BOSCH

Operating instructions

Heat pump manager

HPC 301

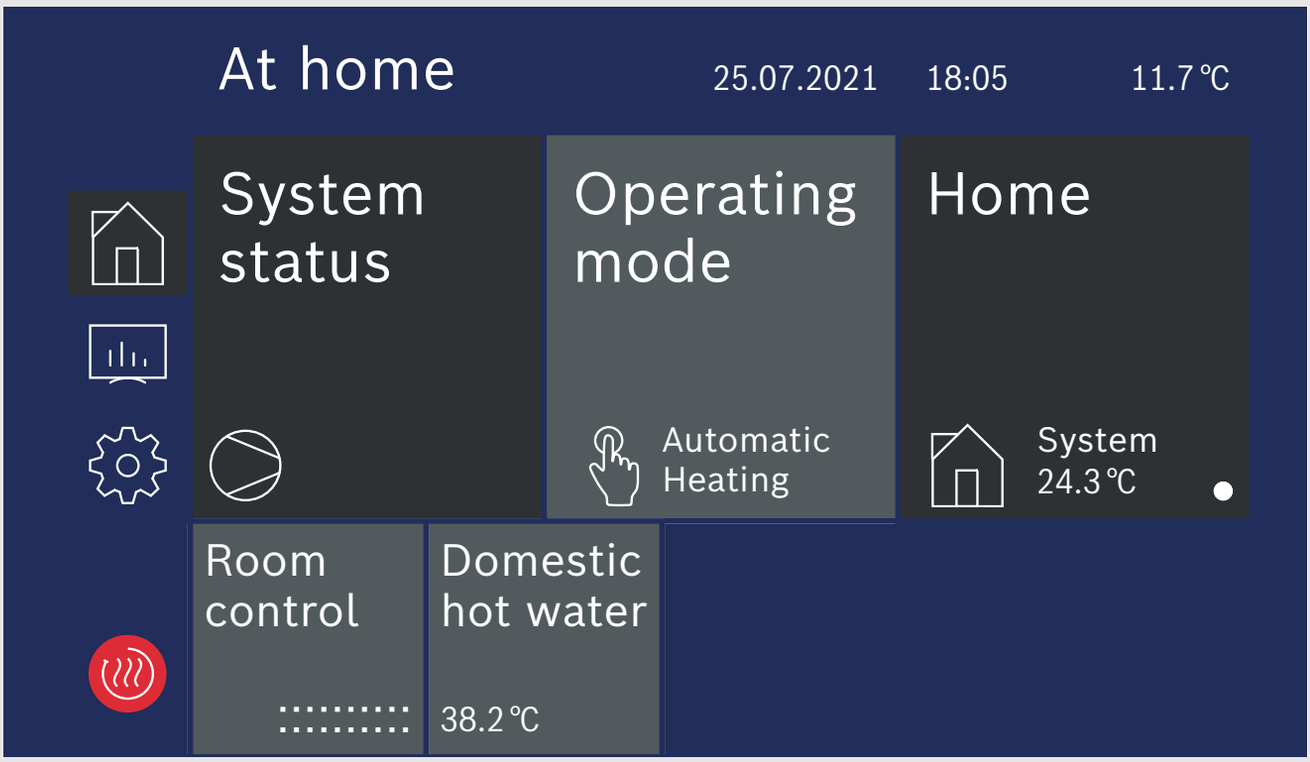

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Table of contents

1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

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

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

DANGER

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

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in serious personal injury or danger to life.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate personal injury.

NOTICE

ATTENTION indicates that material damage may occur.

Important information

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

1.2 General functions

During installation, operation and maintenance, the installation instructions for the specialist must be followed.

This device must be installed and repaired only by a specialist. Improper repairs can pose a significant risk to the user. In accordance with applicable regulations, the installation instructions for specialists must be available at all times and must be provided to the specialist for their information when work is being carried out on the device.

When moving house:

- ▶ Hand these instructions over to the new tenant or owner.

If there is visible damage:

- ▶ Do not connect the device.
- ▶ Contact the supplier.

The replacement of parts must be carried out only by experts.

To avoid consequential damage:

- ▶ Only install original spare parts.
- ▶ Comply with environmental requirements relating to the recovery, reuse and disposal of operating materials and components in accordance with current standards.

1.3 General safety instructions

⚠ Notices for the target group

Any adjustment work inside the device must be carried out only by an approved contractor.

NOTICE

Improper use.

Defect of the .

- ▶ Operate the only in dry rooms with temperatures between 0 °C and 35 °C.
- ▶ Condensation is not permitted.

NOTICE

Sensor connection cables and communication cables routed incorrectly.

defective.

- ▶ Sensor connection cables with a conductor cross-section of 0.75 mm^2 and communication cables may be extended to a maximum of 50 m.
- ▶ Do not route sensor cables and communication cables together with live cables.

NOTICE

Improper use.

Frost protection function defective.

- ▶ The heat pump must be supplied with power at all times, even in the event of active shutdowns by the electricity supplier, SG ready or §14a restrictions.
- ▶ Water must flow through the heat pump hydraulically.

2 Operation

The is essential for the operation of air-to-water heat pumps. It controls a bivalent, monovalent or single energy source heat pump heating system and monitors the safety devices of the refrigerant circuit. The is supplied as a wall-mounted controller with the heat pump. It controls both the heat utilisation system as well as the heat source system. The following information describes the operation and its features. Further information on the settings is provided in the help section for the relevant menu item, which can be accessed via the i-icon in the top right-hand corner.

2.1 Home screen

Fig. 1 Home screen with language and user selection

Access to the display and control unit is obtained by selecting the desired user group and then confirming by tapping the red login icon.

- User
- Trade customer
- Service

Depending on the selected user group, a password is required for access (→ Chapter 2.1.1, page 5).

You can return to the language and user selection screen at any time by tapping the company logo in the bottom left-hand corner. The active user level is also indicated by a colour on the display. The specialist menu is blue and the service menu is red. After a certain period of inactivity, the heat pump controller automatically switches back to the main menu.

If language and user selection are not available, the touch screen is still in start-up mode (→ Fig. 2, page 4).

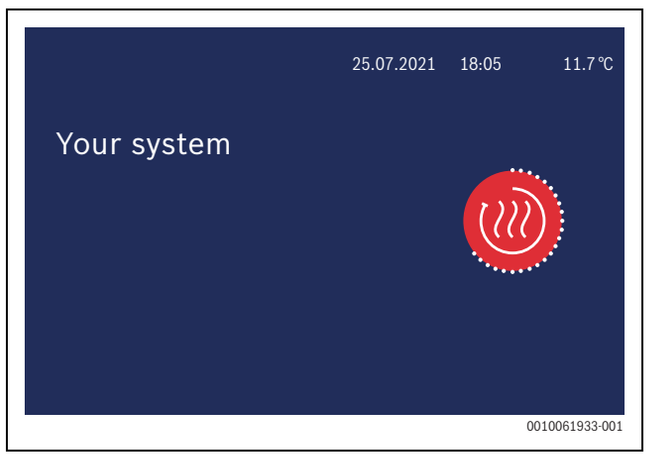


Fig. 2 Touch screen is in start-up mode

2.1.1 Login

A password must be entered to access the specialist and service areas. You will be prompted to enter the password after selecting the user group and then confirming with the Login symbol.

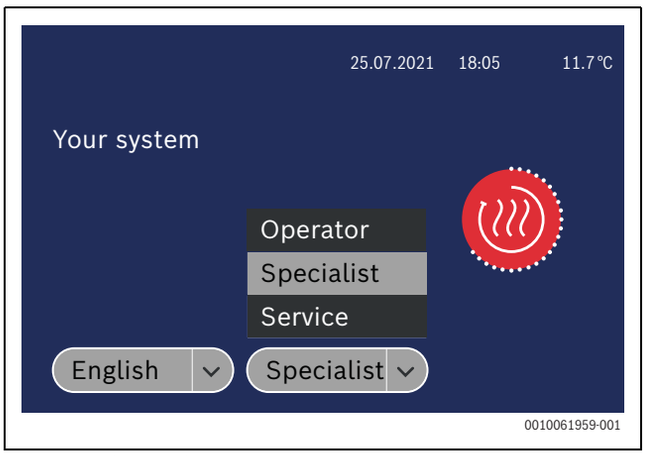


Fig. 3 Selecting the user group

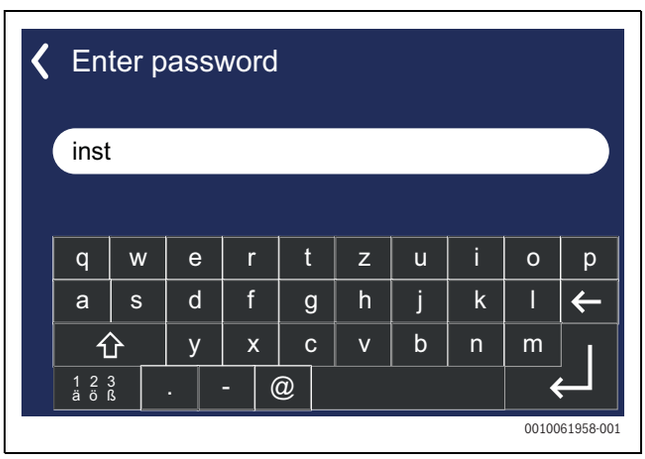


Fig. 4 Entering the password for the specialist

Once the password has been successfully entered and confirmed by pressing the Enter button, you will automatically be taken to the home screen of the . Settings in the **Specialist** menu may be adjusted only by the expert.

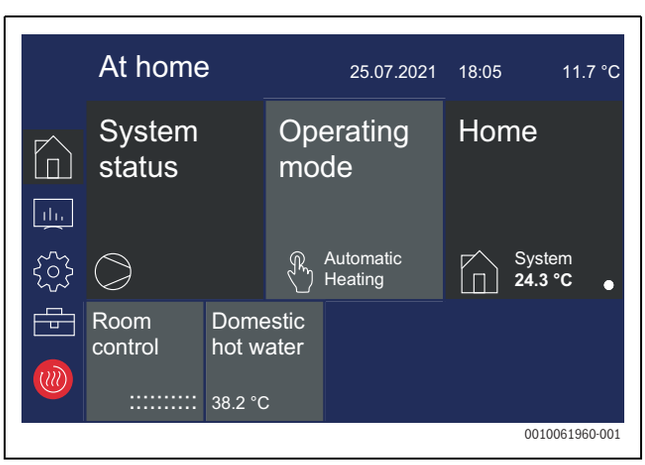


Fig. 5 Start page Specialist

2.2 Main menu

The main menu comprises 5 menu levels. Access to the individual menu levels is granted depending on the selected user group.

	At home	System status, operating mode, settings for the operator
	Analytics	System data, operating data, running times, heat output, inputs and outputs
	Settings	Date and time, language and region, screen
	Installation[1)]	Heating programs, system setup, function locks, EasyOn
	Start view	Return to language and user selection

1) Only available in the specialist and service areas.

Table 1 Control buttons

2.2.1 At home

The At home menu clearly displays all the information required by the operator, the current status of the heating system and settings. In particular, the operating mode, set temperatures and weekly profiles can be easily changed via this menu (→ Chapter 4.1, page 10).

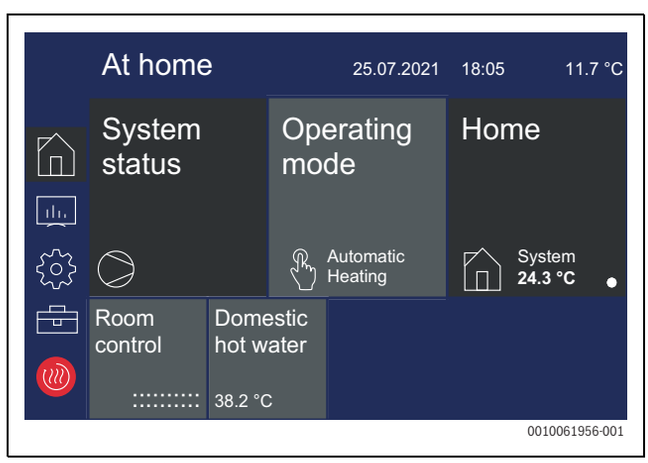


Fig. 6 View At home

2.2.2 Analytics

The Analytics menu displays all current and historical heat quantitiesn (→ Chapter 4.4, page 18), running times (→ Chapter 4.3, page 17) and operating data (→ Chapter 4.2, page 14), as well as the statuses of the inputs and outputs (→ Chapter 4.5, page 20).

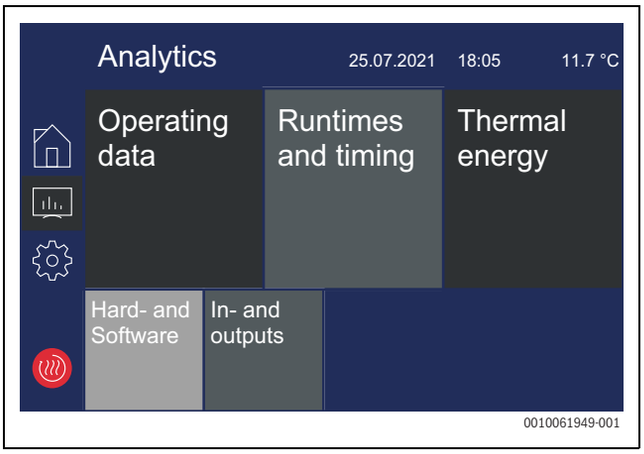


Fig. 7 Overview Analytics

2.2.3 Settings

All system parameters as well as settings relating to the display and accessories are configured in the Settings menu. (→ Chapter 4.6, page 20).

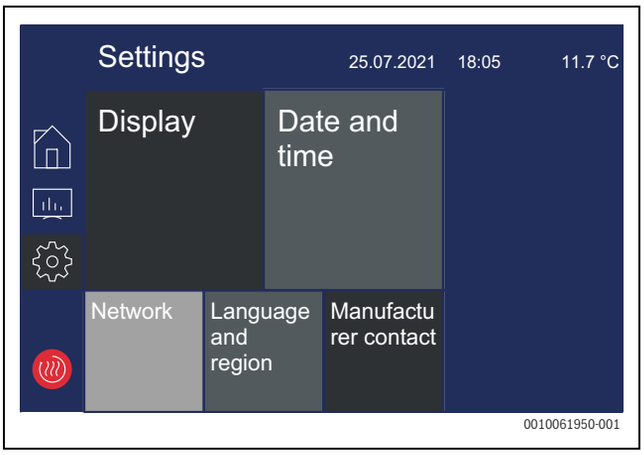


Fig. 8 Overview Settings

2.2.4 Installation

Once commissioning has been successfully completed, a heating program can be activated in the Installation menu, or the guided commissioning process **EasyOn** can be restarted. (→ Chapter 5.3, page 37). This menu is only available at the specialist and service menu.

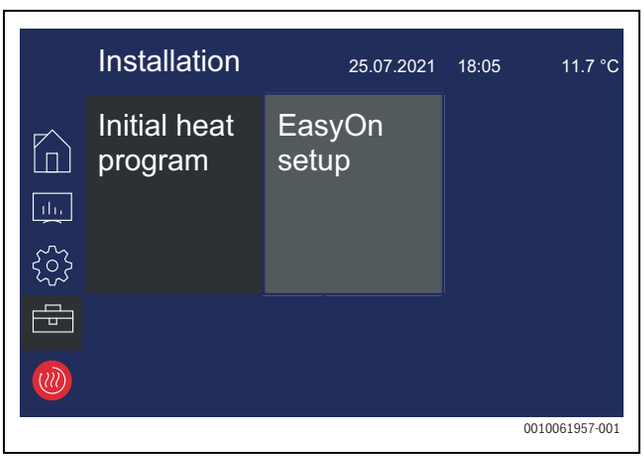


Fig. 9 Overview Installation

2.3 Control elements

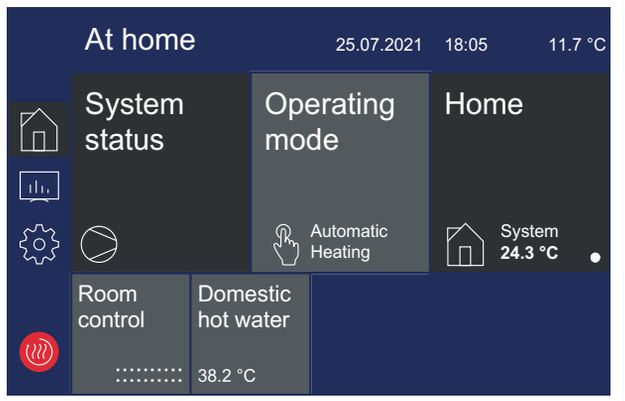


Fig. 10 Operator view

The display and control unit allows you to make the settings required for operation and view the displays.

Depending on the setting, there are different ways to change the value.

2.3.1 +warmer/-colder buttons

In a slider view, the heating curve or set temperature is adjusted using the +Warmer/-Colder buttons. Tapping the button once changes the value by 1 or 0.1 respectively. If the button is kept pressed, the value changes more quickly.

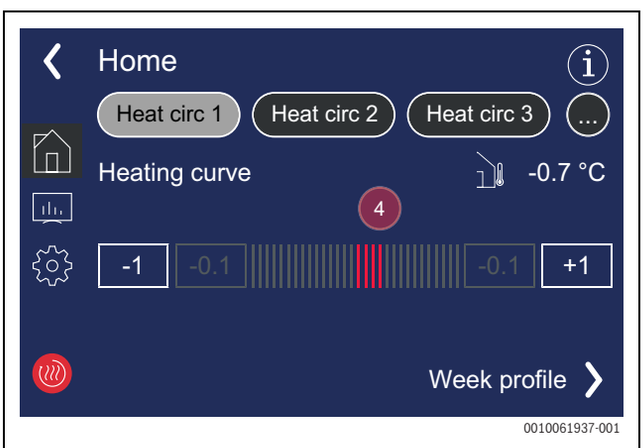


Fig. 11 Changing values using a slider

2.3.2 +/- buttons

When adjusting settings using the +/- buttons, tapping a value highlights it in white.

The value is changed using the +/- buttons. If the button is kept pressed, the value changes more quickly. The value is confirmed after tapping the display area once or when exiting the page.

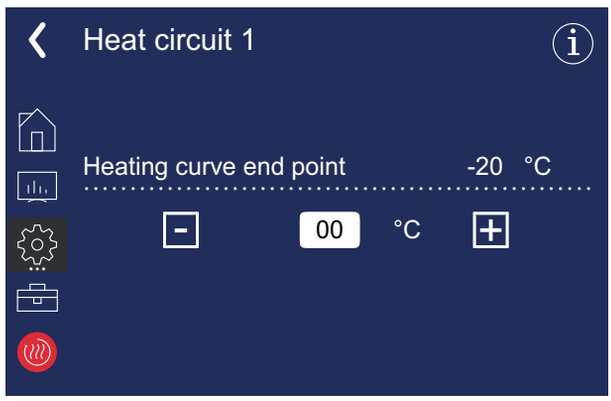


Fig. 12 Setting value highlighted in white

2.3.3 Keyboard

The value is changed using the screen keyboard. To do this, tap the value to be changed; it will then be highlighted in white. The value is then changed using the keyboard. The change is confirmed using the angled Confirm button.

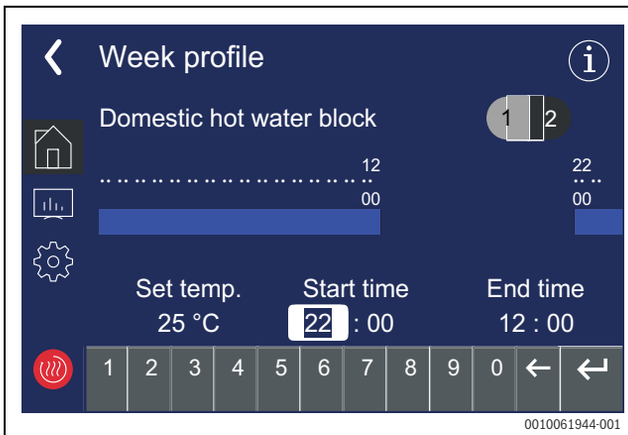


Fig. 13 Changing values using a keypad

3 Commissioning

For commissioning and future operation, it must be ensured that the return flow temperature is at least 20 °C. This is to prevent the defrost cycle from being interrupted because the temperature at the return flow sensor R2 falls below the minimum permissible temperature.
By activating the "Commissioning" function (special function (can only be selected in the specialist menu)), the 2nd heat generator is enabled for a period of one hour, the heat-up time of the compressor is reduced, and defrosting is suppressed or, if currently in progress, cancelled. The heating circulation pump runs continuously during commissioning, and any domestic hot water or pool demand is ignored.

At low heating water temperatures, the buffer tank must first be heated up before the individual heating circuits are opened gradually. We recommend waiting until the return temperature reaches 29 °C.

3.1 Commissioning

The commissioning wizard **EasyOn** automatically guides you through the settings for all system parameters relevant to operation. The menu options available depend on the type of heat pump used and the hardware.

The commissioning wizard **EasyOn** must be carried out in full and completed. It is not possible to cancel the process during commissioning!

EasyOn can be restarted at any time via the HMI/display using the specialist menu.

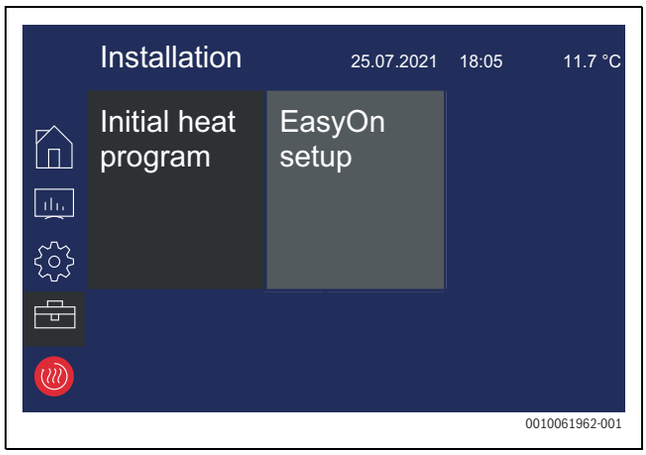


Fig. 14 Access EasyOn

Depending on the factory settings and the heat pump series, the prompts and settings may vary. Depending on the product, you may be prompted to enter the heat pump code, product code or system code.

3.2 Commissioning wizard EasyOn

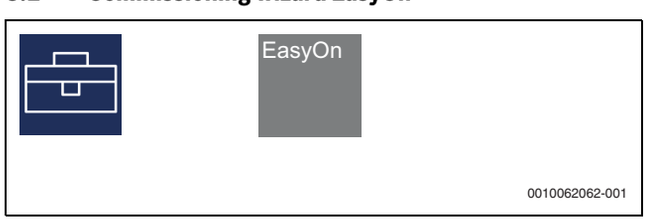


Fig. 15 EasyOn

Fig. 16 Heat pump code

The heat pump code is set at the factory and is shown on the data plate of the heat pump.

When selecting functions for the function blocks, ensure that the electrical wiring is correctly assigned, as shown in the electrical circuit diagram of the or as specified in the hydraulic diagrams.

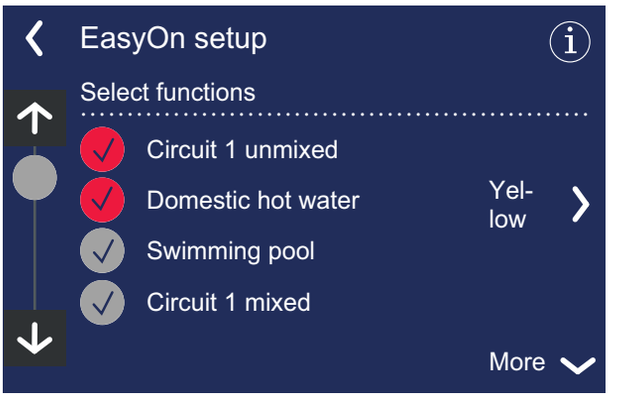


Fig. 17 Selecting functions

The function blocks are pre-assigned and must be set in accordance with the planned hydraulic and electrical wiring.

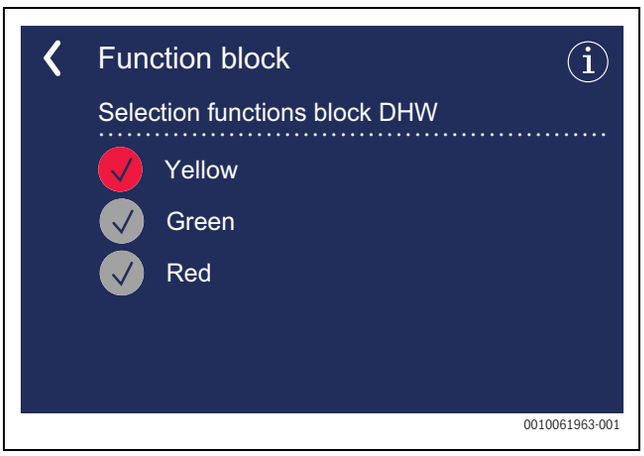


Fig. 18 Default settings and modification of function blocks

Further information on the allocation of the function block is included in the installation manual of the .

The following settings are walked through individually in the commissioning wizard **EasyOn**. Depending on previous settings or heat pump types, individual steps may be skipped.

Parameters		Description	Adjustment range
Heat pump code		The 5-digit heat pump code printed on the data plate is preset and is intended solely for verification purposes during system commissioning (→ Fig. 16, page 7).	
Functions		The desired function must be selected based on the system hydraulics. NOTICE: The functions **1st unmixed circuit** and **1st mixed circuit** are mutually exclusive. The maximum number of available functions depends on the hardware used. In the standard version of the controller, 3 function blocks can be defined. By using the FEM 2 accessory, 2 further function blocks can be defined (→ Fig. 17, page 8).	1st unmixed circuit Domestic hot water Swimming pool 1. mixed circuit 2nd mixed circuit 3rd mixed circuit Bivalent Renewable Cooling Active
Function block		The colour coding of the function must correspond to the functions wired to the controller.	Yellow Green Red
		To assign a function to the **Blue** and **Orange** function blocks, the FEM2 expansion controller with two function blocks is required.	Blue Orange
Heating (2nd heat generator)		Is a pipe heating installed in the hydraulic system? Is an immersion heater installed in the buffer tank, which is used for central heating backup?	Pipe heater M16 Immersion heater
Circuit 1		How is the 1st heating circuit used?	Heating Cooling
	Heat circ 1 Control	Which control option should be used for the 1st heating circuit? Outdoor: Return temperature control depending on the outside temperature and the set heating curve (→ Chapter 5.2.3, page 27). Fixed value: Return temperature control via a fixed value Room temperature: Return temperature control based on the room temperature of a reference room Heating curve: The heating line is a simplified, linear form of the heating curve and represents the relationship between the outside temperature and the set temperature as a straight line defined by 4 points. This applies to heating and cooling (Chapter 5.2.3, page 27).	Outside Fixed-setpoint Room temperature Straight heating
	Heat circ 1 Room control	Which hardware is used for heating room control?	RTH Econ RTM Econ Sensor BMS
	1st CoolCir Control	Which control option should be used for the 1st cooling circuit? Fixed value: Return temperature control using a fixed value Silent cooling: Return temperature control depending on the room temperature of a reference room Cooling curve: Set return temperature control depending on four adjustable corner points (→ Chapter 5.2.3, page 27).	Fixed-setpoint Silent cooling Cooling curve

Parameters		Description	Adjustment range
	1st CoolCir Room control	Which hardware is used for cooling room control?	RTH Econ RTM Econ Sensor BMS
	Circuit 1 RTH Econ	How many RTM Econs are used for the 1st circuit?	1 ... 10
Circuit 2		How is the 2nd heating circuit used?	
	Heat circ 2Control	Which control option should be used for the 2nd heating circuit? Outdoor: Return temperature control depending on the outside temperature and the set heating curve (→ Chapter 5.2.3, page 27). Fixed value: Return temperature control via a fixed value Room temperature: Return temperature control based on the room temperature of a reference room Heating curve: The heating line is a simplified, linear form of the heating curve and represents the relationship between the outside temperature and the set temperature as a straight line defined by 4 points. This applies to heating and cooling (Chapter 5.2.3, page 27).	Outside Fixed-setpoint Room temperature Straight heating
	Heat circ 2 Room control	Which hardware is used for heating room control?	RTH EconRTM Econ Sensor BMS
	Cool circ 2 Control	Which control option should be used for the 2nd cooling circuit? Fixed value: Return temperature control using a fixed value Silent cooling: Return temperature control depending on the room temperature of a reference room Cooling curve: Set return temperature control depending on four adjustable corner points (→ Chapter 5.2.3, page 27)	Fixed-setpoint Silent cooling Cooling curve
	Cool circ 2 Room control	Which hardware is used for cooling room control?	RTH EconRTM Econ Sensor BMS
	Circuit 2 RTH Econ	How many RTM Econs are used for the 2nd circuit?	1 ... 10
Circuit 3		How is the 3rd heating circuit used?	
	Heat circ 3 Control	Which control option should be used for the 3rd heating circuit? Outdoor: Return temperature control depending on the outside temperature and the set heating curve (→ Chapter 5.2.3, page 27). Fixed value: Return temperature control via a fixed value Room temperature: Return temperature control based on the room temperature of a reference room Heating curve: The heating line is a simplified, linear form of the heating curve and represents the relationship between the outside temperature and the set temperature as a straight line defined by 4 points. This applies to heating and cooling (→Chapter 5.2.3, page 27).	Outside Fixed-setpoint Room temperature Heating curve
	Heat circ 3 Room control	Which hardware is used for heating room control?	RTH EconRTM Econ Sensor BMS
	Cooling circuit 3 Control	Which control option should be used for the 3rd cooling circuit? Fixed value: Return temperature control using a fixed value Silent cooling: Return temperature control depending on the room temperature of a reference room Cooling curve: Set return temperature control depending on four adjustable corner points (→ Chapter 5.2.3, page 27).	Fixed-setpoint Silent cooling Cooling curve
	Cooling circuit 3 Room control	Which hardware is used for cooling room control?	RTH Econ RTM Econ Sensor BMS
	Circuit 3 RTH Econ	How many RTM Econs are used for the 3rd circuit?	1 ... 10
Domestic hot water Demand		Is the heat pump used for DHW heating? Is a thermostat or a sensor used for this purpose?	Sensor Thermostat
Domestic hot water 2nd heat generator		Is a pipe heater installed in the system hydraulics that can be used for DHW reheating? Is a flange heater fitted in the DHW cylinder for reheating and thermal disinfection?	Pipe heater Flange heater

Parameters	Description	Adjustment range
Domestic hot water Circulation	Is a DHW circulation pump fitted, and is it controlled via the master controller? Is it controlled via a pulse signal or a time program?	Pulse Timer
Swimming pool Demand	Is the heat pump used for pool heating? Is a thermostat or a sensor used for this?	Sensor Thermostat

Table 2 EasyOn

4 Operator Menu

The Operator Menu is intended for users of the heat pump and can be accessed without a password.

4.1 At home

The **At home** menu item covers basic settings for the operator, such as selecting the operating mode and displaying the current status of the system.

4.1.1 System status

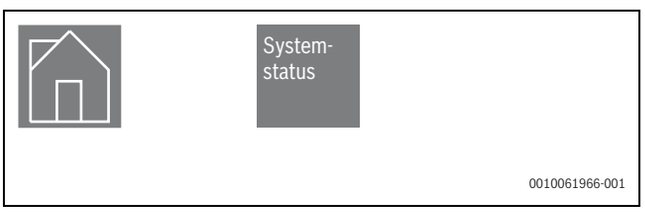


Fig. 19 System status

Within the "System status" tile, the current status of the heating system is displayed according to Table 3, page 10 Furthermore, in the event of a fault or an active block, this is indicated by a red tile and the name of the fault or block.
The sub-menu contains three tabs: Status, Block and Fault.
The **System status > Status** menu displays the currently active function or, when the heat pump is started, the active sub-step.
The **System status > Block** menu documents the last 10 blocks that have occurred.
The **System status > Fault** Menu documents the last 10 causes of a fault that have occurred. The records include the date, time, heat source temperature, flow temperature, return temperature and the status message.
For further information on lockouts and faults, please refer to Chapter → 6, 7 and 8.

4.1.2 Operating mode

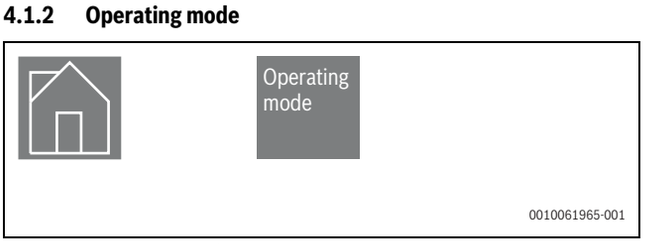


Fig. 20 Operating mode

Blocking heat pump operation: The heat pump is blocked in Operating mode 2nd heat generator. In single energy source systems, heating mode and DHW heating are provided by the booster heaters; in bivalent systems, they are provided by the 2nd heat generator.

The causes and details of lockouts and faults can be found in the individual messages themselves or by clicking the help icon.

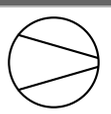
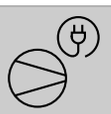
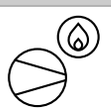
Information	Description
	Compressor **On**
	Compressor and electric heat generator **On**
	Compressor and fossil heat generator **On**
	Electric heat generator **On**
	Fossil heat generator **On**
	§14a - Limiting

Table 3 System status

The operating mode of the heat pump can be set via the following menu.

Parameters	Description	Adjustment range
Automatic	During Automatic operating mode, depending on the outside temperature, the operating mode switches between Winter, Summer, Cooling (where possible). The threshold temperatures for the Automatic operating mode can be adjusted to suit your requirements in the menu Settings > **Mode** outside temperature-dependent.	
Heating / cooling	Settings for the threshold temperatures at which the operating mode of the heat pump switches automatically. A change occurs if the temperature exceeds or falls below the threshold for the set duration without interruption.	-20 ... **8 °C** ... 40 0 ... **1 h** ... 24
Summer	In Summer operating mode, only DHW and pool water are heated by the heat pump. Room heating is not activated. (Frost protection is guaranteed).	
Winter	The heat pump operates in heating mode. Programmed reduction periods, increase periods and lockout periods for heating and domestic hot water heating are initiated automatically. DHW heating, heating and pool water heating are initiated according to their priority. The heat pump and the 2nd heat generator are switched on or off as required.	
Vacation	During Vacation operating mode, a reduction in the heating curves and a DHW block are activated. Both functions then operate independently of the corresponding timers, although the set reduction values apply. The duration of the Vacation operating mode can be set in the menu. Once this time has elapsed, the system automatically switches back to the previous operating mode.	
Days vacation	Duration of holiday mode in days. The day begins at 00:00. The reduction value is set under **Week profile** > Heat circ 1 > **Lower**.	0 ... **11** ... 15
Party	During Party operating mode, any programmed reduction in the heating curves is ignored. The duration of Party operating mode can be set in the menu. Once this time has elapsed, the system automatically switches back to the previous operating mode.	
Hours party mode	Duration of Party mode in hours. The increase value is set in the Heat circ 1 > **Raise** menu.	0 ... **4 h** ... 72
2nd heat generator	In this operating mode, the heat pump is switched off and the entire heat supply is provided by the 2nd heat generator. In single energy source systems, this is the immersion heater; in bivalent systems, it is the oil or floor standing conventional gas boiler. Time programs and heating curve settings remain active.	
Cooling	The system operates in cooling mode, and separate control functions are activated. This operating mode can only be activated if the heat pump is capable of active cooling.	

Table 4 Operating mode

4.1.3 Home

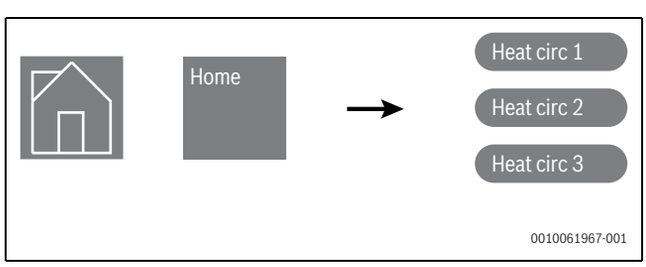


Fig. 21 Home

During commissioning, the heating curve is adjusted to suit local and building-specific conditions. This heating curve can be adjusted to individual temperature preferences using the "Warmer/Colder" buttons. The heating curve can be set separately for each weather-compensated heating circuit. Each heating curve can be lowered or increased via the **Week profile**. For example, in poorly insulated buildings, the heating curve can be lowered at night, or raising it before the off-peak period can prevent the heating surfaces from cooling down too much. If an increase and a decrease overlap, the increase takes precedence.

For energy-efficient operation of the heat pump heating system, the temperature level to be generated by the heat pump should be as low as possible. In well-insulated houses, continuous heating operation without reduction periods generally results in lower energy costs, as power peaks with high flow temperatures are avoided and the same level of comfort is achieved at lower temperatures. Shut-off periods can be compensated for by an increase – which begins approximately 1 hour before the blocking time.

Parameters	Description	Adjustment range
Heating curve	Parallel displacement of the set heating curve. Pressing once shifts the heating curve up (warmer) or down by 1 °C (colder).	
Fixed-setpoint	Setting the desired set return temperature when fixed-value control is selected.	
Week profile	Via the weekly profile of the selected heating/cooling circuit, reduction and increase times can be set using two time programmes.	Mon ... Sun
Lower	Reduction time and reduction value for the heating curve or fixed-value temperature.	
Start time	The set reduction value is also used when the Smart Grid function is in switching state 1.	00:00 ... 23:59
End time		00:00 ... 23:59
Lower value		0 ... **4 K** ... 19
Raise	Rise time and rise value of the heating characteristic curve or fixed temperature.	
Start time	The set rise value is also used when the Smart Grid function is in switching state 3.	00:00 ... 23:59
End time		00:00 ... 23:59
Raise value		0 ... **2 K** ... 19

Table 5 Home

4.1.4 Room control

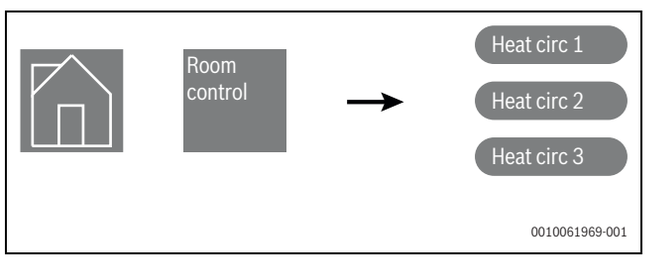


Fig. 22 Room control

When room temperature control is selected, a maximum of 10 rooms can be controlled per heating/cooling circuit. For each room, one room set.temp. and a Set temperature can be selected for a **Week profile**.

Parameters	Description	Adjustment range
room set.temp.	Setting value of the room set.temp..	15 ... **20 °C** ... 35
Week profile	The weekly profile menu for the selected heating circuit can be used to set the reduction and increase values for the Smart Grid switching state. In addition, the days of the week for a selected room set.temp. of the weekly profile can be activated.	Mon ... Sun
Lower value	The set reduction value is used when the Smart Grid function is in switching state 1.	0 ... **2 K** ... 19
Raise value	The set increase value is also used when the Smart Grid function is in switching state 3.	0 ... **2 K** ... 19
Start time	Start and end time of the weekly profile for the selected room set.temp..	00:00 ... 23:59
End time		00:00 ... 23:59
Set temperature	Settings of the room set.temp. with activated weekly profile.	10 ... **22 °C** ... 40
Room control limit temperature	Below the set limit temperature, when Smart Grid switching state 3 is active, the control valves in rooms with a lower set room temperature will not open. Example: Bedrooms – Switching state 3 • Set room temperature 15 °C • Threshold temperature 19 °C • Valve closed • Room is not released for an increase Example: Bathrooms – Switching state 3 • Set room temperature 22 °C • Threshold temperature 19 °C • Valve open • Room is released for an increase	15 ... **19 °C** ... 30

Table 6 Room control

4.1.5 Domestic hot water

As DHW heating is produced at high flow temperatures, which can result in higher energy costs, it is recommended that hot water production be adapted to user behaviour.

This can be achieved by setting DHW temperatures optimally tailored to requirements, with corresponding DHW block and a wide switching differential.

Block

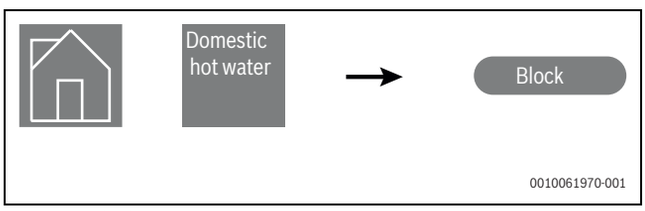


Fig. 23 Block

A DHW block can be set for two different times and days of the week. Despite a DHW block, a minimum DHW temperature can be set for comfort purposes. The minimum DHW temperature is always maintained during a DHW block, and DHW heating is actively produced up to this level. A DHW demand is triggered when the temperature falls below the minimum DHW temperature minus the switching differential.

When using the Smart Grid function – for example, via the on-site photovoltaic system – we recommend programming blocking times extending into midday. When a Smart Grid request is made, a programmed blocking is increased so that the cheaply generated electricity can be utilised for DHW heating.

Parameters		Description	Adjustment range
Set temperature		Setting of the desired Set temperature.	35 ... **50 °C** ... 85
Week profile		Activating the weekday of the selectedBlock.	Mon ... Sun
	Start time	Setting the start and end times of a Block, as well as the minimum set temperature, which is to be maintained even when a block is active. The set minimum Set temperature is also used when the Smart Grid function is in switching state 1.	00:00 ... 23:59
	End time		00:00 ... 23:59
	Set temperature		**10 °C** ... Set temperature

Table 7 Block

Thermal Disinfection

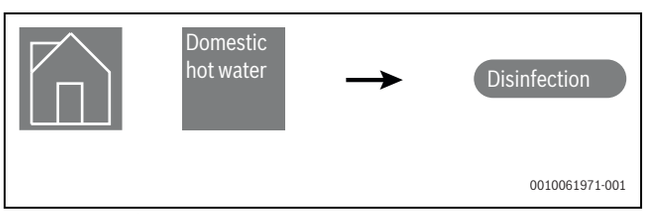


Fig. 24 Disinfection

Thermal disinfection or time-controlled reheating results in a one-off heating of the hot water to the desired temperature. For thermal Disinfection, the system immediately attempts to reach the set temperature. The selection of the DHW heaters used for this purpose depends on the operating mode of the heat pump heating system, the configurations and the current status of the system. In bivalent systems or in DHW cylinders with an integrated flange heater, thermal Disinfection can be carried out at DHW temperatures of up to 85 °C. The process ends automatically once the temperature is reached, at 24:00 or after 4 hours at the latest.

If the set temperature has not been reached after 4 hours, the thermal disinfection is cancelled.

Parameters		Description	Adjustment range
Set temperature		Setting of the desired Set temperature to be achieved by thermal disinfection or reheating.	**60 °C** ... 85
Week profile		Activating the days of the week for thermal Disinfection or time Reheating.	Mon ... Sun
	Start time	Start and end time of the weekly profile for the selected room set.temp..	00:00 ... 23:59

Table 8 Disinfection

Circulation

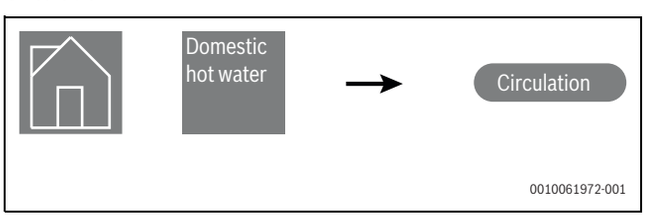


Fig. 25 Circulation

It is possible to control a DHW circulation pump via a time program with 2 time windows.

A maximum of two DHW circulation lines can be assigned to each day of the week. Requirements covering several days are activated or deactivated at the start of each new day.

A DHW circulation line is a major energy consumer. To save on energy costs, circulation should be avoided. If, however, it is cannot be avoided, we recommend adjusting the time windows to the optimal conditions. It is better to run the circulation for a specific time via a pulse. This function is also possible with the .

Parameters		Description	Adjustment range
Priority		The DHW circulation pump can be activated to run at two different times and on different days of the week.	
Week profile		Setting the days of the week for the DHW circulation pump.	Mon ... Sun
	Start time	Setting the start and end times for the DHW circulation pump.	00:00 ... 23:59
	End time		00:00 ... 23:59

Table 9 Circulation

4.1.6 Swimming pool

Block

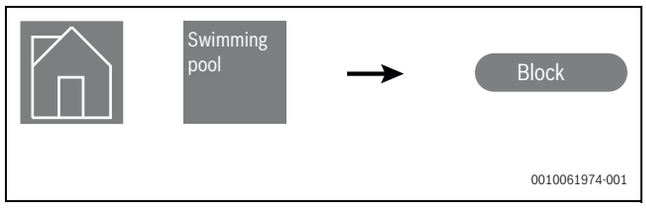


Fig. 26 Block

A pool block can be set for two different times and days of the week. Despite a pool block, a minimum pool temperature can be set for comfort purposes. The minimum pool temperature is always maintained whilst the pool is closed. A pool demand is triggered when the temperature falls below the minimum set temperature minus the switching differential.

Parameters		Description	Adjustment range
Set temperature		Setting of the desired Set temperature.	35 ... **50 °C** ... 85
	Week profile	Activating the weekday of the selectedBlock.	Mon ... Sun
	Start time	Setting the start and end times of a Block as well as the minimum set temperature, which is to be maintained even whilst a block is active. The set minimum Set temperature is also used when the Smart Grid function is in switching interval 1.	00:00 ... 23:59
	End time		00:00 ... 23:59
	Set temperature		**10 °C** ... Set temperature

Table 10 Block

Priority

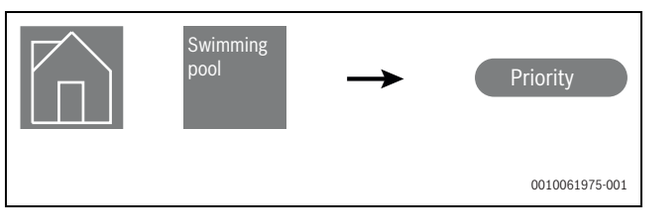


Fig. 27 Priority

During an active pool priority time, any heating or DHW demand is suppressed and the pool heating cycle is given priority.

Parameters		Description	Adjustment range
Priority			
	Week profile	Selection of the days of the week for the chosen priority pool heating cycle.	Mon ... Sun
	Start time	Setting the start time and number of hours for a priority pool preparation.	00:00 ... 23:59
	Priority		**1 h** ... 10

Table 11 Priority

4.2 Operating data

The current status of the heat pump system is documented under **Analytics > Operating data**.

4.2.1 System

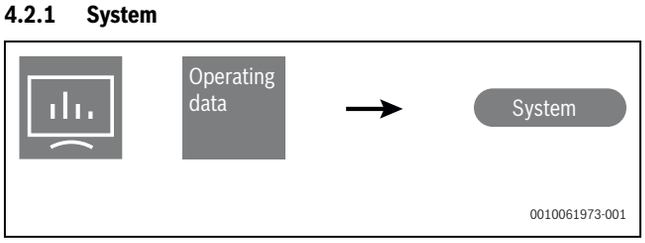


Fig. 28 System

A system overview is provided under **Analytics > Operating data > System**.

Information		Description
External temperature		The outside temperature is used, amongst other things, to calculate the set return temperature, for frost protection functions and for defrosting.
Heating / cooling		
	Demand	Indicates whether a heating/cooling demand is present and, if so, from which heating/cooling circuit. Even if a demand is present, the heat pump may not be running (e.g. during standstill periods or flushing periods).
	Set temperature	Display of the calculated set return temperature for the heating/cooling mode.
	Temperature	Display of the measured set return temperature for the heating/cooling mode.
Cylinder temperature		
	Renewable	Display of the temperature measured in the regenerative storage cylinder.

Table 12 System

4.2.2 1st/2nd/3rd Heating/cooling circuit

Under **Analytics > Operating Data > 1st/2nd/3rd Heating/Cooling Circuit**, the status of each heating circuit is provided.

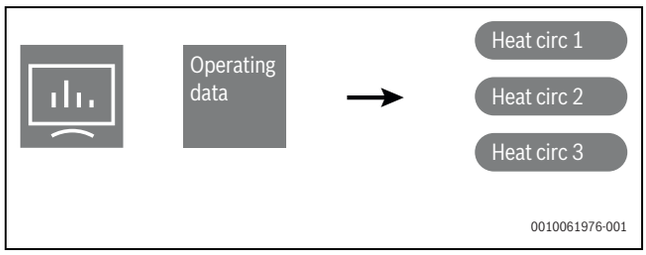


Fig. 29 1st/2nd/3rd Heating/cooling circuit

Information	Description
Status	Indicates whether there is a heating/cooling demand. Even if a demand is present, the heat pump may not be running (e.g. during standstill periods or flushing periods).
Mixer	If a mixer is used, its last and current status is indicated by an icon (open, closed, opening, closing).
Set temperature	Display of the calculated set temperature for the 1st/2nd/3rd heating/cooling circuit.
Temperature	Display of the measured actual temperature for the 1st/2nd/3rd heating/cooling circuit.
Dew point	Display of the calculated dew point temperature without dew point distance.
Humidity room	Display of the measured room humidity, when using an indoor climate station or RTM Econ.
room set.temp.	Display of the set room temperature.
Room temperature	Display of the measured room temperature when using an indoor climate station, RTM Econ or room temperature sensor.

Table 13 1st/2nd/3rd Heating/cooling circuit

4.2.3 Domestic hot water

Under **Analytics > Operating Data > DHW**, the status of the DHW function is documented.

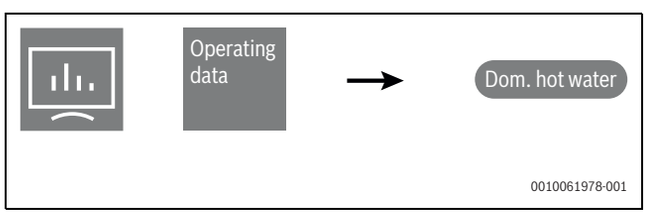


Fig. 30 Domestic hot water

Information	Description
Demand	Specifies whether there is a DHW demand. Even if a demand is present, the heat pump may not be running (e.g. due to a programmed off-peak period, operating limits or heat-up).
Set temperature	Display of current set DHW temperature.
Temperature	Display of measured DHW temperature.

Table 14 Domestic hot water

4.2.4 Swimming pool

Under **Analytics > Operating Data > Pool**, the status of the pool function is documented.

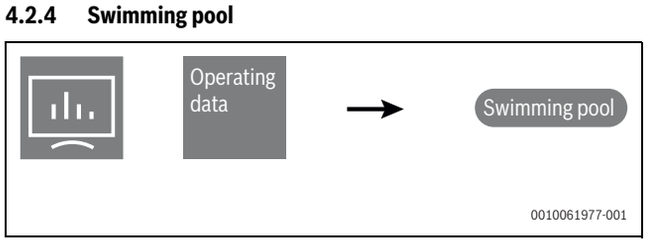


Fig. 31 Swimming pool

Information	Description
Demand	Specifies whether there is a pool demand. Even if a demand is present, the heat pump may not be running (e.g. due to a programmed off-peak period, operating limits or heat-up).
Set temperature	Display of current set pool temperature.
Temperature	Display of measured pool temperature.

Table 15 Swimming pool

4.2.5 Heat pump

Fig. 32 Heat pump

Under **Analytics > Operating Data > heat pump**, the status of the heat pump and the refrigeration circuit is documented.

Information	Description
Status	Displays the current status of the heat pump: Off, Heating, DHW, Pool, Cooling, Defrost, Flow monitoring, Operating mode switch, Blocked.
Flow temperature	Display of measured flow temperature. This temperature is used for frost protection functions, operating limits and, in the case of air-to-water heat pumps, to ensure defrosting takes place.
Return temperature	Display of measured return temperature.
Volume flow	Displays the current flow rate through the heat pump.
Air inlet temperature	Currently measured outside temperature.
High-pressure sensor	Displays the measured pressure in the refrigeration circuit on the high-pressure side.
Low-pressure sensor	Displays the measured pressure in the refrigeration circuit on the low pressure side.
Inverter frequency	Current frequency of the inverter.
Heating output stage	Current status of the compressor.
Heating water working pressure	Measured pressure in the water circuit.
Current operating limits	The operating limits are variable and change depending on conditions and operating condition. If these limits are exceeded or not reached, the system will initially be shut down, followed by an error message.
Minimum flow temp.	Displays the current possible minimum flow temperature.
Maximum flow temperature	Displays the current possible maximum flow temperature.
Minimum return temperature	Displays the current possible minimum return temperature.
Maximum return temperature.	Displays the current possible maximum return temperature.
Minimum heat source temperature.	Displays the current possible minimum heat source temperature.
Maximum heat source temperature.	Displays the current possible maximum heat source temperature.
Minimum compressor frequency	Displays the current possible minimum compressor frequency.
Maximum compressor frequency	Displays the current possible maximum compressor frequency.
Minimum flow rate	Displays the current necessary minimum volumetric flow rate.
Maximum flow rate	Displays the current possible maximum volumetric flow rate.

Table 16 Heat pump

4.3 Runtimes and timing

In addition to keeping the system temperature as low as possible, a long average running time also contributes to the efficient operation of a system. At low outside temperatures and high heat demand, the compressor will run for longer. At higher outside temperatures and lower heat demand, a running time of at least 8 minutes should be achieved. For a heating period, the average runtime should be more than 20 minutes.

4.3.1 Runtimes

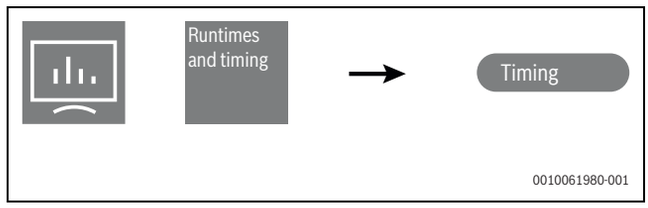


Fig. 33 Runtimes

Under **Analytics > Running Times and Cycles > Runtimes**, the runtimes of the system and refrigeration circuit actuators are recorded. Two counters are available for each actuator: a resettable counter and a non-resettable total counter.

Information	Description
Compressor 1	Compressor 1 runtime. The runtime can be reset.
Compressor 1 total	Total runtime cannot be reset.
Fan	Fan runtime. Due to defrost cycles, the total runtime is less than the sum of the compressor runtimes. The runtime can be reset
Fan total	Total runtime cannot be reset.
2nd heat generator	Runtime 2nd heat generator. The runtime can be reset.
2nd heat generator total	Total runtime cannot be reset.
Primary circuit pump M16	Heating circulation pump runtime The runtime can be reset.
Primary circuit pump M16, total	Total runtime cannot be reset.
Add. circulation pump	Auxiliary circulation pump runtime. The runtime can be reset.
Add. circulation pump total	Total runtime cannot be reset.
Hot water pump	Cylinder primary pump runtime. The runtime can be reset.
Domestic hot water pump total	Total runtime cannot be reset.
Flange heating	Flange heater runtime. The runtime can be reset.
Flange heater total	Total runtime cannot be reset.
Pool pump	Pool heating pump runtime. The runtime can be reset.
Swimming pool pump total	Total runtime cannot be reset.
Renewable	Regeneration runtime. The runtime can be reset.
Renewable total	Total runtime cannot be reset.
Cooling	Runtime of the compressor in cooling mode. The runtime can be reset.
Cooling total	Total runtime cannot be reset.

Table 17 Runtimes

4.3.2 Timing

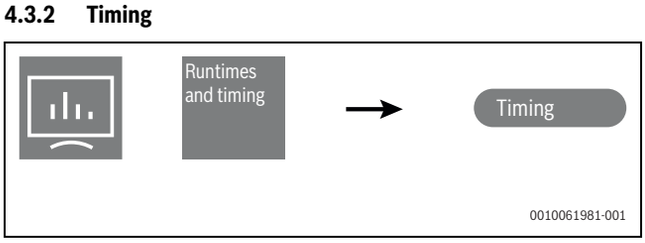


Fig. 34 Timing

Under **Analytics > Runtimes and Cycles >** Timing, the cycles of the compressor are documented, with a distinction made between the various active operating modes.

Information	Description
Compressor 1 total	Display of switching operations, compressor 1 total.
Compressor 1 heating	Display of switching operations, compressor 1 in heating mode.
Compressor 1 DHW	Display of switching operations, compressor 1 in DHW heating.
Compressor 1 swimming pool	Display of switching operations, compressor 1 in pool preparation.
Compressor 1 cooling	Display of switching operations, compressor 1 in cooling mode.

Table 18 Timing

4.4 Thermal energy and energy quantities

Recording the quantity of heat, energy and efficiencies is based on process data from the heat pump. The discrepancies between the displayed and effective electrical and thermal energy may be significant. The figures are not suitable for energy billing purposes and serve merely as comparative values for past heating periods.

4.4.1 Thermal energy

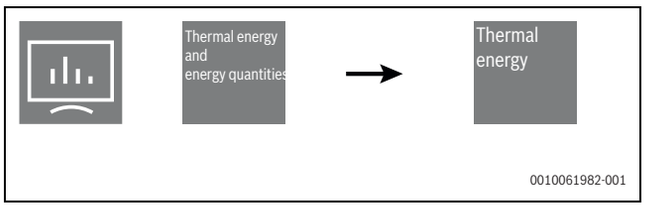


Fig. 35 Thermal energy

Under **Analytics > Thermal energy** > **Heat Quantities**, the heat output for all active operating modes is collected.

Information	Description
Heat pump	The heat output of the heat pump is added up and displayed. The quantity of heat can be reset.
Heat pump total	The total quantity of heat cannot be reset.
Heating	Display of the heat output of the heat pump in heating mode. The heating quantity of heat can be reset.
Heating total	The total quantity of heat for heating cannot be reset.
Domestic hot water	Display of the heat output of the heat pump during DHW mode. The DHW quantity of heat can be reset.
Domestic hot water total	The total quantity of heat for DHW cannot be reset.
Swimming pool	Display of the heat output of the heat pump during pool mode. The pool quantity of heat can be reset.
Swimming pool total	The total quantity of heat for the pool cannot be reset.
Environ. energy	Display of the environmental energy utilised. The environmental energy can be reset.
Environ. energy total	The total quantity of environmental energy cannot be reset.

Table 19 Thermal energy

4.4.2 Electrical energy

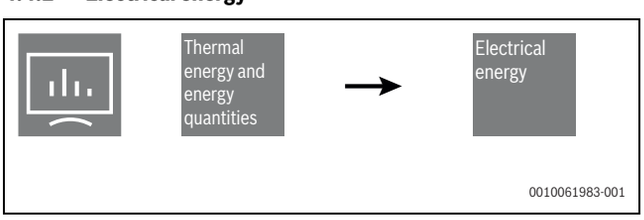


Fig. 36 Electrical energy

Under **Analytics > Thermal energy > Electrical energy**, the electrical energy consumed by the compressor, other electric heat generators and the output share attributable to the fan is documented. This value is available on a daily, weekly, monthly and annual basis.

Information	Description	Display area
Days	Display of the past 11 daily values as well as the current day since 12:00 o'clock (midnight).	0 ... 32000 kWh
Weeks	Display of the past 11 week values as well as the current week since 12:00 o'clock (midnight).	0 ... 32000 kWh
Months	Displays the past 11 monthly values as well as the current month.	0 ... 28000 kWh 28 ... 327.68 MWh
Years	Displays the past 11 annual values as well as the current year.	0 ... 28000 kWh 28 ... 327.68 MWh

Table 20 Electrical energy

4.4.3 Thermal energy

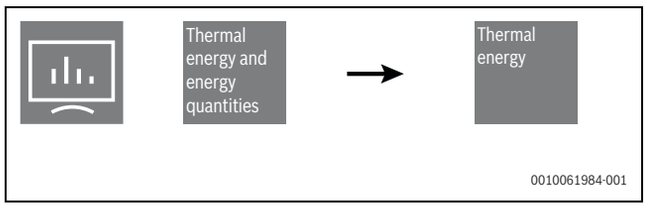


Fig. 37 Thermal energy

Under **Analytics > Thermal energy > Thermal energy**, the thermal energy supplied by the compressor, heat exchanger, flange heater and pipe heater is recorded.
External components, such as heating circulation pumps and bivalent or regenerative heat generators, are not considered. This value is available on a daily, weekly, monthly and annual basis.

Information	Description	Display area
Days	Display of the past 11 daily values as well as the current day since 12:00 o'clock (midnight).	0 ... 32000 kWh
Weeks	Display of the past 11 week values as well as the current week since 12:00 o'clock (midnight).	0 ... 32000 kWh
Months	Displays the past 11 monthly values as well as the current month.	0 ... 28000 kWh 28 ... 327.68 MWh
Years	Displays the past 11 annual values as well as the current year.	0 ... 28000 kWh 28 ... 327.68 MWh

Table 21 Thermal energy

4.4.4 Environ. energy

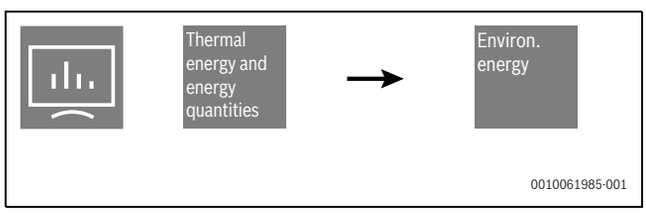


Fig. 38 Environ. energy

Under **Analytics > Thermal energy > Environ. energy**, the energy supplied by the surrounding (air) is documented.
This value is available on a daily, weekly, monthly and annual basis.

Information	Description	Display area
Days	Display of the past 11 daily values as well as the current day since 12:00 o'clock (midnight).	0 ... 32000 kWh
Weeks	Display of the past 11 week values as well as the current week since 12:00 o'clock (midnight).	0 ... 32000 kWh
Months	Displays the past 11 monthly values as well as the current month.	0 ... 28000 kWh 28 ... 327.68 MWh
Years	Displays the past 11 annual values as well as the current year.	0 ... 28000 kWh 28 ... 327.68 MWh

Table 22 Environ. energy

4.4.5 Efficiency

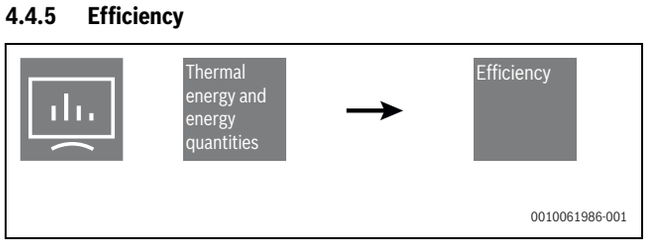


Fig. 39 Efficiency

Under **Analytics > Thermal energy > Efficiency**, the Efficiency is documented. This is derived from the thermal and electrical energy and reflects the quality of the overall system.
This value is available on a monthly and annual basis.

Information	Description	Display area
Months	Displays the past 11 monthly values as well as the current month.	1 ... 36
Years	Displays the past 11 annual values as well as the current year.	1 ... 12

Table 23 Efficiency

4.5 In- and outputs

The current status of the digital inputs and outputs can be checked in the following chapter.

4.5.1 Inputs

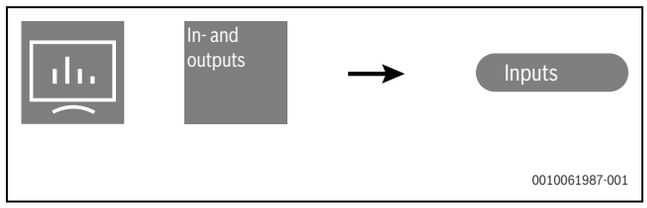


Fig. 40 Inputs

The following table shows the status of the digital inputs.

Information	Description
Low pressure switch	Low pressure, contact open = Fault (setting: low-pressure switch, normally open contact)
High pressure switch	A fault is only detected if the contact is open whilst the compressor is running. When the system is at a standstill, the contact is not evaluated. (Setting: low-pressure switch, normally open contact).
Flow rate switch secondary	Contact open = fault
Thermostat Hot water	Contact closed = DHW demand
Thermostat swimming pool	Contact closed = Pool demand
Motor protection compressor	A fault is only detected if the contact is open whilst the compressor is running. The fault is only triggered after 5 minutes. When the system is at a standstill, the contact is not evaluated.
Motor protection fan	Contact open = Fault
Utility block	Contact open = Energy supplier block
Message	Contact open = §14a – Limitation
Block external	Contact open = External block
Demand circulation pump	Contact closed = DHW circulation pump demand
Dew point monitor	Contact closed = Dew point monitor has tripped
SG ready	Status: green, yellow and red → 6.3, page 40

Table 24 Inputs

4.5.2 Outputs

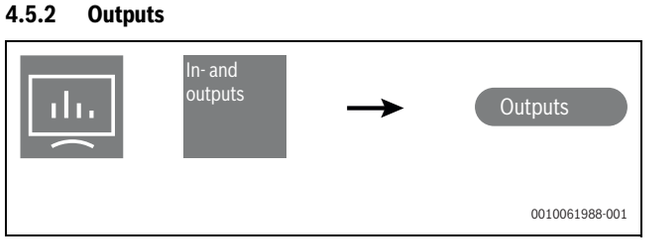


Fig. 41 Outputs

The following table shows the status of the digital outputs.

Information
Compressor 1
Fan M11
Internal 4-way valve Y1
Nozzle ring heater E4
Primary circuit pump M16
Remote fault indicator H5
Cooling circuit pump M17
Immersion heater E10.1
Mixer bivalent M26
Mixer renewable M27
Heating circuit pump 1 M13
Mixer 1. Heating circuit M21
Heating circuit pump 2 M15
Mixer 2. Heating circuit M22
Heating circuit pump 3 M20
Mixer 3. Heating circuit M29
Room thermostat N9
Hot water pump M18
Flange heating F9
Circulation pump M24
Pool pump M19

Table 25 Outputs

4.6 Settings

The following chapter describes the settings that can be carried out on the controller.

4.6.1 Display

The following chapter describes the settings that can be carried out on the display.

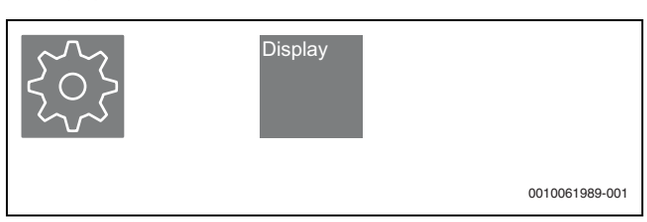


Fig. 42 Display

Parameters	Description	Adjustment range
Brightness	Setting of the display brightness.	0 ... 255
Restart	The display is shut down and restarted. This function can be useful if, for example, certain elements are not being displayed. A restart causes the display to be reinitialised in order to read in the configuration of the again.	Ok
Lock Display immediately	The display is manually set to lock mode.	Ok

Table 26 Display

4.6.2 Date and time

The following chapter describes settings for the date and time.

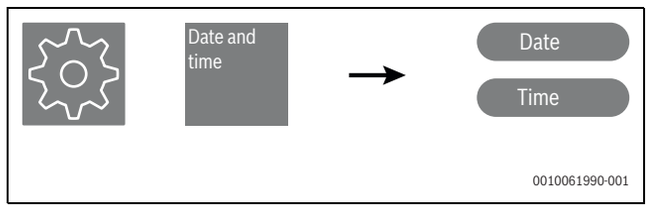


Fig. 43 Date and time

Parameters		Description	Adjustment range
Date		Setting the day, month and year.	Day : Month : Year
	Date format	Setting the desired date format:	**DD.MM.YYY** DD/MM/YYYY DD-MM-YYYY MM-DD-YYYY MM/DD/YYYY YYYY/MM/DD
Time		Setting the hours and minutes.	Hours : Minutes
	Time fromat	Setting the time format.	**24** AM/PM
	Auto clock change	You can select automatic switching between summer and winter time.	**OFF** ON

Table 27 Date and time

4.6.3 Network

The Network menu is used to carry ut the settings for the interfaces available as accessories for external connection.

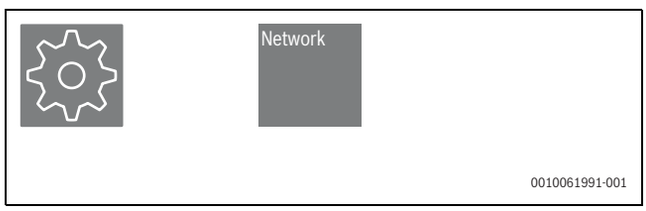


Fig. 44 Network

Parameters		Description	Adjustment range
Protocol		Modbus RTU: LWPM 410 KNX/EIB: KNX WPM Setting to specify which additional hardware is installed and used for connection to a BMS interface.	Modbus RTU EIB/KNX
Modbus		When using Modbus, an address must be assigned to every end device on the network. This address is used to address the desired terminal device.	
	Address	Setting value for the Modbus address of the heat pump.	1 ... 199

Parameters		Description	Adjustment range
	Parity	The parity, stop bits and baud rate must be selected according to the master settings.	**none** even odd
	Stopbits		**1 Bit** 2 bit
	Baudrate		1200 1400 4800 9600 19200

Table 28 Network

4.6.4 Language and region

The Language and region menu can be used to carry out the language settings and settings for physical units.

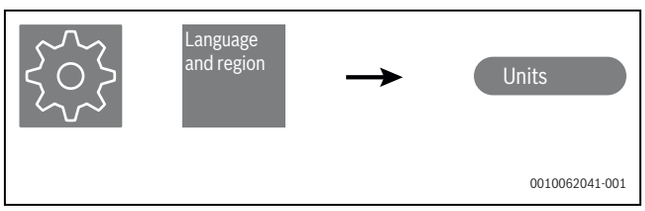


Fig. 45 Language and region

Parameters	Description	Adjustment range
Temperature	It is possible to display readings and set values in various units.	**°C** °F
Pressure		**bar** psi
Volume flow		**l/h** gal/h gal/m

Table 29 Language and region

5 Expert menu

The following settings can only be made in the expert menu. This can be accessed as described in Chapter 2.1.1, page 5.

5.1 Function control

During the function check, the connected actuators (pump, mixer, etc.) can be switched manually for testing purposes. The function check remains active for the set activation time, whilst the actuators operate for the set running time.

5.1.1 Check

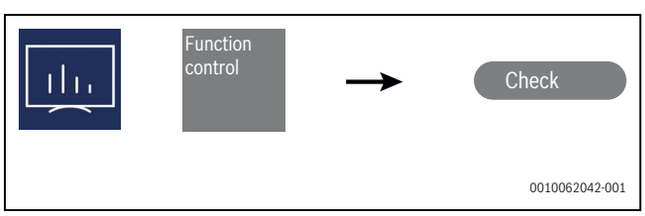


Fig. 46 Check

The following settings apply generally to all actuators and their function check.

Parameters		Description	Adjustment range
Function control		Function for the installer.	
	Function control	Activation for checking individual functions.	**No**/Yes
	Activation time	Once the activation time has elapsed, the function check is deactivated and normal operation resumes.	1 ... **30 minutes** ... 60
	Runtime	Once the set runtime has elapsed, the activated output is deactivated again.	10 ... **90 seconds** ... 120

Table 30 Check

5.1.2 Function control Pump

The function check can be used to control and monitor each pump output individually. The parameters described in the Chapter 5.1.1 can be set.

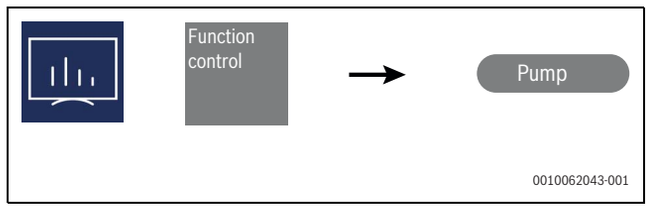


Fig. 47 Function control Pump

Parameters	Adjustment range
Primary pump M16	Off/On
Heating circuit pump 1 M13	
Heating circuit pump 1 M15	
Heating circuit pump 1 M20	
Hot water pump M18	
Circulation pump M24	
Pool pump M19	
Cooling circuit pump M17	
Fan M2	

Table 31 Function control Pump

5.1.3 Function control Heat el

The function check can be used to control and monitor each heating element individually. The parameters described in the Chapter 5.1.1 can be set.

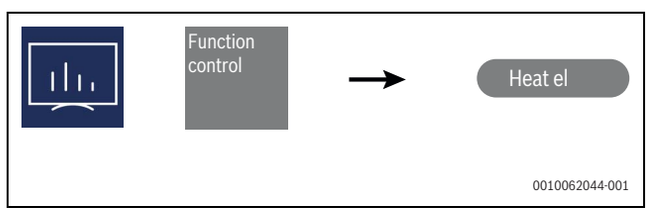


Fig. 48 Function control Pump Heat el

Parameters	Adjustment range
Immersion heater E10.1	Off/On
Flange heating E9	

Table 32 Function control Heat el

5.1.4 Function control Mixer

The function check can be used to control and monitor each output individually. During this process, the mixer or each valve runs through a full **Open** once and then complete**Close**.The parameters described in the Chapter 5.1.1 can be set.

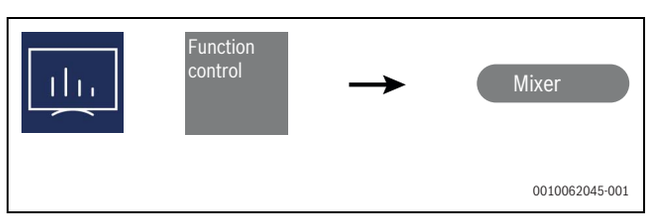


Fig. 49 Function control Mixer

Parameters	Adjustment range
Remote fault indicator H5	Off/On
Mixer bivalent H26	
Mixer renewable M27	
Mixer circuit 1 M21	
Mixer circuit 2 M22	
Mixer circuit 3 M29	
Room thermostat N9	

Table 33 Function control Mixer

5.2 System parameter

System and unit settings are configured in the System Parameters menu. Depending on the system configuration, certain menu items may or may not be visible during commissioning (Easy-ON).

5.2.1 1. Heating/cooling circuit

The following settings apply to the first heating or cooling circuits. Depending on the system configuration, certain parameters may or may not be visible during commissioning (Easy-ON).

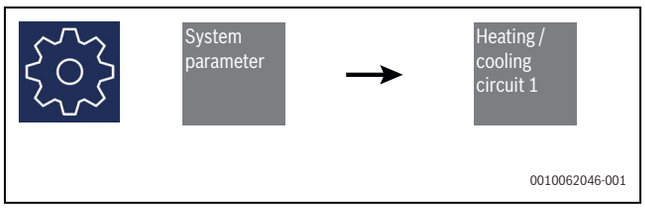


Fig. 50 Heating/cooling circuit

Parameters	Description	Adjustment range
Heating curve end point (-20 °C)	The heating curve end point must be set in accordance with the design of the heat pump heating system. The maximum set return temperature must be entered here; this is calculated based on the maximum flow temperature minus the temperature difference in the heating system (spread) at an outside temperature of -20 °C (→ Chapter 5.2.3, "Heating curve", page 27).	20 ... **30 °C** ... 70
Fixed-set control return set temp.	Setting the desired set return temperature when fixed-value control is selected.	18 ... **40 °C** ... 70
Heating curve min. outside temperature	Setting value for using a heating line (→ Chapter 5.2.3 "Heating line", page 28).	
Heating curve set temperature at min. outside temperature.		
Heating curve max. outside temperature		
Heating curve set temperature at max. outside temperature.		
Min. return temp. heating	Setting the minimum set return temperature for heating mode. When room control is activated, you can choose whether the minimum set return temperature is automatically adjusted to the set room temperature set or is fixed. Recommendation for underfloor heating: automatic Recommendation for radiators: manual / 28 °C NOTICE: The minimum/maximum achievable temperature depends on the type of heat pump used or other heat generators in the system.	**manual**/automatic minimum ... **20 °C** ... 30
Max. return temp. heating	Setting the maximum set return temperature for heating mode. Different maximum temperatures are permitted for underfloor and radiator heating systems. The upper limit of the return setpoint temperature can be set between 25 °C and 70 °C. Recommendation for underfloor heating: manual / 35 °C Recommendation for radiators: manual / 50 °C NOTICE: The minimum/maximum achievable temperature depends on the type of heat pump used or other heat generators in the system.	**manual**/automatic minimum ... **50 °C** ... 70
Mixer hysteresis	The switching differential of the mixer defines the switch-on and switch-off points for the operation of the 1st heating/cooling circuit. When the set temperature plus the switching differential is reached, a mixer close signal is sent. When the set temperature minus the switching differential is not reached, a mixer open signal is sent.	0.5 ... **2.0 K**
Mixer runtime	Depending on the mixer used, the running time between the end positions **Open** and **Close** varies. To achieve optimum temperature control in the 1st heating/cooling circuit, the mixer run time must be set.	1 ... **4 minutes** ... 5
Room control limit temperature	Below the set limit temperature, when Smart - Grid switching - state 3 is active, the control valves in rooms with a lower set room temperature will not open.	15 ... **19 °C** ... 30
Room control lower hysteresis	To prevent unnecessary cycling of the control valves, it is possible to adjust the switching differential for opening and closing the control valves depending on the set room temperature relative to the actual room temperature.	-3.0 ... **0.3 K** ... 0.8
Room control upper hysteresis		0.0 ... **0.8 K** ... 5.0
Room control flow	You can choose whether, in room control mode, the flow temperature required for the mixer is set automatically, based on the calculated temperature difference of the system, or manually. Recommendation: manually	manual/**automatic** 0 ... **5 K** ... 10
Silent cooling dew point distance	Increase in the minimum permissible flow temperature, calculated from the measured values of the room controller. A higher value reduces the risk of condensate formation.	1.5 ... **3.5 K** ... 5.0

Parameters	Description	Adjustment range
Heating M13 Heating M13 Manual	Setting the speed of the electronically controlled heating pump (M13) for the heating circuit in heating mode.	Manual Level 1 Level 2 Level 3 automatic 30 ... **50%** ... 100
Cooling M13 Cooling M13 Manual	Setting the speed of the electronically controlled heating pump (M13) for the cooling circuit in cooling mode.	Manual Level 1 Level 2 Level 3 automatic 30 ... **50%** ... 100
Pump type M13	Selection of the control type for the analogue output of the controlled heating circuit pump (M13).	0 ...10 V PWM
Pump stop M13	Setting the voltage value for pump stop at the analogue output for the controlled heating circuit pump (M13) (for set values, see specifications of the pump manufacturer)	0.1 ...**0.7 V** ... 1.0 0.1 ...**99.9 %** ... 99.9
Dynamic cooling temp.	Setting the desired set return temperature when dynamic cooling is selected. The return set value is adjusted linearly depending on the outside temperature. This is achieved using a characteristic curve, which is set at two specific operating points	→ Chapter 5.2.3, Fig. 55
Dynamic cooling temp. 15 °C	Setting the set return temperature at an outside temperature of 15 °C	10 ... 30
Dynamic cooling temp. 35 °C	Setting the set return temperature at an outside temperature of 35 °C	10 ... 30
Dynamic cooling temp.	Set value when using a fixed value for cooling.	10 ... **15 °C** ... 30
Set temperature at 15 °C outside temperature	The return set value is adjusted linearly depending on the outside temperature. This is achieved using a characteristic curve, which is set at two specific operating points.	10 ... **15 °C** ... 30
Set temperature at 35 °C outside temperature		
Demand sensor cooling	If the system hydraulics are configured with a separate cooling buffer cylinder, a sensor is usually also required. This must be activated in the settings.	**No** Yes
Cooling curve, minimum outside temperature	Setting values for using a cooling line (→ Chapter 5.2.3 "Cooling curve", page 29).	
Cooling curve, set temperature at minimum outside temperature		
Cooling curve, max. outside temperature		
Cooling curve, set temperature at max. outside temperature		
Return temp min. cooling	Setting value to limit the minimum set temperature during cooling.	10 ... **15 °C** ... max. set temperature Cooling
Maximum return temperature cooling	Setting value to limit the maximum set temperature during cooling.	min. set temperature. Cooling... **30 °C**

Table 34 Heating/cooling circuit

5.2.2 2./3. Heating/cooling circuit

The following settings apply to the other heating or cooling circuits.

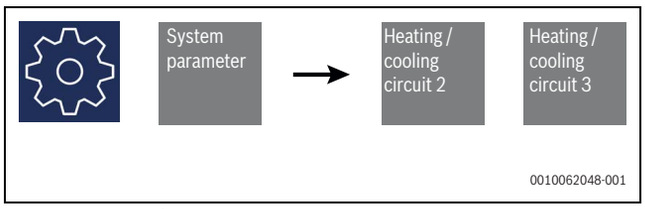


Fig. 51 Heating/cooling circuit

Parameters	Description	Adjustment range
Temperature sensor	Is the sensor for the 2nd/3rd heating circuit installed in the flow or return? If set to **Return**, the calculated set value for the 2nd heating circuit is also used for the heating demand of the heat pump, if set to **Flow**, it is used only for mixer control.	**Return**/Flow
Heating curve end point (-20 °C)	The heating curve end point must be set in accordance with the design of the heat pump heating system. Depending on the sensor location, the maximum flow or return temperature at an outside temperature of -20 °C must be entered (→ Chapter 5.2.3, "Heating curve", page 27).	20 ... **30 °C** ... 70
Heating curve parallel shift	Parallel displacement of the set heating curve for the 2nd/3rd heating circuit. Pressing the arrow buttons once displaces the heating curve by 1 K upwards (warmer) or downwards (colder) (→ Chapter 5.2.3, "Heating curve", page 27).	0 ... **20 K** ... 30
Fixed-set control set temperature	Setting the desired set temperature when fixed-value control is selected.	min. set temperature. ... **40 °C** ... 60
Heating curve min. outside temperature	Setting value for using a heating line (→ ChapterI "Heating line", page 28).	-25 ... **10 °C**... 60
Heating curve set temperature ati min. outside temperature.		-30 ... **10 °C**... 60
Heating curve max. outside temperature		0 ... **40 °C**... 60
Heating curve set temperature ati max. outside temperature.		0 ... **40 °C**... 70
Min. return temp. heating	Setting the minimum set return temperature for heating mode. When room control is activated, you can choose whether the minimum set return temperature is automatically adjusted to the set room temperature set. Recommendation for underfloor heating: automatic. Recommendation for underfloor heating Automatic; recommendation for radiators: manual / 28 °C NOTICE: The minimum/maximum achievable temperature depends on the type of heat pump used or other heat generators in the system.	manual/**automatic** 15 ... **20 °C** ... 30
Max. return temp. heating	Different maximum temperatures are permitted for underfloor and radiator heating systems. The upper limit of the return setpoint temperature can be set between 25 °C and 70 °C. Recommendation for underfloor heating: manual / 35 °C Recommendation for radiators: manual / 50 °C NOTICE: The minimum/maximum achievable temperature depends on the type of heat pump used or other heat generators in the system.	manual/**automatic** 30 ... **50 °C** ... 70 1 ... **10 K** ... 20
Mixer hysteresis	The switching differential of the mixer defines the switch-on and switch-off points for the operation of the 2nd/3rd heating/cooling circuit. When the set temperature plus the switching differential is reached, a mixer close signal is sent. When the set temperature minus the switching differential is not reached, a mixer open signal is sent.	0.5 ... **2.0 K**
Mixer runtime	Depending on the mixer used, the running time between the end positions **Open** and **Close** varies. To achieve optimum temperature control in the 2nd/3rd heating/cooling circuit, the mixer run time must be set.	1 ... **4 minutes** ... 6
Room control limit temperature	When the Smart Grid function is enabled, rooms with a set room temperature set lower than the set room control threshold temperature are not taken into account to prevent superheating.	15 ... **19 °C** ... 30
Room control lower hysteresis	To prevent unnecessary cycling of the control valves, it is possible to adjust the switching differential for opening and closing the control valves depending on the set room temperature relative to the actual room temperature.	0.0 ... **0.5 K** ... 2.0
Room control upper hysteresis		0.0 ... **0.8 K** ... 2.0

Parameters	Description	Adjustment range
Room control flow	You can choose whether, in room control mode, the flow temperature required for the mixer is set automatically, based on the calculated temperature difference of the system, or manually. Recommendation: manually	manual/**automatic** 0 ... **5 K** ... 10
Silent cooling dew point distance	Increase in the minimum permissible flow temperature, calculated from the measured values of the room controller. A higher value reduces the risk of condensate formation.	0.0 ... **3.5 K** ... 5.0
Heat generator request	Can the calculated set temperature of the mixed circuit be used as the reference for the heating or cooling source? If yes, for which operating mode?	**No** Heating Cooling Heating/cooling
Dynamic cooling temp.	Set value when using a fixed value for cooling.	10 ... **15 °C** ... 30
Cooling curve min. outside temperature	Setting values for using a cooling curve (→ Chapter "Cooling curve", page 29).	5 ... **15 °C** ... 40
Cooling curve set temperature at min. outside temperature.		5 ... **30 °C** ... 40
Cooling curve max. outside temperature		10 ... **15 °C** ... 30
Cooling curve set temperature at max. outside temperature.		10 ... **15 °C** ... 30
Flow-/Return temp min. cooling	Setting value to limit the minimum set temperature during cooling.	10 ... **15 °C** ... max. set temperature Cooling
Flow-/Return temp max. cooling	Setting value to limit the maximum set temperature during cooling.	min. set temperature. Cooling ... **30 °C**

Table 35 Heating/cooling circuit

5.2.3 Settings of the set temperature for heating/cooling

Heating curve

If the heating operation is dependent on the **outside temperature**, the heating controller calculates a set return temperature based on the set heating curve and the current outside temperature.

The heating curve should be set to the calculated maximum return temperature of the heating system. Using the Warmer (↑) and Colder (↓) buttons, the heating curve can be shifted upwards or downwards as required to achieve the actual desired room temperatures.

The heating curve should be set as high as necessary and as low as possible.

Setting a weather-compensated heating curve

The heating curve must be adjusted – separately for the 1st and 2nd/3rd heating circuits – to suit the local and building conditions, so that the desired room temperatures are achieved even when outside temperatures fluctuate. As the outside temperature rises, the set return temperature is lowered, thereby ensuring energy-efficient operation of the heating system.

The selection is made in the menu: **Settings > System parameters > 1st/2nd/3rd heating/cooling circuit**. All necessary settings can be made here.

1) Under menu item **Heating curve end point (-20 °C)**, enter the maximum return temperature required when the outside temperature is -20 °C. The goal is to achieve a moderate, constant room temperature even when outside temperatures fluctuate.

The end point to be set is designed for a maximum flow temperature, depending on the heat distribution system, at a specific standard outside temperature, which, depending on the location of the heat pump, ranges between -12 and -18 °C. Examples of settings for different systems and standard outside temperatures can be found in Table 36, page 27and Fig. 52, page 28

2) All heating curves intersect at an outside temperature of +20 °C and a return temperature of +20 °C thus, no further heating output is required at this operating point. Using the bar graph (→ Fig. 11, page 6), this operating point can be shifted between 5 °C and 30 °C along the diagonally marked axis under the menu item **Heating curve and parallel displacement**. This displaces the entire heating curve parallel upwards or downwards by a constant amount of 1 K per bar unit (→Fig. 53, pge 28). The user can adjust this setting according to their individual temperature preferences. Table. 37, page 28 can be consulted to assist with adjusting the heating curve.

3) Each heating curve is limited at the value set under **Max. return temperature**. Each heating curve is limited to the value 15 °C (air heat pump).

Setting examples:

	Underfloor heating 35 °C / 28 °C			Radiators 55 °C / 45 °C		
	[°C]					
Standard outdoor air temperature	-12	-14	-16	-12	-14	-16
Flow temperature required (at standard design temperature)	35	35	35	55	55	55
Flow/return temperature difference	7	7	7	10	10	10
Return temperature required (at standard design temperature)	28	28	28	45	45	45
Heating curve end point to be set	30	29	29	48	47	46

Table 36 Setting examples

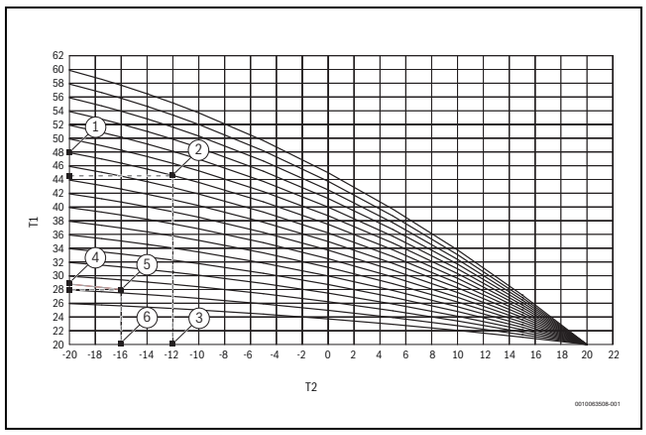


Fig. 52 Heating curve for determining the maximum set return temperature

T1 Set return temperature in °C
T2 Outside wall temperature in °C
[1] Heating curve end point 48 °C (Example 2)
[2] Return temperature at standard outside temperature 45 °C (Example 2)
[3] Standard design temperature-12 °C (Example 2)
[4] Heating curve end point 29 °C (Example 1)
[5] Return temperature at standard outside temperature 28 °C (Example 1)
[6] Standard design temperature-16 °C (Example 1)

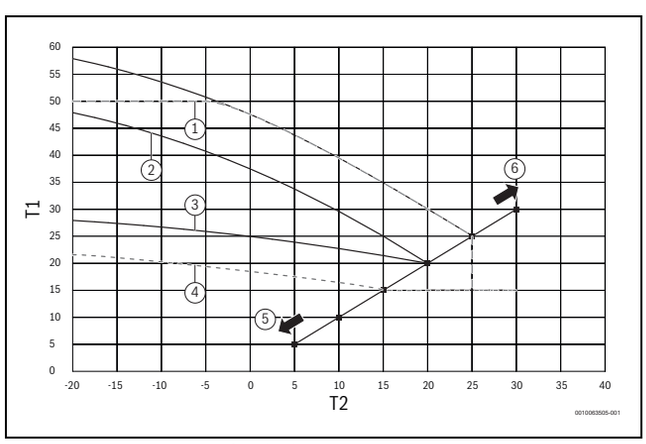


Fig. 53 Setting options for the heating curve

T1 Set return temperature in °C
T2 Outside temperature in °C
[1] Heating curve shifted in parallel (warmer) with heating curve maximum 50 °C
[2] Heating curve, e.g. radiators
[3] Heating curve, e.g. floor
[4] Heating curve shifted in parallel (colder)
[5] Cooler
[6] Warmer

Optimising the heating curve

There are two setting options to optimise the heating curve:

- Adjusting the slope by setting a higher or lower "heating curve end point".
- Raising or lowering the entire heating curve using the Warmer ↑ and Colder ↓ buttons.

To decide which settings that have to be adapted, refer to Table 37, page 28 .

If	Outside temperature		
	below -7 °C	**-7 to +7 °C**	**above -7 °C**
too cool	Value **Heating curve end point** by 2 to 3 °C higher	Warmer (↑)/ Colder (↓) by 1 to 2 °C higher scale divisions	Warmer (↑)/ Colder (↓) by 1 to 2 °C higher scale divisions and value **heating curve end point** by 2 to 3 °C lower
too warm	Value **Heating curve end point** by 2 to 3 °C lower	Warmer (↑)/ Colder (↓) by 1 to 2 °C lower scale divisions	Warmer (↑)/ Colder (↓) by 1 to 2 °C lower scale divisions and value **heating curve end point** by 2 to 3 °C higher

Table 37

Heating line

The heating line is a simplified, linear form of the heating curve and represents the relationship between the outside temperature and the set temperature as a straight line.

It is defined by:

- Rising (how much the set temperature rises as the outside temperature drops)
- Levels (parallel displacement of the straight line)

The heating straight line is defined by 4 corner points (see Fig. 54, page 28) and limited by the minimum as well as maximum set temperatures.

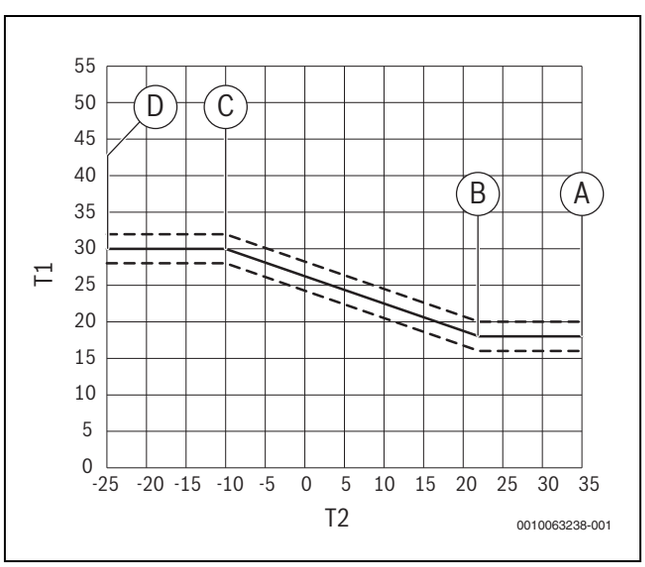


Fig. 54 Heating line

T1 Set temperature in °C
T2 Outside temperature in °C

The following parameters can be set under **Settings > System parameters > 1st/2nd/3rd heating/cooling circuit**.

Parameters	Adjustment	Example	→ Fig. 54
Maximum return temperature for heating	Setting the maximum set temperature for heating mode as limit. The calculated set temperature will not exceed the set value.	30 °C	D
Maximum flow temperature for heating			
Heating curve min. outside temperature	Setting value for the minimum outside temperature at the maximum set temperature.	-10 °C	C
Heating curve: Set temperature at minimum outside temperature.	Setting value for the set temperature at the minimum outside temperature.	30 °C	C
Heating curve max. outside temperature	Setting value for the maximum outside temperature at the minimum set temperature.	22 °C	B
Heating curve: Set temperature at minimum outside temperature.	Setting value for the set temperature at the maximum outside temperature.	18 °C	B
Minimum return temperature for heating	Setting the minimum set temperature for heating mode as limit. The calculated set temperature will not fall below the set value.	18 °C	A
Minimum flow temperature for heating			

Table 38

Dynamic cooling set temperature

During dynamic cooling, the set temperature is controlled within the maximum and minimum values depending on the outside temperature. The outside temperatures at which the minimum and maximum values apply are fixed ($T2_A$= 15 °C and $T2_B$= 25 °C). Only the minimum and maximum return temperatures can be adjusted.

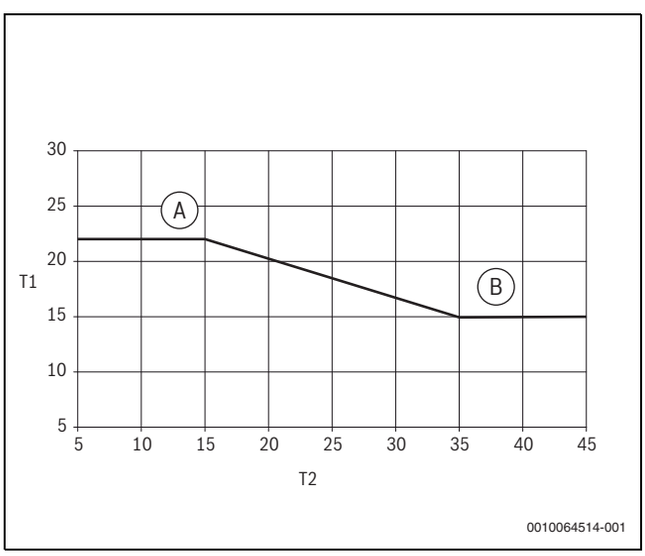


Fig. 55 Dynamic cooling set temperature

T1 Set temperature in °C
T2 Outside temperature in °C
A 22 °C
B 15 °C

Cooling curve

The cooling curve is a simplified, linear representation of the relationship between the outside and set temperature.

It is defined by:

- Rising (how much the set temperature low as the outside temperature drops)
- Levels (parallel displacement of the straight line)

The cooling curve is defined by 4 corner points (see Fig. 56, page 29) and limited by the maximum as well as minimum set temperatures.

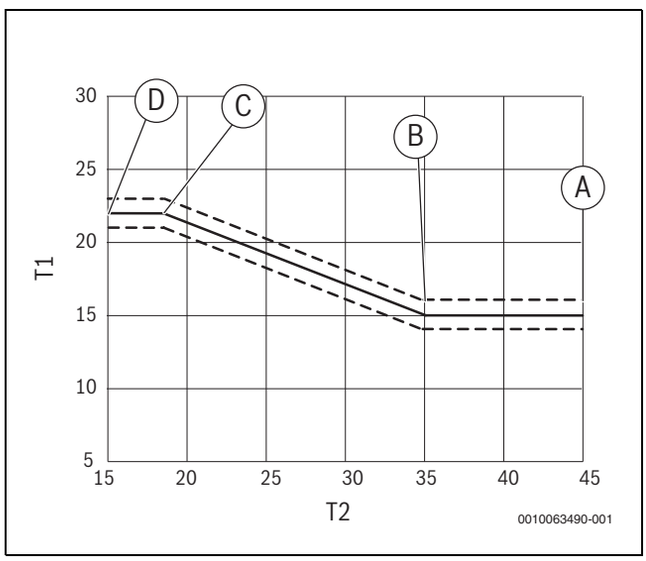


Fig. 56 Cooling curve

T1 Set temperature in °C
T2 Outside temperature in °C

The following parameters can be set under **Settings > System parameters > 1st/2nd/3rd heating/cooling circuit**

Parameters	Adjustment	Example	→ Fig. 56
Cooling circuit min. set temperature.	Limit value for the minimum set temperature in cooling mode. The calculated set temperature will not be exceeded, for example, when the bar graph display changes.	15 °C	A
Cooling curve set temperature at max. outside temperature.	Setting value for the set temperature at the maximum outside temperature.	15 °C	B
Cooling curve min. outside temperature	Setting value for the minimum outside temperature at the maximum set temperature.	18 °C	C
Cooling curve set temperature at min. outside temperature.	Setting value for the set temperature at the minimum outside temperature.	22 °C	C
Cooling curve max. outside temperature	Setting value for the maximum outside temperature at the minimum set temperature.	35 °C	B
Cooling circuit max. set temperature.	Limit value for the maximum set temperature in cooling mode. The calculated set temperature will not be exceeded, for example, when the bar graph display changes.	22 °C	D

Table 39

5.2.4 Domestic hot water

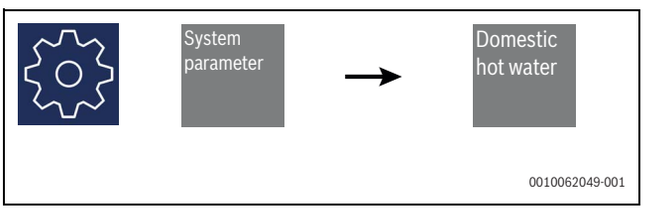


Fig. 57 Domestic hot water

The settings for DHW heating are configured via the menu Settings > System parameter > Domestic hot water The required DHW temperature can be set in menu.

DHW heating without flange heating

If the set DHW temperature is higher than the maximum DHW temperature that can be achieved by the heat pump, DHW heating is stopped as soon as the heat pump **Maximum temperature** reaches this temperature.

DHW heating with flange heating

If the set DHW temperature is higher than the maximum DHW temperature that can be achieved by the heat pump, DHW heating is carried out via the integrated flange heating once the heat pump **Maximum temperature** has reached its limit.

Reheating with flange heater

Following hot water production using the heat pump, systems with a flange/pipe heater or a 2nd heat generator can perform reheating to achieve higher temperatures. This is activated if the set DHW temperature is not reached. The next DHW heating will only commence once the temperature falls below the current heat pump **Maximum temperature** temperature minus the set switching differential. The initial heating is always carried out via the heat pump.

Parameters	Description	Adjustment range
Hysteresis	The switching differential of the set DHW temperature defines the switch-on and switch-off points; if the temperature falls below these points, a DHW demand is triggered.	2 ... **7 K** ... 15
Parallel cooling DHW	Is it possible to run the cooling and DHW in parallel operation, given the hydraulic separation of the cooling and DHW circuit?	**No**/Yes
Set temperature	Setting of the required set DHW temperature:	30 ... **50 °C** ... 85
Minimum temperature	Setting the required set DHW temperature, which is to be maintained even during an active DHW reduction period or an external DHW block, or when using the Smart Grid function, switching state 1.	0 ... **10 °C** ... Set DHW temperature
Maximum temperature	Setting of the required set DHW temperature to be achieved during parallel operation or when using the Smart Grid function, switching state 3.	30 ... **60 °C** ... 85
Reheating	Setting to determine whether the existing flange heater should also be used for reheating. If set to **No**, DHW heating is limited to the current heating pump **Maximum temperature**, depending on the heat source temperature.	**No**/Yes
Circulating switch-off delay	The DHW circulation pump is started, for example, by a paddle switch. If the padle switch is switched back, the DHW circulation pump continues to run for the set time.	1 ... **5 minutes** ... 15
Maximum temp. 1 compressor	Display of the calculated maximum DHW temperature as a function of the heat source temperature.	
Hot water pump	Setting for the speed of the electronically controlled cylinder primary pump (M18).	automatic Level 1 Level 2 Level 3 Manual
Hot water pump Manual		30 ... **50%** ... 100

Parameters	Description	Adjustment range
Pump type	Selection of the control type for the analogue output of the controlled cylinder primary pump (M18).	0-10 V PWM
Pump stop	Setting the voltage value for pump stop at the analogue output for the controlled cylinder primary pump (M18) (for set values, see specifications of the pump manufacturer)	0.1 ... **0.7 V** ... 1.0 0.1 ... **99.9 %**

Table 40 Domestic hot water

5.2.5 Swimming pool

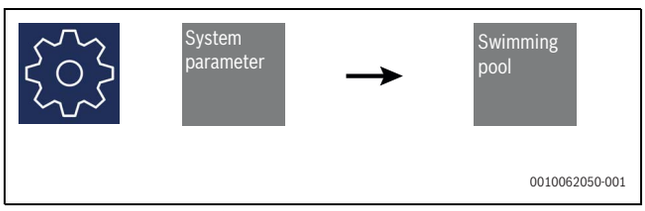


Fig. 58 Swimming pool

The pool functions can be configured under **Settings > System Parameters > Pool**.

Parameters	Description	Adjustment range
Hysteresis	The switching differential of the set pool temperature defines the switch-on and switch-off points; if the temperature falls below these points, a set pool temperature is triggered.	0.0 ... **5 K** ... 20
Set temperature	Setting of the required set pool temperature:	5 ... **25 °C** ... 60
Minimum temperature	Setting the required set pool temperature, which is to be maintained even during an active pool block or when using the Smart Grid function in switching state 1.	0 ... **10 °C** ... Set pool temperature
Maximum temperature	Setting of the required set pool temperature to be reached when using the Smart Grid function in switching state 3.	30 ... **60 °C** ... 85
Pool pump	Setting for the speed of the electronically controlled pool heating pump (M19).	automatic Level 1 Level 2 Level 3 Manual
Pool pumpManual		30 ... **50%** ... 100
Pump type	Selection of the control type for the analogue output of the controlled pool pump (M19).	0-10 V PMW
Pump stop	Setting the voltage value for pump stop at the analogue output for the controlled pool pump (M19) (for set values, see specifications of the pump manufacturer)	5 ... **25 °C** ... 60 0.1 ... **99 %**

Table 41 Swimming pool

5.2.6 Additional Heat generator

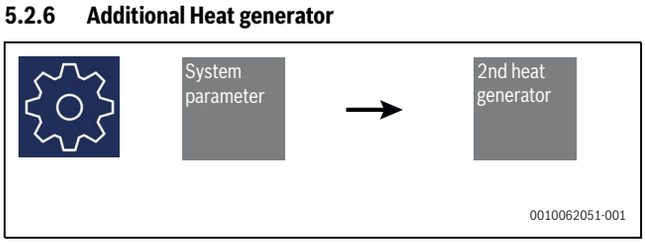


Fig. 59 Heat generator

Settings for additional heat generators, both electric and bivalent, can be configured under **Settings > System Parameters > 2 Heat generators**.

Limit temperature

The outside temperature at which the heat pump only just covers the heating demand is designated as limit temperature 2, heat generator or also dual-fuel switch-over point. This point is characterised by the transition from pure heat pump operation to bivalent operation in conjunction with immersion heaters or a floor standing boiler. The theoretical bivalent temperature may differ from the optimum. Particularly during transitional periods (cold nights, warm days), a lower bivalence point can reduce energy consumption in line with the operator's preferences and habits. For this reason, on a limit temperature for activating the 2nd heat generator can be set in the menu. Typically, the threshold temperature is only used in single energy source systems with air to water heat pumps or in bivalent systems in combination with floor standing boilers. In single energy source operation, a threshold temperature of -5 °C is targeted. The threshold temperature is determined from the building's heat demand, which depends on the outside temperature, and the heating capacity curve of the heat pump.

Parameters	Description	Adjustment range
Limit temperature parallel	The limit temperature for the 2nd heat generator must be selected in accordance with the design of the heat pump heating system. Below the Limit temperature parallel, the heat pump as well as the 2nd heat generator operate to heat the building. Switching on the 2nd heat generator is only carried out in parallel with output stage 3 when the outside temperature falls below the set parallel limit temperature. NOTE! If parallel operation is not required, the **Parallel limit temperature** must be identical to the **Limit temperature alternative**. More details → Chapter 6.4, page 40	**Limit temperature alternative** ... **-5 °C** ...
Limit temperature alternative	If the temperature falls below the **Limit temperature alternative** and output stage 3, only the 2nd heat generator is used to heat the building. The heat pump is blocked from this point onwards. More details → Chapter 6.4, page 40	Lower operating limit ... **-10 °C** ... Limit temperature parallel

Table 42 Limit temperature

Constant-controlled floor standing boiler
With this type of boiler, the boiler water is always heated to a fixed temperature (e.g. 70 °C) when the is activated. The set temperature must be high enough to ensure that DHW heating can also be carried out by the boiler if required. Control of the mixer is handled by , which activates the boiler when necessary and mixes in enough hot boiler water to achieve the desired set return or DHW temperature. The boiler is requested via the 2nd heat generator of the system. The operating mode of the 2nd heat generator must be set to **constant**.

Variable-controlled floor standing boiler
Contrary to a boiler with constant control, a boiler with variable control directly delivers a DHW temperature that corresponds to the outside temperature.

The 3-way diverter valve has no control function; its sole purpose is to direct the flow of heating water either past the boiler circuit or through the boiler, depending on the operating mode. In pure heat pump mode, the heating water is routed past the boiler to avoid losses due to heat radiation from the boiler. If a weather-compensated burner output control is already present, the power supply to the burner output control must be disconnected during exclusive heat pump operation. For this purpose, connect the floor standing boiler control to the output of the 2nd heat generator of the and set the operating mode of the 2nd heat generator to "variable". The curve of the burner output control is adjusted according to .

Parameters	Description	Adjustment range
Operating mode	A 2nd heat generator with variable flow control has its own control and is supplied with the full volumetric flow rate when required. A 2nd heat generator with constant flow control is set to a constant temperature; the mixer control is active.	**Variable (valve)** ... Constant (mixer)
Mixer runtime	Depending on the mixer used, the running time between the end positions **Open** and **Close** varies. To ensure optimum temperature control of the bivalent heat generator the mixer runtime must be adjusted.	1 ... **4 minutes** ... 6
Mixer hysteresis	The switching differential of the mixer defines the switch-on and switch-off points for operation of the bivalent heat generator When the set temperature plus the switching differential is reached, a mixer close signal is sent. When the set temperature minus the switching differential is not reached a mixer open signal is sent	0.5 ... **2 K**

Table 43 controlled heating circuit

Utility block
Energy supply companies (EVU) may require the heat pump to be switched off temporarily as a condition for favourable electricity tariffs. During an energy supplier block, the energy supplier block at is opened. For systems without an energy supplier lockout, a jumper must be inserted at the relevant terminal points. Details can be found in the electrical documentation.
General settings relating to the energy supplier block can be found in Chapter 5.2.10, page 36. In bivalent systems, there are different ways of responding to an energy supplier block:

- Output stage 3
  Heat pump blocked; the 2nd heat generator is only enabled at output stage 3.
- Constant
  The 2nd heat generator is always enabled during the energy supplier block whenever there is a heat demand.
- Temperature-dependent
  Heat pump blocked; the 2nd heat generator is enabled below the adjustable limit temperature. For single energy and monovalent systems, the 2nd heat generator is generally disabled during an energy supplier block. The setting for the energy supplier block is hidden.

To block out heat pump operation externally, which does not automatically reset after a maximum of 2 hour, the external block input must be used. If the return flow temperature falls below the minimum permissible value, the heat pump is enabled even if a block signal is present.

Parameters	Description	Adjustment range
Utility block release	This setting determines the behaviour of the 2nd heat generator during an energy supplier block (interruption of the load voltage). Output stage 3: During the energy supplier block, the 2nd heat generator is only enabled at output stage 3. In single-energy systems, the immersion heater is always blocked. Constant: The 2nd heat generator is only enabled during the energy supplier block. Limit temperature-depending: The 2nd heat generator is only enabled during the energy supplier block if the temperature also falls below the threshold	**Output stage 3** Constant Limit temperature-dependent
Utility block limit temperature	Limit temperature for enabling the 2nd heat generator when setting **Limit temperature-dependent**.	-10 ... **0 °C** ... 10

Table 44 Utility block

Special program

Special program for older floor standing boilers and central storage systems. If the second heat generator has been requested and the special program activated, the 2nd heat generator remains in operation for at least 30 hours. If the heat demand decreases during this time, the second heat generator switches to **standby** (2nd heat generator powered, but mixer **Close**). It is only switched off completely once there has been no demand on the 2nd heat generator for 30 hours.

This function can be used in bivalent systems as follows:

- In older oil or floor standing conventional gas boilers, to prevent corrosion damage caused by the temperature frequently falling below the dew point.
- In central storage systems, to ensure that the storage tank is charged for the following day, regardless of the current heat demand.

Parameters	Description	Adjustment range
Special program	The special program is to be used with old floor standing boilers or bivalent systems with central storage cylinder in order to prevent corrosion caused by condensation. When the 2nd heat generator is enabled, it remains in operation for at least the number of hours set.	0 ... **1 hour**. 99
Pump control M16	Should the primary pump M16 be in operation in the event of a bivalent demand?	Yes/No

Table 45 Special program

Setpoint specification 2nd heat generator

If the bivalent heat generator has a 0–10 V interface for setpoint value, it supplies the via an output of the control signal. For this purpose, 5 corner points must be adjusted to the specifications of the bivalent heat generator. The voltage output for the setpoint corresponds to the calculated system temperature. For DHW/pool heating and/or reheating, the maximum set set value is used.

Parameters		Description	Adjustment range
Setpoint specification 2nd heat generator			→ Fig. 60, page 33
A	System temperature minimum	Setting for the minimum system temperature at minimum voltage.	**8 °C** ... max.
B	Voltage minimum	Setting value for the minimum voltage at the minimum operating temperature.	Off ... **3.0 V** ... max.
C	Voltage maximum	Setting value for the maximum voltage at the maximum operating temperature.	min. ... **10V**
D	System temperature maximum	Setting value for the minimum system temperature at maximum voltage.	min. ... **80 °C**
E	Voltage burner off	Setting value for burner off. The value between the minimum voltage and the voltage off setting corresponds to standby of the boiler. 0 V may be detected as a cable break and therefore as a fault.	0 ... **2.5 V** ... 8.0

Table 46 Setpoint specification 2nd heat generator

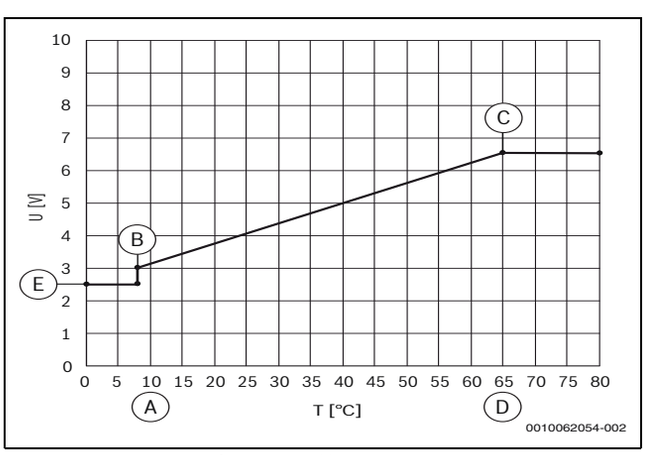


Fig. 60 Setpoint specification 2nd heat generator

T System temperature °C
U Voltage V

A System temperature minimum 8 °C
B Voltage minimum 3.0 V
C Voltage maximum 6.5 V
D System temperature maximum 65 °C
E Voltage burner off 2.5 V

5.2.7 Renewable

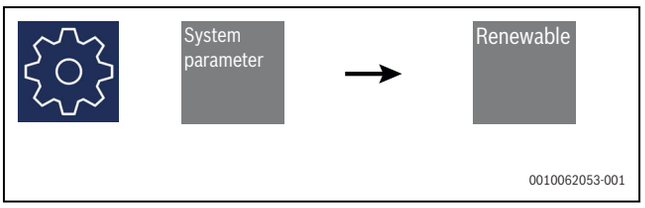


Fig. 61 Renewable

When integrating a regenerative heat source (e.g. solar, wood), this must be given priority over the operation of the heat pump. To do this, select the "Regenerative" function in EasyOn during the selection process. As long as the regenerative storage cylinder is cold, the system behaves like a single-energy system. The sensor for the regenerative storage cylinder is connected to the analogue input (3) of the Renewable function block. Please refer to the installation instructions of the for further details. The mixer outputs of the dual fuel mixer are active.

Standard function

The temperature in the regenerative storage cylinder is measured and compared with the flow temperature for the relevant demand (DHW, heating or pool). If the temperature differential exceeds the values listed below within the setting ranges shown in Tab. 47, page 34, the heat pump is blocked, the regenerative storage cylinder is used as the 2nd heat generator, and the dual fuel mixer is controlled accordingly.

Shutdown due to heating demand

If the temperature in the storage cylinder is 2–20 K higher than the current flow temperature, the heat pump is shut down when a heating demand is present. Operation is resumed only after the difference between the regenerative storage cylinder and the flow temperature is less than half the switching value →Table 47, page 34.

For solar integration, the adjustable overtemperature should be set to the maximum value to prevent the heat pump from cycling.

Blocking due to DHW demand

If the temperature in the storage cylinder is 2–5 K higher than the current DHW temperature, the heat pump is shut down when a DHW temperature is present. It is only enabled again when the difference between the regenerative storage cylinder and the DHW is less than half the switching value → Table 47, page 34

Blocking due to pool demand

If the temperature in the storage cylinder is higher than 35 °C (value can be set in the menu – Settings 2nd heat generator overtemperature, adjustable from 10–50 °C), the heat pump is blocked when there is a pool demand. It is only enabled again once the temperature in the parallel buffer cylinder is 5 K below the switching temperature.

Mixer activation

If there is no regenerative block, the mixer is controlled continuously **Close**. If there is a regenerative block due to DHW or the pool, the mixer is controlled continuously **Open**. If there is a regenerative block due to the heating, the mixer control is activated.

Parameters	Description	Adjustment range
Renewable mixer runtime	Depending on the mixer used, the running time between the end positions **Open** and **Close** varies. To ensure optimum temperature control of the bivalent regenerative heat generator, the mixer runtime must be adjusted.	1 ... **4 minutes** ... 6
Renewable mixer hysteresis	The switching differential of the mixer defines the switch-on and switch-off points for operation of the bivalent regenerative heat generator When the set temperature plus the switching differential is reached, a mixer close signal is sent. When the set temperature minus the switching differential is not reached, a mixer open signal is sent.	0.5 ... **2 K**
Heat temp. bivalent-renewable	The temperature differential between the regenerative storage cylinder and the flow temperature that must be exceeded for the heat pump to be blocked when there is a heating demand. Comfort: A regenerative heating block is only active if the temperature in the regenerative storage cylinder is higher than the current return set temperature minus the switching differential. Energy-optimised: A regenerative heating block is independent of the set return temperature.	2 ... **10 K** ... 20 **Comfort**/Energy option
Heat bivalent-renewable		
DHW bivalent-renewable	The temperature differential between the regenerative storage cylinder and the DHW temperature that must be exceeded for the heat pump to be blocked when there is a DHW temperature.	2 ... **5 K** ... 50
Swim bivalent-renewable	Temperature of the regenerative storage cylinder that must be exceeded for the heat pump to be disabled when there is a pool demand.	10 ... **35 °C** ... 50
Pump control renewable M16	Should the primary pump M16 be in operation in the event of a regenerative demand?	Yes/No

Table 47 Renewable

5.2.8 Heating / cooling

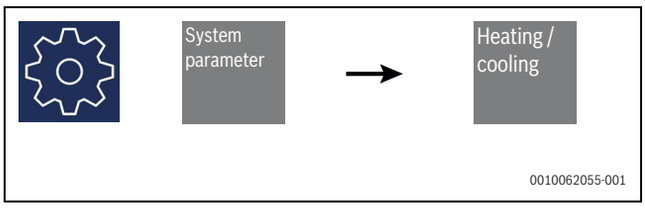


Fig. 62 Heating / cooling

To adjust general settings for heating and cooling, the following settings can be configured. If only heating is enabled, all cooling settings are hidden.

Parameters	Description	Adjustment range
Heating hysteresis return set temp.	The switching differential of the set return temperature defines the switch-on and switch-off points for heating mode of the heat pump. Once the **set return temperature plus switching differential** is reached, the heat pump switches off. Once the **set return temperature minus switching differential** is reached, the heat pump switches off.	0.5 ... **2.0 K** ... 5.0
Heating M16	Speed settings for the electronically controlled heating pump (M16) in heating mode	Manual Level 1 Level 2 Level 3 automatic
Heating M16 Manual	Additional setting when selecting manual speed in heating mode.	30 ... **50%** ... 100
Cooling hysteresis return set temp.	The switching differential of the set return temperature defines the switch-on and switch-off points for cooling mode of the heat pump. Once the **set return temperature plus switching differential** is reached, the heat pump switches off. Once the **set return temperature minus switching differential** is reached, the heat pump switches off.	0.5 ... **2.0 K** ... 5.0
Cooling M16	Speed settings for the electronically controlled primary circuit pump M16 in cooling mode.	Manual Level 1 Level 2 Level 3 automatic
Cooling M16 Manual	Additional setting when selecting manual speed in cooling mode.	30 ... **50%** ... 100
M16 Pump type	Selection of the control type for the analogue output of the controlled primary circuit pump M16.	0-10 V PMW
M16 Pump stop	Setting the voltage value for pump stop at the analogue output for the controlled primary circuit pump M16 (for set values, see specifications of the pump manufacturer)	0.1 ... **0.7 V** ... 1.0 0.1 ... **99.9 %**
Heating room control I-share min.	Control settings when room temperature control is selected for heating.	000 ... **240** ... 999
Heating room control I-share max.	I * Amplification: minimum / maximum setting value	000 ... **480** ... 999
Cooling room control I-share	Setting of the I-component when room temperature control is selected for cooling.	000 ... **060** ... 999

Table 48 Operating mode

5.2.9 Pump control

This chapter describes the pumps and their functions. These settings must be selected in accordance with the system hydraulics.

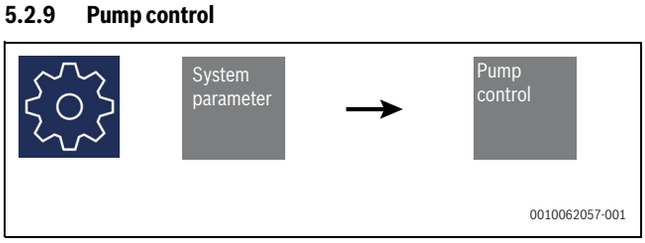


Fig. 63 Pump control

Parameters	Description	Adjustment range
M16 Function M13	Should the primary circuit pump M16 take over the function of the heating circulation pump M13?	Yes/No
Heating limit temperature 1	The heating limit temperatures are based on the outside temperature. Below heating limit temperature 1, the heating pump is switched on continuously. At temperatures between heating limit temperatures 1 and 2, the primary circuit pump M16 operates in pump optimisation.	-10 ... **15 °C** ... Heating limit temperature 2

Parameters	Description	Adjustment range
Heating limit temperature 2	Above heating limit temperature 2, the heating pump is switched Off continuously. The heating pump only starts running above the heating limit temperature when a demand is made, with a flushing period. Flushing therefore takes place on a demand-dependent basis.	Heating limit temperature 1... **25 °C ...** 35
Cooling limit temperature 1	Below cooling limit temperature 1, the heating pump is switched Off continuously. The heating pump only starts running above the cooling limit temperature when a demand is made, with a flushing period. Flushing therefore takes place on a demand-dependent basis.	-10 ... **15 °C** ... Cooling limit temperature 2
Cooling limit temperature 2	Above cooling limit temperature 2, the heating pump is switched On continuously. At temperatures between cooling limit temperatures 1 and 2, the heating pump operates in pump optimisation.	Cooling limit temperature 1... **25 °C ...** 35
Pump forerun sec. pump	Setting the lead time for the primary circuit pump M16 before the compressor starts.	10 ... **60 s** ... 420
Pump afterrun sec. Pump	Setting the overrun time for the primary circuit pump M16 after the compressors have been switched off.	0 ... **5 s** ... 420

Table 49 Pump control

5.2.10 System

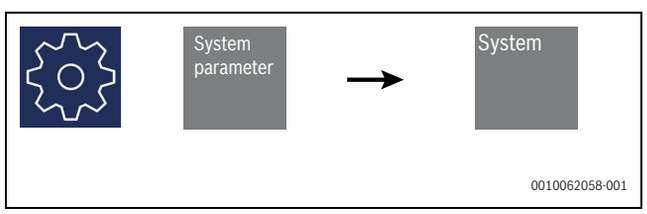


Fig. 64 System

This chapter describes the system settings and functions. These settings must be selected in accordance with the system hydraulics and existing electrical system.

Parameters	Description	Adjustment range
External disable contactor	What function should be performed when this input (DI2 – grey block) is opened? → Chapter 6.11.2, page 44	Frost protection Holiday Block hot water Summer operating mode
Consumption immersion heater	Setting value for the power consumption of the electric immersion heater installed in the buffer storage tank. This value is included in the efficiency calculation.	0 ... 32.00 kW
Consumption pipe heater	Setting value for the power consumption of the electric pipe heater installed in the heating system. This value is included in the efficiency calculation.	0 ... 32.00 kW
Consumption flange heater	Setting value for the power consumption of the electric flange heater installed in the DHW cylinder. This value is included in the efficiency calculation.	0 ... 32.00 kW
Smart grid	Is the "Smart Grid" function used on via the digital inputs (U3 and U4 – grey block) on the unit (→ Chapter 6.3, page 40)?	**Yes** No
Network-oriented control	How does network-oriented control work (→ Chapter Network-oriented control, page 36)?	EVU **Direct** EMS
Maximum power consumption	If "Direct" has been selected as the grid-oriented control mode, the maximum power consumption of the heat pump must be entered as specified in the application form of the network operator. This results from: • Heat pump • Electric immersion heater • Electric pipe heater • Flange heater If the network operator requires a reduction in power, the power output of the system will be reduced to this value. Where necessary, heating elements will be deactivated or the output of the heat pump reduced.	0 ... 320.0 kW

Table 50 System

Network-oriented control

Network-oriented control means that, in the event of an imminent network overload, the network operator temporarily reduces the electricity consumption of a heat pump in order to ensure stability of the network. Until 2023, this was primarily achieved via the energy supplier block and has been regulated since 2024 under Section 14a of the German Energy Industry Act (EnWG). If the heat pump can be controlled, the system operator benefits from a reduced network fees.

Time period	Control via	Action	Setting value
up to 2023 (classic: energy supplier block)	Energy supplier (EVU), traditionally via a timer or ripple control receiver	complete shutdown	EVU
from 2024 (§14a EnWG)	Network operator via smart meter and control box	Power reduction in accordance with Section 14a EnWG	**Direct**
	Via an energy management system capable of controlling multiple loads (heat pump, wallbox, battery, etc.)		EMS

Table 51

Energy management system

If the option to control via an energy management system (EMS) has been selected, the maximum power consumption value can be adjusted dynamically using the various communication protocols (Modbus, KNX). This may be necessary and recommended when several consumers are controlled via an EMS. If the value is > 0, the power consumption is reduced to this value. If the value is 0, no power reduction takes place. Further details can be found in the BMS interface. More details →Chapter 6.11.1, page 44

5.2.11 Heat pump

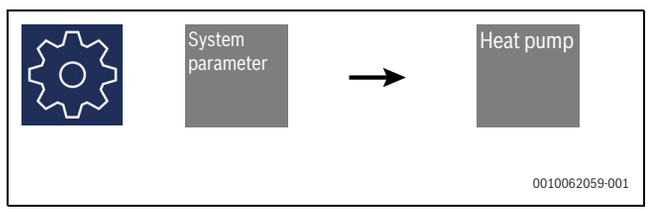


Fig. 65 Heat pump

For heat pumps, there is the option of a time-controlled reduction for low-noise operation. This may be necessary during the night in densely built-up residential areas. Reducing the fan speed leads to a reduction in performance and efficiency. Please refer to the data sheet for the relevant heat pump.

Parameters		Description	Adjustment range
Fan lower time Silent Mode			
	Week profile	The weekly profile can be used to set fan reduction times via two schedules.	Mon ... Sun
	Lower	Reduction time and reduction value for the fan. In heating mode, depending on the heat pump type, Silent Mode has a pre-set reduction value which varies between the minimum and maximum fan speeds during the reduction period. The reduction value can only be adjusted in cooling mode and only applies during the reduction time.	
	Start time		00:00 ... 23:59
	End time		00:00 ... 23:59
	Lower value cool		0 ... 1.5 V
SuperSilentMode		Super Silent mode is a much higher reduction in fan speed and thus a lower noise level. Details can be found in the installation instructions of the . This setting is used to specify the noise-reduction mode. It is activated during the set reduction time.	**deactivated** activated

Table 52 Heat pump

5.3 Installation

Under **Installation**, you can find several functions that can be used during installation and commissioning.

5.3.1 Initial heat program

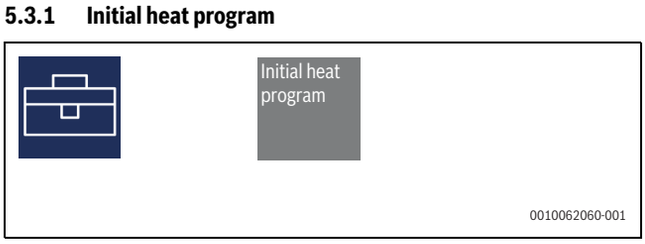


Fig. 66 Initial heat program

The preheating of a screed is carried out in accordance with specified standards and guidelines, which have, however, been adapted to the requirements of a heat pump heating system.

The following applies during firing-up:

- The heating pumps for the 1st, 2nd and 3rd heating circuits run continuously.
- Programmed reductions or increases are discarded. A fixed switching differential of ± 0.5 K applies (regardless of the menu configuration).
- The limit temperature for the 2nd heat generator is set to +35 °C (regardless of the menu configuration).
- The calculated set temperature applies to all heating circuits.
- The mixer for the 2nd/3rd heating circuit is controlled at a time **Open**.
- In the event of a fault or power cut, the selected program is merely interrupted. Once power is restored or the fault is acknowledged, the system continues with the corresponding program step.

Unless the manufacturer specifies otherwise, we recommend use of the standard screed heating program (max. return temperature 35–40 °C).

The guideline assumes full days, for each of which a specified temperature is to be reached or maintained. If the screed has a high moisture content, the specified temperatures are often not reached within the prescribed time frame. However, to ensure the screed is sufficiently dried out, it is essential to maintain the temperature level for a specific period of time. For this reason, the number of days specified in the standard are converted into program steps, with each program step corresponding to a combination of the number of days or hours and the corresponding temperature.

Depending on the ratio of the heat pump's heating capacity to the heated living area, the specified minimum running times may be significantly exceeded, as the required minimum number of hours is only accumulated once the set temperature has been reached.

The relevant standards and guidelines each specify the flow temperature of the heating system. The return temperature is decisive for control of the heat pump.

For the heat-up program, the maximum return temperature must be entered. This is calculated as the maximum flow temperature minus the temperature difference (e.g. 7 K).

5.3.2 Functional heating in accordance with DIN EN 1264-4

This program serves as a functional test for underfloor heating systems and is carried out after the prescribed curing time for the screed. The aim is to identify any defects in the screed and the underfloor heating system.

1. Step	A constant return temperature of 20 °C must be maintained for 72 hours (3 days).
2. Step	The maximum return temperature (adjustable) must be maintained for 96 hours (4 days).
3. Step	The heat pump remains switched off until the return flow temperature has fallen below 20 °C.

Table 53

The duration of step 3 is limited to a maximum of 72 hours, as the return flow temperature may not fall below 20 °C when outside temperatures are high.

NOTICE

Test heating must be carried out to check the function of the underfloor heating construction.

- For cement screed, begin no earlier than 21 days after completion of the screed work.
- For calcium sulphate screed, begin no earlier than 7 days after completion of the screed work.

Once the screed has been casted and has been left to cure for the respective period, and following the function heating test, it must be confirmed that the screed is ready for flooring before the final floor coverings can be applied.

5.3.3 Screed heating to cure the screed

General notes

This program is designed to reduce the moisture content of the screed to a level at which the floor covering can be laid. However, it is essential to measure the moisture content; further drying may be required. The guidelines for drying the screed specify a fixed number of stages with set temperatures and time periods. This sequence can be selected in the menu under **Installation > Heat-up programs Screed drying** > **Standard program:** (→ Tab. 55, page 39). In consultation with the screed installer, the standard program should generally be used. Only where there are specific requirements for the heat-up process is we recommend to adapt the sequence defined for the standard program individually. This can be set in menu Installation > Initial heat program > **Screed drying** (→ Tab. 55, page 39).

Screed heating standard program

This program consists of 8 steps and is generally suitable for all underfloor heating systems. Before activation, the maximum permissible return temperature, e.g. 32 °C, must be entered.

Step		Duration	Example[1)] Return temperature
1	Heating operation	24 h/heat-up process	20 °C
2			24 °C
3			28 °C
4			32 °C
5	Holds	> 264 h	Holds
6	Cooling-down process	24 h/cooling-down process Total max. 72 h	28 °C
7			24 °C
8			20 °C

1) Max. return temperature: 32 °C

Table 54

Steps 1 to 4 are heating cycles, each lasting 24 hours. The set return temperature is increased with each step from 20 °C to the maximum return temperature. Two conditions must be met for a program step to be completed. The relevant set temperature must have been reached or exceeded, and the 24 hour period must have elapsed. If the temperature is reached before the 24 hours have elapsed, the heat pump maintains the relevant set temperature for the remainder of the period. No evaluation is made of how long this temperature was actually maintained. In step 5, the maximum return temperature is to be maintained for a period of 264 hours. The duration during which the maximum return temperature was actually reached is accumulated. Upper limit open, lower limit set by set value switching differential. Only when the cumulative time has reached 264 hours is this programme step completed. Steps 6 to 8 are cooling-down steps, each lasting 24 hours. With each step, the set return temperature is reduced from the maximum return temperature to 20 °C. Two conditions must be met for a program step to be completed. The temperature must fall below the corresponding set value, and the 24 hour period must have elapsed. If the temperature falls below the set value before the 24 hours have elapsed, the heat pump will maintain the corresponding set value for the remainder of the period. However, no assessment is made of how long this temperature was actually maintained. The duration of the cooling-down processes is limited to a maximum of 72 hours, as the return flow temperature may not fall below the required level when outside temperatures are high.

Individual program screed drying

The advanced options for the custom program are also set in the menu Installation > Initial heat program > **Custom program Screed drying** (→ Tab. 55, page 39).

- Temperature differential for heating-up
  Starting from an initial temperature of 20 °C and up to the set maximum temperature, the set temperature is increased by the set difference with each programe step. The number of steps is therefore determined by these factors.
- Heating-up time
  Here, you can enter the number of hours within which the relevant set temperature must be reached and maintained (function as described above).
- Holding time
  Here, you can enter the number of hours for which the maximum setpoint temperature must be maintained.
- Temperature differential for cooling down
  Starting from the set maximum temperature down to the initial value of 20 °C, the set temperature is reduced by the set difference with each program step. The number of steps is therefore determined by these factors.
- Cooling-down time
  Here, you can enter the number of hours within which the corresponding set temperature must be reached and should be maintained.

Parameters		Description	Adjustment range
Maximum temperature		Setting the maximum return temperature to be achieved during the heating process.	25 ... **35 °C** ... 50
Domestic hot water/Swimming pool		Selecting this function allows for a potential demand for hot water or the pool whilst the system is heating up.	**No**/Yes
Heating function program		Activate the functional heating program.	**No**/Yes
Standard program screed drying		Activate the standard program for screed heating.	**No**/Yes
Individual program screed drying			
	Heat-up period	Set the duration in hours for the individual steps of the heat-up phase.	1 ... **24** ... 120
	Maintaining time	Set the holding time.	1 ... **24** ... 480
	Heat-down period	Setting the duration in hours for the individual steps of the cooling phase.	1 ... **24** ... 120
	Heat up temp difference	Setting the temperature differential between two steps in the heat-up phase.	20 ... **5 K** ... 10
	Heat-down temp difference	Setting the temperature differential between two steps in the cooling phase.	20 ... **5 K** ... 10
	Individual program screed drying	Activate the custom program for screed heating.	**No**/Yes

Table 55 Screed drying

5.3.4 Special function

In this menu, special functions required during commissioning can be activated.

Fig. 67 Special function

Parameters	Description	Adjustment range
Quick start	Activating the Quick start function allows the heat pump to start once the safety-related time periods have elapsed. A cycle block is ignored.	**No**/Yes
Commissioning	Activating this function suppresses defrosting in air-to-water heat pumps for one hour and enables the 2nd heat generator. Any defrost cycle already in progress is cancelled.	**No**/Yes

Table 56 Special function

6 Function definition

The following chapter describes the functions of the heat pump as well as the system functions that can be controlled by the .

6.1 Blocking of requests

Various states and settings can lead to a request from the heat pump being blocked. The shown blocks are automatically reset or are cancelled once the process has been completed.

Active blocks and the block history can either be viewed on the control panel of the under the menu item Home > System Status (→ Chapter 4.1.1, page 10) or called up via the BMS interface.

6.1.1 Warm-up

The warm-up block prevents the compressor from starting. In doing so, this warms the oil to a minimum temperature to ensure proper lubrication when the compressor starts.

6.1.2 Mains load

The mains load is a requirement imposed by energy supply companies. After power is restored or an energy supplier block, this may last up to 200 seconds. The mains load cannot be bypassed. This ensures that all network users do not restart simultaneously.

6.1.3 Minimum standstill time

To ensure adequate pressure compensation in the refrigerant circuit and to protect the heat pump, it may take up to 5 minutes for the compressor to restart. The heat pump starts up once the minimum dwell time has elapsed in order to fulfil a pending demand. The minimum standstill time cannot be bypassed.

6.1.4 Switching cycle block

In accordance with the connection conditions of the energy supply companies, the heat pump may only be switched on 3 times per hour. It will therefore only allow the to be switched on at most every 20 minutes.

6.2 2. Heat source

In single energy source systems, electric booster heaters are used. A distinction of the is made between immersion heaters and pipe heating elements.

6.2.1 Control of immersion heaters

Immersion heaters are switched on or off depending on the heat demand when the immersion heater is selected in EasyOn Heating and the temperature falls below the set limit (limit temperature).

6.2.2 Control of pipe heating

Pipe heaters are switched on or off depending on the heat demand when pipe heater is selected in EasyOn Heating and the temperature falls below the set limit (limit temperature).

6.3 SG Ready/Smart Grid/Internal power consumption

It is possible to represent the switching states of the SG Ready label via 2 digital inputs (see electrical documentation). These switching states enable the use of Internal power consumption from a photovoltaic system.
Table 57shows how the various switching states function.

State	Function definition
Switching state 1 – Red (SG1 open, SG2 closed) • Power shortage (low network power, expensive electricity) The energy supplier may block the heat pump or switch it to a reduced operating mode for DHW heating and pool heating.	DHW: The DHW supply is carried out DHW heating continues up to the set minimum temperature. Heating: DHW heating is carried out in setback mode. The set reduction value for the respective time program applies. If control via room temperature is selected, the room temperature is reduced. Pool: Pool block is carried out. Pool heating continues up to the set minimum temperature.
Switching state 2 – Yellow (SG1 open, SG2 open) • No power shortage or surplus (the network is balanced) The heat pump operates in normal mode. The energy supplier does not intervene and the heat pump does not switch to either an automatic reduced or increased operating mode for DHW heating or pool heating.	DHW: DHW heating is carried out up to the set temperature set. Any set blocking actions are considered. Heating: DHW heating is carried out according to the currently set heating curve or room temperature. Any set reduction or increase times are considered. Pool: The pool is heated to the set temperature set. Any set blocking and priority times are considered.
Switching state 3 – Green (SG1 open, SG2 open) • Surplus electricity (excess electricity on the network, low cost electricity) The energy supplier can switch the heat pump to an elevated operating mode forDHW heating and pool heating.	DHW: Any programmed DHW block is cancelled. DHW heating is carried out up to the set maximum temperature or up to the maximum temperature of the heat pump. Heating: DHW heating takes place in enhanced operating mode. When room temperature control is selected, the control valves are opened (only with RTM Econ control) to utilise the building as a thermal storage system. Pool: Any programmed pool block is cancelled. The pool heating is carried out up to the set maximum temperature or up to the maximum temperature off the heat pump. Regenerative: In the case of a regenerative hydraulic integration, the heat pump is given priority. The regenerative storage tank is not discharged and is blocked for operation! Cooling: As PV yield and cooling occur simultaneously during the summer months, there is no separate function for the Cooling operating mode.

Table 57 Function definition

Switching state 3 is used for internal power consumption of the electricity generated by a photovoltaic system.

The **Smart Grid** function is already activated as standard.

6.4 Output control

The defines a maximum of 2 output stages, L1 and L3, between which it switches depending on the heat demand. As the heating demand rises, the system switches to the next higher output stage; as the heating demand falls, it switches to the next lower output stage.

L1: Heat pump operates with one compressor
L3: Heat pump operates and a 2nd heat generator is active (not applicable to monovalent systems)

- After commissioning or following a voltage failure, the always starts in output stage L1.
- During defrosting, pool heating, DHW demand and during an energy supplier block, the output stages are not redefined.

Criteria for switching:

- from L1 to L3 if has been requesting "more heat" for more than 60 minutes and, at the same time, the outside temperature has been below the limit temperature of the 2nd heat generator for more than 60 minutes
- from L3 to L1 if the heating controller has been requesting "less heat" for more than 15 minutes or the limit temperature has been exceeded. In this case, L2 is always skipped.

Output stage	
Stage L1	Compressor controlled
Stage L2	–
Stage L3	Compressor and second heat source, if necessary

Output stage	
Defrosting	Compressor running
DHW heating	Compressor running
Pool water heating	Compressor running

Table 58 Output control

6.5 Switching differential

In the menu Settings > System parameter, the so-called switching differential can be set for the various functions. Switching differential defines the transition zone between the switch-on and switch-off points of the heat pump.

If the current temperature is lower than the set temperature minus the switching differential, a demand is detected. This demand remains active until the current temperature has exceeded the upper limit of the neutral zone. This results in a switching cycling around the set value.

If the switching differential is high, the heat pump runs for longer, with correspondingly large temperature fluctuations in the return flow. With a small switching differential, the compressor running times are reduced and the temperature fluctuations are smaller.

For panel heating systems with relatively flat characteristic curves, a switching differential of approx. 1 K should be set, as a switching differential that is too high can prevent the heat pump from switching on.

6.6 Control via return temperature

These heat pump heating systems are controlled via the return temperature as standard, which offers the following advantages:

- Long running times for the heat pump with demand-based heating of the entire circulating heating volume.
- Detection of the heating system's disturbance variable (e.g. passive solar gains).
- A reduction in the temperature difference, at a constant return temperature, leads to lower flow temperatures and thus to efficient operation.

6.7 Priority processing

The processes the various requirements of the functions according to the following priority.

- DHW
- Heating/cooling
- Swim. pool

When providing DHW or pool heating, the heat pump operates in the same way as in heating mode.

6.8 Control of the heating pumps

Control of the heating pumps for DHW heating or pool heating determines where the heat generated by the heat pump is to be directed. The separate management of different requirements makes it possible to always operate the heat pump at the lowest possible system temperatures, thereby ensuring energy-efficient operation. In the case of heat pumps designed for both heating and cooling, additional cooling pumps can be controlled.

Pump assemblies with non-return valves ensure for defined flow directions.

In Summer operating mode, the heating pump starts up for approximately 1 minute every 150 hours. This is intended to prevent the heating pump from seizing up.

6.8.1 Frost protection

Regardless of the settings of the heating pumps, these always run during heating, defrosting and frost protection modes (→ Chapter 6.8.2, page 41). In systems with multiple heating circuits, the 2nd/3rd heating pump has the same function.

NOTICE

To ensure the frost protection function of the heat pump.

- ▶ Do not disconnect from the power supply.
- ▶ Water must continue to flow through the heat pump.

6.8.2 Heating circulation pump

For the heating pumps in heating circuits (M13, M15, M20), weather-compensated pump optimisation is set in the Settings > System parameter > Pump control menu for heating as well as cooling. If the temperature falls below the selected limit, heating pump optimisation is inactive. The heating pumps operate continuously, except during DHW heating and pool heating and in Summer operating mode.
If the selected limit temperature is exceeded, the heating pump optimisation is active. The heating pumps continue to run for 30 minutes after the mains power is switched on and after the heat pump has been switched off. If the heating pumps have been switched off for longer than 40 minutes, or if the return setpoint temperature has been deliberately increased, the heating pumps are activated for a 7 minute flushing period to ensure that the return sensor (R2, R2.1) receives a representative temperature reading from the heating circuits again. If the system switches from heating to DHW heating and pool heating, the heating pump continues to run. The heating pumps operate continuously when the system temperature falls below the minimum levels and when the temperature at the flow sensor (R9, fitted as standard) of the air to water heat pumps is below 10 °C

In Summer operating mode, the heating pump runs for 1 minute every 150 hours. This prevents the shaft from seizing up.

6.8.3 Cylinder primary pump

The cylinder primary pump (M18) runs during DHW heating. If a demand for DHW heating occurs whilst the heating system is in operation, the heating pump is deactivated and the cylinder primary pump is activated whilst the heat pump is running.

6.8.4 Pool heating pump

The pool heating pump (M19) runs whilst the pool water is being heated. Pool heating is interrupted at any time by a DHW demand, a defrost cycle or an increase in the heating curve (e.g. following night-time temperature reduction), but not by a heating/cooling demand whilst the pool water is being heated.

If, after 60 minutes of pool heating, the heating/cooling demand is still active, the pool heating pump is deactivated for 7 minutes and the heating pump is activated for a 7 minute flushing period, in order to restore representative temperatures of the heating circuits to the return sensor. If, during these 7 minutes, the generates a **more** signal (temperature falling below the set value set value), the heating demand is processed first.

In Summer operating mode, pool heating is not interrupted by a flushing period after 60 minutes.

6.8.5 Primary circuit pump M16

The primary circuit pump output (M16) can be configured to enable the auxiliary circulation pump to operate in parallel with the compressor of the heat pump. Configurations for DHW heating and pool heating are possible. It also runs when the system temperature falls below the minimum set point.

In Summer operating mode, the heating pump runs for 1 minute every 150 hours. This prevents the shaft from seizing up.

6.8.6 Circulation pump

If required, a DHW circulation pump (M24) can be connected. This can be requested via a pulse input or via time programs. If the DHW circulation pump is activated via the pulse input, the run-on time can be set in the menu Settings > System parameter > Domestic hot water. If activation is via a time program, this can be set for two different times and days of the week.

A DHW circulation line is a major energy consumer. To save on energy costs, circulation should be avoided. If this cannot be avoided, we recommend adapting the time slots to the optimum conditions. It is better to run the circulation on a pulse setting for a specific duration. This function is also possible with the .

6.9 Cooling

The cooling function distinguishes between active, dynamic and silent cooling. The following chapter covers the various functions and general settings relating to cooling.

6.9.1 Active cooling

Cooling is achieved actively by reversing the operating cycle of the heat pump. The internal four-way diverter valve is used to switch the refrigerant circuit from heating to cooling mode.

When switching from heating to cooling mode, the heat pump is blocked for up to 10 minutes to allow the different pressures in the refrigerant circuit to equalise.

6.9.2 Cooling mode

The cooling functions can either:

- be manually activated as the 6th operating mode
- implemented via an outside temperature-dependent change of Cooling operating mode
- implemented via external switching of a digital input (see the installation instructions of the for details)

The Cooling operating mode can only be activated if the cooling function is enabled for at least one cooling circuit in the pre-configuration.

Shutdown of cooling

The following limits are provided as safeguards:

- The flow temperature falls below a value of 7 °C
- Triggering of the dew point monitor at sensitive points in the cooling system
- Reaching the dew point during purely passive cooling

6.9.3 Activating the cooling functions

The following factors may prevent the cooling function from activating:

- The outside temperature is below 3 °C (risk of frost).
- For reversible air-to-water heat pumps, the outside temperature is below the cooling operating limit.
- The cooling controller is not fitted or the connection is faulty (I/O extension).
- Neither passive nor dynamic cooling has been selected in the heating/cooling circuit settings.

In these cases, the cooling operating mode remains active, but the control system behaves as in summer operating mode.

6.9.4 Heating pumps in cooling mode

The function of the heating pumps for the 1st, 2nd and 3rd heating circuits (M13, M15 and M20) depends on whether the circuit is configured as a heating and/or cooling circuit. The heating pump will only be active during cooling mode if the cooling function has also been enabled in the relevant heating/cooling circuit.

Heating components can be switched between heating and cooling modes via a potential-free contact (e.g. room temperature controller).

The cooling circulation pump (M17) runs continuously in Cooling operating mode.

6.9.5 Silent and dynamic cooling

Depending on the integration scheme, different system configurations can be implemented in the heating/cooling circuits.

- **Dynamic cooling** (e.g. fan-assisted convector heaters)
  In this configuration, a distinction can be made between fixed-value cooling and a cooling curve. Settings can be made as described in →Chapter 5.2.1, page 24.
  This function corresponds to cooling below the dew point.
- **Silent cooling**(e.g. underfloor, wall or ceiling cooling)
  Control is based on the "room temperature". The temperature of the room in which the room temperature controller 1 (RTH Econ) is connected according to the connection diagram is decisive. This function corresponds to control above the dew point. As described in →Chapter 5.2.1, page 24, the desired room temperature is set for this purpose. With silent cooling, the maximum transferable cooling capacity depends heavily on the relative humidity. High humidity reduces the maximum cooling capacity, as the flow temperature is not lowered any further once the calculated dew point is reached.
- **Combination of dynamic and silent cooling**
  Dynamic and silent cooling can be combined via different heating and cooling circuits. The settings for the respective heating circuits must be configured as described above. A heating circuit can cool either dynamically or passively.

If the cooling source switches off upon reaching the minimum flow temperature of 7 °C, either the water flow rate must be increased or a higher set return temperature (e.g. 16 °C) must be set.

6.10 Room temperature control

The room temperature control system, developed specifically for heat pump heating and cooling systems, ensures a high level of comfort whilst maximising efficiency. The focus is on the comfort of the resident, as they can set their preferred temperature in each room.

The following factors should be considered:

- external heat recovery (e.g. solar radiation on the south-facing side of the building),
- internal heat recovery (e.g. waste heat from technical appliances, fireplaces, etc.)
- Inertia and mass storage of the building (e.g. highly insulated houses do not cool down on cold nights)

6.10.1 Basic principles

The heat pump control system determines the system temperature required to heat the individual rooms. To ensure the system operates at high efficiency, the optimum return temperature is always calculated. The perceived room temperature is determined not only by the air temperature, but also by the temperature of the surrounding surfaces of the room (ceiling, walls and floor). For this reason, the intelligent room temperature control system regulates not only the room temperature but also the thermal mass of the floor.

6.10.2 Control behaviour

In overheated rooms, e.g. due to solar heat recovery, the underfloor heating is maintained at the set room temperature. This ensures that the floor does not cool down despite the increased room temperature. The self-regulating effect of the underfloor heating prevents the "warm" floor from releasing additional heat into the room. A slight overheating of rooms with internal or external heat recovery is induced deliberately. As soon as the heat recovery cease (e.g. at sunset), unlike with a conventionally controlled room temperature, the room is prevented from becoming too cold, as the floor temperature is already at the level of the desired room temperature and immediately releases heat if the temperature should fall below the set temperature (using the underfloor heating as a storage).

6.10.3 Control logic

- The room with the highest set-actual deviation is designated as the reference room.
- The set return temperature is continuously calculated depending on the deviation from Room temperature to room set.temp..
- The greater the deviation, the faster the set return temperature is increased.

6.10.4 Operating behaviour of the control valves

The control valves are preferably opened in order to make optimum use of the self-regulating effect and the storage mass of the underfloor heating, and to extend the running times of the heat pump. The valves are closed only under certain conditions.

Heat pump **Off**

- The control valves are closed only when the underfloor temperature is higher than the room temperature (the return temperature is higher than the room temperature and the room temperature is higher than the set room temperature).
- If the return temperature is lower than the room temperature, heat can be transferred from the room to the underfloor heating. This allows heat being transferred to the underfloor heating to be dissipated (e.g. solar radiation through floor-to-ceiling windows).

Heat pump **on** > Heating

- The control valves are closed when the set room temperature is exceeded (room temperature is higher than the set room temperature + an adjustable hysteresis) and the current system temperature ≥ equals the current room temperature.

Heat pump **On** > Domestic hot waterSwimming pool**heating**

- When the heating pumps are deactivated, all control valves are opened. This allows the reference temperature (return temperature) to be determined after the heating pumps are switched back on (flushing cycle). During DHW heating or pool heating, and whilst the heating pumps are switched off, no heat can be supplied via the heating system.

6.10.5 Settings at commissioning

The preset values are designed for efficient and comfort-oriented operation and can be adjusted to suit user requirements if necessary (→ Chapter 5.2.1, page 24 and Chapter 5.2.2, page 26).

Maximum return temperature.

During commissioning, the default value for the maximum return temperature must be adjusted from 45 °C to suit the existing heating system. If the underfloor heating is designed for 35/28 °C, the return temperature should be limited to 28 °C

Heat pump switching differential

To improve control accuracy, the switching differential of the heat pump should be set between 1 K and 2 K when using underfloor heating with room temperature control.

Room temperature switching differential

Assumed room temperature set value: 20 °C

Upper switching differential: 0.8 => Valve closes at 20.8 °C

Lower switching differential: 0.3 => Valve opens at 20.3 °C

6.10.6 Optimisation of inertia

The inertia, or responsiveness, used to calculate the set temperature can be influenced by two I-components. The higher the I component, the slower the response to temperature fluctuations (maximum setting: 480). The lower the I component, the faster the response to temperature fluctuations; this may result in overshoot and undershoot (minimum setting: 240).

(→ Chapter 5.2.8, page 34)

- Recommendation for setting the I-component for energy-optimised operation:
  I-component min: 240, max: 480
  These values are recommended for energy-efficient operation, which is possible even without additional control valves in the room with the highest temperature requirements (e.g. the bathroom). The system temperature is adjusted moderately to prevent overshoots and thus ensure a consistent room temperature. With this setting, minor fluctuations in the system temperature are to be expected.
- Recommendation for setting the I-component in comfort mode:
  I-component min: 60, max: 120 (comfort settings)
  These values are recommended for comfort-oriented operation, which requires additional control valves in all rooms. The system temperature is adjusted more rapidly. To prevent overshoots, the control valves intervene to regulate the system. With this setting, higher fluctuations in the system temperature are to be expected.

6.10.7 Room control limit temperature

The adjustable minimum room temperature prevents heating demands from rooms that are deliberately kept at a lower temperature (e.g. bedrooms with windows frequently left open). As soon as the set room temperature falls below 19 °C(default value), this room will not become a reference room, even if the room temperature is too low.

6.10.8 Targeted overheating with the Smart Grid function

When the Smart Grid function is active, the set room temperature is increased by the set value. Rooms with a set room temperature lower than the set limit temperature are not taken into account when the room temperature is increased.

6.11 Building services management system

NOTICE

Improper operation of the heat pump due to building management systems, e.g. as a result of running times that are unacceptably short.

No liability is accepted for damage caused by connecting third-party components to the heat pump.

There are two options available for connecting the heat pump to a building management system:

- Transfer of setpoint values via a digital interface through the BMS (Building Management System).
  Various protocols and interfaces are available for this purpose (→ Chapter 6.11.1, page 44)
- Wiring of digital inputs with the option to influence the control of the heat pump on the .

  This allows switching between heating and cooling via digital inputs (→ Chapter 6.11.3, page 44) as well as via the configurable external block (frost protection/DHW/holiday/summer) → Chapter 6.11.2, page 44).

NOTICE

The pre-run and post-run times required for pump operation, as well as the necessary safety measures, can only take effect if:

the primary pump (M16) or – depending on the hydraulic integration – the heating pump (M13) is connected to the .

6.11.1 BMS interface

The BMS interface provides connectivity to Modbus RTU or KNX via the expansion modules available as optional accessories These extensions can be used, amongst other things, to read out operating data and history, and to configure settings such as operating mode or setpoint values.
A Modbus RTU network card is fitted in the as standard. However, this can also be replaced by a KNX card. In principle, a building management system connection via the BMS interface is to be preferred.

The following configuration is recommended: On the , all connected heating or cooling circuits are set to fixed-value control. The set temperature calculated by the building management system is transmitted to the as a fixed-value temperature. The building management system also switches the heat pump to Automatic, Summer and Cooling modes. Further information on these options can be found in the description of the relevant product, accessories and interface specifications.

For further information:
→ Document 6721120932

6.11.2 Block external

The heat pump can be blocked or enabled via a digital input (DI2 – grey block – see electrical circuit diagram for details) to perform one of the following functions:

- Frost protection
  - The heat pump maintains minimum system temperatures; DHW heating and pool heating are disabled.
- DHW block
  - The heat pump is enabled; the minimum DHW temperature is maintained
- Operating mode Vacation
  - The heat pump maintains the reduction value; DHW is blocked.
- Operating mode Summer
  - The heat pump maintains the minimum system temperature; DHW and pool heating are enabled.

Block external	State
active	open
inactive	closed

Table 59 Block external

In All case, frost protection is guaranteed. If the **External block** function is to be used, it must be activated by the customer service team when the heat pump is commissioned.

6.11.3 Heating/cooling changeover

For heat pumps designed for both heating and cooling, the operating mode can be changed via a digital input (K28 – Cooling function – see the electrical diagram for details).

Operating mode	State
Heating	open
Cooling	closed

Table 60 Operating mode

7 Error history

In the event of faults, the heat pump is blocked. In bivalent systems, the second heat generator takes over the heating and DHW heating. In contrast, in single-source systems, the DHW heating is stopped and the immersion heater maintains the minimum permissible return temperature. The displays any faults in plain text. Once the fault has been rectified, the heat pump can be put back into operation. Disconnecting the control voltage also acknowledges an existing fault.

In single energy source systems, switching to the 2nd heat generator operating mode allows the immersion heater to take over the heating and the flange heater to take over DHW heating.

Diagnosis, Fault – Alarm – Block

In the **System status** > **Fault** menu, the last 10 causes of faults that have occurred are recorded. The documentation includes the date, time, heat source temperature, flow temperature, return temperature as well as the status message.

Fault code	Fault	Message	Action
F5	Expansion N17	The "Cooling" expansion module is not being recognised.	▶ Check the connecting cable. – Cable broken? – Plug loose? – Are individual wires swapped? ▶ Check the power supply
F6	0Electronic expansion valve	The electronic expansion valve is not being recognised.	
F9	M16 Frost	The primary pump M16 has been switched on for frost protection, but no flow is detected.	▶ Check the DHW flow rate. ▶ Check the primary pump M16. ▶ Check the power supply to M16. ▶ Check the controller output for M16.
F10	WPIO extension	The refrigeration circuit controller not recognised.	▶ Check the connecting cable. – Cable broken? – Plug loose? – Are individual wires swapped? ▶ Check the power supply.
F12	Inverter	An error occurred on the inverter.	▶ Disconnect power from the device for 2 minutes. ▶ Contact customer services.
F14	Wet-running detection	Liquid has been detected at the compressor.	▶ Contact customer services.
F15	Sensor technology	A fault has occurred in the relevant sensor system; the exact cause is displayed in plain text.	▶ Check the connecting cable. – Cable broken? – Plug loose? – Are individual wires swapped?
F19	Primary circuit	Fault caused by the fan motor protection.	▶ Check the setting or function of the fan motor protection
F20	Defrosting	The defrost cycle for the air to water heat pump could not be initiated or was not completed correctly. There may be several reasons for this message.	▶ Check the DHW flow rate. ▶ Check the DHW pressure. ▶ Check flow and return temperature. ▶ Contact customer services.
F22	DHW high pressure	DHW temperatures below 35 °C when operating in heat pump mode.	▶ Flow rate of the DHW pump is too low. ▶ Heating non-return valve defective. ▶ Check the DHW temperature sensor.
F25	Low Pressure	The heat source is not supplying enough energy. The evaporator is iced up or the system temperatures are too low (return < 18 °C).	▶ Contact customer services.
F28	High pressure	The heat pump has been shut down by the high-pressure sensor or pressure switch.	▶ Set the heating curve lower. Increase the heating water flow rate. Check the bypass valve.
F29	Temperature differential (defrost)	Temperature differential between flow and return for defrost too high (> 12 K) or negative	▶ Check the DHW flow rate. ▶ Check the bypass valve and pump size. ▶ Check flow and return. – Are flow and return swapped?
F31	Flow rate	The heat pump has been shut down due to a insufficient flow in the primary or secondary circuit.	▶ Check the water flow. – Is the water flow rate in the secondary circuit too low? – Is the flow direction incorrect?
F32	Warm-up	The heat pump was unable to reach the required oil temperature.	▶ Contact customer services.
F50	Propane alarm		▶ Contact customer services.
F51	Pressure sensor	The propane sensor has detected a fault or is coming close to the end of its service life.	▶ Replace the propane sensor.
F55	Compressor operating limits	The device has been operating outside the permitted operating limits for too long.	▶ Check the system temperatures.
F56	Invalid parameter	Invalid heat pump code or parameter.	▶ Check the heat pump code. ▶ Update the heat pump software if necessary.

Table 61 Error history

8 Block history

Diagnosis Block

Requirements can be blocked by setting locks, as described in → Chapter 6.1, page 39 A complete list of all possible locks are listed below.

Block code	Lock	Brief description
S2	Vol. flow rate	The volumetric flow rate is outside the specified limits.
S3	Heat pump	The heat pump is reporting an unknown block.
S5	Function check	The function check has been activated by a user.
S7	System check	The system check has been activated by a user for approx. 24 hours.
S8	Delay on operating mode changeover	The delay time protects the heat pump from a rapid temperature changeover caused by a cooling and DHW demand.
S9	Pump flow	The heat pump starts once the set pump pre-run time has elapsed.
S10	Minimum standstill time	The heat pump starts up once the minimum dwell time has elapsed in order to fulfil a pending demand. The minimum standstill time protects the heat pump and can last up to 5 minutes.
S11	Mains load	The heat pump starts up once the mains load has elapsed in order to fulfil a pending demand. The mains load is a requirement imposed by energy suppliers and can last up to 200 seconds after power is restored or following a supplier-imposed block.
S12	Switching cycle block (>3/h)	The heat pump starts up once the switching cycle block has elapsed in order to fulfil a pending demand. The switching cycle block is a requirement imposed by energy suppliers and can last up to 20 minutes after power is restored.
S13	DHW reheating	DHW reheating via the flange or pipe heater is active.
S14	Regenerative	When the "Bivalent-Regenerative" operating mode is selected, the temperature in the storage tank is high enough to meet the current demand.
S15	Energy supplier block	An energy supplier block is present.
S17	Flow rate	The heat pump has been shut down due to a insufficient flow in the secondary circuit. The message is reset automatically after 15 minutes.
S19	High pressure	The permissible high-pressure limits for the heat pump have been exceeded.
S20	Low Pressure	The permissible low-pressure limits for the heat pump have not been reached.
S21	Heat source operating limit	The heat source temperature is below the operating limit of the heat pump.
S23	System limit	The system temperatures are too low to operate the heat pump.
S25	Block external	The system has been placed in block mode by an external block signal at input ID4. This function can be configured in the menu.
S26	Communication error with the heat pump	Communication with the heat pump has been disrupted.
S31	Warm-up	This is a safety function for the compressor. The heat pump is blocked until the minimum oil temperature is reached (→ Chapter 6.1.1, page 39).
S34	2. Enable heat generator	Operating mode 2nd heat generator has been selected. The heat pump is switched off. Heat is generated exclusively by the 2nd heat generator.
S35	General fault	Fault; details can be found in the help section or in register 105.
S51	Heat source minimum	The heat source temperature (outside temperature or brine inlet) is too low and lies outside the operating limits.
S52	Heat source maximum	The heat source temperature (outside temperature or brine inlet) is too high and lies outside the operating limits.
S53	Return minimum	The return temperature is too low and is outside the operating limits.
S54	Return maximum	The return temperature is too high and is outside the operating limits.
S55	Flow minimum	The flow temperature is too low and is outside the operating limits.
S56	Flow maximum	The flow temperature is too high and is outside the operating limits.
S57	Propane sensor communication	Communication with the propane sensor has been interrupted.

Table 62 Error history

9 Environmental protection and disposal

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

Packaging

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

Used appliances

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

Old electrical and electronic devices

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

The symbol is valid for countries that have directives on electronic waste, e.g. "European Union Directive 2012/19/EC on end-of-life electrical and electronic appliances". These provisions define the regulatory framework of the directive valid for the return and recycling of used electronic appliances in each country.

Electronic appliances that may contain hazardous substances must be recycled responsibly in order to minimise possible damage to the environment and dangers to people's health. To this end, the recycling of electronic waste contributes to the preservation of natural resources.

For more information on the environmentally safe disposal of used electrical and electronic appliances, please contact the local authorities, waste disposal company or distributor from which you purchased the product.

You can find more information here:
www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/

Batteries

Batteries must not be disposed together with your household waste.
Used batteries must be disposed of in local collection systems.

10 Data Protection Notice

We, **Bosch Thermotechnology Ltd., Cotswold Way, Warndon, Worcester WR4 9SW, United Kingdom**, process product and installation information, technical and connection data, communication data, product registration and client history data to provide product functionality (art. 6 §1.1 (b) GDPR), to fulfil our duty of product surveillance and for product safety and security reasons (art. 6 §1.1 (f) GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 §1.1 (f) GDPR) and to analyse the distribution of our products and to provide individualized information and offers related to the product (art. 6 §1.1 (f) GDPR). To provide services such as sales and marketing, contract management, payment management, programming, data hosting and hotline services, we may request and transfer data to external service providers and/or Bosch affiliates. In some cases, but only if adequate data protection is ensured, personal data may be transferred to recipients located outside the European Economic Area. Additional information is provided upon request. You can contact our Data Protection Officer under: Data Protection Officer for Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object to the processing of your personal data at any time on the basis of Art. 6 §1.1 (f) GDPR on grounds relating to your particular situation or if your data is used for direct marketing purposes. To exercise your rights, please contact us at **privacy.ttpo@bosch.com.** For more information, follow the QR code.

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