

FM-AM

Function module, alternative heating appliance

For integration of a heat pump via Modbus RTU



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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 minimising danger are not taken.


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


DANGER

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


WARNING

WARNING indicates that severe to life-threatening personal injury may occur.



CAUTION

CAUTION indicates that minor to medium personal injury may occur.

NOTICE

NOTICE indicates that material damage may occur.

Important information



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

Additional symbols

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

Table 1

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 European and national requirements.

 The CE marking declares that the product complies with all the applicable EU legislation, which is stipulated by attaching this marking.

The complete text of the Declaration of Conformity is available on the Internet: www.bosch-homecomfortgroup.com.

2.2 Declaration of Conformity

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

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

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

2.3 Open Source Software

This product contains proprietary software by Bosch (licensed according to the Bosch standard licensing conditions) and Open Source Software (licensed according to the Open Source licensing conditions). The special provisions stated in the license texts apply for LGPL, reverse engineering is permitted for these components in particular.

You can find Open Source information on the DVD supplied with the device/product.

2.4 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

2.5 Product description

The purpose of the module is to integrate alternative heat sources (e.g. CHP modules, heat pumps, solid fuel boilers, buffer cylinders) into heating system control systems.

The module can only be installed once in one of the control units of the Logamatic 5000 / Control 8000 control system.

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

2.6 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.

2.7 Explanation of the concepts used

Since the FM-AM enables various heat sources to be integrated in one system, the term "heat source" or "boiler" is used in the following for all floor-standing boilers, other boilers, wall mounted condensing boilers, wall-mounted condensing boilers or other heat sources.

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 sources fuelled by logs, pellets, woodchips, heat pumps, combined heat and power units or fuel cell heating appliances) are subsequently referred to as alternative heating appliances or AWE.

Standard heat source

Unlike alternative heat sources, standard heat sources are boilers or devices 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.

Further explanations

For further explanations of concepts, refer to chapter 11 (e.g. alternative heating appliances (AWE), standard heat sources).

3 Information for the user

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

- Observe operating instructions of 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.

The terms used are defined in the glossary (→ page 26).

3.1 Operation

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

Calling up the alternative heating appliance

The menu of the alternative heating appliance is called up from the overview of the heat sources.

- **TapHeat production.**
The overview of the available heat sources opens.
- **TapHeat pump.**

Overview, hydraulic view of the heat pump

To access the hydraulic view of the heat pump:

- **Control unit > Heat production > Heat pump**

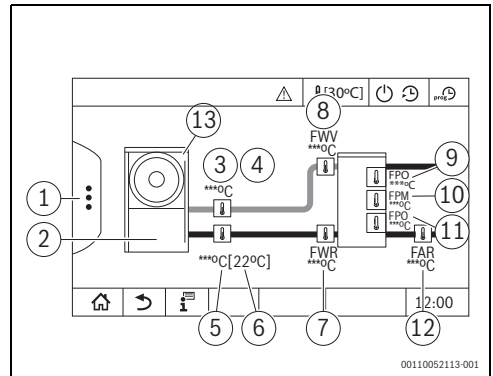


Fig. 1 Hydraulic view of the heat pump

- [1] Advanced functions
- [2] Heat pump (representation depending on the type of heat pump used)
- [3] Heat pump flow temperature
- [4] Flow set temperature
- [5] Heat pump return temperature
- [6] Return set temperature
- [7] Heat pump return temperature, system sensor FWR
- [8] Heat pump flow temperature, system sensor FHW
- [9] Buffer cylinder temperature top FPO
- [10] Buffer cylinder temperature centre FPM
- [11] Buffer cylinder temperature bottom FPU
- [12] System return temperature FAR
- [13] Heat pump status display:
Green = HMI status OK
yellow = HMI status Warning
Red = HMI status Fault
No display = Modbus communication is not yet established

Activate/deactivate manual operation

To activate manual operation:

- Tap symbol.

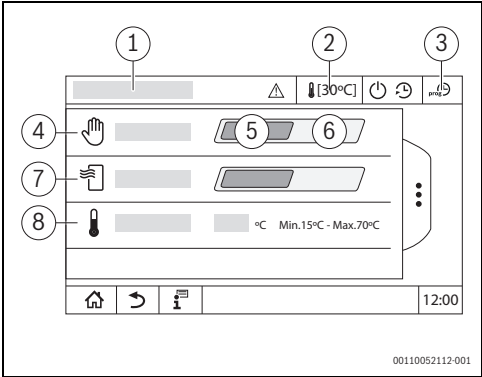


Fig. 2 Advanced functions, Manual operation

- [1] **Heat pump**
- [2] **Header**
- [3] **Timer**
- [4] **Manual operation**
- [5] **Off**
- [6] **On**
- [7] **Heating mode**
- [8] **Set temperature**

To deactivate manual operation:

- Tap **Off** (→ Fig. 2, [5], page 6).

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.

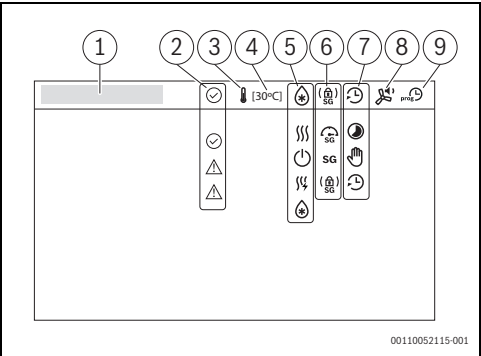


Fig. 3 Header

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

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













Function	Symbol	Status	Notice
Current operating mode		Heating mode	
		Standby	
		Heating rod active	The electric heating can also be active during normal heating mode (compressor and electric heating active)
		Deicing heat pump unit	
State SG-Ready		Definitive start command	→ Chapter 7.4, page 21
	SG	Boost mode	
		Energy provider block mode	
	–	Energy-efficient standard	
Source of demand		Timer	
		Manual operation	
		Automatic	Requirement by Calendar, Weekly scheduler or Frost protection
	–	System	Heat demand by system set value
Silent mode		Fan operating mode active	
	–	Fan operating mode not active	
Configuration of the time program		Configuration of the time program	→ Chapter 3.2, page 8

Table 2 Symbols in the header

3.2 Time program

To call up the time program:

► **Control unit > Heat production > Heat pump**

► Tap .

The menu of the time program opens.

In the time program, the settings for the heat supply and the idle mode for heat pumps can be configured.

The heat planner view consists of the following 4 tiles:

- **Timer:** time-controlled heat demands for heat pump units.
- **Calendar:** calendar based settings for annual heat pump units demand
- **Weekly scheduler:** weekly settings for the heat pump demand
- **Silent mode:** weekly settings for the Silent mode (WLW 276 exclusive)

3.2.1 Timer

To call up the timer:

► **Control unit > Heat production > Heat pump > Schedulers > Timer**

The timer can be activated or deactivated.

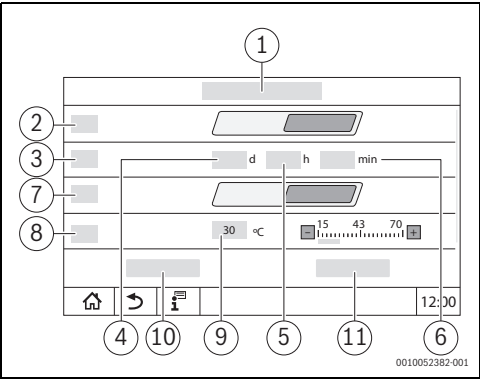


Fig. 4 Timer

- [1] **Schedulers > Timer**
- [2] **Timer**
- [3] **Duration**
- [4] **Days**
- [5] **Hours**
- [6] **Minutes**
- [7] **Heating mode**
- [8] **Set temperature**
- [9] **Temperature**
- [10] **Save**
- [11] **Cancel**

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		
	0...59 min		The duration must be at least 10 minutes.
Heating 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 3 Timer menu

3.2.2 Calendar

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 call up the annual calendar:

- ▶ **Control unit > Heat production > Heat pump > Schedulers > Calendar**
- ▶ Enter the first time period with **+**.
- ▶ Enter the time period in the fields.
- ▶ If **Heating mode** is at **On**:
 - Set the temperature using the standard keypad and/or the standard slider with plus and minus keys.
- ▶ If necessary, add further entries with **+**.
- ▶ If necessary, remove entries with **⏮**.
- ▶ Confirm with **Save**.

3.2.3 Weekly scheduler

The weekly time program is used to configure the heat energy demand for each day of the week 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.
- Activation of heating mode.
- The temperature setpoint for heating mode, with a setting range of 15 °C to 70 °C and a default setpoint of 30 °C. 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:

- No entry can be added after 23:45 as this exceeds the maximum time of day.
- No entry can be inserted 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, as this would result in an overlap.
- A maximum of 8 entries can be inserted.

To open the weekly time program menu:

- ▶ **Control unit > Heat production > Heat pump > Schedulers > Weekly scheduler**

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 day to be copied from is greyed out.
- ▶ Tap the weekdays where the copied settings are to be transferred to.
The weekdays are highlighted.
- ▶ Tap **Save**.

3.2.4 Silent mode

The function Silent mode can be configured for all days of the week via a scheduler. It is only available for BOSCH CS3000 AW / Buderus WLW276.

- 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 call up the Silent mode:

- ▶ Call up menu **Control unit > Heat production > Heat pump > Schedulers > Silent mode.**
- ▶ Tap the day of the week.
- ▶ Enter the first time period with **+**.
- ▶ Enter the start time.
- ▶ Select which Silent mode should be used:
 - **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 Silent mode is currently active.

Copy settings Silent mode 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 day to be copied from is greyed out.
- ▶ Tap the weekdays where the copied settings are to be transferred to.
The weekdays are highlighted.
- ▶ Tap **Save**.

3.3 Heat pump energy data

This menu is used to display the appliance-specific energy monitoring 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 assumptions and not on energy measurements.

The energy data represented here may therefore not be used for invoicing purposes.

To call up the energy data:

- ▶ **Info > Heat production > Heat pump > Energy Monitoring**
- or-
- ▶ **Service menu > Monitor data > Heat production > Heat pump > Energy Monitoring**

FM-AM Module - Activate heat pump

To display the energy data of the heat pump, the heat pump must be activated in the module configuration.

- ▶ Call up **Service > Module configuration** menu.
- ▶ Under **Slot 1...4**, select **FM-AM** at one of the slots.
The parameter **FM-AM Configuration** appears.
- ▶ Choose **Heat pump**.

Current values view


The tile for the current values is displayed if the values are supported by the appliance. If a heat pump is integrated that is not supported, the tile is hidden.

Energy monitoring is supported for the following heat pumps:

- BOSCH CS3000 AW / Buderus WLW276
- BOSCH CS5000 AW / Buderus WLW286

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

To display the current values:

►  **Info > Heat production > Heat pump > Energy Monitoring > Current values**

-or-

►  **Service menu >  Monitor data > Heat production > Heat pump > Energy Monitoring > Current values**


Value	Explanation
Heat transfer	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	<ul style="list-style-type: none">WLW 276: current efficiency received via Modbus RTU.WLW 286: current efficiency calculated by the ratio of heat transfer to electrical output.

Table 4 Overview of the current values

Time periods view

In the Energy data submenu, 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 > SAFe > Energy Monitoring > Year (e.g. 2023)**

-or-

►  **Service menu >  Monitor data > Heat pump > SAFe > Energy Monitoring > Year (e.g. 2023)**

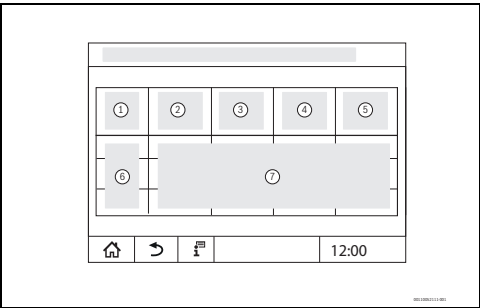


Fig. 5 Time periods view

- [1] **Period**
- [2] **Ø Outside temp. °C**
- [3] **Heat transfer kWh**
- [4] **Electrical power kWh**
- [5] **Efficiency**
- [6] **Time period (Month/year)**
- [7] **Extrapolated measured values over the time period [7]**



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 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 -.

3.4 Unit troubleshooting

**WARNING**

Danger to life due to current!

- Touching live parts can result in 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 power supply via the main circuit breaker.
 - Have faults at the heating system eliminated immediately by an approved and qualified heating contractor.

Fault 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 faults, 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 faults.
 - Have faults rectified immediately by an approved and qualified heating contractor.



The “Fault” column lists the faults, which can occur with the module and the connected heat sources.

- In the case of faults that 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.

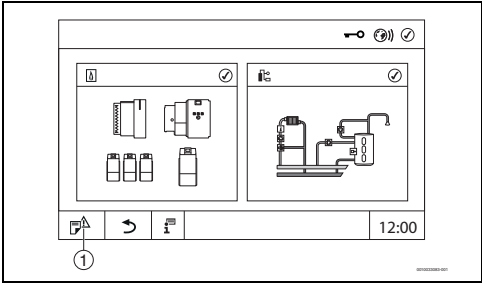


Fig. 6 Call up the message display

[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.

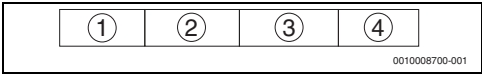


Fig. 7 Message display

- [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 5, page 12).

- ▶ 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
Manual boiler locking	No fault. The standard heat source is locked manually.	▶ Enable the standard heat source if required (→Chapter 3.1, page 5).

Table 5 Fault displays and troubleshooting, example

4 Installation for the qualified person

4.1 Notices regarding installation

- ▶ Observe safety instructions (→ Chapter 1.2, page 3).
- ▶ 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.

 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 maximum temperature for a longer period of time.
 - To ensure this, the maximum demand temperature can be reduced via the parameter **Service > Heat production > Heat pump > Default setting > Reduction of maximum heat pump flow temperature**.

4.2 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).



CAUTION

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 components.
- Route cables in the cable routings provided, or above the insulation.

5.1 Prior to installation

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 module only affects the control unit in which it is fitted. If the module is installed in the master control unit with address 0, it is effective for the connected heat source(s).

If the module is fitted in a substation, it will only respond to the heat demand of that substation.

5.3 Integrating the module into the control unit

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

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

5.4 Software

These instructions describe the functions of the FM-AM when installed in a control unit with the **SW 2.0.x** software version. The functionality of the FM-AM will be restricted when using control units with older software versions.

Checking the software version

All main controllers 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 control unit manufacturer's homepage.

5.5 Connecting temperature sensors

The fitting position for the temperature sensors depends on the system hydraulics.

- 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.
- Make sure that the temperature sensors are connected in the right positions.

5.6 Integrating the heat pump

The FM-AM function module is designed to integrate the heat pumps Buderus WLW 276 or Buderus WLW 286 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) mm².

The communication cable transmits parameters and messages from the heat pump to the control unit.

The parameters and messages from heat pump heat are displayed at the control unit. The start command 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. 8, [3], page 14):

- Terminal 1 = GND (cable shield)

Connection	Heat pump WLW 276	Heat pump WLW 286
Terminal 2	H1	+
Terminal 3	H2	–

Table 6 Terminals

Caution: the wire assignment must not be swapped round!

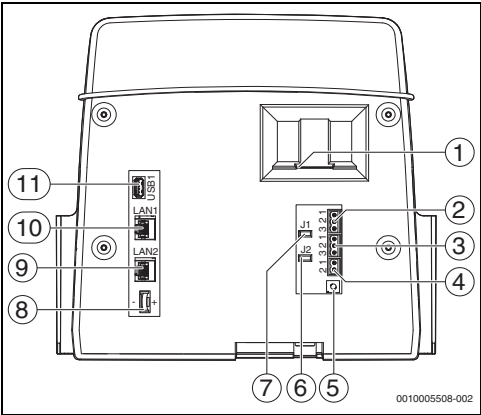


Fig. 8 User interface connections

- [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

6 Settings for the qualified person

6.1 Default setting

The settings can be made in the menu:

► **Service > Heat production > Heat pump > Default setting**

Submenu	Settings/ adjustment range	Explanation	Note
Modbus unit id	0...255	This parameter must match the setting on the heat pump to enable communication.	Only visible if a heat pump is connected (→ Chapter 5.6, page 14).
Capacity heat pump	17 kW	The operating condition of the heat pump is configured using this parameter.	Only visible with heat pump type WLW286.
	22 kW		
	38 kW		
Heat pump temperature spread flow to return temperature	0... 10 ...20 K	This value is used to convert the desired buffer temperature to a return temperature demand.	Only visible with heat pump type WLW286.
Temperature difference heat pump/ buffer storage	-20... 0 ...20 K	Setting by how many K the set value of the heat pump is to be changed compared to the buffer temperature.	
Reduction of maximum heat pump flow temperature	0 ...20 K	In order to increase the service life of the heat pumps, it is recommended not to operate them for longer periods of time within the limits of the outside temperature-dependent operating range of the compressor (→ installation instructions for the heat pump). The demand on the heat pump is reduced to the operating range minus the parameter set here (example → Chapter 7.2, page 20).	

Table 7 Default setting menu

6.2 System Settings

The settings can be made in the menu:

- **Service > Heat production > Heat pump > System Settings**

Submenu	Settings/ adjustment range	Explanation	Note
Source of 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.
	System	The set value of the heat demand is formed exclusively as a max selection by the 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 .	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 3.2.1, page 8 and Chapter 7.2, page 20).
	Max(System, Weekly scheduler)	The set value is formed from a max. temperature selection of the setpoints System and Weekly scheduler	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.
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.
	Parallel	The heat pump and the boiler can be operated simultaneously.	Setting the operating mode below the set bivalent temperature.
	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.	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 7.3, page 20

Submenu	Settings/ adjustment range	Explanation	Note
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 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.	–
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 the 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		
Boiler block due to setpoint jumps	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: <ul style="list-style-type: none"> • 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 block due to setpoint jump	2... 5 ...20 K	Setting at which sudden set value change is present in a sudden set value change.	–
Boiler block time when set value jumps	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.	–

Settings for the qualified person

Submenu	Settings/ adjustment range	Explanation	Note
Deactivate boiler block due to outdoor 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.	–
Outdoor 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 8 System Settings menu

6.3 Frost protection

The settings can be made in the menu:

- **Service > Heat production > Heat pump > Frost protection**

Example:

All settings = Default

In case the minimum value from FPO, FPM and FPU < 25 °C and outside temperature (**Heat demand by outdoor temperature**) < 15 °C:

heat demand frost to heat pump = 25 °C (**Heat demand if**

buffer temperature lower than) + 3 K (**Hysteresis to deactivate heat demand**) + 2 K (Fix Offset) = 30 °C

heat demand frost back off, in case:

minimum value from FPO, FPM and FPU > 25 °C (**Heat demand if buffer temperature lower than**) + 3 K (**Hysteresis to deactivate heat demand**) = 28 °C

or:

outside temperature > 15 °C (**Heat demand by outdoor temperature**) + 1 K (**Hysteresis for heat demand by outdoor temperature**) = 16 °C

Submenu	Settings/ adjustment range	Explanation	Note
Frost protection buffer	Off/On	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 outside 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 settle on the evaporator surfaces of the heat pump.
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 Frost protection buffer is at On.
Hysteresis to deactivate heat demand	1... 3 ...10 K		
Choice of outdoor temperature	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 by outdoor temperature	0... 15 ...30 °C		
Hysteresis for heat demand by outdoor temperature	1 ...10 K		

Table 9 Frost protection menu


7 Further information for qualified persons

**DANGER**

Danger to life due to escaping flue gas!

- ▶ In addition to the FWG flue gas temperature sensor, also install a flue gas temperature monitor on the flue connector of the alternative heating appliance.
- ▶ Integrate the flue gas temperature monitor as shown in the wiring diagram.

7.1 Monitor data

The monitor data displayed depends on the settings made. The data displayed by the heat source depends the heat source.
Tap the symbol  in the footer to in the service menu call up the values.

7.2 Heat demand

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

1. Manual mode: also ignores blocking due to dual-fuel mode
2. Timer
3. Year timer
4. System / weekly timer: depending on the settings under **Service > Heat production > Heat pump > System Settings > Source of demand**

In demand modes 2-4, frost protection and blocking are maintained by dual-fuel mode.
In demand modes 2-4, the demand on the heat pump is limited by the operating limits (operating conditions compressor → installation manual of the heat pump) as well as an additional set back (**Service > Heat productionHeat pumpGeneral dataReduction of maximum heat pump flow temperature**).

Example:
Heat pump type = WLW276-41 KW
Outside temperature = -16 °C
Heat demand = 50 °C
Reduction of maximum heat pump flow temperature = 5 K
Restriction of the heat demand (50 °C) to:
Max. compressor operating condition (45 °C) – **Reduction of maximum heat pump flow temperature (5 K) = 40 °C**

7.3 Bivalent operation

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 6.3, page 19).
The following operating strategies are available for dual-fuel mode:

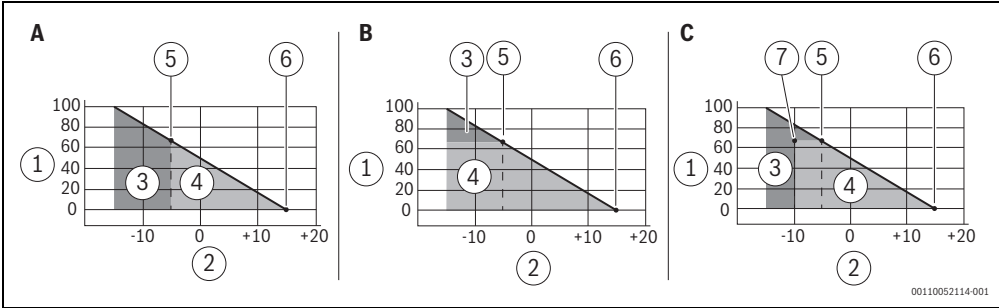


Fig. 9 Operating strategies

- [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] dual-fuel switch-over point (**Service > Heat production > Heat pump > System Settings > Bivalence point**)
- [6] Threshold value for heating, heating load of the building
- [7] Heat pump switch-off point (**Service > Heat production > Heat pump > System Settings > Shut off point heat pump**)

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

7.4 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 BOSCH CS5000 AW / Buderus WLW286, 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.

8 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 user interface shows only the faults and service displays of the selected heat source.

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.

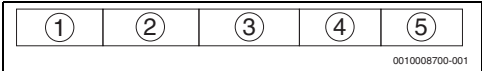


Fig. 10 Notification history

- [1] Incident ID
- [2] Occurred (date, time), specifies when the fault occurred.
- [3] Eliminated (date, time), specifies when the fault ceased to exist.
- [4] Component specifies the component where the fault occurred.
- [5] Display text, describes the type of fault.

8.1 Unit troubleshooting

The fault history depends on the modules used.

Faults caused by the control unit, are automatically deleted once the fault has been rectified.

Faults caused by the burner control unit of the heat source must be reset at the control or the heat source, depending on the type of fault:

- ▶ The documents for the heat source must be observed.

Record the following data for those faults, which you can not rectify yourself:

- Control unit type on the data plate
- Software version

Fault	Effect on the control characteristics	Cause	Remedy
Internal fault	Undefined, depends on the fault type.	Internal software fault.	<ul style="list-style-type: none">▶ Replace module or control unit.▶ Contact the Service team.
Flow temperature sensor heat source defective	<ul style="list-style-type: none">• Emergency cooling is activated with manual heat sources.• An automatic heat source is switched off.	<ul style="list-style-type: none">• The temperature sensor is faulty.• The temperature sensor is incorrectly connected.• Module or control unit is faulty.	<ul style="list-style-type: none">▶ Check the FWV sensor electrical connection on the module.▶ Check the temperature sensor in the alternative heating appliance for damage or incorrect positioning.▶ Check the device fuse.

Fault	Effect on the control characteristics	Cause	Remedy
Return temp. sensor on heat source defective	<ul style="list-style-type: none"> No return temperature control The mixer opens fully. 	<ul style="list-style-type: none"> The temperature sensor is faulty. The temperature sensor is incorrectly connected. Module or control unit is faulty. 	<ul style="list-style-type: none"> Check the FWR sensor electrical connection on the module. Check the temperature sensor in the return of the alternative heating appliance for damage or incorrect installation position. Check the device fuse.
Return temp. sensor system defective	<ul style="list-style-type: none"> No bypass circuit There is constant flow either through the buffer cylinder or through the heat source. 	<ul style="list-style-type: none"> The temperature sensor is faulty. The temperature sensor is incorrectly connected. Module or control unit is faulty. 	<ul style="list-style-type: none"> Check the FAR sensor electrical connection on the module. Check the temperature sensor in the return of the heating system for damage or incorrect positioning. Check the device fuse.
Temperature sensor buffer top defective	<ul style="list-style-type: none"> If the temperature sensor is not installed, the automatic heating appliance will be shut down when it is supposed to heat up a buffer cylinder. The dual-purpose cylinder function is no longer considered for the standard heat source. 	<ul style="list-style-type: none"> The temperature sensor is faulty. The temperature sensor is incorrectly connected. Module or control unit is faulty. 	<ul style="list-style-type: none"> Check the FPO sensor electrical connection on the module. Check the temperature sensor in or on the top buffer cylinder for damage or incorrect positioning. Check the device fuse.
Temperature sensor buffer middle defective	If the temperature sensor is not installed, the automatic heating appliance will be shut down when it is supposed to heat up a buffer cylinder.	<ul style="list-style-type: none"> The temperature sensor is faulty. The temperature sensor is incorrectly connected. Module or control unit is faulty. 	<ul style="list-style-type: none"> Check the FPM sensor electrical connection on the module. Check the temperature sensor at the centre of the buffer cylinder for damage or incorrect positioning. Check the device fuse.

Fault	Effect on the control characteristics	Cause	Remedy
Temperature sensor buffer bottom defective	<ul style="list-style-type: none">• If the temperature sensor is not installed, the automatic heating appliance will be shut down when it is supposed to heat up a buffer cylinder.• The dual-purpose cylinder function is no longer considered for the standard heat source.	<ul style="list-style-type: none">• The temperature sensor is faulty.• The temperature sensor is incorrectly connected.• Module or control unit is faulty.	<ul style="list-style-type: none">▶ Check the FPU sensor electrical connection on the module.▶ Check the temperature sensor on the bottom buffer cylinder for damage or incorrect positioning.▶ Check the device fuse.
Communication fault	The system cannot correctly support the required function.	There is a fault in the communication with the heat source.	<ul style="list-style-type: none">▶ Check the configuration and wiring.▶ Check the module.▶ Replace the faulty part.
Manual mode internal			
Heat pump ambient temperature sensor fault			
Heat pump return temperature sensor fault			
Heat pump flow temperature sensor fault			
Warning heat pump unit			
Fault heat pump unit			
Manual mode Heat pump			

Table 10 Fault displays at the control unit

9 Environmental protection and disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.

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

Packaging

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

Old electrical and electronic appliances



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

The symbol is valid in countries where waste electrical and electronic equipment regulations apply, e.g. "(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)". These regulations define the framework for the return and recycling of old electronic appliances that apply in each country.

As electronic devices may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of electronic scrap helps preserve natural resources.

For additional information on the environmentally compatible disposal of old electrical and electronic appliances, please contact the relevant local authorities, your household waste disposal service or the retailer where you purchased the product.

You can find more information here:

www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/

10 Appendix

10.1 Specifications for FM-AM

	Unit	Value
Operating voltage (at 50 Hz $\pm 4\%$)	V AC	230 (+10 %/-15 %)
Power consumption	W	1
Mixing valves (SWE, SWR) <ul style="list-style-type: none"> Max. switching current Activation 	A V	5 230 three-pointstepper controller (PID characteristics)
<ul style="list-style-type: none"> Recommended servomotor running time 	s	120 (adjustable 6...600)
Maximum switching current <ul style="list-style-type: none"> Pump output, automatic heating appliance Output WE-ON 	A A	5 5
Temperature sensors <ul style="list-style-type: none"> NTC sensor O 	mm	9
Low voltage <ul style="list-style-type: none"> Output WE-ON¹⁾ 	V DC mA	5 10
Ambient temperatures <ul style="list-style-type: none"> Operating Transport and storage 	°C °C	+5...+50 -20...+60
Max. humidity	%	75

1) If the WE-ON output is used for a low voltage circuit, a 230 V circuit must not be switched by this output beforehand.

Table 11 Specifications for FM-AM

10.2 Sensor curves

**DANGER**

Danger to life due to electric shock!


Before opening the device:

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

Checking fault:

- ▶ Remove sensor terminals.
- ▶ Check the resistance at the temperature sensor cable ends using an ohmmeter.
- ▶ Check the temperature at the temperature sensor with a thermometer.

The following tables show whether the temperature and electrical resistance value correspond.



The sensor tolerance for all curves is $\pm 3\%$ at $25\text{ }^{\circ}\text{C}$.

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

Temperature [$^{\circ}\text{C}$]	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

Temperature [$^{\circ}\text{C}$]	Resistance [Ω]
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 12 Pressure drop values of 53xx temperature sensor

11 Glossary

Floor standing heat source with / control 53xx/83xx

Heat source whose burner is connected with the standardised 7-pole plug for stage 1 and the 4-pole plug for stage 2 or for modulation to the Logamatic 5000 / Control 8000 control unit series.

Operation in series

If the alternative heat source, or the buffer cylinder heated by the alternative heat source, is hotter than the system return, that heat source will be integrated as a means of return temperature increase for the standard heat source during operation in series.

Standard heat source

Unlike alternative heat sources, standard heat sources are boilers or devices 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.

12 GB Importer

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Original Quality by
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