⧽SAUTER

EQJW146F002

P100019102

Heating and District Heating Controller

with graphics display

Firmwareversion 2.4x

C E

Old > New	Firmware revisions
2.3x -> 2.4x	Connected sensor inputs not relevant for closed-loop control are displayed on the 'Special values' screen in the controller's operating level
	New **functions and parameters for buffer tank systems** – CO1 > F22: SLP depending on return flow temperature – CO5 > F25: AA1 reverse – CO5 > F31: AE1 zero shift – PA1 > P16: Minimum set point to charge buffer tank – PA1 > P17: Stop charging of the buffer tank – PA1 > P18: Charging temperature boost – PA1 > P19: Lag time of charging pump
	New **differential temperature control** function (CO1 > F23) in systems Anl 1.0 and 16.0
From 2.49	Valve transit time TY 120 s for Rk1, Rk2 and TW

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAUTER devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

Definition of signal words

⚠ DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

⚠ WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

❶ NOTICE

Property damage message or malfunction

ℹ Note

Additional information

☼ Tip

Recommended action

Contents

1 Safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the controller:

- The device is to be mounted, started up or operated only by trained and experienced personnel familiar with the product.
- For electrical installation, you are required to observe the relevant electrotechnical regulations of the country of use as well as the regulations of the local power suppliers. Make sure all electrical connections are installed by trained and experienced personnel! Before performing any such work on the controller, disconnect it from the power supply.
- The device is designed for use in low voltage installations. For wiring and maintenance, you are required to observe the relevant regulations concerning device safety and electromagnetic compatibility.

  To avoid damage to any equipment, the following also applies:
- Proper shipping and storage are assumed.
- Before start-up, wait until the controller has reached the ambient temperature.

1.1 Disposal

Waste electrical and electronic equipment may still contain valuable substances. They may also, however, contain harmful substances which were necessary for them to function. For this reason, do not dispose of this kind of equipment together with your household waste. Select a suitable disposal method. Instead, dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment.
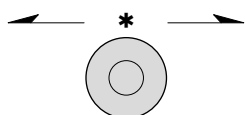
2 Operation

The controller is ready for use with the default temperatures and operating schedules. On start-up, the current time and date need to be set at the controller (see section 2.4).

2.1 Operating controls

The operating controls are located in the front panel of the controller.

2.1.1 Rotary pushbutton
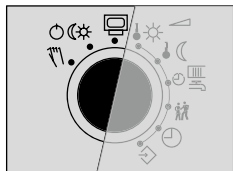
Rotary pushbutton

Turn [○]:
Select readings, parameters and function blocks

Press [✳]:
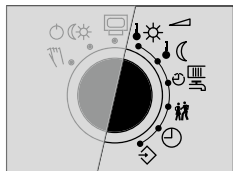Confirm adjusted selection or settings

2.1.2 Rotary switch

The rotary switch is used to set the operating mode and the relevant parameters for each control circuit.

🖵 Operating level

○◖☼ Operating modes

🖐 Manual level

♨☼ Day set point (rated room temperature)

♨◖ Night set point (reduced room temperature)

⏱ Times-of-use for heating/DHW

👥 Special time-of-use

🕐 Time/date

⬦ Settings

2.2 Reading information

The display indicates the date, time and actual temperature when the rotary switch is positioned at ⬚ (operating level).

Wed 21.01.2015 08 19 5.5°C ⌂🌡	Thu 05.03.2015 08:40 27.8°C ⌂🌡 ℛ

Thu 05.03.2015   08:46

72.2°C·▥🌡
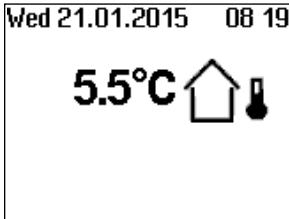
Outdoor-temperature-compensated control · Current temperature = Outdoor temperature
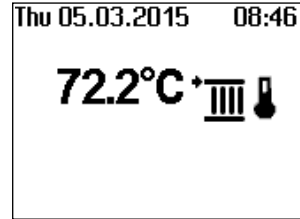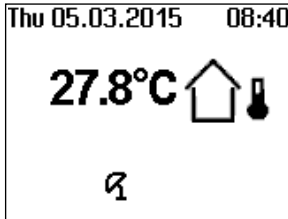
Fixed set point control · Current temperature = Flow temperature

Further information can be obtained by turning the rotary pushbutton:

Operating state
HC1 ⊙❄▾ 0%   ⊘ ON
DHW ⊙❄   ⊘⚐ ON ⊘○ OFF
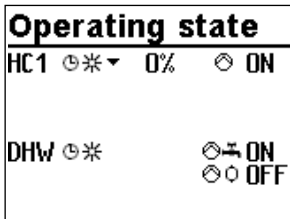
( ) Operating status

The following applies to heating circuits HK1 and HK2:

HC1 ⊙❄▾   0%   ⊘ ON

- Heating circuit
- Current operating mode
- Valve
  ▲ opens
  ▼ closes
- Current positioning value
- Circulation pump (heating) ON/OFF
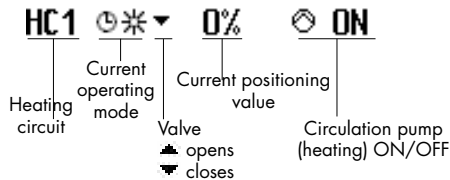
The following applies for DHW heating:

DHW ⊙❄   ⊘⚐ ON
                ⊘○ OFF

- Current operating mode
- Pump ON/OFF
  ⊘○ Storage tank charging pump
  ⊘⚐ Circulation pump (DHW)
  ⊘⤴ Solar circuit pump

For further details, see section 2.3.

System 2.1

HC1   DHW

○ Selected system code number

For further details, see section 3.1.

∗ Important measured values of the entire system, e.g. outdoor temperature, flow temperature and return flow temperature, are displayed.

HC1

○ Times-of-use (depending on system code number)
– Heating circuit HC1
– Heating circuit HC2
– DHW heating

The day mode times is highlighted in black on the time chart.

Night mode and deactivation times are highlighted in gray on the time chart.

For further details, see section 2.5.

∗ Measured values, set points and limits of the system section shown are displayed.

Special value

0-10V Value	0.0
Value 1	-6.8
Value 4	23.1
Value 5	126.8
Value 6	38.5

○ Special values

Measured values from additional sensor inputs (not relevant for closed-loop control) or from the 0 to 10 V input are displayed.

Alarm list

09:30	Disinfection
09:17	Binary alarm
08:53	Sensor failure
2021	Start with defaults

○ Alarm list

The last four alarm entries are listed.

∗ Open the alarm list and select further alarm entries (○). Further information on an alarm (including time and date when it occurred) runs across the display.

Event list

09:25	System=4.5
09:17	C08-F01=1
08:55	System time
08:54	C04-F14 P=Thursda

○ Event list
The last four event entries are listed.

∗ Open the event list and select further event entries (○).
Further information on an event (including time and date when it occurred) runs across the display.

○ Trend-Viewer
The standard graph shows the data measured at the outdoor sensor AF1 and flow sensor VF1 plotted over time.

For further details, see section 2.2.1.

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i *Note*

Details on the controller version (device identification, serial number, software and hardware versions) are displayed in the **extended operating level**.

Information

Modbus ID	5573
Serial number	39477
Software version	2.49
Hardware version	1.35

Turn the rotary switch to ⇄ (settings).

○ Enter code number 1999.

∗ Confirm key number.
Turn the rotary switch to ▢ (operating level).

○ Select 'Information'.

2.2.1 Adapting the Trend-Viewer

The standard graph shows the data measured at the outdoor sensor AF1 and flow sensor VF1 plotted over time.
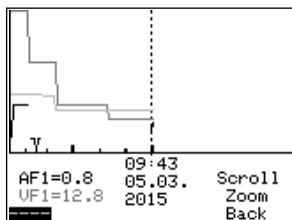
✳ Open the Trend-Viewer.

Adding measuring data

◌ Select – – – – on the display.

✳ Activate editing mode for sensor selection.

◌ Select sensor.

✳ Confirm selected sensor.
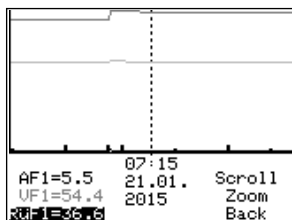
Deleting measured data:

◌ Select the sensor whose measured data are no longer to be displayed.

✳ Activate editing mode for sensor.

◌ Select – – – – on the display.

✳ Confirm deletion.
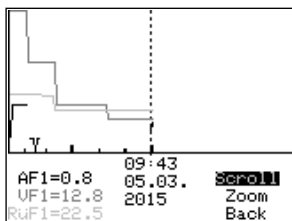
Shifting the time line:

◌ Select 'Scroll'.

✳ Activate editing mode for scroll function.

◌ Shift the time line.

✳ Confirm time display.
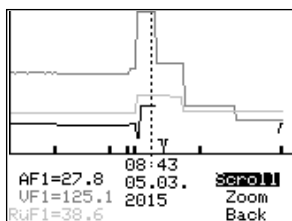
Zooming in/out

◌ Select 'Zoom'.

✳ Open zoom function.

◌ Zoom in or out.

✳ Confirm display.
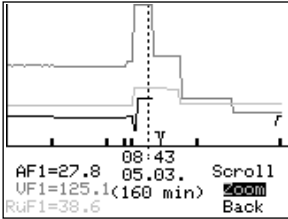
Closing the Trend-Viewer

() Select 'Back'.

✳ Close the Trend-Viewer

2.3 Selecting operating modes

Day mode (rated operation): regardless of the programmed times-of-use and summer mode, the set points relevant for rated operation are used by the controller. Icon: ☀☀

Night mode (reduced operation): regardless of the programmed times-of-use, the set points relevant for reduced operation are used by the controller. Icon: ☽☽

Control operation deactivated: regardless of the programmed times-of-use, control operation of the heating circuits and DHW heating remains deactivated. The frost protection is activated, if need be. Icon: ☼☼
Icons when the frost protection is activated: HC ☼☽, DHW ☼☀

Automatic mode: during the programmed times-of-use, the controller works in day mode. Outside these times-of-use, the controller is in night mode, unless control operation is deactivated depending on the outdoor temperature. The controller switches automatically between both operating modes. Icon within the times-of-use: ⏱☀, icon outside the times-of-use: ⏱☽

Manual mode: valves and pumps can be controlled manually. For further details, see section 4.
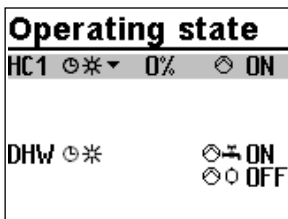
Turn the rotary switch to ⟳☾☀ (operating modes). The operating states of all system control circuits are displayed:
– Heating circuit HC1
– Heating circuit HC2
– DHW heating
→ Only those control circuits are available for selection which can be controlled by the selected system.

() Select the control circuit.

Operating state

HC1 ⊕✳▾ 0% ⊘ ON

DHW ⊕ ⊘⚲ON ⊘○OFF
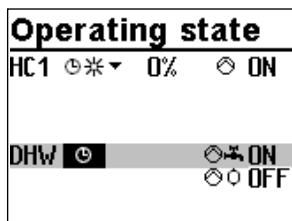
✳ Activate editing mode for the control circuit. The operating mode is shown inverted on the display.

○ Select the operating mode:
⊕ Automatic mode
✳ Day mode

Operating state

HC1 ⊕✳▾ 0% ⊘ ON

DHW ✳✳ ⊘⚲ON ⊘○OFF
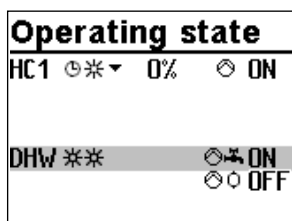
✳ Confirm the operating mode.

2.4 Setting the time and date

The current time and date need to be set immediately after start-up and after a power failure lasting more than 24 hours. This is the case when the time blinks on the display.

Time/date

Time	08:23
Date (dd.mm.)	21.01.
Year	2015
Auto summertime	ON
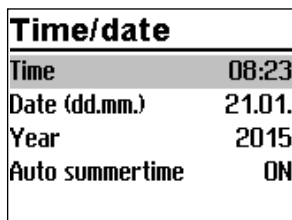
Turn the rotary switch to ⊕ (time/date). The current time is selected (gray background).

Time/date

Time	08:23
Date (dd.mm.)	21.01.
Year	2015
Auto summertime	ON
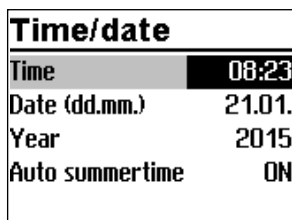
✳ Activate editing mode for the time. The time reading is inverted.
○ Change the time.
✳ Confirm the time setting.

Time/date	
Time	08:44
Date (dd.mm.)	21.01.
Year	2015
Auto summertime	ON

○ Select 'Date' (dd.mm) [○].

Time/date	
Time	08:44
Date (dd.mm.)	**21.01.**
Year	2015
Auto summertime	ON

∗ Activate editing mode for the date. The date reading is inverted.

○ Change date (day.month).

∗ Confirm the date setting.

Time/date	
Time	08:45
Date (dd.mm.)	05.02.
Year	2010
Auto summertime	ON

○ Select 'Year'.

Time/date	
Time	08:45
Date (dd.mm.)	05.02.
Year	**2010**
Auto summertime	ON

∗ Activate editing mode for the year. The year reading is inverted.

○ Change the year.

∗ Confirm the year setting.

Time/date

Time	08:45
Date (dd.mm.)	05.02.
Year	2015
Auto summertime	**ON**

Time/date

Time	08:45
Date (dd.mm.)	05.02.
Year	2015
Auto summertime	**ON**

Deactivate or activate the automatic summer/standard time switchover as required.

○ Select 'Auto summertime'.

✳ Activate the editing mode for automatic summer/standard time switchover. The current setting is shown inverted on the display:
ON = Summer/standard time switchover active
OFF = Summer/standard time switchover not active

○ Deactivate or activate the automatic summer/standard time switchover.

✳ Confirm deactivation/activation.

Turn the rotary switch back to 🖳 (operating level).

ⓘ Note

The correct time is guaranteed after a power failure of 24 hours. Normally, the correct time is still retained at least 48 hours after a power failure.

2.5 Setting the times-of-use

Three times-of-use can be set for each day of the week.

Parameters	WE		Value range
	HC1, HC2	DHW, CP	
Start first time-of-use	06:00	00:00	00:00 to 24:00 h; in steps of 15 minutes
Stop first time-of-use	22:00	24:00	00:00 to 24:00 h; in steps of 15 minutes
Start second time-of-use	–:–	–:–	00:00 to 24:00 h; in steps of 15 minutes
Stop second time-of-use	–:–	–:–	00:00 to 24:00 h; in steps of 15 minutes
Start third time-of-use	–:–	–:–	00:00 to 24:00 h; in steps of 15 minutes
Stop third time-of-use	–:–	–:–	00:00 to 24:00 h; in steps of 15 minutes

---

HC1

	0 6 12 18 24
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	
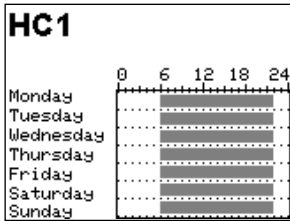
Turn the rotary switch to ⌚ (times-of-use). The first control circuit is displayed together with its programmed times-of-use.

○ Program the times-of-use of another control circuit, if required:
   – Heating circuit HC2
   – DHW heating
   – Circulation pump (DHW) CP

➔ Only those control circuits are available for selection which can be controlled by the selected system.

DHW 00:00   24:00
--:--   --:--
--:--   --:--

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	
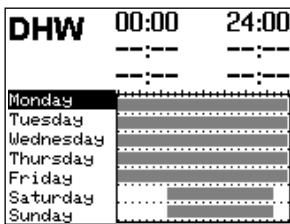
✳ Activate editing mode for the control circuit. The times-of-use for Monday are displayed.

DHW

	0 6 12 18 24
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	
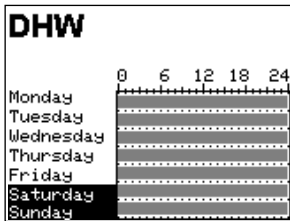
○ Select period/day for which the times-of-use are to be valid. The times-of-use can be programmed for individual days or for a block of days, e.g. Monday to Friday, Saturday and Sunday or Monday to Sunday. The selected days are shown inverted on the display.

DHW 00:00   24:00
--:--   --:--
--:--   --:--

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	
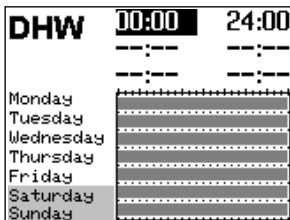
✳ Activate editing mode for the period/day.
The start time of the first time-of-use period can now be edited (inverted reading).

○ Change start time.(in steps of 15 minutes)

✳ Confirm the start time.The stop time of the first time-of-use period can now be edited.

○ End stop time.(in steps of 15 minutes)

```
DHW    07:00  22:00
       22:15  --:--
       --:--  --:--
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
```
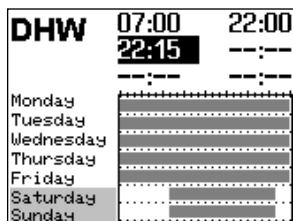
✳ Confirm the stop time. The start time of the second time-of-use period can now be edited.

To set the second and third times-of-use periods, repeat steps with gray background. If no further times-of-use are to be programmed for the selected time period/day, exit the menu by confirming the indicated start time twice (2x ✳).

Proceed in the same manner to program further periods/ days.

After setting all times-of-use:

```
DHW
          0  6  12  18  24
Back
```
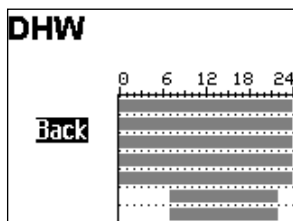
❍ Select 'Back'.

✳ Exit the times-of-use setting.

Turn the rotary switch back to ▱ (operating level).

ℹ **Note**

All function block settings are saved in a non-volatile memory.

2.6 Entering day and night set points

The desired room temperature for the day and night set points can be programmed.

Switch position ☽☼

Parameters	WE	Value range
HC1 room temperature	20.0 °C	0.0 to 40.0 °C
HC2 room temperature	20.0 °C	0.0 to 40.0 °C
DHW temperature	60.0 °C	Min. to max. DHW temperature
HC1 OT deactivation value	22.0 °C	0.0 to 50.0 °C
HC2 OT deactivation value	22.0 °C	0.0 to 50.0 °C

Operation

Switch position ☾

Parameters	WE	Value range
HC1 room temperature	15,0 °C	0.0 to 40.0 °C
HC2 room temperature	15,0 °C	0.0 to 40.0 °C
DHW temperature	40.0 °C	Min. to max. DHW temperature
HC1 OT deactivation value	15,0 °C	–50.0 to 50.0 °C
HC2 OT deactivation value	15,0 °C	–50.0 to 50.0 °C

```
 Night set points
────────────────────
HC1  Room temp.   15.0°C
DHW  DHW temp.    40.0°C
HC1  OT deac. day 15.0°C
```

Turn the rotary switch to ☼ (day set point) or ☾ (night set point).

The day or night set points are listed on the display.

➔ Only those day and night set points are available for selection which can be controlled by the selected system.

ⓘ Note

The deactivation values are located in a separate menu (deactivation values) for systems with three control circuits.

◯ Select the set point.

✳ Activate editing mode for set point.

◯ Adjust the set point.

✳ Confirm setting.

Proceed in the same manner to adjust further set points.

```
 Night set points
────────────────────
HC1  Room temp.   15.0°C
DHW  DHW temp.    40.0°C
HC1  OT deac. da  15.0°C
```

After adjusting all the set points:

Turn the rotary switch back to 🖳 (operating level).

3 Start-up

The modifications of the controller configuration and parameter settings described in this section can only be performed after the valid key number has been entered.

The key number that is valid on the first start-up can be found in chapter 3.7.

3.1 Setting the system code number

Different hydraulic schematics are available. Each system configuration is represented by a system code number. The different schematics are dealt with in section 5.

Changing the system code number resets previously adjusted function blocks to their default settings (WE). Function block parameters and parameter level settings remain unchanged. The system code number is set in the configuration and parameter level.
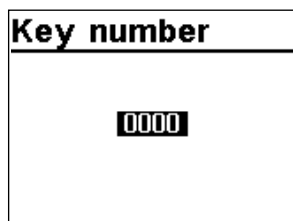
Key number
0000

Turn the rotary switch to ✧ (settings).

() Enter the currently valid key number.

✳ Confirm key number.

Settings	
CO7	░░░░░░░░░░░
CO8	░░░░░░░░░░░
System	**1.0 - 1**
Back	
Select hydraulic scheme	
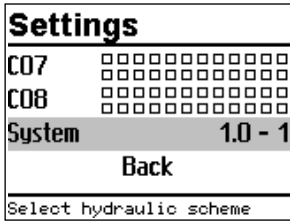
○ Select 'System'.

✳ Open 'System'.

System	2.1

HC1   DHW
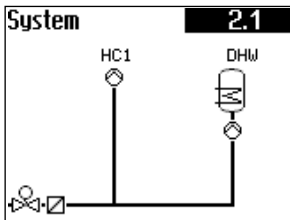
○ Select the required system.

Settings	
CO7	░░░░░░░░░░░
CO8	░░░░░░░░░░░
System	**2.1**
Back	
Select hydraulic scheme	
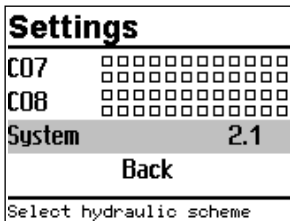
✳ Confirm the system selected.

○ Select 'Back'.

✳ Exit menu.

Turn the rotary switch to ✧ (settings).

3.2 Activating and deactivating functions

A function is activated or deactivated in the associated function block.
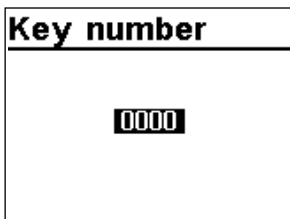
Key number

0000

Turn the rotary switch to ✧ (settings).

○ Enter the currently valid key number.

✳ Confirm key number.

Settings	
Display language	English
PA1	
PA6	
CO1	▫▫▪▪▫▪▫▪▫▫▫▫▫ ▪▫▫▫▫▫▫▫▫▫▫▫
Configuration of first hea	

◊ Select the required configuration level:
– CO1: Heating circuit HC1
– CO2: Heating circuit HC2
– CO3: Not applicable
– CO4: DHW heating
– CO5: System-wide functions
– CO6: Modbus communication

Active function blocks are indicated by the black squares.

➔ Only those configuration levels are available for selection which can be controlled by the selected system.

| CO1 ▫□▪▪▫▫▫▫▫▫▫▫ ▪▫▫▫▫▫▫▫▫▫▫▫	
F01 Room sensor	0
F02 Outdoor sensor	1
F03 Return flow sensor	1
F04 Cooling control	0
Room sensor RF1	

✳ Open configuration level.
The first function block is selected (marked gray).

◊ Select function.

Functions without function block parameters:

✳ Activate editing mode for the function.
The currently active configuration '0' or '1' is shown inverted on the display.

◊ Activate function (1) or deactivate function (0).

✳ Confirm configuration.

CO1 ▫▫▫▫▫□▪▫▫▫▫▫ ▪▫▫▫▫▫▫▫▫▫▫▫	
F05 Underfloor heating	
F05	1
Start temperature	25.0°C
Temp. rise/date	5.0°C
jointless floors	Under

Functions with function block parameters:

✳ Open function.
◊ Select configuration.
✳ Activate editing mode for configuration.
The currently active configuration '0' or '1' is shown inverted on the display.
◊ Activate function (1) or deactivate function (0).
✳ Confirm configuration.
◊ Select function block parameter.
✳ Activate editing mode for function block parameter.
The current setting is shown inverted on the display.
◊ Set function block parameter.

Proceed in the same manner to set further function blocks.

CO1	⬜⬜⬛⬛⬜⬛⬜⬜⬜⬜⬜⬜
	⬛⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜
F17 Binary demand	0
F18 Requesting demand	0
F20 Ext. heat demand	0
Back	
Exit menu	

Exit configuration level:

◌ Select 'Back'.

◌ Exit configuration level.

To adjust further function blocks in other configuration levels, repeat steps with gray background.

Turn the rotary switch back to 🖵 (operating level).

3.3 Changing parameters

Depending on the system code number selected and the activated functions, not all parameters listed in section 10.2 might be available.

Key number
0000

Turn the rotary switch to ✧ (settings).

◌ Enter the currently valid key number.

✳ Confirm key number.

Settings	
Display contrast	50
Display language	English
PA1	
PA4	
Parameterization of first	

◌ Select the required parameter level:
  – PA1: Heating circuit HC1
  – PA2: Heating circuit HC2
  – PA3: Not applicable
  – PA4: DHW heating
  – PA5: Not applicable
  – PA6: Modbus communication

➔ Only those parameter levels are available for selection which can be controlled by the selected system.

PA1	
P01 ⊠⁺Ⅲ	**1.0**
P02 ⌊⁺Ⅲ	**0.0°C**
P06 ⌋⁺Ⅲ	**20.0°C**
P07 ⌠⁺Ⅲ	**50.0°C**
Flow gradient	

✳ Open parameter level.
The first parameter is selected (marked gray).

○ Select parameter.

✳ Activate editing mode for the parameter.
The current setting is shown inverted on the display.

○ Set the parameter.

✳ Confirm setting.

✳ Proceed in the same manner to change further parameters.

PA1	
P12 ⌊⁺∅	**0.0°C**
P13 ⌋⁺∅	**65.0°C**
P14 ⌠⁺∅	**65.0°C**
Back	
Exit menu	

Exit parameter level.

○ Select 'Back'.

○ Exit configuration level.

To adjust further function blocks in other configuration levels, repeat steps with gray background.

Turn the rotary switch back to 🖳 (operating level).

3.4 Change display language

The display texts are shown in German and English ex works.

PA1	
P12 ⌊⁺∅	**0.0°C**
P13 ⌋⁺∅	**65.0°C**
P14 ⌠⁺∅	**65.0°C**
Back	
Exit menu	

✳ Turn the rotary switch to the "Settings" switch position.

✳ Set current key number. / Confirm key number

✳ Select "Display language"

✳ Put display language into edit mode. The current language is selected

✳ Set language / confirm setting

Turn the rotary switch back to the "Operating level" switch position.

3.5 Loading default setting

All parameters set over the rotary switch as well as parameters in the PA1 and PA2 parameter levels can be reset to their default settings (WE). Except for the maximum flow temperature and the return flow temperature limits in PA1 and PA2.

Key number

1991

Turn the rotary switch to ⟐ (settings).

◑ Enter key number 1991.

⁎ Confirm key number. The settings are reset when the following icon appears on the controller display:

3.6 Special values

Special value

0-10V Value	0.0
Value 1	-6.8
Value 4	23.1
Value 5	126.8
Value 6	38.5

If sensor inputs not relevant for closed-loop control are connected, the 'Special values' screen is automatically displayed in the controller's operating level. A maximum of five measured values (sensor inputs or 0 to 10 V input) can be displayed. These readings are displayed without a unit. '°C' is the unit for all sensor inputs. The value originating from the 0 to 10 V input with the CO -> F25-1 setting is displayed as a percentage.

ⓘ **Note** *The measured value number corresponds to the terminal number, e.g. measured value 3 = terminal 3*

3.7 Keynumbers

1732   General parameter setting and configuration

1999   Enable/disable extended information level

1995   Change code number for parameterization and configuration

1991   Load factory setting

0002   Restart

4 Manual mode

Switch to manual mode to configure all outputs.

---

❶ NOTICE

System damage caused by frost when manual operating mode is active!
The frost protection function is deactivated in the manual operating mode.
Do not run the heating during cold weather in the manual mode for long periods of time.

Manually changing the positioning value/switching state:

Manual mode		
◥HC1	▷◁ ▾	0%
◥HC1	⊘	ON
◥DHW	⊘⊰	ON
◥DHW	⊘○	OFF
Information		

Turn the rotary switch to 𝕸 (manual mode).
The outputs of the configured system are listed on the display.

○ Select the output
  ▷◁ Positioning value
  ⊘ Circulation pump (heating)
  ⊘○ Storage tank charging pump
  ⊘⊰ Circulation pump (DHW)
  ⊘➾ Solar circuit pump

○ Activate editing mode for the output.

○ Change the positioning value/switching state.

○ Confirm the positioning value/switching state.
  The modified values remain active as long as the controller is in manual mode.

Turn the rotary switch to 🖳 (operating level). The manual mode is deactivated.

ℹ Note

The outputs of the controller are not affected by merely turning the rotary switch to 𝕸 (manual mode). The outputs are only changed by entering or changing the positioning values or switching states.

---

5 Systems

Different hydraulic schematics are available. The system images on the display show the structure of the hydraulic system.

Boiler systems:

Single-stage boiler systems can be configured from any system whose heating circuits and DHW circuit include just one heat exchanger. These systems are Anl 1.0-1, 1.5-1, 1.6-1, 1.6-2, 1.9-1, 1.9-2, 2.x, 3.0, 3.5, 4.0, 4.1 and 16.x.

The boiler can be controlled by an on/off output (CO1 > F12 - 0).
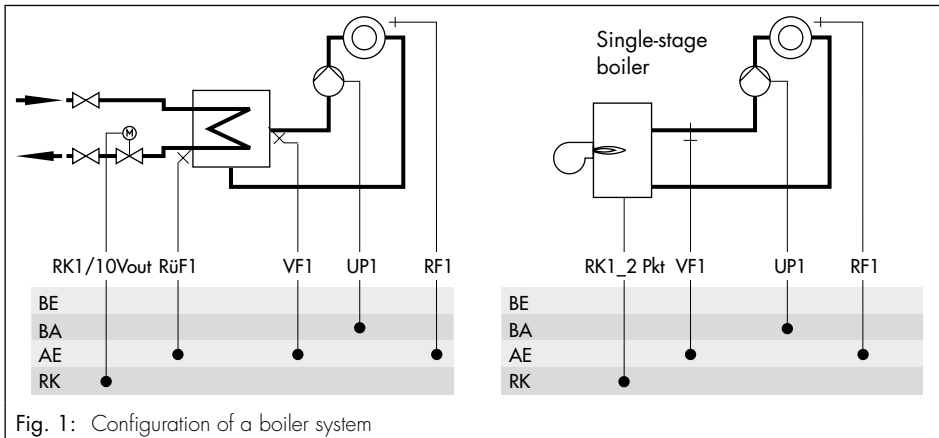
Fig. 1: Configuration of a boiler system

System Anl 1.0-1
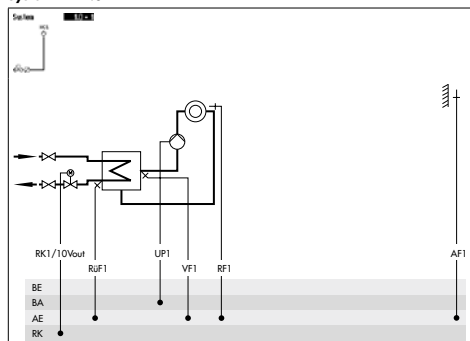
Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.0-2
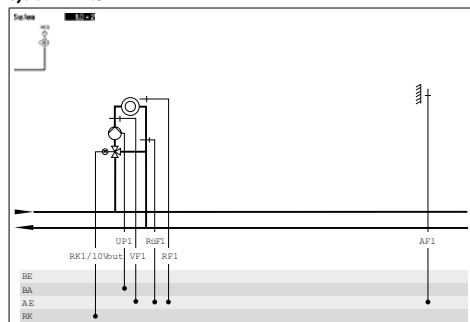
Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.1-1

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.1-2

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

Systems

System Anl 1.2

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 0 (without RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.3-1

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.3-2

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.5-1

Default settings	
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.5-2

Default settings	
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.6-1

Default settings	
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.6-2

Default settings	
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 1.6-3

Default settings	
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

Systems

System Anl 1.9

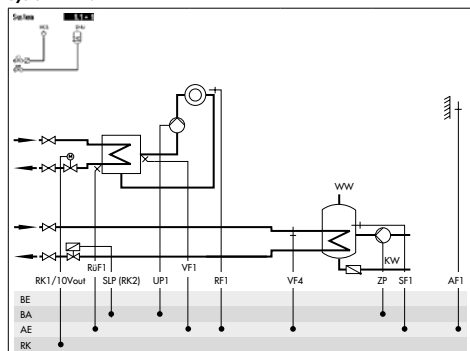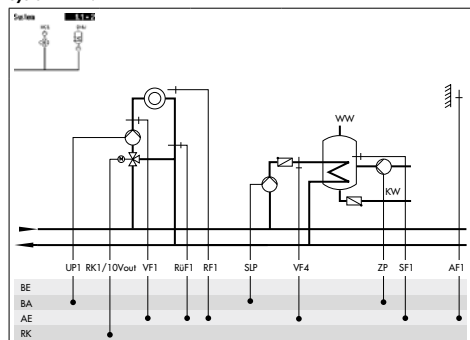| Default settings	
CO4 > F01	- 0 (without SF1)
CO4 > F03	- 0 (without RüF2)
CO4 > F04	- 0 (without flow rate sensor)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 2.0

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 2.1

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 2.2

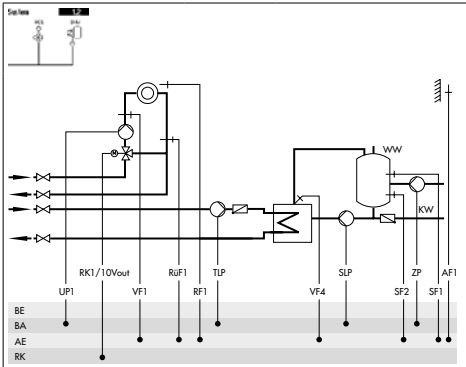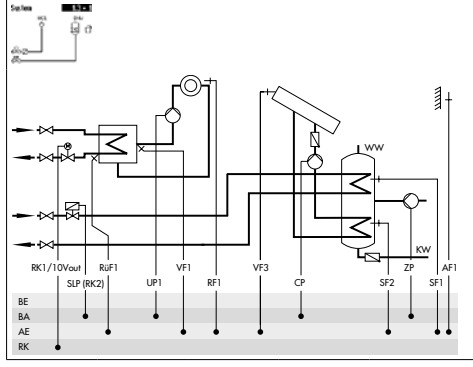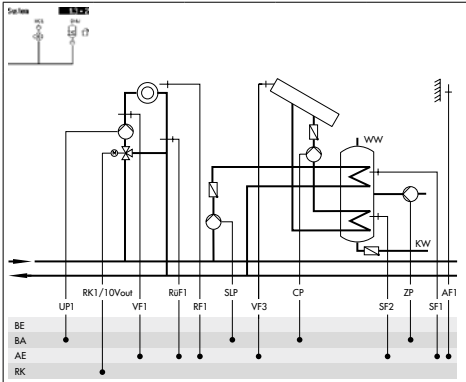| Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F05	- 0 (without VF4)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 2.3

RK1/10Vout | UP1 | RF1 | VF3 | WW
RüF1 | VF1 | SLP | CP | KW | AF1
SF2 | ZP | SF1

BE
BA
AE
RK

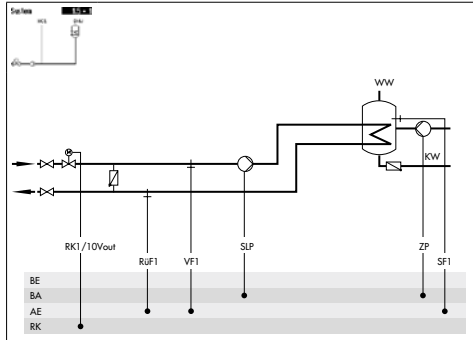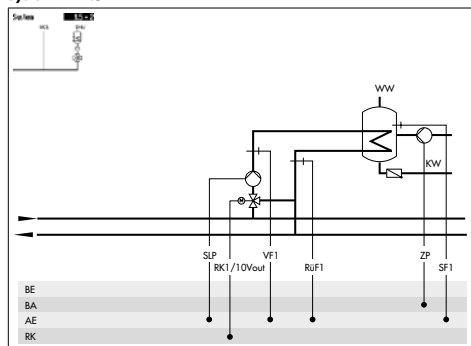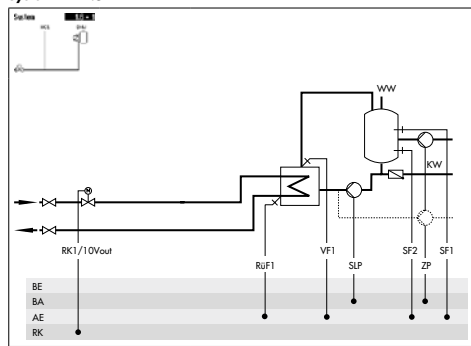| Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 3.0

RK1/10Vout | UP1 | RK2 | RüF2 | UP1 | AF1
RüF1 | VF1 | UP2 | VF2 | RF2

BE
BA
AE
RK

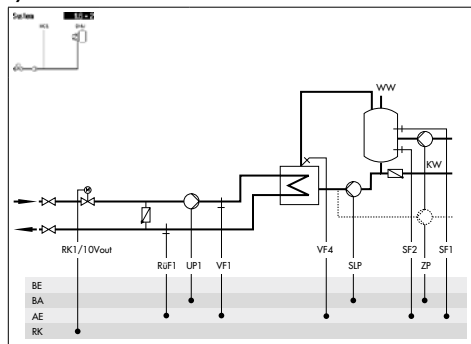| Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 0 (without RüF2)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 3.5

RK1/10Vout | UP1
RüF1 | VF1

BE
BA
AE
RK

Note	Closed control circuit and UP1 are only active during the processing for an external demand
Default settings	
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 4.0

RK1/10Vout | VF1 | RK2 | RüF2 | UP1 | AF1
RüF1 | UP2 | VF2 | RF2 | RF1

BE
BA
AE
RK

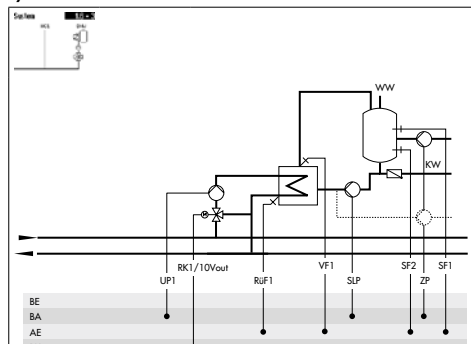| Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 0 (without RüF2)
CO5 > F07	- 0 (without error message at terminal 23)

Systems

System Anl 4.1

RK1/10Vout · RüF1 · VF1 · RK2 · UP2 · RüF2 · VF2 · UP1 · RF2 · SLP · RF1 · SF1 · AF1

BE
BA
AE
RK

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 0 (without RüF2)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)

System Anl 4.5

RK1/10Vout · RüF1 · VF1 · RK2 · UP2 · RüF2 · VF2 · UP1 · RF2 · RF1 · SLP · SF1 · AF1

BE
BA
AE
RK

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 0 (without RüF2)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)

System Anl 10.0-1

RK1/10Vout · RK2 · RüF1 · RüF2 · VF1 · VF2 · UP1 · UP2 · RF1 · RF2 · AF1

BE
BA
AE
RK

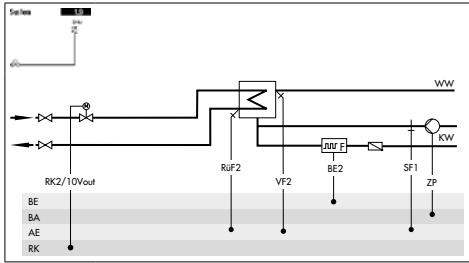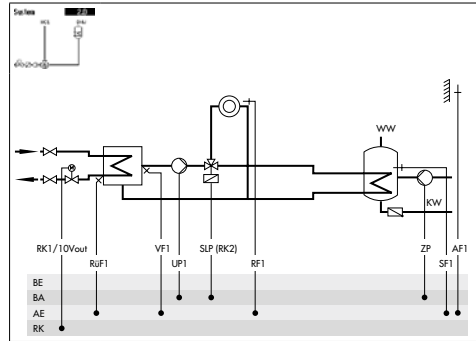| Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 1 (with RüF2)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 10.0-2

RK1/10Vout · UP1 · VF1 · RF1 · RüF1 · RK2 · VF2 · UP2 · RüF2 · RF2 · AF1

BE
BA
AE
RK

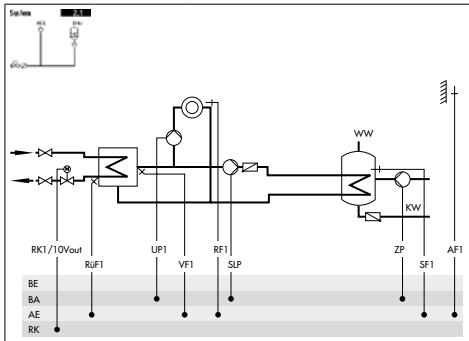| Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F01	- 0 (without RF2)
CO2 > F03	- 1 (with RüF2)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 11.0

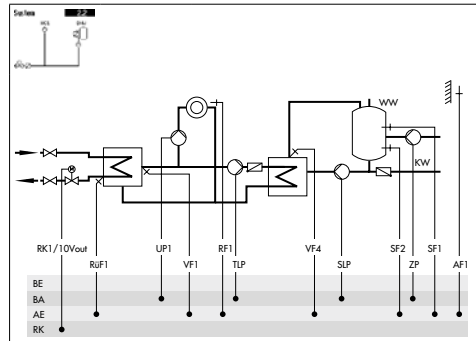**Default settings**

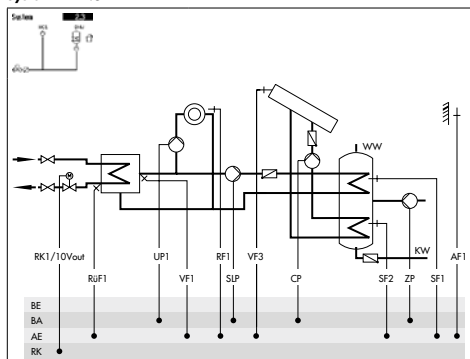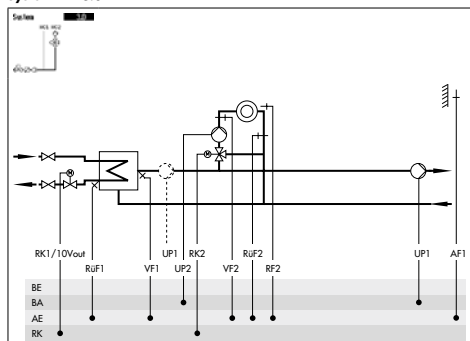|	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F03	- 0 (without RüF2)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 11.1-1

Default settings

CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO4 > F03	- 0 (without RüF2)

System Anl 11.1-2

Default settings

CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)
CO4 > F03	- 0 (without RüF2)

System Anl 11.1-3

Default settings

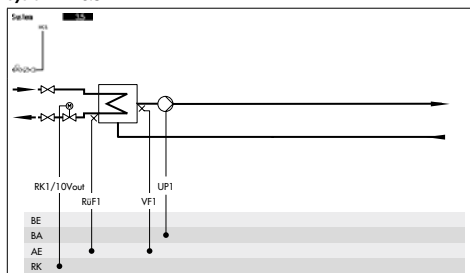|	System Anl 11.1	System Anl 11.2
CO1 > F01	- 0 (without RF1)	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)	- 1 (with SF1)
CO4 > F02	- 0 (without SF2)	- 1 (with SF2)
CO4 > F03	- 0 (without RüF2)	- 0 (without RüF2)

Systems

System Anl 11.2
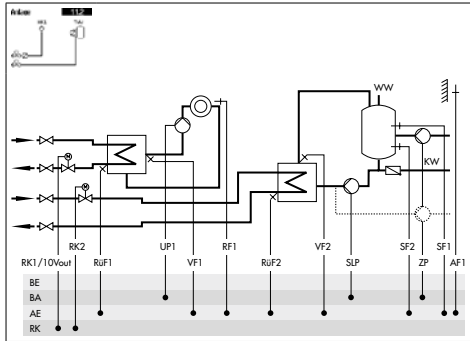
Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F03	- 0 (without RüF2)

System Anl 11.5
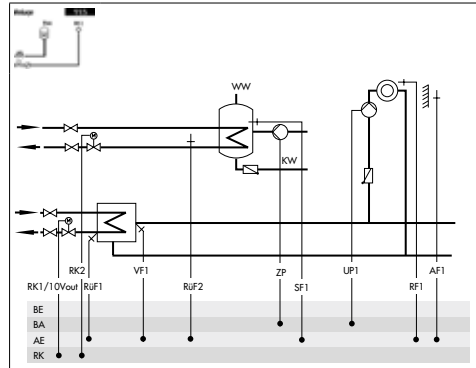
Note	DHW circuit with adjustable valve position for storage tank charging in absolute priority operation. By using RüF2, the ready-adjusted valve position is subject to the return flow temperature limitation.

Default setting	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO4 > F02	- 0 (without SF2)
CO4 > F03	- 1 (with RüF2)

System Anl 11.6
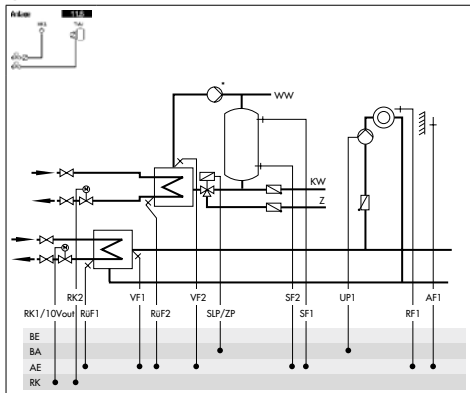
* Note:	Install a continuously running pump in the DHW circuit and connect it directly to the main power supply.

Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 1 (with SF1)
CO4 > F02	- 1 (with SF2)
CO4 > F03	- 0 (without RüF2)

System Anl 11.9
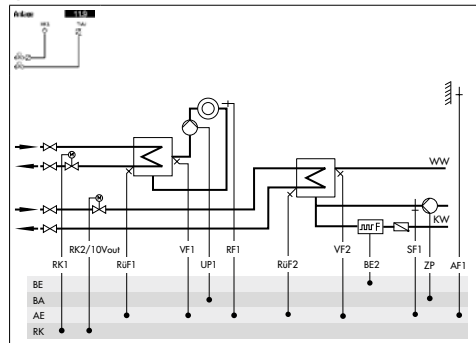
Default settings	
CO1 > F01	- 0 (without RF1)
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO4 > F01	- 0 (without SF1)
CO4 > F03	- 0 (without RüF2)
CO4 > F04	- 0 (without flow rate sensor)
CO5 > F07	- 0 (without error message at terminal 23)

System Anl 16.0

| RK1/10Vout | | VF1 | | SF2 | UP1 | | | | AF1 |
| RüF1 | | SLP | | SF1 | | | | | |

BE
BA
AE
RK

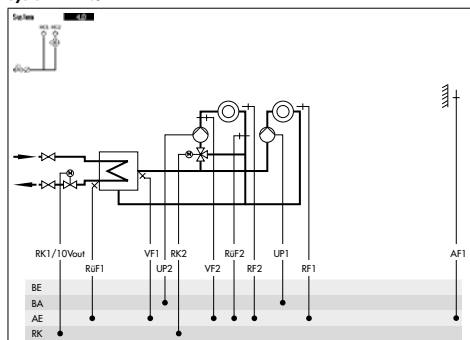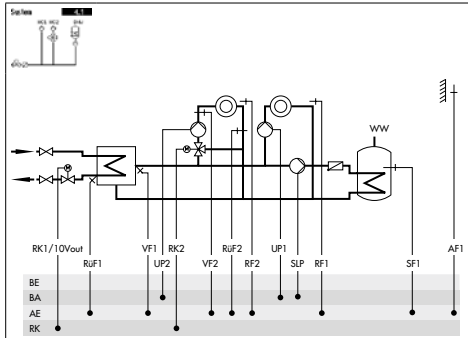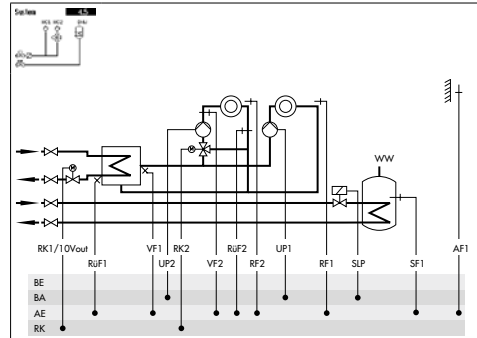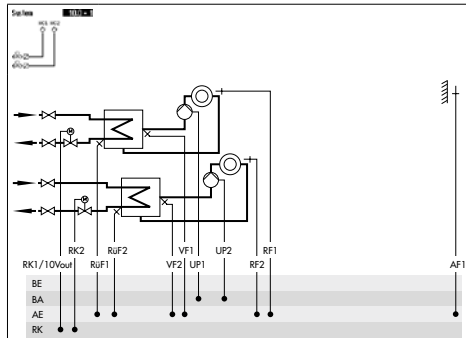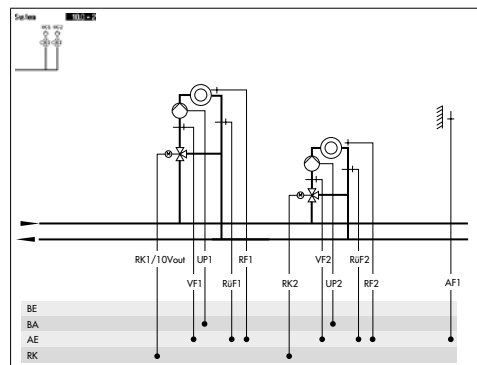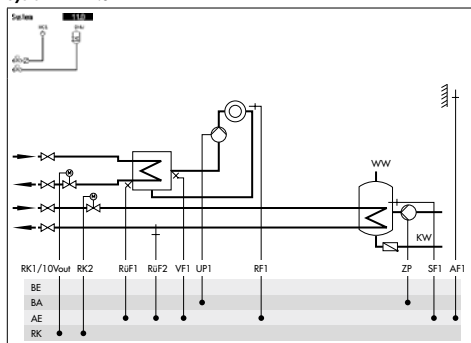| Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 16.1

| RK1/10Vout | | VF1 | | SF2 | UP1 | UP2 | RüF2 | AF1 |
| RüF1 | | SLP | | SF1 | | RK2 | VF2 | |

BE
BA
AE
RK
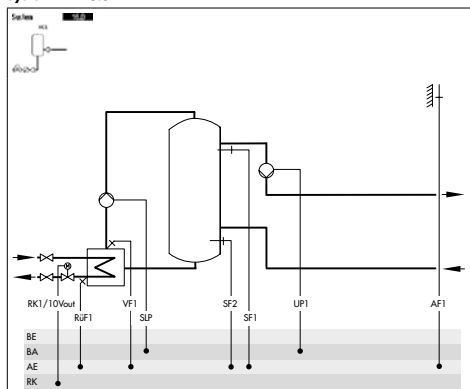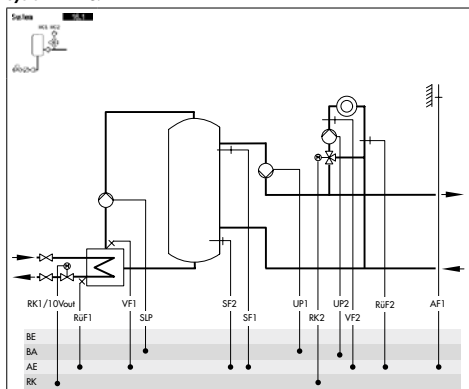
Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F03	- 0 (without RüF2)

System Anl 16.2

| RK1/10Vout | | VF1 | VF2 | | SF2 | UP1 | | AF1 |
| RüF1 | | SLP | | UP2 | SF1 | | | |

BE
BA
AE
RK

Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 16.3

| RK1/10Vout | | VF1 | RüF2 | | | SF1 | | AF1 |
| RüF1 | | SLP | CP | | SF2 | UP1 | | |

BE
BA
AE
RK
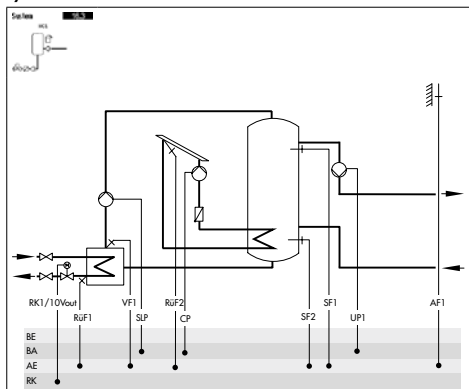
Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

Systems

System Anl 16.4

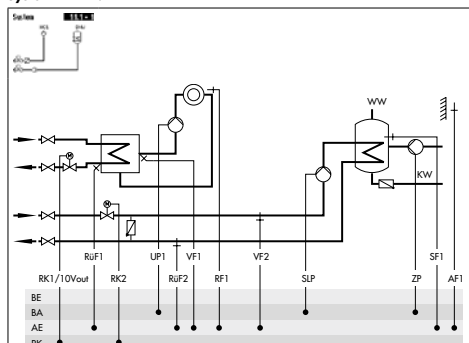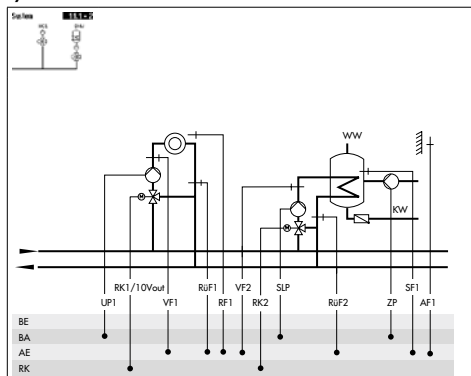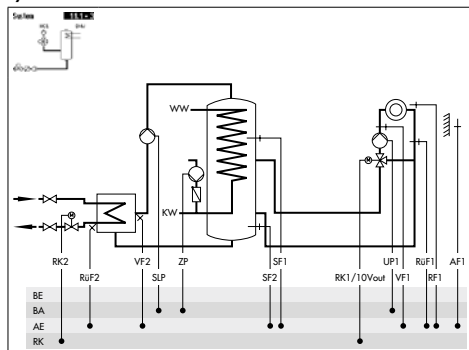| Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO5 > F07	- 0 (without error message at terminal 29)

System Anl 16.6
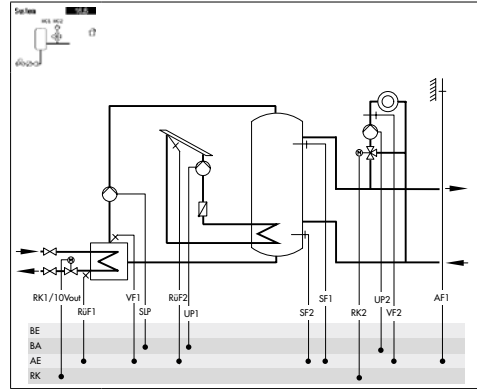
Default settings	
CO1 > F02	- 1 (with AF1)
CO1 > F03	- 1 (with RüF1)
CO2 > F02	- 0 (without AF2 for RK2)
CO2 > F03	- 0 (without RüF2)

6 Operational faults

A malfunction is indicated by the blinking ⚠ icon on the display. Additionally, the display is illuminated for one second every 10 seconds upon sensor failure. Press the rotary pushbutton to open the error level. As long as an error message is present, the error level is displayed, also when it has not been opened by pressing the rotary pushbutton.

In the error level, the error message is displayed as specified in the following list.

ℹ️ **Note**

After the system code number has been changed or after restarting the controller, any error messages are suppressed for approx. three minutes.

6.1 Error list

Sensor failure = Sensor failure

Disinfection = Disinfection temperature not reached

Max. charging temp. = Max. charging temperature reached

Temp. monitoring = Temperature monitor alarm

Unauthorized access = Unauthorized access occurred

Binary alarm = Error message of a binary input

Meter bus = Meter bus communication error

Heat meter = Heat meter error registered

ℹ️ **Note**

If the error messages or indications that can be confirmed are included in the list shown, you can decide whether you want to confirm these error messages on exiting the error list.

6.2 Sensor failure

As described in the error list, sensor failures are indicated by displaying 'Sensor failure' error message in the error level. For detailed information, exit the error level and view the different temperature values in the information level: each sensor icon displayed together with three dashes instead of the measured value indicates a defective sensor. The following list explains how the controller responds to the failure of the different sensors.

- **Outdoor sensor AF1:** When the outdoor sensor fails, the controller uses a flow temperature set point of 50 °C or the 'Max. flow temperature' when the max. flow temperature (PA1, 2 > P07) is lower than 50 °C. With the setting CO1, 2 > F05 - 1 (underfloor heating), the flow temperature set point is 30 °C in the event of a malfunction.

- **Flow sensor(s) in heating circuit(s):** When the flow sensors in the heating circuits are defective, the associated valve moves to 30 % travel. DHW heating using such a sensor to measure the charging temperature is suspended.

- **Flow sensors in the DHW circuit with control valve:** When the flow sensor VF4 fails, the controller behaves as if VF4 has not been configured. As soon as the control of the charging temperature becomes impossible (VF2 defective), the associated valve is closed.

- **Return flow sensors RüF1/2:** When the return flow sensor fails, the controller continues operation without return flow temperature limitation.

- **Room sensors RF1/2:** When the room sensor fails, the controller uses the settings for operation without room sensor. The controller, for example switches from optimizing mode to reduced operation. The adaptation mode is canceled. The last determined heating characteristic remains unchanged.

- **Storage tank sensors SF1/2:** When one of the two sensors fails, the storage tank is no longer charged (exception: solar system).

- **Solar circuit sensors SF3, VF3:** When one of the two sensors fails, the storage tank in the solar circuit is no longer charged.

6.3 Temperature monitoring

When a system deviation greater than 10 °C persists in a control circuit for 30 minutes, an "Err 6" message (temperature monitoring alarm) is generated.

Functions	WE	Configuration
Monitoring	0	CO5 > F19 - 1

6.4 Error status register

The error status register is used to indicate controller or system errors. The error messages which cause a change in the state of the configured fault alarm output (CO5 > F07 - 1) are highlighted in the following table (bold).

In the CO8 configuration level, the binary inputs BI1 and BI2 can be added to the error status register. Either an open or closed binary input can be configured to indicate an error. The controller indicates 'Binary alarm' when at least one of the inputs configured in this way registers an error.

If free inputs are to issue binary signals to a building control station without affecting the error status register, activate the corresponding function block in the CO8 configuration level and select 'None' as the function block parameter.

Error message	Decimal value	
Sensor failure	1	1
–	2	
Disinfection	4	
Max. charging temp.	8	
External	16	
Temp. monitoring	32	32
Unauthorized access	64	
Binary alarm	128	
Meter bus	256	
Heat meter	512	
		Total
Example: Value of error status register when a sensor fails and a temperature monitoring alarm =		33

7 Communication

Using the optional controller EQJW126/146 communication module, the SAUTER EQJW146F002 Heating Controller can communicate with a control system. In combination with a suitable software for process visualization and communication, a complete control system can be implemented.

The following communication variants are possible:

• Operation with RS232 connection on communication module 0440210001 (1)
• Operation via RS485 two-wire bus at the communication module 0440210003 or 0440210004 (2)
• Operation via RS485 two-wire bus with cable converter 0440210012 (2)
• Operation with dial-up modem on communication module 0440210002 (3)
• Operation with Modbus GPRS gateway 0440210011 (4)
• Operation on a RS485 two-wire bus at the Modbus-MBus-gateway 0440210006 (5)
• Operation with LAN connection at Modbus TCP gateway 0440210005 (6)

In principle, automatic communication via a dial-up modem is only established if faults occur in the system. The controller operates autonomously, but can be dialed up, read out and, if necessary, influenced at any time over the modem.

As an alternative to the control station connection, the device bus allows direct data exchange between the controllers.
• Operation with device bus and communication modules, 0440210001 and 0440210002, 0440210003 and 0440210004 or with cable converter 0440210012
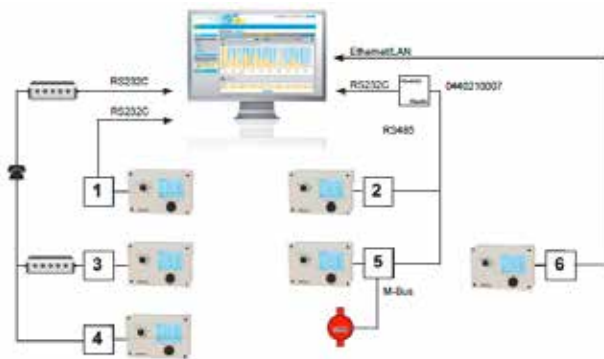
All communication modules are designed for operation at the communication interface coordinated. The interface properties cannot be parameterized.

Property	Setting
Baud rate	19200 Baud
Data bit, parity, stop bit	8 bits, none (no), 1 stop bit

For more details refer to the Communication Connection Manual.

7.1 Memory module

A memory module (0440210010) is particularly useful for transferring all the set data from one EQJW146F002 controller to several other EQJW146F002 controllers.
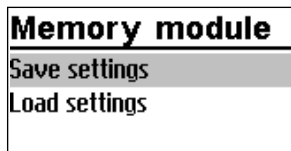
The memory module is connected to the RJ-45 socket on the side. After connection, "Save settings" appears in the controller display. If the memory module already contains data from another SAUTER EQJW146F002 controller, the "Load settings" display can be called up by turning the control knob.

- Pressing the control knob to confirm the "Save settings" display causes the controller setting to be transferred to the memory module.
- Press the rotary pushbutton to confirm "Load settings" to transfer the settings from the memory module to the controller.
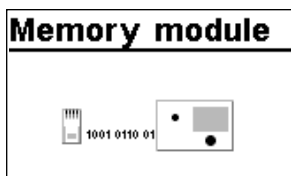
During the data exchange a ticker consisting of zeros and ones is displayed. After successful data transfer "Ok" appears in the display. The connection between controller and memory module can then be disconnected.

8 Installation

The controller can be fitted with a standard base or with a high housing base.

Dimensions in mm (W x H x D)

– Controller with standard base: 144 x 98 x 54
– Controller with high base: 144 x 98 x 75

The controller consists of the housing with the electronics and the back panel with the terminals. It is suitable for panel, wall and top hat rail mounting (see Fig. 2).
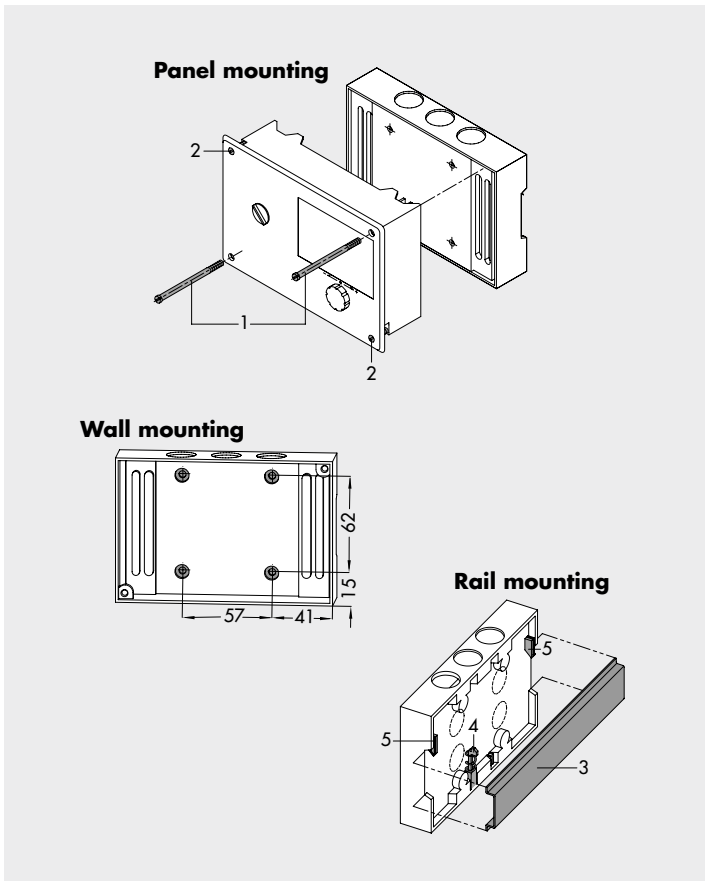
9 Electrical connection

⚠ **DANGER**

Risk of electric shock!

– *For electrical installation, you are required to observe the relevant electrotechnical regulations of the country of use as well as the regulations of the local power suppliers. Make sure all electrical connections are installed by trained and experienced personnel.*

– *The terminals 20, 22, 25 and 28 allow safety equipment which have a direct influence on individual electric acutators and pumps to be integrated. If this is not the case, connect a jumper from terminal 18 to terminals 20, 22, 25 and 28.Do not connect ELV wiring (according to VDE 0100) to these terminals.*

– *Before performing any work on the controller, disconnect it from the power supply.*

Notes on electric wiring

– Install the 230 V power supply lines and the signal lines separately! To increase immunity, keep a minimum distance of 10 cm between the lines. Make sure the minimum distance is also kept when the lines are installed in a cabinet.

– The lines for digital signals (bus lines) and analog signals (sensor lines, analog outputs) must also be installed separately!

– In plants with a high electromagnetic noise level, we recommend using shielded cables for the analog signal lines. Ground the shield at one side, either at the control cabinet inlet or outlet, using the largest possible cross-section. Connect the central grounding point and the PE grounding conductor with a 10 mm² cable using the shortest route.

– Inductances in the control cabinet, e.g. contactor coils, are to be equipped with suitable interference suppressors (RC elements).

– Control cabinet elements with high field strength, e.g. transformers or frequency converters, must be shielded with separators providing a good ground connection.

Overvoltage protection

– If signal lines are installed outside buildings or over large distances, make sure appropriate surge or overvoltage protection measures are taken. Such measures are indispensable for bus lines.

– The shield of signal lines installed outside buildings must have current conducting capacity and must be grounded on both sides.

– Surge diverters must be installed at the control cabinet inlet.

Connecting the controller

Wall mounting

To connect the wiring, pull the controller out of its base. To connect the feeding cables, break through the holes in the marked locations at the top or bottom at the base housing and fit supplied grommets or suitable cable glands. Ensure that the cables are not subject to torsion or bending by taking suitable precautions before inserting the cable.

The controller is connected as illustrated in the following wiring diagrams.

Open the housing to connect the cables. To connect the feeding cables, make holes in the marked locations at the top, bottom or back of the base of the housing and fit suitable grommets or cable glands.

Connecting sensors

Cables with a minimum cross-section of 2 x 0.5 mm² can be connected to the terminals at the base of the housing.

Connecting actuators

– 0 to 10 V control output: Use cables with a minimum cross-section of 2 x 0.5 mm².
– Three-step or on/off outputs: Connect cables with at least 1.5 mm² suitable for damp locations to the terminals of the controller output. The direction of travel needs to be checked at start-up.

Connecting pumps

Connect all cables with at least 1.5 mm² to the terminals of the controller as illustrated in the wiring diagram.

ℹ️ Note

The electric actuators and pumps are not automatically supplied with a voltage by the controller. They can be connected over terminals 20, 22, 25 and 28 to an external voltage source. If this is not the case, connect a jumper from terminal 18 to terminals 20, 22, 25 and 28.

01	AF1			L1	18
02	SF1			N	19
03	SF2/RF2			L1	20
04	RüF2		UP1		21
05	RF1			L1	22
06	RüF1		SLP		23
07	VF1		ZP/UP2		24
08	VF2/3/4			L1	25
09	BE1/FG1		Rk1_3-Pkt		26
10	BE2/FG2				27
11	+ 10 V_{in}/ 10 V_{out} −		Rk1_2-Pkt	L1	28
12	Fühler COM		Rk2_3-Pkt		29
13					30
14			Rk2_2-Pkt/TLP/CP		31
15					32
16					33
17					34

AF	Outdoor sensor	CP	Solar circuit pump
BE	Binary input	RK	Control circuit
FG	Potentiometer	UP	Circulation pump (heating)
RF	Room sensor	SLP	Storage tank charging pump
RüF	Return flow sensor	TLP	Heat exchanger charging pump
SF	Storage tank sensor	ZP	Circulation pump (DHW)
VF	Flow sensor		

Fig. 2: *Connection of* SAUTER EQJW146F002 *Controller with standard base*

10 Appendix

10.1 Function block lists

CO1: HC1 · Heating circuit 1 (not system Anl 1.9)*

F	Function	WE	Anl	Comments Function block parameters: value range (default setting)
01	Room sensor	0	Not systems Anl. 1.5, 1.6, 3.x, 16.x	CO1 > F01 - 1: Room sensor RF1
02	Outdoor sensor	0	1.5, 1.6	CO1 > F02 - 1: Outdoor sensor AF1, outdoor-temperature-compensated control active
		1	Not Anl 1.5, 1.6	
03	Return flow sensor	0	1.2	CO1 > F03 - 1: Return flow sensor RüF1, limitation function active
		1	Not Anl 1.2	**Function block parameters:** KP (limiting factor): 0.1 to 10.0 (1.0)
04	Cooling control	0	All*	CO1 > F04 - 1: Cooling control, only with CO1 > F11 - 1
				The cooling control function causes a reversal of the operating direction and a minimum limitation of the return flow temperature in RK1
05	Underfloor heating	0	Not systems Anl. 1.5, 1.6, 3.x, 16.x	CO1 > F05 - 1: Underfloor heating/drying of jointless floors
				Function block parameters: Start temperature: 20.0 to 60.0 °C (25 °C) Hold (days): 0 to 10 days (0 days) Temp. rise/day: 0.0 to 10.0 °C (5.0 °C) Maximum temperature: 25.0 to 60.0 °C (45.0 °C) Hold (days): 0 to 10 days (4 days) Temp. reduction/day: 0.0 to 10.0 °C (0.0 °C) Start condition: Stop, Start, Hold, Reduction
06	Storage tank sensor SF2	1	System Anl 16.x only	CO1 > F06 - 1: Activate SF2 to switch off charing of the buffer tank
07	Optimization	0	Not systems Anl. 1.5, 1.6, 3.x, 16.x	CO1 > F07 - 1: Optimization of heating times (only with CO1 > F01 - 1 and CO1 > F02 - 1)
08	Adaptation	0	Not systems Anl. 1.5, 1.6, 3.x, 16.x	CO1 > F08 - 1: Heating characteristic adaptation (only with CO1 > F01 - 1, CO1 > F02 - 1 and CO1 > F11 - 0)

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
09	Flash adapta-tion	0	Not systems Anl. 1.5, 1.6, 3.x, 16.x	CO1 > F09 - 1: Flash adaptation of flow temperature (only with CO1 > F01 - 1) **Function block parameters:** Cycle time: 0 or 1 to 100 min (20 min) KP (gain): 0.0 to 25.0 (0.0)
11	Four-point characteristic	0	Not Anl 1.5, 1.6	CO1 > F11 - 1: Four-point characteristic (only with CO1 > F08 - 0) CO1 > F11 - 0: Gradient characteristic
12	Control mode (three-step)	1	All*	CO1 > F12 - 1: Three-step control **Function block parameters:** KP (gain): 0.1 to 50.0 (2.0) Tn (reset time): 1 to 999 s (120 s) TV (derivative-action time): 0 to 999 s (0 s) TY (valve transit time): 15, …, 240 s (35 s) CO1 > F12 - 0: On/off control **Function block parameters:** Hysteresis: 1.0 to 30.0 °C (5.0 °C) Min. ON time: 0 to 10 min (2 min) Min. OFF time: 0 to 10 min (2 min)
13	Damping	0	All*	CO1 > F13 - 1: OPEN signal damping (only with CO1 > F12 - 1) **Function block parameters:** Max. system deviation: 3.0 to 10.0 °C (3.0 °C)
14	Enable	0	All*	CO1 > F14 - 1: Release RK1 at BI1; FG1 has no function **Function block parameters:** Active when BI = ON, OFF (ON)
15	Demand pro-cessing	0	All*	CO1 > F15 - 1: Demand processing in RK1 **Note:** How the demand is processed depends on the configuration of CO1 > F16 and CO1 > F17.
16	Demand pro-cessing, 0 to 10 V Terminals 11/12	0	All*	CO1 > F16 - 1: Demand processing with 0 to 10 V signal (only with CO1 > F15 - 1 and CO1 > F17 - 0) **Function block parameters:** Lower transmission range: 0 to 150 °C (0 °C) Upper transmission range: 0 to 150 °C (120 °C)

Appendix

F	Function	WE	Anl	Comments Function block parameters: value range (default setting)
17	Binary de-mand pro-cessing Terminals 03/12	0	All*	CO1 > F17 - 1: Binary demand processing (only with CO1 > F15 - 1, CO1 > F16 - 0 and CO2 > F01 - 0 and CO4 > F02 - 0) **Function block parameters:** Active when BI = ON, OFF (ON)
18	External de-mand	0	All*	CO1 > F18 - 1: External demand 0 to 10 V The standardized signal output (terminals 11/12) is not available anymore as a control output. The maximum flow set point (with boost, if applicable) is demanded as a 0 to 10 V signal at the standardized signal output. **Function block parameters:** Lower transmission range: 0.0 to 150.0 °C (0.0 °C) Upper transmission range: 0.0 to 150.0 °C (120.0 °C) Boost: 0.0 to 30.0 °C (0.0 °C)
20	Demand for external heat	0	All	CO1 > F20 - 1: External demand for heat due to insuffi cient heat supply
21	Speed control of the charging pump	0	System Anl 16.x only	CO1 > F21 - 1: Temperature-based adaptation of the de livery rate of the charging pump **Function block parameters:** Start speed reduction - SF2 limit: 5.0 to 90.0 °C (40.0 °C) Stop speed reduction - SF2 limit: 5.0 to 90.0 °C (50.0 °C) Minimum speed: 0 to 50 % (20 %)
22	SLP depend-ing on return flow tempera-ture	0	System Anl 16.x only	CO1 > F22 - 1: Storage tank charging pump not ON un less return flow hot
23	Differential temperature control	0	Systems Anl 1.0, 16.0 only	CO1 > F23 - 1: Activation of differential temperature control **Function block parameters:** Set point of differential temperature control: 0.0 to 50.0 °C (20.0 °C) KP (influence factor): 0.1 to 10.0 (1.0) Minimum speed: 0 to 100 % (20 %)

F Function block number, WE Default setting, Anl System code number

CO2: RK2 · Heating circuit 2 (systems Anl 3.x, 4.x and 10.0, 16x)*

F	Function	WE	Anl	**Comments** **Function block parameters: value range (default setting)**
01	Room sensor	0	All*	CO2 > F01 - 1: Room sensor RF2
03	Return flow sensor	0	3.0, 4.x, 16.x	CO2 > F03 - 1: Return flow sensor RüF2; limitation function active
		1	10.x	**Function block parameters:** KP (limiting factor): 0.1 to 10.0 (1.0)
04	Cooling control	0	All*	CO2 > F04 - 1: Cooling control, only with CO2 > F11 - 1 The cooling control function causes a reversal of the operating direction and a minimum limitation of the return flow temperature in RK2.
05	Underfloor heating	0	All*	CO2 > F05 - 1: Underfloor heating/drying of jointless floors **Function block parameters:** Start temperature: 20 to 60 °C (25 °C) Hold (days): 0 to 10 days (0 days) Temp. rise/day: 0.0 to 10.0 °C (5.0 °C) Maximum temperature: 25.0 to 60.0 °C (45.0 °C) Hold (days): 0 to 10 days (4 days) Temp. reduction/day: 0.0 to 10.0 °C (0.0 °C) Start condition: Stop, Start, Hold, Reduction
07	Optimization	0	All*	CO2 > F07 - 1: Optimization of heating times (only with CO2 > F01 - 1 and CO2 > F02 - 1)
08	Adaptation	0	All*	CO2 > F08 - 1: Heating characteristic adaptation (only with CO2 > F01 - 1, CO1 > F02 - 1 and CO1 > F11 - 0)
09	Flash adaptation	0	All*	CO2 > F09 - 1: Flash adaptation of flow temperature (only with CO2 > F01 - 1) **Function block parameters:** Cycle time: 0 or 1 to 100 min (20 min) KP (gain): 0.0 to 25.0 (0.0)
11	Four-point characteristic	0	All*	CO2 > F11 - 1: Four-point characteristic (only with CO2 > F08 - 0) CO2 > F11 - 0: Gradient characteristic

Appendix

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
12	Control mode (three-step)	1	All*	$CO2 > F12 - 1$: Three-step control **Function block parameters:** KP (gain): 0.1 to 50.0 (2.0) Tn (reset time): 1 to 999 s (120 s) TV (derivative-action time): 0 to 999 s (0 s) TY (valve transit time): 15, …, 240 s (35 s) $CO2 > F12 - 0$: On/off control **Function block parameters:** Hysteresis: 1.0 to 30.0 °C (5.0 °C) Min. ON time: 0 to 10 min (2 min) Min. OFF time: 0 to 10 min (2 min)
13	Damping	0	All*	$CO2 > F13 - 1$: OPEN signal damping (only with CO1 > F12 - 1) **Function block parameters:** Max. system deviation: 3.0 to 10.0 °C (3.0 °C)
14	Enable	0	All*	$CO2 > F14 - 1$: Release RK2 at BI2; FG2 has no function **Function block parameters:** Active when BI = ON, OFF (ON)
16	Demand processing, 0 to 10 V Terminals 11/12	0	All*	$CO2 > F16 - 1$: Demand processing in RK2 **Function block parameters:** Lower transmission range: 0 to 150 °C (0 °C) Upper transmission range: 0 to 150 °C (120 °C)

F Function block number, WE Default setting, Anl System code number

CO4: DHW circuit (systems Anl 1.1–1.3, 1.5, 1.6, 1.9, 2.x, 4.1, 4.5, 11.x)*

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
01	Storage tank sensor 1	1	1.1–1.3, 1.5, 1.6, 2.x, 4.1, 4.5, 11.0, 11.2	$CO4 > F01 - 1$: Storage tank sensor SF1 $CO4 > F01 - 0$: Storage tank thermostat (only with CO4 > F02 - 0; not system Anl 11.0)
		0	1.9, 11.9	

F	Function	WE	Anl	Comments Function block parameters: value range (default setting)
02	Storage tank sensor 2	0	1.1, 1.3, 1.5, 2.0, 2.1, 2.3, 4.1, 4.5, 11.0, 11.1, 11.5	CO4 > F02 - 1: Storage tank sensor SF2 (only with CO4 > F01 - 1; not systems Anl 1.3, 1.9, 2.3, 11.0 and 11.9)
		1	1.2, 1.6, 2.2, 11.2	
03	Return flow sensor RüF2	0	1.9, 11.x	CO4 > F03 - 1: Return flow sensor RüF2; limitation function active **Function block parameter:** KP (limiting factor): 0.1 to 10.0 (1.0)
04	Water flow sensor	0	1.9, 11.9	CO4 > F04 - 1: Flow rate sensor at BI2 **Function block parameter:** Select: Analog/binary Binary = Flow switch at terminals 10/12
05	Flow sensor	0	1.1, 1.2, 1.6, 2.2	CO4 > F05 - 1: Flow sensor VF4 (to measure storage tank charging temperature)
06	Parallel pump operation	0	2.1–2.3, 4.1, 4.5	CO4 > F06 - 1: Parallel pump operation **Function block parameters:** Stop: 0 to 10 min (10 min) Temperature limit: 20.0 to 90.0 °C (40.0 °C) CO4 > F06 - 0: UP1 switched off during DHW heating
07	Intermediate heating	1	2.x, 4.1, 4.5	CO4 > F07 - 1: after 20 minutes of DHW heating, heating operation in UP1 circuit reactivated for 10 minutes CO4 > F07 - 0: storage tank charging is given unlimited priority concerning UP1 circuit
08	Priority (reverse)	0	1.1–1.3, 4.1, 4.5, 11.x	CO4 > F08 - 1: Priority by reverse control (only with CO4 > F09 - 0) **Function block parameters:** Start: 0 to 10 min (2 min) KP (influence factor): 0.1 to 10.0 (1.0) only system Anl 4.5: Control circuit: HC1, HC2, HC1+HC2 (HC2)
09	Priority (set-back)	0	1.1–1.3, 4.1, 4.5, 11.x	CO4 > F09 - 1: Priority through set-back operation (only when CO4 > F08 - 0) **Function block parameters:** Start: 0 to 10 min (2 min) Control circuit: HC1, HC2, HC1+HC2 (only system Anl 4.5)

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
10	Circulation pump (DHW) integrated into heat exchanger	0 1	1.6, 11.2 11.6	CO4 > F10 - 1: Control of DHW circuit active while circulation pump (ZP) is running
11	Operation of circulation pump (DHW) during storage tank charging	0	1.1–1.3, 1.5, 1.6, 2.x, 4.1, 4.5, 11.1, 11.2	CO4 > F11 - 1: Circulation pump (ZP) runs according to time schedule during storage tank charging CO4 > F11 - 0: Circulation pump (ZP) switched off during storage tank charging
12	Control mode	1	1.9, 11.x	CO4 > F12 - 1: Three-step control **Function block parameters:** KP (gain): 0.1 to 50.0 (2.0) Tn (reset time): 1 to 999 s (120 s) TV (derivative-action time): 0 to 999 s (0 s) TY (valve transit time): 15, …, 240 s (35 s) CO4 > F12 - 0: On/off control **Function block parameters:** Hysteresis: 1.0 to 30.0 °C (5.0 °C) Min. ON time: 0 to 10 min (2 min) Min. OFF time: 0 to 10 min (2 min)
13	Damping	0	All*	CO4 > F13 - 1: OPEN signal damping (only with CO4 > F12 - 1) **Function block parameters:** Max. system deviation: 3.0 to 10.0 °C (3.0 °C)
14	Thermal disinfection	0	All*	CO4 > F14 - 1: Thermal disinfection (only with CO4 > F01 - 1) **Function block parameters >** Day of week: Monday, Tuesday, …, daily (Wednesday) Time: Adjustable as required (00:00 – 04:00) Disinfection temperature: 60.0 to 90.0 °C (70.0 °C) Duration: 0 to 255 min (0 min) Active when BI = OFF, ON (ON) only possible with setting Start time = Stop time and without SF2/RF2. Input: terminals 03/12
15	SLP depending on return flow temperature	0	1.5, 2.0, 2.1, 2.3, 4.1, 11.1	CO4 > F15 - 1: storage tank charging pump not ON unless return flow hot (only with CO1 > F03 - 1 for systems Anl 1.5, 2.0, 2.1, 2.3, 4.1; only with CO4 > F03 - 1 for system Anl 11.1)

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
16	Priority for external demand	0	1.5, 1.6, 2.x, 4.1	CO4 > F16 - 1: Priority for external demand **Note:** a high external demand causes excessive charging temperatures in DHW circuits without control valve.
19	Switchover	0	1.1–1.3, 1.5, 1.6, 2.x, 4.1, 4.5, 11.1, 11.2	CO4 > F19 - 1: Switchover SF1, SF2 according to a time schedule. SF1 applies for day mode and SF2 for night mode (only with CO4 > F02 - 1)
20	Return flow control	0	11.1	CO4 > F20 - 1: DHW circuit additionally controlled by a globe valve
21	Speed control of the charging pump	0	1.1–1.3, 1.5, 1.6, 2.x, 4.1, 11.1, 11.2	CO4 > F21 - 1: Temperature-based adaptation of the de livery rate of the charging pump **Function block parameters:** Start speed reduction - SF2 limit: 5.0 to 90.0 °C (40.0 °C) Stop speed reduction - SF2 limit: 5.0 to 90.0 °C (50.0 °C) Min. speed signal: 0 to 50 % (20 %)
22	Cold charging protection	0	1.1	CO4 > F22 - 1: Storage tank charging started when the primary flow temperature is high enough

F Function block number, WE Default setting, Anl System code number

CO5: System-wide functions (all systems)

If the controller indicates CO5 > F00 - 1, any access to the return flow, flow rate and capacity settings is locked.

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
01	Sensor type	1	All*	CO5 > F01 - 1, F02 - 0: Pt 1000
02		1		CO5 > F01 - 0, F02 - 0: PTC
03		0		CO5 > F01 - 1, F02 - 1: Ni 1000
04	Summer mode	0	Not systems Anl 1.5, 1.6, 1.9, 3.5	CO5 > F04 - 1: Summer mode **Function block parameters:** Time: Adjustable as required (01.06. - 30.09.) No. days until activation: 1 to 3 (2) No. days until deactivation: 1 to 3 (1) Limit: 0.0 to 30.0 °C (18.0 °C)

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
05	Delayed outdoor temperature adaptation (decreasing)	0	Not Anl 1.9	CO5 > F05 - 1: Delayed outdoor temperature adaptation as the temperature falls **Function block parameters:** Delay/h: 1.0 to 6.0 °C (3.0 °C)
06	Delayed outdoor temperature adaptation (increasing)	0	Not Anl 1.9	CO5 > F06 - 1: Delayed outdoor temperature adaptation as the temperature rises **Function block parameters:** Delay/h: 1.0 to 6.0 °C (3.0 °C)
07	Error message	0	Not Anl 4.1, 4.5, 11.1, 11.2, 11.3, 11.6, 16.1, 16.6	CO5 > F07 - 1: Terminal for error message: see plant scheme table **Function block parameters:** Relay contact = NO contact, NC contact (NO contact)
08	Summer time	0	All	CO5 > F08 - 1: Summer/standard time switchover
09	Frost protection	1	Not systems Anl 1.5, 1.6, 1.9, 3.5	CO5 > F09 - 1: Highest priority for frost protection **Function block parameters:** Limit: −15.0 to 3.0 °C (3.0 °C) CO5 > F09 - 0: Restricted frost protection
		0	1.5, 1.6, 1.9, 3.5	**Function block parameters:** Limit: −15.0 to 3.0 °C (3.0 °C)
10	Capacity limitation Input BI2	0	Not Anl 1.9	CO5 > F10 - 1: Capacity limitation in RK1 with pulses (only with CO6 > F12 - 0) **Function block parameters:** Max. limit: AT to 800 pulse/h (15 pulse/h) Max. limit for heating*: AT to 800 pulse/h (15 pulse/h) Max. limit for DHW*: 1 to 800 pulse/h (15 pulse/h) Limiting factor: 0.1 to 10.0 (1.0) *Not systems Anl. 1.0, 1.5-1.9, 3.0, 3.5, 4.0, 10.x, 11.x, 16.x
12	Creep feed rate limitation	0	Not Anl 1.9	CO5 > F12 - 1: Creep feed rate limitation **Function block parameters:** Switching mode: Binary, analog (binary) Active when BI = ON, OFF (ON)
14	Operation UP1	0	3.0, 16.x	CO5 > F14 - 1: Feeder pump UP1 operation to cover own demand **Note:** the feeder pump UP1 also starts to operate to cover the demand of RK2.

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
15	Enable	0	All	CO5 > F15 - 1: Release controller at BI1 **Function block parameters:** Active when BI = ON, OFF (ON)
16	Return flow temperature limitation (proportional controller)	0	All	CO5 > F16 - 1: Return flow temperature limitation with P algorithm
19	Monitoring	0	All	CO5 > F19 - 1: Temperature monitoring
20	Sensor cali-bration	1	All	CO5 > F20 - 1: Set all sensor calibration values CO5 > F20 - 0: Delete all sensor calibration values
21	Lock manual level	0	All	CO5 > F21 - 1: Lock rotary switch In 🕮 switch position, the controller runs in automatic mode
22	Lock rotary switch	0	All	CO5 > F22 - 1: Lock rotary switch Key number input is still possible.
23	0 to 10 V signal for outdoor tem-perature	0	All	CO5 > F23 - 1: Outdoor temperature received as 0 to 10 V signal or sent (terminals 11/12) **Function block parameters:** Direction: Input, Output (Input) Lower transmission range: –50.0 to 100.0 °C (–20.0 °C) Upper transmission range: –50.0 to 100.0 °C (50.0 °C)
24	0-10 V input	0	All	CO5 > F24 - 1: The measured value at 0 to 10 V input is displayed as a special value.
25	AA1 reverse	0	All	CO5 > F25 - 0: 0 V/0 % = Valve CLOSED/pump OFF CO5 > F25 - 1: 0 V/0 % = Valve OPEN/pump with max. delivery rate **Function block parameters:** Zero: 0 to 50 % (0 %)
31	AI1 Zero shift	0	All*	CO5 > F31 - 0 **Function block parameters:** Zero: 5 to 20 % (5 %)

F Function block number, WE Default setting, Anl System code number

CO6 > Modbus (all systems)

F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
01	Modbus	1	All	CO6 > F01 - 1: Modbus active
02	16-bit address	0	All	CO6 > F02 - 1: Modbus 16-bit addressing (only with CO6 > F01 - 1) CO6 > F02 - 0: Modbus 8-bit addressing
03	Modem	0	All	CO6 > F03 … F06 is required to configure the error message transfer to a connected Modbus/GPRS gateway (0440210011).
04	Automatic configuration	0	All	
05	Lock dial-up to building automation system	0	All	
06	Dial-up also upon corrected error	0	All	
07	Monitoring	0	All	CO6 > F07 - 1: Control system monitoring > Resets all level bits to "autonomous" when there is no communication(only with CO6 > F01 - 1)
08	Text message	0	All	CO6 > F06 is required to configure the error message transfer to a connected Modbus/GPRS gateway (0440210011)
20	Modbus without building automation system	0	All	CO6 > F20 - 1: Various Modbus specifications do not have any effect on the collective level/building automation system reading
				* Not systems Anl 1.0, 1.5–1.9, 3.0, 3.5, 4.0, 10.0, 11.x

F Function block number, WE Default setting, Anl System code number

CO7: Device bus (all systems)

| F	Function	WE	Anl	Comments **Function block parameters: value range (default setting)**
01	Device bus	0	All	CO7 -> F01 - 1: Device bus active **Function block parameters:** Device bus address/Auto [1], 1 to 32 (32) Auto = Automatic search for a free device bus address in the system
02	Clock synchro-nization	0	All	CO7 -> F02 - 1: controller sends its system time to all de vice bus participants once every 24 hours
03	reserved		All	
04	reserved		All	
05	reserved		All	
06	Send AF1	0	All	CO7 -> F06 - 1: **Function block parameters:** Register number/1 to 4 (1)
07	Receive AF1	0	All	CO7 -> F07 - 1: **Function block parameters:** Register number/1 to 4 (1)
08	Send AF2	0	All	CO7 -> F08 - 1: Analysis active **Function block parameters:** Register number/1 to 4 (2)
09	Receive AF2	0	Not Anl 1.9	CO7 -> F09 - 1: **Function block parameters:** Register number/1 to 4 (2)
10	Send demand in HC1	0	All	CO7 -> F10 - 1: Send demand **Function block parameters:** Register number/5 to 64 (5)
11	Send demand in HC2	0	All	CO7 -> F11 - 1: **Function block parameters:** Register number/5 to 64 (5)
13	Send demand DHW	0	All	CO7 -> F13 - 1: 'Charging temperature boost' (P04) is generated in the PA4 level **Function block parameters:** Register number/5 to 64 (5)
14	Send max. de-mand	0	All	CO7 -> F14 - 1: the controller already determines inter-nally the maximum flow set point of its circuit and sends it this value to the primary controllers

F	Function	WE	Anl	Comments Function block parameters: value range (default setting)
15	Receive external demand in HC1	0	All	CO7 -> F15 - 1: External demand processing in HC1 **Function block parameters:** Register number/5 to 64 (5)
16	Receive errors	0	All	CO7 -> F16 - 1: the controller generates the 'External' message as long as the faults of the other device bus participants exist.
17	Receive external demand in HC2	0	All	CO7 -> F17 - 1: External demand processing in HC2 **Function block parameters:** Register number/5 to 64 (5)
19	Raise return flow temperature	0	All	CO7 -> F19 - 1: Return flow temperature limit in HC1 raised when 'DHW heating active' message is received over the device bus **Function block parameters:** Register number/5 to 64 (32)
20	Send 'DHW heating active'	0	All	CO7 -> F20 - 1: **Function block parameters:** Register number/5 to 64 (32)
21	Receive release HC1	0	All	CO7 -> F21 - 1: **Function block parameters:** Register number/5 to 64 (32)
22	Receive release HC2	0	3.1–3.4, 4.x, 5.x, 6.x, 10.x, 16.1, 16.6, 16.8, 25.x	CO7 -> F22 - 1: **Function block parameters:** Register number/5 to 64 (32)
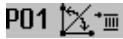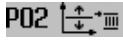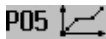
CO8 > Initialization of BI1 and BI2 (all systems)

| F	Function	WE	Anl	Comments Function block parameters: value range (default setting)
01	Analysis of BI1	0	All	CO8 > F01 - 1: Analysis active **Function block parameters:** Error message when BI = 0, BI = 1, none (1)
02	Analysis of BI2	0	All	CO8 > F02 - 1: Analysis active **Function block parameters:** Error message when BI = 0, BI = 1, none (1)

10.2 Parameter lists

PA1: Heating Circuit HC1

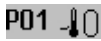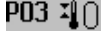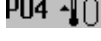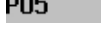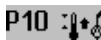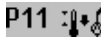**PA2: Heating circuit HC2**

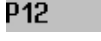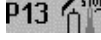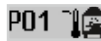| P	Display reading	Parameter: Value range (default setting)
01	P01 ⊠⁺▥ 1.0	Flow gradient: 0.2 to 3.2 (1.8) 0.2 to 1.0 (1.0) with CO1 > F05 - 1
02	P02 ⬍⁺▥ 0.0°C	Level (parallel shift): –30.0 to 30.0 °C (0.0 °C)
03	P03 50.0°C	Flow set point (day) (only with CO1 > F02 - 0 and CO1 > F09 - 1): –5.0 to 150.0 °C (50.0 °C)
04	P04 30.0°C	Flow set point (night) (only with CO1 > F02 - 0 and CO1 > F09 - 1): –5.0 to 150.0 °C (30.0 °C)
05	P05 ⟋ ⌂↓ |-15°|-5°| 5°|15°| ▥↓ |70°|55°|40°|25°| ▥↓ |60°|40°|20°|20°| ↓⊿ |65°|65°|65°|65°|	Four-point characteristic Outdoor temperature: –50.0 to 50.0 °C (–15.0 °C, –5.0 °C, 5.0 °C, 15.0 °C) with CO1 > F04 -1: (5 °C, 15 °C, 25 °C, 30 °C) Flow temperature: –5.0 to 150.0 °C (70.0 °C, 55.0 °C, 40.0 °C, 25.0 °C) with CO1 > F04 -1: (20 °C, 15 °C, 10 °C, 5 °C) Reduced flow temperature: –5.0 to 150.0 °C (60.0 °C, 40.0 °C, 20.0 °C, 20.0 °C) with CO1 > F04 -1: (30 °C, 25 °C, 20 °C, 15 °C) Return flow temperature: 5.0 to 90.0 °C (65.0 °C, 65.0 °C, 65.0 °C, 65.0 °C)
	⌂↓ |-15°|-5°| 5°|15°| V | 0.00 | 0.00 | | 0.00 | 0.00 |m³/h	Flow rate: 0.01 to 650 m³/h (0.00 m³/h, 0.00 m³/h, 0.00 m³/h, 0.00 m³/h)

Appendix

P	Display reading	Parameter: Value range (default setting)
06	**P06** 🌡⁺☰ **20.0°C**	Min. flow temperature: –5.0 to 150.0 °C (20.0 °C)
07	**P07** 🌡⁺☰ **50.0°C**	Max. flow temperature: 5.0 to 150.0 °C (90.0 °C) 5.0 to 50.0 °C (50.0 °C) with CO1 > F05 - 1
09	**P09** 🏠* **-15.0°C**	Outdoor temperature for continuous day mode: –50.0 to 5.0 °C (–15 °C)
10	**P10** 🌡 **40.0°C**	Minimum flow temperature set point HC for binary demand processing: 5.0 to 150.0 °C (40.0 °C)
11	**P11** ✕←⌀ **1.2**	Return flow gradient: 0.2 to 3.2 (1.2)
12	**P12** ←⌀ **0.0°C**	Return flow level: –30.0 to 30.0 °C (0.0 °C)
13	**P13** 🌡←⌀ **65.0°C**	Base point for return flow temperature: 5.0 to 90.0 °C (65.0 °C)
14	**P14** 🌡←⌀ **65.0°C**	Max. return flow temperature: 5.0 to 90.0 °C (65.0 °C)
15	**P15** →⌀ **5.0°C**	Set point boost (pre-control circuit): 0.0 to 50.0 °C (5.0 °C)
16	**P16** 🌡⌀ **AT**	Minimum set point to charge buffer tank: OT to 90.0 °C (AT), only HC 1
17	**P17** 🌡ˢᵀᴼᴾ⌀ **AT**	Stop charging of the buffer tank: OT to 90.0 °C (AT), only HC 1
18	**P18** ⌀ **6.0°C**	Charging temperature boost: 0.0 to 50.0 °C (6.0 °C), only HC 1
19	**P19** ˢᵀᴼᴾ⌀ **1.0**	Lag time of charging pump 0.0 to 10.0 (1.0), only HC 1

PA4: Domestic hot water heating (DHW)

P	Display reading	Parameter: Value range (default setting)
01	P01 ⅃Ό 40.0°C	Min. adjustable DHW set point: 5.0 to 90.0 °C (40.0 °C)
02	P02 Γ̄Ό 60.0°C	Max. adjustable DHW set point: 5.0 to 90.0 °C (90.0 °C)
03	P03 ⅃Ό 5.0°C	Hysteresis: 1.0 to 30.0 °C (5.0 °C)
04	P04 ⅃Ό 0.0°C	Charging temperature boost: 0.0 to 50.0 °C (10.0 °C)
05	P05 80.0°C	Max. charging temperature (only with CO4 > F05 - 1): 20.0 to 150.0 °C (80.0 °C)
07	P07 65.0°C	Max. return flow temperature: 20.0 to 90.0 °C (65.0 °C)
10	P10 ⅃•⌀ 10.0°C	Solar circuit pump ON: 1.0 to 30.0 °C (10.0 °C)
11	P11 ⅃•⌀ 3.0°C	Solar circuit pump OFF: 0.0 to 30.0 °C (3.0 °C)
12	P12 88.0°C	Max. storage tank temperature: 20.0 to 90.0 °C (80.0 °C)
13	P13 ⌂STOP 80.0°C	Maximum buffer tank temperature: 20.0 to 90.0 °C (80.0 °C)
14	P14 ⋈Ό 100%	Control signal DHW for storage tank charging: 5 to 100 % (100 %)
19	P19 STOP ⊘Ό 1.0	Lag time for storage tank charging pump (= Valve transit time x P19): 0.0 to 10.0 (1.0)

PA5: System-wide parameters

P	Display reading	Parameter: Value range (default setting)
01	P01 ⌐⅊ 60.0°C	Start temperature for boiler pump (system Anl 16.x only) 20.0 to 90.0 °C (60.0 °C)

Appendix

P	Display reading	Parameter: Value range (default setting)
02	P02 ⫶📛 5.0°C	Boiler pump hysteresis (system Anl 16.x only) 0.0 to 30.0 °C (5.0 °C)

PA6: Modbus

P	Display reading	Parameter: Value range (default setting)
01	P01 ▪ADR 1	Modbus station address (8 bit): 1 to 246 (255) 1 to 3200 (255) with CO6 > F02 - 1

10.3 Resistance values

Pt 1000

Temperature °C	–35	–30	–25	–20	–15	–10	–5	0	5	10	15	20
Resistance Ω	862.5	882.2	901.9	921.6	941.2	960.9	980.4	1000.0	1019.5	1039.0	1058.5	1077.9
Temperature °C	25	30	35	40	45	50	55	60	65	70	75	80
Resistance Ω	1097.3	1116.7	1136.1	1155.4	1174.7	1194.0	1213.2	1232.4	1251.6	1270.8	1289.9	1309.0
Temperature °C	85	90	95	100	105	110	115	120	125	130	135	140
Resistance Ω	1328.1	1347.1	1366.1	1385.1	1404.0	1422.9	1441.8	1460.7	1479.5	1498.3	1517.1	1535.8
Temperature °C	145	150	155	160	165	170	175	180	185	190	195	200
Resistance Ω	1554.6	1573.3	1591.9	1610.5	1629.1	1647.7	1666.3	1684.8	1703.3	1721.7	1740.2	1758.6

PTC

Temperature °C	–20	–10	0	10	20	30	40	50
Resistance Ω	693	756	824	896	971	1050	1133	1220

Temperature °C	60	70	80	90	100	110	120
Resistance Ω	1311	1406	1505	1606	1713	1819	1925

Ni 1000

Temperature °C	–60	–50	–40	–30	–20	–10	0	10	20	30	40
Resistance Ω	695	743	791	841	893	946	1000	1056	1112	1171	1230

Temperature °C	50	60	70	80	90	100	110	120	130	140	150
Resistance Ω	1291	1353	1417	1483	1549	1618	1688	1760	1833	1909	1986

Temperature °C	160	170	180	190	200	210	220	230	240	250	
Resistance Ω	2066	2148	2232	2318	2407	2498	2592	2689	2789	2892	

Appendix

10.4 Technical data

Inputs	8 inputs for Pt 1000, PTC or Ni 1000 temperature sensors and 2 binary inputs, terminal 11 as 0 to 10 V input (e.g. for external demand or outdoor temperature signal)
Outputs* *** Switch-on surge, max. 16 A**	2 x three-step signal: load max. 250 V AC, 2 A*, alternatively 2 x on/off signal: load max. 250 V AC, 2 A* 3 x pump output: load max. 250 V AC, 2 A*, all outputs are relay outputs with varistor suppression Terminal 11 as 0 to 10 V output (e.g. for continuous closed loop control, outdoor temperature, signal for external demand or pump speed control), load >5 kΩ
Interfaces	M-bus for max. 3 M-bus units, protocol according to EN 1434-3
Optional interfaces	1 x Modbus RS-485 interface for two-wire bus using RS-485 communication module (Modbus RTU protocol, data format 8-N-1, RJ-45 connector socket at the side)
Operating voltage	85 to 250 V, 48 to 62 Hz, max. 1.5 VA
Ambient temperature	0 to 40 °C (operation), –10 to 60 °C (storage and transport)
Degree of protection	IP 40 according to IEC 529
Class of protection	II according to VDE 0106
Degree of contamination	2 according to VDE 0110
Overvoltage category	II according to VDE 0110
Humidity rating	F according to VDE 40040
Noise immunity	According to EN 61000-6-1
Noise emission	According to EN 61000-6-3
Weight	Approx. 0.5 kg
Compliance	CE · EHC

* For systems with one control circuit, a maximum of four pumps are available.

EQJW146F002

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