KNX
Product documentation

GIRA

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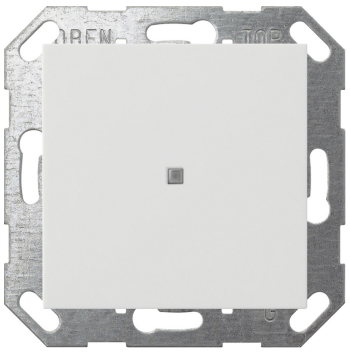
07.08.2020
51713100

Button, rocker

Order no. 5171 .., 5172 .., 5173 .., 5174 .., 5175 ..



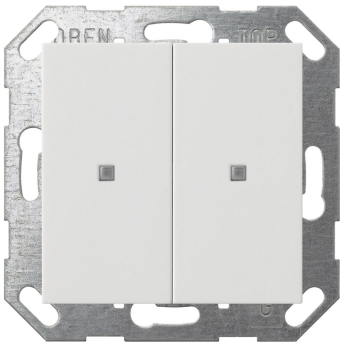


Table of Contents

1 Information on the product

1.1 Product catalogue

Product name	Article number	Use	Design
Button, rocker 1-gang	5171 .., 5172 ..	Sensor	FM (Flush-mounted)
Button, rocker 2-gang	5173 .., 5174 ..	Sensor	FM (Flush-mounted)

1.2 Function

General

Compatible with KNX Data Secure products KNX Data Secure offers protection against manipulation in building automation and can be configured in the ETS project. Detailed specialist knowledge is required. A device certificate, which is attached to the device, is required for safe commissioning. During mounting, it is recommended to remove the certificate from the device and to store it securely.

The device can be updated. Firmware can be easily updated with the Gira ETS Service App (additional software).

Push-button sensor functions

When its buttons are actuated, the device sends telegrams to the KNX, depending on the ETS parameter settings. These can be telegrams for switching, for dimming or for controlling blinds. Value transmitters and scene extension functions can also be programmed. The value transmitter functions include, for example, temperature and brightness value transmitters.

The device can be used as a controller extension, i.e. as an operation and display element of a room temperature controller.

The operation concept can be configured in the ETS either as a rocker function or alternatively as a button function. With the rocker function, two buttons lying one above the other are combined into one rocker. With the button function, each button is evaluated individually.

All buttons or single buttons of the device can be disabled using the disabling function. During active disabling, the assigned buttons perform parameterised behaviour.

LED function

The device possesses a three colour status LED per rocker. These status LEDs can either be switched on or off permanently, or can function as a status indicator for a button or rocker. As an alternative, the LEDs can also be activated via separate communication objects. The LEDs can either indicate the switching status of an object statically or by flashing, or signal operating states of room temperature controllers.

The colour of the status LED can either be parameterised for all status LEDs together or separately for each status LED.

The brightness of all status LEDs is adjustable in six stages using a common parameter. A separate communication object allows the brightness to be reduced, e.g. during night hours.

When the application program is discharged and the bus voltage is connected, all status LEDs initially light up green. Whenever a button is actuated, the respective illuminated status LED changes colour (green → red → blue → green → ...).

Measurement of the room temperature

As a supplement to the controller extension the device has an integrated temperature sensor that makes it possible to measure and forward the local room temperature. A temperature value received via an object can optionally supplement the room temperature measurement performed by the internal temperature sensor in order to improve the measurement result.

1.3 Device components

Front view 1-channel (see figure 1) and 2-channel (see figure 2)

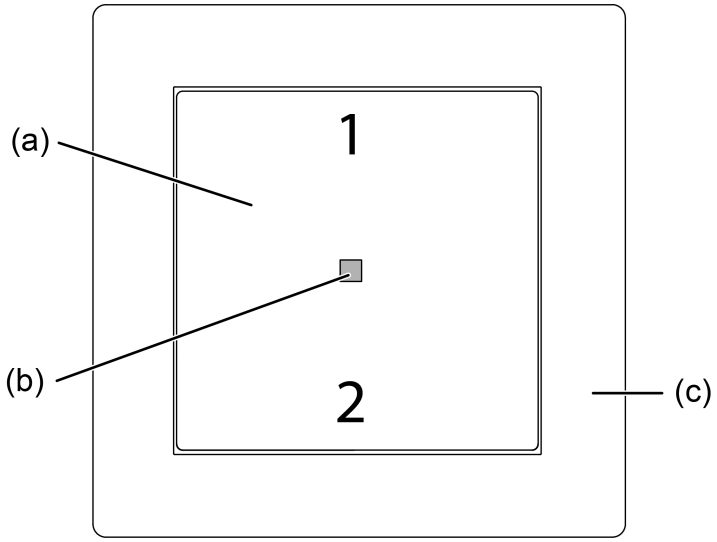


Image 1: Device components 1-channel

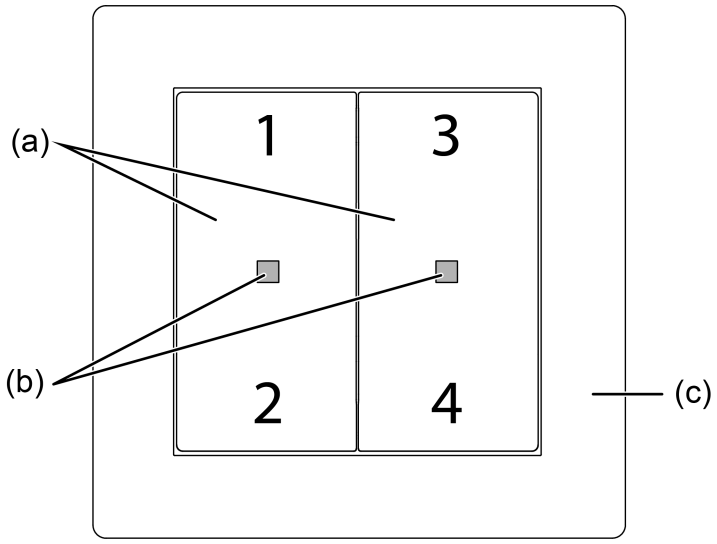


Image 2: Device components 2-channel

(a) Operating rockers (accessory)
(b) Status LED
(c) Cover frame (accessory)
1...4 Push-buttons assignment and status LED

Rear view (see figure 3)

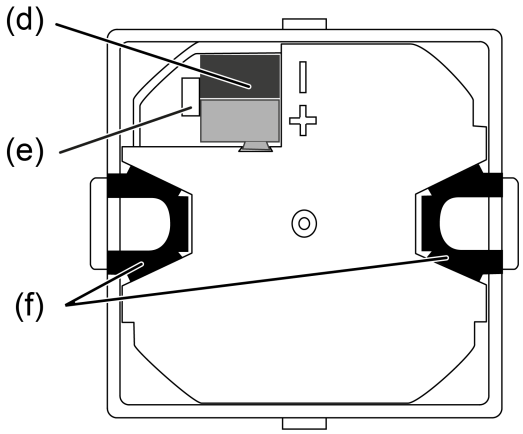


Image 3: Device components

(d) Device connection terminal KNX
(e) Opening for removing the KNX connection terminal with screwdriver
(f) Retaining spring for mounting in supporting frame

1.4 Delivery state

In the delivery state and when the bus voltage is connected, all status LEDs initially light up green. Whenever a button is actuated, the respective illuminated status LED changes colour (green → red → blue → green → ...).

1.5 Technical data

KNX

KNX medium	TP256
Safety	X-mode
Commissioning mode	S-mode
Rated voltage	DC 21 ... 32 V SELV
Current consumption KNX	8 ... 12 mA
Connection mode KNX	Standard device connection terminal
Connecting cable KNX	EIB-Y (St)Y 2x2x0.8
Protection class	III

Ambient conditions

Ambient temperature	-5 ... +50 °C
Storage/transport temperature	-25 ... +70 °C
Relative humidity	max. 93 % (no condensation)

2 Safety instructions

Electrical devices may only be mounted and connected by electrically skilled persons.

Serious injuries, fire or property damage possible. Please read and follow manual fully.

Danger of electric shock. During installation and cable routing, comply with the regulations and standards which apply for SELV circuits.

3 Fitting and electrical connection

DANGER!

Mortal danger of electric shock.

- Cover up live parts in the installation environment.

Mounting and connecting the device (see figure 4)

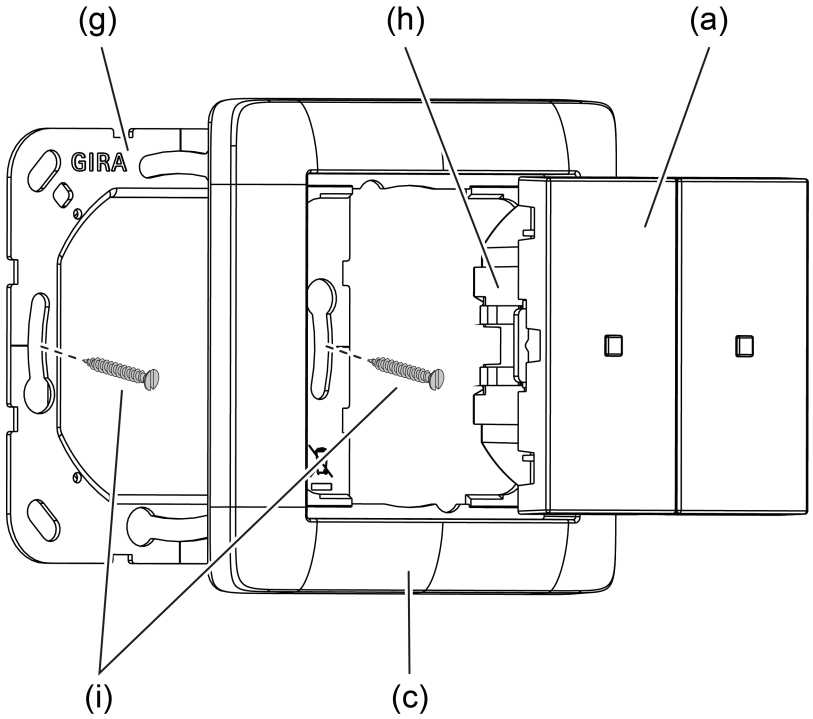


Image 4: Fitting the device

(a) Operating rockers
(c) Cover frame
(g) Supporting frame
(h) Basic unit
(i) Box screws

The device should be used in an air-tight appliance box. Otherwise temperature measurements can be negatively influenced by draughts.

In secure operation (preconditions):

– Secure commissioning is activated in the ETS.
– Device certificate entered/scanned or added to the ETS project. A high resolution camera should be used to scan the QR code.
– Document all passwords and keep them safe.

- Mount supporting frame on an appliance box

Use the supplied box screws.

- Position the cover frame on the supporting frame.
- Connect device to the KNX using KNX connecting terminal (red= +, black = -).
- In secure operation: The device certificate must be removed from the device and stored securely.
- Attach device onto the supporting frame.

  Cover frame is fixed.

  The device can be commissioned and is ready for operation.

4 Commissioning

Programming the physical address and application program, 1-channel (see figure 5) and 2-channel (see figure 6)

Project design and commissioning with ETS from version5.7.3and above.

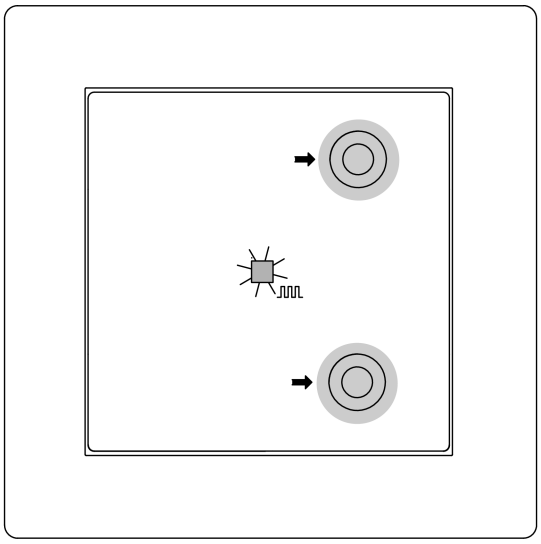


Image 5: Activating programming mode (1-channel)

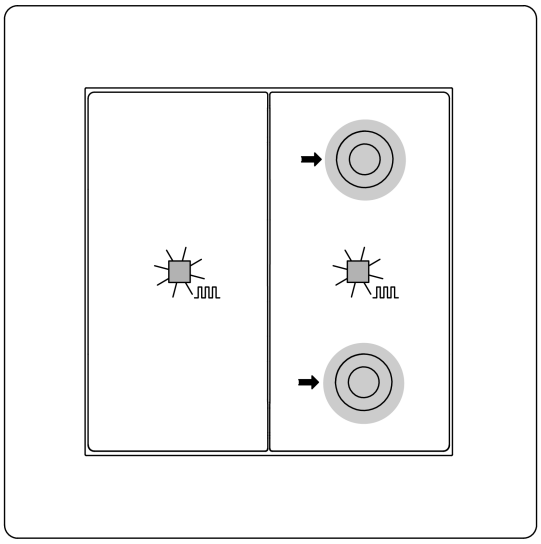


Image 6: Activating programming mode (2-channel)

Precondition: The device is connected and ready for operation.

- Activate programming mode: Press the top right button and bottom right button simultaneously and hold for longer than 4 seconds (see figure 5).

  The Status LED flashes red. Programming mode is activated.

When the programming mode is activated, telegrams can be sent to the bus.

- Programming the physical address.

  The status LED returns to its previous state. Physical address is programmed.

- Programming the application program.

The status LED is switched off while the application program is programmed. As soon as the programming is successfully completed, the status LED carries out its parameterised function.

When the application program is discharged and the bus voltage is connected, all status LEDs initially light up green. Whenever a button is actuated, the respective illuminated status LED changes colour (green → red → blue → green → ...).

4.1 Safe-state mode

The safe state mode stops the execution of the loaded application program.

If the device does not work properly - for instance as a result of errors in the project design or during commissioning - the execution of the loaded application program can be halted by activating the safe-state mode. The safe-state mode does not permit controlling the outputs via the bus and by hand. The push-button remains passive since the application program is not being executed (state-of-execution: terminated). Only the system software is still functional so that the ETS diagnosis functions and also programming of the device continue to be possible.

Only the system software of the device is still functional. ETS diagnosis functions and programming of the device are possible.

Activating the safe-state mode

- Switch off the bus voltage.
- Press and hold down the top right and bottom right button.
- Switch on the bus voltage.

  The safe-state mode is activated. The status LED flashes red slowly (approx. 1 Hz).

Only release the the top right and bottom right buttons when the LED flashes.

Deactivating safe-state mode

- Switch off bus voltage or carry out ETS programming.

4.2 Master reset

The master reset restores the basic device setting (physical address 15.15.255, firmware remains in place). The device must then be recommissioned with the ETS.

During secure operation: A master reset deactivates device security. The device can then be recommissioned with the device certificate.

Devices can be reset to factory settings with the ETS Service App. This function uses the firmware contained in the device that was active at the time of delivery (delivery state). Restoring the factory settings causes the devices to lose their physical address and configuration.

If the device - for instance as a result of errors in the project design or during commissioning - does not work properly, the loaded application program can be deleted from the device by performing a master reset. The master reset resets the device to delivery state. Afterwards, the device can be put into operation again by programming the physical address and application program.

Performing a master reset

Precondition: The safe-state mode is activated.

- Press and hold down the top right and bottom right button for more than 5 seconds until the status LED flashes.

  The device performs a master reset. The status LED flashes quickly (approx. 4 Hz).

  The device restarts and is in delivery state.

5 Operation

Operating areas

The device consists of up to 2 operating areas, depending on the device variant. The operating concept of an operating area can be configured in the ETS as a rocker function or as a button function.

With the rocker function, an operating area is divided into two buttons (top/bottom) with the same basic function.

In the button function either an operating area is divided into 2 functionally separate buttons (double-area operation), or an operating area is evaluated as single-area operation (only one button).

Centrally on each operating area, there is a status LED, which can be connected to the control function, according to the function of the rocker or buttons. A status LED can also signal completely independent display information, flash or be permanently on or off. Besides functions that can be set using the ETS, the status LED also indicates that the device is in the programming mode for commissioning or diagnosis purposes.

The operation of functions or electrical consumers can be set individual for each device:

Operation concept	single-area operation	dual-area operation
Rocker function	-	Each rocker can perform an individual function.
Button function	Two buttons above one another perform the same function.	Each button can perform an individual function.

5.1 Examples for operating various standard applications

- Switch: Short press on button.
- Dim: Long press on the button. The dimming process ends when the button is released.
- Move Venetian blind: Long press on button.
- Stop or adjust Venetian blind: Short press on button.
- Set value, e.g. brightness or temperature setpoint: Short press on button.
- Open scene: Short press on button.
- Save scene: Long press on button.
- Execute channel 1: Short press on button.
- Execute channel 2: Long press on button.
- Operate controller extension: Short press on button.

6 Application programs

ETS search paths:	Push-button/ push-button, 1-gang/ Button, rocker 1-gang
	Push-button/ push-button, 2-gang/ Button, rocker 2-gang
Configuration:	S-mode standard

Application program available for Button, rocker 1-gang

Name	Button, rocker 1-gang 116121
Version:	2.1 for ETS version 5.7.3 onwards
from mask version	07B0
Summarized description	Multifunctional push-button sensor application. 1 rockers or 2 push-buttons on the basic device Temperature measurement and disabling function can be activated.

Application program available for Button, rocker 2-gang

Name	Button, rocker 2-gang 116221
Version:	2.1 for ETS version 5.7.3 onwards
from mask version	07B0
Summarized description	Multifunctional push-button sensor application. 2 rockers or 4 push-buttons on the basic device Temperature measurement and disabling function can be activated.

7 Scope of functions

General

- KNX Data Secure compatible
- Firmware updates are possible

Push-button sensor functions

- Operating concept can be configured (rocker function or as a button)
- Button evaluation for button function concept can be configured (single-area or double-area operation)
- Button function can be configured (switching, dimming, Venetian blind, value transmitter, scene extension, 2-channel operation and controller extension, no function)
- Rocker function can be configured (switching, dimming, Venetian blind, value transmitter, scene extension, 2-channel operation and controller extension, no function)

  Switching: The command on pressing and/or releasing is adjustable (no reaction, switch on, switch off, toggle).

  Dimming: The command on pressing, the time between switching and dimming, the dimming in different levels, the telegram repetition on long press and the transmission of a stop telegram at the end of the press is adjustable.

  Venetian blind: The command on pressing and the operating concept is adjustable. The operating concept can be adjusted in the times for short and long actuation and slat adjustment.

  Value transmitter: The operating mode (1-byte and 2-byte value transmitter) and the value is adjustable.

  Scene extension: The operating mode (with or without storage function) and the scene number is adjustable.

  2-channel operation: Up to two telegrams can be transmitted to the KNX by one button-press. The operating concept can be adjusted and the time for short and long actuation adapted. The function of the channels is adjustable separately.

  Controller extension: The function (operating mode selection, forced operating mode switch-over, presence function and setpoint shift) is adjustable.
- Disabling function can be activated

  The rockers or buttons can be disabled via a 1-bit object. The polarity of the disabling object can be set. During an active disable, all or some of the rockers / buttons can have no function, can perform the function of a selected button or execute one of two presettable disabling functions.

Status LED

- Function can be configured

  The function is selected per status LED

When selecting the function, the following functions can be configured: Always ON, Button-press display, Telegram acknowledgment, Status display, Status display, Activation via separate LED object, Operating mode display, Controller status display, Presence status display, Setpoint shift display

– Colour can be configured

  The colour is selected either together for all status LEDs or separately for each status LED of the device.

  The status LED can light up in red, green or blue according to choice.

– Brightness can be configured

  The brightness of the status LED can be set to six levels.

  Through night reduction, the brightness of the status LED can be reduced at night using a communication object.

Controller extension functions

– The controller extension can be configured as a function of a rocker or button.

  Full control of a room temperature controller (operating modes, presence functions and setpoint shift).

– The displays of the controller extension can be configured as a function of the status LED

  Full-featured indication of the controller status via the status LED of the extension (heating / cooling reporting, setpoint shift, room temperature, setpoint temperature and current operating mode).

– Temperature measurement can be activated

  Measurement of the room temperature with an internal sensor or optionally by determining the measured value of the internally measured temperature with an external temperature.

8 General settings

The "KNX Secure" parameter page provides information about KNX Data Secure. No parameterisation is performed on this parameter page.

On the "General" parameter page, general settings of the status LED are parameterised. These settings apply to all status LEDs of the device.

On the "General" parameter page, the "LED orientation lighting", "LED night reduction", "Disabling function" and "Temperature measurement" functions are enabled. These four functions are parameterised on separate parameter pages.

On the "Operating concepts" parameter page, the operating concepts of all device buttons are parameterised. Button evaluation can be parameterised depending on the parameterised operating concept.

Table of parameters

The following parameters are available on the "General" parameter page under the "Status LED" header.

Colour	red green blue Colour selection per status LED
A distinction is made whether all of the status LEDs have the same colour (settings "red", "green" or "blue"), or whether different colours can alternatively be configured for the LEDs ("Colour selection per status LED" setting). With colour selection per status LED, it is possible to set the colour on the parameter pages of the individual status LEDs.	

Brightness	Level 0 (OFF) Level 1 (dark) Level 2 Level 3 Level 4 Level 5 (bright)
The brightness level for all status LEDs is defined at this point.	

Light duration of status LED for button-press display	1 s 2 s 3 s 4 s 5 s
This parameter defines the switch-on time the status LED is lit up to indicate actuation. The setting concerns all status LEDs whose function is set to "Button-press display".	

The following parameters are available on the "General" parameter page under the "Enabled" header.

LED orientation lighting	Active **Inactive**
The LED orientation lighting of the device can be centrally enabled at this point. If "Active", the ETS shows further communication object and parameters.	

LED night reduction	Active **Inactive**
The LED night reduction of the status LED can be centrally enabled at this point. If "Active", the ETS shows further communication object and parameters.	

disabling function	Active **Inactive**
With this parameter, the disabling function of the device can be centrally activated. If "Active", the ETS shows further communication object and parameters.	

Temperature measurement	Active **Inactive**
The temperature measurement of the device can be centrally enabled at this point. If "Active", the ETS shows further communication object and parameters.	

The following parameters are available on the "Operating concepts" parameter page.

Operating concept of buttons *n* and *m*	**Rocker function** Button function
For each operating area, the user can specify independently whether it is to be used as a rocker with a common basic function or as two different buttons with completely independent functions. Depending on this setting, the ETS displays different communication objects and parameter pages.	

Button evaluation	Single-area operation (button *n*) Dual-area operation (buttons *n* & button *m*)
If the operation concept of a operating area is configured as "button function", this parameter can be used to specify whether single-area or dual-area operation should be implemented. In single-area operation, the entire operating area is evaluated as a single button. The surface can be depressed at any desired point in order to execute the underlying button function. In this setting, the button with the even button number of the button pair (e.g. button 2) is inactive and physically not present. In dual-area operation, the operating area is divided into two mutually independent buttons.	

9 Channel-oriented device functions

The following subchapters provide a description of the device functions. Each subchapter consists of the following sections:

- Functional description
- Table of parameters
- Object list

Functional description

The functional description explains the function and provides helpful tips on project design and usage of the function. Cross references support you in your search for further information.

Table of parameters

The table of parameters lists all parameters associated with the function. Each parameter is documented in a table as follows.

Name of the parameter	Parameter values
Parameter description	

Object list

The object list specifies and describes all communication objects associated with the function. Each communication object is documented in a table.

Object no.	This column contains the object number of the communication object.
Function	This column contains the function of the communication object.
Name	This column contains the name of the communication object.
Type	This column contains the length of the communication object.
DPT	This column assigns a datapoint type to a communication object. Datapoint types are standardized in order to ensure interoperability of KNX devices.
Flag	This column assigns the communication flags in accordance with the KNX specification.
K flag	activates / deactivates the communication of the communication object
L flag	enables externally triggered reading of the value from the communication object
S flag	enables externally triggered writing of the value to the communication object
Ü flag	enables transfer of a value
A flag	enables updating of an object value in case of feedback
I flag	enforces updating of the communication object value when the devices is switched on (reading at init)

9.1 Switching

For each rocker or button with the function set to "switching", the ETS indicates two 1-bit communication objects. The parameters permit fixing the value the "switching" object is to assume on pressing and/or releasing (ON, OFF, TOGGLE – toggling of the object value). No distinction is made between a brief or long press.

9.1.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Command on pressing	no reaction ON OFF **TOGGLE**
This parameter defines the reaction when the button is pressed.	

Command on releasing	**no reaction** ON OFF TOGGLE
This parameter defines the reaction when the button is released.	

9.1.2 Object list

The following communication objects are available for the individual rockers or buttons, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
29, 32, 35, 38	Switching	Button/rocker *n* - output	1-bit	1,001	C, -, -, T, -
1-bit object for transmission of switching telegrams (ON, OFF).					

Object no.	Function	Name	Type	DPT	Flag
30, 33, 36, 39	Switching feedback	Button/rocker *n* - input	1-bit	1,001	C, -,W, -, U
1-bit object for receiving feedback telegrams (ON, OFF).					

9.2 Dimming

For each rocker or button with the function set to "dimming", the ETS indicates two 1-bit and a 4-bit object. Generally, the device transmits a switching telegram after a brief press and a dimming telegram after a long press. In the standard parameterisation the device transmits a telegram for stopping the dimming action after a long press. The time needed by the device to detect an actuation as a long actuation can be set in the parameters.

The "Dimming" function distinguishes between double-area operation (UP, DOWN) and single-area operation (TOGGLE). The parameter "Command on pressing" defines the single-surface or double-surface dimming function.

dual-area operation	single-area operation
Brighter (ON)	Brighter / darker (TOGGLE)
Darker (OFF)	Brighter (TOGGLE)
	Darker (TOGGLE)

With double-area operation, the device transmits a telegram for switching on or off after a brief press, and a telegram for increasing the brightness ("Brighter") or decreasing the brightness ("Darker") after a long press.

With single-area operation, the device transmits ON and OFF telegrams in an alternating pattern ("TOGGLE") for each brief press, and the "brighter" and "darker" telegrams in an alternating pattern for long actuations.

Feedback

If an actuator is controlled from multiple control elements, the actuator must report its switching status to the 1-bit object "Switching feedback" of the button or rocker. Due to the feedback, the device detects that the actuator has changed its switching status by input from another element and adjusts the dimming direction accordingly.

The dimming direction is always only evaluated and switched locally, unless the actuator changes its switching status due to input from multiple elements (e.g. lighting ON / change of brightness value only). The 4-bit dimming objects are not synchronized via the bus.

Advanced configuration options

The device has advanced parameters for the dimming function. If necessary, these advanced parameters can be activated and thus be made visible.
The advanced parameters can be used to determine whether the device is to cover the full adjusting range of the actuator with one dimming telegram continuously ("Increase brightness by 100 %", "Reduce brightness by 100 %") or whether the dimming range is to be divided into several small levels (50 %, 25 %, 12.5 %, 6 %, 3 %, 1.5 %).

In the continuous dimming mode (100%), the device transmits a telegram only at the beginning of the long press to start the dimming process and generally a stop telegram after the end of the press. For dimming in small levels it may be useful if the

device repeats the dimming telegram in case of a sustained press for a presettable time (parameter "Telegram repetition"). The stop telegram after the end of the press is then not needed.

When the parameters are hidden ("Advanced parameters = deactivated"), the dimming range is set to 100 %, the stop telegram is activated and the telegram repetition is deactivated.

9.2.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Command on pressing	No function* Brighter (ON) Darker (OFF) **Brighter / darker (TOGGLE)** Brighter (TOGGLE) Darker (TOGGLE)
This parameter defines the reaction when a button is pressed. If the device is to toggle on a brief press, the corresponding switching objects of other sensors with the same function must be interlinked. * Only for operation concept = button function	

Time between switching and dimming	**0** ... 59 s | 100 ... **400** ... 990 ms
This parameter defines how long the button must be pressed for a dimming telegram to be transmitted.	

Advanced parameters	Active **Inactive**
When the advanced parameters are activated, the ETS shows the following parameters.	

Increase brightness by	1.5 % 3 % 6 % 12.5 % 25 % 50 % **100 %**
This parameter sets the relative dimming level when the brightness is increased. On each button-press, the brightness is changed at maximum by the configured step width. It is recommended that the device repeats the dimming telegrams automatically, particularly with a small dimming level (see "Telegram repetition").	

Reduce brightness by	1.5 % 3 % 6 % 12.5 % 25 % 50 % **100 %**
This parameter sets the relative dimming level when the brightness is reduced. On each button-press, the brightness is changed at maximum by the configured step width. It is recommended that the device repeats the dimming telegrams automatically, particularly with a small dimming level (see "Telegram repetition").	

Stop telegram	**Active** Inactive
On "Active" the device transmits a telegram for stopping the dimming process when the button is released. i When the device transmits telegrams for dimming in smaller levels, the stop telegram is generally not needed.	

Telegram repetition	Active **Inactive**
This parameter can be used to activate telegram repetition for dimming. With telegram repetition activated, the device cyclically sends relative dimming telegrams (in the parameterised step width) to the bus if the button is pressed long.	

Time between two telegrams	**200 ms** 300 ms 400 ms 500 ms 750 ms 1 s 2 s
This parameter defines the interval at which the dimming telegrams are automatically repeated in the telegram repetition mode. This parameter is only visible if "Telegram repetition = active"!	

9.2.2 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
53, 59, 65, 71	Switching	Button/rocker *n* - output	1-bit	1,001	C, -, -, T, -
1-bit object for transmission of switching telegrams (ON, OFF).					

Object no.	Function	Name	Type	DPT	Flag
54, 60, 66, ..., 72	Dimming	Button/rocker *n* - output	4-bit	3,007	C, -, -, T, -
4-bit object for the transmission of relative dimming telegrams.					

Object no.	Function	Name	Type	DPT	Flag
55, 61, 67, ..., 73	Switching feedback	Button/rocker *n* - input	1-bit	1,001	C, -,W, -, U
1-bit object for receiving feedback telegrams (ON, OFF).					

9.3 Venetian blind

For each rocker or button with the function set to "Venetian blind" the ETS indicates the two 1-bit objects "STEP operation" and "MOVE operation".

The "Venetian blind" function distinguishes between double-area operation (UP, DOWN) and single-area operation (TOGGLE). The "Command on pressing" parameter defines the single-area or double-area blind function.

dual-area operation	single-area operation
UP	TOGGLE
DOWN	

With an operating area as a rocker, the double-surface Venetian blind function is preset. This means that the device e.g. with a press of the top button, transmits a telegram for an upward movement and, after a press of the bottom button, transmits a telegram for a downward movement.

In the separate buttons function, the device is preprogrammed for single-surface Venetian blind function. In this case, the device alternates between the directions of the long time telegram (TOGGLE) on each long actuation of the sensor. Several short time telegrams in succession have the same direction.

Feedback

If the actuator can be controlled from several sensors, a faultless single-area operation requires that the long time objects of the control elements are interlinked. The device would otherwise not be able to detect that the actuator has been addressed from another sensor, in which case it would have to be actuated twice during the next use in order to produce the desired reaction.

Operation concept for the Venetian blind function

For the control of Venetian blind, shutter, awning or similar drives, the device supports four operating concepts, for which the telegrams are transmitted in different time sequences. The device can therefore be used to operate a wide variety of drive configurations.

Operation concept "short – long – short"
In the operation concept "short – long – short", the device shows the following behaviour:

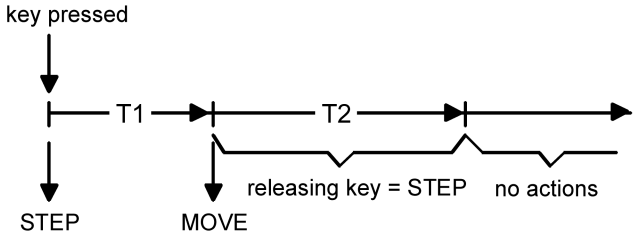


Image 7: Operation concept "short – long – short"

– Immediately on pressing the button, the device transmits a short time telegram. Pressing the button stops a running drive and starts time T1 ("time between short time and long time command"). No other telegram will be transmitted, if the key is released within T1. This short time serves the purpose of stopping a continuous movement.
  The "time between short and long time command" in the device should be selected shorter than the short-time operation of the actuator to prevent a jerky movement of the blind.
– If the button is kept depressed longer than T1, the device transmits a long time telegram after the end of T1 for starting up the drive and time T2 ("slat adjusting time") is started.
– If the button is released within the slat adjusting time, the device sends another short time telegram. This function is used for adjusting the slats of a blind. The function permits stopping the slats in any position during their rotation.
  The "slat adjusting time" should be chosen as required by the drive for a complete rotation of the slats. If the "slat adjusting time" is selected longer than the complete travelling time of the drive, a pushbutton function is possible as well. This means that the drive is active only when the button is kept depressed.
– If the button is kept depressed longer than T2, the device transmits no further telegram. The drive remains on until the end position is reached.

Operation concept "long – short":
In the operation concept "long – short", the device shows the following behaviour:

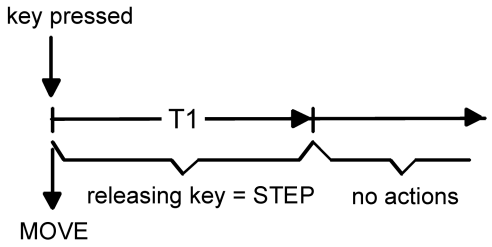


Image 8: Operation concept "long – short"

– Immediately on pressing the button, the device transmits a long time telegram. The drive begins to move and time T1 ("slat adjusting time") is started.
– If the button is released within the slat adjusting time, the device sends a short time telegram. This function is used for adjusting the slats of a blind. The function permits stopping the slats in any position during their rotation.
  The "slat adjusting time" should be chosen as required by the drive for a complete rotation of the slats. If the "slat adjusting time" is selected longer than the complete travelling time of the drive, a pushbutton function is possible as well. This means that the drive is active only when the button is kept depressed.
– If the button is kept depressed longer than T1, the device transmits no further telegram. The drive remains on until the end position is reached.

Operation concept "short – long"
In the operation concept "short – long", the device shows the following behaviour:

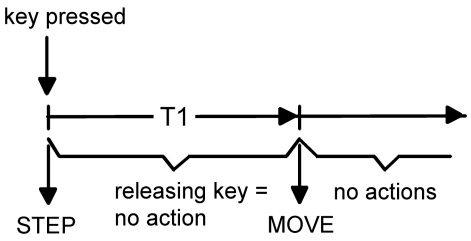


Image 9: Operation concept "short – long"

– Immediately on pressing the button, the device transmits a short time telegram. Pressing the button stops a running drive and starts time T1 ("time between short time and long time command"). No other telegram will be transmitted, if the key is released within T1. This short time serves the purpose of stopping a continuous movement.
The "time between short and long time command" in the device should be selected shorter than the short-time operation of the actuator to prevent a jerky movement of the blind.
– If the button is kept depressed longer than T1, the device transmits a long time telegram after the end of T1 for starting the drive.
– No further telegram is transmitted by the device when the button is released. The drive remains on until the end position is reached.

Operation concept "long – short or short":
In the operation concept "long – short or short", the device shows the following behaviour:

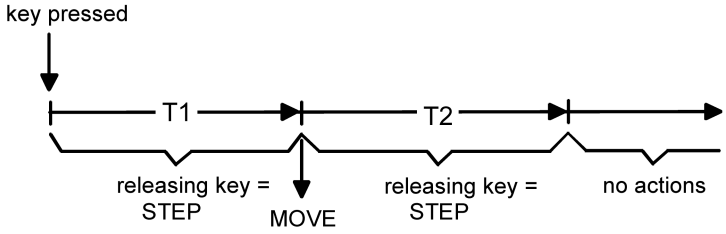


Image 10: Operation concept "long – short or short"

– Immediately on pressing the button, the device starts time T1 ("time between short time and long time command") and waits. If the button is released again before T1 has elapsed, the device transmits a short time telegram. This telegram can be used to stop a running drive. A stationary drive rotates the slats by one level.
– If the button is kept depressed after T1 has elapsed, the device transmits a long time telegram and starts time T2 ("slat adjusting time").
– If the button is released within T2, the device sends another short time telegram. This function is used for adjusting the slats of a blind. The function permits stopping the slats in any position during their rotation.
The "slat adjusting time" should be chosen as required by the drive for a complete rotation of the slats. If the "slat adjusting time" is selected longer than the complete travelling time of the drive, a pushbutton function is possible as well. This means that the drive is active only when the button is kept depressed.

– If the button is kept depressed longer than T2, the device transmits no further telegram. The drive remains on until the end position is reached.

9.3.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Command on pressing	UP DOWN **TOGGLE**
This parameter defines the running direction of the drive on pressing the button. If the setting is "TOGGLE", the direction is changed after each long time command. If several devices are to control the same drive, the long time objects of the devices must be interlinked to ensure that the running direction can be changed correctly.	

Operation concept	**short – long – short** long – short short – long long – short or short
For Venetian blind control, four different operation concepts can be selected. For these concepts, the ETS shows further parameters.	

Time between short-time and long-time command	**0** ... 4 min | **0** ... 59 s | 100 ... **400** ... 990 ms
This parameter sets the time after which the long-time operation will be evaluated on pressing the button. This parameter is not visible with "Operation concept = long – short"!	

Slat adjusting time	**0** ... 4 min | **0** ... 59 s | 100 ... **500** ... 990 ms
The time during which a transmitted MOVE telegram can be terminated by releasing the button (STEP) is set here. This function serves to adjust the slats of a blind. This parameter is not visible with "Operation concept = short - long"!	

9.3.2 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
101, 104, 107, 110	Short time operation	Button/rocker *n* - output	1-bit	1,007	C, -, -, T, -
1-bit object for the transmission of telegrams with which a Venetian blind or shutter drive motor can be stopped or with which the blind slats can be adjusted by short time operation.					

Object no.	Function	Name	Type	DPT	Flag
102, 105, 108, 111	Long-time operation	Button/rocker *n* - output	1-bit	1,008	C, -,W, T, -
1-bit object for the transmission of telegrams with which a Venetian blind or shutter drive motor can be can be moved upwards or downwards.					

9.4 Value transmitter

For each rocker or each button with the function set to "Value transmitter", the ETS indicates a corresponding object. On pressing a button, the configured value is transmitted to the bus. In case of a rocker function, different values can be configured for both buttons.

Value ranges

The "Function" and "Value range" parameters determine the value range used by the value transmitter.

Function	Function	Lower numerical limit	Upper numerical limit
1-byte value transmitter	0...255	0	255
1-byte value transmitter	0...100%	0%	100%
1-byte value transmitter	-128...127	-128	127
1-byte value transmitter	0...255%	0%	255%
2-byte value transmitter	0...65535	0	65535
2-byte value transmitter	-32768...32767	-32768	32767
2-byte value transmitter	Temperature value	0 °C	40 °C
2-byte value transmitter	Brightness value	0 lux	1500 lux

For each of these ranges, the value that can be transmitted to the bus for each button actuation is configurable.

9.4.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Function	**1 byte (0...255)** 1 byte (0...100%) 1 byte (-128...127) 1 byte (0...255%) 2 byte (0...65535) 2 byte (-32768...32767) 2 byte temperature value 2 byte brightness value
The "Value transmitter" function differentiates between 1-byte values and 2-byte values. The following parameters and their settings depend on the setting for this parameter.	

Value (0…255)	**0**...255
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 1-byte" and "Value range = 1-byte (0...255)".	

Value (0…100 %)	**0**...100
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 1-byte" and "Value range = 1-byte (0...100%)".	

Value (-128...127)	-128...**0**...127
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 1-byte" and "Value range = 1-byte (-128...127)".	

Value (0…255%)	**0**...255
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 1-byte" and "Value range = 1-byte (0...255%)".	

Value (0…65535)	**0**...65535
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 2-byte" and "Value range = 2-byte (0...65535)".	

Value (-32768…32767)	-32768...**0**...32767
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 2-byte" and "Value range = 2-byte (-32768...32767)".	

Temperature value (0...40 °C)	0...**20**...40
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 2-byte" and "Value range = 2-byte temperature value".	

Brightness value (0, 50, ..., 1500 lux)	0, 50, ..., **300**, ..., 1500
This parameter defines the object value when the button is pressed. This parameter is only visible if "Function = 2-byte" and "Value range = 2-byte brightness value".	

9.4.2 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter 0...255	Button/rocker *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for the transmission of values from 0 to 255. i These objects are only visible if "Function = 1-byte" and "Value range = 1-byte (0...255)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter 0…100 %	Button/rocker *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting values from 0 to 100%. i These objects are only visible if "Function = 1-byte" and "Value range = 1-byte (0...100%)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter -128...127	Button/rocker *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for the transmission of values from -128 to 127. i These objects are only visible if "Function = 1-byte" and "Value range = 1-byte (-128...127)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter 0…255 %	Button/rocker *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting values from 0 to 255%. i These objects are only visible if "Function = 1-byte" and "Value range = 1-byte (0...255%)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter 0...65535	Button/rocker *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for the transmission of values from 0 to 65535. i These objects are only visible if "Function = 2-byte" and "Value range = 2-byte (0...65535)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Value transmitter -32768...32767	Button/rocker *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for the transmission of values from -32768 to 32767. i These objects are only visible if "Function = 2-byte" and "Value range = 2-byte (-32768...32767)".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Temperature value transmitter	Button/rocker *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values from 0 to 40 °C. i These objects are only visible if "Function = 2-byte" and "Value range = 2-byte temperature value".					

Object no.	Function	Name	Type	DPT	Flag
119, 131, 143, 155	Brightness value transmitter	Button/rocker *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values from 0 to 1500 Lux. i These objects are only visible if "Function = 2-byte" and "Value range = 2-byte brightness value".					

9.5 Scene extension

For each rocker or button with the function set to "scene extension unit", the ETS indicates the "Function" parameter which distinguishes between the following settings:

– "Scene extension without storage function",
– "Scene extension with storage function",

In the scene extension function, the device transmits a preset scene number (1…64) via the "scene extension" communication object to the bus after a button-press. This feature permits recalling scenes stored in other devices and also storing them, if the storage function is used.

Function for the setting "… Scene extension without storage function":

– A button actuation results in a simple recall of the scene.
– A long button-press has no further or additional effect.

Function for the setting "… Scene extension with storage function":

– A button actuation of less than one second results in a simple recall of the scene.
– A button-press of more than five seconds, generates a storage instruction. In the scene extension function, a storage telegram is in this case transmitted to the bus. The internal scene is stored. The internal scene control module will then request the current scene values for the actuator groups used from the bus.

A button actuation lasting between one and five seconds will be discarded as invalid.

9.5.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Function	**Scene extension without storage function** Scene extension with storage function
This parameter defines the functionality of the scene extension. If the device is used as a scene extension, the scenes can either be stored in one or several other KNX devices (e.g. light scene push button sensor). During a scene recall or in a storage function, the device transmits a telegram with the respective scene number via the extension object of the button.	

Scene number (1 … 64)	**1**...64
In accordance with the KNX standard, objects with data type 18.001 "Scene Control" can retrieve or store up to 64 scenes by their numbers. The parameter defines the scene number to be transmitted when the button is pressed.	

9.5.2 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
192, 195, 198, 201	Scene extension	Button/rocker *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for recalling or for storing one of 64 scenes max. from a scene push button sensor.					

9.6 2-channel operation

The "2-channel operation" function allows two function channels to be operated with a single press of a button. In some situations it is desirable to control two different functions with a single press of a button and to transmit different telegrams.

For both channels, the parameters "Function channel 1" and "Function channel 2" can be used to determine the communication object types to be used.

The following functions are available:

- 1-bit switching
- Value transmitter 1 byte (0...255)
- Value transmitter 1 byte (0...100%)
- Value transmitter 1 byte (-128...127)
- Value transmitter 1 byte (0...255%)
- Value transmitter 2 byte (0...65535)
- Value transmitter 2 byte (-32768...32767)
- Value transmitter 2-byte temperature value
- Value transmitter 2-byte brightness value
- Recalling scene (external)

The object value that the device is to transmit on a button actuation can be selected depending on the selected function.

The "1 bit switching" type permits selecting whether an ON or an OFF telegram is to be transmitted or whether the object value is to be switched over (TOGGLE) and transmitted on the press of a button.

With parameterization as a value transmitter ("1 byte ..." or "2 byte ...") the object value can be selected within the value range.

"Recalling scene (...)" can be used to set the scene number to be transmitted to the bus when a button is pressed.

The status LEDs can be configured independently.

Unlike in the other rocker and button functions, the application program assigns the "Telegram acknowledge" function instead of the "Button-press display" function to the status LED. In this mode, the status LED lights up for approx. 250 ms with each telegram transmitted.

Operation concept channel 1 or channel 2

In this operation concept, exactly one telegram will be transmitted on each press of a button.

- A brief press causes the device to transmit the telegram channel 1.
- A long press causes the device to transmit the telegram for channel 2.

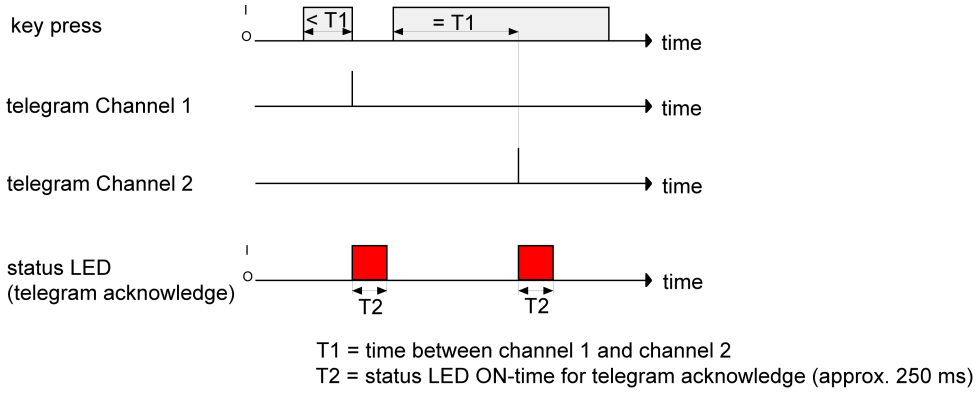


Image 11: Example of operation concept "Channel 1 or Channel 2"

The time required for distinguishing between a short and a long operation is defined by the parameter "Time between channel 1 and channel 2". If the button is pressed for less than the configured time, only the telegram to channel 1 is transmitted. If the length of the button-press exceeds the time between channel 1 and channel 2, only the telegram to channel 2 will be transmitted. This concept provides the transmission of only one channel. To indicate that a telegram has been transmitted, the status LED lights up for approx. 250 ms in the "Telegram acknowledge" setting.
In this operation concept, the push-button sensor will not transmit a telegram immediately after the rocker has been depressed.

Operation concept channel 1 and channel 2

With this operation concept, one or alternatively two telegrams can be transmitted on each button-press.

- A brief press causes the device to transmit the telegram channel 1.
- A long press causes the device to transmit first the telegram for channel 1 and then the telegram for channel 2.

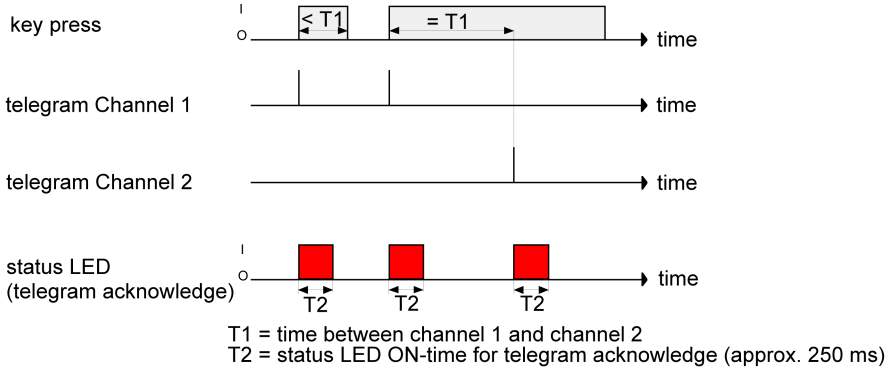


Image 12: Example for operation concept "Channel 1 and channel 2"

The time required for distinguishing between a short and a long operation is defined by the parameter "Time between channel 1 and channel 2". In this operation concept, a button-press sends this telegram is immediately to channel 1. If the button is held depressed for the configured time, the telegram for the second channel is transmitted as well. If the button is released before the time has elapsed, no further telegram will

be transmitted. This operation concept, too, offers the configurable possibility of having the transmission of a telegram signalled by the status LED (setting "Telegram acknowledge").

9.6.1 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Operation concept	**Channel 1 or channel 2** Channel 1 and channel 2
This is where the 2-channel operation concept is defined. If the setting "channel 1 or channel 2" is selected, the device decides dependent on the button-press duration, which of the channels will be used. If the setting "channel 1 and channel 2" is selected, the device transmits only the telegram of channel 1 on a short button-press and both telegrams on a sustained button-press.	

Function channel 1 (Function channel 2)	No function 1-bit switching 1 byte (0...255) 1 byte (0...100%) 1 byte (-128...127) 1 byte (0...255%) 2 byte (0...65535) 2 byte (-32768...32767) 2 byte temperature value 2 byte brightness value Recalling scene (external)
This parameter defines the channel function and specifies which other parameters and which communication object are to be displayed for channel 1 or channel 2 respectively.	

Time between channel 1 and channel 2	0...**3**...25 s | 0...990 ms
Depending on the selected operation concept, this parameter defines the interval at which the device transmits the telegram for channel 1 and the telegram for channel 2. A time from 100 ms to 25.5 s can be set.	

Command for channel 1 (2)	ON OFF **TOGGLE**
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 1 bit switching".	

Value (0...255) for channel 1 (2)	**0**...255
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 1-byte (0...255)".	

Value (0...100%) for channel 1 (2)	**0**...100
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 1-byte (0...100%)".	

Value (-128...127) for channel 1 (2)	-128...**0**...127
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 1-byte (-128...127)".	

Value (0...255%) for channel 1 (2)	**0**...255
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 1-byte (0...255%)".	

Value (0...65535) for channel 1 (2)	**0**...65535
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 2-byte (0...65535)".	

Value (-32768...32767) for channel 1 (2)	-32768...**0**...32767
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 2-byte (-32768...32767)".	

Temperature value (0…40 °C) for channel 1 (2)	0...**20**...40
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 2-byte temperature value".	

Brightness value (0, 50, …, 1500 lux) for channel 1 (2)	0...**300**...1500
This parameter defines the object value transmitted to the bus when the button is pressed. Visible only if "Function channel 1 (2) = 2-byte brightness value".	

Scene number (1…64) for channel 1 (2)	**1**...64
This parameter defines the object value transmitted to the bus when the button is pressed. It is only visible if "Function channel 1 (2) = Recalling scene (external)".	

9.6.2 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 switching	Button/rocker *n* - output	1-bit	1,001	C, -,W, T, U
1-bit object for transmitting switching telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 switching	Button/rocker *n* - output	1-bit	1,001	C, -,W, T, U
1-bit object for transmitting switching telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value 0...255	Button/rocker *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value 0...255	Button/rocker *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value 0...100 %	Button/rocker *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value 0...100 %	Button/rocker *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value -128...127	Button/rocker *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value -128...127	Button/rocker *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value 0...255 %	Button/rocker *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value 0...255 %	Button/rocker *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value 0...65535	Button/rocker *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value 0...65535	Button/rocker *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 value -32768...32767	Button/rocker *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 value -32768...32767	Button/rocker *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 temperature value	Button/rocker *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 temperature value	Button/rocker *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 brightness value	Button/rocker *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 brightness value	Button/rocker *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
209, 222, 235, 248	Channel 1 scene (external) 1…64	Button/rocker *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for transmitting scene values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
210, 223, 235, 249	Channel 2 scene (external) 1…64	Button/rocker *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for transmitting scene values on channel 2 if 2-channel operation is activated.					

9.7 Controller extension

The "controller extension" button or rocker function can be used to control a KNX room temperature controller.

The controller extension itself is not involved in the regulating process. With it, the user can operate the single-room regulation from different places in the room. It can also be used to adjust central heating control units which are located, for instance, in a sub-distribution unit.

Typical KNX room temperature controllers generally offer different ways of influencing the room temperature control:

- Operating mode switch:
  Switching over between different modes of operation (e.g. "Comfort", "Night" ...) with different setpoint temperatures assigned to each mode by the controller.
- Presence function:
  Signalling the presence of a person in a room. The signalling may also be combined with a configured switchover in the mode of operation.
- Setpoint shift:
  Adjustment of the setpoint temperature via a temperature offset (DPT 9.002) or via levels (DPT 6.010).

The controller extension is operated using the push button functions of the device. In this way, it is possible to completely control a room temperature controller by changing the operating mode, by predefining the presence function or by readjusting the setpoint shift.

In addition, the device can – independent of the controller extension function – indicate the state of one or more room temperature controllers with the status LEDs of the rockers or buttons. This feature permits the indication of operating modes or the bit-oriented evaluation of different status objects of controllers. In case of the controller extension functions "Setpoint shift" or "Presence function", the status LEDs can also signal the state of the corresponding functions directly.

9.7.1 Operating mode switchover

Switchover of the controller operating mode can be effected in accordance with the standard function block for room temperature controllers defined in the KNX handbook using two 1-byte communication objects. The operating mode can be switched over with the normal and with the forced objects. The "Operating mode switchover" object offers a selection between the following modes:

- Comfort mode
- Standby mode
- Night operation
- Frost/heat protection mode

The "Forced object operating mode" communication object has a higher priority. It permits forced switching between the following modes of operation:

- Auto (normal operating mode switchover)
- Comfort mode
- Standby mode
- Night operation
- Frost/heat protection mode

The operating mode transmitted to the bus on a button press of the controller extension is defined by the parameter "Operating mode on pressing". Depending on the parameterized operating concept, either a button press activates one of the above modes (with the "rocker function" and "button function" operating concepts), or each button press toggles between two or three modes (only with the "rocker function" operating concept).

Notes on multiple selection:
In order to ensure that a change-over from one operating mode to another works properly even from different locations, the operating mode objects of the controller and those of all controller extensions must be interlinked and have their "Write" flag set. In the objects concerned, this flag is set by default
By checking the linked operating mode switchover feedback object, the controller extension knows which of the possible operating modes is active. Based on this information, the device switches over into the next operating mode in sequence when a button is pressed. In the event that none of the possible operating modes is active, the next operating mode in the sequence is activated. As far as switching over between the forced operating modes and "Auto" is concerned, the device switches into the "Auto" operating mode when none of the configured operating modes is active.

If a status LED is to indicate the current operating mode, the status LED function must be programmed for "Operating mode indication" and its status object be linked with the corresponding group address for operating mode changeover with normal or high priority.

9.7.2 Presence function

All operating areas with a function set to "Presence function" have the two communication objects "Presence function" and "Presence function feedback". The parameter "Presence function on pressing" defines the object value transmitted to the bus on pressing a button.

In order to ensure that the object value transmitted in the "Presence TOGGLE" setting is always the correct one, the presence object of the room temperature controller and the feedback objects of the controller extensions must be interlinked and have their "Write" flag set. In the extension objects concerned, this flag is set by default.

The status LED of a presence function button can directly indicate the presence status (setting "Presence status indicator").

9.7.3 Setpoint shift

The setpoint shift is another available function of the controller extension. It makes use of either two 2-byte communication objects with datapoint type 9.002 or two 1-byte communication objects with datapoint type 6.010 (integer with sign).

This extension function allows shifting of the basic setpoint for the temperature on a room temperature controller by pressing a button. Operation of the extension is generally the same as the operation of the main controller. A button configured as a setpoint shifting button reduces or increases the setpoint shift value on each press by one step respectively. The direction of the value adjustment is defined by the parameters "Temperature difference on pressing" or "Setpoint shift on pressing".

The status LED of a setpoint shifting button can directly indicate the setpoint shifting status (setting "Setpoint value shift indicator").

Type of setpoint shift

The device provides two options for setpoint shifting. Depending on the setting of the parameter "Type of setpoint shift", the shift takes place via the 2-byte communication object "Setpoint shift specification" (acc. to KNX DPT 9.002) or via the 1-byte-communication object "Setpoint shift specification" (acc. to KNX DPT 6.010).

The setting "Via offset (DPT 9.002)" defines the temperature difference in Kelvin by which the setpoint temperature will be shifted up or down when the button is pressed. For a setpoint value shift, the controller extension makes use of the two communication objects "Setpoint shift specification" and "Current setpoint shift". The "Current setpoint shift" communication object informs the extension about the current state of the room temperature controller. Based on this value and the respective parameter, the controller extension determines the new level size which it transmits via the "Setpoint shift specification" communication object to the room temperature controller.

With the "Via levels (DPT 6.010)" setting, only the direction of the setpoint shift on the extension is defined. For a setpoint value shift, the controller extension makes use of the two communication objects "Setpoint shift specification" and "Current setpoint shift". The "Current setpoint shift" communication object informs the extension about the current state of the room temperature controller. Based on this value and the respective parameter, the controller extension determines the new level size which it transmits via the "Setpoint shift specification" communication object to the room temperature controller.

Communication with main controller

In order to enable the device to effect a setpoint shift in a room temperature controller, the controller must have input and output objects for setpoint shifting. In this case, the output object of the controller must be linked with the input object of the extension unit and the input object of the controller must be linked with the output object of the extension via an independent group address.

All objects are of the same datapoint type and have the same value range. A setpoint shift is interpreted by count values: a shift in positive direction is expressed by positive values whereas a shift in negative direction is represented by negative object values. An object value of "0" means that no setpoint shift has been activated.

Via the "Current setpoint shift" object of the controller extensions, which is linked with the room temperature controller, the extensions are enabled to determine the current setpoint shift position. Starting from the value of the communication object, each button-press on an extension will adjust the setpoint in the configured direction. Each time the setpoint is adjusted, the new shift is transmitted to the room temperature controller via the "Controller extension setpoint value specification" object of the controller extension. The controller itself checks the received value for the minimum and maximum temperature limits (see controller documentation) and adjusts the new setpoint shift if the values are valid. When the new count value is accepted as valid, the controller transfers this value to its output object for setpoint shifting and retransmits the value to the extension as feedback.

Due to the standard data point type used as the output and input object of the controller extension, each extension unit is able to determine whether a shift took place, in which direction it took place and by which value (DPT 9.002) or by how many levels (DPT 6.010) the setpoint was shifted.

i In "Via levels (DPT 6.010)" function, the weighting of the respective level is done by the controller itself.

i This requires that the communication objects are connected on all controller extensions and the controller. The feedback information from the controller enables the extension to continue the adjustment anytime at the right point.

9.7.4 Table of parameters

The following parameters are available for the individual buttons, depending on the set operating concept. The default settings change in accordance with the set operating concept.

Function	**Operating mode switchover** Forced oper. mode switchover Presence function Setpoint shift
A controller extension can optionally switch over the operating mode with normal or high priority (forced), change the presence state or change the current room temperature setpoint value. With regard to the setting of this parameter, the ETS shows further parameters.	

Operating mode on pressing	**Comfort mode** Standby mode Night operation Frost/heat protection mode Comfort mode -> Standby mode ->* Comfort mode -> Night mode ->* Standby mode -> Night mode ->* Comfort mode -> Standby mode -> Night mode ->*
If the controller extension is to change over the operating mode of the room temperature controller with normal priority, the extension can – when operated – either switch on a defined operating mode or change over between different operating modes. This parameter is only visible if "Function = operating mode switchover". * Only for operation concept = button function The options marked with a * are only available if the operating concept is set to the button function. i Toggling between operating modes (identified by "->") is only possible if the object value has been received via the "Operating mode switchover feedback" object.	

Forced operating mode on pressing	Auto (Normal operating mode change-over) **Comfort mode** Standby mode Night operation Frost/heat protection mode Comfort mode -> Standby mode ->* Comfort mode -> Night mode ->* Standby mode -> Night mode ->* Comfort mode -> Standby mode -> Night mode ->* Auto -> Comfort mode ->* Auto -> Standby mode ->* Auto -> Night mode ->* Auto -> Frost/heat protection mode ->*

If the controller extension is to change over the operating mode of the room temperature controller with high priority, the extension can – when operated – either enable change-over with normal priority (Auto), switch on a defined operating mode with high priority or change over between different operating modes.

This parameter is only visible if "Function = forced operating mode switchover".

* Only for operation concept = button function
The options marked with a * are only available if the operating concept is set to the button function.

Toggling between forced object operating modes (identified by "->") is only possible if the object value has been received via the "Forced object operating mode feedback" object.

Presence function on pressing	Presence OFF Presence ON **Presence TOGGLE**

On pressing a button, the controller extension can switch the presence state of the room temperature controller either on or off in a defined way or change over between both states ("Presence TOGGLE").

This parameter is only visible if "Function = presence function".

Type of setpoint shift	**Via offset (DPT 9.002)** Via levels (DPT 6.010)

Depending on the setting of the parameter "Type of setpoint shift", the shift takes place via the 2-byte communication object "Setpoint shift specification" (acc. to KNX DPT 9.002) or via the 1-byte-communication object "Setpoint shift specification" (acc. to KNX DPT 6.010).

This parameter is only visible if "Function = Setpoint shift".

Temperature difference on pressing	-2 K -1.5 K -1 K -0.5 K 0.5 K 1 K 1.5 K 2 K
The temperature difference is defined in Kelvin here by which the setpoint temperature will be shifted up or down when the button is pressed. For a setpoint value shift, the controller extension makes use of the two communication objects "Setpoint shift specification" and "Current setpoint shift". The "Current setpoint shift" communication object informs the extension about the current state of the room temperature controller. Based on this value and the respective parameter, the controller extension determines the new level size which it transmits via the "Setpoint shift specification" communication object to the room temperature controller. This parameter is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via offset".	

Setpoint shift on pressing	Reduce setpoint value (level size) **Increase setpoint (level size)**
This parameter defines the direction of the setpoint shift on the extension. For a setpoint value shift, the controller extension makes use of the two communication objects "Setpoint shift specification" and "Current setpoint shift". The "Current setpoint shift" communication object informs the extension about the current state of the room temperature controller. Based on this value and the respective parameter, the controller extension determines the new level size which it transmits via the "Setpoint shift specification" communication object to the room temperature controller. This parameter is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via levels".	

9.7.5 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The name of the object corresponds to the selection of the operating concept and can be adjusted by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
288, 295, 302, 309	Operating mode switchover	Button/rocker n - controller extension - output	1 bytes	20,102	C, -, -, T, -
1-byte object for changing over a room temperature controller between the Comfort, Standby, Night and Frost/heat protection operating modes. This object is only visible if "Function = operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
289, 296, 303, 310	Operating mode switchover feedback	Button/rocker n - controller extension - input	1 bytes	20,102	C, -,W, -, U
1-byte object for receiving the operating mode of a room temperature controller. This object is only visible if "Function = operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
288, 295, 302, 309	Operating mode forced-control	Button/rocker n - controller extension - output	1 bytes	20,102	C, -, -, T, -
1-byte object for changing over a room temperature controller under forced control between the Automatic, Comfort, Standby, Night and Frost / heat protection operating modes This object is only visible if "Function = forced operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
289, 296, 303, 310	Forced object operating mode feedback	Button/rocker n - controller extension - input	1 bytes	20,102	C, -,W, -, U
1-byte object for receiving the operating mode of a room temperature controller. This object is only visible if "Function = forced operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
288, 295, 302, 309	Presence function	Button/rocker n - controller extension - output	1-bit	1,018	C, -, -, T, -
1-bit object for changing over the presence status of a room temperature controller. This object is only visible if "Function = presence function".					

Object no.	Function	Name	Type	DPT	Flag
289, 296, 303, 310	Presence function feedback	Button/rocker n - controller extension - input	1-bit	1,018	C, -,W, -, U
1-bit object for receiving the presence status of a room temperature controller. This object is only visible if "Function = presence function".					

Object no.	Function	Name	Type	DPT	Flag
288, 295, 302, 309	Preset setpoint shifting	Button/rocker n - controller extension - output	2 bytes	9,002	C, -, -, T, -
2-byte object for presetting a basic setpoint shift in Kelvin. The value "0" means that no shift is active . The values can be specified between -670760 K and 670760 K. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via offset (DPT 9.002)".					

Object no.	Function	Name	Type	DPT	Flag
289, 296, 303, 310	Current setpoint shifting	Button/rocker n - controller extension - input	2 bytes	9,002	C, -,W, -, U
2-byte object for receiving the feedback from the current basic setpoint shift in Kelvin. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via offset (DPT 9.002)".					

Object no.	Function	Name	Type	DPT	Flag
288, 295, 302, 309	Preset setpoint shifting	Button/rocker n - controller extension - output	1 bytes	6,010	C, -, -, T, -
1-byte object for presetting a basic setpoint shift. The value "0" means that no shift is active . The value is depicted in a two's complement in the positive or negative direction. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via levels (DPT 6.010)".					

Object no.	Function	Name	Type	DPT	Flag
289, 296, 303, 310	Current setpoint shifting	Button/rocker n - controller extension - input	1 bytes	6,010	C, -,W, -, U
1-byte object for receiving the feedback from the current basic setpoint shift. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via levels (DPT 6.010)".					

9.8 Status LED

Each operating area of the basic device has a status LED.

The 1-gang device variant has one status LED (see figure 1) and the 2-gang device variant has 2 status LEDs (see figure 2).

The configurable functions of the status LED adapt to the configured functions of the rockers or buttons.

A status LED can either be assigned to a rocker or two buttons.

The devices Button, rocker differ in the configuration of the status LED as follows.

Device variant	Status LED
Button, rocker 1-gang	A three-colour status LED (RGB)
Button, rocker 2-gang	Two three-colour status LEDs (RGB)

Independent functions of the status LED

A variety of functions of the status LED can be configured independently of the configured rocker or button function. These functions either define a fixed lighting status of the status LED or have a separate communication object.

The following functions can always be configured for each Status LED:

- always OFF
- always ON
- Control via separate LED object
- Operating mode display
- Controller status indication

Dependent functions of the status LED

A variety of functions of the status LED can be configured depending on the configured rocker or button function.

The following functions are configurable for each Status LED depending on the configured rocker or button function.

- Button-press display
- Telegram acknowledgment
- Status indication
- inverted status display
- Presence status
- Setpoint value shift display

9.8.1 Basic functions

"always OFF" or "always ON"

The corresponding status LED is always switched off or always switched on depending on the parameter setting.

"button-press display"

This function can be configured for each status LED if the rocker or button is configured to "switching", "dimming", "Venetian blind", "value transmitter", "scene extension" or "controller extension":

– With the rocker function, each actuation of one of the two buttons is displayed.
– With the key function, the parameter "Assignment of the status LED" decides whether the actuation of both keys or a single key is displayed.

A status LED used as button-press display is switched on by the device each time the corresponding rocker or button is pressed. The parameter "Light period of status LED for button-press indicator" on the parameter page "General -> Status LED" determines how long the status LED for all status LEDs remains on together. Even if the device only sends a telegram when you release it, the status LED lights up regardless of whether you press the rocker or button.

i In the "value transmitter" device function with activated value adjustment by a long button-press, a status LED configured for the "Actuation display" function flashes each time a new value is transmitted.

"telegram acknowledgment"

This function can be configured for each status LED if the rocker or button is configured to "2-channel operation".

– With the rocker function, each telegram of one of the two buttons is acknowledged.
– With the button function, the parameter "Assignment of the status LED" decides whether the telegrams of both buttons or of a single button are acknowledged.

If a status LED is used for telegram acknowledgement, the status LED lights up when both channels are transmitted for about 250 ms each.

"Status display" and "inverted status display"

These functions can be configured for each status LED if the rocker or button is parameterised to "switching" or "dimming":

– With the rocker function, the switching status of the rocker is displayed.
– With the button function, the parameter "Assignment of the status LED" decides which of the two buttons shows the switching status.

In the rocker or button functions "switching" and "dimming", the status LEDs can also be linked internally to the "Switching feedback" object and thus signal the current switching state of the actuator group.
It is possible to indicate or evaluate the inverted object value.

i After a bus reset or after ETS programming, the value of the LED object is always "OFF".

"control via separate LED object"

Each status LED indicates the state of a separate LED communication object. Here the LED can be switched on or off statically via the 1-bit object value received, or also activated as flashing. If multiple status LEDs are configured to "flashing" and switched on, they will flash synchronously.
It is possible to indicate or evaluate the inverted object value.

i After a bus reset or after ETS programming, the value of the LED object is always "OFF".

"Operating mode display"

In this configuration the status LED has its own 1-byte communication object.
If a status LED is to indicate the operating mode, the communication object of the status LED must be linked with the matching object of a room temperature controller (e. g. Controller status). The desired operating mode that the LED is to indicate can then be selected with the parameter "Status LED ON with". The LED is then lit up when the corresponding operating mode has been activated at the controller.

i After a bus reset or after ETS programming, the value of the LED object is always "0" (automatic).

"Controller status display"

The status LED can indicate the controller status in the data formats "KNX-compliant" or "Controller general". The KNX-compliant objects or general controller objects are offered depending on the configuration. The objects should be connected to the communication objects of the main controller with the same functions via group addresses.
The status objects combine different informations. The "Status LED on with" parameter is used to select what information should be evaluated and displayed via the status LED.

The following information is available for selection with **"KNX-compliant"**:

- Controller error status ("0" = no error / "1" = error)
- Operating mode ("0" = Cooling / "1" = Heating)
- Controller disabled ("0" = Controller enabled / "1" = Controller disabled)
- Frost alarm ("0" = Frost protection temperature exceeded / "1" = Frost protection temperature undershot)
- Heat alarm ("0" = Heat protection temperature exceeded / "1" = Heat protection temperature undershot)

– Controller inactive (Is active in the "Heating and cooling" operating mode when the measured room temperature lies within the deadband. This status information is as a rule always "0" for the individual operating modes "heating" or "cooling"! Is inactive if controller is disabled.)
– Additional level active ("0" = Additional level inactive / "1" = Additional level active)

The following table shows the evaluation of the three KNX-compliant objects.

Status LED ON with	Object RHCC - DPT22.101	Object RTC - DPT22.103
Controller error status	✓ (bit 0)	✓ (bit 0)
Operating mode	✓ (bit 8)	✓ (bit 1)
Controller disabled	✓ (bit 12)	✓ (bit 2)
Frost alarm	✓ (bit 13)	✓ (bit 3)
Heat alarm	✓ (bit 14)	✓ (bit 4)
Controller inactive	☒	✓ (bit 5)
Additional level active	☒	✓ (bit 6)

The following information is available for selection with **"Controller general"**:

– Comfort mode ("0" = Comfort mode inactive / "1" = Comfort mode active)
– Standby mode ("0" = Standby mode inactive / "1" = Standby mode active)
– Night mode ("0" = Night mode inactive / "1" = Night mode active)
– Frost/heat protection mode ("0" = Frost/heat protection mode inactive / "1" = Frost/heat protection mode active)
– Controller disabled ("0" = Controller enabled / "1" = Controller disabled)
– Heating / cooling ("0" = Cooling / "1" = Heating)
– Controller inactive ("0" = Controller active / "1" = Controller inactive (dead band))
– Frost alarm ("0" = no frost alarm / "1" = frost alarm)

The following table shows the evaluation of the object.

Status LED ON with	Object "controller status"
Comfort mode	✓ (bit 0)
Standby mode	✓ (bit 1)
Night operation	✓ (bit 2)
Frost/heat protection mode	✓ (bit 3)
Controller disabled	✓ (bit 4)
Heating / cooling	✓ (bit 5)
Controller inactive	✓ (bit 6)
Frost alarm	✓ (bit 7)

i After a bus reset or after ETS programming, the value of the LED object is always "0".

"Presence status display" and "Inverted presence status display"

These functions can be configured for each status LED if the rocker or button is parameterised to "controller extension" with the "presence" function:

– With the rocker function, the presence status of the rocker is displayed.

– With the button function, the parameter "Assignment of the status LED" decides which of the two buttons shows the presence status:

When the presence status is displayed the LED evaluates the value of the object "Feedback presence function" and switches either on or off, depending on the parameter configuration in the ETS.

"Setpoint value shift display"

This function can be configured for each status LED if the rocker or button is parameterised to "controller extension" with the "setpoint shift" function.

With the rocker function, the setpoint shift of the rocker is displayed.

With the button function, the parameter "Assignment of the status LED" decides which of the two buttons shows the setpoint shift.

When a setpoint shift is indicated the LED evaluates the value of the "Current setpoint shift" object and switches either on or off, depending on the parameter configuration in the ETS.

9.8.2 Colour settings

User-defined colour setting

The colour of the status LEDs can be adjusted. The colours of the status LED can be selected in the ETS to be red, green or blue. In the colour configuration a distinction is made between whether all of the status LEDs have the same colour (common colour setting), or whether alternatively various colours can be configured for each LED (separate colour setting).

The difference is as follows:

– All status LEDs have the same colour.

  If common colour setting is desired, then the "Colour" parameter on parameter page "General -> Status-LED" must be configured to the settings "red", "green" or "blue". The status LEDs light up unchangeably in the configured colour later during operation, if they are switched on.

– The status LEDs have various colours.

  If the separate colour setting is desired, then the parameter "Colour" on parameter page "General -> Status-LED" must be configured to the setting "Colour selection per status LED". In this case additional parameters become visible on the parameter pages of the individual status LEDs. The parameters "Colour of the status LED" can then be used individually to define the desired colour for each status LED. The LED lights up in the configured colour if it is subsequently switched on regularly in operation, in accordance with the basic configuration "Function of the status LED".

Superposed function

Additionally, a superposed function can be enabled for each status LED. The superposed function allows for a colour change of the status LED during device operation. It is also possible here to change the display function.

i A status LED will also indicate actuation if the status LED is controlled by the superposed function.

The superposed function of a status LED is controlled by a separate communication object. The device provides the two following options for controlling the superposed function:

– Control via separate LED object (1 bit)
– Control via separate LED object (1 byte)

Depending on the superposed function selected, the device provides either a 1-bit object or a 1-byte object.

If control via the 1-bit object is selected, the superimposed function is defined in the ETS parameters. You can use the parameters to set whether the superposed function will be switched on or off via a 1-telegram or a 0-telegram, and whether the status LED will statically be switched on or flash with the superposed function switched on. You can additionally set a separate colour for the superposed function

in which the status LED will light up when the superposed function is switched on. When a superposed function is switched off the status LED will be activated according to its basic configuration (regular colour and display function).

If control via the 1-byte object is selected, the superposed function is defined by the bit coding of the 1-byte communication object. No other parameters are available in the in the ETS. The bit coding of the 1-byte communication object "Superposed function" is shown in the table below.

Value of the telegram	Superposed function of the status LED
0_{dec}	Superposed function is deactivated. Status LED has standard colours and display function.
1_{dec}	Lights up red
2_{dec}	Flashes red
3_{dec}	Lights up green
4_{dec}	Flashes green
5_{dec}	Lights up blue
6_{dec}	Flashing blue

The superposed function is initially always inactive after a device reset. The superposed function is only executed when a telegram is received via the corresponding object.

During colour configuration it must be ensured that different colours are configured for the basic display and the superposed function. If this is not done (the colours are the same), then when the display is static it is not possible to determine which display function is being indicated.

During flashing the status LED switches cyclically between the "switched-on" and "switched-off" states. No colour change is performed between the regular colour and the superposed colour.

9.8.3 Brightness settings

The brightness of all status LEDs is defined in the ETS. The "Brightness of all status LEDs" parameter on the "General" parameter page can be used to set the regular brightness of all status LEDs in 6 levels (level 0 = OFF, level 1 = dark, ..., level 5 = bright).

Optionally the brightness can be changed during operation of the device, controlled by the night reduction.

9.8.4 Table of parameters

The following parameters are parameterised on the "General" parameter page.

Colour	red **green** blue Colour selection per status LED
All status LEDs can have the same colour ("red", "green" or "blue" settings). The colours for the LEDs can also be configured separately ("Colour selection per status LED" setting). With colour selection per status LED, it is possible to set the colour on the parameter pages of the individual status LEDs.	

Brightness	Level 0 (OFF) Level 1 (dark) Level 2 Level 3 **Level 4** Level 5 (bright)
The brightness level for all status LEDs is defined at this point.	

Light duration of status LED for button-press display	1 s 2 s **3 s** 4 s 5 s
This parameter defines the switch-on time the status LED is lit up to indicate actuation. The setting concerns all status LEDs whose function is set to "Button-press display".	

The following parameters are configured on the parameter pages "Status-LED *n* - function".

Function of status LED	always OFF always ON **Button-press display** Telegram acknowledgment Status indication inverted status display Control via separate LED object Operating mode display Controller status indication Setpoint value shift display Presence status Inverted presence status
The ETS automatically compiles the selection of functions of the status LED depending on the set rocker or button function. Only functions that make sense in combination with the parameterised rocker or button function are offered for selection.	

The following selection of status LED basic functions can be parameterised for each rocker or button function.

Function of status LED	always OFF always ON Control via separate LED object Operating mode display Controller status indication
always OFF: Irrespective of the pushbutton or rocker function, the status LED is switched off permanently. always ON: Irrespective of the pushbutton or rocker function, the status LED is switched on permanently. Control via separate LED object: The status LED indicates the state of its own, separate 1-bit LED object. This setting causes the additional parameter "Control of the status LED via object value" to be shown. Operating mode display: The status LED indicates the state of a KNX room temperature controller via a separate 1-byte communication object. This setting causes the additional parameter "Status LED ON with" to be shown. Controller status display: The status LED indicates the state of the internal room temperature controller or the controller extension. This setting causes the additional "controller status" and "Status LED on with" parameters to be displayed.	

The following selection of status LED functions can be parameterised **in addition** to the basic functions for the rocker or button functions "Switching" and "Dimming".

Function of status LED	Button-press display Status indication inverted status display
button press display: The status LED indicates a button actuation. The ON time is set on the parameter page "General" in common for all status LEDs that are configured as actuation displays. status display: The status LED indicates the state of the communication object "Switching". If the object value is "ON", the status LED is illuminated. If the object value is "OFF" the status LED is switched off. inverted status display: The status LED indicates the state of the communication object "Switching". If the object value is "OFF", the status LED is illuminated. If the object value is "ON" the status LED is switched off.	

The following selection of status LED functions can be parameterised **in addition** to the basic functions for the rocker or button function "2-channel operation".

Function of status LED	Button-press display Telegram acknowledgment
button press display: The status LED indicates a button actuation. The ON time is set on the parameter page "General" in common for all status LEDs that are configured as actuation displays. telegram acknowledge: The status LED indicates the transmission of a telegram in 2-channel operation.	

The following selection of status LED functions can be parameterised **in addition** to the basic functions for the rocker or button function "Controller extension > Presence function".

Function of status LED	Button-press display Presence status Inverted presence status
button press display: The status LED indicates a button actuation. The ON time is set on the parameter page "General" in common for all status LEDs that are configured as actuation displays. Presence status: The status LED indicates the state of the presence button of the controller operation or in case of controller extension operation. The LED lights up if the presence function is activated. The LED is off if the presence function is inactive. Presence status: The status LED indicates the state of the presence button of the controller operation or in case of controller extension operation. The LED lights up if the presence function is inactive. The LED is off if the presence function is activated.	

The following selection of status LED functions can be parameterised **in addition** to the basic functions for the rocker or button function "Controller extension > Setpoint shift".

Function of status LED	Button-press display Setpoint value shift display
button press display: The status LED indicates a button actuation. The ON time is set on the parameter page "General" in common for all status LEDs that are configured as actuation displays. Setpoint value shift display: The status LED indicates the state of a setpoint shift of the controller operation or in case of controller extension operation. This setting causes the additional parameter "Status LED" to be shown.	

Status LED	**ON in case of variation** On in case of positive variation ON in case of negative variation OFF in case of variation OFF in case of positive variation OFF in case of negative variation
Setting this parameter defines at which setpoint variation the status LED is switched on or off.	

The following parameter is visible on the parameter pages "Status-LED *n* - function" if the function of the status LED is configured to "control via separate LED object".

Control of the status LED via object value	**1 = LED static ON / 0 = LED static OFF** 1 = LED static OFF / 0 = LED static ON 1 = LED flashes / 0 = LED static OFF 1 = LED static OFF / 0 = LED flashes
This parameter defines the telegram polarity of the 1-bit object "status LED". The LED can be switched on or off statically. In addition, the received switching telegram can be evaluated in such a way that the LED flashes.	

The following parameter is visible on the parameter pages "Status-LED *n* - function" if the function of the status LED is configured to "Operating mode display".

Status LED ON with	Automatic mode **Comfort mode** Standby mode Night operation Frost/heat protection mode
The values of a communication object with data type 20.102 "HVAC Mode" are defined as follows: 0 = Automatic 1 = Comfort 2 = Standby 3 = Night 4 = Frost/heat protection The value "Automatic" is used only by the "forced operating mode switchover" objects. The status LED is illuminated when the object receives the value configured here.	

The following parameters are visible on the parameter pages "Status-LED *n* - function" if the function of the status LED is configured to "Controller status display".

Controller status	**KNX compliant** Controller general
Room temperature controllers can transmit their current status to the KNX. The data formats "KNX compliant" and "Controller general" are usually available for this. This parameter adjusts the "Controller status display" function of the status LED to the status message's status format of the room temperature controller. The selection options of the "Status LED ON with" parameter as well as the available communication objects adapt depending on this setting. In the "KNX-compliant" setting, the device provides the 2 communication objects "Controller status RHCC" and "Controller status RTC", depending on the parameter. With the "Controller general" setting, the device provides the "Controller status" communication object.	

Status LED ON with	**Controller error status** Operating mode (Heating = 1 / Cooling = 0) Controller disabled (dew point operation) Frost alarm Heat alarm
This parameter is only visible if "Controller status = KNX compliant". The status LED shows the information of the controller status according to the parameterization.	

DPT controller status	**RHCC (DPT 22.101)** RTC (DPT 22.103)
This parameter is only visible if "Controller status = KNX compliant". This parameter defines the datapoint type of the input object. The input object receives the controller status from the room temperature controller. The datapoint type of the input object must be synchronised with the output object of the room temperature controller.	

Status LED ON with	**Comfort mode** Standby mode Night operation Frost/heat protection mode Controller disabled Heating / Cooling (Heating = 1 / Cooling = 0) Controller inactive (deadband operation) Frost alarm
This parameter is only visible if controller status = controller general. The status LED shows the information of the controller status according to the parameterization.	

The following parameter is exclusively visible for "Colour = Colour selection per status LED" ("General" parameter page).

Colour of the status LED	red **green** blue
If separate colour settings for the status LEDs are required, then this parameter can be used individually to define the desired colour for each status LED. The LED lights up in the configured colour if it is subsequently switched on regularly during operation of the device, in accordance with the "Function" basic configuration.	

Superposed function	Active **Inactive**
Additionally, a superposed function can be enabled separately for each status LED. The superposed function can be used to change the colour of a status LED via a 1-byte communication object during device operation. It is also possible here to change the display function.	

Selection of the superposed function	**Control via separate LED object (1 bit)** Control via separate LED object (1 byte)
This parameter defines whether the superposed function of the status LED is controlled via a 1-bit object or via a 1-byte object. If "Control via separate LED object (1-bit)" is selected, the superimposed function is defined in the ETS parameters. If "Control via separate LED object (1-byte)" is selected, the superimposed function is defined in the 1-byte communication object bit coding.	

Superposed function ON when	**1 telegram** 0 telegram
This parameter is used to set whether the superposed function will be switched on via a 1-telegram or a 0-telegram. If the setting "1 telegram" is selected, the superposed function will be switched on via a 1-telegram and switched off via a 0-telegram. If the setting "0 telegram" is selected, the superposed function will be switched on via a 0-telegram and switched off via a 1-telegram. This parameter is only visible when "Selection of superposed function" = "Control via separate LED object (1-bit)".	

Type of reading with superposed function	**LED static ON** LED flashes
This parameter defines whether the status LED will be statically switched on or flash when the superposed function is switched on. This parameter is only visible when "Selection of superposed function" = "Control via separate LED object (1-bit)".	

Colour of the superposed status LED	**red** green blue
The status LED lights up in the colour set here when the superposed function is switched on. This parameter is only visible when "Selection of superposed function" = "Control via separate LED object (1-bit)".	

9.8.5 Object list

The following communication objects are available for the individual buttons or rockers, depending on the set operating concept. The object name corresponds to the selection for the operating concept (button or rocker). The name of the object can be specified by the parameter "Name of ..." .

Object no.	Function	Name	Type	DPT	Flag
329, 345	Switching	Button/rocker *n* - status LED - input	1-bit	1,001	C, -, W, -, -
1-bit object to control the status LED. This object is only visible with "Function of status LED = Control via separate LED object".					

Object no.	Function	Name	Type	DPT	Flag
329, 345	Operating mode display	Button/rocker *n* - status LED - input	1 bytes	20,102	C, -, W, -, -
1-byte object to control the status LED. This object is only visible with "Function of status LED = Operating mode display".					

Object no.	Function	Name	Type	DPT	Flag
329, 345	Controller status RHCC - KNX-compliant	Status LED *n* - Input	2 bytes	22,101	C, -,W, -, U
2-byte object to control the status LED. This object is only visible for "Function of status LED = Controller status display", "Controller status = KNX-compliant" and "DPT controller status = RHCC (DPT 22.101)".					

Object no.	Function	Name	Type	DPT	Flag
332, 348	Controller status RTC - KNX-compliant	Status LED *n* - Input	2 bytes	22,103	C, -,W, -, U
2-byte object to control the status LED. This object is only visible for "Function of status LED = Controller status display", "Controller status = KNX-compliant" and "DPT controller status = RTC (DPT 22.103)".					

Object no.	Function	Name	Type	DPT	Flag
329, 345	Controller status - controller general	Button/rocker *n* - status LED - input	1 bytes	---	C, -, W, -, -
1-byte object to control the status LED. This object is only visible with "Function of status LED = Controller status display" and "Controller status = Controller general".					

Object no.	Function	Name	Type	DPT	Flag
330, 346	Superposed function	Button/rocker n - status LED - input	1-bit	1,001	C, -, W, -, -
1-bit object for forced control of the status LED. It enables the superposed function to be switched on or off when "Control via separate LED object (1-bit)" is set.					

Object no.	Function	Name	Type	DPT	Flag
330, 346	Superposed function	Button/rocker n - status LED - input	1 bytes	---	C, -, W, -, -
1-byte object for forced control of the status LED. This can be used to change the colour and display information of individual status LEDs according to priority when "Control via separate LED object (1-byte)" is set. "0" = Superposed function is deactivated "1" = LED lights up red, "2" = LED flashes red "3" = LED lights up green, "4" = LED flashes green "5" = LED lights up blue, "6" = LED flashes blue					

10 Channel-independent device functions

The following subchapters provide a description of the device functions. Each subchapter consists of the following sections:

- Functional description
- Table of parameters
- Object list

Functional description

The functional description explains the function and provides helpful tips on project design and usage of the function. Cross references support you in your search for further information.

Table of parameters

The table of parameters lists all parameters associated with the function. Each parameter is documented in a table as follows.

Name of the parameter	Parameter values
Parameter description	

Object list

The object list specifies and describes all communication objects associated with the function. Each communication object is documented in a table.

Object no.	This column contains the object number of the communication object.
Function	This column contains the function of the communication object.
Name	This column contains the name of the communication object.
Type	This column contains the length of the communication object.
DPT	This column assigns a datapoint type to a communication object. Datapoint types are standardized in order to ensure interoperability of KNX devices.
Flag	This column assigns the communication flags in accordance with the KNX specification.
K flag	activates / deactivates the communication of the communication object
L flag	enables externally triggered reading of the value from the communication object
S flag	enables externally triggered writing of the value to the communication object
Ü flag	enables transfer of a value
A flag	enables updating of an object value in case of feedback
I flag	enforces updating of the communication object value when the devices is switched on (reading at init)

10.1 LED orientation lighting

All status LEDs of the device can be used as orientation lights if necessary. The colour of the LED orientation lights can be freely selected from the colour range available for the status LEDs. The brightness with which the status LED lights up when the LED orientation light is switched on can also be set. When the LED orientation light is switched on, all status LEDs of the device always light up in the set colour and brightness. With LED night reduction activated, the corresponding parameter page can be used to configure a separate brightness for the LED orientation light during LED night reduction.

The LED orientation light is activated on the "General" parameter page and can subsequently be configured on the "LED orientation lighting" parameter page.

For orientation, the status LEDs can be:

– switched on continuously,
– switched on via an object, or
– switched on for a set period of time after pressing a button.

In accordance with the available selection options, random levels can be configured for the regular brightness and for the brightness with activated LED orientation lighting in the ETS. It is advisable to set the brightness value for LED orientation lighting to a lower level than regular brightness.

10.1.1 Table of parameters

"General" parameter page

LED orientation lighting	Active **Inactive**
The LED orientation light can be enabled at this point. If the LED orientation light is enabled, the ETS shows further parameters and up to one more communication object.	

The following parameters are visible on the "LED orientation light" parameter page if orientation light has been enabled.

Function	always OFF **always ON** Control via object automatic switch-off
This parameter defines the function of LED orientation lighting. always OFF: LED orientation lighting is permanently switched off. always ON: LED orientation lighting is permanently switched on. Control via object: LED orientation lighting can be switched on and off via the "Switching orientation lighting" object. Automatic switch-off: The LED orientation light is switched on with each press of a button and switched off after a parameterised switch-on time.	

Control via object value	**1 = static ON / 0 = static OFF** 1 = static OFF / 0 = static ON 1 = flashing / 0 = static OFF 1 = static OFF / 0 = flashing
With the "Control via object" function set, this parameter defines the object values for the "Switching orientation lighting" object.	

Switch-off after	**0**...20 min | 0...**3**...59 s
With the "Automatic switch-off" function enabled, this parameter defines the switch-on time of the LED orientation light.	

Colour	red **green** blue
The colour for all status LEDs with LED orientation lighting switched on can be selected here.	

Brightness	Level 0 (OFF) Level 1 (dark) **Level 2** Level 3 Level 4 Level 5 (bright)
The brightness for all status LEDs with LED orientation lighting switched on can be selected here.	

10.1.2 Object list

Object no.	Function	Name	Type	DPT	Flag
5	Switching orientation lighting	LED orientation lighting - input	1-bit	1,001	C, -,W, -, U
1-bit object for switching the LED orientation light on or off. The telegram polarity can be configured.					

10.2 LED night reduction

Optionally, the brightness of the status LED can be adjusted via the LED night reduction during operation of the device. Changing may be advisable, for example, to reduce the brightness during nighttime hours. If change-over of the brightness via the object is required, the "LED night reduction" must be activated on the "General" parameter page. In this case the "LED night reduction" communication object becomes visible in the ETS. As soon as "1" telegram is received via this object, the device switches over to the "Brightness of all status LEDs in night reduction" configured in the ETS ("LED night reduction" parameter page). If a "0" telegram is received via the object, the device switches back to regular brightness.

The change-over of the LED brightness is always performed softly by means of a brief dimming process. Dimming up to a higher level value results in quicker dimming than with dimming to a lower level value. This results in a slow soft dimming that is pleasing for the human eye. The dimming speeds are fixed and therefore not changeable.

After a button has been actuated while the LED night reduction is active, the switched-on LEDs of the device can be controlled to light up with regular brightness for 30 seconds. This behaviour can be activated or deactivated using the "Brightness increase for 30 seconds" parameter. Increasing the brightness, especially with significantly reduced brightness values or LEDs even switched off, permits status changes to be identified more easily (or identified at all) in night mode.

In the ETS it is possible to perform configuration in accordance with the possible selection of required stage values for the regular and reduced brightness. No check is made whether a reduced brightness level is configured for the reduced brightness level. This also makes it possible to use the object to switch over the object to larger brightness levels in comparison to the regular brightness. It is recommended, however, to set the brightness value for the night reduction lower than the regular brightness.

After a device reset, the regular brightness for switched-on LEDs is always effective. Switch-over by night reduction will only take place when a telegram is written to the respective object after a reset.

When the status LED is activated via the regular display function or via the superposed function, it is possible to let the status LED flash. During flashing the LEDs switch synchronously between the "switched-on" and "switched-off" states in the active brightness. This is not interpreted as a change of state of the display function, by means of which the brightness is therefore also not switched over automatically.

10.2.1 Table of parameters

"General" parameter page

LED night reduction	Active **Inactive**
The LED night reduction can be enabled at this point. If the LED night reduction is enabled, the ETS shows further parameters and another communication object.	

The following parameters are visible on the "Night reduction" parameter page if the LED night reduction has been enabled.

Polarity of the night reduction object	**1 = active / 0 = not active** 0 = active / 1 = not active
The night reduction object is used as an input for activating or deactivating the LED night reduction. This object defines the polarity of the "Switching night reduction" object.	

Brightness of all status LEDs in night reduction	Level 0 (OFF) Level 1 (dark) **Level 2** Level 3 Level 4 Level 5 (bright)
The brightness of all status LEDs of the device can be defined on the "General" parameter page. The illumination brightness of all LEDs with active LED night reduction can be set here in 6 levels.	

Increase brightness for 30 seconds	**Active** Inactive
After a button has been actuated while the LED night reduction is active, the switched-on LEDs of the device can be controlled to light up with regular brightness for 30 seconds. This behaviour can be activated or deactivated using this parameter.	

Brightness of orientation lighting in night reduction	Level 0 (OFF) **Level 1 (dark)** Level 2 Level 3 Level 4 Level 5 (bright)
The brightness of the LED orientation light can be defined on the "LED orientation light" parameter page. The illumination brightness of the LED orientation light with active LED night reduction can be set here in 6 levels.	

10.2.2 Object list

Object no.	Function	Name	Type	DPT	Flag
7	Switching night reduction	LED night reduction - input	1-bit	1,001	C, -,W, -, U
1-bit object for activating or deactivating the night reduction (brightness of all LEDs changed). This makes it possible, for example, to reduce the brightness during nighttime hours to a value configured in the ETS ("1" = Night reduction ON; "0" = Night reduction OFF).					

10.3 disabling function

Configuration

With the 1-bit communication object "Disabling", the operating areas of the device can be partly or completely disabled. During a disable, the rockers or buttons can also temporarily execute other functions.

An active disable applies only to the functions of the rockers or buttons. The functions of the status LED and temperature measurements are not affected by the disabling function.

The disabling function and the associated parameters and communication objects are enabled if the "Disabling function" parameter on the "General" parameter page is enabled.

You can parameterize the polarity of the disabling object. In case of polarity inversion (disabled = 0 / enabled = 1), the disabling function is not activated immediately after a bus reset or after ETS programming (object value = "0"). There must first be an object update "0" until the disabling function will be activated. Telegram updates from "0" to "0" or from "1" to "1" on the "Disabling" object remain without effect.

After a device reset, the disabling function is deactivated and must be activated via the bus.

Configuring the reaction during a disable

In an active disable, either all buttons of the device or only individual buttons may be affected by the disable. You can furthermore define in the ETS whether disabled buttons will not show any response when pressed or, alternatively, will behave like another button of the device. This can be used to limit the control function of the device completely or partially.

The disabling function must be activated.

- Set the "Button assignment" parameter to "All buttons assigned".

  The disabling function affects all buttons. As soon as any button of the device is pressed while a disabling function is active, the device executes the "behaviour when a disabling function is active".

- Set the "Button assignment" parameter to "Individual buttons assigned".

  The disabling function affects only the buttons that are assigned on the "Disable function" parameter page. As soon as one of the assigned buttons is pressed while a disabling function is active, the "Behaviour when a disabling function is active" for this button is executed. All other, non-disabled buttons respond normally when pressed.

- Set the parameter "Behaviour when a disabling function is active" to "No response when pressed".

The disabled buttons do not respond when pressed. The status LEDs of the disabled buttons remain off if the display function is configured to "Button-press display" or "Telegram acknowledgement".

- Set the parameter "Behaviour when a disabling function is active" to "No response when pressed like...". Also configure the parameters "All assigned top buttons behave like" and "All assigned bottom buttons behave like" to the required button number or disabling function as a reference button.

  All buttons assigned to the disabling function behave as defined in the parameters for the two specified reference buttons of the device. Different or identical reference buttons can be parameterised separately for all the top and bottom buttons. The two disabling functions of the device can also be configured as a reference button.
  The telegrams are transmitted to the bus via the communication objects of the specified reference buttons. The status LEDs of the reference buttons are controlled according to their function. The status LEDs of the disabled buttons remain off if the display function is configured to "Button-press display" or "Telegram acknowledgement".

i If a button evaluation is taking place at the time of activation / deactivation of a disabling function, this function is aborted immediately and with it also the pertaining button function. It is first necessary to release all buttons before a new button function can be executed if so permitted by the state of disabling.

10.3.1 Table of parameters

"General" parameter page

disabling function	Active **Inactive**
The disabling function can be enabled centrally at this point. If "Active", the ETS shows further communication object and parameters.	

"Disable function" parameter page

Polarity of disabling object	**1 = disable / 0 = enable** 0 = disable / 1 = enable
This parameter defines the value of the disabling object at which the disabling function is active.	

Button assignment	**All buttons assigned** individual buttons assigned
"All buttons assigned": The disabling function affects all buttons. As soon as any button of the device is pressed while a disabling function is active, the "Behaviour when a disabling function is active" is executed. "Individual buttons assigned": The disabling function affects only the assigned buttons. As soon as one of the assigned buttons is pressed while a disabling function is active, the "Behaviour when a disabling function is active" for this button is executed. All other, non-disabled buttons respond normally when pressed.	

Button *n*	Active **Inactive**
With the setting "Individual buttons assigned", these parameters define the assignment of the buttons to the disabling function.	

Behaviour when the disabling function is active	**no reaction to button-press** Reaction to a button-press like...
You can define here whether disabled buttons will not show any response when pressed or, alternatively, will behave like another button of the device or like a virtual disabling function. "no reaction to button-press": The disabled buttons do not respond when pressed. "Reaction to a button-press like...": The disabled buttons can either execute the function of a button that has already been configured or the function of a separate disabling function. The parameters "All assigned top buttons behave like" and "All assigned bottom buttons behave like" define the function of the buttons assigned to the disabling function.	

All assigned upper buttons behave as	**Button 1** Button 2 ... (Selection depends on device variant!) Disabling function 1 Disabling function 2
If a specific button function is to be assigned during disabling to all or to individual buttons, this parameter can be used to select the desired button the function of which will then be executed. During disabling, all assigned upper buttons behave like the one parameterized here. The desired functions can either correspond to the function of an existing button or they can be configured as special disabling functions. This parameter is only visible with "Behaviour when a disabling function is active" = "Reaction to a button-press like..."!	

All assigned lower buttons behave as	**Button 1** Button 2 ... (Selection depends on device variant!) Disabling function 1 Disabling function 2
If a specific button function is to be assigned during disabling to all or to individual buttons, this parameter can be used to select the desired button the function of which will then be executed. During disabling, all assigned lower buttons behave like the one parameterized here. The desired functions can either correspond to the function of an existing button or they can be configured as special disabling functions. This parameter is only visible with "Behaviour when a disabling function is active" = "Reaction to a button-press like..."!	

Parameter page "Disabling function -> Disabling function 1 / Disabling function 2"

The functions "switching", "dimming", "Venetian blind", "value transmitter", "scene extension", "2-channel operation" and "controller extension" are available for the two disabling functions. These functions behave like the button functions of the device (same parameters).

10.3.2 Object list

Object no.	Function	Name	Type	DPT	Flag
9	Disabling	Disabling function - input	1-bit	1,002	C, -, W, -, -
1-bit object for transmission of switching telegrams (ON, OFF).					

Function: switching

Object no.	Function	Name	Type	DPT	Flag
41, 44	Switching	Disabling function *n* - output	1-bit	1,001	C, -, -, T, -
1-bit object for transmission of switching telegrams (ON, OFF).					

Object no.	Function	Name	Type	DPT	Flag
42, 45	Switching feedback	Disabling function *n* - input	1-bit	1,001	C, -,W, -, U
1-bit object for receiving feedback telegrams (ON, OFF).					

Function: dimming

Object no.	Function	Name	Type	DPT	Flag
77, 83	Switching	Disabling function *n* - output	1-bit	1,001	C, -, -, T, -
1-bit object for transmission of switching telegrams (ON, OFF).					

Object no.	Function	Name	Type	DPT	Flag
78, 84	Dimming	Disabling function *n* - output	4-bit	1,007	C, -, -, T, -
4-bit object for the transmission of relative dimming telegrams.					

Object no.	Function	Name	Type	DPT	Flag
79, 85	Switching feedback	Disabling function *n* - input	1-bit	1,001	C, -,W, -, U
1-bit object for receiving feedback telegrams (ON, OFF).					

Function: Venetian blind

Object no.	Function	Name	Type	DPT	Flag
113, 116	Short time operation	Disabling function *n* - output	1-bit	1,008	C, -, -, T, -
1-bit object for the transmission of telegrams with which a Venetian blind or shutter drive motor can be stopped or with which the blind slats can be adjusted by short time operation.					

Object no.	Function	Name	Type	DPT	Flag
114, 117	Long-time operation	Disabling function *n* - output	1-bit	1,008	C, -,W, T, -
1-bit object for the transmission of telegrams with which a Venetian blind or shutter drive motor can be can be moved upwards or downwards.					

Function: value transmitter

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter 0...255	Disabling function *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for the transmission of values from 0 to 255.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter 0…100 %	Disabling function *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting values from 0 to 100%.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter -128...127	Disabling function *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for the transmission of values from -128 to 127.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter 0…255 %	Disabling function *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting values from 0 to 255%.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter 0...65535	Disabling function *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for the transmission of values from 0 to 65535.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Value transmitter -32768...32767	Disabling function *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for the transmission of values from -32768 to 32767.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Temperature value transmitter	Disabling function *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values from 0 to 40 °C.					

Object no.	Function	Name	Type	DPT	Flag
167, 179	Brightness value transmitter	Disabling function *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values from 0 to 1500 Lux.					

Function: scene extension

Object no.	Function	Name	Type	DPT	Flag
204, 207	Scene extension	Disabling function *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for recalling or for storing one of 64 scenes max. from a scene push button sensor.					

Function: 2-channel operation

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 switching	Disabling function *n* - output	1-bit	1,001	C, -,W, T, U
1-bit object for transmitting switching telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 switching	Disabling function *n* - output	1-bit	1,001	C, -,W, T, U
1-bit object for transmitting switching telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value 0...255	Disabling function *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value 0...255	Disabling function *n* - output	1 bytes	5,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value 0...100 %	Disabling function *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value 0...100 %	Disabling function *n* - output	1 bytes	5,001	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value -128...127	Disabling function *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value -128...127	Disabling function *n* - output	1 bytes	6,010	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value 0...255 %	Disabling function *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value 0...255 %	Disabling function *n* - output	1 bytes	5,004	C, -, -, T, -
1-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value 0...65535	Disabling function *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value 0...65535	Disabling function *n* - output	2 bytes	7,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 value -32768...32767	Disabling function *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 value -32768...32767	Disabling function *n* - output	2 bytes	8,001	C, -, -, T, -
2-byte object for transmitting value telegrams on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 temperature value	Disabling function *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 temperature value	Disabling function *n* - output	2 bytes	9,001	C, -, -, T, -
2-byte object for transmitting temperature values on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 brightness value	Disabling function *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 brightness value	Disabling function *n* - output	2 bytes	9,004	C, -, -, T, -
2-byte object for transmitting brightness values on channel 2 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
261, 274	Channel 1 scene (external) 1…64	Disabling function *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for transmitting scene values on channel 1 if 2-channel operation is activated.					

Object no.	Function	Name	Type	DPT	Flag
262, 275	Channel 2 scene (external) 1…64	Disabling function *n* - output	1 bytes	18,001	C, -, -, T, -
1-byte object for transmitting scene values on channel 2 if 2-channel operation is activated.					

Function: controller extension

Object no.	Function	Name	Type	DPT	Flag
316, 323	Operating mode switchover	Disabling function *n* - controller extension - output	1 bytes	20,102	C, -, -, T, -
1-byte object for changing over a room temperature controller between the Comfort, Standby, Night and Frost/heat protection operating modes. This object is only visible if "Function = operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
317, 324	Operating mode switchover feedback	Disabling function *n* - controller extension - input	1 bytes	20,102	C, -,W, -, U
1-byte object for receiving the operating mode of a room temperature controller. This object is only visible if "Function = operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
316, 323	Operating mode forced-control	Disabling function *n* - controller extension - output	1 bytes	20,102	C, -, -, T, -
1-byte object for changing over a room temperature controller under forced control between the Automatic, Comfort, Standby, Night and Frost / heat protection operating modes This object is only visible if "Function = forced operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
317, 324	Forced object operating mode feedback	Disabling function *n* - controller extension - input	1 bytes	20,102	C, -,W, -, U
1-byte object for receiving the operating mode of a room temperature controller. This object is only visible if "Function = operating mode change-over".					

Object no.	Function	Name	Type	DPT	Flag
316, 323	Presence function	Disabling function *n* - controller extension - output	1-bit	1,018	C, -, -, T, -
1-bit object for changing over the presence status of a room temperature controller. This object is only visible if "Function = presence function".					

Object no.	Function	Name	Type	DPT	Flag
317, 324	Presence function feedback	Disabling function *n* - controller extension - input	1-bit	1,018	C, -,W, -, U
1-bit object for receiving the presence status of a room temperature controller. This object is only visible if "Function = presence function".					

Object no.	Function	Name	Type	DPT	Flag
316, 323	Preset setpoint shifting	Disabling function *n* - controller extension - output	2 bytes	9,002	C, -, -, T, -
2-byte object for presetting a basic setpoint shift in Kelvin. The value "0" means that no shift is active . The values can be specified between -670760 K and 670760 K. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via offset (DPT 9.002)".					

Object no.	Function	Name	Type	DPT	Flag
317, 324	Current setpoint shifting	Disabling function *n* - controller extension - input	2 bytes	9,002	C, -,W, -, U
2-byte object for receiving the feedback from the current basic setpoint shift in Kelvin. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via offset (DPT 9.002)".					

Object no.	Function	Name	Type	DPT	Flag
316, 323	Preset setpoint shifting	Disabling function *n* - controller extension - output	1 bytes	6,010	C, -, -, T, -
1-byte object for presetting a basic setpoint shift. The value "0" means that no shift is active . The value is depicted in a two's complement in the positive or negative direction. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via levels (DPT 6.010)".					

Object no.	Function	Name	Type	DPT	Flag
317, 324	Current setpoint shifting	Disabling function *n* - controller extension - input	1 bytes	6,010	C, -,W, -, U
1-byte object for receiving the feedback from the current basic setpoint shift. This object is only visible if "Function = Setpoint shift" and "Type of setpoint shift = Via levels (DPT 6.010)".					

10.4 Temperature measurement

Basic principles

The device possesses an integrated temperature sensor, using which the room temperature can be detected. Alternatively (e.g. if the device has been installed in an unfavourable location or in case of operation in difficult conditions, e.g. in a moist atmosphere) or additionally (e.g. in large rooms or halls), a second external sensor linked via bus telegrams can be used to determine the actual value.

The temperature measurement is activated on the "General" parameter page and configured on the "Room temperature measurement" parameter page.

When choosing the installation location for the device or the external sensors, the following points should be considered:

- The device or temperature sensor should not be used in multiple combinations, especially together with flush-mounted dimmers.
- Do not install the temperature sensor in the area of large electrical consumers (avoid heat influences).
- The push button sensor should not be installed in the vicinity of radiators or cooling systems.
- The temperature sensor should not be exposed to direct sun.
- The installation of sensors on the inside of an outside wall might have a negative impact on the temperature measurement.
- Temperature sensors should be installed at least 30 cm away from doors, windows or ventilation units and at least 1.5 m above the floor.

Temperature measurement and measured value determination

The device possesses an integrated temperature sensor. This temperature sensor can be used to measure the ambient temperature and forward it to a room temperature controller via the 2-byte object "Actual temperature".

The room temperature measurement can optionally be supplemented with an external sensor. The external sensor is linked to the device (for example a KNX room temperature controller) via the bus by means of the additional 2-byte communication object "External temperature".

The "Room temperature measurement by" parameter in the "Room temperature measurement" parameter node specifies the sensors to detect the room temperature. The following settings are possible:

- "internal temperature sensor"

  The temperature sensor integrated in the device is activated. Thus, the actual temperature value is determined only locally on the device.

- "Internal temperature sensor and external temperature

  With this setting the internal as well as the external temperature sensor is active. The external sensor must either be a KNX room temperature controller coupled via the "External temperature" 2-byte object or another bus device

with temperature detection.
When evaluating the internal and the external sensors, the real actual temperature is made up from the two measured temperature values. The weighting of the temperature values is defined by the "Creation of measuring value internal against external" parameter. Depending on the different locations of the sensors or a possible non-uniform heat distribution inside the room, it is thus possible to adjust the actual temperature measurement. Often, those temperature sensors that are subject to negative external influences (for example, unfavourable location because of exposure to sun or heater or door / window directly next to it) are weighted less heavily.

Example:

The device has been installed next to the entrance door (internal sensor). An additional external temperature sensor has been mounted on an inner wall in the middle of the room below the ceiling.
Internal sensor: 21.5 °C
Receiving temperature value: 22.3 °C
Determination of measured value: 30 % to 70 %

-> TResult internal = T internal · 0.3 = 6.45 °C,
-> TResult external = Texternal = 22.3 °C · 0.7 = 15.61 °C
-> TResult actual = TResult internal + TResult external = 22.06 °C

Transmission of the actual temperature

The determined actual temperature can be actively transmitted to the bus via the "Actual temperature"or "actual temperature not adjusted" 2-byte objects.

The room temperature can be transmitted to the bus either after a change in a parameterised temperature value or cyclically after a parameterised cycle time.

The value "0" deactivates the transmission when room temperature changes and the cyclical transmission of the room temperature. If both parameters are set to zero, the room temperature is not transmitted to the bus.

Calibrating the measured values

In some cases during room temperature measurement, it may be necessary to adjust the single temperature values. Adjustment becomes necessary, for example, if the temperature measured by the sensors stays permanently below or above the actual temperature in the vicinity of the sensor. To determine the temperature deviation, the actual room temperature should be detected with a reference measurement using a calibrated temperature measuring device.

The "Calibration ..." parameter enables the temperature calibration to be calibrated in 0.1 K-levels. Thus, the calibration is only set statically once.

The measured value has to be increased, if the value measured by the sensor lies below the actual room temperature. The measured value has to be decreased, if the value measured by the sensor lies above the actual room temperature.

The "Actual temperature" object is always used to transmit the adjusted temperature value to the bus.
When determining the measured value using combined sensors, the two adjusted values are used to calculate the actual value.

10.4.1 Table of parameters

"General" parameter page

Temperature measurement	Active **Inactive**
This parameter activates the temperature measurement. Additional parameters and objects become visible.	

"Room temperature measurement" parameter page

Room temperature measurement using	**internal temperature sensor** Internal temperature sensor and external temperature
The "Room temperature measurement using" parameter specifies the sensors to detect the room temperature. "internal temperature sensor": The temperature sensor integrated in the device is activated. Thus, the actual temperature value is determined only locally on the device. In this configuration, the feedback control will start directly after a device reset. "Internal temperature sensor and external temperature": This setting is used to combine the selected temperature sources. The external temperature is received via the "External temperature" 2-byte object.	

Determination of measured value from internal / external ratio	10% to 90% 20% to 80% 30% to 70% 40% to 60% **50% to 50%** 60% to 40% 70% to 30% 80% to 20% 90% to 10%
The weighting of the measured temperature value for the internal and external sensors is specified here. That results in an overall value, which will be used for the further interpretation of the room temperature. This parameter is only visible with "Room temperature measurement using = internal sensor and external temperature"!	

Internal sensor calibration	-12.8...**0**...12.7
Determines the value in Kelvin by which the internal sensor’s measured value is adjusted. This parameter is only visible when the temperature detection system requires an internal sensor.	

External temperature calibration	-12.8...**0**...12.7
Determines the value in Kelvin by which the external sensor’s room temperature value is calibrated. This parameter is only visible when the temperature detection system requires an external sensor.	

Transmission after room temperature change by	0...**0.2**...25.5
Determines the size of the value change of the room temperature in Kelvin after which the current value is automatically transmitted to the bus via the "Actual temperature" object. If set to "0", the actual value will not be transmitted to the bus depending on a room temperature change.	

Cyclical transmission of room temperature	0...**15**...255
This parameter specifies whether and at what time in minutes the determined room temperature is to be periodically output via the "Actual temperature" object. If the setting is "0", the current room temperature will not be transmitted cyclically to the bus.	

10.4.2 Object list

The name of the following objects can be specified by the parameter "Name of the room temperature measurement".

Object no.	Function	Name	Type	DPT	Flag
363	Actual-temperature	Toom temperature - output	2 bytes	9,001	C, -, -, T, -
2-byte object for displaying the actual temperature (room temperature) determined internally. Possible value range: -99.9 °C to +99.9 °C / Measuring range of internal temperature sensor: -40 °C to +125 °C. The temperature value is always output in the format "°C".					

Object no.	Function	Name	Type	DPT	Flag
364	External sensor	Room temperature - input	2 bytes	9,001	C, -,W, -, U
2-byte object for coupling an external KNX room temperature sensor or a controller extension. Thus cascading of multiple temperature sensors for room temperature measurement. Possible range of values: -99.9 °C to +99.9 °C. The temperature value must always be specified in the format "°C".					

Gira
Giersiepen GmbH & Co. KG
Elektro-Installations-
Systeme

Industriegebiet Mermbach
Dahlienstraße
42477 Radevormwald

Postfach 12 20
42461 Radevormwald

Deutschland

Tel +49(0)21 95 - 602-0
Fax +49(0)21 95 - 602-191

www.gira.de
info@gira.de