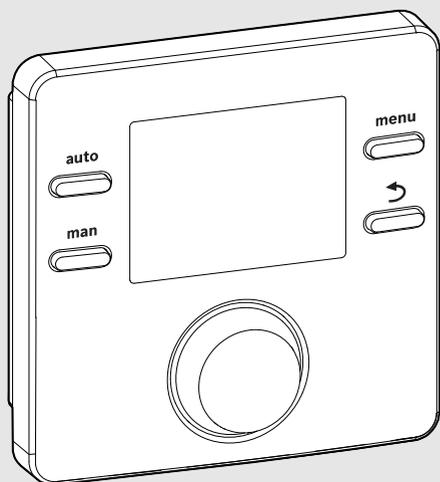


EMS 2



6 720 809 984-00.10



User interface

CR 50



BOSCH

Installation instructions for contractors

6720856749 (2016/03)



1 Key to symbols and safety instructions

1.1 Explanation of symbols

Warning symbols

Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

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



DANGER:

DANGER indicates a situation that will result in severe injury or death.



WARNING:

WARNING indicates a situation that could result in severe injury or death.



CAUTION:

CAUTION indicates a situation that could result in minor to medium injury.

NOTICE:

NOTICE indicates a situation that could result in damage to property or equipment.

Important information



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

1.2 General safety instructions

⚠ Notice for the target group

These installation instructions are intended for plumbers, heating engineers and electricians. All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including possible loss of life.

- ▶ Read the installation instructions (heat source, heating controller, etc.) before installation.
- ▶ Observe the safety instructions and warnings.

- ▶ Observe national and regional regulations, technical rules and guidelines.

⚠ Determined use

- ▶ Only use the product to control solar heating systems in single-family homes or apartment buildings.

Any other use is considered inappropriate. We take no responsibility for damage caused through incorrect use.

⚠ Electrical work

Electrical work must only be carried out by a qualified electrician.

- ▶ Before starting electrical work:
 - Isolate the mains electrical supply and secure against reconnection.
 - Using suitable means, test that the mains voltage is disconnected.
- ▶ Never connect the product to mains voltage.
- ▶ Also observe the connection diagrams of other system components.

2 Product information

The CR 50 user interface is a control unit without an outdoor temperature sensor.

Information on energy efficiency (ErP Directive) can be found in the operating instructions.

2.1 Product description

The user interface is used to control a heating circuit without mixer and a DHW tank charging circuit for water heating directly at the heat source.

The user interface is not suitable for connecting the DHW cylinder behind a low loss header.

The user interface is installed in a suitable living space.

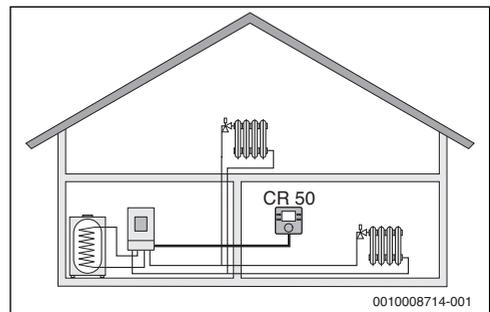


Fig. 1 Example of a heating system with one heating zone and a CR50 as controller (single-family home)

2.2 Scope of delivery

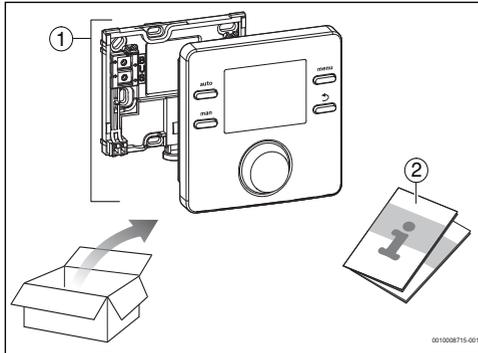


Fig. 2 Scope of delivery

- [1] User interface
- [2] Technical documentation

2.3 Technical data

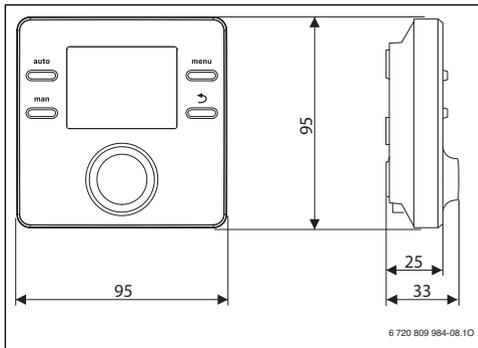


Fig. 3 Dimensions in mm

Rated voltage	8 ... 16 V DC (2-wire BUS/EMS 2 and OpenTherm)
Rated current	5 ... 23 mA (2-wire BUS/EMS 2 and OpenTherm)
BUS interface	2-wire BUS, EMS 2, OpenTherm
Control range	5 ... 30 °C
permissible ambient temperature	0 °C ... 50 °C
Power reserve	≥ 4 h
Protection class	III
IP-Rating	IP20

Table 1 Technical data

2.4 Temperature sensor characteristics

°C	Ω	°C	Ω	°C	Ω	°C	Ω
8	25065	32	9043	56	3723	80	1704
14	19170	38	7174	62	3032	86	1421
20	14772	44	5730	68	2488	-	-
26	11500	50	4608	74	2053	-	-

Table 2 Resistance values for flow and hot water temperature sensors

2.5 Applicability of the technical documentation

Information in the technical documentation about heat sources, heating controllers or the BUS apply also to the present user interface.

2.6 Additional accessories

No other BUS modules and user interfaces are possible in the system with the CR 50.

Combination is not possible with the following products:

- FR..., FW..., TR..., TF..., TA...

3 Installation

DANGER:

Life-threatening danger from electrical shock!

- ▶ Before installing this product:
Disconnect the heat source and all other BUS nodes from the mains voltage across all poles.

3.1 Installation location



This user interface is intended only for wall-mounted installation.

Do not install in the heat source or in wet areas.

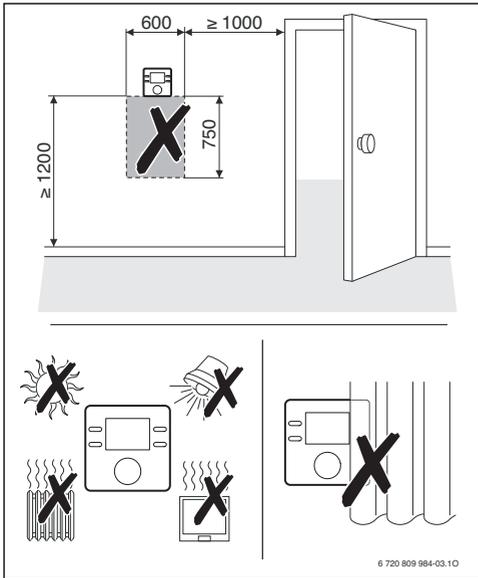


Fig. 4 Installation location in the reference room

3.2 Installation

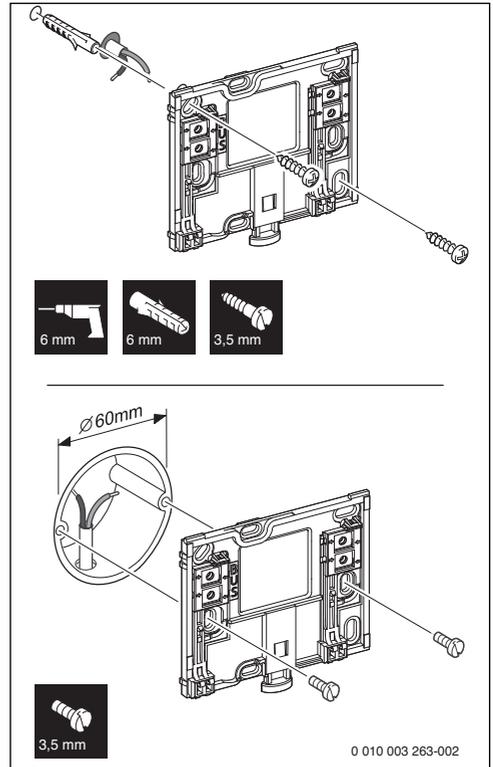


Fig. 5 Installation of the plinth

3.3 Electrical connection

Power is supplied to the user interface via the BUS cable. The wires are insensitive to polarity.



If the maximum total length of the BUS interfaces between all BUS nodes is exceeded or the BUS system has a ring structure, commissioning of the system is not possible.

Maximum total length of BUS interfaces:

- 50 m at 0.50 mm² conductor cross-section
 - 300 m at 1.50 mm² conductor cross-section.
- To avoid inductive interference: Make sure all low-voltage cables are routed separately from mains voltage cables (min. clearance 100 mm).

- ▶ In the case of external inductive interferences (e.g. from photovoltaic systems), use shielded cables (e.g. LIYCY) and earth the shield on one side. Connect the shield to the building's earthing system, such as to a free earth conductor terminal or water pipe.
- ▶ Establish a BUS connection to the heat source.

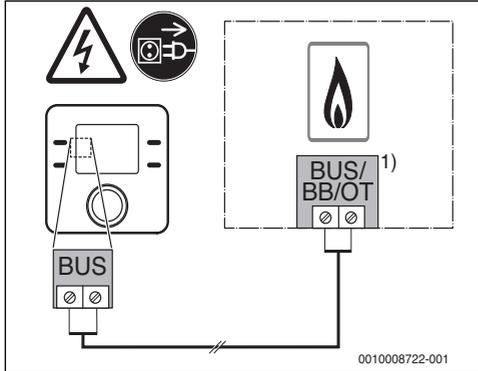


Fig. 6 Connection of the user interface to a heat source

- 1) Terminal identification:
- On heat sources with an OpenThermBUS system: OT
 - On heat sources with a BUS system EMS 2 ABBAS
 - On heat sources with a 2-wire BUS: BB

3.4 Hooking in or removing the user interface

Fitting the user interface

1. Hook in the user interface at the top.
2. Click in the user interface at the bottom.

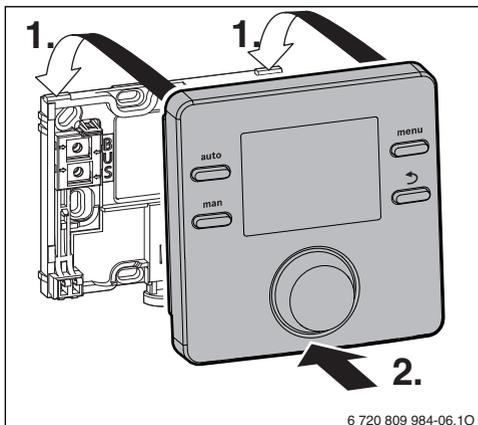


Fig. 7 Fitting the user interface

Removing the user interface

1. Press the button on the underside of the plinth.
2. Pull the bottom of the user interface away from the plate.
3. Remove the user interface by lifting upward.

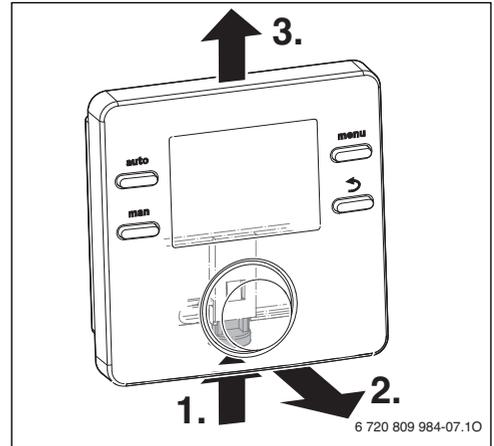


Fig. 8 Removing the user interface

4 Commissioning

- ▶ First make all electrical connections and then carry out commissioning.
- ▶ Follow all installation instructions for all components and assemblies in the system.
- ▶ Turn on the mains power supply.
- ▶ Set the heat source to the maximum flow temperature needed and activate the automatic operation for water heating.

Once the user interface is connected to the power supply, the language selection appears on the display.
- ▶ Make adjustments by turning and pressing the selector.
- ▶ Set the language.



The display switches to the date setting.

6 | Shutdown / switching off

- ▶ Set the date.



The display switches to the time setting.

- ▶ Set the time.



The CR 50 is now set up as a controller and the display automatically changes to the standard display. The heating system and DHW heating are operating (continuous hot water, heating according to the heating program).



The manual adaptation to the individual heating system can be performed in the service menu.

- ▶ Make the corresponding system settings, such as **Control type**, **Max. Suppl.T.**, **PID charact.**, **Opt. pump run**, **Frost protect**, **Max. DHW temp**

5 Shutdown / switching off

The user interface is powered via the BUS interface and is always switched on. The system should only be switched off for maintenance work, for example.

- ▶ Disconnect power from the entire system and all BUS nodes.



After a prolonged power failure or extended period of idleness, the date and time may need to be reset. All other settings are retained permanently.

6 Service menu

- ▶ If the standard display is active, press and hold the **menu** key for about three seconds until the service menu appears in the main menu is displayed.
- ▶ Press the selector to open the highlighted service menu .

- ▶ Turn the selector to select a menu item or change the value of a setting.
- ▶ Press the selector to open the selected menu item, activate the input field for a setting or confirm a setting.



Depending on the control device for the heat source and BUS system employed, some menu items are displayed and cannot be adjusted using the user interface.

Service menu overview → Page 10.

6.1 System data menu

In this menu, monitor and individually reconfigure the entire system with respect to the automatic settings.

Menu item	Control range: Function description
User interf.	Controller: Use as a controller
HC assignment	1
Pump conn.	Heat sources: Heating pump connected to heat source
Heat. System	High Temp Low Temp.: Assign the heating system to the heating circuit
Control type	Room supply Room output: Choose the room control as either a flow temperature control or output control (output control only available with 2-wire BUS/EMS 2-BUS).
Config. HC1	Hydraulic and electrical connection of heating circuit 1 to heat source (only with the EMS 2)
	Own pump: Heating circuit pump electrically connected to the heat source
	P. after header: Low-loss header installed, heating circuit pump connected to heat source
DHW	No: No DHW system installed
	Yes, 3-wy vlv: Existing hot water system is supplied via 3-way valve
	Yes, pr. pump: Existing hot water system is supplied via cylinder primary pump
LLH sensor	No: No low-loss header installed
	Yes, on appl.: Low-loss header installed, temperature sensor connected to heat source

Menu item	Control range: Function description
Recirculation	NO: The DHW circulation pump cannot be controlled by the heat source.
	YES: The DHW circulation pump can be controlled by the heat source.
Reset all	NO: The current settings have been retained.
	YES: The factory settings are being restored (except time and date).

Table 3 Settings in the system data menu

6.2 Heating circuit menu

Settings for the heating zone are made in this menu.

NOTICE:

Risk of damaging or destroying the screed!

- If an underfloor heating system is installed, observe the maximum flow temperature recommended by the manufacturer.

Menu item	Control range: Function description
Max. Suppl.T.	30 ... 48 ... 60 °C (example of underfloor heating system): Maximum flow temperature
PID charact.	Fast: Fast control characteristic, such as when there is a small heating water quantity in the air heating
	Medium: Medium control characteristics, for example with radiator heating
	Slow: Slow control characteristics, for example with underfloor heating system
Opt. pump run	ON: The heating pump runs as little as possible on the basis of the flow temperature
	OFF If the system has more than one heat source installed or a buffer cylinder is installed, this function must be deactivated.
Frost protect (only available with 2-wire BUS/EMS 2-BUS)	OFF: Frost protection off
	by room temp: Frost protection is deactivated/activated on the basis of the temperature selected here
DHW priority	ON: DHW heating is activated, the heating is interrupted
	OFF: DHW heating is activated, parallel operation with heating

Table 4 Settings in the heating zone menu

Frost protection

The setting **by room temp** offers sufficient frost protection only if all the piping in the insulated building envelope is run in the "warm area" (no reliable frost protection if the piping is run in façades, for example).

6.3 DHW menu

Settings for water heating are made in this menu. A contractor can set a hot water temperature higher than 60 °C. Only available with EMS 2-BUS.



WARNING:

Risk of scalding from hot water!

If thermal disinfection has been set to avoid legionella (the DHW is heated once Thursday night at 02:00 to 70 °C), or the maximum storage temperature has been set to above 60 °C:

- Inform all people concerned and make sure that a mixer is installed.

Menu item	Control range: Function description
Max. DHW temp	60 ... 80 °C: The set value is the upper limit for the desired hot water temperature

Table 5 Settings in the hot water menu

6.4 Function test menu

The system pump can be tested using this menu.

Menu item	Control range: Function description
Activation	NO: All actuators return to the same position as before activating the test.
	YES: All actuators in the system switch to the test mode.
System pump	0 (in %): Heating pump not running (switched off).
	100 (in %): Heating pump running at maximum speed.

Table 6 Settings in the function test menu

6.5 Info menu

Heating system settings and measurements are displayed in this menu. Changes are not possible.

Menu item	Possible values: Description
Appl. oper.	ON: Burner in operation
	Off: Burner not operating
Appl.set flow	20 ... 90 °C: Flow temperature required at the heat source (set temperature)

Menu item	Possible values: Description
Appl.act.flow	20 ... 90 °C: Flow temperature measured at the heat source (actual temperature)
Appl.max.flow	35 ... 90 °C: Maximum flow temperature set at the heat source
LLT temp.	20 ... 90 °C: Current hot water temperature in the low-loss header
HC operation	OFF: No operation Heating: Heating mode active Setback: Setback mode active Manual: Manual operation active Current operating mode in heating zone.
HC set sply.	20 ... 90 °C: Required flow temperature in heating zone
Set room temp	OFF: Heating switched off, e. g. in the summer 5.0 ... 30.0 °C: Desired room temperature
Room Temp.	5.0 ... 30.0 °C: Measured room temperature
DHW operation	ON: DHW heating active OFF: Water heating not active
Set DHW temp	15 ... 80 °C: Desired DHW temperature
Act. DHW temp	15 ... 80 °C: Measured DHW temperature
Max. DHW temp	15 ... 80 °C: Maximum hot water temperature set on the user interface

Table 7 Information menu

6.6 Maintenance menu

Service-relevant settings are made in this menu, e. g. deleting the list of faults after all faults have been rectified in the course of service.

Menu item	Control range: Function description
Maint.message	OFF: No service display appears on the user interface. ON: A service display appears on the display of the user interface on the set date.
Maint. date	2012-01-01 – 2099-12-31: Date for next heating system maintenance.
Reset maint.	NO: The service display is not reset. YES: The service display is reset.
Current fault	such as 2012-09-29 A11/802: All current faults are displayed, arranged in order of fault severity: the date is displayed, the fault code and sub-code flash alternately in the value display.

Menu item	Control range: Function description
Fault history	such as 2012-07-31 A02/816: The last 20 faults are displayed, arranged in order of the time of occurrence. The date appears in the text line, the fault code and sub-code flash alternately.
Reset fault	NO: The fault history is retained. YES: The fault history is deleted.

Table 8 Settings in the Maintenance menu

6.7 System info menu

Detailed information about the BUS nodes in the system can be queried in this menu. Changes are not possible.

Menu item	Display example: Function description
Install.date	2012-09-14: Date of first commissioning as a controller is automatically entered.
Control unit	XXXX.X: Designation of the heat source controls
Control SW	1.xx 2.xx: Software version of the heat source controls
SW controller	NFxx.xx: Remote control software version

Table 9 System info

7 Troubleshooting

A fault appears on the display of the user interface. The cause can be a fault on the user interface, in a component, in an assembly or on the heat source. The service manual with detailed fault descriptions contains additional information on troubleshooting.



Structure of table headers:

Fault code - sub-code - [cause or fault description].

A01 - 808 - [DHW heating: hot water temperature sensor 1 faulty - replacement mode active]	
Test procedure/cause	Corrective measure
No hot water system installed	Deactivate hot water system in the service menu
Check connecting lead between controller and hot water temperature sensor	If there is a defect, replace the sensor
Check the electrical connection of the connecting lead in the controller	If a screw or plug is loose, rectify the contact problem

A01 - 808 - [DHW heating: hot water temperature sensor 1 faulty - replacement mode active]

Test procedure/cause	Corrective measure
Check the hot water temperature sensor according to table	If values do not match, replace the sensor
Check the voltage at the connecting terminals of the hot water temperature sensor in the controller according to table	If the sensor values matched, but the voltage values do not match, replace the controller

Table 10

A01 - 810 - [hot water remains cold]

Test procedure/cause	Corrective measure
If the DHW priority was deselected and heating and DHW are running in parallel, the boiler's performance may not be not sufficient	Set water heating to "priority"
Check the hot water temperature sensor according to table	Replace the sensor if there are deviations from the table values

Table 11

A11 - 1000 - [System configuration not confirmed]

Test procedure/cause	Corrective measure
System configuration not completed	Configure system completely and confirm

Table 12

A11 - 1010 - [No communication via BUS interface EMS 2]

Test procedure/cause	Corrective measure
Check whether BUS cable was connected incorrectly	Rectify wiring faults and switch controller off and on again
Check whether BUS cable is defective. Turn the controller off and on again.	<ul style="list-style-type: none"> • Repair or replace the bus cable • Replace defective user interface

Table 13

A11 - 1038 - [Invalid time/date]

Test procedure/cause	Corrective measure
Date/time not yet set	Set date/time
Prolonged loss of power supply	Set date/time

Table 14

A31 - 3021 - [Heating circuit flow temperature sensor faulty - standby mode active]

Test procedure/cause	Corrective measure
Check configuration. The selected setting requires a flow temperature sensor	Change configuration
Check flow temperature sensor according to table	If values do not match, replace the sensor

Table 15

A61 - 1010 - [No communication via BUS interface EMS 2]

Test procedure/cause	Corrective measure
Check whether BUS cable was connected incorrectly	Rectify wiring faults and switch controller off and on again
Check whether BUS cable is defective. Turn the controller off and on again.	<ul style="list-style-type: none"> • Repair or replace the bus cable • Replace defective user interface

Table 16

A61 - 3091 - [Room temperature sensor faulty]

Test procedure/cause	Corrective measure
User interface faulty	<ul style="list-style-type: none"> • Restart auto-configuration. All users must be on the BUS. • Replace user interface

Table 17

Hxx - ... - [...]

Test procedure/cause	Corrective measure
For instance, service interval of heat source elapsed.	Service required; see documents for the heat source.

Table 18

8 Old electrical and electronic appliances

Electrical or electronic devices that are no longer serviceable must be collected separately and sent for environmentally compatible recycling (in accordance with the European Waste Electrical and Electronic Equipment Directive).

To dispose of old electrical or electronic devices, you should use the return and collection systems put in place in the country concerned.

9 Overview of the service menu

The menu items are displayed in the sequence below.

Service

System Data

- User interf. (as a controller)
- HC assignment (HK1)
- Pump conn. (pump connection to the heat source)
- Heat. System
- Control type
- Ext.RoomSens. (external room temperature sensor)
- Config. HC1¹⁾ (Configuration of heating circuit 1)
- DHW
- LLH sensor (low loss header)
- Recirculation (DHW circulation pump)
- Reset all (restoration of default setting)

Heat.circuit

- Max. Suppl.T. (maximum flow temperature)
- PID charact.
- Opt. pump run (optimum heating circuit pump operation)
- Frost protect²⁾
- DHW priority (DHW heating prioritized)

DHW

- Max. DHW temp¹⁾ (maximum DHW temperature)

Function test

- Activation
- System pump

Info

- Appl. oper. (burner in operation)
- Appl.set flow (required flow temperature)
- Appl.act.flow (measured flow temperature)
- Appl.max.flow (maximum flow temperature)
- LLT temp. (low loss header temperature)
- HC operation (heating circuit operation)
- HC set sply. (required flow temperature in heating zone)

- Set room temp (desired room temperature)
- Room Temp. (measured room temperature)
- DHW operation (DHW heating operation)
- Set DHW temp (desired DHW temperature)
- Act. DHW temp (measured DHW temperature)
- Max. DHW temp (maximum DHW temperature)

Maintenance

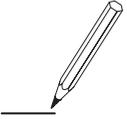
- Maint.message (maintenance message)
- Maint. date
- Reset maint. (reset the service display)
- Current fault (active faults)
- Fault history (of the last 20 faults)
- Reset fault (reset fault history)

System info

- Install.date (date of installation)
- Control unit
- Control SW (software version of the control device)
- SW controller (programming unit software version)

1) Available only when using heat sources with EMS 2.

2) Only available with 2-wire BUS/EMS 2-BUS.



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