Service instructions

Function module FM 446
EIB Module
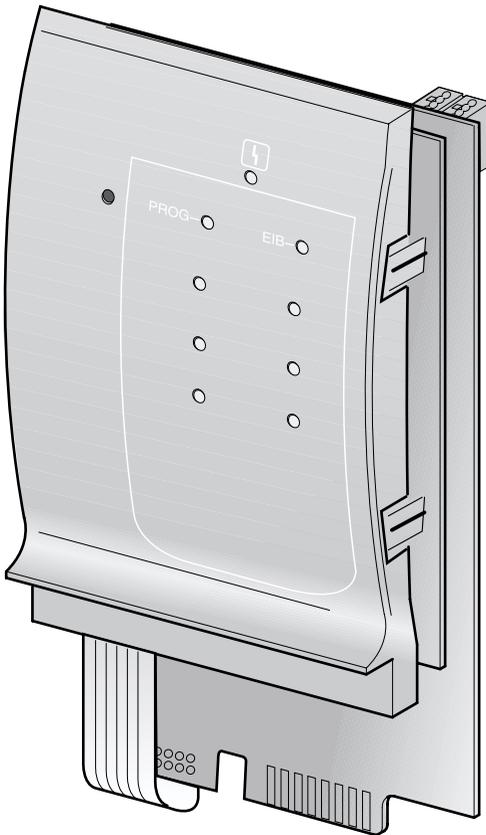
Buderus

Subject to technical modifications.

Constant development may lead to minor deviations of
illustrations, functional steps and specifications from those
described/shown.

Updating your documentation

Please let us know if you would like to make suggestions to
improve our documentation or if you have noticed any errors.

Index

1 EIB and domestic automation

This chapter should provide you with the basics of the EIB technology. A few examples will demonstrate the advantages of combining EIB with domestic automation or building management systems.

In general, the function module FM 446 acts, regarding its utilisation with EIB technology, only as a communication interface. The function module can only be integrated into the EIB system with the EIB Tool Software (ETS).

Leading European electrical engineering companies have joined under the umbrella of the **E**uropean **I**nstallation **B**us **A**ssociation (**EIBA**). The EIBA aims to develop and advance a common European concept regarding guidelines and, amongst others, bus-compatible products.

This concept relates to the EIB (**E**uropean **I**nstallation **B**us).

1.1 General

An EIB system, as part of domestic automation or a building management system, provides you with an innovative, upwardly compatible and flexible system. It meets higher safety requirements.

The flexibility and convenience of electrical installations over the long term are ensured. The EIB further contributes to minimising energy requirements and helps to reduce operating costs.

Suitable systems, which are part of the technical domestic installation, communicate (talk) to each other via the bus system, such as the EIB. These switch, control, regulate, monitor, measure or report current system conditions.

Between you (heating engineer), the building owner and the EIB expert, you can utilise all advantages and optional combinations offered by the EIB technology in new buildings or renovation projects (e.g. in domestic and business accommodation, administration building, assembly rooms).

– Reduce your wiring material requirements and therefore the **fire risk** in buildings.

– Combine diverse systems (e.g. heating and air-conditioning systems), and utilise mutual dependencies (e.g. room and outside temperatures).

An EIB system offers various advantages, especially to heating technology:

– Rooms are only heated when an appropriate demand exists.

– Thermostatic valves close automatically, for example if windows are open.

– Energy is utilised intelligently for heating rooms without loss of convenience and comfort.

1.2 Structure, function and data transfer

1.2.1 Construction

Imagine the structure of an EIB system as a kind of network. Data can be transferred by different means:

– via 24 V low voltage cable (twisted pair – TP)

– via 230 V mains voltage cable (power line – PL)

– via radio link (radio frequency – RF)

USER NOTE

Buderus only uses 24 V low voltage cable (twisted pair – TP) for data transfers.

1.2.2 Function

The sensor information (switching commands, physical measured variables, such as temperatures) are encoded and sent to the actuators. There, the code is re-converted, i.e. decoded. Actions follow these commands (e.g. a thermostatic valve closes).

1.2.3 Data transfer

Imagine the data transfer like the transmission of a telegram.
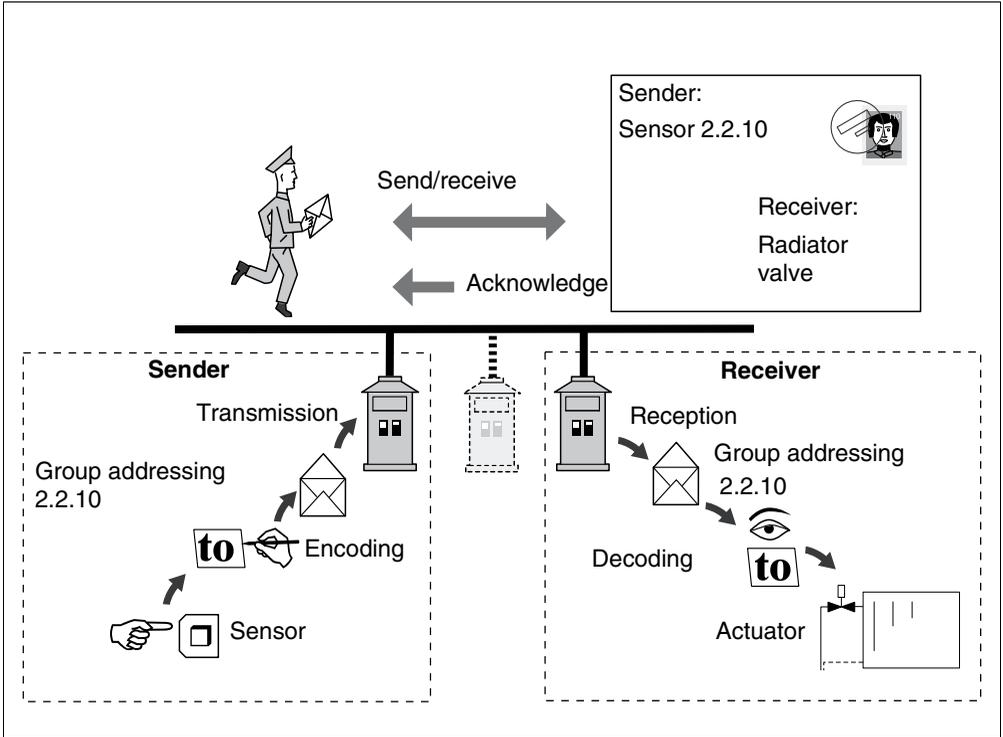
Fig. 1   Data transfer – Example

A temperature is measured via a test point (sensor). The resulting control command is encoded and addressed to a group (e.g. radiator valves) and sent with a command ("open radiator valve"). Because of the address in the "telegram" the receiver recognises that this telegram is meant for it. The receiver then decodes the telegram and transfers it into an "Open command" and passes it to an actuator.

An acknowledgement is sent to the sender, if the telegram was received correctly.

2 Safety

This chapter contains general safety instructions, which you should observe during service work on the function module FM 446.

Also, closely observe the further safety instructions, which you can find in other chapters of these service instructions. Carefully read the safety instructions before commencing the following measures.

Severe injuries and even death, as well as material losses and environmental damage may follow, if you ignore safety instructions.

2.1 Appropriate use

Install the function module FM 446 into the control devices which are part of the Logamatic 4000 control system.

For perfect operation you will require, at least, the software version 4.17 of the control device.

USER NOTE

To integrate the function module FM 446 into the EIB system, you require the EIB product database from Buderus and the EIB Tool Software (ETS) – this is available from your EIB expert.

2.2   Safety instructions and user notes

All safety instructions in these service instructions are identified by the danger sign. A signal word is positioned below this sign, which indicates the level of danger. Always observe the measures prescribed to reduce the risk of danger.

WARNING!

PRIORITY SAFETY INSTRUCTIONS

The term "Warning" refers to dangers which may lead to injury or death.

WARNING!

DANGER TO LIFE THROUGH ELECTRICAL POWER

This symbol indicates a danger from risk of electric shock.

CAUTION

SAFETY INSTRUCTION – 2ND PRIORITY

The term "Caution" refers to dangers, which may lead to material losses.

Generally, user notes provide tips for service work or indicate possible sources of faults, which may lead to danger.

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USER NOTE

User notes enable an optimum, economical, safe and environmentally-friendly utilisation and operation of this technology.

2.3 Please observe this safety instruction

The function module FM 446 has been designed and built in accordance with currently recognised standards and safety requirements.

However, material losses resulting from inappropriate service activities cannot be completely prevented.

Read these service instructions thoroughly before commencing any service work on the function module FM 446.

WARNING!

DANGER TO LIFE

from electric shock when the control device is open.

● Before you open the control device: isolate the heating system from the mains supply using the emergency stop switch or by removing the mains fuse.

2.4 Disposal

Dispose of the defunct module in an environmentally acceptable form through an approved organisation.

3   Function module FM 446

Install the function module FM 446 into the control devices, which are part of the Logamatic 4000 control system (software version 4.17 or higher).

The function module FM 446 provides an interface to the EIB bus system, and you can integrate it as a user into the EIB system. It primarily serves as communication interface for integration of the heating control system into a domestic automation system using the European Installation Bus (EIB). The main functions originate from the EIB system or the EIB software.

Using an EIB system in conjunction with the function module FM 446 enables up to seven heating circuits and the DHW heating of a Buderus boiler control unit to be regulated.

If the function module FM 446 has been installed into the control device and after the type of influence of the control unit via the EIB bus has been determined, the EIB expert must – in accordance with agreed arrangements - integrate the function module FM 446 as user into the existing EIB network.

3.1   Functions and influencing options

Your client can, if he operates an EIB system, control and monitor the Buderus heating system (boiler) via this EIB system. Current operating values and conditions can be visualised and exchanged between systems (e.g. between the heating system and the building management system) using suitable EIB sensor technology or software.

Agree all necessary points with an EIB expert prior to commissioning, to enable your client to utilise all advantages of this network immediately.

To ensure perfect operation, the function module FM 446 must be installed, integrated as user into the EIB system and must be set up on the MEC 2 programming unit.

USER NOTE

To integrate the function module FM 446 into the EIB system, you require the EIB product database from Buderus and the EIB Tool Software (ETS) – this is available from your EIB expert.

3.1.1 Influencing options for heating circuits (1–7)

– Matching heating circuit flow temperatures to demand via EIB valve positioning for individual rooms (adjustment of the heating circuit flow temperature)

– Changeover of the heating circuit operating mode via EIB sensor technology (daytime, night-time or automatic operation)

USER NOTE

Adjusting the heating circuit flow temperature is only appropriate, if an EIB single room control system regulates only that particular heating circuit.

Thermostatically-regulated rooms with mixed installation run the risk of being underprovided.

In any case, agree requirements with your customer and the EIB expert, to allow you to design the system structure in accordance with EIB requirements and those of your client.

3.1.2 Influencing options for DHW heating

– Changeover of the DHW operating mode via EIB sensor technology (ON, OFF or automatic operation)

– Changeover of the operating mode of the DHW circulation pump via EIB sensor technology (ON, OFF or automatic operation)

– Activation of the single DHW loading via EIB sensor technology

– Display of the heating system operating values.

USER NOTE

Please note that you can only start the single DHW loading via the EIB system. You can terminate this function only via the MEC 2 programming unit.

3.1.3 Main function – adjustment of the set flow temperature

The main purpose of the function FM 446 is adjustment of the set flow temperature of a heating circuit in accordance with the actual heat demand.

This function results from the communication between the individual EIB room controllers and the boiler control unit.

The set flow temperatures of individual heating circuits are matched to the heating system control settings via the positions of the radiator valves in the respective rooms. This alters the heating system output (boiler system). This type of control is referred to as "heat demand led" operation.

An economy function (switching off heating circuit pumps) results from the adjustment of the set flow temperature.

For example, the control unit will switch off the circulation pump of the heating system, if valve positions are below 5%. The frost protection and boiler operating conditions remain assured.
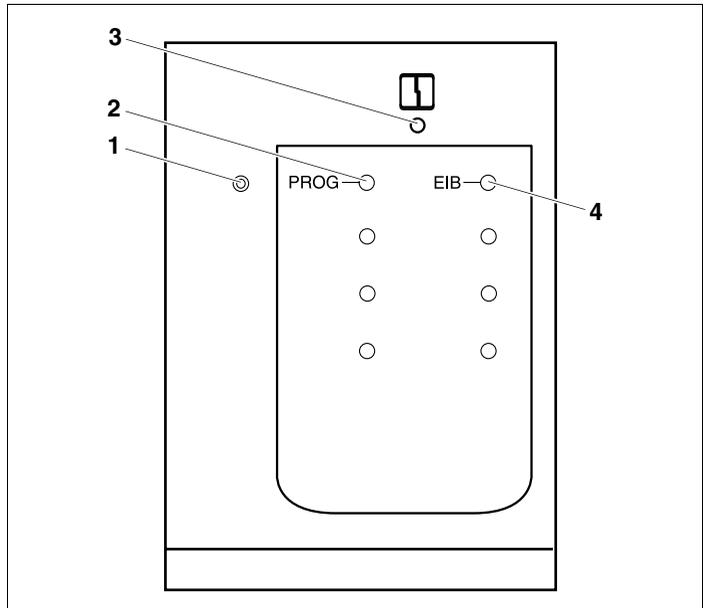
Fig. 2 *Front panel - function module FM 446*

Item 1: *"PROG" key*

Item 2: *"PROG" LED (red) – programming mode*

Item 3: *"Module fault" LED (red) – general module fault*

Item 4: *"EIB" LED (green) – EIB installed*

USER NOTE

Before installing the function module FM 446, please check the software version of the controller module (CM 431) and of the MEC 2 programming unit (version 4.17 or higher).

Your local Buderus sales office will advise you further.

USER NOTE

Generally, only install one function module FM 446 in each control device. Installing a second module generates an error message.

3.2   Installation into the Logamatic 4000 control devices

Where possible, install the function module FM 446 into the extreme r.h. slot of the control device series 4000 (e. g. slot 4 in Logamatic 4311).

Slot allocation in the different control devices		
4111, 4112, 4116	**4211**	**43xx**
2	2	4

Tab. 1   Slot allocation

USER NOTE

The function module FM 446 should be installed into the extreme r.h. slot (see example).

USER NOTE

Connect the function module FM 446 via the standard bus terminal at its back to the EIB system.

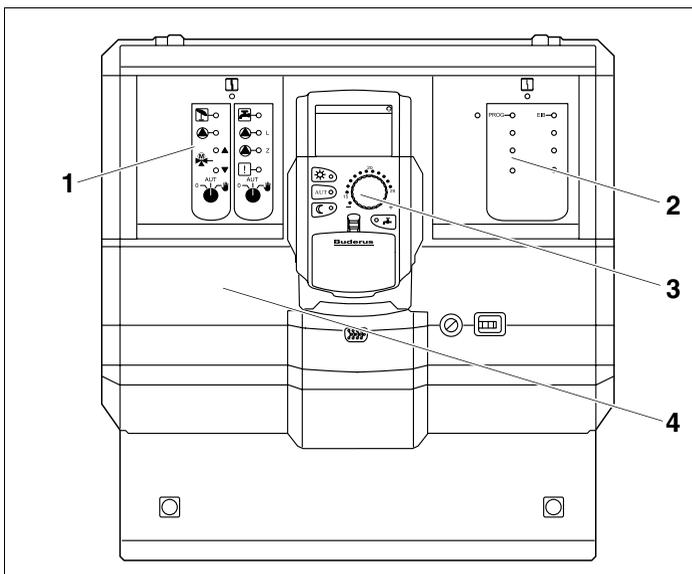### 3.2.1 FM 446 inside the Logamatic 4111, 4112, 4116 control devices

Fig. 3   Function module FM 446 inside the Logamatic 4112 control device

Item 1:   *Slot 1 occupied by function module FM 441*

Item 2:   *Slot 2 occupied by function module FM 446*

Item 3:   *Slot B behind the programming unit MEC 2*

Item 4:   *Slot B for function module FM 451 (only for 4111)*

USER NOTE

Slot B (Fig. 3, **item 3**) is located behind the MEC 2 programming unit and contains the controller and the power supply module (CM, NM).

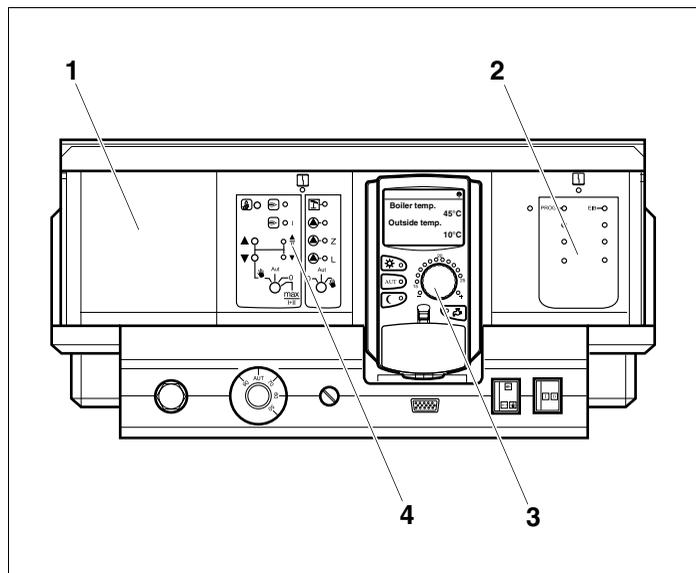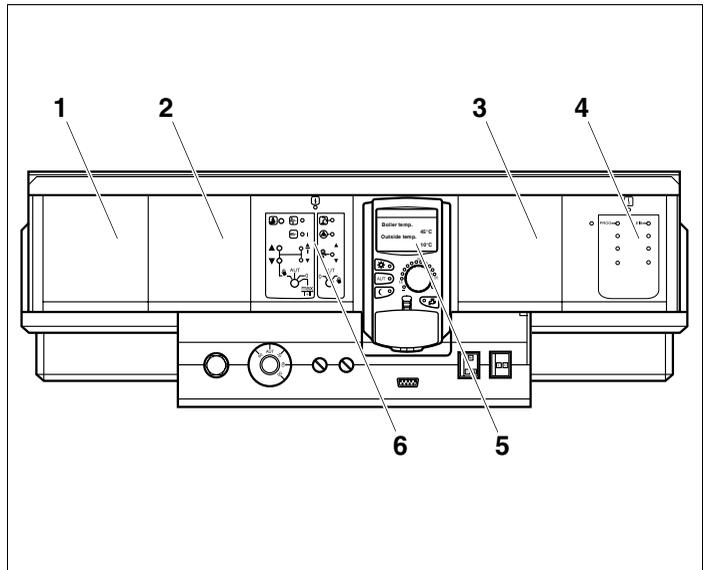### 3.2.2 FM 446 inside the Logamatic 4211 control device

Fig. 4   Function module FM 446 inside the Logamatic 4211 control device

Item 1:   *Slot 1 for an additional function module (FM)*

Item 2:   *Slot 2 occupied by function module FM 446*

Item 3:   *Slot B behind the programming unit MEC 2*

Item 4:   *Slot A for the central module ZM 422 (standard equipment)*

USER NOTE

Slot B (Fig. 4, **item 3**) is located behind the MEC 2 programming unit and contains the controller and the power supply module (CM, NM).

3.2.3   FM 446 inside the Logamatic 43xx control device

Fig. 5   Function module FM 446 inside the Logamatic 4311 control device

Item 1:   *Slot 1 for an additional function module (FM)*

Item 2:   *Slot 2 for an additional function module (FM)*

Item 3:   *Slot 3 for an additional function module (FM)*

Item 4:   *Slot 4 occupied by function module FM 446*

Item 5:   *Slot B behind the programming unit MEC 2*

Item 6:   *Slot A for the central module ZM 432 (standard equipment)*

USER NOTE

Slot B (Fig. 3, **item 5**) is located behind the MEC 2 programming unit and contains the controller and the power supply module (CM, NM).

3.3   EIB integration and programming

USER NOTE

To prepare the function module FM 446 for programming via the EIB system, you should install the module into the control device and integrate it into the EIB system (see chapter 4.1 "Integration of the function module FM 446 into the control device").

The EIB expert can subsequently activate the programming mode and make the necessary settings and design adjustments.

USER NOTE

To integrate the function module FM 446 into the EIB system, you require the EIB product database from Buderus and the EIB Tool Software (ETS) – this is available from your EIB expert.

Activating the programming mode – by the EIB expert

● Press the "PROG" key on the function module FM 446 until the "PROG" LED (red) illuminates.

USER NOTE

For security reasons, the "PROG" key is located underneath the front panel. Activate it with a tool, e.g. a small screwdriver.

The function module is activated for EIB programming.

4   FM 446 settings

In the following sections, you will learn how you can prepare the control device for integration into an EIB-System using the function module FM 446 and the MEC 2 programming unit, and what optional functions are then available to you.

USER NOTE

You can influence the system only via the EIB system and with the allocated EIB users.
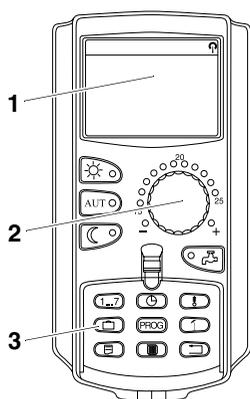
4.1 Integration of the function module FM 446 into the control device

Call up service level

The respective service instructions for your Logamatic 4xxx control device explains in detail how you operate the MEC 2 programming unit. The following provides a brief overview of the MEC 2 operation.

The MEC 2 provides two operating levels (1st level with closed operating flap and 2nd level with open flap) plus a service level (accessible by entering a button code). Various main menus are offered at the service level, giving access to sub-menus, where you can change the settings of the control devices.

Fig. 6   MEC 2 programming unit

Item 1:   *Display*
Item 2:   *Rotary selector*
Item 3:   *Function keys*

To reach the service level, press the following button combination (button code), until "SERVICE LEVEL – Gen. parameters" appears in the display.

Integration of function module FM 446 at the MEC 2 level

After you have installed the function module FM 446 (see installation instruction "Modules for Logamatic 4xxx control devices"), it will be automatically recognised by the control device.
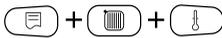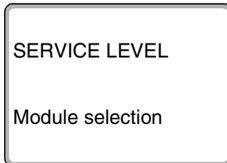
USER NOTE

If the function module FM 446 is not automatically recognised, you will need to manually integrate it once via the MEC 2 programming unit.

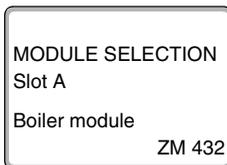### Manual integration of function module FM 446 at the MEC 2 level

Call up service level

Turn the rotary selector, until "SERVICE LEVEL – Module selection" appears in the display.

```
SERVICE LEVEL

Module selection
```

Press the "Display" button to select the main menu "MODULE SELECTION".

The display shows "MODULE SELECTION – Slot A boiler module".

```
MODULE SELECTION
Slot A

Boiler module
                ZM 432
```

Turn the rotary selector to the position (slot), where the function module FM 446 is installed.
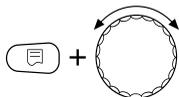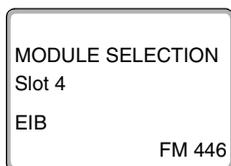
Hold the "Display" button down (the text on the bottom line begins to flash) and turn the selector, until the function module FM 446 appears in the display.

Release the "Display" button.

Press the "Return" button.

The function module FM 446 (EIB module) is installed in slot 4.

```
MODULE SELECTION
Slot 4
EIB
                    FM 446
```

Press "Return" three times, or close the operating flap, to reach the operating level 1.

4.2   Matching the flow temperature of the heating circuits via valve control

The flow temperature of a heating circuit is regulated in conjunction with the valve position of the radiator valves, the setting of the individual room regulators and a weather-compensated heating control unit.

If the heating circuit is only equipped with individual EIB regulators, select "EIB" heating system.

USER NOTE

Please ensure that with this setting, also the EIB settings need to be matched up.
These settings should be made by the EIB expert in conjunction with the EIB Tool Software (ETS).

4.2.1   Selecting "EIB" heating system

You should select the "EIB" heating system for the respective heating circuit, to enable the communication between the function module, the EIB system and the heating circuit.
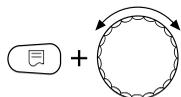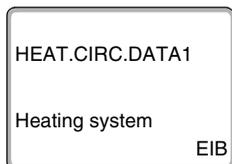
Call up service level

Turn the rotary selector, until "SERVICE LEVEL – Heating circuit 1" appears in the display.

SERVICE LEVEL

Heating circuit 1

4 FM 446 settings
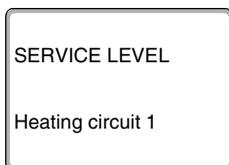
Hold the "Display" button down and turn the selector, until the display shows "HEATINGS CIRCUIT DATA 1 – Heating system EIB".

```
HEAT.CIRC.DATA1


Heating system
                EIB
```

Release the "Display" button.

Press the "Return" button.

USER NOTE

If the "EIB" heating system does not appear in the display, activate the software of the controller module (CM 431) and that of the MEC 2 programming unit – software version 4.17 or higher.

Your local Buderus sales office will advise you further.

Press "Return" three times, or close the operating flap, to reach the operating level 1 or set the heating circuit data for the heating system.

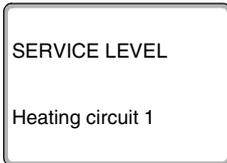### 4.2.2 Setting heating circuit data for the "EIB" heating system

USER NOTE

Set the heating circuit data for the "EIB" heating system, as usual, using the respective service instructions for the control device concerned as reference.

Call up service level

Turn the rotary selector, until "SERVICE LEVEL – Heating circuit 1" appears in the display.

Activate the heating circuit for which you have selected the "EIB" heating system (e.g. heating circuit 1).

SERVICE LEVEL

Heating circuit 1

Press the "Display" button.

HEAT.CIRC.DATA1

Heating system 1
                    EIB

Turn the rotary selector and make the required settings for the "EIB" heating circuit.

Heating system	Setting options
EIB	Heating circuit description
	Minimum flow temperature
	Maximum flow temperature
	Frost protection from
	Actuator
	Actuator run-time
	Raising the boiler temperature
	External fault message - pump

Heating circuit description

From a default list you can select a description for the heating circuit.

USER NOTE

Both settings, i.e. "minimum and maximum flow temperature" provide optimum operating characteristics between the flow rate control of the radiator valves and the flow temperature control of the heating system.

Minimum flow temperature

This setting limits the flow temperature to a minimum set value. Change this value only if necessary.

Maximum flow temperature

This setting limits the flow temperature to a maximum set value. Set the design temperature for this heating circuit here – but only if necessary.

Frost protection from

You must only change the frost protection value in special circumstances.

The circulation pump is automatically switched on, as soon as the actual temperature falls below the set outside temperature threshold.

Actuator

You may enter via the "actuator" function, if the system is equipped with a heating circuit actuator (mixer).

The control unit drives the actuator, if it is installed into the heating circuit (mixer).

The heating circuit is controlled via the boiler flow temperature, if the system is not equipped with a heating circuit actuator.

Actuator run-time

Here you may enter the actuator run-time of existing actuators. Generally, actuators have a run-time of 120 secs.

Raise the boiler temperature

If a heating circuit is controlled with an actuator, a higher design value should be set for the boiler than the normal boiler set value.

The value "Raising the boiler temperature" corresponds to the temperature differential between the set boiler value and the set heating circuit value.

External fault message - pump

This item allows you to select the option as to whether error messages relating to a pump should be displayed.

This function is turned off at the factory.

4.3 Changing the operating modes of heating circuits

The operating modes of heating circuits can be changed via the EIB system. This does not require any settings to be changed via the MEC 2 programming unit.

System	Setting options
Heating circuits (number 1–7)	Daytime mode
	Night-time setback mode
	Automatic operation

USER NOTE

You can either change the adjustment of the set flow temperature (see chapter 4.2 "Matching the flow temperature of the heating circuits via valve control") or the operating mode of the heating circuits. Both functions are mutually exclusive.

USER NOTE

Please ensure that with this setting, also the EIB settings need to be matched up.
These settings should be made by the EIB expert in conjunction with the EIB Tool Software (ETS).

4.4 Changing the operating modes of the DHW circuit

The operating modes of the DHW circuit can be changed via the EIB system. This does not require any settings to be changed via the MEC 2 programming unit.

System	Setting options
DHW circuit (number 1)	ON ("daytime operation" button)
	OFF ("night-time setback" button)
	Automatic operation

USER NOTE

Please ensure that with this setting, also the EIB settings need to be matched up.
These settings should be made by the EIB expert in conjunction with the EIB Tool Software (ETS).

4.5 Changing the operating modes of the DHW circulation pump

The operating mode of the DHW circulation pump can be changed via the EIB system. This does not require any settings to be changed via the MEC 2 programming unit.

System	Setting options
Circulation pump	ON ("daytime operation" button)
	OFF ("night-time setback" button)
	Automatic operation

USER NOTE

Please ensure that with this setting, also the EIB settings need to be matched up.
These settings should be made by the EIB expert in conjunction with the EIB Tool Software (ETS).

4.6 Re-loading domestic hot water function

A re-loading can be activated via the EIB system, if the DHW temperature has fallen below the selected set value.

This will continue until the set DHW value has been reached.

This does not require any settings to be changed via the MEC 2 programming unit.

USER NOTE

Please ensure that with this setting, also the EIB settings need to be matched up.
These settings should be made by the EIB expert in conjunction with the EIB Tool Software (ETS).

4.7 Displaying operating values

Certain system operating values can be visualised (displayed) by the EIB system. These are data relating to the heating circuits, the DHW circuit and the boiler.

Heating circuits (1–7)	
Display	**Comments**
Set flow temperature	Matched flow temperature
Circulation pump status	on/off
DHW circuit	
Display	**Comments**
Set temperature	DHW circuit desired temperature
Actual temperature	Current DHW circuit temperature
Boiler	
Display	**Comments**
Burner operating mode	on/off
Actual boiler temperature	Current boiler temperature
Outside temperature	Current outside temperature
Central fault	This is shown, when the control device develops a fault.

5 Faults

USER NOTE

In the "Fault" column, all faults are listed which can occur in the interaction between the function module FM 446, the Buderus boiler control unit and the EIB system.

The terms in brackets in the "Fault" column show messages which are displayed by the MEC 2 programming unit.

Fault	Effects on control characteristics	Possible causes for faults	Remedy
Heating circuit 1 -9 (EIB setting)	The heating circuit operates at maximum flow temperature.	The EIB module is faulty or not installed/integrated. The heating circuit was incorrectly integrated in the EIB. The heating circuits 1–9 are designed as EIB, but have no EIB system defaults.	Check the settings of the respective heating circuits using the MEC 2 programming unit and the EIB design parameters within the ETS.
Heating circuit (EIB setting)	The heating circuit is not influenced via the EIB. The heating circuit operates in accordance with the settings of the selected heating system.	Either the heating circuit is not available or the "Constant" or "Room regulator" heating system has been selected. The EIB module addresses heating circuits, which the EIB cannot influence.	Check the settings of the respective heating circuits using the MEC 2 programming unit and, if possible, the EIB design parameters.

6 Index

Your local heating engineer:

Buderus

H E I Z T E C H N I K