

Manual

MDT Switch Actuators



Standard Switch Actuators Series

AKS-0410.01

AKS-0416.01

AKS-0810.01

AKS-0816.01

AKS-1210.01

AKS-1216.01

Heavy C-loads Switch Actuators Series

AKI-0416-01

AKI-0816-01

AKI-1216-01

Compact Switch Actuators Series

AKK-01UP.01

AKK-02UP.01

AKK-0216.01

AKK-0406.01

AKK-0810.01

AKK-0816.01

AKK-0810A.01

AKK-1610.01

AKK-1616.01

1 Content

1 Content.....	2
2 Overview.....	4
2.1 Overview devices.....	4
2.2 Exemplary circuit diagrams	5
2.3 Structure & Handling.....	6
2.4 Functions	7
2.4.1 Overview functions.....	7
2.5. Settings at the ETS-Software	8
2.6. Starting up	8
3 Communication objects.....	9
3.1 Communication objects per channel.....	9
3.2 Central communication object.....	10
3.3 Default settings of the communication objects	10
4 Reference ETS-Parameter	11
4.1 General Settings	11
4.2 Channel selection	12
4.3 Identical parameter	13
4.3.1 Relay operating mode	13
4.3.2 Central function.....	14
4.3.3 Behavior at block/unblock.....	14
4.3.4 Behavior at bus power up/down.....	16
4.4 Switching output	17
4.4.1 Overview.....	17
4.4.2 On/Off delay.....	19
4.4.3 Logical functions.....	20
4.4.4 Scene function.....	21
4.5 Staircase	26
4.5.1 Overview.....	26
4.5.2 Staircase time	28
4.5.3 Prewarning und Warning	29
4.5.4 Manual switch off.....	30
4.5.5 Extend staircase time	30
5 Index.....	31
5.1 Register of illustrations.....	31
5.2 List of tables.....	32

6 Attachment.....	33
6.1 Statutory requirements	33
6.2 Routine disposal	33
6.3 Assemblage.....	33
6.4 Datasheet	34

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):

- **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
- **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
- **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-0416.01** Switch actuator 4-fold, 4TE, 230V AC, 16 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

2.2 Exemplary circuit diagrams

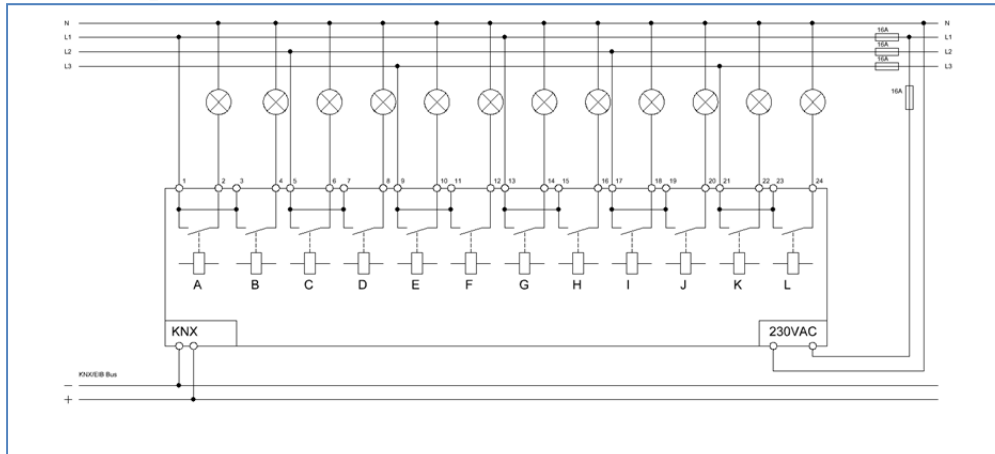


Illustration 1: Exemplary circuit diagram AKS-1216.01

Always 2 channels have common L-connections at the standard design.

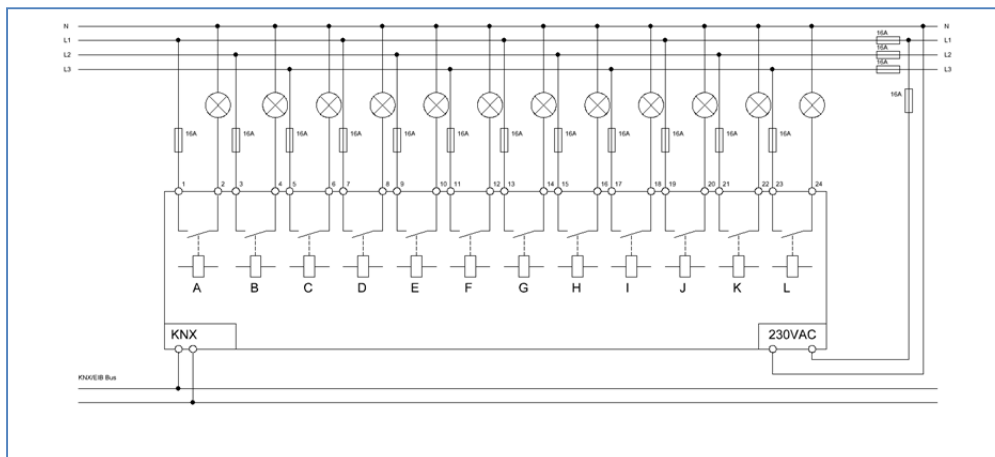


Illustration 2: Exemplary circuit diagram AKI-1216.01

Every L-connection is brought out separately at the industrial design.

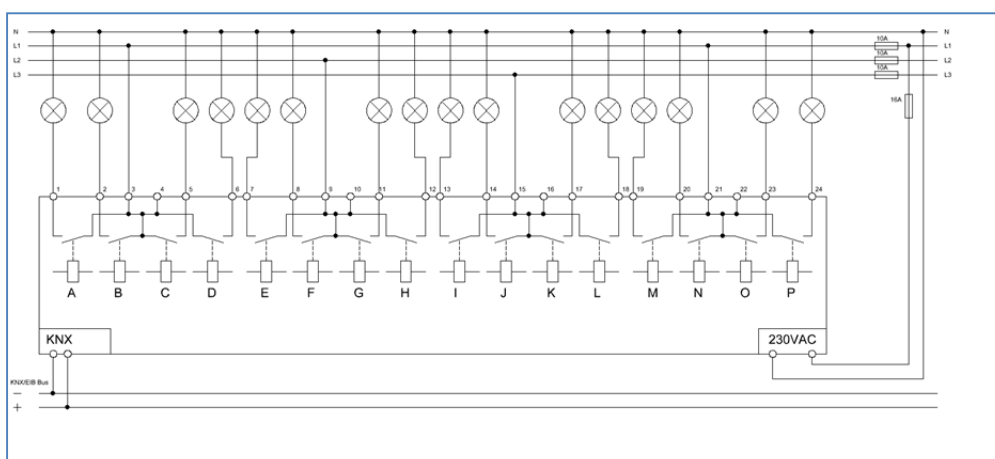


Illustration 3: Exemplary circuit diagram AKK-1610.01

Always four channels have common L-connections at the compact design.

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 programming function is indicated by a lit programming LED.

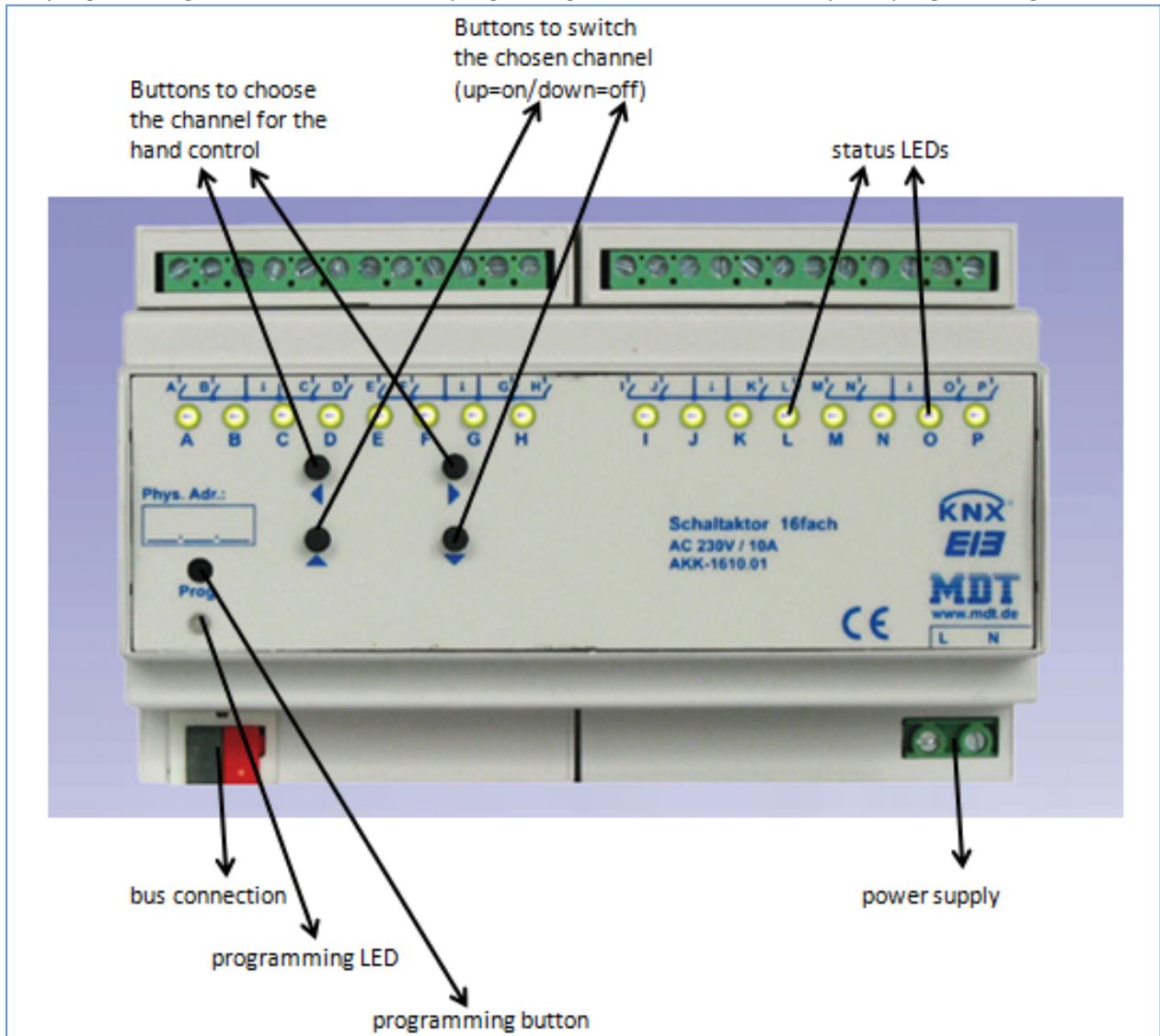


Illustration 4: Overview hardware module switch actuator (e.g. AKK-1610.01)

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.

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

Chart 1: Overview functional possibilities

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) Set bus power up
- (3) Press the programming button at the device (red programming LED lights)
- (4) Loading of the physical address out of the ETS-Software by using the interface (red LED goes out, as well this process was completed successful)
- (5) Loading of the application, with requested parameterization
- (6) Switch the power supply on
- (7) If the device is enabled you can test the requested functions (also possible by using the ETS-Software)

3 Communication objects

3.1 Communication objects per channel

The communication objects per channel are displayed, when they are activated through the parameterization. There are 8 numbers reserved for every channel, even if not all of them are needed. So the first channel has the numbers from 0 to 7, the second from 8 to 15 and so on. The communication objects are needed 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	-	-

Illustration 5: 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
+8	next channel			

Chart 2: Communication objects "switch"

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
+8	next channel			

Chart 3: Communication objects "staircase"

3.2 Central communication object

The central function is always shown also if it is not used in any of the channels. The communication object for the central function is at the bottom of the communication objects. It has always the first number after the communication objects for the channels. So at an 8-fold switch actuator, it has the number 64.

The communication object of the central function calls all channels, which have an activated central function.

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

Nr.	Function	Usage	Data type	
	Central function	number accords to the hardware design	DPT 1.001	In, Write

Chart 4: Central communication object

3.3 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		

Chart 5: 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.

4 Reference ETS-Parameter

4.1 General Settings

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

General	
Startup timeout	1 s

Illustration 6: 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

Chart 6: General settings

4.2 Channel selection

The following illustration shows the menu for selecting the channels:

Channel Preselection

Channel A	Switch
Channel B	Staircase
Channel C	not activ
Channel D	not activ
Channel E	not activ
Channel F	not activ
Channel G	not activ
Channel H	not activ
Channel I	not activ
Channel J	not activ
Channel K	not activ
Channel L	not activ

Illustration 7: 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 chose a channel as “not active”, there will be no further parameterization options available.

The chart shows the setting options for every channel:

ETS-text	Dynamic range [default value]	comment
Channel A-[O]	<ul style="list-style-type: none"> ▪ not active ▪ Switch ▪ Staircase 	Operating mode of the channels

Chart 7: Channel selection

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:

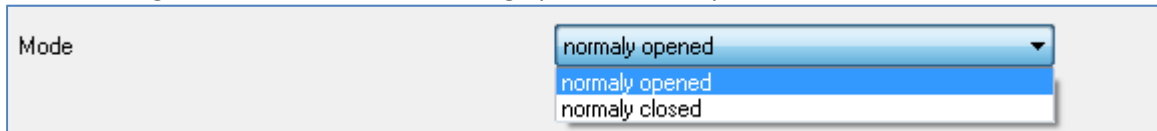


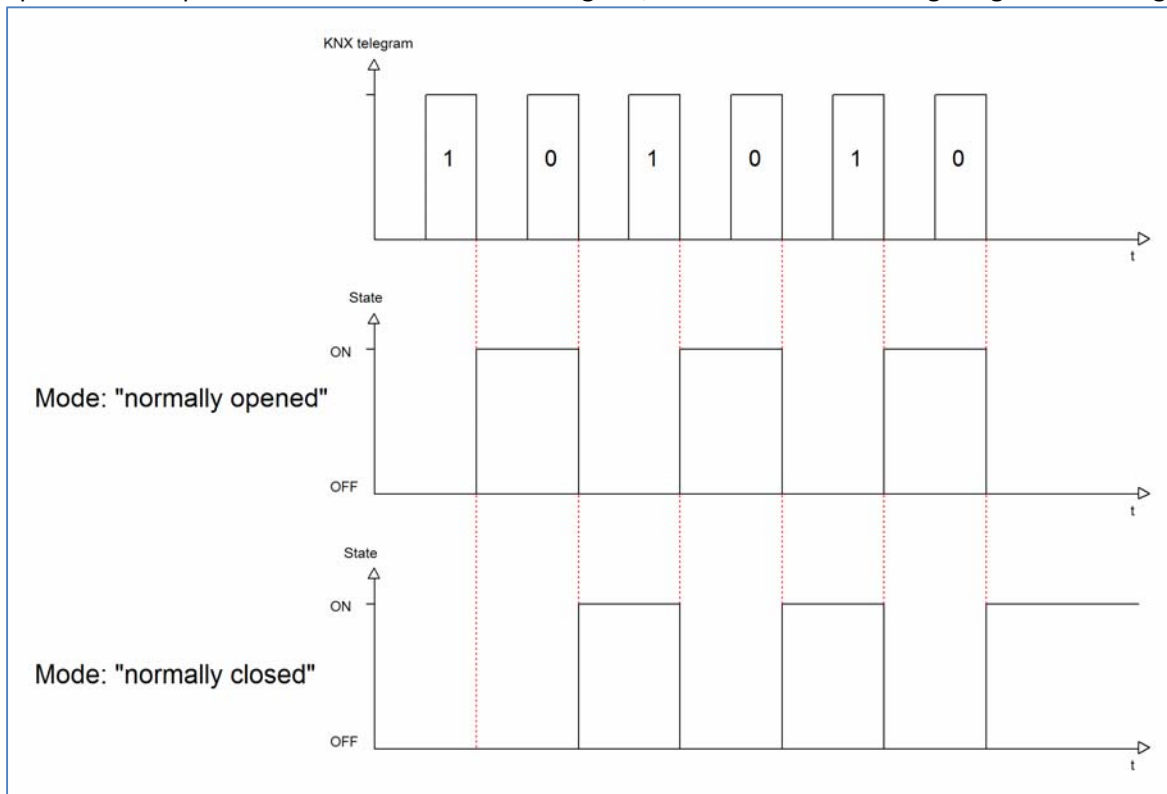
Illustration 8: Operating mode

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range [default value]	comment
Mode	<ul style="list-style-type: none"> ▪ normally opened ▪ normally closed 	Relay operating mode of the channel

Chart 8: 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:



4.3.2 Central function

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

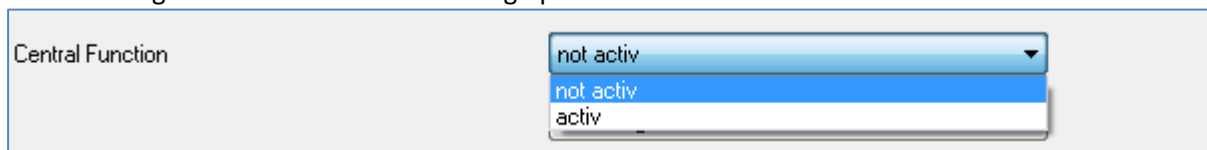


Illustration 9: Central function

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range [default value]	comment
Central function	<ul style="list-style-type: none"> ▪ not active ▪ active 	switches the central function on/off for this channel

Chart 9: 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

Chart 10: Communication object central function

4.3.3 Behavior at block/unblock

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

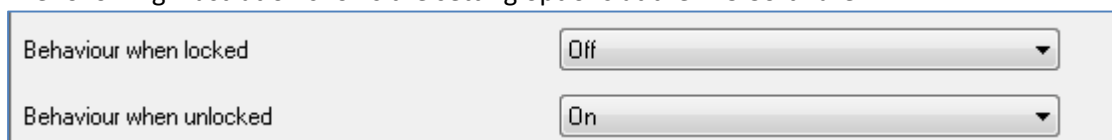


Illustration 10: Blocking function

The following chart shows the dynamic range for this parameter:

ETS-text	Dynamic range [default value]	comment
Behavior when locked Behavior when unlocked	<ul style="list-style-type: none"> ▪ On ▪ Off ▪ no change 	Behavior to a blocking/unblocking process

Chart 11: Behavior at block/unblock

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.

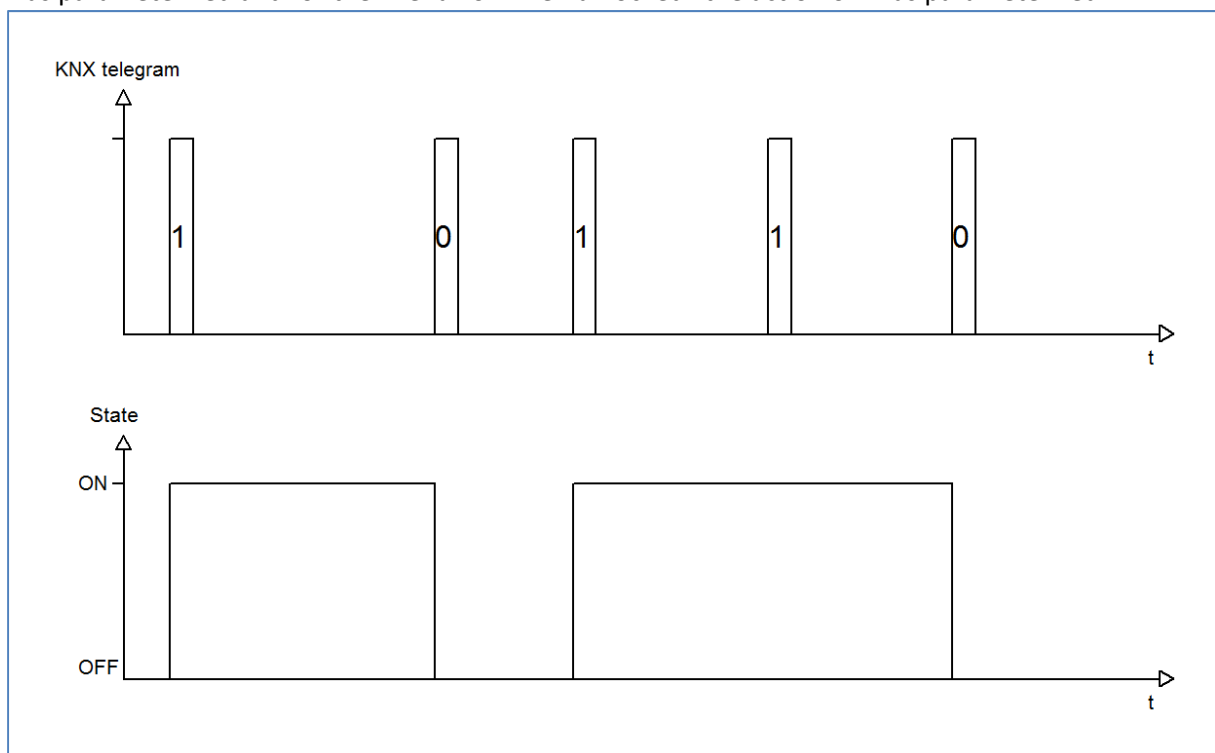
The parameter "Behavior when locked" defines an action for the output at activating the blocking process. There are the setting on, off and no change available. The same settings are also available for the "Behavior when unlocked". This action is called when the blocking function is deactivated again.

The following chart shows the corresponding communication object:

Number	Name	Length	Usage
2	Block	1 Bit	blocks the channel

Chart 12: 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.

4.3.4 Behavior at bus power up/down

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

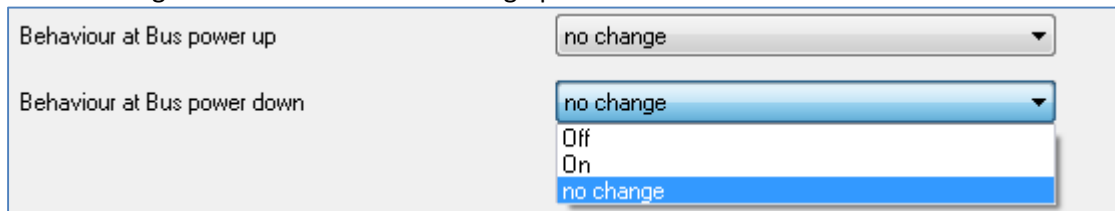


Illustration 11: Behavior at bus power up/down

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	<ul style="list-style-type: none"> ▪ On ▪ Off ▪ no change 	Adjustment, how the channel shall react in case of a bus power breakdown/return

Chart 13: 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.

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:

Channel A Switching	
Mode	normally closed
On Delay [s]	0
Off Delay [s]	0
Central Function	activ
Behaviour when locked	Off
Behaviour when unlocked	On
Behaviour at Bus power up	no change
Behaviour at Bus power down	no change
Logical functions	with two Objects
logic Operations	OR
Szene	activ

Illustration 12: Switching output

The chart shows the possible settings for switching outputs:

ETS-text	Dynamic range [default value]	comment
Mode	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ not active ▪ active 	Activates the central function for this channel
Behavior when locked	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for activating the blocking process
Behavior when unlocked	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for deactivating the blocking process
Behavior at bus power down	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for a bus power breakdown
Behavior at bus power up	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for a bus power return
Logic function	<ul style="list-style-type: none"> ▪ not active ▪ with one object ▪ with two objects 	Activation of the logic function with one or two objects
Logic operation	<ul style="list-style-type: none"> ▪ And ▪ Or 	Selection of the logic function only available, when the logic function was activated
Scene	<ul style="list-style-type: none"> ▪ not active ▪ active 	Activation of the scene function by activation this parameter a new sub menu appears (have a look at 4.4.4)

Chart 14: Switching output

4.4.2 On/Off delay

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

On Delay [s]	<input type="text" value="0"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
Off Delay [s]	<input type="text" value="0"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>

[0..30000]

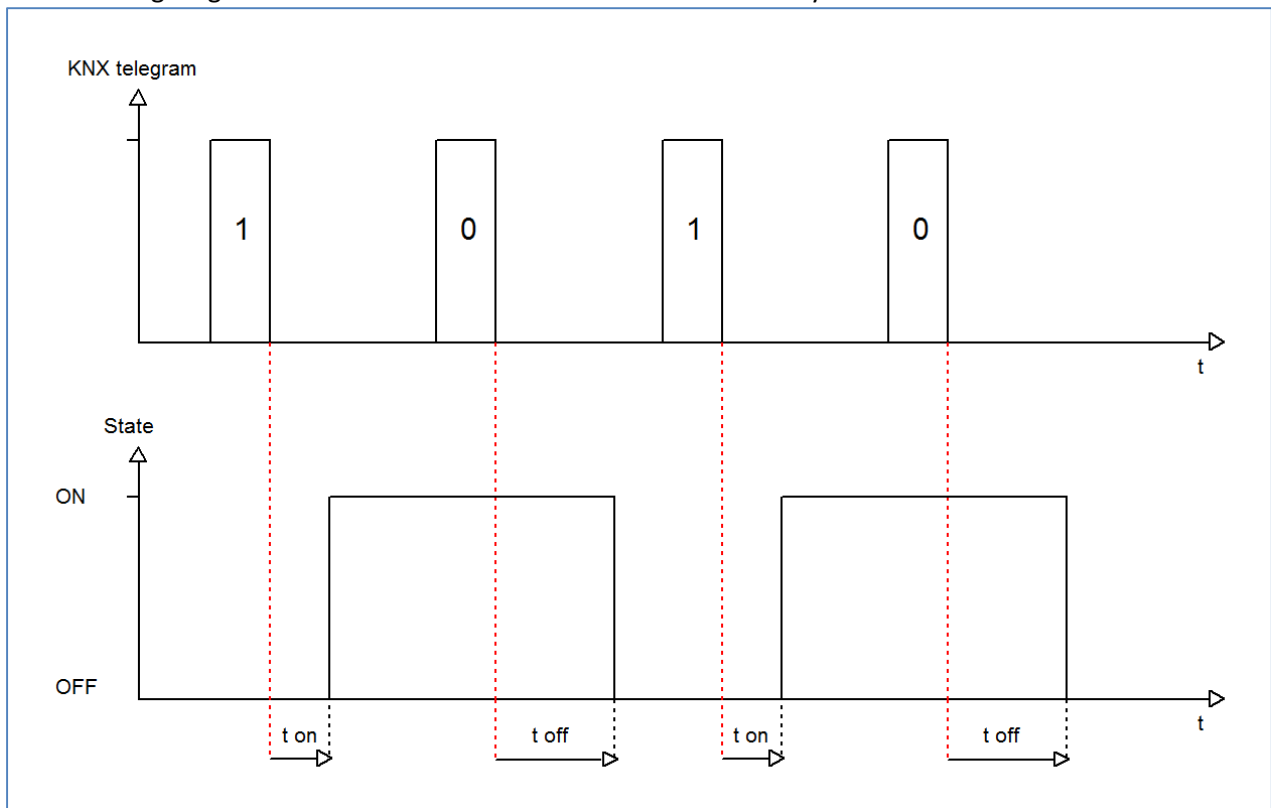
Illustration 13: On/Off delay

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:



4.4.3 Logical functions

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

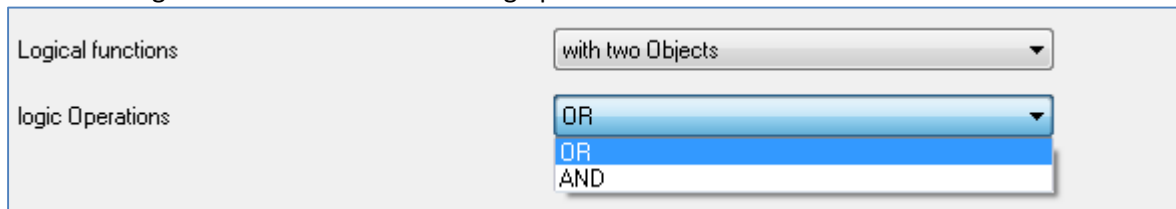


Illustration 14: Logical functions

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.

When you have activated the logic function, the logic block has to be satisfied before switching the channel. As long as the logic function is not satisfied, the channel does not react to any signal.

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

Chart 15: Communication objects logic

According to the chosen logic operation only one or both objects have to become a 1-signal.

The following chart shows the both logic operations with two objects:

AND-Connection			OR-Connection		
Logic 1	Logic 2	Channel switchable?	Logic 1	Logic 2	Channel switchable?
0	0	No	0	0	No
0	1	No	0	1	Yes
1	0	No	1	0	Yes
1	1	Yes	1	1	Yes

Chart 16: Logic operations

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:

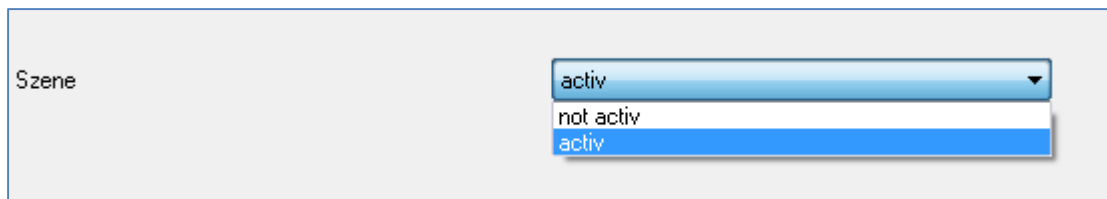


Illustration 15: Scene function

The following chart shows the relevant communication object:

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

Chart 17: 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.

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.

Channel A, Scene	
Save scene	enabled
Scene A	Off
Scene Number A	1
Scene B	Off
Scene Number B	2
Scene C	Off
Scene Number C	3
Scene D	Off
Scene Number D	4
Scene E	Off
Scene Number E	5
Scene F	Off
Scene Number F	6
Scene G	Off
Scene Number G	7
Scene H	Off
Scene Number H	8

Illustration 16: Sub function scene

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	<ul style="list-style-type: none"> ▪ disabled ▪ enabled 	Learning of scenarios; enable/disable memory function
Scene A	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Off ▪ On 	Activation of the scene H
Scene number H	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number

Chart 18: Parameter scene

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

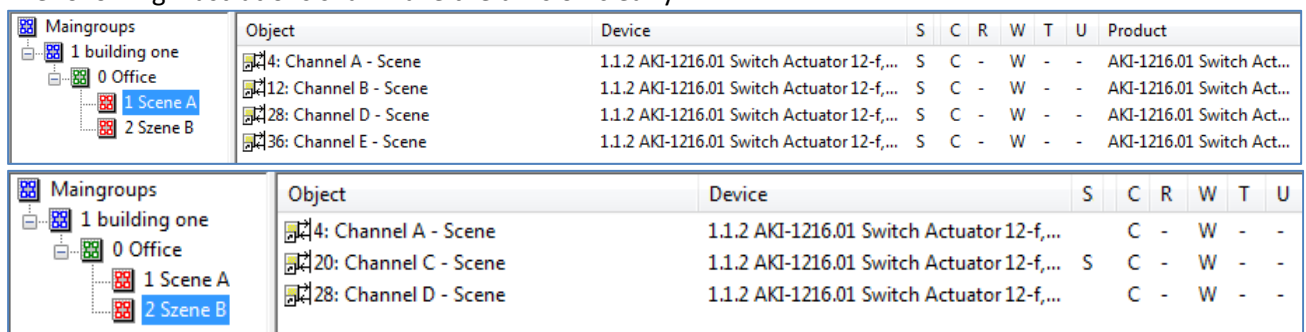
Chart 19: Calling and saving scenes

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:



Object	Device	S	C	R	W	T	U	Product
4: Channel A - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...	S	C	-	W	-	-	AKI-1216.01 Switch Act...
12: Channel B - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...	S	C	-	W	-	-	AKI-1216.01 Switch Act...
28: Channel D - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...	S	C	-	W	-	-	AKI-1216.01 Switch Act...
36: Channel E - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...	S	C	-	W	-	-	AKI-1216.01 Switch Act...

Object	Device	S	C	R	W	T	U
4: Channel A - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...		C	-	W	-	-
20: Channel C - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...	S	C	-	W	-	-
28: Channel D - Scene	1.1.2 AKI-1216.01 Switch Actuator 12-f,...		C	-	W	-	-

Illustration 17: 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.

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:

Channel B Staircase	
Mode	normally closed
Time for Staircase [s]	120
Prewarning	activ
Warning Time [s]	1
Prewarning Time in [s]	10
Manual Switch off	not activ
Extend Staircase time	not activ
Central Function	not activ
Behaviour when locked	no change
Behaviour when unlocked	no change
Behaviour at Bus power up	no change
Behaviour at Bus power down	no change

Illustration 18: Staircase

The chart shows all possible settings for staircase outputs:

ETS-text	Dynamic range [default value]	comment
Mode	<ul style="list-style-type: none"> ▪ normally opened ▪ normally closed 	Operation mode of the channel
Time for staircase [s]	0...65535 sec [120 sec]	Duration of the switching process
Prewarning	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ not active ▪ active 	Activation of the manual turn off of the staircase
Extend staircase time	<ul style="list-style-type: none"> ▪ not active ▪ active 	Activation of the extension of the staircase
Central function	<ul style="list-style-type: none"> ▪ not active ▪ active 	Activates the central function for this channel
Behavior when locked	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for activating the blocking process
Behavior when unlocked	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for deactivating the blocking process
Behavior at bus power down	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for a bus power breakdown
Behavior at bus power up	<ul style="list-style-type: none"> ▪ Off ▪ On ▪ no change 	Action for a bus power return

Chart 20: Parameter staircase

4.5.2 Staircase time

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

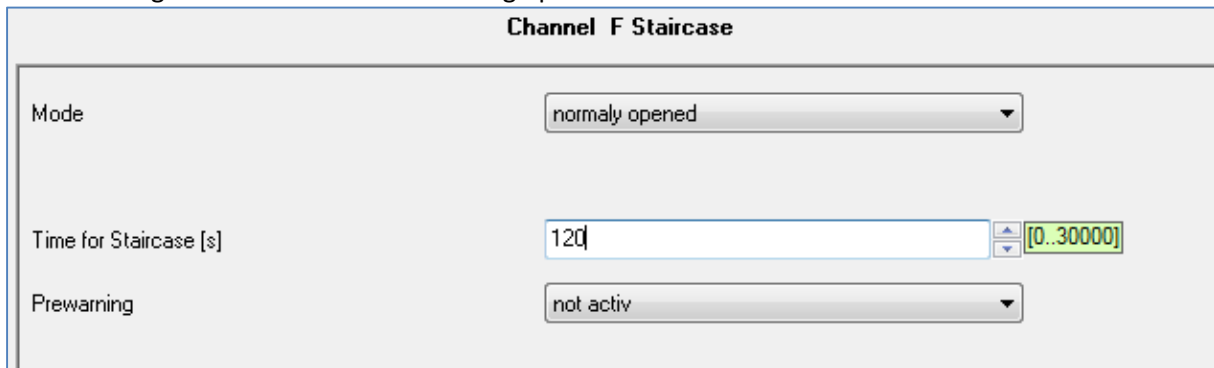


Illustration 19: Staircase time

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

Chart 21: Communication object staircase

4.5.3 Prewarning und Warning

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

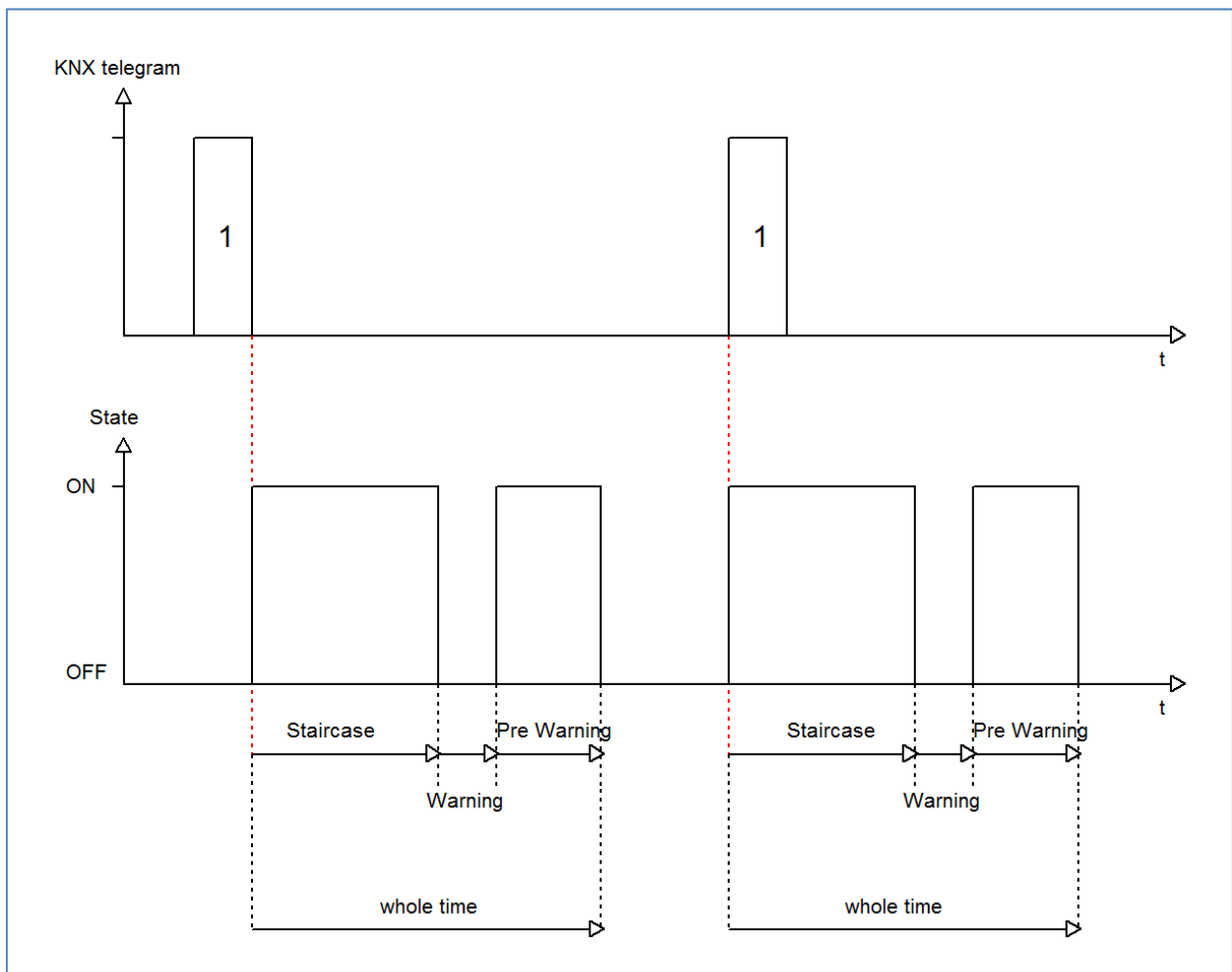
Prewarning	activ
Warning Time [s]	1 [0..30000]
Prewarning Time in [s]	10

Illustration 20: 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 through 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:



4.5.4 Manual switch off

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

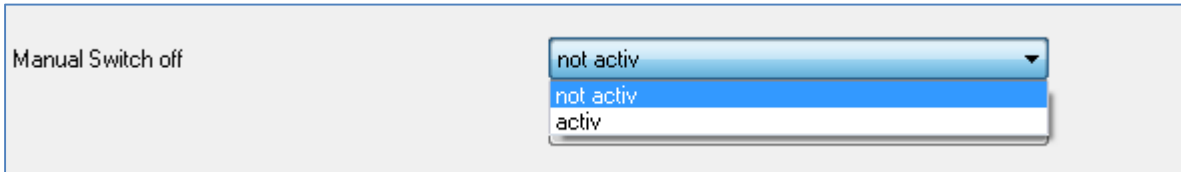


Illustration 21: Manual switch off

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:

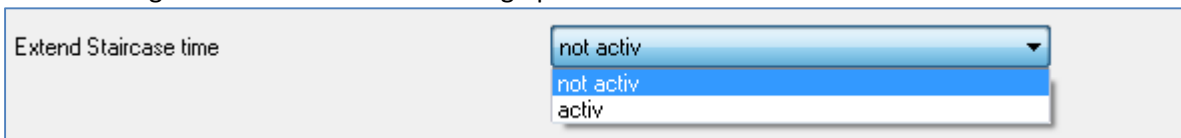
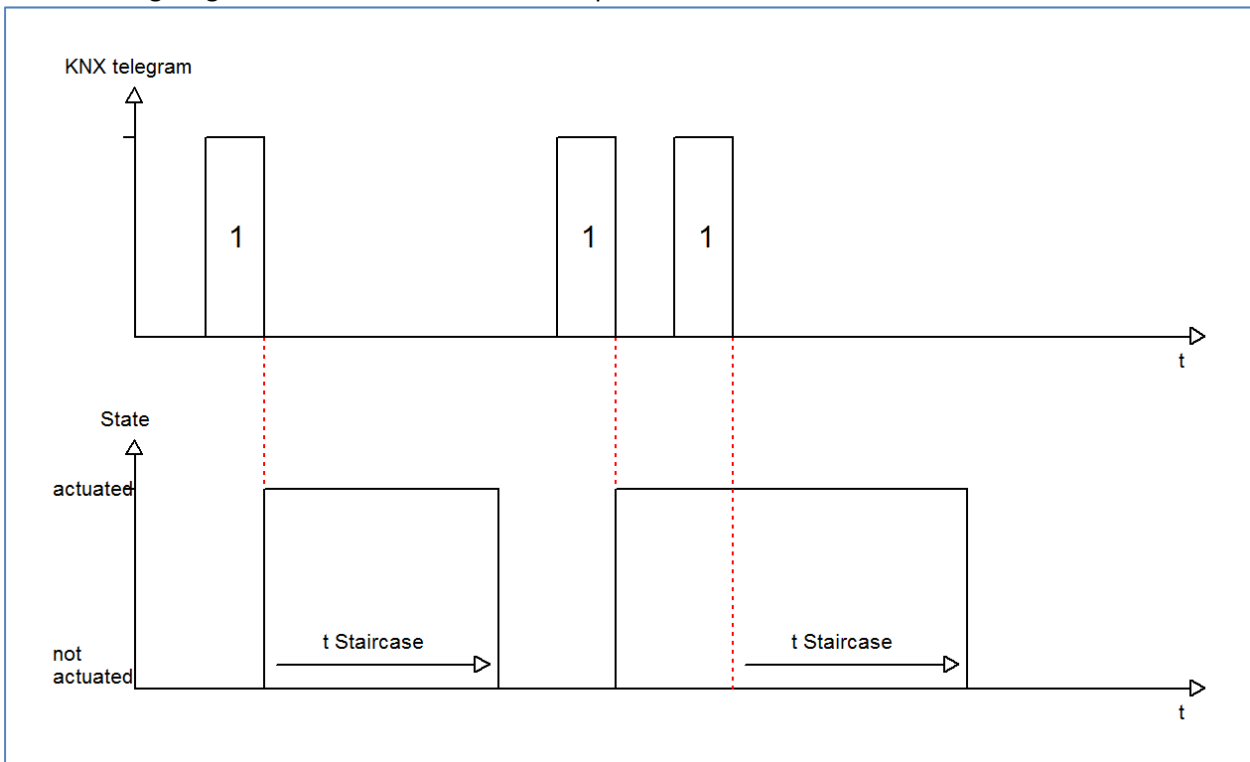


Illustration 22: Extend staircase time

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:



5 Index

5.1 Register of illustrations

Illustration 1: Exemplary circuit diagram AKS-1216.01	Page 5
Illustration 2: Exemplary circuit diagram AKI-1216.01	Page 5
Illustration 3: Exemplary circuit diagram AKK-1610.01	Page 5
Illustration 4: Overview hardware module switch actuator	Page 6
Illustration 5: Communication objects per channel	Page 9
Illustration 6: General settings	Page 11
Illustration 7: Channel selection	Page 12
Illustration 8: Operating mode	Page 13
Illustration 9: Central function	Page 14
Illustration 10: Blocking function	Page 14
Illustration 11: Behavior at bus power up/down	Page 16
Illustration 12: Switching output	Page 17
Illustration 13: On/Off delay	Page 19
Illustration 14: Logical functions	Page 20
Illustration 15: Scene function	Page 21
Illustration 16: Sub function scene	Page 22
Illustration 17: Programming of scenes	Page 26
Illustration 18: Staircase	Page 27
Illustration 19: Staircase time	Page 29
Illustration 20: Warning timer & prewarning time	Page 30
Illustration 21: Manual switch off	Page 31
Illustration 22: Extend staircase time	Page 31

5.2 List of tables

Chart 1: Overview functional possibilities	Page 7
Chart 2: Communication objects “switch”	Page 9
Chart 3: Communication objects “staircase”	Page 10
Chart 4: Central communication object	Page 10
Chart 5: Communication objects – default settings	Page 10
Chart 6: General settings	Page 11
Chart 7: Channel selection	Page 12
Chart 8: Operating mode	Page 13
Chart 9: Central function	Page 14
Chart 10: Communication object central function	Page 14
Chart 11: Behavior at block/unblock	Page 14
Chart 12: Communication object blocking function	Page 15
Chart 13: Behavior at bus power up/down	Page 16
Chart 14: Switching output	Page 18
Chart 15: Communication objects logic	Page 20
Chart 16: Logic operations	Page 20
Chart 17: Communication object scene	Page 21
Chart 18: Parameter scene	Page 23
Chart 19: Calling and saving scenes	Page 24
Chart 20: Parameter staircase	Page 26
Chart 21: Communication object staircase	Page 27

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.

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

Version		
AKS-0416.01	Switch Actuator 4-fold	4TE MDRC, 230VAC, 16A, C-Load 100uF
AKS-0410.01	Switch Actuator 4-fold	4TE MDRC, 230VAC, 10A, C-Load 100uF
AKI-0416.01	Switch Actuator 4-fold	4TE MDRC, 230VAC, 16A, C-Load 200uF
AKS-0816.01	Switch Actuator 8-fold	8TE MDRC, 230VAC, 16A, C-Load 100uF
AKS-0810.01	Switch Actuator 8-fold	8TE MDRC, 230VAC, 10A, C-Load 100uF
AKI-0816.01	Switch Actuator 8-fold	8TE MDRC, 230VAC, 16A, C-Load 200uF
AKS-1216.01	Switch Actuator 12-fold	12TE MDRC, 230VAC, 16A, C-Load 100uF
AKS-1210.01	Switch Actuator 12-fold	12TE MDRC, 230VAC, 10A, C-Load 100uF
AKI-1216.01	Switch Actuator 12-fold	12TE MDRC, 230VAC, 16A, C-Load 200uF

The MDT Switch Actuators receive KNX/EIB telegrams and switch 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.

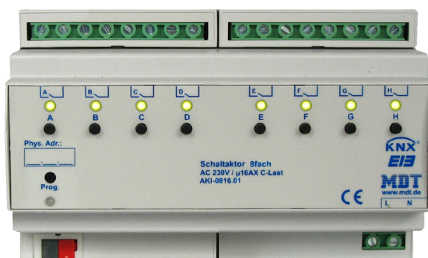
The outputs are parameterized individually via ETS3/4. The device provides extensive functions like logical operation, status response, block functions, central function, delay functions and staircase lighting function. Additionally the device provides several time and scene control.

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 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.

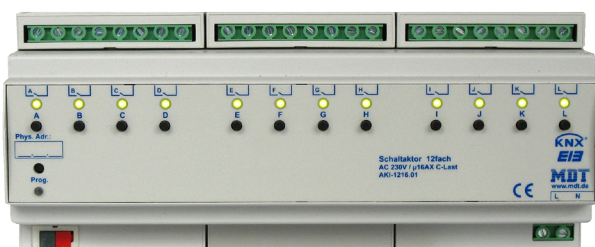
The AKS 08/12 Switch Actuator uses a common power supply terminal for two channels. This feature simplifies the wiring and increases clarity of the circuit. All other Switch Actuators have separate power supply terminals for each channel.

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

AKI/AKS-08xx.01



AKI/AKS-12xx.01



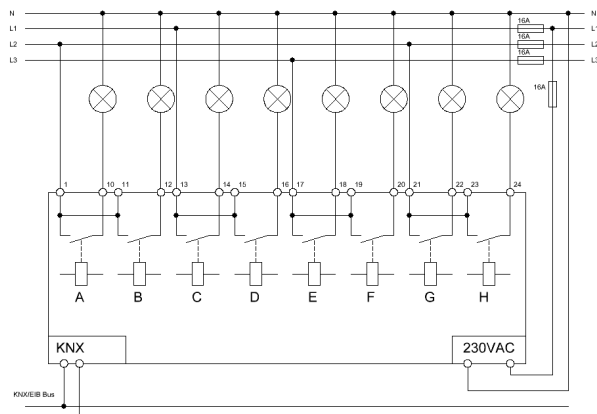
- production in Germany, certified according to ISO 9001
- modern design
- fully compatible to all KNX/EIB devices
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Time functions (switch-on/switch-off delay, staircase light function)
- Status response (active/passive) 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
- Two contacts share one supply phase
- Modular installation device for DIN 35mm rails
- Integrated bus coupling unit
- 3 years warranty

	AKS-0416.01 AKS-0816.01 AKS-1216.01	AKS-0410.01 AKS-0810.01 AKS-1210.01	AKI-0416.01 AKI-0816.01 AKI-1216.01
Technical Data			
Configuration			
Version	Standard	Standard	C-Load
Number of outputs	4/8/12	4/8/12	4/8/12
Power supply			
Supply voltage	230VAC / 50Hz	230VAC / 50Hz	230VAC / 50Hz
Output voltage	230VAC	230VAC	230VAC
Power Consumption	<0,3/0,5W *	<0,3/0,5W *	<0,3/0,5W *
Output switching current			
Ohmic load	16A	10A	16A
capacitive load	16A, max. 100uF	10A, max. 100uF	16A, max. 200uF
Maximum inrush current	400A/150µs - 200A/600µs	400A/150µs - 200A/600µs	600A/150µs - 300A/600µs
Maximum load			
Incandescent lamps	2700W	2000W	3680W
Halogen lamps 230V	2500W	1500W	3680W
Halogen lamps, electronic transformer**	1000W	700W	2000W
Fluorescent lamps, not compensated	1800W	1600W	3680W
Fluorescent lamps, parallel comp.	1000W	700W	2500W
max. number of electronic transformers	14	14	28
Output life expectancy (mechanical)	1.000.000	1.000.000	1.000.000
max. fuse per channel	16A	10A	16A
permitted wire gauge			
Screw terminal	2,5mm ²	2,5mm ²	2,5mm ²
KNX busconnection terminal	0,8mm ²	0,8mm ²	0,8mm ²
Operation temperature range	0 to + 45°C	0 to + 45°C	0 to + 45°C
Enclosure	IP 20	IP 20	IP 20
Dimensions MDRC	4/8/12 TE	4/8/12TE	4/8/12TE

* 4-fold version <0,3W, 8/12-fold version <0,5W

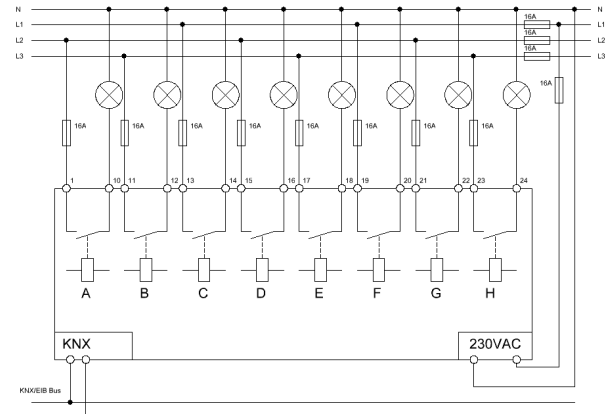
** low voltage halogen lamps with electronic transformer

Exemplary circuit diagram AKS-0816.01



The standard Switch Actuator AKS uses one power supply terminal for two channels.

Exemplary circuit diagram AKI-0816.01



The C-load Switch Actuator has separate power terminals for each channel.

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

MDT Switch Actuator surface mounted 8-fold

MDT Switch Actuator flush mounted 1-fold/ 2-fold

Version		
AKK-0216.01	Switch Actuator 2-fold	2TE REG, 230VAC, 16A
AKK-0406.01	Switch Actuator 4-fold	2TE REG, 230VAC, 6A
AKK-0816.01	Switch Actuator 8-fold	4TE REG, 230VAC, 16A
AKK-0810.01	Switch Actuator 8-fold	4TE REG, 230VAC, 10A
AKK-1616.01	Switch Actuator 16-fold	8TE REG, 230VAC, 16A
AKK-1610.01	Switch Actuator 16-fold	8TE REG, 230VAC, 10A
AKK-0810A.01	Switch Actuator 8-fold	Surface mounted, 230VAC, 10A
AKK-01UP.01	Switch Actuator 1-fold	Flush mounted, 230VAC, 16A
AKK-02UP.01	Switch Actuator 2-fold	Flush mounted, 230VAC, 6A

The MDT Switch Actuators AKK receive KNX/EIB telegrams and switch up to 16 independent electrical loads . Each output uses a monostable relay.

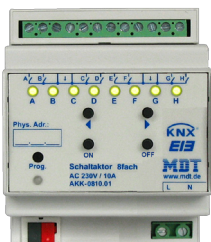
The outputs are parameterized individually via ETS3/4. The device provides extensive functions like logical operation, status response, block functions, central function, delay functions and staircase lighting function. Additionally the device provides several time and scene control.

If the mains voltage fails, all outputs 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 Switch Actuator is available as modular installation device, surface mounted device and flush mounted device for fixed installation in dry rooms.

The MRDC Switch Actuators use a common power supply terminal for four channels. The surface mounted and flush mounted Switch Actuators have a common power supply terminal. This feature simplifies the wiring and increases clarity of the circuit.

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

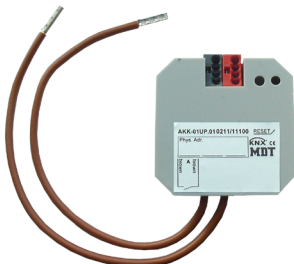
AKK-0810.01



AKK-0810A.01



AKK-01UP.01



AKK-02UP.01



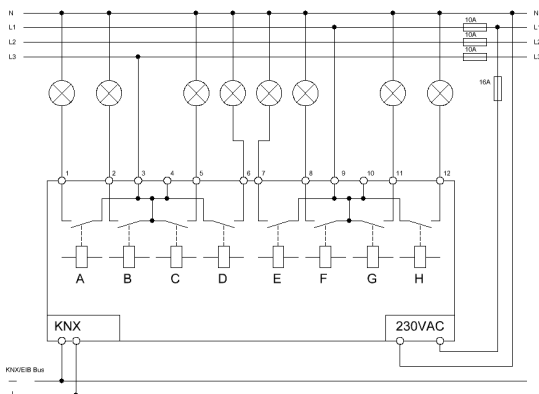
- production in Germany, certified according to ISO 9001
- modern design
- fully compatible to all KNX/EIB devices
- Push Button and LED indicator for each channel
- NO and NC contact operation
- Time functions (switch-on/switch-off delay, staircase light function)
- Status response (active/passive) 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 (MDRC device)
- Common supply phase (UP and AP device)
- Integrated bus coupling unit
- 3 years warranty

Technical Data	AKK-01UP.01 AKK-02/08/1616.01	AKK-08/1610.01 AKK-0810A.01	AKK-02UP.01 AKK-0406.01
Configuration			
Number of outputs	1/2/8/16	8/16	2/4
Power supply			
Supply voltage	230VAC / 50Hz	230VAC / 50Hz	via Bus
Output voltage	230VAC	230VAC	230VAC
Power Consumption	<0,3/0,5W ***	<0,5W	<0,3W
Output switching current			
Ohmic load	16A	10A **	6A **
capacitive load	21uF at 10A	21uF	7uF at 3A
Maximum inrush current	80A/150µs - 40A/600µs	80A/150µs - 40A/600µs	30A/150µs - 15/600µs
Maximum load			
Incandescent lamps	2300W	1900W	1000W
Halogen lamps 230V	2000W	1400W	800W
Halogen lamps, electronic transformer**	800W	500W	300W
Fluorescent lamps, not compensated	800W	500W	300W
Fluorescent lamps, parallel comp.	180W	120W	60W
max. number of electronic transformers	3	3	1
Output life expectancy (mechanical)	1.000.000	1.000.000	1.000.000
max. fuse per channel	16A	10A	6A
permitted wire gauge			
Screw terminal	2,5mm ² ****	2,5mm ² ****	2,5mm ² ****
KNX busconnection terminal	0,8mm ²	0,8mm ²	0,8mm ²
Operation temperature range	0 to + 45°C	0 to + 45°C	0 to + 45°C
Enclosure	IP 20	IP 20	IP 20
Dimensions MDRC	2/4/8 TE	4/8 TE	4 TE
Dimensions UP/AP (W x H x D)	41mm x 41mm x 24mm	100mm x 40mm x 88mm	41mm x 41mm x 24mm

* the total current of each supply terminal should not exceed maximum output switching current.
 ** not suitable to switch AC outlets

*** AKK 01/02 <0,3W, 8/16-fold device <0,5W
 **** UP device with cable connections

Exemplary circuit diagram AKK-0810.01



Exemplary circuit diagram AKK-0810A.01

