Thermocyclic
Individual Room Control

Technical Description

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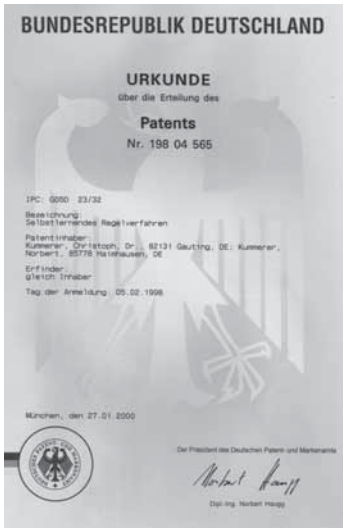
1. Introduction

Dear Customer!

By purchasing your new thermocyclical control, you have obtained a quality, state of the art product. We thank your for your confidence in our product.

To be able to enjoy all the benefits of this modern thermocyclical control, you should read this product information before using it. It contains everything you need to know about the devices.

Please keep this product information in a safe place.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Selbsttätendes Regelverfahren

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Area of Application

The thermocyclical control (referred to from now on as THZ control) represents an innovative concept for controlling heating and cooling systems.

The THZ control finds the optimum control for every system with no presettings whatsoever. You do not need to be familiar with the system‘s technical details; you do not need to set heating curves or similar. Control precision is very high. Only one temperature sensor and one ON/OFF switch are needed per heating circuit as an actuator. Setting up individual room controls for a large number of rooms does not present a problem, since later extensions are possible by simply adding components.

This means that the THZ control is suitable for controlling all types of heating and cooling systems, assuming that they at least have a simple actual actuator (valve, circulating pump, switch).

Hazard Warnings/Maintenance Information

Only wipe with a damp cloth

Do not splash with water

An independent fuse for overtemperature is necessary; particularly with surface heating.

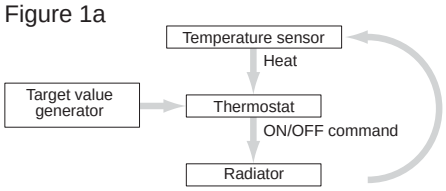
2. Principle of function

The thermocyclic process is a basic innovation for controlling temperatures. It functions according to a completely new principle that has nothing in common with conventional thermostat or PID controls.

It is suitable for use both in heating and cooling systems. We will explain the principle below on the basis of a heating system. The explanations apply in a similar way to cooling systems.

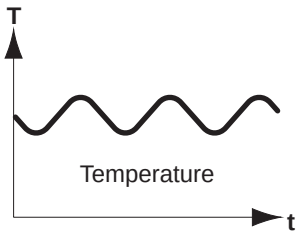
Figure 1a shows the easiest way to control temperature: A thermostat switches on a radiator if it is too cold and switches it off when it is too hot. A system of this type always oscillates, i.e. it generates temperature oscillations as shown in **Figure 1b**.

Figure 1a



Oscillations of this type are usually relatively high and therefore cause disturbances. To avoid these oscillations, you try to attenuate the system and to balance it. The aim is, if possible, to entirely remove this temperature oscillation. **This is exactly the difference that the thermocyclic process offers**. The aim of this process is not to avoid this oscillations and create a balance. On the contrary, the process actively forces temperature oscillations – but controls them on a very precise basis. And since they are controlled very precisely, they can be almost as slight as you like; however, they must never stop entirely.

Figure 1b



In this connection, the basic idea is to selectively use the information that is contained in the temperature oscillations. The amplitude and frequency of the temperature oscillation in **Figure 1b** obviously depend on the system constants and ambient conditions, i.e. in particular on delays, the temperature of the radiator and the ambient temperature. This means that the resulting temperature oscillation contains information about these system constants and ambient conditions and the task is to extract precisely this information and use it for control. As a result, the aim must not be to remove the oscillation, since the information would also be removed. Rather, the aim must be to encourage the system to stimulate oscillations and, using the response to them, to modify this stimulus and through this to control the oscillation.

This yields the following approach (**Figure 2** in a much enlarged representation): A radiator is switched on for a specific time; the system responds to this a little later with a minimum and a maximum temperature.

The thermocyclic control procedure now establishes a relationship between the stimulus due to switching on the radiator and the resulting oscillation. The system calculates the expected extreme values based on the switch-on instant, the temperature increase in the switch-on instant and the duty cycle. The reference parameters are extracted from the measured target/actual deviation and adapted to system changes on an ongoing basis.

With the help of these calculations, it is possible to generate controlled temperature oscillations with a very low amplitude (typically 0.3°C) as shown in **Figure 3** (again much enlarged). The temperature profile is measured constantly. The system determines the reference parameters from the data of the previous heating cycle. Then, the system calculates the switch-on instant (SwitchE) and the duty cycle (SwitchD) of the radiator for the current heating cycle such that it yields the forecast extreme values in the temperature profile.

Figure 2

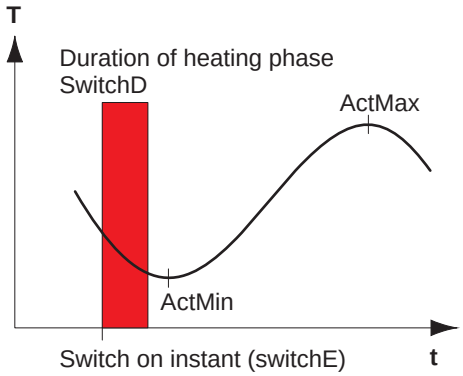
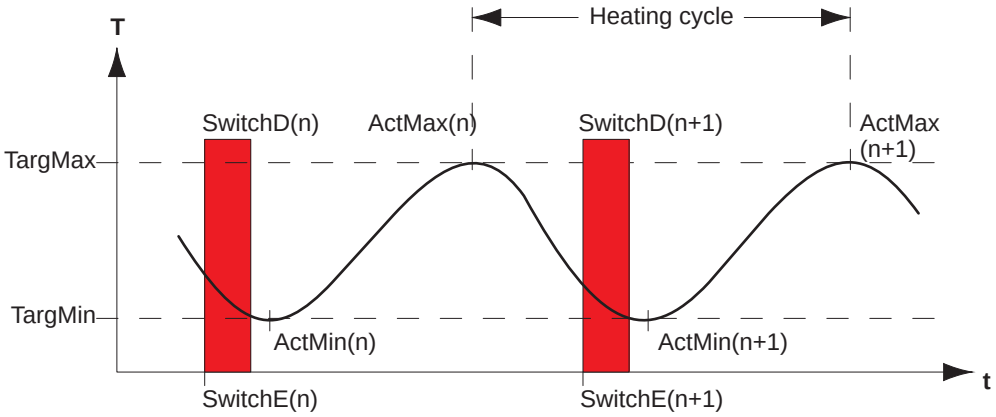


Figure 3



The cycle is run. The system registers deviations in the actual extreme values from the target extreme values and lead to changed parameters in the next cycle. In this way, information about the system and the environment is saved in the parameters. If these conditions change, the changes are reflected dynamically in changed parameters and lead to a changed control response.

Thermocyclic control offers the following benefits:
The control finds the optimum control for every system with no presettings whatsoever. There is no need to have any knowledge of the technical details of the system. In particular, it is not necessary to determine and preset heating curves or similar.

The control only needs a temperature sensor and an ON/OFF switch as an actuator. In particular, no external temperature sensor is needed to control the flow temperature. If you want to control the flow temperature, it is possible to easily calculate the minimum temperature that is needed from existing information and to report it to the heat generator.

It is also possible to determine an automatic hydraulic comparison from the data. Using the SF or SK proportional servomotors, it is possible to automatically compare the entire system with no external intervention.

You can easily implement additional safety functions, it is easy to detect disturbances on the basis of characteristic patterns.

3. System Overview

The THZ System is modular and expandable. You can easily combine the wired and wireless versions with one another. All the components of the THZ control are connected to one other via a simple two-wire line (bus) system. This simple bus is used to supply the power for the RG and RS room units, the ST switching steps, the SK servomotors and the VR flow control, as well as to exchange data with the ZE central unit.

The polarity of the bus connection is of no consequence and the sequence or grouping in which the components are connected are not important either. Any combination of series or star connections is allowed.

Using a rotary coding switch or a menu selection, you permanently set each room unit and each switching step/servomotor to a device number (bus address) at assembly.

If the room unit and the switching step/servomotor have the same device number, they are assigned to one another, i.e. the system sends switching commands for the room in which the room unit is mounted to the switching step/servomotor with the same device number.

You can freely change this assignment in the central unit which means that it is also possible to assign several switching steps/servomotors to one room unit. All the switching steps/servomotors that are assigned to a room unit are switched together.

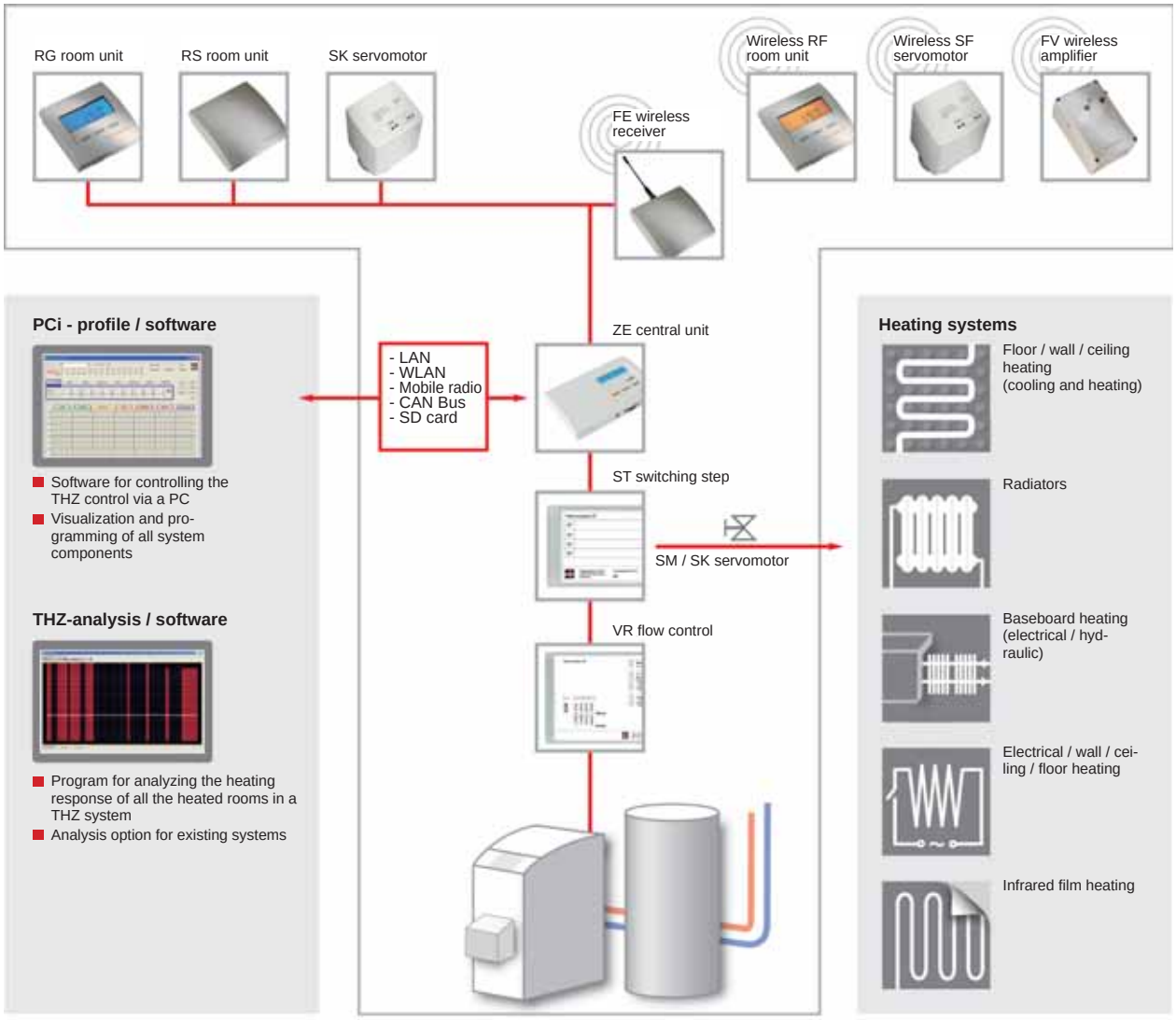
On the basis of the data that a specific room unit transfers to the central unit, it calculates when and for how long the assigned switching step/servomotor must be activated and, with this, which corresponding heating circuit must be switched on. This is carried out for each room unit completely independently of all the others at intervals of one minute in each case.

In this way, the system switches all the heating circuits on and off at the right time such that this yields the desired room temperature.

Apart from this, the system calculates the necessary flow temperature from the data of all the heating circuits. Using the optional VR flow control, the system switches the burner, mixer and circulating pump appropriately.

The wireless components of the system like the RF room unit, the FV amplifier or the SF radio servomotor communicate with the ZE central unit via the FE radio transmitter/receiver. This is the only component to be connected to the ZE via the two-wire bus.

The ThermoZYKLUS System



4. ZE central unit

The ZE central unit is at the heart of the THZ system. It makes possible communication between the system components, generates the switching commands to the switching step/servomotors from the incoming data and calculates the specifications to the VR flow control. It makes possible all the system settings.

All the wired components are also supplied with power via the central unit. Apart from this, it contains a computer clock and an integrated RG room unit.

The basic version of the ZE controls up to ten rooms.

NT mains unit

The NT mains unit provides the power supply for the ZE central unit. It is supplied together with the ZE central unit.

Options

In the ZE central unit, you can also enable the following options (for more details on this, refer to the Options menu description):

16 rooms
The ZE controls up to 16 rooms (Option O-16R).

30 rooms
The ZE controls up to 30 rooms. In addition, options Modbus, Large Timer and Data Backup are included (Option O-PLUS).

Mobile phone function
It is possible to remote-control the ZE mode using your mobile phone. To do this, you need a Mobile Phone Kit. For more detailed information, refer there and see the Mobile Phone menu description. (Option O-HF)

Modbus
The ZE includes a Modbus interface that can be used to communicate with a PC or another ZE. For more detailed information, refer to the chapters entitled Modbus and Networking and the Serial Port menu description. (Option O-MB)

Ethernet
The ZE includes an Ethernet interface that you can use to connect it to a Local Area Network (LAN). For more detailed information, refer to the chapter entitled Ethernet and the Serial Port menu description. (Option O-EN)

Humidity control
The ZE can control the temperature of a room in dependence on the relative humidity. This is conditional on an RS-FF room unit (with humidity sensor) being connected. For more detailed information, refer to the chapter entitled Humidity and the Humidity menu description (Option O-FR)

Large timer
The ZE includes 30 independent timers with a total of 2400 possible switching points. By combining several timers, it is possible to generate virtually any switching pattern you want. For more detailed information, refer to the chapter entitled Timers and the Timer menu description (Option O-GU)

Data backup
The ZE includes a card socket for commercially available SD cards. If you plug in an SD card, the system automatically saves the operating data. The O-DS option makes it possible to also save the configuration data to the SD card and to load it back to the ZE. This makes it easier to manage several ZEs with different configurations. For more detailed information, refer to the SD Card menu description. (Option O-DS)

5. Menu of Central Unit CE

The menu of Central Unit CE is described in detail in a separate document.

6. System Components

A control system around a central unit ZE as the central component can contain the system components listed below.

1. Room unit for temperature measurement
RG room unit (with display and pushbuttons)
RS room unit (without display and pushbuttons)
RS-FF room unit (with humidity sensor)
RS-D room unit (for installation behind a panel)
RF room unit (wireless, with display and pushbuttons)

2 . Actuators for switching the heating circuit valves
ST switching step (with 4 relays)
SK servomotor (direct bus connetion)
SF servomotor (wireless)
STE switching step (controlling electronic relays)
STZ switching step (wireless, for electrical baseboard heaters)
STV switching step (wireless, for infrared transformers)

3 . Components for the wireless network
FE wireless receiver
FV wireless amplifier

4 . System control
VR flow control

5 . Other components
SD card for saving data
Modbus USB converter for connecting to a PC device server to connect to the Internet

These system components are described in the sections below

6.10.1 RG room unit (CN 00-01-04)

The RG room unit measures the temperature in the room and sends it across the THZ bus to the central unit ZE (wired connection). Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Menu settings
Below, we will describe the menu items for the following configurations (for possible configurations, refer to 12.10 Commissioning the RG Room Unit):

CN00 - Normal mode with all setting options
CN01 - Normal mode but the display goes out after 30 seconds
CN04 - Actual temperature via external sensor

These configurations all have the same menu structure.

Using the two keys on the right, you can page upwards and downwards through the following menu items:

1. Display of actual temperature
2. Display of time
3. Setting of the target temperature
4. Setting of the operating mode
5. Setting of the display options
6. Setting of the display colour
7. Display of the set address.
8. Display of the set configuration

When the programming icon >> is shown on the left of the display, you can make settings. Pressing the left-hand programming key activates the setting option; the programming icon >> flashes. Using the two keys on the right, you can now change the settings.

Pressing the lefthand programming key again saves the settings; the programming icon >> stops flashing.

If you do not press a key for 30 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

1. Display of actual temperature
The system displays the currently measured temperature together with the °C unit.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

2. Display of time
The current time is displayed together with the programming icon. (The ZE central unit transfers the time).

3. Setting the target temperature
The set target temperature is displayed together with the programming icon. After pressing the programming key, you can change the target temperature using the two right-hand keys (the programming icon >> flashes). To complete setting, press the programming key again (the programming icon >> stops flashing).

4. Setting the mode
You can set the Day/Night/Off/Party mode. The icon for the currently set mode flashes.

Tag: °C
Nacht: Crescent Moon
Aus: X
Party: P
If you choose the Night or Party modes, the setting applies for eight hours. After this, the mode automatically reverts to Day. By contrast, the Day or Off modes are retained permanently.

In Off mode, the room goes to Frost Protection in the case of heating and to Off with cooling.

5. Setting of the display options
You can change the display‘s response. Normally, the display constantly shows the measured actual temperature (the °C icon flashes). It can, however, also constantly show the time (the clock icon flashes) or the actual temperature and the time (the °C and clock icons flash together).

6. Setting of the display colour
You can change the colour of the display lighting. When you do this, the system shows the colour number.

7. Displaying the set address
The set address of the RG3 is displayed together with the address icon.

8. Display of the set configuration
The system displays the configuration that was set at commissioning. For the possible configurations, see 12.10 Commissioning the RG Room Unit.

Displaying other information
At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RG room unit or the timers.

Update
When switching between the different settings in the RG room unit or the ZE central unit, the values in the RG room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.10.2 RG room unit (CN 02-05-07-10)

The RG room unit measures the temperature in the room and sends it across the THZ bus to the central unit ZE (wired connection). Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Menu settings
Below, we will describe the menu items for following configurations (for possible configurations. refer to 12.10 Commissioning the RG Room Unit):
CN02 - Only the actual temperature and the target temperature are visible.
CN05 - Same as CN02, actual temperature via external sensor
CN07 - Same as CN02, measurement of two actual temperatures
CN10 - Same as CN02, additionally energy display in %

Using the two keys on the right, you can page upwards and downwards through the following menu items:

1. Display of actual temperature
2. Setting the target temperature
3. Display of the current heating power (CN10 only)

When the programming icon >> is shown on the left of the display, you can make settings. Pressing the left-hand programming key activates the setting option; the programming icon >> flashes. Using the two keys on the right, you can now change the settings. Pressing the left-hand programming key again saves the settings; the programming icon >> stops flashing.

If you do not press a key for 30 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

1. Display of actual temperature
The system displays the currently measured temperature together with the °C unit. If heating is currently being carried out, the system additionally shows the heating icon above the °C display.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

2. Setting the target temperature
The set target temperature is displayed together with the programming icon. After pressing the programming key, you can change the target temperature using the two right-hand keys (the programming icon >> flashes). To complete setting, press the programming key again (the programming icon >> stops flashing).

3. Display of the current heating power
The system displays the currently delivered heating power as a percentage of the maximum power(the ‚E' stands for ‚energy'). This assumes that you have made the necessary settings in the ZE central unit and that the ZE is running in a suitable operating mode. If this is not the case, the system always displays 100 %.

Displaying other information
At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RG room unit or the timers.

Update
When switching between the different settings in the RG room unit or the ZE central unit, the values in the RG room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.10.3 RG room unit (CN 03-06-08-09)

The RG room unit measures the temperature in the room and sends it across the THZ bus to the central unit ZE (wired connection). Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Menu settings

Below, we will describe the menu items for following configurations (for possible configurations. refer to 12.10 Commissioning the RG Room Unit):
CN03 - Only the target temperature can be seen.
CN06 - Same as CN03, actual temperature via external sensor
CN08 - Same as CN03, measurement of two actual temperatures
CN09 - Same as CN03, additionally colour change. The colour of the display changes with the set target temperature from blue (low temperature) through green and yellow to red (high temperature).

If you do not press a key for 30 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

Setting the target temperature
The set target temperature is displayed together with the programming icon. Using the two keys on the right, you can change the target temperature. No further settings are possible.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is visible in all the menus.

Displaying other information

At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RG room unit or the timers.

Update
When switching between the different settings in the RG room unit or the ZE central unit, the values in the RG room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.11 RS / RS-FF room unit

The RS room unit measures the temperature in the room and sends it across the THZ bus to the central unit CE (wired connection). Since there is no display or keys, it is not possible to change target values or display information.

The RS-FF room unit additionally contains a humidity sensor that measures the relative humidity and transfers it to the central unit CE. The external appearance is the same as the RS room unit.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Apart from this, it is possible to use an RS room unit as the interface for other input information (e.g. external switches, external control voltages, external digital or analogue values).

6.12.1 RF room unit (wireless, CN 00-01)

The wireless RF room unit measures the temperature in the room and sends it on a wireless basis to the central unit ZE. Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Power is supplied by two AA alkaline manganese batteries that you can access after removing the battery cover. The correct polarity is marked on the housing.

You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

If the batteries run down, this is indicated by a battery icon on the display. Apart from this, the system sends an appropriate message to the ZE central unit that also displays a battery icon in the status menu to indicate that you need to change the batteries.

Menu settings
Below, we will describe the menu items for the following configurations (for possible configurations, refer to 12.11 Commissioning the RF Room Unit):

CN00 - Normal mode with all setting options
CN01 - Normal mode but the display goes out after 30 seconds

Using the two keys on the right, you can page upwards and downwards through the following menu items:

1. Display of actual temperature
2. Setting of the target temperature
3. Setting the mode
4. Setting of the display colour
5. Displaying the set address
6. Displaying the set system address
7. Display of the set configuration

When the programming icon >> is shown on the left of the display, you can make settings. Pressing the left-hand programming key activates the setting option; the programming icon >> flashes. Using the two keys on the right, you can now change the settings. Pressing the left-hand programming key again saves the settings; the programming icon >> stops flashing.

If you do not press a key for 20 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

<u>1. Display of actual temperature</u>
The system displays the currently measured temperature together with the °C unit.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

2. Setting of the target temperature
The set target temperature is displayed together with the programming icon. After pressing the programming key, you can change the target temperature using the two right-hand keys (the programming icon >> flashes). To complete setting, press the programming key again (the programming icon >> stops flashing).

In modes Night/Off, the system additionally displays the Crescent Moon and X icons. It is not possible to display the associated target temperature, since the ZE cannot transfer it (see above).

In Off mode, you cannot change the target temperature.

If you change the target temperature in Night mode, the RF room unit automatically goes back to Day mode.

In Party mode, the system displays a letter P in front of the target value.

If you change the target temperature, the RF room unit automatically goes back to Day mode.

3. Setting the mode
You can set the Day/Night/Off/Party mode. The icon for the currently set mode flashes.

Day °C
Night: Crescent Moon
Off: X
Party: P

If you choose the Night or Party modes, the setting applies for eight hours. After this, the mode automatically reverts to Day. By contrast, the Day or Off modes are retained permanently.

In Off mode, the room goes to Frost Protection in the case of heating and to Off with cooling.

4. Setting of the display colour
You can change the colour of the display lighting. When you do this, the system shows the colour number.

5. Displaying the set address

The set address of the RF is displayed together with the address icon.

6. Displaying the set system address
The set system address of the RF is displayed together with the system address icon.

7. Display of the set configuration
The system displays the configuration that was set at commissioning. For possible configurations, see the chapter entitled Commissioning.

Displaying other information
At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RG room unit or the timers.

Update
When switching between the different settings in the RF room unit or the ZE central unit, the values in the RF room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.12.2 RF room unit (wireless, CN 02-10)

The wireless RF room unit measures the temperature in the room and sends it on a wireless basis to the central unit ZE. Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Power is supplied by two AA alkaline manganese batteries that you can access after removing the battery cover. The correct polarity is marked on the housing.

You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

If the batteries run down, this is indicated by a battery icon on the display. Apart from this, the system sends an appropriate message to the ZE central unit that also displays a battery icon in the status menu to indicate that you need to change the batteries.

Menu settings
Below, we will describe the menu items for the following configurations (for possible configurations, refer to 12.11 Commissioning the RF Room Unit):

CN02 - Only the actual temperature and the target temperature are visible.
CN10 - Same as CN02, additionally energy display in %

Using the two keys on the right, you can page upwards and downwards through the following menu items:

1. Display of actual temperature
2. Setting the target temperature
3. Display of the current heating power (CN10 only)

When the programming icon >> is shown on the left of the display, you can make settings. Pressing the left-hand programming key activates the setting option; the programming icon >> flashes. Using the two keys on the right, you can now change the settings. Pressing the left-hand programming key again saves the settings; the programming icon >> stops flashing.

If you do not press a key for 20 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

<u>1. Display of actual temperature</u>
The system displays the currently measured temperature together with the °C unit.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

2. Setting the target temperature
The set target temperature is displayed together with the programming icon. After pressing the programming key, you can change the target temperature using the two right-hand keys (the programming icon >> flashes). To complete setting, press the programming key again (the programming icon >> stops flashing).

3. Display of the current heating power
The system displays the currently delivered heating power as a percentage of the maximum power(the ‚E' stands for ‚energy'). This assumes that you have made the necessary settings in the ZE central unit and that the ZE is running in a suitable operating mode. If this is not the case, the system always displays 100 %.

Displaying other information
At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RF room unit or the timers.

Update
When switching between the different settings in the RF room unit or the ZE central unit, the values in the RF room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.12.3 RF room unit (wireless, CN 03-09)

The wireless RF room unit measures the temperature in the room and sends it on a wireless basis to the central unit ZE. Depending on the configuration that is set, it is also possible to change target values or display information.

The internal temperature sensor measures the temperature with to an accuracy of 0.1 °C. As an option, you can also connect external sensors. In this case, the accuracy of the measurement depends on the sensor that you use, of course.

Power is supplied by two AA alkaline manganese batteries that you can access after removing the battery cover. The correct polarity is marked on the housing.

You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

If the batteries run down, this is indicated by a battery icon on the display. Apart from this, the system sends an appropriate message to the ZE central unit that also displays a battery icon in the status menu to indicate that you need to change the batteries.

Menu settings
Below, we will describe the menu items for the following configurations (for possible configurations, refer to 12.11 Commissioning the RF Room Unit):

CN03 - Only the target temperature can be seen.
CN09 - Same as CN03, additionally colour change. The colour of the display changes with the set target temperature from blue (low temperature) through green and yellow to red (high temperature).

If you do not press a key for 20 seconds, the system automatically switches off the lighting of the display. Pressing any key switches the lighting back on again.

Setting of the target temperature
The set target temperature is displayed together with the programming icon. Using the two keys on the right, you can change the target temperature. No further settings are possible.

If the system is currently heating, the heating icon is displayed at the far right. The heating icon is visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

Displaying other information
At times, the system displays other information referring to the operating mode of the ZE central unit, the mode of the RF room unit or the timers.

Update
When switching between the different settings in the RF room unit or the ZE central unit, the values in the RF room unit must be refreshed. This can take up to two minutes. To prevent incorrect operation in the meantime, the system blocks setting of the target temperature and also shows a flashing update display.

Mode
In modes Night and Off, the system additionally displays the associated Crescent Moon and X icons. Input of the target temperature is blocked.

Operating mode
If the ZE central unit is in Economy Mode or Frost Protection Mode/Off, the system displays the economy temperature or the frost temperature with a tick in front of it. Input of the target temperature is blocked.

Small timer
If the small timer is active and there is a set-back period, the system displays a clock icon and the set-back temperature. Input of the target temperature is blocked.

Outside a set-back period, the system does not display the clock icon. Input of the target temperature is not blocked.

Large timer
The clock icon is not displayed. Input of the target temperature is not blocked.

6.12.4 RF3 room unit (wireless, CN 11)

The wireless RF room unit measures the temperature in the room and sends it on a wireless basis to the central unit ZE. Depending on the configuration that is set, it is also possible to change target values or display information.

Power is supplied by two AA alkaline manganese batteries that you can access after removing the battery cover. The correct polarity is marked on the housing.

You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

If the batteries run down, this is indicated by a battery icon on the display. Apart from this, the system sends an appropriate message to the ZE central unit that also displays a battery icon in the status menu to indicate that you need to change the batteries.

Menu settings

Below, we will describe operation of the RF room unit for the CN11 configuration. For information on setting the configuration, refer to the commissioning instructions for the RF room unit.

Using the left-hand SET button with the small square, you can page through the following menu items:

1. Activate and set the target temperature
2. Activate night mode
3. Activate frost protection mode/OFF
4. Activate party mode
5. Display the current heating power

Using the two buttons on the right (UP and DOWN), you can set the values in the individual menus.

If you do not press a key for 20 seconds, the system automatically switches off the lighting of the display. Each time you press a key, the system only switches on the lighting without starting to page through the menu.

1. Activating and setting the target temperature (day temperature)

The set target temperature (day temperature) is displayed together with the programming icon. You can change the day temperature using the two right-hand buttons. In this setting, the room is controlled to the set day temperature.

The heating icon at the extreme right indicates that heating is currently being carried out. It is then visible in all the menus.

If the system is currently in cooling mode, this is shown by a snowflake icon at the far left. The snowflake icon is then visible in all the menus.

2. Activating night mode
The night temperature is displayed together with the moon icon. You can now change the night temperature in the ZE central unit. In this setting, the room is controlled to the set night temperature. After eight hours have elapsed, the system automatically leaves night mode and the first menu (day temperature) is reactivated.

3. Activating frost protection mode/OFF
In the heating function, the system displays the frost protection temperature of 5.0 °C together with the icon for „OFF“ (x). It is not possible to change the temperature. In this setting, the room is controlled to the frost protection temperature of 5.0 °C.

In the cooling function, the system displays „--.-“ together with the icon for „OFF“ (x). It is not possible to change the temperature. In this setting, the room is not cooled.

The snowflake icon at the far left shows that the system is in cooling mode. The snowflake icon is then visible in all the menus.

4. Activating party mode
The day temperature is displayed together with a „P“ (for „Party“) at the front. (You can change the day temperature in the first menu). In this setting, the room is controlled to the displayed day temperature. After eight hours have elapsed, the system automatically leaves party mode and the first menu (day temperature) is reactivated.

The result is that party mode deactivates the timer for eight hours.

5. Displaying the current heating power
The system displays the currently delivered heating power as a percentage of the maximum power(the ‚E‘ stands for ‚energy‘). This assumes that you have made the necessary settings in the ZE central unit and that the ZE is running in a suitable operating mode. If this is not the case, the system always displays 100 %.

Display with no wireless connection
If the wireless connection to the STZ fails for a relatively long time (e.g. due to the STZ being switched off), this is indicated as shown in the photo on the right.

6.12.5 RF3 room unit (wireless, CN 12)

Important: Configuration CN12 is designed **for collaboration with STZ1 or STV1 switching steps**, i.e. for single-room controls in which one room is controlled by one RF3 room unit and one or more STZ1s or STV1s. In systems **with a ZE central unit, the configuration does not function.**

The wireless RF room unit measures the temperature in the room and sends it on a wireless basis to the STZ/STV switching steps. Apart from this, it is possible to change target values and display information.

Power is supplied by two AA alkaline manganese batteries that you can access after removing the battery cover. The correct polarity is marked on the housing.

You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

If the batteries run down, this is indicated by a battery icon on the display.

Menu settings

Below, we will describe operation of the RF room unit for the CN12 configuration. For information on setting the configuration, refer to the commissioning instructions for the RF room unit.

Using the left-hand SET button with the small square, you can page through the following menu items:

1. Activate and set the target temperature
2. Activating night mode
3. Activate frost protection mode/OFF
4. Activating party mode
5. Displaying the current heating power
6. Activate and set the time
7. Activate and set the timer

Using the two buttons on the right (UP and DOWN), you can set the values in the individual menus.

If you do not press a key for 20 seconds, the system automatically switches off the lighting of the display. Each time you press a key, the system only switches on the lighting without starting to page through the menu.

1. Activating and setting the target temperature (day temperature)

The set target temperature (day temperature) is displayed together with the programming icon. You can change the day temperature using the two right-hand buttons. In this setting, the room is controlled to the set day temperature.

The heating icon at the extreme right indicates that heating is currently being carried out. It is then visible in all the menus.

2. Activating night mode
The night temperature is displayed together with the moon icon. The night temperature is permanently set to 18.0 °C. In this setting, the room is controlled to the night temperature. After eight hours have elapsed, the system automatically leaves night mode and the previously set first menu (day temperature) or seventh menu (timer) is reactivated.

3. Activating frost protection mode
In the cooling function, the system displays the frost protection temperature of 5.0 °C together with the icon for „OFF“ (x). It is not possible to change the temperature. In this setting, the room is controlled to the frost protection temperature of 5.0 °C.

4. Activating party mode
The day temperature is displayed together with a „P“ (for „Party“) at the front. (You can change the day temperature in the first menu). In this setting, the room is controlled to the displayed day temperature. After eight hours have elapsed, the system automatically leaves party mode and the previously set first menu (day temperature) or seventh menu (timer) is reactivated.

The result is that party mode deactivates the timer for eight hours.

5. Displaying the current heating power
The system displays the currently delivered heating power as a percentage of the maximum power(the ‚E' stands for ‚energy').

6. Activate and set the time
The time is displayed. You can set the clock as follows:

UP/DOWN button - Display of day of week (‚-1-' = Monday)
SET button - Day of week flashes; set using UP/DOWN button
SET button - Hour flashes; set using UP/DOWN button
SET button - Minute flashes; set using UP/DOWN button
SET button - Day of week again, press UP/DOWN button to go back to time

If you do not press a button for 20 seconds, the system automatically leaves the menu and returns to the previously set menu.

7. Activate and set the timer
The system displays the target temperature that the timer output together with the clock icon. The system is currently controlling the room to this temperature.

You can set the timer as follows:

UP/DOWN button - Displays switching points H-01 to H-14.

A hyphen between the letter H and the number means that the switching point is deactivated (e.g. H-05). If the hyphen is missing, the switching point is active (e.g. H 01).

SET button - Day of week flashes, use UP/DOWN button to set ‚---' = OFF, ‚1-7' = all days, ‚-1-' = Monday ‚---' = OFF

‚1-7' = all days

‚-1-' = Monday
‚-2-' = Tuesday
...

SET button - Time flashes use UP/DOWN button to set
(in 15-minute increments)

SET button - Target temperature flashes;
set using UP/DOWN button

SET button - Switching point again, press UP/DOWN button to go back to timer display

If you do not press a button for 20 seconds, the system automatically leaves the menu and returns to the timer display.

Display with no wireless connection
If the wireless connection to the STZ fails for a relatively long time (e.g. due to the STZ being switched off), this is indicated as shown in the photo on the right.

6.20 ST switching step

The ST switching step is fitted with four relays. You can connect one or more electric servomotors, which open and close the valves of the heating circuits, to each relay.

As an alternative, it is also possible to connect other electrical consumers like pumps, electrical heating elements, etc. You must not of course exceed the maximum connection values for the relays.

The ZE central unit controls the relays such that they switch the heating circuits on and off at the right time on a cyclical basis and in this way implement thermocyclical temperature control.

6.21 SK servomotor

The SK servomotor is mounted on the radiator valve and connected directly to the THZ bus. Due to its narrow shape, you can also mount it on heating circuit distributors.

It is not necessary to supply it with auxiliary power.

The SK servomotor opens or closes the valve in accordance with the operation commands that it receives from the ZE central unit. The ZE central unit transmits the operation commands such that the radiators' valves open and close at the right time on a cyclical basis and in this way implement thermocyclical temperature control.

Apart from this, the SK servomotor makes possible proportional opening of the valve so that other functions are possible, like hydraulic comparison, for example.

You can connect up to 30 SK servomotors to one ZE central unit.

If you press the button on the operator panel during operation, the set address flashes: green for the tens and yellow for the units (for example 2x green and 3x yellow means address 23). In this way, it is possible to determine the device address during operation on-site.

In the „open" position, the red LED also lights up for a few seconds.

6.22 Stellantrieb SF (Funk)

The wireless SF servomotor is mounted on the radiator valve. Due to its narrow shape, you can also mount it on heating circuit distributors.

The SF servomotor opens or closes the valve in accordance with the operation commands that it receives from the ZE central unit. The ZE central unit transmits the radio commands such that the radiators‘ valves open and close at the right time on a cyclical basis and in this way implement thermocyclical temperature control.

Apart from this, the SF servomotor makes possible proportional opening of the valve so that other functions are possible, like hydraulic comparison, for example.

You can connect up to 30 SF servomotors to one ZE central unit.

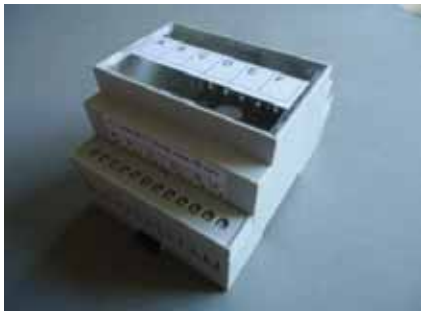
Power is supplied by two AA alkaline manganese batteries. If the batteries run down, this is indicated by brief flashing yellow lights. Apart from this, the system sends an appropriate message to the ZE central unit that displays a battery icon in the status menu to indicate that you need to change the batteries.

To change the batteries, use an appropriate screwdriver to open the battery cover. The correct polarity is marked in the battery compartment.

If you press the button on the operator panel during operation, the SF servomotor tries to establish a wireless connection to the ZE central unit. If this is successful, the LED briefly flashes green (if reception is very good), or yellow (if reception is only adequate.) After a brief pause, the set address flashes: green for the tens and yellow for the units (for example 2x green and 3x yellow means address 23). In this way, it is possible to test the wireless connection as well as the device address during operation on-site.

In the „open“ position, the red LED also lights up for a few seconds.

6.23 STE switching step



The STE switching step is for proportional control of electric heating systems. It is mounted in the switch box on a DIN rail. The input is connected to the THZ bus from where the current is supplied. The outputs drive solid state relays (SSRs) that then switch the electric heating circuits. Two SSRs can be connected to each of the six outputs (no more than eight SSRs in total).

The STE switching step switches the connected SSRs in accordance with the control commands that it receives from the central unit, ZE. The central unit, ZE transmits the control commands such that the heaters are turned on and off at the right time, which implements thermocyclic temperature control.

Apart from this, the STE switching step processes the optimum heating power that the central unit, ZE calculates. It generates a pulse pattern appropriate to the heating power and in this way implements proportional control of the SSRs.

Technical data:
18 V power supply (via the THZ bus), polarity is not important
Power consumption: 0.2 W – 1.7 W
6 outputs, 6 V, max. of 20 mA (for 2 SSRs in-parallel each)
Total max. output current of 80 mA
Outputs not galvanically separated
Pulse width modulation (frequency 1 s, 0 – 100 %)
Ambient temperature 0 – 50 °C
IP20 protection class
Housing ABS, grey
Dimensions 70 mm x 90 mm x 58 mm

6.24 Switching step STZ (wireless)

The STZ switching step, together with an RF room unit, implements single-room control for electric heaters with no other THZ components.

The output of an STZ switching step drives a solid state relay (SSR) that then switches an electric heating circuit. The temperature of the room in which the connected electric heater is located is measured by an RF room unit. It is also possible to set the temperature setpoint value there. The RF room unit sends the data on a wireless basis directly to the STZ switching step. From this, the STZ switching step calculates the correct time at which the heating must be switched on and off to implement thermocyclical temperature control.

Apart from this, the STZ switching step calculates optimum heating power and generates a corresponding pulse pattern that then correctly controls the SSR on a proportional basis.

The STZ switching step is particularly suitable for electric baseboard heaters: due to its flat shape, you can mount it directly in the baseboard heater.

Technical data:
Power supply 230 V (green POWER terminal)
Power consumption: 0.3 W – 0.9 W
1 output, 6 V, max. of 20 mA (for 2 SSRs in-parallel) (grey RELAY terminal)
Output not galvanically separated
Pulse width modulation (frequency 1 s/60 s, 0 – 100 %)
Power limitation 60 % - 100 %
Ambient temperature 0 – 50 °C
Housing polystyrene, black
Dimensions 70 mm x 90 mm x 58 mm

6.25 Switching step STV (wireless)

The STV switching step, together with an RF room unit, implements single-room control for infrared heaters in the low-voltage range with no other THZ components. It is intended to be mounted next to the transformer in the control cabinet.

The output of an STV switching step switches the primary side of a mains transformer whose secondary side is connected to the infrared heating element. The temperature of the room in which the connected heating element is located is measured by an RF room unit. It is also possible to set the temperature setpoint value there. The RF room unit sends the data on a wireless basis directly to the STV switching step. From this, the STV switching step calculates the correct time at which the heating must be switched on and off to implement thermocyclical temperature control.

Apart from this, the STV switching step calculates optimum heating power and generates a corresponding pulse pattern that then correctly controls the heating element on a proportional basis. Due to the integrated soft activation facility, the transformer is switched without the current surges that put a strain on the mains installation.

To ensure that the radiated heat does not go down to zero and create unpleasant cold spots even during switching pauses, the heating element is run at minimum power. This minimum power is determined in dependence on the calculated optimum heating power (see above).

Technical data:
Input for 230 V power supply
Input for temperature monitoring of the transformer
Output for transformer 230 V/max. 2000 W
Pulse width modulation (period 10 s, 0 – 100 %)
IP20 protection class
Max. ambient temperature 60 °C
Dimensions 170 mm x 66 mm x 40 mm

6.30 FE wireless receiver

The FE wireless receiver establishes the connection between the ZE central unit and all the radios in a THZ system. It is connected to the ZE central unit via the THZ bus, which supplies it with power. This means that you can mount it very close to the ZE if the wireless connection to the radios is good. On the other hand, it is possible to mount it further away at a location with better radio reception if this improves the quality of reception.

To improve reception even more, you can operate up to four FE wireless receivers on one ZE. This means that more than one wireless receiver receives the radios, which increases transmission reliability.

After restarting the system (e.g. by switching on the ZE central unit), an LED indicates that the FE wireless receiver is receiving from radios. Every time a wireless message is received, the LED flashes green (if reception is very good), or yellow (if reception is only adequate.) After three hours, this display function switches off automatically.

You use the FV wireless amplifier to increase the range of wireless connections between radios and FE wireless receivers.

The range of wireless connections in buildings is highly dependent on the positions of the rooms, the building materials used, the burden of computers and other electrical equipment. Under difficult building conditions, you can stabilize and optimize wireless connections by using FV wireless amplifiers. In a THZ system, you can use up to six FV wireless amplifiers.

You just plug the FV wireless amplifier into a convenient 230 V socket. It then integrates into the existing wireless network and automatically enhances any wireless connections that need this.

6.40 VR flow control

The flow control controls the boiler system including process water preparation. It can control two independent mixer circuits with circulatory pumps and one process water circuit.

The VR flow control controls the flow temperatures of the mixer circuits and the process water circuit to the target value that the ZE central unit transferred. If all the valves are closed, the circulatory pump is also switched off.
In this way, the system regulates the flow temperature in each heating circuit to the lowest possible value that is just enough for the current energy requirement. This makes it possible to save additional energy.

The flow control is optional. It can be connected but does not have to be. The THZ control functions with the same precision if no flow control is connected.

In relatively large installations, you can network up to nine ZE central units and control one common flow control (refer to the chapter entitled Networking).

The VR flow control has the following sensor inputs:

Actual temperature of boiler (boiler act)
Actual temperature of flow 1 (flow 1 act)
Actual temperature of flow 2 (flow 2 act)
Actual temperature of process water (process water act)

The VR flow control has the following switching inputs (relays):

ON/OFF (potential-free)
Mixer 1 open
Mixer 1 closed
Mixer 2 open
Mixer 2 closed
Circulatory pump 1 ON/OFF
Circulatory pump 2 ON/OFF
Process water pump ON/OFF

7 Other Components

A control system around a central unit ZE can optionally contain the additional system components listed below.

1. SD card for saving data

2. Modbus-USB converter for connecting the ZE central unit to a PC

3. Device server for connecting one or more ZE central units to a PC via a LAN/the Internet

These components are described in the sections below.

7.1 SD card

The ZE central unit has a card slot on the right-hand narrow side. Commercially available SD cards fit into the slot. You can also use the slightly thinner MMC cards. It is possible to save data from the ZE central unit on the card. You can also upload data from the card to the ZE central unit.

Insert a card in the slot with the contacts facing upwards then gently press it in until it latches in place. To take the card out again, gently press it until it unlatches and then pull it out.

The system writes all the ZE central unit data to the card's root directory and it is read out from there. Writing to folders and reading from them is not possible. However, the card can contain any other files and folders you like. They are not affected by the THZ data.

An SD card can contain three different types of THZ data in its root directory:

- one file containing operating data
- one file containing configuration data
- one file containing a software update

Recording operating data

A large amount of data that accrues during operation of a THZ system can be written to a log file on an ongoing basis. This includes, for example, all the temperature values of the controlled rooms, all the target temperatures, all the switching times, etc. It is possible to evaluate this data at a later date and it then shows a very precise profile of the conditions in the controlled rooms.

If you insert an SD card in the card slot, the ZE first searches for an existing log file. (The filename of a log file must be in 8.3 notation with the extension THZ. Otherwise, you can use any names you like.) If a log file is found, all the other data is appended to the end of this file.

If no file is present, the system creates a new one called LOGDAT00.THZ.. The ZE then goes for a few seconds to the Status 4: SD Card menu and displays the name of the existing log file that was found or the new one that was created. At the same time, the system writes 512 bytes of test data to test whether it is possible to write to the card correctly. On the bottom line, the system displays the size of the log file in bytes (i.e. with a newly created file, 512 bytes.)

The amount of data recorded can vary widely depending on the number and character of the rooms that are being controlled. In the case of large systems (30 rooms), up to 1 MB can accrue per day. However, since conventional SD cards can store at least 1 GB (1000 MB), it is possible even with large systems to record data for several years.

Saving and loading configuration data
It is possible to save all the settings of the ZE in a configuration file or to load them from there. For more detailed information, refer to 5. Menu of the ZE central unit - Status 4: SD Card.

Software update
Using an SD card, you can update the ZE software. For more detailed information, refer to 5. Menu of the ZE central unit - Status 4: SD Card.

7.2 Modbus-USB Converter

You can use a converter to connect one or more ZE central units to a PC; the converter converts the signals of the ZE‘s Modbus connection to the signals of a USB connection in the PC.

A PC can communicate with a ZE central unit by means of the PC-i Software Program. You can, however, use other programs if they support communication via a Modbus network.

7.3 Device server

If you want to connect several ZE central units to a LAN (Internet), it can be sensible to use a device server. The ZE central units are connected via their Modbus interfaces to the server‘s Modbus interface. The server converts the Modbus interfaces to the LAN‘s Ethernet/ TCP/IP interface.

8. PC-Software

In the chapters below, we will describe software components that make it easier to operate a THZ system or can support a THZ installation in other ways.

PC-i PC Interface
The PC-i PC program allows you to operate adn configure a ZE central unit using a PC.

8.1 PC-i PC interface

Using the PC-i software program, you manage up to nine ZE central units. All the data of a ZE can be transferred to the PC and is then available there for processing. In this way, it is possible to make all the settings on the PC and then transfer them to the ZE.

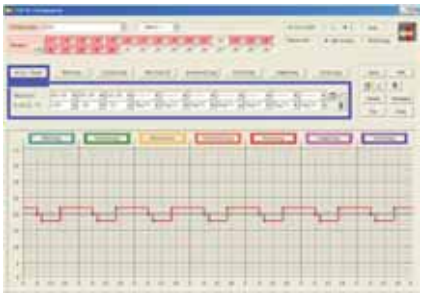
PC-i allows you to access the data of a ZE central unit in several Views that are easy to operate on an intuitive basis:

Status and room
The system displays in a relatively small window only the status messages of the selected ZE. In addition, you have the option of viewing and changing the data of individual rooms. This is intended as a status monitor to allow you to observe disturbances and make small settings.

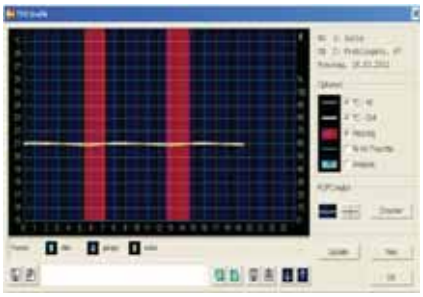
All data
Access to all the data is made possible in a large window. This view is particularly beneficial for configuring a system.

Rooms – heating data/cooling data
The system displays in a table all the rooms with their designations and all the room-specific data. Here, you can make changes to target values in a particularly clear way.

Timers
Each of the 30 possible timers is shown in its own window. The system immediately visualizes the switching times you enter in a graphic overview (timetable). This make it easier to have a clear view of even complex switching patterns.



Graphics
The system displays in a graphic the temperature profile of each rooms, its heating times and some other data. This makes it possible to estimate the energy consumption of a room during operation. You can print out the graphics or export them to an Excel file.



Registers
Finally, you can directly edit the registers of a ZE central unit. This view is only suitable for very experienced users.

There is a detailed description of operating the PC-i software program in the separate PC-i Help document.

9.6. Hydraulic balancing

1. Principle of hydraulic balancing

The heating water flows through the heating system on the principle of least resistance. With systems that have not been balanced, this path leads through the radiator that is closest to the circulatory pump. Radiators that are further away are not supplied adequately. To remedy this, a more powerful pump is frequently installed and the flow temperature is increased. This results in higher energy consumption, flow noise in the heating system, overheated rooms and a system that is difficult to control. Hydronic balancing with similar conditions that are generated for all radiators is the only way to solve these problems with optimum use of energy. According to VOB/C – DIN 18380, each heating system must be balanced on a hydraulic basis.

However, in practice, people often do not carry out a hydraulic balancing at all or only badly, since it is difficult. A large number of parameters must be determined for each room. Then, a pipeline network must be made to determine the setting values of all the control fittings. Finally, suitable fittings must be installed and set. In old buildings, it is only possible to obtain the necessary data by carrying out elaborate measurements on the existing heating system.

Automatic balancing avoids the disadvantages mentioned above without needing painstaking determination of data, calculations and settings.

In theory, hydraulic balancing is achieved when all the heat transfer devices (i.e. with one warm water heating system, all the radiators in one heating circuit) each demonstrate the same hydraulic resistance for the heating medium. However, this would only be practical if the conditions stayed the same; in particular, radiators must not be closed. This means that in practice, hydraulic balancing is carried out for the critical condition, i.e. at the maximum heating load at which there is free flow through all the radiators.

If all the radiators are the same, hydraulic balancing ensures that each of the radiators of a heating circuit is supplied with the same amount of energy. Because the energy that is transported to the radiator is proportional to the temperature of the heating medium and to the volume flow.

In practice, however, it is very rare for all the radiators to be the same, since people choose them on the basis of aesthetic criteria and due to structural conditions. Apart from this, the type and/or number of radiators must be matched to the room to be heated and to its situation. A large north-facing room will need more or larger radiators than a small south-facing one. It is only possible to have the same thermal conditions in a room with the same amount of energy used if you choose the number and type of radiators to exactly match the heat requirement of room. Because the output of the energy supplied to the room and, with this, the room temperature that can be achieved are crucially dependent on local conditions in the room (heat capacity, heat losses, heat gains). A well-insulated room will need considerably less energy to achieve the same room temperature than a badly insulated one.

These factors must be taken into account as much as possible when rating the radiators for a room. Since radiators are mass-produced products, that cannot be tailored precisely for any individual room, it is only possible to set the same thermal conditions in different rooms on a very approximate basis. This means that it is not ideal to balance all the radiators to exactly the same volume flow. It is more correct to set the volume flows such that each room gets exactly the amount of energy that it needs to achieve the same temperature as the other rooms (r.g. 20 °C) and to maintain this temperature. This means that the energy supplied must be dependent on the heat requirement of the room. Below, we will refer to it as the „specific energy supply“. To carry out hydraulic balancing on an optimum basis, you set the volume flows such that the specific energy supply is as far as possible the same for each room.

The thermocyclical control process (referred to below as the THZ process) guarantees that this conditions is met automatically for all the rooms.

2. Automatic balancing with thermocycle

Using the THZ process, you can determine for each room what minimum difference between the target temperature and the heating medium temperature is necessary to maintain the room at the target temperature. On the one hand, you use this information to determine the minimum flow temperature of the heating circuit to which the evaluated rooms are connected. You can also use the information that you gain in this way to determine the volume flow of the heating medium that each room needs in relation to the other rooms for a specific equal amount of energy supplied.

This is illustrated by the following considerations: The THZ process completely switches the radiator of a room either off or on and in this way generates the desired micro oscillations. Following this, very specific oscillation patterns will result that are characteristic of this room. It is possible to derive a measure of the energy requirement of the room from these oscillation patterns. This means that the THZ process provides a performance figure that is proportional to the supplied energy.

If you consider all the performance figures of a heating circuit in relation to each other, it is possible to determine which radiators are supplied with more or less energy relative to the other radiators. This means that the radiator with the slowest oscillation pattern is obviously supplied with the smallest amount of energy. Because it needs a relatively longer time than the other radiators to heat the assigned room. Since the supplied energy is not just proportional to the heating medium temperature but also to the volume flow, it also shows that it demonstrates the lowest volume flow.

Conversely, the radiator with the fastest oscillation pattern is obviously supplied with the largest amount of energy. Because it manages to maintain its temperature in a relatively shorter time. The conclusion is that it demonstrates the greatest volume flow. It is possible to classify all the other radiators between these extremes in accordance with their performance figures.

To carry hydraulic balancing on an optimum basis, you will not now limit the radiators with the greatest volume flow; rather, you will restrict the volume flow of all the other radiators in accordance with their performance figures. (The supply of heat to the coldest room is adapted by regulating the flow temperature, since a reduction here is beneficial to the entire system.)

Within the scope of the THZ process, not special fittings are needed to carry out this type of restricting; rather, it is carried out by not opening the radiator valves completely but by opening them on a restricted basis.

For THZ control, you only really need simple thermo-electrical servomotors on the radiator valves that only have two settings (open/closed). If you use proportional servomotors instead, the THZ system can only use the determined performance figures to drive the servomotors to the extent that matches the desired restriction. In each room, the servomotor only runs „closed“ or „restricted open“. In this case, you do not need special throttling valves.

Of course the THZ system checks and adjusts on an ongoing basis the hydraulic balancing that you carry out in this way; this corresponds to the dynamic character of the THZ process.

Menu settings
Hydraulic balancing is only carried out with Heating or Cooling. With Tempering, hydraulic balancing is off.

Hydraulic balancing is carried out separately for heating circuits 1 and 2. In Commissioning - Assign room unit, you set the room unit that belongs to a particular heating circuit (flow). This setting also applies to hydraulic balancing. If you set Per room there, hydraulic balancing is not carried out for this room.

The setting in Commissioning - Assign room unit - VR: Yes/No does not affect hydraulic balancing. It cannot be excluded that a room is to be included in calculation of the flow temperature but not in hydraulic balancing.

The setting in Commissioning - Room unit ON/OFF is taken into account. A room unit that is set to OFF, is also ignored in hydraulic balancing.

The settings in Commissioning - Hydr. balancing are as follows:

RG x: ON/OFF/+VR - This switches hydraulic balancing for a specific room unit ON or OFF.

The original value is OFF. The setting applies to both heating and cooling. Important: If you set a room unit to OFF, the affected valve opening is set to 100 %, i.e. hydraulic balancing for this channel is deleted. (If you want to carry out hydraulic balancing in a room at heating but not at cooling, Commissioning - Room unit ON must be set to OFF for cooling.)

The value ON is used to activate hydraulic balancing for this room. This happens regardless of all the other rooms; the system does not search for a coldest room. The coldest room may be restricted too. This is beneficial if it is not possible to affect the flow temperature, since it then not sensible to align all the rooms to this, the coldest, room.

Using the +VR value, you align hydraulic balancing to a coldest room. This assumes that it is possible to adjust the heat supply to the coldest room by regulating the flow temperature.

V1 min: xx% / V2 min: xx% - A minimum valve opening is specified for each heating circuit separately. This applies to both heating and cooling. The original value is 30 %.

It is not possible to switch hydraulic balancing ON and OFF as a whole. If you do not want to carry out any hydraulic balancing at all, you must set all the room units to OFF.

9.10. Target temperature

The thermocyclical controller controls the actual temperature of a room to the value that the target temperature requests. The user mainly specifies the target temperature. There are, however, a few other sources that can affect the target temperature. This makes it important to bring all these sources in the correct order and to take into account mutual dependencies.

A. Sources for the target temperature

The following settings affect the target temperature of a room (referred to from now on as ‚TS'):

1. The TS specified by the humidity control
2. The Day / Night / Frost / Party RG mode set on the room unit or in the ZE menu.
3. The Normal / Economy / Frost ZE mode set in the ZE menu.
4. Small timer
5. Large timer
6. The TS (manual TS) set on the room unit or in the ZE menu.

B. Priorities

The actual, significant target temperature (‚current' target temperature) is the result of a process of consideration in which the stated sources are considered in the order below.

1. Humidity control

If humidity control is active for a room, the TS is determined by the value set in the humidity menu. Other sources are not used. Humidity control is active if it is switched on for this room and the humidity threshold value has been exceeded. If the value has not been exceeded or humidity control is not switched on, the TS is determined by other sources.

Display in ZE menu room units

„Humidity" flashes as a warning. The system does not output other warning messages. The other settings in the menu are not blocked either.

Display in the room unit

No display

Important: Humidity control is only active at heating. If room units without humidity sensors are connected, the system does not detect them with humidity control active.

2. RG mode

RG mode Night / Frost / Party always prevails when no humidity control is active. The other sources are only taken into account in Day RG mode. Night / Frost / Party overwrites Economy / Frost mode, as well as a TS from the timers or a manual TS. This means that depending on the set RG mode, the night temperature or the frost protection temperature or the manual TS (in the case of Party) is significant.

Display in ZE menu room units

The TS that results is displayed immediately.

In Night / Frost / Party mode, input of the TS is blocked.

In Day mode, the operating mode and the timers must be taken into account. The display is as follows:

In Economy / Frost operating mode:
Economy temperature or frost temperature, TS blocked, Economy / Frost warning flashes
With small timer in set-back period: Set-back temperature of timer, TS blocked, timer warning flashes

With a small timer outside a set-back period: manual TS, TS not blocked

In the case of a large timer with a programmed absolute TS: absolute TS, TS not blocked, timer warning flashes

In the case of a large timer with a programmed TS
Day°C: manual TS, TS not blocked

Display in the room unit

In Day / Night / Party modes, initially, display of an update

period: Instead of TS, the system displays ‚--.-' flashing for two minutes, input of TS is blocked.

In Night mode, moon icon; in Frost mode, X icon; in Party mode, letter ‚P'

In Economy / Frost operating mode. 1st place „-," and economy or frost temperature, TS blocked

With small timer in set-back period: Clock icon and set-back temperature, TS blocked

With a small timer outside a set-back period: manual TS, TS not blocked

In the case of a large timer with a programmed absolute TS: absolute TS, TS not blocked

In the case of a large timer with a programmed TS Day°C: manual TS, TS not blocked

3. ZE mode
ZE modes Economy / Frost prevail next. Other sources are only considered in Normal ZE mode.

Display in ZE menu room units
Each time the ZE mode switches over, ZE menu room units is blocked for one minute to make possible a complete update of the TS.

Economy / Frost mode: Economy / frost temperature, TS blocked, Economy / Frost warning flashes

Display in the room unit
Economy / Frost mode: 1st place „-," and economy / frost temperature, TS blocked

4. Small timer
The small timer in the set-back period prevails next. The other sources are only taken into account when the timer is inactive, or does not set back.

Display in ZE menu room units
With small timer in set-back period: Set-back temperature, TS blocked, timer warning flashes

With a small timer outside a set-back period: manual TS, TS not blocked

Display in the room unit
With small timer in set-back period: Set-back temperature, TS blocked, clock icon

With a small timer outside a set-back period: manual TS, TS not blocked

5. Large timer
The large timer with absolute temperature prevails next; however, only in the current switching instant (by contrast with the small timer). The other sources are only taken into account when the large timer is off or the temperature set in the timer is not absolute (i.e. in the Day °C setting) or the switching instant is already past. This means that with an active large timer, the system displays the determined absolute TS but setting of the TS is not blocked. However, a manual change to the absolute TS only has an effect until the next switching instant. If you want to permanently change the Day°C TS (manual TS), the large timer must be switched off.

Display in ZE menu room units
In the case of a large timer with a programmed absolute TS: absolute TS, TS not blocked, timer warning flashes

In the case of a large timer with a programmed TS Day°C: manual TS, TS not blocked

Display in the room unit
In the case of a large timer with a programmed absolute TS: absolute TS, TS not blocked

In the case of a large timer with a programmed TS Day°C: manual TS, TS not blocked

6. Manuelle TS
Finally, manual setting of the TS prevails. It is only possible after the settings above, i.e. only in the following cases:

Day ZE mode and Day RG mode and timers OFF

Day ZE mode and Day RG mode and small timer outside a set-back period.

Day ZE mode and Day RG mode and large timer ON

Note that in the case of the large timer with absolute temperature it is not the manual TS that is changed; rather, only the current TS up to the next switching point. In the other cases, the manual TS is changed permanently.

9.12. Tempering

In addition to heating or cooling, you can also choose the tempering function in the ZE central unit. Then, the THZ control tries to exactly comply with the target temperature by active heating and cooling. The function works for each room independently of all the other rooms. A room can be cooled at one instant while another one is being heated at the same instant. This is conditional on separate circuits being available for heating and cooling that can be switched independently. Then the THZ control automatically switches between heating and cooling and switches the corresponding radiator or cooling element of each room on or off.

Menu settings

Normal display
In addition to Heating or Cooling, the system also displays Tempering.

Heating / cooling settings
Switching between heating and cooling is only allowed if Heating = ON and Cooling = ON is set at heating / cooling commissioning. In other cases (heating only = ON or cooling only = ON or tempering = ON), switching over is blocked.

Large timer – priority
The same clocks apply to heating and tempering. (In PC-i, heating is renamed heating / tempering.)

Large timer and small timer – tempering
There is one new tempering menu each with two settings. Limit + (5 - 40 °C) and limit – (5 - 40 °C). 15 and 25 °C are original values.

Commissioning – heating / cooling
There is an additional alternative, i.e. Tempering = ON.

Commissioning – switching relay
There is an additional setting for each relay with the Heating only / cooling only / always alternatives. The original value is always.

Implicit settings / function
Changing the target value manually always yields real tempering with automatic switchover of heating and cooling regardless of the limit values (limit+ and limit-) of the timers.

Operating mode
Tempering - normal real tempering with automatic switchover of heating and cooling.

Tempering - economy switches heating mode on, blocks switchover to cooling and sets Ttarg to the economy value.

Tempering - frost switches heating mode on, blocks switchover to cooling and sets Ttarg to frost protection.

RG mode
Day yields real tempering.

Night switches heating mode on, blocks switchover to cooling and sets Ttarg to the night value.

Frost switches heating mode on, blocks switchover to cooling and sets Ttarg to frost protection.

Party yields real tempering.

Large timer
A timer is taken into consideration if it is set for heating. Timers for cooling are not evaluated at tempering.

If a switching point sets Ttarg to a value < = limit+ and > = limit-, then heating / cooling automatic switchover is activated (= real tempering is active).

If a switching point sets Ttarg to an absolute value > limit+, the system switches to cooling and automatic switchover is blocked. The system then only prevents Tact rising above Ttarg (by cooling). However, the system does not carry out active heating to Ttarg. If, on the other

hand, Ttarg is set to the RG‘s manual target value, the system carries out real tempering as if the target value had been set manually (see above).

If a switching point sets Ttarg to an absolute value > limit-, the system switches to heating and automatic switchover is blocked. This means that the system only prevents Tact falling below Ttarg (by heating). However, the system does not carry out active cooling to Ttarg. If, on the other hand, Ttarg is set to the RG‘s manual target value, the system carries out real tempering as if the target value had been set manually (see above).

Small timer
The small timer automatically applies to heating / tempering or cooling depending on the function that is active. However, with heating / cooling, it is not possible to enter a positive „lowering“. This is only possible with cooling only This means that with tempering, the small timer can only be used on a limited basis. Otherwise, it behaves at tempering like the large timer.

RG ON / OFF
Heating: ON also applies to tempering.
Cooling: ON applies only to cooling.

RG min. / max.
The value for heating also applies to tempering.
The value for cooling applies only to cooling.

Flow temperature
In principle, the flow temperature should be split into the heating flow temperature and the cooling flow temperature. Initially the procedure is as follows: the heating power is determined at heating only and cooling only and at tempering in the heating phase. It is not determined at tempering in the cooling phase. This means that there is only one flow temperature for the heating section at tempering.

Mould avoidance
Mould avoidance raises Ttarg if the humidity limit value is exceeded. This functions with heating and cooling. The same is true at tempering where at most the system switches over from cooling to the heating phase and actively aims for the raised Ttarg by heating.

Humidity control
The humidity control raises or lowers Ttarg to keep humidity constant. This also functions at tempering in both phases (heating and cooling).

Dew point avoidance
Dew point avoidance raises the flow temperature of the coolant. This means that it only has an effect at cooling. Since no flow temperature is calculated for cooling at tempering (see above), raising cannot take place. This means that at tempering, dew point monitoring is not possible.

10.1 Mounting the ZE central unit

You can fasten the ZE central unit anywhere you like on the wall. However, you should not mount it anywhere near strong electromagnetic fields (e.g. pumps, speed controllers, electric motors). Important: The ZE is not suitable for mounting in the control cabinet!

Since the ZE has an integrated room sensor, you can also mount it on a room wall to replace a room unit. In this case, the same regulations apply to the place you mount it as to RG/RS room units (see there).

You must open the ZE for wall mounting and connecting the wiring. To do this, lay the ZE flat on a firm base and release one after the other the inner locking hooks on the two bottom corners of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening close to one of the corners and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. Now repeat this procedure on the other corner. After this, both locking hooks are free and you can pull out the top part together with the electronics PCB upwards/backwards. First put the top part carefully on one side.

Route the connections for the power supply and the bus inwards through the middle opening in the bottom part. As an alternative, it is possible to supply power from outside via the socket on the bottom of the ZE.

Now you can screw the bottom part tight to the wall. The holes for the screws match most flush mounting sockets in common use. Important: If you use the bottom hole, do not drive the screw too tight; otherwise, the housing may warp!

Now pull off the orange bus terminal and the green power terminal off the electronics PCB.

Important: While mounting the connecting wires, they must be deenergized, i.e. the mains unit must not be connected to the mains or the ZE. Mounting the ZE while it is live does not damage it as such. However, during mounting there is a risk of loose connecting wires accidentally touching other parts of the electronics, which can lead to damage occurring!

Connect the bus cable to the orange terminal. The polarity is not important.

If necessary, also connect the power supply cable to the green power terminal. Here, you must observe the correct polarity! The correct polarity is marked on the electronics PCB (+ / GND). If the polarity is reversed, this does not damage the ZE; it just does not start up.

Plug the orange bus terminal and the green power terminal in the sockets of the same colours. If you mix up the two terminals, the ZE starts up, but after a few seconds it issues the message „Power / Bus inverted“. It is not damaged but does not function.

To close the ZE, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hooks snap into place if you press the corresponding point from the top right and left.

10.10 Mounting the RG room unit

The RG room unit is intended for wall mounting. The rules below apply to the set-up location:

- no direct sunlight
- not close to sources of heat
- not under lights
- not close to windows
- not in a draught
- if possible on an inside wall
- as close as possible to the location at which people generally stay – at shoulder height approximately

It is often not possible to meet all the requirements at the same time. In this case, you should try to achieve a reasonable compromise.

You must open the RG room unit for wall mounting and connecting the bus wiring. To do this, lay the RG flat on a firm base and release the inner locking hook on the bottom of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening in the middle and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. After this, you can pull out the top part together with the electronics PCB upwards/ backwards. First put the top part carefully on one side.

Route the connecting wires for the THZ bus inwards through the middle opening in the bottom part. After this, screw the bottom part firmly to the wall. The holes for the screws match most flush mounting sockets in common use. Important: If you use the bottom hole, do not drive the screw too tight; otherwise, the housing may warp!

Important: While mounting the connecting wires for the THZ bus, they must be deenergized, i.e. the THZ bus must not be connected to the ZE central unit or the ZE central unit‘s mains unit must not be connected to the mains. Mounting the RG room unit while it is live does not damage it as such. However, during mounting there is a risk of loose connecting wires accidentally touching

other parts of the electronics, which can lead to damage occurring!

Now connect the connecting wires for the THZ bus to the orange terminal. The polarity is not important.

If you are using an external sensor or a switch, connect its connecting wires to the grey/black terminal. Here too, the polarity is not important.

To close the RG room unit, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hook snap into place if you press the corresponding point from the top centre.

Technical data
18V power supply (via the THZ bus), polarity is not important
Power consumption 0.1 W
Sensor resistor internal/external NTC 10 k
Max. cable length to external sensor 20 m (copper cable 0.5 mm²)
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 59 mm x 24 mm
Dimensions 81 mm x 81 mm x 27 mm

See also in 10.90 Dimension sheets.

10.11 Mounting the RS room unit

The RS room unit is intended for wall mounting. The rules below apply to the set-up location:

- no direct sunlight
- not close to sources of heat
- not under lights
- not close to windows
- not in a draught
- if possible on an inside wall
- as close as possible to the location at which people generally stay – at shoulder height approximately

It is often not possible to meet all the requirements at the same time. In this case, you should try to achieve a reasonable compromise.

You must open the RS room unit for wall mounting and connecting the bus wiring. To do this, lay the RS flat on a firm base and release the inner locking hook on the bottom of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening in the middle and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. After this, you can pull out the top part together with the electronics PCB upwards/ backwards. First put the top part carefully on one side.

Route the connecting wires for the THZ bus inwards through the middle opening in the bottom part. After this, screw the bottom part firmly to the wall. The holes for the screws match most flush mounting sockets in common use. Important: If you use the bottom hole, do not drive the screw too tight; otherwise, the housing may warp!

Important: While mounting the connecting wires for the THZ bus, they must be deenergized, i.e. the THZ bus must not be connected to the ZE central unit or the ZE central unit‘s mains unit must not be connected to the mains. Mounting the RS room unit while it is live does not damage it as such. However, during mounting there is a risk of loose connecting wires accidentally touching

other parts of the electronics, which can lead to damage occurring!

Now connect the connecting wires for the THZ bus to the orange terminal. The polarity is not important.

If you are using an external sensor or a switch, connect its connecting wires to the grey/black terminal. Here too, the polarity is not important.

Setting the device address
It is advisable to set the device address now while the RS room unit is open. If you do not set the device address until commissioning, you must open the device again to do this.

You set the device address using the blue rotary switch and the blue DIP switch. The rotary switch sets the units from 0 to 9 and the DIP switch sets the tens as follows:
- DIP 1 and DIP 2 = OFF-> 0
- DIP 1 = ON -> 10

- DIP 2 = ON -> 20
- DIP 1 and DIP 2 = ON -> 30

In the photo on the right, for example, the address 26 is set.

To close the RS room unit, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hook snap into place if you press the corresponding point from the top centre.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.1 W (RS-FF 0.13 W)
Sensor resistor internal/external NTC 10 k
Max. cable length to external sensor 20 m (copper cable 0.5 mm²)
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Dimensions 81 mm x 81 mm x 27 mm

See also in 10.90 Dimension sheets.

10.12 Mounting the RF room unit

You can mount the RF room unit on an even surface or on the wall. The rules below apply to the set-up location:

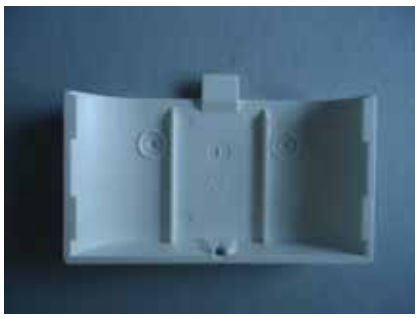
- no direct sunlight
- not close to sources of heat
- not under lights
- not close to windows
- not in a draught
- when mounting on a wall, if possible on an inside wall
- as close as possible to the location at which people generally stay – at shoulder height approximately

It is often not possible to meet all the requirements at the same time. In this case, you should try to achieve a reasonable compromise.

The battery cover is used for wall mounting: it can be fastened to the wall with two screws. You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open. Then you can lift it.

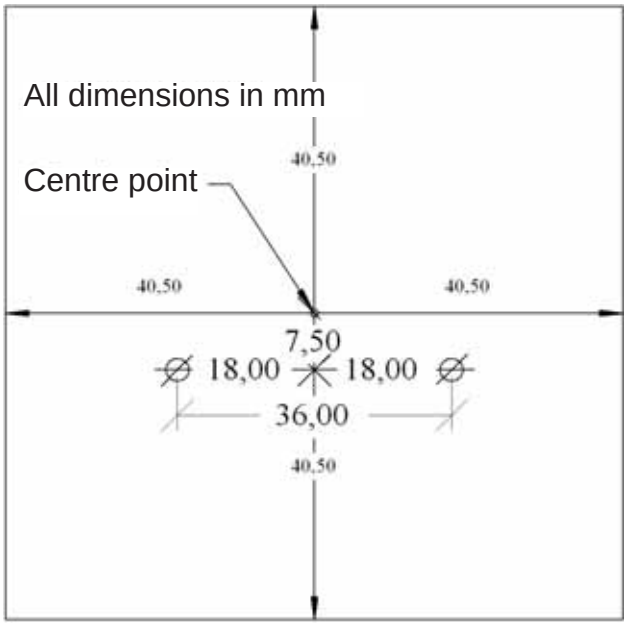
Now set two pointed screws on the two small indentations on the left and right of the battery cover and screw the cover tight to the wall. You may first have to drill holes in the battery cover and the wall. The gap between the two holes is 36 mm. For more details refer to the dimension drawing below.

You can now slide the RF room unit from the top along the wall and push it onto the battery cover.



Technical data
Power supply 3 V (2x AA alkaline manganese batteries, min. 2600 mAh)
Power consumption < 0.0003 W
Sensor resistor internal NTC 10 k
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 59 mm x 24 mm
Dimensions 81 mm x 81 mm x 39 mm

See also in 10.90 Dimension sheets.



10.20 Mounting the ST switching step

Mounting the ST switching step includes the following steps:

- opening the housing
- fastening
- bus wiring
- wiring the servomotors
- setting the device address
- closing the housing and labelling it

Opening the housing
To carry out mounting and wiring, you must open the switching step. To do this, use a small screwdriver to lever upwards the four dust caps on the corners of the housing and then unscrew the screws on the corners.

Fastening
Now you can mount the ST switching step on the wall or any other level surface. To fasten the switching step, you use two screws through the drilled holes in its back panel; see the drawing at the end of the chapter.

Bus wiring
You make the connection to the THZ bus using the orange terminal on the electronics side of the PCB. You route the two bus lines through the drilled holes in the housing and then screw them tight in the terminals. The polarity is not important.

Important: There are two drilled holes in the housing for bus wiring which means that with series wiring there is also space for an outgoing bus cable. However, if you still need to drill another opening or extend the existing one, you must proceed with extreme caution to ensure that you do not damage the PCB. Conventional twist drills pull themselves into the plastic of the housing and out the back which means that there is virtually no way to avoid the PCB being damaged. This means that if you carry out drilling work on the housing, you must first remove the PCB or secure it with a fixed stop block!

Wiring the servomotors
The ST switching step is fitted with four relays designated from top to bottom as A, B, C, D (on the right-hand edge of the PCB outside the terminals). You can connect one or more electric servomotors, which open and close the valves of the heating circuits, to each relay. As an alternative, it is possible to connect other electrical consumers like pumps, electrical heating elements, etc. You must not of course exceed the maximum connection values for the relays (230 V, 8 A).

The power supply for the servomotors is connected to the top two terminals that are designated in the hatched field on the PCB as L for conductor and N for neutral. In the photo, two wires of a 4 x 1.5 mm² conductor are connected. This is the maximum cross-section that you can use. In most cases, it should however be over-dimensioned.

You connect the conductors of the consumers to the terminals for the individual relays. The connections for the four relays are designated A, B, C, D with a ~ symbol for the phase and an N for neutral. In the photo, the cable of a thermoelectric servomotor is connected. If necessary, you can implement tension relief with a cable tie as shown in the photo.

Important: The terminals are anti-slip terminals. Please ensure that the wire is inserted via the elevator and is clamped correctly.

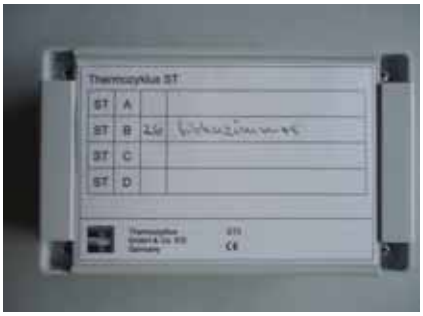
Important: Five drilled holes are provided in the housing for wiring. If you need to drill other openings or extend the existing ones, you must proceed with extreme caution to ensure that you do not damage the PCB. Conventional twist drills pull themselves into the plastic of the housing and out the back which means that there is virtually no way to avoid the PCB being damaged. This means that if you carry out drilling work on the housing, you must first remove the PCB or secure it with a fixed stop block!

Setting the device address
It is advisable to set the device address now while the ST switching step is open. If you do not set the device address until commissioning, you must open the device again to do this.

You set the device address for each individual relay using the blue rotary switch and the blue DIP switch to the left next to the relay. The rotary switch sets the units from 0 to 9 and the DIP switch sets the tens as follows:
- DIP 1 and DIP 2 = OFF-> 0
- DIP 1 = ON -> 10
- DIP 2 = ON -> 20
- DIP 1 and DIP 2 = ON -> 30

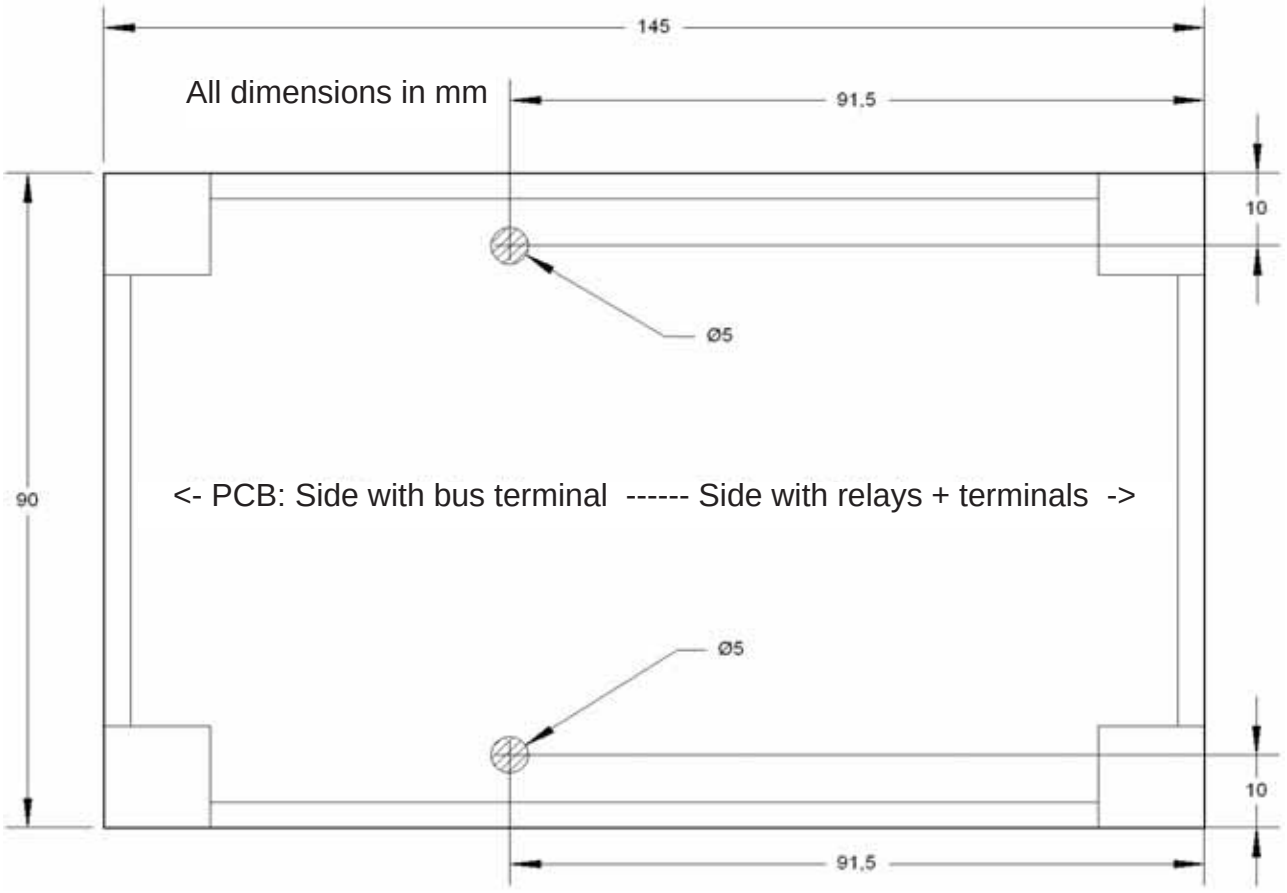
In the photo on the right, for example, relay B has the address 26 set.

Closing the housing and labelling it
To close the housing, put the lid on and tighten the four screws in the corners. When doing this, ensure that the lid is in the correct position such that the designations of the relays on the lid correspond with their actual positions on the PCB. If there are dust caps present and you want to insert them, do this.



In the fields on the lid, make a note of the set device address and the designation of the room or zone whose valve drives are connected.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption: All relays OFF 0.15 W/all relays ON 0.5 W
4 relays, 1x ON in each case, max. 8 A, on common phase
Bus terminal max. 1.0 mm²
Relay terminals max. 1.5 mm²
Ambient temperature 0 – 50 °C
IP20 protection class
Housing ABS, grey
Lid screws M3 x 15
Dimensions 145 mm x 90 mm x 45 mm


145
All dimensions in mm
91,5
10
Ø5
90
<- PCB: Side with bus terminal ------ Side with relays + terminals ->
Ø5
10
91,5

10.21 Mounting the SK servomotor

The SK servomotor is mounted on the radiator valve and connected directly to the THZ bus. Due to its narrow shape, you can also mount it on heating circuit distributors.

Power is supplied via the THZ bus. It is not necessary to supply it with auxiliary power.

You can connect up to 30 SK servomotors to one ZE central unit.

At mounting, please proceed as follows:
1. Check whether the servomotor is in the „open“ position. (The plunger must be retracted into the housing). This is very important. If you mount the servomotor in the „closed“ position, the plunger can jam such that the motor can no longer move it. In this case the servomotor does not function.

Ex-works, the servomotor is supplied in the „open“ position. When the servomotor is connected to an active THZ bus and supplied with power from there, it is also possible to manually retract the plunger to the „open“ position by pressing the button for more than five seconds and then keeping it pressed for some time. (Sometimes it may be necessary to press the button twice.) After you press the button, the plunger runs optionally to the end stop in one direction or the other. If no active THZ bus is available, the servomotor can be connected to a DC 12 V and 18 V supply to provide power. The polarity is not important.

2. Using the union nut, screw the servomotor onto the valve and hand-tighten the nut. If necessary, fix the union nut on the valve thread with two M4 grub screws. Overhead mounting is only allowed if it can be ruled out that water can get into the valve drive if there is a leak in the valve.

3. Connect the servomotor to the THZ bus with its cable. The polarity is not important. For this, the bus should be deenergized (ZE central unit switched off).

4. If the servomotor does not completely close the valve, a plunger extension can be installed (SF/SK 1 mm adapter). To do this, screw the servomotor off the valve and push on the extension cap preferably using a small pair of pliers. For this, the plunger has a small cam on the top side on which the cap is seated fairly tightly. Please ensure that you push the cap all the way on.

The cap extends the plunger by 1 mm. If you only need a 0.5 mm extension, you can install a spacer ring at the same time. If you install a spacer ring and a plunger extension at the same time, this yields an effective extension of the plunger of 0.5 mm.

5. If the servomotor does not completely open the valve, you can increase the distance between plunger and the valve pin by means of a spacer ring (0.5 mm SF/SK spacer ring). To do this, screw the valve drive from the valve and insert the spacer ring in the union nut. You can use several spacer rings. Each spacer ring increases the distance by 0.5 mm.

This concludes mounting.

Visualizing the device address
If you press the button on the valve drive‘s operator panel during operation, the set address flashes: green for the tens and yellow for the units (for example 2x green and 3x yellow means address 23). In this way, it is possible to determine the device address during operation on-site.

Visualizing the valve position
In the „open“ position, the red LED lights up for 60 seconds each time you press a button.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption at rest 0.05 W, maximum of 0.5 W
Actuating time max. 50 seconds
Actuating force 100 N
Ambient temperature 0 – 50 °C
Protection class IP54 (IP50 if mounted overhead)
Cable 2 x 0.75 mm², length 1 m
Stroke 3 mm, position can be shifted with adapter
Thread for connecting valve M30 x 1.5
Grub screws for connecting valve M40 x 5
Housing PC/ABS, white RAL 9010
Dimensions 89 mm x 55 mm x 48 mm

10.22 Mounting the SF servomotor (wireless)

The wireless SF servomotor is mounted on the radiator valve. Due to its narrow shape, you can also mount it on heating circuit distributors.

You can connect up to 30 SF servomotors to one ZE central unit.

At mounting. please proceed as follows:
1. Insert the batteries. To do this, use an appropriate screwdriver to open the battery cover. The correct polarity is marked in the battery compartment. For maximum battery life, use only AA alkaline manganese batteries with at least 2600 mAh.

2. Check whether the servomotor is in the „open“ position. (The plunger must be retracted into the housing). This is very important. If you mount the servomotor in the „closed“ position, the plunger can jam such that the motor can no longer move it. In this case the servomotor does not function.

Ex-works, the servomotor is supplied in the „open“ position. You can manually retract the plunger to the „open“ position by pressing the button for more than five seconds and then keeping it pressed for some time. (Sometimes it may be necessary to press the button twice.) After you press the button, the plunger runs optionally to the end stop in one direction or the other.

3. Using the union nut, screw the servomotor onto the valve and hand-tighten the nut. If necessary, fix the union nut on the valve thread with two M4 grub screws.

4. If the servomotor does not completely close the valve, a plunger extension can be installed (SF/SK 1 mm adapter). To do this, screw the servomotor off the valve and push on the extension cap preferably using a small pair of pliers. For this, the plunger has a small cam on the top side on which the cap is seated fairly tightly. Please ensure that you push the cap all the way on.

The cap extends the plunger by 1 mm. If you only need a 0.5 mm extension, you can install a spacer ring at the same time. If you install a spacer ring and a plunger extension at the same time, this yields an effective extension of the plunger of 0.5 mm.

5. If the servomotor does not completely open the valve, you can increase the distance between plunger and the valve pin by means of a spacer ring (0.5 mm SF/SK spacer ring). To do this, screw the valve drive from the valve and insert the spacer ring in the union nut. You can use several spacer rings. Each spacer ring increases the distance by 0.5 mm.

This concludes mounting.

Visualizing the battery status
If the batteries run down, this is indicated by brief flashing yellow lights. Apart from this, the system sends an appropriate message to the ZE central unit that displays a battery icon in the status menu to indicate that you need to change the batteries.

Visualizing the wireless performance and the device address
If you press the button on the operator panel during operation, the SF servomotor tries to establish a wireless connection to the ZE central unit. If this is successful, the LED briefly flashes green (if reception is very good), or yellow (if reception is only adequate.) After a brief pause, the set address flashes: green for the tens and yellow for the units (for example 2x green and 3x yellow means address 23). In this way, it is possible to test the wireless connection as well as the device address in on-site operation.

Visualizing the valve position
In the „open“ position, the red LED lights up for a few seconds each time you press a button.

Technical data
Power supply 3 V
(2x AA alkaline manganese batteries, min. 2600 mAh,
manufacturer on request)
Power consumption at rest 0.0001 W, maximum of 0.3 W
Actuating time max. 25 seconds
Actuating force 100 N
Ambient temperature 0 – 50 °C
Protection class IP54 (IP50 if mounted overhead)
Stroke 3 mm, position can be shifted with adapter
Thread for connecting valve M30 x 1.5
Grub screws for connecting valve M40 x 5
Housing PC/ABS, white RAL 9010
Dimensions 89 mm x 55 mm x 48 mm

10.23 Mounting the STE switching step

The STE switching step is mounted in the switch box on a DIN rail.

The input is connected to the THZ bus from which the power is supplied (two-wire cable).

You can connect two solid state relays (SSRs) to each of the six outputs (but not more than eight SSRs in total). The SSRs must have a potential-free input (normally an optocoupler). The connection is normally made by means of a two-wire cable that must be wired with correct polarity. The polarity is stated on the housing.

Technical data:
18 V power supply (via the THZ bus), polarity is not important
Power consumption: 0.2 W – 1.7 W
6 outputs, 6 V, max. of 20 mA (for 2 SSRs in-parallel each)
Total max. output current of 80 mA
Outputs not galvanically separated
Pulse width modulation (frequency 1 s, 0 – 100 %)
Ambient temperature 0 - 50 °C
IP20 protection class
Housing ABS, grey
Dimensions 70 mm x 90 mm x 58 mm

10.24 Mounting the STZ switching step (wireless)

The STZ switching step is designed for installation in electric baseboard heaters: due to its flat shape, you can mount it directly in the baseboard heater.

Important:
Since the STZ switching step does not have a housing lid, you must ensure that there is an adequate and safe covering when you carry out mounting. If you choose a metal covering, it must be connected to the protective earth. **Mains voltage 230 V!**

Power is supplied via the 230 V mains. You connect the phase and the neutral conductor to the green double terminal (in front of the transformer), the polarity is not important. The terminal on the PCB is labelled „POWER“. If a clamp is necessary, it should be implemented outside the housing at installation.

The output of the STZ switching step (grey double terminal) is connected to a solid state relay (SSR). The terminal on the PCB is labelled „RELAY“. The SSR must have a potential-free input (normally an optocoupler). The connection is normally made by means of a two-wire cable that must be wired with correct polarity. The polarity is stated on the PCB in front of the grey terminal.

Important:
The mains connection and the relay output must under no circumstances be reversed. This destroys the STZ switching step. Apart from this, components on the PCB could carry a dangerous current in this case.

Technical data:
Power supply 230 V (green POWER terminal)
Power consumption: 0.3 W – 0.9 W
1 output, 6 V, max. of 20 mA (for 2 SSRs in-parallel) (grey RELAY terminal)
Output not galvanically separated
Pulse width modulation (frequency 1 s / 60 s, 0 – 100 %)
Power limitation 60 % - 100 %
Ambient temperature 0 – 50 °C
Housing polystyrene, black
Dimensions 70 mm x 90 mm x 58 mm

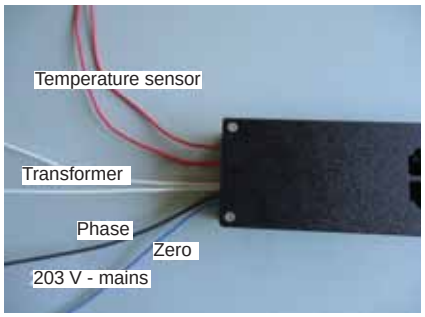
10.25 Mounting the STV switching step (wireless)

The STV switching step is intended to be mounted in the control cabinet next to the transformer. When mounting, observe the following:
- It must be possible for air to circulate freely through the ventilation openings in the lid and on the narrow side. You must not route any wires or similar through the ventilation slits in the lid that could block the fan.

- You must mount the device such that the lid faces the (hot) transformer. The lid tolerates temperatures of up to 120 °C, with the rest of the housing only tolerating temperatures of up to 85 °C.

- The radio antenna is located on the narrow side without ventilation slits. To achieve maximum range, it must be kept as far as possible from metal parts and the transformer.

- If you want the operator buttons to be kept accessible, this means that the optimum installation location is upright in the bottom left-hand corner of the switch box. The antenna is at the bottom with the cables exiting from the housing at the top. The cooling air enters from the right under the transformer and is blown out at the top. The transformer is then moved as far as possible into the top right-hand corner. It is also possible to mirror the arrangement (e.g transformer at top left, STV at top right); however, in this case, the operator buttons are not accessible, since the housing must be turned.



The transformer‘s primary connection is connected to the two white cables, the polarity is not important. The two thinner red cables are intended for connecting to the temperature sensor in the transformer; in this case too, the polarity is not important. You make the connection to the 230 V mains by means of the black and blue cable. You connect the phase to the black cable and the neutral conductor to the blue one.

Important:
You must always connect the transformer first; only then must you connect the 230 V mains. Even when the device is switched off, the transformer connections are live.

Important:
Under no circumstances must the mains connection and the transformer connection be reversed. This destroys the STV switching step.

Technical data:
Input for 230 V power supply
(black and blue cable, 2 x 1.0 mm²)
Input for temperature monitoring of the transformer
(two red cables, 2 x 0.5 mm²)
Output for transformer 230 V / max. 2000 W
(two white cables, 2 x 1.0 mm²)
Pulse width modulation (period 10 s, 0 – 100 %)
IP20 protection class
Max. ambient temperature 60 °C
Dimensions 170 mm x 66 mm x 40 mm

10.30 Mounting the FE wireless receiver

The FE wireless receiver is intended for wall mounting.
The rules below apply to the set-up location:
- as close to the THZ radios as possible.
- no large obstacles (concrete ceilings, steel walls, etc.) on the radio patch
- not close to other radios
- not close to computers, screens, TVs, etc.
- not directly on water pipes, electric cables, etc.

It is often not possible to meet all the requirements at the same time. In this case, you should try to achieve a reasonable compromise. The radio waves in the 868 MHz band spread like light waves in relatively straight lines. They cannot penetrate bodies like reinforced concrete ceilings and stone or brick walls, for example, but are reflected like light from many surfaces. This means that it is often better to attach the FE wireless receiver in stair-wells or supply ducts instead of below a concrete ceiling or on a solid wall even if the direct line to the THZ devices would be shorter. The important thing is that the radio waves have a path that is as unobstructed as possible through clear air or that at least light materials (plaster-board, wood) are on the path to the THZ devices. In many cases, it is enough to have small openings, like ceiling or wall openings for supply lines or similar for example, to allow the radio waves to disperse.

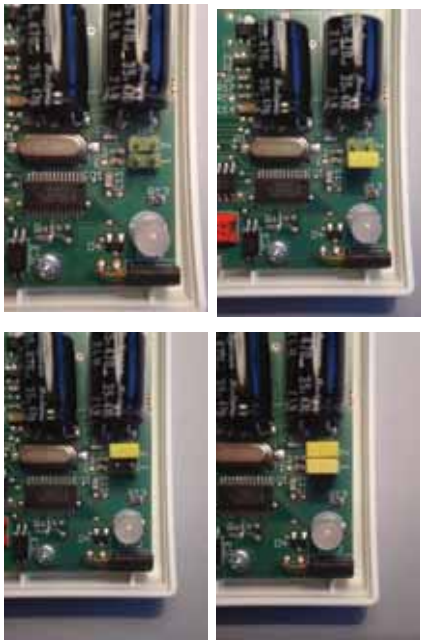
Mounting on the wall
You must open the FE wireless receiver unit for wall fastening and connecting the bus wiring. To do this, lay the device flat on a firm base and release the inner locking hook on the bottom of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening in the middle and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. After this, you can pull out the top part together with the electronics PCB upwards/backwards. First put the top part carefully on one side.

Connecting to the THZ bus
Route the connections for the THZ bus inwards through the middle opening in the bottom part. After this, screw the bottom part firmly to the wall. The holes for the screws match most flush mounting sockets in common use. Important: If you use the bottom hole, do not drive the screw too tight; otherwise, the housing may warp!

Important: While mounting the connecting wires for the THZ bus, they must be deenergized, i.e. the THZ bus must not be connected to the ZE central unit or the ZE central unit's mains unit must not be connected to the mains. Mounting the RS room unit while it is live does not damage it as such. However, during mounting there is a risk of loose connecting wires accidentally touching other parts of the electronics, which can lead to damage occurring!

Now connect the connecting wires for the THZ bus to the orange terminal. The polarity is not important.

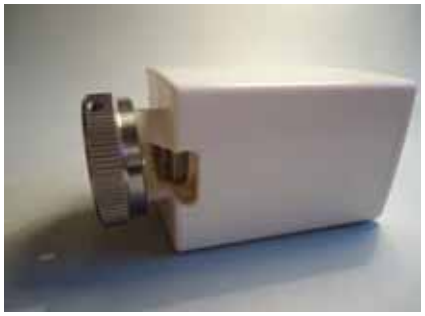
Setting the device number
Under unfavourable reception conditions, it may be necessary to operate up to four FE wireless receivers together on one ZE central unit. In this case, you must differentiate the wireless receivers from one another by an internal number 1 to 4. You can set this number using two jumpers at the bottom right-hand side of the PCB. When you do this, it is not important which device is given a particular number. You can also assign the only device on a ZE with any number you like between 1 and 4. The only important thing is that two devices on one ZE do not have the same number. This means that it does not matter how you insert the jumpers, they must only be inserted differently.



Closing the housing
To close the wireless receiver, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hook snap into place if you press the corresponding point from the top centre.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.5 W
Frequency 868 MHz
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Dimensions 81 mm x 81 mm x 27 mm

10.60 Assembly aid for servomotors



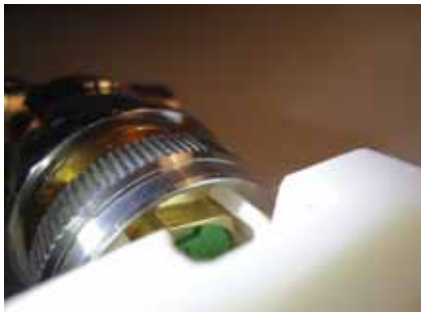
In many cases it is difficult to decide whether the SK or SF servomotors are seated correctly on the valve. In these cases it can be beneficial to check the valve seat using a modified SF servomotor. For this, you cut open the SF servomotor at the side in the area of the valve seat such that you can directly see the seating on the valve body and the position of the plunger relative to the valve pin. If you mount the valve drive for test purposes on the valve to be checked, you can easily inspect the conditions.

At mounting. please proceed as follows:

Insert the batteries. To do this, use an appropriate screwdriver to open the battery cover. The correct polarity is marked in the battery compartment.

Check whether the servomotor is in the „open“ position. (The plunger must be retracted into the housing). This is very important. If you mount the servomotor in the „closed“ position, the plunger can jam such that the motor can no longer move it.

You can manually retract the plunger to the „open“ position by pressing the button for more than five seconds and then keeping it pressed for some time. (Sometimes it may be necessary to press the button twice.) After you press the button, the plunger runs optionally to the end stop in one direction or the other.



1. Correct seating on the valve body
Using the union nut, screw the servomotor onto the valve and hand-tighten the nut. The neck of the servomotors must be seated flat on the surface of the valve body. When you screw the union nut tight, the servomotor must not wobble or be skewed.

2. Correct distance of plunger to valve pin
When the servomotor is completely in position, the plunger must just touch the valve pin. If it presses into it slightly, the valve cannot open completely. On the other hand, if the distance between the plunger and the valve pin is too great, the valve will not close completely.

If the servomotor does not completely close the valve, a plunger extension can be installed (SF/SK 1 mm adapter). To do this, screw the servomotor off the valve and push on the extension cap preferably using a small pair of pliers. For this, the plunger has a small cam on the top side on which the cap is seated fairly tightly. Please ensure that you push the cap all the way on.

The cap extends the plunger by 1 mm. If you only need a 0.5 mm extension, you can install a spacer ring at the same time. If you install a spacer ring and a plunger extension at the same time, this yields an effective extension of the plunger of 0.5 mm.

If the servomotor does not completely open the valve, you can increase the distance between plunger and the valve pin by means of a spacer ring (0.5 mm SF/SK spacer ring). To do this, screw the valve drive from the valve and insert the spacer ring in the union nut. You can use several spacer rings. Each spacer ring increases the distance by 0.5 mm.

3. Examples

If the valve drive is completely open, the valve pin has too much air. The available 3-mm stroke will not close the valve completely.
After mounting an extension cap, the pin just touches the plunger.

Here, in the completely open position, the plunger presses the valve pin in a little.

A spacer ring was mounted.

The valve pin now has some air.

Technical data
Power supply 3 V
(2x AA alkaline manganese batteries, min. 2600 mAh, manufacturer on request)
Power consumption at rest 0.0001 W, maximum of 0.3 W
Actuating time max. 25 seconds
Actuating force 100 N
Ambient temperature 0 – 50 °C
Protection class IP54 (IP50 if mounted overhead)
Stroke 3 mm, position can be shifted with adapter
Thread for connecting valve M30 x 1.5
Grub screws for connecting valve M40 x 5
Housing PC/ABS, white RAL 9010
Dimensions 89 mm x 55 mm x 48 mm

11.4 Cabling CAN

The connection between a Central Unit ZE and a CAN Bus is established by using the following pins in the SUB-D9 jack of the ZE:

SUB-D9 CAN

Pin 2	CAN L (CAN Low)
Pin 7	CAN H (CAN High)
Pin 1	GND (Ground)

For establishing a connection to a UVR1611 of TA the accordingly designated terminals of the UVR1611 (CAN L, CAN H, GND) have to be connected to pins 2, 7, 1 of the ZE in accordance with the table.

In an adapter plug ADP2 the connections are labeled on the board.

If necessary a terminating resistor of 120 ohms can be used within the Central Unit ZE. To activate it the jumper JP9 has to be plugged.

For short connections any three-conductor cable can be used. For longer connections please refer to the cable specifications and wiring guidelines for CAN networks.

12.0 Commissioning general

Before you can start commissioning, you must have mounted the ZE central unit and all the other THZ devices (peripherals). The bus devices must have been connected to the THZ bus.

1. Recording the system
First, you must determine the number or rooms or zones that you want to control. After this, you must specify the following for each room and zone:

- Room units and their addresses.
For each room and zone, there can only be one room unit with one individual address.

- Servomotors and their addresses
For any one room or zone, there can be several servomotors. Each SK and SF servomotor has its own individual address. Servomotors that are connected to an ST switching step (relay box) do not have their own address. Instead, the relay in the relay box has an address that then applies to all the servomotors that are connected to its terminal.

- ZE central unit
Make a note of the associated central unit and its software version.

- System address
If you are using radios, you must assign a system address. The presetting is the ZE central unit‘s serial number.

The best thing to do is to record the data in a list according to the attached sample.

2. Activating batteries
If radios are present, you must now activate the batteries.

3. Switching on the ZE central unit
You can now switch on the ZE central unit.
To do this, connect the supplied NT mains unit to the 230 V mains and connect it to the ZE (see 10.1 Mounting the ZE central unit). The ZE central unit now starts up and carries out a brief self-test. For more details, refer to 12.1 Commissioning the ZE central unit.

4. Making the option settings in the ZE.
The possible settings are described in 5. Menu of ZE central unit. Please refer to this section.

5. Setting the system address
Set the intended system address.

6. Commissioning peripherals
If the peripherals have not yet been commissioned, you must do this now. Commissioning of peripherals is described in the chapters on commissioning for the individual devices. Please refer to these sections.

7. Checking whether all peripherals are detected correctly.
You carry out checking on the basis of the status menus in the ZE. These are described in 5. Menu of ZE central unit. Please refer to this section.

8. Assigning relays/servomotors
Relays and servomotors must be assigned to their room units in the menu of the ZE central unit. For this, refer to the Switching relay menu item in 5. Menu of ZE central unit.

9. Making the other settings in the ZE.
The necessary settings depend on the actual system.
All the possible settings are described in 5. Menu of ZE central unit. Please refer to this section.

10. Testing the system
Set the target temperature up and down in the individual rooms and check whether the valves open and close appropriately. You can directly control the servomotors using the Test relays menu item.

12.1 Commissioning the ZE central unit

To commission the ZE central unit, it must first be supplied with power. To do this, connect the supplied NT mains unit to the 230 V mains and connect it to the ZE (see 10.1 Mounting the ZE central unit). The ZE central unit now starts up and carries out a brief self-test that concludes by prompting you for the desired menu language.

This prompt directly after starting the unit for the first time is the only chance you have to set the language. If you want to change the language, please proceed as described in 5. Menu of ZE central unit. If you do not want to change the language, wait for three seconds until the ZE changes to the normal display or press one of the right-hand buttons.

Shortly after you can see the normal display, the system automatically activates the THZ bus and the ZE starts communicating with the connected peripherals. A complete bus cycle takes one minute; this means that a first system status is not available until at least one minute has elapsed. However, a complete system status of all the connected radios can take a few minutes, since not all the data can be called at once.

This means that commissioning is divided into four parts:

1. Making the option settings in the ZE.
The possible settings are described in 5. Menu of ZE central unit. Please refer to this section.

2. Commissioning peripherals
If the peripherals have not yet been commissioned, you must do this now. Commissioning of peripherals is described in the chapters on commissioning for the individual devices. Please refer to these sections.

3. Checking whether all peripherals are detected correctly.
You carry out checking on the basis of the status menus in the ZE. These are described in 5. Menu of ZE central unit. Please refer to this section.

4. Making the commissioning settings in the ZE.
The necessary settings depend on the actual system.
All the possible settings are described in 5. Menu of ZE central unit. Please refer to this section.

You can find general instructions on the best way to proceed at commissioning in 12.0 Commissioning – General.

Technical data
Power supply 18 V (via NT mains unit), observe the polarity!
Power consumption 1.5 W
Sensor resistor internal NTC 10 k
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 60 x 15 mm, 2 x 16 characters, 256 colours
Dimensions 178 mm x 110 mm x 40 mm

12.10 Commissioning the RG room unit

At commissioning, you must make the following settings on the RG room unit:

- device address
- configuration
- display colour

For commissioning, the RG switching step must be connected to the THZ bus and the central unit, ZE must be running. Ex-works, the RG room unit is set to device address 00 and is thus completely inactive. Only device address 00 is displayed. However, even if you have already configured the RG, the process of resetting is the same.

Setting the device address
Keep both right-hand buttons of the RF pressed for at least five seconds. The display now changes to setting mode and shows the device address together with the programming icon >>.

When you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the device address upwards and downwards. Pressing the left-hand button applies the setting and changes to setting of the configuration.

Each RG or RS or RF room unit must have its own device address between 1 - 30. This device address is to uniquely identify the device within the bus system of a ZE central unit. You must only assign a device address once within the same RG/RS/RF device group and the same ZE. Within another device group (e.g. ST/SK/SF) or another ZE, you are allowed to reassign addresses and this can be sensible and sometimes even necessary.

Setting the configuration
After you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the configuration upwards and downwards. Pressing the left-hand button applies the setting and changes to normal display of the set configuration.

Using the configuration's CN code, you can change the behaviour of the RG room unit; particularly the displayed menu items too. In this connection, there are there following meanings:

CN00 - Normal mode with all setting options

CN01 - Normal mode but the display goes out after 30 seconds

CN02 - Hotel mode 2
You can only see the actual temperature and the target temperature menu items.

CN03 - Hotel mode 3
You can only see the target temperature menu item.

CN04 - Tact external
A temperature sensor connected to the external terminal is used. The internal sensor is deactivated.

CN05 - Tact external + hotel mode 2 (CN04 + CN02)

CN06 - Tact external + hotel mode 3 (CN04 + CN03)

CN07 - Tact external on address +1 + hotel mode 2 (CN02)
The RG appears at the set device address xx with its internal temperature sensor. At the next device address xx+1, it appears with a temperature sensor connected to the external terminal. This means that the same RG appears at two addresses: once as device xx and a second time as device xx+1. You cannot, of course, assign address xx+1 again for another RG/RS/RF device.

CN08 - Tact external on address +1 + hotel mode 3 (CN03)
Otherwise, same behaviour as CN07.

CN09 - Colour change + hotel mode 3 (CN03)
The colour of the display changes with the set target temperature from blue (low temperature) through green and yellow to red (high temperature).

CN10 - Energy display % + hotel mode 2 (CN02)
In addition, the system displays the current performance of the heating circuit in percent. This is mainly intended for electric heating systems.

Setting of the display colour
If you want to change the colour of the display lighting, you can only do this in configuration CN00. Changes to the setting that you make there also apply to the other configurations if they do not change the display colour themselves. This means that you may have to first set the CN00 configuration, then change the display colour before being able to finally set the desired configuration.

To change the display colour in the CN00 configuration, use the two right-hand buttons to page to the corresponding menu item, which you can recognize by the letter „c“ in front of it. Press the left-hand button, the programming symbol >> flashes. Now use the two right-hand buttons to set the desired colour number. Pressing the left-hand button saves the setting.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.1 W
Sensor resistor internal/external NTC 10 k
Max. cable length to external sensor 20 m (copper cable 0.5 mm²)
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 59 mm x 24 mm
Dimensions 81 mm x 81 mm x 27 mm

12.11 Commissioning the RS room unit

To commission the RS room unit, you only need to set the device address. If you already set it at mounting, no further commissioning is necessary.

Otherwise, you must open the RS room unit again. To do this, release the inner locking hook on the bottom of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening in the middle and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. After this, you can pull out the top part together with the electronics PCB upwards/ backwards. The top part is now loosely suspended on the two connecting wires for the THZ bus. If you carefully turn it over, you can now see the two blue switches for the device address.

Setting the device address
You set the device address using the blue rotary switch and the blue DIP switch. The rotary switch sets the units from 0 to 9 and the DIP switch sets the tens as follows:

- DIP 1 and DIP 2 = OFF-> 0
- DIP 1 = ON -> 10
- DIP 2 = ON -> 20
- DIP 1 and DIP 2 = ON -> 30

In the photo on the right, for example, the address 26 is set.

To close the RS room unit, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hook snap into place if you press the corresponding point from the top centre.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.1 W (RS-FF 0.13 W)
Sensor resistor internal/external NTC 10 k
Max. cable length to external sensor 20 m (copper cable 0.5 mm²)
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Dimensions 81 mm x 81 mm x 27 mm

12.12 Commissioning the RF room unit

To commission the RF room unit, you must carry out the following:

Insert the batteries
Set the
- device address
- system address
- configuration
- display colour

Inserting the batteries
To insert the batteries, open the battery cover on the back of the device. You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

You need two AA alkaline manganese batteries with at least 2600 mAh. The correct polarity is marked on the housing. Ex-works, the batteries are already in the device but they are insulated by a strip of paper. To activate them, please remove the paper.

Setting the device address
Ex-works, the RF room unit is set to device address 00 and is thus inactive. Only device address 00 is displayed. However, even if you have already configured the RF, the process of resetting is the same.

Keep both right-hand buttons of the RF pressed for at least five seconds. The display now changes to setting mode and shows the device address together with the programming icon >>.

When you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the device address upwards and downwards. Pressing the left-hand button applies the setting and changes to setting of the system address.
Each RG or RS or RF room unit must have its own device address between 1 - 30. This device address is

to uniquely identify the device within the bus system of a ZE central unit. You must only assign a device address once within the same RG/RS/RF device group and the same ZE. Within another device group (e.g. ST/SK/SF) or another ZE, you are allowed to reassign addresses and this can be sensible and sometimes even necessary.

Setting the system address
When you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the system address upwards and downwards. Pressing the left-hand button applies the setting and changes to setting of the configuration.

The system address is important if you intend running several ZE central units with connected wireless components in close proximity with one another. In this case, you must specify for each radio the ZE to which it belongs. You do this by setting the system address. In principle, it is of no consequence which system address is set. It must just match the system address that is set in the ZE and be different from the system addresses of all the ZEs in the vicinity.

Setting the configuration
After you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the configuration upwards and downwards. Pressing the left-hand button applies the setting and changes to normal display of the set configuration.

Using the configuration‘s CN code, you can change the behaviour of the RG room unit; particularly the displayed menu items too. In this connection, there are there following meanings:

CN00 - Normal mode with all setting options

CN01 - Normal mode but the display goes out after 30 seconds

CN02 - Hotel mode 2
You can only see the actual temperature and the target temperature menu items.

CN03 - Hotel mode 3
You can only see the target temperature menu item.

CN09 - Colour change + hotel mode 3 (CN03)
The colour of the display changes with the set target temperature from blue (low temperature) through green and yellow to red (high temperature).

CN10 - Energy display % + hotel mode 2 (CN02)
In addition, the system displays the current performance of the heating circuit in percent. This is mainly intended for electric heating systems.

CN11 - Menu for STZ and STE without timer

CN11 - Menu for STZ and STE with timer

Setting of the display colour
If you want to change the colour of the display lighting, you can only do this in configuration CN00. Changes to the setting that you make there also apply to the other configurations if they do not change the display colour themselves. This means that you may have to first set the CN00 configuration, then change the display colour before being able to finally set the desired configuration.

To change the display colour in the CN00 configuration, use the two right-hand buttons to page to the corresponding menu item, which you can recognize by the letter „c“ in front of it. Press the left-hand button, the programming symbol >> flashes. Now use the two right-hand buttons to set the desired colour number. Pressing the left-hand button saves the setting.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.1 W
Sensor resistor internal/external NTC 10 k
Max. cable length to external sensor 20 m (copper cable 0.5 mm²)
Measuring accuracy ± 0.1 °C
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 59 mm x 24 mm
Dimensions 81 mm x 81 mm x 27 mm

12.13 Commissioning RF (wireless, FR1)

To commission the RF room unit, you must carry out the following:
Insert the batteries
Set the
- device address
- system address
- sensor threshold
- configuration
- display colour

Inserting the batteries
To insert the batteries, open the battery cover on the back of the device. You can push the battery cover downwards (towards the housing stand) by putting your fingernail in the groove on the top edge of the cover and pressing gently downwards until it snaps open.

You need two AA alkaline manganese batteries with at least 2600 mAh. The correct polarity is marked on the housing. Ex-works, the batteries are already in the device but they are insulated by a strip of paper. To activate them, please remove the paper.

Setting the device address
Ex-works, the RF room unit is set to device address 00 and is thus inactive. Only device address 00 is displayed. However, even if you have already configured the RF, the process for resetting the device is the same.

Keep both right-hand buttons of the RF pressed for at least five seconds. The display now changes to setting mode and shows the device address together with the programming icon >>.

When you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the device address upwards and downwards. Pressing the left-hand button applies the setting and changes to setting of the system address.

Each RF room unit must have its own device address between 1 - 30. This device address is used to uniquely identify the device from amongst all of those devices with the same system address. Devices within the same building must have their own device address but they can have the same system address. Devices in different buildings should have different system addresses.

Setting the system address
When you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the system address upwards and downwards. Pressing the left-hand button applies the setting and changes to setting of the configuration.

Setting the sensor threshold
After this press the left-hand button once, the sensor threshold is displayed and you can see the programming symbol >> again on the left. Now press the left-hand button once, the programming symbol >> flashes. The shut-off threshold for the external temperature sensor in the STV can be set using both of the other buttons (range 25°C - 60°C, standard setting ex-works 40°C). If the set temperature is exceeded, the STV1 is switched off. This is naturally conditional on the correct connection of a suitable external temperature sensor.

Setting the configuration
After you press the left-hand button, the programming icon >> flashes. Now you can use the two right-hand buttons to set the configuration upwards and downwards. Pressing the left-hand button applies the setting and changes to the normal display for the set configuration.

Using the configuration‘s CN code, you can change the behaviour of the RG room unit; particularly the displayed menu items too. In this connection, there are the following meanings:

CN00 - Normal mode with all setting options

CN01 - Normal mode but the display goes out after 30 seconds

CN02 - Hotel mode 2
You can only see the actual temperature and the target temperature menu items.

CN03 - Hotel mode 3
You can only see the target temperature menu item.

CN09 - Colour change + hotel mode 3 (CN03)
The colour of the display changes with the set target temperature from blue (low temperature) through green and yellow to red (high temperature).

CN10 - Energy display % + hotel mode 2 (CN02)
In addition, the system displays the current performance of the heating circuit in percent. This is mainly intended for electric heating systems.

CN11 - Menu for STZ and STE without timer

CN12 - Menu for STZ and STE with timer

Setting of the display colour
If you want to change the colour of the display lighting, you can only do this in configuration CN00. Changes to the setting that you make there also apply to the other configurations if they do not change the display colour themselves. This means that you may have to first set the CN00 configuration, then change the display colour before being able to finally set the desired configuration.

To change the display colour in the CN00 configuration, use the two right-hand buttons to page to the corresponding menu item, which you can recognize by the letter „c“ in front of it. Press the left-hand button, the programming symbol >> flashes. Now use the two right-hand buttons to set the desired colour number. Pressing the left-hand button saves the setting.

Technical data
Power supply 3 V (2x AA alkaline manganese batteries, min. 2600mAh)
Power consumption < 0.0003 W
Sensor resistor internal NTC 10k
Measuring accuracy ± 0.1 °C
Ambient temperature 0 - 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Lit LCD display 59 mm x 24 mm
Dimensions 81 mm x 81 mm x 39 mm

12.20 Commissioning the ST switching step

Commissioning the ST switching step only involves setting the device addresses for the relays that are used. If you have already done this at mounting, no further commissioning is necessary.

Otherwise, you must open the ST switching step again.

Opening the housing
To open the housing, use a small screwdriver to lever upwards the four dust caps on the corners of the housing and then unscrew the screws on the corners.

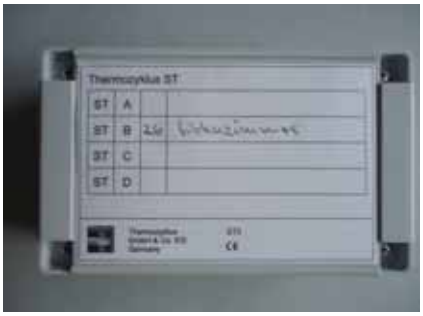
Setting the device address

You set the device address for each individual relay using the blue rotary switch and the blue DIP switch to the left next to the relay. The rotary switch sets the units from 0 to 9 and the DIP switch sets the tens as follows:
- DIP 1 and DIP 2 = OFF-> 0
- DIP 1 = ON -> 10
- DIP 2 = ON -> 20
- DIP 1 and DIP 2 = ON -> 30

In the photo on the right, for example, relay B has the address 26 set.

Closing the housing and labelling it
To close the housing, put the lid on and tighten the four screws in the corners. When doing this, ensure that the lid is in the correct position such that the designations of the relays on the lid correspond with their actual positions on the PCB. If there are dust caps present and you want to insert them, do this.

In the fields on the lid, make a note of the set device address and the designation of the room or zone whose valve drives are connected.
Technical data



18 V power supply (via the THZ bus), polarity is not important
Power consumption: All relays OFF 0.15 W / all relays ON 0.5 W
4 relays, 1x ON in each case, max. 8 A, on common phase
Bus terminal max. 1.0 mm²
Relay terminals max. 1.5 mm²
Ambient temperature 0 – 50 °C
IP20 protection class
Housing ABS, grey
Lid screws M3 x 15
Dimensions 145 mm x 90 mm x 45 mm

12.21 Commissioning the SK servomotor

For commissioning, the SK servomotor must be connected to the THZ bus and the central unit, ZE must be running.

Setting the device address
You set the device address using ZE menu „Commissioning -> SF/Sx address“. After the prompt in the ZE menu, press the button corresponding to the SK servomotor that you want to program. If programming is successful, the green and yellow address LEDs flash alternately for a short time (as shown in the photo on the right). After this, the system visualizes the address you have just programmed by flashing so you can confirm it: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Each SK servomotor must have its own device address between 1 - 30. This device address is to uniquely identify the device within the bus system of a ZE central unit. You must only assign a device address once within the same ST/SK/SF/STE device group and the same ZE. Within another device group (e.g. RG/RS/RF) or another ZE, you are allowed to reassign addresses and this can be sensible and sometimes even necessary.

Visualizing the device address
Each time you press a button, the system visualizes the programmed address by flashing: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Visualizing the valve position
In the „open“ position, the red LED lights up for a few seconds each time you have pressed a button (as shown in the photo on the left).

Technical data

18 V power supply (via the THZ bus), polarity is not important
Power consumption at rest 0.05 W, maximum of 0.5 W
Actuating time max. 50 seconds
Actuating force 100 N
Ambient temperature 0 – 50 °C
Protection class IP54 (IP50 if mounted overhead)
Cable 2 x 0.75 mm², length 1 m
Stroke 3 mm, position can be shifted with adapter
Thread for connecting valve M30 x 1.5
Grub screws for connecting valve M40 x 5
Housing PC/ABS, white RAL 9010
Dimensions 89 mm x 55 mm x 48 mm

12.22 Commissioning the SF servomotor

For commissioning, the SF servomotor must be connected within range of an FE wireless receiver and the central unit, ZE must be running. Apart from this, the batteries must have been inserted in the SF servomotor with the correct polarity.

Setting the device address
You set the device address using ZE menu „Commissioning -> SF/Sx address“. After the prompt in the ZE menu, press the button corresponding to the SF servomotor that you want to program. If programming is successful, the green and yellow address LEDs flash alternately for a short time (as shown in the photo on the right). After this, the system visualizes the address you have just programmed by flashing so you can confirm it: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Each SF servomotor must have its own device address between 1 - 30. This device address is to uniquely identify the device within the bus system of a ZE central unit. You must only assign a device address once within the same ST/SK/SF/STE device group and the same ZE. Within another device group (e.g. RG/RS/RF) or another ZE, you are allowed to reassign addresses and this can be sensible and sometimes even necessary.

Visualizing the battery status
If the batteries run down, this is indicated by brief flashing yellow lights. Apart from this, the system sends an appropriate message to the ZE central unit that displays a battery icon in the status menu to indicate that you need to change the batteries.

Visualizing the wireless performance and the device address
If you press the button on the operator panel during operation, the SF servomotor tries to establish a wireless connection to the ZE central unit. If this is successful, the LED briefly flashes green (if reception is very good), or yellow (if reception is only adequate.) After a brief pause, the set address flashes: green for the tens and yellow

for the units (for example 2x green and 3x yellow means address 23). In this way, it is possible to test the wireless connection as well as the device address in on-site operation.

Technical data
Power supply 3 V (2x AA alkaline manganese batteries, min. 2600mAh)
Power consumption at rest 0.0001 W, maximum of 0.3 W
Actuating time max. 25 seconds
Actuating force 100 N
Ambient temperature 0 – 50 °C
Protection class IP54 (IP50 if mounted overhead)
Stroke 3 mm, position can be shifted with adapter
Thread for connecting valve M30 x 1.5
Grub screws for connecting valve M40 x 5
Housing PC/ABS, white RAL 9010
Dimensions 89 mm x 55 mm x 48 mm

12.23 Commissioning the STE switching step

For commissioning, the STE switching step must be connected to the THZ bus and the central unit, ZE must be running.

Checking the bus connection
If the red bus LED is lit up, the power supply via the bus is OK. The red bus LED then goes out at the same time as the communications protocols are transmitted across the bus. If communication is also OK, this results in slow flashing (a 1-second but not regular frequency; there may be relatively long pauses in which the LED does not go out). Hectic, continuous flashing of the red bus LED indicates that communication across the bus is disturbed or that the STE has another fault.

Setting the device address
You set the device address using ZE menu „Commissioning -> SF/Sx address“. After the prompt in the ZE menu, press the button corresponding to the channel in the STE that you want to program (letter A to E). If programming is successful, the green and yellow address LEDs flash alternately for a short time. After this, the system visualizes the address you have just programmed by flashing so you can confirm it: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Each channel of the STE switching step must have its own device address between 1 - 30. This device address is to uniquely identify the channel within the bus system of a ZE central unit. You must only assign a device address once within the same ST/SK/SF/STE device group and the same ZE. Within another device group (e.g. RG/RS/RF) or another ZE, you are allowed to reassign addresses and this can be sensible and sometimes even necessary.

Setting the heating power „per room“
In the ZE‘s „Commissioning –> Assign RG“ menu, you must set „Per room“ for the RG to which the addressed STE channel is assigned (e.g. RG1). This tells the ZE that RG1 is to calculate separately the heating power for each room and transfer it separately to the assigned STE switching step.

Visualizing the heating power
The red output LED in front of each output terminal lights up when the corresponding output is just switched on. In this way, you can read off on the pulse pattern of the LED the heating power that is just being output.

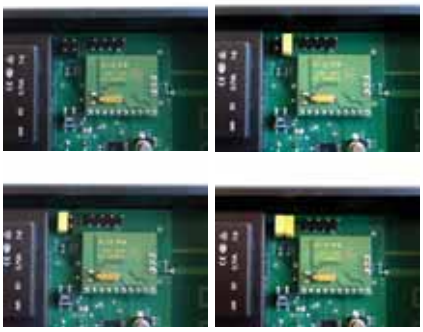
Visualizing the device address
Each time you press a button, the system visualizes the programmed address by flashing: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Technical data:
18 V power supply (via the THZ bus), polarity is not important
Power consumption: 0.2 W – 1.7 W
6 outputs, 6 V, max. of 20 mA (for 2 SSRs in-parallel each)
Total max. output current of 80 mA
Outputs not galvanically separated
Pulse width modulation (frequency 1s, 0 – 100 %)
Ambient temperature 0 – 50 °C
IP20 protection class
Housing ABS, grey
Dimensions 70 mm x 90 mm x 58 mm

12.24 Commissioning the STZ switching step (wireless)

For commissioning, the STZ switching step must be connected to the 230 V mains supply. The associated RF room unit must be switched on.

Important:
Since the housing is open during commissioning, make sure that you do not touch the connecting terminals for the mains voltage!



Using several STZs in-parallell
If you only intend to use one STZ, neither of the two jumpers are fitted.

If you intend operating several STZs on one common RF room unit (RF3 and above), the individual STZs must be differentiated from one another by means of jumpers. Here too, it is important that with one STZ the jumpers are not fitted. This STZ acts as the master for up to three other STZs. They must be differentiated as by fitting jumpers as shown in the photo on the right.

You must then program the device addresses for the individual STZs one after the other.

Power limitation
If you want to limit the maximum power, you must insert the red jumper at the top right on another slot. Reading from left to right, the meanings are as follows:

Jumper on 1st slot - max. power 100 %
Jumper on 2nd slot - max. power 90 %
Jumper on 3rd slot - max. power 80 %
Jumper on 4th slot - max. power 70 %
No jumper - max. power 60 %

In the photo, the jumper is set for a max. power of 80 %.

Slow cycle.
If the cable cross-sections to the baseboard heaters are too small, flickering can occur at switching of the baseboard heaters of the lighting that is switched at the same time. Since the system switches the baseboard heaters every second (pulse width modulation, PWM), this flickering is particularly unpleasant. By setting an additional jumper, it is possible to extend the cycle to 60 seconds. In general, people think that possible flickering is much less annoying.

Setting the device address in the RF and the STZ
Keep both right-hand buttons of the RF pressed for a few seconds. The RF displays the device address, the programming symbol >> is shown on the left of the display.

Now press the left-hand button once, the programming symbol >> flashes. Now you can set the device address using the two other buttons.

After this press the left-hand button once, the system address is displayed and you can see the programming symbol >> again on the left.

Now press the left-hand button once, the programming symbol >> flashes. Now you can set the system address using the two other buttons.

After this press the left-hand button once, the configuration is displayed and you can see the programming symbol >> again on the left. When doing this, you must ensure that you really press the left-hand button only once. The programming symbol must not flash. If the programming symbol does flash, you pressed the button more than once by mistake. You must then repeat the procedure.

In this setting, the RF transmits by wireless the device and system address to the STZ every second. On each reception, the green or yellow LED in the STZ flickers. If reception is very good, the green LED flashes; if it is adequate the yellow one does. You should ensure that the green LED always flashes with the covering open, since experience shows that reception is rather worse with the covering closed; with the yellow LED, it may not even be adequate.

Now press the button in the STZ; this applies the device and system address. If programming is successful, the green and yellow address LEDs in the STZ flash alternately for a short time. After this, the system visualizes the address you have just programmed by flashing so you can confirm it: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Now, complete programming of the RF by choosing the desired configuration.

Note
If there are several RF/STZ controls in one house, you should set a different device address for each room but have the same system address for them all. You should choose different system addresses if two houses next to each other are to be equipped with RF/STZ controls; otherwise, radio interference and crosstalk can occur between the houses.

No further settings are necessary.

Visualizing the heating power
The red output LED in front of the output terminal lights up when the output is just switched on. In this way, you can read off on the pulse pattern of the LED the heating power that is just being output.

Visualizing the device address
Each time you press a button, the system visualizes the programmed address by flashing: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Visualizing the reception strength on the STZ
The RF room unit sends a wireless message to the STZ approximately every ten seconds. On each reception, the green or yellow LED in the STZ flickers. If reception is very good, the green LED flashes; if it is adequate the yellow one does. You should ensure that the green LED always flashes with the covering open, since experience shows that reception is rather worse with the covering closed; with the yellow LED, it may not even be adequate.

Visualizing the reception strength on the associated RF room unit
You can check the reception strength on the associated RF room unit. To do this press the two left-hand buttons on the RF for more than five seconds. The display now switches over and visualizes the wireless connection to the four assigned STZ (starting on the left with the master):

- horizontal line: no connection
- horizontal line with a line upwards: adequate connection
- horizontal line with two lines upwards: good connection

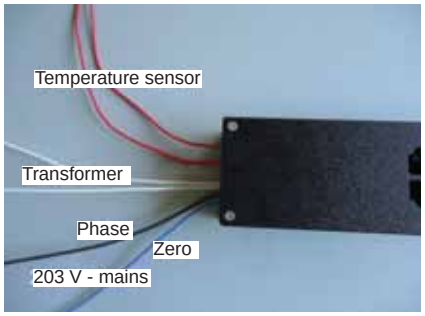
Pressing the button again switches back to the normal display.

Technical data:
Power supply 230 V (green POWER terminal)
Power consumption: 0.3 W – 0.9 W
1 output, 6 V, max. of 20 mA (for 2 SSRs in-parallel) (grey RELAY terminal)
Output not galvanically separated
Pulse width modulation (frequency 1 s/60 s, 0 – 100 %)
Power limitation 60 % - 100 %
Ambient temperature 0 – 50 °C
Housing polystyrene, black
Dimensions 70 mm x 90 mm x 58 mm

12.25 Commissioning the STV switching step (wireless)

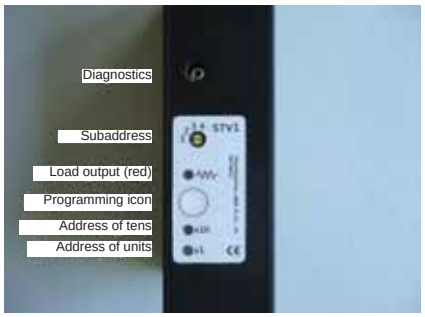
For commissioning, the STV switching step must be connected to the 230V mains supply. The associated RF room unit must be switched on.

Important:
If the transformer has not yet been connected during commissioning, you must not touch the ends of the white connecting cables, since they are live even when the STV has switched off!



Using one or more STVs (maximum of 4)
If you only intend to operate one STV, the yellow rotary switch must be set to ‚1'. This means that that this STV has the subaddress 1.

If you intend operating several STVs on one common RF room unit, the individual STVs must be differentiated from one another. You do this by setting subaddresses using the yellow rotary switch. The important thing is for one STV to always have subaddress 1. This STV acts as the master for up to three other STVs. They must then have subaddresses 2, 3, or 4. If you accidentally set a subaddress greater than 4, the yellow LED indicates this by flashing rapidly (5 Hz). In this case the STV does not function.



After this, you must program the device addresses for the individual STVs.

Setting the device address in the RF and the STV
Keep both right-hand buttons of the RF pressed for a few seconds. The RF displays the device address, the programming symbol >> is shown on the left of the display.

Now press the left-hand button once, the programming symbol >> flashes. Now you can set the device address using the two other buttons.

After this press the left-hand button once, the system address is displayed and you can see the programming symbol >> again on the left.

Now press the left-hand button once, the programming symbol >> flashes. Now you can set the system address using the two other buttons.

After this press the left-hand button once, the configuration is displayed and you can see the programming symbol >> again on the left. When doing this, you must ensure that you really press the left-hand button only once. The programming symbol must not flash. If the programming symbol does flash, you pressed the button more than once by mistake. You must then repeat the procedure.

In this setting, the RF transmits by wireless the device and system address to the STV every second. On each reception, the green or yellow LED in the STV flickers. If reception is very good, the green LED flashes; if it is adequate the yellow one does. You should ensure that if possible the green LED always flashes with the control cabinet door open, since experience shows that reception is rather worse with the door closed; with the yellow LED, it may not even be adequate.

Now press the button in the STV; this applies the device and system address. If programming is successful, the green and yellow address LEDs in the STV flash alternately for a short time. After this, the system visualizes the address you have just programmed by flashing so you can confirm it: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Now, complete programming of the RF by choosing the configuration Cn12.

Note
If there are several RF/STV controls in one house, you should set a different device address for each room but have the same system address for them all. You should choose different system addresses if two houses next to each other are to be equipped with RF/STV controls; otherwise, radio interference and crosstalk can occur between the houses.

No further settings are necessary.

Testing the transformer output
When the transformer output is switched off, you can activate it by pressing the button. While you keep pressing the button, the output switches on and the red LED lights up. If you release the button, the output switches off again. If the output is already switched on, pressing the button has no function.

Visualizing the heating power
The red output LED next to the impedance icon lights up when the output is just switched on. In this way, you can read off on the pulse pattern of the LED the heating power that is just being output.

Visualizing the device address
Each time you press a button, the system visualizes the programmed address by flashing: the green LED flashes the tens in the address and the yellow one flashes its units. (With address 12, for example, the green LED flashes 1x and the yellow one 2x.)

Visualizing the reception strength
The RF room unit sends a wireless message to the STV approximately every 17 seconds. On each reception, the green or yellow LED in the STV flickers. If reception is very good, the green LED flashes; if it is adequate the yellow one does. You should ensure that if possible the green LED always flashes with the control cabinet door open, since experience shows that reception is rather worse with the door closed; with the yellow LED, it may not even be adequate.

Overtemperature
If the device gets too hot, the transformer switches off automatically. This is indicated by the yellow LED flashing rapidly (5 Hz).

After cooling, it switches back on automatically.

Diagnostics/reading out data
Using the 2.5 mm jack above the operating element, you can read out operating data and record it using a data logger, for example. The jack is galvanically separated from the 230 V mains and is safely insulated. This means that you can even touch it during operation.

Technical data:
Input for 230 V power supply
(black and blue cable, 2 x 1.0 mm²)
Input for temperature monitoring of the transformer
(two red cables, 2 x 0.5 mm²)
Output for transformer 230 V/max. 2000 W
(two white cables, 2 x 1.0 mm²)
Pulse width modulation (period 10 s, 0 – 100 %)
IP20 protection class
Max. ambient temperature 60 °C
Dimensions 170 mm x 66 mm x 40 mm

12.30 Commissioning the FE wireless receiver

No special commissioning is needed for the FE wireless receiver. It is activated automatically as soon as the ZE central unit is powered up.

However, if you want to run more than one FE wireless receiver on a ZE and you did not set the device number at mounting, you must do this now. To do this, you must open the FE wireless receiver again.

Opening the housing
To do this, release the inner locking hook on the bottom of the housing. The best way to do this is to insert a small flat screwdriver (not a Philips one) into the rectangular opening in the middle and to gently press it inwards. This bends a plastic tab 1-2 mm inwards and releases the locking hook. If you now slightly raise the top part with your left hand, the hook does not snap back into place even after you let it go. After this, you can pull out the top part together with the electronics PCB upwards/backwards. First put the top part carefully on one side.

Setting the device number
Under unfavourable reception conditions, it may be necessary to operate up to four FE wireless receivers together on one ZE central unit. In this case, you must differentiate the wireless receivers from one another by an internal number 1 to 4.

You can set this number using two jumpers at the bottom right-hand side of the PCB. When you do this, it is not important which device is given a particular number. You can also assign the only device on a ZE with any number you like between 1 and 4. The only important thing is that two devices on one ZE do not have the same number. This means that it does not matter how you insert the jumpers, they must only be inserted differently.

Closing the housing
To close the wireless receiver, insert the top part with slight pressure from above into the small catches on the top narrow side of the bottom part and tilt it downwards. Ensure that the connecting wires do not get tangled. You can hear the locking hook snap into place if you press the corresponding point from the top centre.

Checking radio reception
The display LED in the bottom left-hand corner of the housing is for checking radio reception. When the system is booted, it is activated for three seconds after which it is inactive. If a radio signal is received in the first three seconds, the LED flashes briefly. If reception is very good, the LED flashes green; if it is adequate it flashes yellow. Since each RF room unit radios about every 17 seconds and each SF valve drive radios about every 40 seconds, the LED should light up at corresponding intervals. If several RFs or SFs are active, this can quickly become very confusing. This means that when carrying out testing, you should only ever have one or two devices active.

Technical data
18 V power supply (via the THZ bus), polarity is not important
Power consumption 0.5 W
Frequency 868 MHz
Ambient temperature 0 – 50 °C
IP30 protection class
Housing PC/ABS, white RAL 9010
Dimensions 81 mm x 81 mm x 27 mm