State 01/2015

Technical Manual

MDT RF-Socket

KNX RF+

RF – AxK1ST.01

RF-AKK1ST.01 - RF+ Socket

RF-AZK1ST.01 - RF+ Socket with active power measurement

Further Documents:

Datasheet:

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

Assembly and Operation Instructions:

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

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1 Content

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2 Overview

2.1 Overview devices

The manual refers to the following devices:

- **RF-AKK1ST.01** KNX RF+ Socket
  - flush-mounted, nominal voltage: 230V AC, maximum load: 10A, Switching- and Staircase-function, Communication by new KNX RF+ protocol in system mode
- **RF-AZK1ST.01** KNX RF+ Socket with active power measurement
  - flush-mounted, nominal voltage: 230V AC, maximum load: 10A, Switching- and Staircase-function, Power, Current and Voltage measurement with power monitoring, Metering, Communication by new KNX RF+ protocol in system mode

2.2 Verwendung & Einsatzgebiete

The MDT RF socket can switch almost all electrical devices. The outputs can operate as normal switching outputs or as output with staircase function. In both settings extensive options are available.
The RF socket with active power measurement contains of an integrated true RMS measurement. By measuring current and voltage, the power consumption of a device can be measured precisely. Furthermore, measured values for voltage and current can be sent and in accordance to the values, actions can be triggered.
The devices communicate via the KNX RF+ protocol. By using the RF socket, normal sockets can be controlled via the KNX system.
The device communicates via the KNX RF+ protocol. Detailed information for planning and working with radio lines via the KNX RF+ protocol can be downloaded at http://www.mdt.de/EN_Downloads_Manuals.html.

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2.3 Structure & Handling

The following figure shows the design of the RF socket:

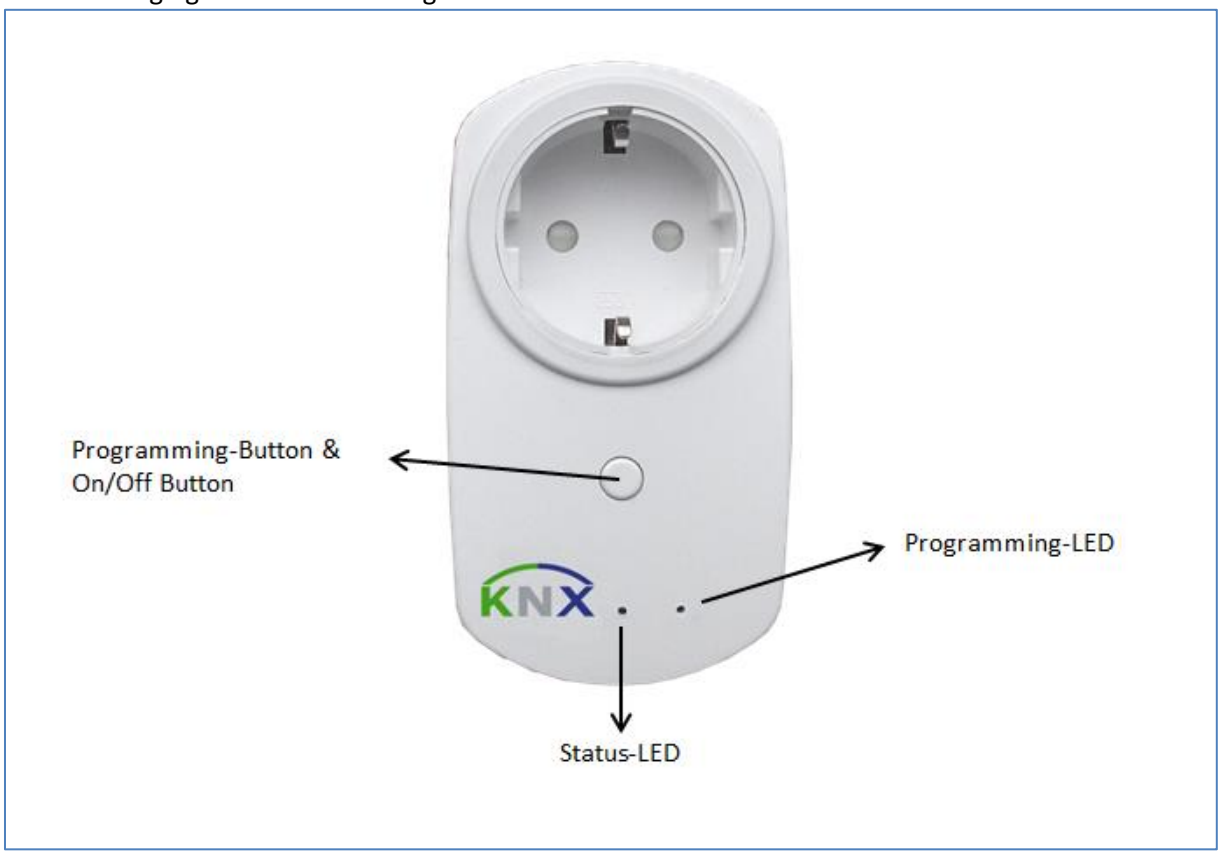

Figure 1: Overview Hardware RF socket

The output can be switched via a short key press on the button. An active output is shown by the green status LED. Via a long key press, the programming mode is activated/deactivated. An active programming mode is shown by the red programming LED.

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2.4 Functions

Every channel can be selected as one of these 3 states:

- **not active**
  The channel has no function. So there are no communication objects for this channel shown.
- **Switch**
  If the channel is chosen as switch, there will be different parameterization options for configuring the switching process.
- **Staircase**
  Now, the channel can become a staircase light function. This function causes an automatic switch off of the channel after an adjusted time.

At the RF socket with active power measurement, the following menus are also available:

- **Active power measurement**
  The active power measurement can send the current power of the connected load and in accordance to the value, specific function, such as Send messages and / or switch the output off, can be triggered.
- **Current measurement**
  The current measurement can send the measured current of the connected load and in accordance to the value, specific function, such as Send messages and / or switch the output off, can be triggered.
- **Voltage measurement**
  The voltage measurement can send the measured current of the connected load and in accordance to the value, specific function, such as Send messages and / or switch the output off, can be triggered.
- **Meter**
  2 counters, main and sub meters, are available. With these various power measurements for daily / weekly / monthly or annual values can be realized.

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2.5 Settings at the ETS-Software

Selection at the product database:

Manufacturer: MDT Technologies
Product family: Actuator
Product type: Switch Actuators
Medium Type: RF
Product name: addicted to the used type, e.g.: RF-AZK1ST.01
Order number: addicted to the used type, e.g.: RF-AZK1ST.01

2.6 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) Connect, parameterize and download RF+ Line Coupler
(3) Connect and download MDT RF+ Line coupler, RF-LK001.01
(4) Press the programming button at the device(red programming LED lights)
(5) 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)
(6) Loading of the application, with requested parameterization
(7) 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

Nr.	Name	Object function	Data type	Direction	Info	Usage	Tip
Switch Channel:							
0	Channel A	Switch on/off	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is shown at the **operating mode „switch“** and controls the **channel On/Off**, which is normally connected to all control keys. **(= Main function at switch)**
1	Channel A	Staircase	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is shown at the **operating mode „switch“** and controls the **channel On/Off**, which is normally connected to all control keys. The channel switches off again after adjusted time is expired. **(= Main function at staircase)**
3	Channel A	Block	DPT 1.003	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is only shown after activation of the blocking object. **Object blocks the function of this channel**. **(= Additional function)**
4	Channel A	Scene	DPT 18.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication onject appears **only after activating scenes**. For calling of saved scenes, which are saved in the actuator. **(= Additional function)**

5	Channel A	Status	DPT 1.001	sending	Actuator sends current state	For diplay on Visu, Tableau, and Display Connection to Push button object „Value for toggle“	Communication object operates as status indication and can be used for visualization… **Must be connected to the object “value for toggle” of the controlling push button for sending its current state to the push button.**
6	Channel A	Logic 1	DPT 1.002	receive	Actuator reacts to Incoming-telegramm	external switching, state object of other devices	Channel switches only On, if the logic function of activated objects and switching onbject (Nr. 85) is true. Only available for switching output.
7	Channel A	Logic 2	DPT 1.002	receive	Actuator reacts to Incoming-telegramm	external switching, state object of other devices	Channel switches only On, if the logic function of activated objects and switching onbject (Nr. 85) is true. Only available for switching output.

Table 1: Communication objects switching output

The following objects are only for the device RF-AZK1St.01 available:

Nr.	Name	Object function	Data type	Direction	Info	Usage	Tip
Objects for the measurement:							
8	Active power meter	Active power	DPT 9.024/ DPT 14.056	send	Socket sends the current power of the connected load	Visu, Diagnostic, Recording	Communication object is shown at activated power measurement
9	Active power meter	Current value	DPT 7.012/ DPT 9.021/ DPT 14.019	send	Socket sends the current of the connected load	Visu, Diagnostic, Recording	Communication object is shown at activated current measurement
10	Active power meter	Voltage value	DPT 14.027	send	Socket sends the current voltage at the connected load	Visu, Diagnostic, Recording	Communication object is shown at activated voltage measurement
11	Sub Meter	Active Energy	DPT 13.010/ DPT 13.013	send	Socket sends the active energy since the last reset	Visu, Diagnostic, Recording	Communication object is shown at activated meters
12	Main Meter	Active Energy	DPT 13.013	send	Socket sends the active energy since the last reset	Visu, Diagnostic, Recording	Communication object is shown at activated meters
13	Active power meter	Exceedance of load	DPT 1.001	send	Socket sends exceedance of load	Visu, Diagnostic, Actuator…	Communication object is shown at power measurement and monitoring of load
14	Active power meter	Lower deviation of load	DPT 1.001	send	Socket sends lower deviation of load	Visu, Diagnostic, Actuator…	Communication object is shown at power measurement and monitoring of load
15	Active power meter	Exceedance of current	DPT 1.001	send	Socket sends exceedance of current	Visu, Diagnostic, Actuator…	Communication object is shown at current measurement and monitoring of current

16	Active power meter	Lower deviation of current	DPT 1.001	send	Socket sends lower deviation of current	Visu, Diagnostic, Actuator…	Communication object is shown at current measurement and monitoring of current
17	Active power meter	Exceedance of voltage	DPT 1.001	send	Socket sends exceedance of voltage	Visu, Diagnostic, Actuator…	Communication object is shown at voltage measurement and monitoring of voltage
18	Active power meter	Lower deviation of voltage	DPT 1.001	send	Socket sends lower deviation of volatage	Visu, Diagnostic, Actuator…	Communication object is shown at voltage measurement and monitoring of voltage
19	Sub Meter	Reset	DPT 1.001	receive	Reset of the sub meter	Visu, Push Button…	Communication object is shown at activated meters
20	Main Meter	Reset	DPT 1.001	receive	Reset of the main meter	Visu, Push Button…	Communication object is shown at activated meters

Table 2: Overview objects - Measurement

3.2 Default settings of the communication objects

The following chart shows the default settings of the communication objects:

Default settings									
Nr.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
Switch channel:									
0	Channel A	Switch on/off	1 Bit	Niedrig	X		X		
1	Channel A	Staircase	1 Bit	Niedrig	X		X		
3	Channel A	Block	1 Bit	Niedrig	X		X		
4	Channel A	Scene	1 Byte	Niedrig	X		X		
5	Channel A	Status	1 Bit	Niedrig	X	X		X	
6	Channel A	Logic 1	1 Bit	Niedrig	X		X		
7	Channel A	Logic 2	1 Bit	Niedrig	X		X		
Active power meter:									
8	Active power meter	Active power	2 Byte/ 4 Byte	Niedrig	X	X		X	
9	Active power meter	Current value	2 Byte/ 4 Byte	Niedrig	X	X		X	
10	Active power meter	Voltage value	4 Byte	Niedrig	X	X		X	
11	Sub Meter	Active Energy	4 Byte	Niedrig	X	X		X	
12	Main Meter	Active Energy	4 Byte	Niedrig	X	X		X	
13	Active power meter	Exceedance of load	1 Bit	Niedrig	X	X		X	
14	Active power meter	Lower deviation of load	1 Bit	Niedrig	X	X		X	
15	Active power meter	Exceedance of current	1 Bit	Niedrig	X	X		X	
16	Active power meter	Lower deviation of current	1 Bit	Niedrig	X	X		X	
17	Active power meter	Exceedance of voltage	1 Bit	Niedrig	X	X		X	
18	Active power meter	Lower deviation of voltage	1 Bit	Niedrig	X	X		X	
19	Sub Meter	Reset	1 Bit	Niedrig	X		X		
20	Main Meter	Reset	1 Bit	Niedrig	X		X		

Table 3: Communication objects – default settings

You can see the default values for the communication objects from the upper chart. 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.

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4 Parameter – Switch Channel

4.1 Identical parameter

The following parameters are as well available at channels selected as switch as at channels selected as staircase.

4.1.1 Relay operating mode

The following illustration shows the setting options for this parameter:

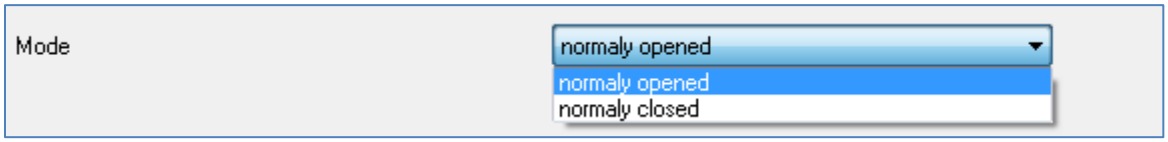


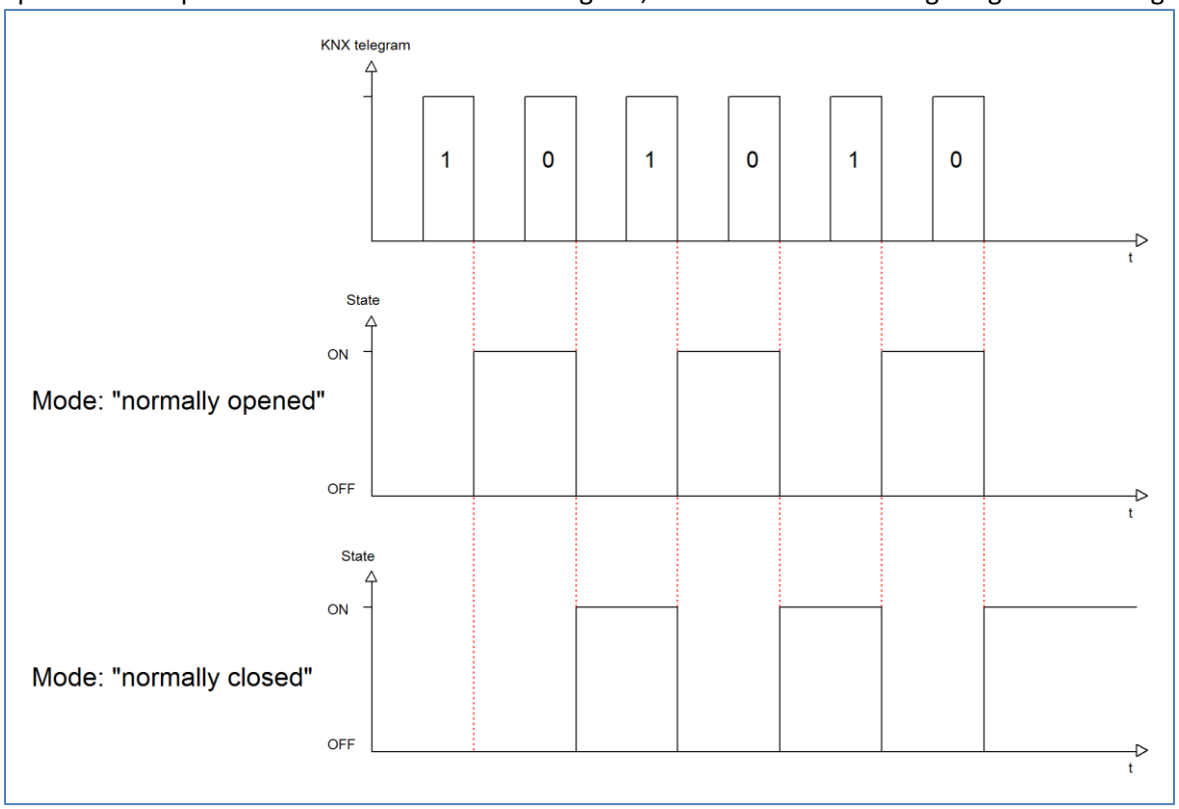
Figure 2: Operating mode

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Mode	▪ **normally opened** ▪ normally closed	Relay operating mode of the channel

Table 4: Operating mode

The following diagram shows the behavior of the relay operating mode normally closed and normally opened. The input for the channels is a KNX-telegram, which sends alternating 0-signals and 1-signals:



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4.1.2 Central function

The following illustration shows the setting options at the ETS-Software:

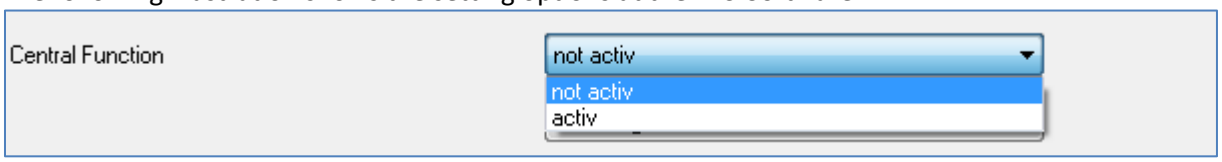

Figure 3: Central function

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Central function	▪ **not active** ▪ active	switches the central function on/off for this channel

Table 5: Central function

The central function can be switched on/off for every channel. For switching on this function, you have to choose the option “active”. By calling the central communication object, all channels with an activated central function are switched on with their current parameterization. So switch-on delays or staircase functions are still kept.
The central function can make programming much more easier and your project can become more clear.

The following chart shows the associated communication object:

Number	**Name**	**Length**	**Usage**
16	Central function	1 Bit	central switching of the channels number depends to the number of channels

Table 6: Communication object central function

4.1.3 Behavior at block/unblock

The following illustration shows the setting options at the ETS-Software:

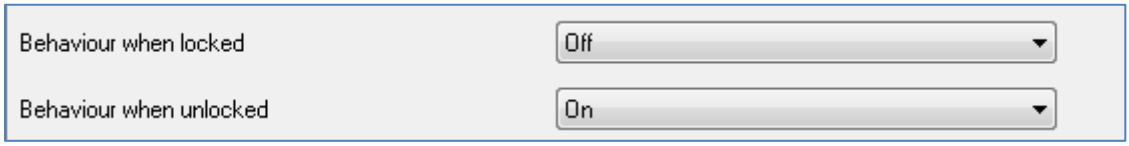

Figure 4: Blocking function

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range **[default value]**	comment
Behavior when locked Behavior when unlocked	▪ On ▪ Off ▪ **no change**	Behavior to a blocking/unblocking process

Table 7: Behavior at block/unblock

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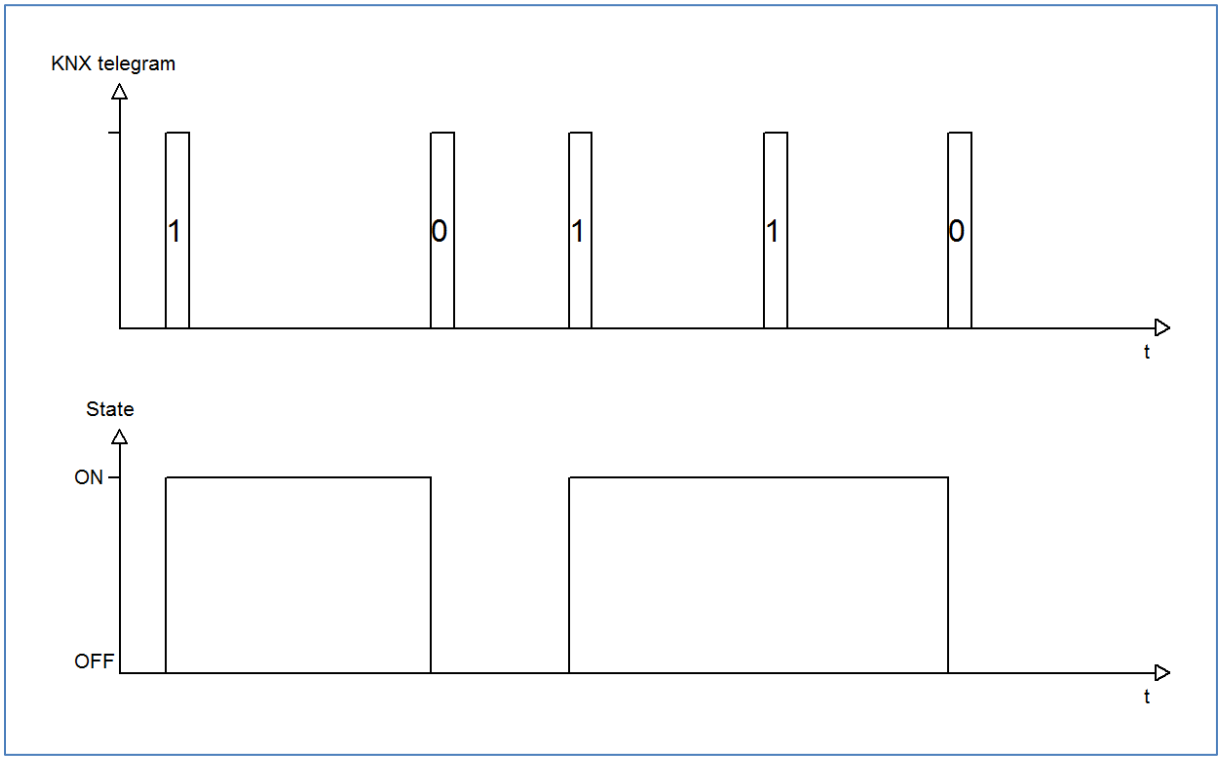
The blocking function gets active, when the corresponding communication object becomes a logical “1”. By sending a logical “0”, the blocking function can be deactivated again.
The parameter “Behavior when locked” defines an action for the output at activating the blocking process. There are the setting on, off and no change available. The same settings are also available for the “Behavior when unlocked”. This action is called when the blocking function is deactivated again.

The following chart shows the corresponding communication object:

Number	Name	Length	Usage
3	Block	1 Bit	blocks the channel

Table 8: Communication object blocking function

The following diagram describes the blocking process. For the “Behavior when locked”, the action on was parameterized and for the “Behavior when unlocked” the action off was parameterized:



The KNX telegram shows which values are send to the blocking object. By sending a logical “1”, the blocking function is activated and the channel is switched on. The blocking function is deactivated again by sending a logical “0”. So the channel is switched off.

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4.2 Switching output

The following parameters, which are described at the headings 4.3.x, are only available at channels selected as switch.

4.2.1 Overview

By choosing a channel as switch, a sub menu, called Channel A Switching, appears for this channel at the left drop down menu.
The sub menu is shown at the following illustration:

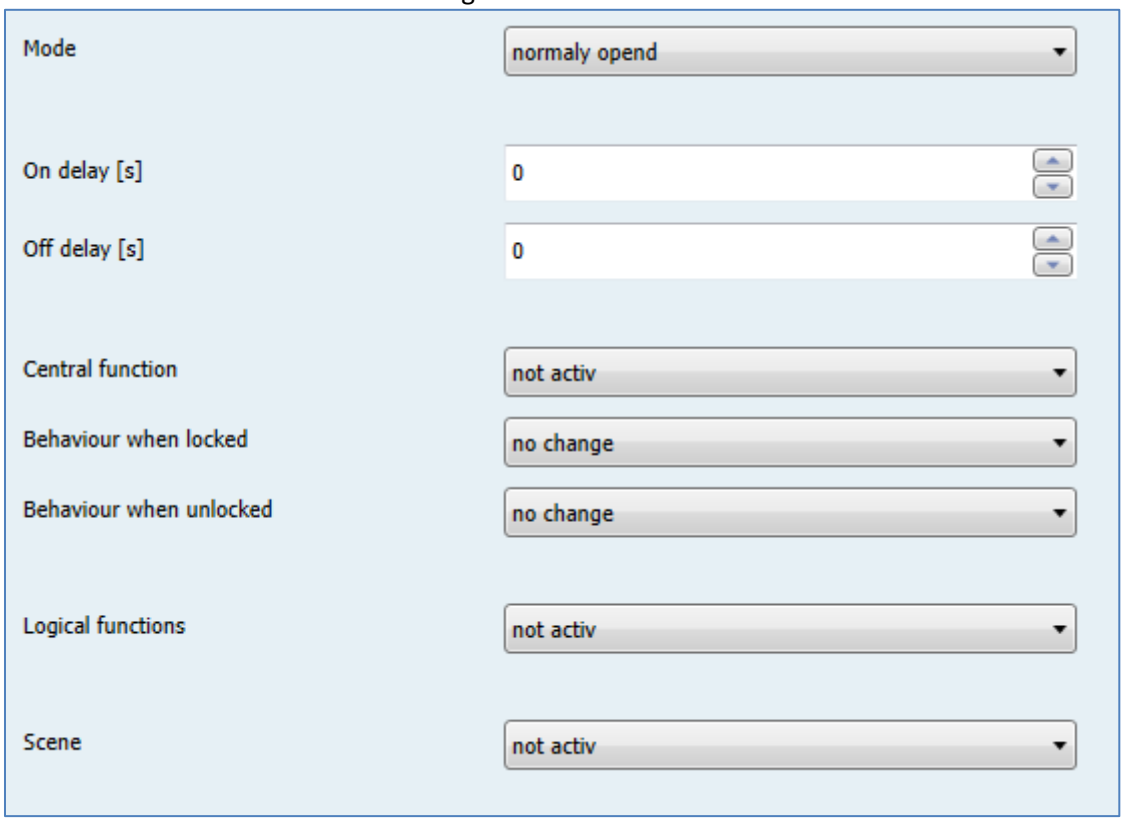

Figure 5: Switching output

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The chart shows the possible settings for switching outputs:

ETS-text	Dynamic range **[default value]**	comment
Mode	▪ **normally opened** ▪ normally closed	Operation mode of the channel
On-Delay	0…30000 sec **[0=no delay]**	Switch on delay of the channel in seconds
Off-Delay	0…30000 sec **[0=no delay]**	Switch off delay of the channel in seconds
Central function	▪ **not active** ▪ active	Activates the central function for this channel
Behavior when locked	▪ Off ▪ On ▪ **no change**	Action for activating the blocking process
Behavior when unlocked	▪ Off ▪ On ▪ **no change**	Action for deactivating the blocking process
Logic function	▪ **not active** ▪ with one object ▪ with two objects	Activation of the logic function with one or two objects
Logic operation	▪ **And** ▪ Or	Selection of the logic function only available, when the logic function was activated
Scene	▪ **not active** ▪ active	Activation of the scene function by activation this parameter a new sub menu appears (have a look at 4.4.4)

Table 9: Switching output

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4.2.2 On-/Off-delay

The following illustration shows the setting options at the ETS-Software:

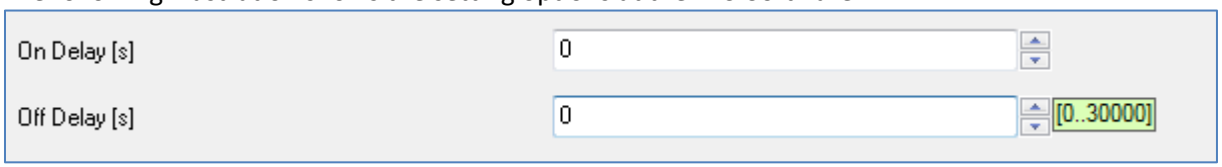
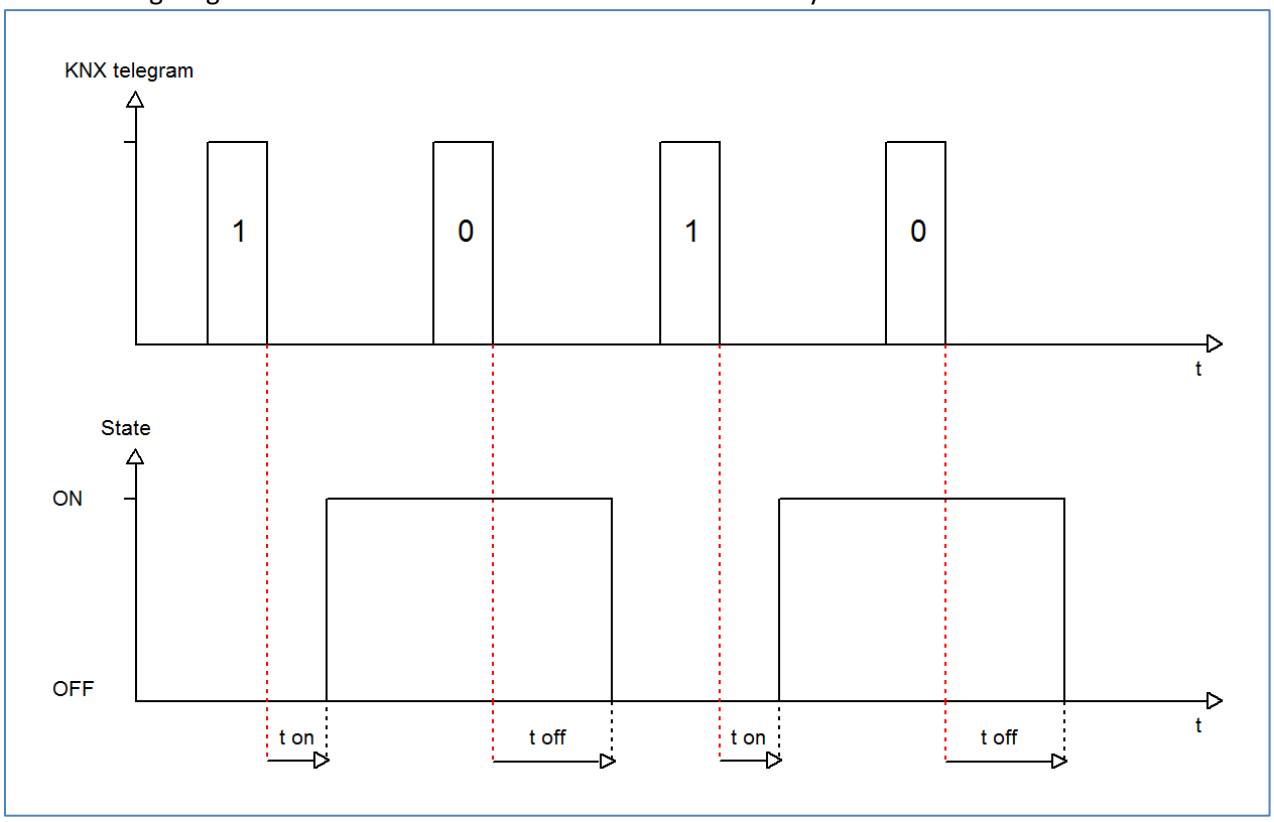


Figure 6: On/Off delay

The on-delay causes a delayed switch of the channel. At sending an on-signal to the channel, first the adjusted on delay time expires and afterwards the channel will be switched on.
The off delay works on the same principle. At sending an off-signal, first the adjusted off delay time expires and afterwards the channel will be switched off.
Both functions work as well alone as combined. By adjusting “0 seconds” for a delay the function is switched off.
The following diagram describes the combination of on and off delay:



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4.2.3 Logical functions

The following illustration shows the setting options at the ETS-Software:

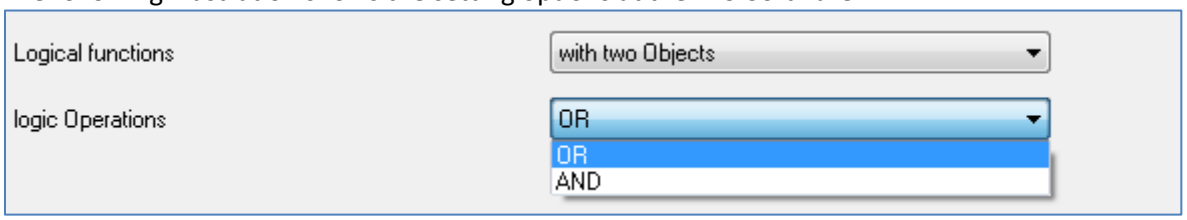

Figure 7: Logical functions

The logic function can be activated with one or two objects. The objects are the inputs of the logic block. Furthermore you can choose between an AND-function and an OR-function. The following figure shows an overview of the basic logic function with two objects:

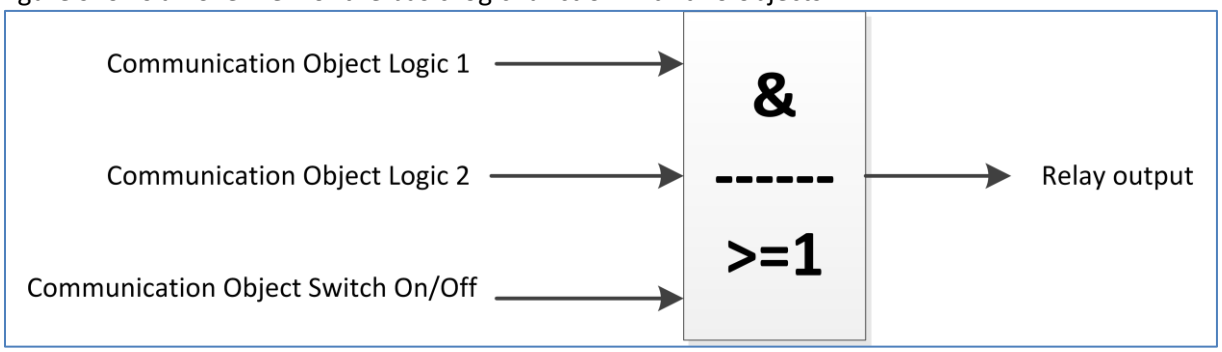

Figure 8: Overview Logic function

The logic function consists of the activated input objects and the switching object for each channel. The output of the logic is the respective relay output of the channel, so the physical switching of the channel.
The following chart shows the relevant communication objects:

Number	Name	Length	Usage
6	Logic 1	1 Bit	Logic object 1, is the first input for the logic block
7	Logic 2	1 Bit	Logic object 2, is the second input for the logic block

Table 10: Communication objects logic

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The following table illustrates the two logic functions:

AND-Connection					OR-Connection			
Switch On/Off	**Logic 1**	**Logic 2**	**Channel switched?**		**Switch On/Off**	**Logic 1**	**Logic 2**	**Channel switched?**
0	0	0	Nein		0	0	0	Nein
0	0	1	Nein		0	0	1	Ja
0	1	0	Nein		0	1	0	Ja
0	1	1	Nein		0	1	1	Ja
1	0	0	Nein		1	0	0	Ja
1	0	1	Nein		1	0	1	Ja
1	1	0	Nein		1	1	0	Ja
1	1	1	Ja		1	1	1	Ja

Table 11: Logic function

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4.2.4 Scene function

When functions of different groups (e.g. light, heating and shutter) shall be changed simultaneously with only one keystroke, it is practical to use the scene function. By calling a scene, you can switch the lights to a specific value, drive the shutter to an absolute position, switch the heating to the day mode and switch the power supply of the sockets on. The telegrams of these functions can have as well different formats as different values with different meaning (e.g. “0” for switch the lights off and open the shutters). If there were no scene function, you would have to send a single telegram for every actuator to get the same function.
The scene function of the switch actuator enables you to connect the channels of the switch actuator to a scene control. For that, you have to assign the value to the appropriated space (scene A..H). It is possible to program up to 8 scenes per switching output. When you activate the scene function at the switching output, a new sub menu for the scenes appears at the left drop down menu. There are settings to activate single scenes, set values and scene numbers and switch the memory function on/off at this sub menu.
Scenes are activated by receiving their scene numbers at the communication object for the scenes. If the memory function of the scenes is activated, the current value of the channel will be saved at the called scene number.
The communication objects of the scenes have always the length of 1 byte.

The following illustration shows the setting options at the ETS-Software for activating the scene function:

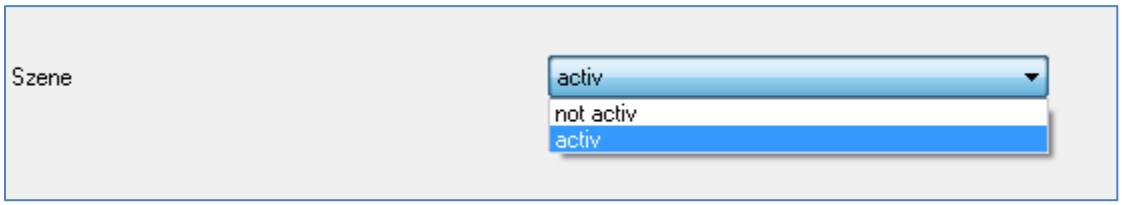

Figure 9: Scene function

The following chart shows the relevant communication object:

Number	Name	Length	Usage
4	Scene	1 Byte	Call of the scene

Table 12: Communication object scene

For calling a certain scene, you have to send the value for the scene to the communication object. The value of the scene number is always one number less than the adjusted scene number. For calling scene 1, you have to send a “0”. So the scene numbers have the numbers from 1 to 64, but the values for the scenes only from 0 to 63.
If you want to call scenes by a binary input or another KNX device, you have to set the same number at the calling device as at the receiving device. The calling device, e.g. a binary input, sends automatically the right value for calling the scene.

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There are up to 8 storage options for scenes at every channel.
These 8 storage options can get any of the possible 64 scene numbers.

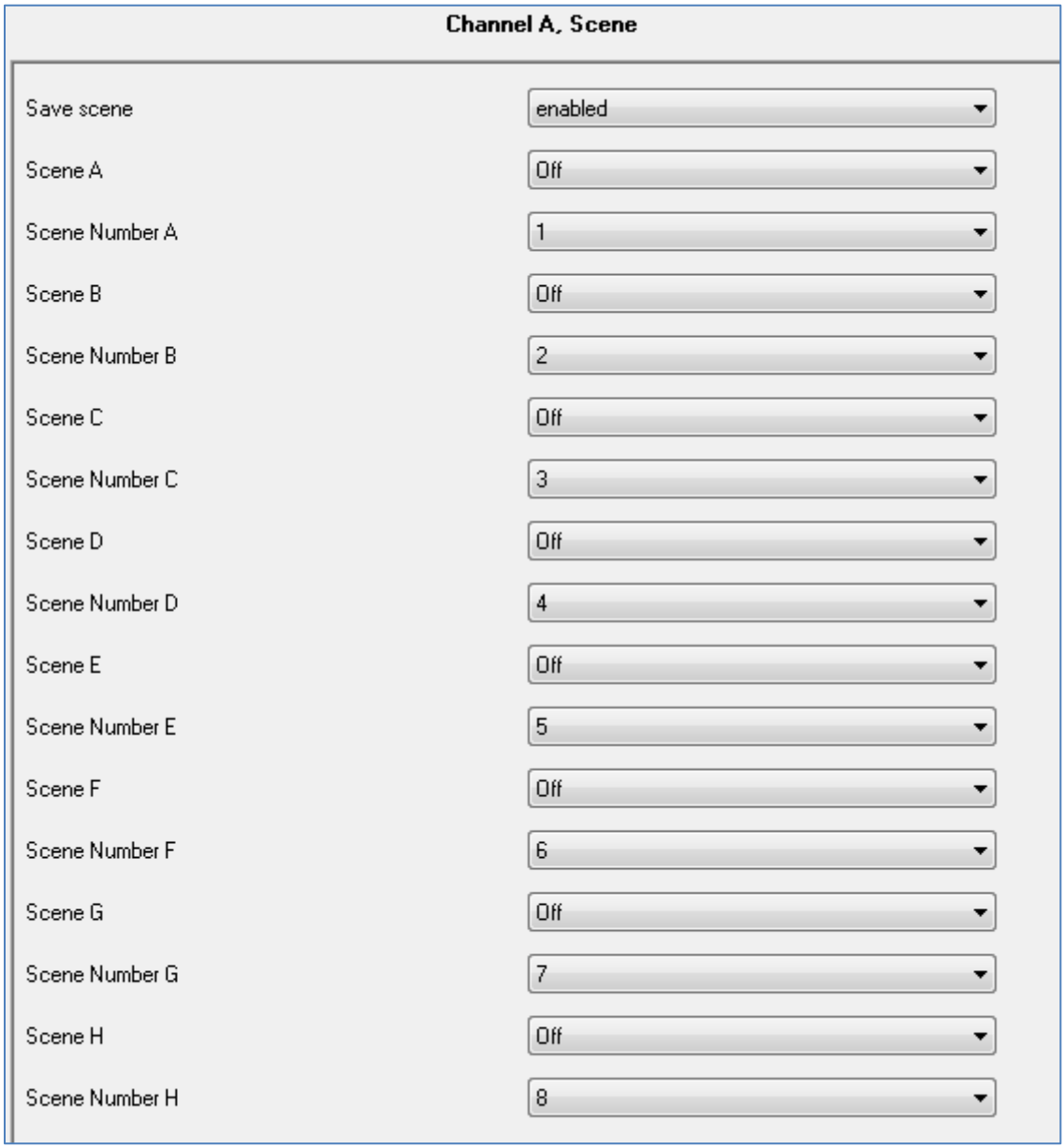

Figure 10: Sub function scene

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The chart shows the possible settings for scenes, which are identical for all channels. The settings are available at the sub menu for the scenes:

ETS-text	Dynamic range **[default value]**	comment
Save scene	▪ **disabled** ▪ enabled	Learning of scenarios; enable/disable memory function
Scene A	▪ **Off** ▪ On	Activation of the scene A
Scene number A	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene B	▪ **Off** ▪ On	Activation of the scene B
Scene number B	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene C	▪ **Off** ▪ On	Activation of the scene C
Scene number C	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene D	▪ **Off** ▪ On	Activation of the scene D
Scene number D	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene E	▪ **Off** ▪ On	Activation of the scene E
Scene number E	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene F	▪ **Off** ▪ On	Activation of the scene F
Scene number F	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene G	▪ **Off** ▪ On	Activation of the scene G
Scene number G	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number
Scene H	▪ **Off** ▪ On	Activation of the scene H
Scene number H	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number

Table 13: Parameter 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.	Dez.	Hex.	Dez.
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 14: Calling and saving scenes

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4.2.4.1 Scene programming example

When the scene function is activated for one channel, a new sub menu for the scene of this channel appears. Up to 8 scenes can be adjusted at this sub menu. Every scene gets one scene number, which enables the calling of the scene. You can adjust one specific state for every scene. So you can switch the channel off, with the setting “Off” or switch the channel on with the setting “On”. When the scene is called, the adjusted parameterization of the channel is kept (e.g. on delay, off delay, …).
To note at the scene programming is that if you want to call 2 or more channels with the same scene number, you have to set the both communication objects for the scenes to the same group address. By sending the calling value, both scenes are called. Your programming can become much clearer if you divide your group addresses by scene numbers. If now one channel shall react to 8 scenes, you will have to connect the communication object for the scenes to 8 group addresses.
The following illustrations shall make the division clearly:

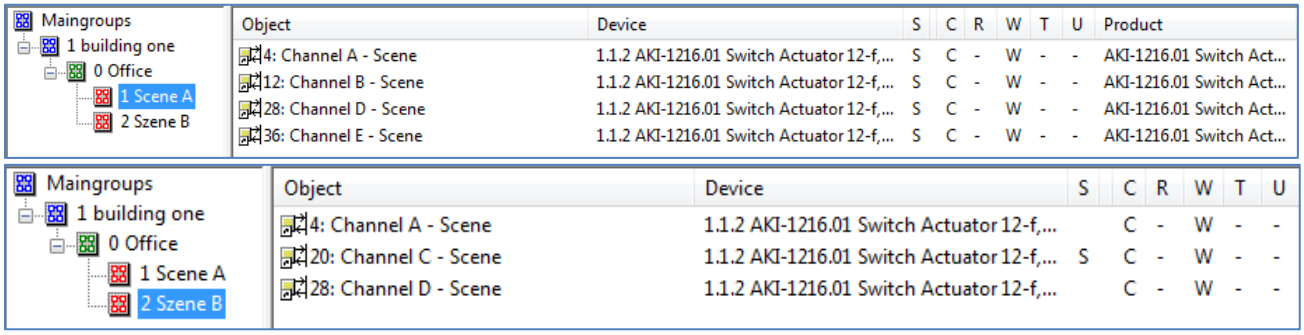

Figure 11: Programming of scenes

The channels A and D shall react to the call of scene A and scene B. So they are connected to both group addresses.

Furthermore you can save scenes at the according scene numbers. For that you have to activate the memory function at a channel of the switch actuator. Now you can call scenes by a binary input with a short keystroke and save scenes by a long keystroke. The adjusted value for the scene is overwritten by the current state of the actuator, when you save the scenes. At the next call of the scene, the scene will be called with the new value.

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4.3 Staircase

The following parameters, which are described at the headings 4.4.x, are only available at channels selected as staircase.

4.3.1 Overview

By choosing a channel as staircase, a sub menu, called Channel A Staircase, appears for this channel at the left drop down menu.
The sub menu is shown at the following illustration:

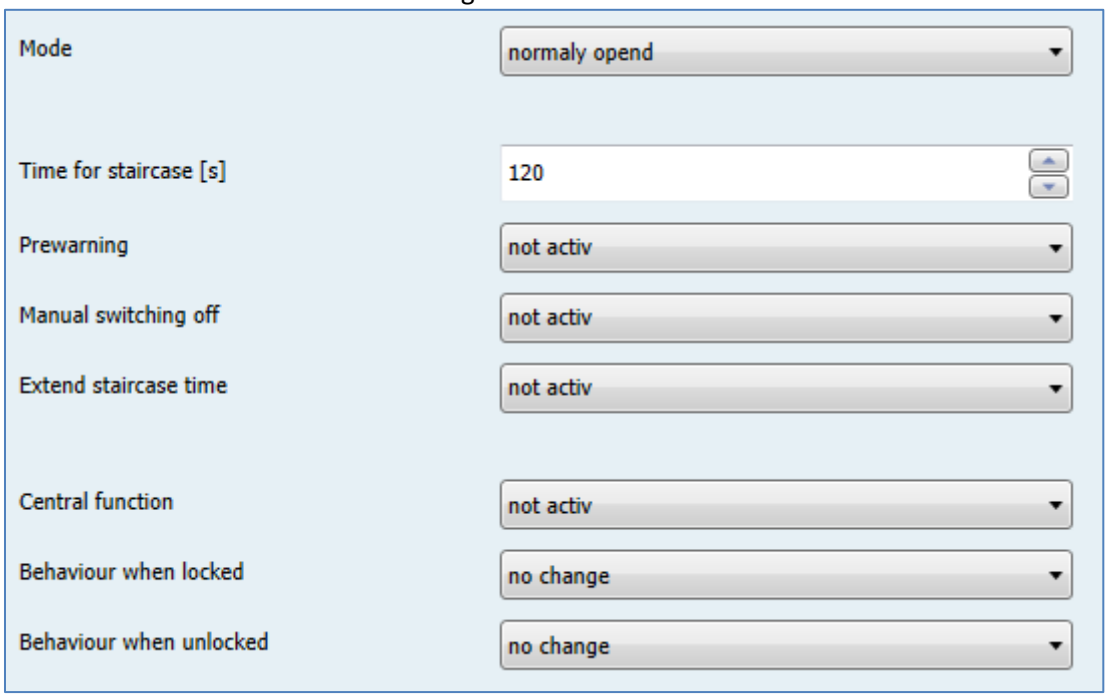

Figure 12: Staircase

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The chart shows all possible settings for staircase outputs:

ETS-text	Dynamic range **[default value]**	comment
Mode	▪ **normally opened** ▪ normally closed	Operation mode of the channel
Time for staircase [s]	0…65535 sec [120 sec]	Duration of the switching process
Prewarning	▪ **not active** ▪ active	Activates the prewarning function
Warning time [s]	0…65535 sec [120 sec]	Duration of the warning; Only available when warning is activated
Prewarning time [s]	0…65535 sec [120 sec]	Adjustment, how long the light shall be switched on after the warning; Whole duration of the warning process is the sum of the 3 times: Staircase time, warning and prewarning Only available when warning is activated
Manual switching off	▪ **not active** ▪ active	Activation of the manual turn off of the staircase
Extend staircase time	▪ **not active** ▪ active	Activation of the extension of the staircase
Central function	▪ **not active** ▪ active	Activates the central function for this channel
Behavior when locked	▪ Off ▪ On ▪ **no change**	Action for activating the blocking process
Behavior when unlocked	▪ Off ▪ On ▪ **no change**	Action for deactivating the blocking process

Table 15: Parameter staircase

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4.3.2 Staircase time

The following illustration shows the setting options at the ETS-Software:

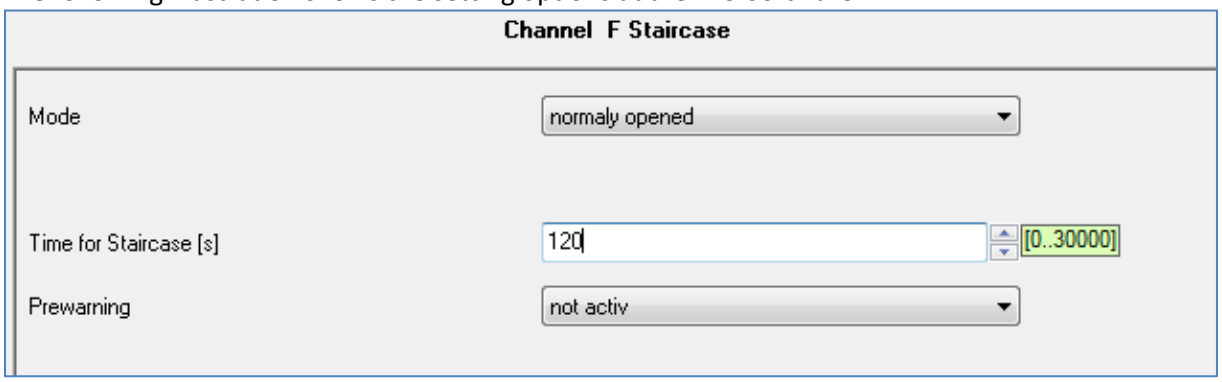

Figure 13: Staircase time

The staircase function is activated by choosing a channel as staircase. This function enables an automatic turn off of the channel after an adjusted time, called “time for staircase”. The time for staircase can be parameterized freely. By sending an “on-signal” at the communication object, the channel is switched on and the time runs out. After the time is ran out, the channel is switched off automatically. There are a lot of further functions to adjust the staircase function. These functions are described at the following segments.

The following chart shows the relevant communication object:

Number	Name	Length	Usage
1	Staircase	1 Bit	Calling of the staircase function

Table 16: Communication object staircase

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4.3.3 Prewarning und Warning

The following illustration shows the setting options at the ETS-Software:

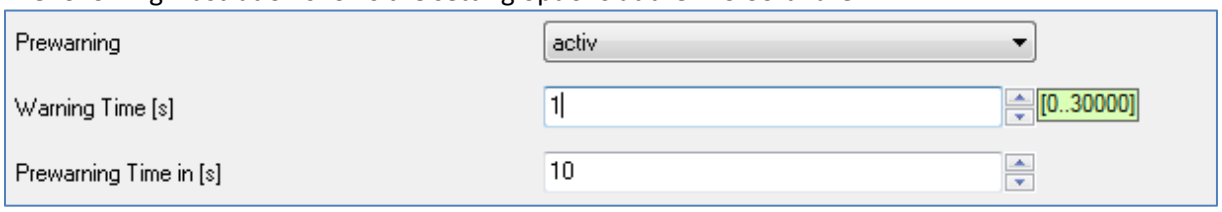
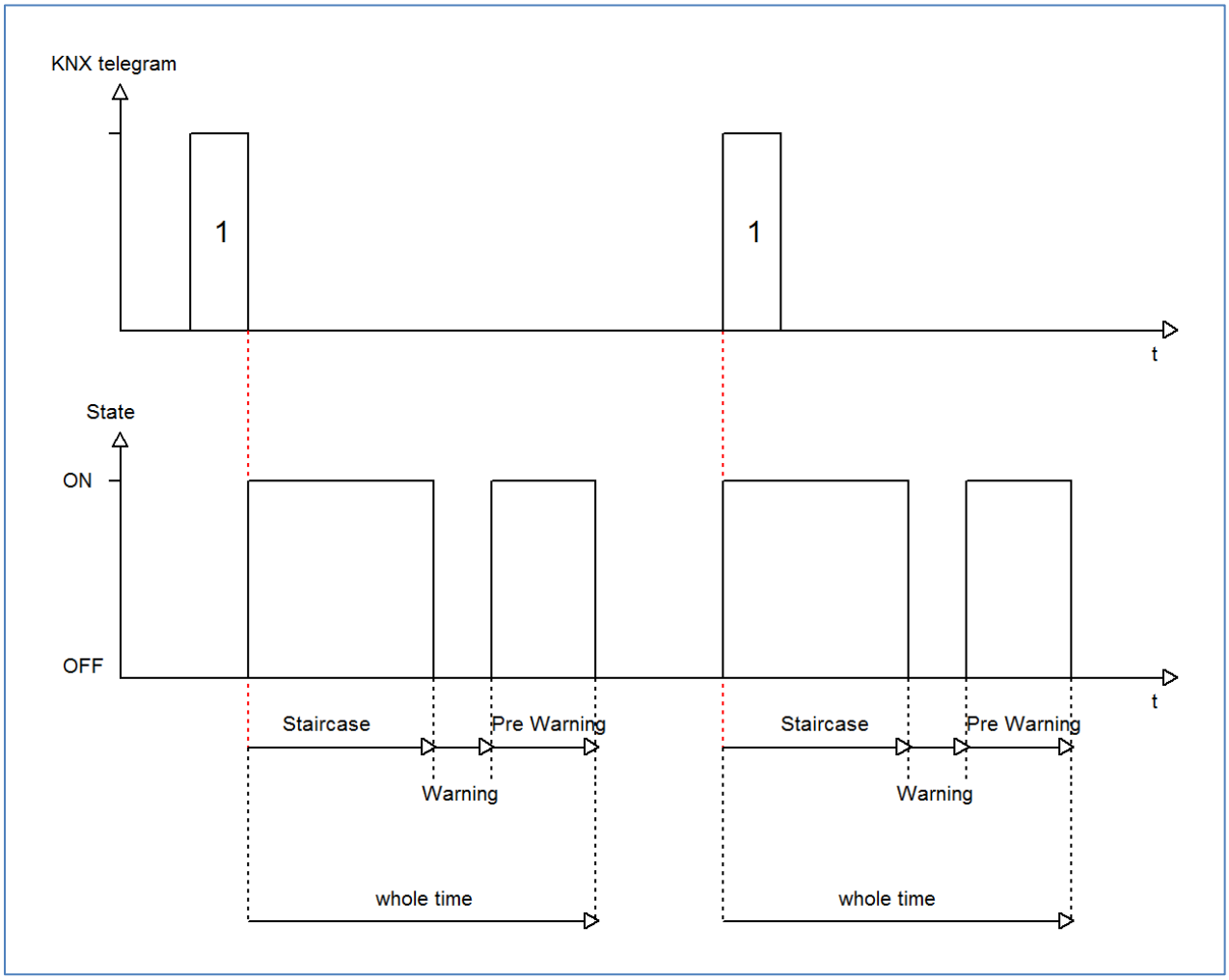


Figure 14: Warning timer & prewarning time

The warning function can be activated by adjusting the parameter “Prewarning” as active. Now, you can adjust warning time and prewarning time.
The warning function is for warning that the staircase time ran almost out and the lights are switched off soon. This warning happens trough a short turn off the lights. The duration of the turn off is indicated by the warning time. A value of 1-3s is advisable for this parameter. When the warning time runs out, the lights will be switched on again for the adjusted prewarning time. Now you have the opportunities to extend the staircase time, when this parameter was activated, or leave the staircase. A dynamic programming is advisable for this time. So you can adapt this time to spatial conditions (next switch, length of the staircase, etc.).
The whole duration of the switching process is the sum of the 3 times. The following diagram shall make this clear:



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4.3.4 Manual switch off

The following illustration shows the setting options at the ETS-Software:

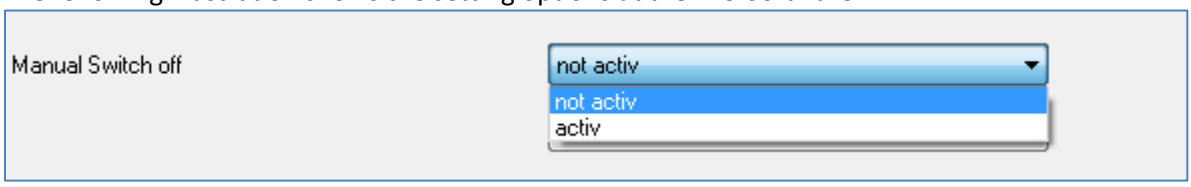


Figure 15: Manual switch off

By activation this function, you can switch the channel off before the staircase time runs out. For switching off the channel, you have to send a logical “0” to the communication object for switching the staircase function (have a look atTable 16: Communication object staircase). When this function is not activated, the channel switches only off after the staircase time runs out.

4.3.5 Extend staircase time

The following illustration shows the setting options at the ETS-Software:

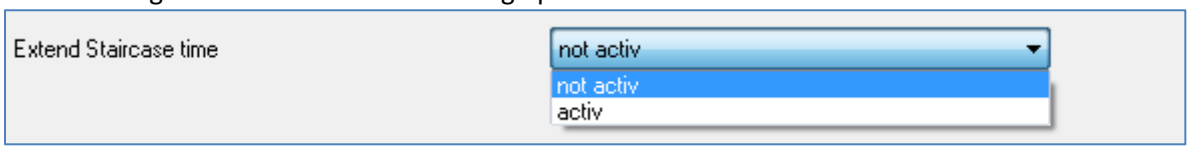
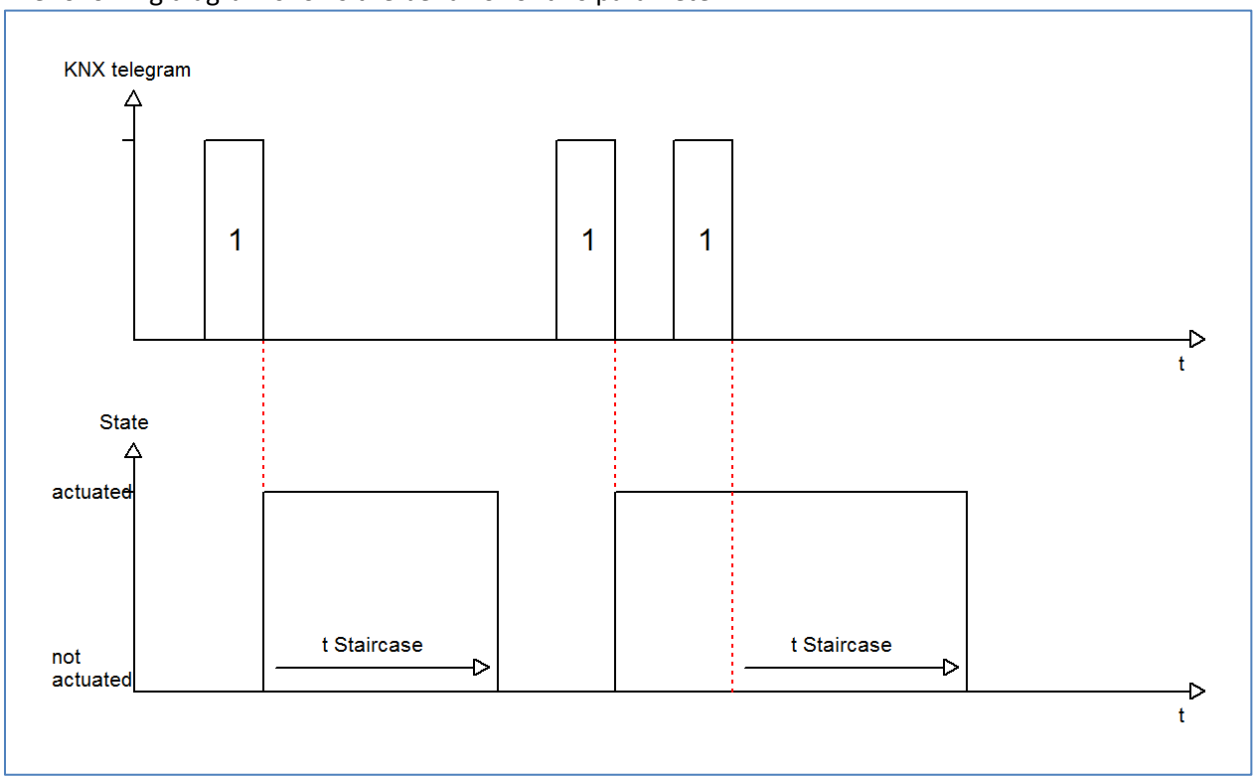


Figure 16: Extend staircase time

By activating this function, the staircase time is retriggerable. That means, when the staircase time runs already out to 2/3, you can restart the time by sending a new on-signal to the communication object of the staircase function (have a look atTable 16: Communication object staircase).
The following diagram shows the behavior of this parameter:



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5 Parameter - Measurement

The following parameters are only in the RF socket with active power meter, RF AZK1ST.01, available.

5.1 Active power measurement

The following figure shows the menu active power measurement:

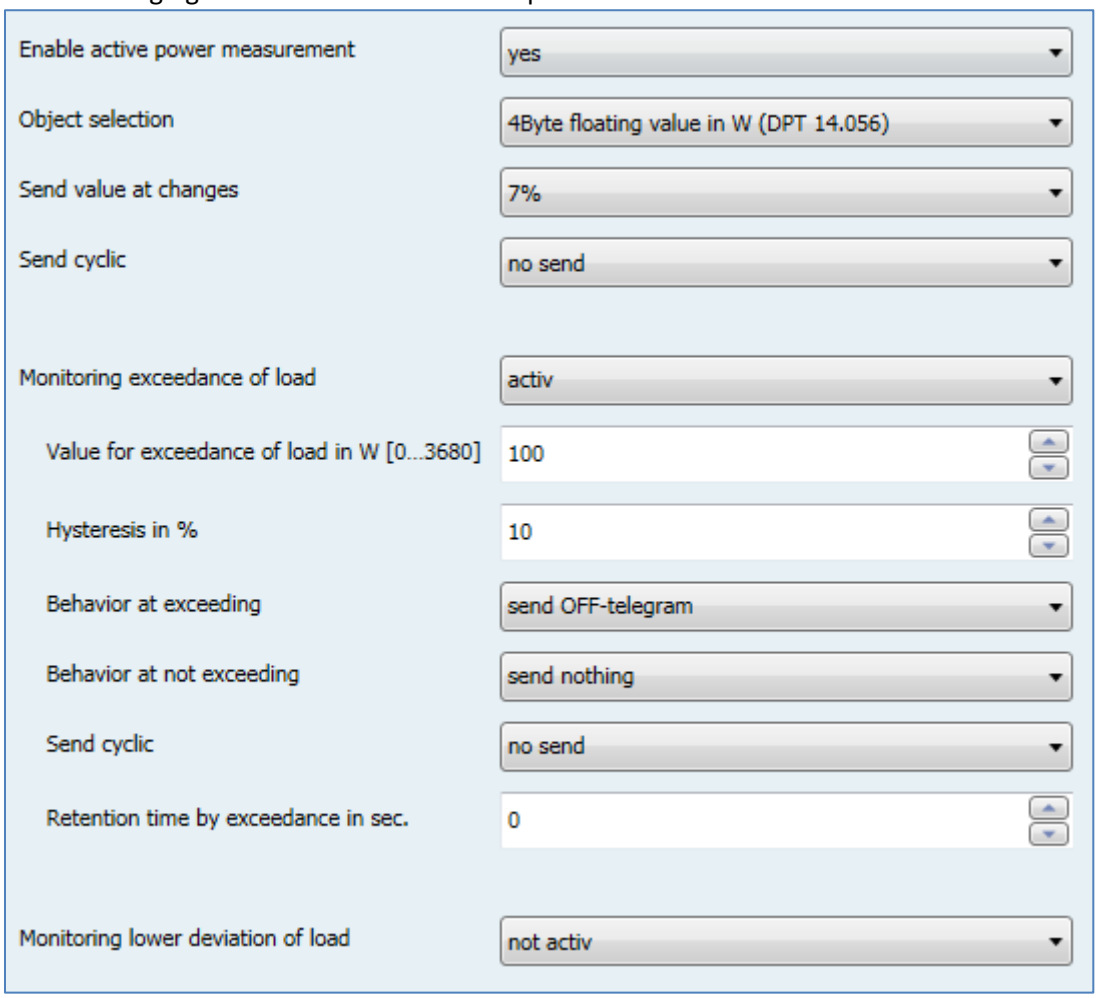

Figure 17: Menu "Active power measurement"

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
General Settings		
Object selection	▪ **4 Byte floating value in W (DPT14.056)** ▪ 2 Byte floating value in kW (DPT9.024)	defines the communication object of the measured active power
Send value at changes	no send, 5%-75% **[no send]**	defines the sending behavior of the measured active power
Send cyclic	no send, 5min-24h **[no send]**	defines the sending behavior of the measured active power
Settings for load monitoring(adjustable for exceeding and underflow):		
Value for exceedance/lower deviation of load	0 - 3680	defines the threshold for triggering an action for exceedance/deviating
Hysteresis in %	10-100% **[10%]**	defines the hysteresis
Behavior at exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the set threshold: **Send ON/OFF telegram:** The object sends the adjusted telegram. **Send ON/OFF telegram and channel OFF:** The object sends the adjusted telegram and the channel is switched off
Behavior at not exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the adjusted threshold; description see before
Send cyclic	no send, 5min-24h **[no send]**	The telegram for exceedance/deviating is sent cyclic
Retention time by exceedance/deviating in sec.	0-30000 **[0]**	defines a retention time, which must run out at an exceedance/deviating before a telegram is sent

Table 17: Menu "Active power measurement"

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The active power measurement possible by simultaneous measurement of current and voltage output of the real active power. So the returned value is no longer a "theoretical" power at rated voltage, but the real power.
For the active power measurement, a monitoring of the load can be enabled and triggering specific actions. At the exceedance of load, the **hysteresis** causes a shift of the cut-off threshold. So, a hysteresis of 10% and a value for load exceeding of 100W causes a value for exceedance of 100W, which is only turned off when the measured value falls below 90W. In the underrun, a hysteresis of 10% and a value for underrun of 100W causes an active lower deviation of load at 100W, which is released until the value exceeds 110W again.
The **retention time by exceedance/deviating** specifies how long ab exceedance/deviation must be measured for the output before the action for exceedance/deviation is triggered. So a retention time by exceedance of 10s causes that an exceedance must be measured for 10s before the action for exceedance is triggered. The retention time works with the hysteresis output. Thus, if an exceedance is measured, the power must fall below the hysteresis value for stopping the retention time tmer.

The following table shows the available communication objects:

Number	Name	Length	Usage
8	Active power	2 Byte/ 4 Byte	Sending the measured active power
13	Exceedance of load	1 Bit	Sending an exceedance of load
14	Lower deviation of load	1 Bit	Sending a deviation of load

Table 18: Communication objects power measurement

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5.2 Current measurement

The following figure shows the menu current measurement:

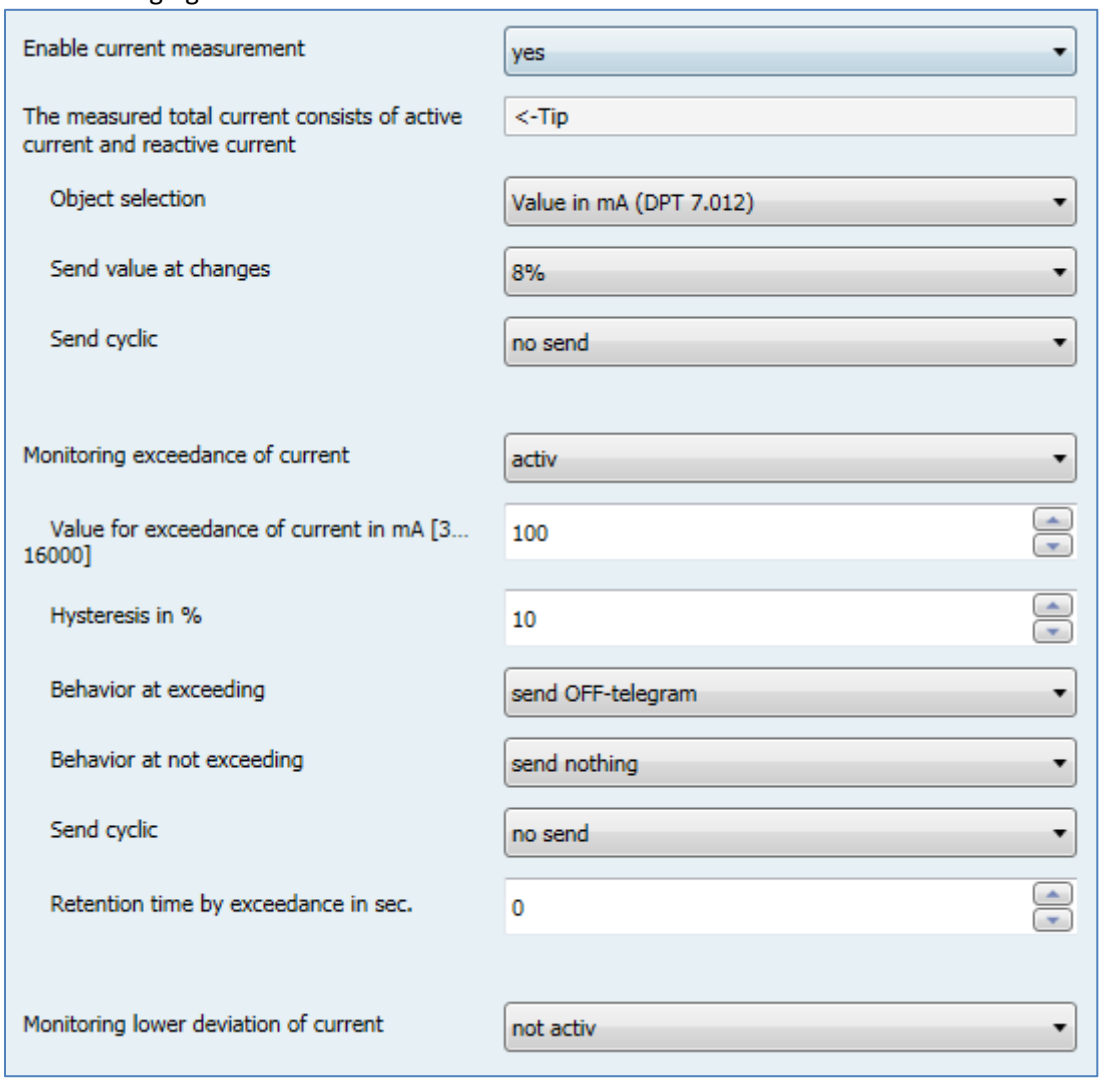

Figure 18: Menu current measurement

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
General Settings		
Object selection	▪ **Value in mA (DPT7.012)** ▪ Floating value in mA (DPT9.021) ▪ Floating value in A (DPT14.019)	defines the communication object of the measured current
Send value at changes	no send, 5%-75% **[no send]**	defines the sending behavior of the measured current
Send cyclic	no send, 5min-24h **[no send]**	defines the sending behavior of the measured current

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Settings for current monitoring(adjustable for exceeding and underflow):		
Value for exceedance/lower deviation of load	0 - 16000	defines the threshold for triggering an action for exceedance/deviating
Hysteresis in %	10-100% **[10%]**	defines the hysteresis
Behavior at exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the set threshold: **Send ON/OFF telegram:** The object sends the adjusted telegram. **Send ON/OFF telegram and channel OFF:** The object sends the adjusted telegram and the channel is switched off
Behavior at not exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the adjusted threshold; description see before
Send cyclic	no send, 5min-24h **[no send]**	The telegram for exceedance/deviating is sent cyclic
Retention time by exceedance/deviating in sec.	0-30000 **[0]**	defines a retention time, which must run out at an exceedance/deviating before a telegram is sent

Table 19: Menu current measurement

The behavior of the hysteresis and the retention time is described in detail in 5.1 Active power measurement.

The following table shows the available communication objects:

Number	Name	Length	Usage
9	Current value	2 Byte/ 4 Byte	Sending the measured current value
15	Exceedance of current	1 Bit	Sending an exceedance of load
16	Lower deviation of current	1 Bit	Sending a deviation of load

Table 20: Communication objects current measurement

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5.3 Voltage measurement

The following figure shows the menu voltage measurement:

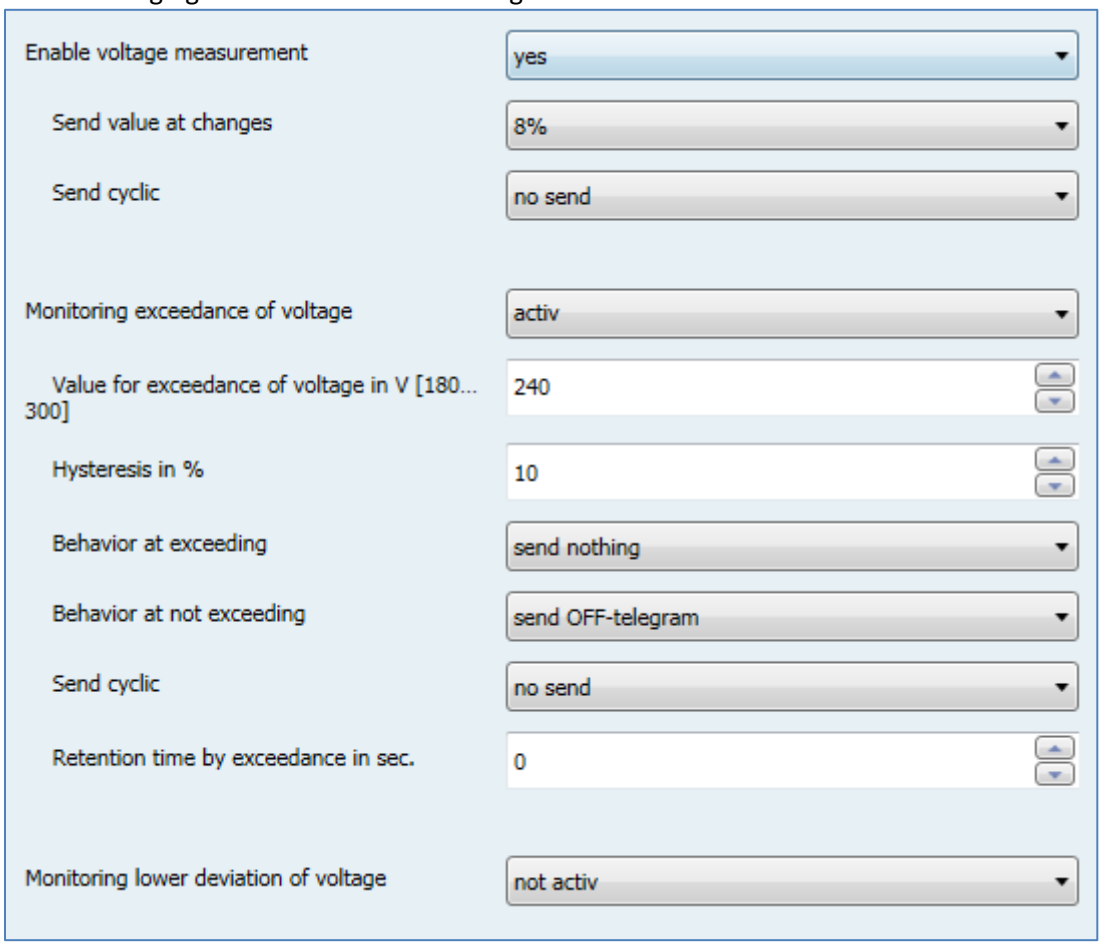

Figure 19: Menu voltage measurement

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
General Settings		
Send value at changes	no send, 5%-75% **[no send]**	defines the sending behavior of the measured voltage
Send cyclic	no send, 5min-24h **[no send]**	defines the sending behavior of the measured voltage

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Settings for current monitoring(adjustable for exceeding and underflow):		
Value for exceedance/lower deviation of load	180-300	defines the threshold for triggering an action for exceedance/deviating
Hysteresis in %	10-100% **[10%]**	defines the hysteresis
Behavior at exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the set threshold: **Send ON/OFF telegram:** The object sends the adjusted telegram. **Send ON/OFF telegram and channel OFF:** The object sends the adjusted telegram and the channel is switched off
Behavior at not exceeding/deviating	▪ **send nothing** ▪ send ON-telegram ▪ send OFF-telegram ▪ send ON-telegram and channel OFF ▪ send OFF-telegram and channel OFF	defines the action for exceedance/deviating of the adjusted threshold; description see before
Send cyclic	no send, 5min-24h **[no send]**	The telegram for exceedance/deviating is sent cyclic
Retention time by exceedance/deviating in sec.	0-30000 **[0]**	defines a retention time, which must run out at an exceedance/deviating before a telegram is sent

Table 21: Menu voltage measurement

The behavior of the hysteresis and the retention time is described in detail in 5.1 Active power measurement.

The following table shows the available communication objects:

Number	Name	Length	Usage
10	Voltage value	2 Byte/ 4 Byte	Sending the measured voltage value
17	Exceedance of voltage	1 Bit	Sending an exceedance of voltage
18	Lower deviation of voltage	1 Bit	Sending a deviation of voltage

Table 22: Communication objects voltage measurement

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5.4 Meter

The following figure shows the menu meter:

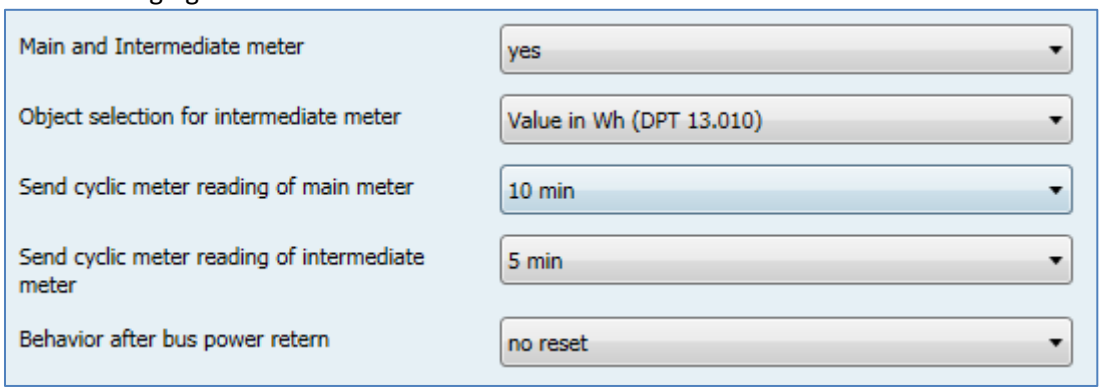

Figure 20: Menu meter

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Object selection for sub meter	▪ **Value in Wh(DPT13.010)** ▪ Value in kWh(DPT13.013)	defines if the sub meter is sent in watt hours or kilo watt hours
Send value of main meter cyclic	no send, 5min-24h **[no send]**	defines the sending behavior of the main meter
Send value of sub meter cyclic	no send, 5min-24h **[no send]**	defines the sending behavior of the sub meter
Behavior after bus power return	▪ no reset ▪ reset sub meter ▪ reset main and sub meter	defines the behavior after bus power return

Table 23: Menu meter

Two meters for counting the power consumption are available, the main and the sub meter. The sub meter can count as well watt hours as kilo watt hours. So the sub meter can be used for counting shorter periods.

The following table shows the available objects:

Number	**Name**	**Length**	**Usage**
11	Sub meter	4 Byte	Value of the sub meter
12	Main meter	4 Byte	Value of the main meter
19	Reset sub meter	1 Bit	Reset value of sub meter
20	Reset main meter	1 Bit	Reset value of main meter

Table 24: Communication objects meter

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6.1 List of figures

6.2 List of tables

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7 Attachment

7.1 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.

7.2 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.

7.3 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.

7.4 Datasheet

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