

**Automation System 5400
Heating and District Heating Controller
TROVIS 5432**



**Mounting and
Operating Instructions**

EB 5432 EN

Firmware version 2.1x
Edition July 2004



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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.

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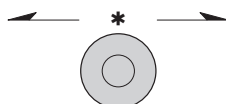
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1 Operation

The controller is ready for use with the temperatures and operating time 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 Control knob



Turn (↻):

Select parameters, displays and temperature displays

Press *:

Confirm adjusted selection or settings

Press for three seconds *3s:

Switch from the operating level to the user level as well as from the user level to the installation level

1.2 Operating modes

Automatic mode

Display: ☀ and ☀ in the time-of-use periods, ☀ and ☾ outside of the times-of-use periods
The controller works in rated operation within the programmed times-of-uses and in reduced operation outside of the times-of-use, provided that the control operation is not deactivated due to the outdoor temperature. The controller switches automatically between both operating modes.

Day mode (constant rated operation)

Display: *PArTY* or ☀

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

Stand-by mode (vacation mode)

Display: *HoLidAY* or ---

In stand-by mode, the heating is switched off regardless of the programmed times-of-use. The frost protection mode is still active.

Night mode (reduced operation; can only be set over the room panel)

Display: ☾

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

1.3 Display

The current set point appears on the display during operation.

Which set point is displayed depends on:

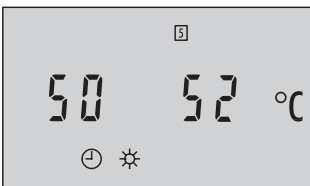
- ▶ The configured type of control
- ▶ The programmed times-of-use

Weather-compensated control, room set point mode (F1 - 1 and F9 - 1)



Day set point (time-of-use period)*
or night set point (outside of time-of-use period)

Weather-compensated control (F1 - 1 and F9 - 0), fixed set point control (F1 - 0 and F7 - 0)





Flow temperature (times-of-use period)*
or reduced flow temperature (outside of time-of-use period)



The set point (left) and the measured value (right) are
displayed in this example.

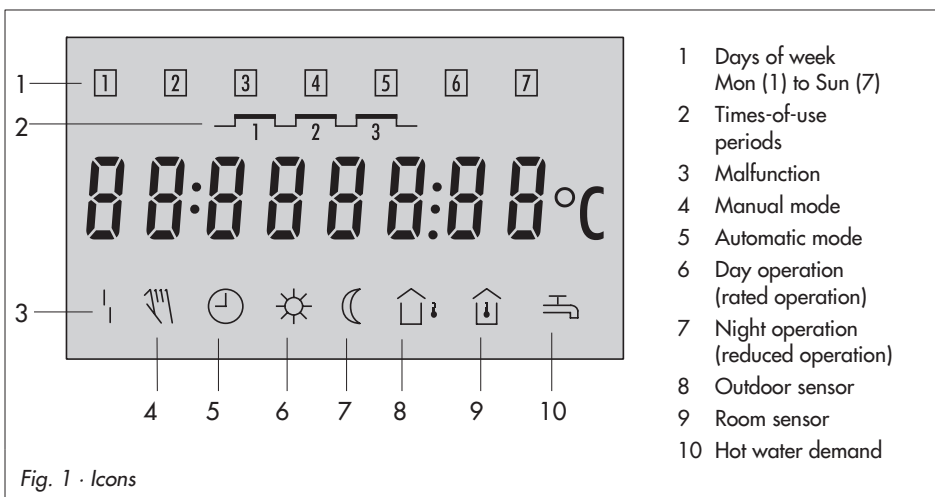
* Appears on the depicted display

Note!

The  icon appears additionally on the display for a control functioning with the room panel unit (F7- 1).

A temporarily active set point (corrected once) is indicated on the display by the  icon together with the  icon (refer to section 1.9.1).

An active function for drying of jointless floors is indicated on the display by the  icon together with the  icon (refer to section 5.3).



1.4 Displaying data











The times-of-use periods, measured values as well as set points or limit values can be retrieved and displayed in the user level (→ Fig. 10 on page 49). The controller configuration determines which measured values as well as which set points or limit values appear on the display.

Proceed as follows:

* **3s** Switch to user level.
Display: Time

(C) Select value.
The different data points appear on the display in sequence:

Display	Meaning
	Current time-of-use
	* Open data point <i>Times-of-use</i> .
	(C) Display daily times-of-use.
	* Confirm <i>Times-of-use</i> by pressing the knob when End appears on the display.

Display	Meaning
 *	Day set point or flow temperature set point (F1 - 0 and F7 - 0)
 *	Night set point or reduced flow temperature set point (F1 - 0 and F7 - 0)
 	OT deactivating value in rated operation (F1 - 1 and F9 - 0)
 	OT deactivating value in reduced operation (F1 - 1 and F9 - 0)
t1	Measured value: Flow temperature * Flow temperature set point
t2 , 	Measured value: Outdoor temperature * Delayed outdoor temperature (F3 - 1)
t2 , 	Measured value: Storage tank temperature (F1 - 0 and F7 - 1) * Activating/deactivating value for DHW system (DHW set point + on/off differential)
t3	Measured value: Return air temperature * Maximum return air temperature
t4	Measured value: DHW temperature monitoring * Monitoring value
t4 , 	Measured value: Room temperature (F7 - 1) * Day set point or night set point (influenced by a room panel, if applicable)
t5 , 	Measured value: Storage tank temperature (F7 - 0) * Activating/deactivating value for DHW system (DHW set point + on/off differential)

 Select **End** on the display.

* Switch to operating level.

*** Note!**

The  icon appears additionally on the display for a control functioning with the room panel unit (F7- 1).

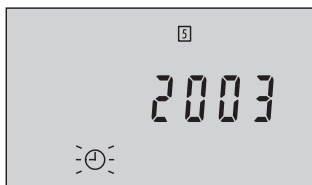
1.5 Setting the system time

The current time and date need to be set immediately after start-up and after a power failure lasting more than 72 hours has occurred. This is indicated by the time blinking on the display. The time is already in the edit mode and can be changed directly. The first two instructions steps are then omitted.

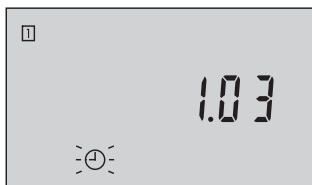
Proceed as follows:



- * **3s** Switch to user level.
Display: Time.
- * Open time data point.
⊕ blinks.
- () Change time.



- () Confirm time setting.
Display: Year.
- () Change year.



- * Confirm year.
Display: Date (day.month) as well as day of the week
(1 = Mon, 2 = Tue, ..., 7 = Sun)
- () Change date.
- * Confirm date.
Display: Time
- () Select **End** on the display.
- * Switch to operating level.

Note! On initial start-up and after a power failure lasting more than 72 hours, the controller switches automatically to the operating level after the date has been set and confirmed. The last two steps are omitted.

Note! The controller automatically switches to the operating level if the control knob is left untouched for five minutes.

1.6 Setting the times-of-use

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

If not all the time-of-use periods are required, the start and stop times of the third time-of-use period (for just two periods) must be set to identical times or, alternatively, the start and stop times of the second time-of-use (for just one period). The controller then automatically sets the start and stop times to the stop time of the previous time-of-use period.

The times-of-use are displayed in the user level (-> Fig. 10 on page 49).

Note!

You can set the times-of-use for each day or for an entire week. If you want to set the times-of-use for certain days to be different than the rest of the week, we recommend you set the times-of-use for the entire week first (display: 1 2 3 4 5 6 7) and then alter the times-of-use for each day which require different times-of-use.

The week setting of the times-of-use writes over any already programmed times-of-use.

Parameter	WE	Range of values
Time period/day	1-7	1 2 3 4 5 6 7 = daily, 1 = Monday, 2 = Tuesday, ..., 7 = Sunday
Start time of first time-of-use	07:00	00:00 to 24:00 h; in steps of 30 minutes
Stop time of first time-of-use	22:00	00:00 to 24:00 h; in steps of 30 minutes
Start time of second time-of-use	22:00	00:00 to 24:00 h; in steps of 30 minutes
Stop time of second time-of-use	22:00	00:00 to 24:00 h; in steps of 30 minutes
Start time of third time-of-use	22:00	00:00 to 24:00 h; in steps of 30 minutes
Stop time of third time-of-use	22:00	00:00 to 24:00 h; in steps of 30 minutes

Note!

The controller includes an optimized activation function which makes sure the controller automatically changes to the valid set point (☼ blinks), six hours at the earliest before the programmed time-of-use starts, to compensate for low outdoor temperatures.

Proceed as follows:



* **3s** Switch to the user level.
Display: Time

(**)** Select *Times-of-use*.

* Open data point *Times-of-use*.
_____ blinks.

(**)** Select time period/day and times-of-use:
[1] = Monday, [2] = Tuesday, ..., [7] = Sunday and
[1] [2] [3] [4] [5] [6] [7] = daily
with
_____ = first time-of-use period,
_____ = second time-of-use period,
_____ = third time-of-use period.

* Open time period/day.
Display: Start time of first time-of-use period
⊖ and ☀ blink.

(**)** Change start time (in steps of 30 minutes).

* Confirm start time.
Display: Stop time of first time-of-use period
⊖ and ☀ blink.

(**)** Change stop time.

* Confirm stop time.
Display: Set time-of-use period
_____ blinks.

To set other times-of-use, repeat the instructions in the fields highlighted in gray.

(**)** Select **End** on the display.

* Exit *Times-of-use*.

(**)** Select **End** on the display.

* Switch to operating level.

Note!

The controller automatically switches to the operating level if the control knob is left untouched for five minutes.

1.7 Stand-by mode

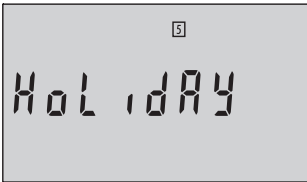
1.7.1 Vacation mode

Function independent of controller setting.

The vacation mode function places the heating circuit into the stand-by mode: the heating is deactivated, however, frost protection is guaranteed. The functions of an existing DHW circuit remain unchanged.

The **vacation mode** function is set in the operating level (set point display).

Proceed as follows:



- ⌚ Select menu *HoLiDAY* (turn knob to the left as far as it will go).
The display blinks.
- * Confirm vacation mode. **Alternatively:**
Wait 3 minutes until the display stops blinking.
The vacation mode is activated.

Note!

The controller is in vacation mode when HoLiDAY appears on the display.

The controller exits the vacation mode when the current set point is reset (→ section 1.9).

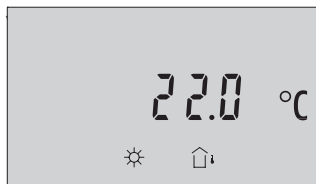
1.7.2 Outdoor temperature dependent deactivation

Controller setting F1 - 1 and F9 - 1

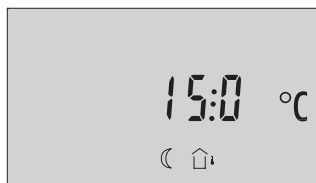
The **outdoor temperature dependent deactivation** function places the heating circuit into the stand-by mode dependent on the outdoor temperature. The heating is deactivated when the outdoor temperature exceeds the active limit value (plus 1 °C on/off differential), however, frost protection is still guaranteed. --- appears on the display as the flow temperature set point while the outdoor temperature dependent deactivation function is active. The functions of an existing DHW circuit remain unchanged.

The *OT deactivating value in rated operation* within the times-of-use and *OT deactivating value in reduced operation* outside of the times-of-use apply and are set in the user level.

Proceed as follows:



OT deactivating value in rated operation



OT deactivating value in reduced operation

- * 3s Switch to user level.
Display: Time.
- () Select OT deactivating value in rated operation or OT deactivating value in reduced operation.
- * Open data point.
- () Change data point.
- * Confirm data point.
- () Select **End** on the display.
- * Switch to operating level.

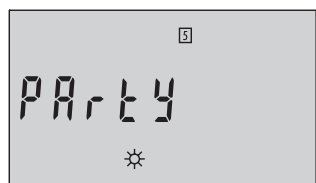
1.8 Party mode (constant rated operation)

Function independent of controller setting.

The party mode function sets the controller in rated operation mode: regardless of the programmed times-of-use, the *Set point day* or *Flow temperature set point* are constantly used by the controller.

The **party mode** function is set in the operating level (set point display).

Proceed as follows:



- () Select menu PArTY (turn knob to the right as far as it will go). The display blinks.
- * Confirm party mode. **Alternatively:**
Wait 3 minutes until the display stops blinking.
The party mode is activated.

Note!

The controller is in constant rated operation when PArTY appears on the display. The controller exits the constant rated operation mode when the current set point is reset (-> section 1.9).

1.9 Correcting the set point

The current set point is displayed in the operating level. In rated operation, the *Day set point* or the *Flow temperature set point* appears on the display (→ section 1.3). In reduced operation, the *Night set point* or the *Reduced flow temperature set point* appears on the display.

1.9.1 Correcting the set point temporarily

The current set point which appears on the display can be changed for just as long as the rated operation mode (programmed time-of-use period) is running or the reduced operation mode (outside of the time-of-use period) is running.

This temporary correction of the set point is made in the operating level (set point display).

Proceed as follows:

- ⌚ Turn the control knob one position.
The icon display blinks.
- ⌚ Change the parameter.
- * Confirm the new parameter setting. **Alternatively:**
Wait until the display stops blinking.
The new parameter setting has been saved.
The temporarily active set point (corrected once) is indicated on the display by the ⌚ icon together with the 🌬 icon.

1.9.2 Correcting the set point permanently

The permanent change of *Day set point* or *Flow temperature set point* in rated operation as well as the *Night set point* or *Reduced flow temperature set point* in reduced operation is made in the user level.

Proceed as follows:

- * **3s** Switch to user level. Display: Time
- ⌚ Select menu *Set point* (→ page 6).
- * Open the set point.
- ⌚ Change the set point.
- * Confirm the set point.
- ⌚ Select **End** on the display.
- * Switch to operating level.

2 Start-up

2.1 Configuration and parameterization

The controller is configured and parameterized in the configuration and parameterization level (→ Fig. 10 on page 49). After accessing the configuration and parameterization level (CoPa level), the function blocks F1 to F9 appear at first, followed by the parameters P1 to P18. The individual functions and parameters are listed in the Appendix (→ page 41). The configuration and parameterization level is locked to prevent unintentional and unauthorized access. This level can only be opened when the key number is known. The key number can be found on page 48. To avoid unauthorized use of the key number, remove the page or make the key number unreadable.

Proceed as follows:

- * **3s** Switch to user level. Display: Time
- () Select **End** on the display.
- * **3s** Switch to the configuration and parameterization level (CoPa level).
Display: 0, **nr** blinks.
- () Set key number.
- * Confirm key number. Display: F1
- () Select function block* or parameter.
- * Open selected data point.
- () Change data point.
- * Confirm setting of the data point.

To set further function blocks and parameters, repeat the instructions in the fields highlighted in gray.

- () Select **End** on the display.
- * Return to operating level.
Display: Current set point

* **Note!**

A function block is activated when F_ 1 appears on the display; it is deactivated when F_ 0 appears on the display.


3 Manual operation mode

In manual operation mode, the circulation pump UP is always switched on. The output SLP is usually switched off. Initially, no control signal is issued for the heating circuit.

Activate the manual operation mode in the configuration and parameterization level (CoPa level) over function block F2.

Functions	WE	Configuration
Manual operation of an actuator	0	F2 - 1

Proceed as follows:

- * **3s** Switch to user level.
Display: Time
- () Select **End** on the display.
- * **3s** Switch to the configuration and parameterization level (CoPa level).
Display: 0, **nr** blinks.
- () Set key number.
- * Confirm key number.
Display: F1
- () Select function block F2.
- * Open function block F2.
- () Activate function block F2.
Display: F2 - 1.
- * Activate manual operation mode.
Display:  and **StoP**
- () Move the actuator manually:
oPEn: OPEN (3-step signal); activate output (on/off signal)
StoP: Last position (3-step signal); deactivate output (on/off signal)
cLoSE: CLOSED (3-step signal)

Note!

The frost protection function is not active in manual operation mode.

Exit manual operation mode:

- ⏪ Select cLoSE on the display.
- * **3s** Close manual operation mode and return to operating level.

Displaying measured values during manual operation mode

- ⏪ Select StoP on the display.
 - * **3s** Switch to user level.
Display: Time
 - ⏪ Select the measured values t1 to t5 in sequence.
 - ⏪ Select **End** on the display.
 - * Switch to menu for moving actuator manually (oPEn, StoP or cLoSE).
-

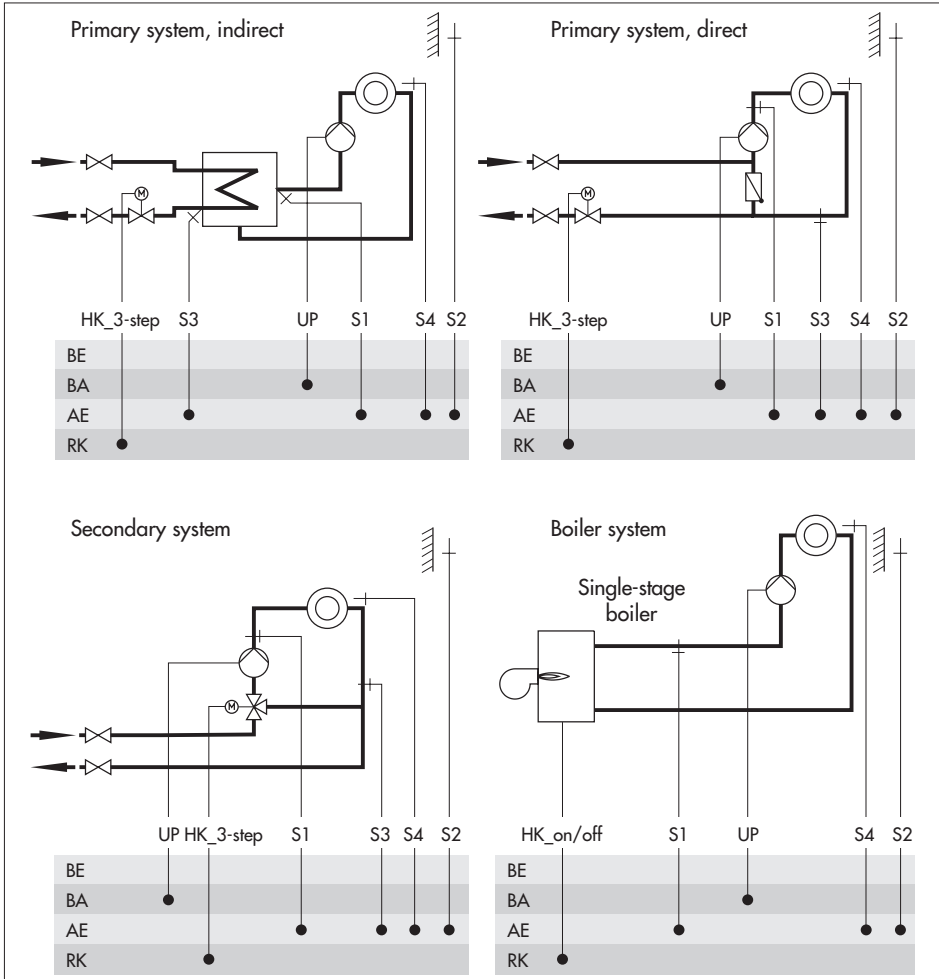
Note!

The manual operation mode is maintained even after a power failure (display: StoP).

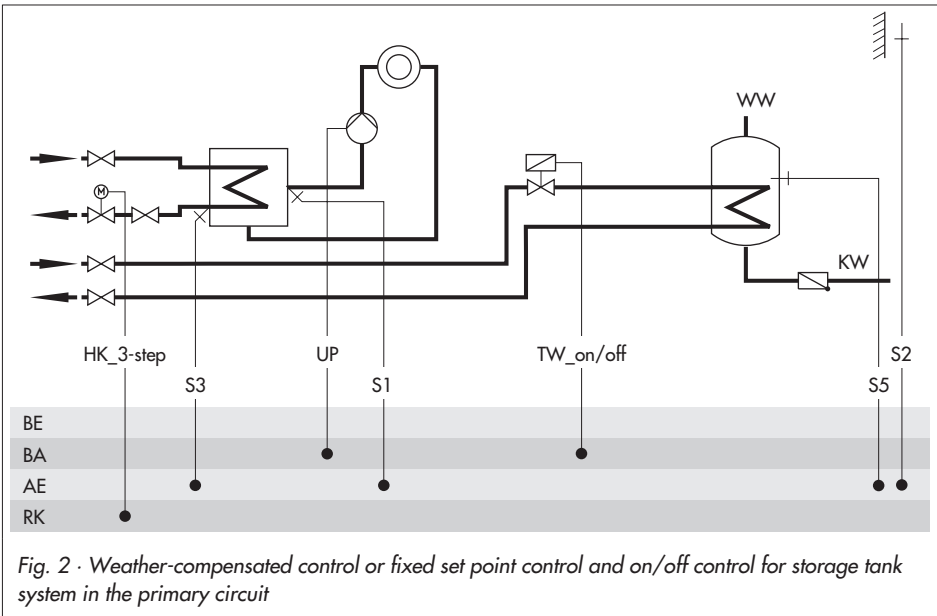
4 Systems

The heating system can be designed either as a primary system, secondary system or a single-stage boiler system.

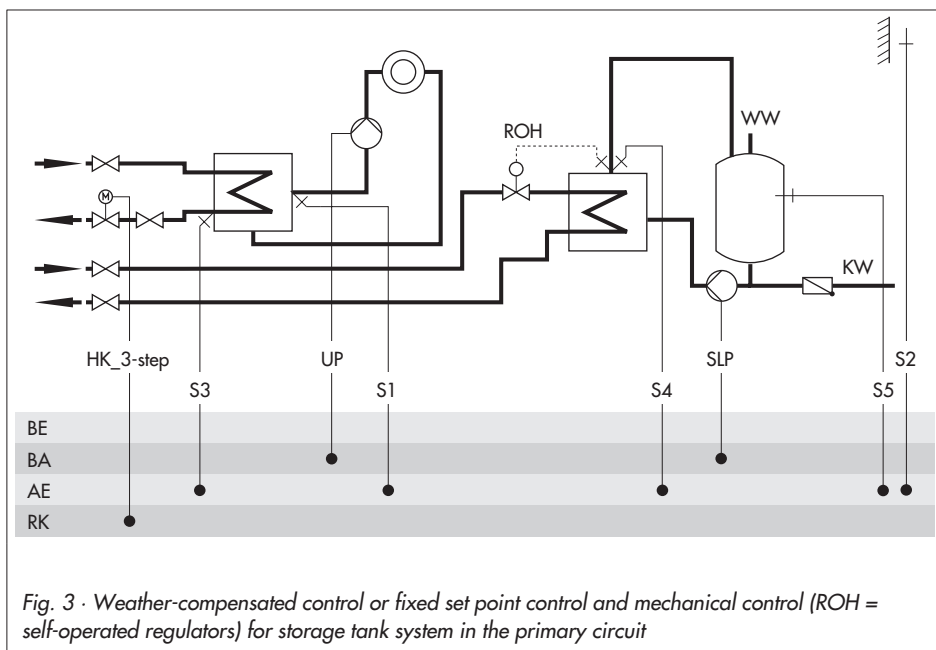
The flow temperature can either be controlled weather-compensated, based on the room temperature or a fixed set point. The hydraulic schematics of the heating system and the controller configuration are the factors that determine how the flow temperature is controlled.



Weather-compensated control without room panel (= default setting)	
Setting	F1 - 1 (with outdoor temperature sensor S2) F7 - 0 (without room panel)
Comments	With or without S3 (depending on the circuit) F4 - 0 for single-stage boiler system Storage tank charging/DHW priority possible (-> Figs. 2 and 3)
Weather-compensated control with room panel	
Setting	F1 - 1 (with outdoor temperature sensor S2) F7 - 1 (with room panel)
Comments	With or without S3 (depending on the circuit) F4 - 0 for single-stage boiler system Storage tank charging/DHW priority not possible
Fixed set point control	
Setting	F1 - 0 (without outdoor temperature sensor S2) F7 - 0 (without room panel)
Comments	With or without S3 (depending on the circuit) F4 - 0 for single-stage boiler system Storage tank charging/DHW priority possible (-> Figs. 2 and 3)
Room temperature-based control	
Setting	F1 - 0 (without outdoor temperature sensor AS) F7 - 1 (with room panel)
Comments	With or without S3 (depending on the circuit) F4 - 0 for single-stage boiler system Storage tank charging/DHW priority possible (-> Fig. 4)



	Weather-compensated control	Fixed set point control
Setting	F1 - 1 and F7 - 0	F1 - 0 and F7 - 0
Comments	With or without S3 (depending on the circuit) Storage tank charging over storage tank sensor S5 (depending on the circuit) Monitoring priority at S5	



	Weather-compensated control	Fixed set point control
Setting	F1 - 1 and F7 - 0	F1 - 0 and F7 - 0
Comments	With or without S3 (depending on the circuit) Storage tank charging over storage tank sensor S5 (depending on the circuit) Monitoring priority at S4 (depending on the circuit) or S5	

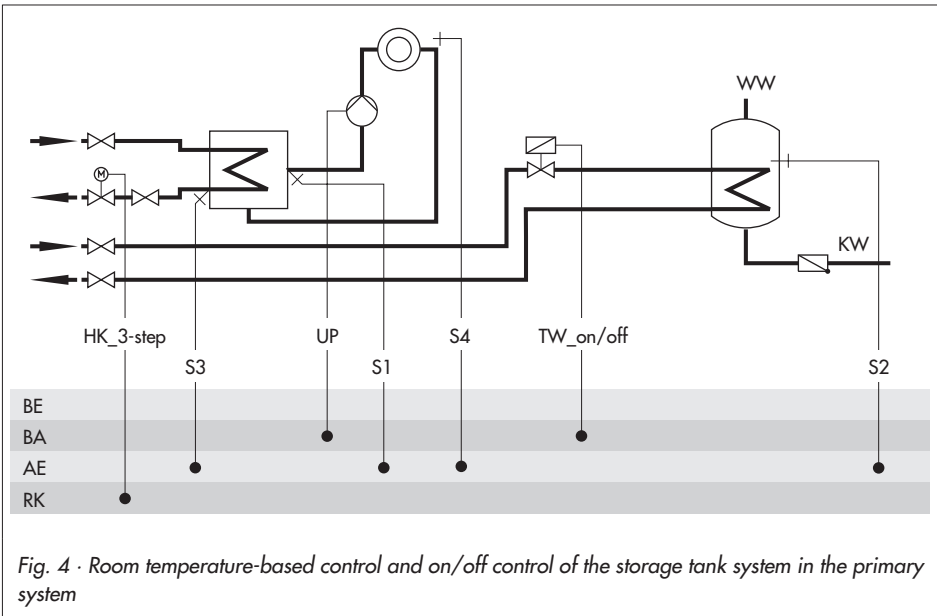


Fig. 4 · Room temperature-based control and on/off control of the storage tank system in the primary system

	Room temperature-based control
Setting	F1 - 0 and F7 - 1
Comments	With or without S3 (depending on the circuit) Storage tank charging over storage tank sensor S2 (depending on the circuit) Monitoring priority at S2

5 Functions of the heating circuit

5.1 Weather-compensated control

When weather-compensated control is used, the flow temperature is adjusted according to the outdoor temperature. The heating characteristic in the controller defines the flow temperature set point as a function of the outdoor temperature (→ Fig. 5).

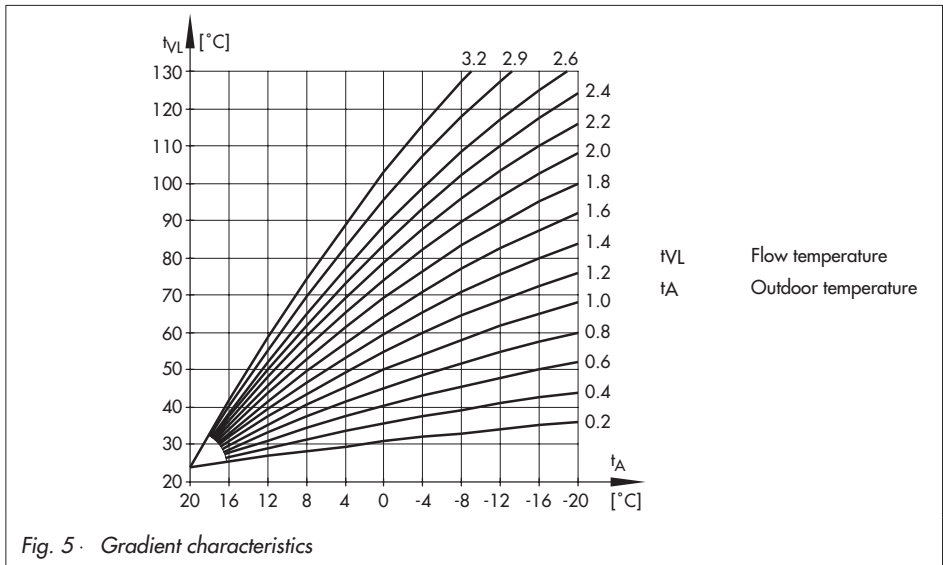


Fig. 5 · Gradient characteristics

Basically, the following rule applies: a drop in outdoor temperature causes the flow temperature to rise. By varying the parameters *Gradient* and *Level*, 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 parameter *Level* performs a parallel shifting of the heating characteristic in upward or downward direction.

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

The reduced flow set point is calculated either as the difference between the adjusted values for *Day set point* (rated room temperature) and *Night set point* (reduced room temperature) or dependent on the parameter P9 (*Set-back of flow temperature in reduced operation*) with the controller setting F1 - 1 and F9 - 0.

The parameters *Max. flow temperature* and *Min. flow temperature* mark the upper and lower limits of the flow temperature.

Examples for setting 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

Weather-compensated control, room set point mode

Functions	WE	Configuration
Type of control	1	F1 - 1
Room set point mode	1	F9 - 1
Parameter	WE	Level / Range of values
Day set point	20 °C	User level / 10 to 40 °C
Night set point	15 °C	User level / 10 to 40 °C
Gradient	1.6	CoPa level P1 / 0.2 to 3.2
Level	0 °C	CoPa level P2 / -30 to 30 °C
Min. flow temperature	30 °C	CoPa level P3 / 0 to 130 °C
Max. flow temperature	80 °C	CoPa level P4 / 0 to 130 °C

Weather-compensated control

Functions	WE	Configuration
Type of control	1	F1 - 1
Room set point mode	1	F9 - 0
Parameter	WE	Level / Range of values
OT deactivating value in rated operation	22 °C	User level / 0 to 50 °C
OT deactivating value in reduced operation	15 °C	User level / -30 to 50 °C
Gradient	1.6	CoPa level P1 / 0.2 to 3.2
Level	0 °C	CoPa level P2 / -30 to 30 °C
Min. flow temperature	30 °C	CoPa level P3 / 0 to 130 °C
Max. flow temperature	80 °C	CoPa level P4 / 0 to 130 °C
Set-back of flow temperature in reduced operation	15 °C	CoPa level P9 / 0 to 50 °C

Note!

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

5.2 Fixed set point control

During a time-of-use period, the flow temperature can be controlled according to a fixed set point. Outside the time-of-use periods, the controller regulates the reduced flow temperature.

Functions	WE	Configuration
Type of control	1	F1 - 0
Parameter	WE	Level / Range of values
Flow temperature set point	50 °C	User level / 0 to 130 °C
Reduced flow temperature set point	30 °C	User level / 0 to 130 °C

5.3 Drying of jointless floors

In compliance with Part 4 of the DIN EN 1264 standard, the first heating up is performed with a flow temperature of 25 °C. This temperature is maintained constant for 3 days. After that, the controller uses the maximum flow temperature as the set point for the following 4 days. When the **drying of jointless floors** function is activated, the set point appears on the left-hand side of the display and the current flow temperature appears on the right-hand side of the display.

An active function for drying of jointless floors is indicated on the display by the ☀ icon together with the 🏠 icon.

The function is switched off automatically when the drying is completed.

Note!

A power failure or any change in the controller setting resets the drying function to restart .

Function	WE	Configuration
Drying of jointless floors	0	F6 - 1

5.4 Automatic deactivation of the heating

The heating is automatically deactivated according to various criteria depending on whether the heating system is equipped with or without a room panel:

Weather-compensated control, room set point mode (F1 - 1 and F9 - 1) – without room panel	
Deactivation during day mode	The outdoor temperature exceeds the <i>Day set point</i> by 1 °C.
Deactivation during night mode	The outdoor temperature exceeds the <i>Night set point</i> by 1 °C.
Weather-compensated control (F1 - 1 and F9 - 0) – without room panel	
Deactivation during day mode	The outdoor temperature exceeds <i>OT deactivating value in rated operation</i> by 1 °C.
Deactivation during night mode	The outdoor temperature exceeds <i>OT deactivating value in reduced operation</i> by 1 °C.
Weather-compensated control (F1 - 1 and F7 - 1) – with room panel	
Deactivation during day mode	The outdoor temperature exceeds the <i>Day set point</i> by 1 °C.
Deactivation during night operating mode	The <i>Night set point</i> is 17 °C or higher and the outdoor temperature exceeds the <i>Night set point</i> by 1 °C. The <i>Night set point</i> is 17 °C or lower and the room temperature exceeds the <i>Night set point</i> by 1 °C.
Room temperature-based control	
Deactivation during day mode	The room temperature exceeds the <i>Day set point</i> by 1 °C.
Deactivation during night operating mode	The room temperature exceeds the <i>Night set point</i> by 1 °C.

The heating is activated immediately when the temperature falls below the relevant set point.

Note!

The table does not include any specifications for fixed set point control as the heating is never deactivated with this type of control.

5.5 Outdoor temperature dependent advance heating

Due to low outdoor temperatures, the controller starts heating before the time-of-use period starts in rated operation. The *Advance heating time* uses a reference outdoor temperature of $-12\text{ }^{\circ}\text{C}$. The advance heating time is shortened when the outdoor temperature is higher. The colder it is outside, the earlier the reduced operation is ended to ensure that the required room temperature is reached at the start of the time-of-use period.

Note! During the advance heating phase, the ☀ icon blinks on the display.

Functions	WE	Configuration
Type of control	1	F1 - 1
Parameter	WE	Level / Range of values
Advance heating time	120 min	CoPa level P17 / 0 to 360 min

5.6 Delayed adaptation to the outdoor temperature

The calculated outdoor temperature is used to determine the flow temperature set point. The heat response is delayed when the outdoor temperature either gets colder or warmer. If the outdoor temperature varies by, for example, $10\text{ }^{\circ}\text{C}$ 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 $5\text{ }^{\circ}\text{C}/\text{h}$, the adaptation would take $t = \frac{10^{\circ}\text{C}}{5^{\circ}\text{C}/\text{h}} = 2\text{h}$.

The delayed adaptation to the outdoor temperature 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.

Note!

The described function can only be activated together with **weather-compensated control**.

Functions	WE	Configuration
Type of control	1	F1 - 1
Delayed adaptation to outdoor temperature	0	F3 - 1
Parameter	WE	Level / Range of values
Delay	$3\text{ }^{\circ}\text{C}/\text{h}$	CoPa level P7 / 1 to $6\text{ }^{\circ}\text{C}/\text{h}$

5.7 Remote control

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

- ▶ Selection of the operating mode:
 - Automatic mode
 - Rated operation (day)
 - Reduced operation (night)
- ▶ 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 remote room controller (room panel) is connected and activated, the corrected *Room temperature set point* is shown.

Functions	WE	Configuration
Room panel	0	F7 - 1

5.8 Flash adaptation

A Type 5257-5 Room Panel must be connected for the **Flash adaptation** function.

The flash adaptation counteracts deviations in room temperature by reducing or raising the flow temperature by up to 30 °C. The *Cycle rate* determines the time between each correction of the flow temperature set point by 1 °C.

The flash adaptation is deactivated when the parameter *Cycle rate* (P18) is set to 0. The measured room temperature then does not have any affect on the flow temperature control.

Note!

*We recommend setting the **flash adaptation** initially with a cycle rate of 10 minutes. Shorter cycle rates are more likely to have a negative effect, particularly when cooling loads such as drafts or an open window affect the control. Then the rooms may be temporarily overheated when the cooling load is eliminated.*

Functions	WE	Configuration
Type of control	1	F1 - 1
Room panel	0	F7 - 1
Parameter	WE	Level / Range of values
Cycle rate	0 min	CoPa level P18 / 0 to 100 min

5.9 Room temperature-based control

A Type 5257-5 Room Panel must be connected for the **Room temperature-based control** function; however, the control works without an outdoor sensor.

The flow temperature is reduced or raised by up to 30 °C when deviations in room temperature occur. The *Cycle rate* determines the time between each correction of the flow temperature set point by 1 °C. The default setting is 10 minutes when the room temperature-based control is activated; the flow temperature control starts with a default set point of 50 °C, provided that the parameter *Max. flow temperature* (P4) permits it.

Note!

We recommend not to set the cycle rate too short. Shorter cycle rates are more likely to have a negative effect, particularly when cooling loads such as drafts or an open window affect the control. Then the rooms may be temporarily overheated when the cooling load is eliminated.

Functions	WE	Configuration
Type of control	1	F1 - 0
Room panel	0	F7 - 1
Parameter	WE	Level / Range of values
Cycle rate	10 min	CoPa level P18 / 1 to 100 min

6 Functions of the DHW circuit

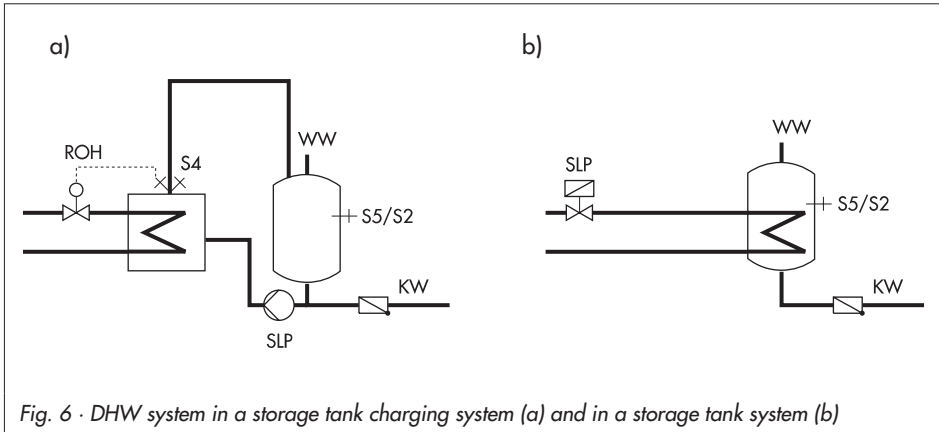


Fig. 6 · DHW system in a storage tank charging system (a) and in a storage tank system (b)

The controller starts charging the storage tank as soon as the water temperature measured at the storage tank sensor (S5 or S2) falls below the *DHW set point* (P16).

The charging of the storage tank finishes when the water temperature measured at the storage tank sensor has reached the temperature $T = \text{DHW set point} + \text{On/off differential of storage tank charging}$.

Use F8 to select the *On/off differential of storage tank charging*.

- ▶ F8 - 0: On/off differential = 5 °C
- ▶ F8 - 1: On/off differential = 2 °C

Functions	WE	Configuration
On/off differential of storage tank charging	0	F8
Parameter	WE	Level / Range of values
DHW set point	45 °C	CoPa level P16 / 20 to 90 °C

6.1 DHW priority

Should the temperature at the DHW sensor S4 or, in cases where DHW sensor S4 does not exist, at the storage tank sensor S5/S2, fall below the *Monitoring value for priority* for five minutes, the heating capacity of the heating circuit is lowered by reducing the set point. The heating circuit set point is then reduced in small steps every five minutes up to a minimum

flow temperature of 20 °C, provided the temperature still lies below the *Monitoring value for priority*.

Three different operating conditions exist:

- ▶ The DHW temperature at S4 (S5/S2) is under the *Monitoring value for priority* → the heating circuit set point is reduced.
- ▶ The DHW temperature to S4 (S5/S2) is up to 5 °C above the *Monitoring value for priority* → the heating circuit set point remains unchanged.
- ▶ The DHW temperature to S4 (S5/S2) exceeds the *Monitoring value for priority* by more than 5 °C → the heating circuit set point which was reduced due to the priority is increased.

Functions	WE	Configuration
Room panel	0	F7 *
* F7 - 0: Monitoring value for priority at S4 (depending on the circuit) or storage tank charging and Monitoring value for priority at S5		
F7 - 1: Storage tank charging and monitoring value for priority at S2 (room temperature-based control)		
Parameter	WE	Level / Range of values
Monitoring value for priority	40 °C	CoPa level P6 / 20 to 90 °C

7 System-wide functions

7.1 Automatic summer time/winter time changeover

The clock is automatically set one hour forward on the last Sunday in March at 2.00 h and set one hour back on the last Sunday in October at 3.00 h.

Function	WE	Configuration
Summer time/winter time changeover	1	F5 - 1

7.2 Frost protection

The frost protection function is activated with weather-compensated or room temperature-based control.

The circulation pump is activated and a flow set point of 20 °C is used for the control when the outdoor temperature is lower than 3 °C with weather-compensated control and the heating is switched off (stand-by mode).

The flow temperature is monitored with room temperature-based control and the heating is switched off. If the flow temperature drops below 5 °C, the circulation pump is activated and the flow temperature set point of 20 °C is used for the control.

Note!

The frost protection function is not active in manual operating mode or with fixed set point control.

7.3 Forced operation of the pumps

When the circulation pumps have not been activated for 24 hours, forced operation of the pumps is started at 12.00 h for one minute to prevent the pumps from getting stuck when they are not operated for a longer period of time.

7.4 Limiting the return flow temperature

The temperature difference between the flow and return flow in a network 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 network flow temperatures are predetermined. The flow temperature set point is reduced when the return flow temperature measured at the return flow sensor S3 exceeds the limit temperature. As a result, the primary flow rate is reduced and the return flow temperature falls. A PI algorithm is used to limit the return flow temperature. The integral action cannot be parameterized.

Parameter	WE	Level / Range of values
Maximum return flow temperature	50 °C	CoPa level P5 / 20 to 90 °C
K _p Return flow temperature limit	1.0	CoPa level P8 / 0.1 to 50.0

7.5 Three-step control

The flow temperature can be controlled with a PI algorithm. The motorized valve reacts to pulses which the controller issues when a system deviation arises. In particular, the length of the first pulse depends on the size of the system deviation and the selected *K_p Proportional gain* (the pulse length increases as the K_p increases). The intervals between each pulse and the interval length between pulses change continuously until the system deviation has been eliminated.

The interval length between each pulse is greatly influenced by the *Reset time T_N* (the interval length increases as T_N increases). The *Valve transit time T_γ* specifies the time required by the valve to travel through the range from 0 to 100 %.

Functions	WE	Configuration
Control signal	1	F4 - 1
Parameter	WE	Level / Range of values
K _p (proportional gain)	2.0	CoPa level P10 / 0.1 to 50.0
T _N (reset time)	120 s	CoPa level P11 / 0 to 999 s
T _γ (valve transit time)	45 s	CoPa level P12 / 10 to 240 s

7.6 On/off control

The flow temperature can be controlled, for instance, by switching a burner on and off. The burner is switched on by the controller when the flow temperature falls below the set point $T = 0.5 \times \text{On/off differential}$. On exceeding the set point by $T = 0.5 \times \text{On/off differential}$, the burner is switched off again. The larger the *On/off differential* selected, the less amount of switching involved. The default setting of *Minimum activation time* enables a burner once it is switched on to run permanently for this time regardless of how long. Likewise, a burner that has just been switched off due to the temperature conditions when the programmed *Minimum activation time* remains switched off regardless how long for the time set.

Functions	WE	Configuration
Control signal	1	F4 - 0
Parameter	WE	Level / Range of values
On/off differential	5 °C	CoPa level P13 / 2 to 10 °C
Min. activation time	120 s	CoPa level P14 / 0 to 600 s
Min. deactivation time	120 s	CoPa level P15 / 0 to 600 s

8 Malfunctions

The controller's reaction when a sensor is defective or a sensor is missing is described in following:

▶ **Flow sensor:**

For three-step control, the control valve takes on the valve position 30 %.

For on/off control, the controller regulates the on/off output at 30-minute intervals as long as the time set under *Minimum activation time* (P14).

The  icon blinks on the display when the sensor fails.

▶ **Outdoor sensor:**

A flow temperature set point of 50 °C is used for control, or the *Maximum flow temperature* is used if the maximum flow temperature (P4) is lower than 50 °C.

The  icon blinks on the display when the sensor fails.

▶ **Return flow sensor:**

The return flow temperature limit function is deactivated.

▶ **Room sensor in room panel:**

The flow temperature control is no longer affected by the measured room temperature.

The  icon blinks on the display when the sensor fails.

▶ **DHW sensor:**

The monitoring of priority changes to storage tank sensor, if necessary.

▶ **Storage tank sensor:**

There is no storage tank charging.

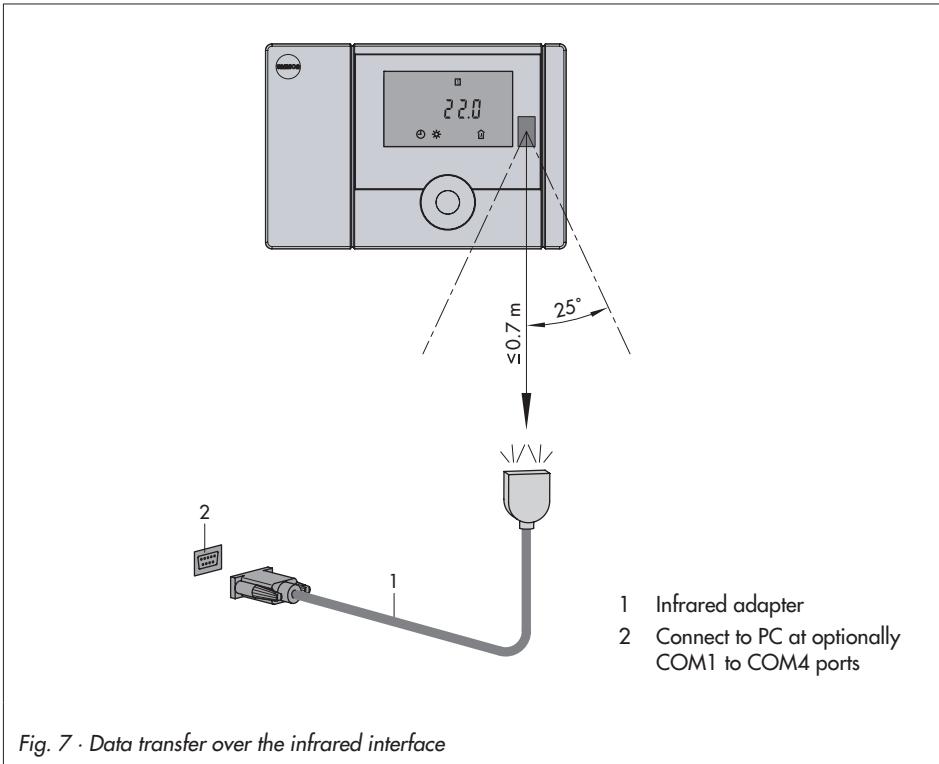
9 Infrared interface

The TROVIS 5432 Heating and District Heating Controller can be configured and operated over the front infrared interface using SAMSON's TROVIS-VIEW Operator Interface software. This software's operation is similar to Microsoft Windows Explorer.

The TROVIS-VIEW software is supplied with the device-specific module for the TROVIS 5432 Heating and District Heating Controller on CD-ROM (order no. 6661-1002).

The minimum system requirements can be found in the Data Sheet T 6661 EN for TROVIS-VIEW as well as the readme.txt file in the main directory of the CD-ROM.

An infrared interface on the controller front panel is used for communication between PC and controller. Data transmission between the RS-232 serial port on a PC and the integrated controller infrared interface requires an infrared adapter (order no. 8864-0900).



10 Installation

The controller consists of the housing section and base. The housing section contains the entire electronics, the display as well as the control knob. The base contains the terminal strip. The controller is suitable for mounting in control panels or on walls (-> Fig. 8).

Note!

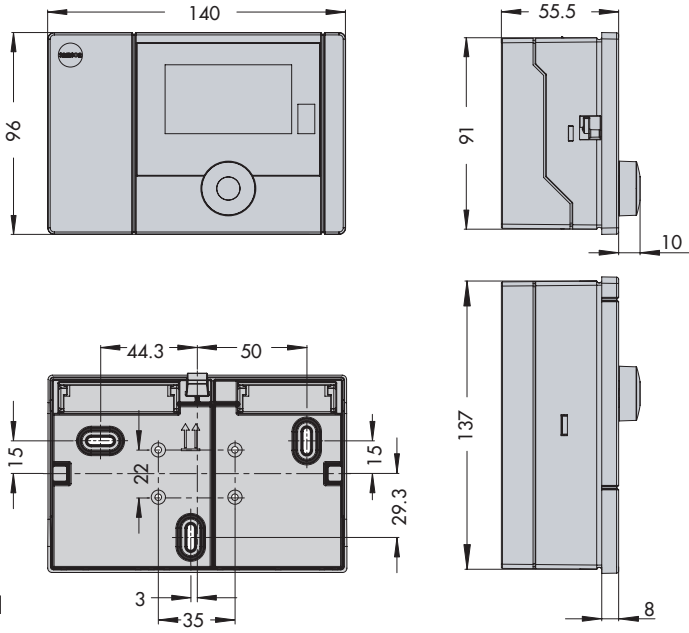
An adapter is available to mount the controller on top-hat rails.

Control panel mounting

1. Press down the tongue on top of the controller.
2. Tip the housing forward and remove it from the base.
3. Make a cut-out of 138 x 92 mm (W x H) in the control panel.
4. Insert the controller housing through the panel cut-out.
5. Use the two threaded bolts located at the side of the housing and the clips to clamp the housing in the panel.
6. Install the electrical connections in the base as described in section 11.
7. First attach the lower part of the base to the housing and then snap on the top part.

Wall mounting

1. Press down the tongue on top of the controller.
2. Tip the housing forward and remove it from the base.
3. If necessary, drill holes at the intended place using the specifications given. Fasten base with screws.
4. Install the electrical connections in the base as described in section 11.
5. First attach the lower part of the base to the housing and then snap on the top part.



Holes for
adapter to
mount on
top-hat rail

Fig. 8 · Installation

11 Electrical connection

Caution!

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

Notes on installing the electrical connections

- ▶ Install the 230 V power supply lines and the signal lines separately! To increase noise immunity, observe a minimum distance of 10 cm between the lines. Make sure the minimum distance is also observed when the lines are installed in a cabinet.
- ▶ The lines for digital signals (bus lines) and analog signals (sensor lines, analog outputs) must also be installed separately!
- ▶ In plants with a high electromagnetic noise level, we recommend to use shielded cables for the analog signal lines. Ground the shield at one side, either at the control cabinet inlet or outlet, using the largest possible cross-section. Connect the central grounding point and the PE grounding conductor with a cable $\geq 10 \text{ mm}^2$ using the shortest route.
- ▶ Inductances in the control cabinet, e.g. contactor coils, are to be equipped with suitable interference suppressors (RC elements).
- ▶ Control cabinet elements with high field strength, e.g. transformers or frequency converters, should be shielded with separators providing a good ground connection.

Overvoltage protection

- ▶ If signal lines are installed outside buildings or over large distances, make sure appropriate surge or overvoltage protection measures are taken. Such measures are indispensable for bus lines!
- ▶ The shield of signal lines installed outside buildings must have current conducting capacity and must be grounded on both sides.
- ▶ Surge diverters must be installed at the control cabinet inlet.

Connecting the controller

The controller is connected as illustrated in the wiring diagram.

Open the housing to connect the cables. To connect the feeding cables, make holes in the marked locations underneath on the base and fit suitable grommets or cable glands.

Connecting the sensors

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

Note!

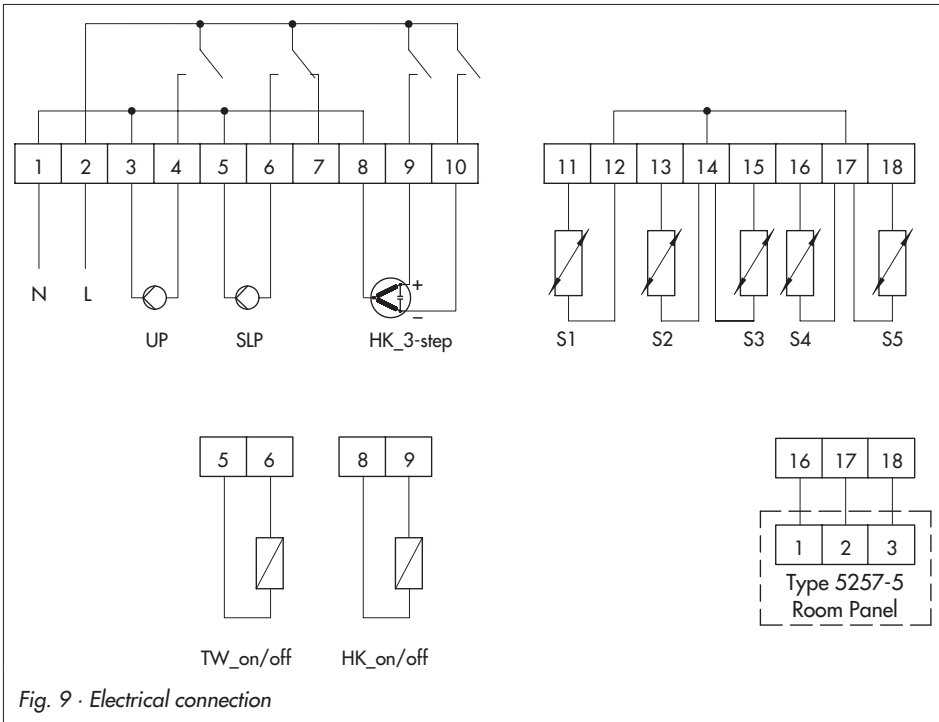
The controller can only be operated with Pt 1000 sensors.

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 (-> section 3).

Connecting the pumps

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



12 Appendix

12.1 Function block list

F	Function	WE	Comments
F1	Type of control	1	F1 - 1: Weather-compensated control F1 - 0: Fixed set point control or F1 - 0 and F7 - 1: Room temperature-based control
F2	Manual operation of actuator	0	F2 - 1: Manual operation mode active
F3	Delayed adaptation to outdoor temperature	0	F3 - 1: Delayed adaptation to outdoor temperature, only effective with F1 - 1
F4	Control signal	1	F4 - 1: 3-step control F4 - 0: On/off control
F5	Summer time/winter time changeover	1	F5 - 1: Changeover active
F6	Drying of jointless floors	0	F6 - 1: Drying of jointless floors active After the function's running time has elapsed, F6 - 0 is set.
F7	Room panel	0	F7 - 1: Connection of Type 5257-5 Room Panel to S4/S5 F7 - 0: DHW priority, storage tank charging over S4/S5 (depending on circuit)
F8	On/off differential of storage tank charging	0	F8 - 1: On/off differential = 2 °C F8 - 0: On/off differential = 5 °C
F9	Room set point mode	1	Only effective with F1 - 1: F9 - 1: Room set point assignable F9 - 0: Set-back and outdoor temperature dependent deactivating values assignable

F Function block, WE default setting

12.2 Parameter list

P	Designation	WE	Range of value
P1	Gradient	1.6	0.2 to 3.2
P2	Level	0 °C	-30 to 30 °C
P3	Min. flow temperature	30 °C	0 to 130 °C
P4	Max. flow temperature	80 °C	0 to 130 °C
P5	Max. return flow temperature	50 °C	20 to 90 °C
P6	Monitoring value for priority	40 °C	20 to 90 °C
P7	Delay	3 °C/h	1 to 6 °C/h
P8	K _p Return flow temperature limit	1.0	0.1 to 50.0
P9	Set-back of flow temperature in reduced operation	15 °C	0 to 50 °C
P10	K _p Three-step control	2.0	0.1 to 50.0
P11	T _N Three-step control	120 s	0 to 999 s
P12	T _Y Three-step control	45 s	10 to 240 s
P13	On/off differential	5 °C	2 to 10 °C
P14	Min. activation time for on/off control	120 s	0 to 600 s
P15	Min. deactivation time for on/off control	120 s	0 to 600 s
P16	DHW set point	45 °C	20 to 90 °C
P17	Advance heating time	120 min	0 to 360 min
P18	Cycle rate	0 min and 10 min	0 to 100 min/ 1 to 100 min

P Parameter, WE Default setting

12.3 Resistance values with Pt 1000 sensor

°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		

12.4 Technical data

Inputs	5 inputs for Pt 1000 sensors
Outputs	
Control signal Y	Three-step or on/off signal, non-floating: 230 V AC, 0.3 A AC (triac outputs with varistor for surge suppression)
Binary output	2 outputs to control heating circuit pump and to release DHW system (double-throw contact), non-floating: 230 V AC, 2 A (relay output with varistor for surge suppression)
Operating voltage	230 V AC (+ 10 %/ - 15 %), 48 to 62 Hz, Power consumption, approx. 1 VA
Ambient temperature	
Operation	0 to 50 °C
Transport/storage	-10 to 60 °C
Relative humidity	Normal, no dew
Degree of protection	IP 40 according to EN 60529
Class of protection	I according to EN 50178
Degree of contamination	2 according to EN 50178
Overvoltage category	II according to EN 50178
Noise immunity	According to EN 61000-6-1
Noise emission	According to EN 61000-6-3
Weight	Approx. 0.4 kg

12.5 User data

Station	
Operator	
Responsible SAMSON office	

Function blocks

F1	F2	F3	F4	F5	F6	F7	F8	F9

Parameters

P	Designation	Setting	Range of values
P1	Gradient		0.2 to 3.2
P2	Level		-30 to 30 °C
P3	Min. flow temperature		0 to 130 °C
P4	Max. flow temperature		0 to 130 °C
P5	Max. return flow temperature		20 to 90 °C
P6	Monitoring value for priority		20 to 90 °C
P7	Delay		1 to 6 °C
P8	K_p Return flow temperature limit		0.1 to 50
P9	Set-back of flow temperature in reduced operation		0 to 50 °C
P10	K_p Three-step control		0.1 to 50
P11	T_N Three-step control		0 to 999 s
P12	T_Y Three-step control		10 to 240 s
P13	On/off differential		2 to 10 °C
P14	Minimum activation time for on/off control		0 to 600 s
P15	Minimum deactivation time for on/off control		0 to 600 s
P16	DHW set point		20 to 90 °C
P17	Advance heating time		0 to 360 min
P18	Cycle rate		0 to 100 min/ 1 to 100 min

Times-of-use

	Start – Stop (1)	Start – Stop (2)	Start – Stop (3)
Monday (1)			
Tuesday (2)			
Wednesday (3)			
Thursday (4)			
Friday (5)			
Saturday (6)			
Sunday (7)			

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Abbreviations

AE	Analog input
BA	Binary output
BE	Binary input
HK	Heating circuit
KW	Cold water
OT	Outdoor temperature
RK	Control circuit
ROH	Self-operated regulators
S1..5	Sensors 1...5
SLP	Storage charging pump
TW	Domestic hot water (DHW)
UP	Circulation pump
WW	Hot water

Key number

1732

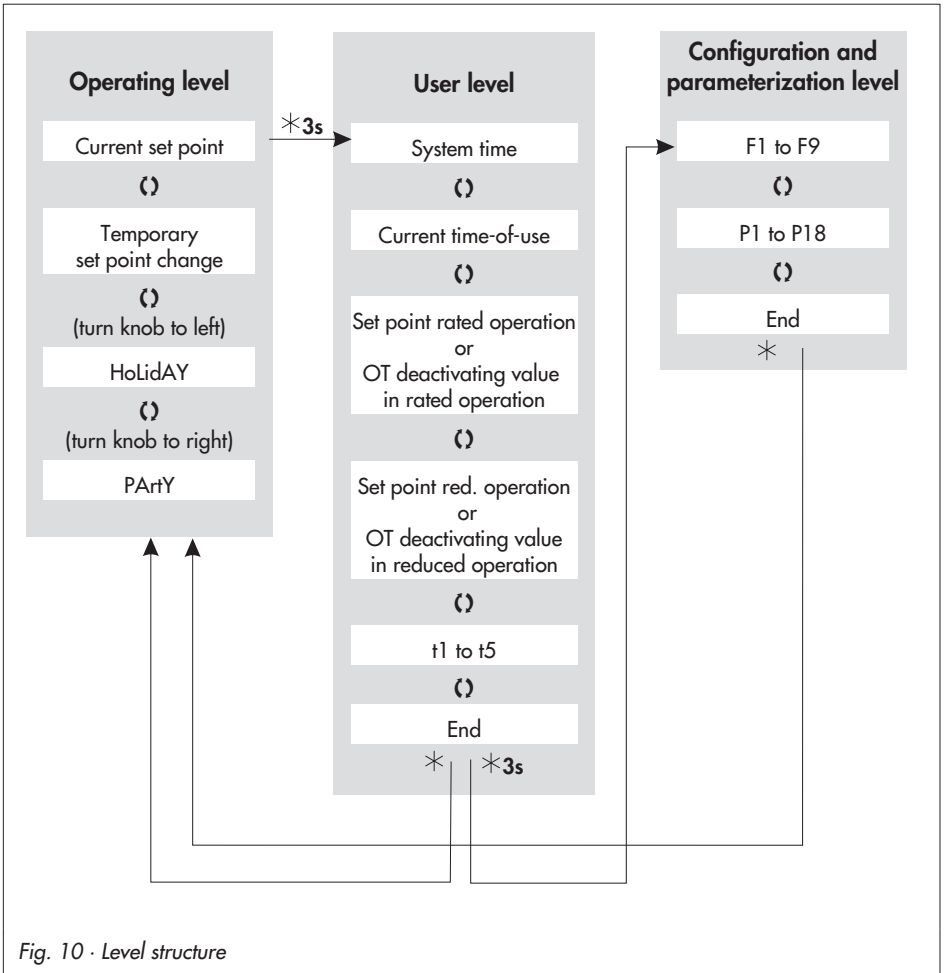


Fig. 10 · Level structure



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