9AKK107680A7862

User manual

EN

Combination thermostat
TC16-20-xx
2TKA0000403x

BVB Eco-design IP21

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1 Notes on the instruction manual

Please read through this manual carefully and observe the information it contains. This will assist you in preventing injuries and damage to property, and ensure both reliable operation and a long service life for the device.

Please keep this manual in a safe place.

If you pass the device on, also pass on this manual along with it.

ABB accepts no liability for any failure to observe the instructions in this manual.

If you require additional information or have questions about the device, please contact ABB or visit our Internet site at:

www.ABB.com

2 Safety

The device has been constructed according to the latest valid regulations governing technology and is operationally reliable. It has been tested and left the factory in a technically safe and reliable state.

However, residual hazards remain. Read and adhere to the safety instructions to prevent hazards of this kind.

ABB accepts no liability for any failure to observe the safety instructions.

2.1 Information and symbols used

The following Instructions point to particular hazards involved in the use of the device or provide practical instructions:

Danger

Risk of death / serious damage to health

– The respective warning symbol in connection with the signal word "Danger" indicates an imminently threatening danger which leads to death or serious (irreversible) injuries.

Warning

Serious damage to health

– The respective warning symbol in connection with the signal word "Warning" indicates a threatening danger which can lead to death or serious (irreversible) injuries.

Caution

Damage to health

– The respective warning symbol in connection with the signal word "Caution" indicates a danger which can lead to minor (reversible) injuries.

Attention

Damage to property

– This symbol in connection with the signal word "Attention" indicates a situation which could cause damage to the product itself or to objects in its surroundings.

NOTE

This symbol in connection with the word "Note" indicates useful tips and recommendations for the efficient handling of the product.

The following safety symbols are used in the operating manual:

This symbol alerts to electric voltage.

2.2 Intended use

The device is a thermostat insert with memory for flush-mounted installation.

The device is intended for the following:

- Operation according to the listed technical data
- Installation in interior rooms and suitable flush-mounted boxes
- Use with the connecting options available on the device
- The device can be used with both electrical and water based heating systems

The intended use also includes adherence to all specifications in this manual.

2.3 Improper use

Each use not listed in Chapter 2.2 "Intended use" on page 6 is deemed improper use and can lead to personal injury and damage to property.

ABB is not liable for damages caused by use deemed contrary to the intended use of the device. The associated risk is borne exclusively by the user/operator.

The device is not intended for the following:

- Unauthorized structural changes
- Repairs
- Outdoor use
- inserting of objects through device openings

2.4 Target group / Qualifications of personnel

2.4.1 Operation

No special qualifications are needed to operate the device.

2.4.2 Installation, commissioning and maintenance

Installation, commissioning and maintenance of the device must only be carried out by trained and properly qualified electrical installers.

The electrical installer must have read and understood the manual and follow the instructions provided.

The electrical installer must adhere to the valid national regulations in his/her country governing the installation, functional test, repair and maintenance of electrical products.

The electrical installer must be familiar with and correctly apply the "five safety rules" (DIN VDE 0105, EN 50110):

1. Disconnect
2. Secure against being re-connected
3. Ensure there is no voltage
4. Connect to earth and short-circuit
5. Cover or barricade adjacent live parts

2.5 Safety instructions

Danger - Electric voltage!

Electric voltage! Risk of death and fire due to electric voltage of 100 … 240 V.

Dangerous currents flow through the body when coming into direct or indirect contact with live components. This can result in electric shock, burns or even death.

- Work on the 100 … 240 V supply system may only be performed by authorised and qualified electricians.
- Disconnect the mains power supply before installation / disassembly.
- Never use the device with damaged connecting cables.
- Do not open covers firmly bolted to the housing of the device.
- Use the device only in a technically faultless state.
- Do not make changes to or perform repairs on the device, on its components or its accessories.
- Keep the device away from water and wet surroundings.

Caution! - Risk of damaging the device due to external factors!

Moisture and contamination can damage the device.

- Protect the device against humidity, dirt and damage during transport, storage and operation.

3 Information on protection of the environment

3.1 Environment

Consider the protection of the environment!

Used electric and electronic devices must not be disposed of with domestic waste.

– The device contains valuable raw materials which can be recycled. Therefore, dispose of the device at the appropriate collecting depot.

All packaging materials and devices bear the markings and test seals for proper disposal. Always dispose of the packaging material and electric devices and their components via the authorized collecting depots and disposal companies.

The products meet the legal requirements, in particular the laws governing electronic and electrical devices, the REACH ordinance and the Ecodesign requirements.

(EU Directive 2012/19/EU WEEE, 2011/65/EU RoHS and 2009/125/EC Ecodesign)

(EU REACH ordinance and law for the implementation of the ordinance (EC) No.1907/2006).

4 Setup and function

4.1 Device overview

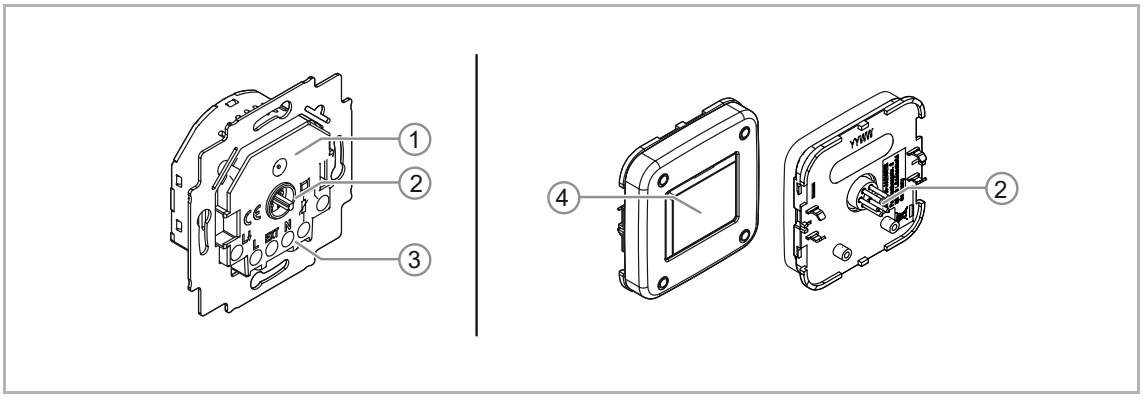


Fig. 1: Overview of devices

[1] Type plate
[2] Connecting plug
[3] Connecting terminal for electrical connection
[4] Display

4.2 Functions

The device serves for the time-controlled temperature regulation through switching contact. Time scheduling of temperature control per day can be set. The temperatures can be set in the block or individually for the individual days. The device can be used with both electrical and water based heating systems

Notice

- The application is not suitable for proportional control

5 Technical data

5.1 Technical data

Designation	Value
Nominal voltage:	230 V AC, ±10%, 50 Hz
Outputs:	1 normally open contact
Connecting terminals	1.5 mm² - 4 mm²
– Minimum tightening torque	> 0.8 Nm
Switching capacity:	250 V AC / 16 (2) A
Power loss (Standby):	≤ 0.05 W
Protection class	II
Operating temperature:	0°C to +35°C
Storage temperature:	-20°C to +70°C
Degree of protection by enclosure:	IP21
Quartz accuracy (at 20°C):	< +/- 0,5 Sec./day
Mode of operation (DIN EN 60730-1)	1 BSTU
Pollution degree (DIN EN 60730-1)	2
Rated impulse voltage (DIN EN 60730-1)	4000 V
Floor sensor:	NTC 10 kΩ @ 25°C
External input:	230 V AC / 10 µA (same phase)

Table 1: Technical data

5.2 Dimensional drawings

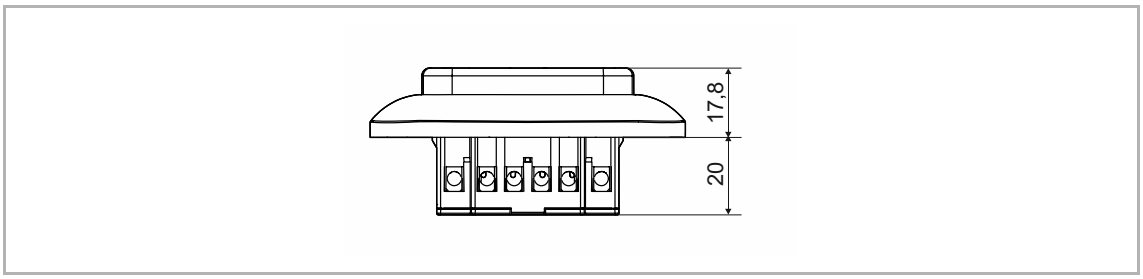


Fig. 2: Dimensions

Notice
All dimensions are in mm.

6 Connection, installation / mounting

Danger - Electric voltage!

Risk of death due to electrical voltage of 100 … 240 V during short-circuit in the low-voltage conduit.

– Low-voltage and 100 … 240 V conduits must not be installed together in a flush-mounted box!

6.1 Requirements for the electrician

Danger - Electric voltage!

Install the device only if you have the necessary electrical engineering knowledge and experience.

- Incorrect installation endangers your life and that of the user of the electrical system.
- Incorrect installation can cause serious damage to property, e.g. due to fire.

The minimum necessary expert knowledge and requirements for the installation are as follows:

- Apply the "five safety rules" (DIN VDE 0105, EN 50110):
  1. Disconnect
  2. Secure against being re-connected
  3. Ensure there is no voltage
  4. Connect to earth and short-circuit
  5. Cover or barricade adjacent live parts.
- Use suitable personal protective clothing.
- Use only suitable tools and measuring devices.
- Check the type of supply network (TN system, IT system, TT system) to secure the following power supply conditions (classic connection to ground, protective earthing, necessary additional measures, etc.).

6.2 Mounting / dismantling

Caution! The device can sustain damage when coming into contact with hard objects!

The plastic parts of the device are sensitive.

– Pull the attachment off only with your hands.
– Do not lever parts off with screwdrivers or similar hard objects.

The flush-mounted insert must only be installed in flush-mounted wall boxes according to DIN 49073-1, Part 1, or suitable surface-mounted housings.

To install the device, perform the following steps:

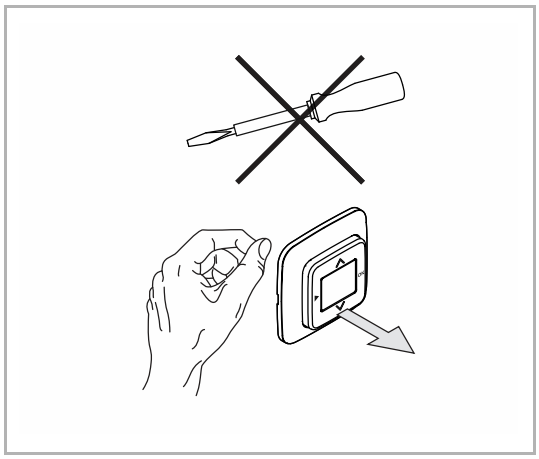


Fig. 3: Wall mounting: pulling off the attachment

– If the device is already mounted or assembled, pull the attachment off the flush-mounted insert with the aid of the cover frame.

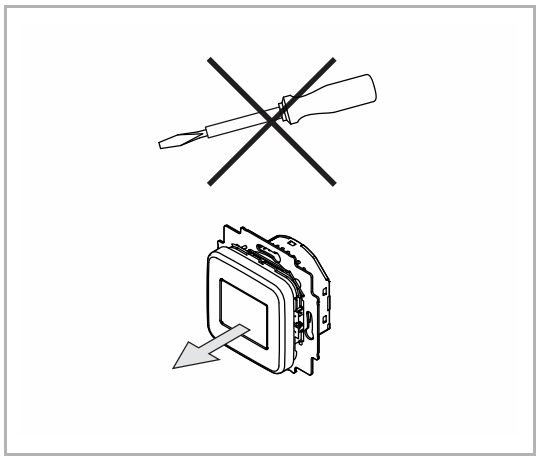


Fig. 4: Device in as-delivered state: pulling off the attachment

– If the device is in its as-delivered state, pull the attachment off the flush-mounted insert with your hands.
  – Pull the attachment off only with your hands!
  – Do not lever parts off with screwdrivers or similar hard objects. This will damage the device.
  – When pulling off, first the resistance of the spring clamps must be overcome.

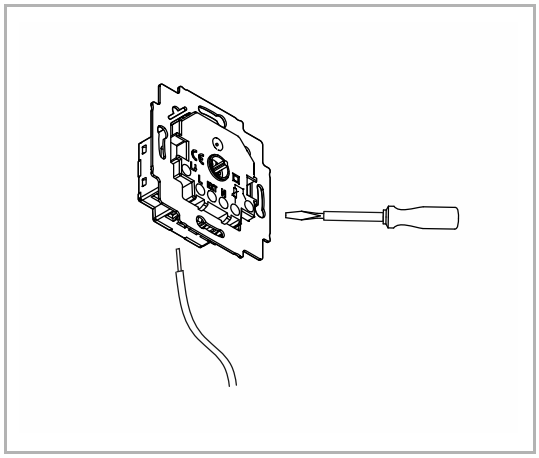


Fig. 5: Connecting the cables

1. Connect the cables to the flush-mounted insert.
   – For the connection assignment, see chapter 6.3 "Electrical connection" on page 16.

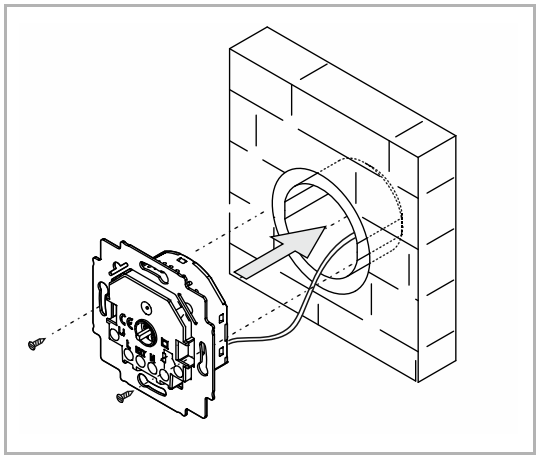


Fig. 6: Mounting the flush-mounted insert

2. Mount the flush-mounted insert.

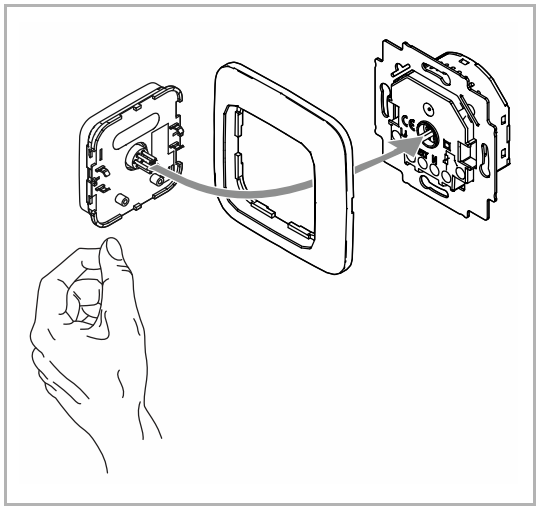


Fig. 7: Mounting the attachment

3. Plug the attachment together with the cover frame onto the flush-mounted insert.
   – Ensure that the plug-in connection on the rear side does not get jammed.
   – If mounting is difficult, check whether a burr has formed at the lock-in openings of the flush-mounted insert and remove it.

The device is now mounted.

6.3 Electrical connection

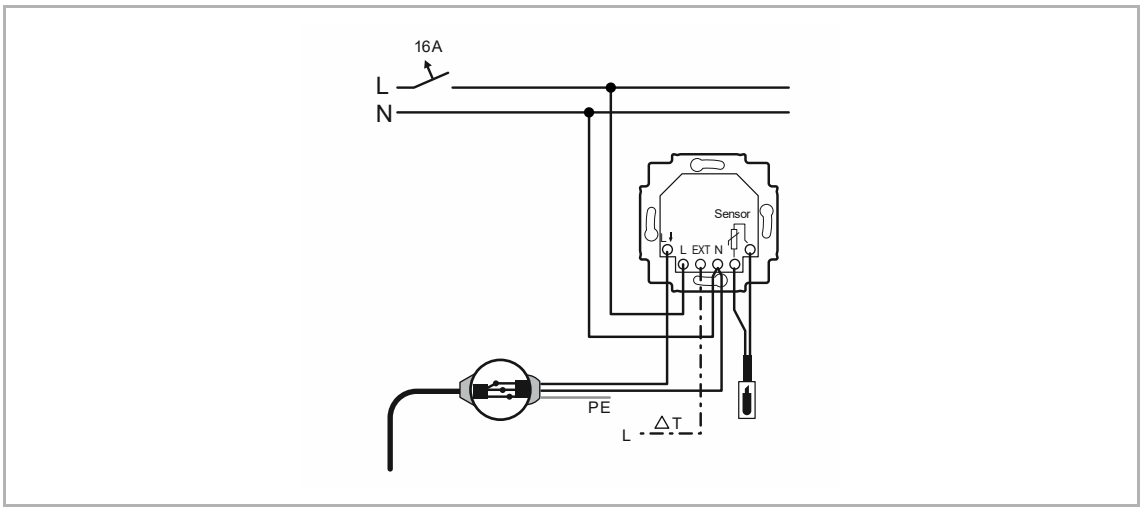


Fig. 8: Electrical connection

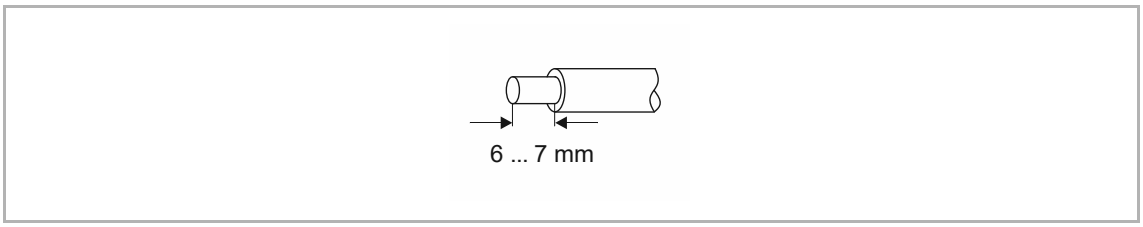


Fig. 9: Skinning length

The skinning length amounts to 6 - 7 mm.

7 Commissioning

7.1 Initial setup

A menu for initial installation is displayed directly after the following situations:

- The first electrical connection.
  - Electrical connection: see chapter 6.3 "Electrical connection" on page 16.
- First mounting of the operating control.
  - Mounting of the operating control: see chapter 6.2 "Mounting / dismantling" on page 14.
- After a reset.
  - Reset: see chapter 8.4.4 "Expert Menu – Factory defaults" on page 32.

All entries can also be made later in the settings.

If no floor sensor is connected, an error message is displayed when selecting the application for "floor control" and "Room control / floor limitation". In this case, select the "Room control" application and confirm it.

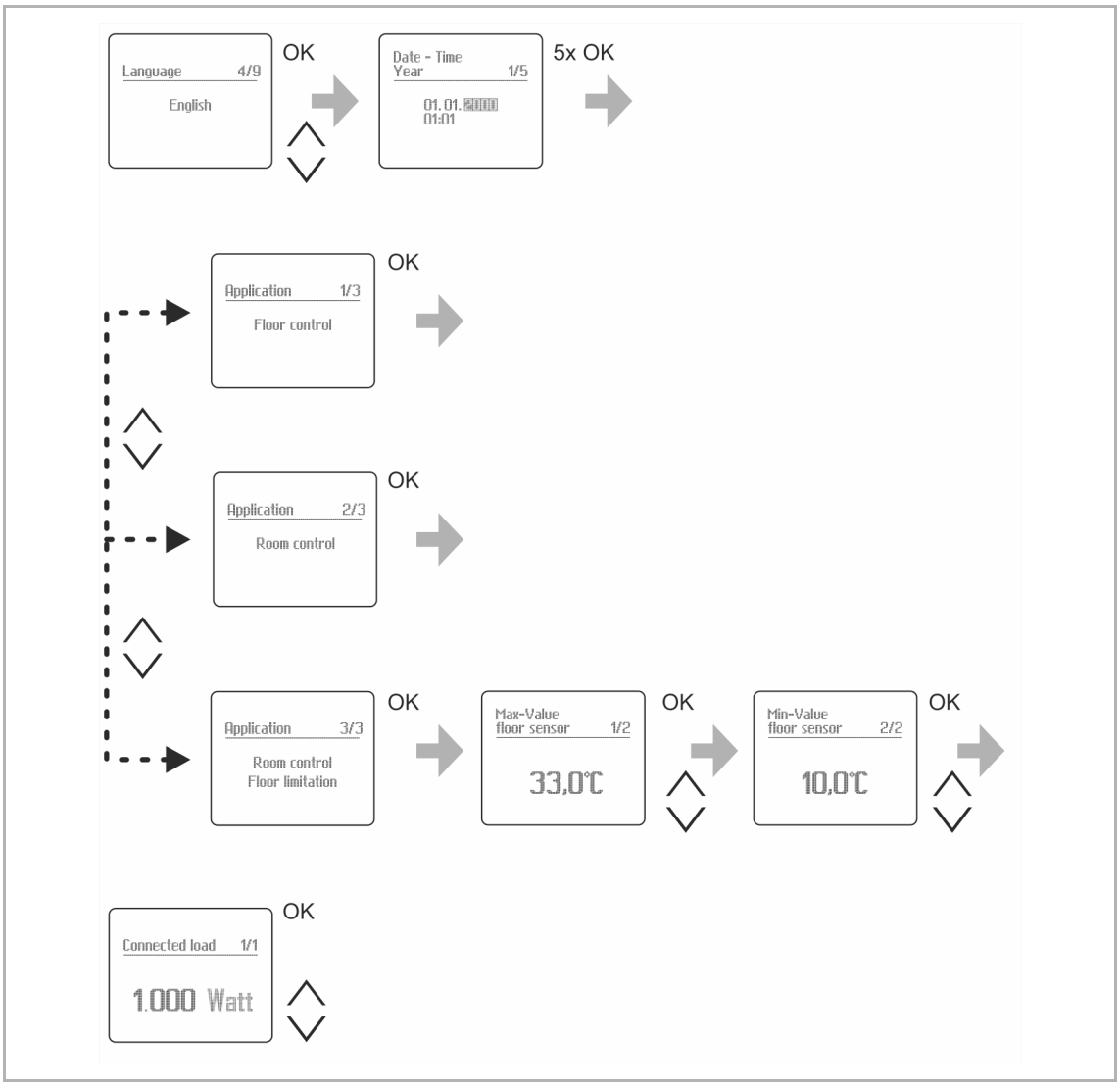


Fig. 10: Initial setup

7.2 Factory defaults

Note

The floor sensor measures the temperature of the concrete in the floor. The temperatures of the floor surface materials are usually about 5 ° C lower than the temperatures of the concrete.

– It is recommended that the limit temperature of the floor sensor be set as low as possible to avoid damaging the floor surface material. However, each material is unique, so check the material manufacturer's recommendations.

Start times		
Comfort	Mon-Fri 07:00 o'clock	Sat-Sun: 08:00 o'clock
ECO	Mon-Fri 22:00 o'clock Sat-Sun 22:00 o'clock	

Temperature settings	
Comfort	23.0 °C
ECO	19.0 °C

First start times when the programming change to 4-events (example block function)	
Comfort	▪ Mon-Fri 07:00 o'clock → 16:00 o'clock ▪ Sat-Sun 08:00 o'clock→ - - : - - o'clock
ECO	▪ Mon-Fri 09:00 o'clock → 22:00 o'clock ▪ Sat-Sun - - : - - o'clock → 22:00 o'clock
- - : - - o'clock: This start time is not active but can be activated.	

Expert mode Options	
Event schedule weekly program	Block function
Event schedule number of events	2-events per block
Adaptive function	Yes
Keylock	No
Display lighting	Automatic
Automatic S/W- change	Yes
Language	English
External Input	OFF (with frost protection)

Expert mode Special function	
Floor Sensor	Original sensor
Application	Floor control – If Combi mode is selected: ▪ 33.0 °C for max. value floor sensor ▪ 10.0 °C for min. value floor sensor
Frost protection	Yes
Min./Max.- values	▪ Max. room 30.0 °C; Min. room 5.0 °C ▪ Max. floor 50.0 °C; Min. floor 5.0 °C
Connected load (electrical)	1.000 W
Display internal temperature value	No
Offset	0.0 °C
Valve protection	No

8 Operation

8.1 Button assignment

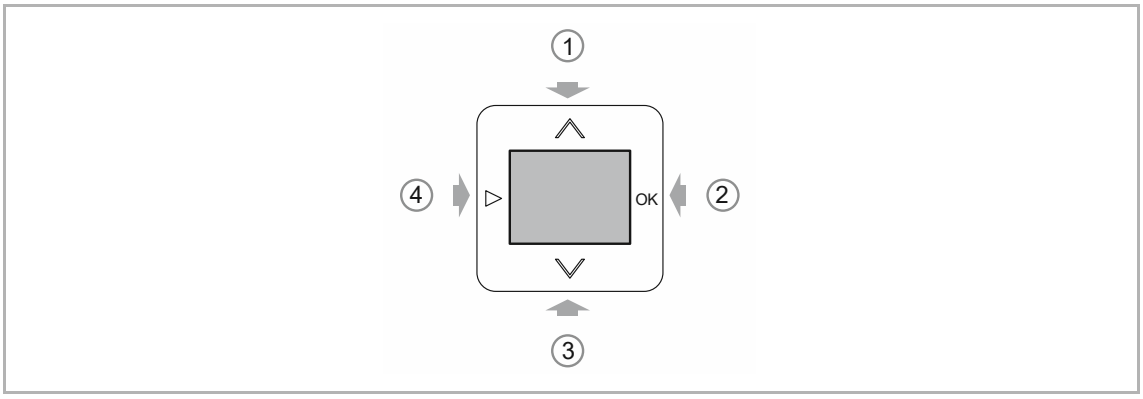


Fig. 11: Button assignment for operation / setting

	Designation	Function
1	UP	▪ Standard modes "AUTO", "OFF", "ECO" and "Comfort": – Set point for the temperature can be adjusted ▪ Programing mode: – mode selection ▪ Programing mode: – Displayed values can be adjusted: – Short press: First digit single step change – Longer press >1 sec: First digit changes step by step with – A frequency of 5 Hz until 5 or 0 is reached, then the step value is increased to be 5.
2	OK	▪ With the OK key, the value of a flashing display is confirmed and next parameter appears. ▪ Programming must be confirmed completely. ▪ If you press > 0.6 seconds in a standard mode – The selection of the standard modes "AUTO" "OFF" "ECO" and "Comfort" appears and the mode can be adjusted. – Selection with the keys Λ V and confirmation with OK ▪ If you press < 0.6 seconds in a standard mode the start times for the current day are displayed.
3	DOWN	▪ Same functions as UP (1)
4	BACK	▪ From a standard modes "AUTO" "OFF" "ECO" and "Comfort" to programming mode and backwards. ▪ Furthermore, this button can be used to get one level back in the menu.

Table 2: Button assignment for operation

8.2 Operating modes

8.2.1 Switching operating modes

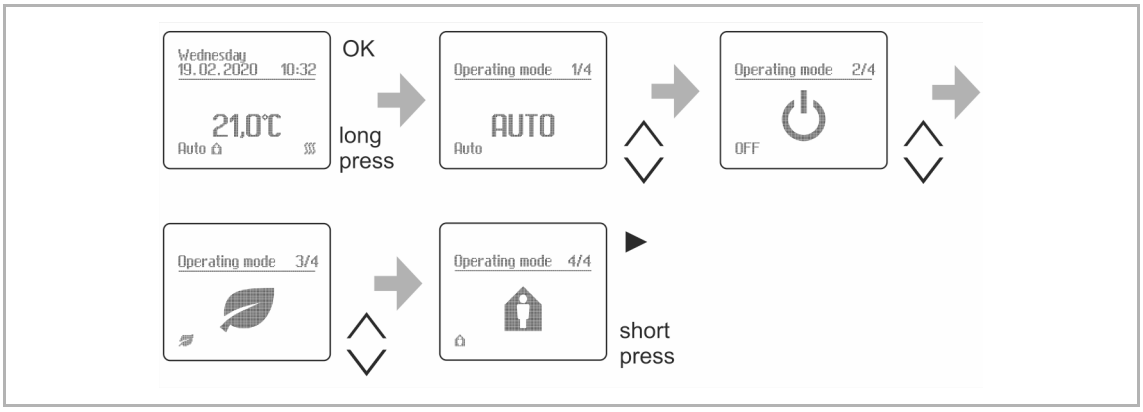


Fig. 12: Switching operating modes

To activate the selected operating mode press OK.

– The unit automatically returns to the main menu.
– The selected operating mode is active.

8.2.2 AUTO

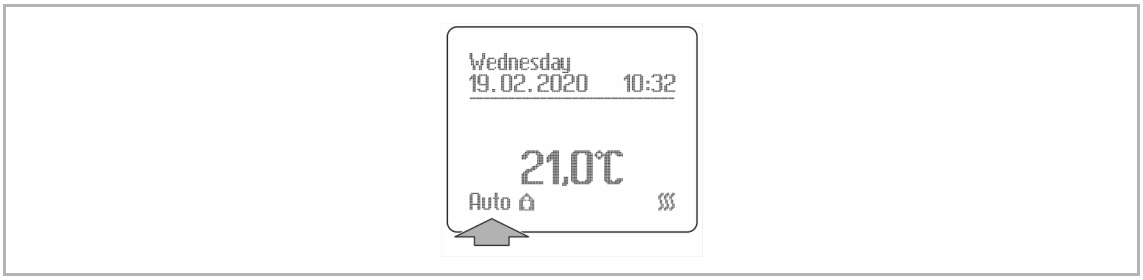


Fig. 13: Operating mode: AUTO

In the AUTO mode the time program is active.

In the time program, the temperature is controlled according to the set times to the comfort temperature and the reduced ECO temperature.

– To set the time values: see chapter 8.3.3 "Set start times" on page 26.
– To set the temperature values: see chapter 8.3.4 "Set temperature Comfort and ECO" on page 28.
– To set 2 or 4 events per day: see chapter 8.4.2 "Expert menu – Options" on page 29.
  – This setting is located in the "Expert menu". If you are not sure, consult an expert to make the settings.

The set value can be adjusted with the UP / DOWN buttons and remains valid until the next programmed start time is reached.

– If the set value is adjusted manually "Manual" is show in the display.

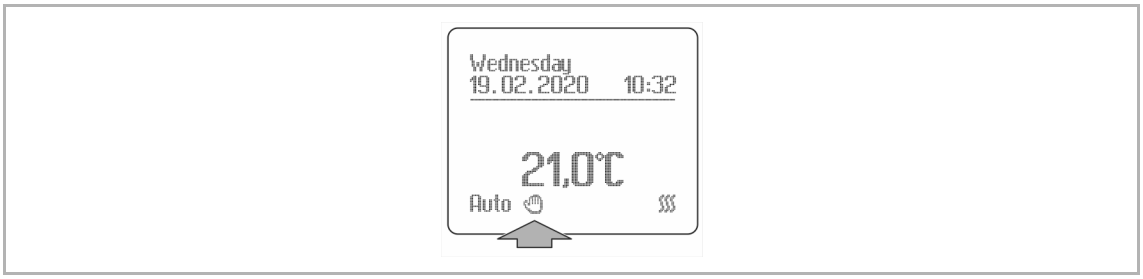
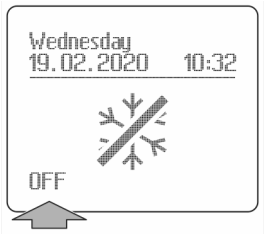
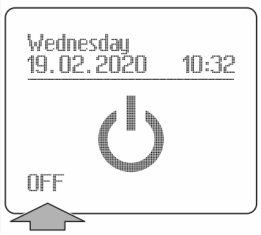


Fig. 14: Operating mode: AUTO with manual adjusted set value

8.2.3 OFF



OFF with freeze protection active



OFF with freeze protection inactive

Fig. 15: Operating mode: OFF

The controller is switched off. With or without freeze protection active.

– To set the freeze protection, when the controller is switched off: see chapter 8.4.3 "Expert menu – Special functions" on page 31.
  – This setting is located in the "Expert menu". If you are not sure, consult an expert to make the settings.

8.2.4 Comfort/ECO

8.2.4.1 Comfort/ECO

No time programs are active in the Comfort or Eco operating mode.

For example, this is desired, if the Comfort or ECO temperature is to be available the whole day. In this case, the corresponding operating mode must be activated. If the time programs are to be active again, the AUTO operating mode is selected again.

– Setting the temperature values for comfort mode: see chapter 8.3.4 "Set temperature Comfort and ECO" on page 28
– Setting the temperature values for ECO mode: see chapter 8.3.4 "Set temperature Comfort and ECO" on page 28

The set value can be adjusted with the UP / DOWN buttons.

– If the set value is adjusted manually "Manual" is shown in the display.

8.2.4.2 Comfort mode

Fig. 16: Operating mode: Comfort

8.2.4.3 ECO mode

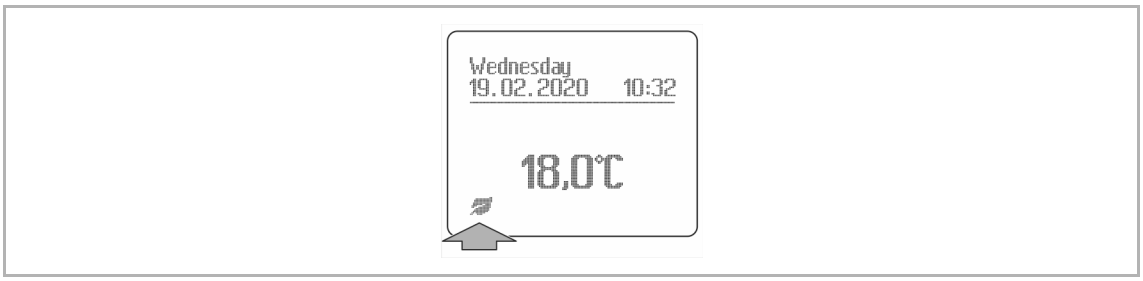


Fig. 17: Operating mode: ECO

8.3 Normal operation

8.3.1 Set nominal temperature manually

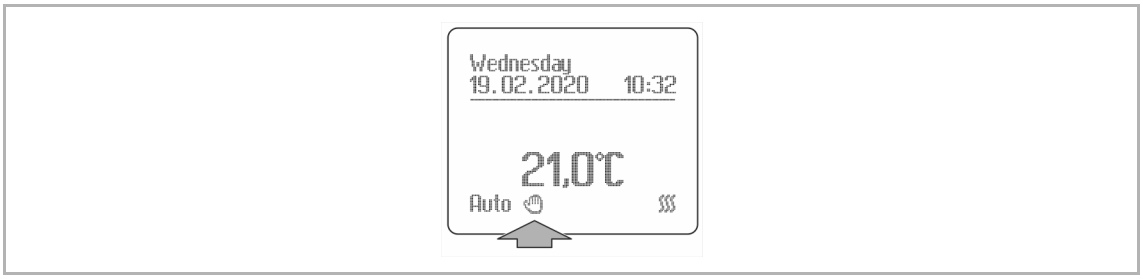


Fig. 18: Nominal temperature set manually

The set value can be adjusted with the UP / DOWN buttons.

- A long press of the UP / DOWN buttons triggers the value to change quickly.
- The manually adjusted set value remains valid until the next programmed start time is reached.
- If the set value is adjusted manually the hand symbol for "Manual" is show in the display.

8.3.2 Display start times

Fig. 19: Display start times

A short press of the OK button displays the actual set start times.

- In the example screen, the device changes to comfort temperature at 06:00 and to ECO mode at 21:00.
- By shortly pressing the OK button again or the BACK button, the device switches back to the home screen.

8.3.3 Set start times

The start times are starting Comfort- mode and the ECO-mode via a block or individual programming.

- Start times can be adjusted in steps of 10 minutes.
- Start times can be deleted.
  - To delete a specific start time, all 4 buttons must be pressed at once during the relevant start time is displayed.
- The difference of time between two starting times is at least half an hour.

2 or 4 switches (events) per day can be implemented.

– To set 2 or 4 events per day: see chapter 8.4.2 "Expert menu – Options" on page 29.
  – This setting is located in the "Expert menu". If you are not sure, consult an expert to make the settings.

Block (Mon … Fri / Sat - Sun) or daily programming can be implemented.

– To set block or daily: see chapter 8.4.2 "Expert menu – Options" on page 29.
  – This setting is located in the "Expert menu". If you are not sure, consult an expert to make the settings.

Example 1: Block programming and 2-events per block

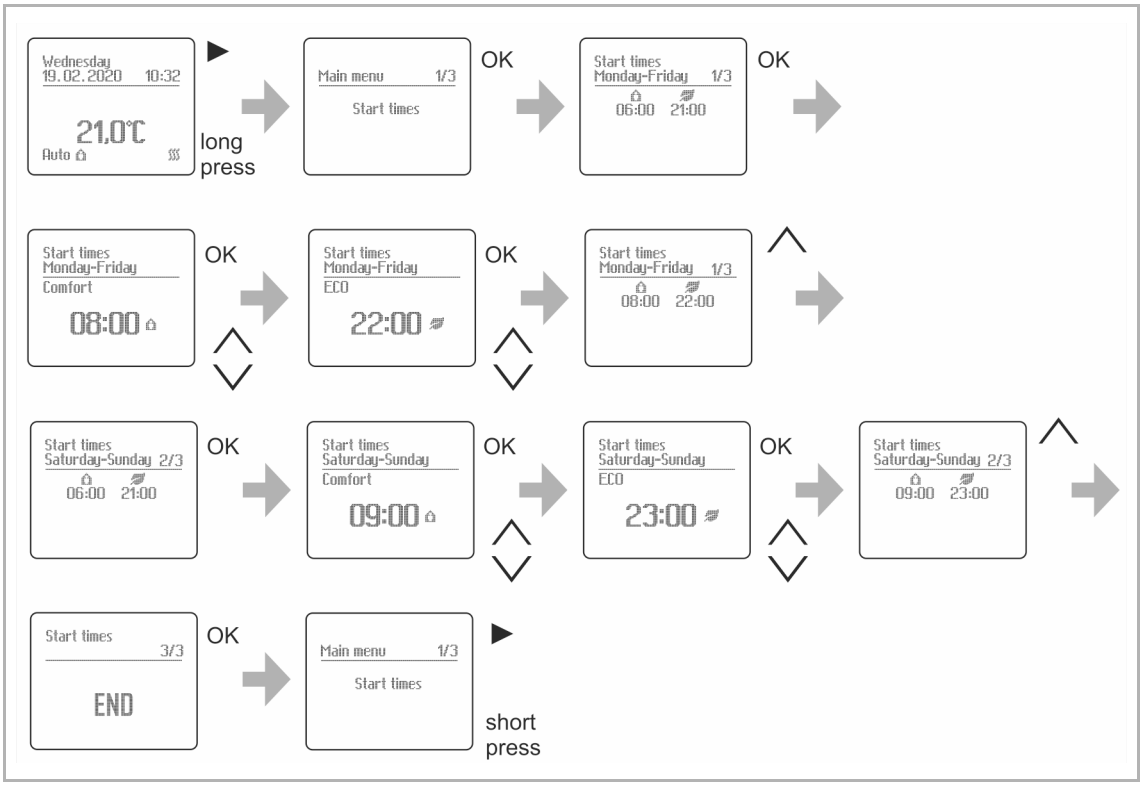


Fig. 20: Set start times: Block and 2-events per block

Example 2: Daily programming and 4-events per day

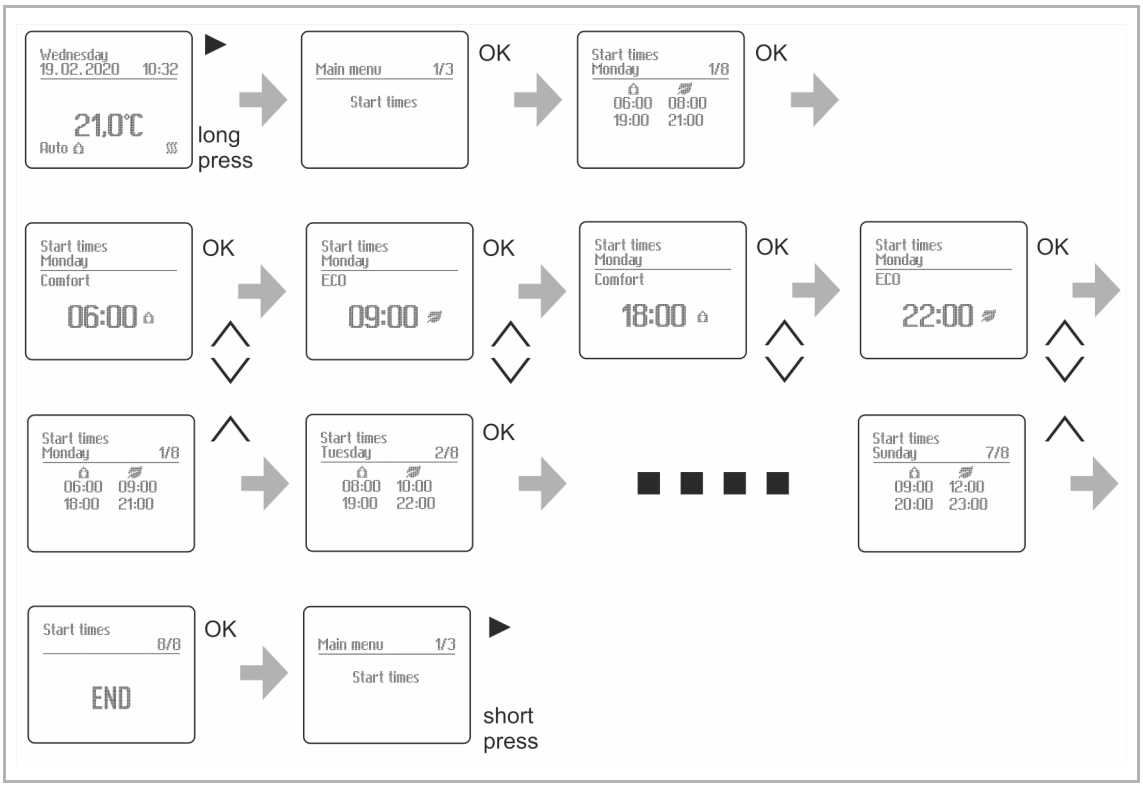


Fig. 21: Set start times: Daily and 4-events per day

Deactivate a start time:

It is possible to deactivate start times.

By doing so, you can realise for example:

- With 4 start times a specific day is only switched twice.
- With 2 start times one day is skipped. For example, on this day, the eco-temperature is set.

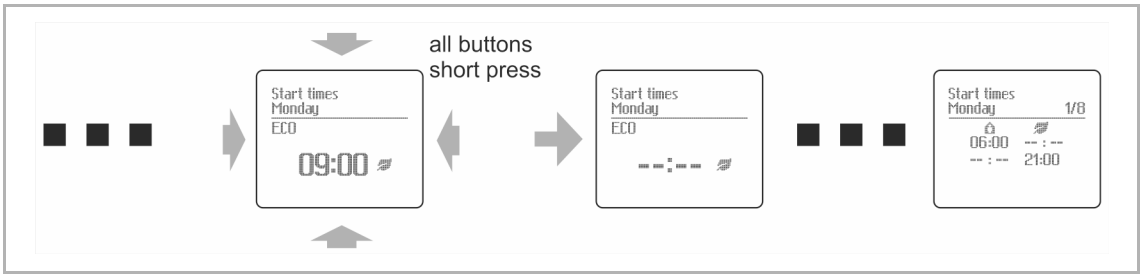


Fig. 22: Deactivate a start time

8.3.4 Set temperature Comfort and ECO

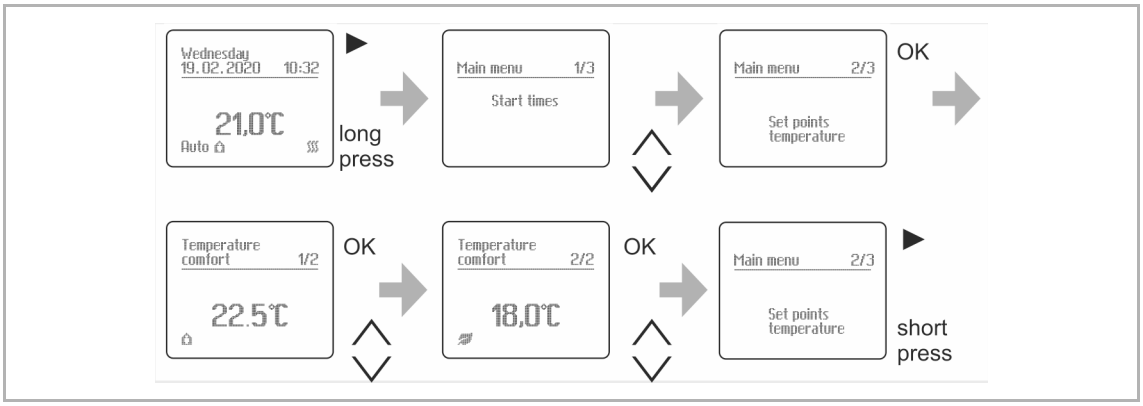


Fig. 23: Set temperature Comfort and ECO

8.3.5 Set date, time and year

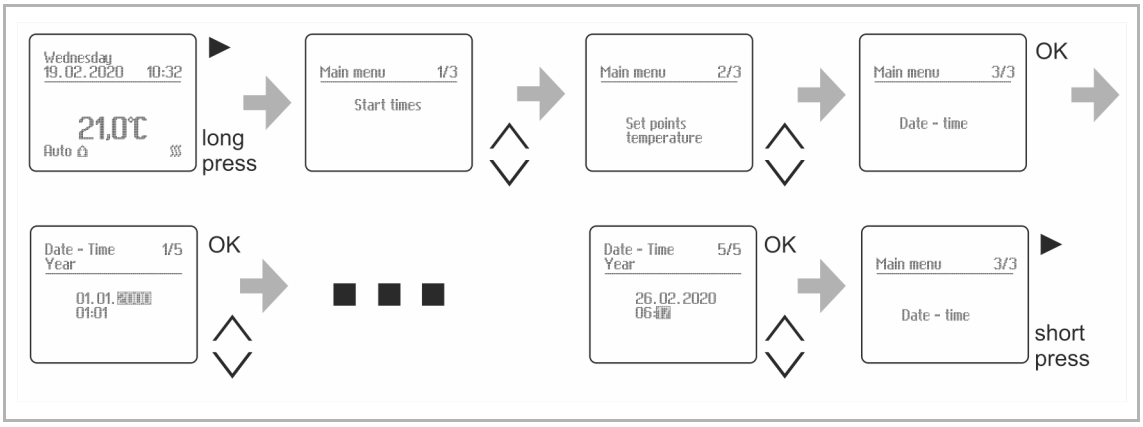


Fig. 24: Set date, time and year

8.3.6 Switching operating modes

To switch to an operating mode, see chapter 8.2.1 "Switching operating modes" on page 21.

8.4 Expert menu

8.4.1 Navigation to the menu "Expert"

Menu selection of the "Expert menu".

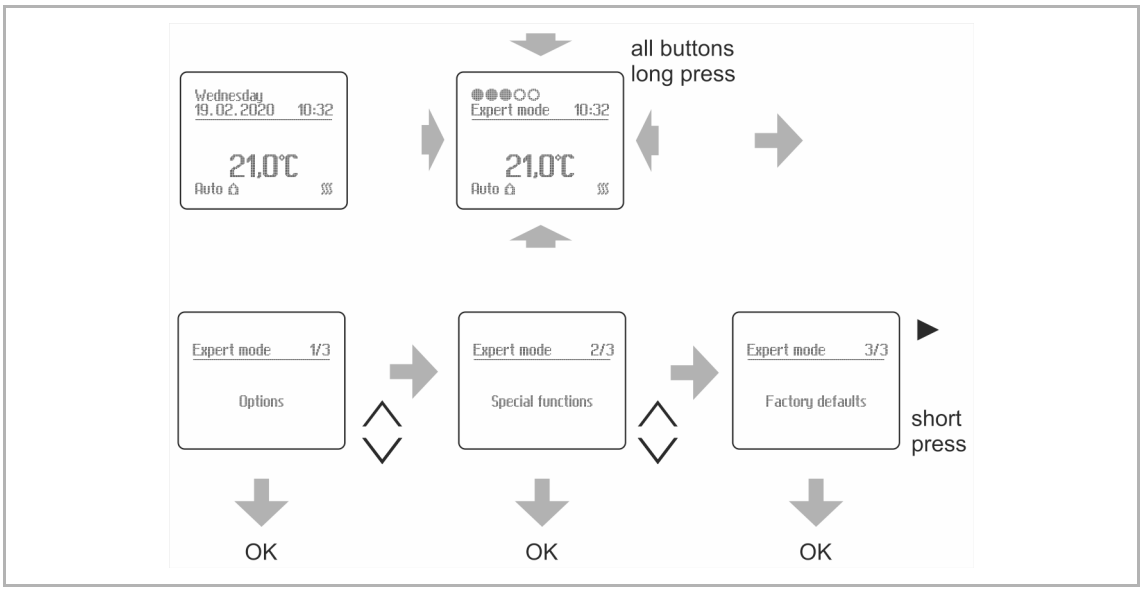


Fig. 25: Navigation to the menu "Expert"

8.4.2 Expert menu – Options

Options		
(1/8)	Event shedule weekly program	Selection of the programming to be "Block" or "Daily".
(2/8)	Event shedule number of phases	number of events ▪ 2-events per block or 2-per day ▪ 4-events per block or 4-per day
(3/8)	Adaptive function	YES / NO ▪ Ensures that the required temperature is reached at the corresponding start time. ▪ The adaptive function is automatically calculated on the basis of the measurements of the previous days ▪ This function applies when changing from a lower to a higher set temperature, e.g. when changing from ECO to comfort.
(4/8)	Keylock	YES / NO ▪ If the lock is activated with Yes, the first press on a key in one of the operating modes AUTO, Comfort, ECO or OFF must have a minimum duration of 5 seconds. ▪ The display shows a count-down from 5 to 0 seconds. If no key is pressed for 1 minute, the key lock is active again.
(5/8)	Display lighting	The Display lighting can be Automatic or ON. ▪ Automatic: – If no key is pressed for a minute, the display lighting turns off. ▪ ON: – The display lighting is always ON.

(6/8)	Automatic S/W change	Automatic Summer/Winter time change ▪ Yes: – Corrects the time according to the European summer time rule ▪ No: – No Summer/Winter time change
(7/8)	Language selection	▪ Czech ▪ Danish ▪ English ▪ Finnish ▪ Norwegian ▪ Russian ▪ Slovak ▪ Swedish (Pre-set language is English)
(8/8)	External input	ECO, Comfort, OFF ▪ Selection of the mode (ECO, Comfort, OFF) which will be activated with an active external input. ▪ With an active external input, the start times are deactivated.

8.4.3 Expert menu – Special functions

Special functions		
(1/8)	Floor sensor	The thermostat controls the floor temperature. A floor sensor must be connected. The following options are available: ▪ 10 kOhm (ABB; Elko) ▪ 2 kOhm (ALRE) ▪ 12 kOhm (OJ) ▪ 15 kOhm (Devi) ▪ 33 kOhm (Eberle; Gira) ▪ 47 kOhm (Ensto)
(2/8)	Application	▪ Floor controlling: – The thermostat controls the floor temperature. – For the application "Floor controlling" a floor sensor must be connected. – If there is no floor sensor connected, there will be displayed the note "Sensor floor error". ▪ Room controlling: – The thermostat controls the room temperature on the basis of the internal sensor (air temperature). ▪ Room controlling / floor limitation: – The thermostat controls the room temperature on the basis of the internal sensor and also monitors the floor temperature to adjust the control depending on extreme floor temperature values. – The user sets the minimum and maximum temperature limit for the floor. The maximum limit is set to protect wooden floors from being destroyed due to excess temperatures. So even if the internal sensor requests more heat, the thermostat won't switch on. The minimum temperature keeps the floor warm when there are other heat sources in the room e.g. a fire place. So even if the internal sensors measures a sufficiently warm room, the thermostat will control the floor temperature to be on a certain minimum level. – For the application "Room controlling / floor limitation" a floor sensor must be connected. – If there is no floor sensor connected, there will be displayed the note "Sensor floor error".
(3/8)	Frost protection	YES / NO ▪ Yes: – If the Thermostat is in mode OFF, the temperature set value is +5°C. ▪ No: – If the Thermostat is in mode OFF, no set value is active at all.
(4/8)	Max. / Min. Values	Floor sensor: – Definition of Max. / Min.- values (Application: Floor control). – Max. value: 20.0 °C … 30.0 °C – Min. value. 5.0 °C … 15.0 °C – Definition of Max. / Min.- values (Application: Room control and Room control with Floor limitation): – Max. value: 20.0 °C … 30.0 °C – Min. value: 5.0 °C … 15.0 °C

(5/8)	Connected load	Connected load – To provide the connected load in Watts: Adjustable in steps of 100 Watt.
(6/8)	Display measured temperature value	No: – The internal temperature value is not displayed. Yes: – The internal temperature value is displayed.
(7/8)	Offset	Due to environmental influences, the actual set value cannot always be achieved. In order to adjust the controller in the best way possible, the temperature offset can be adjusted accordingly. – Adjustable in steps of 0.1 °C. The Offset also affects the displayed internal temperature value.
(8/8)	Valve protection (for water based heating)	YES / NO – If valve protection is activated with Yes, the load will be switched ON every day at 10:00 for at least 5 minutes. – This is important if standard mode is set to OFF.

8.4.4 Expert Menu – Factory defaults

If the selection "Factory settings" in the "Expert menu" is confirmed, the device is reset to the factory settings.

– After confirming, the Initial Setup is started automatically.

– Data of the factory dafaults: see chapter 7.2 "Factory defaults" on page 18.

– Initial setup: see chapter 7.1 "Initial setup" on page 17.

8.5 Error messages

8.5.1 No floor sensor connected

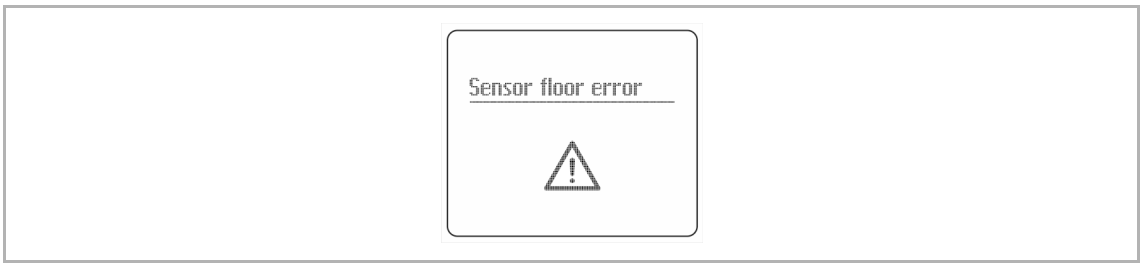


Fig. 26: No floor sensor connected

For the applications "Floor controlling" and "Room controlling / floor limitation" a floor sensor must be connected.

If there is no floor sensor connected and one of the applications activated, the message "Sensor floor error" will be displayed instead of the main menu.

– The buttons have no function.

– The controller carries out PWM control with 30% on-time heating.

To reset the error message, switch to the expert settings and select the application "Room controlling", see chapter 8.4.3 "Expert menu – Special functions" on page 31.

9 Maintenance

9.1 Cleaning

Caution! - Risk of damaging the device!

- When spraying on cleaning agents, these can enter the device through crevices.
  - Do not spray cleaning agents directly onto the device.
- Aggressive cleaning agents can damage the surface of the device.
  - Never use caustic agents, abrasive agents or solvents.

Clean dirty devices with a soft dry cloth.

– If this is insufficient, the cloth can be moistened slightly with a soap solution.

10 Notes

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