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Technical Manual

MDT

Glass Room Temperature Controller

SCN-RT1GW.01
SCN-RT1GS.01

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1 Content

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2 Overview

2.1 Overview Devices

The manual refers to the following glass room temperature controller (order number printed in bold letters):

- **SCN-RT1GW.01** Glass Room temperature controller, white
  - Controller type: Two-position, PI, PWM
  - configurable LCD display with automatic brightness adjustment and adjustable alarm messages
  - ventilation control controllable by bit, byte or binary coded
  - 2 keys configurable
- **SCN-RT1GS.01** Glass Room temperature controller, black
  - same functions as before

2.2 Usage & Areas of Applications

The Glass Room temperature controller combines the complex temperature control with the simple operation on the glass LCD display. For this purpose, 4 buttons and a large LCD display are available. Two of the four buttons are available for free parameterization by the user; the other two buttons are used to operate with the display. In addition, the screen can show up to 4 alarms that are triggered via 1-bit objects, as well as a 14-byte text message.
With the control various control schemes can be realized. Applications range reaches from the room temperature controlling of a room with heating and / or air conditioning as well as in heating or cooling systems.
The application program of the room temperature controller allows you to use your device for "heating.", "cooling." or "heating and cooling-systems". Depending on which function is selected, the ETS displays various parameters and communication objects. All control functions can be used for "heating" and / or "cooling" with a "2-point control", a "PWM control" or a "continuous PI control". In addition, an additional stage for heating control can be used. For a better temperature recording in larger rooms, a temperature value can be received by a further measuring sensor via the bus. The received measurement value is incorporated in accordance with a set of weighting in the room temperature control. The temperature controller works with setpoints, which serve as reference points for the control. Various setpoints for different operating modes can be parameterized. In addition, these references can be shifted via communication objects. In addition, the glass room temperature controller has an integrated ventilation control, which can work with the control value of the temperature controller or can be controlled manual.

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2.3 Exemplary circuit diagram

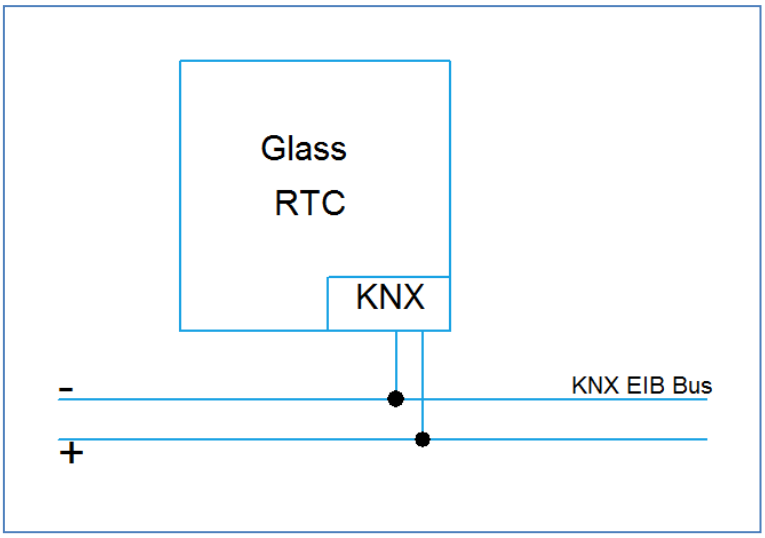

Figure 1: Exemplary circuit diagram

2.4 Design & Usage

The following figure provides an overview of the structure and controls:

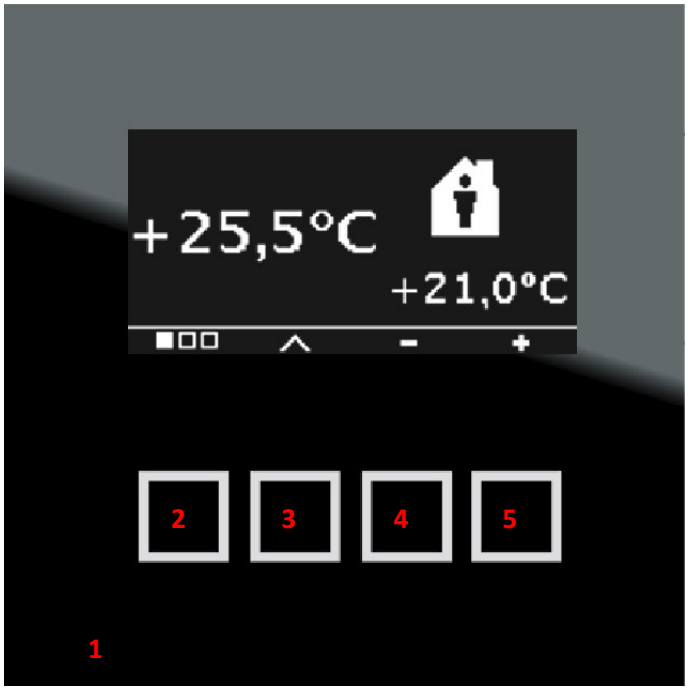

Figure 2: Design & Usage

1 = Programming button (lateral notch in the housing below the glass)
2 = Button for switching between the functional blocks
3 = Button for specific functions of the function block shown
4 & 5 = Buttons for switching in each functional block

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2.5 Functions

The functions of the glass room temperature controller are divided into the areas of LCD display, temperature control, ventilation control and configuration of the keys. In each area, the following settings can be made:

- **LCD Display**
  The presentation and the brightness of the display can be set here. Furthermore the language of the Display and an inverting of the colors can be set here.
- **Temperature Controller**
  The temperature controller is again divided into the following sub-menus:
  - **Temperature measurement**
    In this menu, settings for temperature measurements, such as min / max values and sensor configurations can be parameterized.
  - **Alarm/Messages**
    Alarms / messages, which show falling below or exceeding certain temperatures, can be set here. Also messages, which are shown at the display, can be set here.
  - **Controller general**
    The desired function (Heating and/or Cooling) are set in this menu. Furthermore the setpoints and operating modes can be set here.
  - **Controller settings**
    If one type of controller is set, the behavior of the manipulated variable can be set here. The setting options depend on the used controller.
- **Ventilation Control**
  The ventilation control allows the control of fans and can be controlled as well manually as by the current value of the output value or by the difference between setpoint and current value.
- **Key function of button C/D**
  The key function can be set as well grouped as separately. As well switching function as shutter and dimming functions can be used.

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2.6. Settings at the ETS-Software

Selection at the product database:

Manufacturer: MDT Technologies
Product family: Control
Product type: Any
Medium Type: Twisted Pair (TP)
Product name: SCN-RT1GW.01
Order number: SCN-RT1GW.01

2.7. Starting up

After wiring the allocation of the physical address and the parameterization of every channel follow:

(1) Connect the interface with the bus, e.g. MDT USB interface
(2) set bus power up
(3) Press the programming button at the device(red programming LED lights)
(4) Loading of the physical address out of the ETS-Software by using the interface(red LED goes out, as well this process was completed successful)
(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)

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3 Communication objects

3.1 Summary and Usage

3.1.1 LCD-Display

Nr.	Name	Object function	Data type	Direction	Info	Usage	Tip
Objects for LCD-Display:							
27	Day/Night	Switching	DPT 1.001	receive	Display responds to input telegram	Control buttons, Visu, external status, Time Switch	Communication object is permanently displayed and used for switching the backlight of the display
54	Time	Receive status	DPT 10.001	receive	Display responds to input telegram	Time Switch, Group monitor(once), Visu	Communication object is permanently displayed and used to show the right time of day. Value should be sent regularly to achieve sufficient accuracy.
56-59	Message 1-4	Alarm input fort text message	DPT 1.001	receive	Display responds to input telegram	Status objects, Alarm objects…	Communication object will appear if alarms are activated in the Alarms menu. By receiving a 1, the set message is shown on the display

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60	Message 14 Byte	Variable text message	DPT 16.000	receive	Display responds to input telegram	Visu, Control unit, Tableau	Communication object is displayed as soon as this alarms / messages is enabled in the menu; can display arbitrary string.

Table 1: Overview communication objects - LCD Display

3.1.2 Room temperature controller

Objects for room temperature controller:							
0	Actual temperature value	Transmit temperature value	DPT 9.001	send	Controller sends current temperature	Visu, Display, Diagnostic,…	Communication object is shown permanent and sends according to the setting its current value or can only be read via the bus
1	max. temperature	Exceeded value	DPT 1.001	send	Controller sends state	Visu, Display, Diagnostic,…	Communication object is shown when messages are active
2	min. temperature	Below the value	DPT 1.001	send	Controller sends state	Visu, Display, Diagnostic,…	Communication object is shown when messages are active
3	Frost alarm	Send alarm	DPT 1.001	send	Controller sends state	Visu, Display, Diagnostic, Additional stage,…	Communication object is shown when alarms are active

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4	Heat alarm	Send alarm	DPT 1.001	send	Controller sends state	Visu, Display, Diagnostic, Additional stage,…	Communication object is shown when alarms are active
5	External sensor	Read external sensor	DPT 9.001	receive	Controller receives external temperature	Input for external temperature	Communication object is shown when sensor is set to at least 10% external sensor
6	Setpoint comfort	Set setpoint	DPT 9.001	receive	Controller receives new absolute setpoint	Visu, Opereating keys, Control unit	Object is permanent shown when the controller is active. A new setpoint can be set via this object.
7	Manual setpoint value offset	Reduction/Increase	DPT 9.002	receive	Controller receives new setpoint offset	Visu, Display, Operating keys, Control unit	Object is shown when the setpoint offset via 2 Byte object is active. The setpoint is shifted according to the current setpoint.
8	Control value heating	Send control value	DPT 1.001/ DPT 5.001	send	Controller sends manipulated value	Heating actuator, actuators	Object is shown when the controller is set to heating. The DPT depends to the controller type (two-level & PWM – DPT1.001, PI-DPT5.001).

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8	Control value heating/cooling	Send control value	DPT 1.001/ DPT 5.001	send	Controller sends manipulated value	Heating actuator, actuators	Object is shown when the controller is set to heating and cooling. The DPT depends to the controller type (two-level & PWM – DPT1.001, PI-DPT5.001).
9	Control value additional heating	Send control value	DPT 1.001	send	Controller sends manipulated value	Heating actuator, actuators	Object is shown when the controller is set to heating and an additional stage is activated. The DPT depends to the adjusted controller type (two-level & PWM – DPT1.001, PI-DPT5.001).
10	Control value cooling	Send control value	DPT 1.001/ DPT 5.001	send	Controller sends manipulated value	Heating actuator, actuators	Object is shown when the controller is set to cooling. The DPT depends to the controller type (two-level & PWM – DPT1.001, PI-DPT5.001).
11	Mode comfort	Switch mode	DPT 1.001	receive	Controller switches mode	Visu, Opereating keys, Control unit	Object is always shown and switches the operating modes according to the adjusted priority.
12	Mode Night	Switch mode	DPT 1.001	receive	Controller switches mode	Visu, Opereating keys, Control unit	Object is always shown and switches the operating modes according to the adjusted priority.
13	Mode Frost/Heat protection	Switch mode	DPT 1.001	receive	Controller switches mode	Visu, Opereating keys, Control unit	Wird standardmäßig eingeblendet. Betriebsart schaltet in Abhängigkeit der eingestellten Priorität.

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14	Heating disable object	Disable heating	DPT 1.003	recieve	Controller diasables heating	Visu, Opereating keys, Control unit	Can be activated in the settings when the controller is set to heating.
15	Cooling disable object	Disable cooling	DPT 1.003	recieve	Controller diasables cooling	Visu, Opereating keys, Control unit	Can be activated in the settings when the controller is set to cooling.
17	Heating request	Send request	DPT 1.001	send	Controller sends heating request	Actuator for switching the heating pump…	Can be activated in the settings when the controller is set to heating.
18	Cooling request	Send request	DPT 1.001	send	Controller sends cooling request	Actuator for switching the cooling pump…	Can be activated in the settings when the controller is set to cooling.
19	Heating/Cooling switchover	0 = cooling, 1 = heating	DPT 1.001	receive	Controller switches between heating and cooling	Visu, Opereating keys, Control unit	Can be activated in the parameter when the controller is set to heating and cooling.
20	Outside temperature	Read external sensor	DPT 9.001	receive	Controller receives temperature from outside sensor	Outdoor temperature sensor	Object is shown when the guiding is activated in the parameter
21	Max memory value	Read memory	DPT 9.001	send	Controller sends max. temperature	Visu, Display, Diagnostic…	Object is shown when the min/max values are activated
22	Min memory value	Read memory	DPT 9.001	send	Controller sends min. temperature	Visu, Display, Diagnostic…	Object is shown when the min/max values are activated
23	Min/Max Memory Reset	Reset memory	DPT 1.001	receive	Controller resets min/max values	Visu, Opereating keys, Control unit	Object is shown when the min/max values are activated

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24	Reset setpoint value	Parameter read in	DPT 1.001	receive	Controller resets the setpoints to the values which are set in the parameter	Visu, Opereating keys, Control unit	Object is always shown when the controller is active
25	DPT_HVAC Status	Send controller status	-	send	Controller sends current state	Visu, Display, Diagnostic,…	Object is always shown when the controller is active
28	Error external sensor	Error message	DPT 1.001	send	Controller sends state	Visu, Display, Diagnostic,…	Object is always shown when the controller is active
29	Actual setpoint	Send setpoint	DPT 9.001	send	Conntroller sends current setpoint at a read request	Visu, Display, Diagnostic,…	Object is always shown when the controller is active
30	RHCC Status	Send controller status	DPT 22.101	send	Controller sends current state	Visu, Display, Diagnostic,…	Object is always shown when the controller is active
31	Mode selection	Select mode	DPT 20.102	receive/ send	Controller switches between operating modes and sends the current operating mode if activated	Visu, Operating keys, Control unit, Display, Diagnostic, …	Communication object is permanently displayed when the controller was activated. Via the parameter “Send status on object 31 mode selection”, the sending of this object can be activated. So this object can be directly used by home servers and visualizations.

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32	Manual setpoint value offset	Increase/Reduction (1 = + adjusted step, 0 = - adjusted step)	DPT 1.001	receive	Controller receives setpoint value offset via a 1 Bit object	Visu, Operating keys, Control unit, Display, Diagnostic, …	Object is shown when parameter “Setpoint value offset via” is set to 1 Bit object and shifts the set value depending on the current setpoint. The amount of displacement can be set in the parameters.

Table 2: Overview communication objects - Room Temperature Controller

3.1.3 Ventilation Control

Objects for Ventilation Control:							
38	Ventilation Control	Block	DPT 1.003	receive	Controller locks ventilation control	Visu, Operating keys, Control unit, Display, …	Object is only shown when the locking function was activated in the settings
39	Ventilation Control	Level 1	DPT 1.001	send	Controller switches level 1	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch bit coded
39	Ventilation Control	Bit 0	DPT 1.002	send	Controller switches Bit 0	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch binary coded

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40	Ventilation Control	Level 2	DPT 1.001	send	Controller switches level 2	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch bit coded
40	Ventilation Control	Bit 1	DPT 1.002	send	Controller switches Bit 1	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch binary coded
39	Ventilation Control	Level 1+2	DPT 1.001	send	Controller switches level 1 und 2	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch simply
41	Ventilation Control	Level 3	DPT 1.001	send	Controller switches level 3	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch bit coded
41	Ventilation Control	Bit 2	DPT 1.002	send	Controller switches Bit 2	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch binary coded
41	Ventilation Control	Level 1+2+3	DPT 1.001	send	Controller switches level 1, 2 und 3	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch simply

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42	Ventilation Control	Level 4	DPT 1.001	send	Controller switches level 4	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch bit coded
42	Ventilation Control	Level 1+2+3+4	DPT 1.001	send	Controller switches level 1, 2, 3 und 4	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting step switch simply
43	Ventilation Control	1 Byte Status ventilation level	DPT 5.010	send	Controller sends current status	Visu, Operating keys, Control unit, Display, …	Object must be activated in the settings by the parameter “Use status object 43 as”. Object sends the current level: Value 1 = Level 1, Value 2 = Level 2…
43	Ventilation Control	Status for ventilation active	DPT 1.001	send	Controller sends current status	Visu, Operating keys, Control unit, Display, …	Object must be activated in the settings by the parameter “Use status object 43 as”. Object sends whether the ventilation is active or not.
44	Ventilation Control	Control value	DPT 5.001	send	Controller sends manipulated value	Actuator for controlling a ventilation system, Fan-Coil actuator	Object is shown at the setting „Step switch as Byte“
45	Ventilation Control	Object priority	DPT 1.001	receive	Controller receives incoming telegram	Visu, Operating keys, Control unit, Display, …	Object must be activated in the settings and can call several states.

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46	Ventilation Control	Switch automatic	DPT 1.001	send & receive	Conbtroller switches between automatic and manual mode and sends its current value if the value was toggled at the display	Visu, Operating keys, Control unit, Display, …	Object is always shown when the ventilation control is active.
47	Ventilation Control	Control levels manually	DPT 1.008	receive	Controller switches controller level according to the incoming telegram, 1 = 1 level up, 0 = 1 level down	Visu, Operating keys, Control unit, Display, …	Object is always shown when the ventilation control is active.

Table 3: Overview communication objects - Ventilation Control

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3.1.4 Key functions

Objects for key functions – Buttons grouped:							
61	Button C/D	Dimming On/Off	DPT 1.001	send	Display sends current value	Dimming actuator	Object is shown at the setting Buttons grouped->Dimming
61	Button C/D	Shutter down/up	DPT 1.008	send	Display sends current value	Shutter actuator	Object is shown at the setting Buttons grouped->Shutter
61	Button C/D	Switch On/Off	DPT 1.001	send	Display sends current value	Switch actuator…	Object is shown at the setting Buttons grouped->Switch
62	Button C/D	Dimming	DPT 3.007	send	Display sends current value	Dimming actuator	Object is shown at the setting Buttons grouped->Dimming
62	Button C/D	Stop/Slats Open/Close	DPT 1.009	send	Display sends current value	Shutter actuator	Object is shown at the setting Buttons grouped->Shutter
63	Button C/D	Status dimming value	DPT 5.001	receive	Display receives current state	Dimming actuator	Object is shown at the setting Buttons grouped->Dimming
63	Button C/D	Status absolute position	DPT 5.001	receive	Display receives current state	Shutter actuator	Object is shown at the setting Buttons grouped->Shutter

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Objects for key functions – Buttons separately:							
61	Button C	Switch	DPT 1.001	send	Display sends value	Schaltaktor…	Object is shown at the setting Buttons separately->Switch->Switch/Toggle on key press
61	Button C	Send value	DPT 5.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Switch->Send value
61	Button C	Short key press	DPT 1.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Switch short/long->On/Off
61	Button C	Short key press	DPT 5.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Switch short/long->Send value
61	Button C	Toggle Heating/Cooling	DPT 1.001	send	Display sends value	Regler, interne Verarbeitung…	Object is shown at the setting Buttons separately->Toggle heating/cooling
62	Button C	Value for toggle	DPT 1.001	receive	Display receives current state	Aktor…	Object is shown at the setting Buttons separately->all functions with toggle function; object must be connected with the state of the actuator
63	Button C	Scene	DPT 18.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Scene
63	Button C	Long key press	DPT 1.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Switch short/long->On/Off

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63	Button C	Long key press	DPT 5.001	send	Display sends value	Aktor…	Object is shown at the setting Buttons separately->Switch short/long->Send value
64-67	Button D	same functionality as button C available					

Table 4: Overview communication objects - Key functions

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3.2 Default settings of the communication objects

The respective table shows the default values for the communication objects. According to requirements the priority of the particular communication objects as well as the flags can be adjusted by the user. The flags allocates the function of the objects in the programming thereby stands C for communication, R for Read, W for write, T for transmit and U for update.

3.2.1 LCD Display

Default settings									
Nr.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
27	Day/Night	Switching	1 Bit	Low	X		X		
54	Time	Receive status	3 Byte	Low	X		X	X	
56-59	Message 1-4	Alarm input fort ext message	1 Bit	Low	X		X		
60	Message 14 Byte	Variable text message	14 Byte	Low	X		X		

Table 5: Default settings communication objects - LCD Display

3.2.2 Room Temperature Controller

Default settings									
Nr.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
0	Actual temperature value	Transmit temperature value	2 Byte	Low	X	X		X	
1	max. temperature	Exceeded value	1 Bit	Low	X	X		X	
2	min. temperature	Below the value	1 Bit	Low	X	X		X	
3	Frost alarm	Send alarm	1 Bit	Low	X	X		X	
4	Heat alarm	Send alarm	1 Bit	Low	X	X		X	
5	External sensor	Read external sensor	2 Byte	Low	X		X		
6	Setpoint comfort	Set setpoint	2 Byte	Low	X	X	X	X	
7	Manual setpoint value offset	Reduction/Increase	2 Byte	Low	X		X		
8	Control value heating	Send control value	1 Bit	Low	X	X		X	
8	Control value heating	Send control value	1 Byte	Low	X	X		X	
8	Control value heating/cooling	Send control value	1 Bit	Low	X	X		X	

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8	Control value heating/cooling	Send control value	1 Byte	Low	X	X		X	
9	Control value additional heating	Send control value	1 Bit	Low	X	X		X	
10	Control value cooling	Send control value	1 Bit	Low	X	X		X	
10	Mode comfort	Switch mode	1 Byte	Low	X	X		X	
11	Mode Night	Switch mode	1 Bit	Low	X	X	X		
12	Mode Frost/Heat protection	Switch mode	1 Bit	Low	X	X	X		
13	Control value additional heating	Send control value	1 Bit	Low	X	X	X		
14	Heating disable object	Disable heating	1 Bit	Low	X		X		
15	Cooling disable object	Disable cooling	1 Bit	Low	X		X		
17	Heating request	Send request	1 Bit	Low	X	X		X	
18	Cooling request	Send request	1 Bit	Low	X	X		X	
19	Heating/Cooling switchover	0 = cooling, 1 = heating	1 Bit	Low	X		X		
20	Outside temperature	Read external sensor	2 Byte	Low	X	X	X		
21	Max memory value	Read memory	2 Byte	Low	X	X	X	X	
22	Min memory value	Read memory	2 Byte	Low	X	X	X	X	
23	Min/Max Memory Reset	Reset memory	1 Bit	Low	X		X	X	
24	Reset setpoint value	Parameter read in	1 Bit	Low	X		X		
25	DPT_HVAC Status	Send controller status	1 Byte	Low	X	X		X	
27	Error external sensor	Error message	1 Bit	Low	X		X		
28	Actual setpoint	Send setpoint	1 Bit	Low	X	X		X	
29	RHCC Status	Send controller status	2 Byte	Low	X	X		X	
30	Mode selection	Select mode	2 Byte	Low	X	X		X	
31	Reset setpoint value	Parameter read in	1 Byte	Low	X		X	X	
32	Manual setpoint value offset	Increase/Reduction (1 = + adjusted step, 0 = - adjusted step)	1 Bit	Low	X		X		

Table 6: Default settings communication objects – Room Temperature Controller

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3.2.3 Ventilation Control

Default settings									
Nr.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
38	Ventilation Control	Block	1 Bit	Low	X		X		
39	Ventilation Control	Level 1	1 Bit	Low	X	X		X	
39	Ventilation Control	Bit 0	1 Bit	Low	X	X		X	
39	Ventilation Control	Level 1	1 Bit	Low	X	X		X	
40	Ventilation Control	Level 2	1 Bit	Low	X	X		X	
40	Ventilation Control	Bit 1	1 Bit	Low	X	X		X	
39	Ventilation Control	Level 1+2	1 Bit	Low	X	X		X	
41	Ventilation Control	Level 3	1 Bit	Low	X	X		X	
41	Ventilation Control	Bit 2	1 Bit	Low	X	X		X	
41	Ventilation Control	Level 1+2+3	1 Bit	Low	X	X		X	
42	Ventilation Control	Level 4	1 Bit	Low	X	X		X	
42	Ventilation Control	Level 1+2+3+4	1 Bit	Low	X	X		X	
43	Ventilation Control	1 Byte Status ventilation level	1 Byte	Low	X	X	X	X	
43	Ventilation Control	Status for ventilation active	1 Bit	Low	X	X	X	X	
44	Ventilation Control	Control value	1 Byte	Low	X	X		X	
45	Ventilation Control	Object priority	1 Bit	Low	X		X		
46	Ventilation Control	Switch automatic	1 Bit	Low	X	X	X	X	
47	Ventilation Control	Control levels manually	1 Bit	Low	X		X		

Table 7: Default settings communication objects - Ventilation Control

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3.2.4 Key functions

Default settings									
Nr.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
Buttons grouped									
61	Button C/D	Dimming On/Off	1 Bit	Low	X	X		X	
61	Button C/D	Shutter down/up	1 Bit	Low	X	X		X	
61	Button C/D	Switch On/Off	1 Bit	Low	X	X		X	
62	Button C/D	Dimming	4 Bit	Low	X	X		X	
62	Button C/D	Stop/Slats Open/Close	1 Bit	Low	X	X		X	
63	Button C/D	Status dimming value	1 Byte	Low	X		X		
63	Button C/D	Status absolute position	1 Byte	Low	X		X		
Buttons separately									
61	Button C	Switch	1 Bit	Low	X	X		X	
61	Button C	Send value	1 Byte	Low	X	X		X	
61	Button C	Short key press	1 Bit	Low	X	X		X	
61	Button C	Short key press	1 Byte	Low	X	X		X	
61	Button C	Toggle Heating/Cooling	1 Bit	Low	X		X	X	
62	Button C	Value for toggle	1 Bit	Low	X		X	X	X
63	Button C	Scene	1 Byte	Low	X		X	X	
63	Button C	Long key press	1 Bit	Low	X	X		X	
63	Button C	Long key press	1 Byte	Low	X	X		X	

Table 8: : Default settings communication objects - Key functions

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4 General settings

The figure shows the general settings, which effect to all areas of the device:

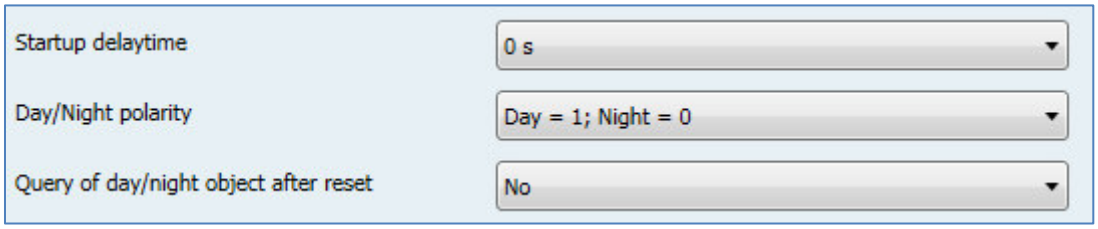

Figure 3: Menu General Settings

In der nachfolgenden Tabelle sind die Einstellmöglichkeiten für dieses Menü dargestellt:

ETS-text	Dynamic range **[default value]**	comment
Startup delaytime	0-60s **[0s]**	defines the time between a reset and the functional start of the device
Day/Night polarity	▪ **Day = 1; Night = 0** ▪ Day = 0; Night = 1	defines the polarity of the day/night object
Query of day/night object after reset	▪ **No** ▪ Yes	defines the behavior after a reset

Table 9: General settings

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5 Settings LCD-Display

5.1 General

The following figure shows the menu “LCD-Display”:

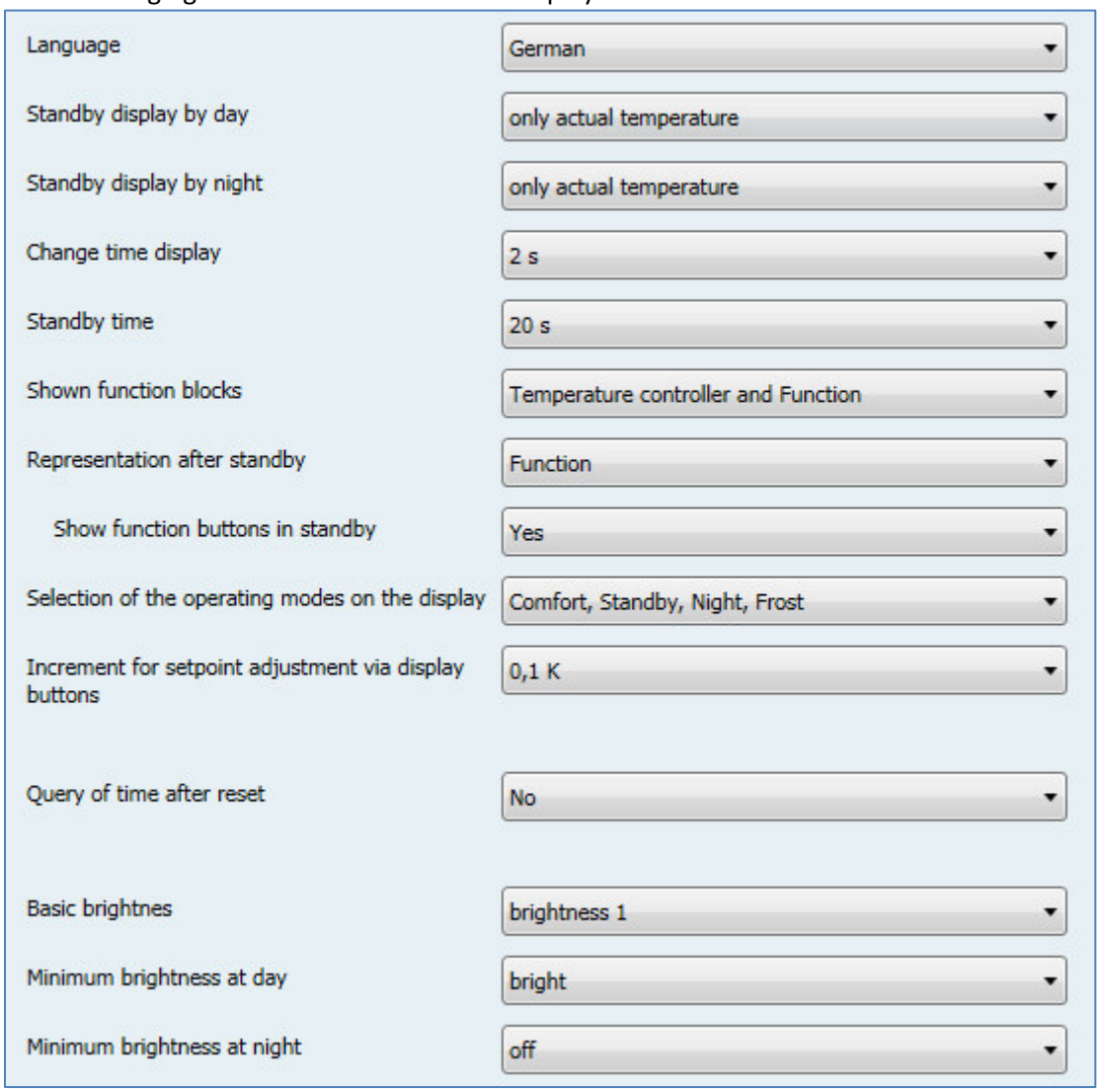

Figure 4: Menu LCD Display

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The following table shows the general settings for the LCD-Display:

ETS-text	Dynamic range **[default value]**	comment
Language	▪ **German** ▪ English	Selection of the language
Query of time after reset	▪ **No** ▪ Yes	defines whether the time is queried after a reset

Table 10: General settings LCD-Display

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The following table shows the available settings for the LCD-Display:

ETS-text	Dynamic range **[default value]**	comment
Standby-Display at Day/Night	▪ switched off ▪ **only actual temperature** ▪ only time ▪ only outside temperature ▪ actual temperature and time ▪ actual temperature and outside temperature ▪ time and outside temperature ▪ actual temperature and outside temperature, time	defines the functional block, which is displayed in standby
Change time between function blocks	never-60s **[2s]**	defines how long a functional block (temperature, time or outside temperature) is shown; is only kept if the standby-mode shows more than one functional block
Time until Display changes into standby	never-60s **[20s]**	defines the time between the last key press and activating of the standby-mode
Shown functional blocks	▪ Temperature controller ▪ Ventilation control ▪ **Temperature controller and function** ▪ Temperature controller and ventilation control ▪ Ventilation control and function ▪ Temperature controller, ventilation control and function	defines the functional blocks, which can be controlled via the display
Representation after standby	▪ Function ▪ Temperature controller ▪ Ventilation control	defines the functional block, which is called after a reset, only active blocks can be chosen
Show function buttons in standby	▪ No ▪ **Yes**	defines if the buttons C/D should be shown in the standby mode

Table 11: Display Settings

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The following table shows the available settings for controlling the room temperature controller via the LCD-Display:

ETS-text	Dynamic range **[default value]**	comment
Selection of the operating modes on the display	▪ Comfort, Night ▪ Comfort, Standby ▪ Comfort, Night, Standby ▪ **Comfort, Night, Standby, Frost**	defines the operating modes which can be selected via the display
Increment for setpoint adjustment via display buttons	▪ Inactive ▪ 0,1K – 1K **[0,2K]**	defines the increment for the setpoint adjustment via the display

Table 12: Settings LCD Display - Room Temperature Controller

The following table shows the available settings for adjusting the brightness of the LCD Display:

ETS-text	Dynamic range **[default value]**	comment
Basic brightness	▪ **Brightness 1** ▪ Brightness 2 ▪ Brightness 3 ▪ Brightness 4	defines the basic brightness of the display
Minimum brightness at day	▪ off ▪ dark ▪ medium ▪ **bright**	defines the minimum brightness at day
Minimum brightness at night	▪ **off** ▪ dark ▪ medium ▪ bright	defines the minimum brightness at night

Table 13: Settings LCD Display - Brightness

The brightness of the display is dynamically adapted to the environment. The settings in the parameters give only the framework for this adaptation. Thus, for example the screen is turned off only in a dark room when the minimum brightness during the day / night is set to OFF.

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5.2 LCD-Alarm messages

The LCD-Alarm messages can be set in the menu Alarm/Messages:

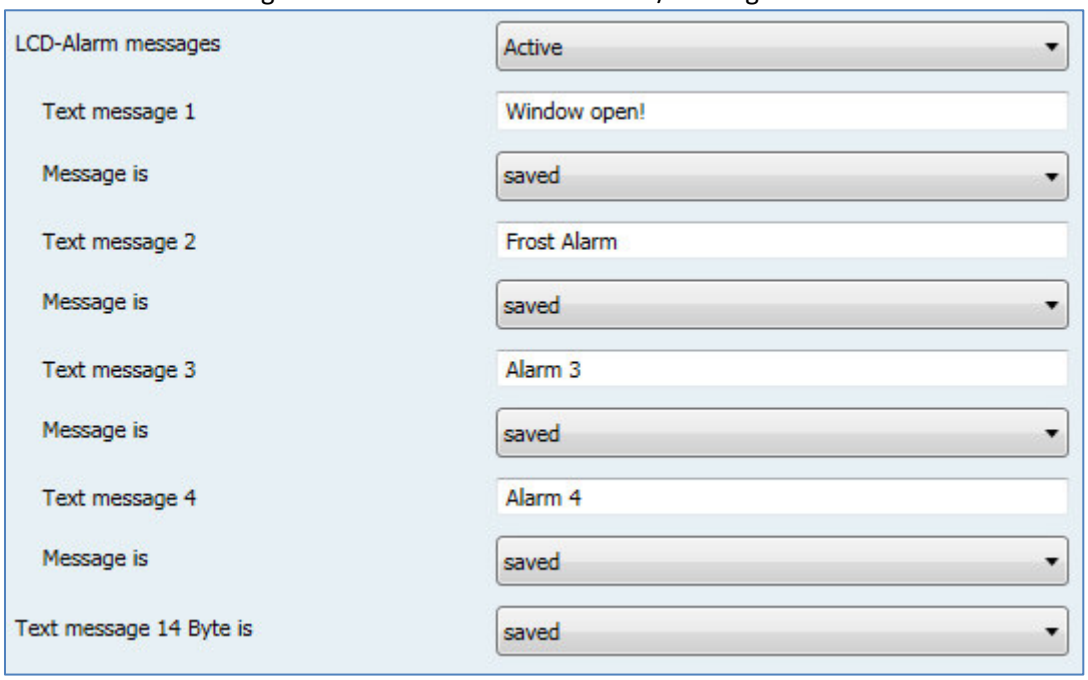

Figure 5: LCD-Alarm messages

Up to 4 text messages with a maximum of 14 characters can be fixed. This 4 text messages are shown on the display when the associated communication object receives the value 1. In addition, a variable text message can be enabled. At this object, any string of the length 14 characters can be sent.
For all text messages, it can be selected whether they are saved or displayed only briefly:

- **displayed only briefly**
  The message is deleted when the display goes into standby mode. Changes the display after 20 seconds in standby mode, the message will be removed after 20 seconds and is no longer comprehensible.
- **saved**
  The message is stored in the display and not deleted when switching to standby mode, but shown here as an incoming message. The message is not deleted as soon as they were acknowledged or viewed by the user.

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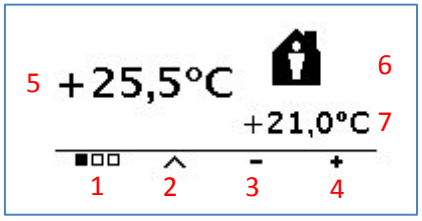
5.3 Display and Operation

5.3.1 Display in Standby-Mode

In standby mode, the outdoor temperature, indoor temperature and time are displayed. Subsequently, the outside temperature is shown:

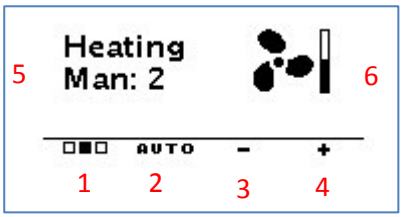
5.3.2 Display of the functional blocks

The following picture shows the functional block **temperature controller**:



1 = Switching between functional blocks
2 = Switching between operating modes
3 & 4 = Decrease / increase the setpoint
5 = Current temperature
6 = Current operating mode
7 = Current Setpoint

The following picture shows the functional block **ventilation control**:



1 = Switching between functional blocks
2 = Switching between automatic/manual mode
3 & 4 = Decrease/increase ventilation level
5 = Current ventilation level and display whether automatic (auto) or manual (man) mode is active
6 = Graphical display of the current ventilation level

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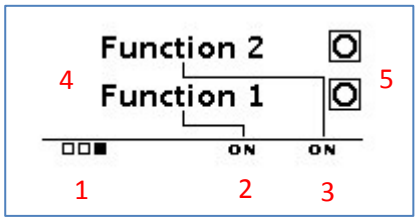
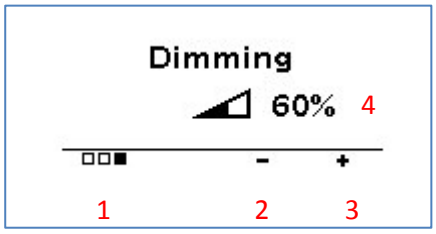
The following picture shows the functional block **function with,** here with two switching functions:



1 = Switching between functional blocks
2 & 3= Switching the functions
4 = Function name from the parameter settings
5 = Display of the function state

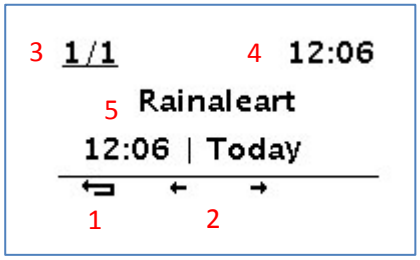
The following picture shows the functional block **function with,** here with a grouped dimming function:



1 = Switching between functional blocks
2 & 3= Dimming up/down
4 = Display of the function and the current state

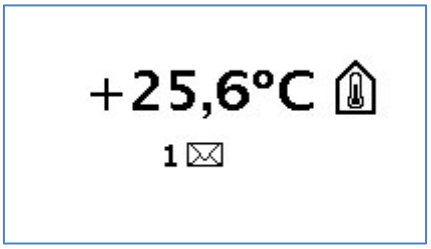
5.3.3 Presentation of text messages

The following picture shows an active text message:



1 = Acknowledgment of the message
2 = Switching between the messages in the memory
3 = Shown messages, here the first of one
4 = Current time of day
5 = Text message and time when the message was sent

In standby mode, a text message is displayed with a small envelope icon. The number indicates the number of stored messages:



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6 Room Temperature Controller

6.1 Temperature Measurement

The following figure shows the menu “Temperature Measurement“:

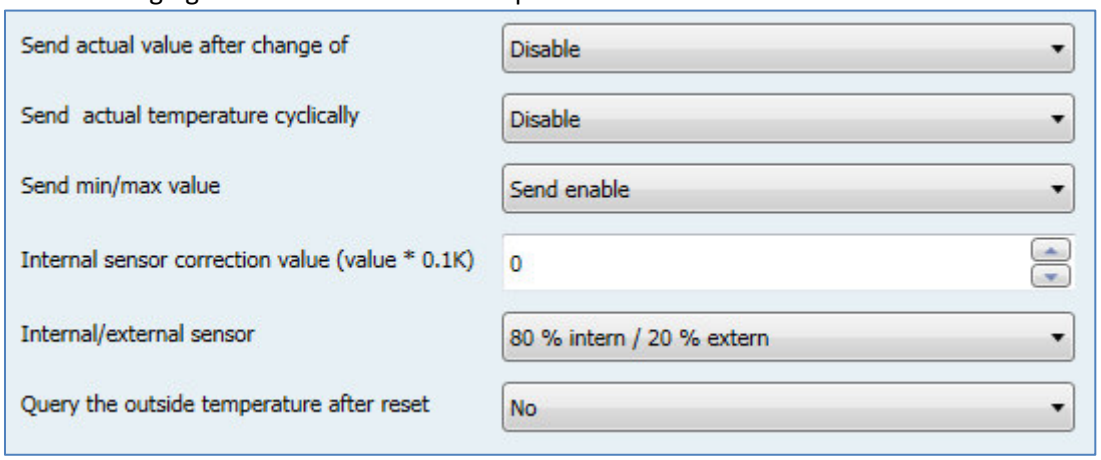

Figure 6: Temperature Measurement

The table shows the available settings for this menu:

ETS-text	Dynamic range **[default value]**	comment
Send actual value after change of	▪ **disable** ▪ 0,1K - 2,0K	Sending condition for the actual temperature value
Send actual temperature cyclically	▪ **disable** ▪ 1 min – 60 min	Activation of the cyclically sending of the temperature value
Send min/max value	▪ **disable** ▪ Send enable	Activation of the sending of min/max values
Internal sensor correction value (value*0,1K)	-50 – 50 [0]	Correction of the internal sensor
Internal/external sensor	▪ **100% intern** ▪ 90% intern/ 10% extern ▪ 80 % intern/ 20% extern ▪ … ▪ 100% extern	Adjustment of the balance between internal and external sensor
Query the outside temperature after reset	▪ **No** ▪ Yes	determines whether the temperature is to be queried after a reset

Table 14: Paramter temperature measurement

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- **Send actual value after change of**
  This functions sets when the current temperature value shall be sent. By choosing the setting “disable”, no value will be sent at all.

- **Send actual temperature cyclically**
  You can activate this function by choosing a time. Now, the room temperature controller sends the current temperature periodically after the adjusted time. This function is independent from the function “Send actual value after change of”. So the temperature controller will send its current value also if there is no change of it.

- **Internal sensor correction value (value*0,1K)**
  You can correct the measured temperature value by this setting. By choosing a negative value for this parameter, the measured value will be lowered and by choosing a positive value, the measured value will be lifted. The value is multiplied by 0,1K, so the current value can be lowered or lifted up to 5K. This setting is useful, when the sensor was built at an unfavorable location, e.g. becoming draft or next to a window. When this function is activated, the temperature controller will also send the corrected values.
  All sensors are matched in-plant to 0,1K.

The chart shows the relevant communication object for the temperature value:

Number	Name	Length	Usage
0	Actual temperature value	2 Byte	sends the current temperature value

Table 15: Communication object temperature value

- **Send min/max value**
  This function activates the sending and saving of the min/max values. When the function is activated by “Send enable”, three communication objects will be shown. Two objects for the Min and the Max value and one for the reset of the min/max values.
  The chart shows the relevant communication objects for this parameter:

Number	Name	Length	Usage
21	Max memory value	2 Byte	sends and saves the maximal temperature value
22	Min memory value	2 Byte	sends and saves the minimal temperature value
23	Min/Max memory reset	1 Bit	resets the min/max values

Table 16: Communication objects Min/Max values

- **Internal/external sensor**
  This setting sets the balance between an internal and an external sensor. The setting 100% intern deactivates any external sensor. By choosing any other setting, an external sensor will be activated. So, also communication objects for the external are shown. A balance of 100% extern deactivates the internal sensor and the temperature controller will only note values of the external sensor.
  The communication objects for an activated external sensor are shown at the chart:

Number	Name	Length	Usage
5	External sensor	2 Byte	sends the measured temperature value of the external sensor
28	Error external sensor	1 Bit	sends an error, when the external sensor sends no value for more than 30min

Table 17: Communication objects external sensor

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6.2 Alarm/Messages

The following figure shows the menu “Alarm/Messages“:

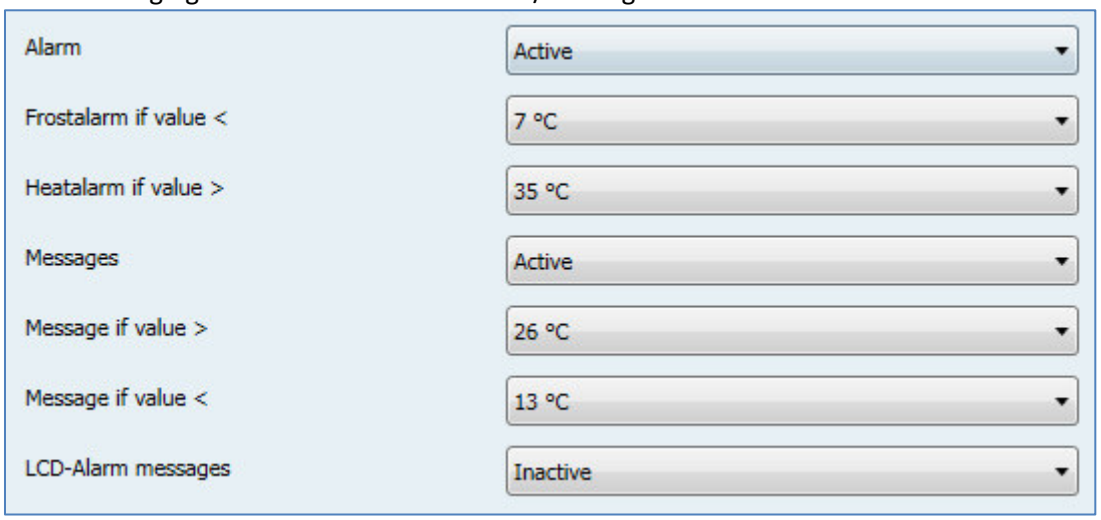

Figure 7: Alarm/Messages

The settings for the LCD-Alarm messages are descripted in the menu 5.2 LCD-Alarm messages.

The table shows the available settings for this menu:

ETS-text	Dynamic range **[default value]**	comment
Alarm	▪ **not active** ▪ active	Activation of the alarm function
Frostalarm if value <	3°C-10°C [7°C]	Dynamic range of the frostalarm Adjustment possible if alarm is activated
Heatalarm if value >	25°C-40°C [35°C]	Dynamic range of the heatalarm Adjustment possible if alarm is activated
Messages	▪ **not active** ▪ active	Activation of the message function
Message if value >	18°C-40°C [26°C]	Dynamic range of the upper message Adjustment possible if messages are activated
Message if value <	1°C-25°C [13°C]	Dynamic range of the lower message Adjustment possible if messages are activated

Table 18: Parameter Alarm/Messages

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- **Alarm**
  There are two parameterizeable alarms, when the alarm function was activated. The frostalarm is for the notification of the lower temperatures and the heatalarm for the notification of the upper temperatures. Both alarms have a separate communication object with the size of 1 Bit.
  The chart shows the relevant communication objects for the alarms:

Number	Name	Length	Usage
3	Frostalarm	1 Bit	send frostalarm
4	Heatalarm	1 Bit	send heatalarm

Table 19: Communication objects alarm

- **Messages**
  The message function is almost identical to the alarm function, but less in its priority. There are two messages available, when the message function was activated. These two messages can be parameterized separately. The dynamic range of the message function is much bigger than the one of the alarm function. So it is also possible, to realize running turn over. Both messages have an own communication object of the size 1 bit. These communication objects are shown in the chart below:

Number	Name	Length	Usage
1	Higher message value	1 Bit	Send the achievement of the higher reporting limit
2	Below message value	1 Bit	Send the achievement of the lower reporting limit

Table 20: Communication objects messages

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6.3 Controller general

6.3.1 Controller type

The following figure shows the available settings for the controller type in the menu controller general:

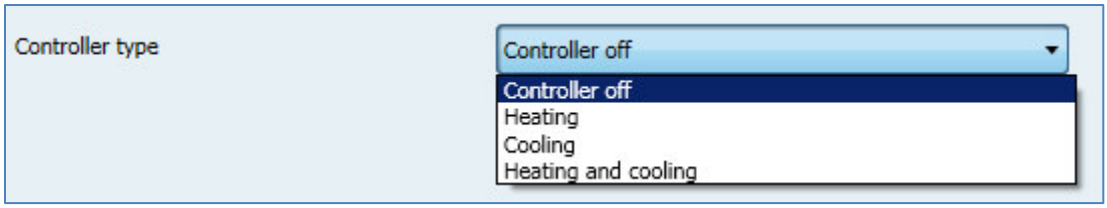

Figure 8: Settings controller type

The chart shows the dynamic range of the controller type:

ETS-text	Dynamic range **[default value]**	comment
Controller type	▪ Controller off ▪ **Heating** ▪ Cooling ▪ Heating and Cooling	Adjustment of the controller type The further settings depend to the adjusted controller type

Table 21: Setting controller type

The controller type defines the function of the room temperature controller. Target of the control is to keep an adjusted temperature constant. There are a lot of settings, which can help to achieve this aim. The settings depend to the adjusted controller type.
By choosing the setting “controller off”, no further settings are possible.

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6.3.2 Operating modes & Setpoints

The following figure shows the available settings for the operating modes and the setpoints:

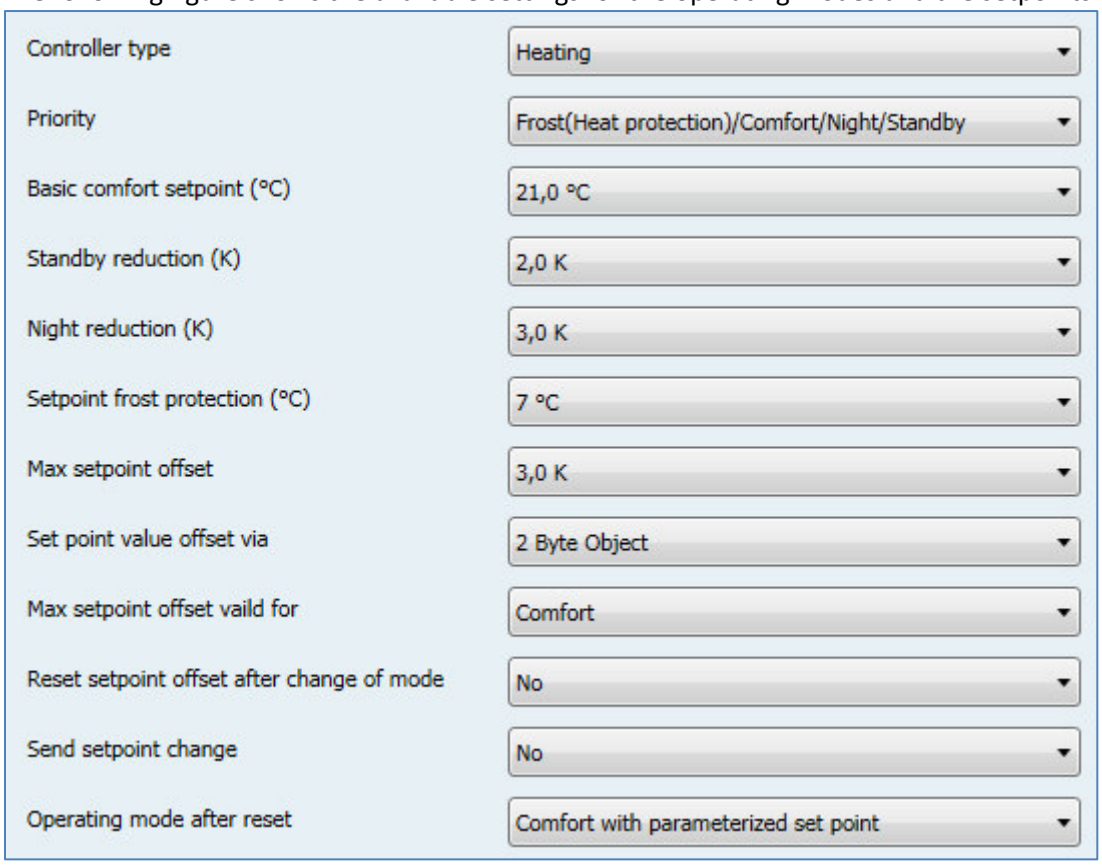

Figure 9: Settings operating modes & setpoints

Die folgende Tabelle zeigt die einzelnen Betriebsarten und deren Einstellbereiche:

ETS-text	Dynamic range **[default value]**	comment
Basis comfort setpoint	18,0°C – 25,0°C [21,0°C]	The basis comfort setpoint is the reference point of the control.
Night reduction	**Lowering in K** 0 K – 10,0 K [3,0 K]	Lowering of the temperature by choosing the operating mode night. Relative to the basis comfort setpoint.
Standby reduction	**Lowering in K** 0 K – 10,0 K [2,0 K]	gets activated when no other operating mode was chosen The lowering is relative to the basis comfort setpoint.
Setpoint frost protection	3°C – 12°C [7°C]	Setpoint of the operating mode frost protection. indicated by an absolute value
Setpoint heat protection	24°C – 40°C [35°C]	Setpoint of the operating mode heat protection. indicated by an absolute value

Table 22: Operating modes & setpoints

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6.3.2.1 Operating mode - Comfort

The operating mode comfort is the reference mode of the controller. The temperature reduction at the operating modes night and standby refer to the setpoint of the comfort mode. When a room is used, the operating mode comfort should be activated. The configured setpoint, the "basic comfort setpoint, is valid for the heating process if the controller was set as heating & cooling (described at 6.3.7 Dead zone).
The chart shows the relevant 1-Bit communication object:

Number	Name	Length	Usage
11	Mode comfort	1 Bit	Activation of the operating mode comfort

Table 23: Communication object operating mode comfort

6.3.2.2 Operating mode - Night

The operating mode night shall cause a significant decrement of the temperature, for example at night or at the weekend. The reduction can be programmed freely and refers to the basic comfort setpoint. If you have programmed a reduction of 5K and a basic comfort setpoint of 21°C, the setpoint for the night mode will be 16°C.
The chart shows the relevant 1-Bit communication object:

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

Table 24: Communication object operating mode night

6.3.2.3 Operating mode - Standby

When nobody is in the room, the operating mode standby is used. This operating mode shall cause a low reduction of the temperature. So the room can be heated up fast again.
The value for the reduction can be programmed freely and refers to basic comfort setpoint. If you have adjusted a reduction of 2K and a basic comfort setpoint of 21°C, the setpoint for the operating mode standby will be 19°C.
The standby mode cannot be activated by a certain communication object. It gets activated, when all operating modes are switched off.

6.3.2.4 Operating mode - Frost/Heat protection

The operating mode frost protection gets activated, when the controller type was set as heating. The heat protection gets activated, when the controller type was set as cooling. When the controller type is set to heating and cooling, the combined operating mode frost-/ heat protection is activated.
This operating mode causes an automatically switch on of heating or cooling, when a parameterized is exceeded or the temperature falls below a parameterized temperature. At this operating mode, the temperature is set as absolute value. You should activate this function if you are longer absent and the temperature must not fall below a specific value or exceed a specific value.
The chart shows the relevant 1-Bit communication objects:

Number	Name	Length	Usage
13	Mode frost protection	1 Bit	Activation of the operating mode frost protection
13	Mode heat protection	1 Bit	Activation of the operating mode heat protection
13	Mode frost/heat protection	1 Bit	Activation of the operating mode frost/heat protection

Table 25: Communication object operating mode frost/heat protection

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6.3.2.5 Priorität der Betriebsarten

The following figure shows the available settings for the priority of the operating modes:

Figure 10: Priority of the operating modes

The chart shows the dynamic range of the priority of the operating modes:

ETS-text	Dynamic range **[default value]**	comment
Priority	▪ **Frost/Comfort/Night/Standby** ▪ Frost/Night/Comfort/Standby	Adjustment of the priority of the operating modes

Table 26: Parameter priority

The setting of the priority enables to adjust which operating mode shall be switched primarily when more than one operating mode is switched on. At the priority of Frost/Comfort/Night/Standby, the comfort mode will be switched on even if comfort and night is switched on to the same time. The night mode will only be active, when the comfort mode is switched off. now the controller changes automatically to the night mode.

6.3.2.6 Operating mode switchover

There are 2 possibilities for the switchover of the operating modes: On the one hand the operating modes can be switched on by their 1 Bit communication object and on the other hand by a 1 Byte object.
The selection of the operating modes by their 1 Bit communication object occurs via a direct selection of their individual communication object. With consideration of the adjusted priority, the operating mode, which was selected via the 1 Bit communication object, is switched on or off. When all operating modes are switched off, the controller changes to the standby mode.

Example:
The priority was set as Frost/Comfort/Night/Standby.

Operating mode				**adjusted 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 27: Example switchover of the operating modes via 1 Bit

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The switchover of the operating modes via 1 Byte occurs by only one object, with the size of 1 Byte, the DPT_HVAC Mode 20.102 of KNX-specification. Additional, there are 2 objects for the visualization available, the 1 Byte object “DPT_HVAC Status” and the 2 Byte object “DPT_RHCC Status”. For the switchover of the operating modes, a Hex-value is sent to the object “mode selection”. The object evaluates the received value and switches the belonging operating mode on and the active operating mode off. If all operating modes are switched off (Hex-value=0), the operating mode standby will be switched on.
The Hex-values for the operating modes are shown at the chart:

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

Table 28: Hex-Values for operating modes

The following example shall clarify how the controller handles received Hex-values and switches operating modes on or off. The chart is to read from the top to the down.
Example:
The priority was set as Frost/Comfort/Night/Standby.

received Hex-value		Handling		adjusted operating mode
0x01		Comfort=1		Comfort
0x03		Comfort=0 Night=1		Night
0x02		Night=0 Standby=1		Standby
0x04		Frost-/Heat protection=1 Standby=0		Frost-/Heat protection

Table 29: Example operating mode switchover via 1 Byte

The DPT HVAC Status communication, DPT_HVAC Status (without number) of KNX-specification, object sends the hex value for the adjusted operating mode. When more than one testify is valid, the hex values are added and the communication object sends the added value. The hex values can be read from visualization afterwards.
The following chart shows the hex values for the single messages:

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

Table 30: Hex-Values DPT HVAC Status

If you heat at the comfort mode, the communication object will send the value 20 (for heating) +1 (for the comfort mode) =21.

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The DPT RHCC Status object is an additional 2 Byte status object with additional status messages. If more than one testify is valid, also here the values will be added in the same way as at the HVAC object.
The following chart shows the hex values for the single 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 31: 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
11	Mode Comfort	1 Bit	Activation of the mode comfort
12	Mode Night	1 Bit	Activation of the mode night
13	Mode Frost/Heat protection	1 Bit	Activation of the mode Frost/ Heat protection
25	DPT_HVAC Status	1 Byte	Visualization of the chosen operating mode
30	DPT_RHCC Status	2 Byte	Visualization measuring/ status of the controller
31	mode selection	1 Byte	Selection of the operating mode

Table 32: Communication objects for the operating mode switchover

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6.3.2.7 Operating mode after reset

The following figure shows the available settings for the operating mode after reset:

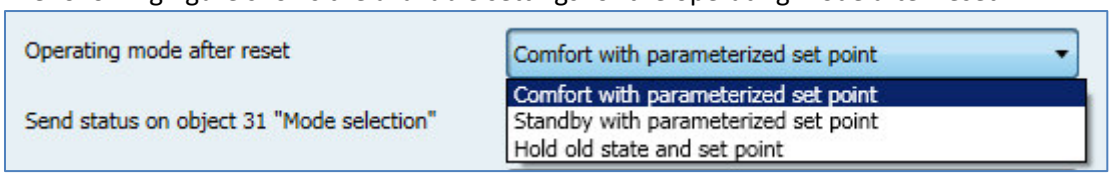

Figure 11: Settings operating mode after reset

The following table shows the available settings for the operating mode after reset:

ETS-text	Dynamic range **[default value]**	comment
Operating mode after reset	▪ **Comfort with parameterized setpoint** ▪ Standby with parameterized setpoint ▪ Hold old state and setpoint	Adjustment, which operating mode shall be switched on after a bus power return

Table 33: 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.

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6.3.3 Setpoint offset

The following settings are available at the ETS-Software:

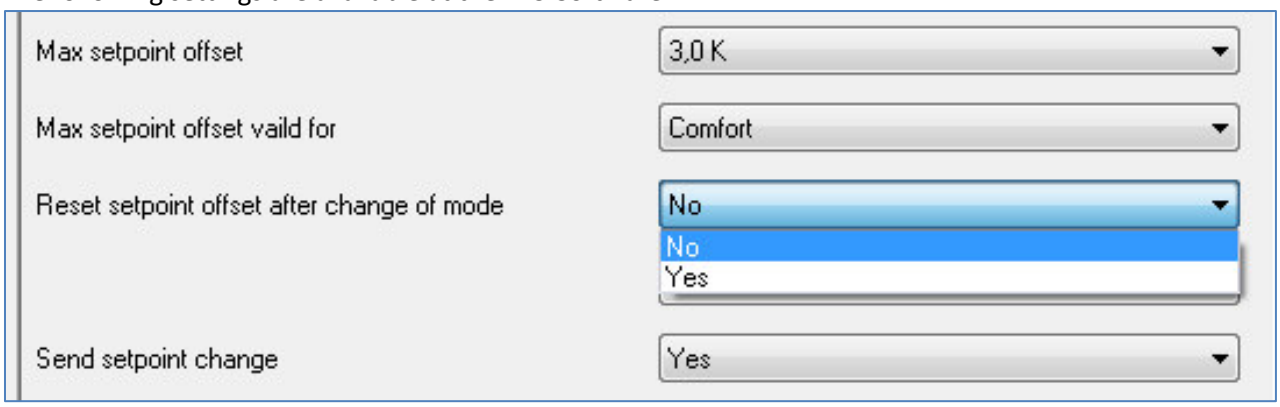

Figure 12: Setpoint offset

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Max setpoint offset	0K – 10,0K [3,0K]	indicates the maximal offset
Max setpoint offset valid for	▪ **Comfort** ▪ Comfort/Night/Standby	scope of the setpoint offset
Reset setpoint offset after change of mode	▪ **No** ▪ Yes	Adjustment, whether a setpoint offset is still valid after change of operating mode or not
Send setpoint change	▪ **No** ▪ Yes	Adjustment, whether a change of mode should be send or not

Table 34: Setpoint offset

The setpoint can be changed manual by the setpoint offset without a new parameterization by the ETS-Software. Therefore, 2 variants are available. On the one hand a new setpoint can be pretended by the communication object “Setpoint comfort”. On the other hand the adjusted setpoint can be increased or decreased manual by the communication object “manual setpoint value offset”.
At the read in of a new absolute comfort setpoint, the controller becomes a new basis comfort setpoint. The new basic comfort setpoint causes also an adaption of the indirect setpoints at the other operating modes. Through this function it is for example possible to read the actual room temperature as new basic comfort setpoint in. The settings “max setpoint offset”, “max setpoint offset valid for” and “Reset setpoint offset after change of mode” are not valid at this variant of setpoint offset, because the controller becomes a complete new setpoint. Specifying a new value is possible by calling the object “Setpoint comfort”.

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The second opportunity of the manual setpoint offset is the movement of the setpoint depending to the current adjusted setpoint. For this variant of setpoint offset, the object “manual setpoint value offset” is used. Sending a positive Kelvin value at this object causes an increment of the current setpoint. Sending a negative Kelvin value at this object causes a decrement of the current setpoint.
The setting “max setpoint offset” indicates the maximal possible setpoint movement. If the controller is for example set to a basic comfort setpoint of 3K, the setpoint can only be moved manual in the limits of 18°C and 24°C.
The setting “max setpoint offset valid for” defines the scope of the setpoint offset. You can choose whether the setpoint offset is only valid for the comfort mode or also for the night and standby mode. The operating mode frost/ heat protection is always independent of the setpoint offset.
The setting „Reset setpoint after change of mode” indicates whether a setpoint offset shall be maintained after a change of mode or not. If this parameter is deactivated, the device will switch to the adjusted setpoint for the chosen operating mode after every change of mode.
The communication object “Actual setpoint” is for the query of the current setpoint at the actual adjusted operating mode.

The following chart shows the relevant communication objects:

Number	Name	Length	Usage
6	Setpoint comfort	2 Byte	Parameterization of a new absolute comfort setpoint
7	Manual setpoint value offset	2 Byte	Movement of the setpoint depending to the current adjusted basic comfort setpoint
29	Actual setpoint	2 Byte	Readout of the actual adjusted setpoint

Table 35: Communication objects setpoint offset

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6.3.4 Disable objects

The following figure shows the available settings for the disable objects:

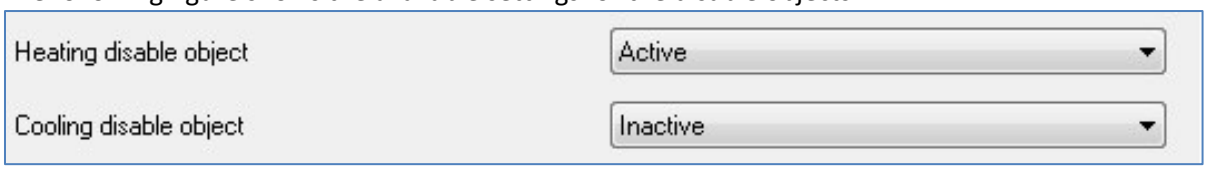

Figure 13: Blocking objects

The following chart shows the dynamic range 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 36: Blocking objects

Depending to the adjusted controller type, one or two blocking objects are available. The blocking objects disable the control value. The blocking objects can be used when the heating or cooling system shall be prevented of an unwanted start.
If the heating must not start at special situations, for example when a window is opened, the blocking object can be used. Another usage of this function is for example the manual blocking, for example by a push button, in case of a cleaning process.
The blocking objects have the size of 1 Bit and blocks by sending a logical 1 at the depending communication object.

The chart shows the relevant communication objects:

Number	**Name**	**Length**	**Usage**
14	Heating disable object	1 Bit	blocks the control value heating
15	Cooling disable object	1 Bit	blocks the control value cooling

Table 37: Communication objects blocking objects

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6.3.5 Heating/Cooling request objects

The following settings are available at the ETS-Software:

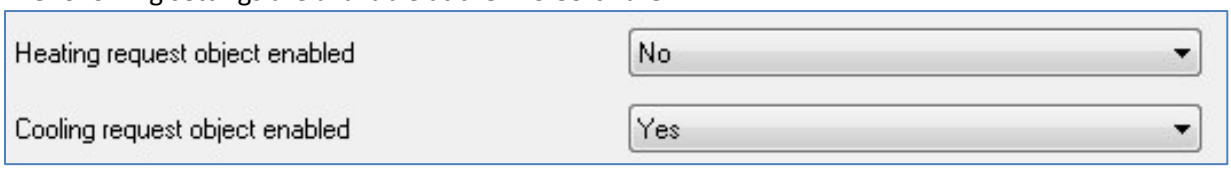

Figure 14: Heating/Cooling request objects

The following chart shows the dynamic range 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 38: Heating/Cooling request objects

The setting “Heating/Cooling request enabled” can show objects, which indicates a beginning heating or cooling process. So these objects are status objects.
The objects can be used for the visualization of a beginning or ending heating/cooling process. So, for example, a red LED could show a heating process and a blue LED a cooling process.
A further opportunity for the usage is the central switch of a heating or cooling process. So can be realized that all heating devices of a building switch on, when a controller gives out a heating request.
The 1 Bit communication object gives as long a 1-signal out as the process is active.

The following chart shows the relevant communication objects:

Number	**Name**	**Length**	**Usage**
17	Heating request	1 Bit	indicates a beginning heating process
18	Cooling request	1 Bit	indicates a beginning cooling process

Table 39: Communication objects heating/cooling request

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6.3.6 Guiding

The following settings are available at the ETS-Software:

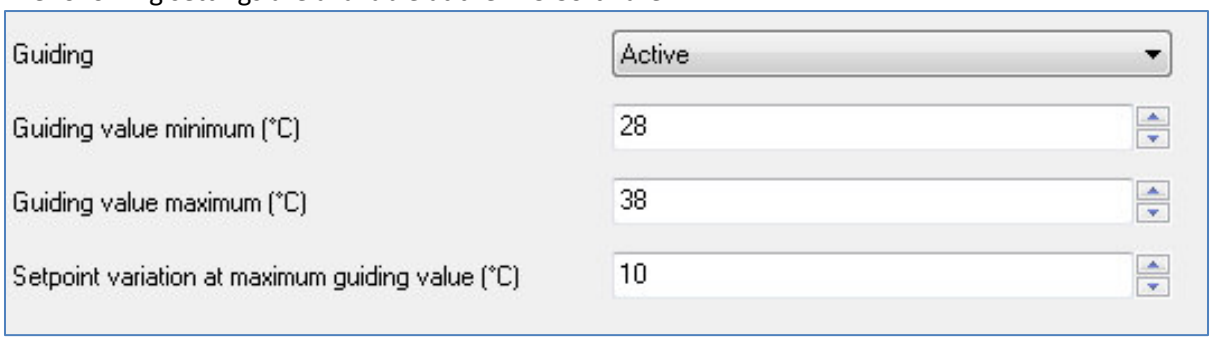

Figure 15: Guiding

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Guiding	▪ **Inactive** ▪ Active	activates/deactivates the guiding
Guiding value minimum (in °C)	-100°C – 100°C [28 °C]	minimum value of the guiding
Guiding value maximum (in °C)	-100°C – 100°C [38 °C]	maximum value of the guiding
Setpoint variation at maximum guiding value (in °C)	-100°C – 100°C [10 °C]	Setpoint offset at achievement of the maximum guiding value

Table 40: Guiding

The parameter guiding causes a linear reposition of the control value in dependence of a guiding value, which is measured by an external sensor. With appropriated parameterization a continuous increment or decrement of the control value can be caused.
For adjusting how the guiding shall impact to the control value, three settings are necessary: Guiding value minimum (w_{min}), guiding value maximum (w_{max}), and setpoint variation at maximum guiding value ($\triangle X$).
The settings for the guiding value maximum (w_{max}) and minimum (w_{min}) describe the range of temperature in which the guiding starts and ends having impact to the setpoint. The real setpoint offset indicates the following formula:

$$\triangle X = \triangle X_{max} * [(w - w_{min})/(w_{max} - w_{min})]$$

If the guiding shall cause an increment of the setpoint, you have to adjust a positive value for the setting “Setpoint variation at maximum guiding value”. If you wish a decrement of the setpoint, you have to choose negative value for the setting “Setpoint variation at maximum guiding value”.
The variation of the setpoint $\triangle X$ is added to the basic comfort setpoint.
A measured temperature value for the guiding above the adjusted maximum value or below the adjusted minimum value has no effect to the setpoint.
So when the value is between the adjusted guiding values (w_{max} & w_{min}) the setpoint is increased or decreased.

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The following diagrams shall illustrate the connection between guiding and setpoint:
(Xsetpoint=new setpoint; Xbasic=basic comfort setpoint)

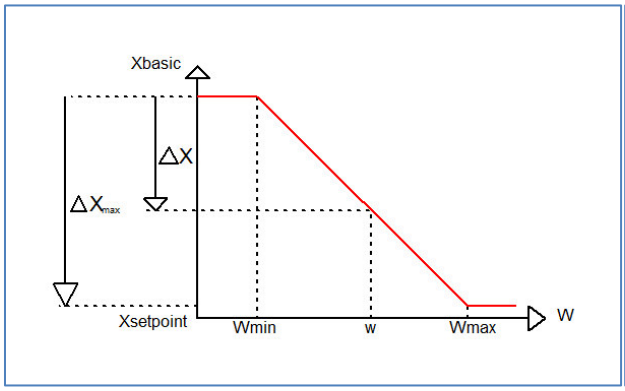

Figure 16: Example Guiding decrement

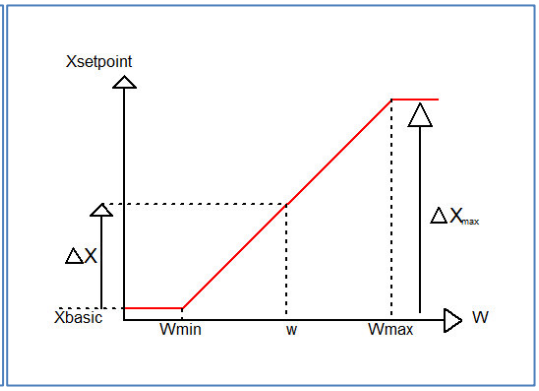

Figure 17: Example Guiding increment

The communication object for the guiding value must be connected to the external measured temperature. Through this object, the guiding becomes the reference value for the guiding process.

The following chart shows the relevant communication objects:

Number	Name	Length	Usage
20	Guiding value	2 Byte	Receiving of the reference temperature for the guiding

Table 41: Communication object guiding

Example for the usage:
For the temperature regulation of a room, the setpoint (22°C) shall be increased in a way that at a measured outside temperature range of 28°C to 38°C, the difference of the temperature outside and inside is never more than 6K.

The following settings must be done at the controller:
Basics Comfort setpoint: 22°C
Guiding: active
Guising value minimum: 28 °C
Guiding value maximum: 38°C
Setpoint variation at maximum guiding value: 10°C

If the temperature outside increase to value of 32°C now, the setpoint will be increased by the following value:
△X = 10°C * [(32°C-28°C)/(38°C–28°C)] = 4°C

So we would have a new setpoint of 22°C+4°C = 26°C.
If the outside temperature reaches the adjusted maximum of 38°C, the setpoint will be 32°C and behave this value even if the temperature would continue to rise.

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6.3.7 Dead zone

The following settings are available at the ETS-Software:

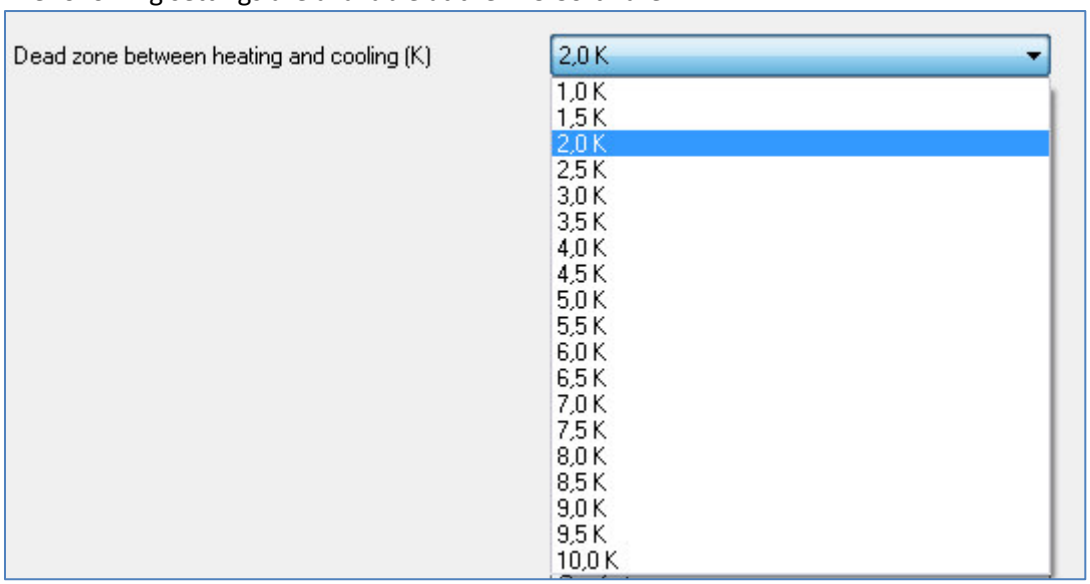

Figure 18: Dead zone

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Dead zone between heating and cooling (K)	1,0K – 10,0K [2,0K]	Dynamic range for the dead zone (Range at which the controller does not activate cooling or heating)

Table 42: Dead zone

The settings for the dead zone are only available, when the controller type (have a look at 4.4.1 controller type) was set as heating and cooling. Now the dead zone can be parameterized.
The dead zone describes the range at which the controller neither heats nor cools. So the controller sends no value to the control value, when he is in the dead zone. At the setting for the dead zone, it is to note, that a value which was chosen too small causes many switches between heating and cooling. Whereas, a too big chosen value causes a wide range of the current room temperature.
When the controller is set as heating and cooling, the basic comfort setpoint is always the setpoint for heating. The setpoint for the cooling is given by the summation of basic comfort setpoint and dead zone. So, when the basic comfort setpoint is set to 21°C and the dead zone is set to 3K, the setpoint for heating is 21°C and the setpoint for cooling is 24°C.

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The dependent setpoints for heating and cooling, so the setpoints for the operating modes standby and night, can be parameterized individually at the controller type heating and cooling. So you can set different values for the nigh and standby reduction/increase at heating and cooling. These setpoints are calculated in dependence to the basic comfort setpoints.
The setpoints for the frost and heat protection are individually from the dead zone and the other setpoints.
The following illustration shows the correlations between dead zone and the setpoints for the single operating modes.
The following settings are made for this example:
Basic comfort setpoint: 21°C
Dead zone between heating and cooling: 3K
Increase and Reduction standby: 2K
Increase and Reduction night: 4K

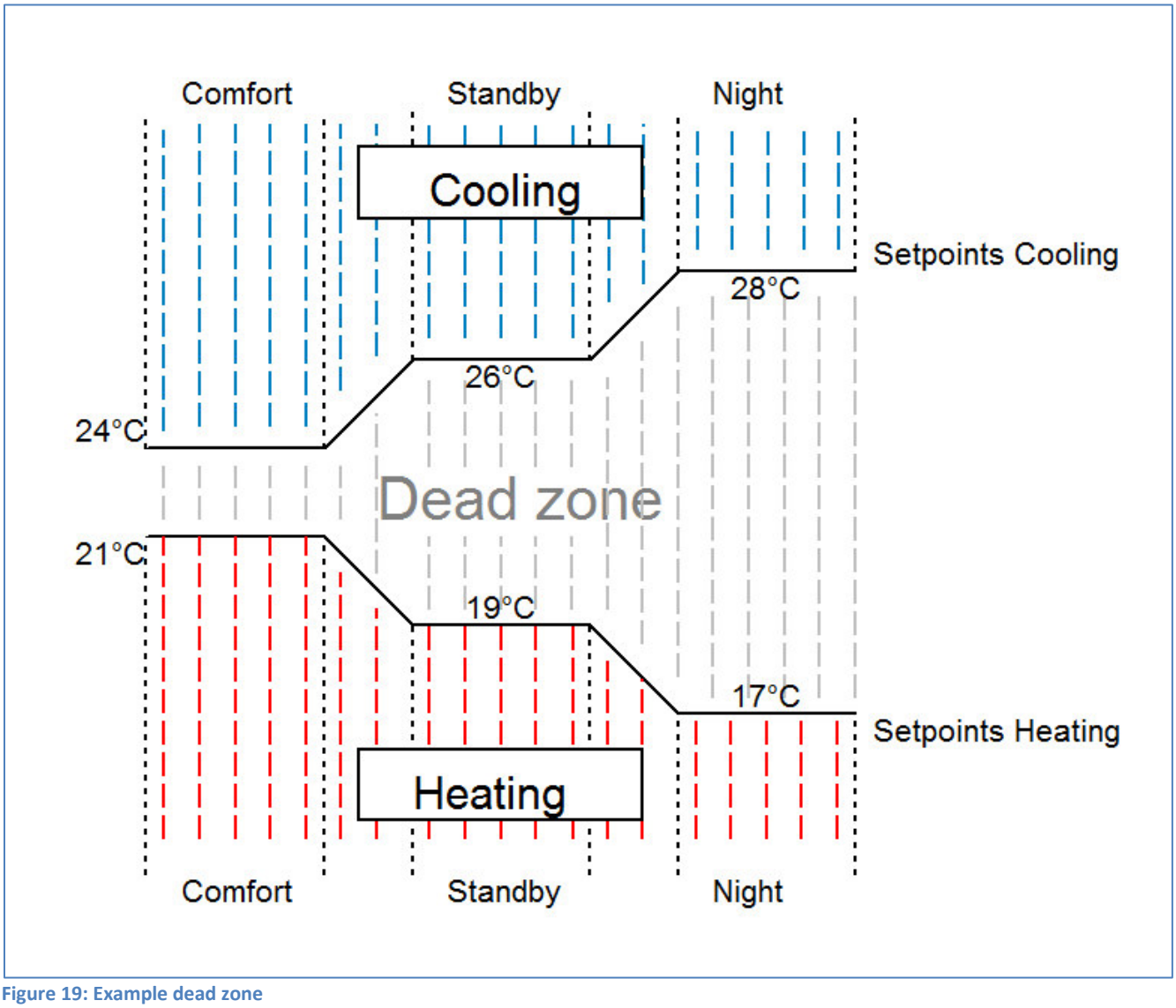

Figure 19: Example dead zone

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6.4 Controller setting

6.4.1 Control value

The following settings are available at the ETS-Software:

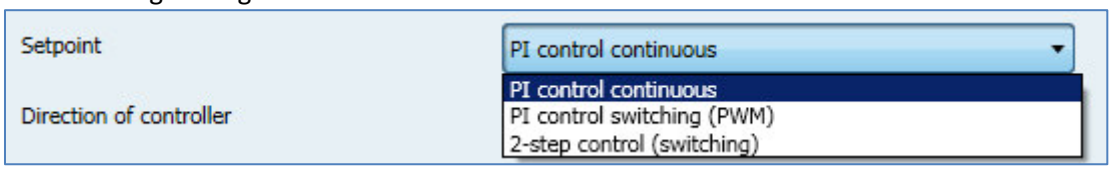

Figure 20: Settings control value

Figure 21: Control value

The following chart shows the dynamic range 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 variable defines the used control method.

Table 43: Control value

The controller contains of three different controlling methods, which control the control value. Further parameterization options are dependent to the adjusted control method. The following controller can be chosen:

- PI control continuous [6.4.2]
- PI control switching (PWM) [6.4.3]
- 2-step control (switching) [6.4.4]

The following chart shows the relevant communication objects:

Number	**Name**	**Length**	**Usage**
8	Control value heating	1 Byte/ 1 Bit	controlling of the actuator for heating
8	Control value heating/cooling	1 Byte/ 1 Bit	controlling of the combined actuator for heating and cooling
10	Control value cooling	1 Byte/ 1 Bit	controlling of the actuator for cooling

Table 44: Communication objects control value

According to the adjusted controller type , the control value controls a heating and/or a cooling process. If the control value is chosen as PI control continuous, the communication objects will have the size of 1 Byte, because the object can assume several states. If the control value is chosen as PI control switching or 2-step control, the communication object will have the size of 1 Bit, because the communication object can only assume the states on or off.

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6.4.2 PI control continuous

The following settings are available at the ETS-Software (here for controller type heating):

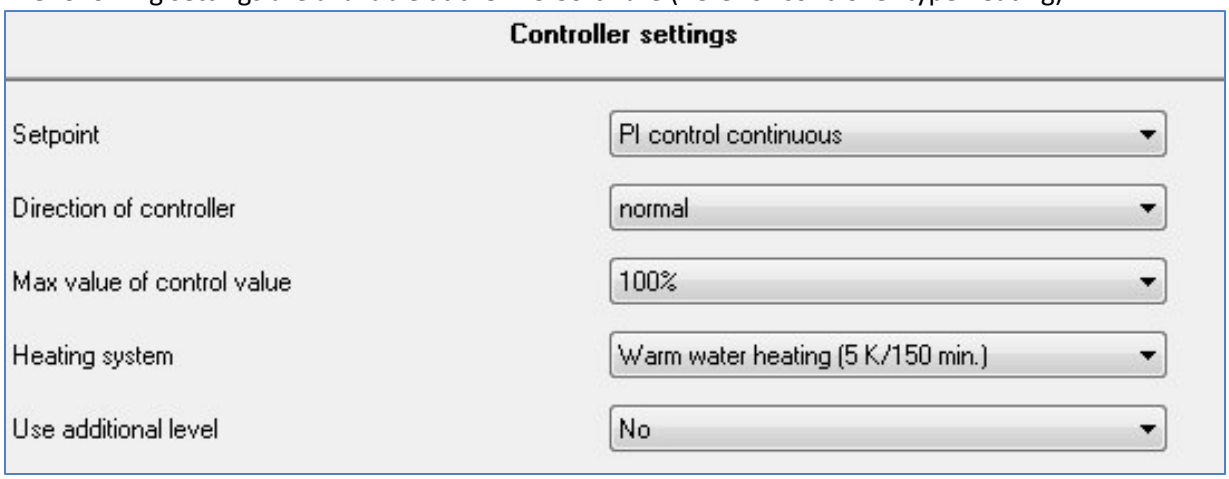

Figure 22: PI control continuous

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Direction of controller	▪ **normal** ▪ inverted	indicates the controlling behavior at rising temperature (4.5.5)
Max value of control value	100%; 90%; 80%; 75%; 70%; 60%; 50%; 40%; 30%; 25%; 20%; 10%; 0% [100%]	indicates the output power at maximum amount
Heating system	▪ **Warm water heating (5K/150 min)** ▪ Underfloor heating (5K/240 min) ▪ Split Unit (4K/90min) ▪ Adjustment via control parameter	Adjustment of the used heating system Individual parameterization available by "Adjustment via control parameter"
Cooling system	▪ **Split Unit (4K/90min)** ▪ Cooling ceiling (5K/240 min) ▪ Adjustment via control parameter	Adjustment of the used cooling system Individual parameterization available by "Adjustment via control parameter"
Proportional range (K)	1K-8K [2K]	By choosing heating/cooling system as "Adjustment via control parameter", the proportional range can be parameterized freely
Reset time (min)	15min – 210 min [150 min]	By choosing heating/cooling system as "Adjustment via control parameter", the reset time can be parameterized freely
Send control value cyclic	Disable, 1 min, 2min, 3min, 4 min, 5min, 10min, 15min, 20min, 30min, 40min, 50min, 60min [Disable]	Activation of cyclic sending of the control value with adjustment of the cyclic time
Use additional level	▪ **No** ▪ Yes	Activation of an additional level available, only for heating (4.5.6)

Table 45: PI control continuous

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The PI control continuous is a continuous controlling with proportional amount, the Proportional range, and an integral amount, the reset time. The size of the proportional range is indicated in K, whereas the I-amount is indicated in minutes.
The control value is controlled in steps from 0% to the adjusted maximum (have a look at 4.5.2.1 Max value of control value) for the PI-control. A big deviation causes at normal direction, a big control value to eliminate the deviation as fast as possible.

6.4.2.1 Max value of control value

By the setting “Max value of control value” can be adjusted which maximum value the control value can assume. To prevent switching processes at large control values, a maximum can be defined by the setting “Max value of control value”. So the control value cannot exceed this value.

6.4.2.2 Heating/ cooling system

The control parameter (P-amount and I-amount) are adjusted by the setting for the used heating/ cooling system. You can use preset values, which fit to determined heating or cooling systems, or parameterize the proportional range and the reset time freely. The preset values for the corresponding heating or cooling system are based on empirical values and lead often to good controlling results.
By choosing “Adjustment via control parameter”, the proportional range and the reset time can be parameterized freely. This setting requires a good knowledge in the field of control technology.

6.4.2.3 Proportional range

The proportional range represents the P-component of a controller. The P-component of a controller results in a proportional increase of the control value in accordance to the control difference.
A small proportional band leads to a rapid settling of the error signal. The controller reacts almost abruptly at a small proportional range and set the control variable even for small control differences almost to the max. Value (100%). If the proportional range is too small, the risk of overshooting is very large.
A proportional range of 4K sets the control value to 100% when the error (difference between the setpoint and the current temperature) at 4 ° C. Thus, in this setting would be a deviation of 1 ° C lead to a control value of 25%.

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6.4.2.4 Reset time

The reset time represents the I-component of a controller. The I component of a controlling leads to an integral approximation of the actual value to the set point. Short integral means that the controller has a strong I component.
A short integral has the effect that the manipulated variable is quickly approaching the proportional band corresponding to the set control value. A large integral causes a slow approach to this value. Important to note is that a too small reset time can cause an overshoot. Basically can be mentioned, slower systems need a greater reset time.

6.4.2.5 Send control value cyclic

The parameter “Send control value cyclic” causes a cyclic sending of the actual control value. The time shifts between two values can be also parameterized.

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6.4.3 PI control switching (PWM)

The following settings are available at the ETS-Software (here for controller type heating):

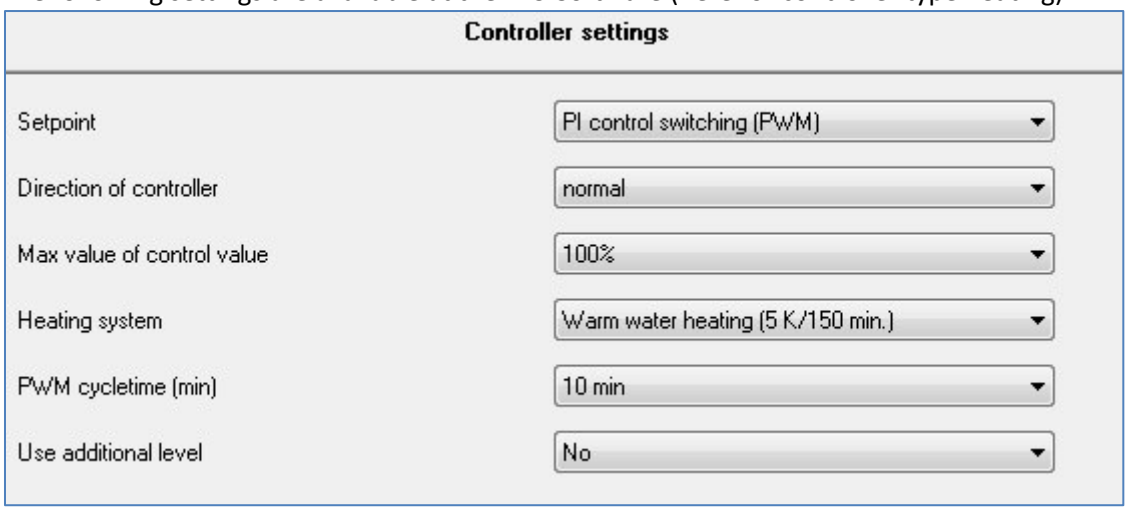

Figure 23: PI control switching (PWM)

The PI control switching is a development of the PI control continuous. All settings of the continuous control are also available at the PI control switching. Additional a PWM cycletime can be adjusted.

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Direction of controller	▪ **normal** ▪ inverted	indicates the controlling behavior at rising temperature (4.5.5)
Max value of control value	100%; 90%; 80%; 75%; 70%; 60%; 50%; 40%; 30%; 25%; 20%; 10%; 0% **[100%]**	indicates the output power at maximum amount
Heating system	▪ **Warm water heating (5K/150 min)** ▪ Underfloor heating (5K/240 min) ▪ Split Unit (4K/90min) ▪ Adjustment via control parameter	Adjustment of the used heating system Individual parameterization available by “Adjustment via control parameter”

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Cooling system	▪ **Split Unit (4K/90min)** ▪ Cooling ceiling (5K/240 min) ▪ Adjustment via control parameter	Adjustment of the used cooling system Individual parameterization available by "Adjustment via control parameter"
Proportional range (K)	1K-8K [2K]	By choosing heating/cooling system as "Adjustment via control parameter", the proportional range can be parameterized freely
Reset time (min)	15min – 210 min [150 min]	By choosing heating/cooling system as "Adjustment via control parameter", the reset time can be parameterized freely
Send control value cyclic	Disable, 1 min, 2min, 3min, 4 min, 5min, 10min, 15min, 20min, 30min, 40min, 50min, 60min [Disable]	Activation of cyclic sending of the control value with adjustment of the cyclic time
Use additional level	▪ **No** ▪ Yes	Activation of an additional level available, only for heating (4.5.6)
PWM cycletime (min)	5min, 10min, 15min, 20min, 25min, 30min [10min]	describes the whole time off an on-pulse and an off-pulse

Table 46: PI control switching (PWM)

At the pulse width modulation, the controller switches the control value according to the calculated value of the continuous control on and off. Thereby the control watches also the adjusted cycletime. So the control value is converted to a pulse width modulation with only the two conditions "0" and "1".

6.4.3.1 PWM cycletime

The cycletime, „PWM cycletime", serves the controlling for calculating the length of the on-pulse and the off-pulse. This calculation occurs at the base of the calculated continuous value in percent. One PWM cycle contains the time, which elapses from one switching on point to the other.

> **Example:** If a control value of 75% is calculated and a cycletime of 10min is adjusted, the control value will be switched on for 7,5min and switched off for 2,5min.

In principle you can say each carrier the system, each bigger the cycletime.

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6.4.4 Two-step control (switching)

The following settings are available at the ETS-Software (here for controller type heating):

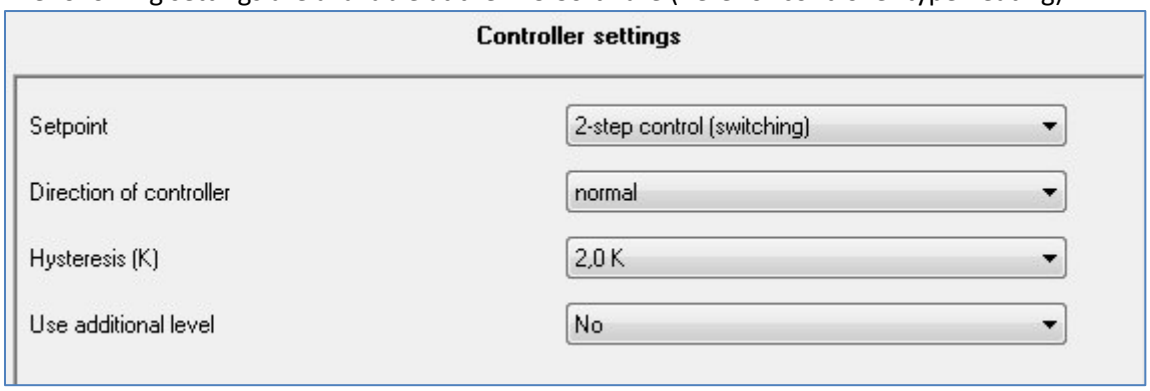

Figure 24: 2-step control (switching)

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Direction of controller	▪ **normal** ▪ inverted	indicates the controlling behavior at rising temperature (4.5.5)
Hysteresis	0,5K – 5,0K [2,0K]	Setting for the switching off point and the switching on point
Use additional level	▪ **No** ▪ Yes	Activation of an additional level possible, only for heating (4.5.6)

Table 47: Two-step control (switching)

The 2-step control is the easiest way of controlling. The controller switches the control value only on and off.
The controller switches the control value (for example at heating) on, when the measured temperature falls below a certain temperature. By exceeding a certain temperature, the control value will be switched off again. The points for switching on and off depend to the current adjusted setpoint and the adjusted hysteresis.
The 2-step control is used in situations, where the control value can only have two conditions and the controlled temperature can alternate a bit more.

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6.4.4.1 Hysteresis

The setting of the hysteresis is used for calculating the points of switching on and off. This occurs under consideration of the current adjusted setpoint.

> **Example:** The controller is adjusted as heating with and a basic comfort setpoint of 21°C and a hysteresis of 2K. So the controller switches the control value, at the mode comfort, on at 20°C and off at 22°C.

To note is that a big hysteresis generates big differences of the room temperature. A small hysteresis can generate an almost permanent switching process, because the points for switching on and off are very close to each other. This can generate a fast consumption of the control value.

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6.4.5 Direction of controller

The following settings are available at the ETS-Software:

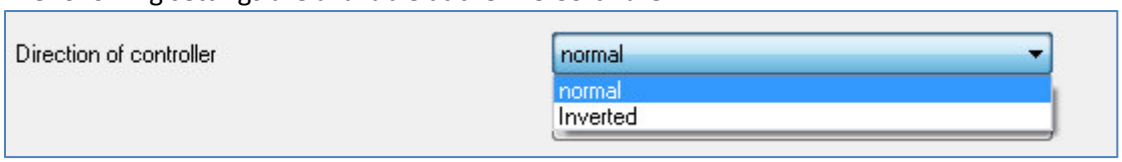

Figure 25: Direction of controller

The direction of the controller describes the behavior of the control value by a changing of the control difference at rising temperature. The control value can react normal or inverted to a rising temperature. The direction of the controller can be adjusted for all control values (PI-control continuous, PI-control switching and 2-Step control).
An inverted control value is for adaption to normally opened valves at the 2-Step control and at the PI-control switching.
An inverted control value means for the single control values, by controller type heating, the following adjustments

- PI-control continuous
  The control value falls at raising regular difference and rises at falling regular difference.
- PI-control switching
  The ratio between duration of switching on to the whole PWM cycletime raise by falling temperature and falls by raising temperature.
- 2-Step control
  The controller switches on at the normal point for switching off and switches off at the normal point for switching on.

6.4.6 Additional level

The following settings are available at the ETS-Software:

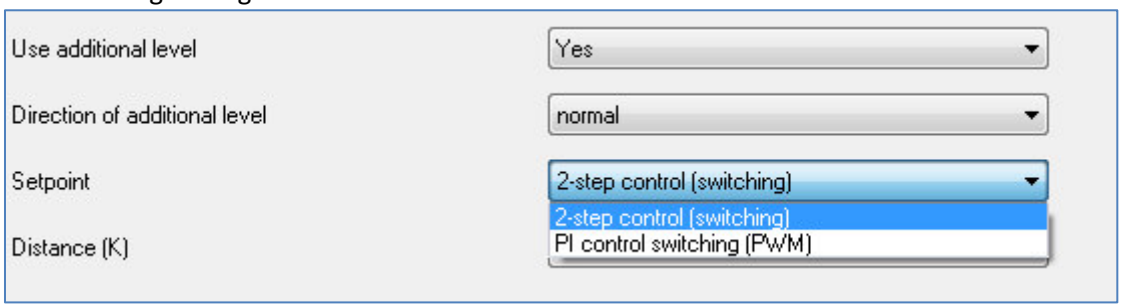

Figure 26: Additional level

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The dynamic range for an additional level is shown at the following chart (the setting options are shown, when an additional level is activated):

ETS-text	Dynamic range **[default value]**	comment
Direction of controller	▪ **normal** ▪ inverted	indicates the controlling behavior at rising temperature (4.5.5)
Control value	▪ **2-Step control (switching)** ▪ PI control switching (PWM)	Setting of the used control value
Distance (in K)	1,0K – 10,0K [2,0K]	Distance between the setpoints of the normal controlling and the setpoint for the additional level

Table 48: Additional level

An additional level can only be chosen for heating. The direction of the controller can be chosen for the additional level, too. The control value can be chosen as PI-control switching (PWM) or 2-Step control. So the communication object for the additional level has always the size of 1 Bit.
The distance in K describes the setpoint of the additional level. The adjusted distance is deducted from the setpoint of the basic level; the resulting value is the setpoint for the additional level.

> **Example:** The controller has the operating mode comfort, with the basic comfort setpoint of 21°C. The distance is adjusted as 2,0K. So the setpoint for the additional level is 21°C-2,0K=19,0°C.

An additional level can be used at carry systems to reduce the warm up time. For example can a radiator be used as additional level for reducing the war up time of an underfloor heating.

The following chart shows the relevant communication object:

Number	**Name**	**Length**	**Usage**
9	Control value additional heating	1 Bit	control value for the additional level

Table 49: Communication object additional level

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The following illustration shows the combination of the basic level and the additional level:

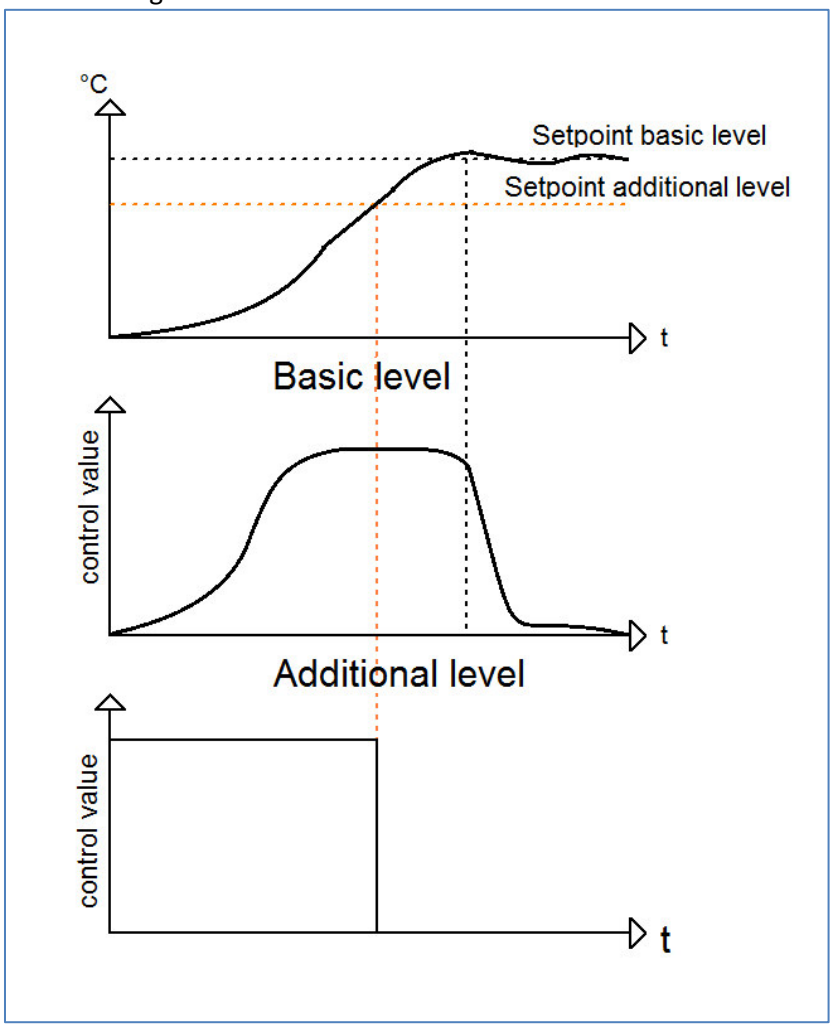

Figure 27: Combination of basic and additional level

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6.4.7 Additional settings for heating and cooling

The following settings are available at the ETS-Software:

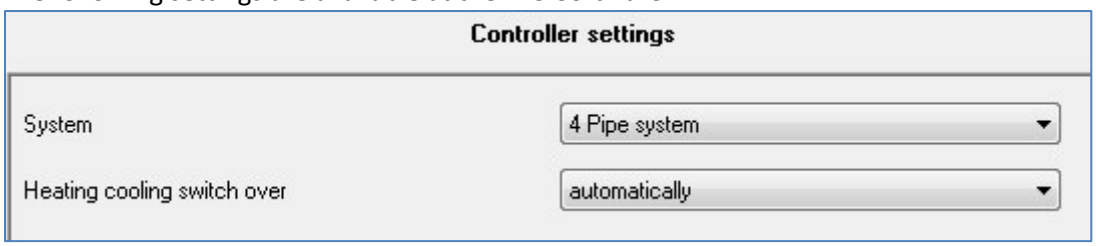

Figure 28: Heating & Cooling

The following chart shows the dynamic range, when the controller type is adjusted as heating and cooling:

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

Table 50: Heating & Cooling

When the controller type (6.3.1 Controller type) is chosen as heating and cooling, the upper shown settings are available.
By the setting for the system, the used system can be chosen. When a combined heating and cooling system is used, the setting 2 Pipe system must be chosen. When a divided system for heating and cooling is used, the setting 4 Pipe system must be chosen.
Furthermore it is possible to choose between an automatic and a manual switch over.

4.5.7.1 - 2 Pipe system

At a common pipe system for heating and cooling, only one communication object for the control value is available. Before changing between heating and cooling, a switchover must occur. The control value can also have only one controller (PI-continuous, PI-switching, 2-Step control). Also the direction must be identical for heating and cooling. But the parameter for the heating and cooling process can be defined individually.

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The following illustration shows the setting option for a 2 Pipe system:

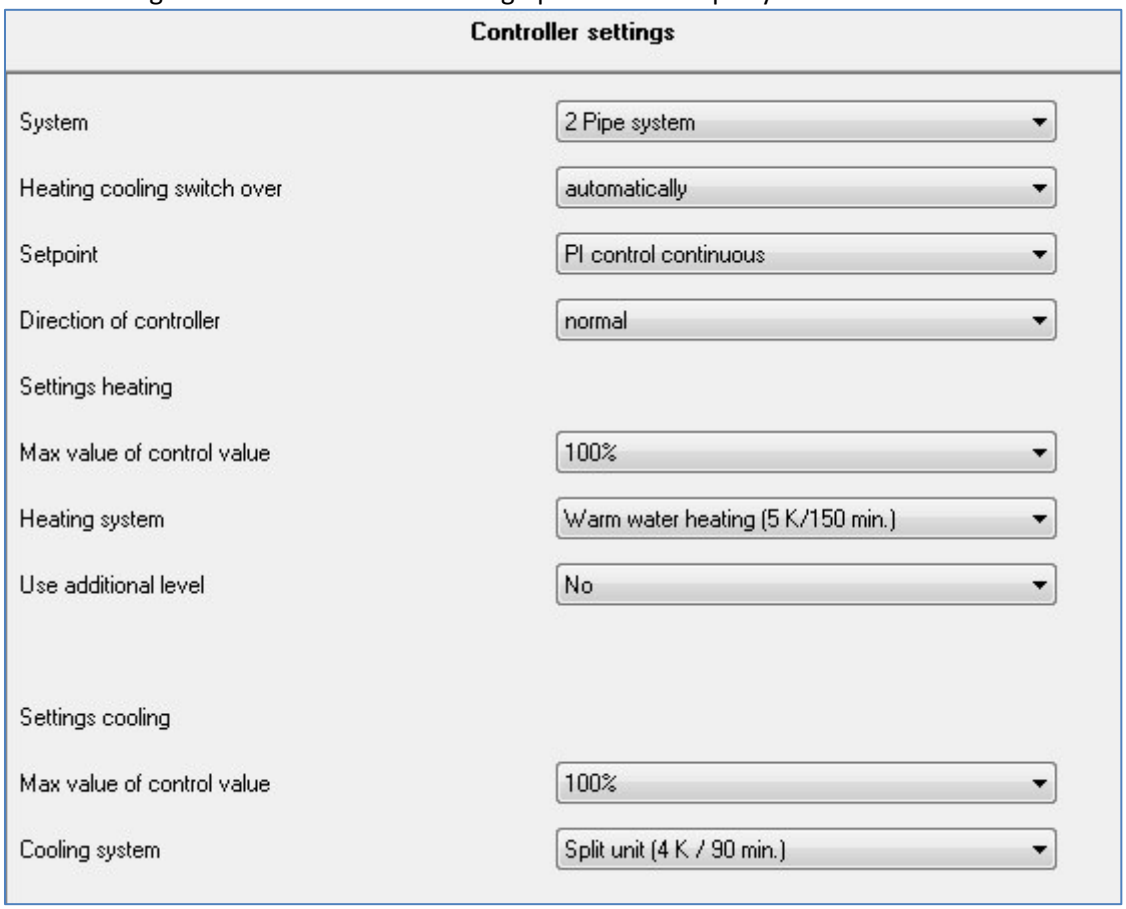

Figure 29: 2 Pipe system

6.4.7.2 4 Pipe-System

When a divided pipe system is used, both operations can be parameterized individually. Consequently two communication objects for the control value exist. So it is possible, to control the heating process e.g. via a PI-control continuous and the cooling process e.g. via a 2-step control, because both processes are controlled by different devices. So for every of the both processes are the settings available, which are described from “4.5 controller settings”.

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The following illustration shows the setting options for a 4 Pipe system:

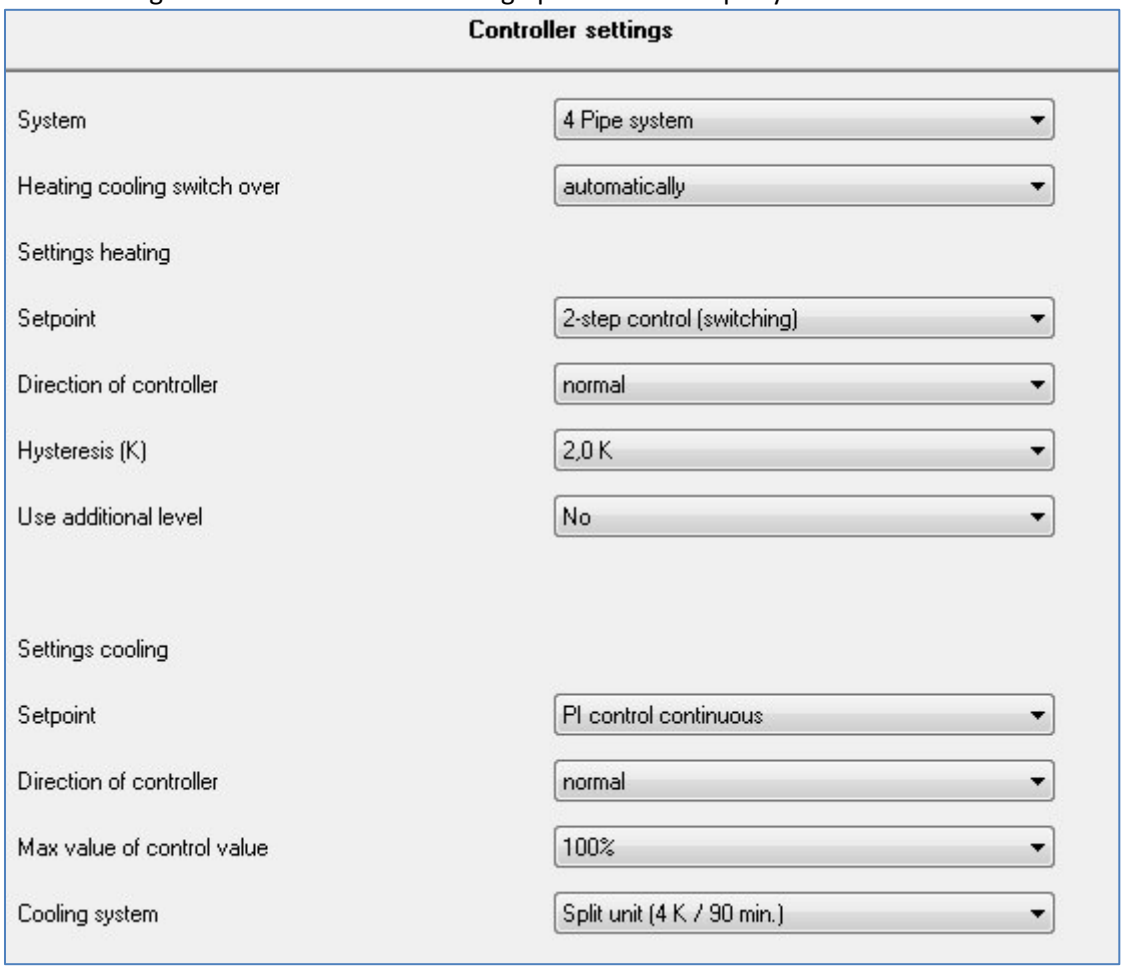

Figure 30: 4 Pipe system

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6.4.7.3 Switchover heating and cooling

By the setting “heating/cooling switch over” it is possible to adjust whether the controller shall switch automatically or via communication object. At the automatic switchover, the controller evaluates the setpoints and knows because of the adjusted setpoints in which mode the controller is at the moment. When the controller heated before, the controller switches over when the measured temperature rises over the adjusted setpoint for cooling. As long as the controller is at the dead zone between heating and cooling, the heating process remains set, but does not heat as long as the temperature is above the adjusted setpoint for heating.
By choosing the switchover via object, an additional communication object is shown. By this object the switchover can be done. The controller stays as long at the adjusted operating mode until it becomes a signal via the according communication object. As long as the controller is at the heating mode only the setpoint for the heating is watched, also if the controller is, according to its setpoints, already at the cooling mode. A start of the cooling mode is also only possible, when the controller becomes a signal via the communication object.
A “0” switches the heating process on and a “1” switches the cooling process on.

The following chart shows the relevant communication object:

Number	Name	Length	Usage
19	Heating/Cooling switchover	1 Bit	Switchover between heating and cooling 0=cooling; 1=heating

Table 51: Communication object heating and cooling

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7 Ventilation control

7.1 Step switch bit coded

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

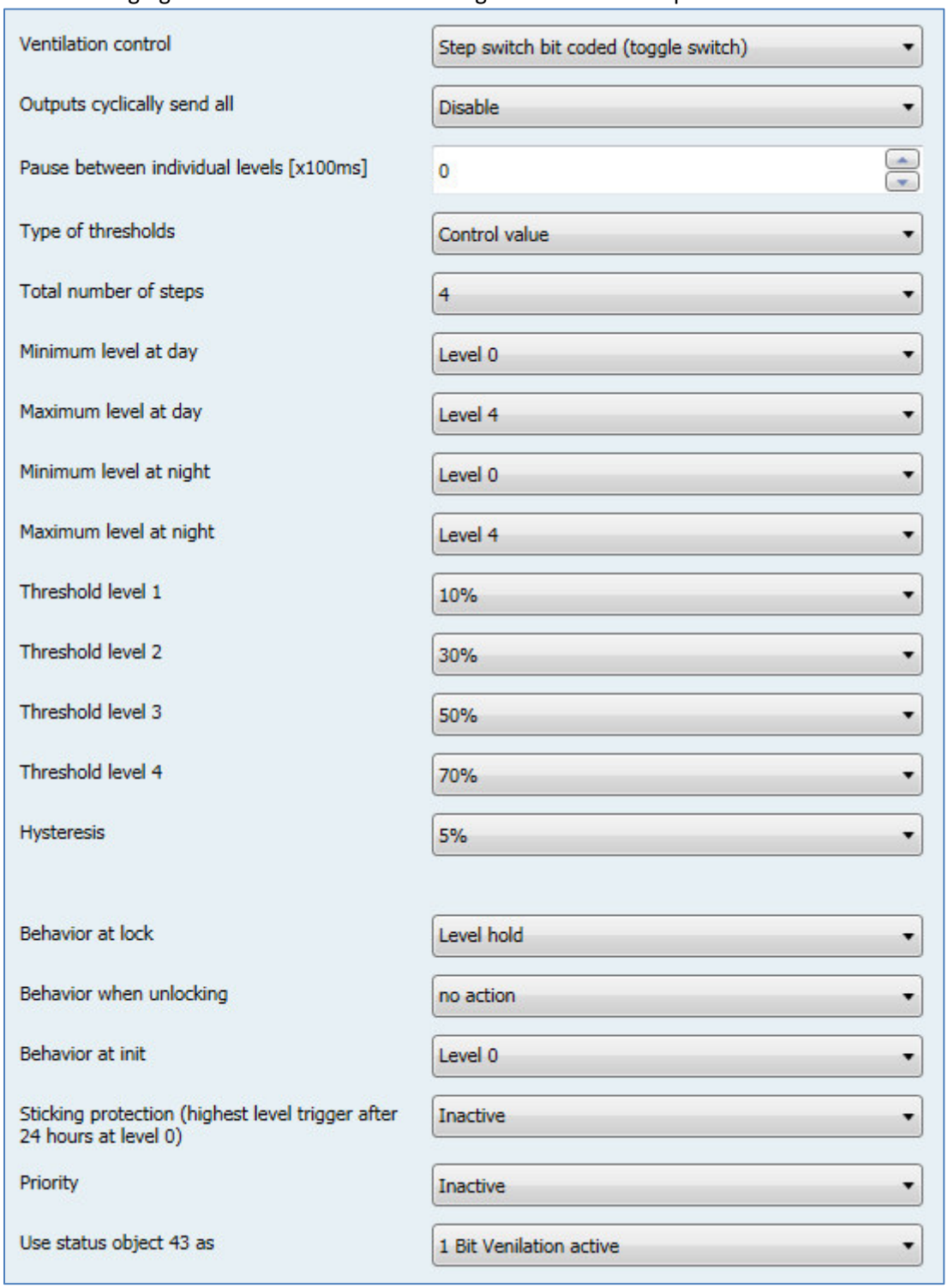

Figure 31: Step switch - bit coded

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7.1.1 Day/Night switchover

The following parameters are available:

ETS-text	Dynamic range **[default value]**	comment
Day/Night switching	▪ **Value 0 = Day/Value 1 = Night** ▪ Value 0 = Night/Value 1 = Tag	defines the polarity of the Day/Night object
Minimum level at day	▪ Level 0 ▪ **Level 1** ▪ Level 2 ▪ Level 3 ▪ Level 4	defines the minimum level at mode day
Maximum level at day	▪ Level 0 ▪ Level 1 ▪ Level 2 ▪ Level 3 ▪ **Level 4**	defines the maximum level at mode day
Minimum level at night	▪ Level 0 ▪ **Level 1** ▪ Level 2 ▪ Level 3 ▪ Level 4	defines the minimum level at mode night
Maximum level at night	▪ Level 0 ▪ Level 1 ▪ **Level 2** ▪ Level 3 ▪ Level 4	defines the maximum level at mode night

Table 52: Day/Night switchover level controller

The day/night switchover limits the minimum/maximum level for the day/night mode. If the ventilation should run at night with only a lower level for limiting the noise or the supply air, this can be realized by using this parameter.

The following table shows the relevant communication object:

Number	Name	Length	Usage
27	Switching Day/Night	1 Bit	Switching between day and night mode

Table 53: Communication object Day/Night switchover#

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7.1.2 Type of thresholds: Control value & Delta T

The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Type of thresholds: Control value		
Threshold level 1	0% – 100% **[10%]**	Below this threshold all levels are switched off, above this threshold level 1 is switched on
Threshold level 2	0% – 100% **[30%]**	Below this threshold level 1 is switched on, above this threshold level 2 is switched on
Threshold level 3	0% – 100% **[50%]**	Below this threshold level 2 is switched on, above this threshold level 3 is switched on
Threshold level 4	0% – 100% **[70%]**	Below this threshold level 3 is switched on, above this threshold level 4 is switched on
Hysteresis	0%-20% **[5%]**	Hysteresis for the switchover of the output stage
Type of thresholds: Delta T		
Threshold level 1	1,0K – 10,0K **[2,0K]**	Below this threshold all levels are switched off, above this threshold level 1 is switched on
Threshold level 2	1,0K – 10,0K **[4,0K]**	Below this threshold level 1 is switched on, above this threshold level 2 is switched on
Threshold level 3	1,0K – 10,0K **[6,0K]**	Below this threshold level 2 is switched on, above this threshold level 3 is switched on
Threshold level 4	1,0K – 10,0K **[8,0K]**	Below this threshold level 3 is switched on, above this threshold level 4 is switched on
Hysteresis	0,1K-2,0K **[0,5K]**	Hysteresis for the switchover of the output stage
Type of thresholds: Control value & Delta T		
Total number of steps	2-4 **[4]**	defines the number of steps for the Ventilation control
Send output cyclic	▪ **Disable** ▪ 1 min – 60 min	Parameter activates the cyclic sending of all output objects

Table 54: Parameter output step-switch

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The following figure shows the switching behavior of the outputs as a function of the threshold values:

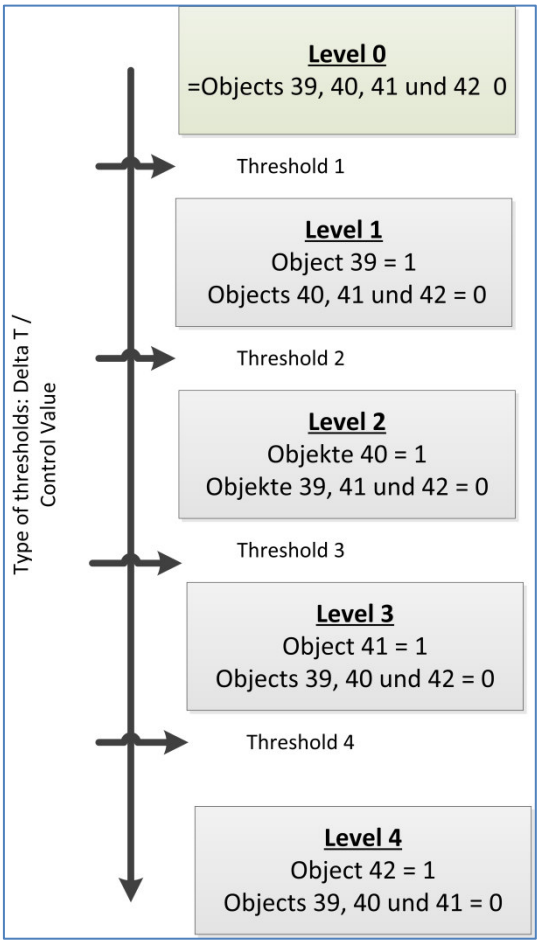

Figure 32: Step-Switch

Hysteresis

The hysteresis is used to avoid frequent switching. So would be switched with a hysteresis of 5% and a threshold of 60%ppm at 60% on and at 55% off.

Send output cyclic

With this parameter, the cyclic sending of the outputs can be activated. In this case, all output states according to the adjusted time are sent cyclically.

The following table shows the relevant communication objects:

Number	Name	Length	Usage
39	Output level 1	1 Bit	Switching of the first output level
40	Output level 2	1 Bit	Switching of the second output level
41	Output level 3	1 Bit	Switching of the third output level
42	Output level 4	1 Bit	Switching of the fourth output level

Table 55: Communication objects output level controller

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7.1.3 Type of thresholds: Manual control only

If the parameter “Type of thresholds” is set as follows, the stages will be only activated manual via its communication objects:

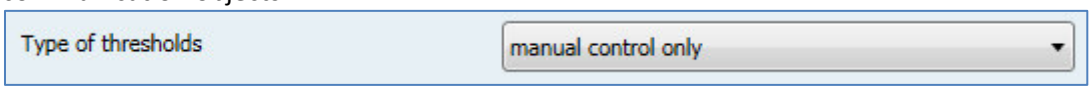

Figure 33: Manual control only

This setting disables automatic control of the levels. The fan speeds can be operated only by objects or via the display.

7.1.4 Behavior at lock

The following settings are available:

- **not use**
  The lock function is disabled and no communication object is shown.
- **Level hold**
  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 certain 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.
- **restore the old state**
  The controller restores the level, which was active before blocking.

The following table shows the object for the locking function:

Number	Name	Length	Usage
38	Block	1 Bit	blocks the ventilation control

Table 56: Communication object - Lock ventilation control

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7.1.5 Behavior at Init

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

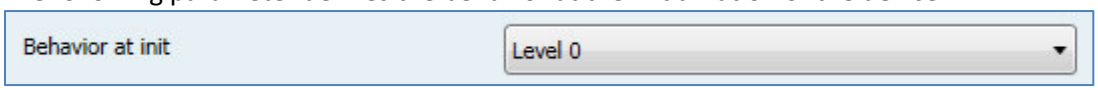

Figure 34: Ventilation Control - Behavior at Init

The behavior at init defines the level, which is called after a reset.

7.1.6 Sticking protection

The following parameter activates a sticking protection:

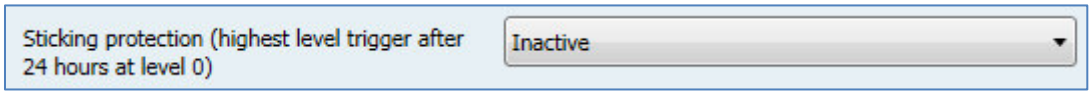

Figure 35: Ventilation Control - Sticking protection

In order to protect the air ventilation in front of a seizing, a stick protection can be enabled. This function runs the ventilation briefly at the highest level, when it was not moved for24 hours (= level 0).

7.1.7 Priority

The priority can call a certain state:

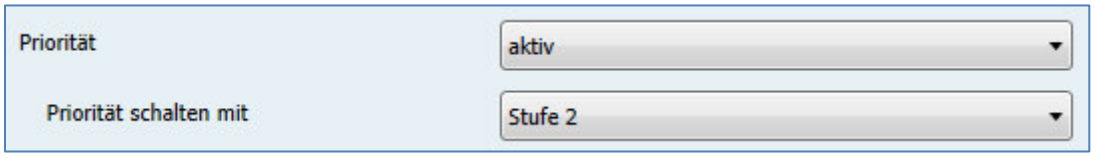

Figure 36: Ventilation Control - Priority

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
45	Object priority	1 Bit	Value 1 calls the adjusted level

Table 57: Communication object ventilation control - priority

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7.1.8 Status

The following parameter activates an object for the state:

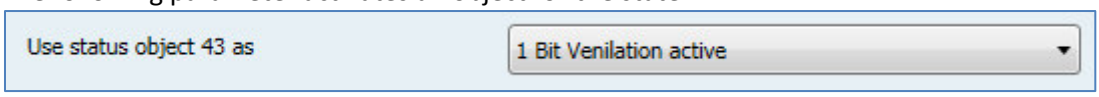

Figure 37: Ventilation control - Status

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. 1 for level 1, 2 for level 2…
  At 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.

7.2 Step Switch – binary coded

The step switch binary coded has the same functionality as the normal step switch, described in 7.1 Step switch bit coded. Only the output stage is sent binary, Here, the object 39 is the Bit 0, the object 40 the Bit 1 and the object 41 the Bit
The following table shows the binary coded switching:

normal step-switch	binary value	step-switch binary coded
Level 0	000	Object 39, 40 ,41 = 0
Level 1	001	Object 39 = 1, Objects 40 & 41 = 0
Level 2	010	Object 40 = 1 ,Objects 39 & 42 = 0
Level 3	011	Objects 39 & 40 = 1, Object 41 = 0
Level 4	100	Object 41 = 1 ,Objects 39 & 40 = 0

Table 58: Step-switch binary coded

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

Number	Name	Length	Usage
39	Bit 0	1 Bit	Switching Bit 0
40	Bit 1	1 Bit	Switching Bit 1
41	Bit 2	1 Bit	Switching Bit 2

Table 59: Communication object step switch binary coded

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7.3 Step switch simply

The step switch simply has the same functionality as the normal step switch, described in 7.1 Step switch bit coded. Only the output stage is different. At each increase of a stage, the previous level and the new level is turned on. This behavior becomes also clear from the communication objects:

Number	Name	Length	Usage
39	Level 1	1 Bit	Switching level 1
40	Level 1+2	1 Bit	Switching level 1+2
41	Level 1+2+3	1 Bit	Switching level 1+2+3
42	Level 1+2+3+4	1 Bit	Switching level 1+2+3+4

Table 60: Communication objects - step switch simply

7.4 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:

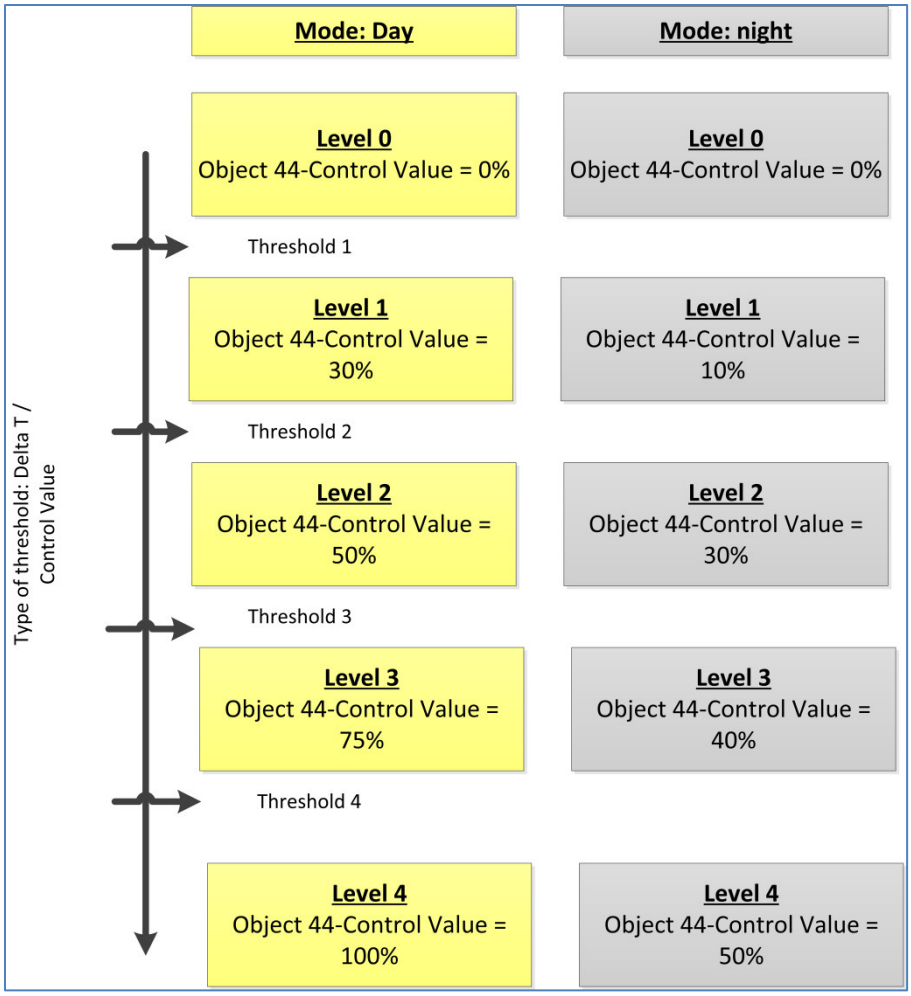

Figure 38: Example output - Step switch as Byte

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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
44	Control value	1 Byte	Control value for an actuator

Table 61: Communication object - Step switch as Byte

All other features are identical to those described under 7.1 Step switch bit coded.

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8 Key functions

8.1 Buttons grouped

The table shows the available settings when the buttons are selected as grouped:

ETS-text	Dynamic range **[default value]**	comment
Button C/D	▪ **Dimming** ▪ Shutter ▪ Switch	Operating mode of the channel
Dimming function A/B	▪ **Brighter/Darker** ▪ Darker/Brighter	Defines which channel should dim up and which should dim down
Shutter function A/B	▪ **Up/Down** ▪ Down/Up	Defines which channel should drive the shutter a down and which up
Switch function A/B	▪ **On/Off** ▪ Off/On	Defines which channel should switch off and which on

Table 62: Buttons grouped

By choosing channels as grouped, two channels become one common function. The grouped function is called dual surface, like dual surface dimming, and dual surface shutter. In contrast to the single surface functions, one action can be performed independent form the other one. One input performs always one function. The assignment for the buttons can be made individually, so it is possible to configure which button should for example drive the shutters up and which down.

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8.1.1 Dimming

The dual surface dimming function (channels grouped) is for controlling dimming actuators by start-stop dimming commands.
The following parameters are visible, when a pair of channels is chosen as dimming-function:

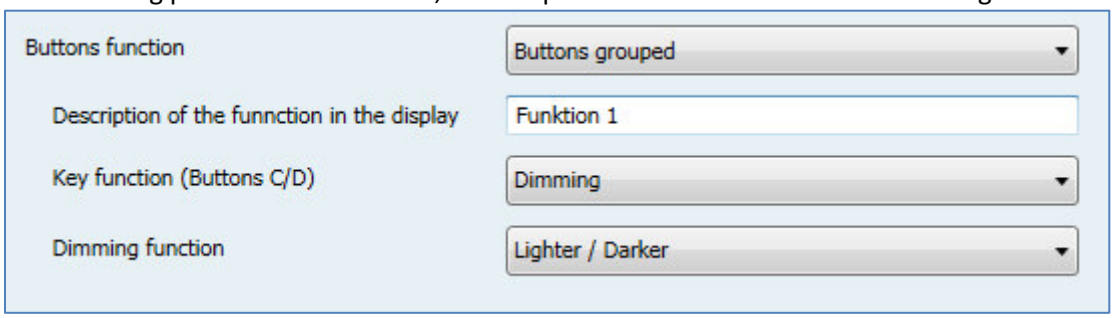

Figure 39: Buttons grouped -dimming

The following table shows the communication objects for this setting:

Number	Name	Length	Usage
61	Dimming On/Off	1 Bit	Switching function of the dimming process; action for a short keystroke
62	Dimming	4 Bit	Dimming function; action for a long keystroke
63	Status dimming value	1 Byte	Status from the dimming actuator; must be connected with the state of the dimming actuator to show the right value on the display

Table 63: Communication objects - buttons grouped dimming function

The polarity of the buttons can be switched via the parameter “Dimming function”.

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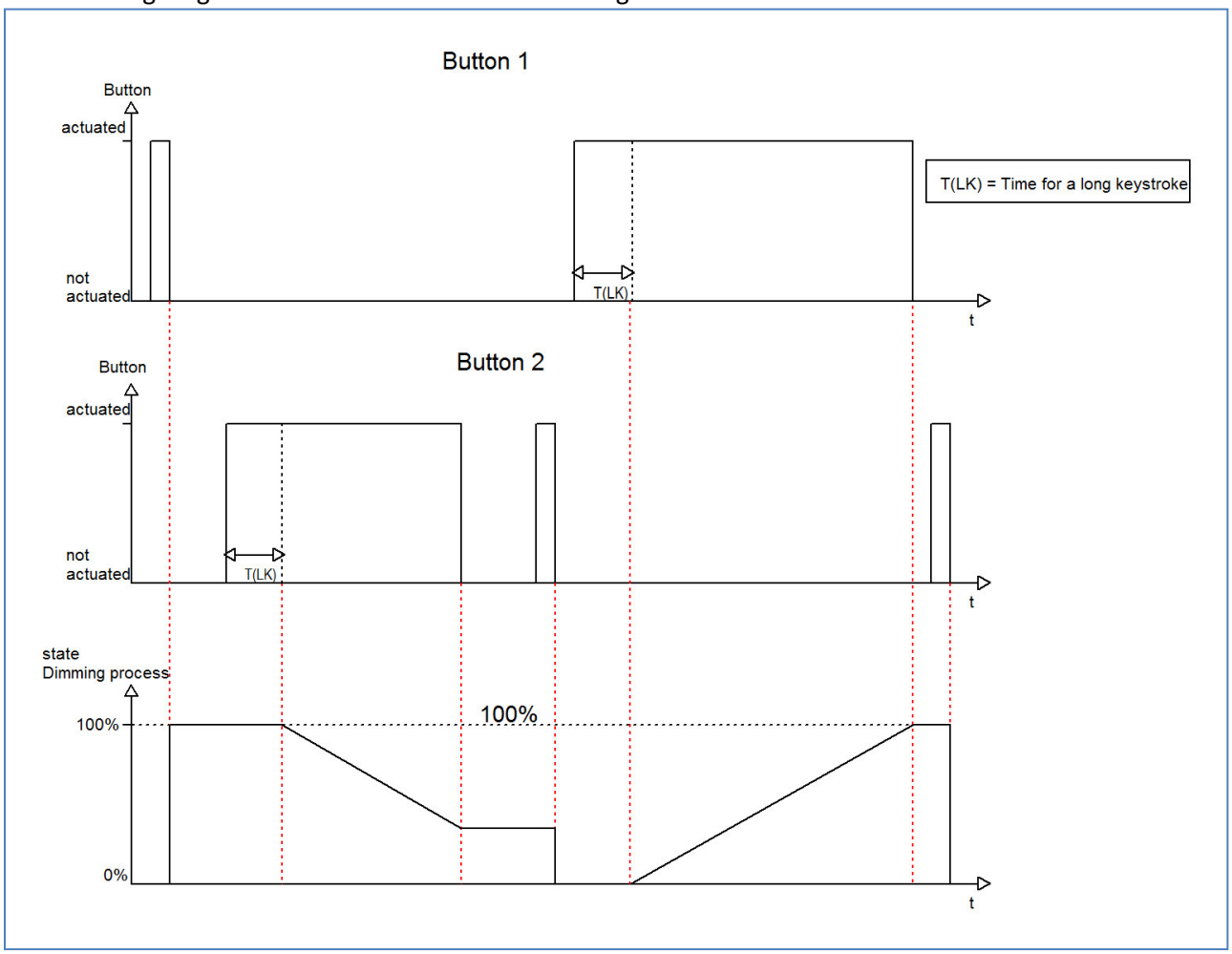
The following diagram shows the dual surface dimming function:



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8.1.2 Shutter

The shutter function for grouped buttons is used for controlling shutters.
The following settings are available at this function:

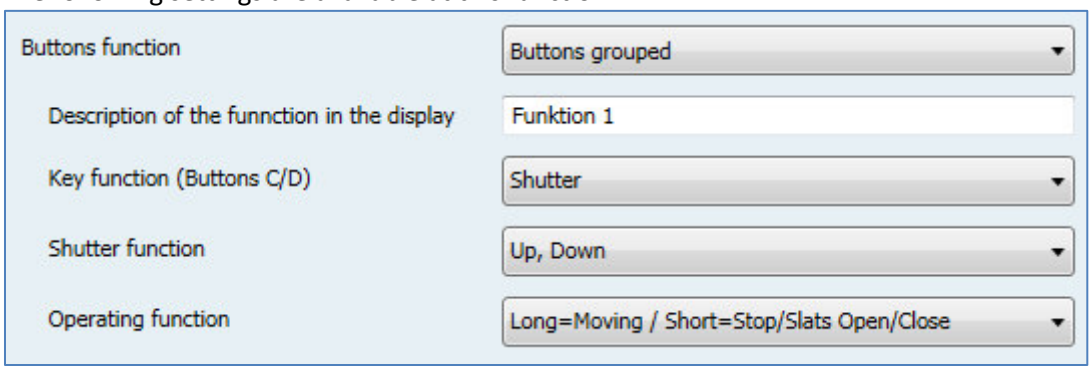

Figure 40: Buttons grouped - Shutter

Number	Name	Length	Usage
61	Shutter Down/Up	1 bit	Driving function for the shutter function
62	Stop/Slats Open/Close	1 bit	Stop-function/ Slat adjustment
63	Status absolute position	1 Byte	Status for the current position; must be connected with the state of the shutter actuator for showing the right state on the display

Table 64: Communication objects - Shutter grouped

The parameter “shutter function” switches the polarity of the buttons C/D and the parameter “Operating function” switches the commands for a long and a short keystroke.

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8.1.3 Switch

The values for on and off can be assigned freely at the switching function for the grouped channels. If you adjust a pair of channel as switch, the following parameters will be shown:

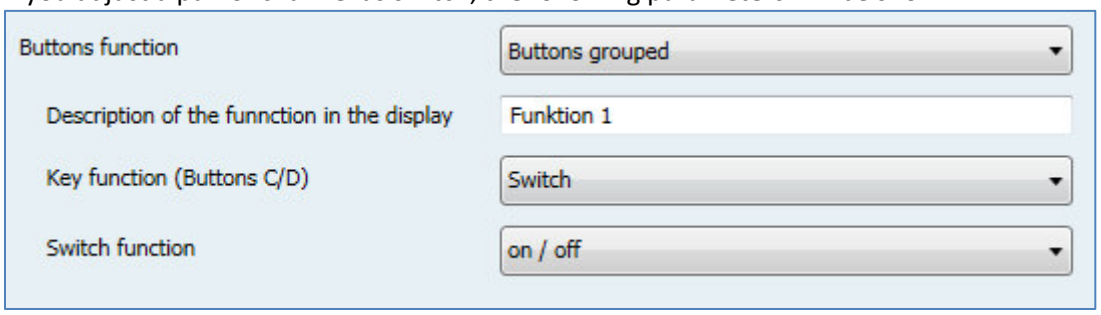

Figure 41: Buttons grouped - Switching

Simple functions, like an alternating circuit, can be programmed easily by using the grouped switch function. The 1 bit communication object sends in dependence of the parameterization a 0- or a 1-signal for the first button and the inverted signal for the second channel. So you can chose which channel should switch off and which should switch on.

The following chart shows the corresponding communication object:

Number	Name	Length	Usage
61	Switch On/Off	1 Bit	Switching object for the grouped switching function

Table 65: Communication object - grouped switching

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8.2 Buttons separately

8.2.1 Switch

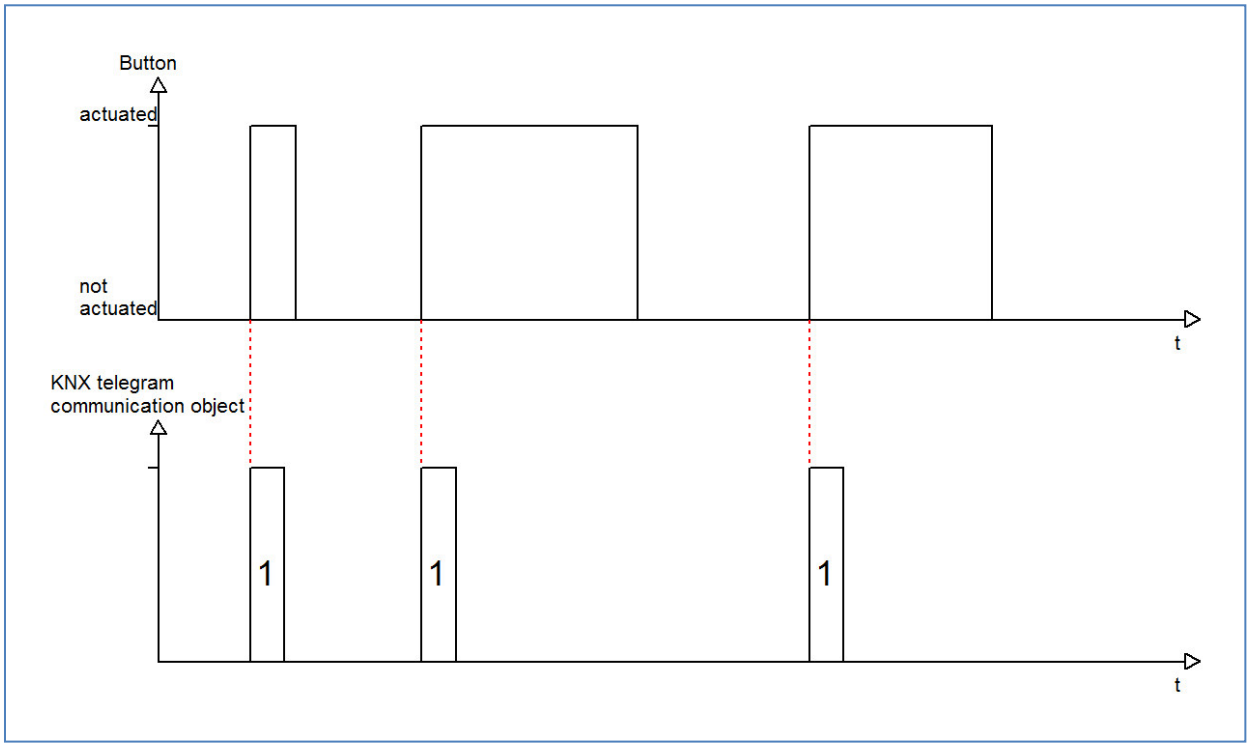
8.2.1.1 Switch on key press

The following settings are available for the function “Switch”, sub function “Switch on key press”:

ETS-text	Dynamic range **[default value]**	comment
Value for key operation	▪ **On** ▪ Off	Switches On/Off at key press

Table 66: Switch on key press

The sub-function “switch by push” or “switch by release” sends only a signal at the adjusted action. You can parameterize whether a 0-signal or a 1-signal should be sent. There is no inverted signal at subsiding the edge. This function always sends only one adjusted signal.
The following diagram shows this sub-function for switch by push. As soon as the state changes from 0 to 1, the push button sends an On-pulse (=1-signal):



The following chart shows the corresponding communication object:

Number	Name	Length	Usage
61	Switch	1 Bit	Switching function

Table 67: Communication object - Buttons separately - Switch on key press

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8.2.1.2 Toggle on key press

The sub function “Toggle on key press” switches at every key press. That means the current object value is inverted at every key press and sent afterwards.
The following table shows the communication object for this function:

Number	Name	Length	Usage
61	Switch	1 Bit	Switching function
62	Value for toggle	1 Bit	Status object, receives the state of the actuator

Table 68: Communication object - Toggle on key press

For sending always the right signal, the switching function must get a notification of the actuator, which should be switched. For getting this notification, the object “value for toggle” must be connected with the state of the actuator.

8.2.1.3 Send value on key press

The following figure shows the function „Send value on key press“:

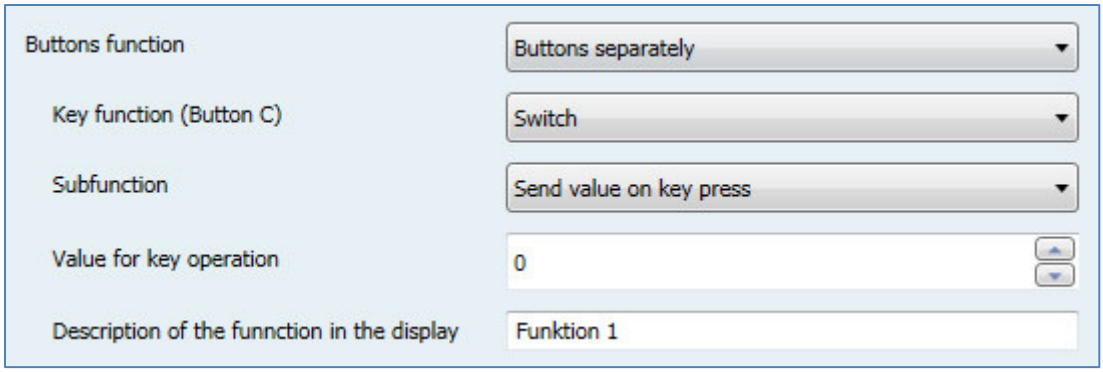

Figure 42: Send value on key press

The parameter „Value for key operation“ defines the value, which is sent at a key press:

ETS-text	Dynamic range **[default value]**	comment
Value for key operation	0-255 **[0]**	Setting which value should be sent on a key press

Table 69: Value for key operation

The following table shows the communication object for this parameter:

Number	Name	Length	Usage
61	Send value	1 Byte	sends the adjusted value

Table 70: Communication object - Send value on key press

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8.2.2 Scene

The scene function calls scenes, which are saved in actuators. Scene numbers in the push button and the actuators must be identical. It is possible to save scenes by a long keystroke if the saving function was activated.

The following illustration shows the setting options for this parameter:

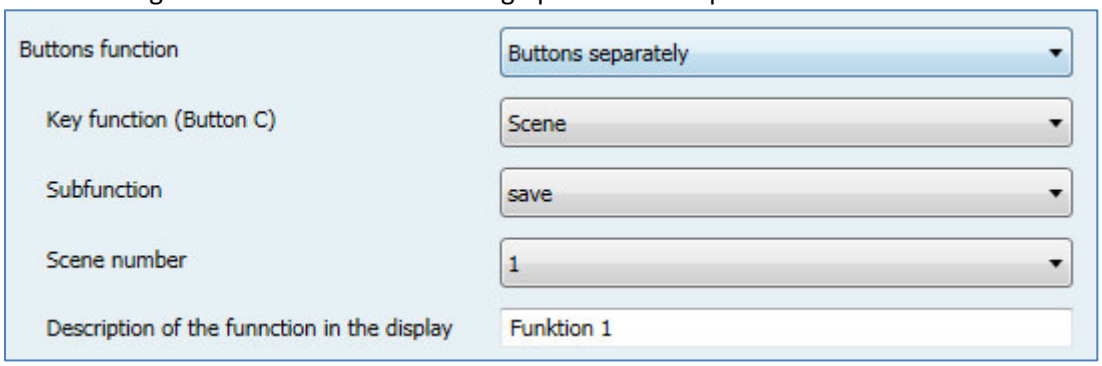

Figure 43: Scene function

The table shows the available settings for the parameter scene:

ETS-text	Dynamic range **[default value]**	comment
Subfunction	▪ no save ▪ **save**	Saving function can be selected via a long key stroke
Scene number	1-64 **[1]**	Scene number must be identical with the one in the actuator

Table 71: Scene function

The following table shows the available communication objects:

Number	**Name**	**Length**	**Usage**
63	Scene	1 Byte	calls the adjusted scene

Table 72: Communication object - scene function

The scene function calls scenes, which were stored in actuators. Scenes contain of parameterized states of several actuators, which can be called with only one keystroke by using the scene function. Additional to the call of scenes, scenes can be saved at the call of a push button by a long keystroke. When the saving function was activated, a long keystroke at the push button saves the current state of the actuators to the depending scene.

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For calling a scene or saving a new value for the scene, you have to send the accordingly code to the relevant communication object for the scene:

Scene	Retrieve		Save	
	Hex.	Dec.	Hex.	Dec.
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

Table 73: Calling and saving scenes

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8.2.3 Switch short/long

The parameter switch short/long can assign the push button different switching processes for a long and a short keystroke.
The following illustration shows the sub-functions for this parameter:

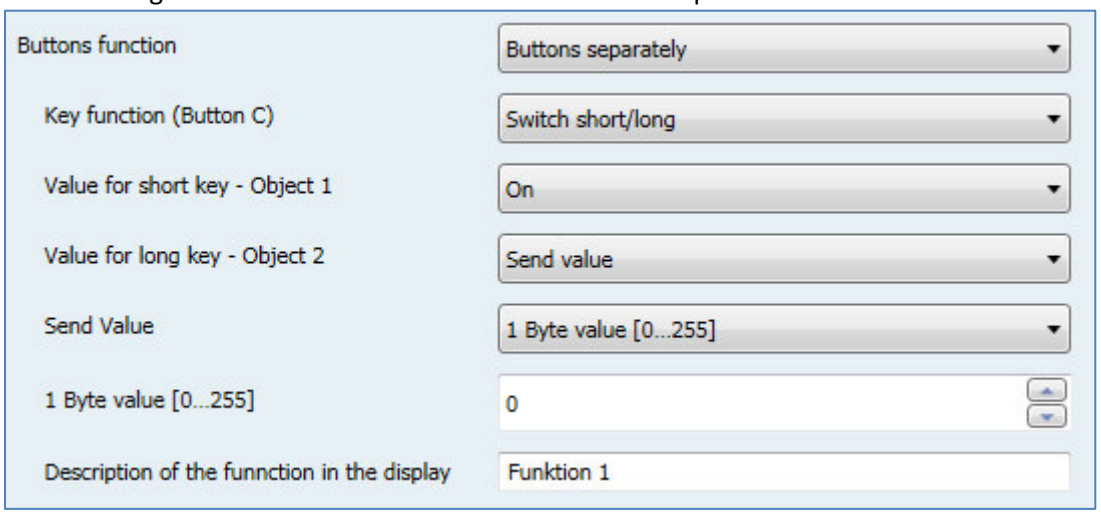

Figure 44: Parameter switch short/long

The table shows the available settings for this function:

ETS-text	Dynamic range **[default value]**	comment
Value for short key – Object 1	▪ On ▪ **Off** ▪ Toggle ▪ Send value ▪ Nothing	Action for a short keystroke
Value for long key – Object 2	▪ On ▪ Off ▪ Toggle ▪ Send value ▪ **Nothing**	Action for a long keystroke

Table 74: Parameter switch short/long

The table shows the communication objects for this function:

Number	Name	Length	Usage
61	Short key press	1 Bit/ 1 Byte	Function for a short key press
63	Long key press	1 Bit/ 1 Byte	Function for a long key press

Table 75: Communication objects - Switch short/long

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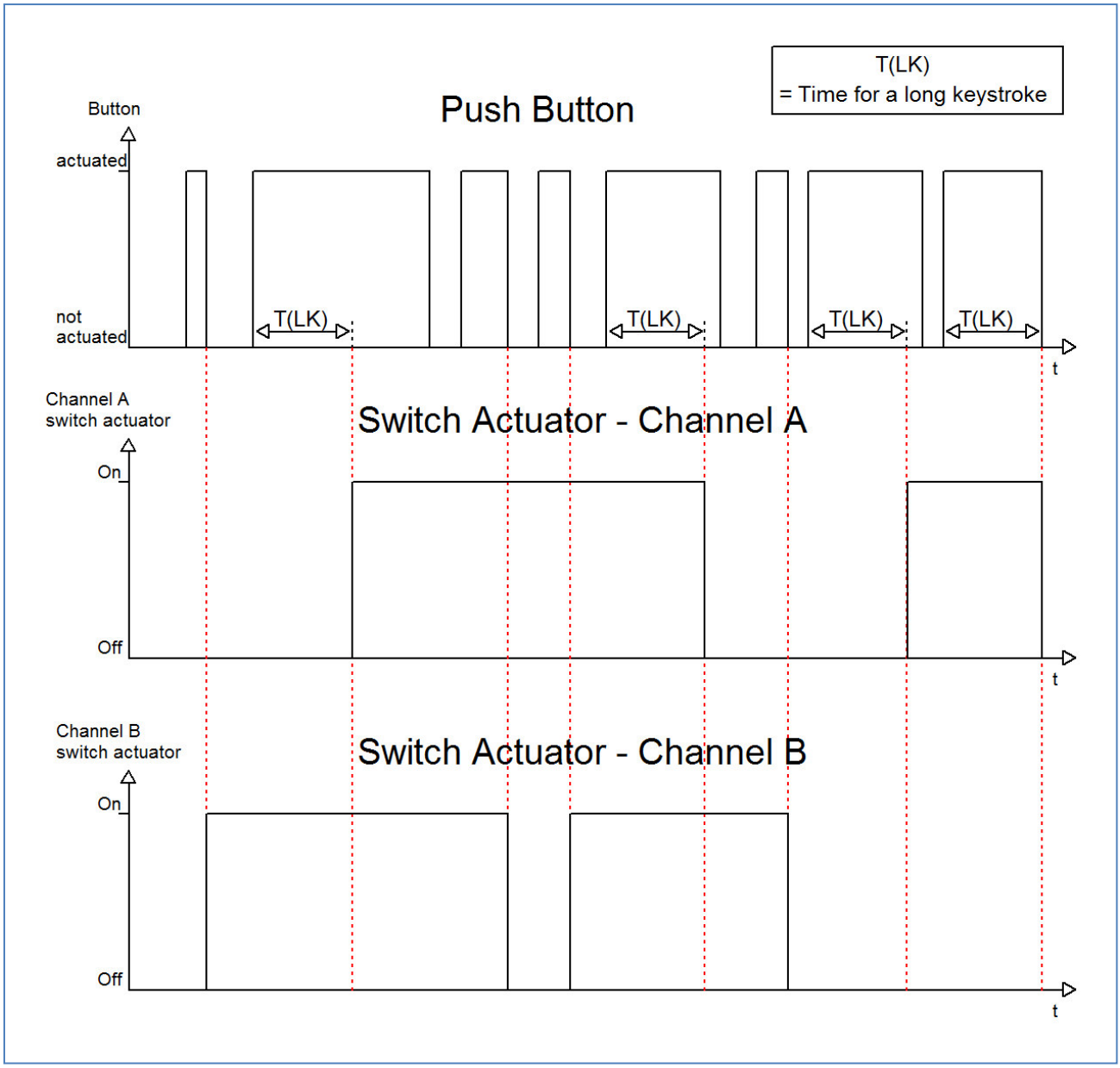
The parameter “switch short/long” can control for example two channels of an actuator by using only one button. Furthermore you can switch a channel with a long keystroke on and with a short keystroke off. For both objects, a function can be set individually. Therefore the sub-functions on, off, toggle and nothing are available. Two communication objects are displayed, which can be connected in any way. By activating the sub-function “toggle” an additional communication object appears, called “value for toggling”. This object is a status object for the push button and must be connected to the status-object of the actuator (have a look at: 4.5.1 Toggle)

The following diagram shows the behavior of this parameter. Both objects (push-button and push-button long) were set to toggle. The object for the long keystroke is connected to channel A of the switch actuator and the object for the short keystroke is connected to channel B:



In this example the push button toggles Channel B with a short keystroke. The Channel A does not react to a short keystroke. This one reacts only at a long keystroke with toggling.

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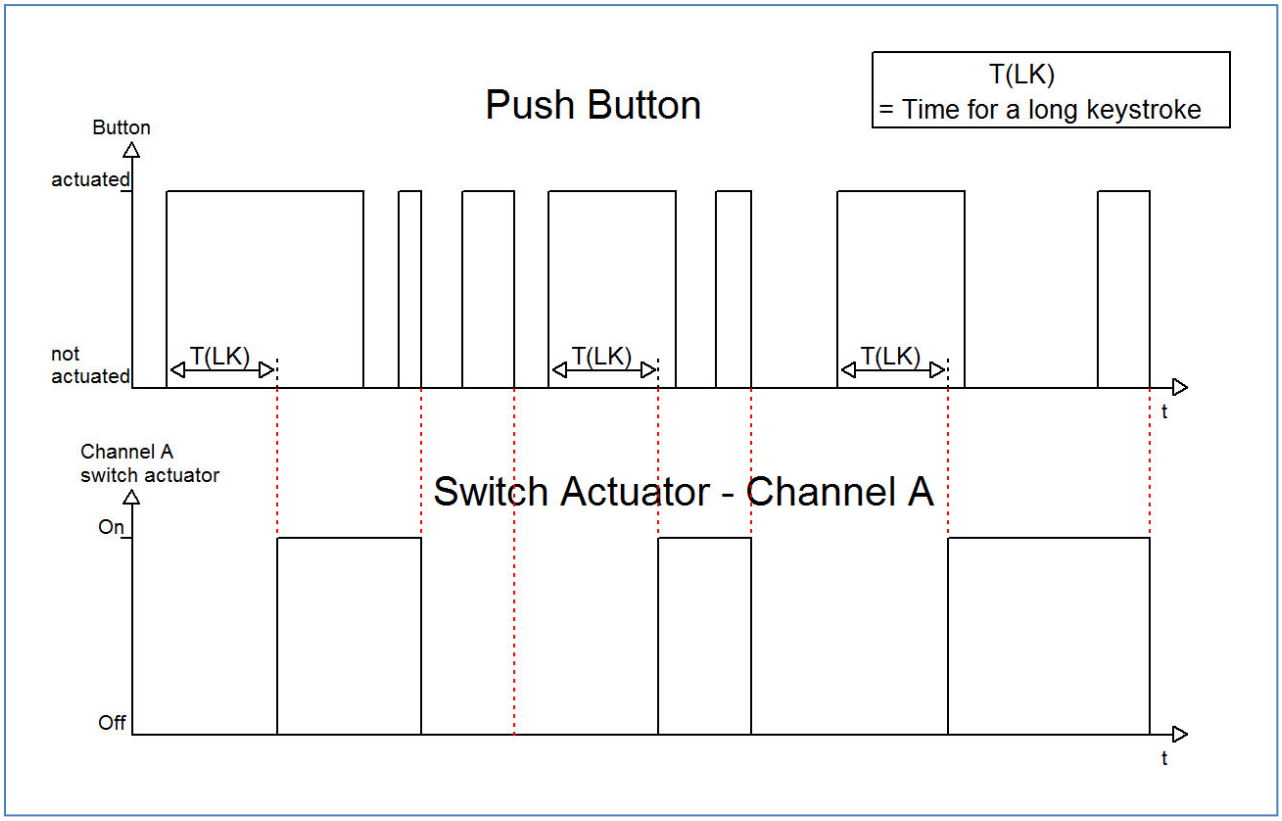
The following diagram shows a further application example for this parameter. In this example, the object for a long keystroke switches the channel A of a switch actuator on. A short keystroke switches the channel off. The three communication objects were connected in only one group address:



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8.2.4 Toggle Heating/Cooling

The following parameter shows the setting toggle heating/cooling:

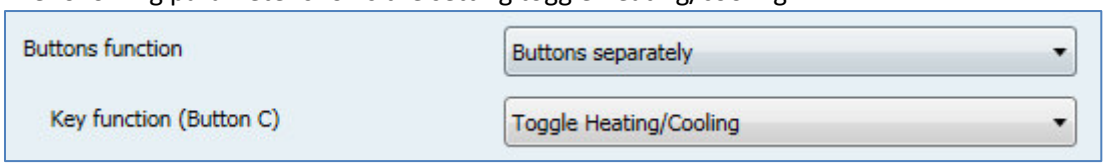

Figure 45: Toggle heating/cooling

The function „Toggle heating/cooling“ switches between heating and cooling. The function works like a normal switching function, but its representation in the display is optimized for heating/cooling switchover.

The following table shows the communication objects for this function:

Number	Name	Length	Usage
61	Toggle Heating/Cooling	1 Bit	Switching between heating and cooling
62	Value for toggle	1 Bit	Status object, should be connected with the state of the controller

Table 76: Communication object - Toggle heating/cooling

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9 Index

9.1 List of figures

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9.2 List of tables

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10 Attachment

10.1 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.

10.2 Routine disposal

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.

10.3 Assemblage

Risk for life of electrical power!
All activities on the device should only be done by an electrical specialist. The county specific regulations and the applicable EIB-directives have to be observed.

10.4 Datasheet

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MDT Glass RTC

MDT Glass Room Temperature Controller 1-fold with LCd display, flush mounted

Version		
SCN-RT1GW.01	Room Temperature Controller 1-fold with LCD display	Flush mounted, White
SCN-RT1GS.01	Room Temperature Controller 1-fold with LCD display	Flush mounted, Black

The MDT Glass Room Temperature Controller is used to control the indoor temperature, it has a working range from -10 to +50°C. The MDT Glass Room Temperature Controller detects the temperature and releases telegrams in dependence on its parameterisation.

The characteristic of the MDT Glass Temperature Controller (Two-position, PI and PWM control) can be set in the ETS3/4. The MDT Glass Room Temperature Controller stores the minimum and maximum temperature and releases an alarm telegram if the temperature differs from the programmed limit values. The temperature of the frost protection is parameterizable.

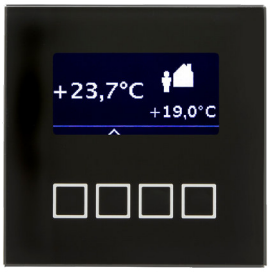
The large LCD display optionally shows inside/outside temperature, the desired value and the current time.
Also user defined messages and 14byte telegramms from the KNX bus can be displayed.

The MDT Glass Room Temperature Controller is a flush mounted device for fixed installations in dry rooms.

For project design and commissioning of the MDT Glass Room Temperature Controller it is recommended to use the ETS. Please download the application software at www.mdt.de/Downloads.html

SCN-RT1GW.01

SCN-RT1GS.01



- Production in Germany, certified according to ISO 9001
- **Large LCD Display (with automatic light intensity control)**
- Room temperature controller with temperature sensor -10 to +50°C
- Comfort-/night-/standby-/frost protection operation
- Selectable temperature controller (PI, Two-position, PWM)
- Status feedback by HVAC and RHCC status objects
- Limit values min/max, frost-/heat protection alarm, min/max memory
- Given value is stored at voltage failure
- **Indication of inside/outside temperature, desired value and time**
- **Indication of user defined messages (1Bit)**
- **Indication of text telegramms (14Byte)**
- **Two direct switching functions (e.g. light, shutter)**
- **Ventilation functions (hand or automatic)**
- Dimensions (W x H): 92mm x 92mm
- Recommended mounting height: 1,50 - 1,60m
- Integrated bus coupling unit
- 3 years warranty

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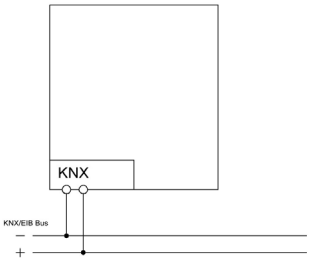
Stand: 0217

MDT Glass RTC

Technical Data	SCN-RT1GW.01	SCN-RT1GS.01		
Configuration	RTC	RTC		
Number of Channels	1	1		
Measurement range temperature	-10 to +50°C	-10 to +50°C		
Specification KNX interface	TP-256	TP-256		
Available application software	ETS 3/4/5	ETS 3/4/5		
Permitted wire gauge				
KNX busconnection terminal	0,8mm Ø, solid core	0,8mm Ø, solid core		
Power supply	KNX bus	KNX bus		
Power consumption KNX bus typ.	< 0,25W	< 0,25W		
Operating temperature range	-10 to +50°C	-10 to +50°C		
Enclosure	IP 20	IP 20		
Dimensions (W x H x D)	92mm x 92mm x 28mm	92mm x 92mm x 28mm		
Recommended mounting height	1,50 - 1,60 m	1,50 - 1,60m		

Examplary circuit diagram SCN-RT1Gx.01



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