Automation System TROVIS 5400
District Heating Controller
TROVIS 5479

Mounting and Operating Instructions

EB 5479 EN

Firmware version 1.5x

Edition October 2004

TROVIS® Electronics from SAMSON

CE

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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.

Contents

1 Operation

The controller is ready for use with the temperatures and operating schedules preset by the manufacturer.
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 Operating keys

Changeover key
Press to switch between operating level and configuration/parameter level

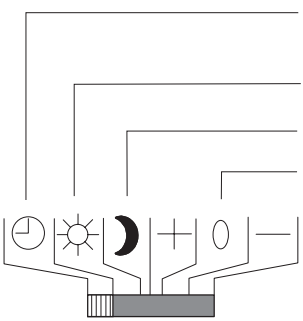
Reset key
Press to reset accessible parameters to their default settings; the controller must be in the parameter level

Arrow keys
– To scroll within levels
– To change values

Enter key
– To access levels
– Access parameters and functions to edit them
– Confirm settings
– Display set points in info level

1.1.2 Operating switches

Heating circuit mode selector switch



Automatic mode with switchover between rated operation and reduced operation

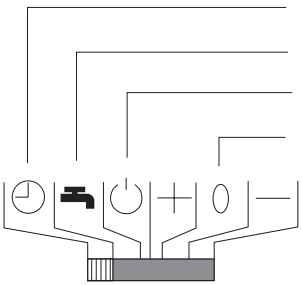
Rated operation

Reduced operation

Manual operation: Control valve open - stationary - closes (for on/off control: + ON, 0 OFF)

DHW circuit mode selector switch

The operating mode icon stickers are included in the scope of delivery and can be stuck on the front above the mode selector switch for control circuit 2 (middle), if required.



Automatic mode

Rated operation, heating circuit(s) deactivated

DHW heating OFF

Manual operation: Control valve open - stationary - closes (for on/off control: + ON, 0 OFF)

Note!
In manual mode, ***frost protection*** *is not guaranteed.*

The assignment of the control circuits to the mode selector switches depends on the system code number (Anl):

System (Anl)	Mode selector switch		
	Top	Middle	Bottom
1	Heating circuit 1	Heating circuit 2	Pre-control circuit
2	Heating circuit 1	DHW heating	Heating circuit 2
3	Heating circuit 1	Heating circuit 2	Heating circuit 3/Pre-control circuit
4	Heating circuit 1	DHW heating	Pre-control circuit
5	Heating circuit 1	DHW heating	Heating circuit 2/Pre-control circuit
6	Heating circuit 1	Heating circuit 2	Heating circuit 3
7	Heating circuit 1	DHW heating	Pre-control circuit
8	Heating circuit 1	DHW heating	Heating circuit 2/Pre-control circuit
9	Heating circuit 1	DHW heating	Heating circuit 2

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.

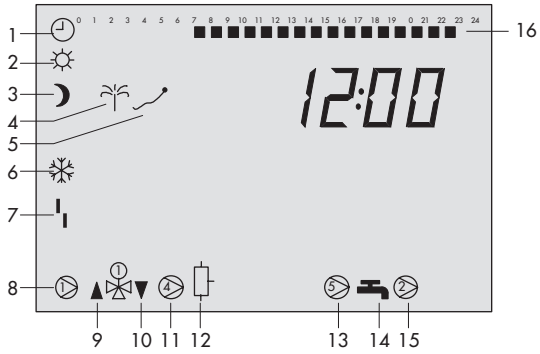
Manual operation+ 0 –

Valves and pumps can be controlled manually.

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.

The controller status can be displayed in the operating level (InF level) (–> section 1.4).



1 Automatic operation
2 Rated operation
3 Reduced operation
4 Vacation mode
5 Public holiday mode
6 Frost protection
7 Malfunction
8 Circulation pump RK1–3
9 Valve RK1–3 or Primary valve: OPEN or DHW: OPEN
10 Valve RK1–3 or Primary valve: CLOSED or DHW: CLOSED
11 Storage tank charging pump SLP
12 DHW storage tank
13 Circulation pump ZP
14 DHW demand
15 Exchanger charging pump TLP
16 Time-of-use

Fig. 1 · Icons

1.4 Displaying data

Measured values, set points, times-of-use, public holidays and vacation periods can be retrieved and displayed in the ***InF1*** to ***InF6*** information levels. The various displays are listed in section 12.3.

- InF1: Heating circuit 1
- InF2: Heating circuit 2
- InF3: Heating circuit 3
- InF4: DHW heating
- InF5: Primary control circuit
- InF6: Baud rate, error status register
- PU: Pumps, manual level
- bin-E: Binary inputs and outputs
- 1434: Meter bus data
- Err: Alarms

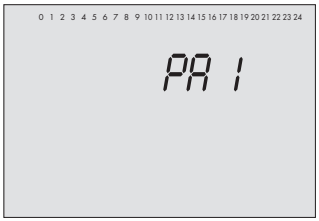
Proceed as follows:

- ↓ Select information level.
- ✳ Confirm information level.
- ↓ Select value you want to change.
- ✳ Compare the set point/limit value and the actual value.
- ↑ ↓ Press keys simultaneously:
  to switch to the operating level.

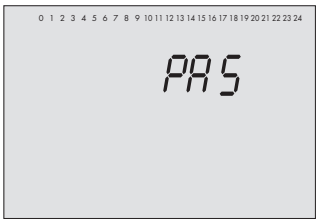
1.5 Setting the controller time

The current time and date need to be set immediately after start-up and after a power failure lasting longer than 24 hours.

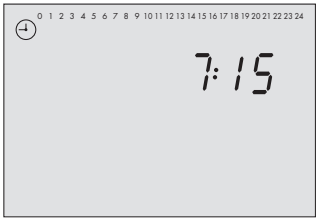
Proceed as follows:



Switch to configuration and parameter level.
Display: ***PA1***



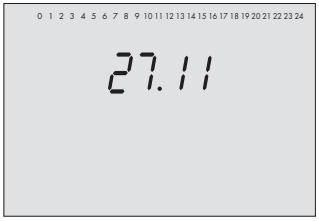
Select PA5 parameter level.



Open PA5 parameter level.
Display: Controller time

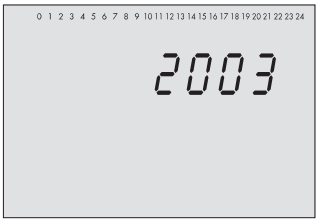
Activate editing mode for the controller time
🕘 blinks.

Change controller time.



Confirm controller time.
Display: Date (day.month)

Change date setting.



- Confirm date.
  Display: Year.
- Change year setting.
- Confirm year.
- Exit PA5 parameter level.
- Return to the operating level.

Note!

The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

1.6 Setting the times-of-use

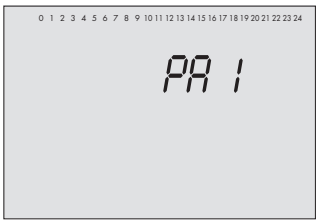
Two times-of-use can be set for each day of the week. If only one time-of-use is required, the start and stop times of the second time-of-use must be programmed to identical times. The time schedules for the three heating circuits, DHW heating and the circulation pump can be read over Modbus. Pump circuits are treated as mixer circuits.

Time schedule	Level	Icon
Heating circuit 1 to 3	PA1 to PA3	
DHW heating	PA4	
Circulation pump	PA4	

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	07:00	0:00 to 24:00h; in steps of 30 minutes
Stop first time-of-use	12:00	0:00 to 24:00h; in steps of 30 minutes
Start second time-of-use	12:00	0:00 to 24:00h; in steps of 30 minutes
Stop second time-of-use	22:00	0:00 to 24:00h; in steps of 30 minutes

* Default settings (WE) valid for heating circuits 1 to 3

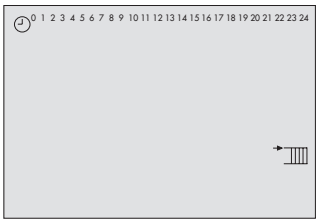
Proceed as follows:



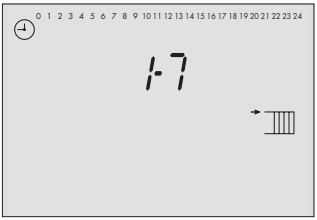
Switch to configuration and parameter level.
Display: ***PA1***

Select parameter level.

Open parameter level.

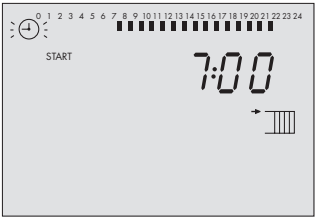


Select datapoint for times-of-use.



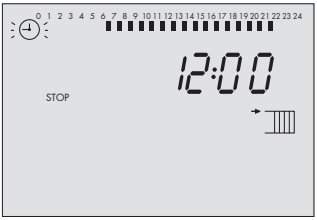
Activate editing mode for times-of-use.
Display: ***1–7***

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 30 minutes).



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

Edit stop time (steps of 30 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.

Select ***End*** on the display.

Exit the datapoint for times-of-use.

Exit the parameter level.

Return to the operating level.

Note!

Do not use the 1–7 menu to check the programmed times-of-use. On opening this period, the times-of-use are reset to their default settings.

Note!

The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

1.6.1 Copying the times-of-use

The times-of-use of heating circuit 1 (2) can be copied and used for heating circuit 2 (3).

Copy function	Parameter level	Icon
HK1 –> HK2	PA1	***COPY 2***
HK2 –> HK3	PA2	***COPY 3***

Proceed as follows:

- Switch to configuration and parameter level.
  Display: ***PA1***
- Select parameter level.
- Open parameter level.
- Select "COPY_" data point.
- Open copy program.
  The display blinks.
- Copy the times-of-use.
- Select ***End*** on the display.
- Exit the parameter level.
- Return to the operating level.

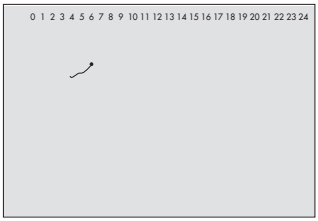
1.6.2 Entering public holidays

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

Parameters	WE	Level / Range of value
Public holidays f. heating circuit 1	–	PA1 / 01.01 to 31.12
Public holidays f. heating circuit 2	–	PA2 / 01.01 to 31.12
Public holidays f. heating circuit 3	–	PA3 / 01.01 to 31.12

Note!
*The programmed public holidays and vacations of any heating circuit (HK1, HK2 or HK3) apply with the setting Co4 -> Fb12 = ON , **select** 1, 2 or 3 also for the DHW heating.*

Proceed as follows:



⇨	Switch to configuration and parameter level. Display: ***PA1***
↓	Select parameter level.
✳	Open parameter level.
↓	Select datapoint for public holidays. Display shows: ↗
✳	Open data point for public holidays.
↓	If applicable, select – – – –.
✳	Activate editing mode for public holiday. ↗ blinks.
↓	Edit public holiday ↗ .
✳	Confirm public holiday.

To enter additional public holidays, re-select – – – – (between 31.12 and 01.01) and repeat the steps in the fields highlighted in gray.

↑ ↓ Exit the parameter level.

⇨ Return to the operating level.

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.

Deleting a public holiday:

↓ Select the holiday you wish to delete in the datapoint for public holidays.

✳ Confirm selection.

↓ Select – – – – .

✳ Delete the public holiday.

Note! *The controller automatically returns to the operating level if the keys are left unpressed for two minutes.*

1.6.3 Entering vacation periods

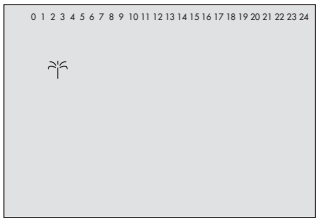
During vacation periods, the controller constantly remains in the reduced operating mode. The system is monitored for frost. A maximum of 10 vacation periods can be entered.

Parameters	WE	Level / Range of value
Vacation period f. heating circuit 1	–	PA1 / 01.01 to 31.12
Vacation period f. heating circuit 2	–	PA2 / 01.01 to 31.12
Vacation period f. heating circuit 3	–	PA3 / 01.01 to 31.12

Note!
*The programmed public holidays and vacations of any heating circuit (HK1, HK2 or HK3) apply with the setting Co4 -> Fb12 = ON , **select** 1, 2 or 3 also for the DHW heating.*

Proceed as follows:

- Switch to configuration and parameter level. Display: ***PA1***
- Select parameter level.
- Open parameter level.



- Select datapoint for vacation periods. Display shows:
- Open datapoint for vacation periods. Display shows: ***START***
- If applicable, select – – – –.
- Activate editing mode for vacation periods. blinks.
- Set start date of vacation period.
- Confirm start date of the vacation period. Display shows: ***STOP***
- Set end of vacation period.
- Confirm end of the vacation period.

To enter additional vacation periods, re-select – – – – (between 31.12 and 01.01) and repeat the steps in the fields highlighted in gray.

↑ ↓ Exit the parameter level.

⇨ Return to the operating level.

Note!

Vacation periods 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.

Deleting vacation periods:

↓ Select the vacation period you wish to delete in the datapoint for vacation periods.

✳ Confirm selection.

↓ Select – – – – .

✳ Delete vacation period.

Note!

The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

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2 Start-up

2.1 Setting the system code number

9 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).

The system code number is set in the configuration level.

Proceed as follows:

- Switch to configuration and parameter level.
  Display shows: ***PA1***
- Select ***Anl_*** on the display.
- Activate editing mode for the system code number.
  Anl blinks on the display.
- Edit system code number.
- Confirm system code number.
  Display shows: ***Co1***
- Return to the operating level.

Note!
The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

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 1
- Co2: Heating circuit 2
- Co3: Heating circuit 3
- Co4: DHW heating
- Co5: System-wide functions
- Co6: Interface operation

Proceed as follows:

	Switch to configuration and parameter level. Display shows: ***PA1***
	Select configuration level.
	Open configuration level.
	Select function block.
	Activate editing mode for the function block. **Fb_** blinks on the display. If ***0 0 0 0*** appears on the display, the key number needs to be entered first. Refer to section 2.3.1
	Activate the function block (Fb = ON). 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 (Fb = OFF).

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.

Exit configuration level.

Return to the operating level.

Note!

The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

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 1
- PA2: Heating circuit 2
- PA3: Heating circuit 3
- PA4: DHW heating
- PA5: System-wide parameters
- PA6: Interface operation

Proceed as follows:

Switch to configuration and parameter level.
Display shows: ***PA1***

Select parameter level.

Open parameter level.

Select parameter.

Activate editing mode for the parameter.

Edit the parameter.

Confirm the parameter setting.

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

Exit parameter level.

Return to the operating level.

Note!
The controller automatically returns to the operating level if the keys are left unpressed for two minutes.

2.3.1 Enter key number

Some functions are protected against unintentional or unauthorized access. These functions can only be activated or deactivated after the valid key number has been entered. The valid key number for initial start-up can be found on page 127. To avoid unauthorized use of the key number, remove the page or make the key number unreadable.

Proceed as follows:

0 0 0 0 blinks on the display.

⇩ Set valid key number.

✳ Confirm key number.
When the correct key number is entered, the function block that is to be changed blinks on the display.
On entering an incorrect key number, the controllers switches to the next configuration level.

The key number remains active for approx. 10 minutes.

2.4 Calibrating sensors

The connected sensors are calibrated in CO5 configuration level .

The following applies:

- Co5 -> Fb02 = ON: Pt 100/Pt 1000 mixed
- Co5 -> Fb02 = OFF: Pt 100/PTC mixed (default setting)
- Co5 -> Fb02 = ON and Co5 -> Fb22 = ON: NTC sensors

The resistance values of the sensors can be found on page 114.

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 F17.

Proceed as follows:

⇨ Switch to configuration and parameter level.
Display shows: ***PA1***

⇩ Select Co5 level.

- Open Co5 level. Display shows: ***Fb00***
- Select function block Fb17.
- Confirm selection. Display shows: ***0 0 0 0***

  Enter and confirm key number. Fb17 blinks on the display.
- Activate editing mode for function block.
- Activate function block.
- Start sensor calibration.
- Select appropriate sensor icon:

   Flow sensor VF

   Room sensor RF

   Flow sensor in heat exchanger charging circuit

   Outdoor sensor AF

   Return flow sensor RüF

   Flow sensor in tank charging circuit

   Storage sensor ON SF1

   Storage sensor OFF SF2

   Flow sensor in tank charging circuit
- Activate editing mode for measured value. Measured value blinks on the display.
- Correct measured temperature. Read the actual temperature directly from the thermometer at the point of measurement and enter this value as the reference temperature.
- Confirm corrected measured temperature.

Additional sensors are calibrated similarly.

- Select function block Fb17 and deactivate it.
- Exit configuration level.
- Return to the operating level.

2.5 Resetting to default values

All parameters and function blocks from any parameter level can be reset to their default settings (WE).

Proceed as follows:

⇥← Reset to default settings.
Function blocks and parameters are reset to their default settings (WE).

Note!
When the key number is active, the function blocks protected by the key number are also reset to their default settings.
The controller is ready for operation with its default settings. You just need to set the correct date and current time.

---

3 Manual operation

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

Proceed as follows:

Position all selector mode switches to "–".

↓ Select ***PU*** pump manual level.

✳ Open pump manual level.

↓ Select pump PU1 to PU5.
PU1: BA11
PU2: BA12
PU3: BA13
PU4: BA14
PU5: BA15

✳ Confirm pump selection.
The display blinks.

Activate output: ↑
Deactivate output: ↓

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

Move slide switch from **0**, **+** or **–**.

↑ ↓ Exit manual level.

Note!
In manual mode, ***frost protection*** *is not guaranteed.*

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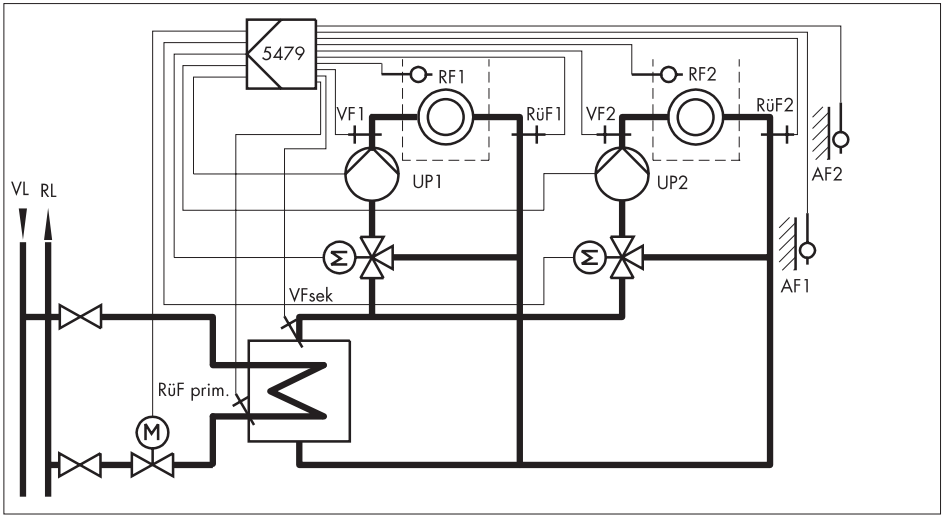
4 Systems

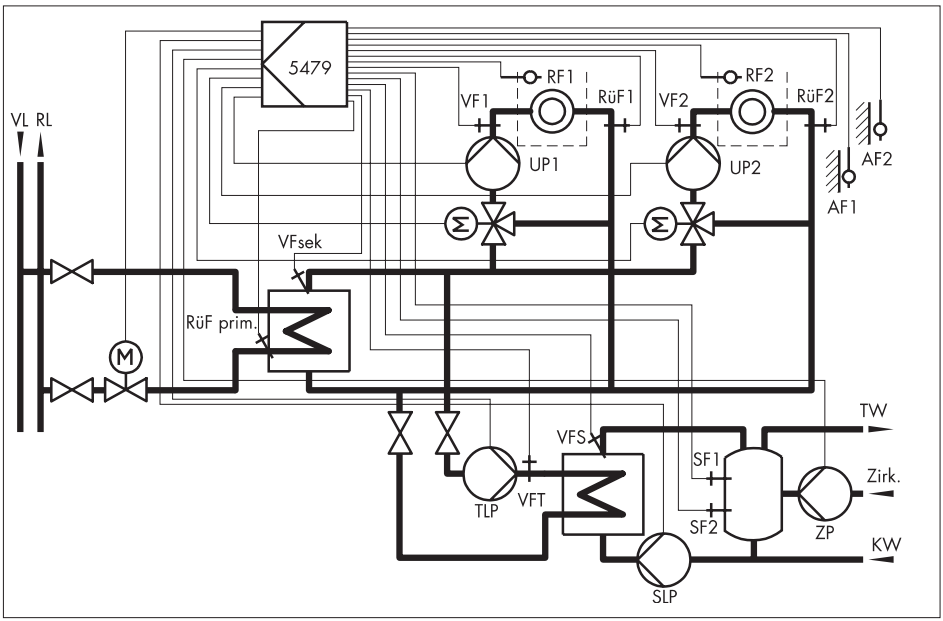
System Anl 1



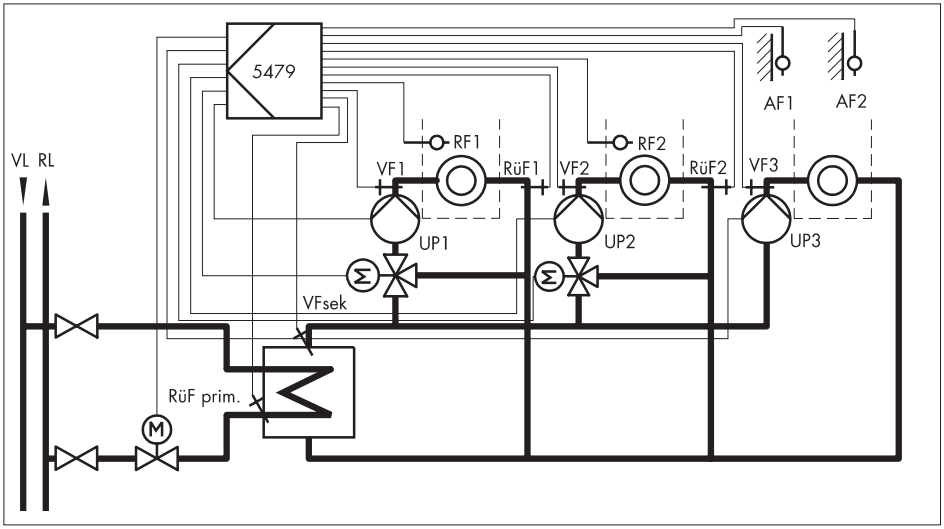
Abbreviations

AF	Outdoor sensor
KW	Cold water
RF	Room sensor
RL	Return flow pipe
RÜF	Return flow sensor
SF	Storage tank sensor
SLP	Storage tank charging pump
TW	Domestic hot water (DHW)
VF	Flow sensor
VL	Flow pipe
UP	Circulation pump (heating circuit)
ZP	Circulation pump (DHW)
Zirk	Circulation

System Anl 2

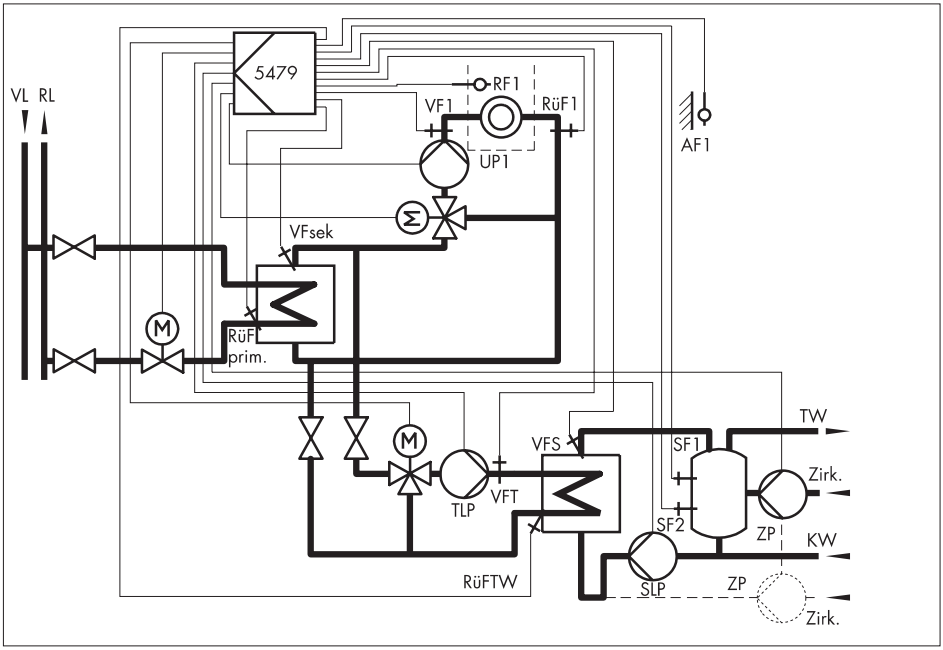

5479
VL RL
RF1
VF1
RüF1
RF2
VF2
RüF2
UP1
UP2
AF2
AF1
VFsek
RüF prim.
M
TW
VFS
SF1
Zirk.
TLP
VFT
SF2
ZP
KW
SLP

System Anl 3



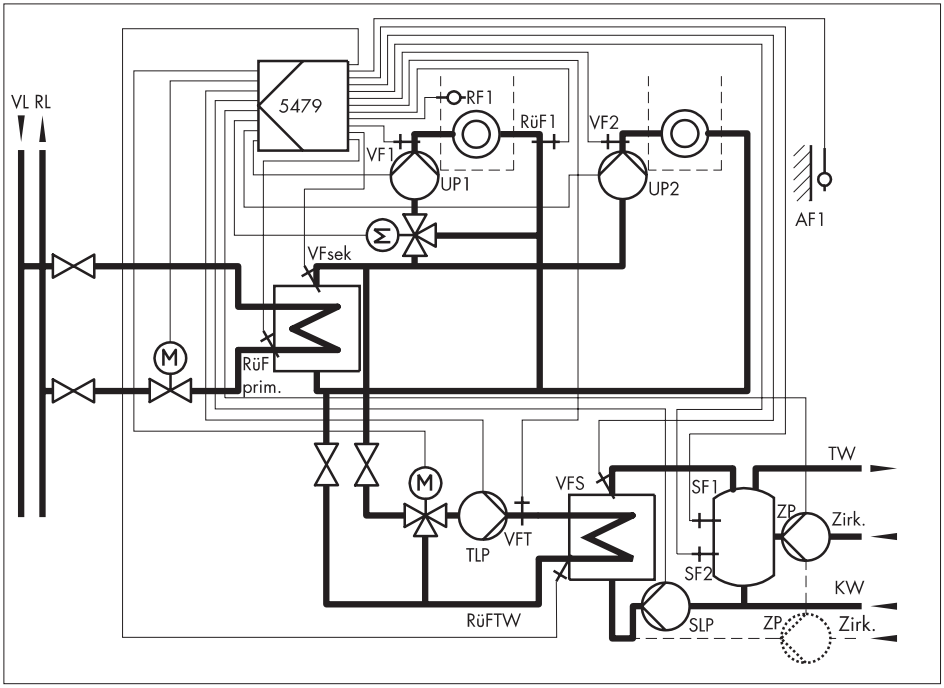
Note!
VFsek does not have any control function. To deactivate, select Co5 -> Fb00 = OFF.

System Anl 4



Set Co4 -> Fb11 = ON if the instrumentation represented by the broken line is required.

System Anl 5

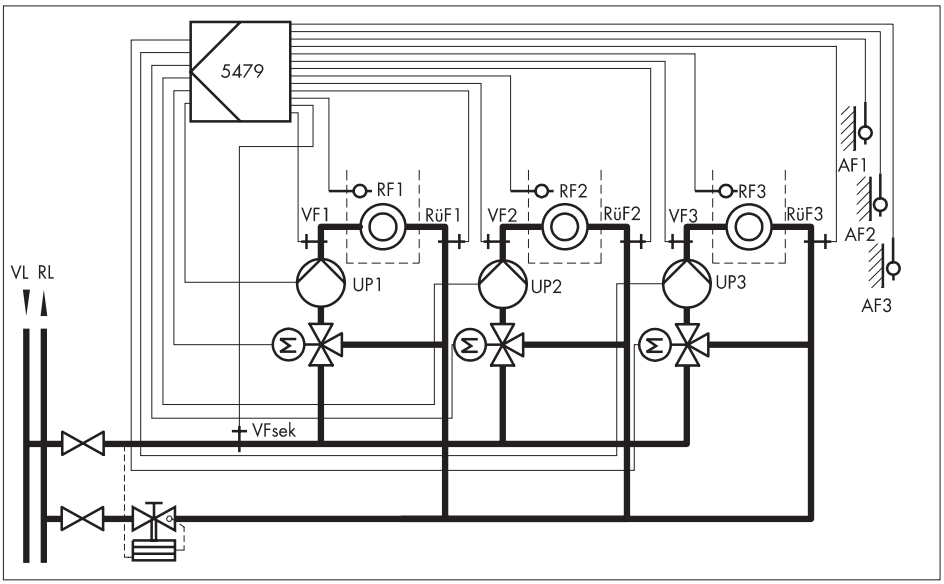


Set Co4 -> Fb11 = ON if the instrumentation represented by the broken line is required.

Note!

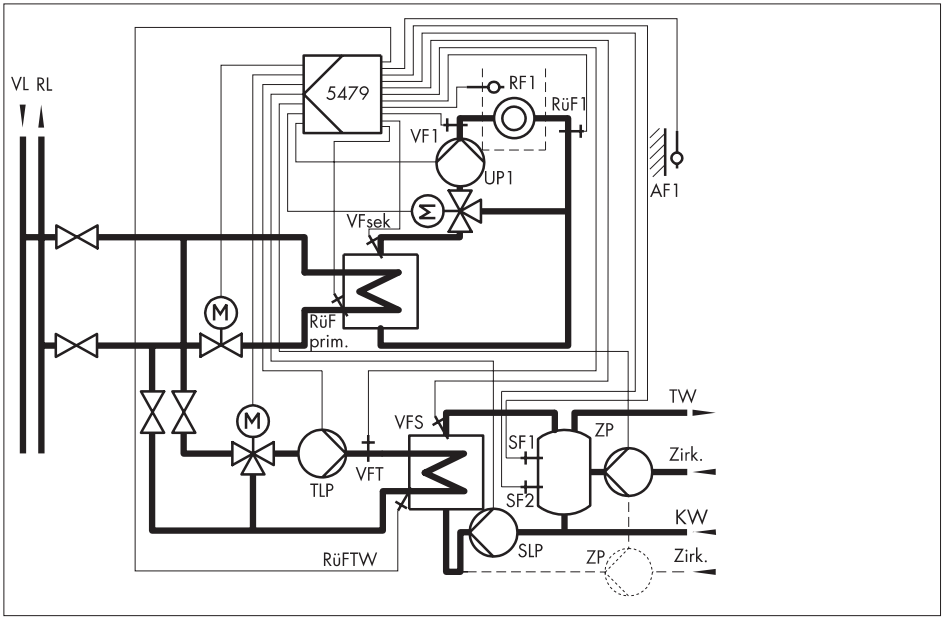
VFsek does not have any control function. To deactivate, select Co5 -> Fb00 = OFF.

System Anl 6



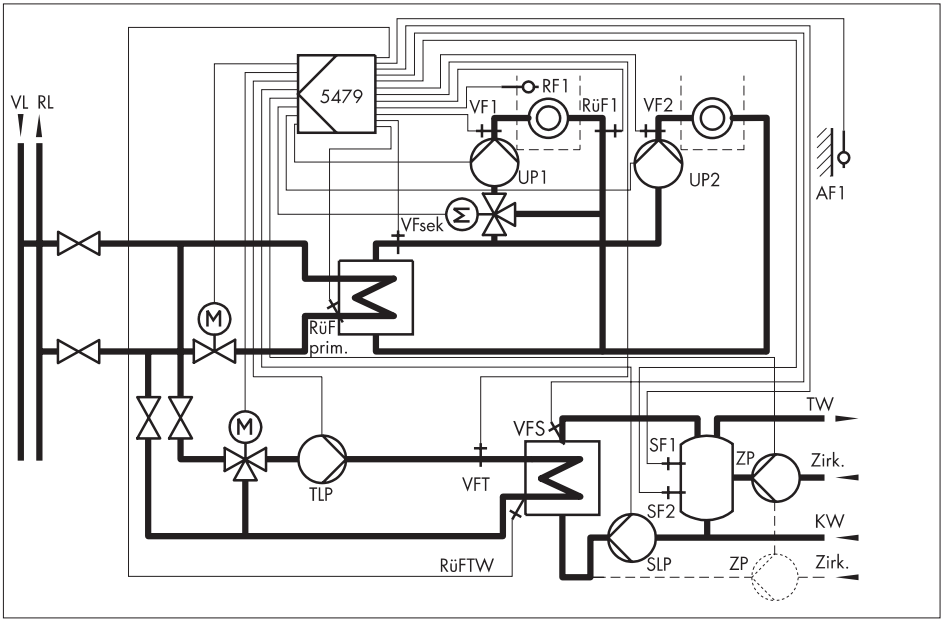
Note!
VFsek does not have any control function. To deactivate, select Co5 -> Fb00 = OFF.

System Anl 7



Set Co4 -> Fb11 = ON if the instrumentation represented by the broken line is required.

System Anl 8

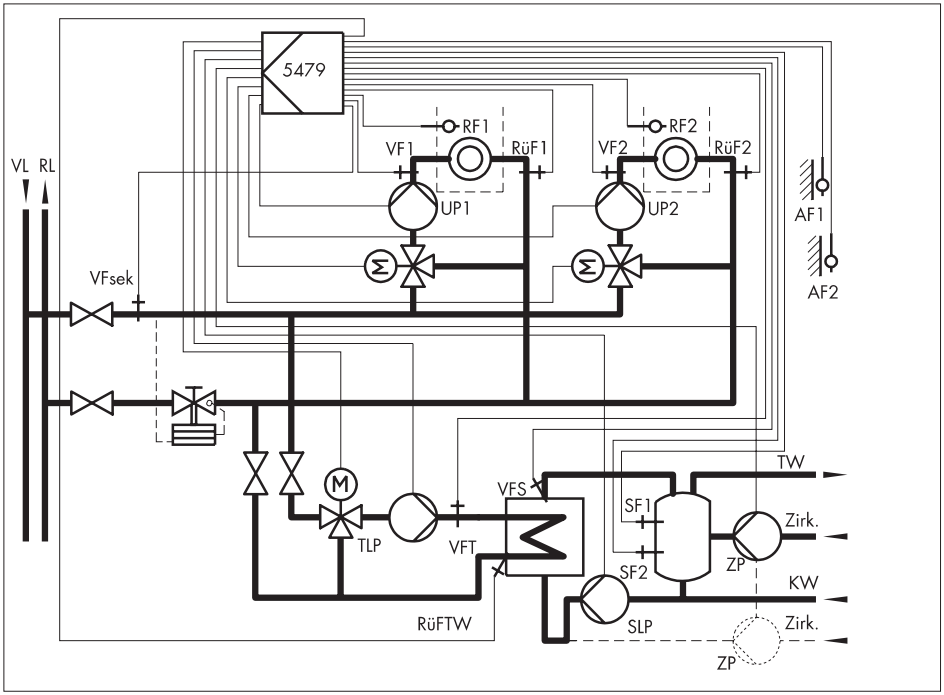


Set Co4 -> Fb11 = ON if the instrumentation represented by the broken line is required.

Note!

VFsek does not have any control function. To deactivate, select Co5 -> Fb00 = OFF.

System Anl 9



Set Co4 -> Fb11 = ON if the instrumentation represented by the broken line is required.

Note!
VFsek does not have any control function. To deactivate, select Co5 -> Fb00 = OFF.

5 Functions of the heating circuit

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

5.1 Functioning principle

The heating circuit with the highest flow set point has priority. This principle applies to all heating circuits with mixing valves. In systems Anl 3, 5 and 8, the pump circuit has priority. The flow set point of the heating circuit with priority is controlled by the valve in the pre-control circuit. If several heating circuits have the same flow set point, the heating circuit with lowest number always has priority and is controlled by the primary valve.

5.2 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. 2). The outdoor temperature required for weather-compensated control is measured at the outdoor sensor, passed on as a current signal or received over a 0 to 10 V signal.

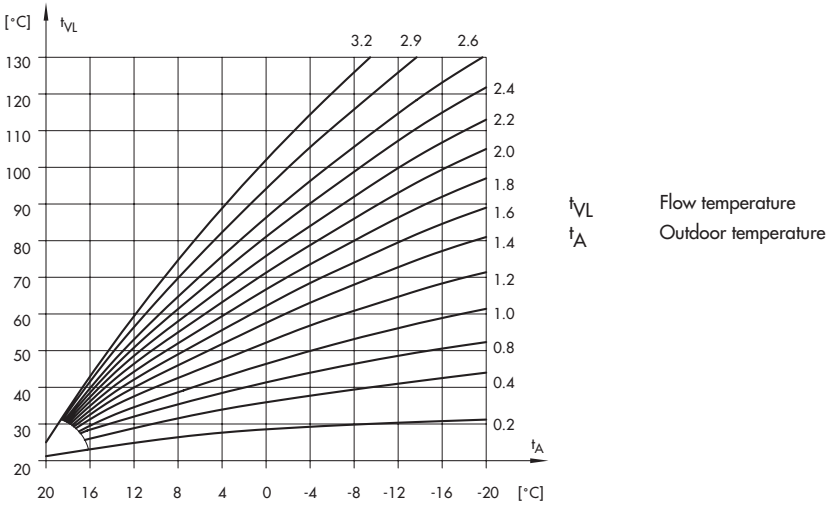


Fig. 2 · Gradient characteristics

Function	WE	Configuration
Outdoor sensor AF1, 2, 3		Co1, 2, 3 -> Fb02 = ON* * Co1 -> Fb02 cannot be deactivated

If the outdoor temperature should alternatively be passed on as a current signal, the following additional configuration must be made for the **outdoor sensor AF1, 2, 3**:

Outdoor sensor AF 0 to 20 mA	OFF	Co1, 2, 3 -> Fb03 = ON 1 0 to 20 mA = –20 to 50 °C 2 0 to 20 mA = –40 to 50 °C

If the outdoor temperature should alternatively be received over a 0 to 10 V signal, additionally configure Co1, 2, 3 -> Fb02 = ON for the **outdoor sensor AF1, 2, 3**:

Outdoor sensor AF 0 to 10 V (0 to 10 V = –40 to 50 °C)	OFF	Co1, 2, 3 -> Fb04 = ON

If just one outdoor sensor should be connected, connect it to AF1. This outdoor temperature is then used also for HK2 and HK3.

5.2.1 Gradient characteristic

Basically, the following rule applies: a decrease in the outdoor temperature causes the flow temperature to increase. By varying the *Gradient* and *Level* parameters, you can adapt the characteristic to your individual requirements. Increasing *Gradient* results in a higher flow temperature, decreasing *Gradient* in a lower flow temperature. The *Level* parameter performs a parallel transport of the heating characteristic in an upward or downward direction.
Outside the times-of-use, reduced set points are used for control:
Reduced flow set point = *Flow set point – Set-back difference*.
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 0.5

Functions	WE	Configuration
4-point characteristic	OFF	Co1, 2, 3 -> Fb10 = OFF
4-point characteristic	OFF	Co5 -> Fb03 = OFF (Anl 3, 5, 8)

Parameters	WE	Parameter level / Range of values
Gradient, flow	1.8	PA1, 2, 3 / 0.4 to 3.2
Level, flow	0 °C	PA1, 2, 3 / –30 to 30 °C
Set-back difference	20 °C	PA1, 2, 3 / 0 to 50 °C
Min. flow temperature	90 °C	PA1, 2, 3 / 20 to 130 °C
Max. flow temperature	20 °C	PA1, 2, 3 / 20 to 130 °C

5.2.2 4-point characteristic

The 4-point characteristic allows you to define your own heating characteristic.
It is defined by 4 points for the *Outdoor temperature*, the *Flow temperature* and the *Return flow temperature*. The *Set-back difference* at points 2 and 3 indicates how much the flow temperature is reduced outside the times-of-use. The *Max. flow temperature* and *Min. flow temperature* parameters mark the upper and lower limits of the flow temperature.

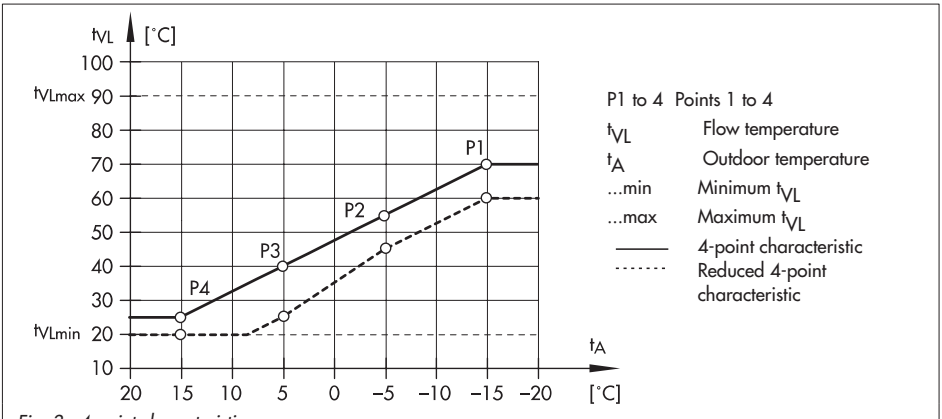


Fig. 3 · 4-point characteristic

Functions	WE	Configuration
4-point characteristic	OFF	Co1, 2, 3 -> Fb10 = ON
4-point characteristic	OFF	Co4 -> Fb03 = ON (Anl 3, 5, 8)

Parameters		WE	Parameter level / Range of values
Flow temperature	Point 1	70 °C	PA1, 2, 3 / 20 to 130 °C
	Point 2	55 °C	
	Point 3	40 °C	
	Point 4	25 °C	
Outdoor temperature	Point 1	–15°C	PA1, 2, 3 / –30 to 90 °C
	Point 2	– 5 °C	
	Point 3	5 °C	
	Point 4	15 °C	
Return flow temperature	Point 1	65 °C	PA1, 2, 3 / 20 to 90 °C
	Point 2	50 °C	
	Point 3	35 °C	
	Point 4	20 °C	
Set-back difference	Points 2, 3	20 °C	PA1, 2, 3 / 0 to 50 °C
Max. flow temperature		90 °C	PA1, 2, 3 / 20 to 130 °C
Min. flow temperature		20 °C	PA1, 2, 3 / 20 to 130 °C

Note!
The 4-point characteristic *function can only be activated when the* ***Adaptation*** *function is not active (Co1, 2, 3 -> Fb07 = OFF).*

5.3 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, this set point is reduced by the *Set-back difference*. Both *Minimum flow temperature* and *Maximum flow temperature* parameters are set to identical values.

Parameters	WE	Parameter level / Range of values
Max. flow temperature	90 °C	PA1, 2, 3 / 20 to 130 °C
Min. flow temperature	20 °C	PA1, 2, 3 / 20 to 130 °C
Set-back difference	20 °C	PA1, 2, 3 / 0 to 50 °C

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 x 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, 3 / 0 to 90 °C

5.4.2 OT deactivation value in reduced operation

If the outdoor temperature in reduced operation exceeds the limit *OT deactivation value 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 x 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 10 °C to save energy. Nevertheless, remember that the system requires some time in the morning to heat up the building (–> Outdoor temperature-dependent advance heating, section 5.6).

Parameter	WE	Parameter level / Range of values
OT deactivation value in reduced operation	10 °C	PA1, 2, 3 / –10 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 *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 the building cooling 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, 3 / –30 to 50 °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 *Outdoor temperature limit in summer mode* on two consecutive days, summer mode is activated on the following day: the heating is switched off. If the mean daytime temperature remains below the *Outdoor temperature limit in summer mode* on the next day, summer mode is deactivated on the following day.

Functions	WE	Configuration
Summer mode	OFF	Co1, 2, 3 -> Fb11 = ON
	01.06	Start summer mode/ 01.01 to 31.12
	30.09	Stop summer mode / 01.01 to 31.12
	18 °C	Outdoor temperature limit in 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, 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 $t = \frac{12\,°C}{3\,°C/h} = 4$ 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.

Function	WE	Configuration
Delayed outdoor temperature adaptation	OFF	Co5 -> Fb04 = ON
	Ab	When outdoor temperature t_A drops
	Auf Ab	When outdoor temperature t_A drops or rises
	3 °C/h	Delay / 0.2 to 6.0 °C/h

5.6 Outdoor temperature-dependent advance heating

The controller activates the heating depending on the outdoor temperature before the time-of-use starts in normal operation. The *Advance heating time* is based on an outdoor temperature of –12 °C. The advance heating time is shorter when the outdoor temperature is higher.

Functions	WE	Configuration
Optimization	OFF	Co1, 2, 3 -> Fb05 = ON, ***Select:** 1*
	120 min	Advance heating time / 0 to 360 min
Outdoor sensor AF1, 2, 3		Co1, 2, 3 -> Fb02 = ON

5.7 Remote operation

Apart from measuring the room temperature, the Type 5244 Room Sensor (PTC sensor) and Type 5257-5 Room Sensor (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. Nevertheless, it is not used for control unless the **Optimization**, **Adaptation**, **Flash adaptation** or **Room temperature dependent control** functions have been activated.

Function	WE	Configuration
Room sensor RF1, 2, 3	OFF	Co1, 2, 3 -> Fb00 = ON, **select:** FUEHL

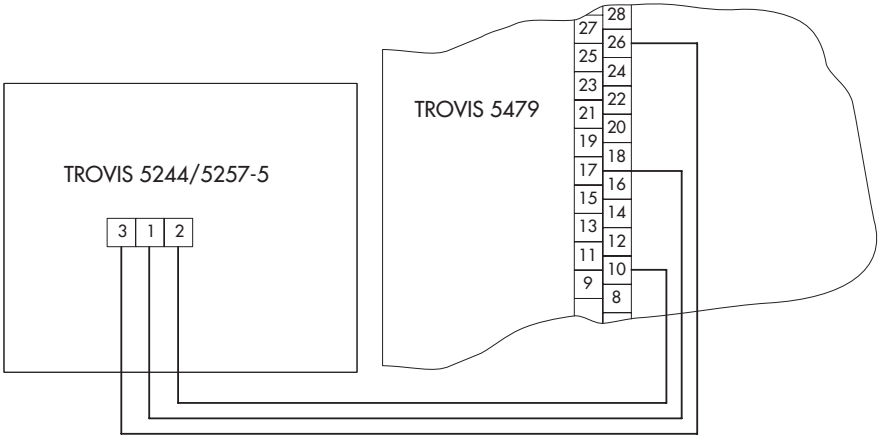


Fig. 4 · Wiring plan for Type 5244/5257-5 Room Sensors

Note!

The room temperature can also be fed over a current input with a 0 to 20 mA signal (= 0 to 40 °C) (Co1, 2, 3 -> Fb00 = ON, 0-20). The remote operation function is not possible in this case.

5.8 Optimization with room sensor

Both the following described functions should only be used when the room (reference room) in which the room sensor is located has a typical heating pattern similar to the rest of the building. In addition, there should be no thermostat valves mounted on the radiators in this reference room.

There are two types of optimization depending on the activation conditions:

- **Outdoor temperature-dependent advance heating, room temperature-dependent deactivation**
  The controller activates the heating depending on the outdoor temperature before the time-of-use starts in normal operation. The *Advance heating time* is based on an outdoor temperature of –12 °C. The advance heating time is shorter when the outdoor temperature is higher (see section 5.6).
- **Room temperature-dependent advance heating and deactivation**
  The controller calculates the required advance heating time (max. 6 hours) adapted to the building characteristics, resulting in the *Day set point* (rated room temperature) being reached in the reference room when the time-of-use starts. The heating is heated with the maximum flow temperature during the advance heating phase. As soon as the *Day set point* is reached, weather-compensated control starts.

The controller deactivates the heating in both types of optimization depending on the room sensors up to two hours before the time-of-use finishes. The controller chooses the deactivation time such that the room temperature does not drop significantly below the desired temperature 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 Room set point.

Function	WE	Configuration
Room sensor RF1, 2, 3	OFF	Co1, 2, 3 -> Fb00 = ON

Outdoor temperature-dependent advance heating, room temperature-dependent deactivation:		
Optimization	OFF	Co1, 2, 3 -> Fb05 = ON, ***select:*** *2*
	120 min	Advance heating time / 0 to 360 min
Outdoor sensor AF1, 2, 3		Co1, 2, 3 -> Fb02 = ON
Room temperature-dependent advance heating and deactivation:		
Optimization	OFF	Co1, 2, 3 -> Fb05 = ON, ***select:*** *3*

Parameters	WE	Parameter level / Range of values
Day set point	20 °C	PA1, 2, 3 / 10 to 90 °C
Night set point	17 °C	PA1, 2, 3 / 10 to 90 °C
Sustained temperature	10 °C	PA1, 2, 3 / 10 to 90 °C

5.9 Flash adaptation

Direct reactions to deviations in room temperature can be achieved using the function block setting: Co1, 2, 3 -> Fb08 = ON.
Flash adaptation counteracts room temperature deviations by increasing or decreasing the flow temperature by up to 10 °C.

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

Functions	WE	Configuration
Room sensor RF1, 2, 3	OFF	Co1, 2, 3 -> Fb00 = ON
Flash adaptation	OFF	Co1, 2, 3 -> Fb08 = ON

5.10 Adaptation

The controller is capable of automatically adapting the heating characteristic to the building characteristics, provided a gradient characteristic has been set (Co1, 2, 3 -> Fb10 = OFF). The reference room, where the room sensor is located, represents the entire building and is monitored to ensure that the *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 PA1, 2, 3 parameter levels under *Gradient, flow*.

Functions	WE	Configuration
Room sensor RF1, 2, 3	OFF	Co1, 2, 3 -> Fb00 = ON
Outdoor sensor AF1, 2, 3		Co1, 2, 3 -> Fb02 = ON
Adaptation	OFF	Co1, 2, 3 -> Fb07 = ON
4-point characteristic	OFF	Co1, 2, 3 -> Fb10 = OFF
Parameter	WE	Parameter level / Range of values
Day set point	20 °C	PA1, 2, 3 / 10 to 90 °C

5.11 Room temperature-dependent control

In systems Anl 6 and 9, the **Room temperature-dependent control** function can be separately activated for each heating circuit. The **Room sensor** function must be activated for this function. The room temperature can be fed over a sensor (FUEHL) or over a current signal (0 to 20 mA corresponding to 0 to 40 °C).
Flow and return flow sensors only serve to display the temperature and can therefore be deactivated.
The outdoor sensors are not required for the room control function, but are still required for the **Frost protection** function. The outdoor sensor AF1 can also be deactivated if all the control circuits are configured as room control circuits.
Activation of the room control function causes the control parameters to be automatically set to the following settings:
T_N (reset time) = 1617 s, T_V (derivative-action time) = 330 s, K_P (proportional gain) = 20

With the aid of **Parameter optimization** (Co1, 2, 3 -> Fb16 = ON), these settings are optimized. This, however, requires a constant room temperature at the time when the function is activated and a temperature difference between the current room temperature and the new room set point of at least 3 °C.
In room control circuits, the heating circuit pump is switched on during the advance heating phase.

Note!
A fictive flow set point is reported to master controller in case there is a demand for an externally required signal when the room control function is active. This set point is calculated from the characteristic and outdoor temperature and adapted to the actual demand over adaptation and flash adaptation.
The fictive flow set point has no effect on mixer circuits and blinks on the display. Just the third type of optimization is permitted when the room control is active.

⚠ ***Caution!***
The frost protection cannot function without an outdoor sensor.

Functions	WE	Configuration
Room sensor RF1, 2, 3	OFF	Co1, 2, 3 -> Fb00 = ON
Room temperature-dependent control	OFF	Co1, 2, 3 -> Fb06 = ON
Flow sensor OFF when room temp. dependent control is used	OFF	Co1, 2, 3 -> Fb14
Parameter optimization for room temp. dependent control	OFF	Co1, 2, 3 -> Fb16

5.12 Pump management

The **Pump management** function can be used for the heating circuits (UP1 and UP2 circulation pumps). The binary outputs BA1 and BA2 or BA3 and BA4 (max. 24 V, 10 mA) should be used to operate the pumps when a speed-control pump is used in heating circuit 1 or 2:

- BA1 or BA3 switches the pump on/off
- BA2 or BA4 releases the speed control in rated operation or sets the pump to minimum speed operation during reduced operation

The speed control with BA2 or BA4 = ON is released with the setting Co1, 2 -> Fb13 = ON; the speed control with BA2 or BA4 = OFF is released with the setting Co1, 2 -> Fb13 = OFF.
Co1, 2 -> Fb13 merely influences the switching state of the binary output BA2 or BA4.

Function	WE	Configuration
Pump management	OFF	Co1, 2 -> Fb13

Note!
Refer to the pump manufacturer instructions for the exact terminal assignments of pumps since the terminal assignments vary depending on the pump.
In systems Anl 3, 5 and 8, the pumps of an uncontrolled heating circuit can be switched on and off over an external binary signal. For this purpose, deactivate the ***Potentiometer input*** *function (Co1 to Co3 -> Fb12 = OFF) and select the function block parameter FrG-E.*

5.13 Releasing the heating circuit

The release of the heating circuit in automatic mode is a default setting after the time schedule has been programmed. In addition, it is possible to release the heating circuit over the corresponding potentiometer inputs. When no signal exists at these inputs and the slide switch of the heating circuit is positioned to automatic mode (🕘), the heating circuit is in stand-by mode (i.e. just the frost protection is active).

Function	WE	Configuration
Potentiometer input for release of HK	OFF	Co1, 2, 3 -> Fb12 = OFF FrG-E: Release over BE (potentiometer) FrG-A: Release over time schedule

5.14 Position feedback in pre-control circuit

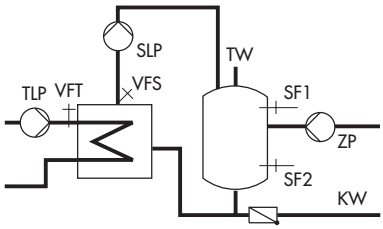
A potentiometer for position feedback (series resistor: 1000 Ω) can be connected at terminal 27 instead of a potentiometer to shift the set point over the room sensor.
The actual position of the valve in the pre-control circuit is issued as an external resistance value.
The valve position is displayed in % of the travel in the operating level at the end of the control circuit data for the pre-control circuit (level 5).

Function	WE	Configuration
Potentiometer in pre-control circuit	OFF	Co5 -> Fb16 = ON

Note!
The potentiometer input HK2 (configuration: Co2 -> Fb12) is not available when this setting is configured.

6 Functions of the DHW circuit

6.1 DHW heating in the storage tank charging system



TLP	Heat exchanger charging pump
VFS/VFT	Flow sensors
SLP	Storage tank charging pump
SF1	Storage sensor 1
SF2	Storage sensor 2
ZP	Circulation pump
TW	DHW
KW	Cold water

Fig. 5 · DHW heating in a storage tank charging system

Start storage tank charging

The controller begins charging the storage tank when the water temperature measured at sensor SF1 falls below the *DHW demand ON* by 0.1 °C.
When there is no heating operation or when the flow temperature in the system is lower, the heat exchanger charging pump is switched on immediately. The storage tank charging pump is switched on when the temperature currently measured at storage sensor VFT has reached the temperature measured at sensor SF1.
If a storage tank thermostat is used, the storage tank charging pump is switched on when the temperature T = *Charging temperature* – 5 °C is reached at sensor VFT.

Note!
The charging temperature VFT is controlled by the primary valve in system Anl 2. In systems Anl 4 and 5, the charging temperature VFT is only controlled by the primary valve when the DHW demand has the highest set point and has priority.
In all other systems (Anl 7, 8 and 9) the mixing valve regulates the charging temperature VFT.

When the **Circulation pump** function is active, the circulation pump remains in operation according to the time schedule. The pump is switched off when this function is deactivated.

The **Mixing valve always active** function allows the heat exchanger to maintain the charging temperature using the mixing valve. The heat exchanger charging pump remains switched on and the return flow temperature is not limited outside the times-of-use.

Stop storage tank charging

The controller stops charging the storage tank when the water temperature in the storage tank measured at sensor SF2 (*DHW demand OFF*) exceeds the set point by 0.1 °C. The primary valve (Anl 2) or the mixing valve in the DHW circuit open until the heat exchanger charging temperature on the primary side at sensor VFT has fallen below the *Heat exchanger charging pump deactivation limit*.

The heat exchanger charging pump is switched off according to the time schedule and depending on the temperature. When the flow set point of the primary heating circuit is lower than the *Heat exchanger charging pump deactivation limit,* the heat exchanger charging pump (TLP) is first switched off when the primary heat exchanger charging temperature at sensor VFT has dropped to the same level as the flow set point of the primary heating circuit. The heat exchanger charging pump is switched off at the latest after t = 2 x Transit time of the primary valve.

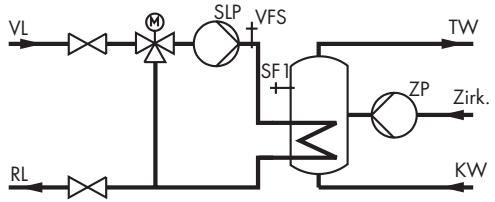
The storage tank charging pump (SLP) is switched off after t = 2 x Transit time of the primary valve or when the storage tank charging temperature in the secondary circuit at sensor VFS has fallen below the *Storage tank charging pump deactivation limit*.

The circulation pump is switched on and off according to a time schedule.

Functions	WE	Configuration
Storage sensor SF1	ON	Co4 -> Fb00 = ON
Storage sensor SF2	ON	Co4 -> Fb01 = ON
Flow sensor VFS	ON	Co4 -> Fb03
Circulation pump	OFF	Co4 -> Fb04
Storage tank system	OFF	Co4 -> Fb10 = OFF
Mixing valve always active	OFF	Co4 -> Fb11

Parameters	WE	Parameter level / Range of values
DHW demand ON	40 °C	PA4 / 20 to 90 °C
DHW demand OFF	45 °C	PA4 / 20 to 90 °C
Charging temperature	55 °C	PA4 / 20 to 90 °C
Heat exchanger charging pump deactivation limit	50 °C	PA4 / 20 to 90 °C
Storage tank charging pump deactivation limit	50 °C	PA4 / 20 to 90 °C
Maximum charging temperature	120 °C	PA4 / 20 to 120 °C

6.2 DHW heating in the storage tank system



SLP	Storage tank charging pump
SF1	Storage sensor 1
VFS	Flow sensor
ZP	Circulation pump
KW	Cold water
TW	Domestic hot water (DHW)
VL	Flow
RL	Return flow

Fig. 6 · DHW heating in storage tank system, applies to systems Anl 4, 5, 7, 8, and 9
Anl 2: without three-way valve

Start storage tank charging

The controller can be reconfigured for all systems with DHW heating to control a DHW storage tank with heating register (storage tank system).

The controller switches the storage tank charging pump (SLP) on and off and controls the mixing valve for the DHW circuit. In system Anl 2, there is no need for a mixing valve in the DHW circuit. The sensor VFS is connected to terminal 28 and the storage tank charging pump to terminal 45.

The controller starts the storage tank charging when the water temperature measured at sensor SF1 falls below the *DHW demand ON* by 0.1 °C.

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 a storage tank thermostat is used, the storage tank charging pump is switched on when the temperature T = *Charging temperature* – 5 °C is reached at sensor VFS.

Note!
The charging temperature VFS is controlled in system Anl 2 by the primary valve. In all the other systems (Anl 4, 5, 7, 8 and 9) the mixing valve regulates the charging temperature VFS.

When the **Circulations pump** function is active, the circulation pump remains in operation according to the time schedule. The pumps is switched off when this function is deactivated.

The **Mixing valve always active** function allows the heat exchanger to maintain the charging temperature using the mixing valve. The heat exchanger charging pump remains switched on and the return flow temperature is not limited outside the times-of-use.

Stop storage tank charging

The controller stops charging the storage tank when the water temperature in the storage tank measured at sensor SF1 exceeds the temperature T = *Charging temperature* + *Hysteresis* by 0.1 °C. 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 when the charging temperature at sensor VFS has fallen below the *Storage tank charging pump deactivation limit;* however, at the latest, after t = *2 x Transit time of the primary valve.*

Functions	WE	Configuration
Storage sensor SF1	ON	Co4 -> Fb00 = ON
Storage tank system	OFF	Co4 -> Fb10 = ON
Circulation pump	OFF	Co4 -> Fb04
Mixing valve always active	OFF	Co4 -> Fb11
Parameters	WE	Parameter level / Range of values
DHW demand ON	40 °C	PA4 / 20 to 90 °C
Hysteresis	5 °C	PA4 / 0 to 30 °C
Charging temperature	55 °C	PA4 / 20 to 90 °C
Storage tank charging pump deactivation limit	50 °C	PA4 / 20 to 90 °C

6.3 Priority operation

In many district heating systems with primary DHW heating, the allotted amount of water is only intended to supply the heating system. 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**.

6.3.1 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 -> Fb06 = ON, the charging temperature can be monitored.
If the temperature also falls below the charging temperature after the time period set in function block Fb07 has elapsed, the heating circuit is controlled by pulse signals and the set point remains the same.
Which circuit is closed depends on how the system (Anl) is configured:

- Anl 2: Heating circuit with the highest flow set point
- Anl 4: Heating circuit
- Anl 5: Heating circuit 1;
  Switching off the pump heating circuit with Co4 -> Fb05 possible.
- Anl 7: Pre-control circuit of heating
- Anl 8: Pre-control circuit of heating
- Anl 9: Heating circuit 1

Functions	WE	Configuration
Reverse control	ON	Co4 -> Fb06 = ON
Time until reverse control	ON	Co4 -> Fb07*
	*	Co4 -> Fb07 = ON: 2 minutes Co4 -> Fb07 = OFF: 10 minutes

6.3.2 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. The charging temperature can be monitored with the setting Co4 -> Fb06 = OFF and *Activate priority in case of deviation* > 0.

If system deviations still occur after the time period set in function block Fb07 has elapsed, the set-back operation is activated for the heating circuit with control valve by the value entered in *Set-back HK in case of DHW priority*.

Functions	WE	Configuration
Reverse control	ON	Co4 -> Fb06 = OFF
	0 °C	Set-back HK in case of DHW priority / 0 to 30 °C
Time until reverse control	ON	Co4 -> Fb07*
	*	Co4 -> Fb07 = ON: 2 minutes Co4 -> Fb07 = OFF: 10 minutes

Note!
The priority operation is deactivated with the setting Co4 -> Fb06 = OFF and Set-back HK in case of DHW priority *= 0!*

6.4 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 = *DHW demand ON + 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.

6.5 Thermal disinfection of the DHW storage tank

In all systems with DHW heating, the DHW storage tank is thermally disinfected on a selected *Day of the week* (1 to 7) or every day (0). The storage tank is heated up to the adjusted *Disinfection temperature*. The charging set point is always higher than the *Disinfection temperature* by the value in *Charging boost*. Disinfection begins at the adjusted *Start time* and, at the latest, ends at the specified *Stop time*.

When the *Disinfection temperature* has not been reached at the end of the thermal disinfection cycle, an "ERR 2" alarm is generated and blinks on the display. This alarm can be confirmed

by opening up Co4 -> Fb08. The alarm is automatically reset when the *Disinfection temperature* is properly reached during the following thermal disinfection cycle.

Thermal disinfection for preventing legionella infection causes

- high return flow temperatures during the disinfection cycle (return flow temperature limitation suspended),
- 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.

Functions	WE	Configuration
Storage sensor SF1	ON	Co4 -> Fb00 = ON
Thermal disinfection	OFF	Co4 -> Fb08 = ON
	3	Day of the week / 1–7, 1, 2, ..., 7 with 1–7 = every day, 1 = Monday, ..., 7 = Sunday
	70 °C	Disinfection temperature / 50 to 80 °C
	5 °C	Charging boost / 0 to 30 °C
	00:00	Start time / 00:00h to 23:30h (in minute steps)
	04:00	Stop time / 00:00h to 23:30h (in minute steps)

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	ON	Co5 -> Fb05 = ON

7.2 Frost protection

The **Frost protection** function does not work in manual mode.
The heating system is automatically monitored for frost protection. The operation of a pump of a heating circuit or DHW circuit as a frost protection measure is indicated by ❄ on the display. Criteria for starting frost protection and the frost protection measures are listed in the table below:

Criteria for starting frost protection	Frost protection measures
The outdoor temperature drops below 0 °C.	Control of a flow temperature set point of 20 °C. Heating circulation pump and circulation pump (ZP) are switched on.
The flow temperature drops below 5 °C.	Control of a flow temperature set point of 20 °C.
The storage tank temperature drops below 5 °C.	Charging of DHW storage tank to 10 °C.

Note!
If a pump circuit is in frost protection mode (systems Anl 3, 5 and 8), its flow set point of 20 °C is not regulated at the primary valve when the mixing circuit(s) require a higher set point. To prevent the pump circuit that is switched off from overheating, the flow temperature is controlled by switching on and of the circulation pumps (UP). The pump is switched on when the measured flow temperature falls below 20 °C. The circulation pump is switched off after a time delay when the flow temperature exceeds 20 °C mark.

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 12.00h and 12.01h. This is done to avoid that the pumps get stuck when they are not operated for a longer period of time. The forced operation of the storage tank or heat exchanger charging pump is operated between 12.01h and 12.02h.

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

Function	WE	Configuration
Return flow sensor RüF1, 2, 3	OFF	Co1, 2, 3 -> Fb01 = ON
Parameters	WE	Parameter level / Range of values
Max. return flow temperature	65 °C	PA1, 2, 3 / 20 to 90 °C
Min. return flow temperature	20 °C	PA1, 2, 3 / 20 to 90 °C

In systems with a DHW in a secondary circuit, the control during DHW heating uses the *Return flow limitation temperature for DHW* parameter (systems Anl 2, 4 and 5). In the transition time or in summer mode, the heating circuit can be operated with a lower return flow temperature while at the same time performing proper storage tank charging.

The *Return flow limitation temperature for DHW* parameter can also be active in systems Anl 4, 5, 7, 8 and 9 at a separate return flow sensor. The separate sensor RüFTW (return flow sensor for DHW) must in this case be installed in the return flow of the DHW circuit.

Note!
In system Anl 2 , the sensor RüFprim is installed in the return flow of the primary circuit. In this case, the ***Return flow sensor, primary*** *function must be activated (Co5 -> Fb01 = ON).*

Function	WE	Configuration
Return flow sensor in DHW circuit	OFF	Co4 -> Fb02
Parameter	**WE**	**Parameter level / Range of values**
Return flow limitation temperature for DHW	45 °C	PA4 / 20 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 **Condensate accumulation control** 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.

In systems Anl 6 and 9, the limitation applies to all control valves; in all other systems, it applies to the control valve with the highest flow temperature set point.

Functions	WE	Configuration
Condensate accumulation control	OFF	Co5 -> Fb07 = ON
	2 °C	Maximum system deviation / 2 to 10 °C
Condensate accumulation control		Co4 -> Fb13 = ON
	2 °C	Maximum system 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 Co5 -> Fb14 = ON.

7.6 Compensating for time delays

The controller regulates the control circuit with the highest flow set point with the secondary flow sensor. If the sensor is placed on the secondary side directly downstream of the heat exchanger and the setting Co5 -> Fb06 = ON configured, any time delays due to changes in temperature at a distant flow sensor do not occur anymore. This measure used with a condensate accumulation control means that the control can intervene before the control valve releases unproportionally too much heat exchanger area.

Functions	WE	Configuration
Flow sensor, secondary	OFF	Co5 -> Fb00 = ON
Compensation of time delays	OFF	Co5 -> Fb06 = ON

7.7 Three-step control

The flow temperature can be controlled using a PI algorithm. The valve reacts to pulses that the controller emits 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 %.

The three-step control can be configured separately for individual heating circuits, for the DHW heating and for the pre-control circuit.

Functions	WE	Configuration
Three-step control for heating circuit	ON	Co1, 2, 3 -> Fb15 = ON
	0.5	K_P (proportional gain) / 0.1 to 50.0
	200 s	T_N (reset time) / 1 to 999 s
	120 s	T_Y (transit time) / 15, 30, …, 240 s
	240 s	UP lag time / 120 to 1200 s
Three-step control for DHW heating	ON	Co4 -> Fb09 = ON
	0.5	K_P (proportional gain) / 0.1 to 50.0
	200 s	T_N (reset time) / 1 to 999 s
	120 s	T_Y (transit time) / 15, 30, …, 120 s
Three-step control for pre-control circuit	ON	Co5 -> Fb14 = ON
	0.5	K_P (proportional gain) / 0.1 to 50.0
	200 s	T_N (reset time) / 1 to 999 s
	120 s	T_Y (transit time) / 15, 30, …, 240 s

No further pulses are issued at the three-step outputs when the control signal deactivation function is activated when the total of the timing pulses (uninterrupted in one direction) is larger than three times the control valve transit time T_Y. In this case, it can be assumed that the control valve is either completely open or completely closed; other signals do not cause any changes in the control valve.

Function	WE	Configuration
Control signal deactivation	OFF	Co5 -> Fb18 = ON

7.8 On/off control

The flow temperature can be controlled by an on/off signal. The controlled valve is opened when the flow temperature falls below the set point by T = 0.5 x *Hysteresis*. When the flow temperature exceeds the set point by T = 0.5 x *Hysteresis*, the control valve is closed. The greater the *Hysteresis* selected, the lower the switching frequency. The *UP lag time* parameter indicates the time span which the circulation pump continues to run after the control valve is closed (the parameter only needs to be set for the heating circuits HK1, HK2 and HK3).

The on/off control can be configured separately for the individual heating circuits and for the pre-control circuit.

Functions	WE	Configuration
Three-step control for heating circuit	ON	Co1, 2, 3 -> Fb15 = OFF
	2 °C	Hysteresis / 1 to 30 °C
	240 s	UP lag time / 120 to 1200 s
Three-step control for pre-control circuit	ON	Co5 -> Fb14 = OFF
	2 °C	Hysteresis / 1 to 30 °C
	120 s	Minimum activation time / 0 to 600 s
	120 s	Maximum activation time / 0 to 600 s

7.9 Requesting/processing an external demand

Requesting an external demand

The flow temperature set points can be passed on from controller to controller in complex heating systems. The external flow set point of the previous controller is fed over the analog input AE_B and compared to its own flow set point. The higher of the two flow set points is passed on over the output AA to the next controller (0 to 10 V = 0 to 120 °C flow temperature).

Passing on the external demand is only possible in systems without a primary valve (systems Anl 6 and 9).

Function	WE	Configuration
Requesting an external demand (0 to 10 V)	OFF	Co5 -> Fb13 = ON

Note!
The value of the 0 to 10 V output can be retrieved and displayed in the InF 5 level by pressing the enter key when the external demand (0 to 120 °C) is displayed.

Processing an external demand

The controller (= primary controller) can process analog requests for an externally required signal, provided this signal is assigned to "0 to 10 V corresponds with 0 to 120 °C flow temperature". The highest flow set point of the connected controller (= secondary controller) is fed over the analog input AE_B and compared with its own flow set pont. The higher of the two flow set points is used for the control plus the *Boost* parameter; minimum 12 °C flow temperature matching 1 V standardized signal.
The *Boost* parameter improves the control performance of the connected heating circuit valves and compensates for any loss in capacity.

Functions	WE	Configuration
Flow sensor, secondary	ON	Co5 -> Fb00 = ON
Control of external demand AE_B (0 to 10 V)	OFF	Co5 -> Fb13 = ON
	0 °C	Boost / 0 to 30 °C

7.10 Passing on and receiving outdoor temperatures

Passing on the outdoor temperature

The outdoor temperature can be passed on over the analog output AA (0 to 10 V, terminal 9) (0 to 10 V corresponding with –40 to 50 °C outdoor temperature). In systems without a primary control valve (Anl 6 and 9), the outdoor temperature function is locked against **Requesting an external demand signal** function.

Function	WE	Configuration
Outdoor temperature passed on over AA	OFF	Co5 -> Fb15 = ON

Receiving the outdoor temperature

The outdoor temperature of another controller is received over the input AE (terminal 11). The received outdoor temperature is used in this case to determine the flow temperature set point.

7.11 Selecting terminals as analog inputs

Two analog inputs can be connected. The input value is passed on over the interface to the higher-level control system (reading in % of the measuring range). After activating the function block (Co5 -> Fb11/Fb12), the input range (0 to 20 mA or 4 to 20 mA) and the terminal number can be selected. A 50 Ω resistor in parallel connection must be routed to the terminals.

Function	WE	Configuration
Analog input to terminal x, y	OFF	Co5 -> Fb11, Fb12 = ON Terminal number 0 to 20 mA / 4 to 20 mA

7.12 Flow rate/capacity limitation over a pulse input

Flow rate/capacity limitation can be implemented based on a pulse signal. This only applies to systems without the function to process an external demand over a 0 to 10 V 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, only the *Max. limit value* for the flow rate or capacity can be set.

A heat meter with pulse output connected at input V_{max} (terminal 30) can be used either to limit the system flow rate (parameter code: U) or the system capacity (parameter code: P). The pulse weighting of the heat meter (WMZ) must be entered. The displayed value corresponds to the unit l/pulse or kWh/pulse.
When the pulse rate reaches the current maximum limit, the flow set point of the 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:

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

Function	WE	Configuration
Pulse input for flow rate or capacity limitation	OFF	Co5 -> Fb09 = ON
		U Flow rate limitation
		P Capacity limitation
	10	Pulse weighting / 0.1 to 999

Parameters	WE	Parameter level / Range of values
Maximum capacity of the entire system	50 kW	PA5 / 0.1 to 5999 kW
Maximum capacity of the heating	50 kW	PA5 / 0.1 to 5999 kW
Maximum capacity of the DHW heating	50 kW	PA5 / 0.1 to 5999 kW
Maximum flow rate of the entire system	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Maximum flow rate of the heating	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Maximum flow rate of the DHW heating	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Proportional-action coefficient for the limitation	1.0	PA5 / 0.1 to 10

The pulses are saved in the holding registers 40031 (low byte) and 40032 (high byte).
A second pulse counter can be connected using a pulse coupler over the serial interface jack (RS-232 version only). The counting values are saved in the holding registers 40042 (low byte) and 40043 (high byte).

7.13 Locking manual level

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

Function	WE	Configuration
Locking manual levels	OFF	Co5 -> Fb10 = ON

8 Operational faults

Malfunctions or faults are indicated by the ! icon blinking on the display. The "Error" alarm is displayed immediately. Press the enter key to open the error level. It may be possible to view several error alarms by pressing the enter key. As long as an error alarm is present, the error level appears in the display loop, even though it has not been opened by pressing the enter key.

In the error level, the controller indicates a defective sensor by displaying the corresponding sensor combination. A fault is displayed as specified in the list below.

8.1 Error list/sensor failure

- ERR 1 Sensor broken in RK1 (in connection with the corresponding sensor icon)
- ERR 2 Sensor broken in RK2 (in connection with the corresponding sensor icon)
- ERR 3 Sensor broken in RK3 (in connection with the corresponding sensor icon)
- ERR 4 Sensor broken in DHW circuit (in connection with the sensor icon)
- ERR 5 Sensor broken in primary circuit (in connection with the sensor icon)
- ERR–1 Standard data entered again (default settings)
- ERR–2 Final temperature of the thermal disinfection not reached
- ERR–3 Mode selector switch 1 defective
- ERR–4 Mode selector switch 2 defective
- ERR–5 Mode selector switch 3 defective
- ERR 10 Sensor change during DHW heating from sensor VFS to sensor VFT

Note!
A sensor breakage cannot be recognized when NTC sensors are used (configuration: Co5 -> Fb22).

In the error level, "ERR1 to 5" on the display indicates the sensor failures as per the error list. Detailed information over a sensor failure can be retrieved within the information level by polling individual temperatures: each sensor icon (see page 24) displayed together with – – – – indicates a defective sensor. The following list explains how the controller responds to the failure of the different sensors.

- **Outdoor sensors AF**: 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* is smaller than 50 °C).
- **Flow sensor VF**: When the flow sensor is defective, the controller continues to work with the valve in the last position.
- **Flow sensor in the DHW heat exchanger VFT**: The DHW control valve is closed when the sensor fails.

- **Flow sensor in the DHW storage tank VFS**: The flow set point is controlled for the DHW heat exchanger only with VFT when the sensor fails. The display blinks.
- **Return flow sensor RüF**: The controller continues to function without the return temperature limitation when the return flow sensor fails.
- **Room sensor RF**: The controller functions using the settings for operation without room sensor when the room sensor fails. For example, optimization mode switches to the reduced operation mode. Adaptation mode is interrupted. The last defined heating characteristic is not changed anymore.
- **Storage tank sensor SF1 and SF2**: When one of the sensors fail, the storage tank is not charged anymore.

8.2 Collective error alarm

In the event of an error occurring in the controller, it can also be indicated over the binary output BA4. BA4 is switched on when the error status register is not equal to 0. BA4 is a DC voltage output in the open-collector circuit and may only be applied with 24 V/10 mA at the maximum. An active **Collective error alarm** function means BA4 is not available for pump management anymore.

Function	WE	Configuration
Collective error alarm	OFF	Co5 -> Fb21 = ON

8.3 Temperature monitoring

The flow temperature and the room temperature can be monitored for deviations. This function is activated by selecting Co5 -> Fb20 = ON. The controller issues an alarm when:

- the flow temperature deviates from its set point by 10 °C for longer than 30 minutes,
- the room temperature falls below its set point by 2 °C for longer than 30 minutes,
- the return flow limitation is active for longer than 30 minutes.

In the event that one of these errors occurs, the bit associated to the sensor is set in the holding register 258. Depending on the controller configuration, the setting of this error status register is issued to a control station or over a collective error alarm contact.

Function	WE	Configuration
Temperature monitoring	OFF	Co5-> Fb20 = ON

8.4 Monitoring the input terminals for limit violations

The controller provides the option to apply limits (in % of measuring range) to two selected inputs (temperature sensor or analog inputs) and to issue an alert to a higher-level control system by writing in the error status register. Directly after setting the function block, select the terminal

that is to be monitored and the condition that triggers the alarm according to the following codes:

- **Alarm when upper limit is exceeded (OGW)**
  Lower limit: 0 %
  Upper limit: Any
- **Alarm when bottom limit is not reached (UGW)**
  Lower limit: Any
  Upper limit: 100 %
- **Alarm when the limits is exceeded or not reached**
  Lower limit: > 0 % < OGW
  Upper limit: > UGW < 100 %
- **Alarm ON, when UGW is exceeded and alarm OFF when OGW is not reached**
  Lower limit: > OGW < 100 %
  Upper limit: > 0 % < UGW

Input to which temperature sensors are connected have readings in °C (measuring range from –30 to 160 °C); analog input readings are shown in % of the measuring range.
In systems Anl 1, 3, 4, 6 and 7, the limit alarm is made with "BA EIN" over an analog relay. A make contact or break contact function can be assigned to the relay by selecting "STEIG" (= rising signal edge) and "FALL" (= negative signal edge) respectively. The limit alarm also appears in the error status register by selecting "Fsr-E".

Note!
The associated binary output is marked in the wiring plan with GWx and GWy and depends on the system code number (Anl).

Function	WE	Configuration
Limit monitoring at terminal x, y	OFF	Co6 -> Fb15, 16 = ON Terminal number Upper/lower limit FSr-E/FSr-A: Status alarm to error status register ON/OFF BA EIN/BA AUS: Setting/not setting the binary input FALL/steig: Negative signal edge/increasing signal edge

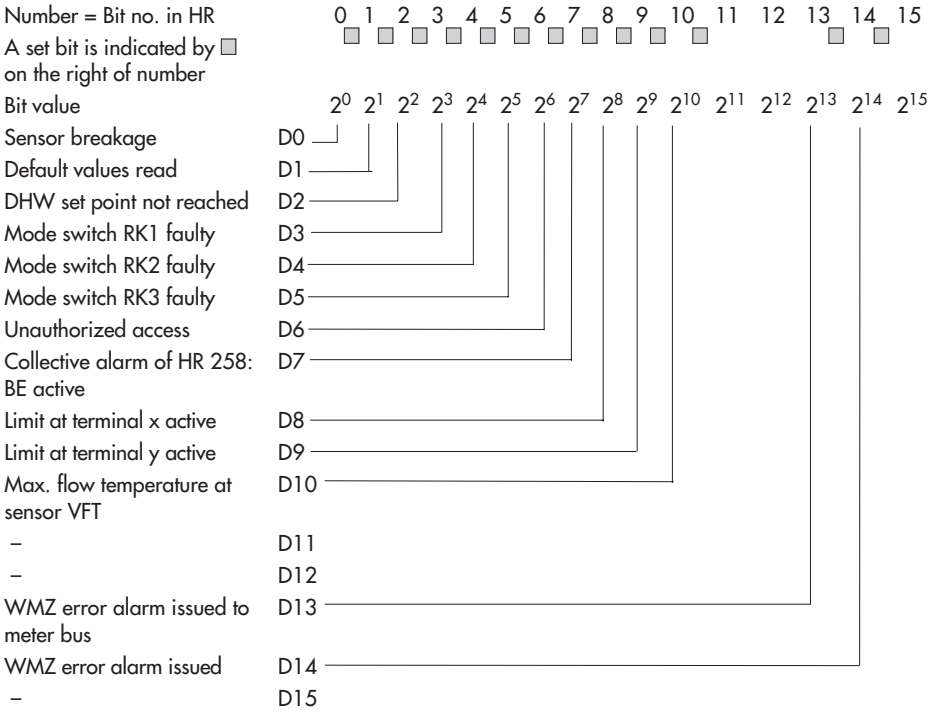
8.5 Error status register

The HR 257 and HR 258 error status registers (holding register - 16-bit) are used to indicate controller or system errors. HR 257 contains general alarms, whereas special faults are entered

in HR 258. In modem mode (Co6 -> Fb17 = ON) the change in state of HR 257 or HR 258 causes the controller to dial the control system.

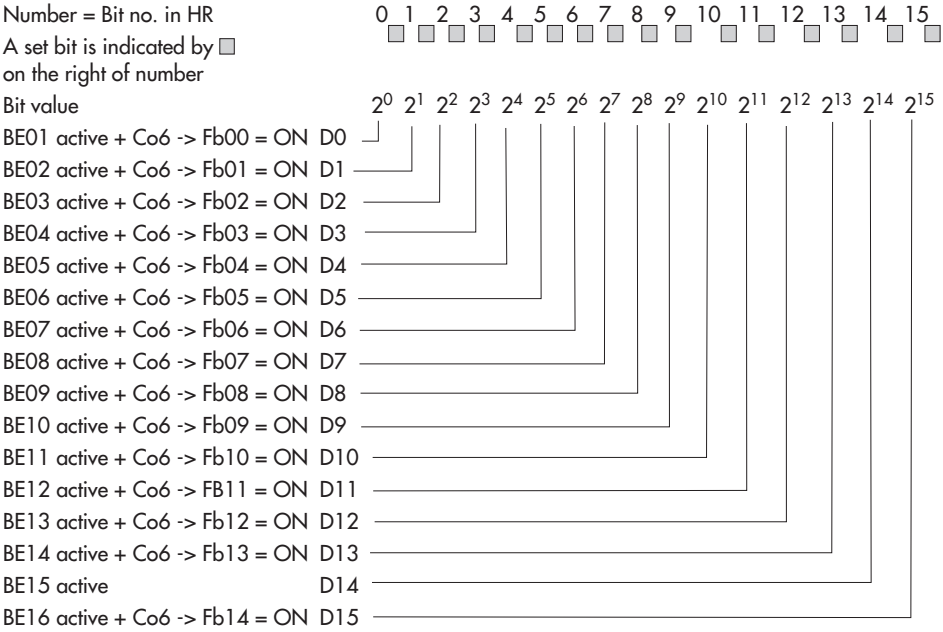
In InF6 level (by pressing ⊠ key when ***BAUD*** appears on the display or over Modbus) the bits of the error status register are displayed: the corresponding square on top of the display appears to indicate that bit has been set.

Holding register 257 (HR 257)



The holding register 258 can only be read over Modbus.

Holding register 258 (*HR258*)



The binary inputs are entered into the error status register if the associated function block in the C06 configuration level is active. On configuring a function block, the following signal edges can be selected:

- "STEIG" rising edge: = Change from "AUS" to "EIN" (make contact)
- "FALL" negative edge: = Change from "EIN" to "AUS" (open contact)

Note!
The holding register 258 is also used for temperature monitoring (–> section 8.3).

Example of a transfer to the control system:
The error status register is transferred as a word <w> in a holding register (HR) whose value is calculated as follows:
<w> = ([D0] x <1> + [D1] x <2>) + to + ([D15] x <32768>)

9 Communication

Using the serial system bus interface, the TROVIS 5479 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 TROVIS 5479 Controller is fitted with either a RS-485 port or a RS-232-C port depending on the order. The optional operation between both versions or a conversion to a different port version is not possible. 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 via the modem connecting cable (1400-7139).

– **Operation at a four-wire or two-wire bus**
To establish the link between controller and bus line, the signal level needs to be converted by a converter (SAMSON's TROVIS 5484 Converter).

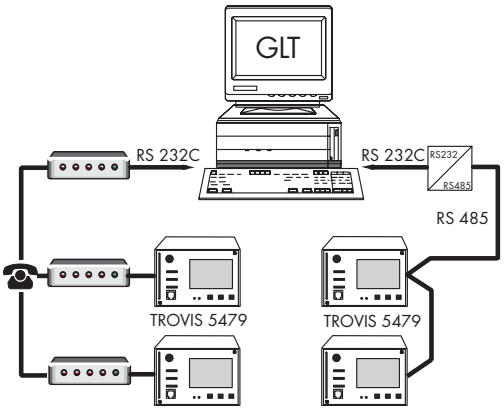


Fig 7 · Network structure

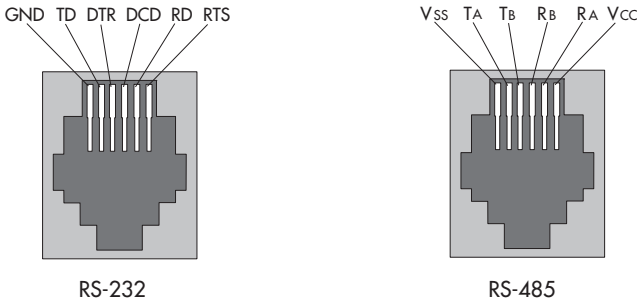


Fig 8 · Pin assignment (at the back of the controller)

9.1 RS-232-C port

The system bus connection is located at the back of the controller housing (RJ-12 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 the controller, read data from it, and send new data once the valid key number has been written to the holding register no. 40255.
On recognizing the key code from the controller as valid, the register value "1" confirms writing permission. In any other case, the register value remains at "0". Any further establishment of communications requires the writing permission to be acquired by resending the key number.

Note!
If a wrong key number has been written to holding register no. 40255 for the third consecutive time, the controller immediately interrupts the modem connection and sets the D6 bit of the error status register (Unauthorized access). As a result, the call to the configured control system is triggered. 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 faults. Using the **Dial-up also upon corrected fault** function, the controller additionally informs the building control station when a previously signaled fault no longer persists.

The **Dial-up infinitely** function causes the controller to continue to try reaching the building control station repeatedly even after a dial-up has been unsuccessful until connection is established.

The **Phone number of alternative recipient** function causes the controller to dial an alternative recipient after dial up to the building control station has been unsuccessful.
With **Automatic Baud rate adaptation** function (only up to firmware version 1.34) the *Baud rate* parameter does not need to be configured as it is done automatically.

Functions	WE	Configuration
Modbus (16-bit addressing)	OFF	Co5 -> Fb19 = ON
Modem function	OFF	Co6 -> Fb17 = ON
Modem dialing procedure	OFF	Co6 -> Fb18 (ON: pulse, OFF: tone)
Dial-up also upon corrected fault	OFF	Co6 -> Fb19
Dial-up infinitely	OFF	Co6 -> Fb20
Phone number of alternative recipient	OFF	Co6 -> Fb21
Automatic Baud rate adaptation	OFF	Co6 -> Fb22 (only up to firmware version 1.34)
Lock dial-up	OFF	Co6 -> Fb23
Parameters*	WE	Parameter level / Range of values
Station address (ST.-NR)	255	PA6 / 1 to 247 with Co5 -> Fb19 = ON: 1 to 999
Baud rate (BAUD)	9600	PA6 / 150 to 9600
Cyclic initialization (init)	30 min	PA6 / 0 to 255 min
Automatic dial-off GLT (tEL)	5	PA6 / 0 to 99
Modem dial interval between calls (PAUSE)	5 min	PA6 / 1 to 250 min
Control system watchdog (GLT)	30 min	PA6 / 1 to 255 min
Number of redial attempts (rUFE)	5	PA6 / 0 to 99
Phone number of building control station (nr GLT)	–	PA6 / Set as required*
Phone number of alternative recipient (nr ALT)	–	PA6 / Set as required* (with Co6 -> Fb21 = ON)

* Digits 0 to 9, P = Pause, - = End, max. 23 characters

* –> Section 9.3 (“Description of communication parameters to be adjusted”)

9.2 RS-485 system bus interface (for four-wire bus)

A constant bus connection is required (data cable) for operation of the controller with RS-485 serial interface. The bus line is routed from the TROVIS 5484 Converter to the individual control instruments 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 32 devices can be connected to such a segment. If you wish to use more than 32 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.

⚠ ***Warning!***

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

Functions	WE	Configuration
Modbus (16-bit addressing)	ON	Co5 -> Fb19 = ON
Modem function	OFF	Co6 -> Fb17 = OFF
Parameters*	WE	Parameter level / Range of values
Station address (ST.-NR)	255	PA6 / 1 to 247 with Co5 -> Fb19 = ON: 1 to 999
Baud rate (BAUD)	9600	PA6 / 150 to 9600

* –> Section 9.3 (”Description of communication parameters to be adjusted”)

9.3 Description of communication parameters to be adjusted

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, the 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.

Cyclic initialization (init)
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 configuration 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.
Typical initialization of a modem with a terminal program:

AT & F	(restores modem to its factory settings)	
OK	(response of the modem)	
ATEOSO = 1	(command input,	EO: echo off; SO = 1: answer on first ring)

Modem dialing pause (PAUSE)
It is recommended to observe an interval of approx. 3 to 5 minutes between dialing up to the control system to avoid a permanent overloading of the (telecommunications) network. The modem dialing pause is the interval between two dialing attempts.

Control system watchdog (GLT)
This function limits how long the control system intervenes in dynamic processes, provided communication between the control system and controller is not taking place. The controller resets the time watchdog after each valid polling of the station address. After the maximum time has elapsed, all even bits are reset to "autonomous".

Number of redialing attempts (rUFE)
The controller tries to dial up the control system again, observing the *Modem dialing pause*, in case the GLT is busy or the function that triggered the alarm call has not been reset by the control system. After the specified number of redialing attempts has failed, the controller switches to the *Phone number of alternative recipient*.
Resetting a triggered call = reading the error status register (HR 0257)

Phone number of control station (nr GLT)
Enter the phone number of the control system's modem, if required including the dialing code. Short pauses between the numbers can be entered using P (= 1 second); "–" indicates the end of the string. The phone number can include max. 23 characters.
Example: "069, 2 sec. pause, 4009, 1 sec. pause, 0": 0 6 9 P P 4 0 0 9 P 0 – (= 11 characters)

Phone number of alternative recipient (nr ALT)
Enter the phone number of an alternative recipient, if required including the dialing code. Short pauses between the numbers can be entered using P (= 1 second); "–" indicates the end of the string. The phone number can include max. 23 characters.
Example: "069, 1 sec. pause, 654321": 0 6 9 P 6 5 4 3 2 1 – (= 10 characters)

Common modem settings are:

- EO - Echo off
- QO - Enable result codes
- X3 - Dial without checking for dial tone
- % CO - Data compression off
- \ N1 - Buffer off, fault correction off
- V1 - Result codes in text format
- % B 9600 - Baud rate 9600
- \ VO - Standard connect result code

Resetting to default settings
A modem can be reset to its default settings directly at the controller after entering the key number.

Key number	Command
44	AT&F&W <CR> <LF>
45	AT&F&W ATX3 <CR> <LF> (for branch exchange systems)

Note!
The initialization settings described here are indispensable for operation on a dial-up modem. Nevertheless, it cannot be guaranteed that data are transferred after the initialization settings have been adjusted. Due to the broad range of modems available on the market and the different commands, refer to the operating manual of the modem for further details.

9.4 Meter bus interface

The TROVIS 5479 Controller in the version with meter bus interface can communicate with up to three heat meters. The meter bus master module is powered by an external power supply unit (order no. 1400-7141). Several heat meters (WMZ) can only be processed when the meter addresses can be changed.
Details on the use of the different 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 (WMZ) to the controller, the heat meter must use a standardized protocol in accordance with EN 1434-3. It is impossible 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 communication with heat or water meters are available in Co5 -> Fb08. The meter bus address, the model code, and the reading mode must be specified. A meter bus address must be unique and correspond with the address preset in the heat meter.

If the preset meter bus address is unknown, a single heat meter connected to the controller can be assigned meter bus address 254. Address 255 deactivates communication with the respective heat meter. The model code, which needs to be set for the respective 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 approx. every 24 hours (24h), continuously (cont) or when the coils (= Modbus data points) assigned to the heat meters WMZ1 to WMZ3 are written with the value 1 over the system bus interface (CoiL).

In InF5 info level, "1434" is displayed when the meter bus is activated. Press the enter key to get to the display referring to the meter bus. For each of the three heat meters whose address is not 255, "buSi" (with i = 1, 2, 3) appears. Press the enter key again to display the following information about the associated meter:

- Flow rate (d, l/h)
- Volume (U, l, m^3)
- Output capacity (P, kW)
- Energy (A, kWh, Mwh, GJ)
- Flow temperature (b, °C)
- Return flow temperature (b, °C)
- Meter ID number (L without enter key, H with enter key)
- Meter bus address (sent by WMZ) (A, –)

Blinking values in combination with black squares in the top row of the display (fault status of the associated meter –> TV-SK 6311) indicate different faults.

Note!
With reading mode "24h", the displayed values are not updated by reading the status information again; the values read during the last cycle remain unchanged.
With reading mode "cont", the values in the levels are not continuously updated. Reopen the specific level to get current values.

Function	WE	Configuration
Meter bus	OFF	Co5 -> Fb08 = ON
	255	Meter bus address for WMZ 1 to 3 (ST.-NR) / 0 to 255
	1434	Model code WMZ 1 to 3 / P15, PS2, 1434, CAL3, APAtO, SLS
		Reading mode WMZ 1 to 3 / 24h, cont, CoiL
	24h	Select the type of limitation: 1: No limitation 2: Flow rate limitation 3: Capacity limitation 4: Flow rate and capacity limitation
		Select tariff function HT/NT, can only be selected with settings "1434" and "cont" tAr-A: Function not active tAr-E: Depending on a defined time schedule, the consumption data are weighted with a high or low tariff. Two time periods can be entered for each day of the week (no public holidays or vacation periods): 1–7 = Every day; 1 = Monday, 2 = Tuesday, …, 7 = Sunday

9.4.2 Flow rate and/or capacity limitation via meter bus

Flow rate and/or capacity limitation with the aid of the connected meter bus can be implemented by selecting the type of limitation 2, 3 or 4. The update rate of the measured variable, flow rate and/or capacity, must be smaller than 5 seconds in meter bus operation to carry out a proper limitation. Refer to the technical documentation TV-SK 6311 for details on which listed heat meters fulfill this criterion and can be used for limitation purposes. In case of battery-operated heat meters in particular, please note that some makes react with communication intervals if they are polled too frequently. Other makes could use up their batteries too quickly. The technical documentation TV-SK 6311 provides more details on these matters.

- 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.

Parameters	WE	Parameter level / Range of values
Maximum capacity of the entire system	50 kW	PA5 / 0.1 to 5999 kW
Maximum capacity of the heating	50 kW	PA5 / 0.1 to 5999 kW
Maximum capacity of the DHW heating	50 kW	PA5 / 0.1 to 5999 kW
Maximum flow rate of the entire system	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Maximum flow rate of the heating	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Maximum flow rate of the DHW heating	9 m^3/h	PA5 / 0.01 to 99.9 m^3/h
Proportional-action coefficient for limitation	1.0	PA5 / 0.1 to 10

9.5 Memory module

The use of a memory module (accessory no. 1400-7142) is particularly useful to transfer all data from one TROVIS 5479 Controller to several other TROVIS 5479 Controllers. The memory module is plugged into the RJ-12 jack integrated into the front panel. Once the module has been connected, “79 SP“ is displayed. If the memory module already contains data from a different TROVIS 5479 Controller, press the enter key until “SP 79" is displayed.

- Pressing the enter key to confirm “79 SP“ causes the controller settings to be transferred to the memory module.
- Pressing the enter key to confirm “SP 79“ 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. After the display stops, remove the memory module from the controller.

⚠ ***Caution!***

Never connect the memory module to a controller and a PC at the same time.

---

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. 9).

Panel mounting

1. Remove both screws (1).
2. Pull apart the controller housing and back panel.
3. Make a cut-out of 138 x 91 mm (width x height) 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 sides. Screw the threaded rod towards the panel with a screwdriver such that the housing is clamped against the control panel.
6. Install the electrical connections 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 back panel.
3. If necessary, bore holes with the specified dimensions in the appropriate places. Fasten the back panel with four screws.
4. Install the electrical connections at the back of the housing as described in section 11.
5. Fit 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 hooks (5) over the top hat rail.

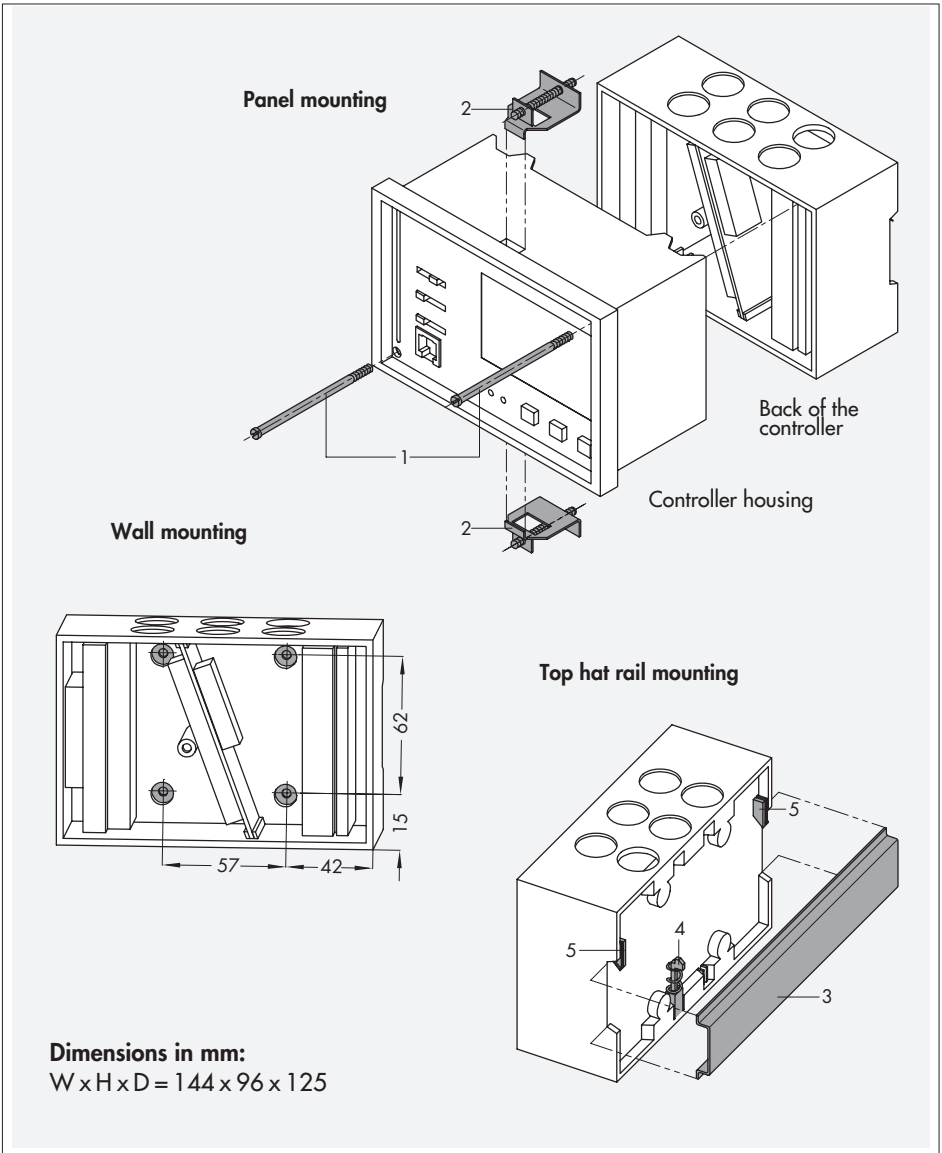


Fig. 9 · Installation

10.1 Installing the external power supply unit for the meter bus master module

Only for controllers with meter bus master module.

1. Clip power supply unit on a top hat rail.
2. Wire power supply unit (–> see wiring plan on page 88).

⚠ ***Caution!***

The mains supply of the controller and power supply unit must have the same phase.

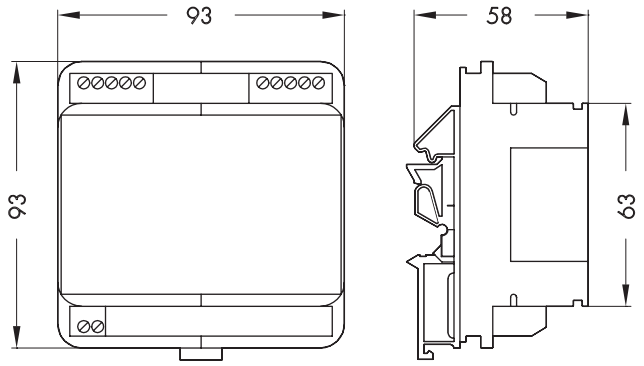


Fig. 10 · Dimensional diagram of external power supply unit for meter bus master module

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 work is performed 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 ≥ 10 mm² 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 following wiring diagrams.
If individual inputs for other functions, e.g. for analog inputs, are to be used, it must be routed separately. Refer to section 7.11 for details.

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 cable glands.

Connecting the sensors

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

Connecting the actuators

Connect cables with at least 1.5 mm² suitable for damp locations to the terminals of the controller output. The direction of travel needs to be checked at start-up.

Set slide switch to (+). Valves must open.

Set slide switch to (–). Valves must close.

Connecting the pumps

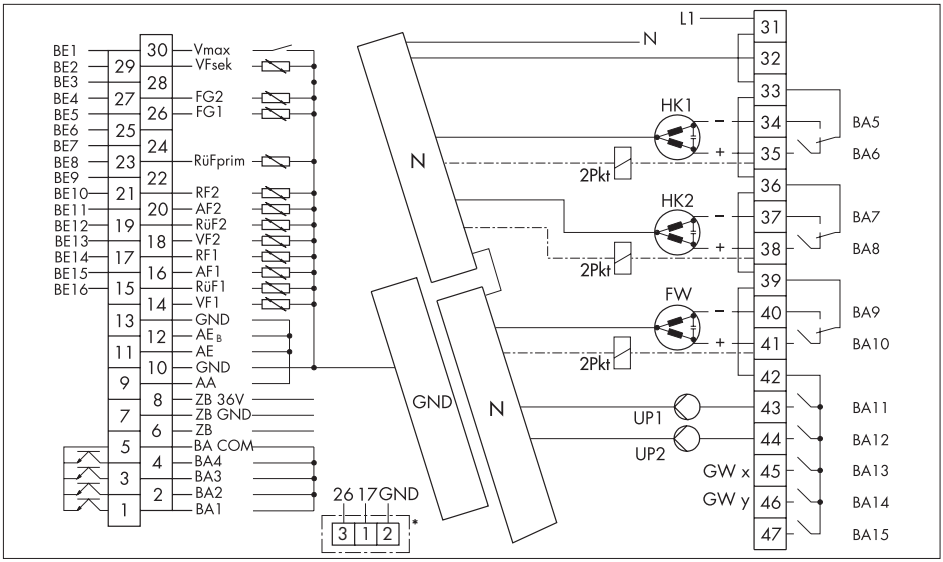
Connect all cables with at least 1.5 mm² to the terminals of the controller as illustrated in the corresponding connection diagram (–> page 84 to 88)

Wiring plan legend

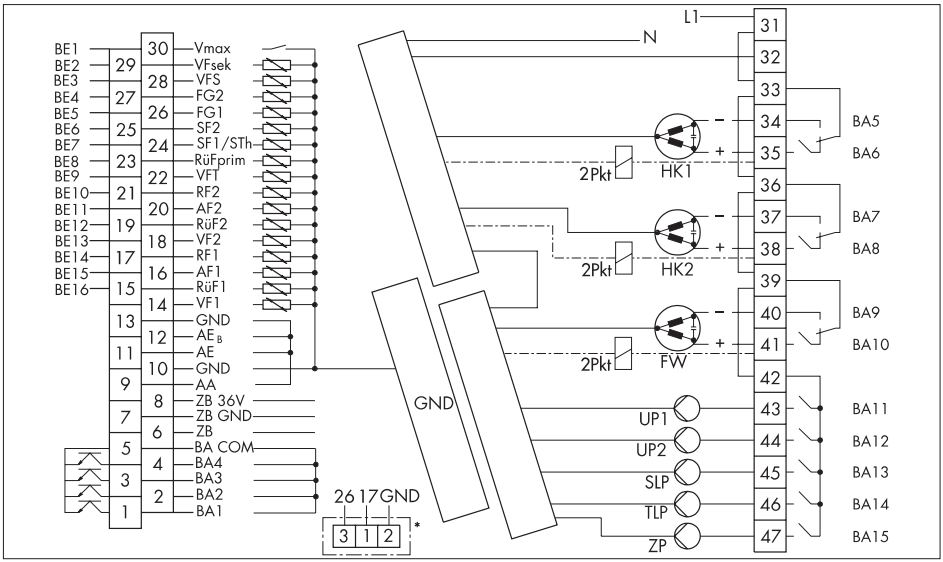
AA	Analog output 0 to 10 V
AE	Analog input 0 to 10 V
AE_B	Input for passing on externally required 0 to 10 V signal
BA	Binary output
BA1	UP HK1 ON/OFF
BA2	UP HK1 Speed reduced
BA3	UP HK2 ON/OFF
BA4	UP HK2 Speed reduced
BE/V	Binary input for flow rate
AF	Outdoor sensor
FG	Potentiometer (terminal 3 for Type 5244)
RF	Room sensor (terminal 1 for Type 5244)
RüF	Return flow sensor
SF	Storage tank sensor (1 = Storage tank ON; 2 = Storage tank OFF)
VF	Flow sensor
VFS	Flow sensor for storage tank
VFT	Flow sensor for heat exchanger
GND	Ground
GWx	Limit alarm to terminal x
GWy	Limit alarm to terminal y
ZB	Meter bus
FW	District heating circuit
HK	Heating circuit
SLP	Storage tank pump
TLP	Heat exchanger pump
UP	Circulating pump
ZP	Circulation pump
STh	Storage tank thermostat

* Option Type 5244 or 5257-5
(Terminal base of room panel is illustrated)

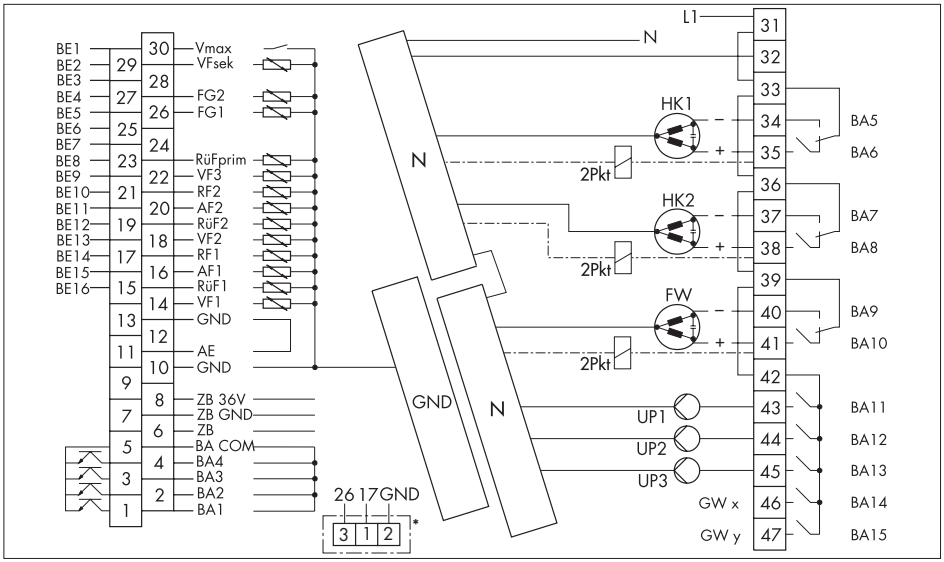
System Anl 1



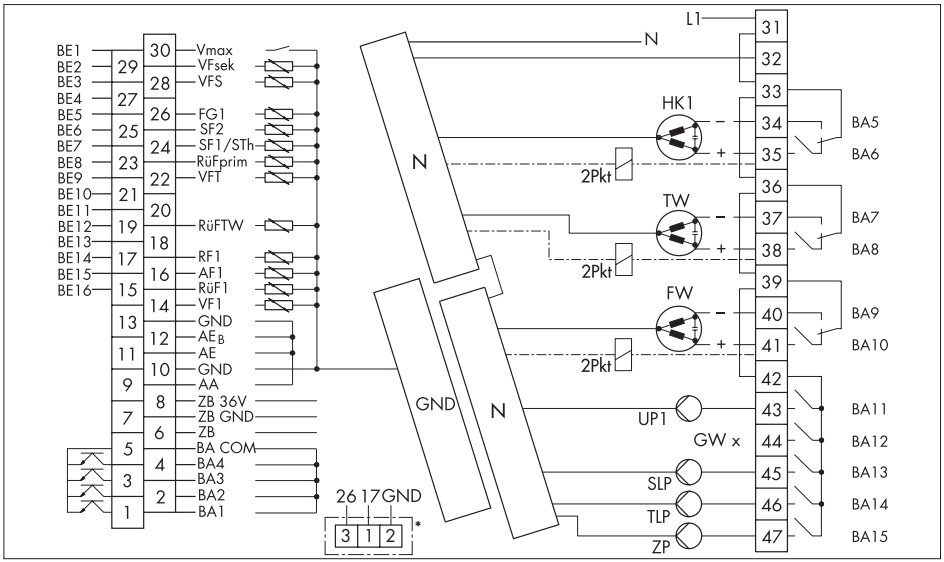
System Anl 2



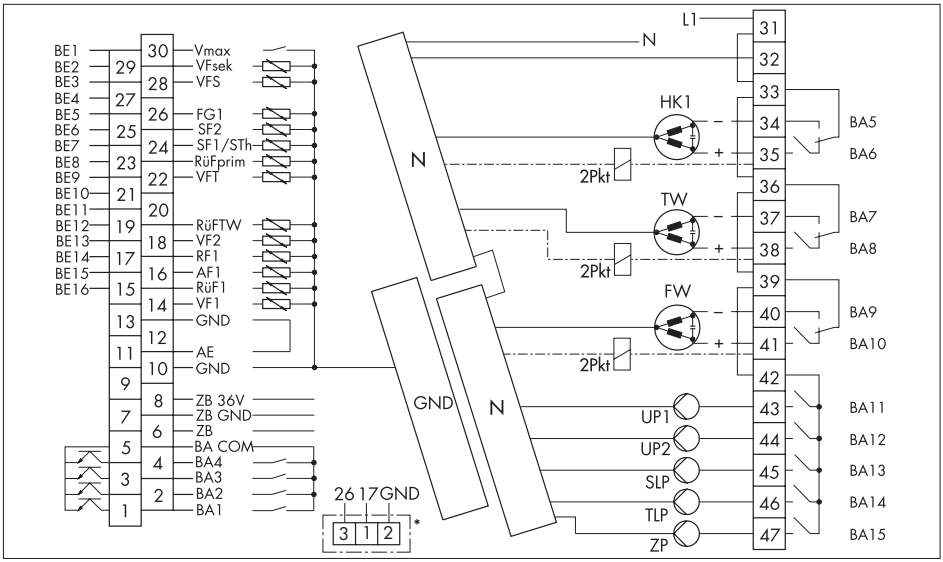
System Anl 3



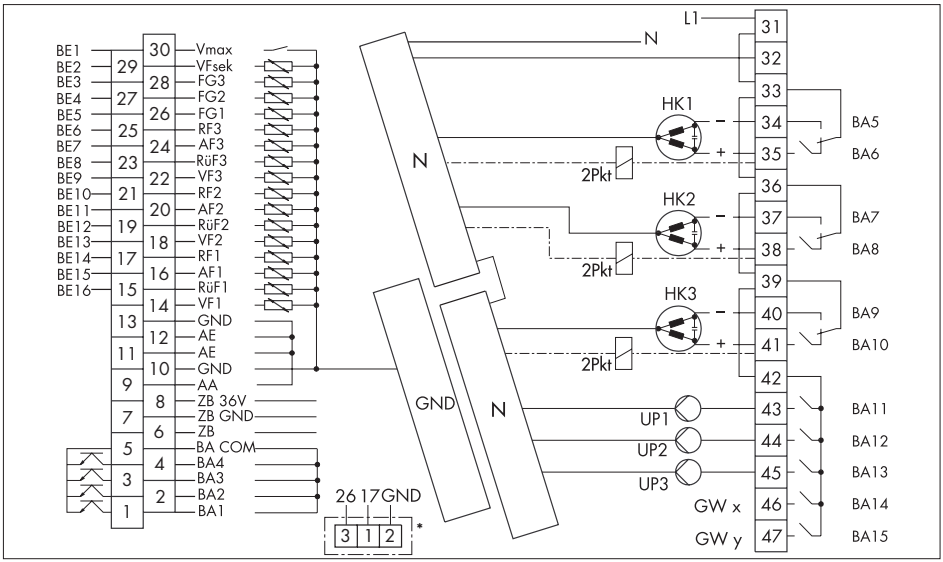
System Anl 4



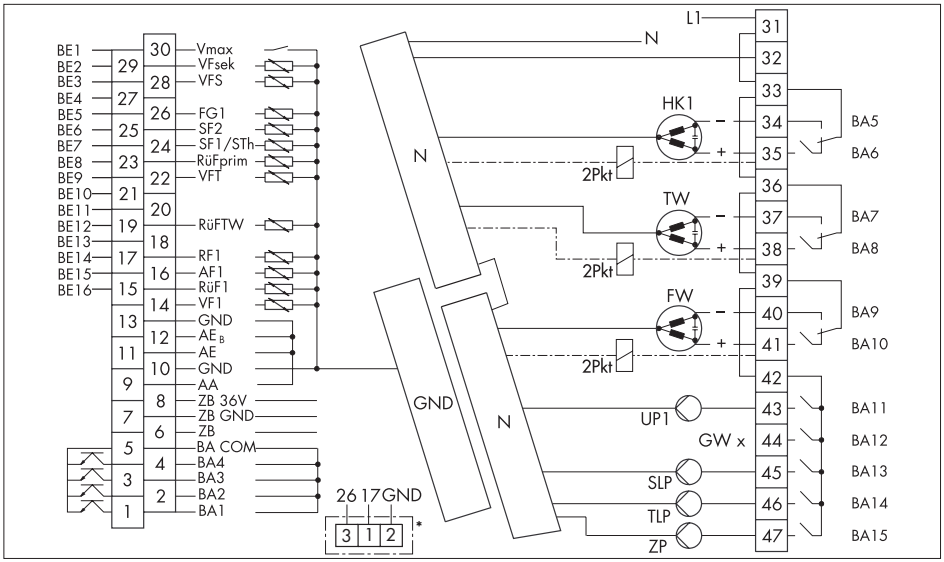
System Anl 5



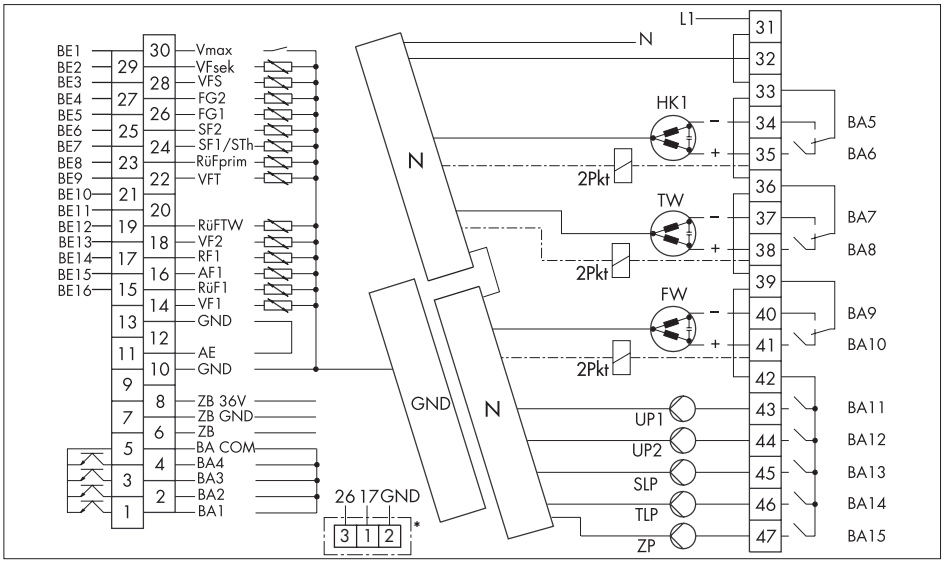
System Anl 6



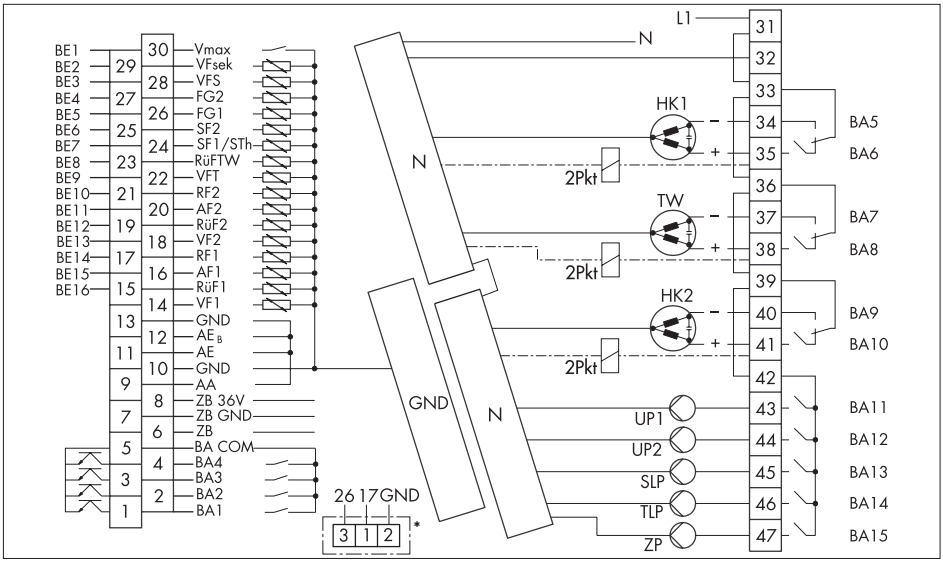
System Anl 7



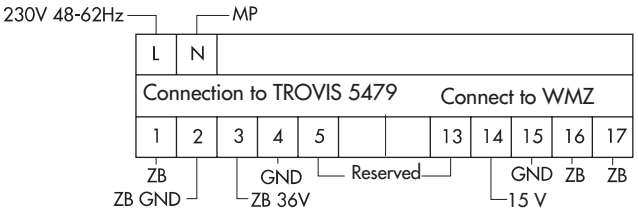
System Anl 8



System Anl 9



External power supply unit for the meter bus master module



12 Appendix

12.1 Function block lists

Co1 to 3: Heating circuits 1 to 3

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
00	Room sensor RF1, 2, 3	OFF	1 to 9	Co1, 2, 3 -> Fb00 = ON: Sensor RF active; **select:** 0-20: 0 to 20 mA = 0 to 40 °C FUEHL: Resistance signal Only for optimization and display in systems Anl 3, 5 and 8.
01	Return flow sensor RüF1, 2, 3	OFF	1 to 9	Co1, 2, 3 -> Fb01 = ON: Sensor RüF active ***Note:*** *Can only be changed with key number in system Anl 6.*
02	Outdoor sensor AF1, 2, 3 * HK1: ON HK2, 3: OFF	*	1 to 9	Co1, 2, 3 -> Fb02 = ON: Sensor AF active; AF1 cannot be deactivated; **Exception:** If all heating circuits are configured for room temperature control. The outdoor temperature is in this case set to a fictive value of 3 °C.
03	Outdoor sensor AF 0 to 20 mA	OFF	1 to 9	Co1, 2, 3 -> Fb03 = ON: Only w. Co1, 2, 3 -> Fb02 = ON; **select:** 1: 0 to 20 mA = –20 to 50 °C 2: 0 to 20 mA = –40 to 50 °C Connect 50 Ω in parallel
04	Outdoor sensor AF 0 to 10 V	OFF	1 to 9	Co1, 2, 3 -> Fb04 = ON: Connect to terminals 11 and 13
05	Optimization	OFF	1 to 9	Co1, 2, 3 -> Fb05 = ON: **select** (2, 3 only with Co1, 2, 3 -> Fb00 = ON): 1: Activation acc. to OT, deactivation acc. to time schedule Advance heating time / 0 to 360 min (120 min) 2: Activation acc. to AT, deactivation acc. to room temp. Advance heating time / 0 to 360 min (120 min) 3: Activation and deactivation acc. to room sensor
06	Room temperature-dependent control	OFF	6, 9	Co1, 2, 3 -> Fb06 = ON: Room temperature-dependent control active
07	Adaptation	OFF	Not 3, 5, 8	Co1, 2, 3 -> Fb07 = ON: Adaptation active; Only with • Co1, 2, 3 -> Fb00 = ON • Co1, 2, 3 -> Fb10 = OFF
08	Flash adaptation	OFF	Not 3, 5, 8	Co1, 2, 3 -> Fb08 = ON: Flash adaptation active; Only with Co1, 2, 3 -> Fb00 = ON

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
09	RK OFF when switch position at MAN CLOSED	OFF	1 to 9	Co1, 2, 3 -> Fb09 = ON: UP is deactivated in manual mode with switch position "– " after the adjusted *Pump lag time* (Co1, 2, 3 ->Summer mode Fb15) has elapsed
10	4-point characteristic	OFF	Not 3, 5, 8	Co1, 2, 3 -> Fb10 = ON: 4-point characteristic Co1, 2, 3 -> Fb10 = OFF: Gradient characteristic
11	Summer mode	ON	1 to 9	Co1, 2, 3 -> Fb11 = ON: Summer mode active **Function block parameters:** Start summer mode / 01.01 to 31.12 (01.06) End summer mode / 01.01 to 31.12 (30.09) Outdoor temp. limit for summer mode / 0 to 30 °C (18 °C)
12	Potentiometer input – Release HK	OFF	1 to 9	Co1, 2, 3 -> Fb12 = ON: Control valve alert (1 to 2 kΩ) Co1, 2, 3 -> Fb12 = OFF: Circuit released by binary signal; **select:** *FrG-E:* Release HK via binary input (ter. 26, 27, 28) *FrG-A*: Release HK via time schedule
13	Pump management HK1, 2	OFF	1 to 9	Co1, 2 -> Fb13 = ON: Binary output OFF outside time-of-use Co1, 2 -> Fb13 = OFF: Binary output ON outside time-of-use
14	Flow sensor OFF when room temperature-dependent control is active	OFF	6	Co1, 2, 3 -> Fb14 = ON: Room temperature-dependent control without flow sensor
15	Three-step control mode for heating circuit	ON	1 to 9	Co1, 2, 3 -> Fb15 = ON: Three-step control **Function block parameters:** K_P (proportional gain) / 0.1 to 50.0 (0.5) T_N (reset time) / 1 to 999 s (200 s) T_y (valve transit time) / 15, 30, 60, 120, 240 s (120 s) UP lag time / 120 to 1200 s (240 s) Co1 to Co3 -> Fb15 = OFF: On/off control **Function block parameters:** Hysteresis / 1 to 30 °C (2 °C), UP lag time / 120 to 1200 s (240 s)
16	Parameter optimization with room temperature-dependent control	OFF	6	Co1, 2, 3 -> Fb16 = ON: Only with Co1, 2, 3 -> Fb06 = ON

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

Co4: DHW heating

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
00	Storage sensor SF1	ON	Not 1, 3, 6	Co4 -> Fb00 = ON: Sensor SF1 active Co4 -> Fb00 = OFF, only with Co4 -> Fb01 = OFF
01	Storage sensor SF2	ON	Not 1, 3, 6	Co4 -> Fb01 = ON: Sensor SF2 active Co4 -> Fb01 = OFF, only if a storage sensor is required Storage tank thermostat: Co4 -> Fb00 = OFF and Co4 -> Fb01 = OFF
02	Return flow sensor in DHW circuit	OFF	4, 5, 7 to 9	Co4 -> Fb02 = ON: Sensor RüFTW active ***Note:*** *Can only be changed with key number.*
03	Flow sensor VFS	ON	Not 1, 3, 6	Co4 -> Fb03 = ON: Charging temperature is controlled with sensor downstream of heat exchanger VFS; Sensor VFT limits the charging temperature. Co4 -> Fb03 = OFF: Charging temperature controlled by sensor upstream of heat exchanger VFT; Sensor VFS is deactivated.
04	Circulation pump	OFF	Not 1, 3, 6	Co4 -> Fb04 = ON: ZP continues to run during storage tank charging ZP = Circulation pump
05	UP OFF at the start of reverse control	OFF	5	Co4 -> Fb05 = ON: UP of the pump heating circuit is additionally deactivated for reverse control.
06	Reverse control	ON	Not 1, 3, 6	Co4 -> Fb06 = ON: Adaptive priority of DHW circuit Co4 -> Fb06 = OFF: **Function block parameters:** Set-back HK in case of DHW priority / 0 to 30 °C (0 °C) With set-back HK in case of DHW priority = 0 °C: Parallel operation With set-back HK in case of DHW priority > 0 °C: Set-back operation
07	Time until reverse control	ON	Not 1, 3, 6	Co4 -> Fb07 = ON: Reverse control after 2 minutes Co4 -> Fb07 = OFF: Reverse control after 10 minutes
08	Thermal disinfection	OFF	Not 1, 3, 6	Co4 -> Fb08 = ON: **Function block parameters:** Day of the week / 0, 1 to 7 (3 = Wednesday) Disinfection temperature / 50 to 80 °C (70 °C) Charging boost / 0 to 30 °C / 5 °C Start time / 00:00 to 23:30 (00:00); in minute steps Stop time / 00:00 to 23:30 (04:00); in minute steps

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
09	Three-step control mode in DHW circuit	ON	4, 5, 7, 8, 9	Co4 -> Fb09 = ON: Three-step control **Function block parameters:** K_P (proportional gain) / 0.1 to 50,0 (0,5) T_N (reset time) / 1 to 999 s (200 s) T_Y (valve transit time) / 15, 30, 60, 120 s (120 s)
10	Storage tank system	OFF	Not 1, 3, 6	Co4 -> Fb10 = ON: DHW heating with internal storage tank register
11	Mixing valve always active	OFF	Not 1, 3, 6	Co4 -> Fb11 = ON: Heating to make up for circulation loss; Mixing valve always active
12	Public holidays and vacations apply to DHW circuit	OFF	Not 1, 3, 6	Co4 -> Fb12 = ON: Adopt public holidays and vacation data; **select:** Reference heating circuit: 1 to 3 (1)
13	Condensation accumulation control	OFF	7, 8	Co4 -> Fb13 = ON: In all other systems, enter in Co5 -> Fb07; **Function block parameter:** Max. system deviation / 2 to 10 °C (2 °C)
14	Reserved			
15	SLP permanent operation	OFF	2, 4, 5, 7, 8	Co4 -> Fb15 = OFF, only with Co4 -> Fb10 = ON: In systems with DHW heating in the secondary circuit, the storage tank pump (SLP) is first switched on when the return flow temperature exceeds the measured value at SF1 when the heating circuit is switched off.

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

Co5: System-wide functions

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
00	Flow sensor in secondary circuit	ON	1 to 9	Co5 -> Fb00 = ON: Sensor VFsek active Setting not possible in systems Anl 6 and 9 with Co5 -> Fb06 = ON.
01	Return flow sensor in primary circuit	ON	1 to 5, 7, 8	Co5 -> Fb01 = ON: Sensor RüFprim active; **select:** 0 Return flow limitation acc. to gradient characteristic 1 Return flow limitation acc. to 4-point characteristic **Function block parameter:** K_V factor / 0 to 25 °C (1 °C) ***Note:*** *Can only be changed with key number.*
02	Sensor selection	OFF	1 to 9	Co5 -> Fb02 = ON: Pt 100 and Pt 1000 sensors Co5 -> Fb02 = OFF: Pt 100 and PTC sensors

Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
03	4-point characteristic	OFF	3, 5, 8	Setting for all heating circuits Co5 -> Fb03 = ON: 4-point characteristic Co5 -> Fb03 = OFF: Gradient characteristic
04	Delayed outdoor temperature adaptation	OFF	1 to 9	Co5 -> Fb04 = ON: **select:** Ab Delay when outdoor temperature falls AufAb Delay when outdoor temperature falls/rises **Function block parameter:** Delay 0.2 to 6 °C/h (3 °C/h)
05	Summer time/winter time changeover	ON	1 to 9	Co5 -> Fb05 = ON: Automatic summer time/winter time changeover active
06	Time delay compensation	OFF	1 to 5	Co5 -> Fb06 = ON, only with Co5 -> Fb00 = ON
07	Condensate accumulation control	OFF	1 to 9	Co5 -> Fb07 = ON, only with Co5 -> Fb14 = ON **Function block parameter:** Max. system deviation / 2 to 10 °C (2 °C)
08	Meter bus	OFF	1 to 9	Co5 -> Fb08 = ON: **Function block parameters:** (WMZ 1, 2, 3)**:** Meter bus address / 0 to 255 (255) Model code / P15, PS2, 1434, CAL3, APAtO, SLS (1434) Reading mode / 24h, cont, CoiL (24h) **Select:** Type of limitation / 1 to 4 Tariff / tAr-A, tAr-E (time schedule) ***Note:*** *Can only be changed with key number.*
09	Pulse input for flow rate or capacity limitation	OFF	1 to 5, 7, 8	Co5 -> Fb09 = ON, **select:** U Flow rate limitation P Capacity limitation **Function block parameter:** Pulse weighting / 0.1 to 999 (10) ***Note:*** *Can only be changed with key number.*
10	Manual level locking	OFF	1 to 9	Co5 -> Fb10 = ON: Controller runs in automatic mode when manual mode is selected. ***Note:*** *Can only be changed with key number.*
11	Analog input to terminal x 0/4 to 20 mA	OFF	1 to 9	Co5 -> Fb11 = ON: Selection of a sensor not assigned for an analog signal; load: 50 Ω; **Select:** 0 to 20 mA 4 to 20 mA

Fb	Function	WE	Anl	Comment Function block parameters / Range of values (default)
12	Analog input to terminal y 0/4 to 20 mA	OFF	1 to 9	Co5 -> Fb12 = ON: Selection of a sensor not assigned for an analog signal; load: 50 Ω; **Select:** 0 to 20 mA 4 to 20 mA
13	Control of external demand AE_B (0 to 10 V)	OFF	1, 2, 4, 7	Co5 -> Fb13 = ON, only with Co5 -> Fb00 = ON **Function block parameter:** Boost / 0 to 30 °C (0 °C)
	Request for externally required signal AA (0 to 10 V)	OFF	6,9	Co5 -> Fb13 = ON: Request issued over AA (0 to 10 V)
14	Three-step control in pre-control circuit	ON	1 to 5, 7, 8	Co5 -> Fb14 = ON: Three-step control **Function block parameters:** K_P (proportional gain) / 0.1 to 50 (0,5) T_N (reset time) / 1 to 999 s (200 s) T_Y (valve transit time) / 15, 30, 60, 120, 240 s (120 s) Co5 -> Fb14 = OFF: On/off control **Function block parameters:** Hysteresis / 1 to 30 °C (2 °C) Minimum activation time / 0 to 600 s Maximum activation time / 0 to 600 s
15	Outdoor temperature passed on over analog output	OFF	1 to 9	Co5 -> Fb15 = ON: Analog signal 0 to 10 V Input: Terminal 11 Output: Terminal 9
16	Potentiometer in pre-control circuit	OFF	1 to 5, 7, 8	Co5 -> Fb16 = ON: Connection to terminal 27; potentiometer input HK2 (Co2 -> Fb12) not available!
17	Sensor calibration	OFF	1 to 9	***Note:*** *Can only be changed with key number.*
18	Control signal deactivation	OFF	1 to 9	Co5 -> Fb18 = ON: Control signal deactivation of three-step outputs after 3 x T_Y
19	Modbus (16 bit-addressing)	OFF	1 to 9	Co5 -> Fb19 = ON: Modbus active (16 bit-addressing)
20	Temperature monitoring	OFF	1 to 9	Co5 -> Fb20 = ON: Monitoring of flow, room and return flow temperatures
21	Collective error alarm	OFF	1 to 9	Co5 -> Fb21 = ON: Collective error alarm to BA4, restricted pump management only
22	NTC sensors	OFF	1 to 9	Co5 -> Fb22 = ON: NTC sensors, only with Co5 -> Fb02 = ON

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

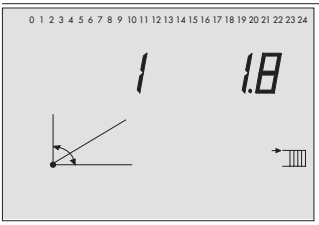
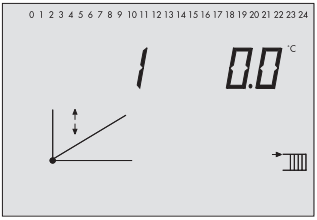
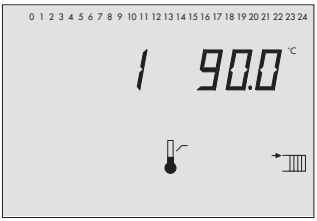
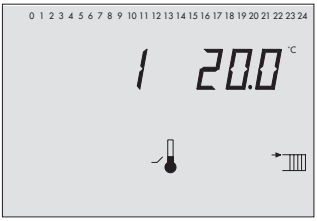
Co6: Interface operation (*Note!* *Can only be changed after entering the key number)*

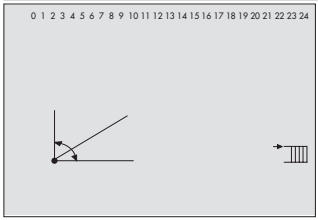
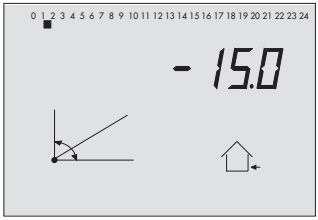
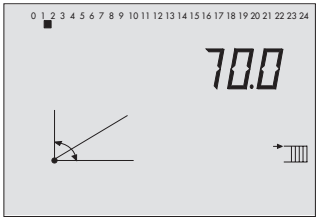
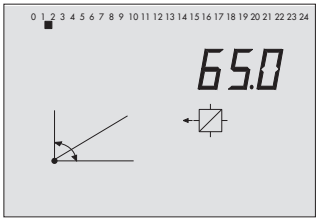
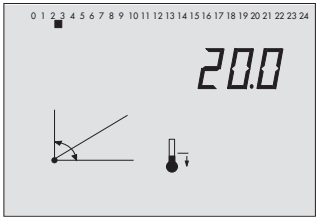
Fb	Function	WE	Anl	Comment **Function block parameters** / Range of values (default)
00 to 13	BE1 to BE14 to error status register	OFF	1 to 9	Co6 -> Fb00 to Fb13 = ON: **Select:** Rising edge/make contact Negative edge/break contact
14	BE16 to error status register	OFF	1 to 9	Co6 -> Fb16 = ON: **Select:** Rising edge/make contact Negative edge/break contact
15	Selected terminal to error status register	OFF	1 to 9	Co6 -> Fb15, 16 = ON: **Function block parameters:** Terminal number Upper/lower limit **Select:** FSr-E/FSr-A: Status alarm to error status register/not to ESR BA ON/BA OFF: Setting/not setting the binary input FALL/steig: Negative/rising edge
16	Selected terminal to error status register	OFF	1 to 9	
17	Modem function	OFF	1 to 9	Co6 -> Fb17 = ON: Modem function active
18	Modem dialing procedure	OFF	1 to 9	Co6 -> Fb18 = ON: Pulse dialing Co6 -> Fb18 = OFF: Tone dialing
19	Dial-up also upon corrected fault	OFF	1 to 9	Co6 -> Fb19 = ON: Dial-up when faults exist/remedied Co6 -> Fb19 = OFF: Dial up only when faults exist
20	Dial-up infinitely	OFF	1 to 9	Co6 -> Fb20 = ON: Attempts to call control station until communication is established
21	Phone number of alternative recipient	OFF	1 to 9	Co6 -> Fb21 = ON: Dialing an alternative recipient
22	Automatic Baud rate adaptation	OFF	1 to 9	No function in Version 1.34 and higher
23	Lock dial-up	OFF	1 to 9	Co6 -> Fb23 = ON: No dial-up in case of fault

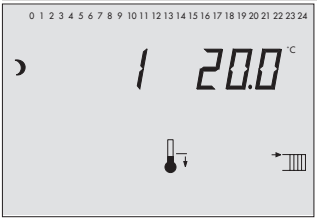
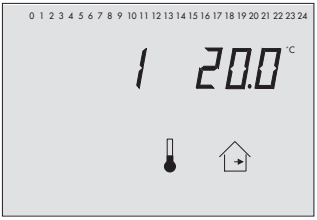
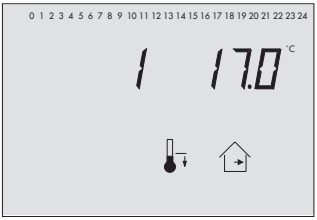
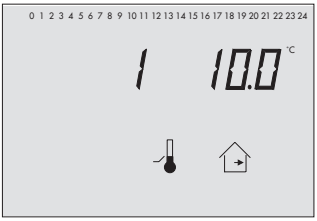
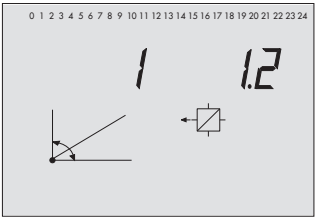
F Function block number, WE Default value, Anl System code number

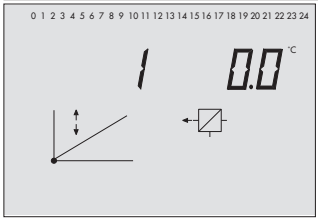
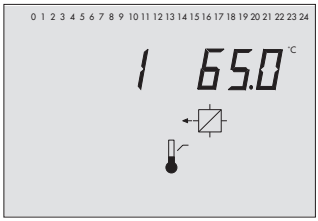
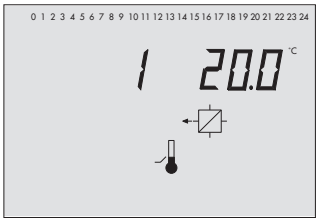
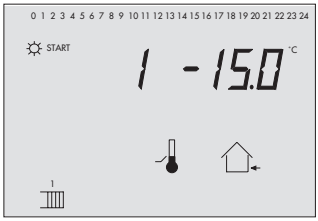
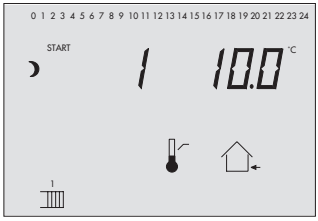
12.2 Parameter lists

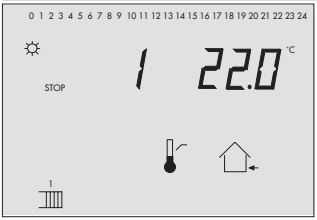
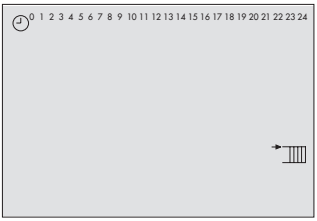
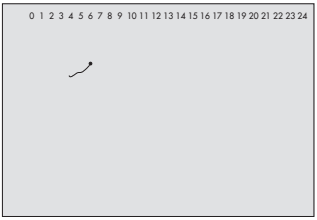
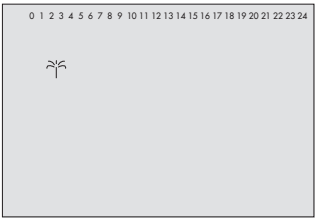
PA1 to 3: Heating circuits HK1 to 3

Display	Parameter designation Range of values (default values)
	Gradient, flow 0.4 to 3.2 (1.8)
	Level, flow –30 to 30 °C (0 °C)
	Maximum flow temperature 20 to 130 °C (90 °C)
	Minimum flow temperature 20 to 130 °C (20 °C) With control according to fixed set point: Max. flow temperature = Min. flow temperature

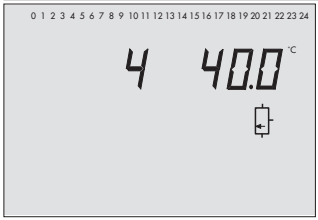
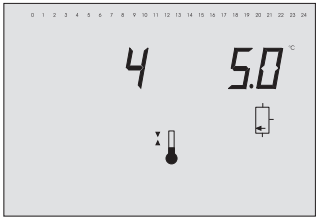
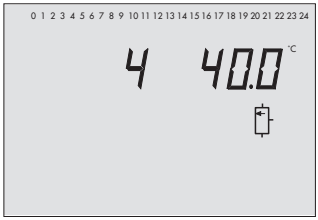
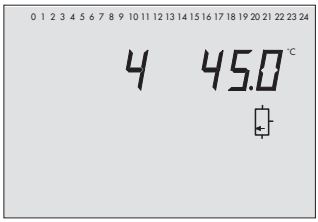
Display	Parameter designation Range of values (default values)
	4-point characteristic Press key to adjust the following parameters: outdoor temperature, flow temperature, return flow temperature and Set-back difference.
	4-point characteristic Point 1: Outdoor temperature Outdoor temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4. –30 to 90 °C (point 1: –15 °C, point 2: –5 °C, point 3: 5 °C, point 4: 15 °C)
	4-point characteristic Point 1: Flow temperature Flow temperatures of the points 2, 3, 4 are marked by squares below the numbers 2, 3, 4. 20 to 130 °C (point 1: 70 °C, point 2: 55 °C, point 3: 40 °C, point 4: 25 °C)
	4-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. 20 to 90 °C (point 1: 65 °C, point 2: 50 °C, point 3: 35 °C, point 4: 20 °C)
	4-point characteristic Set-back difference Varying set-back differences can be entered for the second and third points. The corresponding point is marked by squares below the numbers 2 and 3. 0 to 50 °C (20 °C)

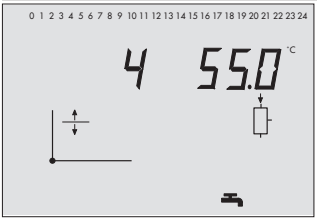
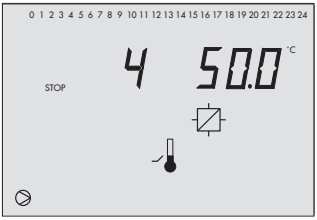
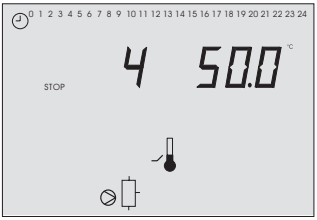
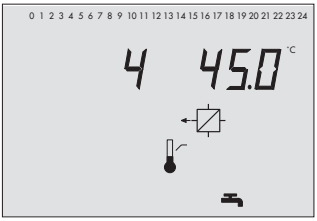
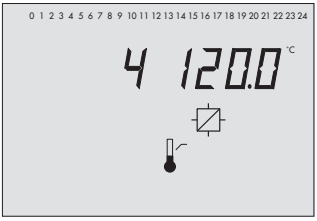
Display	Parameter designation Range of values (default values)
	Set-back difference 0 to 50 °C (20 °C)
	Day set point (room set point) 10 to 90 °C (20 °C)
	Night set point (reduced room set point) 10 to 90 °C (17 °C)
	Sustained temperature 10 to 90 °C (10 °C)
	Gradient of the heating characteristic, return flow 0.4 to 3.2 (1.2)

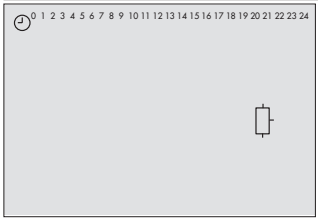
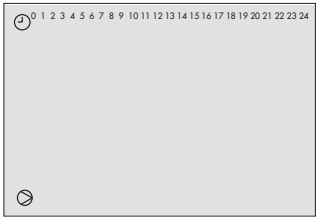
Display	Parameter designation Range of values (default values)
	Level, return flow –30 to 30 °C (0 °C)
	Max. return flow temperature 20 to 90 °C (65 °C)
	Min. return flow temperature 20 to 90 °C (20 °C) Control according to fixed set point: Min. return flow temperature = Max. return flow temperature
	OT activation value in rated operation –30 to 50 °C (–15 °C) The heating continues to run and is not set back outside the time-of-use when the outdoor temperature is below the OT limit.
	OT deactivation value in reduced operation –10 to 50 °C (10 °C) The heating is switched off outside the time-of-use when the outdoor temperature is above the OT limit.

Display	Parameter designation Range of values (default values)
	OT deactivation value in rated operation 0 to 90 °C (22 °C)
	Times-of-use 00:00 to 24:00h –> Section 1.6
	Public holidays 01.01 to 31.12 –> Section 1.6
	Vacations 01.01 to 31.12 –> Section 1.6

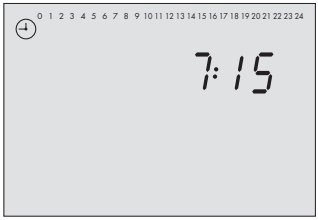
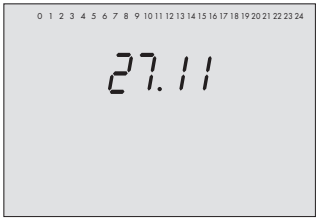
PA4: DHW heating

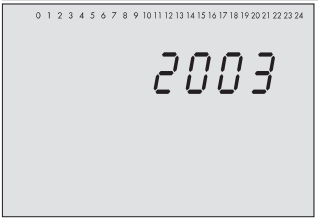
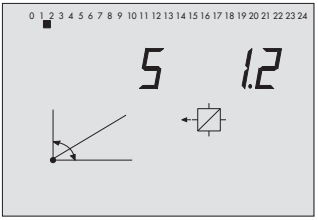
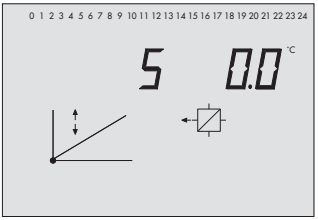
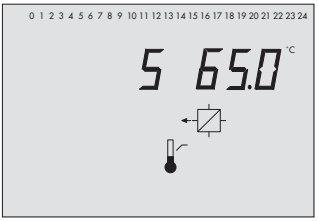
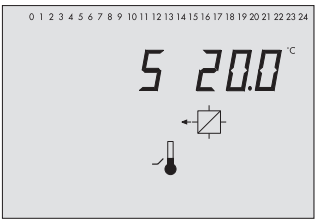
Display	Parameter designation Range of values (default value)
	DHW demand ON 20 to 90 °C (40 °C) Systems with a storage sensor SF1 Co4 -> Fb02 = ON, Fb02 = OFF
	Hysteresis 0 to 30 °C (5 °C)
	DHW demand ON 20 to 90 °C (40 °C) Systems with two storage sensors SF1 and SF2 Co4 -> Fb02 = ON, Fb02 = ON
	DHW demand OFF 20 to 90 °C (45 °C)

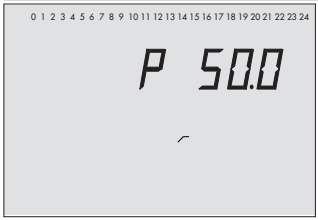
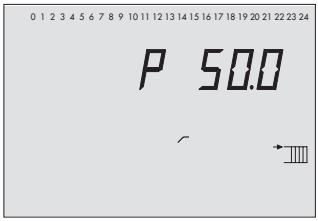
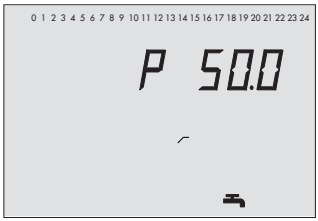
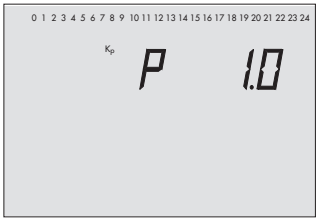
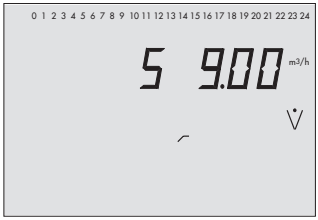
Display	Parameter designation Range of values (default value)
	Charging temperature 20 to 90 °C (55 °C)
	Heat exchanger charging pump, deactivation limit 20 to 90 °C (50 °C) Lag of heat exchanger charging pump until the heat exchanger flow temperature falls below the limit.
	Storage tank charging pump, deactivation limit 20 to 90 °C (50 °C) Lag of storage tank charging pump until the heat exchanger flow temperature falls below the limit.
	Return flow limitation temperature for DHW 20 to 90 °C (45 °C)
	Maximum charging temperature 20 to 120 °C (120 °C)

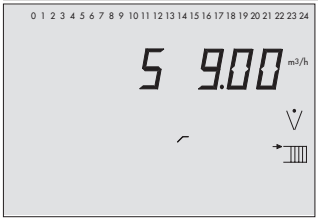
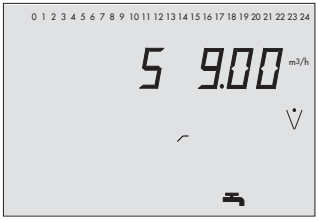
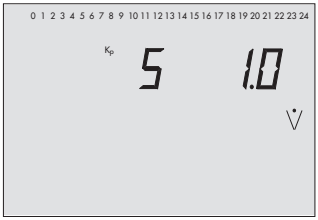
Display	Parameter designation Range of values (default value)
	Time schedule of DHW heating 00:00 to 24:00h
	Time schedule of circulation pump 00:00 to 24:00h

PA5: System-wide parameters

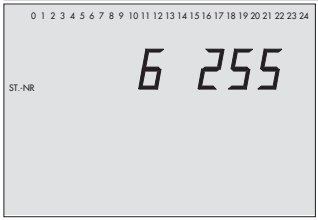
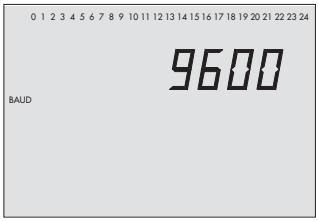
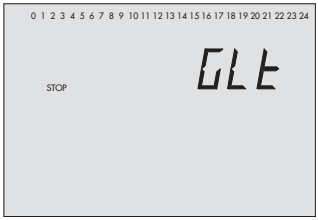
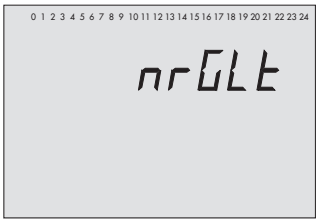
Display	Parameter designation Range of values (default value)
	Time –> Section 1.5
	Date (day.month) –> Section 1.5

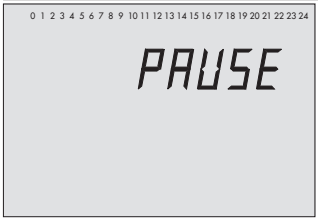
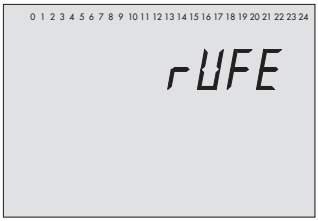
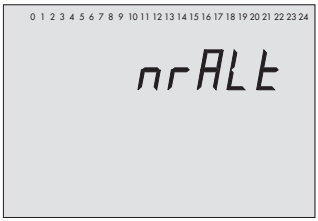
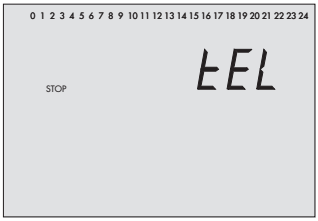
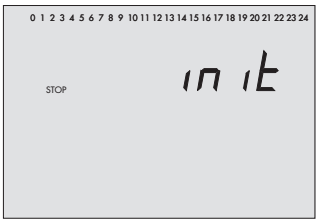
Display	Parameter designation Range of values (default value)
	Date (year) –> Section 1.5
	Gradient, return flow 0.4 to 3.2 (1.2) Not in systems Anl 6 and 9
	Level, return flow –30 to 30 °C (0 °C) Not in systems Anl 6 and 9
	Maximum return flow temperature 20 to 120 °C (65 °C) Not in systems Anl 6 and 9
	Minimum return flow temperature 20 to 120 °C (20 °C) Not in systems Anl 6 and 9

Display	Parameter designation Range of values (default value)
	Maximum capacity of the entire system 0.1 to 5999 kW (50 kW)
	Maximum capacity of the heating 0.1 to 5999 kW (50 kW)
	Maximum capacity of the DHW heating 0.1 to 5999 kW (50 kW)
	Proportional-action coefficient for the limitation 0.1 to 10.0 (1.0)
	Maximum flow rate of the entire system 0.01 to 99.9 m^3/h (9 m^3/h)

Display	Parameter designation Range of values (default value)
	Maximum flow rate of the heating 0.01 to 99.9 m^3/h (9 m^3/h)
	Maximum flow rate of the DHW heating 0.01 to 99.9 m^3/h (9 m^3/h)
	Proportional-action coefficient for the limitation 0.1 to 10.0 (1.0)

PA6: Interface operation

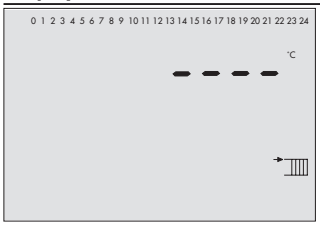
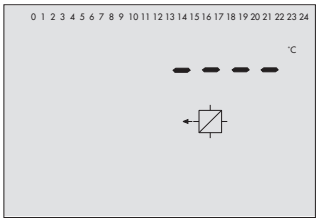
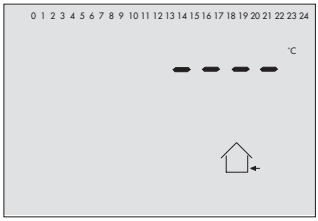
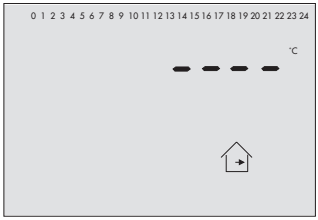
Display	Parameter designation Range of values (default value)
	Station address 1 to 255 (255) with Co5 -> Fb19 = ON: 1 to 999 (255)
	Baud rate 9600, 4800, 2400, 1200, 600, 300, 150 (9600)
	Control system watchdog 1 to 255 min (30 min)
	Phone number of the control station

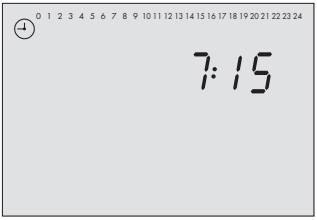
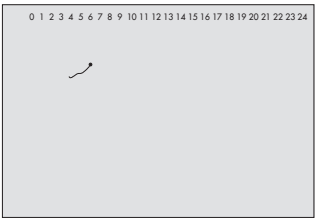
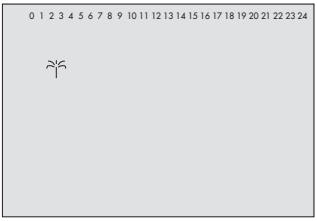
Display	Parameter designation Range of values (default value)
	Modem dialing interval to dial control station (GLT) or alternative recipient 1 to 250 min (5 min)
	Number of dialing attempts to control station (GLT) or to alternative recipient 0 to 99 (5)
	Phone number of alternative recipient
	Automatic dial-off GLT 0 to 99 (5)
	Cyclic initialization 0 to 255 min (30 min)

12.3 Display

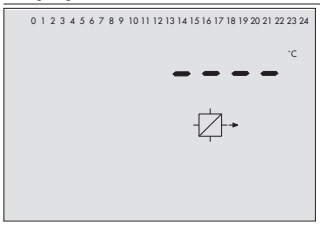
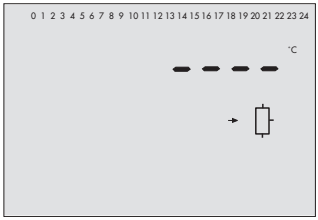
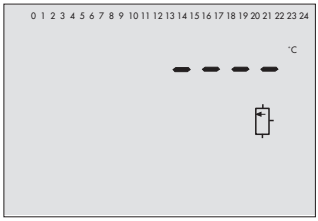
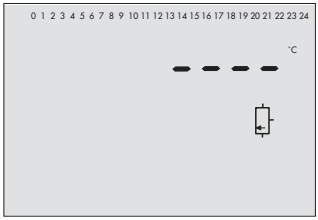
The following displays are typical displays that can appear.
Icons at the edge of the display may vary depending on the operating mode and how the controller is configured; they cannot be shown in this case.

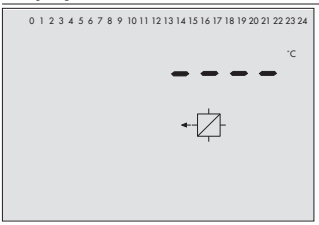
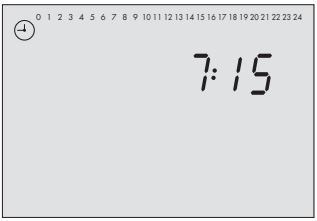
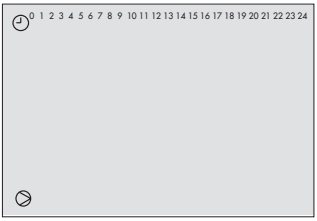
InF1 to 3: Heating circuits HK1 to 3

Display	Parameter designation
	Current flow temperature at VF1 or VF2, VF3 Press enter key to confirm. The set point is displayed.
	Current return flow temperature at RüF1 or RüF2, RüF3 Press enter key to confirm. The set point is displayed.
	Current outdoor temperature Press enter key to confirm. The set point is displayed.
	Current room temperature Press enter key to confirm. The set point is displayed.

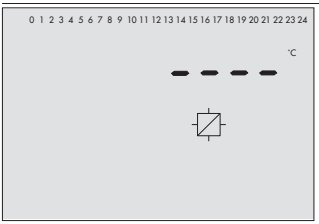
Display	Parameter designation
	Time ✳ Press enter key to confirm. The time-of-use for Monday (1) is displayed. ↓ Press arrow key to scroll between times-of-use for the other days of the week.
	Public holidays ✳ Press enter key to confirm. The first programmed public holiday is displayed. ↓ Press arrow key to scroll between further programmed public holidays.
	Vacation periods ✳ Press enter key to confirm.. The first vacation period is displayed. ↓ Press arrow key to scroll between other vacation periods.

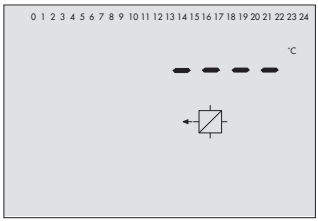
InF4: DHW heating

Display	Parameter designation
	Charging temperature (flow pipe of heat exchanger) Press enter key to confirm. The set point is displayed.
	Charging temperature (flow pipe of storage tank) Press enter key to confirm. The set point is displayed.
	Storage tank temperature at sensor SF1 Press enter key to confirm. The set point is displayed.
	Storage tank temperature at sensor SF2 Press enter key to confirm. The set point is displayed.

Display	Parameter designation
	Storage tank temperature at return flow sensor ✳ Press enter key to confirm. The set point is displayed.
	Time; Times-of-use for DHW demand ✳ Press enter key to confirm. The time-of-use for Monday (1) is displayed. ↓ Press arrow key to view times-of-use of the other days of the week.
	Times-of-use for circulation pump ✳ Press enter key to confirm. The time-of-use for Monday (1) is displayed. ↓ Press arrow key to view times-of-use of the other days of the week.

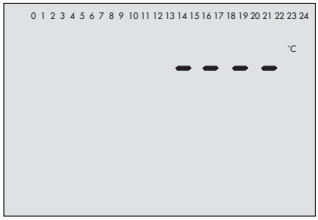
InF5: District heating circuit

Display	Parameter designation
	Charging temperature ✳ Press enter key to confirm. The set point is displayed.



Return flow temperature at sensor RüF or RüFprim

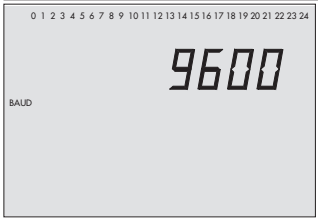
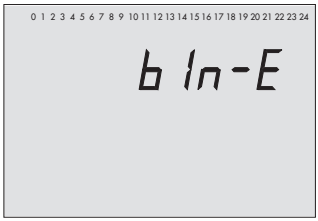
Press enter key to confirm.
The set point is displayed.



External demand

Press enter key to confirm.
The 0 to 10 V output is displayed.

Other displays

Display	Parameter designation
	InF6 level: Baud rate Press enter key to confirm. *FSr* appears on the display.
	Binary inputs Press enter key to confirm. The binary outputs appear on the display.

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

12.5 Technical data

Inputs	Max. 17 configurable inputs for temperature sensors (Pt 100 or PTC or Pt 100 and Pt 1000 or NTC) and binary inputs; BE1 as pulse counter input for flow rate or capacity limitation Analog inputs 0 to 10 V (R_i = 18kΩ) Current input 4(0) to 20 mA with 50 Ω parallel resistors for outdoor temperature Inputs for position feedback, remote control to correct the room temperature and selection of the operating mode
Outputs	0 to 10 V (load > 4.7 kΩ) Three-step signal: 230 V~, 3 A On-off signal: 230 V~, 3 A 5 outputs to control pumps, 230 V~, 3 A 4 outputs for pump management or fault alarms (open collector) max. 24 V/ 10 mA
Interfaces	Depending on order: RS-485 for connection to four-wire bus or RS-232 for connection to a modem; interface for meter bus (optional)
Power supply	230 V, 48 to 62 Hz, power 3 VA
Ambient temperature	0 to 40 °C
Storage temperature	–20 to 60 °C
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. 0.6 kg

12.6 Customer data

Station	
Operator	
Relevant SAMSON office	
System code number	

Function block settings

	Co1	Co2	Co3	Co4	Co5	Co6
Fb00						
Fb01						
Fb02						
Fb03						
Fb04						
Fb05						
Fb06						
Fb07						
Fb08						
Fb09						
Fb10						
Fb11						
Fb12						
Fb13						
Fb14						
Fb15						
Fb16						
Fb17						
Fb18						
Fb19						
Fb20						
Fb21						
Fb22						
Fb23						

PA1 to 3: Heating circuits 1 to 3

Parameters (PA1 to 3)	PA1	PA2	PA3	Range of values
Gradient, flow				0.4 to 3.2
Level, flow				–30 to 30 °C
Set-back difference				0 to 50 °C
Gradient, return flow				0.4 to 3.2
Level, return flow				–30 to 30 °C
4-point characteristic				
Outdoor temperature; point 1				–30 to 90 °C
Outdoor temperature; point 2				–30 to 90 °C
Outdoor temperature; point 3				–30 to 90 °C
Outdoor temperature; point 4				–30 to 90 °C
Flow temperature; point 1				20 to 130 °C
Flow temperature; point 2				20 to 130 °C
Flow temperature; point 3				20 to 130 °C
Flow temperature; point 4				20 to 130 °C
Return flow temperature; point 1				20 to 90 °C
Return flow temperature; point 2				20 to 90 °C
Return flow temperature; point 3				20 to 90 °C
Return flow temperature; point 4				20 to 90 °C
Set-back temperature; 1, 2				0 to 50 °C
Set-back temperature; 3, 4				0 to 50 °C
Maximum flow temperature				20 to 130 °C
Minimum flow temperature				20 to 130 °C
Maximum return flow temperature				20 to 90 °C
Minimum return flow temperature				20 to 90 °C
OT activation value rated op.				–30 to 50 °C
OT deactivation value reduced op.				–10 to 50 °C
OT deactivation value rated op.				0 to 90 °C
Day set point (room set point)				10 to 90 °C
Night set point (reduced room set point)				10 to 90 °C
Sustained temperature				10 to 90 °C

Parameters (PA1 to 3)	PA1	PA2	PA3	Range of values
Times-of-use				
Monday; Start –Stop (1)				00:00 to 24:00
Monday; Start – Stop (2)				00:00 to 24:00
Tuesday; Start – Stop (1)				00:00 to 24:00
Tuesday; Start – Stop (2)				00:00 to 24.00
Wednesday; Start – Stop (1)				00:00 to 24:00
Wednesday; Start – Stop (2)				00:00 to 24:00
Thursday; Start – Stop (1)				00:00 to 24:00
Thursday; Start – Stop (2)				00:00 to 24:00
Friday; Start – Stop (1)				00:00 to 24:00
Friday; Start – Stop (2)				00:00 to 24:00
Saturday; Start – Stop (1)				00:00 to 24:00
Saturday; Start – Stop (2)				00:00 to 24:00
Sunday; Start – Stop (1)				00:00 to 24:00
Sunday; Start – Stop (2)				00:00 to 24:00
Function block parameters (Co1 to 3)				
Advance heat. (Fb05 = ON, 1 and 2)				0 to 360 min
Start summer mode (Fb11 = ON)				01.01 to 31.12
End summer mode (Fb11 = ON)				01.01 to 31.12
Outdoor temp. limit summer mode (Fb11 = ON)				0 to 30 °C
K_P (gain) (Fb15 = ON)				0.1 to 50.0
T_N (reset time) (Fb15 = ON)				1 to 999 s
T_Y (valve transit time) (Fb15 = ON)				15 to 240 s
UP lag time (Fb15 = ON)				120 to 1200 s
Hysteresis (Fb15 = OFF)				1 to 30 °C
UP lag time (Fb15 = ON)				120 to 1200 s

Vacations and public holidays: PA1

Vacations				
Public holidays				

Vacations and public holidays: PA2

Vacations				
Public holidays				

Vacations and public holidays: PA3

Vacations				
Public holidays				

PA4: DHW heating

Parameters	PA4				Range of values
DHW demand ON					20 to 90 °C
DHW demand OFF					20 to 90 °C
Hysteresis					0 to 30 °C
Charging temperature					20 to 90 °C
Heat exchanger charging temp., deactivation value					20 to 90 °C
Storage tank charging pump, deactivation value					20 to 90 °C
Return flow limitation DHW					20 to 90 °C
Maximum charging temperature					20 to 120 °C
Times-of-use	Start 1	Stop 1	Start 2	Stop 2	
Monday					00:00 to 24:00
Tuesday					00:00 to 24:00
Wednesday					00:00 to 24:00
Thursday					00:00 to 24:00
Friday					00:00 to 24:00
Saturday					00:00 to 24:00
Sunday					00:00 to 24:00
Times-of-use for circulation pump	Start 1	Stop 1	Start 2	Stop 2	
Monday					00:00 to 24:00
Tuesday					00:00 to 24:00
Wednesday					00:00 to 24:00
Thursday					00:00 to 24:00
Friday					00:00 to 24:00
Saturday					00:00 to 24:00
Sunday					00:00 to 24:00

Function block parameters (Co4)		
Set-back HK in case of DHW priority (Fb06 = ON)		0 to 30 °C
Day of week (Fb08 = ON)		0. 1 to 7
Disinfection temperature (Fb08 = ON)		50 to 80 °C
Charging boost		0 to 30 °C
Start time (Fb08 = ON)		00:00 to 23:30
Stop time (Fb08 = ON)		00:00 to 23:30
K_P (gain) (Fb09 = ON)		0.1 to 50.0
T_N (reset time) (Fb09 = ON)		1 to 999 s
T_Y (valve transit time) (Fb09 = ON)		15 to 120 s
Max. system deviation (Fb13 = ON)		2 to 10 °C

PA5: System-wide parameters

Parameters	PA5	Range of values
Gradient, return flow		0.4 to 3.2
Level, return flow		–30 to 30 °C
Maximum return flow temperature		20 to 120 °C
Minimum return flow temperature		20 to 120 °C
Max. capacity of the entire system		0.1 to 5999 kW
Max. capacity of the heating		0.1 to 5999 kW
Max. capacity of the DHW heating		0.1 to 5999 kW
Proportional-action coefficient for limitation		0.1 to 10.0
Max. flow rate of the entire system		0.01 to 99.9 m^3/h
Max. flow rate of the heating		0.01 to 99.9 m^3/h
Max. flow rate of the DHW heating		0.01 to 99.9 m^3/h
Proportional-action coefficient for limitation		0.1 to 10.0

Function block parameters (Co5)					
K_V factor					0 to 25 °C
Delay (Fb04 = ON)					0.2 to 6 °C/h
Max. system deviation (Fb07 = ON)					2 to 10 °C
Meter bus address (Fb08 = ON)					0 to 255
Model code (Fb08 = ON)					P15, PS2, 1434, CAL3, APAtO, SLS
Reading mode (Fb08 = ON)					24h, cont, CoiL
Time schedule (Fb08 = ON, "1434" + "cont"	Start 1	Stop 1	Start 1	Stop 2	
Monday					00:00 to 24:00 h
Tuesday					00:00 to 24:00 h
Wednesday					00:00 to 24:00 h
Thursday					00:00 to 24:00 h
Friday					00:00 to 24:00 h
Saturday					00:00 to 24:00 h
Sunday					00:00 to 24:00 h
Pulse weighting (Fb09 = ON)					0.1 to 999
Boost (Fb13 = ON)					0 to 30 °C
K_P (gain) (Fb14 = ON)					0.1 to 50
T_N (reset time) (Fb14 = ON)					1 to 999 s
T_Y (valve transit time) (Fb14 = ON)					15 to 240 s
Hysteresis (Fb14 = OFF)					1 to 30 °C
Minimum activation time (Fb14 = OFF)					0 to 600 s
Maximum activation time (Fb14 = OFF)					0 to 600 s

Heat meters

	Meter bus address	Model code	Reading mode
WMZ1			
WMZ2			
WMZ3			

PA6: Communication parameters

Parameters	PA6	Range of values
Station address (ST.-NR)		1 to 255/999
Baud rate (BAUD)		150 to 9600
Control system watchdog (GLT)		1 to 255 min
Phone number of control station (nr GLT)		–
Modem dialing interval (PAUSE)		1 to 250 min
Number of dialing attempts (rUFE)		0 to 99
Phone number of alternative recipient (nr ALT)		–
Automatic dial-off GLT (tEL)		0 to 99
Cyclic initialization (init)		0 to 255 min

Binary inputs with error status register

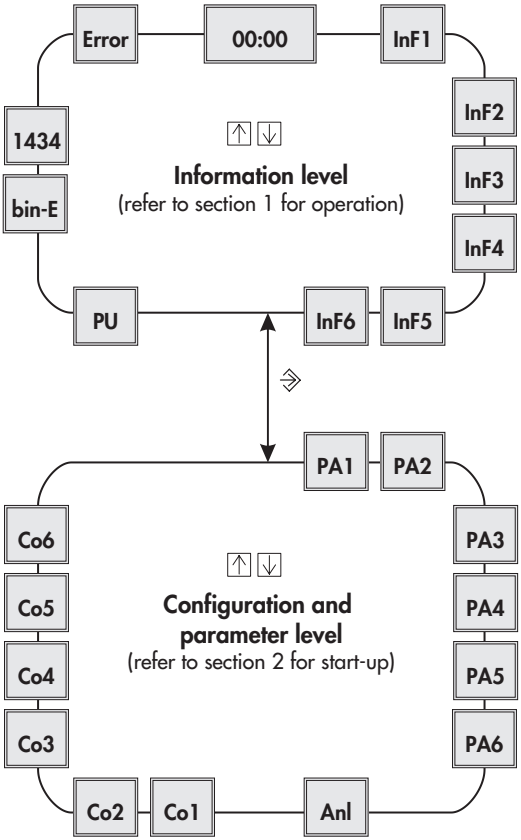
Function block Fb	00	01	02	03	04	05	06	07
Binary input	1	2	3	4	5	6	7	8
Signal edge recognition								
Function block Fb	08	09	10	11	12	13	14	
Binary input	9	10	11	12	13	14	16	
Signal edge recognition								

Index

Frequently used abbreviations

AA	Analog output
AE	Analog input
AF	Outdoor sensor
Anl	System code number
AT	Outdoor temperature
BA	Binary output
BE	Binary input
Co	Configuration level
DHW	Domestic hot water
Fb	Function block
FG	Potentiometer
FW	District heating circuit
GND	Ground
GWx	Limit alarm at terminal x
GWy	Limit alarm at terminal y
HK	Heating circuit
KW	Cold water
RF	Room sensor
RL	Return flow pipe
RüF	Return flow sensor
RT	Room temperature
SF	Storage tank sensor
SLP	Storage tank charging pump
STh	Storage tank thermostat
TLP	Heat exchanger charging pump
TW	Domestic hot water
UP	Circulation pump
VF	Flow sensor
VFS	Flow sensor in storage tank
VFT	Flow sensor in heat exchanger
VL	Flow pipe
WMZ	Heat meter
ZB	Meter bus
ZP	Circulation pump

Service key number	1732



00:00	Actual time
InF1	Heating circuit 1
InF2	Heating circuit 2
InF3	Heating circuit 3
InF4	DHW heating
InF5	District heating circuit
InF6	Baud rate, error status register
PU	Pumps, manual level
bin-E	Binary inputs and outputs
1434	Meter bus data
Error	Alarm

PA1	Heating circuit 1
PA2	Heating circuit 2
PA3	Heating circuit 3
PA4	DHW heating
PA5	System-wide parameters
PA6	Interface operation
Anl	System code number
Co1	Heating circuit 1
Co2	Heating circuit 2
Co3	Heating circuit 3
Co4	DHW heating
Co5	System-wide functions
Co6	Interface operation

Fig. 11 · Level structure of TROVIS 5479 Controller

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