

TROVIS 5500 Automation System TROVIS 5576 Heating and District Heating Controller



Mounting and Operating Instructions

EB 5576 EN

Firmware version 2.14
Edition November 2013



Safety instructions



- ▶ The device may only be assembled, started up or operated by trained and experienced personnel familiar with the product. Proper shipping and appropriate storage are assumed.
- ▶ The controller has been designed for use in electrical power systems. For wiring and maintenance, you are required to observe the relevant safety regulations.

Revisions to controller firmware in comparison to previous versions

1.70 (previous)	1.71 (new)
	Err 2 message (default setting loaded) is not displayed anymore. See section 8.1. Single error messages to be forwarded over the device bus can be selected.
1.71 (previous)	1.82 (new)
	An interrupted drying of jointless floors can be continued by selecting the restarting stages <i>START temperature maintaining phase</i> or <i>START temperature reduction phase</i> . See section 5.3.
	During thermal disinfection, the <i>Hold time of disinfection temperature</i> can be used to determine how long the disinfection temperature must be maintained within the adjusted time period to rate the process successful. See section 6.11.
Besides the release of single control circuits, the release of the controller is possible over the binary input. See section 7.9.	
1.82 (previous)	1.90 (new)
	The new system code numbers Anl 14.1 to 14.3 increase the total of different hydraulic schematics to 43. The new systems are all fitted with a buffer tank and a DHW storage tank. System Anl 14.3 additionally contains a solar circuit with reroutable heat flow. See sections 4 and 6.4.
	For firmware 1.90 and higher, the maximum flow set point of the controller can be demanded by issuing up to two analog signals for requesting external demand with sequence control. See section 7.13.

Revisions to controller firmware in comparison to previous versions	
1.90 (previous)	1.95 (new)
	<p>The priority operation (reverse control and set-back operation) can be set regardless of the time and temperature in the system. Refer to sections 6.9.1 and 6.9.2.</p> <p>The setting CO1 -> F20 - 1 allows an external demand for heat to be made when insufficient heat is supplied. Refer to section 7.16.</p>
1.95 (previous)	2.00 (new)
	New system (Anl 10.5) added. Refer to section 4.
	The limit switch for creep feed rate limitation can also be connected to input RüF1. In previous versions, it could only be connected to the binary input (terminals 04/12). Refer to section 7.11.3.
	A primary controller linked over the device bus can receive and process the demand of downstream controllers (version 2.00 and higher) optionally in control circuit Rk1 and/or Rk2. Refer to section 7.12.1.
	The <i>Boiler pump OFF</i> parameter has been replaced by the <i>Hysteresis</i> parameter. Refer to section 6.4.
2.00 (previous)	2.12 (new)
	New hydraulic schematic (Anl 11.6) added. Refer to page 60.
	New cooling control function (refer to section 5.11)
	The cooling circuit causes a reversal of the operating direction and a minimum limitation of the return flow temperature in Rk1/2.
	The demand processing using a 0 to 10 V signal can be applied to the 0 to 130 °C transmission range. Refer to section 7.10.
2.12 (previous)	2.13 (new)
	The priority operation (reverse control and set-back operation) can be activated for system Anl 4.5 either for only one heating circuit (Rk1 or Rk2) or for both heating circuits (Rk1 and Rk2). Refer to section 6.9.
	New function to control the speed of the charging pump based on the charging progress. Refer to section 6.7.
2.13 (previous)	2.14 (new)
	The flow rate and capacity limitation over meter bus can be performed in control circuit Rk1 and additionally in Rk2. Refer to section 9.4.2.

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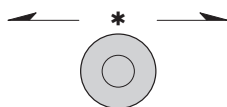
1 Operation

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 (-> section 1.5).

1.1 Operating elements

The operating controls are located in the front panel of the controller and protected by a Plexiglas door.

1.1.1 Rotary pushbutton and changeover key



Rotary pushbutton

Turn (↻):
Display, select parameters and function blocks

Press ✱:
Confirm adjusted selection or settings



Changeover key

(use pen or any other pointed item to press)

Press to switch between operating level and configuration/parameter level

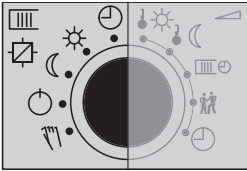
1.1.2 Rotary switches

Use the three rotary switches to adjust the required operating mode (icons on the left) and the relevant parameters (icons on the right).

The top and middle switches are assigned to the heating circuits (see page 157). The rotary switch in the middle is not used in systems without a second heating circuit.

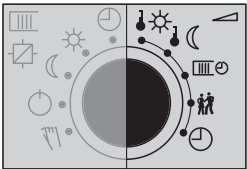
The bottom switch is assigned to the DHW circuit.

Rotary switch to set the operating modes of the heating circuit



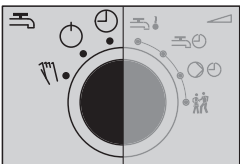
- Automatic/time-controlled operation with switchover between rated and reduced operation
- Day mode (rated operation)
- Night mode (reduced operation)
- Control operation deactivated, frost protection only
- Manual operation: correction value adjusted in percent and activation/deactivation of the pumps

Rotary switch to set the parameters of the heating circuit



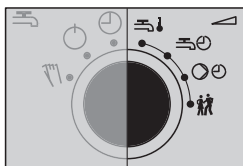
- Day set point (rated room temperature)
- Night set point (reduced room temperature)
- Times-of-use for heating
- Party mode
- Controller time: setting current time, date and year








Rotary switch to set the operating modes of the DHW circuit




- Automatic/time-controlled operation with switchover between times when DHW heating is permissible/impermissible
- DHW heating deactivated, frost protection only
- Manual operation: correction value adjusted in percent and activation/deactivation of the pumps

Rotary switch to set the parameters of the DHW circuit



-   Set point for DHW temperature
-   Times-of-use for DHW heating
-   Times-of-use for DHW circulation pump
-  Party mode

Note: If more than one rotary switch is set to position "Parameter" (right side) at the same time,  blinks on the display. The controller cannot be operated.

1.2 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.

Night mode (reduced operation)

Regardless of the programmed times-of-use, the set points relevant for reduced operation are used by the controller.

Automatic mode

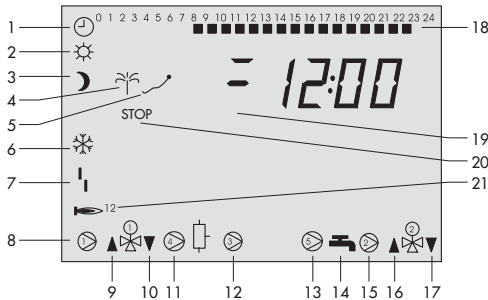
During the programmed times-of-use, the controller works in rated operation. Outside these times-of-use, the controller is in reduced operation, unless control operation is deactivated depending on the outdoor temperature. The controller switches automatically between both operating modes.

Manual operation

Valves and pumps can be controlled manually (-> section 3).

1.3 Display

During operation, the display indicates the current time as well as information about the operation of the controller. The times-of-use are represented by black squares below the row of numbers at the top of the display. Icons indicate the operating status of the controller.



- | | | |
|-----------------------|-------------------------------------|---|
| 1 Automatic operation | 11 Storage tank charging pump SLP | 18 Time-of-use |
| 2 Day mode | 12 Output BA9* | 19 Control circuit assignment:
—: Heating circuit Rk1
= : Heating circuit Rk2 |
| 3 Night mode | 13 Circulation pump UP5* | 20 Outdoor temperature dependent control deactivated |
| 4 Vacation mode | 14 DHW demand | 21 Demand with sequence control:
1: One output active
2: Two outputs active |
| 5 Public holiday mode | 15 Circulation pump UP2* | |
| 6 Frost protection | 16 Valve Rk2: OPEN, output bA9: ON | |
| 7 Operational fault | 17 Valve Rk2: CLOSED output bA8: ON | |
| 8 Output bA9 | | |
| 9 Valve Rk1: OPEN | | |
| 10 Valve Rk1: CLOSED | | |


* UP1, UP2, SLP, UP5, bA9 indicate possible choices for pump selection in manual mode.

Fig. 1 · Icons

The controller status can be displayed in operating level (-> section 1.4).

1.4 Displaying data

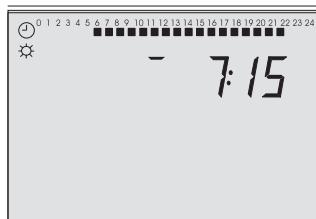
The time, date, public holidays and vacation periods as well as the temperatures measured by the connected sensors and their set points can be retrieved and displayed with the help of the rotary pushbutton.

Note: Data can also be viewed in the  manual mode in the operating level. To do so, select **Info**, confirm and proceed as described below.

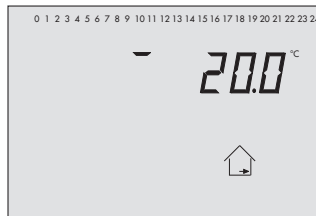
Proceed as follows:

① Select value.

Depending on the configuration of the controller, the different data points are displayed:



Controller time.



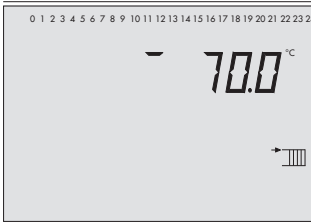
Room temperature

— : Heating circuit Rk1
 = : Heating circuit Rk2



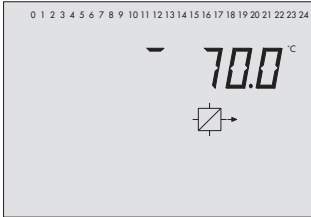
Outdoor temperature

— : Heating circuit Rk1
 = : Heating circuit Rk2

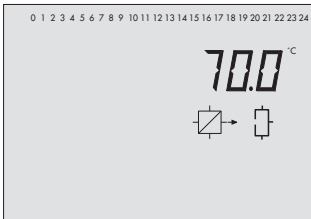


Temperature at the flow sensor VF

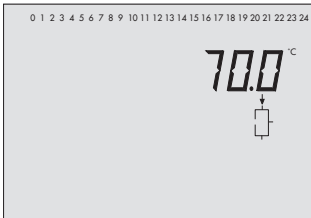
- : Heating circuit Rk1
- : Heating circuit Rk2



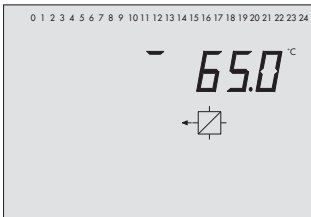
Temperature at the flow sensor VF1, primary exchanger circuit



Temperature at the flow sensor VF2, DHW circuit

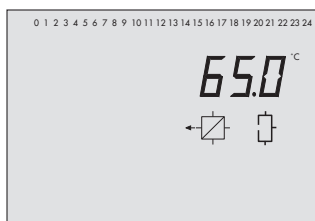


Temperature at the solar collector sensor VF3

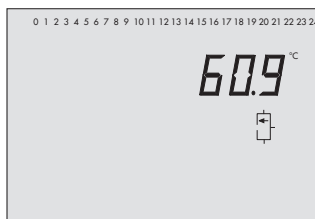


Temperature at the return flow sensor RÜF

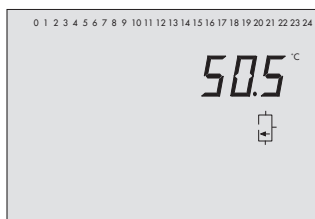
- : Heating circuit Rk1
- : Heating circuit Rk2



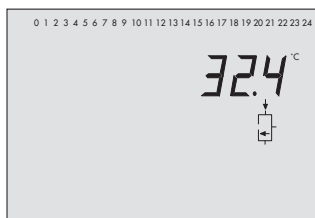
Temperature at the return flow sensor RüF, DHW circuit



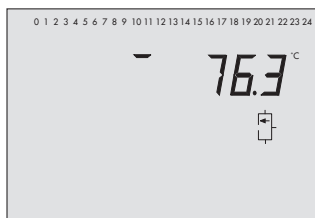
Temperature at the storage tank sensor SF1 (DHW storage tank)



Temperature at the storage tank sensor SF2 (DHW storage tank)



Temperature at the storage tank sensor SF3 (DHW storage tank)



Temperature at the storage tank sensor SF2, SF3 (buffer tank)



Temperature at the storage tank sensor SF4 (buffer tank)



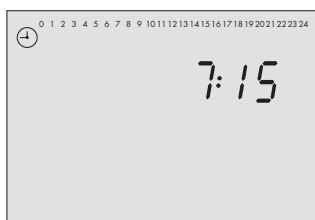
Temperature at the flow sensor VF4

- * Compare set point/limit and actual value.
By pressing the rotary pushbutton when the time is displayed, the date appears on the display.

1.5 Setting the controller time

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

Proceed as follows:



Turn the top rotary switch to position \oplus "Controller time" (right side).

Display shows: time

\odot Edit the controller time.



* Confirm the adjusted time.

Display shows: year

\odot Edit the year.



* Confirm the adjusted year.

Display shows: date (day.month)

\odot Edit the date.

* Confirm the adjusted date.

Display shows: time

Return the rotary switch to the desired operating mode (left side).



1.6 Setting the times-of-use

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

If only one time-of-use is required, the start and stop times of the second time-of-use must be set to identical times. In this case, the third time-of-use is not displayed.

If only two times-of-use are required, the start and stop times of the third time-of-use must be set to identical times.

The times-of-use for the different control circuits are set at the rotary switches **one after the other**:

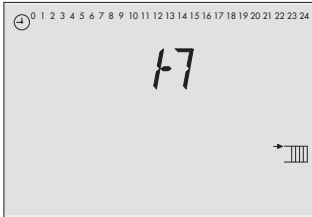
Times-of-use	Rotary switch	Position
Heating circuit 1*	Top	 ⊖
Heating circuit 2*	Middle	 ⊖
DHW heating*	Bottom	 ⊖
Circulation pump	Bottom	 ⊖

* Refer to page 157 for assignment

Parameters	WE*	Range of values
Period/day	1–7	1–7, 1, 2, 3, 4, 5, 6, 7 with 1–7 = every day, 1 = Monday, 2 = Tuesday, ..., 7 = Sunday
Start first time-of-use	6:00	0:00 to 24:00h; in steps of 15 minutes
Stop first time-of-use	22:00	0:00 to 24:00h; in steps of 15 minutes
Start second time-of-use	22:15	0:00 to 24:00h; in steps of 15 minutes
Stop second time-of-use	22:15	0:00 to 24:00h; in steps of 15 minutes
Start third time-of-use	–	0:00 to 24:00h; in steps of 15 minutes
Stop third time-of-use	–	0:00 to 24:00h; in steps of 15 minutes

* Default values (WE) valid for heating circuit 1/primary heat exchanger circuit (top rotary switch)

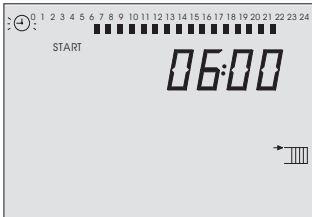
Proceed as follows:



Turn appropriate rotary switch to position "Times-of-use".

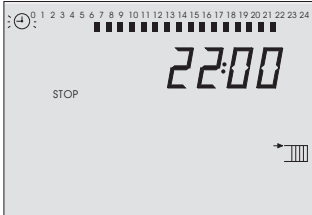
Display shows: **1-7**

- ⌚ Select period/day for which the times-of-use are to be valid:
1-7 = every day,
1 = Monday, 2 = Tuesday, ..., 7 = Sunday



- * Activate editing mode for period/day.
Display shows: **START**, ⊖ blinks

- ⌚ Edit start time (steps of 15 minutes).



- * Confirm start time.
Display shows: **STOP**

- ⌚ Edit stop time (steps of 15 minutes).

- * Confirm stop time.
Display shows: **START**
The second time-of-use is set like the first time-of-use.

To set the times-of-use for each day, repeat the instructions in the fields highlighted in gray. Return the rotary switch to the desired operating mode (left side).

Note: Do not use the 1-7 menu to check the programmed times-of-use. If this menu is opened after the times-of-use have been set, the schedule programmed for Monday is also adopted for all other days of the week.

1.7 Setting the party mode

Using the **Party mode** function, the controller continues or activates the rated operation of the controller during the time when the party timer is active, regardless of the programmed times-of-use. The party timer begins when the rotary switch has been returned to operating mode ☹ "Automatic". When the party timer has elapsed, the party timer is reset to 00:00.

The party modes for the different control circuits are set at the rotary switches **one after the other**:

Party timer	Rotary switch	Position
Heating circuit 1*	Top	
Heating circuit 2*	Middle	
DHW circuit*	Bottom	

* Refer to page 157 for assignment

Parameter	WE	Range of values
Continue/activate rated operation	0 h	0 to 48 hours

Proceed as follows:

Turn appropriate rotary switch to "Party mode".
Display shows: **00:00** or the remaining time of the party timer

- ⌚ Edit desired length of the one-off time-of-use.
Return the rotary switch to operating mode ☹ "Automatic" (left side).

Note: Elapsing of the party timer is displayed in steps of 15 minutes.

1.8 Activating extended operating level

After the key number 1999 has been entered, the following information can be viewed and edited after the data points listed in section 1.4 have been displayed:

- ▶ Heat capacity
- ▶ Flow rate
- ▶ Public holidays \curvearrowright (can be changed)
- ▶ Vacation periods \curvearrowleft (can be changed)
- ▶ Valve positions
- ▶ Modem status information
- ▶ Meter bus status information
- ▶ Switching states of the binary inputs
- ▶ Info 2 · The following data are shown in the same sequence as shown below:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 ■

Controller ID (refer to section 8.6)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 ■

Memory capacity of data logging module (section 9.6)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 ■

Modbus station address (refer to section 9.3)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 ■

Operating hours of solar circuit pump (refer to section 6.4)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
 ■

Water flow sensor (refer to section 6.3)

Opening the extended operating level:

- ⇒ Switch to configuration and parameter level.
Display shows: **0000**
- (C) Set key number 1999.
- * Confirm key number.
Display shows: time

Note:

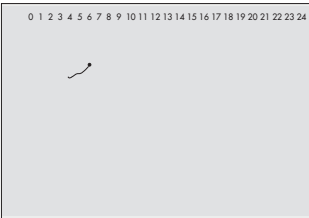
- The additional information is hidden when the key number 1999 is entered again.
- The key number 1999 cannot be used to change the controller configuration and parameterization. A separate key number exists for configuration and parameterization. Refer to section 2.

1.8.1 Setting public holidays

On public holidays, the times-of-use specified for Sunday apply. A maximum of 20 public holidays may be entered.

Parameter	WE	Level / Range of values
Public holidays	–	Extended operating level / 01.01 (1 Jan) to 31.12 (31 Dec)

Proceed as follows:



- ⌚ In extended operating level, select “Public holidays”.
Display shows:
- * Open data point for public holidays.
- ⌚ If applicable, select – – – –.
- * Activate editing mode for public holiday. blinks.
- ⌚ Edit desired public holiday.
- * Confirm public holiday.

To enter additional public holidays, re-select – – – – and repeat the steps in the fields highlighted in gray.

- * Exit data point for public holidays.

Note: Public holidays can also be entered in parameter level PA5 (→ section 2.3).

Deleting a public holiday:

- ⌚ Under data point for public holidays, select the holiday you wish to delete.
- * Confirm selection.
- ⌚ Select – – – – .
- * Delete the public holiday.

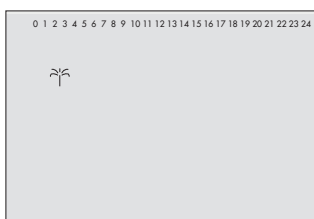
Note: Public holidays that are not assigned to a specific date should be deleted by the end of the year so that they are not carried on into the following year.

1.8.2 Setting vacation periods

During vacation periods, the controller constantly remains in reduced operating mode. A maximum of 10 vacation periods can be entered. Each vacation period can be separately assigned to the heating circuits Rk1 and Rk2 and/or the DHW circuit.

Parameters	WE	Level / Range of values
Vacation period (START, STOP)	–	Extended operating level / 01.01 to 31.12

Proceed as follows:



- ⌚ In extended operating level, select “Vacation periods”.
Display shows: 🏠
- * Open data point for vacation periods.
Display shows: **START**, --.-- (day.month)
- ⌚ If applicable, select ----.
- * Activate editing mode for start date of vacation period.
🏠 blinks.
- ⌚ Edit start date of vacation period.
- * Confirm start date of the vacation period.
Display shows: **STOP**, --.-- (day.month)
- ⌚ Edit end of vacation period.
- * Confirm end of vacation period.
Black squares under 1 to 4 at the top of the display indicate the assignment of the vacation periods to the individual control circuits.
- ⌚ Select the control circuit to which the current vacation period should apply.
 - ¹ ■ Current vacation period applies to circuit Rk1
 - ² ■ Current vacation period applies to circuit Rk2
 - ³ ■ –
 - ⁴ ■ Current vacation period applies to DHW circuit
 The vacation period can be assigned to a single control circuit or any combination of all three control circuits (Rk1 and Rk2, DHW circuit).

To enter additional vacation periods, re-select ---- and repeat the steps in the fields highlighted in gray.

- * Exit data point for vacation periods.
-

Note: Vacation periods can also be entered in parameter level PA5 (-> section 2.3).

Deleting vacation periods:

- () Under data point for vacation periods, select the start date of the period you wish to delete.
 - * Confirm selection.
 - () Select - - - - .
 - * Delete vacation period.
-






Note: Vacation periods should be deleted by the end of the year so that they are not carried on into the following year.

1.9 Setting room and DHW temperature set points

For the heating circuits, the desired room temperatures during the day (*Day set point*) and during the night (*Night set point*) can be entered into the controller.

In the DHW circuit, the temperature you wish the DHW to be heated to can be set.

The temperature set points for the different control circuits are set at the rotary switches **one after the other**:

Desired temperature set point	Switch	Position
Heating circuit 1*: Day set point	Top	
Heating circuit 1*: Night set point	Top	
Heating circuit 2*: Day set point	Middle	
Heating circuit 2*: Night set point	Middle	
DHW circuit*: DHW temperature set point	Bottom	

* Refer to page 157 for assignment

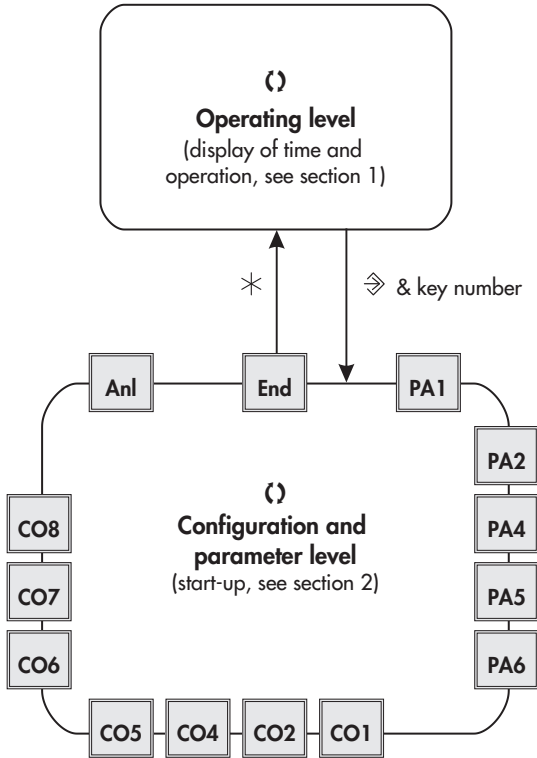
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C
DHW temperature set point	55 °C	Bottom / Min. to max. DHW temperature

Proceed as follows:

Turn appropriate rotary switch to "Set point temperature".
Display shows: temperature

 Set temperature value.

Return the rotary switch to the desired operating mode (left side).



- | | |
|--|------------------------------------|
| PA1/CO1: Heating circuit Rk1 (—) | CO7: Device bus |
| PA2/CO2: Heating circuit Rk2 (—) | CO8: Initialization of free inputs |
| PA4/CO4: DHW heating | Anl: System code number |
| PA5/CO5: System-wide parameters | |
| PA6/CO6: Communication parameters/
Modbus/meter bus communication | |

Fig. 2 · Level structure of TROVIS 5576

2 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 valid key number for initial start-up can be found on page 175. To avoid unauthorized use of the key number, remove the page or make the key number unreadable. In addition, it is possible to enter a new, customized key number (-> section 7.19).

2.1 Setting the system code number

43 different hydraulic schematics are available. Each system configuration is represented by a system code number. The different schematics are dealt with in section 4. Available controller functions are described in sections 5, 6 and 7.

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 level.

Proceed as follows:

- ⇒ Switch to configuration and parameter level.
Display shows: **0000**
- Ⓢ Set valid key number.
- * Confirm key number.
Display shows: **PA1**
- Ⓢ Select **Anl** (-> Fig. 2).
- * Activate editing mode for the system code number.
- Ⓢ Edit system code number.
- * Confirm system code number.
Display shows: **End**
- * Return to operating level.

2.2 Activating and deactivating functions

A function is activated or deactivated in the associated function block. The numbers 0 to 24 in the top row of the display represent the respective function block numbers. When a configuration level is opened, the activated function blocks are indicated by a black square on the right-hand side below the function block number. For more details on function blocks, refer to section 12.1.

The functions are grouped by topics:

- ▶ CO1: Heating circuit Rk1 (—)
- ▶ CO2: Heating circuit Rk2 (—)
- ▶ CO3: Not used
- ▶ CO4: DHW heating
- ▶ CO5: System-wide functions
- ▶ CO6: Modbus and meter bus communication
- ▶ CO7: Device bus
- ▶ CO8: Initialization of free inputs

Proceed as follows:

- ↗ Switch to configuration and parameter level.
Display shows: **0 0 0 0**
- (**)** Set valid key number.
- * Confirm key number.
Display shows: **PA1**
- (**)** Select configuration level (-> Fig. 2).
- * Open configuration level.
- (**)** Select function block.
Activated function blocks are marked by " - 1".
Deactivated function blocks are marked by " - 0".
- * Activate editing mode for the function block.
F__ blinks.
- (**)** Activate the function block.
Display shows: **F__ - 1**
An activated function block is indicated by a black square below (right) the function block number in the top row of the controller display.

Or:

- ⌚ Deactivate the function block.
Display shows: **F__ - 0**
- * Confirm settings.
If the function block is not closed, further function block parameters can be adjusted.
Proceed as follows:
Make the desired changes and confirm.
If applicable, the next function block parameter is displayed.
Confirm all parameters to exit the opened function block.

To adjust additional function blocks, repeat the steps in the fields highlighted in gray.

- ⌚ Select **End**.
- * Exit configuration level.
- ⌚ Select **End**.
- * Return to operating level.

2.3 Changing parameters

Depending on the set system code number and the activated functions, not all parameters listed in the parameter list in the Appendix (→ section 12.2) might be available.

The parameters are grouped by topics:

- ▶ PA1: Heating circuit Rk1 (—)
- ▶ PA2: Heating circuit Rk2 (—)
- ▶ PA3: Not used
- ▶ PA4: DHW heating
- ▶ PA5: Parameters for various systems
- ▶ PA6: Communication parameters
- ▶ PA7: Not used
- ▶ PA8: Not used

Proceed as follows:

Switch to configuration and parameter level.

Display shows: **0 0 0 0**

⌂ Set valid key number.

Confirm key number.

Display shows: **PA1**

⌂ Select parameter level (-> Fig. 2).

* Open parameter level.

⌂ Select desired parameter.

* Activate editing mode for the parameter.

⌂ Edit the parameter.

* Confirm the parameter.

To adjust additional parameters, repeat the steps in the fields highlighted in gray.

⌂ Select **End**.

* Exit parameter level.

⌂ Select **End**.

* Return to the operating level.

2.4 Calibrating sensors

The connected sensors are calibrated in configuration level CO5.

The following applies:

- ▶ CO5 -> F01 - 1, CO5 -> F02 - 0, CO5 -> F03 - 0: Pt 1000 (Pt 100) sensors (default)
- ▶ CO5 -> F01 - 0, CO5 -> F02 - 0, CO5 -> F03 - 0: PTC (Pt 100) sensors
- ▶ CO5 -> F01 - 0, CO5 -> F02 - 1, CO5 -> F03 - 0: NTC (Pt 100) sensors
- ▶ CO5 -> F01 - 1, CO5 -> F02 - 1, CO5 -> F03 - 0: Ni 1000 (Pt 100) sensors
- ▶ CO5 -> F01 - 0, CO5 -> F02 - 0, CO5 -> F03 - 1: Pt 500 (Pt 100) sensors

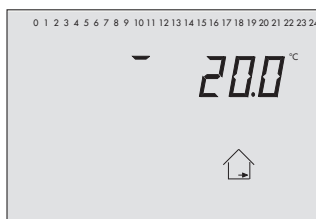
The resistance values of the sensors can be found on page 158.

If the temperature values displayed at the controller differ from the actual temperatures, the measured values of all connected sensors can be changed or readjusted. To calibrate a sensor, the currently displayed sensor value must be changed such that it matches the temperature (reference temperature) measured directly at the point of measurement.

Sensor calibration is to be activated in CO5 via function block F20.
An incorrect sensor calibration can be deleted by setting F20 - 0.

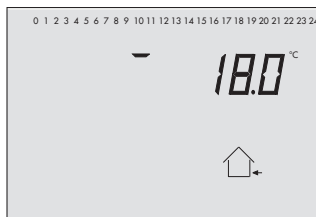
Proceed as follows:

- ⇒ Switch to configuration and parameter level. Display shows: **0 0 0 0**
- ⌚ Set valid key number.
- * Confirm key number. Display shows: **PA1**
- ⌚ Select CO5 configuration level.
- * Open CO5 configuration level.
- ⌚ Select function block F20.
- * Activate editing mode for function block F20.
- ⌚ Select appropriate sensor icon:



Room sensor

- : Heating circuit Rk1
- : Heating circuit Rk2



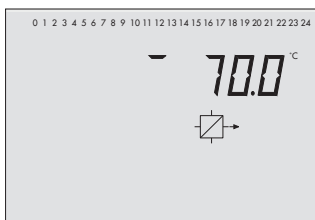
Outdoor sensor

- : Heating circuit Rk1
- : Heating circuit Rk2



Flow sensor VF

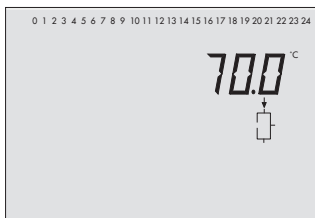
- : Heating circuit Rk1
- : Heating circuit Rk2



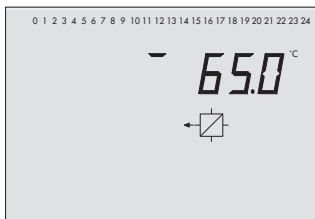
Flow sensor VF1, primary heat exchanger circuit



Flow sensor VF2, DHW circuit

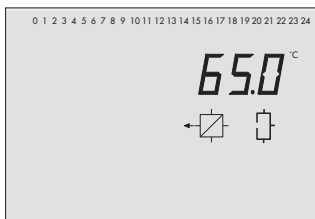


Solar collector sensor VF3

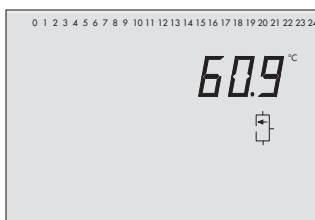


Return flow sensor RüF

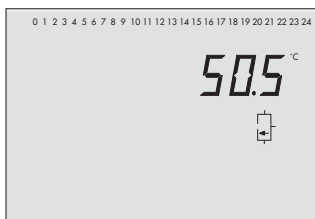
- : Heating circuit Rk1
- : Heating circuit Rk2



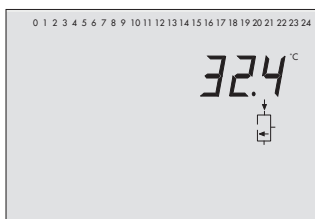
Return flow sensor RüF, DHW circuit



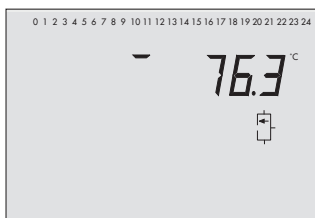
Storage tank sensor SF1 (DHW storage tank)



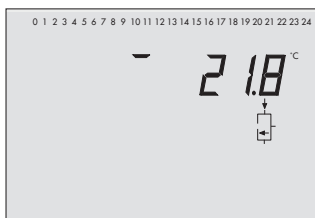
Storage tank sensor SF2 (DHW storage tank)



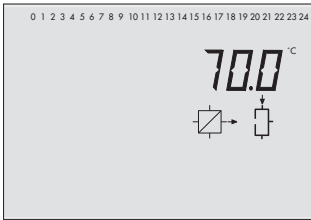
Storage tank sensor SF3 (DHW storage tank)



Storage tank sensor SF2, SF3 (buffer tank)



Storage tank sensor SF4 (buffer tank)



Flow sensor VF4

- * Display measured value.
Measured value blinks.
- (↻) Correct measured value.
Read the actual temperature directly from the thermometer at the point of measurement and enter this value as the reference temperature.
- * Confirm corrected measured value.

Additional sensors are calibrated similarly.

- (↻) Select **End**.
- * Exit configuration level.
- (↻) Select **End**.
- * Return to operating level.

2.5 Resetting to default values

All parameters in parameter levels PA1, PA2 and PA5 set over the rotary switches, except for the maximum flow temperature and the return flow temperature limits in PA1/PA2, can be reset to their default settings (WE).



Proceed as follows:

- ↻ Switch to configuration and parameter level.
- (↻) Set key number 1991.
- * Confirm key number.

3 Manual operation

Switch to manual mode to configure all outputs (see wiring diagram in section 11).

The manual operation for the different control circuits is set at the rotary switches:

Manual operation	Rotary switch	Position
Heating circuit 1*	Top	
Heating circuit 2*	Middle	
DHW heating*	Bottom	

* Refer to page 157 for assignment

Proceed as follows:

Turn appropriate rotary switch to position  "Manual operation".

Ⓒ Select:

POS_ : Correction value in percent

UP_ : Activation of the circulation pump

SLP: Activation of the storage tank charging pump

* Confirm selection.

Display blinks.


Ⓒ Edit the correction value or activate/deactivate the circulation pump, etc.

* Confirm edited settings.

The modified values remain active as long as the controller is in manual mode.

Return the rotary switch to the desired operating mode (left side).

Manual operation of the selected control circuit is deactivated by switching to any other operating mode.

Note: Simply setting the rotary switch to position  "Manual operation" has no influence on the outputs. You have to actually enter a correction value or activate/deactivate the pumps to configure the outputs.

In manual mode, **frost protection** (-> section 7.2) cannot be activated.

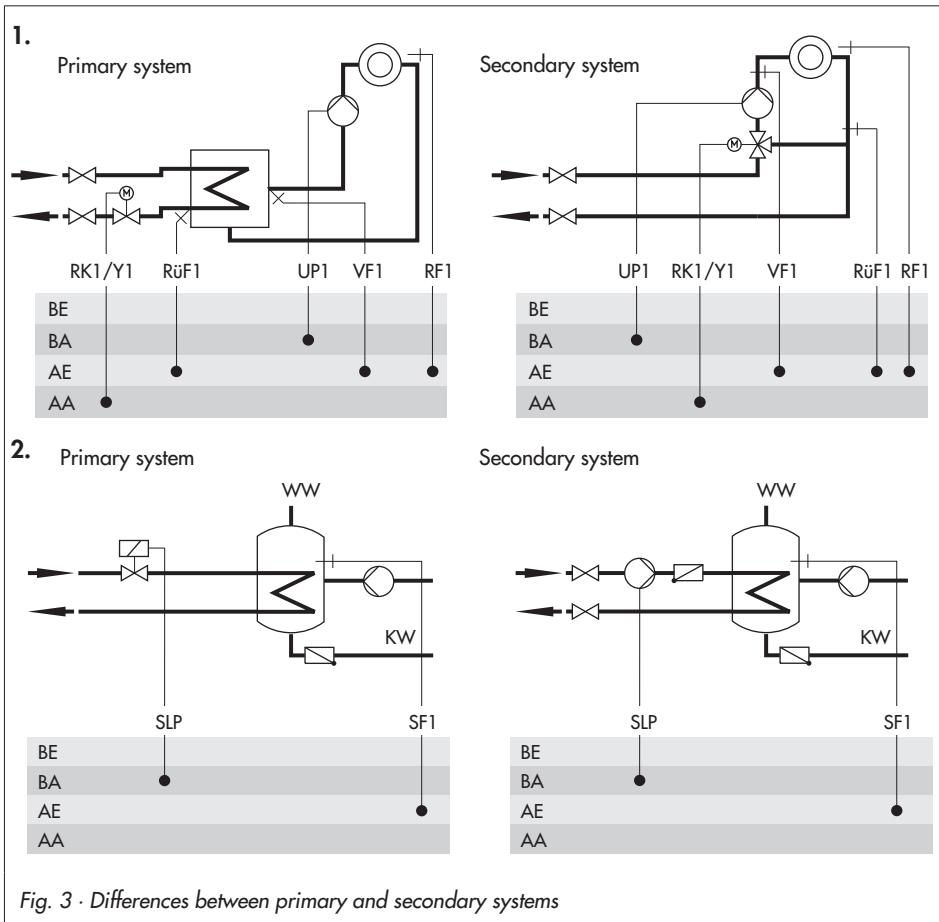
4 Systems

45 different hydraulic schematics are available.

The systems can be configured both as primary and secondary systems. The fundamental hydraulic differences between a primary and a secondary system are illustrated in Fig. 3.

- ▶ 1. A mixing valve replaces the heat exchanger in the heating/DHW circuit
- ▶ 2. A storage tank charging pump replaces the primary solenoid/thermoelectric valve

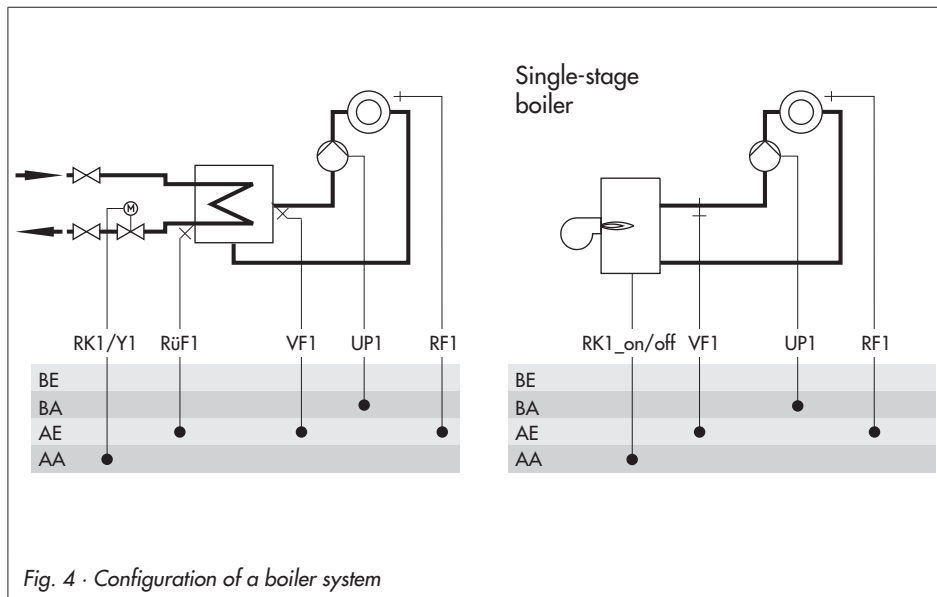
The controller settings do not have to be changed.



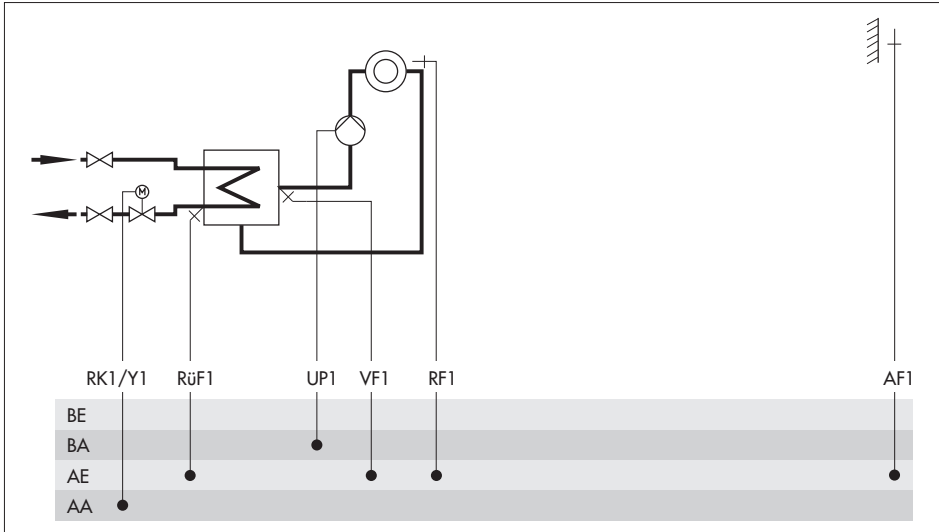
Boiler systems:

Single-stage boiler systems can be configured to include any system whose heating circuits and DHW circuit include just one heat exchanger. These systems are Anl 1.0, 1.5 to 1.8, 2.x, 3.x, 4.0 to 4.3, 7.x and 8.x.

The boiler can be controlled by an on/off output (CO1 -> F12 - 0).



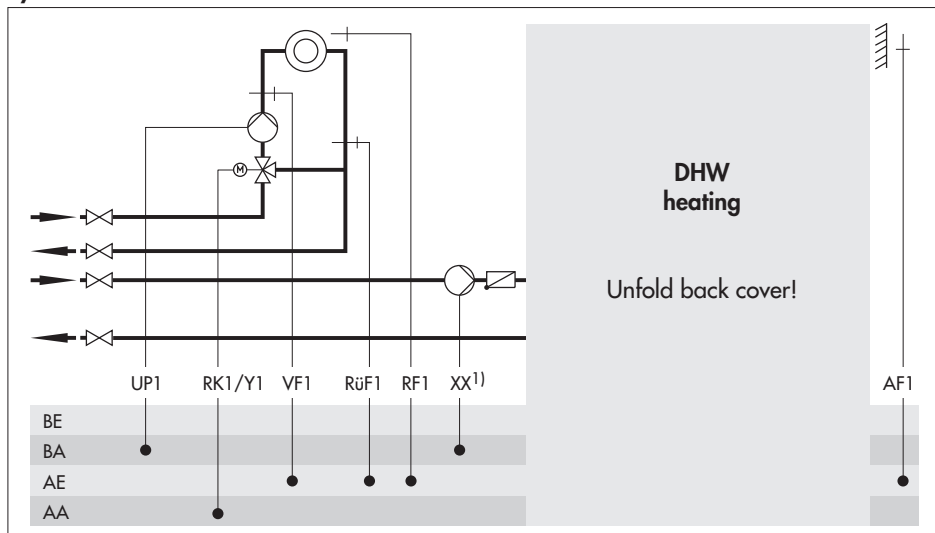
System Anl 1.0



Default settings

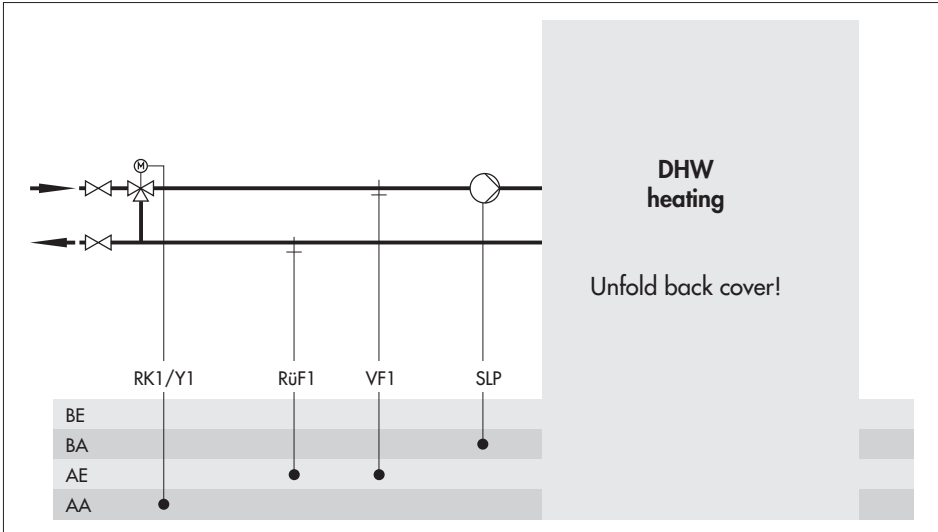
CO1 -> F01	- 0 (without RF1)
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)

Systems Anl 1.1 to 1.4



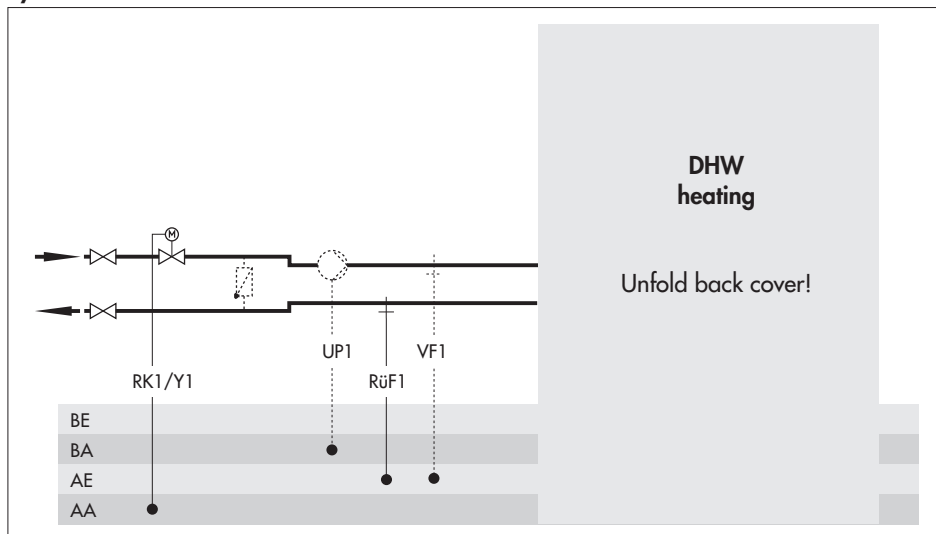
System	Anl 1.1	Anl 1.2	Anl 1.3	Anl 1.4
Type of DHW heating	Type 1	Type 2	Type 3	Type 4
¹⁾ XX =	SLP	UP2	SLP	UP2
Integration of flow sensor VF4	Possible	Possible	Possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Not possible	-	Not possible
Note	-	Only secondary system	-	Only secondary system
Default settings				
CO1 -> F01	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)	- 0 (w/o RüF1)	- 1 (with RüF1)	- 0 (w/o RüF1)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)	- 0 (w/o SF2)	- 1 (with SF2)
CO4 -> F05	- 0 (w/o VF4)	- 0 (w/o VF4)	- 0 (w/o VF4)	- 0 (w/o VF4)

Systems Anl 1.5 and 1.7



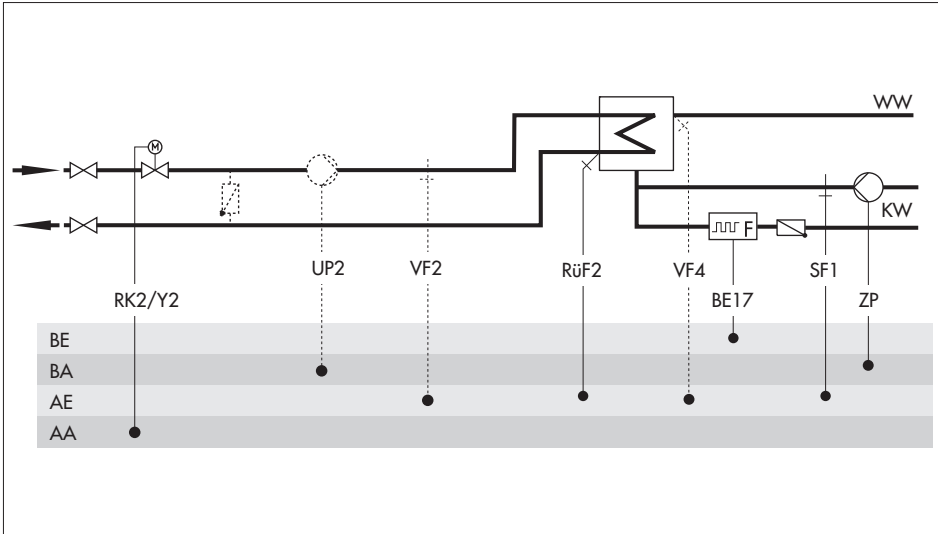
System	Anl 1.5	Anl 1.7
Type of DHW heating	Type 1	Type 3
Integration of flow sensor VF4	Not possible	Not possible
Default settings		
CO1 -> F03		- 1 (with RüF1)
CO4 -> F01		- 1 (with SF1)
CO4 -> F02		- 0 (without SF2)

Systems Anl 1.6 and 1.8



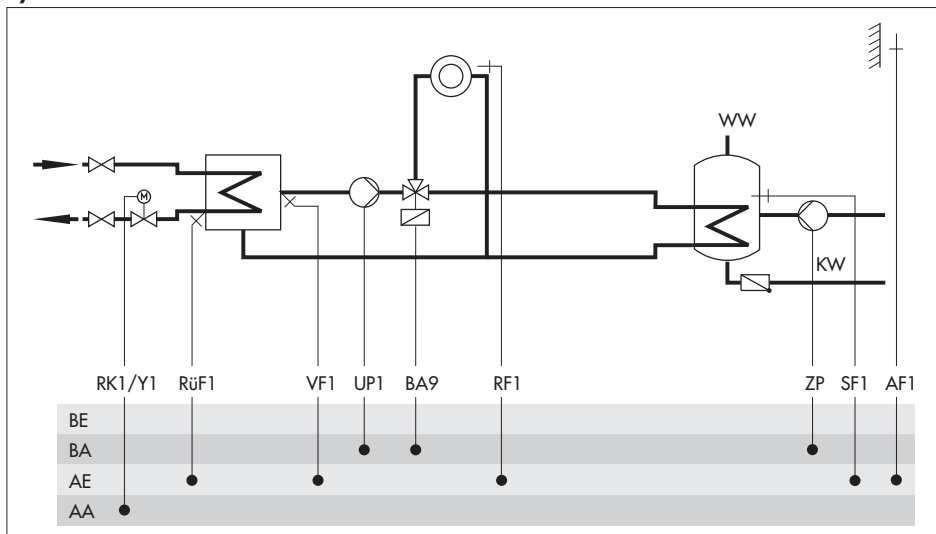
System	Anl 1.6 With pre-control	Anl 1.8 With pre-control	Anl 1.6 W/o pre-control	Anl 1.8 W/o pre-control
Type of DHW heating	Type 2	Type 4	Type 2	Type 4
Integration of VF4, UP1	•		–	
ZP integration (broken line) with CO4 -> F10 - 1	Possible		Possible	
Note	–		VF1 takes the position of VF4; RüF1 is to be installed in the heat exchanger	
Default settings				
CO1 -> F03	– 1 (with RüF1)			
CO4 -> F01	– 1 (with SF1)			
CO4 -> F02	– 1 (with SF2)			
CO4 -> F05	– 0 (without VF4)			

System Anl 1.9



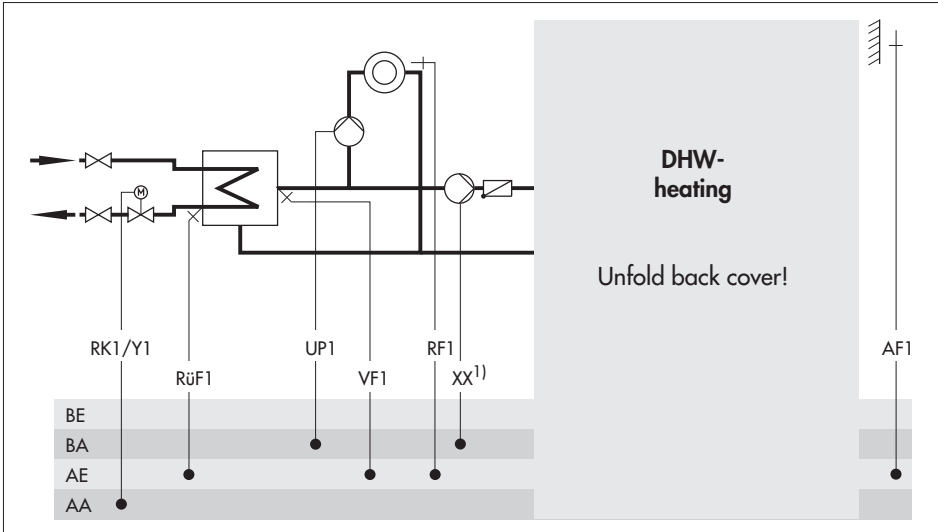
System	Anl 1.9 With pre-control	Anl 1.9 Without pre-control
Integration of VF4, UP2	Yes	No
Note	-	VF2 takes the position of VF4
Default settings		
CO4 -> F01		- 0 (without SF1)
CO4 -> F03		- 0 (without RüF2)
CO4 -> F04		- 0 (without water flow sensor at BE17)
CO4 -> F05		- 0 (without VF4)

System Anl 2.0



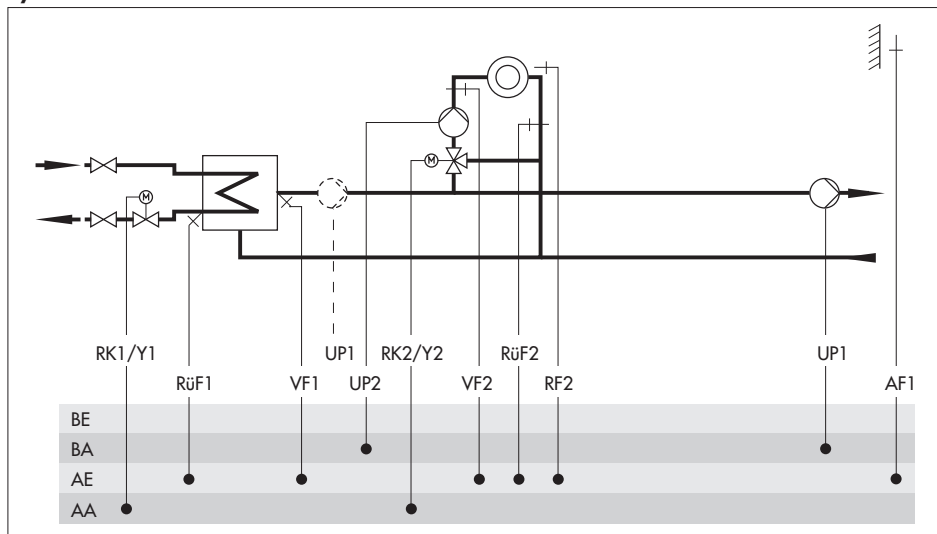
Default settings		
CO1 -> F01		- 0 (without RF1)
CO1 -> F02		- 1 (with AF1)
CO1 -> F03		- 1 (with RüF1)
CO4 -> F01		- 1 (with SF1)
CO4 -> F02		- 0 (without SF2)

Systems Anl 2.1 to 2.4



System	Anl 2.1	Anl 2.2	Anl 2.3	Anl 2.4
Type of DHW heating	Type 1	Type 2	Type 3	Type 4
1) XX =	SLP	UP2	SLP	UP2
Integration of flow sensor VF4	Not possible	Possible	Not possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Not possible	-	Not possible
Default settings				
CO1 -> F01	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)	- 1 (with RüF1)	- 1 (with RüF1)	- 1 (with RüF1)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)	- 0 (w/o SF2)	- 1 (with SF2)
CO4 -> F05		- 0 (w/o VF4)		- 0 (w/o VF4)

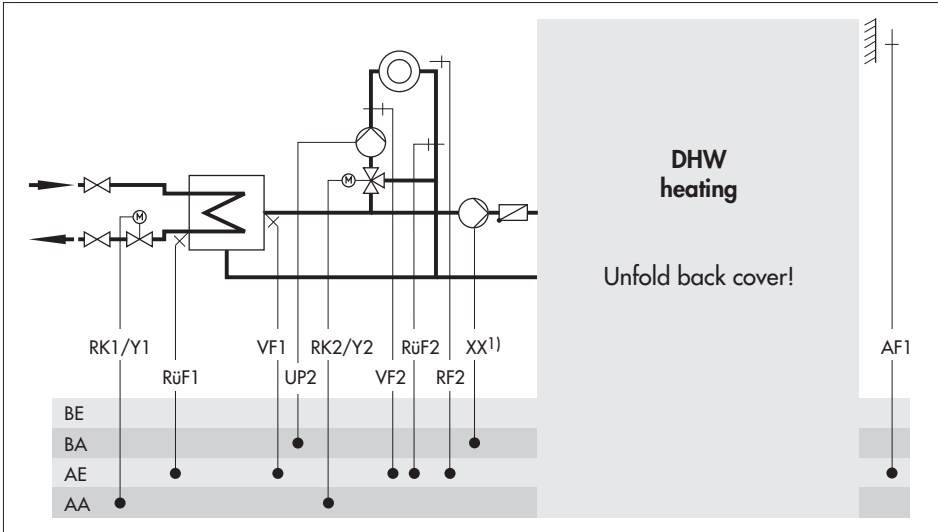
System Anl 3.0



Default settings

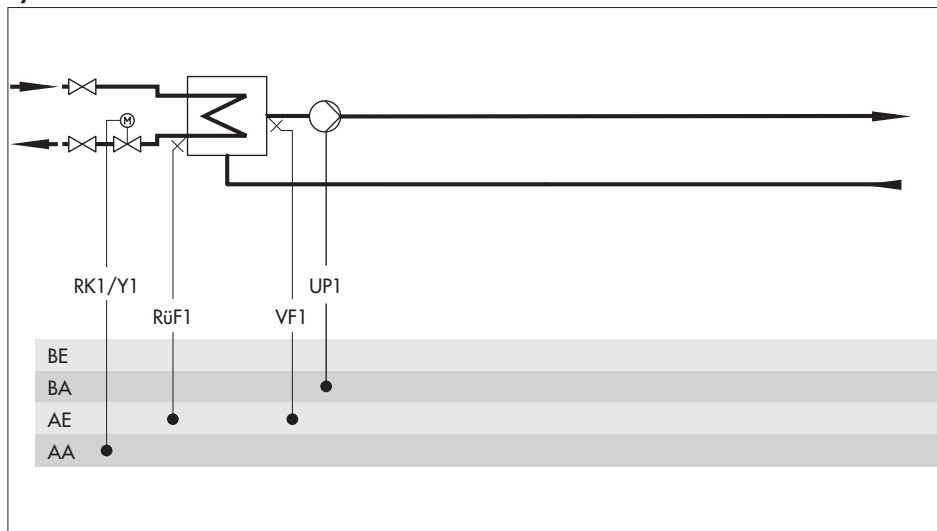
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)
CO2 -> F01	- 0 (without RF2)
CO2 -> F03	- 0 (without RüF2)

Systems Anl 3.1 to 3.4



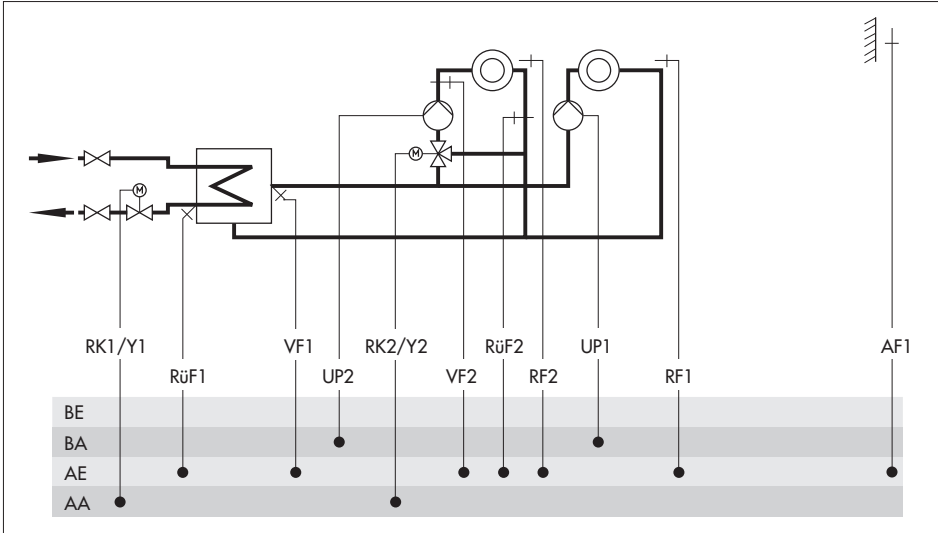
System	Anl 3.1	Anl 3.2	Anl 3.3	Anl 3.4
Type of DHW heating	Type 1	Type 2	Type 3	Type 4
1) XX =	SLP	UP1	SLP	UP1
Integration of flow sensor VF4	Not possible	Possible	Not possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Not possible	-	Not possible
Note	-	-	Binary output BA9 replaced by UP1	Only 0 to 10 V output signal available (Y2)
Default settings				
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)	- 1 (with RüF1)	- 1 (with RüF1)	- 1 (with RüF1)
CO2 -> F01	- 0 (w/o RF2)	- 0 (w/o RF2)	- 0 (w/o RF2)	- 0 (w/o RF2)
CO2 -> F03	- 0 (w/o RüF2)	- 0 (w/o RüF2)	- 0 (w/o RüF2)	- 0 (w/o RüF2)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)	- 0 (w/o SF2)	- 1 (with SF2)
CO4 -> F05		- 0 (w/o VF4)		- 0 (w/o VF4)

System Anl 3.5



Note	Control and UP1 are only active during processing for external demand.
Default setting	
CO1 -> F03	- 1 (with RüF1)

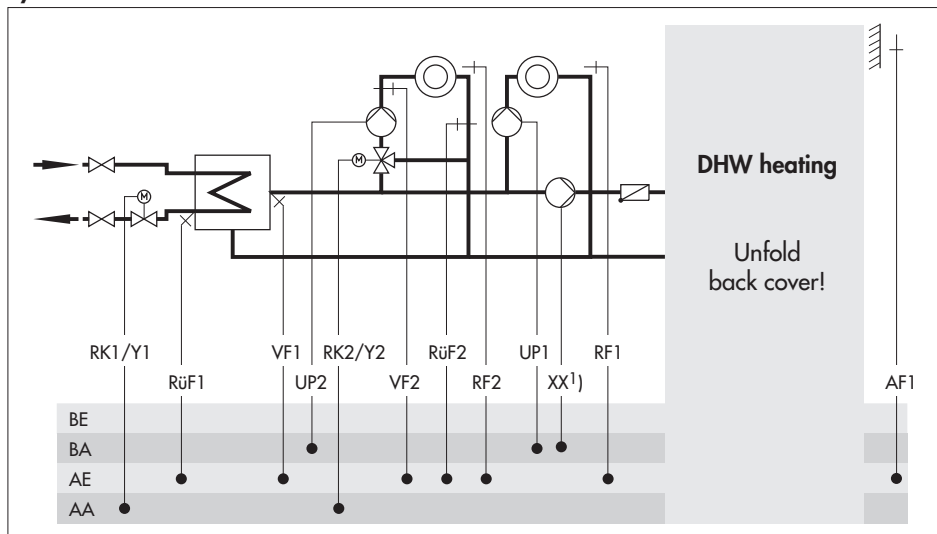
System Anl 4.0



Default settings

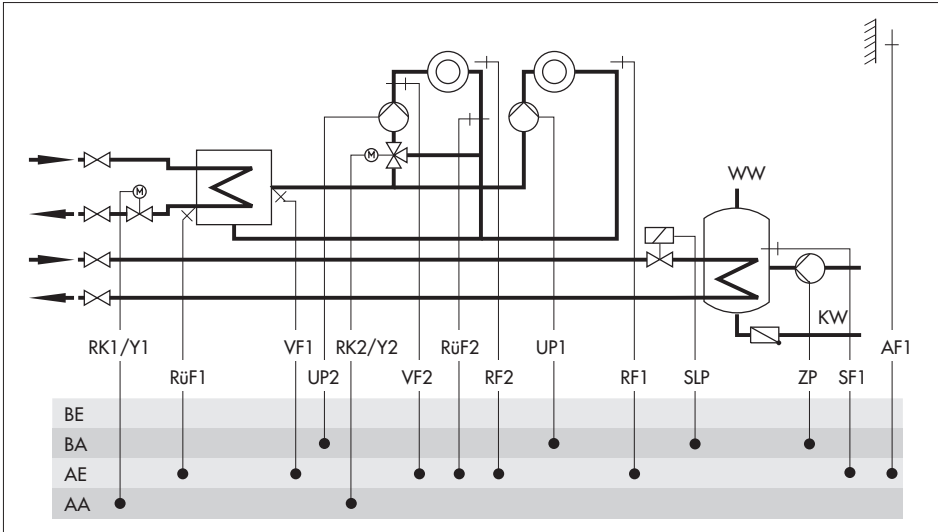
CO1 -> F01	- 0 (without RF1)
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)
CO2 -> F01	- 0 (without RF2)
CO2 -> F02	- 0 (without AF2)
CO2 -> F03	- 0 (without RüF2)

Systems Anl 4.1 to 4.3



System	Anl 4.1	Anl 4.2	Anl 4.3
Type of DHW heating	Type 1	Type 2	Type 3
1) XX =	SLP	BA9	SLP
Integration of VF4	Not possible	Possible	Not possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Not possible	-
Note	-	Only 0 to 10 V output signal available (Y2)	
Default settings			
CO1 -> F01	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)	- 1 (with RüF1)	- 1 (with RüF1)
CO2 -> F01	- 0 (w/o RF2)	- 0 (w/o RF2)	- 0 (w/o RF2)
CO2 -> F02	- 0 (w/o AF2)	- 0 (w/o AF2)	- 0 (w/o AF2)
CO2 -> F03	- 0 (w/o RüF2)	- 0 (w/o RüF2)	- 0 (w/o RüF2)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)	- 0 (w/o SF2)
CO4 -> F05		- 0 (w/o VF4)	

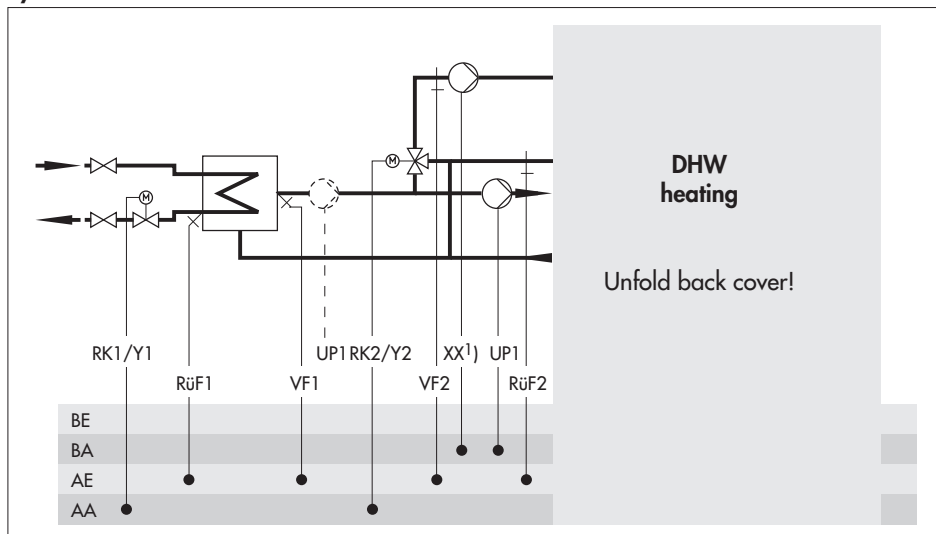
System Anl 4.5



Default settings

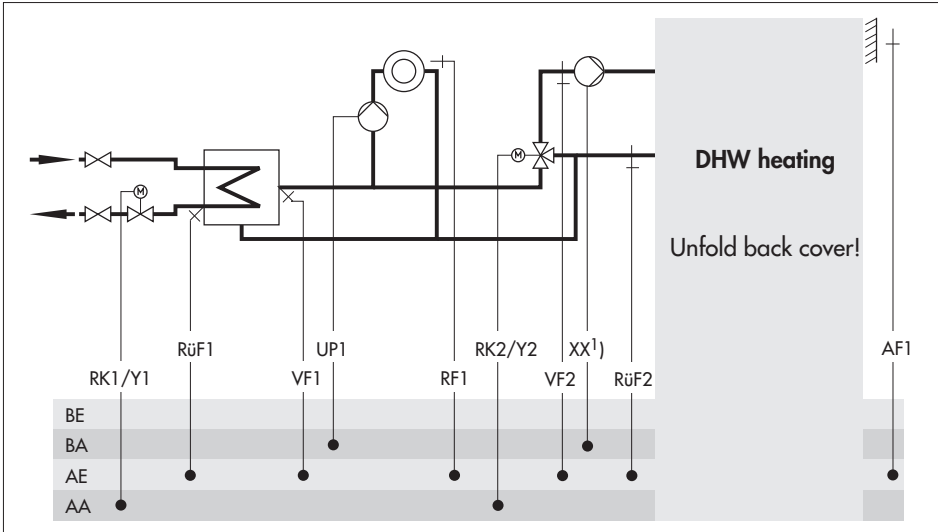
CO1 -> F01	- 0 (without RF1)
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)
CO2 -> F01	- 0 (without RF2)
CO2 -> F02	- 0 (without AF2)
CO2 -> F03	- 0 (without RüF2)
CO4 -> F01	- 1 (with SF1)
CO4 -> F02	- 0 (without SF2)

Systems Anl 7.1 and 7.2



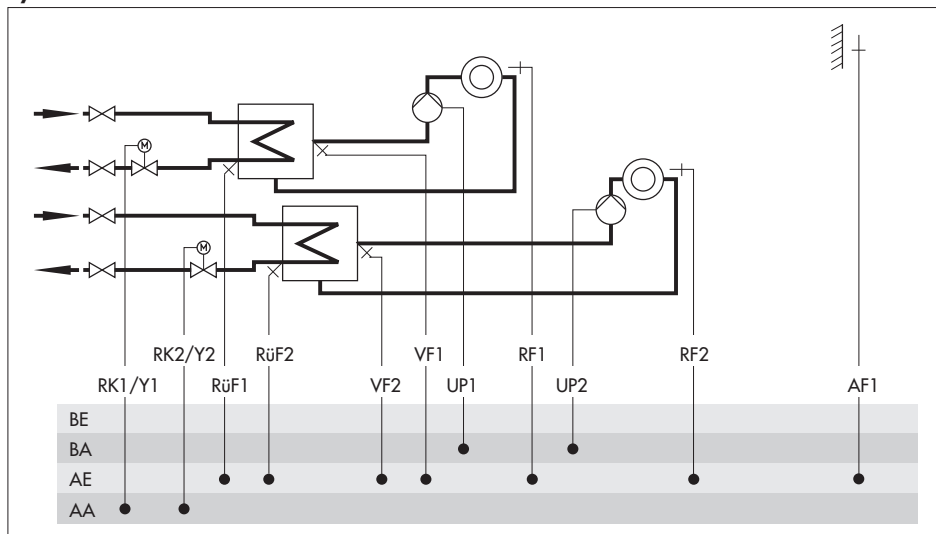
System	Anl 7.1	Anl 7.2
Type of DHW heating	Type 1	Type 2
¹⁾ XX =	SLP	UP2
Integration of VF4	Not possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Possible
Default settings		
CO1 -> F03	- 1 (with RüF1)	- 1 (with RüF1)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (without SF2)	- 1 (with SF2)
CO4 -> F03	- 0 (without RüF2)	- 0 (without RüF2)
CO4 -> F05		- 0 (without VF4)

Systems Anl 8.1 and 8.2



System	Anl 8.1	Anl 8.2
Type of DHW heating	Type 1	Type 2
1) XX =	SLP	UP2
Integration of VF4	Not possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	-
Default settings		
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)
CO4 -> F05		- 0 (without VF4)

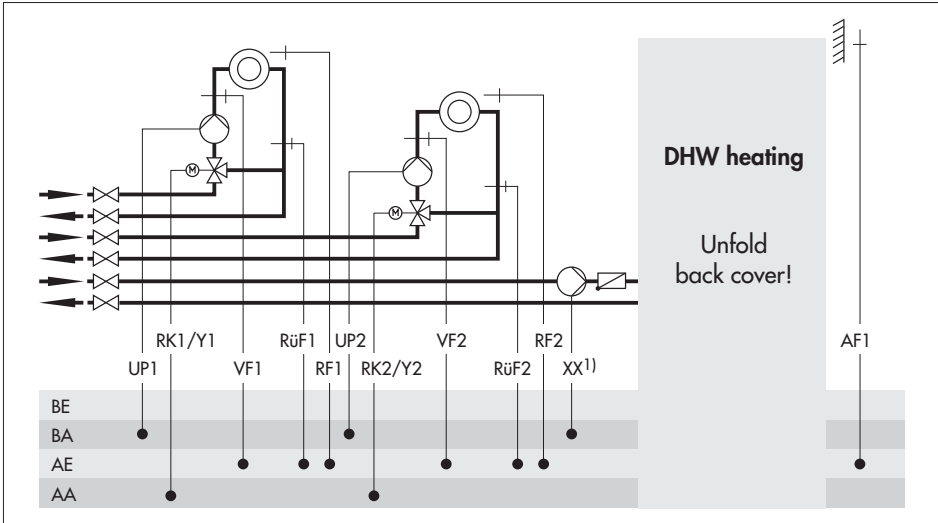
System Anl 10.0



Default settings

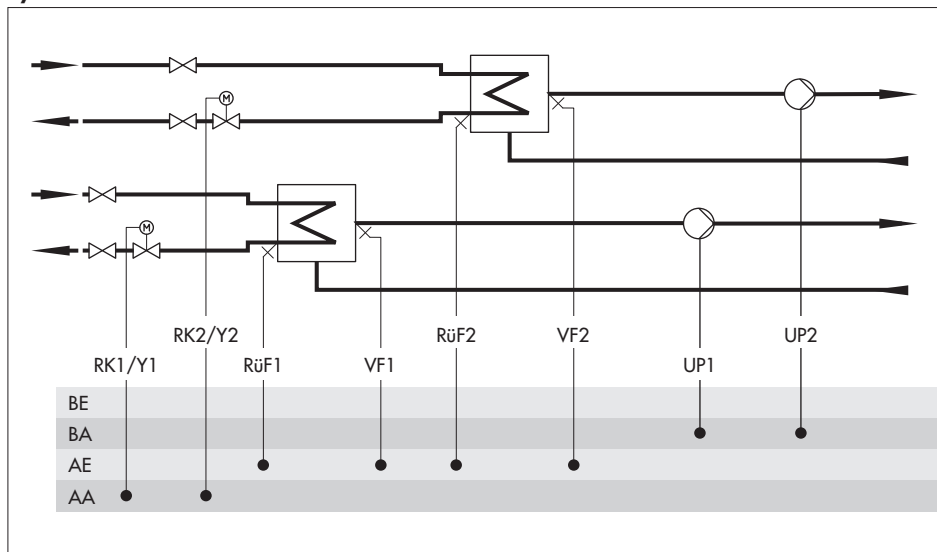
CO1 -> F01	- 0 (without RF1)
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)
CO2 -> F01	- 0 (without RF2)
CO2 -> F02	- 0 (without AF2)
CO2 -> F03	- 1 (with RüF2)

Systems Anl 10.1 to 10.3



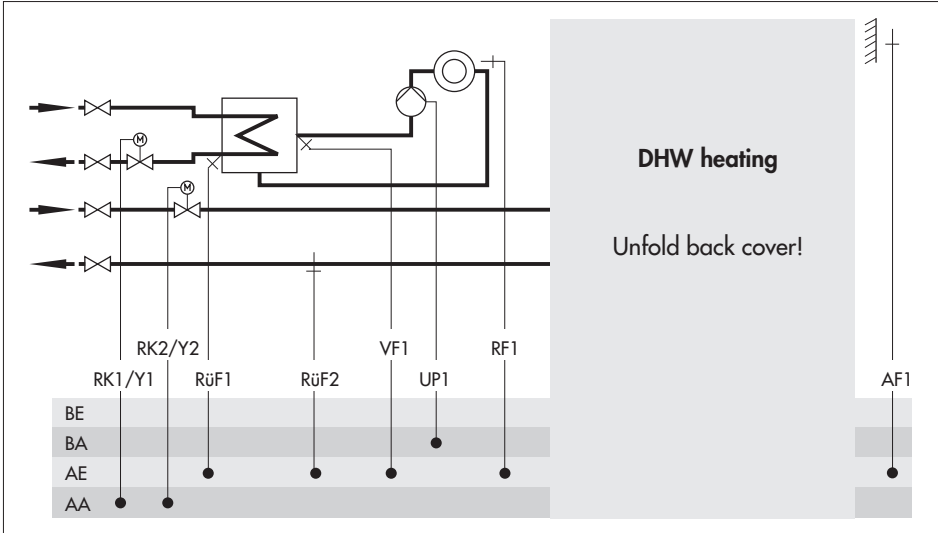
System	Anl 10.1	Anl 10.2	Anl 10.3
Type of DHW heating	Type 1	Type 2	Type 3
1) XX =	SLP	BA9	SLP
Integration of VF4	Possible	Possible	Possible
ZP integration (broken line) with CO4 -> F10 - 1	-	Not possible	-
Note	-	Only 0 to 10 V output signal available (Y2)	
		Only second. system	
Default settings			
CO1 -> F01	- 0 (w/o RF1)	- 0 (w/o RF1)	- 0 (w/o RF1)
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RÜF1)	- 0 (w/o RÜF1)	- 1 (with RÜF1)
CO2 -> F01	- 0 (w/o RF2)	- 0 (w/o RF2)	- 0 (w/o RF2)
CO2 -> F02	- 0 (w/o AF2)	- 0 (w/o AF2)	- 0 (w/o AF2)
CO2 -> F03	- 1 (with RÜF2)	- 0 (w/o RÜF2)	- 1 (with RÜF2)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)	- 0 (w/o SF2)
CO4 -> F05	- 0 (w/o VF4)	- 0 (w/o VF4)	- 0 (w/o VF4)

System Anl 10.5

**Default settings**

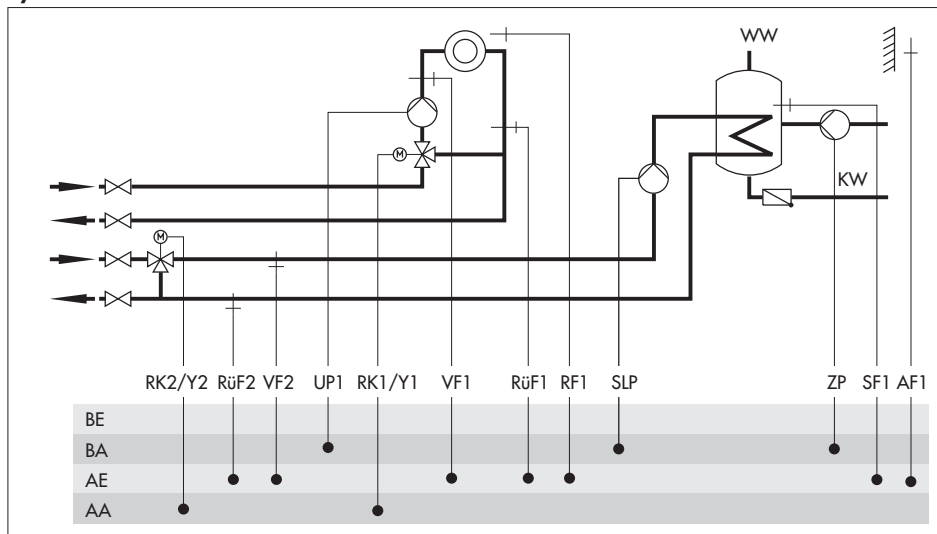
CO1 -> F01	- 0 (without RF1)
CO1 -> F03	- 1 (with RüF1)
CO2 -> F01	- 0 (without RF1)
CO2 -> F03	- 1 (with RüF2)

Systems Anl 11.0 and 11.3



System	Anl 11.0	Anl 11.3
Type of DHW heating	Type 1	Type 3
Integration of VF4	Not possible	Not possible
ZP integration (broken line) with CO4 -> F10 - 1	-	-
Note	-	Binary output BA9 replaced by UP2
Default settings		
CO1 -> F01		- 0 (without RF1)
CO1 -> F02		- 1 (with AF1)
CO1 -> F03		- 1 (with RüF1)
CO4 -> F03		- 0 (without RüF2)

System Anl 11.1

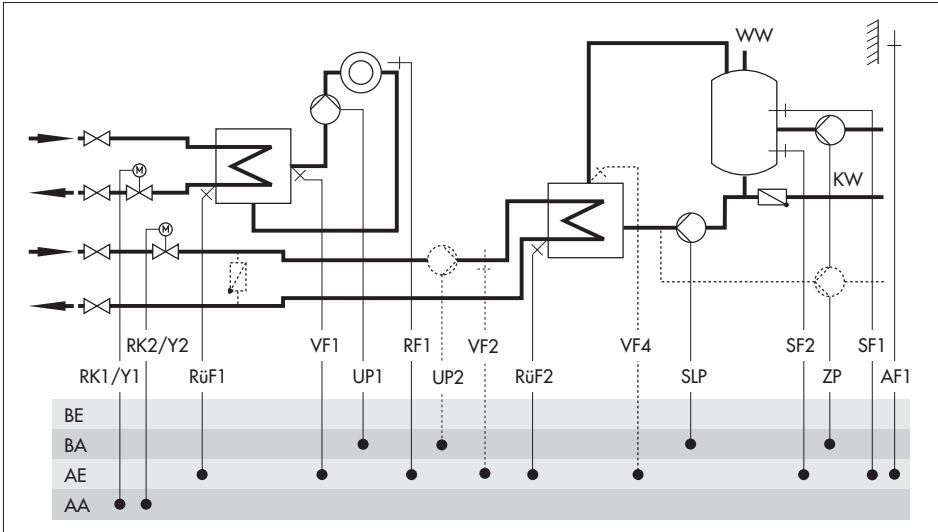


Default settings

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)

The system code Anl 11.1 can also be used for systems with buffer tank. See page 57.

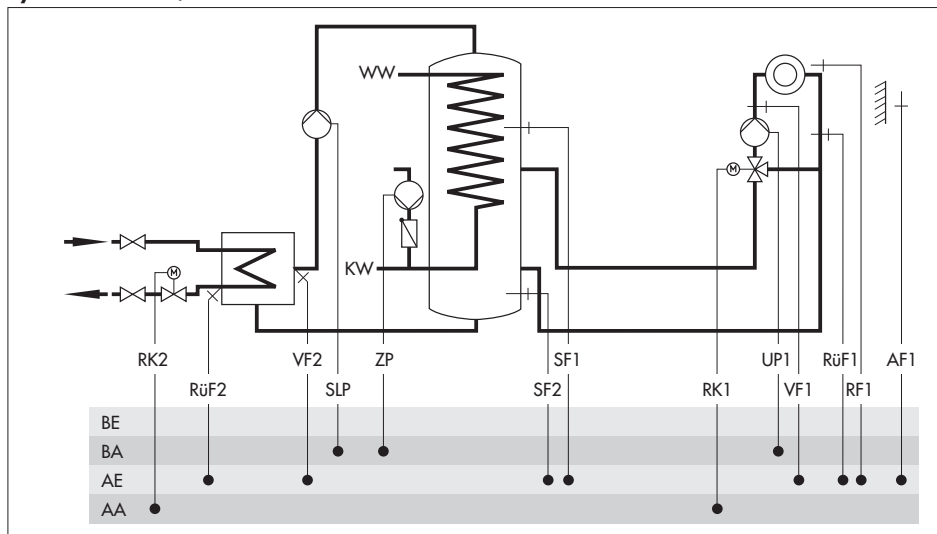
System Anl 11.2



System	Anl 11.2 With pre-control	Anl 11.2 Without pre-control
Type of DHW heating	Type 2	Type 2
Integration of VF4, UP2	•	-
ZP integration (broken line) with CO4 -> F10 - 1	Possible	Possible
Note	-	VF2 takes the position of VF4
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)	
CO4 -> F05	- 0 (without VF4)	

The system code Anl 11.2 can also be used for systems with buffer tank. See page 57.

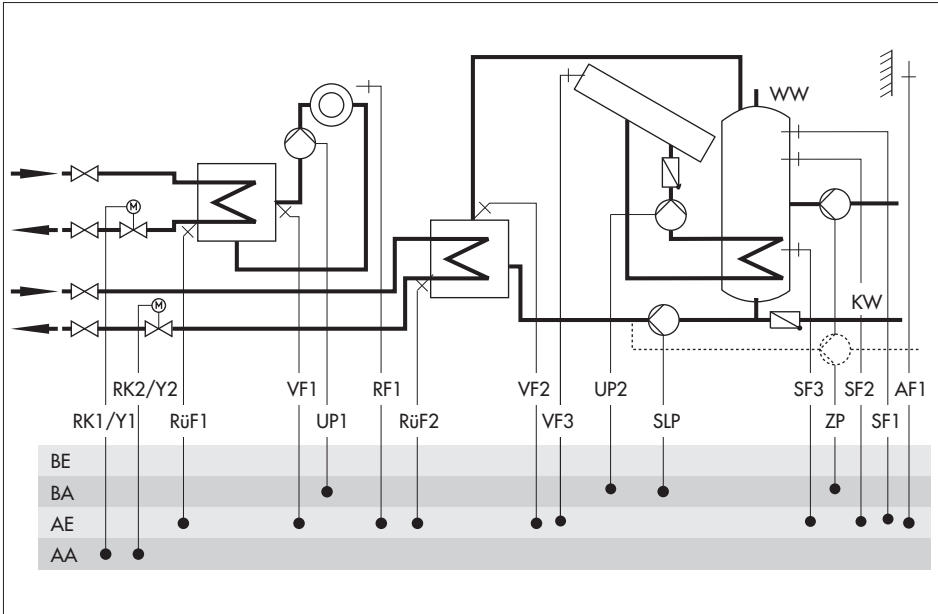
System Anl 11.1/11.2 with buffer tank



Default settings

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

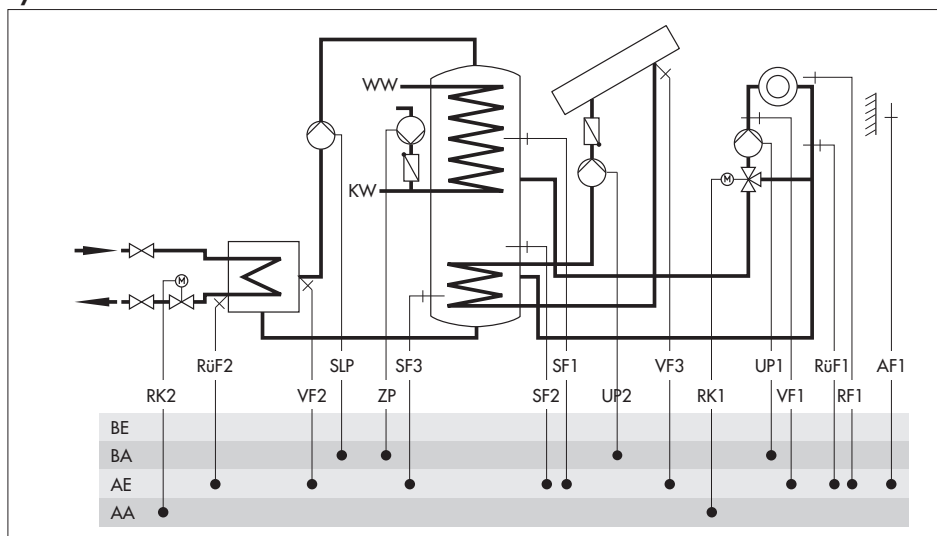
System Anl 11.4



ZP integration (broken line) with CO4 -> F10 - 1	Possible
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)

The system code Anl 11.4 can also be used for systems with buffer tank. See page 59.

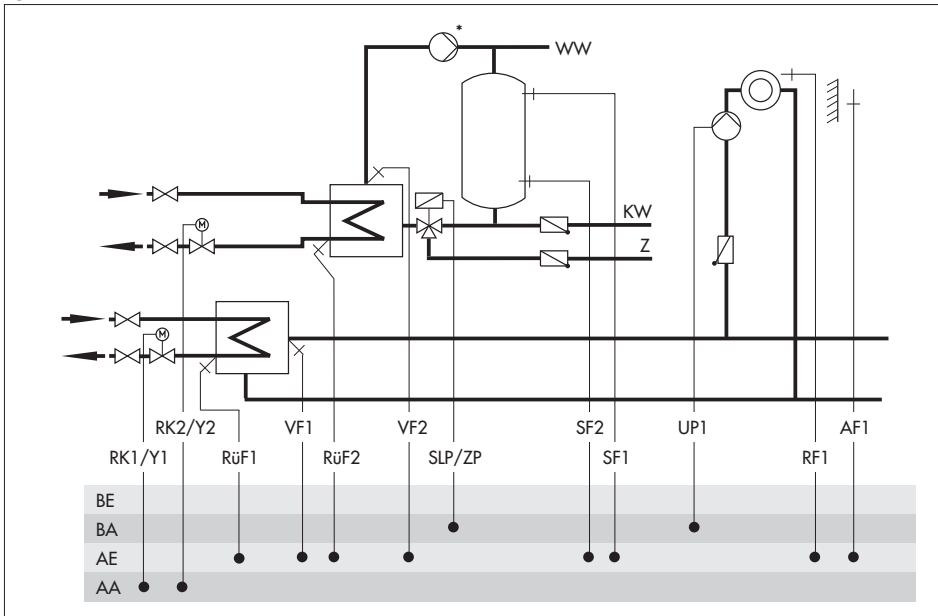
System Anl 11.4 with buffer tank



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 11.6



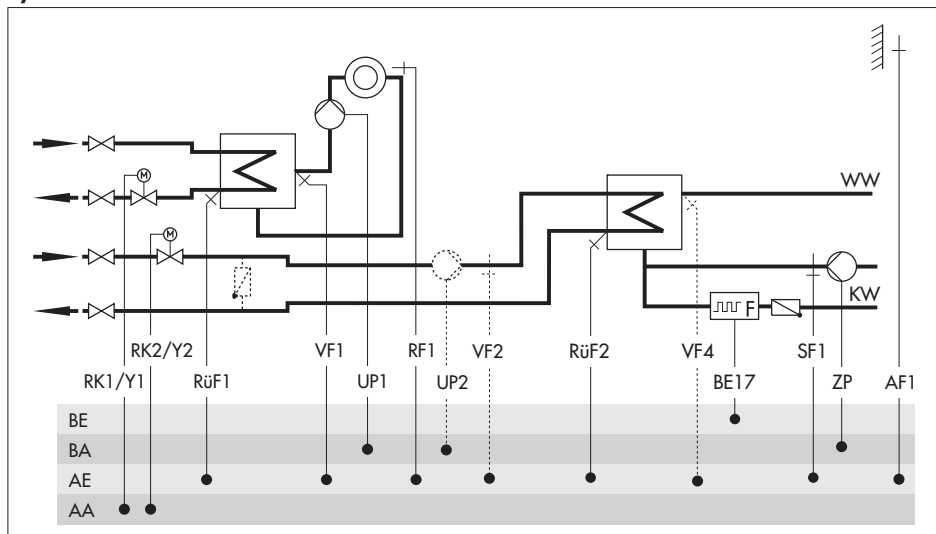
*Note:

The pump in the DHW circuit is designed to run constantly. Therefore, it must be connected directly to the mains supply.

Default settings

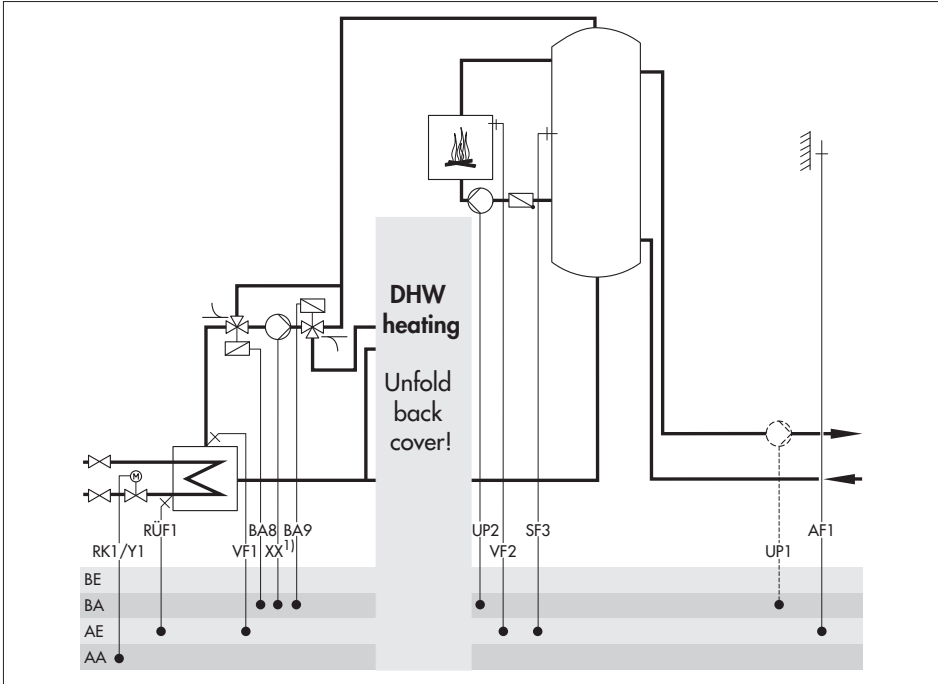
CO1 -> F01	- 0 (without RF1)
CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RüF1)
CO4 -> F01	- 1 (with SF1)
CO4 -> F02	- 1 (with SF2)
CO4 -> F03	- 0 (without RüF2)

System Anl 11.9



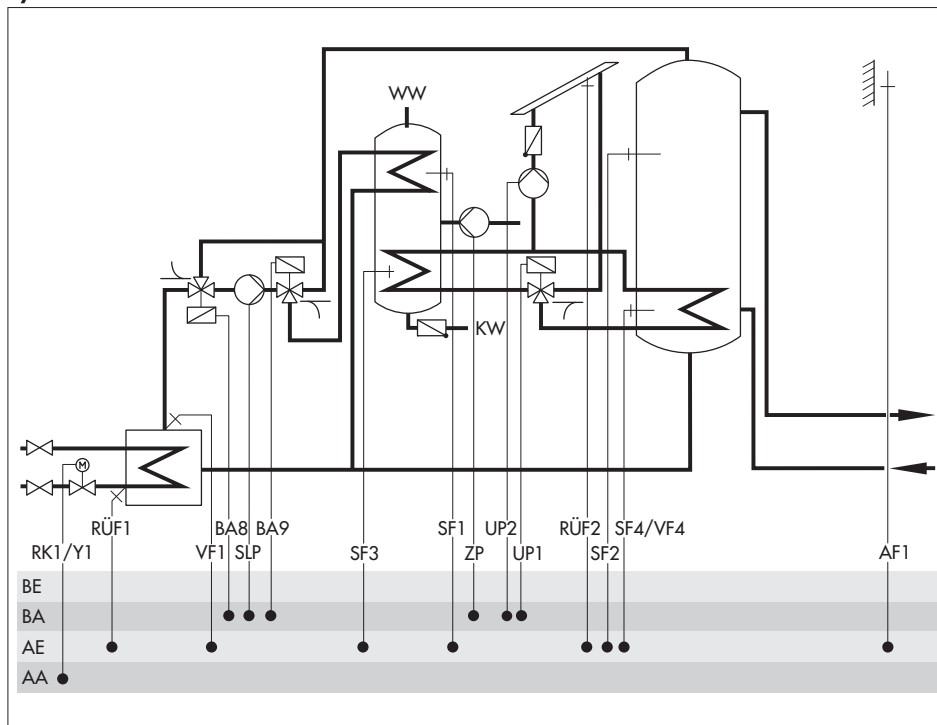
System	Anl 11.9 With pre-control	Anl 11.9 Without pre-control
Integration of VF4, UP2	Yes	No
Note	–	VF2 takes the position of VF4
Default settings		
CO1 -> F01		- 0 (without RF1)
CO1 -> F02		- 1 (with AF1)
CO1 -> F03		- 1 (with RüF1)
CO4 -> F01		- 0 (without SF1)
CO4 -> F03		- 0 (without RüF2)
CO4 -> F04		- 0 (without water flow sensor at BE17)
CO4 -> F05		- 0 (without VF4)

Systems Anl 14.1 and 14.2



System	Anl 14.1	Anl 14.2
Type of DHW heating	Type 1	Type 2
1) XX =	SLP	UP1
Integration of UP1	Possible	Not possible
Default settings		
CO1 -> F02	- 1 (with AF1)	- 1 (with AF1)
CO1 -> F03	- 1 (with RUF1)	- 1 (with RUF1)
CO4 -> F01	- 1 (with SF1)	- 1 (with SF1)
CO4 -> F02	- 0 (w/o SF2)	- 1 (with SF2)

System Anl 14.3



Default settings

CO1 -> F02	- 1 (with AF1)
CO1 -> F03	- 1 (with RÜF1)
CO4 -> F01	- 1 (with SF1)

5 Functions of the heating circuit

Which controller functions are available depends on the selected system code number (An1).

5.1 Weather-compensated control

When weather-compensated control is used, the flow temperature is controlled according to the outdoor temperature. The heating characteristic in the controller defines the flow temperature set point as a function of the outdoor temperature (→ Fig. 5). The outdoor temperature required for weather-compensated control can either be measured at an outdoor sensor or received over the 0 to 10 V input or from a connected device bus.

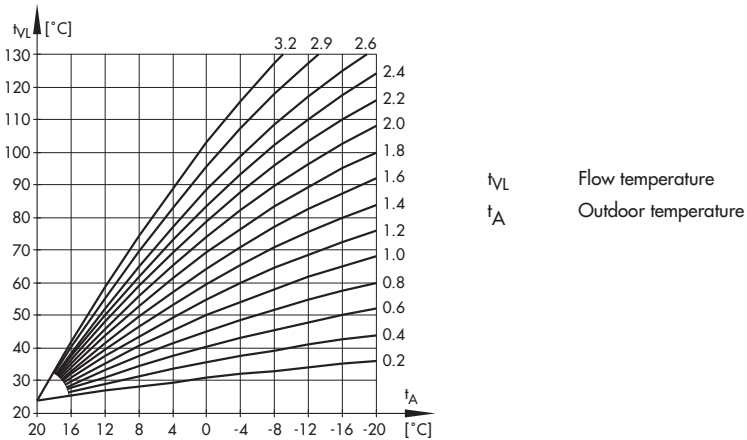


Fig. 5 · Gradient characteristics

Functions	WE	Configuration
Outdoor sensors AF1/2	1	CO1, 2 -> F02 - 1
Outdoor temperature received over 0 to 10 V input	0	CO5 -> F23 - 1
	-20 °C	Lower transmission range / -30 to 100 °C
	50 °C	Upper transmission range / -30 to 100 °C

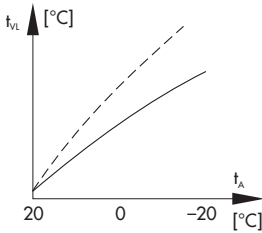
If you wish to alternatively receive the outdoor temperature over the device bus, the following additional configurations must be made:

Device bus	0	CO7 -> F01 - 1; device bus address
Receive value AF1	0	CO7 -> F07 - 1; register no.
Receive value AF2	0	CO7 -> F09 - 1; register no.

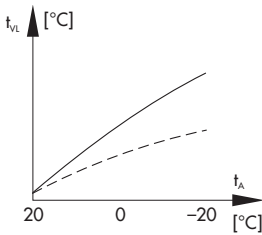
5.1.1 Gradient characteristic

Basically, the following rule applies: a decrease in the outdoor temperature causes the flow temperature to increase.

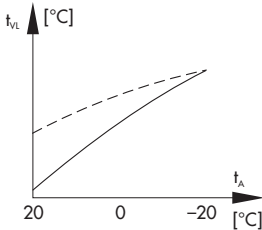
By varying the parameters *Gradient* and *Level*, you can adapt the characteristic to your individual requirements:



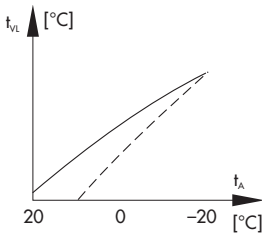
The gradient needs to be increased **if the room temperature drops when it is cold outside.**



The gradient needs to be decreased **if the room temperature rises when it is cold outside.**



The level needs to be increased and the gradient decreased **if the room temperature drops when it is mild outside.**



The level needs to be decreased and the gradient increased **if the room temperature rises when it is mild outside.**

Outside the times-of-use, reduced set points are used for control:

The reduced flow set point is calculated as the difference between the adjusted values for *Day set point* (rated room temperature) and *Night set point* (reduced room temperature).

The *Max. flow temperature* and *Min. flow temperature* parameters mark the upper and lower limits of the flow temperature. A separate gradient characteristic can be selected for the limitation of the return flow temperature.

Examples for adjusting the characteristic:

- ▶ Old building, radiator design 90/70: Gradient approx. 1.8
- ▶ New building, radiator design 70/55: Gradient approx. 1.4
- ▶ New building, radiator design 55/45: Gradient approx. 1.0
- ▶ Underfloor heating depending on arrangement: Gradient smaller than 0.5

Note: Particularly for control operation without room sensor, the room temperatures set for day (*Day set point*) and night (*Night set point*) only become effective satisfactorily when the heating characteristic has been adapted to the building/heating surface layout.

Function	WE	Configuration
Four-point characteristic	0	CO1, 2 -> F11 - 0
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C
Parameters	WE	Parameter level / Range of values
Gradient, flow	1.8*	PA1, 2 / 0.2 to 3.2
Level, flow	0 °C	PA1, 2 / -30 to 30 °C
Min. flow temperature	20 °C	PA1, 2 / 5 to 130 °C
Max. flow temperature	90 °C*	PA1, 2 / 5 to 130 °C
* With CO1, 2 -> F05 - 1, the following applies: Gradient, flow / 0.2 to 1.0 (1.0) Max. flow temperature / 5 to 50 °C (50 °C)		

5.1.2 Four-point characteristic

The four-point characteristic allows you to define your own heating characteristic. It is defined by four points each for the *Outdoor temperature*, the *Flow temperature*, the *Reduced flow temperature* and the *Return flow temperature*. The *Max. flow temperature* and *Min. flow temperature* parameters mark the upper and lower limits of the flow temperature.

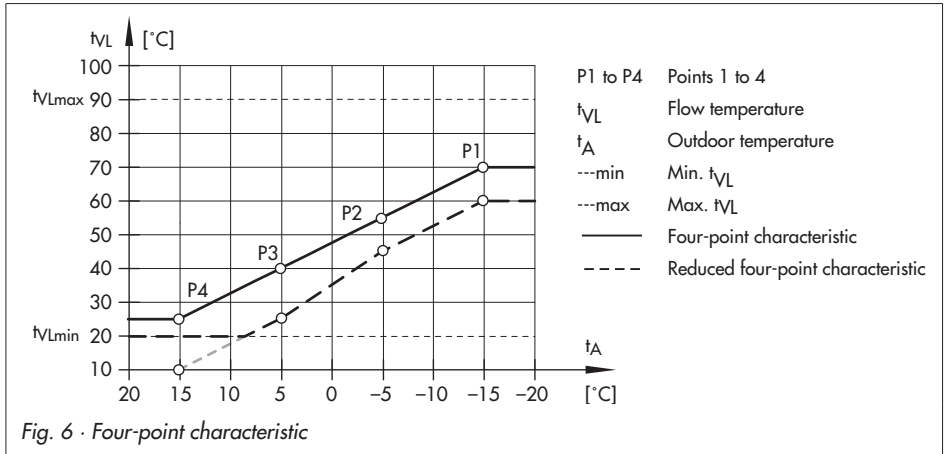


Fig. 6 · Four-point characteristic

Note: The Day set point and Night set point parameters are no longer available when the four-point characteristic has been selected, provided no additional functions (e.g. **Optimization**, **Flash adaptation**) have been selected.

Function		WE	Configuration
Four-point characteristic		0	CO1, 2 -> F11 - 1
Parameters		WE	Parameter level / Range of values
Outdoor temperature	Point 1	-15 °C	PA1, 2 / -30 to 50 °C
	Point 2	-5 °C	
	Point 3	5 °C	
	Point 4	15 °C	
Flow temperature	Point 1	70 °C	PA1, 2 / 5 to 130 °C
	Point 2	55 °C	
	Point 3	40 °C	
	Point 4	25 °C	

Parameters		WE	Parameter level / Range of values
Reduced flow temperature	Point 1	60 °C	PA1, 2 / 5 to 130 °C
	Point 2	40 °C	
	Point 3	20 °C	
	Point 4	20 °C	
Return flow temperature	Points 1 to 4	65 °C	PA1, 2 / 5 to 90 °C
Min. flow temperature		20 °C	PA1, 2 / 20 to 130 °C
Max. flow temperature		90 °C*	PA1, 2 / 20 to 130 °C
* With CO1, 2 -> F05 - 1, the following applies: Max. flow temperature / 5 to 50 °C (50 °C)			

Note: The **four-point characteristic** function can only be activated when the **Adaptation** function is not active (CO1, 2 -> F08 - 0).

5.2 Fixed set point control

During the times-of-use, the flow temperature can be controlled according to a fixed set point. Outside the times-of-use, the controller regulates to a reduced flow temperature. Set the desired rated flow temperature as *Day set point*, and the reduced flow temperature as *Night set point*.

Functions	WE	Configuration
Outdoor sensor AF1	1	CO1 -> F02 - 0
Parameters	WE	Rotary switch / Range of values
Day set point	50 °C	Top, middle / Min. to max. flow temperature
Night set point	30 °C	Top, middle / Min. to max. flow temperature
Parameters	WE	Parameter level / value range
Min. flow temperature	20 °C	PA1, 2 / 5 to 130 °C
Max. flow temperature	90 °C	PA1, 2 / 5 to 130 °C

Note: A fixed set point control in heating circuit 2 with CO2 -> F02 - 0 can only be configured if CO1 -> F02 - 0 is set as well, because the heating circuit 2 with CO2 -> F02 - 0 only uses the measured outdoor temperature provided by heating circuit 1.

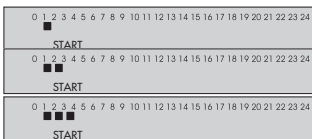
5.3 Underfloor heating/drying of jointless floors

Using function block setting CO1, 2 -> F05 - 1, the respective heating circuit is configured as an underfloor heating circuit. In doing so, the controller at first only limits the value ranges of the heating characteristic gradient and the maximum flow temperature in parameter levels PA1, 2:

- ▶ Value range of the gradient: 0.2 to 1.0
- ▶ Value range of the maximum flow temperature: 5 to 50 °C

In addition, it is possible to activate the **Drying of jointless floors** function. In connection with this, the function block parameters are listed which appear after activating this function block. They determine the drying process: the first heating up phase starts at the entered *Start temperature*, which has a flow temperature of 25 °C in its default setting. In the course of 24 hours, this temperature is raised by the value entered in *Temperature rise*, i.e. the default setting causes the flow temperature set point to rise to 30 °C. If the *Maximum temperature* is reached, it is kept constant for the number of days entered in *Maintaining time for maximum temperature*. The *Temperature reduction* determines the temperature reduction downwards. If the *Temperature reduction* is set to 0, the temperature maintaining phase moves directly to automatic mode. The drying of jointless floor runs to comply with DIN EN 1264 Part 4 when *Start temperature* is set to 25 °C and *Temperature rise* per day to 0.0 °C. As a result, the function starts with a flow temperature of 25 °C regulated to be kept constant for three days. Following this, the temperature is increased to the maximum adjusted temperature. The further process continues as described.

The drying function is activated by changing the setting *STOP* to *START temperature build-up phase* (■ **START** on the display). The restarting stages *START temperature maintaining phase* (■■ **START** on the display) and *START temperature reduction phase* (■■■ **START** on the display) can be selected to continue an interrupted drying process. The course of the drying process can be monitored in the information level over the icon of flow temperature display (*■■■■) of the associated heating circuit:



Temperature build-up phase

Temperature maintaining phase

Temperature reduction phase

The drying process has been successfully completed when the additional icon in the flow temperature display goes out after the last phase.

STOP on the display indicates that there has been a deviation of flow temperature of more than 5 °C for longer than 30 minutes. The function is canceled by the controller in such

cases. While *STOP* appears on the display, the controller keeps the flow temperature constant at 25 °C.

A power failure while the drying function is active or when *STOP* appears on the display automatically leads to the drying function restarting from the beginning.

In systems in which the drying function had to be interrupted due to DHW heating (e.g. Anl 2.1), storage tank charging does not occur while the drying function is active, provided it is not used for frost protection of the storage tank.

Note: *The function block parameter can only be accessed when the function has started by deactivating the function block and activating it again.*

Functions	WE	Configuration
Underfloor heating	0	CO1, 2 -> F05 - 1
Drying of jointless floors	25 °C	Start temperature / 20 to 60 °C
	5 °C/24 h	Temperature rise / 0 to 10 °C/24 h
	45 °C	Maximum temperature / 25 to 60 °C
	4	Maintaining time for max. temperature / 1 to 10 days
	0 °C/24 h	Temperature reduction / 0 to 10 °C/24 h
STOP		■ START, ■■ START, ■■■ START

5.4 Deactivation depending on outdoor temperature

5.4.1 OT deactivation value in rated operation

If the outdoor temperature exceeds the limit *OT deactivation value in rated operation*, the affected heating circuit is put out of service immediately. The valve is closed and the pump is switched off after $t = 2 \times$ valve transit time. When the outdoor temperature falls below this value (less 0.5 °C hysteresis), heating operation is restarted immediately.

With the default settings, this means that, during the warm season, the system is switched off at an outdoor temperature of 22 °C.

Parameter	WE	Parameter level / Range of values
OT deactivation value in rated operation	22 °C	PA1, 2 / 0 to 50 °C

5.4.2 OT deactivation value in reduced operation

If the outdoor temperature exceeds the limit value *OT deactivation value in reduced operation* in reduced operation, the affected heating circuit is put out of service immediately. The valve is closed and the pump is switched off after $t = 2 \times$ valve transit time. When the outdoor temperature falls below this value (less 0.5 °C hysteresis), heating operation is restarted immediately. With the default settings, this means that, at night, the system is switched off at an outdoor temperature of 15 °C to save energy. Nevertheless, remember that the system requires some time in the morning to heat up the building.

Parameter	WE	Parameter level / Range of values
OT deactivation value in reduced operation	15 °C	PA1, 2 / -20 to 50 °C

5.4.3 OT activation value in rated operation

If a heating circuit is in reduced operation (automatic mode), the circuit is automatically transferred to rated operation when the outdoor temperature falls below the limit value *OT activation value in rated operation*. When the limit value is exceeded (plus 0.5 °C hysteresis), reduced operation is restarted.

This function is activated at very low temperatures to avoid that the building cools down excessively outside the times-of-use when low outdoor temperatures occur.

Parameter	WE	Parameter level / Range of values
OT activation value in rated operation	-15 °C	PA1, 2 / -20 to 5 °C

5.4.4 Summer mode

Summer mode is activated depending on the mean daytime temperature (measured between 7.00h and 22.00h) during the desired period.

If the mean daytime temperature exceeds the *OT limit value in summer mode* on n successive days, summer mode is activated on the following day. This means that the valves in all heating circuits are closed and the circulation pumps are switched off after $t = 2 \times$ valve transit time. If the mean daytime temperature remains below the *OT limit value in summer mode* on m successive days, summer mode is deactivated on the following day.

Function	WE	Configuration
Summer mode	0	CO5 -> F04 - 1
	01.06	Start summer mode/ 01.01 (1 Jan) to 31.12 (31 Dec)
	2	No. of days until activation / 1 to 3
	30.09	Stop summer mode / 01.01 to 31.12
	1	No. of days until deactivation / 1 to 3
	18 °C	OT limit value summer mode / 0 to 30 °C

Note: Summer mode only becomes effective when the controller is in automatic mode (⊕).

5.5 Delayed outdoor temperature adaptation

The calculated outdoor temperature is used to determine the flow temperature set point. The heat response is delayed when the outdoor temperature either decreases, increases or increases and decreases. If the outdoor temperature varies by, for example, 12 °C within a very short period of time, the calculated outdoor temperature is adapted to the actual outdoor temperature in small steps. Assuming a *Delay* of 3 °C/h, the adaptation would take $t = \frac{12^{\circ}\text{C}}{3^{\circ}\text{C/h}} = 4 \text{ h}$.

Note: The delayed outdoor temperature adaptation helps avoid unnecessary overloads of central heating stations in combination with either overheated buildings occurring, for example, due to warm winds, or temporarily insufficient heating due to the outdoor sensor being exposed to direct sunshine.

In the operating level, the outdoor temperature blinks on the display while delayed outdoor temperature adaptation is active. The calculated outdoor temperature is displayed.

Functions	WE	Configuration
Delayed OT adaptation when OT decreases	0	CO5 -> F05 - 1
Delayed OT adaptation when OT increases	0	CO5 -> F06 - 1
	3 °C/h	Delay / 1 to 6 °C/h

5.6 Remote operation

Type 5244/5257-5	TROVIS 5576	
	Rk1	Rk2
Terminal 1	Terminal 5	Terminal 6
Terminal 2	Terminal 18	Terminal 18
Terminal 3	Terminal 15	Terminal 16

Fig. 7 · Wiring plan for Type 5244/5257-5 Room Panels to TROVIS 5576 for Rk1 or Rk2

Apart from measuring the room temperature, the Type 5244 Room Panel (PTC sensor) and Type 5257-5 Room Panel (Pt 1000 sensor) offer the following opportunities of influencing the control process:

- ▶ Selection of the operating mode:
 - Automatic mode
 - Day mode
 - Night mode
- ▶ Set point correction: during rated operation, the room temperature set point can be increased or reduced by up to 5 °C using a continuously adjustable rotary knob.

When the room sensor is activated, the measured room temperature is displayed with the connected and activated remote operation. Nevertheless, it is not used for control unless the **Optimization**, **Adaptation** or **Flash adaptation** functions have been activated.

Alternatively, the TROVIS 5570 Room Panel can be connected using the device bus (→ section 7.12.5).

Functions	WE	Configuration
Room sensors RF1/2	0	CO1, 2 -> F01 - 1

If the TROVIS 5570 Room Panel is to be used, the following additional configurations must be made:

Device bus	0	CO7 -> F01 - 1; device bus address
TROVIS 5570 Room Panel in Rk1	0	CO7 -> F03 - 1; device bus address
TROVIS 5570 Room Panel in Rk2	0	CO7 -> F04 - 1; device bus address

Note: The Day set point adjusted via the rotary switch remains unaffected by set point corrections performed at the room panel. Only the calculated flow temperature set point or the room temperature set point (for flash adaptation) are adjusted accordingly. The evaluation of a room temperature sensor connected to the terminals RF is not possible for this control circuit when a TROVIS 5570 Room Panel is configured.

5.7 Optimization

This function requires the use of a room sensor. Depending on the building characteristics, the controller determines and adapts the required advance heating time (maximum 8 hours) to ensure that the desired *Day set point* (rated room temperature) has been reached in the reference room when the time-of-use starts. During the advance heating period, the controller heats with the max. flow temperature. This temperature is built up in steps of 10 °C. As soon as the *Day set point* has been reached, weather-compensated control is activated.

Depending on the room sensors, the controller switches off the heating system up to one hour before the time-of-use ends. The controller chooses the deactivation time such that the room temperature does not drop significantly below the desired value until the time-of-use ends. During the advance heating period and the premature deactivation of the heating system, the icons ☀ or ☾ blink on the display. Outside the times-of-use, the controller monitors the *Night set point* (reduced room temperature). When the temperature falls below the night set point, the controller heats with the max. flow temperature until the measured room temperature exceeds the adjusted value by 1 °C.

Note: Direct sunshine can cause the room temperature to increase and thus result in the premature deactivation of the heating system.

When the room temperature decreases while the heating system is temporarily outside its times-of-use, this can prematurely cause the controller to heat up to the adjusted Day set point.

Functions	WE	Configuration
Room sensors RF1/2	1	CO1, 2 -> F01 - 1
Outdoor sensors AF1/2	0	CO1 (2) -> F02 - 1
Optimization	0	CO1, 2 -> F07 - 1
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C

5.8 Flash adaptation

To ensure that the controller reacts immediately to room temperature deviations during rated or reduced operation, the function block setting CO1, 2 -> F09 - 1 needs to be made. The heating is then always switched off as soon as the room temperature exceeds the *Day set point* or *Night set point* by 2 °C.

Heating first starts again when the room has cooled off and the room temperature is 1 °C above the *Set point*. The flow temperature set point is corrected if the *Cycle time* and *Gain K_p* are set to a value other than 0. The *Cycle time* determines the intervals at which the flow temperature set point is corrected by 1 °C. A *Gain K_p* set to a value other than 0 causes a direct increase/decrease in flow temperature set point when a sudden deviation in room temperature arises. A *Gain K_p* setting of 10.0 is recommended.

Note: *Cooling loads, such as drafts or open windows, affect the control process! Rooms may be temporarily overheated after the cooling load has been eliminated!*

Functions	WE	Configuration
Room sensors RF1/2	0	CO1, 2 -> F01 - 1
Flash adaptation	0	CO1, 2 -> F09 - 1
	20 min 0	Cycle time / 1 to 100 min K _p (gain) / 0 to 25
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C

5.8.1 Flash adaptation without outdoor sensor (room temperature dependent)

The flow temperature control starts with *Flow day set point* in rated operation or with *Flow night set point* in reduced operation as no set points calculated using characteristics exist without an outdoor sensor. The *Cycle time* determines the intervals at which the flow temperature set point is corrected by 1 °C. The heating is then always switched off as soon as the room temperature exceeds the *Day set point* or *Night set point* by 2 °C. Heating first starts again when the room has cooled off and the room temperature is 1 °C above the *Set point*. A *Gain K_p* set to a value other than 0 causes a direct increase/decrease in flow temperature set point when a sudden deviation in room temperature arises. A *Gain K_p* setting of 10.0 is recommended.

Functions of the heating circuit

Functions	WE	Configuration
Room sensors RF1/2	0	CO1, 2 -> F01 - 1
Outdoor sensor AF1/2	1	CO1, 2 -> F02 - 0
Flash adaptation	0	CO1, 2 -> F09 - 1
	20 min	Cycle time / 1 to 100 min
	0	K _p (gain) / 0 to 25
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle, bottom / 0 to 40 °C
Night set point	15 °C	Top, middle, bottom / 0 to 40 °C

Parameters	WE	Parameter level / Range of values
Flow day set point	50 °C	PA1, 2 / 5 to 130 °C
Flow night set point	30 °C	PA1, 2 / 5 to 130 °C

5.9 Adaptation

The controller is capable of automatically adapting the heating characteristic to the building characteristics, provided a gradient characteristic has been set (CO1, 2 -> F11 - 0). The reference room, where the room sensor is located, represents the entire building and is monitored to ensure that the room set point (*Day set point*) is maintained. When the mean measured room temperature in rated operation deviates from the adjusted set point, the heating characteristic is modified accordingly for the following time-of-use. The corrected value is displayed in parameter levels PA1, 2 under *Gradient, flow*.

Functions	WE	Configuration
Room sensors RF1/2	0	CO1, 2 -> F01 - 1
Outdoor sensors AF1/2	1	CO1 (2) -> F02 - 1
Adaptation	0	CO1, 2 -> F08 - 1
Four-point characteristic	0	CO1, 2 -> F11 - 0
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C

Note: If the **Flash adaptation** function is already configured with a small cycle time, the **Adaptation** function should not be configured as well.

5.10 Pump management

The **Pump management** function can be used for a heating circuit circulation pump. Usually, this is the circulation pump UP1. If the control circuit Rk1 is a pre-control circuit, the **Pump management** function is used for circulation pump UP2 (-> system schematics from page 34 onwards). The speed-controlled pump is, however, needs to be connected in any case to the binary outputs BA12 and BA13 (semiconductor relay, max. 24 V, 50 mA).

- ▶ BA12 switches the pump on/off (in parallel with binary output BA1 on the network side)
- ▶ BA13 releases the speed control in rated operation or sets the pump to minimum speed operation during reduced operation

Functions	WE	Configuration
Pump management – switching states of BA13 *	0	CO5 -> F17 - 1: Speed control released with BA13 = ON CO5 -> F17 - 0: Speed control released with BA13 = OFF
Fault indication output BA13	0	CO5 -> F07 - 0
BA12 ON during thermal disinfection	0	CO4 -> F17 - 0
BA12 ON during DHW demand		CO4 -> F18 - 0

* CO5-> F17 - 0 or -1 only influences the switching state of binary output BA13!

5.11 Cooling control

Cooling control with outdoor sensor

When the cooling control function is activated in a control circuit, the four-point characteristic of the corresponding control circuit is automatically activated and the operating direction of the control output is reversed. In PA1 and/or PA2 the four points for the course of the set point based on the outdoor temperatures can be adjusted separately for day and night mode. The *Base point for return flow temperature* that can be adjusted with an active return flow sensor determines the point at which a minimum limitation of the return flow temperature starts: If the measured return flow temperature falls below this value, the flow temperature set point is raised. The four return flow temperature values in the four-point characteristic function have no effect.

Functions of the heating circuit

Functions	WE	Configuration	
Cooling control	0	CO1, 2 -> F04 - 1	
Four-point characteristic	0	CO1, 2 -> F11 - 1	
Parameters	WE	Parameter level / Range of values	
Outdoor temperature	Point 1	-15 °C	PA1, 2 / -40 to 50 °C
	Point 2	-5 °C	
	Point 3	5 °C	
	Point 4	15 °C	
Flow temperature	Point 1	70 °C	PA1, 2 / 5 to 130 °C
	Point 2	55 °C	
	Point 3	40 °C	
	Point 4	25 °C	
Reduced flow temperature	Point 1	60 °C	PA1, 2 / 5 to 130 °C
	Point 2	40 °C	
	Point 3	20 °C	
	Point 4	20 °C	
Base point of return flow temperature	65 °C	PA1, 2 / 5 to 90 °C	

Note: The limiting factors of the **Return flow sensor RÜF1/RÜF2** (CO1, 2 -> F03) functions apply during cooling control as well.

Cooling control without outdoor sensor

When the cooling control function is activated in a control circuit without outdoor sensor, only the adjustment limits for the day and night set points at the rotary switch as well as the *Base point for return flow temperature* can be adjusted in PA1 and/or PA2.

Functions	WE	Configuration
Outdoor sensor	0	CO1 -> F04 - 1
Cooling control	0	CO1, 2 -> F04 - 1
Parameters	WE	Rotary switch / Range of values
Day set point	20 °C	Top, middle / 0 to 40 °C
Night set point	15 °C	Top, middle / 0 to 40 °C
Parameters	WE	Parameter level / Range of values
Min. flow temperature	20 °C	PA1, 2 / 5 to 130 °C

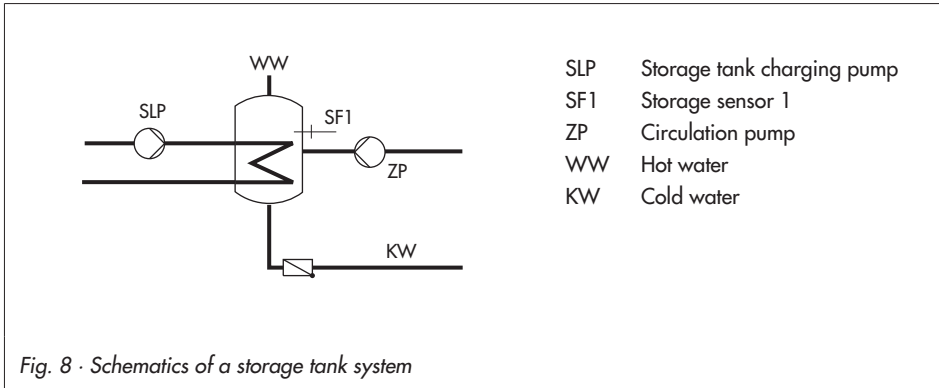
Parameters	WE	Parameter level / Range of values
Max. flow temperature	90 °C	PA1, 2 / 5 to 130 °C
Base point of return flow temperature	65 °C	PA1, 2 / 5 to 90 °C

Note: The limiting factors of the **Return flow sensor RÜF1/RÜF2** (CO1, 2 -> F03) functions apply during cooling control as well.

6 Functions of the DHW circuit

6.1 DHW heating in the storage tank system

Start storage tank charging



The controller begins charging the storage tank when the water temperature measured at sensor SF1 falls below the *DHW temperature set point* by 0.1 °C. If the flow temperature in the system exceeds the desired charging temperature, the controller tries to reduce the flow temperature in the heating circuit for up to 3 minutes before the storage tank charging pump is activated. When there is no heating operation or when the flow temperature in the system is lower, the storage tank charging pump is switched on immediately.

If the function CO4 -> F15 - 1 (**SLP ON depending on return flow temperature**) is activated, the primary valve is opened without simultaneously operating the storage tank charging pump. The storage tank charging pump is not switched on before the primary return flow temperature has reached the temperature currently measured at storage sensor SF1.

This function enables storage tank charging when the heating system is switched off, e.g. in summer mode, without cooling down the storage tank first by filling it with cold flow water. The storage tank charging pump does not start operation before a sufficiently high temperature has been reached at the heat exchanger.

Note: Instead of the DHW temperature parameter, the Charging temperature can be adjusted as the absolute value at the rotary switch if a storage tank thermostat is used.

Time-controlled switchover of storage tank sensors

By configuring a second storage tank sensor SF2 over the function block CO4 -> F19 -1, it is possible to determine that the storage tank sensor SF1 is used for day mode in the DHW circuit and that the storage tank sensor SF2 is used for night mode. As a result, different storage tank volumes can be kept at a constant temperature according to a time schedule, and also at different temperatures if the *DHW set point* and *Sustained DHW temperature* differ from one another.

Stop storage tank charging

The controller stops charging the storage tank when the water temperature measured at sensor SF1 has reached the temperature $T = \text{DHW temperature} + \text{hysteresis}$. When there is no heating operation or when the flow temperature demand in the system is lower, the corresponding valve is closed.

The storage tank charging pump is switched off after $t = \text{lag time of storage tank charging pump} \times \text{valve transit time}$.

With the default settings, the temperature in the storage tank is increased by 5 °C to reach 60 °C when the storage tank temperature falls below 55 °C. The charging temperature is calculated from the DHW temperature (55 °C) plus the charging temperature boost (10 °C), which equals 65 °C. When the storage tank has been charged, the heating valve is closed and the charging pump continues operation for the time t (lag). Outside the times-of-use, the storage tank is only charged when the temperature falls below 40 °C (*Sustained DHW temperature*). In this case, the tank is charged with a charging temperature of 50 °C until 45 °C are reached in the tank.

Functions	WE	Configuration
Storage sensor SF1	1	CO4 -> F01 - 1
Storage sensor SF2		CO4 -> F02 (- 1 when CO4 -> F19 - 1)
SLP ON depending on return flow temperature	0	CO4 -> F15
Time-controlled switchover of storage sensors	0	CO4 -> F19 (-1 only when CO4 -> F02 - 1)
Parameter	WE	Rotary switch / Range of values
DHW temperature set point or charging temperature set point with CO4 -> F01 - 0	55 °C	Bottom / Min. to max. DHW temperature
Parameters	WE	Parameter level / Range of values
Min. DHW temperature*	40 °C	PA4 / 5 to 90 °C
Max. DHW temperature*	60 °C	PA4 / 5 to 90 °C
Hysteresis**	5 °C	PA4 / 0 to 30 °C

Functions of the DHW circuit

Parameters	WE	Parameter level / Range of values
Charging temperature boost***	10 °C	PA4 / 0 to 50 °C
Lag of storage tank charging pump	0.5	PA4 / 0 to 10.0
Sustained DHW temperature	40 °C	PA4 / 5 to 90 °C

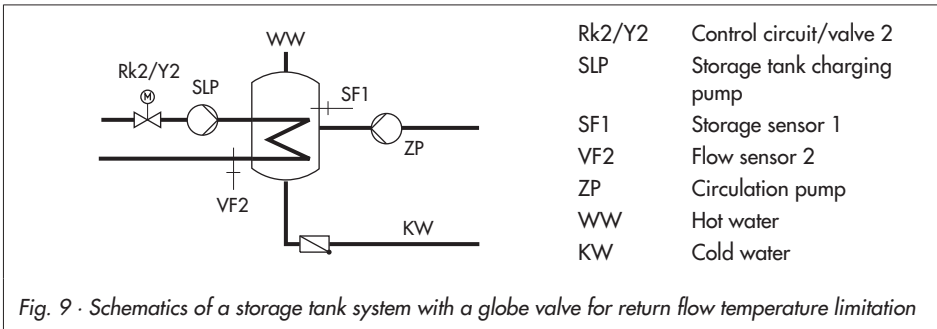
* Parameters serve as limitation of the adjustment range for the DHW temperature to be set at the rotary switch

** Deactivation value $T = \text{DHW temperature} + \text{hysteresis}$

*** Charging temperature $T = \text{DHW temperature} + \text{charging temperature boost}$

6.1.1 DHW circuit additionally controlled by a globe valve

In systems An1 7.1, 8.1 and 11.1, the following version with globe valve can be configured instead of the three-way valve control in the DHW circuit:



Globe valve and temperature sensor VF2 are used exclusively for return flow temperature limitation in the schematics shown above. The pre-control circuit provides at least the same flow temperature as in the standard schematic version which is calculated from *DHW temperature set point + Charging temperature boost + Boost set point of primary exchanger control*.

The functions and parameters of the DHW heating in the storage tank system are upgraded by the following settings:

Function	WE	Configuration
DHW circuit additionally controlled by a globe valve	0	CO4 -> F20 - 1

Parameter	WE	Parameter level / Range of values
Maximum return flow temperature	65 °C	PA4 / 20 to 90 °C

6.2 DHW heating in the storage tank charging system

Start storage tank charging

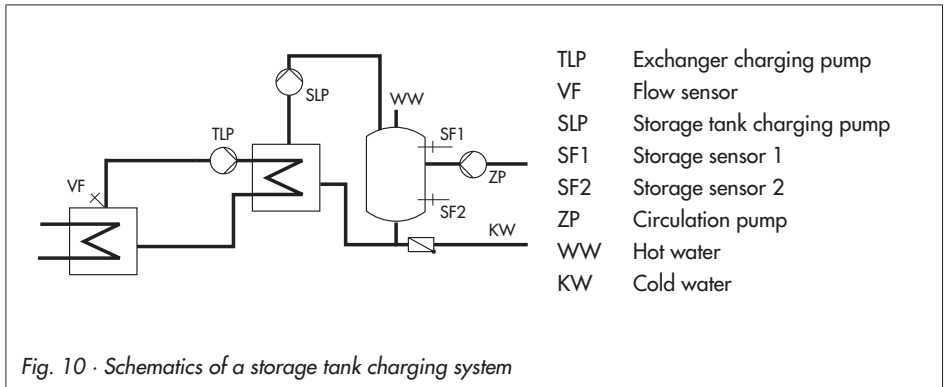


Fig. 10 · Schematics of a storage tank charging system

The controller begins charging the storage tank when the water temperature measured at sensor SF1 falls below the *DHW temperature set point* by 0.1 °C. If the flow temperature in the system exceeds the desired charging temperature, the controller tries to reduce the flow temperature in the heating circuit for up to three minutes before the exchanger charging pump is activated together with the storage tank charging pump.

When there is no heating operation or when the flow temperature in the system is lower, the exchanger charging pump is switched on immediately. If the temperature currently measured at sensor SF1 is reached at sensor VF, or after approximately three minutes at the latest, the storage tank charging pump is switched on.

If a storage tank thermostat is used, the storage tank charging pump is switched on when the temperature $T = \text{Charging temperature} - 5\text{ °C}$ is reached at sensor VF.

Note: *Instead of the DHW temperature parameter, the Charging temperature can be adjusted as the absolute value at the rotary switch if a storage tank thermostat is used.*

When the flow sensor VF4 is activated, the set point in the heat exchanger circuit is influenced by the system deviation in the storage tank charging circuit upon activation of the storage tank charging pump: if the temperature measured at flow sensor VF4 is lower than the desired charging temperature, the set point in the heat exchanger circuit is increased in steps of 1 °C.

When the set point in the heat exchanger charging circuit reaches the *Max. charging temperature*, the set point is no longer increased. An "Err 4" error message is generated.

Note: The set point in the heat exchanger circuit which is valid at the end of the charging cycle will be used again at the beginning of the next cycle.

If times-of-use have been programmed for DHW heating, the *DHW temperature set point* adjusted at the rotary switch is applied during these times-of-use. Outside the times-of-use, the *Sustained DHW temperature* is used. This does not apply when a storage tank thermostat is used.

Time-controlled switchover of storage tank sensors

By configuring a second storage tank sensor SF2 over the function block CO4 -> F19 - 1, it is possible to determine that the storage tank sensor SF1 is used for day mode in the DHW circuit and that the storage tank sensor SF2 is used for night mode. As a result, different storage tank volumes can be kept at a constant temperature according to a time schedule, and also at different temperatures if the *DHW set point* and *Sustained DHW temperature* differ from one another.

Stop storage tank charging

The controller stops charging the storage tank when the water temperature measured at sensor SF2 has reached the temperature $T = \text{DHW temperature} + \text{hysteresis}$. To do so, the heat exchanger charging pump is switched off first.

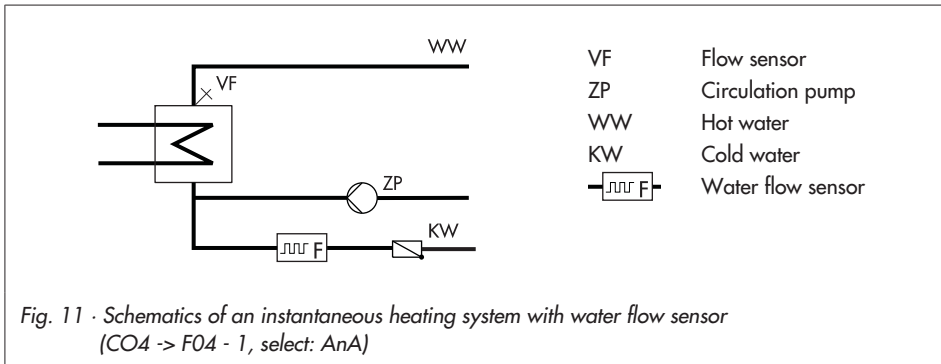
When there is no heating operation or when the flow temperature demand in the system is lower, the corresponding valve is closed. The storage tank charging pump is switched off after $t = \text{Lag time of storage tank charging pump} \times \text{valve transit time}$.

Functions	WE	Configuration
Storage tank sensor SF1	1	CO4 -> F01 - 1
Storage tank sensor SF2	1	CO4 -> F02 - 1
Flow sensor VF4	0	CO4 -> F05
Time-controlled switchover of storage sensors	0	CO4 -> F19
Parameter	WE	Rotary switch / Range of values
DHW temperature set point or charging temperature set point with CO4 -> F01 - 0	55 °C	Bottom /Min. to max. DHW temperature
Parameters	WE	Parameter level / Range of values
Min. DHW temperature*	40 °C	PA4 / 5 to 90 °C
Max. DHW temperature*	60 °C	PA4 / 5 to 90 °C

Parameters	WE	Parameter level / Range of values
Hysteresis**	5 °C	PA4 / 0 to 30 °C
Charging temperature boost***	10 °C	PA4 / 0 to 50 °C
Max. charging temperature	80 °C	PA4 / 20 to 130 °C (only with VF4)
Lag of storage tank charging pump	0.5	PA4 / 0 to 10.0
Sustained DHW temperature	40 °C	PA4 / 5 to 90 °C

- * Parameters serve as limitation of the adjustment range for the DHW temperature to be set at the rotary switch
- ** Deactivation value $T = \text{DHW temperature} + \text{hysteresis}$
- *** Charging temperature $T = \text{DHW temperature} + \text{charging temperature boost}$

6.3 DHW heating in instantaneous heating system



Without a water flow sensor or flow switch, the required *DHW temperature* at sensor VF is only regulated during the times-of-use of the circulation pump ZP. The water flow sensor or flow switch allow the controller to recognize exactly when DHW is being tapped. By deleting all the time-of-uses for the circulation pump, it is possible to regulate the required DHW temperature just while the DHW is being tapping.

When the flow sensor VF4 is activated, the temperature control is shifted to upstream of the heat exchanger: If the required *DHW temperature*, measured at flow sensor VF4, is too low at the heat exchanger outlet, the *Flow temperature set point* upstream of the heat exchanger is raised in steps of 1 °C. The temperature is not raised anymore when the set point reaches the *Maximum charging temperature*, an "Err 4" error message is issued.

Note: The Flow temperature set point upstream of the heat exchanger valid after hot water tapping is finished is used as a reference the next time hot water is tapped. Outside the time-of-use of DHW heating, the hot water is regulated to the Sustained DHW temperature.

Functions	WE	Configuration
Water flow sensor	0	CO4 -> F04 - 1
	AnA	AnA (water flow sensor), bin (flow switch)
Flow sensor V4	0	CO4 -> F05 - 1
Parameter	WE	Rotary switch / Range of values
DHW temperature set point	55 °C	Bottom /Min. to max. DHW temperature
Parameters	WE	Parameter level / Range of values
Sustained DHW temperature	40 °C	PA4 / 5 to 90 °C
Min. DHW temperature	40 °C	PA4 / 5 to 90 °C
Max. DHW temperature	60 °C	PA4 / 5 to 90 °C
Maximum charging temperature	80 °C	PA4 / 20 to 130 °C (only with VF4)

6.4 DHW heating with solar system/buffer tank system

The systems AnI 1.3, 1.4, 1.7, 1.8, 2.3, 2.4, 3.3, 3.4, 4.3, 10.3, 11.3 and 11.4 include a solar system for DHW heating. In these systems, the difference between the temperatures measured at storage sensor SF3 and the sensor at the solar collector VF3 is determined. The *Solar pump ON* parameter determines the minimum temperature difference between sensors VF3 and SF3 required to activate the solar pump. If the temperature difference falls below the value of *Solar pump OFF*, the solar pump is switched off. Basically, the solar pump is also switched off when the water temperature measured at sensor SF3 has reached the *Max. storage tank temperature*.

Note: The times-of-use of the DHW circuit do not affect the operation of the solar system.

After the key number 1999 has been entered, the operating hours of the solar pump are displayed in extended operating level.

Buffer tank system

The systems Anl 14.1 to 14.3 are both fitted with a buffer tank and a DHW storage tank. The buffer tank can be charged by the district heating system according to an adjustable heating characteristic or according to an adjustable fixed value. If a demand for charging the DHW storage tank exists, the controller first checks whether the heat available in the buffer tank is sufficient to charge the DHW storage tank. If the temperature in the buffer tank is insufficient, the DHW storage tank is charged by the district heating circuit. The charging of the DHW storage tank has priority over a demand for charging the buffer tank. The buffer tank is first charged by the district heating circuit after the DHW storage tank charging has finished. The circulation pump UP2 of the solid fuel boiler in the systems Anl 14.1 and 14.2 is switched on when the limit temperature *Boiler pump ON* is exceeded. If the temperature measured at VF2 falls below the temperature measured at SF3 plus the adjustable *Hysteresis*, the circulation pump UP2 is switched off again.

In system Anl 14.3, a solar circuit with reroutable heat exchanger flow is integrated. If the temperature difference between solar collector sensor RUF2 and one of the storage tank sensors SF3 or SF4 is greater than the *Solar circuit pump ON* parameter, the solar circuit pump UP2 is switched on and the corresponding storage tank is charged. In the event that both storage tanks could be charged, the DHW storage tank charging is given priority. If the temperature difference falls below the *Solar circuit pump OFF* parameter in both storage tank circuits, the solar circuit pump UP2 is switched off. In addition to this, the solar circuit pump is usually switched off when the measured data of both storage tank sensors SF3 and SF4 have reached *Maximum storage tank temperature* or *Maximum buffer tank temperature*.

Parameters	WE	Parameter level / Range of values
Solar pump ON	10 °C	PA4 / 1 to 30 °C
Solar pump OFF	3 °C	PA4 / 0 to 30 °C
Max. storage tank temperature	80 °C	PA4 / 20 to 90 °C
Maximum buffer tank temperature	80 °C	PA4 / 20 to 90 °C
Boiler pump ON	60 °C	PA5 / 20 to 90 °C
Hysteresis	5 °C	PA5 / 0 to 30 °C

6.5 Intermediate heating operation

This function is only available in systems Anl 2.x, 4.1 to 4.5 and 8.x. With the setting CO4 -> F07 - 1, heating operation of the UP1 heating circuit is reactivated for a period of 10 minutes after 20 minutes of priority (heating deactivated during DHW heating). By setting CO4 -> F07 - 0, storage tank charging is given unlimited priority over the heating operation in the UP1 heating circuit.

Function	WE	Configuration
Intermediate heating	1	CO4 -> F07 - 1

6.6 Parallel pump operation

This function is only available in systems Anl 2.1 to 2.4, 4.1 to 4.5 and 8.x. With the setting CO4 -> F06 - 1, the circulation pump UP1 remains switched on during DHW heating unless certain operating situations occur. These situations include, for example, those when the current flow temperature demand of the pump circuit is lower than the adjusted *Flow limit temperature for parallel pump operation*. In this case, the controller applies priority operation, if necessary with intermediate heating. Once a parallel pump operation cycle has been activated and the time for *Stop parallel operation in case of deviation* has elapsed, system deviations greater than 5 °C cause the controller to suspend parallel operation for 10 minutes and to apply priority operation. By setting *Stop parallel operation in case of deviation* to 0 min. leads to a parallel operation once initiated remaining regardless of a deviation.

Function	WE	Configuration
Parallel pump operation	0	CO4 -> F06 - 1
	10 min	Stop parallel operation in case of deviation / 0 to 10 min
	40 °C	Flow limit temperature for parallel pump operation / 20 to 90 °C

6.7 Speed control of the charging pump

An active speed control of the charging pump (CO4 > F21 - 1) causes the storage tank sensor SF2 to be activated as well. In combination with CO4 > F02 - 0, however, this sensor is only used for measurement for the speed control.

When the storage tank charging pump SLP is switched on, the speed control of the pump is activated: If the temperature at the storage tank sensor SF2 is low at the beginning, a 10 V signal is issued at Y1. If the temperature at SF2 reaches the value entered in *Start speed reduction*, the signal level at Y1 is reduced within the range between the limits entered in *Start speed reduction* and *Stop speed reduction* (10 V to *Min. speed signal* corresponds with *Start speed reduction* to *Stop speed reduction*). Y1 is set to 0 V when the storage tank charging pump is switched off.

Function	WE	Configuration
Speed reduction of the charging pump based on charging progress	0 40 °C 50 °C 2 V	CO4 -> F21 - 1 Start speed reduction: 5 to 90 °C Stop speed reduction: 5 to 90 °C Min. speed signal: 0 to 10 V

6.8 Circulation pump operation during storage tank charging

With the setting CO4 -> F11 - 1, the circulation pump continues operation according to the programmed time schedule even during storage tank charging.

With the setting CO4 -> F11 - 0, the circulation pump is switched off as soon as the storage tank charging pump is activated. The circulation pump returns to operate according to time schedule when the storage tank charging pump has been switched off again.

Function	WE	Configuration
Circulation pump operation during storage tank charging	0	CO4 -> F11

6.9 Priority operation

In many district heating systems with primary DHW heating, the allotted amount of water does not cover the DHW heating and the heating system at the same time. As a result, the capacity required for DHW heating needs to be taken from the heating system when great heating loads occur; and this, until DHW heating has been concluded.

Nevertheless, heating operation is not simply to be interrupted. Only the amount of energy required for DHW heating is to be deducted. This can be achieved by using the priority functions **Reverse control** and **Set-back operation**.

In system Anl 4.5, the priority functions **Reverse control** and **Set-back operation** can be activated for either one heating circuit or for both heating circuits:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ■	Rk1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ■	Rk2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ■ ■	Rk1+Rk2

6.9.1 Reverse control

In all systems with DHW heating and at least one heating circuit with control valve, DHW heating can be given priority by applying reverse control. With the setting CO4 -> F08 - 1, the temperature at the sensor VFx in the DHW circuit can be monitored.

In systems without the sensor VFx in the DHW circuit (e.g. Anl 4.5, Anl 11.0), the tempera-

ture directly at the storage sensor SF1 is monitored. If system deviations occur after the time for *Activate priority in case of deviation* has elapsed, the set point of the heating circuit with the control valve (the set point of heating circuit Rk2 in systems Anl 10.1 to 10.3) is gradually reduced each minute until the flow temperature set point has reached 5 °C at the minimum. How strongly the controller responds is determined by the *Correction factor*.

When *Activate priority in case of deviation* is set to 0, the priority operation is started regardless of the time and temperature in the system. The control valves of all heating circuits are closed.

Functions	WE	Configuration
Priority through reverse control	0	CO4 -> F08 - 1
	2 min	Activate priority in case of deviation / 0 to 10 min
	1.0	Correction factor / 0.1 to 10.0
Priority through set-back operation	0	CO4 -> F09 - 0

6.9.2 Set-back operation

In all systems with DHW heating and at least one heating circuit with control valve, DHW heating can be given priority by applying set-back operation. With the setting CO4 -> F08 - 1, the temperature at the sensor VFx in the DHW circuit can be monitored.

In systems without the sensor VFx in the DHW circuit (e.g. Anl 4.5, Anl 11.0), the temperature directly at the storage sensor SF1 is monitored. If system deviations occur after the time for *Activate priority in case of deviation* has elapsed, set-back or reduced operation is activated for the heating circuit with the control valve (for heating circuit Rk2 in systems Anl 10.1 to 10.3).

When *Activate priority in case of deviation* is set to 0, the priority operation is started in all heating circuits, regardless of the time and temperature in the system.

Functions	WE	Configuration
Priority through reverse control		CO4 -> F08 - 0
Priority through set-back operation	0	CO4 -> F09 - 1
	2 min	Activate priority in case of deviation / 0 to 10 min

6.10 Forced charging of the DHW storage tank

To provide the full room heating performance when the time-of-use of the heating circuits begins, existing storage tanks are charged one hour before the time-of-use of the heating circuits starts.

For the individual controller, this means that storage tank charging is activated when the water temperature in the storage tank falls below the adjusted deactivation value of $T = \text{DHW temperature} + \text{hysteresis}$. The forced charging of the storage tank does not take place when the DHW circuit is not activated at the beginning of the time-of-use set for the heating circuit(s).

Note: This function is not available when a storage tank thermostat is used.

6.11 Thermal disinfection

In all systems with DHW heating, the DHW storage tank is thermally disinfected on a selected *Day of the week* or every day.

- ▶ In systems with DHW storage tank, it is heated up, taking into account the *Charging temperature boost* parameter (or *Set point boost*, depending on the system) to the adjusted *Disinfection temperature*. Disinfection begins at the adjusted *Start time* and, at the latest, ends at the specified *Stop time*. The storage tank is heated up to the adjusted *Disinfection temperature*, taking into account the *Charging temperature boost* parameter. Disinfection begins at the adjusted *Start time* and, at the latest, ends at the specified *Stop time*.
- ▶ In systems with DHW heating in instantaneous heating system, the function remains active taking into account the *Set point boost* parameter until the circulation pipe, measured at SF1, has reached the adjusted *Disinfection temperature*, provided disinfection has not been terminated because the *Stop time* has been reached.

The *Hold time of disinfection temperature* determines how long the disinfection temperature must be maintained within the adjusted time period to rate the process successful. If the *Hold time of disinfection temperature* is set to a value other than 0, no intermediate heating operation takes place during thermal disinfection.

If the *Start time* and *Stop time* are set to the identical time, disinfection is controlled depending on the switching state of the binary input BE17 to be performed daily or on the programmed day of the week. Disinfection starts when BE17 = ON, or optionally BE17 = OFF. It stops at the latest when the switching state of the binary input next changes.

When the *Disinfection temperature* has not been reached before the end of the thermal disinfection cycle, an "Err 3" error message is generated. This error message can also be generated prematurely if the remaining time until the disinfection temperature is reached is shorter than the adjusted *Hold time of disinfection temperature*. The error message is automatically reset when the *Disinfection temperature* is properly reached during the following thermal disinfection cycle.

Thermal disinfection for preventing legionella infection causes:

- ▶ excessively high return flow temperatures during the disinfection cycle (return flow temperature limitation suspended),
- ▶ excessively high storage temperatures after thermal disinfection has been concluded,
- ▶ lime scale (possibly), which can have a negative effect on heat exchanger performance.

Note: This function is not available when a storage tank thermostat is used.

Controllers that are linked over a device bus are subjected to return flow temperature limitation in the primary control circuit even during the thermal disinfection in a secondary controller.

Functions	WE	Configuration
Storage sensor SF1	1	CO4 -> F01 - 1
Thermal disinfection	0	CO4 -> F14 - 1
	3	Day of the week / 1-7, 1, 2, ..., 7 with 1-7 = every day, 1 = Monday, ..., 7 = Sunday
	0:00h	Start time / 0:00h to 23:45h; in steps of 15 minutes
	4:00h	Stop time / 0:00h to 23:45h; in steps of 15 minutes
	70 °C	Disinfection temperature / 60 to 90 °C
	10 °C	Set point boost / 0 to 50 °C
	0 °C	Hold time of disinfection temperature / 0 to 255 °C
	1	bE = 1, 0 (start of disinfection with BE17 = ON, OFF; only applies when Start time = Stop time)

7 System-wide functions

7.1 Automatic summer time/winter time changeover

The clock is automatically adjusted on the last Sunday in March at 2.00h and on the last Sunday in October at 3.00h.

Function	WE	Configuration
Summer time/winter time changeover	1	CO5 -> F08 - 1

7.2 Frost protection

Frost protection measures are taken when the outdoor temperature falls below the *Frost protection limit*. The switching differential to cancel the frost protection measures is always 1 °C.

- ▶ Frost protection program I (restricted frost protection): frost protection measures are taken only when all heating circuits in the system are in stand-by mode. The circulation pumps are switched on automatically and their flow temperature set points are adjusted to 10 °C. The circulation pump in the DHW circuit is only switched on automatically when the stand-by mode has been selected at the rotary switch in all heating circuits. Nevertheless, the storage tank is always recharged to 10 °C if the storage tank temperature falls below 5 °C.
- ▶ Frost protection program II: the heating circuit circulation pumps are always switched on automatically. The flow temperature set points of all heating circuits currently in stand-by mode are set to +10 °C. In the DHW circuit, the circulation pump is always activated. If the storage tank temperature falls below +5 °C, the storage tank is recharged to +10 °C.

Functions	WE	Configuration
Frost protection program I		CO5 -> F09 - 0
	3 °C	Frost protection limit / -15 to 3 °C
Frost protection program II		CO5 -> F09 - 1
	3 °C	Frost protection limit / -15 to 3 °C

Note: Frost protection operation of a pump, a heating circuit or the DHW circuit is only active when the frost protection icon ❄ is indicated on the display.

Fixed set point control without outdoor temperature sensor does not include frost protection monitoring in stand-by mode.

7.3 Forced operation of the pumps

When the heating circuit pumps have not been activated for 24 hours, forced operation of the pumps is started between 12.02h and 12.03h. This is done to avoid that the pumps get stuck when they are not operated for a longer period of time. In the DHW circuit, the circulation pump is operated between 12.04h and 12.05h, the other pumps between 12.05h and 12.06h.

7.4 Return flow temperature limitation

The temperature difference between the flow and return flow indicates how well the energy is used: the greater the difference, the higher the efficiency. A return flow sensor is sufficient to evaluate the temperature difference when the flow temperatures are preset. The return flow temperature can be limited either to a value depending on the outdoor temperature (variable) or to a fixed set point. When the temperature measured at return flow sensor RüF exceeds the limit value, the set point of the flow temperature (flow temperature of the heating system, charging temperature) is reduced. As a result, the primary flow rate is reduced and the return flow temperature falls.

In systems Anl 2.x, 3.1-3.4, 4.1-4.3, 7.x and 8.x, the *Max. return flow temperature* parameter (PA4 level) is used for limitation in the primary circuit during DHW heating if it is greater than the parameter valid for the primary circuit. In systems Anl 7.x and 8.x with additional return flow sensor RüF2, a *Max. return flow temperature* parameter that is set to a lower limit (PA4 level) only leads to a limitation in the DHW circuit at first; the return flow temperature limitation in the primary circuit only starts when the higher return flow temperature limit valid for that circuit is exceeded. The *Limiting factor* determines how strongly the controller responds when the limit values are exceeded in either direction (PI algorithm).

If just proportional component is to be implemented, set CO5 -> F16 - 1. This allows the integral-action component in the return flow temperature limitation algorithm of all control circuits of the controller to be deactivated.

The set point reading (flow temperature of the heating, charging temperature) blinks to indicate that a return flow limitation is active in the control circuit concerned.

Note: Using weather-compensated control with gradient characteristic, the return flow temperature is limited to a fixed value by equating the Return flow temperature foot and Max. return flow temperature parameters (PA1, 2).

Note: If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Return flow sensors RüF1/2	1	CO1, 2, 4 -> F03 - 1
	1.0	Limiting factor / 0.1 to 10.0
Return flow temperature limitation with P algorithm	0	CO5 -> F16
Parameters	WE	Parameter level / Range of values
Gradient, return flow	1.2	PA1, 2 / 0.2 to 3.2
Level, return flow	0.0 °C	PA1, 2 / -30 to 30 °C
Return flow temperature foot	65 °C	PA1, 2 / 5 to 90 °C
Max. return flow temperature	65 °C	PA1, 2, 4 / 5 to 90 °C
Max. return flow temperature	65 °C	PA4 / 20 to 90 °C
or		
Return flow temp. points 1 to 4	65 °C	PA1, 2 / 5 to 90 °C

Note: To ensure that the preset return flow temperature limit can be met, make sure that

- the heating characteristic is not adjusted to ascend too steeply,
- the speed of the circulation pumps is not set too high,
- the heating systems have been calibrated.

7.5 Condensate accumulation control

Activate the **Limit deviation for OPEN signal** function to start up condensate accumulation plants, in particular to avoid problematic excess temperatures. The controller response to set point deviations which cause the primary valve to open is attenuated. The controller response to set point deviations which cause the control valve to close remains unaffected.

Functions	WE	Configuration
Limit deviation for OPEN signal	0	CO1, 2, 4 -> F13 - 1
	2 °C	Max. deviation / 2 to 10 °C

Note: The condensate accumulation control function can only be activated when no on/off control has been configured, i.e. when CO1, 2, 4 -> F12 - 1 applies.

7.6 Three-step control

The flow temperature can be controlled using a PI algorithm. The valve reacts to pulses that the controller sends when a system deviation occurs. The length of the first pulse, in particular, depends on the extent of the system deviation and the selected *Proportional gain* K_p (the pulse length increases as K_p increases). The pulse and pause lengths change continuously until the system deviation has been eliminated. The pause length between the single pulses is greatly influenced by the *Reset time* T_N (the pause length increases as T_N increases). The *Transit time* T_Y specifies the time required by the valve to travel through the range of 0 to 100 %.

Functions	WE	Configuration
Control mode three-step/0 to 10 V	1	CO1, 2, 4 -> F12 - 1, Rk_
	2.0	K_p (proportional gain) / 0.1 to 50.0
	120 sec	T_N (reset time) / 1 to 999 sec
	45 sec	T_Y (valve transit time) / 5, 10, 15, ..., 240 sec

7.7 On/off control

The flow temperature can be controlled, for example, by activating and deactivating a boiler. The controller switches on the boiler when the flow temperature falls below the set point by $T = 0.5 \times \text{hysteresis}$. When the set point is exceeded by $T = 0.5 \times \text{hysteresis}$, the boiler is switched off again. The greater the value you choose for *Hysteresis*, the lower the activation/deactivation frequency will be. By setting the *Minimum ON time*, an activated boiler remains switched on during this period regardless of the flow temperature fluctuations. Similarly, a deactivated boiler will remain switched off regardless of the flow temperature fluctuations if the *Min. OFF time* has been specified.

Functions	WE	Configuration
Control mode three-step/0 to 10 V	1	CO1, 2, 4 -> F12 - 0
	5 °C	Hysteresis / 1 to 30 °C
	2 min	Min. ON time / 0 to 10 min
	2 min	Min. OFF time / 0 to 10 min

7.8 Continuous control

The flow temperature can be controlled using a PID algorithm. The valve receives an analog 0 to 10 V signal. When a system deviation occurs, the proportional component immediately causes the 0 to 10 V signal to change (the greater K_p , the greater the change). The integral component becomes effective with time: T_N represents the time which elapses until the integral component has changed the output signal to the same extent as the immediate

change performed by the proportional component (the greater T_N , the slower the rate of change). Due to the derivative component, any change of the system deviation is incorporated into the output signal with a certain gain (the greater T_V , the stronger the change).

Functions	WE	Configuration
Control mode three-step/0 to 10 V	1	CO1, 2, 4 -> F12 - 1, Y ₋
	2.0	K_p (proportional gain) / 0.1 to 50.0
	120 sec	T_N (reset time) / 1 to 999 sec
	0 sec	T_V (derivative-action time) / 0 to 999 sec
	45 sec	T_Y (valve transit time) / 5, 10, 15, ..., 240 sec

7.9 Releasing a control circuit/controller over the binary input

The release of an individual control circuit or the controller using the binary input only becomes effective when the respective control circuit is in automatic mode (icon \ominus). The released control circuit always works in automatic mode; the deactivated control circuit behaves as if it were transferred to stand-by mode. It remains active, however, in any case for processing an external demand. The control circuit can be released over the binary input when the binary input is either open ($bE = 0$) or closed ($bE = 1$).

Note: In systems with supplementary heating circuit without a valve (Anl 2.x, 4.x), BE15 only influences the operation of this heating circuit when the **release Rk1** function is configured, while the operation of the entire controller (except for processing an external demand) is affected when the **release controller** function is configured. In systems which only have supplementary heating circuits with or without DHW heating (Anl 3.x), BE15 influences the operation of the entire controller (except for processing an external demand).

Functions	WE	Configuration
Release Rk1 at BE15	0	CO1 -> F14 - 1
	1	$bE = 1, 0$
Release Rk2 at BE16	0	CO2 -> F14 - 1
	1	$bE = 1, 0$
Release controller at BE15	0	CO5 -> F15 - 1
	1	$bE=1, bE=0$

7.10 Processing an external demand in Rk1

The controller can process binary or analog requests for an externally required signal by a more complex secondary system, provided the system is configured without solar system. Input signals lower than 0.8 V are not processed; overvoltage generates a maximum flow set point of 130 °C. An additional processing of requests for an externally required signal over the device bus cannot be configured.

Note: *Overheating may occur in the heating circuits of the primary controller without control valve.*

Excessive charging temperatures in DHW circuits without control valve controlled by the primary controller are excluded when the default settings of the controller are used: while storage tank charging is active, no flow temperature higher than the charging temperature is used by the primary controller.

Nevertheless, if the **Priority for external demand** function is activated, the external demand is also processed during storage tank charging.

Function	WE	Configuration
Priority for external demand	0	CO4 -> F16 - 1

Processing an external demand using a binary signal

Regardless of the operating mode set for control circuit Rk1 – except manual mode –, the flow temperature specified as *Set point for binary demand processing* is used in control circuit Rk1 when the binary input (terminals 17/18) is either open (bE = 0) or closed (bE = 1).

Functions	WE	Configuration
Processing an external demand in Rk1	0	CO1 -> F15 - 1
Processing an external demand, 0 to 10 V	0	CO1 -> F16 - 0
	0	Lower transmission range / 0 to 130 °C
	120 °C	Upper transmission range / 0 to 130 °C
Processing an external demand, binary	0	CO1 -> F17 - 1
	1	bE = 1, 0
Parameter	WE	Parameter level / Range of values
Set point for binary demand processing	40 °C	PA1 / 5 to 130 °C

Processing an external demand using a 0 to 10 V signal

Regardless of the operating mode set for control circuit Rk1 – except manual mode –, at least the flow temperature corresponding with the 0 to 10 V signal which is connected to terminals 17/19 is used.

Functions	WE	Configuration
Processing an external demand in Rk1	0	CO1 -> F15 - 1
Processing an external demand, 0 to 10 V	0	CO1 -> F16 - 1
Processing an external demand, binary	0	CO1 -> F17 - 0
Parameter	WE	Parameter level / Range of values
Set point boost of primary exchanger control	5 °C	PA1 / 0 to 50 °C

7.11 Flow rate/capacity limitation in Rk1

Flow rate/capacity limitation can be implemented based on a pulse or standardized signal of 0/4 to 20 mA provided by the heat meter. This only applies in plants without solar system and without processing an external demand using a 0 to 10 V signal. Particularly when a standardized signal is applied, a heat meter (flow meter) with high measuring accuracy is required.

Make sure that the controller is supplied with updated measured values at intervals of max. 5 seconds. In both cases (pulse or standardized signal), there are three different operating situations:

- ▶ A system with simultaneous room heating and DHW heating requires maximum energy.
- ▶ A system with a fully charged storage tank which performs only room heating requires less energy.
- ▶ A system which suspends room heating during DHW heating requires less energy.

As a result, three different maximum limit values can be specified:

- ▶ *Max. limit value* to determine the absolute upper limit
- ▶ *Max. limit value for heating* for exclusive operation of the room heating
- ▶ *Max. limit value for DHW* for exclusive operation of the DHW heating

In all systems without DHW heating or without heating circuit, only the *Max. limit value* for the flow rate or capacity can be set. In systems An1 10.x and 11.x, the heating circuit Rk1/Y1 is turned down in case the limitation applies.

7.11.1 Limitation using pulse input

Depending on the operating situation, a heat meter with pulse output connected to input WMZ/Bed (terminals 17/19) can be used to limit either the flow rate or the capacity in the system. All limit values are given in the unit "pulses per hour" [pulse/h]. As a result, the controller does not distinguish between a flow rate pulse signal or a capacity pulse signal. As the displayed current pulse rate P [pulse/h] (-> Extended operating level, key number 1999) is calculated depending on the interval between the received pulses, it is natural that the controller cannot react immediately to all rapid flow rate or capacity changes which occur in the system.

When the pulse rate reaches the current *Max. limit value*, the flow set point of control circuit Rk1 is reduced. How strongly the controller responds is determined by the *Limiting factor*.

Example to determine the limit value:

If a capacity of 30 kW is to be limited, the following limit value must be set for a heat meter with an output of one pulse per kilowatt-hour:

$$P = \frac{30 \text{ kW}}{1 \text{ kWh} / \text{pulse}} = 30 \text{ pulse} / \text{h}$$

Note: If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Flow rate limitation (capacity limitation) in Rk1 with pulses at input WMZ	0	CO5 -> F10 - 1
	15 pulse/h	Max. limit value / 3 to 800 pulse/h
	15 pulse/h	Max. limit value for heating* / 3 to 800 pulse/h
	15 pulse/h	Max. limit value for DHW* / 3 to 800 pulse/h
	1.0	Limiting factor / 0.1 to 10.0
Flow rate limitation in Rk1 with 0/4 to 20 mA at input WMZ	0	CO5 -> F11 - 0
Capacity limitation in Rk1 using the meter bus	0	CO6 -> F12 - 0

* Not in Anl 1.0, 1.5, 1.6, 3.0, 3.5, 4.0, 7.x, 10.x and 11.x

7.11.2 Limitation using 0/4 to 20 mA signal

Depending on the operating situation, a heat meter at input WMZ/Bed (terminals 17/19) with a 0/4 to 20 mA output (connected in parallel to input WMZ/Bed using 50 Ω) can be used to limit the flow rate in the system. All limit values are given in the unit "cubic meters per hour" [m³/h]. As a result, both a *Lower measuring range value* 0 or 4 mA and an *Upper measuring range value* must be set in unit [m³/h]. The current flow rate in [m³/h] is displayed in extended operating level (→ key number 1999).

When the flow rate reaches the current *Max. limit value*, the flow set point of control circuit Rk1 is reduced. How strongly the controller responds is determined by the *Limiting factor*.

Note: If CO5 → F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Flow rate limitation (capacity limitation) in Rk1 with pulses at input WMZ	0	CO5 → F10 - 0
Flow rate limitation in Rk1 using 0/4 to 20 mA at input WMZ	0	CO5 → F11 - 1
	1.5 m ³ /h	Lower measuring range value / 0, 4 mA
	1.5 m ³ /h	Upper meas. range value 20 mA / 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value / 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value for heating* / 0.01 to 650 m ³ /h
	1.0	Max. limit value for DHW* / 0.01 to 650 m ³ /h
		Limiting factor / 0.1 to 10.0
Flow rate limitation in Rk1 using the meter bus	0	CO6 → F11 - 0

* Not in Anl 1.0, 1.5, 1.6, 3.0, 3.5, 4.0, 7.x, 10.x and 11.x

7.11.3 Creep feed rate limitation using a binary input

It is possible to report to the controller when the creep feed rate has fallen below a certain level by using a limit switch of the primary valve connected to the input BE13 or RÜF1. When using BE13, either the break contact of (bE=0) binary input or the make contact (bE=1) of binary input can be processed to indicate that the creep feed rate has fallen below a certain level. Only the make contact of the binary input at RÜF1 can be processed. Shortly after the alert, the controller closes the valve Rk1. As soon as the flow temperature falls below the set point by more than 5 °C after the valve has been closed, control operation is started again.

Function	WE	Parameter level / Range of values
Creep feed rate limitation	0	CO5 -> F12 - 1 bin (BE13) / AnA (RüF1)
	1	When 'bin': bE = 0, 1

7.11.4 Limitation of the calculated capacity

The controller is able to calculate the heat capacity used in the system and to limit it depending on the operational circumstances. To achieve this, it uses a connected 0/4 to 20 mA signal for the flow rate, a primary return flow sensor and a primary flow sensor. All limits are given in the unit kilowatt [kW]. The primary flow sensor is connected at input FG2.

The measured temperature of the primary flow sensor [°C] and the current capacity [kW] are displayed in the extended operating level (-> key number 1999).

The flow set point of control circuit Rk1 is reduced if the capacity reaches the current *Maximum limit*. How strongly the controller responds is determined by the *Limiting factor*.

Note: If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Return flow sensor RüF1	1	CO1 -> F03 - 1
	1.0	Limiting factor / 0.1 to 10.0
Flow rate limitation in Rk1 using 0/4 to 20 mA at input WMZ	0	CO5 -> F11 - 1
	0 mA	Lower measuring range value / 0, 4 mA
	1.5 m ³ /h	Upper meas. range value 20 mA / 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value heating* / 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value DHW* / 0.01 to 650 m ³ /h
Capacity limitation based on a connected flow rate signal in Rk1	1.0	Limiting factor / 0.1 to 10.0
	0	CO5 -> F13 - 1
	1.5 kW	Maximum limit / 0.1 to 6500 kW
	1.5 kW	Max. limit value heating* / 0.1 to 6500 kW
	1.5 kW	Max. limit value DHW* / 0.1 to 6500 kW
	1.0	Limiting factor / 0.1 to 10.0

* Not in Anl 1.0, 1.5, 1.6, 3.0, 3.5, 4.0 and 11.x

7.12 Device bus

Using the device bus, it is possible to connect up to 32 device from the Series 55xx. For connection, the TROVIS 5576 Controller is, above all, equipped with the terminals 29/30. No attention must be paid to the polarity of the device bus wiring.

Danger of short circuit!

If several TROVIS 5576 Controllers in one plant are to be connected to the building control station using the system bus interface and the cable converter 1400-8800, remember that all controllers sharing the same bus distributor are also connected over the device bus. Do not wire such controllers in "parallel" by connecting terminals 29/30.

Activate the device bus and specify the device bus address for each device. Note that the device bus address 1 is to be set for just one controller in the system, and that all device bus addresses must be unique. The controller with device bus address 1 implements the required bus bias voltage for the system.

Once the controllers have been connected and programmed, additional functions can be configured. These partly application-specific functions include:

- ▶ Requesting and processing an external demand (-> page 103)
- ▶ Sending and receiving outdoor temperatures (-> page 105)
- ▶ Synchronizing the clock (-> page 105)
- ▶ Priority over all controllers (-> page 106)
- ▶ Connecting a TROVIS 5570 Room Panel (-> page 106)
- ▶ Display error messages issued by the device bus (-> page 107)

7.12.1 Requesting and processing an external demand

In general, the controller which controls the primary valve or boiler (= primary controller) in a system of coupled controllers will process the demand of all subsequent controllers (= secondary controllers). As a result, the primary controller must be configured to receive this demand. Usually, the secondary controllers are configured such that they send their maximum flow set point to the primary controller. In special cases, however, it might happen that only the set point of a control circuit is to be sent. The appropriate function blocks to do so are also available. After the desired function blocks have been activated, you must specify a register number.

The following applies: in a system of linked controllers which are hydraulically supplied by a primary controller all controllers (primary and secondary controllers) must have the same *Register no.* setting for the "demand registers". A controller which is configured to receive a demand in register no. 5 will not process a demand sent to register no. 6.

System-wide functions

The primary controller compares the received requested demands and its own requested demands and supplies the system with the required flow temperature – if necessary increased by the value of the *Set point boost of primary exchanger control* parameter.

Note: Overheating may occur in heating circuits of the primary controller without control valve.

Primary controller:

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1
	32	Device bus address
Receive external demand in Rk1	0	CO7 -> F15 - 1*
Receive external demand in Rk2	0	CO7 -> F17 - 1*
	5	*Register no. / 5 to 64
Parameter	WE	Parameter level / Range of values
Set point boost of primary exchanger control	5 °C	PA1 / 0 to 50 °C

Secondary controller:

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1; device bus address
Send flow set point Rk1	0	CO7 -> F10 - 1*
Send flow set point Rk2	0	CO7 -> F11 - 1*
Send flow set point DHW	0	CO7 -> F13 - 1*
Send max. flow set point	0	CO7 -> F14 - 1*
	5	* Register no. / 5 to 64

Note: The register number specifies the location where the flow set points are saved in the primary controller. As a result, the register no. set in the secondary controller for CO7 -> F10 to F14 must be the same as the register no. adjusted under CO7 -> F15 in the primary controller.

Excessive charging temperatures in DHW circuits without control valve controlled by the primary controller are excluded when the default settings of the controller are used: while storage tank charging is active, no flow temperature higher than the charging temperature is

used by the primary controller.

Nevertheless, if the **Priority for external demand** function is activated, the external demand is also processed during storage tank charging.

Function	WE	Configuration
Priority for external demand	0	CO4 -> F16 - 1

7.12.2 Sending and receiving outdoor temperatures

Controllers equipped with one (two) outdoor sensor(s) can be configured to supply other controllers with the measured outdoor temperature(s) over the device bus. This enables weather-compensated control even in systems which do not have their own outdoor sensor.

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1; device bus address
Send value AF1	0	CO7 -> F06 - 1
	1	Register no. / 1 to 4
Receive value AF1	0	CO7 -> F07 - 1
	1	Register no. / 1 to 4
Send value AF2	0	CO7 -> F08 - 1
	2	Register no. / 1 to 4
Receive value AF2 (receive an outdoor temp. independent of Rk1)	0	CO7 -> F09 - 1
	2	Register no. / 2 to 4

Note: The register no. for the outdoor temperature AF1 or AF2 must be the same for the sending and the receiving controller.

7.12.3 Synchronizing the clock

One controller in a system of linked controllers should perform the **Clock synchronization** function. This controller sends its system time once every 24 hours to all other controllers over the device bus.

Regardless of this function, the system time of all controllers is adapted immediately when the time setting of one controller is changed.

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1; device bus address
Clock synchronization	0	CO7 -> F02 - 1

7.12.4 Priority over all controllers

It is possible to put the heating circuits of other controllers out of operation while the DHW heating is active when the controllers are linked to one another over a device bus. The return flow temperature limitation in the primary circuit can also be raised to the adjusted value for *Maximum return flow temperature* or for *Point 1* of the return flow temperature in a four-point characteristic when the controller is configured correspondingly. Controllers which should operate a DHW heating with priority need to issue *DHW heating active* alert. Controllers that have heating circuits which should be deactivated during this active DHW heating alert need to have the configuration **Receive release of Rk_** for the heating circuits concerned. If the circuit is just a DHW circuit which should influence one or more heating circuits, they need to be given the identical register number. If there are several DHW circuits in the system, selected heating circuits can only react to one or other active DHW circuits by assigning different register numbers.

If a secondary heating circuit with a valve should be put out of operation, the heating circuit valve concerned is closed; the heating circuit circulation pump remains in operation. If a secondary heating circuit without a valve should be put out of operation, for example, in system Anl 2.x, just its heating circuit circulation pump and not the primary circuit Rk1 is put out of operation by using the configuration **Receive release of Rk1**.

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1; Device bus address
Send "DHW heating active"	0	CO7 -> F20 - 1*
Receive release of Rk1	0	CO7 -> F21 - 1*
Receive release of Rk2	0	CO7 -> F22 - 1*
	32	*Register no. / 5 to 64

7.12.5 Connecting a TROVIS 5570 Room Panel

A TROVIS 5570 Room Panel (accessory) can be connected to the TROVIS 5576 Controller to measure the room temperature and for remote operation of a heating circuit. The room panel enables direct access to the operating mode and controller time settings as well as to all relevant parameters of a heating circuit. Additionally, the room temperature, the outdoor temperature and, if applicable, other data points can be retrieved and displayed. The room panel is connected to terminals 27 to 30 as illustrated in Fig. 12.

Note: *The room panel can only be supplied by the controller when no meter bus plug-in module is installed.*

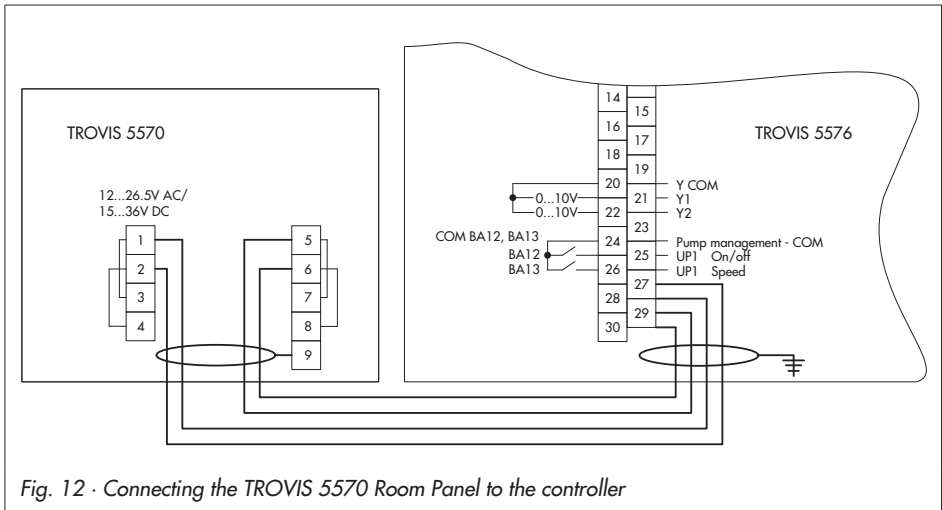


Fig. 12 · Connecting the TROVIS 5570 Room Panel to the controller

Functions	WE	Configuration
Device bus	0	CO7 -> F01 - 1; device bus address
TROVIS 5570 Room Panel in Rk1	0	CO7 -> F03 - 1; device bus address
TROVIS 5570 Room Panel in Rk2	0	CO7 -> F04 - 1; device bus address


7.12.6 Display error messages issued by the device bus

The setting CO7 -> F16 - 1 causes the controller to react to the error messages from the device bus by generating the "Err 5" error message as long as the faults of the other device bus participants exist. If, additionally, the setting CO5 -> F07 - 1 is configured, the fault alarm output BA13 is also set. The black squares under the corresponding numbers at the top of the display indicate (with "Err 5") which device bus address is defective for the first 23 device bus participants.

Regardless of the CO7 -> F16 setting, error messages received over device bus basically lead to the control station (GLT) being dialed when the modem function is active. You can define which error messages are to be passed on over the device bus after entering the key number 0025. The default setting of 465 results in just the errors highlighted (bold) in the table in section 8.5 being passed on over the device bus, except for "Err 5".

Function	WE	Configuration
Display error messages issued by the device bus	0	CO7 -> F16 - 1

7.13 Requesting an external demand by issuing a 0 to 10 V signal

The controller can request a demand for the maximum flow set point (with boost, if need be) by issuing up to two analog 0 to 10 V signals for external demand with sequence control. For this purpose, the outputs Y1 to Y2 are used as an alternative to issuing the control signal. The time delay and the system deviation used to activate an output with sequence control are also adjustable. An interval between lead changes can also be determined. When an external demand with sequence control is configured, the burner icon  in combination with the figures 1 and 2 appears on the controller display. "1" appears next to the burner icon for just one active output with sequence control, "2" for two active outputs with sequence control. Analog or binary signals for processing an external demand or requests processed over the device bus can be integrated into the analog request for an external demand.

Note: If, for example, four supplementary heating circuits pass on their demand as a 0 to 10 V signal split between two controllers connected over a device bus, two systems should not be configured both with system code number An1 10.0. Otherwise, the heating circuit Rk1 of system An1 10.0 in the controller processing the request would process the request of the second controller.

In this case, configure system An1 5.0 (TROVIS 5579 only) in the controller processing the request.

Function	WE	Configuration
Maximum flow set point requested by issuing a 0 to 10 V signal	0	CO1 -> F18 - 1
	0 °C	Lower transmission range / 0 to 130 °C
	120 °C	Upper transmission range / 0 to 130 °C
	0 °C	Boost of flow temperature demand / 0 to 30 °C
Maximum flow set point requested with sequence control	0	CO1 -> F19 - 1
	5 min	Time delay for sequence change /
	3 °C	0 to 10 min
		System deviation for enabling sequence control / 1 to 30 °C
	1	Lead change / 0 to 10 days

7.14 Connecting potentiometers for valve position input

The FG1 and FG2 inputs can be used to connect potentiometers, for example, to input valve positions when a resistance room sensor is not configured in the control circuit concerned. The use of TROVIS 5570 Room Panel is possible.

The measured values both in the measuring ranges from 0 to 2000 Ω do not appear on the controller display. They are only available as Modbus data points.

Function	WE	Configuration
Room sensor RF1, 2	0	CO1, 2 -> F01 - 0 Exceptions: CO1 -> F01 - 1 and CO7 -> F03-1 CO1 -> F01 - 1 and CO7 -> F04-1

7.15 Feeder pump operation

In systems An1 3.0 and 7.x, the feeder pump UP1 only starts to operate in the default setting when a flow temperature demand of a secondary controller exists.

If CO7 -> F14 - 1 is configured, this is also the case when the controller's own secondary circuit requires heat.

Function	WE	Configuration
UP1 operation to cover own demand	0	CO7 -> F14 - 1

7.16 External demand for heat due to insufficient heat supply

An external heat source can be optionally demanded using the binary output BA12 or using an analog signal (0 to 10 V) at Y1. When the analog signal (select AnA) is selected, the function block for a request for external demand CO1 -> F18 - 1 is automatically set. The function block parameters allow the transmission range to be determined.

When a system deviation in Rk 1 greater than 10 °C lasts longer than 30 minutes, the BA12 output is activated or a voltage signal corresponding to the actual demand is issued. At the same time, the valve Rk1 is forced to close. The Rk1 valve icon blinks to indicate that the operating situation has changed. The icon blinks as long as the external heat source is activated. After 30 minutes, the external demand for heat is canceled (BA12 deactivated or 0 V issued) and the control signal output in Rk1 is enabled again.

Function	WE	Configuration
External demand for heat due to insufficient heat supply	0	CO1 -> F20 - 1
	Bin	Demand using binary output BA12
	AnA	Demand using a signal at Y1 (0 to 10 V)

7.17 Locking manual level

To protect the heating system, this function can be used to lock the manual level. When this function has been activated, automatic mode is started when the rotary switch is set to "0".

Function	WE	Configuration
Locking manual levels	0	CO5 -> F21 - 1

7.18 Locking the rotary switches

When this function has been activated, the controller remains in automatic mode regardless of the rotary switch positions. The rotary switches can no longer be used to adjust the controller settings.

Functions	WE	Configuration
Locking the rotary switches	0	CO5 -> F22 - 1

7.19 Setting a customized key number

To avoid the unauthorized modification of functions and parameters of the controller, the default key number can be replaced with an individual key number. Choose your custom key number between 0100 and 1900.

Proceed as follows:

- ⇒ Switch to configuration and parameter level. Display shows: **0 0 0 0**
- ⌚ Set key number 1995.
- * Confirm key number.
- ⌚ Adjust valid key number.
- * Confirm key number. Key number blinks.
- ⌚ Adjust desired custom key number.
- * Confirm custom key number.
This new key number is now valid.

8 Operational faults

A sensor failure is indicated by the blinking $\frac{1}{1}$ icon on the display. In addition, the display is illuminated for 1 second in intervals of 10 seconds when a sensor malfunction persists. The "Error" message is displayed immediately. Press the rotary pushbutton to open the error level. It may be possible to view several error messages by turning the rotary pushbutton. As long as an error message is present, the error level is displayed, even though it has not been opened by pressing the rotary pushbutton. In the error level, the error message is displayed as specified in the list below.

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

8.1 Error list

- ▶ Err 1 = Sensor failure (-> section 8.2)
- ▶ Err 2 = Reserved
- ▶ Err 3 = Disinfection temperature not reached (-> section 6.11)
- ▶ Err 4 = Max. charging temperature reached (-> section 6.2)
- ▶ Err 5 = Error messages issued by the device bus (-> section 7.12.6)
- ▶ Err 6 = Temperature monitoring alarm (-> section 8.3)
- ▶ Err 7 = Unauthorized access occurred (-> section 9.1)
- ▶ Err 8 = Error message of a binary input
- ▶ Err 9 = Error in meter bus communication
- ▶ Err 10 = Error reported by heat meter

All error messages, except for "Err 1" and "Err 8", can be confirmed in the error level. When an error message is indicated, proceed as follows:

- ⌚ Select *Clr* on the display.
- * Confirm the error message.

Note: By confirming the "Err 5", all other error messages from the device bus that are no longer relevant are deleted. These types of error messages can originate, for example, from device bus participants which were temporarily out of order or have been sent from devices which in the meantime have been replaced by devices with different device bus addresses.

8.2 Sensor failure

According to the error list, sensor failures are indicated by displaying "Err 1" error message in the error level. For detailed information, exit error level and view the different temperature values in operating level: each sensor icon displayed together with 3 horizontal lines 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 sensors AF 1/2:** 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* (adjusted under PA1, 2) is smaller than 50 °C.
- ▶ **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 had not been configured. As soon as the control of the charging temperature becomes impossible (VF2 defective), the associated valve is closed.
- ▶ **Return flow sensors RfF1/2:** 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; adaptation mode is canceled. The last determined heating characteristic remains unchanged.
- ▶ **Storage sensors SF1/2:** When one of the two sensors fails, the storage tank is no longer charged (exception: solar system).
- ▶ **Solar sensors SF3, VF3:** When one of the two sensors fails, the storage tank in the solar circuit is no longer charged.

8.3 Temperature monitoring

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

Functions	WE	Configuration
Temperature monitoring	0	CO5 -> F19 - 1

8.4 Collective error message

With the setting CO5 -> F07 - 1, the binary output BA13 is set when an operational fault occurs, which causes a change in state of error status register. The setting bA = 1 causes the binary output BA13 to close when a fault occurs.

Functions	WE	Configuration
Fault indication output BA13	0	CO5 -> F07 - 1
	1	bA = 1, 0

8.5 Error status register

The error status register is used to register controller or system errors. In modem mode when the controller connects to the building control system (GLT) both when an error is detected and when it has been corrected, each change in the status of the error status register causes the controller to dial the control system. The error messages which have an effect on the error status register are listed in the table in bold.

Error message	Meaning	Decimal value	
Err 1	Sensor failure	1	1
Err 2	–	2	
Err 3	Disinfection temperature not reached	4	
Err 4	Maximum charging temperature reached	8	
Err 5	Error messages issued by device bus	16	
Err 6	Temperature monitor alarm	32	
Err 7	Unauthorized access occurred	64	
Err 8	Error message of a binary input	128	
Err 9	Meter bus communication error	256	256
Err 10	Error message issued by heat meter	512	
			Total
Example: Value of error status register when a sensor fails and a meter bus communication error occurs =			257

Using the function blocks in the configuration level CO8, individual controller inputs that are not used can be assigned as binary inputs to the error status register. Either the open or closed binary input can be regarded as an error. "Err 8" error message is indicated by the controller if at least one of these configured inputs reports an error.

Note: If any of the free inputs should issue binary signals directly to the building control station, bypassing the error status register, activate the function block concerned in the configuration level C08, but select --- in the function block parameter.

8.6 Sending text messages in case of error

If a dial-up modem is connected to the RS-232 system bus interface, the controller can send a text message to a mobile phone when an error occurs.

As soon as a fault has been registered in the error status register, the text message indicating a controller fault is sent. On the mobile phone, the following error message is displayed:

```
[Date]                [Time]
[Phone no. of the controller]
Controller fault
TROVIS 5576 # [controller ID of the faulty controller]
```

The time stamp [Date], [Time] is added by the text messaging center, not by the controller. If an error message is transmitted over the device bus to a controller equipped with a dial-up modem, the controller ID of the faulty controller is transmitted, not that of the "modem controller". A detailed error message is not available.

Note: The controller ID is displayed in the extended operating level under Info 2 as the first value in the sequence.

When Modbus is activated and, at the same time, the dial-up in case of error is released, the connection with the building control station is established first, and then the text message is sent. If the first attempt to connect to the building control station fails, the controller tries again until the set number of redialing attempts has been exhausted.

In Germany, the access numbers (tAPnr) of the SMS service center are currently:

- ▶ **D1** network: 0171 252 1002 (alternatively, 0171 252 1099 is also possible)
- ▶ **E-Plus** network: 0177 1167
- ▶ **Cellnet** (UK) network: 0044 0786 098 0480 - routing into the **D1**, **D2** and **E-Plus** networks.

Add "0" to the number when dialing from a telephone extension. The **Mobile phone number** (HAndy) must be entered as follows: 49 xxx yyyyyy, where xxx stands for 160, 171 or any other valid dialing code and yyyyyy represents the specific phone number of the mobile you wish the error message to be sent to.

Functions	WE	Configuration
Text message	0	CO6 -> F08 - 1
Modem function	0	CO6 -> F03 - 1
Automatic modem configuration	0	CO6 -> F04 - 1
Parameters*	WE	Parameter level / Range of values
Modem dialing pause (P)	5 min	PA6 / 0 to 255 min
Modem time-out (t)	5 min	PA6 / 1 to 255 min
No. of redialing attempts (C)	15	PA6 / 1 to 255
Access number (tAPnr)	-	PA6 / Max. 22 characters; 1, 2, 3, ..., 9, 0; "- " end of a string; "P" pause
Mobile phone number (HAndy)	-	PA6 / Max. 22 characters; 1, 2, 3, ..., 9, 0; "- " end of a string; "P" pause

* -> section 9.3 (Description of communication parameter settings)

9 Communication

Using the serial system bus interface, the TROVIS 5576 Heating and District Heating Controller can communicate with a building control system. In combination with a suitable software for process visualization and communication, a complete control system can be implemented. The following communication settings are possible:

– Operation with a dial-up modem at the RS-232 system bus interface

Basically, communication is only established automatically when errors occur. The controller works autonomously. Nevertheless, the modem can dial up to the controller at any time to read data from it or otherwise influence it, if necessary. We recommend to use the modem connecting cable (1400-7139).

– Operation with a leased line modem at the RS-232 system bus interface

Communication is established via a permanent connection between two leased line modems. This setup is applied for long-distance transmissions or when different signal level converters are used. The connection between controller and modem can also be established using the modem connecting cable (1400-7139).

– Operation connected to a four-wire or two-wire bus

To establish the link between controller and bus line, the signal level needs to be converted by an appropriate converter (four-wire bus: SAMSON cable converter 1400-7308, two-wire bus: SAMSON cable converter 1400-8800).

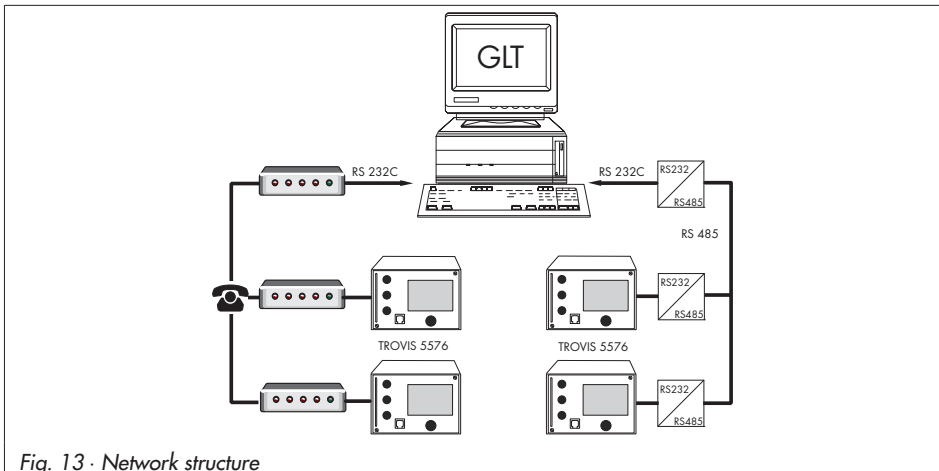


Fig. 13 · Network structure

The TROVIS 5576 Controller is equipped with an RS-232 Modbus interface. Optionally, cable converters are available for operation with a four-wire (1400-7308) or two-wire bus (1400-8800).

Note: Regardless of whether communication is established using a modem or data cable, the operating software can be updated using the serial system bus interface, provided Modbus has been activated (CO6 -> F01 - 1).

9.1 RS-232 system bus interface

When looking onto the controller front, the system bus connection is located on the left side inside the controller housing (RJ-45 jack).

In this case, the controller can be connected either directly to the serial interface of a PC (point-to-point connection) or to a (dial-up) modem. A dial-up modem is required if the controller is to be connected to the telecommunications network. In this case, the controller works autonomously and can issue an alarm call to the building control station when errors occur. Additionally, the building control station can dial up to the controller, read data from it, and send new data once the valid key number has been written to holding register no. 40145.

Note: If a wrong key number has been written to holding register no. 40145 for the third consecutive time, the controller immediately interrupts the modem connection and generates an "Err 7" error message (Unauthorized access occurred). As a result, the call to the configured control system is triggered and a text message is sent. Bit D6 is deleted as soon as the error status register has been read by the control system and the connection has been terminated.

In special cases, the **Lock dial-up** function can be selected to stop dial-up in case of an error occurs. Using the **Dial-up also upon corrected error** function, the controller additionally informs the building control station when a previously signaled error no longer persists. Thanks to the **Automatic modem configuration** function, the dial-up modem connected to the controller does not need to be preset; it is configured automatically by the controller.

Functions	WE	Configuration
Modbus	1	CO6 -> F01 - 1
Modbus 16-bit addressing	0	CO6 -> F02
Modem function	0	CO6 -> F03 - 1
Automatic modem configuration	0	CO6 -> F04 - 1
Lock dial-up	0	CO6 -> F05
Dial-up also upon corrected error	0	CO6 -> F06
Control system monitoring	0	CO6 -> F07 - 0

Parameters*	WE	Parameter level / Range of values
Station address (ST.-NR)	255	PA6 / 1 to 247 with CO6 -> F02 - 1: 1 to 32000
Baud rate (BAUD)	9600	PA6 / 19200, 9600
Cyclical initialization (I)	30 min	PA6 / 1 to 255 min
Modem dialing pause (P)	5 min	PA6 / 0 to 255 min
Modem time-out (t)	5 min	PA6 / 1 to 255 min
No. of redialing attempts (C)	5	PA6 / 1 to 255
Phone no. of control station (tELnr)	-	PA6 / Max. 22 characters; 1, 2, 3, ...9, 0; "-." end of a string, "P" pause

* -> section 9.3 (Description of communication parameter settings)

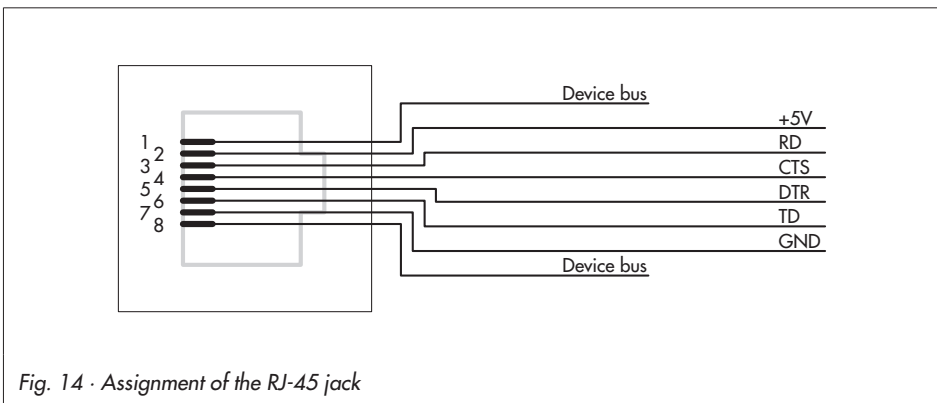


Fig. 14 · Assignment of the RJ-45 jack

9.2 System bus interface with RS-232/RS-485 cable converters (for two-wire and four-wire bus)

To operate the controller in combination with cable converters, a constant bus connection is required (data cable). The bus line links the control units/devices in an open ring. At the end of the bus line, the data cable is connected to the control station using an RS-485/RS-232 converter (e.g. TROVIS 5484).

The maximum range of the bus connection (cable length) is 1,200 meters. A maximum of 126 devices (two-wire bus) can be connected to such a segment.

If you wish to use more than 126 devices in line or need to bridge greater distances, make sure repeaters (e.g. TROVIS 5482) are installed to replicate the signal. With 8-bit addressing, a maximum of 246 devices can be addressed and connected to a bus.

If there is no communication between the control system and the controller, interventions of

the control system in dynamic processes can be limited with regard to time using the **Control system monitoring** function.

While valid Modbus requests are registered, the controller resets the time monitoring. Nevertheless, after 30 minutes have elapsed, all level bits are re-initialized to "autonomous" when an error has occurred.

CAUTION!

You are required to follow the relevant standards and regulations concerning lightning and overvoltage protection on installation.

Functions	WE	Configuration
Modbus	1	CO6 -> F01 - 1
Modbus 16-bit addressing	0	CO6 -> F02
Modem function	0	CO6 -> F03 - 0
Control system monitoring	0	CO6 -> F07
Parameters*	WE	Parameter level / Range of values
Station address (ST.-NR)	255	PA6 / 1 to 247 with CO6 -> F02 - 1: 1 to 32000
Baud rate (BAUD)	9600	PA6 / 19200, 9600

* -> section 9.3 (Description of communication parameter settings)

9.3 Description of communication parameter settings

Station address (ST.-NR)

This address is used to identify the controller in bus or modem mode. In a system, each controller needs to be assigned a unique address.

Baud rate (BAUD)

In a bus system, baud rate refers to the transfer speed between control system and controller. In modem mode, baud rate refers to the transfer speed between controller and modem.

The baud rate adjusted at the controller must correspond with the baud rate of the control system, otherwise no communication can be established.

Cyclical initialization (I)

This parameter defines the period of time for a cyclical issue of the initialization command "ATZ". The command is not issued during dial-up or when connected. "ATZ" causes the profile 0 to be copied to the active profile, provided the modem parameters have been set and saved in profile 0 using a suitable terminal program. With CO6 -> F04 - 1, cyclical initialization of the modem is not required.

Modem dialing pause (P)

It is recommendable to pause for approx. 3 to 5 minutes between dialing up to the control system/the text messaging center to avoid a permanent overloading of the telecommunications network. The *Modem dialing pause* defines the interval between 2 dialing attempts.

Modem time-out (t)

When the controller connects to the GLT but without addressing a Modbus data point, the connection is closed after the time specified for *Modem time-out* has elapsed. If the error status register has not been read during the GLT connection, the controller dials up to the GLT again after the *Modem dialing pause (P)* has elapsed.

When sending a text message, the specified time does not have any meaning.

Number of redialing attempts (C)

The controller tries to dial up to the control system again, observing the *Modem dialing pause*, in case the GLT/text messaging center is busy or the function that triggered the call has not been reset by the controller. After the specified number of redialing attempts have failed, "OFF" is indicated in the controller's extended operating level. The dialing attempt counter is automatically reset at 12:00h and the controller tries to connect again.

Resetting of triggered call = Reading the error status registers (HR40150)

Phone number of control station (tELnr)

Enter the phone number of the control system modem including the dialing code, if necessary. Short pauses between the numbers can be entered using P (= 1 second); the end of the string is to be marked by "-". The phone number may include a maximum of 22 characters.

Example: "069, 2 sec. pause, 4009, 1 sec. pause, 0":

0 6 9 P P 4 0 0 9 P 0 - (= 11 characters)

Note: *The connected modem is automatically configured when the function block CO6 -> F04 - 1 is activated.*

9.4 Meter bus interface

With the help of an optional, retrofittable meter bus plug-in module, the TROVIS 5576 Heating and District Heating Controller can communicate with up to 6 heat or water meters according to EN 1434-3. A flow rate or capacity limitation is possible on the basis of the values measured at heat meter WMZ1. Details on the use of the different heat and water meters can be found in the technical documentation TV-SK 6311.

9.4.1 Activating the meter bus

To successfully transfer data from the heat meter to the controller, the heat meter must use a standardized protocol in accordance with EN 1434-3. It is not possible to make a general statement about which specific data can be accessed in each meter. For details on the different meter makes, refer to the technical documentation TV-SK 6311. All necessary function block parameters to set up the communication with heat or water meters are available in CO6 -> F10. The meter bus address, the model code and the reading mode must be specified for the heat meters WMZ1 to WMZ6. A meter bus address must be unique and correspond with the address preset in the WMZ. If the preset meter bus address is unknown, a single heat meter connected to the controller can be assigned the meter bus address 254. The address 255 deactivates the communication with the respective WMZ. The model code to be set for the heat meter can be found in TV-SK 6311. In general, the default setting of 1434 can be used for most devices. The meters can be read either automatically every 24 hours (approx.), continuously or when the coils (= Modbus data points) assigned to the heat meters WMZ1 to WMZ6 are overwritten with the value 1 via the system bus interface.

In extended operating level, the data point "buS" (status information of meter bus) is available when the meter bus is activated. Press the rotary pushbutton to display the following information about the activated meters "buS 1" to "buS 6" (WMZ1 to WMZ6):

- ▶ Flow rate
- ▶ Total capacity
- ▶ Capacity
- ▶ Energy
- ▶ Flow temperature
- ▶ Return flow temperature
- ▶ Meter identification number
- ▶ Meter bus address (sent by WMZ)

Blinking values in combination with black squares in the top row of the display (error status of the associated meter -> TV-SK 6311) indicate various faults. The controller issues the "Err 9" or "Err 10" error messages.

Note: With reading mode "24h", the displayed values are not updated by reopening the levels "buS 1" to "buS 6"; the values read during the last cycle remain unchanged.

With reading mode "CONT", the values in the levels are not continuously updated. You have to reopen the specific level to get current values.

Functions	WE	Configuration
Meter bus	0	CO6 -> F10 - 1
	255	Meter bus address WMZ 1 to 6 (ST.-NR) / 0 to 255
	1434	Model code WMZ 1 to 6 / 1434, CAL3, APAtO, SLS
	24h	Reading mode WMZ 1 to 6 / 24h, CONT, Coil Tariff function option HT/NT, only selectable for WMZ1 on setting "1434" and "CONT": tAr-A: Function not active tAr-E: Depending on the following programmable time schedule, the consumption data are assigned to a high tariff or a low tariff. Three time periods can be entered per day of the week (not vacations or public holidays): 1-7 daily, 1 = Monday, 2 = Tuesday, ..., 7 = Sunday

9.4.2 Flow rate/capacity limitation using meter bus

Similar to the flow rate limitation based on a standardized 0/4 to 20 mA signal, the refreshing rate of the measured variable (flow rate and/or capacity) in meter bus mode must be smaller than 5 seconds to ensure that the limitation can be performed properly. Technical documentation TV-SK 6311 lists the heat meters which comply with this criterion and, thus, can be used for limitation. Note that some makes, particularly battery-operated heat meters, respond with communication pauses when they are read too frequently. Others might run out of energy early. For details, refer to TV-SK 6311.

- ▶ A system with simultaneous room and DHW heating requires max. energy.
- ▶ A system with a fully charged storage tank that performs only room heating requires less energy.
- ▶ A system that suspends room heating during DHW heating requires less energy.

As a result, three different maximum limit values can be adjusted in all systems with only one control valve and DHW heating on the secondary side:

- ▶ *Max. limit value* to determine the absolute upper limit
- ▶ *Max. limit value for heating* to operate only the room heating
- ▶ *Max. limit value for DHW* to operate only the DHW heating

If the *Max. limit value for heating* parameter is set to "At", a four-point characteristic configured in CO1 -> F11-1 allows the input of four flow rate or capacity limits in addition to the outdoor, flow and return flow temperature values. In all systems without DHW heating or without heating circuit, only the *Max. limit value* for the flow rate or capacity can be specified. In all systems with two control valves, separate maximum limits can be adjusted for the flow rate and capacity.

Note: Since only the Max. limit value for heating can be set to "At", a system with DHW heating must be configured even if a DHW heating is not used to allow the parameterization of a weather-compensated flow rate or capacity limitation. For example, system Anl 2.0 with a deselected storage tank sensor would need to be configured in place of system Anl 1.0.

Flow rate limitation

All function block parameters required to set up flow rate limitation are available in CO6 -> F11 or CO6 -> F13 for systems with two control valves. One after the other, the systems's *Max. limit value* and – for systems with only one control valve and DHW heating on the secondary side – the *Max. limit value for heating* and the *Max. limit value for DHW* have to be set. The *Limiting factor* determines how strongly the controller responds when the limit values are exceeded in either direction.

In extended operating level, the data point *Flow rate* [m³/h] in conjunction with square 1 at the top display indicates that the flow rate limitation is active in Rk1 and/or in conjunction with square 2 in Rk2. Press the rotary pushbutton to display the current max. limit value.

Note: If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Meter bus	0	CO6 -> F10 - 1
	255	Meter bus address WMZ 1 to 6 (ST.-NR) / 0 to 255
	1434	Model code WMZ 1 to 6 / 1434, CAL3, APAtO, SLS
	24h	Reading mode WMZ 1 to 6 / 24h, CONT, CoIL
Flow rate limitation in Rk1 using meter bus	0	CO6 -> F11 - 1
	1.5 m ³ /h	Max. limit value* / 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value for heating / At, 0.01 to 650 m ³ /h
	1.5 m ³ /h	Max. limit value for DHW / 0.01 to 650 m ³ /h
	1.0	Limiting factor / 0.1 to 10.0
Flow rate limitation in Rk2 using meter bus	0	CO6 -> F13 - 1
	1.5 m ³ /h	Max. limit value / 0.01 to 650 m ³ /h
	1.0	Limiting factor / 0.1 to 10.0
* Icons of the maximum limit values on the display: System -> "Flow rate" and "Fixed set point" Heating -> "Flow rate", "Fixed set point" and "Radiator" DHW -> "Flow rate", "Fixed set point" and "Tap"		

Capacity limitation

All function block parameters required to set up capacity limitation are available in CO6 -> F12 or CO6 -> F14 for systems with two control valves. One after the other, the systems's *Max. limit value* and – for systems with only one control valve and DHW heating on the secondary side – the *Max. limit value for heating* and the *Max. limit value for DHW* have to be set. The *Limiting factor* determines how strongly the controller responds when the limit values are exceeded in either direction

In extended operating level, the data point *Capacity [kW]* in conjunction with square 1 at the top display indicates that the capacity limitation is active in Rk1 and/or in conjunction with square 2 in Rk2. Press the rotary pushbutton to display the current max. limit value.

Note: If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

Functions	WE	Configuration
Meter bus	0	CO6 -> F10 - 1
	255	Meter bus address WMZ 1 to 6 (ST.-NR) / 0 to 255
	1434	Model code WMZ 1 to 6 / 1434, CAL3, APAtO, SLS
	24h	Reading mode WMZ 1 to 6 / 24h, CONT, Coil
Capacity limitation in Rk1 using meter bus	0	CO6 -> F12 - 1
	1.5 kW	Max. limit value* / 0.01 to 6500 kW
	1.5 kW	Max. limit value for heating / At, 0.1 to 6500 kW
	1.5 kW	Max. limit value for DHW / 0.1 to 6500 kW
Capacity limitation in Rk2 using meter bus	1.0	Limiting factor / 0.1 to 10.0
	0	CO6 -> F14 - 1
	1.5 kW	Max. limit value / 0.01 to 6500 kW
	1.0	Limiting factor / 0.1 to 10.0

* Icons of the maximum limit values on the display:
 System -> "Flow rate" and "Fixed set point"
 Heating -> "Flow rate", "Fixed set point" and "Radiator"
 DHW -> "Flow rate", "Fixed set point" and "Tap"

9.5 Memory module

The use of a memory module (accessory no. 1400-9379) is particularly useful to transfer all data from one TROVIS 5576 Controller to several other TROVIS 5576 Controllers. The memory module is plugged into the RJ-45 jack integrated into the front panel. Once the module

has been connected, "76 SP" is displayed. If the memory module already contains data from a different TROVIS 5576 Controller, turn the rotary pushbutton until "SP 76" is displayed.

- ▶ Pressing the rotary pushbutton to confirm "76 SP" causes the controller settings to be transferred to the memory module.
- ▶ Pressing the rotary pushbutton to confirm "SP 76" causes the saved controller settings to be transferred from the memory module to the controller.

During the data transfer, the bars on the display indicate the progress. When the transfer was successful, "I.O." is displayed. After that, the connection between controller and memory module can be terminated.

Using TROVIS-VIEW (order no. 6661-1012), it is possible to adjust all controller settings in a convenient user interface on the PC and archive them.

9.6 Data logging

The new hardware 5576-xxx3 automatically saves operating data, such as temperatures measured by the sensors, control signals, switching states of the pump outputs etc., in an integrated historical data memory every one minute. The memory can hold approximately two weeks of data. The data logging module (order no. 1400-9378) can be used to copy the operating data stored in the integrated memory every two minutes or to directly log the operating data every two minutes. After connecting the data logging module at the front RJ-45 jack, select *LOG* or *COPY* on the display to choose the logging or copying function of the module. If no selection is made, data logging starts automatically after two minutes.

The controller starts to write over the oldest data as soon the memory of the data logging module or integrated historical data memory is full. The current memory capacity of the data logging module can be read in the extended operating level under *Info 2* as the second value in the sequence (range of values: 0 to 6035). Directly after inserting the data logging module, data can be first read after the first scanning cycle has been performed.

The data log viewer software allows the data to be viewed in graph format. The USB converter 3 (order no. 1400-9377) is required to connect the data logging module to a computer. The data log viewer software is supplied with the USB converter 3.

10 Installation

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 (Fig. 15)

Panel mounting

1. Remove both screws (1).
2. Pull apart the controller housing and the back panel.
3. Make a cut-out of 138 x 92 mm (W x H) in the control panel.
4. Insert the controller housing through the panel cut-out.
5. Insert one mounting clamp (2) each at the top and bottom or at the side. Screw the threaded rod towards the panel with a screwdriver so that the housing is clamped against the control panel.
6. Connect the electrical wiring at the back of the housing as described in section 11.
7. Fit the controller housing.
8. Fasten both screws (1).

Wall mounting

1. Remove both screws (1).
2. Pull apart the controller housing and the back panel.
3. If necessary, drill holes with the specified dimensions in the appropriate places.
Fasten the back panel with four screws.
4. Connect the electrical wiring at the back of the housing as described in section 11.
5. Remount the controller housing.
6. Fasten both screws (1).

Top hat rail mounting

1. Fasten the spring-loaded hook (4) at the bottom of the top hat rail (3).
2. Slightly push the controller upwards and pull the upper hook (5) over the top hat rail.
3. Remove both screws (1).
4. Pull apart the controller housing and the back panel.
5. Install the electrical connections at the back panel as described in section 11.
6. Remount the controller housing.
7. Fasten both screws (1).

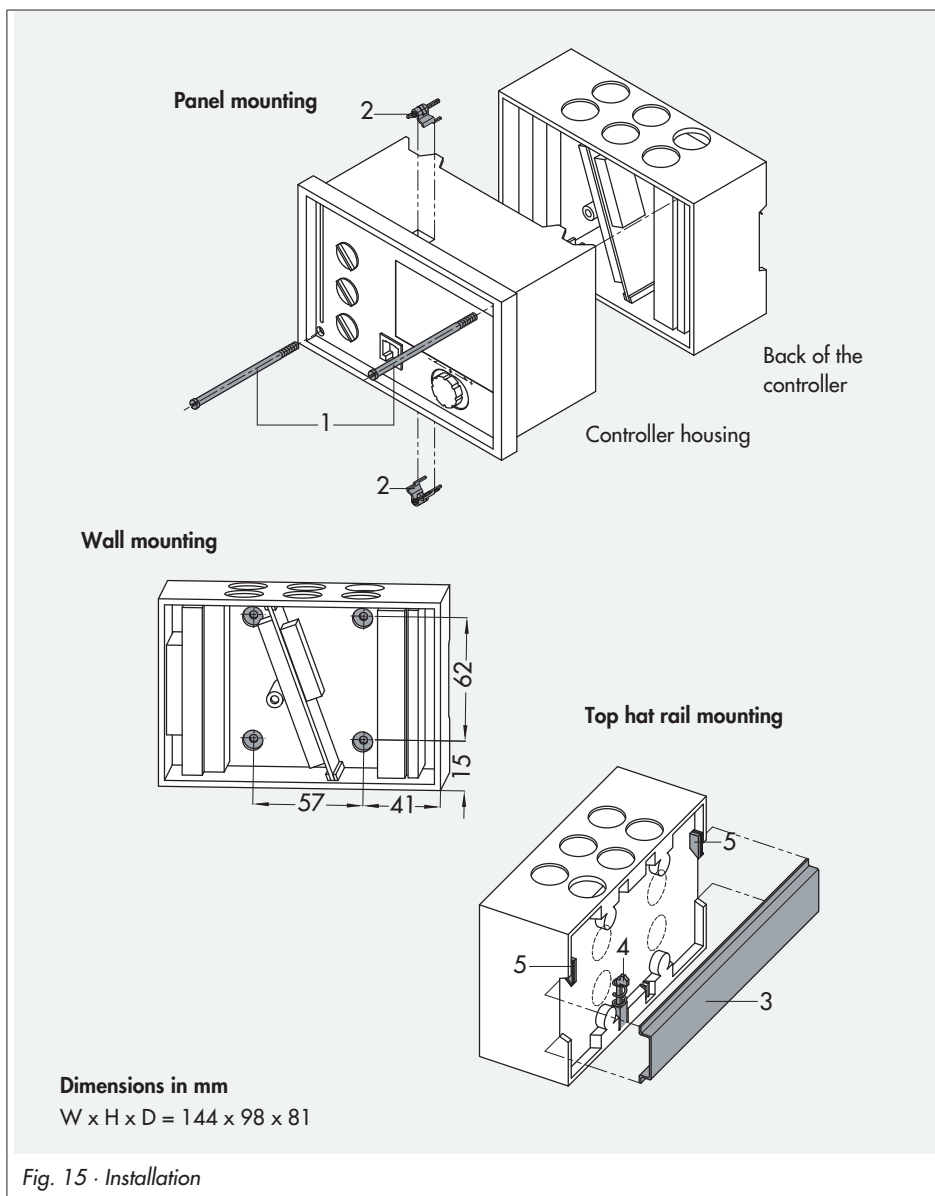


Fig. 15 · Installation

11 Electrical connection

CAUTION!

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!

Notes on installing the electrical connections

- ▶ Install the 230 V power supply lines and the signal lines separately! To increase noise immunity, observe a minimum distance of 10 cm between the lines. Make sure the minimum distance is also observed 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 to use 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 cable $\geq 10 \text{ mm}^2$ 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, should be shielded with separators providing a good ground connection.

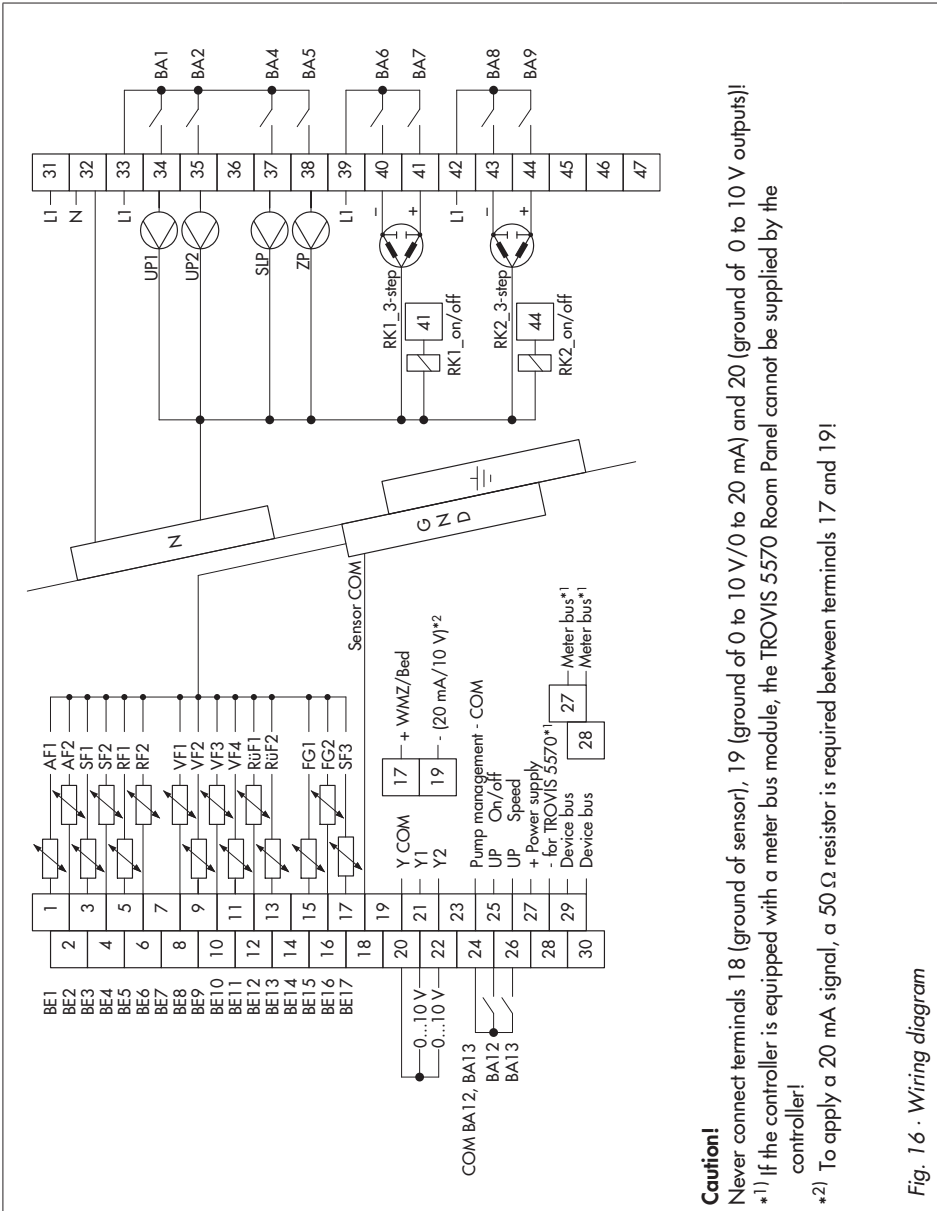
Overvoltage protection

- ▶ 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

The controller is connected as illustrated in the diagram on page 129.

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 rear part of the housing and fit suitable grommets or cable glands.



Caution!

Never connect terminals 18 (ground of sensor), 19 (ground of 0 to 10 V/0 to 20 mA) and 20 (ground of 0 to 10 V outputs)!
 *1) If the controller is equipped with a meter bus module, the TROVIS 5570 Room Panel cannot be supplied by the controller!

*2) To apply a 20 mA signal, a 50 Ω resistor is required between terminals 17 and 19!

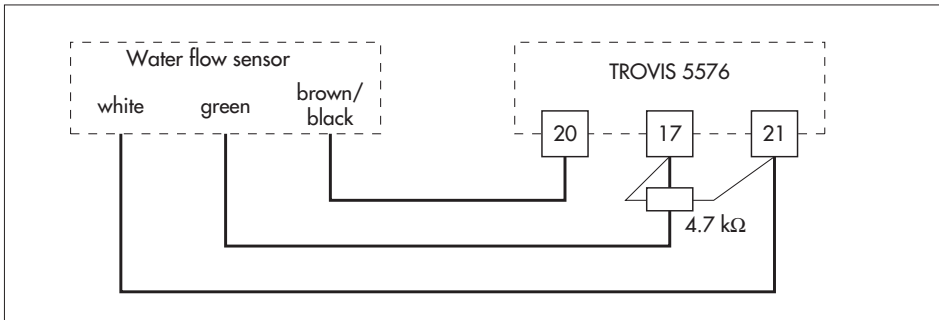
Fig. 16 · Wiring diagram

Connecting the sensors

Cables with a minimum cross-section of $2 \times 0.5 \text{ mm}^2$ can be connected to the terminals at the back panel of the housing.

Connecting the water flow sensor (order no. 1400-9246)

A power supply unit and a $4.7 \text{ k}\Omega$ resistor are required for the water flow sensor to function.



Connecting the actuators

- ▶ 0 to 10 V outputs:
Use cables with a minimum cross-section of $2 \times 0.5 \text{ mm}^2$.
- ▶ Three-step or on/off outputs:
Connect cables with at least 1.5 mm^2 suitable for damp locations to the terminals of the controller output. The direction of travel needs to be checked at start-up.

Connecting the pumps

Connect all cables with at least 1.5 mm^2 to the terminals of the controller as illustrated in the wiring diagram.

Legend for wiring diagram (page 129):

AF	Outdoor sensor	RüF	Return flow sensor
BA	Binary output	SF	Storage sensor
BE	Binary input	SLP	Storage tank charging pump
FG	Potentiometer	UP	Circulation pump
RF	Room sensor	VF	Flow sensor
Rk	Control circuit	WMZ	Heat meter

12 Appendix

12.1 Function block lists

CO1: Heating circuit Rk1 (not Anl 1.9)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Room sensor RF1	0	Not in Anl 1.5-1.8, 3.x, 7.x, 14.x	CO1 -> F01 - 1: Temperature display and input FG1 for Type 5244/5257-5 Room Panel active TROVIS 5570 Room Panel: CO1 -> F01 - 1 and CO7 -> F03 - 1
02	Outdoor sensor AF1	1	Not in Anl 1.5-1.8, 7.x	CO1 -> F02 - 1: Weather-compensated control active Outdoor temperature received via device bus: CO1 -> F02 - 1 and CO7 -> F07 - 1
03	Return flow sensor RfF1	0	1.2, 1.4, 10.2	CO1 -> F03 - 1: Sensor and limiting function active Function block parameter: Limiting factor / 0.1 to 10.0 (1.0)
		1	Not in Anl 1.2, 1.4, 10.2	
04	Cooling control	0	All*	CO1 -> F04 - 1: Cooling control, only with CO1 -> F11 - 1 The cooling control causes the reversal of the operating direction and a minimum limitation of the return flow temperature in Rk1.
05	Underfloor heating Drying of jointless floors	0	Not in Anl 1.5-1.8, 3.x, 7.x, 14.x	CO1 -> F05 - 1: Limitation of the adjustment ranges Function block parameters: Start temperature / 20 to 60 °C (25 °C) Temperature rise / 0 to 10 °C/24 h (5 °C/24 h) Maximum temperature / 25 to 60 °C (45 °C) Maintaining time of max. temperature/1 to 10 days (4 days) Temperature reduction / 0 to 10 °C/ 24 h (0 °C / 24 h) ■ START, ■■ START, ■■■ START
06	Reserved			
07	Optimization	0	Not in Anl 1.5-1.8, 3.x, 7.x, 14.x	CO1 -> F07 - 1: Only with <ul style="list-style-type: none"> • CO1 -> F01 - 1 • CO1 -> F02 - 1
08	Adaptation	0	Not in Anl 1.5-1.8, 3.x, 7.x, 14.x	CO1 -> F08 - 1: Only with <ul style="list-style-type: none"> • CO1 -> F01 - 1 • CO1 -> F02 - 1 • CO1 -> F11 - 0

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
09	Flash adaptation	0	Not in Anl 1.5-1.8, 3.x, 7.x, 14.x	CO1 -> F09 - 1: Only with CO1 -> F01 - 1 Function block parameter: Cycle time / 1 to 100 min (20 min) K _p (gain) / 0 to 25
10	Reserved	0		
11	Four-point characteristic	0	Not in Anl 1.5-1.8	CO1 -> F11 - 1: Four-point characteristic, only with CO1 -> F08 - 0 CO1 -> F11 - 0: Gradient characteristic
12	Control mode three-step [Rk1] 0 to 10 V [Y1]	1	All	CO1 -> F12 - 1: With [Rk1] three-step control With [Y1] 0 to 10 V control Function block parameters: K _p (proportional gain) / 0.1 to 50.0 (2.0) T _N (reset time) / 1 to 999 sec (120 sec) T _V (derivative-action time) / 0 to 999 sec (0 sec) T _Y (valve transit time) / 5, 10, 15, ..., 240 sec (45 sec) CO1 -> F12 - 0: On/off control Function block parameters: Hysteresis / 1 to 30 °C (5 °C) Min. ON time / 0 to 10 min (2 min) Min. OFF time / 0 to 10 min (2 min)
13	Limitation of deviation for OPEN signal	0	All	CO1 -> F13 - 1: Only with CO1 -> F12 - 1 Function block parameter: Max. deviation / 2 to 10 °C (2 °C)
14	Release Rk1 at BE15	0	All	With CO1 -> F14 - 1, FG1 has no function; Options bE / 1, 0 (1)
15	Processing an external demand in Rk1	0	All	How the external demand is processed in Rk1 depends on CO1 -> F16, CO1 -> F17 and CO7 -> F15.
16	Processing an external demand, 0 to 10 V Input term. 17/19	0	Not in systems with solar circuit, not 14.x	CO1 -> F16 - 1: Only with <ul style="list-style-type: none"> • CO1 -> F15 - 1 • CO1 -> F17 - 0 Function block parameters: Lower transmission range / 1 to 130 °C (0 °C) Upper transmission range / 1 to 130 °C (120 °C)
17	Processing an external demand, binary Input term. 17/18	0	Not in systems with solar circuit, not 14.x	CO1 -> F17 - 1: Only with <ul style="list-style-type: none"> • CO1 -> F15 - 1 • CO1 -> F16 - 0 Options bE / 1, 0 (1)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
18	Maximum flow set point requested by issuing a 0 to 10 V signal	0	All	CO1 -> F18 - 1: Controller output Y1 is no longer available. The max. flow set point (with boost, if need be) is requested by issuing a 0 to 10 V signal over Y1 . Function block parameters: Lower transmission range / 0 to 130 °C (0 °C) Upper transmission range / 0 to 130 °C (120 °C) Boost of flow temperature demand / 0 to 30 °C (0 °C)
19	Maximum flow set point requested by issuing a 0 to 10 V signal with sequence control	0	All	CO1 -> F19 - 1: Only with CO1 -> F18 - 1, the controller output Y2 is no longer available. Function block parameters: Time delay for sequence change / 0 to 10 min (5 min) System deviation for enabling sequence control / 1 to 30 °C (1 °C) Lead change / 0 to 10 days (1 day)
20	External demand for heat due to insufficient heat supply	0	All	CO1 -> F20 - 1: Demand for an external heat source Options bin (demand using binary output BA12)/AnA (demand using an analog signal at Y1 (0 to 10 V)) AnA selected by setting C01 -> F18 - 1

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

CO2: Heating circuit Rk2 (systems Anl 3.0-3.4, 4.x, 10.x)*

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Room sensor RF2	0	All*	CO2 -> F01 - 1: Temperature display and input FG2 for Type 5244/5257-5 Room Sensor active TROVIS 5570 Room Panel: CO2 -> F01 - 1 and CO7 -> F04 - 1
02	Outdoor sensor AF2	0	4.x, 10.x	With measured value AF2, the value of AF1 is read Outdoor temperature received via device bus: CO2 -> F02 - 1 and CO7 -> F09 - 1
03	Return flow sensor RüF2	1	10.0, 10.5	CO2 -> F03 - 1: Sensor and limiting function active Function block parameter: Limiting factor / 0.1 to 10.0 (1.0)
		0	3.x, 4.x, 10.1, 10.2, 10.3	
04	Cooling control	0	All*	CO2 -> F04 - 1: Cooling control, only with CO2 -> F11 - 1 The cooling control causes the reversal of the operating direction and a minimum limitation of the return flow temperature in Rk2.

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
05	Underfloor heating Drying of jointless floors	0	All*	CO2 -> F05 - 1: Limitation of the adjustment ranges Function block parameters: Start temperature / 20 to 60 °C (25 °C) Temperature rise / 0 to 10 °C/24 h (5 °C/24 h) Maximum temperature / 25 to 60 °C (45 °C) Maintaining time of max. temperature/1 to 10 days (4 days) Temperature reduction / 0 to 10 °C/ 24 h (0 °C / 24 h) ■ START, ■■ START, ■■■ START
06	Reserved			
07	Optimization	0	All*	CO2 -> F07 - 1: Only with <ul style="list-style-type: none">• CO2 -> F01 - 1• CO1, 2 -> F02 - 1
08	Adaptation	0	All*	CO2 -> F08 - 1: Only with <ul style="list-style-type: none">• CO2 -> F01 - 1• CO1, 2 -> F02 - 1• CO2 -> F11 - 0
09	Flash adaptation	0	All*	CO2 -> F09 - 1: Only with CO2 -> F01 - 1 Function block parameters: Cycle time / 1 to 100 min (20 min) K _P (gain) / 0 to 25
10	Reserved			
11	Four-point characteristic	0	All*	CO2 -> F11 - 1: Four-point characteristic, only with CO2 -> F08 - 0 CO2 -> F11 - 0: Gradient characteristic
12	Control mode three-step [Rk2] 0 to 10 V [Y2]	1	All*	CO2 -> F12 - 1: With [Rk2] three-step control With [Y2] 0 to 10 V control Function block parameters: K _P (proportional gain) / 0.1 to 50.0 (2.0) T _N (reset time) / 1 to 999 sec (120 sec) T _V (derivative-action time) / 0 to 999 sec (0 sec) T _Y (valve transit time) / 5, 10, 15, ..., 240 sec (45 sec) CO2 -> F12 - 0 (only in systems Anl 10.0, 10.1 and 10.3): On/off control Function block parameters: Hysteresis / 1 to 30 °C (5 °C) Min. ON time / 0 to 10 min (2 min) Min. OFF time / 0 to 10 min (2 min)
13	Limit deviation for OPEN signal	0	All*	CO2 -> F13 - 1: Only with CO2 -> F12 - 1 Function block parameter: Max. deviation / 2 to 10 °C (2 °C)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
14	Release Rk2 at BE16	0	All*	CO2 -> F14 - 1: FG2 has no function Select bE / 1, 0 (1)

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

CO4: DHW heating

(Anl 1.1–1.9, 2.x, 3.1–3.4, 4.1–4.5, 7.x, 8.x, 10.1–10.3, 11.x, 14.x)*

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Storage sensor SF1	1	1)	CO4 -> F01 - 0 (not in Anl 11.0, 11.3): Storage tank thermostat, only with CO4 -> F02 - 0 1) WE = 0 in Anl 1.1-1.8, 2.x, 3.1-3.4, 4.1-4.5, 7.x, 8.x, 10.1-10.3, 11.1-11.4 1) WE = 0 in Anl 1.9, 11.9, 14.x
		0	2)	
02	Storage sensor SF2	0	1)	CO4 -> F02 - 1 (not in Anl 1.9, 11.0, 11.3, 11.9, 14.3): Only with CO4 -> F01 - 1 1) WE = 0 in Anl 1.1, 1.3, 1.5, 1.7, 2.0, 2.1, 2.3, 3.1, 3.3, 4.1, 4.3, 4.5, 7.1, 8.1, 10.1, 10.3, 11.1, 14.1 2) WE = 1 in Anl 1.2, 1.4, 1.6, 1.8, 2.2, 2.4, 3.2, 3.4, 4.2, 7.2, 8.2, 10.2, 11.2, 11.4, 14.2
		1	2)	
03	Return flow sensor RüF2	0	1.9, 7.x, 8.x, 11.x	CO4 -> F03 - 1: Sensor and limiting function active Function block parameter: Limiting factor / 0.1 to 10.0 (1.0)
04	Water flow sensor	0	1.9, 11.9	CO4 -> F04 - 1: option: AnA, bin (AnA) AnA: Analog analysis, water flow sensor 1400-9246 bin: Binary analysis, flow switch at terminals 17/19
05	Flow sensor VF4	0	1.1–1.4, 1.6, 1.8, 1.9, 2.2, 2.4, 3.2, 3.4, 4.2, 7.2, 8.2, 10.1-10.3, 11.2, 11.9	CO4 -> F05 - 1: Flow sensor VF4 to measure the storage tank charging temperature or DHW temperature active In some systems, VF4 replaces the flow sensor VF2, which then measures the heat exchanger charging temperature.

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
06	Parallel pump operation	0	2.1-2.4, 4.1-4.5	CO4 -> F06 - 1: Function block parameters: Stop parallel pump operation in case of deviation / 0 to 10 min (10 min) Flow limit temp. parallel pump operation / 20 to 90 °C (40 °C) CO4 -> F06 - 0: UP1 switched off during DHW heating
		1	8.x	
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 over heating operation in UP1 circuit
		0	8.x	
08	Priority through reverse control	0	1.1-1.4, 3.1-3.4, 4.1-4.5, 10.1-10.3, 11.x	CO4 -> F08 - 1: Only with CO4 -> F09 - 0; in systems Anl 10.x, only Rk2 is influenced Function block parameters: Activate priority in case of deviation / 0 to 10 min (2 min) Correction factor / 0.1 to 10.0 (1.0)
09	Priority through set-back operation	0	1.1-1.4, 3.1-3.4, 4.1-4.5, 10.1-10.3, 11.x	CO4 -> F09 - 1: Only with CO4 -> F08 - 0 in systems Anl 10.x, only set-back in Rk2 Function block parameter: Activate priority in case of deviation / 0 to 10 min (2 min)
10	Circulation pump integrated into heat exchanger	0	1.6, 1.8, 7.2, 8.2, 11.2, 11.4	CO4 -> F10 - 1: Control of DHW circuit active while circulation pump ZP is operated
11	Operation of circulation pump during storage tank charging	0	Not Anl 1.9, 11.0, 11.3, 11.9, 14.x	CO4 -> F11 - 1: Circulation pump (ZP) operates according to time schedule during storage tank charging CO4 -> F11 - 0: ZP switched off during storage tank charging

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
12	Control mode three-step [Rk2] 0 to 10 V [Y2]	1	7.x, 8.x, 11.x	CO4 -> F12 - 1: With [Rk2] three-step control With [Y2] 0 to 10 V control Function block parameters: K _p (proportional gain) / 0.1 to 50.0 (2.0; Anl 1.9, 11.9: 0.6) T _N (reset time) / 1 to 999 sec (120 sec; Anl 1.9, 11.9: 12 s) T _V (derivative-action time) / 0 to 999 sec (0 sec) T _Y (valve transit time) / 5, 10, 15, ..., 240 sec (45 sec; Anl 1.9, 11.9: 20 s) CO4 -> F12 - 0 (only in systems Anl 11.0, 11.1, 11.3): On/off control Function block parameters: Hysteresis / 1 to 30 °C (5 °C) Min. ON time / 0 to 10 min (2 min) Min. OFF time / 0 to 10 min (2 min)
13	Limit deviation for OPEN signal	0	1.9, 11.x	CO4 -> F13 - 1: Only with CO4 -> F12 - 1 Function block parameter: Max. deviation / 2 to 10 °C (2 °C)
14	Thermal disinfection	0	All*	CO4 -> F14 - 1: Only with CO4 -> F01 - 1 Function block parameters: Day of the week / 1, 2, ..., 7, 1-7 (3) Start time / 0:00h to 23:45h (0:00h); in steps of 15 min Stop time / 0:00h to 23:45h (4:00h); in steps of 15 min Disinfection temperature / 60 to 90 °C (70 °C) Set point boost / 0 to 50 °C (10 °C) Hold time of disinfection temperature / 0 to 255 min (0 min) With setting Start time = Stop time select: BE / 1, 0 (1)
15	SLP ON depending on return flow temperature	0	1.5-1.8, 2.0, 2.1, 2.3, 3.1, 3.3, 4.1, 4.3, 11.1, 11.2	For systems Anl 1.5-1.8, 2.0, 2.1, 2.3, 3.1, 3.3, 4.1 and 4.3: CO4 -> F15 - 1: Only when CO1 -> F03 - 1 For systems Anl 11.1 and 11.2: CO4 -> F15 - 1: Only when CO4 -> F03 - 1
16	Priority for external demand	0	1.5-1.8, 2.x, 3.1-3.4, 4.1-4.3	With CO4 -> F16 - 1, a high external demand causes excessive charging temperatures in DHW circuits without control valve
		1	7.x, 8.x	Cannot be changed in systems Anl 7.x and 8.x.

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
17	BA12 ON during thermal disinfection	0	All*	CO4 -> F17 - 1: Only with CO4 -> F18 - 0
18	BA12 ON during DHW demand	0	All*	CO4 -> F18 - 1: Only with CO4 -> F17 - 0
19	Time-controlled switchover of storage tank sensors	0	Not Anl 1.9, 11.0, 11.3, 11.9, 14.x	CO4 -> F19 - 1 only with CO4 -> F02 - 1 SF1 for day mode and SF2 for night mode.
20	DHW circuit additionally controlled by a globe valve	0	7.1, 8.1, 11.1	CO4 -> F20 - 1: Return flow temperature limitation over a globe valve with VF2 in the heating register return pipe of the storage tank.
21	Speed reduction of charging pump based on charging progress	0	1.5–1.8, 2.x, 3.1–3.4, 4.1–4.3, 7.x, 8.x, 10.1–10.3, 11.1–11.4	CO4 -> F21 - 1: Activation of speed reduction and storage tank sensor SF2 Function block parameters: Start speed reduction: 5 to 90 °C (40 °C) Stop speed reduction: 5 to 90 °C (50 °C) Min. speed signal: 0 to 10 V (2 V)

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


CO5: System-wide functions (all systems)

If CO5 -> F00 - 1 is indicated, access to the return flow, flow rate and heat capacity settings are locked.

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Sensor calibration	1	All	CO5 -> F01 - 1, -> F02 - 0, -> F03 - 0: Pt 1000 (Pt 100)
02		0	All	CO5 -> F01 - 0, -> F02 - 0, -> F03 - 0: PTC (Pt 100), CO5 -> F01 - 0, -> F02 - 1, -> F03 - 0: NTC (Pt 100)
03		0	All	CO5 -> F01 - 1, -> F02 - 1, -> F03 - 0: Ni 1000 (Pt 100) CO5 -> F01 - 0, -> F02 - 0, -> F03 - 1: Pt 500 (Pt 100)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
04	Summer mode	0	Not Anl 1.9, 3.5	CO5 -> F04 - 1: Activation of time-controlled summer mode Function block parameters: Start summer mode / 01.01 to 31.12 (01.06) No. of days until activation / 1 to 3 (2) Stop summer mode / 01.01 to 31.12 (30.09) No. of days until deactivation / 1 to 3 (1) OT limit value summer mode / 0 to 30 °C (18 °C)
05	Delayed OT adaptation when OT decreases	0	Not Anl 1.9	CO5 -> F05 - 1: Function block parameter: Delay / 1 to 6 °C/h (3 °C/h)
06	Delayed OT adaptation when OT increases	0	Not Anl 1.9	CO5 -> F06 - 1: Function block parameter: Delay / 1 to 6 °C/h (3 °C/h)
07	Fault indication output BA13	0	All	With CO5 -> F07 - 1, the pump management function is not available Function block parameter: bA / 1, 0 (1)
08	Automatic summer time/winter time changeover	1	All	
09	Frost protection program II	1	Not Anl 1.5-1.8, 3.5, 7.x	CO5 -> F09 - 0: Frost protection program I (restricted frost protection) Function block parameter: Frost limit / -15 to 3 °C (3 °C)
		0	1.5-1.9, 3.5, 7.x	CO5 -> F09 - 1: Frost protection program II Function block parameter: Frost limit / -15 to 3 °C (3 °C)
10	Flow rate limitation (capacity limitation) in Rk1 with pulses at input WMZ	0	Not in systems with solar circuit Not Anl 1.9, 14.x	CO5 -> F10 - 1: Only with • CO5 -> F11 - 0 • CO6 -> F12 - 0 Input "WMZ/Bed" (terminal 17/19) Function block parameters: Max. limit value / 3 to 800 pulse/h (15 pulse/h) Max. limit value for heating* / 3 to 800 pulse/h (15 pulse/h) Max. limit value for DHW* / 3 to 800 pulse/h (15 pulse/h) Limiting factor / 0.1 to 10.0 (1.0)

			Comment	
F	Function	WE	Anl	Function block parameters / Range of values (default)
11	Flow rate limitation in Rk1 with 0/4 to 20 mA at input WMZ (with 50 Ω in parallel to input WMZ terminal 17/19)	0	Not in systems with solar circuit Not Anl 1.9, 14.x	CO5 -> F11 - 1 Only with <ul style="list-style-type: none"> • CO5 -> F10 - 0 • CO6 -> F11 - 0 Input "WMZ/Bed" (terminal 17/19) Function block parameters: Lower measuring range value 0 or 4 mA Upper meas. range value 20 mA / 0.01 to 650 (1.5) m ³ /h Max. limit value / 0.01 to 650 (1.5) m ³ /h Max. limit value for heating* / 0.01 to 650 m ³ /h (1.5 m ³ /h) Max. limit value for DHW* / 0.01 to 650 m ³ /h (1.5 m ³ /h) Limiting factor / 0.1 to 10.0 (1.0)
12	Creep feed rate limitation	0	Not Anl 1.9	CO5 -> F12 - 1: Creep feed rate limitation using BE13 (bin) or RUF1 (AnA) Function block parameter (when 'bin' selected): bE / 1, 0 (1)
13	Capacity limitation on the basis of a connected flow rate signal in Rk1	0	All	CO5 -> F13 - 1 only with CO1 -> F03 - 1 and CO5 -> F11 - 1 Connection of primary flow sensor at input FG2 Function block parameters: Max. limit value / 0.1 to 6500 kW (1.5 kW) Max. limit value for heating* / 0.1 to 6500 kW (1.5 kW) Max. limit value for DHW* / 0.1 to 6500 kW (1.5 kW) Limiting factor / 0.1 to 10.0 (0.1)
14	UP1 operation to cover own demand		Anl 3.0, 7.x	CO5 -> F14 - 1: Feeder pump UP1 also starts to cover demand of own control circuit
15	Release controller at BE1		All	CO5 -> F15 - 1: FG1 has no function Function block parameter: bE= 1, bE=0 (bE=1)
16	Return flow temperature limitation with P algorithm	0	All	CO5 -> F16 - 1: Return flow temperature limitation with proportional component only
17	Pump management - switching state of BA13	0	Not Anl 1.5-1.9, 3.5, 7.x	CO5 -> F17 - 1: Speed control released when BA13 = ON, only when CO5 -> F07 - 0 CO5 -> F17 - 0: Speed control released when BA13 = OFF
19	Temperature monitoring	0	All	CO5 -> F19 - 1: Temperature monitoring active
20	Sensor calibration	1	All	CO5 -> F20 - 1: Adjusting all sensor calibration values CO5 -> F20 - 0: Deleting all adjusted sensor calibration values

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
21	Locking manual level	0	All	CO5 -> F21 - 1: In switch position  , automatic mode applies
22	Locking the rotary switches	0	All	CO5 -> F22 - 1: All rotary switches are locked
23	Outdoor temperature received over 0 to 10 V input	0	Not Anl 14.x	CO5 -> F23 - 1: Outdoor temperature received over 0 to 10 V input (terminals 17/19) Function block parameters: Lower transmission range / -30 to 100 °C (-20 °C) Upper transmission range / -30 to 100 °C (50 °C)
				*Not in Anl 1.0, 1.5, 1.6, 3.0, 4.0, 7.x, 10.x, 11.x

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

CO6: Modbus, meter bus (all systems)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Modbus	1	All	CO6 -> F01 - 1: Modbus active
02	Modbus 16-bit addressing	0	All	CO6 -> F02 - 1: 16-bit addressing, only with CO6 -> F01 - 1 CO6 -> F02 - 0: 8-bit addressing
03	Modem function	0	All	CO6 -> F03 - 1: Only with CO6 -> F01 - 1 / F08 - 1
04	Automatic modem configuration	0	All	CO6 -> F04 - 1: Only with CO6 -> F03 - 1 / F08 - 1
05	Lock dial-up	0	All	CO6 -> F05 - 1: No dial-up to GLT in case of error, only with CO6 -> F03 - 1
06	Dial-up also upon corrected error	0	All	CO6 -> F06 - 1: Dial-up to GLT also to indicate that an error has been corrected, only with CO6 -> F03 - 1
07	Control system monitoring	0	All	CO6 -> F07 - 1: Resetting all level bits to "autonomous" when there is no communication, only with CO6 -> F01 - 1
08	Text message	0	All	CO6 -> F08 - 1: Sending of text message active
09	Reserved			

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
10	Meter bus (optional, connection to terminal 27, 28)	0	All	CO6 -> F10 - 1: Meter bus active Function block parameters: (for WMZ1 to WMZ6) Meter bus address / 0 to 255 (255) Model code / 1434, CAL3, APA10, SLS (1434) Reading mode / 24h, CONT, Coil (24h) For WMZ1 with "1434" and "CONT", select: tAr-A, tAr-E with time schedule
11	Flow rate limitation in Rk1 using meter bus	0	Not Anl 1.9	CO6 -> F11 - 1: Only with <ul style="list-style-type: none">• CO6 -> F10 - 1• CO5 -> F11 - 0 Function block parameters: Max. limit value / 0.01 to 650 m ³ /h (1.5 m ³ /h) Max. limit value for heating* / At, 0.01 to 650 m ³ /h (1.5 m ³ /h) Max. limit value for DHW* / 0.01 to 650 m ³ /h (1.5 m ³ /h) Limiting factor / 0.1 to 10 (1)
12	Capacity limitation in Rk1 using meter bus	0	Not Anl 1.9	CO6 -> F12 - 1: Only with <ul style="list-style-type: none">• CO6 -> F10 - 1• CO5 -> F10 - 0 Function block parameters: Max. limit value / 0.1 to 6500 kW (1.5 kW) Max. limit value for heating* / At, 0.1 to 6500 kW (1.5 kW) Max. limit value for DHW* / 0.1 to 6500 kW (1.5 kW) Limiting factor / 0.1 to 10 (1.0)
13	Flow rate limitation in Rk2 using meter bus	0	Anl 3.0-3.4, 4.x, 7.x, 8.x, 10.x, 11.x	CO6 -> F11 - 1: Only with CO6 -> F10 - 1 and activated WMZ2 Function block parameters: Max. limit value / 0.01 to 650 m ³ /h (1.5 m ³ /h) Limiting factor / 0.1 to 10 (1)
14	Capacity limitation in Rk2 using meter bus	0	Anl 3.0-3.4, 4.x, 7.x, 8.x, 10.x, 11.x	CO6 -> F12 - 1: Only with CO6 -> F10 - 1 and activated WMZ2 Function block parameters: Max. limit value / 0.1 to 6500 kW (1.5 kW) Limiting factor / 0.1 to 10 (1.0)
				* Not in Anl 1.0, 1.5-1.8, 3.0, 3.5, 4.0, 7.x, 10.x, 11.x

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

CO7: Device bus (all systems, F02, F03, ... only with CO7 -> F01 -1)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Device bus	0	All	CO7 -> F01 - 1: Device bus active Function block parameter: Device bus address / Auto*, 1 to 32 (32) *Auto = controller automatically searches for free device bus address in the system
02	Clock synchronization	0	All	CO7 -> F02 - 1: Controller sends its time to all units connected to the device bus every 24 hours
03	TROVIS 5570 Room Panel in Rk1	0	1.0–1.4, 2.x, 4.x, 10.x, 11.x	CO7 -> F03 - 1: Communication with TROVIS 5570 active for Rk1; CO1 -> F01 - 1 is set automatically Function block parameter: Device bus address / Auto*, 1 to 32 (32) *Auto = controller automatically searches for a room panel for which detection mode has been activated
04	TROVIS 5570 Room Panel in Rk2	0	3.0-3.4, 4.x, 10.x	CO7 -> F04 - 1: Communication with TROVIS 5570 active for Rk2; CO2 -> F01 - 1 is set automatically Function block parameter: Device bus address / Auto*, 1 to 32 (32) *Auto = controller automatically searches for a room panel for which detection mode has been activated
05	Reserved			
06	Send value AF1	0	Not Anl 1.9	CO7 -> F06 - 1: Function block parameter: Register no. / 1 to 4 (1)
07	Receive value AF1	0	Not Anl 1.9	CO7 -> F07 - 1: Function block parameter: Register no. / 1 to 4 (1)
08	Send value AF2	0	Not Anl 1.9	CO7 -> F08 - 1: Function block parameter: Register no. / 1 to 4 (2)
09	Receive value AF2	0	Not Anl 1.9	CO7 -> F09 - 1: Function block parameter: Register no. / 1 to 4 (2)
10	Send flow set point Rk1	0	All	CO7 -> F10 - 1: In systems Anl 1.5–1.8, 2.x, 3.1–3.4, 4.1–4.3, 7.x, 8.x, the storage tank charging set point is sent during DHW heating Function block parameter: Register no. / 5 to 64 (5)
11	Send flow set point Rk2	0	All	CO7 -> F11 - 1: Function block parameter: Register no. / 5 to 64 (5)
12	Reserved			

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
13	Send flow set point DHW	0	All	CO7 -> F13 - 1: In level PA4, the <i>Charging temperature boost</i> parameter is generated Function block parameter: Register no. / 5 to 64 (5)
14	Send maximum flow set point	0	All	CO7 -> F14 - 1: Internally, the controller already determines the max. flow set point of its circuits and sends this value to the primary controller; Function block parameter: Register no. / 5 to 64 (5)
15	Receive external demand in Rk1	0	Not Anl 1.9	CO7 -> F15 - 1: External processing an external demand in Rk1 using device bus Function block parameter: Register no. / 5 to 64 (5)
16	Display error messages issued by device bus	0	All	CO7 -> F16 - 1: Controller generates "Err 5" error message as long as faults of other device bus participants exist.
17	Receive external demand in Rk2	0	Not Anl 1.x, 2.x	CO7 -> F15 - 1: External processing an external demand in Rk2 using device bus Function block parameter: Register no. / 5 to 64 (5)
18	Reserved	0	All	
19	Raise return flow temperature limit value	0	All	CO7 -> F19 - 1: Return flow temperature limit value of Rk1 raised when "DHW heating active" alert is issued by device bus Function block parameters: Register no. / 5 to 64 (32)
20	Send "DHW heating active"	0	All	CO7 -> F20 - 1: Function block parameter: Register no. / 5 to 64 (32)
21	Received release of Rk1	0	All	CO7 -> F21 - 1: Function block parameter: Register no. / 5 to 64 (32)
22	Receive release of Rk2	0	All	CO7 -> F22 - 1: Function block parameter: Register no. / 5 to 64 (32)

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

CO8: Initialization of free inputs (all systems)

F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
01	Analysis bE1	0	All	CO8 -> F01 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
02	Analysis bE2	0	All	CO8 -> F02 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
03	Analysis bE3	0	All	CO8 -> F03 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
04	Analysis bE4	0	All	CO8 -> F04 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
05	Analysis bE5	0	All	CO8 -> F05 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
06	Analysis bE6	0	All	CO8 -> F06 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
07	Reserved			
08	Reserved			
09	Analysis bE9	0	All	CO8 -> F09 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
10	Analysis bE10	0	All	CO8 -> F10 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
11	Analysis bE11	0	All	CO8 -> F11 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
12	Analysis bE12	0	All	CO8 -> F12 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
13	Analysis bE13	0	All	CO8 -> F13 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)

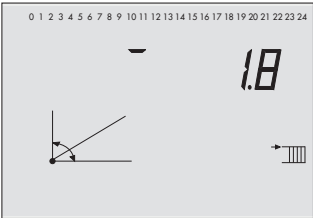
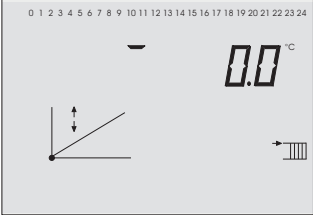
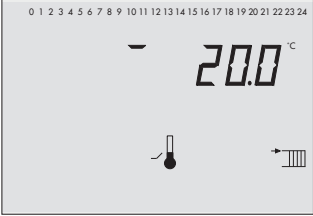
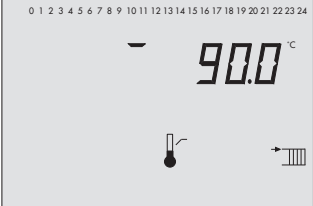
F	Function	WE	Anl	Comment Function block parameters / Range of values (default)
14	Reserved			
15	Analysis bE15	0	All	CO8 -> F15 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1))
16	Analysis bE16	0	All	CO8 -> F16 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)
17	Analysis bE17	0	All	CO8 -> F17 - 1: Function block parameter: Error message to error status register with bE state / 1, 0; no error message / --- (1)

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

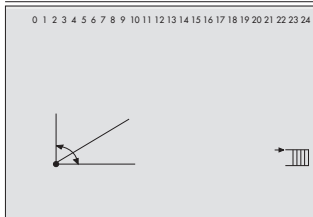
12.2 Parameter lists

PA1 (—): Parameter level Heating circuit Rk1

PA2 (—): Parameter level Heating circuit Rk2

Display	Parameter designation Range of values (default)
	Gradient, flow 0.2 to 3.2 (1.8) (with CO1, 2 -> F05 - 1: 0.2 to 1.0 (1.0) applies)
	Level (parallel shift) -30 to 30 °C (0 °C)
	Min. flow temperature 5 to 130 °C (20 °C)
	Max. flow temperature 5 to 130 °C (90 °C) (with CO1, 2 -> F05 - 1: 5 to 50 °C (50 °C) applies)

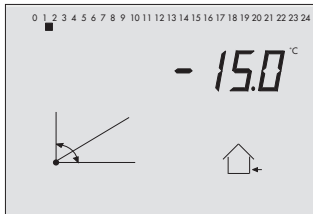
Display



Parameter designation
Range of values (default)

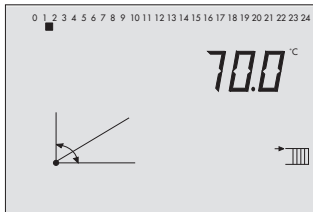
Four-point characteristic

- * Press rotary pushbutton to adjust the following parameters:
outdoor temperature,
flow temperature,
reduced flow temperature and
return flow temperature.



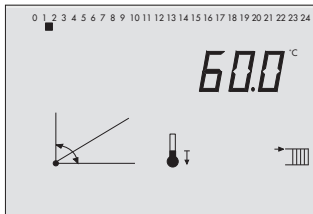
Four-point characteristic
Point 1 : Outdoor temperature

Outdoor temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.
-30 to 50 °C
(point 1: -15 °C, point 2: -5 °C, point 3: 5 °C, point 4: 15 °C)



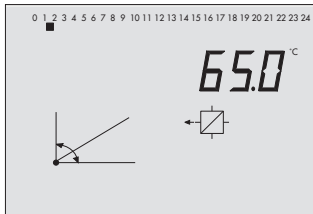
Four-point characteristic
Point 1 : Flow temperature

Flow temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.
5 to 130 °C
(point 1: 70 °C, point 2: 55 °C, point 3: 40 °C, point 4: 25 °C)



Four-point characteristic
Point 1 : Reduced flow temperature

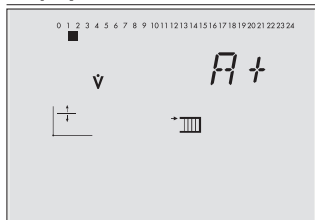
Reduced flow temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.
5 to 130 °C
(point 1: 60 °C, point 2: 40 °C, point 3: 20 °C, point 4: 20 °C)



Four-point characteristic
Point 1 : Return flow temperature

Return flow temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.
5 to 90 °C
(points 1 to 4: 65 °C)

Display



Parameter designation

Range of values (default)

Four-point characteristic

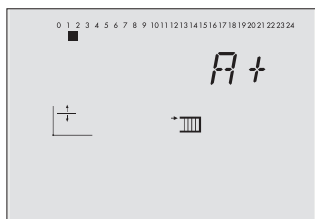
Point 1: Flow rate

Flow rate values of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.

At, 0.01 to 650 $\frac{\text{m}^3}{\text{h}}$

(points 1 to 4: At)

Parameter level PA1 only



Four-point characteristic

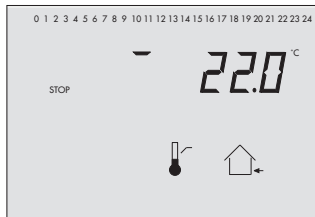
Point 1: Capacity

Capacity values of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4.

At, 0.1 to 6500 kW

(points 1 to 4: At)

Parameter level PA1 only



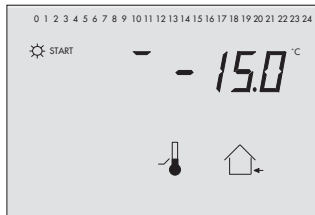
OT deactivation value in rated operation

0 to 50 °C (22 °C)



OT deactivation value in reduced operation

-20 to 50 °C (15 °C)

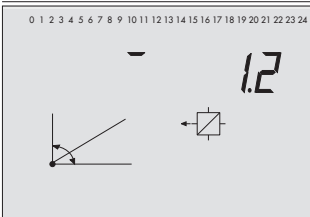


OT activation value in rated operation

-20 to 5 °C (-15 °C)

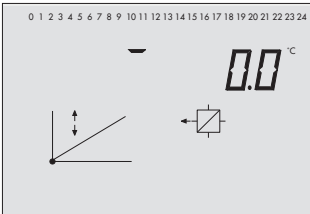
Display

Parameter designation
Range of values (default)



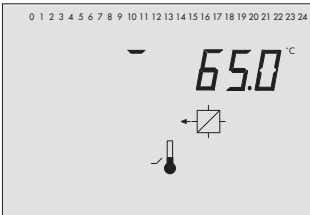
Gradient, return flow

0.2 to 3.2 (1.2)



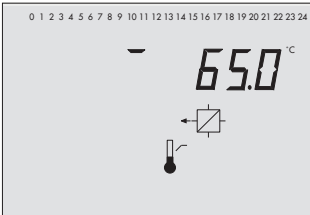
Level, return flow

-30 to 30 °C (0 °C)



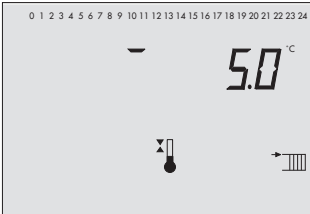
Return flow temperature foot

5 to 90 °C (65 °C)



Max. return flow temperature

5 to 90 °C (65 °C)

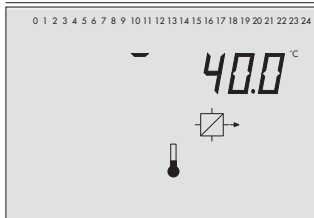


Set point boost for primary exchanger control

0 to 50 °C (5 °C)

Only in parameter level PA1

Display



Parameter designation

Range of values (default)

Set point of binary demand processing

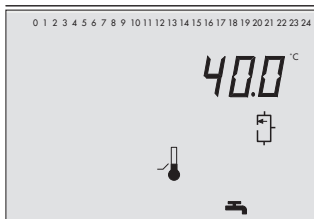
5 to 130 °C (40 °C)

Only in parameter level PA1

PA4: DHW heating parameters

(An1 1.1 to 1.8, 2.x, 3.1 to 3.4, 4.1 to 4.5, 7.x, 8.x, 10.1 to 10.3 and 11.x)

Display

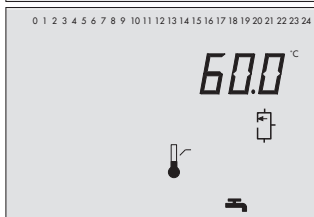


Parameter designation

Range of values (default)

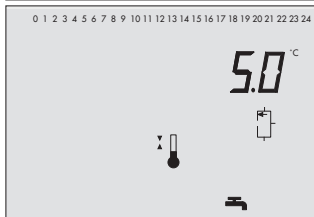
Min. DHW temperature

5 to 90 °C (40 °C)



Max. DHW temperature

5 to 90 °C (60 °C)



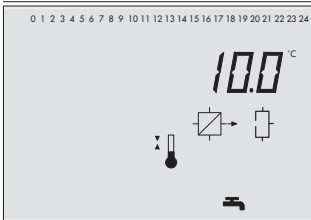
Hysteresis

0 to 30 °C (5 °C)

Display

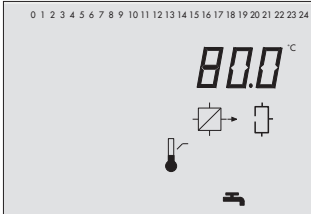
Parameter designation

Range of values (default)



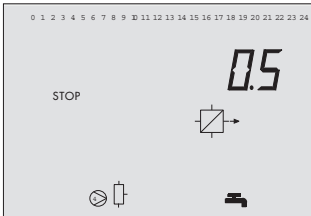
Charging temperature boost

0 to 50 °C (10 °C)



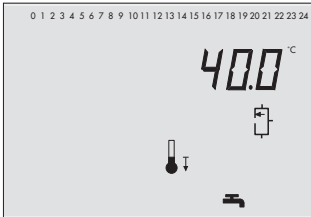
Max. charging temperature (only with VF4)

20 to 130 °C (80 °C)



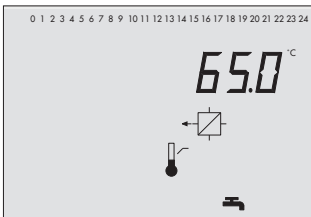
Lag of storage tank charging pump

0 to 10.0 (0.5)



Sustained DHW temperature

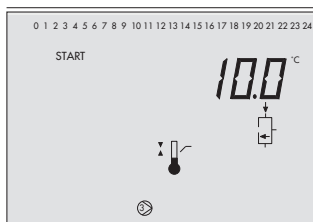
5 to 90 °C (40 °C)



Max. return flow temperature

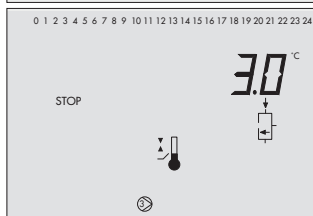
20 to 90 °C (65 °C)

Display

Parameter designation
Range of values (default)

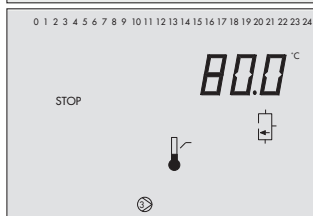
Solar pump ON

1 to 30 °C (10 °C)



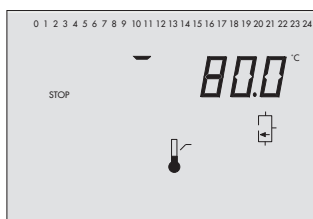
Solar pump OFF

0 to 30 °C (3 °C)



Max. storage tank temperature

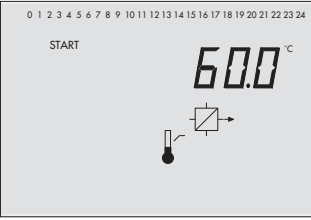
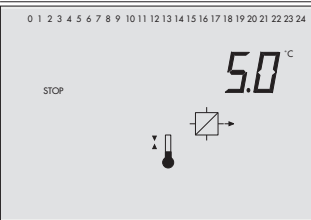
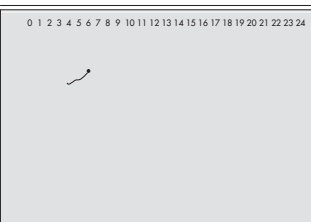
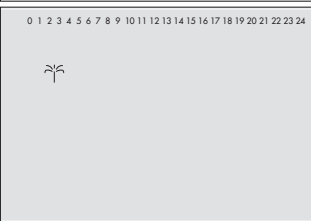
20 to 90 °C (80 °C)



Maximum buffer tank temperature

20 to 90 °C (80 °C)

PA5: System-wide parameters (all systems)

Display	Parameter designation
 <p>The display shows a 24-digit numeric row at the top. Below it, the word 'START' is on the left. In the center, '60.0 °C' is displayed in large digits. At the bottom, there is an icon of a boiler pump (a circle with a vertical line and a square with an arrow pointing right).</p>	<p>Boiler pump ON 20 to 90 °C (60 °C) Anl 14.1, 14.2 only</p>
 <p>The display shows a 24-digit numeric row at the top. Below it, the word 'STOP' is on the left. In the center, '5.0 °C' is displayed in large digits. At the bottom, there is an icon representing hysteresis (a thermometer with a vertical line and a square with an arrow pointing right).</p>	<p>Hysteresis 0 to 30 °C (5 °C) Anl 14.1, 14.2 only</p>
 <p>The display shows a 24-digit numeric row at the top. Below it, there is a small icon of a curved line with an arrow pointing up and to the right, representing public holidays.</p>	<p>Public holidays (01.01 to 31.12 -> section 1.8.1)</p>
 <p>The display shows a 24-digit numeric row at the top. Below it, there is a small icon of a curved line with an arrow pointing up and to the right, representing vacation periods.</p>	<p>Vacation periods (01.01 to 31.12 -> section 1.8.2)</p>

PA6: Modbus parameters (all systems)

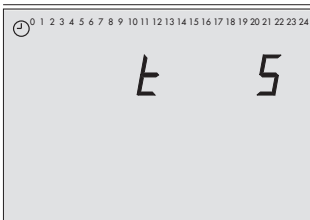
Display

Parameter designation
Range of values (default)

<p>0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24</p> <p>ST-NR</p> <p>255</p>	<p>Station address</p> <p>1 to 247 (255) (with CO6 -> F02 - 1, 1 to 32000 applies)</p>
<p>0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24</p> <p>BAUD</p> <p>9600</p>	<p>Baud rate</p> <p>19200, 9600 (9600)</p>
<p>⌚ 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24</p> <p>1 30</p>	<p>Cyclical initialization (I)</p> <p>1 to 255 min (30 min)</p>
<p>⌚ 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24</p> <p>P 5</p>	<p>Modem dialing pause (P)</p> <p>0 to 255 min (5 min)</p>

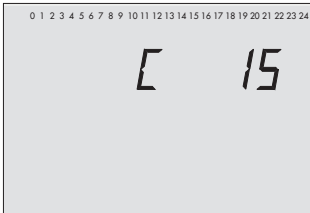
Display

Parameter designation Range of values (default)



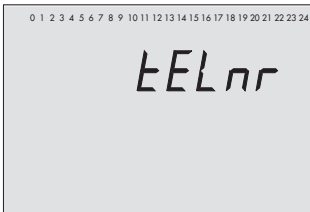
Modem time-out (t)

1 to 255 min (5 min)



Number of redialing attempts to GLT (C)

1 to 255 (15)



Phone number of control station (tELnr)

Max. 22 characters; 1, 2, 3, ..., 9, 0;

"-" = end of a string

"P" = pause



Access number (tAPnr)

Max. 22 characters; 1, 2, 3, ..., 9, 0;

"-" = end of a string

"P" = pause



Mobile phone number (HAndy)

Max. 22 characters; 1, 2, 3, ..., 9, 0;

"-" = end of a string

"P" = pause

12.3 Assignment of the rotary switches

System Anl	Top rotary switch	Middle rotary switch	Bottom rotary switch
1.0	Heating circuit Rk1	–	–
1.1 to 1.4	Heating circuit Rk1	–	DHW heating
1.5 to 1.8	Primary heat exchanger circuit Rk1	–	DHW heating
1.9	–	–	DHW heating
2.x	Heating circuit Rk1	–	DHW heating
3.0	Primary heat exchanger circuit Rk1 and heating circuit Rk2	–	–
3.1 to 3.4	Primary heat exchanger circuit Rk1 and heating circuit Rk2	–	DHW heating
3.5	Primary heat exchanger circuit Rk1	–	–
4.0	Heating circuit Rk1	Supplementary heating circuit Rk2	–
4.1 to 4.5	Heating circuit Rk1	Supplementary heating circuit Rk2	DHW heating
7.x	Primary heat exchanger circuit Rk1	–	DHW heating Rk2
8.x	Heating circuit Rk1	–	DHW heating Rk2
10.0	Heating circuit Rk1	Heating circuit Rk2	–
10.1 to 10.3	Heating circuit Rk1	Heating circuit Rk2	DHW heating
10.5	Heating circuit Rk1	Heating circuit Rk2	–
11.x	Heating circuit Rk1	–	DHW heating Rk2
14.x	Buffer tank circuit Rk1	–	DHW heating

12.4 Sensor resistance tables

Resistance values with PTC resistors

Type 5224 Outdoor Temperature Sensors, Type 5264 and Type 5265 Flow and Return Flow Temperature Sensors, Type 5264 Storage Tank Temperature Sensors

°C	-20	-10	0	10	20	25	30	40	50	60	70	80	90	100	110	120
Ω	694	757	825	896	971	1010	1050	1132	1219	1309	1402	1500	1601	1706	1815	1925

Type 5244 Room Sensor

Switch position ☉, terminals 1 and 2

°C	10	15	20	25	30
Ω	679	699	720	741	762

Resistance values with Pt 1000 resistors

Type 5227-2 Outdoor Temperature Sensor, Type 5277-2 (thermowell required) and Type 5267-2 (contact sensor) Flow, Return Flow and Storage Tank Temperature Sensors.
Type 5257-1, Type 5257-5 (room panel) Room Temperature Sensors.

°C	-35	-30	-25	-20	-15	-10	-5	0	5	10
Ω	862.5	882.2	901.9	921.6	941.2	960.9	980.4	1000.0	1019.5	1039.0
°C	15	20	25	30	35	40	45	50	55	60
Ω	1058.5	1077.9	1097.3	1116.7	1136.1	1155.4	1174.7	1194.0	1213.2	1232.4
°C	65	70	75	80	85	90	95	100	105	110
Ω	1251.6	1270.7	1289.8	1308.9	1328.0	1347.0	1366.0	1385.0	1403.9	1422.9
°C	115	120	125	130	135	140	145	150		
Ω	1441.7	1460.6	1479.4	1498.2	1517.0	1535.8	1554.5	1573.1		

Resistance values with Pt 500 resistors

Halve the listed resistance values with Pt 1000 resistors.

Resistance values with Ni 1000 resistors (acc. to DIN 43760)

°C	-35	-30	-25	-20	-15	-10	-5	0	5	10
Ω	816.2	841.5	867.0	893.0	919.2	945.8	972.7	1000.0	1027.6	1055.5
°C	15	20	25	30	35	40	45	50	55	60
Ω	1083.8	1112.4	1141.3	1170.6	1200.2	1230.1	1260.4	1291.1	1322.0	1353.4
°C	65	70	75	80	85	90	95	100	105	110
Ω	1385.1	1417.2	1449.7	1482.5	1515.7	1549.3	1583.4	1617.8	1652.6	1687.9
°C	115	120	125	130	135	140	145	150		
Ω	1723.6	1759.7	1796.3	1833.3	1870.9	1908.9	1947.4	1986.3		

12.5 Technical data

Inputs	15 configurable inputs for temperature sensor Pt 1000/Pt 100, PTC/Pt 100, NTC/Pt 100, Ni 1000/Pt 100 or Pt 500/Pt 100 and binary inputs, Input 17 alternatively for flow rate signal from the heat meter or demand signal from supplementary circuits, 4(0) to 20 mA with 50 Ω parallel resistor or 0 to 10 V (demand: 0 to 10 V correspond with 20 to 120 °C flow temperature)
Outputs* * For systems with 2 control loops and 5 pumps, the second heating circuit can only use the 0 to 10 V output.	2 x three-step signal: load max. 250 V AC, 2A Alternatively on/off signal: load max. 250 V AC, 2A Alternatively continuous-action output: 0 to 10 V, load > 5 k Ω 4 x pump output: load max. 250 V AC, 2A; all outputs relay outputs with varistor suppression 2 x semiconductor relay: load max. 24 V AC/DC, 50 mA
Interfaces	
Device bus	RS-485 interface for max. 32 bus devices (2-wire connection, polarity independent, connection as required to terminals 29/30 or together with two-wire system bus via cable converter 1400-8800)
System bus	RS-232 interface for modem or point-to-point connection to the PC (Modbus RTU protocol, data format 8N1, RJ-45 jack at the side) Optional: – RS-485 interface for four-wire bus using cable converter 1400-7308 – RS-485 interface for two-wire bus using cable converter 1400-8800
Meter bus	Meter bus plug-in module, protocol according to EN 1434-3 (optional, also suitable for retrofitting)
Operating voltage	165 to 250 V, 48 to 62 Hz, max. 5 VA
Ambient temperature	0 to 40 °C (operation), -10 °C 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

12.6 Customer data

Station	
Operator	
Relevant SAMSON office	
System code number	

Function block settings in configuration levels

	CO 1	CO 2	CO 4	CO 5	CO 6	CO 7	CO 8
F01							
F02							
F03							
F04							
F05							
F06							
F07							
F08							
F09							
F10							
F11							
F12							
F13							
F14							
F15							
F16							
F17							
F18							
F19							
F20							
F21							
F22							
F23							

Parameters in levels 1 and 2 (heating circuits Rk1 and Rk2)

Parameters (PA1 and PA2)	Level 1	Level 2	Range of values
Gradient, flow			0.2 to 3.2
Level, flow			-30 to 30 °C
Min. flow temperature			5 to 130 °C
Max. flow temperature			5 to 130 °C
Four-point characteristic			
Outdoor temperature; point 1			-30 to 50 °C
Outdoor temperature; point 2			-30 to 50 °C
Outdoor temperature; point 3			-30 to 50 °C
Outdoor temperature; point 4			-30 to 50 °C
Flow temperature; point 1			5 to 130 °C
Flow temperature; point 2			5 to 130 °C
Flow temperature; point 3			5 to 130 °C
Flow temperature; point 4			5 to 130 °C
Reduced flow temperature; point 1			5 to 130 °C
Reduced flow temperature; point 2			5 to 130 °C
Reduced flow temperature; point 3			5 to 130 °C
Reduced flow temperature; point 4			5 to 130 °C
Return flow temperature; point 1			5 to 90 °C
Return flow temperature; point 2			5 to 90 °C
Return flow temperature; point 3			5 to 90 °C
Return flow temperature; point 4			5 to 90 °C
Flow rate; point 1		–	At, 0.01 to 650 m ³ /h
Flow rate; point 2		–	At, 0.01 to 650 m ³ /h
Flow rate; point 3		–	At, 0.01 to 650 m ³ /h
Flow rate; point 4		–	At, 0.01 to 650 m ³ /h
Capacity; point 1		–	At, 0.1 to 6500 kW
Capacity; point 2		–	At, 0.1 to 6500 kW
Capacity; point 3		–	At, 0.1 to 6500 kW
Capacity; point 4		–	At, 0.1 to 6500 kW
OT deactivation value in rated operation			0 to 50 °C
OT deactivation value in reduced operation			-20 to 50 °C

OT activation value in rated operation			-20 to 5 °C
Gradient, return flow			0.2 to 3.2
Level, return flow			-30 to 30 °C
Return flow temperature foot			5 to 90 °C
Max. return flow temperature			5 to 90 °C
Set point boost of primary heat exchanger control			0 to 50 °C
Set point for binary demand processing			5 to 130 °C
Function block parameters (CO1 and CO2)	Level 1	Level 2	Range of values
Limiting factor (F03 - 1)			0.1 to 10.0
Start temperature (F05 - 1)			20 to 60 °C
Temperature rise (F05 - 1)			1 to 10 °C/24 h
Maximum temperature (F05 - 1)			25 to 60 °C
Maintaining time of max. temp. (F05 - 1)			1 to 10 days
Temperature reduction (F05 - 1)			0 to 10 °C/24 h
Cycle time (F09 - 1)			0/1 to 100 min
Gain K_p (F09 - 1)			0 to 25
Proportional gain K_p (F12 - 1)			0.1 to 50
Reset time T_N (F12 - 1)			1 to 999 sec
Derivative-action time T_V (F12 - 1)			0 to 999 sec
Valve transit time T_V (F12 - 1)			5 to 240 sec
Hysteresis (F12 - 0)			1 to 30 °C
Min. ON time (F12 - 0)			0 to 10 min
Min. OFF time (F12 - 0)			0 to 10 min
Max. deviation (F13 - 1)			2 to 10 °C
Binary input bE (F14 - 1)			1, 0
Binary input bE (F17 - 1)		-	1, 0
Lower transmission range (CO1 -> F18 - 1)		-	0 to 130 °C
Upper transmission range (CO1 -> F18 - 1)		-	0 to 130 °C
Boost of flow temperature demand (CO1 -> F18 - 1)		-	0 to 30 °C
Time delay for sequence change (CO1 -> F19 - 1)		-	1 to 10 min

System deviation for enabling sequence control (CO1 -> F19 - 1)		-	1 to 30 °C
Lead change (CO1 -> F19 - 1)		-	0 to 10 days
Demand for heat (CO1 -> F20 - 1)		-	bin, AnA

DHW heating

Parameters (PA4)	Level 4	Range of values
Min. DHW temperature		5 to 90 °C
Max. DHW temperature		5 to 90 °C
Hysteresis		0 to 30 °C
Charging temperature boost		0 to 50 °C
Max. charging temperature		20 to 130 °C
Lag of storage tank charging pump		0 to 10.0
Sustained DHW temperature		5 to 90 °C
Max. return flow temperature		20 to 90 °C
Solar pump ON		1 to 30 °C
Solar pump OFF		0 to 30 °C
Max. storage tank temperature		20 to 90 °C
Max. buffer tank temperature		20 to 90 °C
Function block parameters (CO4)		
Limiting factor (F03 - 1)		0.1 to 10.0
Analysis (F04 - 1)		AnA, bin
Stop parallel operation in case of deviation (F06 - 1)		0 to 10 min
Flow limit temp. for parallel pump operation (F06 - 1)		20 to 90 °C
Activate priority in case of deviation (F08 - 1)		0 to 10 min
Correction factor (F08 - 1)		0.1 to 10.0
Activate priority in case of deviation (F09 - 1)		0 to 10 min
Proportional gain K_p (F12 - 1)		0.1 to 50
Reset time T_N (F12 - 1)		1 to 999 sec
Derivative-action time T_V (F12 - 1)		0 to 999 sec
Valve transit time T_Y (F12 - 1)		5 to 240 sec
Hysteresis (F12 - 0)		1 to 30 °C
Min. ON time (F12 - 0)		0 to 10 min
Min. OFF time (F12 - 0)		0 to 10 min
Max. deviation (F13 - 1)		2 to 10 °C
Day of the week (F14 - 1)		1-7, 1 to 7
Start time (F14 - 1)		0:00h to 23:45h
Stop time (F14 - 1)		0:00h to 23:45h

Disinfection temperature (F14 - 1)		60 to 90 °C
Set point boost (F14 - 1)		0 to 50 °C
Hold time of disinfection temperature (F14 - 1)		0 to 255 min

System-wide functions

Parameters (PA5)	Level 5					Range of values
Boiler pump ON						20 to 90 °C
Hysteresis						0 to 30 °C
Public holidays						01.01 to 31.12
Vacation periods, start						01.01 to 31.12
Vacation periods, stop						
Assignment to control circuit						Rk1, Rk2, Rk4
Vacation periods, start						01.01 to 31.12
Vacation periods, stop						
Assignment to control circuit						Rk1, Rk2, Rk4
Function block parameters (CO5)	Level 5					Range of values
Start summer mode (F04 - 1)						01.01 to 31.12
No. of days until activation (F04 - 1)						1 to 3
Stop summer mode (F04 - 1)						01.01 to 31.12
No. of days until deactivation (F04 - 1)						1 to 3
OT limit value summer mode (F04 - 1)						0 to 30 °C
Delay (F05/6 - 1)						1 to 6 °C/h
Binary output bA (F07 - 1)						1, 0
Frost protection limit (F09 - 1 and F09 - 1)						-15 to 3 °C
Max. limit value (F10 - 1)						3 to 800 pulse/h
Max. limit value for heating (F10 - 1)						3 to 800 pulse/h
Max. limit value for DHW (F10 - 1)						3 to 800 pulse/h
Limiting factor (F10 - 1)						0.1 to 10.0
Lower measuring range value (F11 - 1)						0/4 mA

Parameters (PA5)	Level 5	Range of values
Upper range value 20 mA (F11 - 1)		0.01 to 650 m ³ /h
Max. limit value (F11 - 1)		0.01 to 650 m ³ /h
Max. limit value for heating (F11 - 1)		0.01 to 650 m ³ /h
Max. limit value for DHW (F11 - 1)		0.01 to 650 m ³ /h
Limiting factor (F11 - 1)		0.1 to 10.0
Input (F12 - 1)		bin, AnA
Binary input bE (F12 - 1, bin)		1, 0
Max. limit value (F13 - 1)		0.1 to 6500 kW
Max. limit value for heating (F13 - 1)		0.1 to 6500 kW
Max. limit value for DHW (F13 - 1)		0.1 to 6500 kW
Limiting factor (F13 - 1)		0.1 to 10.0
Binary input (F15 - 1)		1, 0
Lower transmission range (F23 - 1)		-30 to 100 °C
Upper transmission range (F23 - 1)		-30 to 100 °C

Modbus, meter bus

Parameters (PA6)	Level 6	Range of values
Station address (ST-NR)		1 to 247 1 to 32000
Baud rate (BAUD)		9600, 19200
Cyclical initialization (I)		1 to 255 min
Modem dialing pause (P)		0 to 255 min
Modem time-out (t)		1 to 255 min
Number of redialing attempts (C)		1 to 255
Phone no. of control station (tELnr)		-
Access number (tAPnr)		-
Mobile phone number (HAndy)		-
Function block parameters (CO6)	Level 6	Range of values
Meter bus address WMZ1 to WMZ6 (F10 - 1)		0 to 255
Model code WMZ1 to WMZ6 (F10 - 1)		APAIO, CAL3, 1434, SLS
Reading mode WMZ1 to WMZ6 (F10 - 1)		COIL, 24h, CONT
Max. limit value (F11 - 1)		0.01 to 650 m ³ /h
Max. limit value for heating (F11 - 1)		At, 0.01 to 650 m ³ /h
Max. limit value for DHW (F11 - 1)		0.01 to 650 m ³ /h
Limiting factor (F11 - 1)		0.1 to 10
Max. limit value (F12 - 1)		0.1 to 6500 kW
Max. limit value for heating (F12 - 1)		At, 0.1 to 6500 kW
Max. limit value for DHW (F12 - 1)		0.1 to 6500 kW
Limiting factor (F12 - 1)		0.1 to 10
Max. limit value (F13 - 1)		0.01 to 650 m ³ /h
Limiting factor (F13 - 1)		0.1 to 10
Max. limit value (F14 - 1)		0.1 to 6500 kW
Limiting factor (F14 - 1)		0.1 to 10

Device bus

Function block parameters (CO7)	Level 7	Range of values
Device bus address (F01 - 1)		Auto, 1 to 32
Device bus address (F03 - 1, room panel Rk1)		Auto, 1 to 32
Device bus address (F04 - 1, room panel Rk2)		Auto, 1 to 32
Register no. (F06 - 1)		1 to 4
Register no. (F07 - 1)		1 to 4
Register no. (F08 - 1)		1 to 4
Register no. (F09 - 1)		1 to 4
Register no. (F10 - 1)		5 to 64
Register no. (F11 - 1)		5 to 64
Register no. (F13 - 1)		5 to 64
Register no. (F14 - 1)		5 to 64
Register no. (F15 - 1)		5 to 64
Register no. (F17 - 1)		5 to 64
Register no. (F19 - 1)		5 to 64
Register no. (F20 - 1)		5 to 64
Register no. (F21 - 1)		5 to 64
Register no. (F22 - 1)		5 to 64

Initialization of free inputs

Function block F	01	02	03	04	05	06			09
Binary input	1	2	3	4	5	6			9
Error message when bE = ON/bE = OFF No error message / ---									
Function block F	10	11	12	13		15	16	17	
Binary input	10	11	12	13		15	16	17	
Error message when bE = ON/bE = OFF No error message / ---									

Heat meters

	Meter bus address	Model code	Reading mode
WMZ1			
WMZ2			
WMZ3			
WMZ4			
WMZ5			
WMZ6			

Rotary switch settings

Parameters	Top rotary switch							Range of values
Day set point								0 to 40 °C 5 to 130 °C
Night set point								0 to 40 °C 5 to 130 °C
Times-of-use	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
Start of first time-of-use								0:00 to 24:00h
End of first time-of-use								0:00 to 24:00h
Start of second time-of-use								0:00 to 24:00h
End of second time-of-use								0:00 to 24:00h
Start of third time-of-use								0:00 to 24:00h
End of third time-of-use								0:00 to 24:00h

Parameters	Middle rotary switch							Range of values
Day set point								0 to 40 °C 5 to 130 °C
Night set point								0 to 40 °C 5 to 130 °C
Times-of-use	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
Start of first time-of-use								0:00 to 24:00h
End of first time-of-use								0:00 to 24:00h
Start of second time-of-use								0:00 to 24:00h
End of second time-of-use								0:00 to 24:00h
Start of third time-of-use								0:00 to 24:00h
End of third time-of-use								0:00 to 24:00h

Parameter	Bottom rotary switch							Range of values
DHW temperature								20 to 90 °C
Times-of use	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
DHW heating								
Start of first time-of-use								0:00 to 24:00h
End of first time-of-use								0:00 to 24:00h
Start of second time-of-use								0:00 to 24:00h
End of second time-of-use								0:00 to 24:00h
Start of third time-of-use								0:00 to 24:00h
End of third time-of-use								0:00 to 24:00h
DHW circulation pump								
Start of first time-of-use								0:00 to 24:00h
End of first time-of-use								0:00 to 24:00h
Start of second time-of-use								0:00 to 24:00h
End of second time-of-use								0:00 to 24:00h
Start of third time-of-use								0:00 to 24:00h
End of third time-of-use								0:00 to 24:00h

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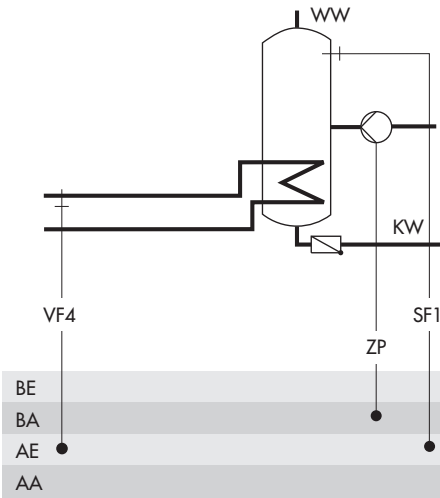
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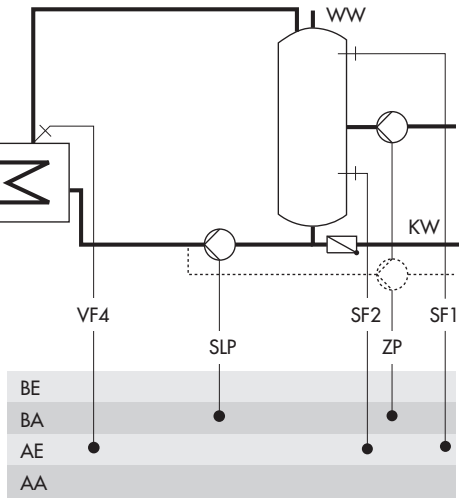
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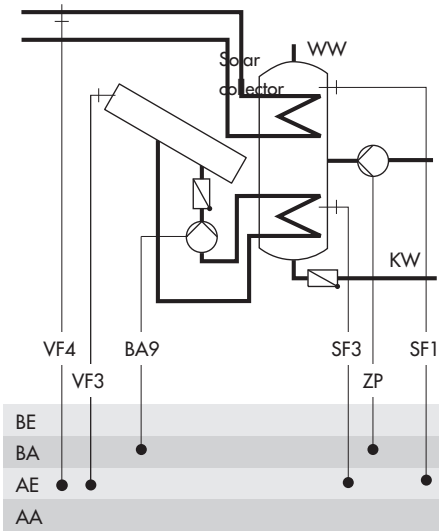
Type 1



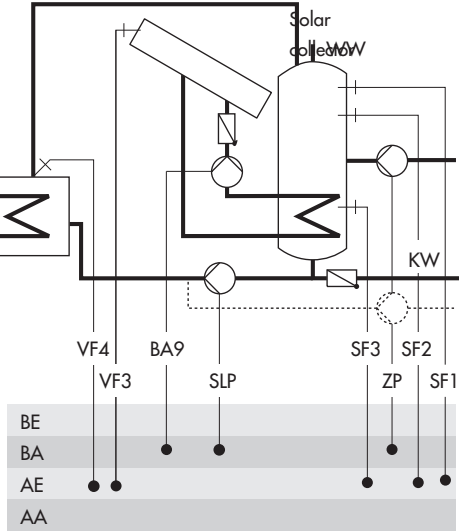
Type 2



Type 3



Type 4



Frequently used abbreviations

<i>AF</i>	Outdoor sensor	<i>Rk</i>	Control circuit
<i>Anl</i>	System	<i>RüF</i>	Return flow sensor
<i>BA</i>	Binary output	<i>SF</i>	Storage sensor
<i>BE</i>	Binary input	<i>SLP</i>	Storage tank charging pump
<i>CO</i>	Configuration level	<i>t</i>	Time
<i>EB</i>	Mounting and Operating Instructions	<i>T</i>	Temperature
<i>F</i>	Function block	<i>TLP</i>	Exchanger charging pump
<i>FSR</i>	Error status register	<i>TW</i>	Domestic hot water (DHW)
<i>HK</i>	Heating circuit	<i>TWE</i>	DHW heating
<i>HR</i>	Holding register	<i>UP</i>	Circulation pump (heating circuit)
<i>FSR</i>	Error status register	<i>VF</i>	Flow sensor
<i>GLT</i>	Building control station	<i>WE</i>	Default values
<i>Kl</i>	Terminal	<i>WMZ</i>	Heat/water meter
<i>KW</i>	Cold water	<i>WW</i>	Hot water
<i>OT</i>	Outdoor temperature	<i>ZP</i>	Circulation pump (DHW circuit)
<i>PA</i>	Parameter level		
<i>RF</i>	Room sensor		



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