State 04/2020 Version V1.1

Technical Manual

MDT Central Operation Unit Smart

BE-GBZW.01

BE-GBZS.01

BE-BZS86.01

Further Documents:

Datasheet:

https://www.mdt.de/EN_Downloads_Datasheets.html

Assembly and Operation Instructions:

https://www.mdt.de/EN_Downloads_Instructions.html

Solution Proposals for MDT products:

https://www.mdt.de/EN_Downloads_Solutions.html

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1 Content

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2 Overview

2.1 Overview devices

The description refers to the following devices (order number in bold):

- **BE-GBZx.01,** Glass Central Operation Unit Smart, white/black
  - Large, active colour display, 6 capacitive sensor surfaces, 6 RGB status LEDs
  - 4 direct operating functions
  - 20 time switch functions each with 6 switching times
  - 6 logic blocks
  - Integrated temperature controller and fan coil control
  - PIN code functionality to lock the device/activate the alarm system or prevent changes by third parties
- **BE-BZ86.01,** Central Operation Unit Smart 86, white
  - Large, active colour display, 6 mechanical keys with finger recesses, 6 RGB status LEDs
  - 4 direct operating functions
  - 20 time switch functions each with 6 switching times
  - 6 logic blocks
  - Integrated temperature controller and fan coil control
  - PIN code functionality to lock the device/activate the alarm system or prevent changes by third parties

2.2 Special functions of the Central Operating Unit Smart

The central operating unit Smart combines a multitude of functions in one device and is particularly suitable for the Smart Home as a central operating unit. The range of functions includes an integrated timer for up to 20 channels with holiday function and automatic holiday calculation, a ventilation control, four direct operating functions for the most important functions such as "Present", "Central Off", light or blinds, as well as a convenient room temperature controller with temperature sensor. A code lock with 4-6 digits protects the control panel from unauthorised third parties, protects an individual push-button function, locks the timer or allows the alarm function to be safely armed. With the 6 sensor surfaces, all functions can be conveniently operated on the large, active colour display. Indoor/outdoor temperature, set points, date/time, status information, up to 4 alarm messages and 14 byte text messages are displayed. The 6 status LEDs can be controlled independently. Furthermore, 6 logic functions are available to process internal and external status information. The glass control panel Smart is in the design of the glass push-button II Smart. However, the operating concept of the Smart glass control panel is completely different and does not replace a glass push-button II Smart. In addition to 4 direct functions, 20 further functions are controlled via an operating menu. In the operating menu, the function is first selected and then switched. In addition, the control menu can be used to set the time, holiday control, timer and manual setting of the holiday mode.

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Daily/weekly time switch with astro switch function, holiday function and automatic calculation of public holidays.

Up to 20 functions/channels can be switched with the integrated timer. The timer is a daily/weekly timer and has an Astro switch function, a holiday function and an automatic holiday calculation. In principle, the time switch can be used as a master and supplies all other participants with date/time. The automatic summer/winter time changeover can be set separately, so that in case the time changeover is abolished, the normal time can be set again at any time. If a timer is already present in the KNX system, e.g. the IP interface with time server function (SCN-IP000.03), the time switch can work with the provided system time in slave mode. Each function/channel can be named individually and can be controlled via the timer function. Per function/channel 6 switching times are possible. These can be executed daily or on different days within the week.

#	Mo	Di	Mi	Do	Fr	Sa	So	Modus	Bedingung	Std	min	Wert	Wert änderbar
1	✓		✓		✓			sunrise	time shift		0	off / on	✓
2		✓		✓				sunrise	time shift		+10min	off / on	✓
3						✓	✓	sunrise	no earlier than...	9	0	off / on	✓
4	✓	✓	✓	✓	✓			sunset	latest at...	22	0	off / on	✓
5						✓	✓	sunset	time shift		0	off / on	✓
6						✓	✓	time		10	0	off / on	✓

In addition to selecting the day and time when a function is to be carried out, additional mode settings and corresponding conditions can also be defined. In addition to the normal standard parameter of time, sunrise, sunset, dawn, dusk and random are also available for the mode. In combination with the conditions time shift (+/- up to 2 hours), at the latest by, at the earliest by, or at random +/- 10min up to one hour, a multitude of useful functions can be generated. Example see description Astro switch function

Astro switch function for comfortable blinds / lighting control

The sunrise and sunset times are calculated using the Astro function. Required is the location, either as location information or by location coordinates, and the date by the timer. The following scenario is then possible: At sunset, the outdoor lighting is switched on at the right time, the blinds are lowered in time for the evening before strangers look into the house, and one hour before the blinds are closed, presence lighting is switched on in the house so that the house looks inhabited even when absent. At sunrise, the exterior lighting is switched off again early and moves the blinds up in the morning. In summer, when the sun rises at 5.20 a.m.*, an additional condition determines the earliest time at which the blinds can be raised, for example 7.30 a.m.. In winter, when the sun rises at 8.30 a.m.*, an additional condition can be used to specify that the blind may move up at the latest by 8.00 a.m., for example. In addition, the presence lighting is switched on and switched off again at 10.00 a.m. when it is bright. This scenario is possible without an external twilight switch and without a logic module. Various fine tuning of the switching threshold of the sunrise and sunset times is possible via the *Individual settings sunrise/sunset* parameter. (* Time examples from June / December of a year)

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Holiday function with period activation
The holiday function carries out desired actions during longer periods of absence, for example lowering the room temperature, lighting scenarios, switching off various functions, etc. The holiday function is activated via a 1-bit object (on/off) or via a 1-byte object. The 1-bit object is used to switch the holiday function on or off at different times, while the 1-byte object is used to activate the holiday function for a fixed period, e.g. 7 days. The status object outputs the remaining days.

With the automatic holiday calculation, holidays can also be enjoyed during the week
The automatic calculation of public holidays can be parameterized individually for all countries. For Germany and Austria the public holidays of all federal states are preconfigured. Further individual dates can be added. The holiday event can actively influence the timer. No action or holiday like Sunday can be set. If the holiday is during the week and the settings are set to holiday like Sunday, the blinds will move up later during the week and you can start the holiday a little later. (Later time setting on Sunday assumed). The hot water is also set to get up later, the time of the circulation pump is also moved back and supplies hot water at a later time when it is needed.

Time function on external display
The timer can send the time telegram cyclically every minute. This enables time displays to be realized on displays which do not have their own clock function.

4 Direct operating functions
Four direct operating functions are available on the first page of the Central Operating Unit. These can be executed individually or in groups. Here, important functions such as switching, dimming, value, scenes, blinds or operating mode changeover can be executed directly. Especially central functions such as central off, presence, standby or light corridor can be implemented optimally.

20 Operating functions via menu / time switch
In general, a maximum of 24 functions can be managed via the Central Operating Unit Smart. Four direct operating functions are available, as described above. Twenty functions can be controlled via manual operating keys and/or the timer. Here, the twenty functions are assigned to a menu with four function levels (light, blinds, temperature or other). This results in a new manageable operating concept of the control panel consisting of the upper level with the selection of the function level, the middle level with the selection of the function, and the lower level with the actual switching function. Regardless of whether an operating function and/or a timer function is required, it always occupies one of the twenty functions. The 20 operating functions can be used to control normal switching functions, blinds/roller shutters, heating/temperature set points, scenes, values and operating modes. Each time switch function has its own blocking object.

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Comfortable room temperature controller with temperature sensor

The functional scope of the room temperature controller ranges from simple heating control to complete air conditioning of a room. The operating modes heating, cooling and heating and cooling are available for this purpose. As control parameters, the 2-point control, a switching PI control (PWM) or continuous PI control can be selected. The room temperature controller supports single and dual-circuit systems in heating/cooling mode. This makes it possible to control air conditioning systems with a common pipe system as well as systems with two separate pipe systems for heating / cooling. The temperature is measured by a temperature sensor hidden in the outer edge of the control panel, which detects the exact room temperature and sends it to the bus. With the parameter Sensor internal/external, an additional measurement extension unit can be activated. If, e.g. in large rooms, the average value of two temperatures is to be formed, the parameter is set to 50% internal / 50% external and an optimum room temperature value is obtained. If the external sensor fails, an error message is generated and the internal sensor is set to 100%. Likewise, an upper and lower alarm value can be activated, which outputs a 1-bit message if the value is exceeded or undershot.

Ventilation control

The integrated ventilation control enables fans to be controlled manually in up to 4 stages, via the control value of the temperature controller or by means of the temperature difference between setpoint and actual value. In addition, the day/night function ensures individual adjustment of the ventilation according to the time of day. For example, the ventilation control runs during the day in up to 4 stages depending on requirements, while a maximum of two stages are available in night operation to avoid disturbing noise levels and draughts. An anti-fixing function can be selected to protect the ventilation system. The behaviour of the locking function can be specifically adjusted.

Code lock

The Central Operating Unit Smart is equipped with a code lock with a digit length of 4-6 digits. The code lock function can be assigned to one of four possible applications. Either as a device lock, in which case access to the entire Smart control panel is protected and can only be enabled via PIN code or an external object. Or as key lock, here a direct operating key is locked and only executed when the key action has been confirmed with the PIN code. Or for controlling the alarm system, here the alarm system is activated via a direct operating button, protected via PIN code. The Smart control panel is then completely locked. It can only be released again and the alarm system disarmed via the PIN code. And finally to protect the time switch from unauthorised modification.

Status displays

Up to 4 status elements can be displayed in the standby mode of the control panel. These status elements can be any values of the KNX bus, 14 byte status texts, date/time, internal room temperature, sunrise/sunset and much more. Via the 14 byte status texts, multimedia information such as playlist, current song, etc. can be visualised and also scrolling texts can be realised.

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Text messages
In addition to the 4 status displays, a further 4 text messages with a maximum of 14 characters can be permanently set. These 4 text messages are shown on the display as soon as the associated communication object receives the value 1. The message remains until it is acknowledged by push-button or a defined time has elapsed. A fifth variable text message can also be activated. Any text with a length of 14 characters can be sent to this object. When the object is received, this variable text is shown in the display until it is acknowledged by pressing the key or until a defined time has elapsed.

Active colour display
The Central Operating Unit Smart has a large, active colour display. This is adjustable in 10 brightness levels and has an automatic adjustment by a brightness sensor. The display of the background colour can be set to white or black for day or night operation, depending on customer requirements.

Logic functions
The application of the Central Operating Unit Smart provides a total of 6 logic functions with which nested function calls can also be implemented, e.g. to enable a scene call in day mode only. The logic function can process both internal and external status information. This enables, for example, a second telegram to be triggered when a button is pressed. The logic operations AND, OR and XOR are available. If the conditions are met, 1 bit / 1 byte values can be sent at the output or scenes can be called up.

Device Configuration App
The DCA app for the Central Operating Unit Smart is available for free download in the KNX Online Shop and on the MDT homepage. DCA Apps are supported from ETS 5 on. The file of the DCA App "MDT_DCA_Operation_Unit_Smart_v10 .etsapp" will be installed as an additional app after the download in ETS 5.6.x. After successful installation, the DCA app appears in the application of the Central Operating Unit Smart. With this app, pictures/symbols in the Central Operating Unit Smart can be exchanged for own symbols. The images to be reloaded must meet the following requirements:

- Format: Bitmap
- Size: 64x64 Pixel
- Colour: Black/White

Already finished symbols/icons can be found in a good quality and selection on the Internet at the KNX User Forum at:
https://service.knx-user-forum.de/?comm=iconset

The symbols / icons in the KNX User Forum are available in the formats *.hsm, *.png and *.bmp. For the Central Operating Unit Smart, please select the *.bmp format.

Mounting height
The recommended mounting height for the Central Operating Unit Smart is 1.6 m.

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2.3 Exemplary Circuit Diagram

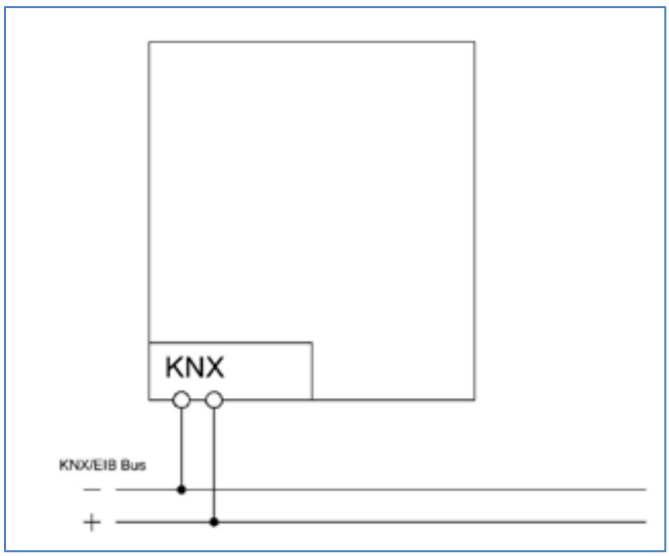

Figure 1: Exemplary circuit diagram

2.4 Structure & Handling

The following figure shows the structure of the Central Operating Unit Smart (here BE-GBZW.01):

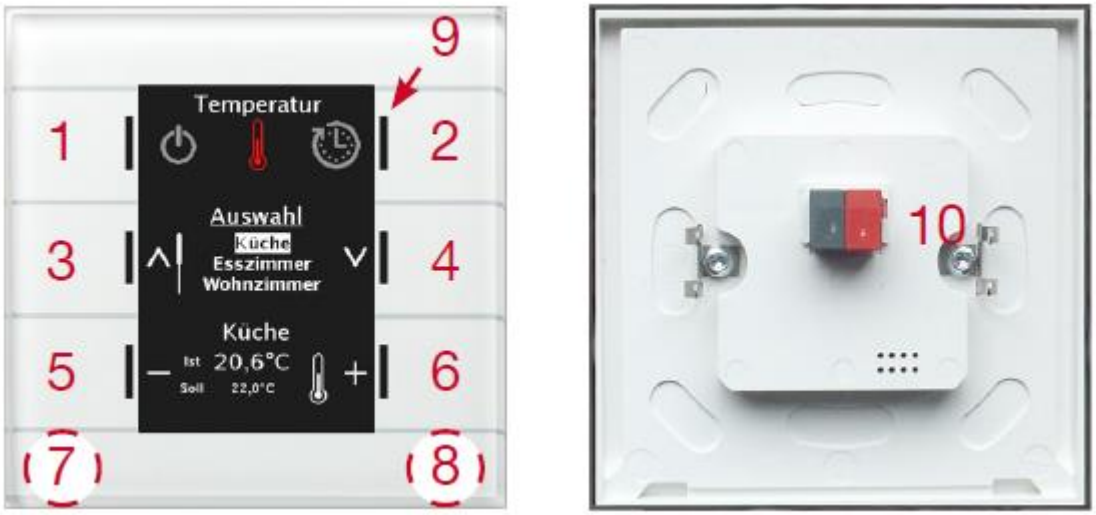

Figure 2: Structure & Handling

1, 2, 3, 4, 5, 6	=	Sensor surfaces/buttons for operating the pushbutton
7, 8	=	Press simultaneously to enter the programming mode
9	=	RGB-Status LEDs
10	=	Bus connection terminal

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2.5 Commissioning

After wiring the device, the assignment of the physical address and the programming of the application follows:

(1) Connect the programming interface with the bus, e.g. MDT USB Interface
(2) Set bus power up
(3) Activate the programming mode by pressing buttons 7 and 8 on the device simultaneously, (Status LEDs on the right and left side of the button alternately flash red)
(4) Loading of the physical address out of the ETS-Software by using the interface (Red LEDs will turn off as soon as this is successfully completed)
(5) Loading of the application, with requested parameterization
(6) If the device is enabled you can test the requested functions (also possible by using the ETS-Software)

2.6 Reload Symbols

Any symbols can be loaded into the Central Operation Unit Smart. For this purpose, a DCA app "MDT_DCA_Glass_Operation_Unit_Smart_v10.etsapp" must be downloaded and installed once from the MDT website or from the shop of my.knx.org. The images to be reloaded have to meet the following requirements:

- Format: Bitmap
- Size: 64x64 Pixel
- Colour: Black/White
- Usage: ETS5 or higher

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3 Communication Objects

3.1 Standard settings of the communication objects

Standard settings per menu / time switch function									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
0	Function 1	Blind Up/Down	1 Bit	Low	X			X	
0	Function 1	Shutter Up/Down/Stop	1 Bit	Low	X			X	
0	Function 1	Dimming On/Off	1 Bit	Low	X			X	
0	Function 1	Switch On/Off	1 Bit	Low	X			X	
0	Function 1	Decimal value	1 Byte	Low	X			X	
0	Function 1	Percent value	1 Byte	Low	X			X	
0	Function 1	Temperature value	2 Byte	Low	X			X	
0	Function 1	Colour temperature	2 Byte	Low	X			X	
0	Function 1	Brightness value	2 Byte	Low	X			X	
0	Function 1	Scene	1 Byte	Low	X			X	
0	Function 1	Forcible control	2 Bit	Low	X			X	
0	Function 1	Temperature shift	1 Bit / 1 Byte/ 2 Byte	Low	X			X	
0	Function 1	Basic Comfort Setpoint	2 Byte	Low	X			X	
0	Function 1	Mode selection (HVAC-Mode)	1 Byte	Low	X			X	
1	Function 1	Stop/Slats Open/Close	1 Bit	Low	X			X	
1	Function 1	Central shutter Up/Down/Stop	1 Bit	Low	X			X	
1	Function 1	State of percent value	1 Byte	Low	X		X	X	X
1	Function 1	State of decimal value	1 Byte	Low	X		X	X	X
1	Function 1	State of temperature value	2 Byte	Low	X		X	X	X
1	Function 1	State of Brightness value	2 Byte	Low	X		X	X	X
1	Function 1	State of colour temperature	2 Byte	Low	X		X	X	X
1	Function 1	Dimming relative	4 Bit	Low	X			X	
1	Function 1	Status HVAC Mode/Status	1 Byte	Low	X		X	X	X
2	Function 1	State of current setpoint	2 Byte	Low	X		X	X	
2	Function 1	Absolute Position	1 Byte	Low	X			X	
2	Function 1	Dimming absolute	1 Byte	Low	X			X	X
3	Function 1	State for display	1 Bit	Low	X		X	X	X
3	Function 1	State for display	1 Byte	Low	X		X	X	X
3	Function 1	State basis comfort setpoint	2 Byte	Low	X		X	X	X
3	Function 1	Setpoint shift	2 Byte	Low	X			X	X
3	Function 1	State setpoint shift	1 Byte 2 Byte	Low	X		X	X	X
3	Function 1	State dimming value for display	1 Byte	Low	X		X	X	X
3	Function 1	State of blind for display	1 Byte	Low	X		X	X	X
4	Function 1	Locking time switch	1 Bit	Low	X		X	X	X
+5	**next button**								

Table 1: Communication objects – Default settings per menu / time switch function

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Central objects Time switch									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
128	Central Lock for Switching time	Set lock	1 Bit	Low	X		X		
129	Central Lock for Switching time	State	1 Bit	Low	X	X		X	X
130	Holiday	Activation	1 Bit	Low	X		X		
130	Holiday	Number of days	1 Byte	Low	X		X		X
131	Holiday	State	1 Bit	Low	X	X		X	
131	Holiday	State (Duration in days)	1 Byte	Low	X	X		X	
132	Public holiday	Activation	1 Bit	Low	X		X		
133	Public holiday	State	1 Bit	Low	X	X		X	
134	Switching times internal	VisuControl Easy Interface (in work)	14 Byte	Low	X		X	X	

Table 2: Communication objects – Central objects time switch

Standard settings Logic function									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
208	Logic A	Input logic 1	1 Bit	Low	X		X	X	X
209	Logic A	Input logic 2	1 Bit	Low	X		X	X	X
210	Logic A	Input logic 3	1 Bit	Low	X		X	X	X
211	Logic A	Input logic 4	1 Bit	Low	X		X	X	X
212	Logic A	Output Switching Output Scene Output value Output Percent value	1 Bit 1 Byte 1 Byte 1 Byte	Low	X	X		X	
+5	**next Logic**								

Table 3: Communication objects – Logic function

Standard settings Status LEDs									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
186	LED 1	Switch	1 Bit	Low	X		X	X	X
+1	**next LED**								
192	LED Direct button 1	Switch	1 Bit	Low	X		X	X	X
+1	**next LED**								
196	LED 1 Priority	Switch	1 Bit	Low	X		X	X	X
+ 1	**next LED Priority**								
202	LED Direct button 1 Priority	Switch	1 Bit	Low	X		X	X	X
+ 1	**next LED Direct button Priority**								
206	LED	Blocking object	1 Bit	Low	X		X	X	X
207	LED	Blinking status	1 Bit	Low	X	X		X	

Table 4: Communication objects – Status LEDs

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Standard settings Temperature controller									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
145	Temperature measurement	Send measurement	2 Byte	Low	X	X		X	
146	max. temperature	Value exceeded	1 Bit	Low	X	X		X	
147	min. temperature	Value fallen below	1 Bit	Low	X	X		X	
150	External sensor	Receive external value	2 Byte	Low	X		X		
151	Setpoint comfort	Set setpoint	2 Byte	Low	X	X	X	X	
152	Manual setpoint value offset	Reduction / increase	2 Byte	Low	X		X		
153	Control value heating	Send control value	1 Bit	Low	X	X		X	
153	Control value heating	Send control value	1 Byte	Low	X	X		X	
153	Control value heating/cooling	Send control value	1 Bit	Low	X	X		X	
153	Control value heating/cooling	Send control value	1 Byte	Low	X	X		X	
155	Control value cooling	Send control value	1 Bit	Low	X	X		X	
155	Control value cooling	Send control value	1 Byte	Low	X	X		X	
155	Requirement Cooling/Heating	0=Cooling 1=Heating	1 Bit	Low	X	X		X	
156	Mode Comfort	Switch mode	1 Bit	Low	X	X	X		
157	Mode Night	Switch mode	1 Bit	Low	X	X	X		
158	Mode Frost/Heat protection	Switch mode	1 Bit	Low	X	X	X		
159	Heating disable object	Disable heating	1 Bit	Low	X		X		
160	Cooling disable object	Disable cooling	1 Bit	Low	X		X		
161	Heating request	Send request	1 Bit	Low	X	X		X	
162	Cooling request	Send request	1 Bit	Low	X	X		X	
163	Heating/Cooling switchover	0=Cooling / 1=Heating	1 Bit	Low	X		X		
165	Max temperature value	Read memory	2 Byte	Low	X	X	X	X	
166	Min temperature value	Read memory	2 Byte	Low	X	X	X	X	
167	Min/Max values Reset	Reset memory	1 Bit	Low	X		X	X	
168	Reset setpoint value	Parameter read in	1 Bit	Low	X		X		
169	DPT_HVAC Status	Send controller status	1 Byte	Low	X	X		X	
170	Error external sensor	Error message	1 Bit	Low	X	X		X	
171	Current setpoint	Send setpoint	2 Byte	Low	X	X		X	
172	RHCC Status	Send controller status	2 Byte	Low	X	X		X	
173	Mode selection	Select mode	1 Byte	Low	X		X	X	
174	Manual setpoint value offset	Increase / reduction (1=+/0=-)	1 Bit	Low	X		X		
175	Flow temperature	Read external sensor	2 Byte	Low	X		X	X	

Table 5: Communication objects – Temperature controller

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Standard settings Ventilation control									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
176	Ventilation control	Block	1 Bit	Low	X		X		
177	Ventilation control	Level 1	1 Bit	Low	X	X		X	
177	Ventilation control	Bit 0	1 Bit	Low	X	X		X	
178	Ventilation control	Level 2	1 Bit	Low	X	X		X	
178	Ventilation control	Bit 1	1 Bit	Low	X	X		X	
178	Ventilation control	Level 1+2	1 Bit	Low	X	X		X	
179	Ventilation control	Level 3	1 Bit	Low	X	X		X	
179	Ventilation control	Bit 2	1 Bit	Low	X	X		X	
179	Ventilation control	Level 1+2+3	1 Bit	Low	X	X		X	
180	Ventilation control	Level 4	1 Bit	Low	X	X		X	
180	Ventilation control	Level 1+2+3+4	1 Bit	Low	X	X		X	
181	Ventilation control	Input: 1 Byte current ventilation value	1 Byte	Low	X		X		
181	Ventilation control	1 Byte current ventilation value	1 Byte	Low	X	X		X	
181	Ventilation control	Status for ventilation active	1 Bit	Low	X	X		X	
182	Ventilation control	Control value	1 Byte	Low	X	X		X	
183	Ventilation control	Object Priority	1 Bit	Low	X		X		
184	Ventilation control	Switch Automatic	1 Bit	Low	X	X	X	X	
184	Ventilation control	Input and Output: Switch Automatic	1 Bit	Low	X		X	X	
185	Ventilation control	Change ventilation levels manually (+/-)	1 Bit	Low	X		X	X	
185	Ventilation control	Output: Change ventilation levels manually (+/-)	1 Bit	Low	X			X	

Table 6: Communication objects – Ventilation control

Standard settings PIN code									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
238	Alarm system with PIN-Code	Activate = 1, Deactivate = 0	1 Bit	Low	X		X	X	
238	Device lock with PIN-Code	locked = 1, unlocked = 0	1 Bit	Low	X		X		
238	Button function with PIN-Code	Input / Output	1 Bit	Low	X	X	X	X	

Table 7: Communication objects – PIN Code

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Standard settings per direct buttons									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
100	Push Button 1 Push Buttons 1/2	Blind Up/Down	1 Bit	Low	X			X	
100	Push Button 1 Push Buttons 1/2	Dimming On/Off	1 Bit	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Switch Switch On/Off	1 Bit	Low	X		X	X	
100	Push Button 1	Toggle	1 Bit	Low	X		X	X	
100	Push Button 1	Send Status	1 Bit	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Decimal value	1 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Percent value	1 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Scene	1 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Forcible control	2 Bit	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Temperature value	2 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Brightness value	2 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	Colour temperature	2 Byte	Low	X		X	X	
100	Push Button 1 Push Buttons 1/2	RGB value	3 Byte	Low	X		X	X	
100	Push Buttons 1/2	Temperature shift	1 Bit / 1 Byte/ 2 Byte	Low	X	X		X	
100	Push Button 1 Push Buttons 1/2	Mode selection (HVAC Mode)	1 Byte	Low	X	X		X	
100	Push Button 1/2 short	Shutter Up/Down/Stop	1 Bit	Low	X			X	
101	Push Buttons 1/2	Stop/Slats Open/Close	1 Bit	Low	X		X	X	
101	Push Button 1	Slats/Stop	1 Bit	Low	X		X	X	
101	Push Button 1 Push Button 1 short	Value for toggle	1 Bit	Low	X		X	X	X
101	Push Button 1 short Push Buttons 1/2 short	State State for display	1 Bit	Low	X		X	X	X
101	Push Button 1 short Push Buttons 1/2 short Push Buttons 1/2	State of percent value	1 Byte	Low	X		X	X	X
101	Push Button 1 short Push Buttons 1/2 short Push Buttons 1/2	State of decimal value	1 Byte	Low	X		X	X	X
101	Push Button 1 short Push Buttons 1/2 short Push Buttons 1/2	State of temperature value	2 Byte	Low	X		X	X	X

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101	Push Button 1 short Push Buttons 1/2 short Push Buttons 1/2	State of brightness value	2 Byte	Low	X		X	X	X
101	Push Button 1 short Push Buttons 1/2 short Push Buttons 1/2	State of colour temperature	2 Byte	Low	X		X	X	X
101	Push Button 1 Push Buttons 1/2	Dimming relative	4 Bit	Low	X		X	X	
101	Push Buttons 1/2	State actual temperature	2 Byte	Low	X		X	X	X
101	Push Button 1 Push Buttons 1/2	Status HVAC Mode/ HVAC Status	1 Byte	Low	X		X	X	X
101	Push Button 1/2 long	Central Shutter Up/Down/Stop	1 Bit	Low	X			X	
102	Push Button 1 long	Switch	1 Bit	Low	X		X	X	
102	Push Button 1 long	Toggle	1 Bit	Low	X		X	X	
102	Push Button 1	Value for toggle	1 Bit	Low	X		X	X	X
102	Push Button 1	Value for change of direction	1 Bit	Low	X		X	X	X
102	Push Button 1 long Push Buttons 1/2 long	Decimal value	1 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Percent value	1 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Scene	1 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Forcible control	2 Bit	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Temperature value	2 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Brightness value	2 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	Colour temperature	2 Byte	Low	X		X	X	
102	Push Button 1 long Push Buttons 1/2 long	RGB value	3 Byte	Low	X		X	X	
102	Push Buttons 1/2	State current setpoint	2 Byte	Low	X		X	X	X
103	Push Button 1 long	Value for toggle	1 Bit	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	State State for display	1 Bit	Low	X		X	X	X
103	Push Button 1	State for display	1 Byte	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	Status of percent value	1 Byte	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	State of decimal value	1 Byte	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	State of temperature value	2 Byte	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	State of brightness value	2 Byte	Low	X		X	X	X
103	Push Button 1 long Push Buttons 1/2 long	State of colour temperature	2 Byte	Low	X		X	X	X
103	Push Button 1 Push Buttons 1/2	State of dimming value for display	1 Byte	Low	X		X	X	X

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103	Push Buttons 1/2	State of shutter for display State of blind for display	1 Byte	Low	X		X	X	X
103	Push Buttons 1/2	State basis comfort setpoint	2 Byte	Low	X		X	X	X
103	Push Buttons 1/2	State setpoint shift	1 Byte/ 2 Byte	Low	X		X	X	X
104	Push Button 1 Push Buttons 1/2	Blocking object	1 Bit	Low	X		X	X	X
+5	**next Button**								

Table 8: Communication objects – Direct buttons

Standard settings general objects									
No.	**Name**	**Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
120	Operation	Output	1 Bit	Low	X	X		X	
121	Day/Night	Day = 1 / Night = 0 Day = 0 / Night = 1	1 Bit	Low	X		X	X	X
122	Presence	Input	1 Bit	Low	X		X	X	X
123	Buttons activation	Output	1 Bit	Low	X	X		X	
124	Display	Brightness	1 Byte	Low	X		X		
125	Time	Receive/Send current value	3 Byte	Low	X		X	X	X
126	Date	Receive/Send current value	3 Byte	Low	X		X	X	X
127	Time / Date	Receive/Send current value	8 Byte	Low	X		X	X	X
135 – 138	Message 1-4 (Message 1 highest priority)	Input	1 Bit	Low	X		X	X	X
139	Message text (lowest priority)	Input	14 Byte	Low	X		X	X	X
140 141	State text 1 State text 2	Input	14 Byte	Low	X		X	X	X
142 – 144	State value 1-3	Input	1 Bit 1 Byte 2 Byte	Low	X		X	X	X

Table 9: Communication objects – General objects

The preset default settings can be taken from the tables above. The priority of the individual communication objects as well as the flags can be adapted as required by the user. The flags assign the respective task to the communication objects in the programming. C stands for communication, R for reading, W for writing, T for transmission, and U for updating.

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4 Reference ETS-Parameter

4.1 General Settings

The following figure shows the menu for the general settings:

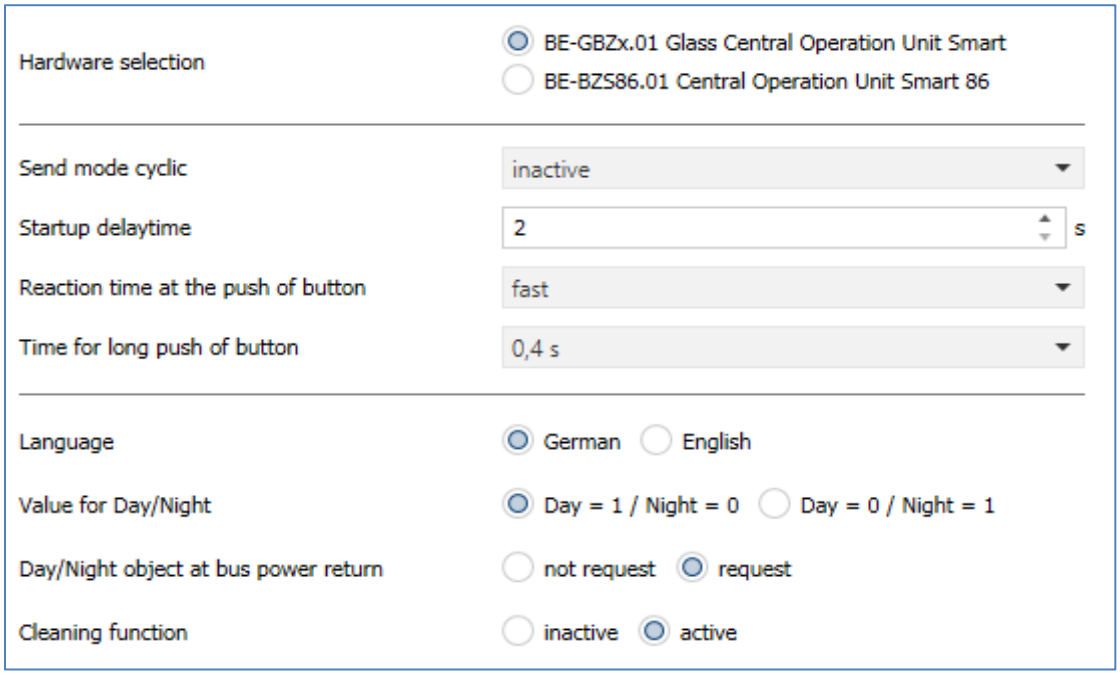

Figure 3: General settings

The following table shows the possible settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Send „operation“ cyclically	**not active** 1 min – 24 h	Activation of a cyclic "in operation" telegram
Startup time	2 – 240s **[2s]**	Sets the time between restart and functional start-up of the device
Reaction time at the push of button	▪ **fast** ▪ medium ▪ slow	Defines the debounce time for one keystroke
Time for long push of button	0,1s-30s **[0,4s]**	Defines the time for detecting a long keystroke
Language	▪ **German** ▪ English	Setting the language on the display
Value for Day/Night	▪ **Day = 1 / Night = 0** ▪ Day = 0 / Night = 1	Sets the polarity for day / night switching
Day/Night object at bus power return	▪ not request ▪ **request**	Setting whether the day/night object should be requested on bus voltage recovery
Cleaning function	▪ not active ▪ **active**	Activation/deactivation of the cleaning function

Table 10: General settings

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Value for Day/Night:
Here the polarity for day/night is defined. Regardless of this polarity, the device always starts in day mode after reprogramming

Cleaning function:
The cleaning function is triggered by pressing 3 or more buttons simultaneously.
The cleaning function locks the button against further operation or the sending of a telegram for 10 seconds. If further keys are pressed within these 10 seconds, e.g. when cleaning the device, the device remains locked. An active cleaning function is indicated by white flashing of all status LEDs.

The table shows the general communications objects:

Number	Name	Length	Usage
120	Operation	1 Bit	Sending a cyclic "In operation" telegram
121	Day/Night	1 Bit	Receiving the status for day/night
123	Button activation	1 Bit	Sending a 1 when a button is pressed, e.g. for switching on an orientation light

Table 11: General communication objects

4.2 Time and Astro settings

The following figure shows the menu for the Time and Astro settings:

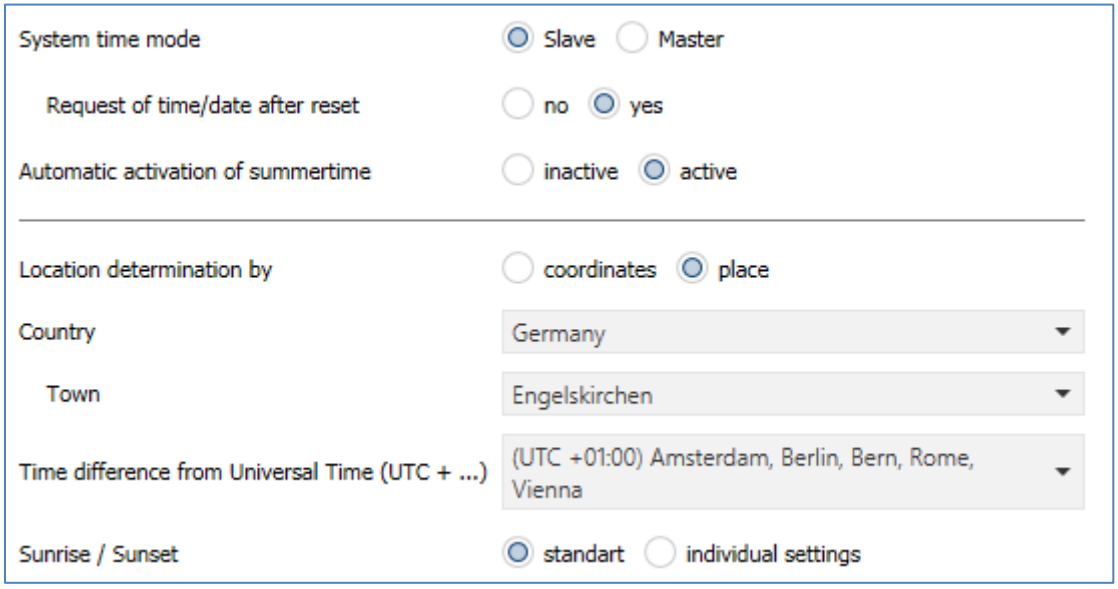

Figure 4: Time and Astro settings

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The following table shows the possible settings:

ETS-Text	Dynamic range **[Default value]**	Comment
System time mode	▪ **Slave** ▪ Master	**Slave:** The device receives the time from another device. **Master:** The device sends the time to the bus.
Request of time/date after reset	▪ no ▪ **yes**	Setting whether the time should be queried after a restart
Send system time cyclically	Never, 1 min – 24 h **[1h]**	Setting the transmission interval for cyclical sending
Automatic activation of summertime	▪ inactive ▪ **active**	Setting whether the device automatically switches between summer/winter time
Location determination by	▪ Coordinates ▪ **Place**	Defines how the location of the device should be determined
If the location is determined by coordinates	Setting of longitude and latitude	
If the location is determined by place	Setting the country and town	
Time difference from Universal time (UTC+…)	Setting the time zone	Setting the time zone for calculating the time

Table 12: Settings - Time and Astro settings

The table shows the date/time objects:

Number	Name	Length	Usage
125	Time	3 Byte	Sending/receiving time
126	Date	3 Byte	Sending/receiving date
127	Time/Date	8 Byte	Sending/receiving time and date

Table 13: Communication objects - Time/Date

4.2.1 Advanced Sunrise/Sunset settings

In certain cases it is necessary to adjust the sunrise and sunset, e.g. in a very mountainous region where the sun rises and disappears behind the mountain. For this purpose the sunrise/sunset and the dawn/dusk can be specifically adjusted with the following parameters:

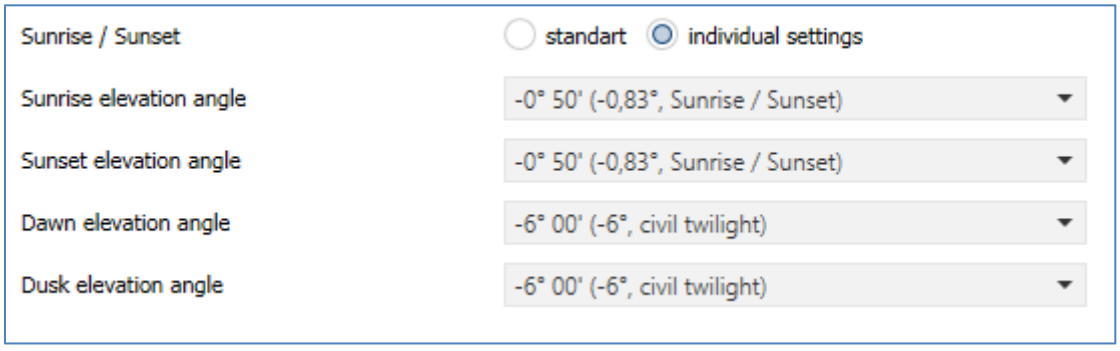

Figure 5: Advanced sunrise/sunset settings

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4.3 Display settings

4.3.1 Display appearance

The following settings can be used to customize the appearance of the display:

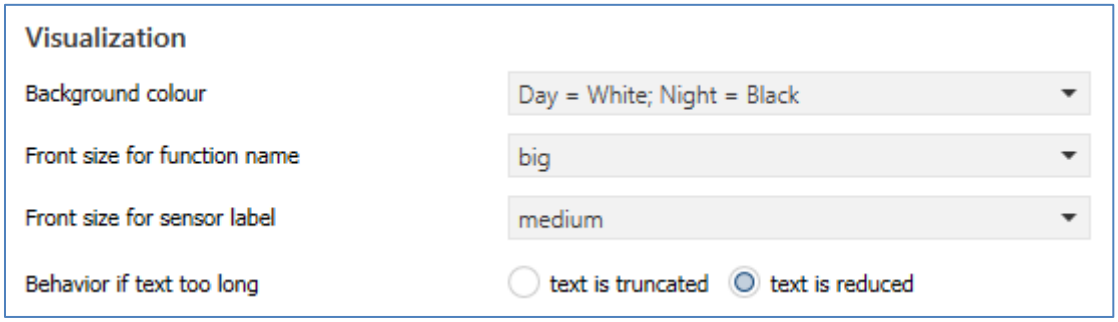

Figure 6: Settings - Display appearance

The following table shows the possible settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Background colour	▪ Day = black; Night = black ▪ **Day = white; Night = black** ▪ Day = black; Night = white ▪ Day = white; Night = white	Sets the background colour of the display
Font size for function name	▪ Small ▪ Medium ▪ **Big**	Sets the font size for the function name
Font size for sensor label	▪ Small ▪ Medium ▪ **Big**	Setting the font size for the sensor labeling
Behavior if text too long	▪ Text is truncated ▪ **Text is reduced**	Setting of the behavior when the text can not be displayed completely

Table 14: Settings - Display appearance

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4.3.2 Automatic Brightness Adjustment

The following settings can be used to influence the adaptation of the display to the ambience:

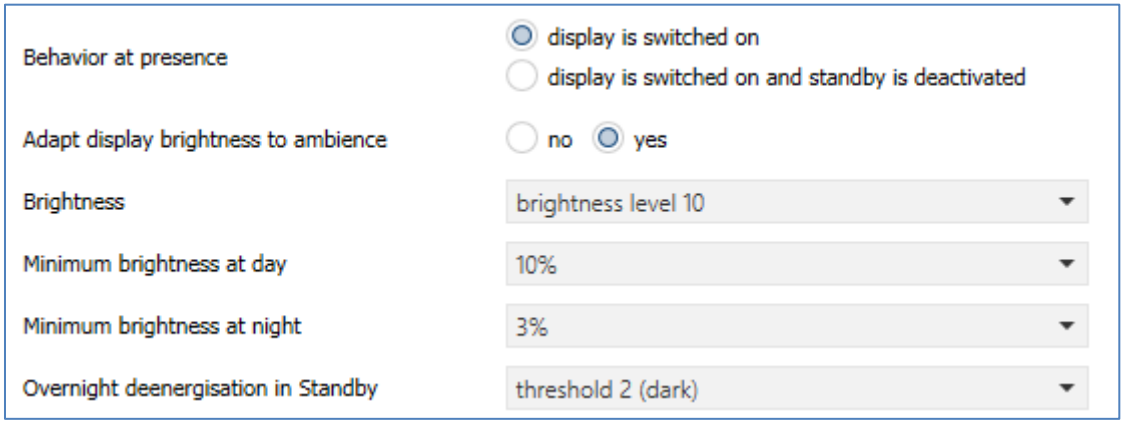

Figure 7: Settings - Adaption to ambience

The following table shows the possible settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Behaviour at presence	▪ Display is switched on ▪ Display is switched on and standby is deactivated	Setting what should happen with a "1" telegram on the presence object
Adapt display brightness to ambience	▪ No ▪ **Yes**	Setting whether the brightness is dynamically adapted to the ambience
Adapt display brightness to ambience: No		
Control of display brightness over bus	▪ Master mode ▪ **Slave mode**	Synchronisation of the brightness of several control panels via the bus
Brightness at day	0 - 100% **[10%]**	Setting a fixed brightness value in day mode
Brightness at night	0 - 100% **[3%]**	Setting a fixed brightness value in night mode
Overnight deenergisation in Standby	▪ not active ▪ threshold 1 (moderately dark) ▪ **threshold 2 (dark)** ▪ threshold 3 (very dark)	Setting the display behavior for night shutdown in standby mode

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Adapt display brightness to ambience: Yes		
Brightness	Brightness level 1-10 **[Brightness level 10]**	Sets the basic brightness of the display
Minimum Brightness at day	0-100% **[10%]**	Setting the minimum brightness of the display; below this value, the display is not dimmed during daytime operation
Minimum Brightness at night	0-100% **[3%]**	Setting the minimum brightness of the display; below this value, the display is not dimmed during night operation
Overnight shutdown in Standby	▪ not active ▪ threshold 1 (moderately dark) ▪ **threshold 2 (dark)** ▪ threshold 3 (very dark)	Setting of the display behavior for the overnight shutdown in standby mode

Table 15: Settings - Adapt display brightness to ambience

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The Central Operation Unit Smart has an internal brightness sensor and can adjust the display brightness dynamically to the environment. The parameter "brightness" influences the dimming behavior and the threshold from when the display is dimmed. The parameter for the minimum brightness defines the absolutely lowest threshold up to which the display is dimmed.
In the programmed state, the menu for the brightness adjustment can be called up by pressing the sensor surfaces 7 and 8 simultaneously:

In this menu the end user has the possibility to adjust the brightness settings independently (without ETS). The settings are stored permanently in the device until the next transfer of the database.
If the parameter „**Adapt display brightness to ambience**“ is set to “Yes”, the following adjustments are available:

Brightness: Defines the basic brightness of the display and influences the dimming behavior of the display according to the measured value for the ambient brightness.
min. Brightness: Defines the minimum brightness at darkness. In day mode, the adjustment for the day mode is set and in night mode the adjustments for the night mode is set.

If the parameter „**Adapt display brightness to ambience**“ is set to “No”, the following adjustments are available:

Brightness: Defines the absolute, fixed brightness. In day mode, the adjustment for the day mode is set and in night mode the adjustments for the night mode is set.
Control of the display brightness over bus: A central operating unit can be set as master and send its brightness value to the bus. The operating units in slave mode then receive the time and adjust their display brightness accordingly. Control via another KNX device is also possible

The following communications objects are available:

Number	Name	Length	Usage
122	Presence	1 Bit	Input for presence active, e.g. from presence detector
124	Display Brightness	1 Byte	Receiving/sending the brightness for the display

Table 16: Communication objects – Presence and Display brightness

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4.3.3 User-defined colours

Up to 3 user-defined colors can be mixed:

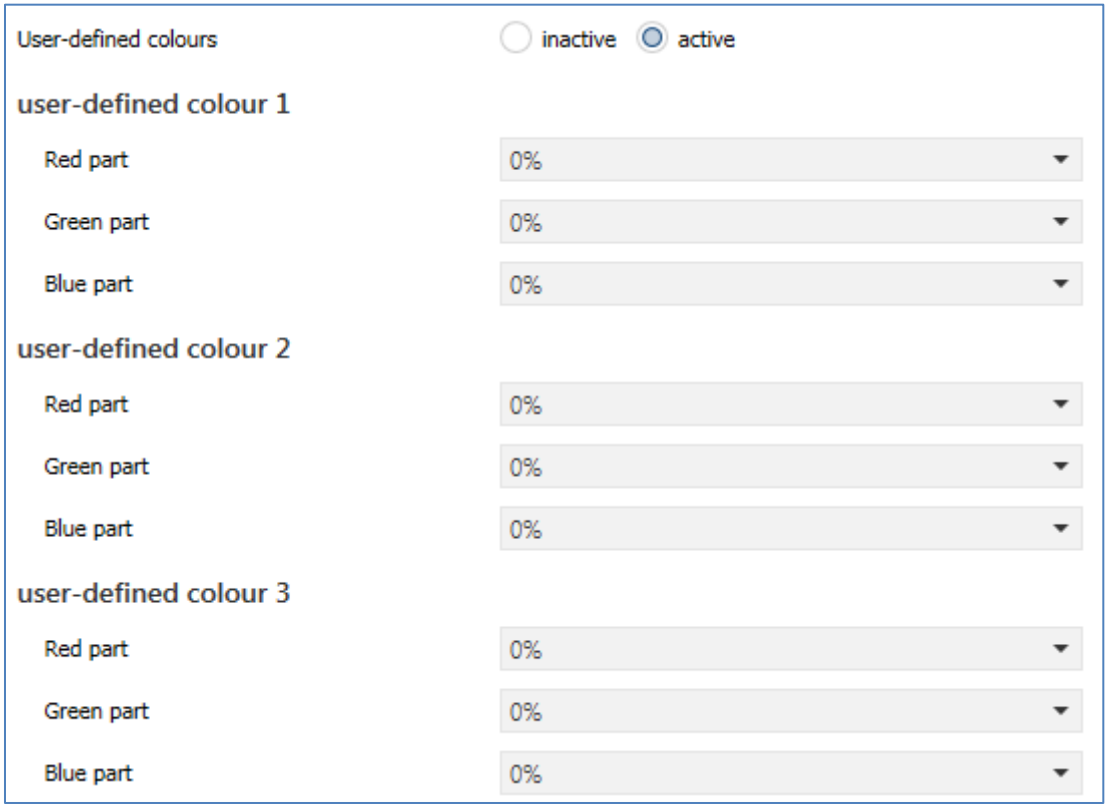

Figure 8: Settings - User defined colours

The user-defined colors can be mixed with the corresponding red / green / blue share and then be used for the display of the symbols.

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4.4 Info-/Standbyanzeige

4.4.1 Infoscreen

The following figure shows the basic settings for the info/standby display:

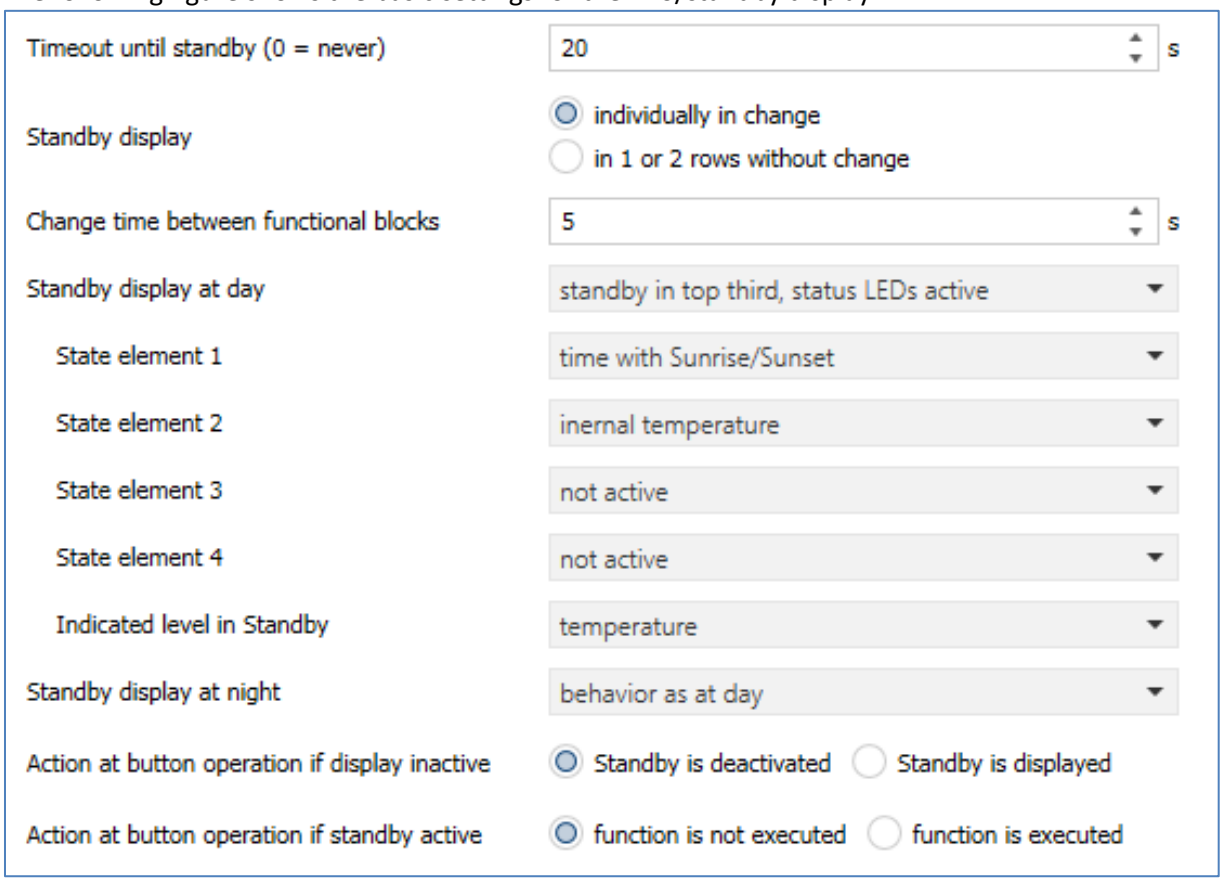

Figure 9: Settings - Info and Standby display

The following table shows the basic settings for the info and standby display:

ETS-Text	Dynamic range **[Default value]**	Comment
Timeout until standby (0=never)	0-60s **[20s]**	Sets the time between the last touch of a button and switching to standby mode
Standby display	▪ **Individually in change** ▪ In 1 or 2 lines without change	Setting the display during standby
Change standby display after	1-60s **[5s]**	Einstellung der Wechselzeit zwischen den aktivierten Statuselementen **Only available with "Standby display" -> "Individually in change"**

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Standby display at day	▪ No standby ▪ **Standby in top third, status LEDs active** ▪ Full screen standby, LEDs active ▪ Display off and LEDs off ▪ Display off and LEDs active	Setting the display behavior of the information screen in day mode
Statuselement 1-4	▪ Not activt ▪ **Time** ▪ Internal temperature ▪ State value 1 ▪ State value 2 ▪ State value 3 ▪ State text 1 (over objekt 140) ▪ State text 2 (ever objekt 141) ▪ Date ▪ Time with Sunrise/Sunset ▪ Time with Date	Activation and setting of max. 4 status elements. **With "Standby display" -> "In 1 or 2 lines without change"** are the settings "not active" (only with "2 elements right/left"), "Time with sunrise/sunset." "Time with date" not available!
Line 1/2	▪ **Not active** ▪ One state element ▪ Two state elements (right/left) ▪ Two state texts (top/bottom)	**Only visible with "In 1 or 2 lines without change".** Selection of what and how many elements should be displayed during standby.
Font size for first/second status line	▪ **Big** ▪ Small	Selecting the appearance in the display
Indicated level **in/after** Standby	▪ **Direct buttons** ▪ Light ▪ Blind ▪ Temperature ▪ Other ▪ Heating/ventilation ▪ Time switch	With the setting "Standby in the top third..." an active level can be selected during standby; with the other standby settings a level after standby
Standby display at night	▪ No standby ▪ Standby in top third, status LEDs active ▪ Full screen standby, LEDs active ▪ Behaviour like day ▪ Display off and LEDs off ▪ Display off and LEDs active	Setting of the display behaviour of the info display in night mode; With setting "Behaviour like day" the settings are taken over from day mode and there are no further settings.

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Statuselement 1-4	▪ Not activt ▪ **Time** ▪ Internal temperature ▪ State value 1 ▪ State value 2 ▪ State value 3 ▪ State text 1 (over objekt 140) ▪ State text 2 (ever objekt 141) ▪ Date ▪ Time with Sunrise/Sunset ▪ Time with Date	Activation and setting of max. 4 status elements. **With "Standby display" -> "In 1 or 2 lines without change"** are the settings "not active" (only with "2 elements right/left"), "Time with sunrise/sunset." "Time with date" not available!
Indicated level **in/after** Standby	▪ **Direct buttons** ▪ Light ▪ Blind ▪ Temperature ▪ Other ▪ Heating/ventilation ▪ Time switch	With the setting "Standby in the top third..." an active level can be selected during standby; with the other standby settings a level after standby
Action at button operation if display inactive	▪ **Standby is deactivated** ▪ Standby is displayed	Setting the behaviour on button operation when the display is off (e.g. via presence object)
Action at button operation if display active	▪ Function is not executed ▪ **Function is executed**	Setting whether the underlying function should also be executed with the first keystroke in standby

Table 17: Basic settings - Info display and standby display

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4.4.2 Activation State values 1-3

The following figure shows the settings for the activation of state values 1-3:

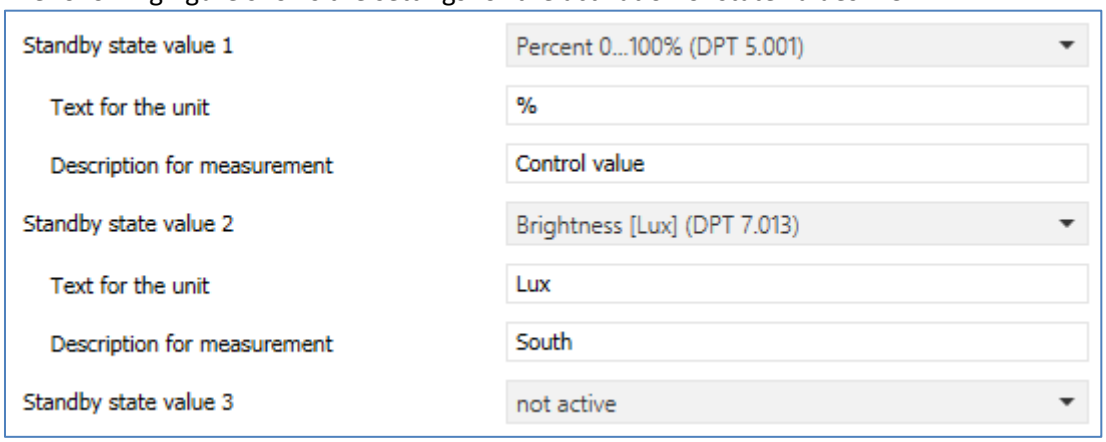

Figure 10: Settings - State values 1-3

The following table shows the available communication objects for the info display:

Number	Name	Length	Usage
140	State text 1	14 Byte	Receiving a status text
141	State text 2	14 Byte	Receiving a status text
142	State value 1		Receive a status value; DPT according to parameter setting
143	State value 2		Receive a status value; DPT according to parameter setting
144	State value 3		Receive a status value; DPT according to parameter setting

Table 18: Communictiona objects - State values/State texts

Various measured values with unit (up to 5 characters) and descriptions for the measured value (up to 15 characters) can be displayed via the status values.
The status text can be used to display any strings up to 14 bytes long.

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4.4.3 Messages/Alarms

The following figure shows the available settings for messages and alarms:

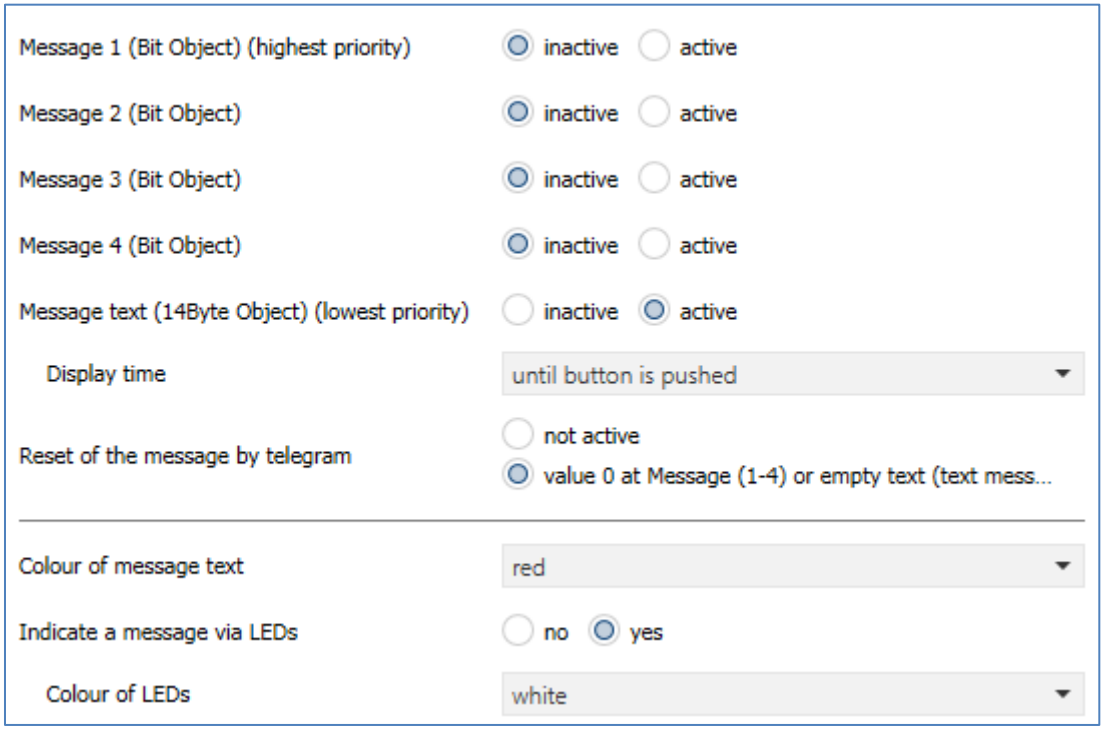

Figure 11: Settings - Messages and Alarms

The following table shows the settings for the messages and alarms:

ETS-Text	Dynamic range **[Default value]**	Comment
Message 1-4 (Bit object)	▪ **Not active** ▪ Active	Activation of message 1-4; **Message 1 (highest priority)**
Text	Any text (15 characters allowed)	Displayed text when the message is triggered
Display time	▪ Not active ▪ **Until button is pushed** ▪ 1s-8h	Setting how long the message should be displayed
Message text (14 Byte objekt)	▪ **Not active** ▪ Active	Activation of the message as text via 14 byte object; **Message text has the lowest priority of all messages**
Display time	▪ Not active ▪ **Until button is pushed** ▪ 1s-8h	Setting how long the message should be displayed
Reset of the message by telegram	▪ Not active ▪ **Value 0 at Message (1-4) or empty text (text message)**	Setting when to cancel the message

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Colour of message text	Any colour **[red]**	Setting the color for the message text
Indicate a message via LEDs	▪ **No** ▪ Yes	Setting whether the LEDs should flash when a message is active
Colour of LEDs	Any colour **[white]**	Only appears if "Indicate message via LEDs" is active

Table 19: Settings - Messages and Alarms

The message behaviour depends on the parameter "Standby display during day/night". The different behaviours are shown below:

Standby display	**Incoming message in standby**
No Standby	▪ No message is displayed, but saved
Standby in upper third, status LEDs active	▪ Message is displayed on upper button pair and the upper LEDs change between parameterized color and black at 600ms pulse ▪ At the same time, the parameterized color is set to double brightness in order to increase the signal effect ▪ The message is only acknowledged by pressing to one of the upper buttons. ▪ A keystroke on the middle and lower buttons performs the displayed switching functions
Full screen standby, LEDs active	▪ Message is displayed in the middle of the screen and all LEDs change between parameterized color and black ▪ At the same time, the parameterized color is set to double brightness in order to increase the signal effect. ▪ The message is acknowledged by pressing to any key
Display and LEDs off	▪ No message is displayed during standby but saved. ▪ The message with the highest priority is indicated by the keystroke after standby ▪ The displayed messages are acknowledged by means of further key strokes ▪ Message is displayed in the middle of the screen and all LEDs change between parameterized color and black ▪ At the same time, the parameterized color is set to double brightness in order to increase the signal effect.
Display off and LEDs on	▪ Message is displayed in the middle of the screen and all LEDs change between parameterized color and black ▪ At the same time, the parameterized color is set to double brightness in order to increase the signal effect. ▪ After the "timeout for standby", the LEDs will stop flashing and the message dispappears. ▪ If any button is pressed after the LEDs have stopped flashing, the message with the highest priority is displayed again. Further keystrokes acknowledge the messages

Table 20: Behaviour on receipt of a message in standby

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Standby display	Incoming message during operation
no Standby	▪ No message is displayed but saved

Table 21: Behaviour on receipt of a message during operation

Standby display	Incoming message while Standby + Displaybrightness „Off“ via brightness sensor
no Standby	▪ No message is displayed but saved
Standby in upper keypad	▪ Brings display back to life (dark background lighting) ▪ After the "timeout for standby" has expired, the backlight is switched off again. ▪ Otherwise as in Standby
Standby on full screen	▪ Brings display back to life (dark background lighting) ▪ After the "timeout for standby" has expired, the backlight is switched off again. ▪ Otherwise as in Standby
Display off	▪ Like in Standby
Display off and orientation-LED on	▪ Brings display back to life (dark background lighting) ▪ After the "timeout for standby" has expired, the backlight is switched off again. ▪ Otherwise as in Standby

Table 22: Behaviour on arrival of a message in standby with operation switched off

The following table shows the available communications objects for the alarms/messages:

Number	Name	Length	Usage
135	Message 1 (highest priority)	1 Bit	Triggering the message
136	Message 2	1 Bit	Triggering the message
137	Message 3	1 Bit	Triggering the message
138	Message 4	1 Bit	Triggering the message
139	Message text (lowest priority)	14 Byte	Trigger the message; send any message text

Table 23: Communications objects - Alarms and Messages

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4.5 Functional Levels

The symbols and names for sorting the levels can be defined in the Function Levels menu. The menu/time switch functions can then be assigned to the function levels **Light, Blind, Temperature** or **Others**.
The following function levels are also available:

- **Heating/Ventilation**
  For controlling the internal temperature regulator/ventilation regulator.
- **Direct buttons**
  For controlling up to 4 functions, which are displayed on a separate level.
- **Time switch**
  Setting of time, holiday function and switching times of the activated functions.

The following settings are available for each level:

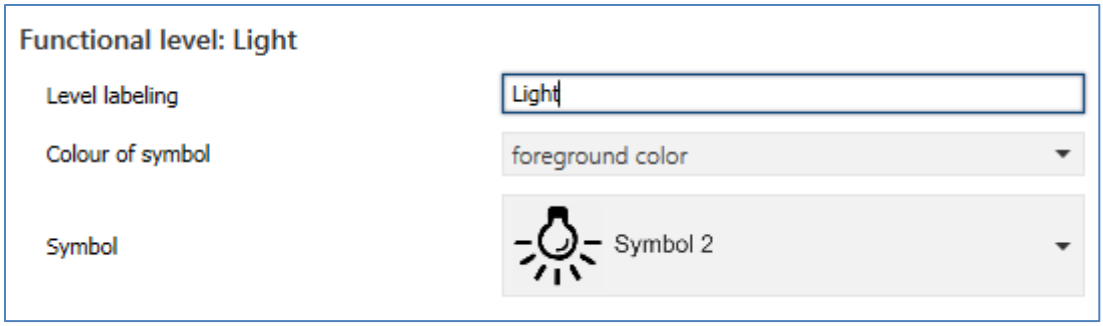

Figure 12: Settings - Functional Level

The name of the level, the symbol and the symbol colour can be set for each function level.

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4.6 PIN-Code

The central control unit Smart has a PIN code with which the device or certain functions of the device can be locked. The PIN code can have 4-6 digits and include the numbers 0-9. The programming mode can also be activated when the unit is locked.

There are 4 different modes in total:

4.6.1 Alarm System Control

This function enables the activation of another trade, alarm system, etc., via a separate object. When the alarm system is activated, a "1" is sent to the corresponding object and, if the PIN code is entered correctly, a "0" is sent to the alarm object.

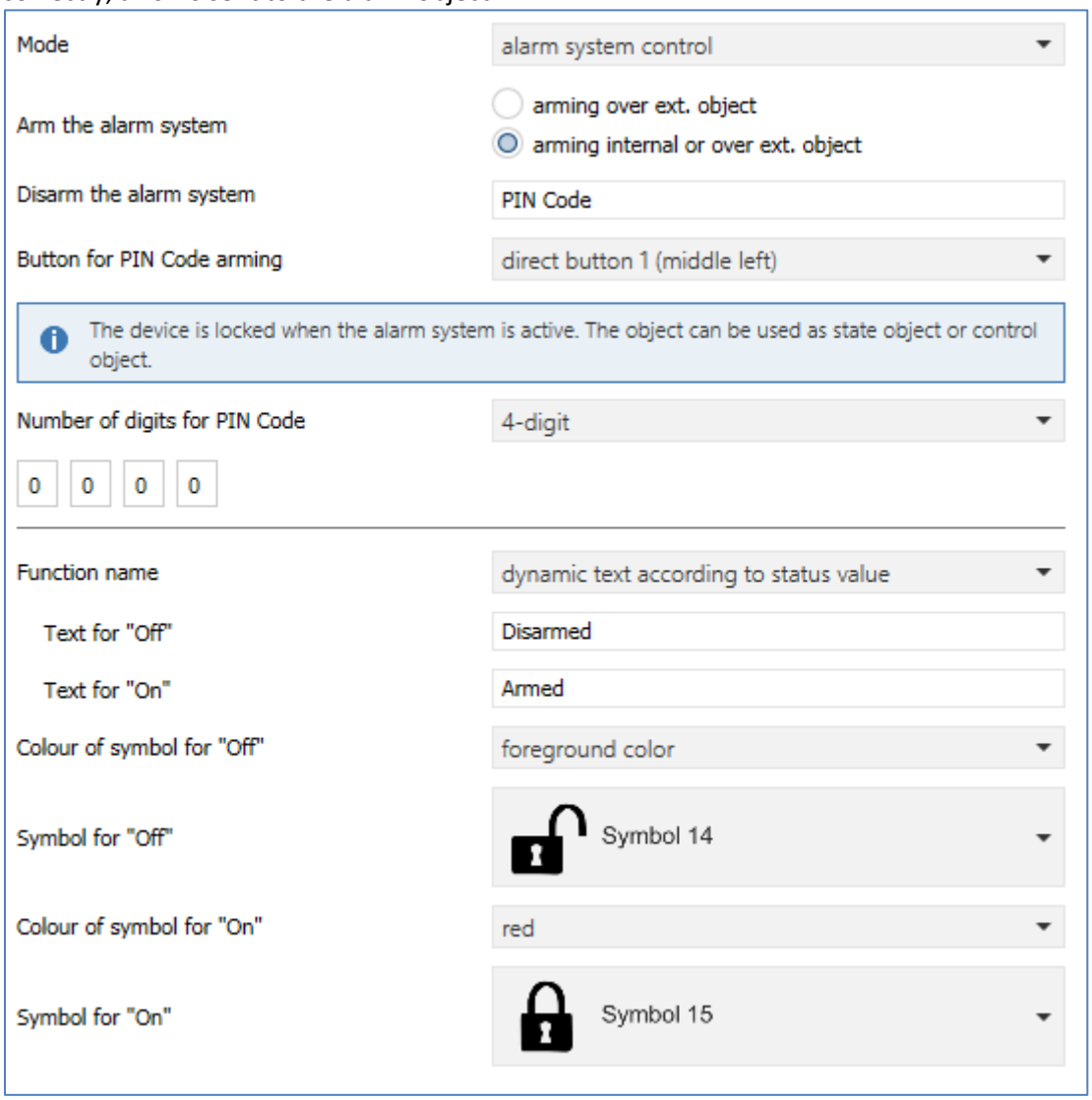

Figure 13: PIN Code - Alarm system control

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In this mode, the alarm system can either be armed via an external object only or via an external object and an internal button. If the functionality "Arming internally or via external object" is selected, one of the 4 direct buttons can be selected for arming the alarm system. This button is thus no longer available for activation with the direct buttons.
Disarming is achieved by entering the correct PIN code on the device.
The external object serves as a status as well as a control object, i.e. the alarm system/device lock can be activated/deactivated via this object and the device sends a "1" to this object when the alarm system is armed and a 0 when the PIN code has been successfully entered and the alarm system is thus disarmed.

Number	Name	Length	Usage
238	Alarm system with PIN-Code	1 Bit	Activation/deactivation of the device lock and status object for switching an alarm system

Table 24: Communication object - PIN Code/Alarm system control

4.6.2 Device locking

The device lock is used to lock the device for unauthorized operation. The device lock can be activated via an object, a button or automatically after a certain time. Only after entering the PIN code or sending a "0" to the corresponding object is the device unlocked and can be operated again.

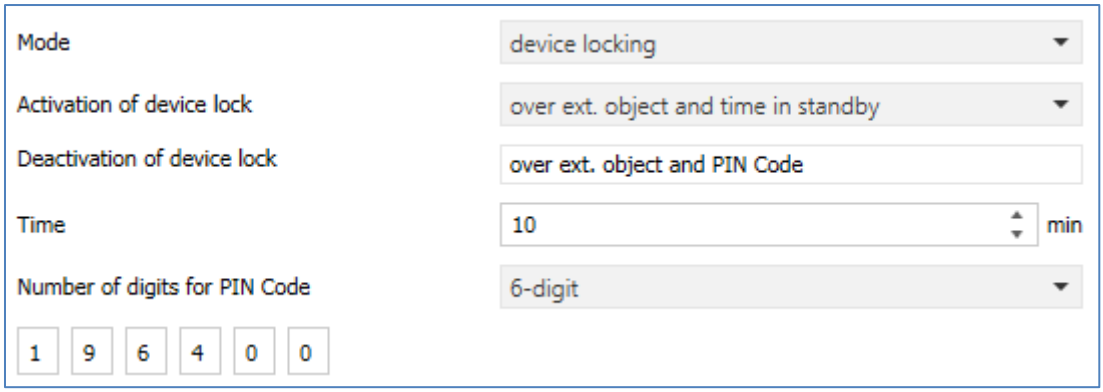

Figure 14: PIN Code - Device lock

The device lock can be activated via 3 different options:

- External objekt
- External objekt and button with PIN Code (one of the 4 directs buttons)
- External objekt and time in Standby

The device lock can then be released again via the external object or by entering the correct PIN code.

Number	Name	Length	Usage
238	Device lock with PIN-Code	1 Bit	Activation/deactivation of the device lock

Table 25: Communication object - PIN Code/Device lock

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4.6.3 Button function with PIN-Code

This function assigns a PIN code to the execution of a single key. If the user wants to execute the 1 bit function of this key, he can only do so if he has entered the correct PIN code. This is how sensitive functions can be blocked for unauthorized users.

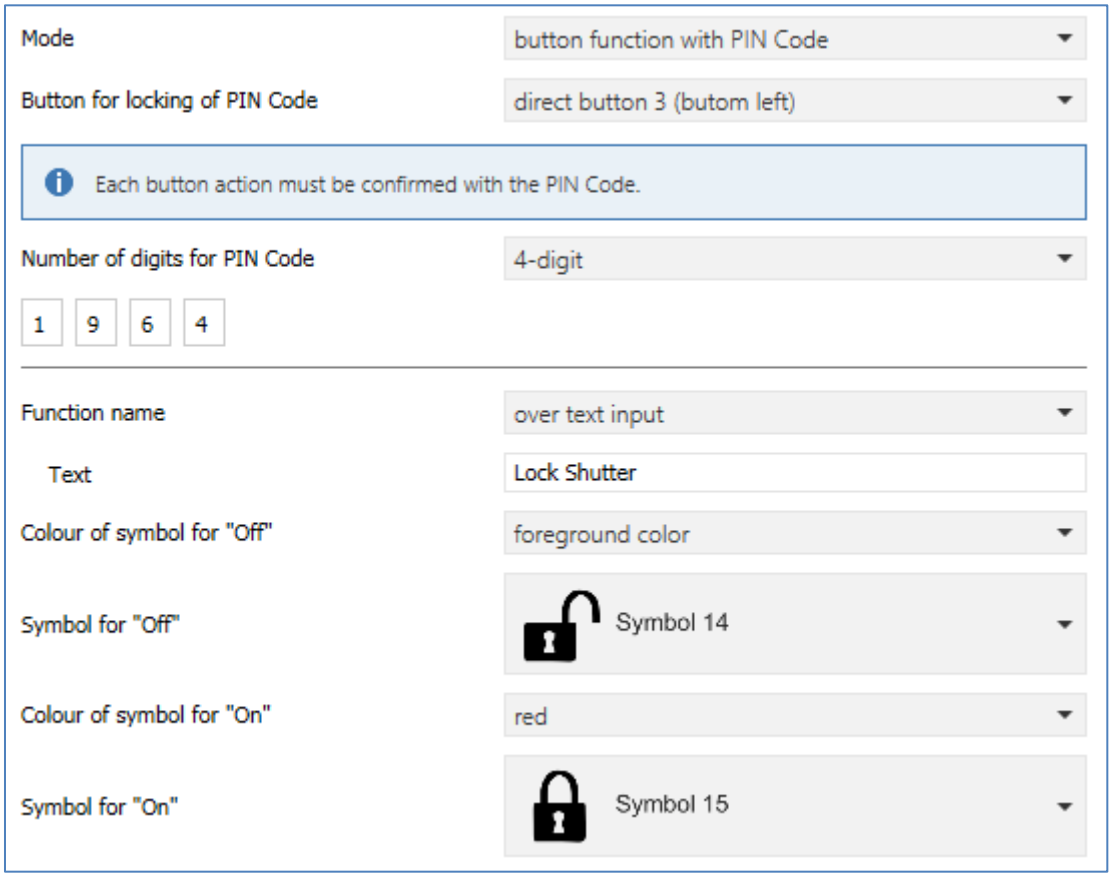

Figure 15: PIN Code - Button function with PIN Code

The key function with PIN code always requires the correct PIN code to be entered before the key function is executed. Only then is the function executed and the associated communication object switched.

Number	Name	Length	Usage
238	Button funktion with PIN-Code	1 Bit	Switch and status object of the button function which is assigned the PIN code

Table 26: Communication object - PIN Code/Button function with PIN Code

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4.6.4 Lock changing the time switch

This function blocks all changes of the time switch for unauthorized users as soon as the "time switch lock" is set.

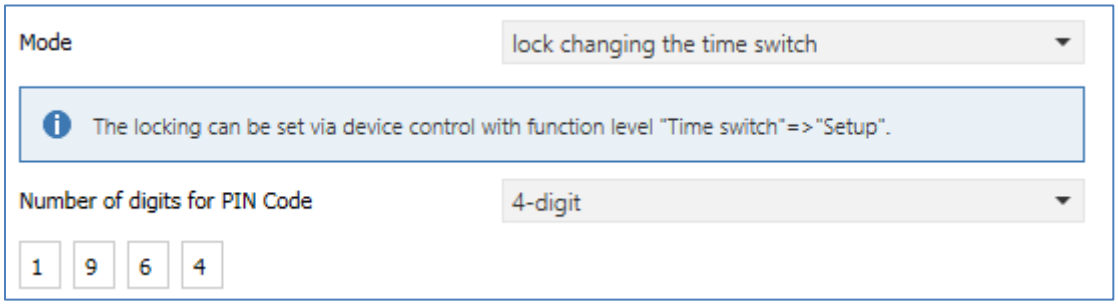

Figure 16: PIN Code – Lock changing the time switch

The lock for changing the time switches can be set or unlocked in this mode in the menu Timer -> Setup via key 6. The change of the lock status becomes effective as soon as the correct PIN code has been entered.

4.6.5 Enter PIN code on the device

The following figure shows the PIN code entry before locking for the functions "Alarm system control" / "Button function with PIN code":

1 = The large numbers show the action for the short keystroke
2 = The small numbers show the action for the long keystroke
3 = With button 6 "Cancel" the input menu for the PIN code entry is left and the previous screen is returned to.

The white button LEDs indicate the unlocked state.

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The following figure shows the PIN code entry during locking with the functions "Alarm system control" / "Device lock":

1 = The large numbers show the action for the short keystroke
2 = The small numbers show the action for the long keystroke
3 = The symbol for the locked state is displayed on the button 6. The button has no function in the locked state.

The red button LEDs indicate the locked state.

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4.7 Logic

The following figure shows the settings for the logic functions:

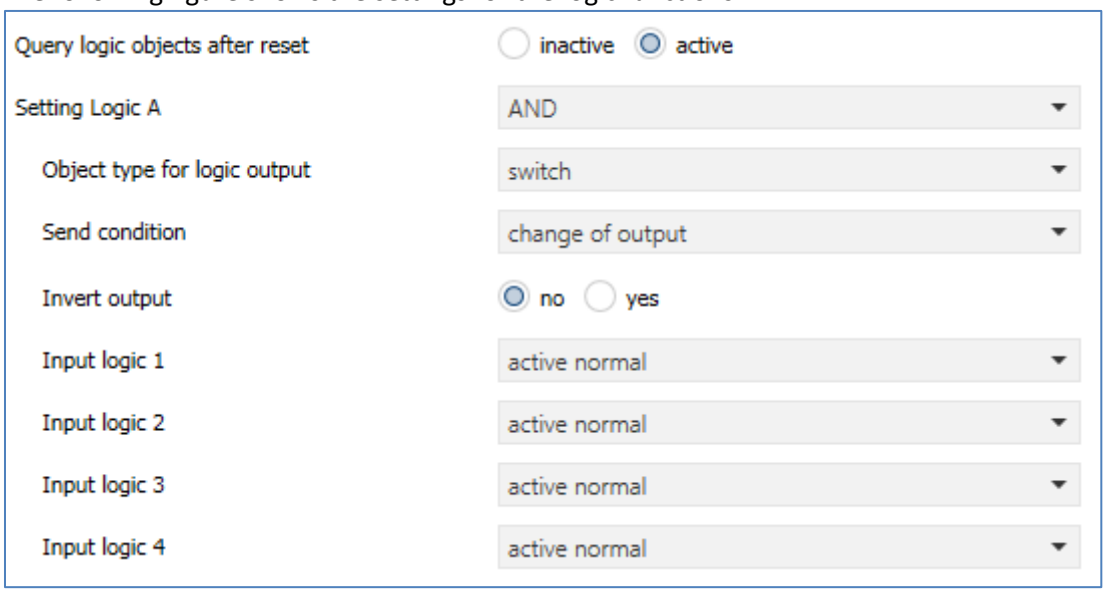

Figure 17: Settings - Logic

A total of 6 logic blocks are available, each of which can be assigned 4 input objects. These can be evaluated both normally and inverted.
If the logic is fulfilled, the output object can send out a 1-bit value, a scene or a 1-byte value. In addition, filter options and various transmission options are available for the 1-bit output object.
There are 3 different logical operations available:

- AND Function
- OR Function
- XOR Function

The parameter "Query logic objects after reset" applies to all 6 logic blocks and defines whether a ReadRequest is sent for the input logics when the device is restarted.

The following table shows the available objects, here for logic A:

Number	Name	Length	Usage
208	Input logic 1	1 Bit	Input object 1 of logic
209	Input logic 2	1 Bit	Input object 2 of logic
210	Input logic 3	1 Bit	Input object 3 of logic
211	Input logic 4	1 Bit	Input object 4 of logic
212	Output Switching/ Scene/ Value/ Percent value	1 Bit/ 1 Byte	Output object of the logic. DPT according to the setting

Table 27: Communication objects - Logic

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4.8 Temperature/Ventilation

4.8.1 Temperature measurement

The following picture shows the menu for temperature measurement:

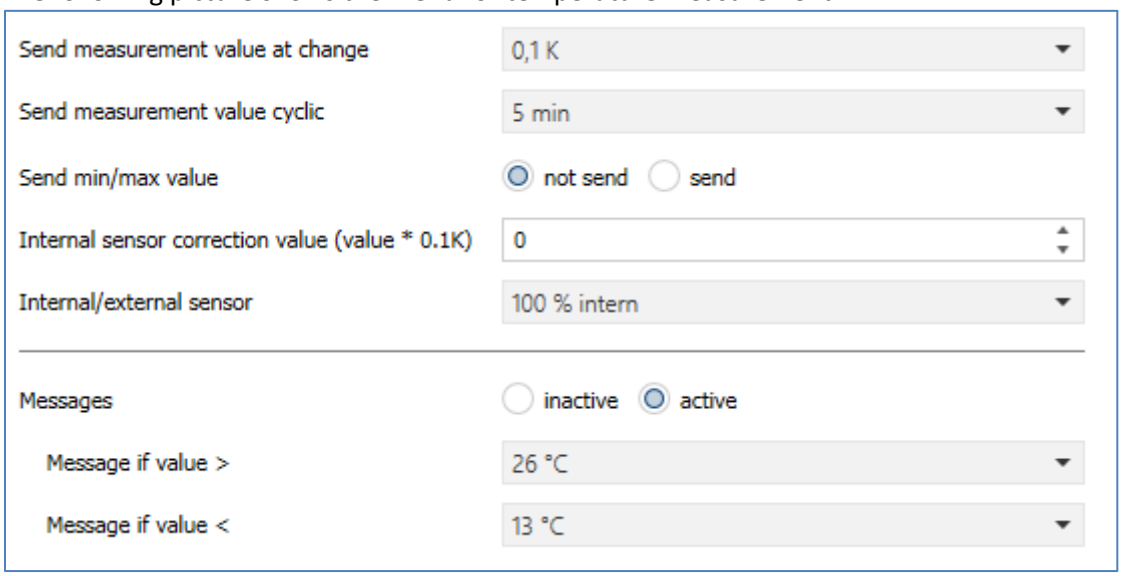

Figure 18: Settings - Temperature measurement

The table shows the possible parameterization options for this setting range:

ETS-Text	Dynamic range **[Default value]**	Comment
Send measurement value at change	**not send** 0,1 K - 2,0 K	Sending condition for the measured value
Send measurement value cyclic	**not send** 1 min – 60 min	Cyclic sending of the measured value
Send min/max value	▪ **not send** ▪ send	Sending condition for min/max values
Internal sensor correction value (value *0,1 K)	-50 – 50 **[0]**	Temperature adjustment for internal sensor
Internal/External sensor	▪ **100% internal** ▪ 90% internal/ 10% external ▪ 80 % internal/ 20% external ▪ … ▪ 100% external	Setting the weighting between internal and external sensor
Messages	▪ **inactive** ▪ active	Activation of the message function
Message if temperatur >	18 °C – 40 °C **[26 °C]**	Setting range of the upper signal value. **Only visible when *Messages* are active**
Message if temperatur <	1 °C – 25 °C **[13 °C]**	Setting range of the lower signal value. **Only visible when *Messages* are active**

Table 28: Settings - Temperature measurement

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The setting "Send measured value at change of" can be used to set the change at which the sensor sends its current temperature value. If this function is deactivated, i.e. set to "do not send", the sensor will not send a value, regardless of the size of the change.
With the setting "Send measured value cyclically" you can set the intervals at which the sensor sends its current temperature value. The cyclical transmission function can be activated or deactivated independently of the "Send measured value on change" setting. Measured values are also sent if the sensor has not detected a change.
If both values are deactivated, i.e. set to "do not send", the sensor does not send its current value.
In addition, a correction value can be parameterized for the internal sensor under the setting "Adjustment value for internal sensor". This correction value is used to increase/decrease the actually measured value. The adjustment range is from -50 to 50 * 0.1K, i.e. the measured value can be lowered by -5 Kelvin and raised to a maximum of 5 Kelvin. For example, if a value of 10 is set, the measured temperature value is raised by 1 Kelvin. This setting makes sense if the sensor is installed in an unfavourable location, such as above a radiator or in a draught area. When this function is activated, the temperature sensor sends the corrected temperature value. In addition, the sensors have a factory temperature adjustment to 0.1K, which is carried out before delivery.
The associated communication object is shown in the table:

Number	Name	Length	Usage
145	Temperaturmesswert	2 Byte	sendet aktuell gemessene Temperatur

Table 29: Communication object - Temperature measurement

The function "send min/max values" can be deactivated by the setting "do not send" and activated by the setting "send". If this function is deactivated, no minimum and maximum values are stored by the temperature sensor. By activating this function, the sensor stores min/max values once reached. As soon as a new minimum or maximum value is registered, the sensor sends it via the associated communication object. The saved values are reset via the "Min/max values reset" communication object. The reset function is a 1-bit object and can be reset, e.g. via a switch object of a binary input.
The associated communication objects are shown in the table:

Number	Name	Length	Usage
165	Maximaler Temperaturwert	2 Byte	sendet und speichert maximal gemessenen Temperaturwert
166	Minimaler Temperaturwert	2 Byte	sendet und speichert minimal gemessenen Temperaturwert
167	Min/Max Werte Reset	1 Bit	setzt Min/Max Werte zurück

Table 30: Communication objects – Min/Max values

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An external sensor can be activated or deactivated via the weighting "Sensor internal/external". If the weighting is set to 100% internal, no external sensor is activated and no communication objects appear for the external sensor. With any other weighting, an external sensor is activated and the associated communication objects are also displayed. The "External temperature sensor" communication object transmits the current temperature measured by the sensor. The "External sensor error" communication object is used for feedback if the external sensor is faulty. If the external sensor does not send a value for 30 minutes, this communication object becomes active.
As soon as the external sensor has an error, the internal temperature value is used for control!
The associated communications objects are shown in the table:

Number	Name	Length	Usage
150	External sensor	2 Byte	Receives measured temperature of external sensor
170	Error external sensor	1 Bit	Sends errors if the sensor does not send a value for a certain time

Table 31: Communication objects – External sensor

If the message function is activated, two message functions can be parameterized. On the one hand the signalling function for the lower response value, the "minimum message value", and on the other hand the upper response value, the "maximum message value". The signalling function has a much larger setting range than the alarm function and overlaps are also possible, so that smooth switching between the message for the minimum value and the maximum value can be achieved. The two message functions each have a separate communication object, which can also be linked individually. The communication objects are 1-bit objects.
The associated communication objects are shown in the table:

Number	Name	Length	Usage
146	max. temperature	1 Bit	Sends a message when the upper message value is exceeded
147	min. temperature	1 Bit	Sends a message when the lower message value is exceeded

Table 32: Communication objects – Messages

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4.8.2 Temperature Controller

The table shows the possible parameterization options for the controller type:

ETS-Text	Dynamic range **[Default value]**	Comment
Controller type	▪ Controller off ▪ **Heating** ▪ Cooling ▪ Heating and Cooling	Setting the control mode. The further parameterization possibilities depend on the set control mode

Table 33: Settings - Controller type

If the setting "controller off" is set for controller type, the controller is deactivated and there are no further parameterization possibilities for the controller. As soon as the controller has been assigned a specific function, heating, cooling or heating & cooling depending on the application, further settings can be made and the next setting range "Control parameters" also appears on the left-hand side.
The task of the controller is to always adjust the actual temperature to the specified setpoint. In order to achieve this, the user has a number of setting options at his disposal. The controller can influence the correcting variable via 3 different control modes (PI control, 2-point control, PWM control). In addition, an additional stage can be assigned to the controller.
In addition, the controller has 4 different operating modes (frost/heat protection, night, comfort, standby) for differentiated control of different requirement ranges.
Further functions of the controller are the manual setpoint adjustment, the dynamic setpoint adjustment, taking into account the measured outdoor temperature, as well as the operating mode selection after reset and integration of blocking objects.

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The following figure shows the setting options in the temperature controller menu:

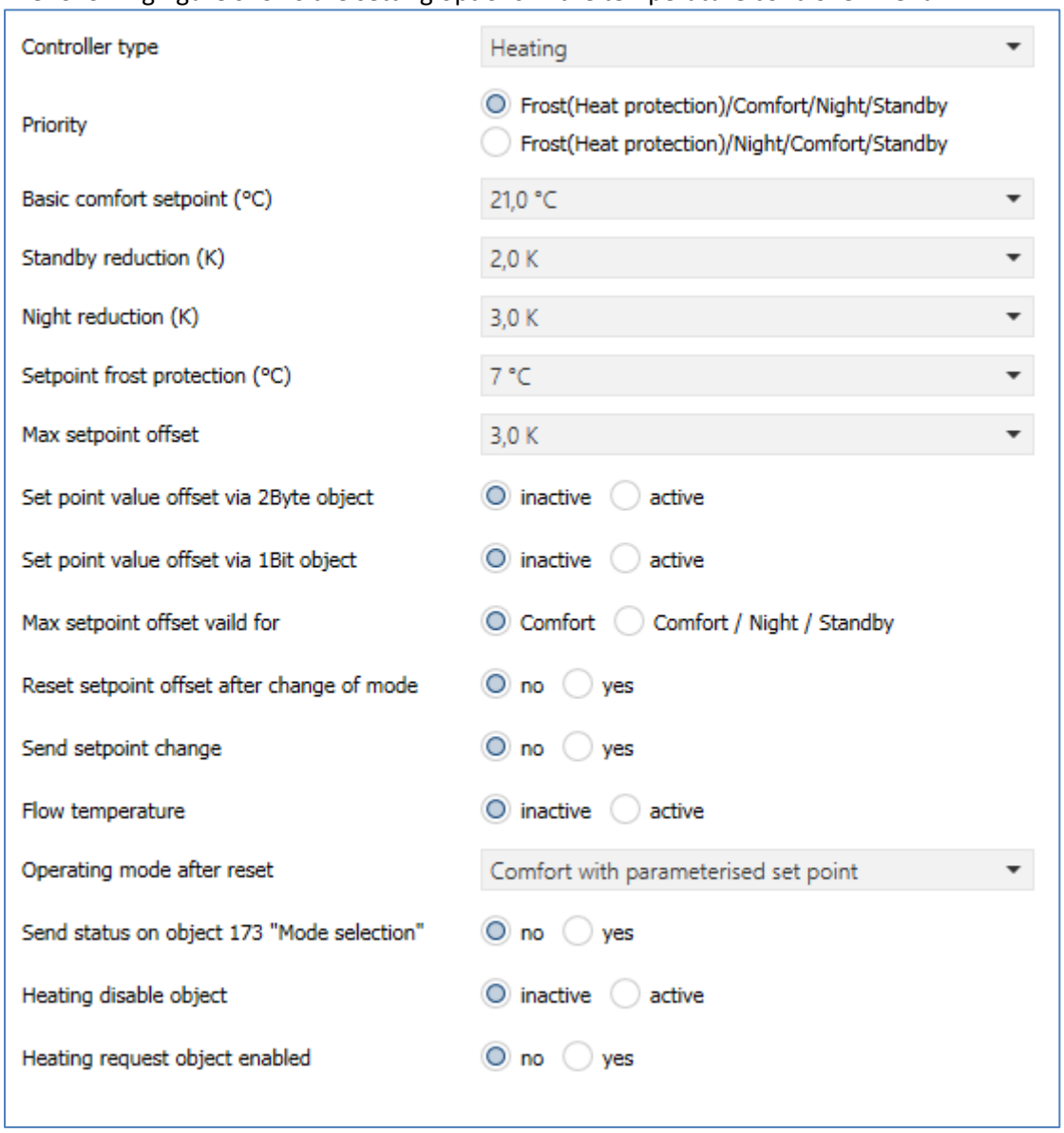

Figure 19: Settings - Temperature Controller

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The following table shows the individual operating modes and their setting ranges:

ETS-Text	Dynamic range **[Default value]**	Comment
Basic comfort setpoint (°C)	18,0 °C – 25,0 °C **[21,0 °C]**	**The basic comfort value is the reference point of the control**.
Standby reduction (K)	0 K – 10,0 K **[2,0 K]**	Reduction/increase in temperature when selecting the Standby mode is specified relative to the basic comfort value. Standby is activated if no other operating mode is active.
Night reduction (K)	**Reduction in K** 0 K – 10,0 K **[3,0 K]**	Reduction/increase in temperature when night mode is selected is specified relative to the basic comfort value
Setpoint frost protection (°C)	3 °C – 12 °C **[7 °C]**	Setpoint of the frost protection mode is set as absolute value. **Visible when "Heating" is active**
Setpoint heat protection (°C)	24 °C – 40 °C **[35 °C]**	Setpoint of the heat protection operating mode is set as absolute value. **Visible when "Cooling" is active**

Table 34: Settings - Operating modes and Setpoints

Comfort mode

Comfort mode is the controller's reference mode. The values in the night and standby operating modes are based on this. The Comfort operation mode should be activated when the room is used. The basic comfort value is parameterised as the setpoint.
If the controller mode is set to Heating & cooling, the basic comfort value applies for the heating process. In cooling mode, the value of the dead zone between heating and cooling is added.
The 1 bit communication object for this operating mode is shown in the following table:

Number	Name	Length	Usage
156	Mode comfort	1 Bit	Activating the comfort operating mode

Table 35: Communication object – Comfort mode 1bit

Night mode

The night operating mode should cause a significant temperature reduction/increase, e.g. at night or on weekends. The value can be freely parameterised and refers to the basic comfort value. So if a 5K reduction has been parameterised and a basic comfort value of 21°C has been set, the setpoint for night operation mode is 16°C. In cooling mode, there is a respective increase in the value.
The 1 bit communication object for this operation mode is shown in the following table::

Number	Name	Length	Usage
157	Mode Night	1 Bit	Activation of the operating mode night

Table 36: Communication object – Night mode 1bit

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Standby mode

The standby mode is used when nobody is using the room. It should cause a slight reduction/increase in the temperature. This value should be set considerably lower than that of the night operating mode to enable the room to heat up/cool down more quickly.
The value is freely parameterisable and refers to the basic comfort value. So if a setback of 2K has been parameterised and a basic comfort value of 21°C has been set, the setpoint for standby operation mode is 19°C. In cooling mode there is a corresponding increase in the value.
The standby operating mode is then activated as soon as all other operating modes are deactivated. This operation mode therefore also has no communication object.

Frost-/Heat protection mode

The frost protection operating mode is activated as soon as the controller has been assigned the heating function, the heat protection operating mode is activated as soon as the controller has been assigned the cooling function. If the controller is assigned the Heating & Cooling function, a combined operating mode called frost/heat protection is activated.
The frost/heat protection operating mode automatically switches on heating or cooling when the temperature falls below or exceeds the parameterised temperature. The temperature is parameterised here as an absolute value. If, for example, the temperature must not fall below a certain value during a longer absence, the frost protection mode should be activated.
The 1 bit communication object for this operation mode is shown in the following table:

Number	Name	Length	Usage
158	Frost protection mode	1 Bit	Activating the frost protection operating mode
158	Heat protection mode	1 Bit	Activating the heat protection operating mode
158	Mode frost/heat protection	1 Bit	Activation of the frost/heat protection mode

Table 37: Communication object – Frost/Heat protection 1bit

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Priority of the operating modes

The following table shows the possible settings for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Priority	▪ **Frost(Heat protection)/Comfort/Night/Standby** ▪ Frost(Heat protection/Night/Comfort/Standby	Setting the priorities of the operating modes

Table 38: Setting - Priority

The priority setting of the operating modes can be used to determine which operating mode is switched on with priority if several operating modes are selected. If, for example, comfort and night are switched on at the same time in the Frost/Comfort/Night/Standby priority, the controller remains in comfort mode until it is switched off. Then the controller automatically switches to night mode.

Operating mode switchover

There are 2 possibilities for operating mode switching: On the one hand, the operating mode can be controlled via the associated 1-bit communications objects and on the other hand, the operating mode can be controlled via a 1-byte object.

The selection of operating modes via 1 bit is done by direct control of the individual communication object. Taking into account the set priority, the operating mode controlled via its communication object is switched on or off. To switch the controller from an operation mode with higher priority to one with lower priority, the previous operation mode first has to be deactivated with a logical 0. If all operation modes are switched off, the controller switches to standby mode

Example (set priority: Frost/Comfort/Night/Standby):

Operating mode				**Set operating mode**
Comfort	Night	Frost/Heat protection		
1	0	0		Comfort
0	1	0		Night
0	0	1		Frost/Heat protection
0	0	0		Standby
1	0	1		Frost/Heat protection
1	1	0		Comfort

Table 39: Example – Mode selection via 1 Bit

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Operating mode switching via 1 byte is done via a single object, the DPT 20.102 HVAC Mode according to KNX specification. In addition, 2 objects are available for visualisation, firstly the 1 byte object "DPT_HVAC Status" and secondly the 2 byte object "DPT_RHCC Status". For operating mode selection, a hex value is sent to the "mode selection" object. The object evaluates the received hex value and thus switches on the corresponding operating mode and switches off the previously active operating mode. If all operating modes are switched off (Hex-value = 0), the operating mode Standby will be switched on.
The hex values for the individual operating modes can be taken from the following table:

Mode selection (HVAC Mode)	Hex-Value
Comfort	0x01
Standby	0x02
Night	0x03
Frost/Heat protection	0x04

Table 40: Hex values of HVAC Modes

The following example illustrates how the controller processes received hex values and thus switches operating modes on or off. The table is based on each other from top to bottom.
Example (set priority: Frost/Comfort/Night/Standby):

Received Hex value	Processing	Set operating mode
0x01	Comfort = 1	Comfort
0x03	Comfort = 0 Night = 1	Night
0x02	Night = 0 Standby = 1	Standby
0x04	Standby = 0 Frost/Heat protection = 1	Frost/Heat protection

Table 41: Example - Mode selection via 1 Byte

The DPT HVAC Status communication object, DPT_HVAC Status (without number) according to KNX specification, sends the corresponding hex value for the currently set operating mode. If several statements apply, the hex values are added together and the status symbol then outputs the added hex value. The hex values can then be read out by a visualisation system.
The following table shows the hex values associated with the individual messages:

Bit	DPT HVAC Status		Hex-Value
0	Comfort	1 = Comfort	0x01
1	Standby	1 = Standby	0x02
2	Night	1 = Nacht	0x04
3	Frost/Heat protection	1 = Frost/Heat protection	0x08
4			
5	Heating/Cooling	0 = Cooling/ 1 = Heating	0x20
6			
7	Frostalarm	1 = Frostalarm	0x80

Table 42: Hex values - HVAC Status

For example, if heating is carried out in comfort mode, the communication object outputs the value 20 (for heating) + 1 (for comfort mode) = 21.

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The DPT RHCC status communication object is an additional 2 byte status object. It contains additional status messages. As with the HVAC object, the hex values of several messages are added together and the added value is output.
The following table shows the hex values associated with the individual messages:

Bit	DPT RHCC Status		Hex-Value
0	Error Sensor	1=Error	0x01
7	Heating/Cooling	0=Cooling/1=Heating	0x80
13	Frost alarm	1=Frost alarm	0x2000
14	Heat alarm	1=Heat alarm	0x4000

Table 43: Hex-Values - DPT RHCC Status

The Controller reacts always to the value, which was sent last. If you switched the operating mode last via 1 Bit, the controller will react to the switchover by 1 Bit. If you switched the operating mode last via 1 Byte, the controller will react to the switchover by 1 Byte.
The communication objects for the mode selection are shown at the following chart. The first 3 communication objects are for the 1 Bit switchover, the last 3 objects are for the switchover via 1 Byte:

Number	Name	Length	Usage
156	Mode Comfort	1 Bit	Activation of the mode comfort
157	Mode Night	1 Bit	Activation of the mode night
158	Mode Frost/Heat protection	1 Bit	Activation of the mode Frost/ Heat protection
169	DPT_HVAC Status	1 Byte	Visualization of the chosen operating mode
172	DPT_RHCC Status	2 Byte	Visualization measuring/ status of the controller
173	mode selection	1 Byte	Selection of the operating mode

Table 44: Communication objects -Operating mode switchover

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Operating mode after reset

The following table shows the possible settings for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Operating mode after reset	▪ **Comfort with parameterised setpoint** ▪ Standby with parameterised setpoint ▪ Maintain previous state and setpoint	Setting which operating mode or behaviour should be activated after a bus voltage recovery

Table 45: Settings - Operating mode after reset

This parameter defines the operating mode, which shall be adjusted after a bus power return:

- **Comfort with parameterized setpoint**
  After a bus power return, comfort is activated with the setpoint, which was set by the ETS.
- **Standby with parameterized setpoint**
  After a bus power return, standby is activated with the setpoint, which was set by the ETS (Comfort-Setpoint - Standby reduction).
- **Hold old state and setpoint**
  The temperature controller calls the setpoint and mode, which was set before bus power down.
  Attention: After reprogramming the device, the memory is erased and there are no previous settings. In this special case, the controller is therefore in **Standby** with the corresponding parameterized setpoint!

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Setpoint offset

The following table shows the possible settings for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Max Setpoint offset	0 K – 10,0 K [3,0 K]	Indicates the maximal offset
Setpoint offset over 2 Byte objekt	▪ **Inactive** ▪ Active	Activation of the setpoint offset via 2 Byte object; a temperature difference in Kelvin is sent
Setpoint offset over 1 Bit objekt	▪ **Inactive** ▪ Active	Activation of the setpoint offset via 1 Bit object; sending a 1 increases the setpoint by the adjusted step range, sending a 0 decreases the setpoint by the adjusted step range. **This parameter is also the reference for the setpoint shift when using the internal buttons - Heating/ventilation operation -> Two-button function -> Temperature shift**
Step range	0,1 K – 1 K **[0,5 K]**	Setting the step width for setpoint shift via 1 bit object
Max setpoint offset valid for	▪ **Comfort** ▪ Comfort/Night/Standby	Scope of validity of the setpoint shift
Reset setpoint offset after change of mode	▪ **No** ▪ Yes	Setting whether the value shift is to be deleted after changing the operating mode
Send setpoint change	▪ **No** ▪ Yes	Setting whether a change of the setpoint value should be sent

Table 46: Settings - Setpoint shift

The Basic Comfort setpoint is fixed parameterised via the ETS. This setpoint can be changed in two ways. Firstly, a new absolute setpoint can be specified for the controller, this is done via the "Comfort setpoint" communication object as a 2 byte absolute value and secondly, the preset setpoint can be increased or reduced manually, this is done via the "Manual setpoint offset" communication object, either via 1 bit or 2 bytes.
When a new absolute comfort setpoint is read in, the controller is assigned a new basic comfort value. This new comfort value also automatically adjusts the dependent setpoints in the other operating modes, as these are relative to the Comfort base value. All settings for setpoint shifting do not apply here, as a completely new base value is assigned to the controller.
The second possibility for changing the setpoint is to shift the currently setpoint as a temperature difference. The communication object "manual setpoint offset" is used for this. The 2-byte object is used to send the controller a positive Kelvin value for raising or a negative Kelvin value for lowering. With manual setpoint offset via the 1-bit object, only ON/OFF commands are sent and the controller raises the setpoint by the set step width when a "1" is received and lowers the setpoint by the set step width when a "0" is received.
During setpoint shifting, the parameterised basic comfort value as reference value for the other operating modes is not changed

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The setting "max. setpoint offset" can be used to limit the maximum manual offset of the setpoint. For example, if the controller is set to a basic comfort value of 21°C and a max. setpoint shift of 3K, the basic comfort value can only be shifted manually within the limits of 18°C to 24°C.
The "Setpoint offset valid for" setting can be used to specify whether the offset is only valid for the comfort mode or whether the setting should also be adopted for the night and standby operating modes. The frost/heat protection operating modes are independent of the setpoint adjustment in any case.
The setting " Reset setpoint offset after change of mode" can be used to specify whether the new setpoint should be retained after a change of mode or whether the controller should return to the value parameterized in the ETS software after a change of mode.
The "Current setpoint" communication object is used to query the setpoint currently set (for the selected operation mode).
The following table shows the communication objects relevant for this parameter:

Number	Name	Length	Usage
151	Setpoint Comfort	2 Byte	Setting of a new absolute setpoint
152	manual setpoint offset	2 Byte	Shifting the setpoint relative to the preset Comfort setpoint
171	Current setpoint	2 Byte	Outputs the currently valid setpoint
174	manual setpoint offset	1 Bit	Increase/decrease the current setpoint by the set step width
168	Rücksetzen der Sollwerte	1 Bit	Resets the setpoints to the parameterized values

Table 47: Communication objects - Setpoint changes

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Blocking Objects

The following table shows the possible settings for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Heating disable object	▪ **Inactive** ▪ Active	Activates the blocking object for the heating process
Cooling disable object	▪ **Inactive** ▪ Active	Activates the blocking object for the cooling process

Table 48: Settings - Blocking objects

By activating the blocking objects, one or two blocking objects are available to the user for blocking the control value, depending on the setting of the controller type. These blocking objects are used to prevent the actuators (heating or cooling device) from starting up unintentionally. For example, if the heating is not to start in certain situations, e.g. when a window is open, the blocking object can be used to block the control value. Another application of the lock object is, for example, manual locking, e.g. via a pushbutton, in the event of a cleaning process. The blocking object blocks the control value as soon as a 1 is sent to the associated 1-bit communication object. A 0 releases the blocking.
The following table shows the communication objects for the blocking objects:

Number	Name	Length	Usage
159	Heating disable object	1 Bit	blocks the control value heating
160	Cooling disable object	1 Bit	blocks the control value cooling

Table 49: Communication objects - Blocking objects

Heating/Cooling request objects

The following table shows the possible settings for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Heating request object enabled	▪ **No** ▪ Yes	activates the communication object for the visualization of a beginning heating process
Cooling request object enabled	▪ **No** ▪ Yes	activates the communication object for the visualization of a beginning cooling process

Table 50: Settings –Heating/Cooling request

The setting "Heating/Cooling request object enabled" can be used to display objects that indicate that heating or cooling is about to start. These objects are status objects.
The objects can be used to visualise a starting or ending heating or cooling process. For example, a red LED could indicate a continuous heating process and a blue LED could indicate a continuous cooling process.
Another possibility of application is the central switching on of a heating or cooling process. For example, an additional logic gate can be used to ensure that all heaters in a building/area are switched on as soon as a controller issues the heating request.
The 1 bit communication object outputs a 1 as long as the respective process continues. If the process is finished, a 0 is output..
Die nachfolgende Tabelle zeigt die entsprechenden Kommunikationsobjekte:

Number	Name	Length	Usage
161	Heating request	1 Bit	indicates a beginning/ending heating process
162	Cooling request	1 Bit	indicates a beginning/ending cooling process

Table 51: Communication objects - Heating/Cooling request

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Dead zone

If the control mode is set to heating and cooling, a parameter for the dead zone between heating and cooling is displayed:

ETS-Text	Dynamic range **[Default value]**	Comment
Dead zone between heating and cooling (K)	1,0 K – 10,0 K [2,0 K]	Setting range for the dead zone (range in which the controller activates neither the heating nor the cooling process)

Table 52: Settings - Dead zone

The settings for the dead zone are only possible if the controller type is set to heating and cooling. As soon as this setting is made, the dead zone can be parameterised.
The dead zone is the area in which the controller does not activate either the heating or cooling process. Consequently, the controller does not send any value to the control value in the area of the dead zone and therefore the control value remains switched off. When setting the dead zone, please note that a low value leads to frequent switching between heating and cooling, whereas a high value leads to a large fluctuation of the actual room temperature.
If the controller is set to heating and cooling, the basic comfort value always forms the setpoint for the heating process. The setpoint for cooling is calculated by adding the base comfort value and the dead zone. So if the base comfort value is set to 21°C and the dead zone to 3K, the setpoint for the heating process is 21°C and the setpoint for the cooling process is 24°C.
The dependent setpoints for heating and cooling, i.e. those for the standby and night operating modes, can again be parameterised independently of each other in the controller mode Heating and Cooling. The setpoints are then calculated as a function of the basic comfort value, the setpoint for the comfort operating mode, for the heating and cooling process.
The setpoints for heat and frost protection are independent of the settings for the dead zone and the other setpoints.
The following diagram shows again the relationship between dead zone and the setpoints for the individual operating modes:
The following settings were selected for this example:
Basic comfort value: 21°C
Dead zone between heating and cooling: 3K
Increase and reduction Standby: 2K
Increase and reduction Night: 4K

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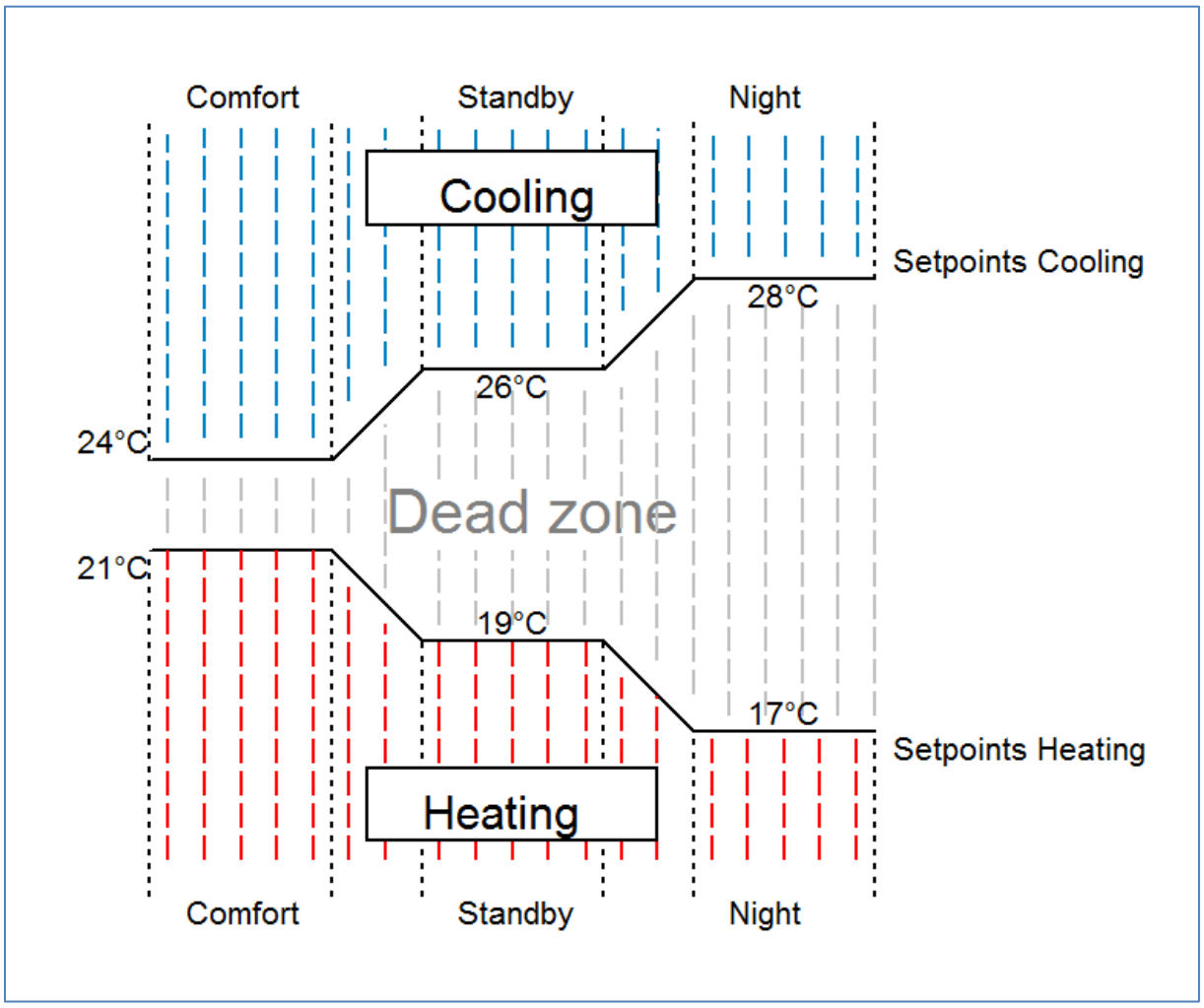

Figure 20: Example - Dead zone and corresponding setpoints

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Flow temperature limit

The following parameter activates the flow temperature limitation:

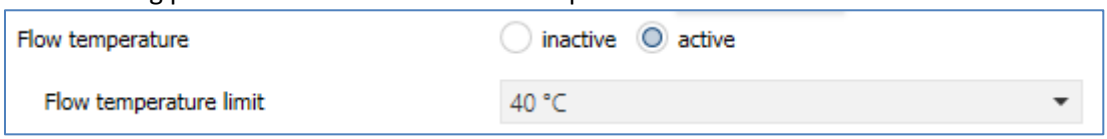

Figure 21: Settings - Flow temperature limit

Once the flow temperature has been activated, the following settings are possible:

Subfunction	Dynamic range **[Default value]**	Comment
Flow temperature limit	10 °C – 60 °C **[40 °C]**	Setting the value to which the flow temperature should be limited

Table 53: Settings - Flow temperature limit

The current flow temperature can be limited by the flow temperature limiter. This allows the heating temperature to be limited as required in certain situations. For example, if an underfloor heating system is not to heat above a certain value to protect the floor coverings, the heating temperature can be limited by the flow temperature limitation.
The flow temperature limitation requires a second sensor on the flow itself. This sensor measures the current flow temperature. The object which detects the flow temperature is then connected in a group address to the object for the flow temperature of the temperature controller. This then limits the flow temperature according to the set parameters.

Number	Name	Length	Usage
175	Flow temperature	2 Byte	Processing the measured flow temperature

Table 54: Communication object - Flow temperature limit

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4.8.3 Controller Settings

The output of the control value is defined with the setting of the control value. Depending on this setting, the other setting options are displayed.
The following table shows the setting options for this parameter:

ETS-Text	Dynamic range **[Default value]**	Comment
Control value	▪ **PI control continuous** ▪ PI control switching (PWM) ▪ 2-step control (switching)	The control value determines the control mode used

Table 55: Settings - Control value

The controller has three different controller types which control the control value. The further parameterisation possibilities depend on the type of controller used. The following controllers can be selected:

- PI control continuous
- PI control switching (PWM)
- 2-step control (switching)

The following chart shows the relevant communication objects:

Number	Name	Length	Usage
153	Control value heating	1 Byte/ 1 Bit	Controlling the actuator for the heating process
153	Control value heating/cooling	1 Byte/ 1 Bit	Controlling the actuator for the heating and cooling process
155	Control value cooling	1 Byte/ 1 Bit	Controlling the actuator for the cooling process

Table 56: Communication objects - Control value

Depending on the controller mode set, the control value controls the heating and/or cooling process. If the control value is selected as continuous PI control, the communication object for the control value is a 1-byte object, as the control value can assume several states. If the actuating variable is selected as a 2-point control or as PWM control, the communication object is a 1-bit object, as the actuating variable can only assume 2 states (0; 1).

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4.8.3.1 PI-control continuous

If the control value is selected as continuous PI control, the following setting options are available (here: controller type heating):

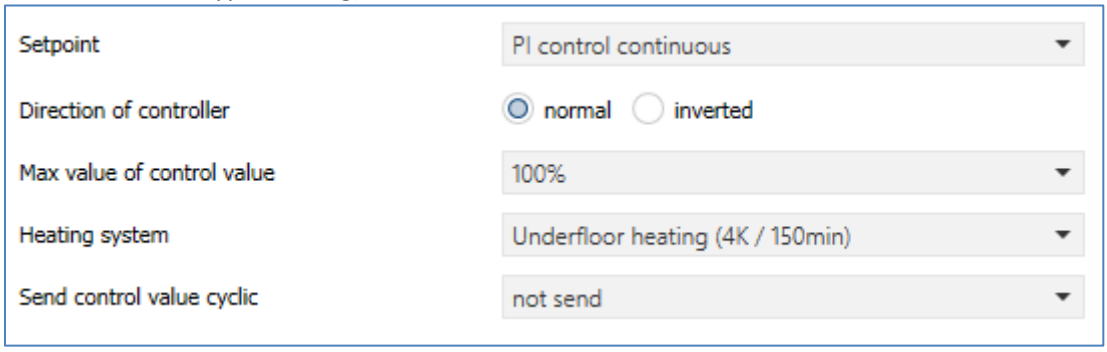

Figure 22: Settings - PI control continuous

The following table shows the possible settings for continuous PI control:

ETS-Text	Dynamic range **[Default value]**	Comment
Direction of controller	▪ **normal** ▪ inverted	Specifies the control behaviour with rising temperature
Max value of control value	**100%**; 90%; 80%; 75%; 70%; 60%; 50%; 40%; 30%; 25%; 20%; 10%; 0%	Specifies the output power of the control value in maximum operation
Heating system	▪ **Water heating (4K / 120 min)** ▪ Underfloor heating (4K / 150 min) ▪ Split Unit (4K / 60min) ▪ Adjustment via control parameter	Setting of the heating system used. Individual parameterization possible via setting 4
Cooling system	▪ **Split Unit (4K / 60 min)** ▪ Cooling ceiling (4K / 150 min) ▪ Adjustment via control parameter	Setting of the cooling system used. Individual parameterization possible via setting 3
Proportional range (K)	1 K - 8 K **[4 K]**	**Only visible with setting "Adjustment via control parameters"**. Here the proportional band can be set freely
Reset time (min)	15 min – 210 min **[150 min]**	**Only visible with setting "Adjustment via control parameters"**. The integral range can be freely adjusted here
Send control value cyclic	**not send**, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 30 min, 40 min, 50 min, 60 min	Activation of cyclical sending of the control value with setting of the cycle time

Table 57: Settings - PI control continuous

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PI control is a continuous control with a proportional component, the P component, and an integral component, the I component. The size of the P component is specified in K (Kelvin). The I component is referred to as reset time and is specified in min (minutes).
The control value for continuous PI control is controlled in steps from 0% up to the set maximum value of the control value.

Max value of control value
The setting "Value of max. control value" can be used to set the maximum value the control value may assume. To prevent switching operations with large manipulated variables, the parameter "Value of the max. control value" can be set to a value so that the final control element does not exceed this maximum value.

Heating/ cooling system
The individual control parameters, P-component and I-component, are set by adjusting the heating/cooling system used. It is possible to use preset values which are suitable for certain heating or cooling systems or to freely parameterize the P-controller and I-controller components. The preset values for the respective heating or cooling system are based on empirical values proven in practice and usually lead to good control results.
If a free "**adjustment via control parameters**" is selected, the proportional band and reset time can be freely set. **This setting requires sufficient knowledge in the field of control engineering**.

Proportional range
The proportional band stands for the P-component of a control. The P-component of a control system leads to a proportional increase of the control value to the system deviation.
A small proportional band leads to a fast correction of the system deviation. With a small proportional band, the controller reacts almost abruptly and sets the control value almost to the maximum value (100%) even with small control differences. However, if the proportional band is selected too small, the risk of overshooting is very high.
A proportional band of 4K sets the control value to 100% with a control deviation (difference between setpoint and current temperature) of 4°C. Thus, with this setting, a control deviation of 1°C would result in a control value of 25%.

Reset time
The reset time represents the I-component of a regulation. The I-component of a regulation leads to an integral approximation of the process value to the setpoint. A short reset time means that the controller has a large I-component.
A small reset time causes the control value to quickly approach the control value set according to the proportional band. A large reset time, on the other hand, causes the output variable to approach this value slowly.
When making the setting, please note that a reset time that is set too small could cause overshooting. In principle, the larger the reset time, the slower the system.

Send control value cyclic
With the aid of the parameter "Send control value cyclically" it can be set whether the channel should send its current status at certain intervals. The time intervals between two transmissions can also be parameterised.

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4.8.3.2 PI control switching (PWM)

If the control value is set as switching PI control (PWM), the following setting options are available (here: controller type heating):

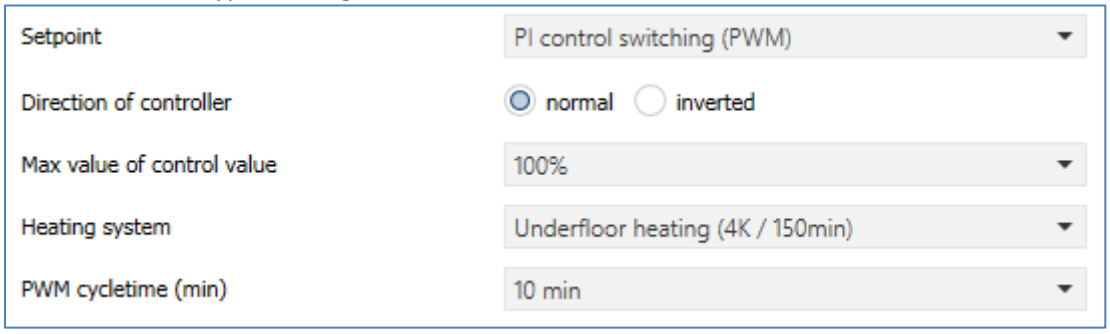

Figure 23: Settings - PI control switching (PWM)

The PWM control is a further development of the PI control. All settings possible for PI control can also be made here. In addition, the PWM cycle time can be set.

The following table shows the settings for switching PI control:

ETS-Text	Dynamic range **[Default value]**	Comment
Direction of controller	▪ **normal** ▪ inverted	Specifies the control behaviour with rising temperature
Max value of control value	**100%**; 90%; 80%; 75%; 70%; 60%; 50%; 40%; 30%; 25%; 20%; 10%; 0%	Specifies the output power of the control value in maximum operation
Heating system	▪ **Water heating (4K / 120 min)** ▪ Underfloor heating (4K / 150 min) ▪ Split Unit (4K / 60min) ▪ Adjustment via control parameter	Setting of the heating system used. Individual parameterization possible via setting 4
Cooling system	▪ **Split Unit (4K / 60 min)** ▪ Cooling ceiling (4K / 150 min) ▪ Adjustment via control parameter	Setting of the cooling system used. Individual parameterization possible via setting 3
Proportional range (K)	1 K - 8 K **[4 K]**	**Only visible with setting "Adjustment via control parameters**". Here the proportional band can be set freely
Reset time (min)	15 min – 210 min **[150 min]**	**Only visible with setting "Adjustment via control parameters**". The integral range can be freely adjusted here
PWM cycletime (min)	5min, **10min,** 15min, 20min, 25min, 30min	Setting the PWM cycle time. Includes the total time of a switch-on and switch-off pulse

Table 58: Settings - PI control switching (PWM)

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In PWM control, the controller switches the control value according to the value calculated in PI control, taking into account the cycle time. The control value is thus converted into pulse width modulation (PWM).

PWM cycle time
The PWM cycle time is used for PWM control to calculate the switch-on and switch-off pulse of the control value. This calculation is based on the calculated control value. A PWM cycle comprises the total time from the switch-on point to the new switch-on point.

Example:
If a control value of 75% is calculated with a set cycle time of 10 minutes, the control value is switched on for 7.5 minutes and switched off for 2.5 minutes.

In principle, the slower the overall system, the longer the cycle time can be set.

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4.8.3.3 Two-step control (switching)

If the control value is selected as 2-step control, the following setting options are available (here: controller type heating):

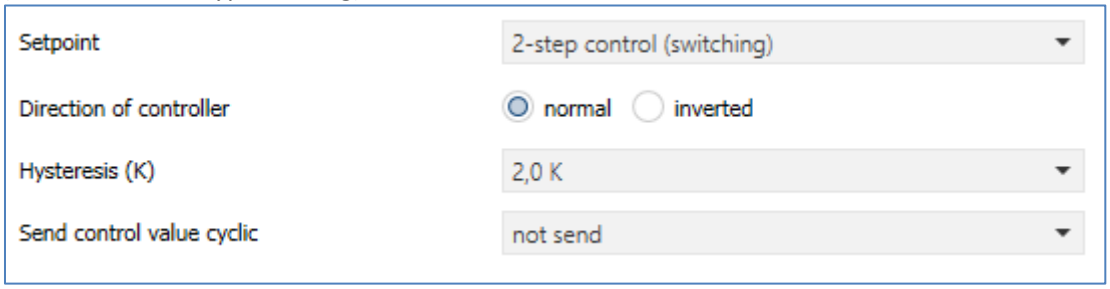

Figure 24: Settings - 2-step control (switching)

The following table shows the possible settings for 2-step control:

ETS-Text	Dynamic range **[Default value]**	Comment
Direction of controller	▪ **normal** ▪ inverted	Specifies the control behaviour when the temperature rises. Adaptation to normally open valves
Hysteresis (K)	0,5 K – 5,0 K **[2,0 K]**	Setting for upper and lower switch-on and switch-off point
Send control value cyclic or: Send control value for heating and cooling cyclic	Not send, 1 min – 60 min **[not send]**	**Visible when heating only or cooling only is set**. Setting whether and at what interval the control value is sent cyclically **Visible when heating and cooling is set**

Table 59: Settings - 2-step control (switching)

The 2-point controller is the simplest type of control. Only the two states ON or OFF are sent to the control value.
The controller switches the control value (e.g. heating process) on when the temperature falls below a certain reference temperature and switches it off again when the temperature exceeds a certain reference temperature.
The switch-on and switch-off points, i.e. where the reference temperature is, depend on the currently adjusted set point and the adjusted switching hysteresis.
The 2-point controller is used when the control value can only assume two states, e.g. an electrothermal valve.

Hysteresis
The setting of the switching hysteresis is used by the controller to calculate the switch-on and switch-off point. This is done taking into account the currently valid setpoint.

> Example: In the controller, with controller type Heating, a basic comfort value of 21°C and a hysteresis of 2K was set. In the comfort mode, this results in an activation temperature of 20°C and an deactivation temperature of 22°C.

When making the setting, please note that a large hysteresis leads to a large fluctuation of the actual room temperature. However, a small hysteresis can cause the control value to be switched on and off permanently, as the switch-on and switch-off points are close together.

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4.8.3.4 Direction of controller

The direction of controller describes the response of the control value to a change in the system deviation as the temperature rises. The control value can exhibit normal control response to a rising temperature or inverted control response. The direction of action is available for all settings of the control value (PI control; PWM; 2-point).
In PWM and 2-point control, an inverted control value is used for adaptation to valves that are open when no current is applied.
For the individual controllers, an inverted correcting variable, here in the example for controller type heating, means:

- PI-Controller
  The control value decreases with increasing system deviation and increases with decreasing system deviation.
- PWM- Controller
  The ratio of the duty cycle to the total PWM cycle increases with rising temperature and decreases with falling temperature.
- 2-Point Controller
  The controller switches itself on at the actual switch-off point and off at the actual switch-on point.

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4.8.3.5 Additional settings for heating & cooling mode

The picture shows the additional settings in heating & cooling mode:

Figure 25: Additional settings - Heating and Cooling

The following table shows the additional settings in heating & cooling mode:

ETS-Text	Dynamic range **[Default value]**	Comment
System	▪ **2 Pipe system** ▪ 4 Pipe system	Setting for separate or combined heating / cooling circuits
Heating/cooling switch over	▪ **automatically** ▪ via object	Selection between manual and automatic switch over

Table 60: Additional settings - Heating and Cooling

If heating & cooling is selected for the controller type, the additional setting options shown above are available.
The System setting can be used to select the system used. If there is a common system for the cooling & heating process, the setting 2 pipe system is to be selected. If cooling and heating are controlled by two individual devices, the setting 4 pipe system is to be selected.
It is also possible to choose between manual switching between heating and cooling and automatic switching..

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2 Pipe system:
In a common pipe system for the cooling and heating process, there is only one communication object that controls the control value. The change from heating to cooling or from cooling to heating is made by a changeover. This can also be used simultaneously for changing between heating and cooling medium in the system. This ensures, for example, that warm water flows in a heating/cooling ceiling during heating and cold water during cooling. In this case only one common controller (PI, PWM or 2-point) can be selected for the control value. The direction of action can also only be defined identically for both processes. However, the individual control parameters for the selected controller can be parameterized independently of each other.

4 Pipe system:
If there is a separate pipe system for the heating and cooling process, both processes can also be parameterized separately. Consequently, separate communication objects exist for both control values. This makes it possible to control the heating process e.g. via a PI control and the cooling process e.g. via a 2-step control, as both processes can be controlled by different devices. For each of the two individual processes, completely individual settings for the control value and the heating/cooling system are therefore possible:

Heating/Cooling switchover:
With the "Heating/cooling switch over" setting it is possible to set whether the controller automatically switches between heating and cooling or whether this process should be carried out manually via a communication object. In the case of automatic switchover, the controller evaluates the setpoints and knows which mode it is currently in based on the set values and the current actual temperature. If, for example, heating was previously carried out, the controller switches over as soon as the setpoint for the cooling process is reached.As long as the controller is in the dead zone, the controller remains set to heat, but does not heat as long as the heating setpoint is not undershot. If the switchover "via object" is selected, an additional communication object is displayed, which can be used to make the switchover. With this setting, the controller remains in the selected mode until it receives a signal via the communication object. For example, as long as the controller is in heating mode, only the setpoint for the heating process is considered, even if the controller is actually already in cooling mode. The cooling process can therefore only be started when the controller receives a signal via the communication object that it should switch over to the cooling process. If the controller receives a 1 via the communication object, the heating process is switched on, and if a 0, the cooling process is switched on.

The following table shows the associated communication object:

Number	Name	Length	Usage
163	Heating/Cooling switch over	1 Bit	Switchover between heating and cooling 0 = cooling; 1 = heating

Table 61: Communication object – Heating/Cooling switch over

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4.8.4 Ventilation control

4.8.4.1 Step switch bit coded

The following figure shows the available settings for the menu step switch:

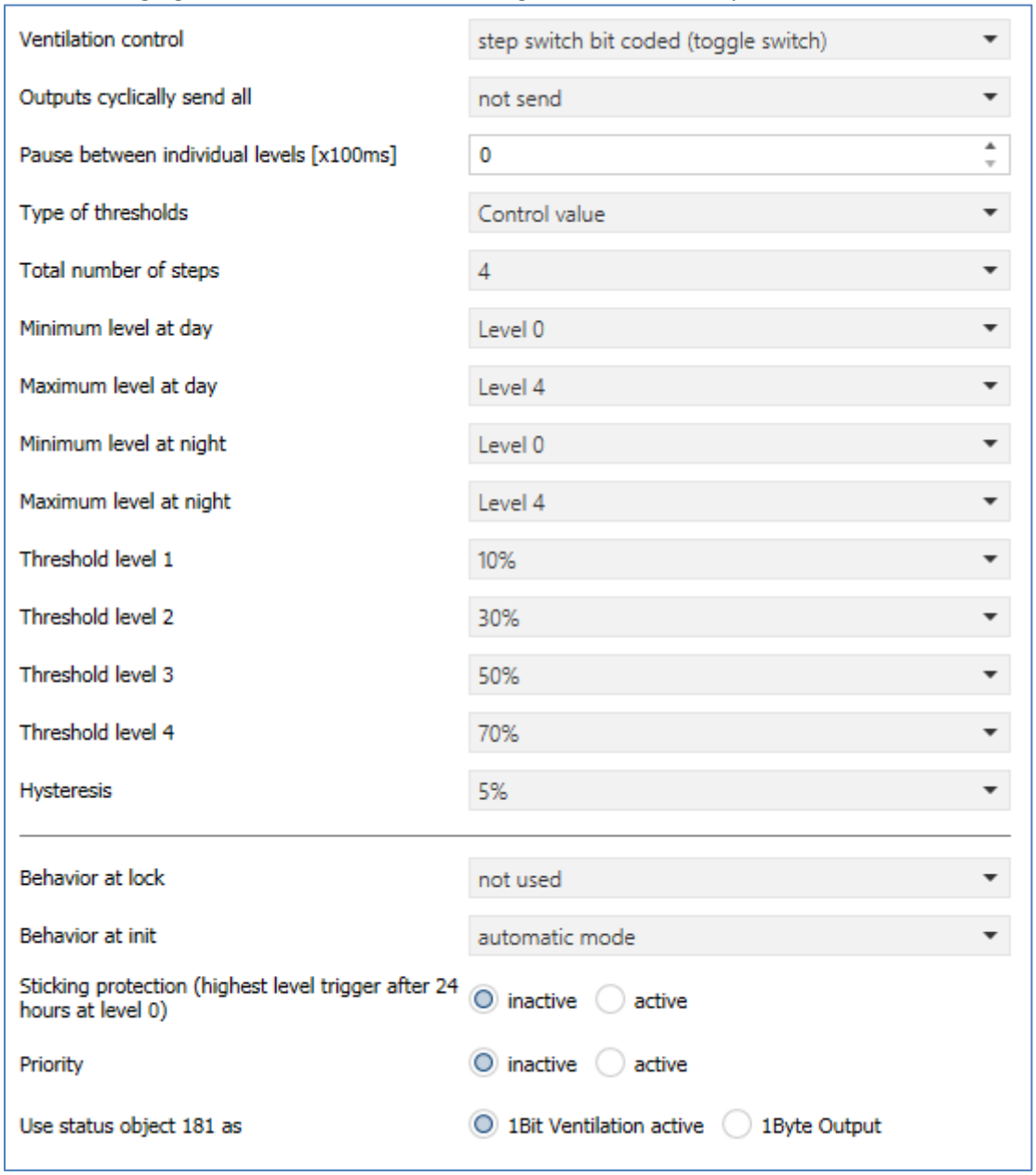

Figure 26: Settings - Step switch bit coded

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Min/Max levels for Day/Night

The setting for day/night switchover is in the "General Settings" menu.

The following parameter settings are available:

ETS-Text	Dynamic range **[Default value]**	Comment
Minimum level at day	Level 0 - Level 4 **[Level 0]**	defines the minimum level at mode day
Maximum level at day	Level 0 - Level 4 **[Level 4]**	defines the maximum level at mode day
Minimum level at night	Level 0 - Level 4 **[Level 0]**	defines the minimum level at mode night
Maximum level at night	Level 0 - Level 4 **[Level 4]**	defines the maximum level at mode night

Table 62: Settings - Min/Max levels for Day/Night

With the day/night switchover and the associated minimum/maximum output stage, the ventilation control can be limited. If, for example, the fan is only to run at level 2 in night mode in order to keep the noise level of the ventilation low or to avoid draughts, this can be realised with this parameter.

The following table shows the communication objects for day/night switching:

Number	Name	Length	Usage
121	Day/Night	1 Bit	Switching between day/night operation

Table 63: Communication object - Day/Night switchover

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Type of thresholds: Control value/Delta T

The ventilation control refers in the setting "Type of thresholds: Control value" to the current control value of the temperature controller. If the temperature controller is active in heating mode, the ventilation stages are switched according to object 153 - Control value heating. If the temperature controller is active in cooling mode, the ventilation stages are switched according to object 155 - Control value cooling. In the control mode heating and cooling, the control value of the currently active mode is used.

In the setting "Type of thresholds: Delta T", the delta is formed from the currently measured temperature value, which is output on object 145 - temperature value, and the setpoint value, which is sent on object 171 - current setpoint value.

The following parameter settings are available:

ETS-Text	Dynamic range **[Default value]**	Comment
Threshold level 1 **(Type of threshold: control value)**	0% – 100% **[10%]**	Threshold value below which all stages are switched off, above which stage 1 is switched on
Threshold level 1 **(Type of threshold: Delta T)**	1,0K-10,0K **[2,0K]**	Delta T below which all stages are switched off, above which stage 1 is switched on
Threshold level 2 **(Type of threshold: control value)**	0% – 100% **[30%]**	Threshold value below which level 1 is switched on and above which level 2 is switched on
Threshold level 2 **(Type of threshold: Delta T)**	1,0K-10,0K **[4,0K]**	Delta T below which level 1 is switched on and above which level 2 is switched on
Threshold level 3 **(Type of threshold: control value)**	0% – 100% **[50%]**	Threshold value below which level 2 is switched on and above which level 3 is switched on
Threshold level 3 **(Type of threshold: Delta T)**	1,0K-10,0K **[6,0K]**	Delta T below which level 2 is switched on and above which level 3 is switched on
Threshold level 4 **(Type of threshold: control value)**	0% – 100% **[70%]**	Threshold value below which level 3 is switched on and above which level 4 is switched on
Threshold level 4 **(Type of threshold: Delta T)**	1,0K-10,0K **[8,0K]**	Delta T below which level 3 is switched on and above which level 4 is switched on
Hysteresis **(Type of threshold: control value)**	0%-20% **[5%]**	Hysteresis for switching the output stages
Hysteresis **(Type of threshold: Delta T)**	0,1K-2,0K **[0,5K]**	Hysteresis for switching the output stages
Outputs cyclically send all	▪ **not send** ▪ 1 min – 60 min	Parameter activates the cyclic sending of all 4 output objects

Table 64: Settings – Output step controller

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The following figure shows the switching behaviour of the outputs depending on the threshold values:

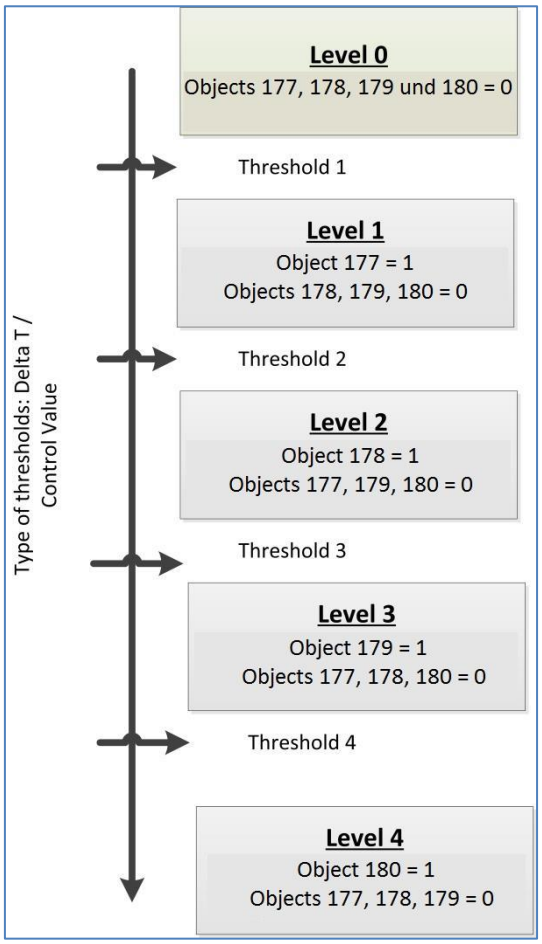

Figure 27: Switching behaviour - Step controller

Hysteresis

The hysteresis serves to avoid too frequent switching. For example, a hysteresis of 5% and a threshold of 50% would switch on at 55% and switch off at 45%. If the thresholds are determined via Delta T, the hysteresis is also given in Kelvin. However, the effect remains the same.

Outputs cyclically send all

With this parameter the cyclical sending of the output can be activated. All output states are sent cyclically according to the set time.

The following table shows the communication objects for the output of the step switch bit-coded:

Number	Name	Length	Usage
177	Ventilation control - Level 1	1 Bit	Switching the output level 1
178	Ventilation control - Level 2	1 Bit	Switching the output level 2
179	Ventilation control - Level 3	1 Bit	Switching the output level 3
180	Ventilation control - Level 4	1 Bit	Switching the output level 4

Table 65: Communication objects - Step switch bit coded

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Type of thresholds: Manual control only

If the Type of threshold parameter is set as follows, the levels are only activated or deactivated manually via their communications objects:

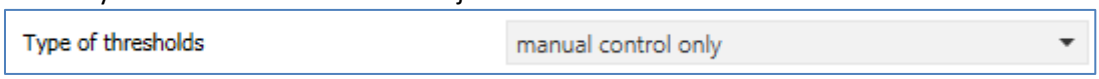

Figure 28: Setting - Manual control only

This setting disables any automatic control of the steps. The fan levels can therefore only be controlled via the objects or via the display.

Behavior at lock

The following settings are available:

- **Not used**
  The lock function is disabled and no communication object is shown.
- **Hold level**
  The controller holds the current level and the ventilation control is blocked due to further control as long the object has the value 1.
- **Send a certail level**
  The controller sets the adjusted level and blocks the ventilation control due to further control as long the object has the value 1.

As soon as the lock function is activated, the behavior of the unlocking can be set:

- **no action**
  The controller remains in the former state.
- **send a certain value**
  The controller sets the adjusted level.
- **Automatic mode**
  The controller switches to automatic mode
  This behavior is not available for " Step switch bit coded" and "Step switch binary coded" if "Type of thresholds: Manual control only" is active.
- **restore the old state**
  The controller restores the level, which was active before blocking.

The following table shows the communication object for the blocking function:

Number	Name	Length	Usage
176	Ventilation control - Block	1 Bit	Locks the ventilation control

Table 66: Communication object - Blocking Ventilation

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Behavior at Init

The following parameter defines the behavior at the initialization of the device:

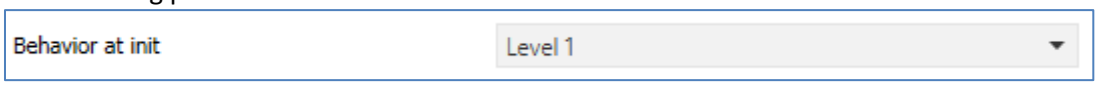

Figure 29: Ventilation control - Behaviour at Init

The behaviour in the Init defines the stage to be called after a reset if the controller has no value yet.

Sticking protection

The following parameter activates a sticking protection:

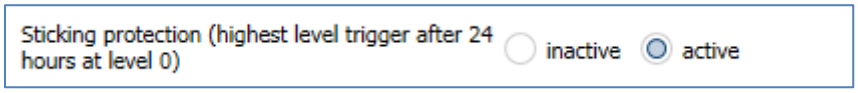

Figure 30: Ventilation control - Sticking protection

In order to protect the ventilation system from getting stuck, an anti-sticking protection can be activated. This allows the ventilation to run at the highest level for a short time, provided that it has not been moved for 24 hours (=level 0).

Priority

The priority can call a certain state:

Figure 31: Ventilation control - Priority

At activating the polarity (value = 1) a certain state is called. The following table shows the communication object for the priority control:

Number	Name	Length	Usage
183	Ventilation control - Object priority	1 Bit	Value 1 calls the adjusted level

Table 67: Communication object - ventilation control – Priority

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Status object

The following parameter activates an object for the state:

Figure 32: Ventilation control - Status object

The following settings are available:

- **1 Byte Output**
- If the state object is parameterized as 1 Byte, the object sends the current level as value, e.g. value 1 for level 1, value 2 for level 2…
  With the setting “step-switch as byte”, the current control value is sent.
- **1 Bit Ventilation active**
  In this case, the value 1 is sent when the ventilation is active and the value 0 when the ventilation is inactive.

4.8.4.2 Step Switch – binary coded

The binary-coded step controller is identical in its functionality to the normal step controller as described in "4.8.4.1 Step switch bit-coded". Only the output level is already binary coded. Object 177 forms bit 0, object 178 bit 1 and object 179 bit 2.

The following table shows the binary-coded switching of the output level:

normal step-switch	binary value	step-switch binary coded
Level 0	000	Objects 177, 178, 179 = 0
Level 1	001	Object 177 = 1, Objects 178 & 179 = 0
Level 2	010	Object 178 = 1, Objects 177 & 179 = 0
Level 3	011	Objects 177 & 178 = 1, Object 179 = 0
Level 4	100	Object 179 = 1, Objects 177 & 178 = 0

Table 68: Settings - : Step-switch binary coded

The following table shows the communication objects for the step switch binary coded:

Number	Name	Length	Usage
177	Ventilation control - Bit 0	1 Bit	Setting the bit 0
178	Ventilation control - Bit 1	1 Bit	Setting the bit 1
179	Ventilation control - Bit 2	1 Bit	Setting the bit 2

Table 69: Communication object - Step switch binary coded

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4.8.4.3 Step switch simply

The binary-coded step controller is identical in its functionality to the normal step controller as described in *4.8.4.1 Step switch bit-coded*. Only the output stage has a different structure. Each time the stage is increased, the previous and the new one are switched on, which is also clear from the communication objects:

Number	Name	Length	Usage
177	Ventilation control - Level 1	1 Bit	Switching level 1
178	Ventilation control - Level 1+2	1 Bit	Switching level 1+2
179	Ventilation control - Level 1+2+3	1 Bit	Switching level 1+2+3
180	Ventilation control - Level 1+2+3+4	1 Bit	Switching level 1+2+3+4

Table 70: Communication objects - Step switch simply

4.8.4.4 Step switch as Byte

The “Step switch as Byte” contains of a steady output value. Up to 4 levels can be defined with an absolute value (0-100%). The fifth level is the off-state, which sends the value 0%.
The following figure shows an example for the output of the step switch as Byte:

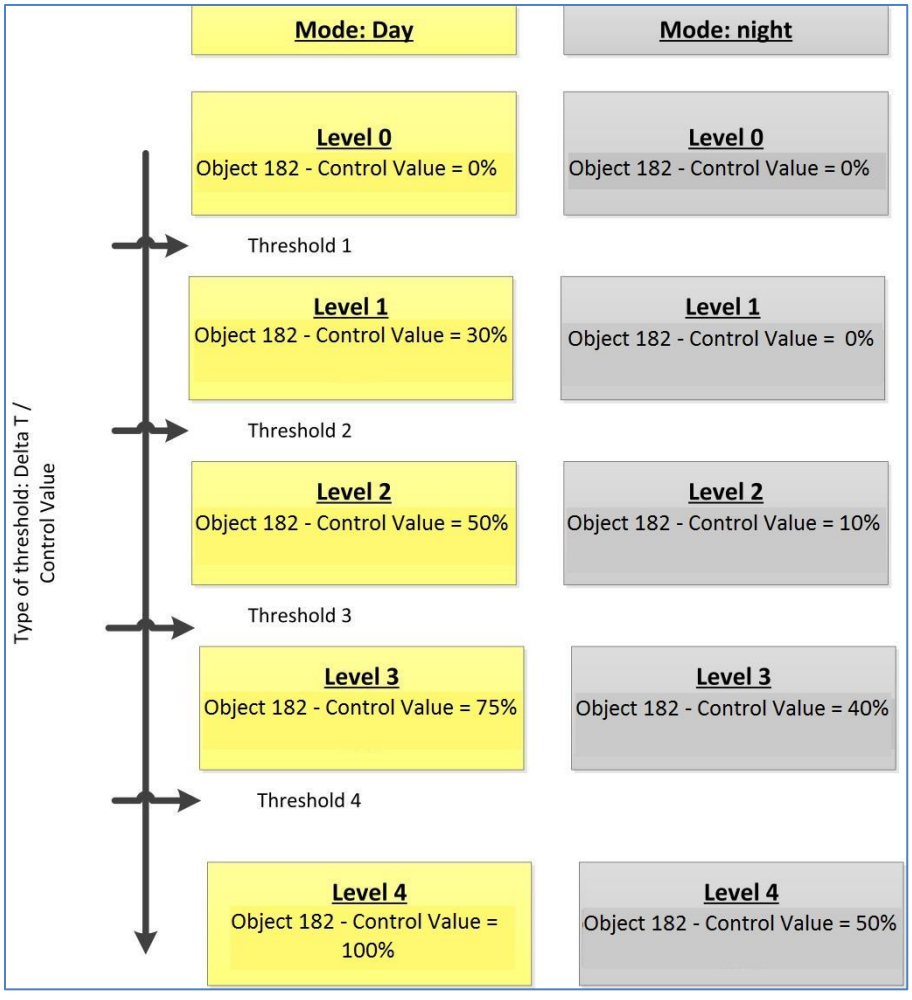

Figure 33: Example - Output: Step switch as Byte

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However, please note that the settings for the minimum / maximum value for the day / night operation are priorities and can limit the settings for the output.

The following table shows the communication object for the step switch as Byte:

Number	Name	Length	Usage
182	Ventilation control - Control value	1 Byte	Control value for an actuator

Table 71: Communication object - Step switch as Byte

All other functions are identical to those described in *4.8.4.1 Step switch bit-coded*.

4.8.4.5 External Control (Slave)

At the external control, the glass central operation unit works as slave, that means as display and switch for the ventilation control. The calculation of the current ventilation level is done from another KNX-device.
The following settings are available:

ETS-Text	Dynamic range **[Default value]**	Comment
Total number of steps	2 - 4 **[4]**	Defines the number of steps (for the visualization on a display)

Table 72: Settings - External control (Slave)

At the operating mode „external control (Slave)“ the current ventilation level is set via the object .
The Central operation unit works only as switch and display for the FanCoil control.
The following table shows the available communication objects for the external control:

Number	Name	Length	Usage
181	Input: 1 Byte current ventilation level	1 Byte	Input for setting the current ventilation level
184	Input and Output: Switch Automatic	1 Bit	Switchover and display of the mode
185	Output: Control ventilation levels manually (+/-)	1 Bit	Sending of Up/Down commands for the master

Table 73: Communication Objects - External control (Slave)

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4.8.5 Operating Heating/Cooling

An additional level can be activated to operate the internal temperature controller/ internal ventilation control of the Smart control panel directly on the unit. This level can have up to 4 keys and is displayed on the unit as the heating/ventilation functional level.
No communication objects are available for these functions and the button functions only affect the internal temperature controller or the internal ventilation control!
The push-buttons can be parameterised as either a one-button function or a two-button function.
The following functions are available:

4.8.5.1 Mode Selection

☑ Single-button function
☑ Two-button function

With the function "Mode Selection" the HVAC Mode can be switched.
The following figure shows the available settings (here for two-button function):

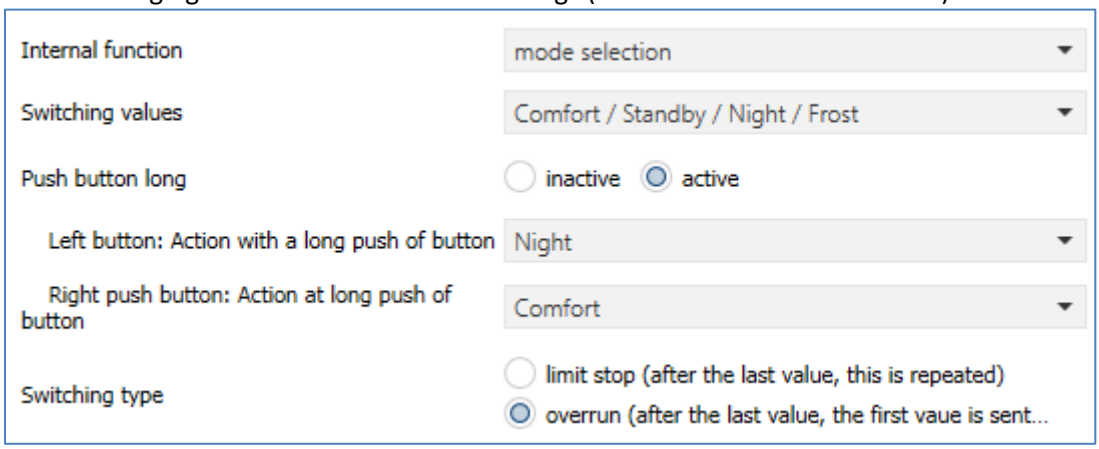

Figure 34: Settings - Mode Selection

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The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Switching values	▪ **Comfort/Standby** ▪ Comfort/Night ▪ Comfort/Standby/ Night ▪ Comfort/Standby/ Night/Frost	Setting between which operating modes can be toggled.
Push Button long	▪ **Inactive** ▪ Active	Activates an action for the long keystroke
Left button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the left button **Only available with two-button function!**
Right button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the right button **Only available with two-button function!**
Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke **Only available with single-button function!**
Switching type	▪ **Limit stop** ▪ Overrun	Setting what should happen when the last switching value is reached. **Only available with two-button function!**

Table 74: Settings - Mode selection

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Functional Principle:
The operating mode switching function can send up to 4 different operating modes when a button is pressed shortly. The operating modes are switched over one after the other. Depending on the set parameters, for example, when the key is pressed, the 2nd changeover value is transmitted if the 1st changeover value was previously transmitted and the 3rd changeover value if the 2nd changeover value was previously transmitted.

Push button long:
In addition to the switchover by a short keystroke, a fixed operating mode can be transmitted by a long keystroke.
One of the 4 operating modes can be transmitted permanently. Thus, a long keystroke would always transmit a fixed operating mode (independent of the last changeover value).

Switching type:
Limit stop: With the limit stop switch mode, the 4th operating mode is transmitted again after the 4th operating mode has been sent.
Overrun: With the overflow switchover mode, the 1st operating mode is sent again after the 4th operating mode has been sent.
For the single button function, this parameter is permanently set to “Overrun”.

Presentation:
☑ Single-button function
☑ Two-button function

Each operating mode is assigned a fixed symbol. The colour of the symbol can be set as required for each operation mode:

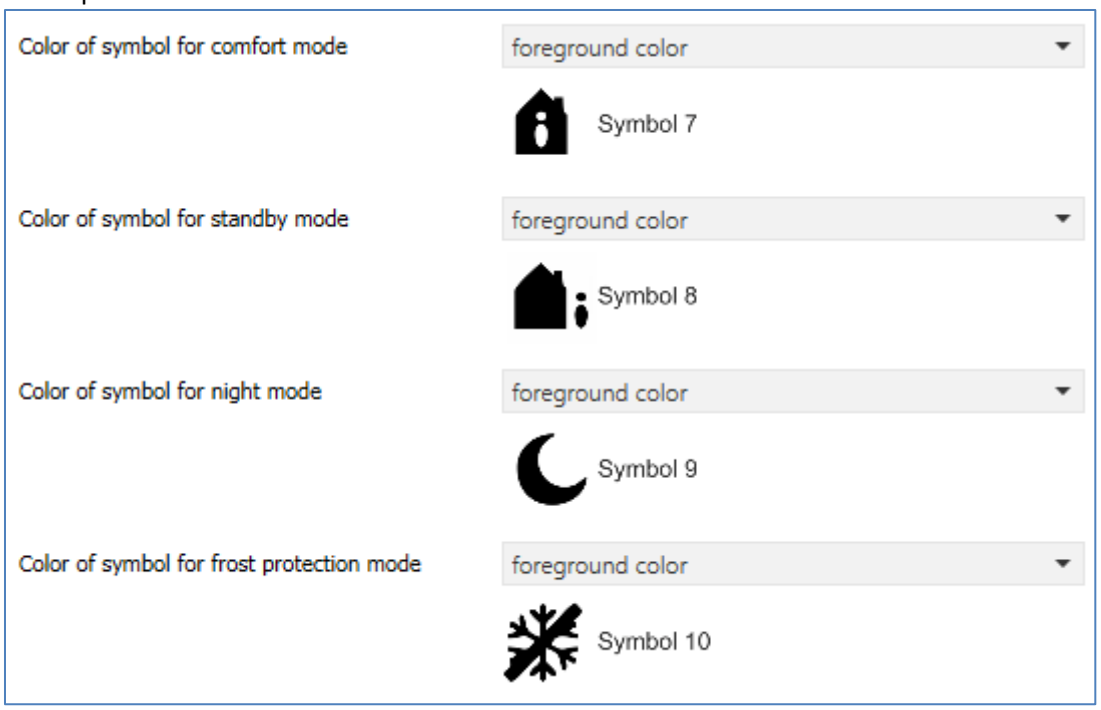

Figure 35: Settings - Presentation of Operating modes

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4.8.5.2 Temperature Shift

☑ Two-button function

The temperature shift can be used to shift the heating control setpoint.
The following figure shows the available settings:

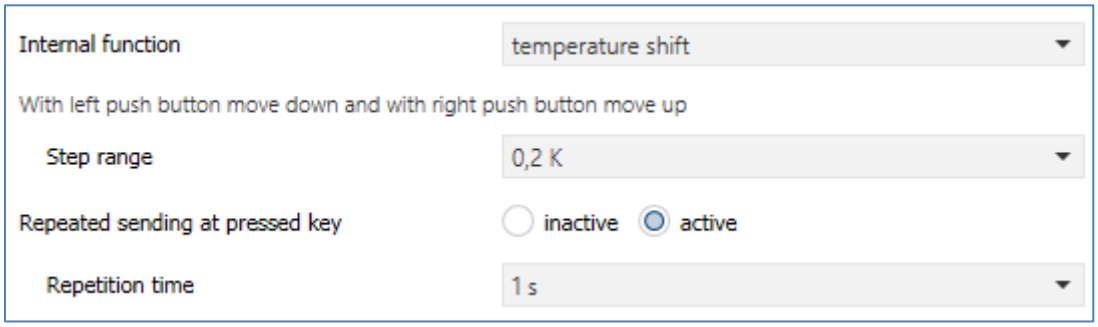

Figure 36: Settings - Temperature Shift

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Repeated sending at pressed key	▪ **Inactive** ▪ Active	Setting whether the shift should be repeated at fixed intervals while holding down the key
Repetition time	200 ms – 3 s **[1 s]**	Setting the repetition time between two transmissions of the temperature shift

Table 75: Settings - Temperature Shift

Note: The "Step range" parameter is only displayed if the "Temperature controller -> Set point shift via 1 bit" menu is active. The setting of the step size in the controller and here in the key function is internally linked. Example: If, for example, the step size is changed here from 0.5 K to 1 K, the step size is also automatically changed to 1 K in the controller. Change in the controller also changes the value here.

Presentation:

☑ Two-button function

The temperature shift is represented by the temperature symbol. The representation is fixed to the symbol no. 6. In addition, the actual value and the setpoint value can be labelled as required:

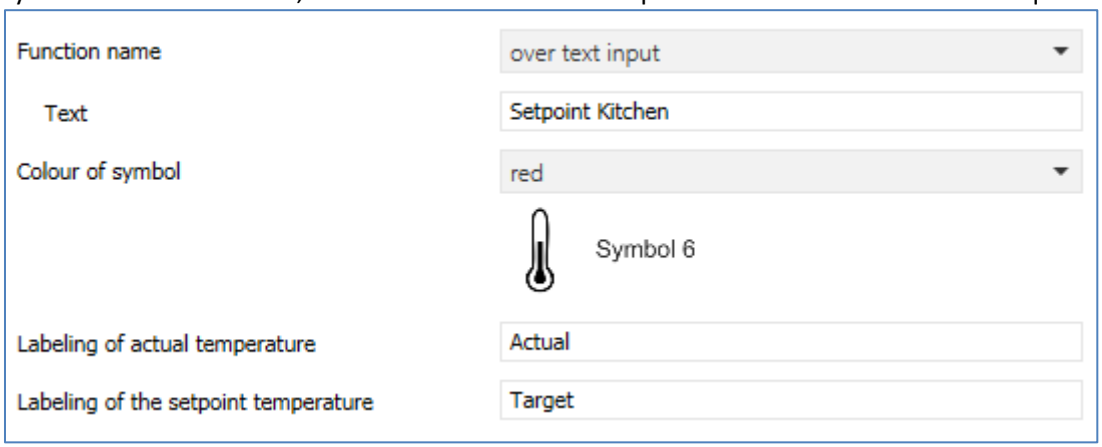

Figure 37: Settings - Presentation of Temperature shift

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4.8.5.3 Heating/Cooling switchover

☑ Two-button function

The heating/cooling switchover is only available if the controller is set to heating and cooling and the switchover is to be made via object. The button function can then act directly on the controller.

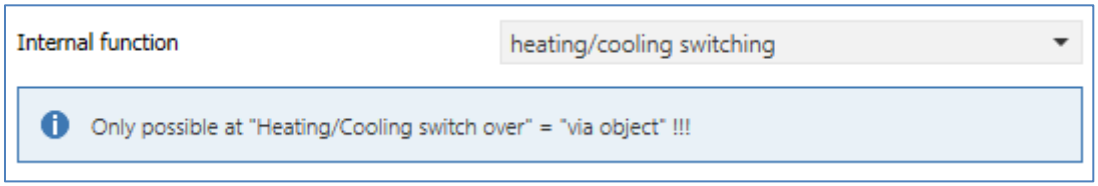

Figure 38: Setting - Heating/Cooling switchover

Presentation:

☑ Single-button function

Any symbol can be selected for heating and cooling. In addition, the function can be labelled or the function name can be adapted dynamically in relation to the current value.

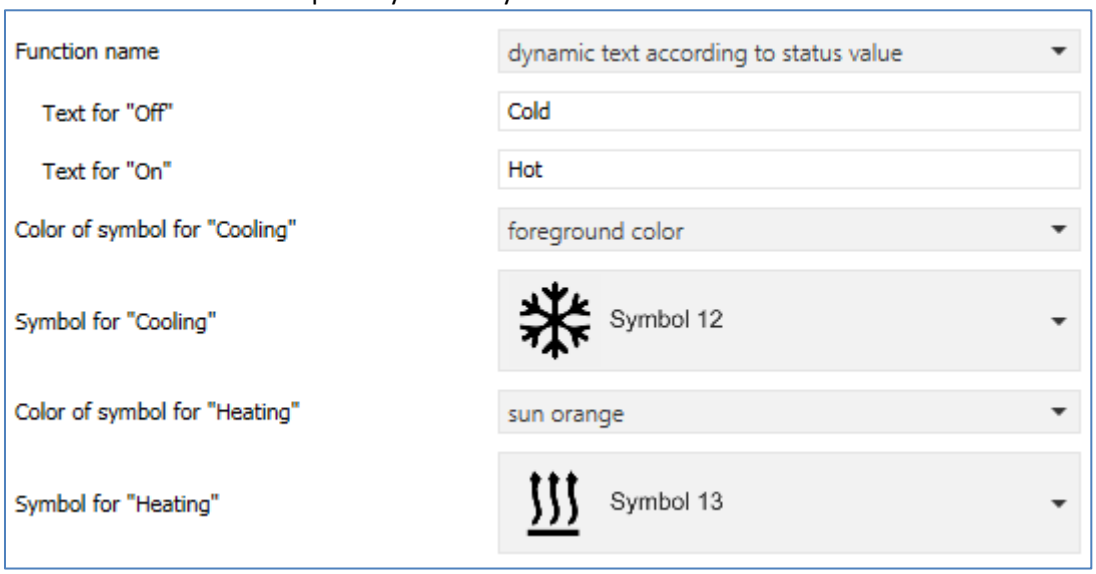

Figure 39: Setting - Presentation of Heating/Cooling switchover

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4.8.5.4 Ventilation control levels

☑ Single-button function
☑ Two-button function

The "Ventilation control levels" function accesses the internal ventilation control and controls the level switching.
The following settings are available (here for two-button function):

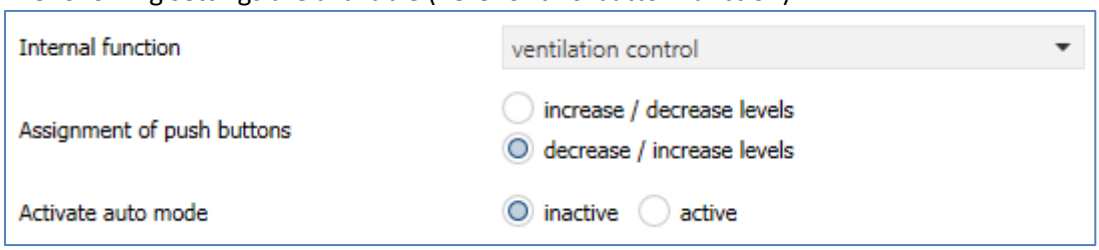

Figure 40: Settings - Ventilation control levels

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of push buttons	▪ **Increase/decrease levels** ▪ Decrease/increase levels	Parameter defines the polarity of the keys. **Only for two buttons Function**
Activate auto mode	• **Inactive** • Active	This parameter defines whether this function switches the ventilation to automatic mode after the highest level or below the lowest level.

Table 76: Settings - Ventilation control levels

If the "Activate auto mode" parameter is set to active, the ventilation is switched to automatic mode after exceeding the last level or falling below the last level.

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Presentation:
☑ Single-button function
☑ Two-button function

2 symbols with color can be defined for the level changeover of the ventilation control. One symbol stands for stage 0 and one for stages 1-4. The current stage is also displayed as a number below the symbol.
The settings for the key labeling are only available for the two-button function:

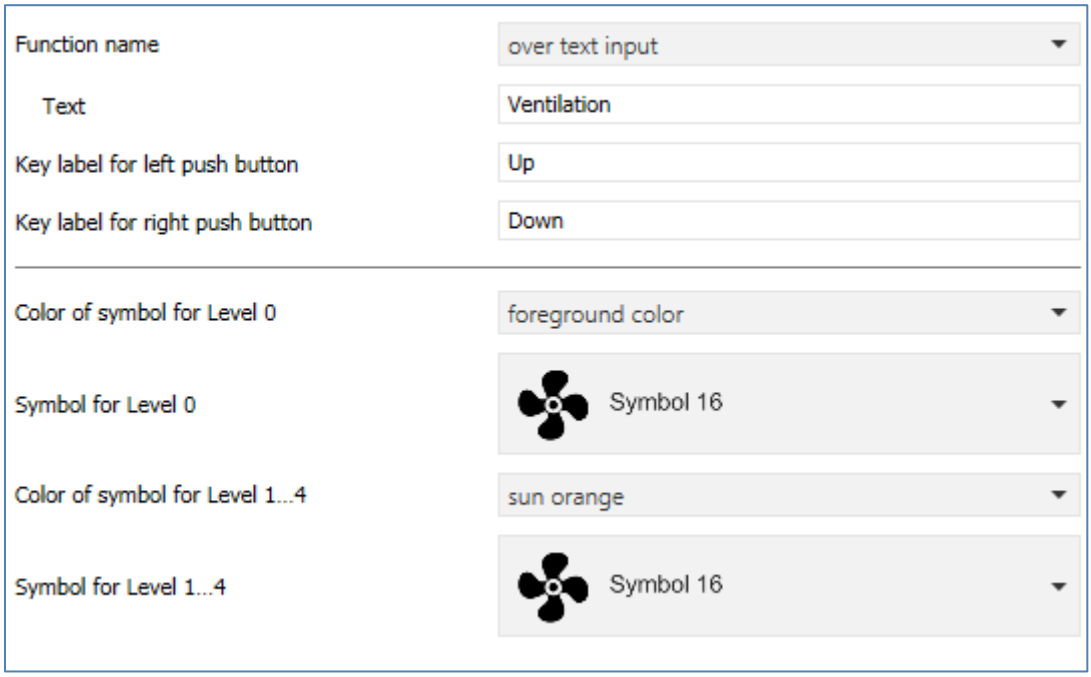

Figure 41: Presentation - Ventilation control levels

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4.8.5.5 Ventilation control Auto/Manual

☑ Single-button function

The "Ventilation control auto/manual" function accesses the internal ventilation control and controls the switchover between auto and manual. No further settings or links are necessary:

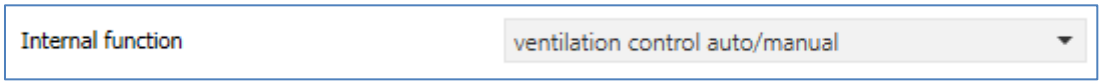

Figure 42: Settings - Ventilation control auto/manual

Presentation:

☑ Single-button function

A separate icon and color can be defined for the auto mode and the manual mode:

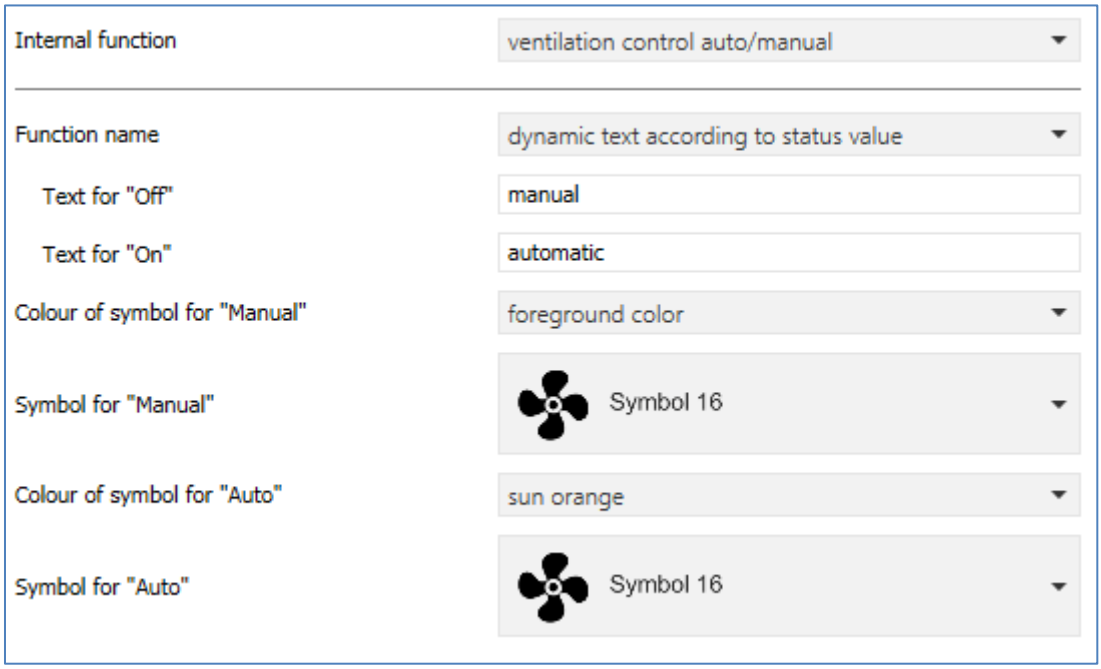

Figure 43: Presentation - Ventilation control auto/manual

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4.9 Direct Functions

Both a blocking object and the function name can be defined for each button function. The blocking object blocks the operation of the key when a logical 1 is received and releases it again as soon as a logical 0 is received.
The function name is displayed centrally above the respective function and can either be set permanently ("over text input") or set dynamically via the communication object.
If the status object for a function is not connected, the switching status is visualised, otherwise the value of the status.

Identical parameters for all button functions are sind:

ETS-Text	Dynamic range **[Default value]**	Comment
Function name	▪ No Text ▪ From „Message Text“ (14 Byte object 139) ▪ From „State object 1“ (14 Byte objekt 140) ▪ From „State object 2“ (14 Byte objekt 141) ▪ **Over text input** ▪ Dynamic text according to status value	Setting of the data source for the function name; with the setting "dynamic text" the function name is changed depending on the received telegram, e.g. "Presence/Absent" can be signalled. **Dynamic text only available for switching functions**
Text	free text with up to 20 characters	Input of the function name; Only visible when " over text input" is active
Blocking object	▪ **Inactive** ▪ Active	Activation/deactivation of the blocking object for this button function

Table 77: Identical Parameters - Direct button functions

Communication objects
The following table shows the available communications objects for the identical objects:

Number	Name	Length	Usage
104	Blocking object	1 Bit	Locking the key function
+5	**next blocking object**		
139	Message text	14 Byte	Receipt of status texts/running texts, etc.
140	State text 1	14 Byte	Receipt of status texts/running texts, etc.
141	State text 2	14 Byte	Receipt of status texts/running texts, etc.

Table 78: Identical Communication objects - Direct button functions

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Display of the direct buttons on the device:

The direct buttons are displayed as a separate function level for direct operation. An individual labeling and symbol can also be selected for this function level.
1 = Displayed function level: Direct buttons
2 = Scroll left to the next function level
3 = Scroll right to the next function level
4/5/6/7: Operation of the direct buttons, here all parameterized as single button function.

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4.9.1 Switch

The following figure shows the available settings for the Switching function (here for the two-button function):

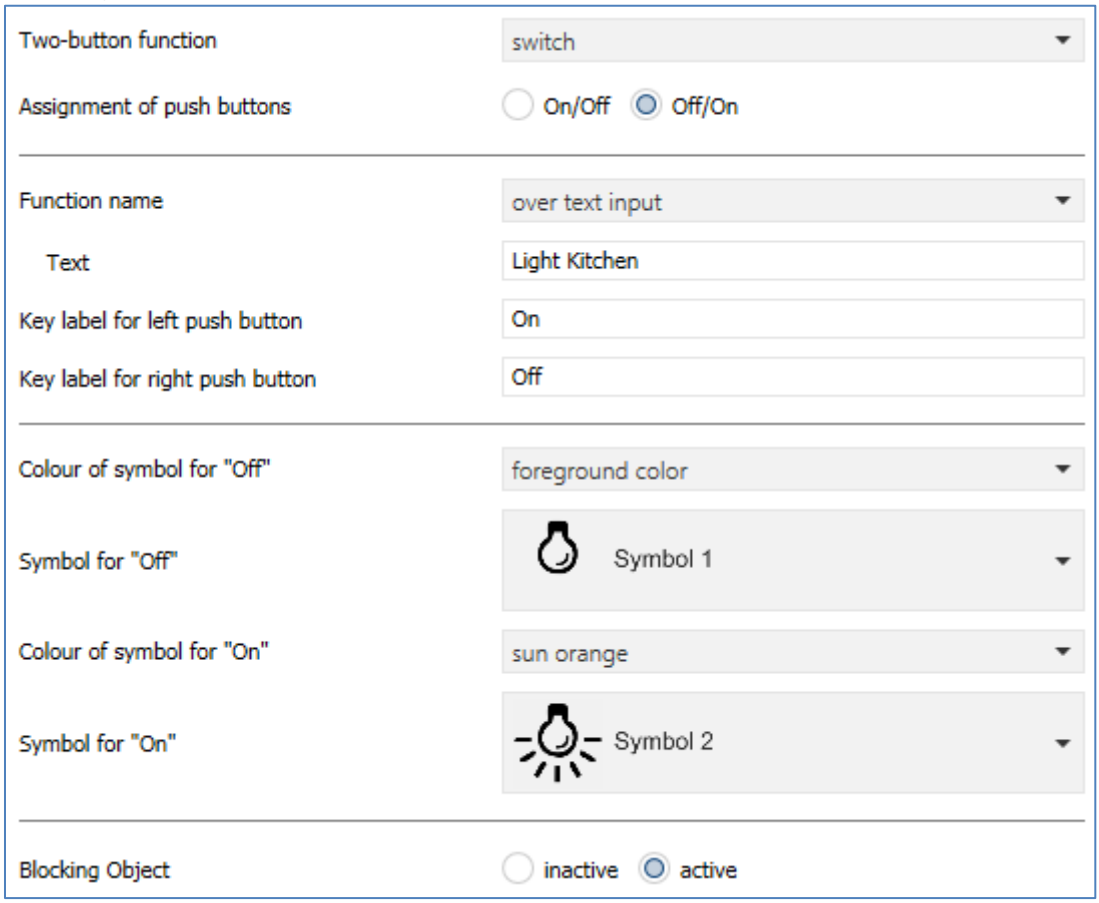

Figure 44: Settings - Direct buttons: Switch

Identical Parameters

The following parameters are identical for all subfunctions of the "Switching" function:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of puch buttons	▪ On/Off ▪ **Off/On**	**Setting only available for the two-button function**. Defines the sending behavior of the left and right key
Subfunction	▪ **Switch** ▪ Toggle ▪ Send Status ▪ Send Status with off-delay	**Setting only available for the single button function**. Defines the sub-function and displays further parameters if necessary

Table 79: Identical Parameters - Direct buttons: Switch

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Switch with the two-button function
☑ Two-button function

In the case of the two-button function, the respective value (On/Off) can be assigned to the left and right buttons. Thus, the left and right buttons sends a set fixed value.
The following figure shows the available settings for the two-button function "switch":

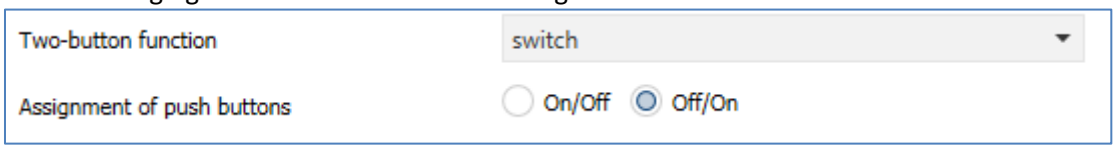

Figure 45: Settings: Two-button function - Switch

Button assignment On / Off: The left button sends the value On and the right button the value Off.
Button assignment Off / On: The left button sends the value Off and the right button the value On.

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct buttons 1/2 – switch	1 Bit	Switch function of the buttons
103	Direct buttons 1/2 – State for display	1 Bit	State to refresh the display/symbol on the button; has to be connected to the state of the actuator to be switched

Table 80: Communication objects: Two-button function - Switch

Subfunction: Switch
☑ Single-button function

With the single-button function "switch" – Subfunction “switch”, the button sends the respective fixed value when pressed.
The following figure shows the available settings:

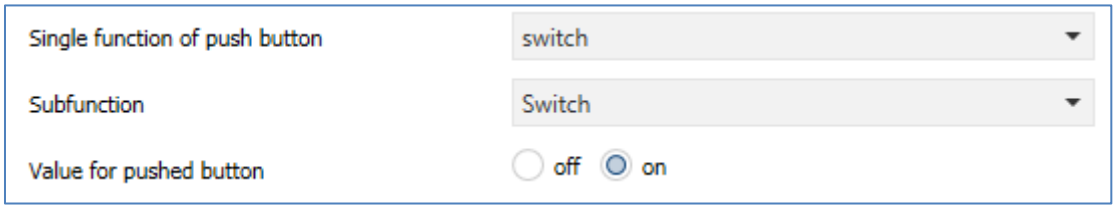

Figure 46: Settings: Single-button function "switch" - switch

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1	1 Bit	Switch function of the button
103	Direct button 1 – State for display	1 Bit	State to refresh the display/symbol on the button; has to be connected to the state of the actuator to be switched

Table 81: Communication objects: Single-button function "switch" - switch

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Subfunction: Toggle
☑ Single-button function

With the single button function "Switch" - Subfunction: Toggle, the key sends the respective inverted value with respect to the last received status value.For this purpose, the status object "value for toggle" has to be connected with the status of the actuator to be switched. If an "on" signal has been received as last value, the push button sends an "off" command at the next keystroke and vice versa.
The following figure shows the available settings:

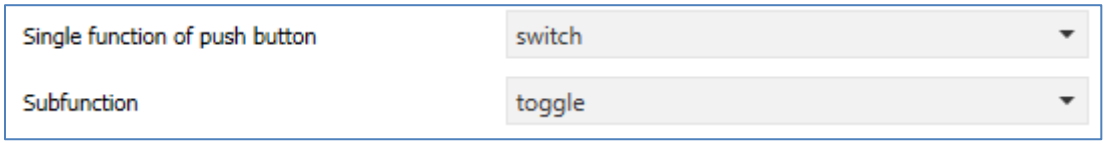

Figure 47: Settings: Single-button function „Switch“ - Toggle

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 – switch	1 Bit	Switch function of the button
101	Direct button 1 – Value for toggle	1 Bit	Status to refresh the display/symbol on the button; has to be connected to the status of the actuator to be switched so that the correct (inverted) value is always transmitted

Table 82: Communication objects: Single-button function „Switch“ – Toggle

Subfunction: Send status
☑ Single-button function

With the single button function "Switch" - Subfunction: Send status, fixed values for an activated key (rising edge) and a released key (falling edge) can be sent. With this function, scanning applications can be realized.
The following figure shows the available settings:

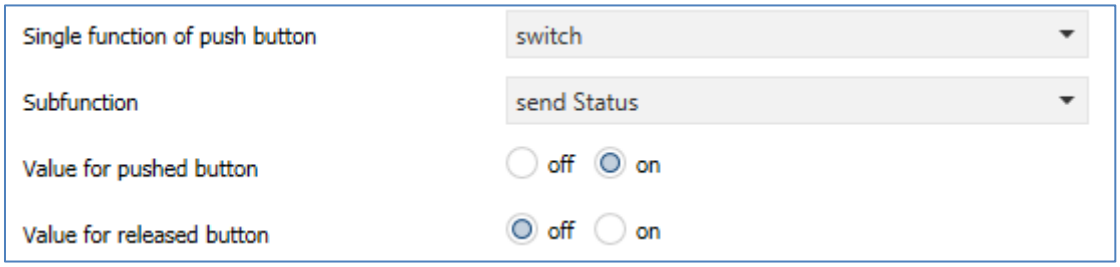

Figure 48: Settings: Single-button function „Switch“ - Send Status

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 – send status	1 Bit	Switch function of the button
103	Direct button 1 – State for display	1 Bit	State to refresh the display/symbol on the button; has to be connected to the state of the actuator to be switched

Table 83: Communication objects: Single-button function „Switch“ - Send Status

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Subfunction: Send status with off-delay
☑ Single-button function

With the single button function Switching - Sub-function: Send state with switch-off delay, the button sends the value On for pressing the button and the value Off for releasing the button. However, the value Off is transmitted delayed by the set time.
The following figure shows the available settings:

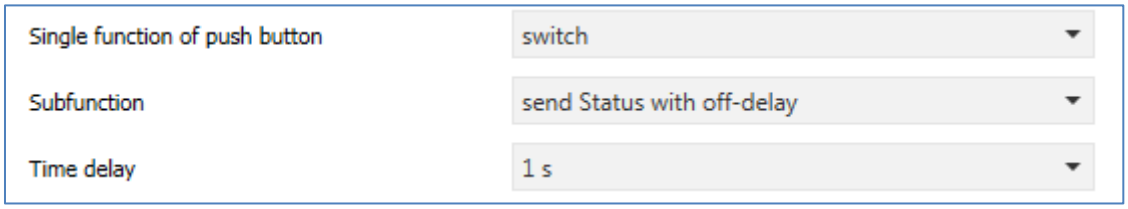

Figure 49: Settings: Single-button function „Switch“ -"send status with off-delay"

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 – send status	1 Bit	Switch function of the button
103	Direct button 1 – State for display	1 Bit	State to refresh the display/symbol on the button; has to be connected to the state of the actuator to be switched

Table 84: Communication objects - Single-button function „Switch“ -"send status with off-delay"

Presentation
☑ Single-button function
☑ Two-button function

The switching function can display the two possible states (on/off) by freely selectable symbols with a freely selectable color. Though the evaluated status is visualized:

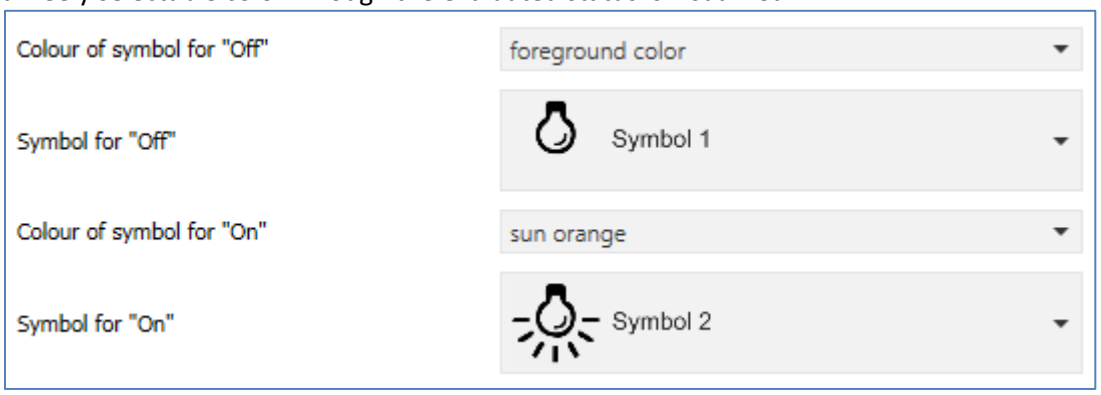

Figure 50: Presentation of switch-function on display

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4.9.2 Send values

Switching values/scenes (up to 4 values)
☑ Single-button function
☑ Two-button function

With the function “Send values – - Switching values/scenes (up to 4 values)” can be switched between up to 4 different values of one data point type.
The following figure shows the available settings:

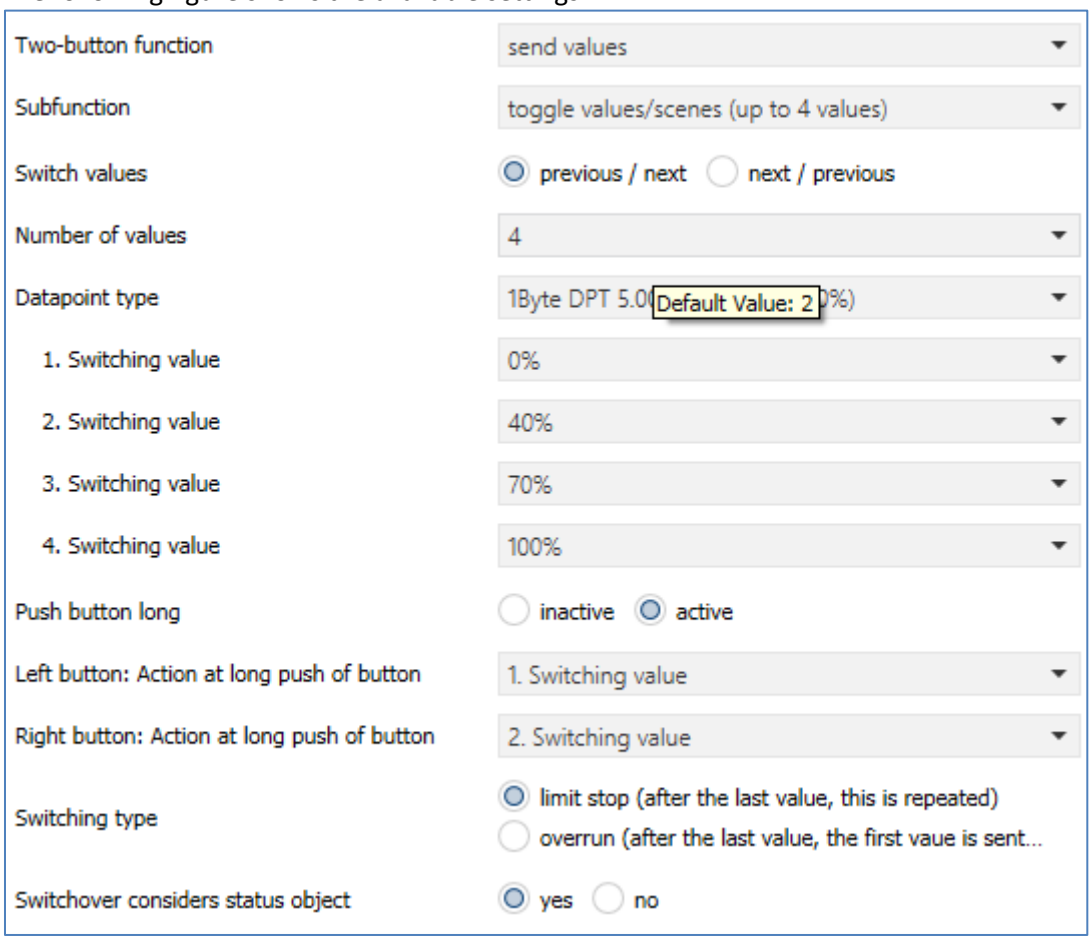

Figure 51: Settings: Send values - switching values/scenes (up to 4 values)

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The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Switch values	▪ **Previous/next** ▪ next/previous	**Only available with two-button function!** Setting to which direction is to be moved at pressing left/right buttons
Number of values	▪ **2** ▪ 3 ▪ 4	Setting between how many values to switch
Datapoint type	▪ DPT 2.001 Switch control ▪ **DPT 5.001 Percent** ▪ DPT 5.005 Decimal factor ▪ DPT 17.001 Scene number ▪ DPT 7.600 Colour temperature (Kelvin) ▪ DPT 9.001 Temperature ▪ DPT 9.004 Brightness ▪ DPT 232.600 RGB value	Sets the data point type to be sent
1st – 4th Switching value	any value according to the selected datapoint type	Sets the respective value for the switching value
Push button long	• **inactive** • active	Activation of a function with a long keystroke
Left / Right button: Action at long push of button	• **1st-4th Switching value** • 4th Switching value if previous was 1st value, otherwise 1st value • Send 0 • “Off” at second object • “On” at second object	**Only available with two-button function!** Setting the action with long keystroke
Action at long push of button	• **1st-4th Switching value** • 4th Switching value if previous was 1st value, otherwise 1st value • Send 0 • “Off” at second object • “On” at second object	**Only available with single-button function!** Setting the action with long keystroke
Switching type	• **Limit stop** • Overrun	**Only available with two-button function!** Setting what should happen when the last switching value is reached
Switchover considers status object	• Yes • **No**	Setting whether the changeover should send the next switching value according to the current status

Table 85: Settings „Send values“ - switching values/scenes (up to 4 values)

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Functional principle:
The function "switching values/scenes" can send up to 4 different values by shortly pressing a button. The values are then switched one after the other. Depending on the set parameters, for example, at a keystroke the second switching value is sent if the 1st switching value has been sent before or the third switching value will be sent if the second switching value has been sent befor…

Parameter "Push button long":
Additionally to a switch over at a short keystroke, a fixed value can be sent at a long keystroke.
For example, the 1st-4th switching value can be sent. Thus, the selected fixed switching value (independent of the last switching value) would always be sent with a long keystroke.
The setting "4th Switching value if previous was 1st value, otherwise 1st value " represents a toggle function, which switches back and forth between the 1st and 4th switching values. If the 1st switching value was sent last, the 4th changeover value is sent, for each other value the 1st switching value is sent.
The setting "send 0" causes sending the value 0 to the switch object.
The setting "On at second object" or "Off at second object" shows another communication object for the long keystroke. The fixed value On or Off is then sent to this object with the size 1 bit.

Parameter "Switching type":
Limit stop: When the switching type "limit stop" is activated, the 4th switching value is sent again after the 4th switching value has been sent.
Overrun: When the switching type "overrun" is activated, the 1st switching value is sent again after the 4th switching value.
For the single-button function, the parameter is set permantly to "overrun".

Parameter "Switchover considers status object":
If the **status value is not taken into account** during the changeover, the button memorizes the last sent value and sends the next or previous value on the next actuation without observing whether another value has been sent to the object in the meantime.
If the **status value is taken into account** during the changeover, the next keystroke will send the next higher or the next lower shift value - with respect to the last received status value. Example: the 2nd switching value is set to 40% and the 3rd switching value is set to 70%. Now, after a received status value of 50%, the value 70% is sent at next keystroke if the next switching value is to be sent and the value 40% if the previous switching value is to be sent.

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 Direct buttons 1/2 – switch control, percent value…		Sending the switching value; DPT depending on the parameter setting
101	Direct button 1 Direct buttons 1/2 – State switch control, state of percent value….		Receiving the status; DPT depending on the parameter setting
102	Direct button 1 long Direct buttons 1/2 long - switch	1 Bit	Switch function of long button/s

Table 86: Communication objects "send values" - switching values/scenes (up to 4 values)

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Shift value
☑ Two-button function

With the function "send values - shift values", values can be moved up or down within the set limits.

The following figure shows the available settings:

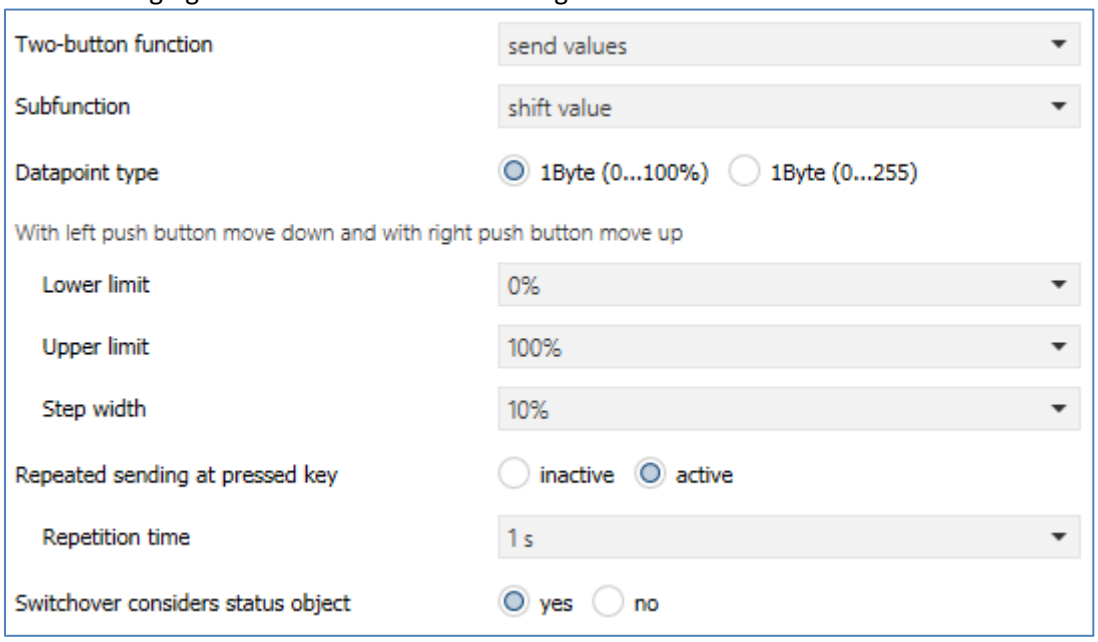

Figure 52: Settings "send values" - shift values

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Datapoint type	▪ **1 Byte (0...100%)** ▪ 1 Byte (0...255)	Sets the datapoint type for the value shift
Lower limit	0 - 100% / 0 - 255 **[0 / 0]**	Sets the lower limit value for the value shift
Upper limit	0 - 100% / 0 - 255 **[100% / 255]**	Sets the upper limit value for the value shift
Step width	0 - 100% / 0 - 255 **[10% / 10]**	Sets the step width between two sending commands
Repeated sending at pressed key	▪ **Inactive** ▪ active	Activation of the sending repetition while pressing the button
Repetition time	200 ms – 3 s **[1 s]**	Repetition time between two telegrams while pressing the button
Switching considers status object	• Yes • **No**	Setting whether the value should be moved according to the current status

Table 87: Settings "send values" - shift values

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Functional principle:
The function "shift value" moves the set datapoint type within the set limits. When the "Down" button is pressed, the set step width is subtracted from the last value and sent. When the "Up" button is pressed, the set step width is added to the last value and sent.

Lower/Upper limit:
Within these limits, the value is shifted. The function never falls below the lower limit value and does not exceed the upper limit value.

Step width:
The step width indicates the difference between two transmitted telegrams. Example: step witdth is set to 10%. If the value 10% was sent with the previous transmission, the value 20% is sent with the next "up" command..

Repeated sending at pressed key:
Repeated transmission while holding down the key allows the function to increase/decrease the value until the upper/lower limit is reached.

Switching considers status object:
If the status value is taken into account, the key function sends the next value depending on the last received status value. If a status value of 15% and a step size of 10% were selected, then the value of 25% would be sent with the next "up" command. If the status value is not taken into account, the push button memorizes the last value that was sent and sends the next value regardless of the status value.

Die nachfolgende Tabelle zeigt die verfügbaren Kommunikationsobjekte:

Number	Name	Length	Usage
100	Direct buttons 1/2 - percent value/decimal value…	1 Byte	Sending the switching value; DPT depending on the parameter setting
101	Direct buttons 1/2 – State for display	1 Byte	Receiving the status; DPT depending on the parameter setting

Table 88: Communitcation objects "send values" - Shift value

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Send value
☑ Single-button function

The function "Send values" - "send value" can send a fixed value according to the set datapoint type.
The following figure shows the available settings:

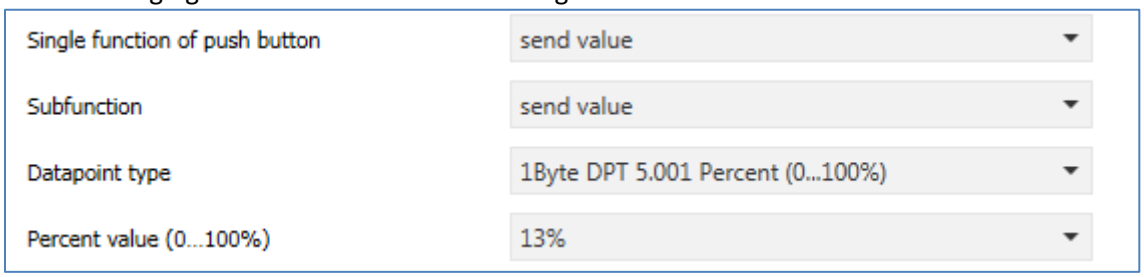

Figure 53: Settings "Send values" - Send value

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Datapoint type	▪ DPT 2.001 Switch control ▪ **DPT 5.001 Percent** ▪ DPT 5.005 Decimal factor ▪ DPT 17.001 Scene number ▪ DPT 7.600 Colour temperature (Kelvin) ▪ DPT 9.001 Temperature ▪ DPT 9.004 Brightness ▪ DPT 232.600 RGB value	Sets the data point type to be sent

Table 89: Settings "Send values" - Send value

The value to be sent can be set according to the datapoint type.
The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 – switch control, percent value…		Sending the switching value; DPT depending on the parameter setting
103	Direct button 1 – State for display		Receiving the status; DPT depending on the parameter setting

Table 90: Communication objects - "Send values" - Send value

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Send value after state
☑ Single-button function

The function "Send values - Send value after state" can send a fixed value according to the set datapoint type and when the key is released a fixed value according to the set datapoint type. The following figure shows the available settings:

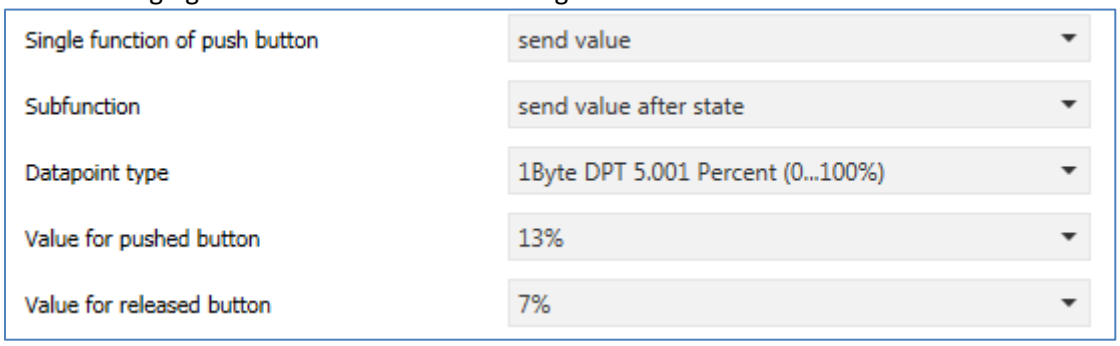

Figure 54: Settings "Send value" - "Send value after state"

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Datapoint type	▪ DPT 2.001 Switch control ▪ **DPT 5.001 Percent** ▪ DPT 5.005 Decimal factor ▪ DPT 17.001 Scene number ▪ DPT 7.600 Colour temperature (Kelvin) ▪ DPT 9.001 Temperature ▪ DPT 9.004 Brightness ▪ DPT 232.600 RGB value	Sets the data point type to be sent

Table 91: Settings "Send value" - "Send value after state"

The value to be sent can be set according to the set datapoint type for pressing and releasing the key. The following table shows the available communication objects:

Number	Name	Length	Usage
0	Direct button 1 – switch control, percent value…		Sending the switching value; DPT depending on the parameter setting
3	Direct button 1 – State for display		Receives the state; DPT dependent on parameter settings

Table 92: Communication objects "Send value" - "Send value after state"

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Presentation
☑ Single-button function
☑ Two-button function

The display of the function "Send values" depends on the selected data point type. Depending on the selected data point type, 1-4 different symbols and their color can be selected.
The following table provides an overview of the settings for the various data point types:

Datapoint type	Adjustable symbols	Comment
2 Bit Switch control, DPT 2.001	4 symbols can be set: 1 symbol for each possible state	
1 Byte Percent, DPT 5.001	3 symbols can be set for the ranges 0, 1-229 and 230-255. Therefore, the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Decimal fator, DPT 5.005	3 symbols can be set for the ranges 0%, 1% - 90% and >90%. Therefore the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Scene Number, DPT 17.001	1 fixed symbol can be set	
2 Byte Colour temperature, DPT 7.600	1 or 2 symbols can be set: 1 for each switching value	
2 Byte Temperature, DPT 9.001	1 fixed symbol can be set	Special presentation possible!
2 Byte Brightness, DPT 9.004	1 fixed symbol can be set	
3 Byte RGB value, DPT 232.600	1 fixed symbol can be set	

Table 93: Presentation - Send values

Special presentation:
For certain data point types, a special presentation (see table above) is possible. In this presentation, the status is shown on a larger scale on the display.
The following presentations are possible:

ETS-Text	Dynamic range **[Default value]**	Comment
Special display (DPT 5.001, DPT 5.005)	▪ value as text (0-100%) ▪ value as text (0-255) ▪ link symbol with switching value	With the settings "value as text" the text is displayed large on the display. **Link symbol with switching value only for 2-button function**
Special display (DPT 9.001)	▪ **value as symbol + "°C"** ▪ value as symbol without unit ▪ value as symbol + "K" ▪ link symbol with switching value	With the settings "value as symbol" the text is displayed large on the display. **Link symbol with switching value only for 2-button function**

Table 94: Presentation - Special symbols

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4.9.3 Switch/send value short/long (with 2 objects)

☑ Single-button function
☑ Two-button function

With the function "switch/send values short/long (with 2 objects)", 2 different values can be sent for the short and long key. The short and the long key have different objects, whereby it is also possible to send out different data point types.
The following figure shows the available settings (here for the two-button function):

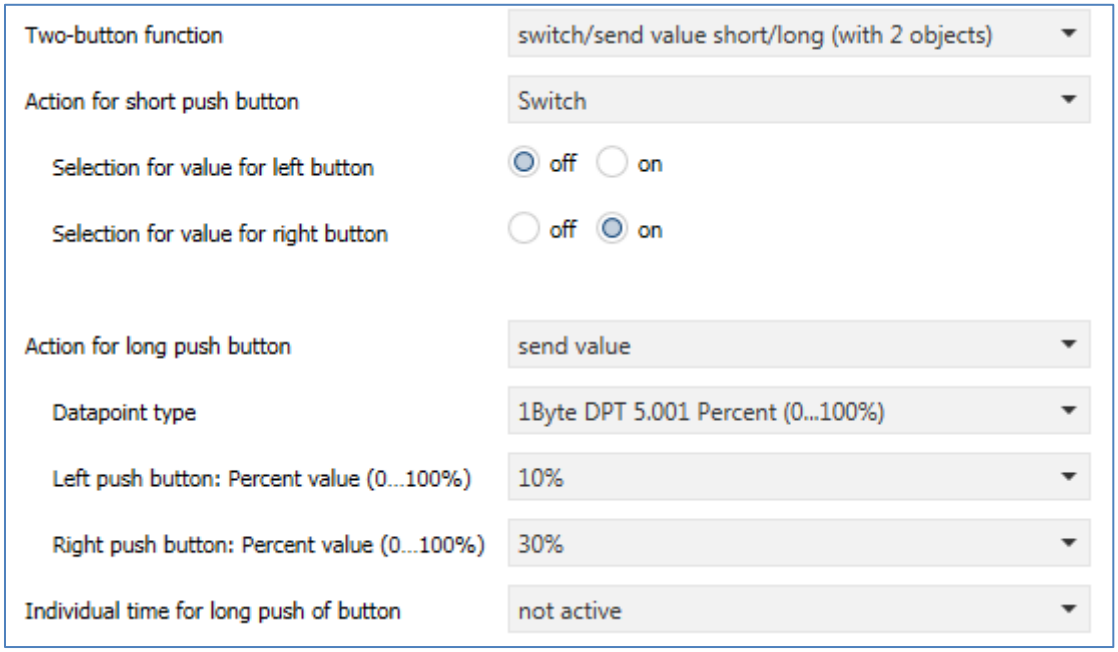

Figure 55: Settings - Switch/send values short/long (with 2 objects)

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Action for short/long push button	▪ **switch (two-button function)** ▪ **switch On (Single-button function**) ▪ Switch Off (Single-button function) ▪ toggle ▪ send value ▪ nothing	Setting the function for the short/long key
Datapoint type	▪ DPT 2.001 Switch control ▪ **DPT 5.001 Percent** ▪ DPT 5.005 Decimal factor ▪ DPT 17.001 Scene number ▪ DPT 7.600 Colour temperature (Kelvin) ▪ DPT 9.001 Temperature ▪ DPT 9.004 Brightness ▪ DPT 232.600 RGB value	**Setting only available when "Action for short/long push button" is set to "send values"** Sets the datapoint type for the value to be sent

Table 95: Settings - Switch/send values short/long (with 2 objects)

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In case of the two-button function, different values for the left and the right button can be sent (for the short as well as for the long button). With the single-button function only one value can be sent for the short as well as for the long button. The datapoint type can be set separately for the short and long button.

Presentation of the function:
Since different data point types can be set for the short and long button, either the function for the long button or the function for the short button can be displayed.

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Button 1 short – Switch control, Percent value…		Sending the value for the short button; DPT depending on the parameter setting
101	Button 1 short – State for display		Receiving the value for the short button; DPT depending on the parameter setting
102	Button 1 long – Switch control, Percent value …		Sending the value for the long button; DPT depending on the parameter setting
103	Button 1 long – State for display		Receiving the value for the long button; DPT depending on the parameter setting

Table 96: Communication objects - Switch/send value short/long (with 2 objects)

Presentation:
With the button function "switching short/long", the function of the short button or the function of the long button can be displayed. The displayed settings depend on whether the function to be displayed has been parameterized as "switch" (switch, switch on, switch off, toggle) or "send values". If the function has been parameterized as "**switch**", the following presentation settings are possible: The switching function can display the two possible states (on / off) by freely selectable symbols with a freely selectable color. The evaluated status is visualized:

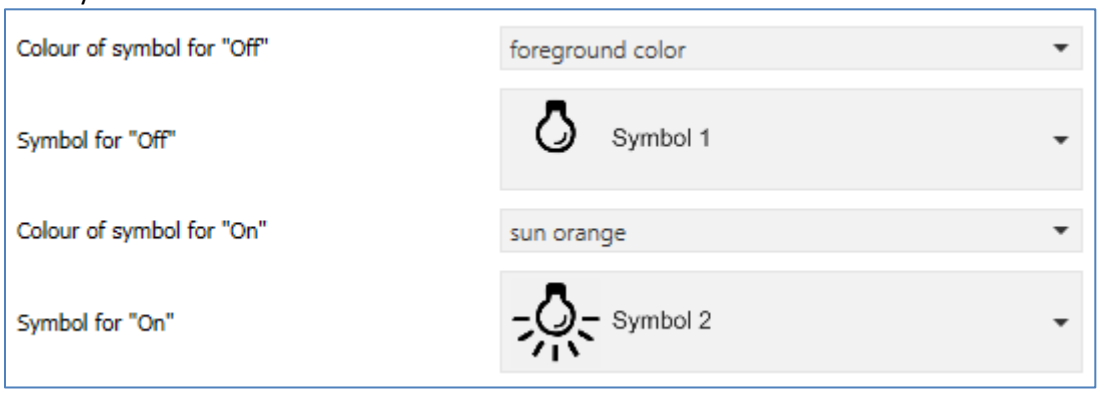

Figure 56: Presentation of the "switch" function

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If the function has been parameterized as "**Send values**", the following settings are possible.
The presentation of the function "send values" depends on the selected datapoint type. Depending on the selected datapoint type, 1-4 different symbols and their color can be selected.
The following table provides an overview of the settings for the various datapoint types:

Datapoint type	Adjustable symbols	Comment
2 Bit Switch control, DPT 2.001	4 symbols can be set: 1 symbol for each possible state	
1 Byte Percent, DPT 5.001	3 symbols can be set for the ranges 0, 1-229 and 230-255. Therefore, the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Decimal fator, DPT 5.005	3 symbols can be set for the ranges 0%, 1% - 90% and >90%. Therefore the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Scene Number, DPT 17.001	1 fixed symbol can be set	
2 Byte Colour temperature, DPT 7.600	1 or 2 symbols can be set: 1 for each switching value	
2 Byte Temperature, DPT 9.001	1 fixed symbol can be set	Special presentation possible!
2 Byte Brightness, DPT 9.004	1 fixed symbol can be set	
3 Byte RGB value, DPT 232.600	1 fixed symbol can be set	

Table 97: Presentation - send values

Special presentation:
For certain data point types, a special presentation (see table above) is possible. In this presentation, the status is shown on a larger scale on the display.
The following presentations are possible:

ETS-Text	Dynamic range **[Default value]**	Comment
Special display (DPT 5.001, DPT 5.005)	▪ value as text (0-100%) ▪ value as text (0-255)	With this settings the text is displayed large on the display.
Special display (DPT 9.001)	▪ **value as symbol + "°C"** ▪ value as symbol without unit ▪ value as symbol + "K"	With the settings "value as symbol" the text is displayed large on the display.

Table 98: Presentation - Special symbols (Switch/send value short/long (with 2 objects)

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4.9.4 Scene

☑ Single-button function

The scene function makes it possible to call up and store scenes. If the memory function is activated, this can be activated by a long key stroke.
The following figure shows the available settings:

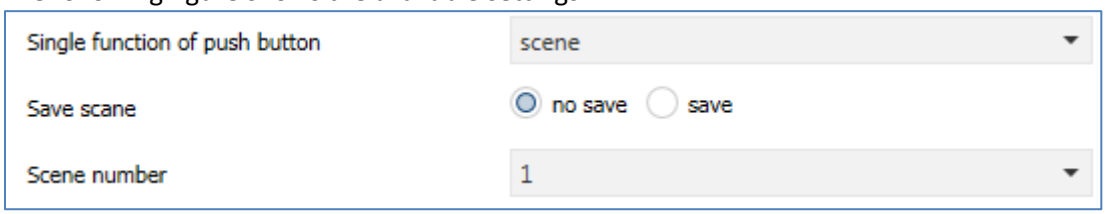

Figure 57: Settings - Scene

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Save scene	▪ **no save** ▪ save	Release of saving the scenes; the saving is carried out by a long keystroke
Scene number	1 - 64 **[1]**	Setting the respective scene number

Table 99: Settings - Scene

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To call a scene or store a new value for the scene, the corresponding code is sent to the corresponding communication object for the scene:

Scene	Call		Save	
	Hex.	Dec.		Hex.
1	0x00	0	0x80	128
2	0x01	1	0x81	129
3	0x02	2	0x82	130
4	0x03	3	0x83	131
5	0x04	4	0x84	132
6	0x05	5	0x85	133
7	0x06	6	0x86	134
8	0x07	7	0x87	135
9	0x08	8	0x88	136
10	0x09	9	0x89	137
11	0x0A	10	0x8A	138
12	0x0B	11	0x8B	139
13	0x0C	12	0x8C	140
14	0x0D	13	0x8D	141
15	0x0E	14	0x8E	142
16	0x0F	15	0x8F	143
17	0x10	16	0x90	144
18	0x11	17	0x91	145
19	0x12	18	0x92	146
20	0x13	19	0x93	147
21	0x14	20	0x94	148
22	0x15	21	0x95	149
23	0x16	22	0x96	150
24	0x17	23	0x97	151
25	0x18	24	0x98	152
26	0x19	25	0x99	153
27	0x1A	26	0x9A	154
28	0x1B	27	0x9B	155
29	0x1C	28	0x9C	156
30	0x1D	29	0x9D	157
31	0x1E	30	0x9E	158
32	0x1F	31	0x9F	159
….	….	….	….	….
64	0x3f	63	0xBF	191

Table 100: Scene call and save

The following table shows the available communication objects:

Number	Name	Length	Usage
102	Direct button 1 – Scene	1 Byte	Call/Save of a scene

Table 101: Communication object - Scene

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Presentation:
☑ Single-button function

The scene function is represented by a fixed symbol. Since the scene function does not get a status, the function is represented by a fixed symbol:

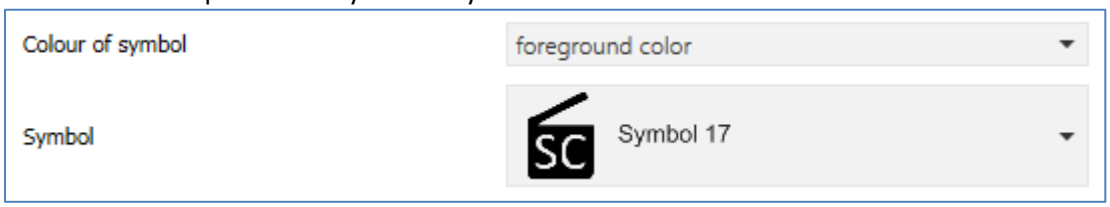

Figure 58: Presentation - Scene

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4.9.5 Blind

☑ Single-button function
☑ Two-button function

The blind function is used to control shutter actuators, which can be used for the adjustment and control of blinds/shutters.
The following picture shows the available settings (here two-button function):

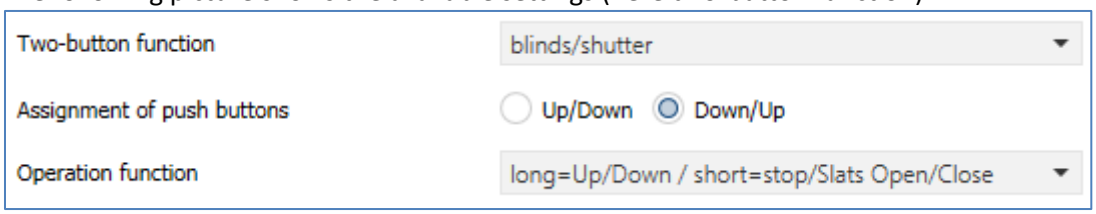

Figure 59: Settings - Blind/Shutter

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of push buttons	▪ Up/Down ▪ **Down/Up**	**Only available for Two-button function!** Setting the key assignment (left/right button) for the up/down function
Operation function	▪ **Long=move / Short=Stop/Slats Up/Down** ▪ Short=move / Long=Stop/Slats Up/Down ▪ Short=Up/Down/Stop (MDT Single Object Control) ▪ Short=Up/Down/Stop / Long = central object (MDT Single Object Control)	Setting whether to move with a long key or with a short key; **MDT Single Object Control is only available for the two-button function**

Table 102: Settings - Blind/Shutter

Two communication objects are displayed for the "blind" function: the object "Stop/slat open/close" and the object "blinds up/down “.
The moving object is used to move the blinds/shutters up and down. The stop/step object is used to adjust the slats. In addition, this function stops the up/down movement as far as the end position has not yet been reached.
In the case of the two-button function, the key assignment can be set; the table below shows the relationships:

	Function Up/Down			**Function Down/Up**	
Input	Push button left	Push button right		Push button left	Push button right
Moving object	Up	Down		Down	Up
Stop/Step object	Stop/slats open	Stop/slats close		Stop/slats close	Stop/slats open

Table 103: Two-button function - Blind function

The one-button function is used to toggle between the up and down movement after each keystroke.

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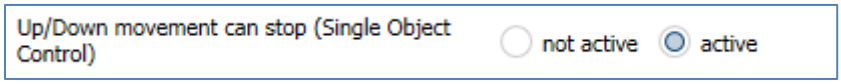
Since shutter actuators always use a 1 signal for the down movement and a 0 signal for the up movement, the button also emits this. It is also possible to change the action for long and short keystrokes. It is thus possible to select whether to move via a long or a short keystroke. The stop/step object then adopts the other operating concept.
The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 Direct buttons 1/2 – Blind Up/Down	1 Bit	Up/Down command for the shutter actuator
100	Direct buttons 1/2 short – Shutter Up/Down/Stop	1 Bit	Up/down/stop command for roller shutter in "Single Object Control" mode
101	Direct button 1 – Slats/Stop	1 Bit	Slats open/close; Stop-command
101	Direct buttons 1/2 – Stop/Slats Open/Close	1 Bit	Slats open/close; Stop-command
101	Direct buttons 1/2 long – Central shutter Up/Down/Stop	1 Bit	**only for two-button function** Additional movement object in "Single Object Control Mode"
102	Direct button 1 – value for change of direction	1 Bit	**only for single-button function** Receiving the status with current information about the direction of the shutter actuator
102	Direct buttons 1/2 – State of slat for display	1 Byte	**only for two-button function** Receiving the status of the current slat position
103	Direct button 1 – State of shutter for display	1 Byte	Receive the status of the current blind position
103	Direct buttons 1/2 – State of shutter for display	1 Byte	Receiving the status of the current shutter position . Additional object in "Single Object Control" mode

Table 104: Communication objects - Blind / Shutter

MDT Single Object Control:
☑ Two-button function

MDT Single Object Control enables a new operating concept for controlling roller shutters. For use, the following parameter has to be set to active in the MDT shutter actuator to be controlled:



Now it is possible to start the up/down movement with a short keystroke and also to stop an active up/down movement with a short keystroke.
Using the setting "Short = Up/Down/Stop / Long = Central object", an additional object is displayed which can start the up/down movement with a long push-button action and can also stop an active up/down movement with a long push-button action. This function can be used, for example, to move an individual shutter in a room with a short push-button action and to move the entire room with a long push-button action

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Presentation:
☑ Single-button function
☑ Two-button function

The blind function can be displayed with 3 freely selectable symbols and freely selectable color. The button evaluates the information of the "Object 3 - State of blind for display". In addition, the current status can be displayed as text under the symbol:

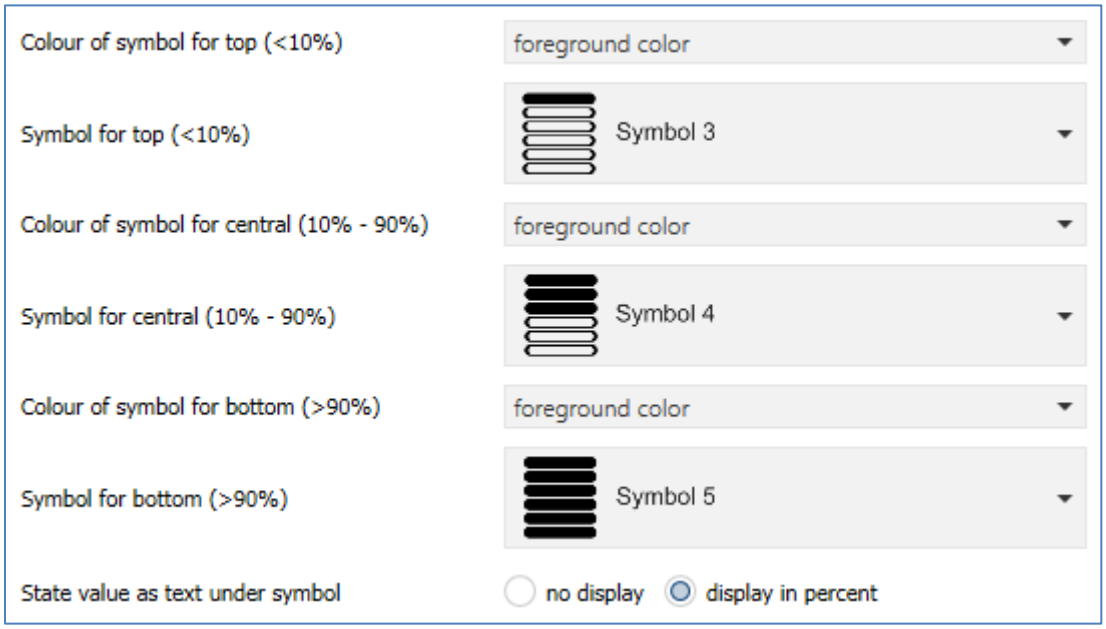

Figure 60: Presentation - Blind/Shutter

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4.9.6 Dimming

☑ Single-button function
☑ Two-button function

The dimming function can be used to control dimming actuators.
The following figure shows the available settings (here for two-button function):

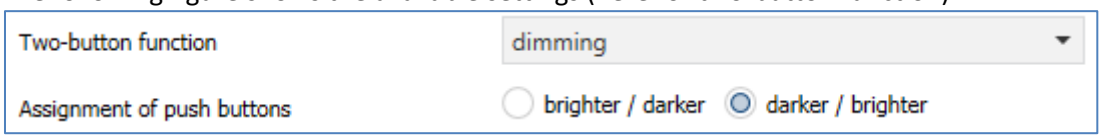

Figure 61: Settings - Dimming

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of push buttons	▪ brighter/darker ▪ **darker/brighter**	**only for two-button function!** Setting the key assignment (left/right key) for the direction (brighter/darker)

Table 105: Settings - Dimming

If the "Dimming" function is parameterised, two communication objects appear, firstly the function for a short push-button action, the "Dimming On/Off" switch object, and secondly the function for a long push-button action, the "Dimming relative" object.
The two-button function dimming can be parameterised either as brighter/darker or as darker/brighter, the relationships are shown in the following table:

	Function brighter/darker			**Function darker/brighter**	
Input	Push button left	Push button right		Push button right	Push button left
Dimming function	brighter	darker		darker	brighter
Switch function	ON	OFF		OFF	ON

Table 106: Two-button function - Dimming

With the one-button function "dimming", the direction (brighter/darker) is reversed as a function of the communication object "value for toggle". The dimming function is a start-stop dimming, that means as soon as the dimming function becomes active, a light or dark command is assigned to the input until it is released. After releasing, a stop telegram is sent which stops the dimming process.
The following table shows the available communication objects:

Number	**Name**	**Length**	**Usage**
100	Direct button 1 Direct buttons 1/2 – Dimming On/Off	1 Bit	Switch command for the dimming function
101	Direct button 1 Direct buttons 1/2 – Dimming relative	4 Bit	Command for relative dimming
102	Direct button 1 – Value for toggle	1 Bit	**only for single-button operation.** Feedback signal about the current state of the actuator to be switched
103	Direct button 1 Direct buttons 1/2 – State dimming value for display	1 Byte	Receive of the status of the current absolute brightness value

Table 107: Communication objects - Dimming

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Presentation:
☑ Single-button function
☑ Two-button function

The parameter "display type" defines whether the dimming function should be displayed in the normal presentation with 3 symbols or by a special symbol representing the status in percent.

Normal view:
The dimming function can be displayed with 3 freely selectable symbols and freely selectable colors. The button evaluates the information of object 3 "State for display". In addition, the current status can be displayed as text under the symbol:

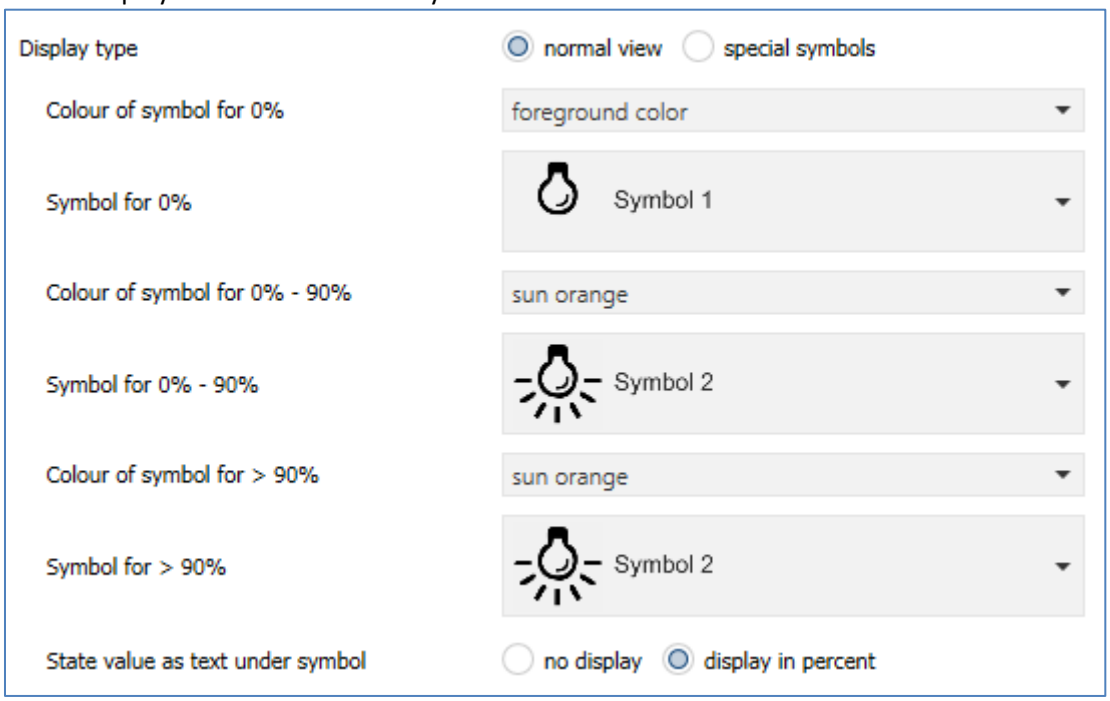

Figure 62: Presentation: Normal view - Dimming Function

Special presentation:
In the special presentation, the status (in percent) is shown on a larger scale on the display. The following illustrations are possible:

ETS-Text	Dynamic range **[Default value]**	Comment
Special symbols	▪ value as text (0-100%) ▪ value as text (0-255)	With the settings "value as text" the text is displayed large on the display.

Table 108: Presentation - Special symbols Dimming Function

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4.9.7 Mode selection

☑ Single-button function
☑ Two-button function

With the function "Mode selection" the HVAC mode can be toggled in heating actuators or temperature controllers.
The following figure shows the available settings (here for Two-button function):

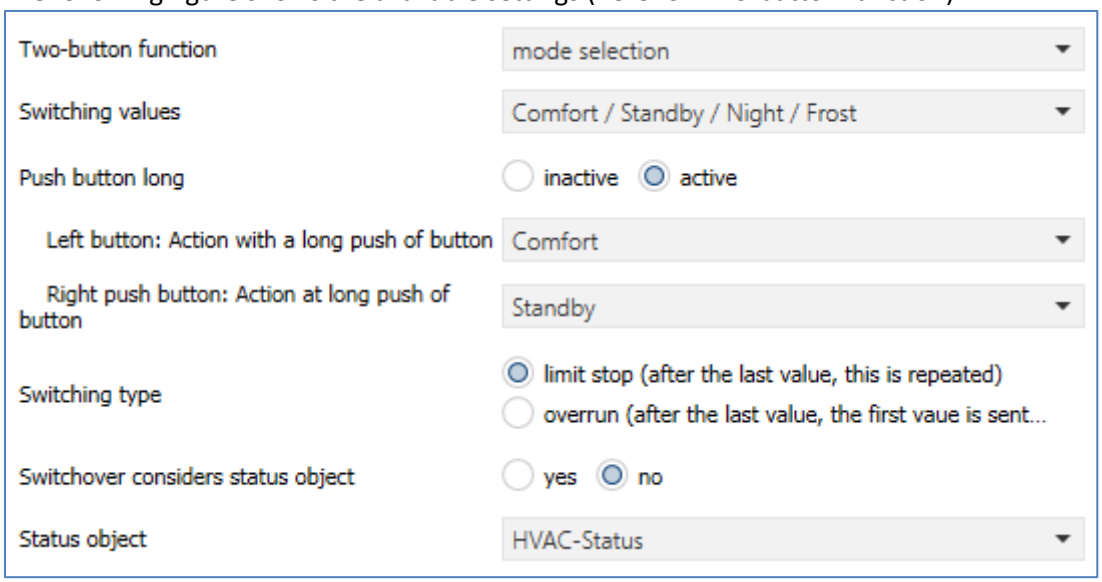

Figure 63: Settings - Mode selection

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Switching values	▪ **Comfort /Standby** ▪ Comfort/Night ▪ Comfort/Standby/ Night ▪ Comfort/Standby/ Night/Frost	Setting between which operating modes can be toggled.
Push Button long	▪ **not active** ▪ active	Activates an action for the long keystroke
Left button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the left button **Only for two-button function!**
Right button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the right button **Only for two-button function!**
Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke **Only for single-button function!**

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Switching type	▪ **Limit stop** ▪ Overrun	**Only for two-button function!** Setting what should happen when the last switching value is reached
Switchover considers status object	▪ **Yes** ▪ No	Setting whether the changeover should send the next switching value according to the current status
Status object	▪ **No Status** ▪ HVAC-Mode ▪ HVAC-Status	Defining whether and how the status is displayed

Table 109: Settings - Mode selection

Function principle:
The function "mode selection" can send up to 4 different operating modes by shortly pressing a button. The operating modes are switched one after the other. Depending on the set parameters, for example, at a keystroke the second operating mode is sent if the 1st operating mode has been sent before or the third operating mode will be sent if the second operating mode has been sent before…

Parameter “Long push button”:
In addition to switchover by a short keystroke, a fixed operating mode can be sent at a long keystroke.
Here one of the 4 operating modes can be sent. This means that a fixed operating mode (independent of the last switching value) would always be sent with a long keystroke.

Parameter “Switching type”:
Limit stop: With the switching type "Limit stop" the 4th operating mode is sent again after sending the 4th operating mode.
Overrun: In the switching type "Overrun", the 1st operating mode is sent again after the 4th operating mode.
For the single-button function, this parameter is set permanently to "Overrun".

Parameter “Switchover considers status object”:
If the **status value is not taken into account** during the changeover, the button memorizes the last sent value and sends the next or previous value on the next actuation without observing whether another value has been sent to the object in the meantime.
If the **status value is taken into account** during the changeover, the next keystroke will send the next higher or the next lower shift value - with respect to the last received status value.

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The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct button 1 Direct buttons 1/2 – Mode selection (HVAC Mode)	1 Byte	Switchover of operating mode
101	Direct button 1 Direct buttons 1/2 – Status HVAC Mode	1 Byte	Receives the status of the heating actuator / temperature controller
101	Direct button 1 Direct buttons 1/2 – HVAC Status	1 Byte	Receives the status of the heating actuator / temperature controller

Table 110: Communication objects - Mode selection

Presentation:
☑ Single-button function
☑ Two-button function

To each operating mode, a fixed symbol is assigned. The color of the symbol can be adjusted for any operating mode:

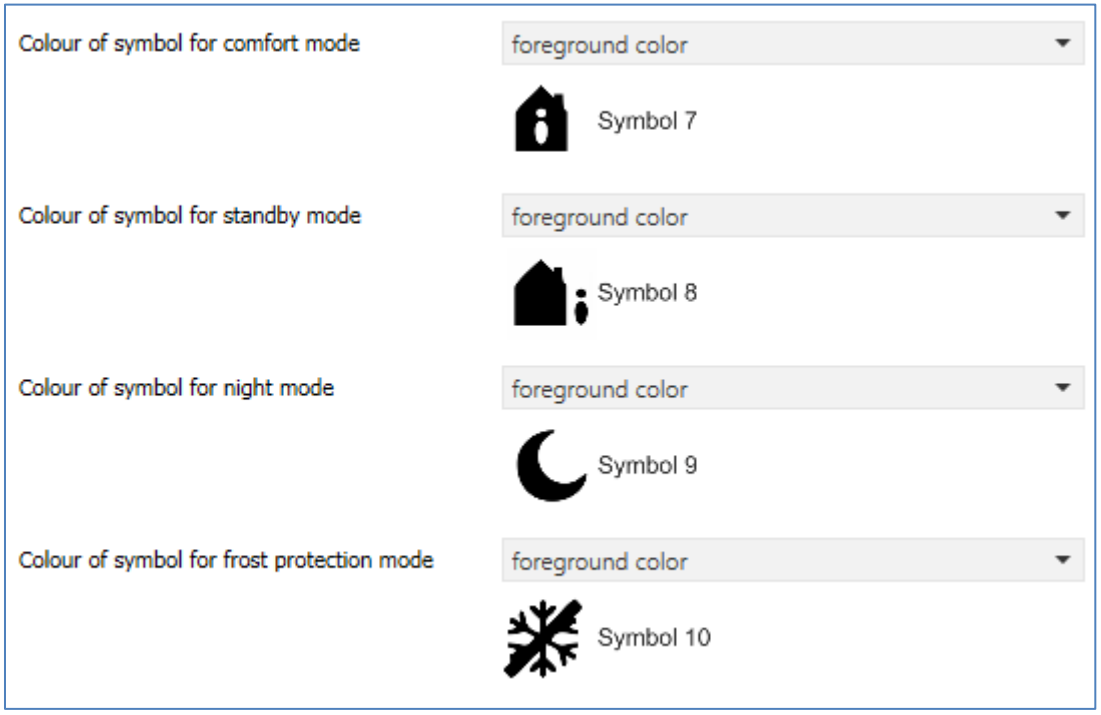

Figure 64: Presentation - Mode selection

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4.9.8 Temperature shift

☑ Two-button function

The temperature shift can be used to move the setpoint of the heating control.
The following figure shows the available settings:

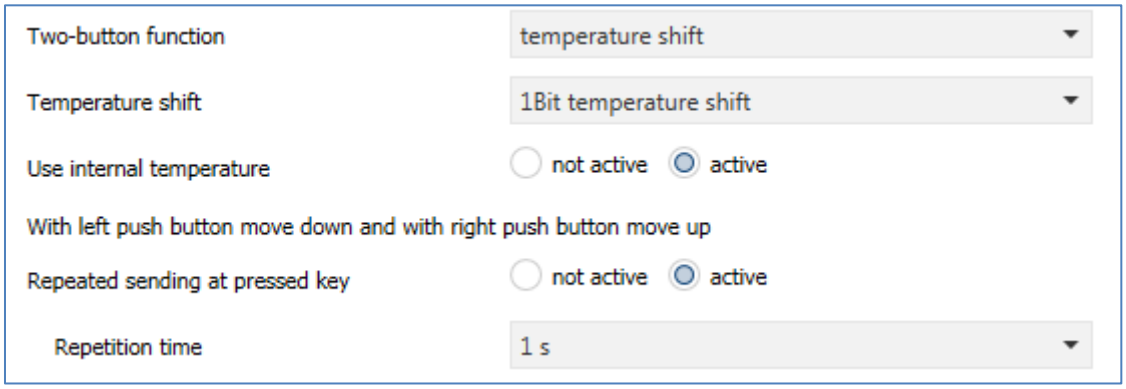

Figure 65: Settings - Temperature shift

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Temperature shift	▪ **1 Bit temperature shift** ▪ 1 Byte temperature shift ▪ 2 Byte temperature shift ▪ 2 Byte shift of basis comfort setpoint value	Setting how the temperature is to be shifted
Use internal temperature	▪ inactive ▪ **active**	Setting whether the internal temperature measurement value is to be used to display the actual value
Repeated sending at pressed key	▪ **inactive** ▪ active	Setting whether the shift should be repeated at fixed intervals while the key is held
Repetition time	200 ms – 3 s **[1 s]**	Sets the time between two telegrams of the temperature shift when repetition is activated

Table 111: Settings - Temperature shift

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The temperature can be shifted in 4 different ways:

1 Bit temperature shift

With the 1-bit temperature shift the central operating unit merely transmits the command 1 for a shift of the setpoint upwards and a 0 for a shift of the setpoint downwards.

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct buttons 1/2 – Setpoint shift	1 Bit	Sends the Setpoint shift
101	Direct buttons 1/2 – State actual temperature	2 Byte	Receiving an external temperature for the display of the current temperature - is only displayed if the parameter "Use internal temperature value" is set to "not active"
102	Direct buttons 1/2 – State current setpoint temperature	2 Byte	Receiving the current setpoint temperature of the temperature controller; to display the status

Table 112: Communication objects - Temperature shift via 1 bit

1 Byte temperature shift

With the 1-byte temperature shifting, the central operating unit sends a 1-byte value which is multiplied by the step width set in the controller. In order for the display and the current setpoint value to be synchronous, the step width and the limits of the setpoint shift have to be specified in the central operating unit.

The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct buttons 1/2 – Setpoint shift	1 Bit	Sends the Setpoint shift
101	Direct buttons 1/2 – State actual temperature	2 Byte	Receiving an external temperature for the display of the current temperature - is only displayed if the parameter "Use internal temperature value" is set to "not active"
102	Direct buttons 1/2 – State current setpoint temperature	2 Byte	Receiving the current setpoint temperature of the temperature controller; to display the status
103	Direct buttons 1/2 – State setpoint shift	1 Byte	Receives the current setpoint shift; has to be connected to all 1 byte objects which send the setpoint shift to the controller in order to correctly evaluate the current status of the setpoint shift

Table 113: Communication objects - Temperature shift via 1 byte

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2 Byte temperature shift

With the 2-byte temperature shift, the central operating unit sends a 2-byte temperature value which is added or subtracted from the set basic comfort value.
The central operating unit sends the shift by the set step width at each keystroke.
In order for the display and the current reference value to be synchronous, the limits of the setpoint shift must be specified in the central operating unit and have to be set to the same values as in the controller.
The following table shows the available communication objects:

Number	Name	Length	Usage
100	Direct buttons 1/2 – Setpoint shift	1 Bit	Sends the Setpoint shift
101	Direct buttons 1/2 – State actual temperature	2 Byte	Receiving an external temperature for the display of the current temperature - is only displayed if the parameter "Use internal temperature value" is set to "not active"
102	Direct buttons 1/2 – State current setpoint temperature	2 Byte	Receiving the current setpoint temperature of the temperature controller; to display the status
103	Direct buttons 1/2 – State setpoint shift	1 Byte	Receives the current setpoint shift; has to be connected to all 1 byte objects which send the setpoint shift to the controller in order to correctly evaluate the current status of the setpoint shift

Table 114: Communication objects - Temperature shift via 2 byte

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2 Byte shift of basis comfort setpoint

In the case of the 2-byte shift of basic comfort setpoint, the central operating unit sends a new basic comfort setpoint to the controller. It evaluates the object "state basis comfort setpoint" and sends the new setpoint +/- the set step width to the controller.
The range of the setpoint shift can be adjusted via the upper and lower limits.
The following table shows the available communication objects:

Number	Name	Length	Usage
100	Push buttons 1/2 – basis comfort setpoint	2 Byte	Sends the new Basis Comfort Setpoint
101	Push buttons 1/2 – State actual temperature	2 Byte	Receiving an external temperature for the display of the current temperature - is only displayed if the parameter "Use internal temperature value" is set to "not active"
102	Push buttons 1/2 – State current setpoint temperature	2 Byte	Receiving the current setpoint temperature of the temperature controller; to display the status
103	Push buttons 1/2 – State basis comfort setpoint	2 Byte	Receives the current setpoint shift; has to be connected to the basic comfort setpoint value of the controller so that the basic comfort setpoint can be correctly displaced even when changing to a different operating mode

Table 115: Communication objects - 2 Byte shift of comfort setpoint value

Presentation:

☑ Two-button function

The temperature shift is represented by the temperature symbol. The display is fixed to the symbol 9.
In addition, the actual value and the desired value can be labeled as desired:

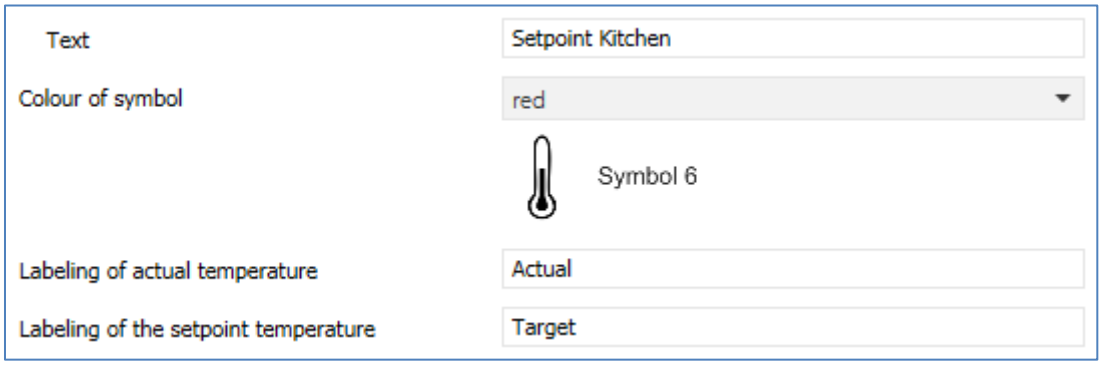

Figure 66: Presentation - Temperature shift

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4.10 Menu and time switch functions

4.10.1 General Settings

The following figure shows the menu "Basic settings" of the menu and time switch functions:

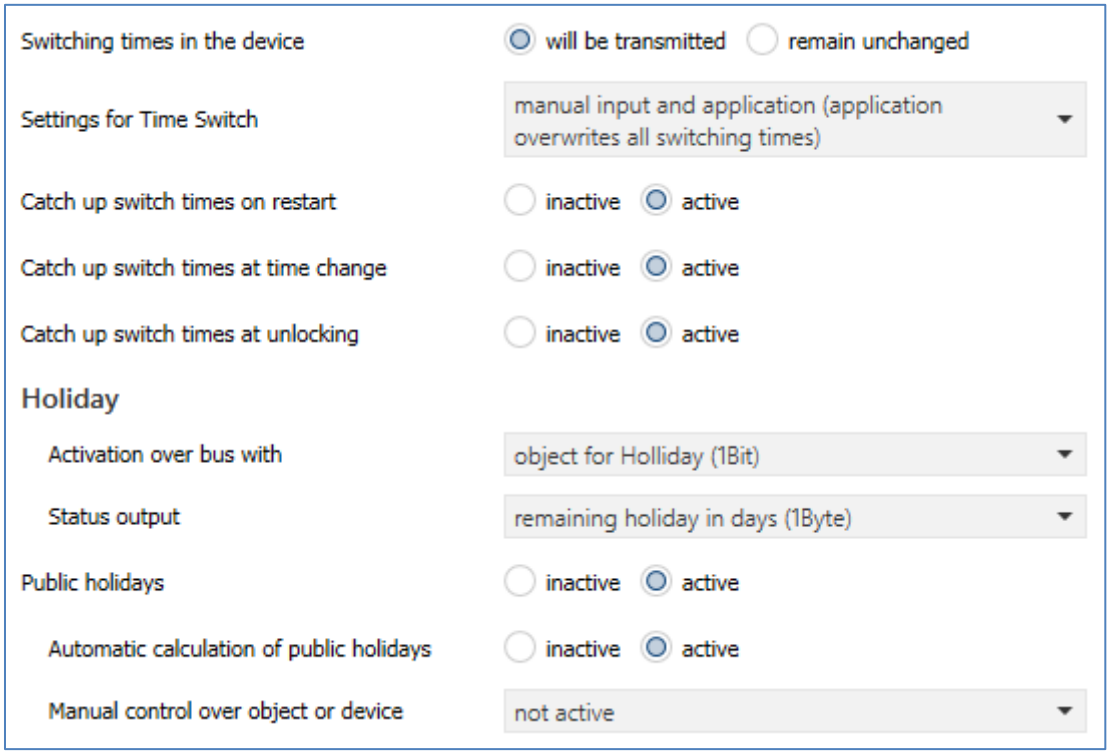

Figure 67: General settings - Menu and time switch functions

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The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Switching times in the device	▪ **will be transmitted** ▪ remain unchanged	Setting whether the parameter block for the switching times is transmitted: **will be transmitted**: The parameter block will be transmitted depending on the parameter "Setting for time switch". **remain unchanged**: The memory block for the switching times is not written by the ETS and the parameter "Settings for time switch" is hidden
Settings for time switch	▪ fix over application (cannot be changed on the device) ▪ **manual input and application (application overwrites all switching times)** ▪ manual input and database (Transmission aborted if switching times are changed on the device)	**fix over application**: The switching times can only be set in the database and cannot be changed in the device. **manual input and application (application overwrites all switching times):** The switching times can be set in database and device. With each transmission, the complete values are written from the database to the device. **manual input and database (Transmission aborted if switching times are changed on the device)**: Before transmission, the ETS makes a comparison between the switching times set in the database and those in the device. If these are not equal, the download is aborted..

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Catch up switching times at restart	▪ **inactive** ▪ active	Determines whether the central operating unit transmits all currently valid switching states after a restart
Catch up switching times at time change	▪ **inactive** ▪ active	Determines whether the central operating unit makes up for the skipped switching states after a clock adjustment to "forward".
Catch up switching times at unlocking	▪ **inactive** ▪ active	Determines whether the central operating unit transmits all omitted switching states after an unlocking procedure
Holiday		
Activation over bus with	▪ **not active** ▪ object for holiday (1 Bit) ▪ number of days (1 Byte)	Setting whether the holiday function can be activated via the bus.
Status output	▪ **not active** ▪ holiday active/not active ▪ remaining holiday in days (1 Byte)	Setting the status output of the holiday on the bus
Public holidays	▪ **inactive** ▪ active	Activating the public holiday function
Automatic calculation of public holidays	▪ **inactive** ▪ active	Activation of the automatic calculation of public holidays
Manual control over object or device	▪ **not active** ▪ active, reset after the 1st change of day ▪ active, reset after the 2nd change of day ▪ active	Activating the holiday function on the device

Table 116: General Settings - Menu and time switch functions

Function: Catch up switching times:
Catching up the switching times makes it possible to set whether switching states that were omitted due to unscheduled events are to be catched up.

- **Catch up switching times at restart**
  After a restart, the last switching states are made up for, i.e. the time switch restores the state which was valid at that time.
- **Catch up switching times at time change**
  If there is a time jump forward, i.e. a time adjustment +..min/h, the switching operations that were omitted due to the time jump are made up for. With a time jump up to +90min, all switching events are made up for. From a time jump of 90min only the last one per function.
- **Catch up switching times at unlocking**
  After unlocking, the switching states that were omitted during unlocking are made up for. This ensures that all the trades are in the "correct" state after unlocking.

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Public holiday function

The device has a comprehensive logic integrated to calculate public holidays. This public holiday calculation can be activated via the parameter "automatic public holiday calculation".
In addition, public holidays can be manually activated on the device if the parameter "Manual control via object/on the device" is set to active. There is also an automatic reset function for this parameter. If, for example, the public holiday is deleted on the 1st day change, the function can be used for the current day, as the public holiday then ends at 00:00 hours for the device.
If, for example, you want to prevent the roller shutters from opening in the morning on the next day, the reset may only be performed on the 2nd change of day, since in this case the "public holiday" key is pressed the evening before. In this case, the automatic reset takes place on the following day at 00:00 hrs.
The key for public holiday activation is located in the level Timer -> Setup.
The interaction between automatic holiday calculation and manual activation via the bus (via object) is described in the following table:

Public holiday calculated?	Value from object 132	Action on object 132	Result: Public holiday active/not active?
No	value 0	Sending a 0	No action
No	value 0	Sending a 1	Public holiday active until set return, automatic mode will be active again from next day
No	value 1	Sending a 0	Manual deactivation, automatic mode becomes active again from the next day
No	value 1	Sending a 1	Public holiday active until set return, automatic mode will be active again from next day
Yes	value 0	Sending a 0	Manual deactivation, automatic mode becomes active again from the next day
Yes	value 0	Sending a 1	Public holiday active until set return, automatic mode will be active again from next day
Yes	value 1	Sending a 0	Manual deactivation, automatic mode becomes active again from the next day
Yes	value 1	Sending a 1	Public holiday active until set return, automatic mode will be active again from next day

Table 117: Calculation of public holidays and manual activation

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The following table shows the available communications objects:

Number	Name	Length	Usage
130	Holiday – Activation	1 Bit	Activation of the holiday function via 1 bit (active/not active)
130	Holiday – Number of days	1 Byte	Activation of the holiday function by sending the number of days how long the time switch should be in holiday mode
131	Holiday – State	1 Bit	Status display whether holiday function is active or not
131	Holiday – State (Duration in days)	1 Byte	Display of the remaining days, how long the holiday function is still active
132	Public holiday – Activation	1 Bit	Activation of the public holiday function via bus, e.g. via visu/button
133	Public holiday – State	1 Bit	Displays whether the device is in public holiday mode; Transmits its status on change and (**from R1.1**) always at 00:00 h
134	Switching times internal	14 Byte	Interface to VisuControl Easy (in preparation, not yet implemented in VisuControlEasy, prepared for future versions)

Table 118: Communication objects - time switch: Holiday/Public holiday

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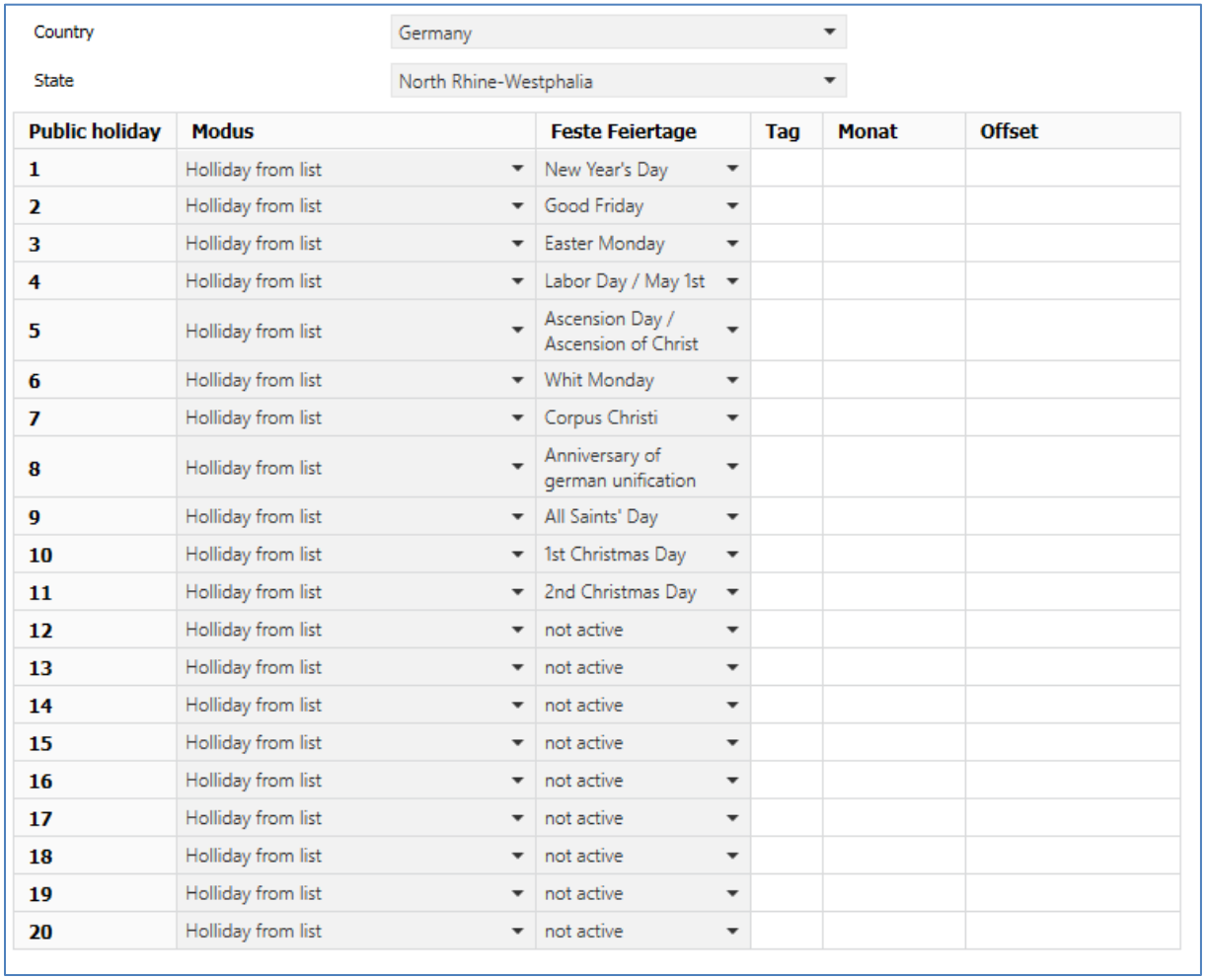
4.10.2 Automatic calculation of public holidays

The following picture shows the menu for the automatic public holiday calculation:



Country: Germany

State: North Rhine-Westphalia

Public holiday	Modus	Feste Feiertage	Tag	Monat	Offset
1	Holliday from list	New Year's Day			
2	Holliday from list	Good Friday			
3	Holliday from list	Easter Monday			
4	Holliday from list	Labor Day / May 1st			
5	Holliday from list	Ascension Day / Ascension of Christ			
6	Holliday from list	Whit Monday			
7	Holliday from list	Corpus Christi			
8	Holliday from list	Anniversary of german unification			
9	Holliday from list	All Saints' Day			
10	Holliday from list	1st Christmas Day			
11	Holliday from list	2nd Christmas Day			
12	Holliday from list	not active			
13	Holliday from list	not active			
14	Holliday from list	not active			
15	Holliday from list	not active			
16	Holliday from list	not active			
17	Holliday from list	not active			
18	Holliday from list	not active			
19	Holliday from list	not active			
20	Holliday from list	not active			

Figure 68: Automatic public holiday calculation

For all federal states in Germany as well as in Austria the public holidays are already predefined and are calculated every year using an integrated logic. Numerous public holidays are also predefined for other EU countries.
In addition, further public holidays can be included using the following rules:
Fixed date:
The "fixed date" rule defines holidays which take place on the same day year after year. Common examples are New Year's Day on January 1 or Labor Day on May 1.
Relative to Easter Sunday:
Since many holidays in Christian areas are based on Easter, holidays can be defined relative to Easter Sunday. Then an offset of -100 to +100 days to Easter Sunday has to be defined. The simplest example is Easter Monday, which is always exactly one day after Easter Sunday
Individual:
Furthermore, individual rules can be created to calculate "own holidays".
If this rule is selected, a date can be chosen and the holiday can be calculated depending on this date. The calculated holiday can be a maximum of 1 week before this date and 1 week after this date.

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4.10.3 Selection of Functions / Functions 1 - 20

Up to 20 functions can be activated in the submenu "Selection of functions". As soon as a function is active, a separate submenu appears for it. The corresponding settings are made there.

Generally applies to all functions:
All functions are only possible in two-button function
If the status object for a function is not connected, the switching status is visualised.

4.10.3.1 Identical parameters/display on the device

The following parameters are identical across all functions:

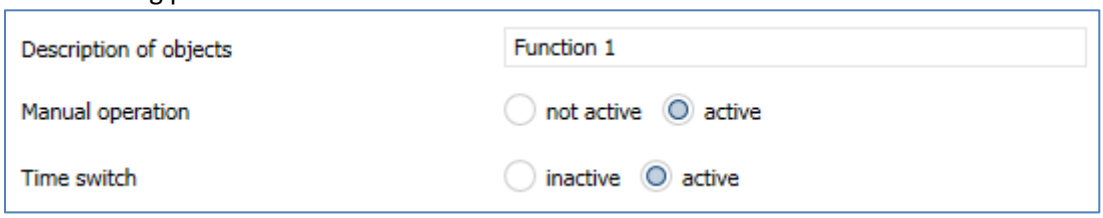

Figure 69: Functions - Identical parameters

The parameter "Description of objects" is used for better clarity in the ETS and has no effect on the display on the device.
The "Manual operation" parameter can be used to define whether this function should be displayed on the central control unit or not. If the parameter is set to "not active", the function is not active on the device, but the time switch can still be executed.
With the parameter "time switch" a submenu for the time switch is shown/hidden in which the switching times for this function can be defined.

The sorting of the function is carried out via the following parameter:

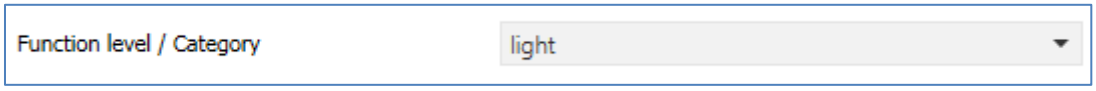

Figure 70: Functions - Sorting of levels

Each function of the time switch can be sorted into a category/function level. This function is then displayed on the device in this level.
The function levels are defined with the parameter "Function levels".
A function level is displayed on the device as soon as more than 1 function is active for this level. The Smart central operating unit displays the function as a list if more than 3 functions are active for 1 function level.

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Furthermore, a function name can be defined for each menu/timeswitch function.
The function name is displayed centrally above the respective function and can either be set permanently ("via text input") or set dynamically via the communication object.

Display on device with 2 functions:

If only one or two functions are assigned to a function level, they are displayed directly below each other for direct operation.
1 = Displayed function level: Light
2 = scroll left to the next function level
3 = scroll right to the next function level
4 = Function 1 of this function level, here kitchen
5 = Function 2 of this function level, here living room

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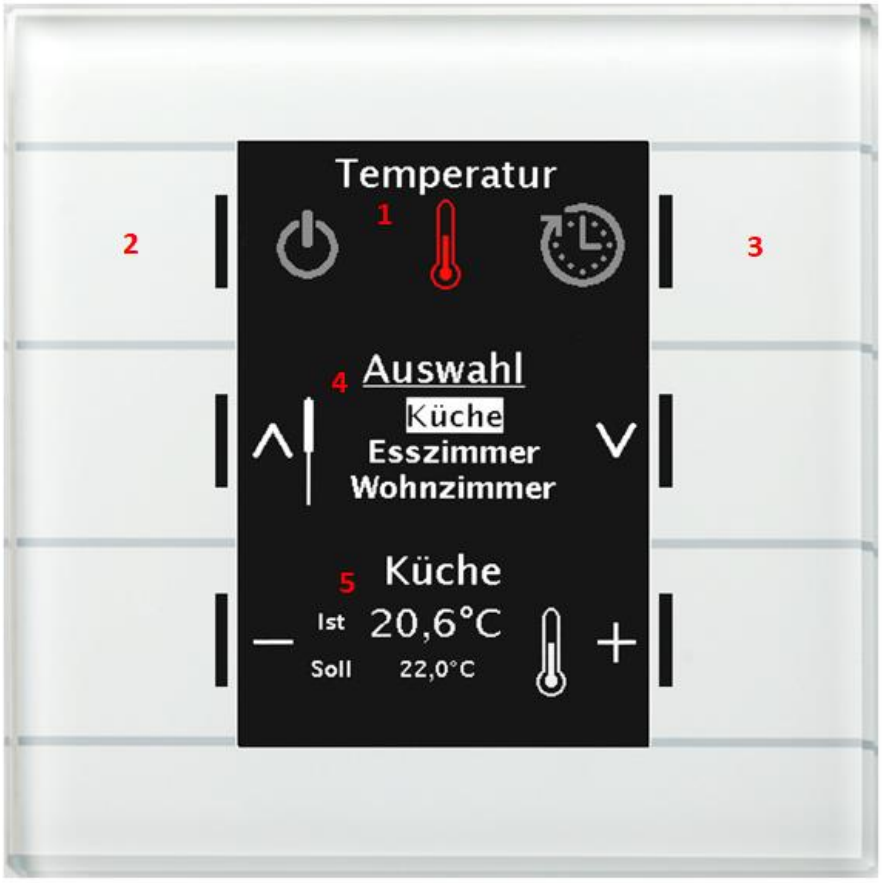
Display on device with 2 or more functions:



If only two or more functions are assigned to a function level, they are displayed with a selection list.
1 = Displayed function level: Temperature
2 = scroll left to the next function level
3 = scroll right to the next function level
4 = Selection list with all functions assigned to the function level
5 = Selected function for operation

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Identical parameters for all functions are:

ETS-Text	Dynamic range **[Default value]**	Comment
Function name	▪ no text ▪ from „Message text“ (14 Byte Objekt 139) ▪ from „State text 1“ (14 Byte Objekt 140) ▪ from „State text 2“ (14 Byte Objekt 141) ▪ **over text input** ▪ dynamic text according to status value	Setting of the data source for the function name; with the setting "dynamic text" the function name is changed depending on the received telegram, e.g. "presence/absent" can be signalled. **“dynamic text according to status value” selectable only for switch functions**
Text	free text with up to 20 characters	Input of the function name; parameter is displayed if the function name is set "over text input"

Table 119: Settings: Functions - Function name

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4.10.3.2 Switch

The following figure shows the available settings for the Switching function:

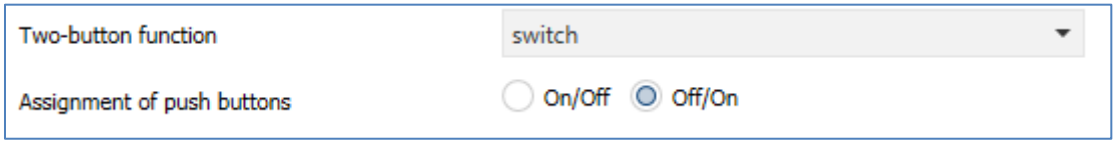

Figure 71: Settings - Switch function

Button assignment On/Off: The left button sends the value On ,the right button sends the value Off.
Button assignment Off/On: The left button sends the value Off , the right button sends the value On.

The following table shows the available communications objects:

Number	Name	Length	Usage
0	Function 1 – Switch On/Off	1 Bit	Switching function of the keys
3	Function 1 – State for display	1 Bit	Status to update display/symbol on the control panel; has to be connected to the status of the actuator to be switched

Table 120: Communication objects - Switch function

The switching function can represent the two possible states (On/Off) by means of freely selectable symbols with a freely selectable colour. The evaluated status is visualized in each case:

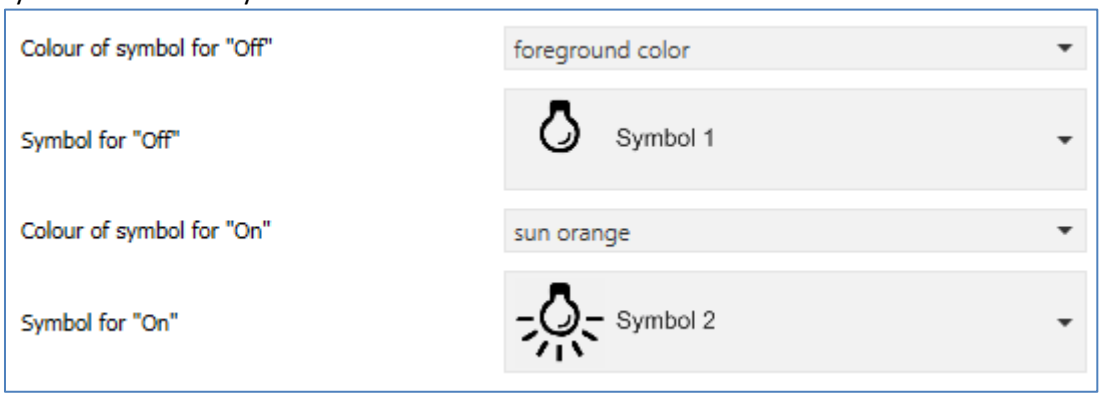

Figure 72: Presentation - Switch function

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4.10.3.3 Send values

Subfunction: Toggle values/scenes (up to 4 values)

With the function Send values - Toggle values/scenes it is possible to switch between 4 different values of a data point type.
The following figure shows the available settings:

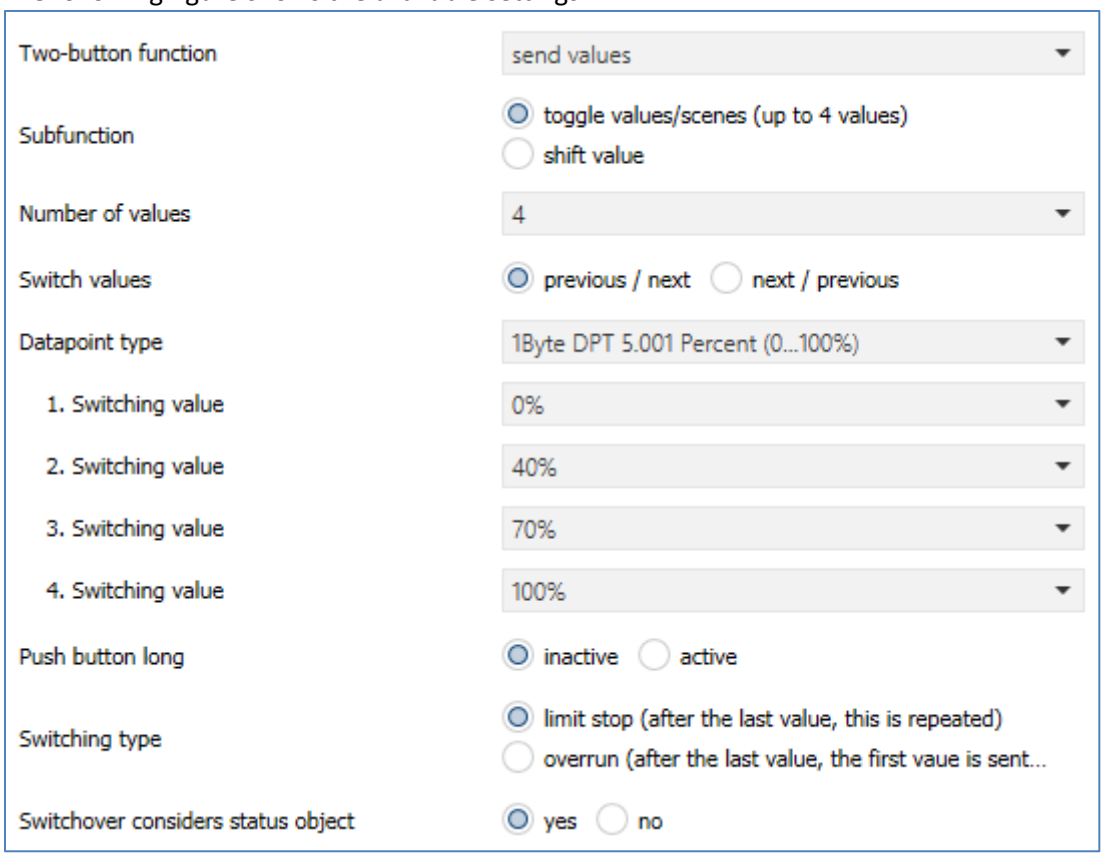

Figure 73: Settings: Send values - Toggle values/scenes (up to 4 values)

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Die nachfolgende Tabelle zeigt alle verfügbaren Einstellungen:

ETS-Text	Dynamic range **[Default value]**	Comment
Switch values	▪ **Previous/next** ▪ next/previous	Setting to which direction is to be moved at pressing left/right buttons
Number of values	▪ **2** ▪ 3 ▪ 4	Setting between how many values to switch
Datapoint type	▪ DPT 2.001 Switch control ▪ **DPT 5.001 Percent** ▪ DPT 5.005 Decimal factor ▪ DPT 17.001 Scene number ▪ DPT 7.600 Colour temperature (Kelvin) ▪ DPT 9.001 Temperature ▪ DPT 9.004 Brightness	Sets the data point type to be sent
1st – 4th Switching value	any value according to the selected datapoint type	Sets the respective value for the switching value
Push button long	• **inactive** • active	Activation of a function with a long keystroke
Left / Right button: Action at long push of button	• **1st-4th Switching value** • 4th Switching value if previous was 1st value, otherwise 1st value • Send 0 • “Off” at second object • “On” at second object	Setting the action with long keystroke
Switching type	• **Limit stop** • Overrun	Setting what should happen when the last switching value is reached
Switchover considers status object	• Yes • **No**	Setting whether the changeover should send the next switching value according to the current status

Table 121: Settings „Send values“ - switching values/scenes (up to 4 values)

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Functional principle:
The function "switching values/scenes" can send up to 4 different values by shortly pressing a button. The values are then switched one after the other. Depending on the set parameters, for example, at a keystroke the second switching value is sent if the 1st switching value has been sent before or the third switching value will be sent if the second switching value has been sent befor…

Parameter "Push button long":
Additionally to a switch over at a short keystroke, a fixed value can be sent at a long keystroke. For example, the 1st-4th switching value can be sent. Thus, the selected fixed switching value (independent of the last switching value) would always be sent with a long keystroke.
The setting "4th Switching value if previous was 1st value, otherwise 1st value " represents a toggle function, which switches back and forth between the 1st and 4th switching values. If the 1st switching value was sent last, the 4th changeover value is sent, for each other value the 1st switching value is sent.
The setting "send 0" causes sending the value 0 to the switch object.
The setting "On at second object" or "Off at second object" shows another communication object for the long keystroke. The fixed value On or Off is then sent to this object with the size 1 bit.

Parameter "Switching type":
Limit stop: When the switching type "limit stop" is activated, the 4th switching value is sent again after the 4th switching value has been sent.
Overrun: When the switching type "overrun" is activated, the 1st switching value is sent again after the 4th switching value.

Parameter "Switchover considers status object":
If the **status value is not taken into account** during the changeover, the button memorizes the last sent value and sends the next or previous value on the next actuation without observing whether another value has been sent to the object in the meantime.
If the **status value is taken into account** during the changeover, the next keystroke will send the next higher or the next lower shift value - with respect to the last received status value. Example: the 2nd switching value is set to 40% and the 3rd switching value is set to 70%. Now, after a received status value of 50%, the value 70% is sent at next keystroke if the next switching value is to be sent and the value 40% if the previous switching value is to be sent.

The following table shows the available communication objects.

Number	Name	Length	Usage
0	Function 1 – switch control, percent value…		Sending the switching value; DPT depending on the parameter setting
1	Function 1 – State switch control, state of percent value ….		Receiving the status; DPT depending on the parameter setting

Table 122: Communication objects "send values" - switching values/scenes (up to 4 values)

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Subfunction: Shift value

With the function "send values - shift values", values can be moved up or down within the set limits.

The following figure shows the available settings:

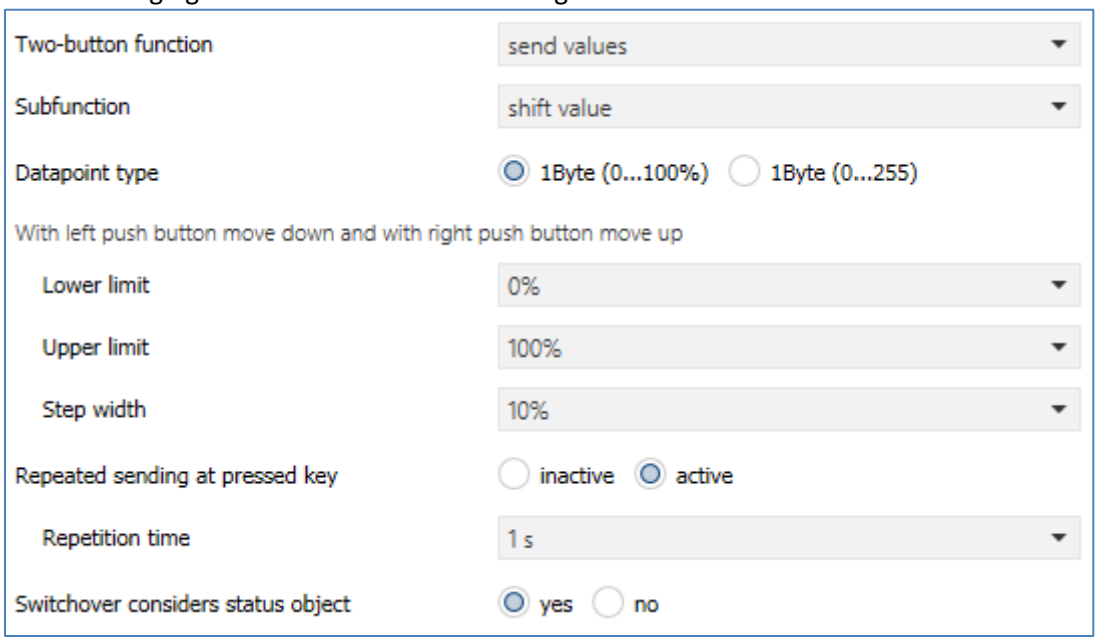

Figure 74: Settings "send values" - shift values

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Datapoint type	▪ **1 Byte (0...100%)** ▪ 1 Byte (0...255)	Sets the datapoint type for the value shift
Lower limit	0 - 100% / 0 - 255 **[0 / 0]**	Sets the lower limit value for the value shift
Upper limit	0 - 100% / 0 - 255 **[100% / 255]**	Sets the upper limit value for the value shift
Step width	0 - 100% / 0 - 255 **[10% / 10]**	Sets the step width between two sending commands
Repeated sending at pressed key	▪ **Inactive** ▪ active	Activation of the sending repetition while pressing the button
Repetition time	200 ms – 3 s **[1 s]**	Repetition time between two telegrams while pressing the button
Switching considers status object	• Yes • **No**	Setting whether the value should be moved according to the current status

Table 123: Settings "send values" - shift values

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Functional principle:
The function "shift value" moves the set datapoint type within the set limits. When the "Down" button is pressed, the set step width is subtracted from the last value and sent. When the "Up" button is pressed, the set step width is added to the last value and sent.

Lower/Upper limit:
Within these limits, the value is shifted. The function never falls below the lower limit value and does not exceed the upper limit value.

Step width:
The step width indicates the difference between two transmitted telegrams. Example: step witdth is set to 10%. If the value 10% was sent with the previous transmission, the value 20% is sent with the next "up" command..

Repeated sending at pressed key:
Repeated transmission while holding down the key allows the function to increase/decrease the value until the upper/lower limit is reached.

Switching considers status object:
If the status value is taken into account, the key function sends the next value depending on the last received status value. If a status value of 15% and a step size of 10% were selected, then the value of 25% would be sent with the next "up" command. If the status value is not taken into account, the push button memorizes the last value that was sent and sends the next value regardless of the status value.

Die nachfolgende Tabelle zeigt die verfügbaren Kommunikationsobjekte:

Number	Name	Length	Usage
0	Function 1 – - percent value/decimal value	1 Byte	Sending the switching value; DPT depending on the parameter setting
3	Function 1 – State for display	1 Byte	Receiving the status; DPT depending on the parameter setting

Table 124: Communitcation objects "send values" - Shift value

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Presentation

The display of the function "Send values" depends on the selected data point type. Depending on the selected data point type, 1-4 different symbols and their color can be selected.
The following table provides an overview of the settings for the various data point types:

Datapoint type	Adjustable symbols	Comment
2 Bit Switch control, DPT 2.001	4 symbols can be set: 1 symbol for each possible state	
1 Byte Percent, DPT 5.001	3 symbols can be set for the ranges 0, 1-229 and 230-255. Therefore, the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Decimal fator, DPT 5.005	3 symbols can be set for the ranges 0%, 1% - 90% and >90%. Therefore the button evaluates the information of the "Status for display" object	Special presentation possible! Additionally it is possible to display the status value below the symbol.
1 Byte Scene Number, DPT 17.001	1 fixed symbol can be set	
2 Byte Colour temperature, DPT 7.600	1 or 2 symbols can be set: 1 for each switching value	
2 Byte Temperature, DPT 9.001	1 fixed symbol can be set	Special presentation possible!
2 Byte Brightness, DPT 9.004	1 fixed symbol can be set	

Table 125: Presentation - Send values

Special presentation:
For certain data point types, a special presentation (see table above) is possible. In this presentation, the status is shown on a larger scale on the display.
The following presentations are possible:

ETS-Text	Dynamic range **[Default value]**	Comment
Special display (DPT 5.001, DPT 5.005)	▪ value as text (0-100%) ▪ value as text (0-255) ▪ link symbol with switching value	With the settings "value as text" the text is displayed large on the display.
Special display (DPT 9.001)	▪ **value as symbol + "°C"** ▪ value as symbol without unit ▪ value as symbol + "K" ▪ link symbol with switching value	With the settings "value as symbol" the text is displayed large on the display.

Table 126: Presentation - Special symbols

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4.10.3.4 Temperature shift

The temperature shift can be used to move the setpoint of the heating control.
The following figure shows the available settings:

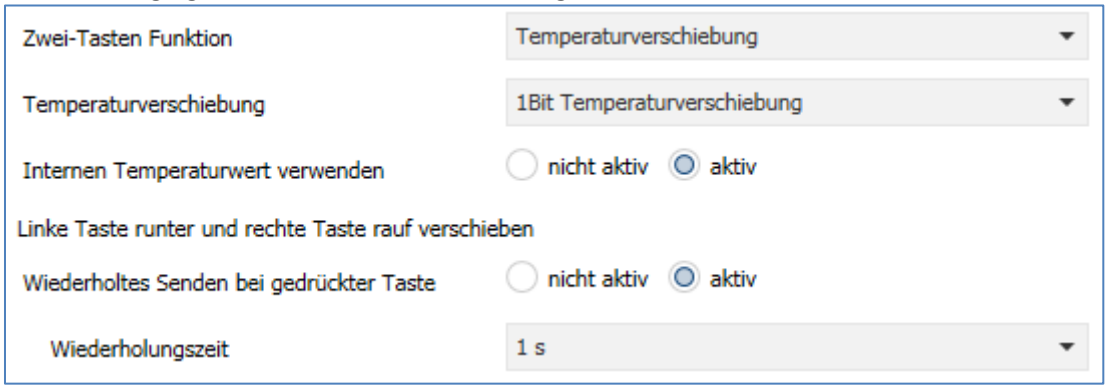

Figure 75: Settings - Temperature shift

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Temperature shift	▪ **1 Bit temperature shift** ▪ 1 Byte temperature shift ▪ 2 Byte temperature shift ▪ 2 Byte shift of basis comfort setpoint value	Setting how the temperature is to be shifted
Use internal temperature	▪ inactive ▪ **active**	Setting whether the internal temperature measurement value is to be used to display the actual value
Repeated sending at pressed key	▪ **inactive** ▪ active	Setting whether the shift should be repeated at fixed intervals while the key is held
Repetition time	200 ms – 3 s **[1 s]**	Sets the time between two telegrams of the temperature shift when repetition is activated

Table 127: Settings - Temperature shift

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The temperature can be shifted in 4 different ways:

1 Bit temperature shift

With the 1-bit temperature shift the Central operating unit merely transmits the command 1 for a shift of the setpoint upwards and a 0 for a shift of the setpoint downwards.
The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 – Setpoint shift	1 Bit	Sends the Setpoint shift
2	Function 1 – State current setpoint	2 Byte	Object for the status value of the current setpoint
3	Function 1 – Setpoint shift (only for time switch)	2 Byte	Sending a 2-byte setpoint shift via the time switch

Table 128: Communication objects - Temperature shift via 1 bit

In order to be able to transmit an explicit setpoint value at a time via the timer, a 2-byte setpoint shift exists here in addition to the 1-bit object. In the MDT heating actuator, the 1-bit setpoint shift and the 2-byte setpoint shift must be activated for this purpose, and the Send setpoint change must be set to "Yes".
For channel A of the heating actuator and function 1 of the Central operating unit Smart this means:

Central operating unit Smart (Function 1)	Heating actuator (Channel A)
Object 0 – Setpoint shift	Object 18 – Setpoint value offset (1 Bit)
Object 2 – State current setpoint	Object 9 – Current setpoint
Object 3 – Setpoint shift (only for time switch)	Object 8 – Setpoint value offset (2 Byte)

Table 129: Example – 1 Bit Setpoint shift with MDT heating actuator

1 Byte temperature shift

With the 1-byte temperature shifting, the Central operating unit sends a 1-byte value which is multiplied by the step width set in the controller. In order for the display and the current setpoint value to be synchronous, the step width and the limits of the setpoint shift have to be specified in the Central operating unit. MDT heating actuator has also to be set to 1 Byte temperature shift.
The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 – Setpoint shift	1 Byte	Sends the Setpoint shift
2	Function 1 – State current setpoint	2 Byte	Object for the status value of the current setpoint
3	Function 1 – State setpoint shift	1 Byte	Object for the status value of the setpoint shift

Table 130: Communication objects - Temperature shift via 1 byte

For channel A of the heating actuator and function 1 of the Central operating unit Smart this means:

Central operating unit Smart (Function 1)	Heating actuator (Channel A)
Object 0 – Setpoint shift	Object 8 – Setpoint value offset (1 Byte)
Object 2 – State current setpoint	Object 9 – Current setpoint
Object 3 – State current setpoint shift	Need only be connected if several units carry out a setpoint shift at the same time. In this case, this object is connected to all objects which influence the setpoint shift (also object 0 of the Central operating unit Smart).

Table 131: Example – 1 Byte Setpoint shift with MDT heating actuator

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2 Byte temperature shift

With the 2-byte temperature shift, the Central operating unit sends a 2-byte temperature value which is added or subtracted from the set basic comfort value.
The Central operating unit sends the shift by the set step width at each keystroke.
In order for the display and the current reference value to be synchronous, the limits of the setpoint shift must be specified in the Central operating unit and have to be set to the same values as in the controller.
The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 – Setpoint shift	2 Byte	Sends the Setpoint shift
2	Function 1 – State current setpoint	2 Byte	Object for the status value of the current setpoint
3	Function 1 – State setpoint shift	2 Byte	Object for the status value of the setpoint shift

Table 132: Communication objects - Temperature shift via 2 byte

For channel A of the heating actuator and function 1 of the Central operating unit Smart this means:

Central operating unit Smart (Function 1)	Heating actuator (Channel A)
Object 0 – Setpoint shift	Object 8 – Setpoint value offset (2 Byte)
Object 2 – State current setpoint	Object 9 – Current setpoint
Object 3 – State current setpoint shift	Need only be connected if several units carry out a setpoint shift at the same time. In this case, this object is connected to all objects which influence the setpoint shift (also object 0 of the Central operating unit Smart).

Table 133: Example – 2 Byte Setpoint shift with MDT heating actuator

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2 Byte shift of basis comfort setpoint

In the case of the 2-byte shift of basic comfort setpoint, the Central operating unit sends a new basic comfort setpoint to the controller. It evaluates the object "state basis comfort setpoint" and sends the new setpoint +/- the set step width to the controller.
The range of the setpoint shift can be adjusted via the upper and lower limits.
The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 – basis comfort setpoint	2 Byte	Sends the new Basis Comfort Setpoint
2	Function 1 – State current setpoint	2 Byte	Object for the status value of the current setpoint
3	Function 1 – State basis comfort setpoint	2 Byte	Object for the status value of the basic comfort setpoint

Table 134: Communication objects - 2 Byte shift via comfort setpoint value

For channel A of the heating actuator and function 1 of the Central operating unit Smart this means:

Central operating unit Smart (Function 1)	Heating actuator (Channel A)
Object 0 – Basis comfort setpoint	Object 7 – Setpoint comfort
Object 2 – State current setpoint	Object 9 – Current setpoint
Object 3 – State basis comfort setpoint	Object 7 – Setpoint comfort (Only required if a setpoint shift or an additional operating mode changeover takes place from another location)

Table 135: Example –Setpoint shift 2 Byte via comfort setpoint with MDT heating actuator

Presentation:

The temperature shift is represented by the temperature symbol. The display is fixed to the symbol 9.
In addition, the actual value and the desired value can be labeled as desired:

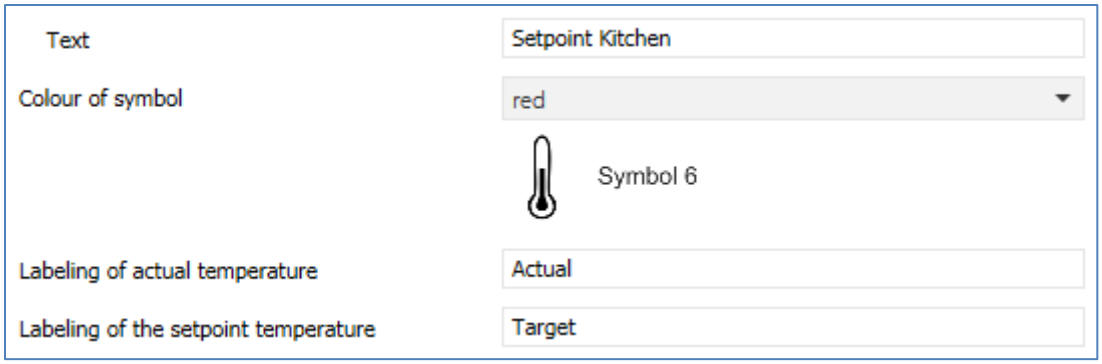

Figure 76: Presentation - Temperature shift

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4.10.3.5 Mode selection

With the function "Mode selection" the HVAC mode can be toggled in heating actuators or temperature controllers.
The following figure shows the available settings:

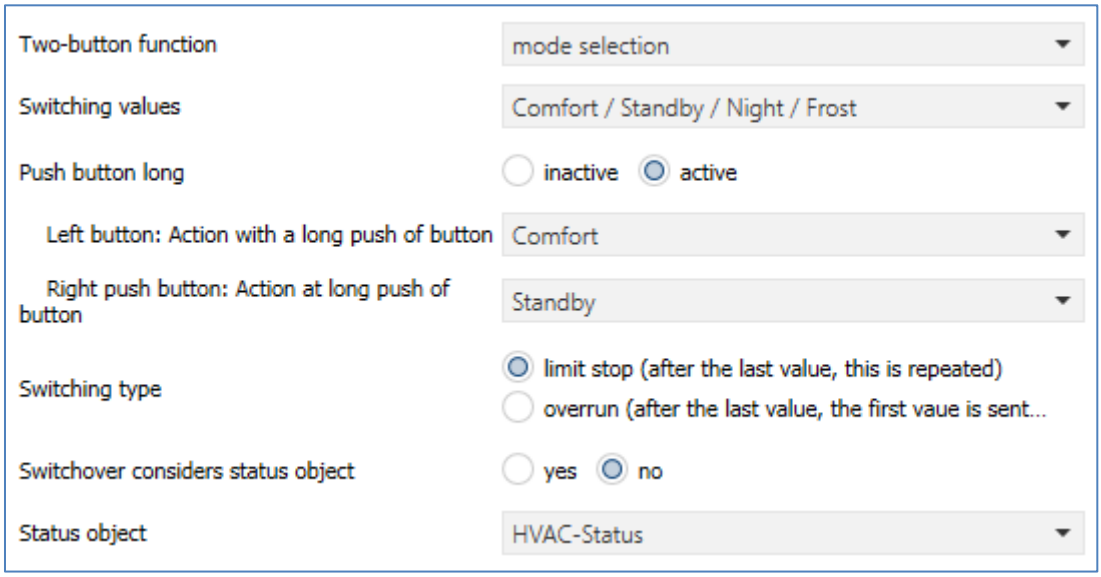

Figure 77: Settings - Mode selection

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Switching values	▪ **Comfort /Standby** ▪ Comfort/Night ▪ Comfort/Standby/ Night ▪ Comfort/Standby/ Night/Frost	Setting between which operating modes can be toggled.
Push Button long	▪ **inactive** ▪ active	Activates an action for the long keystroke
Left button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the left button
Right button: Action at long push of button	▪ **Comfort** ▪ Standby ▪ Night ▪ Frost	Setting which operating mode should be called with a long keystroke to the right button
Switching type	▪ **Limit stop** ▪ Overrun	Setting what should happen when the last switching value is reached
Switchover considers status object	▪ **Yes** ▪ No	Setting whether the changeover should send the next switching value according to the current status
Status object	▪ **No Status** ▪ HVAC-Mode ▪ HVAC-Status	Defining whether and how the status is displayed

Table 136: Settings - Mode selection

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Function principle:
The function "mode selection" can send up to 4 different operating modes by shortly pressing a button. The operating modes are switched one after the other. Depending on the set parameters, for example, at a keystroke the second operating mode is sent if the 1st operating mode has been sent before or the third operating mode will be sent if the second operating mode has been sent before…

Parameter "Long push button":
In addition to switchover by a short keystroke, a fixed operating mode can be sent at a long keystroke.
Here one of the 4 operating modes can be sent. This means that a fixed operating mode (independent of the last switching value) would always be sent with a long keystroke.

Parameter "Switching type":
Limit stop: With the switching type "Limit stop" the 4th operating mode is sent again after sending the 4th operating mode.
Overrun: In the switching type "Overrun", the 1st operating mode is sent again after the 4th operating mode.

Parameter "Switchover considers status object":
If the **status value is not taken into account** during the changeover, the button memorizes the last sent value and sends the next or previous value on the next actuation without observing whether another value has been sent to the object in the meantime.
If the **status value is taken into account** during the changeover, the next keystroke will send the next higher or the next lower shift value - with respect to the last received status value.

Status object:
Setting the status output by the heating actuator/temperature controller.

The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 – Mode selection (HVAC Mode)	1 Byte	Switchover of operating mode
1	Function 1 – Status HVAC Mode	1 Byte	Receives the status of the heating actuator / temperature controller
1	Function 1 – HVAC Status	1 Byte	Receives the status of the heating actuator / temperature controller

Table 137: Communication objects - Mode selection

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Presentation:

To each operating mode, a fixed symbol is assigned. The color of the symbol can be adjusted for any operating mode:

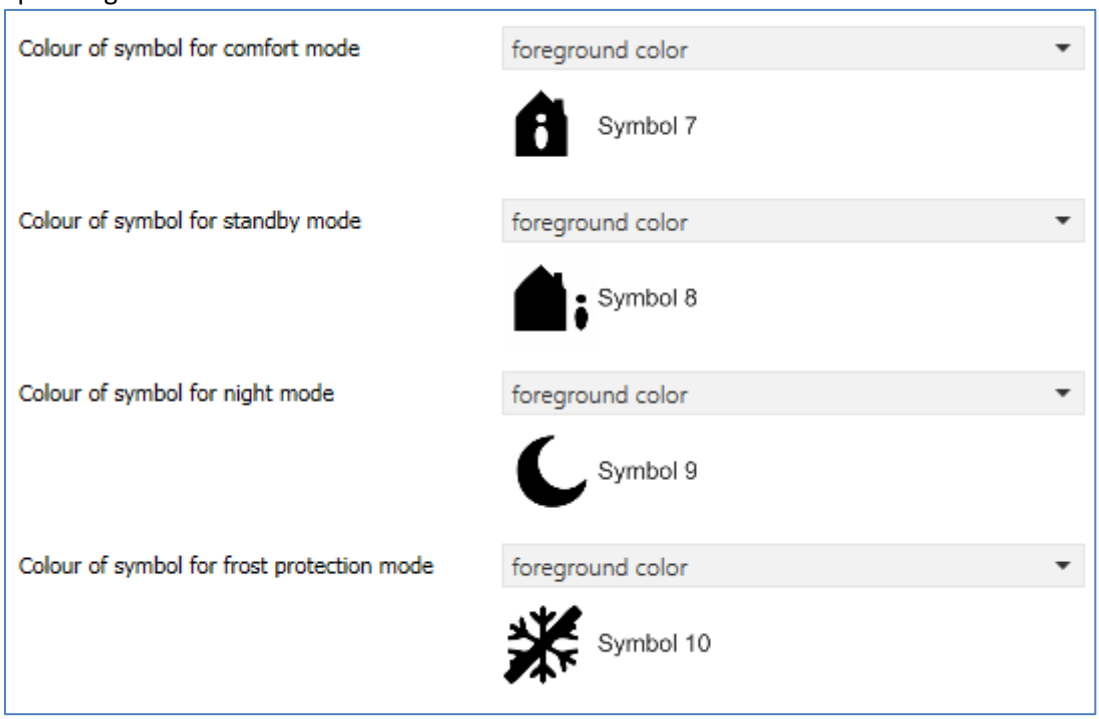

Figure 78: Presentation - Mode selection

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4.10.3.6 Blind/Shutter

The blind/shutter function is used to control shutter actuators.
The following figure shows the available settings:

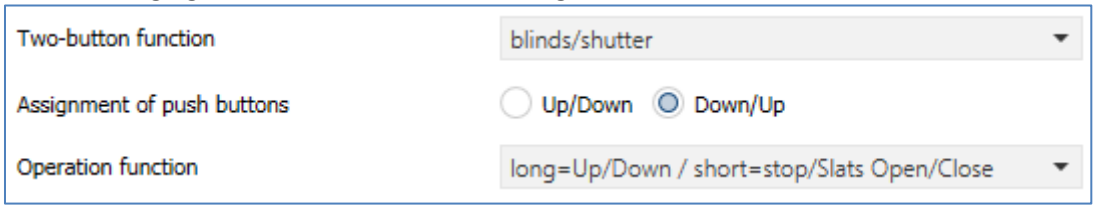

Figure 79: Settings - Blind/Shutter

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of push buttons	▪ Up/Down ▪ **Down/Up**	Setting the key assignment (left/right button) for the up/down function
Operation function	▪ **Long=move / Short=Stop/Slats Up/Down** ▪ Short=move / Long=Stop/Slats Up/Down ▪ Short=Up/Down/Stop (MDT Single Object Control) ▪ Short=Up/Down/Stop / Long = central object (MDT Single Object Control)	Setting whether to move with a long key or with a short key;

Table 138: Settings - Blind/Shutter

Two communication objects are displayed for the "blind" function: the object "Stop/slat open/close" and the object "blinds up/down “.
The moving object is used to move the blinds/shutters up and down. The stop/step object is used to adjust the slats. In addition, this function stops the up/down movement as far as the end position has not yet been reached.
In the case of the two-button function, the key assignment can be set; the table below shows the relationships:

	Function Up/Down			**Function Down/Up**	
Input	Push button left	Push button right		Push button left	Push button right
Moving object	Up	Down		Down	Up
Stop/Step object	Stop/slats open	Stop/slats close		Stop/slats close	Stop/slats open

Table 139: Two-button function - Blind function

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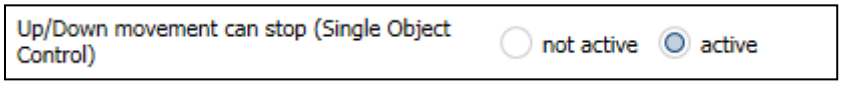
Since shutter actuators always use a 1 signal for the down movement and a 0 signal for the up movement, the button also emits this. It is also possible to change the action for long and short keystrokes. It is thus possible to select whether to move via a long or a short keystroke. The stop/step object then adopts the other operating concept.
The following table shows the available communication objects:

Number	Name	Length	Usage
0	Function 1 long Function 1 short – Blind Up/Down	1 Bit	Up/down command for the shutter actuator. Operation for long/short depends on the polarity of the operating function
0	Function 1 short – Shutter Up/Down /Stop	1 Bit	Additional object in „Single Object Control Mode“
1	Function 1 long Function 1 short – Stop/Slats Open/Close	1 Bit	Lamellen öffnen/schließen; Stop-Befehl
1	Funktion 1 lang – Central shutter Up/Down/Stop	1 Bit	Additional movement object in „Single Object Control Mode“
2	Function 1 – Absolute position (only for time switch)	1 Byte	Aussenden einer absoluten Höhe über die Zeitschaltuhr
3	Function 1 – State of shutter for display	1 Byte	Empfang des Status der aktuellen Jalousieposition

Table 140: Communication objects - Blind / Shutter

MDT Single Object Control:

MDT Single Object Control enables a new operating concept for controlling roller shutters. For use, the following parameter has to be set to active in the MDT shutter actuator to be controlled:



Now it is possible to start the up/down movement with a short keystroke and also to stop an active up/down movement with a short keystroke.
Using the setting "Short = Up/Down/Stop / Long = Central object", an additional object is displayed which can start the up/down movement with a long push-button action and can also stop an active up/down movement with a long push-button action. This function can be used, for example, to move an individual shutter in a room with a short push-button action and to move the entire room with a long push-button action

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Presentation:

The blind function can be displayed with 3 freely selectable symbols and freely selectable color. The button evaluates the information of the "Object 3 - State of blind for display". In addition, the current status can be displayed as text under the symbol:

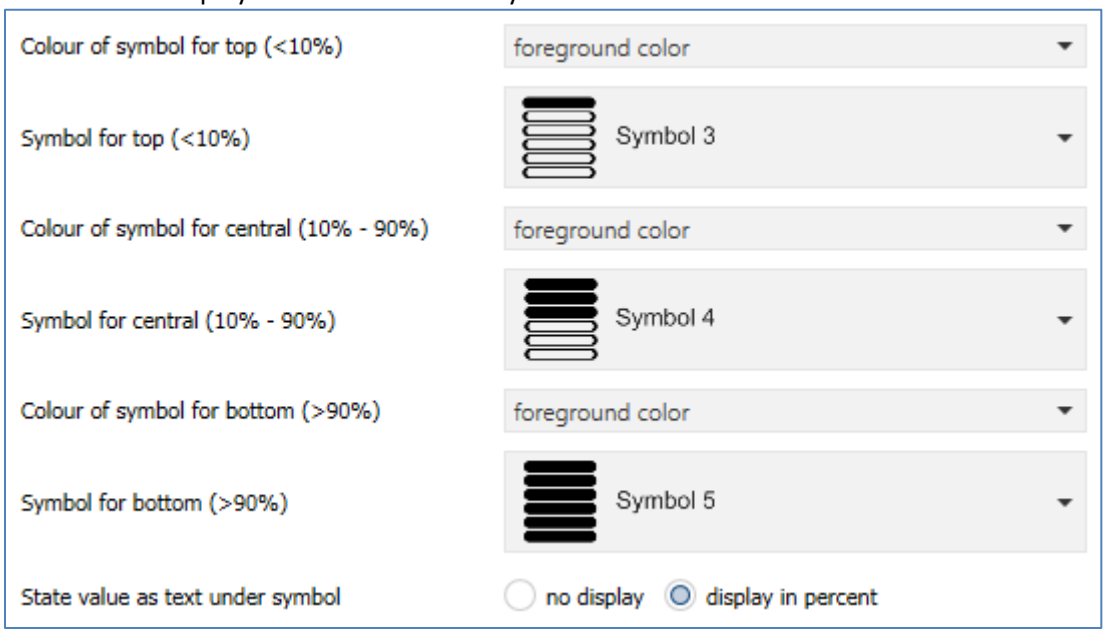

Figure 80 : Presentation - Blind/Shutter

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4.9.6 Dimming

The dimming function can be used to control dimming actuators.
The following figure shows the available settings:

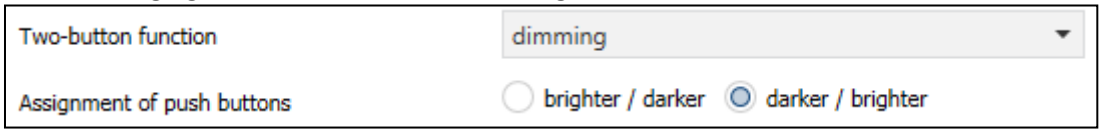

Figure 81: Settings - Dimming

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Assignment of push buttons	▪ brighter/darker ▪ **darker/brighter**	Setting the key assignment (left/right key) for the direction (brighter/darker)

Table 141: Settings - Dimming

If the "Dimming" function is parameterised, two communication objects appear, firstly the function for a short push-button action, the "Dimming On/Off" switch object, and secondly the function for a long push-button action, the "Dimming relative" object.
The two-button function dimming can be parameterised either as brighter/darker or as darker/brighter, the relationships are shown in the following table:

	Function brighter/darker			**Function darker/brighter**	
Input	Push button left	Push button right		Push button right	Push button left
Dimming function	brighter	darker		darker	brighter
Switch function	ON	OFF		OFF	ON

Table 142: Two-button function - Dimming

The dimming function is a start-stop dimming, that means as soon as the dimming function becomes active, a light or dark command is assigned to the input until it is released. After releasing, a stop telegram is sent which stops the dimming process.
The following table shows the available communication objects:

Number	**Name**	**Length**	**Usage**
0	Function 1 – Dimming On/Off	1 Bit	Switch command for the dimming function
1	Function 1 – Dimming relative	4 Bit	Command for relative dimming
2	Function 1 – Dimming absolute (only for time switch)	1 Byte	Sending an absolute brightness value via the time switch
3	Function 1 – State dimming value for display	1 Byte	Receive of the status of the current absolute brightness value

Table 143: Communication objects - Dimming

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Presentation:
☑ Single-button function
☑ Two-button function

The parameter "display type" defines whether the dimming function should be displayed in the normal presentation with 3 symbols or by a special symbol representing the status in percent.

Normal view:
The dimming function can be displayed with 3 freely selectable symbols and freely selectable colors. The button evaluates the information of object 3 "State for display". In addition, the current status can be displayed as text under the symbol:

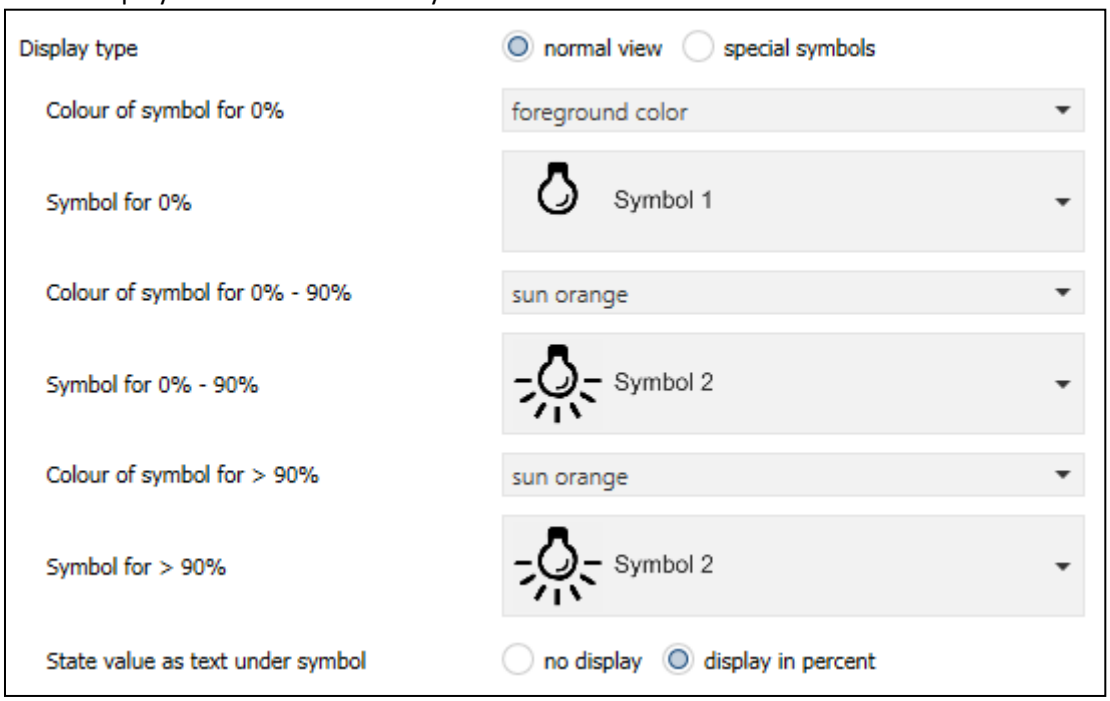

Figure 82: Presentation: Normal view - Dimming Function

Special presentation:
In the special presentation, the status (in percent) is shown on a larger scale on the display. The following illustrations are possible:

ETS-Text	Dynamic range **[Default value]**	Comment
Special symbols	▪ value as text (0-100%) ▪ value as text (0-255)	With the settings "value as text" the text is displayed large on the display.

Table 144: Presentation - Special symbols Dimming Function

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4.10.4 Time Switch

There is a central lock for the timer superordinate to all timers of the 20 functions. The response to this central lock can be defined separately for each of the 20 functions.
The following table shows the available communications objects:

Number	Name	Length	Usage
128	Central locking of the time switch – Set lock	1 Bit	Activating/deactivating the central lock for the time switch
129	Central locking of the time switch – State	1 Bit	Send/read the status whether the central lock is set for the time switch

Table 145: Communication objects: Time switch - Central locking

The following figure shows the setup menu for the timer, to be called up via function level Time switch -> Setup:

1 = Setting the current time
2 = Reset of the switching times set on the device = switching times are reset to the switching times set by the database.
3 = Activation of the holiday function
4 = Exit the menu

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4.10.4.1 Restrict changes to the device

The following parameter can be used to deactivate the change of the switching times on the device:

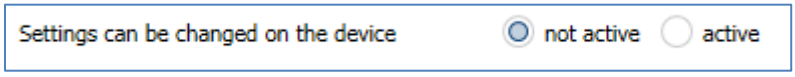

Figure 83: Setting: Time switch - Change times on the device

If this parameter is set to not active, the switching times for this function can only be changed via the database. The function is also no longer listed in the timer menu, but only in the correspondingly set category.

4.10.4.2 Switching times

6 switching times can be set for each function via a table format:

#	Mo	Di	Mi	Do	Fr	Sa	So	Modus	Bedingung	Std	min	Wert	Wert änderbar
1	✓	✓	✓	✓	✓			sunrise	time shift		0	On	✓
2			✓			✓	✓	sunrise	no earlier than...	10	0	On	✓
3	✓	✓	✓	✓	✓			sunset	time shift		0	Off	✓
4						✓	✓	sunset	time shift		0	Off	✓
5					✓			time		12	0	10%	✓
6							✓	time		8	0	Off	✓

Figure 84: Setting: Time switch – Switching times 1-6

For each of the 6 timers you can set on which days of the week they should be active.
The following modes are available:

Time:
The action for this time switch is executed at a fixed time.

Sunrise / Sunset / Dawn / Dusk:
The action for this time switch is executed on the corresponding event. Additionally, conditions can be defined in this mode. Thus, the time can be shifted forwards/backwards by a fixed time via the condition "**time shift**".
The action of the time switch can be limited with the condition "**latest at" / "no earlier than**".
Here is an example:

Modus	Bedingung	Std	min
sunrise	no earlier than...	8	0

This function would be executed at sunrise, but never earlier than 8 am.

Random:
The action for this time switch is executed in a period at a specified time. The randomness is specified as a condition (e.g. +/- 60min) at this time.
The "Value" parameter specifies the value to be transmitted for this time switch. Individual time slots of the time switch can be blocked for the user for modification via the "Value modifiable" parameter.

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The priority of the lock functions is as follows: Lock->Holidays->Public holidays.

4.10.4.3 Sperre/Freigabe

Für jede der 20 Funktionen kann eine Sperr-/Freigabefunktion aktiviert werden:

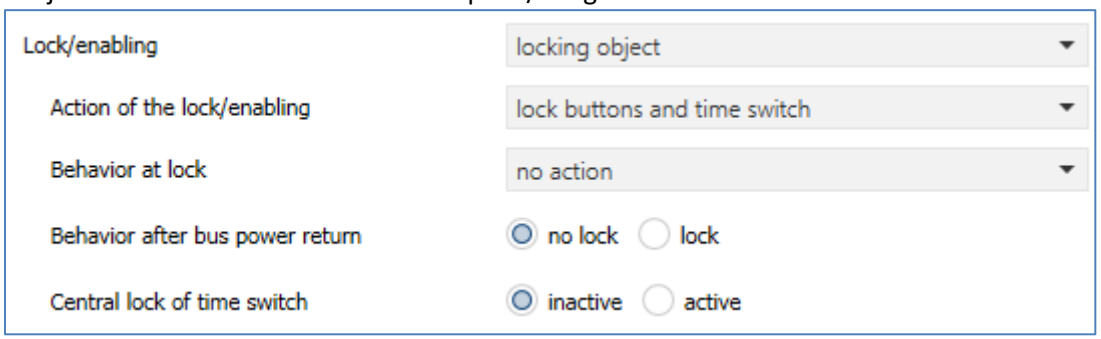

Figure 85: Time switch - Lock/Enabling

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Lock/enabling	• not active • **locking object** • enable object	Setting the type of lock object: **Lock object** = lock with 1, enable with 0 **Enable object** = enable with 1, lock with 0
Action of the Lock/enabling	• no action • lock buttons • lock time switch • lock buttons and time switch	Setting what the lock object should lock
Behaviour during locking	• **no action** • fix value (one time) • fix value (cyclic)	Setting of the behaviour to be performed on activation/duration of the lock
Value for lock	Adjustable value range depends on the selected function	**Only visible if "Behaviour during locking" is set to "Fixed value..".** The set value is sent when locking.
Behaviour after bus power return	• **nicht sperren** • sperren	Setting the behaviour after bus voltage recovery
Central lock of time switch	• nicht aktiv • **aktiv**	Setting whether the central lock is active for this function

Table 146: Settings: Time switch - Lock/Enabling

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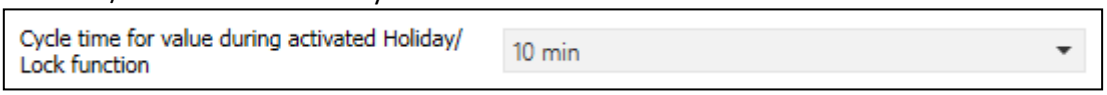
Action of lock / enable
The lock/enable action can be used to set what locks the lock object..

- locks buttons
  blocks the execution of the button functions on the device, the time switch is still executed
- locks time switch
  blocks the execution of the time switch, the buttons on the device can still be executed

Behaviour on locking
Defines the behaviour of the locking function.

- no action
  die Schaltuhr wird nur gesperrt
- fix value (one time)
  the time switch is blocked and a fixed value is sent once upon activation
- fix value (cyclic)
  the time switch is blocked and a fixed value is transmitted cyclically
  The cycle time is set by means of a common parameter for
  "lock / enable" and " holidays"



Value for lock:
The value to be sent depends on the selected function. For example, only ON or OFF can be sent for "Switching". With "Dimming", ON/OFF or a fixed value of 0% - 100% can be sent. A 1 bit value would be transmitted via the 1 bit output object, e.g. object 0 (for function 1) "Dimming ON/OFF", but an absolute value would be transmitted via object 2 "Dimming absolute (only for time switch).

The following table shows the available communications objects:

Number	Name	Length	Usage
4	Function 1 – Locking time switch	1 Bit	Locking or unlocking the time switch

Table 147: Communication object: Time switch - locking object

The status output can be controlled via the flags of the lock object:

- - By default, the K flag and the S flag are set -> The object can only be described.
- - If the L flag is also set, the internal lock status can also be read.
- - If the L flag and the Ü flag are also set, the object sends its internal lock status active. It should be noted, however, that if several lock objects are located in a group address, all locks are also set when a lock object sends its status!

When the lock object is read/sent, the internal lock status is output. Both the lock function and the leave function can set this status.
A locked time switch is displayed in red on the device!

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4.10.4.4 Holidays

For each of the 20 functions a behaviour during an active holiday function can be defined:

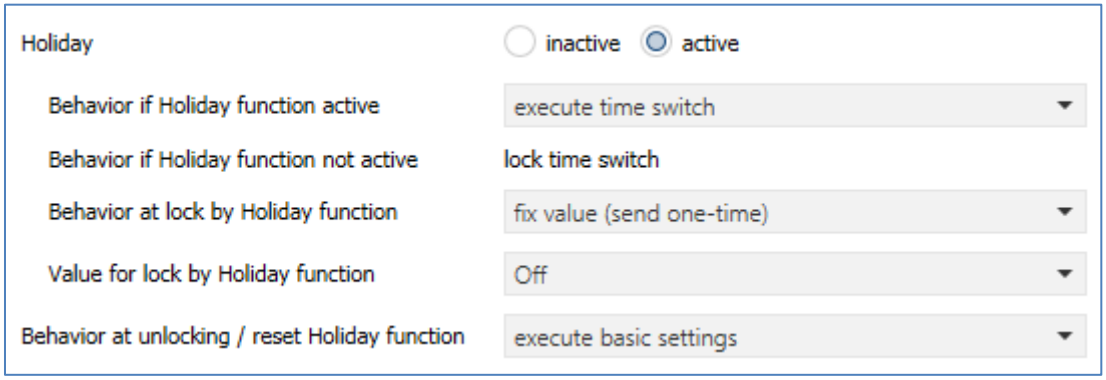

Figure 86: Settings: Time switch - Holiday function

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Holiday	• **inactive** • active	Activate/deactivate the holiday function for this function
Behaviour if holiday function active	• **lock time switch** • execute time switch • behaviour as Sunday	Setting the action active during holiday
Behaviour if holiday function not active	lock time switch execute time switch	These settings are not selectable but also result from the setting " Behaviour if holiday function active".
Behaviour at lock by holiday function	• **no action** • fix value (one time) • fix value (cyclic)	Setting the action when the holiday sets the lock
Value for lock by holiday function	Value range according to set function	**Only visible if " Behaviour at lock by holiday function " is set to "fixed value...".** The set value is sent by the holiday function when locking is performed
Behaviour at unlocking / reset Holiday function	• **execute basic settings** • make up switching times • send fix value • no action	Setting for the action "Blocking end"/"End of holiday".

Table 148: Settings: Time switch - Holiday function

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The holiday function can either be activated via an object, see 4.10.1 Basic settings, or on the device in the menu Time switch->Setup->Holiday.

Aktivierung am Gerät:

1 = Decrease the duration of holiday
2 = Increase the duration of the holiday
3 = Postpone the start time of the holiday
4 = Move the start time of the holiday forward
5 = Save the holiday and exit the menu
6 = Reset the holiday to inactive (do not exit the menu, this can be done via Save)

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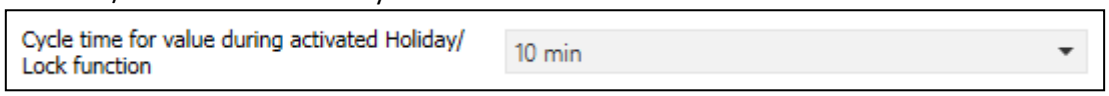
The following scenarios can be realized with the holiday function:

- **Lock time switch**
  The holiday function acts like a lock function and blocks this time switch. If no holiday is active, the time switch is executed as normal.
- **Execute time switch**
  The time switch is only executed if the holiday is active and is blocked if no holiday is active, e.g. can be used for a presence simulation.
- **Behaviour as Sunday**
  The time switch only executes the switching times that are activated exclusively for Sunday.

Behaviour at lock by Holiday function

Defines the behaviour which is executed when the time switch is blocked by the holiday function

- no action
  The holiday function sets a simple lock function and the time switch is locked as long as holiday is active.
- fix value (one time)
  Sends the set value once when the holiday function is activated
- fix value (cyclic)
  A value can be sent cyclically, e.g. to override a higher-level logic.
  The cycle time is set by means of a common parameter for
  "lock / enable" and " holidays"



Behaviour at unlocking / reset Holidy function

Defines the behaviour for the reset of the lock function and the end of the holiday function

- Execute basic setting
  The setting is carried out as set in the menu "Basic setting, see 4.10.1 G, for the parameter "Make up switching times when unlocking.
- Make up switching times
  After unlocking, the switching states that were omitted during unlocking are made up for. This ensures that all the trades are in the "correct" state after unlocking.
- Send fix value
  The set value is transmitted after the unlock/holiday end.
- No action
  No action is performed after the unlock/holiday end and the time switch remains in its current state.

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Examples for the holiday function:

- **During the holiday, the heating should be lowered to standby mode and set to comfort mode again after the holiday:**
  A distinction has to be made here as to whether or not the heating system runs a night setback in normal operation, i.e. is a time switch for operating mode changeover active or not?
  If this is active, it can also be used and the behaviour in case of blocking by holiday should be set to a fixed value (cyclical). This ensures that the Smart operating unit switches the heating controller/heating actuator cyclically to the desired operating mode (e.g. standby). The parameter Reset behaviour on unlock/holiday should be set to catch up switching times. This always produces the currently valid behavior. If the holiday is ended at 0:00 o'clock, the night operating mode is transmitted, for example. If the vacation is ended prematurely at some point during the day, the Comfort operating mode is transmitted
  If no night shut-off is parameterized, a separate function has to be created for the holiday function. No switching times need to be stored for this function. The behaviour in case of locking by holiday should be set to a fixed value (once) and switch to the standby operating mode, for example. The Behaviour on unlocking/holiday reset parameter should be set to a fixed value (once only) and switch back to the Comfort operation mode, for example. Please note that with underfloor heating, the holiday should end one day before the actual end of the holiday due to the longer heating phase.
  Of course, this functionality can also be implemented with the Temperature shift function

- **During vacation a "presence simulation" is to run for certain lights:**
  If certain lights are to be switched on/off randomly during vacation, the parameter "Behaviour if holiday function active" is set to "Execute time switch". The time switch is then only executed if a holiday has been set and is blocked if no holiday has been set. The switching times can be set to random mode.
- **During the holiday, for example, the blinds/shutters should open as on Sunday.**
  For example, if blinds/roller shutters are to open later during the holiday, i.e. perform the behaviour like Sundays, the parameter "Behaviour if holiday function active" has to be set to "Behaviour as Sunday". This means that only the time switches which are defined exclusively for Sunday are executed during the holiday period, e.g. roller shutters are only raised at 9 o'clock instead of 7 o'clock.

4.10.4.5 Behaviour at public holiday

Figure 87: Setting: Time switch - Behaviour at public holiday

For each function one of the following actions can be defined for the public holiday:

- **Holiday as Sunday**
  The time switch only executes the switching times that are activated exclusively for Sunday.
- **No action**
  The time switch is blocked when the public holiday is active.

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4.11 Status LED

4.11.1 LED Basic Setting

The LED basic settings affect all active status LEDs. The following figure shows the available settings:

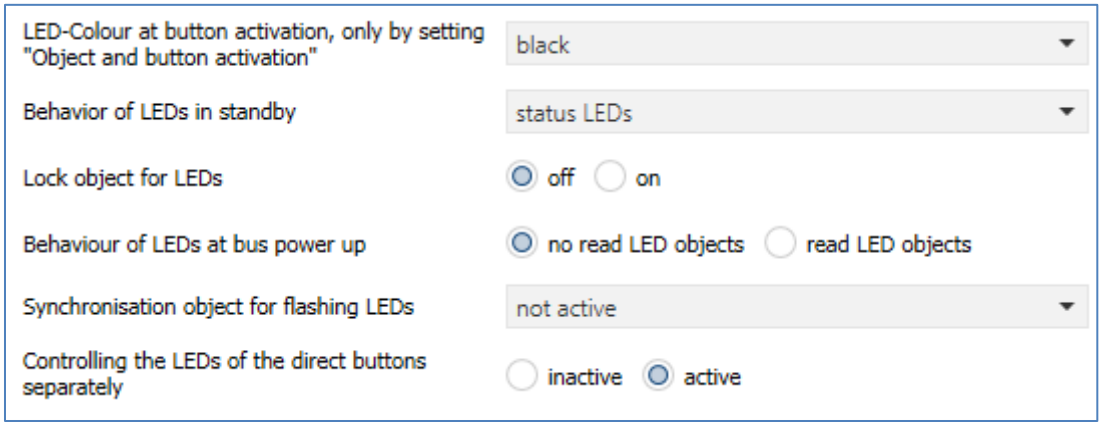

Figure 88: Basic settings - Status LEDs

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
LED-color at button activation, only by setting “Object and button activation”	Any color	Parameter is only used at double assignment: "Keystroke + internal / external object"
Behavior of LEDs in Standby	▪ Off ▪ **Orientation LEDs** ▪ Status-LEDs	Setting how to use the LEDs in Standby mode
Lock object for LEDs	▪ **Off** ▪ On	Activates a lock object which can disable (= switch off) all LEDs
Behaviour of LEDs at bus power up	▪ **no read LED objects** ▪ read LED objects	Setting whether to actively request the objects after a reset; only active at "LED reacts to external object"
Synchronisation object for flashing LEDs	▪ **not active** ▪ active as Master ▪ active as Slave	Activation of a synchronization object for the LEDs
Controlling the LEDs of the direct buttons separately	▪ **inactive** ▪ active	Setting whether the display behaviour for the direct buttons level should be different from that for the other function levels

Table 149: Basic settings - Status LEDs

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The parameter "**LED colour at button activation**" defines the colour change of all status LEDs when a button is activated, if they are assigned twice by the setting "LED reacts to external/internal object **and** button activation". In this case, the settings in the LED 1-6/Direct buttons 1-4 menu refer to control via the object, and the global parameter "LED colour at button activation" defines the behaviour at button activation.
Flashing status LEDs can be synchronised via the synchronisation object for the flashing status. This makes it possible to ensure that all the LEDs in a room flash in the same rhythm. One operating unit in the room is defined as master and all other operating units as slaves. The LED flashing status objects are linked to each other in a group address.
The execution of the action for the long push-button action is signalled by the status LED going out.
Using the parameter "**Control LEDs of direct buttons separately**", it is possible to visualise different statuses in the direct button level than in the other function levels. If this parameter is active, 4 additional submenus are displayed for the LED behaviour of the 4 direct buttons. The behaviour of the 6 LEDs in the other function levels is set via the submenus LED 1-6 and applies to all function levels except the direct keys if they are controlled separately.

The following table shows the available communications objects:

Number	Name	Length	Usage
206	LED – Blocking object	1 Bit	Locking all LEDs
207	LED – Blinking status	1 Bit	Synchronization of the flashing status

Table 150: Communication objects - Status LEDs

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4.11.2 LEDs 1-6/LED Direct buttons 1-4

The following figure shows the available settings for each of the active LEDs:

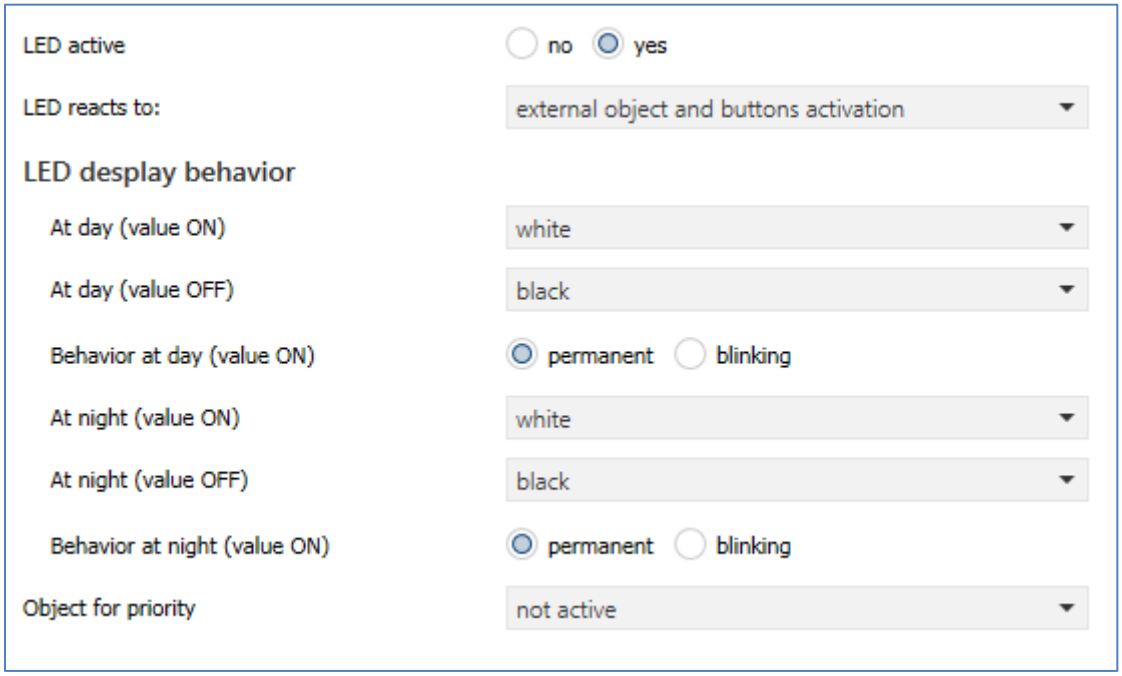

Figure 89: Settings - LEDs 1-6/LED Direct buttons 1-4

The following table shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
LED reacts to	▪ external object ▪ internal object ▪ **button activation** ▪ external object and button activation ▪ internal object and button activation	Setting how LED is to be controlled
Selection of object number	any object	Parameters only available when LED reacts to internal object; Link to internal object

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LED display behaviour		
At day (value ON)	Any color	Color for the object value ON / activated button in day mode
At day (value OFF)	Any color	Color for the object value ON / non-activated button in day mode
Behavior at day (value ON)	▪ **permanent** ▪ blinking	Setting the lighting behavior when LED has the object value ON or the key is pressed
At night (value ON)	Any color	Color for the object value ON / activated button in night mode
At night (value OFF)	Any color	Color for the object value OFF / non-activated button in night mode
Behavior at night (value ON)	▪ **permanent** ▪ blinking	Setting the lighting behavior when LED has the object value ON or the key is pressed

Table 151: Settings - LEDs 1-6/LED Direct buttons 1-4

Each LED can react either to any external object, such as the status of an actuator, an internal object or the activation of a button. In addition, an LED can also react to an external or internal object and the key operation. With this setting, the settings in menu LED 1-6/LED direct buttons 1-4 refer to the control of the LED via the object. In this case, the behaviour of the key operation is set globally for all LEDs and is described in menu 4.11.1 LED . The behaviour for key operation has priority.
If the setting LED reacts to "internal object" is selected, the object number with which the LED is to be linked is selected. If the LED is to switch when the "Object 1 - Value for switchover" has the value 1, the object number 1 is to be entered. In this case the status LED would be switched on if the object has a 1 and switched off if the object has a 0. If the LED is linked to an object which does not have a 1 bit size, the LED is switched off if the object has the value 0 and switched on if the value of the object is not equal to 0. For an object of the DPT 5.001 - percent this would mean that the LED is switched off at 0% and switched on at all other values.
Each LED can assume different colours and behaviour for day and night operation and switches on depending on the object 121-Day/Night.

The following table shows the available communications objects:

Number	Name	Length	Usage
186 - 191	LED 1 -6	1 Bit	Control of the LED; object is only faded in if LED reacts to external object
192 - 195	LED Direct button 1 - 4	1 Bit	Control of the direct button LED; object is only faded in if LED reacts to external object

Table 152: Communication objects - LEDs 1-6/LED Direct buttons 1-4

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4.11.2.1 Priority

The LED priority can force the status LED into a defined state and thus exceed the control via an external / internal object or the key actuation.

The following figure shows the available settings for each of the active LEDs:

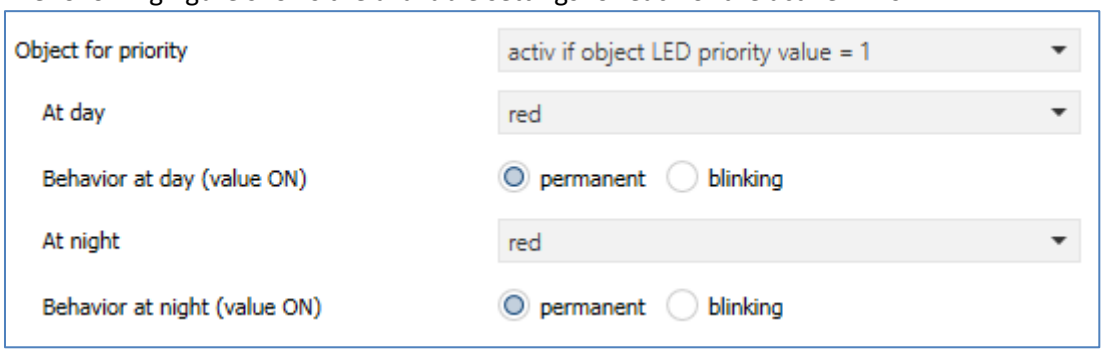

Figure 90: Setting - LED Priority

The table below shows all available settings:

ETS-Text	Dynamic range **[Default value]**	Comment
Object for priority	▪ **not active** ▪ active if object LED priority value = 1 ▪ active if object LED priority value = 0	Sets the polarity of the LED priority
At day	any color	Color for an active LED priority in day mode
Behavior at day (value ON)	▪ **permanent** ▪ blinking	Setting the lighting behavior for an active LED priority in day mode
At night	any color	Color for an active LED priority in night mode
Behavior at night (value ON)	▪ **permanent** ▪ blinking	Setting the lighting behavior for an active LED priority in night mode

Table 153: Setting - LED Priority

As long as the LED priority is active, the parameterized state for the LED priority is kept and the LED does not react to the "normal" control as described in 4.11.2 LEDs 1-6/LED Direct buttons 1-4

The following table shows the available communication objects:

Number	Name	Length	Usage
196 – 201	LED 1-6 Priorität	1 Bit	Controlling the LED priority
202 – 205	LED Direct button 1-4 Priority	1 Bit	Controlling the LED priority of the direct buttons

Table 154: Communication objects - LED Priority

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5 Index

5.1 Register of illustrations

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5.2 List of tables

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6 Attachment

6.1 Statutory requirements

The above-described devices must not be used with devices, which serve directly or indirectly the purpose of human, health- or lifesaving. Further the devices must not be used if their usage can occur danger for humans, animals or material assets.
Do not let the packaging lying around careless, plastic foil/ -bags etc. can be a dangerous toy for kids.

6.2 Disposal routine

Do not throw the waste equipment in the household rubbish. The device contains electrical devices, which must be disposed as electronic scrap. The casing contains of recyclable synthetic material.

6.3 Assemblage

Danger to life from electric current!

All work on the device may only be carried out by qualified electricians. The country-specific regulations and the valid EIB guidelines must be observed.

6.4 History

V1.1	First version of technical manual	DB V1.1	04/2020

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