Technical guide

Modular Control System

Logamatic 5000

Control Units and Extended Functions

Buderus

Heatingsystems with a future.

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1 Logamatic 5000 control system

1.1 Logamatic 5000 – Overview of control units, basic functions and modular expandability

1.2 Features and benefits

All Logamatic 5000 control units feature a large number of basic functions and uniform standard equipment.

Advantages for planning

- Can be expanded to include 16 control units, e.g. for multi-boiler system and substation
- Can be expanded to include function modules, also for subsequent retrofitting
- High flow temperature can be implemented (→Code of Practice K6)
- Activation of modulating boiler circulation pump

Advantages or installation

- Wall and boiler installation
- Large connection compartment
- Electronic safety temperature limiter/return temperature
- Enclosed modules
- Automatic module detection
- Dedicated module for safety chain, safety components freely selectable
- Direct SAFe-BUS connection

Operability and service

- 7" full colour touch screen (capacitive)
- Graphic-assisted operation (e.g. timer, heating curve or hydraulics)
- BUS-wide central operation of several control units connected via BUS
- Operation locally 1:1 in addition to touch screen also via standard PC browser (USB adaptor required (accessory) → Chapter 8.2, page 80)
- Remote operation: basic telecontrol including

Connectivity

- External heat demand via switching contact or 0 ... 10 V (temperature/output)
- Communication with DDC/GLT via integrated TCP Modbus
- Internet-ready with IP inside (communication via Modbus TCP and Internet only possible in alternation)
- Data backup via USB stick
- Data backup via SD card
- Control units can be updated via USB stick

1.3 Areas of application

The Logamatic 5000 control system is the modern solution to diverse modulation and control tasks for single and multi-boiler systems with Buderus boilers of all types and sizes. And it goes without saying that it also caters for renewable energy from sources such as wood, or cogeneration systems (e. g. CHP). One control concept can operate and control not only floor standing and wall-mounted Buderus boilers but also subordinate systems or autonomous heating circuits.

The Logamatic 5000 system is, of course, fully compatible with the Logamatic EMS control system, the Energy Management System of Buderus. Logamatic EMS controls the combustion process and all boiler-related functions of a EMS wall-mounted indoor unit. The individual control functions are implemented by the Logamatic 5000 control system.

The floor standing EMS boilers with digital burner control unit SAFe can also be activated directly with Logamatic 5313. A EMS boiler controller such as Logamatic MC10 is not required. In existing systems containing boilers equipped with a Logamatic MC10 boiler controller, an alternative activation method is via the integrated EMS interface of the Logamatic 5313 control unit.

The Logamatic 5000 control system is a modular system.

System	Logamatic EMS plus	Logamatic 5000		MasterEnergy Control (MEC)
Application area	Residential building	Commercial building	Public building	Industry
Control	Standard control units	Control units Logamatic 5000/ Standard control cabinets		Customer-specific control cabinets

Table 1 Comparison of application area Logamatic 5000

Even if there is no Buderus boiler in use, the Logamatic 5000 control system offers suitable solutions. The Logamatic 5000 system offers autonomous controllers for controlling heating in an apartment block or commercial premises supplied with heat from an external source.

In this case Logamatic 5000 allows any functions to be used. When planning large building projects such as schools or district heating projects for commercial premises or large residential buildings, additional Logamatic 5000 controllers can be installed long distances away in separate subordinate systems. Logamatic 5000 function modules can then take on specific localised tasks. Up to 16 control units can be connected via the LAN cable. With the appropriate equipment and function modules, the system is capable of expansion for the control of complex multi-boiler systems in the medium to large size range.

2 Structure of the modular control system

2.1 Comprehensive standard equipment which is capable of modular expansion

Fig. 1 Control unit Logamatic 5313 or Logamatic 5311

[1] capacitive touch screen, industry standard, size 7" (17.8 cm)
[2] Integratable mounting rail FM-RM (accessory)
[3] Basic functions chimney sweep button, reset button and button for manual operation
[4] 3-colour LED strip for status display (blue: “System OK”, amber: “Manual operation”, flue gas test, maintenance or no Internet connection, red: “Fault”)
[5] USB connection (under the flap) for data recording, data backup, software update, etc.
[6] Central module ZM5313 with Logamatic 5313 or ZM5311 with Logamatic 5311

Detailed information on Controller Module BCT531
→ Chapter 4.1, page 13.

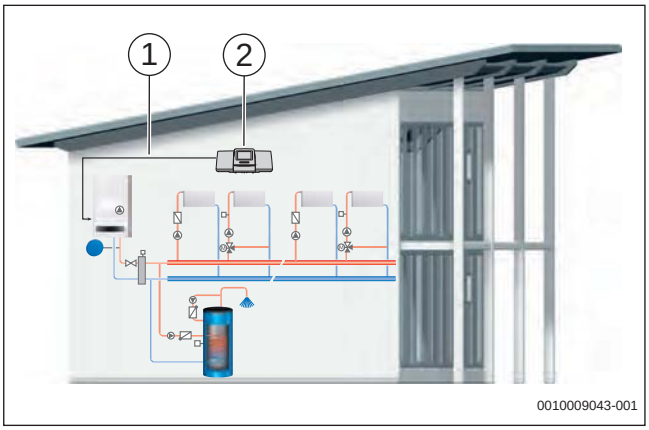


Fig. 2 Control unit for activation of floor standing boiler and control of system

[1] EMS-BUS
[2] Logamatic 5313

The Logamatic 5000 control system is a modular system. The Logamatic 5311 and Logamatic 5313 digital control units are equipped with a BCT531 Controller Module and device-specific ZM5311 or ZM5313 central module.

Both control units have the exactly the same basic functions:

- Burner control
- Ensuring the boiler operating conditions via boiler circulation control with mixing valve and boiler circulation pump
- Speed of boiler circulation pump control based on output or temperature differential via 0 ... 10 V “FlowControl” output
- Control of a heating circuit with/without mixing valve and heating circuit pump (only as alternative to boiler circulation function) with connection option for remote control (BFU)
- An an option, the heating circuit pump can also be configured as feed pump for a subordinate system.
- Control of a DHW circuit with cylinder primary pump and DHW circulation pump

All controllers also have 4 spare slots as standard. They can receive additional modules from the available choice for extending the range of functions to suit the particular project. Additionally all control units can be expanded to include further components such as relays using a mounting rail which is available as an accessory (→ Chapter 7.7, page 78).

Control units Logamatic 5311 and Logamatic 5313 are operated via an integrated capacitive 7" touch screen. It can be used for complete control system installation and retrieving all available information about the control unit in a very convenient intuitive manner.

The Logamatic 5310 control unit (preparation underway) serves to provide additional functions or as subordinate system and is equipped with a CM531 Controller Module. The Logamatic 5310 expansion control unit does not have a touch screen. It is operated via a Logamatic 5311 or Logamatic 5313 master control unit (required). The entire system can be operated from a control unit. The control units communicate with one another via Ethernet interface using a commercially available LAN cable. The connection to the building services management system is established via Modbus TCP/IP as standard.

2.2 The module system: clearly structured, flexible and requirements-focussed

The Logamatic 5311 and 5313 control units (and also 5310, for which preparation is currently underway) have space for optional function expansion modules which can be used as required to suit the control system requirements. There are expansion modules available for specific control functions as determined by the system concept or the nature of the heat-consuming systems.

The control “detects” every new module that is plugged in so that the user guidance displays only the available adjustment options in each case. This simplifies installation and prevents faults. A manual operation level is of course also available for switching the burner or pumps on or off when carrying out service work or repairing faults.

All function modules have an enclosed housing to facilitate optimum handling. Important information can be noted directly on the modules if necessary.

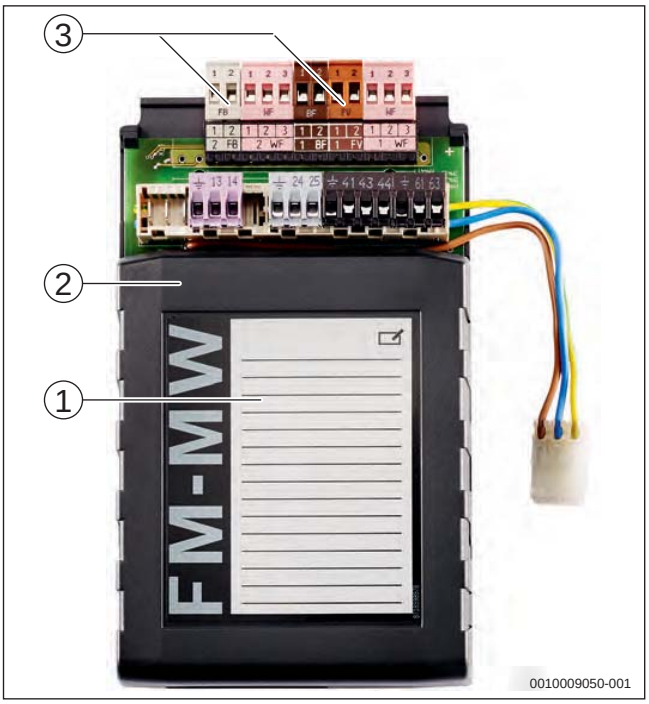


Fig. 3 Function expansion module
Shown here: FM-MW function module

[1] Label with space for notes
[2] Module housing
[3] Plug

The modules are inserted from above into the control unit when the housing cover is removed via special guide rails and fixed automatically. 2 separate terminal blocks for low voltage circuits (e. g. for temperature sensors, remote controls and external switches) and for 230 V control circuits (e. g. for power supply, actuators and circulation pumps) have coloured coded plugs with terminal pins (→ Fig. 4).

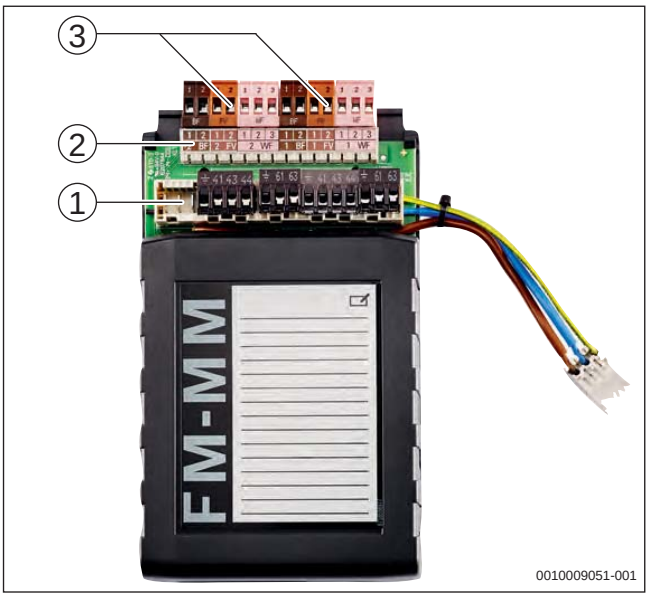


Fig. 4 Function module FM-MM

[1] Module terminal block for control circuits (for 230 V AC mains supply, actuator and circulation pump connectors)
[2] Module terminal block for extra-low voltage circuits (plug for temperature sensor, remote control and external switches)
[3] Plug, extra-low voltage (230 V)

3 CBC-BUS for data exchange

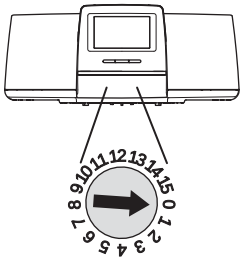
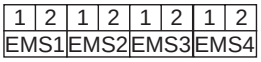
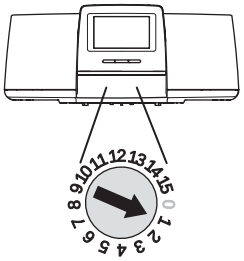
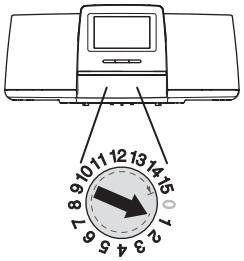
3.1 Layout

The abbreviation “CBC” stands for Commercial Boiler Control. To facilitate data exchange between all control units of the Logamatic 5000 system, they are equipped as standard with an Ethernet interface for connection to the CBC-BUS. Up to 16 control units can be connected to a CBC-BUS network, thereby substantially increasing the number of possible control functions and corresponding heat consumers.

	Logamatic 4000	Logamatic 5000
BUS	ECOCAN-BUS	CBC-BUS (in the control unit “LAN1/LAN2”)
Connection	2-wire BUS cable, provided by the customer	Standard network cable with RJ45 plug
Maximum range	Max. 1000 m overall length	Standard: limit of 100 m between 2 devices, can be extended with switch/repeater, fibre-optic cable, etc.
Operating the appliance	Only on relevant control unit	BUS-wide operation via Master control unit (address 0)

Table 2 Comparison of BUS technology Logamatic 4000 and Logamatic 5000

3.1.1 Addressing CBC-BUS

Sequence	**1.** Master control unit[1)]	**2.** EMS boiler on cascade module FM-CM	**3.** Additional SAFe boilers (Logamatic 5313) or boilers with 7-pin plug (Logamatic 5311)	**4.** Substations
Adjustment range of address	0	1 ... 15	1 ... 15	1 ... 15
Adjustment location[2)]				
	At the address coding switch (→ Fig. 10, Item [5], page 13)	At the connecting terminals[3)]	At the address coding switch (→ Fig. 10, Item [5], page 13)	At the address coding switch (→ Fig. 10, Item [5], page 13)

1) Logamatic 5313: boiler type SAFe or EMS boiler or stand-alone control unit or Logamatic 5311: 7-pin plug

2) The current address is displayed in the start menu (header); the boiler type can be correctly set under “Boiler data”.

3) EMS boilers connected to the FM-CM cascade module are “also counted”; during addressing counting takes place from left to right and only boilers that actually exist are counted. Recommendation: FM-CM at slot 4 for continuous numbering of heating circuits. Can be extended by up to 4 cascade modules FM-CM.

Table 3 Setting address for substantial systems

Every control unit represents a BUS node on CBC-BUS which is assigned a unique CBC-BUS address in the BUS. The address is set on the back of the BCT531 (→ Fig. 10, Item [5], page 13).

Logamatic 5313 and 5311 can either be set as Master control unit (address 0) or so-called Slave control unit (address 1 ... 15) in combination with a Master control unit.

If only one control unit is used (e. g. in a 1-boiler system or as stand-alone control unit for consumers), it is basically a Master control unit with address 0.

In a multi-boiler system, the cascade moduleFM-CM is always located in the Master control unit (address 0). The control units for other boilers or control units in the substations are Slave control units and have a control unit address of between 1 and 15. If floor standing boilers are connected via EMS-BUS to the cascade module FM-CM they are assigned the addresses 1 ... 4. Further Logamatic 5000 control units would then be assigned the addresses 5 ... 15. If boilers are connected via SAFe-BUS, these are no longer taken into consideration when assigning the addresses. 4. Further control units would then be assigned the addresses 2 ... 15. Each address must only be assigned once. If several cascade modules are used, the FVS strategy sensor is connected to the cascade module on the left

Notice: the control unit in a substation communicates with a Master control unit via the CBC-BUS. Only one Master control unit may exist in a CBC-BUS networked system. A stand-alone control unit always has the address 0.

3.1.2 CBC-BUS cable

There are fundamental requirements to be followed for routing the CBC-BUS cable:

- The control units (BUS nodes) can be arranged in series or point-to-point.
- The maximum cable length between two BUS nodes must not exceed 100 metres. The maximum cable length can be doubled using a repeater or network switch. Several switches can also be used to increase the cable length further.
- A standard network cable with RJ45 plugs is used as BUS cable (Cat. 6 recommended).
- Special recommendations for bridging larger distances are available on request.

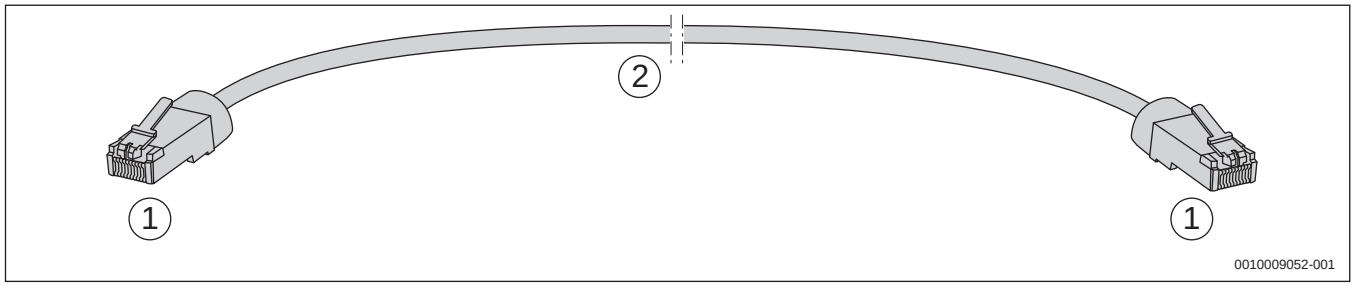


Fig. 5 CBC-BUS connection between control units of the Logamatic 5000 system

[1] RJ45-Stecker
[2] LAN cable (standard uncrossed network cable, Cat. 6 recommended)

Permissible cable length: maximum 100 metres between 2 control units. Longer lengths can be achieved using repeaters/network switches.

3.2 Examples of combining Logamatic 5000 system digital control units using CBC-BUS

- The LAN1 connection to the Master control unit (address 0) is envisaged for the Internet connection, or connection to a building services management system via Modbus TCP/IP, and must be programmed accordingly.
- The LAN1 connection to control units with an address > 0 can only be used for internal communication between control units in the Logamatic 5000 series. LAN1 cannot be programmed during this process.
- As a basic rule, the LAN2 connection can only be used for internal communication between control units in the Logamatic 5000 series, irrespective of the control unit address set.

3.2.1 Floor standing 1-boiler system with boiler with third party burner

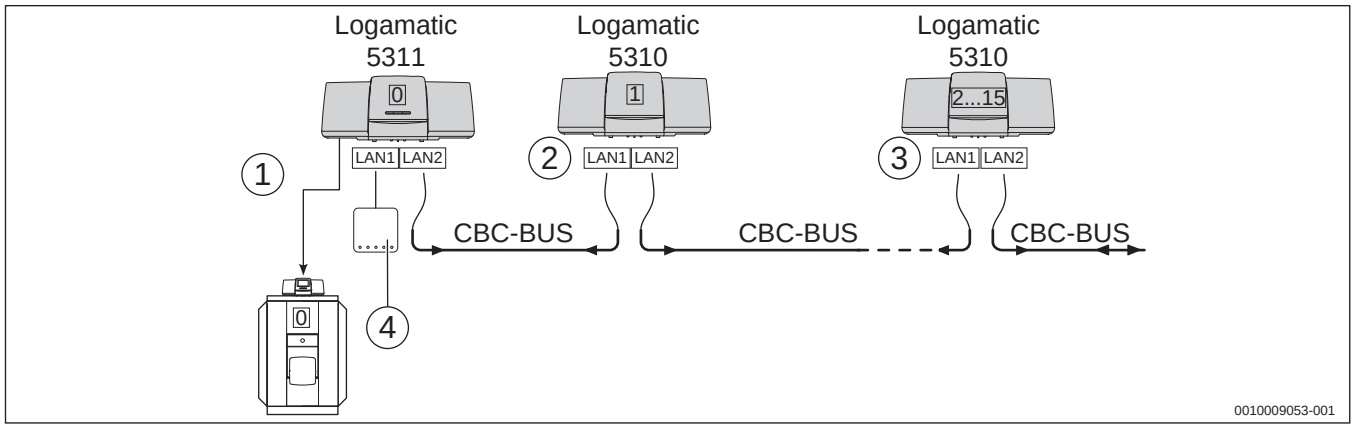


Fig. 6 Example combination of Logamatic 5000 system control units for a floor standing 1-boiler system with boiler equipped with third party burner showing assignment of boiler and addresses on CBC-BUS network

[1] Floor standing boiler with third party burner (e. g. Logano plus SB625 or Logano plus GE615), burner control via conventional 7- and 4-pin plug (connection to ZM5311), Logamatic 5311 address 0 (Master control unit)
[2] Logamatic 5310[1)] Address 1 (Slave control unit)
[3] Logamatic 5310 Address 2 ... max. 15 (Slave control unit)
[4] Router or Modbus to DDC/GLT (connection always to LAN1 of the Master control unit)

Address 0 (master)
Logamatic 5311

- Boiler control unit with outside temperature sensor for heating circuit function (1 heating circuit with mixing valve or alternatively boiler circuit with mixing valve) and DHW heating (via primary pump)
- 4 spare slots for function expansion modules

Address 1 ... 15 (choice and assignment unrestricted)
Logamatic 5310

- Function extension as sub-station with feed pump (activation via FM-MM or FM-MW or master control unit)
- 4 spare slots for function expansion modules

1) Preparation of control unit Logamatic 5310 is underway, or alternatively a Logamatic 5313 or Logamatic 5311 control unit can also be used as substation.

3.2.2 Floor standing 1 boiler system with digital burner control unit SAFe

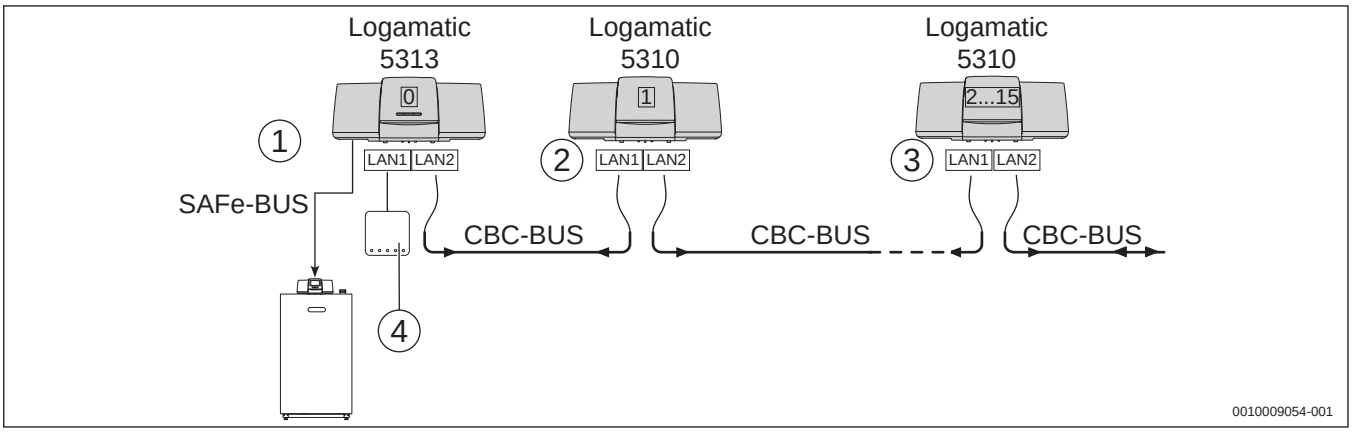


Fig. 7 Example combination of Logamatic 5000 system controllers for a floor standing 1-boiler system, with digital burner control unit SAFe, showing assignment of boiler and addresses on CBC-BUS network

[1] Boiler with burner control unit SAFe (e. g. Logano plus KB372 or Logano plus GB402), direct burner control via SAFe-BUS (connection to ZM5313), Logamatic 5313 address 0 (Master control unit)
[2] Logamatic 5310[1)] Address 1 (Slave control unit)
[3] Logamatic 5310 Address 2 ... max. 15 (Slave control unit)
[4] Router (connection always to LAN1 of the Master control unit)

Address 0 (master)
Logamatic 5313

- Boiler control unit with outside temperature sensor for heating circuit function (1 heating circuit with mixing valve or alternatively boiler circuit with mixing valve) and DHW heating (via primary pump)
- 4 spare slots for function expansion modules

Address 1 ... 15 (choice and assignment unrestricted)
Logamatic 5310

- Function extension as sub-station with feed pump (activation via FM-MM or FM-MW or master control unit)
- 4 spare slots for function expansion modules

1) Preparation of control unit Logamatic 5310 is underway, or alternatively a Logamatic 5313 or Logamatic 5311 control unit can also be used as substation.

3.2.3 1-boiler system with a floor standing or wall mounted EMS gas boiler

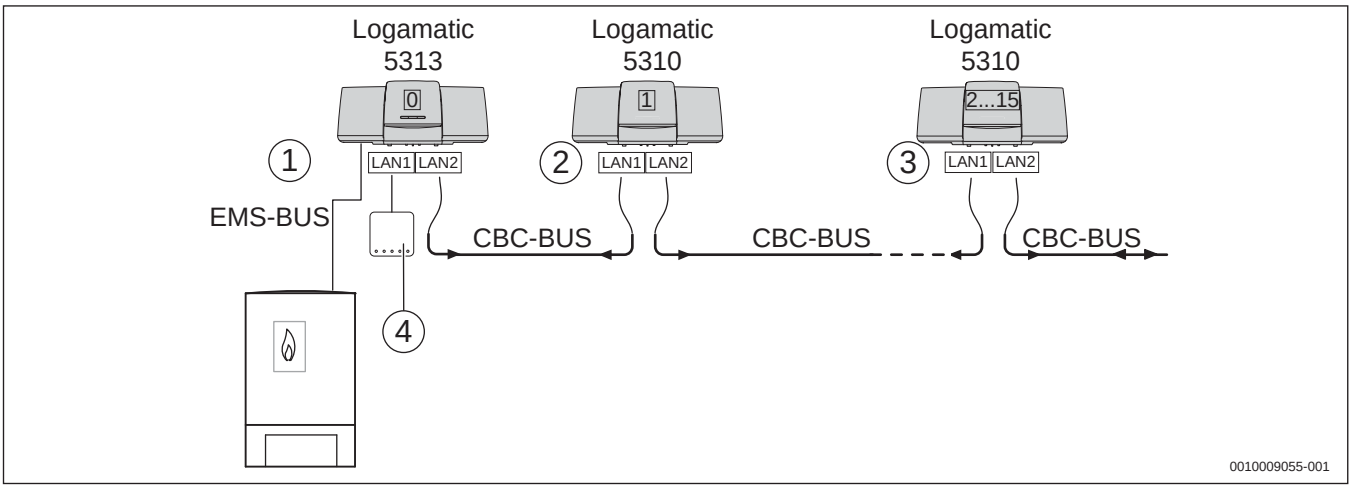


Fig. 8 Example combination of Logamatic 5000 system control units for a 1-boiler system with EMS heat source showing assignment of boiler and addresses on CBC-BUS network

[1] EMS oil/gas heat source (e. g. Logamax plus GB162 or Logano plus KB192i), burner control via EMS BUS (connection to connecting terminal EMS on BCT531), Logamatic 5313 address 0 (Master control unit)
[2] Logamatic 5310[1)] Address 1 (Slave control unit)
[3] Logamatic 5310 Address 2 ... max. 15 (Slave control unit)
[4] Router or Modbus to DDC/GLT (connection always to LAN1 of the Master control unit)

Address 0 (master)
Logamatic 5313

- Boiler control unit with outside temperature sensor for heating circuit function (1 heating circuit with mixing valve or alternatively boiler circuit with mixing valve) and DHW heating via primary pump or 3-way valve (UBA)
- 4 spare slots for function expansion modules

Address 1 ... 15 (choice and assignment unrestricted)
Logamatic 5310

- Function extension as sub-station with feed pump (activation via FM-MM or FM-MW or master control unit)
- 4 spare slots for function expansion modules

More examples of addressing multi-boiler cascades
→ Chapter 7.5, page 67.

1) Preparation of control unit Logamatic 5310 is underway, or alternatively a Logamatic 5313 or Logamatic 5311 control unit can also be used as substation.

4 User interfaces

4.1 User interface/controller module BCT531 for digital control units Logamatic 5311 and 5313

Operating concept

Fig. 9 User interface/controller module BCT531 of digital control units Logamatic 5311 and 5313

[1] Capacitive 7" touch screen
[2] reset button
[3] Chimney sweep button
[4] Button for manual operation

All parameters of a control unit can be adjusted at the controller module BCT531, which serves as user interface. This adjustment is made via the 7" large capacitive touch screen. The user interface on the digital display is programmed in such a way that it only shows the parameters that are actually possible with the function and expansion modules that are installed. For this, the user prompts of the controller module prevent contradictory settings of parameters, thereby largely preventing faults during commissioning.

The controller module can also retrieve and display all available information from the control unit, such as temperature readings, set values, fault displays, etc. When using several control units, all control units connected via the BUS, or the entire system, can be operated from one control unit.

New software can be downloaded via the BCT531 controller module in order to correct errors or extend functions. New software is installed locally at the device via a USB stick (this cannot be done remotely).

Connections

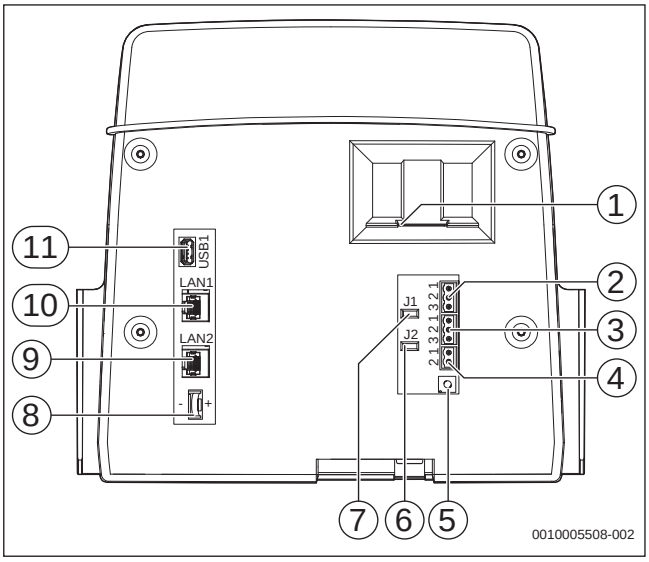


Fig. 10 Connections of user interface BCT531 (rear of touch screen)

[1] Slide type insert for SD card for data recording
[2] CAN-BUS connection (no function, provided for subsequent functions)
[3] Modbus-RTU connection for Buderus/Bosch CHP module
[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 Modbus-RTU terminating resistance
[7] Jumper (J1) for activating the CAN-BUS terminating resistance
[8] Battery CR2032 (time buffer)
[9] Network connection 2 (CBC-BUS)
[10] Network connection 1 (selection: Internet, Modbus TCP/IP, CBC-BUS or Gateway for Control Center CommercialPLUS)
[11] USB connection (for software updates or PC operation via web browser)

Interfaces

The controller module BCT531 has the following interfaces:

- 2 Ethernet interfaces for interconnection of several control units and also connection to a router, or for connection to a building services management system via Modbus TCP/IP
- 2 USB interfaces (front and back) for servicing (software updates or PC operation via web browser)
- A EMS interface for connection of a EMS gas/oil heat source to Logamatic 5313 (e.g. Logamax plus GB162 or Logano plus GB212)
- A Modbus interface for communication with higher-level control
- A SD card slot for data recording

4.2 Remote control BFU

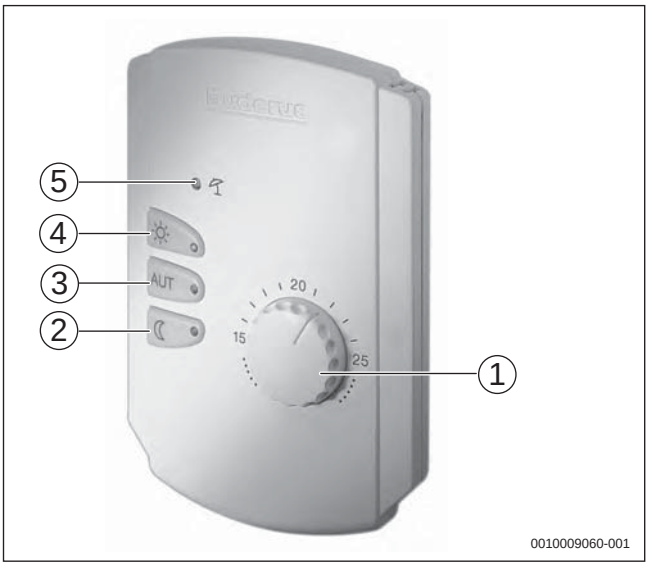


Fig. 11 Remote control BFU with integrated room temperature sensor

[1] Rotary selector for set room temperature
[2] Button with indicator (LED) for manually selecting setback mode
(constant setback mode)
[3] Button with LED for automatic mode (heating mode and setback modes as programmed)
[4] Button with LED for manually selecting heating mode (constant heating mode)
[5] LED for summer mode (only DHW heating is possible)

Please note: remote control installation instructions BFU → Chapter 11.1.2, page 97.

The BFU remote control enables a heating circuit to be operated separately from the living area. No more than one BFU remote control can be installed per heating circuit. The BFU remote control can only be used with the modules FM-MM and FM-MW as an alternative to the optional function terminals WF1-2-3.

The desired set room temperature can be adjusted via the rotary selector (→ Fig. 11, Item [1]).

- Adjustment range in heating mode: 10 °C ... 30 °C
- Minimum adjustment limit for setback mode: 10 °C

Operating mode switching

The following operation modes can be selected via keys on the remote control:

- Heating mode (manually set, constant heating mode)
- Automatic mode (daytime and setback modes as programmed)
- Setback mode (set manually, continuous setback mode)

An indicator (LED) in the button shows which mode is currently active. In Automatic mode, the configurable time programme on the control controls the changeovers between constant heating mode (daytime operation) and setback mode (night-time operation).

Summer mode display

An LED indicates whether the assigned heating circuit is in summer mode, i.e. not heating due to high outside temperatures (→ Chapter 7.2.4, page 47). Only DHW heating is still active.

Summer mode can be cancelled by pressing the button for manually selecting heating mode or setback mode (→ Fig. 11, Item [4] or Item [2]).

Room temperature hook-up

The remote control has an integral room temperature sensor. If the measured room temperature differs from the room setpoint, the flow temperature of the heating circuit concerned is automatically adjusted accordingly. In that way, short-term room temperature fluctuations, e. g. due to window ventilation, heating stoves, etc., can be balanced out. It is important to note that the remote control affects the entire heating circuit, in other words other rooms apart from the one in which it is situated. Therefore, this function only makes sense in a reference room.

Room temperature monitoring in setback mode

The room temperature sensor monitors the temperature in the reference room during setback mode (night-time operation) if the setback option “Room temperature threshold” has been set.

External room temperature sensor

If the installation location of the BFU remote control is not suitable for recording the room temperature, a separate external room temperature sensor can be connected.

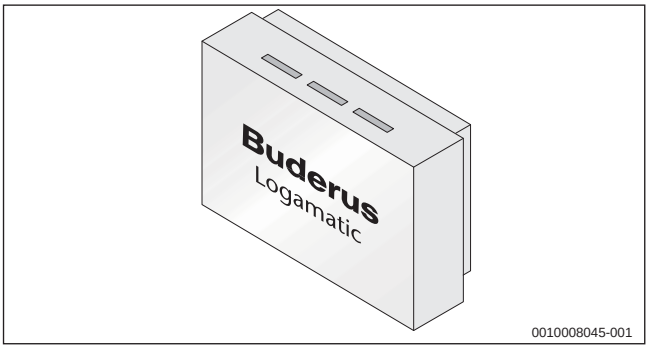


Fig. 12 Separate room temperature sensor for external installation as an alternative to the integral room temperature sensor of the remote controls BFU

4.3 Operation via Internet

The Logamatic 5000 control system allows convenient operation of the entire heating system via the Internet. To do so, the end customer uses the Buderus Control Center Commercial, and the trade customer uses the Control Center CommercialPLUS.

The end customer can use the Buderus Control Center Commercial free of charge and with Logamatic 5311 and 5313 with standard equipment without additional components.

The scope of functions essentially comprises display and programming of the main menu and also automatic forwarding of fault displays via E-Mail.

The Buderus Control Center CommercialPLUS Internet Portal offers many additional functions such as full programming including service menu, data recording, user management, control centre function, etc.
Use is subject to a fee. To use Control Center CommercialPLUS, a Gateway (separate accessory) is required.

Detailed information → Chapter 8.1, page 79 and at www.buderus-commercial.de

5 Control unit Logamatic 5313 for Buderus floor standing boiler

5.1 Description of Logamatic 5313 control unit

5.1.1 Logamatic 5313 control unit for floor standing boiler and burner with digital burner control unit of Buderus (Logamatic EMS)

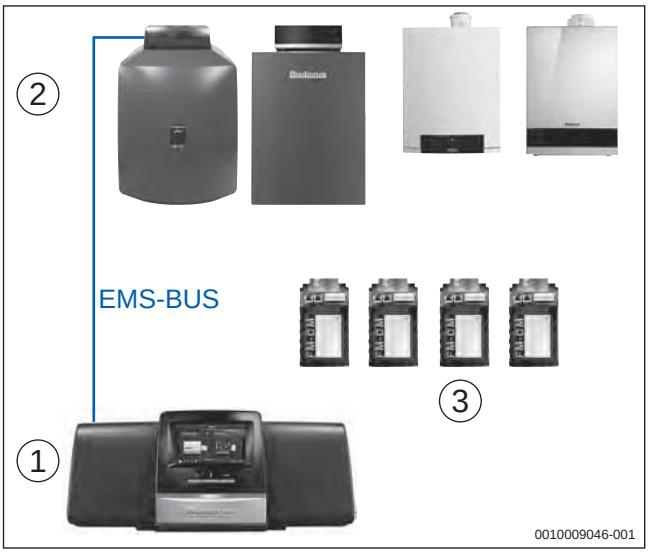


Fig. 13 Wall-mounted installation: Logamatic 5313 control unit for floor standing boilers or wallmounted indoor units in the low to medium output range, dedicated boiler control unit, connection to Logamatic 5000 via EMS-BUS (e.g. Logano plus GB125, Logano plus GB212, Logamax plus GB162, Logamax plus GB192i)

[1] Logamatic 5313 control unit
[2] EMS floor standing boiler/wall-mounted indoor unit, connection to Logamatic 5313 via EMS-BUS
[3] Function modules for implementation of control functions

Floor standing boilers or wall-mounted indoor units with integrated Energy Management System Logamatic EMS with safety technology and basic controller Logamatic BC xx (e.g. Logamax plus GB162/GB192i, Logano plus GB212 or Logano plus GB125)::

- Burner with universal burner control unit UBA or combustion automatic cutout SAFe and MC10/40/100/110 boiler controller
- Temperature sensor and safety equipment are integrated into the boiler
- Communication with the floor standing boiler or wall-mounted indoor unit via EMS interface
- Wall-mounted installation of control unit

5.1.2 Logamatic 5313 control unit for floor standing boiler and burner with combustion automatic cutout SAFe of Buderus

Fig. 14 Boiler installation: Logamatic 5313 control unit for floor standing boilers in the medium output range, burners with combustion automatic cutout SAFe of Buderus, installation Logamatic 5000 directly on the floor standing boiler

[1] Floor standing EMS boilers in the medium output range (e.g. Logano plus GB402, Logano plus GB312, Logano plus KB372)
[2] Logamatic 5313 control unit, directly connected via SAFe-BUS to the burner control unit of the floor standing boiler
[3] Function modules for implementation of control functions

Floor standing boiler with combustion automatic cutout SAFe (e. g. Logano plus KB372 and Logano plus GB402):

- Temperature sensor and safety equipment are integrated into the boiler.
- Direct BUS communication with the combustion automatic cutout SAFe of the floor standing boiler (no boiler controller, e.g. MC10 or MC110 required)
- Installation of control unit on the floor standing boiler

Boiler installation and direct communication Logamatic 5313 with the SAFe-BUS (compared to communication Logamatic 5313 with Logamatic MCxxx via EMS-BUS)

In existing systems with Logano plus GB312 or GB402 we recommend installing the Logamatic 5000 control unit on the boiler.

For the following functional reasons, with the boiler series Logano plus KB372, GB312 and GB402 we recommend installing the Logamatic 5313 control unit on the boiler. In existing systems with Logano plus GB312 or GB402, when installing the Logamatic 5000 control unit an existing Logamatic MCxxx boiler control unit should be omitted.

Advantages of installation on the boiler:

- Boiler control unit Logamatic MCxxx can be omitted (straightforward, cost-effective, space and timesaving installation)
- Comprehensive display of burner control unit monitor data (display limited when using EMS-BUS connection)
- Comprehensive function check of all boiler functions (only possible to a limited extent via EMS-BUS connection, in this case the internal display of the boiler must be used for the boiler function test (e.g. BC 10/25/30/30 E))
- Modulating boiler circulation pump with SAFe-BUS-installation
- Common fault output on Master control unit BUS-wide, also 1 × per Slave control unit (address > 0)
- When DHW is selected via EMS-BUS, only one DHW heating facility is possible, with SAFe-BUS 2 DHW heating facilities are possible for each control unit.

5.1.3 Possible applications

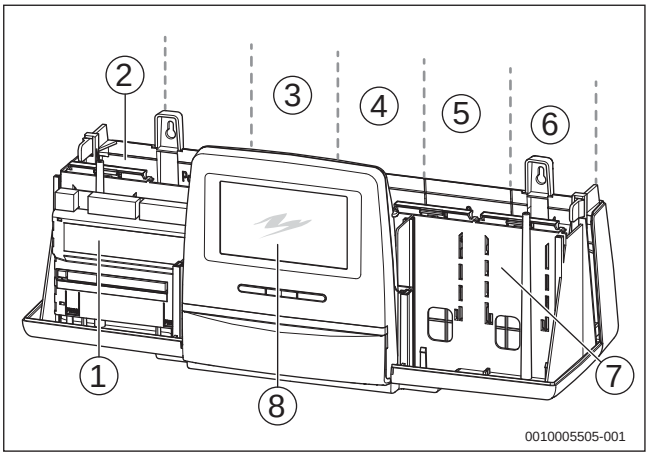


Fig. 15 Overview of slots

[1] Slot A (central module)
[2] Slot B (power supply module)
[3] Slot 1
[4] Slot 2
[5] Slot 3
[6] Slot 4
[7] Slot C
[8] Programming unit

The standard version of the Logamatic 5313 digital control unit can be optionally used as follows:

- Activation of 1-boiler systems with Buderus floor standing boiler and burner control unit SAFe
  or
  with EMS oil/gas heat source
- Functional enhancements for the Logamatic 5000 control system
- Substation with feed pump
- Control unit for stand-alone heating systems (without connection to a floor standing boiler of Buderus)

As standard, the unit includes the functions DHW heating (cylinder system) and optional heating circuit control unit (one heating circuit with mixing valve) or boiler circuit control (boiler circulation pump and boiler mixing valve).

In order to adapt it optimally to the heating system, the Logamatic 5313 control unit can be extended by up to 4 function modules. The Logamatic 5313 control unit can for example control one multi-boiler system in combination with the FM-CM function module (maximum of 4 FM-CM can be used). Using the FM-AM function module, an alternative heat source (e. g. BHKW or biomass boiler) can be integrated into the Logamatic 5000 control system.

If not enough module slots are available in the Master control unit, the control can also be combined with one or several Logamatic 5313 or Logamatic 5310 expansion control units (preparation underway) in the CBC-BUS network.

5.1.4 Boiler control

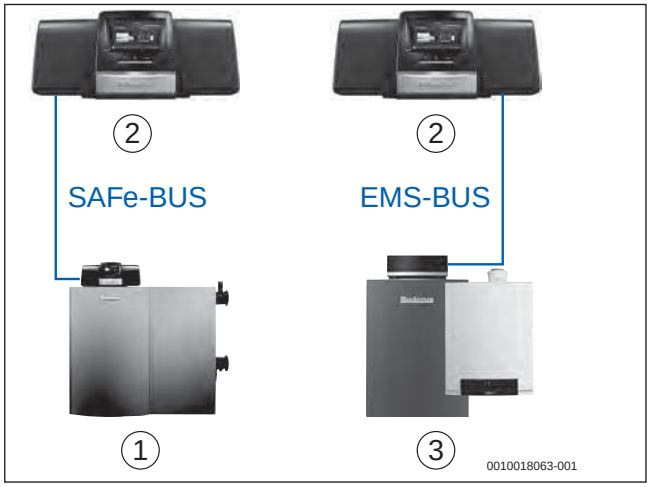


Fig. 16 Activation of various boiler types

[1] Boiler with Buderus burner control unit SAFe
[2] Logamatic 5313
[3] Wall mounted gas condensing boilers or floor standing small-scale boilers

The following boiler types can be adjusted in the service menu of the control unit:

- SAFe (with activation via SAFe-BUS), → Chapter 5.1.2, page 16
- EMS (with activation via EMS-BUS), → Chapter 5.1.1, page 16
- None (stand-alone heating circuit controller and substation), → Chapter 5.1.5, page 18

The correct settings in combination with the appropriate plumbing configuration guarantee Logamatic 5313 that the required boiler operating conditions are maintained.

5.1.5 Stand-alone heating system controller or substation

- Use as stand-alone heating circuit controller without boiler control or as substation with BUS communication with a Master control unit
- Minimum heat-up temperature and maximum heat-up time are adjustable to facilitate monitoring of heat supply
- With demand-dependent control of a feed pump

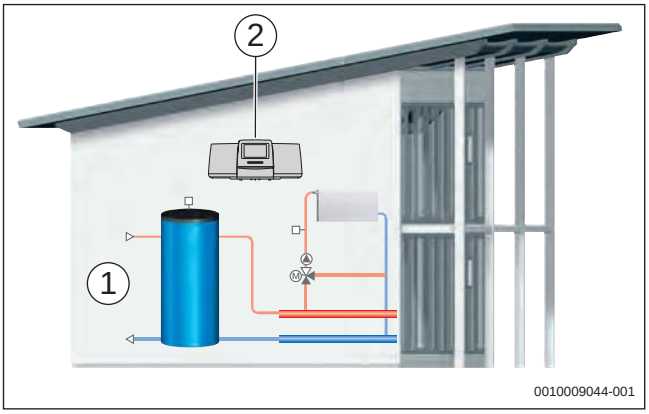


Fig. 17 Control unit for stand-alone system

[1] Third-party heat source
[2] Logamatic 5313

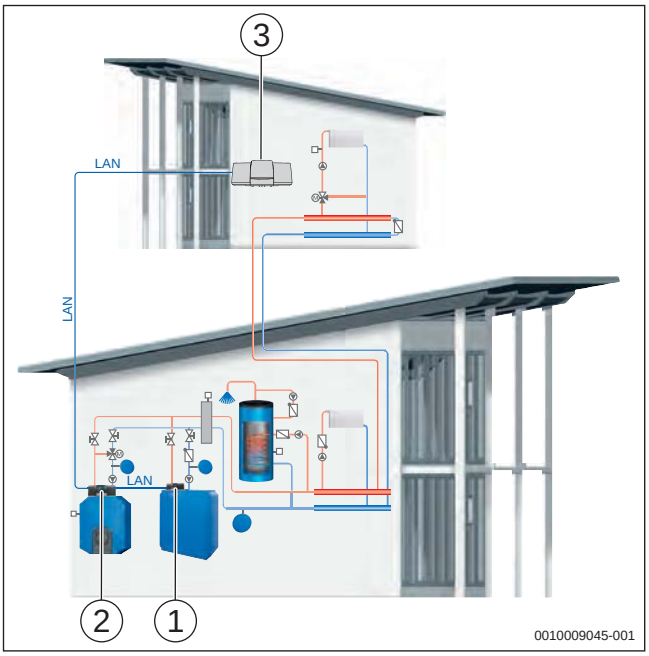


Fig. 18 Control unit for heating with substations

[1] Logamatic 5313
[2] Logamatic 5311 with FM-CM and FM-MW function modules
[3] Logamatic 5310 (preparation underway), e.g. with FM-MM function module

5.1.6 Heating circuit control and DHW heating with Logamatic 5313 control unit

- Weather-compensated control of one heating circuit with mixing valve (mixer) and pump
  Alternative: Activation of a boiler circuit with boiler mixing valve and boiler circulation pump
- Option of connecting a separate remote control for room temperature hook-up of each heating circuit
- Adjustable, automatic switching between summer/winter modes separately for each heating circuit
- Individual time-based adjustable DHW heating via cylinder primary pump (cylinder system), daily monitoring, thermal disinfection and activation of a DHW circulation pump
- Choice of DHW priority or operation in parallel with the heating circuits depending on the boiler and system configuration

5.1.7 Special functions for single and multi-boiler systems

- Separate adjustable boiler curve, e. g. with third party control of the consumers
- Control of a boiler circuit pump for systems with depressurised distributor or low-loss header
- Modulating activation of a boiler circulation pump via a 0 ... 10 V-signal (detailed information → page 30)
- Application of a potential-free signal for an external fault display
- On/off or 0 ... 10 V input (adjustable curve) for external set value hook-up as set temperature value or output specification (heat requirement) with third party heating circuit control

5.1.8 Scope of delivery

- Digital control unit Logamatic 5313 with user interface/BCT531 controller module with integrated 7"-touch screen and ZM5313 central module
- FA outside temperature sensor
- FZ additional temperature sensor, e.g. for low loss header or as heating circuit flow temperature sensor

5.1.9 System schematics Logamatic 5313 with standard equipment

A HK0 heating circuit with mixer or boiler circuit can be implemented with the components connected to the central module (PK pump, SR mixing valve and FZ auxiliary sensor). If a component is used in a function (e.g. for the boiler circuit), the other components can no longer be used for another function (e.g. for heating circuit HK0).

Example: if a mixing valve is connected to the SR terminal in the boiler circuit, a HK0 heating without mixer can be implemented with the PK pump.

Exception: when floor standing boilers are activated via EMS-BUS (e.g. Logamax plus GB162 or Logano plus GB125 with MC10), systems can be implemented with a low loss header and HK0 heating circuit without mixer. In this case, the FZ auxiliary temperature sensor is located in the low loss header (→ Fig. 20 and Fig. 21, page 20).

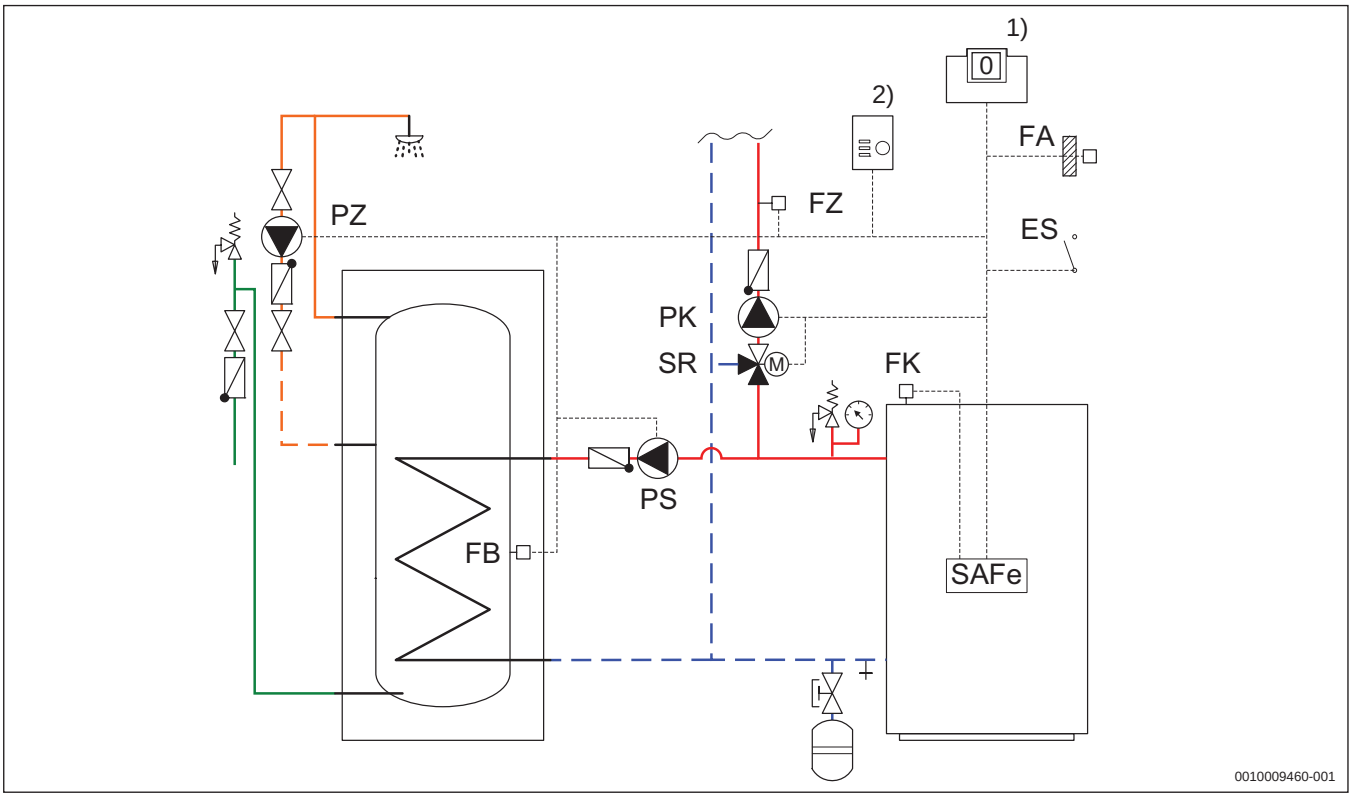


Fig. 19 System schematic Logamatic 5313 (Legend → Chapter 5.5, page 31)

1) Logamatic 5313 control unit
2) Remote control

Logamatic 5313 with standard equipment: activation of a EMS wall-mounted indoor unit, low loss header, heating circuit control unit (1 heating circuit without mixing valve (HK0)) and DHW heating via cylinder primary pump

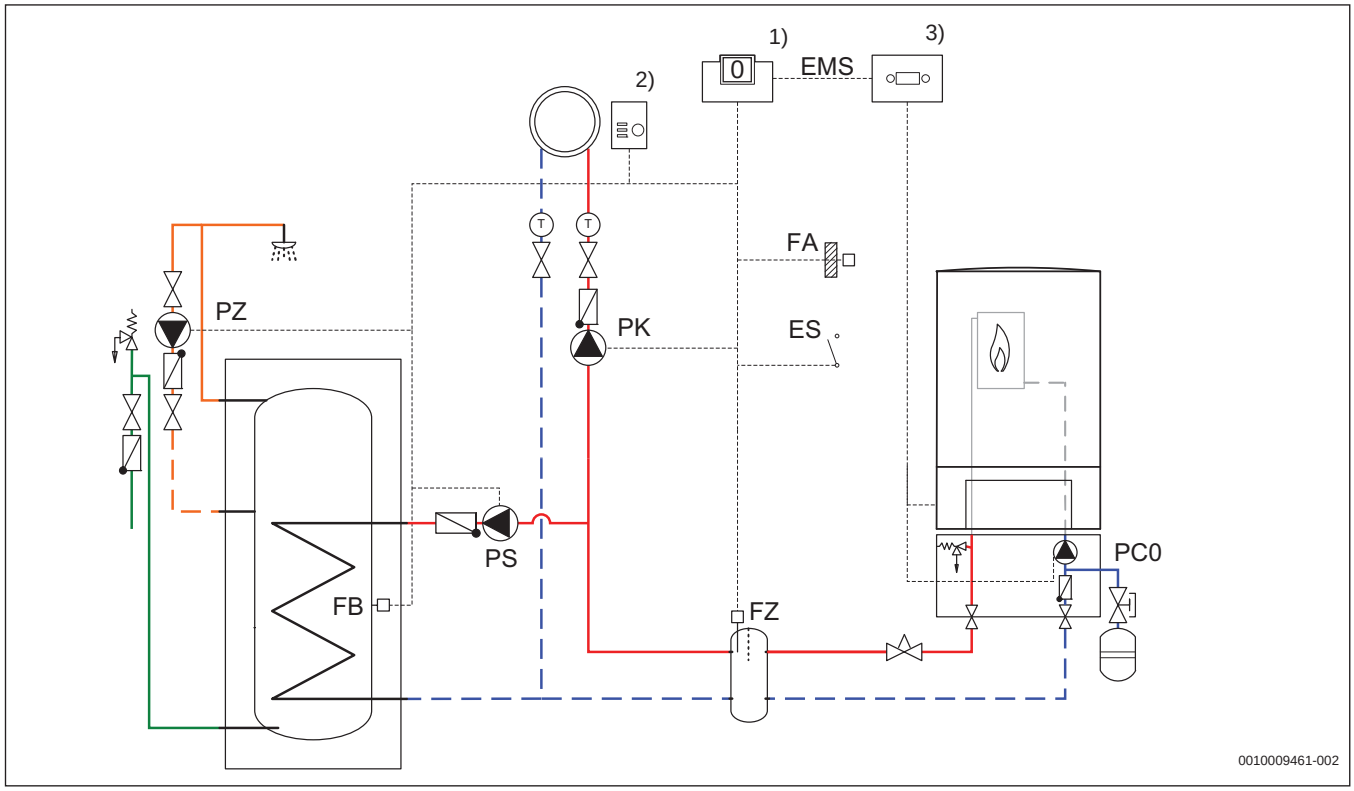


Fig. 20 System schematic Logamatic 5313; alternative: DHW heating via 3-way valve→ Fig. 21, page 21 (Legend → Chapter 5.5, page 31)

1) Logamatic 5313 control unit
2) Remote control
3) Control unit in the wall-mounted indoor unit

A FM-MM or FM-MW module is required to implement a heating circuit with mixing valve.

Logamatic 5313 with standard equipment: activation of a EMS wall-mounted indoor unit, low loss header, heating circuit control unit (1 heating circuit without mixing valve (HK0)) and DHW heating via motorised diverter valve

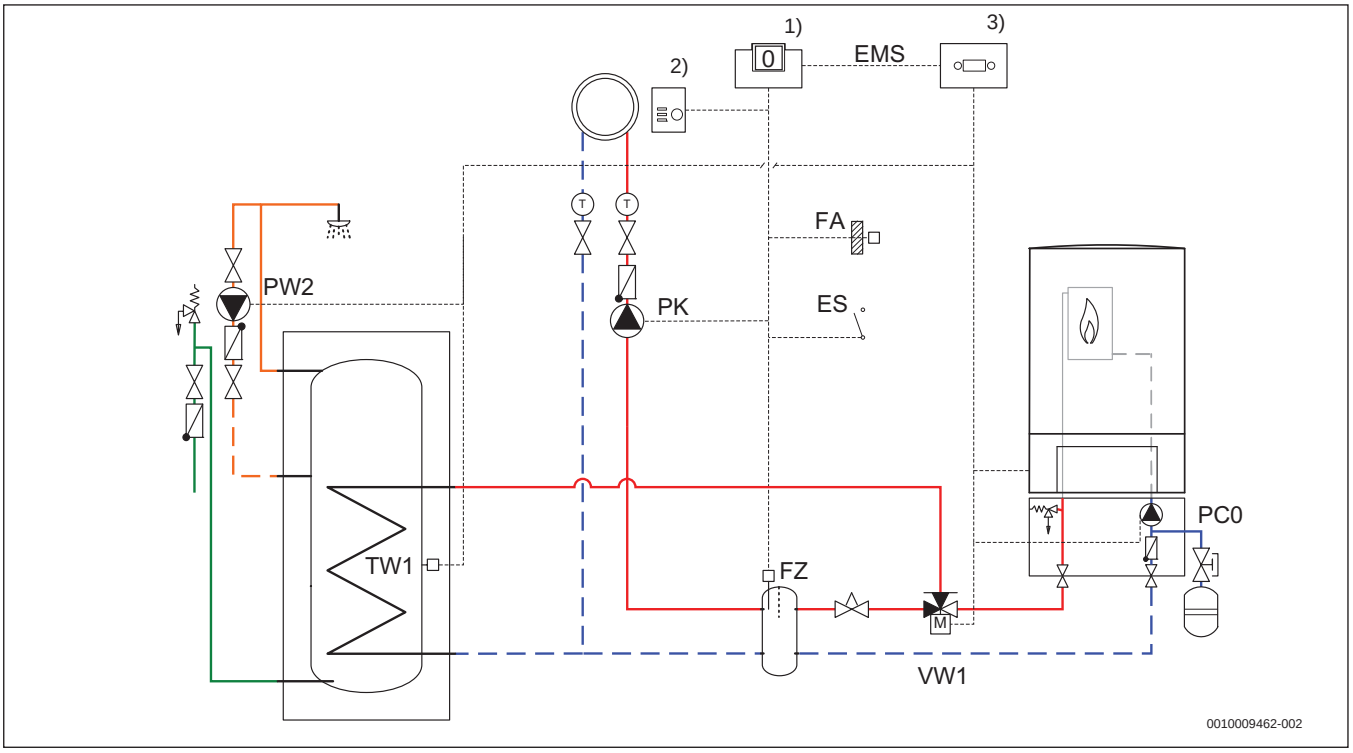


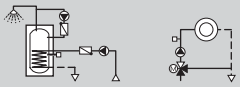
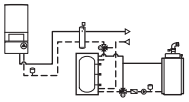
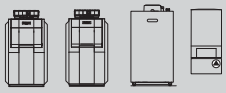
Fig. 21 System schematic Logamatic 5313; alternative: DHW heating via primary pump → Fig. 20, page 20 (Legend → Chapter 5.5, page 31)

1) Logamatic 5313 control unit
2) Remote control
3) Control unit in the wall-mounted indoor unit

A FM-MM or FM-MW module is required to implement a heating circuit with mixing valve.

5.2 Functional enhancements for Logamatic 5313 control unit

Additional function modules for Logamatic 5313

modules[1)]		
Function module FM-MM • 2 HK with mixing valve (mixer)		→ Chapter 7.2, page 45
Function module FM-MW • 1 HK with mixing valve (mixer) • 1 DHW heating (TWE), can only be used with DHW 1 controlled via Logamatic 5000 primary pump; cannot be used with DHW 1 via 3-way valve • If necessary, for a second DHW heating (TWE) (storage system)		→ Chapter 7.3, page 51
Function module FM-AM • Alternative heat source and/or buffer cylinder		→ Chapter 7.4, page 56
Function module FM-CM • Strategy module for 4 heat sources with Logamatic EMS (EMS heat source) and with Logamatic 5000 up to 16 boilers		→ Chapter 7.5, page 67
Function module FM-SI • Integration of up to 5 external safety devices, such as pressure limiter or neutralisation monitoring[2)]		→ Chapter 7.6, page 76

1) 4 available slots in the Logamatic 5313 control unit

2) FM-SI can only be used when the Logamatic 5000 control unit is installed on the boiler, and not when the boiler is connected via EMS-BUS

Table 4 Expansion of Logamatic 5313 control unit functions with additional modules

5.3 Logamatic 5313 control unit specifications

Logamatic 5313	Unit	
Operating voltage	V AC	230 ± 10 %
Frequency	Hz	50 ± 4 %
Power consumption	VA	5
SR heating/boiler circuit mixing valve Maximum switching current Activation Recommended servomotor running time	 A V s	 5 230; 3-point step controller (PI characteristic) 120 (adjustable 6 ... 600)
PK heating circuit/boiler circulation pump maximum switching current	A	5
PS cylinder primary pump: maximum switching current	A	5
PZ DHW circulation pump maximum switching current	A	5
FZ auxiliary temperature sensor[1], NTC sensor	mm	Ø 9
FB hot water temperature sensor[1], NTC sensor	mm	Ø 9
TW1 hot water temperature sensor at TWE via 3-way diverter valve, NTC sensor	mm	Ø 6 (only connection to BC 10/25/30 of a wall-mounted indoor unit)
FA outside temperature sensor[1]	–	NTC sensor
BFU remote control [1]	–	BUS communication
Input external fault display ES	–	Potential-free input[2]
Output for external central fault message AS1	–	Electrically isolated output[3]
Modulating boiler circulation pump PK Mod	–	0 ... 10 V signal
Output for actual burner output U_{BR}	–	0 ... 10 V signal
External heat demand WA	–	Potential-free input[2] or 0 ... 10 V signal
External interlock EV	–	Potential-free input[2]
Dimensions (H × W × D)	mm	274 × 652 × 253
Function modules	–	4 available slots
Boiler connection	–	EMS-BUS 1.0/2.0 or SAFe-BUS
Maximum boiler temperature	–	Boiler-specific; details: “Code of Practice K6 – Operating conditions of heat source” (→ Appendix to catalogue)

1) Max. cable length 100 m (screened upwards of 50 m)

2) Switch load 5 V DC / 10 mA

3) Optionally as N/O or N/C contact, maximum switching current 5 A

Table 5 Logamatic 5313 control unit specifications

5.4 Function description of Logamatic 5313 control unit

For detailed information on the general basic functions of the Logamatic 5000 control system → Chapter 5.1, page 16.

Die Funktionsbeschreibung bezieht sich nur auf die Grundausstattung. Das Regelgerät Logamatic 5313 bietet 4 freie Steckplätze für Funktionsmodule.
For possible additional functions of the Logamatic 5313 control unit, refer to the function description for the module that has been inserted(→ Tab. 4, page 21).

Control of the boiler with the Logamatic 5313 control unit is described below.

5.4.1 EMS wall-mounted indoor units with UBA3.x or higher

The Logamatic 5313 control unit and UBA3.x universal boiler control unit are used to control the wall-mounted indoor units in the Logamax plus product line. In this case, the Logamatic 5313 control unit is mounted on the wall. A 2-core connection to the BCT531 (user interface/ controller module) in the Logamatic 5313 control unit (terminal EMS) enables communication between the UBA3.x universal burner control unit and the Logamatic 5313 control unit using an internal BUS protocol. The UBA3.x is the central control device for boiler and combustion control. It controls and monitors the combustion process and adjusts the flow temperature to the set value as required by the connected components (e.g. Logamatic 5313). The UBA3.x also contains the burner control module (boiler identification module) that provides the universal burner control unit with the boiler-specific and combustion-related data. In addition, the UBA3.x controls the DHW heating in response to external activation and setpoint values, e.g. via the Logamatic 5313 control unit. The Logamatic BC 10/25/30 basic controller serves as the basic control panel on the EMS wall-mounted indoor unit.

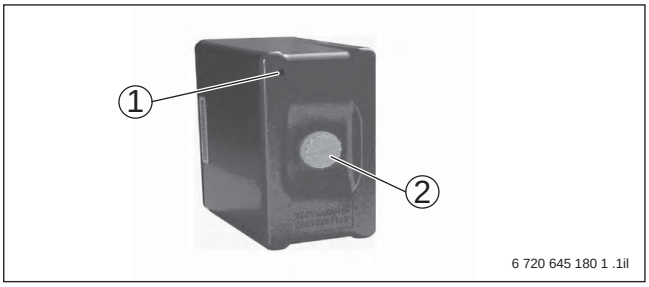


Fig. 22 Universal burner control unit UBA3.x

[1] Fault indicator lamp
[2] Fixing screw

5.4.2 Floor standing heat source with burner control unit SAFe

The Logamatic 5313 control unit and burner control unit SAFe integrated into the floor standing EMS boiler control the floor standing boilers in the Logano plus product line. In this case Logamatic 5313 is installed directly on the floor standing boiler. The burner control unit SAFe and Logamatic 5313 control unit communicate via a BUS connection (BUS SAFe terminal on the central module of the Logamatic 5313). Buderus uses an internal BUS protocol. The combustion automatic cutout SAFe is the core of the boiler and combustion control. It controls and monitors the combustion process and controls the operating conditions as required by the connected components. The SAFe obtains the boiler-specific combustion-related data from the from the BIM burner identification module attached to the boiler.

Alternatively, Logamatic 5313 can communicate with the MC10/40/100/110 boiler controller via the EMS interface. In this case, the Logamatic 5313 control unit is installed on the wall near the floor standing boiler.

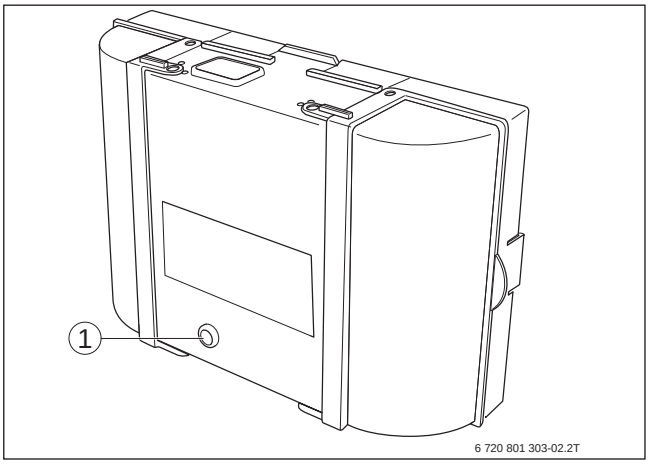


Fig. 23 Digital combustion automatic cutout SAFe

[1] Fault indicator lamp/Reset button

5.4.3 Switching of boiler on and off via the Logamatic 5313 control unit

When there is a change in the required setting, the control unit specifies the temperature and enables boiler output. The floor standing boiler is then controlled by the burner control unit so it reaches the set value as quickly as possible. After a certain time, the Logamatic 5313 control unit checks not only the control deviation between the set heating flow temperature and the actual temperature, but also the temperature gradient at the boiler-water temperature sensor in the floor standing boiler (e.g. if heating circuit is connected directly) or in the low-loss header. The floor standing boiler is switched off as soon as the actual boiler flow temperature exceeds the adjustable set value by a fixed switching differential. If, in the case of small variations to the set value, the heat requirement decreases, e.g. as a result of individual heating circuits or the DHW heating being switched off, the control checks the rate of cooling at the boiler water temperature sensor after a specified period. If the boiler output is still too great to reach the lower set value within the target time, the floor standing boiler modulates down to base-load output and is then switched off. Multi-stage floor standing boilers are switched off immediately by the switching differential.

5.4.4 Special function for external heat detection of the Logamatic 5313 control unit

Where conventional floor standing boilers are combined with solar systems or solid fuel boilers for central heating backup, the aim is to use the renewable energies as effectively as possible. For such situations, the Logamatic 5313 control unit has a special external heat detection function. To that end, FZ additional temperature sensor of the control unit is positioned either in the low-loss header or in a buffer cylinder, depending on the system configuration. A temperature differential between the set and actual heating flow temperatures is then defined via the touch screen. As soon as the actual boiler flow temperature exceeds the set value by the specified temperature differential, the Logamatic 5313 control unit switches off the floor standing boiler and the pump in the boiler or boiler circuit because another heat source is providing sufficient energy.

5.4.5 Control unit Logamatic 5313 as stand-alone heating circuit controller or as substation

As well as activating a heat source, the Logamatic 5313 control unit can also be used as a stand-alone heating circuit controller or as substation.

A control unit is referred to as a “stand-alone heating circuit controller” if it controls only consumers and not gas/oil boilers. Such control units are suitable for demand-based distribution of thermal energy from a buffer cylinder that is heated by manually or externally controlled heat sources.
As a basic rule, the address “0” is set as the control unit address for stand-alone heating circuit controllers.

A control unit is designated a “substation” if connected to a master controller in an CBC-BUS network of Logamatic 5000 system digital control units. The heat requirement from the heat consumers connected to the Logamatic 5313 control unit (which acts as substation) is sent via the CBC-BUS to the master control unit which controls one or several heat sources (via strategy module if applicable). The address of the master control unit is set to “0”. The substation is assigned an address between 1 and 15 and each control unit in the control unit network must have a separate address.

When used as substation, Logamatic 5313 is connected via CBC-BUS to a master control unit of the Logamatic 5000 system. As the outside temperature is also signalled via the CBC-BUS, it is not essential to connect an outside temperature sensor. However, it is possible where parts of the building face in different directions to connect a separate outside temperature sensor to the substation. The heat requirement from the heat consumers connected to the Logamatic 5313 control unit is signalled via the CBC-BUS to the heating centre and is subordinate to the operation demands of the heat source connected to the master control unit.

Both when used as stand-alone heating circuit controller and as a substation, the standard equipment includes individual time-based controllable DHW heating with a cylinder primary pump (cylinder system), thermal disinfection and activation of a DHW circulation pump. A heating circuit with mixer can also be activated providing a feed pump and/or monitoring of the heat supply is not required.

Up to 4 function modules can be installed and used for implementation of additional heating circuits or an additional DHW heating facility.

Logamatic 5313 as substation or stand-alone heating circuit controller with heating circuit with mixer (HK0) and DHW heating

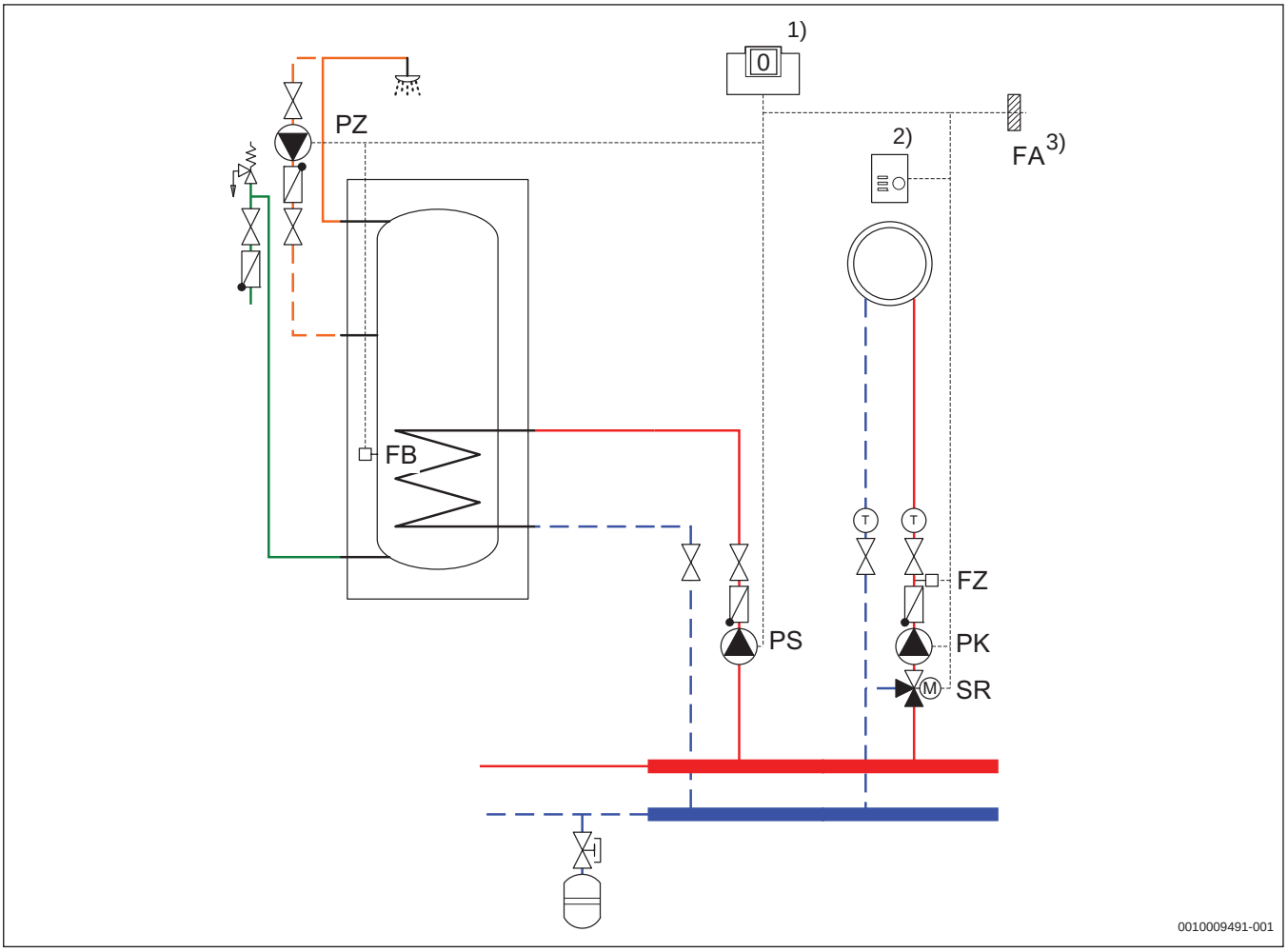


Fig. 24 System schematic Logamatic 5313: one heating circuit with mixer and DHW heating via primary pump (Legend → Chapter 5.5, page 31)

1) Logamatic 5313, address 0 in stand-alone mode, address 1 ... 15 during operation as substation; BUS connection with master control unit required when used as substation
2) Remote control
3) Outside temperature sensor with substation (optional)

Logamatic 5313 as substation or stand-alone heating circuit controller with feed pump and DHW heating

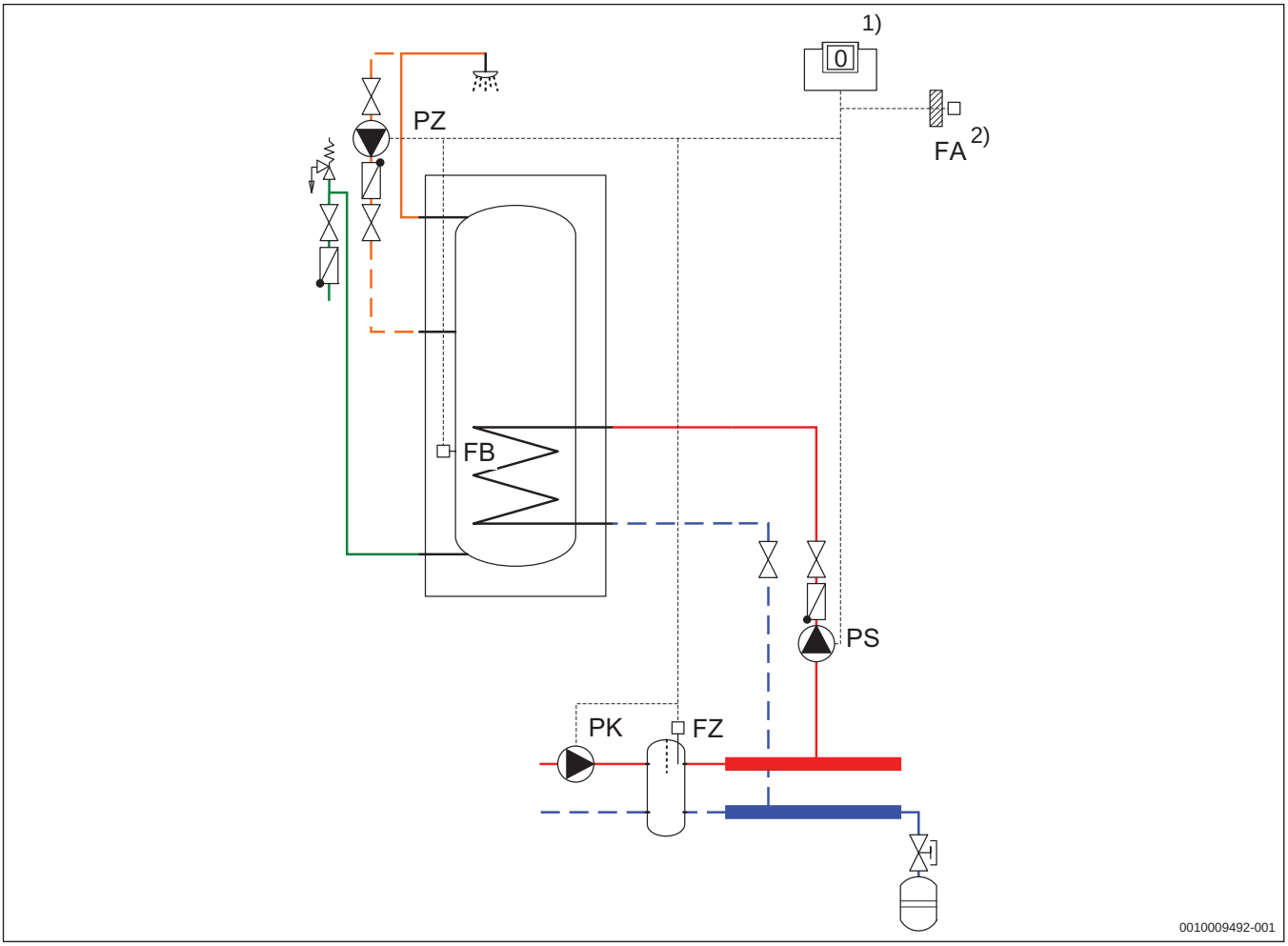


Fig. 25 System schematic Logamatic 5313: feed pump (preparation underway) and DHW via cylinder primary pump (Legend → Chapter 5.5, page 31)

1) Logamatic 5313, address 0 in stand-alone mode, address 1 ... 15 during operation as substation; BUS connection with master control unit required when used as substation

2) Outside temperature sensor with substation (optional)

Logamatic 5313 as substation or stand-alone heating circuit controller with mixing valve, feed pump, buffer cylinder and DHW heating

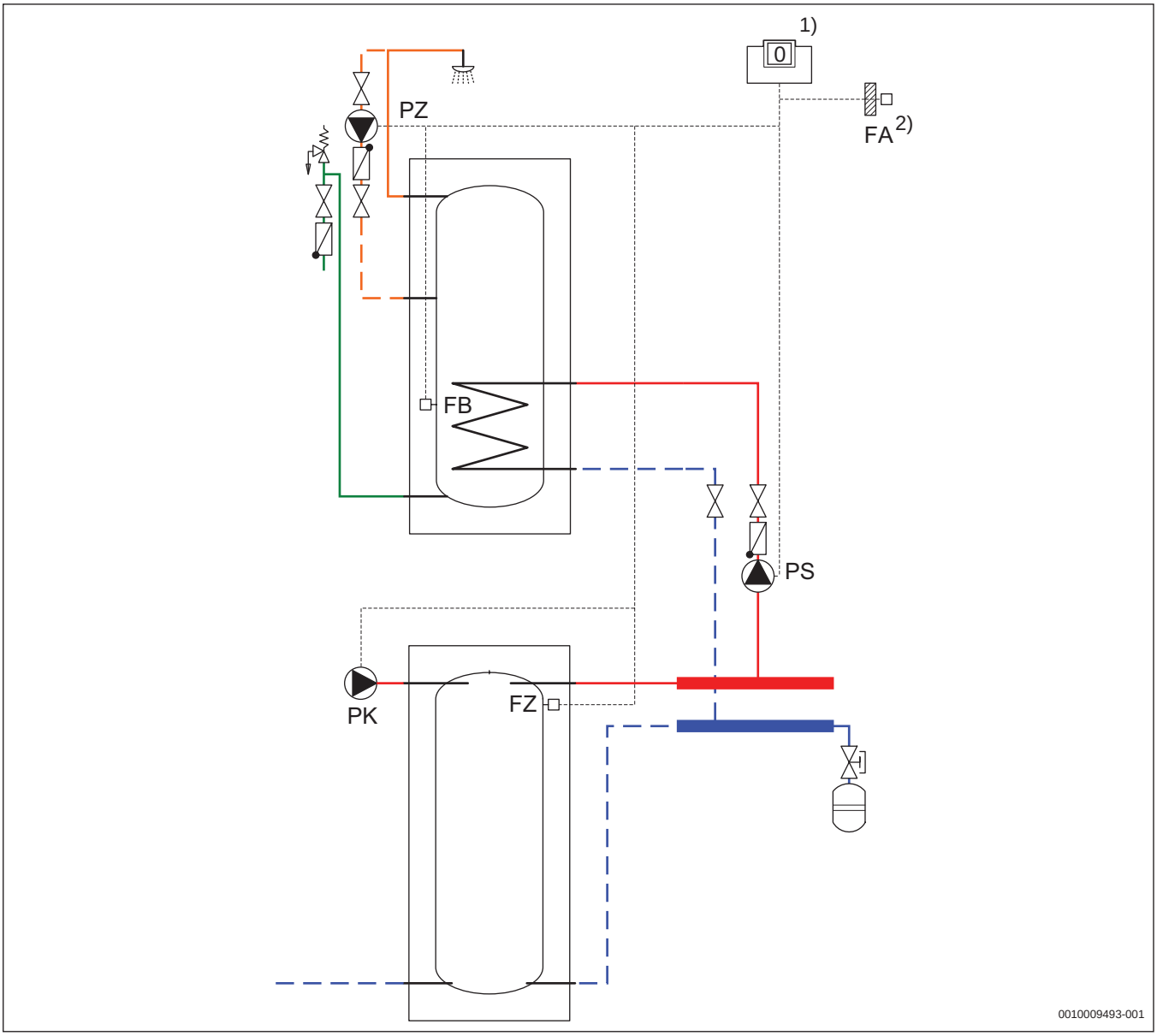


Fig. 26 System schematic Logamatic 5313: feed pump on buffer and DHW via cylinder primary pump (Legend → Chapter 5.5, page 31)

1) BUS connection with master control unit required when used as substation

2) Outside temperature sensor with substation (optional)

5.4.6 DHW heating with control unit Logamatic 5313

In combination with Buderus heat sources with Logamatic EMS or burner control unit SAFe, DHW heating can always be controlled with the standard equipment of the Logamatic 5313 control unit via the cylinder primary pump (or 3-way valve with a EMS wall-mounted indoor unit).

The Logamatic 5313 control unit offers a range of alternatives for implementing the DHW heating (as cylinder system) according to the type and number of boilers.

Separate timer programmes guarantee flexible adaptation to accommodate

- DHW heating
- DHW circulation pump
- Thermal disinfection
- Daily heat-up

More information on the functions can be found in the section describing the functions of the function module FM-MW (→ page 51).

Variant	Used with	Special conditions
DHW via EMS 3-way valve, connection of DHW function to a EMS wall-mounted indoor unit	Wall-mounted indoor unit (single boiler) with motorised diverter valve and wall-mounted combi boilers with integrated DHW heating, but not with cascade systems Adjustment DHW 1: EMS (control via EMS heat source)	• No more than 1 × DHW per system • DHW priority cannot be deactivated • No daily heat-up function • No heat requirement via switching contact • Whether or not the DHW circulation pump can be activated by a wall-mounted combination boiler depends on the type of wall mounted indoor unit.
DHW via Logamatic 5000	Single and multi-boiler systems Selection DHW 1 or 2: ZM (control via a central module Logamatic 5000)	Second DHW function possible via additional FM-MW function module

Table 6 Variants for DHW heating with control unit Logamatic 5313

When DHW is delivered by a primary pump, the primary pump must always be connected to the Logamatic 5000 control unit (connection of primary pump to EMS boiler is not supported).

Logamatic 5313: DHW heating via motorised diverter valve

- Setting for the DHW heating 1 integrated into the central module: EMS
- DHW heating for EMS wall-mounted indoor units with separate or integrated DHW cylinder using a motorised diverter valve
- DHW heating only with priority over heating mode
- Electrical connections (motorised diverter valve, DHW circulation pump, sensor) on EMS wall-mounted indoor unit

Logamatic EMS controls the DHW heating with priority over heating mode by activating the burner, the motorised diverter valve and with the internal heating pump of the EMS wall-mounted indoor unit.
Logamatic EMS controls and monitors the combustion process and adjusts the flow temperature with reference to the set value specified by the Logamatic 5313 control unit. All settings, e.g. set value, time program, daily heatup, thermal disinfection, once-only cylinder charging etc., are made via the touch screen of the Logamatic 5313 control unit.

Notes

- DHW heating via motorised diverter valve can only be implemented with the DHW heating 1 integrated into the central module.
- A second DHW function cannot be implemented with DHW 1 via motorised diverter valve.
- Whether or not the DHW circulation pump can be activated by a wall-mounted combination boiler depends on the type of wall mounted indoor unit.

Logamatic 5313: DHW heating via cylinder primary pump

- Setting for the DHW heating 1 integrated into the central module: ZM or no special setting for DHW heating 2 via the FM-MW function module
- DHW heating for EMS floor standing boiler and EMS wall-mounted indoor units via a PS cylinder primary pump
- DHW heating either with priority over or in parallel with heating mode
- Electrical connections (cylinder primary pump, DHW circulation pump, sensor) on Logamatic 5313
- Separate DHW cylinder

Logamatic 5313 controls the DHW heating, either with DHW priority or simultaneously with the central heating, by activating the boiler and the cylinder primary pump. The Logamatic 5313 control unit signals the set DHW temperature via the internal BUS link to the floor standing boiler, which then controls the boiler output accordingly. The boiler control monitors the combustion process and adjusts the boiler temperature to the set value as required by the Logamatic 5313 control unit. All settings, e.g. set value, time program, daily heat-up, thermal disinfection, once-only cylinder charging etc., are made via the touch screen of the Logamatic 5313 control unit.

5.4.7 Control of heating circuit using Logamatic 5313 control unit

As an option, the control unit Logamatic 5313 can control either a boiler circuit with mixing valve and boiler circulation pump or a heating circuit with mixing valve with weather compensation. The BFU remote control is used for indoor temperature control.

The control functions activate the pumps via a separate 2-point signal (230 V AC) and the heating circuit mixing valves via a separate 3-point signal (230 V AC). The appropriate heating curves for the various standard heating system configurations are stored in the control unit. Adaptation to the individual system layout is straightforward using the touch screen of the control unit.

Heating system options

- Radiator/underfloor
  - Automatic calculation of heating curve to suit heating system
- Base point
  - Pre-control of ventilation systems; heating curve is a linear progression between 2 points, flow temperature is dependent on outside temperature
- Constant
  - Pre-control of ventilation systems or swimming pool heating; heating always based on a constant set flow temperature regardless of outside temperature
- Room
  - The flow temperature set value is dependent only on the measured room temperature
- Feed circuit (preparation underway, detailed information → page 49)

Each heating circuit function can be adapted to the requirements of the system by means of additional functions

- Adjustment of reduced temperature in accordance with DIN EN 12831
- Various low-output options for setback mode or night-time operation
- Room temperature hook-up

The standard DIN EN 12831 is the European standard for calculating the heat energy demand for buildings. According to DIN EN 12831, rooms with intermittent heating operation must be taken into consideration when designing heat sources and heating surfaces. Using Logamatic 5000, the low-output phase can be switched off for every heating circuit when an adjustable adjusted outside temperature is undercut. That prevents excessive cooling of the living spaces. As a result, the allowance for a greater heat-up output can be dispensed with when dimensioning the boiler.

A holiday function with comprehensive setting options including a year calendar can be programmed for each heating circuit and also for the DHW heating. Up to 12 separate holiday time periods can be entered in each case. Therefore, the Logamatic 5000 control unit can be adjusted to different user requirements in the holiday period.

More information on the functions can be found in the section describing the functions of the function module FM-MM (→ page 45).

5.4.8 Logamatic 5313: “Screed drying” function for an underfloor heating circuit with mixing valve

The Logamatic 5000 control system provides an optional separate heating program for screed drying if an underfloor heating system is connected. The screed drying can only be implemented for an underfloor heating circuit with mixing valve.

Example (→ Fig. 27)

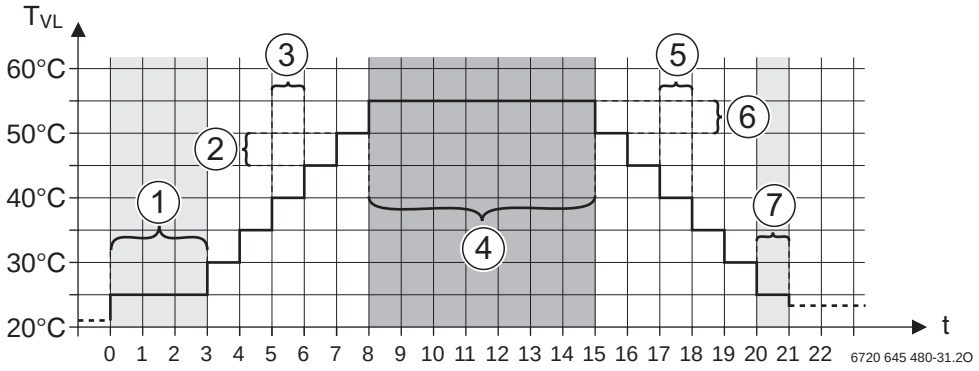


Fig. 27 Screed drying (details on programming this function → installation manual of control unit)

[1] Start temperature, hold start phase
[2] Increase by
[3] Increase
[4] Maximum temperature, hold maximum temperature
[5] Setback
[6] Setback by
[7] Minimum temperature, hold minimum temperature

t Time in days
T_{VL} Flow temperature

5.4.9 Feedback regarding current burner output

The current burner output can be forwarded via the terminal U_{BR} as 0 ... 10-V-signal, e.g. to a higher-level control unit. This information can for example be used to optimise the activation via a higher-level control.

5.4.10 Activation of the boiler circulation pump

The boiler circulation pump is activated via the boiler default setting “Hydraulics = Boiler” (boiler circuit), it can be activated continuously (on/off) or modulatorily. The speed is specified via terminal PK Mod as 0 ... 10-V-signal.

2 variants are possible in this case:

- Speed control of boiler circulation pump based on output. The control signal is subject to the currently required burner output.
- Speed control of boiler circulation pump based on temperature differential. The boiler circulation pump is activated so that the required temperature differential between the FK boiler water temperature sensor and the FZ low-loss header temperature sensor is established (0.5 K ... 20 K, default setting 2.5 K).

The demand-based pump speed counteracts the undesirable return temperature increase at the low-loss header during partial load operation and reduces the current consumption of the boiler circulation pump.

Notes

- The start/stop command for the boiler circulation pump is sent potential-free via a coupling relay (accessory) connected to the PK terminal
- The coupling relay is available as a so-called “E-plug” or can be mounted directly in the control unit on the FM-RM mounting rail module (accessory).
- The volumetric flow rate for full and partial load is adjusted at the pump.

5.4.11 External heat requirement

A heat requirement can also be sent to the Logamatic 5313 control unit externally via the WA terminal.

The following optional variants can also be implemented:

- On/off request without setpoint value. The required set value (flow temperature) must be set at the Logamatic 5313 beforehand.
- Demand via 0 ... 10 V signal as set flow temperature: here, the minimum and maximum set flow temperature and corresponding voltage in each case are set.
- Demand via 0 ... 10 V signal as output specification: the corresponding voltage for the minimum and maximum boiler output is set here.

5.4.12 Service displays

An automatic service display can be activated in the service menu. The service display can be based on hours run or date. The service display is indicated directly via the LED status bar (orange colour) and also in the Control Center Commercial or Control Center CommercialPLUS.

5.4.13 Special aspects to consider when activating a heat source via EMS-BUS (boiler type EMS)

The Logamatic 5313 control unit offers the following 2 options for connection with the boiler, depending on the boiler type:

- Installation of the Logamatic 5313 control unit directly on the floor standing boiler, burner connection via SAFe-BUS (Logano plus KB372, Logano plus GB402, Logano plus GB312 → Fig. 14, page 16)
  or
- Installation of the Logamatic 5313 control unit on the wall and connection to boiler via EMS-BUS (all other EMS gas/oil boilers → Fig. 13, page 16)

The following restrictions apply for the variant via EMS-BUS

- The FM-SI function module must not be used.
- Safety equipment must not be connected to the SI-terminal of the Logamatic 5313. All safety equipment must be connected to the boiler control (BC 10/25/30 or MC10/40/100/110). To make absolutely sure a safety component cannot be connected to the SI terminal of the Logamatic 5313, the SI plug or jumper between SI 17/18 must be removed.
- A flue gas damper must not be connected to the AG terminal of the Logamatic 5313.
- The external interlock terminal remains non-functional. The jumper on the external interlock terminal must be removed. If a heat source is to be disabled, the corresponding terminal on the heat source must be used.

5.5 Wiring diagram for Logamatic 5313 control unit

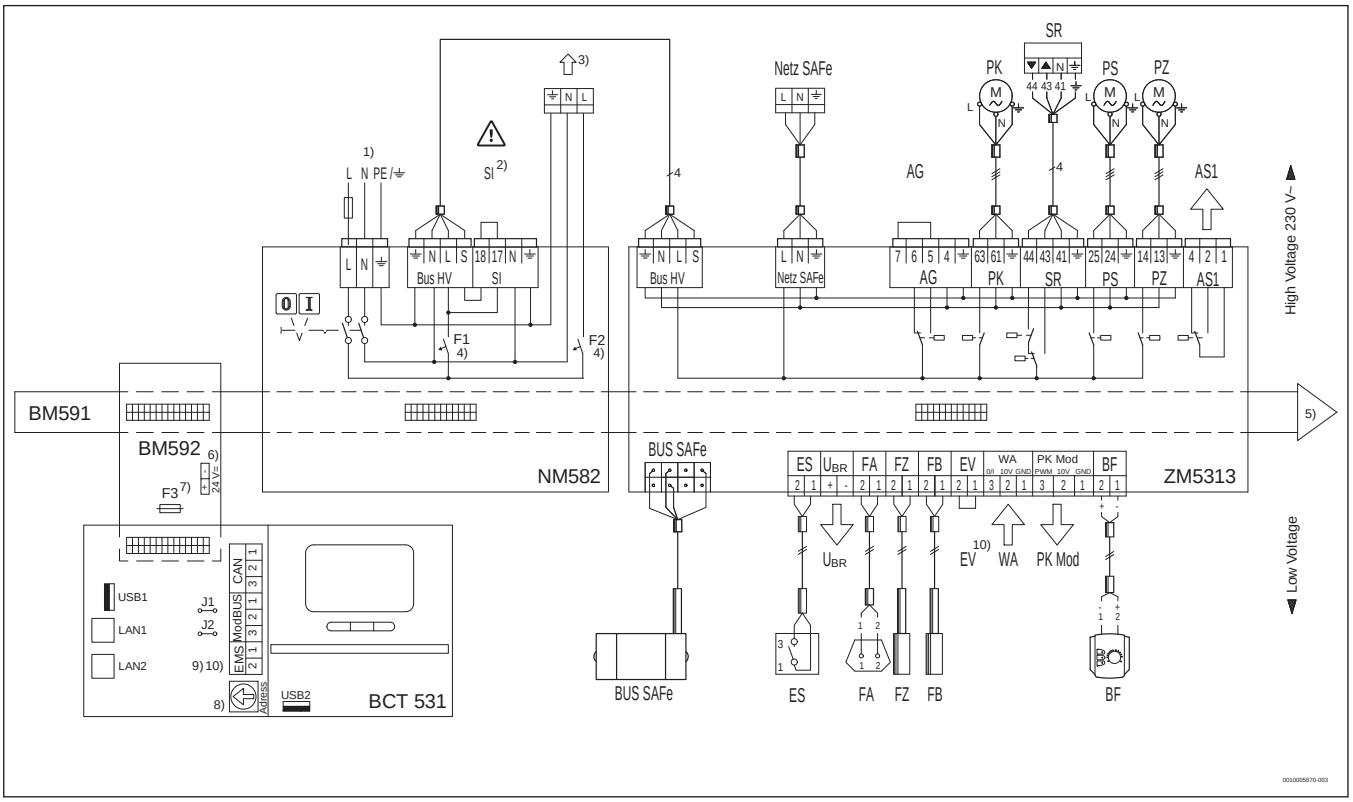


Fig. 28 Wiring diagram for Logamatic 5313 control unit

Handling terminals:

High-Voltage	Control voltage 230 V~ 1,5 mm²/AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0,4 ... 0,75 mm²/AWG 18

1) Mains 230 V ~ 50 Hz max. permitted fuse protection 20 AT on site, at least 2.5 mm²/AWG 10 (terminals max. 2.5 mm²/AWG 10)
2) **Please note:** If FM-SI safety module or safety devices are being connected, remove the jumper. Observe the connection information in the service instructions. Module FM-SI not permitted when connecting to boiler via EMS-BUS.
3) Mains supply for further modules
4) Circuit breaker 10 A
F1: central module fuse protection (ZMxxxx), power supply module (NMxxx) and HMI
F2: Fuse protection for other modules, slot 1...4
Total current per phase (F1, F2) must not exceed 10 A. It is mandatory that this value is observed. In order to avoid damage to the units, check the value when commissioning.
5) Internal BUS in the control unit
6) Power supply for FM-RM components (slot C), 24 V=, max. 250 mA
7) F3 Fuse 5x20, 250 mAT
8) Setting of control unit address (detailed information → Chapter 3.1.1, page 9)
9) **Please note:** if a boiler with SAFe burner control unit is being connected, the EMS connection has no function!
10) **Please note:** if a boiler is being connected via EMS-BUS, the external interlock jumper must be removed.
The external interlock connection has no function in conjunction with EMS boilers!
Only connect external devices which lead to blocking directly to the EMS boiler![1)]
▲ Mixing valve opens
▼ Mixing valve closes

Central unit:

Bus HV	Central module power supply
BUS SAFe	BUS cable SAFe, connection with burner control unit **Please note:** the BUS SAFe connection has no function in combination with EMS boilers.
CAN	ECOCAN-BUS (no function, provided for subsequent functions)
EMS	Connection for EMS boiler (connection of EMS heat source with dedicated basic control (control panel)) **Please note:** when a boiler is connected via EMS, the external interlock jumper must be removed. The external interlock connection has no function in combination with EMS boilers! Only connect external devices, which lead to blocking, directly to the EMS boiler!
F1	Circuit breaker (automatic cut-out) 10 A
F2	Circuit breaker (automatic cut-out) 10 A
F3	Fuse 5x20, 250 mAT

1) For more information, refer to → Chapter 5.4.13, page 30 (master control unit = address 0, more information on addressing → Chapter 3.1.1, page 9)

J1	Jumper for activating the ECOCAN BUS terminating resistance
J2	Jumper for activating the RS485 Modbus terminating resistance RS485
LAN1	Network connection 1, optionally as Internet connection or as connection to the GLT (building services management system) via Modbus TCP/IP or as connection to other control units via CBC bus; recommended: network cable Cat. 6
LAN2	Network connection 2 (as connection to other control units via CBC-BUS); recommended: network cable Cat. 6
ModBUS	Modular BUS connection RS485 for Buderus/Bosch CHP module (use interface LAN1 with Modbus TCP/IP setting for other purposes)
Netz SAFe	Power supply for SAFe burner control unit
SI	Safety equipment or module FM-SI, remove jumper during connection. **Please note:** SI terminal can only be used when connecting to the boiler via SAFe-BUS. SI terminal cannot be used when connecting via EMS-BUS, remove jumper.
USB1	USB connection at rear of HMI
USB2	USB connection at front of HMI

General legend:

AG	Flue gas damper, remove jumper when connecting. The expansion vessel connection must only be used when connecting the boiler via SAFe-BUS. It must not be used when connecting the boiler via EMS-BUS. Only connect safety equipment directly to the EMS boiler.
AS1	Only connect safety equipment directly to the EMS boiler. 1- Foot contact 2- N/O contact 4- N/C contact **Please note:** in combination with several control units the central fault message output of the master control unit (address 0) always operates BUS-wide, in sequential controllers (address 1 ... 15) only the individual control unit is considered.
BF	Remote control
ES	External error input (volt free)
EV	External interlock, remove jumper during connection **Please note:** if a boiler is being connected via EMS, the external interlock jumper must be removed. The external interlock connection has no function in combination with EMS boilers! Only connect external devices, which lead to blocking, directly to the EMS boiler!
FA	Outdoor temperature sensor
FB	DHW temperature sensor
FK	Boiler water temperature sensor
FZ	Additional temperature sensor: used as low-loss header temperature sensor or flow temperature sensor, heating circuit 0, depending on the configuration
PK	Boiler circulation pump, maximum 5 A (30 A for 10 ms), E-plug available as accessory
PK Mod	Output for modulating boiler circulation pump
PS	DHW cylinder primary pump, maximum 5 A
PZ	DHW circulation pump, maximum 5 A
SAFe	Burner control unit
SR	Mixing valve control
U_{BR}	Output for actual burner output
WA	Input for external heat requirement 1/3 = demand via external contact (e.g. thermostat) 1/2 = demand via 0 ... 10 V signal (temperature/output); contacts WA1/3 and WA1/2 can only be used alternately

6 Control unit Logamatic 5311 for floor standing boiler with third party burner

6.1 Description of Logamatic 5311 control unit

6.1.1 Control unit Logamatic 5311 for floor standing boiler with third party burner

Fig. 29 Control unit Logamatic 5311 for floor standing boiler with third party burner

[1] Boiler
[2] Connection Logamatic 5311 with burner via burner cable, 7-pin stage 1, 4-pin stage 2
[3] Logamatic 5311 control unit
[4] Function modules for implementation of control functions

Floor standing boiler with third party burner (e. g. Logano plus SB625 and Logano plus GE615):

- Burner control via standardised 7-pin burner interface
- Temperature sensor and safety equipment (boiler water temperature sensor, safety temperature limiter) are supplied with the control unit.
- Additional safety equipment (e. g. pressure limiter or a second safety temperature limiter) can also be connected to the control unit.
- Installation of control unit on the floor standing boiler

6.1.2 Possible applications

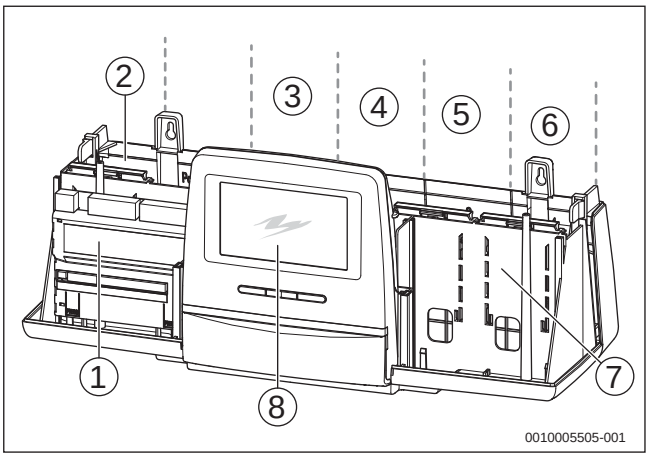


Fig. 30 Overview of slots

[1] Slot A (central module)
[2] Slot B (power supply module)
[3] Slot 1
[4] Slot 2
[5] Slot 3
[6] Slot 4
[7] Slot C
[8] Programming unit

The Logamatic 5311 digital control unit can control a floor standing oil/gas boiler with 1-stage, 2-stage or modulating burner. They also support operation of dual fuel burners. The burner is enabled via a 7-pin or 4-pin burner cable or alternatively via 0 ... 10 V.

As standard, the unit includes the functions DHW heating (cylinder system) and optional heating circuit control unit (one heating circuit with mixing valve) or boiler circuit control (boiler circulation pump and boiler mixing valve).

In order to adapt it optimally to the heating system, the control unit can be extended by up to 4 function modules. The FM-CM function module in the Logamatic 5311 control unit (a maximum of 4 FM-CM is possible) can be used to control multi-boiler systems (maximum of 16 floor standing boilers per function module). The EMS oil/gas heat source is connected directly to the function module. The boilers equipped with third party burners or burner control unit SAFe each require a Logamatic 5311 or Logamatic 5313 control unit. Using the FM-AM function module, an alternative heat source (e.g. CHP module or biomass boiler) can be integrated into the Logamatic 5000 control system.

If not enough module slots are available, the control can also be combined with one or several Logamatic 5310 expansion control units (preparation underway) in the CBC-BUS network.

6.1.3 Boiler safety functions

The following boiler types with optional boiler protection functions can be adjusted in the service menu of the control unit to safeguard the operating conditions:

- Floor standing boiler (required boiler operating conditions ensured by pump logic)
- Ecostream floor standing boiler (required boiler operating conditions ensured by boiler circuit mixing valve or superimposition of heating circuit mixing valves)
- Floor standing boiler with raised minimum boiler temperature/low end temperature (required boiler operating conditions are ensured in the same way as Ecostream floor standing boilers)
- Floor standing boiler with minimum return temperature (required boiler operating conditions ensured in the same way as Ecostream floor standing boilers)
- Floor standing condensing boiler

The correct settings in combination with the appropriate plumbing configuration guarantee that the required boiler operating conditions are ensured.

6.1.4 Burner control

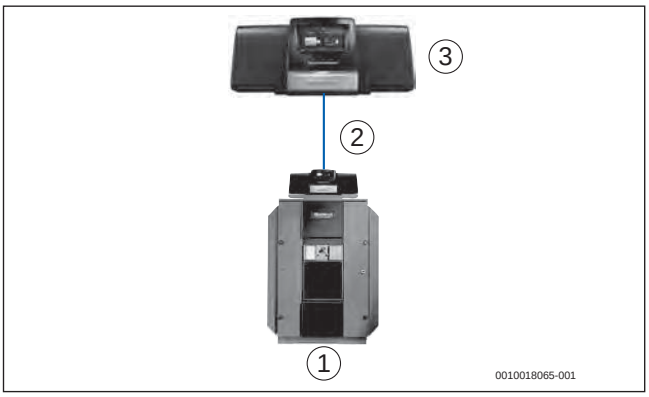


Fig. 31 Activation of oil/gas boilers with third party burner

[1] Oil/gas boiler with third party burner
[2] 7-pin plug
[3] Logamatic 5311

The central module in the control unit controls 1-stage, 2-stage or modulating burners subject to output. With dual fuel burners, it can switch between oil and gas.

Detailed information on burner control → page 38.

6.1.5 Heating circuit control and DHW heating with Logamatic 5311 control unit

- Weather-compensated control of one heating circuit with mixing valve (mixer) and pump
  Alternative: Activation of a boiler circuit with boiler mixing valve and boiler circulation pump
- Option of connecting a separate remote control for room temperature hook-up of each heating circuit
- Adjustable, automatic switching between summer/winter modes separately for each heating circuit (“heating limit”)
- Individual time-based adjustable DHW heating via cylinder primary pump (cylinder system), daily monitoring, thermal disinfection and activation of a DHW circulation pump
- DHW priority or simultaneous with the heating circuits with DHW via cylinder primary pump can be set for each heating circuit separately

6.1.6 Multi-boiler systems

Fitting the FM-CM cascade module to the Logamatic 5311 control unit (maximum of 4 × FM-CM per system) enables up to 16 floor standing boilers to be controlled according to a strategy. The EMS oil/gas heat source is connected directly to the function module. The boilers equipped with third party burners or burner control unit SAFe each require a Logamatic 5311 or Logamatic 5313 control unit. Detailed information on cascade module FM-CM → Chapter 7.5, page 67.

6.1.7 Special functions for single and multi-boiler systems

- Separate boiler curve can be adjusted with third party control of the consumers
- Control of a boiler circuit pump for systems with depressurised distributor or low-loss header
- Modulating activation of a boiler circulation pump via a 0 ... 10 V-signal (detailed information → page 42)
- Application of a potential-free signal for an external fault display or for switching between gas and oil operation in the case of dual fuel burners
- On/off or 0 ... 10 V input for external set value hookup as set temperature value or output specification (heat requirement) with third party heating circuit control units

6.1.8 Electronic safety temperature limiter

The Logamatic 5311 control unit is equipped with an electronic boiler water temperature sensor (FK) with dual-sensor design and integrated safety temperature limiter function. This makes a low temperature difference and therefore very high flow temperatures close to the safety temperature limiter shutdown limit possible (compared to the previous mechanical design of the safety temperature limiter and TR with capillary sensors).

The safety temperature limiter can be set to 99 °C or 110 °C via a jumper on the ZM5311 central module. The default setting is 99 °C.

6.1.9 Scope of delivery

- Logamatic 5311 digital control unit/BCT531 controller module with integrated 7" touch screen and ZM5311 central module
- FA outside temperature sensor
- FK boiler water temperature sensor with safety temperature limiter function
- FZ additional temperature sensor, e.g. for low loss header or as return temperature sensor or as heating circuit flow temperature sensor
- Burner cable for stage 2 (cable for first stage included in the boiler scope of delivery)

6.1.10 Logamatic 5311 with standard equipment: activation of a floor standing boiler with third party burner (e.g. SB625 or SB745), heating circuit control unit (1 heating circuit with mixing valve (HK0)) and DHW heating via cylinder primary pump

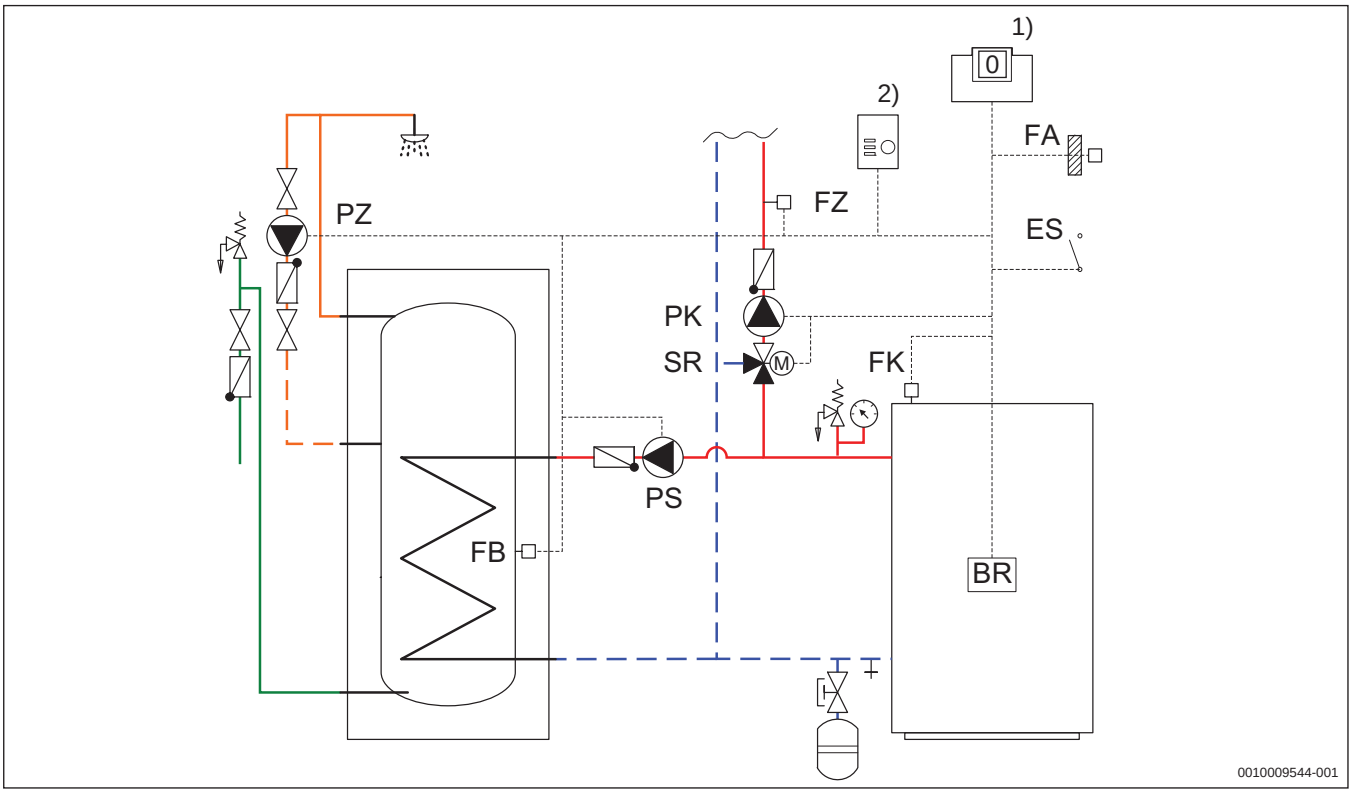
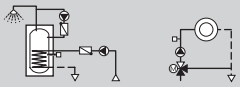
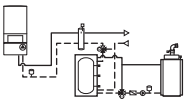
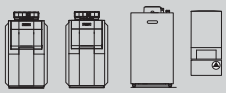


Fig. 32 System schematic Logamatic 5311 (Legend → Chapter 6.5, page 43)

1) Control unit
2) Remote control

6.2 Functional enhancements for Logamatic 5311 control unit

Additional function modules for Logamatic 5311

modules[1)]		
Function module FM-MM • 2 HK with mixing valve (mixer)		→ Chapter 7.2, page 45
Function module FM-MW • 1 HK with mixing valve (mixer) • 1 DHW heating (TWE) • If necessary, for a second DHW heating (TWE) (storage system)		→ Chapter 7.3, page 51
Function module FM-AM • Alternative heat source and/or buffer cylinder		→ Chapter 7.4, page 56
Function module FM-CM • Strategy module for 4 heat sources with Logamatic EMS (EMS boiler) and with Logamatic 5000 up to 16 boilers		→ Chapter 7.5, page 67
Function module FM-SI • Integration of up to 5 external safety devices, such as pressure limiter or neutralisation monitoring		→ Chapter 7.6, page 76

1) 4 available slots in the Logamatic 5311 control unit

Table 7 Expansion of Logamatic 5311 control unit functions with additional modules

6.3 Logamatic 5311 control unit specifications

Logamatic 5311	Unit	
Operating voltage	V AC	230 ± 10 %
Frequency	Hz	50 ± 4 %
Power consumption	VA	5
SR heating/boiler circuit mixing valve		
Maximum switching current	A	5
Activation	V	230; 3-point step controller (PI characteristic)
Recommended servomotor running time	s	120 (adjustable 6 ... 600)
PK heating circuit/boiler circulation pump maximum switching current	A	5
PS cylinder primary pump: maximum switching current	A	5
FK boiler water temperature sensor with safety temperature limiter function, NTC sensor	mm	Ø 9
FZ auxiliary temperature sensor[1], NTC sensor	mm	Ø 9
FB hot water temperature sensor[1], NTC sensor	mm	Ø 9
FA outside temperature sensor[1]	–	NTC sensor
BFU remote control[1]	–	BUS communication
1 and 2-stage burner control	V/A	230/8; 2-point
Burner control modulating	V/A	230 /8; 3-point
Input for ES external fault display or changeover for dual fuel burners	–	Potential-free input[2]
Output for external central fault message AS1	–	Electrically isolated output[3]
Modulating boiler circulation pump PK Mod	–	0 ... 10-V signal
Burner modulation BR Mod	–	4 ... 20 mA or 0 ... 10 V signal
External heat demand WA	–	Potential-free input2[2] or 0 ... 10 V signal
External interlock EV	–	Potential-free input[2]
Dimensions H × B × T	mm	274 × 652 × 253
Function modules	–	4 available slots
Burner connection	–	7-pin (stage 1), 4-pin (stage 2)

1) Max. cable length 100 m (screened upwards of 50 m)

2) Switch load 5 V DC / 10 mA

3) Optionally as N/O or N/C contact, maximum switching current 5 A

Table 8 Logamatic 5311 control unit specifications

Adjustable parameter (maximum temperature)	Logamatic 5311	
High limit safety cut-out (STB)[1]	99 °C	110 °C
	–	
Temperature controller (TR)[1][2]	–	–
	↓↑ ≥ 5 K ↓↑	
Maximum boiler temperature	94 °C	105 °C
	↓↑ ≥ 3 K ↓↑	
Maximum temperature demand[3] of heating circuit[4] and DHW[5]	91 °C	102 °C

1) Set safety temperature limiter and TR as high as possible.

2) A mechanical temperature controller is not installed with the Logamatic 5000. An electronic dual sensor is used in this case.

3) All 3 temperature demands must always be at least 3 K under the maximum boiler temperature. In the burner cycle mode, the maximum temperature of 91 or 102 °C cannot be permanently ensured in combination with Logamatic 5000. The maximum temperature can only be permanently ensured with modulating burner operation and sufficient heat consumption.

4) The temperature demand of heating circuits equipped with a mixing valve is composed of the set flow temperature and the “Boiler rise” parameter in the heating circuit data menu.

5) The temperature demand of DHW heating is composed of the set DHW temperature and “return temperature increase” parameter in the DHW menu.

Table 9 Adjustable parameters and maximum temperatures of Logamatic 5311 control unit

6.4 Function description for Logamatic 5311 control unit

For detailed information on the general basic functions of the Logamatic 5000 control system → Chapter 6.1, page 33.

The function description relates only to the basic version. The Logamatic 5311 control unit has 4 additional slots for function modules. For possible additional functions of the Logamatic 5311 control unit, refer to the function description for the module that has been inserted (→ Tab. 6.2, page 35).

Control of the boiler with the Logamatic 5311 control unit is described below.

6.4.1 Required boiler operating conditions

Every time the floor standing boiler is started up, the hot products of combustion come into contact with the cooler boiler surfaces. The boiler shell may have cooled down to ambient temperature if the floor standing boiler has not been in operation for an extended period, e.g. at the end of the setback mode. As the products of combustion contain water vapour, condensation may form on the boiler surfaces if the temperatures are below a certain level. The temperature at which that occurs is called the dew point and is different for every fuel. The control unit configuration may require entry of the type of fuel so that the required operating conditions can be adjusted to suit the fuel. With condensing boilers, condensation of the water vapour in the flue gas is intentionally brought about in order to make use of the heat released by condensation. With floor standing and Ecostream boilers, by contrast, condensate formation has to be avoided in order to protect the floor standing boilers against corrosion. The temperature range up to the dew point is passed through most quickly if the floor standing boiler can heat up first before the full system volume flows through it.

The Logamatic 5000 control system offers optimum adaptation and adjustment options for maintaining the required boiler-specific operating conditions. Every digital boiler control unit has defined functions specifically adapted to the Buderus floor standing boiler models. In that way, the boiler safety functions can be implemented by the correct software settings for the boiler type in the service menu in conjunction with the appropriate plumbing configuration.

6.4.2 Boiler safety functions

- **Floor standing boiler**
  If a minimum boiler temperature is not reached, the boiler circulation pump, heating circuit pumps and cylinder primary pump are shut down and restarted with a switching differential when the boiler temperature rises. This boiler-safety related function is referred to as the “pump logic”. The switching threshold depends on the burner type and is preset at the factory.
- **Ecostream floor standing boiler**
  For this boiler type, a factory-set “operating flow temperature” for the Ecostream floor standing boiler is ensured. If the temperature falls below that level (measured at the boiler water temperature sensor FK), the flow rate is automatically reduced by means of mixing valves. That control function is assisted by switching off the boiler circulation pump, the heating circuit pumps and the cylinder charging pumps if the boiler flow temperature falls below a certain level. At the same time, the floor standing boiler is run with a minimum set value for the boiler flow temperature when there is a heat is requested by heat consumers. This function is only takes effect with “Burner ON operation”.
  The following boiler safety functions for controlling the operating flow temperature are possible:
  – **Overriding control of the heating circuit mixing valves for 1-boiler systems:**
    the heating circuit mixing valves are closed if the operating flow temperature is not reached, independent of the heat requirement of the heating circuits. For this setting, all heating circuits must be fitted with a mixing valve and controlled by the Logamatic control unit.
  – **Control of a separate boiler circuit mixing valve**
    If the operating flow temperature of the floor standing boiler is not reached, the boiler circuit mixing valve (3-way mixer) is closed (possible configurations → Fig. 85, page 91). This setting is advisable when supplying heat to externally controlled heating circuits or for heating circuits without mixing valve.
  – **Relevant function of a third party control unit**
    Condition: during “burner ON mode”, an operating flow temperature of 50 °C must be reached within 10 minutes and maintained as the minimum temperature, e.g. by limiting the flow rate.
- **Floor standing boiler with low end temperature**
  The principle of operation is the same as the boiler type “Ecostream floor standing boiler”. However, the operating flow temperature is higher and the factory-set minimum required boiler flow temperature is always active whenever there is a demand for heat (heating mode). The same options for controlling the operating flow temperature are available as with Ecostream floor standing boilers.

- **Floor standing boiler with minimum return temperature**
  For this boiler type, a factory-set minimum return temperature for the floor standing boiler is ensured. If this minimum return temperature (captured at the return temperature sensor FR or at the strategy return temperature sensor FRS in multi-boiler systems), the flow rate is automatically reduced via mixing valves. That control function is assisted by switching off the boiler circuit pump, the heating circuit pumps and the cylinder charging pumps if sudden high demand levels occur.
  The following options are available for controlling the minimum return temperature:
  – **Overriding control of the heating circuit mixing valves:**
    the heating circuit mixing valves are closed if the minimum return temperature is not reached, independent of the heat requirement of the heating circuits. For this setting, all heating circuits must be fitted with a mixing valve and controlled by the control unit.
  – **Control of a separate boiler circuit mixing valve:**
    if the minimum return temperature of the floor standing boiler (sensor FR) is not reached, the boiler circuit mixing valve (3-way mixer) is closed (possible configurations → Fig. 86, page 92). This setting is advisable when supplying heat to externally controlled heating circuits or for heating circuits without mixing valve.
- **Floor standing condensing boiler**
  If this boiler type is selected, there are no required boiler operating conditions to be maintained. No boiler safety functions are required.

6.4.3 Burner control

The Logamatic 5311 digital control unit can control 1-stage, 2 × 1-stage, 2-stage or modulating burners and dual fuel burners. The burner is controlled dynamically within fixed switching thresholds (switching differentials) depending on the difference between the set heating flow temperature and the actual boiler flow temperature (control deviation).

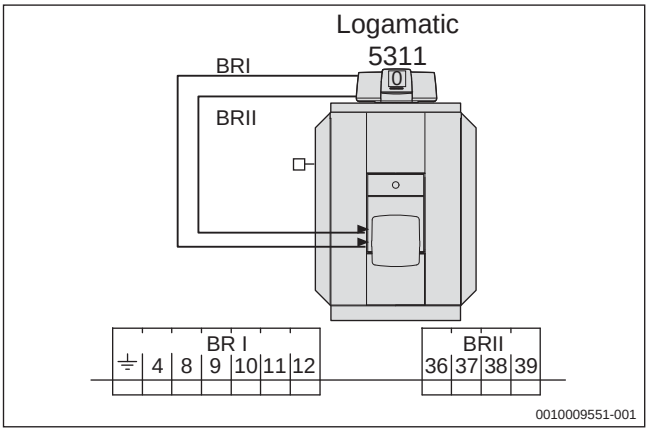


Fig. 33 Burner control via burner terminals BRI (7-pin) and BRII (4-pin)

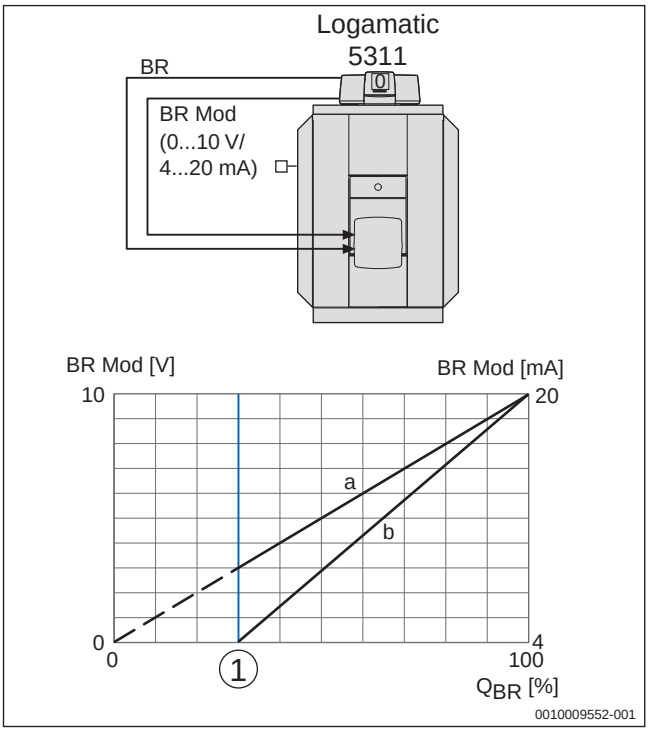


Fig. 34 Burner control for modulating burner via burner terminal BRI (7-pin) and burner terminal BR Mod (0 ... 10 V/4 ... 20 mA, 2-pin)

[1] Minimum output
a Modulation 0 V/4 mA = 0 %
b Modulation 0 V/4 mA = low-load output
Q_{BR} Burner output

As a rule, modulating-control burners are controlled via burner terminal BRI for switching base-load output and burner terminal BR II for activating the modulation (→ Fig. 33). As an alternative option, modulation of a modulating-burner can also be directed by way of a 4 ... 20 mA or 0 ... 10 V signal (→ Fig. 34).

If the minimum and maximum boiler output levels are specified, the Logamatic 5311 control unit can control burners on the basis of heat output. The modulating burner is operated by means of a PID control unit which uses the difference between the set boiler flow temperature and actual boiler flow temperature to calculate an output to be produced by the burner. This is the case regardless of the output used (3-point output, 4 ... 20 mA output or 0 ... 10 V output). If the modulating burner is controlled via the 3-point output, the control unit calculates the burner output by integrating (totalling) all signals issued via the 3-point output to determine the position of the burner actuator. If the 4 ... 20 mA or 0 ... 10 V output is used, the control unit assumes that the burner executes the commands as required.

If a burner output control using a 4 ... 20 mA or 0 ... 10 V signal is intended by Logamatic 5311, the burner control unit must be capable of this method of control. Depending on manufacturer and product, burner control units may offer the function as standard or as an option requiring additional accessories. Using adjustable parameters in the Logamatic 5311 control unit the 4 ... 20 mA or 0 ... 10 V signal can be adapted to the relevant burner control unit.

Control of multi-stage burners is effected by way of burner terminals BR I and BR II for stages I and II respectively. The control unit calculates the required boiler output from a comparison between the highest set temperature value of the consumer, e.g. the heating circuits or DHW heating (set boiler flow temperature), and the actual heating flow temperature. The control unit sets the load point in the burner previously calculated to meet the system requirement.

6.4.4 Dynamic switching differential

The dynamic switching differential is a burner control function which takes account of the actual heat energy demand from the heating system. It dynamically combines 2 different requirements for the switching characteristics of the burner.

Firstly, there is a fixed setting for the burner switching threshold. For a 1-stage burner and the first stage of a 2-stage or modulating burner, this is a maximum difference of ± 7 K between the set heating flow temperature and actual heating flow temperature. For the second stage of a 2-stage burner, the control deviation is an additional ± 8 K. The Logamatic 5311 control unit switches the burner or the burner stage on/off if the prescribed fixed switching threshold in each case is exceeded (→Fig. 35).

Secondly, the control unit constantly checks the difference between the set heating flow temperature and actual heating flow temperature. From that information, the control unit calculates the total control deviation over a specific time interval (integral). If the figure calculated exceeds a set specified limit, the burner is switched on/off even if the fixed threshold has not yet been reached (→ Fig. 36).

On the basis of those two different burner control requirements, which positively influence the starting characteristics of the burner, it is possible to achieve optimum adaptation to the current output demand (effective switching differential) (→ Fig. 37).

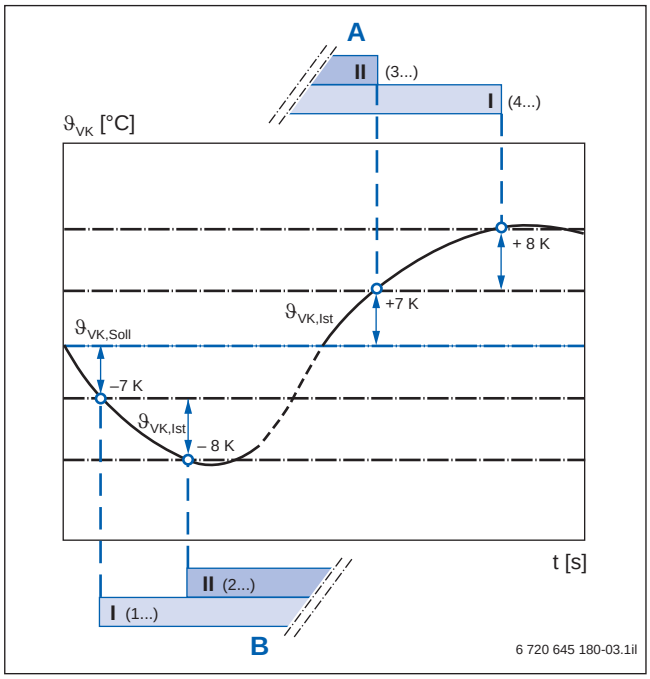


Fig. 35 Fixed switching thresholds for burner stages with reference to control deviation

ϑ_{VK}	Boiler water flow temperature
$\vartheta_{VK,Ist}$	Actual value at the flow temperature sensor
$\vartheta_{VK,Soll}$	Set value for the flow temperature sensor
t	Time
A	Fixed cut-out hysteresis settings
B	Fixed cut-in hysteresis settings
I	Burner stage I
II	Burner stage II
1	ON stage I
2	Everything ON
3	OFF stage II
4	Everything OFF

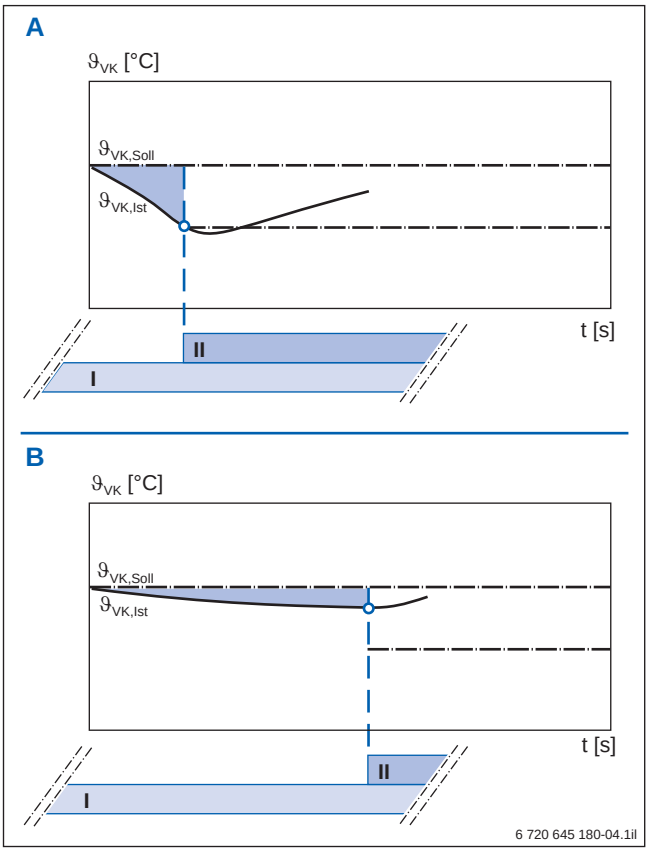


Fig. 36 Principle of dynamic switching differential with different control deviations

ϑ_{VK} Boiler water flow temperature
$\vartheta_{VK,Ist}$ Actual value at the flow temperature sensor
$\vartheta_{VK,Soll}$ Set value for the flow temperature sensor
t Time

A Large control deviation
B Small control deviation
I Burner stage I
II Burner stage II

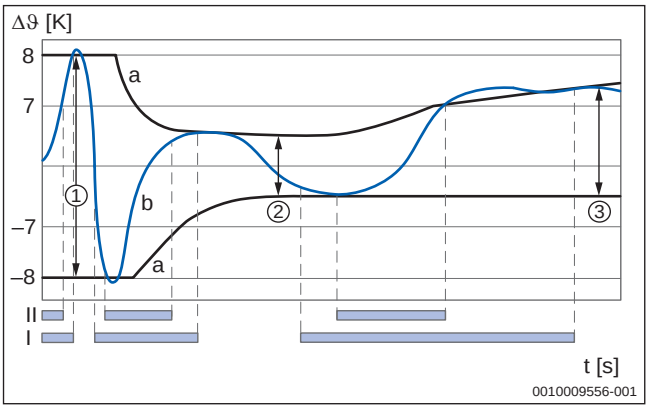


Fig. 37 Progression of effective (optimised) switching differential

[1] Scenario 1: switching of stages 1 and 2 using fixed switching differential
[2] Scenario 2: switching of stages 1 and 2 using dynamic switching differential
[3] Scenario 3: switching via fixed switching differential (stage 2) and dynamic switching differential (stage 1)

a Effective switching differential
b Flow temperature setpoint
I Burner stage 1
II Burner stage 2
t Time
Δϑ Temperature differential

6.4.5 DHW heating with control unit Logamatic 5311

DHW heating can be controlled via a cylinder primary pump with the standard equipment of the Logamatic 5311 control unit. A second DHW heating facility is possible through addition of a FM-MW function module.

Separate timer programmes guarantee flexible adaptation to accommodate

- DHW heating either with priority over or in parallel with heating mode
- DHW circulation pump
- Thermal disinfection
- Daily heat-up

6.4.6 Control of heating circuit using Logamatic 5311 control unit

The Logamatic 5311 control unit can control either a boiler circuit with mixing valve and boiler circulation pump or a heating circuit with mixing valve with weather compensation.
The BFU remote control is used for indoor temperature control.

The control functions activate the pumps via a separate 2-point signal (230 V AC) and the heating circuit mixing valves via a separate 3-point signal (230 V AC). The appropriate heating curves for the various standard heating system configurations are stored in the control unit. Adaptation to the individual system layout is straightforward using the touch screen of the control unit.

Heating system options

- Radiator/underfloor
  - Automatic calculation of heating curve to suit heating system
- Base point
  - Pre-control of ventilation systems; heating curve is a linear progression between 2 points, flow temperature is dependent on outside temperature
- Constant
  - Pre-control of ventilation systems or swimming pool heating; heating always based on a constant set flow temperature regardless of outside temperature
- Room
  - The flow temperature set value is dependent only on the measured room temperature
- Feed circuit (detailed information → page 49)

Each heating circuit function can be adapted to the requirements of the system by means of additional functions

- Adjustment of reduced temperature in accordance with DIN EN 12831
- Various low-output options for setback mode or night-time operation
- Room temperature hook-up

The standard DIN EN 12831 is the European standard for calculating the heat energy demand for buildings. According to DIN EN 12831, rooms with intermittent heating operation must be taken into consideration when designing heat sources and heating surfaces. Using Logamatic 5000, the low-output phase can be switched off for every heating circuit when an adjustable adjusted outside temperature is undercut. That prevents excessive cooling of the living spaces. As a result, the allowance for a greater heat-up output can be dispensed with when dimensioning the boiler.

A holiday function with comprehensive setting options including a year calendar can be programmed for each heating circuit and also for the DHW heating. Up to 12 separate holiday time periods can be entered in each case. Therefore, the Logamatic 5000 control unit can be adjusted to different user requirements in the holiday period.

More information on the functions can be found in the section describing the functions of the function module FM-MM (→ Chapter 7.2, page 45).

6.4.7 Logamatic 5311: "Screed drying" function for an underfloor heating circuit with mixing valve

The Logamatic 5000 control system provides an optional separate heating program for screed drying if an underfloor heating system is connected. The screed drying can only be implemented for an underfloor heating circuit with mixing valve.

Example (→ Fig. 38)

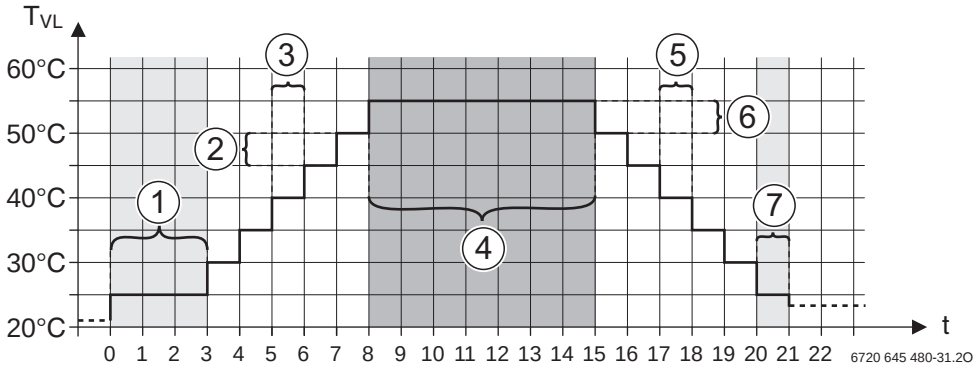


Fig. 38 Screed drying (details on programming this function → installation manual of control unit)

[1] Start temperature, hold start phase
[2] Increase by
[3] Increase
[4] Maximum temperature, hold maximum temperature
[5] Setback
[6] Setback by
[7] Minimum temperature, hold minimum temperature

t Time in days
T_{VL} Flow temperature

6.4.8 Pump function

Boiler circulation pump

The boiler circulation pump starts and runs simultaneously with burner operation. In addition to a straight switching command, the boiler circulation pump can be controlled in a modulating fashion. The speed is specified via terminal PK Mod as 0 ... 10 V signal.

2 variants are possible in this case:

- Speed control of boiler circulation pump based on output (only possible in combination with a modulating burner). The control signal is subject to the currently required burner output.
- Speed control of boiler circulation pump based on temperature differential. The boiler circulation pump is activated so that the required temperature differential between the FK boiler water temperature sensor and the FZ low-loss header temperature sensor is established (0.5 K ... 20 K, default setting 2.5 K).
- **Notice:** during pump activation the boiler operating conditions take priority.

The demand-based pump speed counteracts the undesirable return temperature increase at the low-loss header during partial load operation and reduces the current consumption of the boiler circulation pump.

Notes:

- The start/stop command for the boiler circulation pump which is controlled in a modular fashion is sent potential-free via a coupling relay (accessory) connected to the PK terminal. The coupling relay can be mounted directly in the control unit on the FM-RM mounting rail module (accessory).
- The flow rate for full and partial load is adjusted at the pump.

Depending on the set boiler type, the boiler circulation pump may be briefly switched off by the control system during the operating phase. That is done for boiler safety purposes, e.g. if temperatures fall below certain set levels. The control logic and behaviour of the boiler circulation pump are thus dependent on the boiler type setting. The boiler circulation pump is always switched on whenever the burner is operating or, in the case of multi-boiler systems, whenever the FM-CM function module switches the boiler on. In addition, the boiler circulation pump is switched off if the boiler safety cut-out is active. This does not apply in the case of floor standing boilers with return temperature raising as the required boiler operating conditions can only be met if the boiler circulation pump is running. The pump does not switch off until a certain delay (overrun time) has elapsed after the burner cuts out. The purpose of this is to utilise the residual heat of the floor standing boiler as effectively as possible. The overrun time can be adjusted via the touch screen on the control unit. Basically, the run-on time can be cancelled altogether or constantly active, i.e. the pump is then only switched off if the boiler safety cut-out is active.

Test point pump

In contrast with the boiler circulation pump, the measuring point pump is not subject to any required boiler operating conditions. It always operates in tandem the burner with a adjustable overrun time.

6.4.9 Switching between dual fuel burners

Switching fuels from oil to gas and vice versa on modern dual fuel burners is often carried out directly and automatically by means of a “centralised telecontrol signal” from the energy supplier. The purpose of this is to switch over to the more economical fuel as quickly as possible according to demand. In order that the control unit settings are also adjusted to the different fuel type, the control signal from the energy supplier can also be applied to the central module of the Logamatic 5311 control unit as an electrically isolated signal (terminal ES) and processed.

If that function is used, hooking-up of an external fault display is no longer possible. The reverse also applies, i.e. if the input is already in use for a fault display, the fuel switching function on the control unit is not available.

If the control unit switches to gas operation, a modulating burner is automatically and exclusively activated. Changeover to oil operation is automatically linked to activation of a 2-stage burner.

6.4.10 External heat requirement

A heat requirement can also be sent to the Logamatic 5311 control unit externally via the WA terminal.

The following optional variants can also be implemented:

- On/off request without setpoint value. The required set value (flow temperature) must be set at the Logamatic 5311 beforehand.
- Demand via 0 ... 10 V signal as set flow temperature
- Demand via 0 ... 10 V signal as output specification

6.4.11 Service displays

An automatic service display can be activated in the service menu. The service display can be based on hours run or date. The service display is indicated directly via the LED status bar (orange colour) and also in the Control Center Commercial or Control Center CommercialPLUS.

6.5 Wiring diagram for Logamatic 5311 control unit

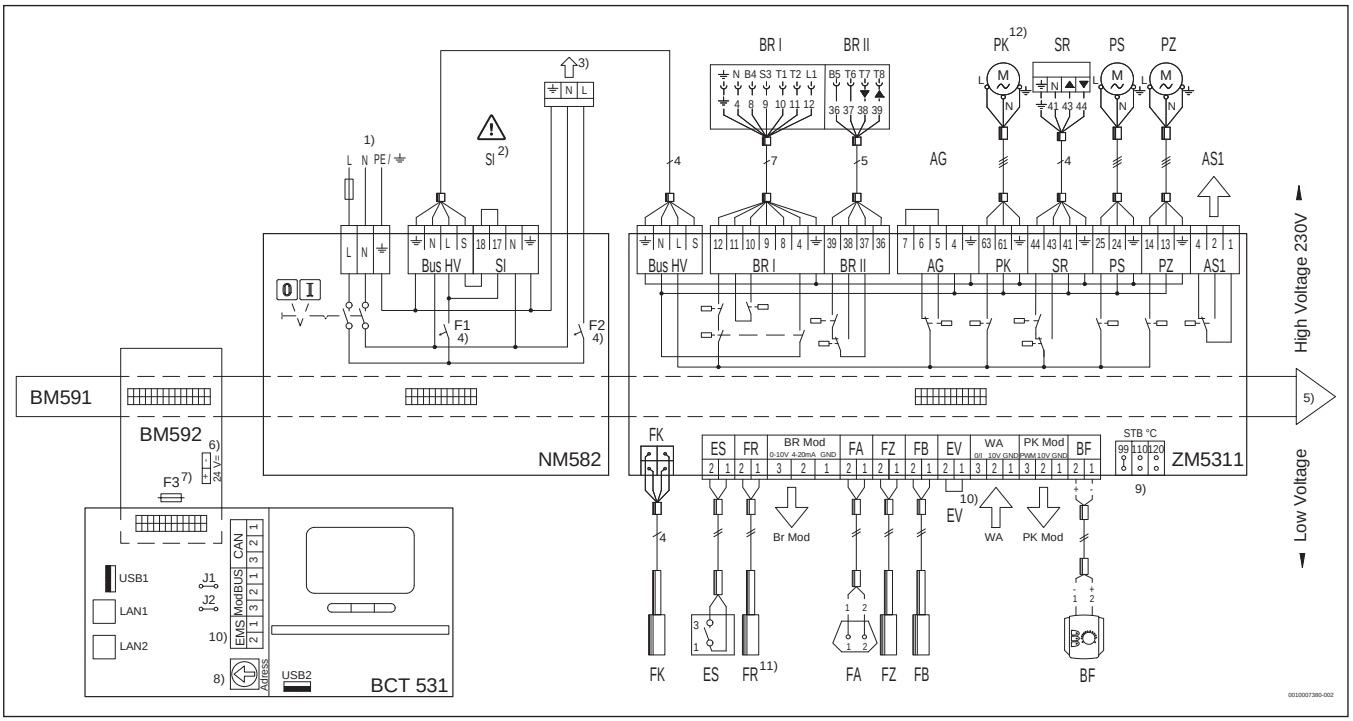


Fig. 39 Wiring diagram for Logamatic 5311 control unit

Handling terminals:

High-Voltage	Control voltage 230 V~ 1,5 mm²/AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0,4 ... 0,75 mm²/AWG 18

1) Mains 230 V ~ 50 Hz max. permitted fuse protection 20 AT on site, at least 2.5 mm²/AWG 10 (terminals max. 2.5 mm²/AWG 10)

2) **Please note:** if you are connecting the FM-SI safety module or safety equipment, remove jumper. Observe information on making connections in the service instructions.

3) Mains supply for further modules

4) Circuit breaker 10 A
F1: central module fuse protection (ZMxxxx), power supply module (NMxxx) and HMI
F2: Fuse protection for other modules, slot 1...4
Total current per phase (F1, F2) must not exceed 10 A. It is mandatory that this value is observed. In order to avoid damage to the units, check the value when commissioning.

5) Internal BUS in the control unit

6) Power supply for FM-RM components (slot C), 24 V=, max. 250 mA

7) F3 Fuse 5x20, 250 mAT

8) Setting of control unit address (detailed information → Chapter 3.1.1, page 9)

9) Setting of the **permitted** safety temperature limiter temperature to 99 °C or 110 °C by plugging in the jumper (120 °C is not available).

10) **Please note:** if a boiler is being connected via EMS, the external interlock jumper must be removed. The external interlock connection has no function in combination with EMS boilers! Only connect external devices, which lead to blocking, directly to the EMS boiler!

11) Can be used for the function of either a return temperature sensor **or** a flue gas temperature sensor.

12) **Please note:** if a modulating boiler circulation pump with switch-on signal is being used as boiler circulation pump, the 230 V pump output must be changed to a volt free signal, e.g. by means of an E-plug. The pump's power supply (continuous voltage) must then be supplied externally.

▲ Mixing valve opens
▼ Mixing valve closes

Central unit:

Bus HV	Central module power supply
CAN	ECOCAN BUS (no function)
EMS	Connection for EMS boiler (connection for EMS heat source with its own basic control (control panel))
F1	Circuit breaker (automatic cut-out) 10 A
F2	Circuit breaker (automatic cut-out) 10 A
F3	Fuse 5 × 20, 250 mAT
J1	Jumper for activating the ECOCAN BUS terminating resistance
J2	Jumper for activating the RS485 Modbus terminating resistance

LAN1	Network connection 1, optionally as Internet connection or as connection to the GLT (building services management system) via Modbus TCP/IP or as connection to other control units via CBC-BUS; recommended: network cable Cat. 6
LAN2	Network connection 2 as connection to other control units via CBC-BUS; recommended: network cable Cat. 6
ModBUS	Modular BUS connection RS485 for Buderus/Bosch CHP module (use interface LAN1 with Modbus TCP/IP setting for other purposes)
STB °C	Setting of the **permitted** safety temperature limiter temperature to 99 °C or 110 °C by plugging in the jumper.
SI	Safety equipment or FM-SI module, remove jumper during connection. **Please note:** the SI connection has no safety function in conjunction with boilers connected via EMS-BUS! Only connect safety equipment directly at the EMS boiler!
USB1	USB connection at rear of HMI
USB2	USB connection at front of HMI

General legend:

AG	Flue gas damper, remove jumper during connection **Please note:** the flue gas damper connection has no technical safety function in conjunction with EMS boilers! Only connect safety equipment directly at the EMS boiler!
AS1	Volt-free output for external central fault message 1- Foot contact 2- N/O contact 4- N/C contact **Please note:** in combination with several control units the central fault message output of the master control unit (address 0) always operates BUS-wide, in sequential controllers (address 1 ... 15) only the individual control unit is considered.
BF	Remote control
BR I	Gas/oil burner, maximum 8 A Burner connection stage 1 8 (B4) - Hours run signal 9 (S3) - Fault signal 10 (T1) - Boiler temperature controller (TR) 11 (T2) - Burner enabling 12 (L1) - L via safety equipment
BR II	Burner connection stage 2 or connection for modulating burners 36 (B5) - Hours run signal 37 (T6) - Foot contact 38 (T7) - Burner closed / off 39 (T8) - Burner open / on
BR Mod	Output for burner modulation 1/3 = Output for 0 ...10 V signal 1/2 = Output for 4 ... 20 mA signal
ES	External error input (volt-free) or input for fuel switching with dual fuel burner, 5V DC/10 mA
EV	External interlock, remove jumper during connection **Please note:** if a boiler is being connected via EMS, the external interlock jumper must be removed. The external interlock connection has no function in conjunction with EMS boilers! Only connect external devices, which lead to blocking, directly to the EMS boiler!
FA	Outdoor temperature sensor
FB	DHW temperature sensor
FR	Return temperature sensor (or for the function as FG flue gas temperature sensor)
FK	Boiler water temperature sensor (with safety temperature limiter function)
FZ	Additional temperature sensor: used as boiler water temperature sensor or flow temperature sensor, heating circuit 0, depending on the configuration
PK	Boiler circulation pump, maximum 5 A (30 A for 10 ms), E-plug available as accessory
PK Mod	Output for modulating boiler circulation pump
PS	DHW cylinder primary pump, maximum 5 A
PZ	DHW circulation pump, maximum 5 A
SR	Mixing valve control
▲	Mixing valve opens
▼	Mixing valve closes
WA	Input for external heat requirement 1/3 = Requirement via external contact (e.g. thermostat) 1/2 = Requirement via 0 ... 10 V signal

7 Function modules

7.1 Comparison of function modules of Logamatic 4000 and Logamatic 5000 control systems

Function description	Logamatic 4000 Designation	Logamatic 5000 Designation
2 heating circuits	FM442	FM-MM
One heating circuit, one DHW	FM441	FM-MW
Alternative heat source	FM444	FM-AM
Safety equipment	–	FM-SI
Remote control	BFU	BFU
DIN-rail module	–	FM-RM
IP inside/basic telecontrol	–	Yes

Table 10 Comparison of function modules Logamatic 4000 and Logamatic 5000

7.2 FM-MM Function module for heating circuit control (2 HK with/without mixing valve)

7.2.1 Brief description of FM-MM function module

Possible applications

The FM-MM function module is capable of controlling 2 heating circuits with/without mixing valve (mixer). The function module can be used in the Logamatic 5311 and 5313 control units (5310 preparation underway). The control unit detects the function module automatically and shows all adjustable parameters in the service menu.

Heating circuit control unit

- Control of two heating circuits with/without mixing valve (mixer) and circulation pump
- Connection of a separate remote control for room temperature hook-up of each heating circuit
- Adjustable, automatic switching between summer/winter modes or heating limit temperature separately for each heating circuit
- Optional function: external electrically isolated mode switch signal or external heat requirement hook-up and electrically isolated input for pump fault signal for each heating circuit

Scope of delivery

- Function module FM-MM
- Flow temperature sensor FV/FZ

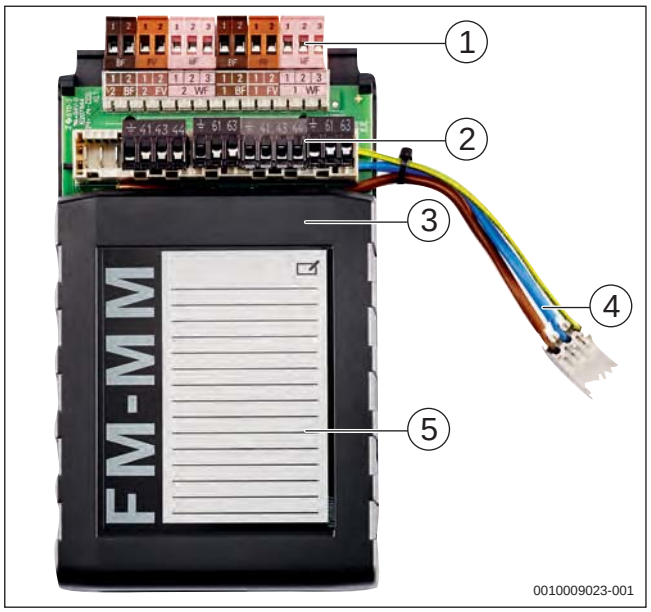


Fig. 40 Function module FM-MM

[1] Module terminal block for extra-low voltage circuits (plug for temperature sensor, remote control and external switches)
[2] Module terminal block for control voltage (plug for 230 V AC mains supply for additional modules, mixing valves and pumps)
[3] Module housing
[4] Connecting lead for 230 V AC mains supply
[5] Label with space for notes

Function module FM-MM: heating circuit control (2 heating circuits with mixing valve)

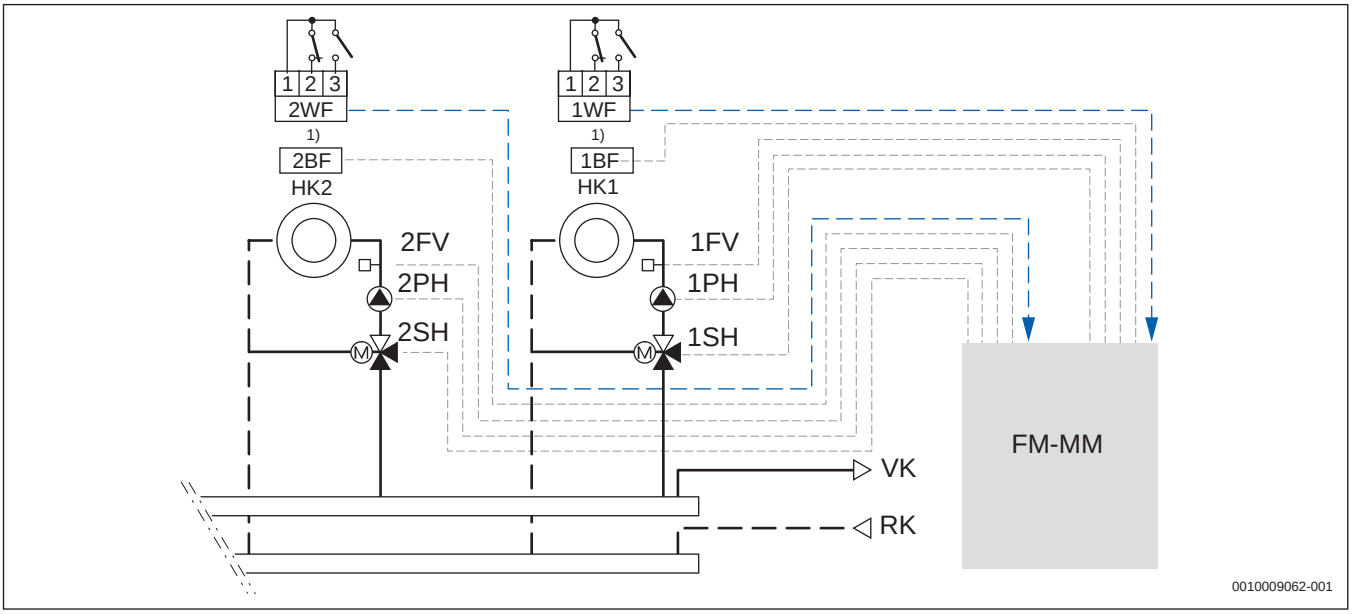


Fig. 41 Connection options on FM-MM function module (wiring diagram → Fig. 46, page 50; abbreviations → Tab. 29, page 84)

1) Either WF or BF

Optional function: external contacts (zero volt) to 1WF and 2WF

Function	Contact	Explanation
Heating mode/setback mode changeover	1 ... 3 closed	Heating mode
	1 ... 3 open	Setback mode
Changeover heating mode/setback mode/automatic mode	1 ... 3 closed	Heating mode
	1 ... 2 closed	Setback mode
	All contacts open	Automatic mode
	All contacts closed	Heating mode
External error display on pump	1 ... 2 open	Fault display
External fault display on pump and heating mode/setback mode changeover	1 ... 2 open	Fault display
	1 ... 3 closed	Heating mode
	1 ... 3 open	Setback mode

Table 11 Settings for the optional function

7.2.2 Possible applications of FM-MM function module

Control unit	FM-MM	Max. number per control unit
Logamatic 5310	Yes	4
Logamatic 5311	Yes	4
Logamatic 5313	Yes	4

Table 12 Possible applications of FM-MM function module

7.2.3 FM-MM function module specifications

	Unit	Function module FM-MM
Operating voltage	V AC	230 (± 10 %)
Frequency	Hz	50 (± 4 %)
Power consumption	VA	5
Heating circuit mixing valve (SH):		
Max. switching current	A	5
Activation	V	230
		three-point stepper controller (PI-characteristics)
Recommended servomotor running time	s	120 (adjustable 10 ... 600)
Heating circuit pump (PH) Max. switching current	A	5
Flow temperature sensor (FV/FZ)[1] NTC sensor Ø	mm	9
Heating circuit external optional function WF[2]	–	Potential-free input

1) Max. cable length 100 m (screened upwards of 50 m)

2) Switch load 5 V DC / 10 mA

Table 13 FM-MM function module specifications

7.2.4 Function description of FM-MM function module

Adjusted outside temperature

A weather-compensated control adjusts the heat production to the demand. The lower the outside temperature, the higher the flow temperature of the heating system must be. The outside temperature sensor must be fitted so it can measure the outside temperature without being affected by other factors (→ Fig. 94, page 98). A building's thermal storage capacity and its characteristic resistance to heat transfer will delay the effect of outdoor temperature variation on the rooms inside. As a consequence, it is not the current outdoor temperature that is crucial to the heat energy demand of rooms, but the so-called “adjusted” outdoor temperature. The Logamatic 5000 control system allows the degree of adjustment used when recording fluctuations in the outside temperature to be defined. This allows the control to adapt to the characteristic behavior of the building.

Automatic summer/winter changeover

Taking account of the outside temperature and the heat storage capacity of the building, i. e. the adjusted outside temperature, a limit for switching from summer to winter mode is defined(“Heating limit temperature”). This limit can be set separately for each heating circuit. In summer mode, heating mode is deactivated, i. e. the control switches off the heating circuit pump for the relevant heating circuit and closes the heating circuit mixing valve. The summer/winter changeover function is only active whenever the selected heating circuit is in automatic mode. If heating or setback mode is activated manually or if an external heat requirement is signalled via an electrically isolated input, the heating circuit is heated to its adjusted set temperature.

Heating systems

The following heating systems can be selected
- None
- Radiator/underfloor
- Base point
- Constant
- Room
- Feed circuit (detailed information → page 49)

Heating system: none

The heating circuit function is not required for the selected heating circuit. None of the heating control functions listed below are subsequently displayed for the heating circuit concerned.

Heating systems: radiators/underfloor

The heating curves for the various systems are automatically calculated to suit the required curve progression and their operating temperatures are already preset. The curves can easily be individually adapted to the specifics of the heating system by adjusting the parameters “Minimum outside temperature” and “Design temperature” on the user interface. A fixed value can be set for the curves via the “Minimum flow temperature” and “Maximum flow temperature” parameters (→ Fig. 42).

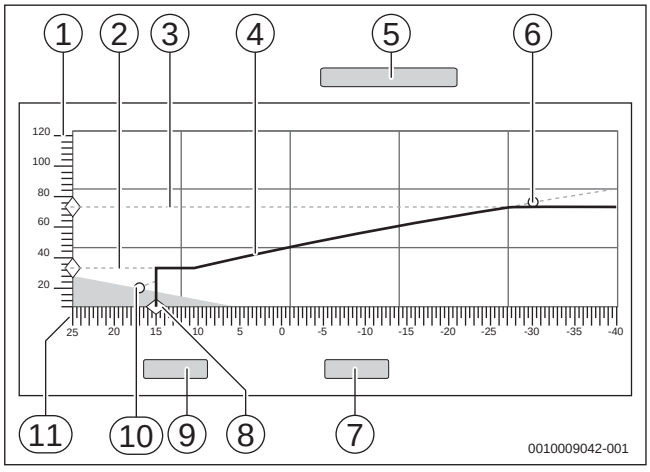


Fig. 42 Heating curves for the “Radiator”, and “Underfloor” heating systems

[1] Flow temperature
[2] Minimum flow temperature
[3] Maximum flow temperature
[4] Heating curve
[5] Operation mode
[6] Design temperature
[7] Cancel
[8] Heating limit (summer at/outside temperature threshold)
[9] Save
[10] Room temperature
[11] Outside Temperature

Heating system: base point

The flow temperature has a linear correlation with the outside temperature. The heating curve is a straight line that connects 2 points defined by entering the heating circuit flow temperature and the corresponding outside temperature (→ Fig. 43).

Heating system: Constant

This system is intended e.g. for controlling a swimming pool heating system or ventilation systems if the set flow temperature must always be the same regardless of outside temperature (→ Fig. 43). If the heat demand (switching between daytime and night-time modes) is to be indicated externally by a swimming pool control or a ventilation system via an electrically isolated switch, then the FM-MM function module must be specified. In setback mode, the curve is shifted downwards by a definable temperature difference. Manual switching between daytime and night-time modes takes priority over switching between summer and winter modes.

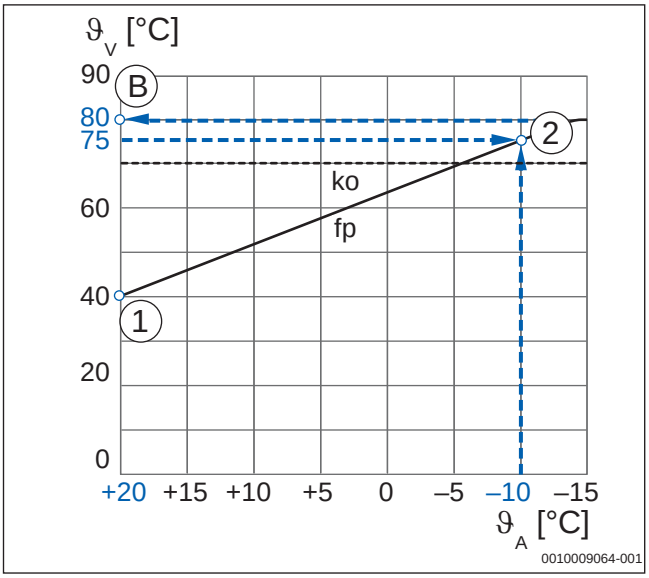


Fig. 43 Heating curve for heating systems “Base point” and “Constant”"

[1] First design point (set flow temperature 1 with outside temperature 1)
[2] Second design point (set flow temperature 2 with outside temperature 2)
B Limit point (adjustable maximum flow temperature)
fp Heating curve “Base point”
ko Heating curve "Constant"
ϑ_A Outside Temperature
ϑ_V Flow temperature

Heating system: room

The flow temperature set value depends only on the measured room temperature. This requires a BFU remote control with integral room temperature sensor to be installed in the room. The heating curve is defined by a minimum flow temperature (room temperature setpoint +5 K) (→ Fig. 44, [1]) and a maximum flow temperature (adjustable maximum temperature of heating circuit) [2]. The control range is between -1 K (for the maximum temperature) [3] and +1 K (for the minimum temperature) [4] relative to the set room temperature. Within this range, the set flow temperature is adjusted proportionally in relation to the control deviation. The heating circuit pump switches off when the actual room temperature rises by the switching differential of 0.2 K above the upper limit for the set room temperature [5]. The pump does not switch on again until the actual room temperature has dropped by the hysteresis allowance of 0.2 K below the upper limit for the set room temperature [6].

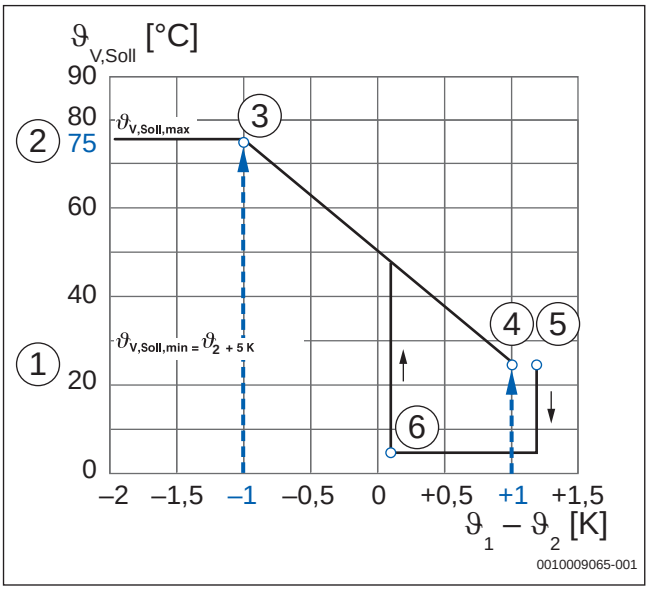


Fig. 44 Heating curve for the heating system “room temperature-dependent controller”

[1] Heating circuit operates at set minimum flow temperature
[2] Heating circuit operates at set maximum flow temperature
[3] Control deviation of –1 K
[3 ... 4] Flow temperature proportional to control deviation
[4] Control deviation of +1 K
[5] Heating circuit pump switches off
[6] Heating circuit pump switches on
ϑ_1 Actual room temperature
ϑ_2 Set room temperature
$\vartheta_{V,\ Soll,\ max}$ Maximum flow temperature
$\vartheta_{V,\ Soll,\ min}$ Minimum flow temperature

Optimisation possibilities for heating systems with outside-temperature dependent heating curve

A convenient option for optimising the room temperature hook-up is available in the Logamatic 5000 control system.

Operating modes

To optimise the heating circuits, various settings can be made for each heating circuit separately in 5 different operating modes.

These operating modes are:
- Auto heating mode
- Auto setback mode
- Manual heating mode
- Manual setback mode
- Holiday

Various parameters can be set for each operating mode, depending on the heating system.

This allows setback modes to be implemented individually for each heating circuit. To adjust the setback types, the parameters described below must be set.

Reduced setback type

The control system is set to a lower set room temperature value (reduced temperature) and continuously activates the heating circuit pump. The control system operates by means of parallel downwards displacement of an outside-temperature dependent heating curve.

Settings for the parameters:

Standby mode	No
Heating limit (summer at/ outside temperature threshold)	No

Outside temperature threshold setback type

This operating mode combines the standby mode and the reduced heating mode. Below an adjustable outdoor temperature, the boiler operates in reduced heating mode and above the set outdoor temperature, it operates in standby mode.

Settings for the parameters:

Standby mode	No
Heating limit (summer at/ outside temperature threshold)	Yes
Summer at/outside temperature threshold	set the temperature at which the changeover is to take place, e.g. 5 °C

Standby mode (shutdown) setback type

The heating circuit is always switched off in setback mode. In this operating mode, the heating circuit pump is completely switched off but the frost protection remains effective.

Settings for the parameters:

Standby mode	Yes

Room temperature threshold setback mode

The heating system remains in standby mode as long as the room temperature does not fall below a set minimum value (reduced temperature). Otherwise it switches to Reduced heating mode. This function can only be activated if a remote control has been connected in a reference room. (→ Chapter 4.2, page 14).

Settings for the parameters:

Room influence/room temperature threshold:	Max./room temp.hold.mode

A changeover between **Automatic heating mode** and **Automatic setback mode** can also be effected manually via an external contact (on-site pushbutton) at the FM-MM function module.

Room temperature hook-up with weather-compensated control

Weather-compensated control with room temperature hook-up constantly monitors the room and flow temperature to adapt the heating curve at short notice to the building and heat energy demand. An outside temperature-dependent heating curve (radiator, underfloor or convector heating circuit) remains selected and a maximum room influence is also specified. This defines the limits of the control deviation between the set room temperature and actual room temperature. The resulting room-temperature control deviation is counterbalanced by an adjustment to the flow temperature brought about by shifting the heating curve within the limits of the override range. A deviation between the actual and set room temperature of 1 °C influences the heating circuit flow temperature by approx. 3 °C. The room temperature hook-up always requires a BFU remote control to be installed in a reference room (→ page 97).

Holiday function

A holiday function can be activated for each heating circuit separately. The holiday period can be specified in a year calendar by entering the first and last day of validity. Up to 12 holiday periods can be set.

Programming of a heating circuit as feed circuit for a substation (preparation underway)

The feed pump can either be connected to the master control unit or corresponding substation. If it is connected to the master control unit, the address of the substation to be supplied must be entered in the menu.

Cancelling low-output phases at low outside temperatures (DIN EN 12831)

The standard DIN EN 12831 is the European standard for calculating the heat energy demand for buildings. According to DIN EN 12831, rooms with intermittent heating operation must be taken into consideration when designing heat sources and heating surfaces. If, however, the low-output phase is cancelled at the right time when the outside temperature drops below a certain level, heating surfaces and heat sources can be dimensioned without the additional allowance. This function makes it possible to cancel the low-output phase for each heating circuit a definable adjusted outside temperature is undercut. That prevents excessive cooling of the living spaces. As a result, the allowance for a greater heat-up output can be dispensed with when dimensioning the boiler.

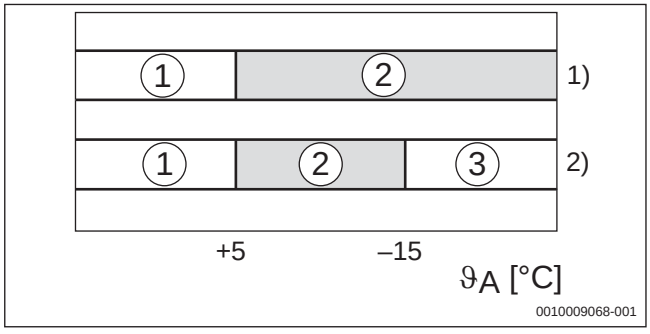


Fig. 45 Adjustment of reduced temperature

[1] Shutdown
[2] Reduced
[3] Day

ϑ_A Outside Temperature
1) Without active function “From which outside temperature should the setback be interrupted?”
2) With active function “From which outside temperature should the setback be interrupted?”

Wiring diagram for function module FM-MM

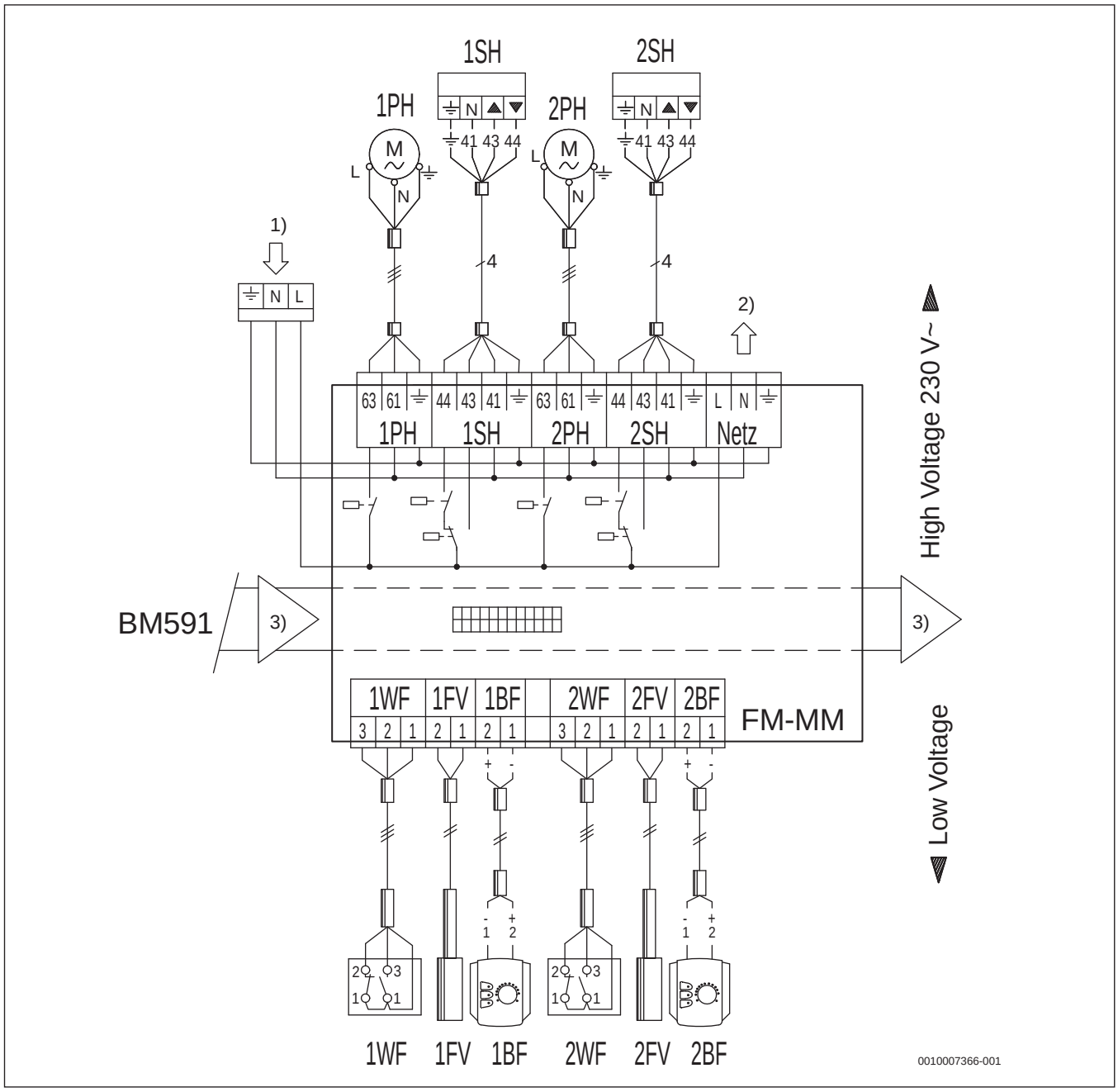


Fig. 46 Wiring diagram for function module FM-MM

BM591	PCB module for internal BUS
FM-MM	Function module 2 heating circuits
1 BF	Remote control heating circuit 1
2 BF	Remote control heating circuit 2
1 FV	Flow temperature sensor heating circuit 1
2 FV	Flow temperature sensor heating circuit 2
HK	Heating circuit
1 PH	Pump heating circuit 1
2 PH	Pump heating circuit 2
1 SH	Mixing valve heating circuit 1
2 SH	Mixing valve heating circuit 2
TWH	Temperature switch
1WF	Optional function heating circuit 1 Optional function is only possible if a remote control is not connected (potential-free contact, switch load 5 V DC/10 mA). 1/3= heating mode or heat requirement 1/2 = setback mode or pump fault
2WF	Optional function heating circuit 2 Optional function is only possible if a remote control is not connected (potential-free contact, switch load 5 V DC/10 mA). 1/3= heating mode or heat requirement 1/2 = setback mode or pump fault

Handling terminals:

High-Voltage	Control voltage 230 V~1.5 mm^2/AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0.4 ... 0.75 mm^2/AWG 18
1)	Mains supply from the power supply module or adjacent module
2)	Mains supply for further modules
3)	Internal BUS in the control unit

7.3 Function module FM-MW for DHW heating with a cylinder system and heating circuit control unit (1 HK with/without mixing valve)

7.3.1 Brief description of FM-MW function module

Possible applications

The FM-MW function module is suitable for controlling a DHW heating system (cylinder system) and a heating circuit with/without mixing valve (mixer). The first DHW function is already included in the basic scope of the Logamatic 5311 and 5313 control units; a second DHW function is available with the FM-MW function module, providing DHW 1 is controlled via the Logamatic 5000 primary pump (and not via the EMS 3-way valve). The DHW function description applies for every DHW circuit incl. corresponding circulation. All parameters can be adjusted separately for each DHW circuit. One FM-MW function module may be fitted in each control unit. The function module can be used in the Logamatic 5311 and 5313 control units (5310 preparation underway). The control unit detects the function module automatically and shows all adjustable parameters in the service menu of the control unit.

DHW heating

- Individual time-based adjustable DHW heating via cylinder primary pump (cylinder system), daily monitoring, thermal disinfection and activation of a DHW circulation pump
- Optional function: electrically isolated external input for once-only cylinder charging outside the set heating times (brief actuation of input WF1-3) or permanent DHW activation (while input WF1-3 is actuated) or for activation of the thermal disinfection
- Optional function: electrically isolated external input for fault display of cylinder primary pump, or for an external current anode for display in BCT531 controller module
- DHW priority or simultaneous operation can be set for each heating circuit separately

Heating circuit control unit

- Weather-compensated control of one heating circuit with mixing valve and pump
- Connection of a separate remote control for room temperature hook-up of the heating circuit
- Adjustable, automatic switching between summer/ winter modes
- Optional function: electrically isolated external mode switch signal or external heat requirement hook-up and electrically isolated input for pump fault signal

Scope of delivery

- Function module FM-MW
- Hot water temperature sensor, 9 mm

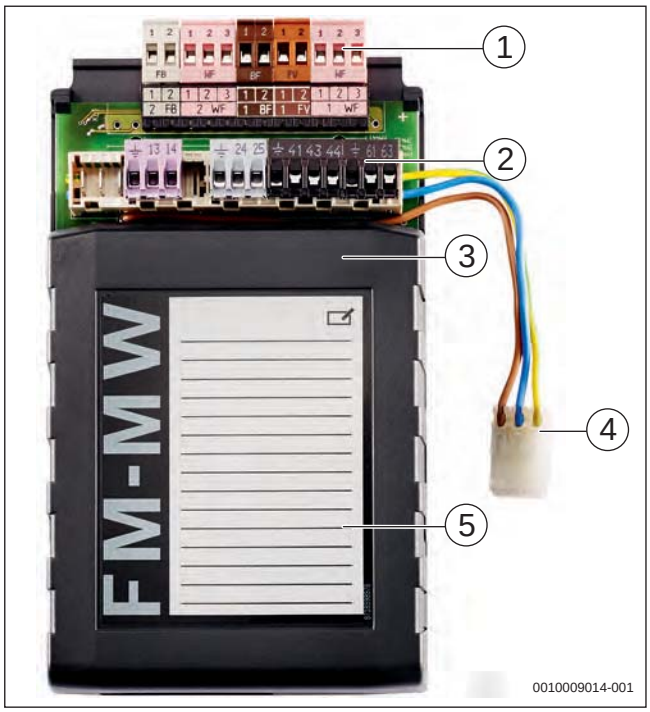


Fig. 47 Function module FM-MW

[1] Module terminal block for extra-low voltage circuits (plug for temperature sensor, remote control and external switches)
[2] Module terminal block for control voltage (plug for 230 V AC mains supply for additional modules, mixing valves and pumps)
[3] Module housing
[4] Connecting lead for 230 V AC mains supply
[5] Label with space for notes

FM-MW function module for DHW heating and heating circuit control unit (1 heating circuit with mixing valve)

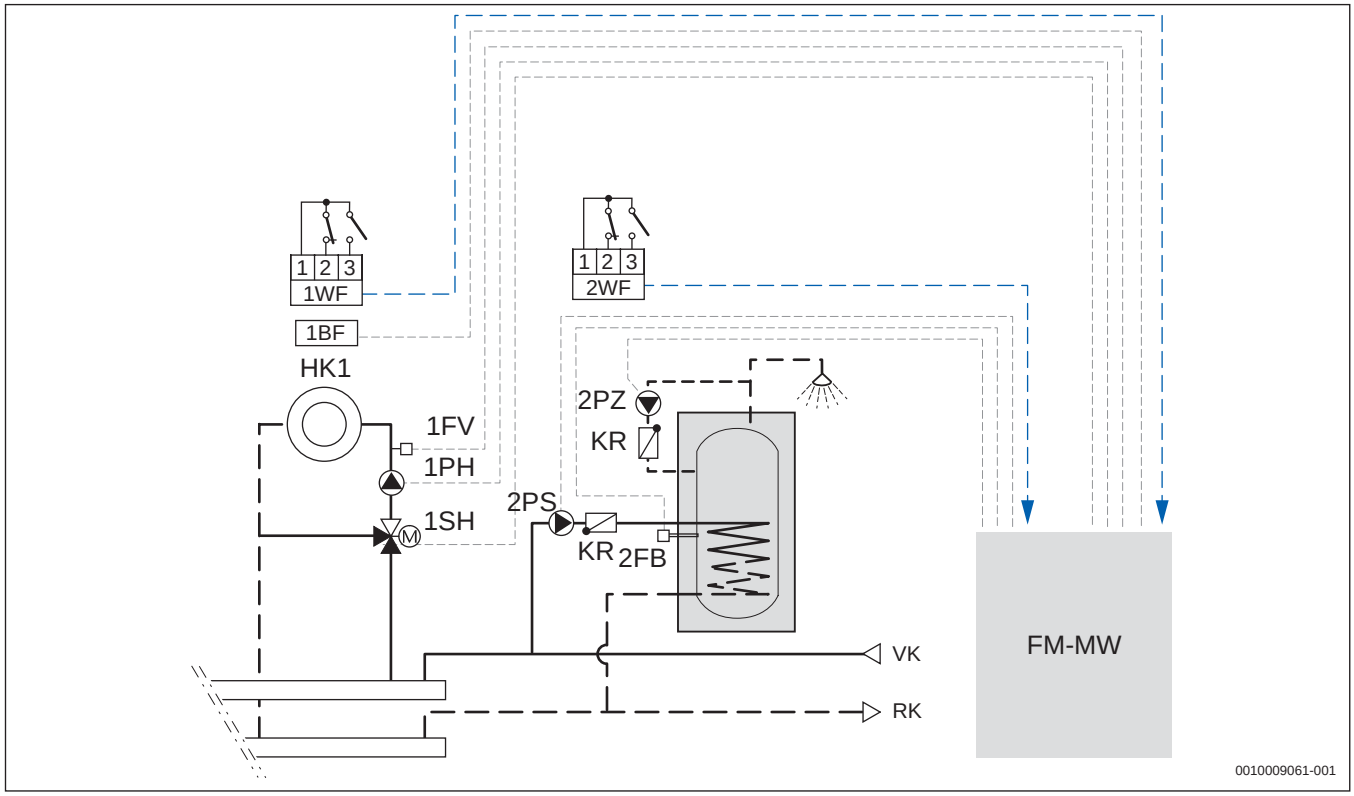


Fig. 48 Connection options on FM-MW function module (wiring diagram → Fig. 49, page 55; abbreviations → Tab. 29, page 84)

External contact (zero volt) at 1 WF

Function	Contact	Explanation
Heating mode/setback mode changeover	1 ... 3 closed	Heating mode
	1 ... 3 open	Setback mode
Changeover heating mode/setback mode/automatic mode	1 ... 3 closed	Heating mode
	1 ... 2 closed	Setback mode
	All contacts open	Automatic mode
	All contacts closed	Heating mode
External error display on pump	1 ... 2 open	Fault display
External fault display on pump and heating mode/setback mode changeover	1 ... 2 open	Fault display
	1 ... 3 closed	Heating mode
	1 ... 3 open	Setback mode

Table 14 Settings for the optional function

External contact (zero volt) at 2 WF

Function	Contact	Explanation
Heat-up for thermal disinfection or once-only cylinder charging	1 ... 3 closed	Activation of heat-up for thermal disinfection or once-only cylinder charging
External fault display for cylinder primary pump or external current anode	1 ... 2 open	Fault display

Table 15 Settings for the optional function

7.3.2 Possible applications of FM-MW function module

Control unit	FM-MW	Max. number per control unit
Logamatic 5310	Yes	1
Logamatic 5311	Yes	1
Logamatic 5313	Yes	1

Table 16 Possible applications of FM-MW function module

7.3.3 FM-MW function module specifications

	Unit	Function module FM-MW
Operating voltage	V AC	230 (± 10 %)
Frequency	Hz	50 (± 4 %)
Power consumption	VA	2
Heating circuit mixing valve (SH): Max. switching current Activation Recommended servomotor running time	 A V s	 5 230 three-point stepper controller (PI-characteristics) 120 (adjustable 6 ... 600)
Heating circuit pump (PH) Max. switching current	A	5
Cylinder primary pump (PS1) max. switching current	A	5
DHW circulation pump (PZ) Max. switching current	A	5
Hot water temperature sensor (FB)[1] NTC sensor Ø	mm	9
Flow temperature sensor (FV/FZ)[2] NTC sensor Ø	mm	9
DHW external optional function WF[1)2)]	–	Potential-free input
Heating circuit external optional function WF[1)2)]	–	Potential-free input

1) Max. cable length 100 m (screened upwards of 50 m)

2) Switch load 5 V DC / 10 mA

Table 17 FM-MW function module specifications

7.3.4 Function description of FM-MW function module

DHW heating

Timer control

The DHW heating can either follow the same time program as the heating circuits or its own separate timer program. DHW priority or simultaneous operation can be adjusted for every heating circuit individually for the purpose of DHW heating.

Charging sequence

If the cylinder temperature falls below the set value by the set switching differential (default setting: 5 K), DHW heating (automatic reheating) starts. In this case the control system requests an increase in the boiler temperature (default setting: 20 K) to ensure rapid DHW heating. The increase in boiler temperature compared to the set DHW temperature can be adjusted in the service menu. Depending on the boiler type, the cylinder charging pump may not start until the required boiler operating conditions are met. The charging process finishes as soon as the set DHW temperature is reached. The control system switches the burner off and the cylinder primary pump cuts out after an adjustable pump run-on time (default setting: 3 minutes).

Residual heat utilisation

If this function is activated, the control system calculates the available energy that can be given off by the floor standing boiler after the burner is switched off. As a result, the burner is switched off before the set DHW temperature is reached. The first time that the control system activates DHW heating, it switches the burner off when the cylinder temperature is 2 K below the set value. The cylinder primary pump continues to run until the set value is reached. From the dynamic characteristics of the cylinder temperature, the control system calculates the new temperature differential at which the burner can switch off. That determines the optimum burner cut-out point for the next charging sequence. In order that the residual heat utilisation can be constantly adapted to the variable system conditions, the function must remain permanently active. This can only be achieved if the DHW priority option is active as effective analysis is not possible if heat is being drawn by the heating circuits at the same time.

Circulation

According to the German Energy Saving Regulations (EnEV), DHW circulation loops must be fitted with automatic devices for switching off the DHW circulation pumps. In a Logamatic 5000 control system, the DHW circulation pump has a separate time programme. This can either be individually programmed or based on the time intervals in heating mode and/or the DHW heating. In heating mode, the control system operates the DHW circulation pump either intermittently or continuously.

DHW circulation lines must be insulated against heat loss according to the recognised technical regulations. The temperature difference between the DHW outlet and the point of entry into the circulation loop must not be more than 5 K. The DHW circulation lines must dimensioned in accordance with DIN 1988-3 or DVGW Code of Practice W553 (DVGW = German Gas and Water Association). According to the DVGW Code of Practice W551, DHW circulation loops should be fitted in small systems with pipe capacities of > 3 l between the water heater outlet and draw-off point as well as in large systems. DHW circulation systems can be switched off for up to 8 hrs a day for energy saving purposes if the hygienic conditions meet requirements. In large systems, the cylinder temperature must not fall below 60 °C. For small systems, the recommended minimum cylinder temperature is 50 °C.

Once-only cylinder charging

Once-only cylinder charging can then be activated manually on the display or via an electrically isolated external input (on-site pushbutton). The DHW circulation pump runs. If applicable, the floor standing boiler used for DHW heating starts up and heats up the DHW cylinder until the set cylinder temperature is reached or “once-only cylinder charging” is cancelled.

Daily heat-up

The “daily heating” function checks once a day whether the DHW heating temperature at the hot water temperature sensor in the DHW cylinder (including solar cylinder if present) has reached a set temperature of 60 °C. If it has, the floor standing boiler remains off. Otherwise the potable water in the cylinder is heated up once by the boiler. The starting time for this function is user definable.

This function meets a requirement of the DVGW Code of Practice W551.

Thermal disinfection

The thermal disinfection function heats up the domestic hot water to a temperature, measured at the hot water temperature sensor, that is sufficient to kill pathogens (e. g. legionella). The cylinder primary pump and DHW circulation pump run continuously during thermal disinfection. The DHW circulation pump ensures that a large proportion of the DHW system is heated up to high temperatures so that the system is “thermally disinfected” and pathogens killed. The “thermal disinfection” function is monitored by the hot water temperature sensor and can be activated either automatically (daily or once a week at a programmable time) or manually by means of an external electrically isolated switch (as alternative to once-only cylinder charging). A separate set DHW temperature can be specified for this function.

The DHW circulation pump and connected water lines must be suitable for temperatures over 60 °C if the thermal disinfection function is used. To protect against scalding, it is advisable to activate thermal disinfection only during night-time hours and to specify thermostatically controlled taps or a thermostatically controlled mixer unit downstream of the cylinder's DHW outlet.

More information can be obtained from DVGW Code of Practise W551. It provides guidelines for DHW heating and piping systems and suggests measured for limiting growth of legionella in large and small systems.

Frost protection

Outside of the programmed DHW heating times, this function ensures that the DHW cylinder does not cool down to temperatures low enough for there to be a risk of freezing. If the frost threshold temperature falls below 5 °C, the DHW cylinder is heated to the specified set DHW temperature in heating mode.

Holiday function

Both the DHW function and the DHW circulation pump can be integrated into the holiday function. Up to 12 holiday periods can be predefined. Both DHW heating and circulation are turned off when the programme is active.

Heating circuit control unit

All heating circuit control unit functions of a heating circuit provided by the FM-MW function module are the same as the heating circuit control unit functions provided by the FM-MM function module (→ Chapter 7.2, page 45).

7.3.5 Wiring diagram for function module FM-MW

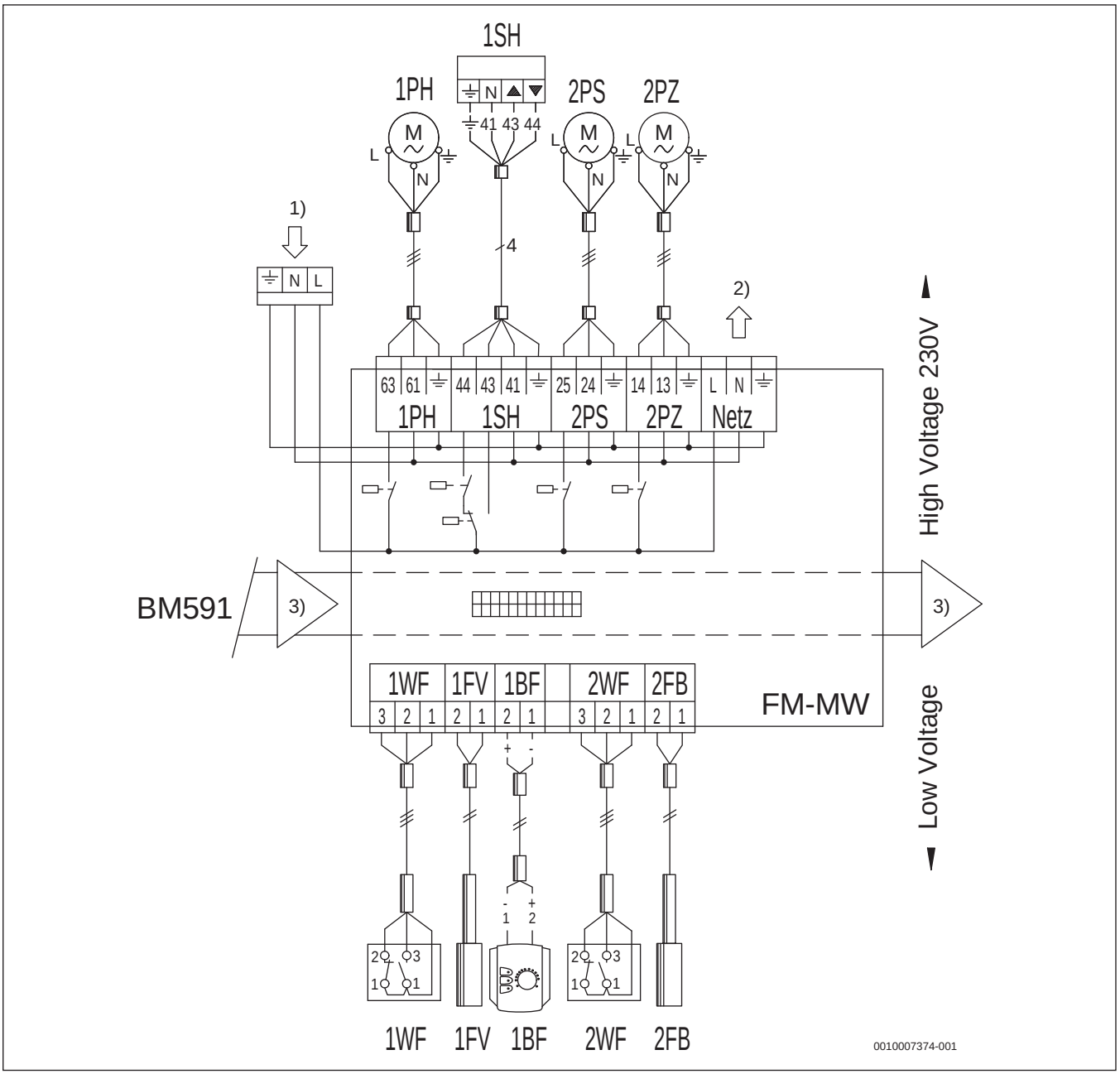


Fig. 49 Wiring diagram for function module FM-MW

BM591	PCB module for internal BUS
FM-MW	Function module for heating circuit and domestic hot water
1 BF	Remote control heating circuit
2FB	DHW temperature sensor
1 FV	Flow temperature sensor heating circuit
1 PH	Pump heating circuit 1
2PS	Cylinder primary pump
2PZ	DHW circulation pump
1 SH	Mixing valve heating circuit 1
1WF	Optional function heating circuit 1: external contact is only possible if a remote control is not connected (potential-free contact, switch load 5 V DC/10 mA). WF 1/3 = heating (heat requirement) WF 1/2 = setting back or pump fault
2WF	Optional function Domestic hot water (potential-free contact, switch load 5 V DC / 10 mA) 1/3 = Thermal disinfection or once-only cylinder charging 1/2 = Pump fault

Handling terminals:

High-Voltage	Control voltage 230 V~1.5 mm^2/AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0.4 ... 0.75 mm^2/AWG 18
1)	Mains supply from the power supply module or adjacent module
2)	Mains supply for further modules
3)	Internal BUS in the control unit

7.4 Function module FM-AM for incorporating an alternative heat source

7.4.1 Brief description of FM-AM function module

Possible applications

The FM-AM function module enables incorporation of an alternative heat source and/or a buffer cylinder in the heat source management system. The function module can be used in the Logamatic 5311 and 5313 control units. Alternative heat sources are distinguished by the fact that they utilise energy from the environment for heating buildings and run on fuels such as wood, woodchips or pellets or are not exclusively used for producing heat. The alternative heat source is always the lead boiler, i.e. the boiler that is given the first opportunity to provide the heat required by the heating system. Oil/gas boilers are used as lag boilers, and only enabled if required. Alternative heat sources are fundamentally different in terms of design and function to the familiar oil/gas boilers. The setting options on the FM-AM function module are thus accordingly variable. Incorporation of the alternative heat source is generally implemented by way of a buffer cylinder. Alternative heat source and oil/gas boiler are switched on and off as required according to the temperature in the buffer cylinder. The temperature measured at the various test points in the buffer cylinder is determined by the boiler management. The FM-AM function module offers a number of different setting options for incorporating the buffer cylinder and therefore the alternative heat source. Furthermore, the function module FM-AM can also be used in heating systems where there is no alternative heat source but where a buffer cylinder provides heat for the heating system, or in stand-alone heating systems which do not have an oil/gas boiler.

If the FM-AM function module is used in combination with a Buderus CHP module Loganova, direct BUS communication with the CHP module control system has significant benefits.

By expanding the control unit to include the FM-CM function module, an alternative heat source can be integrated in the heat source management of the multi-boiler system. The control unit detects the function module automatically and shows all adjustable parameters in the service menu of the user interface.

Scope of delivery

- Function module FM-AM
  - 2 Temperature sensor 6 mm
  - 2 Temperature sensor 9 mm

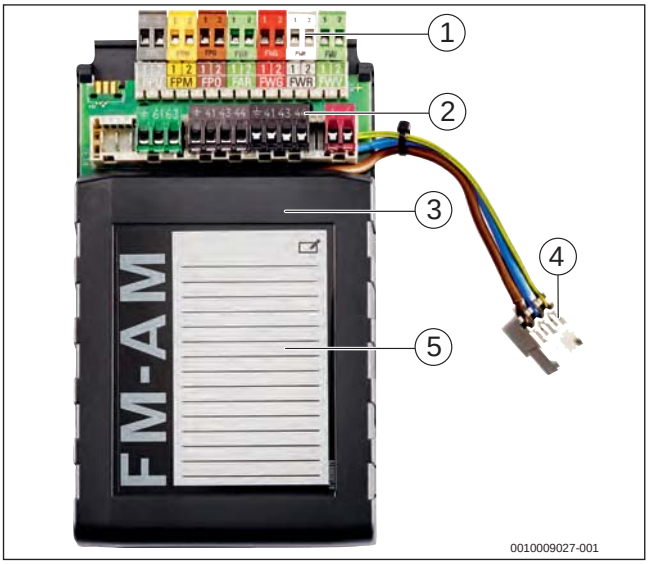


Fig. 50 Function module FM-AM

[1] Module terminal block for extra-low voltage circuits (plug for temperature sensor, remote control and external switches)
[2] Module terminal block for control voltage (plug for 230 V AC mains supply for additional modules, mixing valves and pumps)
[3] Module housing
[4] Connecting lead for 230 V AC mains supply
[5] Label with space for notes

Functions and connection options

- Integration of an alternative heat source into the heating system
- Automatic continued operation for fuel-alternation systems
- Integration of “manually” started heat sources, e. g. solid fuel boilers, stove heating inserts
- Integration of “automatic heat sources”, e. g. pellet boilers, pellet stoves, CHP modules, wood chip boilers, heat pumps, CHPs or fuel cell boilers
- Integration of buffer cylinders for central heating backup
  - Buffer bypass circuit (series connection)
    or
  - Alternative buffer circuit
- Option for interlock of floor standing boiler for a limited period when using an alternative heat source, e. g. solid fuel boiler
- Electrically isolated switch WE-ON
  - For selection/deselection of “automatic” alternative heat source by Logamatic 5000, e. g. pellet boiler or heat pump
    or
  - For implementing an emergency cooling function for “manually” or “externally” started alternative heat sources
- Separate set value and time programme for individually starting the alternative heat source started by the Logamatic 5000
- Facility for return temperature control for the alternative heat source including activation of a mixing valve and pump

Integration of CHP module

Communication between Logamatic 5000 and a Buderus or Bosch CHP module is bidirectional via Modbus RTU interface (RS485). A defined data exchange takes place via this interface, which means a CHP module cannot be activated purely by a start/stop signal (for example), and instead by a setpoint value as output or flow temperature if required.

Logamatic 5000 and Buderus or Bosch CHP module are connected by a shielded cable with core cross-section 0.25 ... 0.75 mm^2 (e.g. LiYCY 3 × 0.75). The cable is connected to screw terminals at BCT531 (Modbus terminal) and CHP module. The maximum total cable length is 20 metres.

The following table shows a comparison of the Logamatic 4000 (FM444 function module) and Logamatic 5000 (FM-AM function module) control systems during integration of the CHP module system.

	Logamatic 4000 with FM444	Logamatic 5000 with FM-AM
Protocol	3964R protocol/ RS232	Modbus RTU/ RS485
Data scope	Fixed data scope (no data point list required for customers)	
CHP module activation	Start/Stop	Start/Stop nominal output/ flow temperature
Buffer management	Control by Logamatic 4000/ Logamatic 5000	
CHP module configuration	Configuration via CHP module user interface. Activation and programming in the context of commissioning	
Connection	9-pin D-SUB plug required (soldering!)	Straightforward connection via screw terminals

Table 18 Comparison of CHP module system integration for Logamatic 4000 and Logamatic 5000

FM-AM function module: system with automatic alternative heat source, e. g. CHP module

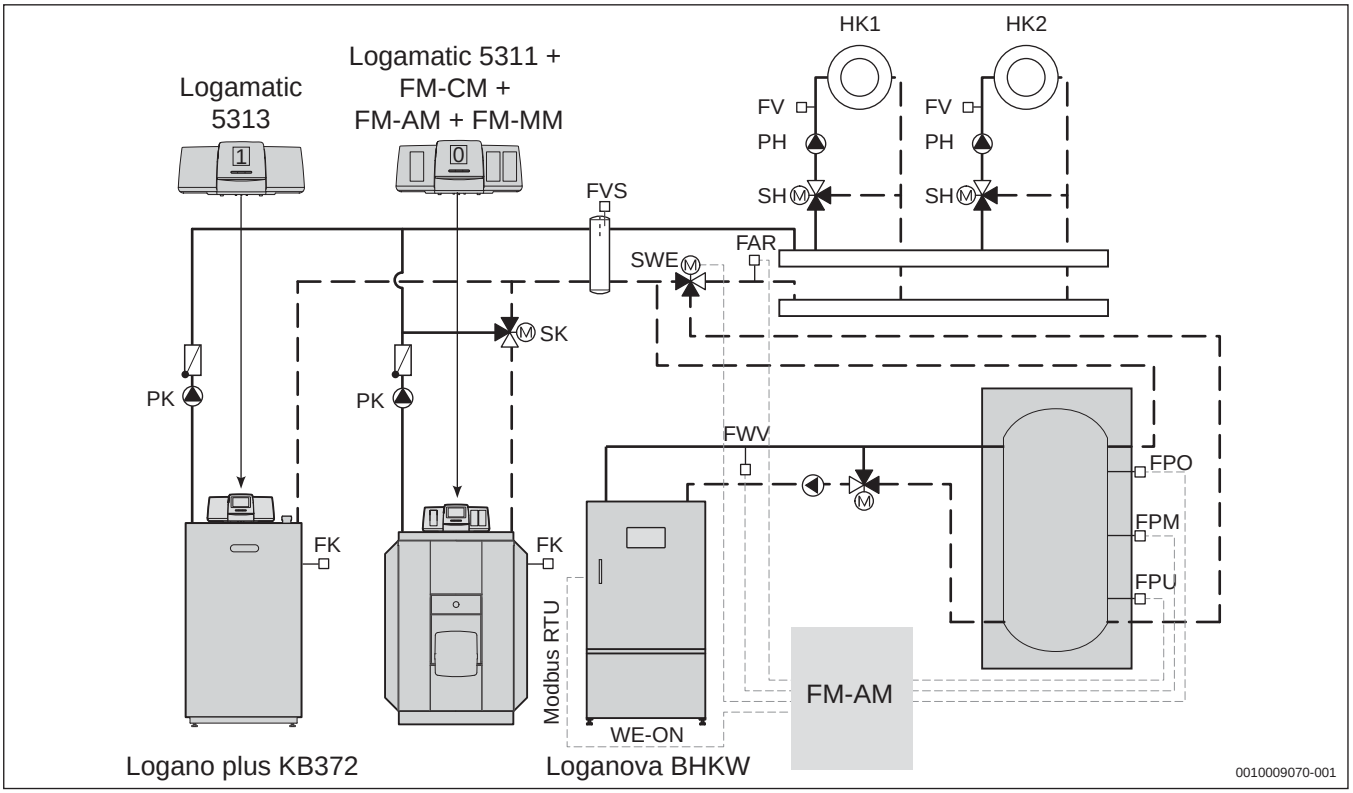


Fig. 51 Connection options on FM-AM function module (wiring diagram → Fig. 60, page 66; abbreviations → Tab. 29, page 84)

7.4.2 Possible applications of FM-AM function module

Control unit	FM-AM	Max. number per control unit
Logamatic 5310	Yes	1
Logamatic 5311	Yes	1
Logamatic 5313	Yes	1

Table 19 Possible applications of FM-AM function module

7.4.3 FM-AM function module specifications

	Unit	Function module FM-AM
Operating voltage	V AC	230 (± 10 %)
Frequency	Hz	50 (± 4 %)
Power consumption	VA	2
Alternative heat source pump output Maximum switching current	A	5
Contact WE-ON Min. Max.	 V DC/mA V AC/A	 5/10 230/5
Activation of mixing valve for integrating heat source	V	230
Activation of return temperature control mixing valve	V	230
Running time of servomotors	s	10 (adjustable 10 ... 600)
Type of controller	–	3-point stepper controller (PI-characteristics)
FWG flue gas temperature sensor		PT1000 sensor, measuring range up to 350 °C, resolution 1 K, tolerance ± 10 %
Alternative heat source flow temperature sensor FWV	–	NTC sensor
Alternative heat source return temperature sensor FWR	–	NTC sensor
Buffer cylinder top temperature sensor FPO	–	NTC sensor
Buffer cylinder centre temperature sensor FPM	–	NTC sensor
Buffer cylinder bottom temperature sensor FPU	–	NTC sensor
System return temperature sensor FAR	–	NTC sensor

Table 20 FM-AM function module specifications

7.4.4 Function description of FM-AM function module

The FM-AM function module distinguishes between the following types of alternative heat source

- Heat sources started automatically by Logamatic 5000
- Externally controlled heat sources started by external controller
- Heat sources started manually

The distinction is made because the behaviour of those types of heat source is fundamentally different and the FM-AM function module thus has different possibilities for accessing it.

As with activation of the floor standing boiler, the FM-AM function module should always be specified on the master control unit. Only when fitted to the master control unit does the FM-AM module have an influence over boiler control and take control of heat source management. Furthermore, only the master control unit processes all requirements from the heating system as a whole, i.e. including from the substations.

Automatic heat sources – started by Logamatic 5000

Automatic alternative heat sources started by Logamatic 5000 are selected/deselected by the electrically isolated switch “WE-ON” on the FM-AM function module. The fuel supply to those heat sources is automatic.

Characteristic

Automatic fuel supply; continuous operation presents no problems, Logamatic 5000 has unrestricted control over the automatic alternative heat source and can select/deselect it as required to cover heat requirements from the heating system. Start-up of the floor standing boiler is prevented according to the possibilities.

This setting supports alternative heat sources such as

- Pellet boiler
- Wood chip boiler
- CHP modules, heat-demand driven
- Fuel cell boilers, heat-demand driven

Control technology integration

If heat is required by the heating system, the alternative heat source is selected/deselected by means of the electrically isolated switch WE-ON on the FM-AM function module. A control unit integrated into the automatic heat source monitors the internal processes. The FM-AM module monitors operation of the alternative heat source by means of its flow temperature (sensor FWV).

Heat source management is effected by comparing the highest set system temperature with the actual system temperature. Depending on the plumbing configuration, the actual system temperature may be measured at various points (sensors) or the measurement point may change while the system is in operation (e.g. alternative switching).

To ensure the heating system receives sufficient heat, the floor standing boiler starts up and provides additional heat if the alternative heat source is not supplying adequate temperatures.

In heating systems in which the automatic heat source delivers its heat to a buffer cylinder or a low-loss header, there is a special arrangement. In such systems, a boiler lock-out prevents the floor standing boiler from starting up after an abrupt change in the set value. An abrupt change in the set temperature refers to a sudden alteration in the set system temperature within a very short time, e. g. when DHW heating is required. The default setting of this blocking time is 30 minutes and is adjustable. In order to prevent insufficient supply of heat to the heating system, the floor standing boiler is re-enabled so as to be able to cover demand when that period has elapsed.

Plumbing configuration with buffer cylinder

In heating systems with buffer cylinders, the floor standing boiler and alternative heat source are operated according to the temperatures in the buffer cylinders. The automatic alternative heat source is selected if the temperature in the buffer cylinder (sensor FPM) falls below the set temperature demanded by the system. The alternative heat source is deselected when the lower part of the buffer cylinder (sensor FPU) has been heated up to the set system temperature. The conventional floor standing boiler is not called upon until the temperature in the buffer cylinder (sensor FPO) drops below the set system temperature.

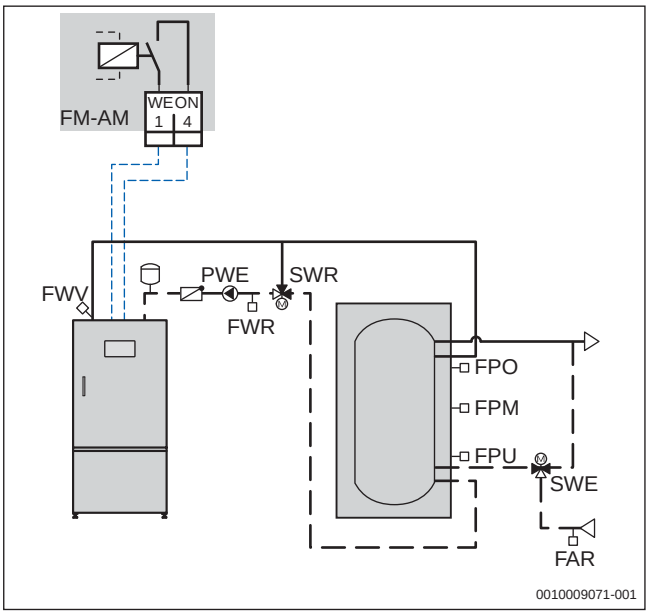


Fig. 52 Automatic heat sources – started by Logamatic 5000 (abbreviations → Tab. 29, page 84)

Configuration without buffer cylinder

In heating systems without buffer cylinder, heat source management is effected by comparing the set system temperature with the actual system temperature at the reference sensor. The FM-AM module always calls on the alternative heat source first.

The automatic alternative heat source is selected if the temperature at the test point for the actual system temperature falls below the set system temperature by a fixed switching differential. The alternative heat source is deselected if the temperature at the test point for the actual system temperature exceeds the set system temperature by fixed switching differential.

If the temperature required in the heating system is provided by the alternative heat source, the boiler remains off as long as the actual system temperature is higher than the set system temperature.

Automatic heat sources – started by external control system

Alternative heat sources started by external controller cannot be controlled by the FM-AM function module. The fuel supply is automatic.

Characteristic

Heat is provided, Logamatic 5000 has no influence over the heat source

This setting supports alternative heat sources such as

- Heat pumps
- CHP module, power-controlled
- Fuel cell boilers, power-controlled

Control technology integration

The FM-AM function module uses either the temperature of the alternative heat source (sensor FWV) or the flue gas temperature (sensor FWG, optional) to detect operation of the externally controlled alternative heat source. Detection of operation is based on specification of a definable temperature threshold. If detection of operation by the temperature of the alternative heat source (sensor FWV) is selected, that temperature threshold for the alternative heat source must be higher than any temperature that has to be maintained for boiler protection.

Heat source management is effected by comparing the highest set system temperature with the actual system temperature. The control unit detects whether the alternative heat source is in operation via the temperature sensor FWV or flue gas temperature sensor FWG. In this case, a boiler lock-out prevents the floor standing boiler from starting up after an abrupt change in the set value. The default setting of this blocking time is 30 minutes and is adjustable. In order to prevent insufficient supply of heat to the heating system, the floor standing boiler is re-enabled so as to be able to cover demand when that period has elapsed.

Manual heat sources – started manually

In the case of heat sources that are started manually, fuel supply and combustion start are not automatic. To achieve a state of operational readiness, manual actions are required (manually filling log boiler, lighting logs and emptying ash pan) that are not performed automatically.

Characteristic
Manual fuel supply; continuous operation only possible within limitations.

This setting supports alternative heat sources such as
- Log boiler
- Manually fed coal-fired boilers
- Fireplace inserts with water routing

Control technology integration
The FM-AM function module detects whether the alternative heat source is in operation by its flow temperature (sensor FWV) or flue gas temperature (sensor FWG). If operation is detected in the heat source flow (sensor FWV), the buffer cylinder is charged on the basis of temperature difference by the buffer cylinder primary pump PWE. Activation of the pump PWE is based on the temperature differential between the alternative heat source flow (sensor FWV) and buffer cylinder (bottom sensor FPU). If operation is detected by means of temperature sensor FWG, the buffer cylinder primary pump PWE is controlled on the basis of the definable temperature threshold (sensor FWG).

As the FM-AM function module has no means of influencing the alternative heat source, the floor standing boiler is enabled without a delay in plumbing configurations with a buffer cylinder when the buffer cylinder temperature is undercut (sensor FPO).

In stand-alone heating systems with FM-AM function module in which the manually started heat source alone is used for the heating and DHW heating, activation of the PS1 cylinder primary pump is controlled based on temperature differential when DHW heating is required. The pump PS1 is switched on as long as the temperatures in the DHW cylinder (sensor FB) are lower than the temperature in the buffer cylinder (sensor FPO). When the temperature in the DHW cylinder reaches the temperature of the buffer cylinder, pump PS1 switches off. Cooling of the DHW cylinder is effectively prevented.

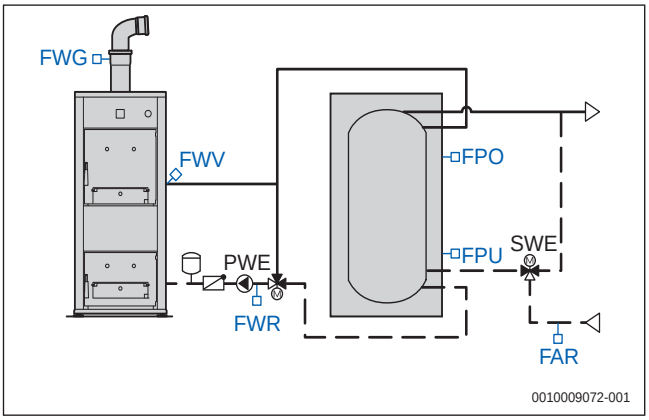


Fig. 53 Manual heat sources – started manually (abbreviations → Tab. 29, page 84)

Possibilities for accessing the alternative heat source via the user interface

The most important operating data from the alternative heat source and buffer cylinder are easily accessible to the user and can be displayed centrally at the user interface.

Thus the user of the heating system can obtain a clear overview of the most important information.

The following will be displayed:
- Temperatures in the buffer cylinder
- Temperature of the “alternative heat source”
- Hours run of the “alternative heat source”
- Status of “alternative heat source”

In addition to displaying the operating data, the following settings and queries can be made on the user interface for alternative heat sources that are started by Logamatic 5000.
- Operating values
- Separate time programme and set value
- Change of operating mode for an automatic alternative heat source
- Temperature threshold for summer mode

Separate set value and separate time program for the alternative heat source started by Logamatic 5000
Compared to an oil/gas floor standing boiler, most alternative heat sources require substantially longer to be fired up and ready to supply heat. Heat-up times of as much as 2 hours are entirely possible. In order to nevertheless enable seamless integration in the heating system, an alternative heat source that is started by Logamatic 5000 can be started according to its own time programme and its own heat requirement independently of the heating system. With its own separate time program, the alternative heat source has sufficient time to heat itself/the buffer cylinder up to the defined set value. When the heat consumers in the system switch to heating mode, there is sufficient available output (→ Fig. 54).

This function enables the alternative heat source to be operated according to its own set value independently of the heating system (e. g. BHKW).

If the alternative heat source is to be operated according to the set system temperature, its own time program should be cancelled when the heat consumer time programs switch over to heating mode.

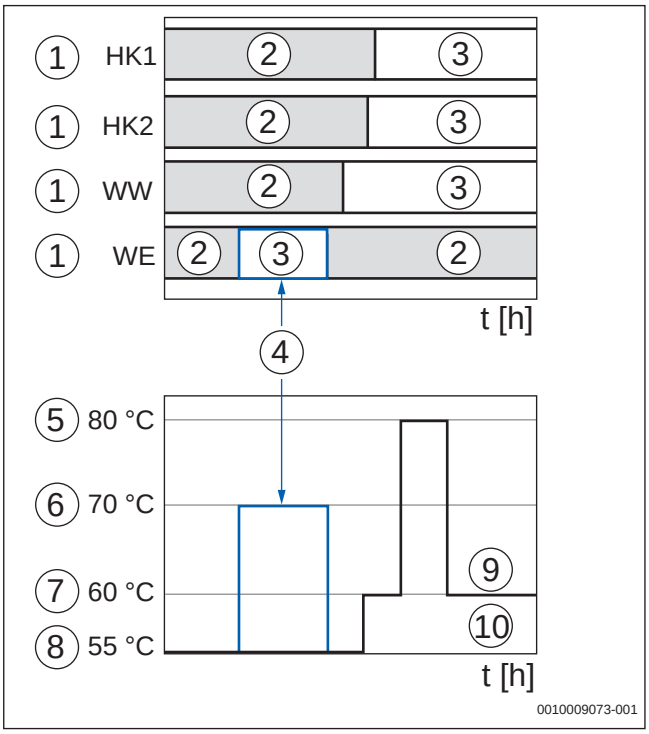


Fig. 54 Set value when operating the alternative heat source with a separate time program

[1] Time program
[2] Setback mode
[3] Heating mode
[4] Time program of alternative heat source
[5] DHW set value
[6] Set value of alternative heat source
[7] Heating mode set value heating circuits
[8] Setback mode set value heating circuits
[9] Set value
[10] System

Operating mode changeover for the alternative heat source started byLogamatic 5000

The operating mode for the alternative heat source can be set via the menu of the BCT531 user interface.

The operating modes are identical to the operating modes of the heating circuits (→ page 48).

Standby or summer mode for the automatic heat sources started by Logamatic 5000

If a time program has been defined and activated for the alternative heat source, a temperature threshold (heating limit temperature) for switching between summer and winter mode can be specified for the alternative heat source via the user interface.

Manual delay of floor standing boiler (preheating function)

The menu for the FM-AM function module contains a button for manually disabling start-up of a floor standing boiler. The preheating function allows the system user to block the floor standing boiler. That allows time for the alternative heat source to heat up and deliver heat to the system. The floor standing boiler is enabled by pressing the button repeatedly or once the blocking time has elapsed, thus preventing insufficient supply of heat to the system. The default setting of the blocking time for the floor standing boiler after the button is pressed once is 60 minutes. However, the preheating function can also be set so that the floor standing boiler remains permanently off until the button is pressed again.

The function is mainly intended for heating systems with "manually" started heat sources. If the operator needs to fire up a solid fuel boiler, this button can be used to block the floor standing boiler. If the manual alternative heat source does not then fire up during the preheating phase, the heating system is supplied by the floor standing boiler once the lock-out period has elapsed and automatic continued operation is ensured.

Emergency cooling function for alternative heat sources started manually and by external control system

When used in combination with manual heat sources (started manually) and automatic heat sources over which the Logamatic 5000 has no control (started by external controller), the FM-AM function module offers an emergency cooling function. If the temperature exceeds the definable maximum temperature of the alternative heat source by 4 K, emergency cooling is activated. An arrangement provided by the customer can be activated via the electrically isolated switch “WE-ON”. It can be used to switch on a pump, for instance, or to send a signal to a monitoring device. This function enables energy that would otherwise be lost by opening the thermally activated safety valve to be used for the heating system.

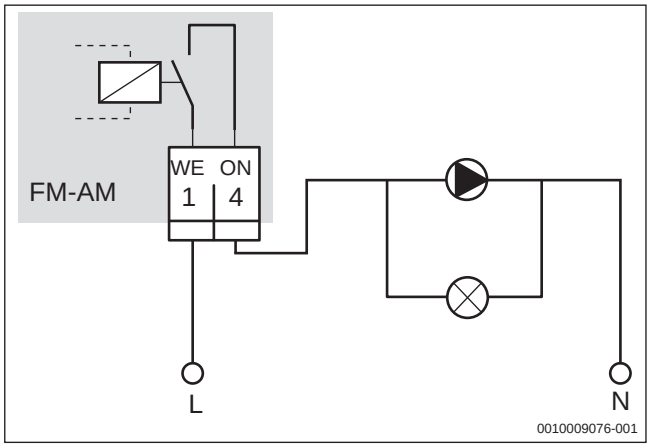


Fig. 55 Emergency cooling function using function module FM-AM

Notes on the flue system

In a system in which an alternative heat source started by Logamatic 5000 or by an external control system is operated in combination with a floor standing boiler, separate flue systems are always required. In a system in which an alternative heat source started manually is operated in combination with a floor standing boiler, a single flue or separate flue systems are possible. If the floor standing boilers and alternative heat sources are connected to the same flue system, a flue gas temperature limiter (ATW) is always required. The flue gas temperature limiter operates as a safety component acting on the safety chain and shuts down the floor standing boiler. When floor standing boilers are activated via the EMS-BUS, a UM10 diverter module or BRM10 Gateway module is essential for single-flue systems. EMS floor standing boilers with Logamatic 5000 control unit installed directly on the boiler (activated via SAFe-BUS) do not require an additional module.

7.4.5 Integrating the alternative heat source

Ensuring required operating conditions

The operating conditions of an alternative heat source are described by the manufacturer of the heat source. Various functions that ensure compliance with a range of operating conditions are available via the FM-AM function module.

The boiler safety functions can be implemented by making the correct setting in the service menu of the user interface combined with an appropriate plumbing configuration.

Minimum return temperature
When this function is activated, a definable minimum return temperature for the alternative heat source is guaranteed by means of the heat source return mixing valve SWR. The flow rate from and to the heat source is regulated by the mixing valve. If the minimum return temperature (sensor FWR) is undercut, the flow rate to the system is reduced by means of the mixing valve SWR. In heating systems without a buffer cylinder, the pumps connected to the control unit are also switched off to provide additional assistance. The pumps are switched back on when the heat source reaches the set minimum temperature.

Pump logic
With this setting, the required operating conditions are ensured by switching the pump output. If the temperature of the alternative heat source falls below the definable minimum temperature (sensor FWV), the pump PWE connected to the control unit is switched off and switched back on according to a switching differential once the temperature has risen (sensor FWV). This safety function is referred to as the “pump logic”. In heating systems without a buffer cylinder, the pumps connected to the control unit are also switched off to provide additional assistance. The pumps are switched back on when the heat source reaches the set minimum temperature.

Externally-controlled safety function
External control of the required operating conditions is also possible. The safety function is then performed by the control system of the alternative heat source or another external control system. The pump PWE and mixing valve SWR connections on the FM-AM function module than have no function.

Integrating the buffer cylinder

The FM-AM function module can incorporate an enormous variety of heat sources in the control strategy. For optimum operation of those heat sources, Buderus recommends connecting these via an adequately dimensioned buffer cylinder.

That recommendation is based on the requirements of the alternative heat sources in relation to heat-up speed and burner runtimes.

The method by which the alternative heat source is integrated in the system is greatly dependent on a number of parameters including:
- Type of heat source
- Demands made by the heat source in respect of correct operation
- Design of the overall system, especially the quantity of heat required throughout the year as minimum consumption (ordered annual demand pattern)
- Clean burnout phase with log boilers
- Favourable start/stop ratio with BHKW and pellet boilers
- Building heating system/operating temperatures

The buffer cylinder allows the time at which energy is generated to be separate to the time at which it is actually required. A buffer cylinder allows the alternative heat source to be operated continuously and under optimum conditions.

For design information on the → buffer cylinder, refer to the technical guide for the relevant product.

Alternative buffer circuit

The FM-AM function module offers the "Alternative" function for central heating backup using buffer cylinders (→ Fig. 56). The alternative control method compares the set system temperature with the temperature in the buffer cylinder (sensor FPO) and switches the 3-way valve SWE over between buffers, i.e. flow through the buffer cylinder and floor standing boiler. If the buffer cylinder temperature is sufficient for the set system temperature, the floor standing boiler remains off and the flow is not directed through it. If the buffer cylinder temperature falls below the set system temperature demanded by the heating system, the 3-way valve SWE is switched over to the floor standing boiler which then covers the demand from the heating system. Meanwhile, the alternative heat source continues to charge the buffer cylinder. As soon as the temperature in the buffer cylinder (sensor FPO) is sufficient to supply the heating system from the buffer cylinder, and therefore from the alternative heat source, the floor standing boiler is switched off.

In order to utilise the remaining energy in the floor standing boiler, the 3-way valve delays for a short time before switching over to the buffer cylinder, after which the flow is no longer directed through the floor standing boiler.

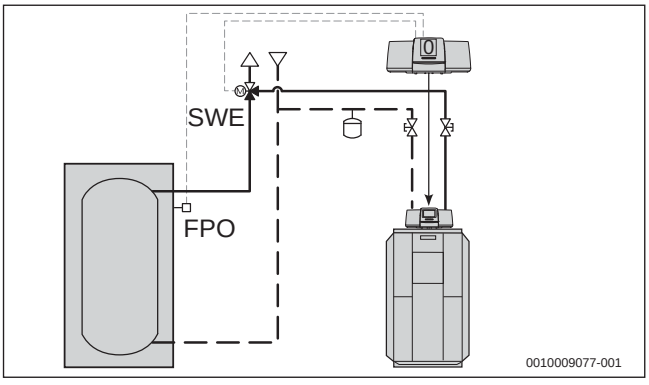


Fig. 56 Schematic diagram of buffer cylinder alternative configuration (abbreviations → Tab. 29, page 84)

Alternative operating mode means that the buffer cylinder charged by the alternative heat source and the floor standing boiler are used in alternation. Due to the way the system is plumbed, simultaneous operation of the two heat sources is not possible. When designing the heat sources, it is important to ensure that each heat source must be capable on its own of covering the heat energy demand of the heating system.

The set value for the buffer cylinder is a dynamic figure dependent on the set values for the heat consumers such as heating circuits and DHW heating, i.e. is based on the heating system. The set system temperature is the maximum requirement from the heat consumers in the heating system. Another advantage of the alternative configuration is that the flow only circulates through the floor standing boiler as and when required.

The alternative configuration is advisable when the alternative heat source is intended as and can also be the main heat provider.

Buffer bypass circuit with diverter valve

The function module FM-AM has a “buffer bypass” function (→ Fig. 57) for integration of a buffer cylinder. The buffer bypass control mode compares the temperature of the heating system return (sensor FAR) with the temperature of the buffer cylinder (sensor FPO). Depending on the temperature differential of the system return in relation to the buffer cylinder, the 3-way valve SWE is switched between the buffer, i.e. flow through the buffer cylinder, and bypass, i.e. past the buffer. After that the flow passes through the floor standing boiler or the low loss header. The motorised diverter valve directs the entire flow of the heating system either through the the buffer cylinder or through the bypass.

The buffer cylinder and floor standing boiler are connected in series with the system. The alternative heat source charges the buffer cylinder. Both heat sources, i.e. alternative heat source (via the buffer cylinder) and floor standing boiler, can jointly cover the heat energy demand of the system.

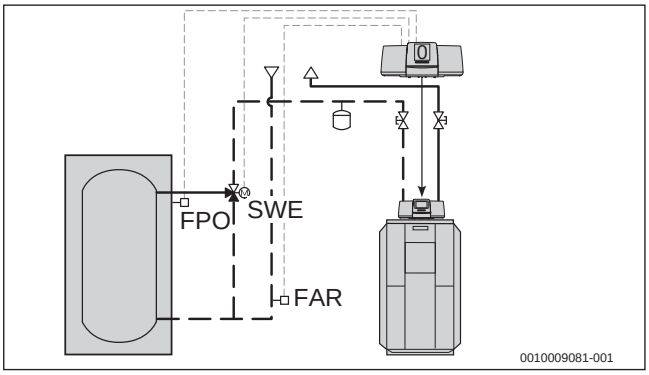


Fig. 57 Schematic diagram of buffer bypass circuit with diverter valve (when positioned as shown here in the buffer cylinder flow, a mixer can be used without any problems.) (Abbreviations → Tab. 29, page 84)

This method of integration is advisable

- for alternative heat sources with a lower output than is required to cover the heat energy demand (base-load output); the buffer cylinder (and therefore the alternative heat source) covers the base-load output of the heating system and the floor standing boiler is used to cover demand peaks;
- if the alternative heat source is used occasionally to provide heat but the oil/gas boiler essentially covers the heat demand from the system;
- if the alternative heat source cannot generate sufficiently high temperatures, e. g. utilisation of waste heat from a refrigeration machine, and the oil/gas floor standing boiler must be in operation more or less continuously.

The advantage of this configuration is that the temperature in the buffer cylinder can be allowed to drop as far as the temperature of the system return. This means the alternative heat source/buffer cylinder can feed energy into the system continuously at the lowest temperature level.

Buffer bypass circuit with pump

The FM-AM function module has a “Pump” function for integration of a buffer cylinder (→ Fig. 58). The buffer bypass control system controls operation of the pump connected to output SWE with reference to the temperature differential between the system return (sensor FAR) and buffer cylinder (sensor FPO). The flow is circulated through the buffer cylinder if the temperature in the buffer cylinder (sensor FPO) is higher than the system return temperature (sensor FAR), otherwise pump SWE is switched off. In addition, pump SWE is controlled according to the demand from the system. In the absence of a set temperature request on the system side, pump SWE remains switched off. When the pump is switched on, this function circulates a proportion of the total heating system flow volume through the buffer cylinder.

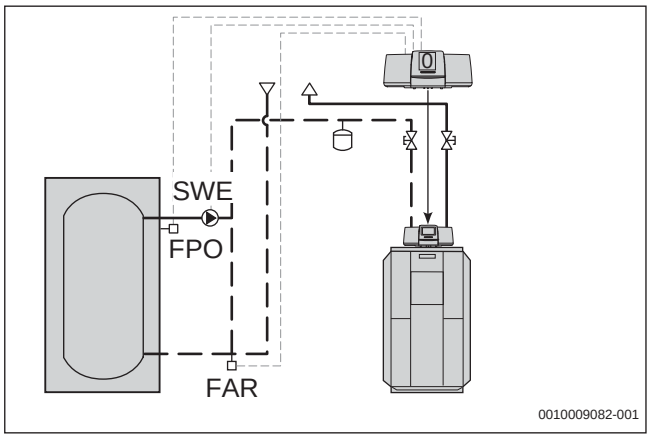


Fig. 58 Schematic diagram of buffer bypass circuit using pump (abbreviations → Tab. 29, page 84)

As with the buffer bypass circuit using diverter valve, the buffer cylinder and floor standing boiler are connected in series with the system. The alternative heat source charges the buffer cylinder. Both heat sources, i.e. alternative heat source (via the buffer cylinder) and floor standing boiler, can jointly cover the heat energy demand of the system. The buffer pump configuration provides the control system requirement for the buffer cylinder to be dimensioned for part of the system flow volume. The buffer cylinder is dimensioned on the basis of the size of the alternative heat source; the pump defines the required flow rate for incorporation of the alternative heat source.

Correct positioning for the sensors FPO and FAR is decisive for correct activation of the pump SWE.

Direct buffer integration

Either a buffer cylinder is not installed or the buffer cylinder operates a stand-alone heating system directly (without a heat source).

Delivery of heat to the heating system by the alternative heat source

The FM-AM function module offers a number of possibilities for delivery of heat to the heating system by the alternative heat source.

Pump

The pump PWE (heat source pump PWE) is activated to deliver the heat produced by the alternative heat source. The general parameters for operating the pump PWE are, depending on programming, guaranteeing the required operating conditions, reaching the temperature thresholds or reaching a temperature differential between heat source flow (sensor FWV) and buffer cylinder (sensor FPU). The overrun time for pump PWE can be defined or it can be set to continuous operation.

Flow control

The flow control function is an additional option for heat delivery for automatic alternative heat sources that are started by Logamatic 5000 and incorporated into the heating system by way of a buffer cylinder or low loss header. The mixing valve SWR, which is required for controlling a minimum return temperature, is operated as an override to control the flow temperature. The flow rate to the buffer cylinder or low loss header is controlled according to the temperature of the alternative heat source in such a way that the temperature of the alternative heat source is at least equal to the set flow temperature demanded by the heating system. The overrun time for pump PWE can be defined or it can be set to continuous operation.

External control

The control system of the alternative heat source or another external control system performs the heat delivery function and, if necessary, the safety function for the alternative heat source. The pump PWE and, if applicable, the mixing valve SWR connections on the FM-AM function module have no function.

Direct integration into heating systems without buffer cylinder

Incorporating an alternative heat source without a buffer cylinder is not advisable and should only be done in exceptional cases.

This integration method is highly dependent on various general conditions:

- Type of heat source
- Demands made by the heat source in respect of correct operation
- Design of the overall system, especially the quantity of heat required throughout the year as minimum consumption (ordered annual demand pattern)

If there is a need to dispense with a buffer cylinder, it is important to ensure that the automatic alternative heat source has similar characteristics to an oil/gas boiler with respect to heat-up speed and burner runtimes.

Without a buffer cylinder, the FM-AM function module only supports alternative heat sources with similar operating characteristics to oil/gas boilers. Alternative heat sources that have substantially different characteristics but are nonetheless incorporated into the heating system without a buffer cylinder are not so effectively supported by the control technology. The function of the heating system may then be substantially impaired.

Whether the FM-AM function module can be used in systems without buffer cylinder must be determined on the basis of individual planning and consultation with a Buderus agent (→ back page).

Integration via a low loss header

The FM-AM function module supports incorporation of an alternative heat source connected to a low loss header. The temperature in the low loss header is the determining factor for boiler management. Alternative heat sources and floor standing boilers are switched on and off as required according to the temperature in the low loss header. This method of integration requires an automatic alternative heat source that is started by Logamatic 5000. The alternative heat source is selected/ deselected by means of the shared flow temperature sensor. This configuration can be used in systems containing several floor standing heat sources with FM-CM function module (temperature sensor FVS). The alternative heat source is the lead boiler, i.e. is selected first and deselected last.

The method of integration requires that the alternative heat source can deliver at least the same ΔT and the same flow temperature as the floor standing boiler(s). By comparing the required set system temperature with the combined actual flow temperature (sensor FVS), the heat source management function decides whether heat output is required or whether the heat requirement is being met.

With this method of integration, if an alternative heat source is unable to deliver the required set system temperature, it is not enabled or is deselected for safety reasons.

If the flow temperature at the common temperature sensor FVS is below the set value for the heating system by a switching differential, the boiler management system first selects the alternative heat source. After the alternative heat source has been started up, all other floor standing boilers remain off for a specified blocking time. The default setting of this blocking time is 30 minutes and is adjustable. During that period, the alternative heat source supplies the heat to meet the demand from the system. If the output from alternative heat source is insufficient, the other floor standing boilers are enabled after the blocking time has elapsed. If the demand from the heating system diminishes, the heat source management switches off output stages/ boilers. The alternative heat source remains in operation longest.

The alternative heat source is not switched off until the common flow temperature measured at the temperature sensor FVS exceeds the set system temperature by a specified switching differential.

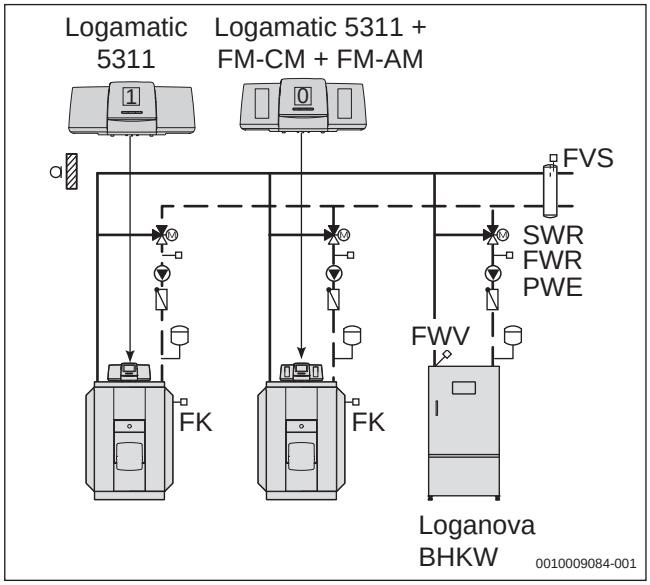


Fig. 59 Integrating the alternative heat source by means of a low loss header (abbreviations → Tab. 29, page 84)

The following integration variants are possible:

- **Bypass configuration (connected in series)**
  Integration of the alternative heat source as return temperature increase for a standard heat source or a low loss header in combination with a wall mounted gas boiler on the secondary side (heating system side)
- **Alternative configuration**
  Integration of an alternative heat source to the standard heat source. Either the alternative heat source or the standard heat source can be operational.
- **Integration via a buffer cylinder**
  The alternative heat source transfers its energy to a buffer cylinder.
- **No integration**
  A heat source is not installed. The buffer cylinder can be operated with the Logamatic 5000 control system (→ "Integrating the buffer cylinder", page 62).

7.4.6 Wiring diagram for FM-AM function module

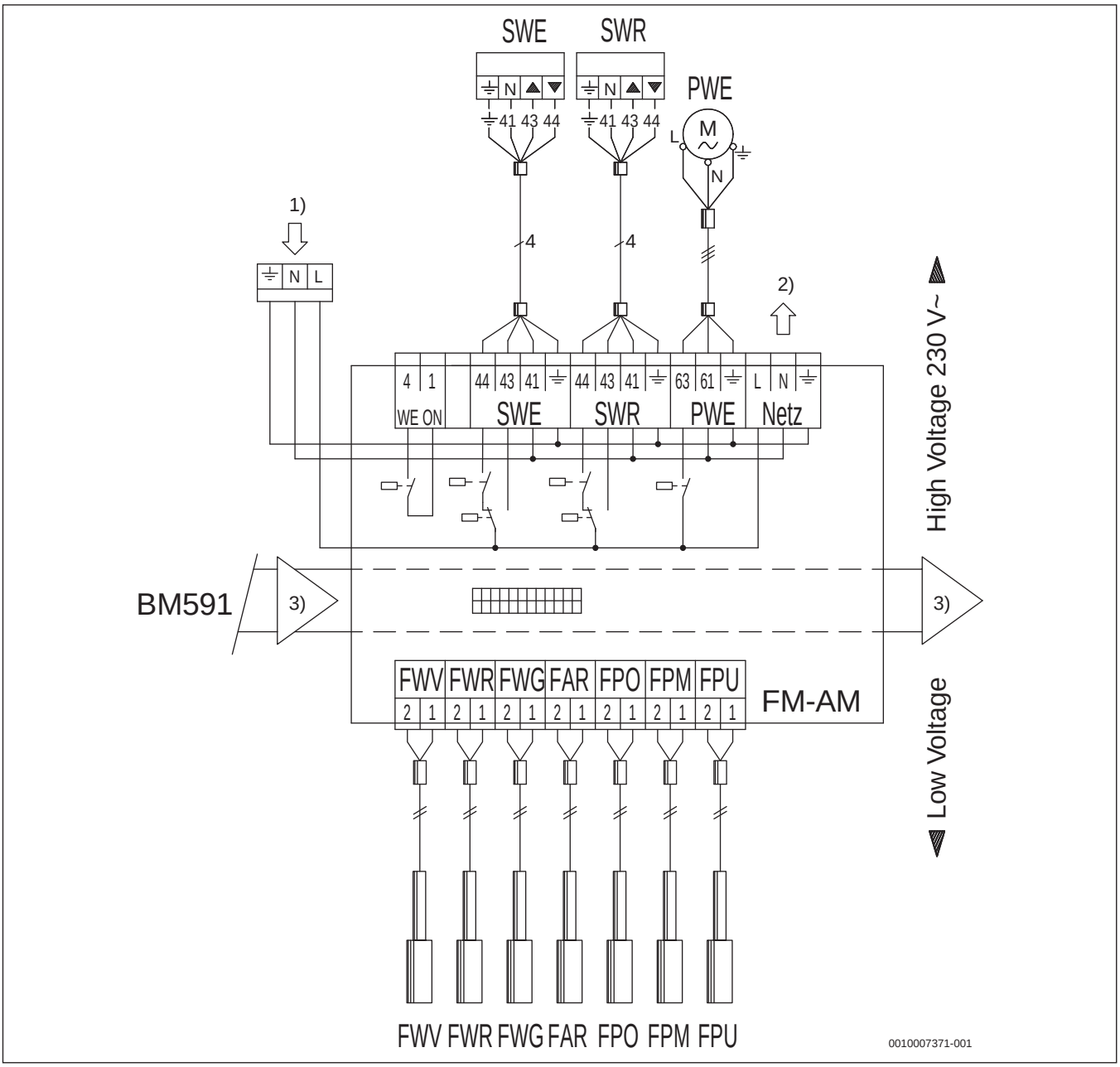


Fig. 60 Wiring diagram for the FM-AM function module (abbreviations → Tab. 29, page 84)

BM591	PCB module for internal BUS
FM-AM	Function module
FAR	Temperature sensor, system return
FPM	Temperature sensor, buffer centre
FPO	Temperature sensor, buffer top
FPU	Temperature sensor, buffer bottom
FWG	Temperature sensor, PT 1000, heat source flue gas
FWR	Temperature sensor, heat source return
FWV	Temperature sensor, heat source flow
PWE	Pump, alternative heat source
SWE	Motorised diverter valve, heat source
SWR	Heat source return mixing valve
WE ON	Output for automatic heat source start signal (zero volt), alternative emergency cooling with manual heat source. Switch load: min. 5 VDC/10 mA, max. 230 VAC/5 A (if the WE-ON output is used for an extra-low voltage circuit, a 230 V circuit must not be switched by that output beforehand).

Handling terminals:

High-Voltage	Control voltage 230 V~1.5 mm^2/ AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0.4 ... 0.75 mm^2/ AWG 18
1)	Mains supply from the power supply module or adjacent module
2)	Mains supply for further modules
3)	Internal BUS in the control unit

A connection via Modbus RTU (BCT531) is required in addition to the FM-AM for the combination with a Buderus CHP module.

7.5 Cascade module FM-CM

7.5.1 Short description of FM-CM cascade module

Possible applications

The FM-CM cascade module is the strategy module for the medium to high output range.

Up to 16 floor standing heat sources can be controlled with the FM-CM cascade module. To do this, each heat source must be equipped with a Logamatic 5311 or Logamatic 5313 control unit. Up to 4 heat sources can be controlled with a Logamatic EMS. If an EMS heat source is also controlled by a Logamatic 5313 basic control unit, a cascade of up to 5 EMS heat sources can be implemented with a FM-CM cascade module.

The module is always to be allowed for in the Logamatic 5311 or Logamatic 5313 master control unit with the CBC-BUS address 0. Up to 4 FM-CM cascade modules are possible and allow activation of up to 16 EMS heat sources.

The cascade module enables the individual output stages of the floor standing boiler depending on the control deviation and time. To that end the cascade module records the flow temperature in the shared system flow (strategy flow temperature sensor FVS) and generates a common set value requirement for all heat consumers in the heating system and external heat requirement via contact, 0 ... 10 V and Modbus. In this case the highest heat requirement is selected.

The FM-CM cascade module allows floor standing boilers equipped with the Logamatic 5000 and Logamatic EMS control system to be operated jointly (mixed cascade). Modulating and multi-stage boilers can be combined with one another regardless of whether the boiler with Logamatic EMS is a floor standing or wall-mounted boiler. In this case, boiler activation with the Logamatic 5313 control unit is effected via SAFe-BUS, and via 1st/2nd stage burner cable with the Logamatic 5311 control unit. The control unit detects the cascade module automatically and shows all adjustable parameters in the service menu of the user interface.

Scope of delivery

- Cascade module FM-CM
- Strategy flow temperature sensor FVS

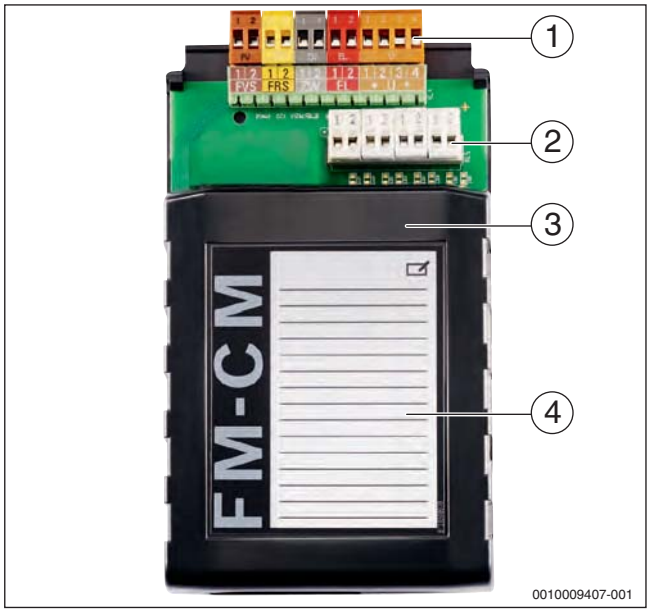


Fig. 61 Cascade module FM-CM

[1] Module terminal block for extra-low voltage
[2] Module terminal block for EMS heat source
[3] Module housing
[4] Label with space for notes

Strategy functions

- Combination with a Logamatic 5311 or Logamatic 5313 control unit
- Maximum of 16 heat sources by combining up to 4 FM-CM cascade modules
- Combination of floor standing boilers with 1-stage, 2-stage and modulating burners
- Boiler sequence in parallel or in series to take system-specific efficiencies into account
- Automatic load limitation based on choice of outside temperature or external switch or continuously
- Automatic sequence reversal of floor standing boilers either daily, according to outside temperature, hours run or external contact
- Automatic boiler sequences or user-defined specification of different boiler sequences for sequence reversal
- Isolation of lag boilers taking account of load limitation and automatic sequence reversal
- Definable run-on period for boiler circulation pumps for utilisation of residual heat from lag boilers
- Output 0 ... 10 V for externally signalling temperature requirement (heat requirement) to master controller (DDC)
- Indication of status of individual boilers
- Output of central fault message included in functional scope of Logamatic 5311/5313 base control unit

Notice: on the FM-CM cascade module, the existing 0 ... 10 V output (terminal U) has no function. Use the input with identical function on the Logamatic 5311 or Logamatic 5313 master control unit for this function. The input ZW (connection of heat meter) also has no function.

Special solution with FM-CM cascade module each with a separate Logamatic 5000 control unit for each boiler

Up to 16 floor standing boilers can be activated with one FM-CM cascade module, providing each floor standing boiler is equipped with a separate Logamatic 5311 or Logamatic 5313 control unit. In this case, boiler activation with the Logamatic 5313 control unit is effected via SAFe-BUS, and via 1st/2nd stage burner cable with the Logamatic 5311 control unit. When using more than 5 floor standing boilers that are activated via EMS-BUS (e. g. wall-mounted indoor units) additional FM-CM cascade modules are required because these floor standing boilers are connected to the terminals EMS1 ... EMS4 of the cascade module..

Notice: the FM-CM cascade module is suitable for controlling boilers with 7-pin plugs (Logamatic 5311) and also EMS boilers with BUS protocol EMS 1.0 (boiler electronics UBA3.x or Logamatic MC10/40. It is not compatible with the BUS protocol EMS 2.0 – Logamatic MC100/110.

Floor standing boilers equipped with the MC100/110 boiler control unit (EMS 2.0) must not be connected to the terminals EMS1 ...EMS4 on the FM-CM cascade module. However, an individual Logamatic MC100/110 control unit can be directly connected to EMS-BUS of the Logamatic 5313 control unit.
Recommendation: to ensure continuous numbering of heating circuits, insert module FM-CM into slot 4 (→ Fig. 15, page 17 or Fig. 30, page 33).

When combined with the Logamatic 5313 control unit, the first EMS boiler (boiler 0) must be connected to the EMS connection of the BCT531 controller module of the base control unit (not to the FM-CM cascade module). The second boiler is connected to the FM-CM cascade module at the EMS1 terminal (boiler 1) and the third boiler is connected to the EMS2 terminal, etc. When a fault occurs, the fault display “communication fault boiler 0” is generated.

Cascade module FM-CM (example 1): control of 4 floor standing boilers with modulating, single-stage or 2-stage burners

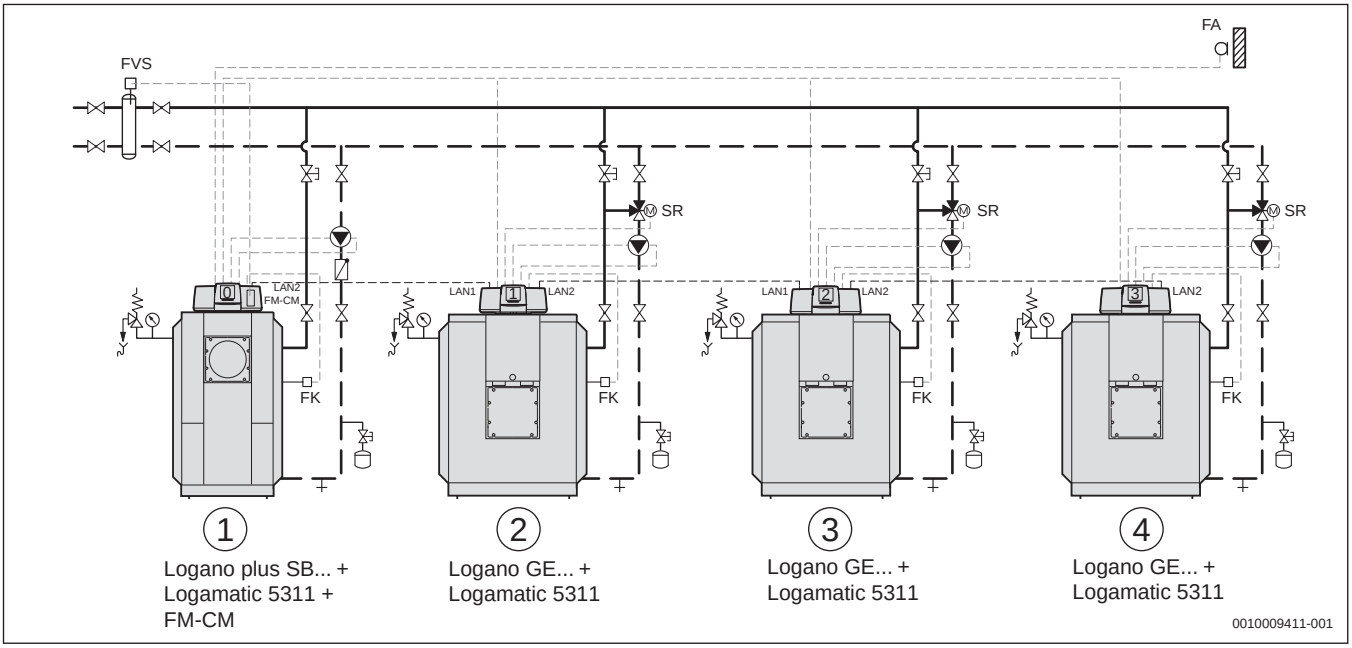


Fig. 62 Connection options at FM-CM cascade module (example 1) abbreviations → Tab. 29, page 84)

[1] Floor standing boiler with address 0 (master control unit)
[2] Floor standing boiler with address 1 (slave control unit)
[3] Floor standing boiler with address 2 (slave control unit)
[4] Floor standing boiler with address 3 (slave control unit)

Cascade module FM-CM (example 2): control of up to 4 Logano plus KB372 floor standing boilers with Logamatic 5313

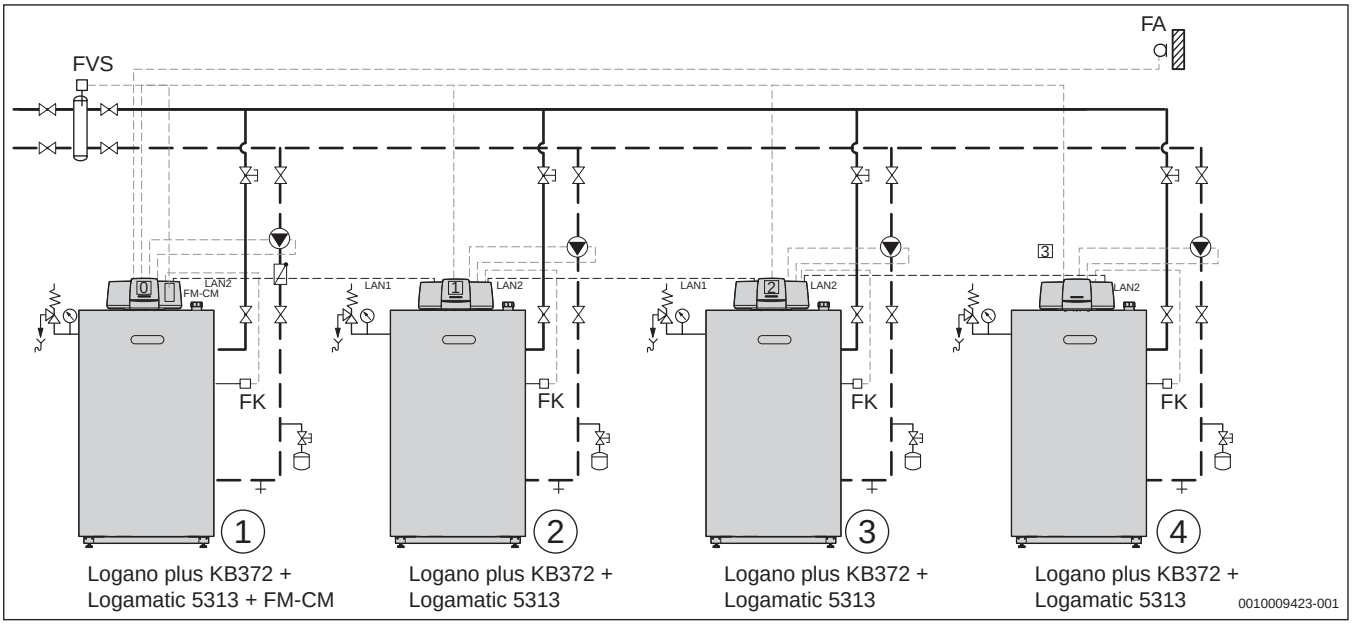


Fig. 63 Connection options at FM-CM cascade module (example 2); abbreviations → Tab. 29, page 84)

[1] Floor standing boiler with address 0 (master control unit)
[2] Floor standing boiler with address 1 (slave control unit)
[3] Floor standing boiler with address 2 (slave control unit)
[4] Floor standing boiler with address 3 (slave control unit)

Cascade module FM-CM (example 3): control of a cascade containing 4 wall-mounted indoor units

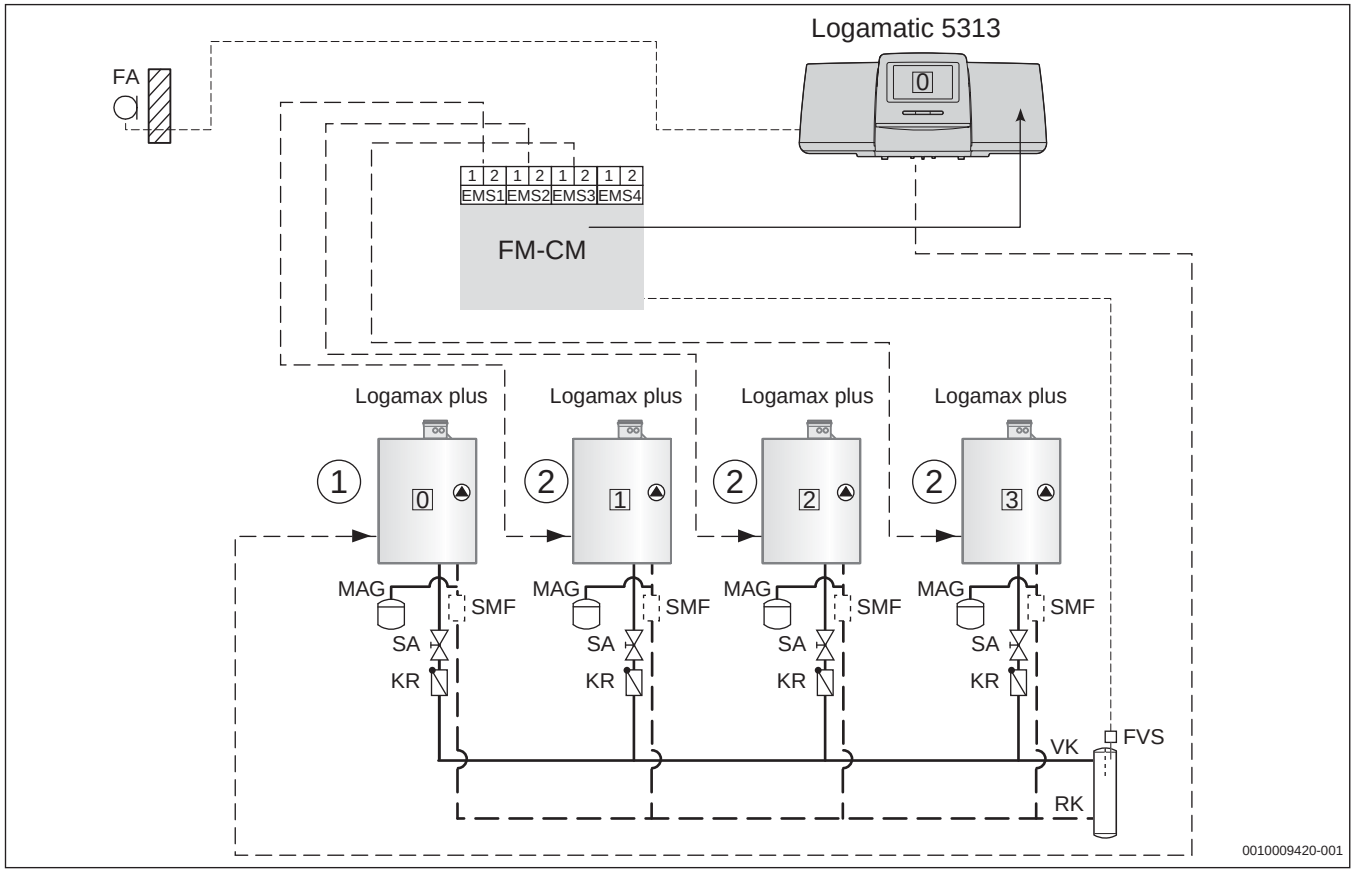


Fig. 64 Connection options at FM-CM cascade module (example 3); abbreviations → Tab. 29, page 84)

[1] Wall-mounted indoor unit with address 0 (connection to terminal EMS on BCT531)
[2] Wall-mounted indoor units with addresses 1 ... 3 (connection to terminals EMS1 ... EMS4 on the FM-CM cascade module)

Cascade module FM-CM (example 4): control of floor standing boilers with Logamatic 5000 and Logamatic EMS

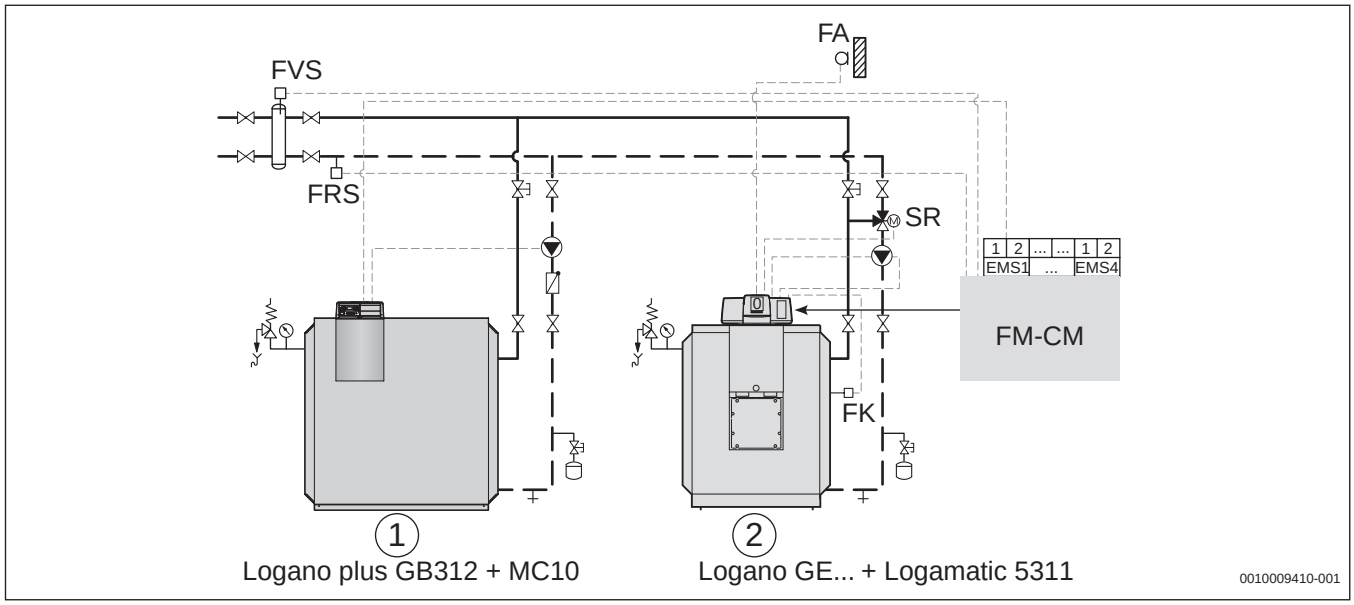


Fig. 65 Connection options at FM-CM cascade module (example 4); abbreviations → Tab. 29, page 84)

[1] Floor standing boilers with address 1 (connection to EMS1 terminals of FM-CM cascade module)
[2] Floor standing boiler with address 0

7.5.2 Possible applications of FM-CM cascade module

Control unit	FM-CM	Max. number per control unit
Logamatic 5310	No	–
Logamatic 5311	Yes	4
Logamatic 5313	Yes	4

Table 21 Possible applications of FM-CM cascade module

7.5.3 Specifications of FM-CM cascade module

	Unit	Cascade module FM-CM
Operating voltage	V AC	230 (± 10 %)
Frequency	Hz	50 (± 4 %)
Power consumption	VA	2
Strategy sensor set FVS/FRS; NTC sensor	mm	Ø 9
Boiler connection	–	EMS 1.0 (not compatible with EMS 2.0 – Logamatic MC100/110)

Table 22 Specifications of FM-CM cascade module

7.5.4 4-boiler system

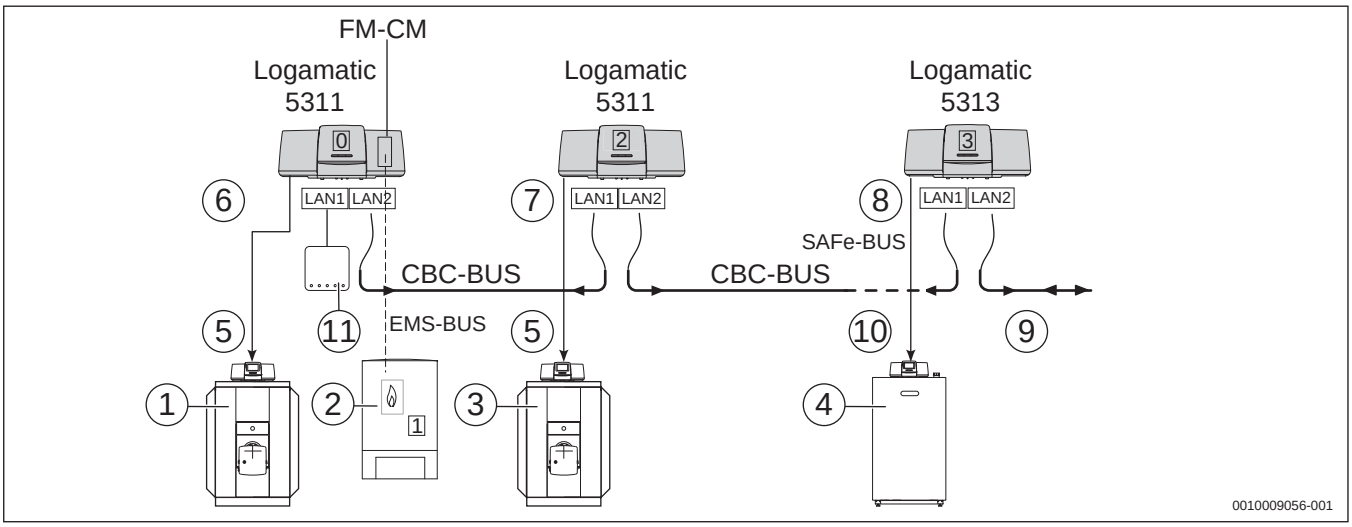


Fig. 66 Example combination of Logamatic 5000 system control units for a 4-boiler system showing assignment of floor standing boiler and addresses in the CBC-BUS network

[1] Floor standing boiler with third party burner (e. g. Logano plus SB625 or Logano plus GE615)
[2] EMS gas wall-mounted indoor unit or EMS gas/oil boiler with address 1 (e. g. Logamax plus GB162 or Logano plus KB192i), connection to FM-CM (terminal EMS1)
[3] Floor standing boiler with third party burner (e. g. Logano plus SB625 or Logano plus GE615)
[4] Floor standing boiler with burner control unit SAFe (e. g. Logano plus KB372 or Logano plus GB402)
[5] Burner control via conventional 7 and/or 4-pin plug (connection to ZM5311)
[6] Logamatic 5311 Address 0 (master control unit), connection to boiler item [1]; connection of device item [2] directly to FM-CM
[7] Logamatic 5311 Address 2 (slave control unit)
[8] Logamatic 5313 Address 3 (slave control unit)
[9] Burner control via EMS-BUS (connection to FM-CM)
[10] Direct burner control via SAFe-BUS (connection to ZM5311)
[11] Router (connection always to LAN1 of the master control unit)

Address 0 (master)
Logamatic 5311
- Control unit for [1] lead boiler with FM-CM cascade module (cascade module) with outside temperature sensor
- 3 spare slots for function expansion modules

Address 1
- EMS oil/gas heat source (connection to FM-CM cascade module)

Address 2
Logamatic 5311
- Control unit for activation of [2] lag boiler
- 4 spare slots for function expansion modules

Address 3
Logamatic 5313
- Control unit for activation of [3] lag boiler
- 4 spare slots for function expansion modules

Address 4 ... 15 (choice and assignment unrestricted)
Logamatic 5310
- Expansion control unit (not shown)

7.5.5 Cascade of 5 wall-mounted indoor units

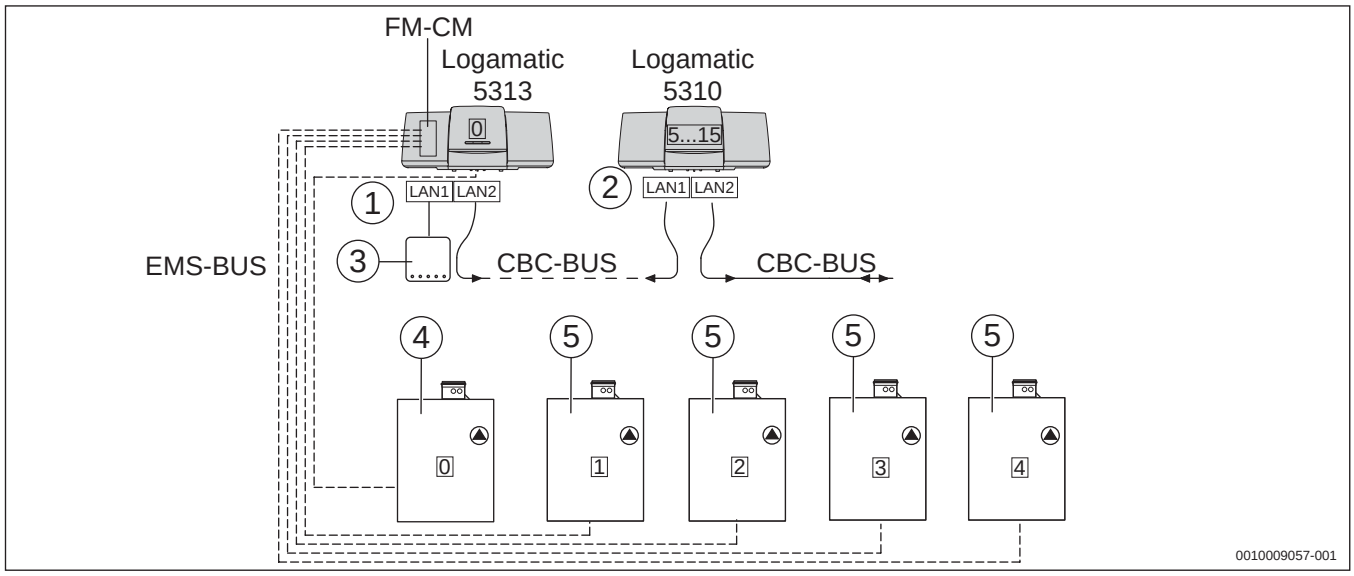


Fig. 67 Example combination of Logamatic 5000 system control units for a cascade of 5 wall-mounted indoor units showing assignment of floor standing boiler and addresses in the CBC-BUS network

[1] Logamatic 5313 with address 0 (master control unit), connection to boiler item [4]; connection of boiler item [5] to FM-CM

[2] Logamatic 5310[1)] Address 5 ... max. 15 (Slave control unit)

[3] Router (connection always to LAN1 of the Master control unit)

[4] Wall-mounted indoor unit 1 (address 0, connection to EMS terminal on BCT531)

[5] Wall-mounted indoor units with addresses 1 ... 4 (connection to FM-CM cascade module, terminals EMS1 ... 4)

Address 0 (master)
Logamatic 5313

- Control unit for cascade control with FM-CM cascade module (for up to 5 wall-mounted indoor units) with outside temperature sensor
- Activation of the first wall-mounted indoor unit with the address 0
- Heating circuit function (1 heating circuit with mixing valve) with DHW heating (cylinder system) via cylinder primary pump
- 3 spare slots for function expansion modules

Address 1 ... 4

- Wall-mounted indoor units with addresses 1 ... 4 (connection to FM-CM cascade module)

Address 5 ... 15 (choice and assignment unrestricted)
Logamatic 5310 (control unit preparation underway)

- Expansion control unit

1) Preparation of control unit Logamatic 5310 is underway, or alternatively a Logamatic 5313 or Logamatic 5311 control unit can also be used as substation.

7.5.6 Cascade of 9 wall-mounted indoor units

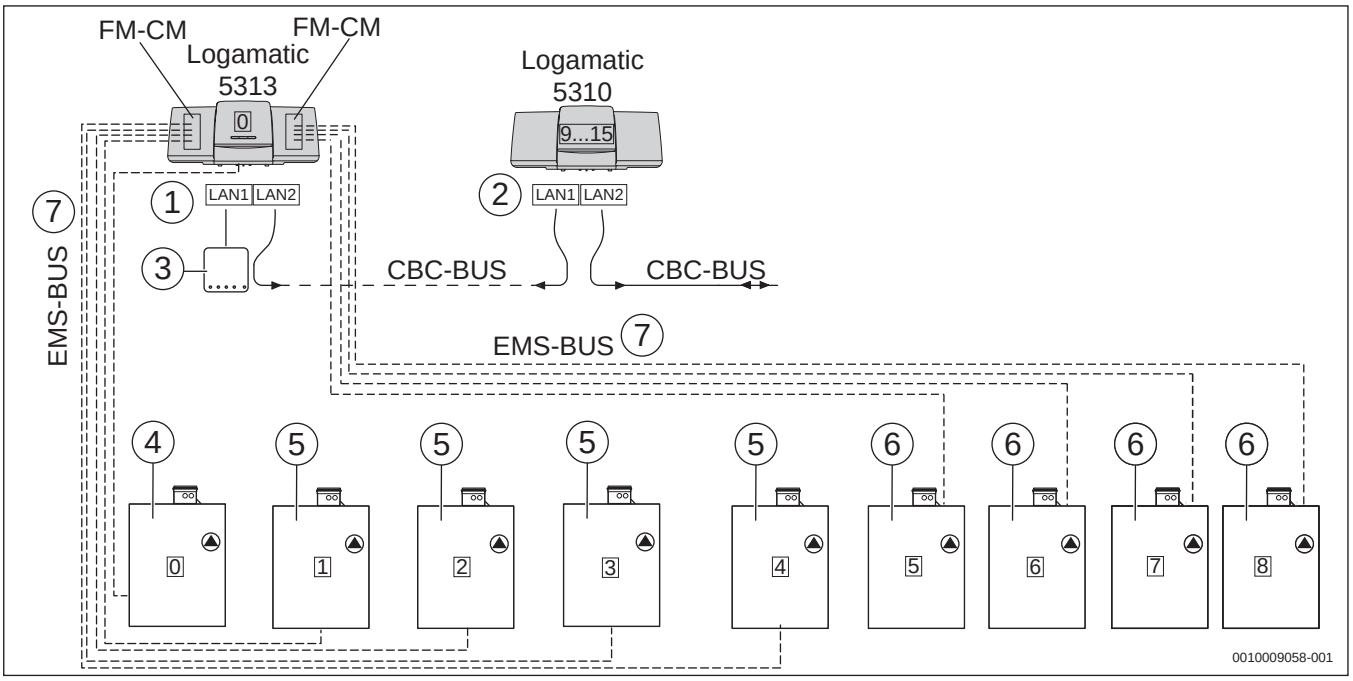


Fig. 68 Example combination of Logamatic 5000 system control units for a cascade of 9 wall-mounted indoor units showing assignment of floor standing boiler and addresses in the CBC-BUS network

[1] Logamatic 5313 with address 0 (master control unit)
[2] Logamatic 5310[1)] Address 9 ... max. 15 (Slave control unit)
[3] Router (connection always to LAN1 of the Master control unit)
[4] Wall-mounted indoor unit 1 (address 0, connection to EMS terminal on BCT531)
[5] Wall-mounted indoor units with addresses 1 ... 4 (connection to FM-CM cascade module on left)
[6] Wall-mounted indoor units with addresses 5 ... 8 (connection to FM-CM cascade module on right)
[7] Burner control via EMS-BUS

Address 0 (master)
Logamatic 5313
- Control unit for cascade control with 2 × cascade module FM-CM (for up to 9 wall-mounted indoor units) with outside temperature sensor
- Activation of the first wall-mounted indoor unit with the address 0
- Heating circuit function (1 heating circuit with mixing valve) with DHW heating (cylinder system) via cylinder primary pump
- 2 spare slots for function expansion modules

Address 1 ... 4
- Wall-mounted indoor units with addresses 1 ... 4 (connection to FM-CM cascade module on left)

Address 5 ... 8
- Wall-mounted indoor units with addresses 5 ... 8 (connection to FM-CM cascade module on right)

Adresse 9 ... 15 (choice and assignment unrestricted)
Logamatic 5310 (control unit preparation underway)
- Expansion control unit

1) Preparation of control unit Logamatic 5310 is underway, or alternatively a Logamatic 5313 or Logamatic 5311 control unit can also be used as substation..

7.5.7 Planning information for the FM-CM cascade module

Boiler protection in multi-boiler systems

When planning multi-boiler systems, ensuring boiler safety for every floor standing boiler is of prime importance. In combination with the appropriate plumbing configuration (e.g. pressurised or low-pressure manifold, low loss header) that is guaranteed with the correct control settings.

When upgrading old systems, the heating circuits are frequently externally controlled, e.g. by a higher-level DDC system. In such cases, system isolation (e.g. by means of a low-loss header, use of boiler circuit mixing valves and boiler circulation pumps) is advisable in order to ensure the safety of the floor standing boiler concerned.

Priority of boiler control compared with strategy

When activated via the cascade module FM-CM, the strategy function basically switches the burner on and off. However, the burner's required operating conditions have the highest priority and are always met under any circumstances. In order to prevent critical boiler operating situations, the floor standing boiler with Logamatic 5313/5311 or Logamatic EMS controls its burner independently in the following situations:

- **Frost protection**
  If the boiler temperature reaches the frost protection limit, the burner is switched on. For boilers with required operating conditions, the burner is switched off after the boiler safety sequence has been completed. The burner in floor standing condensing boilers is switched off via switching differentials.
- **Overheating**
  As soon as the boiler flow temperature has reached its maximum level, the burner switches off.
- **Operating conditions**
  As long as the operating flow temperature of the floor standing boiler is below the set value, the floor standing boiler remains in operation. An exception to that rule is the floor standing boiler with minimum return temperature because it would run continuously in certain operating situations.

Position of strategy flow temperature sensor

This must be placed directly in the low loss header at a suitable height in multi-boiler systems with FVS strategy flow temperature sensor (select suitable sensor pocket to ensure the sensor is positioned at the height “centre of secondary side”). If a heat exchanger is installed or if a low loss header/heat exchanger is not installed (no hydraulic separation and therefore pressurised manifold), the differential sensor must be located as close as possible to the boiler system. Additional time lags due to large distances between the boiler system and the strategy flow temperature sensor have a negative effect on the control characteristics, especially in the case of floor standing boilers with modulating burners.

Setting of control unit address with Logamatic 5000 and Logamatic EMS

Correct functioning requires unambiguous assignment of the boiler address (→ Fig. 69). The boilers are numbered consecutively in ascending order starting from address 0. The address is assigned for floor standing boilers equipped with Logamatic 5313 and 5311 by setting the CBC-BUS address (address coding switch), and for boilers equipped with Logamatic EMS via the connection on the EMS1, EMS2, EMS3 terminal or EMS4 on the FM-CM cascade module. Each boiler address may only be assigned once.

As a basic rule, the FM-CM cascade module can be located at any of the 4 slots of a Logamatic 5313 or 5311 control unit. Recommendation to ensure continuous numbering of heating circuits: if only one FM-CM module is available, install this at slot 4 (→ Fig. 15, page 17 or Fig. 30, page 33).

If several cascade modules are used, as a basic rule they should be addressed from left to right (the addresses 1 ... 4 are assigned to floor standing boilers connected to the cascade module on the left, etc.). All system components, e.g. FVS and FRS sensor, are connected to the cascade module on the left.

For more details on setting addresses → Chapter 3.1.1, page 9.

Notice: if the control unit is installed on a floor standing boiler (e.g. KB372) and activated via SAFe-BUS, this floor standing boiler is assigned the address 0. In this case a floor standing boiler cannot be connected to the EMS terminal on BCT531, and must instead only be connected to the FM-CM cascade module.

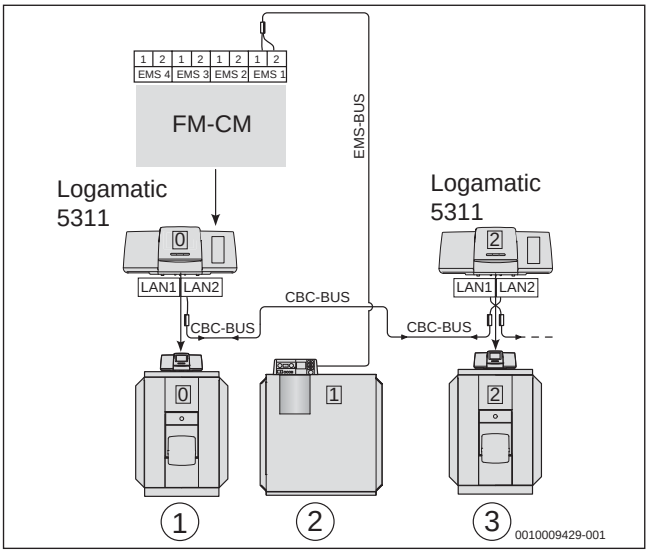


Fig. 69 Connecting floor standing boilers with Logamatic 5311

[1] Floor standing boiler with address 0 (master control unit) with cascade module FM-CM)
[2] Floor standing boiler with address 1 (connection to terminal EMS1 of the FM-CM cascade module)
[3] Floor standing boiler with address 2 (slave control unit)

If several FM-CM cascade modules are installed, all sensors and other inputs and outputs are connected on the left FM-CM (when viewing control unit from the front).

7.5.8 Wiring diagram for FM-CM cascade module

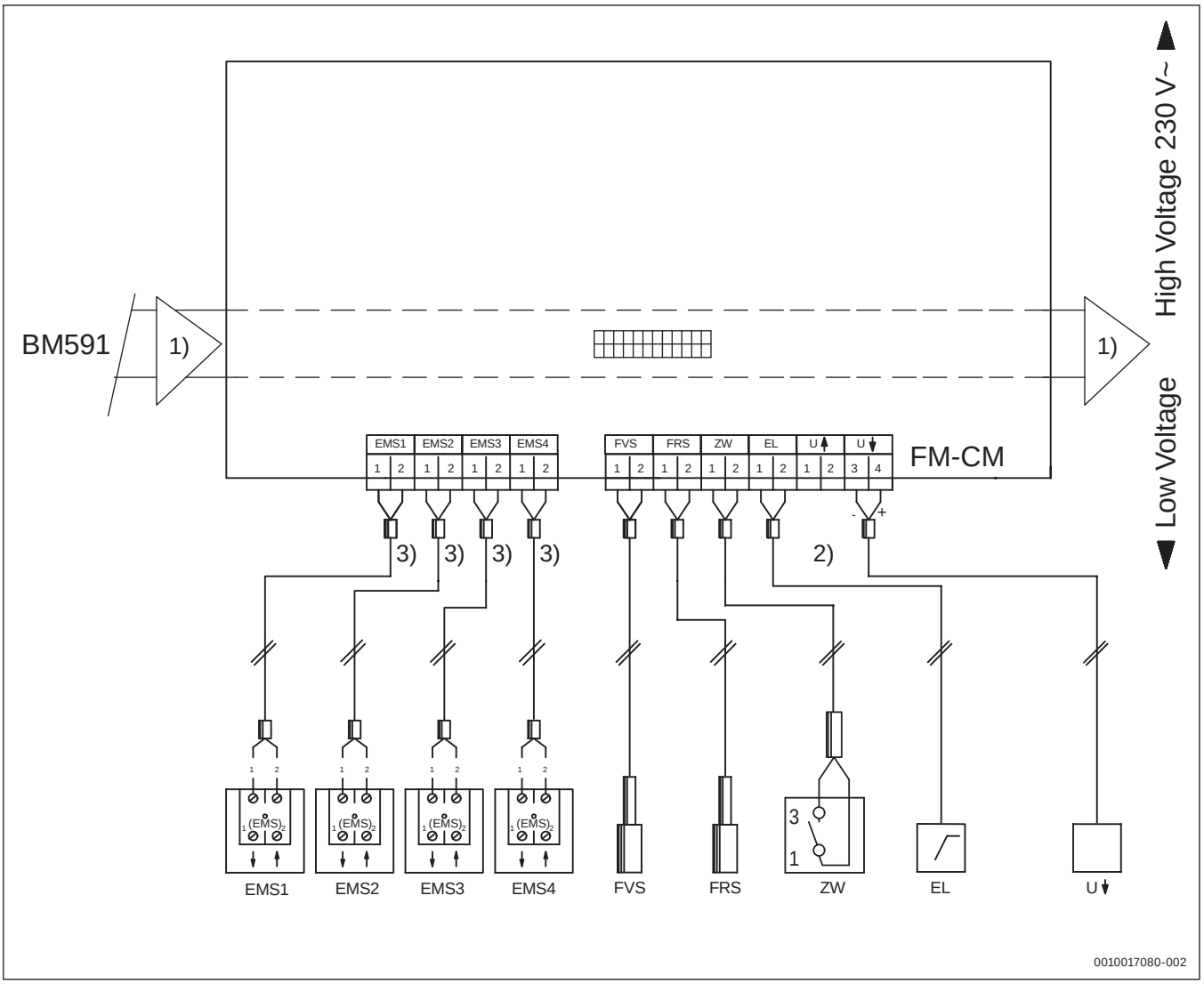


Fig. 70 Wiring diagram FM-CM

1) Internal BUS in the control unit

2) Without function. The voltage input must be connected to the WA terminals of the ZM531x central module in the master control unit.

3) Maximum length of BUS cable 100 m, minimum cross-section 2 × 0,4 ... 0,75 mm^2

AS Central fault message output, max. switch load 230 V/5 A, min. switch load 5 V DC/10 mA

EL Input external load limit optional zero volt contact

EMS1 Heat source; boiler 1 (→ info box)

EMS2 Heat source; boiler 2 (→ info box)

EMS3 Heat source; boiler 3 (→ info box)

EMS4 Heat source; boiler 4 (→ info box)

FA Outdoor temperature sensor

FK Boiler water temperature sensor

FRS System return temperature sensor

FVS System flow temperature sensor

PK Boiler circulation pump (activation over 230 V). When connected to Logamatic 5313 and 5311 the boiler circulation pump can be activated in a modulating fashion via 0 ... 10 V signal by the central module.

SR Return temperature mixing valve (heating circuit 1...3)

U↑ Input – without function. The voltage input must be connected to the WA terminals of the ZM531x central module in the master control unit.

U↓ Output 0 ... 10 V, programmable

ZW External sequence reversal, optional zero volt contact

When combined with the Logamatic 5313 control unit, the first EMS boiler (boiler 0) must be connected to the EMS connection of the BCT531 controller module of the base control unit (not to the FM-CM cascade module). The second boiler is connected to the FM-CM cascade module at the EMS1 terminal (boiler 1) and the third boiler is connected to the EMS2 terminal, etc. When a fault occurs, the fault display “communication fault boiler 0” is generated.

7.6 FM-SI function module for integration of external safety equipment

7.6.1 Brief description of FM-SI function module

Possible applications

The FM-SI function module monitors up to 5 external safety devices, e.g. low water indicator, pressure limiter and safety temperature limiter. One module of this type may be fitted in each control unit. The control unit detects the function module automatically and shows all adjustable parameters in the service menu.

The module can be used in the Logamatic 5311 and Logamatic 5313 control units.
Notice regarding Logamatic 5313: if a heat source is activated via EMS-BUS (boiler type EMS), the FM-SI function module must not be used. With boiler type EMS safety components are connected directly to the boiler electronics (both in 1-boiler systems and also cascades).

Scope of delivery

- Function module FM-SI

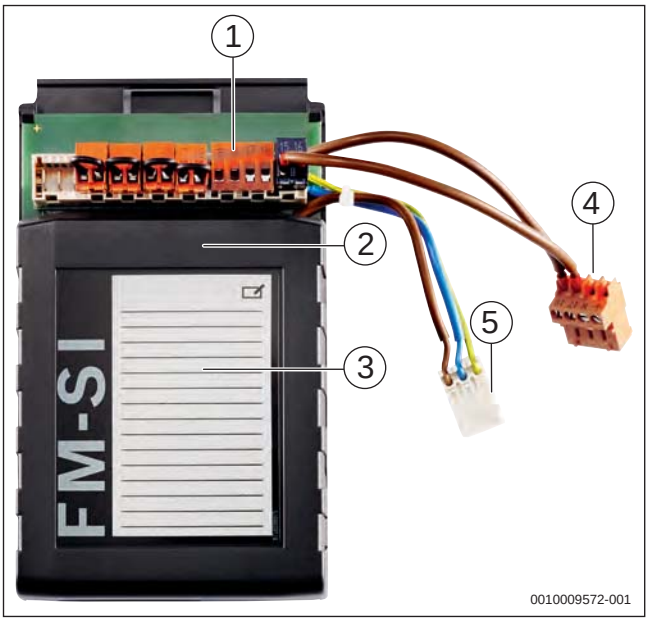


Fig. 71 Function module FM-SI

[1] Module terminal block
[2] Module housing
[3] Label with space for notes
[4] SI terminal on NM582 power supply module of the Logamatic 5000 control unit
[5] Mains supply from the power supply module or adjacent module

The FM-SI function module must be installed at slot 1 (left). When installing the FM-SI module, jumper SI17-18 on the base control unit must be removed.

7.6.2 Possible applications of FM-SI function module

Control unit	FM-SI	Max. number per control unit
Logamatic 5310	No	–
Logamatic 5311	Yes	1
Logamatic 5313	Yes	1

Table 23 Possible applications of FM-SI function module

7.6.3 FM-SI function module specifications

	Unit	Function module FM-SI
Operating voltage	V AC	230 (± 10 %)
Frequency	Hz	50 (± 4 %)
Power consumption (standby)	W	2

Table 24 FM-SI function module specifications

7.6.4 Function description of FM-SI function module

A general 4-pin input as well as 4 additional 2-pin programmable inputs are available for connection of the external safety components.

Each safety device is connected individually and can be named individually via the user interface. This means that faults can easily be evaluated – detection of triggered safety components – via the control unit or via remote enquiry.

The FM-SI function module can only be used when the Logamatic 5000 control unit is installed on the boiler, and not when the Logamatic 5000 control unit is connected to the boiler via EMS-BUS.

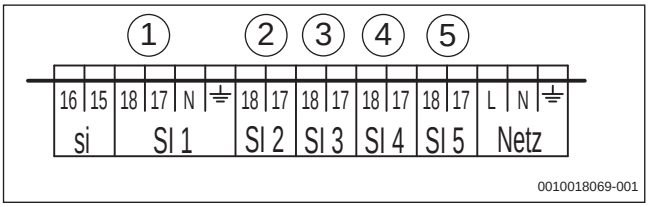


Fig. 72 Safety equipment of FM-SI function module

[1] Neutralisation
[2] Max. pressure limiter
[3] Min. pressure limiter
[4] Water shortage
[5] Pressure maintenance

7.6.5 Wiring diagram for function module FM-SI

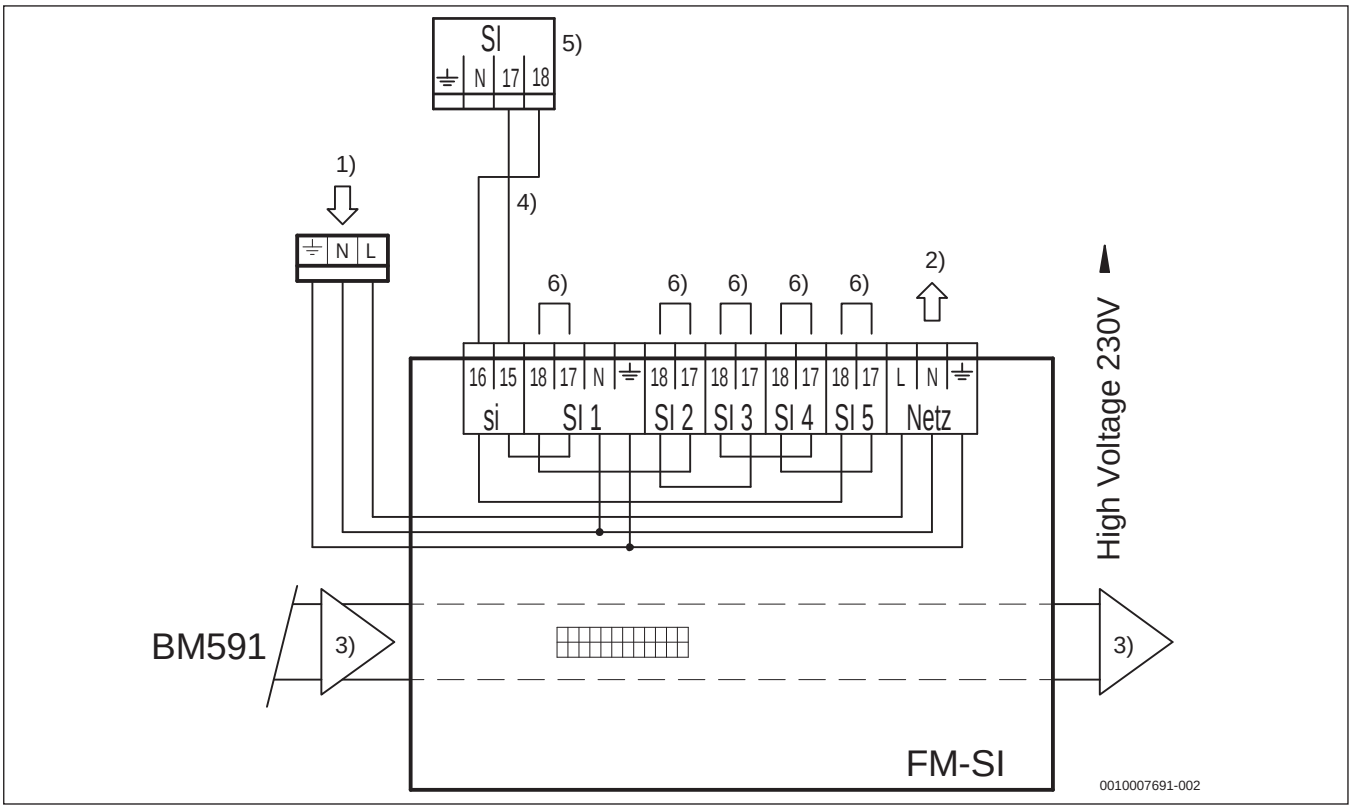


Fig. 73 Wiring diagram for function module FM-SI

BM591 PCB module for internal BUS
FM-SI Safety equipment function module

Handling terminals:

High-Voltage Control voltage 230 V~
1.5 mm^2/AWG 14, max. 5 A

1) Mains supply from the power supply module or adjacent module
2) Mains supply for further modules
3) Internal BUS in the control unit
4) Connecting lead from FM-SI module to NM582 power supply module
5) SI terminal on NM582 power supply module
6) **Caution:** if you are connecting safety equipment, remove the jumper. Unallocated SI connections of the safety chain module must be jumpered.

si Decoupled input for safety devices
SI 1-5 Connection terminals for safety equipment

Please note: if the mains connection 1) is not plugged in and the safety chain is closed, a fault is displayed.

Notes:

- A condensate neutraliser should be connected to the SI1 terminal (due to the additional terminals for PEN conductor and ground conductor).
- If a heat source is activated via EMS-BUS (boiler type EMS), the FM-SI function module must not be used.
- Additional safety equipment must not be connected to the SI terminal of the control unit (Item [5]) when installing the FM-SI module. The jumper on the SI terminal must be removed.

7.7 Mounting rail module FM-RM

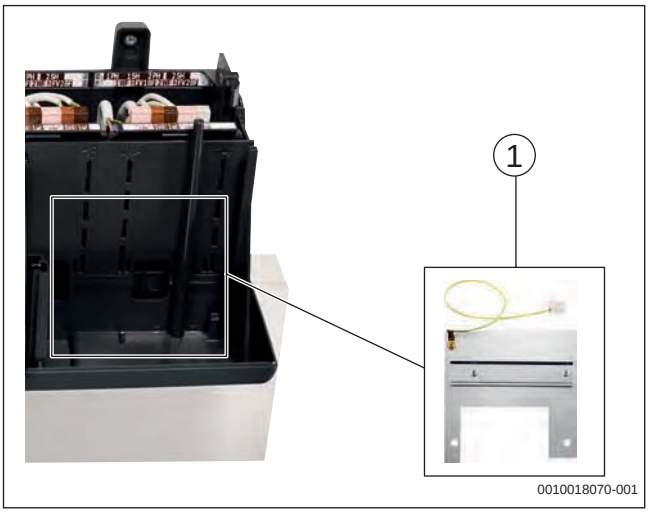


Fig. 74 Mounting rail moduleFM-RM

[1] FM-RM

Brief description

- The FM-RM mounting rail module allows components, e.g. coupling relay, etc., to be mounted on the mounting rail. It can only be installed at the slot C (→ Fig. 1, Item [2], page 7).
- Can be used in the Logamatic 5311, 5313 and 5310 control units (preparation underway).
- Possible applications for integration of the mounting rail module:
  - IP-Gateway for use of Control Center CommercialPLUS
  - UMTS/GSM module
  - Components for mounting rail installation provided by the customer (230 V coupling relay available as accessory, but no three-phase current contactor or similar)
  - Mounting rail modules with up to 10 modular widths (1 TE = 18 mm wide) can be mounted. The maximum acceptable overall height is 60 mm.

8 Connectivity

The Logamatic 5311 and Logamatic 5313 control units offer a large number of interfaces as standard. They are used for communication with the higher-level control system and various heat sources.

8.1 BuderusControl Center Commercial and Control Center CommercialPLUS

Fig. 75 Telecontrol with Control Center Commercial and Control Center CommercialPLUS

Operation as standard via Internet with Control Center Commercial and professional telecontrol with Control Center CommercialPLUS as extension.

For the latest detailed information on the Control Center Commercial and Control Center CommercialPLUS service → https://www.buderus-commercial.de/imprint/index.html#/de/buderus/detail/serviceDescription

Control Center Commercial

The Control Center Commercial Portal can be reached at the following Internet address: www.buderus-commercial.de
Initial registration can be carried out at: www.buderus-commercial.de/register

The system user (end customer) can control the heating system via the Internet using the Buderus Portal Control Center Commercial. The Logamatic 5311 and Logamatic 5313 control units have a standard IP-interface that allows connection to the Internet.

The following functions are available free of charge in the Control Center Commercial:

- Overview over all user systems
- 1:1 mirroring of the touch screen of the Logamatic 5000 control unit in the browser for remote intuitive operation
- Display of monitor data of entire system
- Programming of main menu (e. g. time programs, set room temperatures, holiday, year calendar)
- Display of service menu (read only)
- Display of last operating and fault indications
- Automatic forwarding of fault displays to a configurable e-mail address

Control Center CommercialPLUS

The fee-based Buderus-Portal Control Center CommercialPLUS is aimed at trade customers and, in addition to the basic functions of the Control Center Commercial, provides additional functions as “PLUS”:

- Overview of system with status display
- Full setting of parameters including service menu
- Control centre function
- Data recording (preparation underway)
- User management (preparation underway)

An additional Gateway (separate accessory) is required in order to use the additional functions of the Control Center CommercialPLUS.

Fig. 76 IP-Gateway Control Center CommercialPLUS (for assembly on the FM-RM mounting rail module)

All functions for end customers of the Control Center Commercial are available to trade customers in the Control Center CommercialPLUS. When several systems are used, only one or individual systems can be equipped with the PLUS services.

Current prices and detailed information
→ www.buderus.de/commercial

System requirements

- Recommended Internet connection (in the following order): landline, LTE, UMTS.
  For router, see accessories or if provided by the customer, recommendation: only router for professional telecontrol, further recommendations on request
- To use the Control Center Commercial and Control Center CommercialPLUS a mobile phone is required for transmission of TAN numbers via SMS. Only one mobile phone can be used with the Control Center Commercial, the Control Center CommercialPLUS can be be expanded to include up to max. 10 mobile phones.
- Recommended browser versions:
  – Firefox 36.x and higher
  – Chrome 40.x and higher
- Recommended display size: at least 10"

The following ports must be enabled for the Control Center Commercial, if the control unit is integrated into a network with an active Firewall:

Service	Protocol	Port
DHCP	UDP	67
DNS	UDP	53
NTP	UDP	123
VPN	UDP	1197
XMPP	TCP	50007 5222

Table 25 Port enabling

The following port must be enabled for the Control Center CommercialPLUS in addition to the ports indicated in the table 25:

Service	Protocol	Port
Control channel	TCP	2443

Table 26 Additional enabling of port for Control Center CommercialPLUS

Communication with the Logamatic 5000 control unit is only possible via Modbus TCP or Internet, and not simultaneously. The connection with the Internet can only be established with the address 0 via the master control unit. A connection cannot be established via other control units. The **IP-Gateway** setting option is only available for the master control unit with the address 0.

8.2 Logamatic 5000 service tool for PC/ laptop connection

The Logamatic 5311 and Logamatic 5313 control units can be connected to a PC/laptop. All functions of the control can thus be operated very conveniently via PC/ laptop. This can make sense, e.g. if a control unit is in a position which is difficult to access (top of the boiler with pressure-jet burner in front of boiler) or if the PC is not the boiler room (e.g. with a caretaker).

A special USB to IP adaptor is available as accessory from Buderus as PC or diagnostic interface. The USB interface is on the front of the BCT531 user interface/ controller module behind the flap. The PC/laptop is connected to the RJ45 socket of the adaptor (network cable provided by the customer).

Apart from the browser (Firefox, Internet Explorer or Chrome) no special software is required, the touch screen is displayed in the browser of the PC or laptop to allow intuitive 1:1 operation.
The following address must be entered in the browser address list: **cbc.bosch**

The following data can be accessed with the service tool:
- Main menu and service menu
- Monitor data and fault log
- Access to substations and slave control units

Notice: settings and monitor data on the PC can only be saved, exported or imported on-site via a USB stick (→ 8.4, page 81). The USB stick and service tool cannot be used at the same time. There are 2 USB ports (1 × accessible from the front,1 × BCT531 on the rear) on the Logamatic 5311 and Logamatic 5313 control units. The ports must not be used simultaneously. The service tool is designed for service purposes and must therefore not be used to establish a permanent long-term connection.

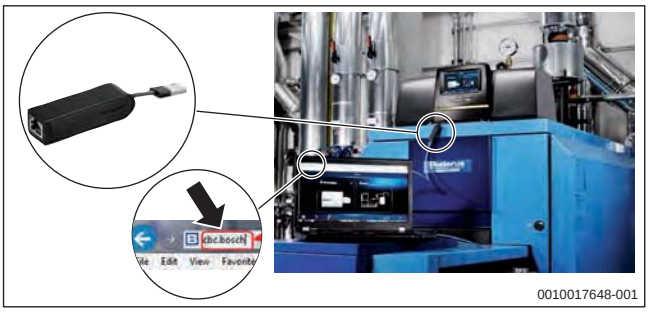


Fig. 77 Service tool Logamatic 5000 adaptor USB (control unit side) to IP (PC side: RJ45)

		Control Center Commercial (free of charge) via IP inside (serial)	Control Center CommercialPLUS (fee applies) via Gateway (accessory)
Monitoring: Parameters	Main menu	Yes	Yes
	Service level	Yes	Yes
Diagnosis: Fault displays	Last 20	Yes	Yes
Parameter: Settings	Main menu	Yes	Yes
	Service level	Read: yes Write: no	Yes
Data record[1)]		No	Yes
System visualisation[1)]		No	Yes
User management		No	Yes
Control centre function		No	Yes
Costs	Investment	Free of charge	Gateway
	Appliance operation	Free of charge	Annual fee per system

1) Preparation underway

Table 27 Scope of functions Control Center Commercial and Control Center CommercialPLUS

8.3 BUS communication

The following interfaces are available for BUS communication:

- The connection to the building services management system can be established via the standard Modbus interface (Modbus TCP/IP). The LAN1 terminal (RJ45 socket) is available for this. A data points list, containing data of the master control unit and also data of the multi-boiler system or substation is available on request.
  Notice: the Logamatic 5000 control unit is accessed via Modbus TCP/IP, Device ID 255. This must be supported by the Modbus connection partner.
  If a different protocol is required (e.g. Modbus RTU, LON, KNX or BACNet), the interfacing can only be carried out on-site using a suitable Gateway.
  Notice: communication via Modbus TCP and Internet is only possible in alternation.
- Communication with a Buderus CHP (combined heat and power) module is only possible via the standard Modbus interface (Modbus-RTU). The Modbus terminal (RS485) on the BCT531 is available for this. The FM-AM function module is also required.

8.4 USB interface

Use with USB stick

- Insert commercially available USB stick directly into the USB interface on the control unit (→ Fig. 78)
- The following data can be saved on the USB stick:
  - Service report
  - Device configurations/parameter settings (backup copy can be saved in the control unit or on USB stick)
  - Fault history
  - Data record: always automatically available for the last 7 days, data can be recorded for longer periods using SD card
  - The USB stick and Logamatic 5000 service tool (→ Chapter 8.2, page 80) cannot be used at the same time.

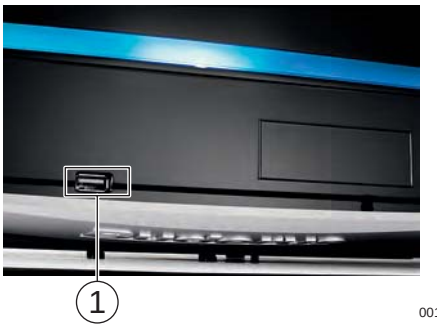


Fig. 78 USB interface: use with USB stick

[1] USB interface

Use with USB service adaptor

Detailed information on Logamatic 5000 service tool → Chapter 8.2, page 80.

8.5 External heat requirement to the Logamatic 5311 or 5313 control unit

Different external requirement types are available:

External request for a set flow temperature

- A variable set flow temperature via a 0 ... 10 V signal (terminal WA1–2 of Logamatic 5000 control unit) boiler attempts to maintain this set flow temperature by regulating its own output.
- A fixed set flow temperature which is set in the control unit via an on/off signal (terminal WA1–3 of the Logamatic 5000 control unit, volt free contact). If the boiler is switched on, this controls its modulation independently in order to maintain the set temperature value.
- Transfer of set system temperature (e.g. as set value for a boiler cascade) via Modbus TCP/IP
- Transfer of boiler set temperature via Modbus TCP/IP

External request for output

- A variable modulation/output via a 0 ... 10 V signal (WA1–2 terminal of Logamatic 5000 control unit), that the boiler then supplies.
- Transfer of modulation/output via Modbus TCP/IP

Operating mode changeover via WF switching contact

The FM-MM and FM-MW function modules provide the option of switching between operating modes with an external switching contact via the WF1–2–3 contact (→ Chapter 7.2, page 45 and Chapter 7.3, page 51).

External interlock via switching contact

The floor standing boiler can be blocked by an external control system, e.g. alternative heat source, via the EV1-2 N/C contact (idle state: closed). The SI terminal must be used for safety-relevant functions (e.g. low water indicator or maximum pressure limiter).

Notice: if a heat source is activated via EMS-BUS (boiler type EMS), the external interlock terminal continues to have no function. The jumper on the EV terminal must be removed. To block the floor standing boiler, the corresponding external interlock/I3 terminal at the heat source must be used.

8.6 Feedback regarding burner output or set system temperature

The Logamatic 5311 and 5313 control units send feedback regarding the burner output or set system temperature to the U-BR contact as 0 ... 10 V signal

8.7 Central fault message output

A fault display can be forwarded to a control room or connected to a signalling or alarm device (e.g warning lamp, acoustic signal) via the central fault message in the form of a AS1 switching contact (zero volt, optionally as N/O or N/C contact).

Notice: if several control units in a system are operated in a network, a fault display is also issued at the AS1 output of the master control unit if the fault occurred at a slave control unit. On the other hand, a fault is only displayed at the AS1 output of a slave control unit if it originated from this control unit.

9 Manual operation and emergency operation

- In contrast to manual operation, the emergency operation is started automatically, e.g. when communication between the device-internal modules BCT531 and ZM5313 fails (device-internal I2C-BUS).
- In exceptional circumstances (e.g. directly after commissioning) the manual operation ensures a supply of heat. It must be started manually by the user.
- Manual operation of the entire system is activated via the “manual” button on the front of the BCT531 user interface. The entire system is subsequently operated using the default parameters in the menu.
- The manual operation can also be activated separately for all parts of the system (e.g. floor standing boiler or heating circuits) via the menu. Individual system components can then be activated separately. This means for example that the degree of modulation of the floor standing boiler can be specified, the mixer can be opened or closed or the pumps switched on or off. If the manual operation is activated, the pump is initially switched off and the mixing valve de-energised.
- In manual operation, the LED status bar lights up yellow.
- In emergency operation, the LED status bar lights up red.

10 System examples

10.1 Explanation of symbols

Symbol	Description	Symbol	Description	Symbol	Description
Pipework/cables					
	Flow - heating/solar		Brine return		DHW circulation
	Return - heating/solar		Potable water		Electrical Wiring
	Brine flow		Hot water		Electrical wiring with break
Mixing valves/valves/temperature sensors/pumps					
	Valve		Differential pressure regulator		Pump
	Revision bypass		Pressure Relief Valve		Non-return valve
	Flow regulating valve		Safety assembly		Temperature sensor / switch
	Overcurrent valve		3-way mixing valve (mixing/distribution)		Safety temperature limiter
	Filter shut-off valve		DHW mixer, thermostatic		Flue gas temperature sensor/ switch
	Cap valve		3-way mixing valve (changeover)		Flue gas temperature limiter
	Valve, motorized		3-way mixing valve (change over, de-energised when closed to II)		Outdoor sensor
	Valve, thermal		3-way mixing valve (change over, de-energised when closed to A)		Wireless outside temperature sensor
	Shut-off valve, magnetically controlled		4-way mixing valve		...wireless...
Miscellaneous					
	Thermometer		Drain outlet with siphon		Low loss header with sensor
	Pressure gauge		System separation according to EN1717		Heat exchanger
	Filling/draining		Expansion vessel with cap valve		Flow rate measuring device
	Water filter		Magnetite separator		Water sink
	Heat meter		Air separator		Heat. circ.
	DHW outlet		Automatic air vent valve		Underfloor heating circuit
	Relay		Expansion joint		Low loss header
	Immersion heater				

Table 28 Hydraulic symbols

10.2 List of abbreviations

Abbreviation	Meaning
BC...	Basic controller EMS gas/oil heat source
BR	Burner
C-CHP	Control CHP module
ES	External error input (zero volt)
FA	Outdoor temperature sensor
FAR	System return temperature sensor
FB	Hot water temperature sensor (potable water)
FK	Boiler water temperature sensor
FM-..	Function module
FPO	Buffer cylinder top temperature sensor
FPM	Buffer cylinder centre temperature sensor
FPU	Buffer cylinder bottom temperature sensor
FRS	Strategy return temperature sensor
FV/FZ	Additional temperature sensor, e.g. flow temperature sensor
FVS	Strategy flow temperature sensor
FWR	Alternative heat source return temperature sensor
FWG	Flue gas temperature sensor
FWV	Alternative heat source flow temperature sensor
HK...	Heating circuit
KR	Non-return valve
MAG	Expansion vessel
PC0	Pump in wall-mounted indoor unit (depending on the control unit in the wall-mounted indoor unit)
PH	Heating pump
PK	Boiler circulation pump
PK Mod	Modulating boiler circulation pump
PS	Cylinder primary pump
PW2	DHW circulation pump
PWE	Heat source pump/buffer cylinder primary pump
PZ	DHW circulation pump
CC...	Control unit
RK	Boiler return
SA	Line control and shut-off valve
SH	Heating circuit mixing valve
SMF	Water/air filter
SR	Boiler circuit mixing valve (return mixing valve)
SWE	Mixing valve for integrating heat source or buffer cylinder
SWR	Return temperature control mixing valve
TWH	Temperature switch
VK	Flow

Table 29 Summary of frequently used abbreviations

10.3 Floor standing boiler with burner control unit SAFe, 3 heating circuits and a DHW cylinder

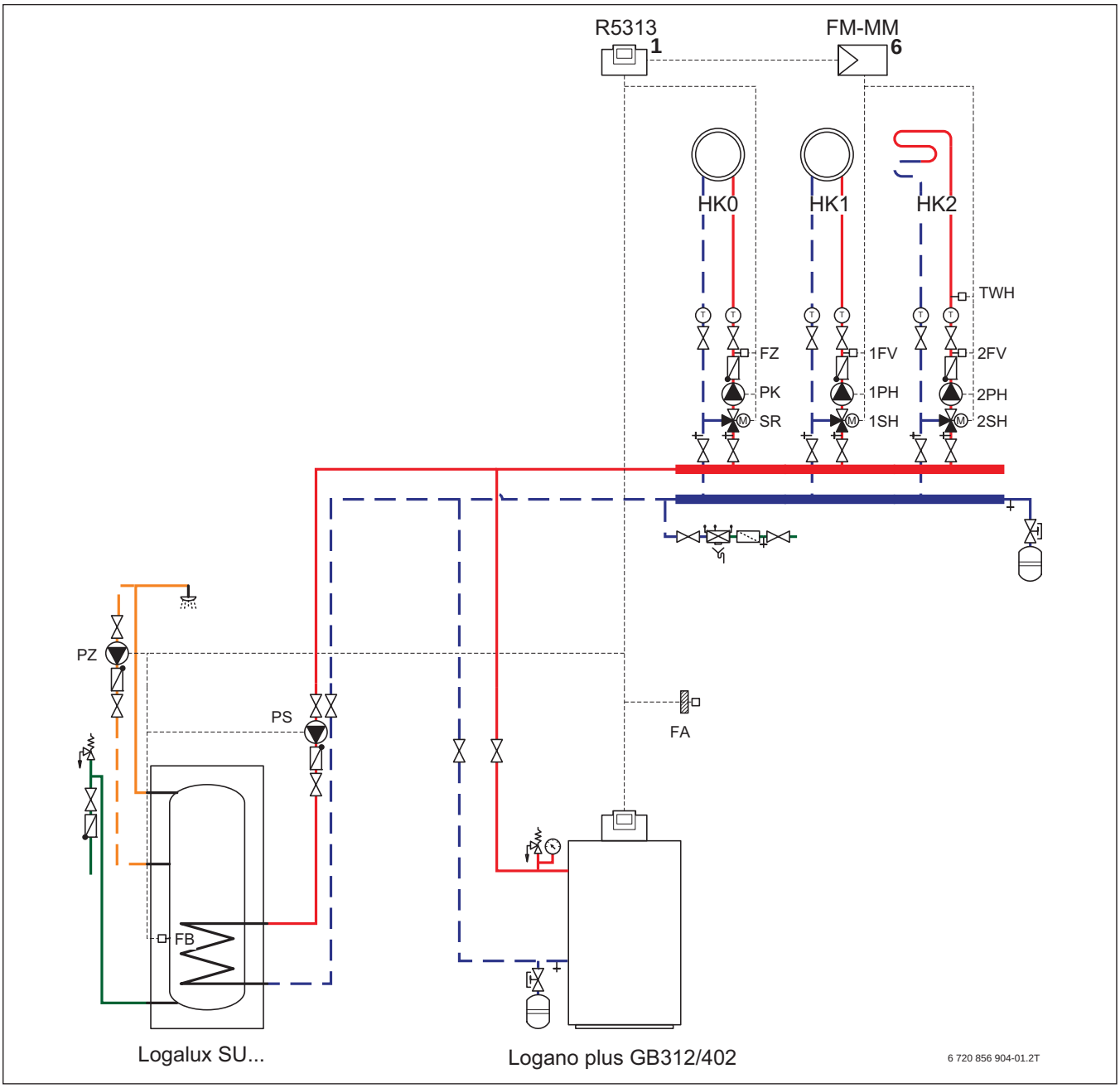


Fig. 79 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5313 control unit

Controlled system components

- 3 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- Logamatic 5313 control unit, address 0
- FM-MM function module, slot 1

Function description

The HK0 heating circuit and DHW heating are activatedwith Logamatic 5313 (standard equipment). Heating circuits HK1 and HK2 are activated with the FM-MM function module.

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

Special planning information

Use of hydraulics without low loss header in the range ΔT = 15 –25 K. The ΔT of the heating system must be no more than 30 K, from 30 K the floor standing boiler modulates back.

10.4 Floor standing boiler with third party burner, 3 heating circuits and a DHW cylinder

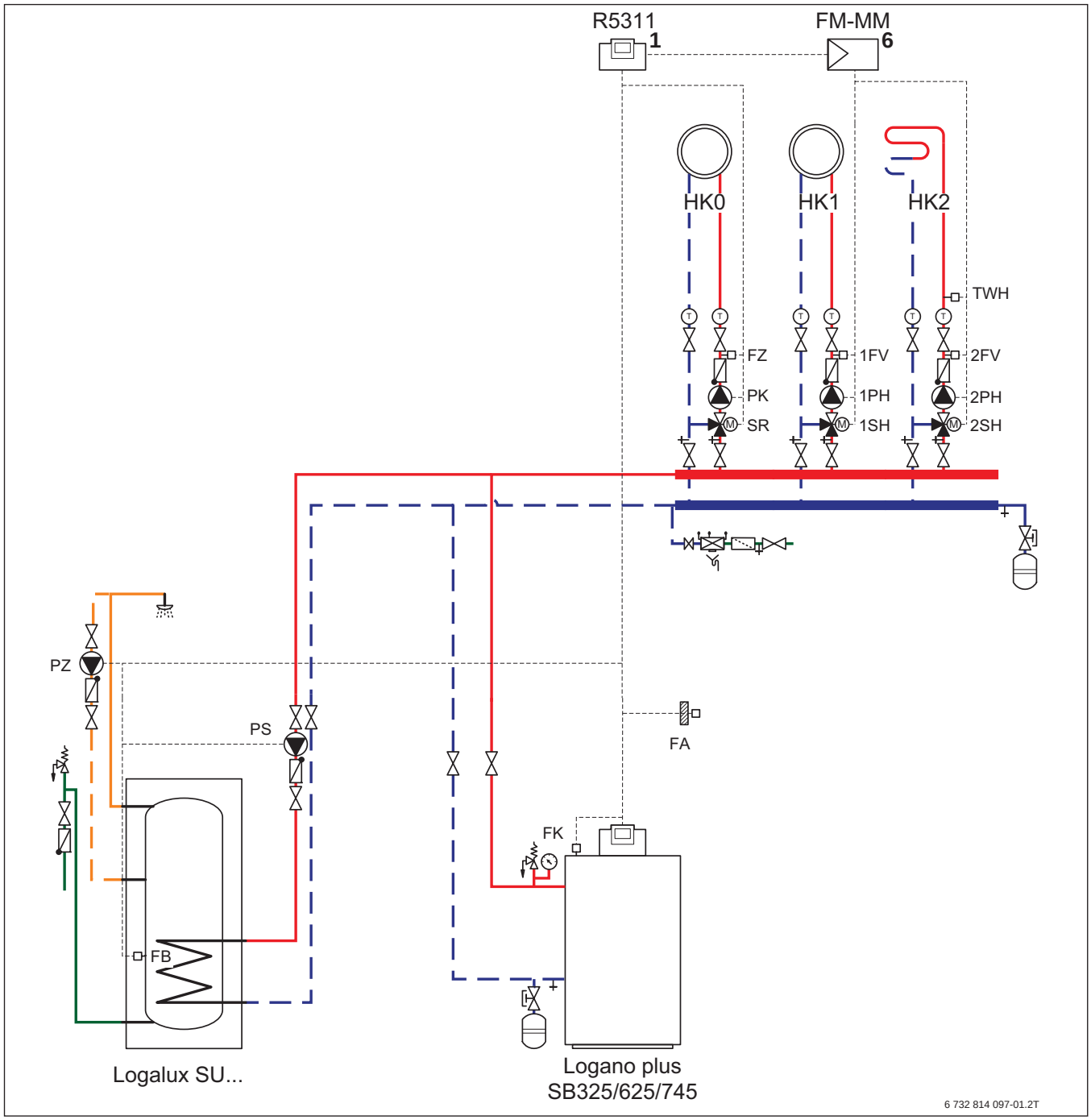


Fig. 80 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 3 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- Logamatic 5311 control unit, address 0
- FM-MM function module, slot 1

Function description

The HK0 heating circuit and DHW heating are activated with Logamatic 5311 (standard equipment). Heating circuits HK1 and HK2 are activated with the FM-MM function module.

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.5 Floor standing boiler with third party burner, 4 heating circuits and 2 DHW cylinders

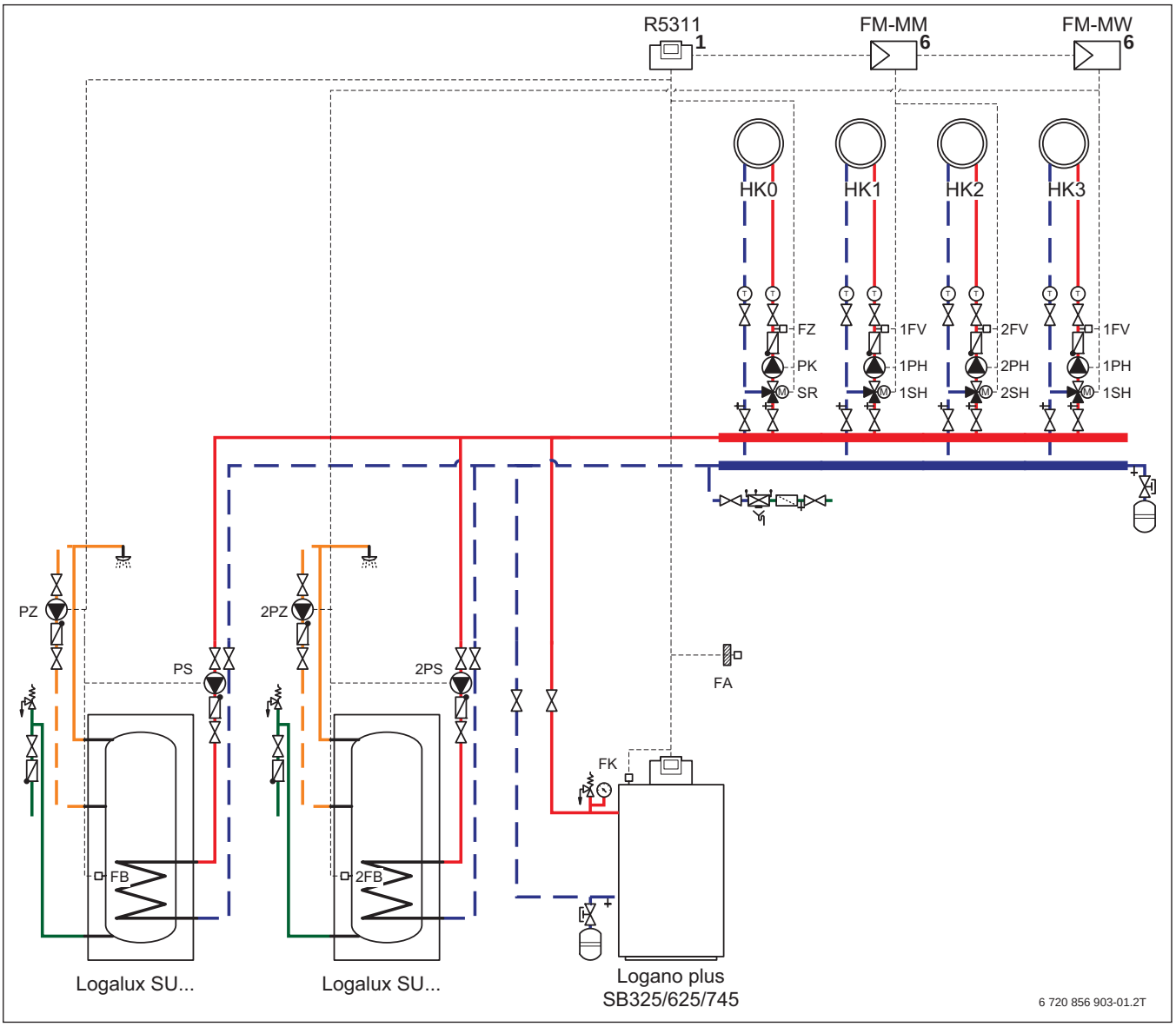


Fig. 81 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 4 heating circuits with mixing valve
- 2 × DHW heating via cylinder primary pump

Control system equipment

- Logamatic 5311 control unit, address 0
- FM-MM function module, slot 1
- FM-MW function module, slot 2

Function description

The HK0 heating circuit and first DHW heating are activated with Logamatic 5311 (standard equipment). Heating circuits HK1 and HK2 are activated with the FM-MM function module. The HK3 heating circuit and second DHW heating are activated with the FM-MW function module.

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.6 2 floor standing boilers with burner control unit SAFe, 2 heating circuits and a DHW cylinder

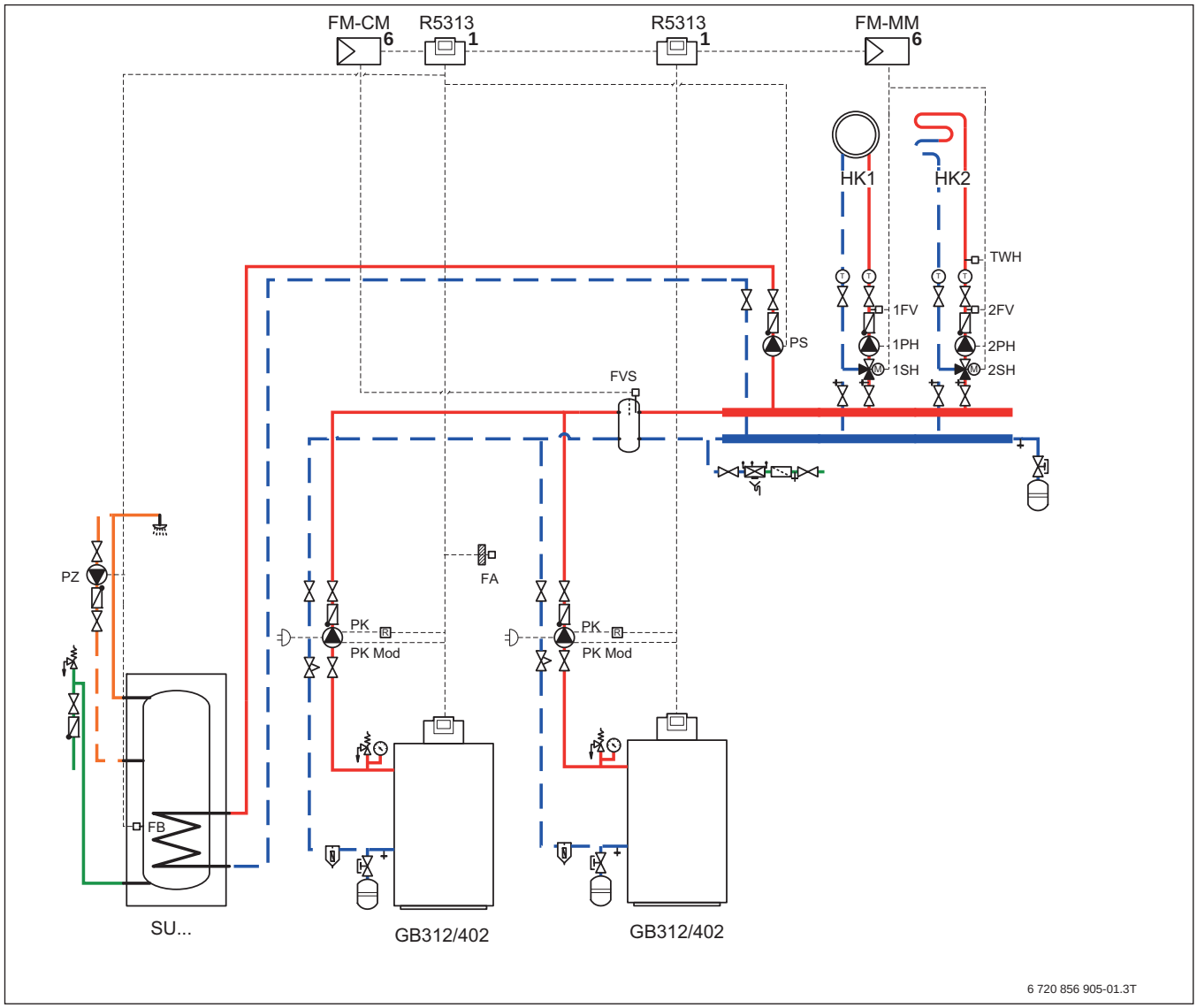


Fig. 82 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5313 control unit

Controlled system components

- 2 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- 2 × Logamatic 5313 control unit, address 0 = master control unit with FM-CM function module, address 1 = sequential controller or lag boiler
- FM-CM function module, installed in Logamatic 5313, address 0, recommendation: slot 4
- FM-MM function module, slot 1

Function description

The control strategy adopts the FM-CM function module. Heating circuits HK1 and HK2 are activated with the FM-MM function module. The DHW heating is activated with Logamatic 5313 (standard equipment).

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

Special planning information

The boiler circulation pumps are permanently connected to 230 V, they can be controlled via a 0 ... 10 V signal “PKmod” in a modulating fashion. The start/stop command is sent via potential-free via a coupling relay to the PK output. More information → Seite 30.

10.7 2 floor standing boilers with third party burner, 2 heating circuits and a DHW cylinder

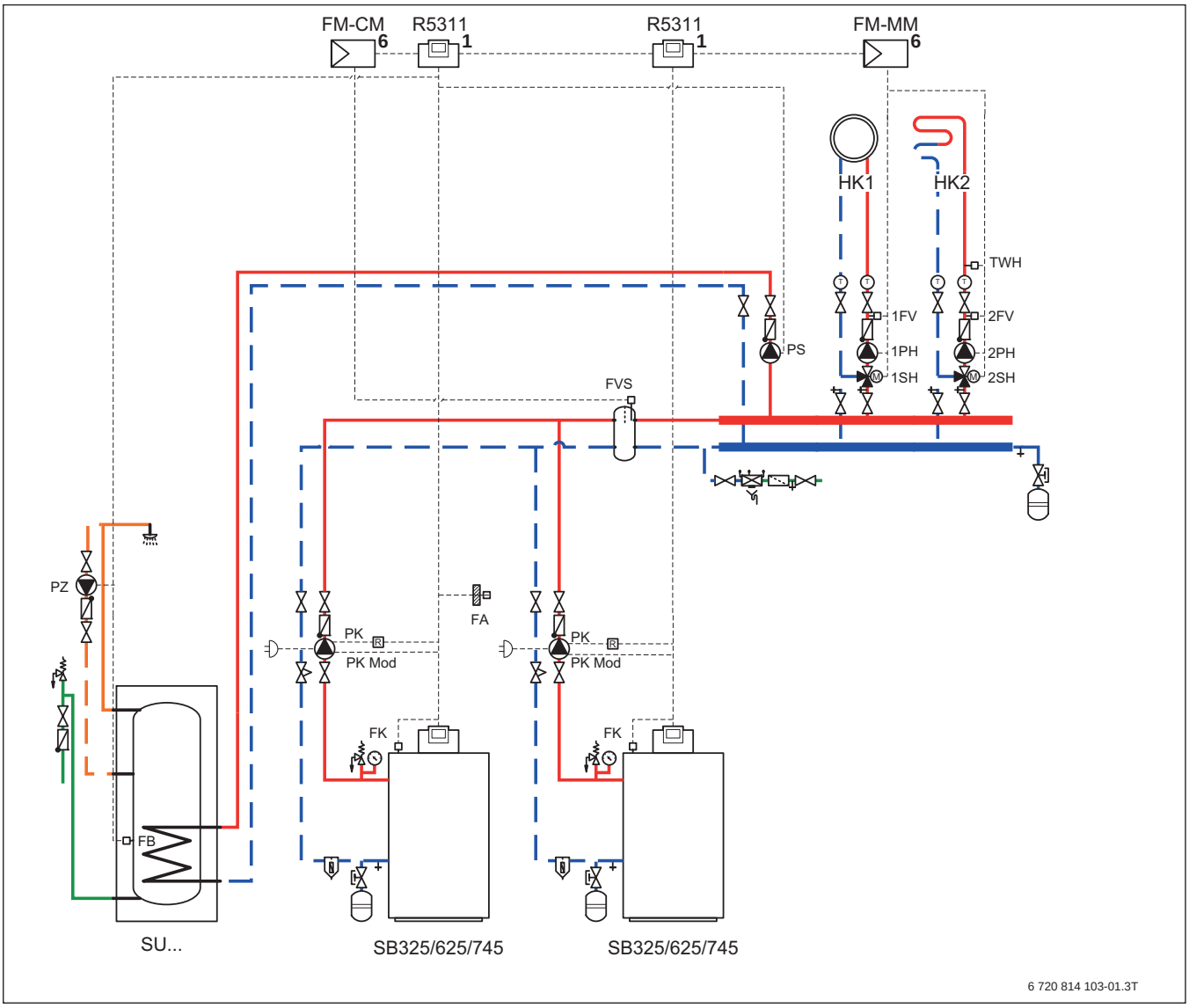


Fig. 83 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 2 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- 2 × Logamatic 5311 control unit, address 0 = master control unit with FM-CM function module, address 1 = sequential controller or lag boiler
- FM-CM function module, installed in Logamatic 5311, address 0, recommendation: slot 4
- FM-MM function module, slot 1

Function description

The control strategy adopts the FM-CM function module. Heating circuits HK1 and HK2 are activated with the FM-MM function module. The DHW heating is activated with Logamatic 5311 (standard equipment).

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

Special planning information

The boiler circulation pumps can be activated via a 0 ... 10 V signal in a modulating fashion. The start/stop command is sent via potential-free via a coupling relay. More information → page 42.

10.8 2 floor standing boilers with third party burner, 4 heating circuits and a DHW cylinder

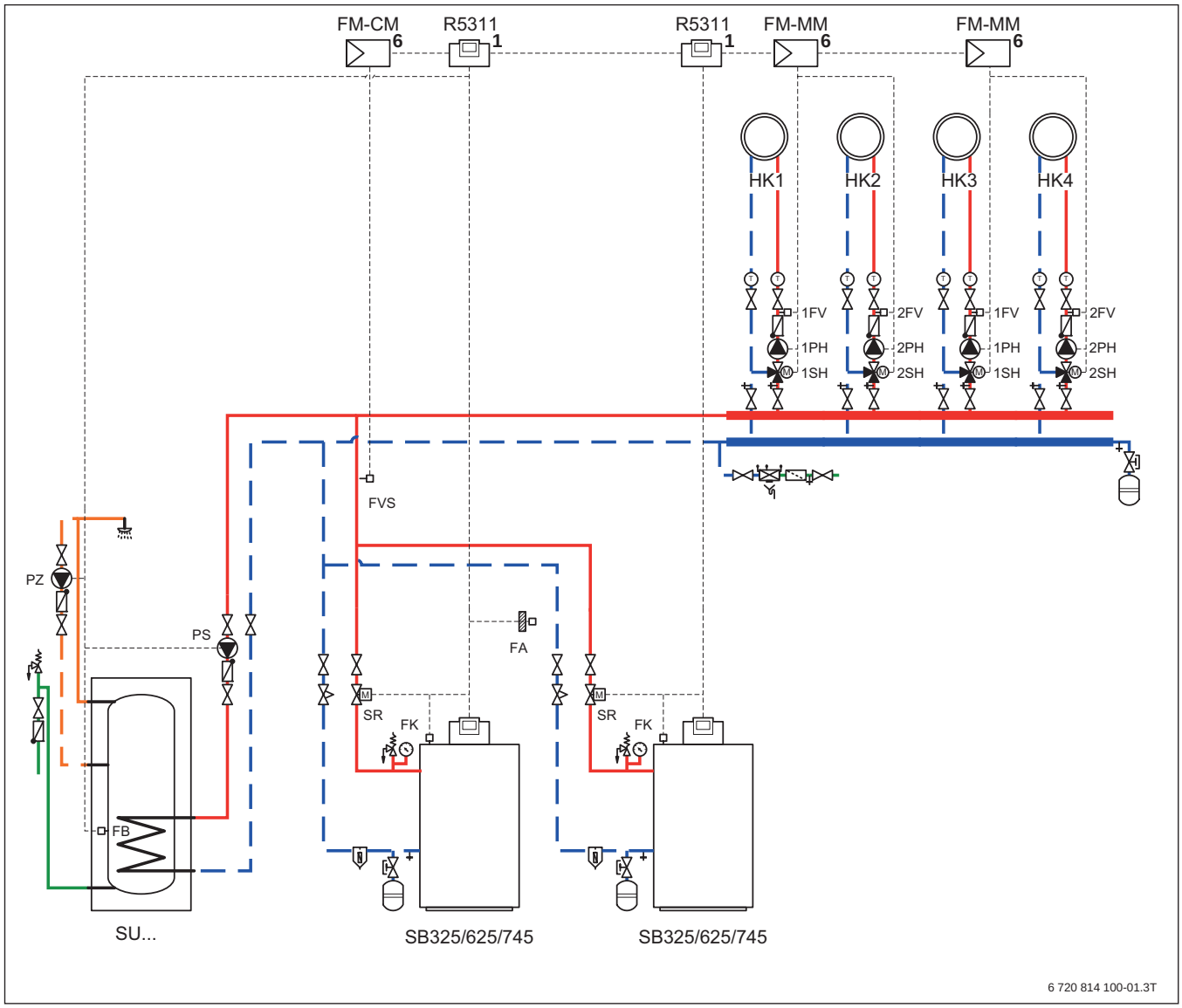


Fig. 84 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 4 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- 2 × Logamatic 5311 control unit, address 0 = master control unit with FM-CM function module, address 1 = sequential controller or lag boiler
- FM-CM function module, installed in Logamatic 5311, address 0, recommendation: slot 4
- 2 × FM-MM function module, slot 1 and 2

Function description

The control strategy adopts the FM-CM function module. Heating circuits HK1 and HK2 or HK3 and HK4 are activated with theFM-MM function modules. The DHW heating is activated with Logamatic 5311 (standard equipment).

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.9 Floor standing condensing boiler and an Ecostream floor standing boiler with third party burner (connected in series), 3 heating circuits and a DHW cylinder

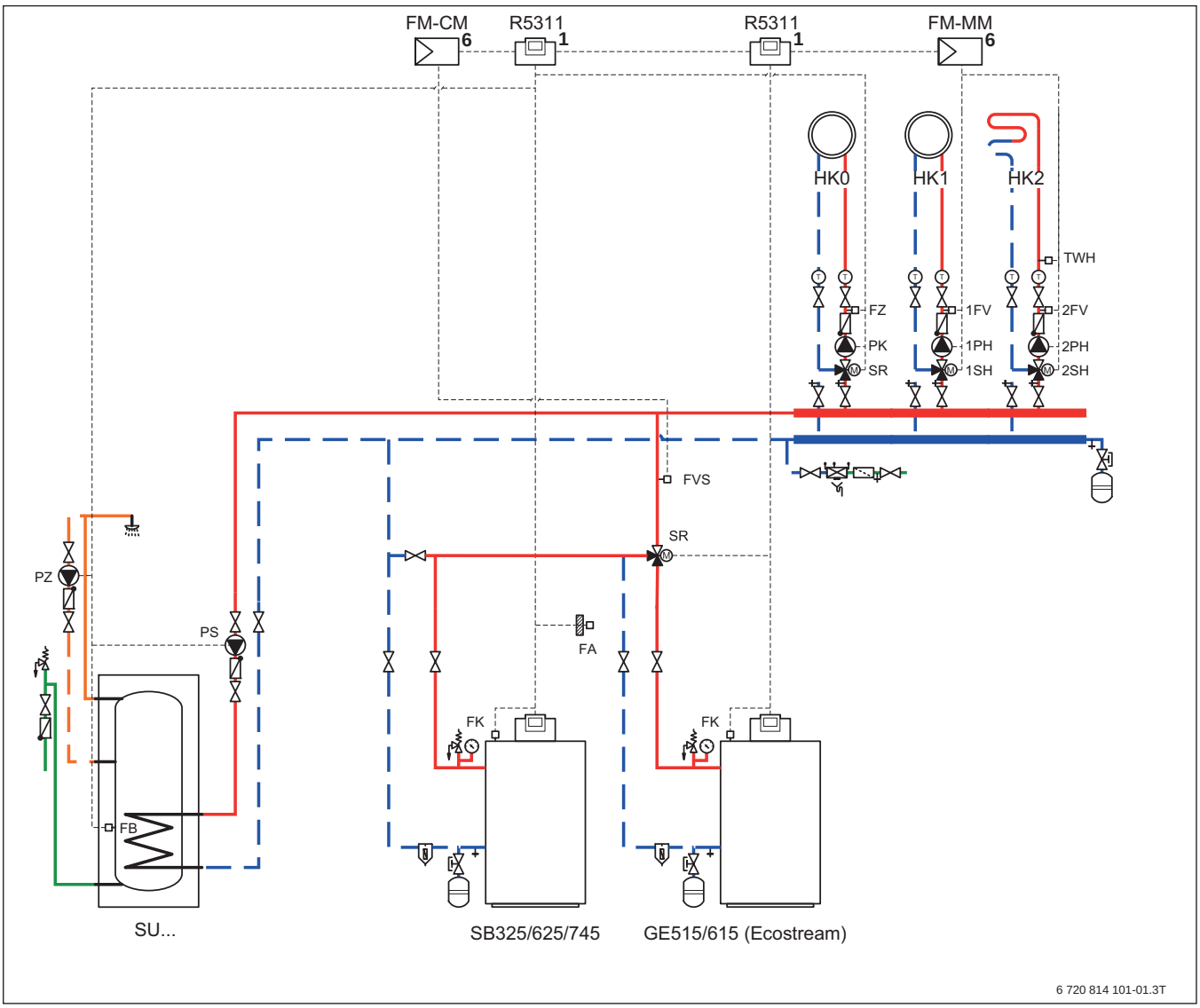


Fig. 85 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 3 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- 2 × Logamatic 5311 control unit, address 0 = master control unit with FM-CM function module, address 1 = sequential controller or lag boiler
- FM-CM function module, installed in Logamatic 5311, address 0, recommendation: slot 4
- FM-MM function module, slot 1

Function description

The control strategy adopts the FM-CM function module. The operating conditions for the Ecostream floor standing boiler are ensured via the boiler mixing valve in order to limit the flow rate via the floor standing boiler – this is activated with Logamatic 5311 (basic function). The HK0 heating circuit and first DHW heating are activated with Logamatic 5311 (standard equipment). Heating circuits HK1 and HK2 are activated with the FM-MM function module.

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.10 Floor standing condensing boiler and a floor standing boiler with third party burner (connected in series), 3 heating circuits and a DHW cylinder

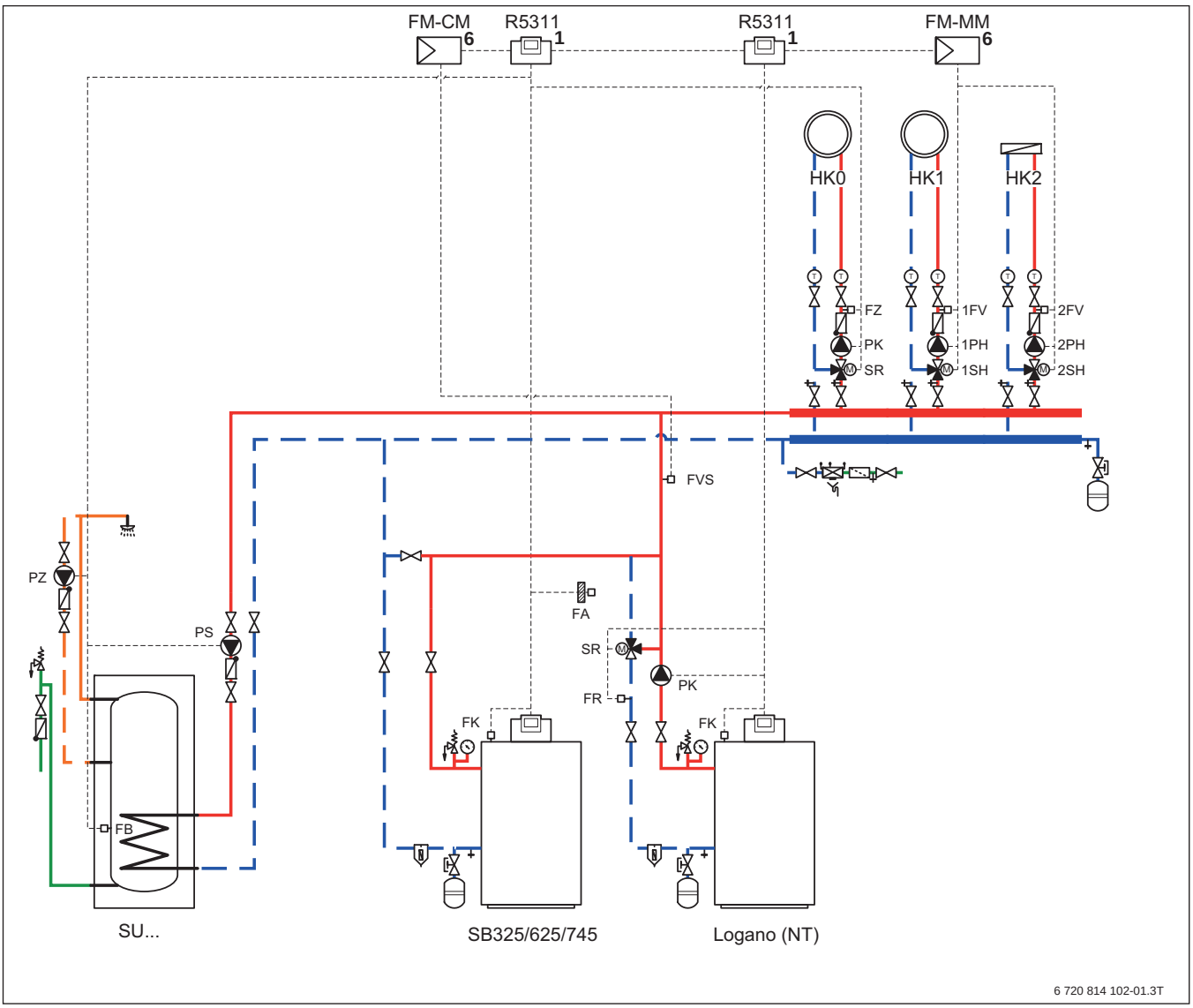


Fig. 86 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5311 control unit

Controlled system components

- 3 heating circuits with mixing valve
- DHW heating via cylinder primary pump

Control system equipment

- 2 × Logamatic 5311 control unit, address 0 = master control unit with FM-CM function module, address 1 = sequential controller or lag boiler
- FM-CM function module, installed in Logamatic 5311, address 0, recommendation: slot 4
- FM-MM function module, slot 1

Function description

The control strategy adopts the FM-CM function module. The operating conditions for the floor standing boiler are ensured via the boiler mixing valve for return temperature increase – this is activated with Logamatic 5311 (basic function). The HK0 heating circuit and first DHW heating are activated with Logamatic 5311 (standard equipment). Heating circuits HK1 and HK2 are activated with the FM-MM function module.

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.11 Floor standing boiler combined with solid fuel boiler, one buffer cylinder, one heating circuit and DHW

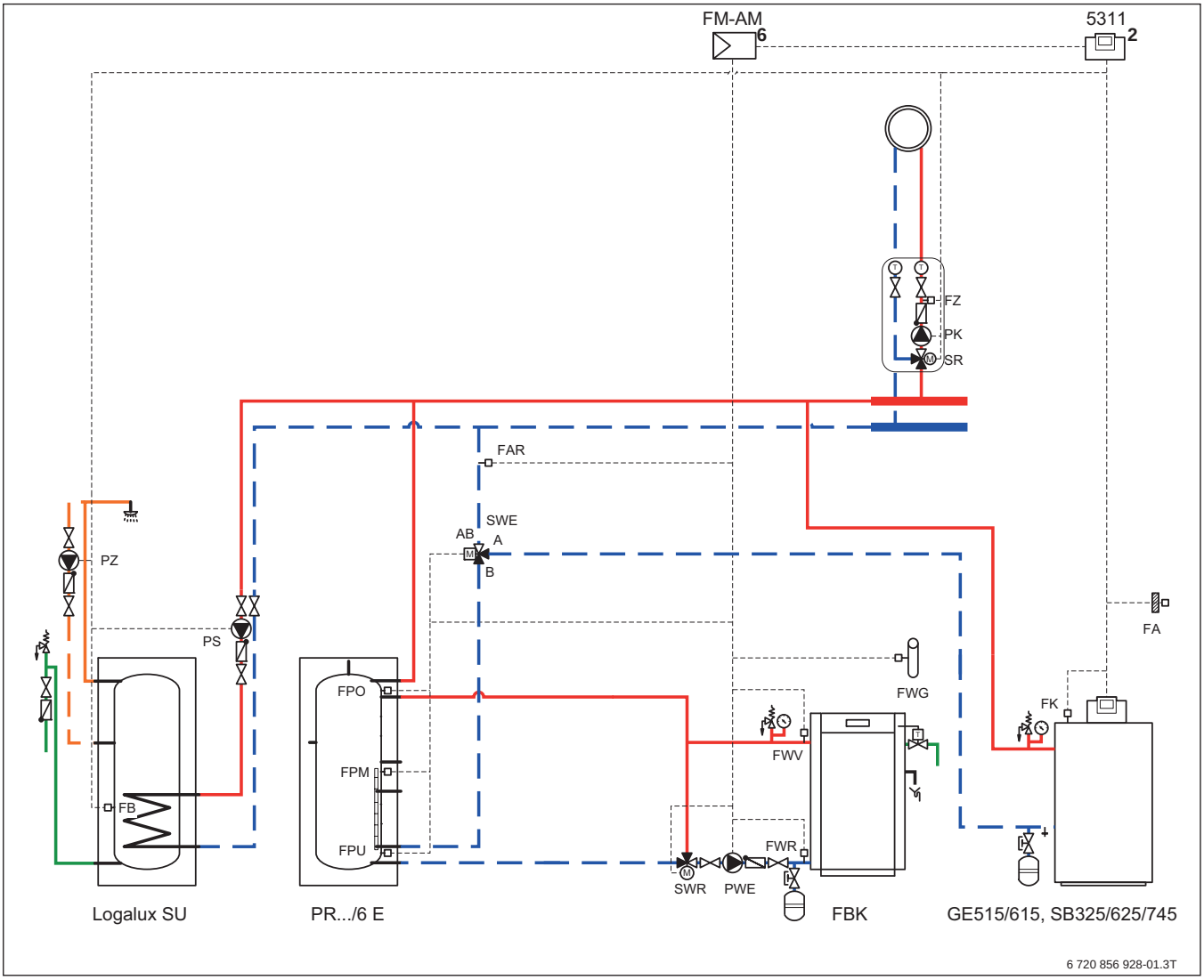


Fig. 87 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
2 On the heat source or on the wall

Controlled system components

- One heating circuit with mixing valve (Logamatic 5311 base control unit)
- DHW cylinder with cylinder primary pump (Logamatic 5311 base control unit)

Control system equipment

- 1 × control unit Logamatic 5311
- Function module FM-AM

Function description

The FM-AM function module integrates the alternative heat source into the buffer and controls its operating conditions. The FM-AM function module controls the buffer bypass circuit.

- Logamatic 5311 → Chapter 6, page 33
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.12 Gas wall-mounted indoor unit combined with solid fuel boiler, buffer cylinder, heating circuit, DHW via 3-way valve and stand-alone solar system

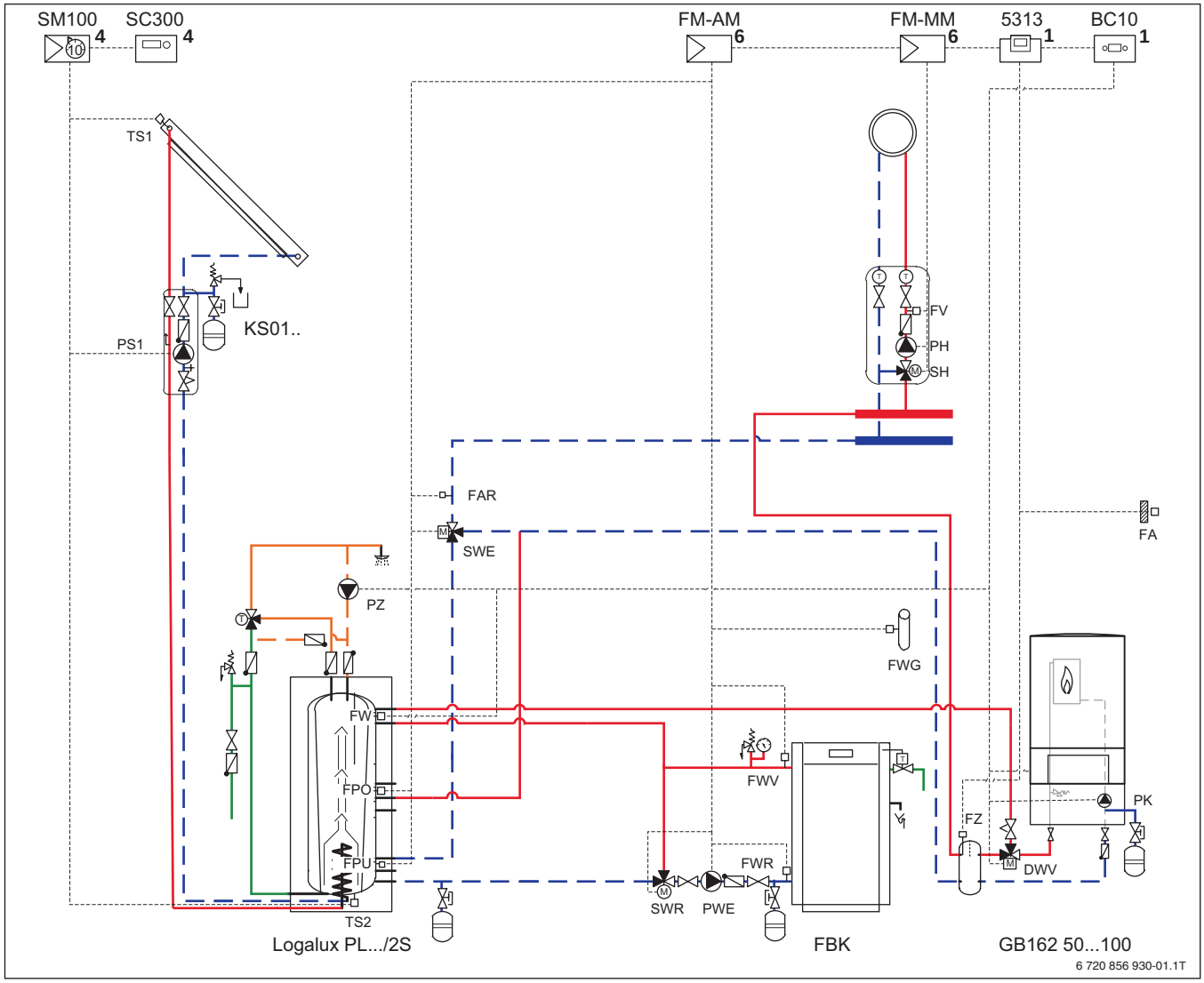


Fig. 88 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
4 In the station or on the wall
6 In the Logamatic 5313 control unit

Controlled system components

- One heating circuit with mixing valve (FM-MM)
- DHW cylinder with 3-way valve (BC 10 wall-mounted indoor unit)

Control system equipment

- One Logamatic 5313 control unit
- Function module FM-MM
- Function module FM-AM
- SM100 solar module
- One SC300 solar stand-alone control unit

Function description

The Logamatic 5313 control unit is set to boiler type = EMS. The FM-MM function module controls up to 2 heating circuits. The control of the DHW function is included in the BC 10 boiler electronics of the wall-mounted indoor unit. The FM-AM function module integrates the alternative heat source into the buffer and controls its operating conditions. The FM-AM function module controls the buffer bypass circuit. The solar system is controlled autonomously via a SM100 solar module (address 10) and a SC300 solar stand-alone control unit.

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.13 Gas wall-mounted indoor unit combined with solid fuel boiler, buffer cylinder, heating circuit, DHW via 3-way valve and stand-alone solar system

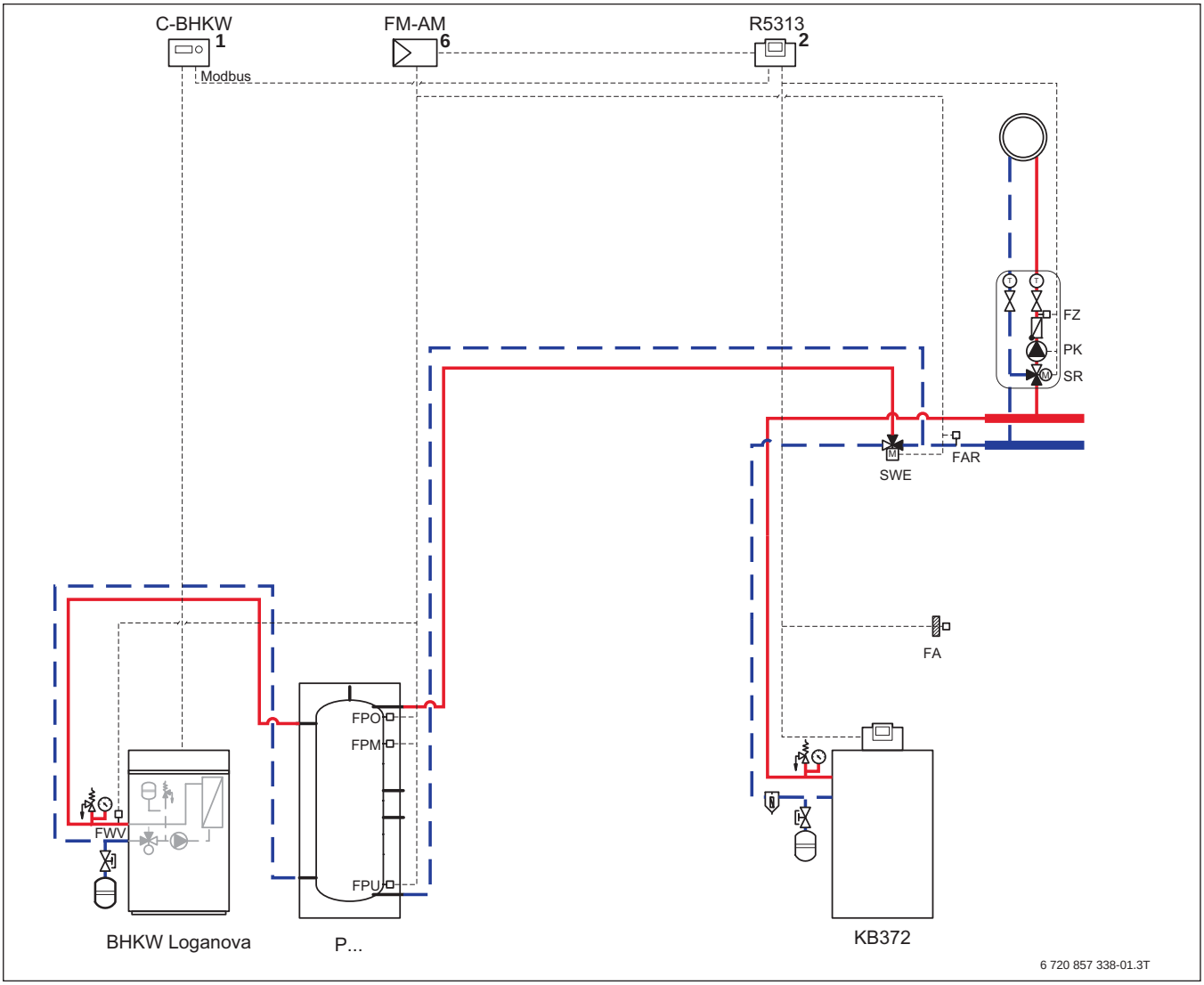


Fig. 89 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
2 On the heat source or on the wall
6 In the Logamatic 5313 control unit

Controlled system components

- One heating circuit with mixing valve (Logamatic 5313 base control unit)

Control system equipment

- One Logamatic 5313 control unit
- One FM-AM function module
- One BHKW Loganova with Modbus data interface

Function description

The FM-AM function module connects the BHKW to the Logamatic 5000 control unit. Heat requirement sent to BHKW from the system or with own curve. The FM-AM module controls the buffer bypass circuit.

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

10.14 4 wall-mounted indoor units with 2 heating circuits and 2 DHW cylinders

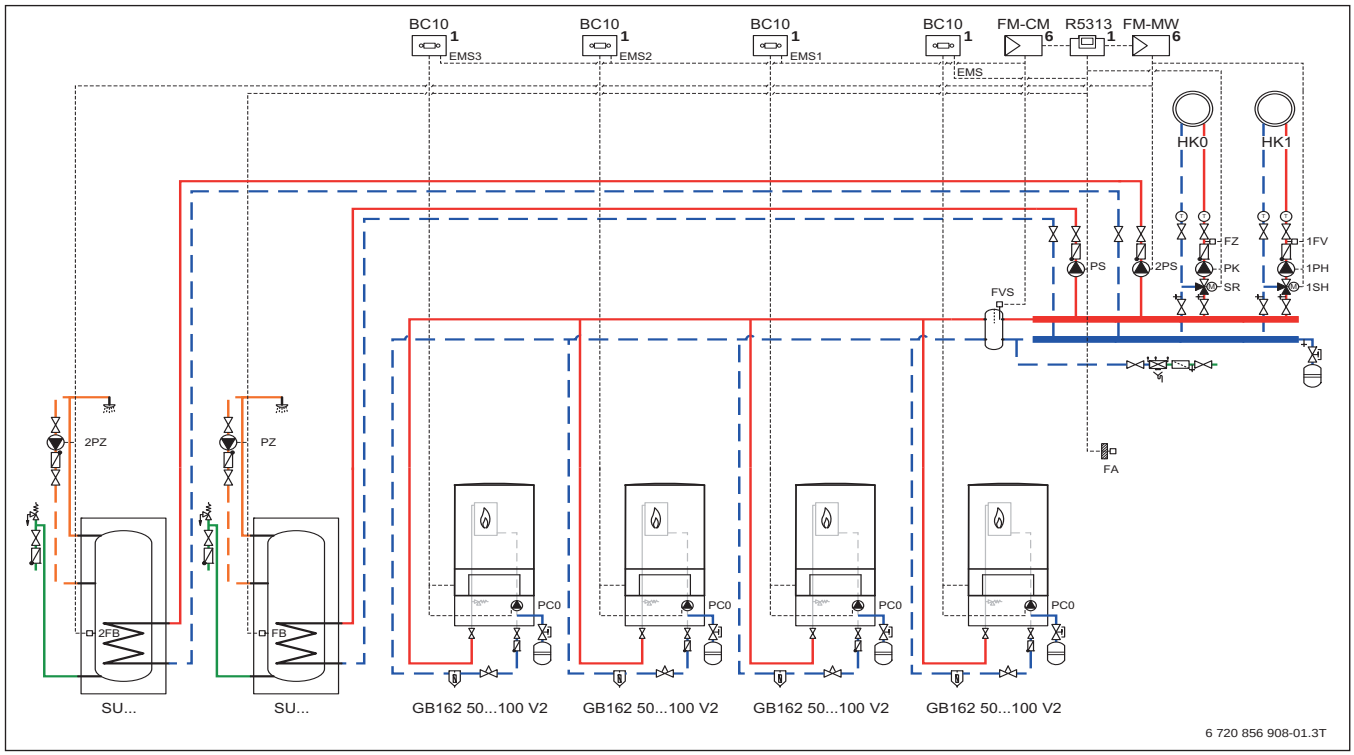


Fig. 90 System schematics (index of abbreviations → Tab. 29, page 84)

Module position:

1 On the heat appliance
6 In the Logamatic 5313 control unit

Controlled system components

- 2 heating circuits with mixing valve
- 2 × DHW heating via cylinder primary pump

Control system equipment

- Logamatic 5313 control unit
- Function module FM-CM
- Function module FM-MW

Function description

The HK0 heating circuit and DHW heating are activated with the Logamatic 5313 control unit (standard equipment). The HK1 heating circuit and second DHW heating are activated with the FM-MW function module.
Notice: up to 5 wall-mounted indoor units can be activated with the control equipment shown. As a basic rule, the first wall-mounted indoor unit is connected to the EMS terminals on the BCT531, and all others are connected to terminals EMS1 ... EMS4 on the FM-CM function module.

- Logamatic 5313 → Chapter 5, page 16
- FM-MM → Chapter 7.2, page 45
- FM-MW → Chapter 7.3, page 51
- FM-AM → Chapter 7.4, page 56
- FM-CM → Chapter 7.5, page 67
- FM-SI → Chapter 7.6, page 76
- Connectivity/interfaces → Chapter 8, page 79

Observe installation instructions → Chapter 11, page 97

11 Installation instructions

11.1 Electrical connection

11.1.1 Assembly and Installation Logamatic 5000

Assembly and Installation Logamatic 5000	
The Logamatic 5000 control unit is especially suited for wall-mounted installation, but can also of course be used for a conventional boiler installation	
Clearly laid out electrical installation with sufficient space (Fig.: fully equipped)	
Clear labelling of all cables and terminals, readable from the front and top	

Table 30 Assembly and Installation Logamatic 5000

11.1.2 Remote control BFU

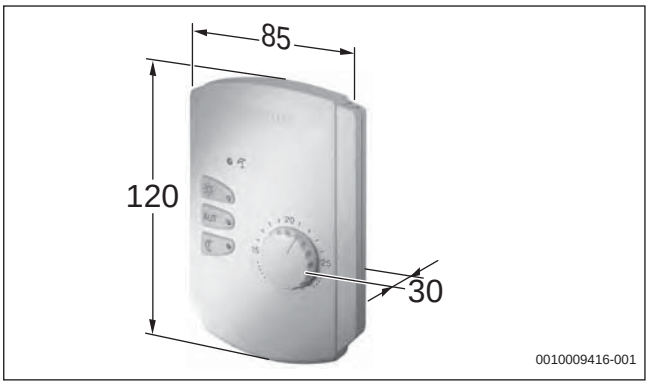


Fig. 91 Remote control BFU with integrated room temperature sensor

With a room temperature-dependent control method, the flow temperature of a heating circuit is adjusted according to the temperature measured in a reference room. For this type of control, a BFU remote control with integrated room temperature sensor must be installed in the room.

The electrical connection is made using a 2-wire cable (2 × 0.4 ... 0.75 mm^2) at the terminal BF.

Remote control in reference room

In order to obtain a representative room temperature, the BFU remote control must be sited in a suitable position in the reference room (→ Fig. 92).

The means, for example:

- Not on an external wall
- Not close to windows or doors
- Not near to thermal bridges
- Not in “dead” spots
- Not above radiators
- Not directly in the sun
- Not in the path of direct heat radiation from electrical appliances or similar

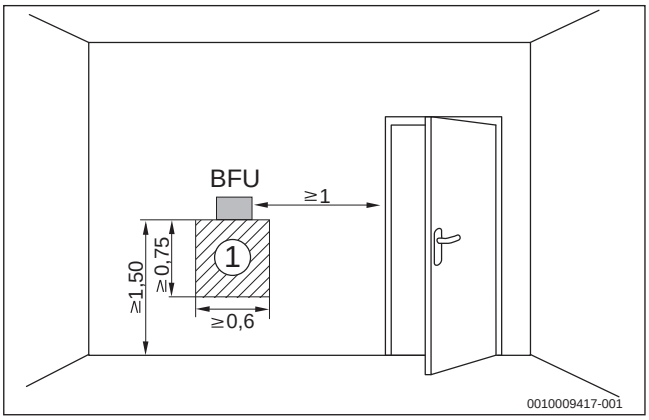


Fig. 92 Siting of the remote control (BFU) or separate room temperature sensor in the reference room (dimensions in m)

[1] Unobstructed space

The temperature conditions in a reference room should be normal and constant. Therefore, the windows/doors should not be left open or closed for unusually long periods. In addition the thermostatically controlled radiator valves in the reference room can be dispensed with or else turned fully on so that 2 independent control systems are not conflicting with one another. If the room temperature set value is 21 °C for example, but the partially-closed thermostatic valve closes at a temperature of 20 °C, the automatic control system in this case would always attempt to continue heating and this would not be possible as the valve is closed (manual control).

Separate room temperature sensor

A separate room temperature sensor should be specified if the BFU remote control in the reference room cannot be sited so that its position is favourable both in terms of user convenience and effectiveness of temperature measurement (→ Fig. 93).

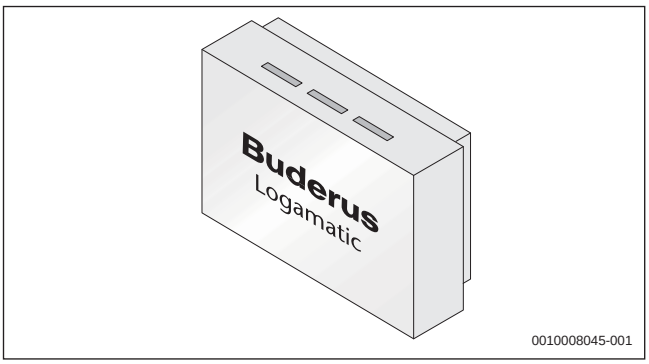


Fig. 93 Separate room temperature sensor for external installation as an alternative to the integral room temperature sensor of the remote controls BFU

11.1.3 Electromagnetic Compatibility (EMC)

Control units of the Logamatic 5000 system satisfy the valid regulations and guidelines according to DIN EN 60730-1, DIN EN 50082 and DIN EN 50081-1. However, to guarantee interference-free operation, the effect of excessively strong sources of interference should be prevented by appropriate installation. When routing cables, care should be taken to ensure that cables carrying supply voltages (230 or 400 VAC) do not run parallel to low-voltage cables (BUS cables, sensor cables, remote control cables).

When routing power cables and extra-low voltage cables in a common cable conduit or with cable lengths over 50 metres, the extra-low voltage cables should be shielded. The cable shield should be connected at one end to the electronic circuit earth. Make especially sure that the entire system is properly earthed and that the earth lead (PE) has been connected correctly.

11.1.4 Outdoor temperature sensor

An outside temperature sensor is included in the scope of delivery of the Logamatic 5311 and Logamatic 5313 digital boiler control units and should always be connected to them if this is necessary in order to support controller functions such as weather compensation or frost protection.

In systems with multiple digital control units, an outside temperature sensor can always be connected to every device. That can be useful for heating circuits with a north-south orientation, for instance. Where a Logamatic 5313 control unit is used as a slave unit, the outside temperature sensor included in the scope of delivery can also be installed as the control unit's own separate sensor. Without an additional outside temperature sensor, the outside temperature measured by the master control unit in the CBC-BUS network is adopted by the sequential control unit or the slave control unit.

The outside temperature sensor must be fitted so it can measure the outside temperature without being affected by other factors. Therefore always install it on the north side of the building.

The outside temperature sensor must however **not** be installed:

- above windows, doors or vents
- below awnings, balconies or roof eaves (→ Fig. 94)

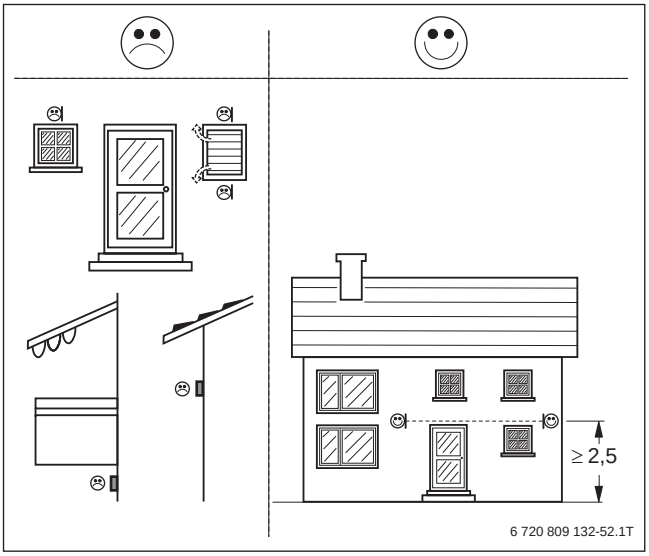


Fig. 94 Arrangement of the outside temperature sensor (dim. in mm)

11.1.5 Connection of 3-phase current consumers and additional safety devices on the Logamatic control unit

Three-phase current consumers cannot be connected to control units of the Logamatic 5000 system.

A FM-RM mounting rail module is available from Buderus which allows additional components provided by the customer to be connected to the Logamatic 5000 control system. This module is mounted directly in the control unit and its purpose is to receive various mounting rail components, such as a relay.

For example, a coupling relay (accessories) via which a zero-volt request signal can be sent to a 3-phase pump can be installed on the mounting rail module. Likewise, zero-volt request signals can be sent to large high-efficiency pumps with on-site power supply. The relay is connected to the terminal PK.

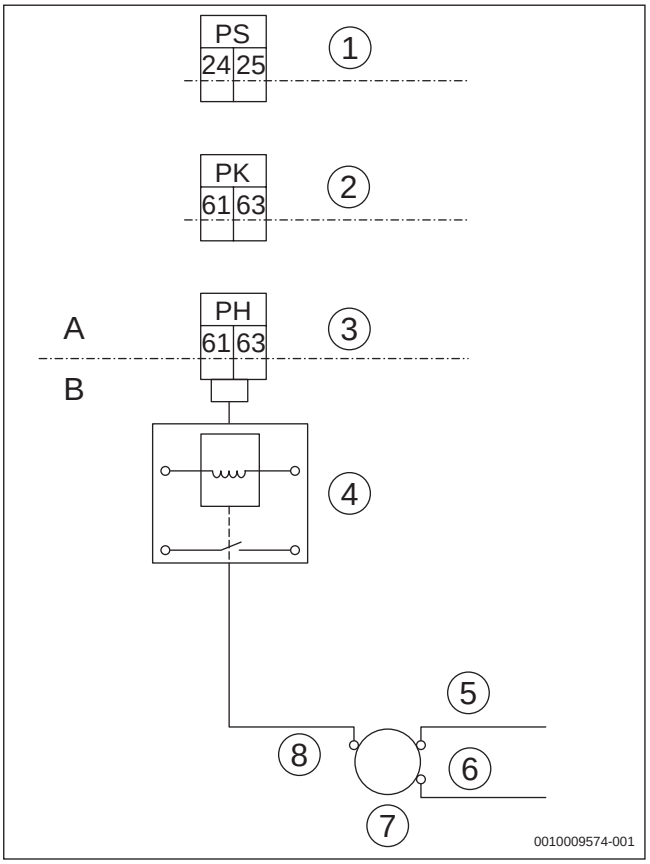


Fig. 95 Connection example of a high-efficiency pump with zero volt on/off input (e.g. Grundfos Magna 3) – symbolic representation

A Terminals in the Buderus control unit
B On-site wiring

[1] Cylinder primary pump
[2] Boiler circulation pump
[3] Heating circuit pump
[4] Coupling relay
[5] 230 V AC (on site)
[6] Terminal PK Mod (0 ... 10 V) – only for boiler circulation pump
[7] High-efficiency pump
[8] ON/OFF (zero volt)

External safety equipment such as pressure limiter, low water indicator, safety temperature limiter or neutralisation monitoring can be connected to the SI terminal at the central module. The FM-SI function module is also available for safe and convenient connection of safety equipment to Logamatic 5000. All safety components can be connected individually there. When a component is triggered, the fault analysis is performed directly via the control unit. This dispenses with time consuming troubleshooting. Details of function module FM-SI → Chapter 7.6, page 76.

Notes:

- A condensate neutraliser should be connected to the SI1 terminal.
- If a heat source is activated via EMS-BUS (boiler type EMS), safety equipment must not be connected to the SI-terminal of the Logamatic 5313 control unit. All safety equipment must be connected to the boiler control (BC 10/25/30 or MC10/40/100/110). To make absolutely sure a safety component cannot be connected to the SI terminal of the Logamatic 5313 control unit, the SI plug or jumper between 17/18 must be removed.
- If a heat source is activated via EMS-BUS (boiler type EMS), a flue gas damper must not be connected to the AG terminal of the Logamatic 5313 control unit.
- If a heat source is activated via EMS-BUS (boiler type EMS), the FM-SI function module must not be used.

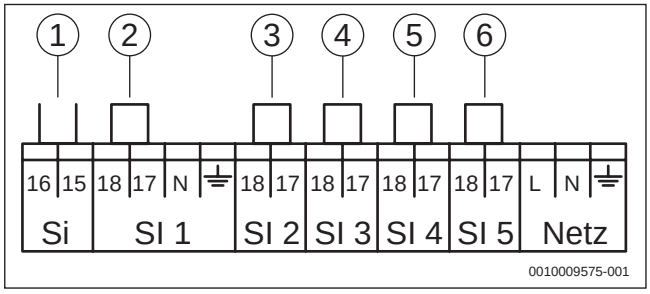


Fig. 96 Connection example of on-site safety equipment to the FM-SI function module – symbolic representation

[1] Connection to SI terminal on central module
[2] Condensate neutraliser
[3] Maximum pressure limiter
[4] Maximum pressure limiter
[5] Minimum pressure limiter
[6] High limit safety cut-out

11.2 Dimensions Logamatic 5000

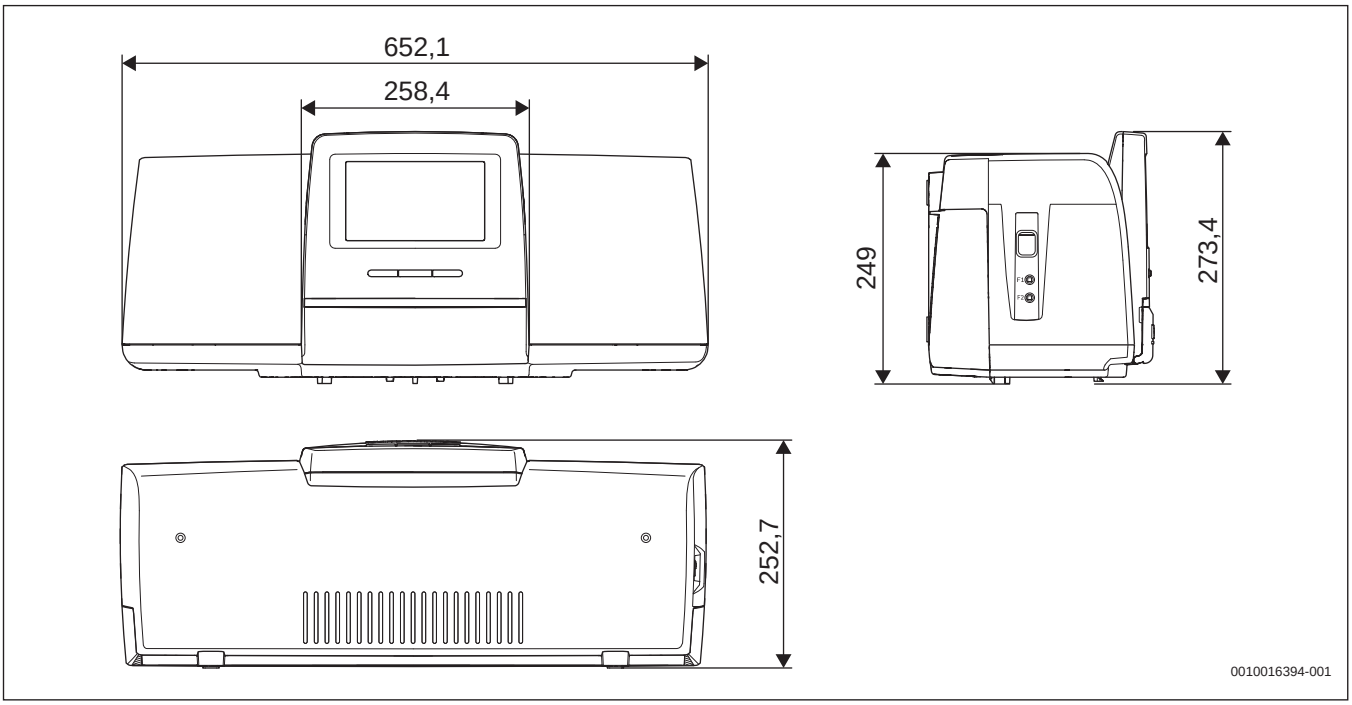


Fig. 97 Dimensions Logamatic 5000 (in mm)

12 Appendix

12.1 Additional technical guides and assembly aids

The Buderus technical guides are available for the following products:

- All types of heat sources
- Memory
- Solar
- Logamatic EMS plus/Logamatic 4000/Logamatic 5000 control systems
- Connectivity

You can find more information on these topics here:

Brochures for trade and end customers as well as technical product documentation:	www.buderus.de/technische-dokumentation
Buderus catalogues:	www.buderus.de/kataloge
Buderus presentation documents:	www.buderus.de/produkte
Buderus hydraulics database:	www.buderus.de/hydraulikdatenbank
Direct links to Buderus products and downloads:	www.budeurs.de/ems-plus www.buderus.de/fernwirksystem www.buderus.de/knx www.buderus.de/lon
Buderus tender documentation:	www.buderus.de/datanorm
Buderus Control Center Connect:	www.buderus-connect.de
Buderus Control Center Connect(PRO):	www.buderus-connect.de/pro
Control Center Commercial info page	www.buderus.de/commercial
Control Center Commercial start page	www.buderus-commercial.de
Control Center Commercial initial registration	www.buderus-commercial.de/register
Buderus Online Shop:	www.buderus.de/shop
Youtube channel “Buderus Germany”:	www.youtube.com/user/BuderusDeutschland
Product information Logamatic 5000	www.buderus.de/logamatic5000
EMS plus control system product information	www.buderus.de/ems-plus
Connectivity	www.buderus.de/konnektivitaet

12.2 Standards, regulations and directives

The following regulations and standards, among others, must be observed during installation and operation:

- Regulations for electrical installation and connection to the electrical grid
- Pressure Equipment Directive – systems with boiler temperatures > 110 °C
- EN 12953-6 – Shell boilers. Requirements for equipment for the boiler
- EN 12828 – Heating systems in buildings
- Water quality operator's log for heat sources
- National regulations for protection of potable water.
- Manufacturer's technical Codes of Practice (e.g. in the catalogue)
- National standards and regulations
- National standards that are based on European standards (EN) in the corresponding version of the specific country must be observed.

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