without additional heat (→ Chapter 8.2.1, 8.3)*

### 8.2.3 System solution with mixed additional heat

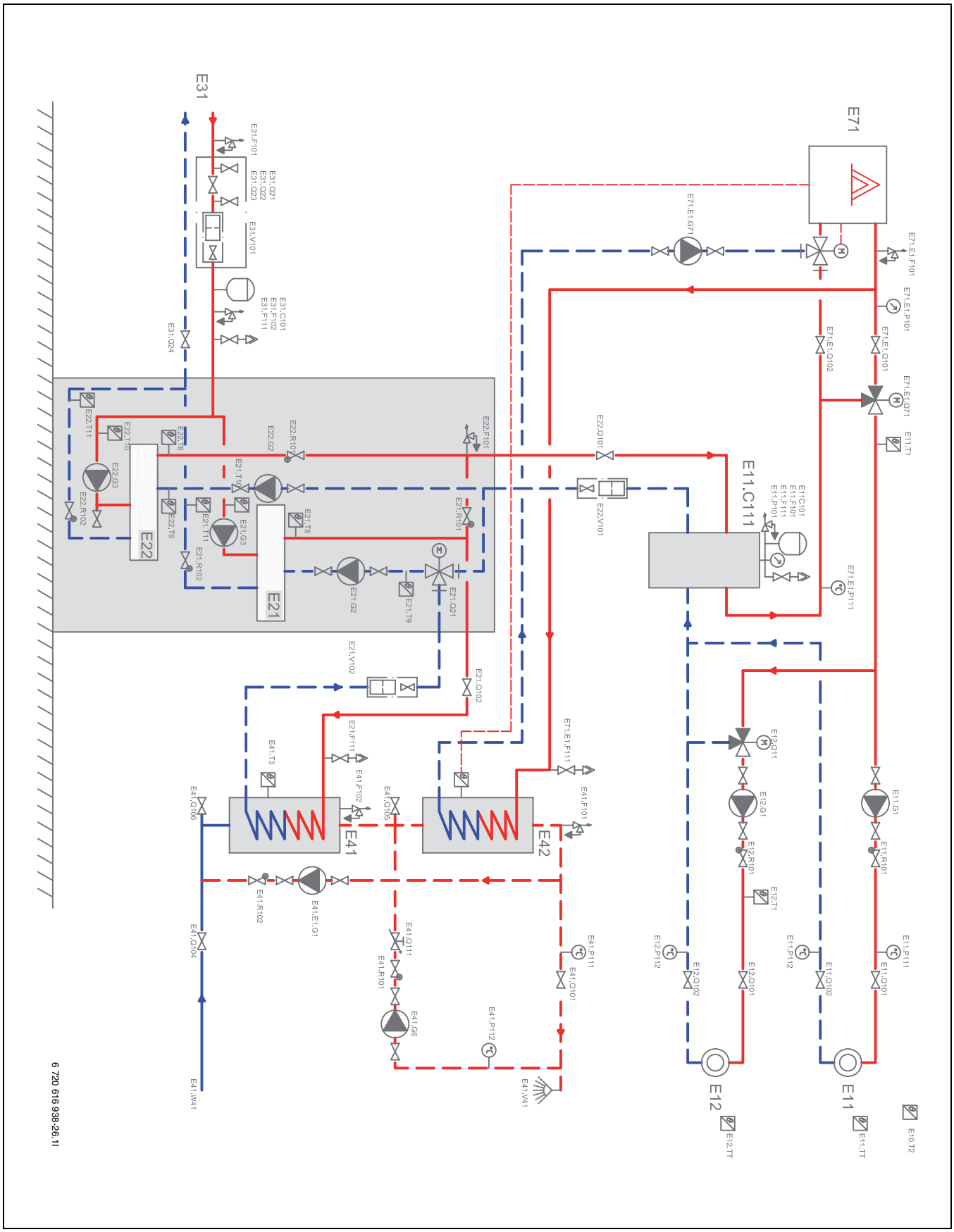



*Fig. 11 Heating circuit, buffer tank and mixed additional heat (→ Chapter 8.2.1, 8.3)*

### 8.2.4 System solution with electric additional heat

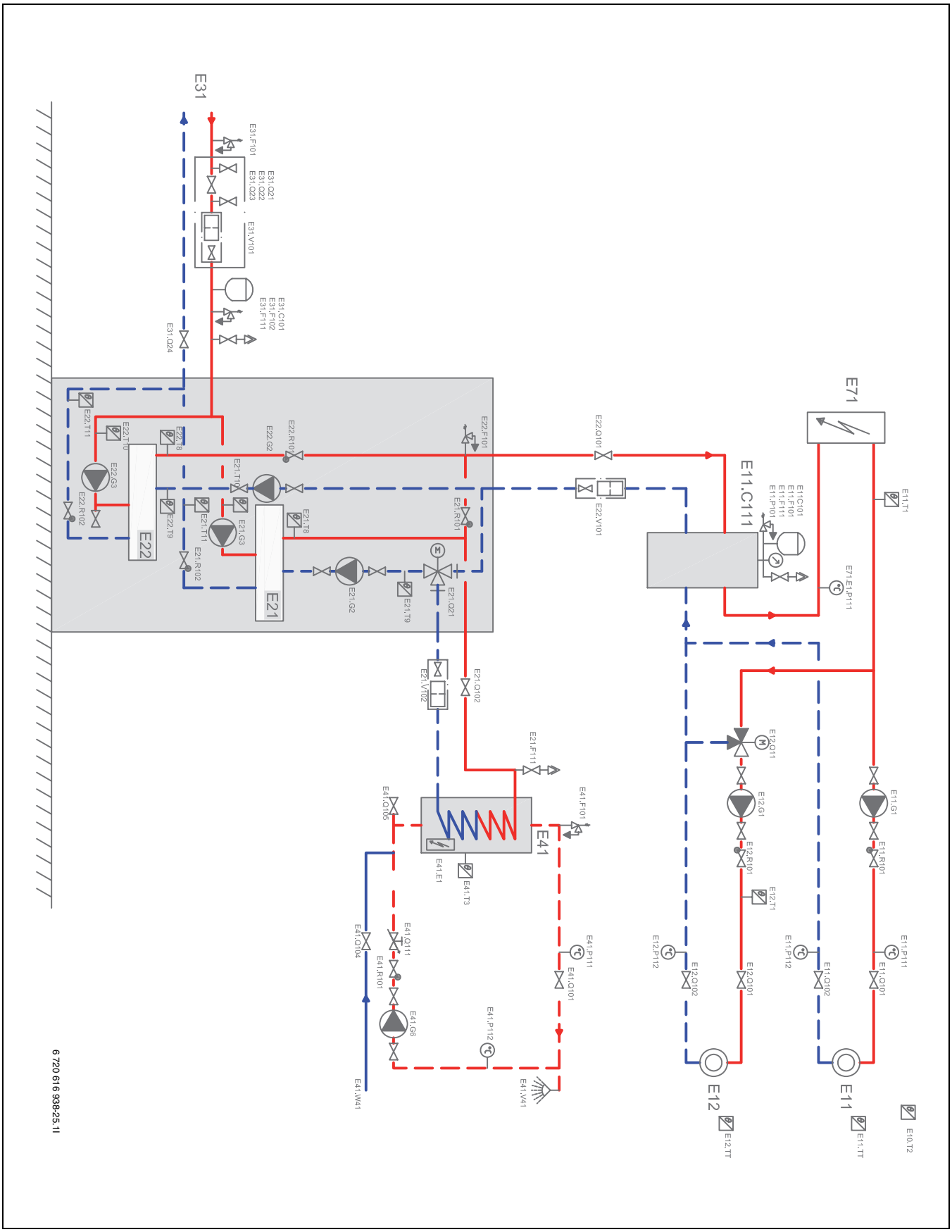



*Fig. 12 Heating circuit, electric additional heat and buffer tank (→ Chapter 8.2.1, 8.3)*

## 8.3 Functional description of system solutions

**System without additional heat (→ Chapter 8.2.2)**

**Heating**

Heat for E11 is taken directly from buffer tank E11.C111. Heat for E12 is taken from buffer tank E11.C111 and is shunting to the set temperature using mixing valve E12.Q11. The heat pump supplies heat to E11.C111 and keeps the temperature set on E11.T11 by starting one compressor at a time when the temperature is too low and stopping one compressor at a time when the temperature is too high.

**Hot water**

When the temperature in hot water heater E41.T3 falls below the set limit, E21.Q21 switches over to water heating and compressor E21 starts. Water heating continues until the temperature of E21.T8 exceeds the set stop limit.

**Pump control**

E11.G1 and E12.G1 start at low outdoor temperature and stop at high outdoor temperature. E21.G2 and E21.G3 are in operation when compressor E21 is in operation. E22.G2 and E22.G3 are in operation when compressor E22 is in operation. E41.G6 is in operation at set times.

**System with mixed additional heat (→ Chapter 8.2.3)**

**Additional heat and heat pump work in parallel**

Heat for E11 is taken directly from buffer tank E11.C111, with possible afterheating by E71. Heat for E12 is taken from buffer tank E11.C111, with possible afterheating by E71, and is released by shunting at the set temperature using mixing valve E12.Q11. The heat pump supplies heat to E11.C111 in order to keep the temperature set on E11.T11 by starting one compressor at a time when the temperature is too low and stopping one compressor at a time when the temperature is too high. If the heat pump does not manage to supply the set temperature by itself, additional heat E71.E1.Q71 is activated and regulates E11.T1 to the set temperature.

**Additional heat and heat pump work separately**

When the heat pump is responsible for all of the heating, it supplies heat to E11.C111 and keeps the temperature set on E11.T11 by starting one compressor at a time when the temperature is too low and stopping one compressor at a time when the temperature is too high. When the heat pump is in operation, boiler E71 is responsible for all of the heat production. Heat for E11 is taken from buffer tank E11.C111 or from E71. Heat for E12 is taken from buffer tank E11.C11 or from E71 and is shunted to the set temperature using mixing valve E12.Q11. Switch between heat pump and additional heat operation can result from low outdoor temperature, temporary stop of the energy supply to the heat pump or activation of external input for blocking the heat pump.

**Hot water**

The hot water is preheated in E41 which is heated by the heat pump. When the temperature in hot water heater E41.T3 falls below the set limit, E21.Q21 switches over to water heating and compressor E21 starts. Water heating continues until the temperature of E21.T8 exceeds the set stop limit. The hot water is afterheated in E42 which is heated by additional heat E71. The heating of the hot water circulation via E41.G6 is done completely by E42. Additional heat E71 exercises full control and regulation of the temperature in hot water heater E42.

**Pump control**

E11.G1 and E12.G1 start at a low outdoor temperature and stop at a high outdoor temperature. E21.G2 and E21.G3 are in operation when compressor E21 is in operation. E22.G2 and E22.G3 are in operation when compressor E22 is in operation. E41.G6 are in operation at the set times. E41.E1.G1 (→ Chapter 11.9) is controlled by the heat pump and is used for thermal disinfection of E41.

**High temperature systems**

In some heating systems the return temperature may at times exceed 55 °C. In such cases the heat pump stops (T9 > 55 °C) and restarts when E11.T1 becomes less than 65 °C.

**System with electric additional heat (→ Chapter 8.2.4)**

This system solution is also suitable for 0-10V output-controlled gas/oil-fired boiler.

**Heating**

Heat for E11 is taken directly from buffer tank E11.C111, with possible afterheating by E71. Heat for E12 is taken from buffer tank E11.C111, with possible afterheating by E71, and is shunted to the set temperature using mixing valve E12.Q11. The heat pump supplies heat to E11.C111 and keeps the temperature set on E11.T11 by starting one compressor at a time in the heat pump when the temperature is too low and stopping one compressor at a time when the temperature is too high. If the heat pump does not manage to supply the set temperature by itself, additional heat is activated, controlling the output via 0-10 V signal so as to keep the set temperature.

**Hot water**

When the temperature in hot water heater E41.T3 falls below the set limit, E21.Q21 switches over to water heating and compressor E21 starts. Water heating continues until the temperature of E21.T8 exceeds the set stop limit.

**Pump control**

E11.G1 and E12.G1 start at low outdoor temperature and stop at high outdoor temperature. E21.G2 and E21.G3 are in operation when compressor E21 is in operation. E22.G2 and E22.G3 are in operation when compressor E22 is in operation. E41.G6 is in operation at set times.

Enter **Yes** for **Acknowledge hot water additional heat** (→Chapter 16.7) in all system solutions.

## 8.4 Technical information

### 8.4.1 HC 22 - 33

| | Unit | HC 22 | HC 33 |
|---|---|---|---|
| **Liquid/water operation** | | | |
| Emitted output / COP (0/35) EN14511[1)] | kW | 21.0/4.4 | 33.8/4.2 |
| Emitted output / COP (0/45) EN14511[1)] | kW | 19.9/3.5 | 31.6/3.2 |
| Emitted output / COP (0/35) EN255[1)] | kW | 21.6/4.8 | 34.2/4.4 |
| Emitted output / COP (10/35) EN255[1)] | kW | 26.4/5.8 | 41.7/5.2 |
| Max. cooling effect (0/35) | kW | 17 | 26 |
| Max. cooling effect (10/35) | kW | 23 | 34 |
| **Collector circuit** | | | |
| Connection, collector circuit | | DN40, 1½ “ | |
| Working pressure collector circuit max/min | bar | 4 / 0.5 | |
| Incoming temperature collector circuit max/min | °C | 22 / -5 | |
| Outgoing temperature collector circuit min. | °C | -8 | |
| Mixture Ethylene glycol max/min | % | 35 / 30 | |
| Nominal flow collector circuit (max deviation 15%) | l/s | 1.3 | 2.3 |
| Permitted ext. pressure drop collector circuit | kPa | 65 | 44 |
| **Heating system** | | | |
| Buffer tank connections | | DN 32, 1¼ “ | |
| Tap hot water connections | | DN 25, 1“ | |
| Nominal flow hot water (max deviation 15%) | l/s | 0.28 | 0.45 |
| Working pressure heating system max/min | bar | 4 / 0.5 | |
| Flow buffer tank max/min | l/s | 0.74/0.52 | 1.1/0.82 |
| Max. ext. pressure drop buffer tank at max. flow | kPa | 30 | 20 |
| Max. ext. pressure drop buffer tank at min. flow | kPa | 40 | 40 |
| **Compressor** | | | |
| Step 1 (no. 1) | | Mitsubishi Scroll | |
| Step 2 (no. 2) | | Mitsubishi Scroll | |
| Max. flow temperature (no. 1/no. 2) | °C | 65/65 | |
| Refrigerant R 407C (no. 1/no. 2) [2)] | kg | 2,4/2,4 | 2,6/2,6 |
| Sound level[3)] | dBA | 51 | 53 |
| **Electrical data** | | | |
| Electrical connection (acc. to EN 60204-1) | | 400V 3N~50Hz | |
| Fuse gL- gG / characteristic D (automatic) | A | 25 | 32 |
| Max. short-circuit impedance soft starter | Ω | 0,42 | 0,47 |
| Max. operating current | A | 17 | 22,3 |
| Start current with soft starter | A | 29 | 30 |
| Nominal output (0/50) | kW | 6,7 | 10,8 |
| Nominal output (0/35) | kW | 5,5 | 8,7 |
| Maximum effect | kW | 10,5 | 14,1 |
| Collector circuit pump output at max. speed (no. 1/no. 2) | W | 310/310 | 390/390 |
| Collector circuit pump output at min. speed (no. 1/no. 2) | W | 290/290 | 360/360 |
| Heat carrier pump output at max. speed (no. 1/no. 2) | W | 91/91 | 124/124 |
| Heat carrier pump output at min. speed (no. 1/no. 2) | W | 49/49 | 61/61 |
| **General** | | | |
| Dimensions (height x depth x width) | mm | 700 x 750 x 1620 | |
| Weight | kg | 330 | 351 |

*Tab. 11 Teknisk information*

1) The indicated values are measured according to WPZ test methods.

2) Global Warming Potential, $GWP_{100}$ = 1526

3) The sound level is the acoustic energy that the heat pump emits and is not affected by the surroundings. On the other hand, the sound pressure level is affected by the surroundings and is approx. 11dBA lower when measured at a distance of 1 m in a free field.

### 8.4.2 Motor cut-out compressor

| Compressor | HC 22 | HC 33 |
|---|---|---|
| No. 1 | 8 A | 13 A |
| No. 2 | 8 A | 13 A |

*Tab. 12 Motor cut-out settings, compressor*

### 8.4.3 Circulation pumps

| Collector circuit pump (G3) | HC 22 | HC 33 |
|---|---|---|
| No. 1 Wilo | TOP-S 30/10 | TOP-S 30/10 |
| No. 2 Wilo | TOP-S 30/10 | TOP-S 30/10 |

*Tab. 13 Built-in collector circuit pumps*

| Heat carrier pump (G2) | HC 22 | HC 33 |
|---|---|---|
| No. 1 Wilo | RS-25/6 | RS-25/7 |
| No. 2 Wilo | RS-25/6 | RS-25/7 |

*Tab. 14 Built-in heat carrier pumps*

### 8.4.4 Measurement values for temperature sensors

| °C | $\Omega_{T...}$ | °C | $\Omega_{T...}$ | °C | $\Omega_{T...}$ | °C | $\Omega_{T...}$ |
|---|---|---|---|---|---|---|---|
| −40 | 154300 | −5 | 19770 | 30 | 3790 | 65 | 980 |
| −35 | 111700 | 0 | 15280 | 35 | 3070 | 70 | 824 |
| −30 | 81700 | 5 | 11900 | 40 | 2510 | 75 | 696 |
| −25 | 60400 | 10 | 9330 | 45 | 2055 | 80 | 590 |
| −20 | 45100 | 15 | 7370 | 50 | 1696 | 85 | 503 |
| −15 | 33950 | 20 | 5870 | 55 | 1405 | 90 | 430 |
| −10 | 25800 | 25 | 4700 | 60 | 1170 | | |

*Tab. 15 Measurement values for temperature sensors*

# 9 Regulations

The following regulations and requirements must be observed:

- The responsible power supply company's local regulations and requirements, including the corresponding special rules (TAB)
- **BImSchG**, Section 2 on installations which do not require permits
- **TA Lärm** Technical Instruction on Noise Protection - (general regulation in accordance with the Federal Emission Control Act)
- National building regulations
- **EnEG** (Energy Saving Act)
- **EnEV** (German regulations on energy saving thermal insulation and energy saving building design)
- **EN 60335** (Safety of electric and similar household appliances)
  p**art 1** (General requirements)
  **Part 2-40** (Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers)
- **EN 12828** (Heating systems in buildings. Design for water-based heating systems)
- **DVGW,** Wirtschafts- und Verlagsgesellschaft, Gas- und Wasser GmbH - Josef-Wirmer-Str. 1–3 - 53123 Bonn
  - Worksheet W 101
    Guidelines for drinking water protection areas; part I: protection areas for groundwater
- **The following DIN standards:DIN 1988**, TRWI (Technical Regulations for Drinking Water Installations),**DIN VDE 0100**, Part 701 (Installation of High-Power Equipment with Rated Voltages up to 1000 V, Rooms with Bath or Shower),**DIN 4751** (Heating Systems; Safety Systems for Water Heating Systems with Flow Temperatures up to 110 °C),**DIN 4807** (Expansion Vessels)Beuth-Verlag GmbH - Burggrafenstraße 6 -10787 Berlin
  - **DIN 1988**, TRWI (Technical Regulations for Drinking Water Installations)
  - **DIN 4108** (Thermal Insulation and Energy Economy in Buildings)
  - **DIN 4109** (Sound Insulation in High Buildings)
  - **DIN 4708** (Central Hot Water Installations)
  - **DIN 4807** and **EN 13831, respectively** (Expansion Vessels)
  - **DIN 8960** (Refrigerants -Requirements and Symbols)
  - **DIN 8975-1** (Refrigerating Plants - Safety Principles for Design, Equipment and Installation - Interpretation)
  - **DIN VDE 0100**, (Installation of High-Power Equipment with Rated Voltages up to 1000 V)
  - **DIN VDE 0105** (Operation of Power Installations)
  - **DIN VDE 0730** (Regulations for Devices with Electromotive Drive for Domestic Use and Similar Purposes)
- **VDI guidelines**, Verein Deutscher Ingenieure e.V. - P.O. Box 10 11 39 - 40002 Düsseldorf
  - **VDI 2035** Sheet 1[1)]: Prevention of damage in water heating installations and scale formation in domestic hot water supply installations and water heating installations
  - **VDI 2035** Sheet 2[2)]: Prevention of water corrosion in the heating system
  - **VDI 2081** Sound production and reduction in ventilation systems
  - **VDI 2715** Noise reduction at domestic hot water and central heating systems
  - **VDI 4640** Thermal use of the underground, Sheet 1: Fundamentals, approvals, environmental aspects;
    Sheet 2: Ground source heat pump systems
- **Austria:**
  - örtliche Bestimmungen und regionale Bauordnungen
  - Vorschriften der Versorgungsnetzbetreiber (VNB)
  - Vorschriften der Wasserversorgungsunternehmen
  - Wasserrechtsgesetz von 1959 in gültiger Fassung
  - ÖNORM H 5195-1 Verhütung von Schäden durch Korrosion und Steinbildung in geschlossenen Warmwasserheizungsanlagen bis 100 °C
  - ÖNORM H 5195-2 Verhütung von Frostschäden in geschlossenen Heizungsanlagen
- **Switzerland:** kantonale und örtliche Vorschriften1

1) If the drinking water has a higher °dH than what is indicated in VDI 2035, a water softener must be installed in the filling pipe to the heating system - this in order to guarantee the function of the heat pump. However, when the hardness is already greater than 3 °dH, the performance of the heat pump will deteriorate with time because of the lime deposits left on the heat exchanger surfaces.

2) The standard discusses the problems but does not set any limit values. This is why, we supplement with the following values: Oxygen content, $O_2$-0.5-1 mg/l. Carbon dioxide content, $CO_2$ - <1 mg/l. Chloride, Cl - <100 mg/l. Sulphate, SO4 - <100 mg/l. If the drinking water exceeds the limit values for chloride or sulphate content, an ion exchange filter must be installed in the filling pipe for the heating system. Do not use any water treatment additives except agents for raising the pH level, keep the water clean.

# 10 Installation

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

## 10.1 Collector system

**Installation and filling**

Installation and filling of the collector system should comply with applicable laws and regulations. Soil used for refilling around the collector hose must not contain stones or other sharp objects. Pressure test the collector system before refilling to ensure that the system is watertight.

When cutting the collector, it is important that no dirt or gravel enters the system. This can cause blockages in the heat pump and damage components.

**Condensation insulation**

Condensation insulation should be mounted on all parts of the collector circuit system.

**Filling unit**

A filling unit is required and should be installed close to the collector circuit inlet.

**Vents**

To avoid operational disturbances because of air bubbles, a microbubble separator with a venting nipple is required and should be installed between the filling unit and the heat pump.

**Expansion vessel, safety valve, pressure gauge**

The expansion vessel, safety valve and pressure gauge are to be provided by the dealer.

**Membrane expansion vessel in the collector circuit**

Select membrane expansion vessel according to:

| Model | Volume |
|---|---|
| HC 22 | 25 litres |
| HC 33 | 35 litres |

*Tab. 16 Volume membrane expansion vessel*

The values apply at a pre-pressure of 0.5 bar.

**Antifreeze/Corrosion preventative**

Freeze protection until –15 °C should be ensured. We recommend the use of ethylene glycol.

## 10.2 Heating system

**Flow over the heating system**

When the heat pump works with a buffer tank, there can be significant variations in the flow into the heating system. However, there must be a certain minimum flow, which is solved by:

In the event of a radiator system, the setting for the radiator thermostats must be limited to a minimum temperature of 18°C.

In the event of a floor heating system, a minimum water flow must be guaranteed by ensuring that there are circuits without room temperature control or with a bypass in the floor heating distributor.

This guarantees cooling of the heating system's circulation pump and correct measurements of the flow sensor. A slight increase in flow rate above the minimum flow is accepted.

**Expansion vessel**

Select expansion vessel in accordance with BS EN 12828.

**Particle filter**

A particle filter for the heating system is included in the delivery and should be installed on the connection for heat transfer fluid in (heating system return).

A particle filter for the collector circuit is included in the delivery and is installed between the filling unit and the heat pump close to the connection for collector circuit in.

A particle filter for hot water is included in the delivery and should be installed on the connection for hot water return.

See also the system solutions (→ Chapter 8.2).

**Ethylene glycol**

Glycol is not normally used in the heating system. In special cases, where increased protection is required, glycol can be added with a maximum concentration of 15%. Heat pump performance will however decrease.

**WARNING:**

- No other anti-freeze may be used in the heating system.

**Safety valve**

Pursuant to EN 12828, a safety valve should be used.

The safety valve must be installed vertically.

**WARNING:**
- Never block the safety valve outlet.

## 10.3 Siting the appliance

Noice transfer to adjacent areas must be taken into consideration when choosing a position for the heat pump (→ Chapter 8.4 for sound levels).

## 10.4 Pipework preparations

- Connection pipes for the collector system, heating system and possible hot water should be installed in the premises to the heat pump location.
- An expansion vessel, a safety group and a pressure gauge should be mounted in the heating circuit (accessories).

**CAUTION:** The heat pump may become damaged in the event of dirt or other particles in the pipework.
- Flush out the system to remove all dirt residues.

- Mount a filling unit at a suitable place in the collector circuit close to the inlet.

## 10.5 Flushing the heating system

The heat pump is a part in a heating system. Faults in the heat pump can be caused by poor water quality in the radiators/floor loops or air penetrating the system continuously.

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 is not clear when drained, require remedial measures before the installation of a heat pump, for example the heating system must be fitted with filters and vents.

Do not use any water treatment additives except agents for raising the pH level. Recommended pH value is 7.5 – 9.

An intermediate heat exchanger is sometimes necessary to protect the heat pump.

**CAUTION:** The heat pump may become damaged in the event of dirt or other particles in the pipework.
- Flush out the system to remove all dirt residues.

## 10.6 Setting up

- Remove packing, taking care to observe the instructions on the packing.
- Remove the supplied accessories.
- Install the supplied adjustable feet and adjust the height.

## 10.7 Heat insulation

All heat conducting pipes must have suitable heat insulation, applied to current standards.

## 10.8 Removing the front panel

- Loosen the screws, tilt the front panel outwards and take it off.

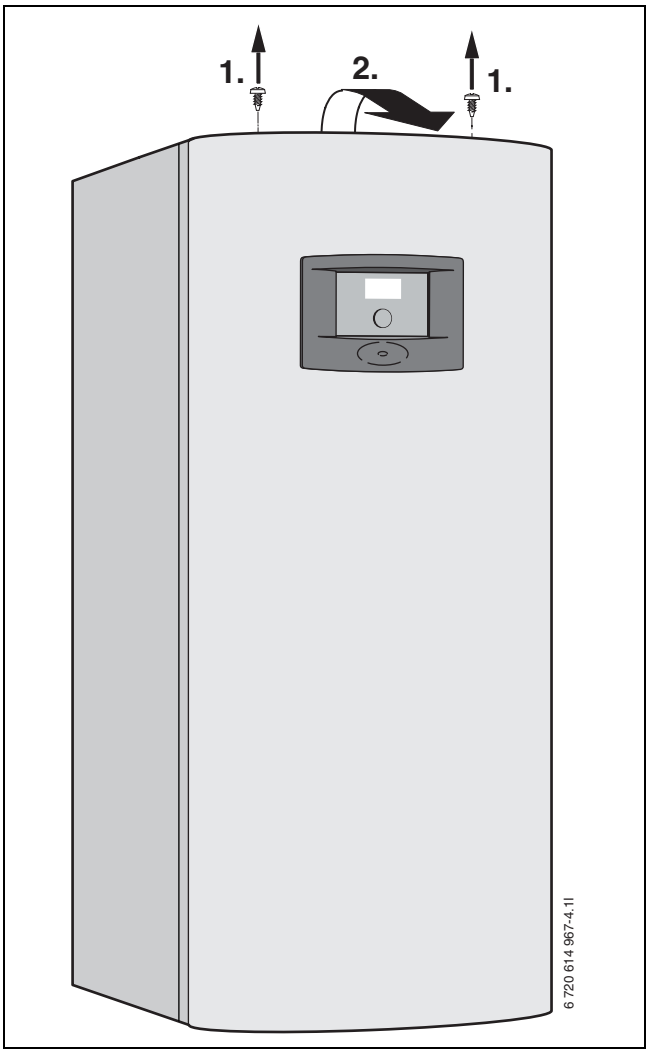



*Fig. 13*

## 10.9 Temperature sensor installation

### 10.9.1 Flow sensor T1

- Operation mode without additional heat with buffer tank. Install the sensor in the upper part of the tank. See the installation manual for the buffer tank.
- Operation mode mixed additional heat (including electric additional heat). Install the sensor in contact with the flow pipe immediately after the mixing valve (Q71) or after the additional electric heat.

### 10.9.2 Outdoor sensor T2

- Install the sensor on the coldest side of the house (the north side). 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.

### 10.9.3 Room sensor T5 (accessory)

It is only the room where the room sensor is located that can influence regulation of the temperature for the relevant heating circuit.

Installation location requirements:

- If possible, interior wall without drafts or heat radiation.
- Unimpeded circulation of room air under room sensor T5 (dotted area in figure 14 must be kept clear).

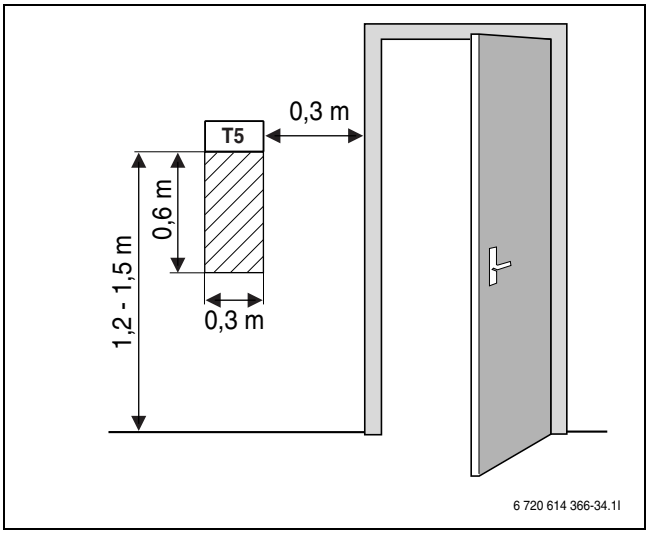



*Fig. 14 Recommended installation location for room sensor T5*

## 10.10 Filling the heating system

- Open the heating system's valves.
- Open the tap on particle filter E22.V101 of the heating system. Open valve E22.Q101.
- Fill up the heating system until the appropriate pressure for the installation is reached. The maximum permitted pressure is 4 bar.
- Vent the heating system.
- Drain some water out of buffer tank E11.C111 in order to flush away possible particles from the tank. Check and clean the particle filter if necessary.
- Check the pressure of the system and refill to the appropriate pressure.
- Repeat the steps above if there is a lot of dirt in the filter or tank.
- Check all connections for leaks.

## 10.11 Filling the hot water circuit

- Remove the cover of particle filter E21.V102. Position the filter in an intermediate position.
- Position the 3-way valve E21.Q21 for heat production.
- Open shut-off valve E21.Q102 a bit and fill the circuit carefully.
- Position the filter in operating mode and refit the cover.
- Open the shut-off valve completely and perform manual operation of the 3-way valve E21.Q21 in both heating and hot water mode for venting.
- Check the pressure of the heating system and fill up, if necessary, to a maximum of 4 bar.
- Check all connections for leaks.

## 10.12 Filling the collector system

The collector system is filled with collector circuit fluid which must guarantee antifreeze protection down to –15 °C. We recommend a mixture of water and glycol.

A rough estimate of the amount of collector circuit fluid that is required in relation to the length of the collector system and the inner diameter of the pipe can be made using table 17.

| Inner diameter | Volume per metre | |
|---|---|---|
| | Single pipes | Double U pipes |
| **28 mm** | 0.62 l | 2.48 l |
| **35 mm** | 0.96 l | 3.84 l |

*Tab. 17 Amount of collector circuit fluid*

Double U pipes, each of which consists of two descending and two ascending pipes, are most often used as a rock collector.

The following description of filling presupposes the use of the filling station accessory. Follow corresponding steps if other equipment is used.

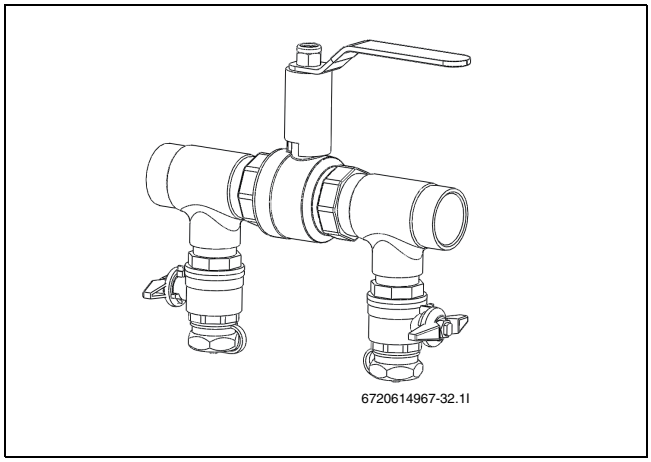



*Fig. 15 Example of a filling unit*

- Connect two hoses from the filling station to the filling unit (→ Figure 16).

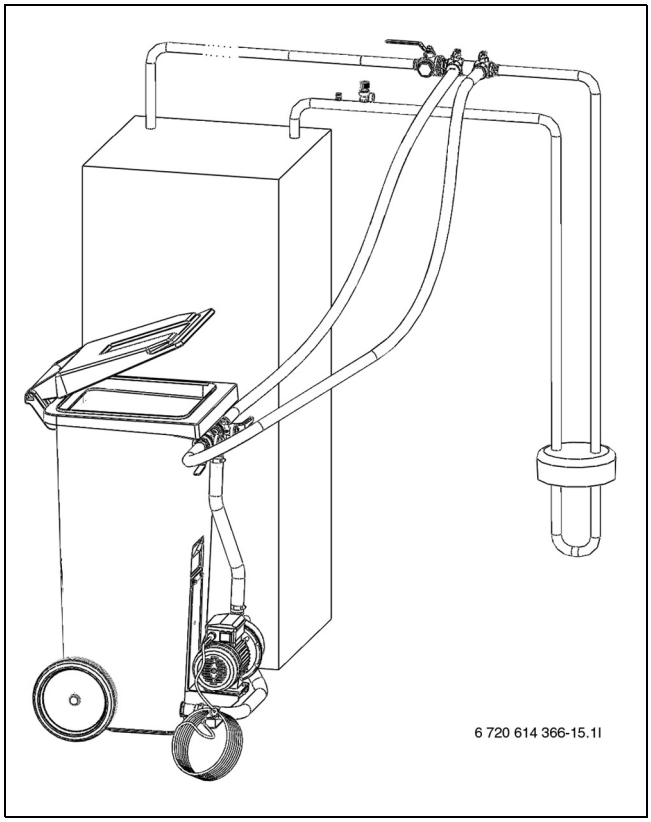



*Fig. 16 Filling with filling station*

- Fill the filling station with collector circuit fluid. Fill water before you fill antifreeze.
- Turn the valves on the filling unit so that they are in filling position (→ Figure 17).

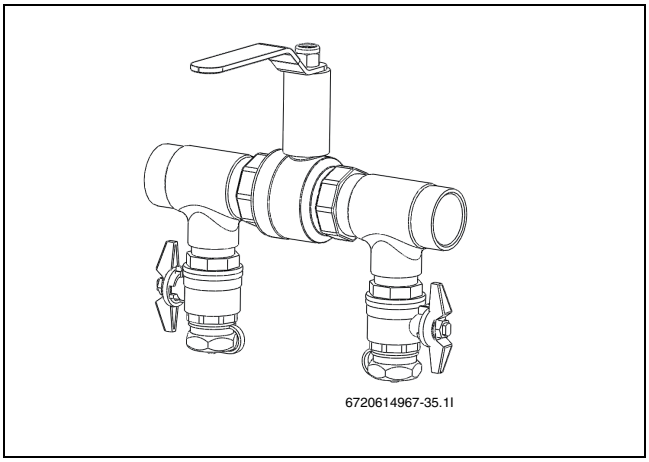



*Fig. 17 Filling unit in filling position*

- Turn the valves on the filling station so that they are in mixing position (→ Figure 18).

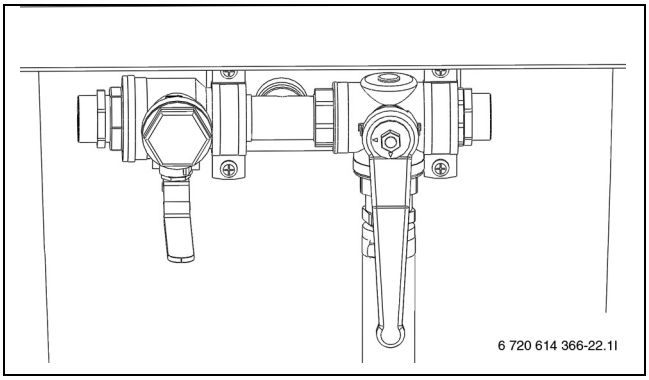



*Fig. 18 Filling station in mixing position*

- Start the filling station (pump) and mix the collector circuit fluid for at least two minutes.

Repeat the following steps for each circuit. One circuit at a time is filled with collector circuit fluid. Keep the valves closed in the other loops during the process.

- Turn the valves on the filling station to filling position and fill the circuit with collector circuit fluid (→ Figure 19).

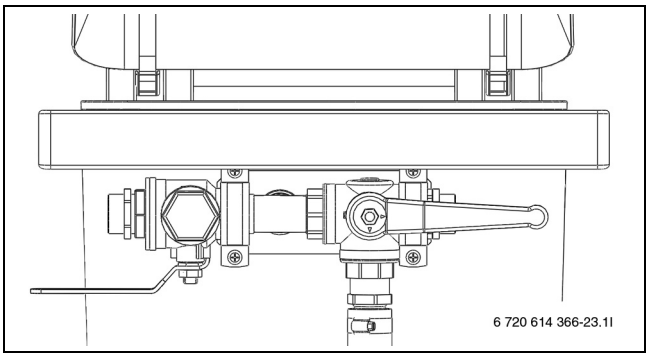



*Fig. 19 Filling unit in filling position*

- ▶ When the fluid level has fallen to 25% in the filling station, the pump should be stopped and more collector circuit fluid should be filled and mixed.
- ▶ When the circuit is full and air no longer comes from the return pipe, the pump should be run again for at least 60 minutes (the fluid should be clear and should not contain any bubbles).
- ▶ The circuit must be pressurized when venting is complete. Turn the valves on the filling unit to pressure increase position and pressurize the circuit to 2.5 to 3 bar (→ Figure 20).

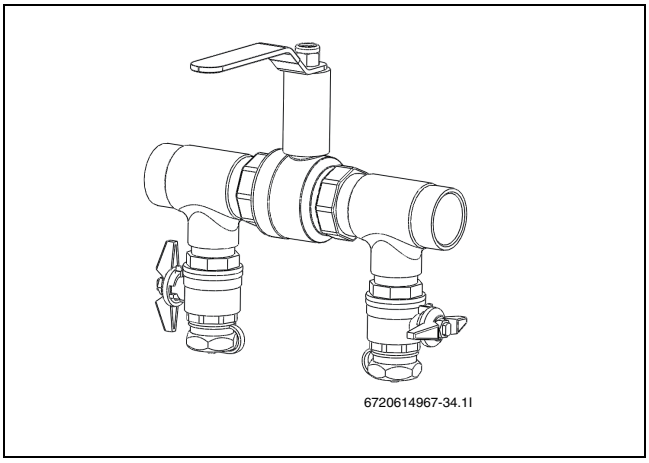



*Fig. 20 Filling unit in pressure increase position*

- ▶ Turn the valves of the filling unit to normal position (→ Figure 21) and turn off the pump on the filling station.

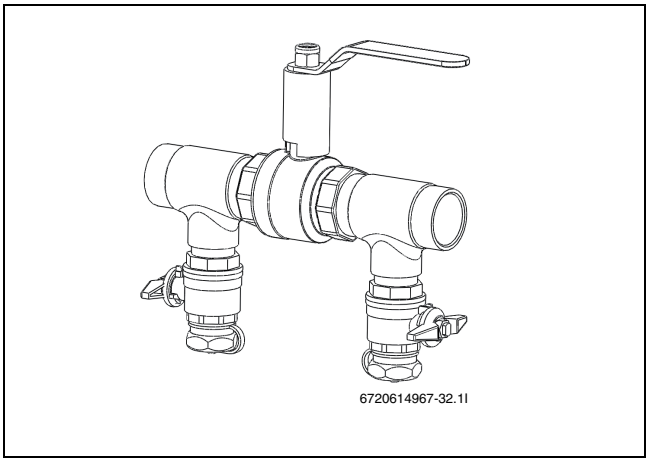



*Fig. 21 Filling unit in normal position*

- ▶ Disconnect the hoses and insulate the filling unit.

If other equipment is used, the following is required, among other things:

- A clean container with capacity for the amount of collector circuit fluid that is required
- An additional container for collection of contaminated collector circuit fluid
- Submerged pump with filter, flow capacity of min. 6 $m^3$/h, pressure height of 60 to 80 m
- Two hoses, Ø 25 mm

# 11 Electrical connections

**DANGER:** Risk of electric shock!
- Switch off the main power supply before starting work on the electrical part.

All regulation, control and safety devices on the heat pump are connected and checked upon delivery.

The heat pump's electrical connections must be able to be disabled safely.
- Install a separate safety switch that cuts all current to the heat pump. A safety switch for each supply is required for separate power supplies.

- According to the applicable regulations for 400 V/ 50 Hz connection, a H05VV-... type 5-core cable must be used as a minimum. Select cable area and cable type that corresponds to the relevant fuse rating (→ Chapter 8.4) and routing method.
- Observe protection measures acc. to VDE regulations 0100 and special regulations of the local power supply utility.
- Connect the heat pump to the electric box connection strip according to BS EN 60335 part 1 and via a switch with a minimum contact distance of 3 mm (e.g. fuses, LS switch). Other consumers must not be connected.
- Follow the relevant wiring diagram when connecting an earth breaker. Only connect components that are approved for each market.
- Observe the colour coding when replacing circuit boards.

## 11.1 Connecting the heat pump

**CAUTION:** Never grasp a circuit board without wearing a ground-connected bracelet (→ Chapter 5.10).

- Remove the front panel (→ page 26).
- Remove the electric box cover.
- Route the connection cables to the electric box through the cable gland in the roof plate of the heat pump.
- Connect the cables according to the wiring diagram.
- Reinstall the electric box cover and the front panel of the heat pump.

## 11.2 Phase guard

A phase guard is mounted and connected to the heat pump in order to monitor the phase sequence to the compressors during installation (→ Figure 33 and 34).

There are three indicator lamps on the phase guard. When the heat pump is started the first time the uppermost lamp lights up yellow and the bottom lamp green. The lamp in the middle flashes red if there is a phase sequence error and the alarm **Phase error E2x.B1** (→ Chapter 17.9.11) is displayed. If so, change the phase sequence. The lamp is not lit at correct phase sequence.

The phase guard also trips on too high or too low voltage. The lamp in the middle lights red and the alarm **Phase error E2x.B1** (→ Chapter 17.9.11) is displayed.

## 11.3 Screed drying

The heat pump alone can not produce enough heating for screed drying. We recommend using building drying equipment.

Screed drying must take place with continuous access to current. When screed drying is used, the electric connection should therefore be made in the standard way, see (→ Chapter 11.4).

On completion of screed drying, the EVU signal can be connected (→Chapter 11.4). Enable the EVU signal according to the settings under menu **External control**.

EVU means a special electrical connection used primarily in countries like Germany and Austria.

The screed drying process is described in (→ Chapter 16.6.9).

## 11.4 Electrical connection wiring diagram

### 11.4.1 Overview of connection between distribution box and heat pump (HC 22 - 33)

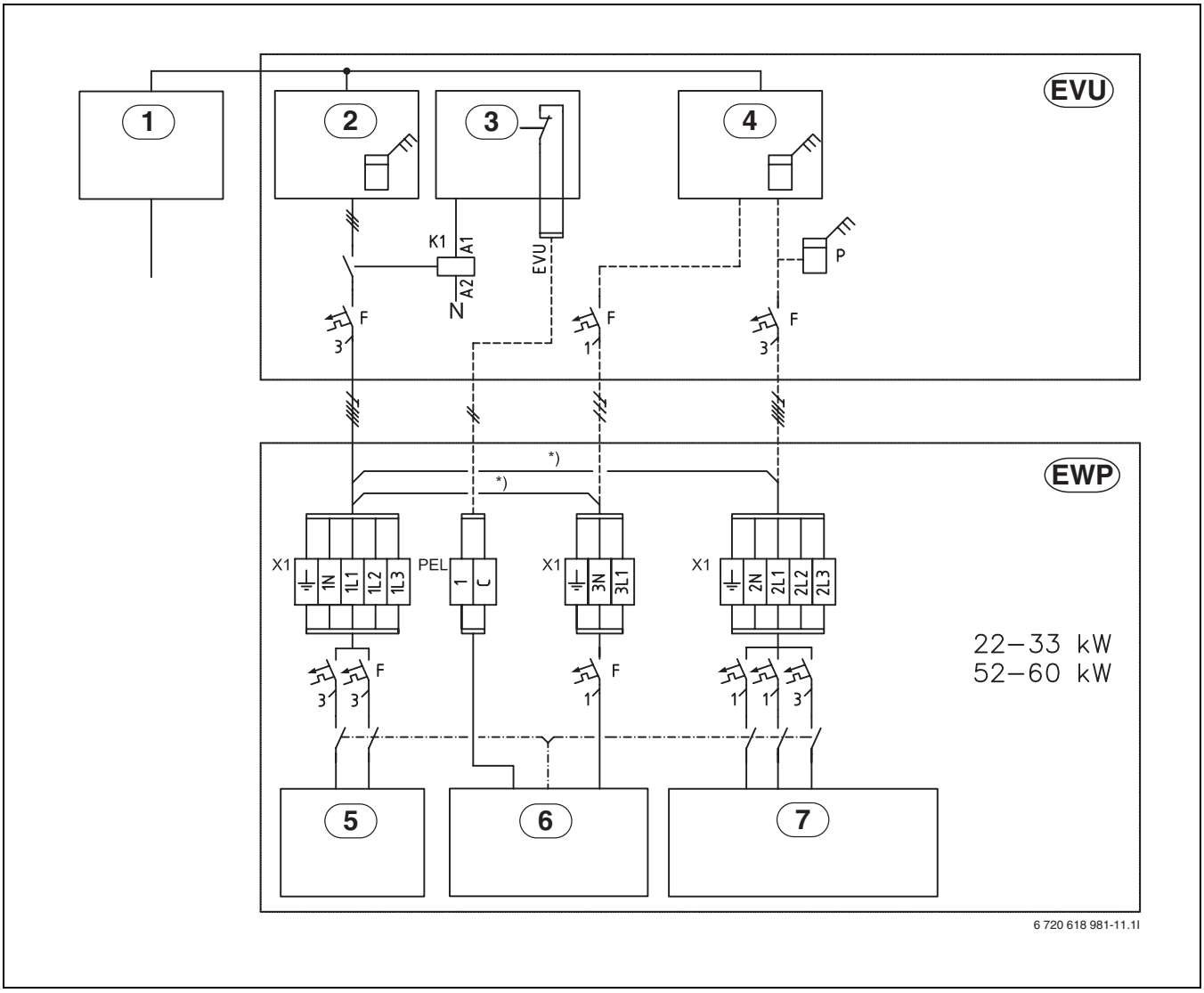



*Fig. 22 Overview of connection between distribution box and heat pump*

**1** Power supply to the distribution box
**2** Power meter for heat pump, low tariff
**3** Tariff control
**4** Power meter for the property, 1-phase high tariff
**5** Compressor 1 and 2
**6** Control unit, E21.G2, E22.G2, EVU, external pumps
**7** Collector circuit pump E21.G3, E22.G3
**EVU** Property's distribution box
**EWP** Heat pump
***)** Strap which is removed in the event of separate power supply
**D** External power meter

EVU means a special electrical connection used primarily in countries like Germany and Austria.

### 11.4.2 Overview of electric box (HC 22 - 33)

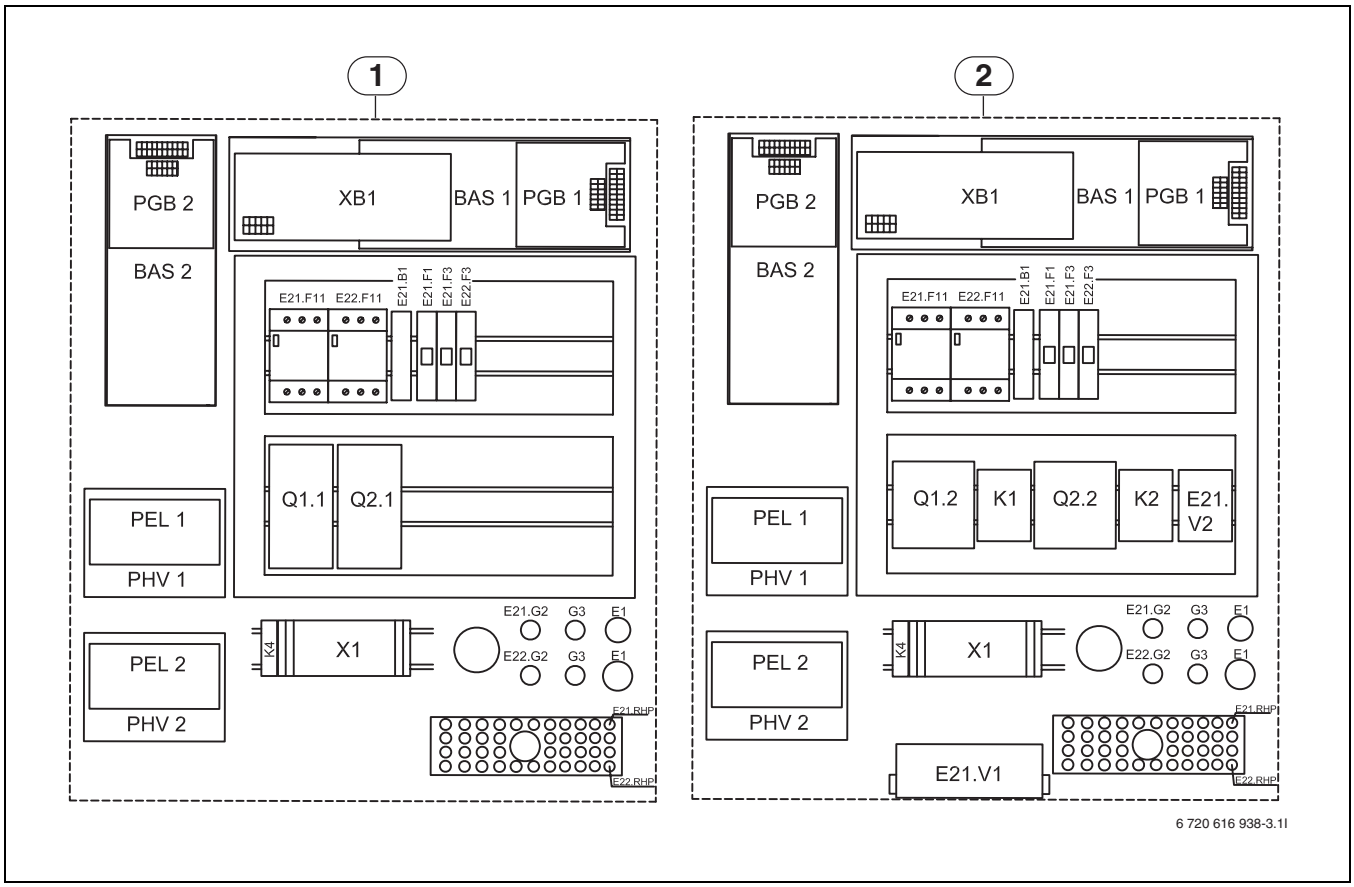



*Fig. 23 Overview of electric box*

**1** Electric box heat pump HC 22
**2** Electric box heat pump HC 33
**E21.F11** Motor cut-out compressor E21
**E22.F11** Motor cut-out compressor E22
**E21.B1** Phase guard for E21 and E22
**E21.F1** Miniature circuit-breaker heat pump
**E21.F3** Miniature circuit-breaker E21.G3
**E22.F3** Miniature circuit-breaker E22.G3
**K1** Contactor compressor E21
**K2** Contactor compressor E22
**K4** Relay E22.K4
**Q1.1/Q1.2** Soft starter E21
**Q2.1/Q2.2** Soft starter E22
**X1** Terminal block
**E21.V1-2** EMC filter
**BAS** Circuit board
**PGB** Circuit board
**XB1** Circuit board
**PEL** Low-voltage external terminal board
**PHV** Terminal board 230 V

### 11.4.3 Overview of circuit boards

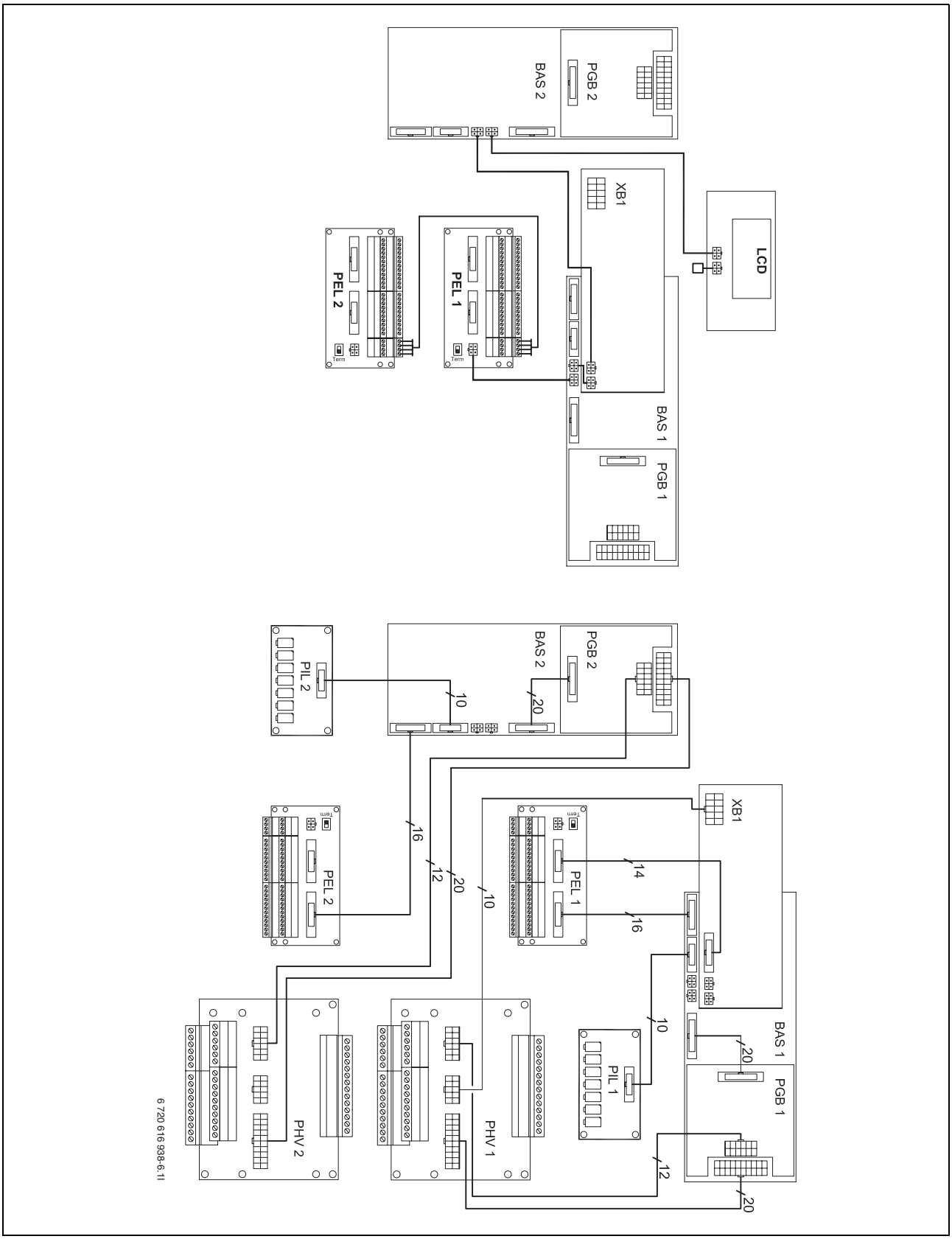



*Fig. 24 Overview of circuit boards and factory-assembled cables*

**LCD** Display board
**BAS** Circuit board
**PGB** Circuit board
**XB1** Circuit board
**PEL** Low-voltage external terminal board
**PHV** Terminal board 230V
**PIL** Low-voltage internal terminal board

### 11.4.4 Power supply of EVU signal

EVU means a special electrical connection used primarily in countries like Germany and Austria.

EVU relay (no. 4, A1, A2, no. 2 Figure 25) with 3 main contacts and 1 auxiliary contact must be dimensioned in accordance with the heat pump's fuse rating. The relay is provided by an electrical fitter or a power company.

Control requires a potential-free contact signal on the external input (1 / C Figure 25). External input connected = EVU block active.

During the blocked period, the energy supply cut-off symbol is displayed in the menu display.

Complete screed drying before connection of the EVU signal.

- Activate the energy supply cut-off in the control unit under menu **External control** (→Chapter 16.5) after drying and connection of the EVU signal.

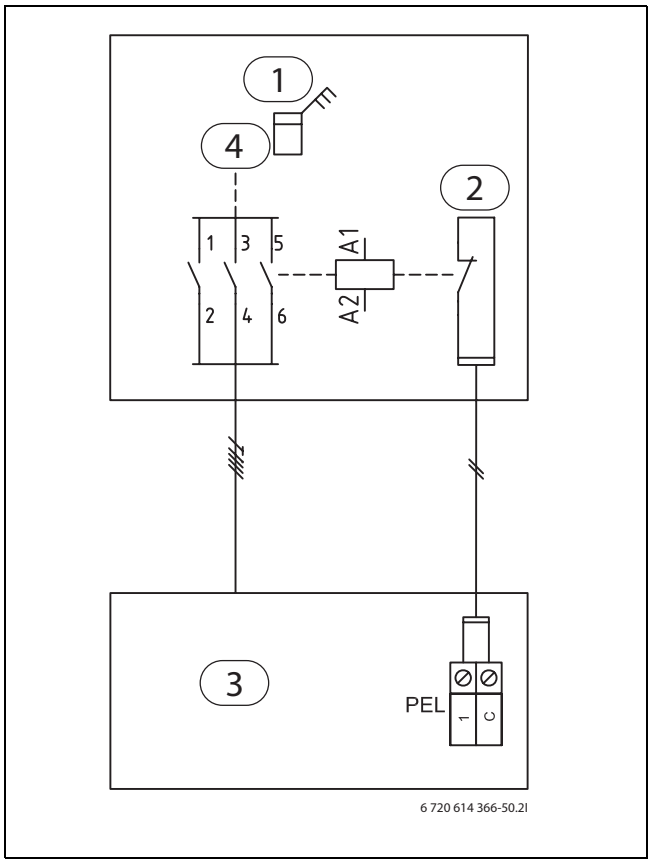



*Fig. 25 Blocked period enabled*

**1** Power meter
**2** Tariff control
**3** Control unit heat pump
**4** Low-tariff

Time difference

- Ensure a maximum time difference of 5 seconds between current control and EVU signal control.

### 11.4.5 Power supply (HC 22 - 33)

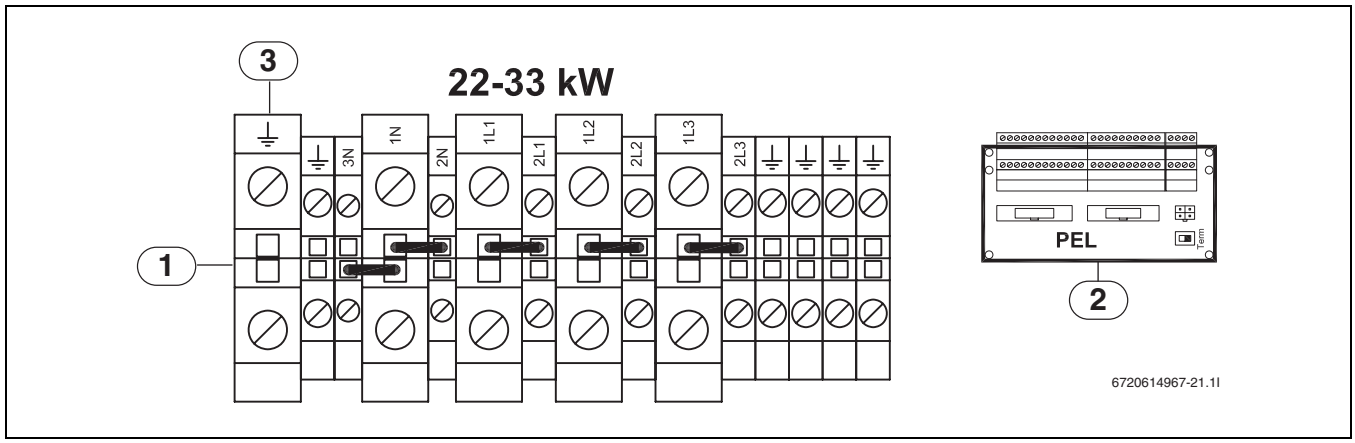



*Fig. 26*

**1** X1 The terminal block in the heat pump
**2** The PEL card where the EVU signal is connected
**3** ⏚ PE (protective earth)

**Standard design without EVU**

The terminal blocks are strapped at the factory to a common power supply. Connected to PE, 1N, 1L1, 1L2 and 1L3.

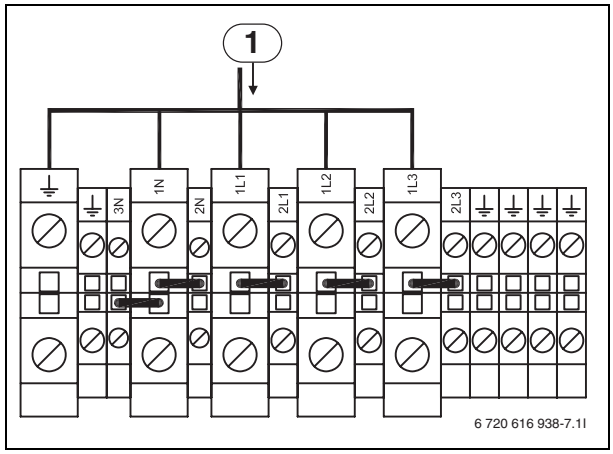



*Fig. 27 Standard design*

**1** Supply, Heat pump

EVU means a special electrical connection used primarily in countries like Germany and Austria.

**Alternative A**

The power supply can also be connected as low tariff from the EVU control unit. During a cut-off period, the control unit is supplied with 1-phase, L1, high tariff. They are connected to PE, 3N and 2L1. Signal from the control unit via EVU control is connected to terminal blocks 1 and C on the PEL card. During a cut-off period, the contact is closed. The terminal straps between 1N-3N and 1L1-2L1 are removed.

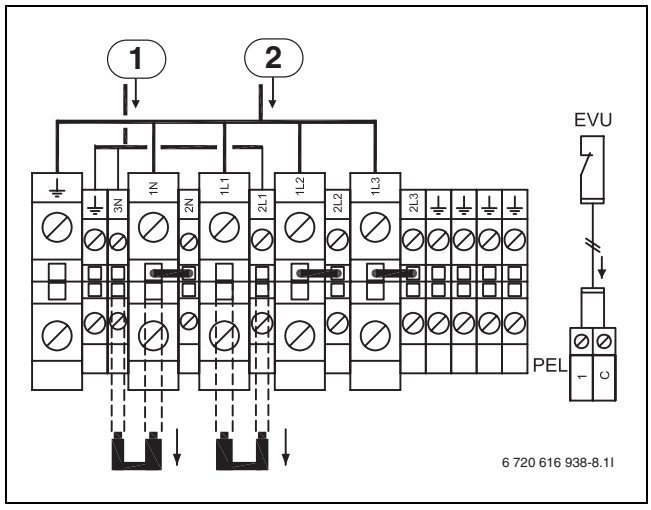



*Fig. 28 Connections Alternative A*

**1** Supply, 1-phase L1 to control unit by EVU
**2** Supply, heat pump

**Alternative B**

If the collector circuit pumps should be supplied separately, they are connected to PE, 2N, 2L2 and 2L3. Remove all terminal straps.

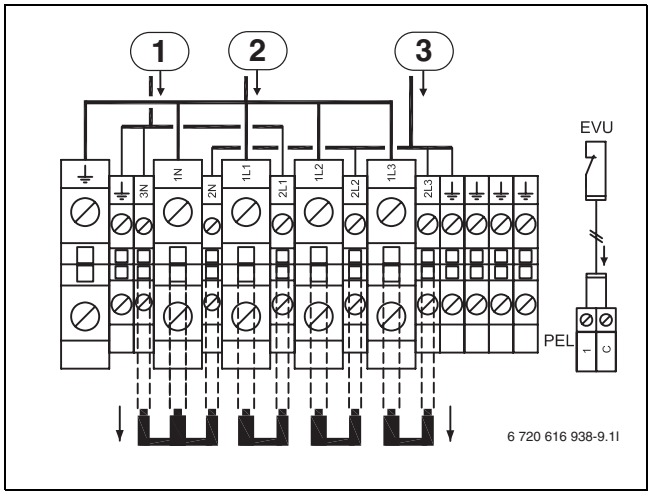



*Fig. 29 Connection alternative B*

**1** Supply 1-phase L1 to control unit by EVU
**2** Supply, heat pump
**3** Supply, collector circuit pumps

## 11.5 External connections

All external connections are made on terminal board PEL (low current) and PHV (high current):

- High and low current cables should be routed separately in order to avoid interference on the sensors (minimum distance of 100 mm).
- Use the following cable area when extending a temperature sensor cable:
  - Up to 20 m long cable: 0.75 to 1.50 $mm^2$
  - Up to 30 m long cable: 1.0 to 1.50 $mm^2$

## 11.6 Other wiring diagrams

### 11.6.1 Explanations

| E11 Circuit 1 | |
|---|---|
| E10.T2 | Outdoor sensor |
| E11.G1 | Circulation pump, heating system |
| E11.P2 | General alarm |
| E11.S11 | External set point value |
| E11.T1 | Flow sensor |
| E11.TT.P1 | Alarm lamp, room sensor |
| E11.TT.T5 | Room sensor, circuit 1 |

*Tab. 18 E 11 Circuit 1*

| E12 Circuit 2 | |
|---|---|
| E12.B11 | External input, circuit 2 |
| E12.G1 | Circulation pump |
| E12.TM | Dew point sensor |
| E12.TM.TM5 | Room temperature sensor |
| E12.TM.TM1 | Humidity sensor |
| E12.T1 | Flow sensor |
| E12.TT.P1 | Alarm lamp, room sensor |
| E12.TT.T5 | Room temperature sensor |
| E12.Q11 | Mixing valve |

*Tab. 19 E12 Circuit 2*

| E21 | Compressor 1 (Step 1) |
|---|---|
| B1 | Alarm phase guard (for E21 and E22) |
| B11 | External input 1 |
| B12 | External input 2 |
| F3 | Circuit breaker, collector circuit pump |
| F11 | Motor cut-out compressor |
| F12 | Motor cut-out collector circuit pump |
| F51 | Fuse 6.3A |
| F52 | Fuse 250mA |
| G2 | Heat carrier pump |
| G3 | Collector circuit pump |
| K1 | Contactor |
| RHP | High pressure switch |
| RLP | Low pressure switch |
| Q1.1 | Soft starter HC 22 |
| Q1.2 | Soft starter HC 33 |
| Q21 | 3-way valve |
| T6 | Hot gas sensor (compressor) |
| T8 | Sensor heat transfer fluid out |
| T9 | Sensor heat transfer fluid in |
| T10 | Sensor collector circuit in |
| T11 | Sensor collector circuit out |
| E21.B1 | Alarm phase guard (for E21 and E22) |
| E21.E1 | Compressor E21 |
| E21.F1 | Miniature circuit-breaker heat pump |
| E21.F3 | Miniature circuit-breaker E21.G3 |
| E21.F11 | Motor cut-out compressor E21 |
| E21.V1 | EMC filter |
| E21.V2 | EMC filter |

*Tab. 20 E21 Compressor 1 (Step 1)*

| E22 | Compressor 2 (Step 2) |
|---|---|
| B11 | External input 1 |
| B12 | External input 2 |
| F3 | Circuit breaker, collector circuit pump |
| F11 | Motor cut-out compressor |
| F12 | Motor cut-out collector circuit pump |
| F13 | Compressor cut-out |
| F51 | Fuse 6.3A |
| G2 | Heat carrier pump |
| G3 | Collector circuit pump |
| K2 | Contactor |
| K3 | Contactor, collector circuit pump |
| RHP | High pressure switch |
| RLP | Low pressure switch |
| Q2.1 | Soft starter HC 22 |
| Q2.2 | Soft starter HC 33 |
| Q21 | 3-way valve |
| T6 | Hot gas sensor (compressor) |
| T8 | Sensor heat transfer fluid out |
| T9 | Sensor heat transfer fluid in |
| T10 | Sensor collector circuit in |
| T11 | Sensor collector circuit out |
| E22.E1 | Compressor |
| E22.F3 | Circuit breaker, collector circuit pump |
| E22.F11 | Motor cut-out compressor |
| E22.F12 | Motor cut-out collector circuit pump |
| E22.F13 | Compressor cut-out |
| E22.V1 | EMC filter |

*Tab. 21 E22 Compressor 2 (Step 2)*

| E41 and E42 | Hot water heater 1 and 2 |
|---|---|
| E41.E1.E1 | Hot water electric heater |
| E41.E1.F21 | Overheat protection, hot water electric heater |
| E41.F31 | Protective anode |
| E41.G6 | Circulation pump hot water |
| E41.Q1 | Mixing valve, hot water |
| E41.T1 | Hot water flow |
| E41.T3 | Sensor, hot water |
| E42.T3 | Sensor, hot water |

*Tab. 22 E41 and E42 Hot water heater 1 and 2*

| E71 | Additional heat |
|---|---|
| E71.E1.E1 | Allow additional heat |
| E71.E1.Q71 | Additional heat mixing valve |
| E71.E1.E1.F21 | Alarm, additional heat |

*Tab. 23 E71 Additional heat*

**+ = Open, – = Close**

### 11.6.2 Internal wiring diagram

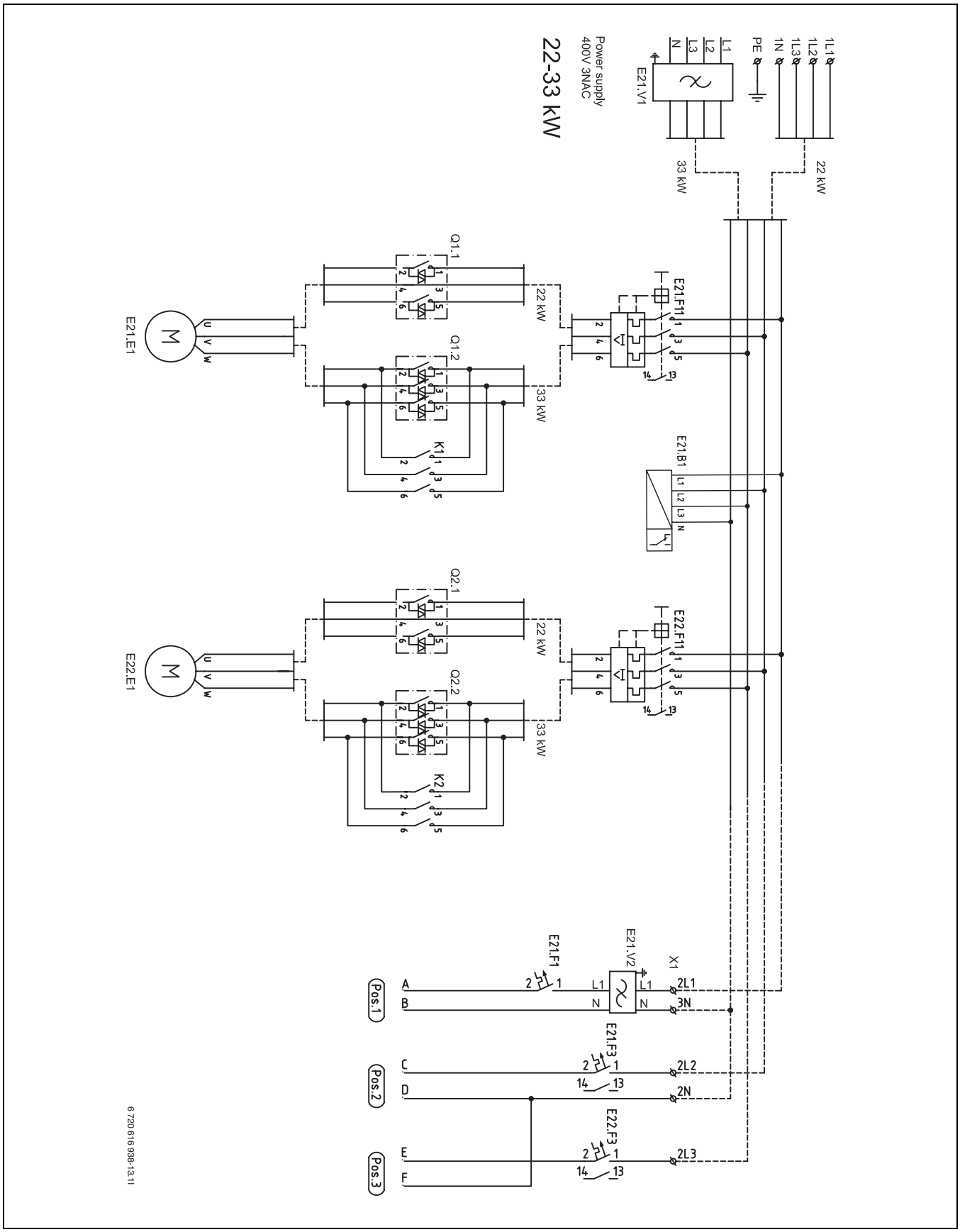



*Fig. 30 Internal wiring diagram*

### 11.6.3 Wiring diagram E21, high current

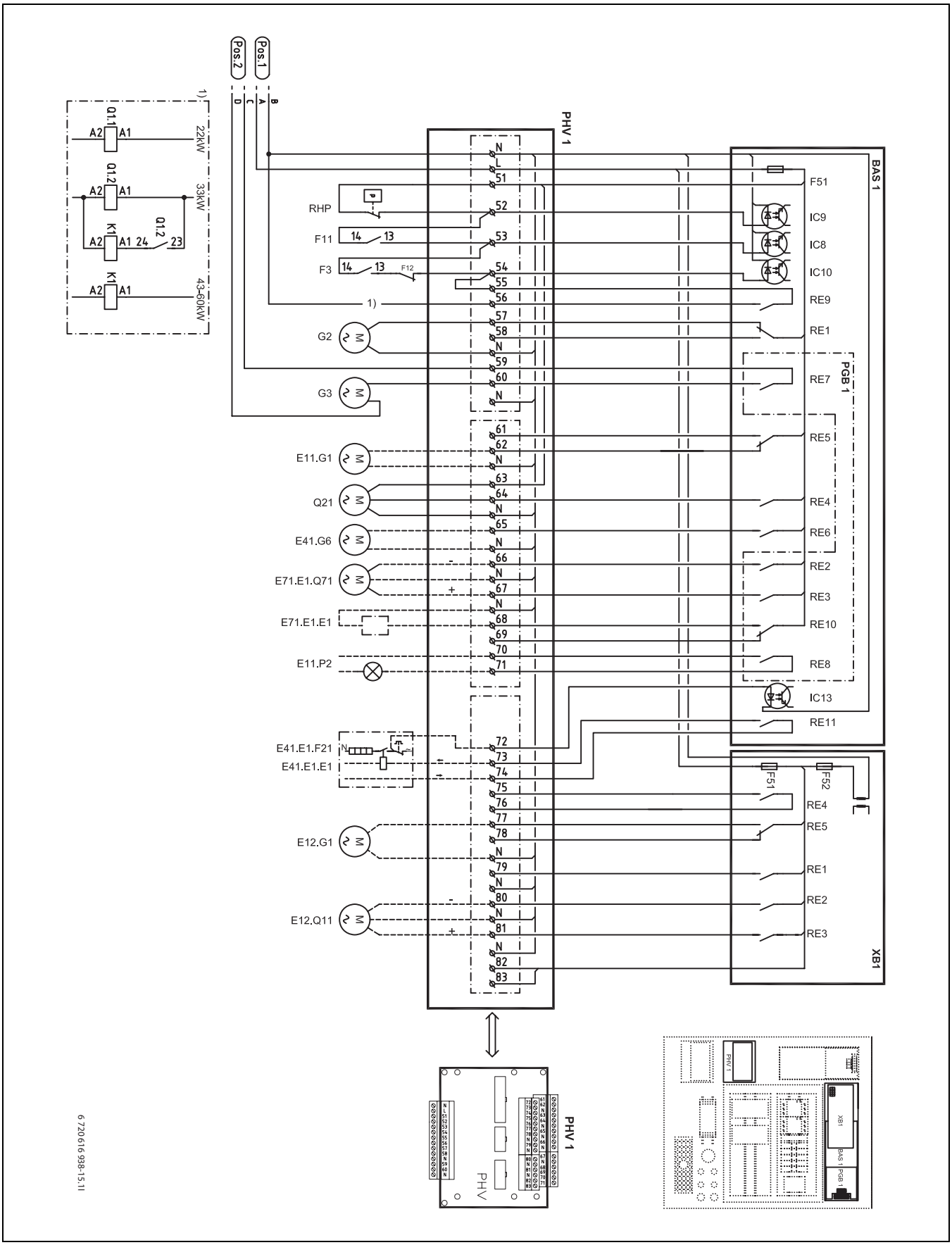



*Fig. 31 Wiring diagram E21, high current*

**Solid line = factory connected. Dotted line = connected at installation.**

### 11.6.4 Wiring diagram E22, high current

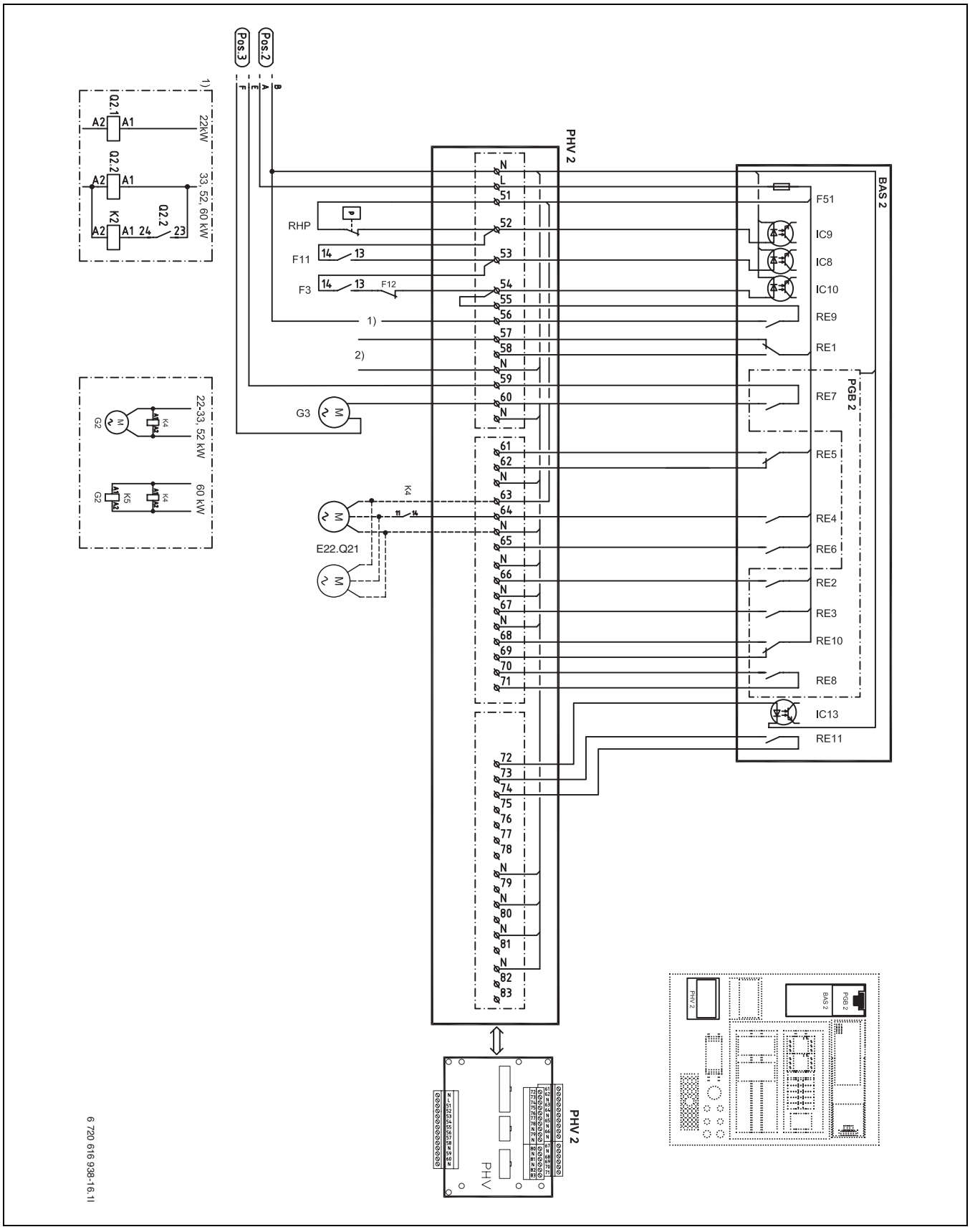



*Fig. 32 Wiring diagram E22, high current*

**Solid line = factory connected. Dotted line = connected at installation.**

### 11.6.5 Wiring diagram E21, low current

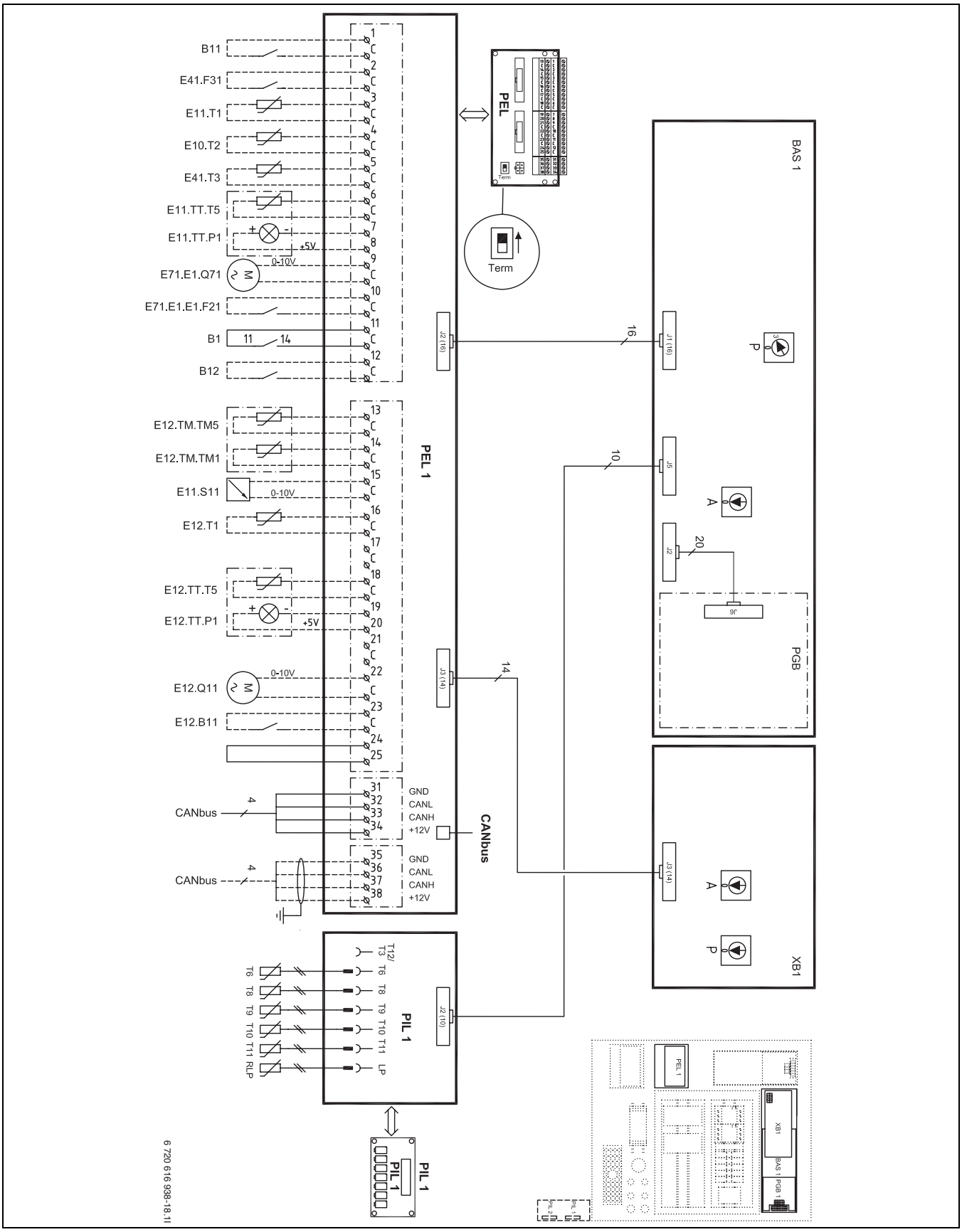



*Fig. 33 Wiring diagram E21, low current*

**Solid line = factory connected. Dotted line = connected at installation.**

### 11.6.6 Wiring diagram E22, low current

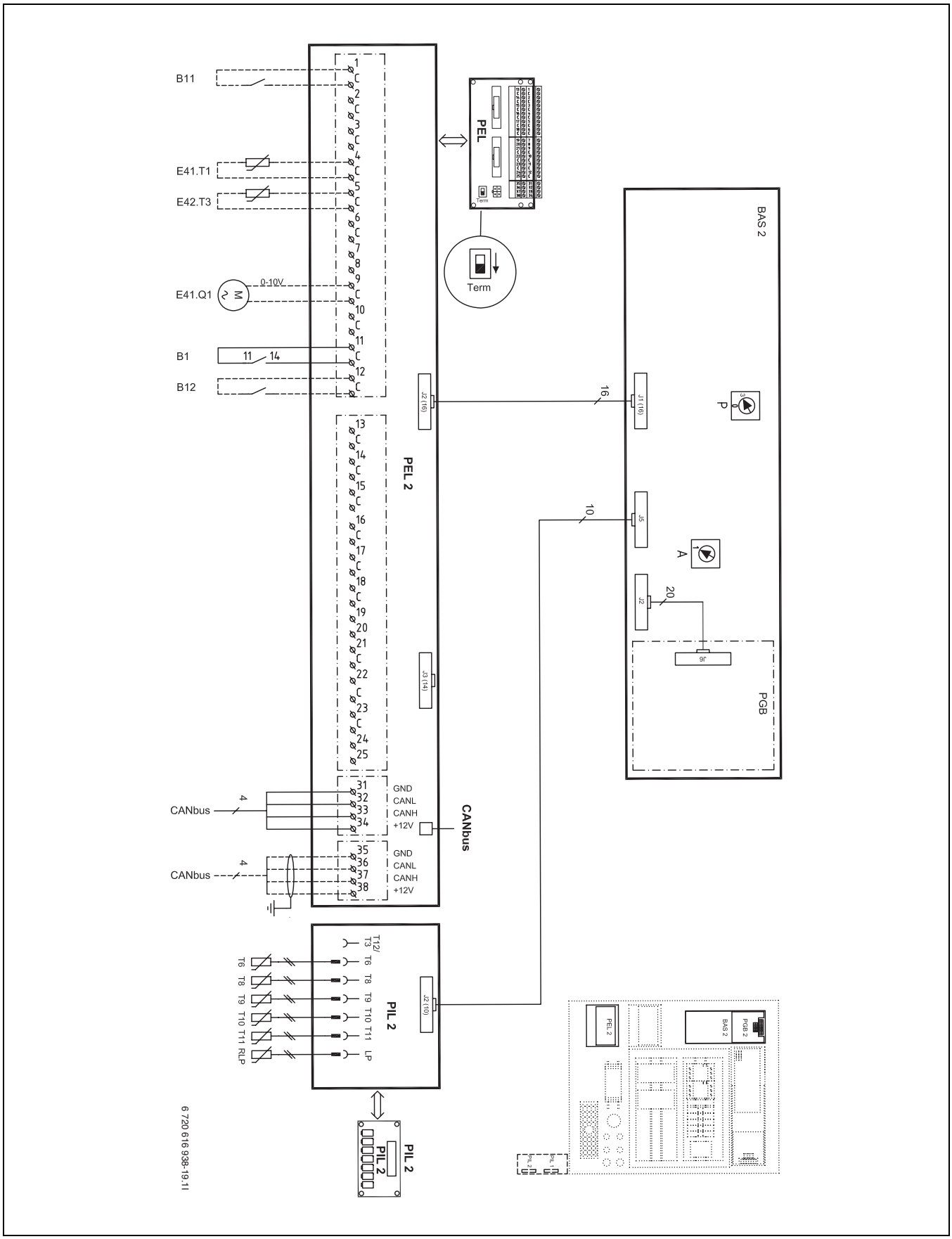



*Fig. 34 Wiring diagram E22, low current*

**Solid line = factory connected. Dotted line = connected at installation.**

### 11.6.7 External connections E21

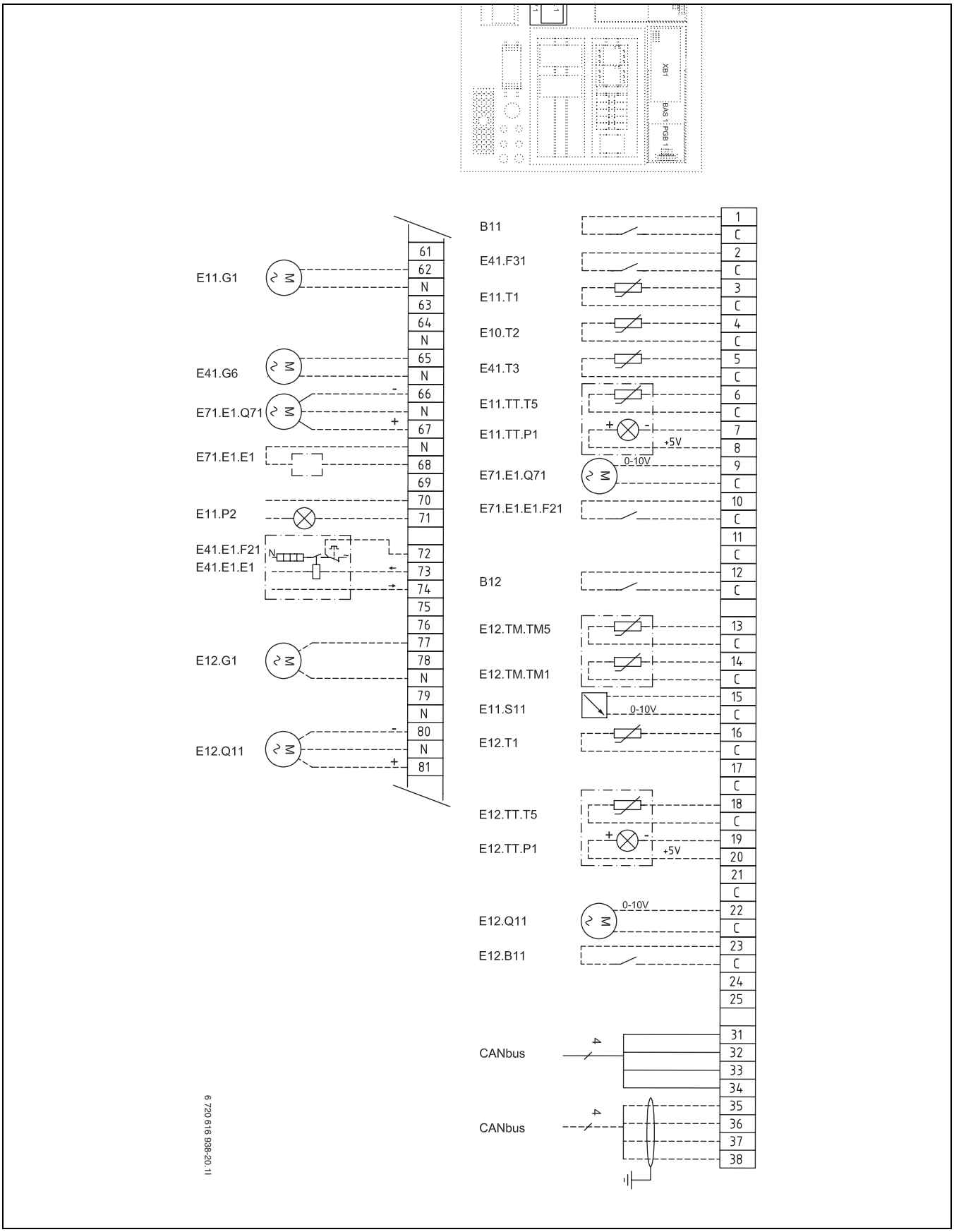



*Fig. 35 External connections E21*

**Solid line = factory connected. Dotted line = connected at installation.**

### 11.6.8 External connections E22

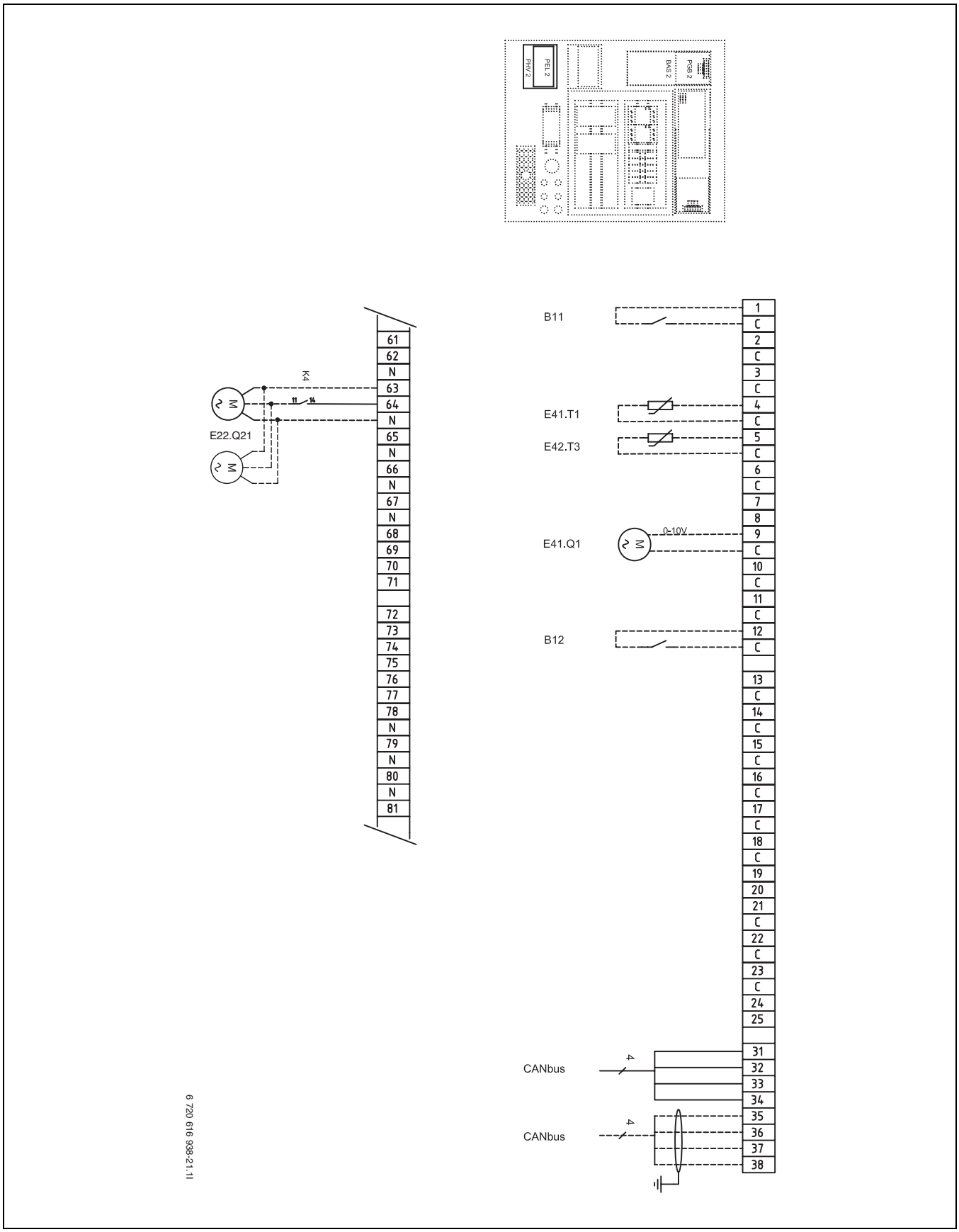



*Fig. 36 External connections E22*

**Solid line = factory connected. Dotted line = connected at installation.**

## 11.7 Connection of additional heat alarm

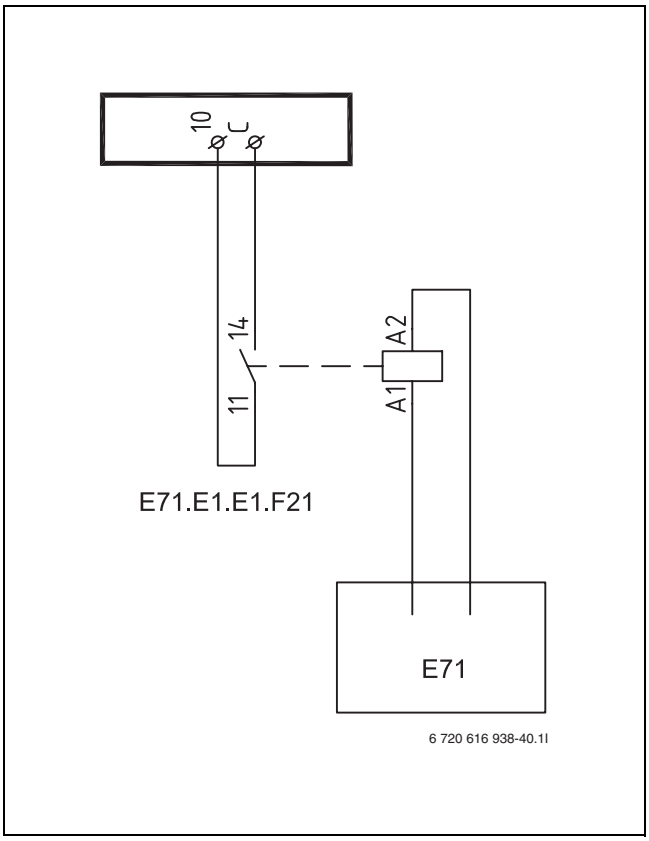



*Fig. 37 Alarm, additional heat*

**E71** Additional heat
**E71.E1.E1.F21** Alarm, additional heat
**A1, A2, 11, 14** Relay
**10, C** Terminal blocks, PEL board

- Use an intermediate relay on connection of additional heat alarm E71.E1.E1.F21 to the low-voltage board (→ Figure 33) when the alarm signal of the additional heat is 230V.

## 11.8 Connection of domestic hot water electric heater

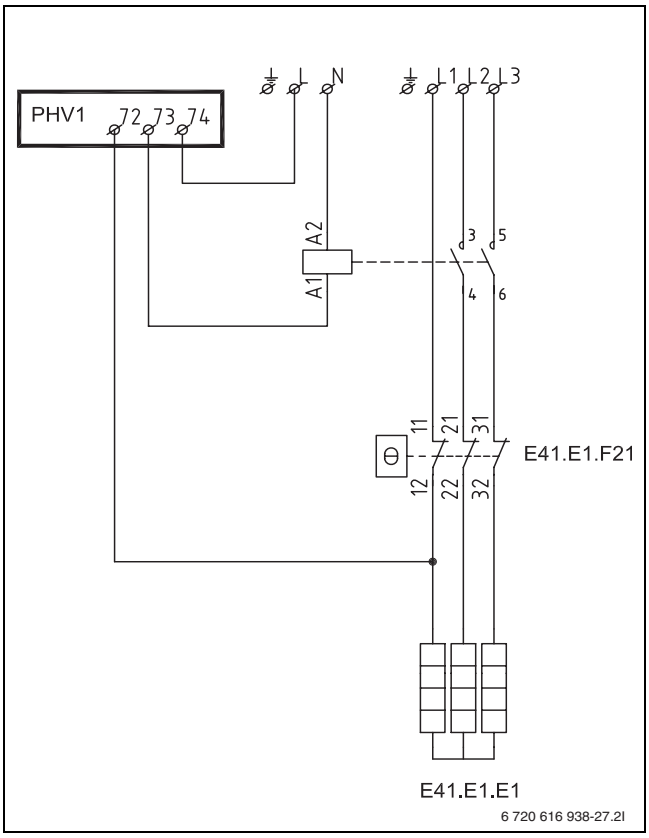



*Fig. 38 Connection, hot water electric heater*

**PHV1** Circuit board in the control unit
**A1,A2, 1-6** Contactor
**E41.E1.E1** Hot water electric heater
**E41.E1.F21** Overheat protection, hot water electric heater

The electric heater is supplied with its own 3-phase voltage from the distribution box. Control is exercised from the control unit via the contactor.

The distribution box supplies the control unit with 1-phase 230V on PHV1, terminal board 74.

The outgoing signal to the contactor for control of the electric heater is on PHV1, terminal board 73.

Connect the alarm signal from phase L1 to PHV1, terminal board, after the overheat protection. When the overheat protection is triggered, the voltage on terminal block 72 disappears and alarm is given in the display.

Acknowledge **Hot water electric heater** under **Additional heat** \ **Hot water electric heater**.

## 11.9 Connection of circulation pump E41.E1.G1

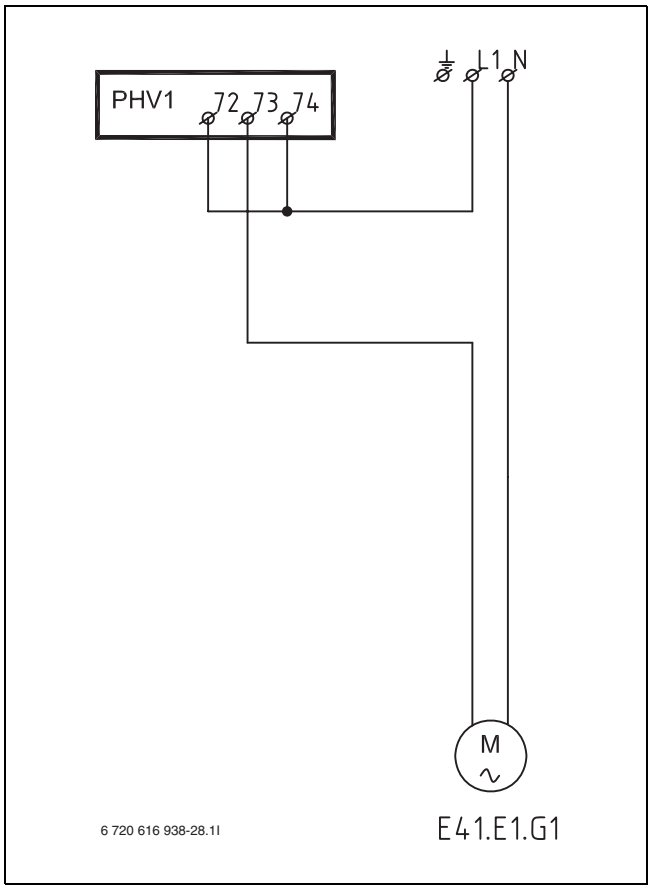



*Fig. 39 Connection of circulation pump E41.E1.G1*

The circulation pump is part of the system solution with mixed additional heat (→ Chapter 8.2.3)

The circulation pump has its own voltage feed from the distribution box. The pump is controlled from the control unit. Incoming voltage feed is connected to terminal block 72 and 74 on PHV1, outgoing voltage feed on terminal block 73.
The maximum load is 2.6A when cos φ = 0.4. For example, Wilo Star-Z 15 can be used.

## 11.10 Connection of low energy pump E11.G1

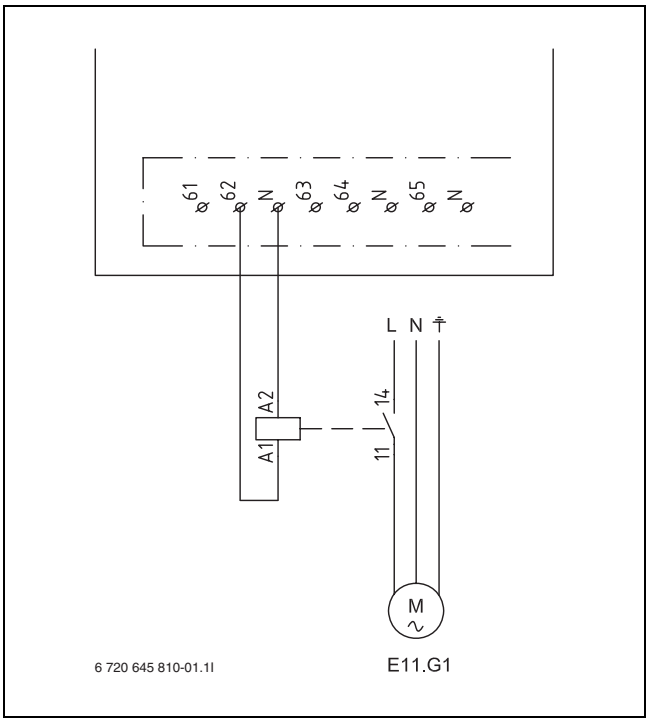



*Fig. 40 Connection of low energy pump E11.G1*

When a low energy circulation pump is connected in the heating circuit an intermediate relay must be used for pump control.

The relay is connected to terminal blocks 62 and N on the PHV board (output for E11.G1).

E11.G1 is powered externally.

# 12 Control panel

Settings for the control of the heat pump are made with the control unit's control panel, which also provides information about current status.

## 12.1 Panel overview

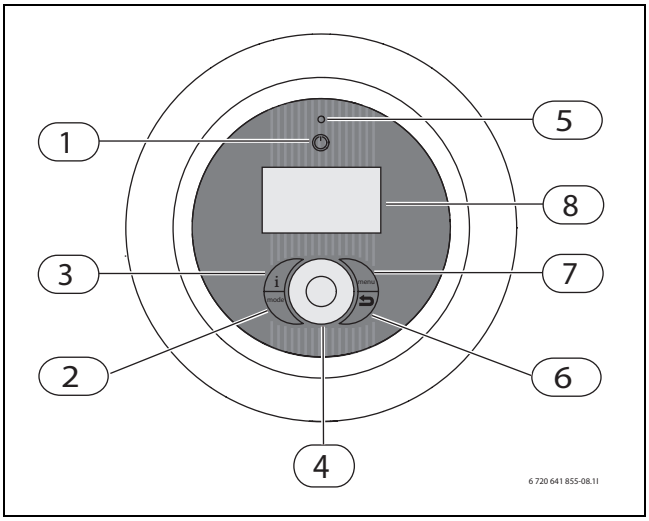



*Fig. 41 Control panel*

**1** On/Off button
**2** Mode button
**3** Info button
**4** Menu dial
**5** Status lamp
**6** Return button
**7** Menu button
**8** Menu display

## 12.2 On/Off button

Use the On/Off button to switch the heat pump on and off.

## 12.3 Status lamp

| | |
|---|---|
| *The lamp lights green.* | The heat pump is running. |
| *The lamp flashes red.* | There is an alarm which has not been acknowledged |
| *The lamp lights red.* | The alarm has been acknowledged but the alarm cause remains |
| *Lamp flashes slowly green, menu window not lit.* | The heat pump is in stand-by mode[1)]. |
| *The lamp and menu display not lit.* | No voltage to control unit. |

*Tab. 24 Lamp functions*

1) Stand-by means that the heat pump is running but no heating or hot water demand exists.

## 12.4 Menu display

Use the menu display in order to:

- View information from the heat pump.
- View available menus.
- Change set values.

## 12.5 Menu button and menu dial

Use (menu) to get from *Initial menu* to the menus. Use the menu dial in order to:

- Navigate the menus and get to the setting displays.
  - Turn the dial to see more menus on the same level or change a set value.
  - Press the dial to change to a lower menu level or save a change.

## 12.6 Return button

Use (↩) to:

- Go back to the previous menu level.
- Leave a setting display without changing the set value.

## 12.7 Mode button

Use (mode) to change type of operation.

The controller language can be changed with the (mode)-key.

▶ Press the (mode) button in the standard display for at least 5 s, then select the required language.

## 12.8 Info button

Use (info) to see information from the control unit about operating mode, temperature, program version, etc.

# 13 Start up

The first time the heat pump is started, a number of settings are displayed automatically so as to facilitate putting it in operation.

Before this stage, the heat pump should be installed in accordance with the previous sections (→ Chapter 10, → Chapter 11). Collector circuits, heating circuits and hot water circuits should be filled and vented.

The settings are also available under ordinary installer menus.

Only functions which are identified by the control unit are displayed in the initial menu.
The start-up menus are available until **Yes** is entered in **Start-up completed**.

- Read the complete menus before start-up.
- A selection must be made in **Protective anode installed**.

**Language, Country and Operating mode**

- Select language for the menus of the control unit (→ Chapter 16.9).
- Select **Country** (→ Chapter 16.9).
- Select operating mode (**L/W + mixed additional heat**) (→ Chapter 6.4, → Chapter 16.6.1).

With the ⮌-button, reinstate the selection that applied to **Language**, **Country** or **Operating mode** prior to or during **Start-up**.

**Start-up**

Review and adjust, as required, the functions below. See the references for description of the functions.

The selected system solution would normally require a review of more settings than the ones in the start-up.

- Set **Heat pump capacity** according to the details on the type plate (→ Chapter 5.3 and 16.6.2).
- Set **Hot water production** for each heat pump (compressor) (→ Chapter 16.2).
- Set **Minimum outdoor temperature** (→ Chapter 16.1.1).
- Set **Groundwater** if it is installed.
- Set **Circuit 1 Heating\ Type of heating system** (→ Chapter 16.1.2).
- Set **Circuit 1 Cooling** (if Cooling has been installed, accessory), see the accessory documentation.
- Set **Circuit 2, 3...** (→ Chapter 16.1.3).
  - **Mixing valve mode**
  - **Type of heating system**
  - **Mixing valve running time**
- Select alternative in **Protective anode installed** (→ Chapter 16.2).
- Set values for **Mixed additional heat** (→ Chapter 16.7).
  - **Mixing valve running time**
  - **Delay mixing valve control after additional heat start**
  - Acknowledge **Hot water electric heater** if such exists (→ Chapter 16.7).
- Set **Date** (→ Chapter 16.9).
- Set **Time** (→ Chapter 16.9).
- **Start-up completed**, **Yes/No**.
  The start-up menus will be available until **Yes** is entered.

Under **Protective anode installed** make the appropriate selection to prevent unnecessary alarm messages.

After the start-up menus, the Initial menu is shown in the display. All customer functions are accessible from this menu, whereas the installer menus are accessible only after change of access level.

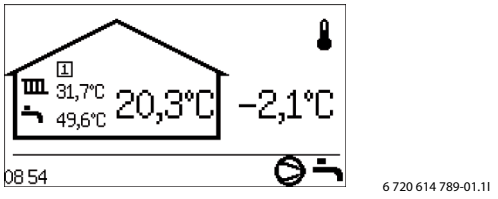



*Fig. 42 Initial menu*

# 14 Installer menus

## 14.1 Access to the functions on Installer level

A four digit access code is required to switch from Customer level to Installer level in the menus. The access code is the present date given as two digits for the month and two digits for the date (for example 0920).

- ▶ Go to **Access level** under **Menu** at Customer level.
- ▶ Enter the four digit access code using the menu dial. Press the menu dial after setting each digit. **Access** = **Installer** shown in the menu window.
- ▶ Turn the menu dial to see the menus in the top level. All functions at Customer level and Installer level can now be reached.

The control unit returns automatically to Customer level:

- After 20 min (adjustable value, → Chapter 16.6.1).

## 14.2 Compressor fast restart

During commissioning, manual operation, etc., you may need to quickly restart the compressor without waiting for the restart timer (10 min).

- ▶ Press (mode) for 5s in an optional installer menu (not a setting display).
  The compressor starts after 20s.

## 14.3 Temperature sensor

The control unit controls the production of heat, hot water, etc., after signals from a great number of temperature sensors. Most signals that can appear in the display are listed here.

Complete component names are displayed in the control unit only when needed. If, for example, you are in a menu which refers only to circuit 2, the sensor names are indicated without E12. before the sensor name.
The complete name is always presented in alarm information so as to facilitate troubleshooting. Full names can also be found on drawings and in system solutions.

E21 = Compressor 1 / Heat pump 1
E22 = Compressor 2 / Heat pump 2

| | |
|---|---|
| T1<br>E11.T1 | Flow, circuit 1 |
| T2<br>E10.T2 | Outdoor |
| T5<br>E11.TT.T5 | Room, circuit 1 (accessory) |
| T6<br>E21.T6 | Hot gas |
| T8<br>E21.T8 | Heat transfer fluid out |
| T9<br>E21.T9 | Heat transfer fluid in |
| T10<br>E21.T10 | Collector circuit in |
| T11<br>E21.T11 | Collector circuit out |
| T1<br>E12.T1 | Flow, circuit 2 (if circuit 2 is used) |
| T5<br>E12.TT.T5 | Room, circuit 2 (accessory) |

*Tab. 25 Temperature sensors*

| | |
|---|---|
| E22.T6 | Hot gas |
| E22.T8 | Heat transfer fluid out |
| E22.T9 | Heat transfer fluid in |
| E22.T10 | Collector circuit in |
| E22.T11 | Collector circuit out |

*Tab. 26 Sensors, heat pump 2*

**Sensors for options**

| | |
|---|---|
| E41.T3<br>E42.T3 | Hot water |

*Tab. 27 Hot water sensors*

| | |
|---|---|
| E13.T1 | Flow, circuit 3 |
| E13.TT.T5 | Room, circuit 3 (accessory) |
| E14.T1 | Flow, circuit 4 |
| E14.TT.T5 | Room, circuit 4 (accessory) |

*Tab. 28 Sensors, circuit 3, 4*

The control unit recognizes which sensors are installed and acknowledges them automatically. An accessory sensor can be deacknowledged manually in the control unit. This makes it possible to remove the sensor from the control unit if it is not used.

# 15 Menu overview

The top menu level for installers is:

- **Room temperature**
- **Hot water**
- **Holiday**
- **Timers**
- **External control**
- **Installer**
- **Additional heat**
- **Safety functions**
- **General**
- **Alarms**
- **Access level**
- **Return to factory settings**
- **Program version**

Access level 0 = Customer
Access level 1 = Installer

HP x = Heat pump 1 or 2 / Compressor 1 or 2

| Room temperature | | | Access level |
|---|---|---|---|
| General | Summer/winter operation | Circuit 1, Circuit 2, 3... | |
| | | > Winter operation | 0 |
| | | > Outdoor temperature limit for change over | 0 |
| | | > Delay before change over to winter operation | 1 |
| | | > Delay before change over to summer operation | 1 |
| | | > Direct start limit for winter operation | 1 |
| | Shut down protection during change over from hot water to heating | | 1 |
| | Minimum outdoor temperature | | 1 |

*Tab. 29 Room temperature menus*

| Room temperature | | | Access level |
|---|---|---|---|
| Circuit 1 Heating | External set point value | | 1 |
| | Use temperature from circuit with highest temperature | | 1 |
| | Type of heating system | | 1 |
| | Highest permitted flow temperature T1 | | 1 |
| | Lowest permitted flow temperature T1 | | 1 |
| | Heat curve | | 0 |
| | Heat curve hysteresis heat pump x | Maximum | 1 |
| | | Minimum | 1 |
| | | Time factor | 1 |
| | Room sensor | Room temperature influence (if installed) | 0 |
| | | Knob's operating range (CAN-BUS) | 0 |
| | | Acknowledge room sensor | 1 |
| | Room temperature program | Active program | 0 |
| | | View/edit active program | 0 |
| | | Room temperature normal | 0 |
| | | Temperature increase/decrease (no room sensor) | 0 |
| | | Setting temp. increase/decrease (no room sensor) | 1 |
| | | > Limit value for left or right end point | 1 |
| | | > Change when much colder/warmer | 1 |
| | | > Change when colder/warmer | 1 |
| | | Room temperature influence (no room sensor) | 0 |
| | | Room temperature exception | 0 |
| | | Copy to all heating circuits | 0 |
| | Air handling unit in circuit | | 1 |
| Circuit 2, 3... | Mixing valve mode | | 1 |
| | Type of heating system | | 1 |
| | Highest permitted flow temperature T1 | | 1 |
| | Lowest permitted flow temperature T1 | | 1 |
| | Heat curve | | 0 |
| | Room sensor | Room temperature influence (if installed) | 0 |
| | | Acknowledge room sensor | 1 |
| | Room temperature program | Som Circuit 1 Heatingminus Copy to all heating circuits | 0, 1 |
| | Regulator settings | P constant | 1 |
| | | I constant | 1 |
| | | D constant | 1 |
| | | Minimum PID signal | 1 |
| | | Maximum PID signal | 1 |
| | | Mixing valve running time | 1 |
| | | Mixing valve fully closed | 1 |
| | | Mixing valve start closing | 1 |
| | | Connected to output type | 1 |
| | Air handling unit in circuit | | 1 |

*Tab. 29 Room temperature menus*

| Hot water | | Access level |
|---|---|---|
| Extra hot water | Extra hot water duration | 0 |
| | Extra hot water stop temperature | 0 |
| Hot water peak | Day of the week | 0 |
| | Interval in weeks | 0 |
| | Start time | 0 |
| | Stop temperature | 1 |
| | Maximum time | 1 |
| | Time for warm-keeping | 1 |
| Hot water program | Active program | 0 |
| | View/edit active program | 0 |
| Hot water mode | | 0 |
| Hot water settings heat pump x | Hot water production | 1 |
| | Start temperature T3 economy mode | 1 |
| | Stop temperature T8 economy mode | 1 |
| | Start temperature T3 comfort mode | 1 |
| | Stop temperature T8 comfort mode | 1 |
| Block heating during hot water demand | | 0 |
| Maximum temperature difference circuit 1 | | 1 |
| Hot water circulation | Hot water circulation pump active | 1 |
| | Time settings | 1 |
| Protective anode installed | | 1 |
| Acknowledge hot water sensor E41.T3 | | 1 |
| Acknowledge hot water sensor E42.T3 | | 1 |

*Tab. 30 Hot water menus*

| Holiday | | Access level |
|---|---|---|
| Circuit 1 and hot water | Activate holiday function | 0 |
| | Start date | 0 |
| | Stop date | 0 |
| | Room temperature | 0 |
| | Copy to all heating circuits | 0 |
| | Block hot water production | 0 |
| Circuit 2, 3... | Activate holiday function | 0 |
| | Start date | 0 |
| | Stop date | 0 |
| | Room temperature | 0 |

*Tab. 31 Holiday menus*

| Timers | | | Access level |
|---|---|---|---|
| Extra hot water | | | 0 |
| Hot water peak time for warm-keeping | | | 1 |
| Alarm mode delay | | | 0 |
| Party mode | | | 0 |

*Tab. 32 Timers*

| Timers | | | Access level |
|---|---|---|---|
| Heat pump x timers | Compressor start delay | | 0 |
| | Compressor start delay groundwater | | 1 |
| | G2 heat carrier pump stop delay | | 1 |
| | Block low pressure switch | | 1 |
| Additional heat timers | Additional heat start delay | | 0 |
| | Delay mixing valve control after additional heat start | | 0 |
| | Additional heat program activation delay after low outdoor temperature | | 1 |
| | Additional heat start delay after high outdoor temperature | | 1 |
| Delay before change over to summer operation | | | 1 |
| Delay before change over to winter operation | | | 1 |
| Shut down protection during change over from hot water to heating | | | 1 |
| Heating start delay | | | 1 |
| Heating stop delay | | | 1 |

*Tab. 32 Timers*

| External control | | | Access level |
|---|---|---|---|
| Heat pump x | External input 1, 2 | Invert input | 1 |
| | | Block compressor x | 0 |
| | | Block additional heat | 0 |
| | | Block heating at tripped underfloor temperature limiter | 1 |
| | | Block heating | 0 |
| | | Room temperature | 0 |
| | | Block hot water production | 0 |
| | | Start collector circuit pump | 1 |
| | | Alarm at low pressure in collector circuit | 1 |
| | | Alarm groundwater circuit | 1 |
| External input circuit 2, 3... | | Invert input | 1 |
| | | Block heating at tripped underfloor temperature limiter | 1 |
| | | Block heating | 0 |
| | | Room temperature | 0 |

*Tab. 33 External control*

| Installer | | | Access level |
|---|---|---|---|
| General | Anti-seizure mode | Day of the week | 1 |
| | | Start time | 1 |
| | | Minimum outdoor temperature | 1 |
| | Highest permitted flow temperature T1 | | 1 |
| | Operating mode | | 1 |
| | Groundwater | Groundwater | 1 |
| | | Compressor start delay groundwater | 1 |
| | Display light switch off delay | | 1 |
| | Time for reset of access level | | 1 |
| Heat pump capacity | | | 1 |
| Connected I/O boards | All boards and current version are displayed, if relevant | | 1 |

*Tab. 34 Installer menus*

| Installer | | | Access level |
|---|---|---|---|
| Operating times and consumptions | The total operating time for the compressor and additional heat (active connection). It can also make short term measurements. | | 1 |
| Temperatures | All connected/acknowledged sensors present values. The opportunity to correct the sensors is also given | | 1 |
| Inputs | The status of all connected inputs is displayed here. Pressure switches and motor cut-outs are shown for each heat pump | | 1 |
| Outputs | All components can be manually operated individually here to check function | | 1 |
| Circulation pumps | Operation alternative heating circuit pump G1 | | 1 |
| | Operation alternative heat carrier pump G2 | | 1 |
| | Operation alternative collector circuit pump G3 | | 1 |
| Screed drying | Activate | | 1 |
| | Current program step | | 1 |
| | Remaining time for current step | | 1 |
| | Heat source | | 1 |
| | Program settings | Flow temperature increase per heating step | 1 |
| | | Number of days per heating step | 1 |
| | | Maximum flow temperature | 1 |
| | | Number of days with maximum temperature | 1 |
| | | Flow temperature decrease per cooling step | 1 |
| | | Number of days per cooling step | 1 |

*Tab. 34 Installer menus*

| Additional heat | | | Access level |
|---|---|---|---|
| Additional heat general | Start delay | | 1 |
| | Allow additional heat timer during energy supply cut-off | | 1 |
| | Additional heat only | | 1 |
| | Ramp time when additional heat only | | 1 |
| | Block additional heat | | 1 |
| | Maximum outdoor temperature for additional heat | | 1 |
| | Additional heat set point value E11.T1 offset | | 1 |
| Mixed additional heat | Delay mixing valve control after additional heat start | | 1 |
| | Regulator settings | P constant | 1 |
| | | I constant | 1 |
| | | D constant | 1 |
| | | Minimum PID signal | 1 |
| | | Maximum PID signal | 1 |
| | | Mixing valve running time | 1 |
| | | Connected to output type | 1 |
| Hot water electric heater | Acknowledge hot water additional heat | | 1 |
| | Temperature change | | 1 |
| | Hysteresis | | 1 |
| Additional heat program | Activate program | | 1 |
| | View/edit active program | | 1 |
| | Outdoor temperature limit for deactivation of time control | | 1 |

*Tab. 35 Additional heat menus*

| Safety functions | | | Access level |
|---|---|---|---|
| Setting collector circuit in T10 | Lowest permitted temperature E21.T10 | | 1 |
| | Lowest permitted temperature E22.T10 | | 1 |
| | Hysteresis alarm reset | | 1 |
| | Number of warnings before alarm | | 1 |
| Setting collector circuit out T11 | Lowest permitted temperature E21.T11 | | 1 |
| | Lowest permitted temperature E22.T11 | | 1 |
| | Hysteresis alarm reset | | 1 |
| | Number of warnings before alarm | | 1 |

*Tab. 36 Safety functions menus*

| General | Access level |
|---|---|
| Set date | 0 |
| Set time | 0 |
| Summer/winter time | 0 |
| Display backlight intensity | 0 |
| Language | 0 |
| Country | 1 |

*Tab. 37 General menus*

| Alarms | | | Accesslevel |
|---|---|---|---|
| Alarm log | | | 0 |
| Delete alarm log | | | 0 |
| Alarm history | | | 1 |
| Alarm indication | Alarm buzzer signal | Interval | 0 |
| | | Blocking time | 0 |
| | Alarm indication control unit | Block alarm buzzer | 0 |
| | Alarm indication room sensor | Block alarm buzzer | 0 |
| | | Block alarm indicator lamp | 0 |
| | General alarm level | Alarms and warnings | 1 |

*Tab. 38 Alarm menus*

| Access level | Access level |
|---|---|
| Access level | 0, 1 |

*Tab. 39 Access level menu*

| Return to factory settings | Access level |
|---|---|
| Return to factory settings | 0, 1 |

*Tab. 40 Return to factory settings menu*

# 16 Settings

## 16.1 Room temperature

Press the menu button in the standard display to open the main menu. Select **Room temperature** to adjust the heating.

The following options are available under **Room temperature**:

- **General**
- **Circuit 1 Heating**
- **Circuit 2, 3...**

### 16.1.1 General

Here are:

- **Summer/winter operation**
- **Shut down protection during change over from hot water to heating**
- **Minimum outdoor temperature**

**> Summer/winter operation**

**>> Circuit 1**

**>>> Winter operation**

| | |
|---|---|
| Factory setting | Automatic |
| Alternative | On/Automatic/Off |

*Tab. 41 Summer/winter operation*

If **On** is selected, the heat pump is constantly in winter operation and heat and hot water are always produced. **Off** signifies constant summer operation; only hot water is produced. **Automatic** signifies change-over at the set outdoor temperature.

**>>> Outdoor temperature limit for change over**

| | |
|---|---|
| Factory setting | 18 °C |
| Lowest value | 5 °C |
| Highest value | 35 °C |

*Tab. 42 Change over temperature*

The menu is displayed only if **Automatic** has been selected in **Winter operation**.

**>>> Delay before change over to winter operation**

| | |
|---|---|
| Factory setting | 4h |
| Lowest value | 1h |
| Highest value | 48h |

*Tab. 43 Delay before change over to winter operation*

**>> Delay before change over to summer operation**

| | |
|---|---|
| Factory setting | 4h |
| Lowest value | 1h |
| Highest value | 48h |

*Tab. 44 Delay before change over to summer operation*

**>>> Direct start limit for winter operation**

| | |
|---|---|
| Factory setting | 13 °C |
| Lowest value | 5 °C |
| Highest value | 17 °C |

*Tab. 45 Direct start limit*

In the event of change over between winter and summer operation and vice versa, there is a certain delay to prevent constant starting and stopping of the compressor when the outdoor temperature oscillates around the temperature limit.
Below the direct start limit, the control unit changes over to winter operation without delay.

When the **Use temperature from circuit with highest temperature** function for **Circuit 1** is used **Circuit 2, 3...** are displayed under **Summer/winter operation**. The same settings as for **Circuit 1** can be made for each circuit. The factory settings are the same as for **Circuit 1**.

**Circuit 1** is never allowed to switch over to summer operation for as long as any circuit is in winter operation.

**> Shut down protection during change over from hot water to heating**

| | |
|---|---|
| Factory setting | 180s |
| Lowest value | 0s |
| Highest value | 600s |

*Tab. 46 Shut down protection during change over to hot water*

- Set how long it should take before a heating demand may be deactivated after hot water production. This ensures that the hot water amount that goes out into the heating circuit after production of hot water does not become a reason for incorrect deactivation of a heating demand.

**> Minimum outdoor temperature**

| | |
|---|---|
| Factory setting | -35,0 °C |
| Lowest value | -35,0 °C |
| Highest value | -10,0 °C |

*Tab. 47 Lowest outdoor temperature*

- Set the minimum outdoor temperature for the heat curve.

### 16.1.2 Circuit 1 Heating

Here are:

- **External set point value**
- **Use temperature from circuit with highest temperature**
- **Type of heating system**
- **Highest permitted flow temperature T1**
- **Lowest permitted flow temperature T1**
- **Heat curve**
- **Heat curve hysteresis heat pump x**
- **Room sensor**
- **Room temperature program**

**> External set point value**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 48 External set point value*

- Change to **Yes** if an external signal 0-10V should control the flow temperature (fixed set point value). 1V= 10 °C, 10V = 80 °C (linear function).

Ensure that the incoming signal does not generate higher flow temperature than what **Circuit 1** withstands.
All safety functions for the heating system must be handled by the external equipment.

**> Use temperature from circuit with highest temperature**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 49 Temperature from circuit with highest temperature*

- Change to **Yes** if the set point value for **Circuit 1** should be the highest of **Circuit x**'s set point values. Only circuits in **Winter operation** are included. This function means that the set point value for **Circuit 1** is always adapted to current need.

In the event of **Yes**, **Summer/winter operation** can be set also for the mixed circuits.

The function is used when **Circuit 1** only consists of a buffer tank.

**> Type of heating system**

| | |
|---|---|
| Factory setting | Underfloor |
| Alternative | Radiator/Underfloor |

*Tab. 50 Type of heating system*

- Select type of heating system, **Radiator** or **Underfloor**.
- Change to **Radiator** at **Yes** in **Use temperature from circuit with highest temperature**.
- Change to **Radiator** at **External heat source** (solar, firewood).

The factory settings for the **Radiator** have a curve value (flow temperature) of 22 °C at 20 °C an outdoor temperature, 37.4 °C at –2.5 °C and 60 °C at -35 °C at an outdoor temperature (the high point of the curve).

The factory settings for the **Underfloor** have a curve value (flow temperature) of 22 °C at 20 °C outdoor temperature, 27.2 °C at -2.5°C and 35 °C at -35 °C outdoor temperature.

At a temperature higher than 20 °C, the same curve value applies as for 20 °C.

The right point of the curve (-35 °C) can be changed in **Minimum outdoor temperature** (→ Chapter 16.1.1). Set value applies for all heat curves.
A change of the right point affects the flow temperature for all outdoor temperatures that are lower than the set temperature.

**> Highest permitted flow temperature T1**

| | |
|---|---|
| Factory setting | 80.0 °C |
| Lowest value | 1) |
| Highest value | 100.0 °C |

*Tab. 51 Radiator*

- Change to 100 °C at **External heat source**.

| | |
|---|---|
| Factory setting | 45.0 °C |
| Lowest value | 1) |
| Highest value | 45.0 °C |

*Tab. 52 Underfloor*

1) The value that is set in **Lowest permitted flow temperature T1**.

**> Lowest permitted flow temperature T1**

| | |
|---|---|
| Factory setting | 10.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 80.0 °C |

*Tab. 53 Radiator*

| | |
|---|---|
| Factory setting | 10.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 45.0 °C |

*Tab. 54 Underfloor*

- Set the highest and lowest permitted temperature for T1. Ensure that the value corresponds with the selected curve and possible curve adjustments.
- Check also that the highest temperature T1 with **Underfloor** does not exceed the permitted value for the type of floor used.

The heat curve forms the basis for set point value calculation of the flow temperature. Most other temperatures for heating that are set refer to room temperature. These values are transformed by the control unit into flow temperature values.

**> Heat curve**

The heat curve constitutes the basis for the control unit's control of the temperature on the heating water to the circuit and indicates how high it needs to be in relation to the outdoor temperature. The control unit increases the temperature of the heating water when the outdoor temperature drops. The temperature of the heating water out to the circuit, i.e. the flow temperature is measured by sensor T1 for circuit 1 (full name E11.T1) and sensor T1 for circuit 2 (full name E12.T1).

Each circuit is controlled by its own heat curve. In **Type of heating system**, a curve can be selected for **Radiator** or **Underfloor**. The curve for **Underfloor** has lower values because the floors do not require high temperatures.

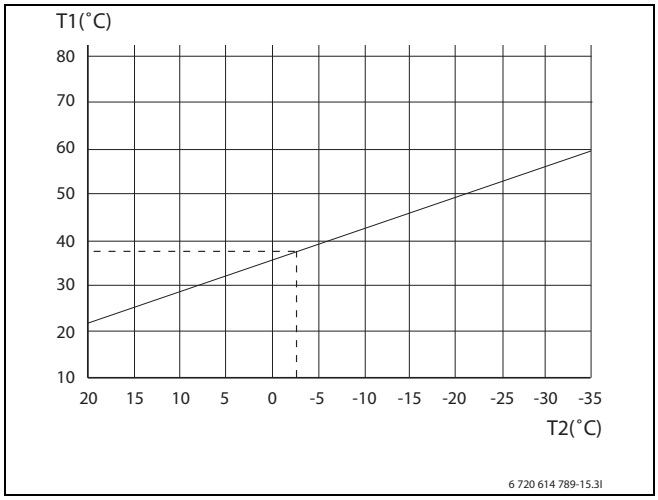



*Fig. 43 Radiator*

The figure indicates the factory setting curve for a radiator circuit. At -2.5 °C the flow set point is 37.4 °C.

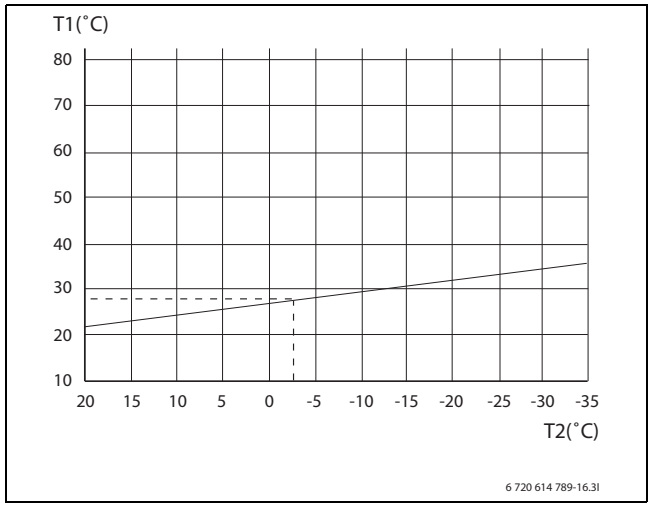



*Fig. 44 Underfloor heating*

The figure indicates the factory setting curve for an underfloor circuit. At -2.5 °C the flow set point is 27.2 °C.

### Setting of heat curve

If the heat curve has been set too high, the display will show the message **Too high heat curve setting**.

- ▶ Change the heat curve setting.

A heat curve is set for each circuit. If the room temperature is perceived to be too high or too low in the circuit, it is preferable to adjust the curve.

The examples shows the curve for **Radiator**. The principle is the same for **Underfloor**.

The curve can be changed in different ways. The slope of the curve can be changed by offsetting the flow temperature upwards or downwards on the left-hand side (the value at outdoor temperature 20 °C, factory value 22.0 °C) as well as the right-hand side (the value at outdoor temperature -35 °C, factory setting 60.0 °C). In addition, the curve can be affected by every 5th outdoor temperature degree.
The value at 0 °C is displayed above the curve's left-hand point, factory value 35.7 °C.

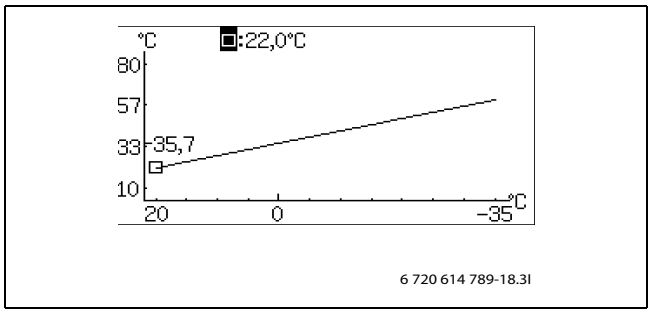



*Fig. 45 Settings window Heat curve (radiator)*

Change the left point:

- ▶ Press the menu dial when the square is marked. The value is marked.

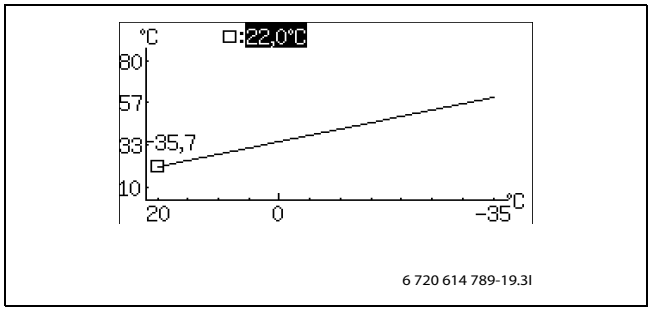



*Fig. 46*

- ▶ Turn the menu dial to change the value. Press the dial to save or use ↩ to return without saving.
  In the window, the square is marked again and any changed values are displayed after the square. In addition, the curve is updated according to the new value.

Change the right point:

- ▶ Turn the menu dial when the square is marked. The upper square is changed to outdoor temperature with the corresponding curve value after the colon. The circle marks the relevant curve position.
- ▶ Continue to turn the dial until it shows a square before the colon.
- ▶ Press the dial to mark the value.

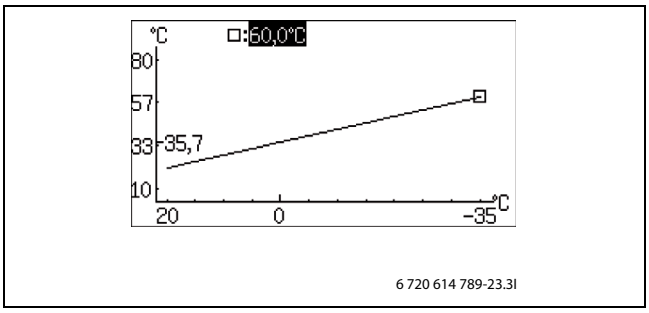



*Fig. 47*

- ▶ Turn the menu dial to change the value. Press the dial to save or use ↩ to return without saving.
  In the window, the square is marked again and any changed values are displayed after the square. In addition, the curve is updated according to the new value.

Change a specific value, for example the value at an outdoor temperature of 0 °C:

- ▶ Turn the menu dial when the square is marked until 0 °C is marked (→ Fig. 48).
- ▶ Press the dial to mark the value.

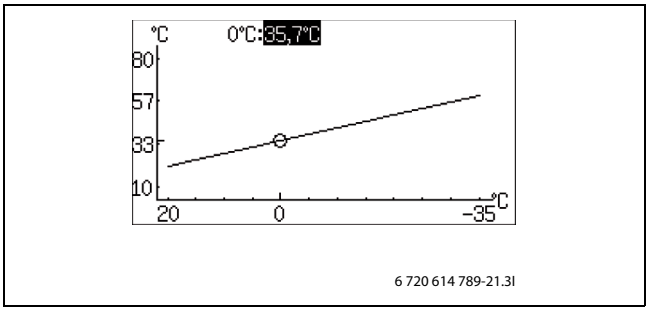



*Fig. 48*

▶ Turn the menu dial to change the value.

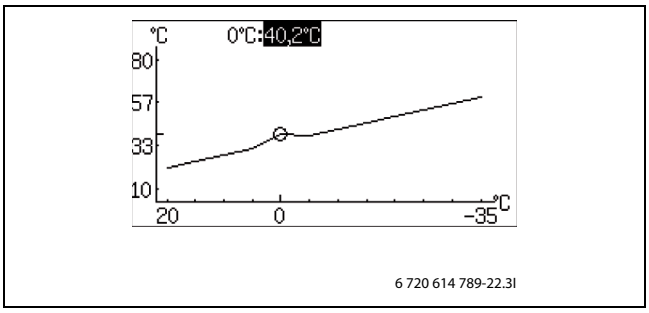



*Fig. 49*

▶ Press the dial to save or use ↩ to return without saving.

▶ Use ↩ to leave the curve setting window and return to the menu.

Recommendations:

- ▶ Increase the value of the right point if it feels too cold at low outdoor temperatures.
- ▶ Increase the value of curve at 0 °C if it feels a little cold at outdoor temperatures around 0.
- ▶ Increase or decrease the value of the curve equally at the right and left points to fine adjust the heat (the curve is offset parallel).

▶ If **Yes** at **Use temperature from circuit with highest temperature** set the heat curve for **Circuit 1** to a low value, i.e. 22 °C.

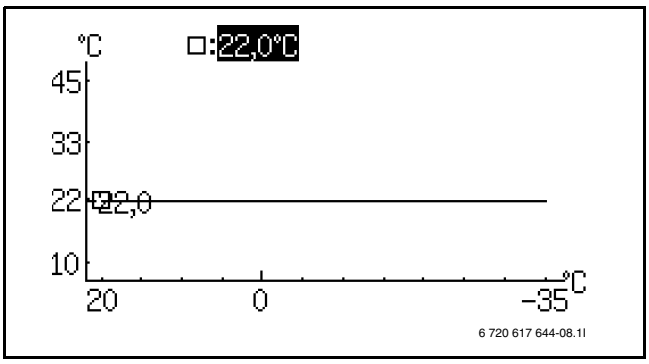



*Fig. 50*

**> Heat curve hysteresis heat pump x**

**>> Maximum**

| | |
|---|---|
| Factory setting | 16.0K |
| Lowest value | The value in Minimum |
| Highest value | 30.0K |

*Tab. 55 Maximum hysteresis*

▶ Set how big the maximum hysteresis for the flow temperature can be.

**>> Minimum**

| | |
|---|---|
| Factory setting | 4.0K |
| Lowest value | 2.0K |
| Highest value | The value in Maximum |

*Tab. 56 Minimum hysteresis*

▶ Set how big the minimum hysteresis for the flow temperature can be.

**>> Time factor**

| | |
|---|---|
| Factory setting | 20.0 |
| Lowest value | 1.0 |
| Highest value | 30.0 |

*Tab. 57 Time factor*

▶ Select how long the compressor should be on or off in heating mode.
Higher set values result in fewer compressor starts and stops, which achieves higher economy. However, more pronounced temperature fluctuations in the heating system may result than with lower values.

**Example**

With the factory settings, hysteresis is changed, as follows:

| Time | Hysteresis |
|---|---|
| At start/stop for heating demand | 16K |
| 2 min | 14K |
| 5 min | 12K |
| 10 min | 10K |
| 14 min | 9K |
| 20 min | 8K |

*Tab. 58 Hysteresis*

When the flow falls below the set point value with half the hysteresis, there is heating demand and when it exceeds the set point value with half the hysteresis, the heating demand is met.

**> Room sensor**

**>> Room temperature influence**

| | |
|---|---|
| Factory setting | 3.0 |
| Lowest value | 0.0 |
| Highest value | 10.0 |

*Tab. 59 Room temperature influence*

- Set how much a 1 K ( °C) difference in room temperature should influence the set point value for the flow temperature.
  Example: at a 2 K ( °C) deviation from the set room temperature, the set point value for the flow temperature is changed by 6 K ( °C) (2 K deviation * factor 3 = 6 K).

The menu is displayed only if a room sensor is installed.

**>> Knob's operating range**

| | |
|---|---|
| Factory setting | 6K |
| Lowest value | 0K |
| Highest value | 6K |

*Tab. 60 Operating range, room sensor knob*

- Set how many degrees the turn of the knob of the room sensor should represent between + and – .
  6K means that a full turn to + gives approx. +3K and a full turn to – gives approx. -3K.

The menu is displayed only when a room sensor (CANbus) is installed.

**>> Acknowledge room sensor**

| | |
|---|---|
| Factory setting | Yes (if correctly installed) |
| Alternative | Yes/No |

*Tab. 61 Acknowledge room sensor*

- Indicate **No** only if the room sensor, even if it is installed, should not be used.

The room sensor measures the temperature in the room where it is located. The value is compared with the set desired room temperature under **Room temperature program**.

**> Room temperature program**

| | |
|---|---|
| Factory setting | Optimised operation |
| Alternative | • Optimised operation<br>• Program 1<br>• Program 2 |

*Tab. 62 Program selection, circuit 1*

- Choose if the circuit should be controlled with a program or not.

**>> HP optimized**

This means that the control unit is only controlled by the flow set point value (→ Chapter 16.1.4), without programmed changes during the day. Optimised operation provides the best comfort and energy savings in the vast majority of cases.

**>> Program 1**, **Program 2**

These selections provide an opportunity to define user programs for time control by adjusting the start and stop times, as well as a normal and an exception temperature.

| Program | Day | Start | Stop |
|---|---|---|---|
| Program 1, 2 | Mon - Sun | 5:30 | 22:00 |

*Tab. 63 Program 1 and 2*

To set the desired time of day:

- Select **Program 1** or **Program 2**.
- Go to menu **View/edit active program**.
- Select day by turning the menu dial.

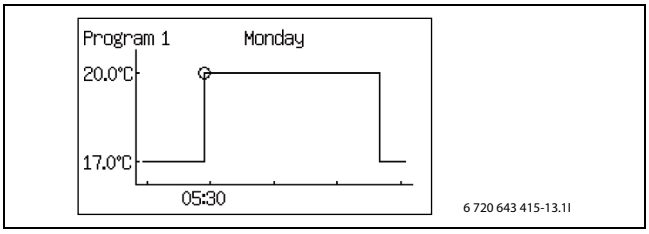



*Fig. 51*

- Press the menu dial to mark the value to be changed.

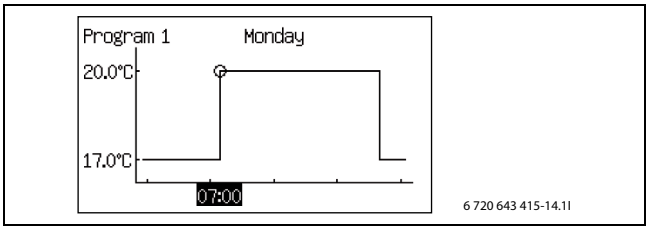



*Fig. 52*

- Turn the menu dial until the desired setting has been selected.
- Then press the menu dial.
- Turn the menu dial to be able to set additional values in the same way as above.

- Go back one step with ⟲.
- Select **Saving alternative**:
  - **Return without saving**
  - **Program 1**
  - **Program 2**

  The set changes are saved as a selected program or not at all.
- To adjust the normal temperature, proceed to menu **Room temperature normal**.
- To adjust the exceptional temperature, proceed to menu **Room temperature exception**.

**Room temperature program when there is a room sensor:**

**> Room temperature program**

**>> Active program**

If a program is selected, the following (if the menu button is turned) is displayed:

**>> View/edit active program**

**>> Room temperature normal**

| | |
|---|---|
| Factory setting | 20.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 35.0 °C |

*Tab. 64 Room temperature, normal*

- Set the desired set point for the room temperature.

**>> Room temperature exception**

| | |
|---|---|
| Factory setting | 17.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 30.0 °C |

*Tab. 65 Room temperature, exception*

- Set the temperature that should apply as exceptional temperature in the program.
  The menu is displayed only if **Program 1**or **Program 2**has been selected.

**>> Copy to all heating circuits**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 66 All circuits*

- Select **Yes** to have the same control for all installed circuits.
  The menu is displayed only under **Circuit 1**.

**>> Air handling unit in circuit**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 67 Air handling unit*

- Select **Yes** when such a unit exists in the circuit.

In the event of mixed additional heat with setting **Op/Cl** in **Connected to output type**, **Mixing valve running time** and **P constant** must be set differently from the factory values (→ Chapter 16.7).

**Room temperature program when there is no room sensor:**

**> Room temperature program**

**>> Active program**

**>> View/edit active program**

The same as when there is a room sensor, see above.

**>> Room temperature normal**

| | |
|---|---|
| Factory setting | 20.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 35.0 °C |

*Tab. 68 Room temperature, normal*

- Set the measured value in the room.
  The indicated value is used by temperature programs to calculate the difference between normal and exceptional temperature.

**>> Temperature increase/decrease**

| | |
|---|---|
| Factory setting | = |
| Alternative | – – , – , =, +, ++ |

*Tab. 69 Room temperature increase/decrease*

- Use this function to adjust the room temperature so that the normal room temperature (see the previous menu) becomes the desired temperature.
- Use this function to simply increase or decrease the heat when there are no room sensors.
  – – gives approx. 1 °C lower room temperature.
  – gives approx. 0.5 °C lower room temperature.
  + gives approx. 0.5 °C higher room temperature.
  ++ gives approx. 1 °C higher room temperature.

**>> Setting temp. increase/decrease**

**>>> Limit value for left or right end point**

| | |
|---|---|
| Factory setting | 0.0 °C |
| Lowest value | -10.0 °C |
| Highest value | 15.0 °C |

*Tab. 70 Heating increase/decrease limit value*

- Set which outdoor temperature should be the limit value for the end point that should be adjusted when increase/decrease is requested.
  At outdoor temperatures lower than the limit value, the flow temperature in the right end point (-35 °C) of the heat curve is affected, with change indicated in %, see below.
  At outdoor temperatures higher than the limit value, the flow temperature in the left end point (+20 °C) of the heat curve is affected, with change indicated in %, see below.

**>>> Change when much colder/warmer**

| | |
|---|---|
| Factory setting | 8% |
| Lowest value | 1% |
| Highest value | 20% |

*Tab. 71 Change when much colder/warmer*

- Set how many % the flow temperature in the applicable end point of the heat curve should change down or up when – – or ++ is selected in **Temperature increase/decrease**.

**>>> Change when colder/warmer**

| | |
|---|---|
| Factory setting | 3% |
| Lowest value | 1% |
| Highest value | 20% |

*Tab. 72 Change when colder/warmer*

- Set how many % the flow temperature in the applicable end point of the heat curve should change down or up when – or + is selected in **Temperature increase/decrease**.

**>> Room temperature influence**

Setting is carried out in the same way as in the menu **Room sensor** (→ Chapter 16.1.2). The setting is used in the temperature program to calculate how the flow temperature is affected when exceptional temperature should apply.

**>> Room temperature exception**

**>> Copy to all heating circuits**

The same as when there is a room sensor, see above.

It always takes some time for a change of a heating setting, e.g. an increase or decrease in room temperature, to apply. The same applies in the event of a quick change of the outdoor temperature. This is why you should always wait for at least 24 hours before making a new change.

### 16.1.3 Circuit 2, 3...

Make the settings for the first mixed circuit under **Circuit 2**. Other circuits are displayed only if they exist. The same functions apply to these as the functions for circuit 2.

Circuits 3 and 4 are accessories.

- **Mixing valve mode**
- **Type of heating system**
- **Highest permitted flow temperature T1**
- **Lowest permitted flow temperature T1**
- **Heat curve**
- **Room sensor** (same as **Circuit 1 Heating**)
- **Room temperature program** (same as **Circuit 1 Heating** minus **Copy to all heating circuits**)
- **Regulator settings**

**> Mixing valve mode**

| | |
|---|---|
| Factory setting | Off |
| Alternative | Heating/Off |

*Tab. 73 Mixing valve operating mode*

- Select **Off** if the circuit is not ready-built or needs to be turned off temporarily or should not be used.

**> Type of heating system**

| | |
|---|---|
| Factory setting | Underfloor |
| Alternative | Radiator/Underfloor |

*Tab. 74 Type of heating system*

- Select type of heating system.

The factory settings for the **Radiator** have a curve value (flow temperature) of 22 °C at 20 °C an outdoor temperature, 37.4 °C at –2.5 °C and 60 °C at -35 °C at an outdoor temperature (the high point of the curve).

The factory settings for the **Underfloor** have a curve value (flow temperature) of 22 °C at 20 °C outdoor temperature, 27.2 °C at -2.5°C and 35 °C at -35 °C outdoor temperature.

At a temperature higher than 20 °C, the same curve value applies as for 20 °C.

The right point of the curve (-35 °C) can be changed in **Minimum outdoor temperature** (→ Chapter 16.1.1). Set value applies for all heat curves.
A change of the right point affects the flow temperature for all outdoor temperatures that are lower than the set temperature.

**> Highest permitted flow temperature T1**

| | |
|---|---|
| Factory setting | 80.0 °C |
| Lowest value | 1) |
| Highest value | 100.0 °C |

*Tab. 75 Radiator*

| | |
|---|---|
| Factory setting | 45.0 °C |
| Lowest value | 1) |
| Highest value | 45.0 °C |

*Tab. 76 Underfloor*

1) The value that is set in **Lowest permitted flow temperature T1**.

**> Lowest permitted flow temperature T1**

| | |
|---|---|
| Factory setting | 10.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 80.0 °C |

*Tab. 77 Radiator*

| | |
|---|---|
| Factory setting | 10.0 °C |
| Lowest value | 10.0 °C |
| Highest value | 45.0 °C |

*Tab. 78 Underfloor*

- Set the highest and lowest permitted temperature for T1. Ensure that the value corresponds with the selected curve and possible curve adjustments.
- Check also that the highest temperature T1 with **Underfloor** does not exceed the permitted value for the type of floor used.

**> Heat curve**

The settings are the same as for **Circuit 1**.

**> Room sensor**

The settings are the same as for **Circuit 1**.

**> Room temperature program**

The settings are the same as for **Circuit 1**, except that **Copy to all heating circuits** is not included.

**> Regulator settings**

The mixing valve is controlled with PID regulator in order to reach the flow set point value when there is a need. The signal determines how much the opening of the mixing valve should change. It is calculated with short time intervals.

**>> P constant**

| | |
|---|---|
| Factory setting | 1.0 |
| Lowest value | 0.1 |
| Highest value | 30.0 |

*Tab. 79 P constant*

**>> I constant**

| | |
|---|---|
| Factory setting | 300.0 |
| Lowest value | 5.0 |
| Highest value | 600.0 |

*Tab. 80 I constant*

**>> D constant**

| | |
|---|---|
| Factory setting | 0.0 |
| Lowest value | 0.0 |
| Highest value | 10.0 |

*Tab. 81 D constant*

**>> Minimum PID signal**

| | |
|---|---|
| Factory setting | 0% |
| Lowest value | 0% |
| Highest value | 100% |

*Tab. 82 Minimum PID signal*

**>> Maximum PID signal**

| | |
|---|---|
| Factory setting | 100% |
| Lowest value | 0% |
| Highest value | 100% |

*Tab. 83 Maximum PID signal*

**>> Mixing valve running time**

| | |
|---|---|
| Factory setting | 300s / 05:00 |

*Tab. 84 Mixing valve running time*

- Set the run time that is indicated on the mixing valve and indicate value in number of minutes.

In the event of **Yes** on **Air handling unit in circuit** and output type **Op/Cl**:

- Indicate the double value compared with what is specified on the mixing valve.

If there is no time indication on the mixing valve, run it manually (→ Chapter 16.6.7) and measure how long it takes to go from fully closed to a fully open mixing valve (the mixing valve stops sounding and the endposition switch switches off).

**>> Mixing valve fully closed**

| | |
|---|---|
| Factory setting | 2.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 85 Mixing valve fully closed*

- Set how many K ( °C) below the maximum permitted flow temperature T1 the mixing valve is to be fully closed. The maximum flow temperature is different depending on the type of heating system (radiator or underfloor). With an underfloor system, the mixing valve should be fully closed at 45 °C-2K=43 °C (with factory settings).

**>> Mixing valve start closing**

| | |
|---|---|
| Factory setting | 2.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 86 Start closing mixing valve*

- Set how many K ( °C) below the value for fully closed mixing valve the closure of the mixing valve should begin. The result is 43 °C-2K=41 °C (with the factory settings for underfloor heating).

**>> Connected to output type**

| | |
|---|---|
| Factory setting | Op/Cl |
| Alternative | Op/Cl / 0 - 10V |

*Tab. 87 Output type*

- Select how the mixing valve is controlled. **Op/Cl** means control via an Open/Close signal.
  A mixing valve of the **Op/Cl** type is calibrated once every 24 hours. The mixing valve closes fully during a run time.
  Exception is when **Yes** has been selected in **Air handling unit in circuit** to ensure the flow over the circuit.

**> Air handling unit in circuit**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 88 Air handling unit*

- Select **Yes** when such a unit exists in the circuit.

### 16.1.4 Set point

The heating circuit's set point value is the temperature of the flow that the heat pump attempts to maintain. Sometimes, the measured actual value fluctuates a bit upward and downward depending on changes in the outdoor temperature or a large hot water demand.

The set point value specified by the customer/installer is most often the room temperature, which is recalculated by the control unit into a corresponding flow temperature set point value. Under normal conditions, 1 K ( °C) in room temperature corresponds to approx. 3 K ( °C) in flow temperature.

The set point value is normally based on:

- Current curve value (the flow temperature at the current outdoor temperature according to the applicable heat curve).
- Current curve influence through:
  - **Room sensor**
  - **Holiday**
  - **Active program**
  - **External control**

**Set point value calculation**

The set point value for the heating circuit is the current curve value adjusted with active curve influence, if any such exists.

Priority order for curve influence is:

- **External control**
- **Active program**
- **Holiday**
- **Room sensor**

Only one of these can be active. How big the influence should be and when to exercise it is set in the respective function.

**Fixed set point value**

A fixed set point value (not curve-based) applies in the event of:

- External set point value. The set point value is determined according to input signal 0-10V where 1V is 10 °C and 10V is 80 °C (0V triggers an alarm).

**Screed drying**

When using the screed drying program, the set point value is what applies in the drying program.

**Set point value when using function Use temperature from circuit with highest temperature**

The highest set point value for all circuits applies as the set point value for **Circuit 1**.

**Set point value limitation**

The calculated set point value is always checked against the permitted temperature limits.

The applicable set point value T1 for **Circuit 1** and the measured actual value for T1 are used to activate and deactivate the heat demand.

If the flow temperature has been below the set point value for a certain period of time, there is heat demand and the compressor produces heat before there is a too significant temperature reduction indoors. This happens until the flow temperature is a few degrees higher than the set point value.

The following applies to **Circuit 2, 3...**: When the actual value for the mixed circuit's T1 is low in relation to the set point value, more heating water is shunted into the circuit so as to maintain the set point value.

Heating demand is not active during summer operation.

## 16.2 Hot water

The heat pump's hot water production presupposes that sensor E41.T3 is acknowledged and that heat pump 1 is set to produce hot water. Heat pump 2 can be set for hot water production. In the system solutions (→ Chapter 8.2.2, 8.2.4), heat pump 1 makes hot water. In the system solution (→ Chapter 8.2.3), heat pump 1 heats hot water and the mixed additional heat afterheats the hot water. Heat pump 2 is used only for heating production.

Under **Hot water**, there are functions to:

- **Extra hot water**
- **Hot water peak**
- **Hot water program**
- **Hot water mode**
- **Hot water settings heat pump x**
- **Block heating during hot water demand**
- **Maximum temperature difference circuit 1**
- **Hot water circulation**
- **Protective anode installed**
- **Acknowledge hot water sensor E41.T3**
- **Acknowledge hot water sensor E42.T3**

**Extra hot water** and **Hot water peak** require that there is an additional electric heater in the hot water tank or that the installation has been configured so that the mixed additional heat (oil/gas boiler) makes hot water.

**> Extra hot water**

**>> Extra hot water duration**

| | |
|---|---|
| Factory setting | 0h |
| Lowest value | 0h |
| Highest value | 48h |

*Tab. 89 Extra hot water duration*

▶ Set the duration of extra hot water production.

**>> Extra hot water stop temperature**

| | |
|---|---|
| Factory setting | 65 °C |
| Lowest value | 50 °C |
| Highest value | 65 °C |

*Tab. 90 Extra hot water stop temperature*

▶ Set the stop temperature for extra hot water.

Additional amount of hot water is produced by temporarily increasing the temperature of the hot water during the set number of hours to the indicated stop temperature.

The heat pump starts the function directly and uses the compressor first and then the additional heat source to increase the temperature. When the desired number of hours have passed, the heat pump returns to normal hot water mode.

**DANGER:** Risk of burn injuries.

▶ Use a mixing valve when the hot water temperature exceeds 60 °C.

**> Hot water peak**

**Hot water peak** means a temporary increase in the hot water temperature to approx. 65 °C for thermal elimination of bacteria (pasteurisation).

The **Hot water circulation pump** is controlled by the control unit during the hot water peak.

For the hot water temperature increase, the compressor is used first; the additional heat source then continues alone.

**>> Day of the week**

| | |
|---|---|
| Factory setting | Wednesday |
| Area | None, Day, All |

*Tab. 91 Weekday*

▶ Set the day on which the hot water peak should take place. **None** means that the function is disabled. **All** means that a hot water peak takes place every day.

**>> Interval in weeks**

| | |
|---|---|
| Factory setting | 1 |
| Lowest value | 1 |
| Highest value | 4 |

*Tab. 92 Week interval*

▶ Set how often a hot water peak should take place.
- 1 means a hot water peak every week.
- 2 means that a hot water peak takes place in all even weeks of the year, i.e. in week 2, 4, 6, etc.
- 3 means week 3, 6, 9, etc.
- 4 means week 4, 8, 12, etc.

**>> Start time**

| | |
|---|---|
| Factory setting | 3:00 |
| Lowest value | 0:00 |
| Highest value | 23:00 |

*Tab. 93 Start time*

- Set the time of the hot water peak.

**>> Stop temperature**

| | |
|---|---|
| Factory setting | 65.0 °C |
| Lowest value | 48.0 °C |
| Highest value | 70.0 °C |

*Tab. 94 Stop temperature*

**>> Maximum time**

| | |
|---|---|
| Factory setting | 3.0h |
| Lowest value | 1.0h |
| Highest value | 5.0h |

*Tab. 95 Maximum time*

**>> Time for warm-keeping**

| | |
|---|---|
| Factory setting | 1.0h |
| Lowest value | 1.0h |
| Highest value | Maximum time - 1h |

*Tab. 96 Time for warm-keeping*

- Set **Stop temperature**, **Maximum time** and **Time for warm-keeping**.
  The hot water peak is activated on the selected day and at the selected time. It continues until the stop temperature has been reached plus the time for warm-keeping. The hot water peak cannot continue longer than the set **Maximum time**. If it is cancelled because the maximum time has expired, a message is shown in the display and a new attempt is made after 24 hours.

**> Hot water program**

**Program 1** and **Program 2** enables you to block hot water production during the set time.

**>> Active program**

| | |
|---|---|
| Factory setting | Always hot water |
| Alternative | • Always hot water<br>• Program 1<br>• Program 2 |

*Tab. 97 Hot water program*

**>> View/edit active program**

The menu is displayed only if **Program 1** or **Program 2** has been selected. Programs are changed in the same way as for **Room temperature program** (→Chapter 16.1.2).

**> Hot water mode**

| | |
|---|---|
| Factory setting | Economy |
| Alternative | Economy/Comfort |

*Tab. 98 Hot water mode*

The recommended mode is **Comfort**.

If **Yes** at **Hot water circulation pump active** the mode is automatically set to **Comfort** and the menu is not shown.

**> Hot water settings heat pump 1**

In certain countries there are requirements regarding the lowest hot water temperature in buildings. Check that the settings in Economy and Comfort mode conform to the applicable regulations.

**>> Hot water production**

| | |
|---|---|
| Factory setting | Yes |
| Alternative | No/Yes |

*Tab. 99 Hot water production*

**>> Start temperature T3 economy mode**

| | |
|---|---|
| Factory setting | 47 °C |
| Lowest value | 20 °C |
| Highest value | 57 °C |

*Tab. 100 Start temperature T3 economy mode*

**>> Stop temperature T8 economy mode**

| | |
|---|---|
| Factory setting | 57 °C |
| Lowest value | 20 °C |
| Highest value | 64 °C |

*Tab. 101 Stop temperature T8 ekonomy mode*

**>> Start temperature T3 comfort mode**

| | |
|---|---|
| Factory setting | 56 °C |
| Lowest value | 20 °C |
| Highest value | 57 °C |

*Tab. 102 Start temperature T3 comfor mode*

**>> Stop temperature T8 comfort mode**

| | |
|---|---|
| Factory setting | 64 °C |
| Lowest value | 20 °C |
| Highest value | 64 °C |

*Tab. 103 Stop temperature T8 comfort mode*

**> Hot water settings HP 2**

**>> Hot water production**

| | |
|---|---|
| Factory setting | No |
| Alternativ | No/Yes |

*Tab. 104 Hot water production HP 2*

- Select **Yes** if heat pump 2 should take part in the hot water production. Heat pump 1 must make hot water.

Heat pump 2 can work with another hot water heater. In this case, E42.T3 is used for start and stop. This sensor must then be connected.

At **Yes** a further external 3-way valve is required.

- Set values for heat pump 2 for **Economy** and **Comfort**. Factory settings are 10K lower then for heat pump 1.

**> Block heating during hot water demand**

| | |
|---|---|
| Factory setting | No |
| Alternativ | No/Yes |

*Tab. 105 Block heating*

- **Yes** should always be used.

**> Maximum temperature difference circuit 1**

| | |
|---|---|
| Factory setting | 10K |
| Lowest value | 0K |
| Highest value | 30K |

*Tab. 106 Temperature difference circuit 1*

- Indicate how many degrees lower than the set point value for the flow temperature - half the hysteresis may become before the heating priority kicks in. Heat pump 2 stops producing hot water and switches over to heating. The set point value for the flow temperature is reduced with the set temperature difference. This setting has no relevance when only heat pump 1 produces hot water.

**> Hot water circulation** (accessory)

A special circulation pump for hot water, E41.G6, can be installed. It is subject to time control, i.e., it can be activated during parts of the day. Due to the circulation, the hot water reaches the tapping place faster.

**>> Hot water circulation pump active**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 107 Hot water circulation pump active*

- Select **Yes** if a circulation pump is installed. Then time settings can be done. **Yes** sets the hot water mode to **Comfort** automatically and the menu **Hot water mode** is not shown.

**>> Time settings**

| Start time | Stop time |
|---|---|
| 00:00 | 24:00 |

*Tab. 108 Time settings*

- Set up to four separate intervals.
- To change time: turn the menu dial until the desired time appears. Push the menu dial to continue to the next setting field.
- Go back to the previous field by using ⟲.
- Press the menu dial in the last setting field to save settings
  Hot water circulation takes place every day during the set periods.

**> Protective anode installed**

| Factory setting | 1) |
|---|---|
| Alternative | Yes/No |

*Tab. 109 Anode installed*

1) value set during **Start-up**

Change the value if there has been a change since start-up.

- Change to **No** if no anode exists.
  Normally, there is an anode in the hot water heater in order to protect it against corrosion. If the anode breaks, it must be fixed to prevent the hot water heater from being damaged. The control unit alerts when the anode is broken.

**> Acknowledge hot water sensor E41.T3**

**> Acknowledge hot water sensor E42.T3**

If the sensor is installed correctly, the acknowledgement is given automatically. E41.T3 is required if the heat pump should produce hot water. E42.T3 is used when step 2 of the heat pump should produce hot water in a second hot water heater.

- Indicate **No** if the installed sensor should not be used.

## 16.3 Holiday

During holidays (absence), the heating can, for example, be kept at a lower or higher level and hot water production can be switched off.

**Holiday**

**> Circuit 1 and hot water**

**>> Activate holiday function**

| Factory setting | No |
|---|---|
| Alternative | No/Yes |

*Tab. 110 Holiday function*

**>> Start date**

**>> Stop date**

- Set start and stop date for the desired period. Format yyyy-mm-dd.
  The period starts and ends at 00:00. Both the start and end date are included in the period.
- Terminate the period prematurely by indicating **No** in the menu **Activate holiday function**.

**>> Room temperature**

| Factory setting | 17 °C |
|---|---|
| Lowest value | 10 °C |
| Highest value | 35 °C |

*Tab. 111 Room temperature, holiday*

- Set the room temperature that should apply to the circuit during the period.

**>> Copy to all heating circuits**

| Factory setting | No |
|---|---|
| Alternative | Yes/No |

*Tab. 112 Copy circuits*

**>> Block hot water production**

| Factory setting | No |
|---|---|
| Alternative | Yes/No |

*Tab. 113 Block hot water*

**> Circuit 2, 3...**

**>> Activate holiday function**

**>> Start date**

**>> Stop date**

**>> Room temperature**

- Set the values in the same way as for **Circuit 1 and hot water**.

## 16.4 Timers

The control unit shows the timers that are in operation. There are a number of timers for, e.g., delays of different types, but also for extra hot water, hot water peak, etc. A number of these times are set under customer or installer, whereas others have a set factory value which cannot be changed. Level shows at what level the setting can be made. 0 = Customer, 1 = Installer, 3 = Factory.

| Timers | Setting | Factory value | Level |
|---|---|---|---|
| Extra hot water | Extra hot water duration | 0h | 0 |
| Hot water peak time for warm-keeping | Hot water\Hot water peak\Time for warm-keeping | 1,0h | 1 |
| Alarm mode delay | | 1,0h | 3 |
| Party | Party ( mode ) | 0h | 0 |
| Heat pump x timers | | | |
| > Compressor start delay | | 10min | 3 |
| > Compressor start delay groundwater | Heat pump\Groundwater\Compressor start delay | 0s | 1 |
| > G2 heat carrier pump stop delay | | 5min | 3 |
| > Block low pressure switch | | 150s | 3 |
| Additional heat timers | | | |
| > Additional heat start delay | Additional heat\Additional heat general\Start delay | 60min | 1 |
| > Delay mixing valve control after additional heat start | Additional heat\Mixed additional heat\Delay mixing valve control after additional heat start | 20min | 1 |
| > Additional heat start delay after high outdoor temperature | Additional heat\Additional heat general\Additional heat start delay after high outdoor temperature | 30min | 1 |
| Delay before change over to summer operation | Room temperature\General\Summer/winter operation\Delay before change over to summer operation | 4h | 1 |
| Delay before change over to winter operation | Room temperature\General\Summer/winter operation\Delay before change over to winter operation | 4h | 1 |
| Shut down protection during change over from hot water to heating | Room temperature\General | 180s | 1 |
| Heating start delay *) | | 3min | - |
| Heating stop delay *) | | 3min | - |

*Tab. 114Timers*

*) Between compressors/heat pumps

## 16.5 External control

When an external input is connected, the control unit performs functions which are set to **Yes** or is separated from 0 (**Room temperature**). When the external input is no longer connected, the control unit returns to normal mode. Only installed functions are displayed.

This is where the functions for the external inputs 1 and 2 per heat pump and the external inputs for circuits 2, 3, etc. are located.

**> Heat pump x**

**>> External input 1, 2**

**>>> Invert input**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 115 Invert input*

- Select **Yes** if the input signal is to be reversed (i.e. activated with open contact).

**>>> Block compressor x**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 116 Blocking*

**>>> Block additional heat**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 117 Blocking*

**>>> Block heating at tripped underfloor temperature limiter**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 118 Blocking*

This function requires the installation of a safety thermostat to the floor heating circuit and its connection to the external input.

**>>> Block heating**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 119 Blocking*

**>>> Room temperature**

| | |
|---|---|
| Factory setting | No (0.0 °C) |
| Lowest value | 10.0 °C |
| Highest value | 35.0 °C |

*Tab. 120 Room temperature*

- Set the room temperature that should apply in the event of enabled external control.
- Value > 0 °C enables the function.

**>> Block hot water production**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 121 Blocking*

**>> Start collector circuit pump**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 122 Start collector circuit pump*

**>> Alarm at low pressure in collector circuit**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 123 Alarm at low pressure in collector circuit*

This function requires the installation of a pressure switch in the collector circuit and its connection to the external input. In the event of incorrect pressure in the circuit, the external input closes, triggering a category A alarm (→ Chapter 17.7).

**>> Alarm groundwater circuit**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 124 Alarm groundwater circuit*

This function requires the installation of a pressure or a flow switch in the groundwater circuit and its connection to the external input. In the event of incorrect pressure/flow in the circuit, the external input closes, triggering a category A alarm (→ Chapter 17.7).

**> External input circuit 2, 3...**

**>> Invert input**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 125 Invert input*

- Select **Yes** if the input signal is to be reversed (i.e. activated with open contact).

**>> Block heating at tripped underfloor temperature limiter**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 126 Blocking*

**>> Block heating**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 127 Blocking*

**>> Room temperature**

| | |
|---|---|
| Factory setting | No (0.0 °C) |
| Lowest value | 10.0 °C |
| Highest value | 35.0 °C |

*Tab. 128 Room temperature*

- Set the room temperature that should apply in the event of enabled external control.
- Value > 0 °C enables the function.

The highest temperature is used if temperature changes have been set for a certain circuit at several external inputs.

## 16.6 Installer

This section includes:

- **General**
- **Heat pump capacity**
- **Connected I/O boards**
- **Operating times and consumptions**
- **Temperatures**
- **Inputs**
- **Outputs**
- **Circulation pumps**
- **Screed drying**

### 16.6.1 General

**> Anti-seizure mode**

**>> Day of the week**

| | |
|---|---|
| Factory setting | Wednesday |
| Alternative | Monday-Sunday |

*Tab. 129 Anti-seizure day*

**>> Start time**

| | |
|---|---|
| Factory setting | 12:00 |
| Alternative | 0:00 - 23:00 |

*Tab. 130 Anti-seizure start time*

- Set date and time for anti-seizure operation of vital parts of the installation.
  Anti-seizure mode ensures that vital components do not become clogged during periods when they are not used.

**>> Minimum outdoor temperature**

| | |
|---|---|
| Factory setting | 2.0 °C |
| Lowest value | -20.0 °C |
| Highest value | 20.0 °C |

*Tab. 131 Minimum outdoor temperature*

- Set the outdoor temperature under which anti-seizure run may not be run.

Anti-seizure mode operates differently in summer and in winter. This enables the duration of the anti-seizure operation to be reduced. Furthermore, during anti-seizure operation the entire system does not need to be switched off in winter.

**Anti-seizure mode in summer mode**

Anti-seizure mode starts only if there is no other type of demand. When there is a demand, the anti-seizure operation waits for one hour at the most for the demand to be satisfied. Otherwise, the anti-seizure operation has to wait until the next occasion.
Heat pump 1 runs first followed by heat pump 2, etc. 3-way valves and circulation pumps are run for 1 minute and mixing valves for the respective mixing valve's run time + 10s. A pause of 30s is made between components.
During anti-seizure mode, certain parts of the heating system become hot for a short period of time, which is completely normal.

The anti-seizure mode is not cancelled if hot water demand arises during the anti-seizure operation. The hot water temperature can thereby fall. A suitable time for anti-seizure operation is when the hot water consumption is low, e.g., at night.

**Anti-seizure mode in winter mode**

In winter mode, anti-seizure operation is executed on valves, mixers and pumps that normally do not operate in winter mode (refers to accessories such as cooling, pool and solar). Anti-seizure mode can occur during operation.

**>> Highest permitted flow temperature T1**

| | |
|---|---|
| Factory setting | 80,0 °C |
| Lowest value | 10,0 °C |
| Highest value | 100,0 °C |

*Tab. 132 Radiator*

| | |
|---|---|
| Factory setting | 45,0 °C |
| Lowest value | 10,0 °C |
| Highest value | 45,0 °C |

*Tab. 133 Underfloor*

**> Operating mode**

| | |
|---|---|
| Factory setting | |
| Alternative | L/W mixed additional heat |

*Tab. 134 Operating mode*

- For a description of operating modes (→ Chapter 6.4).

**> Groundwater**

**>> Groundwater**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 135 G33*

- Indicate if groundwater pump G33 exists or not. G33 is normally run simultaneously with collector circuit pump G3.

In the event of **Yes**:

**>> Compressor start delay**

| | |
|---|---|
| Factory setting | 15s |
| Lowest value | 0s |
| Highest value | 600s |

*Tab. 136 Start delay compressor*

- Indicate the delay that is required until the groundwater circuit circulates. The compressor should not start before this has taken place.

There will be no delay under certain circumstances.

**> Display light switch off delay**

| | |
|---|---|
| Factory setting | 5min |
| Lowest value | 1min |
| Highest value | 240min |

*Tab. 137 Display light switch off delay*

- Set the delay before the display backlighting is automatically switched off after the last display activity (navigating, setting, alarm display etc.).

**> Time for reset of access level**

| | |
|---|---|
| Factory setting | 20min |
| Lowest value | 1min |
| Highest value | 240min |

*Tab. 138 Reset of access level*

- Set how much time it should take for the control unit to return automatically from installer level to customer level.

### 16.6.2 Heat pump capacity

| | |
|---|---|
| Factory setting | Select |
| Alternative | 22/33 kW |

*Tab. 139 Heat pump capacity 22-33 kW*

- The total capacity is selected under **Start-up**. If an incorrect value was selected, make changes in line with the heat pump type plate.

### 16.6.3 Connected I/O boards

All boards and current version are displayed, if relevant.

### 16.6.4 Operating times and consumptions

The total operating time for the control unit, heat pump x and additional heat (active connection). It can also make short term measurements for compressor and additional heat.

### 16.6.5 Temperatures

All connected/acknowledged sensors present values. The set point value is also given for some. The opportunity to correct the sensors is also given.

Attenuation function for room sensor is avaliable at each circuit. Factory setting is 0,25 h. The function means that the set point value is continuously adjusted against the changed room temperature value. Temporary fluctuations in the room temperature will then have limited effect.

Open circuits/short circuits/faults in sensors are indicated with a dash in the (info) display and under **Temperatures**. Alarms are triggered and stored in alarm log and alarm history.

| | |
|---|---|
| T2 Outdoor, display | T2 correction |
| Temperatures heat pump x | T1 Start/stop limits compressor |
| | T6,T8,T9,T10,T11 display, correction |
| | T3 hot water start |
| | T8 hot water stop |
| Circuit x | T1 set point |
| | T1 display, correction |
| | T5, display, correction, damping |
| | Room temperature set point value |
| | Menu dial influence, display (CANbus) |
| Hot water | T3 display, correction |
| | Extra hot water stop temperature |
| | Hot water peak stop temperature |

*Tab. 140 Temperature display*

**Deviation of T6 hot gas temperature**

Details regarding the hot gas temperature at T6 are also displayed if the actual value has deviated during the last 24 hours from the calculated ideal value. This enables the status of the refrigerant circuit to be assessed without special tools.

Deviations in excess of -10 °C can have the following causes:

- Filter E2x.V101 obstructed [1)]
- Compressor run time too short [1)]
- Incorrect temperature indication from an internal sensor [1)]
- Expansion valve works incorrectly (too much open) [2)]

Deviations in excess of +10 °C can have the following causes:

- Incorrect temperature indication from an internal sensor [1)]
- Expansion valve works incorrectly (too much open) [2)]
- Too little or too much refrigerant [2)]
- Contaminants, magnetite and/or limescale deposits in the condenser [2)]

[1)] Inspection and remedy possible by the installer.

[2)] Visit by an authorised refrigeration engineer with suitable tools for the inspection and remedy is required.

### 16.6.6 Inputs

The status of all inputs is displayed here. Pressure switches and motor cut-outs are shown for each heat pump. In addition, any alarms for shunted additional heat, status for external inputs and protective anode are shown.
Only connected inputs are displayed.

### 16.6.7 Outputs

All components can be manually operated individually here to check function.

**> Manual operation time**

| | |
|---|---|
| Factory setting | 0min |
| Lowest value | 0min |
| Highest value | 240min |

*Tab. 141 Manual operation time*

- Set the number of minutes for manual operation. Different vital components can be put into operation/ turned off separately.
  With 0min, status, e.g., **On** or **Off**, is displayed for each component.

When checking status, it may take a couple of seconds before the correct value for, e.g., **Mixing valve signal** is displayed.

Use the manual operation function on commissioning in order to check if the installed components work.

Manual operation is possible for the following components (only the ones that are installed are displayed):

- **G1 Heating circuit pump**
- **Heat pump x**
  - **Q21 Three-way valve** (**Heating**/**Hot water**)
  - **G2 Heat carrier pump**
  - **G3 Collector circuit pump**
  - **Compressor**
- **Hot water electric heater**
- **Hot water circulation pump**
- **Circuit 2, 3...**
  - **Circulation pump**
  - **Mixing valve signal**
  - **Mixing valve open**
  - **Mixing valve close**
- **Mixed additional heat**
  - **Mixed additional heat**
  - **Mixing valve signal**
  - **Mixing valve open**
  - **Mixing valve close**
- **Alarm buzzer** (all **Off**/**On**)
- **General alarm**

### 16.6.8 Circulation pumps

**> Operation alternative heating circuit pump G1**

| | |
|---|---|
| Factory setting | Continuous |
| Alternative | Continuous/Automatic |

*Tab. 142 G1*

- Select if circulation pump G1 should run continuously or in optimised operation. The setting applies to G1 of all circuits.
  **Continuous** means that G1 is always in operation during the heating season.
  **Automatic** means that the circulation pump runs in approx. 10 min, stands idle for 10 min, and so on, if it is in winter operation and there has not been any heating demand for 40 min. Automatic operation is cancelled when heating demand arises or winter operation is disabled.
  G1 stands idle (apart from anti-seizure operation) if it is summer operation.
- Select **Continuous** when an air handling unit is installed.

**> Operation alternative heat carrier pump G2**

| | |
|---|---|
| Factory setting | Automatic |
| Alternative | Continuous/Automatic |

*Tab. 143 G2*

- Select if heat carrier pump G2 should run continuously or start automatically when the compressor starts.
  In systems without bypass or without a buffer tank, G2 must be in continuous operation.
  The setting applies to G2 of all heat pumps. In automatic operation, G2 starts for heat pump 2 when compressor 2 starts.

**> Operation alternative collector circuit pump G3**

| | |
|---|---|
| Factory setting | Automatic |
| Alternative | Continuous/Automatic |

*Tab. 144 G3*

- Select if collector circuit pump G3 should run simultaneously with the compressor or continuously. Continuous operation is suitable if external cooling control exists.
  The setting applies to G3 of all heat pumps. In automatic operation, G3 starts for heat pump 2 when compressor 2 starts.
  G3 stops in the event of low pressure in the collector circuit. This function requires the installation of a pressure switch to the collector circuit and its connection to the external input (→ Chapter 16.5).

### 16.6.9 Screed drying

The heat pump alone can not produce enough heating for screed drying. We recommend using building drying equipment.

Screed drying requires the installation of underfloor heating coils under the floor tiles.

Screed drying requires an electrical installation without EVU.

EVU means a special electrical connection used primarily in countries like Germany and Austria.

The screed drying function is used to expel humidity from the floor tiles in newly-built houses. The drying program has the highest priority, i.e., all other functions than security functions and additional heat only are disabled. All circuits contribute to the drying.
Screed drying takes place in three phases:

- Heating phase
- Phase with maximum temperature
- Cooling phase

Heating and cooling are performed stepwise; each step continues for at least a day. The phase with maximum temperature is considered to be one step. There are 9 steps with the factory values: Heating phase in 4 steps (25 °C, 30 °C, 35 °C, 40 °C), maximum temperature (45 °C for four days), cooling phase in 4 steps (40 °C, 35 °C, 30 °C, 25 °C).
It is possible to cancel a running program. On completion of the program, the heat pump returns to normal operation.

**> Activate**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 145 Activate screed drying*

- Select **Yes** if drying should be performed.

**Current program step** and **Remaining time for current step** are displayed. It is possible to change the program step.

**> Heat source**

| | |
|---|---|
| Factory setting | Additional heat |
| Alternative | Both/Compressor/Additional heat |

*Tab. 146 Heat source drying*

- Select the heat source(s) which should contribute during screed drying.
- When the compressor is part of the selected alternative: Set **Lowest permitted temperature E2x.T11** under **Heat pump**\ **Safety functions** to 0 °C apart from the period from April to August when -3 °C can be used. This prevents the collector circuits from becoming too cold.

**> Program settings**

**>> Flow temperature increase per heating step**

| | |
|---|---|
| Factory setting | 5.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 147 Temperature increase per heating step*

**>> Number of days per heating step**

| | |
|---|---|
| Factory setting | 1 |
| Lowest value | 1 |
| Highest value | 5 |

*Tab. 148 Days per heating step*

**>> Maximum flow temperature**

| | |
|---|---|
| Factory setting | 45 °C |
| Lowest value | 25 °C |
| Highest value | 60 °C |

*Tab. 149 Maximum flow temperature drying*

**>> Number of days with maximum temperature**

| | |
|---|---|
| Factory setting | 4 |
| Lowest value | 0 |
| Highest value | 20 |

*Tab. 150 Days with maximum temperature*

**>> Flow temperature decrease per cooling step**

| | |
|---|---|
| Factory setting | 5.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 151 Temperature decrease per cooling step*

**>> Number of days per cooling step**

| | |
|---|---|
| Factory setting | 1 |
| Lowest value | 1 |
| Highest value | 5 |

*Tab. 152 Days per cooling step*

**CAUTION:** Risk of floor damage

- Follow the manufacturer's recommendations for the floor tiles.

Complete screed drying before connection of the EVU signal.

- Activate the energy supply cut-off in the control unit under menu **External control** (→Chapter 16.5) after drying and connection of the EVU signal.

EVU means a special electrical connection used primarily in countries like Germany and Austria.

## 16.7 Additional heat

The additional heat works together with the heat pump to maintain the right heating in the circuits. The additional heat can be selected to work alone.

Under **Additional heat**, there are:

- **Additional heat general**
- **Mixed additional heat**
- **Hot water electric heater** (must be present if hot water production is added)

**Additional heat general**

**> Start delay**

| | |
|---|---|
| Factory setting | 60 min |
| Lowest value | 0 min |
| Highest value | 240 min |

*Tab. 153 Start delay*

- Set what start delay should apply to the additional heat.
  When the need for additional heat arises, a timer with set time is started. When this time has passed the additional heat starts.

**> Allow additional heat timer during energy supply cut-off**

| | |
|---|---|
| Factory setting | Economy |
| Alternative | Economy/Comfort |

*Tab. 154 Allow additional heat timer during energy supply cut-off*

- Set the desired value.
  In **Economy**, the additional heat timer is not allowed to count down before the energy supply stop is discontinued. In **Comfort**, the additional heat timer is allowed to start. This applies to type 1 energy supply cut-off and allows a quicker start of the additional heat after an energy supply cut-off, if there is a demand.

**> Additional heat only**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 155 Additional heat only*

- Change to **Yes** if the additional heat should work alone.
  This can be suitable if the heat pump should provide heat before, e.g., the collector circuit is ready.

**> Block additional heat**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 156Block additional heat*

- Indicate if the additional heat should be blocked. In this case, the additional heat may not take part. The additional heat is, however, allowed to kick in in alarm mode and additional heat only mode if no other blocking function is enabled, e.g., type 1 energy supply cut-off.
- Select **Yes** at operating modes without additional heat (→ Chapter 6.4).

**> Maximum outdoor temperature for additional heat**

| | |
|---|---|
| Factory setting | 10 °C |
| Lowest value | -30 °C |
| Highest value | 40 °C |

*Tab. 157 Maximum outdoor temperature for additional heat*

- Set the desired temperature limit. If the outdoor temperature exceeds this value, the additional heat may not work.

**> Additional heat set point value E11.T1 offset**

| | |
|---|---|
| Factory setting | 1.0K |
| Lowest value | 0.0K |
| Highest value | 10.0K |

*Tab. 158 Additional heat set point value offset*

- Set the desired change.
  The additional heat's set point value for T1 becomes T1's normal set point value - the set value. As a result of the reduction, the compressor is not turned off unnecessarily when the additional heat is in operation.

**Mixed additional heat**

Mixed additional heat can be e.g. a oil heater or a gas burner. Heat pump and additional heat are allowed to work in parallell.

**> Delay mixing valve control after additional heat start**

| | |
|---|---|
| Factory setting | 20min |
| Lowest value | 0min |
| Highest value | 120min |

*Tab. 159 Mixing valve control delay*

- Set for how long the mixing valve should be inactive after the additional heat has started.
  This allows, e.g., the oil boiler time to get warm.
- Select 0 min at operating modes with electrical heater (→ Chapter 6.4).

**> Regulator settings**

**>> P constant**

| | |
|---|---|
| Factory setting | 4.0 |
| Lowest value | 0.1 |
| Highest value | 30.0 |

*Tab. 160 P constant*

If **Yes** on **Air handling unit in circuit** for **Circuit 1** and output type **Op/Cl**:

- Change to 2.0.

**>> I constant**

| | |
|---|---|
| Factory setting | 300.0 |
| Lowest value | 5.0 |
| Highest value | 600.0 |

*Tab. 161 I constant*

**>> D constant**

| | |
|---|---|
| Factory setting | 0.0 |
| Lowest value | 0.0 |
| Highest value | 10.0 |

*Tab. 162 D constant*

**>> Minimum PID signal**

| | |
|---|---|
| Factory setting | 0% |
| Lowest value | 0% |
| Highest value | 100% |

*Tab. 163 Minimum PID signal*

**>> Maximum PID signal**

| | |
|---|---|
| Factory setting | 100% |
| Lowest value | 0% |
| Highest value | 100% |

*Tab. 164 Maximum PID signal*

**>> Mixing valve running time**

| | |
|---|---|
| Factory setting | 300s / 05:00 |

*Tab. 165 Mixing valve running time*

- Set the run time that is indicated on the mixing valve and indicate value in number of minutes.

If there is no time indication on the mixing valve, run it manually (→ Chapter 16.6.7) and measure how long it takes to go from fully closed to a fully open mixing valve (the mixing valve stops sounding and the endposition switch switches off).

If **Yes** on **Air handling unit in circuit** for **Circuit 1** and output type **Op/Cl**:

- Set the double value compared to what is specified on the mixing valve.

**>> Connected to output type**

| | |
|---|---|
| Factory setting | Op/Cl |
| Alternative | Op/Cl / 0 - 10V |

*Tab. 166 Output type*

- Select how the mixing valve is controlled. **Op/Cl** means control via an Open/Close signal.
  A mixing valve of the **Op/Cl** type is calibrated once every 24 hours. The mixing valve closes fully during one run time.
  Exception is when **Yes** has been selected on **Air handling unit in circuit** for **Circuit 1** in order to ensure the flow over the circuit.
- Select 0-10V at operating modes with 0-10V output-controlled additional heat.

### Hot water electric heater

**Hot water electric heater** is required to be able to use the functions for **Extra hot water** and **Hot water peak**.

**> Acknowledge hot water additional heat**

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 167 Additional electric heat, hot water*

- Indicate **Yes** in all system solutions → Chapter 8.2). In system solution 8.2.3, there is no physical electric additional heat in the hot water tanks but the mixed additional heat provides hot water, extra hot water and hot water peak. In the event of **No**, the **Extra hot water** and **Hot water peak** menus are not displayed and this is why **Yes** should be selected.

The settings below are displayed only if the additional electric heat for hot water has been acknowledged in **Start-up** or here.

**> Temperature change**

| | |
|---|---|
| Factory setting | 5K |
| Lowest value | -10K |
| Highest value | 10K |

*Tab. 168 Temperature change*

- Set how much higher the T3 start temperature should be when hot water is produced with the hot water electric heater.
  When the compressor produces hot water, the temperature in the heater becomes higher. This is compensated with this setting.

**> Hysteresis**

| | |
|---|---|
| Factory setting | 2.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 169 Hysteresis, hot water*

- Set hysteresis for the hot water production.

### Additional heat program

This function can be used to set the times between which additional heat mode is blocked.

**> Activate program**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 170 Activate additional heat program*

**> View/edit active program**

The menu is only shown if a program is chosen.

The program for additional heat is set in the same way as **Room temperature program**(→ Chapter 16.1.2).

**> Outdoor temperature limit for deactivation of time control**

The menu is only shown if a program is chosen.

| | |
|---|---|
| Factory setting | -26 °C (Off) |
| Lowest value | -26 °C |
| Highest value | 20 °C |

*Tab. 171 Outdoor temperature limit time control*

- Set a suitable temperature for deactivation of time control. -26 °C = function **Off**.

If T2 is over set **Outdoor temperature limit for deactivation of time control** for 15 minutes, or if **Outdoor temperature limit for deactivation of time control** is set to **Off**, the additional heat will be blocked by time control as long as **Additional heat program** is activated.

If T2 is under set **Outdoor temperature limit for deactivation of time control** or if **Additional heat program** is deactivated the additional heat will not be blocked by time control.

## 16.8 Safety functions

This section includes:

- **Setting collector circuit in T10**
- **Setting collector circuit out T11**

The settings for collector circuit in/out are:

**> Lowest permitted temperature E2x.T10**

**> Lowest permitted temperature E2x.T11**

| | |
|---|---|
| Factory setting | -10.0 °C<br>4.0 °C Groundwater (T10)<br>2.0 °C Groundwater (T11) |
| Lowest value | -10.0 °C |
| Highest value | 20.0 °C |

*Tab. 172 Lowest temperature, collector circuit*

**> Hysteresis alarm reset**

| | |
|---|---|
| Factory setting | 1.0K |
| Lowest value | 1.0K |
| Highest value | 10.0K |

*Tab. 173 Hysteresis*

**> Number of warnings before alarm**

| | |
|---|---|
| Factory setting | 1 |
| Lowest value | 1 |
| Highest value | 4 |

*Tab. 174 Number of warnings before alarm*

The number of warnings is calculated during a time period of 180 min.

## 16.9 General

Among other things, settings for date and time are available here.

**> Set date**

| | |
|---|---|
| Factory setting | |
| Format | yyyy-mm-dd |

*Tab. 175 Date*

**> Set time**

| | |
|---|---|
| Factory setting | |
| Format | hh:mm:ss |

*Tab. 176 Time*

▶ Check and change, if necessary, date and time. These are used by the control unit to manage the different clock settings, e.g., holiday and room temperature program.

**> Summer/winter time**

| | |
|---|---|
| Factory setting | Automatic |
| Alternative | Manual/Automatic |

*Tab. 177 Summer/winter time.*

▶ Select if there should be automatic change over between summer and winter time or not (dates according to EU standard).

**> Display backlight intensity**

| | |
|---|---|
| Factory setting | 100% |
| Lowest value | 20% |
| Highest value | 100% |

*Tab. 178 Display backlight intensity*

▶ If necessary, change the background light of the control panel.

**> Language**

▶ Select language for the menus of the control unit. This option allows you to switch to another language than the one indicated on start-up.

Language change can also be brought about by holding down the (mode)-button in the standard display for at least 5 s.

**> Country**

▶ Select country.
Here, a different country can be selected than was chosen as part of the pre-configuration (start-up).

## 16.10 Alarms

The different alarms that can occur are described in (→Chapter 17).

Under **Alarms** there is:

- **Alarm log**
- **Delete alarm log**
- **Alarm history**
- **Alarm indication**

The alarm log shows the alarms and warnings that have occurred. Alarm category (→ Chapter 17.7) is displayed in the top left corner of the display and if the alarm is active, the alarm symbol is displayed both in the alarm log and the initial menu of the control panel.

The alarm history saves complete information about the latest 20 alarms/warnings. The most recent record is listed first.

Press (INFO) and turn the dial to see all information about the alarm. Turn the dial to see more alarms.

The information shows the current values immediately after the appearance of the alarm but before action/ cancellation.

### 16.10.1 Alarm indication

Settings for alarm buzzer and status lamp are made here.

**> Alarm buzzer signal**

**>> Interval**

| | |
|---|---|
| Factory setting | 2s |
| Lowest value | 2s |
| Highest value | 3600s (60min) |

*Tab. 179 Interval*

▶ Set the length of the alarm interval.
The alarm buzzer sounds for one second and is silent during the rest of the interval. The setting applies to all alarm buzzers.

**>> Blocking time**

| | |
|---|---|
| Factory setting | Off |
| Start time | 0:00 - 23:45 |
| Stop time | 0:00 - 23:45 |

*Tab. 180 Blocking time*

▶ Indicate the times between which the alarm buzzer may not give out a sound.
All alarm buzzers are silent during a set interval.

**> Alarm indication control unit**

**>> Block alarm buzzer**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 181 Block alarm buzzer*

The setting applies only to the control unit's alarm buzzer.

**> Alarm indication room sensor**

**>> Block alarm buzzer**

| | |
|---|---|
| Factory setting | Yes |
| Alternative | No/Yes |

*Tab. 182 Block alarm buzzer*

▶ Set if the alarm buzzer should be off or not.

The setting applies to **Circuit 1** and to a CANbus-connected room sensor.

**>> Block alarm indicator lamp**

| | |
|---|---|
| Factory setting | Yes |
| Alternative | No/Yes |

*Tab. 183 Block indicator lamp*

▶ Set if the indicator lamp should be off or not.

The setting is common for all room sensors.

**> General alarm level**

**>> Alarms and warnings**

| | |
|---|---|
| Factory setting | No |
| Alternative | No/Yes |

*Tab. 184 Alarms and warnings*

**No** means that alarms produce a signal on the general alarm output. **Yes** means that alarms as well as warnings produce a signal on the general alarm output.

## 16.11 Access level

Access level is **Customer** as standard: This level gives you access to all functions that the user requires. The installer also has access to the additional functions required at installation.

## 16.12 Return to factory settings

- Select **Return to factory settings** and **Yes** to reset all settings to the factory settings. Settings made by the customer are not affected.

| | |
|---|---|
| Factory setting | No |
| Alternative | Yes/No |

*Tab. 185 Return to factory settings*

# 17 Alarms

## 17.1 Alarms

This section includes:

- **Alarm log** (→ Chapter 16.10).
- **Delete alarm log**
- **Alarm history** (→Chapter 16.10).

## 17.2 Control unit and room sensor alarm lamp

The status lamp on the control unit is used to show ON/OFF status for the heat pump but also to show possible alarms. The status lamp is therefore also called alarm lamp.

In the event of an alarm the alarm lamp flashes red (control unit) until the warning cause has disappeared. The alarm lamp is not used for warning alarms.
The room sensor alarm lamp can be blocked.

| Behaviour | Function |
|---|---|
| *The lamp lights green continuously.* | The heat pump is running. |
| *The lamp flashes red* | There is an alarm which has not been acknowledged |
| *The lamp lights red continuously.* | The alarm has been acknowledged but the alarm cause remains |
| *Lamp flashes green slowly* | The heat pump is in stand-by mode[1)] |

*Tab. 186 Alarm lamp control unit*

1) Stand-by means that the heat pump is running but no heating or hot water demand exists.

The alarm lamp of the CANbus sensor shows the same information as the alarm lamp of the control unit.

Other room sensors flash with low-frequency red light in the event of alarms; the lamp is otherwise off.

## 17.3 Alarm display

When an alarm/warning occurs, the display shows information about what has happened. At the same time, information is saved in the alarm log and alarm history.

## 17.4 Alarm buzzer at alarm

When there is an alarm, the alarm buzzer on the heat pump and the CANbus-connected room sensor sounds for a second per set alarm interval. The alarm buzzer can be blocked for a certain part of the day or completely. In the event of a warning alarm, the alarm buzzer does not sound.

## 17.5 Acknowledgement of alarms

Acknowledgement means that you have to press (MENU) to make the alarm window disappear. What happens after acknowledgement is described in the respective alarm description.

In most cases, warnings do not have to be acknowledged. The alarm window disappears by itself once the warning cause has disappeared. It is, however, possible to acknowledge the warning.

## 17.6 Alarm timer, alarm mode

In the event of an alarm that stops the compressor the control unit starts a timer at 1h. If the fault does not recur additional heat may start when the timer has counted down.

## 17.7 Alarm categories

The alarms are divided into different categories depending on the type and seriousness of the fault.

Alarm category is displayed in the alarm window, alarm log and alarm history.

**Category A-H comprises alarms, category I-M warnings and category Z information.**

| Meaning | A | B | C | D | E | F | G | H | I | J | K | L | M | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stops the compressor | X | X | X | X | X | | | | X | X | | | | |
| Stops additional heat/mixing valve | | | | | | X | X | | | | X | | | |
| Alarm buzzer and lamp is activated | X | X | X | X | X | X | X | X | | | | | | |
| Alarm delay | 5s | 3s | 15 min | 1 min | 5s | 1s | 1s | 1s | 5s | 5s | 2s | 5s | 0s | 0s |
| Requires acknowledgement to restart | X | X | X | X | | X | | | | | | | | |
| Can be restarted before acknowledgement | | | | | X | | X | X | X | X | X | | X | |
| Menu display must be acknowledged | X | X | X | X | X | X | X | X | | | | X | X | |

*Tab. 187 Alarm categories*

**I** Temporary stop of compressor.

**J** Temporary stop of compressor. The warning may recur a number of times during a certain time period; if there are more during the period, the category changes to A.

**M** Used for board connection problems.

## 17.8 Alarm window

When an alarm/warning occurs, the display shows information about what has happened. At the same time, information is saved in the alarm log and alarm history.

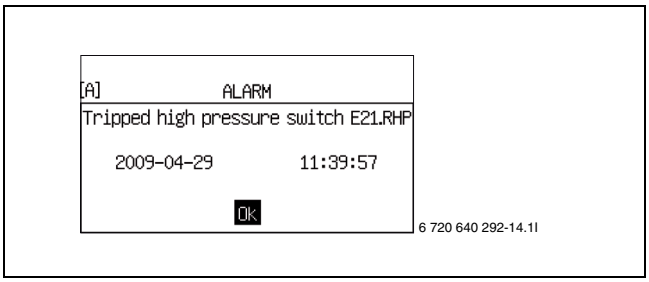



*Fig. 53*

## 17.9 Alarm functions

The alarm text is indicated in the heading.

### 17.9.1 High hot gas temperature E2x.T6

**Function:** Compressor stops. Activated when the temperature on sensor T6 exceeds the applicable maximum hot gas temperature.

**Alarm timer starts:** Yes.

**Reset condition:** The hot gas temperature drops 5K below the alarm limit.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.2 Tripped low pressure switch E2x.RLP

**Function:** The compressor is stopped because of too low pressure in the refrigerant circuit. Activated on open contact on the low pressure switch. The alarm is delayed with 150s after compressor start or alternation between hot water and heating production.

**Alarm timer starts:** Yes.

**Reset condition:** Closed signal over the pressure switch.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.3 Tripped high pressure switch E2x.RHP

**Function:** The compressor is stopped because of too high pressure in the refrigerant circuit. Activated on open contact on the high pressure switch.

**Alarm timer starts:** Yes.

**Reset condition:** Closed signal over the pressure switch.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.4 Low pressure collector circuit

**Function:** If **Alarm at low pressure in collector circuit** is selected and the external input closes, this alarm is triggered. The compressor stops (→ Chapter 16.5).

**Alarm timer starts:** Yes.

**Reset condition:** The pressure exceeds the set level. The setting is made on the pressure switch.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.5 Low temperature collector circuit in E2x.T10

**Function:** Warning/alarm is given if the temperature of the collector circuit in is too low. First, a warning is given. If the warning appears several times during a certain time period, the warning transforms into a category A alarm.
For settings of T10: (→Chapter 16.8).

**Alarm timer starts:** Yes.

**Reset condition:** T10 exceeds the lowest permitted temperature T10 plus hysteresis.

**Category:** J which goes over into A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required in category A.

### 17.9.6 Low temperature collector circuit out E2x.T11

**Function:** Warning/alarm is given if the temperature of the collector circuit out is too low. First, a warning is given. If the warning appears several times during a certain time period, the warning transforms into a category A alarm.
For settings of T11: (→Chapter 16.8).

**Alarm timer starts:** Yes.

**Reset condition:** T11 exceeds the lowest permitted temperature T11 plus hysteresis.

**Category:** J which goes over into A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required in category A.

### 17.9.7 Alarm from groundwater circuit

**Function:** Compressor stops. Activated when pressure/ flow (depending on the installed equipment) becomes too low/high in the groundwater circuit.

**Alarm timer starts:** Yes.

**Reset condition:** Pressure/flow goes back to the permitted level.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.8 Too high boot count I/O board BAS x

**Function:** Compressor stops. Is activated if the controller has executed more than three new starts after the alarm **Check CANbus cable connection**, (→ Chapter 17.9.47).

**Alarm timer starts:** Yes.

**Reset condition:** The CANbus communication with the controller has been restored.

**Category:** A.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.9 Motor cut-out 1 E2x.F11, Compressor

**Function:** Activated when the compressor's motor cut-out has tripped because of high current or lost current phase resulting in undue strain on the compressor.

**Alarm timer starts:** Yes.

**Reset condition:** Motor cut-out reset.

**Category:** B.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.10 Motor cut-out 2 E2x.F12, Collector circuit pump

**Function:** Activated when the collector circuit pump motor cut-out/circuit breaker has tripped. The collector circuit pump stops and the compressor also stops so as to prevent the evaporator from freezing.

**Alarm timer starts:** Yes.

**Reset condition:** Motor cut-out/circuit breaker reset.

**Category:** B.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.11 Phase error E2x.B1

**Function:** The compressor stops when the phase guard trips because of the lack of a phase or the presence of a phase sequence error. Also too low (<195V) or too high (>254V) voltage generates an alarm.

(→ Chapter 11.2.)

**Alarm timer starts:** Yes.

**Reset condition:** The error has been remedied.
At too low/high voltage: The voltage is greater than 201V or lower than 250V.

**Category:** E.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.12 Failure on sensor E2x.T6 hot gas

**Function:** The compressor stops because the hot gas cut-out cannot be guaranteed. Activated when the sensor's value indicates a temperature lower than -50 °C.

**Alarm timer starts:** Yes.

**Reset condition:** The value of the sensor indicates > -50 °C.

**Category:** E.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.13 Short circuit on sensor E2x.T6 hot gas

**Function:** The compressor stops because the hot gas cut-out cannot be guaranteed. Activated when the sensor's resistance value indicates a temperature higher than 150 °C.

**Alarm timer starts:** Yes.

**Reset condition:** The value of the sensor indicates < 150 °C.

**Category:** E.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.14 High flow temperature E1x.T1

**Function:** The compressor stops because the flow temperature is too high for the heating circuit. Activated when the sensor shows a value which is 5K higher than the highest set point value for the circuit. The factory setting for the highest set point value is 60 °C for radiator type of circuit and 35 °C for underfloor type of circuit
After hot water production, the alarm is delayed with 4 min.

**Alarm timer starts:** Yes.

**Reset condition:** The sensor's value falls below the temperature for beginning of the heating demand.

**Category:** E.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.15 Faulty external additional heat E71.E1.E1.F21

**Function:** External additional heat refers to additional heat which is controlled as mixed additional heat or via 0-10V signal. If the alarm signal from the additional heat has been connected to 10 - C on the PEL board, the alarm can be given when an error occurs. The type of error depends on the connected unit.

**Reset condition:** The error in the external additional heat has been overcome and no alarm signal.

**Category:** F.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.16 Overheat protection tripped hot water electric heater

**Function:** The electric heater is turned off. If alarm output from the electric heater has been connected to the control unit, the alarm is given when an error occurs.

**Reset condition:** The error in the electric heater has been overcome and no alarm signal.

**Category:** F.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.17 Failure on sensor E31.T32 anti-freeze cooling

**Function:** Activated when the sensor's value indicates a temperature lower than -10 °C. The sensor is used in the collector circuit for cooling in order to prevent the heat exchanger from freezing. The mixing valve in the collector circuit is closed.

**Reset condition:** The value of the sensor indicates >-10 °C.

**Category:** G.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.18 Short circuit on sensor E31.T32 anti-freeze cooling

**Function:** Activated when the sensor's value indicates a temperature higher than 30 °C. The sensor is used in the collector circuit for cooling in order to prevent the heat exchanger from freezing. The mixing valve in the collector circuit is closed.

**Reset condition:** The value of the sensor indicates < 30 °C.

**Category:** G.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.19 Error dew point sensor E1x.TM

**Function:** Activated when voltage 0-10V for temperature falls below 0.5V or exceeds 8V. Also activated when voltage 0-10V for humidity falls below 0.5V or exceeds 9.8V. Cooling on current mixing valve is aborted. The alarm may appear after a power failure but the alarm cause normally disappears automatically and the only thing that has to be done is to acknowledge the alarm.

**Reset condition:** The sensor's value for temperature is 1V-7V and the sensor's value for humidity is 1-9.7V.

**Category:** G.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.20 Faulty protective anode E41.F31

**Function:** The alarm is activated when the anode in the hot water heater is broken or does not work. Presupposes that **Yes** is indicated in **Protective anode installed**.

**Reset condition:** The anode should be taken care of so as to prevent corrosion in the hot water heater.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Acknowledgement is required.

### 17.9.21 Failure on sensor E11.T1 flow

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than 0 °C. The flow temperature T1 becomes identical to T8. If there are several heat pumps installed, T1 = T8 for the heat pump that does not produce hot water and has the highest value on T8. Additional heat mixing valve shut.

**Reset condition:** The value of the sensor indicates >0 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.22 Short circuit on sensor E11.T1 flow

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than 110 °C. The flow temperature T1 becomes identical to T8. If there are several heat pumps installed, T1 = T8 for the heat pump that does not produce hot water and has the highest value on T8. Additional heat mixing valve shut.

**Reset condition:** The value of the sensor indicates < 110 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.23 Failure on sensor E12.T1, E13.T1... flow

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than 0 °C. The mixing valve for the circuit is closed completely.

**Reset condition:** The value of the sensor indicates >0 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.24 Short circuit on sensor E12.T1, E13.T1... flow

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than 110 °C. The mixing valve for the circuit is closed completely.

**Reset condition:** The value of the sensor indicates < 110 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.25 Failure on sensor T2 outdoor

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than -50 °C. In the event of a failure on T2, the outdoor temperature is set to 0 °C.

**Reset condition:** The value of the sensor indicates > -50 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.26 Short circuit on sensor T2 outdoor

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than +70 °C. In the event of a short circuit on T2, the outdoor temperature is set to 0 °C.

**Reset condition:** The value of the sensor indicates < 70 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.27 Failure on sensor E4x.T3 hot water

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than 0 °C. The hot water production is terminated.

**Reset condition:** The value of the sensor indicates >0 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.28 Short circuit on sensor E4x.T3 hot water

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than +110 °C. The hot water production is terminated.

**Reset condition:** The value of the sensor indicates < 110 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.29 Failure on sensor E1x.TT.T5 room

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than -1 °C. In the event of a failure on sensor T5, the room temperature influence is set to 0.

**Reset condition:** The value of the sensor indicates > -1 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.30 Short circuit on sensor E1x.TT.T5 room

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than +70 °C. In the event of a short circuit on sensor T5, the room temperature influence is set to 0.

**Reset condition:** The value of the sensor indicates < 70 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.31 Failure on sensor E31.TT.T5 room

**Function:** The alarm is activated when the sensor's value indicates a temperature lower than -1 °C. In the event of a failure on sensor T5, the room temperature influence is set to 0.

**Reset condition:** The value of the sensor indicates > -1 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.32 Short circuit on sensor E31.TT.T5 room

**Function:** The alarm is activated when the sensor's value indicates a temperature higher than +70 °C. In the event of a short circuit on sensor T5, the room temperature influence is set to 0.

**Reset condition:** The value of the sensor indicates < 70 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.33 Failure on sensor E2x.T8 heat transfer fluid out

**Function:** Activated when the sensor's value indicates a temperature lower than 0 °C. To be able to make hot water, T8 is set at a temperature calculated according to the following formula: T8 = T9 + *Compressor* x 7K + 0.07K x *current output in operation*.

The active compressor provides *Compressor* = 1 and *current output in operation* means additional heat in %. Compressor operation and 50% additional heat then give T8 = T9 + 10.5K. Compressor off (*Compressor* = 0) and no additional heat (0%) give T8 = T9.

**Reset condition:** The value of the sensor indicates >0 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.34 Short circuit on sensor E2x.T8 heat transfer fluid out

**Function:** Activated when the sensor's value indicates a temperature higher than 110 °C. T8 is calculated according to the same formula as in the event of a failure → Chapter 17.9.33).

**Reset condition:** The value of the sensor indicates < 110 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.35 Failure on sensor E2x.T9 heat transfer fluid in

**Function:** Activated when the sensor's value indicates a temperature lower than 0 °C. T9 is calculated according to the following formula: T9 = T8 - *Compressor* x 7K + 0.07K x *current output in operation*.

**Reset condition:** The value of the sensor indicates >0 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.36 Short circuit on sensor E2x.T9 heat transfer fluid in

**Function:** Activated when the sensor's value indicates a temperature higher than 110 °C. T9 is calculated according to the following formula: T9 = T8 - *Compressor* x 7K + 0.07K x *current output in operation*.

**Reset condition:** The value of the sensor indicates < 110 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.37 Failure on sensor E2x.T10

**Function:** Activated when the sensor's resistance value indicates a temperature lower than -20 °C. In the event of a failure, T10 is set at a temperature calculated according to the following formula: T10 = T11 + *Compressor* x 3K.

**Reset condition:** The value of the sensor indicates > -20 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.38 Short circuit on sensor E2x.T10

**Function:** Activated when the sensor's value indicates a temperature higher than 40 °C. In the event of a short circuit, T10 is set at a temperature calculated according to the following formula: T10 = T11 + *Compressor* x 3K.

**Reset condition:** The value of the sensor indicates < 40 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.39 Failure on sensor E2x.T11

**Function:** Activated when the sensor's value indicates a temperature lower than -50 °C. In the event of a failure, T11 is set at a temperature calculated according to the following formula: T11 = T10 - *Compressor* x 3K.

**Reset condition:** The value of the sensor indicates > -50 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.40 Short circuit on sensor E2x.T11

**Function:** Activated when the sensor's value indicates a temperature higher than 40 °C. In the event of a short circuit, T11 is set at a temperature calculated according to the following formula: T11 = T10 - *Compressor* x 3K.

**Reset condition:** The value of the sensor indicates < 40 °C.

**Category:** H.

**Alarm lamp/buzzer:** Yes.

**Restart:** Automatic once the alarm cause has disappeared.

#### 17.9.41 High flow temperature E2x.T8

**Function:** Compressor stops. Activated when the temperature on sensor T8 exceeds the maximum permitted temperature for T8.

**Reset condition:** Restarts when E2x.T9 falls below the saved temperature with hysteresis on 3K (not adjustable).

**Category:** I.

**Alarm lamp/buzzer:** No.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.42 Additional heat is now working at its highest temperature

**Function:** The additional heat begins to be stepped down. The warning is activated in additional heat mode if the outgoing temperature (T1 or T8) approaches the installed maximum value.

**Reset condition:** The warning is deactivated when the sensor temperature falls sufficiently.

**Category:** K.

**Alarm lamp/buzzer:** No.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.43 High temperature difference heat transfer fluid E2x

**Function:** The warning is activated when the difference between sensor E2x.T8 and E2x.T9 exceeds 13K. 10 min after compressor start and change of production mode, the temperature difference is measured and if it is too big, the warning is given after a delay of 3 min. The warning is not given when the compressor is inactive or when additional heat is allowed.

**Reset condition:** The warning does not shut down any function but is registered in the alarm log.

**Category:** L.

**Alarm lamp/buzzer:** No.

**Restart:** Deactivated on acknowledgement of the warning display.

### 17.9.44 High temperature difference collector circuit E2x

**Function:** The warning is activated when the difference between sensor E2x.T10 and E2x.T11 exceeds 6K. 30 min after compressor start and change of production mode, the temperature difference is measured and if it is too big, the warning is given after a delay of 15 min. The warning is not given when the compressor is inactive.

**Reset condition:** The warning does not shut down any function but is registered in the alarm log.

**Category:** L.

**Alarm lamp/buzzer:** No.

**Restart:** Deactivated on acknowledgement of the warning display.

### 17.9.45 Screed drying set point value for heating not reached

**Function:** Activated when the set point value for a drying step has not been reached.

**Reset condition:** The warning is deactivated on acknowledgement of the warning display.

**Category:** L.

**Alarm lamp/buzzer:** No.

**Restart:** The warning does not shut down anything, the drying program continues with the following step.

### 17.9.46 The heat pump is now working in anti-freeze mode

**Function:** Activated when the flow temperature of a circuit falls below 8 °C and the 10-min timer has counted down.

**Reset condition:** The circuit's flow temperature exceeds 25 °C.

**Category:** L.

**Alarm lamp/buzzer:** No.

**Restart:** Automatic once the alarm cause has disappeared.

### 17.9.47 Check CANbus cable connection

**Function:** Communication with the controller has been interrupted. The controller executes a new start if the alarm is still active after two hours. If more than three new starts have been carried out within one hour, the alarm **Too high boot count I/O board BAS x** (category A), → Chapter 17.9.8.

**Reset condition:** The CANbus communication with the controller has been restored.

**Category:** M.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is required.

### 17.9.48 Check connection to I/O board x

**Function:** Depends on the board.

**Reset condition:** Communication with the board is re-established.

**Category:** M.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is required.

#### 17.9.49 Check connection to room sensor E1x.TT

**Function:** Activated when communication with the room sensor is terminated.

**Reset condition:** Communication with the board is re-established.

**Category:** M.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is required.

#### 17.9.50 Hot water peak failure, new try within 24 hours

**Function:** The hot water has not come up at the right temperature. The hot water peak is repeated at the same time on the next day.

**Reset condition:** The correct hot water peak temperature is reached.

**Category:** Z.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is required.

#### 17.9.51 Temporary heat pump stop due to working area limits

**Function:** The information is displayed only if *Hot gas stop function activated* has been set to Yes. The compressor stops until the hot gas temperature falls below the set limit.

**Reset condition:** The hot gas temperature is within the range of the compressor.

**Category:** Z.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is not required.

#### 17.9.52 Temporary hot water stop due to working area limits

**Function:** The information is displayed only if *Hot gas stop function activated* has been set to Yes. Ongoing hot water operation is aborted and replaced with heating operation.

**Reset condition:** The hot gas temperature is within the range of the compressor.

**Category:** Z.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is not required.

#### 17.9.53 Temporary hot water stop E2x

**Function:** Ongoing DHW mode is temporarily interrupted; the system changes over to heating mode.

**Reset condition:** DHW temperature drops a few degrees.

**Category:** Z.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is not required.

#### 17.9.54 Wrong program version I/O board ...

**Function:** The board's program version does not correspond with the expected version.

**Reset condition:** Board with correct software is installed.

**Category:** Z.

**Alarm lamp/buzzer:** No.

**Restart:** Acknowledgement is not required.

## 17.10 Alarm log

The alarm log shows the alarms, warnings and other information that has come up. Alarm category (→ Chapter 17.7) is displayed in the top left corner of the display and if the alarm is active, the alarm symbol is displayed both in the alarm log and the initial menu of the control panel.

## 17.11 Alarm history

The alarm history saves complete information about the latest 20 alarms/warnings. Older alarms are displayed with limited information. What happened latest is listed as number 1.

Press INFO and turn the dial to see all information about the alarm. Turn the dial to see more alarms.

The information shows the current values immediately after the appearance of the alarm but before action/ cancellation.

| Information | Comment/Value |
|---|---|
| Alarm category | Letter (→Table 187). Displayed in the top left corner of the display. |
| Alarm text | Displayed at the top of the display. Full component name is most often indicated. |
| Start date, Start time | Indicates when the alarm occurred |
| Stop date, Stop time | Indicates when the alarm was acknowledged/cancelled |
| ========== | |
| Heat pump x | On / Off |
| Additional heat | %/Off/Blocked |
| ========== | |
| T1 Flow | Current value |
| T1 Flow set point value | Current set point value |
| T2 Out | Current outdoor temperature |
| E41.T3 | Hot water temperature |
| E42.T3 | Hot water temperature |
| T5 Room | Current value if room sensor exists |
| Room | Current value if room sensor does not exist/is used |
| G1 Heat carrier pump | Off/On |
| ========== | |
| Heat pump E2x | |
| E2x.T6 Hot gas | Current value |
| E2x.T8 Heat transfer fluid out | Current value |
| E2x.T9 Heat transfer fluid in | Current value |
| E2x.T10 Collector circuit in | Current value |
| E2x.T11 Collector circuit out | Current value |
| E2x.RLP Low pressure switch | OK/Error |
| E2x.RHP High pressure switch | OK/Error |
| E2x.G2 Heat carrier pump | Off/On |
| E2x.G3 Collector circuit pump | Off/On |
| E2x.Q21 3-way valve | Off/On |

*Tab. 188 Information in Alarm history*

# 18 Factory settings

## 18.1 Return to factory settings

The function exists on both customer and installer level. All settings available to the customer are restored on customer level.
All settings on installer level are restored when the function is used on installer level. Customer level settings are not affected.

HP x = Heat pump 1 or 2 / Compressor 1 or 2

Access level 0 = customer, 1 = installer

## 18.2 Factory values

| Room temperature | | | Factory setting | Access level |
|---|---|---|---|---|
| General | Summer/winter operation | Circuit 1, Circuit 2, 3... | | |
| | | > Winter operation | Automatic | 0 |
| | | > Outdoor temperature limit for change over | 18 °C | 0<br>1 |
| | | > Delay before change over to winter operation | 4h | 1 |
| | | > Delay before change over to summer operation | 4h | 1 |
| | | > Direct start limit for winter operation | 13 °C | |
| | Shut down protection during change over from hot water to heating | | 180s | 1 |
| | Minimum outdoor temperature | | -35 °C | 1 |
| Circuit 1 Heating | External set point value | | No | 1 |
| | Use temperature from circuit with highest temperature | | No | 1 |
| | Type of heating system | | Underfloor | 1 |
| | Highest permitted flow temperature T1 | | 45.0 °C | 1 |
| | Lowest permitted flow temperature T1 | | 10.0 °C | 1 |
| | Heat curve | | | 0 |
| | Heat curve hysteresis heat pump x | Maximum | 16.0K | 1 |
| | | Minimum | 4.0K | 1 |
| | | Time factor | 20.0 | 1 |
| | Room sensor | Room temperature influence (if installed) | 3.0 | 0 |
| | | Knob's operating range (CAN-BUS) | 6K | 0 |
| | | Acknowledge room sensor | (Auto) | 1 |
| | Room temperature program | Active program | HP optimized | 0 |
| | | View/edit active program | | 0 |
| | | Room temperature normal | 20.0 °C | 0 |
| | | Temperature increase/decrease (no room temperature sensor) | = | 0 |
| | | Setting temp. increase/decrease (no room temperature sensor) | | 1 |
| | | > Limit value for left or right end point | 0.0 °C | 1 |
| | | > Change when much colder/warmer | 8 % | 1 |
| | | > Change when colder/warmer | 3 % | 1 |
| | | Room temperature influence (no room temperature sensor) | 3.0 | 0 |
| | | Room temperature exception | 17.0 °C | 0 |
| | | Copy to all heating circuits | No | 0 |
| | Air handling unit in circuit | | No | 1 |

*Tab. 189 Factory settings, room temperature*

| Room temperature | | | Factory setting | Access level |
|---|---|---|---|---|
| Circuit 2, 3... | Mixing valve mode | | Off | 1 |
| | Type of heating system | | Underfloor | 1 |
| | Highest permitted flow temperature T1 | | 45.0 °C | 1 |
| | Lowest permitted flow temperature T1 | | 10.0 °C | 1 |
| | Heat curve | | | 0 |
| | Room sensor | Room temperature influence (if installed) | 3.0 | 0, 1 |
| | | Acknowledge room sensor | (Auto) | 0, 1 |
| | Room temperature program | Same as Circuit 1 Heating minus Copy to all heating circuits | | 0, 1 |
| | Regulator settings | P constant | 1.0 | 1 |
| | | I constant | 300.0 | 1 |
| | | D constant | 0.0 | 1 |
| | | Minimum PID signal | 0 % | 1 |
| | | Maximum PID signal | 100 % | 1 |
| | | Mixing valve running time | 300s | 1 |
| | | Mixing valve fully closed | 2.0K | 1 |
| | | Mixing valve start closing | 2.0K | 1 |
| | | Connected to output type | Op/Cl | 1 |
| | Air handling unit in circuit | | No | 1 |

*Tab. 189 Factory settings, room temperature*

| Hot water | | Factory setting | Access level |
|---|---|---|---|
| Extra hot water | Extra hot water duration | 0h | 0 |
| | Extra hot water stop temperature | 65 °C | 0 |
| Hot water peak | Day of the week | Wednesday | 0 |
| | Interval in weeks | 1 | 0 |
| | Start time | 3:00 | 0 |
| | Stop temperature | 65,0 °C | 1 |
| | Maximum time | 3,0h | 1 |
| | Time for warm-keeping | 1,0h | 1 |
| Hot water program | Active program | Always hot | 0 |
| | View/edit active program | water | 0 |
| Hot water mode | | Economy | 0 |
| Hot water settings heat pump 1 / 2 | Hot water production | Yes/No | 1 |
| | Start temperature T3 economy mode | 47 °C/37 °C | 1 |
| | Stop temperature T8 economy mode | 57 °C/47 °C | 1 |
| | Start temperature T3 comfort mode | 56 °C/46 °C | 1 |
| | Stop temperature T8 comfort mode | 64 °C/54 °C | 1 |
| Block heating during hot water demand | | No | 0 |
| Maximum temperature difference circuit 1 | | 10K | 1 |
| Hot water circulation | Hot water circulation pump active | No | 1 |
| | Time settings | | 1 |
| Protective anode installed | | No | 1 |
| Acknowledge hot water sensor E41.T3 | | (Auto) | 1 |
| Acknowledge hot water sensor E42.T3 | | (Auto) | 1 |

*Tab. 190 Factory settings hot water*

| External control | | | Factory setting | Access level |
|---|---|---|---|---|
| Heat pump x | External input 1, 2 | Invert input | No | 1 |
| | | Block compressor | No | 0 |
| | | Block additional heat | No | 0 |
| | | Block heating at tripped underfloor temperature limiter | No | 1 |
| | | Block heating | No | 0 |
| | | Room temperature | No (0,0 °C) | 0 |
| | | Block hot water production | No | 0 |
| | | Start collector circuit pump | No | 1 |
| | | Alarm at low pressure in collector circuit | No | 1 |
| | | Alarm groundwater circuit | No | 1 |
| External input circuit 2, 3... | | Invert input | No | 1 |
| | | Block heating at tripped underfloor temperature limiter | No | 1 |
| | | Block heating | No | 0 |
| | | Room temperature | No (0,0 °C) | 0 |

*Tab. 191 Factory settings External control*

| Installer | | | Factory setting | Access level |
|---|---|---|---|---|
| General | Anti-seizure mode | Day of the week | Wednesday | 1 |
| | | Start time | 12:00 | 1 |
| | | Minimum outdoor temperature | 2,0 °C | 1 |
| | Highest permitted flow temperature T1 | | 45 °C (Underfloor) | 1 |
| | Operating mode | | | 1 |
| | Groundwater | Groundwater | No | 1 |
| | | Compressor start delay groundwater | 15s | 1 |
| | Display light switch off delay | | 5min | 1 |
| | Time for reset of access level | | 20min | 1 |
| Heat pump capacity | | | (Start-up) | 1 |
| Outputs | Manual operation time | | 0min | 1 |
| Circulation pumps | Operation alternative heating circuit pump G1 | | Continuous | 1 |
| | Operation alternative heat carrier pump G2 | | Automatic | 1 |
| | Operation alternative collector circuit pump G3 | | Automatic | 1 |

*Tab. 192 Factory settings Installer*

| Installer | | | Factory setting | Access level |
|---|---|---|---|---|
| Screed drying | Activate | | No | 1 |
| | Current program step | | | 1 |
| | Remaining time for current step | | | 1 |
| | Heat source | | Additional heat | 1 |
| | Program settings | Flow temperature increase per heating step | 5,0K | 1 |
| | | Number of days per heating step | 1 | 1 |
| | | Maximum flow temperature | 45 °C | 1 |
| | | Number of days with maximum temperature | 4 | 1 |
| | | Flow temperature decrease per cooling step | 5,0K | 1 |
| | | Number of days per cooling step | 1 | 1 |

*Tab. 192 Factory settings Installer*

| Additional heat | | | Factory setting | Access level |
|---|---|---|---|---|
| Additional heat general | Start delay | | 120min | 1 |
| | Allow additional heat timer during energy supply cut-off | | Economy | 1 |
| | Additional heat only | | No | 1 |
| | Ramp time when additional heat only | | 3min | 1 |
| | Block additional heat | | No | 1 |
| | Maximum outdoor temperature for additional heat | | 10 °C | 1 |
| | Additional heat set point value E11.T1 offset | | 1,0K | 1 |
| Mixed additional heat | Delay mixing valve control after additional heat start | | 20min | 1 |
| | Regulator settings | P constant | 4,0 | 1 |
| | | I constant | 300,0 | 1 |
| | | D constant | 0,0 | 1 |
| | | Minimum PID signal | 0% | 1 |
| | | Maximum PID signal | 100% | 1 |
| | | Mixing valve running time | 300s | 1 |
| | | Connected to output type | Op/Cl | 1 |
| Hot water electric heater | Acknowledge hot water additional heat | | No | 1 |
| | Temperature change | | 5K | 1 |
| | Hysteresis | | 2,0K | 1 |
| Additional heat program | Activate program | | No | 1 |
| | View/edit active program | | | 1 |
| | Outdoor temperature limit for deactivation of time control | | -26 °C | 1 |

*Tab. 193 Factory settings additional heat*

| Safety functions | | Factory setting | Access level |
|---|---|---|---|
| Setting collector circuit in T10 | Lowest permitted temperature E21.T10 | -10,0 °C<br>4,0 °C Groundwater | 1 |
| | Lowest permitted temperature E22.T10 | -10,0 °C<br>4,0 °C Groundwater | 1 |
| | Hysteresis alarm reset | 1,0K | 1 |
| | Number of warnings before alarm | 1 | 1 |
| Setting collector circuit out T11 | Lowest permitted temperature E21.T11 | -10,0 °C<br>2,0 °C Groundwater | 1 |
| | Lowest permitted temperature E22.T11 | -10,0 °C<br>2,0 °C Groundwater | 1 |
| | Hysteresis alarm reset | 1,0K | 1 |
| | Number of warnings before alarm | 1 | 1 |

*Tab. 194 Factory settings Safety functions*

| General | Factory setting | Access level |
|---|---|---|
| Set date | | 0 |
| Set time | | 0 |
| Summer/winter time | Automatic | 0 |
| Display backlight intensity | 100% | 0 |
| Language | | 0 |
| Country | (Start-up) | 1 |

*Tab. 195 Factory settings General*

| Alarms | | | Factory setting | Access level |
|---|---|---|---|---|
| Alarm indication | Alarm buzzer signal | Interval | 2s | 0 |
| | | Blocking time | Off | 0 |
| | Alarm indication control unit | Block alarm buzzer | No | 0 |
| | Alarm indication room sensor | Block alarm buzzer | Yes | 0 |
| | | Block alarm indicator lamp | Yes | 0 |
| General alarm level | Alarms and warnings | | No | 1 |

*Tab. 196 Factory settings Alarm*

# 19 Function check

## 19.1 Refrigerant circuit

The refrigerant circuit is hermetically sealed and the amount of refrigerant is less than 6 kg. Therefore there is no requirement for a yearly function check of the circuit (EC No 842/2006).

The refrigerant circuit may be opened only by authorised service engineers.

**DANGER:** Risk of toxic fumes!
The refrigerant circuit contains substances which, when released or exposed to open fire, can form toxic fumes. The fumes block the airways even at low concentrations.

- If the refrigerant circuit is not air-tight, the room must be vacated immediately and properly aired.

When the heat pump starts and there are quick changes in temperature, bubbles may become visible in the sight glass → Fig. 54.

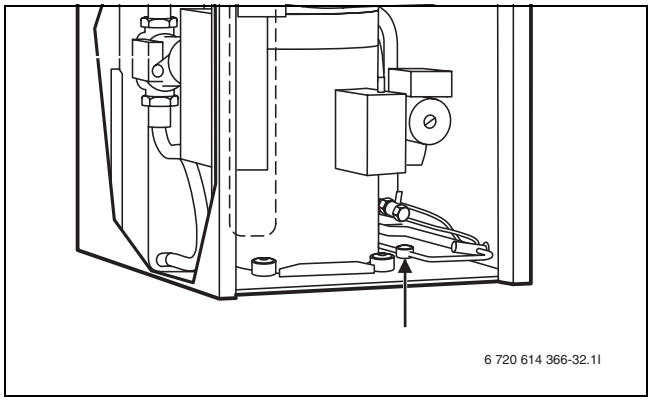



*Fig. 54*

In the event of constant formation of bubbles:

- Contact reseller/service.

## 19.2 Filling pressure in collector circuit

- Check the filling pressure in the collector circuit.

If the filling pressure is lower than 1 bar:

- Fill up collector circuit fluid (→ Chapter 10.1).

## 19.3 Setting heating system operating pressure

| Indication on pressure gauge | |
|---|---|
| 1 bar | Minimum system pressure (when cold). |
| 4 bar | Maximum filling pressure at max. temperature of the heating water: may not be exceeded (safety valve opens). |

*Tab. 197Operating pressure*

- Fill up until required pressure is reached, depending on the height of the property.

Fill the hose with water before topping up the heating system. This will prevent air getting into the central heating system.

- If there is a pressure drop: check the expansion vessel and heating system for leaks.

## 19.4 Operating temperatures

Check the temperatures in the heat carrier and collector circuit after 10 minutes of operation:

- Temperature difference between heating system flow and return approx. 7 ... 10 K.
- Temperature difference between collector circuit in and out approx. 2 ... 5 K, recommendation: 2 ... 3 K.

When the temperature difference is too small:

▶ Reduce the speed of the corresponding circulation pump (G2 or G3) in order to obtain a lower flow.

When the temperature difference is too great:

▶ Increase the speed of the corresponding circulation pump (G2) in order to obtain a greater flow.

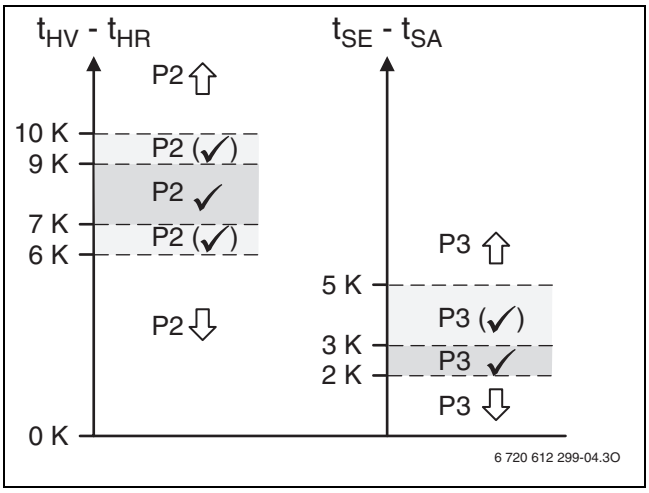



*Fig. 55*

**P2** Heat carrier pump G2
**P3** Collector circuit pump G3
**$t_{SA}$** Temperature collector circuit out T11
**$t_{SE}$** Temperature collector circuit in T10
**$t_{HV}$** Temperature heat transfer fluid out T8
**$t_{HR}$** Temperature heat transfer fluid in T9

# 20 Environmental protection

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

**Packaging**

We participate in the recycling programmes of the countries in which our products are sold to ensure optimum recycling.
All of our packaging materials are environmentally compatible and can be recycled.

**Old products**

Old products contain materials which should be sorted. Component groups are simple to differentiate and the materials are marked. In this way, the different component groups are sorted and handed over for recycling or waste disposal, respectively.

# 21 Maintenance

**DANGER:** Risk of electric shock!
- Switch off the main power supply before starting work on the electrical part.

We recommend that a function check be performed regularly by an authorised 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 (→ Chapter 17.10).

**Function check**

- A function check should be performed in connection with each service (→ Page 102).

**Electrical cable routing**

- Check the electrical cable routing with regard to mechanical damage and replace defective cables.

**Check the particle filters for the heating system and collector system**

The filters prevent dirt from entering the heat pump. If they are clogged, they can cause malfunctions.

It is not necessary to empty the installation in order to clean the filters. Filter and shut-off valve are integrated.

- Turn off the heat pump.
- Close the valve.
- Loosen the lid.
- Remove the circlip with the circlip pliers.
- Pull the filter out and clean it, if necessary, under running water.

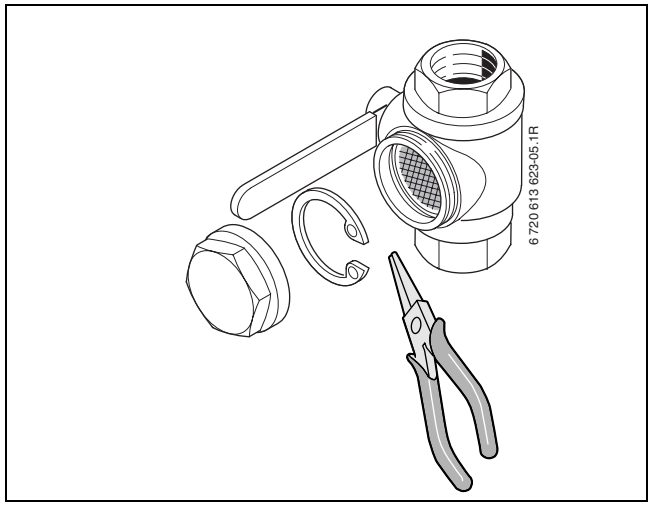



*Fig. 56*

- Put the parts back again in reverse order.

# 22 Commissioning protocol

| | |
|---|---|
| Information about the installation: | |
| Customer/responsible for installation: | |
| Installer/person in charge of commissioning: | |
| Heat pump: _____ | Serial number: _____ |
| Commissioning date: _____ | Date of manufacture: _____ |
| Type of collector: _____ | Number of circuits: _____ Length per circuit: _____ m |
| Additional heat (Oil/Gas/Power): _____ Output: _____ kW | Product / Type: _____ |
| Hot water heater, volume: _____ litres | Product / Type: _____ |
| Expansion vessel, volume:<br>Heating system: _____ litres<br>Collector circuit: _____ litres | <br>Product / Type: _____<br>Product / Type: _____ |
| External circulation pumps:<br>G1 Circuit 1<br>G1 Circuit 2<br>G1 Circuit 3<br>G1 Circuit 4<br>G6 Hot water circulation | <br>Product / Type: _____<br>Product / Type: _____<br>Product / Type: _____<br>Product / Type: _____<br>Product / Type: _____ |
| Type of heating system (Radiator/Underfloor): Circuit 1 _____ Circuit 2 _____<br>Circuit 3 _____ Circuit 4 _____ | |
| External motor valves:<br>Mixing valve Additional heat Q71<br>Mixing valve Circuit 2 Q11<br>Mixing valve Circuit 3 Q11<br>Mixing valve Circuit 4 Q11 | <br>Product / Type: _____<br>Product / Type: _____<br>Product / Type: _____<br>Product / Type: _____ |
| Other components in the installation: | |
| Unscrew the transport locking devices installed in the heat pump (→ 5.5 ). Check that the pipes in the heat pump have not been displaced during transportation and lie opposite to the chassis and that the bottom plate is free. ❑ | |
| Check of collector circuit installation: | |
| Collector circuit system connected according to system solution, Figure: _____, in the handbook and correctly insulated against insulation ❑<br>Remark: | |
| Collector circuit filled with water mixed with antifreeze type_____ mixture_____% | |
| Vented ❑ Freezing limit____°C checked with refractometer. Pressure filled to_____bar. | |

*Tab. 198 Commissioning protocol*

| |
|---|
| Check of electrical connections part 1: |
| Supply fuse:_____A type_____ |
| Supply voltage phase - 0: L1 _____ V ... L2 _____ V ... L3_____ V. Should be between 220 and 240 V. |
| Turn on fuses and cut-outs in the heat pump. Start the control unit. |
| Run the Start-up menu of the control unit ❑ Supplement the Start-up menu with the basic settings. ❑ (→ Chapter 13, Chapter 16). Check, in particular, the alarm limit settings for collector circuit (depending on collector circuit system).<br>Also check the heat curve settings. |
| Collector circuit filling and venting: |
| Enter the manual operation menu, start E21.G3 and E22.G3 to check if continued venting is required.<br>Check the pressure of the collector circuit 'Q❑ Bleed the collector circuit system ❑ Repeat venting and filling until no additional air has come in within one hour ❑<br>For venting of the collector circuit side, see the filling unit instructions. |
| Check of heating medium installation: |
| Heating and hot water system connected according to system solution, Figure: _____, in the handbook. Check, in particular, the flow diagrams. |
| E11.T1 Flow sensor: Check that the sensor is positioned correctly (assembled in accordance with system diagram) with good contact ❑ Note: strap-on temperature detectors do not work on thick-walled steel pipes, use immersed sensors. |
| Hot water pipes for, e.g., drying room turned off or switched over to the heating system ❑ Note: Important to check the flow in the hot water part.Remark: |
| Heating medium filling and venting: |
| Check the heating system's pressure ❑ |
| Heating system filled to ____bar. Leak traced❑ Vented ❑ |
| Hot water system filled ❑ Leak traced❑ Hot water heater vented❑<br>Continuous flow over E11.G1 guaranteed (in connection with additional electric heat) ❑ |
| Check of electrical connections part 2: |
| Sensor correctly linked up with cable max. 0.5 $mm^2$ ❑ Valve actuators correctly connected ❑ |
| Circulation pumps correctly connected ❑ Additional electric heat correctly connected ❑<br>External signals correctly connected ❑ |
| Switch on fuses to built-in circulation pumps ❑ |
| Function test: |
| Check if the right circulation pump starts by running manually one pump at a time.<br>E11. G1 Circulation pump circuit 1 ❑ E1x. G1 Circulation pump circuit 2-4 ❑<br>E41.G6 Circulation pump hot water ❑<br>E2x.G2 Heat carrier pump ❑ E2x.G3 Collector circuit pump❑ |
| Check that the shunt motors work and go in the right direction and that any limit switches are correctly set by running them manually.<br>E1x.Q11 Mixed circuit 2-4 ❑ E71.E1.Q71 Mixed additional heat ❑ |

*Tab. 198 Commissioning protocol*

| | |
|---|---|
| Check that the additional electric heat works and that the control from the heat pump works.<br>E71 ❑ E41. E1 ❑ | |
| Check that external signals and alarms to/from the heat pump work, e.g., EVU block and general alarm ❑ | |
| Check the pressure and temperature of the collector circuit again, fill up with collector circuit fluid, if necessary ❑ | |
| Turn on the motor cut-out for compressor 1 (top). When compressor 1 goes well (with reasonable temperature differences), turn on the motor cut-out for compressor 2 (bottom). | |
| When both compressors go, check that the temperatures of the heating system and the hot water heaters increase, also make sure that the temperature differences are reasonable. Check regularly the pressure and temperature differences, fill the heating system up and clean the filter, if required. | |
| Check that connected sensors show values within permitted range: | |
| T2 Outdoor sensor: Check that the sensor is on a north-facing wall and not above windows or ventilation openings. The sensor must not be concealed or be flush under edge eaves ❑ | |
| E4x.T3 Hot water sensor: ❑ | |
| E1x.T1 Flow sensor circuit 2-4 Check that the sensor is positioned correctly (in accordance with the system diagram in the handbook) with good contact ❑ | |
| E1x.TT.T5 Room sensor circuit 1-4: Sensor placed on a representative hot junction, see instructions in handbook ❑ | |
| Operating temperatures (after 20 minutes of operation): | |
| Set the flows on the warm and cold side of the hot pump, respectively, by setting correct speed on the built-up circulation pumps. Note: the filters must be newly cleaned when this setting should be done. | |
| Step 1 E21 (top): | |
| Heat transfer fluid out (T8): _____ °C | Heat transfer fluid in (T9): _____ °C |
| Difference T8-T9: _____ K (should be 7-10 K). | Setting heat carrier pump (G2): _____ |
| Collector circuit in (T10): _____ °C | Collector circuit out (T11): _____ °C |
| Difference T10-T11: _____ K (should be 2-5 K). | Setting collector circuit pump (G3): _____ |
| Step 2 E22 (bottom): | |
| Heat transfer fluid out (T8): _____ °C | Heat transfer fluid in (T9): _____ °C |
| Difference T8-T9: _____ K (should be 7-10 K). | Setting heat carrier pump (G2): _____ |
| Collector circuit in (T10): _____ °C | Collector circuit out (T11): _____ °C |
| Difference T10-T11: _____ K (should be 2-5 K). | Setting collector circuit pump (G3): _____ |
| | |
| Check that three-way valve E21. Q21 goes over to heating operation when the temperature in the hot water heater is up ❑ | |
| | |
| Customer/responsible for installation: has been informed of how to operate the heat pump ❑ | |
| Documentation handed over❑ | |
| Date/signature of the installation installer/person in charge of commissioning: | |

*Tab. 198 Commissioning protocol*

# Notes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