Installation and operating instructions

FM-AM

Function module, alternative heat source for integration of a heat pump (heating/cooling) via Modbus RTU



6721111566 (2025/09) GB/AU SW 4.x

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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

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

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

DANGER

DANGER indicates that severe 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.

Additional symbols

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

Table 1

1.2 Safety precautions

Failure to observe the safety instructions can result in serious personal injury and a risk to life as well as material losses and damage to the environment.

- ▶ Installation and commissioning as well as service and maintenance must only be carried out by an approved and qualified heating contractor.
- ▶ Read these instructions carefully.
- ▶ Only perform work described for the user group concerned (users, contractors). Other activities can lead to malfunctions, material damage and personal injury.
- ▶ Carry out cleaning and maintenance at least once a year. This involves checking that the entire system is working correctly.
- ▶ Immediately remedy all defects found.

⚠ Safety precautions

- ▶ Observe safety instructions in the documents of the basic controller.

⚠ Danger to life due to current

- ▶ Installation and commissioning as well as maintenance must only be carried out by an approved and qualified heating contractor.
- ▶ Electrical work may only be carried out by an authorised specialist.

⚠ Handover to the user

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

- ▶ Explain how to operate the heating system and draw the user's attention to any safety relevant action.
- ▶ In particular, point out the following:
  - Alterations and repairs must only be carried out by an approved contractor.
  - Safe and environmentally compatible operation requires inspection at least once a year and responsive cleaning and maintenance.
  - The heat generator may only be operated with the casing fitted and closed.
- ▶ Point out the possible consequences (personal injury, including danger to life or material damage) of non-existent or improper inspection, cleaning and maintenance.
- ▶ Point out the dangers of carbon monoxide (CO) and recommend the use of CO detectors.
- ▶ Leave the installation instructions and the operating instructions with the user for safekeeping.

2 Product Information

2.1 Declaration of Conformity

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

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

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

2.2 Scope of delivery

Upon delivery:

- ▶ Check that the packaging is intact.
- ▶ Check that all package contents are present.

Included in the scope of delivery:

- Function module FM-AM
- 2 temperature sensors (Ø 6 mm)
- 2 contact sensors (Ø 9 mm)
- Fixing materials for the contact sensor
- Technical documentation

2.3 Product description

The purpose of the module is to integrate an alternative cold / heat source, such as heat pumps, combined heat and power units, buffer cylinders, or solid fuel boilers into heating system control systems.

The module can be installed up to two times in the control units Logamatik 5311, Logamatik 5313, Control 8311 or Control 8313.

The first or single module supports the heating function of alternative heat sources. The second module provides connections and function for the cooling function of the heat pump. The Logamatic 5310 and 8310 control units do not support a second module.

The module supports the following functions and connection options:

- Integration of an alternative heat source with or without buffer cylinder
- Intelligent buffer management by detecting available heat automatically and preventing the heat source from starting
- Requests the operating values of the alternative heat source
- Requests the operating values of an installed buffer cylinder

- Retrieving operating values for the cooling buffer and control of the diverter valves for heating/cooling
- Integration of heat pumps via Modbus RTU

2.4 Intended use

The control unit controls and monitors heating systems in multi-occupancy housing, residential complexes and commercial or industrial buildings.

▶ Country-specific standards and regulations with regard to installation and operation must be observed!

The FM-AM function module must only be installed in control units of the Logamatic 5000/Control 8000 control system.

2.5 Explanation of the concepts used

Since the FM-AM enables various sources to be integrated in one system, the floor-standing boilers, boilers, wall mounted condensing boilers, or other heat sources are assigned to the following higher-level definitions.

Qualified person

A qualified person is a person who has extensive, specialist, theoretical and practical knowledge, as well as experience in the specialist area and is familiar with applicable standards.

Contractor

A contractor is an organisational unit of the industrial sector with specially trained personnel.

Alternative heating appliance (AWE)

Alternative heating appliances (e.g. heat pumps for heating/cooling, combined heat and power units, log boilers, pellet boilers, wood chip boilers or fuel cell heating appliances) are subsequently referred to as alternative heating units or AWE.

Standard heat source

Standard heat exchangers are boilers or devices that are typically operated with fossil fuels, e.g. wall mounted gas condensing boilers or floor standing oil or gas boilers. These are heat generators that cannot be controlled directly via the FM-AM.

3 Information for the user

These instructions contain important information for the system user regarding safe operation of the control unit.

▶ Please observe the operating instructions for the control unit and the heat source.

Operation of the control unit for the module-specific application is described below.

Depending on the software version, the display and menu items shown in the instructions may differ from those in the control unit.

3.1 Operation

Operation takes place via the user interface of the control unit in which FM-AM module has been installed.

Heat pump Call up .

The hydraulic view for the heat pump is called up from the overview of the thermal generator.

▶ Tap**Thermal production**.
The overview of the available heat sources opens.
▶ TapHeat pump.
The hydraulic view of the heat pump opens.

This view displays the operating conditions.

By tapping the active elements, you can perform actions and select or change operating conditions. You can also access and modify the time programs.

The hydraulic representation and available functions vary depending on the selected heat pump and system configuration.

The hydraulic view may have a second view **Inactive heat pump sensors**.

Overview, hydraulic view of the heat pump

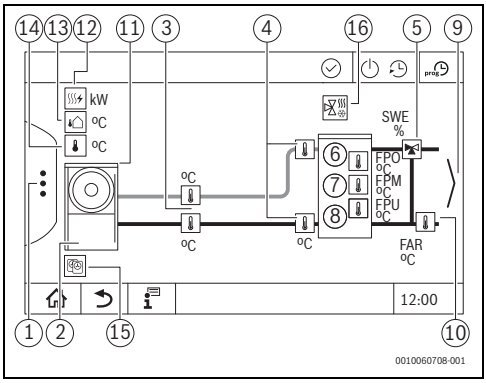


Fig. 1 Hydraulic view of the heat pump

[1] Screen menu for advanced functions
[2] Heat pump (representation depending on the type of heat pump used or heat pump cascade)
[3] Heat pump flow/return temperature
[4] FWR/FWV flow/return temperature
[5] Sensitive return valve (SWE)/Buffer bypass for heating
[6] Buffer cylinder temperature top FPO
[7] Buffer cylinder temperature centre FPM
[8] Buffer cylinder temperature bottom FPU
[9] Navigation to view the inactive heating/cooling buffer sensors (if present)
[10] System return temperature FAR
[11] Heat pump status display:
Green = HMI status OK
yellow = HMI status Warning
Red = HMI status Fault
No display = Modbus communication is not yet established
[12] Output - Heat | Electric
[13] Outside temperature
[14] Display Control temperature - Heating/Control temperature - Cooling
[15] Number of heat pumps in the cascade (active/installed)
[16] Change over position (SWE/SWR)(Heating/cooling)

Inactive heat pump sensors

▶ In the hydraulics view, use the right-arrow to scroll to the menu **Inactive heat pump sensors**.

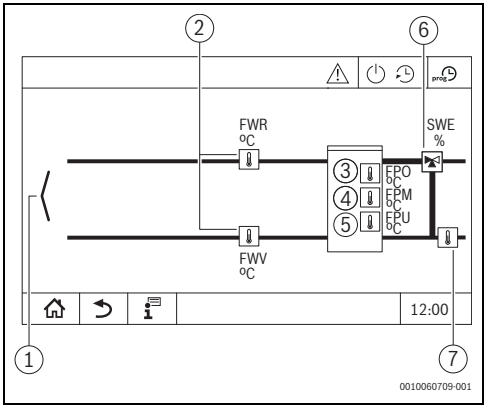


Fig. 2 Inactive heat pump sensors

[1] Navigate to the heat pump view with active heating/cooling buffer sensors
[2] FWR/FWV flow/return temperature
[3] Buffer cylinder temperature top FPO
[4] Buffer cylinder temperature centre FPM
[5] Buffer cylinder temperature bottom FPU
[6] Sensitive return valve (SWE)/Buffer bypass for heating mode
[7] System return temperature FAR

Activate/deactivate manual control

To activate the manual control:

- ▶ Open the screen menu.
- ▶ Tap ⋮ symbol.

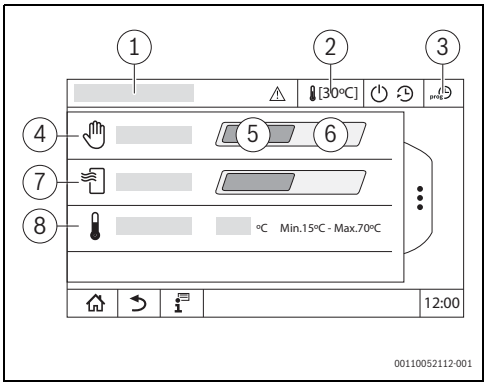


Fig. 3 Advanced functions, Manual Mode

[1] Menu line Heat pump
[2] Header
[3] **Scheduler View**
[4] Manual Mode
[5] **Off**
[6] **On**
[7] **Cooling**/**Off**/**Heating**
[8] **Set temperature**

To deactivate manual operation:

- ▶ Tap **Off** (→ Fig. 3, [5], page 7).

Information about the header

The header displays the various states of the heat pump functions to provide information about the current operating status of the heat pump.

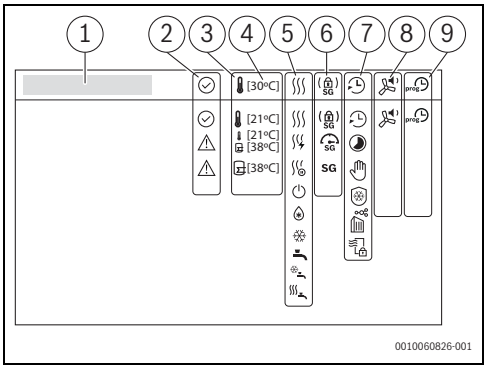


Fig. 4 Header

[1] Menu line Heat pump
[2] Current status of the heat pump
[3] Requirements of the heat pump
[4] Temperature request
[5] Current operating mode
[6] State SG-Ready
[7] Source of demand
[8] Silent mode
[9] Configuration of the time program

Function	Symbol	Status	Note
Current status of the heat pump	(green)	Status OK	–
	(yellow)	Status Warning	–
	(red)	Status Fault	–
Heat demand of the heat pump		Heat demand active	[***°C]
		Heat and DHW demand active	[***°C] [***°C]
	–	Heat demand not active	–
Temperature demand	[42°C]	Display of required set temperature	–

Function	Symbol	Status	Note
Current operating mode		Heating mode	–
		Standby	–
		Auxiliary heat source active	The booster heater can also be active during normal heating mode (compressor and booster heater active)
		Deicing heat pump unit	–
		Stop the heat pump temporarily	–
		Cooling operation mode	–
		Water heating	–
		DHW frost protection	–
		DHW and heating mode	–
State SG-Ready		Definitive start command	→ Chapter 8.8, page 49
		Increased operation mode	
		Energy provider block mode	
	–	Energy-efficient standard mode	
Source of demand		Timer	–
		Manual operation	–
		Automatic	Requirement by Calendar, Weekly scheduler or Frost protection
	–	System	Heat demand through system set value
		Frost Protection	Heat pump demand to prevent damage caused by frost
		Modbus/BACnet	Specification via Bus
		Heat pump lock	Outside temperature Is outside the envelope range
Silent mode		Low noise mode	–
	–	Normal Operation	–
Configuration of the time program		Configuration of the time program	→ Chapter 3.3, page 10

Table 2 Symbols in the header

3.2 Setting options of the operating conditions in the advanced functions

The hydraulic circuits can include the following applications:

- Heating circuit
- Cooling circuit
- combined circuit (heating and cooling)

In the advanced functions, the operating modes for the heating circuit, cooling circuit and combined circuit can be selected.

3.2.1 Possible settings for the heating circuit

Parameters	Settings/adjustment range	Explanation
Circuit state	Off/On	–
Type of operation	Automatic	Automatic causes the time schedule to be used (with known priority). This switches to the selected operating mode, the parameters of which are set under menu Heating curve.
	Manual heating mode	–
	Manual setback mode	–
Room temperature setpoint	–	Parameter only visible if a room-setpoint-dependent calculation basis has been selected. If possible (depending on the heating system set): can be set via the screen menu in manual mode (only one mode visible at a time). • If Heating is selected: Set value for heating • If Heating setback reduction is selected: Set value for reduction

Table 3 Possible settings for the heating circuit

3.2.2 Possible settings for the cooling circuit

Parameters	Settings/adjustment range	Explanation
Circuit state	Off/On	–
Type of operation	Automatic	Operation according to timer program
	Manual cooling mode	–
	Manual cooling mode off	–

Table 4 Possible settings for the cooling circuit

3.2.3 Possible settings for the combined circuit

Parameters	Settings/adjustment range	Explanation
Circuit state	Off/On	–
Type of operation	Auto	Operation according to timer program
	Manual heating mode	–
	Manual setback mode	–
	Manual cooling mode	–
	Manual cooling mode off	–

Parameters	Settings/adjustment range	Explanation
Room temperature setpoint	–	Only in heating and reduced heating modes. Parameter only visible if a room-setpoint-dependent calculation basis has been selected. If possible (depending on the heating system setting): can be set via the screen menu in manual mode (only one mode visible at a time). • If Heating is selected: Set value for heating • If Heating setback reduction is selected: Set value for reduction

Table 5 Possible settings for the combined circuit

3.2.4 Operating status displays

Display	Meaning
	Heating mode
	Cooling operation mode
	Heating setback mode
	Standby
	Off
	Time program

Table 6 Operating status displays

3.3 Time program

To call up the time program:

- ▶ **Control unit** > **Thermal production** > Heat pump
- ▶ Tap prog.
  The menu of the time program opens.

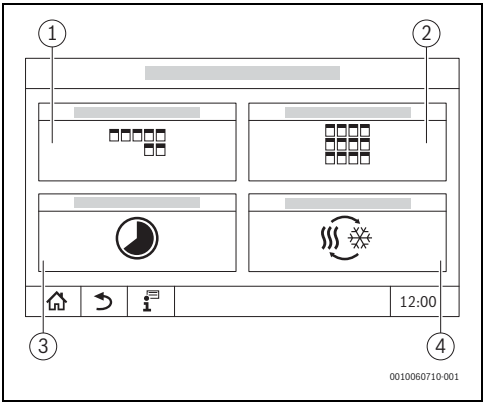


Fig. 5 Schedulers

[1] Weekly scheduler
[2] Yearly calendar
[3] Timer
[4] Type of cooling changeover (if cooling is configured)

In the time program menu, you can configure the settings for the heating/cooling programs and the fan mode.

The timer has the higher priority over the annual calendar and the weekly timer.

In addition, the type of cooling changeover can be defined in this menu.

3.3.1 Weekly time program (overview)

The weekly time program determines the recurring operating condition of the heat pump across the days of the week. The weekly time programs allow you to define the desired temperatures and operating conditions for the different days of the week.

Using the weekly time program, the requirements for each day of the week can be configured via a planner. Up to 8 entries can be added for each day of the week. Entries are added in ascending order of start time. Entries can be added between existing entries as long as they remain in ascending order of start time.

The following entries are possible:

- The start time of the heat energy demand, with a maximum range of 0:00 to 23:45, adjustable in 15 minute increments.
- Selecting the operating mode.
- Depending on the mode selected: temperature limit setting for operation. This set value can be configured using the standard keypad and/or the standard slider with plus and minus keys.

The following settings cannot be made and will result in warning messages:

- Entries after 23:45. This would exceed the maximum time of day.
- Entries between existing entries, if there are less than 15 minutes between the end time of the first entry and the start time of the second entry. This could lead to an overlap.
- More than 8 entries.

To open the weekly time program menu:

► **Control unit** > **Thermal production** > Heat pump
► Tap prog.
► TapWeekly scheduler.
The menu for weekly time program opens.

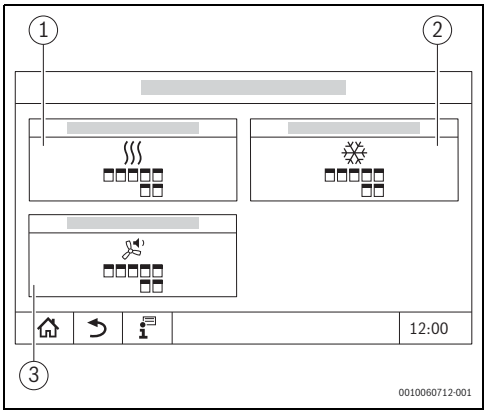


Fig. 6 Weekly scheduler

The view Weekly scheduler consists of up to three tiles:

[1] Heating mode
[2] Cooling operation mode
[3] Fan operation mode (Fan mode of the heat pump)

3.3.2 Weekly time program for heating mode

In the weekly time program for heating mode, the desired operating modes are set for the different days of the week.

The operating modes are applied when the heat pump is in heating mode.

To open the weekly time program menu:

► **Control unit** > **Thermal production** > Heat pump
► Tap prog.
► TapWeekly scheduler.
► TapHeating mode.
The menu for week days for heating mode opens.

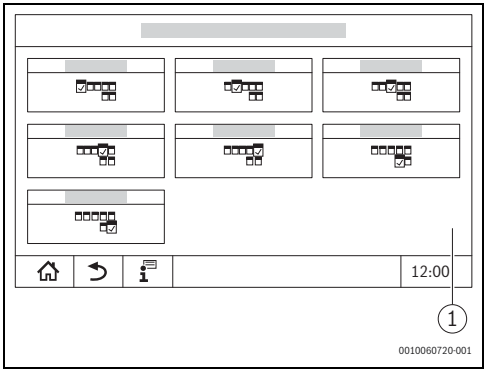


Fig. 7 Weekly time program for heating mode

[1] Display of week days

- Tap on a desired week day.
  The settings page for that week day opens.

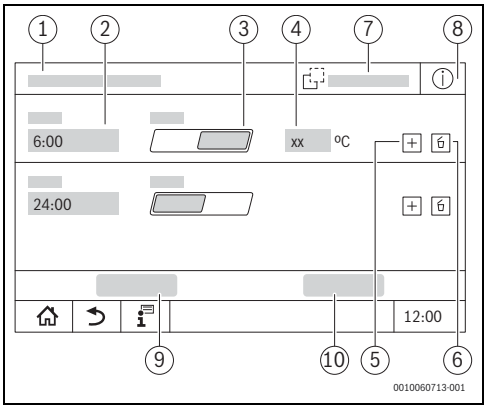


Fig. 8 Settings for the selected week day

[1] Selected week day
[2] Start time of the selected operating mode
[3] Operating mode
[4] Temperature setting for the operating mode
[5] Add new entry
[6] Remove entry
[7] Transfer selected settings to other days
[8] View information about the menu and function
[9] Save entries
[10] Discard entries

Copy entries from weekdays

Using the function **Copy day** , entries can be transferred from one day of the week to one or more other days of the week.

- Tap**Copy day**.
  The menu for copying the entries opens.
  The day to be copied from is greyed out.

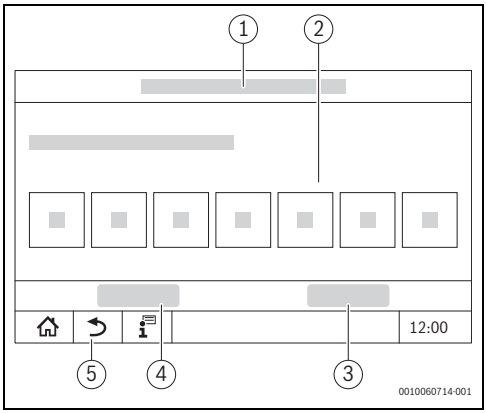


Fig. 9 Copy day

[1] Selected week day
[2] Select the week days to which the week day selected is to be copied
[3] Reset selection
[4] Save selection
[5] Back to day selected

- Tap the weekdays where the copied settings are to be transferred to.
  The weekdays are highlighted.
- Tap**Save**.

3.3.3 Weekly time program for cooling mode

In the weekly time program for cooling mode, the desired operating modes are set for the different days of the week.

The operating modes are applied when the heat pump is in cooling mode.

To open the weekly time program menu:

- **Control unit** > **Thermal production** > Heat pump
- Tap .
- TapWeekly scheduler.
- TapCooling operation mode.
  The menu for week days for cooling mode opens.

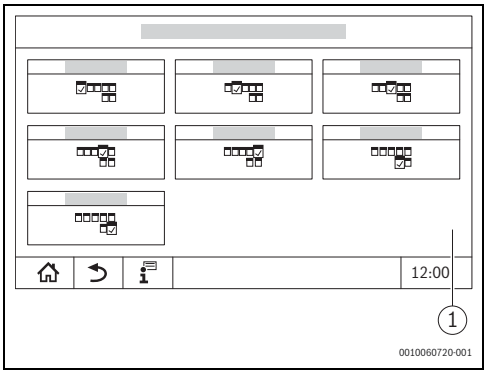


Fig. 10 Weekly time program for cooling mode

▶ Tap on a desired week day.
The settings page for that week day opens.

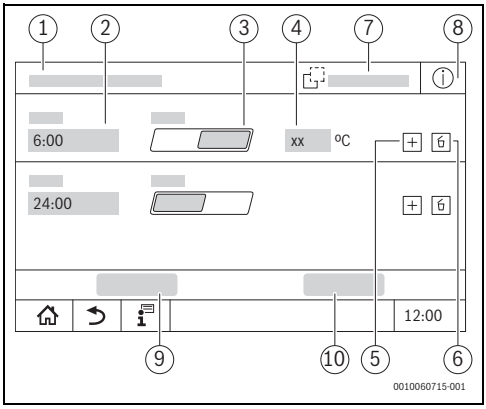


Fig. 11 Settings for the selected week day

[1] Selected week day
[2] Start time of the selected operating mode
[3] Operating mode
[4] Temperature setting for the operating mode
[5] Add new entry
[6] Remove entry
[7] Transfer selected settings to other days
[8] View information about the menu and function
[9] Save entries
[10] Discard entries

Copy entries from weekdays

Entries for weekdays can be copied in the same way as for heating mode (Chapter , Page) (→ Chapter Copy entries from weekdays, page 12)

3.3.4 Weekly time program for fan operation (fan mode of the heat pump)

In the weekly time program for fan operation, the desired operating modes are set for the different days of the week.

The operating modes are applied when the heat pump is in automatic mode.

The settings are not available for all heat pumps.

The settings may affect the available heat output. This is because low fan speeds to minimise noise have an impact on heat transfer.

- Up to 8 entries can be created for each day of the week.
- The entries are added in ascending order of the start time.
- Entries can be added between existing entries as long as they remain in ascending order of the start time.

Each entry contains the following parameters:

- The start time of Silent mode, with a maximum range of 0:00 to 23:45, adjustable in 00:15 minute increments.
- The default value for the first entry is 06:00 and the default value for subsequent entries is the value of the previous entry plus 00:15 minutes.
- The type of Silent mode can be configured via a drop-down menu
  - **Standard mode**: no reduction of the speed
  - **Silent mode**: slight reduction of the speed
  - **Super silent mode**: medium reduction of the speed
  - **Night mode**: high reduction of the speed

The setting from the previous day is retained until the time of the next entry.

example:
if an entry is made for Monday, this period is automatically adopted for the following days Tuesday, Wednesday, Thursday, Friday. If a new entry is made for Saturday, it is also automatically adopted for Sunday, provided there is no separate entry for Sunday.

To open Silent mode:

- ▶ Call up menu **Control unit** > **Thermal production** > Heat pump > Schedulers > Silent mode.
- ▶ Tap the day of the week.
- ▶ Enter the first time period with +.
- ▶ Enter the start time.
- ▶ Select which operating mode to use:
  - **Standard mode**
  - **Silent mode**
  - **Super silent mode**
  - **Night mode**
- ▶ If necessary, add further entries with +.
- ▶ If necessary, remove entries with 🗑.
- ▶ Confirm with **Save**.

The corresponding icon in the header in the display shows which operating mode is currently active.

To open the weekly time program menu:

- ▶ **Control unit** > **Thermal production** > Heat pump
- ▶ Tap prog.
- ▶ TapWeekly scheduler.
- ▶ TapFan operation mode.
  The menu for week days for fan operation opens.

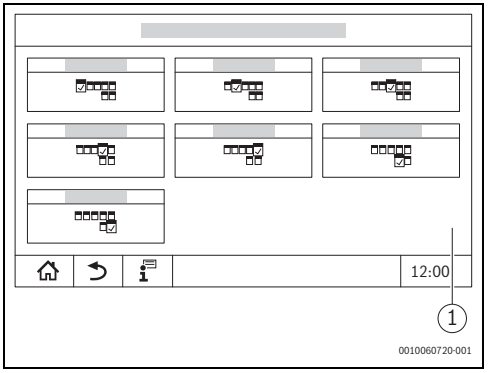


Fig. 12 Weekly time program for fan operation

- ▶ Tap on a desired week day.
  The settings page for that week day opens.

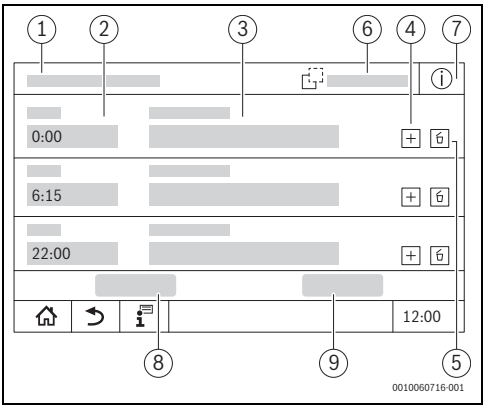


Fig. 13 Settings for the selected week day

[1] Selected week day
[2] Start time of the selected operating mode
[3] Operating mode
[4] Add new entry
[5] Remove entry
[6] Transfer selected settings to other days
[7] View information about the menu and function
[8] Save entries
[9] Discard entries

Copy entries from weekdays

Entries for weekdays can be copied in the same way as for heating mode (Chapter , Page) (→ Chapter Copy entries from weekdays, page 12)

3.3.5 Calendar (overview)

In the annual calendar, the heat energy demand can be added and configured for up to 8 consecutive periods (entries). The entries are added in ascending order of the start time.

Entries can be added between existing entries as long as they remain in ascending order of start time. The start date can be entered in increments of 1 day.

The period must be between the current date and any date in the future. The default value for the first entry is the current date and the default value for subsequent entries is the value of the end date of the previous entry plus 1 day.

The end date of the heat energy demand can be set in increments of 1 day. The period is between the start date and any date in the future. The default value is the start date.

Time periods that lie in the past are removed from the annual calendar and are no longer displayed.

The following settings cannot be made and will result in warning messages:

- No entry can be inserted between existing entries if there is less than 1 day between the end date of the first entry and the start date of the second entry, as this would result in an overlap.
- No more than 8 entries can be inserted.

To open the annual calendar:

► **Control unit** > **Thermal production** > Heat pump
► Tap prog.
► TapYearly calendar.
The menu for annual calendar opens. The menu depends on the respective configuration.

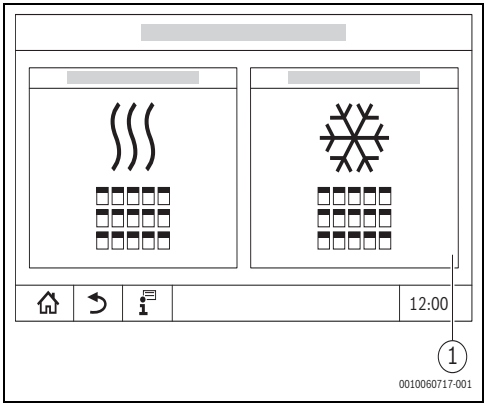


Fig. 14 Yearly calendar

[1] Display of operating modes

3.3.6 Annual calendar for heating mode

The annual calendar can be used to define a time span during which a different heating mode to the usual one is to be used. The annual calendar has a higher priority than the weekly calendar.

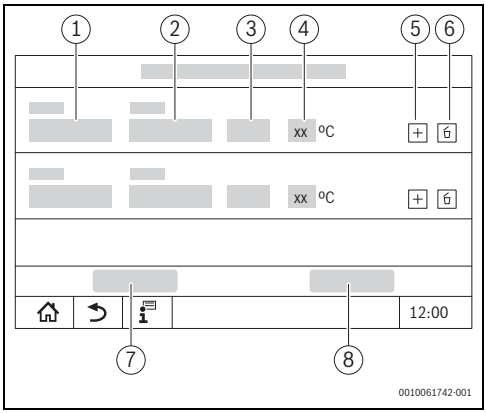


Fig. 15 Annual calendar for heating mode

[1] Start time of the time span
[2] End of the time span
[3] Operating mode
[4] Setting temperature
[5] Add new entry
[6] Remove entry
[7] Save entries
[8] Discard entries

3.3.7 Annual calendar for cooling mode

The annual calendar can be used to define a time span during which a different cooling mode to the usual one is to be used. The annual calendar has a higher priority than the weekly calendar.

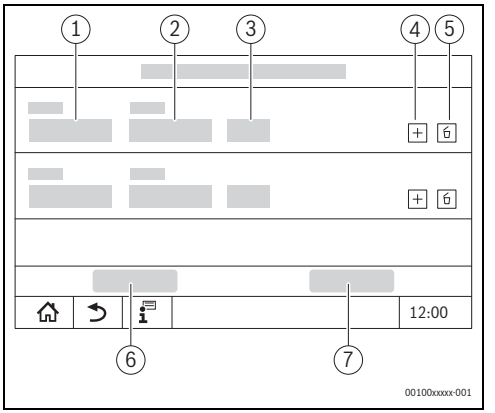


Fig. 16 Annual calendar for cooling mode

[1] Start time of the time span
[2] End of the time span
[3] Operating mode
[4] Add new entry
[5] Remove entry
[6] Save entries
[7] Discard entries

3.3.8 Temporary manual mode (Timer)

The temporary manual mode allows a temporary operating mode to be set for a specified time. This operating mode takes precedence over the operating modes of the weekly and annual timers.

The selection of heating or cooling mode depends on the current operating condition. If the system is in heating mode, the temporary time period for heating operation can be set. If the system is in cooling mode, the temporary time period for heating operation can be set.

The timer switch is reset when the operating mode changes from cooling to heating or vice versa.

To open the timer:

- ▶ **Control unit** > **Thermal production** > Heat pump
- ▶ Tap prog.
- ▶ TapTimer.
  The menu for the timer switch opens.

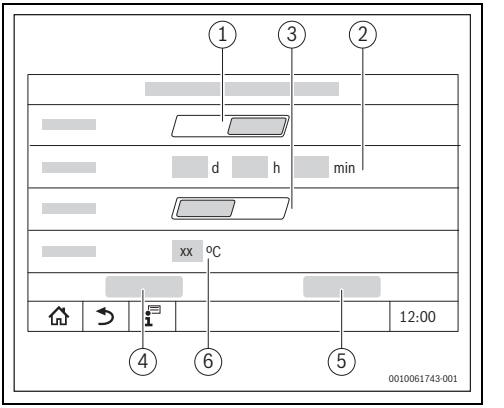


Fig. 17 Timer

[1] Activate/deactivate the timer switch
[2] Duration of the temporary operating mode in days/ hours/minutes
[3] Operating mode
[4] Save selection
[5] Cancel process
[6] Temperature setting

Submenu	Settings/ adjustment range	Explanation	Note
Timer	Off/On	–	The time has elapsed when this parameter is automatically set to Off.
Duration	**0**...138 d	–	Only visible if the parameter Timer is at On.
	0...**3**...23 h	–	The duration must be at least 10 minutes.
	0...59 min	–	
Heating mode/Cooling operation mode	Off/On	–	Only visible if the parameter Timer is at On.
Set temperature	15...**30**...70 °C	–	Only visible if the parameters Timer and Heating mode are at On.

Table 7 TimerMenu

3.3.9 Cooling changeover (overview)

The condition for switching to cooling mode can be defined in the menu **Cooling changeover**. In doing so, this determines the criteria on which the cooling mode is activated.

Switching to cooling mode puts the heat pump into cooling mode. Cooling mode is available for the cooling circuits and combined circuits, depending on the operating condition. The following options are available:

- Changeover based on the adjusted outside temperature
- Constant (continuous) cooling mode
- Changeover via external bus commands (Modbus/BACnet)
- Changeover according to the date (cooling period)

To open the cooling changeover:

- ▶ **Control unit** > **Thermal production** > Heat pump
- ▶ Tap $_{prog}$.
- ▶ Tap**Cooling changeover**.
  The menu for cooling changeover opens.
  Depending on the type of cooling mode, the cooling changeover menu has different views:

Cooling changeover via Outside temperature (FA)

Submenu	Settings/ adjustment range	Explanation	Note
Cooling changeover via	Outside temperature (FA)	The cooling operating condition is activated or deactivated depending on the adjusted outside temperature.	–
Cooling if outside temperature is above	15…**25**…40	–	If the outside temperature (adjusted value) rises above the set value, cooling mode is switched on.
Hysteresis for switching off the cooling mode	15…**10**…20	–	If the outside temperature (adjusted value) falls below the set value by this hysteresis, heating mode is switched on.

Table 8 Menu Cooling changeover via Outside temperature (FA)

Cooling changeover via Constant

Submenu	Settings/ adjustment range	Explanation	Note
Cooling changeover via	Constant	The cooling operating condition is selected permanently.	–
Constant mode	Heating/Cooling	The selected operating mode Heating or Cooling is set permanently.	–

Table 9 Menu Cooling changeover via Constant

Cooling changeover via Modbus/BACnet

Submenu	Settings/ adjustment range	Explanation	Note
Cooling changeover via	Modbus/BACnet	The cooling changeover is carried out via the building management system interface using Modbus TCP/ IP or BACnet Gateway.	→ Installation/operating instructions for the main controller. For this purpose, other settings are required.

Table 10 Menu Cooling changeover via Modbus/BACnet

Cooling changeover via Date

Submenu	Settings/ adjustment range	Explanation	Note
Cooling changeover via	Date	The cooling operating condition is changed over annually based on fixed dates.	–
Cooling period	From/To	–	The recurring date can be selected by choosing the month and tapping the desired day.

Table 11 Menu Cooling changeover via Date

3.4 Heat pump energy data

This menu is used to display appliance-specific energy monitoring and efficiency data. It is visible in the module configuration directly after configuration and activation of the FM-AM module. One of the supported heat pumps must also be integrated/configured.

There may be non-negligible deviations between the calculated energy data and real energy consumption. The calculation of the energy data is based on operating conditions and not on energy measurements.
The energy data represented here may therefore not be used for invoicing purposes.

To call up the energy data:

The heat pump is activated (→ Chapter 5.7, page 22).

▶ **Info** > **System strategy** > Heat pump > **Energy monitoring**

-or-

▶ **Service menu** > **Monitor data** > **System strategy** > Heat pump > **Energy monitoring**

Current values view

The tiles for energy data are displayed if the values are supported by the device. If a heat pump is integrated that is not supported, the tile is hidden.

Energy values are displayed as total energy data and are counted separately according to operating condition. Depending on the configuration, values are available separately for heating, cooling, DHW, external booster heater and defrosting.

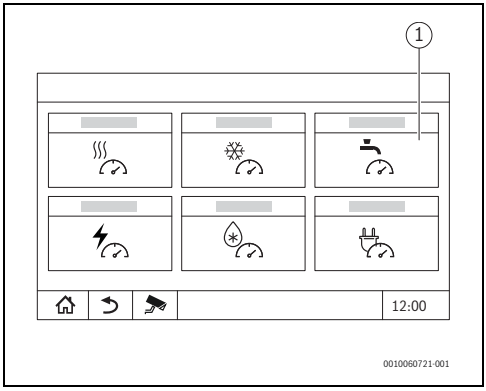


Fig. 18 Energy data selection

[1] Tiles for selecting energy data

In the energy data selection, the current values for specific types of energy data can be selected.

In the event of loosing a connection, the tile continues to be displayed with the last data received.

To display the current values:

▶ **Info** > **System strategy** > Heat pump > **Energy monitoring** > Energy data selection > **Current values**

-or-

▶ **Service menu** > **Monitor data** > **System strategy** > Heat pump > **Energy monitoring** > Energy data selection > **Current values**

Value	Explanation
Thermal power	Current heat transfer of the heat pump received via Modbus RTU.
Electrical power	Current electrical output of the heat pump received via Modbus RTU.
Efficiency	Depending on the heat pump, either the current efficiency received via Modbus RTU or the calculated ratio of heat output to electrical output.

Table 12 Overview of the current values

Time periods view

In the submenu for the various energy data types, up to three tiles are displayed to navigate to the aggregated data for the last three years, if data is available for the respective year.

To display the time periods:

- ▶ **Info** > Heat pump > **System strategy**> Heat pump > **Energy monitoring** > Energy data selection > **Year** (e.g. 2025)

-or-

- ▶ **Service menu** > **Monitor data** > **System strategy** > Heat pump > **Energy monitoring** > Energy data selection > **Year** (e.g. 2025)

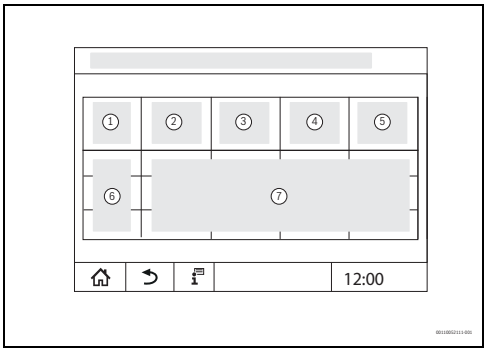


Fig. 19 Time periods view

[1] **Period**
[2] **Ø Outside temp. °C**
[3] **Thermal energy kWh**
[4] **Electrical energy kWh**
[5] Efficiency
[6] Time period (month)
[7] Extrapolated measured values over the time

If data is shown in italics, the calculation was not based on valid data and the values are “estimated”. The reason for this can be, for example:
- a change of the time in the current time period
- no data could be determined in the meantime
- energy data has been influenced by a change of the time settings
.- new energy data were loaded
- energy data were reset.

Unavailable data elements for individual entry lines are displayed as -.

3.5 Dealing with Notifications

WARNING

Danger to life from electric shock!

Touching live electrical parts can cause an electric shock.

- ▶ Do not open the control unit under any circumstances.
- ▶ Switch off the control unit in an emergency (e.g. heating system emergency stop switch) or disconnect the heating system from the mains via the circuit breaker.
- ▶ Have faults in the heating system rectified immediately by an approved heating contractor.

Fault displays, which displays, which refer to heat sources with a control unit in the Logamatic 5000/Control 8000 series, are described in the instructions for the relevant control unit. They appear on the display of the control unit.

For Notifications, which refer to a different heat source:

- ▶ The documents for the heat source must be observed.
- ▶ Contact an approved and qualified heating contractor to report Notifications.
- ▶ Have rectified immediately by an approved and qualified heating contractor Notifications.

The Message text column lists the Notifications, which can occur with the module and the connected heat sources.

- ▶ In the case of that Notifications are not listed, refer to the technical documents for the connected components.

Call up the message display

To call up the message display:

- ▶ Tap symbol.

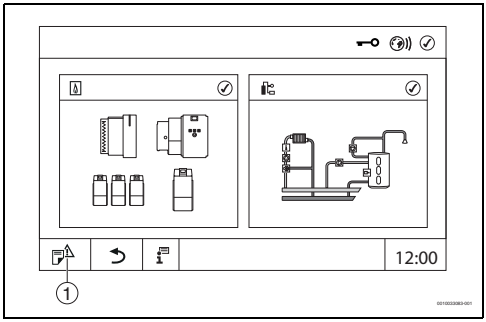


Fig. 20 Call up the message display

[1] Error display

The Notifications menu shows the active faults and service displays of the heating system in plain text. The control unit shows only the faults and service displays of the selected heat source. Collective messages from substations are also displayed in the master control unit.

If more faults and service displays than can be displayed on one page exist, you can scroll through the pages via the arrows in the footer.

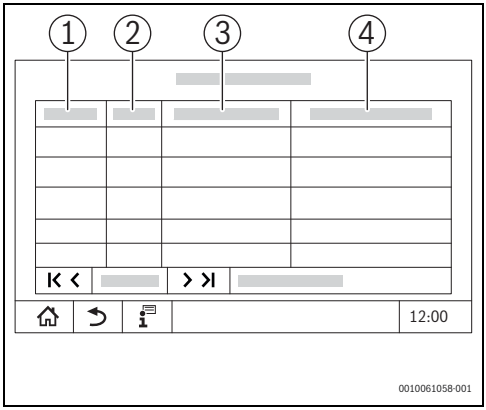


Fig. 21 Message display

[1] Incident ID
[2] Occurred (date, time)
[3] Component (specifies the component where the fault occurred).
[4] Display text (describes the type of fault).

Active faults and service displays are displayed in plain text (example → Table 13, page 20).

- ▶ Phone an approved and qualified heating contractor to report faults.
- ▶ Have faults rectified immediately by an approved and qualified heating contractor.

Display text/ Observation/ Fault	Cause/Effect	Remedy
Cylinder temperature sensor defective	The control expects a valid DHW storage temperature based on the configuration.	▶ If necessary, deactivate the DHW function or check and replace the cylinder temperature sensor.

Table 13 Fault displays and troubleshooting, example

4 Installation for the qualified person

4.1 Notices regarding installation

- ▶ Observe safety instructions (→ Chapter 1.2, page 4).
- ▶ Observe the safety instructions and notes on installation of the basic control unit.

⚠ Notices for the target group

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

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

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- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.
- ▶ Record all work carried out.

⚠ Notices for the service life

To ensure the long service life of the heat pump:

- ▶ Ensure proper system integration of the heat pump.
- ▶ Do not let the heat pump run close to the limit temperature for a longer period of time.
  - – To ensure this, the maximum demand temperature can be reduced via the parameter: **Service** > **System strategy**> **Heat pump settings** > Heating > **System settings** > **Reduction of maximum heat pump flow temperature** or **Max. supply temperature**

4.3 Standards, regulations and directives

- ▶ The following regulations and standards in the documents of the Logamatic 5000/Control 8000 control unit series must be observed during installation and operation.

5 Installation

NOTICE

Faults/material damage due to inductive interference!

- ▶ Make sure all low-voltage cables are routed separately from mains voltage cables (min. clearance: 100 mm).

WARNING

Danger to life and risk of system damage due to high temperatures.

All parts directly or indirectly exposed to high temperatures must be designed to withstand these temperatures.

- ▶ Keep cables at a safe distance from hot and cold components.
- ▶ Route cables in the cable routings provided, or above the insulation.

5.1 Prior to installation

Note the recommended hydraulics for installation (→ Chapter 10, page 50).

Observe the following prior to installation:

- All electrical connections, safety measures and safeguards must only be performed by an approved qualified person, taking into account the relevant standards, guidelines and local regulations.
- The electrical connections must be made in accordance with the wiring diagram for the control unit and the modules.
- When installing the devices, make sure that there is an earth connection.
- Before opening the control unit, disconnect it from all poles of the power supply and secure against unintentional reconnection.
- Incorrect attempts to make connections when live may destroy the control unit and lead to dangerous electric shocks.
- Do not exceed the total current stated on the data plate or the current for each connection.

5.2 Installation in the control unit

The modules affect all control units in the network, particularly during the heating/cooling changeover.
When the module is installed in a substation, it affects the heat demand of the substation.

5.3 Integrating the module into the control unit

Once the module has been installed in the control unit, the control unit detects it automatically when it is switched on.

If the module is not detected automatically, it will have to be integrated via the control unit once manually (→ installation and operating instructions for the control unit).

5.4 Software

These instructions describe the functionality of the FM-AM modules when installed in a control unit with software version SW 4.x. The functionality of the FM-AM module will be restricted when using control units with older software versions.

Checking the software version

All main controllers connected in the network must have the same software version.

To check the software version of the control unit:

- ▶ The service instructions for the control unit must be observed.

Performing a control unit update

The procedure for performing an update with the various versions is described on the homepage of the control unit manufacturer.

5.5 Connecting temperature sensors

The fitting position for the temperature sensors depends on the system hydraulics. Examples of system hydraulics are shown in → Chapter 10, page 50

- ▶ Check whether the selected hydraulics is compatible with the cold / heat source used.
- ▶ Check whether the system components used (e.g. buffer cylinder) are compatible with the heat source used.
- ▶ Make sure that the temperature sensors are connected in the right positions.

The sensor abbreviation and sensor function are explained in → Chapter 10.6, page 61

5.6 Integrating the heat pump

The FM-AM function modules are designed to integrate certain heat pumps of Buderus and Bosch hydraulically. The control unit can communicate with heat pump heat via the Modbus RTU.

Connecting the communication cable

The length of the cable between the control unit and heat pump must not exceed 1000 m. A screened cable must be used as the communication cable, e.g. LiYCY 2 x 0.75 (TP) mm^2.

The communication cable transmits parameters and messages between the heat pump to the main controller.

The control unit displays the parameters and messages of the heat pump. The start command and the selection of operating mode is also sent to the heat pump via the communication cable.

- ▶ Use screened cable as the communication cable.
- ▶ Connect communication cable to the Modbus RTU connection.
- ▶ Observe the connections at the heat pump.
- ▶ Observe the installation instructions for the heat pump.

To avoid stray voltages:

- ▶ **Only** connect the cable shield to the control unit or heat pump heat and power unit!

Assignment of Modbus RTU connection (→ Fig. 22, [3], page 22):

- Terminal 1 = GND (if necessary, shield)
- Terminal 2 = + (H1, A)
- Terminal 3 = – (H2, B)

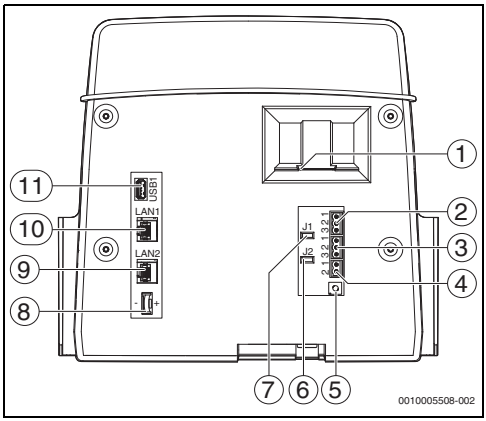


Fig. 22 User interface connections

[1] Slide type insert for SD card
[2] CAN-BUS connection (no function, provided for subsequent functions)
[3] Modbus-RTU connection to heat pump
[4] EMS connection (connection for EMS heat source with its own basic control (control panel))
[5] Address setting of control unit
[6] Jumper (J2) for activating the terminating resistor Modbus RTU
[7] Jumper (J1) for activating the CAN BUS terminating resistor
[8] Battery CR2032
[9] Network connection 2 (CBC-BUS)
[10] Network connection 1 (Internet, ModBus TCP/IP, CBC-BUS)
[11] USB connection

The plug-in connector assignment on the back of the control unit depends on what it is used for and the configuration.

Assignment of the CAN-BUS/Modbus RTU/EMS plug:

- Jumper (J2) for activating the terminating resistor Modbus RTU
- Jumper (J1) for activating the CAN BUS terminating resistor

5.7 Activate heat pump

- ▶ Call up **Service** >**System/Module configuration** menu.
- ▶ Under **Slot 1...4**, select at least one of the slots **FM-AM** if it has not already been activated automatically.
  The parameter **FM-AM Configuration** appears.
- ▶ Select the heat pump type.

6 Settings for the qualified person

6.1 General data Heat pump settings

The factory settings of the heat pump can be carried out in the different submenu entries.

▶ **Service** > **System strategy** > **Heat pump settings** > **Default setting**

Submenu	Settings/ adjustment range	Explanation	Note
Modbus RTU Unit ID	0...**1**...255	This parameter must match the setting on the heat pump to enable communication.	In the case of a heat pump cascade, the unit ID of the heat pump master of the heat pump cascade must be set.
Heat pump cascade active	**No**/Yes	Information on whether one heat pump is connected or if several heat pumps are connected in a cascade.	–
Number of heat pumps	**2**...8	Information of the number of heat pumps that are operated in the cascade.	–
Capacity reference heat pump	.. kW (depending on the heat pump used)	For a cascade: Specify the output of the master heat pump	Only visible for heat pump types that require selection.
Capacity heat pump	.. kW (depending on the heat pump used)	The operating condition of the heat pump is configured using this parameter.	Only visible for heat pump types that require selection.

Table 14 Default settingMenu

6.2 Heat pump settings – Heating

The system settings, hydraulic integration and defrost function support can be configured here.

The settings can be made in the menu:

▶ **Service** > **System strategy** > **Heat pump settings** > Heating

6.2.1 System settings

In the system settings, the demand sources, limitations and bivalence strategies can be set. For single-buffer solutions in cooling mode, the settings for bivalence operation and boiler blocking are not effective, as the boiler is permanently blocked in cooling mode.

The settings can be made in the menu:

▶ **Service** > **System strategy** > **Heat pump settings** > Heating > **System settings**

Submenu	Settings/ adjustment range	Explanation	Note
Source of heat demand	Weekly scheduler	The set value of the heat demand is determined exclusively by the weekly time program of the heat pump function.	Setting for how the set value for the heat pump control is formed. If the Timer function has been activated, the parameter Source of demand has no influence on the set value of the heat pump. The set value settings of the Timer function are adopted instead (→ Chapter 3.3.8, page 16 and Chapter 8.2, page 44). The time program Silent mode has no influence on the temperature set value of the heat demand. This time program enables a temporary noise-reduced operation, with a corresponding output reduction.
	System	The set value of the heat demand is formed exclusively as a max selection by the system (**System**), this means all connected consumers (HK/WW). Whether an external demand via the building management system is also considered depends on the parameter **Strategy** > **Demand via Bus**.	
	Max (System, Weekly scheduler)	The set value is formed from a max. temperature selection of the setpoints **System** and. Weekly scheduler	
Supply temperature limitation via	Custom envelope	The respective compressor operating curves are stored for the heat pumps supported by the control system. If the Custom envelope option is selected, the control system limits only the maximum and minimum flow temperatures. The heat pump limits the compressor envelope itself if it lies outside the operating range.	The compressor envelopes determine the possible flow temperatures of the heat pumps depending on the outside temperature and can be found in the heat pump documentation.
	Compressor envelope	The respective compressor operating curves are stored for the heat pumps supported by the control system. If the **Compressor envelope** option is selected, the requirements are limited so that the heat pump can always operate within the compressor envelope. In addition, the margin to the maximum flow temperature can be reduced within the respective operating ranges.	The compressor envelopes determine the possible flow temperatures of the heat pumps depending on the outside temperature and can be found in the heat pump documentation. An additional clearance below the maximum flow temperature can improve efficiency and service life.
Max. supply temperature	15…75 °C (depending on the heat pump used)	Maximum flow temperature sent to and demanded by the heat pump during heating.	Only visible if the parameter Supply temperature limitation via is at Custom envelope.
Min. supply temperature	15…75 °C (depending on the heat pump used)	Minimum flow temperature sent to and demanded by the heat pump during heating.	Only visible if the parameter Supply temperature limitation via is at Custom envelope.
Reduction of maximum heat pump flow temperature	0… 20 K (depending on the heat pump used)	The maximum flow temperature demanded from the heat pump is reduced by this value at the respective operating points.	Only visible if the parameter Supply temperature limitation via is at Custom envelope. An additional clearance below the maximum flow temperature can improve efficiency and service life.

Submenu	Settings/ adjustment range	Explanation	Note
Temperature difference heat pump/ buffer storage	**0**...20 K	Setting by how many K the set value of the heat pump is to be increased compared to the buffer temperature.	–
Heat pump temperature spread flow to return temperature	0...**10**...20 K	This value is used to convert the desired buffer temperature to the return temperature demand.	Only visible for heat pump types that are controlled by the return.
Bivalent operation	Off/On	Setting whether the operating strategy is used or the heat pump and boiler are operated side by side on an equal basis. On: the following operating strategy is used. If there is a second heat generator or the heat pump cannot guarantee the heating of the system by itself, this operating mode should be selected. Off: boiler and heat pump are requested independent of the outside temperature. Operation takes place without an operating strategy.	Heat pumps operated bivalent generate the heating energy in combination with another heat generator, which supports or completely takes over the heating of the building at lower outside temperatures. Dual-fuel mode is defined as a combination with a heater rod, another heat pump, or a combustion heating system using oil or gas.
Heat pump operation strategy	Alternative	Below the bivalence point only the boiler is operated, above it only the heat pump.	Only visible if the parameter Bivalent operation is at On. Setting the operating mode below the set bivalent temperature. The fulfilment of the system temperature requirement has the highest priority. In case of insufficient supply of the system, the boiler can switch on at any time. More information → Chapter 8.3, page 44
	Parallel	The heat pump and the boiler can be operated simultaneously.	
	Partly-Parallel	Below the bivalent temperature, the heat pump and the boiler are operated in parallel in an adjustable outside temperature range. Below the temperature set under **Shut off point heat pump**, only the boiler is operated.	
Bivalence point	−20...**3**...20 °C	Setting of the outside temperature up to which the heat pump is to take over the heating alone. Above the outside temperature set here → The heat pump is operated exclusively/alone. Below the outside temperature set here: → Depending on the setting under Heat pump operation strategy.	The current outside temperature of the main controller is used.
Hysteresis for bivalence point	0.5...**1**...5 K	Setting of the increase of outside temperature at which the heat pump can take over the supply exclusively/alone again.	–

Submenu	Settings/ adjustment range	Explanation	Note
Shut off point heat pump	−30…**-5**…10 °C	Setting of the outside temperature up to which the heat pump and the boiler are operated simultaneously in the Partly-Parallel operating strategy. Above the outside temperature set here: → the heat pump and boiler are operated at the same time. Above the outside temperature set here: → the boiler is operated alone.	Only visible if the parameter Heat pump operation strategy is at Partly-Parallel. The current outside temperature of the main controller is used. The parameter must be considered in conjunction with the set Bivalence point.
Hysteresis for bivalence shut off point	0.5…**1**…5 K	Setting of the increase of outside temperature at which the heat pump can take over the supply again.	–
Boiler delay due to set point increase	Off/On	If there is a sudden set value change in the system, the lock remains in place for a certain time to give the heat pump time to fulfil this sudden set value change. Setting whether the boiler should react to a change in the system set value temperature. On: the boiler is blocked if there is a sudden set value change. Off: the boiler will attempt to meet the new set value.	Conditions: • The heat pump was capable of supplying the system without a boiler before the sudden set value change. • The temperature set value is within the operating range of the heat pump after the sudden set value change.
Offset for boiler delay due to set point increase	2…**5**…20 K	Setting at which sudden set value change is present in a sudden set value change.	–
Boiler delay time due to setpoint increase	10…**30**…300 min	Setting for how long the sudden set value change keeps the boiler lock activated. This gives the heat pump time to reach the new set value.	–
Deactivate boiler block due to outside temperature	Off/On	Setting whether the boiler is no longer blocked below certain outside temperatures in the event of a sudden set value change. On: the boiler is not blocked when there is a sudden set value change below a certain outside temperature. Off: the boiler is blocked in the event of a sudden set value change, even at low outside temperatures.	–

Submenu	Settings/ adjustment range	Explanation	Note
Outside temperature threshold to deactivate boiler block	−20…**10**…40 °C	Setting of the outside temperature up to which the boiler is blocked in the event of a sudden set value change. Above the outdoor temperature set here: → boiler blocking possible. Below the outside temperature set here: → boiler blocking is not possible The boiler will intervene immediately.	–
Hysteresis to reactivate the boiler block	0.5…**1**…5 K	Setting of the increase of outside temperature at which the boiler lock is possible again by a sudden set value change.	–
Enable boiler when setpoint is not reached	No/**Yes**	If the boiler is blocked due to the operating strategy for dual-fuel mode, this parameter can be used to release the boiler for support in the event of an insufficient supply of the system demand. Setting whether the boiler can be enabled although, e.g. the operating strategy of the heat pump blocks the boiler. **Yes**: the boiler is to be partially excluded from the operating strategy of the heat pump if the system supply is insufficient. No: the operating strategy of the heat pump remains the determining function.	**Example:** Set temperature = 50 °C **Maximum acceptable temperature deviation before enabling boiler** = −3 K **Hysteresis to deactivate heat demand** = 3 K Result: boiler enabled when below 47 °C at FPO. blocked when above 50 °C at FPO.
Maximum acceptable temperature deviation before enabling boiler	-30…**-3**…-1 K	Setting for how much the temperature at the FPO may drop below the system set value before the boiler is enabled.	
Hysteresis to turn off the boiler	1…**3**…30 K	Setting of the increase in temperature at the FPO at which the boiler release is ended.	

Table 15 System settingsMenu

6.2.2 Defrost settings

Depending on operating temperatures and humidity levels, heat pumps occasionally need to defrost to prevent or remove ice build-up on the heat exchanger. This requires heating energy from the system, preferably from the buffer cylinder. The defrosting support function is designed to ensure that sufficient energy is always available for this process.

The settings can be made in the menu:

► **Service** > **System strategy** > **Heat pump settings** > Heating > Defrost settings

Example:
All settings = Default

If sensor values FPO, FPM and FPU < 25 °C
or outside temperature < 15 °C:
A heat demandt is sent to the heat pump. If the buffer sensor falls below 25 °C, for example, a demand of 30 °C is sent (2 K fixed offset + 3 K set hysteresis).

The heat request is withdrawn again when the minimum value from FPO, FPM and FPU is > 28 °C or the outdoor temperature is > 15 °C.

Submenu	Settings/ adjustment range	Explanation	Note
Ensure minimum buffer temperature	No/**Yes**	To enable defrosting of the evaporator surfaces, energy is taken from the buffer cylinder. This function ensures a temperature level in the buffer below the ouside temperature. If the temperature falls below this level, a heat demand is sent to the heat pump.	Depending on the outside temperature and humidity, ice can form on the evaporator surfaces of the heat pump if the temperature at any of the 3 sensors (FPO, FPM, FPU) drops below the set value.
Ensure minimum temperature via system return flow	No/**Yes**	If the temperature at any of the 3 sensors (FPO, FPM, FPU) drops below the set value and the system return is warm enough, the sensible return logic is reversed. The valve opens and heats the buffer with warm return water.	–
Heat demand if buffer temperature lower than	5…**25**…40 °C	Minimum temperature in the heat pump buffer to be applied to FPO, FPM and FPU.	Only visible if the parameter Ensure minimum buffer temperature is at On.
Hysteresis to deactivate heat demand	1…**3**…10 K	If the minimum buffer temperature + the hysteresis set here is reached, the heat demand is cancelled.	
Choice of outside temperature sensor	Heat pump	Outside temperature via bus from the heat pump	
	System	Undamped system outside temperature	
	System and heat pump	Minimum value from undamped system outside temperature and outside temperature of the heat pump via bus	
Heat demand if outside temperature lower than	0…**15**…30 °C	When the frost protection is activated, a heat demand is automatically sent when the outside temperature drops below the set value. Example cases: Very cold outside temperature to prevent pipes from freezing. The outside temperature is warm, but the buffer is cold.	
Hysteresis for heat demand by outside temperature	**1**…10 K	Example for value 1 K: The +/-1 K value is processed as follows. Set value for heat request based on outside temperature = 15 °C Assume outside temperature = 15 °C . Set hysteresis value = 1 K. The request is sent at an outside temperature of 15 °C – 1 K. The request is ended at an outside temperature of 15 °C + 1K.	

Table 16 Defrost settingsMenu

6.2.3 Hydraulic integration

In the Hydraulic integration menu, the sensible return feed for heating mode can be activated and adjusted. The menu is only visible if two buffers are activated. With this function, the heating mode of the system to be directed into the buffer or bypassed via a mixing valve on the SWE of the first FM-AM module. For this purpose, the value of a selectable buffer sensor (FPO, FPU, FPM) is compared with the system return sensor FAR.

The settings can be made in the menu:

- ▶ **Service** > **System strategy** > **Heat pump settings** > Heating > Hydraulic integration

Submenu	Settings/ adjustment range	Explanation	Note
Type of buffer integration	**Direct/without valve (SWE)** Direct/with valve (SWE)	The Type of buffer integration of the heat pump buffer can be selected.	–
Buffer reference sensor for sensitive return valve	Buffer temperature bottom (FPU) **Buffer temperature middle (FPM)** Buffer temperature top (FPO)	The sensor for the buffer temperature for comparison with the plant return temperature (FAR) can be selected.	–
Switching differential to inject buffer	-20…**-2**…20 K	If the plant return temperature is colder than the buffer temperature plus this value, the system return flows into the heat pump buffer (SWE = 100%).	If the plant return temperature is lower than the buffer temperature at the selected reference sensor + this value, the plant return flows to the heat pump buffer (SWE = 100%).
Switching hysteresis to bypass buffer	2…**4**…20 K	If the plant return temperature is higher than the buffer temperature plus the switching difference for injection into the buffer plus this value, the plant return flows into the heat pump buffer (SWE = 0%).	If the plant return temperature is higher than the buffer temperature at the selected reference sensor + this value + the switching difference for buffer feed, then the plant return is routed past the buffer (SWE = 0%).
Actuator runtime sensitive return	5…**120**…600 s	The valve motor running time of the sensible return feed is configurable.	

Table 17 Hydraulic integrationMenu

6.3 Heat pump settings Cooling

Here, you can set the source of the cooling demand, the flow temperature limit and the temperature difference.

The settings can be made in the menu:

- ▶ **Service** > **System strategy** > **Heat pump settings** > Cooling

Submenu	Settings/ adjustment range	Explanation	Note
Source of cool demand	Weekly scheduler	The set value of the cooling demand is determined exclusively by the weekly time program of the heat pump function.	Setting for how the set value for the heat pump control is formed. If the Timer function has been activated, the parameter Source of demand has no influence on the set value of the heat pump. Instead, the set value settings for the Timer function are applied.
	Constant setpoint	The selected set value is continuously demanded from the heat pump in cooling mode.	
	External	The set value received externally (via Modbus/BACnet) is demanded from the heat pump.	
Constant setpoint	7…**17.**..20 °C	Fixed set value sent to the heat pump in cooling mode.	–
Supply temperature limitation via	**No limitation**	The set value is sent directly to the heat pump, and the heat pump will provide the set value within its possible parameters.	The compressor envelopes determine the possible flow temperatures of the heat pumps depending on the outside temperature and can be found in the heat pump documentation.
	Compressor envelope	The respective compressor operating curves are stored for the heat pumps supported by the control system. If the compressor envelope is selected, the requirements are limited so that the heat pump can always operate within the compressor envelope. In addition, the margin to the minimum flow temperature can be reduced within the respective operating ranges.	The compressor envelopes determine the possible flow temperatures of the heat pumps depending on the outside temperature and can be found in the heat pump documentation. An additional clearance below the minimum flow temperature can improve efficiency and service life.
Increasing of minimum heat pump flow temperature	0…**2**…10 K	Value by which the minimum flow temperature is increased in the corresponding compressor envelope to maintain a margin from the technically feasible limit.	Only visible if the parameter Supply temperature limitation via is at **Compressor envelope**.
Heat pump temperature spread flow to return temperature	0…**3**…10 K	This value is used to convert the desired buffer temperature to the return temperature demand.	Only visible for heat pump types that are controlled by the return.

Table 18 CoolingMenu

6.4 Strategy heat pump

In the **System strategy**, the buffer hydraulics relating to the heat pump can be set under the relevant entry Strategy heat pump.

The settings can be made in the menu:

► **Service** > **System strategy** > Strategy heat pump

Submenu	Settings/ adjustment range	Explanation	Note
Used hydraulic	**One buffer**	For the heat pump integration, a buffer is used for heating as well as cooling.	The changeover from heating to cooling is carried out globally for the heat pumps. Accordingly, the buffer or buffers are conditioned for the purpose of heating or cooling via the diverter valve settings.
	Two buffer	A two-buffer solution is used for the heat pump integration. One buffer provides the heating energy and the second buffer is used for cooling.	
Actuator runtime cooling changeover	5...**120**...600 s	Runtime of the mixing valve for cooling changeover.	Outlet SWE of the second FM-AM (cooling)
Actuator anti-seizing cooling changeover	Off/On	Setting to determine whether the mixing valves should be moved briefly during prolonged periods of inactivity to prevent them from blocking.	The On setting may cause the volumetric flow rates for heating or cooling to be briefly reversed.

Table 19 Strategy heat pumpMenu

7 Hydraulic circuits

The heating circuit on the central module (terminals PK, SR, FZ) can be used as a heating circuit with or without mixer or as a boiler circuit. If a system component is used in a function, the other system components can no longer be used for the other function.

Example: if SR is used as the mixing valve for the boiler circuit, PK cannot be used for a heating circuit without mixer.

When used as a heating circuit, this is displayed as heating circuit 00.

Only the heating circuits that are available via modules are displayed. The heating circuit symbols turn dark if heating circuits are available but not active. If heating circuits are available and active, the heating circuit symbols are displayed brightly/normally.

Display of heating circuits

A hydraulic circuit on the central module can only be assigned as a heating circuit. The following information applies to all types of hydraulic circuits (heating, cooling or combined).

The designation assigned to the heating circuits depends on the slot of the heating circuit module. The heating circuits are numbered according to the sequence of slots. This means that the heating circuits at slot 1 appear in the display as heating circuit 01 and 02. The heating circuits at slot 2 are displayed as 03 and 04. If a different module is inserted at a slot, these heating circuit numbers are omitted.

If a name has been assigned to the heating circuit, this is displayed.

7.1 Configuration of the hydraulic circuit

Hydraulic circuits can include the following use cases:

- Heating circuit
- Cooling circuit
- Combined circuit (heating and cooling)

The parameters for the cooling circuit or the combined circuit can be set if the following components are connected to the master main controller:

- Heat pump capable of cooling
- 2 FM-AM modules

The setting values are described in the FM-AM document (Function module, alternative heating appliances – For integrating heat pumps via Modbus-RTU).

Hydraulic circuits are configured in the following menu:

Service menu > **Hydraulic circuits** > **Hydraulic circuits configuration**

Parameters	Settings/ adjustment range	Explanation	Note
Hydraulic circuit (00)	**None**	Makes the options for the desired hydraulic circuit available.	
Hydraulic circuit (01)	**None** Heating circuit Cooling circuit Combined circuit	Makes the options for the desired hydraulic circuit available.	
Name of hydraulic circuit (01)	*** Bath Cellar Apartment Swim. pool Building Floor heating Floor	***: Freely defineable name	

Table 20 Configuration menu

7.2 Heating circuit

7.2.1 Default setting

Parameters	Settings/ adjustment range	Explanation	Note
Heating system	**Radiator/ Underfloor**	Suitable for heating circuits that mainly consist of flat radiators or underfloor heating systems.	The type of heating system determines the gradient or curvature of the heating curve. → Service instructions for specialist contractors
	Constant	Suitable for heating systems that require a constant flow temperature irrespective of the outside temperature (e.g. industrial applications, process heat).	
	Base Point	Suitable for heating systems with a rising linear heating curve.	
	Room	Suitable for heating systems with remote control that controls the set flow temperature based on the outside temperature and set room temperature.	
	Supply substation	The heating circuit is used to supply a substation. The substation is supplied by a pump (supply pump) which is controlled by the central module ZM or a function module.	
Influence of attenuation outside temperature	0…**100** %	Influencing the calculation of the adjusted outside temperature.	The adjusted outside temperature takes the heat storage option of the building into consideration (**Building type**, **Insulation standard**).
Remote Control	No/**Yes**	Determines whether a remote control is installed for the heating circuit that influences the heating circuit.	→ Service manual of the main controllers.
Underfloor heating	Off/On	–	Adjustment required if the heating system is an underfloor heating system.
Maximum underfloor flow temperature	20…**45**…60 °C	This value defines the temperature that the flow temperature must not exceed. Depending on the selected heating curve.	The value set influences the heating curve.
Maximum flow temperature	30…**120** °C	This value defines the temperature that the flow temperature must not exceed.	The maximum flow temperature depends on the heat source and can therefore be limited by it.
Minimum flow temperature	**5**…70 °C	Limiting the heating curve to a minimum set value. This value defines the temperature that the flow temperature must not fall below.	This parameter cannot be adjusted with the heating system constant. ▶ Only change value if necessary.

Parameters	Settings/ adjustment range	Explanation	Note
Actuator (SH)	No/**Yes**	Specifies whether or not a heating circuit mixing valve is available.	If a heating circuit actuator is fitted in the installed heating circuit, the control unit actuates this mixing valve. If a heating circuit mixing valve is not installed, the heating circuit is supplied with the current operating temperature.
Actuator runtime	5…**120**…600 s	Setting the elapsed time of the available mixing valve. The elapsed time of the mixing valve determines the length of the command signals that are sent to the mixing valve.	If the mixing valve frequently opens and closes at short intervals, this could be an indication that the elapsed time of the mixing valve has been incorrectly set. The control characteristic can be set to respond more slowly by reducing the elapsed time of the mixing valve. ▶ Observe the manufacturer's instructions.
Increase system demand	0…**5**…20 K	This temperature is added to the flow temperature of the heating circuit to give the system requirement temperature.	A rise in the system requirement (set flow temperature) improves the control characteristics of the mixing valve.
DHW priority / low HC priority	No/**Yes**	Setting the priority of the heating circuit over DHW heating. No: the DHW heating and the heating circuit have the same priority. The DHW and heating circuit are heated in parallel.	**Yes**: the DHW heating and all heating circuits with the setting No have a higher priority than this heating circuit. The charging of the heating circuit is reduced if necessary. ▶ **Observe the chapter for DHW priority (→ Service manual of the main controllers).**
Pump/actuator anti-seizing function	Off/On	Setting that specifies whether or not a pump/mixing valve is to be regularly switched on for short periods to prevent it from seizing up during extended downtimes.	–
Pump overrun	0…**2**…60 min	Setting that determines how many minutes a pump should remain switched on once the switch-on condition no longer exists.	–

Parameters	Settings/ adjustment range	Explanation	Note
Select function	**None**	Switching the operating mode of the heating circuit via an external contact (terminal WF) at the FM-MM and FM-MW module.	The optional function is not available with the connections of the boiler circuit. Heating circuits → Service manual of the main controllers.
	Heating/ setback mode WF1/3		
	Heating/ Setback/Auto WF1/2/3		
	Ext. fault display pump WF1/2	Display of faults for a pump.	
	Ext. fault display pump WF1/2 and heat/setback WF1/3	Display of faults for a pump via 1/2 and external changeover via 1/3.	
Frost protection delay timer enabled	Off/On	Specifies whether a time-delayed activation of the frost protection of the system for the heating circuit is active at low priority. During this delay period, the heat generators can gradually heat up the system without the entire system output being immediately called up for the frost protection function.	The default setting On is the optimal choice for most systems. It ensures that the heat generators do not have to meet the frost protection requirements immediately under high load. This allows the system to initially warm up gradually. The Off setting should only be selected in rare exceptional cases (e.g. for system components in outdoor areas) or where the system has specific requirements.
Frost protection delay timer value	15…**120**…1440 min	Defines the maximum delay time before the general frost protection function for this heating circuit is activated. For example, if the heat generator is still cold when a frost protection demand is made.	The frost protection function starts as soon as the internal conditions of the entire system permit it, at the latest after the set duration has elapsed. The default setting of 120 minutes is optimal for many standard applications. The value should be carefully adjusted to the specific conditions of the system and the heat generator.

Table 21 Hydraulic circuitsMenu

Further settings can be found in the advanced functions of the hydraulics view (→ Service manual of the main controllers).

- ▶ Check and adjust the settings in the advanced functions of the hydraulics view.

7.2.2 Heating curve, Operating mode

Various operating modes are available for every heating circuit (with or without mixer). Various heating curves can be defined for each operating mode.

Heating curve

The menu item **Hydraulic circuits > Default setting** with the selected **Heating system** is used as reference for the set heating curve. The settings can be made in a table or in a graphic representation under menu item **Graphic setting** (→ Service manual of the main controllers).

Operating mode

It is possible to jump from any operating mode to other operating modes:

- **Automatic heating mode**
- **Automatic setback mode**
- Manual heating mode
- Manual setback mode
- **Holiday**

Settings for all operating modes. The heating curve can also be adjusted graphically (→ operating instructions of the main controllers).

Parameters	Settings/ adjustment range	Explanation	Note
Standby mode	No/**Yes**	The heating circuit or this function is switched off.	The heating circuit is switched off (summer mode) when the setting is **Yes**.
Room temperature setpoint	5…**21**…35 °C	Setting of the required room temperature for operating mode Manual heating mode	–
	5…**17**…35 °C	Setting of the required room temperature for operating mode Manual setback mode	–
	5…**21**…35 °C	Setting of the required room temperature for operating mode Automatic heating mode	–
	5…**17**…35 °C	Setting of the required room temperature for operating mode Automatic setback mode	–
	5…**17**…35 °C	Setting of the required room temperature for operating mode Holiday	–
Design temperature for all operating modes	30…**75**…120 °C	Setting that specifies the design temperature for the Heating system **Radiator/Underfloor** for all operating modes	A change in the design temperature in one operating mode always affects the design temperature of the other operating modes of this heating circuit.
Underfloor design temperature for all operating modes	20…**45**…60 °C	Setting that specifies the design temperature for the Heating system Underfloor heating for all operating modes	A change in the design temperature in one operating mode always affects the design temperature of the other operating modes of this heating circuit.
Outside temp. 1	−50…**20**…50 °C	Reference temperature for set flow temperature 1 and 2	Setting required if the following has been selected: Heating system > Base Point Additional settings are required in the menu: Heating curve
Outside temp. 2	−50…**-10**…50 °C		

Parameters	Settings/ adjustment range	Explanation	Note
Flow temp. 1 setting	10…**60**…120 °C	Required flow temperature with reference to outside temperatures 1 and 2	Setting required if the following has been selected: Heating system > Base Point Additional settings are required in the menu: Heating curve
Flow temp. 2 setting	10…**75**…120 °C		
Set flow temperature with manual heating mode	10…**75**…120 °C	Setting that specifies the set flow temperature for the operating mode Manual heating mode	Setting required if the following has been selected: Heating system > Base Point Additional settings are required in the menu: Heating curve
Set flow temperature with manual setback mode	10…**50**…120 °C	Setting that specifies the set flow temperature for the operating mode Manual setback mode	
Flow set temp. for auto. heat mode	10…**75**…120 °C	Setting that specifies the set flow temperature for the operating mode Automatic heating mode	
Flow set temp. for auto. setback mode	10…**50**…120 °C	Setting that specifies the set flow temperature for the operating mode Automatic setback mode	
Set flow temperature for holiday mode	10…**50**…120 °C	Setting that specifies the set flow temperature for the operating mode Holiday	
Room influence/ maintenance	**None** According to offset Max./room maint. mode	Limits the influence of the room temperature (room temperature hook-up) on the flow temperature set value. The value specifies the highest possible room temperature setback. This also applies for rooms which are also supplied by the heating circuit and where no remote control units are installed.	Requirements for the setting: • Remote Control is selected. • Room heating system is not selected. Ensure that the remote control is not exposed to heat sources (e.g. lamps, TV sets or other heat sources).
Max. reduction	-10…**-3**…-1 K	Adjustment of the temperature differentials between the actual and set temperature. This adjustment effects a parallel displacement of the heating curve.	Is only displayed with the setting: Room influence/maintenance > According to offset or Max./room maint. mode > According to offset This function is only recommended if no remote control has been installed inside the living space. → Service manual of the main controllers

Parameters	Settings/ adjustment range	Explanation	Note
Heat limit	No/**Yes**	Selection that determines whether the heating circuit or a function is to be switched off once a set outside temperature has been reached.	The heating circuit is switched off when the set outside temperature is exceeded and switched back on when it is undercut.
Heat limit outside temperature	−50…**17**…50 °C	Setting that specifies the required cut-off temperature for operating mode Manual heating mode	
	−50…**5**…50 °C	Setting that specifies the required cut-off temperature for operating mode Manual setback mode	
	−50…**17**…50 °C	Setting that specifies the required cut-off temperature for operating mode Automatic heating mode	
	−50…**5**…50 °C	Setting that specifies the required cut-off temperature for operating mode Automatic setback mode	
	−50…**5**…50 °C	Setting that specifies the required cut-off temperature for operating mode Holiday	
Constant heat below	No/**Yes**	The setting **Yes** cancels a cut-off function that was set.	–
Constant heat below outside temp.	−30…-**5**…10 °C	The system heats continuously when the set temperature is undercut.	Outside temperature limit value for interruption of setback mode (manual or automatic setback mode)
Manual heating mode	Shortcut keys	If you tap a shortcut key, the display jumps to the settings area of the selected operating mode.	You can make separate settings for each operating mode. Settings for the setback types (→ Service instructions for specialist contractors).
Manual setback mode			
Automatic heating mode			
Automatic setback mode			
Holiday			

Table 22 Menu Hydraulic circuits > Heating curve

7.2.3 Frost protection

Parameters	Settings/ adjustment range	Explanation	Note
Outside temperature-dependent frost protection	Off/On	Setting that specifies whether the frost protection is to depend on the outside temperature.	On: the pump is switched on when the set temperature is reached and the mixing valve controls the flow temperature with reference to the value set under the menu item **Set flow temperature at frost protection**.
Frost protection from outside temperature	−20…**5**…30 °C	Setting that specifies the outside temperature from which frost protection is to be activated.	–

Parameters	Settings/ adjustment range	Explanation	Note
Room temperature-dependent frost protection	Off/On	Setting that determines whether the frost protection is to the based on the room temperature.	A room thermostat must be installed for this function.
Frost protection from room temperature	1…**5**…30 °C	Setting that specifies the room temperature from which frost protection is to be activated.	–
Set flow temperature at frost protection	3…**10**…100 °C	Setting that specifies the minimum flow temperature to be reached when the frost protection function is active.	The setting applies for Room temperature-dependent frost protection and Outside temperature-dependent frost protection.

Table 23 Menu Hydraulic circuits > Heating circuit > Frost protection

7.2.4 Screed drying

NOTICE

Risk of system damage!

If the permissible heat-up and operating temperatures of the screed and plastic pipes (on the secondary side) are disregarded, parts of the system or screed may be damaged.

- ▶ If an underfloor heating system is installed, observe the maximum flow temperature recommended by the manufacturer.
- ▶ Do not exceed the permissible set value.
- ▶ Observe the instructions of the screed manufacturer for screed drying.
- ▶ Check systems every day despite the screed drying program and keep the prescribed record.

The screed drying program is a special heating circuit program for drying the screed using a defined temperature/time profile. The flow setpoint is increased staircase shaped and reduced again staircase shaped after a hold time. The control mode only remains active until the screed has dried or the time program has expired.

Attention:
Before the screed drying is started:

- ▶ Set the drying conditions here.

The screed drying must set separately for each heating circuit.

Parameters	Settings/ adjustment range	Explanation	Note
Screed drying	Off/On	Switch the screed drying program on/ off.	Observe safety instructions. → Chapter 7.2.4, page 39
End automatically	Off/On	Setting that specifies whether the drying process should end automatically	–
Power failure during screed drying	Reset	Acknowledge the fault display that a power failure was present during an active screed drying	**Max. pause time**: a power failure lasts longer than the time set.
Interrupt	Off/On	Setting that specifies whether the drying process should be interrupted	–
Resume after long power down	Off/On	Setting that specifies whether the drying process should be automatically resumed following the interruption	–
Wait time	**0**…50 days	Screed drying program starts once the set waiting time has elapsed	–

Parameters	Settings/ adjustment range	Explanation	Note
Hold start phase	0…**3**…30 days	Time interval between the start of the start phase and the next phase	–
Start temperature	20…**25**…55 °C	Flow temperature during the start phase	–
Ramp-up	0…**1**…10 days	Setting that specifies the daily cycle for increasing the temperature in order to dry out the screed	–
Ramp-up by	**1**…30 K	Setting that specifies the increments in which the temperature should increase to dry out the screed	–
Hold maximum temperature	1…**7**…99 days	Setting the period of time for which the maximum temperature should be maintained in order to dry out the screed	–
Maximum temperature	20…**55** °C	Setting the maximum temperature for screed drying	–
Setting back	0…**1**…10 days	Setting that specifies the daily cycle for reducing the temperature in order to dry out the screed	With the setting 0, screed drying ends once the step Hold maximum temperature is complete.
Setting back by	1…**5**…35 K	Setting that specifies the increments in which the temperature should decrease to dry out the screed	–
Hold minimum temperature	0…**1**…30 days	Setting that specifies the period of time for which the minimum temperature should be maintained in order to dry out the screed	–
Min. temperature	20…**25**…55 °C	Setting that specifies the minimum temperature for drying out the screed	–
Max. pause time	2…**12**…24 h	Setting the time that is allowed to elapse (e.g. in the event of a power failure) in order still to be able to continue the drying process successfully	–

Table 24 Menu Hydraulic circuits > Heating circuit > Screed drying

7.3 Cooling circuit

Parameters	Settings/ adjustment range	Explanation	Note
Pump/actuator anti-seizing function	Off/On	Setting that specifies whether or not a pump/mixing valve is to be regularly switched on for short periods to prevent it from seizing up during extended downtimes	–
Pump overrun	0…**2**…60 min	Setting that determines how many minutes a pump should remain switched on once the switch-on condition no longer exists	–
Select function	**None**	Switching the operating mode of the heating circuit via an external contact (terminal WF) at the FM-MM and FM-AM module	It is not possible to switch between operating modes externally for cooling circuits.
	Ext. fault display pump WF1/2	Display of faults for a pump	–

Table 25 Cooling circuitMenu

7.4 Combined circuit

7.4.1 Default setting

Parameters	Settings/ adjustment range	Explanation	Note
Heating system	**Radiator/ Underfloor**	Suitable for heating circuits that mainly consist of flat radiators or underfloor heating systems.	The type of heating system determines the gradient or curvature of the heating curve. → Service manual of the main controllers
	Constant	Suitable for heating systems that require a constant flow temperature irrespective of the outside temperature (e.g. industrial applications, process heat).	
	Base Point	Suitable for heating systems with a rising linear heating curve.	
Influence of attenuation outside temperature	0…**100** %	Influencing the calculation of the adjusted outside temperature.	The adjusted outside temperature takes the heat storage option of the building into consideration (**Building type**, **Insulation standard**).
Remote Control	No/**Yes**	Determines whether a remote control is installed for the heating circuit that influences the heating circuit.	→ Chapter 7.2.2, page 36 → Service manual of the main controllers
Underfloor heating	Off/On	–	Adjustment required if the heating system is an underfloor heating system.

Parameters	Settings/ adjustment range	Explanation	Note
Maximum underfloor flow temperature	20…**45**…60 °C	This value defines the temperature that the flow temperature must not exceed. Depending on the selected heating curve.	The value set influences the heating curve.
Maximum flow temperature	30…**120** °C	This value defines the temperature that the flow temperature must not exceed.	The maximum flow temperature depends on the heat source and can therefore be limited by it.
Minimum flow temperature	**5**…70 °C	Limiting the heating curve to a minimum set value. When making the setting for the substation it is not possible to go back. This value defines the temperature that the flow temperature must not fall below.	It makes sense to use this setting if there is a long time delay before the heating system reaches the set flow temperature. This parameter cannot be adjusted with the heating system constant. ▶ Only change value if necessary.
Actuator (SH)	No/**Yes**	Specifies whether or not a heating circuit mixing valve is available.	If a heating circuit actuator is fitted in the installed heating circuit, the control unit actuates this mixing valve. If a heating circuit mixing valve is not installed, the heating circuit is supplied with the current operating temperature.
Actuator runtime	5…**120**…600 s	Setting the elapsed time of the available mixing valve. The elapsed time of the mixing valve determines the length of the command signals that are sent to the mixing valve.	If the mixing valve frequently opens and closes at short intervals, this could be an indication that the elapsed time of the mixing valve has been incorrectly set. The control characteristic can be set to respond more slowly by reducing the elapsed time of the mixing valve. ▶ Observe the manufacturer's instructions.
Increase system demand	0…**5**…20 K	This temperature is added to the flow temperature of the heating circuit to give the system requirement temperature.	A rise in the system requirement (set flow temperature) improves the control characteristics of the mixing valve.
DHW priority / low HC priority	No/**Yes**	Setting the priority of the heating circuit over DHW heating. No: the DHW heating and the heating circuit have the same priority. The DHW and heating circuit are heated in parallel.	**Yes**: the DHW heating and all heating circuits with the setting No have a higher priority than this heating circuit. The charging of the heating circuit is reduced if necessary. ▶ **Observe the chapter for DHW priority (→ Service manual of the main controllers).**
Pump/actuator anti-seizing function	Off/On	Setting that specifies whether or not a pump/mixing valve is to be regularly switched on for short periods to prevent it from seizing up during extended downtimes.	–

Parameters	Settings/ adjustment range	Explanation	Note
Pump overrun	0…**2**…60 min	Setting that determines how many minutes a pump should remain switched on once the switch-on condition no longer exists.	–
Select function	**None**	Switching the operating mode of the heating circuit via an external contact (terminal WF) at the FM-MM and FM-AM module.	
	Ext. fault display pump WF1/2	Display of faults for a pump.	
Frost protection delay timer enabled	Off/On	Specifies whether a time-delayed activation of the frost protection of the system for the heating circuit is active at low priority. During this delay period, the heat generators can gradually heat up the system without the entire system output being immediately called up for the frost protection function.	The default setting On is the optimal choice for most systems. It ensures that the heat generators do not have to meet the frost protection requirements immediately under high load. This allows the system to initially warm up gradually. The Off setting should only be selected in rare exceptional cases (e.g. for system components in outdoor areas) or where the system has specific requirements.
Frost protection delay timer value	15…**120**…1440 min	Defines the maximum delay time before the general frost protection function for this heating circuit is activated. For example, if the heat generator is still cold when a frost protection demand is made.	The frost protection function starts as soon as the internal conditions of the entire system permit it, at the latest after the set duration has elapsed. The default setting of 120 minutes is optimal for many standard applications. The value should be carefully adjusted to the specific conditions of the system and the heat generator.

Table 26 Combined circuitMenu

7.4.2 Heating curve, Operating mode

Setting the heating curve for the combined circuit: → Service manual for control units

7.4.3 Frost protection

Frost protection settings: → Chapter 7.2.3, page 38

8 Further information for qualified persons

8.1 Monitordata

The monitor data displayed depends on the settings made. The data displayed by the cold / heat generator depends the cold / heat generator.

Tap the symbol in the footer to in the service menu call up the values.

8.2 Heating operation demand

There are the following options for sending an operation demand to the heat pump (sorted by priority):

1. Manual Mode: also ignores blocking due to dual-fuel mode
2. Timer (corresponds to Temporary manual mode)
3. Calendar
4. System / weekly timer: depending on the settings under **Service** > **System strategy** > **Heat pump settings** > Heating > **System settings** > **Heat demand source** and **Service** > **System strategy** > **Heat pump settings** > Cooling > Source of cool demand

In demand modes 2 to 4, frost protection and blocking caused by dual-fuel mode in heating mode are maintained.

In demand modes 2 to 4, the requirements to the heat pump may be limited by the physical and parametrised operating limits.

8.3 Bivalent operation in heat mode

Outside temperature dependent (undamped outside temperature system) release of boiler and heat pump.

There are conditions under which the boiler and heat pump are allowed to run through bi-fuel operation despite being blocked (→ Chapter 6.2.2, page 27).

The following operating strategies are available for dual-fuel mode:

Alternative mode
When outdoor temperatures are below the dual-fuel switch-over point, only the boiler is operated. At outdoor temperatures above the dual-fuel switch-over point, only the heat pump is operated.

Parallel mode
When outdoor temperatures are below the dual-fuel switch-over point, the heat pump and the boiler are operated in parallel. At outdoor temperatures above the dual-fuel switch-over point, only the heat pump is operated.

Partially parallel mode
When outdoor temperatures are below the switch-off point of the heat pump, only the boiler is operated. At outside temperatures between the switch-off point of the heat pump and the dual-fuel switch-over point, the heat pump and boiler are operated in parallel. At outdoor temperatures above the dual-fuel switch-over point, only the heat pump is operated.

Example:
Operating strategy = Parallel
Dual-fuel switch-over point= 3 °C
Hysteresis for the dual-fuel switch-over point = 1 K

Boiler and heat pump are enabled as soon as outside temperature system (undamped) is ≤ 3 °C

Boiler is blocked and heat pump enabled as soon as outside temperature system (undamped) is ≥ 4 °C

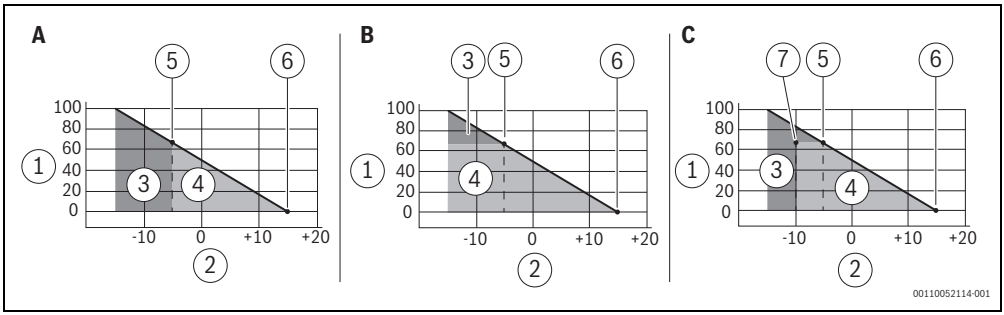


Fig. 23 Operating strategies

[A] Alternative mode
[B] Parallel mode
[C] Partially parallel mode

[1] Axis: heating demand in %
[2] Axis: outside temperature in °C
[3] Additional heating - e.g. covered by oil or gas heater
[4] Area covered by the heat pump
[5] Bivalent point (**Service** > **System strategy**> **Heat pump settings**>Heating > **System settings** > Parameter Bivalence point)
[6] Threshold value for heating, heating load of the building
[7] Heat pump switch-off point (**Service** > **System strategy**> **Heat pump settings**>Heating > **System settings** > Parameter **Shut off point heat pump**)

8.4 Cooling operating demand

If two FM-AM modules are installed in the master control unit, the heat pump can be set to both heating and cooling modes, provided it is configured accordingly. For this purpose, a heat pump supported by the main controller and the **Heating & Cooling** operating mode must be selected in the service menu.

▶ **Service** > **System/Module configuration**

The key component is the cooling buffer, which in a single-buffer configuration can also be the combined heating/cooling buffer. Depending on the selected changeover type (Outside temperature/Constant/**Modbus**/**BACnet**/Date) the heat pump can be set to global cooling mode. In this mode, the mixing valves are switched from **Heating** to **Cooling** and the cooling buffer can be conditioned.

As with heating mode, cooling mode of the heat pump can be influenced by various options (sorted by priority) depending on the parameter settings:

1. Manual mode
2. Timer
3. Year timer
4. System / weekly timer: depending on the settings under **Service** > **System strategy** > **Heat pump settings** > Heating > **System settings** > **Heat demand source** and **Service** > **System strategy** > **Heat pump settings** > Cooling > Source of cool demand

In demand modes 2-4, the requirements to the heat pump may be limited by the physical and parametrised operating limits.

The cooling buffer is conditioned in accordance with the specifications, thereby supplying the desired medium temperature to the cooling circuits and the combined heating/cooling circuits. Depending on the configuration of the relevant hydraulic circuits, these can then cool the consumers.

8.5 Process of the cooling changeover

The cooling changeover is carried out as follows:

As soon as a changeover command is issued, the changeover process begins. The main controller sends switch-off commands via Modbus RTU to the heat pump and hydraulic circuits to bring the system into a defined hydraulic state.

The main controller waits for feedback from the heat pump and for the pump run-on times of the hydraulic circuits to elapse. The waiting time can been up to 60 minutes.

The FM-AM function module switches the valves SWE, SWR and PWE.

Once the double valve run-on time has elapsed, the changeover process is complete.

The heat pump is controlled according to the parameters selected for the respective operating mode.

The hydraulic circuits receive notification of the applicable operating mode and also operate in accordance with their settings.

Depending on the heat pump used, it takes varying amounts of time for the heat pump to actually start heating or cooling.

8.6 Compressor envelope

The **Compressor envelope** indicates the operating range of the compressor. The **Compressor envelope** depends on the heat pump type, the heat pump design and the outside temperature, or indicates the achievable Flow temperature for each respective Outside temperature.

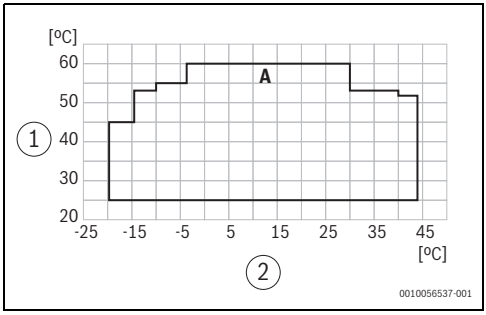


Fig. 24 Example compressor envelope for heating mode

[1] Flow temperature
[2] Outside temperature
[A] **Compressor envelope**

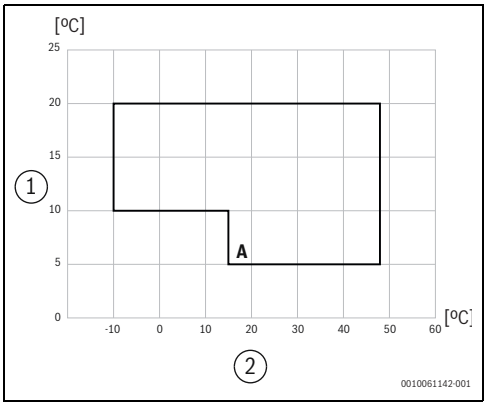


Fig. 25 Example compressor envelope for cooling mode

[1] Flow temperature
[2] Outside temperature
[A] **Compressor envelope**

The Control unit is familiar with the maximum and minimum temperatures of the **Compressor envelope** heat pumps in the main controller. Heat pumps work less efficiently at very low and very high outside temperatures. This means that the maximum or minimum Flow temperature cannot be or minimum reached (physical limitation). Even if the operating point lies within the envelope curve, the compressor should not be operated continuously at the limits along the **Compressor envelope** as this can unnecessarily increase wear and tear of the Heat pump. For this reason, the flow temperatures can be limited via the settings in **Control unit**.

8.6.1 Supply temperature limitation via Compressor envelope when heating

The Control unit is familiar with the maximum and minimum temperatures of the **Compressor envelope** of the Heat pump. The graphic shows an example of the Buderus WLW276/Bosch CS3000 AW in which the **Compressor envelope** (→ Bild 26 [A], page 47), as well as the **Compressor envelope** with **Reduction of maximum heat pump flow temperature** (→ Fig. 26 [B], page 47) with a reduction of 5 K can be seen. The system control will now only request flow temperatures that are within the range of the reduction.

Recommendation: limit the maximum flow temperature in continuous operation to avoid disproportionate wear and inefficient operation of the heat pump.

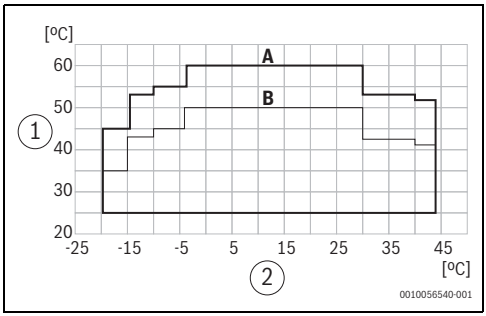


Fig. 26 Reduction of maximum heat pump flow temperature

[1] Outside temperature
[2] Flow temperature

[A] **Compressor envelope**
[B] **Compressor envelope** with **Reduction of maximum heat pump flow temperature**

8.6.2 Supply temperature limitation via Custom envelope when heating

Max. supply temperature: Specifies the limitation of the maximum flow temperature via a set temperature value.

Min. supply temperature: Specifies the limitation of the minimum flow temperature via a set temperature value. The **Compressor envelope** is not considered in this function. The plant control limits the heat demand temperature to the temperatures configured by the user (grey area in the diagram). The minimum and maximum ambient temperature (vertical lines in the envelope) are also not considered when limiting the required temperature.

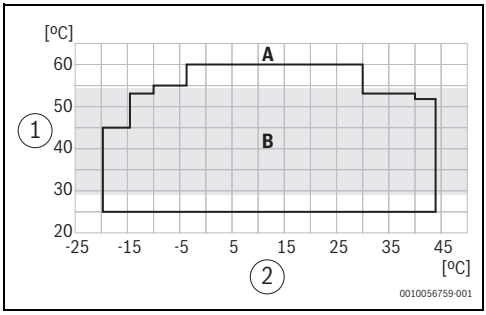


Fig. 27 Supply temperature limitation via Custom envelope

[1] Outside temperature
[2] Flow temperature

[A] **Compressor envelope**
[B] defined range (minimum and maximum values)

Example:

Demand Flow temperature = 60 °COutside temperature = -20 °C

Compressor envelope [A]: the heat pump can only reach 45 °C

With this configuration (max. and min. limitation), the heat pump will achieve the flow temperature that it can provide in all areas where the envelope is below the defined maximum value. However, this means that, in contrast to Supply temperature limitation via Custom envelope in the areas an outside temperature -10 °C and an ouside temperature higher then 30 °C, it works at the heat pump's output limit.

Recommendation: limit the maximum flow temperature in continuous operation to avoid disproportionate wear and inefficient operation of the heat pump.

8.6.3 Supply temperature limitation via Compressor envelope when cooling

The main controller is aware of the envelopes of the selectable heat pumps in cooling mode. When compressor envelope limitation is active, only requests that fall within the operating range are sent to the heat pump. The parameter for increasing the minimum heat pump flow temperature can also be used to define a margin relative to the minimum curve, ensuring the heat pump is always operated as efficiently as possible.

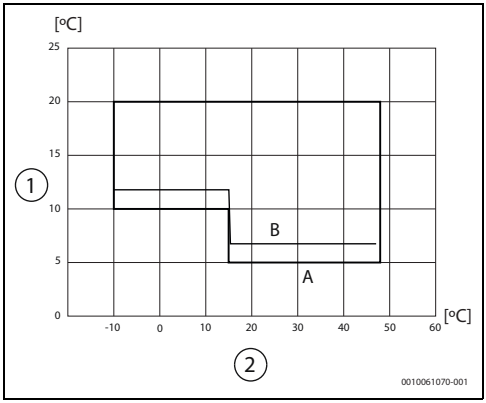


Fig. 28 Reduction of the minimum heat pump flow temperature

[1] Outside temperature
[2] Flow temperature

[A] **Compressor envelope**
[B] **Compressor envelope** with reduction of the minimum heat pump flow temperature

8.7 Sensitive return valve (SWE)/ buffer bypass

The **SWE** valve controls where the system return is directed in order to operate the heat pump/system efficiently. The control depends on the following factors:

- Water temperature of the system return, which is determined by the FAR sensor
- Parameter settings

The temperature of the system return **FAR** is compared with the selected buffer value **FPO**, **FPM** or **FPU**. In doing so, the values for hysteresis and offset are taken into account for the measured values in order to prevent the valve from switching too frequently.

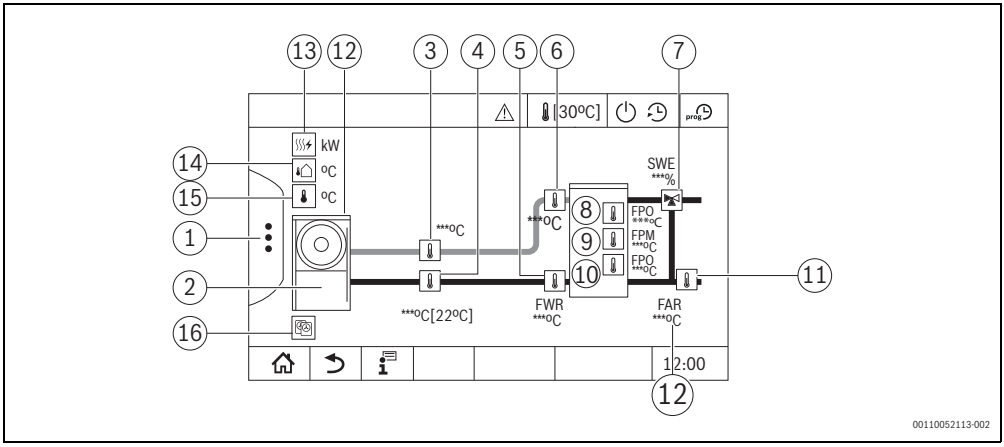


Fig. 29

[1] Advanced functions
[2] Heat pump (representation depending on the type of heat pump used or heat pump cascade)
[3] Heat pump flow temperature
[4] Heat pump return temperature
[5] Heat pump return temperature, system sensor FWR
[6] Heat pump flow temperature, system sensor FWV
[7] Sensitive return valve (SWE)/ buffer bypass
[8] <Buffer cylinder temperature top FPO and heat pump demand
[9] Buffer cylinder temperature centre FPM
[10] Buffer cylinder temperature bottom FPU
[11] System return temperature FAR
[12] Heat pump status display:
Green = HMI status OK
yellow = HMI status Warning
Red = HMI status Fault
No display = Modbus communication is not yet established
[13] Output - Heat | Electric
[14] Outside temperature
[15] Heat pump control temperature and heat pump temperature demand
[16] Number of heat pumps in the cascade

The following control characteristic occurs in the 3 possible operating modes:

Mode Standard mode

The efficiency as well as the share of the heat pump mainly depends on the return and flow temperatures at the heat pump. To increase the efficiency and also the share of the heat pump, the return to the heat pump should be as low as possible within the operating limits of the heat pump. Since the return to the heat pump comes from the buffer cylinder, the temperature in the buffer cylinder should only be increased by the heat pump.
Normal operating mode (**SWE** = 100 %): The flow from the buffer is routed to the heating circuits and the return from the heating circuits to the buffer.

Example:

- Return **FAR** = 30 °C
- Reference sensor selected: **FPU**
- Temperature at selected reference sensor **FPU**: 35 °C
- Switching differential to inject buffer selected: -2K
- Comparison: **FAR** ≤ **FPU** + Switching differential to inject buffer selected

30 °C ≤ 35 °C + (-2K)? → Yes, **FAR** is smaller, supply and return flow run in normal operating mode.

Mode Bypass

In some cases, the temperature of the system return of the heating circuits is higher than the buffer temperature (e.g. fresh water station in circulation mode, DWH during thermal disinfection, etc.). If the system return is now routed into the buffer, it heats up, which is not desired and must be avoided. The system return must therefore be routed past the buffer cylinder of the heat pump.

For this purpose, the 3-way valve **SWE** is used to divert the system return directly into the flow of the consumer.
Bypass Mode (**SWE** = 0%): The flow from the buffer is routed into the heating circuits and the return from the heating circuits is routed past the buffer and into the flow of the heating circuits.

Example:

- Return **FAR** = 40 °C
- Reference sensor selected: **FPU**
- Temperature at selected reference sensor **FPU**: 35 °C
- Switching differential to inject buffer selected: -2K
- Switching hysteresis to bypass buffer: 4K
- Comparison: **FAR** ≤ **FPU** + Switching differential to inject buffer + Switching hysteresis to bypass buffer selected

40 °C ≤ 35 °C +(-2 K)+ 4 K? → No, the temperature of the return flow **FAR** is higher, so the return flow is routed past the buffer.

Inverted logic mode

If the parameter Ensure minimum temperature via system return flow= active, a heat request can be triggered (e.g. when the set valuet Heat demand if buffer temperature lower than or the set value Heat demand if outside temperature lower than is reached). Now the **SWE** valve is no longer used to bypass the warmer return temperature from the system return to the buffer. The warmer return flow from the system is directed to the buffer to heat it up again (additional protection against freezing of the pipes). If frost protection is active and the mode Inverted logic is in operation, the snowflake appears on the valve in the hydraulic overview of the HMI.

Example:

- Ensure minimum temperature via system return flow= Active
- An antifreeze case has occurred
- Return **FAR** = 30 °C
- Reference sensor selected: **FPU**
- Temperature at selected reference sensor **FPU**: 10 °C
- Switching differential to inject buffer selected: -2K
- Comparison: **FAR** ≤ **FPU** + Switching differential to inject buffer selected

30 °C ≤ 10 °C +(-2K)? → No, **FAR** is greater. Normally, the system return would now be fed into the buffer, but the inverted logic mode with setting Ensure minimum temperature via system return flow is active

Example:

- Ensure minimum buffer temperature= Active
- Ensure minimum temperature via system return flow= Active
- Heat demand if buffer temperature lower than 25 °C (an FPO, FPM or FPU)
- Outside temperature < 15 °C

Selected buffer sensors + hysteresis for switching off > 28 °C? à The heat demand to **SWE** is taken away.

8.8 Smart Grid / Energy supplier contacts

The heat pumps have the option of switching a smart grid/ energy supplier functionality via input contacts on the heat pump. The operating states are read out by the Logamatic 5000/Control 8000 and displayed graphically in the header and in the monitor data.

The following states are possible:

- **Energy-efficient normal mode:**
  operation of the heat pump is currently not influenced by the smart grid/energy supplier function.
- **Boosted mode:**
  in this operating state, the heat pump runs in boosted mode within the controller. Whether and how high the boost is depends on the heat pump and must be configured on the heat pump control unit. The boost must be selected in such a way that superheating of the heating system is prevented.
- **Definite start command:**
  this is a definitive start-up command, provided it is possible within the scope of the control settings. Whether and how high the boost is depends on the heat pump and must be configured on the heat pump control unit. The boost must be selected in such a way that superheating of the heating system is prevented. In addition, (optional) electric booster heaters are frequently enabled in this operating state.
- **Energy supplier block:**
  operation of the heat pump is blocked for a certain time. For the heat pump Buderus WLW286/Bosch CS5000 AW, this operating state can also be a reduced operation. In this case, the heat pump continues to operate with a reduced setpoint. For detailed information on the behaviour → Heat pump documentation.

9 Messages/fault displays for qualified persons

To call up the Notification history:

- ▶ Call up **Service menu**.
- ▶ In the **Service menu**, tap the symbol.
- ▶ Tap symbol.

The Notification history menu shows the faults and service displays of the heating system. The control unit shows only the faults and service displays from the control to which it is connected.

If more messages exist than can be displayed on one page, you can scroll through the pages via the arrows in the footer.

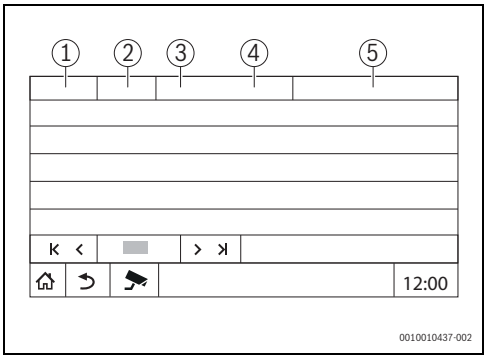


Fig. 30 Notification history

[1] Incident ID
[2] Occurred (date, time), specifies when the message occurred.
[3] Eliminated (date, time), specifies when the message to exist.
[4] Component specifies which component the message originated from.
[5] Display text, describes the type of message.

9.1 Unit troubleshooting

The message history depends on the modules used.

Messages caused by the control unit, are automatically deleted once the cause been rectified.

Messages used by the burner control unit of the heat source must be reset at the control or the heat source, depending on the type of cause:

- ▶ Refer to the documentation for the connected system boilers.
- ▶ Record the following data for those messages, which you can not rectify yourself:
  - Control unit type on the data plate
  - Software version

10 Recommended hydraulic schemes

The recommended hydraulics are schematic representations only and show a selection of the hydraulic systems which are possible with this module. For the sake of clarity, some hydraulic components that may be required (e.g. pressure relief valves or expansion vessels) have deliberately not been included.

The hydraulic schemes shown are tailored to the type of cold/ heat source.

- ▶ Check whether the selected hydraulics is compatible with the heat source used.
- ▶ Check whether the system components used (e.g. buffer cylinder) are compatible with the heat source used.

Corresponding parameters are listed for each hydraulic scheme. Only the settings required for configuring the relevant hydraulic system are listed.

Further hydraulic examples (without parameters) than those shown here can be found at the following web address: https://buderus-de-de.boschtt-documents.com/hdb/

Please note: the numbers in the No. column are only provided in order to explain the hydraulic schemes shown. They have no reference to parameters in the software.

The following parameters applies exclusively to the hydraulics represented. Individual hydraulics and systems planned in-house require an adapted parameters.

The abbreviations used in the hydraulic schemes are defined in → Chapter 10.6, page 61.

Heat source settings

The settings of the heat source and system are made menu under **Service** > **System strategy** > **Heat pump settings**.

Settings of schedules

The settings for the schedules are made in the main menu under **Control unit** > **Thermal production >** Heat pump **>** prog.

10.1 Bivalent hydraulics with Buderus WLW276/Bosch CS3000 AW high and low temperature buffer cylinder, LOAD plus and Hybrid Injection Technology

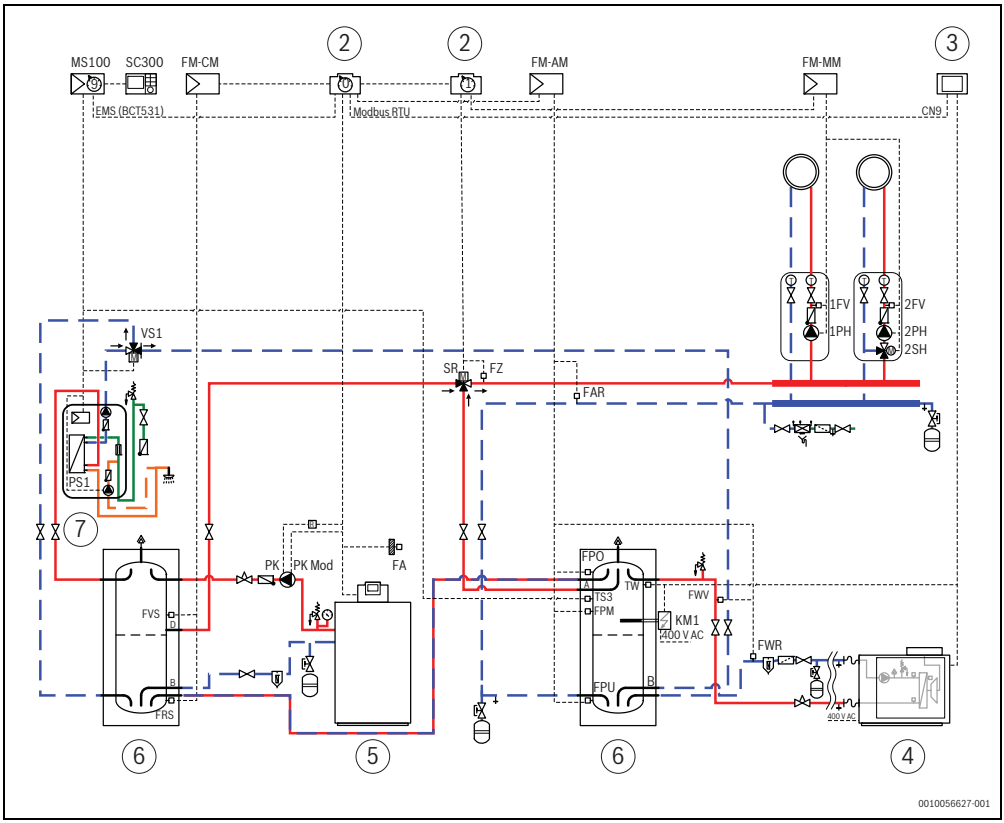


Fig. 31 Bivalent hydraulics with Buderus WLW276/Bosch CS3000 AW

[2] Control unit 5313/8313
[3] HMI of the heat pump
[4] Heat pump Buderus WLW276/Bosch CS3000 AW
[5] Floor standing condensing heating appliance
[6] System buffer cylinder
[7] Freshwater station

No.	Settings in the service menu	Parameters	Adjustment	Description
1	Default setting	Modbus unit ID	1	
2		Heat pump cascade active	No	
7		Temperature difference heat pump/ buffer storage	0 K	
8		Supply temperature limitation via	**Compressor envelope**	
9		Reduction of maximum heat pump flow temperature	5 K	Reduction of the curve
12	System settings	Source of demand	Weekly scheduler	
13		Bivalent operation	On	
14		Heat pump operation strategy	**Parallel**	
15		Bivalence point	3 °C	
16		Hysteresis for bivalence point	1 K	
19		Boiler block due to setpoint jump	Off	
22		Deactivate boiler block due to outside temperature	Off	
28	Defrost settings	Ensure minimum buffer temperature	**Yes**	
30		Heat demand if buffer temperature lower than	25 °C	
31		**Hysteresis to deactivate heat demand**	3 K	
32		Choice of outside temperature sensor	System	
33		Heat demand if outside temperature lower than	15 °C	
34		Hysteresis for heat demand by outside temperature	2 K	
35	Hydraulic integration	Type of buffer integration	**Direct/without valve (SWE)**	

Table 27 Settings in the main menu

10.2 Monoenergetic with Buderus WLW286/Bosch CS5000 AW high and low temperature buffer cylinder and Hybrid Injection Technology

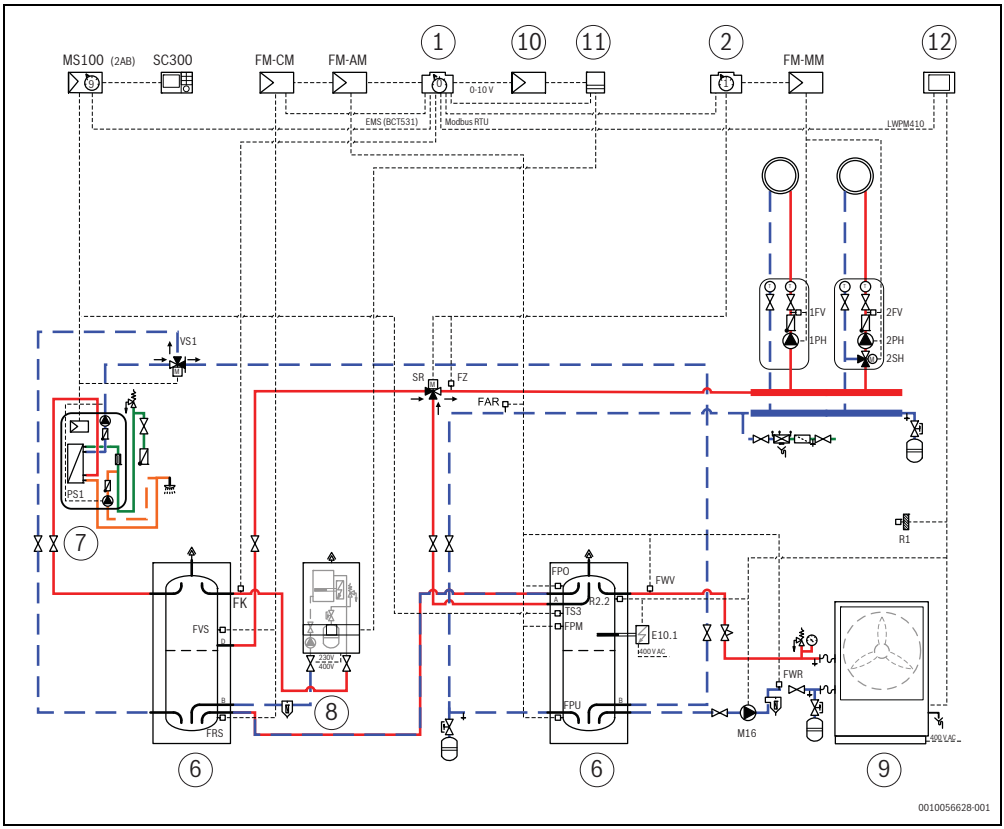


Fig. 32 Monoenergetic hydraulics with Buderus WLW286/ Bosch CS5000 AW

[1] Control unit 5311/8311
[2] Control unit 5313/8313
[6] System buffer cylinder
[7] Freshwater station
[8] E156/TH3500
[9] Heat pump Buderus WLW286/Bosch CS5000 AW
[10] EKR module
[11] Control unit of the E156/ TH3500 (on the appliance)
[12] Heat pump manager

No.	Settings in the service menu	Parameters	Adjustment	Description
1	Default setting	Modbus unit ID	1	
2		Heat pump cascade active	No	
5		Capacity heat pump	17 kW **22kW** 38 kW	according to the size of the heat pump used
6		Heat pump temperature spread flow to return temperature	5 K	
7		Temperature difference heat pump/ buffer storage	0 K	
8		Supply temperature limitation via	**Compressor envelope**	
9		Reduction of maximum heat pump flow temperature	5 K	Reduction of the curve
10		Max. supply temperature	–	Not relevant, hidden
11		Min. supply temperature	–	Not relevant, hidden
12	System settings	Source of demand	Weekly scheduler	
13		Bivalent operation	On	
14		Heat pump operation strategy	**Parallel**	
15		Bivalence point	3 °C	Depending on the size of the heat pump design
16		Hysteresis for bivalence point	1 K	
19		Boiler block due to setpoint jump	Off	
22		Deactivate boiler block due to outside temperature	Off	
28	Defrost settings	Ensure minimum buffer temperature	**Yes**	
30		Heat demand if buffer temperature lower than	25 °C	
31		**Hysteresis to deactivate heat demand**	3 K	
32		Choice of outside temperature sensor	System	
33		Heat demand if outside temperature lower than	15 °C	
34		Hysteresis for heat demand by outside temperature	2 K	
35	Hydraulic integration	Type of buffer integration	**Direct/without valve (SWE)**	Realisation via HIT function

Table 28 Settings in the main menu

10.3 Monoenergetic hydraulics with cascade Buderus WLW276/Bosch CS3000 AW, high and low temperature buffer cylinder

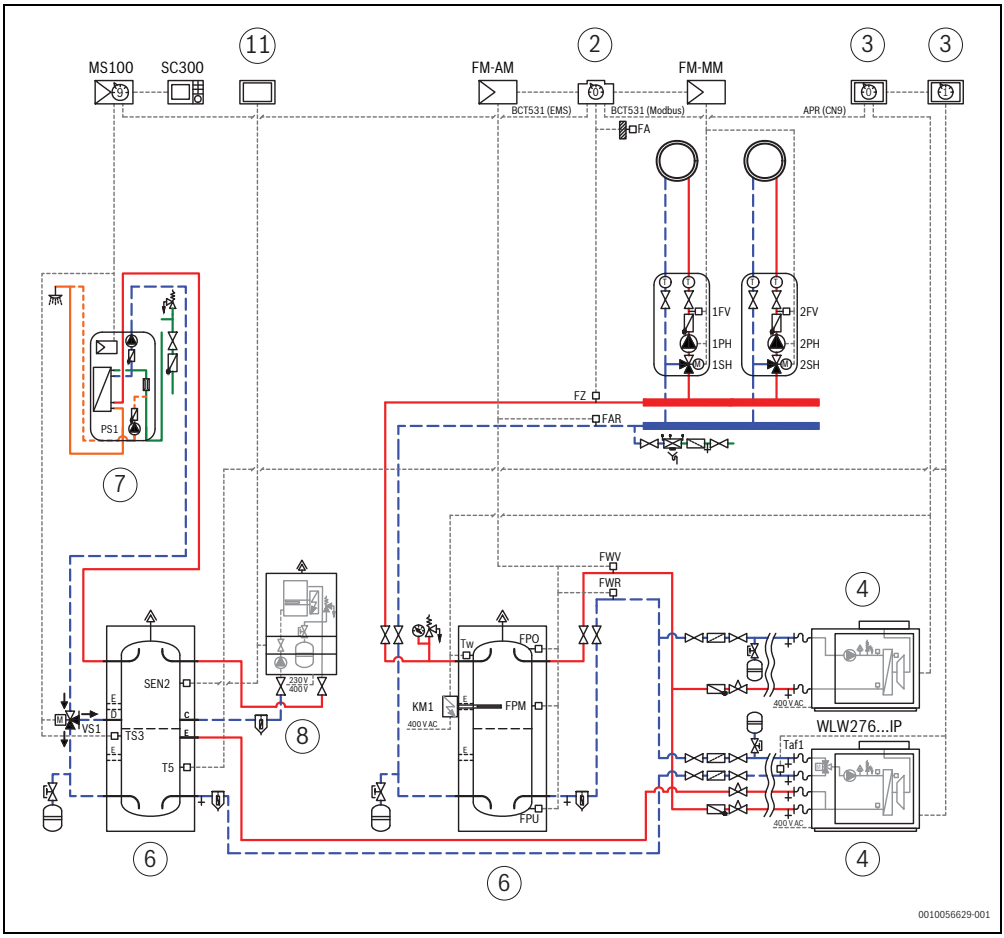


Fig. 33 Monoenergetic hydraulics with Cascade Buderus WLW276/Bosch CS3000 AW

[2] Control unit 5313/8313
[3] HMI of the heat pump
[4] Heat pump Buderus WLW276/Bosch CS3000 AW
[6] System buffer cylinder
[7] Freshwater station
[8] E156/TH3500
[11] Control unit of the E156/ TH3500 (on the appliance)

No.	Settings in the service menu	Parameters	Adjustment	Description
1	Default setting	Modbus unit ID	1	
2		Heat pump cascade active	**Yes**	
3		Number of heat pumps	2	
7		Temperature difference heat pump/ buffer storage	0 K	
8		Supply temperature limitation via	**Compressor envelope**	
9		Reduction of maximum heat pump flow temperature	5 K	Reduction of the curve
10		Max. supply temperature	–	Not relevant, hidden
11		Min. supply temperature	–	Not relevant, hidden
12	System settings	Source of demand	System	
13		Bivalent operation	Off	
19		Boiler block due to setpoint jump	Off	
28	Defrost settings	Ensure minimum buffer temperature	**Yes**	
29		Ensure minimum temperature via system return flow	No	
30		Heat demand if buffer temperature lower than	25 °C	
31		**Hysteresis to deactivate heat demand**	3 K	
32		Choice of outside temperature sensor	System	
33		Heat demand if outside temperature lower than	15 °C	
34		Hysteresis for heat demand by outside temperature	2 K	
35	Hydraulic integration	Type of buffer integration	**Direct/without valve (SWE)**	Realisation via HIT function

Table 29 Settings in the main menu

10.4 Single energy source, hydraulics for heating and cooling

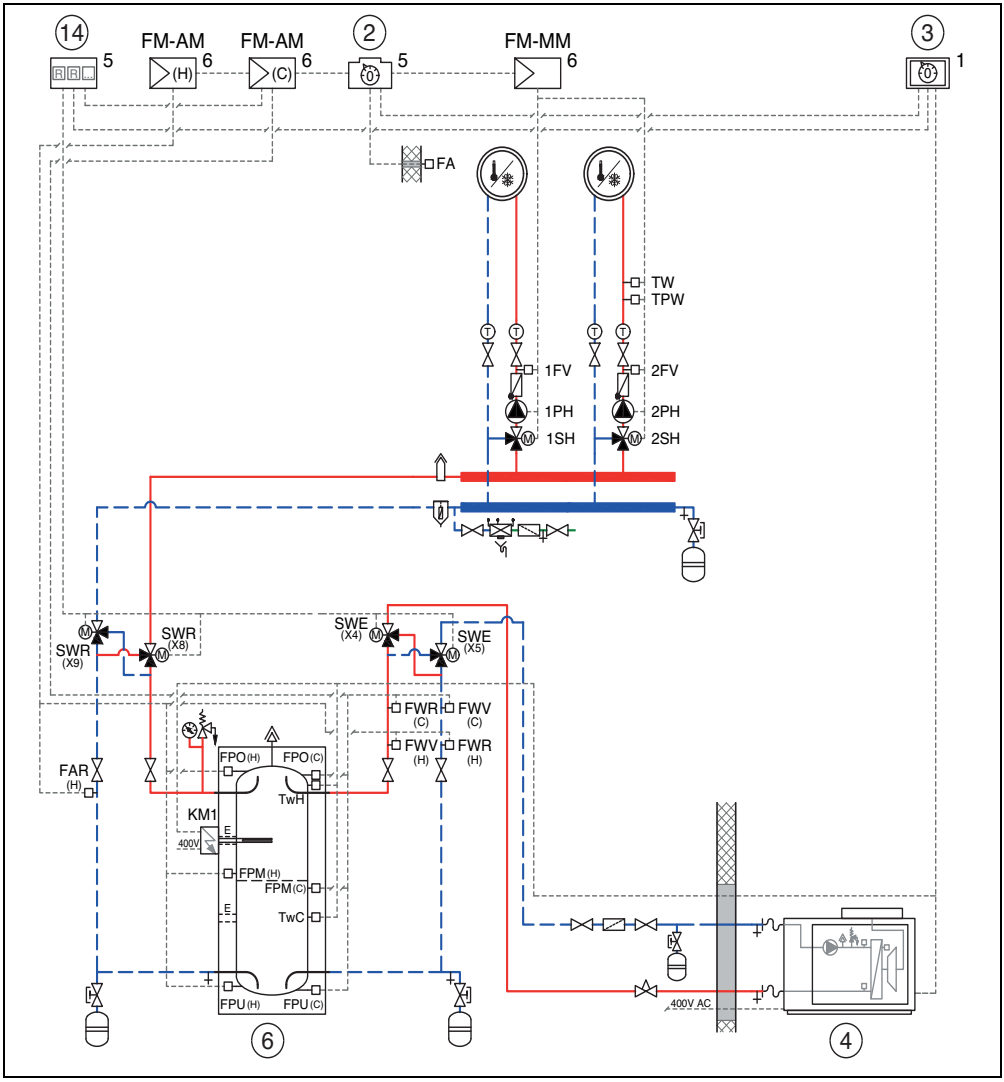


Fig. 34 Single energy source, hydraulics for heating and cooling

[2] Control unit 5313/8313
[3] HMI of the heat pump
[4] Heat pump Buderus WLW276/Bosch CS3000 AW
[6] System buffer cylinder
[14] Relay box for heating/cooling for changeover between heating and cooling (changeover)

The full description of this hydraulic example is available in the hydraulics database under reference number 6721896600 (→ Chapter 10, page 10)

No.	Settings in the service menu	Parameters	Adjustment	Description
System/Module configuration				
1	System/Module configuration	Slot A	ZM5313	
2		Heat source type	without burner	
3		EMS Bus	Not active	
4		Slot 1	FM-MM	
5		Slot 2	FM-AM	FM-AM Heating
6		Slot 3	FM-AM	FM-AM Cooling, must be selected for the operating mode to be displayed.
7		Slot 4		
8		FM-AM configuration	WLW 276	
9		Type of operation	Heating & Cooling	
System strategy				
10	System strategy > Strategy heat pump	Used hydraulic	**One buffer**	Number of buffers the heat pump operates on
11	System strategy > Heat pump settings > General data	Auxiliary heat source active	**Yes**	
12		Power auxiliary heat source 1 heat pump 1	Selection of the output	
13		Power auxiliary heat source 2 heat pump 1	0 kW	
14	System strategy > Heat pump settings > Heating > System settings	Bivalent operation	Off	
15		Boiler block due to setpoint jump	Off	
16		Enable boiler when setpoint is not reached	No	
17	System strategy > Heat pump settings > Heating > Hydraulic integration	Type of buffer integration	**Direct/without valve (SWE)**	
18	System strategy > Heat pump settings > Cooling	Source of cool demand	Constant setpoint	
19	System strategy > Strategy boiler > General data	Hydraulic integration	Direct	
Hydraulic circuits configuration				
20	**Hydraulic circuits configuration** > Hydraulic circuits	Hydraulic circuit (01)	Combined circuit	
21		Hydraulic circuit (02)	Combined circuit	

Table 30 Settings for main controllers with address 0

10.5 Bivalent hydraulics with HT/NT buffer cylinder and HIT valve for heating and cooling

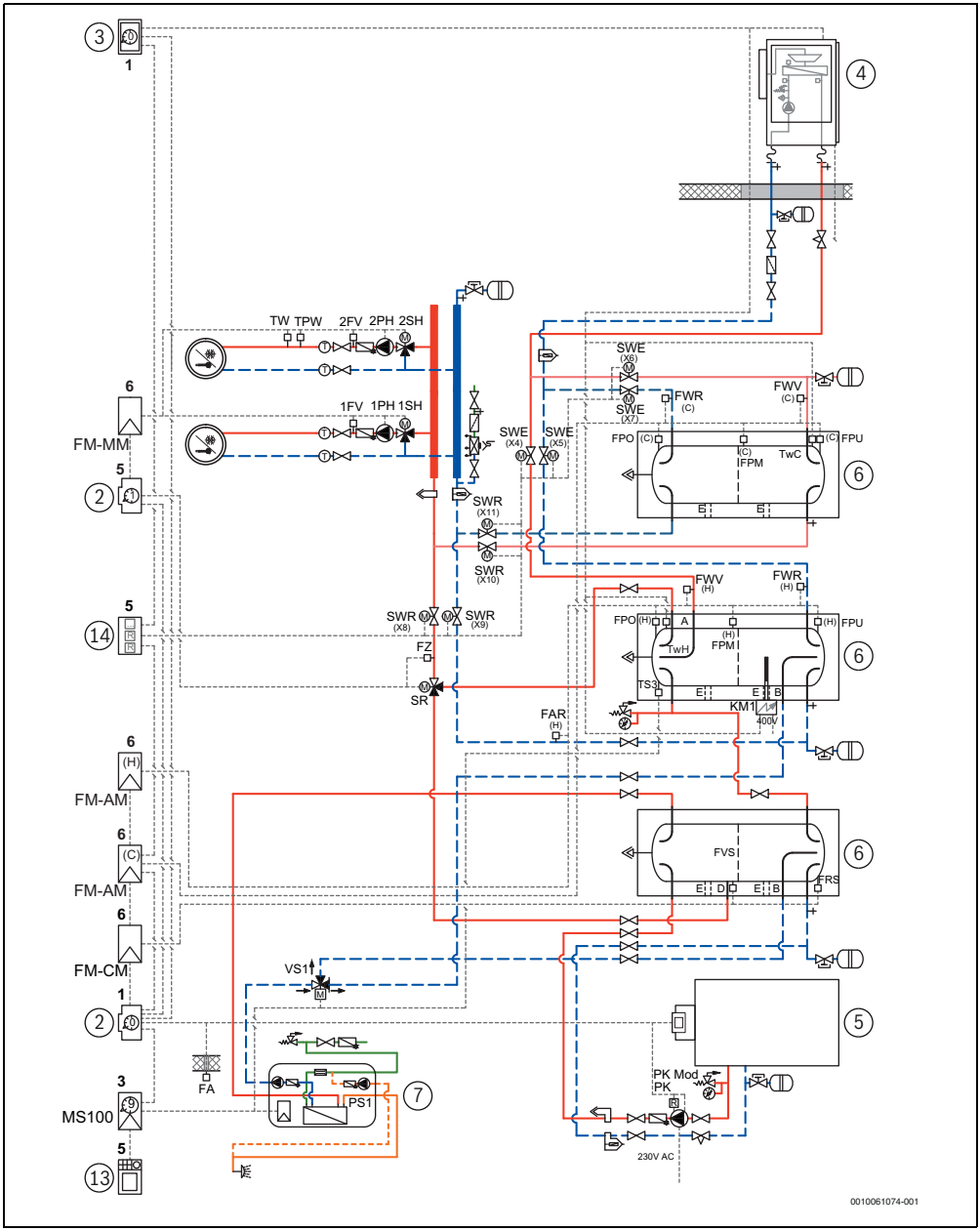


Fig. 35 Bivalent hydraulics with HT/NT buffer cylinder and HIT valve for heating and cooling

[2] Control unit 5313/8313
[3] HMI of the heat pump
[4] Heat pump Buderus WLW276/Bosch CS3000 AW
[5] Floor standing condensing heating appliance
[6] System buffer cylinder (from the left: HT, NT, cooling buffer)
[7] Freshwater station
[13] SC300/CS200
[14] Relay box for heating/cooling for changeover between heating and cooling (changeover)

The full description of this hydraulic example is available in the hydraulics database under reference number 6721896601 (→ Chapter 10, page 10)

No.	Settings in the service menu	Parameters	Adjustment	Description
System/Module configuration				
1	System/Module configuration	Slot A	ZM5313	
2		Heat source type	with SAFe	
3		EMS Bus	Not active	
4		Slot 1	if required, FM-SI	
5		Slot 2	FM-AM	FM-AM Heating
6		Slot 3	FM-AM	FM-AM Cooling, must be selected for the operating mode to be displayed.
7		Slot 4	FM-CM V2	
8		FM-AM configuration	WLW 276	
9		Type of operation	Heating & Cooling	
System strategy				
10	System strategy > Strategy heat pump	Used hydraulic	Two buffer	Number of buffers the heat pump operates on
11	System strategy > Heat pump settings > General data	Auxiliary heat source active	**Yes**	If a booster heater is used
12		Power auxiliary heat source 1 heat pump 1	Selection of the output	
13		Power auxiliary heat source 2 heat pump 1	0 kW	0 kW, if single-stage auxiliary heater
14	System strategy > Heat pump settings > Heating > System settings	Bivalent operation	Off	
15		Boiler block due to setpoint jump	Off	
16		Enable boiler when setpoint is not reached	No	
17	System strategy > Heat pump settings > Heating > Hydraulic integration	Type of buffer integration	**Direct/without valve (SWE)**	
19	System strategy > Heat pump settings > Cooling	Source of cool demand	Constant setpoint	

Table 31 Settings for main controllers with address 0

No.	Settings in the service menu	Parameters	Adjustment	Description
System/Module configuration				
1	System/Module configuration	Slot A	ZM5313	
2		Heat source type	as Substation	
3		EMS Bus	Freshwater station	
4		Slot 1	FM-MM	
5		Slot 2		
6		Slot 3		
7		Slot 4		
8		FM-AM configuration		
9		Type of operation		
Hydraulic circuits configuration				
10	**Hydraulic circuits configuration** > Hydraulic circuits	Hydraulic circuit (01)	Combined circuit	
11		Hydraulic circuit (02)	Combined circuit	
12	**Hydraulic circuits configuration** > Combined circuit (01)	Actuator (SH)	Off	

Table 32 Settings for main controllers with address 1

10.6 Abbreviations

Abbreviation	Designation	Function
APR (CN9)	Terminal for connecting Modbus RTU	
EMS	EMS- terminal on the BCT 531 in the Logamatic 5000/Control 8000	
FA	Outside temperature sensor	
FAR	System return temperature sensor	Reference sensor for serial or buffer bypass circuits. Controls whether flow is through the alternative heating appliance or the buffer cylinder based on the buffer differential temperature.
FM-AM	Function module, alternative heating appliance	
FM-CM	Function module, cascade module	
FM-MM	Function module, heating circuit module	
FPM	Buffer cylinder centre temperature sensor	This sensor is used to start an automatic , alternative heating appliance during buffer cylinder heating.
FPO	Buffer cylinder top temperature sensor	Controls whether flow is through the buffer cylinder (if buffer cylinder is installed) based on temperatures.
FPU	Buffer cylinder bottom temperature sensor	Switches off buffer cylinder heating in combination with automatic , alternative heating appliances. Temperature-differential controlled actuation of the PWE buffer cylinder heating pump in combination with manual alternative heating appliances (together with the FWV temperature sensor).

Abbreviation	Designation	Function
FRS	Return temperature sensor strategy	Controls the operating conditions of a system containing several heat sources. Definition of the point of heat transfer from heating system to heat source (system return).
FV	Flow temperature sensor for heating circuit	
FVS	Flow temperature sensor strategy	Controls the operating conditions of a system containing several heat sources. Definition of the point of heat transfer from heat source to heating system (system flow).
FWR	Return temperature sensor on heat source	Safeguarding operating conditions of the alternative heating appliance in case of return temperature control of the alternative heating appliance.
FWV	Heat source flow temperature sensor	Temperature detection of the alternative heating appliance Detection is required if parameters have been set for a heat source.
FZ	Additional sensor	
KM1	Heater rod connection	
LWPM410	Extension module for the heat pump manager	For data transmission via Modbus RTU interface protocol to higher-level control systems.
Modbus RTU	Communication protocol	
PH	Heat carrier pump	
PK	Boiler circulation pump	
PK Mod	Modulation connection of the boiler circulation pump	
PS	Cylinder primary pump	
R1	External sensor heat pump	
SEN2	Additional sensor on terminal B9/B10 of E156/ TH3500	
SH	Heating circuit actuator	
SR	Actuator return HIT valve (Hybrid Injection Technology), connected to the SR terminal	
SWE	Actuator integration of the alternative heating appliance	
SWR	Actuator return of the alternative heating appliance	
T5	Heat pump DHW sensor	
TS3	Fresh water station sensor	
TW	Heat pump sensor	
VS1	Diverter valve for temperature-sensitive return feed of fresh water station	
WPM100	Heat pump manager	

Table 33 Abbreviations

11 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.

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/

12 Appendix

12.1 Specifications FM-AM

	Unit	Value
Operating voltage (at 50 Hz ± 4 %)	V AC	230 (+10 %/– 15 %)
Power consumption	W	1
Mixing valves (SWE, SWR)		
• Max. switching current	A	5
• Activation	V	230 three-pointstepper controller (PID characteristics)
• Recommended servomotor running time	s	120 (adjustable 6...600)
Maximum switching current		
• Pump output, automatic heating appliance	A	5
• HS - ON output	A	5
Temperature sensor	Type	NTC10K
Minimum switching current at low DC signal voltages		
• HS - ON output[1)]	mA	>10
Ambient temperatures		
• Operation	°C	+5...+50
• Transport and storage	°C	–20...+60
Max. humidity (no dewing)	%	75

1) If the HS-ON output is used for signal voltages, no mains voltage must be switched via the output beforehand.

Table 34 Specifications FM-AM

12.2 Sensor curves

DANGER

Danger to life due to electric shock!

Before opening the device:

- ▶ Isolate the mains voltage.
- ▶ Secure against unintentional reconnection.

Check:

- ▶ Remove the sensor terminal.
- ▶ Use an ohmmeter to measure the resistance at the cable ends of the temperature sensor.
- ▶ Use a thermometer to measure the temperature of the temperature sensor.

The following tables show whether the temperature and pressure drop value correspond.

For all curves, the sensor tolerance is ± 3 % at 25 °C.

Resistance values for buffer temperature sensors FPO, FPM, FPU, FAR, FWV and FWR

Temperature [°C]	Resistance [Ω]
−40	332100
−35	240000
−30	175200
−25	129300
−20	95893
−15	72228
−10	54889
−5	42069
0	32506
5	25313
10	19860
15	15693
20	12486
25	10000
30	8060
35	6536
40	5331
45	4372
50	3605
55	2989
60	2490
65	2084
70	1753
75	1480
80	1258
85	1070
90	915
95	786
100	677
110	508
115	443
120	387

Table 35 Temperature sensor electrical resistance values 53xx

13 GB Importer

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Worcester WR4 9SW / UK







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