6/2014

# Technical Manual

## MDT Switch Actuators

## with current measurement

## AMI/AMS R2.x (2nd Hardware Revision)



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## 1 Content





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# 2 Overview

## 2.1 Overview devices

The manual refers to the following devices, which are in our assortment of switch actuators. Actually we can offer you the following switch actuators (Order Code respectively printed in bold type, Hardwarerevison R2.x):

- **AMS-0416.01** Switching actuator 4-fold,4TE, 230V AC, 16 A, C-Load 100µF, standard design
  - 4 TE REG, 230VAC, 16A, C-Load 100uF, with current measurement
- **AMS-0816.01** Switching actuator 8-fold,8TE, 230V AC, 16 A, C-Load 100µF, standard design
  - 8 TE REG, 230VAC, 16A, C-Load 100uF, with current measurement
- **AMS-1216.01** Switching actuator 12-fold,4TE, 230V AC, 16 A, C-Load 100µF, standard design
  - 12 TE REG, 230VAC, 16A, C-Load 100uF, with current measurement

- **AMI-0416.01** Switching actuator 4-fold,4TE, 230V AC, 16 A, C-Load 200µF, industrial design
  - 4 TE REG, 230VAC, 16A, C-Load 200uF, with current measurement
- **AMI-0816.01** Switching actuator 8-fold,8TE, 230V AC, 16 A, C-Load 200µF, industrial design
  - 8 TE REG, 230VAC, 16A, C-Load 200uF, with current measurement
- **AMI-1216.01** Switching actuator 12-fold,8TE, 230V AC, 16 A, C-Load 200µF, industrial design
  - 12 TE REG, 230VAC, 16A, C-Load 200uF, with current measurement


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## 2.2 Exemplary circuit diagrams

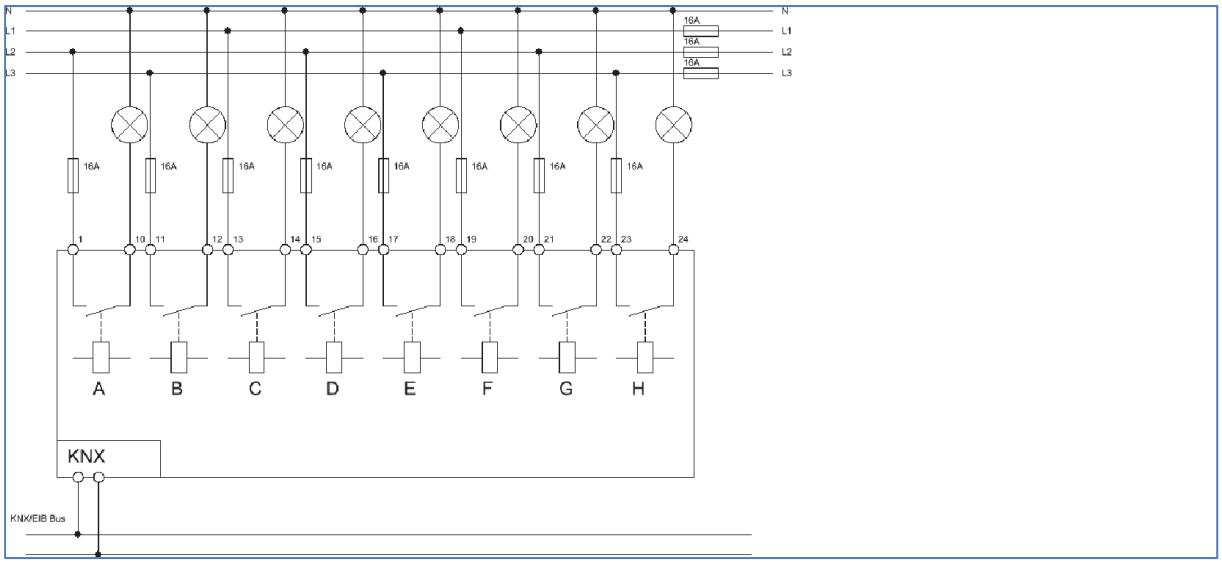


Figure 1: Exemplary circuit diagram AMS-0816.01

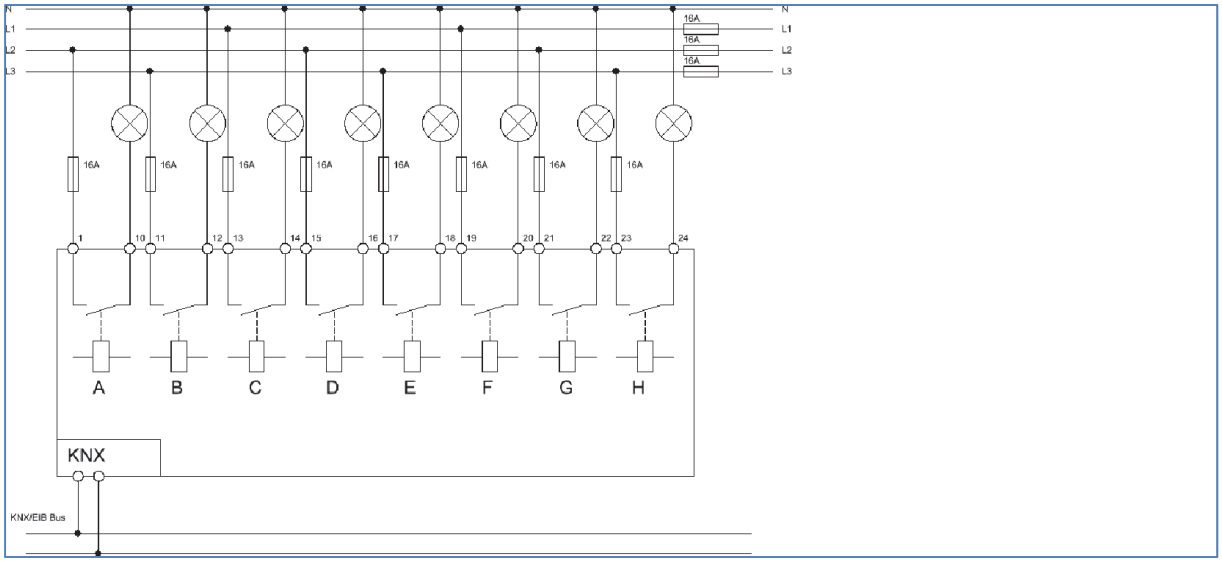


Figure 2: Exemplary circuit diagram AMI-1216.01



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## 2.3 Structure & Handling

The switch actuators (here: AKI 1216.01) contain of one status LED per channel. This LED indicates the state of the depending output. Furthermore every output can be switched manual, independent of the current parameterization. The lines AKS and AKI have buttons for every channel. In contrast the line of the AKK has only four buttons, independent to the number of channels. Two buttons are for choosing the channel, whereby the chosen channel is indicated by a flashing status LED. The buttons up and down are for switching the channel on and off. The programming button activates the programming function. An activated programing function is indicated by a lit programming LED.

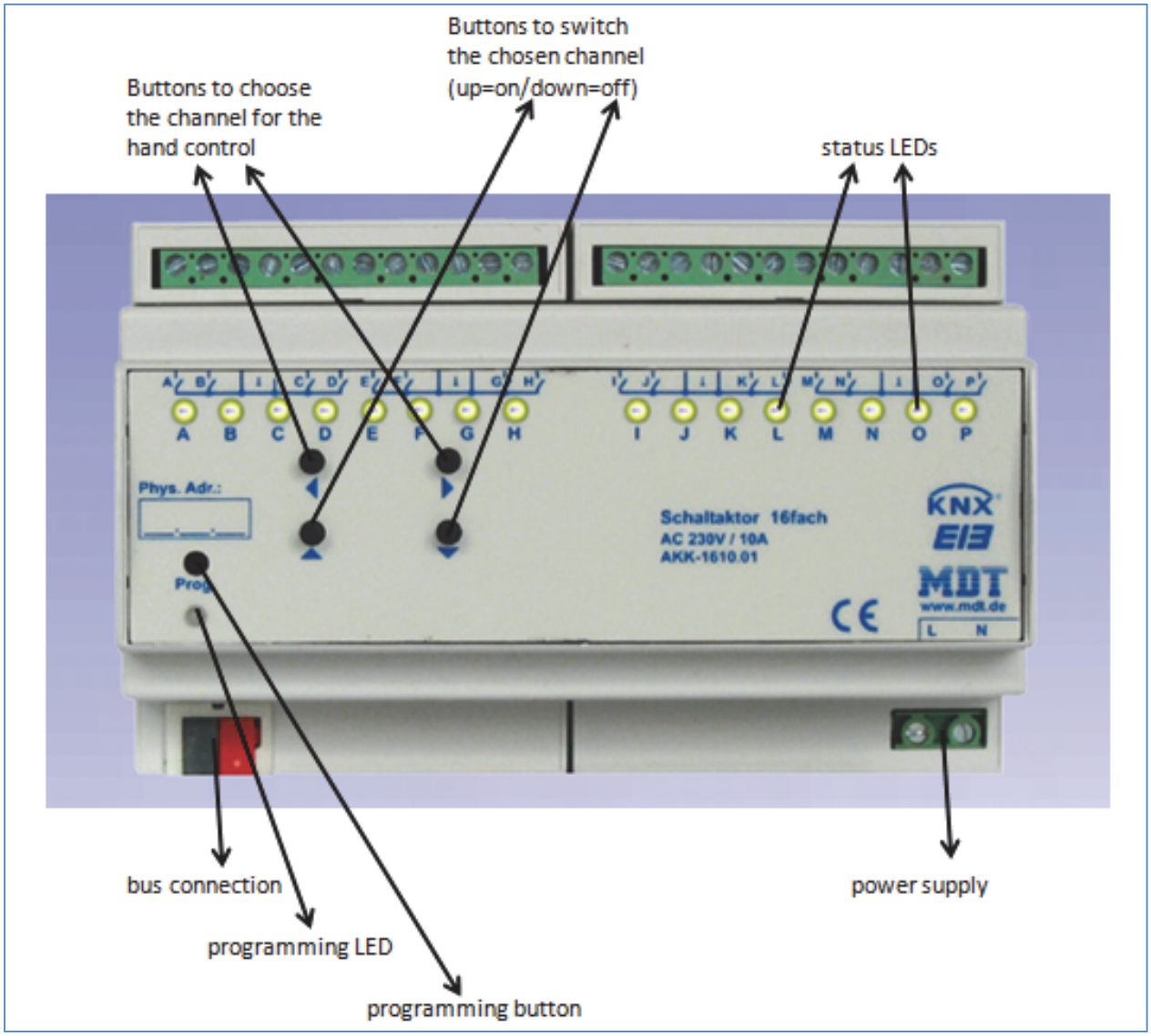


Figure 3: Overview hardware module switch actuator (e.g. AMI-1216.01)

The lines AMS and AMI have bistable relays. At the bistable relays the current switching state also stays in case of a breakdown of the 230V auxiliary voltage and at an update of the parameterization.



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## 2.4 Functions

All of the channels have identical functions (have a look at the functional overview). The numbers of channels depends to the hardware design, which can have 2, 4, 8, 12 or 16 channels. The identification is standardly in consecutive alphabetic order.
There are 3 different states for every channel possible:

- **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.

### 2.4.1 Overview functions

| Group of functions | Functions |
|---|---|
| Reset behavior | behavior at bus power breakdown |
| | behavior at bus power up |
| | startup timeout |
| Relay mode | normally closed/ normally opened |
| Switch functions | switching |
| | central switching function |
| Time functions | on-delay |
| | off-delay |
| Staircase light functions | time for staircase |
| | pre-warning (with adjustable warning and pre-warning time) |
| | manual off |
| | retriggerable on/off |
| Superior functions | blocking function |
| | logic functions (AND/ OR) |
| Scenes | scene function for up to 8 scenes per channel |
| Status functions | feedback function |
| | cyclic send able “operating-state” telegram |
| | group state of all channels |
| Current measurement | single current measurement of each channel |
| | warning and error messages adjustable |
| | total current measurement of the whole device |
| Electric meter functions | counting of the current consumption of every channel |
| | counting of the current consumption of the whole actuator |
| Operating hours counter | forward counter of the operating hours |
| | back counter to next service time |

Table 1: Overview functions


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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: Twisted Pair (TP)
Product name: addicted to the used type, e.g.: AMI-0816.01 switch actuator 8-fold, 8TE, 16A
Order number: addicted to the used type, e.g.: AKI-0816.01

## 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) Switching the power supply
(3) Set bus power up
(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 Communication objects per channel

The communication objects per channel are displayed, when they are activated trough the parameterization. There are 8 numbers reserved for every channel, even if not all of them are need. So the first channel has the numbers from 0 to 7, the second from 8 to 15 and so on. The communication objects are need for the connection to the group addresses and to program your project.
The following illustration shows the communication objects for the channels A and B. Channel A is selected as switch. Logic functions, blocking object and scenes are activated. Channel B is selected as staircase. Only the blocking function is activated:

| Number | Name | Object Function | Description | Group Addresses | Leng... | C | R | W | T | U |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Channel A | Switch On/Off | | | 1 bit | C | - | W | - | - |
| 2 | Channel A | Block | | | 1 bit | C | - | W | - | - |
| 4 | Channel A | Scene | | | 1 Byte | C | - | W | - | - |
| 5 | Channel A | Status | | | 1 bit | C | R | - | T | - |
| 6 | Channel A | Logic 1 | | | 1 bit | C | - | W | - | - |
| 7 | Channel A | Logic 2 | | | 1 bit | C | - | W | - | - |
| 9 | Channel B | Staircase | | | 1 bit | C | - | W | - | - |
| 10 | Channel B | Block | | | 1 bit | C | - | W | - | - |
| 13 | Channel B | Status | | | 1 bit | C | R | - | T | - |
| 96 | Central Function | Switch On/Off | | | 1 bit | C | - | W | - | - |

Figure 4: Communication objects per channel (Channel A –switch; Channel B –staircase)

The following communication objects can be shown for a channel selected as switch:

| Nr. | Function | Usage | Data type | |
|---|---|---|---|---|
| 0 | Switch on/off | switches the channel on/off | DPT 1.001 | In, Write |
| 2 | Block | blocks the channel | DPT 1.001 | In, Write |
| 4 | Scene | calls activated scenes | DPT 18.001 | In, Write |
| 5 | Status | feedback function | DPT 1.001 | Out, Read |
| 6 | Logic 1 | only shown at activated logic function | DPT 1.001 | In, Write |
| 7 | Logic 2 | only shown at activated logic function | DPT 1.001 | In, Write |
| **+18** | **next channel** | | | |

Table 2: Communication objects “switch”


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The following communication objects can be shown for a channel selected as staircase:

| Nr. | Function | Usage | Data type | |
|---|---|---|---|---|
| 1 | Staircase | switches the staircase function on/off | DPT 1.001 | In, Write |
| 2 | Block | blocks the channel | DPT 1.001 | In, Write |
| 5 | Status | feedback function | DPT 1.001 | Out, Read |
| **+18** | **next channel** | | | |

Table 3: Communication objects “staircase”

## 3.2 Central communication object

The central functions are always shown also if they are not used in any of the channels. The communication objects for the central functions are at the bottom of the communication objects. They have always the first number after the communication objects for the channels.
Every channel can be parameterized whether it shall be effected of the central functions or not.

The following communication object exists only once and is for channels:

| Nr. | Function | Usage | Data type | |
|---|---|---|---|---|
| | Switch on/off | central switching function | DPT 1.001 | In, Write |
| | Operating | sends cyclic if the actuator answers at the bus | DPT 1.001 | Out, Send |
| | Group State | sends the state of all channels | DPT 4.001 | Out, Send |
| | Manual Control | blocks the manual control | DPT 1.001 | In, Write |

Table 4: Central communication object


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## 3.3 Communication Objects current measurement

The following communication objects are available for the current measurement and counting of the operating hours:

| Nr. | Function | Usage | Data type | |
|---|---|---|---|---|
| 8 | Response operating hours | reports counted operating hours | DPT 7.007 | Out, Read |
| 8 | Time to the next service | reports time to the next service | DPT 7.007 | Out, Read |
| 9 | Reset operating hours | resets counter for the operating hours | DPT 1.001 | In, Write |
| 9 | Reset service | resets the counter for the service time | DPT 1.001 | In, Write |
| 10 | Service required | reports required maintenance | DPT 1.001 | Out, Read |
| 11 | Current value | reports the actual current consumption of the channel | DPT 7.012/ DPT 9.021/ DPT 14.019/ DPT 9.024 | Out, Read |
| 12 | Exceedance of load | reports an exceeded load | DPT 1.001 | Out, Read |
| 13 | Lower deviation of load | reports an underranged load | DPT 1.001 | Out, Read |
| 14 | Fault current | reports a fault current | DPT 1.001 | Out, Read |
| 14 | Load faulty | reports a fault of the load | DPT 1.001 | Out, Read |
| 14 | Fault current/Load faulty | reports a fault current and a fault of the load | DPT 1.001 | Out, Read |
| 15 | Reset power meter | resets the calculated energy of the channel | DPT 1.001 | In, Write |
| 16 | Active energy | sends the calculated energy of the channel | DPT 13.010/ DPT 13.013 | Out, Read |
| **+18** | **next channel** | | | |
| 75/147 | Total active energy | sends the sum of the calculated energy | DPT 13.010/ DPT 13.013 | Out, Read |
| 76/148 | Value of total current | reports the total current of all activated channels | DPT 9.021/ DPT 14.019/ DPT 9.024 | Out, Read |
| 77/149 | Exceedance of total current | reports an exceeded load of all activated channels | DPT 1.001 | Out, Read |

Table 5: Communication objects current measurement

The sizes as well as the type of the shown objects depends to the adjusted parameterization, have a look at the relevant explanations at section 4.
There are objects for the current measurement of the single channels as well as for the total current measurement of the actuator. It can be adjusted whether a channel shall be included to the total current measurement or not.


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## 3.4 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** |
| 0 | Channel A | switch on/off | 1 Bit | Low | X | | X | | |
| 1 | Channel A | Staircase | 1 Bit | Low | X | | X | | |
| 2 | Channel A | Block | 1 Bit | Low | X | | X | | |
| 4 | Channel A | Scene | 1 Byte | Low | X | | X | | |
| 5 | Channel A | Status | 1 Bit | Low | X | X | | X | |
| 6 | Channel A | Logic 1 | 1 Bit | Low | X | | X | | |
| 7 | Channel A | Logic 2 | 1 Bit | Low | X | | X | | |
| 8 | Channel A | Response operating hours | 2 Byte | Low | X | X | | X | |
| 8 | Channel A | Time to the next service | 2 Byte | Low | X | X | | X | |
| 9 | Channel A | Reset operating hours | 1 Bit | Low | X | | X | | |
| 9 | Channel A | Reset service | 1 Bit | Low | X | | X | | |
| 10 | Channel A | Service required | 1 Bit | Low | X | X | | X | |
| 11 | Channel A | Current value | 2 Byte | Low | X | X | | X | |
| 11 | Channel A | Exceedance of load | 4 Byte | Low | X | X | | X | |
| 12 | Channel A | Lower deviation of load | 1 Bit | Low | X | X | | X | |
| 13 | Channel A | Fault current | 1 Bit | Low | X | X | | X | |
| 14 | Channel A | Load faulty | 1 Bit | Low | X | X | | X | |
| 14 | Channel A | Fault current/Load faulty | 1 Bit | Low | X | X | | X | |
| 14 | Channel A | Reset service | 1 Bit | Low | X | X | | X | |
| 15 | Channel A | Reset power meter | 1 Bit | Low | X | | X | | |
| 16 | Channel A | Active energy | 4 Byte | Low | X | X | | X | |
| **+8** | **next channel** | | | | | | | | |
| 72/144 | Central function | Operating | 1 Bit | Low | X | X | | X | |
| 73/145 | Central function | Group state | 4 Byte | Low | X | X | | X | |
| 74/146 | Central function | Manual control | 1 Bit | Low | X | | X | | |
| 75/147 | Central function | Total active energy | 4 Byte | Low | X | X | | X | |
| 76/148 | Central function | Value of total current | | Low | X | X | | X | |
| 77/149 | Central function | Exceedance of total current | 1 Bit | Low | X | X | | X | |
| 78/150 | Central function | switch on/off | 1 Bit | Low | X | | X | | |

Table 6: 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 Reference ETS-Parameter

## 4.1 General Settings

The following parameter exists only once and affects to all channels:

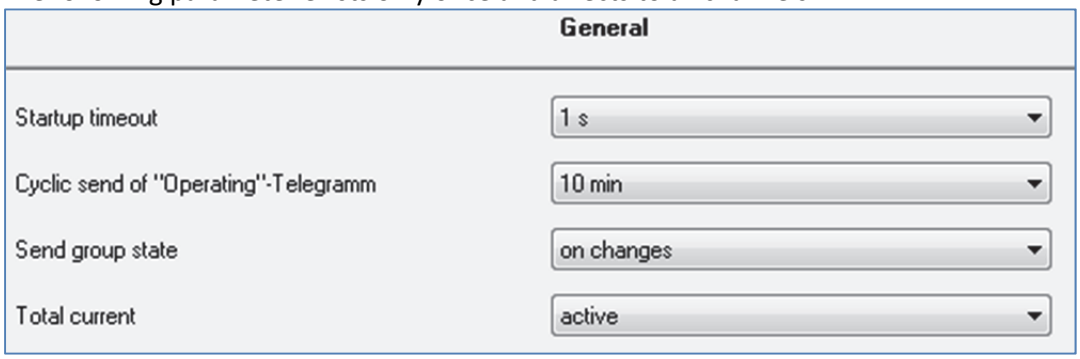


Figure 5: General settings

The parameter startup timeout adjusts the time between an upload and the functional start of the device. The used hardware reacts only after expiration of the adjusted time. All input commands before the startup timeout expire. Furthermore an “Operating” telegram and a telegram for the group state can be activated. The “Operating” telegram sends cyclic whether the actuator answers at the bus or not, so the debugging of greater objects become much easier. The group state sends the state of all channels as 4 Byte telegram, which can be used for visualizations.

The following chart shows the dynamic range of this parameter:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Startup timeout | 1-60s **[1s]** | Time between an upload and the functional start of the device |
| Cyclic send of “Operating”-Telegram | **no send**, 10min, 30min, 1h, 3h, 6h, 12h, 24h | activates the cyclic sending of the “Operating” telegram if the actuator answers at the bus |
| Send group state | **not active**, on request, on changes, on changes and cyclic 5min/ 19min/ 30min/ 1h/ 2h/ 4h | sends the states of all channels as 4 Byte telegram |
| Total current | ▪ active<br>▪ **not active** | activates the total current measurement, have a look at chapter 4.6.2 total current |

Table 7: General settings

The following chart shows the relevant communication objects:

| **Number** | **Name** | **Length** | **Usage** |
|---|---|---|---|
| | Operating | 1 Bit | sends cyclic, if the actuator is at the bus |
| | Group state | 4 Byte | sends the state of all channels |

Table 8: Communication objects general functions


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## 4.2 Channel selection

The following illustration shows the menu for selecting the channels:

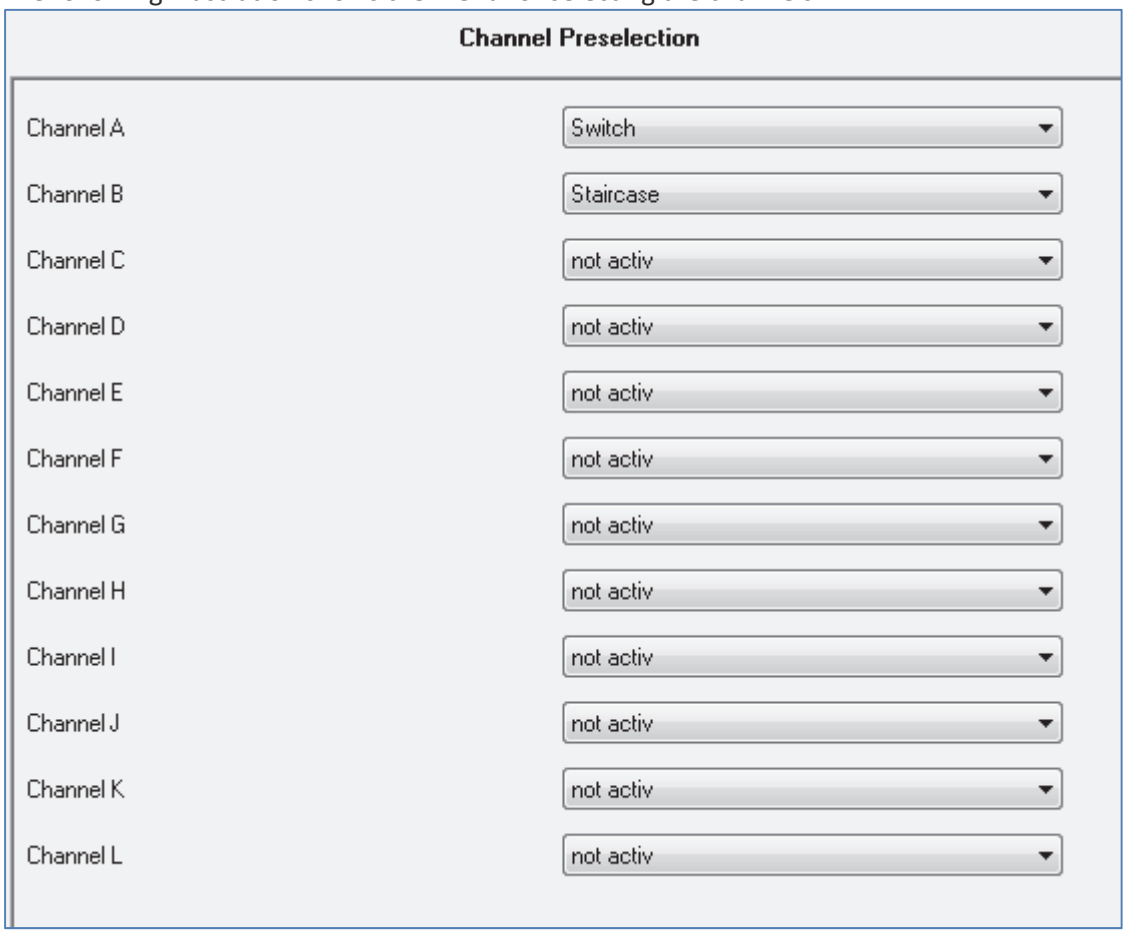


Figure 6: Channel selection

There are 3 possible states for every channel, which can be adjusted at the menu “channel preselection”. The following parameterization accords to the chosen state of a channel. But if you chosse a channel as “not active”, there will be no further parameterization options available.

The chart shows the setting options for everey channel:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Channel A-[O] | ▪ **not active**<br>▪ Switch<br>▪ Staircase | Operating mode of the channels |

Table 9: Channel selection



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## 4.3 Identical parameter

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

### 4.3.1 Relay operating mode

The following illustration shows the setting options for this parameter:

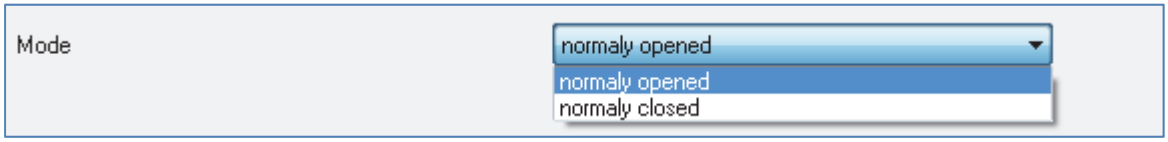


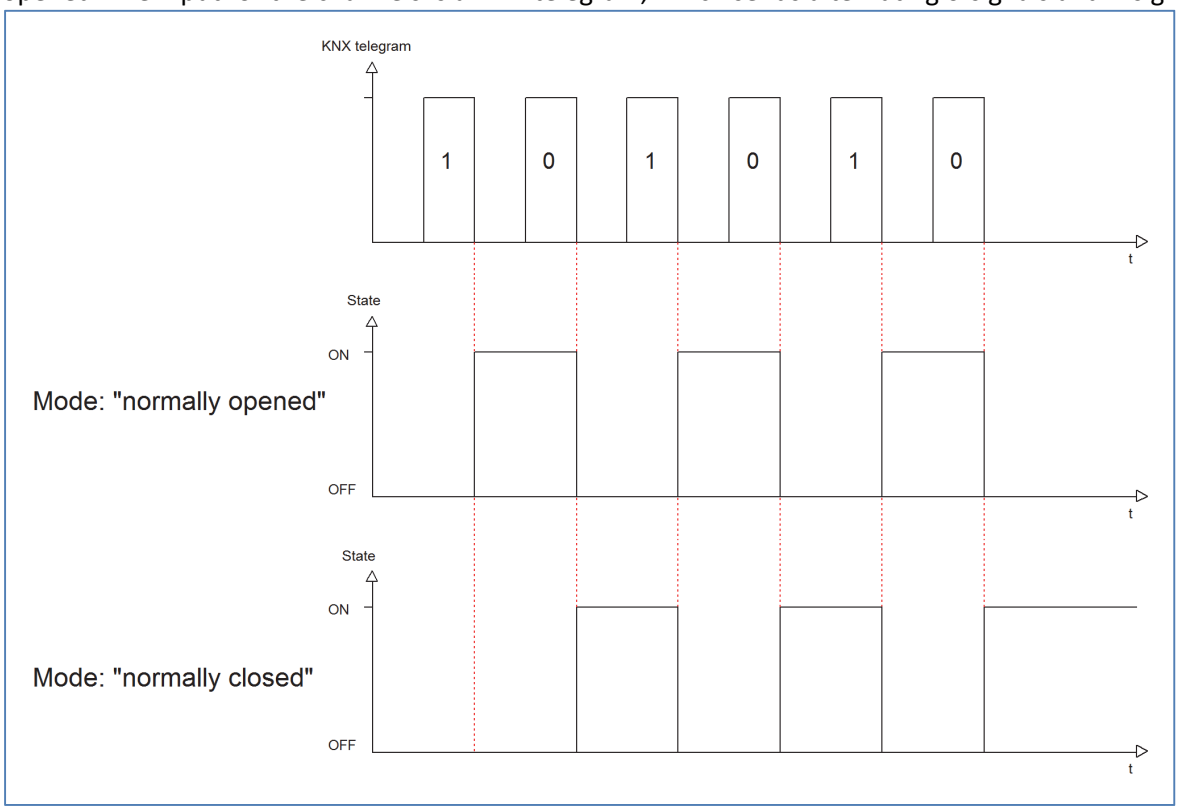

Figure 7: Operating mode

The following chart shows the dynamic range for this parameter:

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

Table 10: 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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### 4.3.2 Central function

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

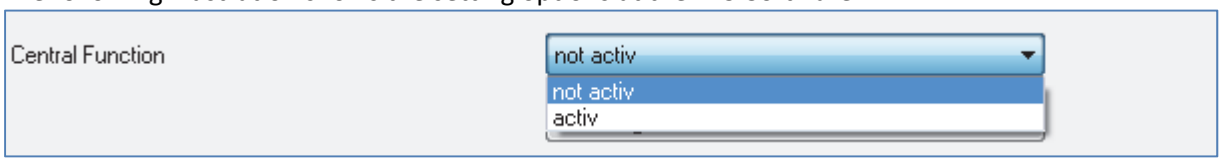


Figure 8: Central function

The following chart shows the dynamic range for this parameter:

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

Table 11: 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** |
|---|---|---|---|
| | Central function | 1 Bit | central switching of the channels<br>number depends to the number of channels |

Table 12: Communication object central function

### 4.3.3 Behavior at block/unblock

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

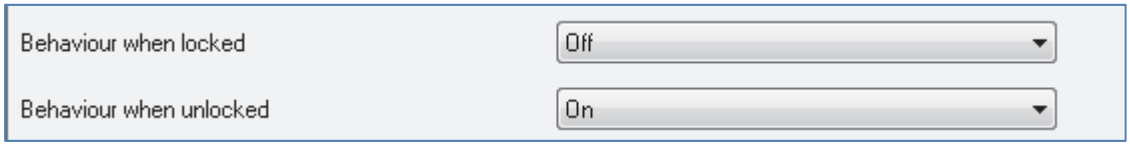


Figure 9: Blocking function

The following chart shows the dynamic range for this parameter:

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

Table 13: Behavior at block/unblock


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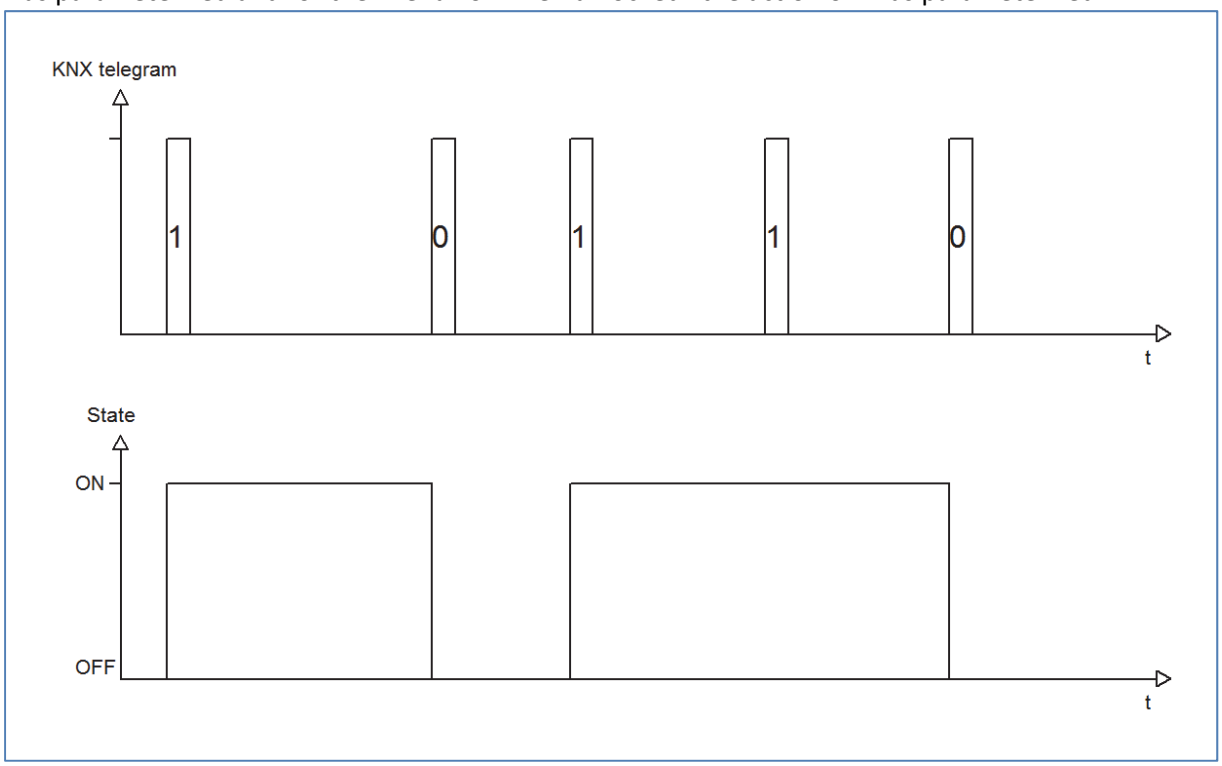
The blocking function gets active, when the corresponding communication object becomes a logical “1”. By sending a logical “0”, the blocking function can be deactivated again.
The parameter “Behavior when locked” defines an action for the output at activating the blocking process. There are the setting 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 |
|---|---|---|---|
| 2 | Block | 1 Bit | blocks the channel |

Table 14: 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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### 4.3.4 Behavior at bus power up/down

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

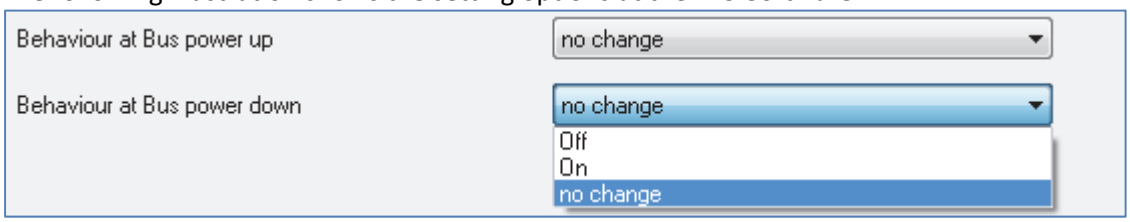


Figure 10: Behavior at bus power up/down

The following chart shows the dynamic range for this parameter:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Behavior at bus power up/ Behavior at bus power down | ▪ On<br>▪ Off<br>▪ **no change** | Adjustment, how the channel shall react in case of a bus power breakdown/return |

Table 15: Behavior at bus power up/down

Every channel can occupy a certain state as well in case of a bus power breakdown as in case of a bus power return. The channel can be switched off or on, but also stay in its current state by choosing the parameter “no change”.
To avoid problems in case of a bus power breakdown, you should adjust this parameter very conscientious. Because there is no controlling possible as long as the bus power is down.


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### 4.3.5 Manual control and cyclic send of the current state

The following illustration shows the available settings for the manual control and the cyclic sending:

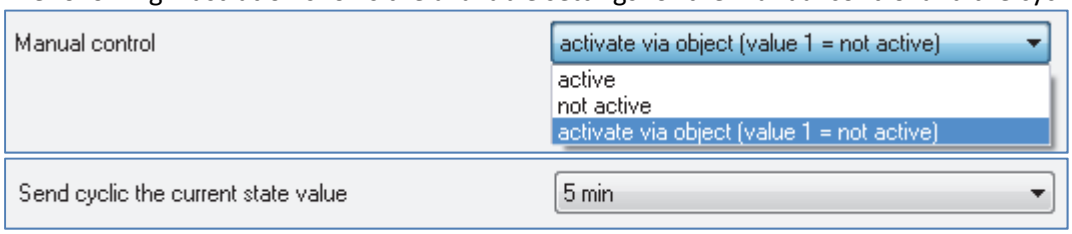


Figure 11: Manual control and cyclic send

The following chart shows the dynamic range for this parameter:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Manual control | ▪ **active**<br>▪ not active<br>▪ activate via object (Value 1 = not active) | activates or deactivates the manual control, also switchable via the central object „manual control“ |
| Send cyclic the current state value | ▪ **no send cyclic**<br>▪ 5min<br>▪ 10min<br>▪ 20min<br>▪ 30min<br>▪ 1h<br>▪ 2h<br>▪ 4h | activates the cyclic send of the current value<br>If activated, the current state will be send cyclic at the adjusted time steps via the object Channel X: state |

Table 16: Manual control and cyclic send

The manual control can be activated or deactivated permanent for each channel, by the settings “active” or “not active”. Additional the manual control can be blocked or enabled via the central object “manual control”. There is only one central object for every channel. This object blocks the manual control, by a logical “1”, at every channel with the setting “activate via object”.
The setting “Send cyclic the current state value” activates the cyclic send of the state of the channel via its status object.

The following chart shows the relevant communication objects:

| **Number** | **Name** | **Length** | **Usage** |
|---|---|---|---|
| 5 | State | 1 Bit | Status object for the corresponding channel |
| | Manual control | 1 Bit | blocks the manual control in the channels with activated function |

Table 17: Communication objects manual control and cyclic send


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## 4.4 Switching output

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

### 4.4.1 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:

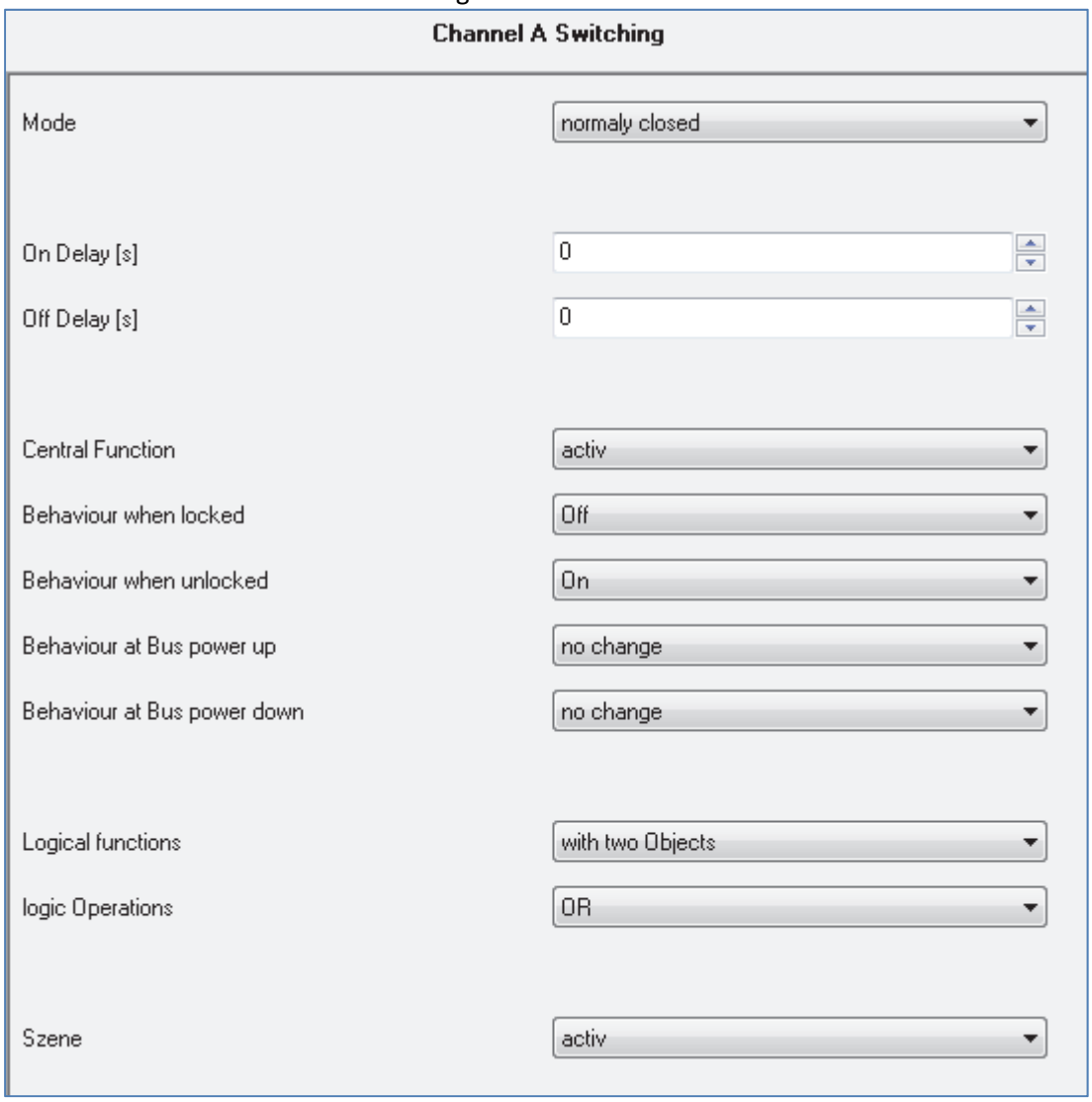


Figure 12: Switching output



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The chart shows the possible settings for switching outputs:

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

Table 18: Switching output



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### 4.4.2 On/Off delay

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

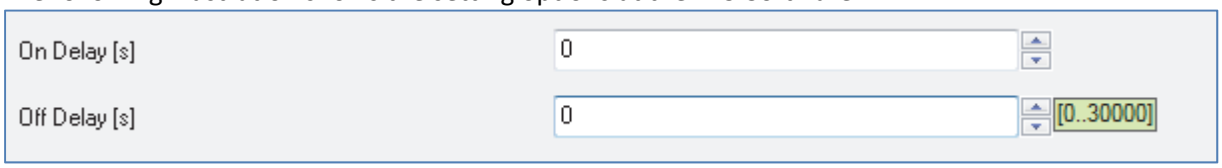
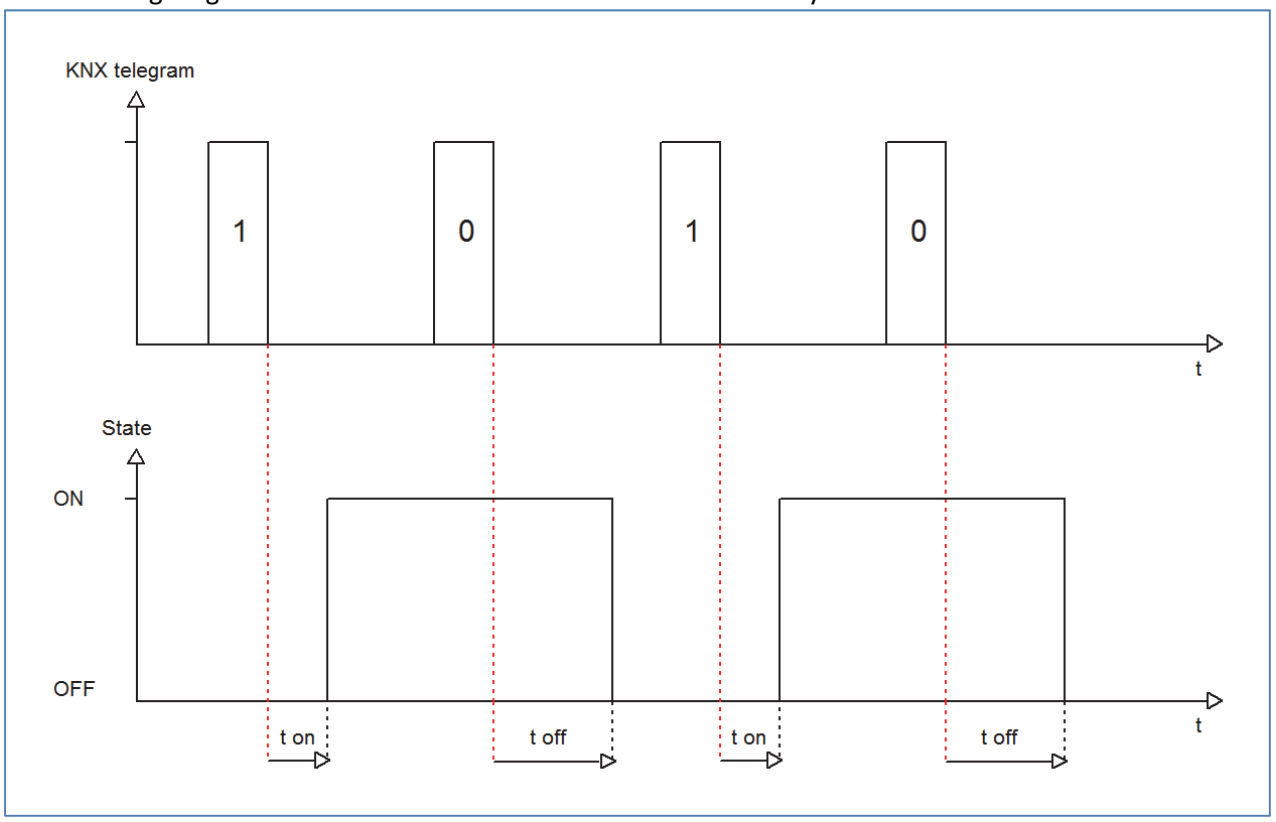



Figure 13: On/Off delay

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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### 4.4.3 Logical functions

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

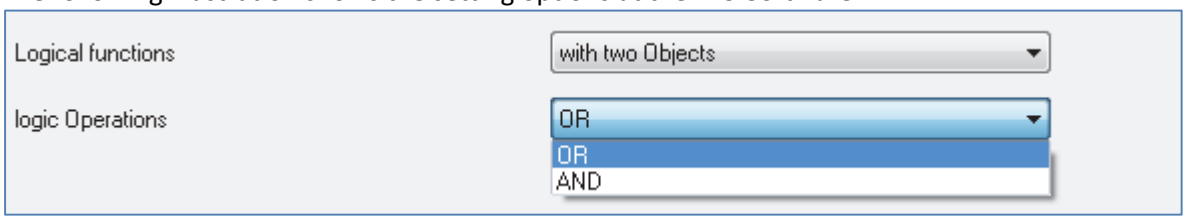


Figure 14: Logical functions

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:

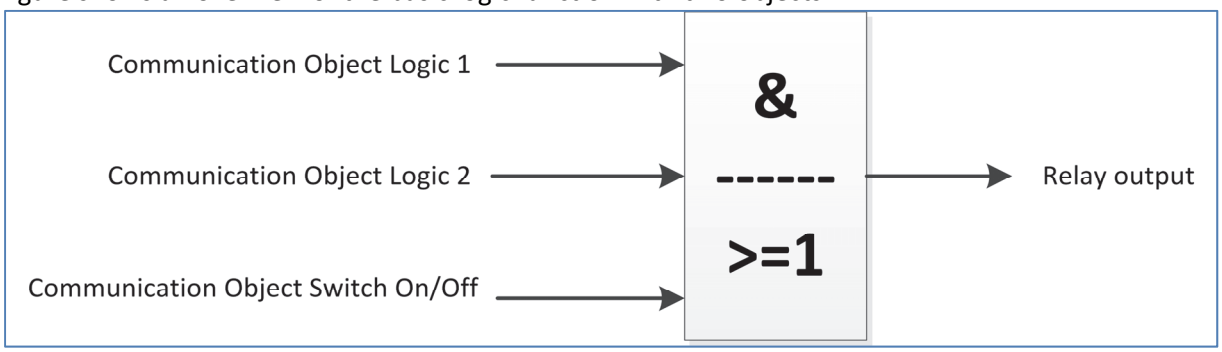


Figure 15: Overview Logic function

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 19: 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 20: Logic function



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### 4.4.4 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:

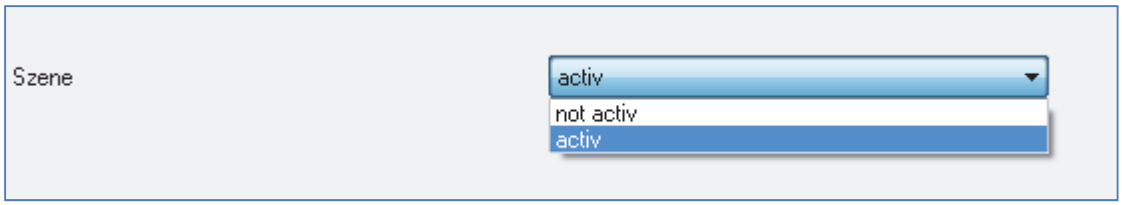


Figure 16: Scene function

The following chart shows the relevant communication object:

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

Table 21: 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.

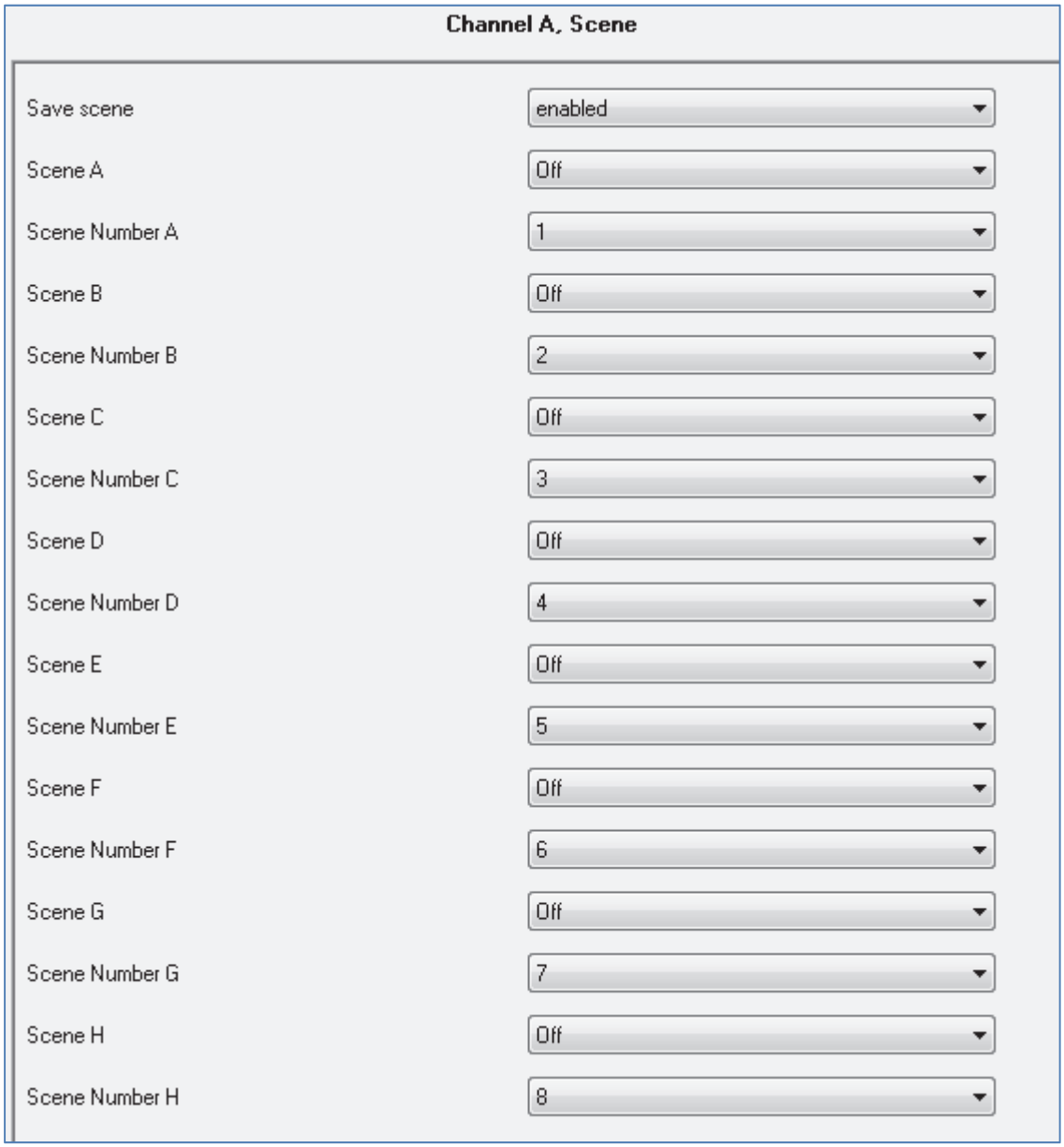


Figure 17: Sub function scene



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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**<br>▪ enabled | Learning of scenarios; enable/disable memory function |
| Scene A | ▪ **Off**<br>▪ On | Activation of the scene A |
| Scene number A | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene B | ▪ **Off**<br>▪ On | Activation of the scene B |
| Scene number B | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene C | ▪ **Off**<br>▪ On | Activation of the scene C |
| Scene number C | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene D | ▪ **Off**<br>▪ On | Activation of the scene D |
| Scene number D | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene E | ▪ **Off**<br>▪ On | Activation of the scene E |
| Scene number E | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene F | ▪ **Off**<br>▪ On | Activation of the scene F |
| Scene number F | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene G | ▪ **Off**<br>▪ On | Activation of the scene G |
| Scene number G | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |
| Scene H | ▪ **Off**<br>▪ On | Activation of the scene H |
| Scene number H | 1-64<br>[1] | Scene number; Calling value = 1 less than the adjusted scene number |

Table 22: 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 23: Calling and saving scenes



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#### 4.4.4.1 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:

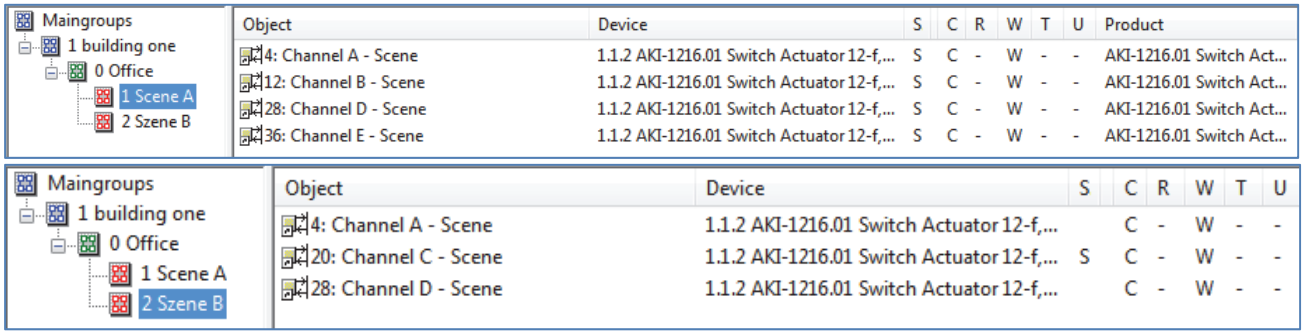


Figure 18: Programming of scenes

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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## 4.5 Staircase

**The following parameters, which are described at the headings 4.5.x, are only available at channels selected as staircase.**

### 4.5.1 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:

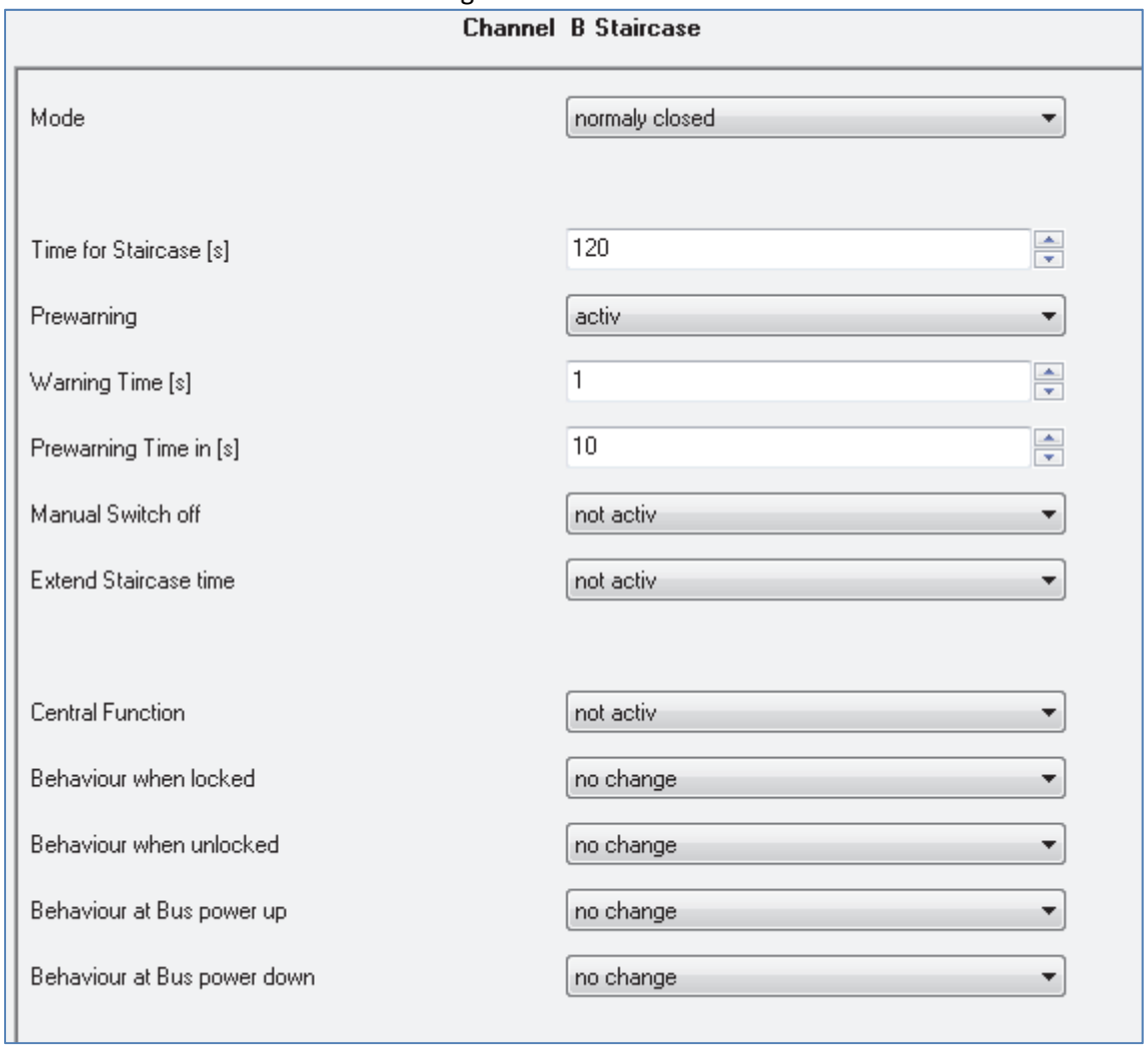


Figure 19: Staircase


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The chart shows all possible settings for staircase outputs:

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

Table 24: Parameter staircase



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### 4.5.2 Staircase time

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

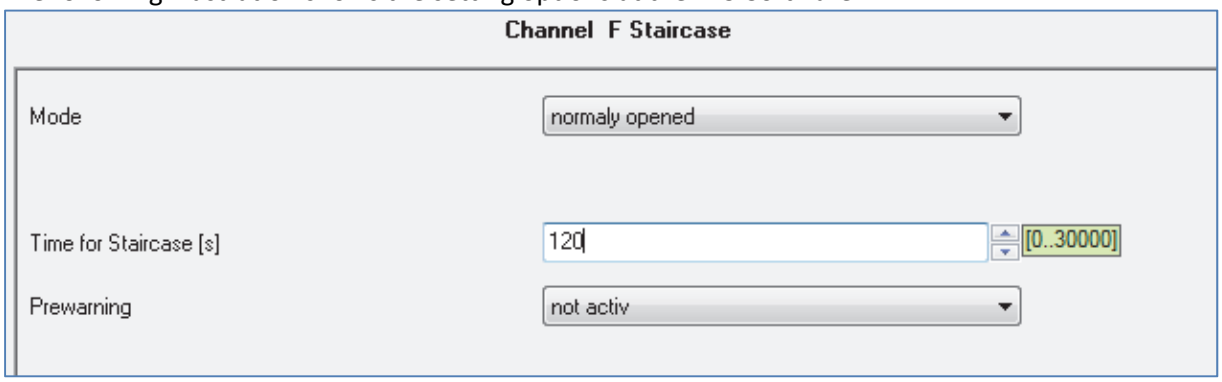


Figure 20: Staircase time

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 25: Communication object staircase



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### 4.5.3 Prewarning und Warning

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

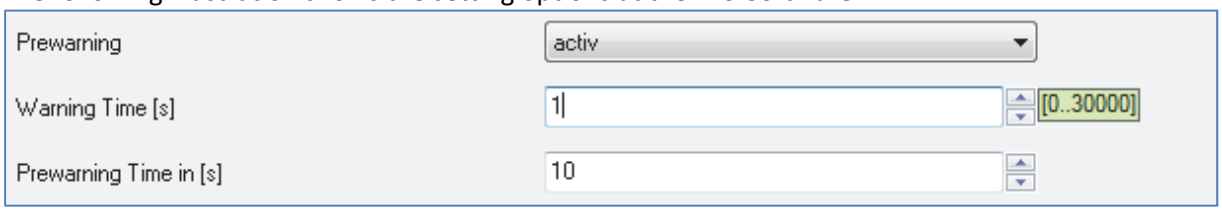
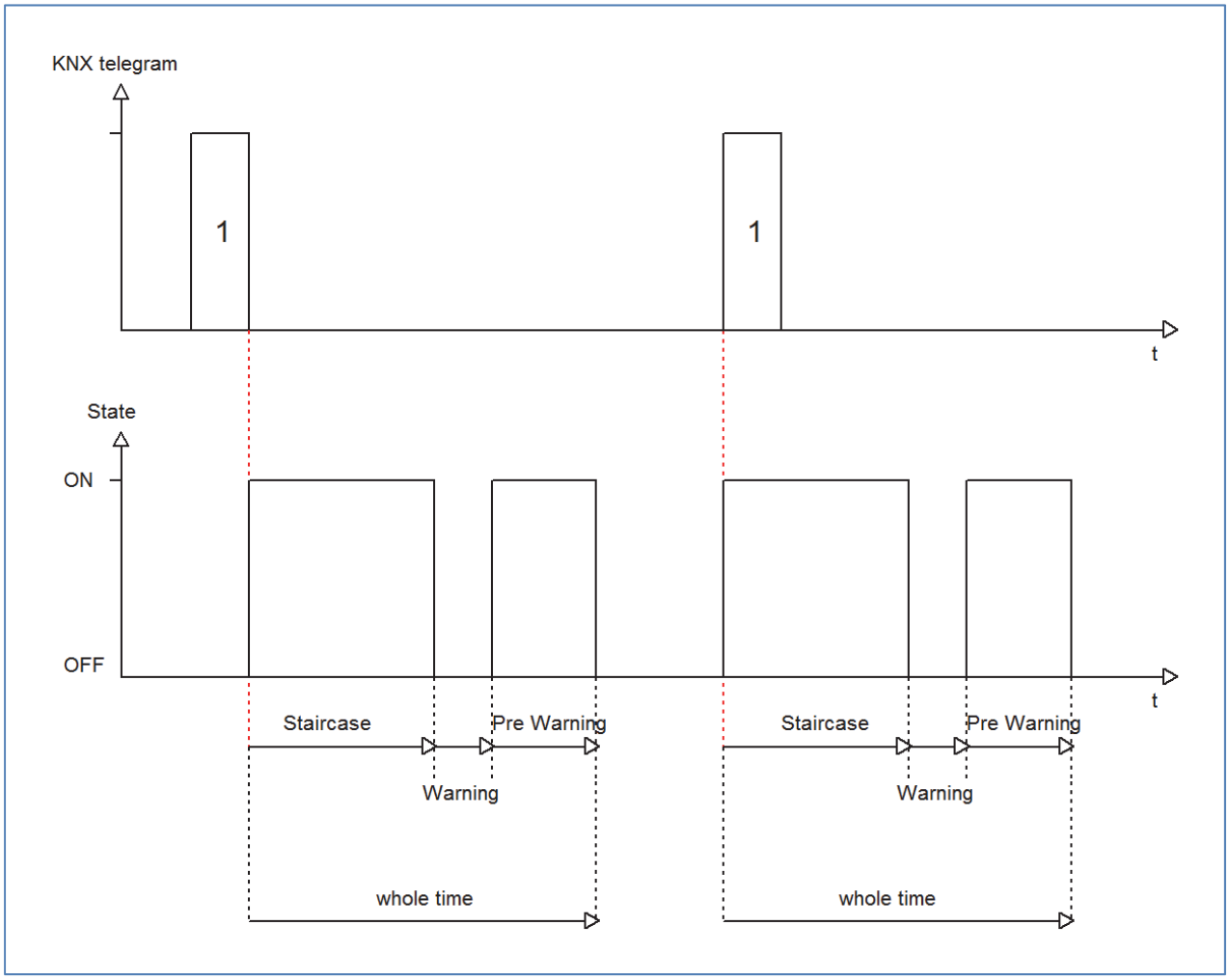



Figure 21: Warning timer & prewarning time

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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### 4.5.4 Manual switch off

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

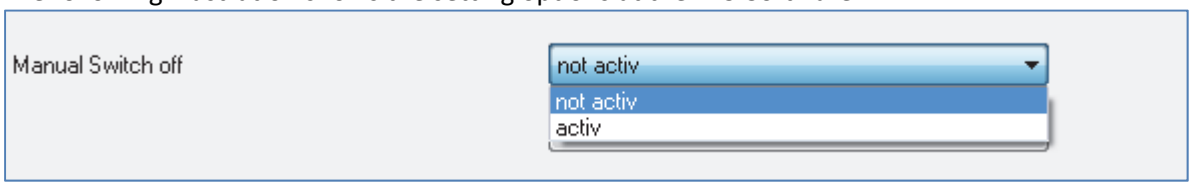



Figure 22: Manual switch off

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 at chart 20, page 27). When this function is not activated, the channel switches only off after the staircase time runs out.

### 4.5.5 Extend staircase time

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

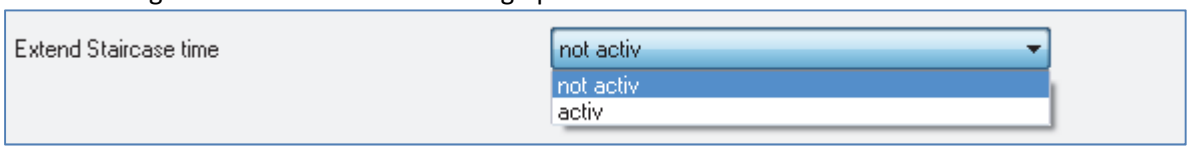
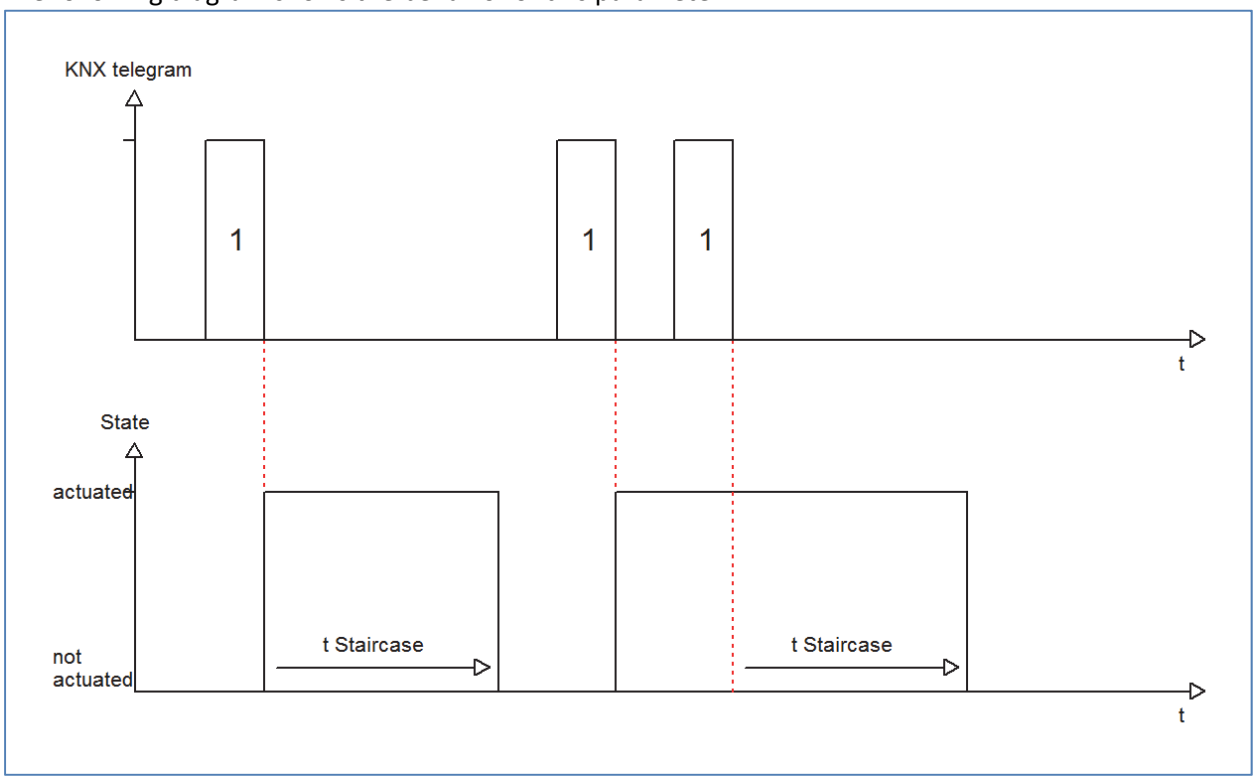



Figure 23: Extend staircase time

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 at chart 20, page 27).
The following diagram shows the behavior of this parameter:



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## 4.6 Current measurement

The current measurement must be activated for every chanel at the accordingly parameter:

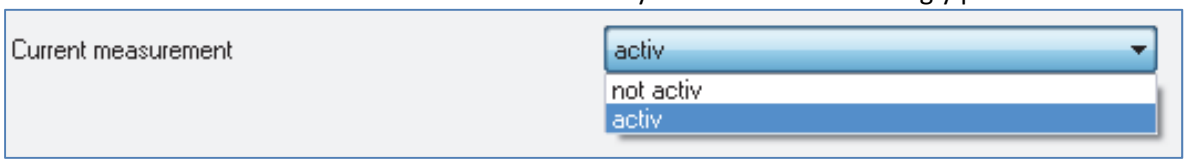


Figure 24: Activation current measurement

If the current measurement is activated, a new submenu will appear. At his submenu, the current measurement can be parameterized for this channel.

### 4.6.1 General settings

The current measurement can be parameterized for the adjusted channel at the according submenu:

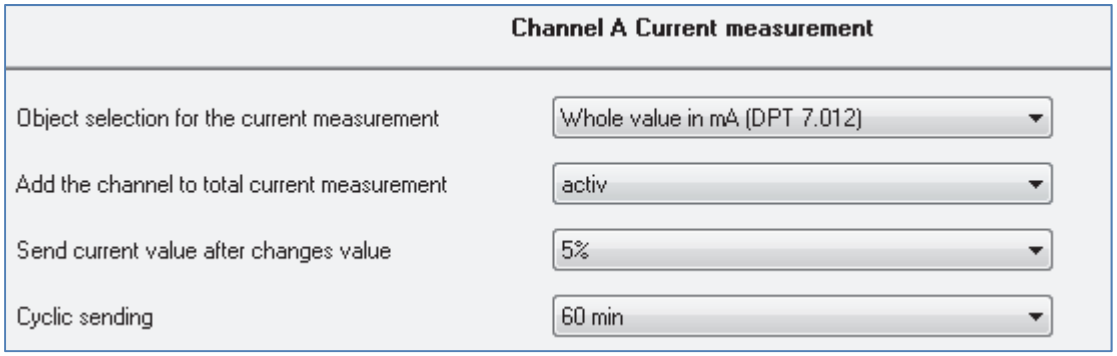


Figure 25: General settings current measurement

The following general settings can be done for the current measurement:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Object selection for the current measurement | ▪ **Whole value in mA**<br>▪ Floating value in mA<br>▪ Value in A<br>▪ Value in kW | Selection of the sending object for the current measurement |
| Add the channel to total current measurement | ▪ **not active**<br>▪ active | adjusts, whether the channel hall be addicted to the total current measurement |
| Send actual value after changes value | not active, 1% - 75%<br>**[not active]** | Activation and adjustment of the sending of the current value at determined changes |
| Cyclic sending | ▪ **not active**<br>▪ 15min<br>▪ 30min<br>▪ 60min<br>▪ 90min<br>▪ 120min | Activation and adjustment of the sending of the current value at determined times |

Table 26: General settings current measurement



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It can be adjusted for the current measurement of every channel, which object shall be shown. The accuracy of the current measurement as well as the size depends to the adjusted object.
Three different sizes are distinct:

- **Whole value in mA**
  sends the current value in mA, only whole values are sent
- **Floating value in mA**
  sends the current value in mA; the value is sent as floating value, so included with decimals
- **Value in A**
  sends the current value in A; the value is sent as floating value, so included with decimals

Additional a setting is available for the calculation of the electric power of the channel. For this setting, additional the used voltage multiplied with the active power factor must be entered:

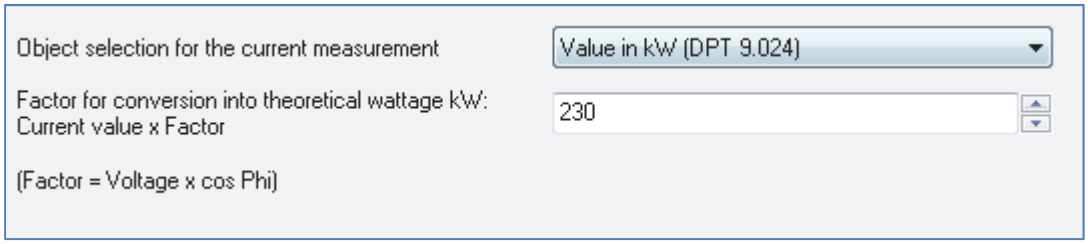


Figure 26: Calculation of the theoretical power

The power of the channel is approximated calculated afterwards by a multiplication.

Furthermore can be set, whether the channel shall be integrated to the total current measurement of the actuator (have a look at 4.6.2 Total current measurement). Also the sending conditions of the channel can be adjusted. The channel can send its actual value as well as determined percentage change or in fixed time steps, independent of a change of the value. Both sending conditions can be combined, too.

The following chart shows the communication object for the current value:

| Number | Name | Length | Usage |
|---|---|---|---|
| 11 | Current value | 2/4 Byte | sends the actual current value of the channel |

Table 27: Communication object current measurement


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### 4.6.2 Power meter function

The power meter function can be activated for each channel and can be parameterized further afterwards:

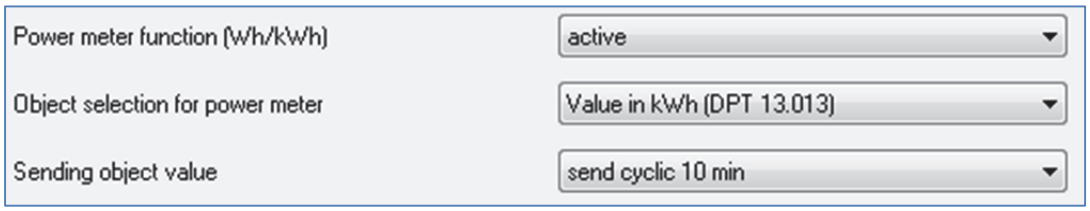


Figure 27: Power meter function

The following chart shows the available settings for this parameter:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Object selection for power meter | ▪ **Value in Wh (DPT 13.010)**<br>▪ Value in kwh (DPT 13.013) | Selection of the sending object for the power meter |
| Sending object value | ▪ **only request**<br>▪ send cyclic 10min/ 30min/ 1h/ 3h/ 6h/ 12h/ 24h | defines the sending condition for the calculated power |

Figure 28: Settings power meter function

The power meter counts the active energy of the channel according to the adjusted voltage and the measured current. The intern count is continuous but the output rises only up every 10Wh.
Via the object “Reset power meter”, the power meter can be set to zero again.
So the power meter function offers an effective method for observing the power consumption of devices at determined cycles (day, week, month). An additional visualization of the power consumption can help saving energy and switch devices on demand.

The following chart shows the relevant communication objects:

| Number | Name | Length | Usage |
|---|---|---|---|
| 15 | Reset power meter | 1 Bit | resets the power meter to zero again |
| 16 | Active energy | 4 Byte | sends the measured energy |

Table 28: Communication object meter


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### 4.6.3 Total current measurement

The total current measurement can be activated for the whole actuator once at the submenu "General" (have a look at 4.1 General). For every channel can be set, whether this channel shall be integrated to this measurement or not. The submenu for the parameterization of the total current measurement is constructed as follows:

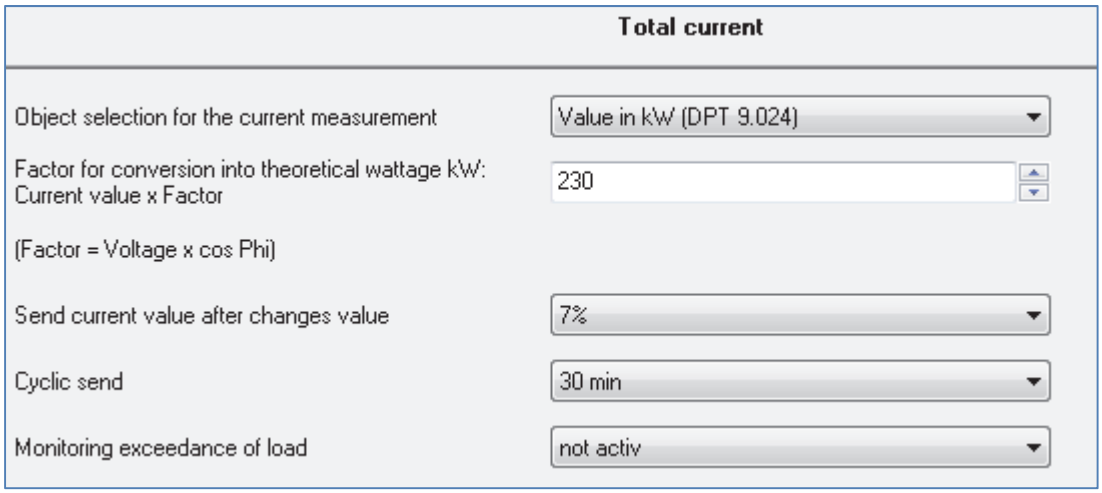


Figure 29: Total current

The following settings can be made for the total current measurement:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Object selection for the current measurement | ▪ **Floating value in mA**<br>▪ Value in A<br>▪ Value in kW | Selection of the sending object for the current measurement |
| Send actual value after changes value | not active, 1% - 75%<br>**[not active]** | Activation and adjustment of the sending of the current value at determined changes |
| Cyclic sending | ▪ **not active**<br>▪ 15min<br>▪ 30min<br>▪ 60min<br>▪ 90min<br>▪ 120min | Activation and adjustment of the sending of the current value at determined times |
| Monitoring exceedance of load | ▪ **not active**<br>▪ active | Activation of the observation of the exceedance of the load, have a look at 4.6.3 Monitoring exceedance/deviation of load |

Table 29: Total current


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The object, which shall be shown for the total current measurement, can also be adjusted, but the setting “whole value in mA” is not available for the total current measurement. For a detailed explanation of the available settings have a look at chapter “4.6.1 General settings”.
The sending condition can be adjusted. So it is possible to send the value after an adjustable change or after an adjustable period of time. The cyclic sending is independent from a change of the measured current. Both sending conditions can also be combined.
Additional an observation of the total current can be activated. This is described in detail at the following chapter.

The communication object for the total current measurement is shown at the following chart:

| Number | Name | Length | Usage |
|---|---|---|---|
| 78/ 148 | Value of total current | 2/4 Byte | sends the actual current of the whole actuator |
| 79/149 | Exceedance of total current | 1 Bit | reports an exceedance of the total current |

Table 30: Communication object total current

### 4.6.4 Total power meter function

The following illustration shows the available settings for the „total power meter function“:

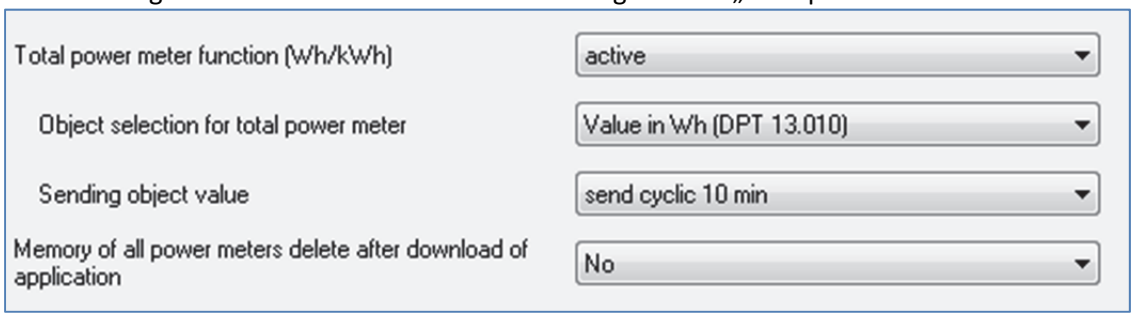


Figure 30: Total power meter function

The following chart shows the dynamic range for this parameter:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Object selection for total power meter | ▪ **Value in Wh (DPT 13.010)**<br>▪ Value in kWh(DPT 13.013) | Selection of the object value for the total power meter |
| Sending object value | ▪ **only request**<br>▪ send cyclic 10min/ 30min/ 1h/ 3h/ 6h/ 12h/ 24h | Setting, whether the value shall be sent cyclic or only on request |
| Delete memory of all power meters after download of application | ▪ **No**<br>▪ Yes | Setting if all power meters shall be deleted or saved at a download |

Table 31: Total power meter function


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The total power meter function calculates the sum of the active energy of all channels at which the power meter function was activated. The object can be selected as well to Wh as to kWh.
Via the parameter “Sending object value” can be determined, if the object sends its current value only on request or in adjustable time intervals. Furthermore it can be adjusted, if the power meter shall hold its current value or if they shall set to zero again after a download.
The total power meter has in contrast to the power meter for the single channels no reset object. The total power meter function calculates always the sum of all single channels. So, a reset of all single channels causes automatically a reset of the total power meter.

The communication object for the total power meter function is shown at the following chart:

| Number | Name | Length | Usage |
|---|---|---|---|
| | Total active energy | 4 Byte | sends the summed up active energy |

Table 32: Communication object total power meter

### 4.6.5 Monitoring exceedance/deviation of load

An observation of the load can be activated for every channel for an exceedance of a comparable worth as well as for a deviation of this worth. The total current measurement can only observe a exceedance. The possible settings are shown at the following illustration:

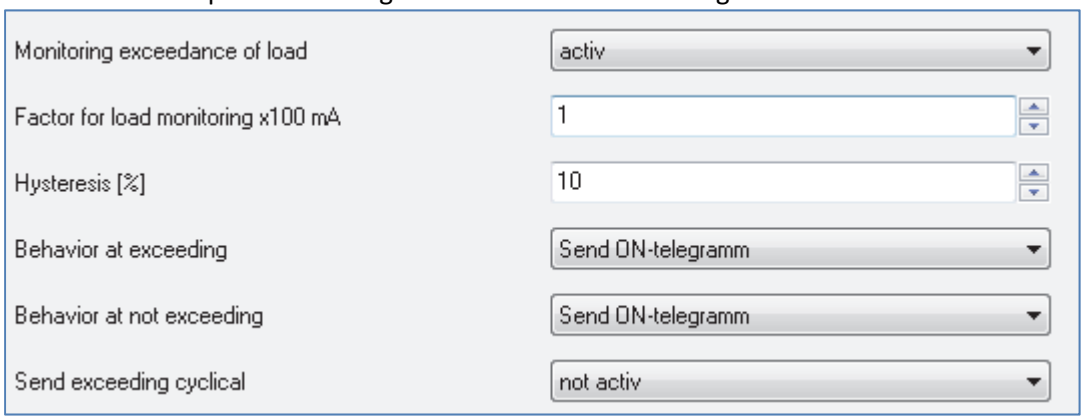


Figure 31: Monitoring exceedance/deviation of load


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The available settings for a load monitoring are shown at the following chart:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Factor for load monitoring x100mA | 1-200<br>**[1]** | adjusts the reference value for the monitoring of load |
| Hysteresis % | 10-100<br>**[10]** | Adjustment of the hysteresis for avoiding to fast switching |
| Behavior at exceeding/deviating | ▪ **Send no telegram**<br>▪ Send On-telegram<br>▪ Send Off-telegram | Adjustment of the behavior, when the measured value is out of the adjusted range |
| Behavior at not exceeding/deviating | ▪ **Send no telegram**<br>▪ Send On-telegram<br>▪ Send Off-telegram | Adjustment of the behavior, when the measured value is in the adjusted range |
| Send exceeding/deviating cyclical | ▪ **not active**<br>▪ 15min<br>▪ 30min<br>▪ 60min<br>▪ 90min<br>▪ 120min | Activation and adjustment of the time step for a cyclic sending |

Table 33: Monitoring exceedance/deviation of load

The reference value for the observation is set by the parameter “Factor for load monitoring”. The adjusted value is multiplied with 100mA, so the value can be adjusted in the range of 0,1A to 20A with 100mA steps. The hysteresis, which is indicated in % of the reference value, can avoid a too fast switching. At the monitoring exceedance of load, the hysteresis is subtracted from reference value. At the monitoring lower deviation of load, the hysteresis is added to the reference value. But the switch-on value is always the same as the reference value only the switch-off value is calculate by the upper way:
So, for a hysteresis of 10% and a reference value of 1A, the following switching points will result:
At the exceedance of load, a value is sent at exceedance of 1A, which only is reset when the value deviates above 0,9A.
At the deviation of load, a value is sent at deviating 1A, which only is reset when the value exceeds above 1,1A.
The sending conditions of the according communication object can also be adjusted. The telegram can send as well on-telegrams as off-telegram for the different cases. Additional the object can sent no telegram. Also, a cyclic sending can be activated.

The following chart shows the relevant communication objects:

| Number | Name | Length | Usage |
|---|---|---|---|
| 12 | Exceedance of load | 1 Bit | reports an exceedance of load |
| 13 | Lower deviation of load | 1 Bit | reports an deviation of load |

Table 34: Communication objects load deviation/exceedance


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### 4.6.6 Fault current/ Load failure

An error message can be activated for every channel for a fault current as for faulty load:

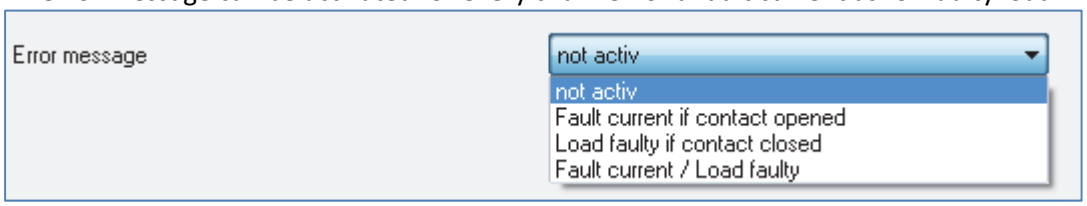


Figure 32: Error message

The following settings are available for the error message:

| ETS-text | Dynamic range **[default value]** | comment |
|---|---|---|
| Error message | ▪ **not active**<br>▪ Fault current is contact opened<br>▪ Load faulty if contact closed<br>▪ Fault current/Load faulty | Adjustment of the type of the error message |
| Switching threshold | ▪ **20mA**<br>▪ 50mA<br>▪ 100mA<br>▪ 200mA<br>▪ 500mA<br>▪ 1A<br>▪ 2A | Adjustment of the reference value<br><br>At the fault current, an exceeding is reported.<br>At the Load faulty a deviation is reported |

Table 35: Fault current/Load faulty

By activating an error message, a fault current or/and a load failure can be shown. The fault current is calculated, when the channel has not been switched, so the contact is opened. The load failure is calculated, when the channel has been switched, so the contact is closed. If the error message is active, a 1-signal is sent by the communication object.
Via the setting switching threshold, the sensitivity of the error message can be adjusted. At the fault current, the communication object sends a 1-signal when the switching threshold is exceeded. At the load faulty, the communication object sends a 1-signal when the current is smaller then the adjusted switching threshold.

The following chart shows the relevant communication objects, which changes depending to the actual setting:

| Number | Name | Length | Usage |
|---|---|---|---|
| 14 | Load faulty | 1 Bit | reports a load failure |
| 14 | Fault current | 1 Bit | reports a fault current |
| 14 | Fault current/Load faulty | 1 Bit | reports a fault current and a load failure |

Table 36: Communication object Fault current/Load faulty


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## 4.7 Operating hours

The operating hours counter can count the activity of a channel. There is as well a reverse counter to the next service as a forward counter, with the setting operating hours counter, available.

### 4.7.1 Operating hours counter

The following illustration shows the available settings for the operating hours counter:

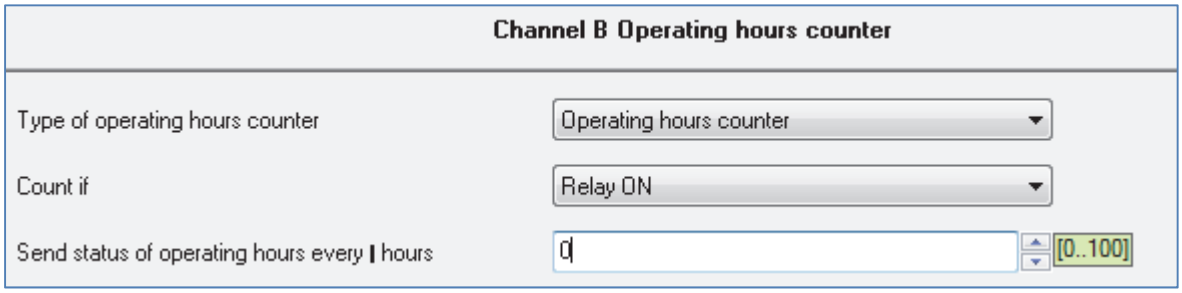


Figure 33: Operating hours counter

The following chart shows the dynamic range for this parameter:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Type of operating hours counter | **Operating hours counter** | Chosen operating mode:<br>Operating hours counter |
| Count if | ▪ **Relay ON**<br>▪ Current >20mA<br>▪ Current >50mA<br>▪ Current >100mA<br>▪ Current >200mA<br>▪ Current >500mA<br>▪ Current >1A<br>▪ Current >2A<br>▪ Current >5A | Adjustment of the counting condition |
| Send status of operating hours every … hours | 0-100<br>**[0h]** | Adjustment when a message shall be sent |

Table 37: Operating hours counter

The operating hours counter can count the operating hours at which the channel is active. These can be count as well when the channel is switched on as when a determined current value is exceeded. Furthermore can be adjusted when the communication object “Response operating hours” shall send a value. This function can be deactivated by the setting 0h. So the object is switched passive and sends no value, but can be requested. Via the object “Reset operating hours” the operating hours are set back to 0h.

The following chart shows the relevant communication objects for this parameter:

| Number | Name | Length | Usage |
|---|---|---|---|
| 8 | Response operating hours | 2 Byte | sends the number of counted operating hours |
| 9 | Reset operating hours | 1 Bit | sets the operating hours back to 0h |

Table 38: Communication object operating hours counter


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### 4.7.2 Reverse counter

The following illustration shows the settings for the reverse counter to the next service:

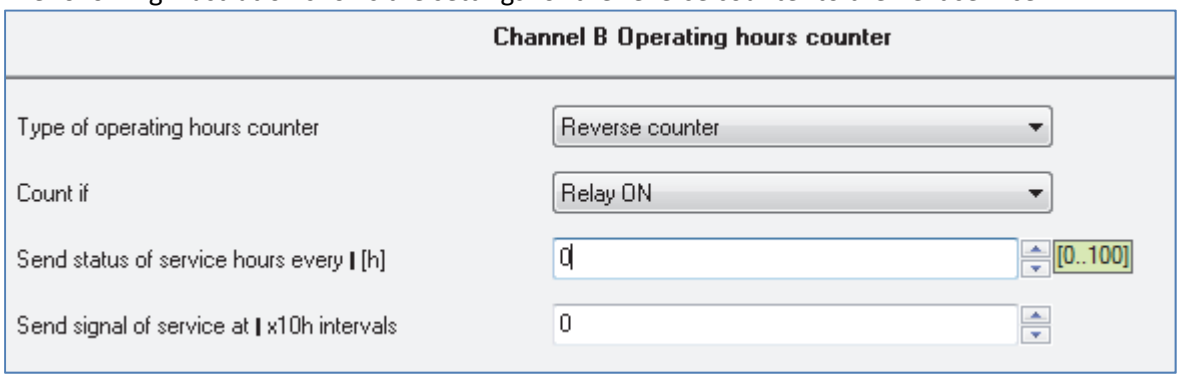


Figure 34: Reverse counter to next service

The following chart shows the dynamic range of this parameter:

| ETS-text | Dynamic range<br>**[default value]** | comment |
|---|---|---|
| Type of operating hours counter | **Reverse counter** | Chosen operating mode:<br>Reverse counter |
| Count if | ▪ **Relay ON**<br>▪ Current >20mA<br>▪ Current >50mA<br>▪ Current >100mA<br>▪ Current >200mA<br>▪ Current >500mA<br>▪ Current >1A<br>▪ Current >2A<br>▪ Current >5A | Adjustment of the counting condition |
| Send status of service hours every … [h] | 0-100<br>**[0h]** | Adjustment when a message shall be sent |
| Send signal of service at …x10h intervals | 0-250<br>**[0h]** | Adjustment when a service is required |

Table 39: Reverse counter to next service

The reverse counter to the next service can count the operating hours in which the channel is active. These can be counted back as well when the channel is switched on as when a determined current value is exceeded.
The value when a service is required can be adjusted with the setting “Send signal of service at”. When this service time runs out, the dependent communication object “Service required” sends a service requirement. The setting 0h deactivates this function and so also the one described below.
Via the setting “Send status of service hours every … h” can be adjusted in which steps the object “Time to next service” sends a message with the remaining operating hours before the next service. The setting 0h deactivates this function.


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The following chart shows the relevant communication objects for this parameter:

| Number | Name | Length | Usage |
|---|---|---|---|
| 8 | Time to the next service | 2 Byte | sends the remaining time to the next service |
| 9 | Reset service | 1 Bit | resets service time back to the adjusted value |
| 10 | Service required | 1 Bit | reports that a service is required |

Table 40: Communication object reverse counter to next service



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# 5 Index

## 5.1 Register of illustrations





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## 5.2 List of tables





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# 6 Attachment

## 6.1 Statutory requirements

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

## 6.2 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.

## 6.3 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.


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## 6.4 Group state

The following chart shows the assignment of the 4 Byte-object:

| Channel | active | not active | ON | OFF |
|---|---|---|---|---|
| **Channel A** | Bit 16 = 1 | Bit 16 = 0 | Bit 0 = 1 | Bit 0 = 0 |
| **Channel B** | Bit 17 = 1 | Bit 17 = 0 | Bit 1 = 1 | Bit 1 = 0 |
| **Channel C** | Bit 18 = 1 | Bit 18 = 0 | Bit 2 = 1 | Bit 2 = 0 |
| **Channel D** | Bit 19 = 1 | Bit 19 = 0 | Bit 3 = 1 | Bit 3 = 0 |
| **Channel E** | Bit 20 = 1 | Bit 20 = 0 | Bit 4 = 1 | Bit 4 = 0 |
| **Channel F** | Bit 21 = 1 | Bit 21 = 0 | Bit 5 = 1 | Bit 5 = 0 |
| **Channel G** | Bit 22 = 1 | Bit 22 = 0 | Bit 6 = 1 | Bit 6 = 0 |
| **Channel H** | Bit 23 = 1 | Bit 23 = 0 | Bit 7 = 1 | Bit 7 = 0 |
| **Channel I** | Bit 24 = 1 | Bit 24 = 0 | Bit 8 = 1 | Bit 8 = 0 |
| **Channel J** | Bit 25 = 1 | Bit 25 = 0 | Bit 9 = 1 | Bit 9 = 0 |
| **Channel K** | Bit 26 = 1 | Bit 26 = 0 | Bit 10 = 1 | Bit 10 = 0 |
| **Channel L** | Bit 27 = 1 | Bit 27 = 0 | Bit 11 = 1 | Bit 11 = 0 |

The following chart shows exemplary the emitted group state for some cases:

| Channel | Case 1 | | Case 2 | | Case 3 | | Case 4 | |
|---|---|---|---|---|---|---|---|---|
| | active | ON | active | ON | active | ON | active | ON |
| **Channel A** | | | X | X | X | X | X | X |
| **Channel B** | | | X | X | | | X | |
| **Channel C** | | | X | X | X | | X | X |
| **Channel D** | | | X | X | | | X | X |
| **Channel E** | | | X | X | | | X | X |
| **Channel F** | | | X | X | | | X | |
| **Channel G** | | | X | X | | | X | X |
| **Channel H** | | | X | X | X | X | X | X |
| **Channel I** | | | X | X | | | | |
| **Channel J** | | | X | X | X | X | | |
| **Channel K** | | | X | X | | | | |
| **Channel L** | | | X | X | | | | |
| **Bit-code active/inactive ON/OFF** | 0000 0000 0000 0000<br>0000 0000 0000 0000 | | 0000 1111 1111 1111<br>0000 1111 1111 1111 | | 0000 0101 0000 0101<br>0000 0101 0000 0001 | | 0000 0000 1111 1111<br>0000 0000 1101 1101 | |
| **Output of the group state** | **00 00 00 00** | | **0F FF 0F FF** | | **05 05 05 01** | | **00 FF 00 DD** | |



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# MDT Switch Actuator AMS/AMI

**MDT Switch Actuator 4/8/12-fold with current measurement, MDRC ( valid from hardware revision 2.0 )**

| Version | | |
|---|---|---|
| AMS-0416.01 | Switch Actuator 4-fold | 4SU MDRC, 230VAC, 16A, C-Load 140uF, current measurement |
| AMI-0416.01 | Switch Actuator 4-fold | 4SU MDRC, 230VAC, 16/20A, C-Load 200uF, current measurement |
| AMS-0816.01 | Switch Actuator 8-fold | 8SU MDRC, 230VAC, 16A, C-Load 140uF, current measurement |
| AMI-0816.01 | Switch Actuator 8-fold | 8SU MDRC, 230VAC, 16/20A, C-Load 200uF, current measurement |
| AMS-1216.01 | Switch Actuator 12-fold | 12SU MDRC, 230VAC, 16A, C-Load 140uF, current measurement |
| AMI-1216.01 | Switch Actuator 12-fold | 12SU MDRC, 230VAC, 16/20A, C-Load 200uF, current measurement |

The MDT Switch Actuator receives KNX/EIB telegrams and switches up to 12 independent electrical loads . Each output uses a bistable relay and can be operated manually via a push button. A green LED indicates the switching status of each channel.

The outputs are parameterized individually via ETS3/4. The device provides extensive functions like logical operation, status response, block functions, central function, delay functions and staircase lighting function. Additionally the device provides several time and scene control.

**The MDT Switch Actuator offers current measurement for each channel and measurement of the total current. In dependence on the parameterization the measured data can be transmit in different data formats (mA/A/kW) onto the KNX bus. Additionally the device provides an hour/service interval meter. The integrated counter allows to capture the power consumption easily. The active power is calculated by the voltage and the factor cos phi.**

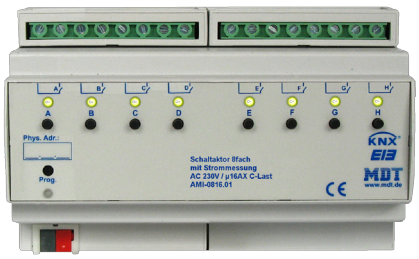
If the mains voltage fails, all outputs hold their current position. After bus voltage failure or recovery the relay position is selected in dependence on the parameterization.

The MDT Switch Actuator is a modular installation device for fixed installation in dry rooms. It fits on DIN 35mm rails in power distribution boards or closed compact boxes. The MDT Switch Actuator has a separate power supply terminals for each channel.

For project design and commissioning of the MDT Switch Actuator it is recommended to use the ETS3f/ETS4 or later. Please download the application software at www.mdt.de/Downloads.html

AMS/AMI-04xx.01

AMS/AMI-08xx.01



- Production in Germany, certified according to ISO 9001
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Cyclic overall-/operation response
- Logical linking of binary data
- 8 scenes per channel
- Hour meter
- Central switching functions and block functions
- Programmable behaviour in case of bus voltage failure or return
- Each contact has an own supply phase
- **Integrated True RMS current measurement (current, kWh)**
- **Current measurement range 10mA-20A**
- **Integrated counter to capture power consumption (Wh/kWh)**
- Power supply via KNX bus
- Modular installation device for DIN 35mm rails
- Integrated bus coupling unit
- 3 years warranty

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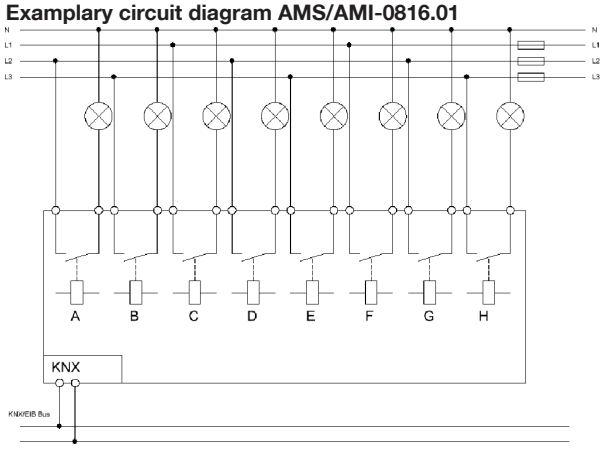
Stand: 0113

# MDT Switch Actuator AMS/AMI

| Technical Data ( valid from hardware revision 2.0 ) | AMS-0416.01 AMS-0816.01 AMS-1216.01 | | | AMI-0416.01 AMI-0816.01 AMI-1216.01 | | |
|---|---|---|---|---|---|---|
| **Number of outputs** | 4 | 8 | 12 | 4 | 8 | 12 |
| **Current measurement range** | 10mA - 20A | | | 10mA - 20A | | |
| **Measuring inaccuracy** | 2% | | | 2% | | |
| **Sampling rate** | 2000 samples/500ms | | | 2000 samples/500ms | | |
| **Output switching ratings** | | | | | | |
| Ohmic load | 16A | | | 16/20A* | | |
| Capacitive load | max. 140uF at 16A | | | max. 200uF at 16A | | |
| Voltage | 230VAC | | | 230VAC | | |
| **Maximum inrush current** | 400A/150µs 200A/600µs | | | 600A/150µs 300A/600µs | | |
| **Maximum load** | | | | | | |
| Incandescent lamps | 2700W | | | 3680W | | |
| Halogen lamps 230V | 2500W | | | 3680W | | |
| Halogen lamps, electronic transformer** | 1000W | | | 2500W | | |
| Fluorescent lamps, not compensated | 1800W | | | 3680W | | |
| Fluorescent lamps, parallel comp. | 1000W | | | 2500W | | |
| Max. number of electronic transformers | 14 | | | 28 | | |
| **Output life expectancy (mechanical)** | 1.000.000 | | | 1.000.000 | | |
| **Permitted wire gauge** | | | | | | |
| Screw terminal | 0,5 - 4,0mm² solid core 0,5 - 2,5mm² finely stranded | | | 0,5 - 4,0mm² solid core 0,5 - 2,5mm² finely stranded | | |
| KNX busconnection terminal | 0,8mm Ø, solid core | | | 0,8mm Ø, solid core | | |
| **Power supply** | KNX bus | | | KNX bus | | |
| **Power consumption KNX bus typ.** | < 0,3W | < 0,4W | < 0,4W | < 0,3W | < 0,4W | < 0,4W |
| **Operation temperature range** | 0 to + 45°C | | | 0 to + 45°C | | |
| **Enclosure** | IP 20 | | | IP 20 | | |
| **Dimensions MDRC (Space Units)** | 4SU | 8SU | 12SU | 4SU | 8SU | 12SU |

* total current carrying capacity neighbouring outputs max. 32A
** low voltage halogen lamps with electronic transformer

**Examplary circuit diagram AMS/AMI-0816.01**

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