12/2014

Technical Manual

MDT Switch Actuator

Series AKI:

AKI-0416.01
AKI-0816.01
AKI-1216.01

Series AKS:

AKS-0416.01 (until Q3 - 2012)
AKS-0410.01 (until Q3 - 2012)
AKS-0816.01 (until Q3 - 2012)
AKS-0810.01 (until Q3 - 2012)
AKS-1216.01 (until Q3 - 2012)
AKS-1210.01 (until Q3 - 2012)
AKS-0416.02 (from Q3 - 2012)
AKS-0816.02 (from Q3 - 2012)
AKS-1216.02 (from Q3 - 2012)
AKS-2016.02 (from Q3 - 2012)

Series AKK:

AKK-0810A.01
AKK-01UP.01
AKK-02UP.01
AKK-0216.01 (until Q2 – 2014)
AKK-0406.01 (until Q2 – 2014)
AKK-0816.01 (until Q2 – 2014)
AKK-0810.01 (until Q2 – 2014)
AKK-1616.01 (until Q2 – 2014)
AKK-1610.01 (until Q2 – 2014)
AKK-0216.02 (from Q2 – 2014)
AKK-0416.02 (from Q2 – 2014)
AKK-0816.02 (from Q2 – 2014)
AKK-1616.02 (from Q2 – 2014)

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1 Content

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2 Overview

2.1 Overview devices

The manual refers to the following devices (Order Code respectively printed in bold type). For the actuators with integrated current measurement, a separate manual exists.

2.1.1 Industrial design AKI

Old series (until Q3 - 2013):

- **AKI-0416.01** Switch actuator 4-fold,4TE, 230V AC, 16 A, C-Load 200µF, industrial design
- **AKI-0816.01** Switch actuator 8-fold,8TE, 230V AC, 16 A, C-Load 200µF, industrial design
- **AKI-1216.01** Switch actuator 12-fold,12TE, 230V AC, 16 A, C-Load 200µF, industrial design

The switch actuators from Hardware R3.0 are only supplied by the bus voltage and do not need any external voltage.

2.1.2 Compact bistable design AKS

Old series (until Q3 - 2012):

- **AKS-0416.01** Switch actuator 4-fold,4TE, 230V AC, 16 A, C-Load 100µF, standard design
- **AKS-0410.01** Switch actuator 4-fold,4TE, 230V AC, 10 A, C-Load 100µF, standard design
- **AKS-0816.01** Switch actuator 8-fold,8TE, 230V AC, 16 A, C-Load 100µF, standard design
- **AKS-0810.01** Switch actuator 8-fold,8TE, 230V AC, 10 A, C-Load 100µF, standard design
- **AKS-1216.01** Switch actuator 12-fold,12TE, 230V AC, 16 A, C-Load 100µF, standard design
- **AKS-1210.01** Switch actuator 12-fold,12TE, 230V AC, 10 A, C-Load 100µF, standard design

New series (from Q3 – 2012)

- **AKS-0416.02** Switch actuator 4-fold, 4TE, 230V AC 16A, C-Load 140µF, new series
- **AKS-0816.02** Switch actuator 8-fold, 6TE, 230V AC 16A, C-Load 140µF, new series
- **AKS-1216.02** Switch actuator 12-fold, 8TE, 230V AC 16A, C-Load 140µF, new series
- **AKS-2016.02** Switch actuator 20-fold, 12TE, 230V AC 16A, C-Load 140µF, new series

The switch actuators of the new series are only supplied by the bus voltage and do not need any external voltage.

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2.1.3 Compact design AKK

Old series (bis Q4 - 2014): monostable Relaiy

- **AKK-0810A.01** Switch actuator 8-fold, surface mounted, 230V AC, 10 A, compact design
- **AKK-01UP.01** Switch actuator 1-fold, flush-mounted, 230V AC, 16 A, compact design
- **AKK-02UP.01** Switch actuator 2-fold, flush mounted, 230V AC, 6 A, compact design
- **AKK-0216.01** Switch actuator 2-fold, 2TE, 230V AC, 16 A, compact design
- **AKK-0406.01** Switch actuator 4-fold, 4TE, 230V AC, 6 A, compact design
- **AKK-0816.01** Switch actuator 8-fold, 4TE, 230V AC, 16 A, compact design
- **AKK-0810.01** Switch actuator 8-fold, 4TE, 230V AC, 10 A, compact design
- **AKK-1616.01** Switch actuator 16-fold, 8TE, 230V AC, 16 A, compact design
- **AKK-1610.01** Switch actuator 16-fold, 8TE, 230V AC, 10 A, compact design

New series (ab Q4 - 2014): bistable Relaiy

- **AKK-0216.02** Switch actuator 2-fold, 2TE, 230V AC, 16 A, compact design
- **AKK-0416.02** Switch actuator 4-fold, 4TE, 230V AC, 16 A, compact design
- **AKK-0816.02** Switch actuator 8-fold, 4TE, 230V AC, 16 A, compact design
- **AKK-1616.02** Switch actuator 16-fold, 8TE, 230V AC, 16 A, compact design

The functions of the actuators of the new series are the same as the one of the first series. Only design and the circuit diagram are different. For detailed information have a look at the next segment, 2.2 Exemplary circuit diagrams, or at the datasheets of the new series.

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2.2 Exemplary circuit diagrams

2.2.1 AKI

Until Hardware R2.x (supplied by supply voltage):

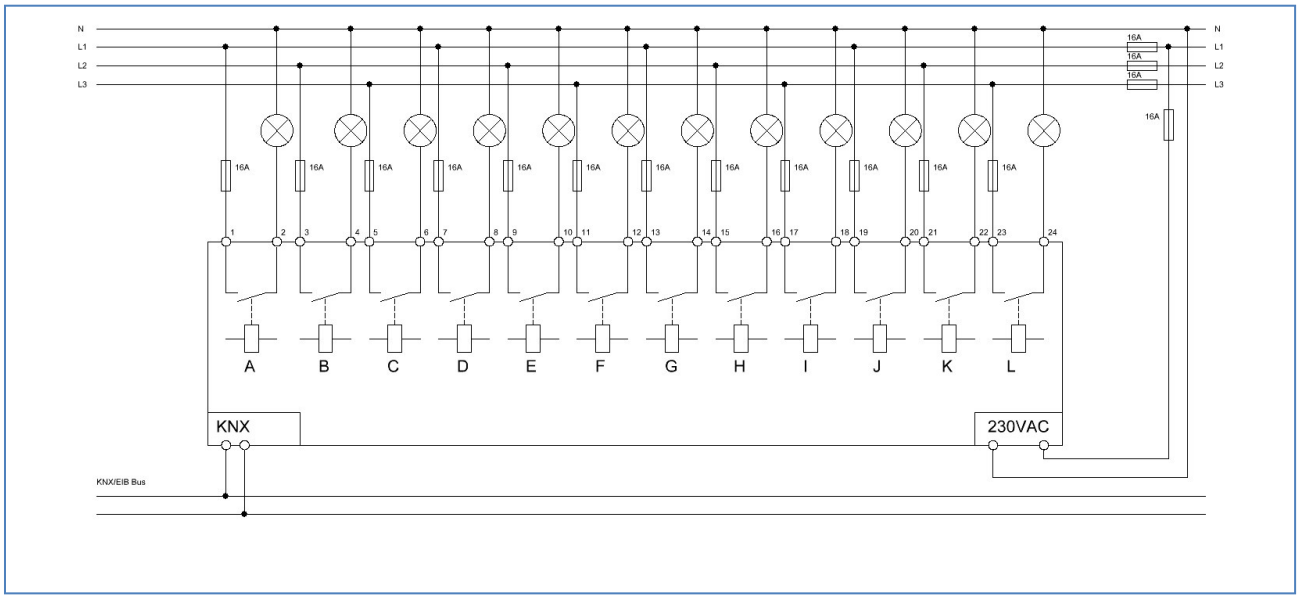

Figure 1: Exemplary circuit diagram AKI-1216.01 (until R2.x)

From Hardware R3.0 (supplied by bus voltage):

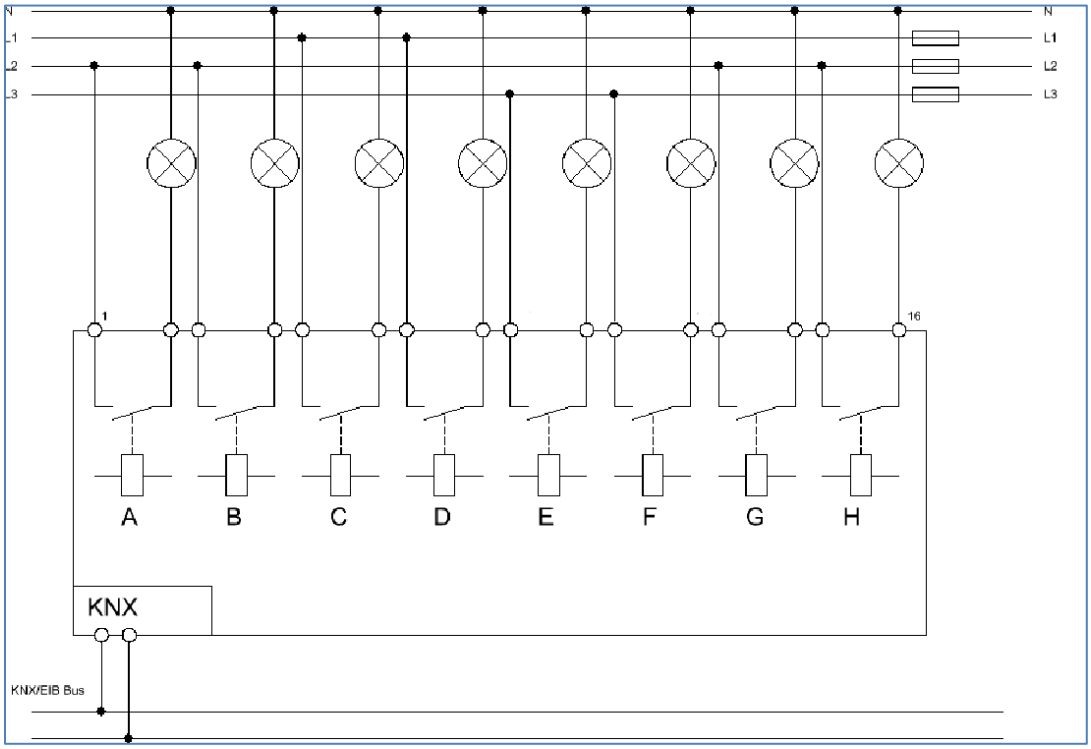

Figure 2: Exemplary circuit diagram AKI-0816.02 (from R3.0)

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2.2.2 AKS

Old series (supplied by supply voltage):

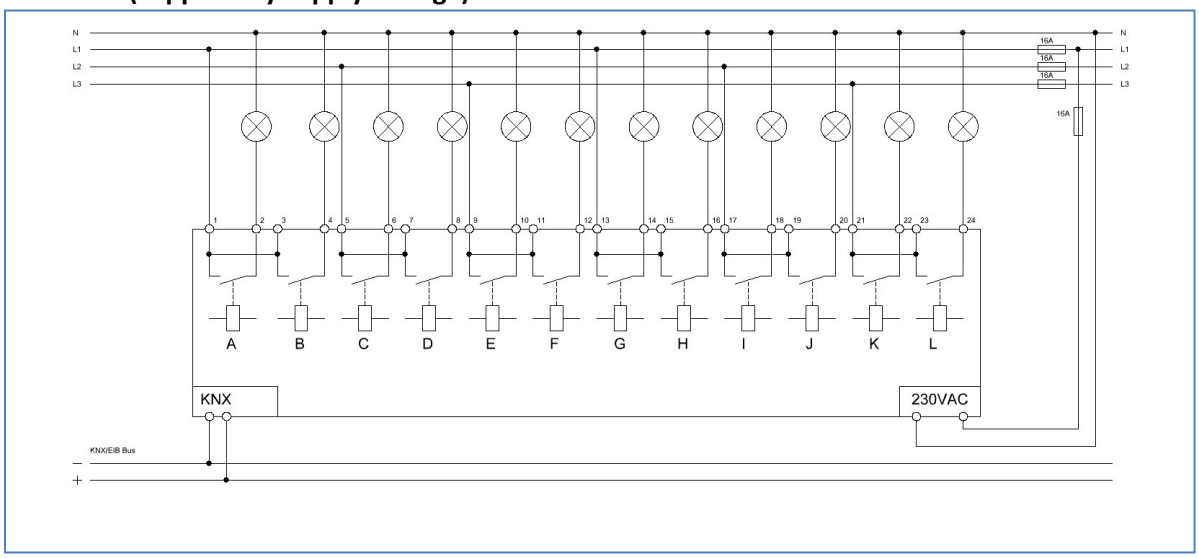

Figure 3: Exemplary circuit diagram AKS-1216.01

New series (supplied by bus voltage):

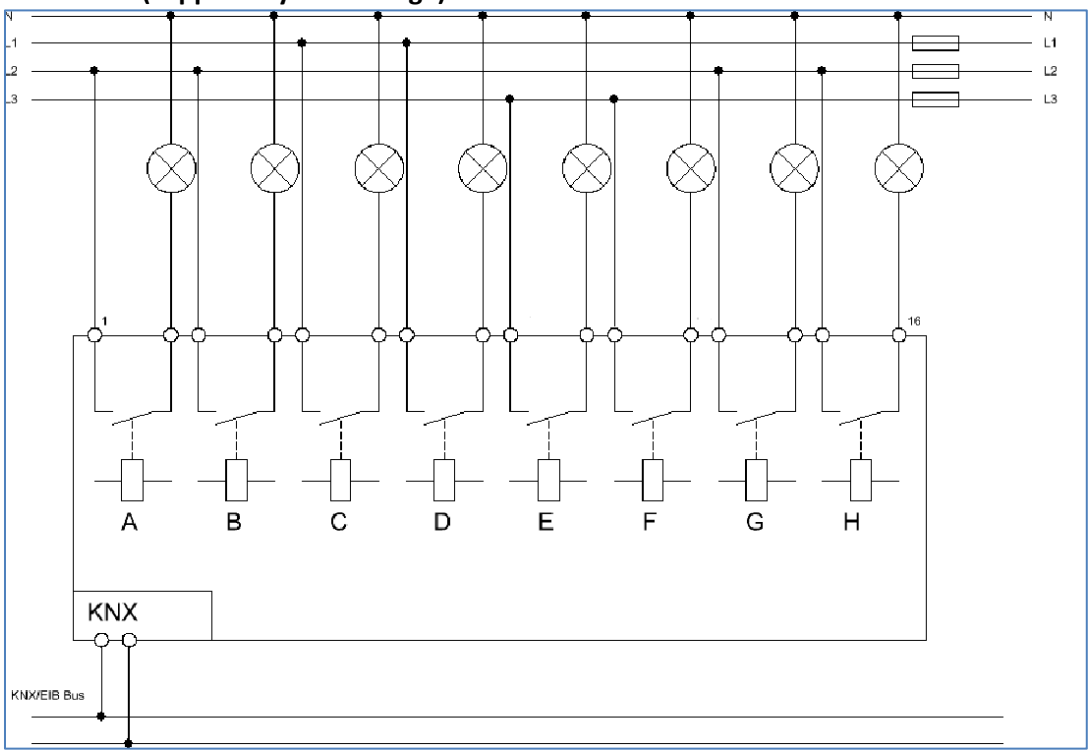

Figure 4: Exemplary circuit diagram AKS-0816.02

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2.2.3 AKK

Old series (supplied by supply voltage):

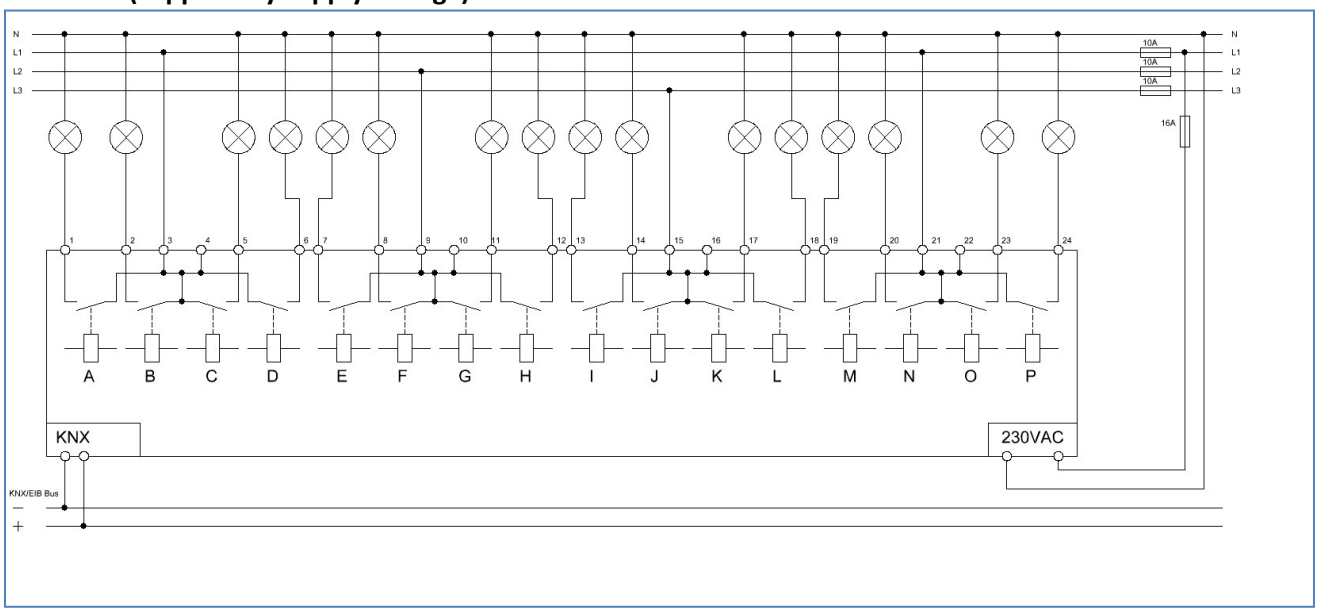

Figure 5: Exemplary circuit diagram AKK-1610.01

New series (supplied by bus voltage):

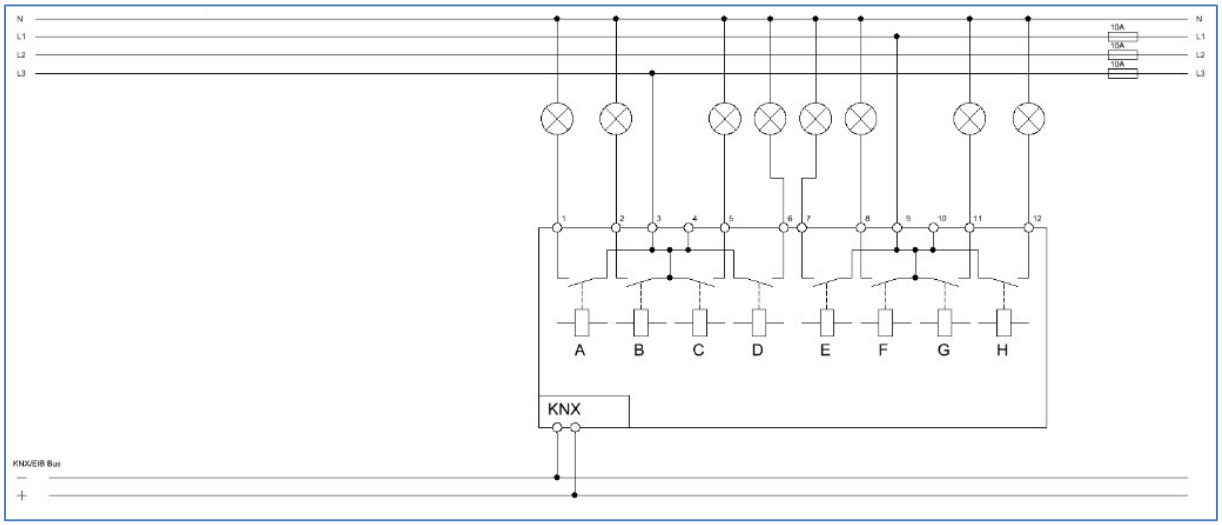

Figure 6: Exemplary circuit diagram AKK-0816.02

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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.

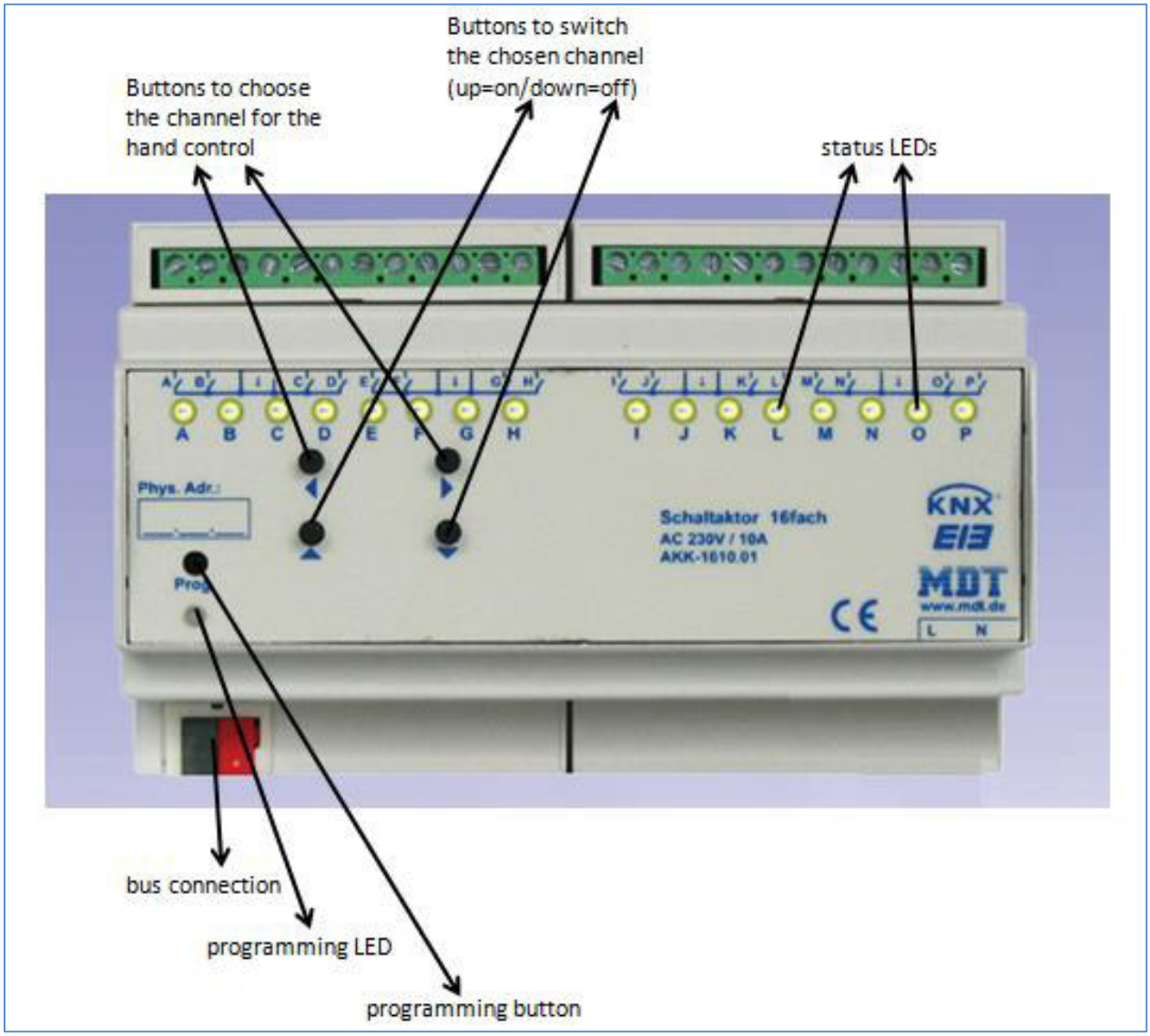

Figure 7: Overview hardware module switch actuator (e.g. AKK-1610.01)

The lines AKS and AKI have bistable relays. The line AKK has monostable 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.
The monostable relays fall back to their output state when the power breaks down or the parameterization is updated.

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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**
Group addresses	number of objects/connections= dynamic (freely assignable of the user)
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
Superordinate functions	blocking function
	logic functions (AND/ OR)
Scenes	scene function for up to 8 scenes per channel
Status functions	feedback function

Table 1: Overview functional possibilities

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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.: AKI-1216.01 switch actuator 12-fold, 8TE, 16A
Order number: addicted to the used type, e.g.: AKI-1216.01

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 Summary and Usage

Nr.	Name	Object function	Data type	Direction	Info	Usage	Tip
global Objects:							
according to the number of channels	Central function	Switch On/Off	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is **always shown** and enables controlling the **standard function "Switch On/Off"**, for **all channels with activated central function**, which is normally connected to all control keys.
Objects per channel:							
0	Channel A	Switch On/Off	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Standard function of the Channel function "Switch", which enables the switching of the output.
1	Channel A	Staircase	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Standard function of the Channel function "Staircase", which enables the switching of the output at which the channel switches off automatically after the parameterized time.

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2	Channel A	Block	DPT 1.003	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	This communication object is always shown for an activated channel and allows the blocking of the channel with simultaneously calling of parameterized states.
4	Channel A	Scene	DPT 18.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	This communication object is **only shown after activating the scene function** and allows the calling of 8 parameterized scenes. **(= Additional function)**
5	Channel A	State	DPT 1.001	send	Actuator sends current switching state	Visu, Connection to the object „Value for Toggle“ of Push Buttons	This communication object is always shown for an activated channel and sends the current output state of the channel.

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Logical functions per channel:							
6	Channel A	Logic 1	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	This communication object **is only shown after activating the Logical functions** and can be used for switching the channel according to the adjusted logical setting. **(= Additional function)**
7	Channel A	Logic 2	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	This communication object **is only shown after activating the Logical functions** and can be used for switching the channel according to the adjusted logical setting. **(= Additional function)**

Table 2: Communication Objects

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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**
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	**next channel**								
96 128	Central function	switch on/off	1 Bit	Low	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 Reference ETS-Parameter

4.1 General Settings

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

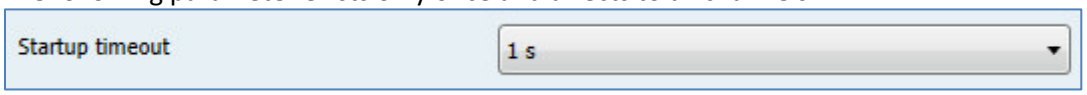

Figure 8: General settings

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.

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

Table 4: General settings

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4.2 Channel selection

The following illustration shows the menu for selecting the channels:

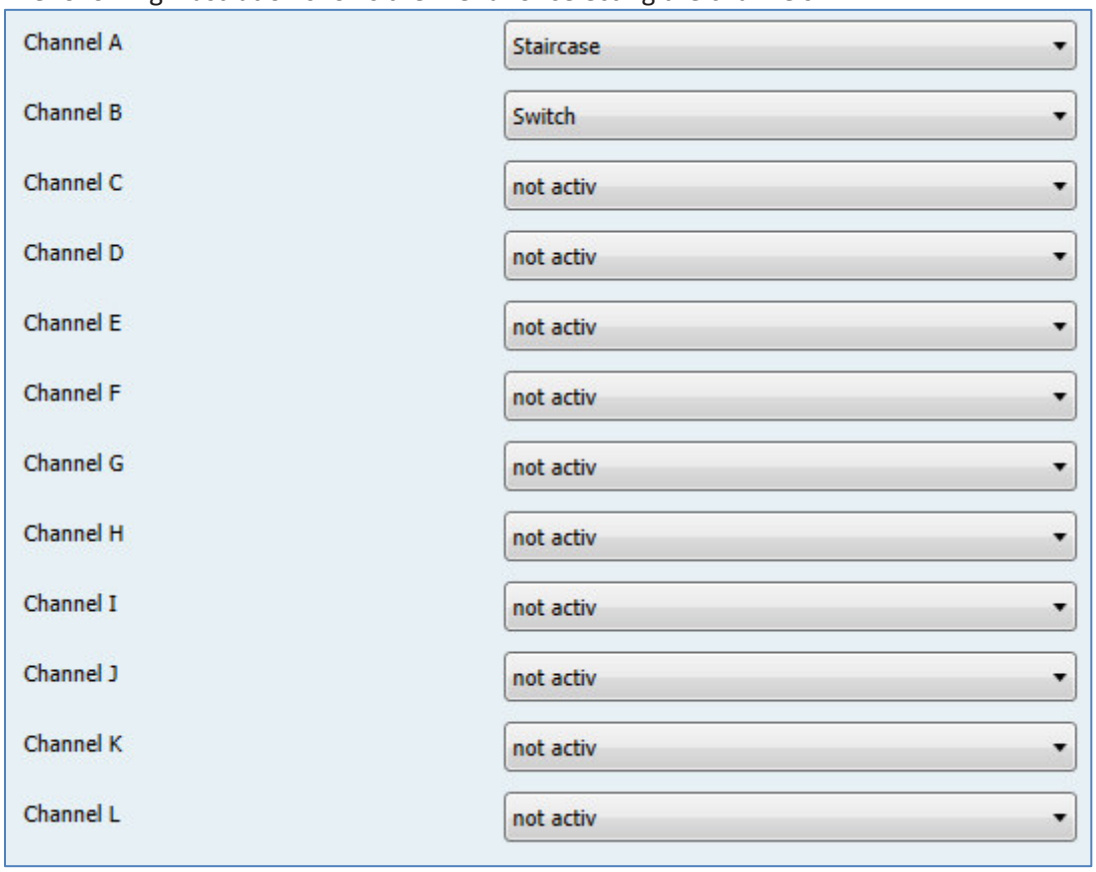

Figure 9: Channel selection

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-[T]	▪ **not active** ▪ Switch ▪ Staircase	Operating mode of the channels

Table 5: 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:

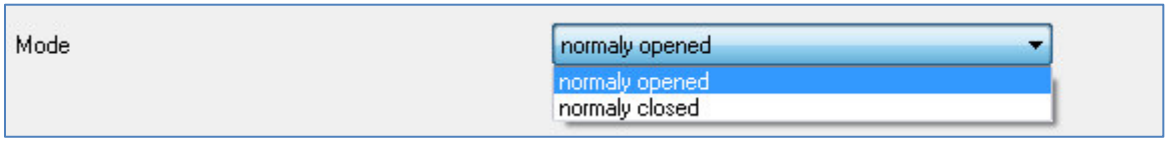


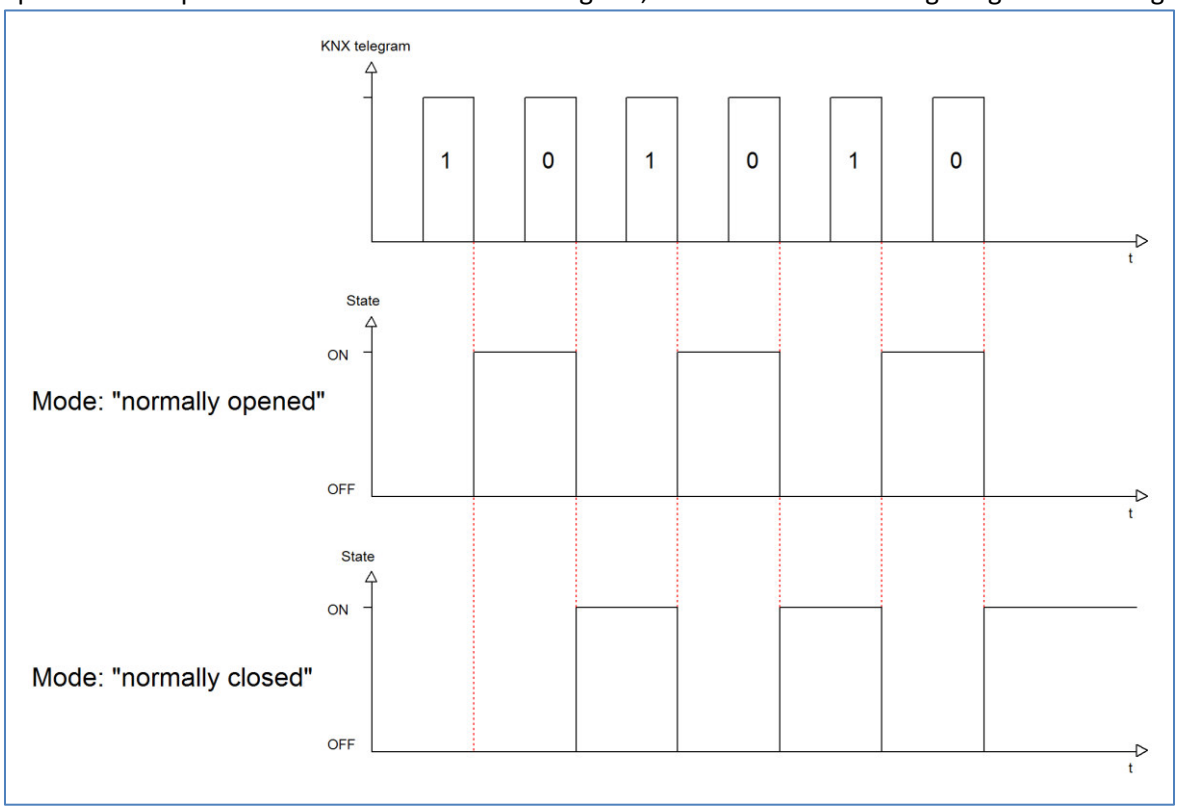
Figure 10: Operating mode

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 6: 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:

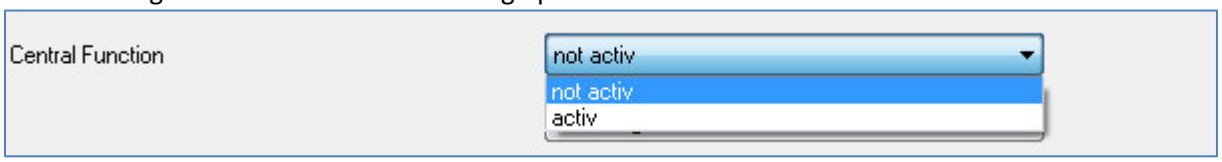

Figure 11: Central function

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 7: 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 number depends to the number of channels

Table 8: Communication object central function

4.3.3 Behavior at block/unblock

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

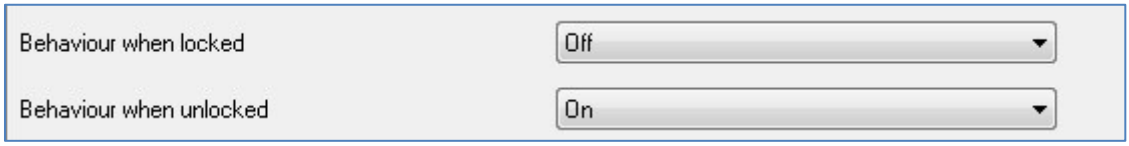

Figure 12: Blocking function

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 9: Behavior at block/unblock

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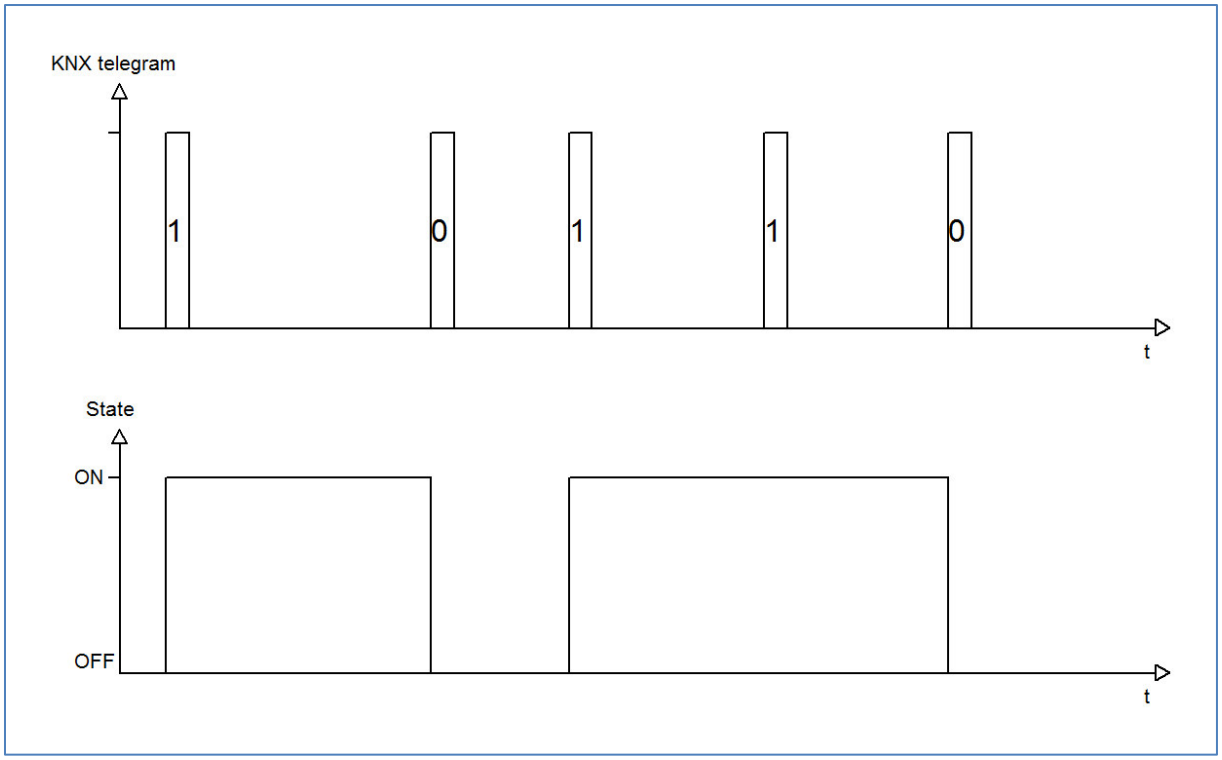
The blocking function gets active, when the corresponding communication object becomes a logical “1”. By sending a logical “0”, the blocking function can be deactivated again.
The parameter “Behavior when locked” defines an action for the output at activating the blocking process. There are the setting 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 10: 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:

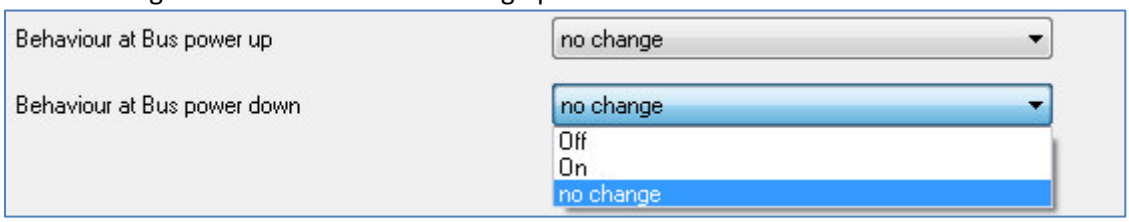

Figure 13: Behavior at bus power up/down

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 ▪ Off ▪ **no change**	Adjustment, how the channel shall react in case of a bus power breakdown/return

Table 11: 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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4.4 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:

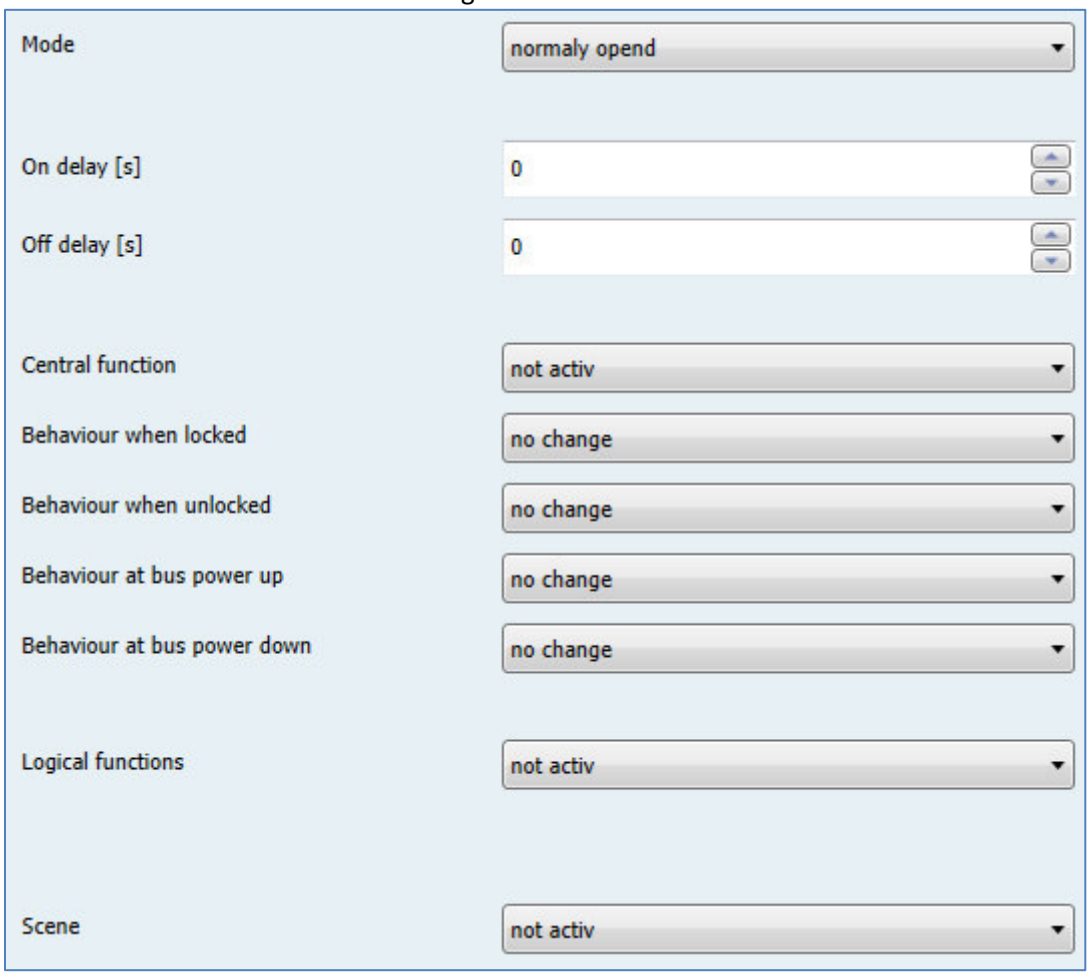

Figure 14: Switching output

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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
Behavior at bus power down	▪ Off ▪ On ▪ **no change**	Action for a bus power breakdown
Behavior at bus power up	▪ Off ▪ On ▪ **no change**	Action for a bus power return
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 12: Switching output

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4.4.2 On/Off delay

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

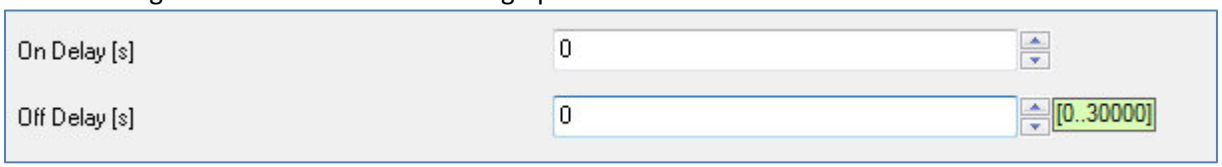
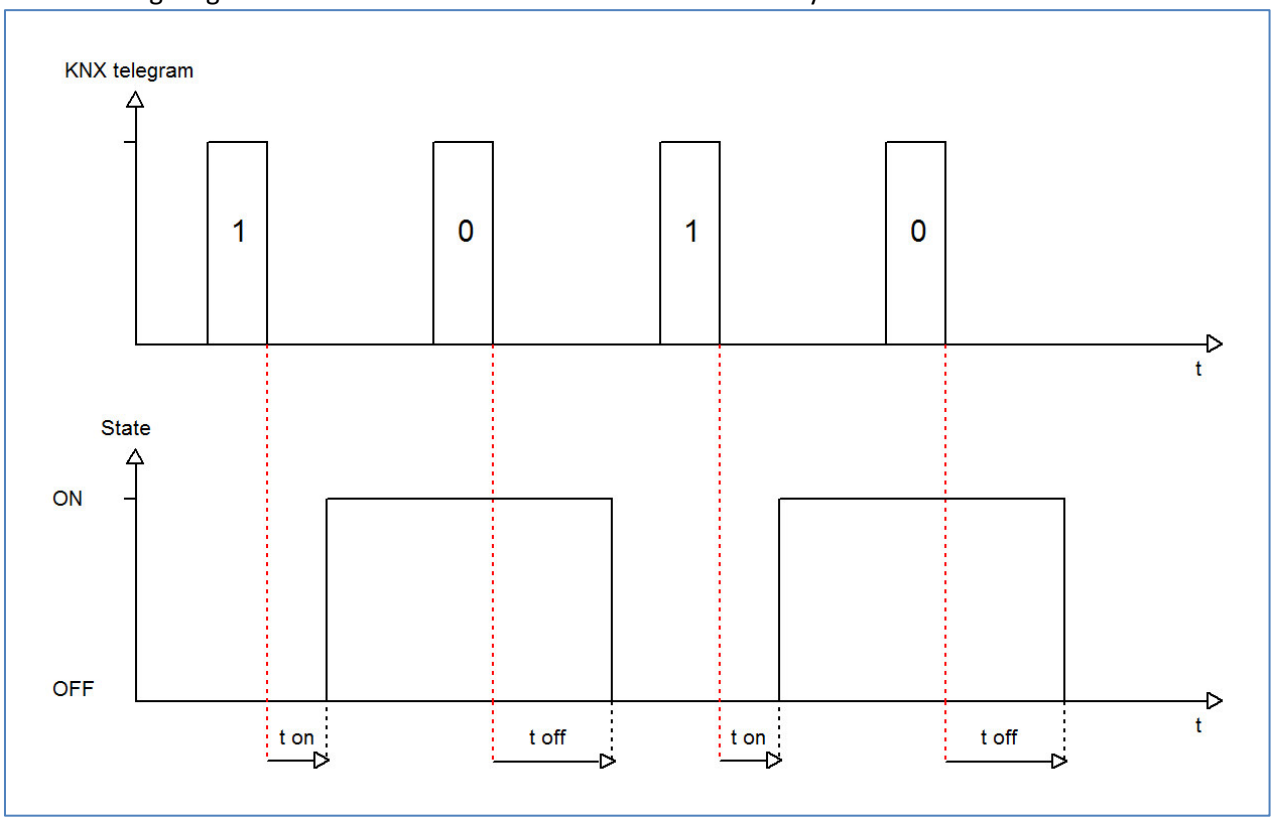


Figure 15: On/Off delay

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:

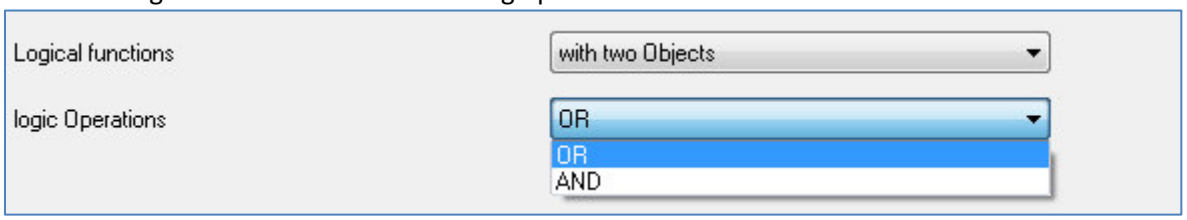

Figure 16: Logical functions

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:

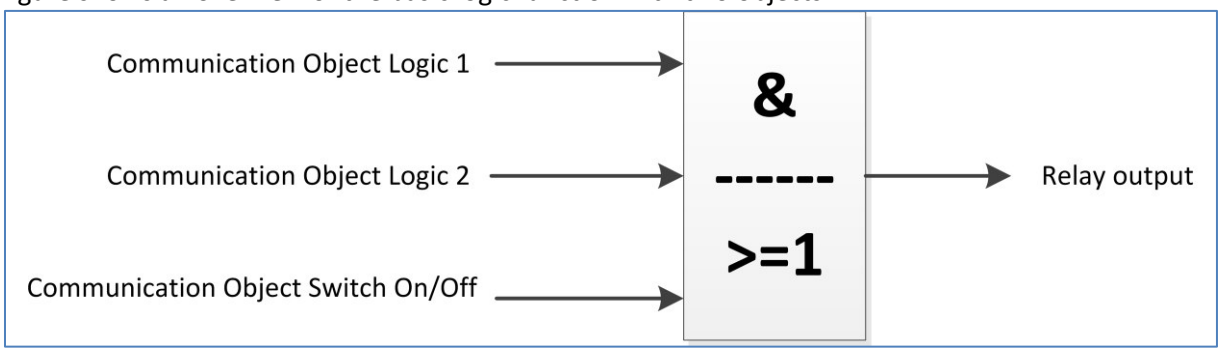

Figure 17: Overview Logic function

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 13: 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 14: 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:

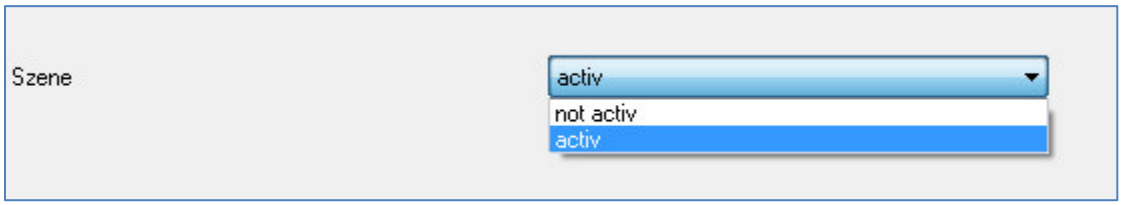

Figure 18: Scene function

The following chart shows the relevant communication object:

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

Table 15: 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.

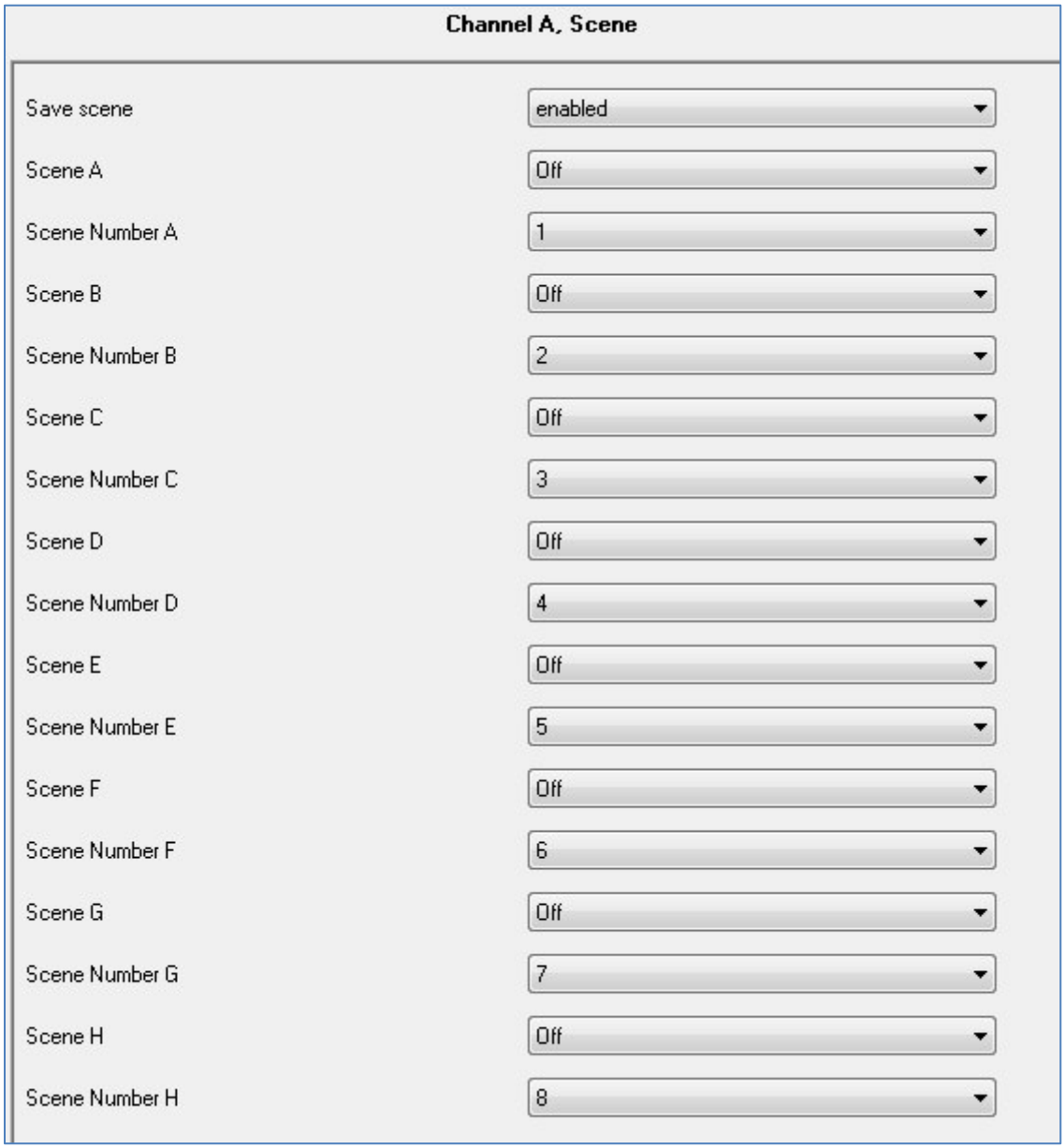

Figure 19: Sub function scene

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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 16: 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 17: 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:

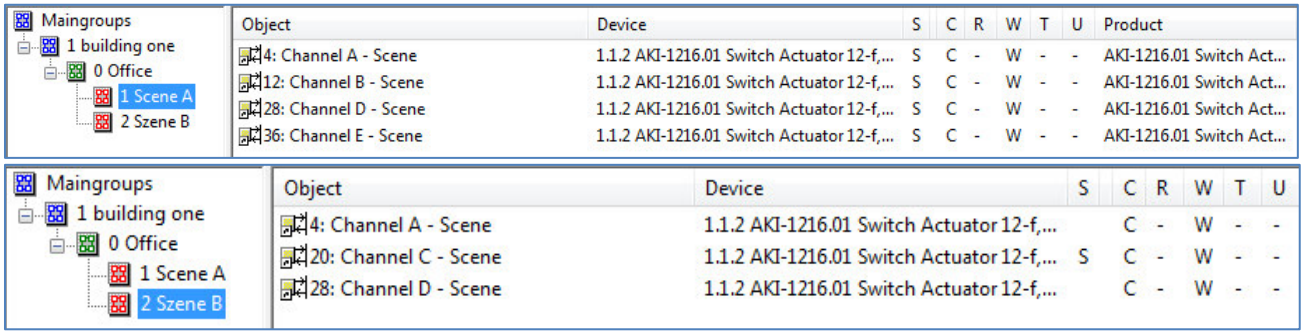

Figure 20: Programming of scenes

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:

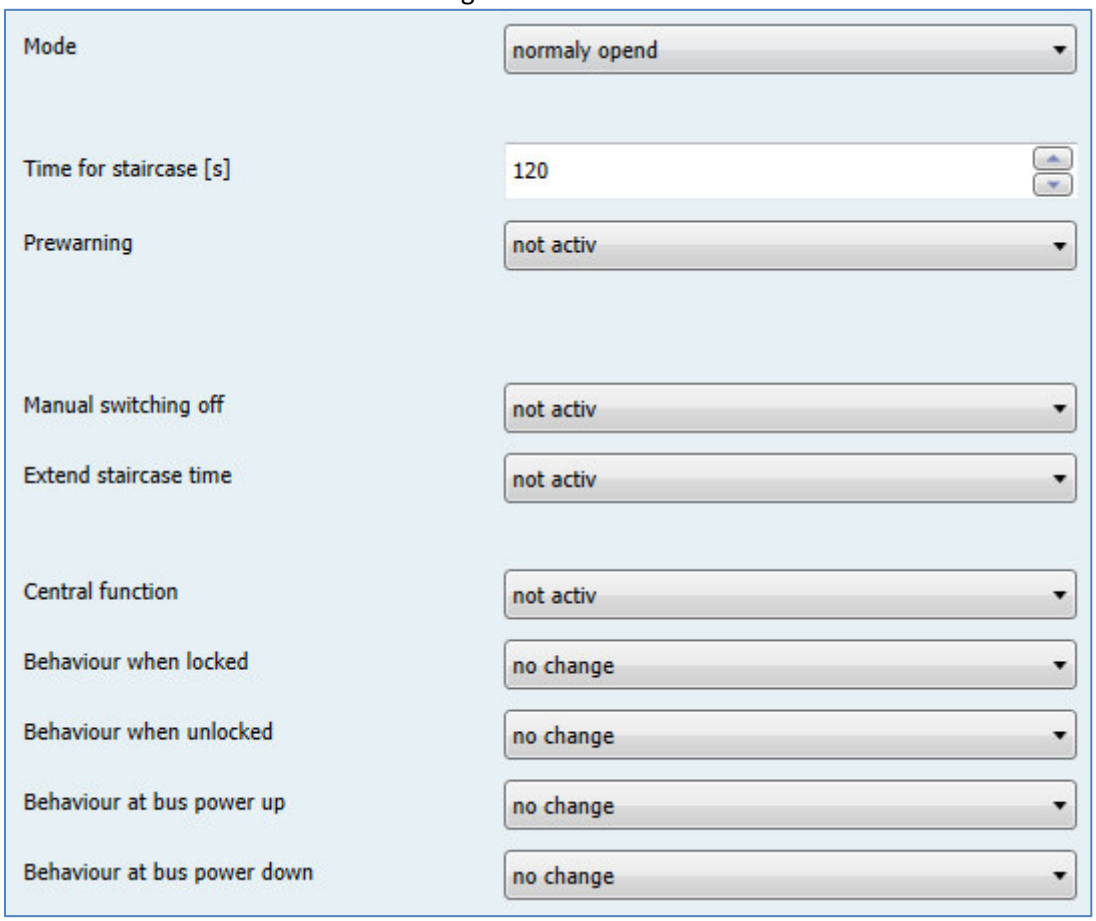

Figure 21: Staircase

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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
Behavior at bus power down	▪ Off ▪ On ▪ **no change**	Action for a bus power breakdown
Behavior at bus power up	▪ Off ▪ On ▪ **no change**	Action for a bus power return

Table 18: Parameter staircase

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4.5.2 Staircase time

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

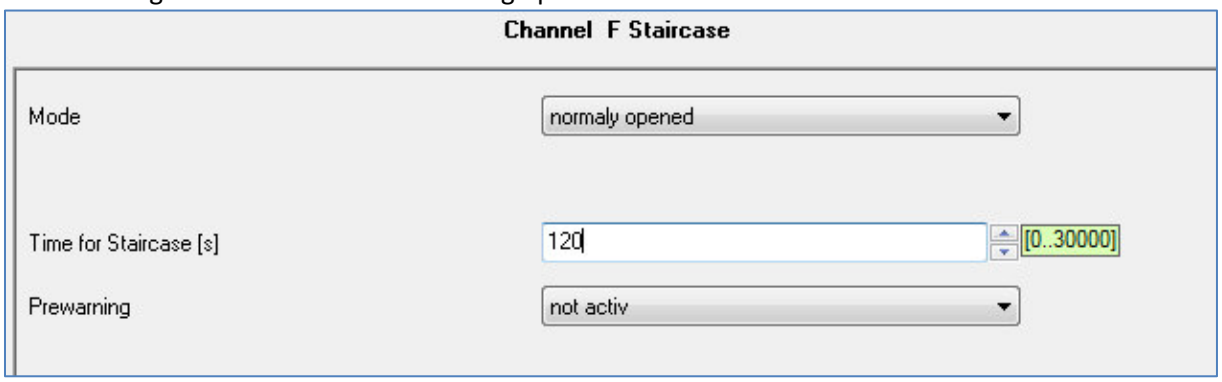

Figure 22: Staircase time

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 19: Communication object staircase

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4.5.3 Prewarning und Warning

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

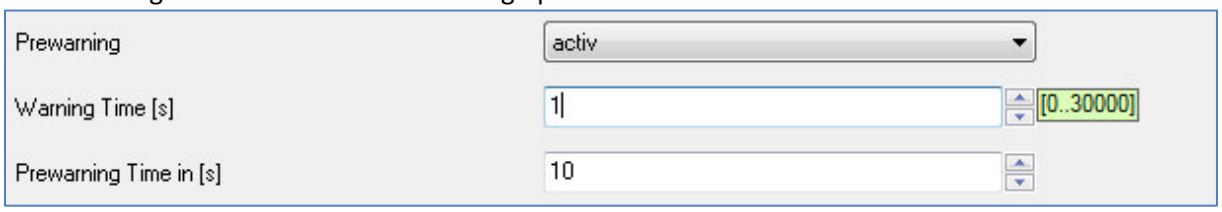
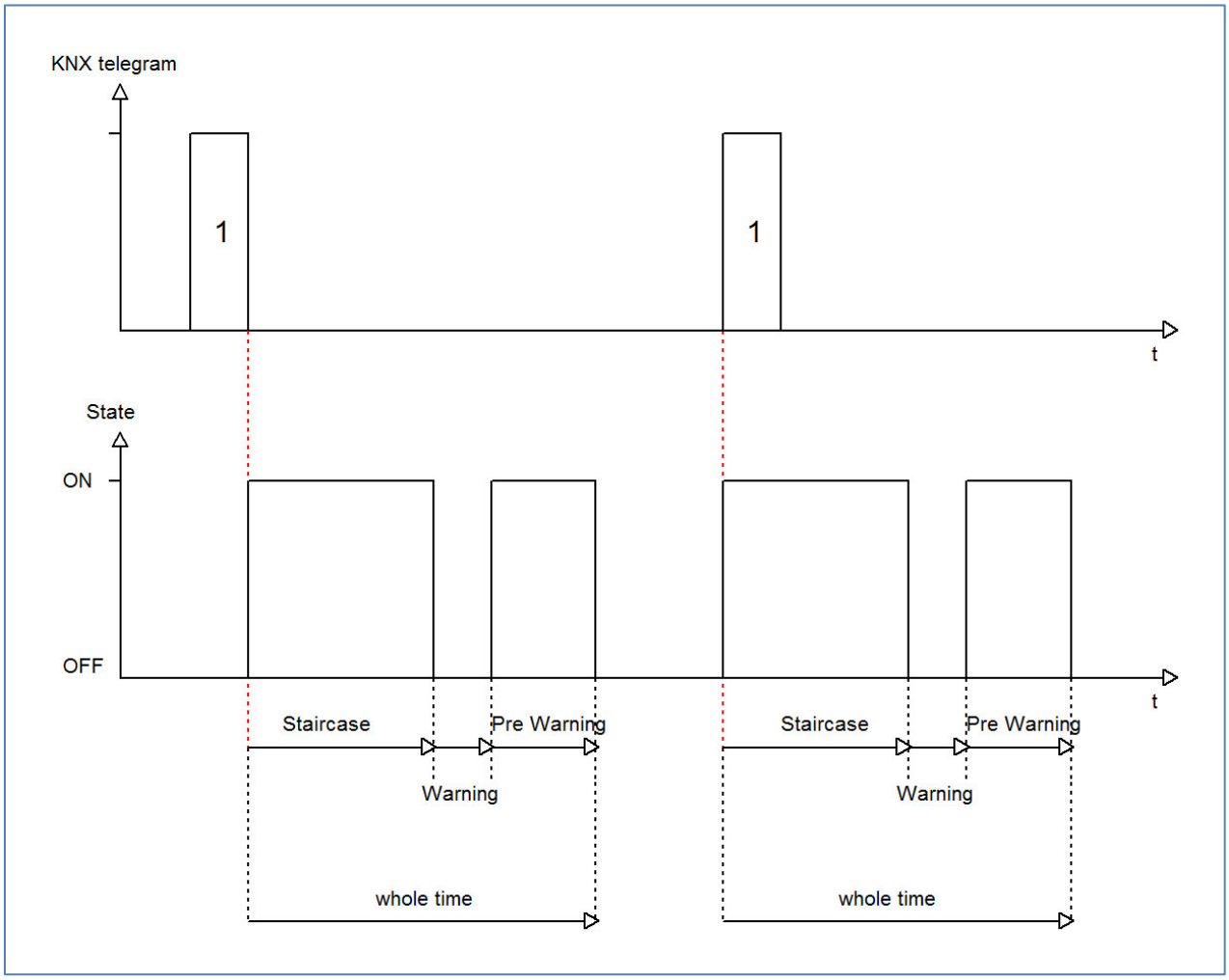


Figure 23: Warning timer & prewarning time

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:

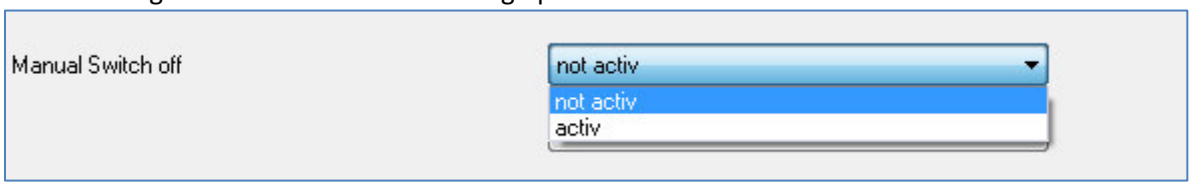


Figure 24: Manual switch off

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:

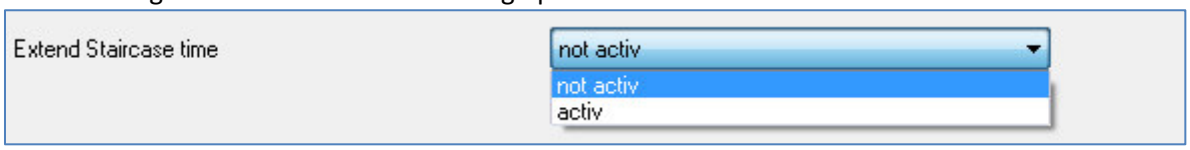
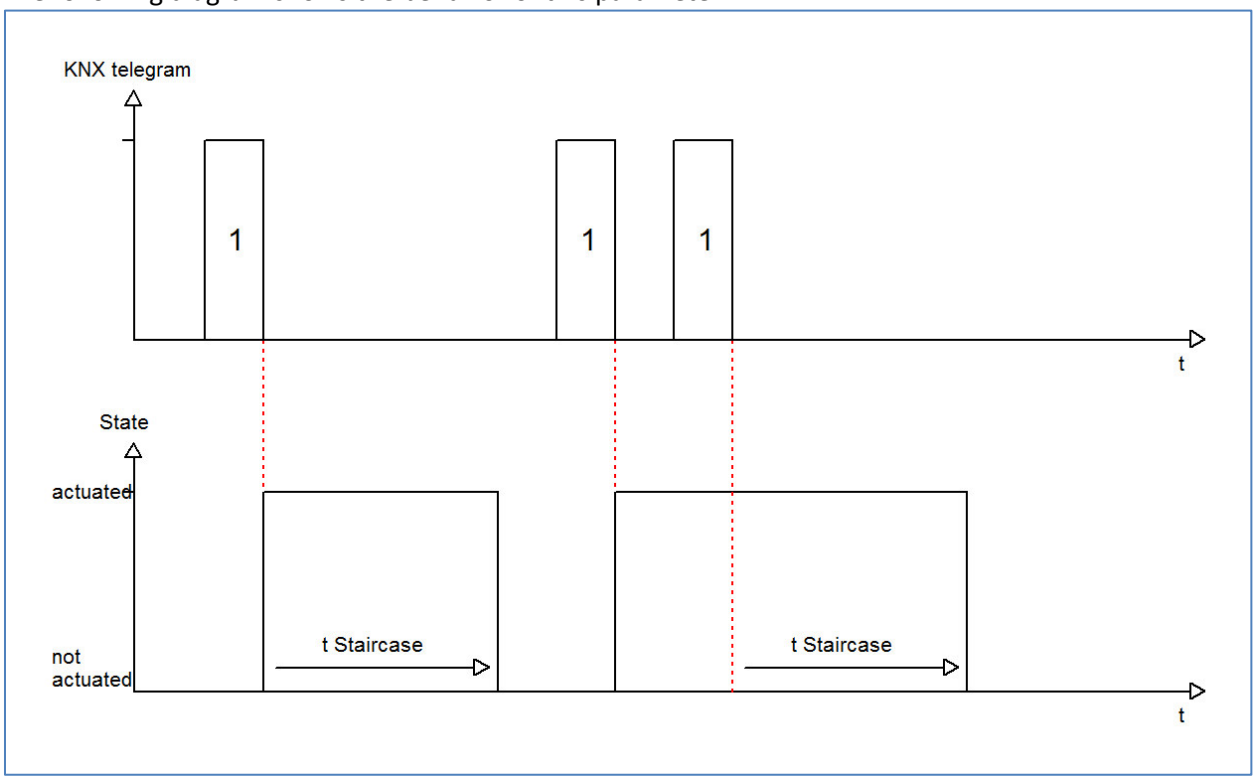


Figure 25: Extend staircase time

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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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 Datasheet

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MDT Switch Actuator AKI

MDT Switch Actuator 4/8/12-fold, MDRC

Version		
AKI-0416.01	Switch Actuator 4-fold	4SU MDRC, 230VAC, 16/20A, C-Load 200uF
AKI-0816.01	Switch Actuator 8-fold	8SU MDRC, 230VAC, 16/20A, C-Load 200uF
AKI-1216.01	Switch Actuator 12-fold	12SU MDRC, 230VAC, 16/20A, C-Load 200uF

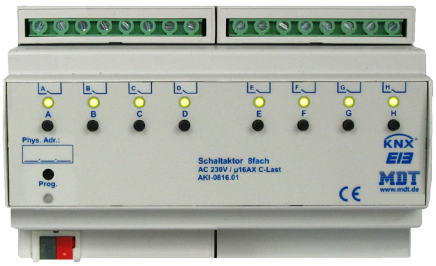
The MDT Switch Actuator receives KNX/EIB telegrams and switches up to 12 independent electrical loads . Each output uses a bistable relay and can be operated manually via a push button. A green LED indicates the switching status of each channel. The MDT Switch Actuator is suitable for extreme high inrush currents and used for heavy loads (C-Load).

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. 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.

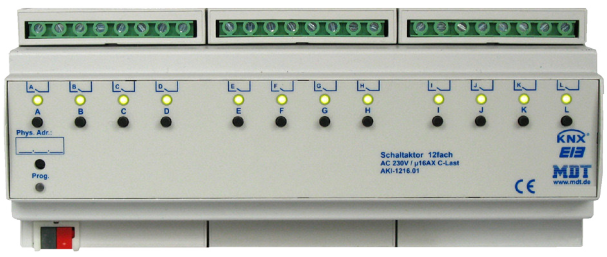
The MDT Switch Actuator has separate power supply terminals for each channel. It is a modular installation device for fixed installation in dry rooms. It fits on DIN 35mm rails in power distribution boards or closed compact boxes.

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

AKI-0816.01



AKI-1216.01



- Production in Germany, certified according to ISO 9001
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Status response after manually operation
- Time functions (swich-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data, 8 scenes per channel
- Central switching functions and block functions
- Programmable behavior in case of bus voltage failure or return
- **Separate power supply terminals for each channel**
- AKI 04/08: Power supply via KNX bus
- AKI 12: Power supply 230VAC, from Q4 2012 via KNX bus
- Modular installation device for DIN 35mm rails
- Integrated bus coupling unit
- 3 years warranty

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Tel.: +49-2263-880 • Fax: +49-2263-4588 • knx@mdt.de • www.mdt.de

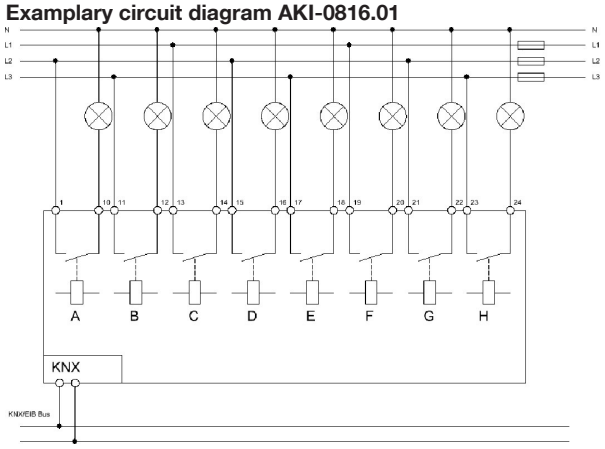
Stand: 1012

MDT Switch Actuator AKI

Technical Data	AKI-0416.01	AKI-0816.01	AKI-1216.01
Number of outputs	4	8	12
Output switching ratings			
Ohmic load	16A/20A*	16A/20A*	16A/20A*
Capacitive load	max. 200uF at 16A	max. 200uF at 16A	max. 200uF at 16A
Voltage	230VAC	230VAC	230VAC
Maximum inrush current	600A/150µs 300A/600µs	600A/150µs 300A/600µs	600A/150µs 300A/600µs
Maximum load			
Incandescent lamps	3680W	3680W	3680W
Halogen lamps 230V	3680W	3680W	3680W
Halogen lamps, electronic transformer**	2500W	2500W	2500W
Fluorescent lamps, not compensated	3680W	3680W	3680W
Fluorescent lamps, parallel comp.	2500W	2500W	2500W
Max. number of electronic transformers	28	28	28
Output life expectancy (mechanical)	1.000.000	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	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	0,8mm Ø, solid core
Power supply	KNX bus	KNX bus	230VAC/50Hz
Power consumption KNX bus typ.	< 0,25W	< 0,25W	< 0,15W***
Power consumption mains 230VAC typ.	--	--	< 0,3W***
Operation temperature range	0 to + 45°C	0 to + 45°C	0 to + 45°C
Enclosure	IP 20	IP 20	IP 20
Dimensions MDRC (Space Units)	4SU	8SU	12SU

* total current carrying capacity neighbouring outputs max. 32 A
** low voltage halogen lamps with electronic transformer
*** from Q4 2012 Power consumption KNX bus < 0,3W, Power supply mains 230VAC not longer required

Examplary circuit diagram AKI-0816.01



Note: AKI/AKS 08/12: Power supply 230VAC, from Q3 2012 via KNX Bus.

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Stand: 1012

MDT Switch Actuator AKS

MDT Switch Actuator 4/8/12/20-fold, MDRC

Version		
AKS-0416.02	Switch Actuator 4-fold	4SU MDRC, 230VAC, 16A, C-Load 140uF
AKS-0816.02	Switch Actuator 8-fold	6SU MDRC, 230VAC, 16A, C-Load 140uF
AKS-1216.02	Switch Actuator 12-fold	8SU MDRC, 230VAC, 16A, C-Load 140uF
AKS-2016.02	Switch Actuator 20-fold	12SU MDRC, 230VAC, 16A, C-Load 140uF

The new AKS series offers more channels at less space, so lower costs per channel.

The MDT Switch Actuator receives KNX/EIB telegrams and switches up to 20 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 MDT Switch Actuator is suitable for high inrush currents and used for heavy loads (C-Load).

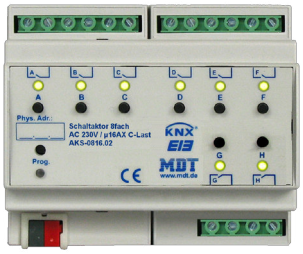
The outputs are parameterized individually via ETS3/4. The device provides extensive functions like logical operation, status response, block functions, central function, delay functions and staircase lighting function. Additionally the device provides several time and scene control. If the mains voltage 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 has separate power supply terminals for each channel and are very space saving by ideal form factor.

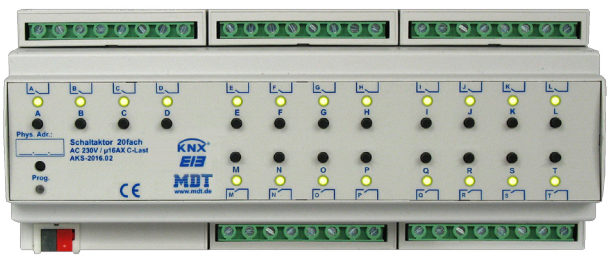
The MDT Switch Actuator is a modular installation device for fixed installation in dry rooms. It fits on DIN 35mm rails in power distribution boards or closed compact boxes.

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

AKS-0816.02



AKS-2016.02



- Production in Germany, certified according to ISO 9001
- Modern design
- Fully compatible to all KNX/EIB devices
- **Space saving by ideal form factor**
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Status response after manually operation
- Time functions (swich-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data
- 8 scenes per channel
- Central switching functions and block functions
- Programmable behavior in case of bus voltage failure or return
- **Each contact has an own supply phase**
- Power supply via KNX bus
- Modular installation device for DIN 35mm rails
- Integrated bus coupling unit
- 3 years warranty

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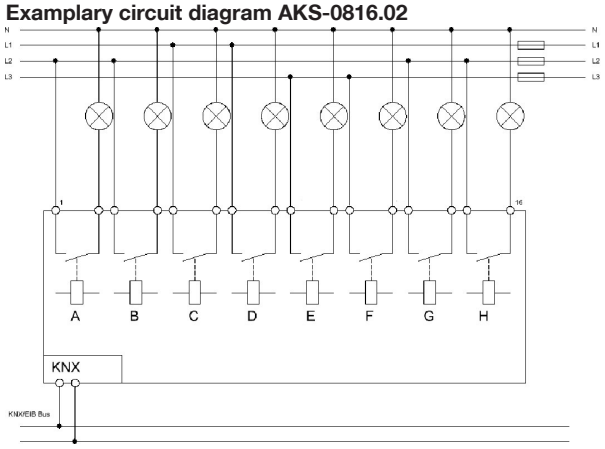
Stand: 1012

MDT Switch Actuator AKS

Technical Data	AKS-0416.02 AKS-0816.02 AKS-1216.02 AKS-2016.02				
Number of outputs	4	8	12	20	
Output switching ratings					
Ohmic load	16A				
Capacitive load	max. 140uF at 16A				
Voltage	230VAC				
Maximum inrush current	600A/150µs 250A/600µs				
Maximum load					
Incandescent lamps	3000W				
Halogen lamps 230V	3000W				
Halogen lamps, electronic transformer*	1500W				
Fluorescent lamps, not compensated	2500W				
Fluorescent lamps, parallel comp.	1800W				
Max. number of electronic transformers	20				
Output life expectancy (mechanical)	1.000.000				
Max. total current of the actuator	64A	96A	128A	192A	
Permitted wire gauge					
Screw terminal	0,5 - 4,0mm² solid core 0,5 - 2,5mm² finely stranded				
KNX busconnection terminal	0,8mm Ø, solid core				
Power supply	KNX bus				
Power consumption KNX bus typ.	< 0,25W	< 0,25W	< 0,3W	< 0,3W	
Operation temperature range	0 to + 45°C				
Enclosure	IP 20				
Dimensions MDRC (Space Units)	4SU	6SU	8SU	12SU	

* low voltage halogen lamps with electronic transformer

Examplary circuit diagram AKS-0816.02



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Stand: 1012

MDT Switch Actuator AKK

MDT Switch Actuator compact 2/4/8/16-fold, MDRC

Version		
AKK-0216.02	Switch Actuator 2-fold	2SU MDRC, 230VAC, 16A
AKK-0416.02	Switch Actuator 4-fold	2SU MDRC, 230VAC, 16A
AKK-0816.02	Switch Actuator 8-fold	4SU MDRC, 230VAC, 16A
AKK-1616.02	Switch Actuator 16-fold	8SU MDRC, 230VAC, 16A

The MDT Switch Actuator AKK receives KNX/EIB telegrams and switches up to 16 independent electrical loads . Each output uses a bistable relay and can be operated manually via a push button. The outputs are parameterized individually via ETS3f/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.

If the mains voltage fails, all outputs were switched off. After mains voltage recovery the relay position will be restored. After bus voltage failure or recovery the relay position is selected in dependence on the parameterization. The MRDC Switch Actuators use a common power supply terminal for four channels. This feature simplifies the wiring and increases clarity of the circuit.

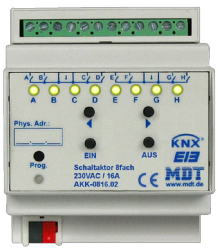
The MDT Switch Actuator AKK is a modular installation device for fixed installations in dry rooms. It fits on DIN 35mm rails in power distribution boards or closed compact boxes.

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

AKK-0216.02

AKK-0416.02

AKK-0816.02



AKK-1616.02

- Production in Germany, certified according to ISO 9001
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Status response after manually operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data
- 8 scenes per channel
- Central switching functions and block functions
- Programmable behavior in case of bus voltage failure or return
- Four contacts share one supply phase
- Integrated bus coupling unit
- 3 years warranty

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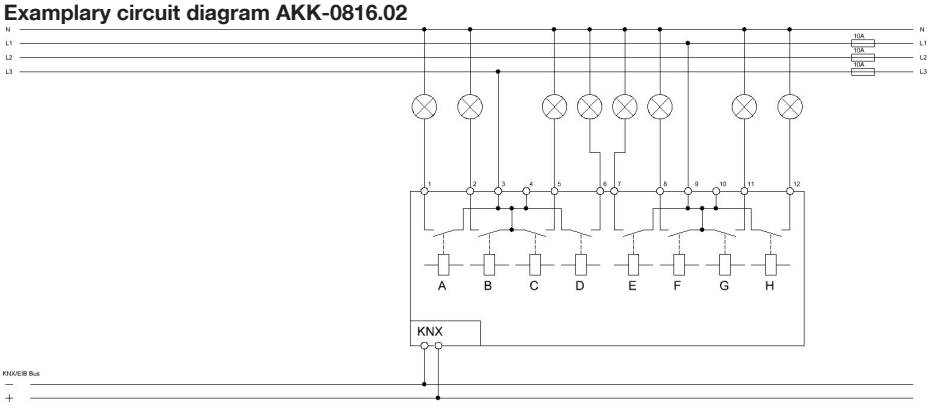
Stand: 0314

MDT Switch Actuator

Technical Data	AKK-0216.02	AKK-0416.02	AKK-0816.02	AKK-1616.02
Number of outputs	2	4	8	16
Output switching ratings*				
Ohmic load	16A	16A	16A	16A
Capacitive load	21uF at 10A	21uF at 10A	21uF at 10A	21uF at 10A
Voltage	230VAC	230VAC	230VAC	230VAC
Maximum inrush current	80A/150µs 40A/600µs	80A/150µs 40A/600µs	80A/150µs 40A/600µs	80A/150µs 40A/600µs
Maximum load				
Incandescent lamps	2300W	2300W	2300W	2300W
Halogen lamps 230V	2000W	2000W	2000W	2000W
Halogen lamps, electronic transformer	800W	800W	800W	800W
Fluorescent lamps, not compensated	800W	800W	800W	800W
Fluorescent lamps, parallel comp.	180W	180W	180W	180W
Max. number of electronic transformers	3	3	3	3
Output life expectancy (mechanical)	1.000.000	1.000.000	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	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	0,8mm Ø, solid core	0,8mm Ø, solid core
Power supply	KNX bus	KNX bus	KNX bus	KNX bus
Power consumption KNX bus	<0,3W	<0,3W	<0,3W	<0,3W
Operation temperature range	0 to +45°C	0 to +45°C	0 to +45°C	0 to +45°C
Enclosure	IP20	IP20	IP20	IP20
Dimensions MDRC (Space Units)	2SU	2SU	4SU	8SU

* the total current of each supply terminal should not exceed maximum output switching current.

Examplary circuit diagram AKK-0816.02



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Stand: 0314